Exhibit 1

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

NEODRON LTD., Plaintiff, v. DELL TECHNOLOGIES INC., Defendant.	Case No. 1:19-cv-00819-ADA
NEODRON LTD., Plaintiff, v. HP, INC., Defendant.	Case No. 1:19-cv-00873-ADA
NEODRON LTD., Plaintiff, v. MICROSOFT CORPORATION, Defendant.	Case No. 1:19-cv-00874-ADA

NEODRON LTD., Plaintiff, v. AMAZON.COM, INC., Defendant.	Case No. 1:19-cv-00898-ADA
NEODRON LTD., Plaintiff, v. SAMSUNG ELECTRONICS CO., LTD. and SAMSUNG ELECTRONICS AMERICA, INC., Defendant.	Case No. 1:19-cv-00903-ADA

DECLARATION OF RICHARD A. FLASCK IN SUPPORT OF PLAINTIFF NEODRON LTD.'S OPENING CLAIM CONSTRUCTION BRIEFS

I. INTRODUCTION

1. I have been retained as an expert in this case by Neodron Ltd. ("Neodron"). I have been asked to consider and opine on claim constructions for a number of disputed claims terms in several of the patents-in-suit, which include U.S. Patent Nos. 9,086,770 ("'770 Patent"), 9,823,784 ("'784 Patent"), 8,946,574 ("'574 Patent"), 10,088,960 ("'960 Patent"), and 7,821,502 ("'502 Patent"). I address these claim terms in separate sections below for each term.

2. In forming my opinions, I have reviewed, considered, and had access to the patent specifications and claims, their prosecution histories, the parties' proposed claim constructions, and the extrinsic evidence cited by the parties in connection with those proposed constructions. I have also relied on my professional and academic experience in the fields of thin film devices, flat panel displays, active matrix, LED, OLED, touchscreens, and touch panels. I reserve the right to consider additional materials as I become aware of them and to revise my opinions accordingly.

II. QUALIFICATIONS

3. My qualifications for forming the opinions set forth in this Declaration are summarized here and explained in more detail in my curriculum vitae, which is attached as Exhibit 2.

4. I received a Bachelor of Science degree in Physics from the University of Michigan, Ann Arbor, in 1970. I thereafter received a Master of Science degree in Physics from Oakland University in Rochester, Michigan, in 1976. I am the founder and CEO of RAF Electronics Corp., where I developed and patented Liquid Crystal on Silicon (LCOS) microdisplay projection technology using active matrix transistor arrays as well as developed proprietary LED-based Solid State Lighting (SSL) products.

5. After receiving my bachelor's degree, I was employed as a scientist and a manager by Energy Conversion Devices, Inc., from 1970 through 1982. My work at Energy Conversion Devices concerned the development of electroluminescent displays, thin film photovoltaics, ablative imaging films, non-volatile memory, multi-chip modules, and superconducting materials. After leaving Energy Conversion Devices, I founded and served as CEO of Alphasil, Inc., where I developed amorphous silicon thin film transistor (TFT) active matrix liquid crystal displays (AMLCDs). My work at Alphasil included thin film transistor array substrate process and circuit design, data driver and gate driver design, scalers, video circuits, gamma correction circuits, backlighting, and inverter design. At Alphasil I also designed and incorporated touch panel screens into active matrix display devices. The touch panel technologies included surface acoustic wave and capacitive sensing. I worked at Alphasil from 1982 through 1989.

6. After leaving Alphasil, I founded RAF Electronics Corp., described above. I have served as CEO of RAF Electronics since that time. At RAF I developed HDTV projection technology including transistor array substrates for LCOS devices and the associated optical systems. My activities at RAF have included developments in lighting systems using both traditional LED and OLED (Organic Light Emitting Diode) technologies. In 2016 I was granted US Patent 9,328,898 which includes OLED and LED technology and lighting systems. In 2019 RAF received a CalSEED grant from the California Energy Commission to develop ultra-efficient lighting products and explore establishing a Central Valley manufacturing facility.

7. In 1997, I took the position of President and COO at Alien Technology Corporation, where I was responsible for completing a Defense Advanced Research Projects Agency (DARPA)

contract, and for implementing MEM fluidic self-assembly (FSA) technology. I left that position in 1999.

8. In 2002, I co-founded and served as COO of Diablo Optics, Inc., where I developed, produced, and commercialized key optical components for HDTV projectors, such as polarization optics, condenser lenses, projection lenses, and ultra-high performance optical interference filters using thin film stacks in conjunction with LED and thin film transistor arrays and devices. I left Diablo in 2007.

9. I am listed as an inventor on twenty-six patents issued in the United States and foreign countries, including one United States design patent. My inventions concern technologies including LED devices, semiconductor materials, glass materials, non-volatile memory cells, thin film transistors, flat panel backplanes and displays, and wafer based active matrices, and various transistor array substrates.

10. I have authored or co-authored twenty-five articles or conference presentations, including numerous papers and presentations concerning lighting and display technologies. My curriculum vitae (Exhibit A) lists these articles, conference presentations, and patents.

11. I am also a member of several professional organizations, including the OSA, SPIE, AES, SID, and the IEEE.

12. In summary, I have almost 50 years of experience in the field of high tech product development including flat panel displays, transistor array substrates, touchscreens and touch panels, and OLED and LED devices.

13. In the past twelve years, I have served as an expert witness for patent infringement litigation (or arbitrations) or PTAB proceedings in the following cases:

- *Nichia Corporation v. Seoul Semiconductor*, 3:06-cv-0162 (NDCA), on behalf of Seoul Semiconductor Company, Inc.
- *Hewlett Packard v. Acer Incorporated et al.*, U.S. ITC Investigation No. 337-TA-606, on behalf of Acer Incorporated et al.
- *Samsung v. Sharp*, U.S. ITC Investigation No. 337-TA-631, on behalf of Samsung.
- *Sharp v. Samsung*, U.S. ITC Investigation No. 337-TA-634, on behalf of Samsung.
- *O2Micro v. Monolithic Power Systems et al.*, U. S. ITC Investigation No. 337-TA-666, on behalf of O2Micro.
- IPR No. IPR2014-0168 of U.S. 7,612,843, on behalf of Petitioner Sony, Corp.
- *Ushijima v. Samsung*, 1:12-cv-00318-LY (WDTX), on behalf of Ushijima.
- *Delaware Display Group LLC and Innovative Display Technologies LLC v. Sony Corp. et al.*, Case No. 1:13-cv-02111-UNA DDEL, on behalf of Sony Corp.
- *Funai v. Gold Charm Limited*, Case No. IPR2015-01468, on behalf of Petitioner Funai.
- *Phoenix, LLC v. Exar et al.*, Case No. 6:15-CV-00436-JRG-KNM., on behalf of Exar et al.
- *MiiC v. Funai*, Case No. 14-804-RGA, on behalf of Funai.
- *Delaware Display Group LLC v. Vizio*, Case No. 13-cv-02112-RGA, on behalf of Vizio.
- *ARRIS v. Sony*, U.S. ITC Investigation No. 337-TA-1060, on behalf of Sony.
- *BlueHouse Global, LTD. v. Semiconductor Energy Laboratory Co. LTD.*, IPRs on behalf of BlueHouse Global, LTD.

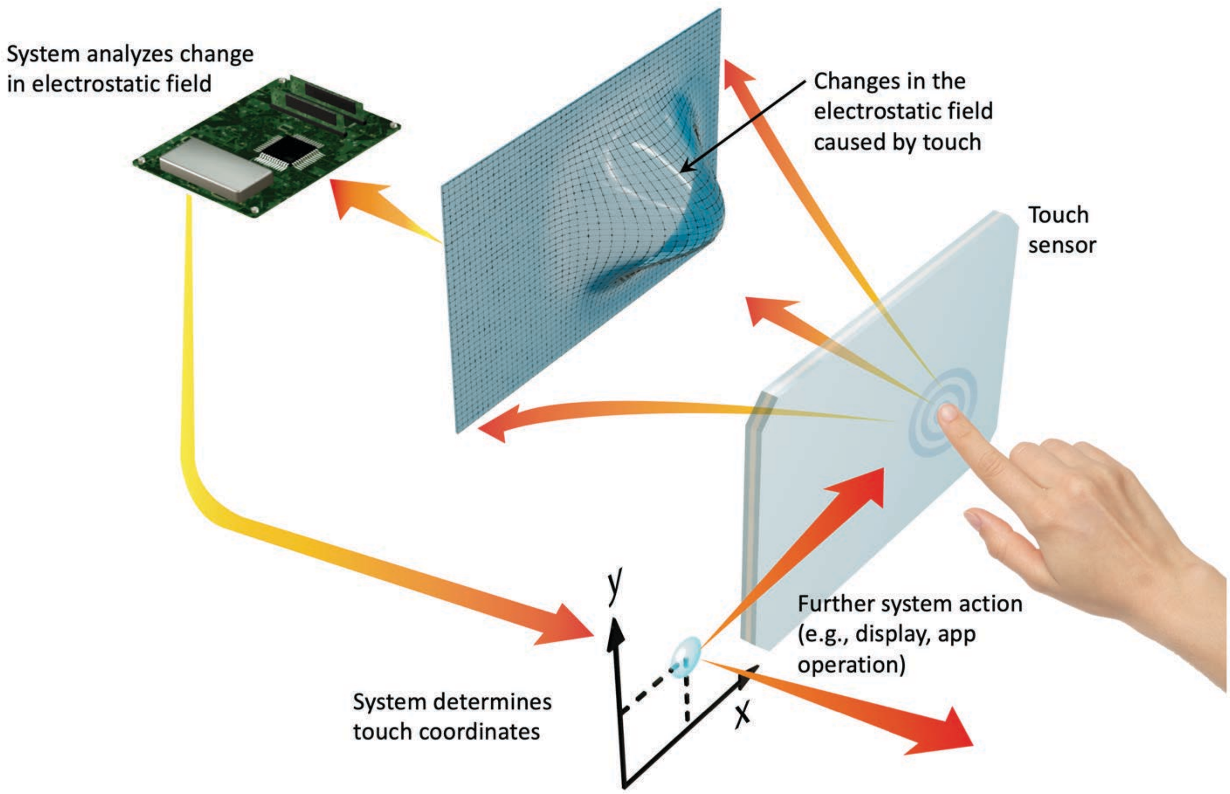
- *Phoenix, LLC v. Wistron Corp.*, Case No. 2:17-cv-00711-RWS, on behalf of Wistron Corp.
- *Ultravision v. Absen et al.*, ITC Investigation No. 337-TA-1114, on behalf of Absen et al.
- *Viavi Solutions Inc. v. Materion Corp.*, PGR2019-00017, on behalf of Viavi Solutions, Inc.
- *NEC v. Ultravision*, IPR2019-01123 and IPR2019-01117, on behalf of NEC.
- *Solas OLED Ltd. v. Samsung Display Co., Ltd., et al.*, Case No. 2:19-cv-00152-JRG, on behalf of Solas.
- *Solas OLED Ltd. v. LG Display Co., Ltd., et al.*, Case No. 6:19-cv-00236-ADA, on behalf of Solas.

III. TECHNOLOGY BACKGROUND

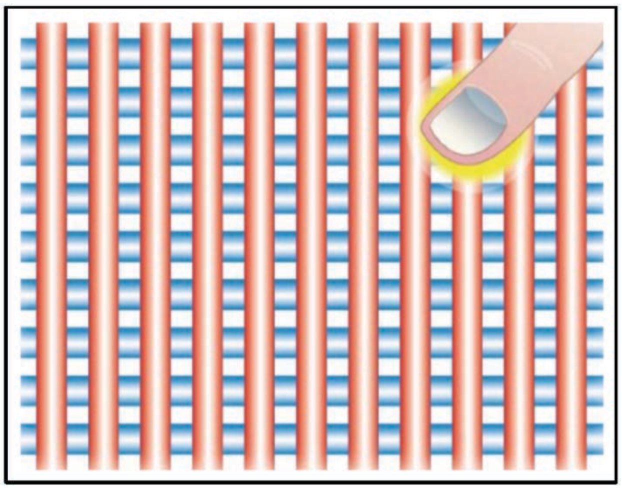
14. The asserted patents generally relate to devices containing a touch-sensitive display (which may be referred to as a "touchscreen") that allows a user to interact with an electronic device with a finger or stylus. This display may include a touch sensor overlaid on or incorporated into a display screen. '784 Patent at 1:50-60. A touch sensor is used to determine the "location touch as a set of x and y coordinates." *Id.* at 1:44-46.

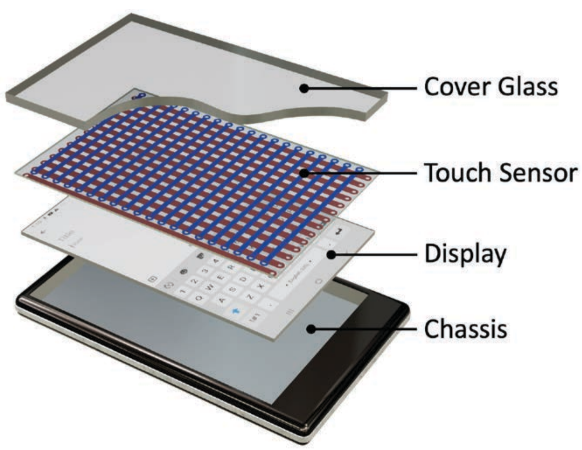
15. A capacitive touch system can be designed to detect and report a two-dimensional coordinate (e.g., x, y position) identifying the location of the user's finger or stylus. When a finger touches a capacitive touch sensor, it interacts with electrical fields projected from the sensor. In particular, the finger creates a capacitive coupling between the user's body and the portion of the sensor near the touch. This effect is commonly referred to as a change in capacitance within the touchscreen at the location of the touch. A touch controller,

microprocessor, or other related application specific integrated circuit ("ASIC") may be employed to measure this electrical effect and process information from that measurement to determine the touch's position on the screen.

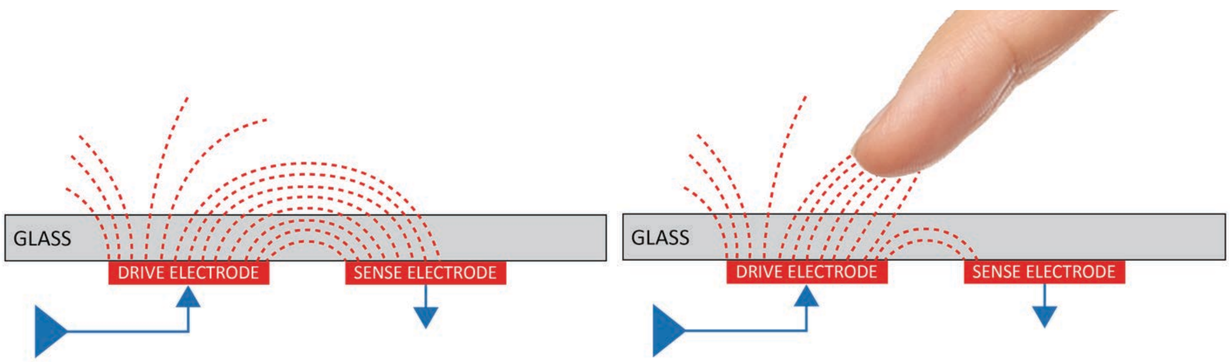


16. The most common type of capacitive touch sensing is "mutual capacitance" sensing. Mutual capacitance refers to the capacitance between a drive electrode (or "drive line") and a sense electrode (or "sense line").





17. In a common mutual-capacitance implementation, the touch sensor includes an array of electrodes that are arranged along x- and y-axes to form capacitive nodes where the electrodes intersect, as depicted above. By convention, the transmit or "drive" electrodes are commonly referred to as the X axis, and the receive or "sense" electrodes are referred to as the Y axis. Mutual capacitive sensing "uses a transmit-receive process to induce charge across the gap between an emitting electrode and a collecting electrode (the transmitter and the receiver respectively, also referred to as X and Y). … As a finger touch interacts with the resulting electric field between the transmitter and receiver electrodes, the amount of charge coupled from transmitter to receiver is changed." '784 patent at 1:16-39. Conceptually, when a finger comes near a capacitive node, it effectively "steals" charge from the drive electrode, which reduces the capacitance of the node in a measurable way, as depicted below:



18. The electrodes used for mutual capacitive sensing may be formed in numerous ways. Some electrodes are formed from a transparent conductive material called Indium Tin Oxide ("ITO"). Other electrodes are formed from opaque metallic conductors such as silver or copper. For opaque metals to be usable as touch screen electrodes, they need to be formed into fine mesh patterns that allow light from the underlying display to pass through. In each case, the conductive material is patterned to form electrodes.

19. In order to form the X-Y array of electrodes typically used for mutual capacitive sensing, in which one set of electrodes runs vertically and another runs horizontally, some provision must be made to prevent the two sets of electrodes from making direct electrical contact with each other. One way to accomplish that is by putting the vertical electrodes and horizontal electrodes on separate layers, one above the other.

IV. BACKGROUND OF THE PATENTS

A. U.S. Patent No. 8,946,574 (the "'574 Patent")

20. The '574 patent generally relates to touch sensors. The title of the '574 patent is: "Two Layer Sensor Stack." The three named inventors were concerned with improving display quality in conjunction with designing the necessary touch-sensor that goes with the display, for an overall improved human-machine interaction, from the touch of a finger to the visibility of the human eye.

21. To achieve this, the inventors determined that a phenomenon called the moiré effect may arise from interactions between the repeat length or cell size of an electrode pattern and a cell size of a display visible through the touch position sensing panel. Moiré effects may produce a repeated pattern across the touch position sensing panel. Such repetitive interference patterns are perceived by the human eye. '574 Patent at 10:58-11:3.

22. Recognizing this problem, the inventors also sought a solution, as they explained that as the deviation from regularity of a pattern of electrodes increases, the scattering of light increases. And by using an alternative to the widely used Indium Titanium Oxide electrode designs, namely, "mesh" electrodes, the inventors allowed "any display below the touch position-sensing panel [] to be visible with little perceptible darkening or other loss of display quality." '574 Patent at 4:16-19.

23. For example, narrower mesh-pattern lines have reduced visibility to the naked eye, with different designs taught by the inventors. For example, Figs. 11 and 12 are designed to form thin conductive lines "to interconnect at a connection point to define a conductive grid or mesh pattern made up of an array of mesh cells."

FIG. 11

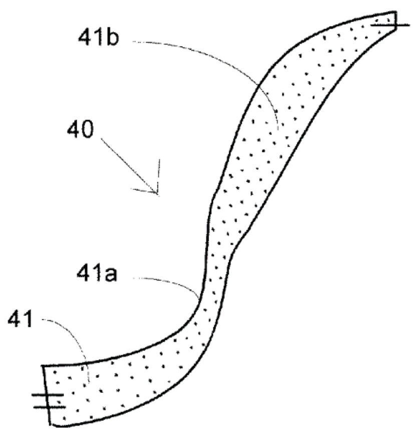
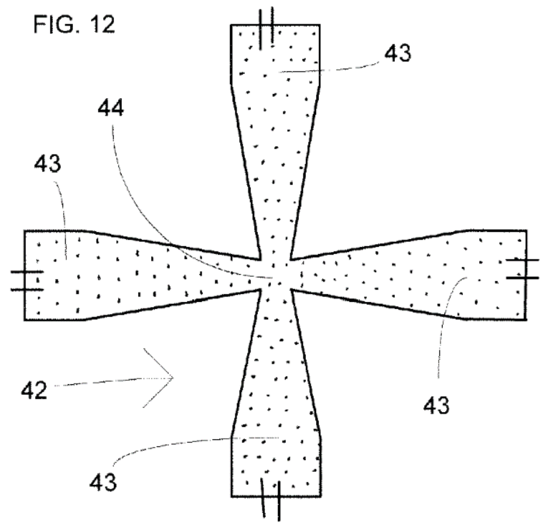
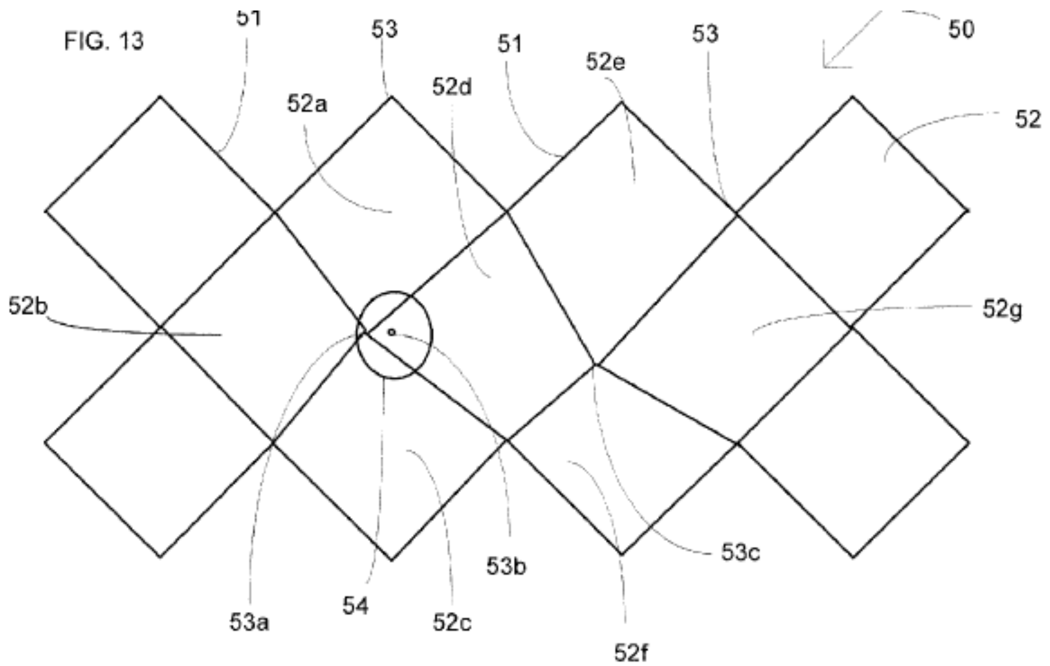


FIG. 12



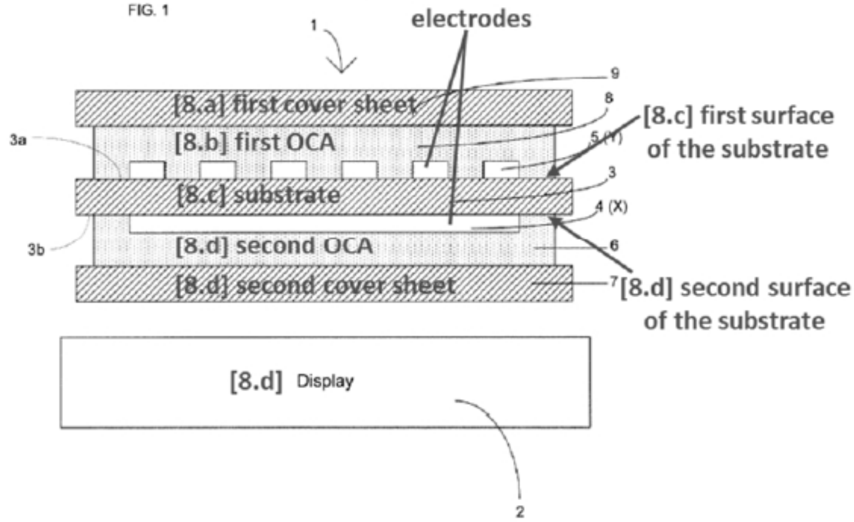
24. In another example, in Figure 13, the inventors taught that the electrode pattern 50 may be formed by a number of conductive lines 51 arranged to interconnect at connection points to define a conductive grid or mesh pattern made up of an array of mesh cells 52. The connection points of the conductive lines 51 may be the vertices 53 of the mesh cells 52. In the illustrated example, the pattern of the conductive lines 51 and mesh cells 52 may be determined by first arranging all of the vertices 53 of the mesh cells 52 in a regular square array.

FIG. 13



25. To make this work with even more benefits, and little to any drawbacks, the inventors taught features of an exemplary touchscreen in a mutual capacitance configuration whereby "a portion of the second cover sheet is positioned between the second surface of the substrate and the display" as shown below.

FIG. 1



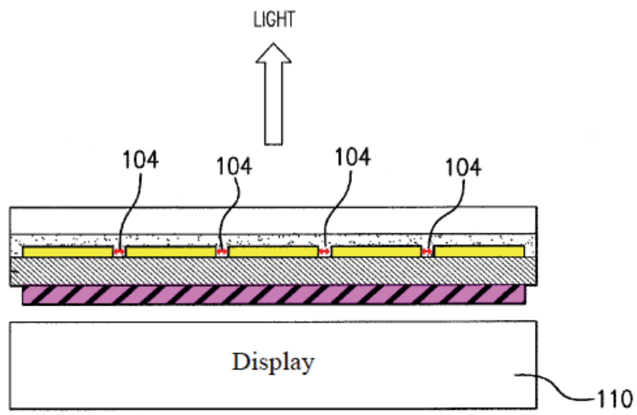
26. The independent claims, such as claim 8 below, recite features of these novel and advanced structures, including their advantageous requirements of using metal mesh and a second, intelligently-placed cover sheet in the design.

> 8. a first cover sheet;
>
> a first optically clear adhesive layer (OCA) between the first cover sheet and a substrate;
>
> the substrate, with drive or sense electrodes of a touch sensor disposed on a first surface and a second surface of the substrate, the first surface being opposite the second surface, the drive or sense electrodes ***being made of a conductive mesh conductive material comprising metal***;
>
> ***a display separated from the second surface of the substrate by a second OCA and a second cover sheet such that at least a portion of the second cover sheet is positioned between the second surface of the substrate and the display***; and
>
> one or more computer-readable non-transitory storage media embodying logic that is configured when executed to control the touch sensor.

B. U.S. Patent No. 9,086,770 (the "'770 Patent")

27. The '770 Patent, titled "Touch Sensor with High-Density Macro-Feature Design," was issued by the United States Patent and Trademark Office on July 21, 2015. The '770 patent teaches a novel design in touch sensor electrodes that, for example, improves the functionality of the touch sensor and reduces manufacturing costs in certain embodiments. '770 Patent at 13:27-48. In an exemplary touch sensor, there are electrodes running in one direction, which may be called sense electrodes or a plurality of first electrodes (purple), and electrodes running in another direction, which may be called drive electrodes or a plurality of second electrodes (yellow). *Id.* at 1:65-2:2; 6:35-38, Figure 2. The electrodes may be comprised of a copper conductive mesh. *Id.* at 6:67-7:3, 7:4-6. Gaps

(red) are then cut into the electrodes (purple and yellow). *Id.* at 7:4-6. These gaps serve in part to "enhance the electrode's shield ability against noise" from the display. Id. at 6:57-61.



Cross-Section of a Touch Sensor

28. There are a variety of cut designs that can be used in creating these gaps. Certain cut designs may be "difficult to employ in touch sensors with certain space or shape requirements that may prevent or limit the very precise cuts required in the conductive mesh." *Id.* at 8:32-36, Figure 3A. To address the problems of conventional designs, the '770 patent teaches the use of "generally quadrilateral electrodes." *Id.* at 8:45-48. The patent teaches that it is preferable to cut these gaps in generally straight lines to create generally quadrilateral electrodes. *See id.* at Abstract ("wherein each of the plurality of gaps runs in a generally straight line from one side of the sensing area to an opposing side of the sensing area"), Figures 4A, 5A, and 6A. Benefits of this design include improved functionality for unique sensing configurations, reduced need for production cutting precision, improved production speed, and reduced production errors. *Id.* at 13:27-43. This design also opens the door for producers to use other or lower-cost conductive mesh. *Id.* at 13:43-46.

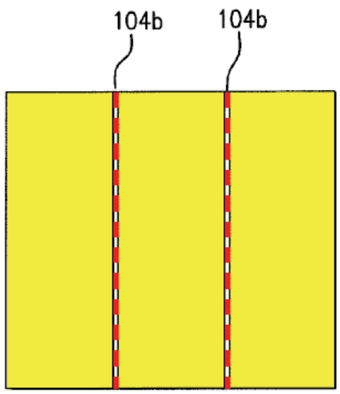


FIG. 4A

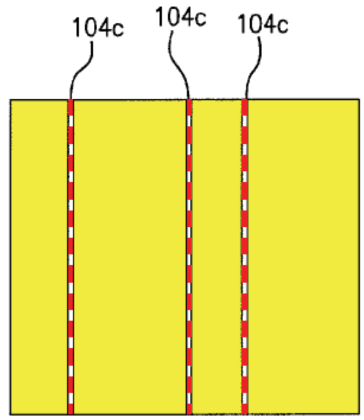


FIG. 5A

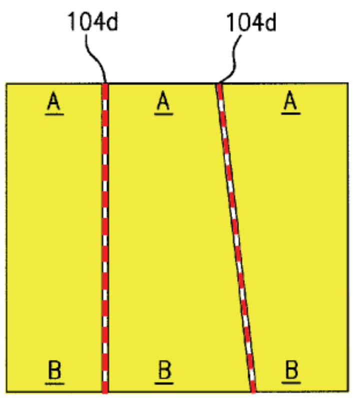


FIG. 6A

C. U.S. Patent No. 9,823,784 (the "'784 Patent")

29. The '784 Patent teaches a novel design for a capacitive touch sensor that substantially improves both the performance and optical characteristics relative to prior art capacitive sensors. '784 Patent at Abstract. A capacitive touch sensor requires two sets of electrodes: drive and sense electrodes, sometimes called transmit and receive electrodes. *See* '784 Patent at 1:16-60. To form a touch screen, these electrodes are placed above a display, and therefore their optical and electrical properties are critical to obtain both good optical performance of the display and good touch sensing performance. *See id.* One particular feature of the patented invention is an "area-filling design for the drive electrodes with small gaps," which "allows for an almost invisible drive pattern." '784 Patent at 4:34-36. Because it is not desirable for the sense electrodes themselves to fill the entire area of the

sensor, another feature of the patented invention is to fill the space between sense electrodes with isolated conductive elements, such that the sense electrodes and isolated conductive elements together substantially fill the sensing region. *See* ’784 Patent Claims 1-3. An example of these isolated conductive elements is provided in Figure 8A:

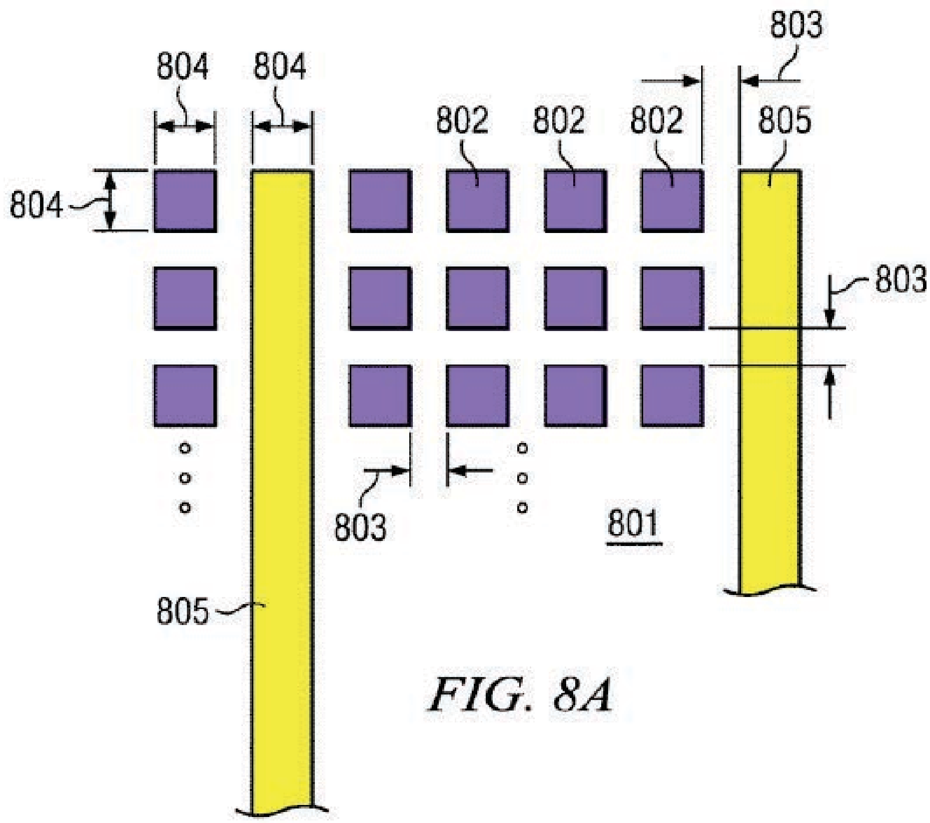


FIG. 8A

’784 Patent Fig. 8A.

D. U.S. Patent No. 10,088,960 (the “’960 Patent”)

30. The ’960 patent is directed towards a novel capacitive touch sensor design for use in devices with advanced touchscreen capability. The patent describes a prior art position sensor as including, for example, rows of drive electrodes and columns of sense electrodes, as shown in Figure 21 below, in which the sense electrodes are capacitively coupled to the drive electrodes where they cross so that a change in the measured sense signal on one or

more of the sense channels indicates that the finger or stylus was in proximity to those electrodes.

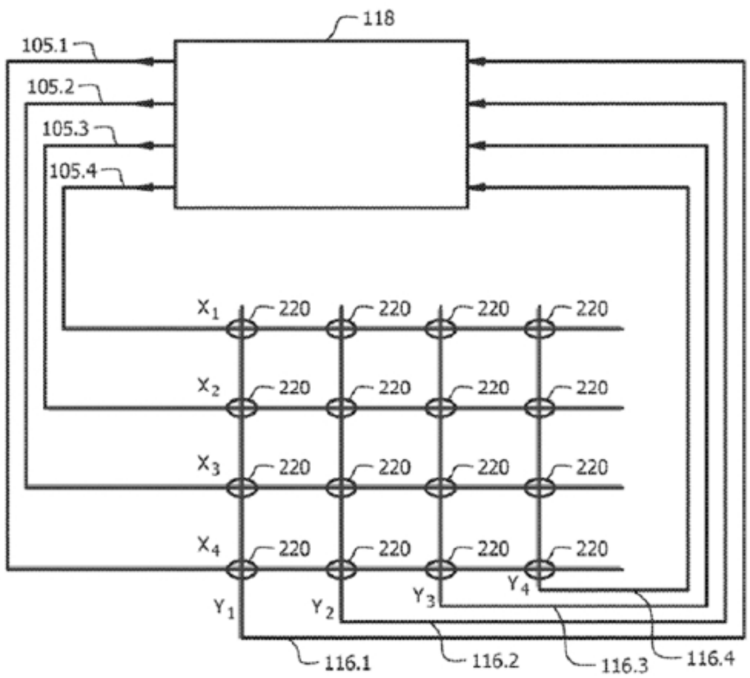


FIG. 21
(Prior Art)

31. The prior art had other designs, with other shortcomings. For example, Figure 22 (below) "illustrates a pattern of electrodes comprising longitudinal (bar) drive electrodes 152. The drive electrodes 152 are coupled via drive channels 158 and 160 to a controller (not shown in the figure). Each drive channel supplies drive signals to the group of four drive electrodes 152. The drive electrodes 152 are each connected to one another by a chain or row of resistors 170 having the same value:

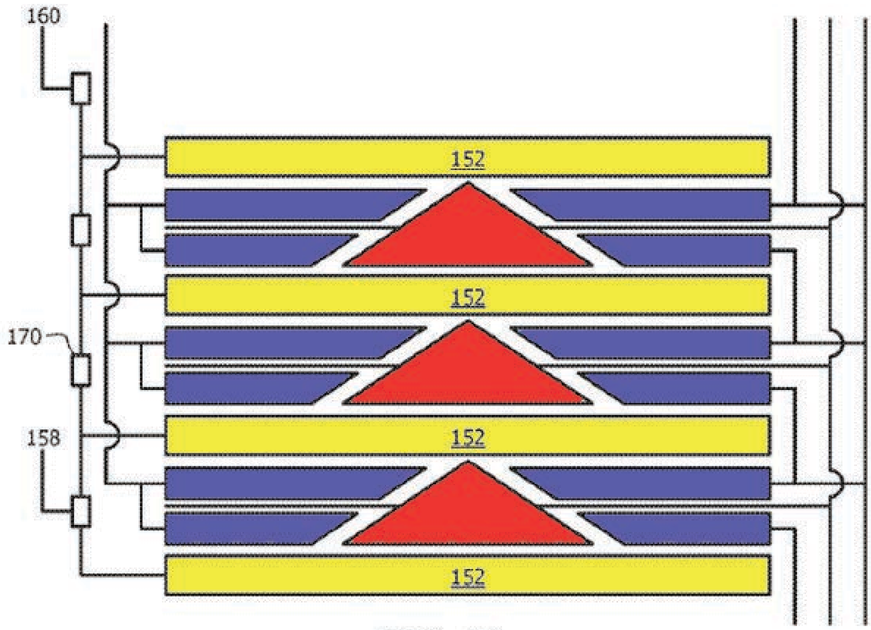


FIG. 22
(Prior Art)

32. But when operated the grouped drive electrodes will receive a different value drive signal. And the above method can only "be repeated with drive channel 158 being connected to a drive signal and drive channel 160 being connected to ground. This effectively, allows four drive electrodes to be driven using only two drive channels. The arrangement shown in the figure can be repeated and expanded to include more intermediate drive electrodes with respective resistors. However, the method described above is only suitable for the drive electrodes and is not transferable to the sense electrodes.

33. To overcome these and other shortcoming, the five named inventors explained that it "would therefore be desirable to provide an electrode pattern for a mutual capacitive or active type sensor that can be used to allow the size of the overall sensitive area to be increased without needing to introduce more sense channels."

34. Thus, they conceived the '960 patent. In 20 other figures and nearly 30 columns of specification teachings, it teaches forming the electrodes out of a mesh of conductive wires

that visually resemble a screen-like structure. The independent claims of the '960 patent recite mesh electrode segments, and Figure 17 (below) illustrates an exemplary embodiment of them:

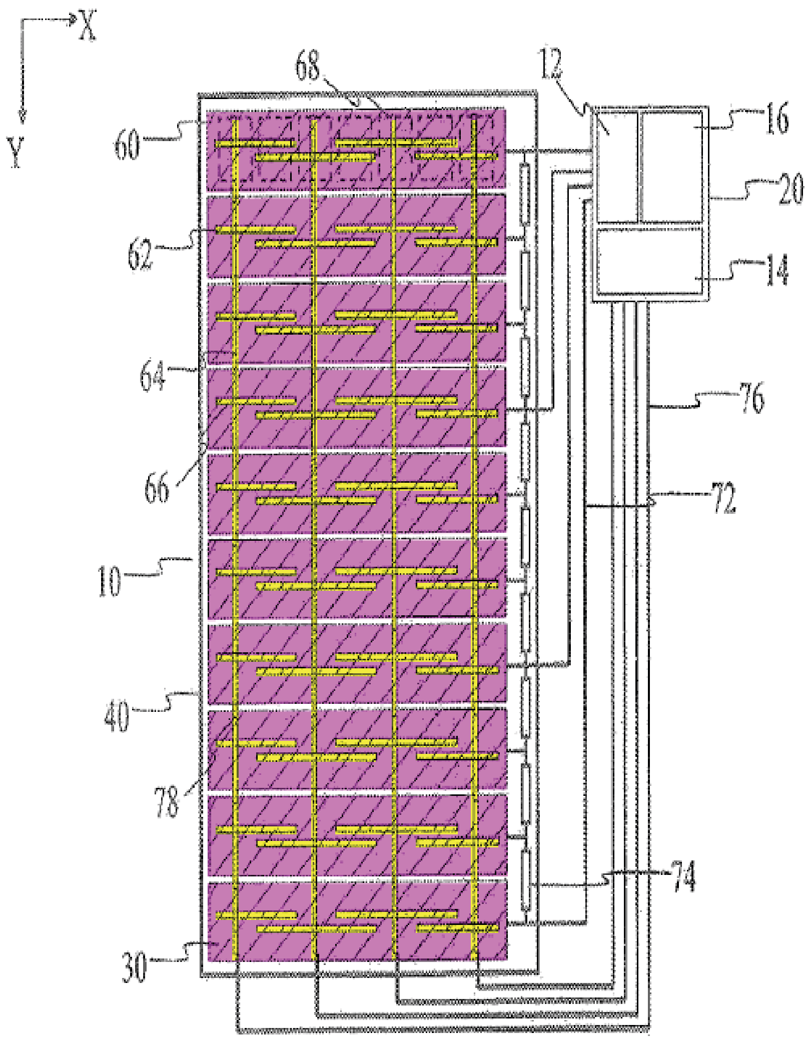


Figure 17

35. Figure 17 also illustrates a first mesh segment that forms a perimeter that defines a shape of one of the drive electrodes and a second mesh segment that spans across the perimeter of the first mesh segment. The sense electrodes, which include the interconnecting vertical and horizontal portions, are also made of mesh segments.

36. Claim 1 of the patent recites an exemplary independent claimed invention:

> 1. An apparatus comprising:
>
> a first substrate with sense electrodes of a touch sensor disposed on it;
>
> a second substrate with drive electrodes of the touch sensor disposed on it, one or more of the following being true:
>
> the sense electrodes of the first substrate are made of a first conductive mesh of conductive material such that the sense electrodes comprise the first conductive mesh, wherein the first conductive mesh comprises a plurality of interconnecting mesh segments occupying at least a portion of an area of the sense electrodes, each of the mesh segments of the first conductive mesh comprising a line of conductive material; and
>
> the drive electrodes of the second substrate are made of a second conductive mesh of conductive material such that the drive electrodes comprise the second conductive mesh, wherein:
> the second conductive mesh comprises a plurality of interconnecting mesh segments occupying at least a portion of an area of the drive electrodes,
> each of the mesh segments of the second conductive mesh comprises a line of conductive material,
> a first mesh segment of the interconnecting mesh segments forms a perimeter that defines a shape of one of the sense electrodes, and
> a second mesh segment of the interconnecting mesh segments spans across the perimeter of the first mesh segment; and
>
> an insulating layer between the sense electrodes of the first substrate and the drive electrodes of the second substrate.

E. U.S. Patent No. 7,821,502 (the "'502 Patent")

37. The '502 Patent, titled "Two-dimensional Position Sensor," was issued by the United States Patent and Trademark Office on October 26, 2010. Atmel Corporation, the original assignee of the '502 Patent, was a pioneer in the development of practical and high-performing touch sensor devices. The '502 Patent teaches innovative designs for positional capacitive touch sensors that provide accurate touch response while minimizing the number of sensing channels by employing a trace layout that includes wrap-around connection outside the sensing area. *See* '502 Patent at 1:27-2:61; 3:10-47.

38. For example, in one embodiment of the ’502 Patent, a position sensor comprises a substrate with an arrangement of electrodes mounted on a surface, where the electrodes define an array of sensing cells arranged in columns and rows to for a capacitive sensing area, where the sensing cells each include a column sensing electrode and a row sensing electrode, where the column sensing electrodes of the same column are electrically coupled together and the row sensing electrodes of the same row are electrically coupled together.

39. For example, Fig. 3 of the ’502 Patent shows an embodiment that has row wrap-around connections (e.g., element 38), which lie “outside of the sensing area…to ensure the respective row sensing electrodes of the other rows are connected together.” ’502 Patent at 6:53-7:10 (“The connection 38 runs around the outside of the sensing area to connect the electrode 34 providing the row sensing electrodes in columns x1 and x2 of row y2 with the electrode 36 providing the row sensing electrodes in columns x3 and x4 of row y2. Thus, all row sensing electrodes in this row are electrically connected together. Similar wrap-around connections outside of the sensing area are made to ensure the respective row sensing electrodes of the other rows are connected together.”).

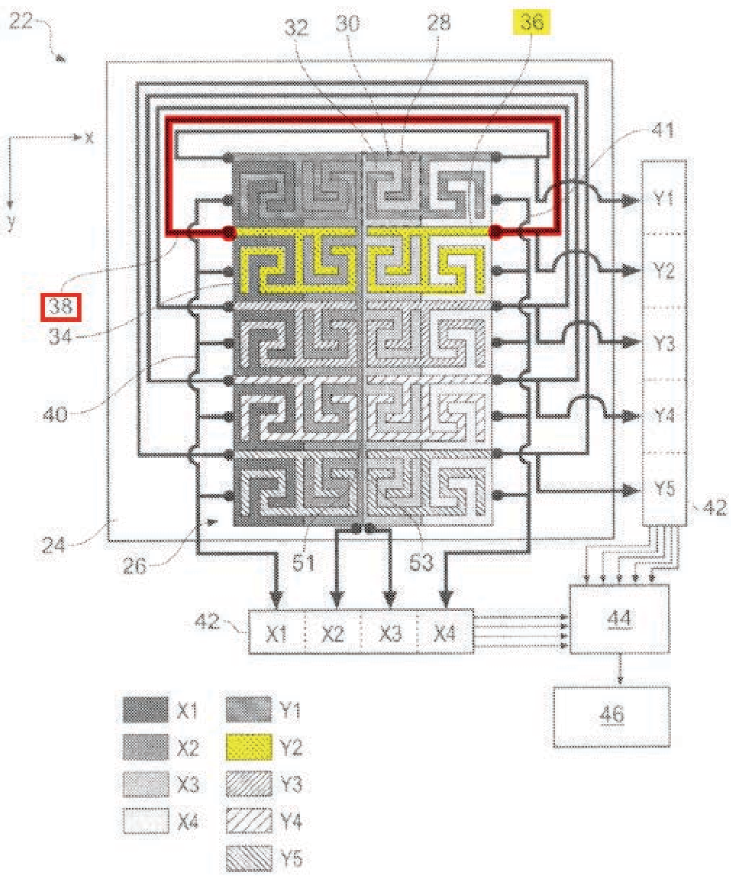


Fig. 3

’502 Patent Fig. 3.

V. LEVEL OF ORDINARY SKILL IN THE ART

40. In my opinion, a person of ordinary skill in the art (“POSITA”) for the patents I discuss here would be a person with a bachelor’s degree in physics, electrical engineering, or a related field, and at least two years of experience in the research, design, development, and/or testing of touch sensors, touchscreens and display stacks, human-machine interaction and interfaces, and/or graphical user interfaces, and related firmware and software. A person with less education but more relevant practical experience, or vice versa, may also meet this standard.

41. I further note that I am at least a POSITA and that for 50 years I have worked with colleagues who are POSITAs. Thus, I am well qualified to give technical opinions from the perspective of a POSITA.

VI. CLAIM CONSTRUCTION PRINCIPLES

42. I understand that a claim construction inquiry begins and ends in all cases with the actual words of the claim. Thus, quite apart from the written description and the prosecution history, the claims themselves provide substantial guidance as to the meaning of particular terms. I further understand that to begin with, the context in which a term is used in the asserted claim can be highly instructive. The patent specification can also shed light on the meaning of claim terms.

43. I understand that when conducting a claim construction inquiry, district courts are not (and should not be) required to construe every limitation present in a patent's asserted claims. Simply put, claim construction is not an obligatory exercise in redundancy. I further understand that where a term is used in accordance with its plain meaning, the court should not re-characterize it using different language.

44. I understand that there is a "heavy presumption" that claim terms carry their full ordinary and customary meaning, unless the accused infringer can show the patentee expressly relinquished claim scope. The ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention. Thus, the task of comprehending the claims often involves little more than the application of the widely accepted meaning of commonly understood words.

45. I understand that without clear and unambiguous disclaimer, courts do not import limitations into claims from examples or embodiments appearing only in a patent's written

description, even when a specification describes very specific embodiments of the invention or even only a single embodiment. Similarly, statements during patent prosecution do not limit the claims unless the statement is a clear and unambiguous disavowal of claim scope.

46. I understand that Defendant bears the burden of proving that a claim is indefinite by clear and convincing evidence. I understand that a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

VII. DISPUTED TERMS

A. DISPUTED TERMS FOR THE '502 PATENT

1. "a substrate having a surface with an arrangement of electrodes mounted thereon" ('502 Patent, claims 1, 2, 5–8, 11–14, 16)

Neodron's Proposed Construction	Defendants' Proposed Construction
Plain and ordinary meaning; no construction necessary: "a substrate having a **surface** with an arrangement of electrodes mounted thereon"	"a substrate having a **side** with an arrangement of electrodes mounted thereon"

47. It is my understanding that the dispute between the parties here is that whether the term "surface" in the longer claim phrase (shown above) of the '502 Patent should be changed to "side" instead, as proposed by Defendants.

48. The noun "surface," as in the phrase "a substrate having a surface" of the '502 Patent, has a plain meaning to a POSITA and needs no redefining as it is not a difficult technical term, and perhaps is not a technical term at all. For example, common dictionaries provide well-known definitions of "surface." Merriam-Webster, https://www.merriam-

webster.com/dictionary/surface, "surface" ("1. the exterior or upper boundary of an object or body…3a. the external or superficial aspect of something…3b. an external part or layer.") (Ex. 11); Lexico, https://www.lexico.com/en/definition/surface, "surface" ("1. The outside part or uppermost layer of something.") (Ex. 10).

49. The intrinsic record confirms that the substrate has a "surface," not a side. For example, the patent specification consistently describes a "substrate having a surface," and not as having a side. *See, e.g.*, '502 Patent at 2:49-51 ("the sensor comprising a substrate having a surface with an arrangement of electrodes mounted thereon."); '502 Patent at 4:55-57 ("the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon."); '502 Patent at Abstract ("The sensor comprises a substrate having an arrangement of electrodes mounted on a single surface thereof"). I do not find anything in the intrinsic record to suggest that the inventors intended "surface" to mean something else. I also do not find any evidence in the intrinsic record that suggests the inventors disclaimed portions of the scope of the term "surface" or acted as a lexicographer to redefine the term "surface."

50. To be clear, the term "side" is used in some portions of the patent specification for some embodiments, *outside* the claims, to convey the idea that an electrode is situated on one side of the substrate (and not both sides). *See, e.g.*, '502 Patent at 11:30-39 ("i.e., sensing electrodes on one side of the substrate only…a position sensor having sensing electrodes on one side of the substrate only."). Although for this embodiment ("sensing electrodes on one side of the substrate only"), the term "surface" could possibly be used interchangeably for "side," that is not always the case, and I do not find the possibility of them meaning the

same thing in some instances to be a reason to substitute "side" for the term "surface" in the claims because they do not necessarily mean the same thing.

51. For example, the '502 Patent uses the term "side" to refer to two distinct halves or portions on the same surface:

> In this example, the row and column sensing electrodes of each sensing cell do not spiral around one another. In sensing cells in column x2 (e.g. sensing cell 84) the column sensing electrode runs continuously through the sensing cell as a spine, with the row sensing electrode comprising two conductive regions ***on either side*** of the column sensing electrode.

'502 Patent at 10:61-67.

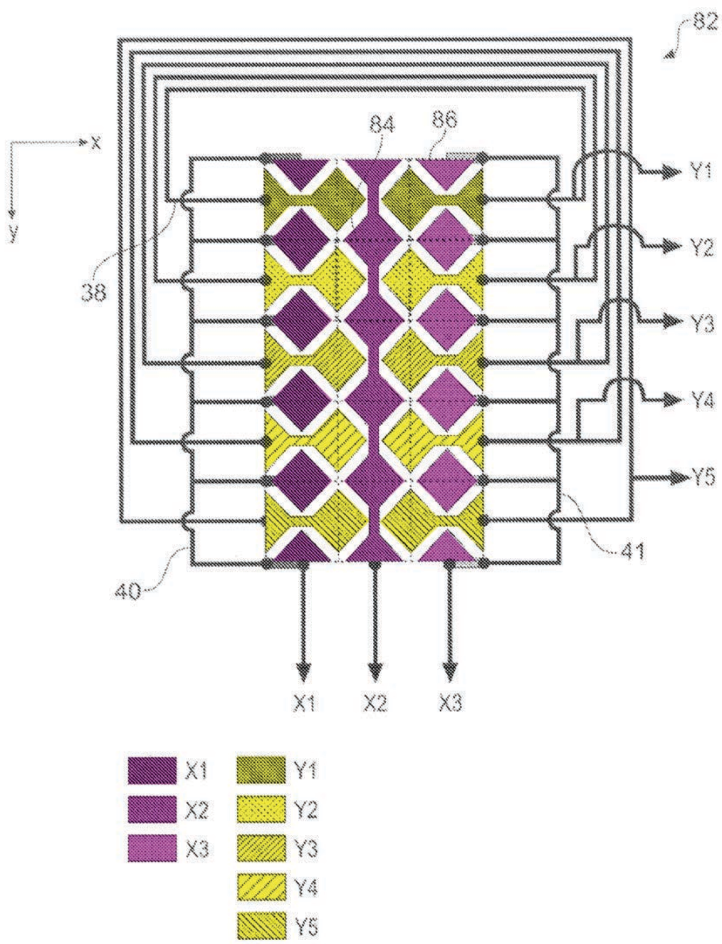


Fig. 8

’502 Patent at Fig. 8.

52. Relatedly, the term “outside” is not used in the ’502 Patent as something related to a surface, but rather to indicate that an item is beyond the boundary of another item. *See, e.g.*, ’502 Patent at 7:29-32 (“In an alternative design the connections made outside of the sensing area may be provided by conductive traces on the substrate similar to the electrodes forming the sensing area.”); *id.* at 6:62-65 (“The connection 38 runs around the outside of the sensing area to connect the electrode 34…”).

2. “sensing area” (’502 Patent, claims 1, 2, 5–8, 11–14, 16)

Neodron’s Proposed Construction	Defendants’ Proposed Construction
“an area defined by the sensing **cells**”	“an area defined by the sensing **electrodes**”

53. It is my understanding that the dispute between the parties is whether “sensing cells” define the boundaries of the “sensing area” or if Defendants’ “sensing electrodes” define the boundaries of the “sensing area.”

54. The claim language is informative and makes clear that electrodes, namely “a column sensing electrode and a row sensing electrode,” “define an array of sensing cells.” ’502 Patent at claim 1. In turn, it is those resulting “sensing cells” that define the disputed “sensing area” because the resulting “sensing cells [are] arranged in columns and rows to form a capacitive sensing area of the sensor”:

> wherein the electrodes define an array of ***sensing cells*** arranged in columns and rows ***to form a capacitive sensing area of the sensor***, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together

’502 Patent Claim 1 (emphasis added). This is the reading that a POSITA would observe from the independent claims.

55. Further, the intrinsic record confirms that each “sensing cell” is formed of at least one row-sensing electrode and at least one column-sensing electrode. For example, the patent specification states that each sensing cell includes a column sensing electrode and a row sensing electrode. *See, e.g.* ’502 Patent at 2:51-55 (“wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, ***each sensing cell including a column sensing electrode and a row sensing electrode…***” (emphasis added); ’502 Patent at 4:57-61 (“each sensing cell including a column sensing electrode and a row sensing electrode.”); ’502 Patent at 6:8-9 (“Each sensing cell includes a row sensing electrode 30 and a column sensing electrode 32.”).

56. Each depiction of a “sensing cell” in the 502 Patent includes both a row-sensing electrode and a column-sensing electrode. For example, Fig. 3 depicts an exemplary sensing cell 28 surrounded by a dotted outline. This sensing cell, like all the other sensing cells in Fig. 3, contains a row-sensing electrode (in this case, y1) and a column-sensing electrode (in this case, x3):

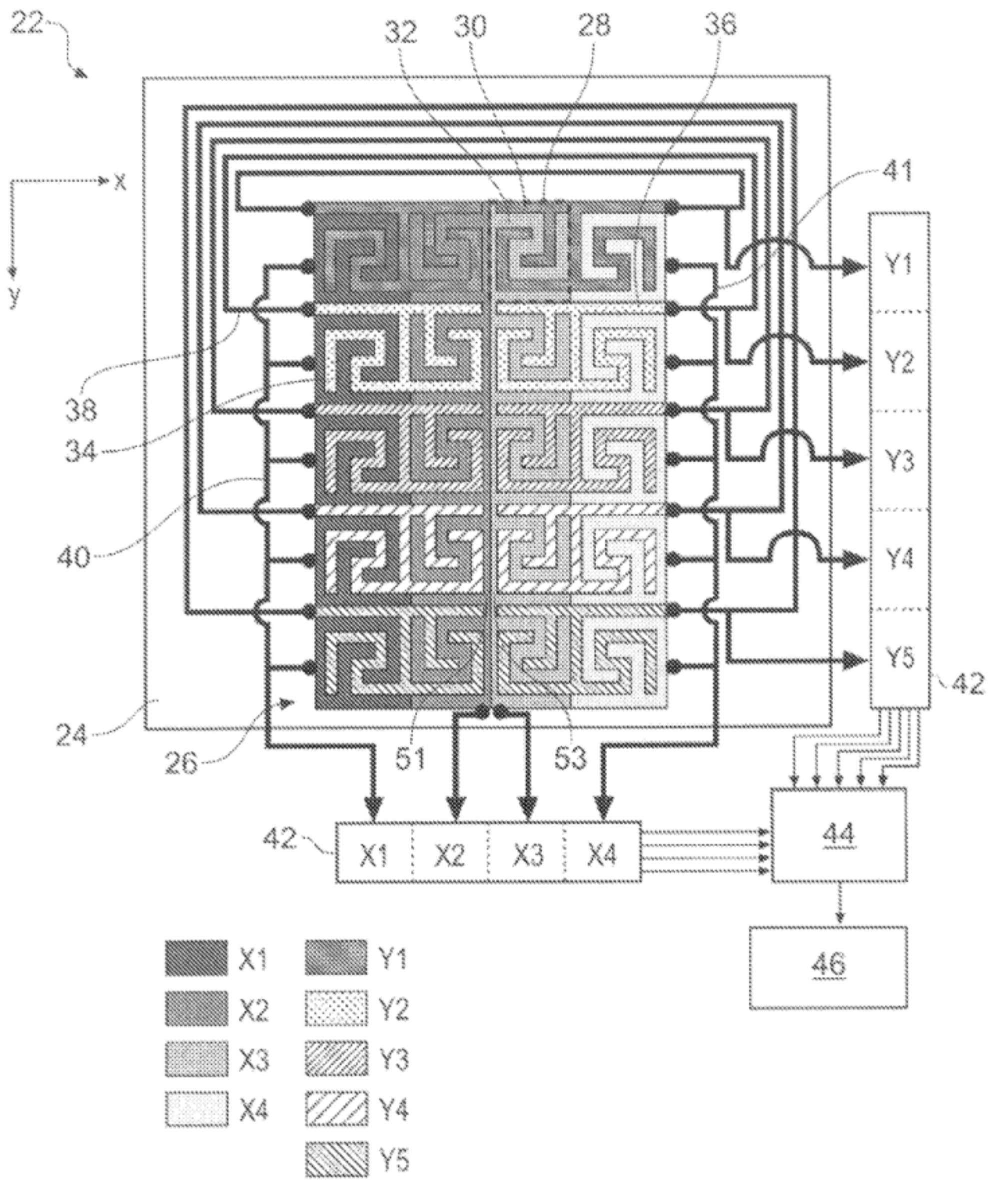


Fig. 3

’502 Patent at Fig. 3; *see also* ’502 Patent at 5:58-6:7.

57. The dependent claims also consistently support this construction. For example, though each sensing cell must include at least a portion of at least one row sensing electrode and one column sensing electrode, the claims consistently refer to the “sensing cells” that exist at and defines the boundary or “edge” of a sensing area. *See, e.g.*, ’502 Patent at Claim 4 (“The position sensor of **1**, wherein the column sensing electrodes of a column ***of sensing***

cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.") (emphasis added).

58. This relationship between the sensing cells, and its role in defining the sensing area, is further discussed in the specification. *See, e.g.*, '502 Patent at 3:48-51 ("The ***sensing cells*** may be arranged into three or four columns. ***This can provide*** a position sensor with sufficient resolution ***over a typically sized sensing area*** for most applications.") (emphasis added). In other words, the sensing cells define the "edge" of the sensing area:

> ***In sensing cells in columns at the edge of the sensing area*** (i.e. columns x1 and x3, e.g. sensing cell 86) the row sensing electrode runs continuously through the sensing cell with the column sensing electrode comprising two conductive regions on either side of the row sensing electrode.

'502 Patent at 10:67-11:5 (emphasis added); *see id.* at 3:17-20 ("The column sensing electrodes of a column of sensing cells at an edge of the sensing area may be electrically coupled to one another by column wrap-around connections made outside of the sensing area in a similar fashion.").

59. Like the example of dependent claim 4, the '502 Patent further makes clear that, unlike the role of the sensing cell, the sensing electrodes do not have to run to the "very edge" of the sensing area:

> It is noted that although one is shown in FIG. 3, a connection outside of the sensing area between the row sensing electrodes at opposing ends of row y1 is not required because the spines connecting between the column sensing electrodes of columns x2 and x3 ***need not extend to the very edge of the sensing area*** and a connection running along the top edge of the sensing area could be used to connect between the row sensing electrodes in row y1 (not shown).

'502 Patent at 7:3-10 (emphasis added).

3. "wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area" ('502 Patent, claims 1, 2, 5–8, 11–14, 16)

Neodron's Proposed Construction	Defendants' Proposed Construction
Plain and ordinary meaning, which is "wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by **respective connections that wrap around and are made outside of the sensing area**."	Plain and ordinary meaning, which is "wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by **respective row wrap-around connections made outside of the sensing area**."

60. In my opinion, Neodron's claim construction proposal, shown above, is consistent with and faithful to the intrinsic record because it gives proper meaning to the claim term "respective row-wrap-around connections made outside of the sensing area." Defendants' construction is merely the claim language verbatim. For example, Fig. 3 of the '502 Patent shows an embodiment that has row wrap-around connections (e.g., element 38), which lie "outside of the sensing area…to ensure the respective row sensing electrodes of the other rows are connected together." '502 Patent at 6:53-7:10. This portion of the specification makes clear that the species of "connections" recited are "connections" configured to "run[] around the outside of the sensing area to connect the electrode 34 providing the row sensing electrodes in columns x1 and x2 of row y2 with the electrode 36 providing the row sensing electrodes in columns x3 and x4 of row y2." '502 Patent at 6:62-66; '502 Patent at 6:66-7:3 ("Thus all row sensing electrodes in this row are electrically connected together. Similar wrap-around connections outside of the sensing area are made to ensure the respective row sensing electrodes of the other rows are connected together."); *see also id.* at Fig. 3 (below).

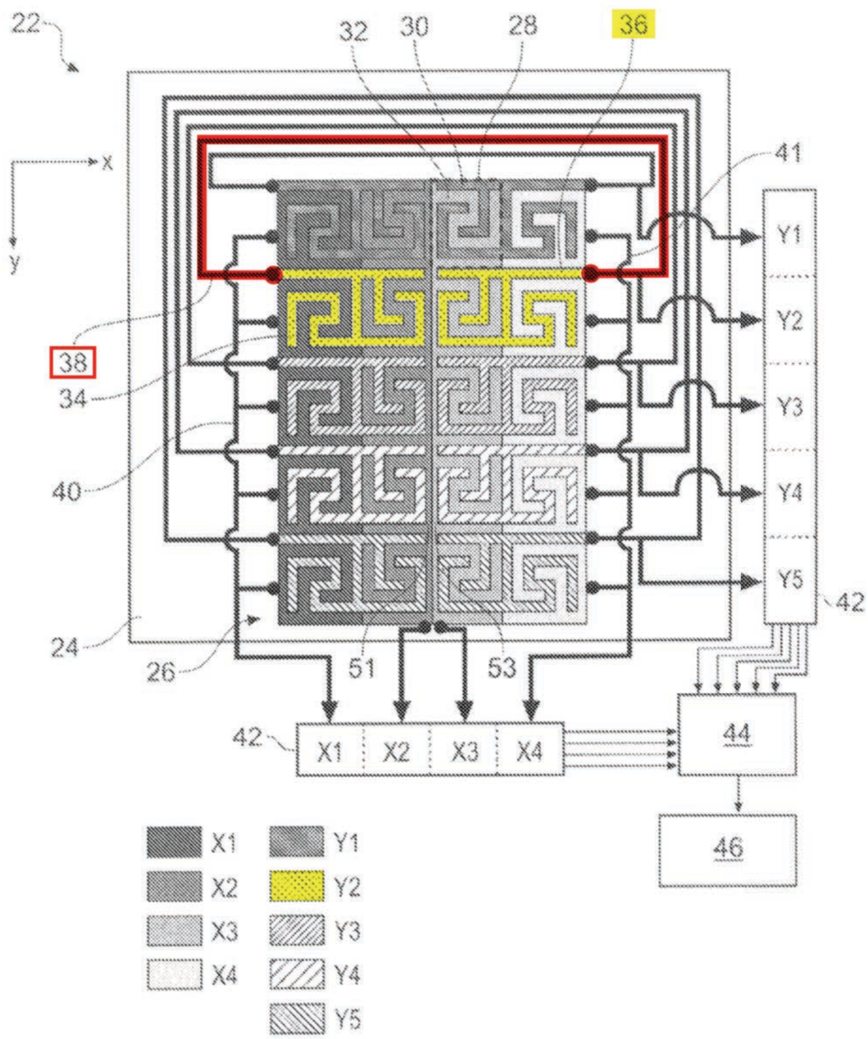


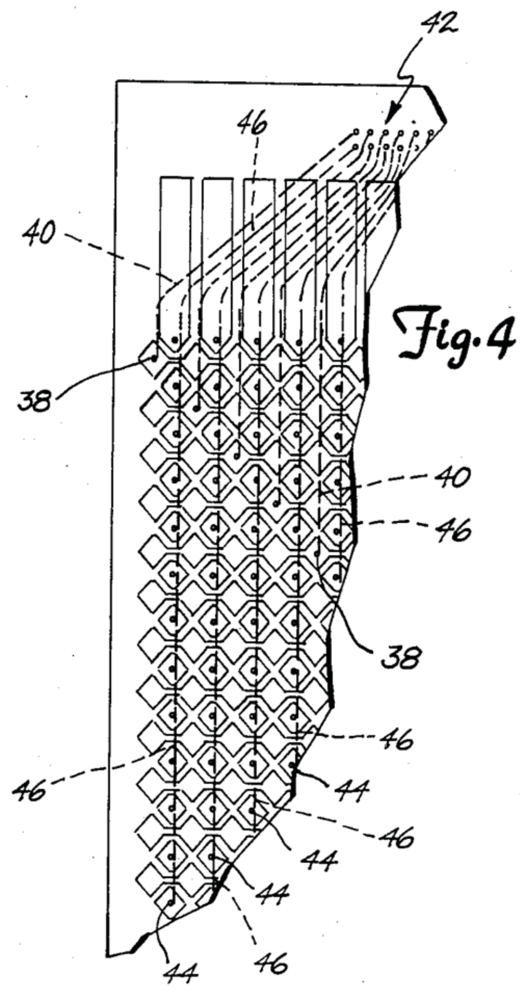
Fig. 3

61. As further evidence, during prosecution the patentee made clear that not every "connection" between rows qualifies as a "wrap-around" connection. The patentee also explained the purpose of "row wrap-around connections" is to couple the opposing ends of the row electrodes together:

> For example, claim 1 recites, in part, "wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area."

> *Mabusth shows only one end of a column of electrode plates 44 coupled to something other than an adjacent electrode plate.* (Mabusth; FIG. 4.) Adjacent electrode plates within the column are connected together with conductors 46 located on the bottom surface of the substrate. (Mabusth; FIG. 4; col. 4, lines 49-55) *The conductors 46 are positioned completely within the sensing area of the electrode pattern. (Mabusth; FIG. 4)*
>
> Thus, Mabusth does not show or teach electrodes of sensing cells at opposing ends of a row (or column) connected ***using a wrap-around connection,*** in contrast to the above quoted elements of independent claim 1. Additionally, since Mabusth does not show or teach such a wrap-around connection, Mabusth also does not teach or show that such connections are made outside the sensing area, as also quoted above in claim l.

Ex. 29 (Response to Office Action, November 24, 2009) (emphasis added); *see* Ex.28 (Mabusth) at Fig. 4.



62. In another response, the patentee gave a similar explanation to distinguish over the prior art that did not show a coupling at opposing ends of row sensing electrodes:

> FIG. 4 of Mabusth shows electrode plates forming column electrodes. "The plates of each column Xl through X12 are connected together by means of plated-through holes 44 and conductors 46 which are located on the bottom surface of substrate 28 (as shown in FIG. 4)." (Mabusth; col. 4, lines 50-54). The rejection appears to state that a column of plates at the edge of the sensing area in FIG. 4 of Mabusth "teaches where at least one of the rows are electrically coupled to one another in Figs. 3 & 4". (Office Action, section 7) However, claim 1 recites "wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another". Mabusth does not show electrode plates at opposing ends of a row (or column) electrically coupled together as required in claim 1.
>
> Additionally, claim 1 goes on to recite that the above-quoted row sensing electrodes are coupled to one another ***"by respective row wrap-around connections made outside of the sensing area".*** In contrast to the above-quoted elements of claim 1 and the assertions of the rejection, the conductors 46 connecting one sensing plate to another sensing plate in FIG. 4 of Mabusth appear to all be shown within the sensing area of the touch sensitive device.

Ex. 30 at 0059 (Response to Office Action, April 19, 2010) (emphasis added); *see* Ex. 28 (Mabusth) at Fig. 4.

63. Based on my review of the intrinsic record, it is clear that "row wrap-around connections" connect to the opposing ends of a row electrode, where the "connection" is routed and runs around the outside the touch sensing area.

B. DISPUTED TERMS FOR THE '574 PATENT

1. "mesh" ('574 Patent, claims 1, 8, 15)

Neodron's Proposed Construction	Defendants' Proposed Construction
Plain and ordinary meaning; no construction necessary: "**mesh**."	Dell: "**set of wires that surround open spaces in a net or network**" HP/Microsoft/Lenovo: Plain and ordinary meaning, i.e., "**set of thin wires that surround open spaces in a net or network**"

64. I am informed that Defendants recently represented to the PTAB that "[m]esh electrodes" generally were "known well in advance of the priority date of the '574 patent." Ex. 27 ('574 IPR [IPR2020-00459]) at 13.

65. It is my understanding that some Defendants now propose that this Court replace the term "mesh" with other words, as shown in the table above. For example, Defendants propose words such as "net" and "network," which have meaning that may or may not be related to (or may or may not be helpful to understand the meaning of) a "mesh."

66. To a POSITA, however, portions of Defendants' would appear inconsistent with the plain meaning of "mesh," especially with regard to the pattern of a mesh electrode. For example, it is not clear what Defendants intend by the terms "net" or "network," as these terms may not connote a web-like pattern or interlaced and intricate structures. Merriam-Webster, https://www.merriam-webster.com/dictionary/mesh, "mesh" ("a weblike pattern or construction") (Ex. 15); Lexico, https://www.lexico.com/en/definition/mesh, "mesh" ("An interlaced structure…form[ing][intricate meshes…") (Ex. 14) .

67. Further, Defendants inclusion of other terms also improperly alter the plain and ordinary meaning of "mesh." For example, the terms "wire" and "thin wires" suggests that only

certain types of materials may be used in a "mesh." Based on my review, the '574 Patent does not use the term "wire" to describe anything inherent to the plain meaning of mesh. On the other hand, the '574 Patent uses *other descriptions*, such as consistently describing a mesh as being of "conductive material," "thin conductors," or comprising "cells." *See, e.g.*, '574 Patent at 1:52-55 ("The opaque metal electrodes may be made of a conductive mesh of thin conductors, which may be of copper, silver or other conductive materials."); *id.* at Abstract ("the drive or sense electrodes are made of a conductive mesh of conductive material including metal."); *id.* at 4:58-59 ("square shaped mesh cells"). Notably, the intrinsic record does not support the notion that a metal mesh could be made of the widely used "indium tin oxide" (ITO). It is also my opinion that a POSITA would also not find that ITO electrodes would be considered metal mesh electrodes.

68. The intrinsic record provides examples of what a "mesh" could be. In my opinion, these examples—though not exhaustive—along with a POSITA's knowledge in the field of art, provide a POSITA with the understanding of the plain and ordinary meaning of "mesh." For example, most figures of '574 Patent are relevant in showing different examples of "mesh," including Fig. 2a, Fig. 6 (showing sinusoidal mesh elements), and Fig. 14 (showing irregular/random mesh elements). I provide some examples from the intrinsic record below to support my position.

'574 Patent at 1:51-56:

> While clear conductors such as ITO may be used for electrodes, opaque metal electrodes also may be used. The opaque metal electrodes may be made of a conductive mesh of thin conductors, which may be of copper, silver or other conductive materials. The thin conductors may be made very thin as to be substantially invisible to the naked eye.

'574 Patent at 3:61-4:32:

> FIG. 2 a illustrates an exemplary electrode pattern 10 which may be used in the touch position-sensing panel 1. The exemplary electrode pattern may be used to form any one electrode of either set of the electrodes 4 (X) and 5 (Y). The electrode pattern 10 may be formed by a number of straight conductive lines 11 arranged to interconnect at connection points to define a conductive grid or mesh pattern made up of an array of square shaped mesh cells 13 arranged in a layer. The connection points of the conductive lines 11 are the vertices 12 of the square shaped mesh cells 13. The conductive lines may be formed of copper with a width in the range approximately 1 μm to approximately 10 μm and size of the mesh pattern, that is, the spacing of the vertices, may be in the range approximately 500 μm to approximately 10 mm. In one example, the electrode pattern 10 may be arranged so that no more than approximately 5% of the surface of the touch position-sensing panel is covered by the conductive lines 11. Thus, the contribution of the conductive lines to the attenuation of light through a sensor should not be more than approximately 5%. Accordingly, although the conductive lines 11 may be opaque, in this example, the combined optical transmissivity of the electrode pattern 10 and all other electrode patterns on the panel may be 90% or more, allowing any display below the touch position-sensing panel 1 to be visible with little perceptible darkening or other loss of display quality.
>
> In other examples, the electrode pattern may be formed by a number of square shaped mesh cells 13 a that do not have four metal lines meet at vertices. Instead of the connection points of the conductive lines being the vertices of the square shaped mesh cells as shown in FIG. 2 a, in FIG. 2 b, each of the square shaped mesh cells 13 a may be separated from adjacent cells by a connecting segment 14. This arrangement may result in reduced line density on the vertices 12 by reducing the number of converging metal lines 11 a from 4 to 3. While the connecting segments 14 in FIG. 2 b are straight, in other examples, the connecting segments may be sinusoidal or non-linear, and may be at any angle relative to the vertices 12 a.

’574 Patent at 4:44-59:

> In other examples, the mesh pattern may be made up of an array of other regular trapezoid shaped mesh cells. In one example, the mesh pattern may be made up of an array of two different diamond shaped mesh cells which tessellate to form the mesh pattern.
>
> An example of a portion of an electrode pattern 14 is shown in FIG. 4. In this illustrated example, the electrode pattern 14 may be formed of conductive lines 15 arranged to interconnect at connection points to define a conductive grid or mesh pattern made up of an array of substantially square shaped mesh cells 17 arranged in a layer. The connection points of the conductive lines 15 form vertices 16 of the square shaped mesh cells 17. In FIG. 4, a single substantially square shaped mesh cell 17 is shown

together with parts of the conductive lines 15 defining adjacent substantially square shaped mesh cells 17.

’574 Patent at Figs. 2A, 6, and 14:

FIG. 2a

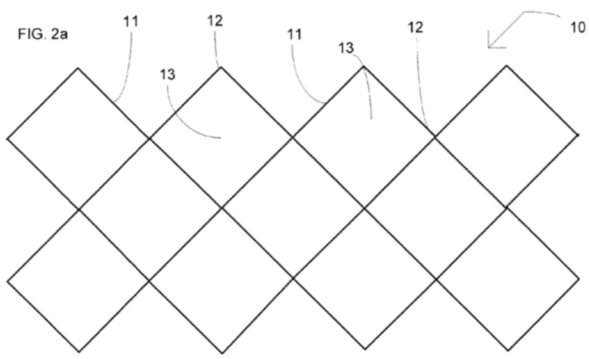


FIG. 6

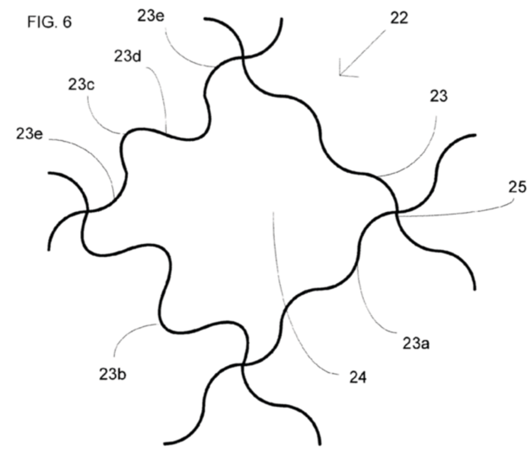
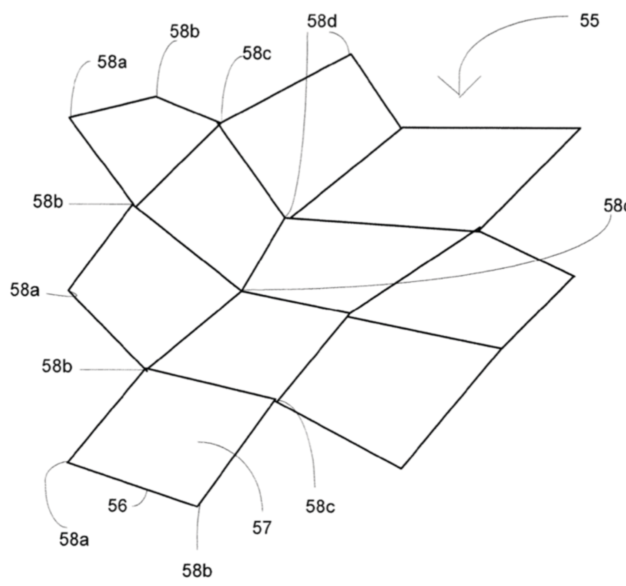


FIG. 14



C. DISPUTED TERMS FOR THE '960 PATENT

1. "interconnecting mesh segments" ('960 Patent, claims 1, 9, 17)

Neodron's Proposed Construction	Defendants' Proposed Construction
Plain and ordinary meaning, which is "**interconnecting lines of conductive electrode material forming a mesh pattern,** instead of a continuous layer of conductive electrode material."	"**interconnected fine lines of highly conducting wire or traces**, instead of a continuous layer of conductive electrode material"

69. Similar to my discussion above for the "mesh" term for the '574 Patent, Defendants appear to include material-related limitations "wire or traces," "fine," and "highly conducting" in this claim limitation, which is improper for the reasons I provided for the "mesh" term for the '574 Patent.

70. Other than that, it appears there is no real dispute, as the only difference is that Defendants are construing the term "interconnecting" as "interconnected," which appears to have no difference as used here. And the parties appear to agree on the term "segments."

71. Again, the main dispute is on the term "mesh." As I have stated, this term has a plain meaning to a POSITA, especially one with the '960 Patent in hand. Defendants' proposed construction does not include any reference to the pattern of a mesh electrode design, which is inherent to its plain meaning, like I have discussed for the '574 Patent above. For example, here, Defendants' proposed construction is even more uninformative than their proposal of "mesh" for the '574 Patent, where they made reference to a "net" or "network" pattern.

72. For example, it would appear that Defendants' proposal for this claim term may result in prior art designs, that a POSITA would not recognize as mesh, to be call within the scope of the claim limitation. *See, e.g.*, '960 Patent at Fig. 21.

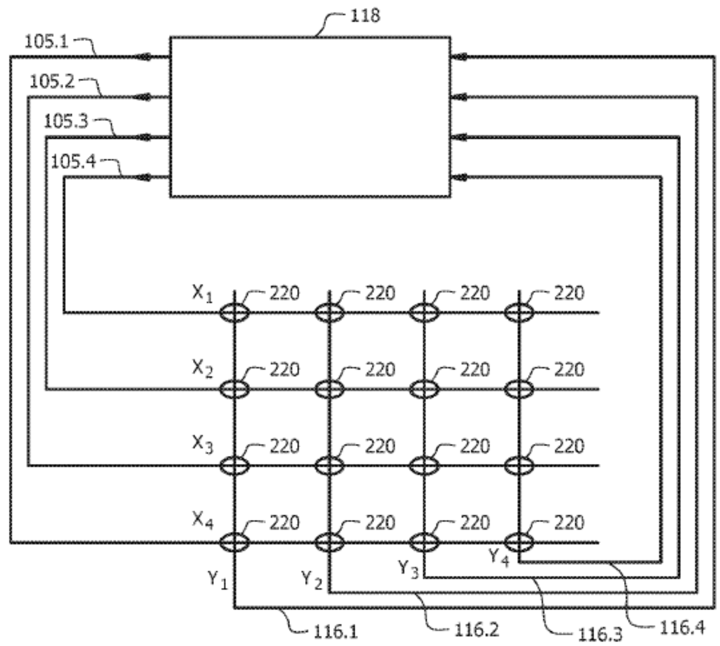


FIG. 21
(Prior Art)

73. Again, to support my position, I rely on the following passages in the '960 Patent, which are consistent with the passages regarding "mesh" in the '574 Patent, and are consistent with my opinion on the term "mesh" for the '574 Patent.

'960 Patent at Abstract:

> In certain embodiments, an apparatus includes a first substrate with sense electrodes of a touch sensor disposed on it and a second substrate with drive electrodes of the touch sensor disposed on it. One or more of the following is true: the sense electrodes of the first substrate are made of a first conductive mesh of conductive material such that the sense electrodes include the first conductive mesh; and the drive electrodes of the second substrate are made of a second conductive mesh of conductive material such that the drive electrodes include the second conductive mesh. The apparatus also includes an insulating layer between the sense electrodes of the first substrate and the drive electrodes of the second substrate.

'960 Patent at 5:24-36:

> In some embodiments, each drive and/or sense electrode is made of a continuous sheet of electrically conductive material, such as ITO or a metal. In other embodiments, each drive and/or sense electrode is made of

> a mesh or filigree pattern of interconnected lines of highly conductive material which collectively define each electrode. Still further embodiments use continuous sheets for one of the electrode types and meshes for the other electrode type. In the mesh approach, the interconnected lines preferably have a sufficiently small width so as to be invisible or almost invisible. They can then be made of material that is not inherently invisible, e.g. a metal such as copper, but still remain practically invisible.

'960 Patent at 26:3-48:

> FIG. 17 is a view of a front side of a position sensor 10 according to another embodiment of the invention. The position sensor shown in FIG. 18 is similar to the sensor shown in FIG. 12 in layout and operation. However, the position sensor shown in the figure has an alternative arrangement of electrodes. The drive and sense electrodes shown in the figure are made up of thin wires or a mesh of wire instead of the continuous layer of electrode material shown in FIG. 12. The drive electrodes 60 are constructed by a rectangular perimeter of wire to define the shape of the drive electrode with a series of diagonal wire lines going across the rectangular perimeter. The diagonal lines are typically at an angle of 45 degrees to an axis running along the x-direction. The diagonal lines and the rectangular perimeter of each drive electrode are electrically connected and connected to the drive unit 12 via the drive channels 72. The wires or mesh are manufactured from metal wires e.g. copper, but could also be made of gold or silver. Similarly the sense electrodes are also manufactured using a thin metal trace that follows the perimeter of the sense electrode pattern shown in FIG. 12. The sense electrodes 62 are relative narrow compared to the drive electrodes 60, so there is no need to use in-filling with diagonal lines. However, some extra wires are added within the sense electrode mesh structure as shown in FIG. 17 by short lines 78. This is to add redundancy in the pattern, so that if there is a defect in the electrode wire at one location, the current has an alternative path. Such defects can occur if there is a defect in the optical mask used to pattern the wires or if there is debris on the surface of the wires during processing. It will be appreciated that the electrode arrangements shown in FIG. 16 and FIG. 17 may also be constructed from the electrode wires or mesh as described above.
>
> It will be understood that the "mesh" or "filligrane" approach to forming each electrode out of a plurality of interconnected fine lines of highly conducting wire or traces may be used for either Layer 1 (X drive), Layer 2 (Y sense) or both. The FIG. 17 embodiment uses meshes for both layers. However, a particularly preferred combination for display applications or other applications where invisibility is important is that Layer 1 is made with non-mesh, i.e. "solid" electrodes with the small, invisible gaps, for example from ITO, and Layer 2 is made with mesh electrodes, for

example out of copper, having line widths sufficiently small to be invisible also.

’960 Patent at Fig. 17:

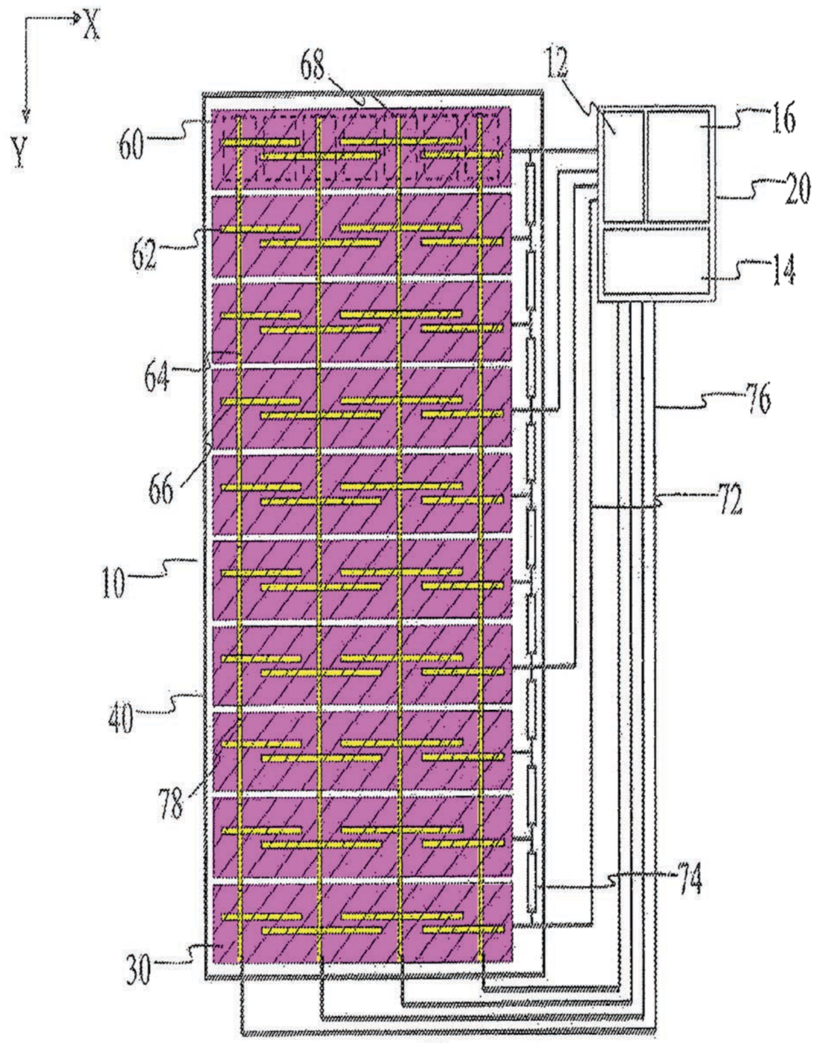


Figure 17

D. DISPUTED TERMS FOR THE '770 PATENT

1. "generally straight line" ('770 Patent, claim 7)

Neodron's Proposed Construction	Defendants' Proposed Construction
Plain and ordinary meaning; no construction necessary.	Indefinite.

74. The phrase "generally straight line," as used in the '770 patent, has its plain and ordinary meaning and is readily understandable to a POSITA. It encompasses both a perfectly straight line as well as some deviation from mathematical perfection. A POSITA would have more than reasonable certainty about the scope of this term.

75. A POSITA would be able to rely on the claim language, the figures, and the written specification to confirm and understand the plain meaning of the term "generally straight line." For example, a POSITA reviewing Figures 3 and 4 of the '770 patent, along with the accompanying description of interdigitated electrodes (Fig. 3) and generally quadrilateral electrodes (Fig. 4), would readily understand that Fig. 3 depicts an electrode design where the gaps between adjacent electrodes (labeled as 140a in the figure, likely a typo for 104a as described in the specification) do not run in a "generally straight line," whereas Figure 4 depicts a design where the gaps (104b) do run in a "generally straight line." It is clear from context that the patent claims do not encompass the pattern of figure 3A. This provides even more clarity to a POSITA about what is "generally straight" and what is not "generally straight."

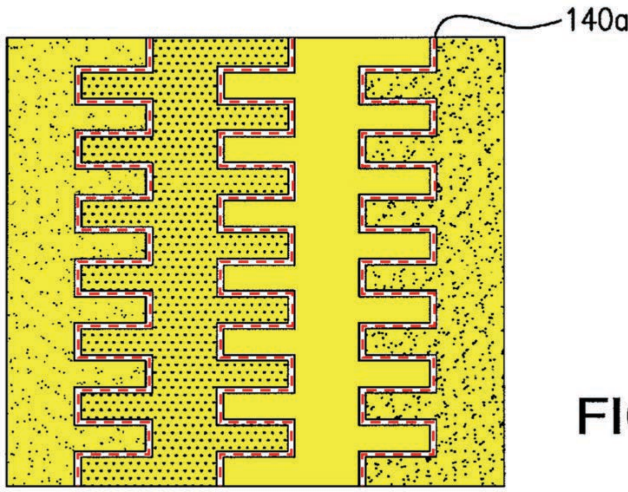


FIG. 3A

’770 Patent Fig. 3A.

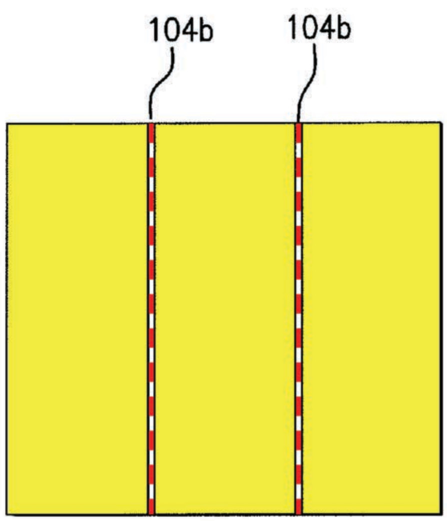


FIG. 4A

’770 Patent Fig. 4A.

76. Furthermore, a POSITA reading the specification would understand that the purpose of having an electrode design where the gaps between adjacent electrodes run in a substantially straight line is to accommodate limitations of the mesh cutting process required to form the electrode. As the specification describes:

> Although this approach may improve accuracy of the reported touch coordinate, the interdigitated pattern may make it difficult to employ

> in touch sensors with certain space or shape requirements that may prevent or limit the very precise cuts required in the conductive mesh. In embodiments employing a conductive mesh with a node pitch of a certain dimension, it may be difficult or impossible to use an interdigitated design. For example, if the node pitch of an electrode is 4 mm, the node pitch of the base portion or spine of the electrode may be 2 mm and the node pitch of the digits extending from the base portion may be 1 mm. These electrode configurations may produce limited or no redundancy and/or may result in a touch sensor with limited or no functionality, both of which are undesirable results.

’770 patent at 8:32-39.

77. This is not to be confused with the specification’s separate disclosure of gap widths, e.g. the 5 to 20 micron gaps recited in the claim limitations. A POSITA would have readily understood that although forming a 5 to 20 micron gap might require *small* or *fine* cuts, that would not undermine or contradict the specification’s disclosure of the benefits of substantially quadrilateral electrodes having edge gaps in substantially straight lines, which do not require *precisely located* cuts. A POSITA would by no means understand that a mesh pattern formed of 5 to 20 micron gaps would necessarily have those gaps running in mathematically perfect straight lines (or in any other mathematically precise shape). Nor would a POSITA find any inconsistency between the 502 patent claims’ requirement of small 5 to 20 micron gaps, on the one hand, and the requirement that those gaps run only in a generally straight line, on the other hand.

E. DISPUTED TERMS FOR THE ’784 PATENT

1. “wherein the plurality of drive electrodes are substantially area filling within the sensing region relative to the plurality of sense electrodes” (’784 Patent, claims 1–3)

“together, the plurality of sense electrodes and the plurality of isolated conductive elements are substantially area filling within the sensing region relative to the plurality of sense electrodes” (’784 Patent, claims 1–3)

Neodron’s Proposed Construction	Defendants’ Proposed Construction
Plain and ordinary meaning; no construction necessary: “wherein the plurality of drive electrodes are **substantially area filling** within the sensing region **relative to** the plurality of sense electrodes”	Indefinite
Plain and ordinary meaning; no construction necessary: “together, the plurality of sense electrodes and the plurality of isolated conductive elements are **substantially area filling** within the sensing region **relative to** the plurality of sense electrodes”	Indefinite

78. These two terms are substantially similar in terms of the disputed phrase “substantially area filling . . . relative to.” Both terms are readily understandable to a POSITA. The plain, lay understanding of the term is sufficiently clear; furthermore, in light of the intrinsic record, a POSITA would readily understand what it means to be “substantially area filling… relative to.”

79. A POSITA would readily understand that the purpose of having the electrode substantially fill the sensing area is to prevent the electrodes from being visible. But the electrical requirements of drive and sense electrodes require some gap between adjacent electrodes. The specification provides specific guidance how to resolve this tension, which allows a POSITA to understand when the electrodes substantially fill the sensing area:

> Two-dimensional touch screens are typically used as on overlay on a display screen. The area filling design of the driven electrodes

> leads to an almost invisible electrode pattern. The area filling design also provides partial attenuation of noise coupled from an underlying LCD module or other noise source.

’784 Patent at 8:4-9. And:

> Overall, the bars in Layer 1 can be seen to be substantially area filling; almost all of the surface area is flooded with electrode. The gaps between the bars 205 can be made arbitrarily small and indeed, the smaller the better from a visibility point of view. Making the gaps larger than around 100 μm is non-ideal as this leads to increased visibility of the gap to the human eye and a key goal is often to try and ***make*** an invisible touch screen. A larger gap also tends to increase the possibility of a significant fringing electric field near the gap to electrodes in Layer 2 which will lead to worsening non-linearity. Gaps of a few 10's of micrometers are common as they are almost invisible and can be easily mass-produced, for example gaps of between 20 and 50 micrometers.

’784 Patent at 12:5-18.

80. Together, these provide more than adequate guidance to a POSITA to understand the scope of the claim.

81. Furthermore, a POSITA would have no difficulty understanding that the term “relative to” is used in this context in its ordinary sense, *i.e.* as a relative comparison of two things.

82. The ’784 Patent specification discloses that “The drive electrodes are shaped and dimensioned to substantially entirely cover the touch sensitive area with individual drive electrodes being separated from each other by small gaps, the gaps being so small as to be practically invisible.” ’784 Patent at Abstract. This is illustrated primarily in Figures 2A and 7B, where the drive electrodes run horizontally from the side of the page to the other side, as shown below:

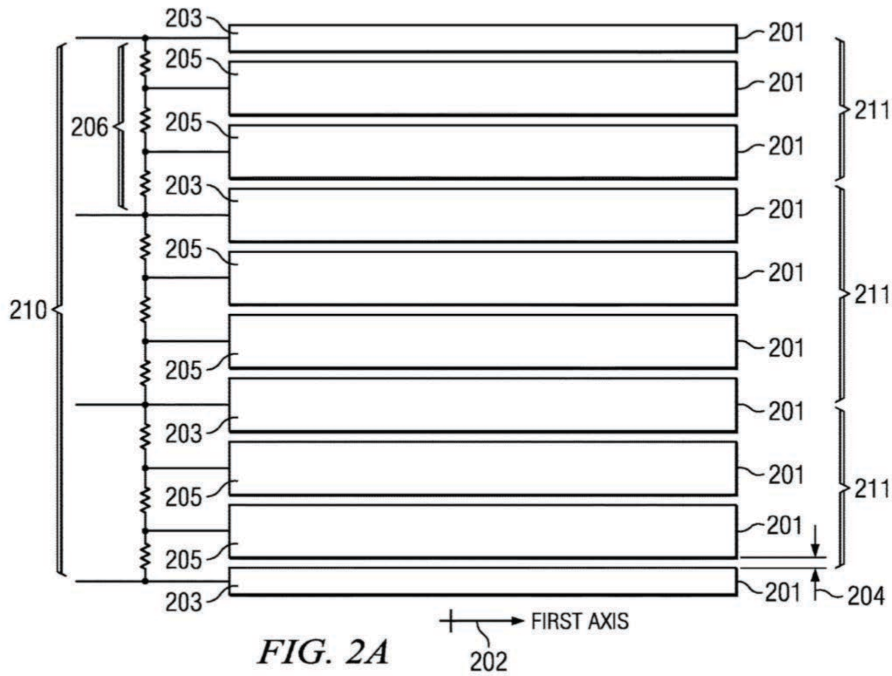


FIG. 2A

’784 Patent at Fig. 2A.

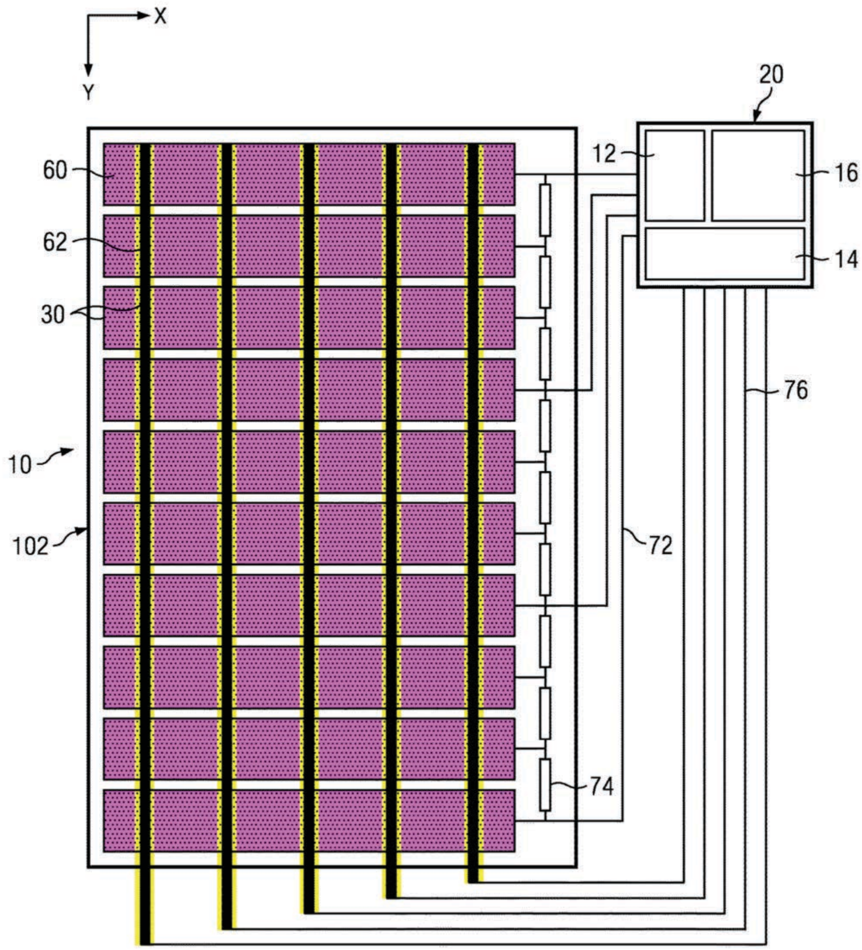


FIG. 7B

’784 Patent at Fig. 7B.

83. The Abstract describes these drive electrodes as providing “near blanket coverage,” which also “serves to screen out interference from noise sources below the drive electrode layer, such as drive signals for an underlying display, thereby suppressing noise pick-up by the sense electrodes that are positioned above the drive electrodes.” ’784 Patent at Abstract.

84. The ’784 Patent specification describes the sense electrodes as much narrower than the drive electrodes, which substantially cover the entire area of the touch sensor. This can be seen in Figs. 7A and 7B.

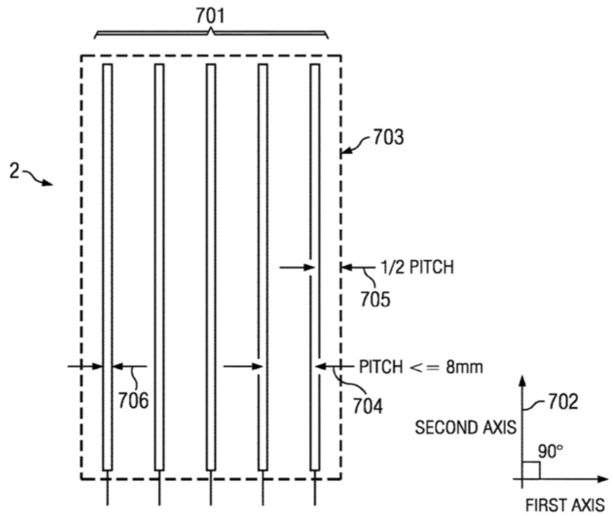


FIG. 7A

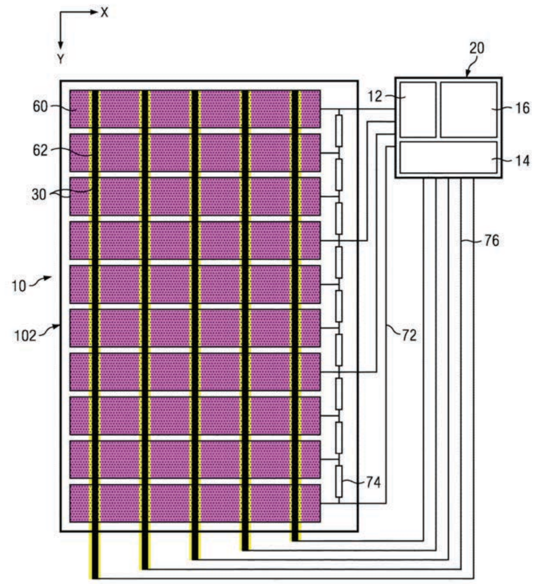


FIG. 7B

’784 Patent at Figs. 7A and 7B.

85. The empty areas between narrow sense electrodes can be filled in with isolated conductive elements that (with the sense electrodes) substantially cover the entire touch sensor. This has the benefit of making the sense electrodes invisible because the empty areas cannot be clearly distinguished. Figs. 8A and 10 best show these isolated elements.

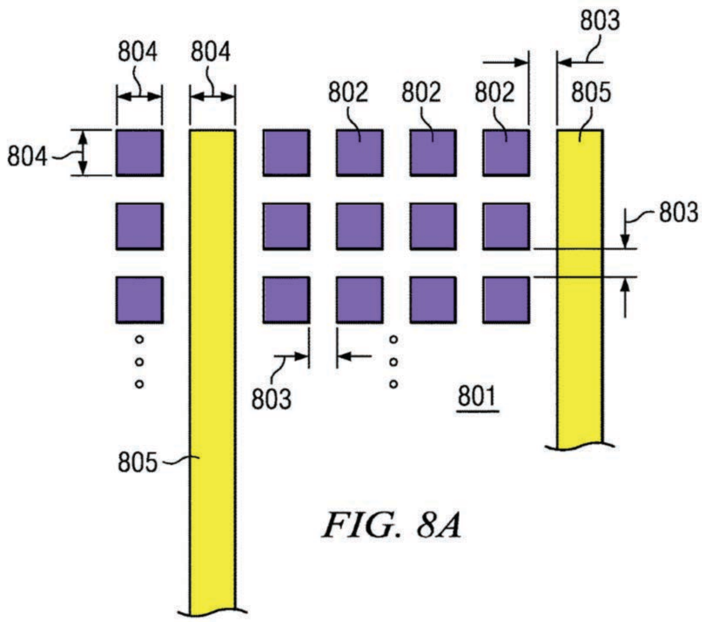


FIG. 8A

’784 Patent at Fig. 8A.

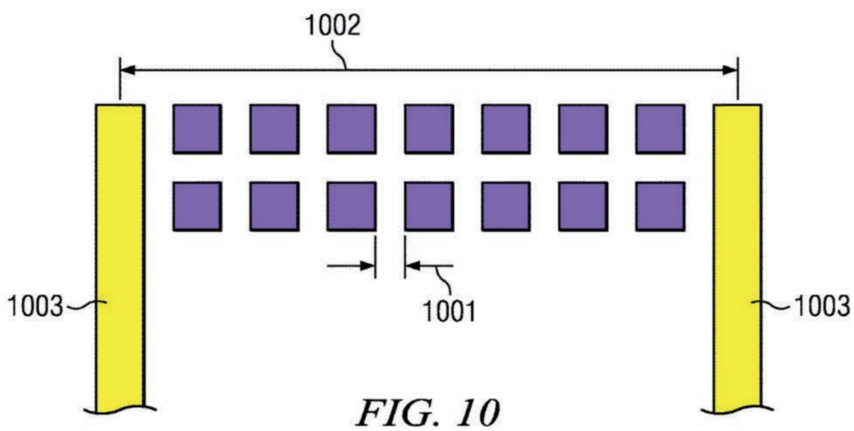


FIG. 10

’784 Patent at Fig. 10.

86. Further disclosures in the specification of the in-filling or flood technique are listed below:

’784 Patent at 4:43-50:

The second layer can also be made invisible either through in-filling of islands of electrode material between the sense electrodes to also “flood” the second layer, or alternatively simply by making the sense electrodes very thin or very sparse with line widths so small that they are invisible. This sparse approach using meshes is described further below. The reduced sense electrode area also reduces susceptibility to coupling noise from touches.

’784 Patent at 5:4-11:

In some embodiments, the second layer additionally accommodates isolated elements arranged between the sensing electrodes so that the sense electrodes and the isolated elements together substantially entirely cover the second layer with individual ones of the sense electrode and isolated elements being separated from each other by small gaps. The small gaps have comparable function and dimensions to the small gaps between the drive electrodes.

'784 Patent at 14:33-53:

FIG. 8A shows a portion of the electrode pattern shown in FIG. 7A with infilling electrodes. This method fills all "unused" 801 space with isolated squares of conductor 802 (ITO for example), separated with gaps 803 to its neighbors that are small enough to be practically invisible and small enough to cause significant square-to-square capacitance. Another key factor in designing the isolated elements or islands is to make them the same size 804 in each axis as the width of the Y lines 805. In this way, the uniformity of the overall pattern is optimal, and the only irregularity is in the length of the Y lines. This pattern is substantially invisible to the human eye. The gaps between neighboring squares, and the gaps between squares and neighboring Y lines can be made arbitrarily small, typically in the region of 10's of μm as they are almost invisible and can be easily mass-produced. The in-filling is generated during manufacture at the same time, and using the same process steps, as the sense electrodes, so they are made of the same material and have the same thickness and electrical properties as the sense electrodes. This is convenient, but not essential. The in-filling could be carried out separately in principle.

'784 Patent at 17:21-25:

3. Narrow Y lines on Layer 2 with optional area filling isolated squares leading to; (i) almost invisible electrode pattern when using ITO (ii) reduced electrode area reduces susceptibility to coupling noise from touch.

VIII. CONCLUSION

I declare under penalty of perjury that the foregoing is true and correct.

Executed April 17, 2020 in San Ramon, California.

By: Richard A. Flasck

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