

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Hayato Nakanishi
U.S. Patent No.: 7,259,736 Attorney Docket No.: 54108-0002IP1
Issue Date: August 21, 2007
Appl. Serial No.: 10/712,381
Filing Date: November 14, 2003
Title: ELECTRO-OPTICAL DEVICE, ACTIVE-MATRIX SUB-
STRATE, AND ELECTRONIC APPARATUS

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 7,259,736 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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EXHIBITS

EX-1001	U.S. Patent No. 7,259,736 to Hayato Nakanishi (“the ’736 patent”)
EX-1002	Excerpts from the Prosecution History of the ’736 Patent (“the Prosecution History”)
EX-1003	Declaration of Dr. David K. Liu
EX-1004	U.S. Patent No. 5,831,699 (“Wright”)
EX-1005	Prosecution History of JP2002-348622 (“the Foreign Counterpart Prosecution History”)
EX-1006	Certified Translation of Pages 1-10, 50-58 from the Foreign Counterpart Prosecution History
EX-1007	Certified Translation of Pages 63-79 from the Foreign Counterpart Prosecution History
EX-1008	JPH11185654A to Yukio Masuda et al (“Masuda”)
EX-1009	Certified Translation of Masuda
EX-1010	JP2002-278504A to Mitsuo Inoue et al (“Inoue”)
EX-1011	Certified Translation of Inoue
EX-1012	KR960012168A to Yang-Ho Kwon (“Kwon”)
EX-1013	Certified Translation of Kwon
EX-1014	Sarma et al., “Flat Panel Displays for Portable Systems,” 13 <i>Journal of VLSI Signal Processing Systems</i> 165-190 (1996)

- EX-1015 Complaint, *Element Capital Commercial Company PTE. Ltd. v. BOE Technology Group Co., Ltd. et al.*, Case No. 2:22-cv-0118-JRG (E.D. Tex.)
- EX-1016 Docket Control Order, *Element Capital Commercial Company PTE. Ltd. v. BOE Technology Group Co., Ltd. et al.*, Case No. 2:22-cv-0118-JRG (E.D. Tex.)
- EX-1017 Plaintiff's Infringement Contentions, served on January 5, 2023 in *Element Capital Commercial Company PTE. Ltd. v. BOE Technology Group Co., Ltd. et al.*, Case No. 2:22-cv-0118-JRG (E.D. Tex.)
- EX-1018 2023-05-31 Email from Patent Owner to Petitioner
- EX-1019 2023-06-29 Email Thread Between Patent Owner and Petitioner Memorializing Agreement re Second IPR Petition
- EX-1020 U.S. Published App. No 2003/0090447 to Hajime Kimura ("Kimura")

I. INTRODUCTION

BOE Technology Group Co., Ltd., Beijing BOE Display Technology Co., Ltd., and Motorola (Wuhan) Mobility Technologies Communication Co., Ltd. (“Petitioner”) petition for *Inter Partes* Review (“IPR”) of claims 18, 23, 33, and 35 (“Challenged Claims”) of U.S. Patent No. 7,259,736 (“the ’736 patent”).

Petitioner previously filed an IPR petition challenging claims 3-5, 7, 9, and 13-17 of the same patent, which at the time, were the only ’736 patent claims asserted against Petitioner in co-pending district court litigation. *See* EX-1017 (2023-01-05 Plaintiff’s Infringement Contentions). Since that time, Patent Owner indicated that it intends to move the District Court for leave to assert additional claims 23 and 35 (which depend from claims 18 and 33, respectively), which prompted Petitioner to file this second IPR petition. *See* EX-1018 (2023-05-31 Email from Patent Owner). In exchange for Petitioner’s non-opposition to Patent Owner’s motion for leave to amend its infringement contentions in the District Court case, Patent Owner has agreed “not to argue for discretionary denial of this subsequent IPR petition filed against the newly asserted claims.” EX-1019 (2023-06-29 Email Thread Memorializing Agreement). The primary reference in this petition—a Japanese published patent application to Masuda—also served as the primary reference in the prior IPR. *See* IPR2023-00605, Paper 1.

II. REQUIREMENTS FOR IPR

A. Grounds for Standing

Petitioner certifies that the '736 Patent is available for IPR. The present petition is being filed within one year of service of a complaint against Petitioner.

Petitioner is not barred or estopped from requesting this review.

B. Challenge and Relief Requested

Petitioner requests IPR on the grounds set forth below. The Declaration of Dr. David K. Liu provides additional explanation and support. *See* EX-1003.

Ground	Claims	Basis for Rejection
1A	18 and 33	Anticipated by, and Obvious over JPH11185654A ("Masuda")
1B	18, 23, 33, and 35	Obvious over Masuda in view of U.S. Pub. App. No. 2003/0090447 ("Kimura")

These references qualify as prior art based on the earliest claimed priority date, 11/29/2002, as shown below. Petitioner does not concede that the '736 patent is entitled to the claimed priority.

Notably, none of the references was considered during prosecution before the United States Patent Office. *See generally* EX-1001 at (56); EX-1002.

Reference	Date	Statutory Ground ¹
JPH11185654A ("Masuda")	7/9/1999 (publication)	§102(b)
U.S. Pub. App. No. 2003/0090447 ("Kimura")	9/18/2002 (filing) 5/15/2003 (publication)	§102(e)

C. Level of Ordinary Skill in the Art

For purposes of IPR, a person of ordinary skill in the art at the time of alleged invention ("POSITA") would have had at least a Master's degree in electrical engineering, physics, or a related field, and at least two years of relevant work experience in the field of integrated circuit design and manufacturing. EX-1003 at ¶¶ 26-27. Additional education can remedy lack of work experience and vice versa. *Id.*

¹ Because the '736 patent was filed on November 14, 2003, it is treated as a "pre-AIA" patent. Thus, all citations to 35 U.S.C. § 102 in this petition will refer to the pre-AIA version of § 102.

III. SUMMARY OF THE '736 PATENT

A. Brief Description

The '736 patent relates to an “electro-optical device.” EX-1001 at Abstract. It discloses, as background, that “an active matrix drive system” can drive various types of displays, including those having “liquid-crystal elements, organic EL (electroluminescent) elements, electrophoresis elements, electron emitting elements, or the like.” *Id.* at 1:10-14. This system features a “display panel,” a “plurality of pixels in a matrix,” and “pixel circuits . . . for supplying drive power to the electro-optical elements.” *Id.* at 1:14-19.

The patent alleges that, when an active matrix drive system’s “pixel circuits have different shapes and/or different pitches” in the column and row directions, “directional viewing variation occurs,” impairing “display quality.” *Id.* at 1:23-34. The '736 patent discloses three exemplary embodiments that purport to solve that and other display-related problems. *See* EX-1003 at ¶¶ 56-63.

1. First Exemplary Embodiment

The '736 patent’s first exemplary embodiment generally relates to a pattern of display pixels. *See* EX-1001 at 7:6-13:20. The pattern features green (“ZG”),

blue (“ZB”), and red (“ZR”) “pixel forming regions,” and a “dummy forming region” (“ZS”) laid out in a square lattice. *See id.* at 7:58-62.² Each pixel forming region features a “pixel circuit”³ (20G, 20B, and 20R for green, blue, and red, respectively) to drive an “organic EL (electroluminescent) element”⁴ (21G, 21B, and 21R). *See id.* at 7:44-48. The dummy region, in contrast, lacks pixel circuits or organic EL elements and instead features an “anti-reflection member.” *Id.* at 8:1-4, Fig. 3. The patent states that “[t]hus, black is displayed in the dummy forming region” instead of a color, which enhances “the contrast ratio of the display.” *Id.* at 8:4-8; EX-1003 at ¶¶ 56-61.

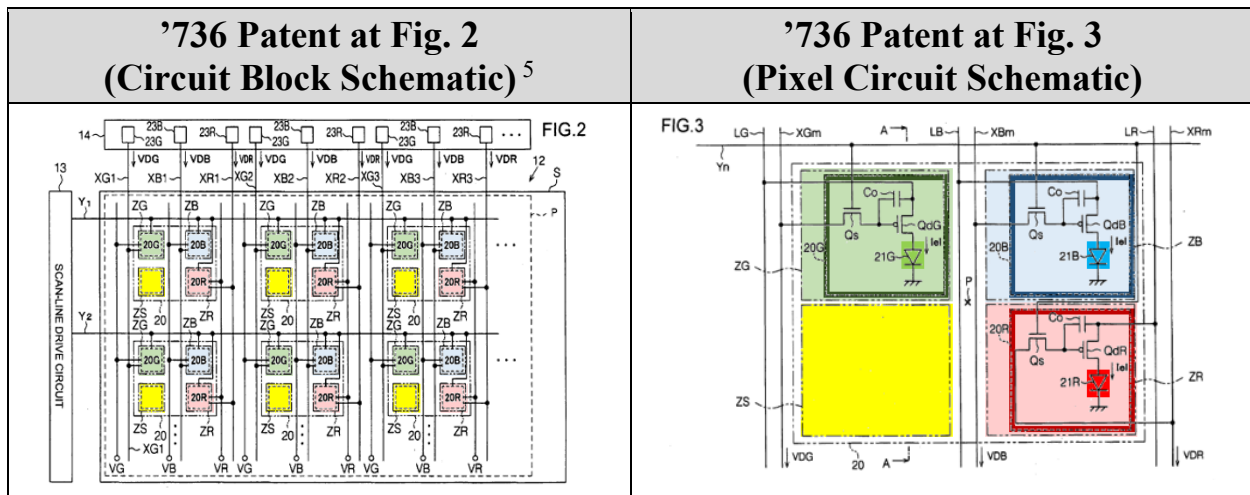
Figure 2 is annotated below to identify pixel-forming regions (in pale green,

² As a convention throughout this petition, the color yellow will generally be used to depict the “dummy,” “non-luminous,” or “non-element forming” region.

³ The patent later clarifies that “the pixel circuits 20 and 30 . . . may [] be embodied as electronic circuits to drive electro-optical elements, for example, light-emitting elements, such as LED or FED, other than the organic elements 21G, 21B, and 21R.” EX-1001 at 16:42-47.

⁴ The patent later clarifies that “the electro-optical elements may be applied to an inorganic EL display having inorganic EL elements.” EX-1001 at 16:48-53.

blue, and red shading) and dummy regions (yellow shading), and figure 3 is annotated to identify exemplary pixel-forming regions (pale green, blue, and red shading), pixel circuits (dark green, blue, and red outlines), organic EL elements (bright green, blue, and red shading), and a dummy region (yellow shading), which lacks pixel circuits or elements. See EX-1003 at ¶¶ 56-61.



The '736 patent alleges this pattern provides various advantages. First, by

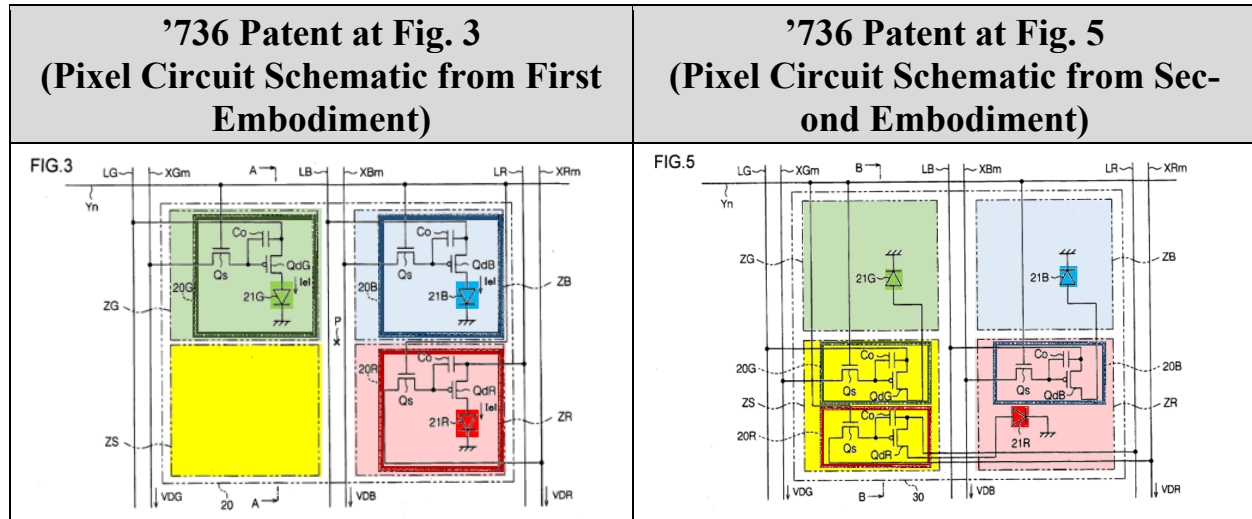
⁵ This petition uses the '736 patent's original November 14, 2003 filing's figures rather than the '736 patent's figures. EX-1002 at 31-37. The '736 patent apparently issued with the wrong figures, which pertain to unrelated U.S. application no. 10/721,381 and not the '736 patent (U.S. application no. 10/712,381). Petitioner may challenge the validity of the patent on other grounds in district court based on this defect.

having “two adjacent same-color organic EL elements . . . arranged at regular intervals with one forming region interposed therebetween, it is possible to reduce directional viewing variation that occurs between the column direction and the row direction of the display panel portion 12.” EX-1001 at 12:61-67. Second, the dummy forming region’s “anti-reflection member” results in “a display having a high contrast ratio.” *Id.* at 13:1-6. Third, having the “same shape” for the pixel and dummy forming regions reduces “coating spots that result from the formation of the organic EL elements.” *Id.* at 13:7-14; *see also* EX-1003 at ¶¶ 56-61.

2. Second Exemplary Embodiment

The ’736 patent’s second exemplary embodiment “is analogous to the first exemplary embodiment except that the formation positions of the pixel circuits 20G, 20B, and 20R in the first exemplary embodiment are different.” *See* EX-1001 at 13:24-15:28. Comparing figure 3 (corresponding to the first embodiment) with figure 5 (corresponding to the second embodiment) illustrates this difference. Specifically, green pixel circuit 20G and red pixel circuit 20R are moved to dummy region ZS (*id.* at 13:42-46, 13:58-63) and blue pixel circuit 20B is moved to red pixel region ZR (*id.* at 13:47-57). The organic EL elements 21G, 21B, and 21R, on the other hand, remain in their original locations. *See id.* at 13:41-57. Figures 3 and 5 are annotated below to identify exemplary instances of pixel circuits (dark green, blue, and red outlines), elements (bright green, blue, and red shading),

pixel regions (pale green, blue, and red shading), and a dummy region (yellow shading).

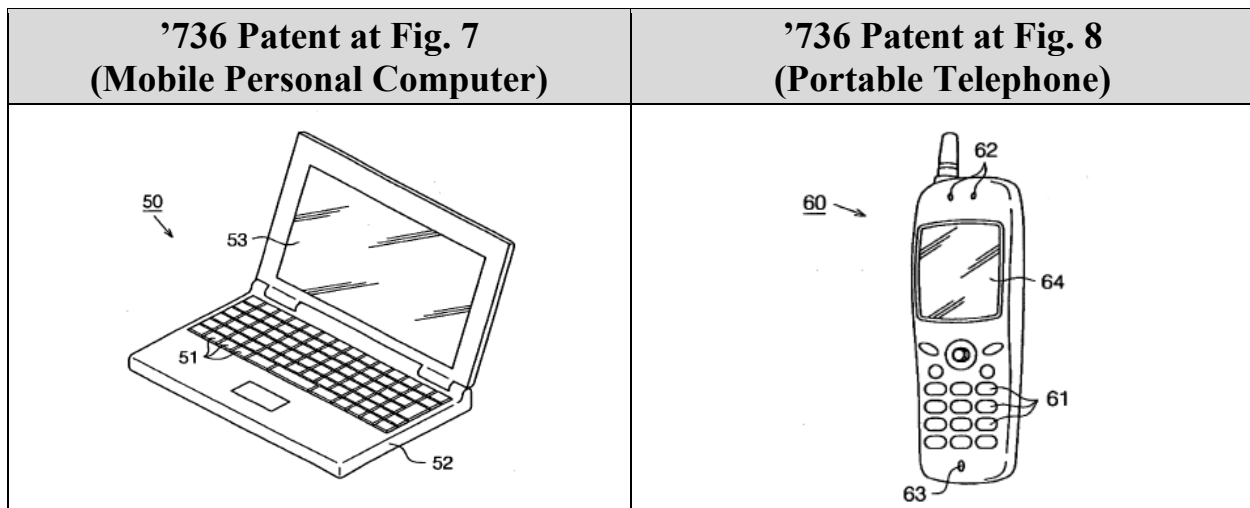


Altering the pixel circuit's "formation positions" in this manner allegedly allows the "aperture ratios in the green pixel forming region ZG and the blue pixel forming region ZB" to be increased. EX-1001 at 13:52-53. "As a result, a display having reduced power consumption can be provided." *Id.* at 15:18-23. The "formation of the pixel [circuits⁶], which control the green and red organic EL elements 21G and 21R, in the dummy forming region ZS can reduce the area of the pixel circuit 30." *Id.* at 15:24-28; *see also* EX-1003 at ¶ 62.

⁶ The patent's reference to "pixel elements" rather than "pixel circuits" in this section appears to be a typo. *See* EX-1001 at 13:42-45, 13:58-63; EX-1003 at ¶ 62.

3. Third Exemplary Embodiment

The '736 patent's third and final exemplary embodiment generally relates to an "electronic apparatus . . . which serves as an electro-optical device" and embodies the display described in the first or second exemplary embodiments. *See* EX-1001 at 15:30-59. Such an apparatus can be, for example, a "mobile personal computer" or a "portable telephone." *See id.* at 15:39-60, Fig. 7, Fig. 8; *see also* EX-1003 at ¶ 63.



B. Prosecution History

1. United States Patent Office Proceedings

The '736 patent was filed on November 14, 2003, claiming priority to a Japanese application no. 2002-348622 filed November 29, 2002. EX-1002 at 1.

The first office action issued June 25, 2006, and it included a restriction requirement. *Id.* at 228-231. In response, the Applicant provisionally elected "Spe-

cies 1” with traverse and characterized the elected species as corresponding to figures 1-4, 7, and 8 and claims 1-7, 11-20, 23-29, 32, and 33. *Id.* at 232-233. Non-elected claims 8, 21, and 30 generally recited that at least one of the first and second optical [sic]/ light-emitting / element forming regions has an electronic circuit to drive or control electro-optical elements / light-emitting films in another first or second optical [sic] / light-emitting / element forming region. *Id.* at 26-29.

The next office action issued September 12, 2006. *Id.* at 241-250. Despite the Applicant’s request for examination of all species (on the basis of M.P.E.P. § 803), the Examiner maintained the restriction requirement, examined only the elected claims, and deemed claims 8-10, 22, 22, 30, and 31 withdrawn from examination. *Id.* at 242-243. This office action also rejected all elected claims based on Wright (U.S. Patent No. 5,831,699) and other references. *Id.* at 245-249; EX-1004. The Examiner asserted that elements 34-37 in figure 1 of Wright disclosed the claimed “ineffective optical regions” (annotated in yellow) that were “sandwiched” by “first effective optical regions (24, 27)” and “second effective optical regions (25, 26)” (all annotated in red) as recited by claims 1-3. EX-1002 at 245-246. The Examiner did not distinguish claim 1 and 3’s “effective optical regions” from claim 16’s “light-emitting regions” or claim 26 and 27’s “element forming regions.” *See id.* at 25-28, 245-246. Nor did the Examiner distinguish claim 1 and 3’s “ineffective optical regions” from claim 16’s “non-luminous regions” or claim

26 and 27's "non-element-forming regions." *See id.*

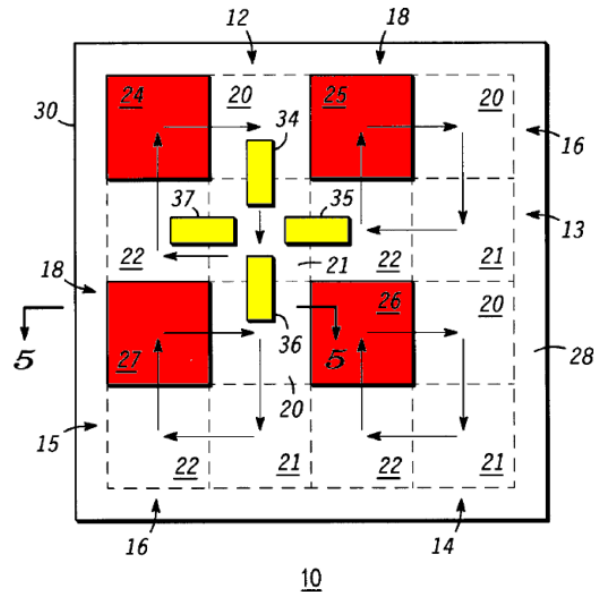


FIG. 1

EX-1004 at Fig. 1; *see also* EX-1003 at ¶¶ 64-65.

In an interview held December 16, 2006, the Examiner agreed that, if "the limitation of 'the ineffective optical region' changed to -- the *whole* ineffective optical region -- in claim 2, the claim 2 rejection will be withdrawn." EX-1002 at 256 (emphasis added). The interview summary does not indicate that any claims other than claims 1, 2, and 4 were discussed. *See id.*

The Applicant amended the claims on January 17, 2007, including canceling claim 2 and moving its limitations to claim 1, which resulted in all independent claims reciting either that:

- the "whole" "ineffective optical regions" (claim 3) or "non-luminous re-

gions” (claim 16) or “non-element-forming regions” (claim 27) are sandwiched

- “ineffective optical regions” (claim 1) or “non-element-forming regions” (claim 26) are “*provided in a square lattice*” as well as sandwiched.

Id. at 257-268. The Applicant noted that the Examiner apparently agreed that amending claim 2 to recite that each of “the whole ineffective optical region[s]” were sandwiched would overcome the § 102 rejection, which was based on Wright. *Id.* at 267. Although it cancelled claim 2, the Applicant noted that it “amended independent claims 3, 16 and 28” in this manner. *Id.* Like the Examiner’s prior office action, the Applicant did not distinguish (A) claim 1 and 3’s “effective optical regions” from claim 16’s “light-emitting regions” or claim 26 and 27’s “element forming regions” or (B) claim 1 and 3’s “ineffective optical regions” from claim 16’s “non-luminous regions” or claim 26 and 27’s “non-element-forming regions.” *See id.* The Applicant further argued that Wright does not disclose that “ineffective optical regions are arranged on the (square) lattice so as to be sandwiched . . .” *Id.* at 267-268. The Applicant also requested rejoinder of the withdrawn claims. *Id.* at 268.

A notice of allowance issued April 9, 2007, and allowed claims 1 and 3-38,

renumbered⁷ as 1-37. *Id.* at 275-280. The notice stated that none of the cited references “teaches the whole ineffective optical regions being arranged so as to be sandwiched by two of the first effective optical regions and so as to be sandwiched by two of the second effective optical regions.” *Id.* at 279.

The ’736 patent issued on August 21, 2007. *Id.* at 294.

2. Japanese Patent Office Proceedings

Though the ’736 patent’s priority Japanese application—JP2002-348622—was filed roughly a year earlier than the ’736 patent’s U.S. application, its prosecution lagged behind the U.S. application. As a result, the Japan Patent Office (“JPO”) uncovered prior art that was never considered by the USPTO, which it used to reject claims substantially similar to those that had already issued in the United States. *See* EX-1002 at 294 (August 21, 2007, issuance); EX-1007 at 1-2 (September 5, 2007 first office action); EX-1003 at ¶¶ 66-68.

Around January 29, 2007, while the U.S. application was still pending, the JPO issued a search report that identified three prior art references, including JP11-

⁷ Original claim 32, once allowed, became final claim 2. EX-1002 at 286. Thus, original claim 3, after amendment and allowance, became final claim 3. *Id.* Additionally, original claim 16 became final claim 18, and original claim 27 became final claim 33. *Id.*

185654 (“Masuda”). EX-1007 at 12-14; EX-1009. Masuda published on July 9, 1999, and thus qualifies as prior art not only to the Japanese application, but also to the U.S. application under pre-AIA 35 U.S.C. § 102(b). EX-1009. Masuda was not made available to the USPTO Examiner or considered during prosecution of the U.S. application. EX-1001 at References Cited (lacking any mention of references to “Masuda”); EX-1002.

Around September 5, 2007, the JPO rejected claims that were essentially identical to claims that the USPTO allowed only a couple weeks before. EX-1007 at 1-2. First, the JPO found that Masuda described the alleged inventions in at least Japanese application claims 3, 16, and 27. *Id.* at 1 (citing those claims, Reason 1, and Document 1, which is defined in the “Cited References” portion as Masuda).⁸ As shown by the table below, these rejected Japanese claims correspond to claims 3, 18, and 33 of the ’736 patent. EX-1006 at 5-11. The first entry has been highlighted to identify limitations from the Japanese independent claims and U.S. independent claims that are substantially the same, including challenged claims 18 and 33:

⁸ The JPO further noted that these claims “could have been arrived at easily by [a] person skilled in the art based on [Masuda].” EX-1007 at 1 (citing Reason 2).

Claims Anticipated by Masuda According to the JPO	Issued Claims of the '736 Patent
3. An electro-optical device, comprising: a plurality of first effective optical regions provided with a first electro-optical element; a plurality of second effective optical regions provided with a second electro-optical element; and a plurality of non-effective optical regions in which electro-optical elements are not provided; wherein each of the plurality of non-effective optical regions is interposed between two first effective optical regions of the plurality of first effective optical regions and simultaneously interposed between two second effective optical regions of the plurality of second effective optical regions.	3. An electro-optical device comprising: a substrate; a plurality of first effective optical regions provided above the substrate, first electro-optical elements being provided in the first effective optical regions; a plurality of second effective optical regions provided above the substrate, second electro-optical elements being provided in the second effective optical regions; and a plurality of ineffective optical regions provided above the substrate, no electro-optical elements being provided in the ineffective optical regions, each of the whole ineffective optical regions being arranged so as to be sandwiched by two of the first effective optical regions and so as to be sandwiched by two of the second effective optical regions.
16. An electro-optical device, comprising on a substrate: a plurality of first light emitting regions on which a first light emitting film is formed;	18. An electro-optical device, comprising: a substrate; a plurality of first light-emitting regions provided above the substrate, first light-emitting films being provided in the first light-emitting regions;

a plurality of second light emitting regions on which a second light emitting film is formed; and a plurality of non-light-emitting regions on which the light-emitting film is not formed; wherein each of the plurality of non-light-emitting regions is interposed between two first light-emitting regions of the plurality of first light-emitting regions, and simultaneously interposed between two second light-emitting regions of the plurality of second light-emitting regions.	a plurality of second light-emitting regions provided above the substrate, second light-emitting films being provided in the second light emitting regions; and a plurality of non-luminous regions provided above the substrate, no light-emitting films being provided in the non-luminous regions, each of the whole non-luminous regions is arranged so as to be sandwiched by two of the first light-emitting regions and so as to be sandwiched by two of the second light-emitting regions.
27. An active matrix substrate, comprising on a substrate: a plurality of first element forming regions where the first electro-optic elements are formed; a plurality of second element forming regions where the second electro-optic elements are formed; and a plurality of non-element forming regions in which electro-optical elements are not formed; wherein each of the plurality of non-element	33. An active matrix substrate comprising: a substrate; a plurality of first element forming regions provided above the substrate, first electro-optical elements being provided in the first element forming regions; a plurality of second element forming regions provided above the substrate, second electro-optical elements being provided in the second element forming regions; and a plurality of non-element-forming regions provided above the substrate, no electro-optical elements being provided in the non-element-forming regions, each of the whole non-element-forming

forming regions is interposed between two first element forming regions of the plurality of first element forming regions, and simultaneously interposed between two second element forming regions, of the plurality of second element forming regions.	regions being arranged so as to be sandwiched by two of the first element forming regions and so as to be sandwiched by two of the second element forming regions.
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Second, the JPO found that claims 12, 14, 15, and 25 “could have been easily invented by a person with ordinary knowledge . . . based on” Masuda and JP2002-278504 (“Inoue”). EX-1007 at 2-3 (citing those claims, Reason 2, and Cited References 1 and 2). Inoue published on September 27, 2002, and thus qualifies as prior art not only to the Japanese application, but also to the U.S. application under 35 U.S.C. § 102(a). *See* EX-1011. Inoue was not made available to the USPTO Examiner or considered during prosecution of the U.S. application. EX-1001 at References Cited (lacking any mention of references to “Inoue”); EX-1002.

In the Japanese prosecution, the Applicant did not dispute that Masuda anticipated claims 16 and 27 of the Japanese application. EX-1007 at 7-9. Applicant instead amended the rejected claims of the Japanese application to incorporate subject matter of “Claims for Which No Reason for Rejection Has Been Discovered.” *Id.* at 2-5. Specifically, the Applicant amended claims 3, 16, and 27, to incorporate the subject matter of claims 8-9, 21-22, and 30-31, forming new claims 1-2, 12-13, and 20-21—respectively. *Id.* at 3-7 (mapping new claim numbers to pre-

amendment claim numbers). The Applicant argued that Masuda had “no disclosure whatsoever . . . regarding the arrangement of electronic circuits, for driving the electro-optical elements, with respect to the effective optical regions and non-effective optical regions,” which it characterized as “a distinctive feature of the invention” after amending the claims to require the electronic circuit for driving an electro-optical element of a particular effective optical region to be provided on a different effective optical region or a non-effective optical region. *Id.* at 8.

The claims rejected by the JPO generally reflected the ’736 patent’s “first exemplary embodiment” of a pattern using colored “pixel forming regions” that sandwich a “dummy region.” *See supra* Section III.A.1.

Notably, the Applicant’s November 8, 2007 response in the Japanese application acknowledged that “an invention that is achieved through combining the driving method disclosed in [Inoue] with the layout of display elements described in [Masuda] would be . . . an invention wherein a basic layout of two rows and two columns is formed through three primary color display elements and one element that does not contribute to an image display, in an organic EL display device of an active matrix display system.” EX-1007 at 8.

C. Claim Construction

Based on the prior art’s description of the claimed elements being similar to that of the ’736 patent specification, no formal claim constructions are necessary in

this proceeding because “claim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011).⁹

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1A: Claims 18 and 33 are anticipated by, and obvious over, Masuda

1. Overview of Masuda¹⁰

JPH11185654A (“Masuda”) is a Japanese patent application that published on July 9, 1999, and thus qualifies as prior art under pre-AIA 102(b). EX-1008; EX-1009. Masuda relates to “a display panel for producing a color display using primary color display elements that are arranged in a matrix, and to an image displaying device equipped with said display panel.” EX-1009 at [0001].

⁹ Petitioner does not concede that each claim satisfies all statutory requirements, such as §§101 and 112, or waive any arguments concerning claim scope or grounds that can only be raised in district court. For this petition, Petitioner applies prior art in a manner consistent with Patent Owner’s allegations of infringement before the district court.

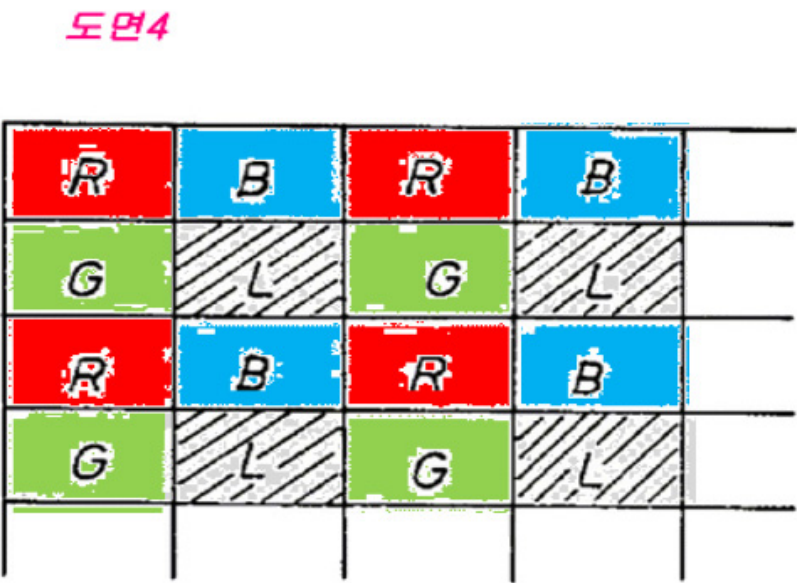
¹⁰ General descriptions provided for the references and combinations thereof are incorporated into each subsection and mapping of the claims that includes citations to these references.

Masuda teaches that rearranging a pixel's colors in a display can improve image quality. *See id.* at [0017]-[0022]; EX-1003 at ¶¶ 69-74. It noted that conventional displays featured pixels “lined up in the horizontal direction to form a single pixel” or in a “stripe arrangement.” EX-1009 at [0017]. This arrangement allegedly suffers from reduced “resolution in the horizontal direction.” *Id.* A “checkerboard arrangement” improves resolution compared to the stripe arrangement, but it “cannot produce [its] maximum performance, because the green outputs [which in the example below are included in each column and each row whereas the blue and red outputs are included in every *other* row and every *other* column] are each limited to half in order to . . . achieve a color balance.” *Id.* at [0019]-[0020].

Masuda's invention improves upon the checkerboard arrangement by adding “*one element that does not contribute to the image display*” to reduce “the difference in luminosity between columns or difference in luminosity between rows” that would otherwise appear in the checkerboard arrangement. *Id.* at [0021]-[0022]. Figures 3(a), 3(b), and 5—annotated below to show red, blue, green, and “non-display elements” (marked by “X” and highlighted with yellow)—depict the pixel arrangements disclosed by Masuda:

Masuda at Figure 3(a) (conventional “stripe arrangement”)	Masuda at Figure 3(b) (conventional “checkerboard arrange- ment”)	Masuda at Figure 5 (improved arrange- ment with “non-display elements”)
 (a)	 (b)	

Masuda’s checkerboard pattern including a “non-display” element was known generally in the art of pixel-based displays. EX-1003 at ¶¶ 72-75. For example, KR960012168A to Kwon discloses a “plasma display device” featuring red, blue, green and “black” pixels (indicated by the letters R, B, G, and L, respectively, in Kwon’s highlighted figure 4 reproduced below:



EX-1013 at Fig. 4; *see also id.* at Abstract.

Masuda describes its invention as applicable at least to displays based on “cold cathode” “electron emitting elements.” *See generally* EX-1009 at [0002]-[0016]. Such elements include both “field emission-type elements,” also known as “FE-type,” and “metal/insulating layer/metal-type” elements, also known as “MIM-type.” *Id.* at [0002]. These elements generate electrons that strike “fluorescent materials” to emit light. *See id.* at [0015]; EX-1003 at ¶¶ 49, 73. Figures 19 and 20 of Masuda, reproduced below, depict an FE-type electron emitting element and a MIM-type electron emitting element, respectively:

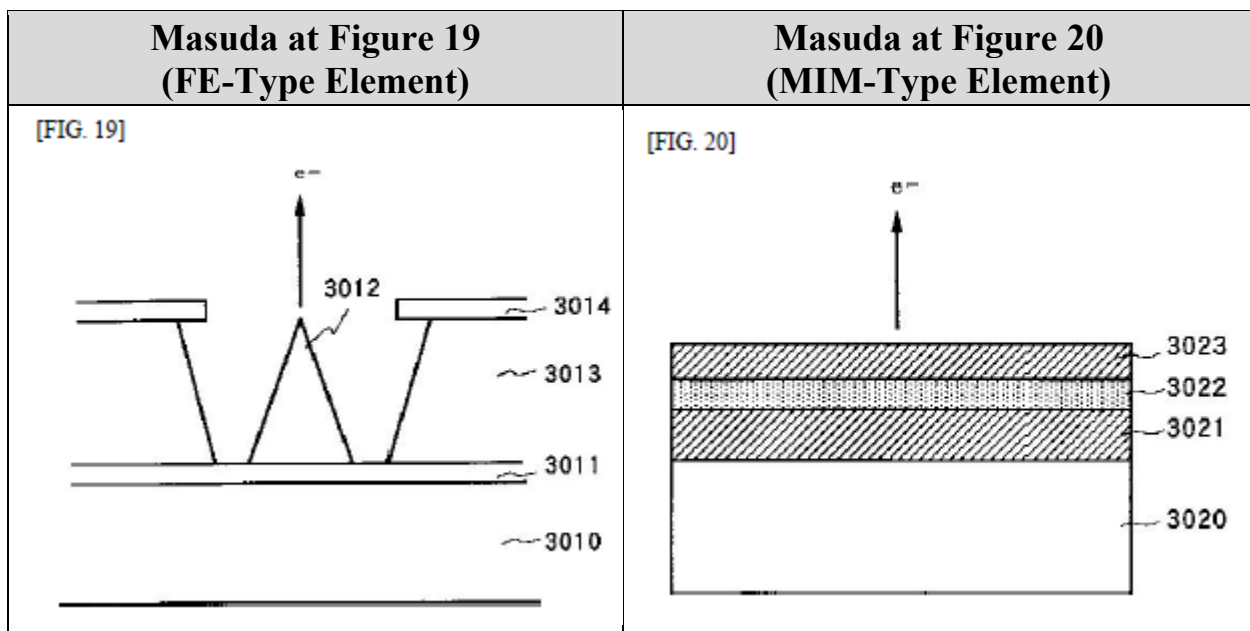
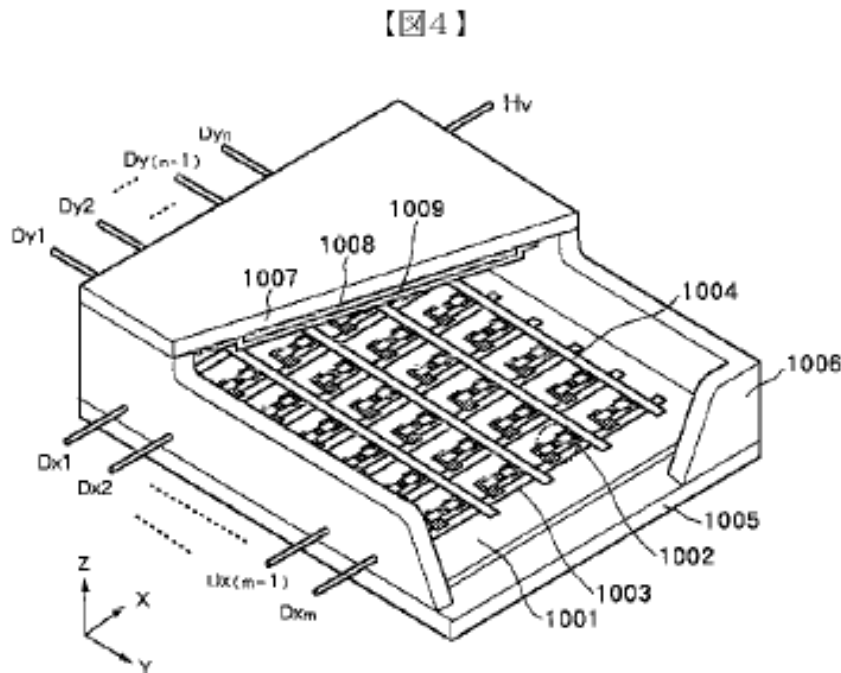


Figure 4 of Masuda, reproduced below, uses a “partial cutaway . . . to show the internal structure” of this display. EX-1009 at [0032]. It features a rear plate (1005), sidewall (1006), and a faceplate (1007), which form an “airtight container

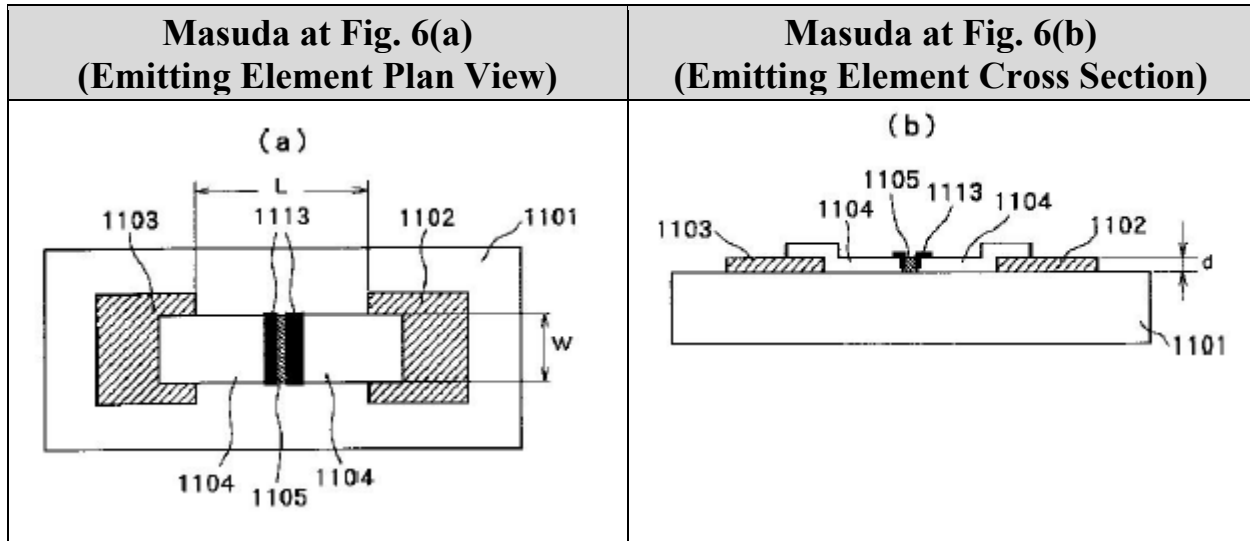
for preserving a vacuum.” *Id.* at [0033]. Within that airtight container lies a substrate (1001) upon which are formed “N x M surface conduction-type emitting elements” (1002), which correlate to the “number of pixels that are to be displayed.” *Id.* at [0034]. M row lines (1003) and N column lines (1004) connect these elements “in a simple matrix.” *Id.* A fluorescent film (1008) “is formed on the bottom surface of the faceplate” and coated with “fluorescent materials of the three primary colors of red (R), green (G), and blue (B).” *Id.* at [0036].



EX-1009 at Fig. 4.

Figure 6, reproduced below, provides a “plan view (a) and a cross-sectional drawing (b)” of the “emitting elements” used by Masuda’s display. *See id.* at [0045], [0118]. In these figures, “1101 is a substrate, 1102 and 1103 are element

electrodes, 1104 is a conductive thin film, 1105 is an electron emitting portion formed through an electrical forming process, and 1113 is a thin film formed through an electrical activating process.” *Id.* at [0045].



2. Claims 18 and 33

- (a) 18[a] “An electro-optical device, comprising:”
33[a] “An active matrix substrate comprising:”

To the extent the preamble is limiting, Masuda discloses an “Image Displaying Device Having [a] Display Panel,” which is an “electro-optical device.” *See* EX-1009 at Title; *see also id.* at [0001] (“The present invention relates to a display panel for producing a color display using primary color display elements that are arranged in a matrix.”), [0021]-[0022], [0101].

In the context of the ’736 patent, an “electro-optical device” refers to an apparatus incorporating a display, such as “mobile personal computers, portable telephones, and digital cameras.” EX-1001 at 15:32-38; *see also id.* at 15:39-48, Fig.

Figure 4, for example, depicts an “image displaying device” which is an “electro-optical device”:

During prosecution of the Japanese counterpart patent, the Applicant acknowledged that “Document 1 [i.e., Masuda] describes an image displaying device.” EX-1007 at 7. Applicant did not argue that Masuda does not disclose an

“electro-optical display” or an “active matrix substrate.” *Id.*

To the extent that the preamble is limiting, an “active matrix substrate” would have been obvious over the teachings of Masuda. Masuda features “color display elements arranged in a matrix.” *See id.* at [0022], [0027]. These elements, which are “connected in a simple matrix” are formed on a “substrate 1001.” *See id.* at [0034], [0042]-[0043]. As was known in the art, “active matrix” and “passive matrix” are the two primary techniques for driving a matrix of pixels. *See* EX-1014 at 9-11; *see also id.* at 11-13. Because Masuda’s pixel layout is not restricted to a specific display technology, it would have been obvious to implement Masuda using pixels on an active matrix substrate. *See* EX-1009 at Claim 1 (reciting a “display panel for displaying a color image wherein primary color display elements are arranged in a matrix”); EX-1003 at ¶ 91.

For these reasons, Masuda discloses and renders obvious an electro-optical device and renders obvious an active matrix substrate. EX-1003 at ¶¶ 91-92.

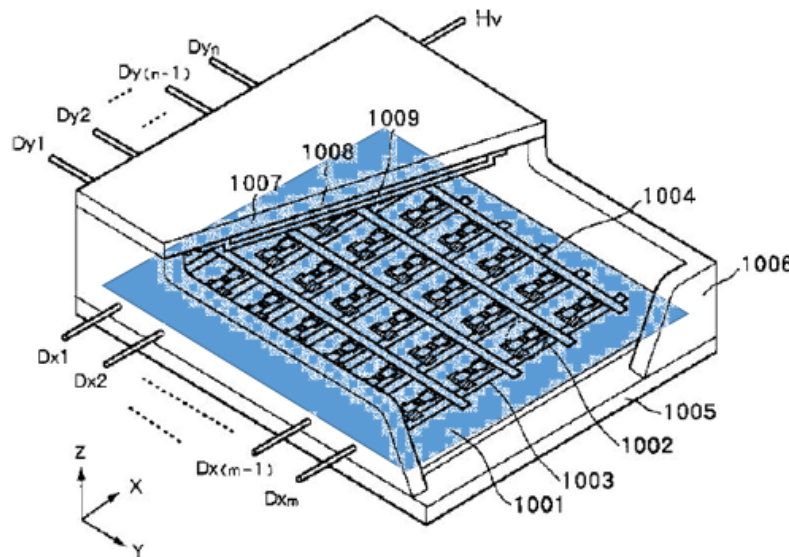
(b) 18[b] “a substrate;”
33[b] “a substrate;”

Masuda discloses a “substrate 1001,” which is a “substrate” as claimed by the ’736 patent. *See* EX-1009 at [0034].

Masuda describes that a “specific example will be presented to explain the structure and manufacturing method for a display panel used in the image displaying device wherein the present invention is applied.” EX-1009 at [0031]. That

structure includes a “substrate 1001,” which is “secured to the rear plate 1005 of the airtight container.” *Id.* at [0034]-[0035]. Masuda’s figure 4 shows a “perspective diagram of a display panel used in the present invention, showing a partial cut-away structure for a panel in order to show the internal structure” and is annotated below to identify the substrate 1001 in blue:

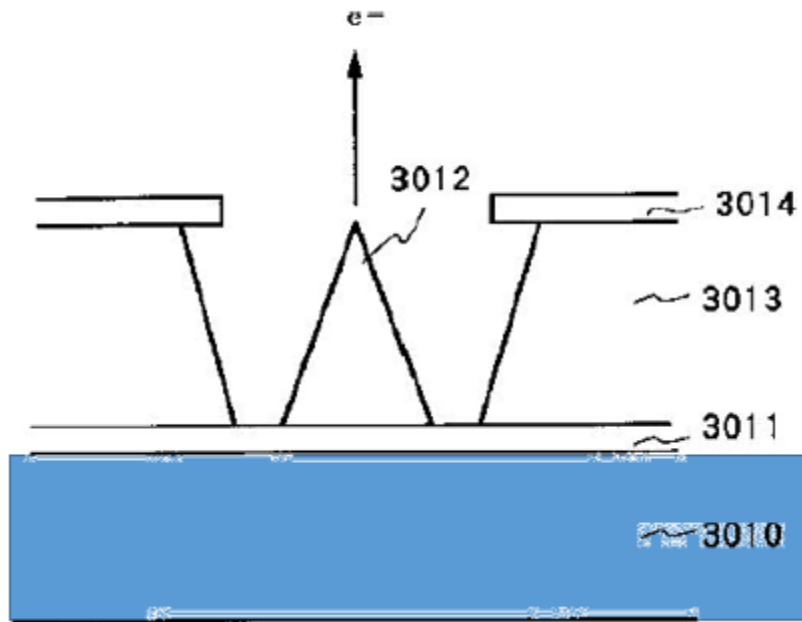
[FIG. 4]



Id. at Fig. 4, [0032].

Masuda further teaches that a substrate was a well-known component of conventional display technology, including field emission displays. *See id.* at [0004]-[0005], [0008]-[0010]. Figure 19 shows a “typical example of an FE-type element” which features substrate 3010, identified in blue below:

[FIG. 19]



Id. at Fig. 19, [0008].

Furthermore, during prosecution of the Japanese counterpart patent, the Applicant acknowledged “Document 1 [i.e., Masuda] describes an image displaying device.” EX-1007 at 7. Applicant did not argue that Masuda does not disclose a “substrate.” *Id.*

For these reasons, Masuda discloses and renders obvious a substrate. EX-1003 at ¶ 90.

- (c) 18[c] “a plurality of first light-emitting regions provided above the substrate, first light-emitting films being provided in the first light-emitting regions;”
33[c] “a plurality of first element forming regions provided above the substrate, first electro-optical

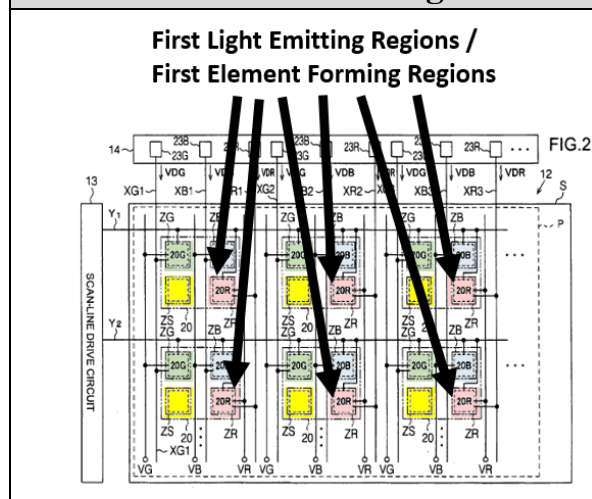
elements being provided in the first element forming regions;”

Masuda discloses “image displaying devices that use combinations of surface conduction-type emitting elements and fluorescent materials that emit light through exposure to an electron beam.” EX-1009 at [0015].

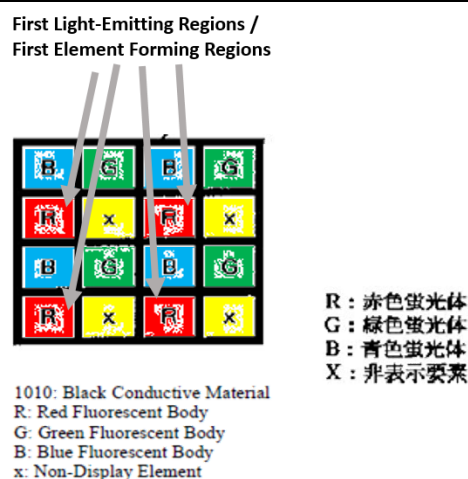
The regions encompassing the fluorescent materials of a particular color, such as red, and their corresponding electron emitting elements constitute a “plurality of first light-emitting regions” as well as a “plurality of first element forming regions.” *See id.* at [0022]-[0026] (referencing “primary color display elements”), [0036]; EX-1003 at ¶¶ 60, 92. As discussed above, the ’736 patent uses the terms “effective optical region,” “light emitting region,” and “element forming region” to generally refer to a region that contains an electro-optical element. *See supra* Section III.

As shown by the table below, Masuda and the ’736 patent both disclose a pattern that includes red light-emitting regions / element forming regions.

'736 Patent at Fig. 2



Masuda at Fig. 5



Masuda's light-emitting regions / element forming regions are above the substrate. "[F]luorescent materials of the three primary colors of red (R), green (G), and blue (B) ... are coated onto the fluorescent film" 1008. EX-1009 at [0036]. These materials, including the red fluorescent material coated on a fluorescent film, along with its corresponding electron emitting elements (1002) are above the substrate (1001) that is secured to the rear plate (1005). *See id.* at [0034] ("A substrate 1001 is secured to the rear plate 1005, and N x M surface conduction-type emitting elements 1002 are formed on the substrate 1001"), [0037] ("[T]he fluorescent film 1008 is formed on the faceplate substrate 1007."), Fig. 4 (depicting fluorescent film 1008 and emitting elements 1002 as above the substrate 1001 secured to the rear plate); EX-1003 at ¶ 89.

Masuda's light-emitting regions / element forming regions include "light-emitting films" / "electro-optical elements." As stated above, Masuda's electro-

optical regions encompass red “fluorescent material.” *See* EX-1009 at [0015]; EX-1003 at ¶ 87. This red material is a “light-emitting film” as claimed in the ’736 patent. Masuda describes this red material as formed on a “film” and therefore this material would also be considered a film—or at least the combination of the “material” and the “film” constitute a “film.” *See* EX-1003 at ¶ 95; EX-1009 at [0036] (“[A] fluorescent film 1008 is formed on the bottom surface of the faceplate 1007. . . . [F]luorescent materials of the three primary colors of red (R), green (G), and blue (B) . . . are coated onto the fluorescent film 1008.”).¹¹ As discussed above, this “fluorescent material emit[s] light through exposure to an electron beam” and is therefore “light-emitting.” *See* EX-1009 at [0015]. Moreover, because the ’736 patent does not restrict its inventions as applicable to a particular display technology, a POSITA would have understood that the light-emitting film it discloses encompasses fluorescent-material based display technology disclosed by Masuda. *See* EX-1003 at 96. *See* EX-1001 at 16:42-47 (“[A]lthough the pixel circuits 20 and 30 are embodied as electronic circuits to provide preferable advantages, they

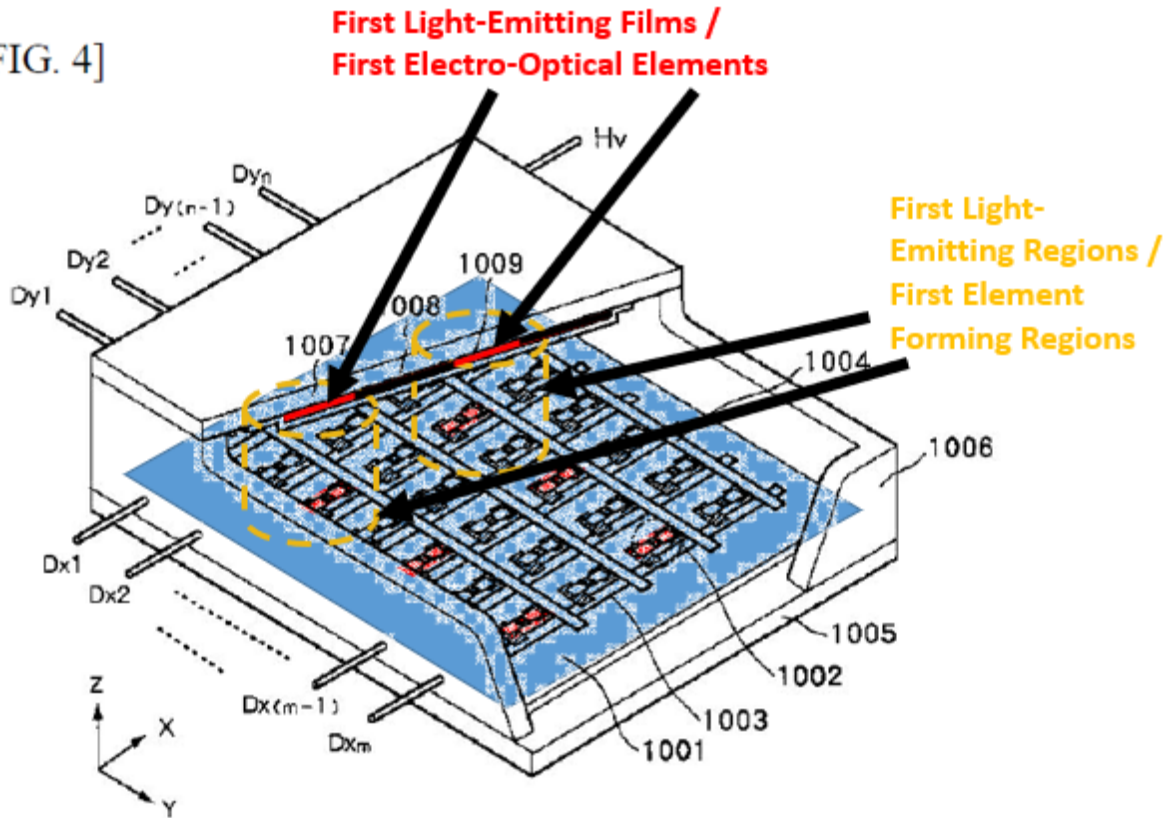
¹¹ At a minimum, light-emitting films were well-known before the ’736 patent and Masuda’s disclosure of “fluorescent material” and a “film” would have rendered obvious the use of a light-emitting film for its light-emitting elements.

maybe embodied as electronic circuits to drive electro-optical elements, for example, light-emitting elements, such as LED or FED, other than the organic EL elements 21G, 21B, and 21R.”).

The combination of this red light-emitting material and its corresponding electron emitting element for a given pixel is thus an “electro-optical element.”

Figure 4 is reproduced and highlighted below to identify the substrate (1001) (in blue), red fluorescent light-emitting film material (1008) (in red), and corresponding electron emitting elements (1002) (in red) when laid out in Masuda’s improved checkerboard pattern. EX-1009 at [0032]-[0036]; EX-1003 at ¶ 95. This figure has been annotated to identify exemplary first light-emitting regions / element forming regions (corresponding to orange cylinders) and first light-emitting films (corresponding to each red highlighted fluorescent material 1008) and first electro-optical elements (corresponding to each *pair* of red highlighted fluorescent material 1008 and its corresponding red highlighted electron emitter 1002):

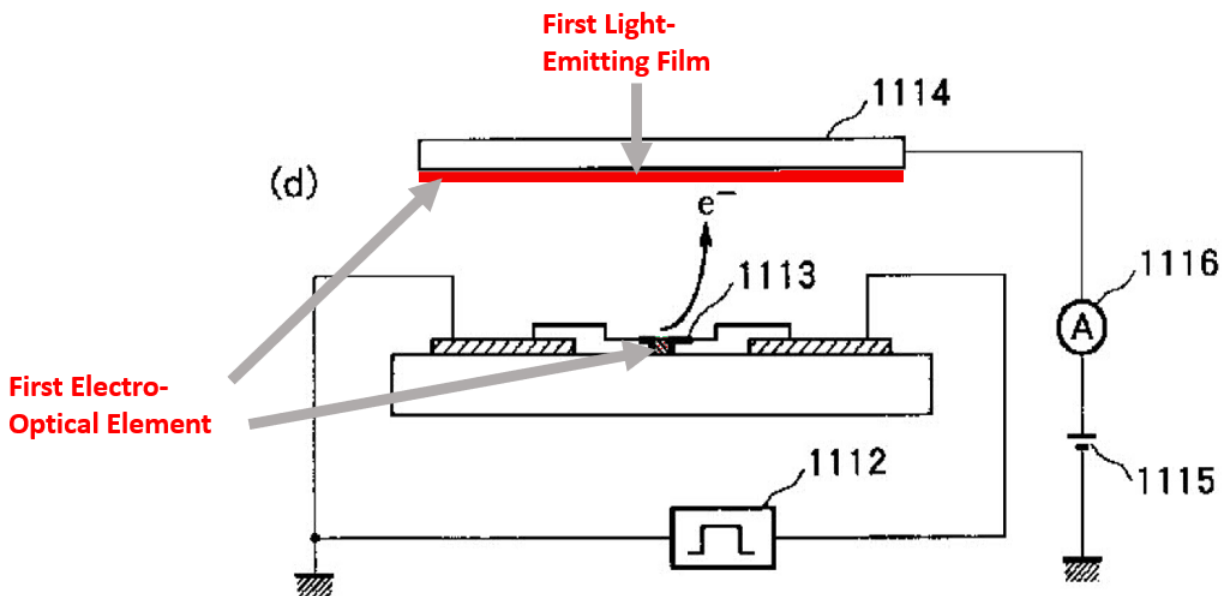
[FIG. 4]



EX-1009 at Fig. 4.

Figure 7(d), reproduced and highlighted below, shows another “cross-sectional” view of red electro-optical elements, including red light-emitting films. Masuda’s series of Figures 7(a)-(d) illustrate the “method for manufacturing the flat surface conduction-type emitting element.” EX-1009 at [0061]. The red rectangle on the bottom corresponds to “electron emitting portion” 1105, which emits electrons. *See id.* at [0061]-[0067] (explaining the steps that culminate in creation of this component), Fig. 7(c); EX-1003 at ¶ 96. The rectangle labelled 1114 on the top is an “anode electrode” and, in some embodiments, is also “the fluorescent face of the display panel” that emits light when struck by electrons. EX-1009 at [0075];

EX-1003 at ¶¶ 95-96. By serving as the fluorescent face, the anode has a fluorescent material deposited on it in order to cause electrons to strike that material, as shown in the annotated figure below. *See* EX-1003 at ¶¶ 95-96. In embodiments in which the anode electrode is distinct from the fluorescent material, the fluorescent material portion of the electro-optical element would nevertheless be above the electron emitting portion. *See* EX-1003 at ¶¶ 95-96.



EX-1009 at Fig. 7(d).

Although several types of display technology were known in the art, the '736 patent expressly contemplates that it can be implemented by electron emitting-type displays, such as that disclosed in Masuda. *See* EX-1001 at 16:42-47; EX-1003 at ¶¶ 61, 74. In Masuda's display, "surface conduction-type emitting elements, or cold cathode elements of the *FE* type or MIM type may be used." EX-

1009 at [0042]. The '736 patent discloses that type of display technology as a potential embodiment of the alleged invention, stating that its pixel circuits “may[] be embodied as electronic circuits to drive electro-optical elements, for example, light-emitting elements, such as LED or *FED*.” EX-1001 at 16:42-47; *see also* EX-1001 at 1:11-14, 1:41-42 (describing its “active matrix drive system” as capable of driving a “display having liquid-crystal elements, organic EL (electroluminescent) elements, electrophoresis elements, *electron emitting elements*, or the like”).

Furthermore, during prosecution of the Japanese counterpart patent, the Applicant acknowledged “Document 1 [i.e., Masuda] describes an image displaying device wherein a basic layout of two rows and two columns is formed through elements for displaying the three primary colors.” EX-1007 at 7. Applicant did not argue that Masuda does not disclose “light-emitting regions” / “element forming regions” or “light-emitting films” / “electro-optical elements.” *Id.*

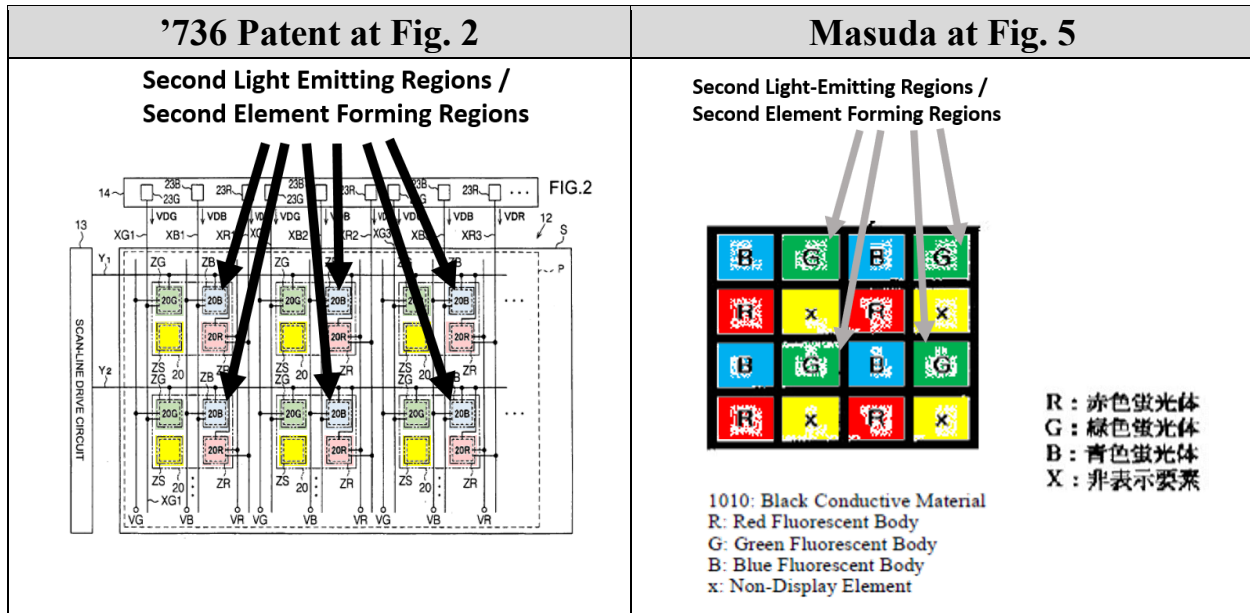
For these reasons, Masuda discloses and renders obvious a plurality of first light-emitting regions / element forming regions provided above the substrate, with first light-emitting films / electro-optical elements being provided in these regions. EX-1003 at ¶¶ 92-97.

- (d) 18[d] “a plurality of second light-emitting regions provided above the substrate, second light-emitting films being provided in the second light emitting regions; and”

33[d] “a plurality of second element forming regions provided above the substrate, second electro-optical elements being provided in the second element forming regions; and”

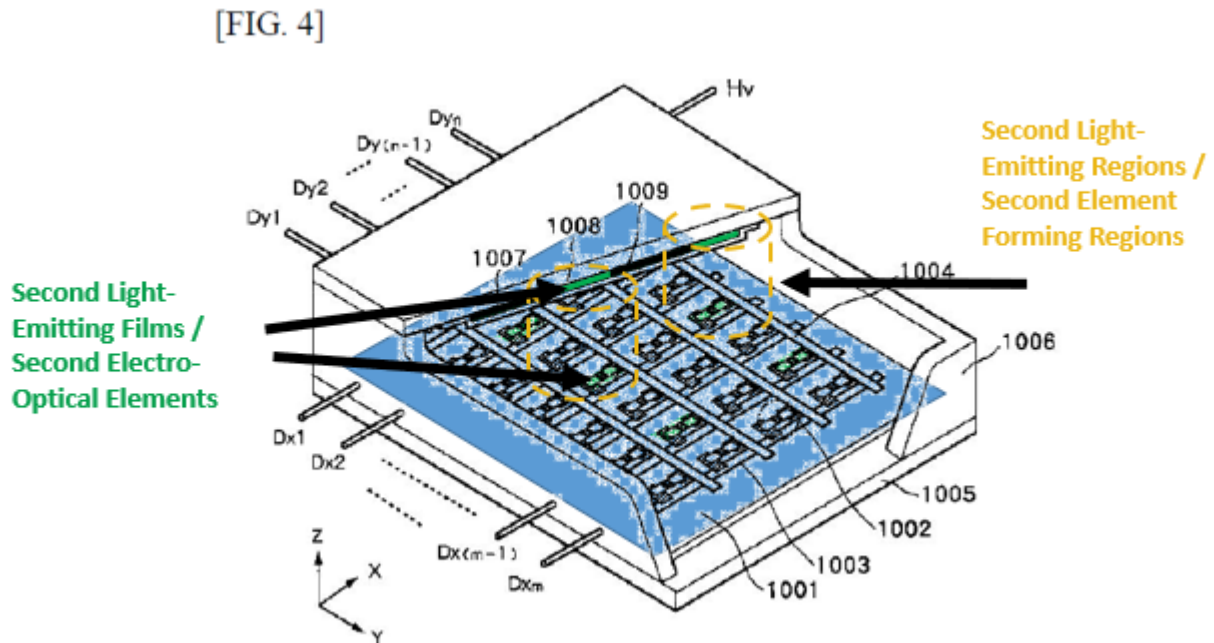
Masuda discloses second “light-emitting regions” / “element forming regions” above a substrate that provide “light-emitting films” / “electro-optical elements.” As explained in the previous section (3[c], incorporated here), Masuda discloses regions that encompass fluorescent materials of a particular color and their corresponding electron emitting elements, which constitute “light-emitting regions” / “element forming regions.” *See also* EX-1009 at [0015].

The regions encompassing the fluorescent materials of another color, such as green, and their corresponding electron emitting elements constitute a “plurality of first light-emitting regions” as well as a “plurality of first element forming regions.” *See* EX-1009 at [0022]-[0026] (referencing “primary color display elements”), [0036]; EX-1003 at ¶¶ 60, 93. As shown by the table below, Masuda and the '736 patent both disclose a pattern that includes green light-emitting regions / element forming regions.



(in blue), green fluorescent light-emitting film material (1008) (in green), and corresponding electron emitting elements (1002) (in green) when laid out in Masuda's improved checkerboard pattern. EX-1009 at [0032]-[0036]; EX-1003 at ¶ 95.

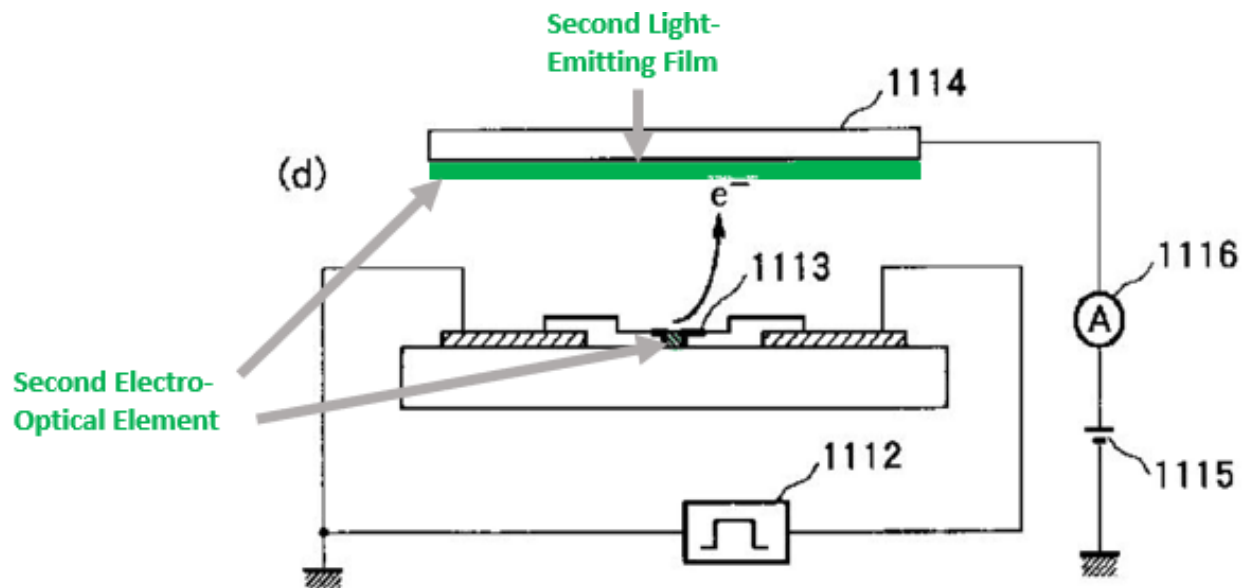
This figure has been further annotated to identify exemplary second light-emitting regions / element forming optical regions (corresponding to orange cylinders) and second light-emitting films (corresponding to each green highlighted fluorescent material 1008) and second electro-optical elements (corresponding to each *pair* of green highlighted fluorescent material 1008 and its corresponding blue highlighted electron emitter):



EX-1009 at Fig. 4.

Figure 7(d), reproduced and highlighted below, shows another “cross-sectional” view of green electro-optical elements, including green light-emitting films.

Masuda's series of Figures 7(a)-(d) illustrate the "method for manufacturing the flat surface conduction-type emitting element." EX-1009 at [0061]. The green rectangle on the bottom corresponds to "electron emitting portion" 1105, which emits electrons. *See id.* at [0061]-[0067] (explaining the steps that culminate in creation of this component), Fig. 7(c); EX-1003 at ¶ 96. The green rectangle on the top is an "anode electrode" and, in some embodiments, is also "the fluorescent face of the display panel" that emits light when struck by electrons. EX-1009 at [0075]; EX-1003 at ¶ 96. In embodiments in which the anode electrode is distinct from the fluorescent material, the fluorescent material portion of the electro-optical element would nevertheless be above the electron emitting portion. *See* EX-1003 at ¶ 96.



EX-1009 at Fig. 7(d).

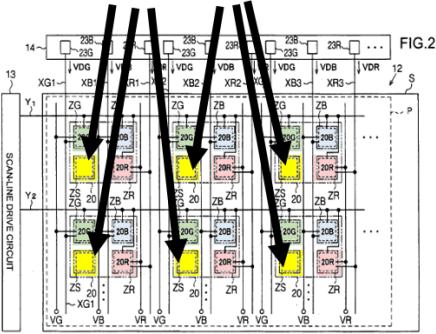
For these reasons, Masuda discloses and renders obvious a plurality of second light-emitting regions / element forming regions provided above the substrate, second light-emitting films / electro-optical elements being provided in these regions. EX-1003 at ¶¶ 92-97.

- (e) 18[e] “a plurality of non-luminous regions provided above the substrate, no light-emitting films being provided in the non-luminous regions,”
33[e] “a plurality of non-element-forming regions provided above the substrate, no electro-optical elements being provided in the non-element-forming regions,”

Masuda discloses “non-luminous regions” / “non-element-forming regions” above a substrate. It discloses “a display panel for displaying a color image, with primary color display elements arranged in a matrix, where a two-row, two-column basic arrangement is formed from three primary color display elements and *one element that does not contribute to the image display*.” EX-1009 at [0022]; *see also id.* at [0027]-[0029] (referencing “non-display element”). As discussed above, the ’736 patent uses the terms “ineffective optical region,” “non-luminous region,” and “non-element forming region” generally interchangeably. *See supra* Section III.

Masuda’s “non-display element” constitutes a non-luminous region / non-element-forming region. EX-1003 at ¶ 98. The ’736 patent describes the “region where the non-luminous films NLF are formed” as “the dummy forming regions

ZS” (EX-1001 at 10:11-14) and similarly discloses that “non-element-forming regions recited in the claims correspond to . . . the dummy forming regions ZS” (EX-1001 at 12:32-37). These regions “can ensure that black is displayed” and, “[a]s a result, the contrast ratio of the display can be enhanced.” EX-1001 at 8:4-7. Additionally, these regions allegedly reduce “directional viewing variation.” *Id.* at 12:61-67, 14:8-11. Masuda’s “non-display element” performs the same “dummy” function in the sense that it does not contribute to the image display and is intended to increase contrast and reduce directional viewing variation. EX-1003 at ¶¶ 54-55, 93; EX-1009 at [0021]-[0022], [0027]-[0028]. As shown by the table below, Masuda and the ’736 patent both disclose a pattern that includes non-luminous / non-element-forming regions.

'736 Patent at Fig. 2	Masuda at Fig. 5
Non-Luminous Regions / Non-Element-Forming Regions  FIG. 2	Non-Luminous Regions / Non-Element-Forming Regions  R : 赤色蛍光体 G : 緑色蛍光体 B : 青色蛍光体 X : 非表示要素 1010: Black Conductive Material R: Red Fluorescent Body G: Green Fluorescent Body B: Blue Fluorescent Body x: Non-Display Element

Because Masuda’s “non-display element” does not contribute to the image

display, a POSITA would have understood or found obvious that it has no electro-optical element or light-emitting film. EX-1003 at ¶ 98; *see also* EX-1001 at [0036]. Given that Masuda's display emits light by having electrons strike phosphor material of different colors, it would have been obvious that the non-display region, which by design does not contribute to the image, should not have the phosphor material, which is a light-emitting film. Including this material in those regions would needlessly risk unintentional light emission if stray electrons from adjacent sub-pixels struck that material. *Id.* If there is no phosphor material, there is also no electro-optical element because phosphor is necessary for the region to emit optical light. *Id.* A POSITA would also have recognized that omitting electro-optical elements in those regions would not make the display more costly. *Id.* Masuda itself acknowledges that unnecessary components may be omitted by teaching, for example, "there *is no need to provide memory for the non-display element portion.*" EX-1009 at [0113]. For these reasons, based on Masuda's disclosure, a POSITA would have understood or found it obvious to implement Masuda's "non-display elements" as non-luminous regions with no light-emitting films or as non-element-forming regions with no electro-optical elements. EX-1003 at ¶ 98.

Furthermore, during prosecution of the Japanese counterpart patent, the Applicant acknowledged "Document 1 [i.e., Masuda] describes an image displaying

device wherein a basic layout of two rows and two columns is formed through elements for displaying the three primary colors and *one element that does not contribute to the image display.*” EX-1007 at 7. Applicant did not argue that Masuda does not disclose “non-luminous regions” / “non-element-forming regions” with no “electro-optical elements” or “light-emitting films.” *Id.*

For these reasons, Masuda discloses and renders obvious a plurality of non-luminous regions / non-element-forming regions provided above the substrate, with no electro-optical elements or light-emitting films being provided in these regions. EX-1003 at ¶ 98.

- (f) 18[f] “each of the whole non-luminous regions is arranged so as to be sandwiched by two of the first light-emitting regions and so as to be sandwiched by two of the second light-emitting regions.”
33[f] “each of the whole non-element-forming regions being arranged so as to be sandwiched by two of the first element forming regions and so as to be sandwiched by two of the second element forming regions.”

Masuda discloses that “each of the whole”¹² “non-luminous regions” / “non-

¹² The presence of dummy pixels located at the edges of the display does not undermine that Masuda discloses that “each” of the non-luminous regions / non-element-forming regions are sandwiched. The ’736 patent specifically provides an embodiment in which the non-luminous / non-element-forming regions along the

element-forming regions” are sandwiched by two of the first “light-emitting regions” / “element forming regions” and sandwiched by two of the second “light-emitting regions” / “element forming regions.” Masuda discloses that a “two-row, two-column basic arrangement is formed from three primary color display elements and one element that does not contribute to the image display.” EX-1009 at [0022]; *see also* Ground 1A, Claims 18[c]-[d] and 33[c]-[d].

Masuda’s “checkerboard” pattern pixel arrangement shows that the non-luminous regions / non-element-forming regions (marked by “X”) are sandwiched, for example, by the red and green pixels. The top and bottom edges of a given non-luminous / non-element-forming region in Masuda are each bounded by a red pixel, such that each region is between two “same-color” regions, consistent with

edges of the device are not “sandwiched.” *See* EX-1001 at 8:28-33 (“That is, except for the pixel circuits 20 that are located at the top, bottom, left, and right edges, the dummy forming regions ZS of the pixel circuits 20 are arranged so as to be sandwiched by the red pixel forming regions ZG in the vertical direction (column direction).”). The ’736 patent does not disclose any embodiments where non-luminous regions / non-element-forming regions are absent from the display’s edges. *See id.* at Fig. 2 (illustrating non-luminous regions / non-element-forming regions along first pixel column).

how the '736 patent uses the term “sandwich.” *See, e.g.*, EX-1001 at 16:12-16.

Likewise, the right and left edges of that given non-luminous region / non-element-forming region are each bounded by a green pixel, forming another sandwich.

The “whole” of Masuda’s non-luminous regions / non-element-forming regions are sandwiched. While the '736 patent itself does not elaborate on what it means for a “whole” region to be sandwiched, its prosecution history indicates that the term means that no portion of the non-luminous / non-element-forming region extends beyond the effective optical regions that sandwich it. *See supra* Section III.B.1 (addressing how the “whole” limitation was introduced via amendment to overcome prior art); EX-1003 at ¶ 99. In Masuda, as shown by the table below, no portion of the non-luminous region / non-element-forming region extends beyond the light-emitting regions/ element-forming regions that sandwich it, similar to the '736 patent.

**'736 Patent at Fig. 2
(annotated)**

**Masuda at Fig. 5
Red: “First Light-Emitting Regions” /
“First Element Forming Regions”**

**Green: “Second Light-Emitting Regions”
/
“Second Element Forming Regions”**

**Yellow: “Non-Luminous Regions” /
“Non-Element-Forming Regions”**

Furthermore, during prosecution of the Japanese counterpart patent, Applicant did not argue that Masuda failed to disclose non-luminous regions / non-element-forming regions that are “interposed between” or “sandwiched by” light-emitting regions / element forming regions. *See* EX-1007 at 7-8.

For these reasons, Masuda discloses and renders obvious each of the whole non-luminous regions / non-element-forming regions being arranged so as to be sandwiched by two of the first light-emitting regions / element forming regions and so as to be sandwiched by two of the second light-emitting regions / element forming regions. EX-1003 at ¶ 99.

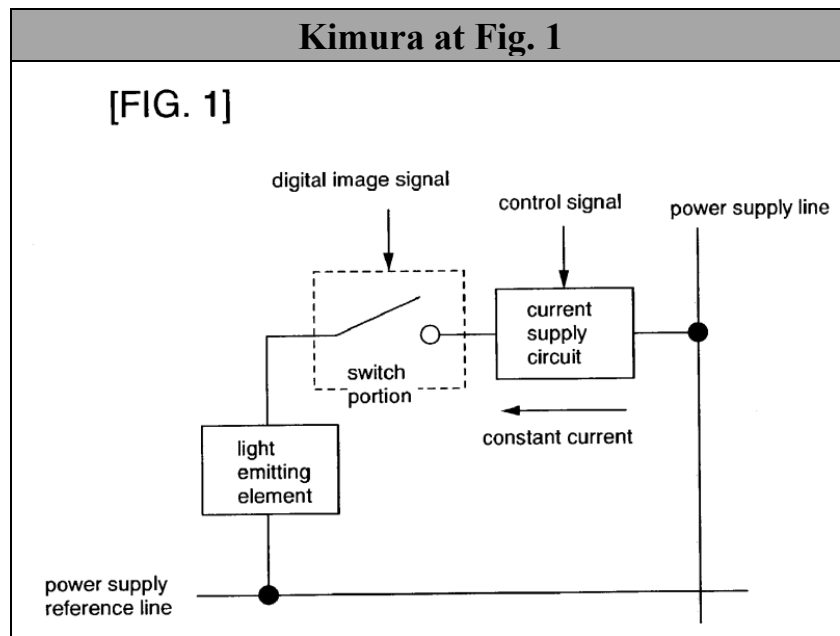
B. Ground 1B: Claims 18, 23, 33, and 35 are obvious over Kimura in view of Masuda

1. Overview of Kimura

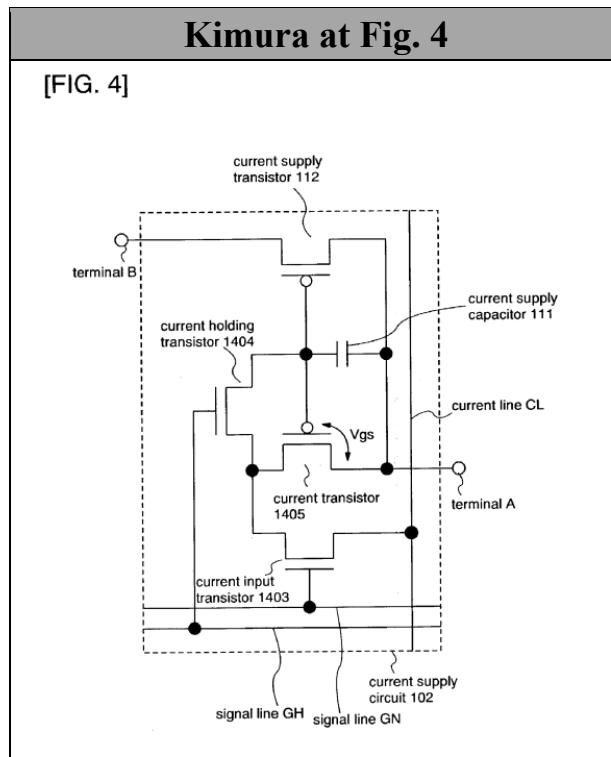
U.S. Pub. App. No. 2003/0090447 (“Kimura”) is a United States patent application that was filed September 18, 2002 and published on May 15, 2003. *See* EX-1020. Kimura thus qualifies as prior art under pre-AIA 102(e).

Kimura relates to “an active matrix display device in which a transistor is provided in each pixel to control light emission of the pixel.” EX-1020 at [0001]. In particular, Kimura discloses an “Organic Light Emitting Diode” or “OLED” type of display panel—the same type of display to which the ’736 patent is primarily focused. *See* EX-1020 at [0003]; EX-1001 at 1:9-14, 7:44-57.

Each pixel in Kimura’s “Embodiment Mode 1” “has a current supply circuit, a switch portion, and a light emitting element.” *See* EX-1020 at [0071].

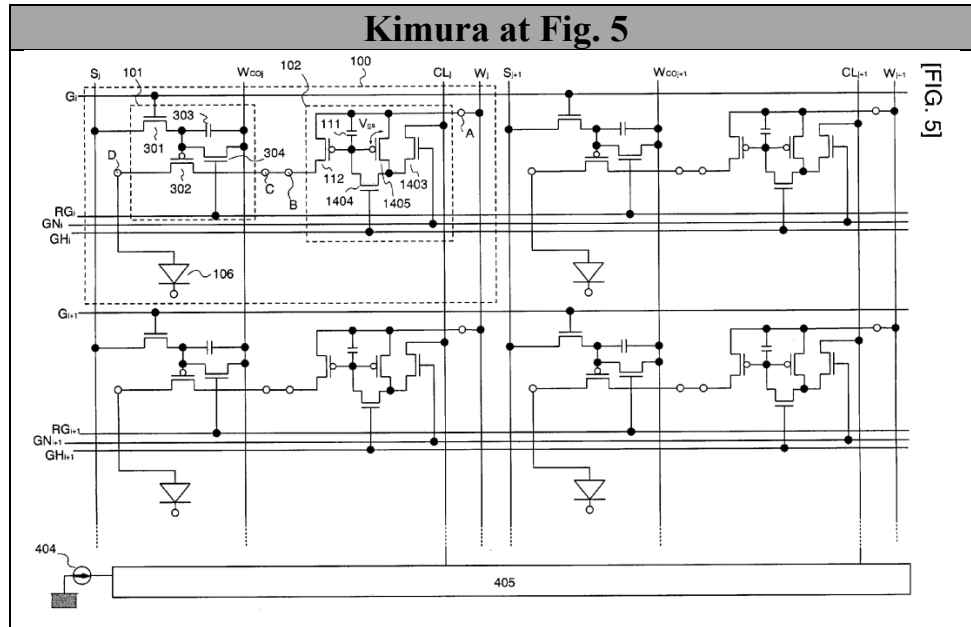


These pixels are driven by “current supply circuits” 102, each of which “is composed of a current supply capacitor 111, a current supply transistor 112, a current transistor 1405, a current input transistor 1403, a current holding transistor 1404, a current line CL, a signal line GN, and a signal line GH.” EX-1020 at [0185]. Kimura’s figure 4 illustrates such a current supply circuit.

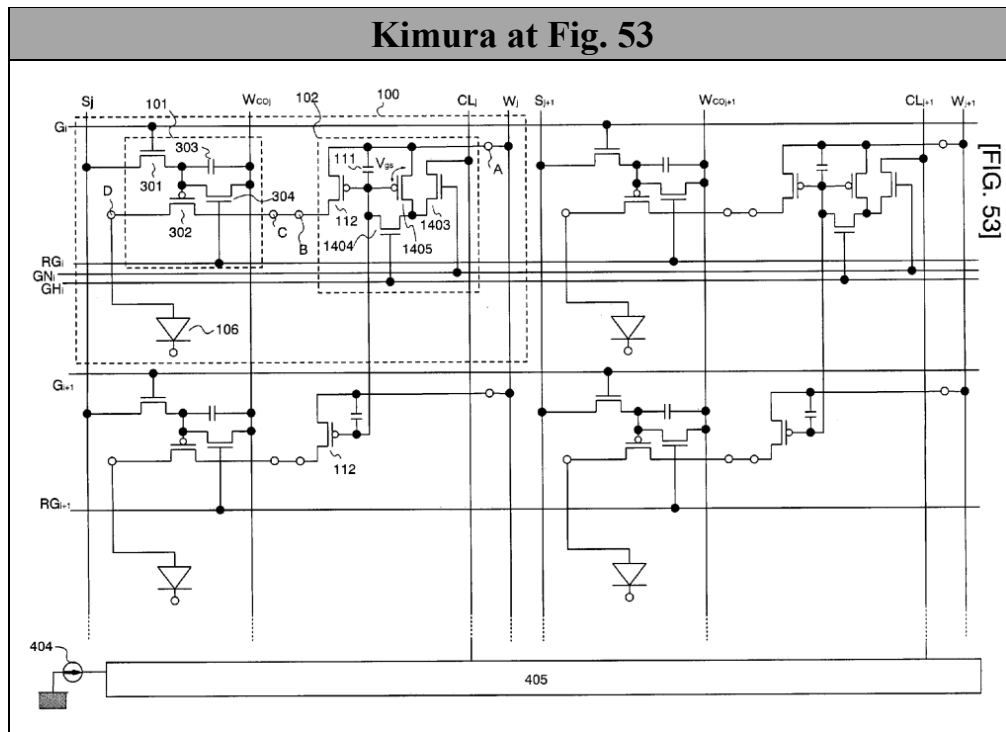


Kimura further discloses that, in this embodiment mode, “[e]ach of the pixels is denoted by 100 and has a current supply circuit 102 structured as shown in FIG. 4 and a switch portion 101 structured as shown in FIG. 13.” EX-1020 at

[0201]. “FIG. 5 is a circuit diagram of a part of a pixel region in which x columns $\times$ y rows of pixels are arranged to form a matrix pattern.” *Id.*



Kimura discloses an “Embodiment 10” variation of Embodiment Mode 1 in which “one current transistor 1405 is shared between two pixels” located in the same columns and adjacent rows. EX-1020 at [0468]-[0469] (referencing sharing among pixels in the j -th column and among pixels in the $(j+1)$ -th column). Kimura teaches that, “in general, one current transistor 1405 can be shared among plural pixels.” *Id.* According to Kimura, sharing this transistor “makes it possible to reduce in number transistors and signal lines per pixel,” thereby achieving “a display device having high aperture ratio.” *Id.* ; see also EX-1003 at ¶¶ 76-79.

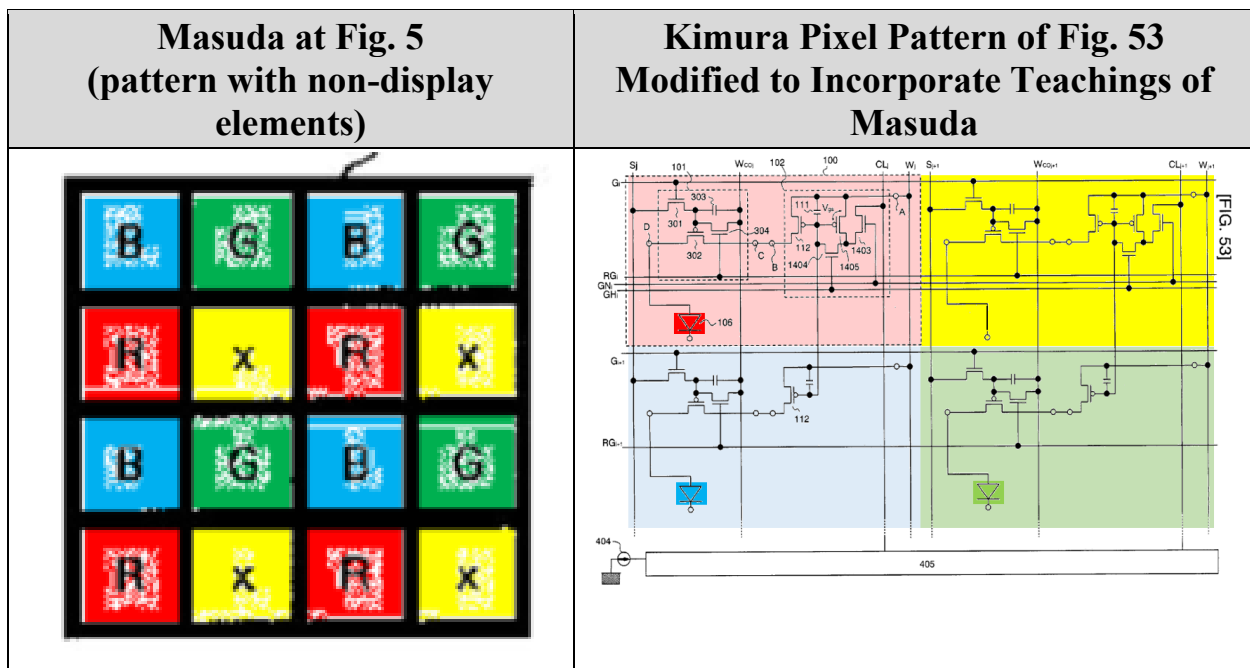


2. The Kimura-Masuda Combination

In the combination of Kimura and Masuda, Kimura's organic EL elements match the pattern taught by Masuda that includes three color pixel elements and one non-display element.

Kimura's display device, embodiment 10 of which is illustrated in figure 53, includes pixels "arranged to form a matrix pattern." EX-1020 at [0201] (describing figure 5 and embodiment mode 1); *see also id.* at [0467]-[0468] (explaining that embodiment 10 features "pixel structure shown in FIG. 5 in accordance with Embodiment Mode 1").

A POSITA would have recognized that Masuda's pixel pattern could be implemented in Kimura's display by arranging Kimura Embodiment 10's blue, green, and red pixels as shown below and simply omitting any EL element in the fourth spot of the pixel pattern. EX-1003 at ¶¶ 80-87. Kimura's figure 53 has been modified below to omit the EL element in the top-right region, causing that region to become a non-display element, as taught by Masuda. *Id.*



3. Motivations to Combine Kimura and Masuda

A POSITA would have been motivated to combine Kimura and Masuda in this manner for multiple reasons.

First, both references constitute “analogous art” to the ’736 patent. *See Donner Tech., LLC v. Pro Stage Gear, LLC*, 979 F.3d 1353, 1359 (Fed. Cir. 2020)

(“Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.”).

The '736 patent, Masuda, and Kimura all pertain to the same field of endeavor: an electro-optical display using display elements arranged in a matrix. *See, e.g.*, EX-1001 at 1:8-9 (“The present invention relates to *an electro-optical device, an active matrix substrate*, and an electronic apparatus.”); EX-1009 at [0001] (“The present invention relates to *a display panel for producing a color display using primary color display elements that are arranged in a matrix, and to an image displaying device equipped with said display panel.*”); EX-1020 at [0001] (“[T]he invention relates to an active matrix display device in which a transistor is provided in each pixel to control light emission of the pixel.”); *id.* at [0201].

The '736 patent, Masuda, and Kimura also address the same problem—improving display quality. Kimura discloses that, in prior art active-matrix type organic EL display panels, “the current flowing in the OLED [element] fluctuates greatly due to changes in drain current caused by fluctuation in current characteristic of the driving TFT.” EX-1020 at [0010], [0037]. Kimura proposes solutions

such that “a light emitting element can emit light at a constant luminance irrespective of a change in current characteristic due to degradation or the like.” *Id.* at [0051].

Masuda teaches a pixel pattern designed to reduce “the difference in luminosity between columns or difference in luminosity between rows.” EX-1009 at [0021]. As illustrated by Masuda’s Figure 3(b), Masuda teaches that, “[t]ypically, when primary color display elements are arranged in two rows and two columns and one desired color is repeated in spatial additive color mixing, it is necessary to consider the luminosity values of the individual elements in arranging the primary color display elements.” *Id.* at [0024]. Such conventional arrangements could not achieve “maximum performance” because the output of the repeated element (e.g., green in Masuda Figure 3(b)) must be “limited to half in order to . . . achieve a color balance.” *Id.* at [0020]. Moreover, these conventional arrangements caused the viewer to perceive alternating red and blue horizontal or vertical lines. *Id.* at [0019]. Masuda’s improved checkerboard pattern includes “one element that does not contribute to the image display” and places the “the primary color display element that has the highest luminosity value and the primary color display element that has the second-highest luminosity value . . . at opposite corner positions.” *Id.* at [0022]. Masuda’s improved checkerboard pattern rearranges the pixels to minimize the “maximum luminosity difference between rows or columns.” *Id.* at

[0027]. As a result, “the less the observer will be made to feel that there is striped interference in the display device.” *Id.*

Masuda’s Figure 21 quantifies luminosities by row and column for different possible arrangements of R, B, G, and “non-display” elements. *Id.* at [0028].

“[T]he minimum value among the maximum luminosity differences between columns and rows will be 0.40, where this occurs when the red (R) and green (G) are arranged at opposite corner positions.” *Id.*

[FIG. 21]

				Sum of Luminosity for Each Row and Column				Maximum Luminosity Difference between Rows or Columns
				First Row	Second Row	Third Row	Fourth Row	
m11	m12	m21	m22	行・列ごとの輝度和				行間・列間の最大輝度差
				1行目	2行目	3行目	4行目	
R	G	B	x	0.89	0.11	0.41	0.59	0.78
R	G	x	B	0.89	0.11	0.30	0.70	0.78
R	B	G	x	0.41	0.59	0.89	0.11	0.78
R	B	x	G	0.41	0.59	0.30	0.70	0.40
R	x	G	B	0.30	0.70	0.89	0.11	0.78
R	x	B	G	0.30	0.70	0.41	0.59	0.40
G	R	B	x	0.89	0.11	0.70	0.30	0.78
G	R	x	B	0.89	0.11	0.59	0.41	0.78
G	B	R	x	0.70	0.30	0.89	0.11	0.78
G	B	x	R	0.70	0.30	0.59	0.41	0.40
G	x	R	B	0.59	0.41	0.89	0.11	0.78
G	x	B	R	0.59	0.41	0.70	0.30	0.40
B	R	G	x	0.41	0.59	0.70	0.30	0.40
B	R	x	G	0.41	0.59	0.11	0.89	0.78
B	G	R	x	0.70	0.30	0.41	0.59	0.40
B	G	x	R	0.70	0.30	0.11	0.89	0.78
B	x	R	G	0.11	0.89	0.41	0.59	0.78
B	x	G	R	0.11	0.89	0.70	0.30	0.78
x	R	G	B	0.30	0.70	0.59	0.41	0.40
x	R	B	G	0.30	0.70	0.11	0.89	0.78
x	G	R	B	0.59	0.41	0.30	0.70	0.40
x	G	B	R	0.59	0.41	0.11	0.89	0.78
x	B	R	G	0.11	0.89	0.30	0.70	0.78
x	B	G	R	0.11	0.89	0.59	0.41	0.78

Id. at Fig. 21.

A POSITA implementing Kimura's display panel of pixels would have been motivated to arrange those pixels in the improved checkerboard pattern taught by Masuda. As discussed above, Kimura seeks to reduce variation in luminance across pixels. For that reason, a POSITA implementing Kimura would have been motivated to seek out complementary techniques to reduce that variation as much

as possible. EX-1003 at ¶¶ 80-87. Masuda provides such a complementary technique. Masuda's figure 21, reproduced above, and accompanying prose teaches how luminosity varies by how color pixels are arranged. A POSITA implementing Kimura, upon reviewing Masuda's teachings, would have recognized that how pixels are arranged in Kimura matters, and that the variation in luminance across pixels, rows, and columns could be reduced if pixels were arranged in the checkerboard pattern taught by Masuda. A POSITA implementing Kimura would have recognized that, compared to other possible pixel arrangements, Masuda's pixel pattern would reduce an observer's impression "that there is striped interference in the display device." EX-1009 at [0027]. That Masuda's checkerboard pattern reduces variation in pixel luminance and is generally applicable to different types of display devices is further confirmed by Kwon, which recognizes that the same pattern of red, blue, green, and a "black" pixel "has the advantage of being able to make the luminance between pixels uniform and improve the contrast." EX-1013 at Abstract.

Second, arranging Kimura's pixels in the pattern taught by Masuda would have amounted to an application of known techniques that would have created expected results. *See Presidio Components, Inc. v. AVX Corp.*, 825 F. App'x 909, 916 (Fed. Cir. 2020) (affirming PTAB determination of unpatentability); EX-1003 at ¶¶ 85-86.

Although Kimura itself does not restrict how to lay out colored pixels in its display, it specifically requires that the pixels “form a matrix pattern.” *See* EX-1020 at [0201]; *id.* at [0290] (referencing red, green, and blue light emitting elements without restricting how those elements are laid out). A POSITA would have understood that Kimura’s display would have pixels laid out in some pattern, but does not describe the specific arrangement of colored pixels (pixel geometries). *See* EX-1003 at ¶ 85. This would have led a POSITA to consider known pixel geometries, like Masuda, to understand how Kimura’s colored pixels may be arranged. *See id.*

Masuda’s arrangement was a known option that a POSITA would have found obvious to use/try. *Id.* Indeed, Masuda’s teachings of a checkerboard pattern with a non-display element that reduces differences in luminosity is generally applicable to any display technology that uses color elements to implement a pixel. *Id.* at ¶¶ 74-75. Masuda itself mentions two types of displays—FE-type and MIM-type—as potentially using the checkerboard pattern. EX-1009 at [0042]. Furthermore, KR960012168A to Kwon discloses a “plasma display device” using the same checkerboard pattern. *See supra* Section IV.A.1; EX-1013 at Fig. 4; *id.* at Abstract. Thus, Kwon confirms that the type of pixel arrangement described by Masuda was a known option that a POSITA would have found obvious to consider for the pixel arrangement in Kimura’s display. EX-1003 at ¶¶ 87.

Third, a POSITA arranging Kimura's pixels in the pattern taught by Masuda would have had a reasonable expectation of success in making the proposed combination. As discussed above, Masuda's teachings are generally applicable to different types of display technologies. Masuda itself describes its teachings as applicable to FE-type and ME-type displays, EX-1009 at [0042], and Kwon describes the same pattern as applicable to plasma displays, EX-1013 at Fig. 4, Abstract. A POSITA would have no reason to doubt that the same pattern would be equally successful in an organic EL display, such as that disclosed by Kimura. *See* EX-1003 at ¶ 87.

Fourth, during prosecution of the Japanese counterpart application, the Applicant acknowledged that Masuda could be combined with a display-related prior art reference similar to Kimura by describing the characteristics of "an invention that is achieved through combining the driving method disclosed in [Inoue] with the layout of display elements described in [Masuda]." *See* EX-1007 at 8. This statement binds Patent Owner. *See* 37 C.F.R. § 1.104 ("In rejecting claims the examiner may rely upon admissions by the applicant . . . as to any matter affecting patentability."); *Riverwood Int'l Corp. v. R.A. Jones & Co.*, 324 F.3d 1346, 1354 (Fed. Cir. 2003) ("This court and its predecessor have held that a statement by an applicant during prosecution identifying certain matter not the work of the inventor as "prior art" is an admission that the matter is prior art."); *Bos. Sci. Scimed, Inc. v.*

Cook Grp. Inc., 809 F. App'x 984, 989 (Fed. Cir. 2020) (“[A]n admission in a preliminary patent owner response, just like an admission in any other context, is evidence appropriately considered by a factfinder.”). Although made before a foreign patent office, the statement still binds Patent Owner since the foreign and domestic applications “are related and share a familial relationship.” *See Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1313 (Fed. Cir. 2014), overruled on other grounds by *Williamson v. Citrix Online, LLC*, 792 F.3d 1339 (Fed. Cir. 2015) (approving district court reliance upon statements to the JPO).

4. Claims 18 and 33

- (a) 18[a] “An electro-optical device, comprising:”
33[a] “An active matrix substrate comprising:”

The Kimura-Masuda combination renders obvious an “electro-optical device” as well as an “active matrix substrate.” Kimura, for example, discloses an “active matrix display device.” EX-1020 at [0001]; *see also id.* at Abstract (referencing “display device”), [0003]-[0005], [0185], [0468]-[0470], [0514]-[0516] (providing examples of “electronic equipment utilizing a display device of the present invention”), Figs 2, 5, 46, 53. Kimura’s “[active matrix] display device,” at least as implemented in such electronic equipment, is an “electro-optical device.” *See also supra* Ground 1A, 18 [a] and 33[a] (discussion of Masuda’s disclosure of an “electro-optical display”).

Kimura’s “[active matrix] display device” also features an “active matrix

substrate.” *See* EX-1020 at [0050] (explaining that such devices feature pixels “formed on a glass or other insulating substrate”). The substrate upon which pixels of an active matrix display are formed constitutes an “active matrix substrate.” EX-1003 at ¶ 101.

For these reasons, the Kimura-Masuda combination renders obvious an electro-optical device and an active matrix substrate. EX-1003 at ¶ 101.

- (b) 18[b] “a substrate;”
33[b] “a substrate;”

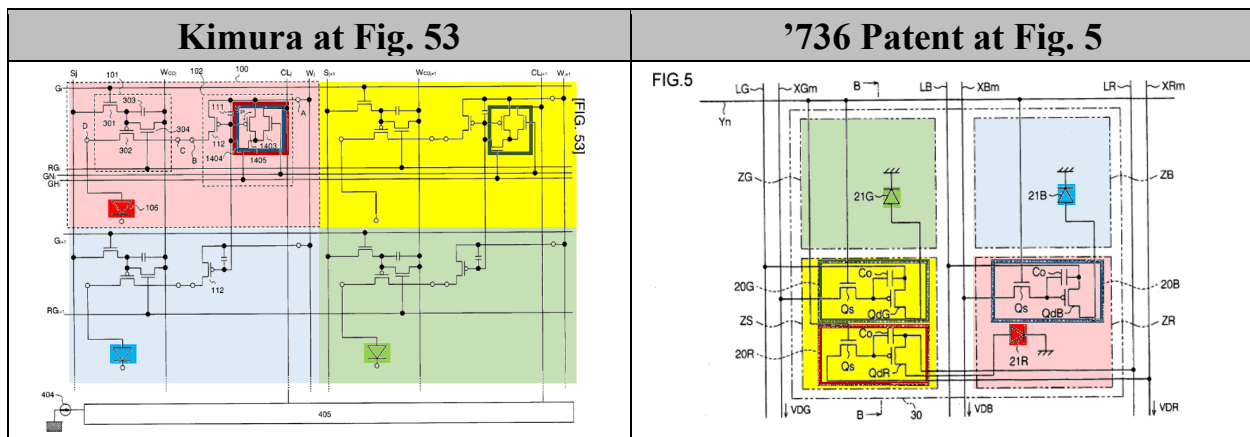
The Kimura-Masuda combination renders obvious “a substrate.” Kimura, for example, discloses an organic EL display panel that includes pixels “formed on a glass or other insulating substrate.” *See* EX-1020 at [0050]. *See also supra* Ground 1A, 18[b] and 33[b] (discussion of Masuda’s disclosure of a “substrate”).

For these reasons, the Kimura-Masuda combination renders obvious a substrate. EX-1003 at ¶ 102.

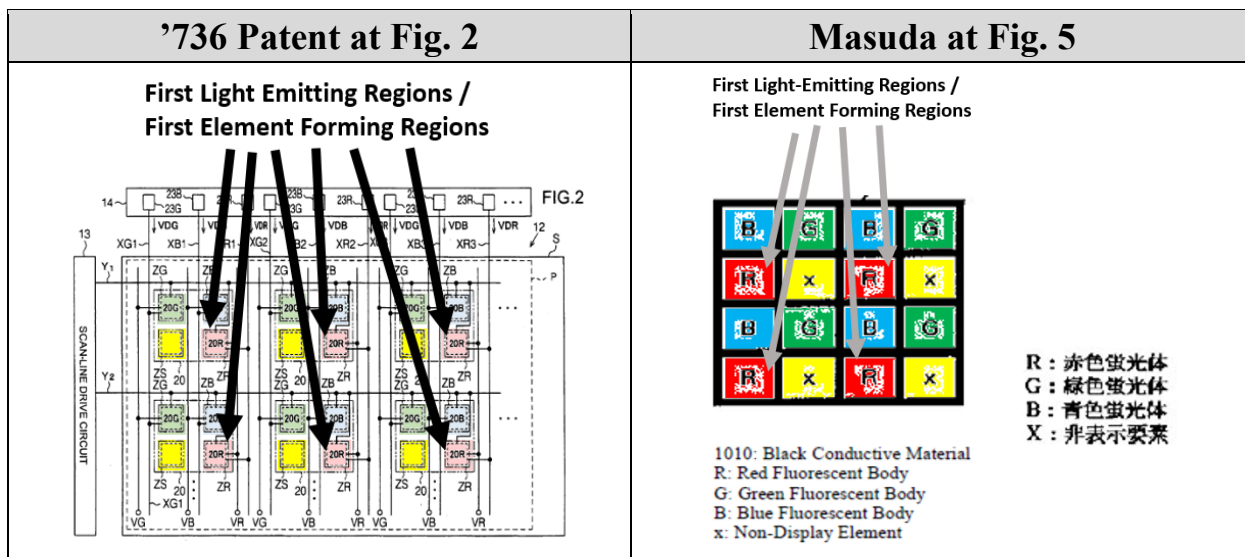
- (c) 18[c] “a plurality of first light-emitting regions provided above the substrate, first light-emitting films being provided in the first light-emitting regions;”
33[c] “a plurality of first element forming regions provided above the substrate, first electro-optical elements being provided in the first element forming regions;”

The Kimura-Masuda combination renders obvious a plurality of first “light-emitting regions” as well as first “element forming regions” provided above the

substrate. Kimura discloses that “pixels are generally formed on a glass or other insulating substrate.” EX-1020 at [0050]. Each region in which a pixel is formed constitutes both a “light-emitting region” as well as an “element forming region.” This is confirmed by comparing Kimura’s figure 53 to the ’736 patent’s figure 3, both annotated to show an exemplary light-emitting region / element forming region in red and the electro-optical element in a different shade of red. EX-1003 at ¶¶ 103-105. Kimura discloses organic light emitting diodes “OLEDs,” which are electro-optical elements. *See* EX-1020 at [0072]. Each OLED includes a “light emitting layer” in an “organic compound layer,” which is a light emitting film. *See id.*



The light-emitting regions / element forming regions of the Kimura-Masuda combination encompass the organic EL element of a particular color, such as red. *See also* EX-1009 at [0022]-[0026] (referencing “primary color display elements”).



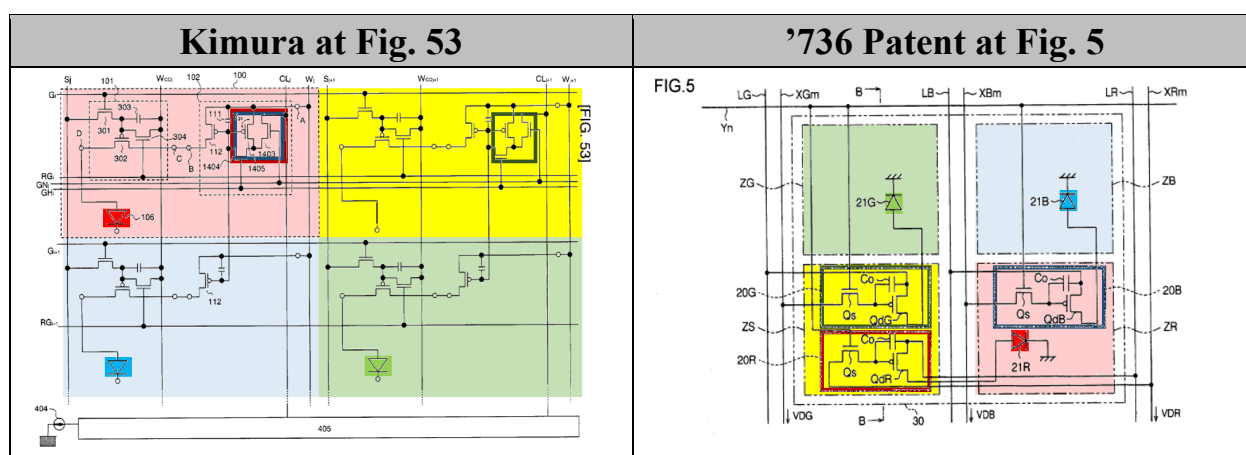
See also supra Ground 1A, 18[c] and 33[c] (discussion of Masuda's disclosure of first light-emitting regions / element forming regions and first light-emitting films / electro-optical elements).

For these reasons, the Kimura-Masuda combination renders obvious a plurality of first light-emitting regions / element forming regions provided above the substrate, with first light-emitting films / electro-optical elements being provided in these regions. EX-1003 at ¶¶ 103-105.

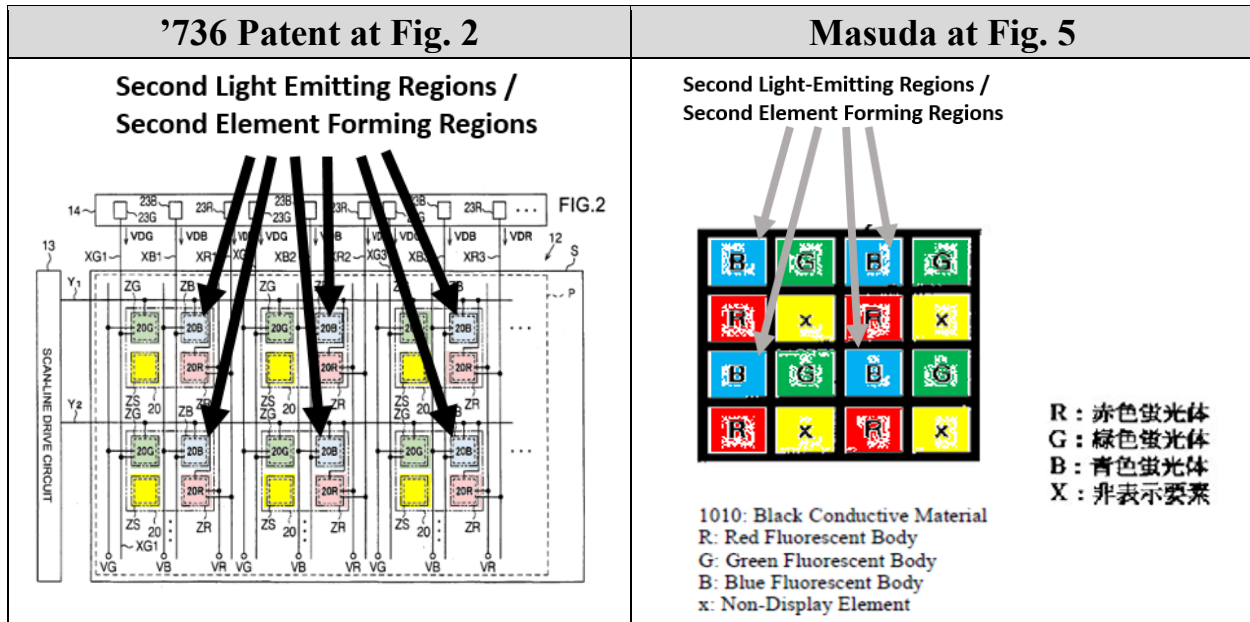
- (d) 18[d] “a plurality of second light-emitting regions provided above the substrate, second light-emitting films being provided in the second light emitting regions; and”
33[d] “a plurality of second element forming regions provided above the substrate, second electro-optical elements being provided in the second element forming regions; and”

The Kimura-Masuda combination renders obvious second “light-emitting regions” / “element forming regions” above a substrate that provide “light-emitting

films” / “electro-optical elements.” As explained in the previous section (18[c] and 33[c], incorporated here), the Kimura-Masuda combination renders obvious regions that encompass organic EL elements of a particular color, which constitute “light-emitting regions” / “element forming regions.” This is confirmed by comparing a portion of Kimura’s figure 53 to the ’736 patent’s figure 3, both annotated to show an exemplary light emitting region / element forming region in blue and the electro-optical element (which has a light-emitting film) in a different shade of blue. EX-1003 at ¶¶ 103-105.



The regions corresponding to another color, such as blue, constitute a “plurality of light-emitting regions” / “plurality of element forming regions.” See EX-1009 at [0022]-[0026] (referencing “primary color display elements”).



See also *supra* Ground 1, 18[d] and 33[d] (discussion of Masuda's disclosure of second light-emitting regions / element forming regions and second light-emitting films / electro-optical elements).

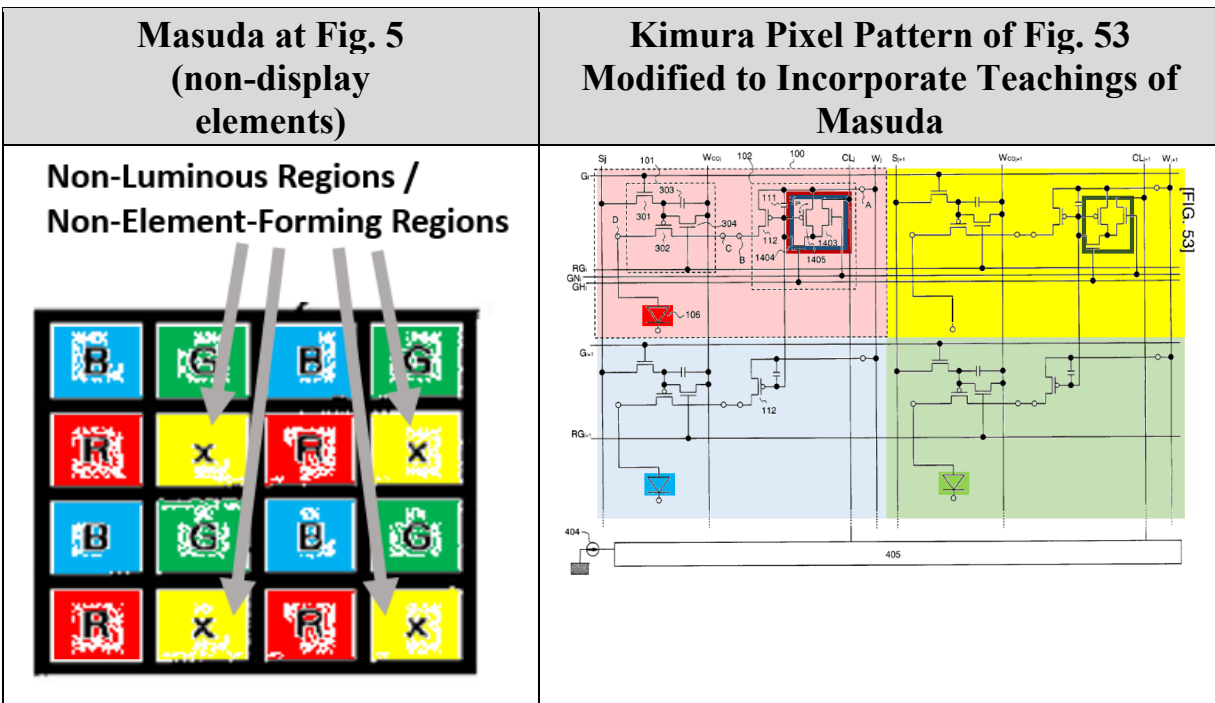
For these reasons, the Kimura-Masuda combination renders obvious a plurality of second light-emitting / element forming regions provided above the substrate, with second light-emitting films / electro-optical elements being provided in the second light-emitting / element forming regions. EX-1003 at ¶¶ 103-105.

- (e) 18[e] “a plurality of non-luminous regions provided above the substrate, no light-emitting films being provided in the non-luminous regions,”
33[e] “a plurality of non-element-forming regions provided above the substrate, no electro-optical elements being provided in the non-element-forming regions,”

The Kimura-Masuda combination renders obvious “non-luminous regions” /

“non-element-forming regions” above a substrate. Masuda discloses “a display panel for displaying a color image, with primary color display elements arranged in a matrix, where a two-row, two-column basic arrangement is formed from three primary color display elements and *one element that does not contribute to the image display.*” EX-1009 at [0022]; *see also id.* at [0027]-[0029] (referencing “non-display element”). As discussed above, a POSITA would have been motivated to lay out Kimura’s OLED-based pixels in the pattern taught by Masuda, which includes the non-display element. *See supra* Section IV.B.3.

Masuda’s “non-display element” constitutes a non-luminous region / non-element-forming region. The ’736 patent describes the “region where the non-luminous films NLF are formed” as “the dummy forming regions ZS” (EX-1001 at 10:11-14) and similarly discloses that “non-element-forming regions recited in the claims correspond to . . . the dummy forming regions ZS” (EX-1001 at 12:32-37). These regions “can ensure that black is displayed” and, “[a]s a result, the contrast ratio of the display can be enhanced.” EX-1001 at 8:4-7. Additionally, these regions allegedly reduce “directional viewing variation.” *Id.* at 12:61-67, 14:8-11. Masuda’s “non-display element” performs the same “dummy” function in the sense that it does not contribute to the image display and is intended to increase contrast and reduce directional viewing variation. EX-1003 at ¶¶ 54-55, 93, 106-107.



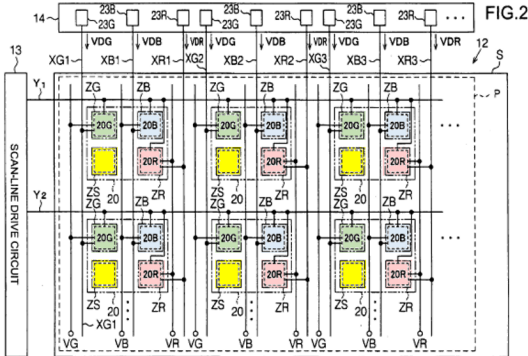
Because Masuda's "non-display element" does not contribute to the image display, a POSITA would have understood or found obvious that it has no electro-optical element or light-emitting film. EX-1003 at ¶¶ 106-107; *see also supra* Ground 1A, 18[e] and 33[e] (discussion of Masuda's disclosure of non-luminous regions / non-element-forming regions with no electro-optical elements or light-emitting films).

For these reasons, the Kimura-Masuda combination renders obvious a plurality of non-luminous / non-element-forming regions provided above the substrate, with no light-emitting films / electro-optical elements being provided in the non-luminous / non-element-forming regions. EX-1003 at ¶¶ 106-107.

- (f) 18[f] “each of the whole non-luminous regions is arranged so as to be sandwiched by two of the first light-emitting regions and so as to be sandwiched by two of the second light-emitting regions.”
33[f] “each of the whole non-element-forming regions being arranged so as to be sandwiched by two of the first element forming regions and so as to be sandwiched by two of the second element forming regions.”

The Kimura-Masuda combination renders obvious that “each of the whole”¹³ “non-luminous regions” / “non-element-forming regions” are sandwiched by two of the first “light-emitting regions” / “element forming regions” and sandwiched by two of the second “light-emitting regions” / “element forming regions.” Masuda discloses that a “two-row, two-column basic arrangement is formed from three primary color display elements and one element that does not contribute to the image display.” EX-1009 at [0022]. This square pattern shape shows that the non-luminous / non-element-forming regions are sandwiched, for example, by the red and blue pixels.

¹³ The presence of dummy pixels located at the edges of the display does not undermine that Masuda discloses “each” of the non-luminous regions / non-element-forming regions are sandwiched. *See supra* Ground 1, 18[f] and 33[f] (addressing this issue in footnote).

'736 Patent at Fig. 2 (annotated)	Masuda at Fig. 5 Red: “First Light-Emitting Regions” / “First Element Forming Regions” Blue: “Second Light-Emitting Regions” / “Second Element Forming Regions” Yellow: “Non-Luminous Regions” / “Non-Element-Forming Regions”
	

See also supra Ground 1A, 18[f] and 33[f] (discussion of Masuda’s disclosure of sandwiched non-luminous / non-element-forming regions).

For these reasons, the Kimura-Masuda combination renders obvious each of the whole non-luminous regions / non-element-forming regions being arranged so as to be sandwiched by two of the first light-emitting regions / element forming regions and so as to be sandwiched by two of the second light-emitting regions / element forming regions. EX-1003 at ¶ 108.

5. Claims 23 and 35

- (a) Claim 23 “The electro-optical device according to claim 18, at least one of the first and second light-

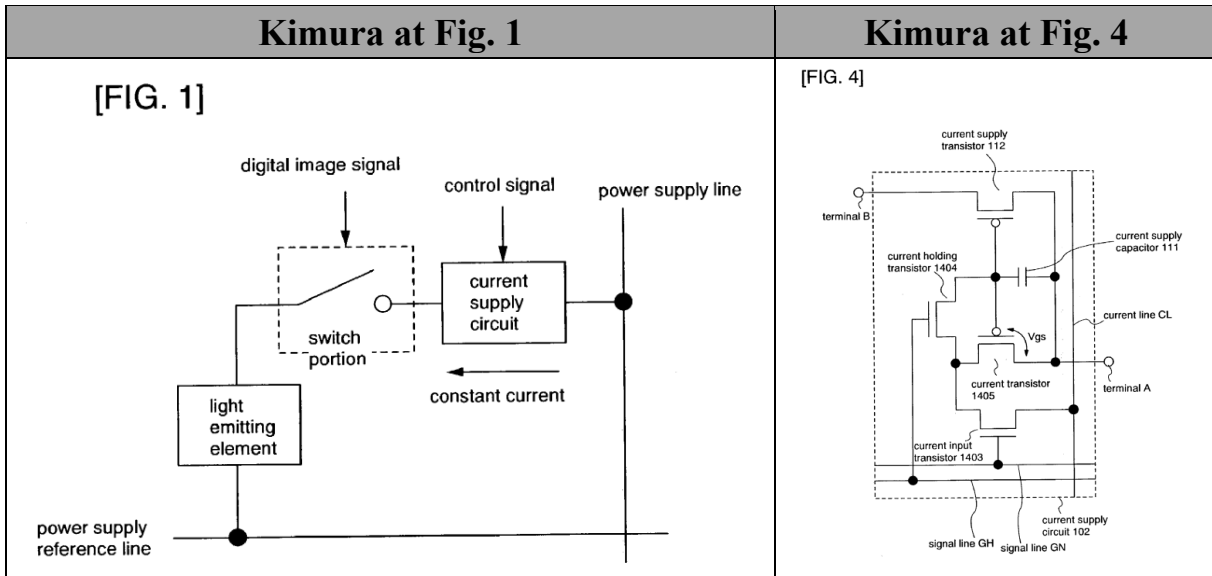
emitting regions having an electronic circuit to control light emission of the first or second light-emitting film provided in another first or second light-emitting region.” / Claim 35 “The active matrix substrate according to claim 33, at least one of the first and second element forming regions has an electronic circuit to drive the electro-optical element that is provided in another first or second element forming region.”

The Kimura-Masuda combination renders obvious that “at least one” of the “light-emitting regions” / “element forming regions” has an “electronic circuit” to “control light emission of the first or second light-emitting film provided in another first or second light-emitting region” / “drive the electro-optical element that is provided in another first or second element forming region.” EX-1003 at ¶ 111.

Kimura discloses pixels that, in general, each have “a current supply circuit, a switch portion, and a light emitting element.” *See* EX-1020 at [0071], Fig. 1. The current supply circuit aims to provide a constant current to the light emitting element. *Id.* at [0172]. It includes a “current supply transistor 112” that supplies this “constant current (hereinafter referred to as pixel reference current) corresponding to a constant current (hereinafter referred to as reference current) that is inputted from the outside of the pixel.” *Id.* at [0174]. Additionally, the amount of this constant pixel reference current “is determined by a control signal inputted from the outside of the pixel.” *Id.* at [0074]-[0076].

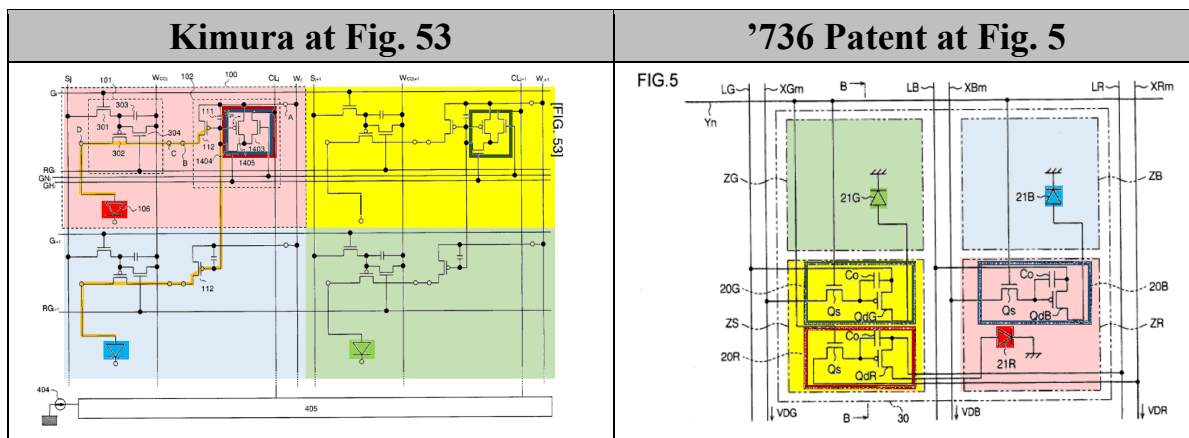
Kimura discloses that a “current mirror method” is one of the ways to implement a current supply circuit. *See id.* at [0179]-[0182], [1085]-[0191], Fig. 4. It features “a pair of transistors whose gate electrodes are electrically connected to each other.” *Id.* at [0180]. In figure 4 below, “[t]he current supply transistor 112 and the current transistor 1405 form a pair to constitute a current mirror circuit.” *Id.* at [0185]. Because these transistors’ gate electrodes have the same electric potential, their source terminals have the same electric potential, and they have the same current characteristics, the “pixel reference current” supplied by current supply transistor 112 is set “according to the reference current I_0 that flows in the current transistor 1405.” *Id.* at [0274].

As a result, the light emitted by a light emitting element’s light-emitting film is controlled by the current transistor 1405. EX-1003 at ¶ 111. A POSITA would have understood or found obvious this current transistor 1405 as driving the light emitting element (which is an electro-optical element). *Id.*



Although a pixel's current supply circuit is generally located in the same region as that pixel, Kimura discloses an "Embodiment 10" in which two pixels share the current supply circuit's "current transistor 1405." EX-1020 at [0468]-[0469] (referencing sharing among pixels in the j -th column and among pixels in the $(j+1)$ -th column). As shown by the annotated version of Kimura's figure 53 reproduced below, when Kimura's embodiment 10 implements Masuda's pixel pattern, the red (i.e., "first") light-emitting / element forming regions include circuitry (e.g., current transistor 1405) that drives the light-emitting film / electro-optical element provided in blue (i.e., "second") light-emitting / element forming regions. Kimura's figure 53 is annotated below to identify the shared current transistor (and transistors 1403 and 1404, which are also involved in driving and also shared by the blue and red electro-optical elements) using red and blue boxes, which signifies

that it controls light emitting by both the blue electro-optical element and the red electro-optical element. EX-1003 at ¶¶ 78, 111. Orange shows two signal paths: one that connects the gate of this shared current transistor through the blue pixel's current supply transistor (112) to the red electro-optical element (106) and one that connects the gate of this shared current transistor through the red pixel's current supply transistor (112) to the blue electro-optical element (106). *Id.*



According to Kimura, sharing this transistor “makes it possible to reduce in number transistors and signal lines per pixel” thereby achieving “a display device having high aperture ratio.” EX-1020 at [0469]. This is the same alleged benefit claimed by the '736 patent. *See* EX-1001 at 13:52-53 (alleging that arranging the pixel circuit’s “formation positions” in the manner shown in figure 5 allows the “aperture ratios in the green pixel forming region ZG and the blue pixel forming region ZB” to be increased).

For these reasons, the Kimura-Masuda combination renders obvious that “at

least one” of the “light-emitting regions” / “element forming regions” has an “electronic circuit” to “control light emission of the first or second light-emitting film provided in another first or second light-emitting region” / “drive the electro-optical element that is provided in another first or second element forming region.”. EX-1003 at ¶ 111.

V. DISCRETIONARY CONSIDERATIONS

As discussed above, in exchange for Petitioner’s non-opposition to Patent Owner’s planned motion for leave to assert additional claims in the district court action, Patent Owner has agreed “not to argue discretionary denial of a subsequent IPR petition filed against the newly asserted claims.” EX-1019. Nevertheless, Petitioner briefly addresses here discretionary considerations.

A. The Board Should Not Exercise its Discretion to Deny Institution Based on the Filing of a Prior IPR Petition

This petition is not redundant under 35 U.S.C. § 325(d) with Petitioner’s previous IPR petitions challenging the ’736 Patent because it challenges different claims. This petition challenges claims 18, 23, 33, and 35 which were not included in the previous petition, have not been challenged in an IPR proceeding, and were not asserted against Petitioner until recently. *See, e.g., Fisher & Paykel Healthcare Limited v. Resmed Limited*, IPR2017-01789, Paper No. 7 (PTAB Jan. 25, 2018) (instituting petition notwithstanding two earlier-filed IPR proceedings).

Also, this petition is based on additional prior art (i.e., Kimura) and arguments to address the limitations unique to claims 23 and 35 (that “at least one of the first and second [light-emitting regions/element forming regions] [has] an electronic circuit to [control light emission/drive]” another region’s “[light-emitting film / electro-optical element]” of the first or second light-emitting film provided in another first or second light-emitting region.” *See* 35 U.S.C. 325(d).

B. The Board Should Not Exercise its Discretion to Deny Institution Based on Co-Pending District Court Litigation

The *Fintiv* factors strongly favor institution.

1. No evidence regarding a stay

No motion to stay has been filed, so the Board should not infer the outcome and this factor is neutral.

2. Parallel proceeding trial date

The expected date for an Institution Decision is in January 2024 and the expected date for a Final Written Decision is in January 2025, within a year of trial.

As of this petition, the operative docket control order sets jury selection to begin on May 20, 2024. EX-1016.

Trial may be significantly delayed from that date. The Patent Owner did not *serve* the complaint on Petitioner until about five months later, on September 27, 2022. The normal deadlines in the case have had concomitant delays. For exam-

ple, this case's docket control order, which sets various case deadlines, did not issue until February 3, 2023—about ten months after the answer was filed. *See* EX-1016. With Patent Owner's delay in service of the complaint causing significant delay in the schedule, the median time to trial should be judged from the date of complaint service (e.g., when the case actually started), instead of the date of complaint filing. Using the service date, the median time to trial would place trial in October 2024, only about three months before the expected Final Written Decision timeline. Moreover, the introduction of new claims into this case may cause further delays. Thus, Factor 2 weighs in favor of institution.

3. Investment in parallel proceeding

The co-pending litigation is in its early stages, and investment has been minimal. Claim construction has not occurred; fact discovery will not close until December 1, 2023; expert discovery has not begun and will not close until February 5, 2024. EX-1016. Thus, Factor 3 weighs in favor of institution.

4. Overlapping issues

If the Board institutes trial, Petitioner will cease asserting in the district court any invalidity contention based on the prior art presented in this petition that constitutes part of a ground. Institution will not result in overlapping consideration of invalidity arguments, thereby favoring institution.

5. Petitioner status

Petitioner is a defendant, but that is true of most Petitioners and this factor should not be a basis for denying institution.

6. Other circumstances

The merits of Petitioner's arguments are strong. Indeed, the JPO, an independent authority, already found claims similar to claims 18 and 23 to be unpatentable over the applied Masuda reference and another prior art reference, which were not considered by the US Examiner. Thus, claims similar to Challenged Claims 18 and 23 have already been found unpatentable over the same prior art advanced in this petition. With that history, and the indisputable similarity between the pixel layout of Masuda and the pixel layout claimed in the '736 patent, the present petition presents a compelling case of invalidity that supports institution, regardless of the status of the parallel proceeding.

Additional factors unique to this petition favor institution. First, as stated above, Patent Owner has agreed not to argue that the Board should exercise its discretion to deny this petition. *See* EX-1019. The Board should honor Patent Owner's agreement and decline to consider discretionary denial, particularly in view of Patent Owner's late assertion of claims and Petitioner's agreement in the district court not to oppose the late admission. Considering discretionary denial in

this circumstance would dissuade parties from compromising and would lead to inefficiencies in litigation and before the Board, contrary to the objectives of the AIA. Second, this petition relies on the same primary prior art reference (Masuda) relied upon in the earlier petition, representing minimal imposition on the Board's resources. Third, at the time this petition was filed, Patent Owner had not filed any preliminary patent owner's response to the first petition.

Thus, the *Fintiv* factors favor institution.

VI. FEES

Petitioner authorizes the Patent and Trademark Office to charge Deposit Account No. 06-1050 for the fee set in 37 C.F.R. § 42.15(a) for this Petition.

VII. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

BOE Technology Group Co., Ltd., Beijing BOE Display Technology Co., Ltd., and Motorola (Wuhan) Mobility Technologies Communication Co., Ltd. are the real parties-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

Petitioners are not aware of any disclaimers, reexamination certificates for the '736 Patent. Petitioners previously filed IPR2023-00605 challenging the '736 patent. Petitioners are not aware of any other petitions for *inter partes* review for the '736 Patent. The '736 patent is the subject of the following civil action: *Element Capital Commercial Company PTE. Ltd., v. BOE Technology Group Co., et*

al, 2:22-cv-00118-JRG (E.D. Tex.).

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

Lead Counsel	Backup counsel
Jeremy J. Monaldo, Reg. No. 58,680 Fish & Richardson P.C. 60 South Sixth Street Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 IPR54108-0002IP1@fr.com	Joseph Colaianne, Reg. No. 39,948 Linhong Zhang, Reg. No. 64,749 Fish & Richardson P.C. 60 South Sixth Street Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 PTABInbound@fr.com

D. Service Information

Please address correspondence/service to the above-listed address. Petitioner consents to email service at IPR54108-0002IP1@fr.com (referencing No. 54108-0002IP1 and cc'ing PTABInbound@fr.com).

Respectfully submitted,

Dated July 7, 2023

/ Jeremy J. Monaldo /
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(Control No. IPR2023-01178)

Attorneys for Petitioner

CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter partes* Review totals 13,318 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated July 7, 2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on July 7, 2023, a complete and entire copy of this Petition for *Inter partes* Review and all supporting exhibits were served via email to the Patent Owner. These materials were also provided via Federal Express to the correspondence address of record as follows:

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