Paper No. 10

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

SAMSUNG DISPLAY CO., LTD; SAMSUNG ELECTRONICS CO., LTD.; and SAMSUNG ELECTRONICS AMERICA, INC.
Petitioners
v.

POLARIS POWERLED TECHNOLOGIES, LLC
Patent Owner

IPR2023-00771
U.S. Patent No. 7,259,521

# PETITIONER'S AUTHORIZED REPLY TO PATENT OWNER'S PRELIMINARY RESPONSE

# TABLE OF CONTENTS

I. The "Video Driver" Of Claim 1 Is Not Required To Be A Separate And Distinct Structure ..... - 1 -

II. The "Video Driver" Does Not Require An Amplifier ..... - 2 -

## EXHIBIT LIST

| Exhibit No.[1] | Description |
|---|---|
| **1001** | U.S. Patent No. 7,259,521 ("the '521 Patent") |
| **1002** | Expert Declaration of Dr. Alex Kattamis |
| **1003** | CV of Dr. Alex Kattamis |
| **1004** | Prosecution File History of the '521 Patent |
| **1005** | Complaint in *Polaris PowerLED Technologies, LLC v. Samsung Electronics America, Inc.*, Case No. 2:22-cv-00469 (E.D. Tex.) |
| **1006** | U.S. Patent Publication No. 2005/0190128 ("Hayafuji") |
| **1007** | U.S. Patent Publication No. 2005/0140600 ("Kim") |
| **1008** | International Publication No. WO2004034365A1 ("Steer") |
| **1009** | James W. Nilsson, et al., *Electric Circuits* (5th ed. 1996) |
| **1010** | Paul Horowitz, et al., *The Art of Electronics* (2nd ed. 1989) |
| **1011** | Willem Den Boer, *Active Matrix Liquid Crystal Displays – Fundamentals and Applications* (1st ed. 2005) |
| **1012** | Min-Koo Han, *AM backplane for AMOLED*, PROC. OF ASID (2006) |
| **2001** | Declaration of Thomas L. Credelle |
| **2002** | *Curriculum Vitae* of Thomas L. Credelle |
| **2003** | R. Dawson, et al., "The impact of the transient response of organic light emitting diodes on the design of active matrix OLED displays," IEEE ELEC. DEV. MTG. DIGEST (1998) ("Dawson") |

[1] Citations to patents are made by column and line cite; citations to U.S. patent publications are made by paragraph number; citations to International patent applications are made by page number; citations to other exhibits are made with reference to the Bates-stamped pagination.

# CLAIM LISTING

## Claim 1

| | |
|---|---|
| **[1-Pre]** | An active matrix organic light emitting diode (AMOLED) display system comprising an AMOLED display panel receiving a video signal to be displayed on the AMOLED display panel, the AMOLED display panel comprising a plurality of organic light emitting diode (OLED) pixel elements, the AMOLED display system comprising: |
| **[1-A]** | a video driver receiving the video signal and generating a video drive signal indicative of the video signal and referenced to a positive power supply voltage of the AMOLED display panel; and |
| **[1-B]** | a current driver coupled to at least one OLED pixel element, the current driver receiving the video drive signal and the positive power supply voltage and providing a drive current to the at least one OLED pixel element, |
| **[1-C]** | the drive current being proportional to a current drive voltage being indicative of the video signal and independent of the positive power supply voltage. |

## Claim 2

| | |
|---|---|
| **[2]** | The AMOLED display system of claim 1, wherein the video drive signal is indicative of the sum of or the difference between the positive power supply voltage and the video signal and the current drive voltage is indicative of the difference between the positive power supply voltage and the video drive signal. |

## Claim 3

| | |
|---|---|
| **[3]** | The AMOLED display system of claim 2, wherein the video driver comprises a differential instrumentation amplifier circuit for providing the video drive signal being the difference between the positive power supply voltage and the video signal. |

**Claim 4**

| | |
|---|---|
| **[4-pre]** | 4. The AMOLED display system of claim 3, wherein the video driver comprises: |
| **[4-A]** | an operational amplifier having a positive input terminal coupled to a first resistor, a negative input terminal coupled to a second resistor and an output terminal providing the video drive signal; |
| **[4-B]** | the first resistor being coupled between the positive input terminal of the operational amplifier and a ground voltage or a negative power supply voltage; |
| **[4-C]** | the second resistor being coupled between the video signal and the negative input terminal of the operational amplifier; |
| **[4-D]** | a third resistor being coupled between the positive input terminal of the operational amplifier and the positive power supply voltage; and |
| **[4-E]** | a fourth resistor being coupled between the negative input terminal and the output terminal of the operational amplifier. |

**Claim 5**

| | |
|---|---|
| **[5]** | The AMOLED display system of claim 2, wherein the video driver comprises a current mode isolator circuit for providing the video drive signal being the difference between the positive power supply voltage and the video signal. |

**Claim 7**

| | |
|---|---|
| **[7]** | The AMOLED display system of claim 2, wherein the video driver comprises a video clamp circuit for providing the video drive signal being the sum of the positive power supply voltage and the video signal. |

## I. THE "VIDEO DRIVER" OF CLAIM 1 IS NOT REQUIRED TO BE A SEPARATE AND DISTINCT STRUCTURE

Patent Owner's (PO) contention that the "video driver" claim element in claim 1 must be a "separate and distinct" structure is not supported by the claims of the '521 patent and is expressly contradicted by its specification. *See, e.g.*, Patent Paper 8 (POPR), 25, 34-35. First, at page 25 of the POPR, PO states that "the claimed video driver of the '521 patent is necessarily separate and distinct from the pixel circuit …. Otherwise, if the video driver was part of the pixel circuit, it would be impossible for the 'video driver' to 'isolate[e] the pixel circuit.'" POPR, 25 (citing EX1001, 1:6-9). Here, PO completely mischaracterizes the patent specification which refers to *electrical* isolation, not physical isolation. *Id.*

Next, at pages 34-35 of the POPR, PO doubles down on its proposition and argues that the "plain language of the claims and Federal Circuit precedent … require the 'video driver' and the 'display panel' to be separate and distinct structures." POPR, 35. In particular, PO contends that the language of the claim requires an "AMOLED display system comprising an AMOLED display panel" that comprises a plurality of OLED pixel elements and separately requires "the AMOLED display system" to comprise a "video driver." *Id.* Yet, PO ignores that the claim recites "the AMOLED display system comprising … a video driver ... ***and a current driver***," [2] which according to PO's own annotated figures of the '521 Patent on pages 33 to 34

[2] All emphasis in quoted text herein is added.

of the POPR is ***not*** separate and distinct from the display panel. EX1001, Cl. 1. PO provides no explanation as to why the "video driver" allegedly needs to be physically separated and distinct from the "display panel," but the "current driver" does not need to be. Indeed, claim 1 recites no such requirements. PO simply made them up while relying on factually distinguishable cases that do not involve claim elements that can be integrated. *See* POPR, 35-36.

The specification also expressly contradicts PO's position:

> In FIGS. 2-4, the video drivers are shown as being formed outside of the AMOLED display panel 30. The embodiments in FIGS. 2-4 are illustrative only and are ***not intended to require the video driver to be formed outside of the AMOLED display panel***.

EX1001, 7:62-66. *See also id.*, 3:67-4:1 ("the ***video driver*** [can be] ***incorporated in*** an AMOLED ***display panel ...***."); 7:59-62 ("[T]he ***video driver*** of the present invention can be integrated on the ***same integrated circuit with the current driver and the OLED pixel elements*** of the AMOLED ***display panel***."); 7:52-59.

Accordingly, PO's contention that the "video driver" must be a separate and distinct structure from the "display panel" and "pixel circuit" is baseless.

## II. THE "VIDEO DRIVER" DOES NOT REQUIRE AN AMPLIFIER

PO contends that the "video driver" of claim 1 requires an amplifier because "[w]ithout an amplifier the alleged video driver is unable to generate the claimed

video drive signal." POPR, 27. PO's argument is again expressly contradicted by the claims and specification of the '521 Patent, as well as its own words in the POPR.

First, claim 1 does not recite "an amplifier," while dependent claims 3, 4, 6 and 8 do. Construing the term "video driver" to require an "amplifier" would improperly render the "amplifier" recited in claims 3, 4, 6, and 8 superfluous. *AMP Plus, Inc. v. DMF, Inc.*, 2022 WL 16844516, *6 (Fed. Cir. Nov. 10, 2022).

Second, the specification expressly states that amplification in the video driver is not required: "In the video driver 102, resistors 105 to 108 can have the same or different resistance values. When the resistance values of resistors 105 to 108 are the same, the differential instrumentation amplifier has unity gain. ***If some gain or attenuation is desired***, then different resistance values for resistors 105 to 108 can be used." EX1001, 5:30-36; *see also id.,* 6:38-44 (same).

Third, PO contends that because *Steer*'s video driver has an amplifier, the circuit in *Steer* is not referenced to the positive power supply voltage. POPR, 61. Thus, PO attempts to distinguish *Kim* because *Kim* does not have an amplifier, but then attempts to distinguish *Steer* because *Steer* has an amplifier. POPR, 27, 61. PO's contradictory arguments underscore their lack of merit. As explained in the specification, amplification in the video driver is optional.

August 7, 2023

Respectfully submitted,

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## CERTIFICATE OF COMPLIANCE

I hereby certify that this Petitioner's Authorized Reply to Patent Owner's Preliminary Response, excluding the parts of the brief exempted by 37 C.F.R. § 42.24, complies with the page limits provided by the Board via email (July 31, 2023), which stated: "Petitioner's Preliminary Reply is limited to 3 pages and due no later than August 7, 2023."

Respectfully submitted,

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## CERTIFICATE OF SERVICE

The undersigned hereby certifies on this August 7, 2023, a true and correct copy of the foregoing **Petitioner's Authorized Reply to Patent Owner's Preliminary Response** was served to counsel via electronic mail as follows:

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