

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CHONGQING HKC OPTOELECTRONICS TECHNOLOGY CO., LTD.,
Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,
Patent Owner.

Case IPR2023-00476
U.S. Patent No. 7,335,913

PATENT OWNER'S PRELIMINARY RESPONSE

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IPR2023-00476

U.S. Patent No. 7,335,913

TABLE OF EXHIBITS

Number	Description
2001	Declaration of Michael Lebby, Ph.D.

I. PRELIMINARY STATEMENT

Pursuant to 37 C.F.R. § 42.107, Patent Owner 138 East LCD Advancements Limited (“138 East” or “Patent Owner”) submits its Preliminary Response to the Petition for *Inter Partes* Review (“IPR”) of U.S. Patent No. 7,335,913 (“the ’913 patent”). Paper 2 (“Petition” or “Pet.”). Petitioner Chongqing HKC Optoelectronics Technology Co., Ltd., challenges the validity of claims 1-11 of the ’913 patent.

The Petition has not established a reasonable likelihood that the asserted references render any of claims 1-11 unpatentable. The asserted references, alone or in combination as presented in the Grounds, do not disclose all limitations of any challenged claim. In particular, the Petition consistently overlooks plain claim language reciting two sets of wiring lines. The Board therefore should deny institution for failure to present a likelihood that the Petitioner will prevail on any Ground.

II. THE ’913 PATENT

The ’913 patent, titled “Electro-optical device and electronic apparatus,” describes improved liquid crystal display layouts. Liquid crystal displays include a first substrate “on which display electrodes and a circuit unit for driving the display electrodes are provided,” a second substrate facing the first substrate, and electro-optical material (e.g., liquid crystal) sealed therebetween. Ex. 1001, 1:16-25. The

'913 patent explains that the first substrate often protrudes from the second substrate on at least one side, and that an “extending portion” supports external connecting terminals. *Id.*, 1:26-30. “The external connecting terminals are connected to wiring lines led from a circuit unit and the like, and are provided such that surfaces thereof are exposed to the outside so as to be supplied with signals or power from the outside.” *Id.*, 1:30-34.

The '913 patent explains that in certain prior layouts, the extending portion included a driving circuit. *Id.*, 1:34-36. In the alternative, prior layouts placed the driving circuit in the “internal space,” to make the extending portion narrower. *Id.*, 1:37-42. But “it is difficult to provide a space sufficient to dispose the driving circuit and to lead the wiring lines from the driving circuit in the internal space.” *Id.*, 1:43-46. And the extending portion would still need to accommodate lead wiring lines. *Id.*, 1:46-50.

Thus, the '913 patent describes improved layouts to optimize space on the extending portion of the substrate and to reduce its size. The improved layout includes wiring lines for driving the circuit units and display electrodes, and lead wiring lines led from one of the sides of the wiring lines to the extending portion and connected to external connecting terminals. *Id.*, 1:60-2:8. In particular, the external connecting terminals are provided on the extending portion *overlapping* the lead wiring lines. *Id.* “Such a configuration is implemented by electrically

connecting at least some of the lead wiring lines and the external connecting terminals to each other via contact holes or the like, for example, and by laminating them with an interlayer insulating film interposed therebetween.” *Id.*, 2:35-40. Because of the overlap, “the width of the extending portion in the extension direction thereof can be reduced,” and “the space of the electro-optical device can be saved.” *Id.*, 2:44-47. The layout improvements create manufacturing efficiencies and cost-savings. *Id.*, 2:47-58.

Claim 1 recites this improved layout, including, in particular, (1) wiring lines for driving the circuit unit and the display electrodes; (2) lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion; and (3) external connecting terminals provided on the extending portion and overlapping with the lead wiring lines in plan view.

1. An electro-optical device comprising:

a pair of substrates that are disposed to face each other

with a predetermined gap therebetween, one

substrate of the pair of substrates including an

extending portion that extends from the other

substrate on one side in plan view;

display electrodes that are provided on the one substrate;

a circuit unit that is provided on the one substrate so as to
drive the display electrodes;
wiring lines for driving the circuit unit and the display
electrodes;
a plurality of lead wiring lines provided on the extending
portion and that are led from one of the sides of the
wiring lines to the extending portion; and
a plurality of external connecting terminals provided on
the extending portion, each of the external
connecting terminals overlapping with the plurality
of lead wiring lines in plan view.

Id., 16:31-48.

The '913 patent describes and claims a second improved layout, in which a circuit unit is disposed in the extending portion. The layout includes a circuit unit for driving display electrodes, wiring lines for driving the circuit units and display electrodes, and lead wiring lines led from one of the sides of wiring lines that drive the circuit unit to the extending portion and connected to external connecting terminals. *Id.*, 4:6-21. In particular, the external connecting terminals are provided on the extending portion overlapping the circuit unit. *Id.*, 4:22-25. Thus, “the space can be saved in the liquid crystal device 100 of the present embodiment, and thus

an electronic apparatus, to which the liquid crystal device 100 is applied, can have a high degree of freedom in terms of design.” *Id.*, 8:63-67.

Claim 5 recites this improved layout, including (1) a circuit unit for driving display electrodes, (2) wiring lines for driving the circuit unit and the display electrodes; (3) lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion; and (4) external connecting terminals provided on the extending portion and overlapping with the circuit unit in plan view.

5. An electro-optical device comprising:

a pair of substrates that are disposed to face each other
with a predetermined gap therebetween, one
substrate of the pair of substrates including an
extending portion that extends from the other
substrate on one side in plan view;
display electrodes that are provided on the one substrate;
a circuit unit that is provided on the one substrate so as to
drive the display electrodes;
wiring lines for driving the circuit unit and the display
electrodes;

a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion; and
a plurality of external connecting terminals provided on the extending portion, each of the external connecting terminals overlapping with the circuit unit in plan view.

Id., 17:6-22.

None of the asserted references or combinations disclose the claimed layouts that deliver the benefits of the '913 inventions.

III. CLAIM CONSTRUCTION

No claim terms require express construction to determine that the Petition does not establish a reasonable likelihood of unpatentability of any claim and, thus, deny institution. For purposes of this Preliminary Response, Patent Owner contends that the claims should be given their ordinary and customary meaning in light of the specification and prosecution history, as understood by a person of ordinary skill in the art. 37 C.F.R. § 100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).

IV. LEGAL STANDARD

The Board may not institute an *inter partes* review unless the Petition demonstrates a reasonable likelihood that the petition would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. § 314(a).

V. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this Preliminary Response only, Patent Owner does not dispute the level of skill for a person of ordinary skill in the art (“POSITA”), set forth in the Petition. Pet., 5. The level of skill in the art does not affect whether to deny institution, because the Petition and its expert do not address certain claim limitations and disclosures from the applied references. Patent Owner does not waive, however, any argument regarding the proper level of skill and reserves the right to later advance additional arguments.

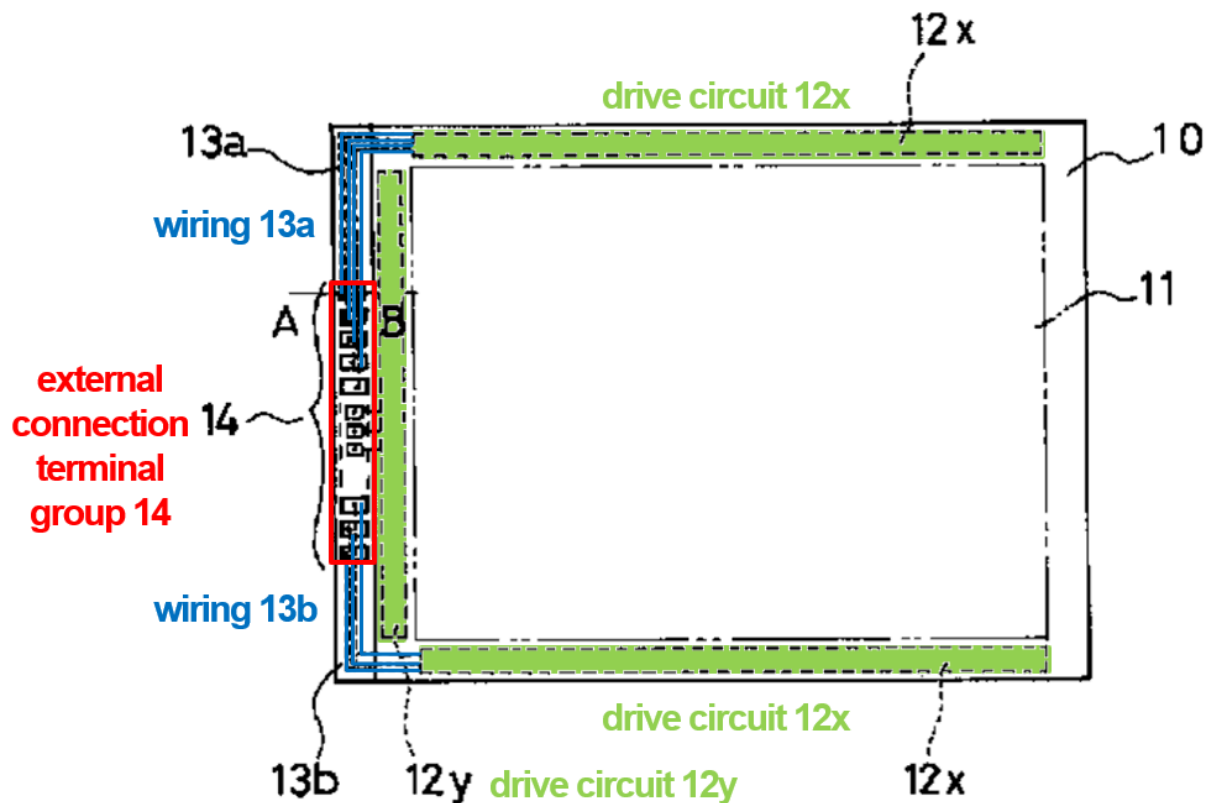
VI. THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD THAT THE ASSERTED REFERENCES RENDER UNPATENTABLE ANY CHALLENGED CLAIM.

A. The Petition does not establish a reasonable likelihood that Adachi anticipates or renders obvious claims 1-4, 9 (Ground 1).

1. Adachi: Overview

Adachi discloses a liquid crystal display device. *See* Ex. 1005. Adachi describes scanning line drive circuits in the periphery of the display region that drive the scanning lines; signal line drive circuits also in the periphery of the display region that drive the signal lines; and “a common wiring for supplying

power to the scanning line drive circuit and a common wiring for supplying power to the signal line drive circuit.” *Id.*, [0007], [0015]. Adachi also describes “external connection terminals.” *Id.* In particular, Adachi describes wiring connected to a drive circuit on one end and to an external connection terminal on the other:



Id., Fig. 1 (annotations added); *see also* Ex. 2001 ¶52.

Adachi does not disclose a second set of wiring lines led from one of the sides of the wiring line in groups 13a and 13b. Ex. 2001 ¶53.

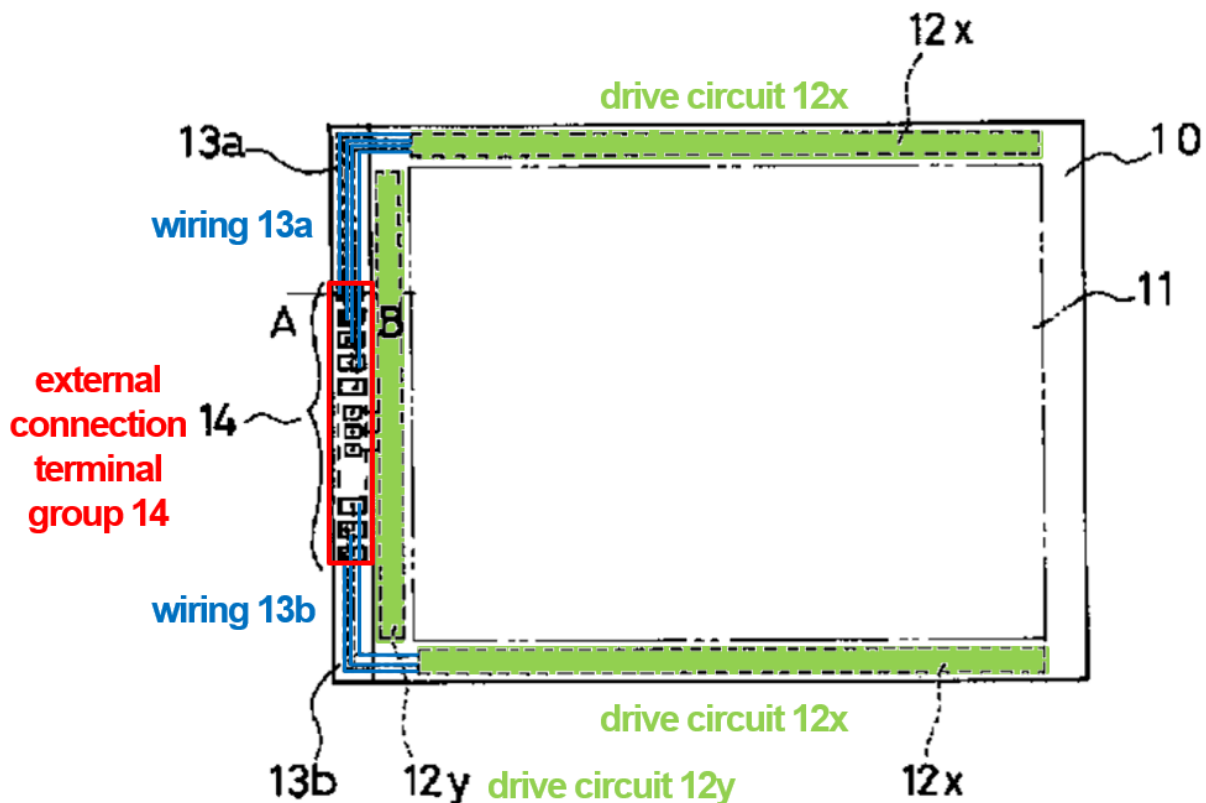
2. The Petition fails to show that Adachi discloses all limitations of any challenged claim.

a. Claim 1

i. The Petition does not show that Adachi discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

The Petition fails to show that Adachi discloses “wiring lines for driving the circuit unit and the display electrodes” and separate “lead wiring lines . . . that are led from one of the sides of the wiring lines to the extending portion.” *Id.* ¶¶50, 54-56. The Petition identifies “wiring lines” in Adachi’s disclosure and suggests that those wiring lines include segments satisfying the “lead wiring lines” limitation. But the Petition offers only unsupported conclusions and ignores that claim 1 recites that the lead wiring lines “are led from one of the sides of the wiring lines.”

The Petition contends that Adachi discloses the claimed “wiring lines” but does not identify separate “lead wiring lines.” The Petition notes that Adachi discloses “a common wiring for supplying power to the scanning line drive circuit and a common wiring for supplying power to the signal line drive circuit” and argues that the common wiring—e.g., wiring groups 13a and 13b—teaches the claimed “wiring lines.” Pet., 13-14.



Ex. 1005, Fig. 1 (annotations added, blue identifying wiring groups 13a and 13b and, according to Petition, the claimed “wiring lines”).

But the Petition does not show that Adachi discloses *separate* lead wiring lines: it argues only that wiring groups 13a and 13b purportedly include “segments” that disclose the claimed “lead wiring lines.” Pet., 14; *see also id.*, 16 (“Figure 3 shows external connection terminal 29 overlapping with *all the lead wirings in the wiring group 13a.*” (emphasis added)). The Petition cites no evidence to show that wiring groups 13a and 13b comprise “segments.” And more important, the Petition does not argue, much less cite evidence sufficient to show, that Adachi discloses lead wiring lines “led from one of the sides of the wiring

lines.” Ex. 1001, 16:42-44. Claim 1’s plain language recites two different lines: wiring lines and lead wiring lines *that are led from one of the sides of the wiring lines*. *Id.* A line cannot lead from one of its own sides. Yet the Petition identifies only one set of lines in Adachi’s disclosure: the wiring that supplies power to the drive circuits and connects to the external connection terminals. *See* Ex. 1005, [0007]-[0009], Fig. 1. Tellingly, the Petition conflates “wiring lines” and “lead wiring lines” at points. For example, the Petition identifies wiring 28 (a wire in wiring group 13a) as a “wiring line” and then, in addressing claim 2, argues that wiring 28 is instead a “lead wiring line.” *Compare* Pet., 14 *with* Pet., 19.

Thus, the Petition fails to show that Adachi discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

b. Claim 2

The Petition fails to show that Adachi discloses the electro-optical device according to claim 1 and, thus, fails to show that Adachi discloses claim 2.

Ex. 2001 ¶57.

c. Claim 3

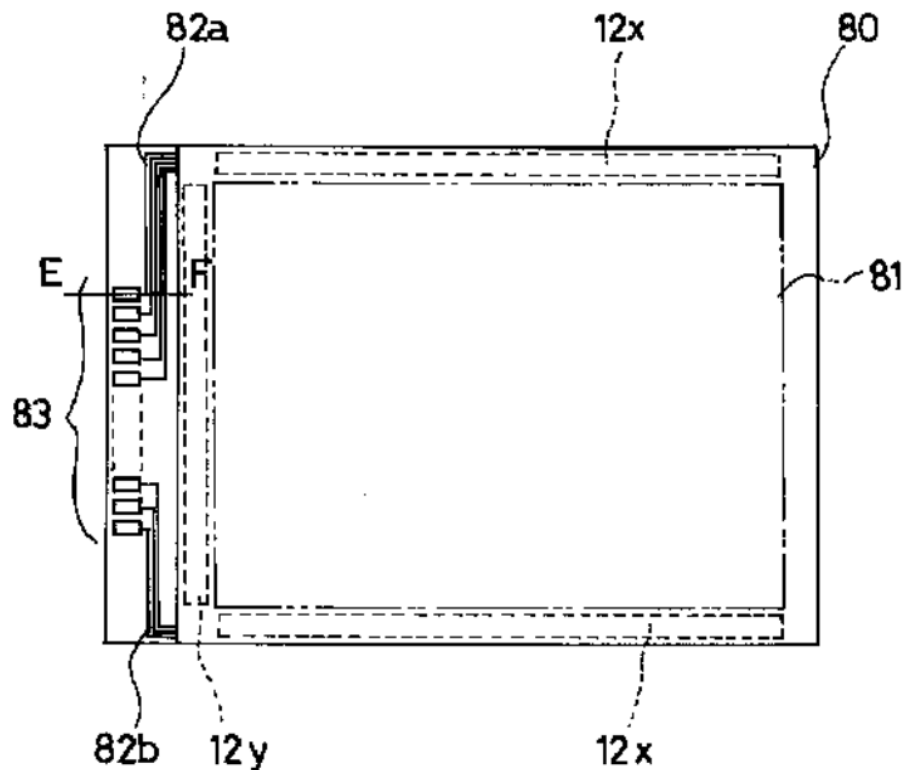
- i. The Petition does not show that Adachi discloses “the plurality of lead wiring lines . . . are correspondingly connected to edges of the**

**external connecting terminals in a direction
intersecting the direction along the one side.”**

The Petition fails to show that Adachi discloses the electro-optical device according to claim 1 and, thus, fails to show that Adachi discloses claim 3. *Id.* ¶58.

Further, the Petition fails to show that Adachi teaches that lead wiring lines “are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side.” *Id.* ¶¶59-60. The Petition cites only Adachi’s Figure 8, which does *not* disclose claim 3’s layout. *See* Pet., 20-21. Figure 8 does not show (1) external connecting terminals *overlapping* the lead wiring lines (claim 3 depends from claim 1), *and* (2) lead wiring lines connected to edges of the external connecting terminals perpendicularly, as claimed (i.e., in a direction intersecting the direction along the one side). The Petition does not and cannot suggest otherwise.

【図8】



Ex. 1005, Fig. 8. Indeed, the Petition argues that Adachi teaches the *opposite*: that the purported lead wiring lines connect to the external connecting terminals not at an edge but *where they intersect*. See Pet., 22.

Thus, the Petition fails to show that Adachi discloses “the plurality of lead wiring lines . . . are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side.”

d. Claim 4

The Petition fails to show that Adachi discloses the electro-optical device according to claim 1 and, thus, fails to show that Adachi discloses claim 4.

Ex. 2001 ¶61.

e. Claim 9

The Petition fails to show that Adachi discloses the electro-optical device according to claim 1 and, thus, fails to show that Adachi discloses claim 9. *Id.* ¶62.

B. The Petition does not establish a reasonable likelihood that Adachi in view of Takezawa renders obvious claim 8 (Ground 2).

For the same reasons that the Petition fails to show that Adachi discloses claim 1, the Petition fails to show that Adachi in view of Takezawa discloses claim 8. *Id.* ¶¶51, 63.

C. The Petition does not establish a reasonable likelihood that Adachi in view of Aruga renders obvious claim 10 (Ground 3).

For the same reasons that the Petition fails to show that Adachi discloses claim 1, the Petition fails to show that Adachi in view of Aruga discloses claim 10. *Id.* ¶¶51, 64.

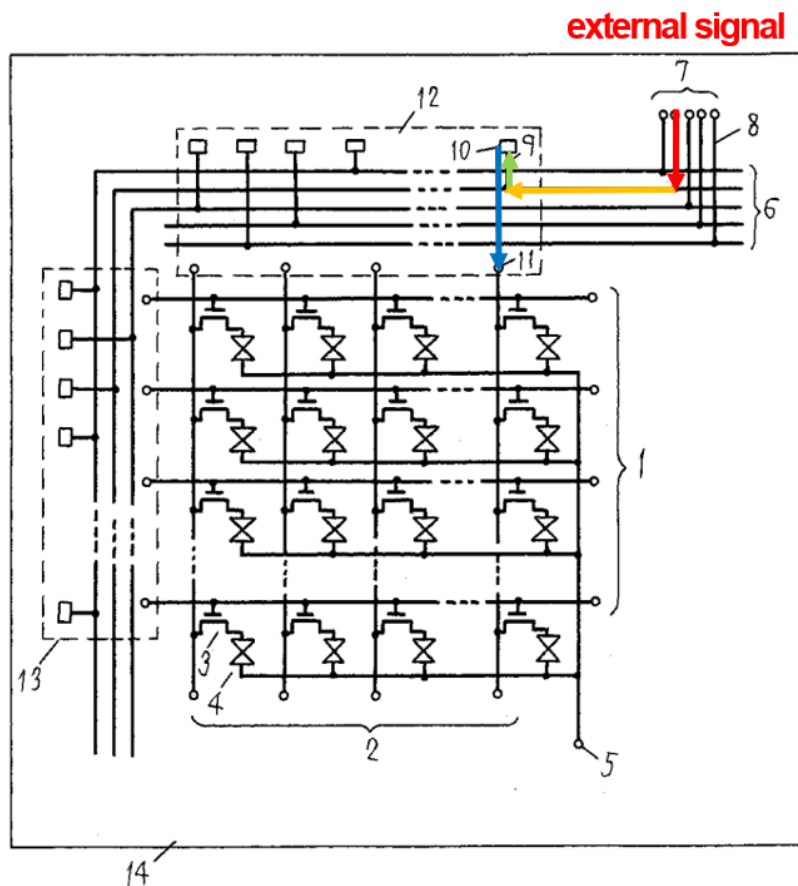
D. The Petition does not establish a reasonable likelihood that Sekado anticipates claims 1-6, 9 (Ground 4).

1. Sekado: Overview

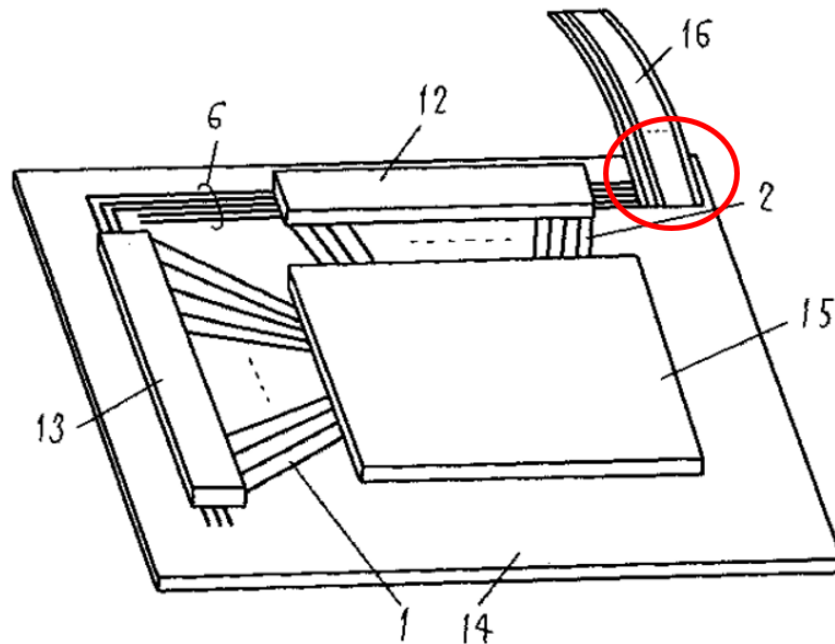
Sekado discloses a liquid crystal display device. *See* Ex. 1007. Sekado's display device includes a driver IC (integrated circuit) "so as to supply signals to

the signal lines and the scanning lines.” *Id.*, 2. Sekado describes two methods of connecting a driver IC to external (outside) signals: the “film carrier method” and the “chip-on-glass” (COG) method. *Id.* The Petition relies on Sekado’s COG teachings, “in which a driving IC for driving use is directly mounted on mounting terminals formed around an image display portion on one substrate constituting a liquid crystal display device.” *Id.*; Ex. 2001 ¶67.

Sekado describes a “conventional COG method.” Ex. 1007, 2. Specifically, driver driving wirings 6 “are wired to supply signals to the scanning line driving driver 13 and the signal line driving driver 12.” *Id.* Sekado teaches that external signal supply mounting terminals 7 receive external (outside) signals. *Id.*, 3. Following the path of an external signal, extraction wirings 8 supply the external signal to the driver driving wirings 6. Extraction wirings 9 connect the driver driving wirings 6 to the driver’s input connection terminals 10. And output connection terminals 11 connect the driver to the signal lines 2.

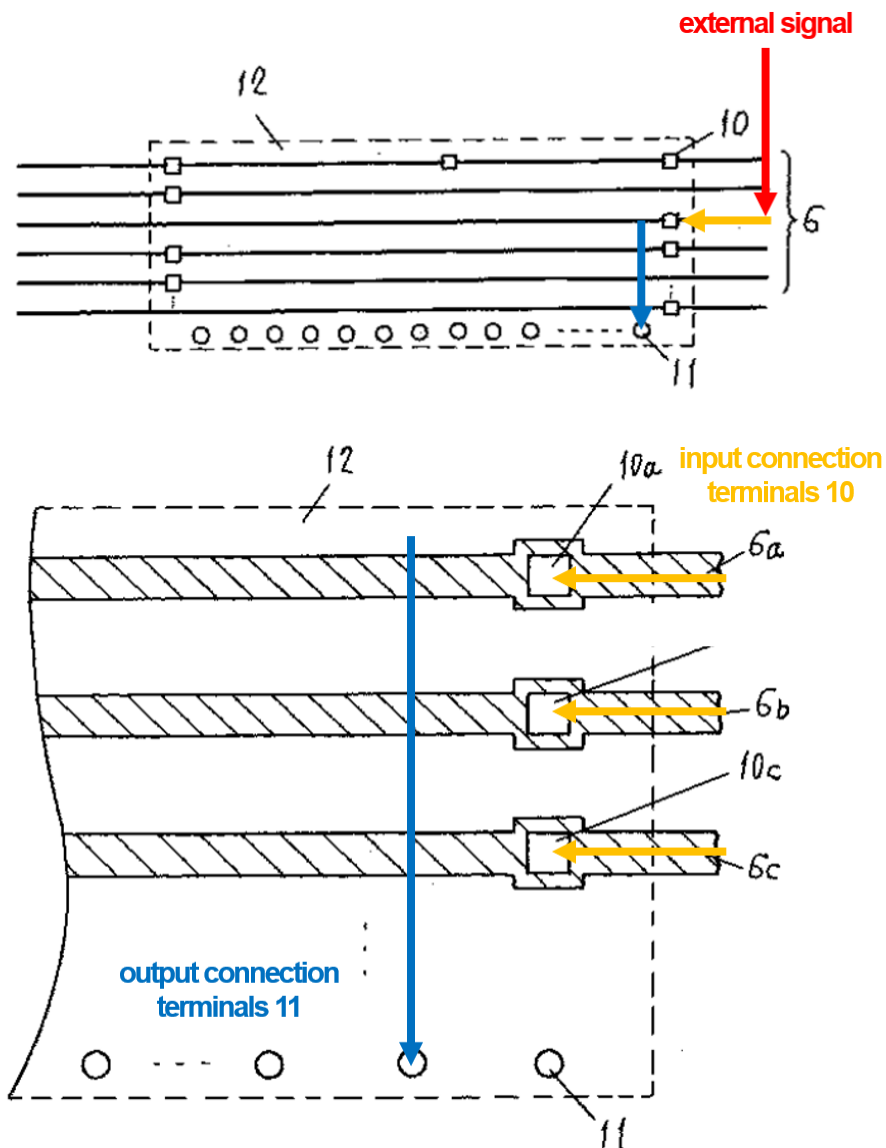


Id., 2-3, Fig. 4 (annotations added); Ex. 2001 ¶68. Sekado explains that external signal supply mounting terminals 7 are “pressure connected” to external signal supplying conductive film 16, located here:



Ex. 1007, 3, Fig. 5 (annotations added); Ex. 2001 ¶68.

Sekado identifies purported limitations to the conventional configuration: the “cross structure” between driver driving wirings 6 and extraction wirings 9 causes shorts. Ex. 1007, 3. Sekado’s purported invention removes the “cross structure,” or overlap. “In view of the above problem, in the present invention, an input pad group of an [sic] driver IC for driving use is arranged in a vertical direction with respect to an arrangement direction of an output pad group of the driver IC for driving use.” *Id.* In short, Sekado teaches placing input pads in direct contact with driver driving wirings 6, eliminating extraction wirings 9.



Id., Fig. 1, Fig. 2 (annotations added); *see also* Ex. 2001 ¶69.

Thus, “according to the present invention, it is possible to eliminate the cross structure of the driver driving wiring and the driver driving side extraction wiring of the active liquid crystal panel substrate, and accordingly, a short defect between the driver driving wiring and the driver driving side extraction wiring can be eliminated, and there is a large practical effect.” Ex. 1007, 4; Ex. 2001 ¶70.

2. The Petition fails to show that Sekado discloses all limitations of any challenged claim.

a. Claim 1

i. The Petition does not show that Sekado discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

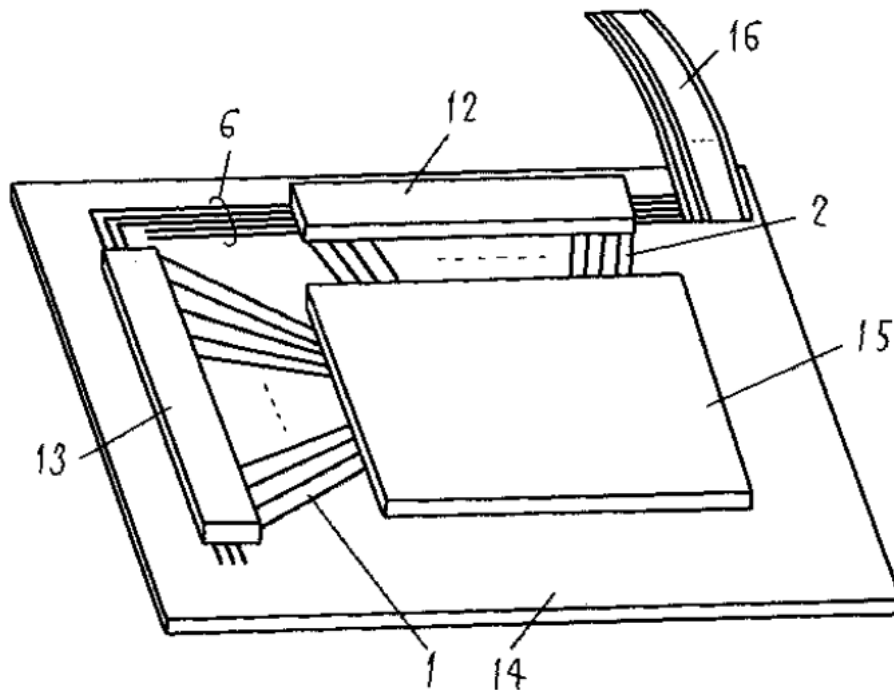
The Petition fails to show that Sekado discloses “wiring lines for driving the circuit unit and the display electrodes” and separate “lead wiring lines . . . that are led from one of the sides of the wiring lines to the extending portion.” Ex. 2001 ¶¶65, 71-74. The Petition identifies “wiring lines” in Sekado’s disclosure and suggests that those wiring lines include segments satisfying the “lead wiring lines” limitation. But the Petition offers only unsupported conclusions and again ignores that claim 1 recites that the lead wiring lines “are led from one of the sides of the wiring lines.”

The Petition contends that Sekado discloses the claimed “wiring lines” but does not identify separate “lead wiring lines.” The Petition argues that Sekado’s “driver driving wirings 6” “are wired to supply signals to the scanning line driving driver 13 and the signal line driving driver 12” and, thus, disclose “wiring lines.” Pet., 32. But the Petition does not show that Sekado discloses *separate* lead wiring lines: it argues only that wirings 6 also disclose “lead wiring lines.” *Id.*, 33. Like Adachi, the Petition suggests that Sekado’s wirings 6 comprise distinct “segments”

and that those segments disclose the claimed lead wiring lines. *Id.* But the Petition cites no evidence to show that wirings 6 comprise “segments.” More important, the Petition does not argue, much less cite evidence sufficient to show, that Sekado discloses lead wiring lines “led from one of the sides of the wiring lines.”

Ex. 1001, 16:42-44.

Nor does the Petition show that Sekado discloses lead wiring lines *outside of* the substrate’s purported extending portion. Ex. 2001 ¶73. Claim 1 recites lead wiring lines led from one of the sides of the wiring lines *to the extending portion*. But the Petition does not explain how wirings 6—shown in Sekado’s Figure 5 *only* on the purported extending portion of insulating substrate 14—lead *from* one of the sides of the wiring lines *to* the extending portion.



Ex. 1007, Fig. 5.

Thus, the Petition fails to show that Sekado discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

ii. The Petition does not show that Sekado discloses “external connecting terminals overlapping with the plurality of lead wiring lines in plan view.”

The Petition fails to show that Sekado discloses “external connecting terminals overlapping with the plurality of lead wiring lines in plan view.”

Ex. 2001 ¶¶75-77. The Petition misidentifies Sekado’s external connecting terminals.

The Petition contends that input “connection terminal 10 and a corresponding extraction wiring 9 form an external connecting terminal.” Pet., 34. But the Petition cites no evidence to show that input connection terminals 10 / extraction wirings 9 are external connecting terminals. *See, e.g.*, Ex. 1001, 8:17-29 (external connecting terminals “supply power or signals to the liquid crystal device 100 from an external circuit” and receive signals “inputted . . . from the outside”). To the contrary, Sekado teaches that *external signal supply mounting terminals 7* receive external (outside) signals. Extraction wirings 8 then supply external signals to the driver driving wirings 6. And extraction wirings 9 connect the driver driving

wirings 6 to the driver's input connection terminals 10. The input connection terminals 10 and extraction wirings 9 receive an internal input from the driver driving wirings 6 and are part of the driver IC—they are *not* external connecting terminals. Ex. 2001 ¶76. Indeed, the Petition concedes that “the [image] signals are supplied to the connection terminals 10/extraction wirings 9 via the wirings 8 and 6, and the connection terminals 10/extraction wirings 9 supply the signals to and drive the signal line driving driver 12.” Pet., 43. Further, the Petition concedes that the *actual* external connecting terminals (7) do *not* overlap driver driving wirings 6 in plan view.



Ex. 1007, Fig. 4 (annotations added).

Thus, the Petition fails to show that Sekado discloses “external connecting terminals overlapping with the plurality of lead wiring lines in plan view.”

b. Claim 2

The Petition fails to show that Sekado discloses the electro-optical device according to claim 1 and, thus, fails to show that Sekado discloses claim 2.

Ex. 2001 ¶78.

Moreover, because the Petition misidentifies Sekado's external connecting terminals, it fails to identify "an interlayer insulating film interposed" between external connecting terminals and lead wiring lines. *Id.* ¶79.

c. Claim 3

The Petition fails to show that Sekado discloses the electro-optical device according to claim 1 and, thus, fails to show that Sekado discloses claim 3. *Id.* ¶80.

Moreover, because the Petition misidentifies Sekado's external connecting terminals, it fails to show that "lead wiring lines . . . are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side." *Id.* ¶81.

d. Claim 4

The Petition fails to show that Sekado discloses the electro-optical device according to claim 1 and, thus, fails to show that Sekado discloses claim 4. *Id.* ¶82.

Moreover, because the Petition misidentifies Sekado's external connecting terminals, it fails to show that "lead wiring lines . . . are correspondingly connected to the external connecting terminals in a region where the lead wiring lines and the external connecting terminals intersect each other in plan view." *Id.* ¶83.

e. Claim 5

The Petition fails to show that Sekado discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.” § VI.D.2.a.i, *supra*; Ex. 2001 ¶84.

Further, the Petition fails to show that Sekado discloses “external connecting terminals overlapping with the circuit unit in plan view,” because the Petition misidentifies Sekado’s external connecting terminals. Sekado’s external signal supply mounting terminals 7 overlap *nothing* in plan view, much less a circuit unit. § VI.D.2.a.ii, *supra*; Ex. 2001 ¶85.

f. Claim 6

The Petition fails to show that Sekado discloses the electro-optical device according to claim 5 and, thus, fails to show that Sekado discloses claim 6. Ex. 2001 ¶86.

g. Claim 9

The Petition fails to show that Sekado discloses the electro-optical device according to claim 1 and, thus, fails to show that Sekado discloses claim 9. *Id.* ¶87.

E. The Petition does not establish a reasonable likelihood that Sekado in view of Aruga renders obvious claim 7 (Ground 5).

For the same reasons that the Petition fails to show that Sekado discloses claim 5, the Petition fails to show that Sekado in view of Aruga discloses claim 7. *Id.* ¶¶66, 88.

F. The Petition does not establish a reasonable likelihood that Sekado in view of Takezawa renders obvious claim 8 (Ground 6).

For the same reasons that the Petition fails to show that Sekado discloses claim 1, the Petition fails to show that Sekado in view of Takezawa discloses claim 8. *Id.* ¶¶66, 89.

G. The Petition does not establish a reasonable likelihood that Sekado in view of Kim renders obvious claim 10 (Ground 7).

For the same reasons that the Petition fails to show that Sekado discloses claim 1, the Petition fails to show that Sekado in view of Kim discloses claim 10. *Id.* ¶¶66, 90.

H. The Petition does not establish a reasonable likelihood that Sekado in view of Aruga and Kim renders obvious claim 11 (Ground 8).

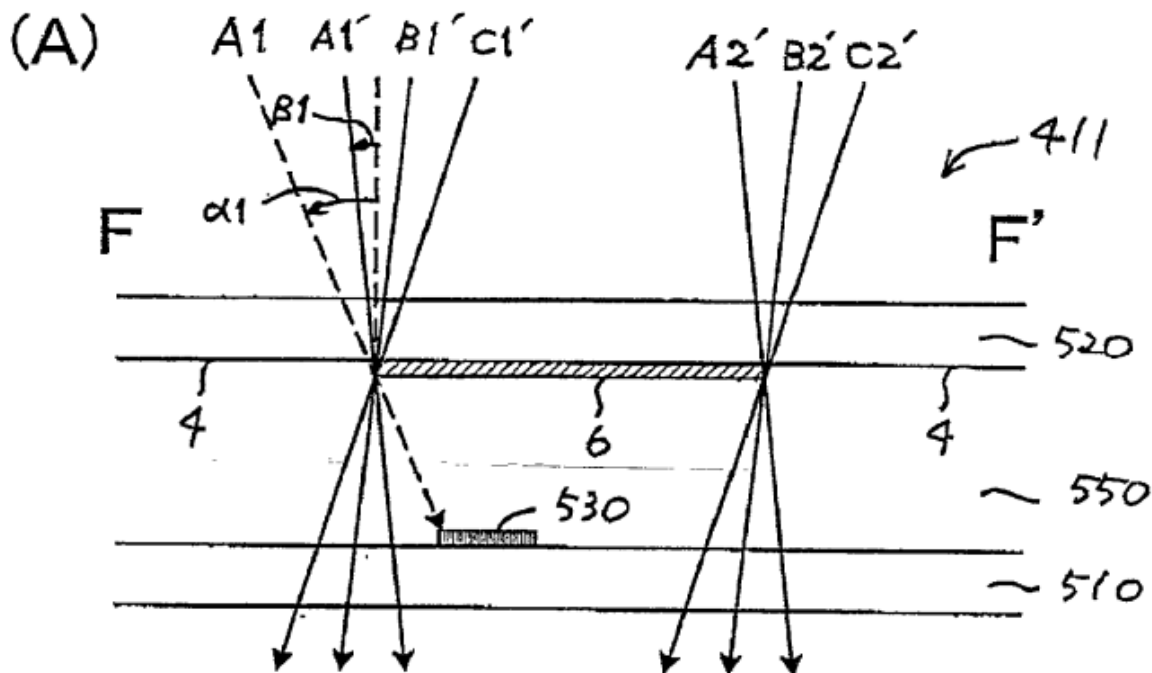
For the same reasons that the Petition fails to show that Sekado discloses claim 5, the Petition fails to show that Sekado in view of Aruga and Kim discloses claim 11. *Id.* ¶¶66, 91.

I. The Petition does not establish a reasonable likelihood that Takezawa in view of Kim renders obvious claims 1-4, 8-10 (Ground 9).

1. Takezawa: Overview

Takezawa, a U.S. patent application publication titled “Projector,” describes projectors and, related to those projectors, liquid crystal panels. *See* Ex. 1006. Takezawa describes improving projected image quality “by eliminating the

chances of a drive element [part of the liquid crystal panel] being directly struck by incident light.” *Id.*, [0009]. In particular, Takezawa describes improved lens arrangements that restrict incident light. “According to the present invention, the angle of the light incident upon the liquid crystal device is restricted not to allow the incident light to strike the drive elements, so that scratching, breakage, and malfunctioning of the drive elements do not occur. Therefore, it is possible to improve the quality of a projected image.” *Id.*, [0024].



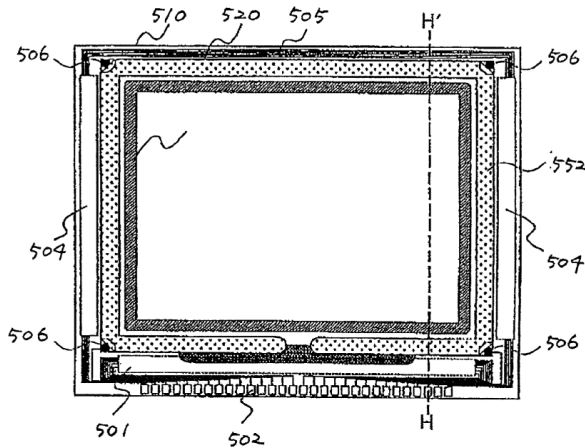
Id., Fig. 12(A), [0099]; Ex. 2001 ¶95.

But the Petition does not cite Takezawa for its projector arrangements.

Rather, it cites Takezawa's figures showing LCD layouts, in which the external

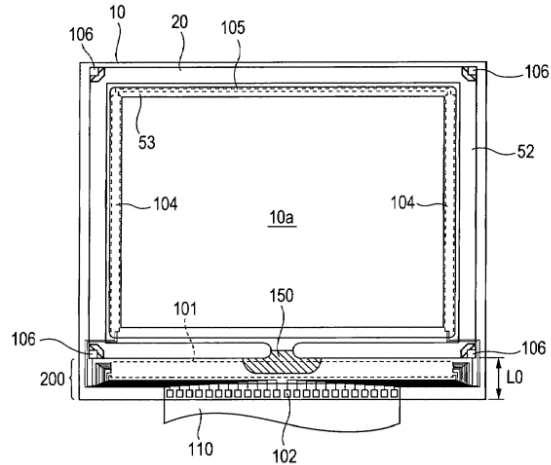
connecting terminals overlap *nothing*. *See, e.g.,* Pet., 55-60. Indeed, the '913 patent describes a similar layout, and then *improves* it:

Takezawa Fig. 6
No Overlap



Ex. 2001 ¶96.

'913 Patent Fig. 3
No Overlap, in Contrast with
Claimed Inventions



2. Kim: Overview

Kim, a U.S. patent titled “Connecting part of outer circuit in liquid crystal display panel and a fabricating method thereof,” describes liquid crystal panels and certain outer circuit “connecting part” arrangements. Ex. 1008, Abstract. Kim explains that LCD driving circuits are connected to an outer circuit “supplying a data input signal.” *Id.*, 1:17-26. The “outer circuit and the driving circuit are connected to each other by a pad,” using wiring. *Id.*, 1:27-31. Kim notes that pads “are densely located at the connecting part of the outer circuit,” yet “the wires connected to a plurality of pads, which are densely arranged, should have a certain space to prevent an electrical short in the arranged space.” *Id.*, 1:49-56 (figure

numbering omitted). Kim purportedly “minimize[s] the space required for the wires.” *Id.*, 1:57-2:8; Ex. 2001 ¶97.

Kim describes wiring extending in two directions. Specifically, Kim provides that “[e]ach of the pads located at the middle of the connecting part of the outer circuit is connected to a driving circuit located at a lower part by the second wire 43 arranged in a column, while each of the remaining pads located at the side portions of the connecting part is arranged in a row-like fashion for a distance and then connected to the driving circuit by the first wire 42 which is bent or angled toward the driving circuit at a certain point or region.” Ex. 1008, 4:11-26; Ex. 2001 ¶98.

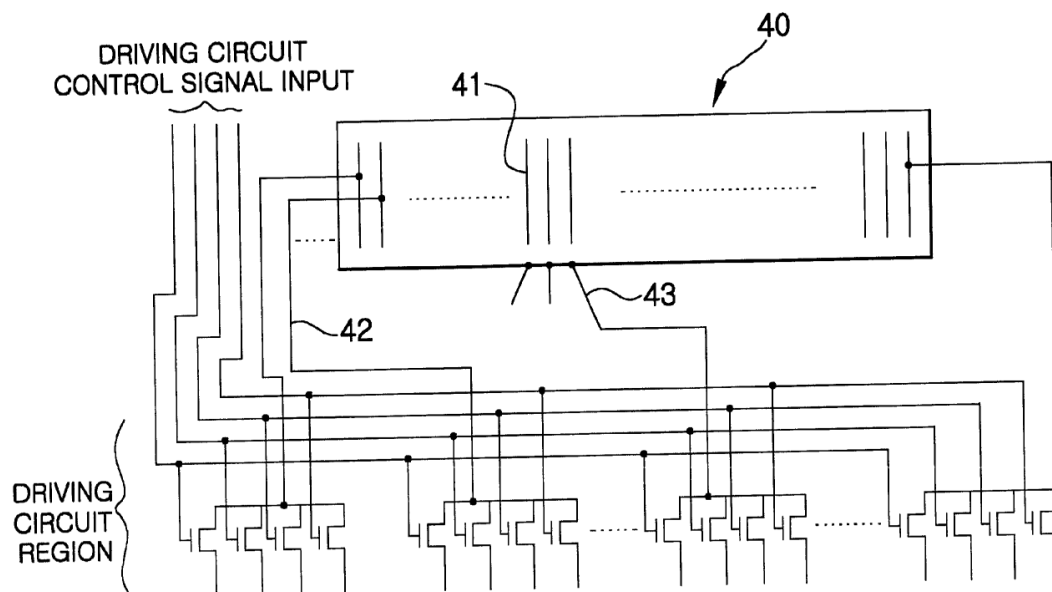


FIG.4

Ex. 1008, Fig. 4.

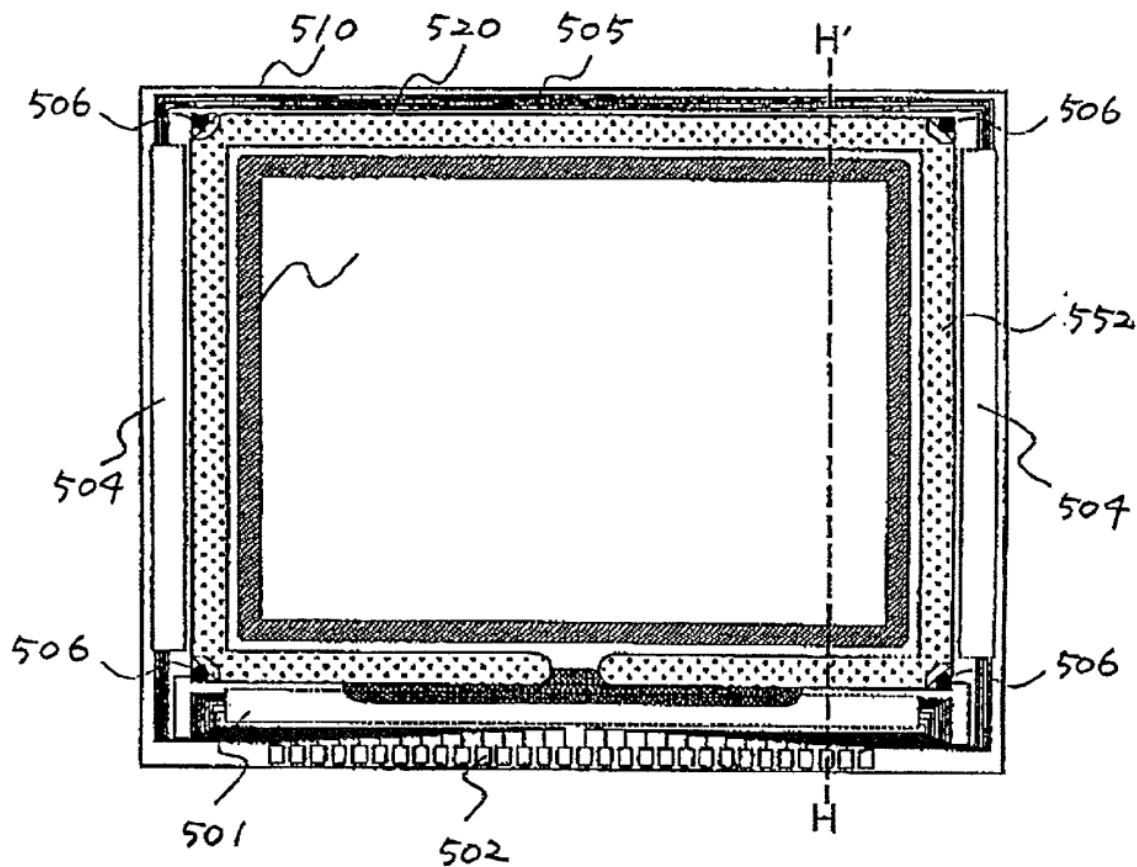
3. The Petition fails to show that Takezawa in view of Kim discloses all limitations of any challenged claim.

a. Claim 1

i. The Petition does not show that Takezawa in view of Kim discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

The Petition fails to show that Takezawa in view of Kim discloses “wiring lines for driving the circuit unit and the display electrodes” and separate “lead wiring lines . . . that are led from one of the sides of the wiring lines to the extending portion.” Ex. 2001 ¶¶92, 102-06. As in other grounds, the Petition identifies “wiring lines” and suggests that those wiring lines include segments satisfying the “lead wiring lines” limitation. Again, the Petition flouts the plain claim language.

The Petition contends that Takezawa discloses the claimed “wiring lines” but does not show that Takezawa—or Kim, for that matter—discloses separate “lead wiring lines.” The Petition argues that Takezawa’s “Figure 6 shows a plurality of wiring lines coupled to the data line drive circuit 501.” Pet., 58.



Ex. 1006, Fig. 6.

But the Petition does not show that Takezawa discloses *separate* lead wiring lines: it argues only that the wiring lines include “segments” and that those undefined segments disclose the claimed lead wiring lines. *See* Pet., 59 (“Figure 6 shows segments of the wiring lines are led from one of the sides of the wirings to the extending portion and extend on the extending portion.”). The Petition cites no evidence to show that Takezawa’s “wiring lines” comprise segments, much less that those “segments” disclose the claimed lead wiring lines. And the Petition cites no evidence to show that Takezawa discloses lead wiring lines “led from one of the

sides of the wiring lines.” It cites one set of wiring lines. It parrots the claim language. And the supporting expert declaration offers nothing more. *See* Ex. 1002 ¶¶239-41.¹

Thus, the Petition fails to show that Takezawa in view of Kim discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

b. Claim 2

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 2. Ex. 2001 ¶107.

c. Claim 3

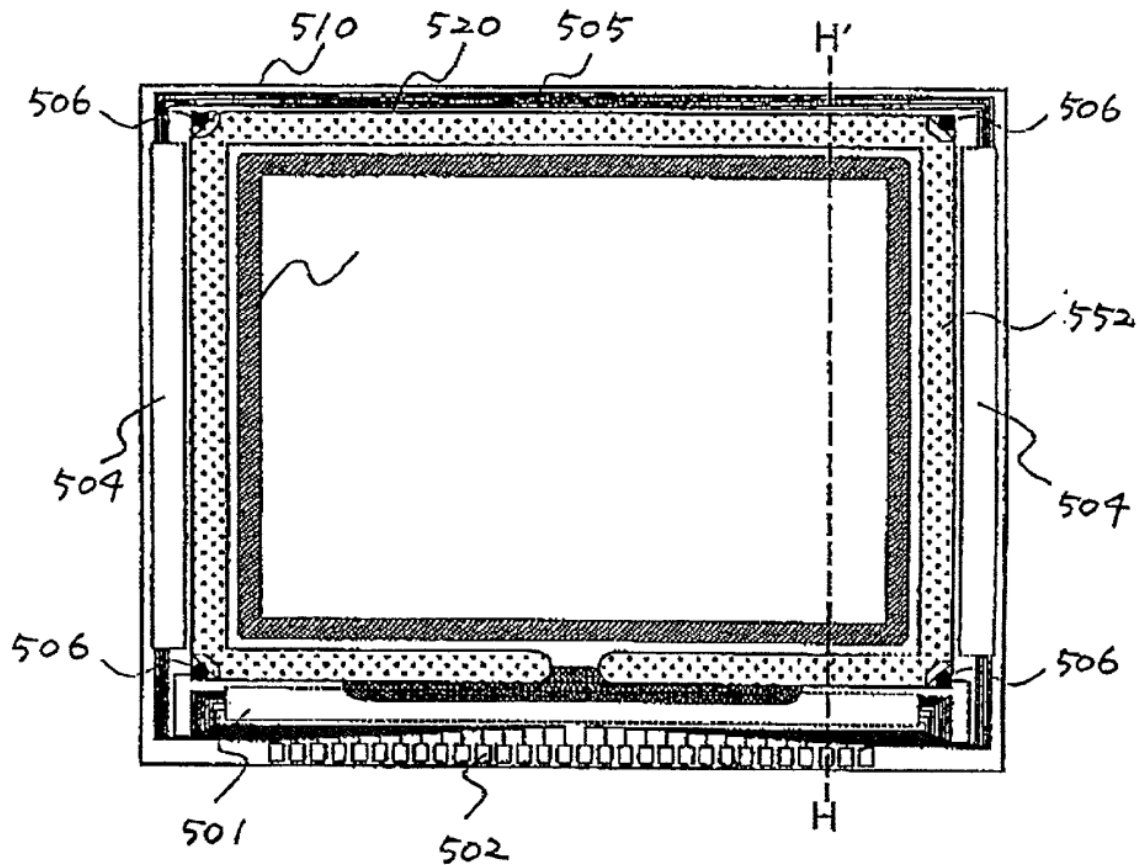
i. The Petition does not show that Takezawa in view of Kim discloses “the plurality of lead

¹ The Petition does not argue that Kim discloses the claimed “lead wiring lines,” but it includes a passing comment that Kim teaches that “segments of the wires 42 connected to the pads 41 constitute lead wiring lines.” Pet., 61. That argument fails for the same reason that the Petition’s other “segments” arguments fail—the Petition does not show that Kim discloses wiring lines and separate lead wiring lines, nor does it show that the purported “lead wiring lines” are led from one of the sides of the wiring lines. Ex. 2001 ¶105.

wiring lines . . . are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side.”

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 3. *Id.* ¶108.

Further, the Petition fails to show that Takezawa in view of Kim teaches that lead wiring lines “are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side.” *Id.* ¶¶109-11. The Petition cites only Takezawa’s layout, which does *not* disclose the claimed layout. It does not show (1) external connecting terminals *overlapping* the lead wiring lines (claim 3 depends from claim 1), *and* (2) lead wiring lines connected to edges of the external connecting terminals perpendicularly, as claimed (i.e., in a direction intersecting the direction along the one side).



Ex. 1006, Fig. 6; Pet., 67-68.

The Petition does not show that, were a POSITA to modify Takezawa in view of Kim, lead wiring lines would connect to edges of the external connecting terminals in a direction intersecting the direction along the one side *and* overlap the external connecting terminals. Ex. 2001 ¶110. Indeed, the Petition argues that Kim's layout discloses the *opposite*. See, e.g., Pet., 68-69 (arguing that Kim discloses wires connected to pads "in a region where the first wires 42 and the pads 41 intersect each other in plan view").

Thus, the Petition fails to show that Takezawa in view of Kim discloses “the plurality of lead wiring lines . . . are correspondingly connected to edges of the external connecting terminals in a direction intersecting the direction along the one side.”

d. Claim 4

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 4. Ex. 2001 ¶112.

e. Claim 8

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 8. *Id.* ¶113.

f. Claim 9

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 9. *Id.* ¶114.

g. Claim 10

The Petition fails to show that Takezawa in view of Kim discloses the electro-optical device according to claim 1 and, thus, fails to show that Takezawa in view of Kim discloses claim 10. *Id.* ¶115.

J. The Petition does not establish a reasonable likelihood that Takezawa in view of Yoneda renders obvious claims 5 or 6 (Ground 10).

1. Yoneda: Overview

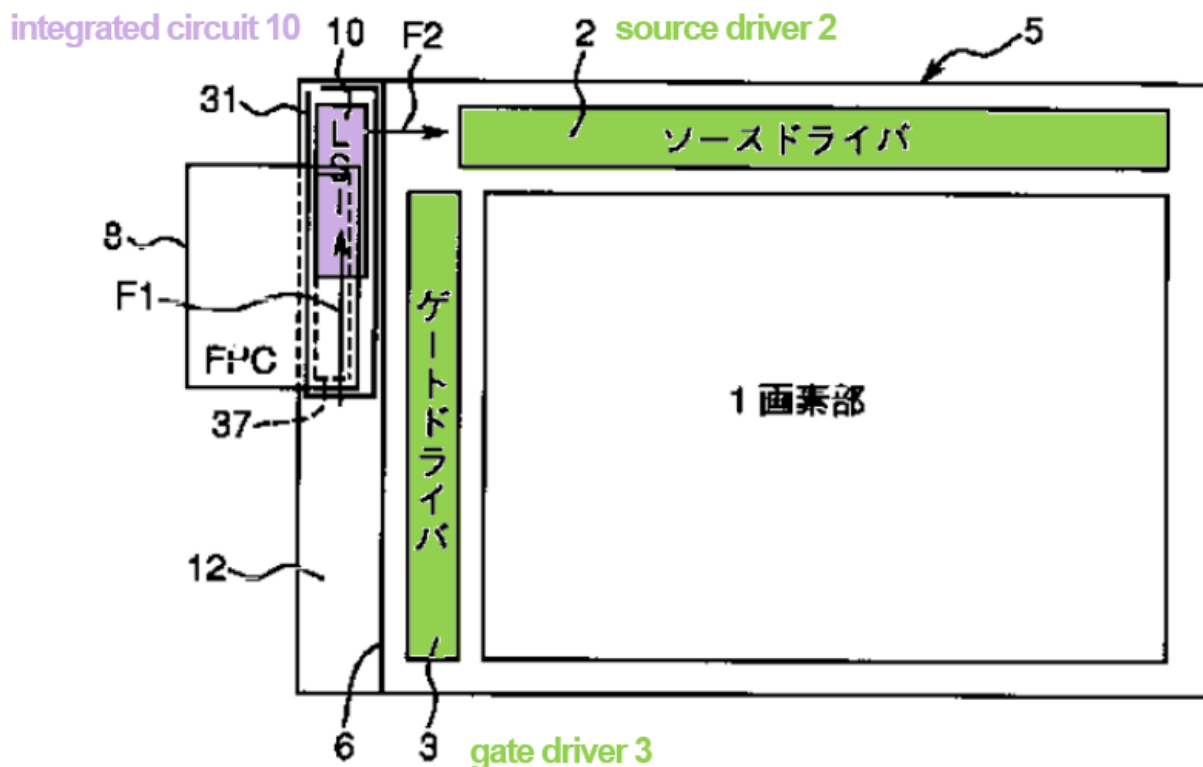
Yoneda discloses an “image display device.” Ex. 1011, 1. It describes a layout “in which peripheral circuits for a polysilicon TFT liquid crystal display device can be configured without increasing frame area, thereby contributing to miniaturization and simplification of design by a user.” *Id.*, [0010]; Ex. 2001 ¶99.

Yoneda describes LCD panels including multiple circuits: drive circuits that drive display electrodes, and additional circuits that, according to Yoneda, improve performance of the drive circuits. Yoneda describes LCD panels “in which drive circuits called source drivers or gate drivers are integrally formed on a same glass substrate as a pixel portion using polysilicon TFTs (thin film transistors).”

Ex. 1011, [0004]. Those drive circuits drive display electrodes. According to Yoneda’s disclosure, polysilicon TFTs may also include a “phase expansion circuit or time axis expansion circuit for lowering the video signal frequency to a speed that could be processed by the monolithic driver.” *Id.*, [0006], [0008]. Yoneda explains that those “outside” (outside the panel) integrated circuits may process or convert video signals before providing those signals to the drive circuits. *Id.*, [0008], [0019]-[0020], [0024]. “Thus, [according to Yoneda,] the LPS panel using the polysilicon driver formed of polysilicon has the advantage that the driver is

monolithically formed on the glass substrate and a frame can be made small, while also has the disadvantage that the contribution to miniaturization of equipment is small, since such an external circuit (LSI) is required.” *Id.*, [0009]; Ex. 2001 ¶100.

Thus, Yoneda describes layouts incorporating an additional, external integrated circuit. Ex. 1011, [0008]-[0009]. Yoneda describes *adding* an integrated circuit, rather than saving space otherwise allocated to drive circuits—Yoneda is directed to “peripheral circuits for a polysilicon TFT liquid crystal display device.” *Id.*, [0043]; Ex. 2001 ¶101.



Ex. 1011, Fig. 3 (annotations added).

2. The Petition fails to show that Takezawa in view of Yoneda discloses all limitations of any challenged claim.

a. Claim 5

i. The Petition does not show that Takezawa in view of Yoneda discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

The Petition fails to show that Takezawa in view of Yoneda discloses “lead wiring lines . . . that are led from one of the sides of the wiring lines to the extending portion,” for the same reasons that it fails to show that Takezawa in view of Kim discloses the limitation. *See* § VI.I.3.a.i, *supra*; Ex. 2001 ¶¶93, 116.

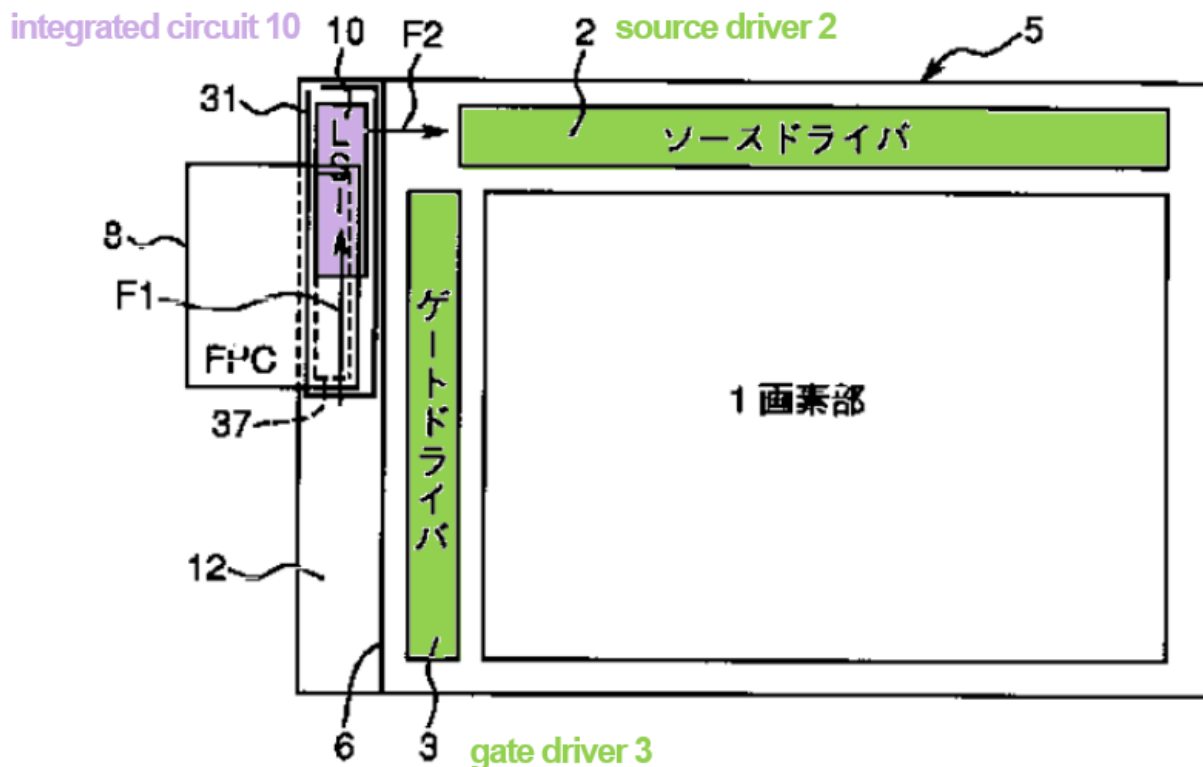
ii. The Petition does not show that Takezawa in view of Yoneda discloses “a circuit unit that is provided on the one substrate so as to drive the display electrodes” and “external connecting terminals overlapping” that circuit unit.

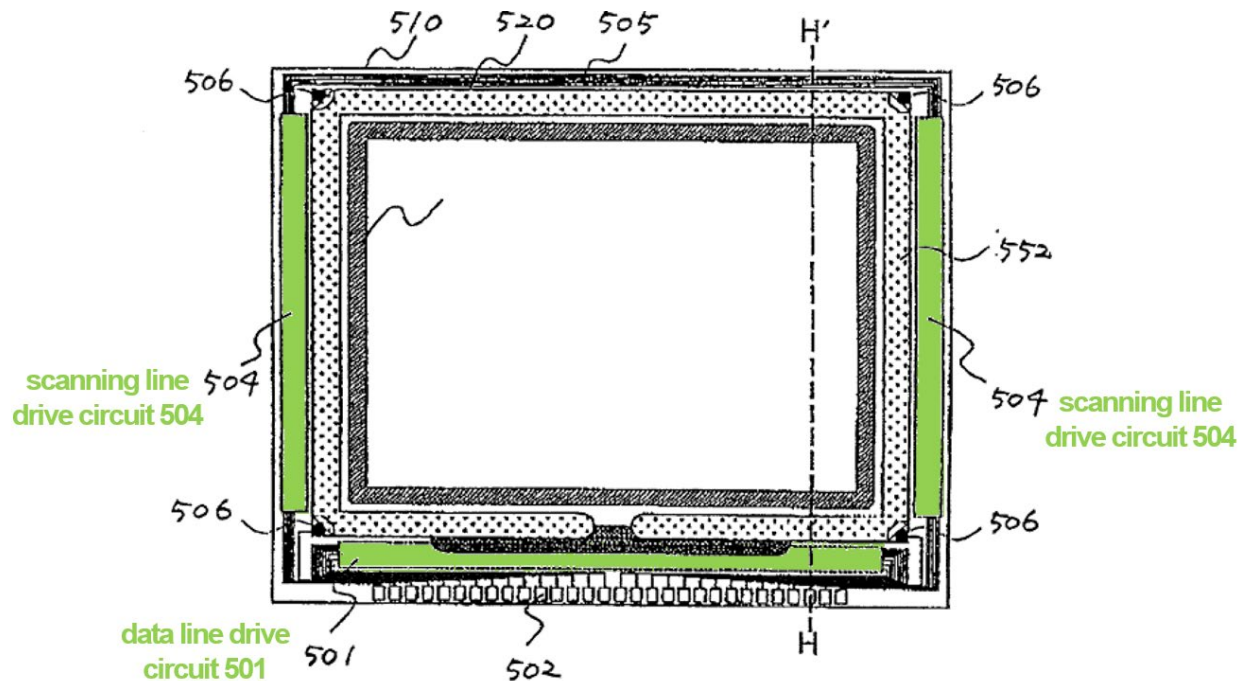
The Petition fails to show that Takezawa in view of Yoneda discloses “external connecting terminals overlapping” “a circuit unit . . . so as to drive the display electrodes.” The Petition misidentifies Yoneda’s “circuit unit . . . so as to drive the display electrodes.” Ex. 2001 ¶¶93, 117-21.

The Petition suggests that Yoneda’s “integrated circuit 10” discloses the claimed “circuit unit . . . so as to drive the display electrodes” and argues that external connecting terminals “overlap with the integrated circuit 10 in a plan view.” Pet., 75-76. But the Petition cites no evidence to show that integrated circuit

The Petition’s conclusory arguments regarding the proposed combination confirm that neither Takezawa nor Yoneda—nor, as a result, the combination—discloses external connecting terminals overlapping the claimed circuit unit.

Ex. 2001 ¶120. The Petition argues that “a POSITA would have been motivated to modify the arrangement of the external circuit connection terminals 502 and the circuit unit (e.g., data line drive circuit 501) of *Takezawa* according to the disclosure of *Yoneda*.” Pet., 76. But *Takezawa* and *Yoneda* disclose *similar driver arrangements*, i.e., drive circuits in the periphery of the display region and *not* overlapping external connecting terminals.





Compare Ex. 1011, Fig. 3 *with* Ex. 1006, Fig. 6; Ex. 2001 ¶120. Neither Takezawa nor Yoneda discloses external connecting terminals overlapping a circuit unit “so as to drive the display electrodes.”

Thus, the Petition fails to show that Takezawa in view of Yoneda discloses “a circuit unit that is provided on the one substrate so as to drive the display electrodes” and “external connecting terminals overlapping” that circuit unit.

b. Claim 6

The Petition fails to show that Takezawa in view of Yoneda discloses the electro-optical device according to claim 5 and, thus, fails to show that Takezawa in view of Yoneda discloses claim 6. Ex. 2001 ¶122.

K. The Petition does not establish a reasonable likelihood that Takezawa in view of Yoneda and Aruga renders obvious claim 7 (Ground 11).

For the same reasons that the Petition fails to show that Takezawa in view of Yoneda discloses claim 5, the Petition fails to show that Takezawa in view of Yoneda and Aruga discloses claim 7. *Id.* ¶¶94, 123.

L. The Petition does not establish a reasonable likelihood that Takezawa in view of Yoneda, Aruga, and Tanaka renders obvious claim 11 (Ground 12).

For the same reasons that the Petition fails to show that Takezawa in view of Yoneda discloses claim 5, the Petition fails to show that Takezawa in view of Yoneda, Aruga, and Tanaka discloses claim 11. *Id.* ¶¶94, 124.

M. The Petition does not establish a reasonable likelihood that Hirosue anticipates claims 5 or 6 (Ground 13).

1. Hirosue: Overview

Hirosue, a U.S. patent application publication titled “Display device,” describes liquid crystal display arrangements. Ex. 1013, 1. Hirosue describes providing “a display device that makes miniaturization possible without there being a reduction in the display characteristics and the manufacturing yield.” *Id.*, [0006]. Relevant here, Hirosue describes mounting driver circuits “and the flexible substrates that supply a potential from outside the liquid crystal panels to these driver circuits” “close to one side of a display region,” so that “the display device can be miniaturized by making the wiring regions excluding the mount regions of

the driver circuits extremely small.” *Id.*, [0005], [0037], [0046]. Importantly, Hirosue describes *concentrating* driver circuits and flexible substrates—it does not describe mounting circuits *in overlap with* a flexible substrate or external connecting terminals. Ex. 2001 ¶127.

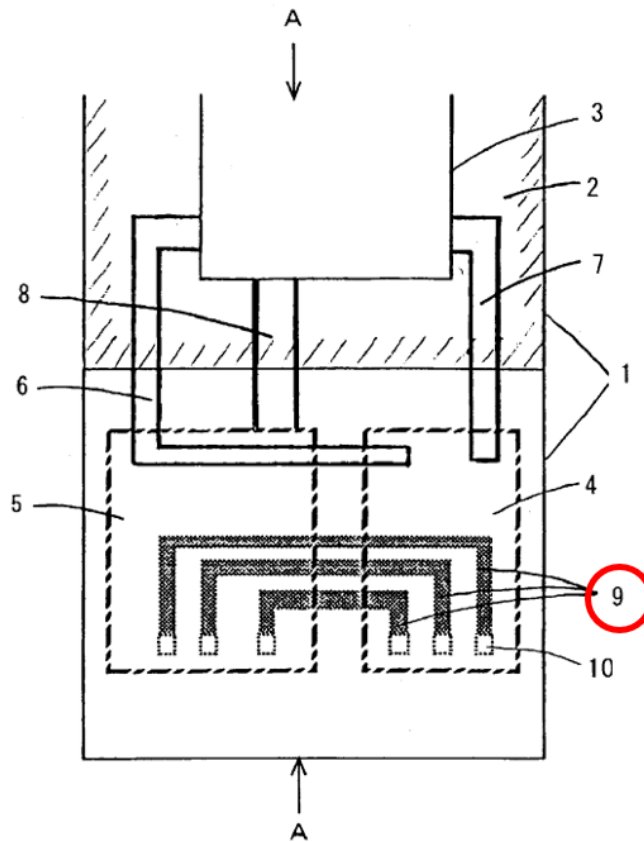
2. The Petition fails to show that Hirosue discloses all limitations of any challenged claim.

a. Claim 5

i. The Petition does not show that Hirosue discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

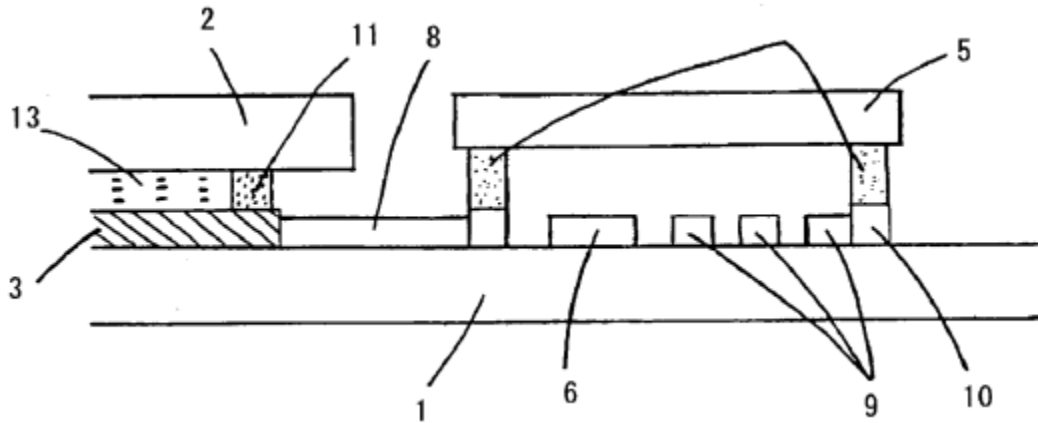
The Petition fails to show that Hirosue discloses “wiring lines for driving the circuit unit and the display electrodes” and separate “lead wiring lines . . . that are led from one of the sides of the wiring lines to the extending portion.” *Id.* ¶¶125, 128-32. Once more, the Petition identifies “wiring lines” and suggests that those wiring lines include segments satisfying the “lead wiring lines” limitation.

The Petition contends that Hirosue discloses the claimed “wiring lines” but does not show that it discloses separate “lead wiring lines.” The Petition contends that Hirosue discloses the claimed “wiring lines”—including “connecting lines that connect[] the scan line driver circuit and the signal line driver circuit” 9. Ex. 1013, [0035]; Pet., 88.



Ex. 1013, Fig. 1 (annotation added). But the Petition does not identify separate “lead wiring lines”—consistently, it points to “segments” of connecting lines 9. Pet., 89. The Petition argues that Hirose “teaches segments of at least the lines 9 . . . are provided on the extending portion, and are led from one of the sides of the lines to the extending portion and extend on the extending portion.” *Id.* The Petition cites no evidence to show that connecting lines 9 comprise “segments” or, more important, that one set of lines discloses the claimed wiring lines *and* lead wiring lines “led from one of the sides of the wiring lines.”

Moreover, the Petition cites no evidence to show that the purported “lead wiring lines” are led from one of the sides of the wiring lines *to the extending portion*. Ex. 2001 ¶131. Claim 5 recites lead wiring lines led from one of the sides of the wiring lines *to the extending portion*. Thus, the lead wiring lines must lead from *outside* of the extending portion. Connecting lines 9 are on only the purported extending portion and do not *lead* to it.



Ex. 1013, Fig. 2.

Thus, the Petition fails to show that Hirosue discloses “a plurality of lead wiring lines provided on the extending portion and that are led from one of the sides of the wiring lines to the extending portion.”

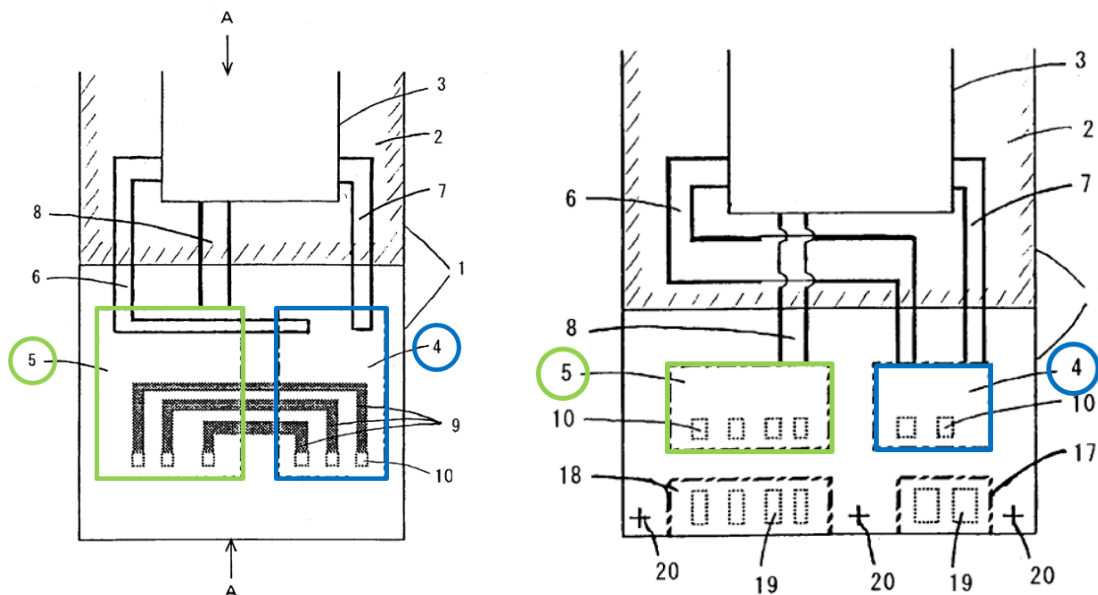
- ii. **The Petition does not show that Hirosue discloses “a circuit unit that is provided on the one substrate so as to drive the display**

electrodes” and “external connecting terminals overlapping” that circuit unit.

The Petition fails to show that Hirosue discloses “external connecting terminals overlapping” “a circuit unit . . . so as to drive the display electrodes.”

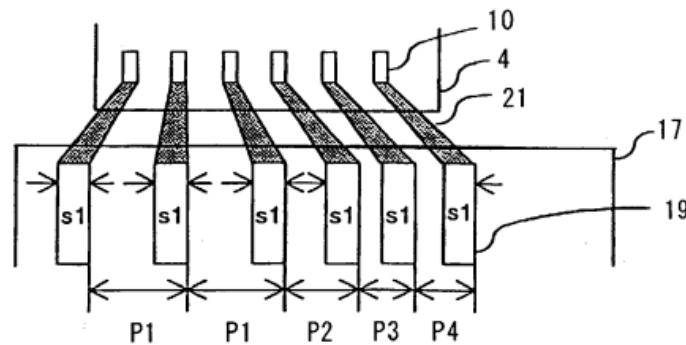
Ex. 2001 ¶¶133-37. The Petition misidentifies Hirosue’s external connecting terminals. Properly identified, the external connecting terminals do not overlap a circuit unit that drives display electrodes.

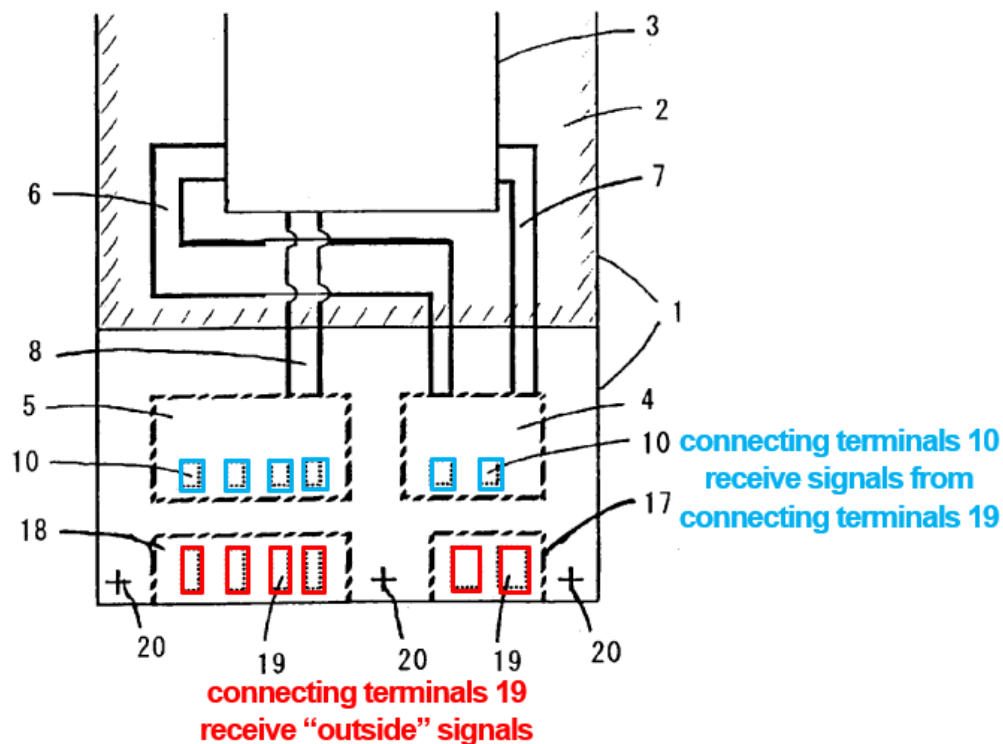
The Petition contends that Hirosue discloses a circuit unit that is provided on the one substrate so as to drive the display electrodes, specifically, scan line driver circuit 4 and signal line driver circuit 5. Pet., 87.



Ex. 1013, Fig. 1, Fig. 5 (annotations added). Then the Petition contends that “connecting terminals 10 overlap with the scan line driver circuit 4 and the signal line driver circuit 5.” Pet., 91. But the Petition cites no evidence to show that

connecting terminals 10 are *external* connecting terminals. *See, e.g.*, Ex. 1001, 8:17-29 (external connecting terminals “supply power or signals to the liquid crystal device 100 from an external circuit” and receive signals “inputted . . . from the outside”); Ex. 2001 ¶134. To the contrary, Hirose teaches that connecting terminals 19 (not 10) receive external signals. Flexible substrate 17 “supplies a scan line potential from outside the liquid crystal panel,” and connecting terminals 19 connect the flexible substrate to the liquid crystal panel, through *non-external* connecting terminals 10. *See, e.g.*, Ex. 1013, [0045], [0049]; Ex. 2001 ¶135.





Ex. 1013, Fig. 5, Fig. 8 (annotations added).

The Petition does not contend that the external connecting terminals 19 overlap driver circuits 4 or 5. Indeed, it cannot. Hirosue teaches mounting the driver circuits, the flexible substrate, and external connection terminals on one end of the substrate, but not in overlap. *Id.*, [0046]. Indeed, Hirosue specifically teaches including “a gap” between the driver circuits and the flexible substrate (including external connecting terminals 19), to include alignment marks. *Id.*

Thus, the Petition fails to show that Hirosue discloses “external connecting terminals overlapping” the claimed circuit unit.

b. Claim 6

The Petition fails to show that Hirosue discloses the electro-optical device according to claim 5 and, thus, fails to show that Hirosue discloses claim 6.

Ex. 2001 ¶138.

N. The Petition does not establish a reasonable likelihood that Hirosue in view of Aruga renders obvious claim 7 (Ground 14).

For the same reasons that the Petition fails to show that Hirosue discloses claim 5, the Petition fails to show that Hirosue in view of Aruga discloses claim 7. *Id.* ¶¶126, 139.

O. The Petition does not establish a reasonable likelihood that Hirosue in view of Aruga and Tanaka renders obvious claim 11 (Ground 15).

For the same reasons that the Petition fails to show that Hirosue discloses claim 5, the Petition fails to show that Hirosue in view of Aruga and Tanaka discloses claim 11. *Id.* ¶¶126, 140.

VII. CONCLUSION

The Petition does not establish a reasonable likelihood that any of the challenged claims are unpatentable. The Board should deny institution.

Date: June 7, 2023

Respectfully submitted,

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IPR2023-00476
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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION

I certify that this Patent Owner's Preliminary Response complies with the word count limit and contains 7,670 words in 14-point Times New Roman font as calculated by the word count feature of Microsoft Office, in compliance with 37 C.F.R. § 42.24(a)(1)(i). This word count is inclusive of all text and footnotes but does not include the table of contents, table of authorities, certificate of service or word count, or appendix of exhibits or claim listing.

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CERTIFICATE OF SERVICE

I certify that on June 7, 2023, a copy of Patent Owner's Preliminary Response, including exhibits, was served in its entirety by electronic mail to Petitioner's counsel at the following addresses indicated in Petitioner's Mandatory Notices:

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