

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOE TECHNOLOGY GROUP CO., LTD.,
Petitioner,

v.

138 EAST LCD ADVANCEMENTS LIMITED,
Patent Owner.

Case No. IPR2025-01413
U.S. Patent No. 8,319,512

PATENT OWNER'S PRELIMINARY RESPONSE

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Number	Description
Ex. 2001	Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 1, Case No. 2:25- cv-00358 (E.D. Tex.) (April 8, 2025)
Ex. 2002	Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 1, Case No. 2:25- cv-00440 (E.D. Tex.) (April 25, 2025)
Ex. 2003	Consolidation Order, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 23, 2:25-cv-00440 (E.D. Tex.) (August 14, 2025)
Ex. 2004	Order Setting Scheduling Conference, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 15, 2:25-cv00440 (E.D. Tex.) (August 15, 2025)
Ex. 2005	Order Resetting Scheduling Conference, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 30, 2:25-cv-00440 (E.D. Tex.) (September 11, 2025)
Ex. 2006	Defendant BOE Technology Group Co., Ltd.’s Amended Answer and Defenses to Plaintiffs’ Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 32, 2:25-cv-00358 (E.D. Tex.) (September 16, 2025)
Ex. 2007	Defendant BOE Technology Group Co., Ltd.’s Amended Answer and Defenses to Plaintiffs’ Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 39, 2:25-cv-00440 (E.D. Tex.) (October 14, 2025)
Ex. 2008	Declaration of E. Fred Schubert, Ph.D.
Ex. 2009	Disclaimer in a Patent under 37 C.F.R. § 1.321(a) (filed Dec. 9, 2025)

Ex. 2010	Defendant LG Electronics Inc.’s Answer to Plaintiffs’ Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 21, 2:25-cv-00440 (E.D. Tex.) (September 8, 2025)
Ex. 2011	Defendants Hisense Group Holdings Co., Ltd., and Hisense Visual Technology Co., Ltd.’s Answer to Plaintiffs’ Complaint for Patent Infringement, <i>Longitude Licensing Limited et al. v. BOE Technology Group Co., Ltd. et al.</i> , Dkt. 21, 2:25-cv-00440 (E.D. Tex.) (September 8, 2025)

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 of U.S. Patent No. 8,319,512 (“the ’512 patent”). Paper 2 (“Petition” or “Pet.”). Petitioner BOE Technology Group Co., Ltd., challenges the validity of claims 1-12 of the ’512 patent.

The Petition has not established a reasonable likelihood that the asserted references render any of claims 1-9 unpatentable, and Patent Owner has disclaimed claims 10-12. The ’512 patent provides a flexible substrate including an inspection electrode located on the substrate itself, electrically connected to the integrated circuit and capable of outputting signals processed in the IC. The asserted references, alone or in combination as presented in the Grounds, do not disclose all limitations of any remaining challenged claim of the ’512 patent.

In particular, the asserted lead references Saito and Taguchi both—by Petitioner’s own admission—fail to disclose switching logic required by certain claims of the ’512 patent which allows switching an inspection electrode on and off or, alternatively, allows selecting among different types of signals processed in the integrated circuit. Petitioner relies on a secondary reference, Her, to fill these gaps. But the modifications proposed by Petitioner would destroy the basic functionality of the lead references, discouraging a person of skill in the art from

making these modifications. Further, Her fails altogether to teach different types of signals, let alone switching logic that switches among them. The Board should deny institution.

II. THE '512 PATENT

The '512 patent (U.S. Patent No. 8,319,512), titled “Flexible Substrate Including Inspection Electrode for Outputting Signal Processed in Integrated Circuit, Electro-Optical Device, and Electronic Device,” is directed to improved flexible-substrate technology for electro-optical devices such as LCD panels. The patent identifies a core limitation in prior systems: when a driver IC is mounted on a flexible substrate (FPC), signals processed inside the IC—such as conversion, correction, or synchronization signals—cannot be monitored unless additional terminals are added to the LCD panel, which increases complexity and still fails to expose internal-only signals. *See* Ex. 1001, 1:17-37 (discussing conventional flexible substrates and problems with inspection and explaining inability to monitor internal IC signals).

To address this problem, the '512 patent provides a flexible substrate including an inspection electrode located on the substrate itself, electrically connected to the integrated circuit and capable of outputting signals processed in the IC, including signals that are *not* output through the ordinary FPC terminals. Ex. 1001, 2:12-37 (inspection electrode outputs both external-output signals and

internal-processing signals). The inspection electrode is exposed on the surface of the flexible substrate so that a probe can directly touch it during manufacturing or testing. *Id.*, 3:42-48. By placing the inspection electrode on the flexible substrate rather than on the LCD panel, the invention avoids increasing the number of panel-side terminals while enabling appropriate monitoring of internal IC behavior. *Id.*, 2:26-37.

The specification further explains that the inspection electrode may be configured with structural features that enhance reliability and manufacturability. For example, the electrode may have a width larger than each of the ordinary conductive lines on the substrate to facilitate more reliable contact with a probe. Ex. 1001, 3:40-41 (“inspection electrode has a width larger than the width of each of the lines”). The FPC may also include optional circuitry such as:

- a first switching section that controls whether the inspection electrode outputs a signal (*Id.*, 2:60-63);
- a second switching section capable of switching between different signal types output from the IC (*Id.*, 3:10-12); and
- an amplifier for boosting small-amplitude processed signals before they reach the inspection electrode (*Id.*, 3:27-29).

These elements ensure that internal IC signals can be selectively output, amplified, and inspected without interfering with normal panel operation.

For instance, the '512 patent describes IC-based switching circuitry that governs whether the inspection electrode outputs a processed signal. By using this control mechanism, the inspection electrode can be configured to provide a signal only when monitoring is required, which the patent explains helps lower the inspection electrode's power consumption. *Id.* at 2:64-3:5.

The '512 patent further describes IC-level circuitry that can select among different kinds of signals and route the chosen signal to the inspection electrode. See *id.* at 9:13-20. These signal types can include, for example, a clock, start, or timing signal. *Id.* at 8:44-46. As the patent explains, this switching capability enables multiple distinct signal types to be observed even when the flexible substrate includes only a single inspection electrode. *Id.* at 3:13-20. By permitting the inspection of various signals through one electrode, the design reduces the number of inspection electrodes required and thereby conserves area on the flexible substrate. *Id.*

The '512 patent also describes the corresponding electro-optical device (e.g., a TFT-LCD panel) that operates together with the improved flexible substrate. The electro-optical panel includes a TFT array substrate, an opposing substrate, pixel electrodes, data and scanning lines, and a built-in liquid-crystal layer. See *generally* Ex. 1001, 4:53-6:7, Figs. 1-3. The driver IC on the flexible substrate performs data processing functions for output to the panel's electrodes. *Id.*, 8:6-18,

Figs. 4, 7. The inspection electrode enables testing of these IC outputs—including internal-only signals—without requiring additional LCD-panel terminals.

Finally, the patent describes various electronic devices, such as projection systems or mobile devices, that incorporate the electro-optical device driven by the flexible substrate containing the inspection electrode. Ex. 1001, 10:17-24; Fig. 8. The invention allows these devices to be manufactured with high reliability and without increasing wiring density on the LCD panel. *Id.*, 2:26-37, 9:38-43.

Claim 1 recites:

1. A flexible substrate comprising:
 - a substrate body;
 - a plurality of lines that are arranged on the substrate body;
 - a plurality of connection terminals that are arranged on an end portion of the substrate body and electrically connected to the respective lines;
 - an integrated circuit that is arranged on the substrate body and electrically connected to at least one of the lines;
 - an inspection electrode that is arranged on the substrate body and electrically connected to the integrated circuit and capable of outputting a signal processed in the integrated circuit, and

a switching section that switches an operation of the inspection electrode on/off to cause the inspection electrode to output or not to output the signal processed in the integrated circuit.

Ex. 1001, 10:41-56. Claim 8 recites:

8. A flexible substrate comprising:
a substrate body;
a plurality of lines that are arranged on the substrate body;
a plurality of connection terminals that are arranged on an end portion of the substrate body and electrically connected to the respective lines;
an integrated circuit that is arranged on the substrate body and electrically connected to at least one of the lines;
an inspection electrode that is arranged on the substrate body and electrically connected to the integrated circuit and capable of outputting a signal processed in the integrated circuit, and
a switching section that switches the types of signals that are to be output from the inspection electrode.

Id., 11:11-24. And claim 9 recites:

9. A flexible substrate comprising:

a substrate body;

a plurality of wirings that are arranged on the substrate body;

a plurality of connection terminals that electrically connects a device and at least one of the plurality of wirings;

an inspection electrode that is arranged on the substrate body, the inspection electrode electrically connecting to an integrated circuit, the inspection electrode being capable of outputting a signal processed by the integrated circuit; and

a switching section that switches types of the signal, are to be outputted from the inspection electrode,

the inspection electrode being disposed between one of the plurality of wirings and another one of the plurality of wirings, wherein the integrated circuit is electrically connected to at least one of the plurality of wirings.

Id., 11:26-12:9.

None of the asserted references or combinations disclose the claimed components that deliver the benefits of the '512 inventions.

III. CLAIM CONSTRUCTION

No claim term requires express construction to determine that the Petition does not establish a reasonable likelihood of unpatentability of any challenged claim. For purposes of this Preliminary Response, Patent Owner contends that the claim terms should receive 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., 12; Ex. 1002, ¶ 26. The level of skill in the art does not affect whether to deny institution. 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
OBVIOUS ANY CHALLENGED CLAIM.**

**A. The Petition does not establish a reasonable likelihood that claims
1-4, 6 and 8-9 are obvious over Saito and Her (Ground 1).**

Petitioner's Ground 1 challenges claims 1-4, 6 and 8-11. The Petition does not establish a reasonable likelihood that claims 1-4, 6 and 8-9 are obvious over Saito and Her, for the reasons described below. Patent Owner has disclaimed claims 10 and 11. Ex. 2009. Thus, the Board need not consider those claims under Ground 1.

1. Saito: Overview

U.S. Patent No. 6,300,997 to Saito et al. is titled "Liquid Crystal Display Device Having an IC Chip Mounted on a Narrow Film Wiring Board." Unlike the '512 patent, which is directed to efficient placement and operation of an inspection electrode on a flexible substrate, Saito is chiefly concerned with reducing the width of a film wiring board used to mount a driver IC while maintaining reliable electrical connection to the LCD panel. *See* Ex. 1004 (Saito), Abstract.

Saito explains that the film wiring board in conventional LCD modules required a width sufficient to accommodate bonding leads that align with the terminals arranged along the edge of the LCD panel. The width of the wiring board was therefore constrained by the arrangement of the terminals on the LCD panel

substrate. This width limitation was therefore a limiting factor in reducing device size and manufacturing cost while causing increased complexity in positioning and bonding to connect the flexible wiring board to the LCD panel. Ex. 1004, 2:8-18.

To address this problem with conventional LCD modules, Saito teaches a particular arrangement of the terminals on the LCD panel to achieve a more compact terminal layout region; this arrangement allows the film wiring board to be smaller, reducing manufacturing costs and improving bonding reliability between the flexible wiring board and the LCD panel. In particular, Saito teaches arranging the segment terminals and common terminals in a densely packed configuration where the terminals that connect with the flexible wiring board are grouped centrally and symmetrically, which allows a substantial reduction in the width of the flexible wiring board. *Id.*, Fig. 2A, 6:27-33.

Unlike the '512 patent, which is concerned with testing signals output from an IC, Saito is directed to a specific design problem, namely panel terminal geometry and film-board width. Ex. 2008, ¶ 44. Saito does not provide any teaching of amplifying, switching, or selectively outputting internal or external IC-generated signals. Saito discloses using test pads (62, 63, 64, and 66 in Figure 3) only “to inspect whether the semiconductor chip 53 is satisfactorily connected to lead wires 54, 55, 56, and 57.” *Id.*, 5:43-46. Further, Saito does not provide any teaching or motivation concerning how to provide a dedicated inspection electrode

on a flexible substrate or how to monitor signals that are not supplied to the LCD panel or that are not otherwise available at the output terminals of the flexible substrate. Ex. 2008, ¶ 44. Instead, Saito's test pads are provided on lines 54-57, which include "output lead wires 54 for the segment terminals," "output lead wires 55 and 56 for the common terminals" and "input lead wires" that are "connected to the semiconductor chip 53." *Id.*, Fig. 3, 4:17-21, 4:51-54.

2. Her: Overview

U.S. Patent Application No. 2004/0183563, listing inventors Her and Han, is titled "Semiconductor Integrated Circuit Including Test Pins and Method for Testing Thereof." Her is chiefly concerned with using a single test pin to test semiconductor integrated circuits having a large number of data-output pins. *See* Ex. 1007 (Her), Abstract.

Her explains that conventional IC test devices needed numerous test pins to match the IC's output pins. *Id.*, ¶ [0006]. Her notes that as LCD resolutions increased, the number of data-output pins grew correspondingly, making it impractical for test devices to provide a sufficiently large number of test pins. *Id.*, ¶ [0007].

Her teaches solving this scalability problem by providing a single "test pin" on the IC and operating the IC in a special test mode in which the IC sequentially outputs its various output signals to the one test pin under control of a clock signal.

E.g., id., ¶ [0009], Figs. 2, 4. Under normal mode operation, the data-processing circuit outputs signals to the numerous data-output pins. In test mode operation, however, the output circuit routes those signals—one by one—to the test pin. *See id.*, Figs. 2, 4 (illustrating sequential signal output). This test mode procedure allows a test device with only one pin to test an IC having many outputs. *Id.*, ¶ [0037].

Unlike the '512 patent, which is directed to testing selected IC output signals with an inspection electrode on the flexible substrate, Her is concerned with multiplexing of output signals in the IC in a special test mode. While the '512 patent teaches a test pad on the flexible substrate itself (outside of the IC), Her's test pin is located in an "inner circuit" of the IC itself. *See id.*, ¶ [0022], Fig. 2 (showing test pin "TP" as component of IC 100). Her does not teach a flexible substrate at all (let alone a test pad on a flexible substrate), and the problem addressed by Her—the difficulty in testing many output pins with conventional test equipment—differs from the '512 patent's focus on providing reliable, non-intrusive access to IC-processed signals from the flexible substrate on which the IC is mounted. Ex. 2008, ¶ 48.

3. The Petition fails to show that Saito in view of Her discloses or renders obvious all limitations of any of remaining challenged claims 1-4, 6 and 8-9.

a. Claim 1

i. The Petition does not show that Saito in view of Her discloses “a switching section that switches an operation of the inspection electrode on/off to cause the inspection electrode to output or not to output the signal processed in the integrated circuit” (claim 1[f]).

The Petition concedes that its asserted lead reference for Ground 1, Saito, does not disclose the “switching section” recited in claim 1[f]. Pet., 32. Her fails to fill that gap, for reasons explained below.

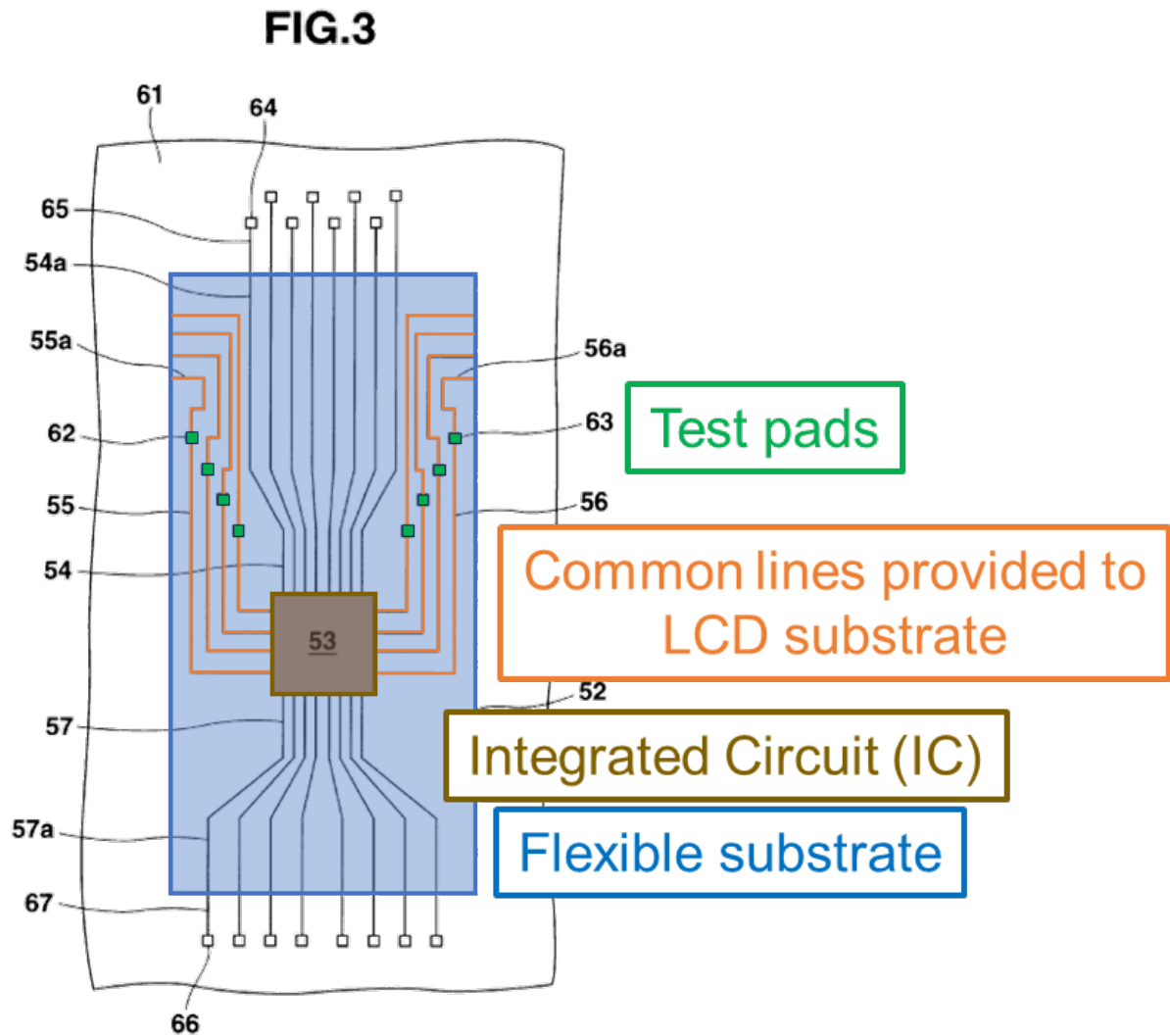
In particular, a POSITA would not modify Saito in view of Her to obtain the claimed “switching section” because doing so would render Saito largely inoperable. Ex. 2008 (Schubert Decl.), ¶ 51. Saito teaches test pads on wires that supply signals to the LCD array substrate. *E.g.*, Ex. 1004, Figs. 1, 2. More specifically, those test pads, which the Petition points to as being “capable of outputting a signal processed in the integrated circuit” for claim 1[e]—test pads 62 and 63—are on wires 55 and 56 as taught by Saito. *See* Pet., 29; Ex. 1004, Fig. 3. Saito describes these wires as “output lead wires 55 and 56 for the common terminals.” Ex. 1004, 4:18-21. Saito further describes output lead terminal portions 55a and 56a “for the common electrodes.” *Id.*, 4:45-52. And Saito teaches that the output lead terminals 55a and 56a are “connected to . . . the common terminals 36

and 37 of the liquid crystal display panel 31 via anisotropic conductive adhesive.”

Id., 4:58-63. A POSITA would understand that the wires 55 and 56 therefore supply the common signals or, equivalently, scan line signals to the LCD panel.

Ex. 2008, ¶ 52.

The annotated Figure 3 below demonstrates that the **common lines** output from the **integrated circuit** do not terminate at the **test pads** but rather continue through to the terminals at the edge of the **flexible substrate**, where they connect to the LCD panel and supply the common lines as evident from the annotated Figure 2 of Saito in the Petition.



Ex. 1004, Fig. 3 (annotations added).

FIG.2A

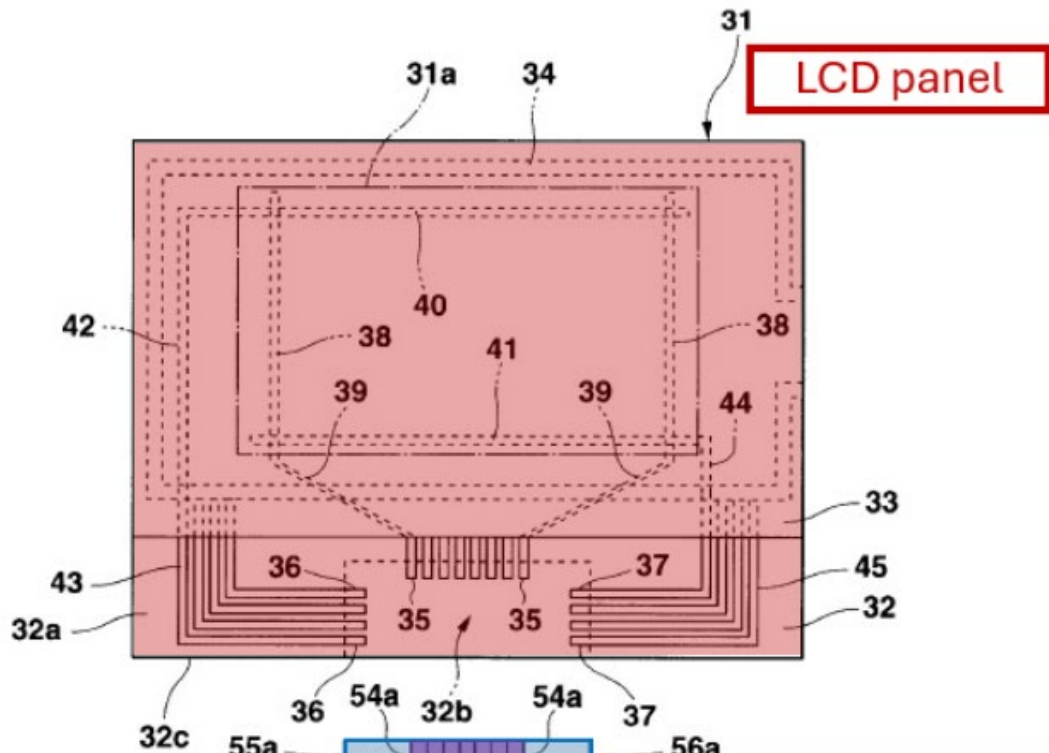
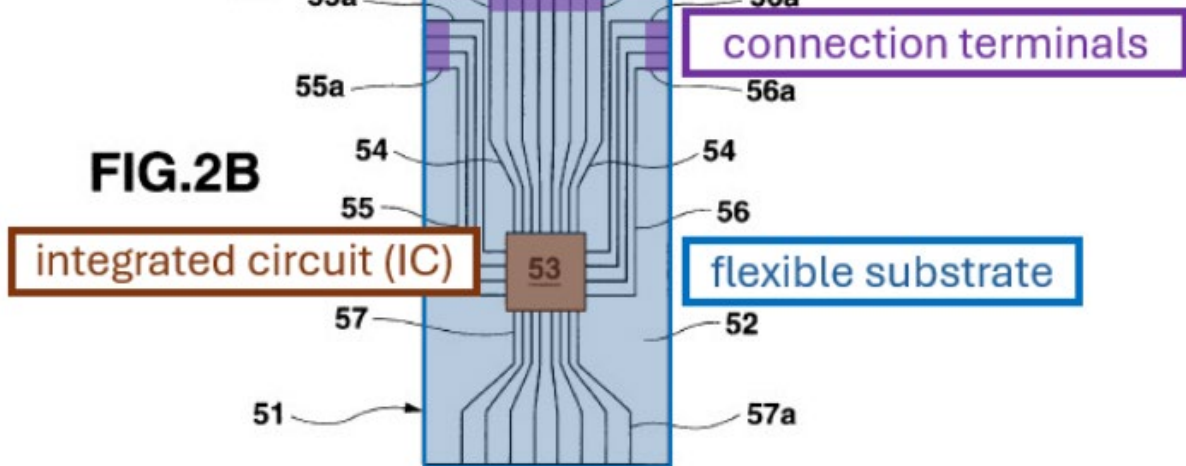


FIG.2B



Pet., 13.

A POSITA would further understand that these common or scan lines are necessary to the fundamental operation of the LCD pixels.¹ Ex. 2008, ¶ 54. If the scan lines are in an off state because they cannot output a signal processed by the IC, the pixels cannot function and the row will be dark. *Id.*

The Petition states that “a POSITA thus would be motivated to add the on/off switching mechanism taught in Her to selectively enable or disable the connection between the test pad and the driver IC” in Saito. Pet., 37. But Petitioner is incorrect, as explained by Patent Owner’s expert Dr. Schubert in his accompanying declaration (Exhibit 2008). In particular, if the “connection between the test pad and driver IC” in Saito is disabled such that a signal processed in the IC is not output to the test pad, the driver IC cannot drive the corresponding scan line or row of counter electrodes in the LCD panel. Ex. 2008, ¶ 55. This is because Saito’s test pad is directly connected to the output lead terminal portions 55a and 56a, which supply the common electrodes on the LCD panel, as evident in the

¹ In an active-switching LCD device, the gate terminals of one row of switching TFTs (thin film transistors) are common to all TFTs in the row. For this reason, the associated electrodes controlling rows of TFTs can be referred to as common electrodes. Similarly, in a passive LCD device, the common electrodes are electrically floating except for one common electrode that is at a fixed potential, typically the ground potential. At the intersections of the grounded common electrode and the segment electrodes (which carry the image information), an electric field is generated that orients the liquid crystal molecules in each pixel, thereby giving the associated pixels the desired transparency. Ex. 2008, ¶ 54 n.3.

annotated version of Saito's Figure 3 above. Because Saito's test pad is directly connected to the output terminal, the two cannot be operated independently: the connection between the test pad and the driver IC cannot be selectively disabled without also disabling the output lead terminal portions 55a and/or 56a for the common electrodes. Ex. 2008, ¶ 55.

A POSITA would understand that the coupling (i.e. connection) of the test pad to the signal line in Saito precludes the possibility for the "inspection electrode" to be turned "on / off" in the manner that the Petition proposes. In the test mode, the "inspection electrode" cannot be turned "off" because the test pad provides a testing signal. Similarly, in the normal mode, the input / output lines and the connected "inspection electrode" cannot be turned "off" because the input / output lines provide necessary signals processed in the IC to the LCD panel. The configuration that results from the combination of Saito and Her therefore cannot meet the claim limitation. Ex. 2008, ¶ 56.

The Petition identifies several purported advantages of incorporating Her's switching functionality into Saito's test pads, including reducing parasitic capacitance and improving power efficiency. Pet., 36-37. But each of these purported advantages would be substantially outweighed by the disadvantage of compromising the basic operation of the LCD panel itself, as explained by Dr. Schubert. While a consumer might derive some small benefit from corresponding

noise reduction and power savings, an LCD panel manufacturer would not be motivated to add switching circuitry to reduce parasitic capacitance and improve power efficiency where doing so would also require shutting down entire rows of pixels. Ex. 2008, ¶ 57. Shutting off rows of pixels would fundamentally compromise the basic operation of Saito's LCD panel, leading to unacceptable linear artifacts in any rendered image. *Id.*

Similarly, the Petition states that a POSITA would know that isolating the test pad "when it is not needed" would reduce the risk of electro-static discharge, current leakage, or other factors affecting the IC. Pet., 37. As explained by Dr. Schubert, however, a POSITA would understand that Saito's LCD device does not have periods during which the common lines are "not needed" and could be shut down to avoid carrying signals processed in the integrated circuits. Ex. 2008, ¶ 58. Disabling the common lines by not outputting a signal processed in the integrated circuit would again compromise the basic operation of Saito's LCD device. *Id.*

Thus, the Petition fails to show that Saito in view of Her discloses "a switching section that switches an operation of the inspection electrode on/off to cause the inspection electrode to output or not to output the signal processed in the integrated circuit."

b. Claim 8

i. The Petition does not show that Saito in view of Her discloses “a switching section that switches the types of signals that are to be output from the inspection electrode” (claim 8[f])

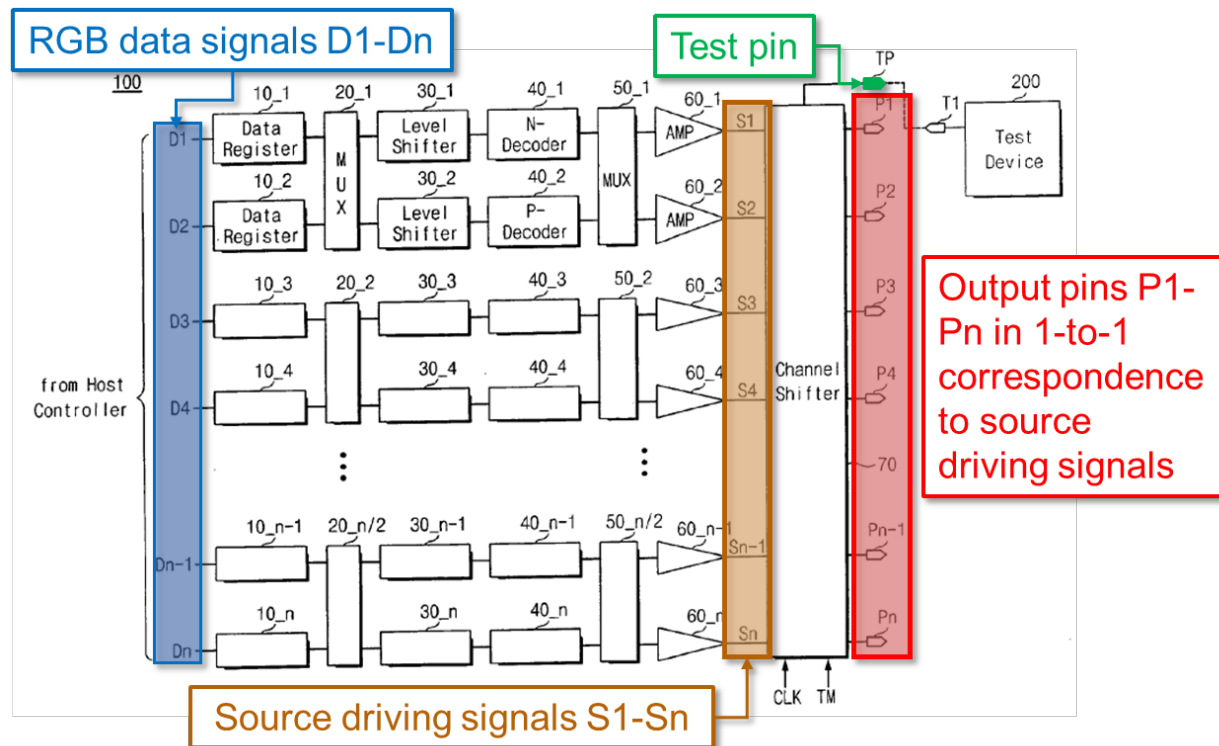
The Petition points exclusively to dependent claim 3[a] as allegedly teaching this limitation of claim 8. Pet., 48. Patent Owner therefore responds here to the Petition’s arguments at dependent claim 3[a], which is worded substantially identically.

The Petition relies exclusively on Her as allegedly teaching this limitation. The Petition does not point to Saito as teaching “a switching section that switches the types of signals that are to be output from the inspection electrode.” But the Petition fails to show that Her teaches this limitation, and the combination of Saito and Her therefore cannot teach it either.

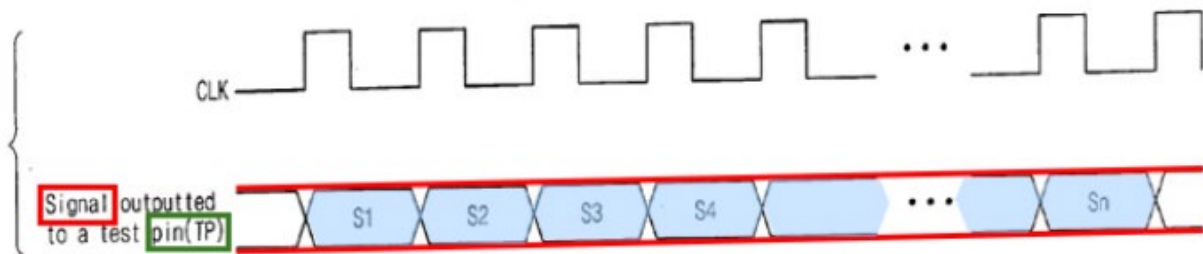
The ’512 patent provides non-limiting examples of different “types” of signals that can be output from the inspection electrode, including “a clock signal, a start signal and a timing signal.” Ex. 1001, 8:44-46. A POSITA would understand these different signal types to be conventional. Ex. 2008, ¶ 63. These signal types are consistent with a POSITA’s understanding of the term “types of signals” as of the patent priority date. *Id.*

But Her does not teach different “types of signals” that can be switched. Her teaches only *one* signal “type” that can be provided either to a test pin or to the output pins of Her’s IC: a “source driving signal.” Ex. 2008, ¶ 64. More specifically, these “source driving signals” are simply the “RGB data signals D1-Dn” passed through multiplexers, level shifters, decoders, and amplifiers within the IC and ultimately provided either to the test pin or to the output pins P1-Pn through the switching section depending on whether the test mode signal is high (on) or low (off). *See* Ex. 1007, ¶ [0023], Fig. 2; Ex. 2008, ¶ 64.

The annotated Her Figure 2 below further demonstrates that Her teaches providing only one signal type—source driving signals—to the channel shifter and therefore to either (1) output pins P1-Pn or (2) the test pin, depending on whether the test mode is on or off. As is clear from the figure, Her teaches only RGB data signals D1-Dn input to the data registers. Following processing in the IC, only one type of signal—source driving signals S1-Sn—are output from the amplifiers and subsequently input to the channel shifter. Ex. 2008, ¶ 65. Depending on whether the test mode is on or off, those source driving signals S1-Sn are either provided sequentially to the test pin (as further shown in annotated Figure 4 from the Petition below), or placed on output pins P1-Pn, which Her describes as corresponding one-to-one to source driving signals S1-Sn. Ex. 1007, ¶ [0031].



Ex. 1007, Fig. 2 (annotations added).



Pet., 36.

Her's source driving signals all have the same role or function: as Her explains, "[s]ignals S1-Sn outputted from the amplifiers 60₁-60_n are provided to a pixel of a corresponding LCD panel (not shown) through data output pins P1-Pn acting as source driving signals." Ex. 1007, ¶ [0028]. Each source driving signal

provides a voltage to a pixel on the LCD panel to control RGB color, consistent with the origin of the source driving signals as “RGB data signals D1-Dn.” Her teaches switching the output of the source driving signals between the output pins P1-Pn and the test pin:

In a normal mode, the source driving signals S1-Sn outputted from the amplifiers 60_1-60_n are provided to the LCD panel through the data output pins P1-Pn. However, during a test mode, the source driving signals S1-Sn outputted from the amplifiers 60_1-60_n are outputted through a channel shifter 70 to a test pin TP.

Id. But Her does not teach switching the *types* of signals output from the switching section, as the plain language of claim 8[f] requires. Regardless of their destination (output pins P1-Pn or the test pin), Her’s signals are all source driving signals, that is, signals that control the voltage on the pixel electrodes on the LCD panel. Ex. 2008, ¶ 66.

According to the Petition, a POSITA would understand the signals output from different amplifiers corresponding to different output channels to be “different types of signals.” Pet., 40. The Petition therefore suggests that, regardless of whether source driving signals are provided to the output pins P1-Pn or to the test pin, any two signals that come from neighboring amplifiers (60_1 to 60_n) are signals of distinct types. But the Petition is incorrect. A POSITA would have understood that different *types* of signals might be provided from an IC mounted on a flexible substrate to an LCD panel, including source driving signals,

gate driving signals, power signals, and clock signals, consistent with the examples expressly provided by the '512 patent. Ex. 2008, ¶ 67. A POSITA would not understand two otherwise identical signals output from neighboring amplifiers to be signals of different “types,” simply because they are output from different channels. *Id.* Instead, Her’s image data output pins P1-Pn all provide the same *type* of signal: specifically, source driving signals.

Thus, the Petition fails to show that Saito in view of Her discloses “a switching section that switches the types of signals that are to be output from the inspection electrode.”

c. Claim 9

i. The Petition does not show that Saito in view of Her discloses “a switching section that switches types of the signal, are to be outputted from the inspection electrode” (claim 9[e])

Claim 9[e] is substantially identical to claim 8[f]. The Petition fails to show that Saito in view of Her discloses claim 8[f], for the reasons discussed at § VI.A.3.b.i above. Thus, the Petition likewise fails to show that Saito in view of Her discloses “a switching section that switches types of the signal, are to be outputted from the inspection electrode.”

d. Claims 2-4 and 6

Because the Petition cannot show that Saito in view of Her renders obvious claim 1, the Petition cannot show that the combination renders obvious any of claims 2-4 or 6, which depend from claim 1. Ex. 2008, ¶ 73.

B. The Petition does not establish a reasonable likelihood that claims 1-6 and 8 are obvious over Taguchi and Her (Ground 4).

The Petition does not establish a reasonable likelihood that claims 1-6 and 8 are obvious over Taguchi and Her, for the reasons described below.

1. Taguchi: Overview

U.S. Patent Application No. 2004/0183985 is titled “Liquid Crystal Display Apparatus.” Unlike the ’512 patent, which is directed to efficient placement and operation of an inspection electrode on a flexible substrate, Taguchi is chiefly concerned with wiring continuity across multiple insulation film substrates that supply signals to an LCD panel via drive ICs mounted thereon. *See* Ex. 1006 (Taguchi), Abstract.

Taguchi observes that in conventional systems, when no dedicated input-signal substrate (Taguchi’s prior art “Y substrate 3”) is connected, it becomes difficult to confirm whether specific input signal wires, such as the gate or source transmission lines, are properly functioning. Ex. 1006, ¶¶ [0022], [0023], Fig. 1. Taguchi’s proposed solution is to provide a “through wire”—a conductive line that runs between terminals of the insulation-film substrate—and to place a test pad on

the through wire. *Id.*, ¶¶ [0026], [0054]. Taguchi's test pad facilitates measurement of the resistance of the wire or the presence of continuity along the path. *Id.*, ¶ [0066]. The test pad is connected to the through wire, which in turn bridges multiple terminals on the substrate. *Id.*, ¶ [0054], Fig. 5.

Taguchi separately describes a prior art configuration including a test pad on the output side of a gate drive IC. Ex. 1006, ¶ [0012], Fig. 2. According to Taguchi, the prior art taught that "the output side signal can be detected through contact of the test pad 9 with the test probe." *Id.*, ¶ [0012].

Unlike the '512 patent, Taguchi is therefore primarily directed to testing for panel-wiring continuity in electro-optical devices that lack a signal-input substrate. Taguchi is not directed to enabling inspection of IC-generated signals from an IC mounted on a flexible substrate. Ex. 2008, ¶ 78.

2. The Petition fails to show that Taguchi in view of Her discloses or renders obvious all limitations of any of challenged claims 1-6 and 8.

a. Claim 1

i. The Petition does not show that Taguchi in view of Her discloses “a switching section that switches an operation of the inspection electrode on/off to cause the inspection electrode to output or not to output the signal processed in the integrated circuit” (claim 1[f]).

The Petition concedes that its asserted lead reference for Ground 4, Taguchi, does not disclose the “switching section” recited in claim 1[f]. Pet., 72. Her fails to fill that gap, for reasons explained below.

In particular, a POSITA would not modify Taguchi in view of Her to obtain the claimed “switching section” because—for reasons similar to those described at § VI.A.3.a.i above, doing so would render Taguchi largely inoperable. Ex. 2008, ¶ 81.

Like Saito, Taguchi’s prior art test pad 9, as shown in Figure 1, is on a wire that supplies signals to the LCD array substrate. More specifically, the test pad that the Petition identifies as being “capable of outputting a signal processed in the integrated circuit” for claim 1[e]—test pad 9 (*see* Pet., 68)—is on “one of the patterned wires connecting between the output signal terminals 8 and the gate drive IC 6-1.” Ex. 1006, ¶ [0010], Fig. 2. The output signal terminals 8 are located on one of Taguchi’s “insulation film substrates,” 2-1. *Id.*, Fig. 2, ¶ [0010]. Taguchi

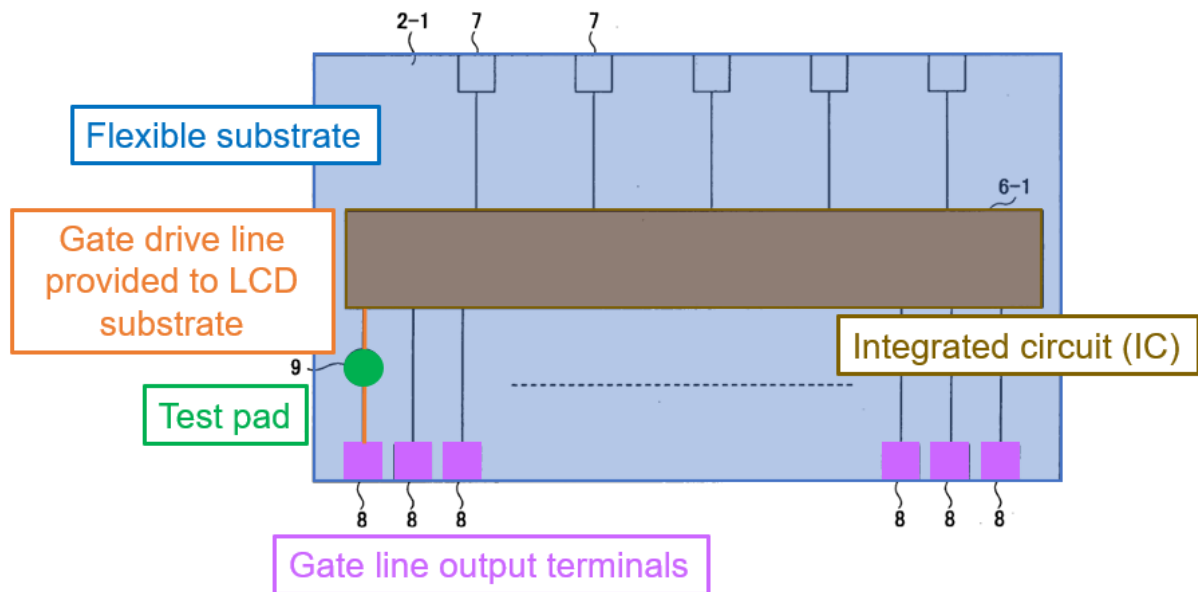
further teaches that “[a] plurality of insulation film substrates 2-1 through 2-3 . . . are coupled to . . . Y directional edges of a liquid crystal panel 1 in accordance with the form of an active matrix substrate.” *Id.*, ¶ [0007]. Finally, Taguchi teaches:

A Y substrate 3 is connected as a signal input substrate to the insulation film substrates 2-1 through 2-3 having respective gate drive ICs to supply an X axis (horizontal) directional signal. From the Y substrate 3, an input signal is supplied to the insulation film substrates 2-1 through 2-3.

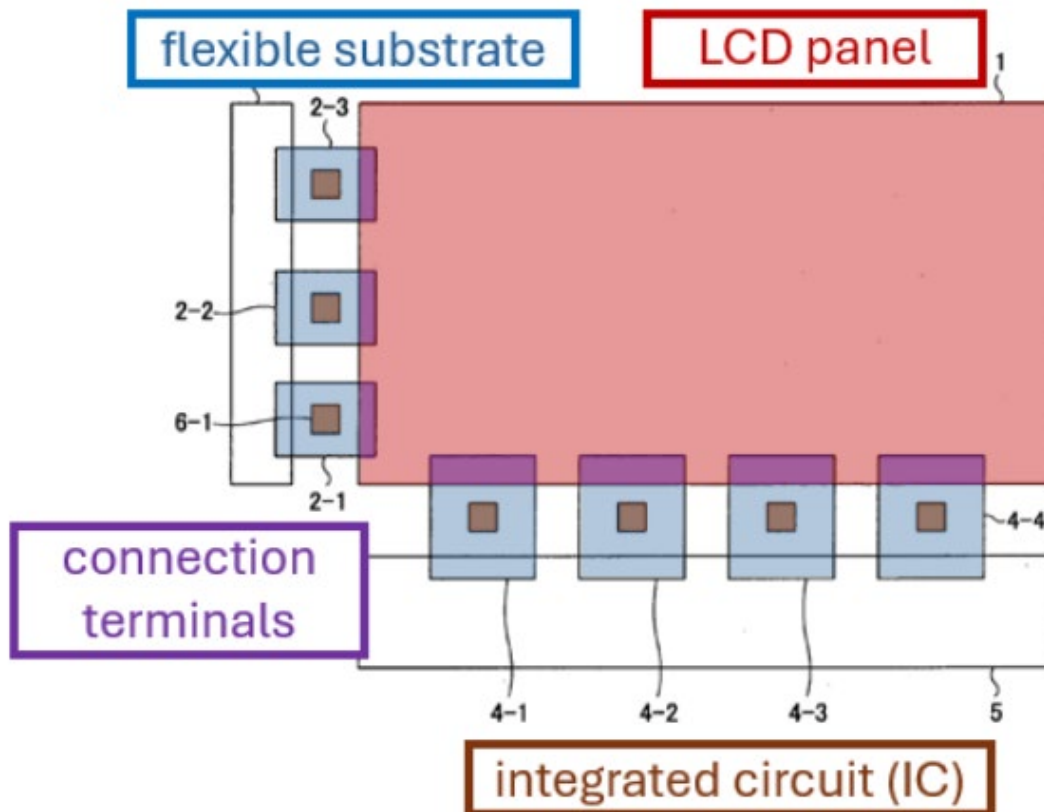
Id., ¶ [0008].

In view of these teachings, a POSITA would understand that Taguchi’s “output signal terminals 8” on the insulation film substrate connect to corresponding input terminals on the LCD substrate and supply gate signals (horizontal directional signals from the gate drive ICs) to the transistors along each (horizontal) row of the LCD pixel array. Ex. 2008, ¶ 83.

The annotated Taguchi Figure 2 below further demonstrates that the **gate drive line** output from the **integrated circuit** and connected to Taguchi’s **test pad** does not terminate at the **test pad** but instead continues through to one of the **gate line output terminals**, from which it connects to Taguchi’s LCD panel as evident from annotated Figure 1 of Taguchi included in the Petition.



Ex. 1006, Fig. 2 (annotations added).



A POSITA would further understand that these gate signals are necessary to the fundamental operation of the LCD pixels. Ex. 2008, ¶ 85. If a gate signal line is inactive such that it cannot output a signal processed by the IC, for example, then no pixels in the row can be switched on. *Id.* The pixels would be stuck in an off state and the row would be dark. *Id.*

The Petition states that it would have been “obvious to a POSITA in view of Taguchi to connect a patterned wire with an enlarged test electrode to the ‘test pin TP’ of Her for ‘easier reading’,” and further that “[w]hen so connected, the switching mechanism of ‘channel shifter 70’ turns the inspection electrode on the substrate on/off in response to whether the test mode signal TM indicates the ‘test mode’ . . . or the ‘normal mode’.” Pet., 73. But the Petition is incorrect: a POSITA would *not* have been motivated to implement Her’s switching mechanism in Taguchi’s inspection electrode on the insulation film substrate. Ex. 2008, ¶ 86. Doing so would fundamentally compromise the basic operation of Taguchi’s electro-optical device, because Taguchi’s test pad is directly connected to the output signal terminal 8, which supplies the gate signal to rows on the LCD panel, as illustrated in the annotated version of Taguchi’s Figure 2 above. *Id.* Because Taguchi’s test pad is directly connected to the output signal terminal, the two cannot be operated independently: that is, the connection between the test pad and the driver IC cannot be selectively disabled as the Petition proposes without also

disabling the output signal terminal 8. *Id.* If the output signal terminal is disabled such that it cannot output a signal processed by the IC, any corresponding rows of pixels on the LCD panel will go dark. *Id.* A POSITA would find this compromised operation unacceptable. *Id.*

A POSITA would understand that the coupling (i.e. connection) of the test pad to the signal line in Saito precludes the possibility for the “inspection electrode” to be turned “on / off” in the manner that the Petition proposes. In the test mode, the “inspection electrode” cannot be turned “off” because the test pad provides a testing signal. Similarly, in the normal mode, the input / output lines and the connected “inspection electrode” cannot be turned “off” because the input / output lines provide necessary signals processed in the IC to the LCD panel. Accordingly, the configuration that results from the combination of Taguchi and Her cannot meet the claim limitation. Ex. 2008, ¶ 87.

As with Ground 1 for the Saito/Her combination, the Petition identifies several purported advantages of incorporating Her’s switching functionality into Taguchi’s test pad, including reducing parasitic capacitance and improving power efficiency. Pet., 73-74. But each of these purported advantages would be substantially outweighed by the disadvantage of compromising the basic operation of the LCD panel itself. Ex. 2008, ¶ 88. While a consumer might derive some small benefit from corresponding noise reduction and power savings, an LCD panel

manufacturer would not be motivated to add switching circuitry to reduce parasitic capacitance and improve power efficiency where doing so would also require shutting down entire rows of pixels. *Id.* Shutting off rows of pixels would fundamentally compromise the basic operation of Taguchi's LCD panel, leading to unacceptable linear artifacts in any rendered image. *Id.*

Similarly, the Petition states that a POSITA would know that isolating the test pad "when it is not needed" would reduce the risk of electro-static discharge, current leakage, or other factors affecting the IC. Pet., 74. But a POSITA would understand that Taguchi's LCD device does not have periods during which the common lines are 'not needed' and could be shut down to avoid carrying signals processed in the integrated circuits. Ex. 2008, ¶ 89. Disabling the common lines by not outputting a signal processed in the integrated circuit would again compromise the basic operation of Taguchi's LCD device. *Id.*

Thus, the Petition fails to show that Taguchi in view of Her discloses "a switching section that switches an operation of the inspection electrode on/off to cause the inspection electrode to output or not to output the signal processed in the integrated circuit."

b. Claim 8

- i. The Petition does not show that Taguchi in view of Her discloses “a switching section that switches the types of signals that are to be output from the inspection electrode” (claim 8[f])**

The Petition points exclusively to dependent claim 3 as allegedly teaching this limitation of claim 8. Pet., 81 Patent Owner therefore responds here to the Petition’s arguments at dependent claim 3, which is worded substantially identically.

The Petition relies exclusively on Her as allegedly teaching this limitation. It does not point to Taguchi as teaching “a switching section that switches the types of signals that are to be output from the inspection electrode.” But the Petition fails to show that Her teaches this limitation, and the combination of Taguchi and Her therefore cannot teach it either.

As discussed at § VI.A.3.b.i above, the ’512 patent provides non-limiting examples of different “types” of signals that can be output from the inspection electrode, including “a clock signal, a start signal and a timing signal.” As also explained at § VI.A.3.b.i above, unlike the ’512 patent, Her teaches only one signal “type”: a “source driving signal.” More specifically, Her’s source driving signals cannot be signals of different types because they all have the same role or function. Ex. 2008, ¶ 95.

A POSITA would not understand two otherwise identical signals output from neighboring amplifiers to be signals of different “types,” as posited by the Petition, simply because they are output from different channels. Ex. 2008, ¶ 96.

For the same reasons discussed at § VI.A.3.b.i above, therefore, the Petition fails to show that Taguchi in view of Her discloses “a switching section that switches the types of signals that are to be output from the inspection electrode.” Ex. 2008, ¶ 97.

c. Claims 2-6

Because the Petition cannot show that Taguchi in view of Her renders obvious claim 1, the Petition cannot show that the combination renders obvious any of claims 2-6, which depend from claim 1. Ex. 2008, ¶ 99.

C. The Petition does not establish a reasonable likelihood that claim 9 is obvious over Taguchi and Her, in further view of Saito (Ground 5).

Petitioner’s Ground 5 challenges claims 9-11. The Petition does not establish a reasonable likelihood that claim 9 is obvious over Taguchi and Her, in further view of Saito, for the reasons described below. Patent Owner has disclaimed claims 10 and 11. Ex. 2009. Thus, the Board need not consider those claims under Ground 5.

- 1. The Petition fails to show that Taguchi and Her, in further view of Saito, discloses or renders obvious all limitations of remaining challenged claim 9.**

- a. Claim 9**

- i. The Petition does not show that Taguchi and Her, in further view of Saito, discloses “a switching section that switches types of the signal, are to be outputted from the inspection electrode” (9[e]).**

Taguchi in view of Her does not disclose or render obvious this limitation for the same reasons set forth for the nearly identical claim 8[f] in Ground 4 above. Ex. 2008, ¶ 101. Further, while Ground 5 of the Petition adds an additional reference—Saito—to the Taguchi/Her combination, the Petition does not rely on Saito for any alleged teaching of claim 9[e]. *E.g.*, Pet., 76-77, 93. Therefore Saito is not addressed here in the context of Ground 5. Patent Owner reserves the right to address Saito for Ground 5 should these proceedings be instituted.

- D. The Petition does not establish a reasonable likelihood that claim 5 is obvious over Saito and Her in further view of Taguchi (Ground 2); that claims 2 or 7 are obvious over Saito and Her, in further view of Kim (Ground 3); or that claims 2 or 7 are obvious over Taguchi and Her, in further view of Saito and Kim (Ground 6).**

Grounds 2, 3, and 6 as raised by the Petition challenge only dependent claims. Ground 2 challenges claim 5, which depends from claim 1. Pet., 52. Ground 3 challenges claims 2 and 7, which depend from claim 1. Pet., 55. Ground 3 further challenges claim 12, which Patent Owner has disclaimed (*see* Ex. 2009),

so the Board need not consider it here. Like Ground 3, Ground 6 challenges claims 2, 7, and 12.

Because the Petition fails to establish that any of these independent claims are obvious in view of any of the asserted references—for the reasons discussed for Grounds 1, 4, and 5 herein—they cannot show that any of the remaining dependent claims are obvious either.

The Petition further relies on one additional reference, Kim, for Grounds 3 and 6. As the Petition does not rely on Kim for any of the independent claims, Kim is not addressed here. Patent Owner reserves the right to address the Kim reference and Petitioner's arguments concerning Kim should these proceedings be instituted.

VII. PATENT OWNER DOES NOT WAIVE ADDITIONAL ARGUMENTS.

The Petition fails to establish a reasonable likelihood that any challenged claim is unpatentable, and the Board should deny institution. Patent Owner does not waive its right to address additional arguments in favor of validity and/or objective indicia of non-obviousness in its Patent Owner's Response, should the Board institute these proceedings.

VIII. PETITIONER’S *SOTERA* STIPULATION DOES NOT CHANGE THE FACT THAT RELEVANT FACTORS FAVOR DISCRETIONARY DENIAL.

Petitioner filed a *Sotera* stipulation on December 9, 2025. *See* Paper 9. First, Patent Owner notes that the stipulation suggests that it covers Petitioner’s co-defendants in the related district court proceedings. *See id.* at 1 (“Petitioner and the defendants in the co-pending district court proceeding . . . will not advance invalidity challenges under §§ 102 or 103 . . .”). But the stipulation does not indicate that Petitioner has the authority to bind those co-defendants—separate LG and Hisense entities—and those co-defendants have not separately executed or otherwise joined the *Sotera* stipulation. Thus, it remains likely that the related district court proceedings will involve the validity of the ’512 patent, including §§ 102 and 103 challenges by the defendants other than Petitioner. *See* Ex. 2010 at 28 (co-defendant LG Electronics Inc.’s Answer in related proceeding asserting counterclaim of invalidity of the ’512 patent, including under §§ 101, 102, 103, and 112), Ex. 2011 at 21 (co-defendants Hisense Group Holdings Co., Ltd, and Hisense Visual Technology Co., Ltd.’s Answer in related proceeding asserting counterclaims of invalidity of the ’512 patent, including under §§ 101, 102, 103, and 112).

Second, Patent Owner stands on its discretionary denial brief, Paper 6, noting, in particular, settled expectations regarding the ’512 patent and Petitioner’s

longstanding knowledge of the patent and of Patent Owner's infringement contentions. For that reason alone, the *Sotera* stipulation should not change the fact that current guidance and efficiency favor discretionary denial.

IX. CONCLUSION

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

IPR2025-01413
U.S. Patent No. 8,319,512

Date: December 10, 2025

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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 7,251 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.

Date: December 10, 2025

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CERTIFICATE OF SERVICE

I certify that on December 10, 2025, 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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