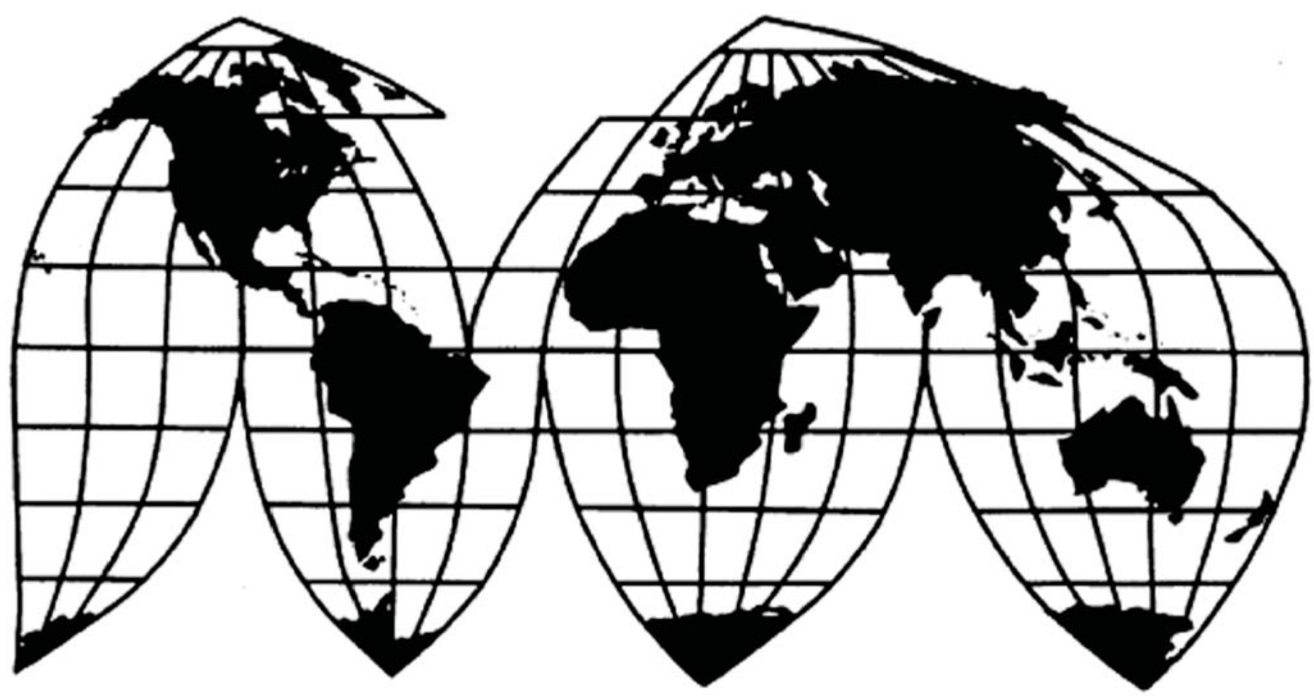
In the Matter of

Certain Liquid Crystal Display Devices, Including Monitors, Televisions, and Modules, and Components Thereof

Investigation Nos. 337-TA-741 and 337-TA-749
Volume 1 of 2

Publication 4383 **March 2013**

U.S. International Trade Commission



Washington, DC 20436

U.S. International Trade Commission

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In the Matter of

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Volume 1 of 2

Publication 4383 **March 2013**

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, MODULES, AND COMPONENTS THEREOF

Investigation Nos. 337-TA-741/749

COMMISSION DETERMINATION NOT TO REVIEW AN INITIAL DETERMINATION TERMINATING THE INVESTIGATION AS TO U.S. PATENT NO. 6,121,941; TERMINATION OF INVESTIGATION

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined not to review initial determinations ("ID") (Order No. 31) granting a joint motion to terminate the above-captioned investigation with respect to U.S. Patent No. 6,121,941. The investigation is terminated in its entirety.

FOR FURTHER INFORMATION CONTACT: Jia Chen, Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-4737. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at http://www.usitc.gov. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at http://edis.usitc.gov. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted Inv. No. 337-TA-741 on October 18, 2010, based on a complaint filed by Thomson Licensing SAS of France and Thomson Licensing LLC of Princeton, New Jersey (collectively "Thomson"). 75 *Fed. Reg.* 63856 (Oct. 18, 2010). The complaint alleged violations of section 337 of the Tariff Act of 1930, as amended 19 U.S.C. § 1337, by reason of infringement of various claims of United States Patent Nos. 6,121,941 ("the '941 patent"); 5,978,063 ("the '063 patent"); 5,648,674 ("the '674 patent"); 5,621,556 ("the '556 patent"); and 5,375,006 ("the '006 patent"). The Commission instituted Inv. No. 337-TA-749 on November 30, 2010, based on a complaint filed by Thomson. 75 *Fed. Reg.* 74080 (Nov. 30, 2010). The complaint alleged violations of section 337 of the Tariff Act of 1930 by reason of infringement of various claims of the '063, '556, and '006 patents. On January 5, 2011, the Commission consolidated the two investigations. The respondents are Chimei InnoLux Corporation of Taiwan and InnoLux Corportation of Austin, Texas (collectively, "CMI"); MStar Semiconductor Inc. of Taiwan ("MStar"); Qisda Corporation of Taiwan and Qisda America Corporation of Irvine, California (collectively, "Qisda"); BenQ Corporation of Taiwan, BenQ America Corporation of Irvine, California, and BenQ Latin America Corporation of Miami, Florida (collectively "BenQ"); Realtek Semicondustor Corp. of Taiwan ("Realtek"); and AU Optronics Corp. of Taiwan and AU Optronics Corp. America of Houston, Texas.

On January 12, 2012, the ALJ issued his final ID finding no violation with respect to the '941, '063, '556, and '006 patents and a violation with respect to the '674 patent. On June 14, 2012, the Commission affirmed the ALJ's finding of no violation with respect to the '063, '556, and '006 patents. 77 *Fed. Reg.* 47067 (June 20, 2012). The Commission reversed the ALJ's finding of violation with respect to the '674 patent and remanded the investigation to the ALJ to determine whether the '941 patent is anticipated. *Id.*

On July 6, 2012, complainant Thomson and respondents Qisda, BenQ, CMI, Realtek, and MStar filed a joint motion under Commission Rule 210.21(a)(1) to terminate the investigation with respect to the '941 patent. The motion stated that there are no other agreements, written or oral, express or implied, between the parties concerning the subject matter of this investigation. On July 9, 2012, the ALJ issued the subject ID granting the joint motion. The ALJ found that no extraordinary circumstances exist that would prevent the requested termination and that the motion fully complies with Commission Rule 210.21(a)(1). No petitions for review were received.

The Commission has determined not to review the subject ID. The investigation is terminated in its entirety.

This action is taken under the authority of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and Part 210 of the Commission's Rules of Practice and Procedure (19 CFR Part 210).

By order of the Commission.

William R. Bishop
Hearings and Meetings Coordinator

Issued: July 26, 2012

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF — **337-TA-749** **337-TA-741**

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **ORDER** has been served by hand upon the following parties as indicated, on **July 26, 2012**

Lisa R. Barton, Acting Secretary
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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF**	**Investigation No. 337-TA-749** **Investigation No. 337-TA-741**

COMMISSION OPINION

On March 26, 2012, the Commission determined to review a portion of the presiding administrative law judge's ("ALJ") final initial determination ("ID") issued on January 12, 2012. The ALJ found a violation of Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337 ("Section 337"), by respondents Chimei InnoLux Corporation of Taiwan, Chi Mei Optoelectronics USA, Inc. of San Jose, California, and InnoLux Corportation of Austin, Texas (collectively, "CMI"); Qisda Corporation of Taoyuan, Taiwan, Qisda (Suzhou) Co. Ltd. of China, and Qisda America Corporation of Irvine, California (collectively, "Qisda"); and BenQ Corporation of Taipei, Taiwan, BenQ America Corporation of Irvine, California, and BenQ Latin America Corporation of Miami, Florida (collectively "BenQ"). The ALJ found that the asserted claims of U.S. Patent No. 5,648,674 ("the '674 patent") are infringed by the CMI accused products including the "Type 2 Array Circuitry" and any Qisda or BenQ accused product incorporating these CMI accused products. The ALJ found that no other accused products infringe the asserted claims of the '674 patent. The ALJ also found that no accused products infringe the asserted claims of United States Patent Nos. 5,978,063 ("the '063 patent"), 5,375,006 ("the '006 patent"), 5,621,556 ("the '556 patent"), and 6,121,941 ("the '941 patent").

The ALJ also found that claims 1, 2, 3, 4, 8, 11, 12, 14, and 18 of the '063 patent and claims 4 and 14 of the '006 patent are invalid. The ALJ concluded that a domestic industry exists in the United States that exploits the asserted patents as required by 19 U.S.C. § 1337(a)(2).

The Commission determined to review the following portions of the ALJ's ID: (1) claim construction of the term "layer" of the asserted claims of the '006 patent; (2) infringement of the asserted claims of the '006 patent; (3) anticipation of claims 4 and 7 of the '006 patent by Scheuble; (4) claim construction of the limitations "mechanically rubbing" / "mechanically rubbed," "a plurality of spacing elements," and "an affixing layer" of the asserted claims of the '063 patent; (5) infringement of the asserted claims of the '063 patent; (6) obviousness of the asserted claims of the '063 patent in view of Sugata and Tsuboyama; (7) whether Lowe and Miyazaki are prior art to the asserted claims of the '063 patent; (8) anticipation of the asserted claims of the '063 patent by Lowe; (9) anticipation of the asserted claims of the '063 patent by Miyazaki; (10) obviousness of the asserted claim of the '556 patent in view of Takizawa and Possin; (11) anticipation and obviousness of the asserted claims of the '674 patent in view of Fujitsu; (12) claim construction of the "second rate" "determined by" limitation of the asserted claims of the '941 patent and the "input video signal" limitation of claim 4 of the '941 patent; (13) infringement of the asserted claims of the '941 patent; (14) anticipation of the asserted claims of the '941 patent by Baba; (15) exclusion of evidence of the ViewFrame II+2 LCD Panel; and (16) the economic prong of the domestic industry requirement. The Commission also determined to review and to take no position on the claim construction of the terms "drain electrodes" and "source electrodes" of the '556 patent. The Commission determined not to review any other issues.

On review, the Commission has determined to reverse the ALJ's finding of a violation of section 337 with respect to the '674 patent. The Commission has determined to affirm, with modifications, the ALJ's finding of no violation of section 337 as to the remaining asserted patents. Specifically, the Commission finds that the asserted claims of the '674 patent are infringed by the accused products of respondents CMI, Qisda, and BenQ, but that claims 1, 7, 8, 14, 16, 17, and 18 of the '674 patent are anticipated by Fujitsu and that claims 9, 11, and 13 are obvious in view of Fujitsu and the knowledge of one of ordinary skill in the art,. The Commission also finds that (a) respondents' accused products do not infringe the asserted claims of the '006 patent; (b) Scheuble does not anticipate claims 4 and 7 of the '006 patent; (c) the accused products of respondents AU Optronics Corp., AU Optronics Corp. America, Qisda, and BenQ infringe claims 11, 12, 14, 17, and 18, but not the remaining asserted claims of the '063 patent; (d) respondent CMI's accused products do not infringe the asserted claims of the '063 patent; (e) the asserted claims of the '063 patent are obvious in view of Sugata and Tsuboyama; (f) Lowe and Miyazaki are prior art to claims 1-4 and 8 of the '063 patent, but not the remaining asserted claims of the '063 patent; (g) respondents' have not shown that Lowe anticipates the asserted claims of the '063 patent; (h) Miyazaki anticipates claims 11, 12, 14, 17, and 18 of the '063 patent, but not any of the remaining asserted claims of the '063 patent; (i) respondents have not shown that claim 3 of the '556 patent is obvious in view of Takizawa and Possin; (j) respondents' accused products do not infringe the asserted claims of the '941 patent; (k) respondents have not shown that the asserted claims of the '941 patent are obvious in view of Baba; and (l) Thomson has established that a domestic industry exists under 19 U.S.C. § 1337(a)(3)(C). The Commission also determined to remand to the ALJ to decide whether respondents have shown that the asserted claims of the '941 patent are anticipated by the ViewFrame II+2 LCD Panel.

I. BACKGROUND

On October 18, 2010, the Commission instituted a first investigation, No. 337-TA-741, based on a complaint filed by Thomson Licensing SAS of France and Thomson Licensing LLC of Princeton, New Jersey (collectively, "Thomson"). 75 *Fed. Reg.* 63856 (Oct. 18, 2010). The complaint alleges violations of Section 337 by reason of infringement of certain claims of the '941, '063, '674, '556, and '006 patents. The named respondents are CMI, MStar Semiconductor Inc. ("MStar") of Taiwan, Qisda, BenQ, and Realtek Semicondustor Corp. ("Realtek") of Taiwan.

On November 23, 2010, the Commission instituted a second investigation, No. 337-TA-749, based on another complaint filed by Thomson. 75 *Fed. Reg.* 74080 (Nov. 23, 2010). The complaint alleges violations of Section 337 by reason of infringement of certain claims of the '556, '063, and '006 patents. The named respondents are Qisda, BenQ, and AU Optronics Corp. of Taiwan and AU Optronics Corp. America of Houston, Texas (collectively "AUO").

On December 16, 2010, the ALJ consolidated Investigation Nos. 337-TA-741 and 337-TA-749. Investigation No. 337-TA-749 was designated as the lead case for the consolidated investigation.

The products accused of infringing the '063, '006, and '556 patents are CMI, Qisda, and BenQ LCD monitors that contain certain AUO and CMI LCD modules. The products accused of infringing the '674 patent are CMI, Qisda, and BenQ monitors that contain certain CMI LCD modules. The products accused of infringing the '941 patent are CMI, Qisda, and BenQ displays that include an MStar or Realtek LCD controller (also referred to as a scaler chip).

The ALJ held an evidentiary hearing from September 13, 2011 through September 19, 2011, and received post-hearing briefs from the parties thereafter. On January 12, 2012, the ALJ issued a final ID finding a violation of Section 337 by CMI, Qisda, and BenQ. The ALJ found that the CMI accused products that include the Type 2 Array Circuitry and any Qisda or BenQ accused products incorporating these CMI accused products infringe the asserted claims of the '674 patent. The ALJ found that no other accused products infringe the '674 patent. The ALJ also found that no accused products infringe the asserted claims of the '063, '006, '556 patent, or '941 patents. The ALJ also found that claims 1, 2, 3, 4, 8, 11, 12, 14, and 18 of the '063 patent are invalid for obviousness under 35 U.S.C. § 103, and that claims 4 and 14 of the '006 patent are invalid as being anticipated under 35 U.S.C. § 102. Finally, the ALJ concluded that a domestic industry exists in the United States that exploits the asserted patents as required by 19 U.S.C. § 1337(a)(2).

With respect to remedy, the ALJ recommended that the Commission issue a limited exclusion order directed to products that infringe the asserted claims of the '674 patent and that the order should contain a certification provision. The ALJ recommended that the Commission also issue a cease and desist order against Qisda America only. The ALJ also recommended that the bond during the Presidential review period be set at 0%.

On January 25, 2012, Thomson filed a petition for review challenging the ALJ's finding with respect to claim construction, infringement, and invalidity for the '063 and '006 patents, and challenging the ALJ's finding with respect to claim construction and infringement for the '556 and '941 patents. Complainant Thomson's Petition for Review of Initial Determination (Jan. 25, 2012) ("Thom. Pet."). On the same day, AUO filed a petition for review challenging the ALJ's finding with respect to claim construction, infringement, and invalidity for the '063, '006, and '556 patents. Respondent AUO's Petition for Review of Initial Determination (Jan. 25, 2012) ("AUO Pet."). CMI also filed a petition for review challenging the ALJ's finding with respect to claim construction, infringement, and invalidity for the '063, '006, '556, and '941 patents, and challenging the ALJ's findings with respect to infringement and invalidity for the '674 patent. Respondent CMI's Petition for Review of Initial Determination (Jan. 25, 2012) ("CMI Pet."). Mstar also filed a petition for review challenging the ALJ's finding with respect to claim construction, infringement, and invalidity of the '941 patent. Respondent MStar's Petition for Review of Initial Determination (Jan. 25, 2012) ("MStar Pet."). Realtek also filed a petition for review challenging the ALJ's finding with respect to claim construction, infringement, and invalidity of the '941 patent. Respondent Realtek's Petition for Review of Initial Determination (Jan. 25, 2012) ("Realtek Pet."). Finally, Qisda and BenQ also filed a petition for review incorporating all of the respondents' arguments by reference.

On February 2, 2012, Thomson filed a reply to each of the respondents' petitions for review. Complainant Thomson's Reply to Respondent AUO's Petition for Review of Initial Determination (Feb. 2, 2012); Complainant Thomson's Reply to Respondent CMI's Petition for Review of Initial Determination (Feb. 2, 2012); Complainant Thomson's Reply to Respondent MStar's Petition for Review of Initial Determination (Feb. 2, 2012); Complainant Thomson's Reply to Respondent Realtek's Petition for Review of Initial Determination (Feb. 2, 2012) ("Thom. Rep. Realtek Pet."); Complainant Thomson's Reply to Respondents Qisda and BenQ's Petition for Review of Initial Determination (Feb. 2, 2012); On the same day, each of the respondents filed a reply to Thomson's petition for review. Respondent AUO's Reply to Complainant Thomson's Petition for Review (Feb. 2, 2012); Respondent CMI's Reply to Complainant Thomson's Petition for Review (Feb. 2, 2012);Respondent MStar's Reply to

Complainant Thomson's Petition for Review (Feb. 2, 2012) ("MStar Rep. Thom. Pet."); Respondent Realtek's Reply to Complainant Thomson's Petition for Review (Feb. 2, 2012); Respondents Qisda and BenQ's Reply to Complainant Thomson's Petition for Review (Feb. 2, 2012);

On March 26, 2012, the Commission determined to review the following portions of the ALJ's ID: (1) claim construction of the term "layer" of the asserted claims of the '006 patent; (2) infringement of the asserted claims of the '006 patent; (3) anticipation of claims 4 and 7 of the '006 patent by Scheuble; (4) claim construction of the limitations "mechanically rubbing" / "mechanically rubbed," "a plurality of spacing elements," and "an affixing layer" of the asserted claims of the '063 patent; (5) infringement of the asserted claims of the '063 patent; (6) obviousness of the asserted claims of the '063 patent in view of Sugata and Tsuboyama; (7) whether Lowe and Miyazaki are prior art to the asserted claims of the '063 patent; (8) anticipation of the asserted claims of the '063 patent by Lowe; (9) anticipation of the asserted claims of the '063 patent by Miyazaki; (10) obviousness of the asserted claim of the '556 patent in view of Takizawa and Possin; (11) anticipation and obviousness of the asserted claims of the '674 patent in view of Fujitsu; (12) claim construction of the "second rate" "determined by" limitation of the asserted claims of the '941 patent and the "input video signal" limitation of claim 4 of the '941 patent; (13) infringement of the asserted claims of the '941 patent; (14) anticipation of the asserted claims of the '941 patent by Baba; (15) exclusion of evidence of the ViewFrame II+2 LCD Panel; and (16) the economic prong of the domestic industry requirement. The Commission also determined to review and to take no position on the claim construction of the terms "drain electrodes" and "source electrodes" of the '556 patent. The Commission determined not to review any other issues. The Commission requested briefing from the parties on the issues on review, as well as on remedy, the public interest, and bonding.

On April 9, 2012, Thomson and each of the respondents filed a response to the Commission's request for written submissions. Written Submission of Complainant Thomson In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012) ("Thom. Resp."); Written Submission of Respondent AUO In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012); Written Submission of Respondent CMI In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012) ("CMI Resp."); Written Submission of Respondent MStar In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012) ("MStar Resp."); Written Submission of Respondent Realtek In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012) ("Realtek Resp."); Written Submission of Respondents Qisda and BenQ In Response to the Commission's Determination to Review-in-Part a Final Determination (Apr. 9, 2012). On April 16, 2012, Thomson and each of the respondents filed a reply submission.

II. ANALYSIS

A. The '006 Patent

1. The Invention of the '006 Patent

The basic components of an LCD consist of a thin layer of liquid crystal sandwiched between a pair of glass substrates, consisting of a first substrate with electrodes to control the pixels of the display and a second substrate that contains a color filter. The first substrate is associated with a first polarizer that polarizes light in one direction, while the second substrate is associated with a second polarizer that is perpendicular to the first polarizer. The first polarizer selects one linear polarization of light and allows that polarization to shine through. The second polarizer, in the absence of any manipulation of the polarization, will block the light because it is perpendicular. The liquid crystal material changes the polarization of the light depending on the voltage applied to the liquid crystal.

The '006 patent is directed to a particular type of LCD known as "twisted nematic display," in which the alignment direction of the liquid crystal molecules at one substrate is approximately perpendicular to the alignment of the liquid crystal molecules at the other substrate when no voltage is applied (*i.e.*, ON state). This twisted alignment allows the polarization of the polarized light to rotate by 90 degrees when the LCD is in the ON state, thus allowing the light to shine through the second polarizer.

When a voltage is applied, the electrical field created by the voltage untwists the liquid crystal molecules so that the polarization of the light will ideally be unchanged, thus causing the light to be blocked by the second polarizer. This corresponds to the OFF state. When voltage is applied, however, a property of nematic liquid crystals known as "birefringence" causes unwanted changes to the polarization of light. As a consequence, the polarization state of an incoming beam of polarized light can be modified, especially at viewing angles other than the normal or perpendicular direction of observation. This unwanted polarization change in turn causes some light to be leaked through the second polarizer in the OFF state. As the viewing angle moves away from the normal or perpendicular direction, the polarization change increases and the amount of light leakage increases. As a result, the contrast ratio of an image displayed on a twisted-nematic LCD is poorer at large viewing angles.

The invention of the '006 patent addresses this contrast ratio problem by adding a compensating plate formed by "a uniaxial birefringent optical" medium to the twisted-nematic liquid crystal layer of the LCD. The plate counters the "birefringent" properties of the nematic liquid crystal to create a more homogenous contrast ratio for the display device in a wider angle of observation. The asserted claims are claims 4, 7, and 14.

2. Construction of the Term "Layer" of the '006 Patent

The Commission determined to review the ALJ's construction of the term "layer," which appears in independent claim 14 as part of the limitations "a first birefringent layer" and a "liquid crystal layer." The term also appears in independent claim 1 as part of the limitation "a layer of twisted nematic liquid crystal." The ALJ found that the term means "one or more thicknesses," as proposed by Thomson, as opposed to the "the entire thickness" of the material, as proposed by respondents. ID at 75. The ALJ found that there is no clear intrinsic evidence indicating that the inventors intended to limit the meaning of "layer" to an "entire thickness." *Id.* at 77. The ALJ cited the general rule that the terms "a" or "an" in a patent claim carries the meaning of "one or more." *Id.* Because the term "layer" appears in two different contexts in the asserted claims: "a layer of twisted nematic liquid crystal" and "a first birefringent layer," the ALJ reasoned that the proper construction must apply to both instances. *Id.* at 76. Thus, the ALJ concluded that the inclusion of the "one or more" language as proposed by Thomson is proper for both the limitation "a layer of twisted nematic liquid crystal" as well as the limitation "a first birefringent layer." *Id.*

We begin our analysis with independent claim 14, which recites both a "twisted nematic liquid crystal *layer*" and a "birefringent *layer*." The language of claim 14 which includes the limitation "liquid crystal layer" refers to the entire thickness of the liquid crystal. In particular, claim 14 requires "providing a voltage across the liquid crystal layer" by placing "a pair of transparent electrodes opposing one another across the liquid crystal layer." In other words, the electrode must be placed on each side of the entire thickness of the liquid crystal layer. Similarly, the term "birefringent layer" must refer to the entire thickness of the birefringent material. It is well-settled that "the same terms appearing in different portions of the claims should be given the same meaning." *Fin Control Sys. Pty, Ltd. v. OAM, Inc.,* 265 F.3d 1311, 1318 (Fed. Cir. 2001). Thus, the term "layer" in claim 14 means "the entire thickness."

The term "layer" also appears in claim 1 as part of the limitation "a layer of twisted nematic liquid crystal." Unlike claim 14, the language of claim 1 does not recite details regarding the structure surrounding the liquid crystal layer. Nevertheless, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. *Phillips v. AWH Corp.,* 415 F.3d 1303, 1314 (Fed. Cir. 2005). The patent provides no indication that the inventors intended the term "layer" to have different meanings in the claims. Because claim 14 uses the term "layer" to refer to the entire thickness of the liquid crystal, the term "layer" should likewise have the same meaning in claim 1.

The specification supports construing the term layer to mean the entire thickness of a material. The specification explains that "the layer of twisted nematic liquid crystal is a layer of uniform thickness, imprisoned between two transparent plates 3 and 4 with parallel faces." '006 patent at 5:28-32. In addition, although the specification does not use the term "layer" to describe the negatively birefringent compensator, there is no indication that the structure of the compensator can be considered as having one or more thicknesses. Rather, the specification describes the structure of the negatively birefringent compensator as either a "blade" or a "plate." *Id.* at 1:22-23. There may be more than one blade or plate that accomplishes the compensation, but each blade or plate refers to the entire thickness of the material. *Id.* at 1:21-25.

For the foregoing reasons, we reverse the ALJ's construction of the term "layer" appearing in claims 1 and 14 of the '006 patent. We find that the proper construction of the term layer is the entire thickness of the material.

3. Direct Infringement of the '006 Patent

The products accused of infringing the asserted claims of the '006 patent are CMI, Qisda, and BenQ monitors and televisions that contain twisted nematic LCD modules,[1] including AUO and CMI LCD modules, that use [ ] compensation film [ ]. The AUO and CMI modules are identified in the direct witness statement of Thomson's expert Dr. Escuti. CX-4241C at Q.273-277, 279-280. The CMI, Qisda, and BenQ LCD displays that use such AUO and CMI modules are identified in CMI's, Qisda's, and BenQ's interrogatory responses. CX-4241C at Q.278; CX-459C; CX-367C, and CX-379C.

Before the ALJ, the primary claim construction and infringement disputes were the meaning of "uniaxial" and whether the [ ] in the accused products meets the limitation "uniaxial compensating means with negative birefringence" of claim 1 and the limitation "a first birefringent layer . . . wherein the first birefringent layer has the property that it provides uniaxial negative birefringence" of claim 14. Thomson argued that the term "uniaxial" should be construed as "a refractive index along one axis (n1) that is less than the refractive indices along the orthogonal axes (n2, n3), where n2 and n3 are substantially the same ($n1<n2\approx n3$)." Respondents argued that the term "uniaxial" means "having a single optical axis," where an "optical axis" is a "direction in a doubly-refracting (birefringent) material along which the two refracted rays travel at the same speed – *i.e.*, without double refraction." Respondents' construction requires the refractive indices n2 and n3 to be the same, and not just substantially

[1] An LCD module, or LCD panel, is the part of an LCD that includes the polarizers, two substrates, and liquid crystal. The LCD module is housed within the LCD casing and is electronically connected to the control circuitry of the display.

the same. The ALJ adopted respondents' construction of "uniaxial." The Commission determined not to review the ALJ's construction.

With respect to infringement, Thomson advanced two theories explaining why the [ ] serves as the recited uniaxial negatively birefringent compensator recited in the claim. First, Thomson argued that each layer of the [ ] portion[2] of the [ ] constitutes the uniaxial compensator with negative birefringence, and that [ ] in the [ ] compensates the positive birefringence of each liquid crystal layer in the LCD. For this "sublayer theory," Thomson uses the ALJ's construction of the term "uniaxial," which requires the two refracted rays in the birefringent material to travel at the same speed, *i.e.*, n2=n3. Second, Thomson argued that the [ ] as a whole is a uniaxial compensator with negative birefringence. Under this "entire layer theory," Thomson uses its own proposed construction of the term "uniaxial," which requires only that the refractive indices n2 and n3 be *substantially* equal.

Even though the ALJ did not adopt Thomson's construction of "uniaxial," the ALJ nevertheless analyzed each theory. The ALJ did not find either theory persuasive. We address each of the two theories in turn. Because we construe the term "layer" to mean "the entire thickness," we address Thomson's entire layer theory first.

a. Thomson's Entire Layer Theory

The ALJ rejected Thomson's theory that the [ ] as a whole is a uniaxial compensator with negative birefringence. The ALJ found that testing performed by AUO's expert shows that the [ ] does not have a single optical axis or a non-zero birefringence, as required under the ALJ's construction of "uniaxial." ID at 356. The ALJ found on the other hand that testing performed by Thomson's expert showing that the film is uniaxial

[2] The [ ].

was based on flawed methodology. *Id.* at 357. The ALJ further found that the two technical articles by Yamahara ("Yamahara articles") discussing the [ ], on which Thomson rests its infringement argument, not only contained incorrect assumptions but did not fully describe the complex nature of the [ ]. *Id.* at 355.

We agree with the ALJ's finding. Thomson argues against the ALJ's construction of "uniaxial" by challenging that it requires n2 and n3 to be equal to an infinite amount of decimal places and thus makes it impossible to prove that a compensator is uniaxial in the real world. We find this argument to be unpersuasive for two reasons. First, it improperly conflates the definition of uniaxial with the evidence required to prove that a material is uniaxial. The possibility of measurement errors does not change the definition of "uniaxial." It merely impacts the evidence one would need to prove that a material is "uniaxial." Second, and more importantly, Thomson incorrectly applies the ALJ's construction of "uniaxial." The ALJ did not construe the term "uniaxial" to merely mean that refractive indices n2 and n3 are equal. Rather, the ALJ construed the term "uniaxial" as "having a single optical axis" and the term "optical axis" in turn as a direction in a birefringent material in which n2 and n3 are equal. ID at 71-75. In other words, the term "uniaxial" means that there is *only one* direction in the material in which n2 and n3 are equal. Thus, one cannot simply prove infringement by finding *a* direction in which n2 and n3 are equal. Rather, to satisfy the "uniaxial" limitation, there must *be only one* such direction.

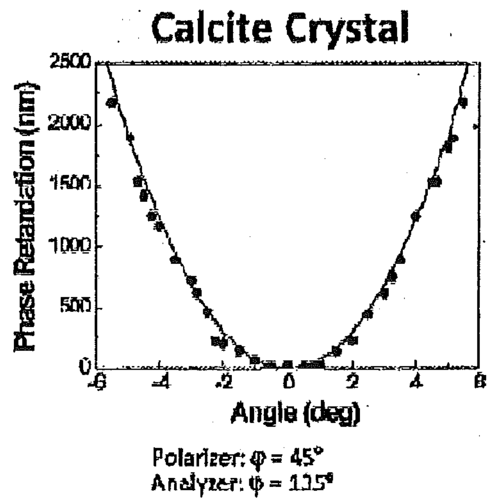
Because a proper analysis of Thomson's infringement evidence with respect to the "uniaxial" limitation requires an understanding of how birefringent materials are tested and described in practice, we begin with an explanation of these concepts. It is undisputed that one cannot measure n2 and n3 of a birefringent material directly, but must rely on other measured parameters of the system. RX-556C at Q.58-64, 99. One way of testing whether a birefringent material is "uniaxial" is to measure the "phase retardation" of the material under a limited set of conditions. RX-556C at Q.58-64, 99; RX-557 at Q.22-24; RX-558C at Q.27. Specifically, the "phase retardation" of a birefringent material quantifies the amount of polarization change of light passing through the material, and is defined as the product of the birefringence of the material, Δn (*i.e.*, the difference between n2 and n3), and the thickness of the particular birefringent material, *d*. RX-556C at Q.58-64, 72; CX-4241C at Q.40. Because a compensation material always has a certain thickness (*i.e.*, *d* cannot be zero), retardation is only zero when birefringence is zero, *i.e.*, n2 – n3 = 0. RX-157C at Q.135; RX-556C at Q.196. The phase retardation value may not be exactly zero, but the value must be within the experimental error of the test for that material, which differs depending on the particular material. Tr. at 1440:15-1442:1. When there is only a single zero-point phase retardation value, within the experimental error of the test for that material, then the material has only a single optical axis and is thus "uniaxial." RX-557 at Q.64-74. Thus, the ALJ's construction does not impose an impossible standard for demonstrating that a material is uniaxial.

Thomson did not present its own testing results of the [ ], but attempts to show infringement by using the retardation test results of the [ ] by AUO's expert Dr. Wu, as well as the retardation test results of calcite by Dr. Wu. Thomson argues that the [ ] must be uniaxial because the lowest retardation value found by Dr. Wu for the [ ] is 13nm, which is lower than the retardation value of 15nm found by Dr. Wu for calcite.. Thom. Resp. at 28; Thom. Pet. at 55. According to Thomson, Dr. Wu's tests confirmed that n2 and n3 in the [ ] are "equal" to three decimal places, because 13 nanometers divided by the thickness of the [ ], which is 80 microns, is 0.0001625. Thom. Pet. at 55.

We find Thomson's self-performed calculations to be inaccurate. First, Thomson does not take into account that the experimental error for phase retardation measurements differs based on the particular material being tested. Tr. at 1440:15-1442:1. For a relatively thick material such as calcite, the experimental error is 20 nm, while for a relatively thin material such as the accused [ ], the experimental error is 5 nm. *Id.*; RX-557 at Q.66. Thus, a retardation value of 15 nm for calcite is within the 20 nm experimental error for that material, while a retardation value of 13nm for the [ ] is much higher than the 5 nm experimental error for the film. RX-556C at Q.123; RX-557 at Q.68, 71-73. In other words, as observed by the ALJ, Dr. Wu's testing shows that there is a single direction in calcite in which there is no birefrigence, *i.e.*, where n2 and n3 in calcite are equal; while there is no direction in the [ ] where there is no birefrigence, *i.e.*, where n2 and n3 in the film are equal. ID at 356.

In addition, Thomson based its calculation for the [ ] on only one low phase retardation value measured in the [ ] and ignores that Dr. Wu also found additional low phase retardation values in the film. RX-557 at Q.66-70. As shown below in RX-480, Dr. Wu measured *three* distinct low phase retardation points -- two measuring approximately 13 nm in the horizontal direction and one measuring approximately 30 nm in the vertical direction. RX-480; RX-557 at Q.66-70. The ALJ's claim construction, however, requires that there be only one optical axis. By contrast, the uniaxial calcite measurements, shown below in RX-481, show a symmetric curve around a *single* low point of zero.

[



]

RX-480; RX-481; RX-556 at Q.126. Thus, even assuming that the three distinct low phase retardation values for the [ ] are close to zero, one can only conclude from Dr. Wu's test results that the [ ] has more than one direction in which n2=n3, and thus has more than one optical axes. Thus, it cannot be uniaxial under the ALJ's construction of the term as adopted by the Commission.

Thomson also relies on the description of the [ ] in the Yamahara articles, which described the [ ] as having "uniaxial negative birefringence," with n2 and n3 being 1.5999 nm and 1.6 nm and thus substantially the same. CX-4241C at Q.424-35; CX-48; CX-65. We find that the ALJ properly found the Yamahara articles to be unreliable evidence. ID at 355. AUO's expert Dr. Drzaic testified in depth about the Yamahara articles, explaining that they were an early analysis of the [ ] in which the author acknowledged using a simplified model with a limited set of data that did not fully describe the complex nature of the [ ]. RX-556 at Q.100-104. Moreover, as pointed out by the ALJ, Dr. Drzaic explained that the model used in the Yamahara articles contained out-of-date assumptions, and that there is currently no consensus in the industry as to how the [ ] should be modeled. *Id.* at

Q.108-110. AUO's expert Dr. Yeh also provided similar testimony regarding the Yamahara papers. RX-558 at Q.257-58.

Accordingly, we agree with the ALJ that Thomson has not shown that the entire accused [ ] meets the "uniaxial" limitation of the asserted claims.

b. Thomson's Sublayer Theory

With respect to Thomson's sublayer theory, the ALJ found that Thomson has offered no evidence that the [ ] portion in the [ ] consists of distinct sublayers other than the fact that [ ]. ID at 358-59. The ALJ found that such computer modeling does not reflect the actual physical composition of the [ ]. *Id.* at 359. The ALJ thus concluded that Thomson has failed to demonstrate that the accused products meet the "uniaxial compensating means with birefringence" limitation of claims 4 and 7 and the "first birefringent layer . . . wherein the first birefringent layer has the property that it provides uniaxial negative birefringence" limitation of claim 14. *Id.* at 360.

We agree with the ALJ that Thomson's sublayer theory is unpersuasive. As found by the ALJ, Thomson did not use any test results or printed publications to support its assertion that each layer of the [ ] portion of the [ ] is "uniaxial," but instead relied on computer modeling data acquired by [ ]:

[

]

CX-39C at AUO-THO 0307904; JX-49C at 48-51. Thomson did not explain how this modeling evidence equates to the actual physical composition of the [ ]. Rather, as pointed out by the ALJ, AUO's expert Dr. Yeh testified that the fact that the [ ] may be modeled as [ ] does not mean that such sublayers actually exist. RX-558C at Q.273-75. Even Thomson's expert Dr. Escuti admitted that the alleged sublayers do not have distinct boundaries. CX-4241C at Q.420. In addition, AUO's expert Dr. Drzaic credibly explained that "[t]he layer-by-layer method is a mathematical convenience used in many types of optical modeling merely as a way to facilitate the calculation" and "[i]t does not follow that the simplified model is an accurate description of the structure or phenomenon." RX-556C at Q.80-81. Thus, even if the alleged sublayers exist, Thomson has not provided any actual evidence showing that the values listed in the table above are the actual n2 and n3 values for the sublayers. Accordingly, we agree with the ALJ's finding that even under Thomson's sublayer theory, which uses the ALJ's construction of the term "uniaxial," Thomson has not shown that the accused products meet the uniaxial negatively birefringent compensator limitation of the asserted claims.

Moreover, as discussed in the claim construction portion of this opinion, the term "layer" means "the entire thickness of a material." This means that Thomson must establish that the accused products meet the "uniaxial" limitation by considering the accused [ ] compensation film as a whole, rather than sublayers of the [ ] portion for the film. Thomson cannot show infringement by simply showing that each sublayer of the [ ] meets the "uniaxial" limitation.

For the foregoing reasons, the Commission affirms the ALJ's finding that Thomson has not shown that the accused devices directly infringe the asserted claims of the '006 patent under either Thomson's entire layer theory or under Thomson's sublayer theory.

4. Infringement of the '006 Patent under the Doctrine of Equivalents

An element of an accused product is equivalent to a claim limitation if the differences between the two are insubstantial, a question that turns on whether the element of the accused product performs substantially the same function in substantially the same way to obtain the same result as the claim limitation. *Absolute Software, Inc.. v. Stelath Signal, Inc.*, 659 F.3d 1121, 1139-40 (Fed. Cir. 2011). The patentee must provide particularized testimony and linking argument with respect to the function, way, result test when such evidence is presented to support a finding of infringement under the doctrine of equivalents. *Texas Instruments Inc. v. Cypress Semiconductor Corp.*, 90 F.3d 1558, 1567 (Fed. Cir. 1996).

Before the ALJ, Thomson argued that the uniaxial negatively birefringent compensator limitation is satisfied by the [ ] under the doctrine of equivalents, under both its sublayer theory and its entire layer theory. With respect to Thomson's sublayer theory, the ALJ found that the sublayers of the [ ] do not perform the same function because AUO's expert Dr. Drzaic testified that an arbitrarily thin sublayer of the film would be too thin to provide sufficient retardation to effectively serve as a compensator in an LCD. ID at 361 (citing RX-556C at Q.156).

With respect to Thomson's entire layer theory, although not explicitly stated, the ALJ's finding implied that the [ ] as a whole does perform the same compensation function and produces the same compensation result. ID at 361-62. The ALJ found, however, that the *way* the [ ] compensates as a whole is substantially different. *Id.* at 361. The ALJ found that Thomson uses the same evidence that the ALJ rejected in his direct infringement analysis. *Id.* In addition, the ALJ found that accepting Thomson's position that a material where n2 is approximately equal to n3 can meet the "uniaxial" limitation would entirely vitiate the limitation. *Id.* at 361-362. Thus, the ALJ concluded that Thomson failed to demonstrate that the [ ] meets the "uniaxial" claim limitation under the doctrine of equivalents. *Id.* at 362.

Thomson argues that the [ ] as whole compensates in the same *way* as the compensator of the asserted claims of the '006 patent and that the ALJ erred in applying the doctrine of claim vitiation. We disagree with Thomson and find that the term "uniaxial" is not entitled to a numerical range of equivalents. The ALJ construed the term "uniaxial" as "having a *single* optical axis." As found by the ALJ, a birefringent material may have zero, one, or two optical axes." ID at 70-71. Thus, the number of axes in a "uniaxial" material is qualitatively different from a value that is defined by a range of degrees or values. Given the very small discrete set of possible values for the number of optical axes for a birefringent material – zero to two – the term "uniaxial" cannot readily be assigned a range of numerical values.

Thomson cites three cases purporting to show that the doctrine of equivalents is applicable where claims require an exact numerical value. We find these cases to be distinguishable because unlike the situation here, the facts of each of these cases involve a parameter that is defined by a *range* of values rather than by a discrete value. *See Adams Respiratory Therapeutics, Inc. v. Perrigo Co.*, 616 F.3d 1283, 1292 (Fed. Cir. 2010) (discussing the limitation "at least 3500hr*ng/mL"); *Pozen Inc. v. Par Pharm., Inc.*, 800 F. Supp. 2d 789, 809-13 (E.D. Tex. 2011) (discussing a limitation construed to require "at least 90% of the naproxen"); *Phillips Corp. v. Iwasaki Elec. Co.*, 505 F.3d 1371, 1376 (Fed. Cir. 2007) (discussing a limitation requiring between 10^{-6} and 10^{-4} μmol/mm^3 halogen).

We find that the facts here are akin to those in *Moore U.S.A., Inc. v. Standard Register Co.*, 229 F.3d 1091, 1119 (Fed Cir. 2000), where the Court found that the term "majority" is not entitled to a range of equivalents covering 47.8%. According to *Phillips Corp. v. Iwasaki Elec. Co.* (one of the three cases cited by Thomson), discussing *Moore*, "[e]ven though the term 'majority' means a quantity greater than 50% and less than or equal to 100%, holding 47.8% to be equivalent to a majority *changes the character* of the claim limitation in a way that merely broadening a range need not." 505 F.3d at 1379 (emphasis added). Here, allowing n2≈n3 to be equivalent to n2=n3 would also change the character of the claim limitation because, as Thomson's expert Dr. Escuti admitted, the scope of materials where n2≈n3 "would include materials that fall under the textbook definition of biaxial." Tr. 360:5-9. This would vitiate the requirement that the compensator have a single optical axis.

Additionally, we note that Thomson makes the same arguments and cites to the same evidence in support of application of the doctrine of equivalents as it did with respect to direct infringement. Specifically, Thomson cites to the same retardation measurements of the [ ] taken by AUO's expert Dr. Wu to argue that n2 and n3 are substantially equal. Thomson also cites to the same two Yamahara articles discussing the [ ] to argue that n2 and n3 do not have to be strictly equal for a material to be considered uniaxial. We find that the ALJ properly rejected these arguments, stating that they are "just a repeat assertion from the literal infringement analysis." ID at 361. As held by the Federal Circuit, "[t]he evidence and argument on the doctrine of equivalents cannot merely be subsumed in plaintiff's case of literal infringement." *Lear Siegler, Inc. v. Sealy Mattress*, 873 F.2d 1422, 1425 (Fed. Cir. 1989). Accordingly, Thomson has not shown that the [ ] as a whole meets the "uniaxial" limitation under the doctrine of equivalents.

Lastly, we turn to Thomson's argument that the sublayers of [ ] accomplish the same compensation *function* as the claimed compensator because each sublayer of the film compensates a sublayer of the liquid crystal. Thom. Pet. at 64. In other words, Thomson argues that the asserted claims do not require the recited compensator to compensate the birefringence of the entire liquid crystal layer, but merely a portion of the birefringence of the crystal layer. We find Thomson's argument to be unpersuasive. It is illogical to urge that a sublayer contributing a small amount of compensation is performing the function of the associated compensator. To the contrary, the language of claim 1 states that the compensator is "associated with" the "layer of twisted nematic liquid crystal *placed between two polarizers*," thus indicating that the compensator must compensate for the entire layer of twisted nematic liquid crystal that is placed between two polarizers, not just a portion of the layer. Thus, we agree with the ALJ that a sublayer of the [ ] would not perform the compensation function because it would be far too thin to provide sufficient retardation to effectively serve as a compensator in a liquid crystal display. ID at 361.

In addition, we note that Thomson's argument is based on an incorrect construction of the term "layer." As discussed above, the proper construction of the term "layer" is the entire thickness of a material, and therefore Thomson must show infringement of the "uniaxial" limitation by considering the entire thickness of the compensator as well as the entire thickness of the liquid crystal layer. Thus, Thomson has not shown that each of the sublayers of the accused [ ] meet the "uniaxial" limitation under of the doctrine of equivalents.

For the forgoing reasons, the Commission affirms the ALJ's finding that Thomson has not shown that the accused devices infringe the asserted claims of the '006 patent under the doctrine of equivalents, using either Thomson's entire layer theory or its sublayer theory.

5. Anticipation of Claims 4 and 7 of the '006 Patent by Scheuble

The ALJ found that respondents failed to establish by clear and convincing evidence that U.S. Patent No. 6,327,010 to Scheuble ("Scheuble") anticipates asserted claims 4 and 7. Before the ALJ, Thomson argued that Scheuble does not disclose several limitations of claims 4 and 7. The ALJ addressed only one of these limitations, finding that Scheuble does not disclose the limitation "a birefringent plate" of claim 3, from which asserted claims 4 depends, and "a pair of uniaxial birefringent plates" of claim 7.[3] ID at 219. Specifically, the ALJ found that although he did not explicitly construe the term "plate" in his claim construction analysis, under both parties' proffered constructions of the term, a "plate" must be solid and not liquid. ID at 220. The ALJ analyzed expert testimony from both sides and found that respondents have not shown by clear and convincing evidence that the liquid-crystalline compensation layer disclosed in Scheuble is a "plate" as required by claims 4 and 7. *Id.*

Respondents argue that the "birefringent plate" limitation of claims 4 and 7 encompasses the liquid compensation layer sealed between two glass substrates disclosed in Scheuble. We find that neither the intrinsic evidence nor extrinsic evidence supports respondents' argument.

[3] The parties agree that for purposes of the anticipation analysis, the terms "plate" and "plates" should be construed the same.

The language "said compensating means comprises a birefringent plate" of claim 3 and "said compensating means comprises a pair of uniaxial birefringent plates" of claim 7 suggests that the *compensating means itself* be a plate, not the compensating means and surrounding glass structures. Also, the specification describes compensating element 11 as either "a plate with parallel faces cut out of a uniaxial birefringent medium" or a "blade" formed by such a medium, and does not suggest that the compensating element 11 can be a liquid layer sealed between two substrates. '006 patent at 2:66-3:4, 1:21-25. Moreover, AUO's expert Dr. Yeh never opined that Scheuble discloses the "birefrignent plate" limitation of claims 4 and 7 by disclosing a liquid compensation layer sealed between two glass substrates. Rather, Dr. Yeh testified that the glass substrates themselves are plates, not the combination of the glass substrates and the liquid compensator.

> Scheuble also discloses that ***glass substrates*** may be used at the end of column 8. A person of ordinary skill in the art would understand that a glass substrate is a smooth, flat, relatively thin, rigid body of uniform thickness meeting this limitation under Respondents' construction of plate.

RX-157C at Q.381 (emphasis added). Thus, we agree with Thomson that a compensating liquid enclosed by two glass plates such as that disclosed in Scheuble is not a "birefringent plate" required by claims 4 and 7.

We turn to respondents' argument that even if the enclosed liquid compensation structure of Scheuble is not a "birefringent plate," other portions of Scheuble disclose a solid compensator that satisfies the limitation. As pointed out by AUO, the ALJ's analysis focused only on the liquid crystal compensator disclosed in column 8 of Scheuble and did not address Scheuble's disclosure of compensating "films" in column 9:

> However, the object of FIG. 17 is merely to illustrate the principle of a compensation layer of this type, and a wide range of variants are possible. Thus, for example, the layers of monomeric nematic liquid crystal can be replaced or combined with

> ***stacks of films*** comprising liquid-crystalline polymers whose mesogenic groups are aligned correspondingly, and/or with ***films*** comprising isotropic polymer material which are axially stretched correspondingly.

RX-75 at 9:1-9 (emphasis added). Also, as pointed out by CMI, the ALJ did not consider Scheuble's disclosure that the compensation layer of its invention may be made of a "thermoplastic polymer" that is stretched two-dimensionally:

> In addition to this liquid-crystal layer, the electrooptical systems according to the invention may contain one or more, preferably not more than 2 and in particular one, compensation layer. ***The compensation layers may be based on low-molecular weight liquid crystals, liquid-crystalline polymers or thermoplastic polymers, which are, for example, stretched 2-dimensionally and are thus made optically uniaxial.***

RX-75 at 3:38-42 (emphasis added). We find, however, that respondents did not provide clear support showing that the "films" or "polymers" referred in these passages are indeed solid material within the meaning of the "birefringent plate" limitation of claims 4 and 7. AUO's expert Dr. Yeh did not rely on these passages when opining on whether Scheuble discloses "plates," but cited only to the particular portion of Scheuble discussing the glass substrates that enclose the liquid compensator. RX-157C at Q.356.

Because we find that respondents have not shown by clear and convincing evidence that Scheuble discloses the "birefringent plate" limitation of claims 4 and 7, we affirm the ALJ's finding that Scheuble does not anticipate claims 4 and 7 of the '006 patent.

B. The '063 Patent

1. The Invention of the '063 Patent

As discussed in the background section of the '006 patent, the basic components of an LCD consist of a thin layer of liquid crystal sandwiched between a pair of glass substrates, each substrate having a polarizer and a set of electrodes cemented to its surfaces. The liquid crystal thus sandwiched between two substrates will not maintain a uniform thickness by itself. Rather, the thickness of the liquid crystal layer is kept uniform by using "spacers" that are made of glass fibers or plastic microspheres.

The invention of the '063 patent is directed to an improved liquid crystal display cell assembly in which the spacers are engineered to be highly "anisotropic" in shape so that they can be compatible with the aggressive mechanical rubbing process of LCD assembly. The patent defines the term "anisotropic" as a shape in which one side of the spacer is longer than the other (as opposed to the prior art shape where all sides of the spacer are equal in length). In addition to allowing the spacers to be compatible with the aggressive mechanical rubbing process of LCD assembly, the anisotropic shape of the spacers also allows the spacers to be situated within the non-active areas of the LCD cell, *i.e.*, areas that do not transmit light. Thus the spacers will not interfere with the active areas, *i.e.*, areas that transmit light.

Figure 6 shows a bottom substrate of a four-pixel liquid crystal display cell with active areas 34 and non-active areas 36:

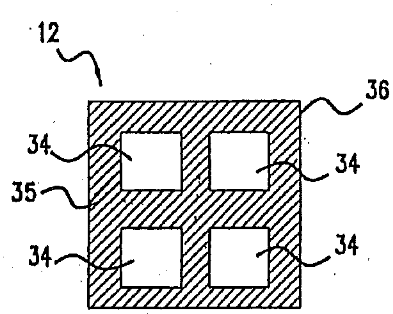


FIG. 6

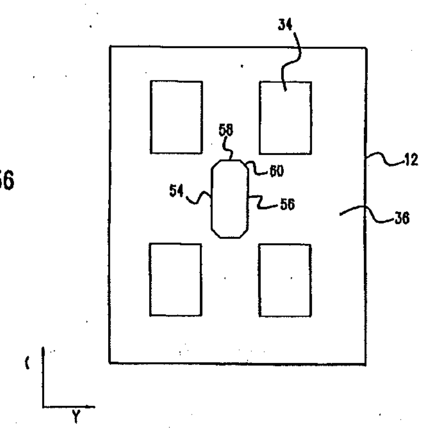


FIG. 11

Figure 11 shows an anisotropic spacer 54 formed in non-active area 36 having a first side 56 along the X direction that is longer than a second side 58 along the Y direction.

The asserted claims are claims 1-4, 8, 11, 12, 14, 17, and 18.

2. Claim Construction of the '063 Patent

The Commission determined to review the ALJ's construction of the terms "mechanically rubbing" / "mechanically rubbed," "a plurality of spacing elements," and "an affixing layer."

a. "Mechanically Rubbed" / "Mechanical Rubbing" of Claims 1 and 11

Before the ALJ, the parties disputed whether the terms "mechanically rubbed" of claim 1 and "mechanically rubbing" of claim 11 require rubbing along the long axis of the spacer. Thomson argued that there is no directional requirement and that the proper construction of the terms is "using a machine or apparatus to apply a moving pressure." Respondents argued on the other hand that the terms require rubbing along the long axis of the spacer. According to AUO, the proper construction of the limitations "mechanically rubbed" of claim 1, "mechanically rubbing" of claim 11, and "rubbed along a first axis" of claim 14 is "the substrate and spacers are mechanically rubbed along the long axis of the spacer in the plane of the substrate."

The ALJ adopted the directional requirement proposed by respondents, but added the term "substantially" to respondents' proposed construction. Specifically, the ALJ construed the term "mechanically rubbed" of claim 1 as "having a moving pressurized friction applied by a machine or apparatus *substantially along the long axis* of the spacing elements" and the term "mechanically rubbing" of claim 11 as "using a machine or apparatus to apply a moving pressurized friction *substantially along the long axis* of the spacing elements formed on the substrate." ID at 58 (emphasis added). The ALJ added the term "substantially" to respondents' proposed directional requirement based on his finding that according to expert testimony, anisotropic spacers do not need to be rubbed precisely along their long axis in order to have strength superior to that of non-anisotropic spacer elements. *Id.* at 61.

We begin our analysis with the language of the claims. Claim 1 requires that the spacing layer of the claimed display cell include, *inter alia*, "a plurality of spacing elements ... said spacing elements being anisotropic in shape" and "the plurality of spacing elements have been mechanically rubbed." Claim 11 requires that the claimed method of forming a display cell comprise, *inter alia*, "forming a plurality of spacing elements" and "mechanically rubbing over the first substrate having the plurality of spacing elements formed thereon." The ALJ construed the term "anisotropic in shape," appearing in both claims 1 and 11, as "having a length dimension that is greater than a width dimension in the plane of the substrates." ID at 60. We agree with Thomson that nothing in the language of claims 1 and 11 by itself indicates that the mechanical rubbing must occur along the long dimension of the anisotropically-shaped spacer elements, or that the rubbing must occur in any direction at all. The only claim that indicates a rubbing direction is dependent claim 14, which depends from claim 11 via claim 12 and recites "wherein the spacing elements are rubbed along the first axis."

We find that the broad language in independent claim 11, when compared with the language "rubbed along the first axis" of dependent claim 14, raises a presumption under the doctrine of claim differentiation that the term "mechanically rubbing" of claim 11 does not require rubbing along the "first axis" (*i.e.*, the long axis) of the spacer element. We do not agree with the ALJ that the presumption created by the doctrine of claim differentiation that "mechanically rubbing" of claim 11 is broader than "rubbing along the first axis" of claim 14 is rebutted by the alleged emphasis in the specification that rubbing must occur along the long axis. *See Am. Calcar, Inc. v. Am. Honda Motor Co.*, 651 F.3d 1318, 1337 (Fed. Cir. 2011) ("The doctrine of claim differentiation creates a presumption that each claim in a patent has a different scope. However, the doctrine of claim differentiation is not a conclusive basis for construing claims."). We also do not agree with the ALJ that the doctrine of claim differentiation as asserted by Thomson does not apply because the "first axis" of claim 14 refers to the long axis of the *non-active area of the substrate* and not the long axis of the *spacer element.*

We first address the ALJ's finding that the doctrine of claim differentiation does not apply because the "first axis" of claims 12 and 14 refers to the long axis of the *non-active area of the substrate* and not the long axis of the *spacer element.* In our view, there is no support in the specification for the finding that the "first axis" of claims 12 and 14 refers to the long axis of the *non-active area of the substrate.* The specification discusses a long axis and a short axis only in the context of the length and width of the spacer element and never in the context of the substrate. For example, the description accompanying Figure 7 states that "[s]pacer 54 is anisotropic in shape as it includes first side 56 along an X direction (also known as the long axis) and a second side 58 along a Y direction (not shown in FIG. 7)." '063 patent at 3:63-66. Similarly, the description accompanying Figure 9 describes that "a LCD rubbing process using a roller 50 that rolls along the X direction (long axis) of the spacers 54":

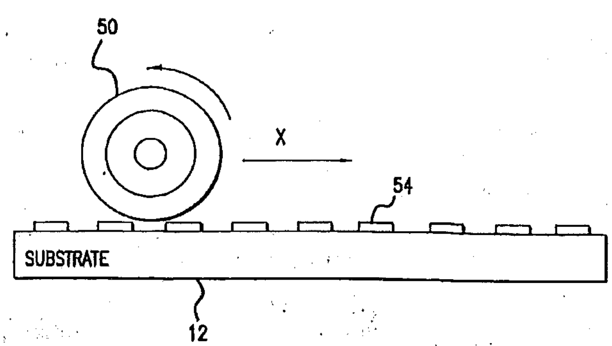


FIG. 9

'063 patent at 4:30-32; Fig. 9. The specification never hints that the non-active area of the substrate even has a long versus short axis.

We also disagree with the ALJ's finding that the terms "a first axis" and "a second axis" of claim 12 cannot describe the length and width of the spacer element itself, allegedly because independent claim 11 already requires that the shape of the spacer element be "anisotropic," *i.e.* "having a length dimension that is greater than a width dimension." We find that the language of dependent claim 12 is a clear example where a dependent claim is redundant to an independent claim. The patentee acted as his own lexicographer and explicitly defined the term "anisotropic" recited in claim 11 as meaning "a longer side along the X direction compared to the shorter side along the Y direction," in which the X direction is "also known as the long axis." *Id.* at 3:66-67. The ALJ essentially adopted this construction by construing "anisotropic" as "having a length dimension that is greater than a width dimension." The parties do not dispute this construction. Thus, the recitation "wherein the spacing elements extend along a first axis and along a second axis shorter than the first axis" of claim 12 is redundant to what is already required by claim 11.

Although we find the language of claim 12 to be redundant to claim 11 and the presumption created by the doctrine of claim differentiation to be rebutted, we do not find that the presumption that claims 11 and 14 have different scopes is rebutted. *Am. Calcar*, 651 F.3d at 1337. In our view, unlike the term "anisotropic," there is no express teaching in the '063 patent specification with respect to the direction of rubbing that would render the scope of claim 14 the same as claim 11. We begin with Figure 9 of the '063 patent, on which the ALJ grounds his construction. As discussed above, the description accompanying Figure 9 states "a conventional LCD rubbing process using a roller 50 that rolls along the X direction (long axis) of the spacers 54." '063 patent at 4:30-32; Fig. 9. The description accompanying Figure 9 goes on to state that "[u]nlike prior art spacers, the spacers of the present invention withstand the rubbing process due to their anisotropic shape." *Id.* at 4:32-34. We find that this language at best shows that the length-to-width ratio of the spacers allows them to withstand the mechanical rubbing process occurring in the length direction. However, neither this particular description accompanying Figure 9 nor anything else in the specification indicates that rubbing *must* occur in the direction of the long axis of the spacer. Rather, the specification emphasizes that the spacers are anisotropic in shape in order to accomplish two goals: (1) to better withstand rubbing (without specifying the particular direction of rubbing) and (2) so that the spacers can be situated entirely within the non-active areas of the substrate. *Id.* at 2:37-44; 4:42-43. There is no teaching in the specification that would override the presumption that while dependent claim 14 requires rubbing in the direction of the long axis of the spacer element, independent claim 11 does not. Accordingly, we find that the terms "mechanically rubbing" and "mechanically rubbed" do not require rubbing along the long axis of the spacer element or in any particular direction at all.

We turn to the ALJ's addition of the term "substantially" to his claim construction. It is not clear how the ALJ arrived at his conclusion that the mechanical rubbing needs to occur "*substantially* along the long axis of the spacer." The only testimony the ALJ cited in support is an equivocal admission by AUO's expert on cross-examination that when rubbed at [ ], an anisotropic spacer element had superior strength when compared to a cylindrical spacer element described as prior art in the '063 patent. ID at 61 (citing Tr. at 950:19-953:5). According to the ALJ, this particular admission shows that an anisotropic spacer element does not need to be rubbed precisely along the long axis in order to be more effective than prior art spacer elements. However, the ALJ then added in a footnote that the term "substantially" would not include rubbing [ ], even though the ALJ found that the particular admission indicates that the claimed invention *would* cover rubbing in the [ ] as long as the spacer elements are anisotropic in shape. *Id.* at n.10. Accordingly, we disagree with the ALJ that the asserted claims require rubbing "*substantially* along the long axis of the spacer." As discussed above, the intrinsic evidence is clear that the terms "mechanically rubbing" and "mechanically rubbed" do not contain a requirement of rubbing in any particular direction.

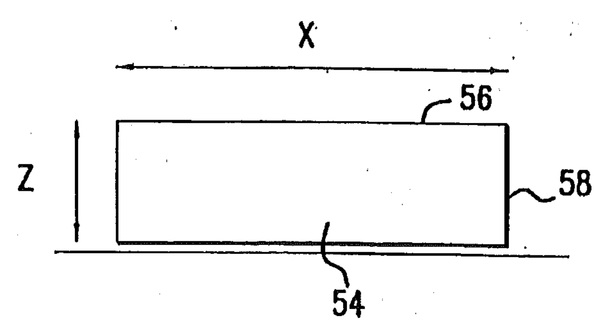
For the foregoing reasons, the Commission reverses the ALJ's construction of "mechanically rubbed" of claim 1 and "mechanically rubbing" of claim 11. Instead, the proper construction of the terms is "using a machine or apparatus to apply a moving pressure," which does not contain a directional requirement.

b. "A Plurality of Spacing Elements" of Claims 1 and 11

Before the ALJ, Thomson argued that the proper construction of "a plurality of spacing elements" is "more than one spacing element, where a spacing element is a structure that functions to keep the gap between the two substrates largely uniform." Respondents argued that the proper construction also requires that the spacing elements contact the second substrate of the display cell. The ALJ adopted respondents' narrower construction, construing "a plurality of spacing elements" as "two or more structures, not physically connected to one another, which structures serve to substantially uniformly separate two substrates, said structures formed on one of said two substrates and contacting the second substrate." ID at 48. According to the ALJ, claims 1 and 11 both require that the two substrates are physically attached to one another via the spacing elements, and the specification does not teach away from the concept of requiring the spacing elements to touch both substrates. *Id.* at 45.

We begin our analysis with the language of the claims. In addition to reciting "a plurality of spacing elements separate from one another," claim 1 recites "wherein said two substrates are affixed to each other after one of the two substrates and the plurality of spacing elements have been mechanically rubbed, the two substrates remaining substantially uniformly separated from each other by said spacing elements." Similarly, claim 11 recites "attaching a second substrate on the front surface of said first substrate, said second substrate being kept at a substantially uniform distance from said first substrate by said spacing elements." The ALJ found that this claim language requires that the spacing elements physically hold the two substrates apart because the language requires that "the two substrates be physically attached to one another and that the spacing elements serve to substantially uniformly separate those attached substrates." ID at 44-45. We disagree with the ALJ's reading. Although the claims recite that the second substrate is "affixed" or "attached" to the first substrate, the language does not require that the "spacing elements" play a role in the attachment. The language does not require the spacing elements to physically hold the two substrates apart

Neither do we find this requirement in the '063 specification. At the outset, we disagree with CMI that the specification discloses forming spacers of a precise thickness Z in order to establish a cell gap of Z height. We find that CMI mischaracterizes the description of the preferred embodiment with respect to Figure 7. Referring to Figure 7, the specification states that "the precise thickness of the spacer 54 in the Z direction can be achieved by spin coating techniques or CVD technology as is well known to one skilled in the art" and that the "the cell gap of Z-height is on the order of 5 μm for LC materials with an optical anisotrophy, Δn, of 0.09-0.1," where "Z-height strongly depends on the Δn of the LC being used."



'063 patent at Fig. 7, 4:13-19. Thus, the '063 patent uses the vertical axis as a reference in describing the thickness of the spacer and the distance between the top and bottom substrates. Reference to the Z axis, however, does not mean that the height of the spacer 54 and the distance between the top and bottom substrates are equal. *See* CX-4242C at Q.137. While the thickness between the top and bottom substrates in vertical Z direction is preferably set "on the order of 5 μm," the same discussion does not suggest a numerical value for the thickness of the spacers 54, stating only that "the spacers 54 can be made of sufficient size" and that "the precise thickness of the spacer 54 in the Z direction can be achieved by spin coating techniques or CVD technology as is well known to one skilled in the art." '063 patent at 4:11-18.

The only indication in the specification that the height of the spacer may be equal to the cell gap is in Figures 1-3, depicting prior art spacers 20 between substrates 12 and 14:

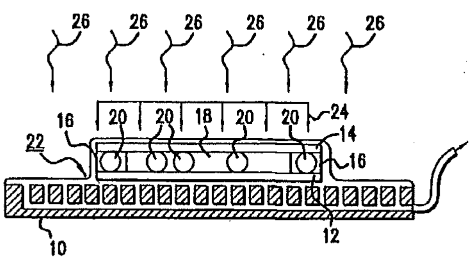


FIG. 1
(PRIOR ART)

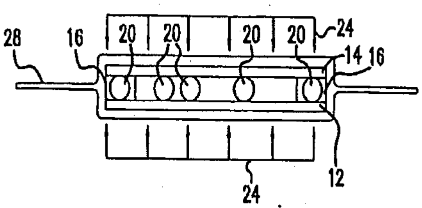


FIG. 2
(PRIOR ART)

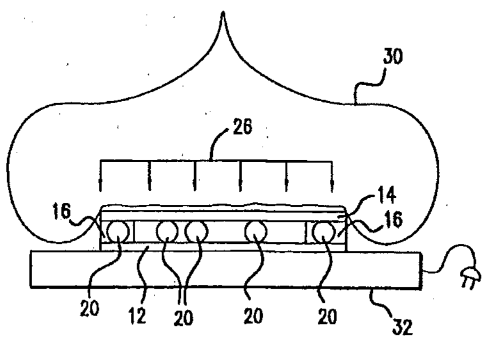


FIG. 3
(PRIOR ART)

'063 patent, Figs. 1-3. However, the accompanying text to Figures 1-3 is silent as to whether contact with the second substrate 14 is an actual requirement for the spacers 20 or whether the spacers 20 are simply depicted as such. Moreover, Figure 12, which also depicts prior art spacer 20, does not seem to show spacer 20 to be in contact with the top substrate:

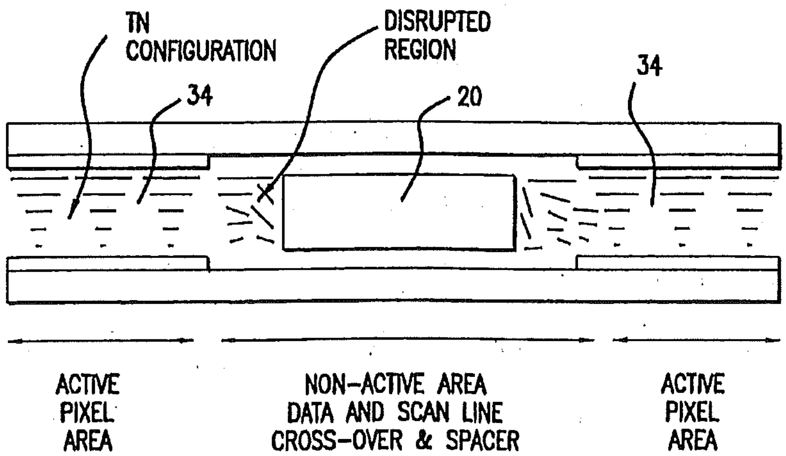


FIG. 12
(PRIOR ART)

Id. at Fig. 12. As for CMI's argument that the contact requirement is present in several references cited on the face of the '063 patent, we do not find the argument sufficient to overcome the silence as to this requirement in the claims and specification of the '063 patent. *See, e.g.*, *Modine Mfg. Co. v. Int'l Trade Comm'n*, 75 F.3d 1545, 1553 (Fed. Cir. 1996) ("[I]ncorporation by reference does not convert the invention of the incorporated patent into the invention of the host patent."), *overruled on other grounds by Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 234 F.3d 558 (Fed. Cir. 2000).

As for the extrinsic evidence, neither side has provided persuasive arguments. On one hand, CMI argues that the testimony of Thomson's expert Dr. West actually supports requiring the "spacing elements" to contact the opposite substrate, because Dr. West allegedly testified that spacers having a fraction of the height of the normal post-like spacers are not able to maintain a uniform cell gap. Written Submission of Respondent CMI In Response to the Commission's Determination to Review-in-Part a Final Determination (April 9, 2012) ("CMI. Resp.") at 3-4 (citing CX-4242C at Q.37). We find that CMI mischaracterizes Dr. West's testimony because the particular portion of Dr. West's testimony cited by CMI was referring to spacers that are "destroyed or dislodged," which are different from a spacer deliberately engineered to almost touch the opposing side. CX-4242C at Q.37.

On the other hand, Thomson points to the testimony of Dr. West that a person of ordinary skill in the art would know that spacing elements can cause two substrates to be "substantially uniformly separated from each other," as required by the claims, without contacting the "second substrate." Specifically, Dr. West testified that a spacer connected to the bottom substrate that almost contacts the top substrate (and does contact that substrate if the substrate is compressed) can maintain a substantially uniform cell gap because it allows the cell gap to be narrowed only to the point where the second substrate would hit the spacer. CX-4242C at Q.132-33, 200, 566; Tr. at 259:4-17. Dr. West, however, based his testimony on disclosure of a patent that was filed after the invention of the '063 patent. CX-4242C at Q.133 (citing CX-1127). Thus, we do not find Dr. West's testimony to be helpful.

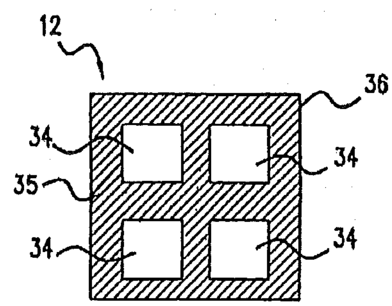
Nevertheless, because the claim language does not recite a contact requirement and because the specification is silent on this issue, we believe that Thomson's construction of "a plurality of spacing elements" is the proper one, *i.e.*, "more than one spacing element, where a spacing element is a structure that functions to keep the gap between the two substrates substantially uniform." Accordingly, the Commission reverses the ALJ's construction requiring the "plurality of spacing elements" to contact "the second substrate." We note that although this construction encompasses spacers that do not contact the opposing substrate, for such spacers to meet the "spacing elements" limitation, the spacers must function to keep the cell gap substantially uniform.

c. "Affixing Layer" of Claim 1

Claim 1 recites "a spacing layer, interposed between said two substrates, the spacing layer including an affixing layer . . . the affixing layer covering at least a portion of the non-active area and remaining substantially outside of the active aperture area." Before the ALJ, Thomson argued that the proper construction of "affixing layer" is "material that attaches the spacing elements to a substrate" and that the "affixing layer" may be part of the material used to form the spacing elements. Respondents argued that the "affixing layer" must be separate and distinct from the spacing elements. The ALJ adopted AUO's narrower construction, construing "an affixing layer" as "a stratum of material that attaches the spacing elements to a substrate, and which is separate and distinct from said spacing elements." ID at 34.

We first address Thomson's argument that because the "affixing layer" and "spacing elements" are recited as part of the same "spacing layer," the two elements cannot be separate and distinct as construed by the ALJ. While it is clear from the claim language that the two elements are part of the same overall "spacing layer," it is also clear from the claim language that the "affixing layer" and the "spacing elements" are two distinct (if not necessarily separate) elements within the "spacing layer." It is a well established principal of claim construction that where a claim lists elements separately, the clear implication of the claim language is that those elements are distinct components of the patented invention. *Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010). Thus, the affixing layer should be construed as a distinct component from the spacing elements.

Our construction is supported by the specification. First, Figure 6 of the '063 patent shows spacers 34 as distinct from the affixing layer 35:



'063 patent, Fig. 6. Second, while the specification clearly states that the thickness of the affixing layer should be no more than 1 micron, the specification allows the thickness of the spacing elements to be greater. Specifically, the specification describes an "affixing layer" as "a thin coating of negative photoresist or negative UV curable polymide" and states that"[t]he thickness of this thin coating should be in the range of approximately 0.1 microns to 0.5 microns and should be at least 0.05 microns, but generally no more than 1 micron and preferably 0.2 microns." *Id.* at 3:37-42. By contrast, in describing the thickness of the spacing elements, the specification states that "the precise thickness of the spacer 54 in the Z [*i.e.*, vertical] direction can be achieved by spin coating techniques or CVD technology as is well known to one skilled in the art." '063 patent at 4:13-16. The specification also states that the height of the cell gap between the top and bottom substrates 12 and 14, which contains spacer 54, is preferably set "on the order of 5 μm." *Id.* at 4:16-19. Even though the spacer 53 may not be exactly the same height as the cell gap, which is disclosed to be around 5 microns, it would not make sense for spacer 54 to be as thin as the affixing layer, which is disclosed to be at most 1 micron. In our view, the statement that "the precise thickness of the spacer 54 in the Z direction can be achieved" implies that an additional layer of negative photoreactive polymide must be deposited on top of the affixing layer. Thus, the affixing layer and the spacing elements cannot be exactly the same layer.

It is significant that even Thomson does not argue that the height of the spacers can be the same as the thickness of the affixing layer and that as a result, the height of the spacers can vary greatly from the height of the cell gap. In response to AUO's argument that the specification discloses a disparity in thickness of the affixing layer and the spacing elements, Thomson argues that the cell gap is always larger than the spacer height because the cell gap is measured from the top and bottom substrates in the *active areas*, but the spacers are formed in the *non-active areas*, which have additional layers including electronics. Thomson, however, cites to nothing in the '063 patent to support its definition of "cell gap."

We turn to Thomson's argument that during prosecution of the '063 patent application, the examiner rejected the asserted claims, including claim 1, as anticipated by the Hasegawa reference, which discloses "a negative photosensitive layer disposed on the bottom substrate, wherein portions of the negative photosensitive layer are exposed to light, thereby, forming spacing elements disposed in non-display/active areas." *See* Complainant Thomson's Post-Trial Brief at 19, n.18 (citing JX-6 at THOM3375). We find that even if Thomson's argument were true, the rejection at best shows the views of the examiner and cannot be attributed to the patentee. *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1345 (Fed. Cir. 2005) ("[A]n applicant's silence regarding statements made by the examiner during prosecution, without more, cannot amount to a 'clear and unmistakable disavowal' of claim scope.").

Lastly, AUO's expert Dr. Lowe testified that it was common around the time of the '063 patent invention to use a thin layer , often called an "adhesion promoter," between two materials to promote adhesion of the spacing elements to the substrate. RX-554 at Q.174. Thus, there is support in the extrinsic evidence that one of ordinary skill in the art at the time of the '063 patent invention would understand that the "affixing layer" is distinct from the "spacing elements."

In sum, the claims recite the "affixing layer" and the "spacing elements" as two distinct elements, and the specification and prosecution history do not contradict the claim language. The words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art when read in the context of the specification and prosecution history. *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution. *Id.* Neither exception applies in this situation. Accordingly, the Commission finds that the proper construction of the term "affixing layer" is "a stratum of material that attaches the spacing elements to a substrate, and which is distinct from said spacing elements."[4]

3. Infringement of the '063 Patent

The products that allegedly infringe the '063 patent include CMI, Qisda, and BenQ LCD monitors and televisions that contain AUO and CMI LCD modules [

]. The CMI, Qisda, and BenQ LCD displays that use such AUO and CMI modules are identified in CMI's, Qisda's, and BenQ's interrogatory responses. CX-4242C at Q.219; CX-459C; CX-367C; CX-379C.

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[4] Note that we do not require the "affixing layer" to be "separate" from the "spacing elements," as required by the ALJ's construction. The term "separate" is inaccurate and is not required to resolve the issue of infringement. Two layers of materials deposited on top of one another are not necessarily "separate" layers even though they may be "distinct" layers. Thus, it is sufficient for the issue of infringement to determine whether two layers are "distinct."

The parties do not dispute that a determination of whether or not the accused modules infringe the asserted independent claims of the '063 patent turns on five issues: (1) whether the accused modules meet the limitation "affixing layer" of claim 1; (2) whether the accused modules meet the limitation "plurality of spacing elements" of claims 1 and 11; (3) whether the accused modules meet the limitation "anisotropic in shape" of claims 1 and 11; (4) whether the accused modules meet the limitation "mechanically rubbed" of claim 1 and the limitation "mechanically rubbing" of claim 11; and (5) whether the accused modules meet the limitation "forming a plurality of spacing elements . . . on the *front surface* . . . of said first substrate" of claim 11. ID at 329, 343.

We address each issue separately.

a. "Affixing Layer" of Claim 1

The ALJ found that the accused AUO and CMI modules do not meet the "affixing layer" limitation of claim 1 under his construction of the term, which requires that the affixing layer be distinct from the spacing elements. *Id.* at 330. The ALJ found that there is no affixing layer between the [ ] and the bottom substrate in the accused AUO and CMI modules. *Id.* at 331.

As discussed above in our claim construction analysis, we agree with the ALJ that claim 1 requires that the "affixing layer" be distinct from the "plurality of spacing elements." Specifically, the "affixing layer" is "a stratum of material that attaches the spacing elements to a substrate, and which is distinct from said spacing elements." We agree with the ALJ that the accused AUO and CMI modules do not meet this limitation. AUO's expert Dr. Lowe testified that the photospacers in the accused AUO modules are [

]

[ ]. RX-554C at Q.164-166. Dr. Lowe points to Figure 4 of Exhibit 28 of Thomson's complaint showing a scanning transmission electron microscope ("TEM") image of [ ]:

[ ]

Id. at Q.172. Although Thomson has drawn an arrow pointing to the lower portion of the spacing element and labeled it "Affixing Layer," Dr. Lowe pointed out that the [ ], and that the [ ]. *Id.* CMI's expert Dr. Wagner testified [ ] that nothing in the accused CMI module other than the [ ] themselves adheres to the bottom substrate. RX-636C at Q.118-126.

Lastly, we turn to Thomson's argument that the accused products meet the "affixing layer" limitation even under the ALJ's construction because there is an [ ].

Thomson Pet. at 40, n.15. In our view, Thomson's argument is unpersuasive because Thomson has not shown that the alleged [ ].

Accordingly, we agree with the ALJ that the accused AUO and CMI modules do not meet the "affixing layer" limitation of independent claim 1. As such, the Commission affirms the ALJ's non-infringement finding with respect to asserted independent claim 1 and asserted dependent claims 2-4 and 8.

b. "Plurality of Spacing Elements" of Claims 1 and 11

With respect to the accused CMI modules, the ALJ found that the [ ] in the accused CMI modules serve as the "plurality of spacing elements" of claim 1 and 11, but that the [ ] in the accused CMI modules do not. ID at 333. Under the ALJ's construction of "plurality of spacing elements," the spacers in the accused modules must contact the second substrate. *Id.* at 43. According to the ALJ, the [ ] in the accused CMI modules, but the [ ] do not because they do not normally contact both substrates between which they are situated. *Id.* at 333.

With respect to the accused AUO modules, the ALJ found that the [ ] in the accused AUO modules serve as the "plurality of spacing elements" of claims 1 and 11. According to the ALJ, AUO's expert Dr. Lowe admitted that the [ ] in the accused AUO modules are [ ]. *Id.* at 332. The ALJ did not address AUO's argument regarding the [ ] in AUO's accused modules.

As discussed above in our claim construction analysis, the proper construction of "a plurality of spacing elements" is "more than one spacing element, where a spacing element is a structure that functions to keep the gap between the two substrates substantially uniform." The accused CMI and AUO modules contain [ ]. The distinction between these spacers is [ ]. CX-4242C at Q.507; RX-554C at Q.246. While the

[ ]:

[ ]

CDX-244C; CDX-246C.

With respect to the [ ]. RX-554C at Q.246, 263. CMI's expert Dr. Wagner contends, however, that the [ ] in the accused CMI modules [ ]. RX-545C at ¶50-52, 87. According to Dr. Wagner, the cell gap in CMI's accused modules is determined by the [ ] rather than the [ ]. *Id.* at ¶52. Dr. Wagner does not explain, however, the function of the [ ], if it is the [ ] that maintains the cell gap. By contrast, both Dr. West and Dr. Lowe testified that it is impossible for [ ] to maintain a uniform cell gap in modern displays, and that [ ]. CX-4242C at Q.547; Tr. at 1350:7-20. Accordingly, Thomson has shown that the [ ] in the accused CMI and AUO modules meet the "spacing elements" limitation of claim 11.

We turn to whether the [ ] function to maintain a substantially uniform cell gap and thus meet the "spacing elements" limitation. The expert testimony from both sides is generally consistent regarding the specific purpose of the [ ]. According to Thomson's expert Dr. West, the [ ]. CX-4242C at Q.511-513. Similarly, CMI's expert Dr. Wagner and AUO's expert Dr. Lowe each testified that the [ ]. RX-636C at Q.258; RX-554C at 255-256. In others words, the [ ] do not themselves maintain the uniformity of the cell gap, but only [ ]. AUO's and CMI's experts both testified that [ ], the "cell gap tolerance" has been exceeded so that the cell gap is no longer "substantially uniform."

RX-554C at Q.245-46; RX-636C at Q.263-64. Thus, although we disagree with the ALJ on the proper construction of "spacing elements," the non-infringement result is the same with respect to the [ ] in the accused products. Thomson has not shown that the [ ] in the accused CMI and AUO modules keep the gap between the two substrates substantially uniform and thus meet the "spacing elements" limitation of claim 11.

c. "Anisotropic in Shape" of Claims 1 and 11

Because Thomson has not shown that the [ ] in the accused products are "spacing elements," Thomson must show that the [ ] meet the "anisotropic in shape" limitation of claim 11.

With respect to AUO, we agree with the ALJ that there is no real dispute that the "spacing elements" in the accused AUO modules are "anisotropic in shape." ID at 330 at n.45. Specifically, AUO's expert, Dr. Lowe, admitted that [ ] in the accused AUO modules are [ ], as required by the claims. Tr. at 1340:24-1342:18. Thus, Thomson has shown that the accused AUO products meet the [ ] limitation of claim 11.

With respect to CMI, Thomson admits that in some CMI accused products, the [ ] are not anisotropic. Thom. Resp. at 14. Dr. West admitted on cross-examination, for example, that in the accused [ ] panel, the [ ] (shown as the dot in the photograph below) are not anisotropic, and that only the [ ] (shown as rods in the picture below) are anisotropic:

[

]

Tr. at 189:2-190:4; CDX-250C. Similarly, CMI's expert Dr. Wagner testified that while the [ ] in the accused CMI modules are anisotropic in shape, *only some* of the [ ] in the accused modules are anisotropic in shape. 1385:21-1387:1. Thus, to show infringement, Thomson must identify the specific accused CMI modules that have [ ] that are "anisotropic in shape."

We find Thomson has not satisfied its burden. The testimony of its expert Dr. West with respect to the "anisotropic in shape" limitation did not tease out which accused CMI products have [ ] that are anisotropic and which products do not. Specifically, Dr. West testified that there are [ ] spacing elements in the accused CMI products, and that although not "all of the Accused Products have anisotropic [ ] . . . even panels where just the [ ] or just the [ ] are anisotropic meet the claim elements." CX-4242C at Q.504-507; 604-18. Moreover, Dr. West's testimony was conclusory at best. While his testimony was based on examination of CMI's design documents, the particular documents were excluded from evidence for lacking proper translation. *Id.* at Q.616-617. As for the GDS files showing masks used in the specific accused CMI products that allegedly contain anisotropic [ ], Dr. West did not testify as to these files. *See* Thom. Resp. at 13-15. Without expert guidance, it is not apparent from any of the mask images shown in these files whether the spacers are [ ] or [ ] or whether they are anisotropic. Thus, Thomson has not shown that the accused CMI products meet the "anisotropic in shape" limitation and thus has not shown that they infringe claim 11.

d. "Mechanically Rubbed" / "Mechanically Rubbing" of Claims 1 and 11

The ALJ found that the accused modules (both CMI and AUO modules) do not meet the "mechanically rubbed" / "mechanically rubbing" limitations of claims 1 and 11, either directly or under the doctrine of equivalents, [ ] *Id.* at 335-336. As discussed above in our claim construction analysis, however, the term "mechanically rubbing" of claims 1 and 11 means "using a machine or apparatus to apply a moving pressure" and does not contain a directional requirement. As found by the ALJ, it is undisputed that the spacing elements in both the AUO and CMI accused products are rubbed using [ ]. RX-554C at Q.202-203; RX-636C at Q.227. Because our construction of "mechanically rubbing" of claims 1 and 11 does not contain a directional requirement, we find that Thomson has shown that both the AUO and CMI accused products practice this limitation.

e. "Front Surface" / "Rear Surface" of Claim 11

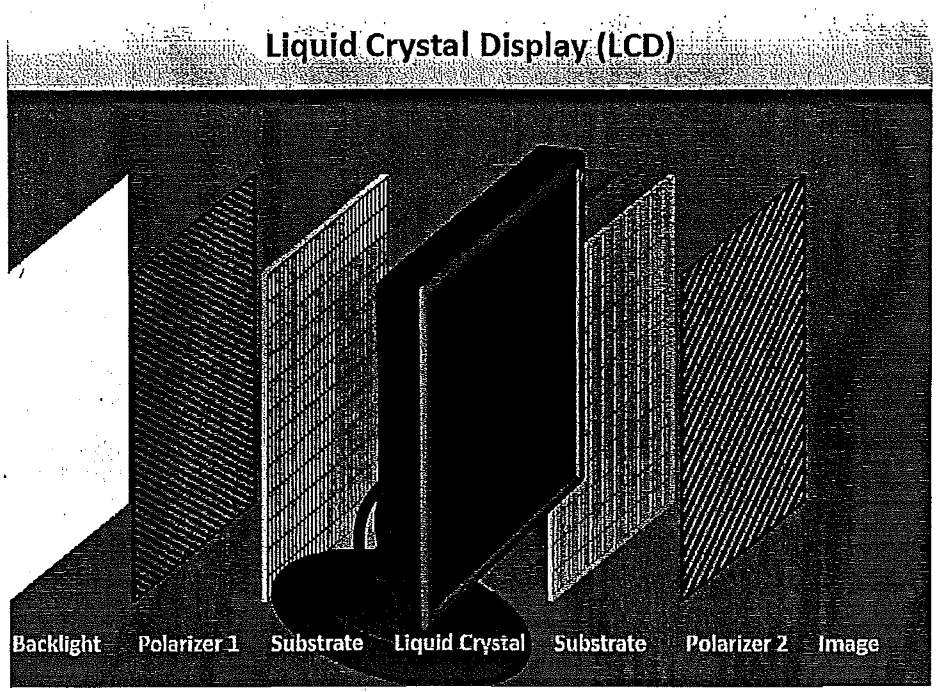
The ALJ found that the accused modules (both CMI and AUO modules) meet the limitation "forming a plurality of spacing elements . . . on the *front surface* . . . of said first substrate" of claim 11. ID at 344. While the ALJ did not address the terms "front surface" and "rear surface" of claim 11 in his claim construction analysis section of the ID, the ALJ found that claim 11 makes clear that "the front surface" of the first substrate is the surface upon which the spacing elements are formed, and the surface upon which the second substrate is mounted, thus locating the spacing elements between the two substrates. *Id.* The ALJ rejected AUO's argument that the front and rear surfaces refer to the position of the viewer. *Id.* The ALJ found that the accused products practice the "front surface" limitation of claim 11 because AUO's argument that this limitation is not met is based only on AUO's claim construction, which the ALJ rejected. *Id.*

AUO argues that the ALJ erred in failing to address the parties' dispute regarding the proper construction of the terms "front surface" and "rear surface" of claim 11. AUO argues that to the extent that the ALJ construed the "front surface" limitation, he erroneously concluded that the "front surface" is the surface upon which the spacing elements are formed. According to AUO, the proper construction of the terms must take into account the point of reference of the viewer. According to AUO, because the [

].

We disagree with AUO that the ALJ erred in failing to address the proper construction of the terms "front surface" and "rear surface" of claim 11. While the ALJ did not explicitly construe the terms in the claim construction section of his ID, he did make a claim construction finding in addressing infringement of these terms by the accused products. According to the ALJ, "the claim makes clear that *the 'front surface' of the first substrate is the surface upon which the spacing elements are formed, and the surface upon which the second substrate is mounted*, thus locating the spacing elements between the two substrates." *Id.* at 344 (emphasis added). According to the ALJ, "[a]s a result the second substrate is kept at a substantially uniform distance from the first substrate by said spacing elements. *Id.* Thus, based on the claim language itself, the ALJ construed the "front surface" of the first substrate to mean "the surface upon which the spacing elements are formed, and the surface upon which the second substrate is mounted." The "rear surface" is the surface opposite the front surface, which the parties agreed to in their proposed constructions. JX-37.

We turn to AUO's argument that to the extent the ALJ construed "front surface" and "rear surface," his construction is incorrect and the accused products do not meet the "front surface" limitation under AUO's construction of the term. AUO's argument is best explained in reference to the illustration below:



CDX-541. According to AUO, the "front surfaces" of each of the two substrates recited in claim 11 are the surfaces of the two substrates on either side of the liquid crystal that face the viewer (to the right side of the illustration above). AUO argues that [

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[

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In our view, the ALJ correctly construed "front surface" as "the surface upon which the spacing elements are formed, and the surface upon which the second substrate is mounted." In other words, "front surface" is the surface facing the liquid crystal layer of the module, which is away from the viewer. The language of claim 11 makes no reference to the position of the viewer in reciting "a front surface" and "a rear surface," but refers to the front surface of the first substrate as the surface on which the spacing elements are formed as well as the surface on which the second substrate is attached:

> 11. A method of forming a display cell comprising:
>
> providing a first substrate which has been partitioned into an active aperture area and a non-active area and has ***a front surface*** and a rear surface;
>
> forming a plurality of spacing elements separate from one another ***on the front surface*** and non-active areas of said first substrate, the spacing elements being anisotropic in shape;
>
> mechanically rubbing over the first substrate having the plurality of spacing elements formed thereon; and
>
> attaching a second substrate ***on the front surface*** of said first substrate, said second substrate being kept at a substantially uniform distance from said first substrate by said spacing elements.

'063 patent at claim 11 (emphasis added). The language further indicates that, as a result, a substantially uniform distance is maintained between the two substrates by placing spacers on the front substrate surface that faces the front surface of the second substrate, *i.e.*, the surface that faces the interior of the display cell.

AUO cites to the introductory section of the '063 patent specification describing the related art to argue that the point of reference for the terms "front" and "rear" is the viewer of the display. AUO Pet. at 14 (citing '063 patent at 1:13-21). In our view, however, the uses of the term "front" and "rear" at column 1, lines 13-21, of the '063 patent do not concern substrate surfaces — they concern things such as rear projection monitors, and front and rear glass layers.

AUO also cites to the testimony of Dr. Parsons, Thomson's technical expert for the '556 and '674 patents, and argues that Dr. Parsons' testimony directly contradicts the ALJ's conclusion that the term "front surface" and "rear surface" do not relate to the viewer of the display. AUO Pet. at 16 (citing CX-4244C at Q.22-23). We find that AUO mischaracterizes Dr. Parsons' testimony. Dr. Parsons was not testifying about claim terms in the '063 patent. Moreover, Dr. Parsons was testifying about a finished monitor in general and not a substrate in the process of forming a display cell as in claim 11 of the '063 patent.

Lastly, we point out that the ALJ's construction of "front" and "rear" surfaces is consistent with the extrinsic evidence in the form of inventor testimony. The inventor of the '063 patent, Dr. Ho, testified that [

]. Because AUO's argument that this limitation is not met is based only on AUO's claim construction, which the ALJ correctly rejected, we agree with the ALJ's finding that the accused products meet the "front surface" limitation of claim 11.

For the foregoing reasons, we affirm the ALJ's finding that the accused AUO and CMI products do not infringe claim 1. We also affirm the ALJ's finding that the accused CMI products do not infringe claim 11. We reverse the ALJ's finding that the accused AUO products do not infringe claim 11.

f. Dependent Claims 2-4, 8, 12, 14, 17, and 18

The ALJ found that Thomson has shown that the accused modules (both CMI and AUO modules) meet each of the requirements of the dependent claims 2-4,12, 14, 17, and 18. ID at 339, 346-347. The parties do not challenge these particular findings. The ALJ concluded, however, that because these claims depend from independent claims 1 and 11, which he found not to be infringed, these claims are also not infringed. *Id.*

Because we find that the accused AUO products infringe claim 11, we also find that the accused AUO products infringed claims 12, 14, 17, and 18. With respect to CMI, however, because the accused CMI products do not infringe claim 11, they also do not infringe claims 12, 14, 17, and 18.

4. Obviousness of the Asserted Claims of '063 Patent in View of Sugata and Tsuboyama

The ALJ found that claims 1-4, 8, 11, 12, 14, and 18 are obvious over U.S. Patent No. 4,568,149 to Sugata ("Sugata") in view of U.S. Patent No. 4,775,225 to Tsuboyama ("Tsuboyama"). ID at 202. The ALJ found that Sugata discloses each of the limitations of the above claims except mechanical rubbing of the substrate and spacers *after* the spacers have been formed. *Id.* at 172. The ALJ found that although Sugata discloses forming spacers and the need to apply an orientation controlling treatment (*i.e.*, mechanical rubbing), Sugata does not reveal whether the mechanical rubbing is performed on the spacer members and when the mechanical rubbing occurs. *Id.* at 172-73. The ALJ found the limitation to be disclosed in Tsuboyama and that a person of ordinary skill in the art would be motivated to combine Sugata and Tsuboyama at the time of the invention of the '063 patent. *Id.* at 202-04. The ALJ thus found that respondents have presented a *prima facie* case of obviousness for asserted claims 1-4, 8, 11, 12, 14, and 18. *Id.* at 208. The ALJ found that the secondary considerations offered by Thomson failed to overcome this obviousness showing. *Id.*

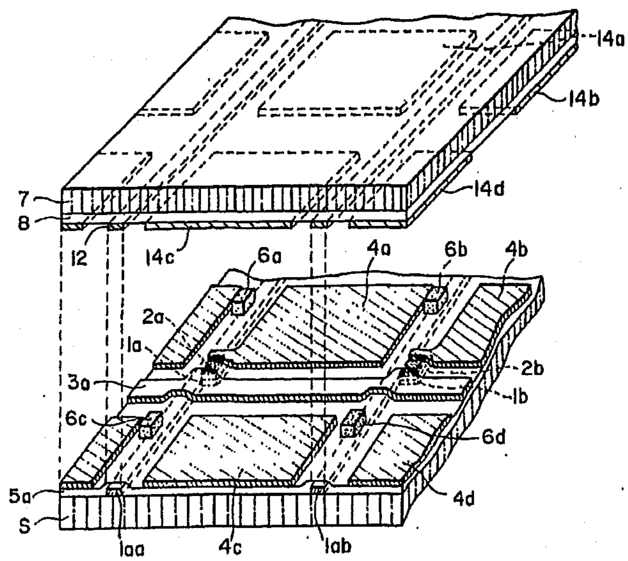
With respect to dependent claim 17, the ALJ found that the record lacks clear and convincing evidence that the combination of Sugata and Tsuboyama discloses that the spacing elements are photolithographically formed. *Id.* at 205. Thus, the ALJ concluded that the invention of claim 17 is not obvious.

The Sugata patent issued February 4, 1986 and is prior art under 35 U.S.C. § 102(b). RX-15. Sugata teaches an active matrix liquid crystal display panel having spacers for maintaining a uniform gap between two substrates (referred to as electrode plates). *Id.* at Abstract, 2:45-3:2. As found by the ALJ, Sugata discloses almost all of the elements of asserted claims 1-4, 8, 11, 12, 14, and 18 of the '063 patent under either parties' constructions, including anisotropic spacers that remain in the non-active areas of the substrate, an affixing layer that affixes the spacers to one electrode plate, and a cell gap between the two electrode plates that is kept substantially uniform by the spacers. *See* RX-158C at Q.344-373. In addition, Sugata discloses a mechanical rubbing step to control the orientation of the liquid crystal. RX-15 at 4:38-44. The parties dispute, however, whether Sugata's rubbing step is performed *after* the spacers are formed, as required by the claims. Specifically, claim 1 recites "after one of the two substrates and the plurality of spacing elements have been mechanically rubbed," and claim 11 recites the step of "mechanically rubbing over the first substrate having the plurality of spacing elements formed thereon," which occurs after the step of forming the spacing elements. We note that these sequential limitations were added by amendment to distinguish from a prior art reference cited by the Examiner during prosecution of the '063 patent application. JX-6 at THOM3427-31.

The Tsuboyama patent issued on October 4, 1988 and is prior art under 35 U.S.C. § 102(b). RX-18. Tsuboyama discloses a liquid crystal device having two substrates (referred to as first and second base plates) and anisotropic spacers between the substrates that are mechanically rubbed along their long axis. *Id.* at Abstract, 2:34-46.

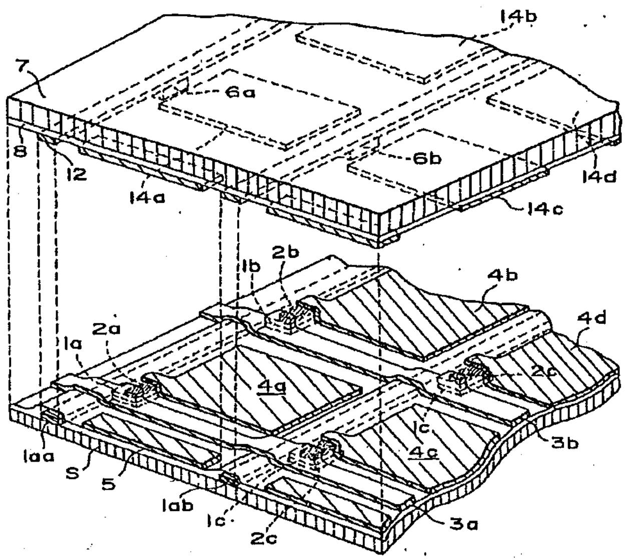
Thomson argues that one of ordinary skill in the art would not be motivated to combine Sugata with the teachings of Tsuboyama so that rubbing occurs *after* the spacers are formed, as required by the claims, because Sugata already discloses rubbing the substrate *prior to* spacer formation. Thus, according to Thomson, one of ordinary skill in the art would have no reason to modify Sugata with the teachings of Tsuboyama. For the reasons explained below, we disagree with Thomson that Sugata discloses rubbing *prior to* spacer formation. Rather, as found by the ALJ, Sugata does not reveal the sequence in which spacer formation and mechanical rubbing occur.

Although spacer formation on a substrate and rubbing of a substrate are discussed in two alternative embodiments in Sugata, it is not clear in either embodiment whether the substrate on which the spacers are formed is the same substrate that is rubbed, *i.e.*, whether rubbing occurs after the spacers are formed. The first embodiment is shown in Figure 3(a):



RX-15 at Fig. 3(a). With respect to Figure 3(a), Sugata states that "in the liquid crystal display panel, spacer members 6a, 6b, 6c, 6d are fixed on row electrodes 1aa, 1ab on the electrode plate S through the insulating layer 5a." RX-15 at 3:47-51. In other words, spacers 6a-6d are formed on insulating layer 5a. Sugata then states that "each surface of two electrode plates in contact with the liquid crystal may be coated with an *insulating material*." *Id.* at 4:31-33 (emphasis added). Sugata further states that "*to the insulating film* . . . an orientation controlling treatment is applied. . . . As a typical process, the surface of the insulating film is rubbed in one direction with a velvet or cloth." *Id.* at 4:38-44 (emphasis added). We find that it is not clear whether the "insulating film" that is rubbed is the "insulating layer 5a" on which the spacers 6a-6d are formed or the "insulating material" that is coated on top of the spacers 6a-6d. On one hand, AUO's expert Dr. Lowe testified that the insulating film that is rubbed is not the insulating layer 5a on which the spacers 6a-6d are formed, but an additional insulating film (not shown) that is coated on top of the spacers 6a-6d, thereby subjecting spacers 6a-6d to the rubbing treatment after the spacers are formed as required by the claims. RX-158 at Q.335-336. On the other hand, Thomson's expert Dr. West testified that the orientation insulating film that is rubbed is the same as the insulating layer 5a. Tr. 1586:12-16. We find neither testimony to be persuasive. We find that the first embodiment does not clearly disclose whether rubbing occurs prior to spacer formation, as urged by Thomson, or after spacer formation, as required by the claims.

Neither is the sequence of rubbing and spacer formation clearly disclosed in the second embodiment of Sugata, which is shown in Figure 3(b):



F I G. 3(b)

RX-15 at Fig. 3(b). According to the description accompanying Figure 3(b), spacers 6a-6d are formed on "an insulating layer (not shown)" coated on non-transmissive members 12 and color filters 14a-14d. *Id.* at 5:1-4. The description accompanying Figure 3(b), however, does not mention rubbing of the insulating layer on which the spacers 6a-6d are formed. According to Thomson, this "insulating layer" of Figure 3(b) must be the same "insulating film to which an orientation controlling treatment is applied," as described with respect to Figure 3(a). CX-4304C at Q.319-321. We do not find this argument persuasive. Again, it is not clear whether the "insulating layer" described with respect to Figure 3(b) is the same "insulating film" that is rubbed. Thus, as with the first embodiment in Sugata, it is not clear whether rubbing occurs prior to spacer formation, as urged by Thomson, or after spacer formation, as required by the claims.

Because we disagree with Thomson that Sugata clearly discloses rubbing the substrate *prior to* forming spacers on the substrate, we also disagree with Thomson's argument that one of ordinary skill in the art would not be motivated to modify Sugata with Tsuboyama's teaching of rubbing *after* spacer formation to arrive at the claimed invention. On the contrary, the evidence indicates that one of ordinary skill in the art would be motivated to combine the references to arrive at the claimed invention.

As found by the ALJ, Sugata and Tsuboyama share a common goal of providing spacing elements that do not disturb the orientation or alignment of the liquid crystal molecules in the active area of the display. Specifically, Sugata states its object as "provid[ing] a liquid crystal display panel in which alignment or orientation of liquid crystal molecules is not disturbed on an image display surface." RX-15 at 2:54-57. Similarly, Tsuboyama states that its invention provides a liquid crystal device "which is free of orientation or alignment defects over the whole area of the device despite spacers which are present" within the liquid crystal. RX-18 at 2:35-38. In Sugata, the goal of avoiding orientation or alignment defects is accomplished by locating the spacers in the light non-transmissive areas of the display panel. RX-15 at 6:49-52. In Tsuboyama, this same goal is accomplished by providing rectangular spacers that are narrow in a direction perpendicular to the rubbing direction, *i.e.*, rubbing in the direction of the long axis, which occurs *after* the spacers are formed. RX-18 at Fig. 3B, 2:46-50, 4:49-51, 4:66-5:6.; Fig. 10, 7:51-58.

The evidence further indicates that a person of ordinary skill in the art would be motivated by the common goal of avoiding orientation defects to combine Sugata's teaching of locating the spacers in the non-active area of the substrate with Tsuboyama's teaching of rubbing along the long axis of the spacers after spacer formation. Specifically, respondents' expert Dr. Lowe testified that a person of ordinary skill in the art who was following the teachings of Sugata would be interested in additional steps that could be taken to avoid defects in the alignment or orientation of the liquid crystal molecules in the image display area in the vicinity of the spacers. RX-158C at Q.542. According to Dr. Lowe, the person of ordinary skill would recognize that, in addition to locating the spacers in the light non-transmissive areas of the display panel, as taught by Sugata, a further improvement could be achieved by forming spacers that are rectangular in shape and rubbing along the long axis of the spacers after the spacers are formed, as taught by Tsuboyama. *Id.*

In addition, the evidence indicates that the combination of Sugata and Tsuboyama is a combination of known elements that yield predictable results. Thomson does not dispute Dr. Lowe's testimony that at the time of the '063 patent, it was known that the mechanical rubbing step could be performed *either before or after* the spacers were formed on the substrate. Tr. 1095:1-8 ("[B]oth processes were known"). Also, the '063 patent itself acknowledges that it was well known to perform rubbing after the spacers have been formed on the substrate, stating that "[p]rior art spacers that are post-like are easily destroyed by the rubbing process." '063 patent at 4:34-35. In addition, Tsuboyama describes in detail the effects of mechanically rubbing anisotropic spacers to the alignment or orientation of the liquid crystals. RX-18 at 4:66-5:6, 10:40-45, cols. 9-12, tbls. 1-4. Thus, we agree with the ALJ that respondents have shown a *prima facie* case of obviousness of claims 1-4, 8, 11, 12, 14, and 18.

We turn to the ALJ's finding that the combination of Sugata and Tsuboyma does not render claim 17 of the '063 patent obvious. Claim 17 recites:

> The method of claim 11, wherein the forming step comprises photolithographically forming the spacing elements having the anisotropic shape using a mask.

We find that the evidence shows that Tsuboyama discloses forming spacing elements using photolithography. Specifically, Dr. West discussed in detail that Tsuboyama discloses formation of spacing elements using photoresist, etching, and masking:

> The method of forming the spacers of Figure 3A is described in column 8, lines 26-52 of the Tsuboyama patent. First, the two glass substrates covered in stripe ITO electrodes are each coated with a polyimide film. These polyimide films are then heat-cured. Then, a second polyimide film that will result in a film of approximately 1 micron thickness is applied to one of the substrates. *To this polyimide film a photoresist solution is applied, and the materials are pre-baked. Then, the photoresist is exposed through a mask to form a pattern on top of the polyimide film. then the polyimide film is selectively etched using the mask just formed.* At the end of this process the remaining polyimide pattern is heat cured to form the material shown in Figure 3A ofTsuboyama.

CX-4304C at Q.431 (emphasis added).

Moreover, we find that Sugata also discloses forming spacing elements using photolithography. Sugata discloses forming spacing elements by forming a film and then patterning the film through etching:

> Spacer members 6a, 6b, 6c, 6d, ..., etc. may be formed by vapor deposition, sputtering and the like with a mask having a predetermined pattern, or by forming a uniform film having a thickness substantially equally to that of the liquid crystal layer by vapor deposition, sputtering[,] coating or the like *and then patterning the film through etching of portions other than those forming spacers.*

RX-15 at 5:44-51 (emphasis added). Dr. Lowe's testimony shows that Sugata's disclosure of "forming a uniform film" and "then patterning the film through etching of portions other than those forming spacers" is a disclosure of photolithographically forming the spacers using a mask.

Q: How are the spacer members formed in Sugata, RX-15?

> A: According to Sugata, spacer members 6a, 6b, 6c, 6d may be formed by vapor deposition or sputtering with a mask having a predetermined pattern or by forming a film and then patterning the film through etching of portions other than those forming spacers.
>
> . . .
>
> Q: Does Sugata disclose photolithographically forming the anisotropically shaped spacing elements using a mask, as recited in claim 17?
>
> A: Yes. Sugata teaches that spacer members 6a, 6b, 6c, 6d are formed photolithographically using a mask and that they can be anisotropic in shape.

RX-158C at Q.332, 373. As acknowledged by the ALJ, Thomson made no effort to rebut Dr. Lowe's testimony on this point. ID at 205, n.28 (citing CX-4304C at Q.442-446; CDX-1351). We disagree with the ALJ that, because Sugata does not contain the word "photolithographically," this claim element is not disclosed. In addition to the testimony of Dr. Lowe, the testimony of Thomson's expert Dr. West acknowledges that the act of forming a film and then patterning the film is known as "photolithography":

> Q.47. What does it mean that the spacers are "photolithographically formed"?
>
> A. Photolithography is a technique for selectively *patterning* a material on a substrate. CDX-0026 to CDX-0030 illustrates this technique.

CX-4242C at Q.47 (emphasis added). Dr. West also testified that in the '063 patent, "the spacers are first formed when they are *patterned* onto the substrate in only the non-active areas." CX-4304C at Q.295 (emphasis added). Accordingly, we find that respondents have shown a *prima facie* case of obviousness of claim 17.

Lastly, we turn to Thomson's commercial success argument. Once a challenger has presented a *prima facie* case of invalidity, the patentee has the burden of going forward with rebuttal evidence, which may include evidence of secondary considerations of non-obviousness such as commercial success, long felt but unsolved needs, failure of others, and so forth. *Pfizer Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007). Commercial success is usually shown by significant sales in a relevant market and that the successful product is the invention disclosed and claimed in the patent. *Ormco Corp. v. Align Tech. Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006). Evidence of commercial success is only significant, however, if there is a nexus between the claimed invention and the commercial success. *Id.* at 1311-12. If the commercial success is due to an unclaimed feature of the device, or if the feature that creates the commercial success was known in the prior art, the commercial success is irrelevant. *Id.* at 1312.

To show commercial success, Thomson offered the testimony of Dr. West that there is widespread infringement by respondents' accused products and that the photolithographically formed anisotropic spacers of the '063 patent are important to a successful display cell both during the manufacturing and in the field. CX-4304C at Q.449-451. In our view, Dr. West's conclusory testimony that the "['063] spacers are critical to the proper manufacturing and utility in the field of the display cells at issue" is insufficient to demonstrate a nexus between the alleged commercial success and the features that allegedly distinguish the claimed invention from the prior art. *See id.* Dr. West's testimony does not show that the accused products are coextensive with the claimed features of the '063 patent, or that favorable results in the accused products could be achieved only by using the combination of features claimed in the '063 patent. Thus, ALJ correctly found that Thomson's assertions regarding secondary considerations are unsupported by the evidence and fail to rebut respondents' strong showing of obviousness.

Accordingly, we find that respondents have shown by clear and convincing evidence that all asserted claims of the '063 patent, including claim 17, are rendered obvious by Sugata in combination with Tsuboyama. As such, the Commission affirms the ALJ's finding that claims 1-4, 8, 11, 12, 14, and 18 are rendered obvious by Sugata and Tsuboyama and reverses the ALJ's finding that claim 17 is not rendered obvious by the combination.

5. Anticipation of the Asserted Claims of '063 Patent in View of Either Lowe or Miyazaki

U.S. Patent No. 5,801,796 to Lowe ("Lowe") was filed on May 10, 1996, eleven months before the filing date of the '063 patent. U.S. Patent No. 5,978,061 to Miyazaki ("Miyazaki") was filed on September 5, 1996, seven months before the filing date of the '063 patent. As a result, both references are presumptively prior art under 35 U.S.C. § 102(e). Before the ALJ, respondents argued that both references anticipate the '063 patent. Thomson attempted to "swear behind" the references, arguing that the '063 patent invention was conceived and reduced to practice before the filing dates of Lowe and Miyazaki.

The ALJ found that Lowe and Miyazaki are not prior art to asserted claims 11, 12, 14, 17, and 18 of the '063 patent because Thomson has shown that the claims were reduced to practice before the effective dates of Lowe and Miyazaki. ID at 152. The ALJ found, however, that Lowe and Miyazaki are prior art to asserted claims 1-4 and 8 because Thomson has not shown that the claims were reduced to practice before the effective dates of Lowe and Miyazaki. *Id.*

With respect to Lowe, the ALJ found that even if Lowe is prior art to all asserted claims, Lowe does not anticipate any of the asserted claims. *Id.* at 182. With respect to Miyazaki, the ALJ found that respondents have failed to offer clear and convincing evidence that Miyazaki anticipates claims 1-4 and 8 of the '063 patent. *Id.* at 186. The ALJ found, however, that if Miyazaki is prior art to claim 11 and its dependent claims, it would anticipate claims 11, 12, 14, and 18, but not claim 17. *Id.* at 187.

a. Conception and Reduction to Practice

Priority of invention usually goes to the first party to reduce an invention to practice, unless the other party can show that it was the first to conceive the invention and that it exercised reasonable diligence in later reducing that invention to practice. *Mahurkar v. C.R. Bard Inc.*, 79

F.3d 1572, 1577 (Fed. Cir. 1996). To have conceived of an invention, an inventor must have formed in his or her mind a definite and permanent idea of the complete and operative invention, as it is hereafter to be applied in practice. *Id.* Reduction to practice follows conception. *Id.* at 1577. To show actual reduction to practice, an inventor must demonstrate that the invention is suitable for its intended purpose. *Id.* at 1578. Depending on the character of the invention and the problem it solves, the showing of reduction to practice may require test results. *Id.* Conception and reduction to practice cannot be established solely on the basis of an inventor's testimony but must be corroborated by independent evidence. *Loral Fairchild Corp. v. Matsushita Elec.*, 266 F.3d 1358, 1363 (Fed. Cir. 2001). The sufficiency of such corroborating evidence is evaluated under a "rule of reason," considering all of the pertinent evidence. *Id.*

In an infringement action, when a party offers into evidence a prior art reference challenging the validity of the asserted patent, the burden of production shifts to the patentee to show that the patented invention was conceived and reduced to practice with reasonable diligence. *Stamps.com Inc. v. Edicia Inc.*, 437 Fed. App'x. 897, 908 (Fed. Cir. 2011); *Mahurkar* at 1576. In other words, when a patent's validity is challenged on the basis of a prior art reference, the patentee has the burden of production in antedating (or "swearing behind") the prior art reference. The party that challenges the validity of the asserted patent, however, bears the burden of persuasion by clear and convincing evidence on all issues relating to the status of the reference as prior art. *Id.*

We analyze the evidence presented by Thomson to determine whether Thomson has met its burden of production in showing that the asserted claims of the '063 patent were conceived and reduced to practice before Lowe (filed on May 10, 1996) and Miyazaki (filed on September 5, 1996). Thomson presents the testimony of inventor Dr. Ho, who along with Dr. Crawford, devised the invention [

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Thomson presents the following evidence as independent corroboration to Dr. Ho's testimony: [

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[

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We find that [ ] discusses most of the limitations of the asserted claims. As found by the ALJ, [

], however, does not discuss assembling a second substrate to the first substrate on which the "smart spacers" are fabricated to form a complete display cell, as required by all of the asserted claims. [ ] also does not discuss whether there is a distinct "affixing layer" between the spacers and the substrate, as required by claims 1-4 and 8. Rather, [

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With respect to claims 1-4 and 8, which require the presence of an "affixing layer," we find that Thomson has not met its burden of production in showing that the claimed invention was conceived and reduced to practice before the filing dates of Lowe and Miyazaki. As noted above, [

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[ ]. Thus, we agree with the ALJ that Lowe and Miyazaki are prior art to claims 1-4 and 8 of the '063 patent.

We also agree with the ALJ that Lowe and Miyazaki are not prior art to claims 11, 12, 14, 17, and 18. We find that Thomson has met its burden of production with respect to these claims. [

]. Evaluating the evidence together under a "rule of reason," we find that Thomson has presented sufficient independent corroboration to Dr. Ho's testimony that the complete display cells were built, tested, and worked for their intended purpose. "The law does not impose an impossible standard of 'independence' on corroborative evidence by requiring that every point of a reduction to practice be corroborated by evidence having a source totally independent of the inventor; indeed, such a standard is the antithesis of the rule of reason." *Knorr v. Pearson*, 671 F.2d 1368, 1374 (C.C.P.A. 1982). Thus, we find that

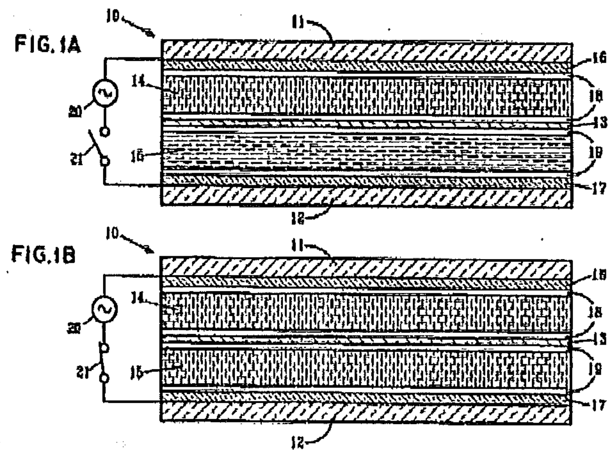
Thomson has met its burden of production in showing that claims 11, 12, 14, 17, and 18 of the '063 patent were conceived and reduced to practice before the filing dates of Lowe and Miyazaki, but has not met its burden with respect to claims 1-4 and 8.

We turn to whether respondents have met their ultimate burden of persuasion in establishing Lowe and Miyazaki as prior art with respect to claims 11, 12, 14, 17, and 18. Citing the Federal Circuit's decisions in *Hahn v. Wong*, AUO and CMI argue that documents originating from the inventor cannot serve as independent corroboration. We do not read the Court's case law on reduction-to-practice so narrowly. The Federal Circuit has found that documents made by the inventor can serve as independent corroboration to the inventor's subsequent testimony when the documents show an appreciation of the invention and that the invention was communicated to others. *See, e.g., Purdue Pharma L.P. v. Boehringer Ingelheim GMBH*, 237 F.3d 1359, 1366 (Fed. Cir. 2001) (finding sufficient corroboration in graphs and memos that showed an appreciation of the invention, its benefits, and its practice in the trials, indicating that the invention was communicated to others). [ ] and thus shows an appreciation of the invention. Moreover, the contents of [ ] were communicated to others. [ ] Although there is no clear author named for [ ], respondents never asserted that the document originated entirely from the inventors themselves. Thus, we find that respondents have not met their burden, by clear and convincing evidence, in establishing Lowe and Miyazaki as prior art with respect to claims 11, 12, 14, 17, and 18 of the '063 patent. As discussed above, respondents have, however, established Lowe and Miyazaki as prior art to claims 1-4 and 8.

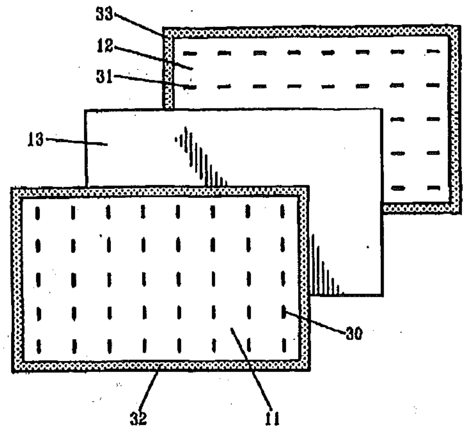
b. Anticipation of the Asserted Claims by Lowe and Miyazaki

We turn to whether claims 1-4 and 8 are anticipated by Lowe and Miyazaki and whether claims 11, 12, 14, 17, and 18 would be anticipated if Lowe and Miyazaki were prior art to those claims.

Lowe discloses a liquid crystal display cell having a stacked double-cell construction:



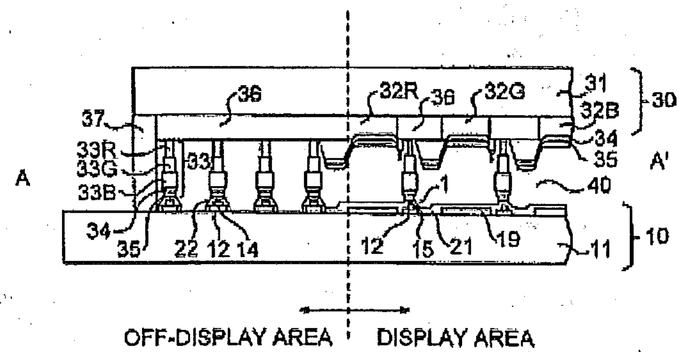
RX-16, Figs. 1A and 1B, Abstract. Thomson does not dispute that Lowe discloses a "transparent front substrate 11," "a transparent or opaque rear substrate 12," and an "intermediate substrate 13," together forming two display cell compartments 14 and 15, each of which is filled with liquid crystal material. RX-16, 3:15-21. Thomson also does not dispute that Lowe discloses anisotropic spacers 30 and 31 that are deposited on the "interpixel" gaps of substrates 11 and 12, respectively, followed by rubbing of the substrates in the direction of the long axis of the spacers.



RX-16, Fig. 2, 4:49-5:9. The parties dispute, however, whether one of the substrates disclosed by Lowe is partitioned into "an active aperture area and a non-active area" as required by claims 1 and 11. Specifically, AUO argues that the rear substrate 12 in Lowe has a multiplicity of transparent pixel electrodes (*i.e.*, "active aperture areas") separated by interpixel gaps (*i.e.*, non-active areas), in which the spacers are hidden.

The ALJ correctly found that Lowe does not disclose portioning the rear substrate 12 into active aperture areas and non-active areas. Rather, according to Lowe, the "inner surface of the rear substrate is coated with an electrode material 17 which can be transparent or opaque, reflective or light absorbing, depending on the particular liquid crystal effect employed." *Id.* at 4:22-25. In other words, the rear substrate 12 is either all opaque or all transparent. Although AUO argues that the "interpixel gaps" in which the spacers are formed are the "non-active areas, AUO does not provide any explanation for its assertion. Moreover, as found by the ALJ, Thomson's expert Dr. West testifed that the interstitial gaps are not opaque non-active areas. CX-4304 at Q.350. Thus, we agree with the ALJ that Lowe does not disclose portioning the substrate into active-aperture and non-active areas, as required by the claims. Accordingly, we find that Lowe does not anticipate any of the asserted claims.

We turn to the Miyazaki patent, which discloses a liquid crystal display device having pillar-shaped spacers (shown as 33 in the figure below) for keeping a constant distance between the active matrix substrate (shown as 10 in the figure below) and the color filter substrate of a liquid crystal display cell (shown as 30 in the figure below):



RX-12, Abstract, Fig. 1; RX-158C at Q.423. Respondents challenge the ALJ's finding that Miyazaki does not disclose an "affixing layer" as required claims 1-4 and 8, and the ALJ's finding that Miyazaki does not disclose forming spacers using photolithography as required by claim 17. Thomson, however, does not challenge the ALJ's finding that Miyazaki discloses each of the limitations of claims 11, 12, 14, and 18 of the '063 patent and thus would anticipate if it were prior art.

With respect to claims 1-4 and 8, AUO argues that the ALJ erred in finding that Miyazaki does not disclose an "affixing layer," when Thomson admitted that the red color layer 32R is an "affixing layer" under the ALJ's construction of the term. We do not find AUO's argument persuasive. First, we point out that respondents themselves, who have the ultimate burden of persuasion, never presented their own expert testimony showing that Miyazaki discloses an "affixing layer" under the ALJ's construction of the term, which requires a stratum of material that attaches the spacing elements to a substrate, and which is distinct from said spacing elements. Rather, Dr. Lowe testified that his anticipation opinion with respect to the "affixing layer" limitation "is based only on Complainants' proposed construction." RX-158C at Q.422.

Second, although Dr. West testified that the red color layer 32R functions as a material that attaches the spacer 33 to the substrate, he also testified that red color layer 32R covers one-third of all subpixels and is not substantially outside of the active aperture area. CX-4304C at Q.367-393. Thus, Dr. West's testimony shows that the red color layer 32R cannot serve as the "affixing layer" of claim 1 even under the ALJ's construction of the term, because it does not meet claim 1's requirement that "the affixing layer cover[] at least a portion of the non-active area and remain[] substantially outside the active aperture area." Accordingly, we agree with the ALJ that respondents have not met their burden by clear and convincing evidence that Miyazaki discloses each of the limitations of claims 1-4 and 8 and thus anticipates those claims. We also agree with the ALJ in light of Thomson's failure to petition that Miyazaki would anticipate claims 11, 12, 14, and 18 if it were prior art to those claims.

We disagree, however, with the ALJ that Miyazaki does not disclose forming spacers using photolithography as recited in claim 17. The ALJ found that Miyazaki describes forming "stacked" spacers consisting of three color layers of red, blue, and green, and that such a process is much different from the process of photolithography. ID at 186, 188. The ALJ's finding is contrary to expert testimony from both sides. Thomson's expert Dr. West testified that the three color layers that form stacked spacers are each formed using a patterning process, which he refers to as "photolithography." CX-4304C at Q.371, CX-4242C at Q.47. According to Dr. West, "the layer of red color material is *photolithographically* patterned," and that after the layer of red material has been developed and baked, "a layer of green color material is layered over the entire substrate," then "a mask is used to pattern the green color layer." CX-4305C at Q.380

(emphasis added). Dr. West further testified that "a layer of blue material is layered over the entire substrate and patterned using a mask." *Id.* Also, respondents' expert Dr. Lowe testified that each of the three color layers are formed using photolithography. RX-158C at Q.433. According to Dr. Lowe, "a red-pigmented photosensitive resist [is] coated on the substrate and then patterned using *photolithography* and a mask to form the red color filters, including the bottom layer of the spacers." *Id.* (emphasis added). Dr. Lowe further testified that "[t]he green and blue filters are formed in a similar manner, with a portion of the blue and green layers overlapping the red layer in order to form spacers constructed of the stacked color filter layers." *Id.* Based on the foregoing evidence, we find that respondents have shown by clear and convincing evidence that Miyazaki discloses the limitation of claim 17 of forming spacers using photolithography and thus anticipates the claim.

In sum, we affirm the ALJ's finding that Lowe and Miyazaki are prior art to claims 1-4 and 8 of the '063 patent, and that respondents have not shown that either Lowe or Miyazaki anticipates claims 1-4 and 8. Also, we find that if Lowe and Miyazaki were prior art to claims 11, 12, 14, 17, and 18 of the '063 patent, only Miyazaki would anticipate claims 11, 12, 14, 17, and 18, but respondents have not shown that Lowe or Miyazaki are prior art to those claims.

C. The '556 Patent

1. The Invention of the '556 Patent

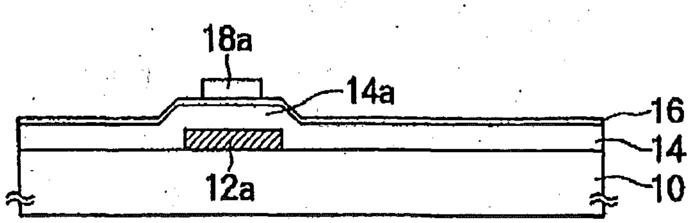
The '556 patent is directed to a method for manufacturing an active LCD. An active matrix LCD includes multiple thin-film transistors ("TFTs"), which are switches that control the orientation of liquid crystal, thereby controlling the amount of light passing through the LCD panel. The process for forming TFTs is called the "photo-exposure process" or "PEP," which involves a series of steps including thin film deposition, photolithography or "masking," and etching. The '556 patent provides a five-mask PEP process for forming a TFT. Dependent claim 3 is the only asserted claim for the '556 patent.

The Commission determined not to review the ALJ's finding that Thomson has not shown that the accused products infringe claim 3.

2. Obviousness of the '556 Patent over Takizawa in view of Possin

Before the ALJ, CMI and AUO argued that U.S. Patent No. 5,483,082 to Takizawa ("Takizawa"), either alone or in combination with U.S. Patent No. 5,041,888 to Possin ("Possin"), renders claim 3 obvious. The ALJ found that respondents have not shown by clear and convincing evidence that Takizawa, either alone or in combination with Possin, renders claim 3 obvious. ID at 241. The ALJ found that Takizawa does not disclose the limitation "forming a plurality of etch stoppers over the plurality of gate electrodes using a second mask," because the testimony of Thomson's expert Dr. Parsons shows that Takizawa does not clearly disclose use of a single mask for forming etch stoppers. *Id.* at 242. The parties did not dispute that Possin does not disclose this limitation. Thus, the ALJ concluded that Takizawa, alone or in combination with Possin, fails to render claim 3 obvious. For the reasons detailed below, we agree with the ALJ's finding.

The Takizawa reference is directed to an improved structure for a TFT matrix device. Takizawa discloses forming a "channel protecting film" or "etch stoppers" 18a over gate electrodes 12a:



RX-45 at Fig. 5B. The ALJ found, however, Takizawa does not disclose, expressly or inherently, whether a mask is used to form the etch stoppers over the gate electrodes. ID at 242. The terms "photolithography" and "mask" are nowhere mentioned in the relevant passages describing formation of the etch stoppers 18a. RX-45 at 15:6-16. Rather, the particular passage in Takizawa simply states that the protecting film 18 is "etched off":

> Then, on the insulating film **14**, the non-doped i-type a-Si layer **16**, and the protecting film **18** of SiO_2 film or SiN film are formed in the stated order respectively in a 20 nm-thickness and a 150 nm-thickness by plasma CVD (FIGS. 4A to 4D).
>
> Then, the protecting film **18** except a part thereof on the TFT channel unit is etched off using hydrofluoric acid buffer or others. That is, the protecting film **18** is left only above the gate electrode **12*a*** of the TFT unit to form the channel protecting film **18*a*** (FIGS. 5A to 5D).

Id. As pointed out by Thomson's expert Dr. Parsons, "[w]hile the cited section discloses etching to form a channel protecting film, it does not disclose how many masks were used, if any, in this step." CX-4306C at Q.100.

Respondents nevertheless argue that it is obvious to a person of ordinary skill in the art to use a single mask to form the etch stoppers over the gate electrodes as described in Takizawa. Respondents rely on the testimony of CMI's expert Dr. Howard. Specifically, Dr. Howard testified that photolithography was at the time of Takizawa and through today, the predominant way to manufacture TFTs for arrays in LCDs. RX-159C at Q.232. According to Dr. Howard, although Takizawa does not mention using a mask to form "the protecting film 18a" over "gate electrode 12a," a person of ordinary skill in the art would know that photolithography using a mask would be the most likely and efficient way to accomplish the task. *Id.* at 233. While Dr. Howard's testimony is not largely disputed, it is nevertheless conclusory and does not explain how or why a person of ordinary skill in the art would know to use a *single* mask versus multiple masks to form the etch stoppers disclosed in Takizawa. To support the legal conclusion of obviousness, "there must be some articulated reasoning with some rational underpinning." *In re Kahn,* 441 F.3d 977, 988 (Fed. Cir. 2006); *see also Innogenetics, N.V. v. Abbott Labs.,* 512 F.3d 1363, 1373 (Fed. Cir. 2008) (finding that use of the stock phrase "to one of skill in the art it would have been obvious to perform" without more was insufficient to demonstrate obviousness).

Respondents also rely on the admission of Thomson's expert Dr. Parsons. Specifically, CMI and AUO argue that Dr. Parsons admitted on cross-examination that the cited passage in Takizawa discloses to a person of ordinary skill in the art that *one* or more masks can be used.

> Q. But you agree, sir, that based on the description of the etch stopper in the '082 patent, one of ordinary skill would also understand that a mask could be used to form the etch stopper, correct?
>
> A. *One of ordinary skill could presume* that one or masks was used.
>
> *****
>
> Q. Okay. And is it also your understanding, sir, that such persons reading the '082 back in the 1995 time frame would understand that either one or more than one mask could also be used to form etch stoppers?
>
> A. Yes, *I think that's true.*

Tr. at 1621:22-1622:3; 1624:14-19. We find that this particular portion of Dr. Parsons' testimony, in which he voices presumptions and speculations regarding the understanding of those of skill in the art, is ambiguous at best and cannot provide the missing evidence requisite for a finding of obviousness. *See Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.,* 655 F.3d 1364, 1376 (Fed. Cir. 2011) ("[S]peculative and tentative disclosure of what 'might' or 'may' [happen] does not sufficiently direct or instruct one of skill in [the] art."). Dr. Parsons made these brief statements as part of his overall testimony that one of ordinary skill in the art would understand Takizawa to disclose use of *more than one* mask to form the etch stoppers. Tr. at 1623:14-1624:6, 1698:1-22.

Moreover, Thomson has presented evidence suggesting that Takizawa actually teaches away from using a single mask. As pointed out by Dr. Parsons, the inventors of the Takizawa patent referred to the use of the resist pattern as a mask for the formation of the gate electrode, drain and source electrodes, and the passivation layer, but did not disclose the use of the resist pattern as a mask to form the channel protecting film. *Compare* RX-45, 14:56-63, 15:21-25, 15:46-52 *with* RX-45, 15:11-16. Dr. Parsons testified that this distinction indicates that a single mask was not necessarily used to form the etch stoppers in Takizawa. CX-4306C at Q.104-05.

The ALJ did not err in finding claim 3 not obvious. Respondents bear the burden of proving obviousness by clear and convincing evidence. *See Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1380 (Fed. Cir. 2008) ("We recognize that it is ICOS's burden to prove invalidity by clear and convincing evidence, and that that burden of proof never shifts to the patentee to prove validity."). Further, respondents' evidence must give the fact finder "an abiding conviction that the truth of [the] factual contentions are highly probable." *Procter & Gamble Co. v. Teva Pharm. USA Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009). Here, neither the brief testimony of Dr. Howard, nor the ambiguous admission of Dr. Parsons, clearly show that a person of ordinary skill in the art would know to use a single mask to form the etch stoppers in Takizawa. Accordingly, the Commission affirms the ALJ's finding of non-obviousness of claim 3 of the '556 patent.

D. The '674 Patent

1. The Invention of the '674 Patent

The '674 patent is directed to an improved structure for the array circuitry of thin-film transistor LCDs. As shown in Figures 1 and 2 below, the improved structure includes (1) a TFT consisting of contact leads 22 and 24 and channel 26, (2) a capacitor electrode 30 and conductive lines 20 formed from a single layer of highly conductive metal (shown in back-slashes), and (3) a conductive element 76:

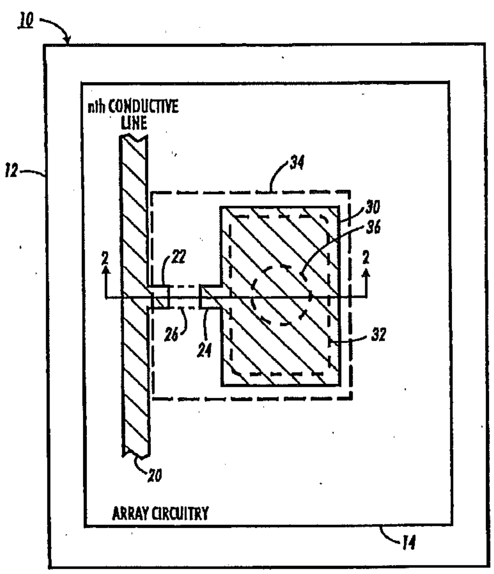


FIG. 1

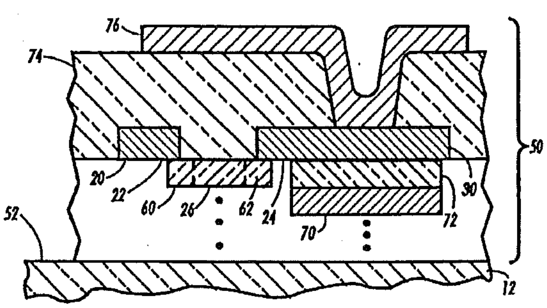


FIG. 2

Contact lead 24 and capacitor electrode 30 are electrically connected, and the capacitor electrode 30 has an exposed part due to an opening 36 in the insulating layer 74 over it. Thus, the overlying conductive element 76 contacts the upper electrode 30 in the exposed part, providing an electrical connection to the switching element via contact lead 24.

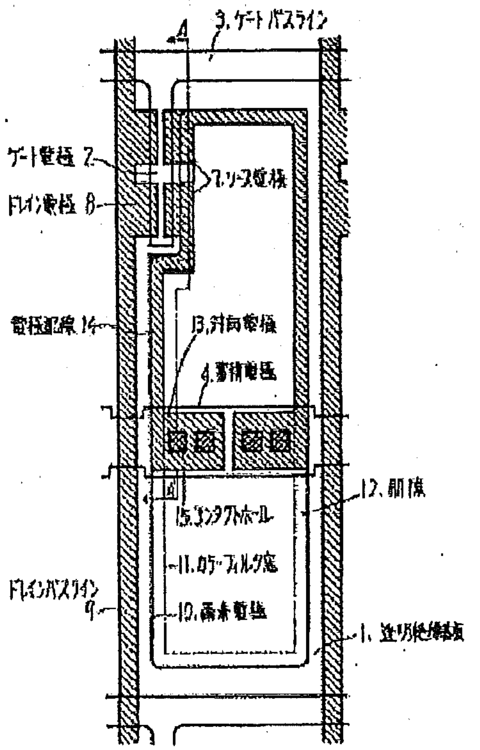
The asserted claims are claims 1, 7-9, 11, 13, 14, and 16-18. The Commission determined not to review the ALJ's finding that the asserted claims are infringed by the CMI accused products including the "Type 2 Array Circuitry" and any Qisda or BenQ accused product incorporating these CMI accused products.

2. Anticipation and Obviousness of the '674 Patent in view of Fujitsu

Before the ALJ, CMI argued that Japanese Published Application No. JP 06-130415A ("Fujitsu") anticipates claims 1, 7, 8, 14, 16, 17, and 18 of the '674 patent. CMI also argued that dependent claims 9, 11, and 13 are obvious over the Fujitsu reference in combination with the knowledge of one of ordinary skill in the art. The ALJ found that CMI has not shown by clear and convincing evidence that any of these claims are anticipated. Specifically, the ALJ found that Fujitsu does not disclose the limitations "the second patterned conductive layer including the N conductive lines and the first and second contact leads and the second electrode of each unit of cell circuitry" of independent claims 1 and "the second patterned conductive layer including the N data lines and the first and second contact leads and the second electrode of each unit of cell circuitry" of claim 16. ID at 254. The ALJ also found that Fujitsu does not disclose the limitation "the second contact lead and the second electrode [are] joined in the second patterned conductive layer."[5] *Id.* at 257. The ALJ found that the only explicit disclosure in Fujitsu on whether the recited elements are in a single layer is the diagram of Figure 1 depicting the bus lines, drain and source electrodes, and the opposing electrode in the same shading. *Id.* at 256. The ALJ found that respondents have not met their burden of clear and convincing evidence with this single ambiguous disclosure. The ALJ found that because Fujitsu does not disclose each of the limitations of independent claims 1 or 16, it cannot render obvious dependent claims 9, 11, and 13. *Id.* For the reasons detailed below, we disagree with the ALJ's finding.

[5] The ALJ construed the limitation to mean "the second contact lead and the second electrode are electrically connected in the second patterned conductive layer," which was not challenged by the parties.

Claims 1 and 16 require the "conductive lines" or "data lines" to be in the same layer as the first and second "contact leads" of the "switching element" and the "second electrode" of the "capacitive element." '674 patent, claim 1 ("the second patterned conductive layer including the N conductive lines and the first and second contact leads and the second electrode of each unit of cell circuitry"); claim 16 ("the second patterned conductive layer including the N data lines and the first and second contact leads and the second electrode of each unit of cell circuitry"). Claims 1 and 16 also require that the second contact lead and the second electrode are joined in the same layer. *Id* ("the second contact lead and the second electrode [are] joined in the second patterned conductive layer.").The parties agree that the "drain bus line" or "data bus line" (labeled 9 in Figure 1 below) of Fujitsu serve as the recited "conductive line" or "data line," that the source electrode and drain electrode (labeled 7 and 8 in Figure 1 below) serve as the first and second "contact leads" of the "switching element," and that the opposing electrode (labeled 13 in Figure 1 below) serves as the "second electrode" of the "capacitive element":



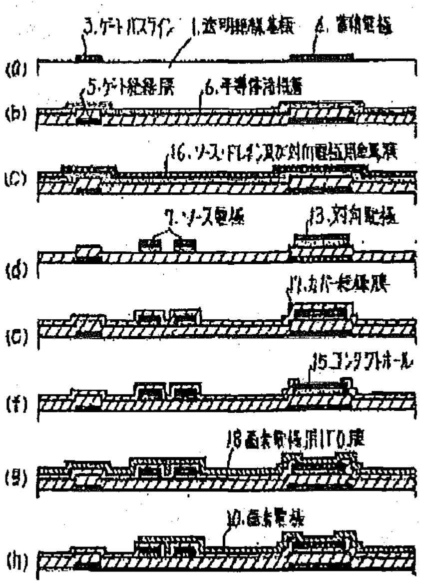
1. Transparent insulating substrate
2. Gate electrode
3. Gate bus line
4. Storage electrode
7. Source electrode
8. Drain electrode
9. Drain bus line
10. Pixel electrode
11. Color filter window
12. Gap
13. Opposing electrode
14. Electrode wiring
15. Contact hole

RX-325 at CMI-741-600702. The parties dispute, however, whether one of ordinary skill in the art would understand Fujitsu to also disclose that the data bus line (labeled 9 above) is in the same layer as the source and drain electrodes (labeled 7 and 8 above) and the opposing electrode (labeled 13 above).

We find that when Figure 1 of Fujitsu is viewed in the context of the full disclosure, including Figure 3 and the supporting text, one of ordinary skill in the art would understand that data bus line 9 is formed from the same patterned conductive layer as are the source electrode 7, drain electrode 8, opposing electrode 13, and electrode wiring 14. First, one of ordinary skill in the art would understand that Figures 1 and 2 depict bus line 9, source electrode 7, drain electrode 8, opposing electrode 13, and electrode wiring 14 in the continuous and consistent shading. Dr. Hatalis testified that when elements such as the drain bus lines and drain electrodes are disclosed as being connected to one another, the continuous and consistent shading between those elements in Figure 1 indicates to one of ordinary skill in the art that they are connected together in the same layer. RX-393C at Q.143.

Figure 3 shows a cross-sectional view of the Fujitsu invention taken along the A-A' line of Figure 1 (and is consistent with Figure 4 which shows a sectional schematic view of the process sequence):

FIG. 3
Description of principles of present invention



1. Transparent insulating substrate
3. Gate bus line
4. Storage electrode
5. Gate insulating film
6. Semiconductor active layer
7. Source electrode
15. Contact hole
16. Metal film for use as source, drain and opposing electrode
17. Cover insulating film
18. ITO film for pixel electrode use
19. Transparent glass substrate
20. First Ti film
21. Gate bus line
22. Storage electrode
23. First Si_3N_4 film
24. α-Si film
25. Second Ti film
26. Source electrode
27. Opposing electrode

RX-325 at Fig. 3. As shown in Figures 3(c) and (d) and the line 16 of the accompanying list, source electrode 7, drain electrode 8, and opposing electrode 13 are formed from the same metal film 16. According to Fujitsu, this metal film 16 (referred to as the second Ti film 25 in Figure 4(d)) is photolithographically patterned to create source electrode 7 (referred to as source electrode 26 in Figure 4(e)), drain electrode 8 (referred to as source electrode 27 in Figure 4(e)), and the opposing electrode 13 (referred to as opposing electrode 27 in Figure 4(e)). *Id.* at ¶ 21. Moreover, with respect to Figure 4(d), Fujitsu discloses that the source electrode 26 and the opposing electrode 27 are connected by electrode wiring 14. *Id.* at ¶ 21.

The only question remaining is whether data bus line 9 is formed from the same metal film 16 (also referred to as Ti film 25) as the drain and source electrodes and the opposing electrode. We acknowledge that Figure 3 does not show data bus line 9 and electrode wiring 14. This is expected because Figure 3 is a cross-sectional view of Figure 1 along the A-A' line, which does not pass through the data bus line 9. We find, however, that the only logical conclusion as to how data bus line 9 is connected to drain electrode 8 is that they are both formed from metal layer 16. Figure 3 and the remaining descriptions in Fujitsu describe a manufacturing process involving three metal layers. Specifically, Fujitsu discloses a first metal layer referred to as Ti film 20 that forms the gate electrode and gate bus lines; a second metal layer referred to as metal film 16 or 25 which contains the source and drain electrodes, opposing electrode, and electrode wiring; and a third metal layer 30 containing the ITO electrode. *Id.* at Fig. 3-4, ¶ 19, 23; RX-393C at Q.145. Thomson has never asserted that the gate metal layer or the ITO layer can be used to form data bus line 9. Thus, the only possible metal layer from which data bus line 9 could be formed is the second metal layer containing the drain electrode 8.

Paragraph 15 of Fujitsu, which describes the sequence in which the components of the Fujitsu invention are deposited, confirms our conclusion:

0015

To explain, in a method for manufacturing a TFT matrix which uses as switching devices bottom gate staggered thin film transistors wherein, as shown in FIG. 1 through FIG. 3, deposited on a transparent insulating substrate 1 in the following sequence are, at least, a gate electrode 2, gate bus line 3 that connects a plurality of said gate electrodes 2, storage electrode 4, gate insulating film 5, semiconductor active layer 6, source electrode 7, drain electrode 8, drain bus line 9 that connects a plurality of said drain electrodes 8 and a pixel electrode 10, the object of the present invention is achieved by using the gap 12 between the pixel electrode 10 and a color filter window 11 that is opened inside said pixel electrode 10 region to form an electrode wiring 14 that connects said source electrode 7 and said opposing electrode 13.

. . . .

Id. at ¶ 15. Paragraph 15 states, *inter alia*, that "source electrode 7, drain electrode 8, drain bus line 9 that connects a plurality of said drain electrodes 8" are formed after gate insulating film 5 and semiconductive active layer 6.[6] This disclosure indicates that drain bus line 9 is formed from the same metal layer as the drain electrode 8. Moreover, paragraph 15 mentions only insulating film 5 and makes no mention of another insulating film that is deposited after drain electrode 8 is formed, which would be necessary if drain bus line 9 is formed from a separate layer of metal than drain electrode 8, and connected via a contact hole, as Thomson's argument suggests.

As explained by CMI's expert Dr. Hatalis, if the drain bus lines and electrode wiring were in different layers, more complex structures would be required, such as contact holes. RX-393C at Q.146. In other words, if drain bus line 9 is formed from a different metal layer than drain electrode 8, there must be an opening through the insulation layer between the two

[6] We note the Abstract in Fujitsu provides further support that the source electrode, drain electrode, drain bus line, electrode wiring and opposing electrode are in the same layer. Specifically, the Abstract states: "In a method for manufacturing matrix semiconductor devices . . . wherein deposited on a transparent insulating substrate 1, in succession, are: . . source electrode 7, drain electrode 8, drain bus line 9 that connects a plurality of drain electrodes 8 and pixel electrode 10, an electrode wiring 14 that connects the source electrode 7 and the opposing electrode 13...". *See also* claim 1 in Fujitsu.

different metal layers. No such contact holes are disclosed, even though contact holes are disclosed when connecting the other two metal layers, *i.e.*, the gate layer and the ITO layer. *Id.* Furthermore, it was the intent of the Fujitsu reference to eliminate any contact holes on top of the source metal. RX-325 at ¶ 14. Thomson's argument that the drain bus lines and electrode wiring are not in the same layer runs counter to the stated goal of the Fujitsu reference, which is to minimize cost and complexity in the device structures by using fast and easy photolithographic techniques top of the source metal. *Id.* at ¶ 3.

Thomson's expert Dr. Parsons testified that Fujitsu "lists" certain items in the second titanium layer and does not mention the drain bus lines, and that the continuous and consistent shading does not indicate that all of the elements are patterned together in the same layer because Figure 1 is an "overhead view." CX-4307C at Q.57, 60. However, Dr. Parsons does not rebut the substantial textual evidence of Fujitsu relied on by CMI's expert Dr. Hatalis. Only one of Dr. Parsons' statements cited by the ALJ is even related to the question of whether one of ordinary skill in the art would understand the Fujitsu reference as disclosing the electrode wiring and drain bus lines in the second titanium layer. Dr. Parsons states that at the time of the '674 patent, it was "advantageous to form different elements out of different metal layers." CX-4307C at Q.60. Dr. Parsons does not explain, however, why it was advantageous, does not cite to any evidence to support such as statement, and does not testify how such a statement even relates to the Fujitsu reference. We find that this testimony is contrary to the express teachings of the Fujitsu reference and the '674 patent, which both disclose only three metal layers for the purpose of manufacturing devices that "can be formed using photolithographic techniques that are fast and easy to operate." RX-325 at ¶ 003; *see also* JX-2 at 1:31-33 ("[t]he new structure's simplicity and ease of production result from forming several different features in a single layer of highly conductive metal"). Thus, we find that respondents have shown by clear and convincing evidence that Fujitsu discloses the limitation of the asserted claims requiring that the "conductive lines" or "data lines" be in the same layer as the first and second "contact leads" of the "switching element" and the "second electrode" of the "capacitive element," and that the second contact lead is joined to the second electrode in the same layer.

Before the ALJ, Thomson also argued that Fujitsu does not disclose the "highly conductive metal" limitation of claims 1 and 16. ID at 252. Thomson, however, does not challenge the ALJ's finding that respondents have shown by clear and convincing evidence that this limitation is disclosed by Fujitsu. *Id.* at 253-54. Because Thomson does not dispute that Fujitsu discloses the remaining limitations of claims 1, 7, 8, 14, 16, 17, and 18 of the '674 patent, we find that respondents have shown by clear and convincing evidence that Fujitsu anticipates those claims.

We also find that respondents have shown by clear and convincing evidence that dependent claims 9, 11 and 13 are obvious in light of the Fujitsu reference. Dr. Hatalis testified extensively regarding the knowledge of one of ordinary skill in the art, why one would be motivated to combine the Fujitsu reference with the teachings of several other prior art references, and the likelihood of success in modifying the Fujitsu reference. RX-393 at Q.161-186. For each of claims 9, 11, and 13, Dr. Hatalis analyzed several prior art references that could have been be combined with the Fujitsu reference to render the claims obvious. *Id.*

Regarding claim 9, which recites a second patterned conductive layer of aluminum, Dr. Hatalis testified that aluminum was a well-known metal commonly used in fabricating electrodes and conductive lines since the early 1980s. RX-340; RX-393C at Q.165. Dr. Hatalis testified that aluminum had certain advantages over titanium in the manufacture of TFT-LCDs, such as the manufacture of larger displays with a higher resolution. RX-338; RX-393C at Q.165. Thus, if one wanted to manufacture a larger display using the structure disclosed in Fujitsu, it would have been natural to select aluminum for the highly conductive metal.

Regarding claim 11, which recites a second patterned conductive layer with sublayers of a highly conductive metal and a refractory metal, Dr. Hatalis testified that the use of a multi-layer metallization using a refractory metal has been well known since the mid-1980s. RX-393C at Q.174; *see also* JX-53C, Yao 6/13/2011 Dep. Tr. 179:23-180:0. Dr. Hatalis testified that the use of a refractory metal sublayer along with a highly conductive metal would have solved the problem of hillocks, which would allow for the manufacture of larger panels at a decreased cost, as taught by the Fujitsu reference. RX-393C at Q.175.

Regarding claim 13 which recites an opening in the second insulating layer with a tapered profile, Dr. Hatalis testified that the tapered profile provided better step coverage at the edge of a tapered via hole. RX-393C at Q.183. In fact, Dr. Hatalis testified that the tapered via hole was a natural result from certain wet or plasma etching processes which were then in use. *Id.*; *see also* JX-53C, Yao 6/13/2011 Dep. Tr. 181:23-182:24. Use of a tapered via hole reduces breakage and results in better contact between the pixel electrode and the second electrode, thereby increasing the manufacturability of the panels and lowering the cost. RX-393C at Q.183.

In rebuttal to respondents' evidence of the obviousness of claims 9, 11, and 13, Thomson relies on Dr. Parsons' conclusory testimony that one of ordinary skill in the art would not have combined elements from two different array circuitry disclosures. *See*, CX-4307C at Q.99, 101, 115, 117, 157, 159, 171, and 189. We disagree with Thomson's argument. "It is not necessary that the inventions of the references be physically combinable to render obvious the invention under review. *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983). The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference. *In re Keller*, 642 F.2d 413, 424 (CCPA 1981). Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. *Id.*; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418-420 (2007).

Dr. Parsons does not dispute any of CMI's evidence regarding the scope and content of the prior art, the level of ordinary skill, or the similarities between claims 9, 11, and 13 and the prior art. *See Scanner Techs. Corp v. ICOS Vision Sys. Corp N.V.*, 528 F.3d 1365, 1379 (Fed. Cir. 2008) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). Moreover, Thomson has failed to adduce any reliable secondary evidence of non-obviousness to rebut respondents' prima facie case. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 291-92 (Fed. Cir. 1985). The mere statement that prior art references disclose different array circuitry designs is insufficient evidence to overcome a showing of obviousness. Thus, the clear and convincing evidence demonstrates that the combinations of prior art references described in Dr. Hatalis' testimony disclose all limitations of asserted claims 9, 11, and 13 of the '674 patent.

E. The '941 Patent

1. The Invention of the '941 Patent

The '941 patent, entitled "Method and Device for the Controlling of Matrix Displays," issued on September 19, 2000 to Hirtz. '941 patent. The invention relates to the control of signal processing in an active matrix display consisting of M x N pixels (where M is the number of pixels per line and N is the number of lines). *Id.* at 1:17-19. The control of pixels in an active matrix display is generally carried out line by line, *i.e.*, a video signal containing the information of a picture line is scanned N times. More specifically, the '941 patent is directed to utilizing signals for cathode ray tubes, which include lines or portions thereof that do not contain data (also known as horizontal blanking, vertical blanking and overwrite periods), for other matrix displays that do not require the same periods having no picture data.

The object of the invention is to reduce the ratio ft/Za, where Za represents the number of lines to be displayed and ft is the clock signal for controlling signal processing and depends on the number M of pixels to be presented per line. *Id.* at 1:30-34; 2:35-38. This reduction in clock frequency is accomplished by expanding the time interval available for executing signal processing algorithms by taking advantage of time periods in which a video signal contains no picture information. *Id.* at 2:38-41.

Figure 2, reproduced below, illustrates the vertical and horizontal blanking periods. In Figure 2, there are Z lines and the duration of each line is Tz. *Id.* at 3:4-10. Za is the number of active lines and Tza is the active time of each line. *Id.* at 3:1-7.

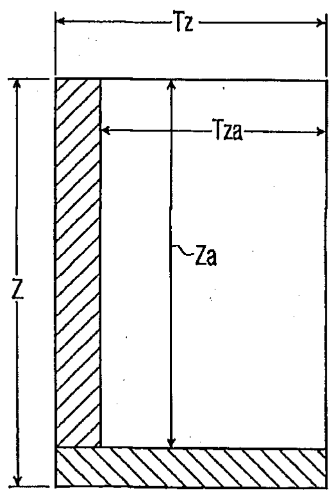


FIG. 2

The first embodiment of the invention is illustrated in Figure 3, reproduced below.

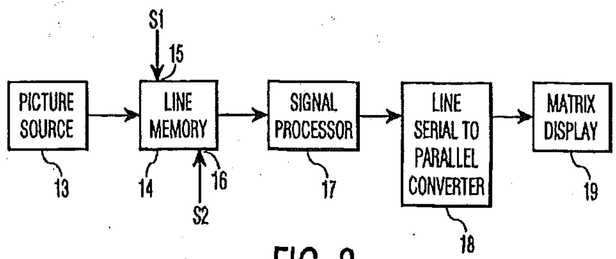


FIG. 3

The picture source processes the signal and outputs the video line by line into memory 14. *Id.* at 3:36-41. S1 is the first input control signal that controls storing the line data. *Id.* at 3:44-46. S2 is the second line control signal that controls reading-out of video line data. *Id.* at 3:46-48. The signal output from line memory is processed by the signal processor and is sent to the line serial to parallel converter. *Id.* at 3:49-52. The output for the line serial to parallel converter results in the video display. *Id.* at 52-53. Unlike a cathode ray tube, the matrix display used in the invention does not need to adjust for "the feedback [for] a beam ... triggering matrix displays" and therefore, the horizontal blanking period, Tz-Tza, of Figure 2 can be used for executing signal processing algorithms and for triggering the matrix display. *Id.* at 3:54-62. A line initialization time period Ti has to be taken into account when determining the additional available time. *Id.* at 3:64-65. The time for reading out the display is therefore *Tza* <= Tz-Ti*. *Id.* at 65-4:1. In this embodiment of the invention, the number of picture elements per line M is equal to the number of picture elements per line to be presented M'. *Id.* at 4:3-6. The clock frequency of S1 equals *ft=M/Tza*. *Id.* at 4:7-10. The clock frequency of S2 equals *ft'=M/Tza**. *Id.* at 4:12-15. Therefore, the frequency for triggering the display for the same number of lines to be displayed (Za) is less than in the prior art. *See id.* at 4:23-25.

Figure 4 illustrates a second embodiment of the invention. The video signal is sent to image memory 20 and S1' controls the storage of the video image data in memory and S2' controls the reading out of the video image data. In this embodiment both the horizontal and vertical blanking periods are utilized. *Id.* at 4:42-45.

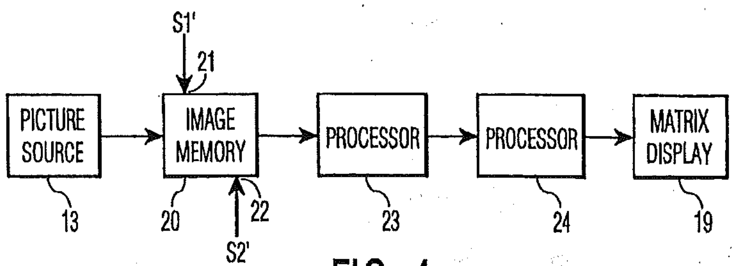


FIG. 4

As in the first embodiment, the clock frequency of S1' is *ft=M/Tza*. *Id.* at 4:53. The line frequency of S1' is *fz=Z/Tb*. *Id.* at 4:55-57. Tb is the picture duration and Tb = 1/fB, where fB is the picture frequency. *Id.* The readout of the picture, in this embodiment, includes the vertical blanking period as controlled by S2'. *Id.* at 4:61-63. The time available to display Za lines is designated Tba' and is determined by *Tba<=Tba'<=Tb*. *Id.* at 4:64-67. This increases the amount of time to display Za lines, which reduces the line frequency. *Id.* at 5:1-11. The time to display the Za lines results in a prolonged Tz period delineated as Tz'. *Id.* Tz' is determined by *Tz'=Tba'*/Za. *Id.* The line frequency is reduced as illustrated by the equation *fz*'=1/Tz'. *Id.* The resulting reduced clock frequency is equal to *ft'=M/Tza'*. *Id.* at 5:17-20. Figure 5 (reproduced below) illustrates the picture build up in accordance with the second embodiment of the invention. This illustrates that most of the time is now utilized for signal processing. *Id.* at 5:27-31. The time available for signal processing in this embodiment increases over the prior art systems.

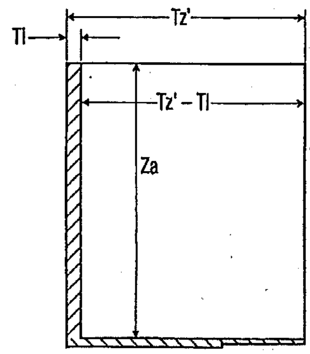


FIG. 5

In the final embodiment described, the video signals are displayed over a larger number of lines, which results in a "vertical upward interpolation [of] the number of lines Za." *Id.* at 6:17-24.

Thomson asserts independent claims 1 and 4.

2. Claim Construction of the Term "Second Rate" "Determined By" and the ALJ's Finding of Non-infringement Based on this Term

a. Construction of "Second Rate" "Determined By" Limitations

Thomson challenges the ALJ's construction of "determined by." Thom. Pet. at 89. Thomson argues that the term "determined by" means "based on," and asserts that the ALJ re-wrote the claim language by inserting a mathematical formula into the claims when the claims do not call for one. Thom. Resp. at 44. MStar argues that "a second rate determined by . . ." and "a second rate which is determined by . . ." means "a frequency equal to the density of picture information to be displayed divided by the time available for display comprising active and inactive parts." *See* MStar Resp. at 2. MStar contends that Thomson's construction is so broad that "it would provide no meaningful limitation on the scope of the claim." *Id.* at 7. Realtek asserts that the ALJ's construction, which is the construction also advocated by MStar, is the correct construction. Realtek Resp. at 4.

The ALJ adopted MStar's proposed construction. ID at 111-13. The ALJ concluded that "[t]he claims make clear that the second rate is 'determined by' two factors: (1) the density of picture information to be displayed; and (2) the time available for display comprising active and inactive parts." *Id.* at 111. However, he found that the specification "provides only one method for determining the second rate," which is "dividing the number of pixel elements by the available time." *Id.* at 111-12. According to the ALJ, "the absurd result that the second rate limitation would be met no matter what mathematical operation is performed, as long as it includes the density of picture information to be displayed and the time available for display comprising active and inactive parts," cannot be correct. *Id.* at 112. The ALJ concluded that "[e]ven if the second rate could be determined in a way that is different than dividing the density of picture information to be displayed by the time available for display comprising active and inactive parts, the intrinsic evidence provides no disclosure of that, and Thomson offers no evidence that such a determination would be within the knowledge of one of ordinary skill in the art." *Id.* at 112. The Commission adopts the ALJ's construction.

We first turn to the language of claims 1 and 4. Both claims recite: "a second rate" "*determined by* the density of picture information to be displayed" and "the time available for" "display." While the language of the claims requires a "rate," the claim language does not explicitly teach how the time available for display and the density of picture information are used to calculate that rate. Based on the claim language the only way to calculate a rate from these factors is to divide the density of picture information must by the available time.

The first column of the specification teaches that "[t]he clock frequency ft for triggering signal processing devices, which ... control the matrix display, depends on a number M' of picture elements to be presented per line." '941 patent at 1:30-34. It further teaches that the resulting formula is *ft*=M'/Tza, where Tza is the duration of the video signal to be presented within one line. *Id.* at 1:35-38. The first and second embodiments also teach a similar formula. In the first embodiment, the second line control signal S2 has a reduced frequency that is calculated by the formula *ft'*=M/Tza*, where M is the number of picture elements per line to be presented and Tza* is the time available for reading-out, processing and displaying a line. *Id.* at 3:65-4:15. For the second embodiment, the reduced readout frequency is calculated by the formula *ft'=M/Tza'*, where M is the number of pixels per line and Tza' is the time available to present the active lines (Za). *See id.* at 4:64-5:24. Each of these formulas includes the number of pixels divided by a processing time. Although none of these formulas teach the exact relationship adopted by the ALJ, the same relationship is found in the ALJ's construction when considering the screen in its entirety. The ALJ's construction requires the density of picture information for the whole screen divided by the time available to display the picture information. The formulas discussed in the specification similarly teach a number of pixels divided by the time to display the pixels. Notably, the specification does not teach any other methods for computing the second rate.

Thomson's construction that "determined by" means "based on" allows for any conceivable equation involving the density of picture information and the time available of the claims to be used to calculate the second rate. As noted above, in general terms, the formulas of the specification only teach one way of calculating this, where the numerator relates to a number of pixels that is divided by a denominator that relates to the time available to display those pixels as the methods for calculating the second rate. Thomson's construction goes so far beyond the formulas provided in the specification such that it provides no meaningful limitation on the scope of the claims. Any equation that includes the two variables or includes variables "based on" the two variables of the claim would meet this claim limitation. Thomson also cites to nothing in the intrinsic record to support its construction. Accordingly, the Commission adopts the ALJ's construction for these limitations.

b. Infringement of the "Second Rate" Limitation

The ALJ found that both MStar and Realtek[7] products do not meet the "second rate" limitation of the asserted claims and therefore, found that there was no infringement. ID at 401-403, 406-07. Claim 1 is a method claim and claim 4 is an apparatus claim. The parties did not challenge the ALJ's finding of non-infringement under his construction of the "second rate" "determined by" limitations. On review, the Commission affirms the ALJ's finding of non-infringement.

In addition to finding that the accused scaler chips do not meet the "second rate" "determined by" limitation, the ALJ also determined that Thomson failed to provide evidence of direct infringement of claim 1 because the evidence for both MStar and Realtek was directed to the importation, sale for importation, or sale after importation of an apparatus that allegedly performs the claimed process. These actions, the ALJ found, do not constitute direct infringement of claim 1, and therefore, claim 1 is not met by MStar or Realtek. ID at 401, 406. The Commission did not review this finding of the ALJ.

In addition, the Commission concludes that even under Thomson's construction of the "second rate" "determined by" limitations of asserted claims 1 and 4, Respondents MStar and Realtek and Respondents CMU, Qisda, and BenQ, which manufacture products including MStar and Reaktek scaler chips do not infringe.

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[7] The ALJ also determined that Respondents CMU, Qisda and BenQ, which manufacture products including MStar and Reaktek scaler chips, do not infringe claims 1 and 4. ID at 407.

1) *MStar*

MStar explains that there is no dispute about the operation of the Accused MStar Chips or the Accused Monitors. MStar Resp. at 8. Thomson alleges that the calculation of the clock rate, using the following formulas, is the second rate of claims 1 and 4:

[

]

Thom. Resp. at 45. According to MStar, [ ] is the amount of [

]. MStar Resp. at 9. MStar further explains that the [

] *Id.* The [ ] variable is the number of [

] *Id.* The [ ] variable is the number of

[

] *Id.* Finally, the [ ] is the number [ ] *Id.*

Thomson argues that the product of [ ] and [ ] is based on the density of pixel information recited in claims 1 and 4. Thom. Resp. at 45-46. MStar argues that it does not infringe the second rate limitation under Thomson's construction because the alleged second rate formula does not include the density of picture information to be displayed. Instead, MStar argues that the formula relied on by Thomson to prove infringement includes a different and larger number that includes [

] MStar Resp. at 9-10. The parties agree that the density of the picture information to be displayed is the number of pixels on the screen. *See e.g.*, CX-4243C, Q.114; MStar Resp. at 9. During the hearing, Thomson's expert conceded that the product of [ ] and [ ] is not the "density of the picture information to be displayed." Tr. at 636:1-639:21. MStar therefore argued that Thomson does not and cannot explain how the second rate formula can be based on the number of pixels on the screen when that number is not a factor in the formula. MStar Rep. Thomson Pet. at 11. We agree with MStar.

As noted above, Thomson argues that this calculation is based on the density of the picture information even though the product does not include the variables necessary to determine the density of the picture information. Thomson argues that because the horizontal lines include inactive pixels on the line does not preclude a finding of infringement because "a quantity can be based on one factor without precluding other factors." Thom. Resp. at 45 n.46. While we agree with this general principle, Thomson does not appear to rely on the claimed factor (*i.e.*, density of picture information) anywhere in the asserted formula. Instead, the product relied upon by Thomson is a larger area than the pixels on the screen. The Commission concludes that MStar and the Respondents manufacture products including the MStar scaler chips that do not infringe this limitation even under Thomson's construction of the term.

2) *Realtek*

Thomson argues that the accused Realtek products use the following DCLK formulas, depending on whether or not a frame buffer is used:

[ ]

[ ]

Thomson alleges that the DCLK is based on the density of picture information to be displayed by relying on the product of [ ]

[

] Thom. Resp. at 46. Thomson relies on the product of

[

] for the buffered products. *Id.*

However, Realtek argues that products relied upon by Thomson include a number greater than the number of pixels in each horizontal line because they include non-active or blanking pixels.[8] Realtek Resp. at 13. Therefore, [ ] cannot be used to calculate the density because it includes the blanking periods. Thomson argues that the fact that [ ] includes additional inactive pixels does not change the fact that it is determined by the number of picture elements to be controlled. Thom. Resp. at 46 n.47. Realtek argues that Thomson has failed to provide any evidence that [ ] is a combination of the pixels in a horizontal line and the number of blanking pixels in the line such that it would be "based on" the density of picture information. Realtek Resp. at 6. As with the MStar formulas, Thomson does not appear to even rely on the claimed factor (i.e., density of picture information) anywhere in the asserted formula. Instead, the product relied upon by Thomson includes a larger number of horizontal pixels. For the reasons noted above with respect to MStar, we also conclude that Realtek does not meet the "second rate" "determined by" limitations even under Thomson's construction of the term.

3. Whether Claim 4 Requires an "Input Video Signal" for a Finding of Infringement

Realtek challenges the ALJ's determination that an "input video signal" is not required to find infringement of claim 4 of the '941 patent. Realtek Pet. at 4.

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[8] [

] Realtek Resp. Thom. Pet. at 4 n.1.

Thomson asserts that claim 4 requires an apparatus "capable of processing an input signal," and does not require that the apparatus include the input video signal. Thom. Resp. at 47. According to Thomson, "Realtek's argument is contrary to Federal Circuit law that courts must take care to avoid reading process limitations into an apparatus claim." ID at 399. Realtek argues that the Realtek-Based products generate an input video signal. Realtek Resp. at 15. Realtek contended that the input video signal "can only be supplied by an end user when the Realtek-based Products are connected to a third-party video source." *Id.*

The ALJ adopted Thomson's position with respect to claim 4 of the '941 patent. ID at 402. The ALJ concluded that claim 4 is "directed to 'an apparatus for controlling a matrix display.'" *Id.* The apparatus "does not include an input video signal, but performs certain actions when presented with an input video signal." *Id.* Therefore, the ALJ held that "the inquiry is whether or not the accused Realtek products include all of the elements of the claimed apparatus; the fact that Realtek does not provide the input video signal is not relevant." *Id.* The ALJ cites *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990), for support for the proposition, "[a]pparatus claims cover what a device is, not what a device does." *Id.*

The Commission affirms the ALJ's finding that claim 4 does not require an input signal. Infringement of an apparatus claim is based on whether the alleged infringing device is the same device as disclosed by the claims. In this instance, claim 4 requires that the memory be controlled by a first control signal so that active portions of an input video signal are stored at a first rate. The parties dispute whether or not this is a functional or structural limitation. Realtek argues that the claim does not require that the memory be "*capable* of being controlled by a first control signal," but instead requires that it be "controlled by" the input video signal, and therefore, this limitation of the apparatus claim must be met in order to find infringement. Realtek Resp. at 16. In contrast, Thomson argues that the preamble provides an apparatus "for controlling a matrix display" and that this language indicates that the claim is directed to an apparatus that can be used to control a matrix display. Thom. Rep. Realtek Pet. at 3-4. Thomson also argues that the claim language does not require the presence of a video signal, but requires the capability of processing the input signal. *Id.* at 4; Thom. Resp. at 47.

The Federal Circuit has stated that method claims and apparatus claims are different, and method claims require performance of steps for infringement. *See generally Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990); *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1344-45 (Fed. Cir. 2008). "[A]pparatus claims cover what a device is, not what a device does." *Hewlett-Packard Co.*, 909 F.2d at 1468.

We first look to the language of the claim which requires "a memory controlled by a first control signal so that active portions of an input video signal having active and inactive portions ... are stored." '941 patent at 8:7-10. We find that the language is functional language and that the input signal is not a limitation of the claims but describes what the device must be capable of doing when presented with an input video signal. Moreover, the specification teaches that: "The invention in question concerns a method for controlling a matrix display according to the preamble of the main claim as well as a device, suitable for executing the method according to the invention, according to the preamble of the first device claim." '941 patent at 1:7-11. While the claim language itself is the primary focus, this paragraph illustrates that the inventors intended the invention be a device that is "suitable for" (*i.e.*, capable of) executing the method.

Realtek argues that claim 5 bolsters its position that the input signal must be met because claim 5 refers to "transmitted video signal" which therefore, requires that claim 4 have an input video signal. Realtek Rep. Resp. at 7. However, Thomson argues that this refers to a video signal, which must be transmitted by its nature. We agree with Thomson and believe that this language is functional. Accordingly, the Commission affirms the ALJ's finding that claim 4 does not require an input video signal to be infringed.

4. Anticipation of the Asserted Claims of the '941 Patent by Baba

Respondents challenge the ALJ's finding that the asserted claims of the '941 patent are not anticipated by Japanese Patent Publication No. H2-70186 ("Baba").

The Baba reference discloses a method and apparatus for converting an interlaced signal for a CRT display into a progressive signal for an LCD display. RX-168. Interlacing is a technique for transmitting video signals that is still widely used with many CRT displays. CX-4308C at Q.24; RX-160 at Q.42-44. Interlacing reduces the data transfer rate of a video signal in half by splitting each image or "frame" to be displayed into two fields, each field containing half the lines of the full frame: one field containing the odd lines and the other field containing the even lines. *Id.* The cathode ray gun of a CRT display first paints the odd field on the phosphor on the inside of the screen, and then – before the image can fade – paints the even field. CX-4308C at Q.24. Thus, for interlaced signals, only half of the lines of a frame are updated during a single "field period," generally 1/60 second. Tr. at 1758:4-1759:18; 1760:3-25. A non-interlaced video signal is known as a progressive video signal. In a progressive video signal, all the lines of an input frame are updated at the same time. *Id.* at 1753:20-1754:1.

The ALJ found that Baba does not anticipate the asserted claims of the '941 patent because it does not disclose the limitation "a ratio ft/za is reduced from the ratio required for a cathode ray tube, where ft is a clock frequency for signal processing and for controlling the display, and za represents the number of lines to be displayed." ID at 283. Before the ALJ, the parties agreed that in Baba the input clock frequency (*i.e.*, the frequency associated with the CRT) is 6.72 MHz and the output clock frequency (*i.e.*, the frequency associated with the LCD) is 10.06 MHz. RX-160 at Q.190; CX-4308C at Q.197. The parties also agreed that in Baba, the value za associated with the LCD is 200. The parties disagreed, however, over the value of za associated with the CRT. The value of za, *i.e.*, "number of lines to be displayed," associated with the CRT affects whether the ratio ft/za for the LCD display in Baba is "reduced from the ratio ft/za required for a cathode ray tube," as required by the claims. According to MStar, a standard 200-line CRT display receiving an interlaced video signal, only 100 lines are updated on the CRT display in a given "field period" and thus the value of za for a CRT display is 100. RX-160 at Q.190. According to Thomson, the value of za in a standard 200-line CRT display receiving an "interlaced" video signal, the value of za is still 200 because all 200 lines are visible to the user at any given time. CX-4308C at Q.197.

The ALJ found Thomson's argument to be more persuasive. ID at 284. The ALJ found that the parties both relied on a textbook authored by Thomson's expert Dr. Ferraro for an understanding of "interlaced" signals in a CRT. *Id.* According to the ALJ, the relevant passage in the textbook indicates that even though only half of the lines in an interlaced display are updated during a specific time period, the number of lines to be displayed includes both the odd and even lines because the set of lines that is not updated during the specific period is still shown to the user. *Id.* at 285. Accordingly, the ALJ found that the proper za value for the ratio required for a CRT in the Baba reference is 200, and that using this za value, Baba fails to disclose the reduced ft/za limitation of claims 1 and 4. *Id.*

We find that the parties' arguments can be boiled down to this: whether the limitation "the number of lines to be displayed" means the number of lines updated in a given field period, as alleged by MStar, or whether the limitation means the number of lines actually displayed at any given time, as urged by Thomson and adopted by the ALJ. For interlaced signals, a field period refers to the time in which half of the lines (even or odd) are updated in a CRT, which usually has a duration of 1/60 second. We find that neither the intrinsic evidence nor extrinsic evidence supports MStar's construction that the value of za associated with a CRT display is the number of lines that are *updated* for a given field period.

First, we disagree with MStar that by reading the claim language "the number of lines to be displayed" as meaning the number of visible lines at any given time, the ALJ read out the words "to be." In our view, the words "to be" do not provide a temporal limitation. Rather, the key word here is "displayed," which does not mean "updated," as urged by MStar.

The words "to be displayed" are used in the specification to refer to all visible lines at any given time. The specification discusses upscaling all 482 interlaced lines (including odd and even lines) of a CRT display to 560 lines on a matrix display. '941 patent at 6:40-43. Specifically, the specification states: "[w]hen using a matrix display, with, for example, 560 lines, and when processing a video image according to the M standard (US standard) using approx. 482 active lines, it is possible to expand the picture to be displayed to 560 lines." The M standard, as MStar's expert Dr. Drabik admitted under cross-examination, refers to the U.S. standard which uses an interlaced video signal displayed on a CRT with 482 active lines in each frame (and therefore, 482 lines that are visible to the viewer at any point in time). CX-4308C at Q.91-92; Tr. at 1232:18-1233:7-15. If the number of lines "to be displayed" did not mean the number of lines that are visible to the user at a given point for both the CRT display and the matrix display, the specification would have referred to upscaling from 291 lines, rather than 482 lines, to 560 lines. *Id.*

We disagree with MStar's interpretation of the written description accompanying Figure 2 of the '941 patent, which states that in interlaced signals, za represents the number of lines that are active, "*i.e.*, contain picture information." '941 patent at 3:4-7. We find that this statement merely defines za as the number of lines in the image with respect to the number of total lines available on the physical display, as opposed to the number of odd or even lines in the image that are updated in a given field period. As shown by Figure 2, za denotes the entire height of an image of an interlaced signal in comparison to the total available lines z of the display:

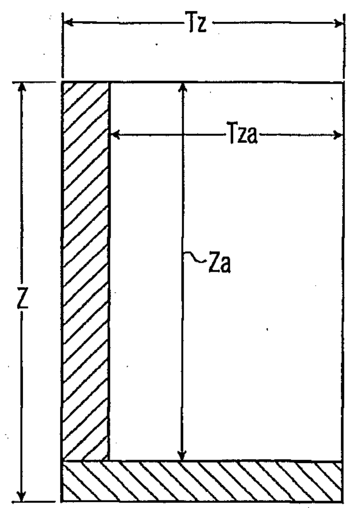

FIG. 2

Id. at Fig. 2. The description does not suggest that za refers to half of the lines of the image updated for a given field.

We turn to MStar's argument that because Dr. Ferraro's textbook states that for an interlaced signal, only half of the lines are "displayed" at any give time while the other half of the lines are not "displayed," the limitation "the number of lines to be *displayed*" for an interlaced signal in a 200-line CRT display is only 100. MStar Resp. at 19. We believe that MStar mischaracterizes the evidence. Dr. Ferraro explained at the hearing that the term "displayed" stated in the textbook does not mean actual image displayed, but rather the number of even or odd lines that are updated in a given field period. Tr. at 1771:18-23. Dr. Ferraro's testimony shows that at any given time, all lines of an interlaced signal are displayed on a CRT display, not just half. *Id.* at 1769-1771.

Nothing in the intrinsic or extrinsic evidence indicates that za should be interpreted as anything but the total number of lines of an image, regardless of whether the image is interlaced or progressive. Applying this construction of za, Baba would not disclose a reduced ft/za ratio as required by the claims. In Baba, the input ratio required for a 200-line CRT would be 6.72MHz/200 and the output ratio for the LCD of Baba would be 10.06 MHz/200. Thus, we agree with the ALJ that Baba does not disclose the limitation requiring a reduction of the ratio ft/za. Accordingly, the Commission affirms the ALJ's finding that Baba does not anticipate the asserted claims of the '941 patent.

5. Exclusion of the ViewFrame II+2 LCD Panel

At the hearing, the ALJ granted Thomson's motion *in limine* to exclude physical exhibit RPX-12, also known as ViewFrame II+2, which is allegedly a prior art device to the '941 patent. He excluded it on the ground that the date of the device was insufficiently corroborated:

> Motion in limine number 7, regarding the nView ViewFrame II + 2, this motion is granted. What this essentially amounts to is inventor's testimony regarding an alleged prior art invention and the date of it. The ViewFrame II + 2 has not been shown to be – contain any indication of when it was made and the testimony of the inventor that he thinks it is the same product or he is certain it is the same product is still not going to get past the date issue. That must be corroborated independently by some sort of documentary evidence. This motion is granted.

Tr. at 31:23-32:11. In response to the ALJ's ruling, MStar's counsel pointed out during the hearing that the physical device itself (RPX-12) contains a serial number, indicating when the device was sold. Tr. at 33:14-20. MStar's counsel also pointed out to the ALJ that MStar's response to Thomson's motion *in limine* cites a list of documents showing that the ViewFrame II+2 was created and sold before the priority date of the '941 patent. *Id.* The ALJ did not consider MStar's arguments, stating that "I am going to let you just go ahead and appeal this." *Id.* at 33:24-25. The ALJ affirmed his evidentiary ruling in the final ID. ID at 281 n.32.

We disagree with the ALJ's ruling and find that MStar has presented sufficient evidence showing that the ViewFrame II+2 was sold before the priority date and that the ALJ should have allowed the evidence in to consider whether the ViewFrame II+2 anticipates the asserted claims of the '941 patent.

The evidence shows that counsel for MStar purchased the device designated RPX-12 through eBay. MStar Resp. at 22. Mr. Vogeley, the inventor of ViewFrame II+2, testified in a deposition that he inspected the exhibit and testified that RPX-12 is a true, accurate, and unmodified version of the ViewFrame II+2 device that he designed, and that his company manufactured and sold before the priority date. RX-161 at Q.260-63. Mr. Vogeley testified that the particular exhibit of RPX-12 was sold roughly in the late 1980's, as indicated by the date on the circuit board. *Id.* at Q.258-60. The circuit board of ViewFrame II+2 (RPX-12) is stamped with "COPYRIGHT N VIEW CORPORATION 1989," and the microcontroller is also stamped with a 1989 copyright. In addition, several articles and documents dated before the priority date mention sales of the ViewFrame II+2. RX-217 at 18-19, 24; RX-219C at MS0208735, MS0208740; RX-220; JX-41; RX-211; RX-218C at MS0208360-63; MStar Resp. at 23-24. Accordingly, Mr. Vogeley's testimony that the ViewFrame II+2 was sold prior to the priority date is sufficiently corroborated by other evidence.

Thomson argues that MStar cannot provide any chain of title evidence to describe where the device of RPX-12 came from and how it has been handled before it came into MStar's possession. Thom. Resp. at 50; Thom. Rep.; MStar Pet. at 12. We disagree with Thomson's argument that the proponent of a physical exhibit must establish such a strict chain-of-custody to justify admission of the exhibit into evidence. *See Certain Ceramic Capacitors and Products Containing Same*, Inv. No. 337-TA-692, Order No. 46 (July 19, 2010) (denying motion *in limine* and rejecting a strict chain-of-custody requirement for the admissibility of evidence). Accordingly, we find that RPX-12 and corresponding evidence was improperly excluded.

We also find that there is clear and convincing evidence that ViewFrame II+2 is prior art under 35 U.S.C. § 102(b) because the evidence supports the conclusion that it was sold more than one year prior to the priority date. RX-161 at Q.259; RX-217 at 18, 19, 24; RX-219C at MS0208735, MS0208740; RX-220; JX-41; RX-211; RX-218C at MS0208360-63. Although the Commission is cognizant of the fact that the '941 patent will expire on August 26, 2012, in view of the reversal of this evidentiary ruling, a remand is required to address the issue of invalidity in light of ViewFrame II+2.[9] The ALJ should determine whether the '941 patent is invalid in light of RPX-12 and the related evidence.

F. Economic Prong of the Domestic Industry Requirement

In a patent-based action, a complainant must demonstrate that a domestic industry either exists in the United States or is in the process of being established to prove a violation of section 337. *See* 19 U.S.C. § 1337(a)(2). Sections 337(a)(2) and (3) set forth the domestic industry requirement:

> **(2)** Subparagraphs (B), (C), (D), and (E) of paragraph (1) apply only if an industry in the United States, relating to the articles protected by the patent, copyright, trademark, mask work, or design concerned, exists or is in the process of being established.

[9] Commissioner Dean Pinkert takes no position on whether RPX-12 anticipates the asserted claims of the '941 patent.

> **(3)** For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent, copyright, trademark, mask work, or design concerned—
>
> > **(A)** significant investment in plant and equipment;
> > **(B)** significant employment of labor or capital; or
> > **(C)** substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. §§ 1337(a)(2) and (3).

When a complainant seeks to satisfy the economic prong of the domestic industry requirement specifically through its investments in licensing under section 337(a)(3)(C), the complainant must show that it has made a substantial investment in the exploitation of the asserted patent through licensing. 19 U.S.C. § 1337(a)(3)(C); *Multimedia Display and Navigation Devices and Sys., Components Thereof, and Prods. Containing Same,* Inv. No. 337-TA-694, Comm'n Op. at 7-8 (Aug. 8, 2011) ("*Navigation Devices*"). To be considered "exploitation" though licensing within the meaning of the statute, the complainant must demonstrate that a particular activity: (1) relates to the asserted patent; (2) relates to licensing; and (3) occurred in the United States.[10] *Id.* Activities that meet these three requirements can be considered in our evaluation of whether a complainant has satisfied the domestic industry requirement, but our inquiry does not end there. *Id.* A complainant must also demonstrate that the amount of its investment in these activities is substantial. In the portfolio licensing context, the Commission has indicated that it considers the relative importance of the asserted patent to the licensing investment to determine to what extent the claimed licensing investments can be attributed to the asserted patent. *Navigation Devices*, Comm'n Op. at 8 ("Because Pioneer's activities are associated both with the asserted patents and unasserted patents, a key issue

[10] Because the statute requires that investment activities satisfy all three of these requirements, the absence of a connection to any one of them will defeat complainant's attempt to rely on those activities to satisfy the domestic industry requirement. *Navigation Devices*, Comm'n Op. at 15 n.12.

presented is the strength of the nexus between the activities and the asserted patents."). Finally, a complainant must establish that its investment in licensing the asserted patent is substantial. *Id.*

1. Which of Thomson's Activities Constitute Exploitation Through Licensing

As an initial matter, the Commission considers which of Thomson's activities constitute exploitation through licensing for purposes of section 337(a)(3)(C).[11] *Id.* Thomson identifies four categories of activities that it alleges are licensing: (1) activities relating to Thomson's LCD licensing program, including employee time, facility use, travel, and product acquisition; (2) the purchase of the Xerox/PARC patent portfolio; (3) litigation of the underlying section 337 investigations and the parallel, stayed district court action; and (4) the reexamination of the '006, '674, and '556 patents.

Respondents do not dispute that the first category of activities relates to licensing. *See* CMI Pet. at 74-80. As discussed below, the Commission holds based on the evidence in this investigation, that the latter three categories of activities do not constitute exploitation through licensing under section 337(a)(3)(C).

With respect to the second category, Thomson's acquisition of the Xerox/PARC patent portfolio, Thomson argues that it paid [ ] to acquire the portfolio of patents, including the '063, '674, and '556 patents, as well as Xerox's licensing work product. Thomson asserts that this investment should be considered part of its own licensing program because [

] and because Xerox's licensing work product could be used to incorporate Xerox's licensing program into Thomson's

[11] Respondents do not challenge the ALJ's conclusion that Thomson's activities occurred in the United States, nor do they challenge that these activities sufficiently relate to the asserted patents to be considered in our domestic industry analysis. Thus, we begin by determining which of complainants' activities relate to licensing and then turn to the strength of the relationship to the asserted patents.

future LCD Licensing Programs. Thom. Resp. at 65-66. Thomson proposes that, as a general matter, investments by a prior patent owner should be attributed to a complainant when the "Complainant acquired an existing licensing program with the intent of continuing that program and did in fact continue that program." Thom. Resp. at 67. Respondents counter that Thomson had no involvement with any licensing activities associated with these patents before buying them from Xerox, so Thomson's purchase of the portfolio is solely related to ownership, not licensing. CMI Resp. at 71.

The ALJ found that Thomson did not show that its expenditures for acquiring the Xerox/PARC portfolio actually relate to licensing. ID at 424. We agree. Congress clearly stated that it did not intend mere patent ownership to constitute a domestic industry and as such cannot constitute exploitation through licensing:

> The mere ownership of a patent or other form of intellectual property rights would not be sufficient to satisfy this test. The owner of the property right must be actively engaged in steps leading to the exploitation of the intellectual property, including application engineering, design work, or other such activities.

S. Rep. No. 100-71, at 130 (1987). Thomson's investment in Xerox/PARC's patent portfolio simply reflects a transfer of legal title of the patents in return for monetary consideration. In other words, Thomson merely assumed the status of a patent owner through its investment in Xerox/PARC's patents. And while Thomson argues that it purchased Xerox/PARC's portfolio because of its licensing prospects, we agree with the ALJ that "Thomson's motivation is similar to most patent owners, who acquire patents, either through prosecution or purchase, for the purpose of exploiting them for financial gain." ID at 424. Therefore, we find that Thomson has not presented evidence sufficient to establish that the acquisition of the Xerox/PARC portfolio constitutes an investment in the exploitation of the patents through licensing. Nor do we believe that Xerox's work product should be attributed to Thomson. There is no evidence that Thomson had any involvement with Xerox/PARC's licensing activities before purchasing the patent portfolio, and Thomson has failed to present sufficient evidence as to why these expenses should be attributed to Thomson. Nor has Thomson shown that its purchase of Xerox's patent portfolio and work product constitutes the type of active engagement envisioned by Congress to be considered exploitation of the patent through licensing. Thus, we hold that under the facts presented here, Thomson's acquisition costs are patent ownership costs that do not warrant consideration in our evaluation of whether Thomson satisfies the domestic industry requirement.

Turning to the third category, Thomson's litigation of the underlying section 337 investigations (337-TA-741 and 337-TA-749) and the parallel, stayed Delaware district court action, Thomson argues that these actions relate to licensing because Thomson attempted to license the patents prior to filing the actions and because litigation is part of its overall licensing strategy. Thomson Pet. at 95-96; Thom. Resp. at 70. Thomson also argues that the Commission should consider the litigation expenses for its parallel district court action, regardless of whether or not it is stayed, because "there is a nexus between those expenses and licensing the asserted patents." *Id.* at 70-71. Respondents respond that allowing legal expenses for the instant investigations and corresponding district court action would nullify the nexus to licensing requirement. CMI Resp. at 72 n.23. Respondents further argue that the Commission has held that only activities that occurred before the filing of a complaint are relevant to whether or not a domestic industry exists and that Thomson incurred these expenses after the complaint was filed. *See id.* at 73.

The ALJ, relying on Commission precedent holding that only costs incurred before the filing of the complaint generally can be considered in assessing a complainant's domestic industry, held that Thomson did not provide evidence about which litigation costs were incurred before the filing of the complaint. ID at 425. The Commission agrees with the ALJ that, as a general matter, "only activities that occurred before the filing of a complaint with the Commission are relevant to whether a domestic industry exists or is in the processing of being established," and that Thomson failed to distinguish between costs incurred prior to and after filing its complaint. *See Video Game Sys. and Controllers*, Inv. No. 337-TA-743, Comm'n Op. at 5 (Jan. 20, 2012) ("*Video Game Systems II*") (quoting *Coaxial Cable Connectors Components Thereof and Prods. Containing Same*, Inv. No. 337-TA-650, Comm'n Op. at 51 n.17 (Apr. 14, 2010) ("*Coaxial Cables*")); ID at 425.

Moreover, the Commission holds that, regardless, litigation expenses for an underlying section 337 investigation may not establish a domestic industry under section 337(a)(3)(C). In *John Mezzalingua Associates, Inc. v. International Trade Commission*, the Federal Circuit held that litigation expenses do not automatically constitute evidence of the existence of a domestic industry. 660 F.3d 1322, 1328 (Fed. Cir. 2011) ("We agree with the Commission that expenditures on patent litigation do not automatically constitute evidence of the existence of an industry in the United States established by substantial investment in the exploitation of a patent."). In *Coaxial Cable Connectors*, Inv. No. 337-TA-650, the Commission further held that litigation costs, if directly related to licensing, may be considered in determining whether a domestic industry exists. *Coaxial Cables*, Comm'n Op. at 50-51. The Commission did not consider, however, the propriety of allowing its own investigations to support the domestic industry requirement. We hold that underlying section 337 investigations and parallel, stayed district court actions should not be considered in our domestic industry analysis. Holding to the contrary would essentially eliminate the domestic industry requirement. Every complainant that comes before the Commission invests resources when bringing a section 337 complaint and supporting its allegations during the investigation. Permitting complainants to rely on these activities and investments to establish a domestic industry, would be inconsistent with the statute and legislative history which imposes an affirmative requirement of demonstrating the domestic industry, one which cannot be automatically fulfilled by the filing of a Section 337 complaint. Thomson has not shown that Congress intended the filing of a section 337 complaint to support the very allegations a complainant must prove, even when the investment is intended to further a licensing agenda. In addition, Thomson failed to show that the district court action that was filed to parallel the section 337 investigation and was stayed pursuant to 28 U.S.C. § 1659 had a clear relationship to licensing. Therefore, Thomson's litigation of the underlying section 337 investigations (337-TA-741 and 337-TA-749) and the parallel, stayed Delaware district court action do not warrant consideration in our evaluation of whether Thomson satisfies the domestic industry requirement.

Finally, with respect to the fourth category, Thomson's reexamination of the '006, '674, and '556 patents, Thomson argues that its ongoing reexamination expenses have a strong nexus to licensing because the proceedings were initiated by respondent Qisda Corp. during the course of licensing negotiations and Thomson incurred these expenses as part of its continuing efforts to maintain and license the asserted patents to respondents and other potential licensees. Thom. Resp. at 71. Respondents argue that the reexamination expenses were incurred in connection with the instant investigation and corresponding district court action and that there is no nexus between the reexamination of three of the asserted patents and licensing of those patents to warrant consideration under section 337(a)(3)(C). CMI Resp. at 74-75.

The ALJ again relied on the fact that Thomson did not provide evidence about which costs were incurred before the filing of the complaint to conclude that the reexamination costs should not be considered. ID at 425. We agree with the ALJ, and further note that, in general, reexaminations are simply a continuation of prosecution that reaffirm or modify the boundaries of the patentee's ownership. Thomson has not established evidence to show that these activities and investments are encompassed within the statute. Nor has Thomson shown that these activities and expenditures constitute more than mere patent ownership. S. Rep. No. 100-71 at 130; *Video Game Sys. and Controllers*, Inv. No. 337-TA-743, Comm'n Op. at 8 (Apr. 14, 2011) ("*Video Game Systems I*") (holding that "patent prosecution activities alone would be insufficient to establish the domestic industry requirement under section 337(a)(3)(C)"). Accordingly, on the facts presented here, the Commission finds that these activities and investments do not fall within section 337(a)(3)(C).

Thus, only Thomson's activities relating to its LCD licensing program, including employee time, facility use, travel, and product acquisition, constitute exploitation through licensing and may be considered to determine the level of investment Thomson made in the asserted patents.

2. What Did Thomson Invest in Licensing the Asserted Patents

Having identified the activities that constitute exploitation through licensing, Thomson must establish what amount it invested in those activities and ultimately what portion can be attributed to the patents at issue. *See Navigation Devices*, Comm'n Op. at 12-13. Oftentimes, a complainant can only provide the Commission with the total amount it invested in licensing the entire patent portfolio. It may be challenging, if not impossible, to allocate a particular dollar amount to each asserted patent. This does not preclude a complainant from establishing a domestic industry. *See Navigation Devices*, Comm'n Op. at 11-12 n.8. Indeed, Congress, by using the word "substantial," indicated that no mathematical precision is required when assessing the amount a complainant has invested in each patent. *See* 19 U.S.C. § 1337(a)(3)(C); *Certain*

Stringed Musical Instruments and Components Thereof, Inv. No. 337-TA-586, Comm'n Op. at 25-26 (May 16, 2008) ("[T]here is no need to define or quantify the industry itself in absolute mathematical terms."). In addition, we see no reason to believe that Congress intended the domestic industry to be established only on the basis of licenses covering individual patents. However, a complainant must provide additional evidence to establish the extent that it was investing in licensing the asserted patent. *Navigation Devices*, Comm'n Op. at 9 ("Where the complainant's licensing activities and investments involve a group of patents or a patent portfolio, the complainant must present evidence that demonstrates the extent of the nexus between the asserted patent and the complainant's licensing activities and investments."). In this regard, the Commission will consider all evidence demonstrating the importance of the asserted patent to the licensing expenses incurred. *Id.* at 9-11. In *Navigation Devices,* the Commission indicated it will consider, among other things: evidence showing that complainants' licensing activities are particularly focused on the asserted patent among the group of patents in the portfolio, including evidence that the patent was discussed during the licensing negotiation process, it has been successfully litigated before by the complainant, it relates to a technology industry standard, it is a base patent or a pioneering patent, it is infringed or practiced in the United States, or the market recognizes its value in some other way; whether the licensee's efforts relate to "an article protected by" the asserted patent; the number of patents in the portfolio; the relative value contributed by the asserted patent to the portfolio; the prominence of the asserted patent in licensing discussions, negotiations and any resulting license agreement; and the scope of technology covered by the portfolio compared to the scope of the asserted patent. *Id.*

Thomson argues that it invested a total of [ ] in its LCD licensing program, including [ ] in employee costs, [ ] in facility costs, [ ] in travel expenses, and [ ] in product acquisition for analyzing potentially infringing products. Thom. Resp. at 53. While the ALJ attributed this entire amount to each of the asserted patents, ID at 420, we decline to do so. Thomson's investment relates to the entire LCD patent portfolio, not just the asserted patents. In *Navigation Devices*, the Commission declined to adopt a policy whereby every investment in a patent portfolio is automatically allocated in its entirety to each individual patent in the portfolio. *Navigation Devices*, Comm'n Op. at 13. Instead, we adopted a fact-focused and case-specific inquiry to determine whether a substantial investment in the exploitation of the asserted patent has been made by the complainant. *Id.* Thus, of the total amount invested in licensing the LCD patent portfolio, Thomson must establish that a substantial investment can be attributed to the patents at issue. *See id.*

The Commission finds that Thomson has shown that a substantial portion of the [ ] invested in licensing the LCD patent portfolio can be attributed to the asserted patents because Thomson's licensing activities were heavily focused on the asserted patents among the group of patents in the portfolio. Thomson Licensing LLC is a U.S. company with offices in Princeton, New Jersey, whose primary business is licensing patents [ ]. In this regard, Thomson has multiple ongoing licensing programs, including one directed to its LCD patent portfolio. The ALJ found that as of December 31, 2009, Thomson owned [ ] patents and patent applications worldwide, but that only a very small subset [ ] is part of its LCD licensing program. *Id.* [ ]

[

] The ALJ also found that "[w]ith respect to the LCD licensing program, Thomson has executed [ ] licenses [ ] that cover the '006 and '941 patents" and "[ ] of those licenses [ ] cover the '063, '556, and '674 patents." ID at 420. "Thomson has also executed [ ] release agreements with fields of use that cover the '006 and '941 patents." *Id.* This evidence shows that Thomson has negotiated a number of licenses that cover the asserted patents.

In addition, as the ALJ found, Thomson prominently asserted the five patents in many of its licensing negotiations. [

] During licensing discussions, Thomson actively relied on the five asserted patents [

]

[

] The ALJ also found that "[o]ne or more of the patents-in-suit were asserted in each of the Thomson patent books identified." *Id.* He also relied on five exemplary patent books which included claim chart proofs [ ] For example, the patent book for [ ] provides claim charts [ ]. In the patent book for [ ] claim charts are for asserted patents; in the patent book for [ ] claim charts are for asserted patents; in the patent book for [ ] claim charts are for asserted patents; and finally, a supplemental patent book was provided to [ ] including claim charts for two of the asserted patents. ID at 419-20. The ALJ concluded, and we agree, that "while Thomson's patent books may mention more than [ ] patents . . . and Thomson's LCD licensing program includes approximately [ ] patents . . ., Thomson typically provides claim charts for a small subset of patents, often including the asserted patents, from its LCD licensing program." *Id.* at 420. The parties did not challenge these findings by the ALJ in their petitions for review.

The claim charts signify that particular patents were important to Thomson for purposes of licensing negotiations. They also establish that Thomson believed the claims of those patents actually cover commercially-available products of the targeted company. We conclude that Thomson was specifically investing in these particular patents through licensing. Also, the evidence indicates that Thomson has executed licenses with or is in active negotiations with much of the industry [

] and suggests that the industry agreed that the risk of infringing these patents was sufficiently high to warrant taking a license and that the patents are important to the industry. *See* ID at 420 (citing CX-4245C at Q.203).

Thus, we agree with the ALJ that the evidence shows that Thomson's licensing activities for licensing the LCD patent portfolio are particularly focused on the asserted patents and conclude that a substantial portion of the [ ] invested in procuring the LCD portfolio licenses can be attributed to the asserted patents. We find further support for this conclusion in Thomson's estimate that [ ] relates directly to the asserted patents. To reach this estimate, Thomson's witness Ms. Coto determined what percentage of time each employee spent on the asserted patents and based on these percentages, she calculated the costs associated with those employees. She also reviewed the travel expense reports and verified with the relevant employees whether or not the expenditures related to licensing the asserted patents, and finally, she attributed the percentage of the employee time to the square footage of office space, insurance, and overhead to determine the total facility costs attributable to the asserted patents. CX-4247C at Q.69-98; *see generally* ID at 427-28.

Respondents argue, however, that the [ ] is itself inflated because it includes costs incurred prior to the acquisition of the Xerox/PARC patent portfolio.[12] *See* CMI Resp. at 63. Thomson acquired the Xerox/PARC patent portfolio, which included three of the five asserted patents, in [ ] Respondents argue that none of the costs

[12] Respondents also argue that the [ ] investment Thomson identified as specifically related to the asserted patents "remains overstated given that this amount still encompasses expenses related to a host of other patents, including Thomson's numerous other licensing programs, in addition to the five asserted patents that are among the patents involved in the LCD licensing program." CMI Resp. at 63; *see also* CMI Resp. at 61 nn.13-14. However, Respondents did not make this argument in their Petitions for Review. Respondents only asserted that Thomson's [ ] investment is overstated because of the timing issue addressed above. Respondents also did not assert that the [ ] investment they identify was overstated in their Petitions for Review nor did they provide a lower number for the Commission to consider. Therefore, we believe that Respondents' arguments have been waived before the Commission.

incurred between [ ] can be attributed to the asserted patents and that without those employee and facility costs, Thomson's total investment is only [ ]. We disagree that the investment made between [ ] cannot be attributed to the two patents owned by Thomson during that time period. [ ] Thus, in our view, a portion of the amount invested from [ ] can be attributed to the after-acquired patents as well.

3. Whether Thomson's Investments in Licensing the Asserted Patents Are Substantial

Finally, Thomson must establish that the amount invested in the exploitation of each patent through licensing is substantial. 19 U.S.C. § 1337(a)(3)(C). The Commission has indicated that whether an investment is substantial may depend on the industry and the size of the complainant. *Navigation Devices*, Comm'n Op. at 15. The Commission has also indicated that it will consider, among other things, the existence of other types of "exploitation" of the asserted patent such as research, development, or engineering; the existence of license-related ancillary activities such as ensuring compliance with license agreements and providing training or technical support to its licensees; whether the complainant's licensing activities are continuing; and whether the complainant's licensing activities are those that are referenced favorably in the legislative history of section 337(a)(3)(C). *Id.* at 16. Finally, the Commission has stated that "there is no minimum monetary expenditure that a Complainant must demonstrate to qualify as a domestic industry under the 'substantial investment' requirement of this section." *Stringed Musical Instruments*, Comm'n Op. at 25.

Although we cannot credit Thomson's entire investment in licensing the LCD patent portfolio to the five asserted patents, we conclude that Thomson's investment in licensing the asserted patents is nevertheless substantial. The close relationship between the licensing activities and the asserted patents in combination with the amount invested in those activities leads us to this conclusion. Moreover, because we find that, at a minimum, Thomson has invested [ ] in licensing the asserted patents and Thomson focused heavily on each of the asserted patents during licensing, we conclude that the amount invested in each patent is substantial.

As in *Navigation Devices*, this is not an instance where the complainant is an individual, a university, or other entity with limited resources. The ALJ found, and we agree, that Thomson Licensing LLC is a U.S. company with offices in Princeton, New Jersey. ID at 418. Thomson's primary business is licensing patents [ ] Thomson Licensing LLC and Thomson Licensing SAS are both subsidiaries of the French Company Technicolor. *Id.* As of December 31, 2009, Thomson owned [ ] patents and patent applications worldwide and approximately [ ] patents are part of its LCD licensing program. *Id.* Moreover, the ALJ noted that "[f]rom January 1, 2008 through June 30, 2010, Thomson's worldwide expenditures on its licensing programs totaled over [ ] and its United States expenditures on its licensing programs totaled approximately [ ] Thus, Thomson has significant resources and a vast international patent portfolio at its disposal. Nevertheless, Thomson's [ ] dollar investment in licensing its LCD portfolio represents [ ] of its total U.S. licensing expenditures and [ ] of its worldwide licensing expenditures, while the patents included in its LCD licensing program make up only [ ] of Thomson's approximately [ ] patent and patent applications. In addition, Thomson's [ ] dollar investment in the asserted patents represents [ ] of its total U.S. licensing expenditures and [ ] of its worldwide licensing expenditures. This suggests that Thomson was investing more heavily in its LCD patent portfolio and in the five asserted patents than in its other patents.

We also believe that Thomson's investment is substantial in relation to the industry. Unlike in *Navigation Devices*, where Pioneer identified a number of potential licensees but executed a few licenses, one of which was a cross license resulting from litigation, Thomson has successfully licensed its LCD portfolio, including the asserted patents, to a large portion of the industry. *Navigation Devices*, Comm'n Op. at 24-25. Indeed, by late 2010, Thomson had licensed or was in renewal talks with licensees representing [ ] of the LCD monitor market and Thomson had licensed or was in active negotiations with over [ ] of the LCD digital television market. CX-4245C at Q.203. Thomson has shown that it was able to license or was in licensing negotiations with a majority of the industry, thereby demonstrating the significance of its investment in licensing the asserted patents in view of the particular industry at issue.

In addition, we agree with the ALJ, for the reasons he indicated, that the substantial nature of Thomson's investment is bolstered by the fact that Thomson invests in license-related ancillary activities and the fact that its licensing activities are ongoing. We also note, as the ALJ did, that Thomson has generated [ ] in revenue from its licenses covering the patents-in-suit. CX-4247C, Q.100; CX-4246C, Q.128-129. Of the [ ] in revenue, [ ] was collected from [ ] and over [ ] was collected between [ ]. While the ALJ found that this was strong evidence that Thomson's investment is substantial, we caution that royalties do not constitute the investment itself. *Navigation Devices*, Comm'n Op. at 24. Rather, they are circumstantial evidence that an investment was made and are consistent with our conclusion that Thomson's investment in the asserted patents was substantial.

Further, we note that the fact that complainant's licensing activities are revenue-driven and target existing production detracts somewhat from the substantiality of Thomson's investment. *See Navigation Devices*, Comm'n Op. at 25. Thomson argues that its activities fall into the category of production-driven licensing because it developed and practiced two of the five patents (the '006 and '941 patents) until it was forced from the market, and it supported PARC's research and development by purchasing Xerox/PARC's patents. Thom. Resp. at 63. We find however that, like complainant in *Navigation Devices*, Thomson's current business is based on a revenue-driven licensing model, so its investments are entitled to less weight.[13]

Finally, Thomson argues that it has invested in other types of "exploitation" of the asserted patents such as research, development, or engineering. Specifically, Thomson argues that it developed the technology covered by two of the five patents and that it has a history of developing, innovating, manufacturing, and licensing. Thom. Resp. at 61-62. In addition, Thomson argues that it manufactured radios, moved into the turntable business, and then into televisions, though Thomson does not allege that it currently manufactures or performs research and development or engineering in the United States. CX-4646C, Q.24. We do not believe that this supports Thomson's assertion that its investment in the exploitation of the asserted patents is substantial. Thomson provides no information about the amount it invested in research, development, or engineering for us to assess whether this contributes to its investment in the asserted patents' exploitation. Rather, we find that, taken as a whole, Thomson's investment in

[13] In *Coaxial Cables*, the Commission held that section 337(a)(3)(C), by using the broad term "licensing," "does not limit the types of licensing activities that the Commission can consider," including revenue-driven licensing, even when viewed in light of the legislative history drawn to production-based licensing. *Coaxial Cables*, Comm'n Op. at 49-50.

licensing the asserted patents is substantial. We, therefore, affirm the ALJ's conclusion that Thomson has established the economic prong of the domestic industry requirement under section 337(a)(3)(C).

VI. CONCLUSION

For the foregoing reasons, the Commission reverses the ALJ's determination of violation of section 337 with respect to the asserted claims of the '674 patent. The Commission affirms, with modifications, the ALJ's determination of no violation of Section 337 with respect to the asserted claims of the '006, the '063, and the '556 patents, as well as the ALJ's determination that the economic prong of the domestic industry requirement has been met. With respect to the '941 patent, we remand to the ALJ for a determination of whether the ViewFrame II+2 prior art invalidates the '941 patent.

By order of the Commission.

Lisa R. Barton
Acting Secretary to the Commission

Issued; July 6, 2012

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF **337-TA-749**

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Daniel L. Girdwood, Esq., and the following parties as indicated, on **July 6, 2012**

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On Behalf of Respondents Chimei Innolux Corporation; Innolux Corporation; and Chi Mei Optoelectronics USA, Inc.:

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CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF **337-TA-749**

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **COMMISSION OPINION** has been served by hand upon the Commission Investigative Attorney, Daniel L. Girdwood, Esq., and the following parties as indicated, on **July 6, 2012**

Lisa R. Barton, Acting Secretary
U.S. International Trade Commission
500 E Street, SW
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On Behalf of Complainants Thomson Licensing SAS and Thomson Licensing LLC:

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On Behalf of Respondents AU Optronics Corporation and AU Optronics Corporation America:

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On Behalf of Respondents Qisda Corporation; Qisda America Corporation; Qisda (Suzhou) Co., Ltd.; BenQ Corporation; BenQ America Corporation; and BenQ Latin America Corporation:

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Jack Q. Lever, Esq. **WHITE & CASE LLP** 701 13th Street NW Washington, DC 20005	( ) Via Hand Delivery (✓) Via Overnight Mail ( ) Via First Class Mail ( ) Other: ________

On Behalf of Respondent MStar Semiconductor, Inc.:

James B. Altman, Esq. **FOSTER, MURPHY, ALTMAN, & NICKEL, PC** 1899 L Street, NW Suite 1150 Washington, D.C. 20036	( ) Via Hand Delivery (✓) Via Overnight Mail ( ) Via First Class Mail ( ) Other: ________

On Behalf of Respondent Realtek Semiconductor Corporation:

Nabeel Khan, Esq. **SIDLEY AUSTIN LLP** 717 North Harwood, Suite 3400 Dallas, TX 75201	( ) Via Hand Delivery (✓) Via Overnight Mail ( ) Via First Class Mail ( ) Other: ________

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, MODULES, AND COMPONENTS THEREOF**	**Investigation No. 337-TA-741/749**

THE COMMISSION'S FINAL DETERMINATION OF NO VIOLATION OF SECTION 337 WITH RESPECT TO U.S. PATENT NOS. 5,978,063; 5,648,674; 5,621,556; AND 5,375,006 AND TERMINATION OF THE INVESTIGATION AS TO THOSE PATENTS AND REMAND OF THE INVESTIGATION AS TO U.S. PATENT NO. 6,121,941

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to reverse the determination of the presiding administrative law judge ("ALJ") that found a violation of section 337 of the Tariff Act of 1930 with respect to U.S. Patent No. 5,648,674 ("the '674 patent"), and to affirm, with modifications, the determination of the ALJ that found no violation with respect to U.S. Patent Nos. 5,978,063 ("the '063 patent"); 5,648,674 ("the '674 patent"); 5,621,556 ("the '556 patent"); and 5,375,006 ("the '006 patent"). The Commission hereby terminates the investigation with a finding of no violation as to the '006, '063, '556 and '674 patents. With respect to U.S. Patent No. 6,121,941 ("the '941 patent"), the Commission has determined to issue a remand to the ALJ to determine whether the asserted claims are invalid in view of the ViewFrame II+2 prior art.

FOR FURTHER INFORMATION CONTACT: Jia Chen, Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-4737. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

SUPPLEMENTARY INFORMATION: The Commission instituted Inv. No. 337-TA-741 on October 18, 2010, based on a complaint filed by Thomson Licensing SAS of France and Thomson Licensing LLC of Princeton, New Jersey (collectively "Thomson"). 75 *Fed. Reg.* 63856 (Oct. 18, 2010). The complaint alleged violations of section 337 of the Tariff Act of 1930, as amended 19 U.S.C. § 1337, by reason of infringement of various claims of the '941,'063,'674,'556; and '006 patents. The Commission instituted Inv. No. 337-TA-749 on November 30, 2010, based on a complaint filed by Thomson. 75 *Fed. Reg.* 74080 (Nov. 30, 2010). The complaint alleged violations of section 337 of the Tariff Act of 1930 by reason of infringement of various claims of the '063, '556, and '006 patents. On January 5, 2011, the Commission consolidated the two investigations. The respondents are Chimei InnoLux Corporation of Miaoli County, Taiwan and InnoLux Corportation of Austin, Texas (collectively, "CMI"); MStar Semiconductor Inc. of ChuPei, Taiwan ("MStar"); Qisda Corporation of Taoyuan, Taiwan and Qisda America Corporation of Irvine, California (collectively, "Qisda"); and BenQ Corporation of Taipei, Taiwan, BenQ America Corporation of Irvine, California, and BenQ Latin America Corporation of Miami, Florida (collectively "BenQ"); Realtek Semicondustor Corp. of Hsinchu, Taiwan ("Realtek"); and AU Optronics Corp. of Hsinchu, Taiwan and AU Optronics Corp. America of Houston, Texas (collectively "AUO").

On January 12, 2012, the ALJ issued the subject ID finding a violation of Section 337 with respect to the '674 patent. The ALJ found that the CMI accused products including the Type 2 Array Circuitry and any Qisda or BenQ accused products incorporating these CMI accused products infringe the asserted claims of the '674 patent. The ALJ found that no other accused products infringe the '674 patent. The ALJ also found that no accused products infringe the asserted claims of the '063 patent, the '006 patent, the '556 patent, or the '941 patent. The ALJ also found that claims 1, 2, 3, 4, 8, 11, 12, 14, and 18 of the '063 patent are invalid for obviousness under 35 U.S.C. § 103, and that claims 4 and 14 of the '006 patent are invalid as anticipated under 35 U.S.C. § 102. The ALJ further found that claim 17 of the '063 patent, claim 7 of the '006 patent, and the asserted claims of the '556 patent, the '674 patent, and the '941 patent are not invalid. The ALJ concluded that a domestic industry exists in the United States that exploits the asserted patents as required by 19 U.S.C. § 1337(a)(2). On January 25, 2011, Thomson, CMI, MStar, Realtek, and AUO each filed a petition for review of the ID. BenQ and Qisda filed a joint petition for review incorporating the other respondents' arguments by reference.

On March 26, 2012 the Commission determined to review (1) claim construction of the limitation "layer" of the asserted claims of the '006 patent; (2) infringement of the asserted claims of the '006 patent; (3) anticipation of claims 4 and 7 of the '006 patent by Scheuble; (4) the claim construction of the limitations "mechanically rubbing" / "mechanically rubbed," "a plurality of spacing elements," and "an affixing layer" of the asserted claims of the '063 patent; (5) infringement of the asserted claims of the '063 patent; (6) obviousness of the asserted claims of the '063 patent in view of Sugata and Tsuboyama; (7) whether Lowe and Miyazaki are prior art to the asserted claims of the '063 patent; (8) anticipation of the asserted claims of the '063 patent by Lowe; (9) anticipation of the asserted claims of the '063 patent by Miyazaki; (10) obviousness of the asserted claim of the '556 patent in view of Takizawa and Possin; (11) anticipation and obviousness of the asserted claims of the '674 patent in view of Fujitsu; (12) claim construction of the "second rate" "determined by" limitation of the asserted claims of the '941 patent and the "input video signal" limitation of claim 4 of the '941 patent; (13) infringement of the asserted claims of the '941 patent; (14) anticipation of the asserted claims of the '941 patent by Baba; (15) exclusion of evidence of the ViewFrame II+2 LCD Panel; and (16) economic prong of the domestic industry requirement.

On March 26, 2012, the Commission also determined to review and to take no position on the claim construction of the terms "drain electrodes" and "source electrodes" of the '556 patent. The Commission requested briefing from the parties on the issues on review, as well as on remedy, the public interest, and bonding.

Having examined the record of this investigation, including the ALJ's final ID and the submissions of the parties, the Commission has determined to reverse the ALJ's finding of violation of section 337 by the '674 patent and affirm, with modifications, the findings of no violation of section 337 as to the '006, '063 and '566 patents. Specifically, the Commission finds that the asserted claims of the '674 patent are infringed by respondents CMI, Qsida, and BenQ, and that respondents have shown that claims 1, 7, 8, 14, 16, 17, and 18 of the '674 patent are anticipated by Fujitsu and that claims 9, 11, and 13 are obvious in view of Fujitsu and the knowledge of one of ordinary skill in the art. The Commission also finds that (a) respondents do not infringe the asserted claims of the '006 patent; (b) Scheuble does not anticipate claims 4 and 7 of the '006 patent; (c) respondent AUO, Qsida, and BenQ infringe claims 11,12, 14, 17, and 18, but not the remaining asserted claims of the '063 patent; (d) respondent CMI does not infringe the asserted claims of the '063 patent; (e) the '063 patent are obvious in view of Sugata and Tsuboyama; (f) Lowe and Miyazaki are prior art to claims 1-4 and 8 of the '063 patent, but not the remaining asserted claims of the '063 patent; (g) respondents have not shown that Lowe anticipates the asserted claims of the '063 patent; (h) Miyazaki anticipates claims 11, 12, 14, 17, and 18 of the '063 patent, but not any of the remaining asserted claims of the '063 patent; (i) respondents have not shown that claim 3 of the '556 patent is obvious in view of Takizawa and Possin; and (j) complainant satisfied the economic prong of the domestic industry requirement under 19 U.S.C. § 1337(a)(3)(C). Therefore, the investigation is terminated with a finding of no violation as to the '006, '063, '556 and '674 patents. With respect to the '941 patent, the Commission affirms that (a) respondents do not infringe the asserted claims of the '941 patent; and (b) respondents have not shown that the asserted claims of the '941 patent are obvious in view of Baba. The Commission reverses the ALJ's ruling to exclude from the record evidence of the ViewFrame II+2 prior art, and remands to the ALJ to decide whether the ViewFrame II+2 anticipates the asserted claims of the '941 patent (the Commission notes that this patent expires on August 26, 2012).

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42-46 and 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.42-46 and 210.50).

By order of the Commission.

Lisa Barton
Acting Secretary to the Commission

Issued: June 14, 2012

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF **337-TA-749**

CERTIFICATE OF SERVICE

I, Lisa R. Barton, hereby certify that the attached **NOTICE** has been served by hand upon the Commission Investigative Attorney, Daniel L. Girdwood, Esq., and the following parties as indicated, on **June 14, 2012**

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On Behalf of Respondents Qisda Corporation; Qisda America Corporation; Qisda (Suzhou) Co., Ltd.; BenQ Corporation; BenQ America Corporation; and BenQ Latin America Corporation:

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On Behalf of Respondents Chimei Innolux Corporation; Innolux Corporation; and Chi Mei Optoelectronics USA, Inc.:

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UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, MODULES, AND COMPONENTS THEREOF

Investigation No. 337-TA-741/749

NOTICE OF COMMISSION DETERMINATION TO REVIEW-IN-PART A FINAL DETERMINATION; SCHEDULE FOR FILING WRITTEN SUBMISSIONS

AGENCY: U.S. International Trade Commission.

ACTION: Notice.

SUMMARY: Notice is hereby given that the U.S. International Trade Commission has determined to review certain portions of the final initial determination ("ID") issued by the presiding administrative law judge ("ALJ") on January 12, 2012 in the above-captioned investigation.

FOR FURTHER INFORMATION CONTACT: Jia Chen, Office of the General Counsel, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 708-4737. Copies of non-confidential documents filed in connection with this investigation are or will be available for inspection during official business hours (8:45 a.m. to 5:15 p.m.) in the Office of the Secretary, U.S. International Trade Commission, 500 E Street, S.W., Washington, D.C. 20436, telephone (202) 205-2000. General information concerning the Commission may also be obtained by accessing its Internet server at *http://www.usitc.gov*. The public record for this investigation may be viewed on the Commission's electronic docket (EDIS) at *http://edis.usitc.gov*. Hearing-impaired persons are advised that information on this matter can be obtained by contacting the Commission's TDD terminal on (202) 205-1810.

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On January 12, 2012, the ALJ issued the subject ID finding a violation of Section 337 with respect to the '674 patent. The ALJ found that the CMI accused products including the Type 2 Array Circuitry and any Qisda or BenQ accused products incorporating these CMI accused products infringe the asserted claims of the '674 patent. The ALJ found that no other accused products infringe the '674 patent. The ALJ also found that no accused products infringe the asserted claims of the '063 patent, the '006 patent, the '556 patent, or the '941 patent. The ALJ also found that claims 1, 2, 3, 4, 8, 11, 12, 14, and 18 of the '063 patent are invalid for obviousness under 35 U.S.C. § 103, and that claims 4 and 14 of the '006 patent are invalid as anticipated under 35 U.S.C. § 102. The ALJ further found that claim 17 of the '063 patent, claim 7 of the '006 patent, and the asserted claims of the '556 patent, the '674 patent, and the '941 patent are not invalid. The ALJ concluded that a domestic industry exists in the United States that exploits the asserted patents as required by 19 U.S.C. § 1337(a)(2). On January 25, 2011, Thomson, CMI, MStar, Realtek, and AUO each filed a petition for review of the ID. BenQ and Qisda filed a joint petition for review incorporating the other respondents' arguments by reference.

Having examined the record of this investigation, including the ALJ's final ID and the submissions of the parties, the Commission has determined to review (1) claim construction of the limitation "layer" of the asserted claims of the '006 patent; (2) infringement of the asserted claims of the '006 patent; (3) anticipation of claims 4 and 7 of the '006 patent by Scheuble; (4) the claim construction of the limitations "mechanically rubbing" / "mechanically rubbed," "a plurality of spacing elements," and "an affixing layer" of the asserted claims of the '063 patent; (5) infringement of the asserted claims of the '063 patent; (6) obviousness of the asserted claims of the '063 patent in view of Sugata and Tsuboyama; (7) whether Lowe and Miyazaki are prior art to the asserted claims of the '063 patent; (8) anticipation of the asserted claims of the '063 patent by Lowe; (9) anticipation of the asserted claims of the '063 patent by Miyazaki; (10) obviousness of the asserted claim of the '556 patent in view of Takizawa and Possin; (11) anticipation and obviousness of the asserted claims of the '674 patent in view of Fujitsu; (12) claim construction of the "second rate" "determined by" limitation of the asserted claims of the '941 patent and the "input video signal" limitation of claim 4 of the '941 patent; (13) infringement of the asserted claims of the '941 patent; (14) anticipation of the asserted claims of the '941 patent by Baba; (15) exclusion of evidence of the ViewFrame II+2 LCD Panel; and (16) economic prong of the domestic industry requirement.

The Commission has also determined to review and to take no position on the claim construction of the terms "drain electrodes" and "source electrodes" of the '556 patent.

The parties should brief their positions on the issues on review with reference to the applicable law and the evidentiary record. In connection with its review, the Commission is particularly interested in responses to the following questions:

Question 1: The ALJ construed the term "a plurality of spacing elements" of claims 1 and 11 of the '063 patent as "two or more structures, not physically connected to one another, which structures serve to substantially uniformly separate two substrates, said structures formed on one of said two substrates and contacting the second substrate." ID at 43. Does the proper construction require that the "spacing elements" contact the "second substrate?" Does certain language from claim 1 ("the two substrates remaining substantially uniformly separated from each other by said spacing elements") and from claim 11 ("said second substrate being kept at a substantially uniform distance from said first substrate by said spacing elements") require that the spacing elements physically separate the two substrates? Please cite to evidence in the record showing the understanding of person of ordinary skill in the art at the time of the '063 patent invention.

Question 2: The ALJ construed "an affixing layer" of claim 1 of the '063 patent as "a stratum of material that attaches the spacing elements to a substrate, and which is separate and distinct from said spacing elements." ID at 34. Is this construction supported by the intrinsic evidence? In particular, does the preferred embodiment of the '063 patent specification disclose forming spacers directly from the affixing layer?

Question 3: The ALJ construed the term "a plurality of spacing elements separate from one another" as "two or more structures, not physically connected to one another, which structures serve to substantially uniformly separate two substrates, said structures formed on one of said two substrates and contacting the second substrate." ID at 43. Do the main photospacers in the accused CMI modules meet the limitation under the ALJ's construction? Please cite to the evidence in the record.

Question 4: With respect to the '063 patent, the ALJ stated in the ID that [[

]] ID at 334. He also stated that [[

Id. Are these accurate statements? Please provide citations to the record as support. In addition, please identify [[

]]

Question 5: At the time of the invention of the '063 patent, would it have been obvious to combine the teachings of Sugata and Tsuboyama, such that the substrate on which the spacers are formed in Sugata would be rubbed *after* the spacers are formed? Is the combination of the teachings of Sugata and Tsuboyama a combination of known elements that yield predictable results? Are there any secondary considerations such as commercial success that would be probative of non-obviousness? Please cite evidence in the record as support.

Question 6: Has Thomson produced sufficient independent corroborating evidence showing that the inventions of each of the asserted claims of the '063 patent have been reduced to practice before the filing dates of Lowe and Miyazaki? In particular, please discuss whether the evidence shows that display cells embodying the inventions have been tested and shown to work for their intended purposes.

Question 7: Does the intrinsic evidence support the construction of the term "plate" recited in claim 3 of the '006 patent to require a solid and not liquid material? ID at 220. Can the term "plate" include a liquid compensation layer sealed between two glass substrates? *See* CMI Petition at 31. Please cite to the evidence of the record as support. Under the proper construction of the term "plate," does Scheuble anticipate claims 4 and 7 of the '006 patent?

Question 8: With respect to infringement of the asserted claims of the '006 patent, what is an acceptable range of variance in the measurement of n2 and n3, given the probability of errors in any real-world measurement of the index of refraction? What are the values and measurement errors of n2 and n3 for the entire layer in the accused devices? How close does the real-world measurement of n2 have to be compared to n3 for the layer to be considered "uniaxial" as construed by the ALJ? How close would n2 have to be to n3 for the layer to be equivalent to a "uniaxial" layer under the ALJ's construction? Please limit your response to the evidence in the record.

Question 9: Would a person of ordinary skill in the art be motivated to modify Takizawa to use only one mask to form the plurality of etch stoppers recited in claim 3 of the '556 patent? Does Takizawa teach away from using a single mask to form the plurality of etch stoppers? Please cite to the evidence in the record. Please discuss any Federal Circuit case law regarding obviousness of a patent claim that requires a single structure or process, in light of prior art that discloses one or more such structures or processes.

Question 10: What is the proper construction of the limitation "a second rate" "determined by" of the asserted claims of the '941 patent? Please provide all relevant intrinsic and extrinsic evidence of record, including expert testimony.

Question 11: Do the respondents' accused products infringe claims 1 and 4 of the '941 patent under Thomson's construction of "determined by." Please cite any record evidence, including expert testimony, to support your response.

Question 12: Discuss any Federal Circuit case law relevant to whether or not claim 4 of the '941 patent requires an input video signal for a finding of infringement. Please discuss any basis, other than the language of the claims, (*e.g.*, prosecution history) that provides guidance on whether or not claim 4 requires an input video signal.

Question 13: For claims 1 and 4 of the '941 patent, what is the proper construction of the term "za" in the ratio ft/za "required for a cathode ray tube." For an interlaced signal associated with a CRT display, does za refer to the number of lines updated in a given field period? Please cite to the intrinsic evidence of the '941 patent as support.

Question 14: Is Mr. Vogeley's testimony regarding the prior art status of the ViewFrame II+2 with respect to the '941 patent sufficiently corroborated under a "rule of reason" analysis? Assuming that the ViewFrame II+2 is prior art to the asserted claims of the '941 patent, does the ViewFrame II+2 anticipate each of the asserted claims? Please cite to the evidence in the record.

Question 15: With respect to respondents' arguments that Thomson's investments in licensing its LCD patent portfolio cannot be completely allocated to the asserted patents, what portion of the investments should be allocated to the asserted patents? Please provide the legal and factual basis for such allocations.

Question 16: Based on the factors outlined below, please discuss the legal and factual bases for your position as to whether Thomson's investment in licensing for the asserted patents is substantial. Please consider at least the following factors: (1) the industry and size and scope of complainant's operations; (2) the existence of other types of "exploitation" of the asserted patents such as research, development, or engineering; (3) the existence of license-related ancillary activities such as ensuring compliance with the license agreement and providing training or technical support to its licensees; (4) whether complainant's licensing activities are continuing; (5) whether complainant's licensing activities are those referenced favorably in the legislative history of section 337(1)(3)(C); (6) complainant's return on investment; and (7) the extent to which complainant's LCD portfolio licenses are worldwide licenses.

Question 17: What should the Commission compare complainants' investments to in analyzing whether the complainants' investments are substantial? Please cite any relevant legal basis and evidence of record to support your position.

Question 18: Should Thomson's expenses related to the acquisition of the Xerox patent portfolio be [[ ]]? Is the purchase of a patent considered an exploitation of that patent under section 337(a)(3)(C)? Can investments in [[ ]] for purposes of establishing domestic industry under section 337 (a)(3)(C)? With respect to any argument that the Commission should [[ ]]? Further, how should the [[ ]]? Please provide legal and factual support for your position.

Question 19: Should the Commission consider litigation expenses for the particular Section 337 investigation at issue? Should the Commission consider litigation expenses for parallel district court actions? Should it matter if the district court actions are stayed or ongoing?

Question 20: Should the Commission consider reexamination expenses when determining if a domestic industry exists and if so should they be treated in the same manner as litigation expenses in determining whether or not the expenses are investments in licensing?

In connection with the final disposition of this investigation, the Commission may (1) issue an order that could result in the exclusion of the subject articles from entry into the United States, and/or (2) issue one or more cease and desist orders that could result in a respondent being required to cease and desist from engaging in unfair acts in the importation and sale of such articles. Accordingly, the Commission is interested in receiving written submissions that address the form of remedy, if any, that should be ordered. If a party seeks exclusion of an article from entry into the United States for purposes other than entry for consumption, the party should so indicate and provide information establishing that activities involving other types of entry either are adversely affecting it or likely to do so. For background, *see Certain Devices for Connecting Computers via Telephone Lines*, Inv. No. 337-TA-360, USITC Pub. No. 2843, Comm'n Op. at 9 (December 1994).

If the Commission contemplates some form of remedy, it must consider the effects of that remedy upon the public interest. The factors the Commission will consider include the effect that an exclusion order and/or cease and desist orders would have on (1) the public health and welfare, (2) competitive conditions in the U.S. economy, (3) U.S. production of articles that are like or directly competitive with those that are subject to investigation, and (4) U.S. consumers. The Commission is therefore interested in receiving written submissions that address the aforementioned public interest factors in the context of this investigation.

If the Commission orders some form of remedy, the United States Trade Representative, as delegated by the President, has 60 days to approve or disapprove the Commission's action.

See Presidential Memorandum of July 21, 2005, 70 *Fed. Reg.* 43251 (July 26, 2005). During this period, the subject articles would be entitled to enter the United States under bond, in an amount determined by the Commission and prescribed by the Secretary of the Treasury. The Commission is therefore interested in receiving submissions concerning the amount of the bond that should be imposed if a remedy is ordered.

WRITTEN SUBMISSIONS: The parties to the investigation are requested to file written submissions on the issues identified in this notice. Parties to the investigation, interested government agencies, and any other interested parties are encouraged to file written submissions on the issues of remedy, the public interest, and bonding. Such submissions should address the recommended determination by the ALJ on remedy and bonding. Complainant is also requested to submit proposed remedial orders for the Commission's consideration. Complainant is also requested to state the date that the patent expires and the HTSUS subheadings under which the accused products are imported. The written submissions and proposed remedial orders must be filed no later than close of business on Monday, April 9, 2012. Reply submissions must be filed no later than the close of business on Monday, April 16, 2012. The written submissions must be no longer than 75 pages and the reply submissions must be no longer than 35 pages. No further submissions on these issues will be permitted unless otherwise ordered by the Commission.

Persons filing written submissions must do so in accordance with Commission rule 210.4(f), 19 C.F.R. § 210.4(f), which requires electronic filing. The original document and 8 true copies thereof must also be filed on or before the deadlines stated above with the Office of the Secretary. Any person desiring to submit a document to the Commission in confidence must request confidential treatment unless the information has already been granted such treatment during the proceedings. All such requests should be directed to the Secretary of the Commission and must include a full statement of the reasons why the Commission should grant such treatment. *See* 19 C.F.R. § 210.6. Documents for which confidential treatment by the Commission is sought will be treated accordingly. All non-confidential written submissions will be available for public inspection at the Office of the Secretary and on EDIS.

The authority for the Commission's determination is contained in section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337), and in sections 210.42-46 and 210.50 of the Commission's Rules of Practice and Procedure (19 C.F.R. §§ 210.42-46 and 210.50).

By order of the Commission.

James R. Holbein
Secretary to the Commission

Issued: March 26, 2012

CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF **337-TA-749**

PUBLIC CERTIFICATE OF SERVICE

I, James R. Holbein, hereby certify that the attached has been served by hand upon the Commission Investigative Attorney, Daniel L. Girdwood, Esq., and the following parties as indicated, on **March 27, 2012**

J R Hol

James R. Holbein, Secretary
U.S. International Trade Commission
500 E Street, SW
Washington, DC 20436

On Behalf of Complainants Thomson Licensing SAS and Thomson Licensing LLC:

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(X) Via Overnight Mail
( ) Via First Class Mail
( ) Other: ________

On Behalf of Respondents AU Optronics Corporation and AU Optronics Corporation America:

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( ) Other: ________

On Behalf of Respondents Qisda Corporation; Qisda America Corporation; Qisda (Suzhou) Co., Ltd.; BenQ Corporation; BenQ America Corporation; and BenQ Latin America Corporation:

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555 Thirteenth Street. NW
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On Behalf of Respondents Chimei Innolux Corporation; Innolux Corporation; and Chi Mei Optoelectronics USA, Inc.:

Jack Q. Lever, Esq. **WHITE & CASE LLP** 701 13th Street NW Washington, DC 20005	( ) Via Hand Delivery (X) Via Overnight Mail ( ) Via First Class Mail ( ) Other: ________

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On Behalf of Respondent Realtek Semiconductor Corporation:

Brian Koo, Esq. **SIDLEY AUSTIN LLP** 1501 K Street N.W. Washington, DC 20005	( ) Via Hand Delivery (X) Via Overnight Mail ( ) Via First Class Mail ( ) Other: ________

PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.

In the Matter of **CERTAIN LIQUID CRYSTAL DISPLAY DEVICES, INCLUDING MONITORS, TELEVISIONS, AND MODULES, AND COMPONENTS THEREOF**

Inv. No. 337-TA-749
Inv. No. 337-TA-741

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Robert K. Rogers, Jr.

(January 12, 2012)

Appearances:

For Complainants Thomson Licensing SAS & Thomson Licensing, LLC:

Steven Cherny, Esq.; Todd M. Friedland, Esq.; James E. Marina, Esq. of Kirkland & Ellis LLP, New York, New York

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Lawrence J. Gotts, Esq.; Elizabeth M. Rossel, Esq.; Bert C. Reiser, Esq. of Latham & Watkins LLP, Washington, DC

Clement J. Naples, Esq. of Latham & Watkins, LLP, New York, New York

For Respondents Chimei InnoLux Corporation, Chi Mei Optoelectronics USA, Inc., & InnoLux Corporation:

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Warren S. Heit, Esq.; Eric Krause, Esq. of White & Case LLP, Palo Alto, California

For Respondent MStar Semiconductor, Inc.:

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James B. Altman, Esq.; F. David Foster, Esq.; Barbara A. Murphy, Esq.; David F. Nickel, Esq. of Foster, Murphy, Altman & Nickel, Washington, DC

For Respondents Qisda Corporation, Qisda America Corporation, Qisda (Suzhou) Co., Ltd., BenQ Corporation, BenQ America Corporation, & BenQ Latin America:

Steven P. Hollman, Esq.; Susan M. Cook, Esq.; Rebecca C. Mandel, Esq.; Laura E. Schabinger, Esq. of Hogan Lovells US LLP, Washington, DC

Arlene L. Chow, Esq.; Gary Serbin, Esq.; Robert Kohse, Esq. of Hogan Lovells US LLP, New York, New York

For Respondent Realtek Semiconductor Corporation:

Brian Koo, Esq. of Sidley Austin LLP, Washington, DC

Li Chen, Esq.; Dale B. Nixon, Esq.; Steve Malin, Esq.; Nabeel U. Khan, Esq.; Lauren G. Grau, Esq.; David A. Foley, Esq. of Sidley Austin LLP, Dallas, Texas

TABLE OF CONTENTS

Pursuant to the Notice of Investigation and Rule 210.42 of the Rules of Practice and Procedure of the United States International Trade Commission, this is the Administrative Law Judge's Final Initial Determination in the matter of Certain Liquid Crystal Display Devices, Including Monitors, Televisions, and Modules, and Components Thereof, Investigation Nos. 337-TA-749 & 337-TA-741.

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof, in connection with U.S. Patent No. 5,978,063 ("the '063 patent").

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof, in connection with U.S. Patent No. 5,375,006 ("the '006 patent").

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof, in connection with U.S. Patent No. 5,621,556 ("the '556 patent").

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof, in connection with U.S. Patent No. 5,648,674 ("the '674 patent").

The Administrative Law Judge hereby determines that a violation of Section 337 of the Tariff Act of 1930, as amended, has not been found in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof, in connection with U.S. Patent No. 6,121,941 ("the '941 patent").

The following abbreviations may be used in this Initial Determination:

CPX	Complainants' physical exhibit
CDX	Complainants' demonstrative exhibit
CX	Complainants' exhibit
CIB	Complainants' initial post-hearing brief
CRB	Complainants' reply post-hearing brief
RPX	Respondents' physical exhibit
RDX	Respondents' demonstrative exhibit
RX	Respondents' exhibit
AIB	AUO's initial post-hearing brief
ARB	AUO's reply post-hearing brief
CMIB	CMI's initial post-hearing brief
CMRB	CMI's reply post-hearing brief
MIB	MStar's initial post-hearing brief
MRB	MStar's reply post-hearing brief
QIB	Qisda/BenQ's initial post-hearing brief
QRB	Qisda/BenQ's reply post-hearing brief
RIB	Realtek's initial post-hearing brief
RRB	Realtek's reply post-hearing brief
Dep.	Deposition
JSRCC	Joint Statement Regarding Claim Construction
JSCI	Joint Stipulation of Contested Issues
JX	Joint Exhibit
Tr.	Transcript
CPHB	Complainants' pre-hearing brief
APHB	AUO's pre-hearing brief
CMPHB	CMI's pre-hearing brief
MPHB	MStar's pre-hearing brief
QPHB	Qisda/BenQ's pre-hearing brief
RPHB	Realtek's pre-hearing brief

I. BACKGROUND

A. Procedural History

On October 12, 2010, the Commission issued a Notice of Investigation in Investigation No. 337-TA-741 to determine:

> [W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof that infringe one or more of claims 1and 4 of the '941 patent; claims 1-4, 8, 11, 12, 14, 17, and 18 of the '063 patent; claims 1, 7-9, 11, 13, 14, and 16-18 of the '674 patent; claim 3 of the '556 patent; and claims 4, 7-10, and 14 of the '006 patent, and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

(*See* Notice of Investigation.) The investigation was instituted upon publication of the Notice of Investigation in the *Federal Register* on October 18, 2010. *See* 75 Fed. Reg. 63856-57 (2010). 19 CFR § 210.10(b).

The complainants are Thomson Licensing SAS, 1-5 rue Jeanne d'Arc, 92130 Issy-les-Moulineaux, France; and Thomson Licensing LLC, 2 Independence Way, Princeton, New Jersey 08543. The respondents are Chimei Innolux Corporation, No. 160 Kesyue Road, Jhunan Science Park, Miaoli County 350, Taiwan; Innolux Corporation, 2525 Brockton Drive, Suite 300, Austin, TX 78758; Chi Mei Optoelectronics USA, Inc., 101 Metro Drive, Suite 510, San Jose, CA 95110; MStar Semiconductor, Inc., 4F-1, No. 26, Tai-Yuan Street, ChuPei, Hsinchu Hsien, Taiwan 302; Qisda Corporation, 157 Shan-Ying Road, Gueishan, Taoyuan 333, Taiwan, Qisda America Corporation, 8941 Research Drive, Suite 200, Irvine, CA 92618; Qisda (Suzhou) Co., Ltd., No. 169 Zhujiang Road, Suzhou, China 215015; BenQ Corporation, 16 Jihu Road, Neihu, Taipei 114, Taiwan; BenQ America Corporation, 15375 Barranca Parkway, Suite A-205, Irvine, CA 92618; BenQ Latin America, 8200 NW 33rd Street, Suite 301, Miami, FL 33122;

Realtek Semiconductor Corporation, No. 2 Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan.

On November 23, 2010, the Commission issued a Notice of Investigation in Investigation No. 337-TA-749 to determine:

> [W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain liquid crystal display devices, including monitors, televisions, and modules, and components thereof that infringe one or more of claim 3 of the '556 patent; claims 1-4, 8, 11, 12, 14, 17, and 18 of the '063 patent; claims 4, 7-10, and 14 of the '006 patent, and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

(*See* Notice of Investigation.) The investigation was instituted upon publication of the Notice of Investigation in the *Federal Register* on November 30, 2010. *See* 75 Fed. Reg. 74080-81 (2010). 19 CFR § 210.10(b).

The complainants are Thomson Licensing SAS, 1-5 rue Jeanne d'Arc, 92130 Issy-les-Moulineaux, France; and Thomson Licensing LLC, 2 Independence Way, Princeton, New Jersey 08543. The respondents are Qisda Corporation, 157 Shan-Ying Road, Gueishan, Taoyuan 333, Taiwan; Qisda America Corporation, 8941 Research Drive, Suite 200, Irvine, CA 92618; Qisda (Suzhou) Co., Ltd., No. 169 Zhujiang Road, Suzhou, China 215015; BenQ Corporation, 16 Jihu Road, Neihu, Taipei 114, Taiwan; BenQ America Corporation, 15375 Barranca Parkway, Suite A-205, Irvine, CA 92618; BenQ Latin America, 8200 NW 33rd Street, Suite 301, Miami, FL 33122; AU Optronics Corporation, No. 1, Li-Hsin Road 2, Hsinchu Science Park, Hsinchu, Taiwan; AU Optronics Corporation America, 9720 Cypresswood Drive, Suite 241, Houston, TX 77070-3355.

On December 16, 2010, I consolidated Investigation Nos. 337-TA-741 and 337-TA-749. Investigation No. 337-TA-749 was designated as the lead case for the consolidated investigation.

As part of the consolidation, I issued an Initial Determination extending the target date for Investigation No. 337-TA-741 to align it with Investigation No. 337-TA-749. On January 5, 2011, the Commission issued a Notice indicating that it would not review my Initial Determination.

On February 15, 2011, the Commission Investigative Staff ("Staff") submitted a letter stating that Staff would no longer participate in Investigation Nos. 337-TA-749 & 337-TA-741.

All motions for summary determination were denied.

An evidentiary hearing was conducted before me from September 12, 2011 through September 19, 2011. Complainants Thomson Licensing SAS and Thomson Licensing LLC ("Thomson") and respondents AU Optronics Corporation and AU Optronics Corporation America (collectively "AUO"); Chimei InnoLux Corporation, Chi Mei Optoelectronics USA, Inc., and InnoLux Corporation (collectively "CMI"); MStar Semiconductor Inc. ("MStar"); Qisda Corporation, Qisda America Corporation, and Qisda (Suzhou) Co., Ltd. (collectively "Qisda"); BenQ Corporation, BenQ America Corporation, BenQ Latin America (collectively "BenQ"); and Realtek Semiconductor Corporation ("Realtek") participated in the hearing.[1]

After the hearing, post-hearing briefs and reply briefs were filed on October 7, 2011 and October 14, 2011, respectively.

B. The Private Parties

1. Thomson

Thomson Licensing SAS is organized and existing under the laws of France, and is a subsidiary of Technicolor, S.A. (CX-4246C at Q. 18.) Thomson Licensing SAS is the owner of the asserted patents. (*Id.* at Q. 44-54.) Thomson Licensing, LLC is organized and existing under

[1] All of the respondents will collectively be referred to as "Respondents."

the laws of Delaware. (*Id.* at Q. 12.) {

}

2. AUO

AU Optronics Corporation is a Taiwanese corporation with its principal place of business in Taiwan. (AUO Answer at ¶ 28.) AU Optronics Corporation America is a subsidiary of AUO Optronics Corporation, and is organized and existing under the laws of California. (*Id.* at ¶ 30.)

3. CMI

Chimei InnoLux Corporation is a Taiwanese corporation with its principal place of business in Taiwan. (CMI Answer at ¶ 20.) InnoLux Corporation is a subsidiary of Chimei InnoLux Corporation and is organized and existing under the laws of Texas with its principal place of business in Austin, Texas. (*Id.* at ¶ 22.) Chi Mei Optoelectronics USA, Inc. is a subsidiary of Chimei InnoLux Corporation and is incorporated in Delaware with its principal places of business in San Jose, California. (*Id.* at ¶ 24.)

4. MStar

MStar is a Taiwanese corporation with its principal place of business in Taiwan. (MStar Answer at ¶ 26.)

5. Qisda

Qisda Corporation is a Taiwanese corporation with a principal place of business in Taiwan. (Qisda Answer at ¶ 16.) Qisda America Corporation is a subsidiary of Qisda Corporation and is organized and existing under the laws of California, with its principal place of business in Irvine, California. (*Id.* at ¶ 18.) Qisda (Suzhou) Co., Ltd. is a subsidiary of Qisda Corporation and is organized and existing under the laws of China, with its principal place of business in Suzhou, China. (*Id.* at ¶ 20.)

6. BenQ

BenQ Corporation is a subsidiary of Qisda Corporation, and is organized and existing under the laws of Taiwan with a principal place of business in Taiwan. (Qisda Answer at ¶ 22.) BenQ America Corporation is a subsidiary of BenQ Corporation, and is organized and existing under the laws of California with a principal place of business in Irvine, California. (*Id.* at ¶ 24.) BenQ Latin America Corporation is a subsidiary of BenQ Corporation, and is organized and existing under the laws of Florida with its principal place of business in Miami, Florida. (*Id.* at ¶ 26.)

7. Realtek

Realtek is a corporation organized under the laws of Taiwan with its principal place of business in Taiwan. (Realtek Answer at ¶ 40.)

C. Overview Of The Patents At Issue

1. The '063 Patent

The '063 patent is entitled "Smart Spacers for Active Matrix Liquid Crystal Projection Light Valves." (JX-1.) It lists Gregory P. Crawford and Jackson Ho as the inventors. (*Id.*) It was filed on April 15, 1997 and issued on November 2, 1999. (*Id.*) The Abstract of the '063 patent states:

> A liquid crystal display is provided having two substrates. One substrate includes active aperture areas and a non-active area. A spacing layer is provided between the two substrates and includes spacing elements of anisotropic shape and geometry. The anisotropic spacing elements are formed only within the non-active areas of the substrate. A method of manufacturing is also provided including mechanically rubbing the liquid crystal display after the spacing elements are formed on the one substrate.

(*Id.*)

2. The '006 Patent

The '006 patent is entitled "Twisted Nematic Liquid Crystal Display Devices With Optical Axis of Birefringent Layer Inclined With Respect to Birefringent Layer Normal." (JX-4.) It lists Gunther Haas as the inventor. (*Id.*) It was filed on June 24, 1993 and issued on December 20, 1994. (*Id.*) It claims priority to a June 26, 1992 French patent application. (*Id.*) The Abstract of the '006 patent states:

> The disclosure relates to electrically controlled display devices that use the polarization rotation properties of twisted nematic liquid crystal layers. A display device comprises an optical cavity formed by two polarizers enclosing a layer of twisted nematic liquid crystal with which uniaxial birefringent means are associated in order to compensate for the residual birefringence of the liquid crystal layer which tends to reduce the contrast ratio of the display device. Thus, the homogeneity of the angular distribution of the contrast ratio is improved in relation to a device having no compensating means. The disclosed device can be applied in particular to data display devices for computers and to the display of television pictures directly or by projection.

(*Id.*)

3. The '556 Patent

The '556 patent is entitled "Method of Manufacturing Active Matrix LCD Using Five Masks." (JX-3.) It lists Ronald T. Fulks, William Yao, and Chuang C. Tsai as the inventors. (*Id.*) It was filed on May 30, 1995 and issued on April 15, 1997. (*Id.*) It is a continuation-in-part of an application filed on April 28, 1994. (*Id.*) The Abstract of the '556 patent states:

> The invention provides a method for manufacturing an active matrix liquid crystal displaying device having a plurality of thin film transistors using five masks. A plurality of gate electrodes are formed using a first mask. A plurality of etch stoppers are formed over the gate electrodes using a second mask. A plurality of chain electrodes and a plurality of source electrodes are formed using a third mask. A passivation layer including via holes is formed using a fourth mask. A plurality of pixel electrodes are formed using a fifth mask.

(*Id.*)

4. The '674 Patent

The '674 patent is entitled "Array Circuitry With Conductive Lines, Contact Leads, and Storage Capacitor Electrode All Formed in Layer That Includes Highly Conductive Metal." (JX-2.) It lists Richard L. Weisfield, Nizar S. Kheraj, and Mai T. Nguyen as the inventors. (*Id.*) It was filed on June 7, 1995 and issued on July 15, 1997. (*Id.*) The Abstract of the '674 patent states:

> A product such as an x-ray sensor array includes, for each unit of cell circuitry, a capacitor with upper and lower electrodes. A conductive layer that includes highly conductive metal such as aluminum is patterned to include the upper electrode of the capacitor, the contact leads of a switching element, and the data lines of the array. The upper electrode has an exposed area due to an opening in an insulating layer over it. A conductive element, such as an ITO island, is formed over the insulating layer, contacting the exposed area of the upper electrode so that the conductive element is electrically connected to one of the contact leads of the switching element through the upper electrode. The conductive elements of adjacent units can be separated by the minimum spacing necessary to ensure isolation. Or each unit's conductive element can be offset slightly from the data and scan lines and can also be pulled back from the channel of the switching element, which can be a TFT.

(*Id.*)

5. The '941 Patent

The '941 patent is entitled "Method and Device for the Controlling of Matrix Displays." (JX-5.) It lists Gangolf Hirtz as the inventor. (*Id.*) It was filed on July 26, 1997 and issued on September 19, 2000. (*Id.*) It is a continuation of an application filed on August 26, 1992. (*Id.*) The Abstract of the '941 patent states:

> Apparatus and method therefor reduces the ratio ft/Za for driving matrix displays where ft represents a signal processing clock frequency and Za represents the number of lines to be displayed on the matrix display. The time interval available for executing signal processing algorithms which drive a matrix display is expanded into time intervals in which a video signal contains no information. The invention is preferably used for driving LCD displays.

(*Id.*)

D. Products At Issue

According to Thomson, the products accused of infringing the '063 patent, the '006 patent, and the '556 patent are CMI, Qisda, and BenQ LCD monitors that contain certain AUO and CMI LCD modules. (CIB at 10-11.) The products accused of infringing the '674 patent are CMI, Qisda, and BenQ monitors that contain certain CMI LCD modules. (CIB at 11-12.) The products accused of infringing the '941 patent are CMI, Qisda, and BenQ displays which include an MStar or Realtek LCD controller (also referred to as a scaler chip). (CIB at 12.)

II. JURISDICTION

A. Subject Matter Jurisdiction

Respondents do not contest Thomson's allegation that Respondents import into the United States, sell for importation, or sell within the United States after importation products that Thomson has accused of infringement in this investigation. Thus, I find that the Commission has subject matter jurisdiction over this investigation under Section 337 of the Tariff Act of 1930. *See Amgen, Inc. v. United States Int'l Trade Comm'n*, 902 F.2d 1532, 1536 (Fed. Cir. 1990).

B. Personal Jurisdiction

Respondents each responded to the Complaint and Notice of Investigation, participated in the investigation, made an appearance at the hearing, and submitted post-hearing briefs. Thus, I find that Respondents submitted to the personal jurisdiction of the Commission. *See Certain Miniature Hacksaws*, Inv. No. 337-TA-237, Initial Determination, 1986 WL 379287 (October 15, 1986).

C. In Rem Jurisdiction

The Commission has *in rem* jurisdiction over the products at issue by virtue of the finding that accused products have been imported into the United States. *See Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 985 (C.C.P.A. 1981).

III. CLAIM CONSTRUCTION

A. Applicable Law

"An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996) (citation omitted). Claim construction "is a matter of law exclusively for the court." *Id.* at 970-71. "The construction of claims is simply a way of elaborating the normally terse claim language in order to understand and explain, but not to change, the scope of the claims." *Embrex, Inc. v. Serv. Eng'g Corp.*, 216 F.3d 1343, 1347 (Fed. Cir. 2000). "[O]nly those [claim] terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Claim construction focuses on the intrinsic evidence, which consists of the claims themselves, the specification, and the prosecution history. *See generally Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (*en banc*). The Federal Circuit in *Phillips* explained that in construing terms, courts must analyze each of these components to determine the "ordinary and customary meaning of a claim term," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313.

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Id.* at 1312 (citations omitted). "Quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular claim terms." *Id.* at 1314. For example, "the context in which a term is used in the asserted claim can be highly instructive," and "[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term." *Id.*

"[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (citation omitted). "The longstanding difficulty is the contrasting nature of the axioms that (a) a claim must be read in view of the specification and (b) a court may not read a limitation into a claim from the specification." *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1117 (Fed. Cir. 2004). The Federal Circuit has explained that there are certain instances when the specification may limit the meaning of the claim language:

> [O]ur cases recognize that the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs. In other cases, the specification may reveal an intentional disclaimer, or disavowal, of claim scope by the inventor. In that instance as well, the inventor has dictated the correct claim scope, and the inventor's intention, as expressed in the specification, is regarded as dispositive.

Phillips, 415 F.3d at 1316.

In addition to the claims and the specification, the prosecution history should be examined if in evidence. "The prosecution history...consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent. Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Id.* at 1317 (citation omitted). "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

If the intrinsic evidence does not establish the meaning of a claim, then extrinsic evidence may be considered. Extrinsic evidence consists of all evidence external to the patent and the prosecution history, including dictionaries, inventor testimony, expert testimony and learned treatises. *Id.* at 1317. Extrinsic evidence is generally viewed "as less reliable than the patent and its prosecution history in determining how to read claim terms[.]" *Id.* at 1318. "The court may receive extrinsic evidence to educate itself about the invention and the relevant technology, but the court may not use extrinsic evidence to arrive at a claim construction that is clearly at odds with the construction mandated by the intrinsic evidence." *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 977 (Fed. Cir. 1999).

B. The '063 Patent

1. Level of Ordinary Skill in the Art

Thomson argues that a person having ordinary skill in the art related to the '063 patent would have at least a bachelor's degree in chemistry or physics and "a few years'" experience in LCD display design and fabrication, or at least the equivalent by experience, education, or training. (Citing CX-4304C at Q. 134.)

AUO argues the construction of the '063 patent for the Respondents. AUO contends that its definition of a person having ordinary skill in the art related to the '063 patent "encompasses the level of skill defined by Thomson's Dr. West." AUO asserts that Dr. West's criticism of its definition of the level of ordinary skill as "too high" is unsupported, because "Dr. Lowe's definition does not necessarily require a masters' degree.

The parties' proposed definitions of a person having ordinary skill in the art ("PHOSITA") do not materially differ, and I find that a PHOSITA in the context of the '063 patent would be one who has at least a bachelor's degree in chemistry or physics and 3 years' experience in display design and fabrication, or the equivalent by experience, education or training.

2. "one of said two substrates divided into an active aperture area and a non-active area" and "a first substrate which has been partitioned into an active aperture area and a non-active area"

The terms "one of said two substrates divided into an active aperture area and a non-active area" and "a first substrate which has been partitioned into an active aperture area and a non-active area" appear in claims 1 and 11 respectively.

Thomson's Position: Thomson argues that the proper construction is "at least one of the substrates divided into a light-transmissive area that does not overlap an area where data and scan lines cross over in the display cell, and an opaque area." (Citing JX-37; CX-4242C at Q. 104-122) Thomson contends that the '063 patent divides at least one substrate of a display cell into (a) non-active areas that are opaque areas that are also used to hide the patent's anisotropic spacers; and (b) active aperture areas through which light is transmitted and that do not overlap data and scan lines and areas where they intersect. (Citing CX-4242C at Q. 105; JX-1 at3:34-36, 2:35-39, 4:38-44) Thomson says that active aperture areas, like their plain language suggests, are light-transmissive windows framed by non-active (opaque) areas. (*Id.*) Thomson reasons that this is consistent with the ordinary meaning of "aperture" as an opening through which light is transmitted (Citing CX-1137; CX-1140; CX-1147; CX-1155) as well as the intrinsic evidence.

Thomson avers that the patent teaches that its spacers are "hidden," which requires opaque non-active areas or spacers could not be "hidden." (Citing JX-1 at2:37-39.) Thomson continues that the patent states: "The non-active area 36 is opaque and preferably does not transmit light in the ultraviolet (UV) range." (Citing JX-1 at3:34-35). Thomson says that Figure 10a shows anisotropic spacers "hidden" in the "intersection of the data lines 57 and the scan lines 59 of the LCD" and "therefore contained only in the non-active area." (Citing JX-1 at4:38-44; CX-4242C, Q106.) Thomson says that Figure 12 shows a prior-art non-active area labeled to include where "Data and Scan Line Cross-Over." Thomson asserts that this confirms that active areas are light-transmissive areas that do not overlap areas where data and scan lines intersect. (CX-4242C, Q107.)

Thomson argues that Dr. Lowe tries new constructions for "active aperture area" and "non-active area" as "the part of the pixel that visibly changes when the pixel is addressed" and "the part of the pixel that does not visibly change when the pixel is addressed." Thomson alleges that these constructions were not disclosed in the Joint Claim Construction Statement, should not be permitted, and are baseless. (Citing JX-37; and CX-4242C at Q. 19-21)

Addressing the substance of the new constructions, Thomson argues that Respondents ignore the requirement that at least one substrate is partitioned and instead propose, incorrectly, that "the active aperture area is the visible part of the pixel and the non-active area is the non-visible part of the pixel." (Citing 4304C at Q. 19-26.) Thomson contends that this is wrong. Thomson says, first, all parts of a pixel are visible. (Citing CX-4242C at Q. 116, 121) Thomson continues, second, the patent never refers to "visible" or "nonvisible" pixel parts; it refers to opaque areas and light transmissive apertures as Dr. Lowe admits. (Tr. at 944:18-948:21.)

In its reply brief Thomson says that Respondents argue that Thomson's construction is incorrect because Dr. West testified that the '063 patent claims may cover active and passive matrix displays, and Thomson's construction allegedly limits the claims to active matrix displays.

(Citing AIB at 3) Thomson responds that it never defined the claims by reference to a display type, such as active matrix or passive matrix displays. Thomson says that Dr. West testified that all passive matrix displays do not necessarily have data and scan lines that cross over in the active area. (Citing Tr. at 284:13-285:3.) Thomson explains that the construction proposed by Dr. West and Thomson does not exclude all passive matrix displays, only the subset of passive matrix displays that are not partitioned into light transmissive active aperture areas that do not overlap an area where the data and scan lines cross over and opaque non-active areas. (Citing Tr. at 230:7-231:15, 284:13-285:22.) Thomson adds that the claims cover a variety of display cells including those built by the inventors and described in their invention proposal for what became the '063 patent. (Citing CX-1643C; CX-1645C; CX-4240C at Q. 229-241; Tr. at 1037:17-1038:6; and CX-4242C at Q. 66, 80-81)

Thomson says that Respondents argue that the specification's disclosure that spacers "may be placed at the intersection of the data lines 57 and scan lines 59" is permissive, and should not be used to define active aperture area. (Citing AIB at 2) Thomson agrees that this language refers to the ability to place spacers at the intersection and does not limit the invention to placing them only in that area. Thomson notes that Dr. Lowe admitted, "[a]ll of the data and all of the scan line area is non-active area." (Citing Tr. at 948:9-17.) Thomson contends that its construction, however, confirms that the active aperture area cannot overlap an area where those data and scan lines cross over because that is a part of the non-active area where the patent expressly teaches that spacers ***may*** be placed. (Citing Tr. at 229:9-230:6.)

Thomson says that Respondents also argue that there is nothing in the intrinsic evidence that requires the non-active area to be opaque. (Citing AIB at 4) Thomson replies that, in addition to express language in the '063 patent that "the non-active area 36 is opaque," Dr. West testified that the patent teaches opacity because it repeatedly instructs that spacers are "hidden" in the non-active area. (Citing Tr. at 224:23-230:6.) Thomson reasons that if the non-active areas were not opaque, the spacing elements and the defects would not be "hidden." (Citing CX-4204C at Q. 20)

AUO's Position:[2] AUO asserts that the ordinary meaning of "active aperture area" in the art is the visible part of the pixel, which is the part of the pixel that visibly changes when the pixel is addressed. (Citing RX-158C at Q. 86.) AUO avers that the '063 patent does not provide any special definition for "active aperture area" or otherwise limit its ordinary meaning. AUO says that according to the specification, an active aperture area 34 or active area 34 is shown in each of Figures 4, 6, 10 and 11. (Citing JX-1 at 2:1-3, 3:34, 4:44, 4:65; RX-158C at Q. 90; and RDX-203 to 205, 207.) AUO concludes that the portions of the specification describing these figures use the term "active aperture area" or "active area" consistent with Respondents' ordinary meaning construction. (Citing RX-158C at Q. 91-94.)[3]

AUO argues that Thomson's construction is erroneous, because it improperly reads into the term an extraneous limitation that is loosely based on a preferred embodiment described at JX-37, 4:38-65. Citing *Linear Techn. Corp. v. ITC*, 566 F.3d 1049, 1058 (Fed. Cir. 2009)) AUO adds that the description merely states that spacers "***may*** be placed at the intersection of the data lines 57 and scan lines 59," which intersection is shown to be outside of "the active areas 34." AUO says this "permissive description of where the spacers may be placed" does not define what constitutes the active aperture area. (Citing RX-158C at Q. 107-110)

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[2] Respondents CMI, Qisda and BenQ adopt by reference and join with AUO in all of its positions on constructions of terms in the '063 patent.

[3] AUO says pixels are the picture elements of a display. AUO contends that a display has thousands of pixels arranged in an array. Each pixel has a visible part, which forms part of the image that is displayed, and a non-visible part, which does not form part of the displayed image, but may include structures that perform other functions. (Citing RX-158C at Q. 87-88)

AUO argues that Thomson proposed its construction in an attempt to limit the claims to an active matrix display (where the data lines and scan lines cross over outside of the pixel area), thereby avoiding highly relevant prior art relating to a passive matrix display (where the crossover of the data and scan lines occurs within the pixel area).[4] AUO says that Dr. West admitted that the '063 claims cover both active matrix displays and passive matrix displays. (Citing Tr. 285:9-22; RX-158C at Q. 100-103; RDX-201; CX-4242C at Q. 118; and Tr. 283:8-13, 284:21-285:8)

AUO argues that Thomson's proposed construction would limit the claims to active matrix displays, and cannot be correct. AUO states that this is confirmed by the broad description in the specification that "the present invention is ... applicable to the assembly of any display cell" having two substrates that must be closely and uniformly spaced apart, which includes both passive matrix and active matrix displays. (Citing JX-1 at 3:28-33.)

AUO argues that the term "non-active area" is also not defined in the specification or file history. AUO argues that the construction should be the ordinary meaning of the claim term, which it describes as the opposite of "active aperture area": the non-visible part of the pixel, which is the part of the pixel that does not visibly change when the pixel is addressed. (Citing RX-158C at Q. 86) Citing Dr. Lowe, AUO asserts that one of ordinary skill in the art would understand that the non-active area of a substrate may, but need not, be opaque. (Citing RX-158C at Q. 116) AUO adds that, although it has been common since the early to mid 1980's to use an opaque non-active area to improve contrast, opacity is not necessary for the display to operate. (*Id.*) AUO concludes that the ordinary meaning does not require that the non-active area be opaque.

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[4] AUO says the passive matrix prior art includes Tsuboyama (RX-18).

AUO contends that nothing in the intrinsic evidence requires opacity. AUO continues that the word opaque is used only once in the patent and then only as part of the "Detailed Description Of Preferred Embodiments": "The non-active area 36 is opaque and preferably does not transmit light in the ultraviolet (UV) range." (Citing JX-1 at 3:35-37) AUO argues that claims are not limited to the preferred embodiments. (Citing *Linear*, 566 F.3d at 1058) AUO cites the testimony of its expert, Dr. Lowe to say that this language could broadly mean that the non-active area does not transmit light at all, either in the visible or ultraviolet range, or it could more narrowly mean that the non-active area does not transmit light in the UV range. (RX-158C at Q. 117) AUO argues that the latter interpretation makes sense in context because this portion of the specification appears to have been copied from a co-pending patent application 08/767,652, which is incorporated by reference in the '063 patent (Citing JX-1 at 2:30-34) and which describes a process in which the non-active area is used as a mask when the substrate is back-illuminated with UV light. (Citing RX-20 at 8, Fig. 8 and page 9; RDX-211; RX-158C at Q. 149; and RDX-242)

In its reply brief AUO says that Thomson's proposed construction for these terms would improperly restrict the claims to a preferred embodiment: an active matrix display cell in which the active aperture area does not overlap an area where data and scan lines cross over in the display cell, and in which the non-active area is opaque.[5] AUO argues that it is also unwarranted because both sides' experts agree that the '063 claims cover both active matrix displays and passive matrix displays. (Citing Tr. 285:9-22; Tr. 1036:3-10; and RX-158C at Q. 104) AUO adds that they agree that in a passive matrix display, the data and scan lines cross over in the

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[5] AUO cites *Linear Tech. Corp. v. ITC*, 566 F.3d 1049, 1058 (Fed. Cir. 2009) in support.

active aperture area. (Citing RX-158C at Q. 100-103; RDX-201; CX-4242C at Q. 118; and Tr. 283:8-13, 284:21-285:8)

Construction to be applied: "one of said two substrates separated into an area through which light can be transmitted and an opaque area" and "a first substrate which has been separated into an area through which light can be transmitted and an opaque area."

The dispute here is focused on the nature of the two areas into which the relevant substrate(s) are partitioned or divided. The parties do not appear to dispute that the active area is the portion through which light is transmissible through the pixels. Thomson, however, seeks to define the term "non-active area" as one that is opaque and to add a requirement that the active area "does not overlap an area where data and scan lines cross over in the display cell."

The '063 patent makes clear that it is concerned with spacers for active matrix liquid crystal displays. First, the title of the '063 patent is "Smart Spacers for Active Matrix Liquid Crystal Projection Light Valves." (JX-1) The Background portion of the specification describes the Field of the Invention as follows: "[t]his invention relates generally to displays and more particularly concerns an active matrix liquid crystal display cell in which smart spacers are provided having an anisotropic shape." (JX-1 at 1:8-11.) Describing the prior art, the '063 patent refers, *inter alia*, to Figure 4 (shown below) wherein the spacers 20 are randomly distributed throughout both the active aperture area 34 and the non-active area 36.

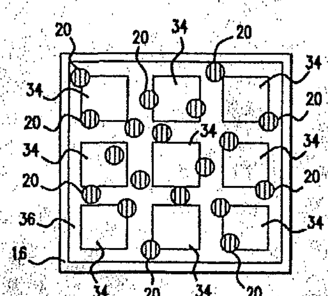

FIG. 4
(PRIOR ART)

(JX-1 at Figure 4.)

In the Summary of the Invention, the '063 patent states that "[i]t is an object of the present invention to provide spacers that are hidden and occupy space only on the non-active areas of the liquid crystal cell." (JX-1 at 2:37-39.) This passage supports a finding that the spacers are hidden (i.e. unseen) when located on the non-active areas of the liquid crystal cell and addresses the previously revealed drawback in the prior art in which the spacers overlap or rest on the active aperture area, which "significantly disrupts the performance of the liquid crystal display cell and degrades the resulting image." (JX-1 at 2:10-14, Figure 4.) In the Detailed Description of Preferred Embodiments, the '063 patent describes the non-active area as "opaque." (JX-1 at 3:35.)

The specification provides further enlightenment regarding the nature and location of the non-active area when it describes a mask design that is used to selectively position the spacers. Describing Figure 10*a,* the specification notes that the spacers are placed at the intersection of the data lines and scan lines, so that they are hidden and contained only in the non-active areas. (JX-1 at 4:39-46.) While this is but one embodiment of the invention, it is illustrative of the nature of the non-active area as opaque, because the spacers are hidden when they are placed in the non-active area. The Figure itself depicts the non-active areas 36 separated from the active areas 34.

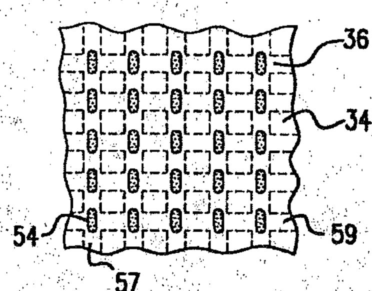

FIG. 10a

Based upon all of the foregoing, I find that the specification makes clear that the "non-active area" of the invention is the opposite of "light transmissible" (*i.e.* opaque). This does not add an additional limitation to the claim. The specification merely provides insight into the meaning of the term "non-active area."

Finally, AUO argues persuasively that the additional language proposed by Thomson, regarding data and scan lines, improperly imports a limitation into the claim from the specification.

The title of the '063 patent refers to smart spacers for *active* matrix LCD's, and the field of the invention says that the invention "relates generally to displays and more particularly concerns an active matrix liquid crystal display cell ..." (JX-1 at 1:8-11.) Nevertheless, the detailed description of preferred embodiments clearly states:

> The present invention is not limited to only the assembly of liquid crystal display cells but is also applicable to the assembly of any display cell having a bottom substrate 12 and a top substrate 14 that should remain closely and uniformly spaced apart such as field emitting displays (FED's), electroluminesce, etc.

(JX-1 at 3:27-32.) The foregoing passage does not limit itself to any particular type of FED or other display.

Neither claim 1 nor claim 11 mention data or scan lines, and there is no indication or hint within those claims of any spatial relationship between the active aperture area and the data or scan lines. (*See* JX-1 at 5:23-39, 6:11-24.) It is true that the detailed description of preferred embodiments only contains references to active matrices wherein the active aperture area is separate from the non-active area. In fact the description contains specific words of limitation when it says, "[t]he spacers of the present invention do not overlap into the active areas 34." (JX-1 at 3:50-52.) The description of preferred embodiments does contain at least one Figure wherein the non-active areas coincide with data and scan lines. (*See e.g.* JX-1 at 3:34-37, 4:4-7, 4:11-14, 4:40-43, 4:44-46, and Figure 10*a*.) Unlike the clear language eliminating overlap into the active areas, however, the language describing Figure 10*a* does not demonstrate a "clear intention" to limit the claim's scope with "words or expressions of manifest exclusion or restriction" regarding data or scan lines. *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004); *see also Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed.Cir.2002). The description is "FIG. 10*a* shows ***an embodiment*** in which spacers 54 are provided at the intersection of the data line 57 and the scan line 59." Nowhere does the inventor use words that limit the invention of the '063 patent to require that the non-active area coincides with the data lines or scan lines. I find that adding the language proposed by Thomson would improperly read a limitation into the claim(s) from the specification. *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1117 (Fed. Cir. 2004).

Based upon all of the foregoing, the terms "one of said two substrates divided into an active aperture area and a non-active area" and "a first substrate which has been partitioned into an active aperture area and a non-active area" shall be construed in accordance with their plain and ordinary meaning to be, respectively, "one of said two substrates separated into an area through which light can be transmitted and an opaque area" and "a first substrate which has been separated into an area through which light can be transmitted and an opaque area."

I find that examination of the extrinsic evidence offered by the parties is unnecessary because the intrinsic evidence is sufficient to understand the meaning of the terms construed in this section. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) ("In most situations, an analysis of the intrinsic evidence alone will resolve any ambiguity in a disputed claim term. In such circumstances, it is improper to rely on extrinsic evidence.")

3. "active aperture area"

Thomson's Position: Thomson argues that the issues on these terms are the same as set forth above. (Citing CX-4242C at Q. 112, 114-116)

AUO's Position: AUO's position on this term is included in the discussion in section III.B.2, *supra.*

Construction to be applied: The construction of this term is included in section III.B.2, *supra.*

4. "non-active area"

Thomson's Position: Thomson argues that the issues on these terms are the same as set forth 2 above. (Citing CX-4242C at Q. 112, 114-116.)

AUO's Position: AUO's position on this term is included in the discussion in section III.B.2, *supra.*

Construction to be applied: The construction of this term is included in section III.B.2, *supra.*

5. "affixing layer"

The term "affixing layer" appears in asserted claim 1.

Thomson's Position: Thomson contends that the proper construction of "affixing layer" is "material that attaches the spacing elements to a substrate." (Citing CX-4242C at Q. 138-147, 151-153.) Thomson says the specification describes coating a substrate with a negative photoresist or negative UV curable polyimide "also [called] affixing layer 35" and explains that "[a]fter coating the bottom substrate 12 with a thin coating of negative photoresist or negative UV curable polyimide, spacers are photolithographically formed in non-active areas 36 of the bottom substrate 12." (Citing JX-1 at3:37-38; 45-48; and CDX-66) Thomson asserts that this confirms the "affixing layer" is material that attaches spacers to the substrate and that the "affixing layer" may be part of the material used to form spacers. Thomson says the patent states that: "Figure 7 shows a side view of a spacer 54 of the present invention that may be formed using a mask and the negative photoreactive polyimide." (Citing JX-1 at3:60-63; and CX-4242C at Q. 144.) Thomson states that the antecedent for "the negative photoreactive polyimide" is "negative UV curable polyimide" called "affixing layer 35." Thomson adds that the same material that supplies the "affixing layer" may be formed into spacer 54 using a mask. (Citing CX-4242C at Q. 138-144; Tr. at 211:22-219:15; CDX-1627; and CX-4240C at Q. 50-52.)

Thomson argues that the prosecution history shows that claims 1-4 and 8 were initially rejected as anticipated by Hasegawa's disclosure of "a negative photosensitive layer disposed on the bottom substrate, wherein portions of the negative photosensitive layer are exposed to light, thereby, forming spacing elements disposed in non-display/active areas." (Citing JX-6, THOM3375-3378; and RX-10, 11:32-60) Thomson says that the Examiner considered a negative photoresist layer used to form spacers and adhere them to a substrate to include an affixing layer. Thomson says its construction also matches the ordinary definition of "affix" as "attach." (Citing CX-4242C at Q. 140; and CX-1139; CX-1445; CX-1146; CX-1149; and CX-1153)

Thomson says that Respondents construe "affixing layer" as "a layer outside the active area and distinct from the spacing elements which affixes the spacing elements directly to the substrate." Thomson argues that Respondents seek to exclude a preferred embodiment that forms the affixing layer and spacers of the same material. (Citing CX-4242C at Q. 141-44) Thomson argues that absent statements to the contrary, claim language should be construed to include disclosed embodiments. (Citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996)) Thomson says that Respondents also rely on a different application that was distinguished prior art that does not change the disclosure of the '063 patent. (Citing CX-4242C at Q. 145-47; and 4304C at Q. 46-47) Thomson adds that Respondents' expert admitted on redirect that the '063 patent discloses spacers formed of a single layer of material including an affixing layer. Thomson says, when asked for prior art purposes "[w]hat does claim 1 and 11 say about the material from which the spacing elements are formed," Dr. Lowe responded that "It says nothing about the material. So the spacing elements are as described in the '063 patent, in the body of the '063 patent, made from a layer of homogeneous polyimide or photoresist that will be covered . . . ." (Citing Tr. at 1091:16-1092:2.)

Thomson adds that the definition of "substantially" is properly "being largely but not wholly that which is specified." (Citing CX-1152 and *Cordis Corp v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1360 (Fed. Cir. 2003))

In its reply brief Thomson says that Respondents rely heavily on the disclosure of the '652 application, listed in the "Description of the Related Art" section, rather than the '063 patent, to argue that the affixing layer in the '063 patent must be limited to alleged embodiments of the '652 application. (Citing AIB at 7) Thomson responds that "incorporation by reference does not convert the invention of the incorporated patent into the invention of the host patent." (Citing *Modine Mfg. Co. v. U.S. Intern. Trade Comm'n*, 75 F.3d 1545, 1553 (Fed. Cir. 1996) *overruled on other grounds by Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 234 F.3d 558 (Fed. Cir. 2000)) Thomson adds that it is particularly inappropriate to limit the '063 "affixing layer" to the material in the '652 application because, as Dr. West testified, the '063 patent explicitly teaches that spacing elements and affixing layer may be formed from a single coating of "the negative photoreactive polyimide." (Citing Tr. at 211:11-217:15) Thomson contends that the '652 patent application is not directed to the same kind of spacers disclosed and claimed by the '063 patent. Thomson says the '063 patent describes and claims spacers formed in non-active areas using photolithographic techniques, whereas the '652 applies pre-fabricated spacers lacking affixing properties randomly across the substrate and required a different technique to adhere those spacers to the substrate. (Citing CX-4304C at Q. 47)

Thomson cites the testimony of Dr. Ho that the '063 patent discloses two embodiments, one where the spacing element and affixing layer are formed of the same material and one where they are formed of separate material, and an "affixing layer" is present either way. (Citing CX-4240C at Q. 50-53) Thomson argues there is no basis for excluding the embodiment where the spacer and affixing layer are formed from the same layer of material. (Citing CX-4304C at Q. 32-40; and Tr. at 211:11-217:15) Thomson contends that its construction is consistent with the '063 patent's disclosure that spacing elements should be sufficiently affixed to withstand subsequent mechanical rubbing. Thomson says that Dr. West testified, "it is the affixing layer that allows the spacing element to stay in place when it is mechanically rubbed." (Citing CX-4242C at Q. 181) Thomson says under its construction, this is accomplished by "material that attaches the spacing elements to a substrate" that is part of the layer used to form spacers or a separate layer. (Citing CX-4242C at Q. 138-147, 151-153) Thomson adds that its construction would not cover spacers that are not adhered to the substrate. Thomson concludes that its construction is consistent with the function of an "affixing layer" and the disclosure that material used to form spacers can supply their affixing layer.

AUO's Position: AUO argues that common sense, the intrinsic evidence and the fundamental rules of claim construction compel the conclusion that the affixing layer is separate and distinct from the spacing elements, as set forth in Respondents' proposed construction.

AUO contends that while the spacing layer includes both an affixing layer and a plurality of spacing elements, the latter two elements are called out as separate component structures of the spacing layer. (Citing Tr. 157:4-10) AUO asserts there is no transitional language, such as "comprising," "including" or "having" that connects the spacing elements to the affixing layer in a way that would suggest that the affixing layer either is, or can be, part of the spacing elements. AUO concludes that the plain language of claim 1 strongly indicates that the affixing layer is separate and distinct from the spacing elements.

AUO says that Dr. West explained that the spacing elements of claim 1 are separate and distinct from the affixing layer when he testified that:

In terms of this claim, my understanding is that you have a spacing element and one surface of the spacing element is on the affixing layer in this claim.

(Citing Tr. 160:22-25.) AUO notes that Dr. West explained that the spacing elements perform a completely different function than the affixing layer. AUO says whereas the function of the affixing layer is to attach the spacing elements to the substrate, the function of the spacing elements is to maintain the gap between the substrates so that the gap is largely or substantially uniform. (Citing Tr. 162:6-19) AUO concludes that, because the spacing elements are "on the affixing layer" (Citing Tr. 160:22-25) and perform a different function from the affixing layer, the affixing layer must be separate and distinct from the spacing elements.

AUO finds it significant that claim 1 requires a "plurality of spacing elements" that are "separate from one another," but only calls for "an affixing layer" in the singular. (Citing JX-1 at 5:29-31) AUO argues it would be nonsensical to claim a single affixing layer and multiple but separate spacing elements if, as Thomson contends, the multiple and separate spacing elements are part of the affixing layer.

AUO argues that its position is reinforced by the dependent claims. AUO says whereas claim 7 specifies that the thickness of the spacing elements is "approximately 5 microns," claim 10 specifies that the affixing layer "is from approximately 0.05 microns to approximately 1 micron thick." (Citing JX-1 at 6:1-2, 7-9) AUO argues that the range of thicknesses defined by claims 7 and 10 are distinct and do not overlap. AUO concedes that these dimensions cannot be read into claim 1; but argues the dependent claims demonstrate that the affixing layer and the spacing elements are separate layers, each of which has a distinct thickness that can be specified in microns. (Citing RX-158C at Q. 140)

AUO says its construction is supported by the description of an "affixing layer" in the '652 application, RX-20, which is incorporated by reference into the '063 patent. (Citing JX-1 at 2:30-34; and RX-158C at Q. 142) AUO says that according to the '652 application, an affixing layer is first formed on the substrate and spacing elements are then attached to the affixing layer. (Citing RX-20 at p. 4) AUO alleges that the '652 application consistently shows and describes the affixing layer as a separate and distinct layer that is used to secure the spacing elements to the substrate. (Citing RX-20 at Figs. 7-9; RX-158C at Q. 145-155; RDX-210, RDX's-235 to 237, and RDX-242) AUO asserts that the portion of the '063 patent that describes the "affixing layer" (*i.e.*, column 3, lines 37-44) is nearly identical to the description of the "affixing layer" in the first 1½ paragraphs of the detailed description in the '652 application, and was apparently copied from that earlier application. (Citing RX-20 at p. 8; RX-158C at Q. 157, 159; and RDX-211) AUO alleges that Dr. West concedes that the "affixing layer" described in the '652 application is separate from the spacing elements. (Citing CX-4304C at Q. 47) AUO argues that, because the description of the "affixing layer" in the '063 patent was virtually copied from the '652 application, and because the '652 application was incorporated by reference into the '063 patent, the term "affixing layer" must have the same meaning in the '063 patent as it does in the '652 application. (Citing *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1256 (Fed. Cir. 2011); *Phillips*, 415 F.3d at 1314.)

AUO continues that the description in the '063 patent of how the spacing elements may be photolithographically formed confirms the conclusion that the affixing layer is distinct from the spacing elements. AUO says the '063 patent discloses two alternative ways to form the spacers: one that uses an affixing layer and another that does not. (Citing RX-158C at Q. 161) AUO says the first way is, "After coating the bottom substrate 12 with a thin coating of negative photoresist or negative UV curable polyimide, spacers are photolithographically formed in non-active areas 36 of the bottom substrate 12." (Citing JX-1 at3:45-48) AUO argues that in this method, after forming the affixing layer, a layer of spacer material is laid down and then etched to form the spacers. (Citing RX-158C at Q. 162-163) AUO asserts that photolithographic formation of the spacers necessarily involves depositing an additional layer of material on top of the affixing layer, because the affixing layer and the spacing elements are disclosed as having different thicknesses. AUO concludes that the spacing elements could not possibly be patterned from the same layer of material that is used to form the affixing layer. (Citing RX-158C at Q. 164)

AUO alleges that the second way that the '063 patent discloses to form the spacing elements does not involve the use of an affixing layer, reciting: "Alternatively, the spacers 54 may be photolithographically formed from a deposited dielectric such as CVD oxide, nitride and/or oxy/nitride." (Citing JX-1 at3:48-50; and RX-158C at Q. 165) AUO says no affixing layer is mentioned in this method, and asserts that a layer of negative photoresist or negative UV curable polyimide would not normally be used to affix CVD oxide, nitride and/or oxy/nitride to the substrate. (Citing RX-158C at Q. 165)

AUO contends that, because only two alternative ways of forming the spacing elements are disclosed in the '063 patent, and it is undisputed that the second alternative way does not involve an affixing layer, the logical conclusion to be drawn from the foregoing testimony of Drs. Ho and West is that the first alternative way – described in the '063 patent at column 3, lines 45-48 – uses a separate affixing layer.

AUO argues that the figures in the '063 patent also support Respondents' construction. AUO asserts that Figure 6 is the only one that illustrates an affixing layer, and it reveals that the affixing layer is distinct from the spacing elements. AUO notes specifically in Figure 6, the line from number 35 points to the cross-hatched area, which is designated both as the affixing layer and as the non-active area 36. (Citing JX-1 at3:34-35, 39) AUO says that Figure 6 is thus consistent with claim 1, which states that the affixing layer (cross-hatching in Figure 6) covers "at least a portion of the non-active area [cross-hatching in Figure 6] and remain[s] substantially outside of the active aperture area [white squares 34 in Figure 6]." (Citing JX-1 at5:32-34; and Tr. 201:2-15) AUO continues that, because the affixing layer 35 is shown only in the cross-hatched area in Figure 6, it must be patterned separately and differently from the spacing elements, which are not even shown in Figure 6. (Citing Tr. 201:24-202:3; and RX-158C at Q. 130) AUO concludes that this supports the conclusion that the affixing layer is distinct from the spacing elements, and is deposited before and separately from the spacing elements.

AUO refers to the testimony of Dr. West that "the specification expressly provides that the negative photoresist or UV curable polyimide, the 'affixing layer,' is photolithographically patterned to form spacing elements." (Citing CX-4242C at Q. 144; and Tr. 163:17-164:10.)

AUO says that as support for his opinion, Dr. West cited column 3, lines 45-48 of the '063 patent. (Citing CX-4242C at Q. 144; and Tr. 164:11-20) AUO counters that on cross-examination, Dr. West admitted that this sentence does not state that the affixing layer is photolithographically patterned to form spacing elements. AUO adds that the disclosed affixing layer could not be so patterned, because Dr. West also agreed that, as disclosed in the specification, the thickness of the affixing layer is at least ½ to one full order of magnitude smaller than the thickness of the spacing elements. (Citing Tr. 166:11-23; Tr. 167:7-18, 168:5-16, 168:21-171:8)

AUO argues that Thomson's construction for "affixing layer" should be rejected because it would have the impermissible effect of reading this separately-recited structural element out of the claim. AUO says that according to Thomson, if the spacing elements, alone, happen to be made from a material that, alone, adheres to the substrate, then the spacing elements do not require an affixing layer because they are self-adhering. AUO argues that Thomson's logic renders the "affixing layer" element superfluous, which contravenes well-established Federal Circuit law on claim construction, quoting:

> Allowing a patentee to argue that physical structures and characteristics specifically described in a claim are merely superfluous would render the scope of the patent ambiguous, leaving examiners and the public to guess about which claim language the drafter deems necessary to his claimed invention and which language is merely superfluous, nonlimiting elaboration. For that reason, claims are interpreted with an eye toward giving effect to all terms in the claim.

Bicon, Inc. v. Straumann Co., 441 F.3d 945, 950 (Fed. Cir. 2006); *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005).

AUO argues in its reply brief that Thomson's argument is refuted by its own expert's admission that this sentence does not state that the affixing layer is photolithographically patterned to form spacing elements. (Citing Tr. 166:11-23, 167:7-18, 168:5-16.) AUO adds that

Thomson's argument is inconsistent with the most important intrinsic evidence – the language of the claims themselves – which calls out an "affixing layer" and "spacing elements" as separate components of the spacing layer. (Citing JX-1 at5:29-30) AUO concludes that Dr. West admits that the spacing elements must be "on the affixing layer," as called for by claim 1. (Citing Tr. 160:22-25.)

AUO says that Thomson argues that the prosecution history supports its construction for "affixing layer." (Citing CIB 19 n.18) AUO counters that the Examiner's rejection over the Hasegawa prior art makes no mention of an affixing layer, and there is no indication that the Examiner believed that Hasegawa's negative photosensitive layer included a separate affixing layer, as argued by Thomson. (Citing JX-6 at THOM00003376-78.)

AUO says that Thomson argues Respondents' construction would exclude a preferred embodiment. AUO counters that Thomson's witnesses admit that the '063 patent discloses an embodiment having a separate affixing layer formed from a separate coating of material. (Citing CX-4242C at Q. 151; and CX-4240C at Q. 51) AUO asserts that the embodiment with a separate affixing layer is the subject of claim 1. (Citing JX-1 at5:29-30) AUO concludes that the alternative embodiment in which the spacers are self-affixing is encompassed by claim 11, which recites spacing elements, but does not require an affixing layer at all. (Citing CX-4240C at Q. 50-51; CX-4304C at Q. 36; and RX-158C at Q. 161)[6]

CMI's Position: While joining AUO in its construction argument, CMI submitted its own argument on this term in its reply brief.

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[6] AUO argues that there is no requirement that both of these embodiments be encompassed by claim 1. (Citing *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1383 (Fed. Cir. 2008)) AUO contends that the fact that claim 1 does not encompass the embodiment without a separate affixing layer does not outweigh the language of that claim which clearly requires a separate affixing layer. (Citing *August Tech. Corp. v. Camtek, Ltd.*, No. 2010-1458, ___ F.3d ___, 2011 U.S. App. LEXIS 17451, at *14-15 (Fed. Cir. Aug. 22, 2011))

CMI says that Thomson alleges Respondents "seek to exclude a preferred embodiment that forms the affixing layer and spacers of the same material." CMI counters that Respondents' proposed construction places no restrictions on the material which forms the affixing layer and the spacing elements. CMI contends that Respondents' proposed construction of "affixing layer" respects the fact that the affixing layer and the spacing elements are claimed and disclosed in the specification as separate elements. (Citing JX-37, Ex. A at 2)

CMI argues that Thomson's proposed construction blurs the distinction between the affixing layer and spacing elements, because CMI's products do not use an affixing layer. CMI asserts that it is only by conflating spacing elements with the affixing layer and arguing that an affixing layer is somehow formed when the spacers are formed that Thomson can put forward an infringement argument. CMI posits that Thomson's attempt to unify these distinct elements should be rejected. (Citing *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006); *Merck & Co. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005))

CMI alleges it is undisputed that the affixing layer and spacing elements perform distinct functions. (Citing Tr. 162:6-19.) CMI adds it is also undisputed that the claims recite them as distinct elements. CMI says Dr. West explains that "the spacing element is on the affixing layer in this claim" when describing the two discrete structures in relation to each other. (Citing Tr. 160:16-161:3.) CMI states that Claim 1 recites a "plurality of spacing elements;" but only requires one "affixing layer." (Citing JX-1 at5:29-31) CMI notes that claims 7 and 10 require disparate thicknesses of the spacing elements (5 microns) and the affixing layer (1 micron at most). (Citing JX-1 at 6:1-2 and 7-9)

CMI contends that the specification also supports Respondents' proposed construction. CMI says the specification provides two alternative embodiments—one with an affixing layer and one without. (Citing RX-158C at Q. 161) CMI recites that the '063 patent describes the first embodiment as follows: "After coating the bottom substrate 12 with a thin coating of negative photoresist or negative UV curable polyimide, spacers are photolithographically formed in nonactive areas 36 of the bottom substrate 12." (Citing JX-1 at3:45-48) CMI alleges that this embodiment describes that after the affixing layer is formed, a layer of spacer material is introduced and etched to form spacing elements. (Citing RX-158C at Q. 162-163) CMI asserts that photolithographically forming the spacing elements requires depositing an additional layer of material over the affixing layer because the spacing elements are much thicker. (Comparing JX-1 at3:41-43 with JX-1 at4:16-20)

CMI says that the second alternative embodiment does not require an affixing layer, quoting: "Alternatively, the spacers 54 may be photolithographically formed from a deposited dielectric such as CVD oxide, nitride and/or oxy/nitride." (Citing JX-1 at3:48-50) CMI states there is no mention of an affixing layer, and a negative photoresist or negative UV curable polyimide affixing layer would not normally be used with spacing elements formed of CVD oxide, nitride and/or oxy/nitride. (Citing RX-158C at Q. 165)

CMI says that when asked what material can be used to form the spacing elements (without inquiry as to the affixing layer), Dr. Lowe testified that the spacing elements could be formed of polyimide or photoresist. (Citing Tr. 1091:16-1092:2.) CMI adds that Thomson "circularly uses this response to support its construction", asserting that "spacers [are] formed of a single layer of material including an affixing layer."

CMI continues that Respondents' proposed construction is also consistent with the '652 application, incorporated into the '063 patent as intrinsic evidence. CMI avers that the '652 application repeatedly describes the affixing layer as separate and distinct from the spacing elements, and that Dr. West agreed that the '652 application describes the affixing layer as separate from the spacing elements. (Citing RX-20 at Figs. 7-9, pages 8-9; RX-158C at Q. 145-155; and CX-4304C at Q. 47) CMI says, in its Post-Trial Brief, Thomson argues that the '652 application was distinguished prior art; but this conclusion is unsupported by the '063 patent, which "incorporates" but does not distinguish the '652 application. (Citing JX-1 at2:29-31) CMI asserts that the '063 patent describes the affixing layer in nearly identical terms. (Comparing JX-1 at3:37-44 with RX-20 at 8; and citing RX-158C at Q. 157 and 159)

CMI argues that Thomson's chief argument in support of its construction depends on the description of Figure 7 of the '063 patent; but that Dr. West admits Figure 7 lacks an affixing layer. (Citing Tr. 286:12-16) CMI concludes that Figure 7 only relates to the second embodiment and not the affixing layer.

Construction to be applied: "a stratum of material that attaches the spacing elements to a substrate, and which is separate and distinct from said spacing elements"

The relevant language of asserted claim 1 states: "...the spacing layer including an affixing layer and a plurality of spacing elements separate from one another..." (JX-1 at 5:29-30.) The parties do not appear to disagree that the plain and ordinary meaning of the term "affixing layer" includes the first clause of the construction shown above. They differ, however, in their view of the second clause. Thomson specifically includes language that is not materially different from the first clause in its brief on the issue. (*See* CIB at 19 and fn 18.) AUO and CMI, while never quite defining "affixing layer" in their briefs, seem to accept the circular definition that an "affixing layer" is a layer that affixes the spacer elements to the substrate. Their arguments jump straight to urging that the construction include a recitation that the affixing layer is separate and distinct from the spacer elements. (*See* JX-37, p. 2; AIB at 5-7; CMRB at 1.)

I conclude that the intrinsic evidence makes clear that the affixing layer of asserted claim 1 is, in fact, separate and distinct from said spacer elements.

First, as noted by AUO, while the claim teaches that the spacing layer includes both an affixing layer and a plurality of spacing elements, the latter two elements are called out as separate component structures of the spacing layer. There is no transitional language, such as "comprising," "including" or "having" that would include the spacing elements as a part of the affixing layer. Therefore, the plain language of asserted claim 1 indicates that the affixing layer is separate and distinct from the spacing elements.

Second, the primary intrinsic evidence cited by Thomson from the specification is a portion of the description of preferred embodiments that states:

> After coating the bottom substrate 12 with a thin coating of negative photoresist or negative UV curable polyimide, spacers are photolithographically formed in non-active areas 36 of the bottom substrate 12. Alternatively, the spacers 54 may be photolithographically formed from a deposited dielectric such as CVD oxide, nitride and/or oxy/nitride.

(JX-1 at 3:45-50.)

I do not concur with Thomson's position that the foregoing language describing a preferred embodiment teaches that the "affixing layer" may be ***part of*** the material used to form spacers. The language set forth in the first sentence of the quoted description does not specify the type of material from which the spacers are formed, and it may be that the spacers could be photolithographically formed from the same ***type*** of material as the affixing layer. Thomson's choice of words, however, would result in a situation in which the affixing material and the spacers would be in the same ***layer*** of material. Since the term "affixing layer" is required by claim 1, and that claim does not teach that the affixing layer and spacers are in the same layer, the result urged by Thomson cannot be correct.

The second sentence quoted above provides an alternative to the method described in the first sentence. Since the first sentence does not provide for a specific type of material, it is highly unlikely that the word "alternatively" that appears in the second sentence refers to a type of material. Instead, looking at the language of the entire first sentence, it appears to me that the unrestricted word "alternatively" that begins the second sentence refers to that entire first sentence and the process it describes. I conclude that the two alternatives provided are: (1) applying the described affixing layer to the substrate and then forming the spacers photolithographically on the thin coating of affixing layer on the substrate; or (2) photolithographically forming the spacers directly on the substrate using a deposited dielectric such as CVD oxide, nitride and/or oxy/nitride.

In describing the "thin coating" of the affixing layer cited, *supra*, the description of preferred embodiments explains:

> The thickness of the thin coating should be in the range of approximately 0.1 microns to 0.5 microns and should be at least 0.05 microns, but generally no more than 1 micron and preferably 0.2 microns. If the thin coating gets too thick it may cause filling problems and disturb the liquid crystal profile.

(JX-1 at 3:39-44.) By contrast, when describing the profile of the preferred embodiment of a spacer, the '063 patent teaches:

> Minimum display distances are typically required so the cell gap of Z-height is on the order of 5μm for LC materials with an optical anisotrphy, Δn, of 0.09-0.1. The Z-height strongly depends on the Δn of the LC being used.

(JX-1 at 4:17-20.) This example would provide a spacer that is approximately 5-10 times greater in height (thickness) than the underlying thin coating of affixing layer. This lends greater credibility to AUO's argument that the spacing elements could not be patterned from the ***same layer of material*** that is used to form the affixing layer.

Returning to the original quote from the description of preferred embodiments, I concur with AUO that what is described in the first sentence reflects the limitations of claim 1 that there be an affixing layer separate and distinct from the plurality of spacing elements which spacing elements are, in turn, separate from one another. The second sentence is consistent with claim 11, which does not require an affixing layer.

Finally, Thomson argues incorrectly that in rejecting claims 1-4 and 8, the patent examiner considered a negative photoresist layer used to form spacers and adhere them to a substrate to include an affixing layer. As AUO argues, the language of the rejection notice omits any reference to an affixing layer. The examiner said, specifically:

Hasegawa et al disclose and show a liquid crystal display device and a method of making the device comprising:

> ... a negative photosensitive layer disposed on the bottom substrate, wherein portions of the negative photosensitive layer are exposed to light, thereby, forming spacing elements disposed in nondisplay/active areas.

(JX-6 at THOM00003376.) Clearly the examiner contemplated only a description wherein the layer formed spacing elements on the bottom substrate without a separate affixing layer.

Based upon all of the foregoing, I conclude that the term "affixing layer" shall be construed as, "a stratum of material that attaches the spacing elements to a substrate, and which is separate and distinct from said spacing elements."

I find that examination of the extrinsic evidence offered by the parties is unnecessary because the intrinsic evidence is sufficient to understand the meaning of the term "affixing layer." *Vitronics*, 90 F.3d at 1583.

6. "a plurality of spacing elements separate from one another"

The term "a plurality of spacing elements separate from one another" appears in asserted claims 1 and 11.

Thomson's Position: Thomson argues that the proper construction is "more than one spacing element, where a spacing element is a structure that functions to keep the gap between the two substrates largely uniform." (Citing JX-37; CX-4242C at Q. 125-137.) Thomson maintains that this is consistent with the claims and their disclosure of spacing elements that maintain a uniform cell gap within desired tolerance levels. Thomson alleges that Respondents do not dispute that spacing elements "function[] to keep the gap between the two substrates largely uniform". Thomson says that Respondents seek to read in a limitation that spacing elements contact both substrates and are wrong. (Citing CX-4242C at Q. 125-26, 133.)

Thomson says the claim language itself discusses "separate" spacing elements, and the specification describes separate spacers placed, for example, at every intersection, every fourth intersection, or at random intersections of data and scan lines. (Citing JX-1 at4:46-55.) Thomson contends that separation allows "the spacer distribution and count [to be] precisely controlled" and "the number of spacers 54 [to be] minimized to ensure optimal optical performance." (Citing JX-1 at4:52-55) Thomson adds that separate spacers were relied upon to distinguish prior art to interconnected spacing structures. (Citing JX-6 at THOM3371-73; and CX-4242C at Q. 128-130)

Thomson argues that Respondents' construction, "[s]eparate structures that maintain substantially uniform separation by contact with each of the substrates when the substrates are affixed to one another," reads in limitations without support. Thomson says the claims and specification do not require spacing elements contacting both substrates to maintain a uniform cell gap. (Citing CX-4242C at Q. 132-137) Thomson asserts that it is also known in the art that spacers can maintain substantially uniform cell gaps without contacting both substrates. (Citing CX-4242C at Q. 133; CX-1127, 1:41-43; 3:23-27; 11:42-46) Thomson concludes that the '063 patent claims refer to a substantially uniform cell gap without referring to spacers contacting substrates.

In its reply brief Thomson says that Respondents support their argument by reference to a drawing depicting prior art spacers and prior art references cited in the specification and file history of the '063 patent showing spacers contacting the substrates. Thomson counters that Dr. West testified the claims, specification and file history of the '063 patent do not mention any requirement that the smart spacers contact both substrates. (Citing CX-4242C, Qs. 131-35.) Thomson says Respondents argue that because the cell gap is defined as having Z-height of 5μm and the thickness of the spacer is described as extending in the Z direction, the two measurements must be equal and the spacing elements must contact both substrates. Thomson contends that the passages cited by Respondents do not support this conclusion because "Z direction" defines only what direction the height of the spacer is measured in, not the actual height of the spacer. (Citing CX-4304C at Q. 122-124.) Thomson concludes that there is no language that would limit the claims to prior art embodiments as argued by Respondents. (*Id.* at Qs. 122-128; CX-4242C at Q. 131-137)

AUO's Position: AUO alleges that the parties agree that the function of the claimed "spacing elements" is to maintain a substantially uniform gap between the two substrates of a display cell. (Citing JX-37, Ex. A at 2.) AUO argues that the intrinsic evidence supports Respondents' construction, which requires that the spacing elements perform this function by contacting each of the substrates of the display cell, because absent such contact, the spacers cannot maintain the uniform gap. AUO says that Thomson's position that spacing elements can maintain a substantially uniform gap without contacting both substrates makes no sense and is wholly unsupported by the intrinsic evidence.

AUO argues that one of ordinary skill in the art understands that a spacer performs the function of maintaining a substantially uniform separation or distance between the two substrates by contacting two substrates. (Citing RX-158C at Q. 250) AUO asserts that this understanding is reinforced by Figures 1-3 of the '063 patent, which show that spacers 20 "perform the function of maintaining a substantially uniform cell gap by contacting both the bottom substrate 12 and the top substrate 14" (Citing JX-1 at 1:21-61, 2:4-6, Figs. 1-3), and by the detailed description of the preferred embodiments, which references the conventional cell assembly techniques shown in these figures. (Citing JX-1 at 4:36-37; RX-158C at Q. 251-252.) AUO contends that this understanding is further reinforced by the '063's teaching that the thickness of the spacing elements is the same as the cell gap height and the thickness of the liquid crystal layer. AUO says all three dimensions are disclosed as being "on the order of 5 μm" or "approximately 5 microns." (Citing JX-1 at 4:13-19, 6:1-3 (claim 7), 6:37-38 (claim 16), FIG. 7 (showing a spacing element of Z-height); RX-158C at Q. 253) AUO asserts that the '063 patent nowhere suggests that the claimed "spacing elements" can perform their function without contacting both substrates. AUO concludes that Dr. West admits that the '063 patent nowhere discloses spacers that do not contact the upper substrate. (Citing Tr. 191:5-192:3)

AUO says JX-31 ("Maltese") is incorporated by reference in the '063 (Citing JX-1 at2:23-28) and is part of the intrinsic evidence for purposes of claim construction. (Citing *V-Formation, Inc. v. Benetton Grp. SpA*, 401 F.3d 1307, 1311 (Fed. Cir. 2005)) AUO asserts that, like the figures in the '063 patent, Maltese teaches that spacers perform the function of maintaining a uniform cell gap by contacting both substrates. AUO avers that the article states that the two glass substrates are "in contact through distributed spacers," and Figure 5 of the article shows spacers that are photolithographically formed on one substrate, and that are always in contact with the opposite substrate after the two substrates are attached to each other in the completed display cell. (Citing JX-31 at AUO-THO 0121088; and RX-158C at Q. 255-260)

AUO contends that RX-11 ("Hsieh") was cited during prosecution of the '063 patent and is also part of the intrinsic evidence for purposes of claim construction. (Citing *V-Formation*, 401 F.3d at 1311) AUO says the Hsieh patent discloses photolithographically formed spacers that provide uniform spacing between two substrates of a liquid crystal display cell, and the function of the spacers in the Hsieh patent is the same as the function of the spacing elements claimed in the '063 patent. (Citing RX-158C at Q. 262) AUO argues that Figure 7 and its description in the Hsieh patent confirm that, at the time the '063 was filed, one of ordinary skill in the art understood that spacers perform the function of maintaining a uniform cell gap by contacting both substrates of the display cell. (Citing RX-158C at Q. 262-266; and RDX-220) AUO concludes that Dr. West admits that both the Maltese article and the Hsieh patent show the spacers contacting both substrates. (Citing CX-4304C at Q. 127)

AUO continues that its expert, Dr. Lowe, explains why a structure that does not contact both substrates cannot perform the function of a spacing element. (Citing RX-554C at Q. 89) AUO argues that Dr. West's opinion is contradicted by his own description of what would happen if spacers are destroyed or dislodged during the rubbing process: "spacers that are destroyed or dislodged are no longer able to maintain a cell gap. Spacers that break in half are only a fraction of the height of the normal post-like spacers ..." (Citing CX-4242C at Q. 37) AUO argues that the clear implication of Dr. West's description is that a spacer that is "only a fraction of the height of the normal post-like spacers" is "no longer able to maintain a cell gap." (*Id.*) AUO contends that this directly contradicts Dr. West's opinion that "it is quite feasible that at any one particular time, none, some or all of the spacers are in contact with both substrates in a device." (Citing CX-4242C at Q. 132)

AUO argues that the agreed upon function of the spacing elements is to maintain a substantially uniform gap, not a minimum gap, between the substrates. AUO says when pressure is locally applied over spacing elements that, before the pressure is applied, are not in contact with both substrates, the gap at the point of pressure is smaller than the gap throughout the rest of the display precisely because the spacers were not initially in contact with both substrates. AUO reasons that, by definition, such non-contacting spacers do not maintain a uniform gap between the substrates.

In its reply brief AUO says that Thomson cites ***no*** intrinsic evidence which supports its contention that the spacing elements do not need to contact both substrates. AUO says that the reference in the '063 to "uniform cell gap spacing within desired tolerance levels" "fails to teach that the spacing elements do not need to contact both substrates. Indeed, the opposite is taught." (Citing JX-1 at1:19-23) AUO avers that the quoted sentence refers to "conventional ways ... to assemble AM LCDs" (*id.*), shown in Figures 1-3, all of which illustrate spacers touching both substrates. AUO says that Dr. Lowe explained that in these conventional ways, a pressure is applied to the two substrates, which presses them into contact with the spacers across the display. (Citing RX-158C at Q. 63, 251)

CMI's Position: While joining AUO in its position on construction of this term, CMI submitted its own argument in its reply brief.

CMI contends that Thomson's sole complaint regarding Respondents' proposed construction of these terms is that they require the spacing elements to contact both substrates. CMI says that Thomson's only intrinsic evidence is a reference within the '063 patent that "conventional ways are known to… achieve uniform cell gap spacing." CMI asserts that Thomson identifies no intrinsic reference to spacers which do not contact both substrates. CMI adds that Thomson provides no evidence that such spacers were known when the '063 patent application was filed in 1997. Instead, CMI argues, Thomson relies on a patent application filed 8 years after the relevant time period, and this evidence is irrelevant. (Citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005))

Construction to be applied: "two or more structures, not physically connected to one another, which structures serve to substantially uniformly separate two substrates, said structures formed on one of said two substrates and contacting the second substrate"

Asserted claim 1 teaches:

A display cell comprising:

two substrates with at least one of said two substrates divided into an active aperture area and a non-active area;

a spacing layer, interposed between said two substrates, the spacing layer including an affixing layer and a plurality of spacing elements separate from one another, said spacing elements being anisotropic in shape, the affixing layer covering at least a portion of the non-active area and remaining substantially outside of the active aperture area, wherein said two substrates are affixed to each other after one of the two substrates and the plurality of spacing elements have been mechanically rubbed, ***the two substrates remaining substantially uniformly separated from each other by said spacing elements.***

Asserted claim 11 teaches:

A method of forming a display cell comprising:

providing a first substrate which has been partitioned into an active aperture area and a non-active area and has a front surface and a rear surface;

> forming a plurality of spacing elements separate from one another on the front surface and non-active areas of said first substrate, the spacing elements being anisotropic in shape;
>
> mechanically rubbing over the first substrate having the plurality of spacing elements formed thereon; and
>
> attaching a second substrate on the front surface of said first substrate, ***said second substrate being kept at a substantially uniform distance from said first substrate by said spacing elements.***

(JX-1 at 5:23-39 and 6:11-24) (Emphasis added)

I begin from the understanding that "the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Phillips*, 415 F.3d at 1313. The application for the '063 patent was filed on April 15, 1997.

The parties agree that the function of the spacing elements is to maintain a substantially uniform separation between the two substrates as asserted claims 1 and 11 clearly teach. AUO argues persuasively that a person of ordinary skill in the art would have known at the time the '063 patent application was filed that the function of the spacing elements would be carried out by placing the elements in contact with the two surfaces to be maintained at a substantially uniform distance from one another.

First, simple logic leads to the conclusion that, structures designed to substantially uniformly separate two surfaces from one another would necessarily be in contact with both of the two surfaces that the structures serve to separate. Second, neither the claims nor the description of the preferred embodiments teaches a method of performing the function of the spacing elements other than the spacing elements physically holding the two surfaces apart, which necessarily requires that the spacing elements be in contact with the two surfaces they are tasked with separating from one another.

Next, asserted claims 1 and 11 both specifically teach that the spacing elements are formed on the non-active surface of one of the two substrates. Claim 1 requires that the spacing layer be formed by "covering" at least a portion of the non-active area of one substrate with an "affixing layer." The same spacing layer that requires the affixing layer on the substrate also requires as part of the spacing layer "a plurality of spacing elements" that are mechanically rubbed along with one substrate. Claim 11 specifically requires "forming a plurality of spacing elements separate from one another on the front surface" of a substrate. Figure 9, which is a depiction of one embodiment, shows the spacers physically attached to a substrate while undergoing mechanical rubbing.

Both asserted claims 1 and 11 also require that the two substrates be physically attached to one another and that the spacing elements serve to substantially uniformly separate those attached substrates.

The '063 patent does not teach away from the concept that the spacing elements must be in contact with both substrates. In describing the preferred embodiments, the '063 patent focuses on the placement of the spacing elements to avoid interfering with the active pixel areas. (*See e.g.* JX-1 at 3:54-60.) The '063 patent teaches minimum display distances (the "Z-height") "on the order of 5μm" which height depends on the characteristics of the liquid crystal being used. (JX-1 at 4:13-20.) These teachings are consistent with spacers that are in contact with both substrates to maintain a uniform distance between those two substrates.

The description of related art says, "[s]everal conventional ways are known to assemble AM LCSs and achieve uniform cell gap spacing within desired tolerance levels." Figures 1-3 of the '063 patent illustrate spacers of the prior art, all of which are in direct contact with each of the two substrates that they serve to separate. (JX-1 at 1:21-61.)

The '063 patent incorporates by reference an article entitled "Improved Construction of Liquid Crystal Cells" by Maltese et al ("Maltese"). (JX-31.) At page 666 of that article, describing Figure 5, the author details a part of the process of creating a crystal, "[t]he two internal surfaces are compressed one against the other through the spacers. In this way the initial waviness of the plates is levelled by the internal compression and one can obtained [*sic*] disuniformities of the hollow space much smaller than the waviness of the plates."

The '063 patent also incorporates by reference U.S. Patent No. 5,707,785 ("Hsieh"), which at Figure 7 shows two substrates being separated by spacers that are in contact with the two substrates. Hsieh consistently describes its "invention" as having spacers that provide a uniform distance between the two substrates. (*See e.g.* JX-11 at 1:27-31, 1:53-56, 2:8-10, 4:13-17, and 4:46-50.) Figure 7 of Hsieh is reproduced below:

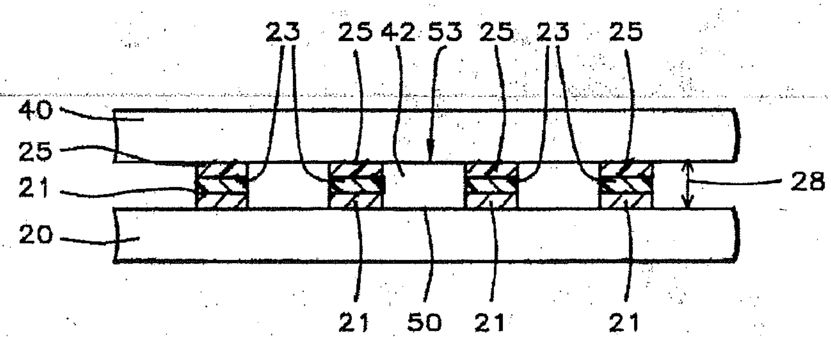

FIG. 7

All of the foregoing reveals that the method of maintaining separation between two substrates of a liquid crystal cell by compressing the two substrates against the spacing elements was well known in the prior art.

Dr. Lowe, AUO's expert, testified credibly that the conventional way of creating a liquid crystal cell was to apply a pressure to the two substrates, which presses them into contact with the spacers across the display. (RX-158C at Q. 63, 251.) In discussing the need for anisotropic spacers instead of "post" spacers, Thomson's expert Dr. West, said that they are destroyed by the mechanical rubbing process. He said that when they are destroyed or dislodged they are no longer able to maintain a cell gap. Dr. West went on to describe that dislodged or broken spacers are only a fraction of their height or are as tall as their diameter – not their height. (CX-4242C at Q. 34-37.)

Contrasted with the foregoing testimony of Dr. West is Thomson's assertion that it is also known in the art that spacers can maintain substantially uniform cell gaps without contacting both substrates. (Citing CX-4242C at Q. 133; CX-1127 at 1:41-43; 3:23-27; 11:42-46.) This argument is based in large part upon exhibit CX-1127, which is a patent issued on June 15, 2010 and the application for which was made on February 16, 2005. I find that this recent patent is not evidence of what a person of ordinary skill in the art would have known in 1997.

Based upon all of the foregoing, I find that a person having ordinary skill in the art at the time the '063 patent was filed on April 15, 1997, would have known that the conventional way to provide substantially uniform separation between substrates of a liquid crystal cell was to place spacing elements between the two substrates and to apply pressure so that the two substrates were in contact with one another through the spacing elements. I find, too, that those spacing elements would necessarily have to be in contact with the inner surfaces of the two substrates in order to maintain that substantially uniform separation.

Inasmuch as the '063 patent refers in asserted claims 1 and 11 to maintaining a substantially uniform separation between the two substrates and accomplishes that without revealing a method other than the conventional means known in the art, I find that the claims require that the spacing elements be in contact with the two substrates they are separating from one another. Therefore, the plain and ordinary meaning of "a plurality of spacing elements separate from one another" as used in asserted claims 1 and 11 to provide substantially uniform spacing between two substrates of a liquid crystal cell at the time the '063 patent was filed, is "two or more structures, not physically connected to one another, which structures serve to substantially uniformly separate two substrates, said structures formed on one of said two substrates and contacting the second substrate."

7. "anisotropic in shape"

The term "anisotropic in shape" appears in asserted claims 1 and 11.

Thomson's Position: Thomson argues that the proper construction is "having a length dimension that is greater than a width dimension in the plane of the substrates." (Citing JX-37; CX-4242C at Q. 157-161; and CX-4240C at Q. 39) Thomson reasons that this is consistent with the specification's disclosure that "[t]he anisotropic shape of spacer 54 refers to a longer side along the X direction compared to the shorter side along the Y direction." (Citing JX-1 at3:66-4:1) Thomson adds that it is also consistent with the ordinary meaning of anisotropic as having "different properties in different directions." (Citing CX-1136; CX-1148; and CX-1154) Thomson says Respondents construe "anisotropic in shape" to mean "formed to include a first side along the long axis (X direction) and a second side along the short axis (Y direction) perpendicular to the long axis." Thomson counters that the patent does not impose any perpendicular limitation. Thomson says even the definition cited by Respondents does not limit different directions to perpendicular. (Citing RX-25) Thomson says while Respondents cite to the patent's disclosure that anisotropic shape enables spacers to withstand rubbing, nothing in the patent requires anisotropy along perpendicular axes to enable spacers to withstand rubbing. (Citing CX-4304C at Q. 149-158) Thomson says this argument is based on a faulty premise that an anisotropic spacer only provides a benefit along the long axis; but that Dr. Lowe admitted, an anisotropic spacer provides a benefit over an isotropic spacer even if rubbed at other angles. (Citing CX-4249C, 195:13-23; CX-4240C at Q. 43-48; and CX-4242C at Q. 176-92)

AUO's Position: AUO argues that its construction is consistent with the express definition of "anisotropic shape" set forth in the '063 patent. AUO says that Thomson's construction permits the length and width of the spacers to be determined in any direction, even along axes that are not perpendicular or are oriented in different directions for different spacing elements. AUO asserts that Thomson's proposed construction is inconsistent with "the patentee's express definition" and contravenes the stated purpose of the anisotropic shape: to enable the spacing elements to withstand the mechanical rubbing process. (Citing JX-1 at2:40-42)

AUO argues that the term "anisotropic shape" "must be construed in accordance with the patentee's special definition in the specification." (Citing *Phillips*, 415 F.3d at 1316) AUO avers that the patentee's special definition is found in the specification at JX-1 at3:63-4:1. AUO contends that this "special definition" is reinforced elsewhere in the specification, where the sides of the anisotropic spacing elements are likewise described as being "along the X direction (long axis)" and "along the Y direction (short axis)." (Citing JX-1 at4:59-62) AUO asserts that Figures 7 and 8 of the '063 patent show perpendicular X and Y axes corresponding to the long axis and short axis of the spacers, and consistent with the patentee's express definition, Figures 10a-c and 11 show a plurality of spacing elements 54 with their long axes all oriented in a single direction: the vertical direction (labeled X in Figure 11 and unlableled in Figures 10a-c).

AUO argues that intrinsic evidence compels the conclusion that "anisotropic in shape" means the spacing element is formed to include a first side along the long axis (X direction) and a second side along the short axis (Y direction) perpendicular to the long axis, as set forth in Respondents' proposed construction. (Citing *See Trading Techs. Int'l, Inc. v. eSpeed Inc.*, 595 F.3d 1340, 1353 (Fed. Cir. 2010))

Construction to be applied: "having a length dimension that is greater than a width dimension in the plane of the substrates"

The parties argue essentially the same language from the specification to support their positions. Thomson agues, correctly, that the specification describes the shape of the spacers as having a length dimension that is greater than a width dimension in the plane of the substrates. AUO attempts to apply the description found in the specification to the orientation of the spacers as well as their shape. AUO's position is not supported by the clear language of the '063 patent's specification.

The specification of the '063 patent describes Figure 7 as:

> Spacer 54 is anisotropic in shape as it includes first side 56 along an X direction (also known as the long axis) and a second side 58 along a Y direction (not shown in FIG. 7). The anisotropic shape of spacer 54 refers to a longer side along the X direction compared to the shorter side along the Y direction.

(JX-1 at 3:63-4:1.)

Neither Figure 7, described above, nor Figure 8, to which AUO makes added reference, show the orientation of the spacer on the substrate. Rather, the spacer is shown in isolation from a side and top down perspective. The references to the "X" and "Y" directions in the description clearly are intended to describe the length and width of the spacers themselves and not their orientation on the substrate.

Based upon the intrinsic evidence, I find that the term "anisotropic in shape" is properly construed to have its plain and ordinary meaning, which is clearly expressed in the '063 patent as "having a length dimension that is greater than a width dimension in the plane of the substrates."

I find that examination of extrinsic evidence is unnecessary because the intrinsic evidence is sufficient to understand the meaning of the term "anisotropic in shape." *Vitronics*, 90 F.3d at 1583.

8. "mechanically rubbed" & "mechanically rubbing over the first substrate"

The terms "Mechanically rubbed" and "Mechanically rubbing over the first substrate" appear in asserted claims 1 and 11, respectively.

Thomson's Position: Thomson contends that the proper construction for claim 1 is "using a machine or apparatus to apply a moving pressure" and for claim 11 is "using a machine or apparatus to apply a moving pressure to material formed on the substrate." (Citing JX-37; CX-4242C at Q. 165-192, 195; and Tr. at 246:8-251:3) Thomson asserts that this is consistent with the patent's disclosure of a machine that applies moving pressure such as "a conventional LCD rubbing process using a roller" (Citing JX-1 at4:30-31; and CX-4242C at Q. 166) and with the plain meaning of "mechanically" (Citing CX-1141; and CX-1150) and "rub" (Citing CX-1151; and CX-4242C at Q. 166) Thomson says that Respondents have not proposed a construction of "mechanically rubbed" but instead add limitations around "mechanically rubbed," requiring spacing elements "mechanically rubbed along the long axis (X direction)," which is not required by the independent claims. Thomson says that only claim 14, which depends from claim 11, adds the limitation that "the spacers are rubbed along the first axis." (Citing JX-1) Thomson argues that the Federal Circuit has held, "the presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim." (Citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004); and *Certain Biometric Scanning Devices*, 337-TA-729, 2011 WL 2907232, Final Determination (June 17, 2011) (citing *Liebel-Flarsheim*)) Thomson concludes that where, as here, the limitation that is sought to be read into an independent claim already appears in a dependent claim, claim differentiation is at its strongest. (*Id.*)

Thomson asserts that Respondents' arguments rely on a misreading of prosecution history, which only distinguished when rubbing was performed, and a theory regarding relative strengths of isotropic and anisotropic spacers that their own expert has twice admitted is factually wrong. Thomson adds that Dr. Lowe admitted, there is no rubbing direction in the independent claims, only a sequence. (Citing Tr. at 939:7-14, 941:6-16) Thomson says that Dr. Lowe calculated abilities of anisotropic and isotropic spacers to withstand rubbing and found that anisotropic spacing elements have a better ability to withstand mechanical rubbing along either long or short axes, or all angles between. (Citing CX-4242C at Q. 191; CX-1640C; CX-1641C; and CX-4249C at 195:13-23.)[7] Thomson says that Dr. Lowe admits that Respondents' seek to limit the claims to their "most specific, preferred, optimal commercial implementation." (Citing Tr. at 957:20-958:5) Thomson argues that Respondents err in this argument. (Citing *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367, 1371 (Fed. Cir. 2005)) Thomson concludes that the patent never requires a rubbing direction for its independent claims. (Citing CX-4304C at Q. 59-77, 82-94; Tr. at 247:10-249:19; and CX-4240C at Q. 44-48)

In its reply brief Thomson says that Respondents argue that the preferred embodiment in Figure 9 and corresponding description should limit the scope of the "mechanically rubbed" and

[7] Thomson says that, in his witness statement, Dr. Lowe provided a new calculation that is based on a spacer that could only be potentially hidden in one specific portion of non-active area to which Dr. Lowe admits the claims are not restricted. (Tr. at 948:12-17, 953:5-12.)

"mechanically rubbing" terms; but Respondents have offered no evidence to rebut the presumption that dependent claim 14, which claims mechanical rubbing along the long axis of the spacer, is narrower than the independent claims under claim differentiation. Thomson asserts, because claim 14 only adds a single additional limitation — the rubbing direction — Respondents' construction would render claim 14 meaningless.

AUO's Position: AUO argues that Thomson proposes an overly broad construction based on dictionary definitions that are wholly divorced from the '063 patent and the field of liquid crystal displays. AUO asserts that its proposed construction, on the other hand, captures the actual scope of the invention: carrying out the conventional LCD rubbing process such that the substrate and spacing elements are mechanically rubbed along the long axis. AUO contends that rubbing along the long axis of the spacers is not just a preferred embodiment; but is disclosed in the '063 patent and its prosecution history as the invention. AUO says there is no support in the intrinsic evidence for broadening the claims "beyond what the inventors actually invented and described in their patent application."

AUO says that claims 1 and 11 of the '063 patent specify that the spacing elements are "anisotropic in shape" and that the substrate and the spacing elements are mechanically rubbed. (Citing JX-1 at5:35-37 (claim 1), 6:19-20 (claim 11)) AUO says that claims 1 and 11 require the directionality described by Respondents' construction by reciting spacers that are anisotropic in shape, which the '063 patent expressly defines as having a longer side in a single direction, *e.g.*, the "X direction." (Citing JX-1 at3:66-4:1.)

AUO contends that the specification repeatedly emphasizes that the anisotropic shape of the spacers is what permits them to withstand the mechanical rubbing process necessary to align the liquid crystal molecules in a single direction, quoting:

> The spacers may also be engineered to be highly anisotropic in shape so as to be compatible with the aggressive mechanical rubbing process of the LCD assembly. (JX-1 at 2:40-42.)

> As discussed below, the spacers are anisotropic in shape to withstand the LCD assembly processes including the mechanical rubbing. (JX-1 at 3:52-54.)

> The anisotropic shape of spacer 54 refers to a longer side along the X direction compared to the shorter side along the Y direction. .... This enables the spacer 54 to withstand the mechanical rubbing process .... (JX-1 at 3:66-4:5.)

AUO asserts that during prosecution, the applicant amended claims 1 and 11 to include the disputed mechanical rubbing limitations and made the following argument in support of patentability:

> Furthermore, the present application expressly discusses the advantages of using an anisotropic spacer so as to be compatible with the aggressive mechanical rubbing process of LCD displays. That is, spacers having an anisotropic shape (i.e., as in the present claims) enable the spacer to withstand the mechanical rubbing process. This differs from prior art spacers which are not able to withstand the rubbing process and are easily destroyed. (Citing RX-35 at 4.)

AUO says that the '063 patent illustrates (in Figure 9) and explains (in columns 3 and 4) how and why the anisotropically-shaped spacers are able to withstand damage or destruction by the rubbing process, quoting:

> FIG. 9 shows a conventional LCD rubbing process using a roller 50 that rolls along the X direction (long axis) of the spacers 54. Unlike prior art spacers, the spacers of the present invention withstand the rubbing process due to their anisotropic shape.

(Citing JX-1 at4:30-34, 3:13-14 ("FIG. 9 shows a rubbing process according to the present invention"); and RDX-252, 253, and 214)

AUO contends that "these repeated assertions and explanations, both in the specification and prosecution history, inextricably link the utility of the anisotropically-shaped spacers to the direction in which they are rubbed: along the long axis." AUO says that Dr. Lowe explained that, to enable the spacers to withstand the mechanical rubbing process, the '063 patent teaches essentially two things: first, that the spacers are anisotropic in shape, and second that they are rubbed along the long axis. (Citing RX-158C at Q. 189) AUO alleges that neither feature is taught as merely preferred or optional. AUO says on the contrary, Figure 9 and its discussion show and describe the rubbing process of "the present invention." AUO argues that Figure 9 limits the scope of the claimed invention. (Citing JX-1 at3:13-14; *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007); *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1348 (Fed. Cir. 2004); and *Alloc, Inc. v. ITC*, 342 F.3d 1361, 1370 (Fed. Cir. 2003))

AUO avers that Dr. West agreed that the ability of the spacer to withstand the rigors of the rubbing process depends on the direction of rubbing. AUO says he admitted that when the spacer is three times longer than it is wide, the force applied to the spacer is "three times greater" when rubbed along the short axis than when rubbed along the long axis. (Citing Tr. 203:11-204:17) AUO adds that there is no suggestion in the '063 patent that the anisotropic shape provides any advantage or benefit unless the spacer is rubbed along the long axis. AUO concludes that there is no discussion whatsoever about rubbing the spacer in any direction other than along the long axis. (Citing RX-158C at Q. 200-202; RX-554C at ¶¶ 112-113; and Tr. 176:6-18, 203:2-10)

AUO respond to Thomson's claim differentiation argument, saying it is well-settled law that the principle of claim differentiation "is not a conclusive basis for construing claims." (Citing *Am. Calcar, Inc. v. Am. Honda Motor Co.*, Nos. 2009-1503, -1567, ___ F.3d. ___, 2011 U.S. App. LEXIS 13083, at *37 (Fed. Cir. June 27, 2011)) AUO says it merely creates a rebuttable presumption that each claim in a patent has a different scope, which can be overridden by a contrary teaching in the specification or prosecution history. (*Id.*; *ERBE Elektromedizin*

GmbH v. Canady Techn. LLC, 629 F.3d 1278, 1286-87 (Fed. Cir. 2010); *Fantasy Sports Props., Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1115 (Fed. Cir. 2002))

AUO argues that Thomson's proposed construction ignores the problems described in the '063 patent that are overcome by rubbing in a particular direction, and it is meaningless because it has nothing to do with, and is completely divorced from, the context of a liquid crystal display. (Citing JX-1 at4:34-35; RX-158C at Q. 225-229; and RX-554C at Q. 108.) AUO asserts that Thomson's proposed construction only requires "moving pressure" and fails to require rubbing, which is necessary to create microgrooves in the substrate for aligning the liquid crystal. (Citing RX-158C at Q. 225-226; and Tr. 171:9-17)

AUO argues that intrinsic evidence, rather than extrinsic evidence such as dictionary definitions should be used here to construe the claims. (Citing *Ultimax Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1347 (Fed. Cir. 2009); and *Finisar Corp. v. DirecTV Grp. Inc.*, 523 F.3d 1323, 1328 (Fed. Cir. 2008))

Regarding Thomson's contention that neither the claims, nor the prosecution history, say anything about the direction of rubbing, AUO states that Thomson is wrong. AUO says that the claims recite a direction because the term "anisotropic shape" is expressly defined to require a direction. (Citing JX-1 at3:63-4:1) AUO continues that the prosecution history distinguished the claimed mechanical rubbing from the prior art based not on when it was performed (as Thomson contends), but on the ability of the anisotropic spacers to withstand the rubbing process. (Citing RX-35 at 4.) AUO contends this is so, because both in the specification and the prosecution history, the patentee admitted that it already was known in the art to conduct the mechanical rubbing after the spacers have been formed. (*Id.*; JX-1 at4:32-34)

Finally, AUO argues that Thomson mistakenly relies upon Dr. Lowe's calculations regarding the relative strength of isotropic and anisotropic spacers. AUO says that Dr. Lowe repeatedly testified on cross-examination that the calculation relied upon by Thomson was only for "a particular isotropic spacer and a particular anisotropic spacer." (Citing Tr. 949:23-950:3, 950:19-951:10, 952:11-953:4) AUO contends that Thomson ignores the more general result of Dr. Lowe's calculations, namely that an anisotropic spacer is always stronger when rubbed along the long axis than when rubbed along the short axis or any other angle (Citing RDX-255C; and CDX-0089), as Dr. West admitted. (Citing Tr. 203:11-204:17)

CMI's Position: While joining AUO in its argument on the construction of this term, CMI submitted its own argument in its reply brief.

CMI argues that Respondents' construction is confirmed by the prosecution history, where the applicant states that the '063 patent application "expressly discusses the advantages of using an anisotropic spacer so as to be compatible with the aggressive mechanical rubbing process," then refers to the '063 patent application's teaching to rub along the long axis. (Citing RX-35 at 4) CMI asserts that Thomson "turns a blind eye to this concession", asserting that the prosecution history "only distinguished when rubbing was performed."

CMI contends that Thomson misrepresents the underlying testimony of Dr. Lowe who, according to CMI, testified that one of skill in the art would follow the '063 patent, which only teaches the most commercially optimal technique of rubbing along the long axis of the spacers. (Citing Tr. 956:14-957:19.)

CMI argues that Thomson's proposed construction resorts to interpretation of "mechanical rubbing" using dictionary definitions rather than describing how it is understood to one of skill in the art in the field of LCDs. CMI asserts that Thomson's proposed constructions are so broad they recapture embodiments the applicant surrendered to obtain the patent. (Citing

RX-35 at 4; and RX-158C at Q. 229) CMI adds that these constructions fail to require mechanical rubbing as understood by one of skill in the art and are unrelated to the field of liquid crystal display. (Citing JX-1 at4:34-35; RX-158C at Q. 225-229; and RX-554C at Q. 108)

Construction to be applied: "having a moving pressurized friction applied by a machine or apparatus substantially along the long axis of the spacing elements" and "using a machine or apparatus to apply a moving pressurized friction substantially along the long axis of the spacing elements formed on the substrate"

First, AUO is correct when it points out that Thomson's proposed construction only requires "moving pressure" and fails to require rubbing, which is necessary to create microgrooves in the substrate for aligning the liquid crystal.

Second, as AUO asserts, Figure 9, which is a depiction of the present invention, shows a mechanical process in which the lateral movement of the apparatus across the substrate (arrow X) is accompanied by a rotational movement of the apparatus (depicted by an arrow following the curve of 50) that moves against the direction in which the apparatus is moving laterally, which provides not only pressure but friction. (JX-1 at 3:13-14 and Figure 9.)

AUO argues persuasively that the '063 patent makes clear that the primary purpose of the anisotropic shape of the spacers is to provide spacers that will withstand the mechanical rubbing process necessary to align the liquid crystal molecules in a single direction. In the detailed description of preferred embodiments, the inventors clearly disclaim the prior art and limit the meaning of the claim language[8] when they state:

> FIG. 9 shows a conventional LCD rubbing process using a roller 50 that rolls along the X direction (long axis) of the spacers 54. ***Unlike prior art spacers, the spacers of the present invention withstand the rubbing process due to their***

[8] *See Phillips,* 415 F.3d at 1316.

> ***anisotropic shape.*** Prior art spacers that are post-like are easily destroyed by the rubbing process.

(JX-1 at 4:30-35) (Emphasis added.)

The detailed description of preferred embodiments consistently points to the same benefits of the anisotropic shape of the spacers, when it says:

> As discussed below, the spacers are anisotropic in shape to withstand the LCD assembly processes including the mechanical rubbing. (JX-1 at 3:52-54.)
> The anisotropic shape of spacer 54 refers to a longer side along the X direction compared to the shorter side along the Y direction. ... This enables the spacer 54 to withstand the mechanical rubbing process .... (JX-1 at 3:66-4:5.)
> The Summary of the Invention provides further support when it describes:
>
> The spacers may also be engineered to be highly anisotropic in shape so as to be compatible with the aggressive mechanical rubbing process of the LCD assembly.

(JX-1 at 2:40-42.)

The prosecution history reveals that during prosecution, the applicant amended claims 1 and 11 to include the disputed mechanical rubbing limitations and made the following argument in support of patentability:

> Furthermore, the present application expressly discusses the advantages of using an anisotropic spacer so as to be compatible with the aggressive mechanical rubbing process of LCD displays. That is, spacers having an anisotropic shape (i.e., as in the present claims) enable the spacer to withstand the mechanical rubbing process. This differs from prior art spacers which are not able to withstand the rubbing process and are easily destroyed.

(RX-35 at 4.)

Thomson's argument regarding the doctrine of claim differentiation is misapplied here. It is true that the presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim. *Liebel-Flarsheim*, 358 F.3d at 910. Nevertheless, the presumption is rebuttable, and the language to be construed must be read in context.

I have already construed the term "anisotropic in shape" to mean "having a length dimension that is greater than a width dimension in the plane of the substrates."

Dependent claims 4 and 12 each add to the limits of their respective independent claims[9] the requirement that the spacing elements "extend along a first axis and along a second axis shorter than the first axis." Inasmuch as, the shape of the spacing elements is adequately described in asserted claims 1 and 11 by use of the term "anisotropic in shape," it would be redundant to use the term "extends" in claims 4 and 12 to re-describe the shape of the spacing elements. That redundancy would render claims 4 and 12 meaningless. In order for claims 4 and 12 to have meaning within the '063 patent, the term "extends" must refer to something other than the shape of the spacer elements. I find that the term "extends" refers to the orientation of the spacing elements within the non-active area of the substrate upon which they are located. Thus, claims 4 and 12 add the requirement that the spacers be oriented lengthwise along the long axis of the non-active area of the substrate.

Consistent with the foregoing, asserted claim 14, which depends from independent claim 11 via dependent claim 12, teaches that the spacing elements are rubbed along the first (*i.e.* "long") axis. This reading of claim 14 further narrows the scope of the mechanical rubbing, which I have construed in claims 1 and 11 to refer to rubbing in a direction ***substantially*** along the long axis of the spacer elements.

At the hearing, Dr. West testified, for example, that when the spacer is three times longer than it is wide, the force applied to the spacer is "three times greater" when rubbed along the short axis than when rubbed along the long axis. (Tr. at 203:11-204:17.) AUO's expert, Dr. Lowe, testified unequivocally under cross-examination that, when rubbed at a 45° angle, an

[9] Asserted claim 4 depends from independent claim 1, and asserted claim 12 depends from asserted claim 11.

anisotropic spacer element had superior strength when compared to a cylindrical spacer element. Dr. Lowe agreed that the anisotropic spacer element did not need to be rubbed along the long axis in order to have superior strength when compared with a cylindrical spacer element. (Tr. at 950:19-953:5.)

The experts' testimony at the hearing supports a finding that the strength of the anisotropic spacing elements remains superior when the spacing elements are rubbed at an angle that is not precisely along the long axis of the spacing element. The construction I apply here allows for the placement of the spacing elements at orientations within the non-active area of the substrate that are not precisely "along" the long axis of the non-active area of the substrate and, consequently, for the mechanical rubbing to occur at an angle that is "substantially" but not precisely "along the long axis" of the spacing elements.[10]

Based upon the foregoing, I find that the terms "mechanically rubbed" and "mechanically rubbing over the first substrate" as they are used in in asserted claims 1 and 11, respectively, of the '063 patent shall be construed to have the meaning given to them by the inventors, to wit: "having pressurized friction applied by a machine or apparatus substantially along the long axis of the spacing elements" and "using a machine or apparatus to apply a moving pressurized friction substantially along the long axis of the spacing elements formed on the substrate."

9. "the spacers are rubbed along the first axis"

The meaning of this term, which appears in dependent claim 14, has been explained in Section III.B.8, *supra*.

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[10] To be clear, inasmuch as, the object is to create a spacing element with the strength to withstand the aggressive rubbing process of the LCD assembly, the angle of the rubbing should be as close as practicable to the longer (i.e. X) axis of the anisotropic spacing element. The evidence is that the closer the angle of rubbing is to the longer axis, the greater will be the strength of the spacing element to withstand the rubbing process without damage. I do ***not*** find, here, that a 45° angle is "substantially" along the longer axis.

10. "the two substrates remaining substantially uniformly separated from each other" & "said second substrate being kept at a substantially uniform distance from said first substrate"

The terms "the two substrates remaining substantially uniformly separated from each other" and "said second substrate being kept at a substantially uniform distance from said first substrate" appear in asserted claims 1 and 11, respectively.

Thomson's position: Thomson argues that the proper construction is "the gap between the two substrates is largely uniform." Thomson asserts that this is supported by the claim language and specification which discusses maintaining a uniform cell gap within desired tolerance levels. (Citing CX-4242C at Q. 198) Thomson says that the specification states that "[t]he cell gap spacing between the front and rear glass layers should remain uniform for consistent light propagation through the AM LCD. Several conventional ways are known to assemble AM LCDs and achieve uniform cell gap spacing within desired tolerance levels." (Citing JX-1 at1:19-21) Thomson avers that the goal of the patent is to achieve uniform cell gap spacing within desired tolerances. Thomson says that the terms of Respondents' proposed construction "the spacing elements separate the two substrates to maintain a substantially uniform gap" appears to be part of Respondents' attempt to require spacers to contact both substrates.

AUO's position: AUO recites that claim 1 of the '063 patent states: "the two substrates remaining substantially uniformly separated from each other by said spacing elements." (Citing JX-1 at5:37-39) AUO adds that claim 11 of the '063 patent states: "said second substrate being kept at a substantially uniform distance from said first substrate by said spacing elements." (Citing JX-1 at6:22-24) AUO proposes the terms be construed as: "The spacing elements separate the two substrates to maintain a substantially uniform gap." (Citing RX-158C at Q.

245) AUO argues that this is the plain meaning of the claim language. AUO asserts that Thomson's proposed construction ignores the last four words of the claim limitation. (*Id.*) AUO argues that it is also improper to replace the word "substantially" with "largely," which AUO says is an inappropriate attempt to broaden the meaning of the claim.

Construction to be applied: "the two substrates remaining largely uniformly separated from each other" and "said second substrate being kept at a largely uniform distance from said first substrate."

The dispute here comes in two parts. First, AUO disputes Thomson's use of the word "largely" in place of "substantially." Second, AUO argues that the construction proposed by Thomson ignores the last four words of the terms as they appear in claims 1 and 11, to wit: "by said spacing elements."

I find that Thomson's use of the word largely is appropriate here, because it is a reasonable replacement for "substantially" and provides a word that accurately describes "substantially." To define "substantially uniform" and "substantially uniformly" as AUO proposes, using the word "substantially," is circular and unhelpful in enlightening one on the meaning of the term. As Thomson avers, the word "largely" describes a uniform space between the substrates while allowing some leeway "within desired tolerance levels." That characterization is consistent with a separation provided by spacing elements after they have undergone mechanical rubbing, as required by the claims.

To the extent that AUO argues that the definition should include "by said spacing elements," I find it unnecessary to add that language, because the term being defined is the "substantially uniform" separation between the substrates. I already made clear in Section III.B.6, *supra*, that the two substrates are separated from each other by the spacing elements when I described the process of achieving that separation as pressing the substrates together until they contact the spacing elements.

C. The '006 Patent

1. Level of Ordinary Skill in the Art

Thomson's expert Dr. Escuti opined that a person of ordinary skill in the art would have a bachelor's degree in engineering, physics, or materials science with a few years of experience in LCD testing, fabrication, or design, or equivalent experience through education, experience, and training. (CX-4241C at Q. 79.) Respondents' expert Dr. Yeh testified that a person of ordinary skill in the art would have at least a bachelor's degree in engineering, physics, or material science, with some work experience involving the optical aspects of active matrix crystal devices, sensors, and display devices, or the combined equivalent education and work experience. (RX-157C at Q. 68.) According to Thomson, there is no meaningful dispute between the parties' positions. (CIB at 54.)

I find that a person of ordinary skill in the art would have at least a bachelor's degree in engineering, physics, or material science, with at least two years of work experience involving the optical aspects of active matrix crystal devices, sensors, and display devices, or the combined equivalent education and work experience. (RX-157C at Q. 68.) Even though I agree that the parties' proposed definitions appear very similar, I have adopted the position stated by Dr. Yeh because the description of the required work experience is more specific and more closely tied to the technology of the '006 patent. (JX-4.)

2. "uniaxial"

The term "uniaxial" appears in asserted claims 4, 7, and 14.

Thomson's Position: Thomson contends that "uniaxial" means "a refractive index along one axis (n1) that is less than the refractive indices along the orthogonal axes (n2, n3), where n2 and n3 are substantially the same ($n1<n2\approx n3$)."

Thomson asserts that the parties' dispute is centered on whether n2 and n3 can be substantially the same or whether n2 and n3 must be exactly mathematically equal. Thomson argues that its position that n2 and n3 can be substantially the same is consistent with the specification of the '006 patent. (Citing CX-4305C at Q. 51-52.) Thomson cites to a 1994 paper by Dr. Yeh that Thomson asserts supports the position that n2 and n3 can be substantially the same. (Citing CX-18.)

Thomson argues that its construction is consistent with the understanding of those of ordinary skill in the art. To support this, Thomson cites to a patent naming Dr. Yeh as an inventor. (Citing CX-84 at 7:6-13.) Thomson states that while Dr. Yeh attempted to disavow his patent at trial, his testimony was not credible. (Citing CX-101; RX-644; Tr. at 1133:14-1134:6.) Thomson claims that Dr. Yeh also admits that Thomson's construction is correct when he claims that the Arakawa prior art reference discloses a uniaxial compensator under both parties' constructions of "uniaxial." (Citing RX-157C at Q. 432.) In addition, Thomson cites to a European patent application and a corresponding U.S. patent from Fuji that both allegedly demonstrate that it is sufficient for n2 and n3 to be approximately equal. (Citing CX-7; CX-4241C at Q. 137; CX-4.)

Thomson notes that Respondents criticize Thomson's construction because it may encompass some theoretically biaxial materials. Thomson asserts that a material can be both uniaxial and biaxial, as demonstrated by the Freeman and Hull textbook injected into this case by Respondents. (Citing CX-100.)

Thomson argues that in real world uniaxial materials, n2 and n3 cannot be measured to be exactly equal. (Citing CX-4241C at Q. 148.) Thomson states that Dr. Wu's testing of calcite – a material that everyone agrees is uniaxial – shows that n2 was never mathematically equal to n2. (Citing Tr. at 1437:1-5, 1435:18-1436:6.) Thomson claims that Respondents are offering a construction that would result in indisputably uniaxial materials failing to meet the "uniaxial" limitation of the claims.

AUO's Position: AUO contends that "uniaxial" means "having a single optical axis," where an "optical axis" is a "direction in a doubly-refracting (birefringent) material along which the two refracted rays travel…without double refraction."

AUO states that the ordinary meaning of "uniaxial" is "having a single optical axis" – a point acknowledged by Thomson's expert Dr. Escuti. (Citing Tr. at 410:4-14.) AUO asserts that the parties' constructions of "optical axis" make clear that there is no birefringence is the direction of the optical axis. (Citing Tr. at 374:13-17; CX-4241C at Q. 42.) AUO claims that both of these points are confirmed by the intrinsic record. (Citing RX-157C at Q. 75-76, 127-128.)

AUO argues that Thomson now seeks to construe the term to mean that the optical axis is a direction where there is little or no meaningful birefringence. (Citing CX-4305C at Q. 77-79; CX-4241C at Q. 41.) AUO claims that this is incorrect, and that the evidence demonstrates that the optical axis is a direction in which there is no birefringence. (Citing Tr. at 372:15-22; RX-157C at Q. 45, 132, 134; RX-558C at Q. 157.)

AUO argues that the textbook definition of "uniaxial" requires that n2 equal n3. (Citing Tr. at 356:23-357:1; RX-157C at Q. 110; JX-35; RX-88.) AUO states that if the optical axis is the direction n1, and n2, is equal to n3, there will be zero birefringence. (Citing (RX-157C at Q.

105, 140.) AUO states that if n2 is not equal to n3, there will be some birefringence. (Citing Tr. at 376:4-7.)

AUO argues that the specification uses the terms "optical axis" and "uniaxial" consistent with their ordinary meanings. In particular, AUO notes that the specification describes the birefringent material as having "isotropic properties" along the optical axis. (Citing JX-4 at 4:18-21.) AUO argues that there is no birefringence in an isotropic material – an incident ray will form only one refracted ray. (Citing RX-157C at Q. 124.)

According to AUO, Thomson's proposed construction would cover biaxial materials. (Citing RX-157C at Q. 93-94; Tr. at 359:22-360:9.) AUO claims that there are fundamental differences between a uniaxial material and a biaxial material. (Citing RX-157C at Q. 111, 115-116.) In addition, AUO asserts that if a material is biaxial, the direction of n1 will not be an optical axis at all because in a biaxial material, the optical axes do not correspond to the principle indices of refraction, n1, n2, and n3. (Citing Tr. at 376:8-377:3.)

AUO claims that Thomson does not rely on the intrinsic evidence, and instead relies the definitions provided by other inventors in patents other than the '006 patent. AUO argues that the special definitions of "uniaxial" from the three patents cited by Thomson are clearly not evidence of the ordinary meaning of "uniaxial" in the context of compensators. AUO claims that if the patents were using the ordinary meaning of "uniaxial," there would have been no need to specifically call out the definition of the term.

Construction to be applied: "having a single optical axis"

The asserted claims of the '006 patent recite a "uniaxial compensating means with negative birefringence" or a birefringent layer that "provides uniaxial negative birefringence along an axis…" (JX-4 at 6:42-43, 8:22-26.) The parties dispute the meaning of "uniaxial."

The term "uniaxial" appears in the specification, but the usage in the specification does not provide sufficient guidance on the meaning of the claim term. (*See, e.g.*, JX-4 at 1:30-35, 3:3, 3:49-50, 4:64-65, 5:14-15, 6:11-13.) The Background of the Invention explains:

> The present invention relates to electrically controlled electro-optical devices that enable the display of images, directly by transmission on a panel that modulates light or indirectly by projection on a screen...The displayed image has a defect of uniformity that depends on the angular conditions of observation. To reduce this drawback, the invention proposes to associate one or more compensating blades or plates, ***formed by a uniaxial birefringent optical medium***, with the liquid crystal layer, the unit thus formed being placed between the two crossed polarizers. This technique can be used to obtain a far more homogeneous contrast ratio in a wider angle of observation.

(JX-4 at 1:8-26) (emphasis added).

Thomson notes that the parties' dispute regarding the meaning of "uniaxial" centers on whether the refractive indices along the orthogonal axes (referred to as n2 and n3) must be equal, or whether they can be "substantially the same." Because the intrinsic record alone does not resolve this dispute, the parties turn to extrinsic evidence to provide insight into the meaning of "uniaxial" to one of ordinary skill in the art. *Vitronics*, 90 F.3d at 1584 ("No doubt there will be instances in which intrinsic evidence is insufficient to enable the court to determine the meaning of the asserted claims, and in those instances, extrinsic evidence...may also properly be relied on to understand the technology and to construe the claims.")

Thomson cites to U.S. Patent No. 7,527,834 ("the '834 patent"), which lists Respondents' expert Dr. Yeh as a named inventor.[11] The '834 patent includes the following passage:

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[11] Thomson makes much of the fact that Dr. Yeh is a named inventor on the '834 patent. (*See, e.g.*, CIB at 58-59.) Dr. Yeh testified that he had no involvement in the drafting or prosecution of the patent application that resulted in the '834 patent, and had not seen the '834 patent prior to his deposition in this investigation. (Tr. at 1141:13-25, 1143:8-25.) The prosecution history of the '834 patent includes a submission indicating that Dr. Yeh did not join in the filing of the application that resulted in the '834 patent. (RX-644.) Based on this evidence, I find that Dr. Yeh's position is more accurately reflected in the book he co-authored (found at JX-19 & JX-35), rather than the '834 patent.

> The disclosed compensator for a liquid crystal display comprises at least one layer of negative biaxial birefringent material, which is thin crystal film (TCF) based on an aromatic polycyclic compound. This material usually possesses negative biaxial features $n^1_o \geqq n^{22}_o > n_e$. The extraordinary optical axes of the same materials coincide with direction of alignment. For practical applications the thin crystal films may be regard as uniaxial films: $n^1_o \approx n^2_o$.

(CX-84 at 7:6-13).[12]

Thomson cites to European Patent Application EP0646829A1, which lists Fuji Photo Film Co., Ltd. as the applicant. (CX-7.) This patent application includes the following passage:

> The negative uniaxial property of the invention, that the layer of the discotic liquid crystal generally has, means property as satisfies the condition of:
>
> $n_1 < n_2 = n_3$
>
> in which n_1, n_2 and n_3 are refractive indices in the three axes directions of a discotic liquid crystal and n_1, n_2 and n_3 satisfy $n_1 \leq n_2 \leq n_3$. However, n_2 and n_3 are not required to be strictly equal to each other and it will be satisfied that they are approximately equal to each other. In more detail, there is no problem in practical use as long as the negative uniaxial property satisfies the condition of:
>
> $|n_2 - n_3| / |n_2 - n_1| \leq 0.2$
>
> in which n_1, n_2 and n_3 have the meanings described above.

(CX-7 at THOM00076811). U.S. Patent No. 5,528,400, also owned by Fuji Photo Film Co., Ltd., includes the same passage. (CX-4 at 5:4-17.)

Thomson notes that AUO argues Thomson's construction will encompass biaxial materials. Thomson cites to a textbook entitled "Optics" by M.H. Freeman and C.C. Hull in an attempt to counter this claim. (CX-100.) The Freeman and Hull textbook includes a table of "the more important uniaxial crystals," and notes that Mica is "slightly biaxial." (CX-100 at THOM00096181.)

While AUO's proposed construction does not expressly address the indices of refraction, AUO's brief makes clear that it believes that in a uniaxial material, n2 must be equal to n3. (*See*

[12] I note that there is no dispute that the symbol "≈" means "approximately equal to."

AIB at 77.) AUO cites to a textbook entitled "Optics of Liquid Crystal" by Dr. Yeh and Claire Gu. This textbook states that if "two of the principal indices are equal," then "the medium is said to be uniaxial." (JX-35 at 57; *see also* JX-19 at 97-98.)

AUO cites to a textbook entitled "Optics" by Eugene Hecht that states the following:

> The optic axis corresponds to a direction about which the atoms are arranged symmetrically. Crystals like these, for which there is only one such direction, are known as ***uniaxial.***

(RX-88 at 342) (emphasis in original).

AUO cites to the definition of "double refraction" from the Concise Science Dictionary. The definition includes the statement that "[s]ome crystals, such as calcite, quartz, and tourmaline, have only one optic axis; they are *uniaxial crystals*. Other, such as mica and selenite, have two optic axes; they are *biaxial crystals*." (RX-92 at 210) (emphasis in original).

AUO cites to the American Heritage Dictionary of "uniaxial," which provides the following: "[h]aving one direction along which double refraction of light does not take place. Used of a crystal." (RX-106 at 1951.)

The parties also offer extrinsic evidence in the form of extensive testimony from their respective experts. (*See* CX-4241C at Q. 126-148; RX-157C at 69-83, 89-116.) Unsurprisingly, the experts disagree on the meaning of "uniaxial." (*Id.*)

Birefringence occurs "when a single incident ray of light forms two refracted rays." (Tr. at 372:9-14) (*see also* RX-157C at Q. 45 (explaining that "[b]irefringence refers to the phenomenon of light splitting into two rays in certain birefringent media.")). Birefringence is also known as "double refraction." (RX-157C at Q. 45.) Light will not experience birefringence if it is traveling along the optical axis. (RX-157C at Q. 45, 52; Tr. at 374:13-17.) A material may have zero, one, or two optical axes. (RX-157C at Q. 53.) A material having a single optical axis is a uniaxial material. (*Id.*; RX-88 at 342; RX-92 at 210; RX-106 at 1951.)

The indices of refraction are relevant because when light is traveling along n1, the birefringence that the light experiences will be the difference between n2 and n3. (Tr. at 375:7-12; RX-157C at Q. 105.) Therefore, for light to not experience birefringence, n2 must be equal to n3. (RX-157C at Q. 140; RX-558C at Q. 157.) This conclusion is supported by the extrinsic sources cited by AUO, discussed *supra*.

Thomson's expert Dr. Escuti agrees that "the textbook definition of uniaxial requires two of the three indices of refraction to be exactly the same." (Tr. at 356:23-357:1, *see also* Tr. at 358:14-359:7.) Thomson and Dr. Escuti contend that a practical, real-world definition of "uniaxial," as opposed to the "textbook" definition, should apply. Dr. Escuti claims that Dr. Yeh is relying on "a theoretical, textbook definition of 'uniaxial' that does not reflect the understanding of that term in real world applications, particularly in the context of compensation films." (CX-4241C at Q. 132.)

Examining the extrinsic sources offered by the parties, I find the sources offered by AUO to be the most persuasive. The "Optics of Liquid Crystal" textbook co-authored by Dr. Yeh was "intended as a textbook for students in electrical engineering and applied physics, as well as a reference book for engineers and scientists in the area of research and development of display technologies." (JX-35 at THOM00077641.) Therefore, I find that it is a particularly helpful resource in determining how a person of ordinary skill in the art would understand the meaning of "uniaxial." In addition, AUO's proposed construction is supported by two different dictionary definitions. (RX-92 at 210; RX-106 at 1951.) I find each of these sources to be credible evidence of what a person of ordinary skill in the art would understand "uniaxial" to mean.

Thus, I accept AUO's position that in a uniaxial material, n2 must be equal to n3, and I reject Thomson's position that n2 may be "substantially the same" as n3.

Thomson supports its "real world" construction through citation of patents and patent applications that allow for n2 to be approximately equal to n3. (CX-84 at 7:6-13; CX-7 at THOM00076811; CX-4 at 5:4-17.) I find these extrinsic sources to be less reliable, as patents' discussion of the relation between n2 and n3 does not state whether this is specific to the inventions claimed in the patents, or if it is meant to serve as a general description of uniaxial materials. I find that the textbooks and dictionary definitions cited by AUO are more reliable indicators of the understanding of one of ordinary skill in the art. *Phillips*, 415 F.3d at 1318 (noting that, within the class of extrinsic evidence, technical dictionaries and treatises are helpful in providing evidence of "the way in which one of skill in the art might use the claim terms.")

In addition, I find that there are problems inherent with Thomson's proposed construction. Thomson's construction allows n2 and n3 to be "substantially the same," but the construction fails to specify how to determine if the values are substantially the same. The construction thus adds more ambiguity to the claims, instead of clarifying the meaning of the claim language. *Embrex*, 216 F.3d at 1347 ("The construction of claims is simply a way of elaborating the normally terse claim language in order to understand and explain, but not to change, the scope of the claims.") While Thomson cites to the formula used in the Fuji patents to determine substantial similarity, it does not incorporate such a formula into the construction.

Thomson's construction also encompasses biaxial materials, which have three different indices of refraction and two optical axes. (JX-35 at 57; RX-88 at 342; RX-157C at Q. 94.) Dr. Escuti does not deny this, as he agreed that his definition of "uniaxial" would cover materials in which all three indices of refraction are different. (Tr. at 359:18-360:9.) I decline to adopt a construction of "uniaxial" that also encompasses biaxial materials, as there is clearly a difference between "uniaxial" and "biaxial" materials. (JX-35 at 57; RX-88 at 342; RX-157C at Q. 94.)

Dr. Escuti offers three reasons for why he believes AUO's position is incorrect. First, he claims that AUO attempts to construe "uniaxial" in a way that is "divorced from the way that term is used by those of ordinary skill in the art in the context of compensation materials used in LCD devices, which is the context of the claims and disclosure of the '006 patent." (CX-4241C at Q. 144.) Dr. Escuti's unsupported assertion is insufficient evidence to demonstrate that AUO's construction is somehow contrary to the context of the '006 patent.

Dr. Escuti next opines that the '006 patent precludes AUO's construction because dependent claim 7 allows for a uniaxial material that has more than one optical axis. (CX-4241C at Q. 145-146.) Claim 7 states that the "[uniaxial] compensating means comprises a pair of uniaxial birefringent plates, each of said birefringent plates having parallel faces, said birefringent plates having orthogonal optical axes." Dr. Escuti opines that because the "uniaxial compensating means" of claim 7 would have more than one optical axis, it would not meet AUO's construction. (*Id.*) I find that Dr. Escuti's opinion is based on an incorrect interpretation of claim 7. Claim 7 requires the uniaxial compensating means comprises "***a pair*** of uniaxial birefringent plates." The "optical axes" of claim 7 therefore refers to the two optical axes from the pair of birefringent plates, *i.e.* each birefringent plate has a single optical axis. I do not find that claim 7 conflicts with the adopted claim construction.

Dr. Escuti's third reason for opposing AUO's construction is that there is always a finite error present in the manufacturing process that will make it practically impossible to ensure that n2 is exactly equal to n3. (CX-4241C at Q. 148.) I find that this assertion by Dr. Escuti is not enough to overcome the definitions of "uniaxial" found in the credible extrinsic sources.

Moreover, Dr. Yeh's textbook demonstrates that it is not impossible to make a thin film compensator that is actually uniaxial. (JX-19 at Chapter 9; RX-558C at Q. 139; Tr. at 1154:23-1156:19.)

Based on the foregoing, I find that "uniaxial" means "having a single optical axis."

3. "optical axis"

The term "optical axis" appears in asserted claims 4 and 7 of the '006 patent.

Thomson's Position: Thomson contends that "optical axis" means "a direction along which light does not experience birefringence, which is n1 in the context of the uniaxial compensating means with negative birefringence of claim 1."

Thomson argues that its proposed construction is correct for the same reasons as discussed with respect to "uniaxial." Thomson notes that Respondents argue that Thomson's construction of "optical axis" is inconsistent with the description in the '006 patent of the compensating material having isotropic properties along the optical axis. (Citing JX-4 at 4:18-21.) Thomson asserts that its proposed construction is mandated by that description. Thomson states that because n2 approximately equals n3, birefringence and retardation are effectively zero along the optical axis, resulting in no polarization change.

AUO's Position: AUO contends that "optical axis" means "a direction in a doubly refracting (birefringent) material along which the two refracted rays travel at the same speed – i.e., without double refraction." AUO's argument concerning "uniaxial" and "optical axis" is consolidated into a single section in its post-hearing brief. (See AIB at 72-91.) Therefore, I incorporate by reference AUO's positions described in Section III.C.2 *supra*.

Construction to be applied: "a direction in a doubly refracting (birefringent) material along which the two refracted rays travel at the same speed – i.e., without double refraction."

As the parties note, the construction of "optical axis" is directly tied to the construction of "uniaxial." Thomson argues that its construction of "optical axis" is correct because the optical axis is "a direction along which light does not experience birefringence," which occurs when n2 approximately equals n3. AUO argues that its construction of "optical axis" is correct because a uniaxial material is a material that has a single optical axis, and there will be no birefringence along that optical axis.

I find no meaningful difference between the parties' proposed constructions of "optical axis." The parties use this term as a way to rehash their arguments regarding the meaning of "uniaxial." I hereby incorporate by reference my analysis of the term "uniaxial" found in Section III.C.2 *supra*. I find that AUO's proposed construction of "optical axis" is consistent with my adopted construction of "uniaxial."

4. "layer"

The term "layer" appears in asserted claims 4, 7, and 14.

Thomson's Position: Thomson contends that "layer" means "one or more thicknesses."

Thomson asserts that its construction is consistent with how the term is used in the claims and in the LCD field. (Citing CX-4241C at Q. 93.) Thomson states that a layer of twisted nematic liquid crystal is understood in the art as being comprised of multiple thicknesses. (Citing CX-10; CX-4241C at Q. 99; CX-89; CX-19.) Thomson claims that the parties agreed construction of "layer" in the '674 patent is consistent with Thomson's proposed construction of "layer" for the '006 patent. (Citing JX-37.)

Thomson asserts that Respondents rely on dictionary definitions, but the definitions do not support Respondents' constructions. Thomson notes that the dictionaries define "layer" as a "single thickness," not an entire thickness as Respondents propose.

AUO's Position: AUO contends that "layer" means "the entire thickness."

AUO asserts that "layer" is used in two instances in the asserted claims – the twisted nematic liquid crystal layer and the birefringent layer. AUO asserts that the construction must be consistent for all uses of the term "layer" throughout the claims. AUO argues that the construction that would yield a consistent result for all of the mentions of "layer" in the claims is "the entire thickness." (Citing RX-157C at Q. 145-147; Tr. at 382:23-383:3.)

According to AUO, the specification's use of the term "layer" refers to the entire thickness of the material. (Citing JX-4 at 2:48-53, 5:28-30.) AUO states that there is no discussion in the specification of sublayers, much less any hint that the birefringent layer may be a sublayer of a thicker layer. (Citing RX-558C at Q. 41-44.) AUO believes that if the '006 patent intended the term "layer" to refer to sublayers, it would have expressly stated so in the specification. (*Id.*)

AUO claims that Thomson's proposed construction is indefinite. AUO asserts that Dr. Escuti admitted the indefiniteness of the construction when he admitted that the number of sublayers in a compensating means is not finite, the supposed sublayers have no distinct boundaries, and he had not had access to such sublayers in this investigation. (Citing Tr. at 391:7-392:7.)

Construction to be applied: "one or more thicknesses of material"

The term "layer" appears in two different contexts in the asserted claims: "a layer of twisted nematic liquid crystal" and "a first birefringent layer." The adopted construction must apply to both instances where "layer" is used, as "a claim term should be construed consistently with its appearance in other places in the same claim or in other claims of the same patent." *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1342 (Fed. Cir. 2001).

The parties agree that the '006 patent does not provide any special definition of "layer," and that the ordinary meaning of the term should apply. (CX-4241C at Q. 93; AIB at 99.) However, the parties dispute the proper meaning of the term "layer." It appears that the dispute focuses on Thomson's position that a "layer" can include sublayers and AUO's position that "layer" refers to the ***entire*** thickness, thereby excluding sublayers.

The parties do not dispute that a "layer" is "a thickness of material." AUO seeks to further limit the meaning to an "entire thickness" under the belief that the '006 patent only discloses a layer as an "entire thickness." (AIB at 100-101.) I find that there is no clear evidence in the claims, specification, or prosecution history that the inventors intended to limit the meaning of "layer" to an "entire thickness." (*See generally* JX-4; JX-9.) Limiting the meaning of "layer" based on the preferred embodiments of the specification, as AUO suggests, is improper. *Phillips*, 415 F.3d at 1323 ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments.")

Thomson states that "layer" means "one or more thicknesses." I find inclusion of the "one or more" language to be proper. The claims recite, for example, "a layer of twisted nematic liquid crystal" and "a first birefringent layer." Because of the general rule that "the words 'a' or 'an' in a patent claim carry the meaning of 'one or more,'" I find that inclusion of "one or more" is consistent with the meaning of the claim language "a layer." *TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1303 (Fed. Cir. 2008).

5. "birefringent layer"

The term "birefringent layer" appears in asserted claim 14.

Thomson's Position: Thomson contends that "birefringent layer" means "an optically anisotropic layer."

Thomson states that a layer is optically anisotropic if it has different optical properties in different directions. (Citing CX-4241C at Q. 220.) Thomson states that claim 14 makes clear that the birefringent layer has the property that it provides uniaxial negative birefringence. Thomson claims that because uniaxial materials have indices of refraction that are not the same for all directions, they are optically anisotropic. (*Id.*)

Thomson argues that AUO's proposed construction is incorrect. Thomson reiterates its dispute with AUO's construction of "layer." Thomson also takes issue with AUO's inclusion of the term "refracted rays." (Citing CX-4241C at Q. 222.) Thomson asserts that only if the birefringent layers in LCDs are thick can one observe two refracted rays. (*Id.*)

AUO's Position: AUO refers to its proposed construction of "layer," and then contends that "birefringent" describes "a material in which a single incident ray forms two refracted rays of light."

AUO claims that its proposed construction uses the plain meaning of "birefringent," as demonstrated by the definitions provided in technical references. (Citing RX-157C at Q. 222-229; RX-92; RX-99.) AUO asserts that Dr. Escuti admitted in his expert report that AUO's proposed construction of "birefringent" comports with the understanding of those of ordinary skill in the art. (Citing RX-501C at 39; Tr. at 381:16-24.)

AUO notes that Dr. Escuti now opines that in thin birefringent layers, light does not separate into two distinct rays. (Citing CX-4241C at Q. 222.) AUO argues that this position is incorrect, and is not supported by anything beyond Dr. Escuti's bare testimony. (Citing RX-

558C at Q. 199, 202.) AUO asserts that Dr. Escuti's change in position between his expert report and his trial testimony demonstrates that his trial testimony lacks credibility.

Construction to be applied: "one or more thicknesses of material in which a single incident ray forms two refracted rays of light"[13]

Claim 14 requires a "first birefringent layer" that "has the property that it provides uniaxial negative birefringence along an axis that is inclined with respect to a normal to the plane in which the first birefringent layer extends." The '006 patent does not provide any special definition of "birefringent," thereby indicating that the term shall be given its ordinary meaning to those of ordinary skill in the art. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998) ("Absent a special and particular definition created by the patent applicant, terms in a claim are to be given their ordinary and accustomed meaning.")

AUO offers the definition of "double refraction" from the Concise Science Dictionary. The definition recites, *inter alia*: "[t]he property, possessed by certain crystals (notably calcite), of forming two refracted rays from a single incident ray." (RX-92 at 210.) The definition makes clear that "[t]his phenomenon is also known as *birefringence* and the double-refracting crystal as a *birefringent crystal*." (*Id.*) (emphasis in original). The same definition is found in the Oxford Dictionary of Science, also offered by AUO. (RX-99 at 255.) I find that these technical dictionary definitions provide adequate support for a conclusion that the ordinary meaning of "birefringent layer" is "a thickness of material in which a single incident ray forms two refracted rays of light." *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 996 (Fed. Cir. 2006) ("Because there is no suggestion that the intrinsic evidence defines the term 'catalyst,' one may

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[13] I note that the adopted construction of "birefringent layer" incorporates the construction of "layer" discussed in Section III.C.3 *supra*.

look to technical dictionaries for assistance in determining that term's meaning to a person of ordinary skill in the art.")

Dr. Escuti opines that this definition is inadequate because "light in these thin birefringent layers does not in reality separate into distinct rays." (CX-4241C at Q. 222.) Dr. Escuti further states that "[o]nly if the birefringent layers in LCDs were thick (i.e., several mm or cm) could one observe the two rays referred to by Respondents and some textbooks, but the birefringent layers are thin." (*Id.*) Dr. Escuti's opinion is not supported by any evidence from outside technical sources. (*Id.*) Moreover, Dr. Escuti appears to state that because one may not be able to observe the two rays in a thin layer, those two rays do not exist. (*Id.*) I find this logic to be puzzling.

Dr. Escuti's opinion is further called into question by the fact that he agreed at his deposition that "birefringence occurs when a single incident ray forms two refracted rays of light." (Tr. at 372:6-14.) In his expert report, Dr. Escuti stated that he "generally agree[s] with Respondents' proposed definition of 'birefringent' as it comports with the understanding of those of skill in the art." (RX-501C at 39.) In view of his prior inconsistent positions, I find that Dr. Escuti's trial testimony on this issue lacks credibility.

6. "twisted nematic liquid crystal"

The term "twisted nematic liquid crystal" appears in asserted claims 4, 7, and 14.

Thomson's Position: Thomson contends that "twisted nematic liquid crystal" means "liquid crystal with a twist angle of approximately 90 degrees."

Thomson claims that the specification of the '006 patent provides support for Thomson's proposed construction. (Citing JX-4 at 2:48-53, 3:7-14.) Thomson notes that Dr. Yeh's book defines "twisted nematic liquid crystal" as having a twist of about 90 degrees. (Citing JX-19 at

THOM00077148.) Thomson states that an online glossary maintained by CMI defines "twisted nematic" as having a twist of 90 degrees. (Citing CX-45.) Finally, Thomson claims that CMI's and AUO's corporate witnesses both admitted that twisted nematic liquid crystal has a twist of about 90 degrees. (Citing JX-49C at 15:14-21; JX-59C at 11:7-11.)

Thomson claims that Respondents' proposed construction is overbroad, and would encompass super-twisted nematic ("STN") liquid crystal. (Citing CX-4241C at Q. 121.) Thomson states that STN liquid crystal is liquid crystal with a twist angle substantially greater than 90 degrees. (Citing CX-4241C at Q. 122.) Thomson asserts that the '006 patent does not cover STN liquid crystal. (Citing CX-4241C at Q. 123; JX-19 at THOM00077148.)

AUO's Position: AUO contends that "twisted nematic liquid crystal" means "a layer of liquid crystal material consisting of elongated molecules, where the axis of the molecules rotates from one side of the layer of material to the other."

AUO notes that the key dispute between the parties is whether or not the term is limited to a specific twist angle of 90 degrees. AUO argues that Thomson is seeking to read in the 90 degree limitation into the claims, and that the twist angle may range from 0 degrees to 180 degrees. (Citing RX-157C at Q. 160-161.) AUO asserts that it is generally recognized that regular twisted nematic and super twisted nematic liquid crystals are sub-sets within the general category of twist nematic liquid crystals. (Citing RX-157C at Q. 162-164, 166; RX-85 at Abstract; RX-87 at 67-70.)

AUO argues that the '006 patent uses the term "twisted nematic" consistent with its ordinary meaning. According to AUO, claim 1 recites "a layer of twisted nematic liquid crystal" and dependent claim 2 adds the limitation that the rotation of the light is a 90 degree rotation.

(Citing RX-558C at Q. 63; JX-4 at 6:49-51.) AUO asserts that if "twisted nematic" is limited to 90 degrees, claim 2 is superfluous.

Construction to be applied: "liquid crystal with a twist angle of approximately 90 degrees."

The parties' dispute centers on whether or not "twisted nematic liquid crystal" is limited to a twist angle of approximately 90 degrees. Under AUO's proposed construction, no such limitation would be present, allowing super twisted nematic liquid crystal to be covered by the asserted claims.

Each asserted claim requires "a layer of twisted nematic liquid crystal." The specification states:

> This electrical control field modifies the twisted molecular orientation as shown in the cylindrical zone 8. When there is no control field, the molecular orientation is symmetrical and capable of bringing about a 90° rotation in the rectilinear polarization of a light radiation that penetrates the liquid crystal layer through one of its main faces and emerges through its other main face.

(JX-4 at 2:46-53.) The specification also provides the characteristics of an example twisted nematic liquid crystal display device, indicating that the "helix angle" is 90 degrees. (*Id.* at 3:7-18.) While these passages from the specification do not expressly define or limit the meaning of "twisted nematic liquid crystal," they are both consistent with Thomson's assertion that a "twisted nematic liquid crystal" has a twist angle of approximately 90 degrees.

The parties also rely on extrinsic evidence to support their respective constructions. I find that the clearest and most credible piece of extrinsic evidence offered by the parties is Dr. Yeh's book, which includes the following passage:

> Most of the displays produced recently involve the use of either twisted nematic (TN) or supertwisted nematic (STN) liquid crystals. In TN liquid crystal, the director of the LC is twisted by an angle of about 90°, whereas in STN the LC director is twisted by an angle larger than 90° (e.g., 180°, 240°, or 270°).

(JX-35 at THOM00077803; *see also* JX-19 at THOM00077148.) Based on this evidence, it becomes clear that adoption of AUO's position results in "twisted nematic liquid crystal" encompassing supertwisted nematic liquid crystal. I find that such a result is improper.

AUO argues that adoption of Thomson's proposed construction would render claim 2 superfluous. I do not concur. Claim 2 requires that the polarizers of claim 1 have "crossed polarization directions respectively aligned with the rectilinear polarization of said light wave at said main faces." It therefore adds a limitation regarding the alignment of the polarizers that is absent from claim 1, and would not be rendered superfluous due to the adoption of Thomson's proposed construction.

Based on the foregoing, I find that "twisted nematic liquid crystal" means "liquid crystal with a twist angle of approximately 90 degrees."

7. "compensating means with negative birefringence"

The phrase "compensating means with negative birefringence" appears in asserted claims 4 and 7.

Thomson's Position: Thomson contends that "compensating means with negative birefringence" means "a material with a refractive index along one axis (n1) that is less than the refractive indices along the orthogonal axes (n2, n3), where n2 and n3 are substantially the same ($n1 < n2 \approx n3$), that compensates for the residual positive birefringence of the liquid crystal layer."

Thomson argues that "compensating means" is not a means-plus-function term. Thomson asserts that claim 1 is written in structural terms. According to Thomson, the structural language of claim 1 is sufficient to overcome the presumption that the "compensating means" is a means-plus-function term. Thomson asserts that a claim does not have to explicitly spell out every structural detail of a claimed component. Thomson notes that claim 1 requires that the compensating means provide compensation, so it must necessarily have a shape that will perform that function. (Citing CX-4241C at Q. 158.)

Thomson claims that even if the term is a means-plus-function term, AUO's identification of corresponding structure is too limited. (Citing CX-4241C at Q. 160.) In addition, Thomson asserts that the function stated by AUO is not completely correct because the compensation of the '006 patent is for residual birefringence, a point that is left out of AUO's stated function. (Citing CX-4305C at Q. 109.)

AUO's Position: AUO contends that "compensating means with negative birefringence" is a means-plus-function claim term governed by 35 U.S.C. § 112, ¶ 6. AUO contends that structure corresponding to the compensating function is: (1) the single negative birefringent layer described in Figure 5; and (2) the two juxtaposed positive layers described in Figures 6 and 7.

AUO argues that "compensating means" does not describe structure sufficient to perform the recited function – namely, compensating using negative birefringence. (Citing RX-157C at Q. 178; RX-558C at Q. 145-148; JX-4.) AUO asserts that Thomson has failed to overcome the presumption that "compensating means" is a means-plus-function term.

With regard to the function, AUO notes that the parties agree, at a minimum, that the compensating means performs the function of "compensating for birefringence of the twisted nematic crystal layer by using negative birefringence." (Citing CX-4305C at Q. 109.) AUO states that Dr. Escuti asserts that the compensation is specifically for the "positive residual birefringence of the twisted nematic liquid crystal layer." (*Id.*) AUO argues that this limitation is found nowhere in the claims or the specification, and that Thomson includes it in an attempt to avoid prior art.

With regard to the structure, AUO identifies (1) the single negative birefringent layer described in Figure 5; and (2) the two juxtaposed positive layers described in Figures 6 and 7. (Citing RX-157C at Q. 182-183; JX-4 at 3:47-52, 4:21-65, 5:28-6:5, Figs. 5-7.) AUO notes that Thomson claims that AUO's description of the structure depicted in Figure 5 is unduly restrictive. (Citing CX-4241C at Q. 160; CX-4305C at Q. 108.) AUO argues that Thomson is incorrect because the '006 patent expressly states that "[t]he compensation illustrated in FIG. 5 uses only one element 11 with negative birefringence." (Citing JX-4 at 4:18-19.) Regarding the second disclosed structure, AUO notes that Thomson suggests that the two layers need not be positive. (Citing CX-4241C at Q. 212.) AUO argues that the specification expressly states that Figures 6 and 7 implement positive uniaxial birefringent media. (Citing JX-4 at 4:64-65.) AUO further asserts that the specification makes clear that the term "juxtaposed" means "side by side" or "adjacent." (Citing JX-4 at 4:21-23; RX-473; RX-474.)

Construction to be applied: I find that "compensating means" is a means-plus-function term. The claimed function is "compensating for birefringence of the twisted nematic crystal layer by using negative birefringence." The corresponding structure is (1) the single compensating element shown in Figure 5; or (2) the two juxtaposed compensating elements shown in Figures 6 and 7.

Claim 1 requires "uniaxial compensating means with negative birefringence." The parties dispute whether or not "compensating means" is a means-plus-function element subject to 35 U.S.C. § 112, ¶ 6.

"[A] patentee's use of the word 'means' in a claim limitation creates a presumption that 35 U.S.C. § 112 paragraph 6 applies." *Welker Bearing Co. v. PHD, Inc.*, 550 F.3d 1090, 1096 (Fed. Cir. 2008). The Federal Circuit has explained how a party may overcome that presumption:

> If, in addition to the word "means" and the functional language, the claim recites sufficient structure for performing the described functions in their entirety, the presumption of § 112 ¶ 6 is overcome – the limitation is not a means-plus-function limitation...Sufficient structure exists when the claim language specifies the exact structure that performs the functions in question without need to resort to other portions of the specification or extrinsic evidence for an adequate understanding of the structure.

TriMed, Inc. v. Stryker Corp., 514 F.3d 1256, 1259-1260 (Fed. Cir. 2008).

The parties dispute whether or not claim 1 recites sufficient structure for the "compensating means." To understand whether or not sufficient structure is recited, it is first helpful to understand the function performed by the "compensating means." I find that the function associated with the "compensating means" is "compensating for birefringence of the twisted nematic crystal layer by using negative birefringence." This is apparent from the plain language of claim 1.

Claims 1 recites, *inter alia*, "uniaxial compensating means with negative birefringence being associated with said layer within the optical cavity formed by said polarizers, wherein the optical axis of said uniaxial compensating means with negative birefringence have an inclination with respect to the normal (Z) to the main faces of said layer." I do not find that this language from claim 1 "specifies the exact structure that performs the function[] in question without need to resort to other portions of the specification or extrinsic evidence for an adequate understanding of the structure." *TriMed*, 514 F.3d at 1260. I do not see how any language of claim 1 – particularly the terms "uniaxial," "negative birefringence," or the inclination language – reveals sufficient structure for the "compensating means." Dr. Escuti admitted as much during cross examination. (Tr. at 379:8-381:5.) Even if Thomson is correct in asserting that the language of claim 1 reveals some structure associated with the compensating means, "[t]he recitation of some structure in a means plus function element does not preclude the applicability of section 112(6)." *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, (Fed. Cir. 1991).

Now that it has been determined that "compensating means" is a means-plus-function claim, with the function of "compensating for birefringence of the twisted nematic crystal layer by using negative birefringence," the corresponding structure must be identified. I find that the corresponding structure is (1) the single compensating element shown in Figure 5; or (2) the two juxtaposed compensating elements shown in Figures 6 and 7. (*See* JX-4 at 3:47-4:57.)

In sum, I find that "compensating means" is a means-plus-function term. The claimed function is "compensating for birefringence of the twisted nematic crystal layer by using negative birefringence." The corresponding structure is (1) the single compensating element shown in Figure 5; or (2) the two juxtaposed compensating elements shown in Figures 6 and 7.

D. The '556 Patent

1. Level of Ordinary Skill in the Art

Thomson asserts that a person of ordinary skill in the art would have had a BS degree in electrical engineering or a BS or BA degree in a related scientific field and at least three years of experience in the development of hardware relating to liquid crystal devices. (CX-4244C at Q. 66.) Alternatively, Thomson believes that a person of ordinary skill in the art could have an MS in electrical engineering, or a similar field, and at least one year of experience in the development of hardware relating to liquid crystal devices. (*Id.*) CMI asserts that a person of ordinary skill in the art would have had a BS degree in physics, electrical engineering, or materials science and two or more years of experience in the field of semiconductor or liquid crystal display development involving TFTs,[14] or the equivalent combined education and work experience. (RX-159C at Q. 67.)

I find that one of ordinary skill in the art would have a BS degree in physics, electrical engineering, or materials science, and two or more years of experience in the field of semiconductor or liquid crystal display development involving TFTs. (RX-159C at Q. 67.) The primary difference between the parties' positions is that CMI requires experience in the field of semiconductor or liquid crystal display development involving TFTs, while Thomson only requires experience in the broader category of liquid crystal devices. Because the '556 patent is directed to TFTs, I find that experience involving TFTs is necessary for a complete understanding of the technology described in the '556 patent. (*Id.*; JX-3 at 1:10-63.)

2. "etch stopper"

The term "etch stopper" appears in asserted claim 3.

Thomson's Position: Thomson contends that an "etch stopper" is "a region or material that slows down or stops etching."

Thomson states that etch stoppers are commonly used in the manufacture of devices to slow down or stop etching at particular locations for a variety of purposes, including but not limited to, preventing damage to underlying features. (Citing CX-4244C at Q. 122-123; CX-2233; CX-2234; CX-2236; CX-2238.) Thomson notes that Dr. Howard agreed that the inventors of the '556 patent used the amorphous silicon channel layer of a TFT as an etch stop to protect the gate insulating layer in a contemporaneously filed patent. (Citing Tr. at 1166:24-1173:2.) Thomson asserts that the etch stopper is not an inventive aspect of the '556 patent, as etch

[14] A "TFT" is a thin film transistor. (*See* JX-3 at 1:18.)

stoppers were known and used in TFT manufacture to slow down or stop the n+ etch for years before the filing of the '556 patent. (Citing Tr. at 543:5-554:9

Thomson states that the parties agree on a number of issues with regard to the meaning of "etch stopper." Specifically, Thomson believes that the parties agree that: (1) "etch stopper" is not defined in the intrinsic evidence; (2) the etch stopper is used to protect the channel from being etched during the n+ amorphous silicon etch that complete formation of the source and drain electrodes in the third mask step; (3) the channel must be protected from the etch process in either the by-layer or tri-layer type TFT; (4) the channel is a thin layer formed at the interface of the a-Si and the gate insulating layer when the TFT is in the on state; (5) the channel does not make up the entire a-Si layer; (6) the '556 patent includes no material requirement for the etch stopper; and (7) there is no claim requirement that the etch stopper be formed over the a-Si layer.

Thomson claims that the intrinsic evidence supports its proposed construction. Thomson states that U.S. Patent No. 5,496,752, which is cited on the face of the '556 patent, describes the use of thick dielectrics as etch stoppers in tri-layer TFTs and also reports that the a-Si layer must be thick in bi-layer TFTs to protect the channel. (Citing RX-47 at 1:66-2:2.)

Thomson argues that Respondents' construction seeks to improperly import limitations from the specification. Thomson states that claim 1 requires only that the etch stopper be formed over a corresponding gate electrode. (Citing JX-3 at 5:25-33.) Thomson asserts that the limitations added by Respondents are not found in the claims and contradict the ordinary meaning of "etch stopper." (Citing JX-37.) Thomson notes that the specification describes the embodiments as "illustrative, not limiting." (Citing JX-3 at 3:24-36, 5:25-33.)

CMI's Position: CMI contends that an "etch stopper" is "a discrete structure resistant to an etchant, interposed between two layers of materials reactive to that etchant, to protect the underlying layer from being etched."

CMI asserts that the name "etch stopper" indicates that an etch stopper is intended to protect an underlying layer from being etched away by an etchant that is being used above the etch stopper. (Citing RX-635C at Q. 84.) CMI states that etch stopper type TFTs stand in stark contrast to back channel etch ("BCE") type TFTs, which have no etch stopper. (Citing RX-159C at Q. 56-57.) CMI argues that Thomson's proposed construction is entirely driven by its desire to expand the scope of the '556 patent to cover BCE type TFTs.

CMI claims that its construction is supported by the intrinsic record, as every description of an etch stopper in the '556 patent is consistent with CMI's proposed construction. (Citing Tr. at 441:13-19.) CMI states that the '556 patent describes one and only one type of etch stopper: a layer of material that is separate and discrete from every other layer of material in the TFT, and that is used to protect the underlying channel layer from being etched. (Citing Tr. at 441:13-19; RX-635C at Q. 34; RX-159C at Q. 111.)

CMI asserts that Figures 2 and 3 illustrate the etch stopper type TFT, with the etch stopper shown as a discrete structure interposed between two layers of materials, undoped and doped amorphous silicon, and protecting the underlying channel layer. (Citing RDX-308a; Tr. at 438:16-441:25.) CMI points to Dr. Parsons' testimony that the '556 patent nowhere describes an etch stopper as anything other than a structure discrete from the other layers of material that form that TFT. (Citing Tr. at 441:13-19.) CMI claims that Thomson's proposed construction is inconsistent with the specification, as the '556 patent recognizes that a material that merely slows down an etch is not an etch stopper at all. 9Citing JX-3 at 4:42-61; Tr. at 451:10-452:4;

RX-159C at Q. 147; RX-635C at Q. 104.) Thomson argues that it would be improper to adopt a construction that is inconsistent with the intrinsic evidence.

CMI claims that the prior art patents cited on the face of the '556 patent further support CMI's proposed construction. CMI states that U.S. Patent No. 5,478,766 discloses an etch stopper that is a discrete structure deposited on top of the amorphous silicon channel to protect the channel. (Citing RX-159C at Q. 115.) CMI states that U.S. Patent No. 5,496,752 distinguishes between etch stopper TFTs and BCE TFTs, and is consistent with CMI's construction. (Citing RX-159C at Q. 114.)

CMI argues that its construction is consistent with how those of ordinary skill in the art understood the term "etch stopper." CMI claims that this can be seen in numerous contemporaneous technical references. (Citing RX-68; RX-57; RX-58; RX-63.) CMI asserts that the extrinsic evidence relied on by Dr. Parsons is unreliable and irrelevant. (Citing RX-555C at Q. 65, 70-73, 74-75; RX-635C at Q. 116-117.)

CMI argues that the inventors, in their publications and testimony, also support CMI's position with regard to "etch stopper." CMI notes that in three other patents, one or more of the inventors explicitly identify the etch stopper in a TFT in the exact same way that they did in the '556 patent. (Citing RX-132; RX-147; RX-156; RX-159C at Q. 116-122.) CMI claims that one of the inventors, Dr. Yao, testified that there is an etch stopper type TFT and a BCE type TFT, and that he and others at Xerox chose to focus on etch stopper type TFTs instead of BCE type TFTs. (Citing JX-53C at 33:12-24, 31:25-32:11, 38:11-39:2.) CMI claims that Mr. Fulks, one of the inventors, also testified in a way that is consistent with CMI's proposed construction. (Citing JX-55C at 67:23-68:12.)[15]

Construction to be applied: "a structure that protects an underlying layer from being etched"

Asserted claim 3 indirectly depends from claim 1. Claim 1 recites "[a] method for manufacturing an active matrix liquid crystal device using five masks." The method includes the step of "forming a plurality of etch stoppers over the plurality of gate electrodes using a second mask, each etch stopper being formed over one gate electrode." The parties dispute the construction of "etch stopper."

Figure 2 of the '556 patent shows the cross section of a TFT. (JX-3 at 2:43-44.) In describing the figure, the specification states that "[a]n etch stopper 60 is formed above the gate electrode 44 over the a-Si layer 58." (*Id.* at 2:53-54.) Figure 2 shows the following:

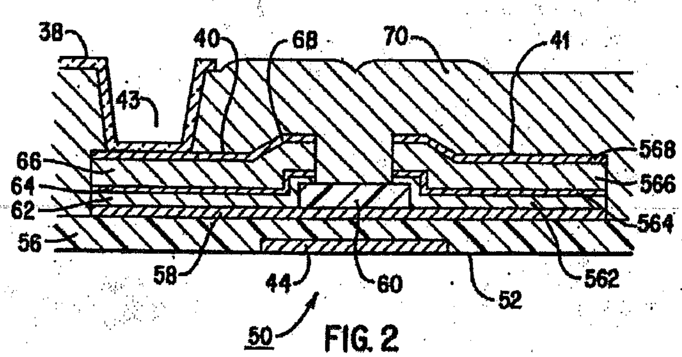

FIG. 2

(JX-3 at Fig. 2.)

In describing Figure 3B, the specification states: "[a]n etch stopper layer is formed over the a-Si layer 58. The etch stopper layer is formed at a temperature range of about 200°-250°C. to

[15] In its reply brief, AUO argues against adoption of Thomson's proposed construction of "etch stopper." (ARB at 60-64.)

a thickness of between about 10001-500 Å. A second mask is used to pattern the etch stopper layer to form the etch stopper 60." (JX-3 at 3:31-35.) Figure 3B shows the following:

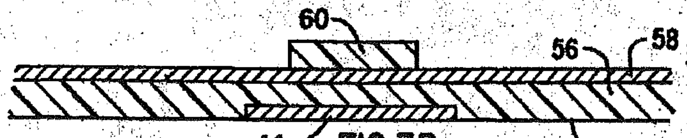

FIG. 3B

(JX-3 at Fig. 3B.) Figure 3E shows a completed TFT, with the etch stopper still intact:

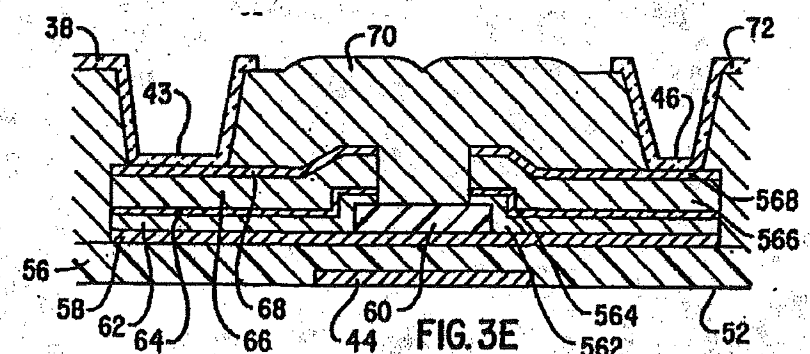

FIG. 3E

(JX-3 at 4:9-14, Fig. 3E.)

Based on the claims, specification, and drawings, I find that an "etch stopper" is "a structure that protects an underlying layer from being etched." This construction is also consistent with U.S. Patent No. 5,478,766 ("the '766 patent"), which is cited on the face of the '556 patent. *Phillips*, 415 F.3d at 1317 ("The prosecution history, which we have designated as part of the 'intrinsic evidence,' consists of the complete record of the proceedings before the PTO and includes the prior art cited during the examination of the patent.") The '766 patent depicts an etch stopper as a structure that protects an underlying layer from being etched. (RX-48 at 6:64-67, Figs. 7C, 7D, 7E, 7F.)

Thomson seeks to construe "etch stopper" to mean "a region or material that slows down or stops etching." I find no support for the inclusion of the "slows down" language. Thomson has cited to no evidence in the intrinsic record that an etch stopper is a structure that slows down etching. Dr. Parsons acknowledged that the '556 patent makes no reference to an etch stopper slowing down etching. (Tr. at 450:22-452:17.) Thomson only cites to one piece of intrinsic evidence to support its construction – a prior art patent cited on the face of the '556 patent. The cited portions of the prior art patent relied upon by Thomson fail to mention an etch stopper, and Thomson fails to adequately explain how this prior art patent provides support for the finding that an etch stopper may slow down etching. (CIB at 105; RX-47 at 1:66-2:2, 3:41-47.) Thomson's remaining evidence comes from extrinsic sources with no connection the '556 patent. (*See* CX-4244C at Q. 122-123, 125-129, 131-135.) I do not find such evidence to be persuasive.

In addition, Thomson's expert Dr. Parsons offers the following opinion:

> [T]he term "etch stopper" is used in the field to include etch stop layers that serve to protect the etch stop layer itself, and therefore are not necessarily discrete structures, interposed between two layers, to protect the underlying layer from being etched. These etch stop layers stop itself from etched and the etch stop layer remains to be an operative layer in the resulting structure.

(CX-4244C at Q. 133.)

Neither Thomson nor its expert offer any intrinsic evidence to support the assertion that an "etch stopper" may serve to protect itself. (*See id.* at Q. 122-123, 125-129, 131-135.) The claims identify the etch stopper as a discrete element with no additional stated functionality. Likewise, the '556 patent figures depict the etch stopper as a structure with no purpose other than serving as an etch stopper.

While it is true that limitations from the specification should not be read into the claims, I find that this is not an instance where I am importing limitations into the claims. Here, there is no intrinsic evidence to support a finding that the etch stopper may serve to protect the etch stop layer itself. Absent any intrinsic evidence that would demonstrate that such an embodiment should be covered by the claims, I decline to define "etch stopper" in the manner articulated by Thomson. In sum, I find that the only interpretation supported by the intrinsic evidence is that an "etch stopper" is a structure that protects an underlying layer from being etched.

CMI's proposed construction also seeks to define characteristics regarding the layers above and below the etch stopper. Claim 1 already defines the required layers above and below the etch stopper, and proper construction of this term does not require further details regarding the surrounding layers.

3. "drain electrode" & "source electrode"

The terms "drain electrode" and "source electrode" appear in asserted claim 3.

Thomson's Position: Thomson contends that "drain electrode" and "source electrode" mean "an electrode of a transistor through which current can flow when a voltage is applied to the gate electrode."

Thomson asserts that its construction is consistent with the intrinsic evidence and the understanding of one of ordinary skill in the art. (Citing JX-3 at 3:3-14; CX-4244C at Q. 139; CX-2252.) Thomson argues that Respondents' construction seeks to import limitation from an embodiment disclosed in the specification. Thomson argues that nothing in the claims limit the "drain electrode" and "source electrode" to a particular material composition. (Citing JX-3 at 5:42-50.) Thomson claims that Respondents' own prior art demonstrates that source and drain electrodes for TFTs are not limited to a particular material composition. (Citing RX-46 at 8:59-9:5, Figs. 7-8.)

CMI's Position: CMI contends that "drain electrode" means "a layer of doped silicon and a layer of metal forming the drain element of a transistor" and "source electrode" means "a layer of doped silicon and a layer of metal forming the source element of a transistor."

CMI claims that its proposed constructions are consistent with the specification, which repeatedly defines the source and drain electrodes as a layer of n+ doped silicon and metal. (Citing JX-3 at 2:55-64, 3:38-55.) CMI points to Figures 2 and 3C as consistent with its proposed constructions. (Citing RX-635C at Q. 127; RDX-1424; JX-3 at 2:66-3:2.) CMI claims that Dr. Parsons agreed that the '556 patent defines the source and drain electrodes as including the n+ silicon layer. (Citing Tr. at 518:11-16.)

CMI states that its construction is consistent with the claims of the '556 patent which recite forming the drain and source electrodes using one mask, because in the manufacture of an etch stopper type TFT, the doped silicon and metal that form the drain and source electrodes are typically deposited and etched using a single mask. (Citing JX-3 at 5:43-44.) According to CMI, one of ordinary skill in the art would recognize that the presence of the n+ silicon serves a particular purpose and function, as the n+ silicon reduces the contact resistance of the metals and increases the amount of current that can flow when the transistor is "on." (Citing RX-635C at Q. 127.)

CMI points to extrinsic evidence to support its constructions. CMI states that a continuation-in-part from the application that led to the '556 patent again defines the source and drain electrodes as the doped silicon and metal layers. (Citing RX-156 at 3:43-45.) CMI claims that one of the co-inventors of the '556 patent testified that the '556 patent defines the source and drain electrodes as n+ and metal. (Citing JX-53C at 149:25-150:12.)

CMI notes that Thomson argues that CMI's construction limits the claims to the preferred embodiment. CMI argues that Thomson is incorrect because the preferred embodiment discloses the specific metals that could be used in the metal layer. (Citing JX-3 at 2:55-64.) CMI claims that the '556 patent makes clear that the source and drain electrodes comprise doped silicon plus metal, but that the materials for the metal layer can be specifically chosen depending on the embodiment. (Citing JX-3 at 2:55-64, 3:38-55.)

CMI argues that Thomson's construction consists of functional language, and fails to explain the structure of the drain and source electrodes. CMI claims that even if a functional description was appropriate, Thomson's construction is not accurate. (Citing RX-635C at Q. 130-131.)

CMI notes that Dr. Parsons relies on an extrinsic patent to opine that the source and drain electrodes do not have not be limited to metal and n+ silicon. (Citing CX-4244C at Q. 144.) CMI claims that the prior art patent describes a different type of TFT than what is found in the '556 patent. (Citing RX-555C at Q. 88.) Moreover, CMI claims that the prior art patent actually supports CMI's position, and not Thomson's position. (*Id.*)[16]

Construction to be applied: "an electrode of a transistor through which current can flow when a voltage greater than the threshold voltage of the transistor is applied to the gate electrode."

Claim 1 of the '556 patent requires the following step:

> forming a plurality of ***drain electrodes*** and a plurality of ***source electrodes*** using a third mask, a portion of each of the drain electrodes being formed over a first portion of a corresponding one of the etch stoppers and a portion of each of the source electrodes being formed over a second portion of the corresponding one of the etch stoppers, wherein the source and the drain electrodes are separated over the corresponding one of the etch stoppers;

(emphasis added).

The specification describes the composition of the source and drain electrodes:

> The drain electrode of the TFT 50 comprises an n+ doped silicon layer 62 and a metal layer formed over the a-Si layer 58 and partially over the etch stopper 60.

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[16] In its reply brief, AUO argues that Thomson incorrectly construes "source electrode" and "drain electrode" based on their function, and not their structure. (ARB at 64-65.)

> For this embodiment the metal layer comprises a titaniumtungsten (TiW) barrier layer 64, an aluminum layer 66 and another TiW layer 68. The metal layers 64, 66 and 68 form a metal contact for the drain electrode 40. The source electrode 41 of the TFT 50 is formed similarly to the drain electrode 40 but is separated from the drain electrode 40 above the etch stopper 60.

(JX-3 at 2:55-64.)

> In FIG. 3C, the drain electrode 40 and the source electrode 41 are formed. The drain and source electrodes 40 and 41, respectively, includes the n+ silicon layers 62 and 562 formed over the a-Si layer 58 and the etch stopper 60. The n+ silicon contains about 0.5-2% phosphorous and about 5-15% hydrogen and is deposited at between about 200°-250°C. to a thickness of about 1000 Å. Metal layers are formed over the n+ silicon layers 62 and 562. The metal layer may be metals such as molybdenum-chromium, titanium, tantalum, a multilayered structure of alternating layers of aluminum and titanium-tungsten or aluminum with a dual dielectric capping layer. For this embodiment, the metal layers are a multilayered structure each having a first TiW layer 64 and 564 of about 500 Å as barrier metal, an aluminum layer 66 and 566 of between about 3000-4000 Å and another TiW layer 68 and 568 of between about 500-1000 Å thick. The metal layers and the n+ silicon layers 62 and 562 are patterned by a third mask and etched to form the drain electrode 40 and the source electrode 41.

(*Id.* at 3:36-54.)

Both of these passages from the specification describe the source and drain electrode as comprising a metal layer formed over an n+ silicon layer. Based on these disclosures, CMI seeks to limit the source and drain electrodes to "a layer of doped silicon and a layer of metal..." CMI argues that the above-quoted passages define the structure of the source and drain electrodes. (CMIB at 34-36.)

I do not concur that these passages limit the source and drain electrodes to structures made of a layer of doped silicon and a layer of metal. For a patentee to serve as his own lexicographer and define a term in the specification, the definition must be clear. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) ("[T]he claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and ***clearly*** set forth a definition of the disputed claim term in either the specification or prosecution history.")

(emphasis added). The above-quoted passages merely describe the composition of the source and drain electrodes in the preferred embodiment. There is no language in the passages making it clear that the patentee intended to limit the source and drain electrodes of the patent claims to the structures described in the specification. Contrary to CMI's position, I do not find that these passages evidence a clear definition of the terms "source electrode" and "drain electrode."

Thomson's proposed construction addresses the functionality of the electrodes. This functionality is described in the specification:

> A display data signal from an external source (not shown) is input to the TFT 50 through the source electrode 41. The pixel electrode 38 does not receive the display data signal unless the TFT 50 is ON. ***When an appropriate electrical potential is applied to the gate 44, the TFT 50 turns ON. When the TFT is ON, the a-Si layer 58 above the gate 44 becomes conductive and connects the source electrode 41 with the drain electrode 40.*** Thus, when the TFT 50 is ON, the display data signal is connected to the pixel electrode 38. The pixel electrode 38, in conjunction with the common electrode (not shown), switches the LCD pixel element ON and OFF based on the content of the display data signal.

(JX-3 at 3:3-14) (emphasis added). Thus, the specification explains that when an appropriate voltage is applied to the gate electrode, the TFT turns on and electrically connects the source electrode and the gate electrode. Thomson's proposed construction attempts to describe that functionality.

CMI argues that Thomson's proposed construction is inaccurate because "[t]he voltage applied to the gate must be greater than the threshold voltage of the transistor in order to turn the TFT 'on.' Merely applying any amount of voltage to the gate electrode will not result in current flow, which Complainants' proposed construction fails to account for." (RX-635C at Q. 131.) I find that CMI's criticism is addressed by making clear that the voltage applied to the gate electrode must be greater than the threshold voltage of the transistor.

CMI and AUO argue that the source and drain electrodes should be defined by their structure, and not by their functionality. CMI and AUO cite no case law supporting the contention that the source and drain electrodes must be construed based on their composition rather than their functionality. The case law cited by AUO merely stands for the proposition that the context of how claim terms appear in the claim should be considered when construing the claims. *See, e.g., Hockerson-Halberstadt, Inc. v. Converse Inc.*, 183 F.3d 1369, 1374 (Fed. Cir. 1999) ("Proper claim construction...demands interpretation of the entire claim in context, not a single element in isolation.") The adopted construction does not run afoul of this claim construction principle.

I find that the "source electrode" and "drain electrode" may be construed based on what they do, rather than their composition. While claim 1 of the '556 patent is concerned with a process for, *inter alia*, "forming a plurality of drain electrodes and a plurality of source electrodes," restricting the composition of the electrodes based on the description of the preferred embodiment would result in importing limitations from the specification into the claims. To preclude doing so, I find that the appropriate approach is to construe the terms based on their functionality within the TFT, which finds support within the specification. (JX-3 at 3:3-14.)

4. "a portion of"

The phrase "a portion of" appears in asserted claim 3.

Thomson's Position: Thomson contends that the proper construction of these terms is "the drain electrodes are formed over a first region of the etch stopper and the source electrodes are formed over a second region of the etch stopper."

Thomson argues that Respondents' proposed construction is too limiting because it takes the word "portion" out of context of the claim where it is modified by "a." (Citing CX-4244C at

Q. 150.) Thomson claims that one of ordinary skill in the art would not separate the two words, but would rather interpret them together. (*Id.*) Thomson argues that its construction is correct because the common meaning of the term "a" in the patent lexicon is "one or more," or "at least one." Thus, Thomson asserts that "a portion" means "one or more portions" or "at least a portion."

CMI's Position: CMI contends that "a portion of" means "a part less than the whole."

CMI states that the parties dispute is whether "a portion of" means "a part less than the whole," or whether it can mean "all of," as Thomson argues. CMI claims that its proposed construction is consistent with the disclosure of the '556 patent, which discloses that a small portion of the drain and source electrodes over the etch stoppers. (Citing JX-3 at 2:55-57, 3:64-67, Fig. 2.)

CMI claims that its proposed construction is consistent with the understanding of one of ordinary skill in the art, as evidenced by the testimony of the experts on both sides. (Citing RX-635C at Q. 173; Tr. at 517:19-518:10, 518:25-519:20.) CMI notes that the ordinary meaning of "portion" is "a section or quantity within a larger thing; a part of the whole." (Citing RX-64.)

CMI claims that Dr. Parsons' opinion regarding the meaning of "a portion" was crafted by Thomson's lawyers to support Thomson's infringement case. (Citing Tr. at 579:22-580:11.) CMI argues that Thomson's construction removes "a portion of" from the claim language, going against the established precedent that each word in the claim is presumed to have meaning.[17]

Construction to be applied: "a portion of" means "a part less than the whole."

Claim 1 requires, *inter alia*, "a portion of each of the drain electrodes being formed over a first portion of a corresponding one of the etch stoppers and a portion of each of the source

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[17] In its reply brief, AUO argues that Thomson is incorrect to construe "a portion" to mean "at least a portion." (ARB at 65-66.)

electrodes being formed over a second portion of the corresponding one of the etch stoppers." The parties dispute the meaning of "a portion of," with Thomson arguing that the phrase means "at least a portion of," and CMI arguing that the phrase means "a part less than the whole."

In describing the preferred embodiments, the specification states:

> The drain electrode of the TFT 50 comprises an n+ doped silicon layer 62 and a metal layer formed over the a-Si layer 58 and partially over the etch stopper 60...The source electrode 41 of the TFT 50 is formed similarly to the drain electrode 40 but is separated from the drain electrode 40 above the etch stopper 60.

(JX-3 at 2:55-64.) The specification further states:

> The combination of these etching steps forms the drain and source electrodes 40 and 41, respectively. The metal layers and the n+ silicon layers 62 and 562 above the etch stopper 60 are etched leaving a small portion of the drain and source electrodes 40 and 41, respectively over the edge of the etch stopper 60.

(*Id.* at 3:62-67.)

The Federal Circuit "has repeatedly emphasized that an indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.'" *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). The court has recently clarified that there is no "hard and fast rule that 'a' always means one or more than one." *Harari v. Lee*, --- F.3d ----, 2011 WL 3849622, at *10 (Fed. Cir. Sept. 1, 2011). The limitation at issue must be read "in light of the claim and specification to discern its meaning. When the claim language and specification indicate that 'a' means one and only one, it is appropriate to construe it as such even in the context of an open-ended 'comprising' claim." *Id.* (citation omitted); *see also TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1303 (Fed. Cir. 2008) ("[T]he question whether 'a' or 'an' is treated as singular or plural depends heavily on the context of its use.")

I find that "a portion of" in claim 1 means a single portion, and does not allow for the source or drain electrode to be fully formed over the etch stopper. The specification only depicts the source and drain electrodes as partially formed over the etch stopper. (JX-3 at 2:55-64, 3:62-67.) The '766 patent, which is cited on the face of the '556 patent, also shows the source and drain electrodes only partially formed over the etch stopper. (RX-48 at 6:62-67, 7:30-34, Fig. 7F.) Thomson can point to nothing in the intrinsic record that describes the source and drain electrode as formed fully over the etch stopper. Thus, I find that the intrinsic evidence indicates that the "a" in "a portion of" should be treated as singular.

In addition, the extrinsic evidence supports the adopted construction. For the TFT to properly function, the source electrode and drain electrode must be in contact with the channel. (CX-4244C at Q. 26; RX-159C at Q. 38.) If the source and drain electrode were fully formed over the etch stopper, then there would be no contact between the channel and the source and drain electrode, meaning that the TFT would not function. (RX-159C at Q. 176.) Thus, construing "a portion" to mean "a part less than the whole" is the only way to ensure that the TFT is a fully functioning device. Finally, the plain and ordinary meaning of the term "portion" supports the adopted construction. (RX-64.)

Based on the foregoing, I find that "a portion of" means "a part less than the whole."

E. The '674 Patent

1. Level of Ordinary Skill in the Art

Thomson asserts that a person of ordinary skill in the art would have had a BS degree in electrical engineering or a BS or BA degree in a related scientific field and at least three years of experience in the development of hardware relating to liquid crystal devices. (CX-4244C at Q. 66.) Alternatively, Thomson believes that a person of ordinary skill in the art could have an MS in electrical engineering, or a similar field, and at least one year of experience in the development of hardware relating to liquid crystal devices. (*Id.*)

CMI asserts that a person of ordinary skill in the art would have had a BS degree in electrical engineering and at least 2 to 3 years of work experience in active matrix liquid crystal devices including TFT design, sensors, and display devices. (RX-393C at Q. 30.)

The parties' positions are similar with regard to level of ordinary skill in the art. Based on the foregoing, I find that a person of ordinary skill in the art has a BS degree in electrical engineering and at least three years of experience in hardware relating to liquid crystal devices. (CX-4244C at Q. 65-68; RX-393C at Q. 30-31.) I find that the chosen field of experience – "hardware relating to liquid crystal devices" – most accurately reflects the field of technology of the '674 patent. (JX-2.) CMI's proposed field of experience – "active matrix liquid crystal devices including TFT design, sensors, and display devices" – is overly narrow in comparison to the invention disclosed in the '674 patent.

2. "highly conductive metal"

The term "highly conductive metal" appears in each of the asserted claims.

Thomson's Position: Thomson contends that "highly conductive metal" means "a metal that is sufficiently conductive that signals can traverse the layer, line, or component within the switching period of related switching elements and without significant delay due to capacitance."

Thomson relies on the '674 patent specification to support this construction. (Citing JX-2 at 6:57-60.) Thomson notes that the dispute with regard to "highly conductive metal" is whether or not to include the examples provided in the specification as part of the definition. (Citing JX-2 at 6:61-64.) Thomson argues that such examples are not definitions, and should not be included. (Citing CX-4244C at Q. 175-178; CX-4307C at Q. 28-29.)

CMI's Position: CMI contends that "highly conductive metal" means "metal that is sufficiently conductive that signals can traverse the layer, line, or component within the switching period of related switching elements and without significant delay due to capacitance; aluminum, certain alloys of aluminum, and certain other metals are highly conductive metals in nearly all contexts, while less conductive metals may be highly conductive at lower switching speeds."

CMI asserts that the '674 specification clearly defines the term "highly conductive metal." (Citing JX-2 at 4:12-14, 6:55-64.) CMI notes that "highly conductive metal" as defined by the inventors is a relative term, meaning that what constitutes a "highly conductive metal" depends on the particular application. (Citing RX-393C at Q. 58; JX-2 at 6:55-64.)

CMI states that claims 1 and 16 recite that the second patterned conductive layer comprises "highly conductive metals other than indium tin oxide." (Citing JX-2 at 14:51-59.) CMI claims that this language demonstrates that indium tin oxide ("ITO") is a highly conductive metal in the context of the '674 patent, even though ITO is much less conductive than other metals such as aluminum and titanium. (Citing RX-393C at Q. 130.) CMI asserts that the claim language regarding ITO was added during prosecution to overcome a rejection and further supports the conclusion that ITO is a highly conductive metal in the context of the '674 patent. (Citing JX-7 at 159.)

CMI argues that Thomson's construction improperly cuts the definition in half and excludes the inventors' additional, explanatory language. CMI claims that the inventors clearly intended for the definition of "highly conductive metal" to include the recited examples, and Thomson has offered no reason why those examples should be excluded.

Construction to be applied: "a metal that is sufficiently conductive that signals can traverse the layer, line, or component within the switching period of related switching elements and without significant delay due to capacitance; aluminum, certain alloys of aluminum, and certain other metals are highly conductive metals in nearly all contexts, while less conductive metals may be highly conductive at lower switching speeds."

The '674 patent specification includes a section that expressly defines certain terms used in the patent. The section begins with this explanation: "[t]he following conceptual framework is helpful in understanding the broad scope of the invention, and the terms defined below have the indicated meanings throughout this application, including the claims." (JX-2 at 4:11-14.) The specification then defines "highly conductive metal" in the following way:

> A conductive layer, a conductive line, or another component includes a "highly conductive metal" when the layer, line, or component includes a metal that is sufficiently conductive that signals can traverse the layer, line, or component within the switching period of related switching elements and without significant delay due to capacitance. Aluminum, certain alloys of aluminum, and certain other metals are highly conductive metals in nearly all contexts, while less conductive metals may be highly conductive at lower switching speeds.

(JX-2 at 6:55-64.)

When the inventors clearly set forth a definition of a claim term in the specification, that definition shall apply. *CCS Fitness*, 288 F.3d at 1366. Thomson and CMI agree that the inventors clearly defined "highly conductive metal" in the specification, and I concur. Thus, I adopt the inventors' express definition of the term.

The parties' dispute centers on whether or not to include in the construction the language regarding examples of highly conductive metals. Regardless of whether or not such examples are included in the construction, I find that they are examples only and do not serve to limit the meaning of "highly conductive metal." I find that it is beneficial to include the exemplary language in the construction, as it further reinforces that the term "highly conductive metal" is relative, and that what constitutes a "highly conductive metal" depends on the particular application. (RX-393C at Q. 58.)

3. "the second contact lead and the second electrode being joined in the second patterned conductive layer"

The phrase "the second contact lead and the second electrode being joined in the second patterned conductive layer" appears in each asserted claim.

Thomson's Position: Thomson contends that "the second contact lead and the second electrode being joined in the second patterned conductive layer" means "the second contact lead and the second electrode are electrically connected in the second patterned conductive layer, where the connection is also in the second patterned conductive layer."

Thomson asserts that the '674 patent discloses and claims a structure whose "simplicity and ease of production result from forming several different features in a single layer of highly conductive metal." (Citing JX-2 at 1:31-42.) Thomson argues that its proposed conduction captures this innovation by explaining that the connection between the second contact lead and the second electrode is in the second patterned conductive layer. (Citing CX-4244C at Q. 179-185; CX-4307C at Q. 30-31.)

Thomson claims that its proposed conduction is supported by the claim language and the specification. (Citing JX-2 at 14:56-58, 18:8-10, 1:59-64.) Thomson also points to Figure 4, asserting that it clearly indicates that the connection between the second contact lead and the second electrode is in the same metal layer as the components themselves. (Citing JX-2 at 9:29-31; Tr. at 525:7-526:23.)

Thomson argues that CMI's proposed construction is not supported by any intrinsic or extrinsic evidence. (Citing RX-393C at Q. 72-74.) According to Thomson, CMI's proposed construction conflicts with both the claims and the specification of the '674 patent. (Citing JX-2 at 3:32-35; CX-4037C at Q. 30-31.)

CMI's Position: CMI contends that "the second contact lead and the second electrode being joined in the second patterned conductive layer" means "the second contact lead and the second electrode are electrically connected in the second patterned conductive layer."

CMI argues that it is improper to include the language "where the connection is also in the second patterned conductive layer" in the construction. According to CMI, this language imports an additional limitation into the asserted claims.

CMI asserts that the additional limitations that Thomson seeks to add also injects a vague physical or mechanical requirement into the claim language. (Citing RX-393C at Q. 74.) CMI argues that, contrary to Dr. Parsons' testimony, Thomson's proposed construction does not simplify or clarify the claim language for one of ordinary skill in the art. (Citing CX-4307C at Q. 31.)

Construction to be applied: "the second contact lead and the second electrode are electrically connected in the second patterned conductive layer."

Claim 1 includes the following language:

> a second patterned conductive layer that comprises highly conductive metal other than indium tin oxide; the second patterned conductive layer including…the first and second contact leads and the second electrode of each unit of cell circuitry; the second contact lead and the second electrode being joined in the second patterned conductive layer;

(JX-2 at 14:51-58.) Claim 16 includes almost identical language. (*Id.* at 18:1-10.)

The parties agree that the language "being joined" means "electrically connected." (CIB at 132; CMIB at 75.) CMI's proposed construction replaces "being joined" with "electrically connected," and leaves the remaining claim language. Thomson's proposed construction also replaces "being joined" with "electrically connected," but it adds the phrase, "where the connection is also in the second patterned conductive layer."

Thomson cites to Dr. Parsons' testimony to support the inclusion of "where the connection is also in the second patterned conductive layer." Dr. Parsons states that "[a]lthough both parties' constructions require that the connection be in the second patterned conductive layer, my proposed construction is more clear." (CX-4244C at Q. 181.) Neither Thomson nor Dr. Parsons cite to any intrinsic evidence that supports the inclusion of the language in question. (CIB at 132-133; CX-4244C at Q. 179-182.)

I find that Thomson's added language is unnecessary. The claim language already states that the second patterned conductive layer includes the second contact lead and the second electrode. The parties agree that the claim language requires that the second contact lead and the second electrode are electrically connected in the second patterned conductive layer. I find it redundant to additionally state that "the connection is also in the second patterned conductive layer." Contrary to Dr. Parsons' assertion, I find that the addition of this language is confusing and makes the construction less clear than the actual claim language. Furthermore, Dr. Parsons' testimony acknowledges that the addition of the language in question is unnecessary because both parties' constructions already require that the connection be in the second patterned conductive layer.

F. The '941 Patent

1. Level of Ordinary Skill in the Art

Thomson contends that one of ordinary skill in the art would have at least a bachelor's degree in electrical engineering and a minimum of two years of work experience with video signals and electronics that display these video signals on both CRT and LCD displays at the time of the invention of the '941 patent. (CX-4243C at Q. 58.) Respondents contend that a person of ordinary skill in the art would have a bachelor's degree in electrical engineering plus two years of work experience with information displays in the late 1980s to early 1990s. (RX-160 at Q. 65.)

Thomson states that there is no dispute between the parties over the level of ordinary skill in the art, as the requirements offered by the parties lack a meaningful distinction. (CIB at 151.) While I concur that there appears to be no meaningful distinction between the parties' positions, I find that the level of ordinary skill in the art offered by Thomson contains more detail and is more closely tied to the technology of the '941 patent. Based on the foregoing, I find that a person of ordinary skill in the art would have a bachelor's degree in electrical engineering and a minimum of two years of work experience with video signals and electronics that display these video signals on both CRT and LCD displays at the time of the invention of the '941 patent.

2. "determined by"

The term "determined by" appears in asserted claims 1 and 4.

Thomson's Position: Thomson contends that "determined by" means "based on."

Thomson claims that when determining the second rate, the number of picture elements to be controlled and the time available for display comprising active and inactive parts are both factors, but additional factors may also be taken into account. (Citing CX-4243C at Q. 128; CX-2305.) Thomson states that the mathematical formula proposed by Respondents is found nowhere in the intrinsic evidence. (Citing CX-4243C at Q. 127.) Thomson argues that Respondents are attempting to re-write the claim language by inserting a mathematical formula into the claims when the claims do not call for one. (Citing Tr. at 751:16-753:5.)

MStar's Position: MStar contends that "a second rate determined by..." and "a second rate which is determined by..." mean "a frequency equal to the number of picture elements to be controlled divided by the time available for display comprising active and inactive parts."

MStar asserts that its construction is dictated by the '941 patent, which defines the second rate in the specification. (Citing JX-5 at 1:30-38.) MStar claims that this defined second rate formula is used repeatedly throughout the specification. (Citing JX-5 at 4:15, 5:20.)

MStar asserts that Thomson's proposed construction is overly broad, and that the limitation is met as long as the two variables recited in the claim are taken into account in any manner whatsoever. (Citing Tr. at 716:2-720:16, 755:10-23.) MStar argues that Thomson's construction is not based on the intrinsic evidence or any dictionary definition. (Citing Tr. at 720:17-23, 756:3-757:2.) According to MStar, Thomson's construction is so broad that it provides no meaningful limitation on the claim scope.

Realtek's Position: Realtek proposes a construction that is identical to the construction offered by MStar, for reasons discussed *supra.*

Construction to be applied: "a second rate determined by..." and "a second rate which is determined by..." mean "a frequency equal to the density of picture information to be displayed divided by the time available for display comprising active and inactive parts."

Claims 1 and 4 each require information read out of memory at a "second rate." The claims make clear that the second rate is "determined by" two factors: (1) the density of picture information to be displayed; and (2) the time available for display comprising active and inactive parts. (JX-5 at 7:26-32, 8:13-18.)

The specification of the '941 patent provides only one method for determining the second rate based on the two above-mentioned factors. The specification shows that the second rate is determined by dividing the number of pixel elements by the available time. (*See* JX-5 at 1:30-46, 3:64-4:25.) This is wholly consistent with the adopted construction.

Thomson seeks to construe "determined by" to mean "based on." Under Thomson's construction, the second rate limitation would be met so long as the density of picture information to be displayed and the time available for display comprising active and inactive parts are taken into account in the calculation. (Tr. at 719:1-719:23, 755:19-756:2.) Thomson's construction does not preclude the inclusion of other numbers or variables in the calculation, as long as the two claimed factors are included. (*Id.*) This leads to the absurd result that the second rate limitation would be met no matter what mathematical operation is performed, as long as it includes the density of picture information to be displayed and the time available for display comprising active and inactive parts. (*Id.*) Under Thomson's construction, the second rate limitation would be met by the sum of or difference between these two factors, or any other mathematical formula that includes these two factors. (*Id.*) Such a result cannot be correct.

In addition, Thomson's construction goes way beyond anything that is taught or suggested by the intrinsic evidence. Even if the second rate could be determined in a way that is different than dividing the density of picture information to be displayed by the time available for display comprising active and inactive parts, the intrinsic evidence provides no disclosure of that, and Thomson offers no evidence that such a determination would be within the knowledge of one of ordinary skill in the art. Construing "determined by" in the manner advocated by Thomson "would...expand the scope of the claims far beyond anything described in the specification." *Kinetic Concepts, Inc. v. Blue Sky Med. Group, Inc.*, 554 F.3d 1010, 1019 (Fed. Cir. 2009); *see also On Demand Machine Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1338

(Fed. Cir. 2006) ("In general, the scope and outer boundary of claims is set by the patentee's description of his invention.")

3. "the time available for display comprising active and inactive parts"

The phrase "the time available for display comprising active and inactive parts" appears in asserted claim 1. Likewise, the phrase "the time available for its display which includes time available for the active and inactive parts" appears in asserted claim 4.

Thomson's Position: Thomson contends that "the time available for display comprising active and inactive parts" means "the available time for display corresponding to parts of the input video signal that have picture information and parts of the input video signal that do not have picture information."

Thomson claims that Respondents concede that the proper construction of "active and inactive parts" is "parts of the input video signal that have picture information and parts of the input video signal that do not have picture information" by not addressing this term in their pre-hearing briefs. Moreover, Thomson states that the claims and specification support this construction. (Citing JX-5 at 3:6-7, 7:17-18.)

Thomson claims that Respondents' construction is incorrect because there is no requirement anywhere that the available time be equal to duration of a field or frame minus the time which the matrix display cannot display information. Thomson asserts that Respondents' proposed construction reads out multiple embodiments from the claims. Thomson states that by tying their construction to the duration of a field or frame, Respondents are requiring the use of all of the horizontal and vertical blanking. (Citing RX-559C at Q. 74.) Thomson asserts that this is just one embodiment, and there are other, different embodiments disclosed in the '941 patent. (Citing JX-5 at 1:61-63, 3:60-64.)

MStar's Position: MStar contends that "the time available for display comprising active and inactive parts" means "the duration of one field or frame of the input video signal, less the time, if any, during which the matrix display is unable to display picture information (e.g., initialization time)."

MStar states that the '941 patent repeatedly emphasizes the ability of a matrix display to "extend" the processing and display of picture information beyond the active periods into blanking periods. (Citing JX-5 at Abstract, 1:57-61, 2:38-41.) MStar asserts that the '941 patent makes clear that the entire duration of a picture period is available for display of picture information unless there exists a portion of the picture period during which the physical limitations of the matrix display (such as initialization time) prevent display from occurring.

MStar offers three reasons why its construction is correct. First, MStar states that the language of the claim itself – the key word "available" – unambiguously encompasses all time during which the matrix is capable of displaying picture information. MStar states that any time that is not "unavailable" must, by definition, be "available." MStar cites to dictionary definitions of "available" for support. (Citing Tr. at 623:22-624:10.)

Next, MStar claims that the specification supports the common-sense understanding that "available time" is any time that the physical limitations of the matrix display do not render it "unavailable." MStar asserts that the specification shows that unless there is a reason why a portion of the picture period is not available for display – the entire period, including blanking intervals – is available for display. (Citing JX-5 at 2:23. 5:25-30, 6:4-7.)

Finally, MStar claims that "the time available for display" should be construed to cover all of the available time due to the way in which claims 1 and 4 were drafted. MStar notes that the patentee chose to use the definite article "<u>the</u> time available for display" rather than an open-ended phrase like "a portion of the time available for display." MStar argues that use of the definite article to introduce a subject indicates that the claim is referring to the entirety of that subject.

MStar claims that Thomson's proposed construction is circular and avoids the central issue posed by this claim language – what is means for time to be "available for display" in the first place. MStar states that Thomson's construction would cover a time period that includes only "parts" of the time that the display is actually capable of displaying picture information. MStar argues that Thomson's construction is infringement-driven and would all but vitiate the word "available" from the claims.

MStar argues that Thomson's construction is so broad that it would negate the purpose of the invention, which is to improve, in a matrix display, on the operation of a CRT by using the active portion plus the inactive portion. (Citing JX-5 at 1:57-61.) MStar asserts that Thomson's claims should not be construed in a way that would encompass the opposite of this central concept.

Realtek's Position: Realtek proposes a construction that is identical to the construction offered by MStar, for reasons discussed *supra*.

Construction to be applied: "the sum of the time in which a transmitted video signal contains picture information and at least some of the time in which the transmitted video signal contains no picture information."

The invention of the '941 patent is based on differences between cathode ray tube displays and matrix displays. Specifically, there are inactive time periods built into video signals that are necessary for cathode ray tube displays, but are not necessary for matrix displays. The '941 patent discloses a way for a matrix display to utilize these inactive time periods:

> In accordance with the invention it is proposed to extend a period of time for performing the signal processing algorithms for controling a matrix display into periods of time in which a video signal transmitted from a transmitter or a means of storage contains no picture information.

(JX-5 at 1:57-61.)

The specification further explains:

> For triggering cathode ray tubes…after writing each individual picture line the electron beam must be guided back to the start of the next picture line. This feeding back requires a certain length of time. It is for this reason that a horizontal blanking period is provided within each line in which there is no active video signal from which the picture to be presented is derived.
>
> Furthermore, with the triggering of a cathode ray tube, after writing the final line of each picture the electron beam must be guided back to the start of the first line. The time required for this is designated the vertical blanking period and taken into account in the video signal to be processed by non-visible flyback lines.
>
> In addition, with cathode ray tubes an overwrite in the horizontal and vertical direction is usually performed because of tolerances which result from the manufacturing process, aging, etc., whereby the picture area to be presented is reduced in both the horizontal and vertical direction.
>
> In contrast to this, when triggering a matrix display consideration of the horizontal and vertical blanking periods in not necessary.
>
> Therefore, these periods are available for the above named signal processing algorithms and the associated clock frequency can be reduced.

(JX-5 at 2:1-25.)

Thus, the specification explains that "[t]he time interval available for executing signal processing algorithms which drive a matrix display is expanded into time intervals in which a video signal contains no information." (JX-5 at 2:38-41.)

Asserted claim 1 requires "reading out from said memory the stored information at a second rate determined by the density of picture information to be displayed and ***the time available for display comprising active and inactive parts***." Similarly, asserted claim 4 requires "a second rate which is determined by the density of picture information to be displayed and from ***the time available for its display which includes time available for the active and inactive parts.***"

The parties' dispute centers on whether or not "the time available" requires all of the inactive time or just a portion of the inactive time. I find that "the time available" requires the active time along with at least a portion of the inactive time.

The specification includes references that make clear that the invention does not need to use all of the inactive time. For example, the specification states:

> In accordance with the invention it is proposed to extend a period of time for performing the signal processing algorithms for controling a matrix display into periods of time in which a video signal transmitted from a transmitter or a means of storage contains no picture information. This will preferably be the horizontal blanking period, the vertical blanking period ***and/or*** an overwrite period.

(JX-5 at 1:57-63.) The specification goes on to describe embodiments where just the horizontal blanking period is used, just the vertical blanking period is used, and both the horizontal and vertical blanking periods are used. (*Id.* at 3:60-63, 4:42-46, 5:38-44.) Respondents' construction seeks to restrict the claims to require use of all of the inactive time, which would read these embodiments out of all six claims of the '941 patent. *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276 (Fed. Cir. 2008) ("We normally do not interpret claim terms in a way that excludes embodiments disclosed in the specification."); *see also Verizon Services Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1305 (Fed. Cir. 2007) (same).

4. "stored information" & "video information stored in the memory"

The term "stored information" appears in asserted claim 1. The phrase "video information stored in memory" appears in asserted claim 4.

Thomson's Position: Thomson contends that these terms mean "parts of the input video signal that have picture information and that are stored in memory."

Thomson asserts that the language of claim 1 makes clear that "stored information" is the information that was stored in the storing step, i.e. the active portions of the input video signal that have picture information. Thomson claims that its proposed construction is also consistent with claim 4 and the specification. (Citing JX-5 at 5:64-67.)

Thomson asserts that Respondents base their construction on a statement made during prosecution. (Citing JX-10 at 270.) Thomson argues that the passage relied upon by Respondents does not relate to the "stored information" or "video information stored in memory" limitations of claims 1 and 4. Instead, Thomson asserts that the statement relates to the fact that the image represented by the input video signal is displayed on the whole screen, as opposed to a portion of the screen. (Citing CX-4243C at Q. 109; JX-40 at THOM00011642.) Thomson also asserts that Respondents are interpreting their construction to preclude upscaling after the memory. Thomson asserts that this interpretation is plainly incorrect. (Citing CX-4308C at Q. 102-107; JX-5 at 6:27-33, Fig. 5.)

MStar's Position: MStar takes no position on the construction of these terms.

Realtek's Position: Realtek contends that these terms mean "the video signals displayed on the whole screen."

Realtek asserts that the parties dispute on this claim term comes down to whether or not the stored information read from memory over the duration of a display period must be sufficient to fill the entire screen. Realtek argues that the stored information must be sufficient to fill in the entire screen. Realtek contends that the claim language of claims 1 and 4 support this conclusion. (Citing CX-4243C at Q. 114-115; Tr. at 632:1-633:14, 761:6-19.)

Realtek states that during prosecution, the applicants distinguished the claims from U.S. Patent No. 4,990,902 ("Zenda"). According to Realtek, the applicants distinguished Zenda by stating that the video signals in Zenda do not fill the entire display screen. (Citing JX-10 at THOM00004013.) Realtek asserts that in making this argument, the applicants made clear that the "stored information" consists of "video signals displayed on the whole screen." (*Id.*) Realtek claims that its construction is also entirely reasonable in view of the specification, which discloses two embodiment where the "upscaled" data is read out of memory. (Citing JX-5 at 6:13-15, 6:52-55; Tr. at 1267:13-1269:10.)

Construction to be applied: "active portions of an input video signal that are stored in memory."

Claim 1 requires "reading out from said memory ***the stored information*** at a second rate..." The "stored information" in claim 1 refers to the "active portions of an input video signal." Claim 4 requires "the memory being controllable responsive to signals at control inputs of the memory for controlling ***the video information stored in the memory***." This refers to "active portions of an input video signal having active and inactive portions provided from a picture source containing picture information in the active parts."

Based on the claim language itself, it becomes apparent that the "stored information" consists of "active portions of an input video signal that are stored in memory." This construction is consistent with the specification, which discloses storing in memory the active portions of an input video signal. (*See* JX-5 at 5:64-67.)

Realtek seeks to limit the meaning of this claim language based on an alleged disclaimer in the prosecution. During prosecution, the applicants distinguished the Zenda reference by stating:

> The object of Zenda is to optimize, when display is made in a plurality of display modes of different resolutions in a signal plasma display apparatus, a display position on a display screen. Thus, in figures 2A to 2D or figures 4 and 6, the non-hatched areas are different from what is called nonactive parts in claim 11.

> The features of claim 11[18] are, more particularly, that the data inputted in the memory at a first rate and read out at a second rate, are the video signals displayed on the whole screen. On the screen, there are no hatched and non-hatched parts, as in Zenda and Okayama et al.

(JX-10 at THOM00004013.) According to Realtek, this passage makes clear that the "stored information" must consist of "video signals displayed on the whole screen." (RIB at 35.)

The doctrine of prosecution disclaimer holds that a patentee may narrow the scope of the claims through statements made during prosecution of the patent. "[W]here the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and narrows the ordinary meaning of the claim congruent with the scope of the surrender." *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003). The Federal Circuit requires that the disclaimer is "clear and unambiguous" before it can serve to limit the scope of the claims. *Seachange Int't, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1373 (Fed. Cir. 2005); *see also Verizon Services Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1306 (Fed. Cir. 2007) ("To operate as a disclaimer, the statement in the prosecution history must be clear and unambiguous, and constitute a clear disavowal of scope.")

The parties' dispute centers on whether or not the claims require that the video signal is upscaled prior to being stored in memory. The parties agree that Realtek's proposed construction would add this requirement to the claims, even though the express language of the claims does not include such a requirement. I find that the prosecution history does not include a clear and unambiguous disclaimer as argued by Realtek. The above-quoted paragraph does not specifically reference the "stored information" claim language, and does not clearly and unambiguously state that the video signal stored in memory is a signal that is displayed on the

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[18] Realtek contends that the claim 11 referenced in this passage eventually became claim 1 of the '941 patent. (RIB at 35.) Realtek does not cite any passage in the prosecution history specifically related to asserted claim 4 of the '941 patent.

whole screen. Therefore, I find that the prosecution history does not serve to limit the meaning of "stored information."

Based on the foregoing, I find that "stored information" and "video information stored in the memory" shall be construed to mean "active portions of an input video signal that are stored in memory."

5. "control lines of the matrix display"

The phrase "control lines of the matrix display" appears in asserted claims 1 and 4.

Thomson's Position: Thomson contends that "control lines of the matrix display" means "lines of pixels on the matrix display used for controlling the display."

Thomson states that the specification makes clear that a matrix display consists of a number of lines of pixels to be controlled, and refers to them as "control lines." (Citing JX-5 at 1:17-19, 6:17-23, 6:39-42; CX-4243C at Q. 132-133.) Thomson states that while Respondents' proposed construction is consistent with the plain language of the claim it appears nowhere in the intrinsic evidence. Thomson states that Respondents' sole argument against Thomson's construction is that a line of pixels cannot control a display, but Thomson states that its construction refers to lines of pixels that are used for controlling the display, which is consistent with the claim term "control line."

MStar's Position: MStar contends that "control lines of the matrix display" means "electrical conductors which carry control signals for the matrix display."

MStar claims that its construction is consistent with the claim language and with how one of ordinary skill in the art would understand the operation of a matrix. (Citing RX-160 at Q. 77-78; RX-162 at ¶¶ 137-141.) MStar states that control lines are the physical lines (i.e. electrical conductors) that control the writing of picture information to a matrix display. (*Id.*)

MStar asserts that Thomson's construction contradicts the claim language. MStar explains that the claims state that the picture elements are "to be controlled" – the opposite of the elements that do the "controlling." MStar claims that the specification describes "signal processing devices" in the apparatus as the elements that "control the matrix display." (JX-5 at 1:30-32.) MStar notes that Dr. Drabik testified that control is exercised over electrical conductors. (Citing JX-160 at Q. 77-78.)

Construction to be applied: "lines of pixels on the matrix display used for controlling the display."

Asserted claims 1 and 4 each include the following claim language: "the number of control lines of the matrix display being greater than the number of lines of the video signal to be displayed." In addition, dependent claims 3 and 6, which depend from claims 1 and 4 respectively, require "the number of lines of the matrix display to be controlled is 560."

The specification establishes that "[m]atrix displays consist of an arrangement of M*N picture elements, so-called pixels. Here, M is the number of these picture elements per line and N is the number of lines." (JX-5 at 1:17-19.) The specification discusses taking an input video signal with 482 lines and displaying it on a matrix display of 560 lines. (*Id.* at 6:39-42; *see also id.* at 6:17-23.)

Based on the foregoing, I find that "the number of control lines of the matrix display" means "lines of pixels on the matrix display used for controlling the display." This construction is consistent with the claim language, especially dependent claims 3 and 6 that derive antecedent basis from the "number of control lines of the matrix display" claim language of claims 1 and 4. Moreover, this construction is consistent with the specification, which discusses the lines of pixels of a matrix display to be controlled. MStar's proposed construction – "electrical conductors which carry control signals for the matrix display" – finds no basis in the intrinsic evidence and is based primarily on the expert testimony of Dr. Drabik. *Vitronics*, 90 F.3d at 1583 ("In most situations, an analysis of the intrinsic evidence alone will resolve any ambiguity in a disputed claim term. In such circumstances, it is improper to rely on extrinsic evidence.")

6. "the number of lines of the video signal to be displayed"

The phrase "the number of lines of the video signal to be displayed" appears in asserted claims 1 and 4.

Thomson's Position: Thomson contends that "the number of lines of the video signal to be displayed" should be construed to mean "the number of lines in the input video signal containing picture information."

Thomson asserts that the claims and specification make clear that the lines to be displayed on the matrix display are the lines containing picture information. (Citing JX-5 at 1:17-19, 2:35-38.) Thomson argues that there is no intrinsic support for Respondents' proposed construction. Thomson asserts that the '941 patent only refers to the number of lines in one frame, and not one field. (Citing JX-5 at 6:39-49; CX-4308C at Q. 92; Tr. at 1233:7-15.) Thomson argues that the '941 patent's references to pictures are references to frames, and not interlaced fields.

MStar's Position: MStar contends that "the number of lines of the video signal to be displayed" should be construed to mean "the number of horizontal lines of one field or frame of the input video signal." MStar asserts that the parties agree on the practical application of this claim language in the case of a progressive signal but not in the case of an interlaced signal. MStar explains that in a progressive signal, all of the lines for form a single picture (i.e. frame) are delivered during a single cycle referred to as a frame period. (Citing RX-160 at Q. 42; CX-

4308C at Q. 24.) MStar states that modern matrix displays are typically driven with progressive signals. (Citing RX-160 at Q. 42.)

MStar states that when a progressive signal is used, a matrix display is refreshed once every frame period based on the lines that are delivered during a frame period of the progressive signal. MStar offers the example of a 30 Hz progressive signal, which has a frame period of 1/30 of a second. In this example, one complete set of batch lines would be delivered in 1/30 of a second, meaning the matrix display would be refreshed once every 1/30 of a second. (Citing RX-160 at Q. 42-43; RX-162 at ¶ 34.) The parties agree that the claimed comparison for a progressive signal is between the number of control lines of the matrix display and the number of lines sent to the matrix display during a frame period, which is the period of time during which the matrix display is updated in the case of a progressive signal.

MStar explains that in an interlaced signal, a frame is broken up into two fields, each with half as many lines as a frame. (Citing Tr. at 1752:14-23, 1753:11-13.) MStar states that fields in an interlaced signal are delivered with twice the frequency that frames are delivered in a corresponding progressive signal. Thus, MStar asserts that the field period is half as long as the frame period. (Citing Tr. at 1246:16-1247:8; RX-160 at Q. 43.) MStar states that, assuming each has the same frame rate, a matrix display driven by an interlaced signal is updated twice as often as a matrix display driven by a progressive signal. (Citing Tr. at 1752:14-23, 1753:11-13.)

MStar asserts that since the control lines are activated/populated every time the matrix display is updated, their number must logically be compared to the number of lines that are delivered to the matrix during a single update period. MStar states that for a progressive signal, the matrix is updated every frame period, and for an interlaced signal, the matrix is updated every field period.

Construction to be applied: "the number of lines in the input video signal containing picture information."

Claims 1 and 4 each include the following claim language: "the number of control lines of the matrix display being greater than the number of lines of the video signal to be displayed."[19] The parties dispute the meaning of "the number of lines of the video signal to be displayed." The specification provides an example of this claim limitation, whereby a matrix display has 560 lines and a video image having 482 lines. (JX-5 at 6:39-42.) The specification states: "[w]hen using a matrix display with, for example, 560 lines, and when processing a video image according to the M standard (US standard) using approx. 482 active lines, it is possible to expand the picture to be displayed to 560 lines." (*Id.*) The parties' experts agree that this text in the specification refers to the standard television signal used in the United States, which is an interlaced video signal with 482 active lines in each frame. (CX-4308C at Q. 92; Tr. at 1233:7-15.)

MStar advocates a construction that would also cover the number of lines in one field. The only reference to a "field" in the intrinsic evidence that MStar cites to is an ambiguous reference that is not discussing the comparison between the number of control lines of the matrix display and the number of lines of the video signal to be displayed. (*See* MRB at 7; JX-5 3:4-7.) Instead, MStar is left to rely mainly on expert testimony to support its proposed construction. (*See* MIB at 35-37.) I find that Thomson's proposed construction, which is the only proposed construction that is consistent with the claim language and specification, is correct.

Based on the foregoing, I find that "the number of lines of the video signal to be displayed" means "the number of lines in the input video signal containing picture information."

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[19] Claim 4 uses the word "then" in place of "than." I find that this is a minor typographical error that does not affect the substance of the claim language.

IV. INVALIDITY

A. Applicable Law

It is the respondent's burden to prove invalidity, and the burden of proof never shifts to the patentee to prove validity. *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1380 (Fed. Cir. 2008). "Under the patent statutes, a patent enjoys a presumption of validity, *see* 35 U.S.C. § 282, which can be overcome only through facts supported by clear and convincing evidence[.]" *SRAM Corp. v. AD-II Eng'g, Inc.*, 465 F.3d 1351, 1357 (Fed. Cir. 2006). The clear and convincing standard was recently reaffirmed by the Supreme Court. *Microsoft Corp. v. i4i Ltd. P'ship*, 131 S.Ct. 2238 (2011) (upholding the Federal Circuit's interpretation of 35 U.S.C. § 282).

The clear and convincing evidence standard placed on the party asserting the invalidity defense requires a level of proof beyond the preponderance of the evidence. Although not susceptible to precise definition, "clear and convincing" evidence has been described as evidence which produces in the mind of the trier of fact "an abiding conviction that the truth of a factual contention is 'highly probable.'" *Price v. Symsek*, 988 F.2d 1187, 1191 (Fed. Cir. 1993) (citing *Buildex, Inc. v. Kason Indus., Inc.*, 849 F.2d 1461, 1463 (Fed.Cir.1988).)

1. Anticipation

"A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention. Moreover, a prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference." *Schering Corp. v. Geneva Pharm., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (citations omitted).

"When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984). Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1467 (Fed.Cir.1990).

2. Obviousness

Section 103 of the Patent Act states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. § 103(a) (2008).

"Obviousness is a question of law based on underlying questions of fact." *Scanner Techs. Corp. v. ICOS Vision Sys. Corp. N.V.*, 528 F.3d 1365, 1379 (Fed. Cir. 2008). The underlying factual determinations include: "(1) the scope and content of the prior art, (2) the level of ordinary skill in the art, (3) the differences between the claimed invention and the prior art, and (4) objective indicia of non-obviousness." *Id.* (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966)). These factual determinations are often referred to as the "*Graham* factors."

"When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job[.]" *Am. Hoist & Derrick Co.*, 725 F.2d at 1359. Therefore, the challenger's "burden is especially difficult when the prior art was before the PTO examiner during prosecution of the application." *Hewlett-Packard Co.*, 909 F.2d at 1467.

The critical inquiry in determining the differences between the claimed invention and the prior art is whether there is a reason to combine the prior art references. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417-418 (2007). In *KSR*, the Supreme Court rejected the Federal Circuit's rigid application of the teaching-suggestion-motivation test. The Court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *Id.* at 418. The Court described a more flexible analysis:

> Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue…As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

Id.

Since *KSR* was decided, the Federal Circuit has announced that, where a patent challenger contends that a patent is invalid for obviousness based on a combination of prior art references, "the burden falls on the patent challenger to show by clear and convincing evidence that a person of ordinary skill in the art would have had reason to attempt to make the composition or device, . . . and would have had a reasonable expectation of success in doing so." *PharmaStem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007).

In addition to demonstrating that a reason exists to combine prior art references, the challenger must demonstrate that the combination of prior art references discloses all of the limitations of the claims. *Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1373-1374

(Fed. Cir. 2010) (upholding finding of non-obviousness based on the fact that there was substantial evidence that the asserted combination of references failed to disclose a claim limitation); *Velander v. Garner*, 348 F.3d 1359, 1363 (Fed. Cir. 2003) (explaining that a requirement for a finding of obviousness is that "all the elements of an invention are found in a combination of prior art references").

B. The '063 Patent

1. Lowe & Miyazaki As Prior Art

AUO's Position: AUO states that U.S. Patent No. 5,801,796 ("Lowe") (RX-16) was filed on May 10, 1996 – more than eleven months before the filing date of the '063 patent, and U.S. Patent No. 5,978,061 ("Miyazaki") (RX-12) was filed on September 5, 1996 -- more than seven months before the '063 patent. AUO argues that each of these patents is presumptively prior art under 35 U.S.C. § 102(e). AUO says that, in an attempt to avoid these references, Thomson asserts that the '063 invention was conceived and reduced to practice at least as early as December 4, 1995. AUO concedes that as the parties challenging validity, Respondents bear the burden of persuasion; but AUO asserts that Thomson has the burden of production of evidence sufficient to antedate the prior art references. (Citing *Stamps.com Inc. v. Endicia, Inc.*, No. 2010-1328, 2011 WL 2417044, at *9 (Fed. Cir. June 15, 2011)); and *Mahurkar v. C.R. Bard Inc.*, 79 F.3d 1572, 1577 (Fed. Cir. 1996))

AUO contends that to establish an earlier date of invention, Thomson was required to introduce evidence sufficient to show both conception and actual reduction to practice. (Citing *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998); and *Certain Plastic Fasteners and Processes for the Manufacture Thereof*, ITC Inv. 337-TA-248, 1986 ITC LEXIS 343, at *13 (Aug. 18, 1986))

AUO argues that conception is the formation, in the mind of the inventor, of a definite and permanent idea of the complete and operative invention. (Citing *Cooper*, 154 F.3d at 1327) AUO continues, a conception must include ***all*** of the limitations or elements of a patent claim. (Citing *Hitzeman v. Rutter*, 243 F.3d 1345, 1354 (Fed. Cir. 2001))

AUO says that to show conception, Thomson relies upon an invention proposal and the testimony of one of the inventors, Dr. Ho. (Citing CX-4240C; CX-1643C; and CX-1643aC.) AUO asserts that neither shows that the inventors conceived of a display cell that includes an affixing layer, as in claims 1-4 and 8.

AUO avers that Dr. Ho's witness statement discusses an "affixing layer" at Qs. 50-53 and an "interface layer" at Q. 141. (Citing CX-4240C) AUO says that nowhere does Dr. Ho state that he or Dr. Crawford conceived of an "affixing layer" as part of their invention. AUO alleges instead, Dr. Ho asserts that there "could" or "would" be an affixing layer or an interface layer when a coating of spacer material, such as polyimide, is formed on a substrate. (Citing CX-4240C at Q. 50-53, 141) AUO contends that Dr. Ho's testimony, without independent corroboration, is not evidence of conception. (Citing *Procter & Gamble Co. v. Teva Pharm. USA Inc.*, 566 F.3d 989, 999 (Fed. Cir. 2009))

AUO alleges that the invention proposal does not show conception of an affixing layer, and therefore, does not corroborate Dr. Ho's testimony. (Citing CX-1643C; CX-1643aC; RX-158C, Q. 550; and RX-554C at Q. 50-52) AUO states that although Dr. Ho discusses the invention proposal (CX-1643C), he never states that it shows conception of an affixing layer. (Citing CX-4240C at Q. 204-232) AUO continues that the term "affixing layer" does not appear anywhere in Thomson's evidence until December 1996, when it was first used in the '652 application (RX-20) to describe a separate and distinct layer that attaches the spacers to the substrate. AUO adds that the first time that an affixing layer was mentioned in connection with the '063 invention is in the original claims of '063 patent, filed April 15, 1997. (Citing RX-554C at Q. 52)

AUO says that Dr. West argues that the invention proposal discusses photolithographically forming the spacers from a negative photoreactive polyimide, and that an "affixing layer" is an inherent "property" of the negative photoreactive polyimide, which would have been known to one of ordinary skill in the art. (Citing CX-4242C at Q. 68) AUO contends that argument is legally insufficient to establish conception, quoting "Conception requires contemporaneous recognition and appreciation of the limitations of the claimed invention, not merely fortuitous inherency." (Citing *Mycogen Plant Sci., Inc. v. Monsanto Co.*, 252 F.3d 1306, 1314 (Fed. Cir. 2001), *vacated on other grounds*, 535 U.S. 1109 (2002)) AUO counters that Dr. Lowe explained why Dr. West's theory regarding the inherent presence of an affixing layer is scientifically incorrect. (Citing RX-554C at Q. 45, 52; and Q. 188)

AUO asserts that in order to establish an actual reduction to practice, Thomson was required to introduce evidence sufficient to show that (1) the inventors constructed an embodiment that meets all the limitations of claim 1 and performed a process that meets all the limitations of claim 11; (2) the inventors determined that the claimed invention would work for its intended purpose; and (3) there is sufficient evidence to corroborate the inventor's testimony regarding each of these events. (Citing *Medichem S.A. v. Rolabo S.L.*, 437 F.3d 1157, 1169 (Fed. Cir. 2006); and *Cooper*, 154 F.3d at 1327)

AUO says to establish an actual reduction to practice, Thomson relies principally on the testimony of Dr. Ho, who has been a paid consultant for Thomson since May 2011. (Citing Tr. 140:8-11, 140:20-141:2; and CX-4240C at Q. 16-17) AUO says that Dr. Ho asserts that the inventions of claims 1 and 11 were reduced to practice in two ways: (1) assembly of display cells for optical performance testing, *i.e.*, test cells, and (2) assembly of display cells for Ansel displays. (Citing CX-4240C at Q. 163) AUO argues that neither assertion is sound.

Regarding test cells, AUO says that Dr. West's testimony regarding actual reduction to practice based on Dr. Ho's testimony has been excluded (Citing Tr. 66:23-25, granting part one of AUO's motion in limine no. 6), and Dr. Ho's testimony comparing his alleged test cells with the '063 patent claims has also been excluded. (Citing Tr. 67:14-15, granting Respondents' motion in limine no. 7.)

Addressing the merits, AUO continues that Dr. Ho's testimony is uncorroborated, and for that reason alone, it must be rejected. (Citing *Martek Biosciences Corp. v. Nutrinova Inc.*, 579 F.3d 1363, 1374-75 (Fed. Cir. 2009)) AUO adds even if corroboration had been adduced, Dr. Lowe's unrebutted testimony establishes that the alleged test cells do not meet the limitations of claims 1 or 11. (Citing *Eaton v. Evans*, 204 F.3d 1094, 1098 (Fed. Cir. 2000))

AUO says according to Dr. Ho, the test cells were made from a quartz substrate having a pattern of opaque metal data and scan lines, a layer of ITO, and anisotropic spacers formed over the opaque areas. (Citing CX-4240C at Q. 165, 172-174.) AUO continues that there is no evidence that the alleged test cells contained an "active aperture area" and "non-active area" under either side's construction of those terms. AUO asserts that Thomson's construction for "active aperture area" requires data and scan lines, but the alleged test cells had a metal grid pattern, which simulated the form, but not the function of the data and scan lines. (Citing Tr. 1032:9-24, 1036:19-1037:14, 1039:18-24; and RX-554C at Q. 63)

AUO says that under Respondents' construction, Dr. Ho's alleged test cells did not have any non-active area, *i.e.*, no non-visible part of the pixel, because Dr. Ho's alleged test cells were single pixel display cells in which the entire substrate is covered with ITO. AUO explains that this means that the entire substrate is active and switches when the display cell is turned on and off. (Citing Tr. 1039:8-17, 1088:6-1090:1; and RX-554C at Q. 74) AUO contends that because one would still see a contrast change in the regions covered by the metal grid lines, those areas are not "non-visible," as required by Respondents' construction. (Citing JX-37, Ex. A at 1; and RX-158C at Q. 562) AUO concludes that Dr. Ho's alleged test cells also failed to include an "affixing layer" under either side's construction, for the same reasons that the accused products do not include an "affixing layer." (Citing RX-554C at Q. 74) AUO adds according to Dr. Ho, his spacers were on the ITO, not on an affixing layer, as required by claim 1. (*Comparing* CX-4240C at Q. 165 *with* Tr. 160:14-161:3)

AUO asserts, too, there is no evidence that Dr. Ho's alleged test cells were rubbed along the long axis of the spacers, as required by Respondents' construction of the claimed mechanical rubbing limitations. (Citing RX-554C at Q. 74-75)

AUO asserts that there is no credible or corroborated evidence that Ansel display cells with spacers were ever built. (Citing *Martek*, 579 F.3d at 1374-75) AUO avers that Dr. Ho testified that Ansel wafers with smart spacers, and in particular wafer #13 referenced in Dr. Ho's lab notebook, would have been sent to a vendor, Standish, for cell assembly and rubbing. (Citing CX-4240C at Q. 144, 149-153, 162-163, 250-255) AUO counters that no one testified and no document showed that any Ansel wafers were ever actually sent to any vendor for cell assembly and rubbing. AUO avers that Dr. Ho's testimony is directly contradicted by the Copperfield program review, which demonstrates that, as of June 19, 1996, patterning polyimide spacers over the opaque regions of the active matrix had not yet been tried in Ansel displays and this was the "next step" in the program. (Citing CX-1642C at 6; and RX-554C at Q. 77) AUO concludes that Thomson has submitted no evidence of any activity relating to the '063 invention after June 19, 1996.

AUO argues that to establish an earlier invention date, Thomson was required to prove that a display cell meeting all the limitations of claim 1, and a process meeting all the limitations of claim 11, were demonstrated to actually work for their intended purpose. (Citing *Cooper*, 154 F.3d at 1327; and *Newkirk v. Lulejian*, 825 F.2d 1581, 1582 (Fed. Cir. 1987))

AUO contends that Thomson has produced no evidence that either the test cells or the Ansel display cells worked for their intended purpose. With respect to the test cells, AUO says that Dr. Ho speculates that "optical inspection technicians tested the optical performance" and the test cells were "successful." (Citing CX-4240C at Q. 186-187, 202-203) Regarding the Ansel display cells, AUO avers that Dr. Ho merely asserts that "if there was a problem with the display cells, [technicians] would alert me to it," and "internal demonstrations" showed that "Ansel displays using our smart spacers worked." (*Id.* at ¶¶ 149, 153.) AUO contends that not only is Dr. Ho's testimony uncorroborated, it is contradicted by the Copperfield program review and Dr. Lowe's unrebutted testimony, which demonstrate that: (1) smart spacers had not yet been tried in Ansel display cells, and (2) even if test cells with smart spacers had been built and tested, they were not sufficient to show that the '063 invention worked for its intended purpose, because they were "not capable of demonstrating the electric field pattern that would exist in either an active matrix or a passive matrix display cell." (Citing RX-158C at Q. 562) AUO alleges that the Copperfield document (CX-1642) demonstrates that additional prototypes needed to be built and tested in order to demonstrate that the '063 invention would work for its intended purpose of providing spacers that are hidden in the non-active areas where they will not be visible and will not affect the image being displayed. (Citing RX-158C at Q. 558, 562-566; and Tr. 1088:6-1090:1)

AUO notes that in addition to Dr. Ho's testimony and the Copperfield document, Thomson also relies on the Invention Proposal and TAP panel review. (Citing CX-1643C; CX-1643aC; and CX-1645C.) AUO counters that these documents also fail to demonstrate that an embodiment of claims 1 and 11 was built, tested and shown to work for its intended purpose. AUO says although the inventors answered "yes" to the question whether the invention "has been built, made, run or tested" (Citing CX-1643C at PARC 878), and the TAP panel stated "it has been successfully reduced to practice" (Citing CX-1645C), both statements were made about the invention proposal, which summarized the invention as follows:

> We ... propose ... smart spacers formed photolithographically with an organic coating such as polyimide or a deposited dielectric such as CVD oxide, nitride and/or oxy nitride. The smart spacers can be positioned in such a way that they are hidden and occupy space only on non-active areas and are engineered to be highly aniso-tropic in shape to be compatible with the aggressive mechanical rubbing process of LCD assembly. Their distribution and number is also precisely controlled.

(CX-1643C at PARC 873.) AUO argues that this description of the proposed invention is not a complete display cell as described in claims 1 and 11. (Citing Tr. 1021:2-14, 1023:5-16; RX-158C at Q. 557; and RX-554C at Q. 56) AUO continues that none of the passages relied upon by Thomson shows that complete display cells were built and tested. (Citing RX-158C at Q. 552-556; and RX-554C at Q. 55; *Cooper*, 154 F.3d at 1328; and *Newkirk*, 825 F.2d at 1582)

AUO contends if complete display cells had actually been built and tested, as Dr. Ho asserts, one would expect to see qualitative and quantitative results, such as optical micrographs, showing the performance of the test cells. AUO concludes Thomson has produced no evidence showing actual prototypes, testing or test results. (Citing RX-554C at Q. 70-71)

AUO argues that Thomson's evidence fails for lack of sufficient corroboration for Dr. Ho's testimony regarding actual reduction to practice. AUO reiterates that in order to establish an actual reduction to practice, an inventor's testimony must be corroborated by independent evidence. AUO explains that independent corroboration may consist of testimony of a witness, other than the inventor, to the actual reduction to practice or it may consist of evidence of surrounding facts and circumstances independent of information received from the inventor. AUO avers that Thomson has produced no evidence independent of Dr. Ho that is sufficient to corroborate his testimony. AUO asserts that each of the exhibits relied upon by Thomson to swear behind the prior art is introduced through Dr. Ho and depends on information available solely from the inventors.

AUO argues that Dr. Crawford's signature on the invention proposal (CX-1643C, and CX-1643aC) has no corroborative value because he is a co-inventor. (Citing *Medichem,* 437 F.3d at 1171) AUO says the signature of Russell Martin at most establishes that the invention proposal existed on the date it was witnessed; but it does not independently corroborate the statements made in the proposal. AUO cites *Hahn v. Wong*, 892 F.2d 1028, 1033 (Fed. Cir. 1989) in which the court said "affiants' statements that by a certain date they had 'read and understood' specified pages of ... laboratory notebooks ... established only that those pages existed on a certain date; they did not independently corroborate the statements made on those pages".

AUO says the TAP panel review (CX-1645C) is based on the invention proposal, which was written by the inventors. AUO avers there is no indication that the TAP panel had independent first-hand knowledge of the inventors' work. AUO Cites *Reese*, 661 F.2d at 1231 to say that letters written by the inventors and "read and understood" by a third party do not corroborate the inventor's testimony because the third party had no first-hand knowledge that the inventor performed the experiments described in the letters. AUO adds even though the depositions of two of the TAP Panel members are in evidence (*See* JX-55C; and JX-69C), Thomson failed to obtain corroborating testimony from these witnesses, which further confirms the lack of independent corroboration for Dr. Ho's testimony regarding an alleged reduction to practice.

AUO argues that Dr. Ho's unwitnessed lab notebook (CX-1644C, CX-1644aC) has "minimum corroborative value." AUO concludes that inventors' notebooks that are not witnessed do not provide an 'independent' source of authority on the issue of reduction to practice." AUO asserts that the Copperfield program review (CX-1642C) has no author, and it is impossible to determine whether the information in the document is independent of Dr. Ho. AUO argues that corroboration is inadequate where "all corroborative information contained in documents relevant to actual reduction to practice of the count is dependent on information available solely from [the inventor]". (Citing *Reese*, 661 F.2d at 1234)

AUO argues that the masks (CPX-5C to 8C), mask box labels (CX-1647C and CX-4101C to 4104C), mask photographs (CX-1648C) and SEM photographs (CX-1646C) are all meaningless without Dr. Ho's explanation of what they are and how they allegedly relate to the smart spacers invention and therefore cannot be considered independent. To support that argument, AUO cites *In re NTP, Inc.*, Nos. 2010-1243 et al., ___ F.3d ___, 2011 U.S. App. LEXIS 15814, at *20 (Fed. Cir. Aug. 1, 2011) to hold that the inventors' attempts to corroborate their own testimony with a document and software files, and at the same time, to corroborate the date of the document and the functionality of the software with their own testimony is "circular".

AUO adds that Thomson's evidence fails to corroborate Dr. Ho's testimony that he actually made an embodiment that meets the limitations of the '063 patent claims. AUO contends that none of Thomson's evidence -- the invention proposal, TAP panel review, Copperfield program review, Ho lab notebook, masks, mask box labels, mask photographs or SEM photographs -- corroborates Dr. Ho's testimony that display cells embodying the elements of claims 1 and 11 were actually built and tested. (Citing CX-1642C to CX-1648C, CX-4101C to 4104C, CPX-5C to 8C; RX-158C at Q. 563, 568; and RX-554C at Q. 68-69, 77-78) AUO says that the Copperfield program review (CX-1642C), for example, mentions test cells; but says nothing about spacers that are anisotropic in shape, withstand the mechanical rubbing process or are attached with an affixing layer – all of which are important limitations of the claims. (Citing RX-554C at Q. 59-62) AUO argues that none of the remaining evidence corroborates the building or testing of complete display cells as claimed in the '063 patent, as opposed to the mere formation of spacers on various substrates and rubbing, which is not enough to satisfy the claims. (Citing RX-158C at Q. 553-557, 570-573; and RX-554C at Q. 53-58, 64-66)

In its reply brief AUO says that Thomson fails even to address the issue of conception, which is fatal to its attempt to establish a date of invention for claims 1-4 And 8.[20] AUO continues that Thomson claims that Dr. Ho built embodiments having "spacing elements [that] included material affixing them to the substrate" and "[a] spacing layer including an affixing layer …" (Citing CIB at 40, 43, citing CX-4240C at Q. 165, 166, 174;, but the cited testimony does not mention any such material or affixing layer. AUO adds that there is no evidence that Dr. Ho contemporaneously recognized the presence of an affixing layer as required by *Knorr v. Pearson*, 671 F.2d 1368, 1375 (C.C.P.A. 1982) and *Heard v. Burton*, 333 F.2d 239, 243

[20]AUO cites *Cooper v. Goldfarb*, 154 F.3d 1321, 1327 (Fed. Cir. 1998) ("Priority therefore depends upon conception and reduction to practice.")

(C.C.P.A. 1964). AUO argues that, having failed to address these issues, Thomson should be precluded from doing so for the first time on reply.

AUO says in the last sentence of the section of its brief that addresses date of invention, Thomson asserts: "there is a corroborated April 1996 conception with diligent reduction to practice ...." (Citing CIB at 43) AUO avers that Thomson's assertion of an April 1996 conception conflicts with Dr. Ho's testimony that he and Dr. Crawford conceived of the invention "a few months before October 1995" or "by the summer of 1995." (Citing CX-4240C at Q. 56-57) AUO adds that Thomson has never asserted that it is entitled to an earlier date of invention based on conception coupled with diligence leading to a reduction to practice, which would have required the inventors to account for the entire time period from before the filing date(s) of the Lowe and Miyazaki patents until the alleged date of reduction to practice. (Citing *Griffith v. Kanamaru*, 816 F.2d 624, 626 (Fed. Cir. 1987) to require that the party asserting priority "must account for the entire period from just before [opposing party's] filing date until his reduction to practice". AUO argues no such proof has been submitted in this case.

AUO contends that, contrary to Thomson's assertions, the invention proposal does ***not*** state that the inventors "tested the optical performance of spacers at every intersection or fourth intersection." AUO avers that it merely states: "We minimize the number of smart spacers to ensure optimum optical performance. We have tested 1 spacer every intersection (1/1) and 1/4 (see Fig. 3(a))." (Citing CX-1643C at PARC 877) AUO alleges that, according to the invention proposal, the embodiment that was tested is shown in Fig. 3(a), which schematically shows smart spacers and a pattern of data and scan lines on a substrate, but does not show a display cell.

(Citing CX-1643C at PARC 881.)[21] AUO concludes that Thomson's questions to Dr. Lowe are premised on a misreading of the invention proposal, which fails to corroborate Dr. Ho's testimony that complete display cells (rather than just substrates with spacers) were actually built and tested. (Citing CIB at 40-41, citing Tr. 1031:10-15)

AUO says that Thomson relies on the statement that "[t]he concepts are being pursued with a vendor (Standish) under nondisclosure agreements" (CX-1645); but that vague statement says nothing about whether Standish actually assembled test cells having the structure described by Dr. Ho. (Citing CX-4240 Qs. 165-166)

AUO argues that Thomson's attempt to produce corroborating evidence cannot be compared with the level of proof found sufficient in the *Cooper*, 154, F.3d at 1330. AUO says that the court in *Cooper* relied upon the testimony of two non-inventor witnesses, who corroborated the inventor's testimony that he measured the fibril length of a particular sample vascular graft (2-73 RF) that had been successfully implanted and harvested from a dog and that, at that time, he recognized the critical limitation of the claim. *Id.* at 1330.

AUO says that Thomson alleges that Drs. Ho and Crawford built embodiments of the claimed invention by the fall of 1995, citing Dr. Ho's witness statement; but Dr. Ho's testimony fails to show that display cells meeting all limitations of '063 claims 1 and 11 were actually built. (Citing CX-4240C, ¶¶ 56-58, 63-64, 111, 165-166, 171-172) AUO says that according to Dr. Ho, the test cells merely had a "pattern of opaque metal data and scan lines" (Citing CX-4240C at Q. 165), not actual data and scan lines, as required by Thomson's construction for "active aperture area." (Citing JX-37, Ex. A at 1; Tr. 1036:19-1037:14, 1039:18-24) AUO asserts that Thomson's evidence also fails to show that the test cells meet Respondents' construction for

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[21] In a footnote, AUO states that Fig. 3(b) on the same page (CX-1643C at PARC 881) is duplicated in the '063 patent and shows the prior art, not the invention. (Citing JX-1, Fig. 12; Tr. 152:16-153:2)

active aperture area, non-active area, affixing layer and mechanical rubbing.

AUO elaborates that Thomson's brief is inconsistent with Dr. Ho's testimony. (Citing CIB at 39-40) AUO avers that Dr. Ho testified that he and Dr. Crawford designed masks (Citing CX-4240C at Q. 63); but mentions no other contribution by Dr. Crawford to actually building the alleged embodiments of the claimed invention. AUO says Dr. Ho testified that "me or a technician" formed certain structures on quartz substrates, and Thomson inaccurately asserts that "a technician" did this work. (*Comparing* CIB at 39 *with* CX-4240C at Q. 165) AUO continues that, whereas Dr. Ho testified that he or a technician "formed the pattern of opaque metal data and scan lines" on quartz substrates, Thomson inaccurately asserts that actual "data and scan lines" were formed. (*Comparing* CIB at 39 *with* CX-4240C at Q. 165) AUO adds although Dr. Ho testified that the same masks were used to make patterns on quartz substrates as were used for Ansel displays, he never said the "same ... metal" was used, as asserted by Thomson. (*Comparing* CIB at 40 *with* CX-4240C at Q. 165) AUO reiterates that Dr. Ho's testimony says nothing about whether the "spacing elements included material affixing them to the substrate," as asserted by Thomson. AUO says, instead, the cited testimony states that a vendor "affixed the cells" (Citing CX-4240C at Q. 166), which has nothing to do with an affixing layer. AUO concludes that Dr. Ho testified that the vendor was not involved in fabrication of spacers. (*Id.* at ¶ 167.)

AUO argues that Thomson skips over another element of its evidentiary burden: proof that the embodiment relied upon as evidence of priority was tested and shown to work for its intended purpose. (Citing *Cooper*, 154 F.3d at 1327) AUO says that Thomson does not dispute that testing was necessary to show that the '063 invention would work for its intended purpose.