

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG DISPLAY CO., LTD.,
Petitioner

v.

WUHAN CHINA STAR OPTOELECTRONICS SEMICONDUCTOR DISPLAY
TECHNOLOGY CO., LTD.
Patent Owner.

Case No. IPR2026-00485
U.S. Patent No. 11,257,891

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 11,257,891**

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LIST OF EXHIBITS¹

Ex. No.	Description
Ex-1001	U.S. Patent No. 11,257,891 (“the ’891 Patent”)
Ex-1002	Declaration of Dr. Michael Lebby
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Ex-1004	Prosecution History of U.S. Patent No. 11,257,891
Ex-1005	U.S. Patent No. 9,780,157 (“Kwon”)
Ex-1006	U.S. Patent No. 10,651,261 (“Kang’261”)
Ex-1007	U.S. Patent Publication No. 2017-0287937 (“Ka”)
Ex-1008	Korean Patent Publication No. 2017-0103740
Ex-1009	Certified translation of Korean Patent Publication No. 2017-0103740
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Ex-1011	INTENTIONALLY LEFT BLANK
Ex-1012	INTENTIONALLY LEFT BLANK
Ex-1013	INTENTIONALLY LEFT BLANK
Ex-1014	INTENTIONALLY LEFT BLANK
Ex-1015	INTENTIONALLY LEFT BLANK
Ex-1016	INTENTIONALLY LEFT BLANK
Ex-1017	INTENTIONALLY LEFT BLANK

¹ Four-digit pin citations that begin with 0 are to the branded numbers added by Samsung in the bottom right corner of the exhibits. All other pin citations are to original page, column, paragraph, or line numbers.

Ex. No.	Description
Ex-1018	INTENTIONALLY LEFT BLANK
Ex-1019	INTENTIONALLY LEFT BLANK
Ex-1020	Claim mapping table for the '891 Patent
Ex-1021	Chinese Patent No. 205140985U
Ex-1022	U.S. Patent No. 12,238,996 to Park (“Park’996”)
Ex-1023	U.S. Patent No. 9,627,463 to Kwon (“Kwon’463”)
Ex-1024	U.S. Patent No. 10,762,838 to Kang (“Kang’838”)
Ex-1025	U.S. Patent No. 10,424,631 to Kim (“Kim’631”)
Ex-1026	U.S. Patent No. 10,803,792 to Kim (“Kim’792”)
Ex-1027	U.S. Patent No. 9,349,758 to Ki (“Ki”)
Ex-1028	U.S. Patent No. 9,356,087 to Kee (“Lee’087”)
Ex-1029	U.S. Patent Publication No. 2015/0382446 to Kwon (“Kwon’446”)
Ex-1030	U.S. Patent Publication No. 2015/0187279 to Lee (“Lee’279”)
Ex-1031	U.S. Patent Publication No. 2017/0358641 to Park (“Park’641”)
Ex-1032	U.S. Patent Publication No. 2018/0337226 to Liu (“Liu’226”)
Ex-1033	WIPO Publication No. 2017/177127A1 to Shyu (“Shyu”)
Ex-1034	U.S. Patent Publication No. 2018/0204895 to Lin (“Lin’895”)
Ex-1035	Gregory P. Crawford, Flexible Flat Panel Displays, Wiley Series in Display Technology (2005) (“Crawford”)

I. INTRODUCTION

Samsung Display Co., Ltd. (“Petitioner”) requests *inter partes* review (“IPR”) of Claims 1–18 of U.S. Patent No. 11,257,891 (“the ’891 Patent”) (Ex-1001), currently assigned to Wuhan China Star Optoelectronics Semiconductor Display Technology Co., Ltd. (“Patent Owner” or “PO”).

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

Real Parties-in-Interest: Petitioner maintains that Petitioner Samsung Display Corporation is the only real party-in-interest in this proceeding. Specifically, petitioner maintains for example that its corporate parent, Samsung Electronics Ltd. does not fund or have the ability to control this proceeding. *See Sun Pharmaceutical Industries, Inc. v. Biofrontera*, PGR2026-00021, Paper 12 (PTAB May 26, 2026). However, out of an abundance of caution and based on the Board’s recent precedent, Petitioner identifies Samsung Electronics Ltd. as its corporate parent.

Related Matters: PO has asserted the ’891 Patent against Petitioner in *Wuhan China Star Optoelectronics Semiconductor Display Technology Co., Ltd. v. Samsung Display Co., Ltd. et al.*, 2:26-cv-228 (E.D. Tex.) (“Samsung litigation”), which is currently set for trial beginning May 8, 2028.

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III. FEE AUTHORIZATION

The United States Patent and Trademark Office is authorized to charge any fees due during this proceeding to Deposit Account No. LA500639.

IV. GROUNDS FOR STANDING

Petitioner certifies that the '891 Patent is available for review, and Petitioner is not barred or estopped from requesting review.

V. PRECISE RELIEF REQUESTED

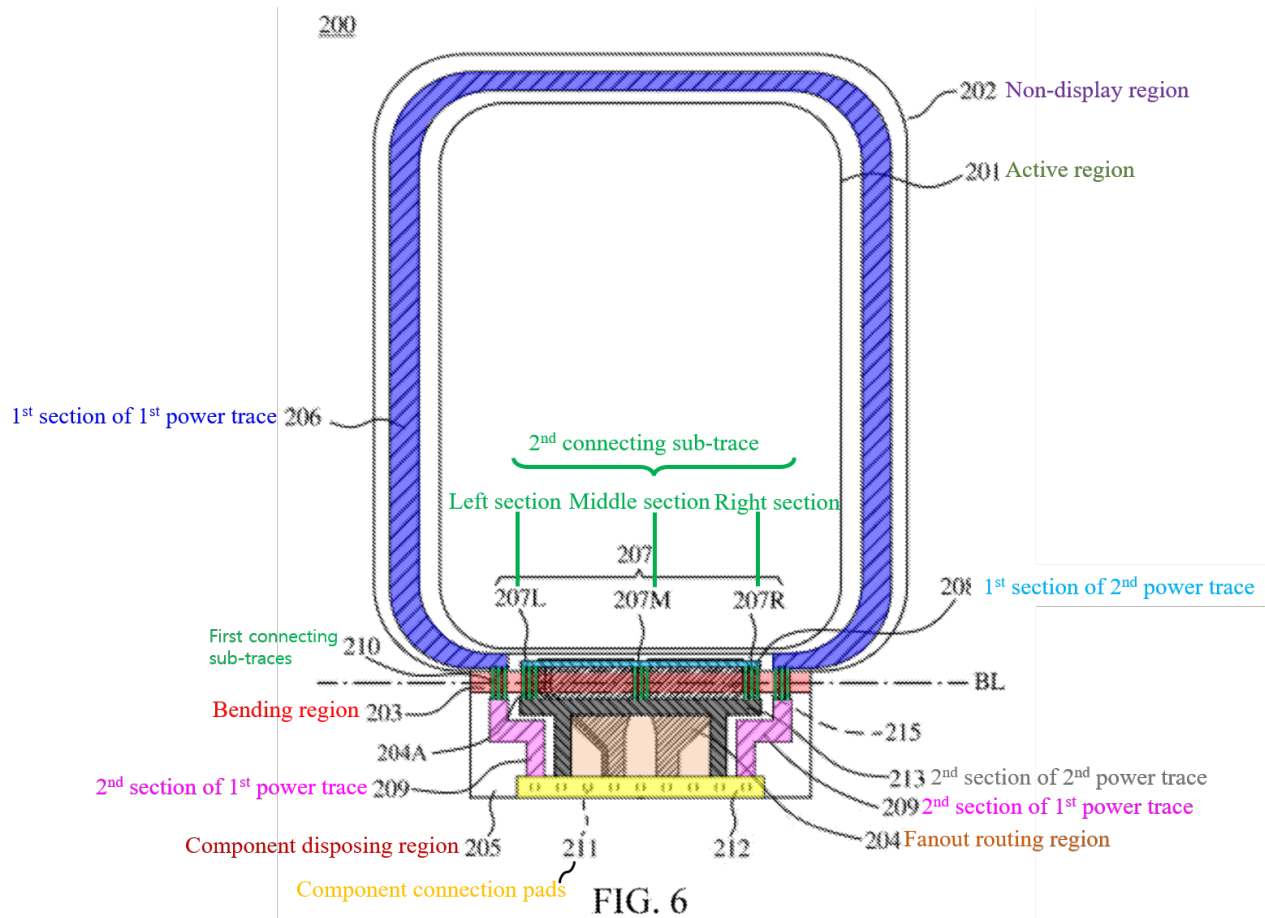
Petitioner requests review and cancellation of Claims 1–18 as unpatentable based on the following grounds, supported by a declaration from Dr. Michael Lebby. Ex-1002 ¶¶1–229 (citing Ex-1001, Exs-1004–1009, Exs-1020–1035); Ex-1003.

Ground	Summary
1	Claims 1, 7, and 10 are obvious over Kwon (Ex-1005)
2	Claims 3, 11, and 16 are obvious over Kwon and Kang'261 (Ex-1006)
3	Claims 2, 4–6, 8–9, 12–15, and 17–18 are obvious over Kwon, Kang'261, and Ka (Ex-1007).

VI. THE CHALLENGED PATENT

The '891 Patent teaches a display device that purportedly “solve[s] the problems existing in the conventional art, to allow that the bottom border of the display panel can realize a true narrow border design, and to avoid the narrow border design that may cause product reliability problems or product failure due to trace breakage.” Ex-1001, 2:32–36. As shown in annotated Figure 6 below,² the '891 Patent teaches a display device, which includes an active region 201 (light green) and non-display region 202 (dark purple) that includes a bending region 203 (red), a fanout routing region 204 (orange), and a component disposing region 205 (maroon) containing component connecting pads 211 (yellow). Ex-1001, 5:29–37.

² Throughout, emphasis and annotations are added unless otherwise specified.

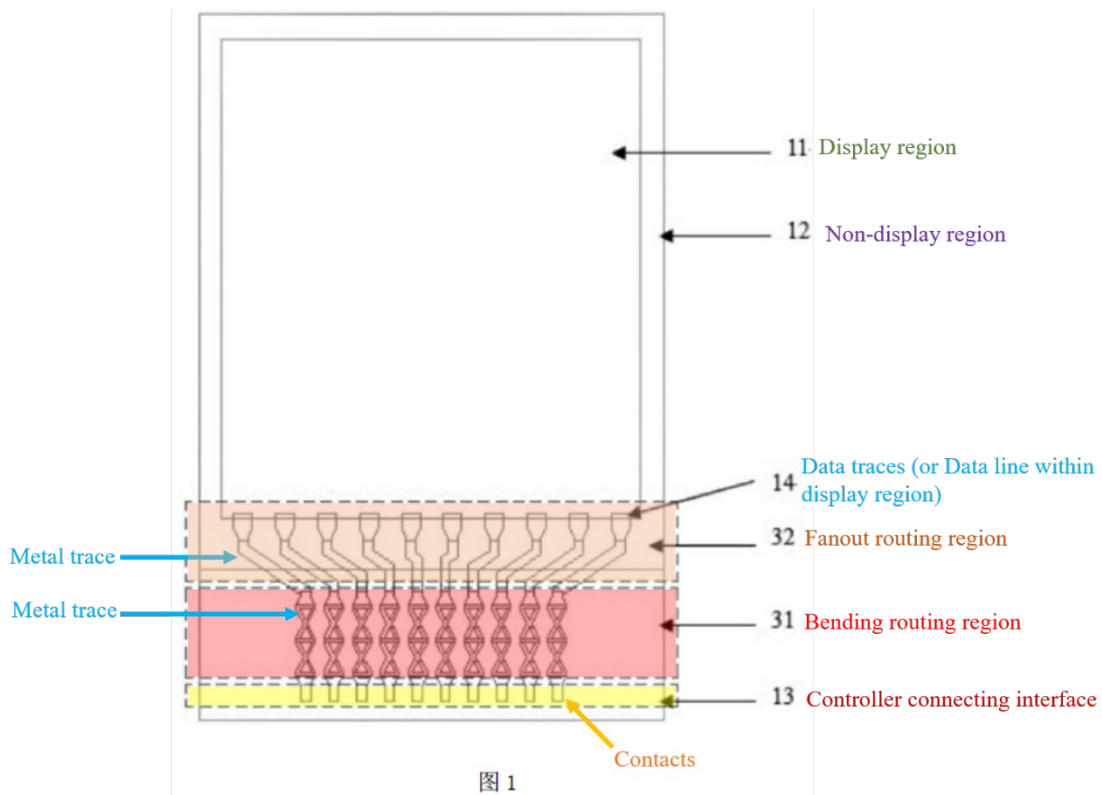


Independent Claim 1 of the '891 Patent recites a specific arrangement of the components of the display device including a first section of a first power trace 206 (blue) disposed within the non-display region 202 around the active region 201, and connected to a second section of the first power trace 209 (pink) disposed within the component disposing region 205, and connected to the plurality of component connecting pads 211. Ex-1001, Cl. 1, 9:26–32. A first section of the second power trace 208 (light blue) is disposed adjacent to the active region 201 and disposed between the active region 201 and the bending region 203, and connected to a second section of the second power trace 213 (grey) disposed within the component

disposing region 205 by at least a set of second connecting sub-traces 207 (green) passing through two sections of the bending region 207L, 207R disposed within the bending region 203 and connected to the plurality of component connecting pads 211. *Id.* Independent Claims 11 and 16 of the '891 Patent include three sets of connecting sub-traces passing through a left section 207L, a middle section 207M, and a right section 207R of the bending region. Ex-1001, Cls. 11, 16, 10:31–51, 11:1–17.

The '891 Patent discusses at least an “active region/display region,” “non-display region,” “bending routing region/bending line,” “data trace/metal trace”, “fanout routing region,” “component controlling interface/component disposing region,” “contacts,” “high-potential power trace,” “low-potential power trace,” and two sections of “bending line” through which the “high-potential power trace” passes as prior art in its prior art section. Specifically, the '891 Patent states that “China utility model patent No. 205140985U discloses a flexible AMOLED display panel structure comprising a first substrate and a second substrate, the second substrate being a protective cover plate, and the first substrate comprising *a display region* [light green] and *a non-display region* [dark purple], wherein the non-display region is disposed around the display region and is bilaterally symmetric”; “[e]ach of contacts [yellow] of a controller connecting interface [maroon] disposed on the non-display region is connected to each of *data traces* [blue] within the display

region by a metal routing structure, and the metal routing structure includes *a bending routing region* [red] and *a fanout routing region* [orange], each *metal trace* in a bending routing region and each *metal trace* in the fanout routing region is connected to each other one by one”; and “[b]y changing the metal routing structure of the flexible AMOLED display panel, resistance of the metal traces in the bending routing region and resistance of the metal traces in the fanout routing region are more uniform, and the display region in the entire display panel is proportionally increased, therefore increasing area of the display region.” Ex-1001, 1:22–40; *see also* Ex-1021 (CN205140985U), Fig. 1 (annotated).



Referring to Figure 1 (prior art) below, the '891 Patent shows “a display panel 100 for a conventional smartphone 1,” which “includes a display region 101 [light green] and a non-display region 102 [dark purple] ... distributed around the display region 101”; “[a] component disposing region 103 [maroon] ... disposed under the display region 101 and configured for disposing a plurality of traces (not shown) and at least one control chip 105.” Ex-1001, 1:41–49, Fig. 1 (annotated).

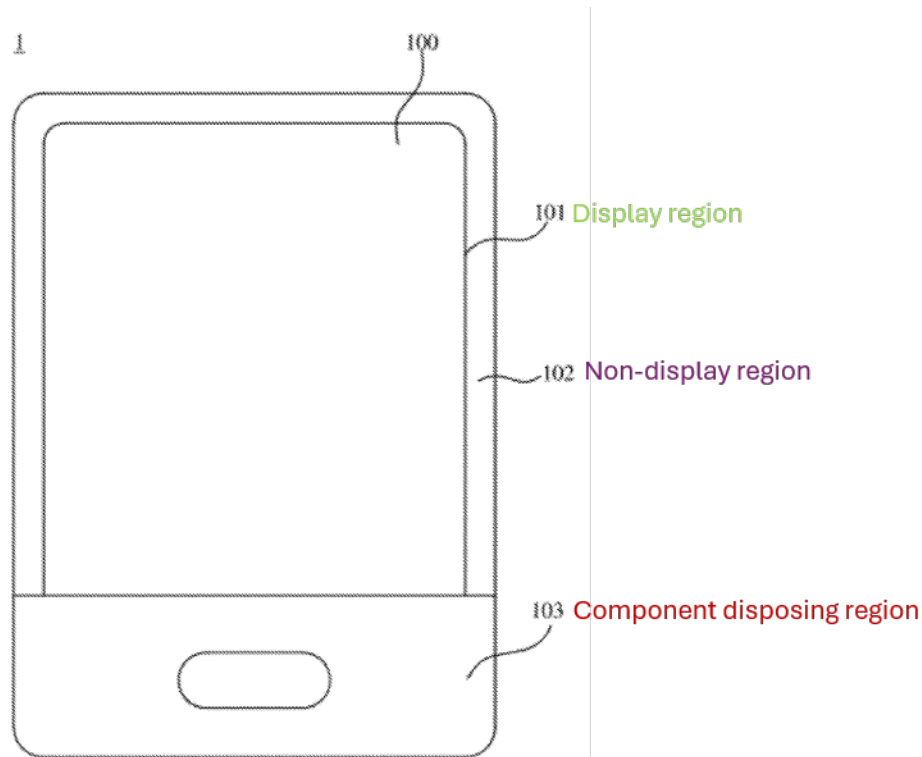
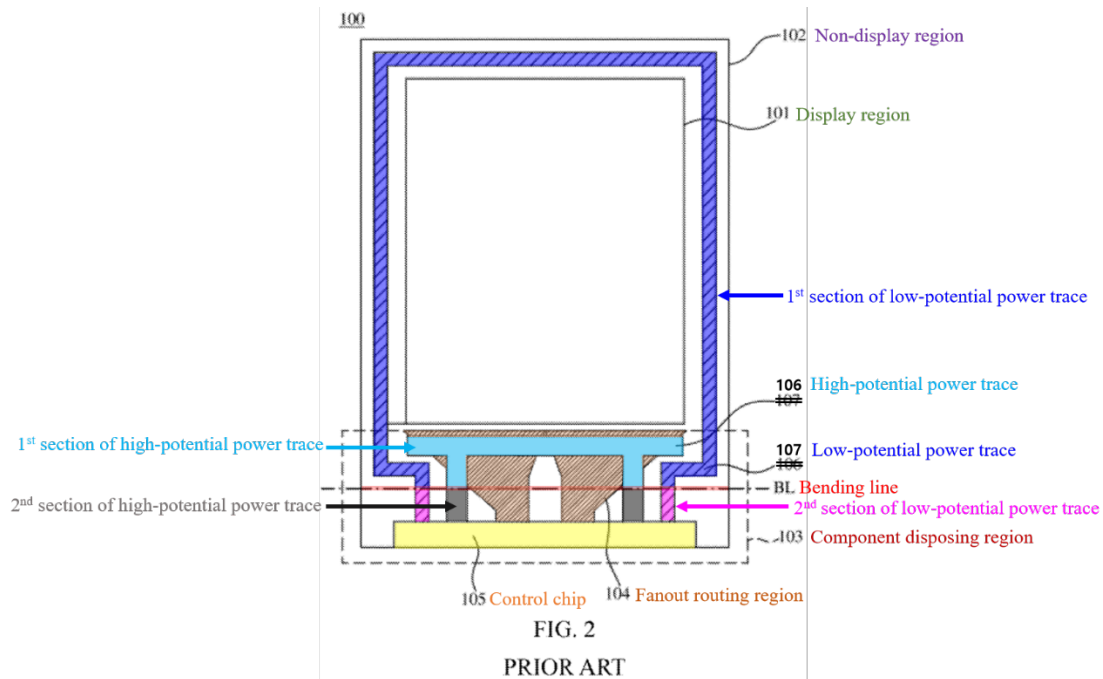


FIG. 1
PRIOR ART

Next, referring to Figure 2 (prior art) below, the '891 Patent states that “a fanout routing region 104 [orange] is disposed within the component disposing region 103 [maroon], and the fanout routing region 104 has a plurality of traces

configured for connecting the display region 101 [light green] and the control chip 105 [yellow], thereby controlling the display region 101 by the control chip 105.” Ex-1001, 1:49–54, Fig. 2 (annotated). The ’891 Patent further states that “high-potential power trace 106³ is disposed within the component disposing region 103 and under the display region 101 to provide a high-potential voltage to the display region 101”; “low-potential power trace 107 surrounds the display region 101 and extends downwardly outside the high-potential power trace 106 and is retracted below the high-potential power trace 106”; and “low-potential power trace 107 is parallel to the high-potential power trace 106, and extends downwardly to connect the control chip 105.” Ex-1001, 1:53–62. Figure 2 also shows that conventional high-potential power trace 106 has a first section (blue) over the bending line (red) and a second section (grey) under the bending line; and conventional low-potential power trace 107 has a first section (blue) over the bending line (red) and a second section (pink) under the bending line. Ex-1001, Fig. 2; Ex-1002 ¶¶65–69.

³ A POSITA would have understood that there is a typographical error in Figure 2 such that reference numerals 106 and 107 should be swapped to 107 and 106, respectively. Ex-1002 ¶69 n.2.



VII. PROSECUTION HISTORY OF THE '891 PATENT

The '891 Patent was filed December 12, 2018 as the U.S. national stage entry of PCT Application No. PCT/CN2018/108168, filed September 28, 2018, and claims priority to Chinese Application No. 201810581903.1, filed June 7, 2018.

The '891 Patent was allowed after one office action. On June 22, 2021, the Examiner rejected then-pending Claims 1–2, 11, and 17–18 as anticipated over U.S. Patent Publication No. 2017/0288008 to Kim (“Kim”), Claims 5–6 as obvious over Kim, and Claim 8 as obvious over Kim in view of U.S. Patent Publication No. 2014/0042406 to Degner (“Degner”). Ex-1004, 247–58. In a September 21, 2021 response, the Applicant amended independent Claim 1 to recite “wherein the first section of the second power trace is separately connected to the second section of the second power trace disposed within the component disposing region by two sets

of the second connecting sub-traces passing through two sections at the bending region” and independent Claim 17 (issued as Claim 16) to recite “wherein the first section of the power trace is separately connected to the second section of the power trace disposed within the component disposing region by three sets of connecting sub-traces passing through a left section, a middle section and a right section of the bending region.” Ex-1004, 283–289. The Applicant argued that these limitations were not taught by the prior art of record. *Id.* The Examiner issued a Notice of Allowance on November 5, 2021. Ex-1004, 290–94. The prior art relied upon in this Petition was not considered by the Examiner during prosecution of the ’891 Patent. Therefore, the Grounds discussed in this Petition present new arguments that were not considered during prosecution. Ex-1002 ¶¶70–72.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) at the relevant time would have had at least a bachelor’s degree in electrical engineering, materials science, mechanical engineering, or a related field, and two years of experience in the design and/or development of display devices or consumer electronics, including familiarity with OLED displays, flexible display panels, display module structures, adhesives, and/or packaging technologies, with additional education substituting for experience and vice versa. Ex-1002 ¶¶42–46.

IX. PRIORITY DATE

For purposes of this proceeding only, Petitioner applies the earliest alleged priority date of the '891 Patent: June 7, 2018.⁴

X. CLAIM CONSTRUCTION

Petitioner interprets the claims according to *Phillips*. 37 C.F.R. §42.100(b). To resolve this Petition, Petitioner does not believe that any term requires express construction.⁵ CTPG, 44; Ex-1002 ¶¶47–49, 73. That said, the '891 specification explains that certain structures fall within the scope of certain claim terms. As noted below, the associated claims terms would have been understood to include at least such recited structures.

an active region: a display area that includes, at least pixels, such as “a plurality of thin-film transistors to control the emitting of the display panel.” Ex-1001, 6:5–8.

⁴ Petitioner respectfully reserves the right to challenge the priority date in other proceedings.

⁵ The Samsung litigation is in its infancy. Petitioner respectfully reserves all rights to raise claim construction and other arguments in district court and will request leave to submit the district court's claim construction as soon as it becomes available. Additionally, should PO raise express or implied claim construction arguments in its Preliminary Response, Petitioner will respectfully seek a Preliminary Reply to respond. Consolidated Trial Practice Guide (“CTPG”), 44–45.

a non-display region: an area that does not display an image and instead includes non-display components, such as “the plurality of traces and the control chip.” Ex-1001, 1:66–2:6.

a first power trace: a first trace that transmits power, such as a VSS trace. Ex-1001, 6:48–49 (“the first power trace is a low-potential power trace (VSS)”).

a second power trace: a second trace (different than the first trace) that transmits power, such as a VDD trace. Ex-1001, 7:34–36 (“the second power trace is a high-potential power trace (VDD)”).

component connecting pads: pads for connecting an electronic component, such as “a controller chip,” “a rigid board,” a “rigid-flex board” or the like, using, for example, “a plurality of bumps.” Ex-1001, 6:26–34.

XI. BRIEF DESCRIPTION OF THE APPLIED PRIOR ART

A. Kwon (Ex-1005)

Kwon (U.S. Patent No. 9,780,157) issued October 3, 2017, and is prior art to the '891 Patent under 35 U.S.C. §102(a)(1). Ex-1002 ¶¶74–78.

Kwon teaches “a flexible display having a plurality of innovations configured to allow bending of a portion or portions to reduce apparent border size and/or utilize the side surface of an assembled flexible display.” Ex-1005, Abstract. As shown in annotated Figures 1 and 16A below, Kwon teaches a “flexible display 100.” Ex-1005, Figs. 1, 16A. That flexible display includes an active area (light green)

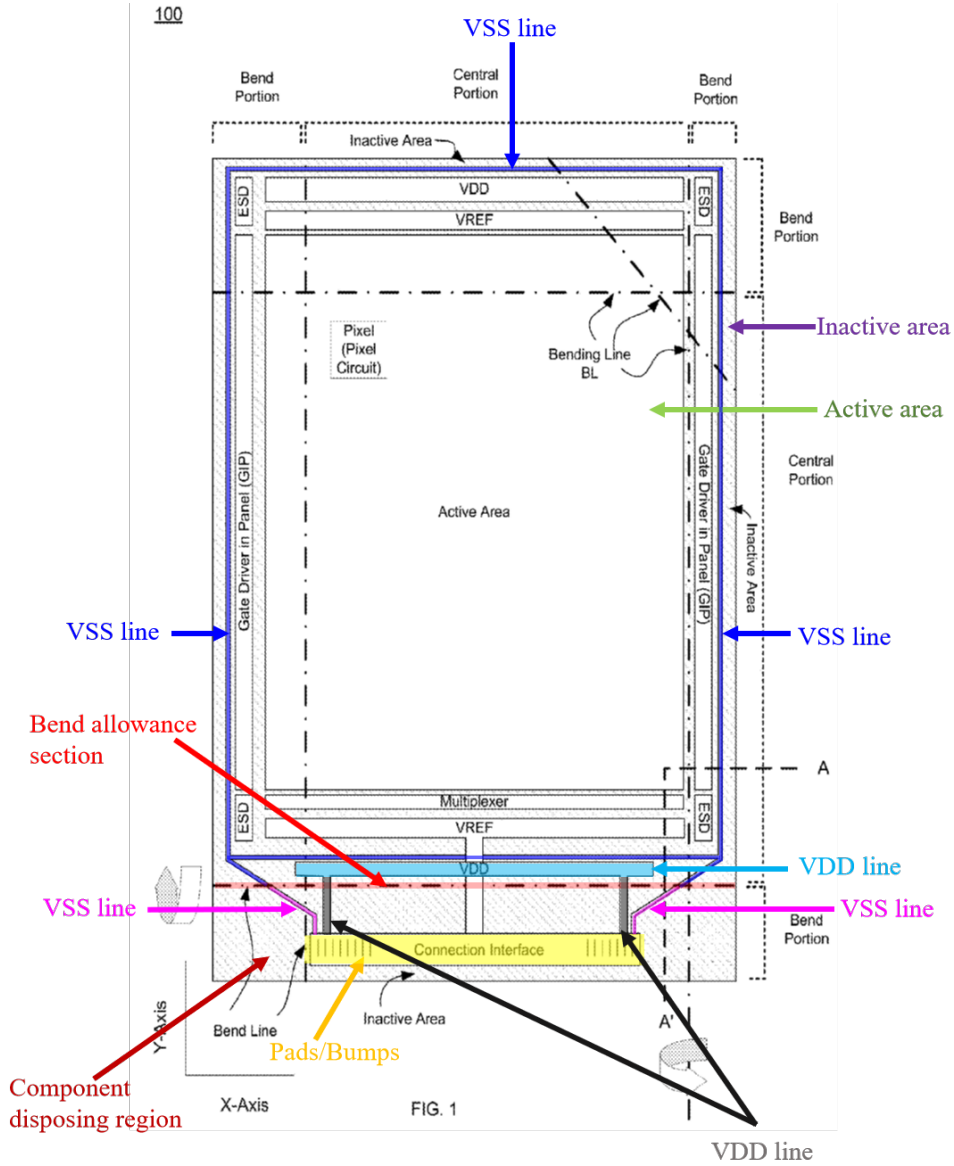
surrounded by an inactive area (dark purple). The inactive area further includes a “bend allowance section” (red), “routing area” (orange), and “connection interface” (maroon) with “Pads/Bumps” (yellow).

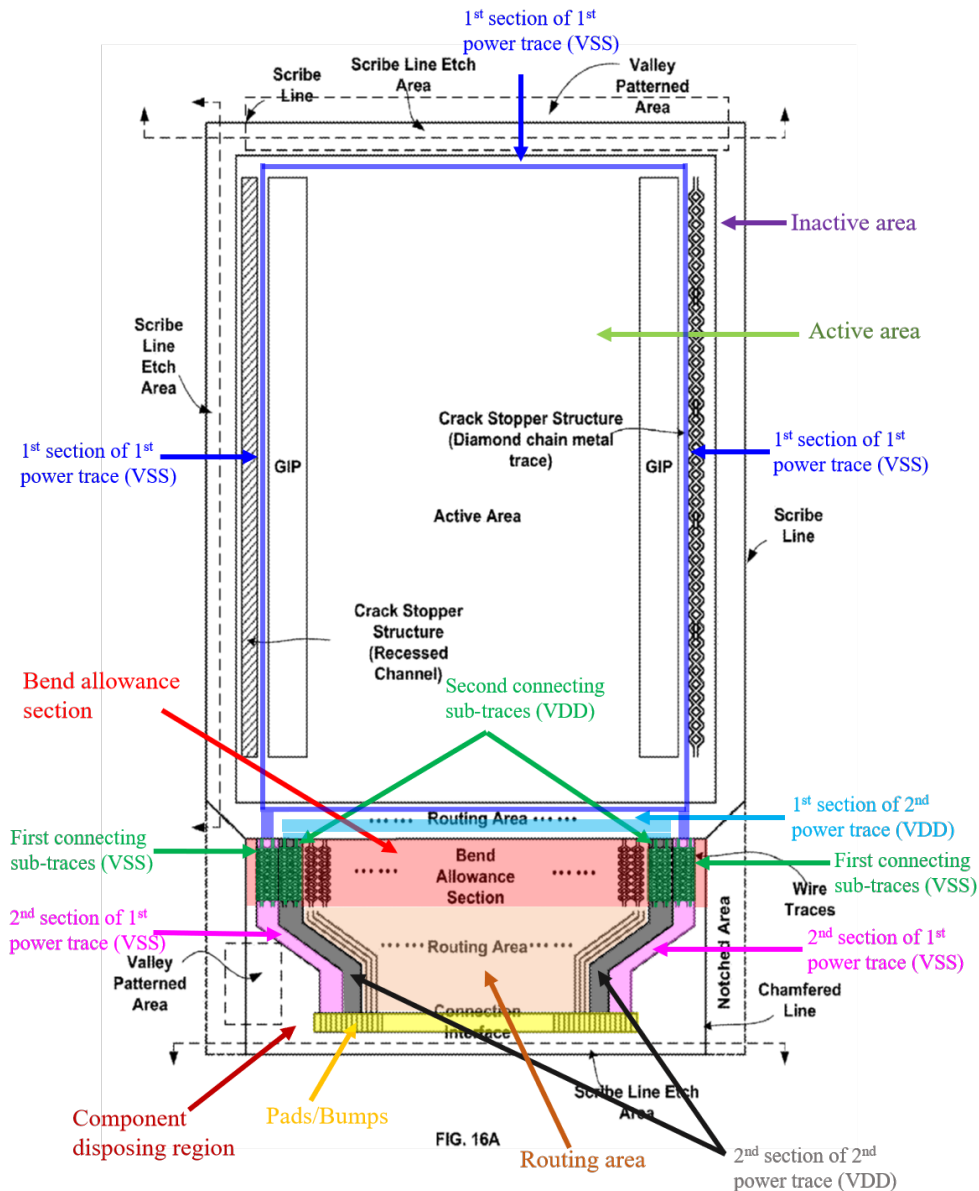
“The bend portion includes a bend allowance section, which can be actively curved in a certain bend radius.” Ex-1005, 6:33–35. “The bend allowance section” is “between the active area and the inactive area where the external printed circuit is attached thereto.” Ex-1005, 34:7–9. “The bend allowance section” has “only the conductive line 120 rather than active display components or peripheral circuits.” Ex-1005, 46:30–32.

The “routing area” is “between the active area and the bend allowance section” as well as “between the COF bonding area and the bend allowance section” and has a patterned insulation layer containing wire traces. Ex-1005, 31:23–31. The COF bonding area is “coupled to a connection interface (Pads/Bumps, Pins) disposed in the inactive area.” Ex-1005, 5:46–47.

Kwon also teaches VSS lines (blue and pink) and VDD lines (light blue and grey), as shown in annotated Figures 1 and 16A below. Ex-1005, 2:31–33, Figs. 1, 16A. Kwon teaches that “the area positioned even further out toward the scribe line of the base layer 106” may include VSS lines (blue) and surround the “top edge and the bottom edge” and “side edges of the flexible display 100.” Ex-1005, 35:51–63, 36:32–37. Kwon further teaches a “plurality of wire traces extending between the

first area and the second area” (green) that connects the first and second sections of the power traces. Ex-1005, 2:31–33. Kwon also teaches that these wire traces “may split into additional number of sub-traces” to connect the first and second sections of the corresponding traces. Ex-1005, 28:32–34. “For example, a VSS line and a VDD line in the flexible display 100 ... are arranged to cross over a bend allowance section.” Ex-1005, 28:38–41. Moreover, Kwon teaches that the above “wire trace[s] ... may extend across the bend allowance section” so that the second section of the first power trace (VSS line) (pink) and second power trace (VDD line) (grey) are “routed to pads for COF or other components of the flexible display 100.” Ex-1005, 33:40–43.





B. Kang'261 (Ex-1006)

Kang'261 (U.S. Patent No. 10,651,261) was filed August 16, 2018, and claims priority to a Korean Patent Application filed August 16, 2017. Kang'261 is prior art to the '891 Patent under at least AIA 35 U.S.C. §102(a)(2).

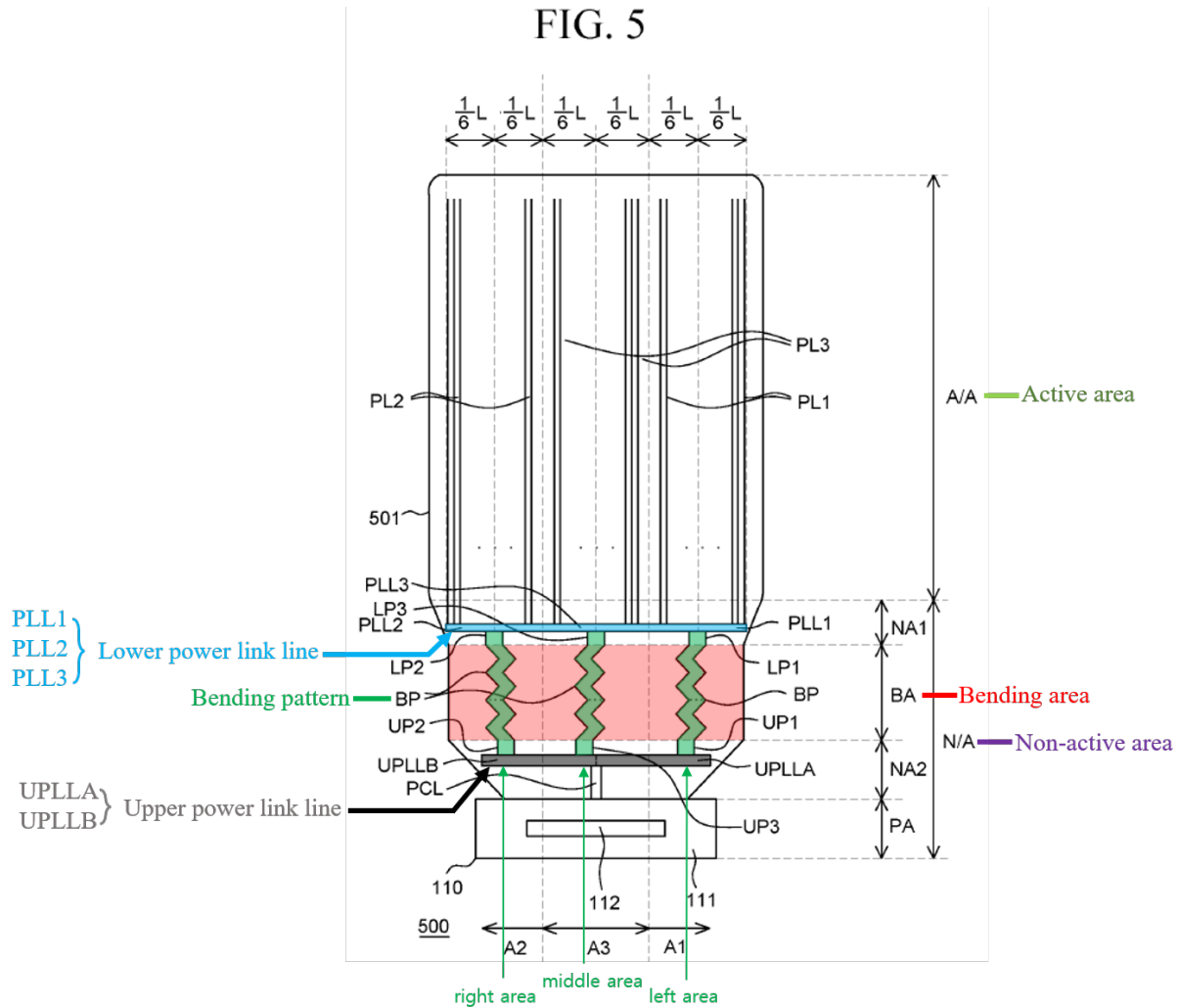
Kang’261’s Korean counterpart is essentially identical to the U.S. filing. *See* generally Ex-1006 (U.S. published application), Ex-1008 (Korean application), Ex-1009 (certified translation of Korean application). The figures are identical, and the specification is equivalent. *Id.*; Ex-1002 ¶¶79–81. Because the described subject matter is identical, Kang’261’s Korean counterpart provides support for Kang’261’s disclosures, and Kang’261 is thus available as a patent prior art reference under AIA 35 U.S.C. §102(a)(2) as of its Korean priority date of August 16, 2017. *See* AIA 35 U.S.C. §102(d)(2).⁶

Kang’261 teaches a “Display Device” with a plurality of power lines and power link lines disposed in the active (light green) and non-active (dark purple) areas, respectively, that are configured to transmit power voltage across a bending area (red) via bending patterns connecting an upper power link line (light blue) to a lower power link (grey) line using sub-traces (green) divided across right, middle, and left areas. Ex-1006, 13:20–14:46, 15:18–20. As shown in the annotated version

⁶ Because the subject matter of Kang’261 and its Korean priority application are effectively identical, Kang’261 is prior art as of its Korean priority date, August 16, 2017. *See Penumbra, Inc. v. RapidPulse, Inc.*, IPR2021-01466, Paper 34 (P.T.A.B. Mar. 10, 2023) (precedential as to section II.E.3) (“Under the AIA, a reference patent document need only meet the ‘ministerial requirements’ of §§ 119 and 120, and the provisional or other earlier application(s) to which the reference patent document claims a right of priority must ‘describe[] the subject matter’ relied upon in the reference patent document as prior art.” (citing 35 U.S.C. §102(d)(2))).

of Figure 5⁷ below, Kang'261 teaches a “first area A1, second area A2, and third area A3 ... defined by dividing the length of the substrate 501 along a longitudinal direction” with A1 corresponding to the “the left area of the substrate 501,” A2 corresponding to “the right area,” and A3 corresponding to the “the central area.” Ex-1006, 13:20–33, Fig. 5. Kang'261 further teaches that “the power link lines,” one of which corresponds to the second power trace (VDD), “are disposed to transmit power voltage to pixels in their respective areas.” Ex-1006, 15:18–20. These power link lines are further divided by “upper power link lines” UPLLs and “lower power link lines,” PLLs. *See* Ex-1006, 13:42–14:46. These two sections are connected by a “plurality of bending patterns BP in the bending area BA” and Kang'261 teaches that “some are disposed in the first area A1, some are disposed in the second area A2, and others are disposed in the third area A3.” Ex-1006, 14:1–4.

⁷ For clarity, Figure 5 has been flipped vertically without changing its content.



C. Ka (Ex-1007)

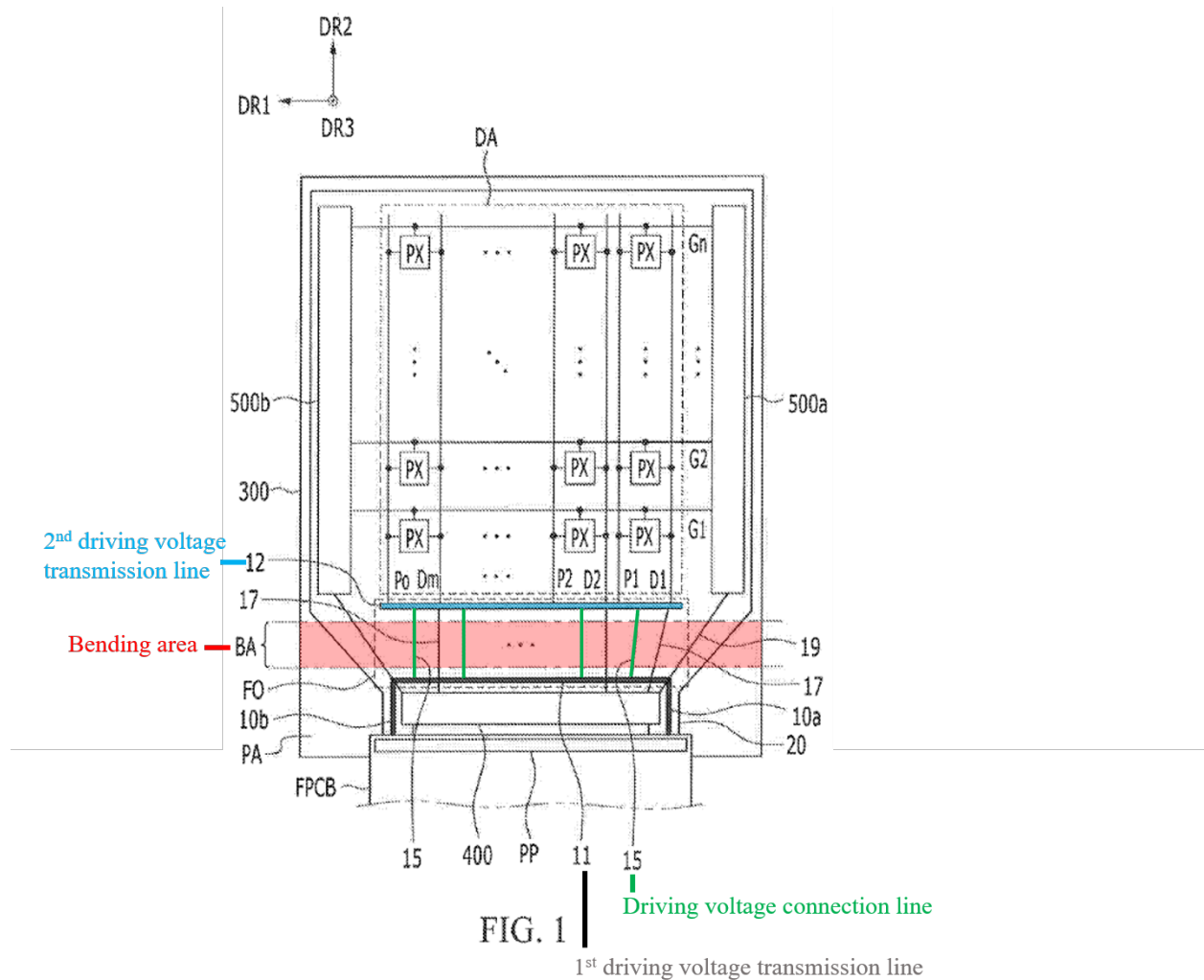
Ka (U.S. Patent Publication No. 2017/0287937) was filed November 23, 2016, published October 5, 2017, and is prior art to the '891 Patent under 35 U.S.C. §102(a)(1) and (2). Ex-1002 ¶¶82–83.

Ka is directed to a “Display Device Capable of Reducing Resistance of Driving Voltage Supply Wires,” and teaches specific, quantified width relationships among its first driving voltage transmission line 11 (light blue), second driving

voltage transmission line 12 (grey), and driving voltage connection lines (green). Ex-1007, Cover. As shown in annotated Figure 1⁸ below, Ka teaches that “first driving voltage transmission line 11 and the second driving voltage transmission line 12 may each have a width of about 50 to about 200 micrometers, and the driving voltage connection line 15⁹ may have a width of about 3 micrometers.” *Id.* ¶74, Fig. 1. Ka teaches that “the display panel 300 may be bent with a predetermined curvature in the bending area BA (red).” *Id.* ¶68. Ka further teaches that transmission-line / trace-section widths are deliberately set wider than the connecting sub-trace or connection-line widths that cross the bend region because “[w]hen the length or width of the wires is increased or decreased, current density and voltage drop may also increase or decrease, causing deterioration in luminance uniformity of the image displayed in the display area.” *Id.* ¶5.

⁸ For clarity, Figure 1 has been flipped vertically without changing its actual content.

⁹ A POSITA would have understood that “17” in the quotation is a typographical error because Ka’s driving voltage connection line corresponds to component “15.” *See, e.g.*, Ex-1007 ¶¶62, 65, 74–76, 84–88.



XII. DETAILED EXPLANATION OF THE UNPATENTABILITY GROUNDS

A. Ground 1: Claims 1, 7, and 10 Are Obvious over Kwon

1. Independent Claim 1

a. 1[pre]: A display panel, comprising:

Kwon teaches the preamble of Claim 1, to the extent that it is limiting.

Ex-1002 ¶¶84–85.

As shown in Figure 1 below, Kwon teaches a “flexible display 100.” Ex-1005, Fig. 1. Kwon further teaches that flexible display 100 “may be incorporated in electronic devices.” Ex-1005, 5:15–16. Moreover, Kwon teaches that its “assembled display may include *a display panel*.” Ex-1005, 1:15.

100

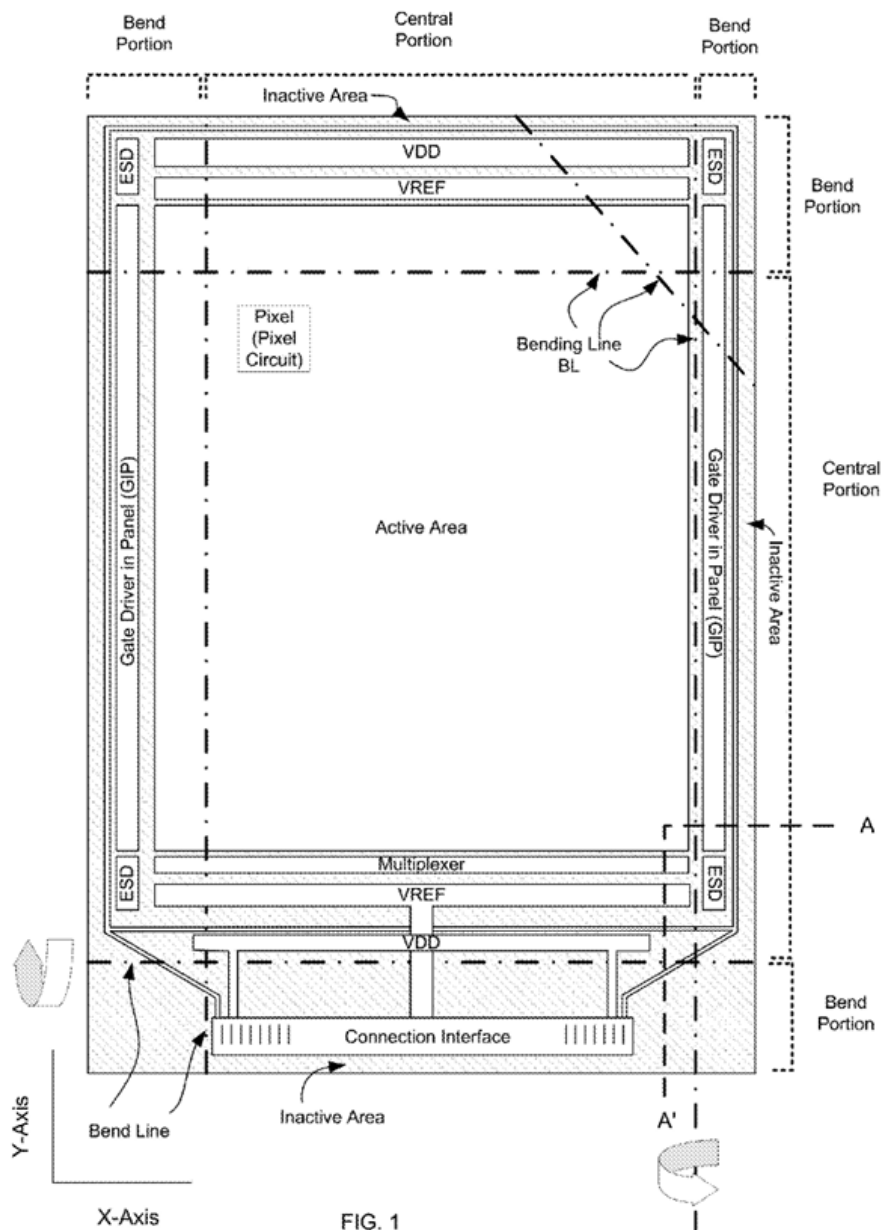


FIG. 1

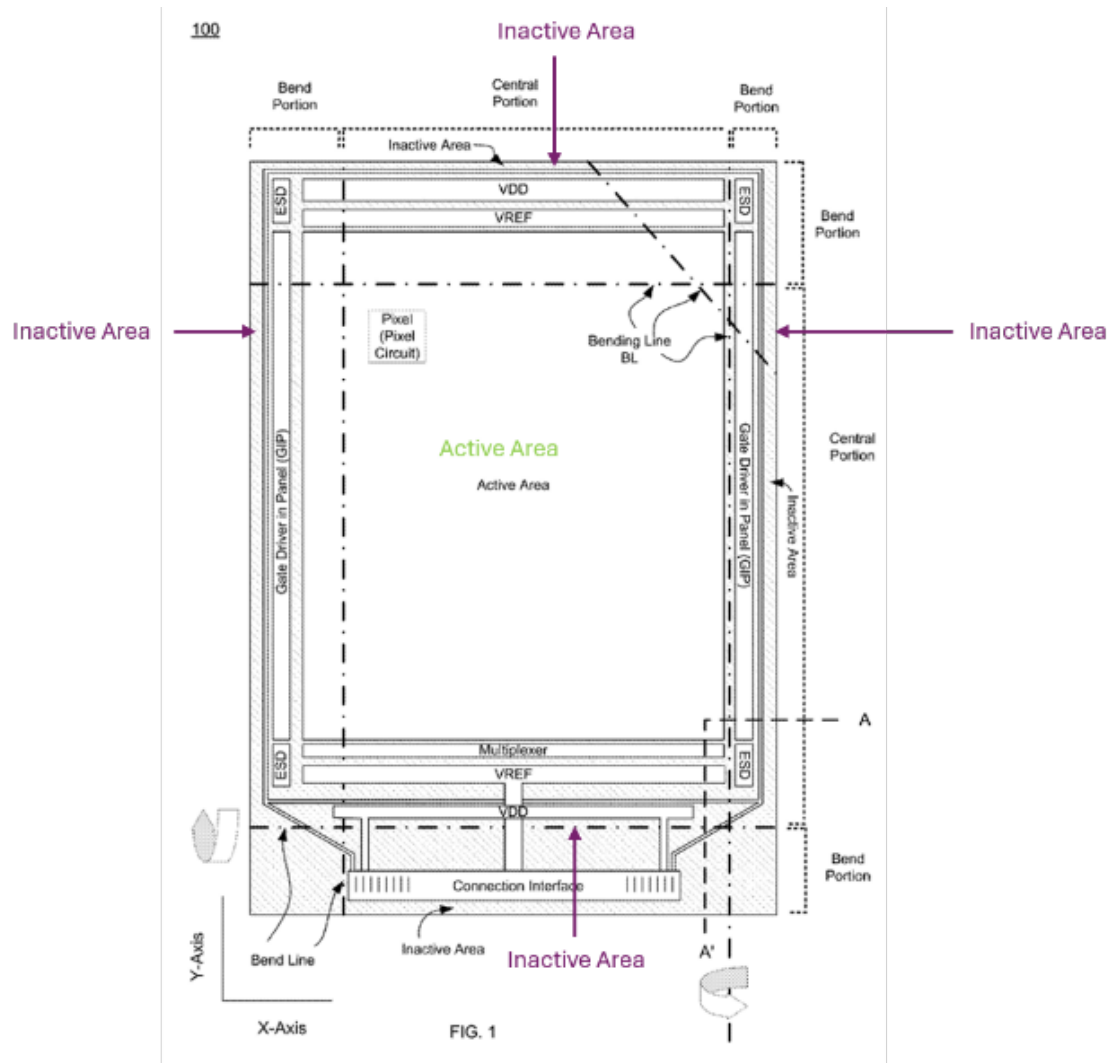
- b. **1[a]: an active region and a non-display region, the non-display region disposed around the active region and extending to form a bending region, a fanout routing region, and a component disposing region; the component disposing region having a plurality of component connecting pads;**

Kwon teaches Element 1[a]. Ex-1002 ¶¶86–87.

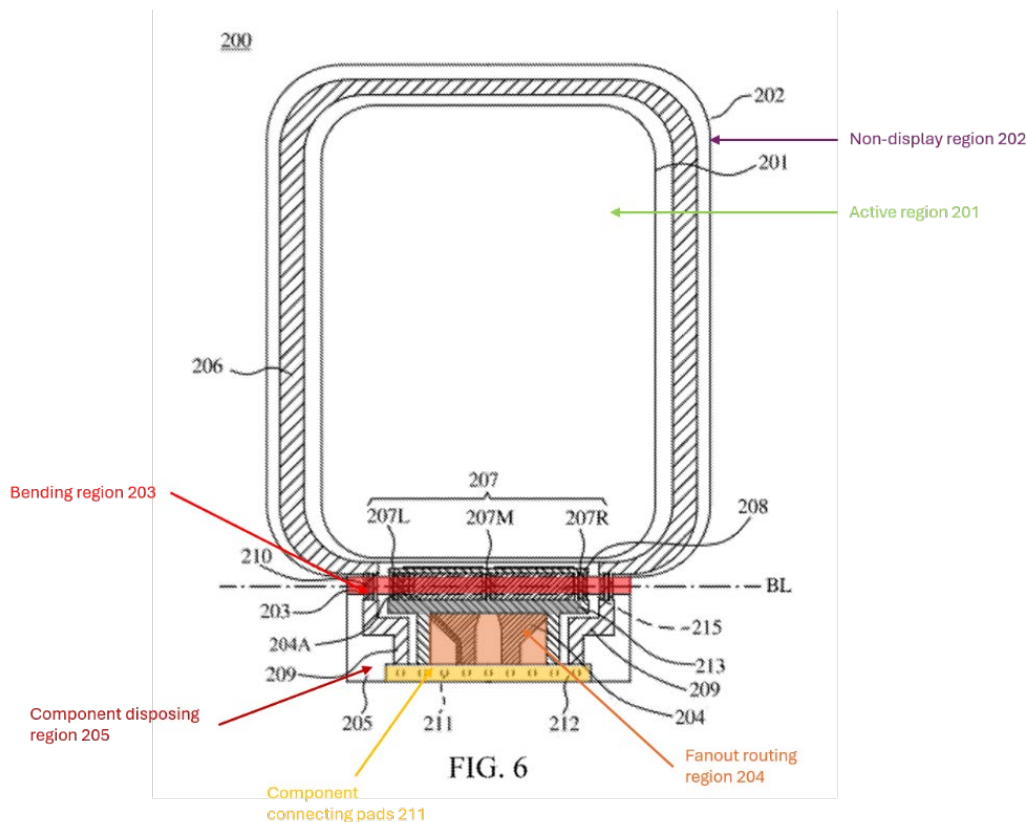
Although the recited “active region,” “non-display region,” “bending region,” “fanout routing region,” “component disposing region,” and “connecting pads” are admittedly prior art components (*see* Section VI), Kwon also teaches that its display panel comprises an “active region,” “non-display region,” “bending region,” “fanout routing region,” “component disposing region,” and “plurality of component connecting pads.”

Specifically, Kwon’s display panel 100 includes an active region and a non-display region disposed around the active region. Kwon teaches that “flexible display 100 includes at least one active area (i.e., display area), in which an array of display pixels are formed therein” and “[o]ne or more inactive areas ... provided at the periphery of the active area.” Ex-1005, 5:17–20. Kwon also teaches that “the inactive area may be adjacent to one or more sides of the active area.” Ex-1005, 5:20–21. Kwon’s active area corresponds to the recited “active region” and Kwon’s inactive area corresponds to the recited “non-display region.” Ex-1002 ¶88.

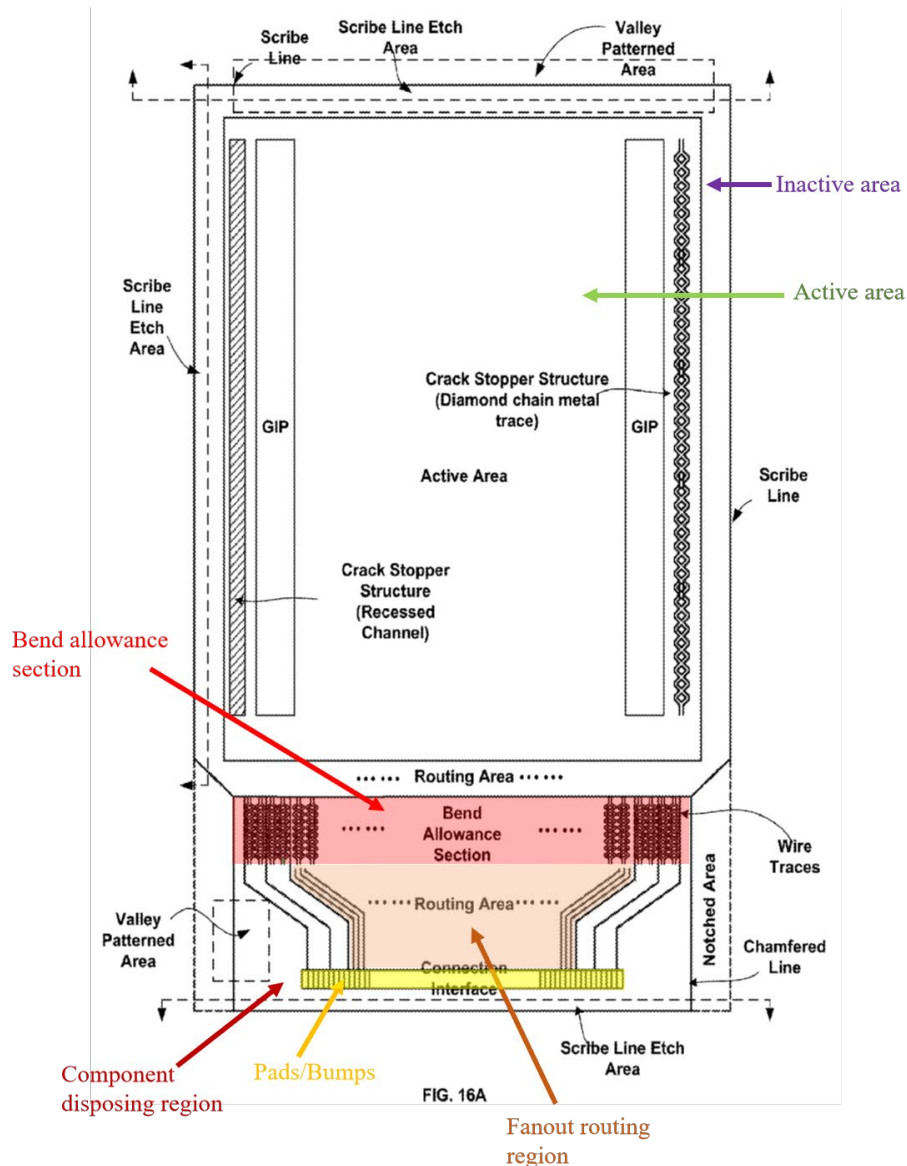
As shown in annotated Figure 1 below, Kwon's display panel 100 has a non-display region, which Kwon calls an inactive area, that surrounds the active region. Ex-1001, Fig. 6; Ex-1005, Fig. 1; Ex-1002 ¶¶89–91. In Figure 1, the inactive area is shaded in grey and houses a number of non-pixel, non-display-active components. Indeed, Kwon expressly teaches that “the *inactive area surrounds a* rectangular shape *active area*.” Ex-1005, 5:21–23.



Kwon also teaches that the non-display region extends to form a bending region, a fanout routing region, and a component disposing region, which has a plurality of component connecting pads at its end. The “component disposing region” of the ’891 Patent “is disposed under the display region” and “configured for disposing a plurality of traces (not shown) and at least one control chip.” Ex-1001, 1:46–49, Fig. 6 (annotated below (maroon)). The “fanout routing region” of the ’891 Patent “is disposed within the component disposing region” and “has a plurality of traces configured for connecting the display region” and the control chip, “thereby controlling the display region [] by the control chip.” Ex-1001, 1:49–54, Fig. 6 (orange).



As shown in annotated Figure 16A below, like the '891 Patent, Kwon's non-display region (i.e., inactive area (dark purple)) extends to form a bending region (red), which Kwon calls a "Bend Allowance Section," a fanout routing area (orange), which Kwon calls a "Routing Area," and a component disposing region (maroon) that includes at its end what Kwon calls a "connection interface" (yellow). Ex-1005, Fig. 16A.



Specifically, Kwon teaches a component disposing region that includes an “inactive area with the connection interface [that] can be bent away from the plane of the adjacent portion of the flexible display so that the printed circuit (e.g., COF, PCB and the like) is positioned at the rear side of the flexible display 100.” Ex-1005, 5:50–54. Kwon teaches that “bending the inactive area allows to minimize or to eliminate the inactive area to be seen from the front side of the assembled flexible display 100.” Ex-1005, 6:65–67. Kwon teaches that “the bend allowance section” is “between the active area and the inactive area where the external printed circuit is attached thereto.” Ex-1005, 34:7–9. Kwon’s bend allowance section corresponds to the recited “bending region,” which is formed by an extension of the inactive area, as shown in Figure 16A above. Ex-1002 ¶¶92–93. Notably, Kwon teaches several bend regions in the inactive areas around multiple edges of the flexible display 100. But the specific “bending region” corresponding to this claim element is the bottom bend region in Kwon’s Figure 1 (also referred to specifically as the “bend allowance section” in Kwon’s Figure 16A). Ex-1005, Figs. 1, 16A.

Kwon’s “connection interface” is part of the recited “component disposing region” because, like the ’891 Patent, Kwon’s connection interface is bent, by way of the bend area, to be disposed under the display region and configured to dispose a plurality of traces and at least one control chip. Ex-1001, 1:46–49. As Kwon explains “some of the components, such as data drive-IC, may be mounted on a

separate printed circuit and coupled to a connection interface (Pads/Bumps, Pins) disposed in the inactive area using a printed circuit such as flexible printed circuit board (PCB), chip-on-film (COF), tape-carrier-package (TCP) or any other suitable technologies.” Ex-1005, 5:44–50.

Moreover, Kwon’s routing area corresponds to the recited “fanout routing region” because, like the ’891 Patent, it is disposed in the component disposing region, and includes a plurality of traces that connect to the pads on the “connection region” with an attached, e.g., COF device. Ex-1005, 22:4–9, 31:23–31; Ex-1002 ¶¶94–96.

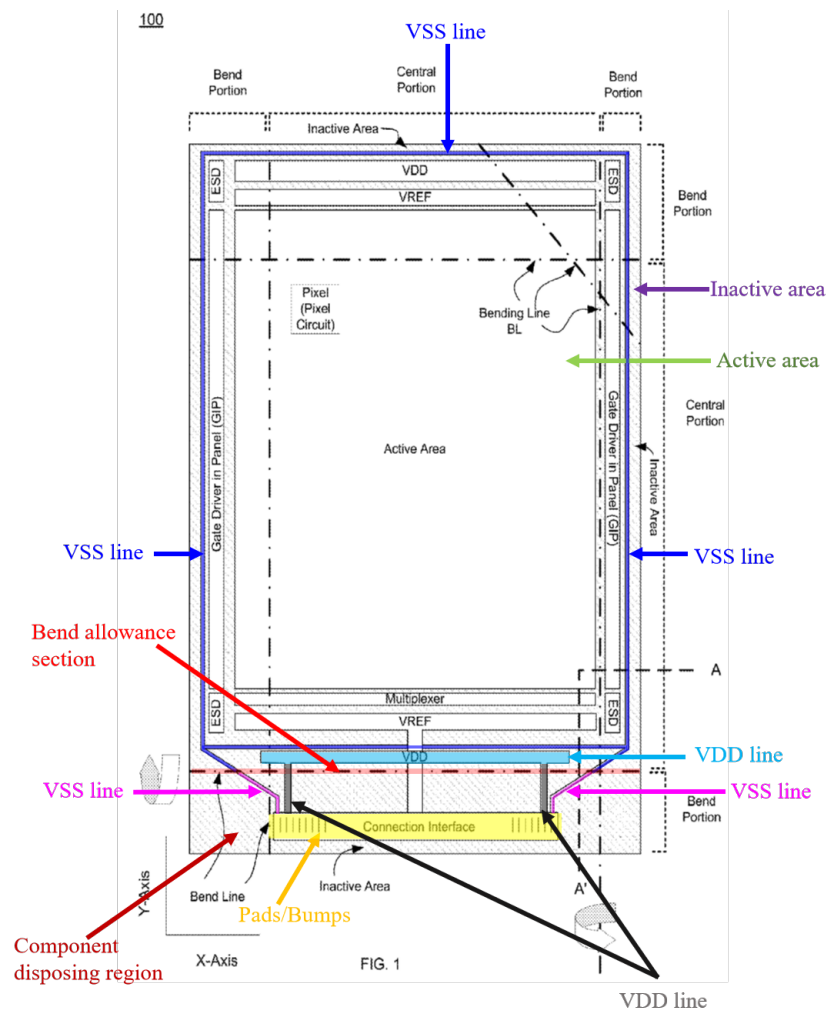
- c. **1[b]: wherein a first section of a first power trace is disposed within the non-display region around the active region, the first section of the first power trace is connected to a second section of the first power trace disposed within the component disposing region, and the second section of the first power trace is connected to the plurality of component connecting pads; and**

Kwon teaches Element 1[b]. Ex-1002 ¶¶97–99.

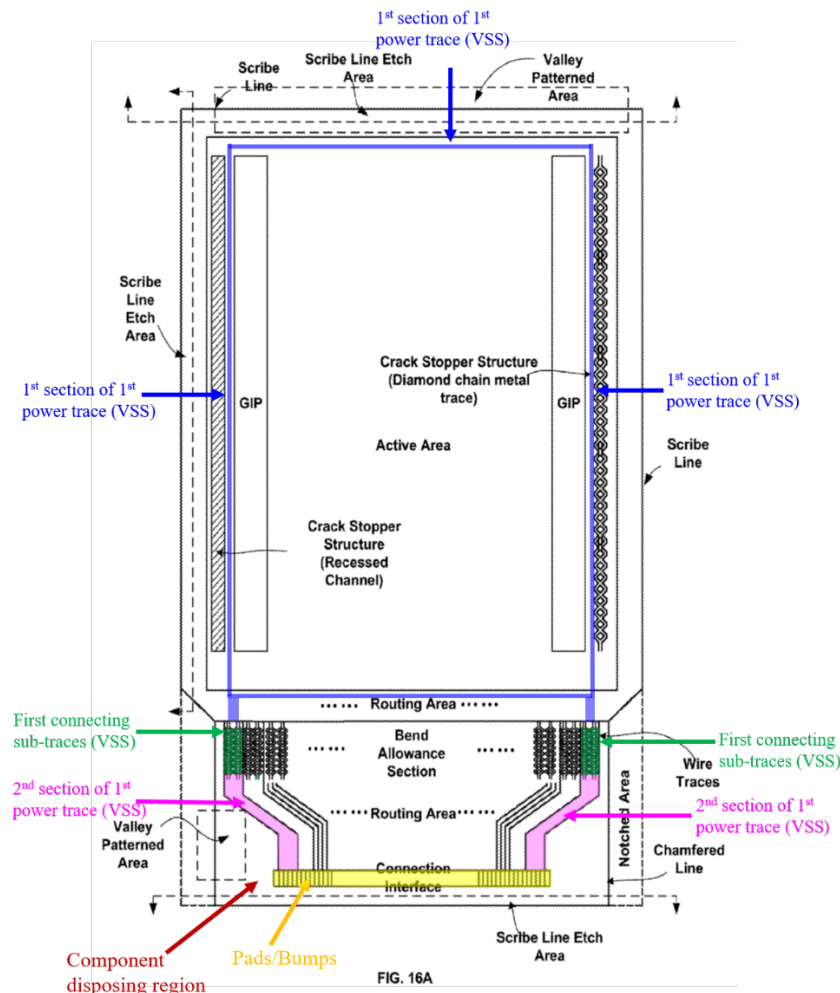
Although the recited “first section of a first power trace” and “second section of the first power trace” are admittedly prior art components (*see* Section VI), Kwon also teaches that its display panel comprises a “first section of a first power trace” and “second section of the first power trace.”

Kwon teaches that a first section of a first power trace is disposed within the non-display region around the active region. Kwon teaches “*a VSS line* and a VDD

line in the flexible display 100.” Ex-1005, 28:38–41. Specifically, Kwon’s VSS located around the active area corresponds to the recited “first section of a first power trace.” Kwon teaches that “[v]arious signal lines, including but not limited to, the data signal lines from the display D-IC and *the VDD/VSS lines ... may be routed in the GIP input signal line area.*” Ex-1005, 35:55–61. This is shown in Kwon’s Figure 1, annotated below (VSS line in dark blue). All of these features are located in a non-display area, which Kwon identifies as the “inactive area” with grey shading in its Figure 1.

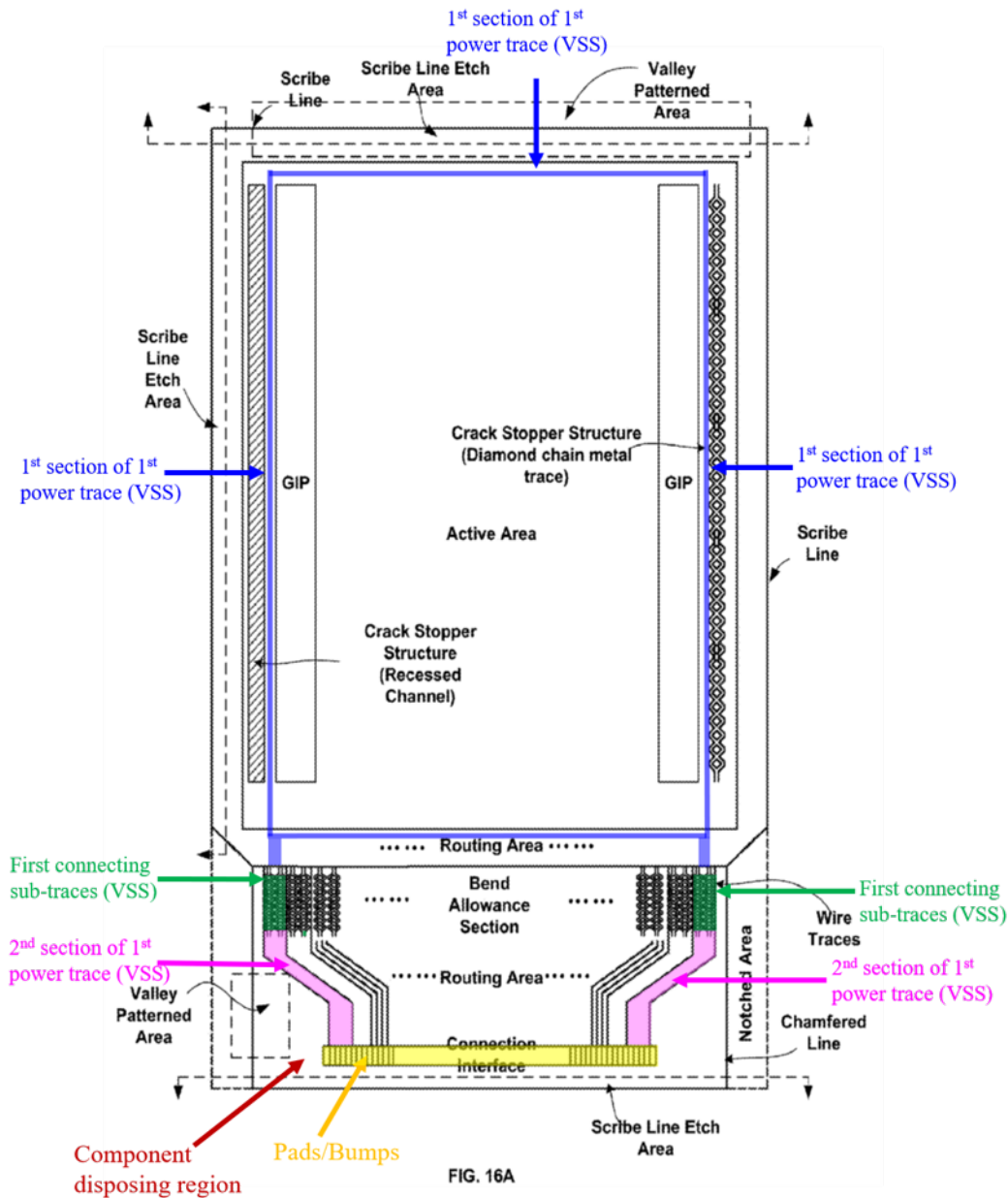


Kwon's VSS lines routed in the GIP input signal area correspond to recited first section of a first power trace. Ex-1002 ¶100; *see also, e.g.*, Ex-1001, 6:48–49 (“the first section 206 of the first power trace is a low-potential power trace (VSS)”). As shown in annotated Figure 16A below, (with Kwon's VSS lines (blue) from Figure 1 overlaid), the VSS lines are disposed within the inactive region around the active region of the display panel, because the GIP (Gate Driver in Panel) where they are routed surrounds the active area in Kwon's inactive area. Ex-1005, 36:32–37, Fig. 16A.



Kwon teaches that the first section of the first power trace (VSS) is connected to a second section of the first power trace disposed within the component disposing region. Kwon teaches that “[s]ome conductive lines may be routed from the substantially flat portion to the bend portion of the flexible display 100.” Ex-1005, 20:8–10. Specifically, Kwon teaches that “[t]he wire trace ... may extend across the bend allowance section and routed to pads for COF or other components of the flexible display 100.” Ex-1005, 33:40–43. Kwon’s wire traces (pink) in the routing area that connect to the component disposing region (maroon) and its included connection interface (yellow) correspond to the recited “second section of the first power trace disposed within the component disposing region.” Ex-1002 ¶¶101–102.

As shown in annotated Figure 16A below, the first section of the first power trace (i.e., VSS lines (blue)) is connected by sub-traces through the bend allowance section (green) to a second section of the first power trace disposed within the component disposing region (pink), as recited. Ex-1005, Fig. 16A, 25:42–44 (“a wire trace includes at least two sub-traces arranged to form a trace design resembling a chain with a series of connected links”), 28:32–34 (“wire trace may split into additional number of subtraces, resulting series of links arranged in a grid-like configuration”).



As shown in annotated Figure 16A above, Kwon further teaches that the second section of the first power trace (pink) is connected to the plurality of component connecting pads (yellow) within the component disposing region (maroon), as recited. Ex-1005, Fig. 16A, 33:40–43 (“The wire trace ... may extend across the bend allowance section and *routed to pads for COF* or other components

of the flexible display 100.”); *see also id.*, 21:54–55 (“a pad for receiving one or more signals may be provided on one end of the conductive lines”), 44:7–8 (“part of the conductive lines can serve as a connector (e.g., pads or pins)”); Ex-1002 ¶¶103–105.

- d. **1[c]: a first section of a second power trace is disposed adjacent to the active region and disposed between the active region and the bending region, the first section of the second power trace is connected to a second section of the second power trace disposed within the component disposing region by at least a set of second connecting sub-traces disposed within the bending region, and the second portion¹⁰ of the second power trace is connected to the plurality of component connecting pads,**

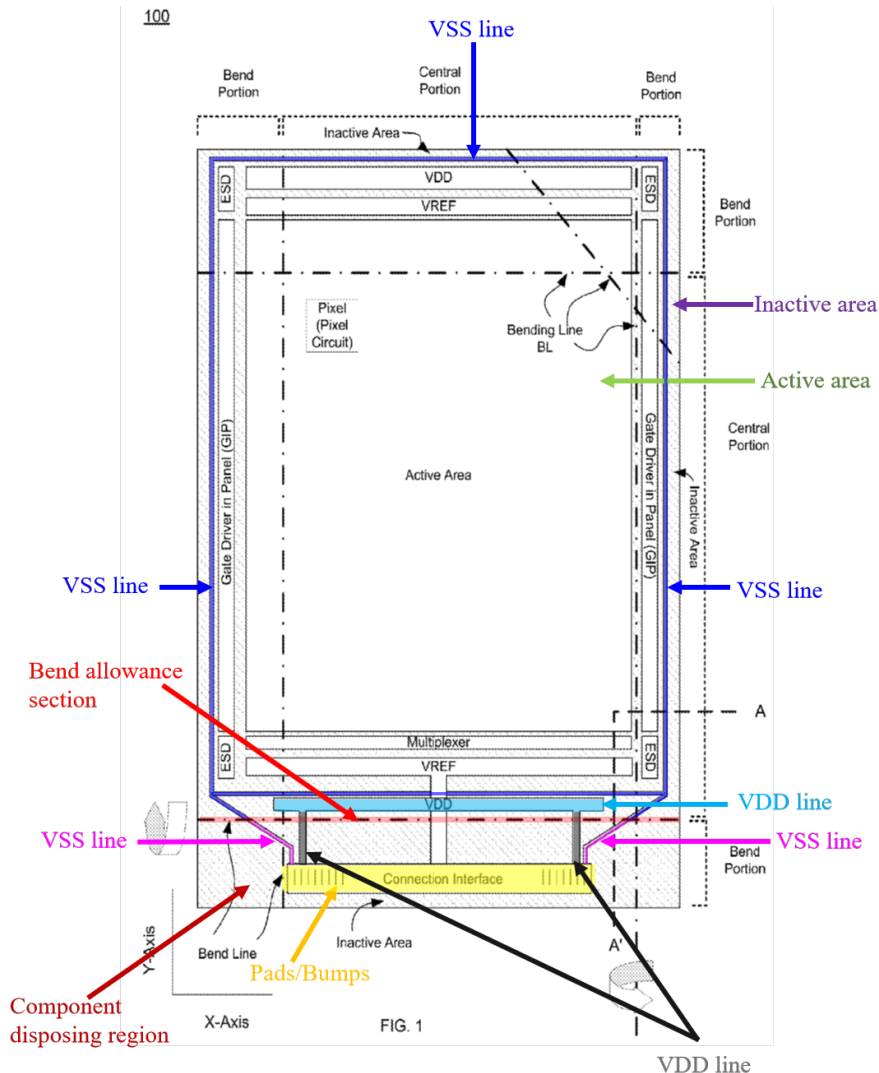
Kwon teaches Element 1[c]. Ex-1002 ¶¶106–108.

Although the recited “first section of a second power trace” and “second section of the second power trace” are admittedly prior art components (*see* Section VI), Kwon also teaches that its display panel comprises “a first section of a second power trace ... connected to a second section of the second power trace.”

Specifically, Kwon teaches that a first section of a second power trace is disposed adjacent to the active region, between the active region and the bending region. Specifically, Kwon’s VDD line (light blue) is a second power trace disposed

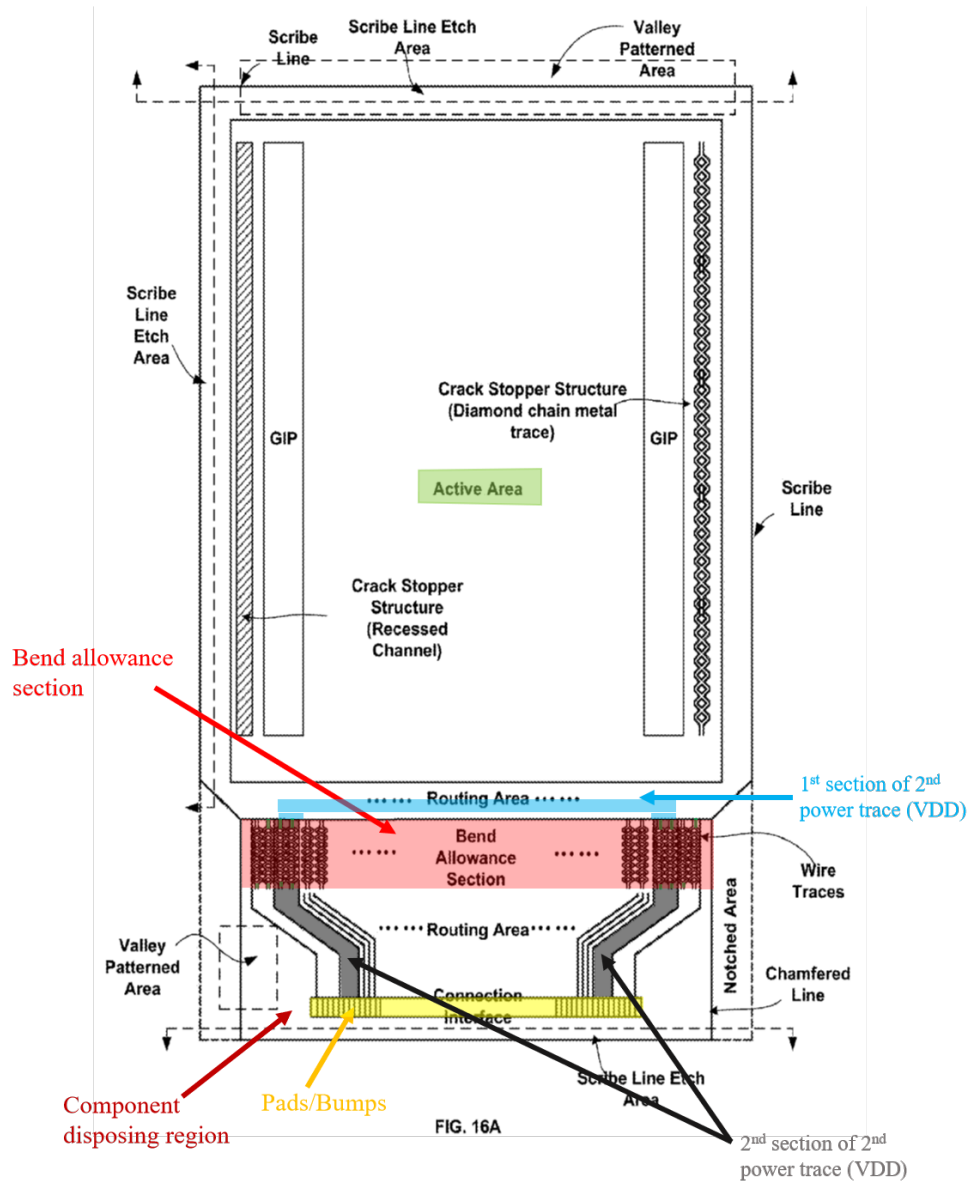
¹⁰ Applicant filed a certificate of correction that “portion” should be “section.” Ex 1004, 332–36.

between the active region and the bend allowances section, as shown in annotated Figure 1. *See, e.g.*, Ex-1001, 7:34–36 (“the first section 208 of the second power trace is a high-potential power trace (VDD)”).



As shown in annotated Figure 16A below, (with Kwon’s VDD lines (light blue) from Figure 1 overlaid), the VDD line is disposed adjacent to the active region (immediately below it) and disposed between the active region and the bend allowance section. Ex-1005, Fig. 16A. To be clear, the “second power trace”

corresponds to Kwon’s VDD line, and the “first section” of the section power trace corresponds to the portion of the VDD line that sits between the active area and the bend allowance section. Ex-1002 ¶109.



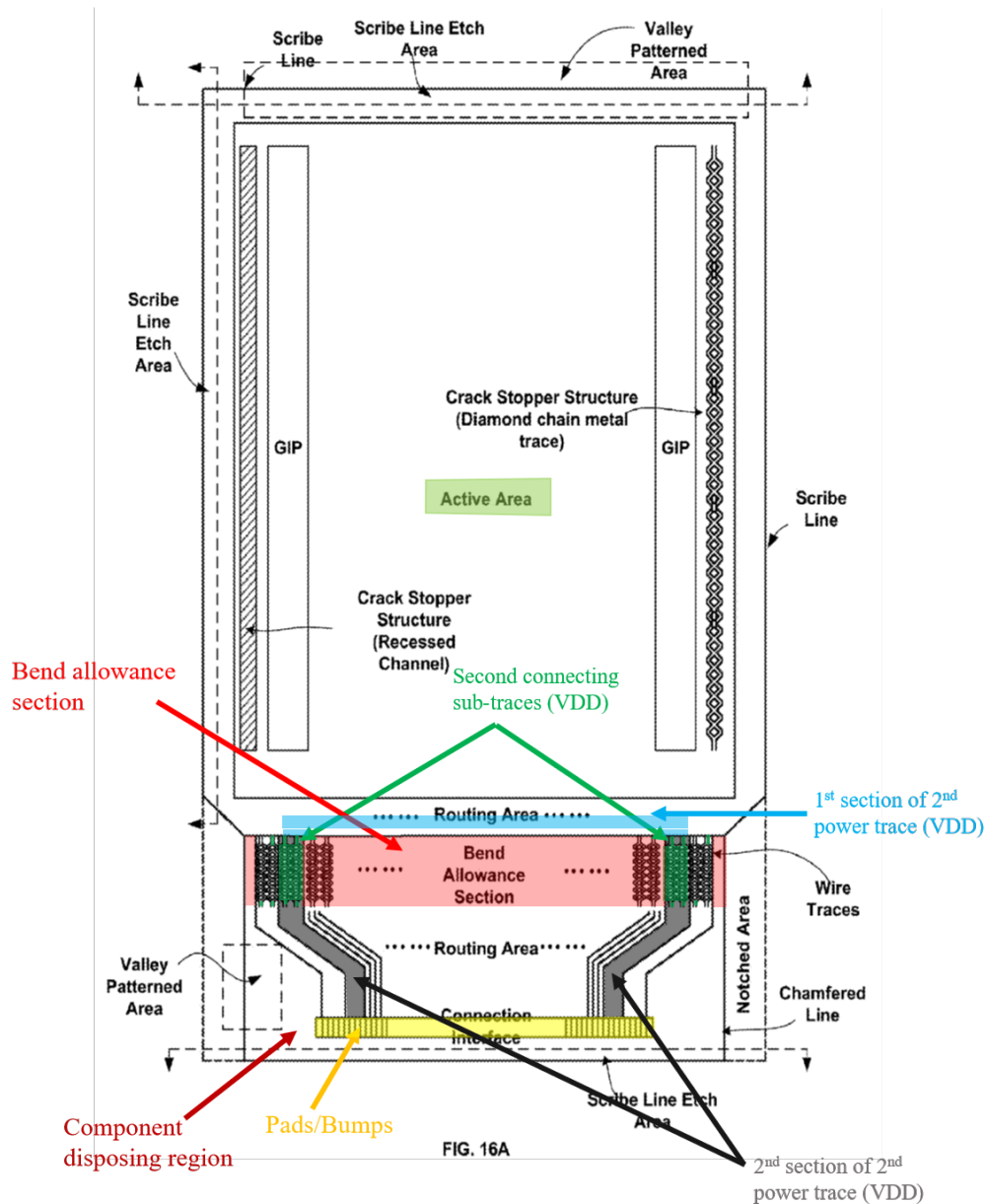
Just like for the VSS line discussed above, a VDD “wire trace may split into additional number of sub-traces, resulting series of links arranged in a grid-like configuration” such that it is configured, for example, “as a web of diamond trace

shapes.” Ex-1005, 28:32–35. Kwon further explains that the “***VDD line*** in the flexible display 100 may have the grid-like trace design, especially if such lines are ***arranged to cross over a bend allowance section.***” Ex-1005, 28:38–41. Kwon thus teaches that the first section of the second power trace is connected to a second section of the second power trace disposed within the component disposing region by at least a set of second connecting sub-traces disposed within the bending region as shown in Figure 16A. Ex-1002 ¶¶110–111.

Specifically, Kwon teaches that “[s]ome conductive lines may be routed from the substantially flat portion to the bend portion of the flexible display 100.” Ex-1005, 20:8–10. Indeed, “[t]he wire trace ... may extend across the bend allowance section and routed to pads for COF or other components of the flexible display 100.” Ex-1005, 33:40–43. To be clear, Kwon’s wire traces (grey) in the routing area after the bend allowance section, which connect to the connection interface (yellow) within the component disposing region (maroon) correspond to the recited “second section of the second power trace disposed within the component disposing region.” Ex-1002 ¶¶112–113.

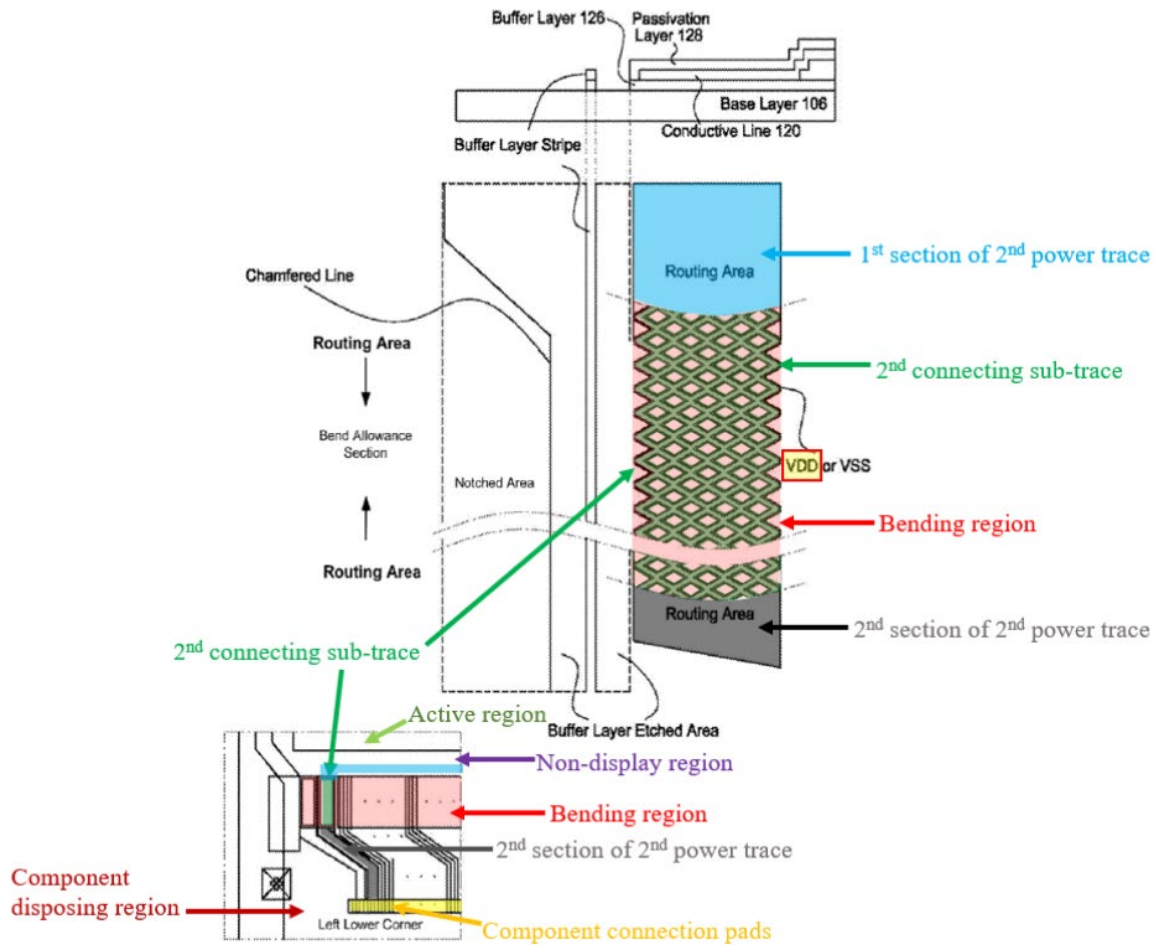
As shown in annotated Figure 16A below, the first section of the second power trace (i.e., VDD line (light blue)) is connected by at least a set of second connecting sub-traces (green) disposed within the bending region (red) to a second section of the second power trace disposed within the component disposing region (grey), as

recited. Ex-1005, Fig. 16A, 25:42–44 (“a wire trace includes at least two sub-traces arranged to form a trace design resembling a chain with a series of connected links”), 28:32–34 (“wire trace may split into additional number of subtraces, resulting series of links arranged in a grid-like configuration”).



As shown in annotated Figure 16A above, the second section of the second power trace (grey) is connected to the plurality of component connecting pads (yellow) within the component disposing region (maroon). Ex-1005, Fig. 16A, 33:40–43 (“The wire trace ... may extend across the bend allowance section and *routed to pads for COF* or other components of the flexible display 100.”)

Kwon also includes Figure 16B, providing a blow up and further explanation of the use of its subtraces crossing the bending region. Specifically, “FIG. 16B is an enlarged view of lower left corner of the flexible display near the notched area.” Ex-1005, 37:17–18. As shown in annotated Figure 16B below, the upper-most portion of the VDD line (light blue, “first section of second power trace”) is connected the lower portion (grey, “second section of the second power trace”) via a mesh/grid subtrace (green, “second connecting subtrace”) that passes through the bend allowance section. Ex-1005, Fig. 16B; Ex-1002 ¶¶114–123 (*citing also, e.g.,* Ex-1005, Figs. 11A-11B, 21).

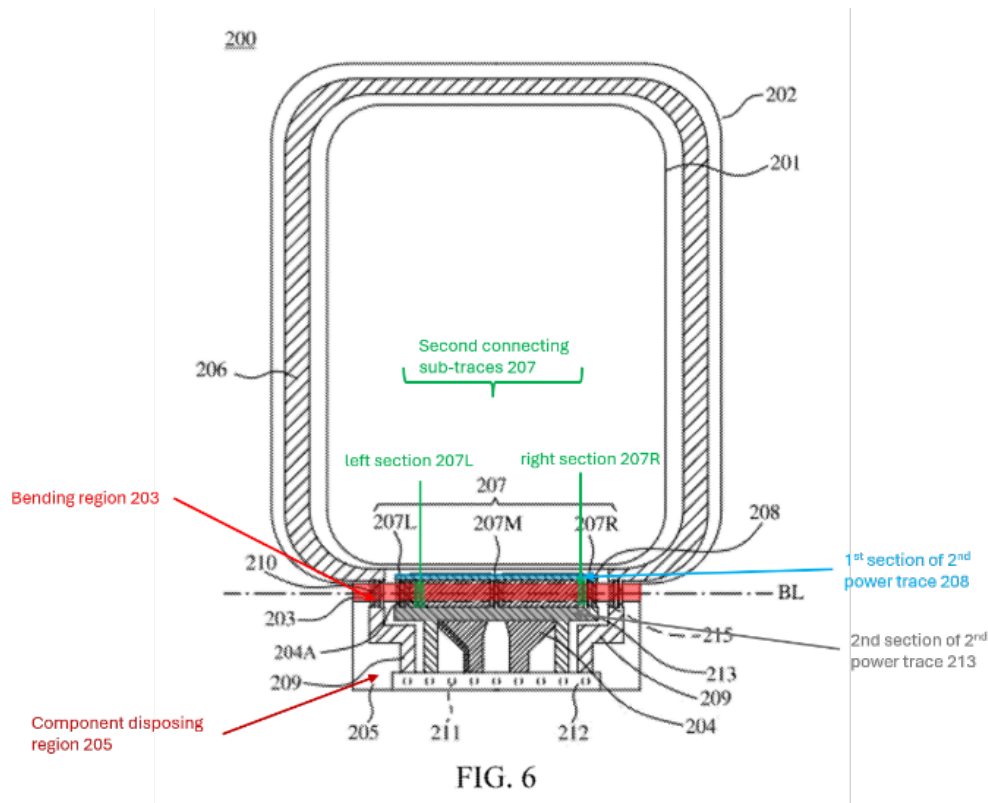


- e. **1[d]:** wherein the first section of the second power trace is separately connected to the second section of the second power trace disposed within the component disposing region by two sets of the second connecting sub-traces passing through two sections of the bending region.

Kwon teaches Element 1[d]. Ex-1002 ¶¶124–126.

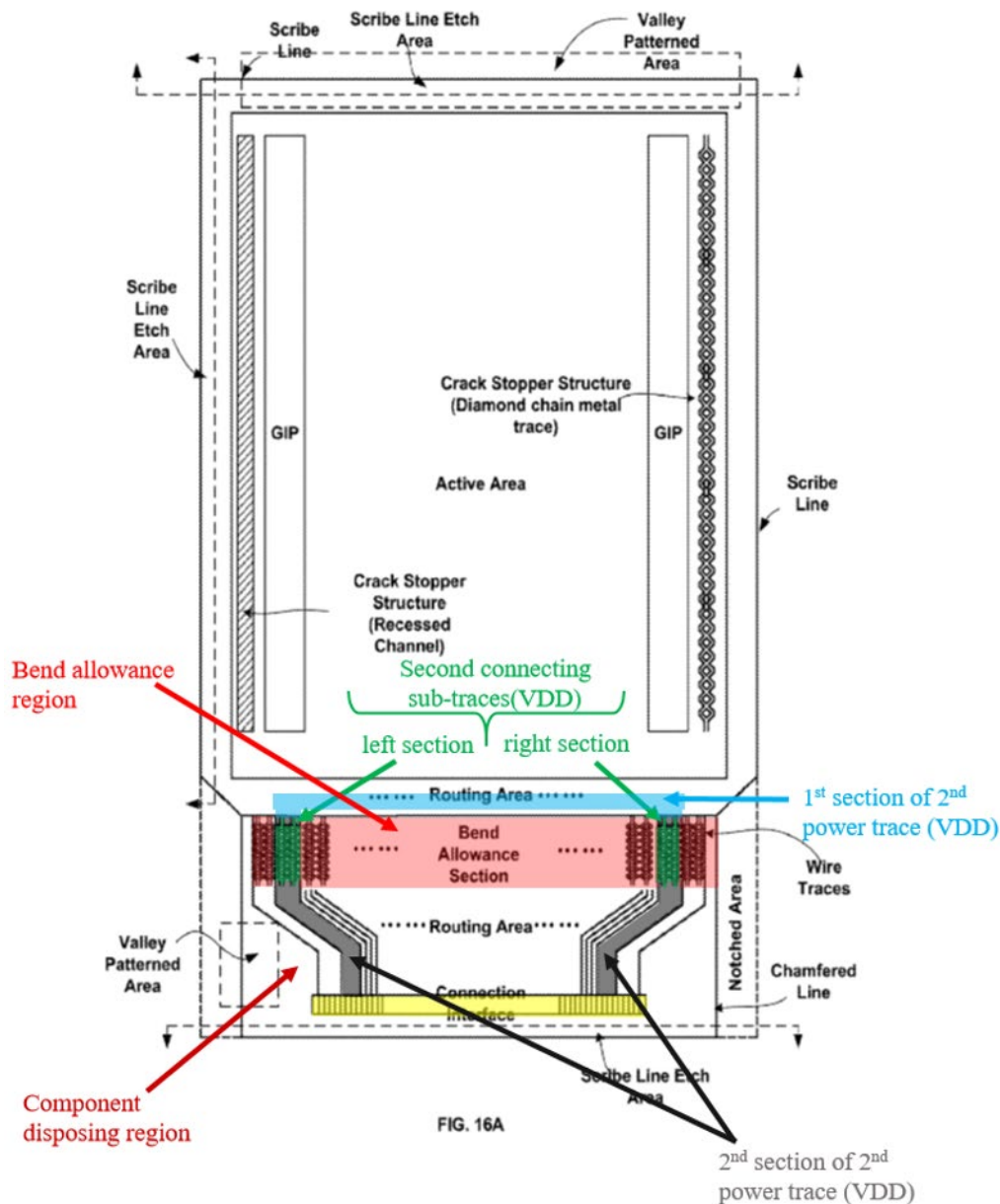
Although the recited “two sections of the bending region” are admittedly prior art components (*see* Section VI), Kwon also teaches that its display panel comprises two sections of the bending region. For example, as shown in Kwon’s figures and further explained below, the bend allowance section includes, at least, a symmetric

left and right side the same way that '891 patent does. *See, e.g.*, Ex-1001, 1:40–45 (“The display panel 100 includes a display region 101 and a non-display region 102, the non-display region 102 is distributed around the display region 101 and is *bilaterally symmetric*.”).

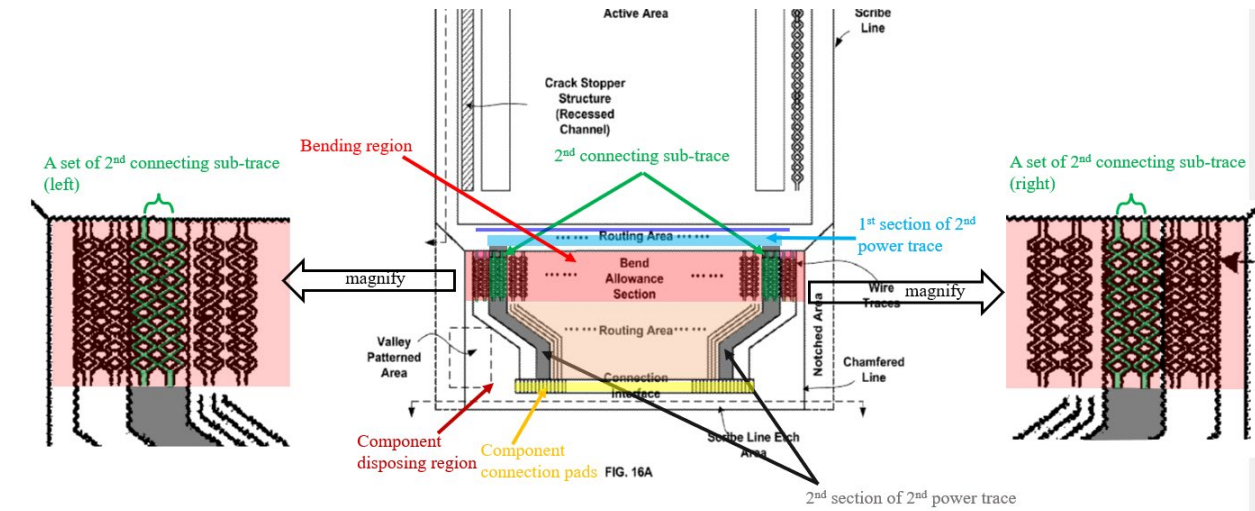


As explained above in connection with Element 1[c], Kwon’s VDD line corresponds to the recited second power trace. The first section (light blue), disposed between the active area and the bend allowance section, is connected to the second section (grey) via a number of sets of subtraces (green). As shown in annotated Figure 16 below, there is a set of subtraces on the left side of the VDD line, and a set on the right side. The left-side and right-side correspond to the recited “two

sections of the bending region” in the same way as the described by the ’891 Patent, because they are located on both opposing, symmetric ends of the VDD line. *See, e.g.,* Ex-1001, 8:7–14 (“the second connecting sub-traces 207 are *separately disposed at two ends* of the first section 208 of the second power trace and the second section 213 of the second power trace”).



Both of these separate left and right sections are shown in the below cropped and annotated Figure 16A' below. Ex-1005, Fig. 16A'. As previously described, just like the '891 Patent, Kwon teaches a symmetric set of traces positioned in, at least, the left and right sides of the bend allowance section. And these traces separately connect the first and second sections because they are distinct from each other, and positioned on opposing ends of the VDD line. Ex-1002 ¶¶127–129.



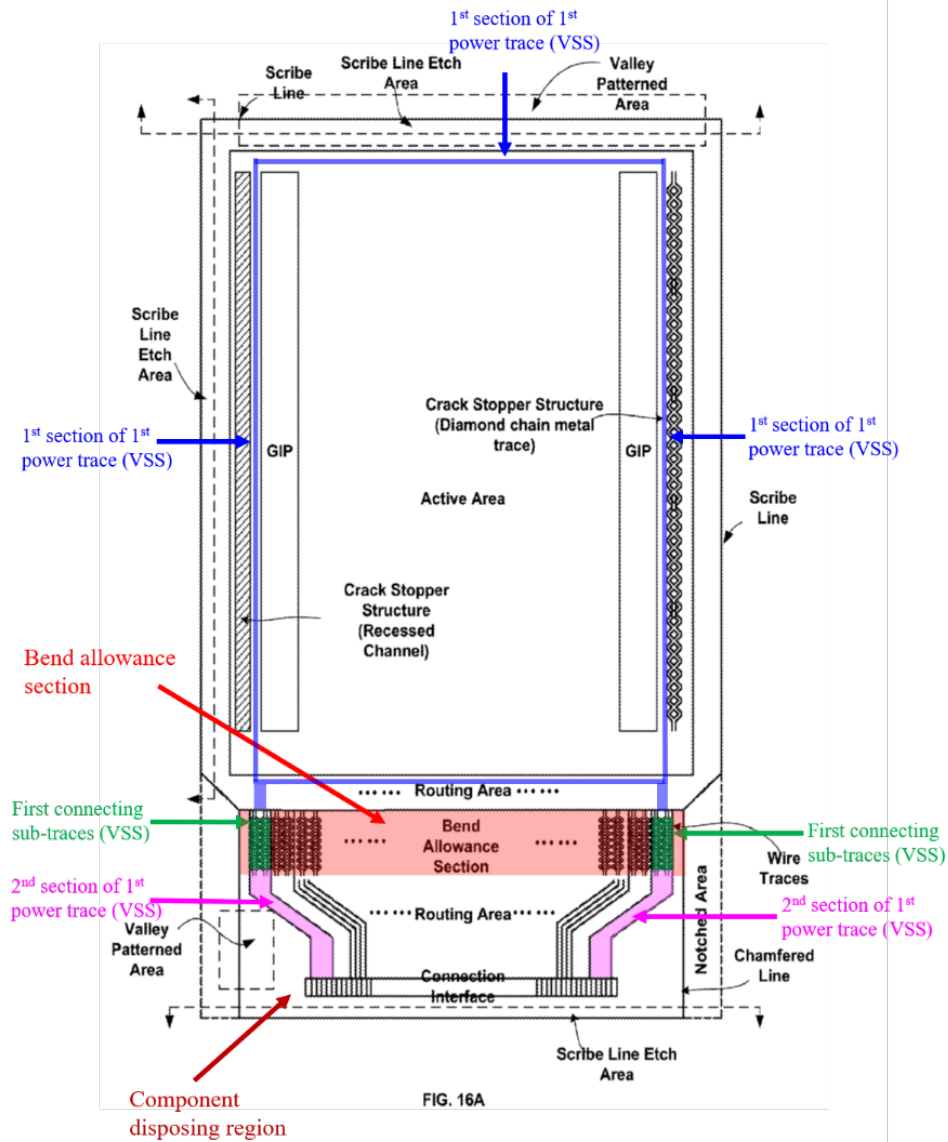
2. **Claim 7: The display panel according to claim 1, wherein the first section of the first power trace is separately connected to the second section of the first power trace disposed within the component disposing region by a plurality of first connecting sub-traces disposed within the bending region.**

Kwon teaches Claim 7. Ex-1002 ¶130.

Notably, Claim 7 is very similar to claim Elements 1[c] and 1[d], just applied to the “first power trace” (VSS) as opposed to the “second power trace” (VDD). That is to say that Claim 1 does not specifically recite either “first connecting subtraces” or the “separately connected” requirements recited in Claim 7. Regardless, each of

these additional features are taught in connection with Kwon's VSS line. Ex-1002 ¶131.

As explained above in connection with Element 1[b], Kwon's VSS line corresponds to the recited first power trace. The portion of the VSS line that surrounds the active area corresponds to the recited first section of the first power trace (blue). The portion of the VSS line in the routing area below the bend allowance section (pink) corresponds to the recited second section of the first power trace. Each of these two sections are separately connected by a number of subtraces (green) that pass through the bend allowance section (red). As explained above in connection with Element 1[d], these sections are separately connected in the same was as described by the '891 Patent because they are a symmetric set of traces positioned in, at least, the left and right sides of the bend allowance section, and they are distinct from each other, positioned on opposing ends of the VSS line. Ex-1002 ¶132.



Moreover, similar to discussed above in Fig. 16A for Element 1[c] and the VDD line, Kwon's Figure 16B provides a blow up and further explanation of the use

of its subtraces crossing the bending region, including the VSS line. Specifically, “FIG. 16B is an enlarged view of lower left corner of the flexible display near the notched area.” Ex-1005, 37:17–18. As shown in annotated Figure 16B below, the upper-most portion of the VSS line (blue, “first section of first power trace”) is connected to the lower portion (pink, “second section of the first power trace”) via a mesh/grid subtrace (green, “first connecting subtrace”) that passes through the bend allowance section. Ex-1005, Fig. 16B; Ex-1002 ¶¶133–139 (*citing also, e.g.,* Ex-1005, Figs. 11A-11B, 21).

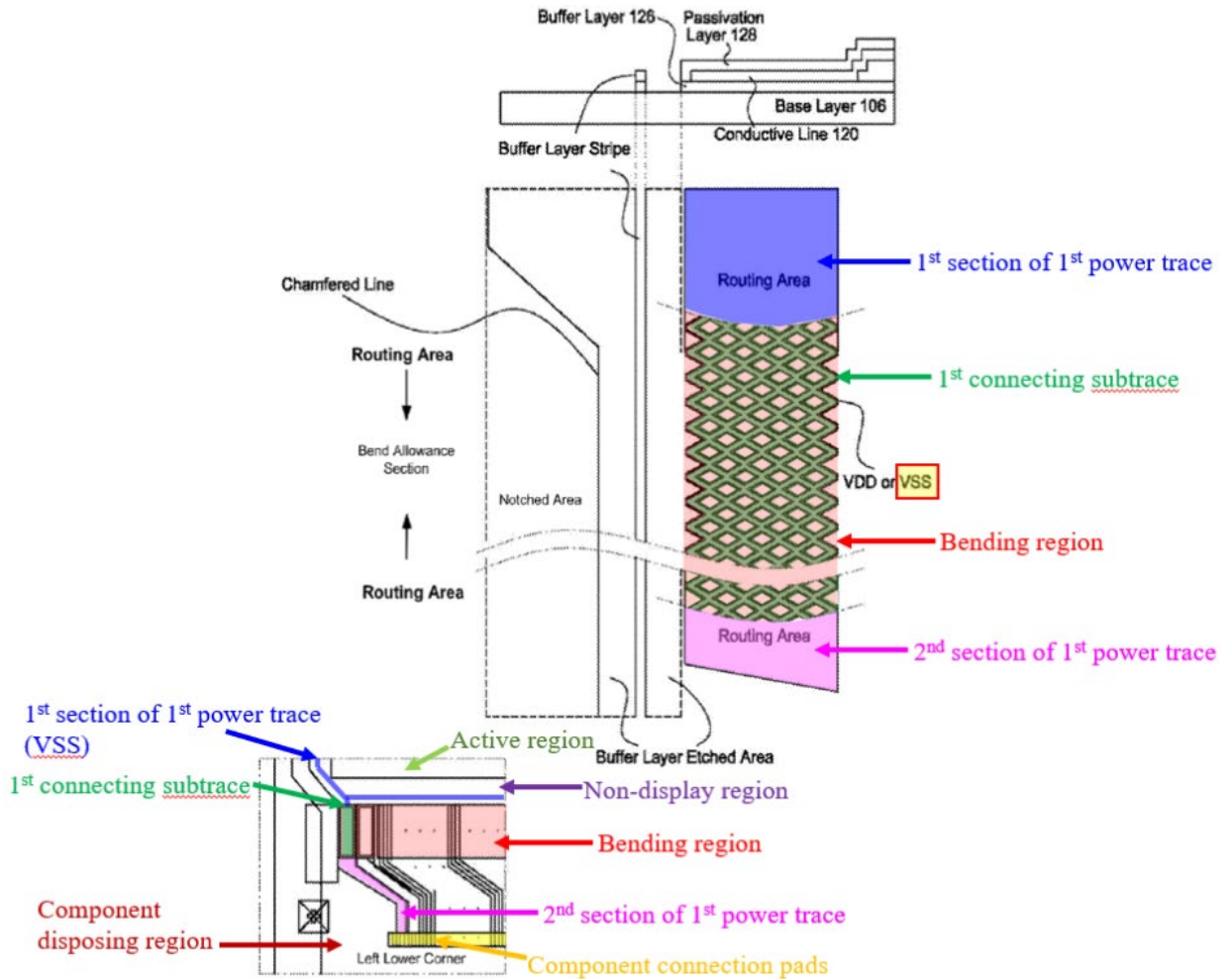


FIG. 16B

3. **Claim 10:** The display panel according to claim 1, wherein the fanout routing region further comprises a plurality of data traces, and wherein a material of the first connecting sub-traces and the second connecting sub-traces located within the bending region and a material of the plurality of data traces is selected from a group consisting of titanium-aluminum-titanium, molybdenum, copper, and silver nanowire.

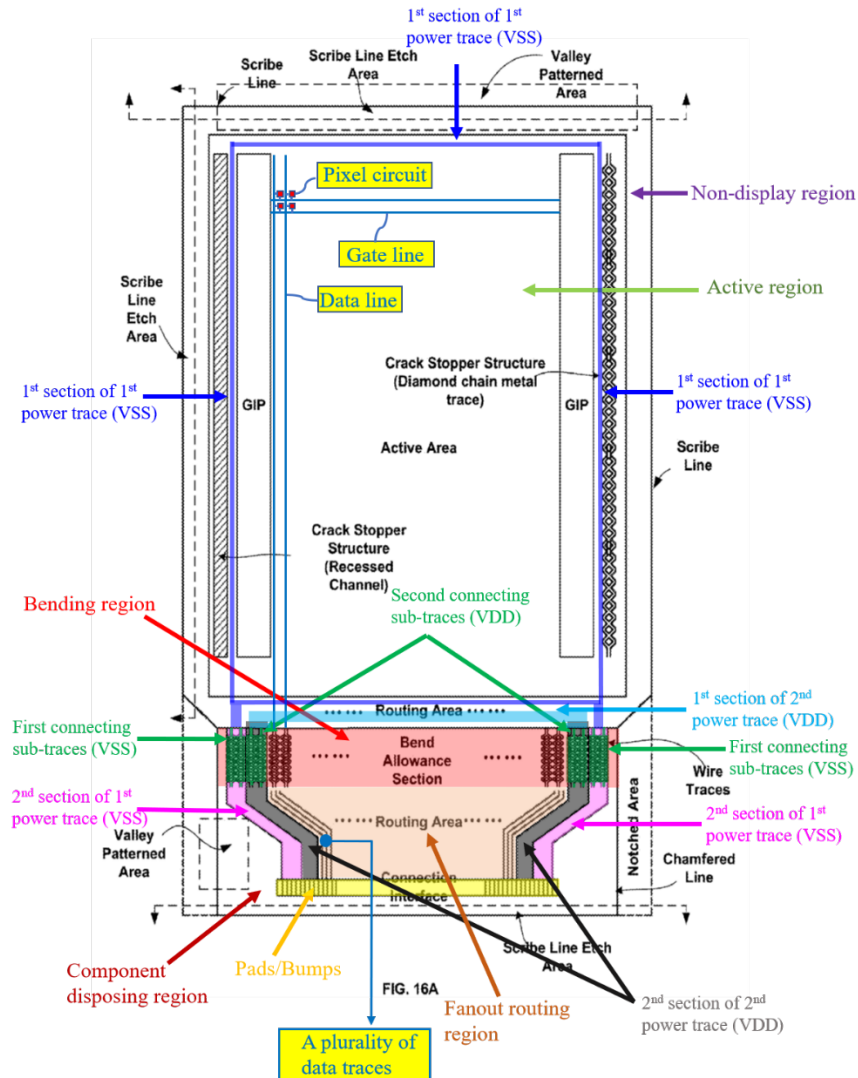
Kwon teaches Claim 10. Ex-1002 ¶¶140–141.

Although the recited “plurality of data traces” are admittedly prior art components (*see* Section VI), Kwon also teaches that its fanout routing region further comprises a plurality of data traces.

As shown in annotated Figure 16A below and explained for Element 1[a], Kwon’s “Routing Area” (orange) corresponds to the recited “fanout routing region.” Ex-1005, Fig. 16A. Kwon teaches conductive lines including, for example, data lines that “communicate with one or more driving circuits,” which corresponds to the recited “plurality of data traces.” Ex-1002 ¶142. Specifically, Kwon teaches that “[e]ach pixel in the active area may be associated with a pixel circuit,” which, in turn, is “electrically connected to a gate line and a data line to communicate with one or more driving circuits, such as a gate driver¹¹ and a data driver positioned in the inactive area of the flexible display 100.” Ex-1005, 5:33–40. Additionally, Kwon teaches that “a pad for receiving one or more signals may be provided on one end of the conductive lines” and “[t]he other end of the conductive line may be connected to the ***data lines*** of the pixels[.]” Ex-1005, 21:54–57; Ex-1002 ¶142. Accordingly, as shown in annotated Figure 16A below, the conductive lines (navy blue) connected between the pads (yellow) and the data lines are the plurality of data traces (navy

¹¹ The gate driver here is a GIP (gate in panel). Ex-1005, 5:43–44.

blue). Ex-1005, Fig. 16A (modified to include pixel circuit, gate line, and data line as taught by Kwon); Ex-1002 ¶142.



Moreover, Kwon further teaches that the material of the first connecting sub-traces, the second connecting sub-traces, and the data traces may consist of titanium-aluminum-titanium, molybdenum, or copper. Specifically, Kwon explains that “at least some of the conductive lines 120 of the flexible display 100 may be formed with *two or more of layers selected from aluminum (Al), titanium (Ti),*

molybdenum (Mo), Copper (Cu) layers.” Ex-1005, 20:39–42. Kwon further teaches that “[e]xamples of such combination include *an aluminum layer sandwiched between titanium layers (Ti/Al/Ti)[.]*” Ex-1005, 20:43–44; Ex-1002 ¶¶143–145 (*citing also, e.g.,* Ex-1005, Fig. 16B).

B. Ground 2: Claims 3, 11, and 16 Are Rendered Obvious by the Combination of Kwon and Kang’261

1. A POSITA would have been motivated to combine Kwon’s teachings with Kang’261’s teachings and would have had a reasonable expectation of success.

A POSITA would have been motivated to combine the teachings of Kwon and Kang’261 and would have had a reasonable expectation of success in doing so because both references are directed to flexible display devices that route power-supply conductive lines across a non-active, bendable region of the substrate in order to reduce the size of the non-active area while preserving the electrical and mechanical integrity of those power lines during bending. Ex-1005, Abstract, Figs. 1, 16A; Ex-1006, Abstract, Figs. 1, 5; Ex-1002 ¶146. And each reference is directed to similar methods of solving similar problems. First, they each focus on mitigating crack propagation over a bending region. Second, they each address potential issues that may arise when the bending regions and corresponding routing regions are notched, chamfered, or otherwise narrower than the active display region. Ex-1002 ¶146.

Specifically, Kwon is directed to a “Flexible Display Device With Gate-In-Panel Circuit,” and teaches VSS/VDD power lines and other conductive lines routed through a bend allowance section of the inactive area of the display panel. Ex-1005, 2:22–28. Kwon further teaches a strain-reducing trace design in which a conductive line, including specifically a “VSS line and a VDD line,” is divided into “at least two sub-traces” that “split away from each other and merge back at each joint,” forming a chain of diamond-shaped (or grid-like) links, in order to reduce crack initiation and propagation in the bend region while preserving the low electrical resistance required for power transmission. *See* Ex-1005, 25:48–50, 28:32–44. Moreover, Kwon teaches “a notch may be provided in the bend allowance section between the first area and the second area to reduce the size of bend allowance section” and “the notch provided in the bend allowance section would also facilitate easier bending of the flexible base layer.” Ex-1005, 3:32–37. By removing this notch, the routing area after Kwon’s bend allowance section is narrower than the display area, causing the wires to pack more tightly in the routing area. Ex-1002 ¶147. This narrowing constrains the degrees of freedom in placement and design for VDD and VSS routing within the non-display area. This may also cause an increase in resistance and may affect the uniformity of power distribution for the VDD and VSS lines in the non-display area. Ex-1002 ¶147.

Similarly, Kang'261 teaches a "Display Device" including plurality of power lines and power link lines disposed in the active and non-active areas of the display device, respectively. Further, as shown in Figure 5, Kang'261 also teaches a notched area on either side of the bend/routing area that serves to make the bended region narrower than the active display area. Ex-1006, Fig. 5; Ex-1002 ¶148. This causes the same issues noted above with respect to Kwon (increased resistance and potentially uneven power distribution). Kang'261 teaches to solve these similar problems by using multiple vertical subtraces, which are then connected to a horizontal line in the bent region. Ex-1002 ¶148. These multiple vertical subtraces are configured to transmit power voltage across a bending area via bending patterns connecting an upper power link line to a lower power link line using sub-traces divided across a right, middle, and left area. Ex-1006, 13:20–14:46, 15:18–20. Kang'261 teaches that its sub-traces "may employ repeated patterns having at least one of a diamond, rhombic, zigzag, or circular shape" and that "[t]he bending patterns BP may employ a variety of shapes to reduce stress and cracks on the bending patterns BP." Ex-1006, 7:17–21.

Accordingly, a POSITA attempting to address issues similar to those in Kwon would have looked to the solutions provided by Kang'261, which provides additional implementation details for the sub-trace geometry of power lines crossing Kwon's bend area. Ex-1002 ¶149. Specifically, A POSITA would have been

motivated to implement Kang’261 teachings into Kwon’s system because Kwon expressly directs a POSITA to apply Kwon’s sub-trace geometry to power lines that “cross over a bend allowance section” (Ex-1005, 28:38–41) and Kang’261 teaches additional examples of bending patterns employing “a variety of shapes” that may be used to reduce stress and cracks (Ex-1006, 7:19–21), which is a goal of Kwon’s system. *See, e.g.*, Ex-1005, 8:52–55 (discussing the need to “suppress generation of cracks” in the system), 23:11–12 (discussing patterning the conductive lines “to suppress crack propagation in the wire traces”). Further, to solve problems related to increased resistance and potentially uneven power distribution, Kang’261 employs an upper power link line, extending horizontally, that distributes power within itself and supplies it to multiple points on a lower power link line, also extending horizontally, via a bending pattern of at least 3 vertical traces. As a result, supplying power at multiple points along the lower power link line resolves resistance issues and ensures a uniform power supply to the active region. Indeed, Kwon acknowledges that “[b]end stress management of the insulation layers near the conductive line is just as important as the managing the strain of the conductive line itself.” Ex-1005, 24:21–23. A POSITA would have understood that implementing Kang’261’s bend-durable sub-trace geometries with Kwon’s diamond-chain/grid design would have been a suitable design choice to solve these

similar problems in both references. Ex-1002 ¶¶149–159 (*citing also, e.g.*, Ex-1005, Fig. 16B; Ex-1006, Fig. 5).

A POSITA would have had a reasonable expectation of success in combining the teachings of Kwon and Kang’261. Ex-1002 ¶160. Both references address the identical structural context—power-line routing across the bend region of a flexible display to minimize the inactive area—rendering their teachings directly interchangeable and combinable. Ex-1005, Abstract, Figs. 1, 16A; Ex-1006, Abstract, Figs. 1, 5. A POSITA would thus have understood that these references disclose interrelated teachings based on well-understood technologies that would have been amenable to various well-understood and predictable combinations. Ex-1002 ¶160.

2. **Dependent Claim 3: The display panel according to claim 1, wherein the first section of the second power trace is separately connected to the second section of the second power trace disposed within the component disposing region by three sets of the second connecting sub-traces passing through a left section, a middle section, and a right section of the bending region.**

Kwon in view of Kang’261 (“Kwon-Kang’261”) teaches Claim 3. Ex-1002 ¶161.

Kwon teaches that the first section of the second power trace is separately connected to the second section of the second power trace disposed within the component disposing region for the reasons described for Element 1[d]. While Kwon

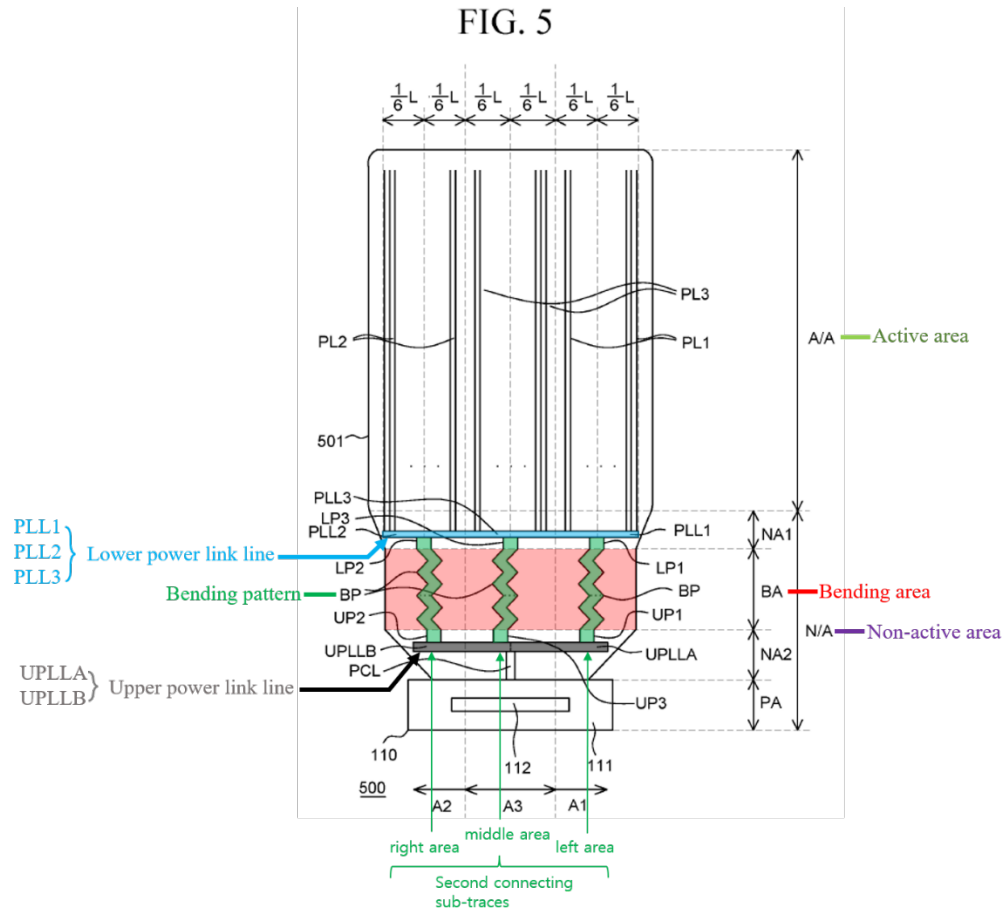
teaches that the two components are connected by at least two sets of the second connecting sub-traces passing through two sections of the bending region (*see* Element 1[d]), it would have been obvious to implement Kwon's system to include three sets of the second connecting sub-traces passing through a left section, a middle section, and a right section of the bending region, as taught by Kang'261. Ex-1002 ¶¶162–163.

As shown in the annotated Figure 5 below, Kang'261 teaches a “first area A1, second area A2, and third area A3 ... defined by dividing the length of the substrate 501 along a longitudinal direction” with A1 corresponding to the “the left area of the substrate 501,” A2 corresponding to “the right area,” and A3 corresponding to the “the central area.” Ex-1006, 13:20–33. Kang'261 further teaches that “the power link lines and power lines corresponding to the respective areas are disposed to transmit power voltage to pixels in their respective areas.” Ex-1006, 15:18–20. Kang'261 teaches that the power link lines are further divided by “upper power link lines” UPLLs and “lower power link lines,” PLLs, which correspond to the two sections of the recited second power trace. Ex-1006, 13:42–14:46. Specifically, Kang'261 teaches that “[t]he upper power link line includes a first portion UPLLA, extending from the center of the third area A3 through the first area A1, and a second portion UPLLB, extending from the center of the third area A3 through the second area A2.” Ex-1006, 13:34–41. Kang'261 teaches that “in the first non-active area

NA1, the first lower power link line PLL1 is disposed in the first area A1, the second lower power link line PLL2 is disposed in the second area A2, and the third lower power link line PLL3 is disposed in the third area A3[,]” “the first lower power link line PLL1, the second lower power link line PLL2, and the third lower power link line PLL3 may extend throughout the length of the first area A1, second area A2, and third area A3, respectively” and “PLL1, PLL2, and PLL3 can form a single power line[.]” Ex-1005, 14:29–46.

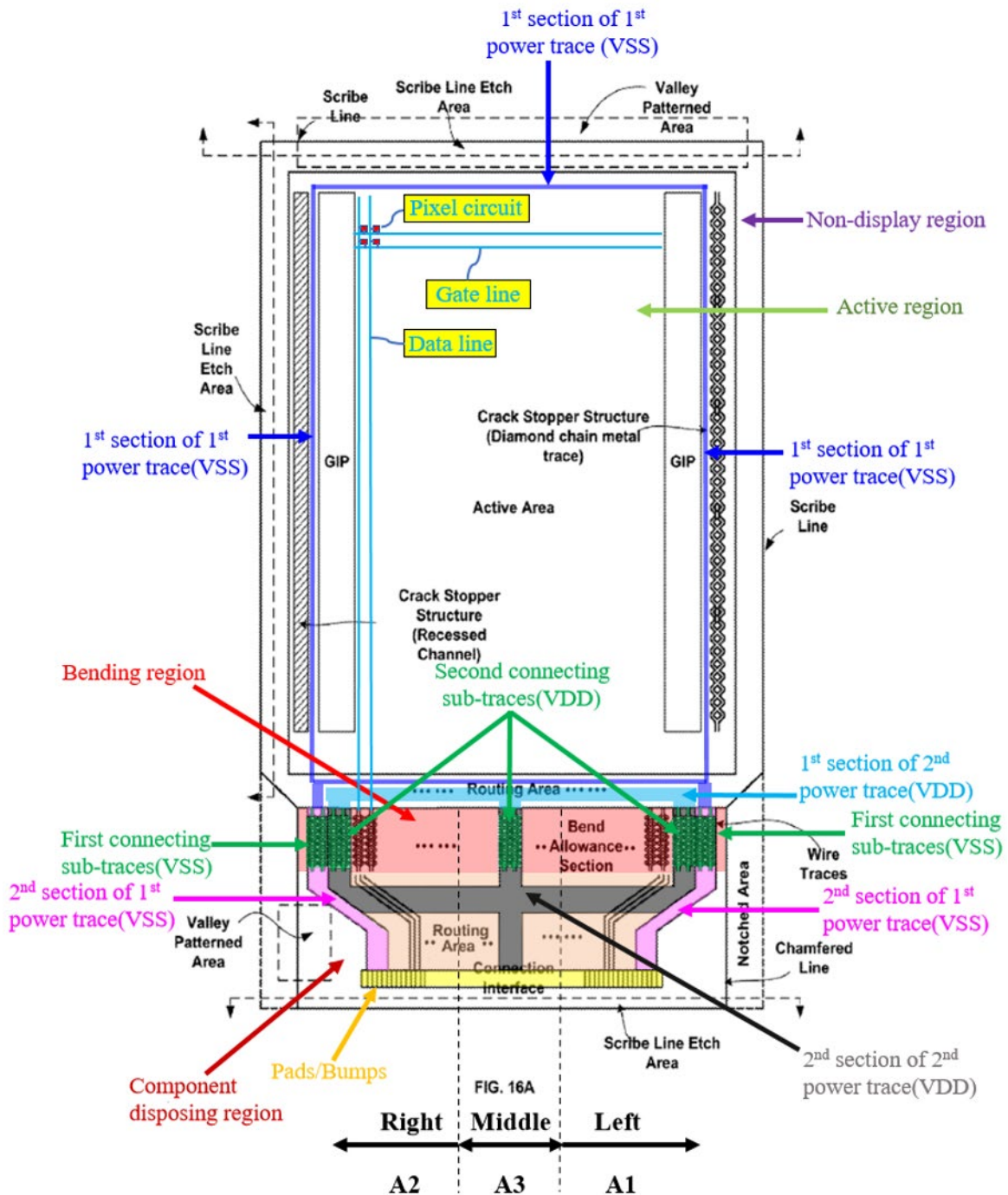
Kang’261 further teaches that its UPLL and PLL sections are connected to each other by a “plurality of bending patterns BP in the bending area BA,” wherein “some are disposed in the first area A1, some are disposed in the second area A2, and others are disposed in the third area A3.” Ex-1006, 14:1–4. Specifically, Kang’261 teaches that “the plurality of bending patterns may extend to the first lower connecting line from an end of the first portion of the upper power link line” and the “other bending patterns among the plurality of bending patterns may extend to the second lower connecting line from an end of the second portion of the upper power link line.” Ex-1006, 22:9–14. For example, “[t]he lower power link line transmits power voltage received through the upper power link line and the plurality of bending patterns BP to each of the first power lines PL1 and second power lines PL2[.]” Ex-1006, 7:22–25. Kang’261’s bending patterns BP correspond to the recited “second connecting sub-traces.” As shown in annotated Figure 5 below,

Kang'261 teaches that three sets of bending patterns BP (green) pass through a left section (A2), a middle section (A3), and a right section (A1) of the bending region (red). Ex-1006, Fig. 5; Ex-1002 ¶164.



A POSITA would have been motivated to combine Kwon with Kang'261 and had a reasonable expectation in doing so for the reasons described in Section XII.B.1. Ex-1002 ¶165. Specifically, Kwon's subtraces (green) would have been used to connect an upper portion of the VDD line (light blue), extending through the middle of the bend allowance section, to a lower portion of the VDD line (grey) that

connects to the pads on Kwon's connection interface, as in the modified Figure below (middle traces added). Ex-1002 ¶165.



3. Independent Claim 11

a. 11[pre]: A display panel comprising:

Kwon-Kang'261 teaches Element 11[pre] for the reasons described in Section XII.A.1.a. Ex-1002 ¶166.

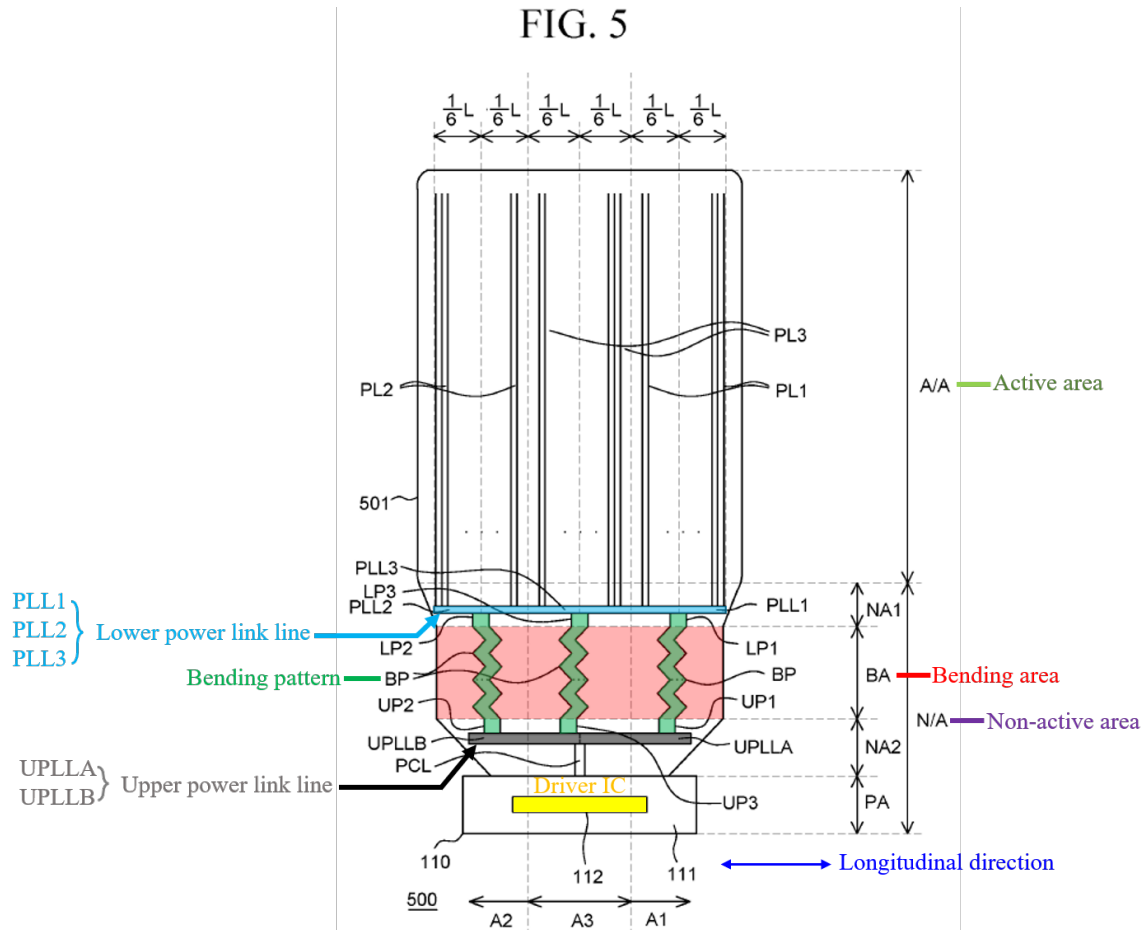
b. 11[a]: an active region and a non-display region, the non-display region disposed around the active region and extending to form a bending region and a component disposing region, wherein the bending region defines a left section, a middle section, and a right section, the component disposing region having a plurality of component connecting pads; and

Kwon-Kang'261 teaches Element 11[a]. Ex-1002 ¶¶167–168.

Kwon teaches an active region and a non-display region, the non-display region disposed around the active region and extending to form a bending region and a component disposing region, the component disposing region having a plurality of component connecting pads for the reasons described in Section XII.A.1.b. Kwon further teaches a left and right section, as described above in connection with Claim 7.

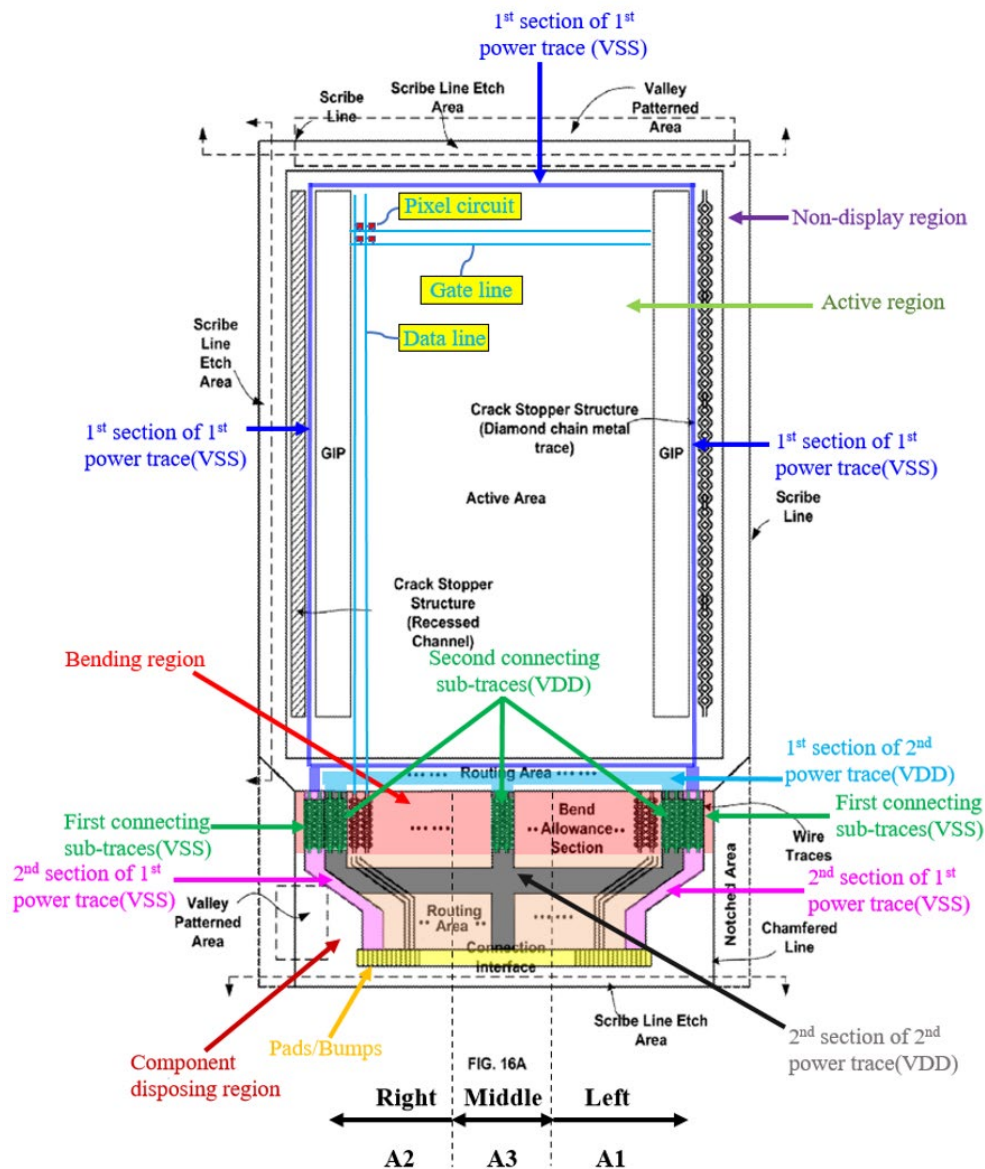
Kang'261 further teaches that the bending region defines a left section, a middle section, and a right section. Specifically, as shown in annotated Figure 5 below, Kang'261 teaches that “substrate 501 of the display device 500 includes a first area A1, second area A2, and third area A3[,]” which “may be defined by dividing the length of the substrate 501 along a longitudinal direction.” Ex-1006,

13:20–24, Fig. 5. Kang’261’s first area A1, second area A2, and third area A3 correspond to the recited left section, a middle section, and a right section of the bending region, as explained above in connection with claim 3. Ex-1002 ¶169.



A POSITA would have been motivated to implement Kang’261’s left-right-middle teaching in Kwon. As previously explained, Kwon specifically teaches left and right edges of the bend allowance area, as discussed above in connection with Claim 7. Kwon further teaches that data traces pass over the bend allowance section internal to the VDD and VSS traces on the left and right edges, as explained in connection with Claim 10. A POSITA implementing Kwon and Kang’261 together

would have identified the portions of Kwon's bend allowance section A1, A2, and A3, corresponding to a left, right, and middle sections, to more efficiently organize and identify the particular subtraces. Ex-1002 ¶170. Doing so would be nothing more than routine and ordinary naming, and would not otherwise affect the structure and operation of Kwon's device. Ex-1002 ¶170. This is shown in the figure below combining Kwon's Figure 16A and Kang'261's Figure 5.

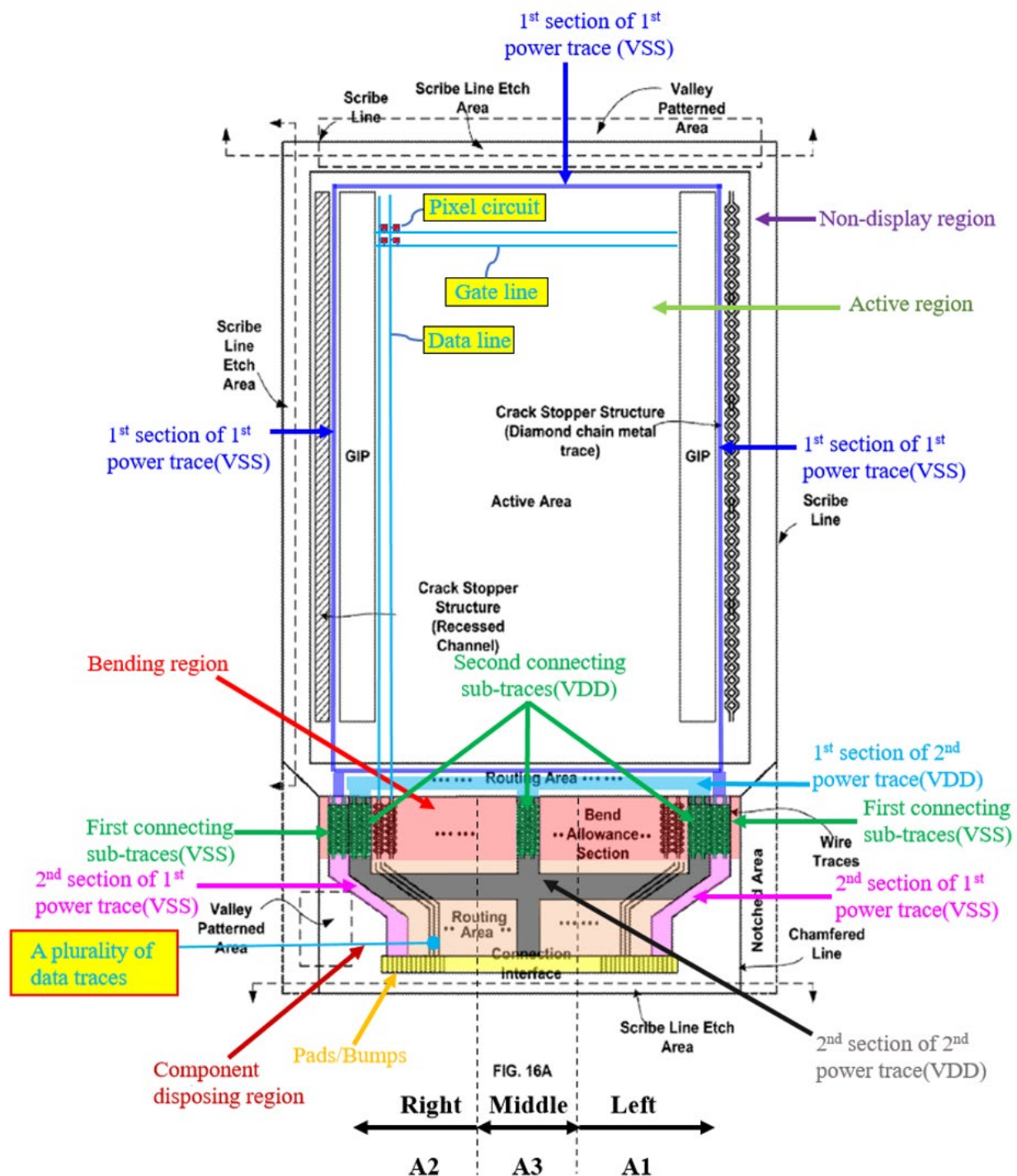


- c. **11[b]: a plurality of data traces passing through the bending region and connected with the active region and the plurality of component connecting pads;**

Kwon-Kang'261 teaches Element 11[b]. Ex-1002 ¶171.

Kwon teaches a plurality of data traces passing through the bending region for the reasons described in Section XII.A.3. *See, e.g.*, Ex-1005, 5:33–50, 21:54–57, 46:29–32. Kwon's conductive lines including, for example, data lines “to communicate with one or more driving circuits” correspond to the recited “plurality of data traces” passing through the bending region. Ex-1002 ¶172.

Moreover, as explained in the prior section, the data traces pass through the middle section of the bend allowance region, corresponding to Kang'261's A3. Ex-1002 ¶173.



- d. **11[c]: wherein a first section of a power trace is disposed adjacent to the active region, the first section of the power trace is connected to a second section of the power trace disposed within the component disposing region by three sets of connecting sub-traces passing through the left section, the middle section and the right section, and the second section of the power trace is connected to the plurality of component connecting pads.**

Kwon-Kang'261 teaches Element 11[c]. Ex-1002 ¶¶174–176.

Kwon teaches that a first section of a power trace is disposed adjacent to the active region, the first section of the power trace is connected to a second section of the power trace disposed within the component disposing region, and the second section of the power trace is connected to the plurality of component connecting pads for the reasons described in Section XII.A.1.d.

Kang'261 teaches that the first section of the power trace is connected to a second section of the power trace disposed by three sets of connecting sub-traces passing through the left section, the middle section and the right section for the reasons described in Section XII.B.2.

4. Independent Claim 16

- a. **16[pre]: A display panel comprising:**

Kwon-Kang'261 teaches Element 16[pre] for the reasons described in Section XII.A.1.a. Ex-1002 ¶177.

- b. 16[a]: an active region and a non-display region, the non-display region disposed around the active region and extending to form a bending region and a component disposing region;**

Kwon-Kang'261 teaches Element 16[a] for the reasons described in Section XII.A.1.b. Ex-1002 ¶178.

- c. 16[b]: wherein a first section of a power trace is disposed adjacent to the active region, the first section of the power trace is separately connected to a second section of the power trace disposed within the component disposing region by at least one set of connecting sub-traces passing through the bending region,**

Kwon-Kang'261 teaches Element 16[b] for the reasons described in Section XII.A.1.c (first section of a power trace is disposed within the non-display region around (and adjacent to) the active region) and XII.A.2 (first section of the power trace is separately connected to a second section of the power trace disposed within the component disposing region by at least one set of connecting sub-traces passing through the bending region). Ex-1002 ¶179.

- d. 16[c]: wherein the first section of the power trace is separately connected to the second section of the power trace disposed within the component disposing region by three sets of connecting sub-traces passing through a left section, a middle section and a right section of the bending region.**

Kwon-Kang'261 teaches Element 16[c]. Ex-1002 ¶¶180–182.

Kwon teaches that the first section of the power trace is separately connected to the second section of the power trace disposed within the component disposing region for the reasons described in the previous section. *Supra* §XII.B.4.d.

Kang'261 teaches that the first section of the power trace is separately connected to the second section of the power trace by three sets of connecting sub-traces passing through a left section, a middle section and a right section of the bending region for the reasons described in in Section XII.B.2.

C. Ground 3: Claims 2, 4–6, 8–9, 12–15, and 18–19 Are Rendered Obvious by the Combination of Kwon, Kang'261, and Ka

1. A POSITA would have been motivated to combine Kwon's teachings with Kang'261's teachings and Ka's teachings and would have had a reasonable expectation of success.

A POSITA would have been motivated to combine the teachings of Kwon, Kang'261, and Ka and had a reasonable expectation of success in doing so because all three references relate to flexible, foldable display devices including bending region and sub-traces to minimize the bottom border using similar components. Ex-1005, Abstract, Figs. 1, 16A; Ex-1006, Abstract, Figs. 1, 5; Ex-1007 ¶¶4–5, Fig. 1; Ex-1002 ¶183; *see also supra* §XII.B.1.

As explained in Section XII.B.1, Kwon and Kang'261 would have been combined because they each include similar teachings and address similar problems related to cracking in a bend area, and voltage and power distribution issues for wires passing through a bending area. Ex-1002 ¶184. Moreover, Kwon and Kang'261 each

include some teachings- relating the design and width of its various traces, but leaves some of those routine implementation details to a POSITA. Ex-1002 ¶¶184–187.

A POSITA seeking such implementation details relating to the width of traces would have turned to a reference such as Ka, which teaches substantially the same architecture of wires crossing a bending region. For example, Ka teaches a display device in which a plurality of driving voltage transmission lines are connected by sub-trace driving voltage connection lines. Ka further teaches specific, quantified width relationships among its driving voltage transmission lines and driving voltage connection lines to solve the same problems as those discussed by Kwon. Ex-1007 ¶74. In particular, Ka teaches that the sub-traces may have a width of about 3 micrometers while the power traces can “each have a width of about 50 to about 200 micrometers[.]” Ex-1007 ¶74. Ka further teaches that transmission-line / trace-section widths are deliberately set wider than the connecting sub-trace or connection-line widths that cross the bend region because “[w]hen the length or width of the wires is increased or decreased, current density and voltage drop may also increase or decrease, causing deterioration in luminance uniformity of the image displayed in the display area.” Ex-1007 ¶4. Ka also notes that “in wire design, there is a limit to how much a line width of the driving voltage supply lines 10a and 10b may be increased” and provides solutions accordingly. Ex-1007 ¶65.

A POSITA would have been motivated to implement Ka's teachings with the Kwon-Kang'261 combination because, for example, one of Kwon's goals is to "achieve more stable level of luminance" in the display. Ex-1005, 11:38–41. Ka further addresses similar problems to those in both Kwon and Kang'261. *See, e.g., supra* §XII.B.1; Ex-1005, 8:52–55, 23:8–12, 24:21–23, 26:8–11, 27:11–13; Ex-1006, 7:19–21; Ex-1002 ¶¶188–192 (*citing also, e.g.,* Ex-1007, Fig. 3).

A POSITA would have had a reasonable expectation of success in combining the teachings of Kwon, Kang'261, and Ka. Ex-1002 ¶193. All three references relate to flexible, foldable display devices including bending region and sub-traces to minimize the bottom border using similar components, rendering their teachings interchangeable and combinable. Ex-1005, Abstract, Figs. 1, 16A; Ex-1006, Abstract, Figs. 1, 5; Ex-1007 ¶¶4–5, Fig. 1. A POSITA would thus have understood that these references disclose interrelated teachings based on well-understood technologies that would have been amenable to various well-understood and predictable combinations. Ex-1002 ¶193.

- 2. Dependent Claim 2: The display panel according to claim 1, wherein the first section of the second power trace and the second section of the second power trace are parallel to each other, and a width of the first section of the second power trace is less than a width of the second section of the second power trace, and is greater than a width of the second connecting sub-trace.**

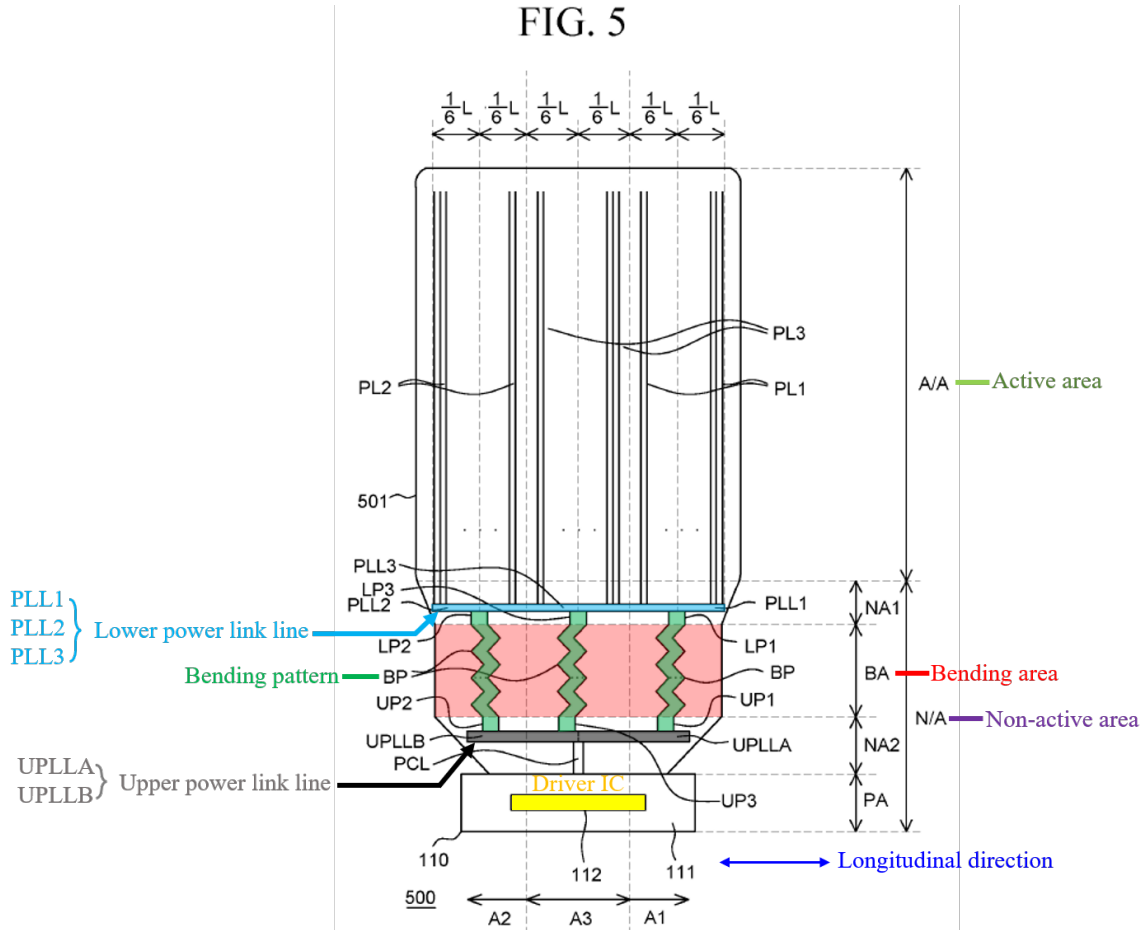
Kwon in view of Kang'261, and Ka ("Kwon-Kang'261-Ka") teaches Claim 2.

Ex-1002 ¶194.

The Kwon-Kang'261-Ka combination teaches that the first section of the second power trace and the second section of the second power trace are parallel to each other. Ex-1002 ¶195. As discussed in connection with claim element 1[C], Kwon teaches that the first second power trace (the VDD line) sits between the active display area and the bend allowance section, stretching from left to right. Kwon does not teach to use a parallel second section of the VDD line, but nothing in Kwon would have precluded a POSITA from implementing such an obvious approach as a matter of routine design choice. Ex-1002 ¶195. A POSITA would have been motivated to do so for the reasons explained above in Section XII.B.1. Indeed, such a configuration is taught by both Kang'261 and Kwon. It would have been obvious to a POSITA to implement Kwon and Kang'261's teaching together such that that a first section of the VDD line above the bend allowance section would be parallel to a second section of the VDD line below it. Ex-1002 ¶195.

As explained in Section XII.B.2 and shown in annotated Figure 5 below, Kang'261's first lower power link line PLL1 (blue) having the lower power link lines PLL1, PLL2 and PLL3 corresponds to the recited "first section of the second power trace" and Kang'261's first portion UPLLA of the upper power link line (grey) having the first and second portions UPLLA and UPLLB corresponds to the recited "second section of the second power trace." Ex-1002 ¶196. Kang'261 further teaches that "substrate 501 of the display device 500 includes a first area A1, second area A2, and third area A3[,]" which "may be defined by dividing the length of the substrate 501 along a longitudinal direction." Ex-1006, 13:20–24. Moreover, Kang'261 teaches that "power voltage from the driver IC 112 [yellow] may be sequentially transmitted to the pad connecting line PCL, the first portion UPLLA of the upper power link line, the first upper connecting line UP1, a bending pattern BP, the first lower connecting line LP1, the first lower power link line PLL1, and the first power lines PL1 in sequence, to transmit power voltage to pixels disposed in the first area A1." Ex-1006, 14:59–66; *see also id.*, 14:66–15:6 (describing the same for the power transmitted UPPLB through second lower power link line PLL2). Kang'261's lower and upper power link lines (blue and grey) corresponding to the claimed first and second sections of the second power trace, respectively, extend the longitudinal direction and, thus, Kang'261's first section of the second power trace

and the second section of the second power trace are parallel to each other. *Id.*; Ex-1006, Fig. 5.



Indeed, this parallel relationship is additionally taught by Ka. For example, as Shown below in Ka's annotated Figure 3, an upper voltage driving line (blue) and a lower voltage driving line (gray) are parallel extending horizontally, connected by a number of smaller vertical lines (green). Ex-1007, Fig. 3; Ex-1002 ¶¶197–198.

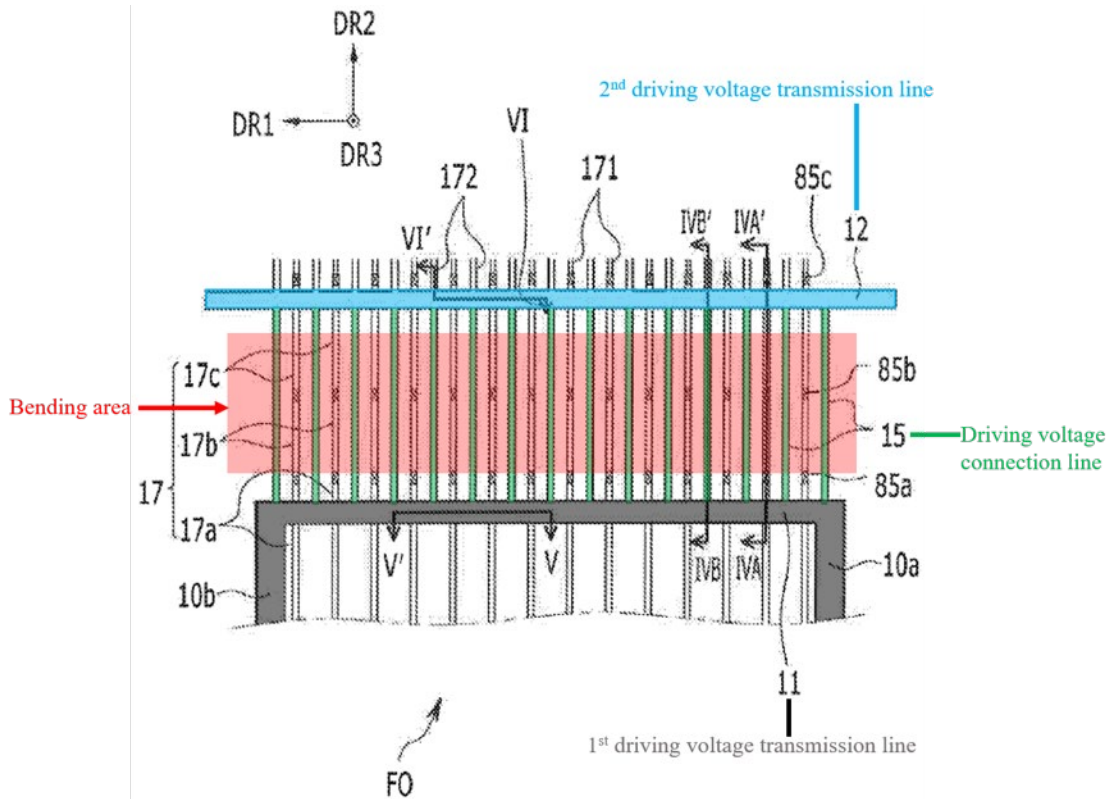
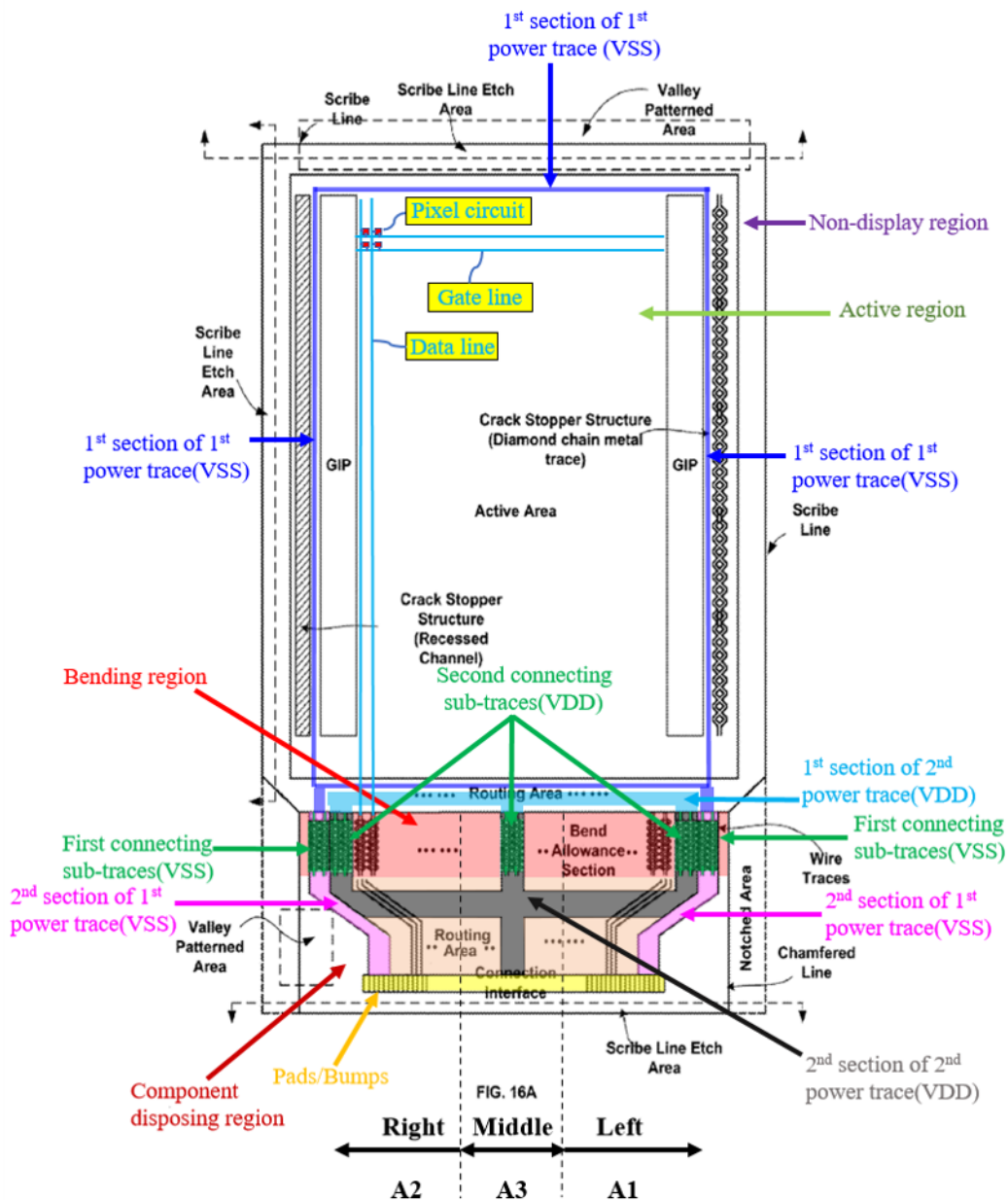


FIG. 3

Thus, the combined system would have included the respective teachings from Kwon's Figure 16A, Kang'261's Figure 5, and Ka's Figure 3, as in the modified figure below. As depicted in the figure, both the first section (light blue) and second section (gray) of the VDD lines are parallel to each other. Ex-1005, Fig. 16A.

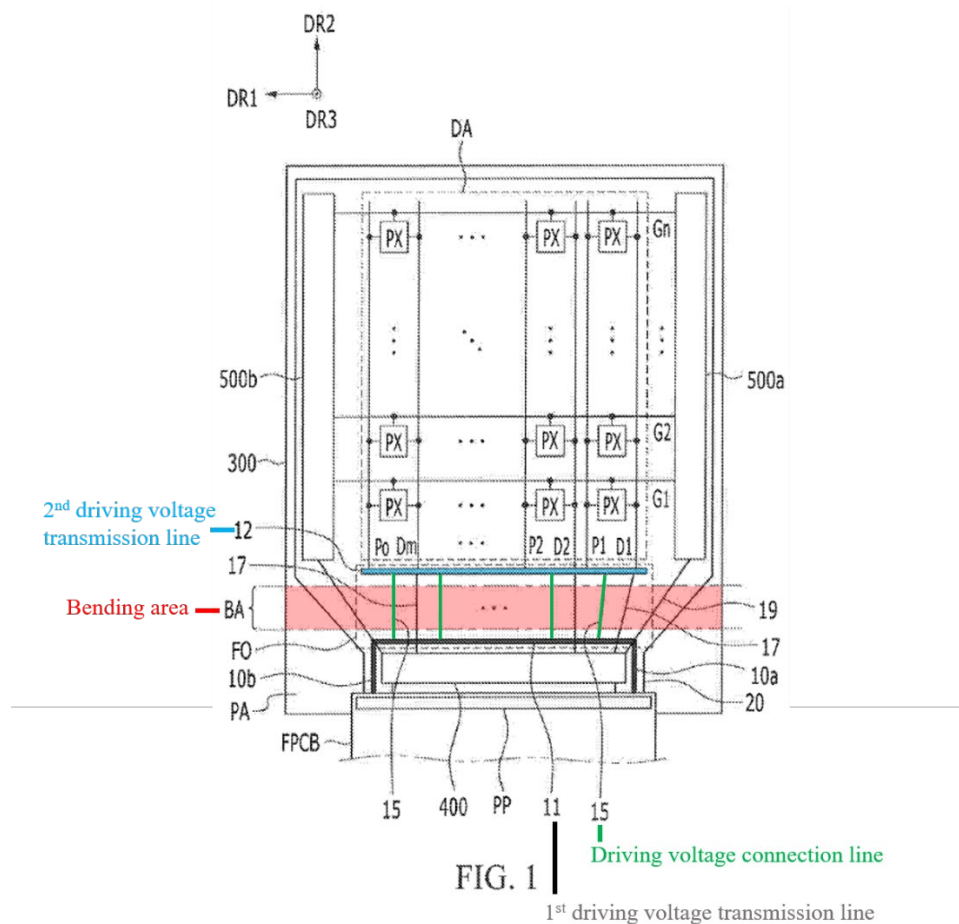


The Kwon-Kang'261 combination and the Kwon-Kang'261-Ka combination also teach that a width of the first section of the second power trace is less than a width of the second section of the second power trace, and is greater than a width of the second connecting sub-trace. For example, Kang'261's Figure 5 above shows that the width of Kang'261's upper power link line (grey) is relatively greater than

the width of Kang’261’s lower power link line (blue). Ex-1006, Fig. 5; Ex-1002 ¶¶199–204 (*citing also, e.g.*, Ex-1005, Figs. 1, 11A, 16A). As explained in the motivation to combine section, Kwon also teaches some specific widths for its subtraces, with widths selected to minimize stress along the bend allowance area. *Supra* §XII.C.1; Ex-1005, 28:1–7. Thus, Kwon or the Kwon-Kang’261 combination teach specific widths for their subtraces and other components. Kwon and Kang’261, however, leave some implementation details for other common traces and specific widths of the same to a POSITA. To the extent that a POSITA would have been interested in such routine details, they are taught by Ka. Ex-1002 ¶204.

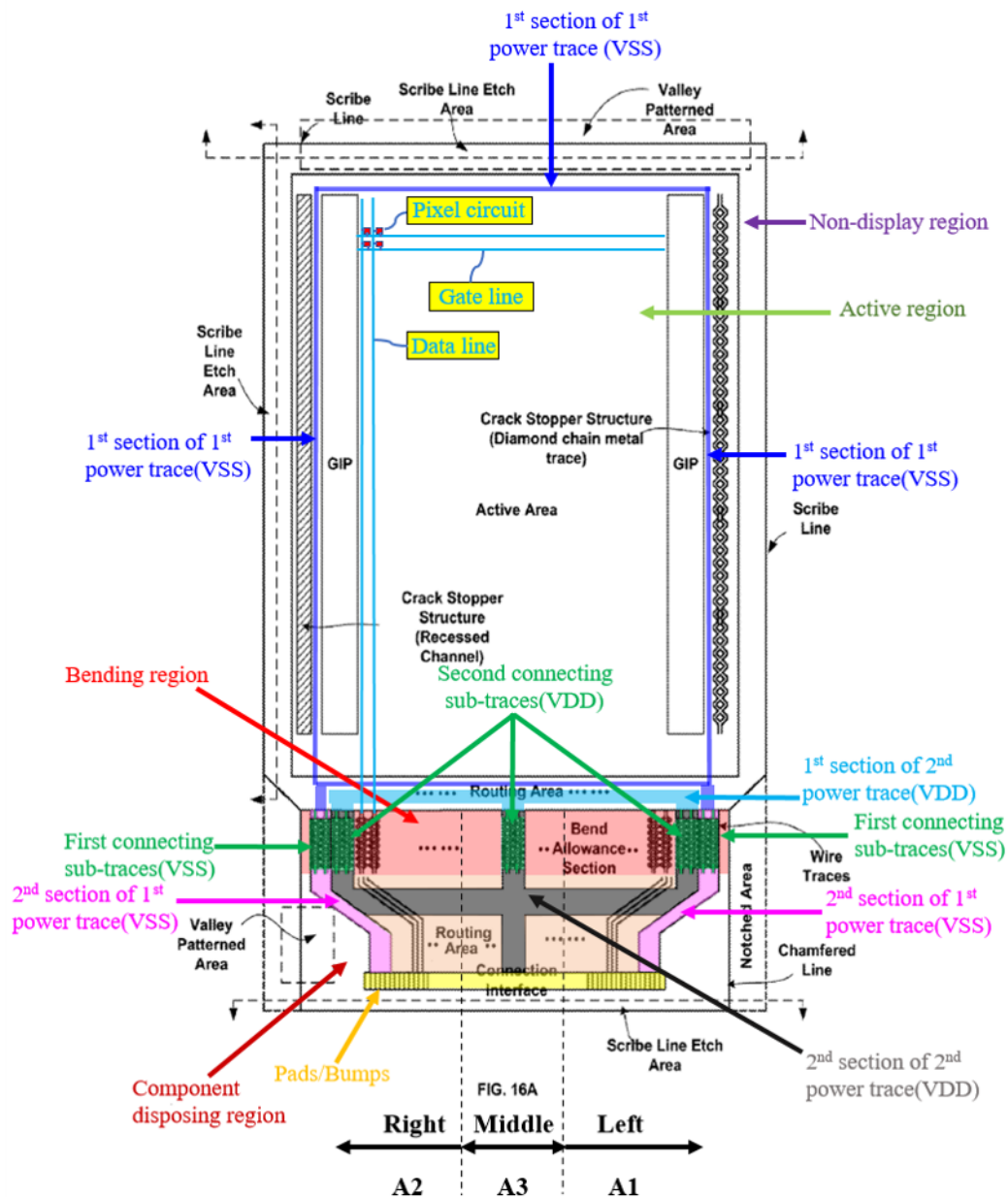
For example, Ka teaches that a width of the first section of the second power trace is less than a width of the second section of the second power trace, and is greater than a width of the second connecting sub-trace. Ex-1002 ¶¶205–206. Ka teaches “a display device[,]” which “includes a display panel including a display area and a peripheral area, a plurality of data lines and a plurality of driving voltage lines provided in the display area, a plurality of data connection lines provided in the peripheral area and connected to the plurality of data lines, ***a first driving voltage transmission line*** provided in the peripheral area and overlapping the plurality of data connection lines, ***a second driving voltage transmission line*** provided in the peripheral area and disposed between the first driving voltage transmission line and the display area, and ***a plurality of driving voltage connection lines***.” Ex-1007 ¶5.

Ka further teaches that “the first driving voltage transmission line 11 ... is connected to the second driving voltage transmission line 12 through the plurality of driving voltage connection lines 15.” Ex-1007 ¶65. As shown in annotated Figure 1 below, Ka’s second driving voltage transmission line 12 (blue) corresponds to the recited “first section of the second power trace,” first driving voltage transmission line 11 (grey) corresponds to the recited “second section of the second power trace),” and driving voltage connection line 15 corresponds to the recited “second connecting sub-trace.” Ex-1007, Fig. 1.



Ka teaches that “the first driving voltage transmission line 11 and the second driving voltage transmission line 12 may each have a width of about 50 to about 200 micrometers, and the driving voltage connection line 17 may have a width of about 3 micrometers[,]” and “the inventive concept is not limited thereto.” Ex-1007 ¶74. As applied in the Kwon-Kang-Ka combination, this teaching would practice the claim.

Specifically, a POSITA would have implemented the upper section of the VDD line (blue) at the lower end of the width range suggested by Ka, e.g. 50–100 microns, since it is placed in the relatively narrow section between the display active area and the bend allowance section. Ex-1002 ¶206. This would additionally keep the non-display area around the phone’s bezel as small as possible, which is a stated goal of both Kwon and Ka. And the subraces (green) would have been implemented with a width of about 3 microns as suggested by Ka (and similar in width to what is taught by Kwon itself). The lower section of the VDD line (the horizontal grey line added from Kang’261) would have been implemented at the higher end of the width range suggested by Ka, e.g. 100–200 microns, since it connects to a number of subraces in the routing area the additional line (Kang’261’s PCL) coming out of the bottom and then connecting with the connection interface.



Accordingly, in the Kwon-Kang'261-Ka combination, a width (50–100 microns) of the first section of Kwon's second power trace (blue) is less than a width (100–200 microns) of the second section of Kwon's second power trace (gray), and a width of the first section of Kwon's second power trace is greater than a width (~3 microns) of Kwon's second connecting sub-trace (green). Ex-1002 ¶¶207–208.

A POSITA would have been motivated to combine Kwon-Kang’261 with Ka and had a reasonable expectation of success in doing so, for the reasons described in Section XII.C.1. Ex-1002 ¶208.

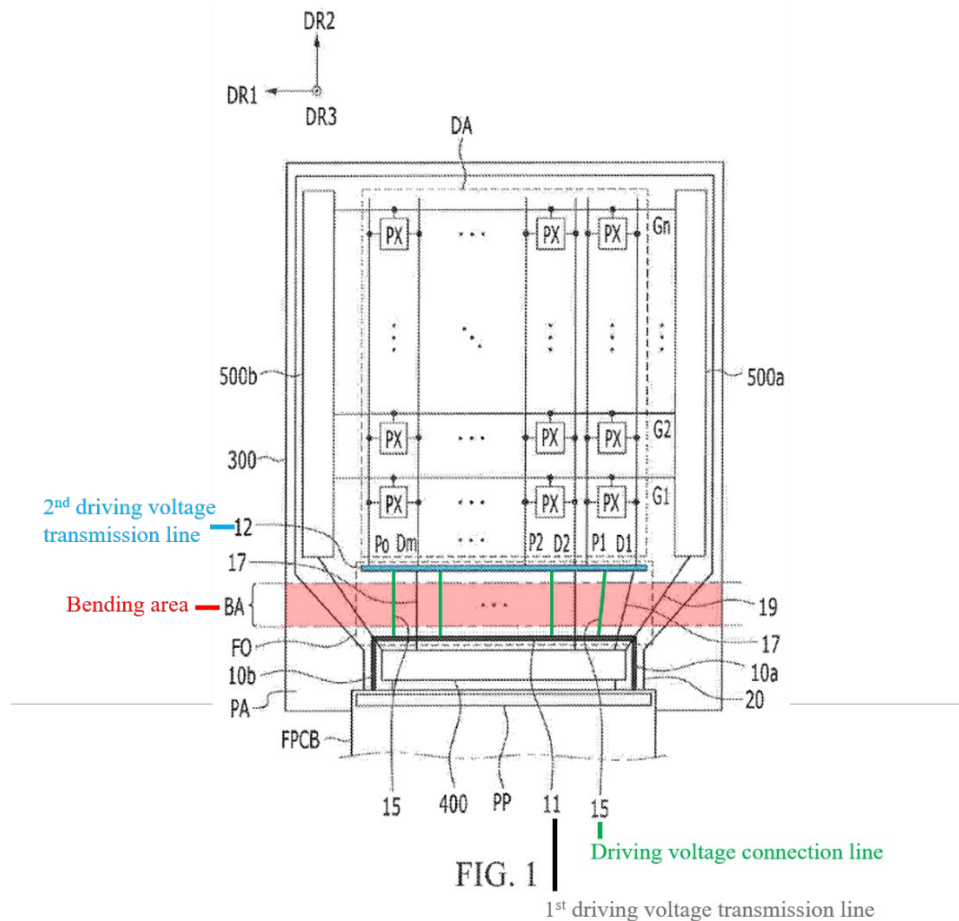
3. Dependent Claim 4: The display panel according to claim 2, wherein a width of the first section of the second power trace is not greater than [150] microns.

Kwon-Kang’261-Ka teaches Claim 4. Ex-1002 ¶209.

Ka teaches that the width of the first section of the second power trace is not greater than 150¹² microns. Specifically, Ka teaches that, as an example, “the first driving voltage transmission line 11 and the second driving voltage transmission line 12 may each have a width of about 50 to about 200 micrometers” and “the inventive concept is not limited thereto.” Ex-1007 ¶74. As shown in annotated Figure 1 below and explained above for Claim 2, Ka’s second driving voltage transmission line 12 (blue) corresponds to the recited “first section of the second power trace.” Ex-1007, Fig. 1. Additionally, as explained above in connection with claim 2, the width would be on the lower end of the range, e.g., 50–100 microns, to minimize the bezel area around the display. Ex-1002 ¶210. Indeed, While a portion of the range taught by Ka is greater than 150 microns, a POSITA would have been motivated to implement Ka’s teachings in Kwon’s system such that the width of Kwon’s first section of the

¹² Applicant filed a certificate of correction that “ISO” should read as “150.” Ex 1004, 325–27.

second power trace is not greater than 150 microns, as recited, because Kwon teaches, for example, that “***the width*** and the shape of the conductive line trace as well as the width of the patterned inorganic insulation layers interfacing with the surface of the conductive line trace ***should be kept minimal.***” Ex-1005, 25:25–28.



Kwon further teaches that “[t]he ***thickness*** of the conductive line 120, insulation layers and other components ***may be altered or optimized*** in the bend portion of the flexible display 100 ***to reduce breakage during bending.***” Ex-1005, 40:54–57. Moreover, Ka, like the ’891 Patent, teaches that “the width of a bezel that

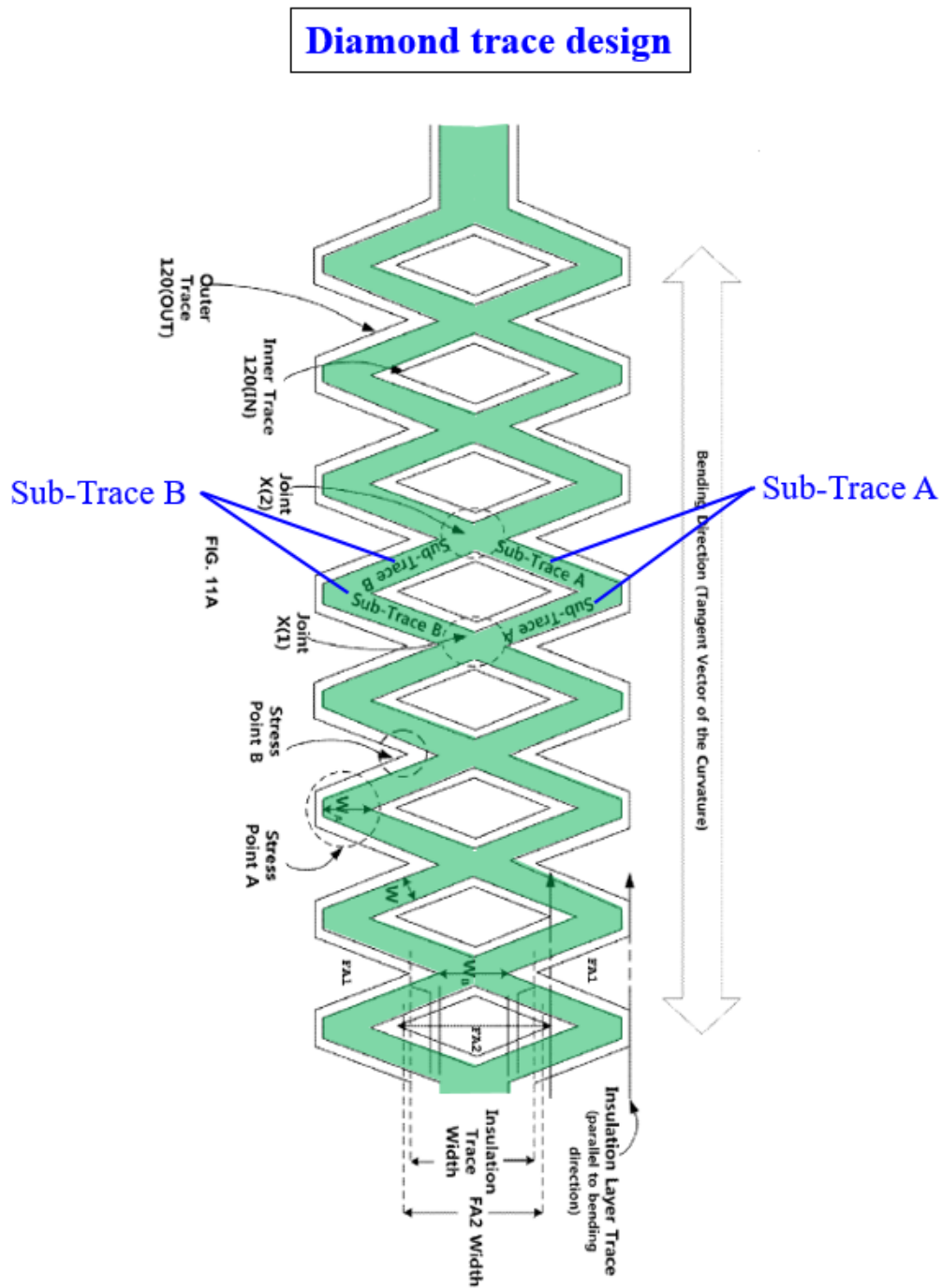
covers the peripheral area PA in the display device, such as a smart phone, can be reduced.” Ex-1007 ¶69; *see also* Ex-1001, 4:49–53 (the display panel of the present invention not only greatly shortens “a length of a bottom border of the display panel, but also realize[s] the full-screen display design, and can also have a smaller smartphone size under the same display size”). It would thus have been obvious based on the combined teachings of Kwon and Ka to implement width of Kwon’s first section of the second power trace such that it is on the lower end of Ka’s range, and not greater than 150 microns, because Kwon, Kang’261, and Ka all relate to flexible display devices having display panels, which a POSITA would have understood should be designed and/or modified to be a suitable size for a smartphone. Ex-1002 ¶211.

4. Dependent Claim 5: The display panel according to claim 2, wherein a width of the second connecting sub-trace is not greater than 20 microns.

Kwon-Kang’261-Ka teaches Claim 5. Ex-1002 ¶212.

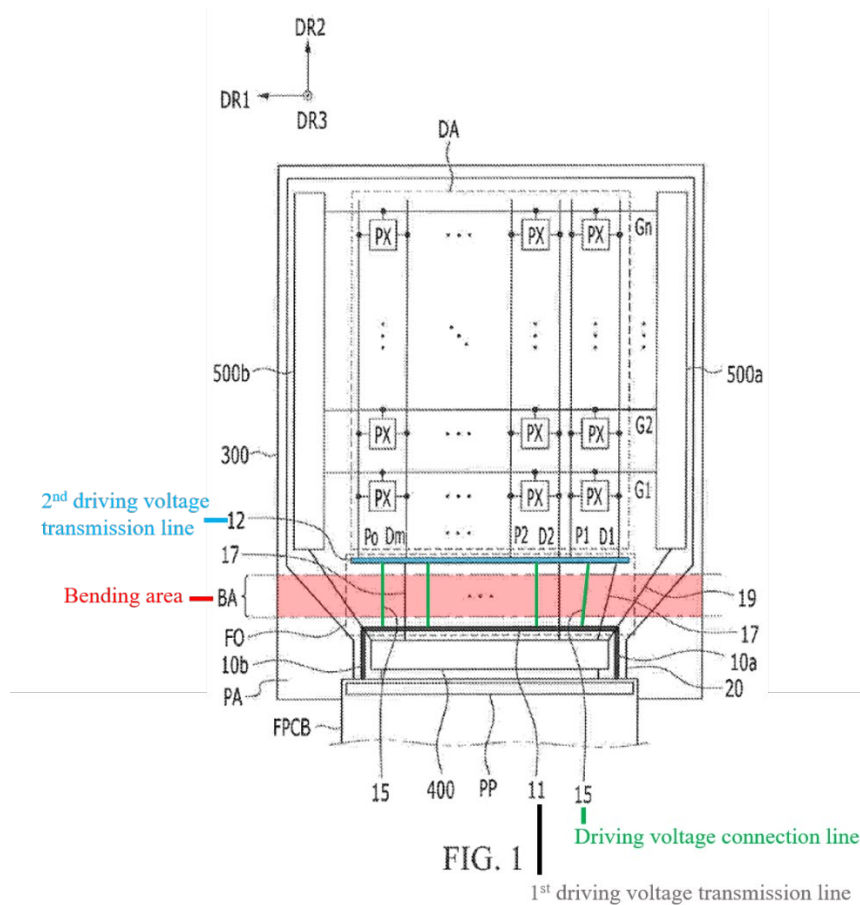
Kwon teaches that a width of the second connecting sub-trace is not greater than 20 microns. Specifically “the width of the conductive line 120 ... at the stress points A ranges from about 2.5 um to about 8 um, more preferably, from about 3.5 um to about 6 um, more preferably from about 4.5 um to about 8.5 um, and more preferably at about 4.0 um” and the “width of the conductive line 120 at the stress points B should also be maintained in the similar manner as the width of the

conductive line 120 at the stress points A.” Ex-1005, 28:1–9. This is further depicted, for example, in annotated Figure 11A, below. Ex-1005, Fig. 11A. Kwon teaches that “[r]eferring to FIG. 11A, the conductive line 120 includes sub-trace A and sub-trace B, which are split away from each other and merge back at each joint X.” Ex-1005, 25:48–50. “In this example, the shape of the conductive line 120 between the joint X(1) and X(2) (i.e., link) has a diamond shape with an open area surrounded by the sub-trace A and the sub-trace B. With additional joints X, the conductive line 120 forms a chain of diamond shaped links, and thus the trace design may be referred to as the diamond trace design.” Ex-1005, 25:61–67.



A POSITA would thus have understood that Kwon teaches that the width of the second connecting sub-trace is less than 8.5 microns. Ex-1002 ¶213.

This is also taught by Ka. Ka teaches that there are a “plurality of driving voltage connection lines 15 connecting the first driving voltage transmission line 11 and the second driving voltage transmission line 12[.]” Ex-1007 ¶74. As shown in annotated Figure 1 below and explained above for Claim 2, Ka’s driving voltage connection line 15 (green) corresponds to the recited “second connecting sub-trace.” Ex-1007, Fig. 1. Ka further teaches that “the driving voltage connection line ... may have a width of about 3 micrometers.” Ex-1007 ¶74. Ka thus teaches that a width of the second connecting sub-trace is not greater than 20 microns. Ex-1002 ¶214.



5. Dependent Claim 6: The display panel according to claim 3, wherein a width of the second section of the second power trace is not greater than 250 microns.

Kwon-Kang'261-Ka teaches Claim 6. Ex-1002 ¶215.

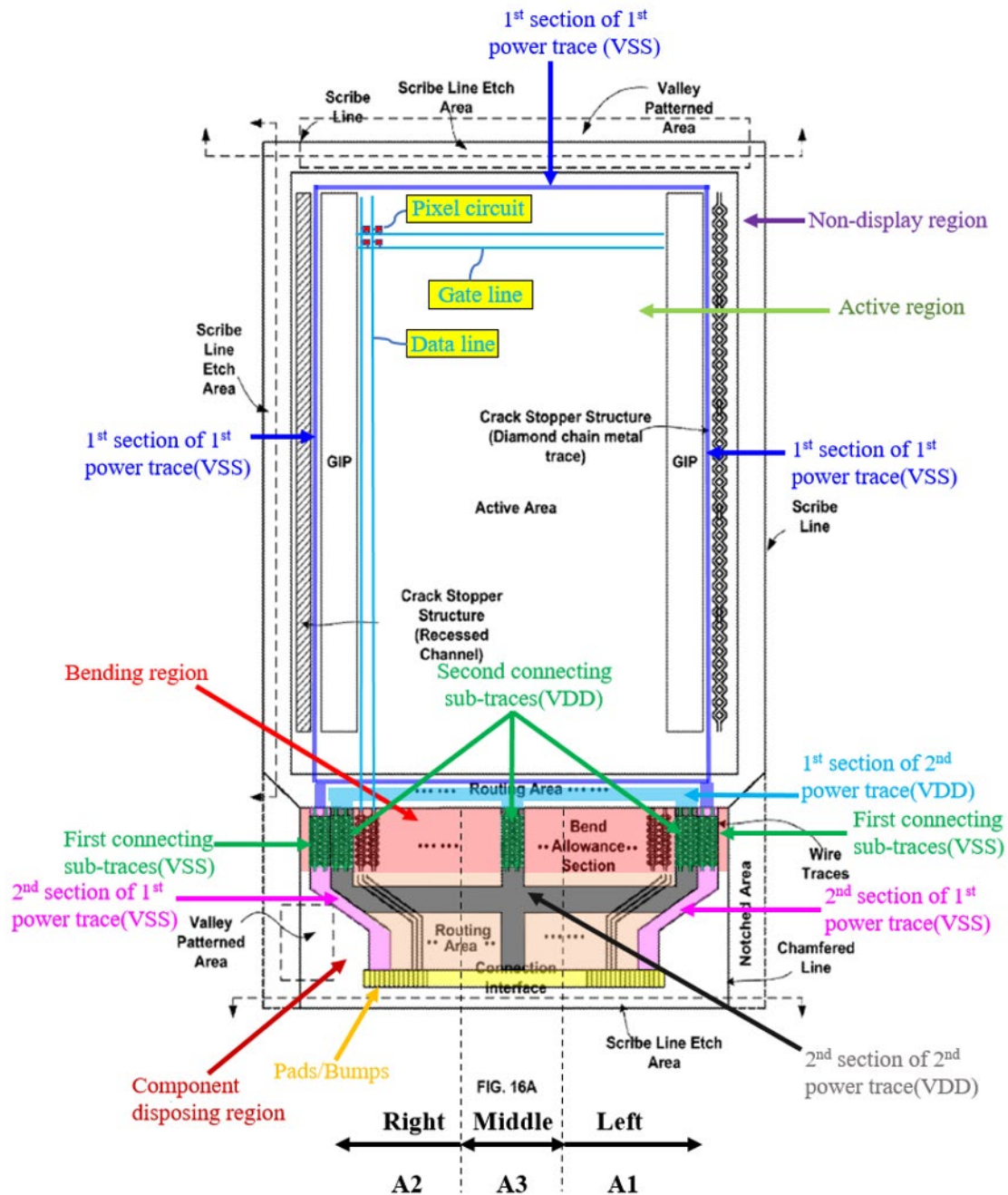
The Kwon-Kang'261 combination teaches the recited “second section of the second power trace” for the reasons described in Section XII.B.2. Ex-1002 ¶¶216–217.

Ka teaches that a width of the second section of the second power trace is not greater than 250 microns for the reasons described for Claim 2. Indeed, the high end of Ka's range is 200 microns, which is less than 250 microns. Ex-1007 ¶74.

6. Dependent Claim 8: The display panel according to claim 6, wherein a width of the first section of the first power trace and a width of the second section of the first power trace are greater than a width of the first connecting sub-trace.

Kwon-Kang'261-Ka teaches Claim 8. Ex-1002 ¶218.

Ka teaches this limitation for the reasons described for Claims 2 above. *Supra* §XII.C.2. Specifically, in the Kwon-Kang'261-Ka combination, a width (50–100 microns) of the first section of Kwon's second power trace (blue) is less than a width (100–200 microns) of the second section of Kwon's second power trace (gray), and a width of the first section of Kwon's second power trace is greater than a width (~3 microns) of Kwon's second connecting sub-trace (green). Ex-1002 ¶219.



7. **Dependent Claim 9:** The display panel according to claim 6, wherein a width of the first connecting sub-trace is not greater than 20 microns.

Kwon-Ka teaches Claim 9 for the reasons described for Claim 5. *Supra* §XII.C.4; Ex-1005, 28:50–53; Ex-1007 ¶74; Ex-1002 ¶220.

- 8. Dependent Claim 12: The display panel according to claim 11, wherein the first section of the power trace and the second section of the power trace are parallel to each other, and a width of the first section of the power trace is less than a width of the second section of the power trace, and is greater than a width of the connecting sub-trace.**

Kwon-Kang'261-Ka teaches Claim 12 for the reasons described for Claim 2.

Supra §XII.C.2; Ex-1002 ¶221.

- 9. Dependent Claim 13: The display panel according to claim 12, wherein a width of the first section of the power trace is not greater than 150 microns.**

Kwon-Kang'261-Ka teaches Claim 13 for the reasons described for Claim 4.

Supra §XII.C.3; Ex-1002 ¶222.

- 10. Dependent Claim 14: The display panel according to claim 12, wherein a width of the connecting sub-trace is not greater than 20 microns.**

Kwon-Kang'261-Ka teaches Claim 14 for the reasons described for Claim 5.

Supra §XII.C.4; Ex-1002 ¶223.

- 11. Dependent Claim 15: The display panel according to claim 12, wherein a width of the second section of the power trace is not greater than 250 microns.**

Kwon-Kang'261-Ka teaches Claim 15 for the reasons described for Claim 6.

Supra §XII.C.5; Ex-1002 ¶224.

- 12. Dependent Claim 17: The display panel according to claim 16, wherein the first section of the power trace and the second section of the power trace are parallel to each other, and a width of the first section of the power trace is less than a width of the second section of the power trace, and is greater than a width of the connecting sub-trace.**

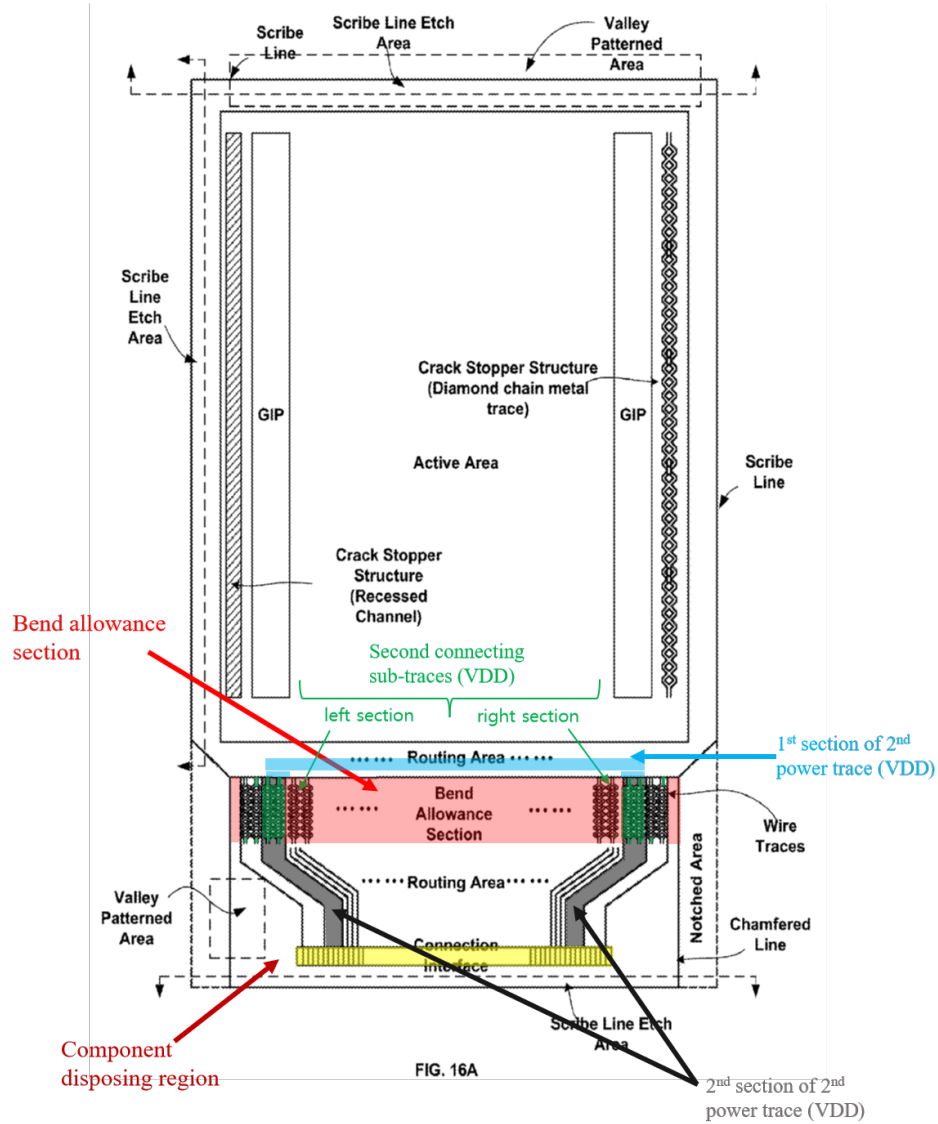
Kwon-Kang'261-Ka teaches Claim 17 for the reasons described for Claim 2.

Supra §XII.C.2; Ex-1002 ¶225.

- 13. Dependent Claim 18: The display panel according to claim 16, wherein the first section of the power trace is separately connected to the second section of the power trace disposed within the component disposing region by two sets of the connecting sub-traces passing through two sections of the bending region.**

Kwon-Kang'261-Ka teaches Claim 18. Ex-1002 ¶226.

Specifically, Kwon teaches that two sets of the connecting sub-traces of the power trace pass through two sections of the bending region for the reasons described in Sections XII.A.1.e, XII.B.2, and XII.B.4.d. Ex-1002 ¶227; Ex-1005, Fig. 16A (annotated).



XIII. CONCLUSION

Petitioner requests institution of IPR for Claims 1–18 of the '891 Patent based on each of the grounds in this Petition.

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), Petitioner certifies that this petition includes 12,915 words, as measured by Microsoft Word, exclusive of the table of contents, mandatory notices under § 42.8, certificates of service, word count, and exhibits.

CERTIFICATE OF SERVICE (37 C.F.R. §42.6(e)(1))

The undersigned hereby certifies that the above document was served on September 17, 2026, by filing this document through the Patent Trial and Appeal Board P-TACTS System, as well as delivering a copy via express mail upon the following attorneys of record for the Patent Owner:

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