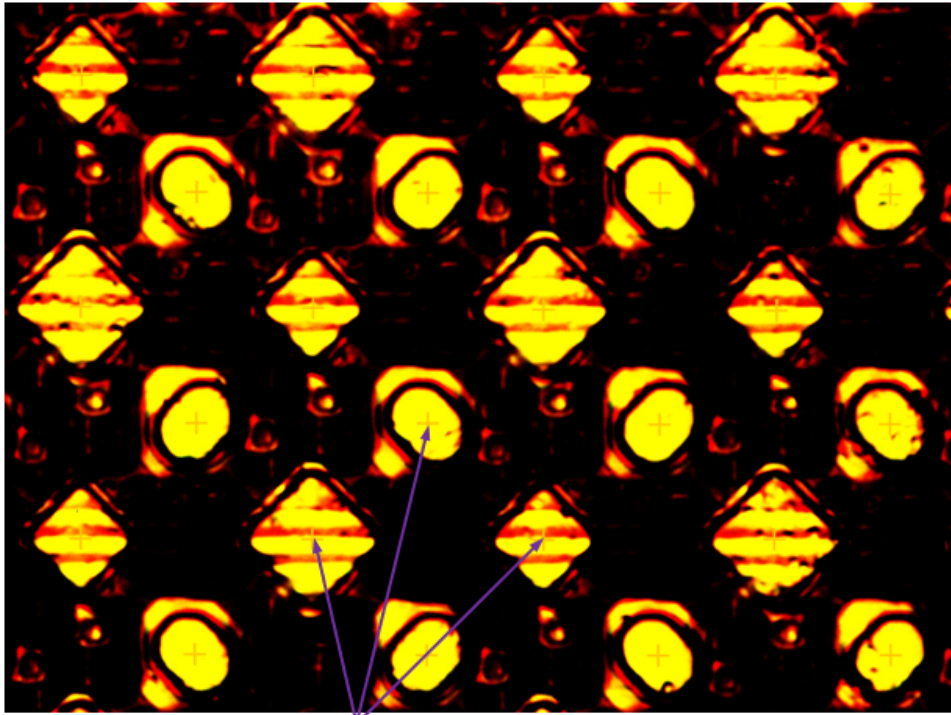


EXHIBT 2028

CLAIM CHART: AMOLED DISPLAY IN SAMSUNG GALAXY S22 Ultra

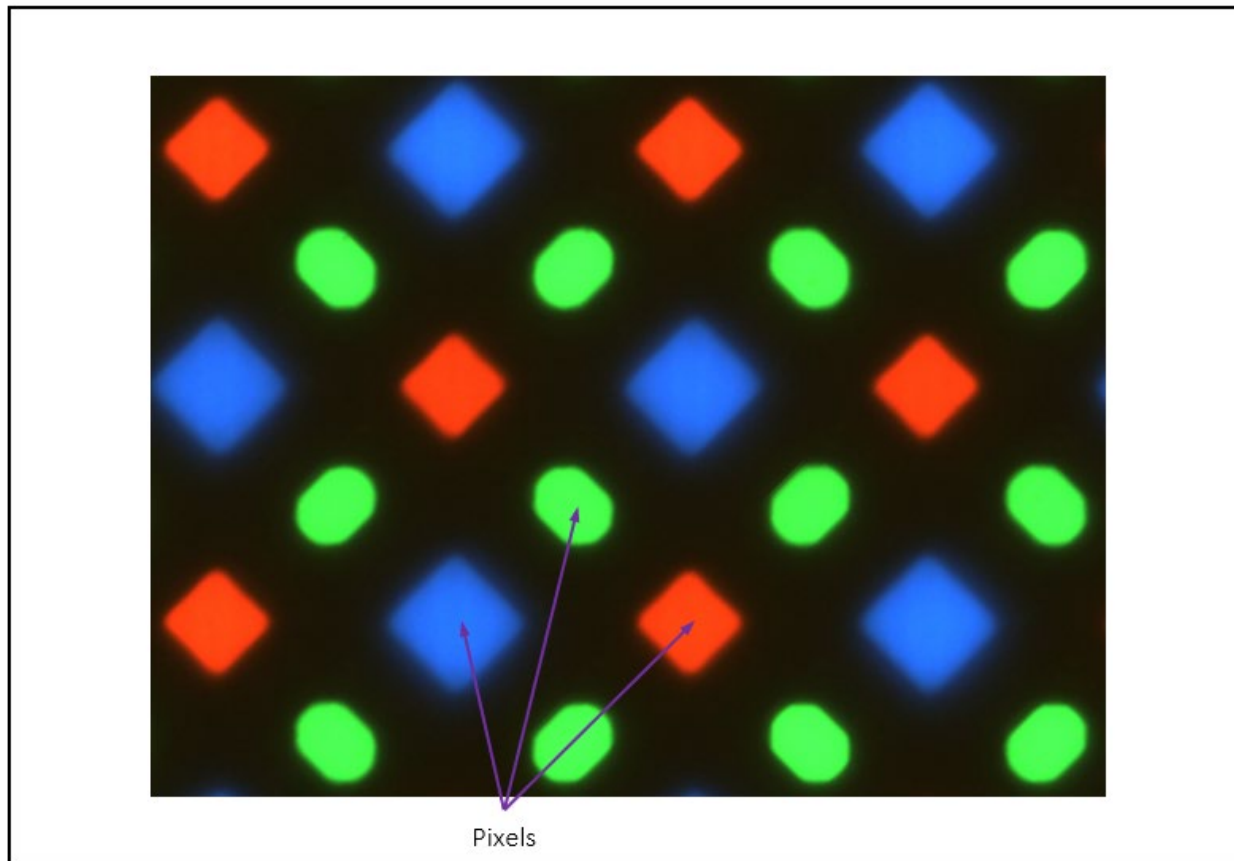
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[preamble] A pixel arrangement structure of an organic light emitting diode (OLED) display, the pixel arrangement structure comprising a plurality of pixels comprising:	The Samsung Galaxy S22 Ultra product comprises an organic light-emitting diode (“OLED”) display. As shown in the annotated image below, the Samsung Galaxy S22 Ultra product contains a pixel arrangement structure of an OLED display, the pixel arrangement structure comprising a plurality of pixels.  Pixels Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578

Samsung Galaxy S22 Ultra

1[preamble] A pixel arrangement structure of an organic light emitting diode (OLED) display, the pixel arrangement structure comprising a plurality of pixels comprising:

(cont'd)

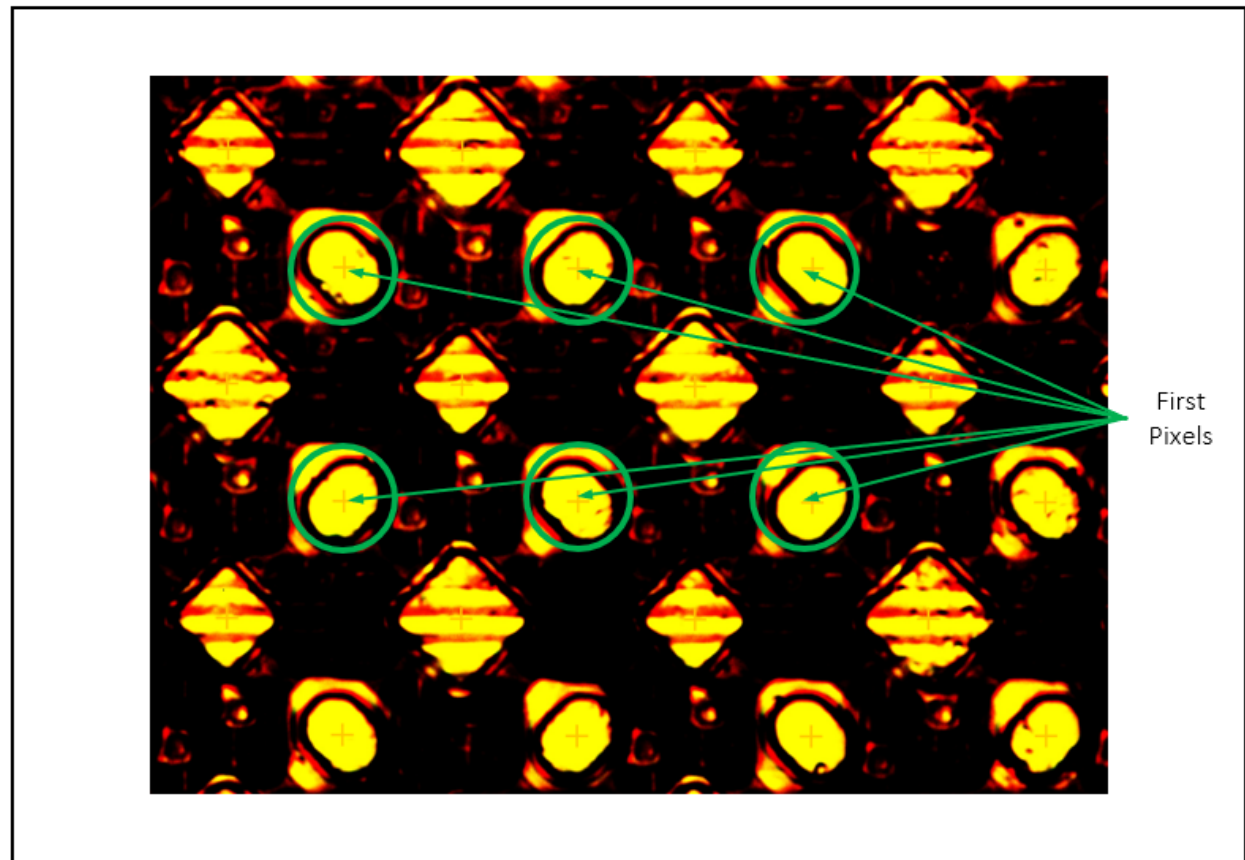


Annotated Exhibit 2029 at 5
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[preamble] A pixel arrangement structure of an organic light emitting diode (OLED) display, the pixel arrangement structure comprising a plurality of pixels comprising: (cont'd)	 Annotated Exhibit 2029 at 2 (Galaxy S22 Ultra Teardown Photos)

1[a] a plurality of first pixels;

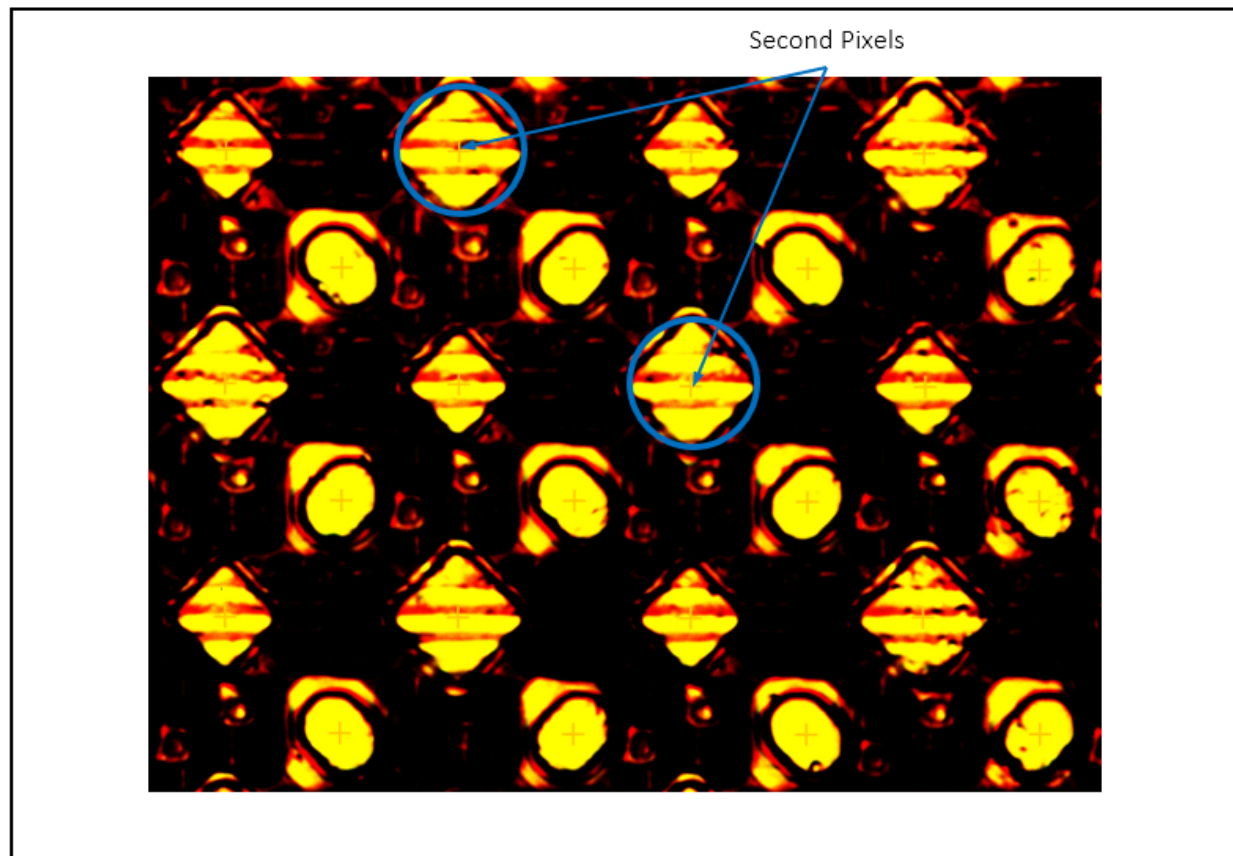
As shown in the annotated image below, the Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of first pixels.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

1[b] a plurality of second pixels; and

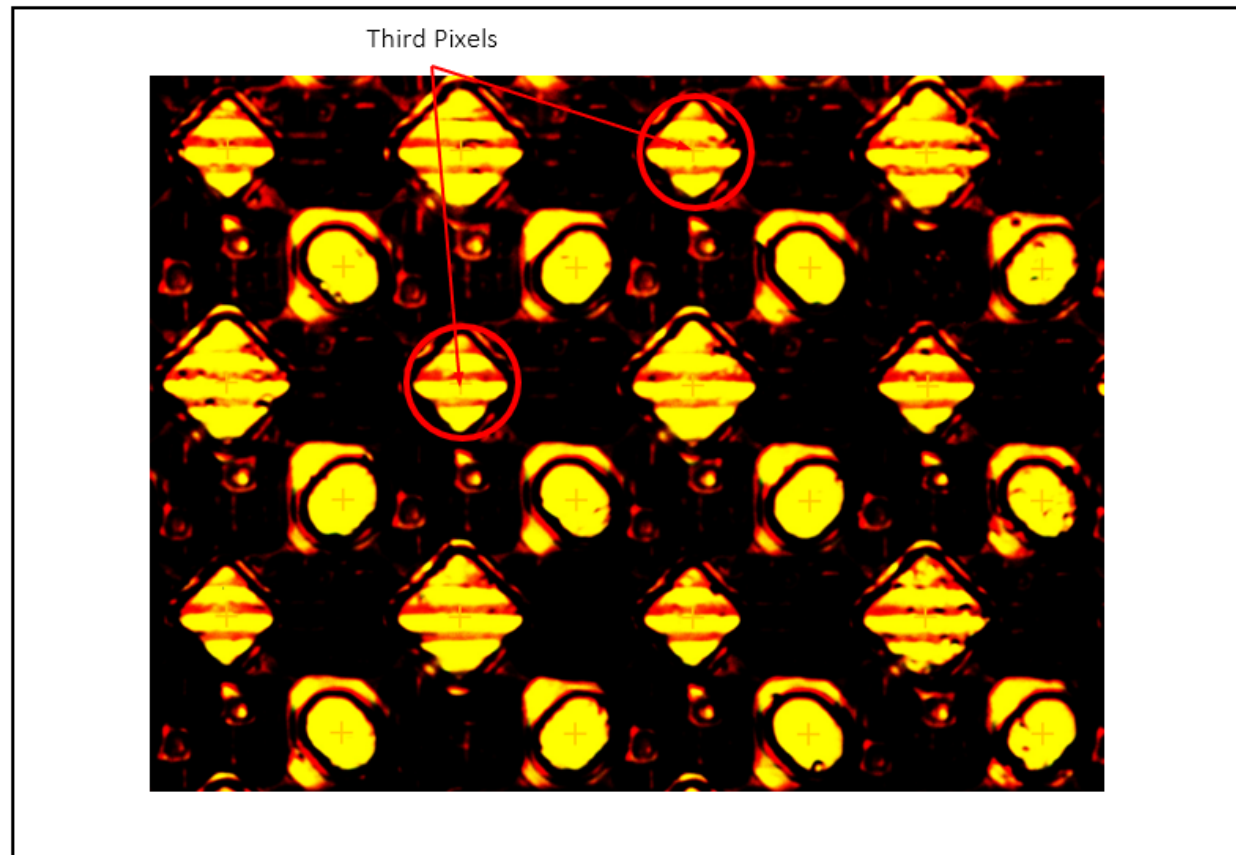
As shown in the annotated image below, the Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of second pixels.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

1[c] a plurality of third pixels,

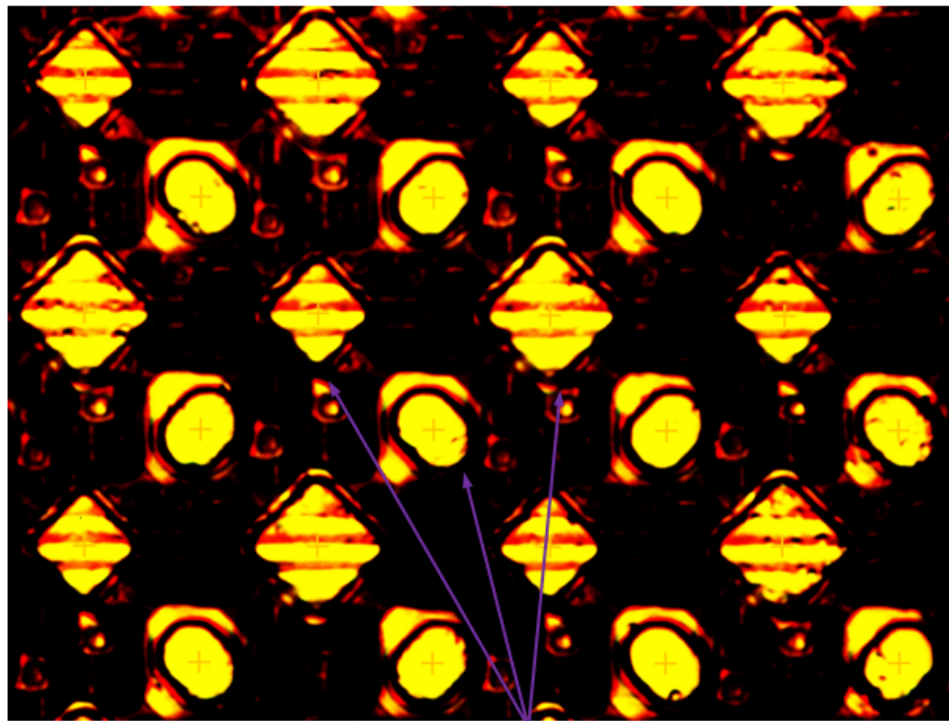
As shown in the annotated image below, the Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of third pixels.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

1[d] wherein the OLED display comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels,

The Samsung Galaxy S22 Ultra product comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels. A pixel defining layer is formed to define the area of each pixel, as evidenced, for example, by the black boundaries surrounding each pixel in the annotated image below.



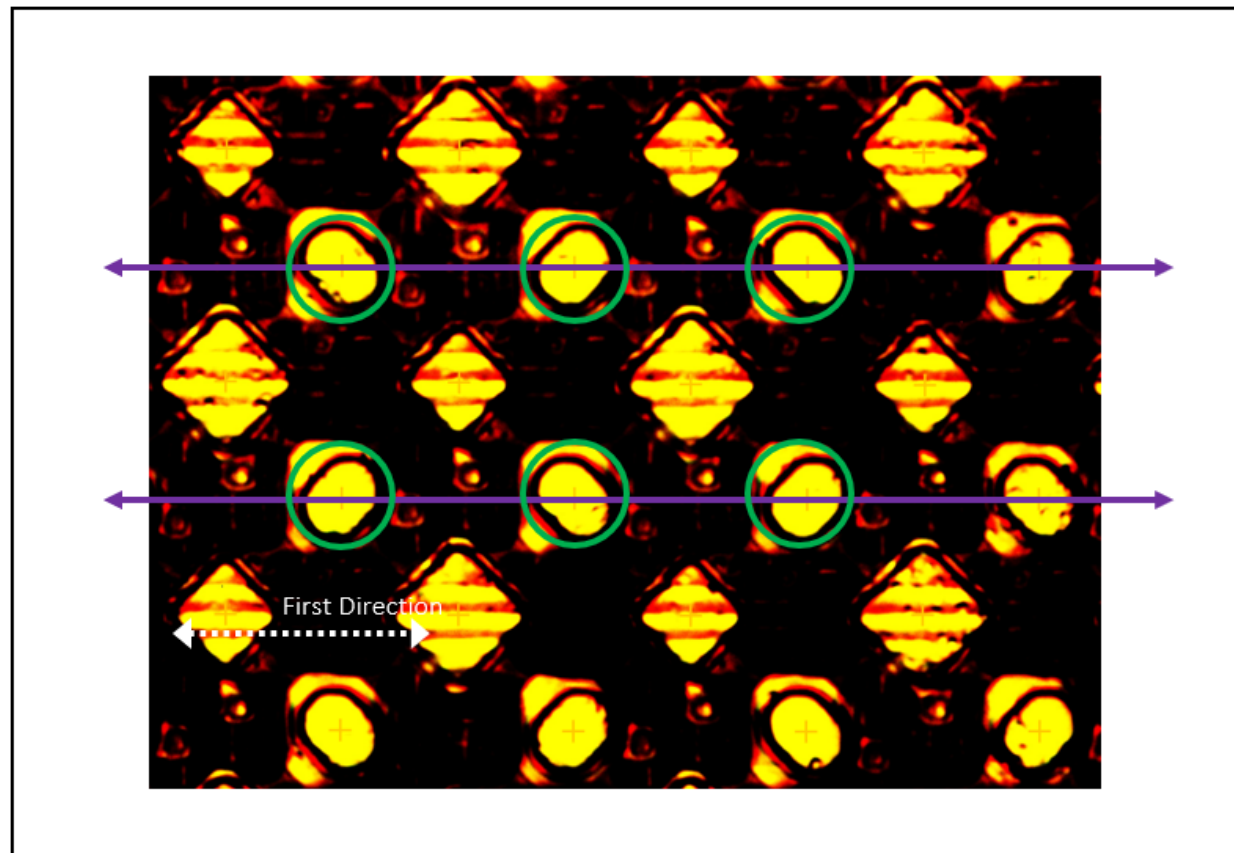
Areas Defined by Pixel Defining Layer

Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

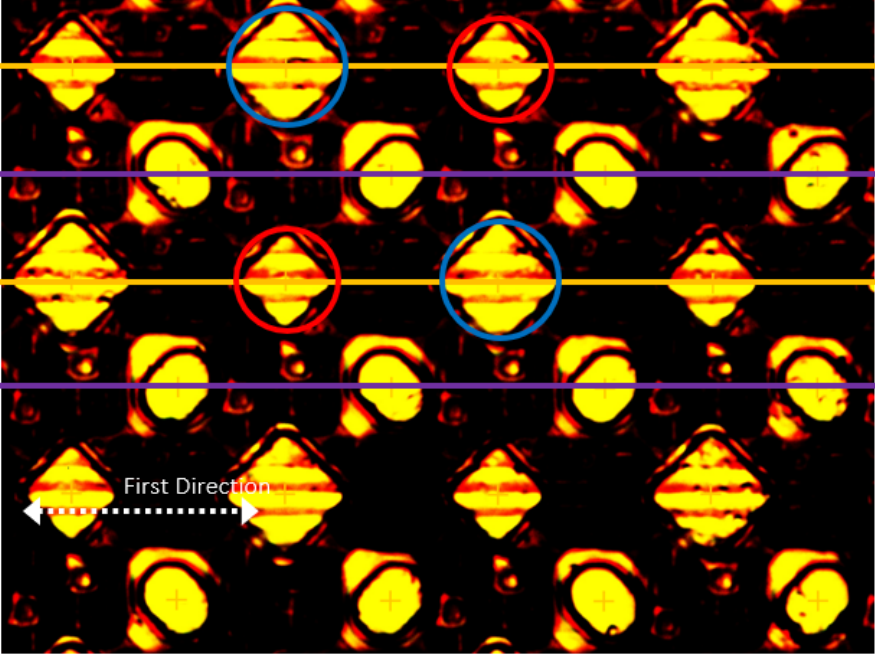
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[e] wherein the first pixels, the second pixels, and the third pixels are configured to emit different color lights,	In the Samsung Galaxy S22 Ultra product, the first pixels, the second pixels, and the third pixels are configured to emit different color lights. As shown in the annotated image below, the first pixels (see green arrows) are configured to emit green light, the second pixels (see blue arrows) are configured to emit blue light, and the third pixels (see red arrows) are configured to emit red light. The image shows a close-up of the Samsung Galaxy S22 Ultra display, highlighting the subpixel arrangement. The display features a grid of pixels, each emitting a different color of light. The pixels are arranged in a repeating pattern of red, blue, and green. The red pixels are labeled 'The Third Pixels' with red arrows. The blue pixels are labeled 'The Second Pixels' with blue arrows. The green pixels are labeled 'The First Pixels' with green arrows. The arrows originate from a single point at the bottom center and point to various pixels of the corresponding color across the grid. Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

1[f] wherein the first pixels are arranged in first sets extending along a first direction to form respective first lines,

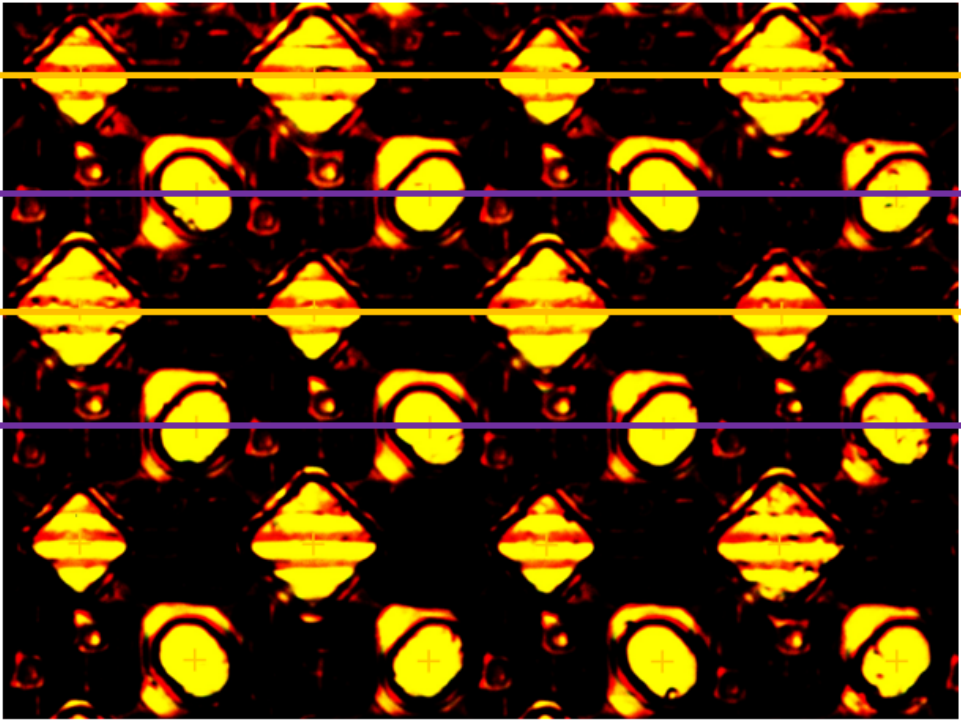
In the Samsung Galaxy S22 Ultra product, the first pixels are arranged in first sets extending along a first direction to form respective first lines. As shown in the annotated image below, the first pixels (green circles) are arranged in first sets extending along a first direction to form respective first lines (purple lines).



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

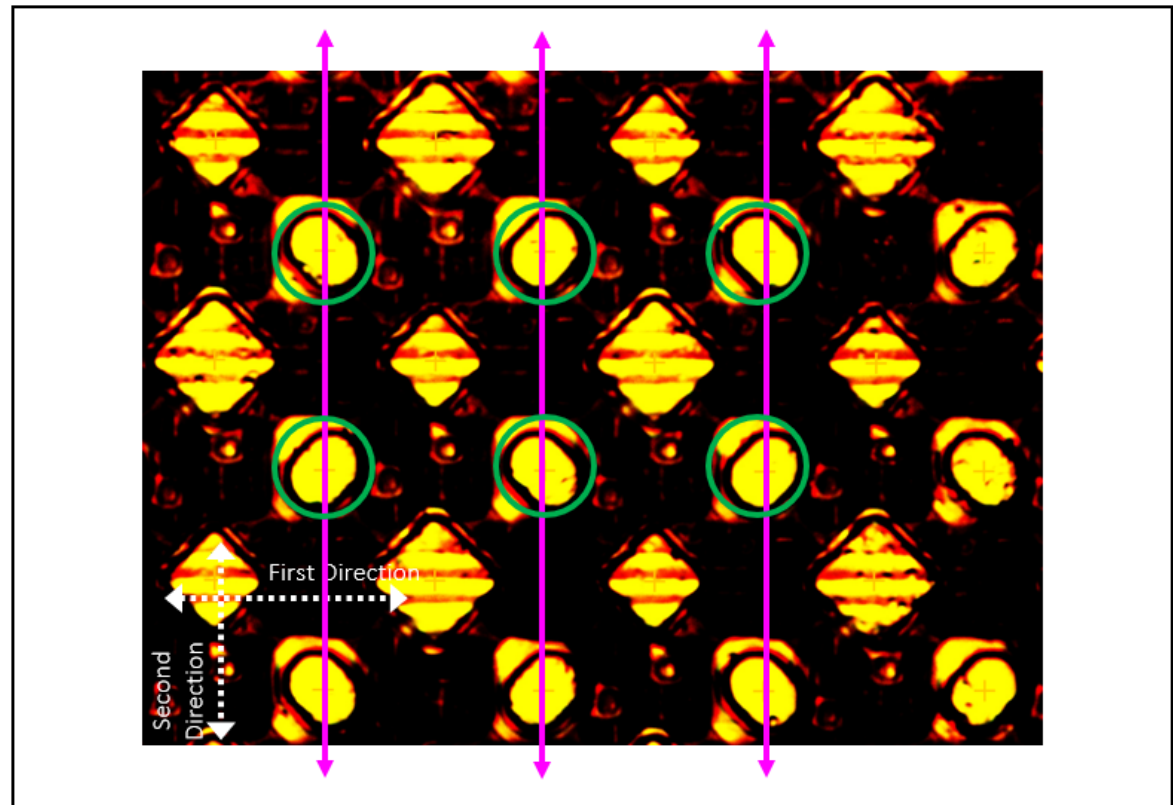
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[g] wherein the second pixels and the third pixels are alternately arranged in second sets extending along the first direction to form respective second lines parallel to the first lines,	In the Samsung Galaxy S22 Ultra product, the second pixels and the third pixels are alternately arranged in second sets extending along the first direction to form respective second lines parallel to the first lines. As shown in the annotated image below, the second pixels (blue circles) and the third pixels (red circles) are alternately arranged in second sets extending along the first direction to form respective second lines (orange lines) parallel to the first lines (purple lines).  The image shows a grid of sensor elements. Two horizontal lines of orange arrows represent the 'first direction'. Two horizontal lines of purple arrows represent the 'second lines'. Two horizontal lines of orange arrows represent the 'third lines'. Two horizontal lines of purple arrows represent the 'fourth lines'. The second pixels (blue circles) and the third pixels (red circles) are alternately arranged in second sets extending along the first direction to form respective second lines (orange lines) parallel to the first lines (purple lines). First Direction Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[h] wherein one of the second lines passes through centers of the second pixels and the third pixels in a corresponding one of the second sets and passes between the first pixels in corresponding adjacent ones of the first sets,	In the Samsung Galaxy S22 Ultra product, one of the second lines passes through centers of the second pixels and the third pixels in a corresponding one of the second sets and passes between the first pixels in corresponding adjacent ones of the first sets. As shown in the annotated image below, one of the second lines (orange line) passes through centers of the second pixels and the third pixels in a corresponding one of the second sets (blue circle and red circle) and passes between the first pixels in corresponding adjacent ones of the first sets (green circles). The image shows a top-down view of a sensor array with a grid of yellow diamond-shaped pixels. A horizontal orange line with arrows at both ends passes through the center of a row of pixels. In this row, the second pixel from the left is circled in blue, and the third pixel is circled in red. The first pixel is circled in green, and the fourth pixel is also circled in green. The same pattern of green circles is visible in the row below. The orange line passes through the centers of the blue and red circles and between the green circles. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[i] wherein the first lines and the second lines are alternately arranged,	In the Samsung Galaxy S22 Ultra product, the first lines and the second lines are alternately arranged. As shown in the annotated image below, the first lines (purple lines) and the second lines (orange lines) are alternately arranged.  The image shows a grid of yellow and orange diamond-shaped patterns on a black background. Four horizontal arrows are overlaid on the image: the top and third arrows are orange and point left and right, while the second and fourth arrows are purple and point left and right. This illustrates the alternating arrangement of the first and second lines. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

1[j] wherein the first pixels are also arranged in third sets extending along a second direction that is perpendicular to the first direction to form respective third lines,

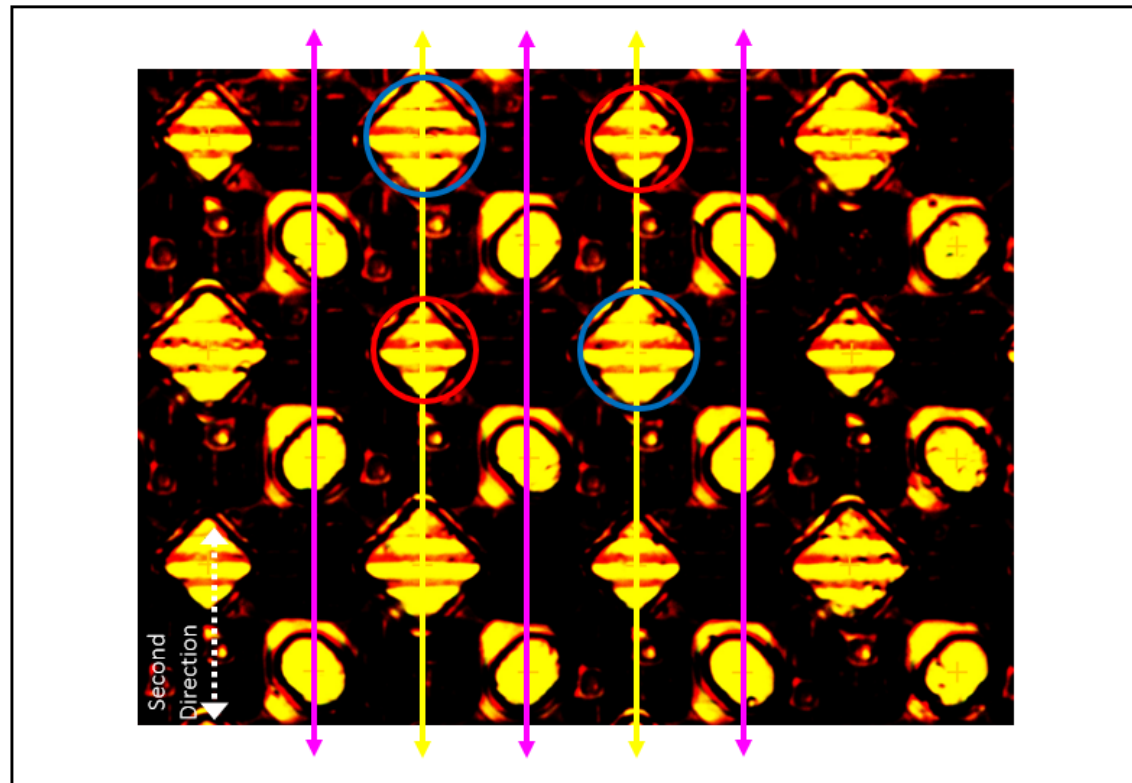
In the Samsung Galaxy S22 Ultra product, the first pixels are also arranged in third sets extending along a second direction that is perpendicular to the first direction to form respective third lines. As shown in the annotated image below, the first pixels (green circles) are also arranged in third sets extending along a second direction that is perpendicular to the first direction to form respective third lines (pink lines).



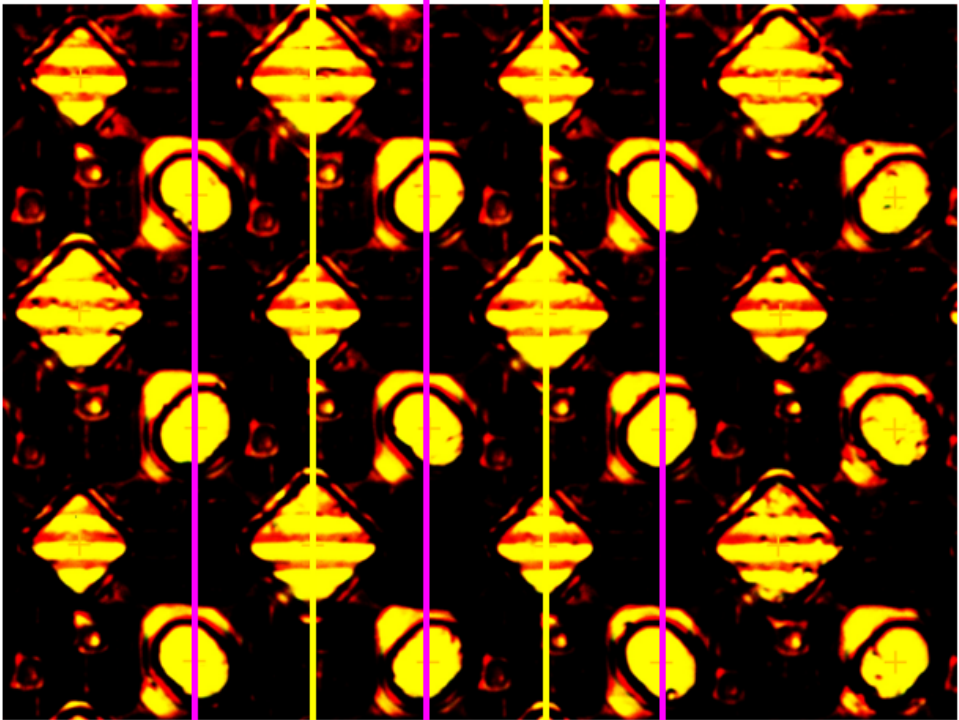
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

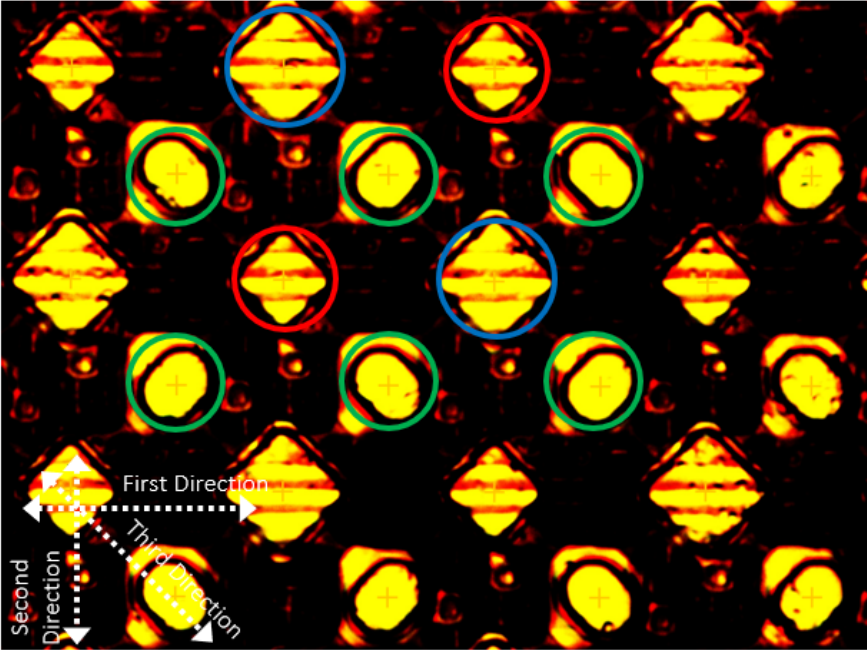
1[k] wherein the second pixels and the third pixels are also alternately arranged in fourth sets extending along the second direction to form respective fourth lines that are parallel to the third lines,

In the Samsung Galaxy S22 Ultra product, the second pixels and the third pixels are also alternately arranged in fourth sets extending along the second direction to form respective fourth lines that are parallel to the third lines. As shown in the annotated image below, the second pixels (blue circles) and the third pixels (red circles) are also alternately arranged in fourth sets extending along the second direction to form respective fourth lines (yellow lines) that are parallel to the third lines (pink lines).



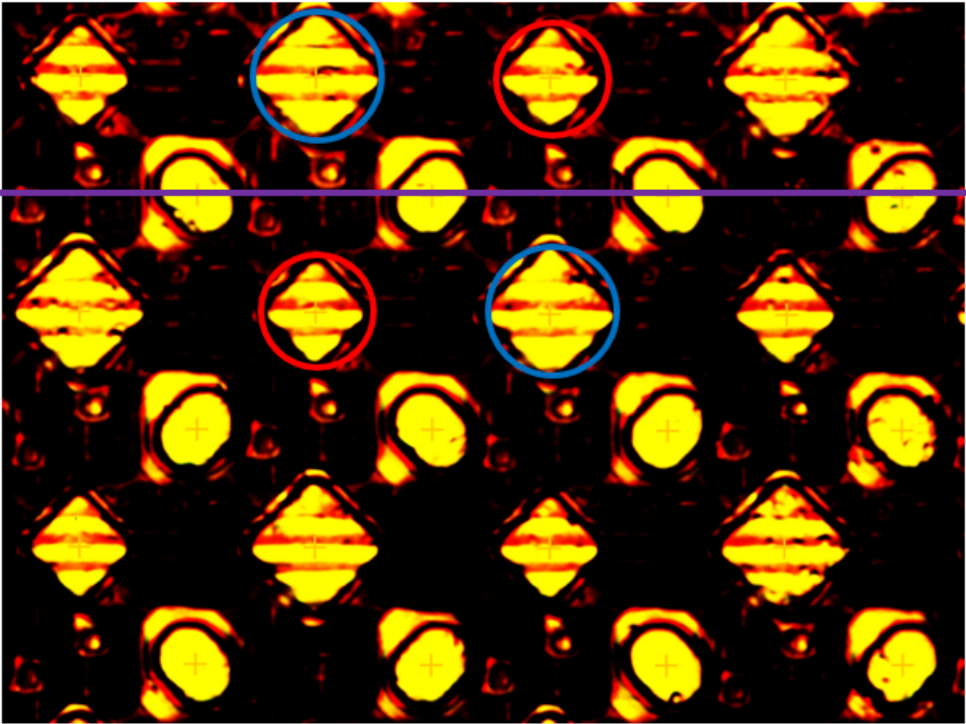
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

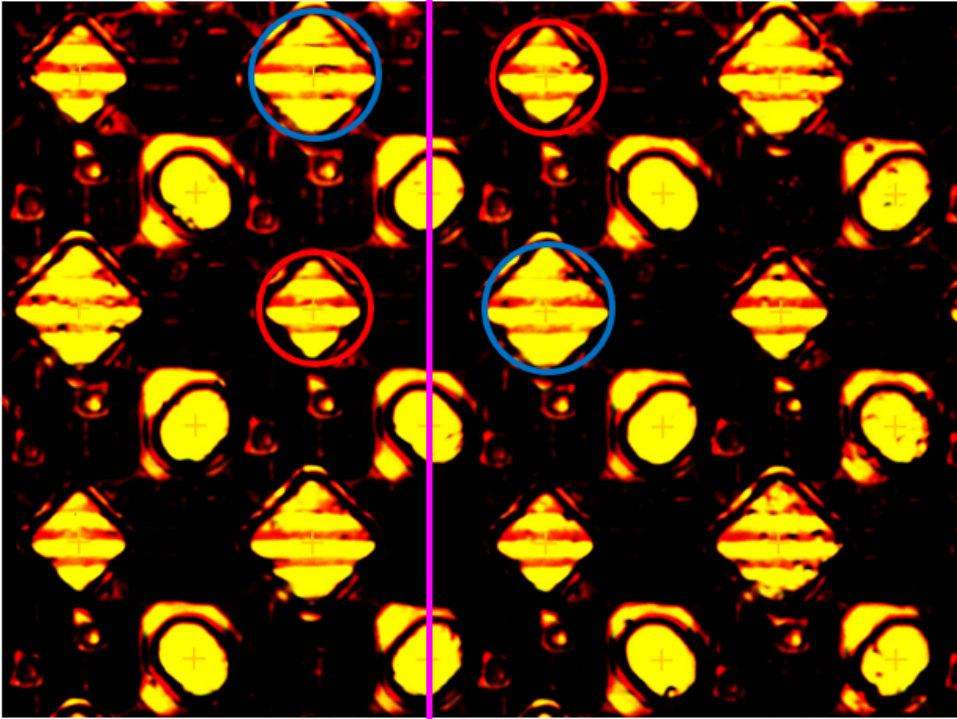
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[I] wherein the third lines and the fourth lines are alternately arranged,	In the Samsung Galaxy S22 Ultra product, the third lines and the fourth lines are alternately arranged. As shown in the annotated image below, the third lines (pink lines) and the fourth lines (yellow lines) are alternately arranged.  Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[m] wherein the first pixels and either the second pixels or the third pixels are alternately arranged along a third direction, which crosses the first direction and the second direction,	In the Samsung Galaxy S22 Ultra product, the first pixels and either the second pixels or the third pixels are alternately arranged along a third direction, which crosses the first direction and the second direction. As shown in the annotated image below, the first pixels (green circles) and either the second pixels (blue circles) or the third pixels (red circles) are alternately arranged along a third direction, which crosses the first direction and the second direction.  Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[n] wherein a region having a width in the second direction that is equal to a width of the first pixels in the second direction, extending parallel to the first direction, and completely overlapping a row of the first pixels extending in the first direction, is entirely offset in the second direction from at least one of the second pixels or the third pixels in at least one of rows of the second pixels and the third pixels adjacent to the row of the first pixels, and	In the Samsung Galaxy S22 Ultra product, a region having a width in the second direction that is equal to a width of the first pixels in the second direction, extending parallel to the first direction, and completely overlapping a row of the first pixels extending in the first direction, is entirely offset in the second direction from at least one of the second pixels or the third pixels in at least one of rows of the second pixels and the third pixels adjacent to the row of the first pixels. As shown in the annotated image below, a region (orange region) having a width in the second direction that is equal to a width of the first pixels in the second direction, extending parallel to the first direction, and completely overlapping a row of the first pixels extending in the first direction, is entirely offset in the second direction from at least one of the second pixels (blue circles) or the third pixels (red circles) in at least one of rows of the second pixels and the third pixels adjacent to the row of the first pixels. The image shows a close-up of a sensor array from a Samsung Galaxy S22 Ultra. It displays a grid of pixels, each with a distinct cross-like pattern. A horizontal orange band is overlaid across the middle of the image. Several pixels are highlighted with colored circles: blue circles are placed on pixels in the second row from the top, and red circles are placed on pixels in the third row from the top. A green circle is also visible on a pixel in the second row. In the bottom-left corner, there are two dashed arrows: a horizontal one labeled 'First Direction' pointing to the right, and a vertical one labeled 'Second Direction' pointing upwards. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

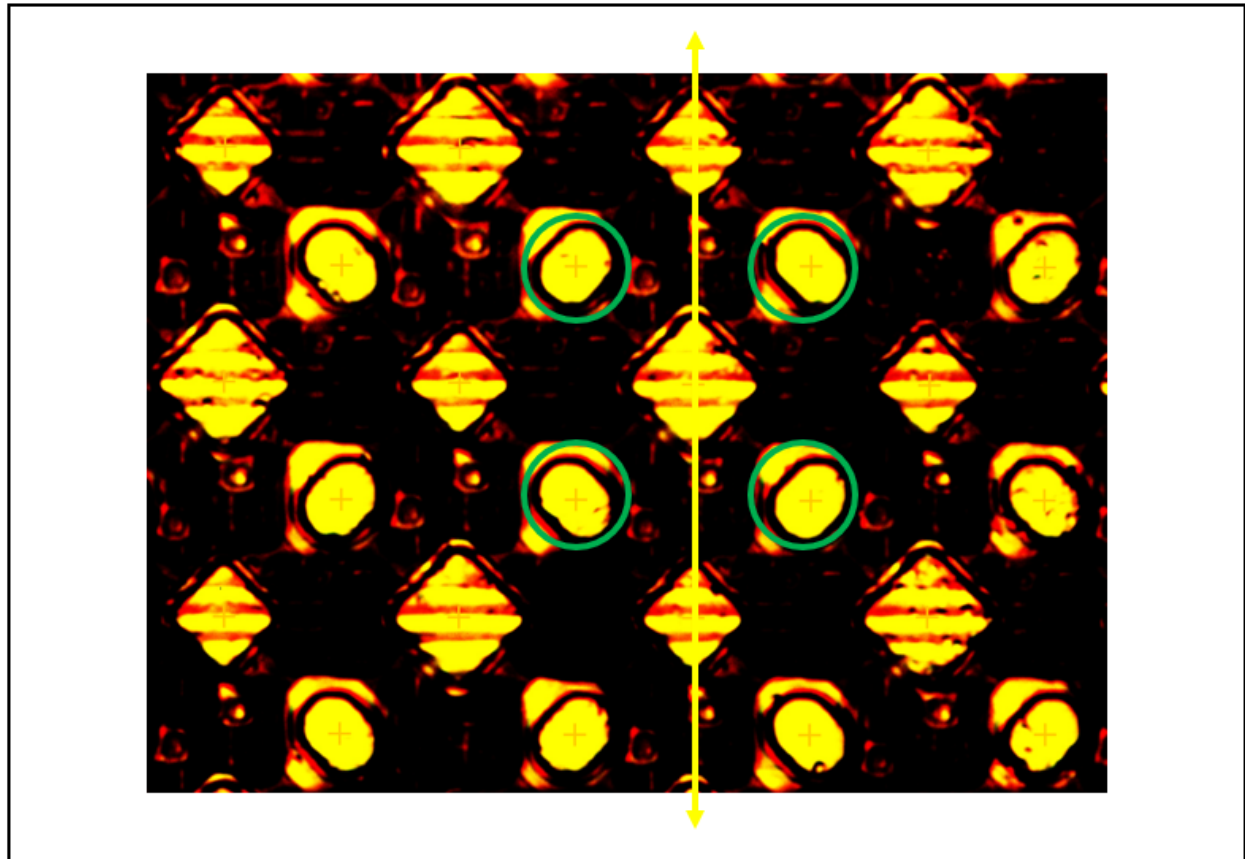
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
1[o] wherein a shortest distance between two nearest ones of the first pixels in one of the first sets is greater than a shortest distance between one of the second pixels and one of the third pixels that are nearest each other in one of the second sets.	In the Samsung Galaxy S22 Ultra product, a shortest distance between two nearest ones of the first pixels in one of the first sets is greater than a shortest distance between one of the second pixels and one of the third pixels that are nearest each other in one of the second sets. As shown in the annotated image below, a shortest distance (light green) between two nearest ones of the first pixels in one of the first sets (green circles) of 36 micrometers is greater than a shortest distance (light blue) between one of the second pixels and one of the third pixels that are nearest each other in one of the second sets (blue circle and red circle) of 27 micrometers. The image shows a microscopic view of a sensor array with a grid of diamond-shaped pixels. Two specific measurements are highlighted: a light blue line between a blue circle and a red circle is labeled '27 μm', and a light green line between two green circles is labeled '36 μm'. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
2. The pixel arrangement structure of claim 1, wherein one of the first lines passes between the second pixels and the third pixels in corresponding adjacent ones of the second sets.	In the Samsung Galaxy S22 Ultra product, one of the first lines passes between the second pixels and the third pixels in corresponding adjacent ones of the second sets. As shown in the annotated image below, one of the first lines (purple line) passes between the second pixels (blue circles) and the third pixels (red circles) in corresponding adjacent ones of the second sets.  The image shows a close-up of a sensor array with a grid of yellow and orange diamond-shaped pixels. A horizontal purple line with arrows at both ends passes through the center of the grid. Two blue circles are positioned above the line, and two red circles are positioned below it, illustrating the pixel arrangement described in the patent claim. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

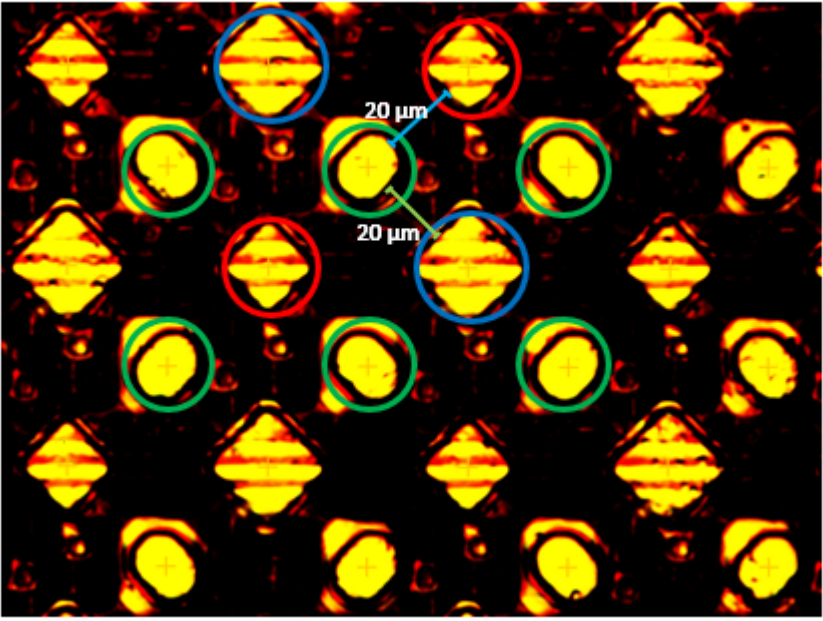
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
3. The pixel arrangement structure of claim 1, wherein one of the third lines passes between the second pixels and the third pixels in corresponding adjacent ones of the fourth sets.	In the Samsung Galaxy S22 Ultra product, one of the third lines passes between the second pixels and the third pixels in corresponding adjacent ones of the fourth sets. As shown in the annotated image below, one of the third lines (pink line) passes between the second pixels (blue circles) and the third pixels (red circles) in corresponding adjacent ones of the fourth sets.  The image shows a grid of pixels arranged in a diamond pattern. The pixels are primarily yellow and red. A vertical pink line with arrows at both ends passes through the center of the grid, positioned between two columns of pixels. Two blue circles highlight specific pixels in the second column from the left, and two red circles highlight specific pixels in the third column from the left. The pink line passes between the blue circles and the red circles in corresponding adjacent rows. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

4. The pixel arrangement structure of claim 1, wherein one of the fourth lines passes between the first pixels in corresponding adjacent ones of the third sets.

In the Samsung Galaxy S22 Ultra product, one of the fourth lines passes between the first pixels in corresponding adjacent ones of the third sets. As shown in the annotated image below, one of the fourth lines (yellow line) passes between the first pixels (green circles) in corresponding adjacent ones of the third sets.



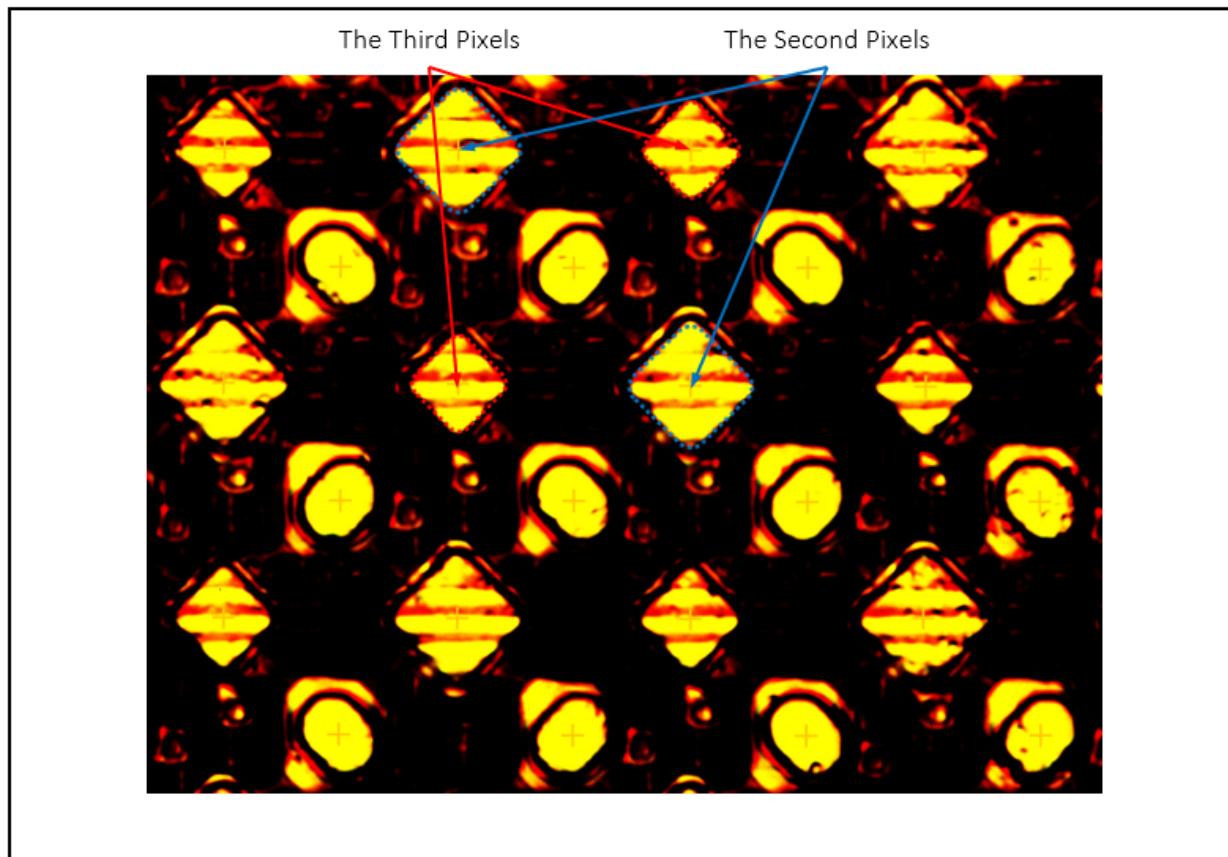
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
5. The pixel arrangement structure of claim 1, wherein a shortest distance between the first pixels and the second pixels, and a shortest distance between the first pixels and the third pixels, are a same first length.	In the Samsung Galaxy S22 Ultra product, a shortest distance between the first pixels and the second pixels, and a shortest distance between the first pixels and the third pixels, are a same first length. As shown in the annotated image below, a shortest distance (light blue) between the first pixels (green circles) and the second pixels (blue circles), and a shortest distance (light green) between the first pixels (green circles) and the third pixels (red pixels), are a same first length of 20 micrometers.  The image shows a microscopic view of a pixel array. It features a grid of diamond-shaped pixels. Some pixels are highlighted with colored circles: green circles represent 'first pixels', blue circles represent 'second pixels', and red circles represent 'third pixels'. Two specific distances are marked with arrows and labeled '20 μm': a light blue arrow indicates the distance between a green circle and a blue circle, and a light green arrow indicates the distance between a green circle and a red circle. The overall image has a yellow and orange color scheme, typical of a false-color micrograph. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
6. The pixel arrangement structure of claim 1, wherein the first pixels are configured to emit green light, the second pixels are configured to emit blue light, and the third pixels are configured to emit red light.	In the Samsung Galaxy S22 Ultra product, the first pixels are configured to emit green light, the second pixels are configured to emit blue light, and the third pixels are configured to emit red light. As shown in the annotated image below, the first pixels (see green arrows) are configured to emit green light, the second pixels (see blue arrows) are configured to emit blue light, and the third pixels (see red arrows) are configured to emit red light. The image shows a close-up of a display panel with a grid of subpixels. The subpixels are arranged in a repeating pattern of red, blue, and green. Green arrows point to several green subpixels, labeled 'The First Pixels'. Blue arrows point to several blue subpixels, labeled 'The Second Pixels'. A red arrow points to a red subpixel, labeled 'The Third Pixels'. The subpixels are arranged in a grid where red and blue subpixels are in the top row, green subpixels are in the middle row, and red and blue subpixels are in the bottom row. Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

10. The pixel arrangement structure of claim 1, wherein each of the second pixels has a larger area than each of the third pixels.

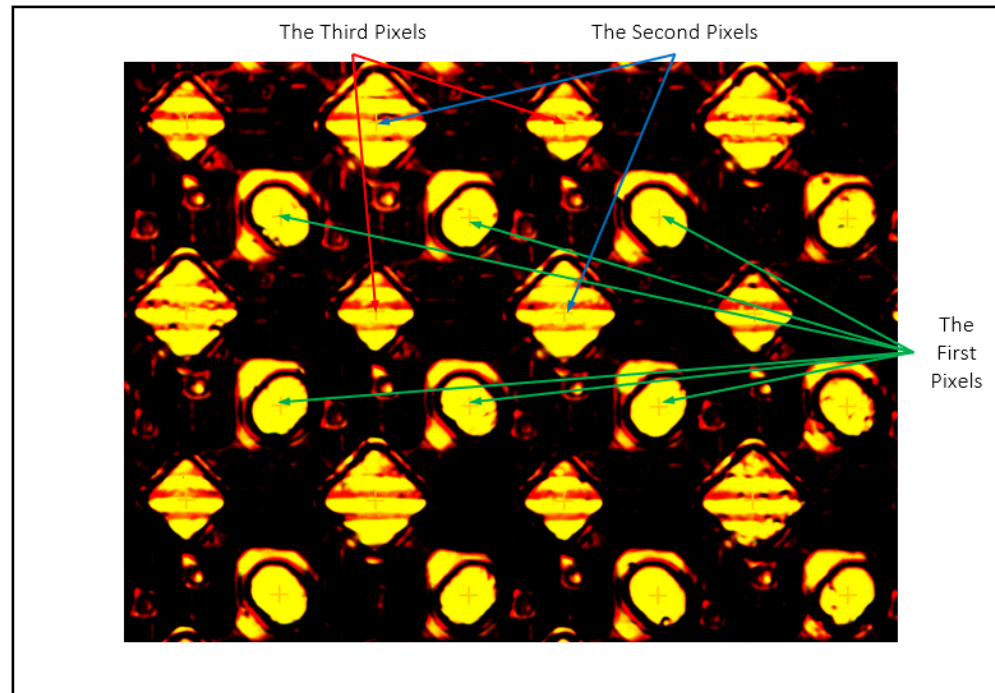
In the Samsung Galaxy S22 Ultra product, each of the second pixels has a larger area than each of the third pixels. As shown in the annotated image below, each of the second pixels' areas (dotted blue lines) are larger than each of the third pixels' areas (dotted red lines).



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

12. The pixel arrangement structure of claim 1, wherein the first pixels, the second pixels, and the third pixels have polygonal shapes.

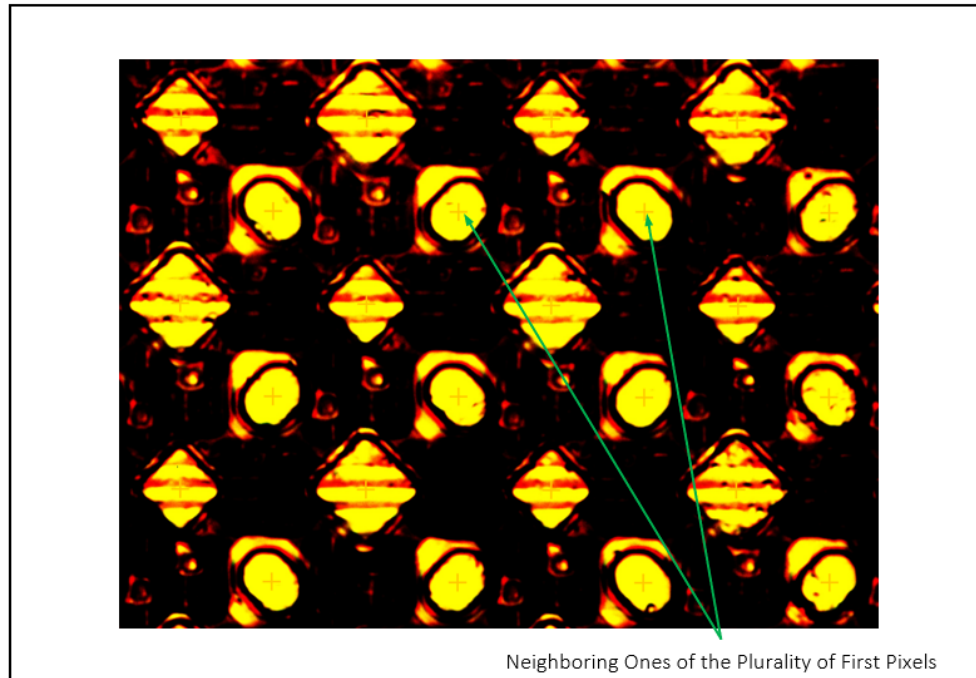
In the Samsung Galaxy S22 Ultra product, the first pixels, the second pixels, and the third pixels have polygonal shapes. As shown in the annotated image below, the first pixels (see green arrows), the second pixels (see blue arrows), and the third pixels (see red arrows) each have polygonal shapes.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

13. The pixel arrangement structure of claim 12, wherein neighboring ones of the plurality of first pixels have octagonal shapes that are symmetrical to each other.

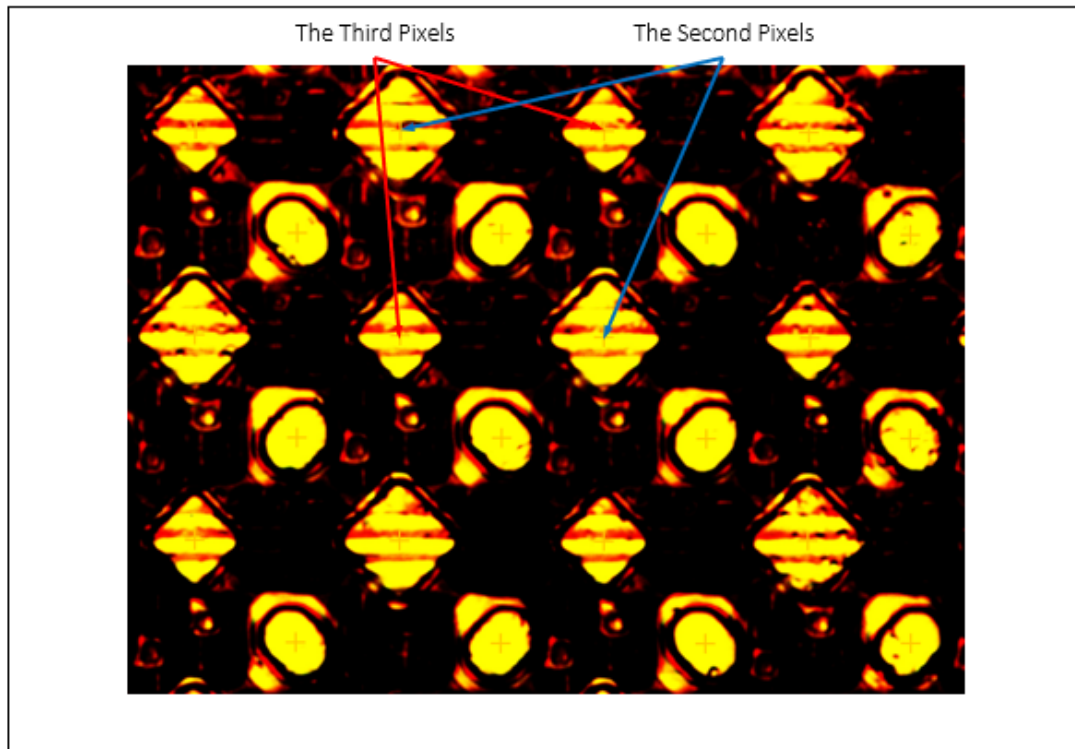
In the Samsung Galaxy S22 Ultra product, neighboring ones of the plurality of first pixels have octagonal shapes that are symmetrical to each other. As shown in the annotated image below, neighboring ones of the plurality of first pixels (see green arrows) have octagonal shapes that are symmetrical to each other.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

14. The pixel arrangement structure of claim 12, wherein the second pixels and the third pixels have octagonal shapes.

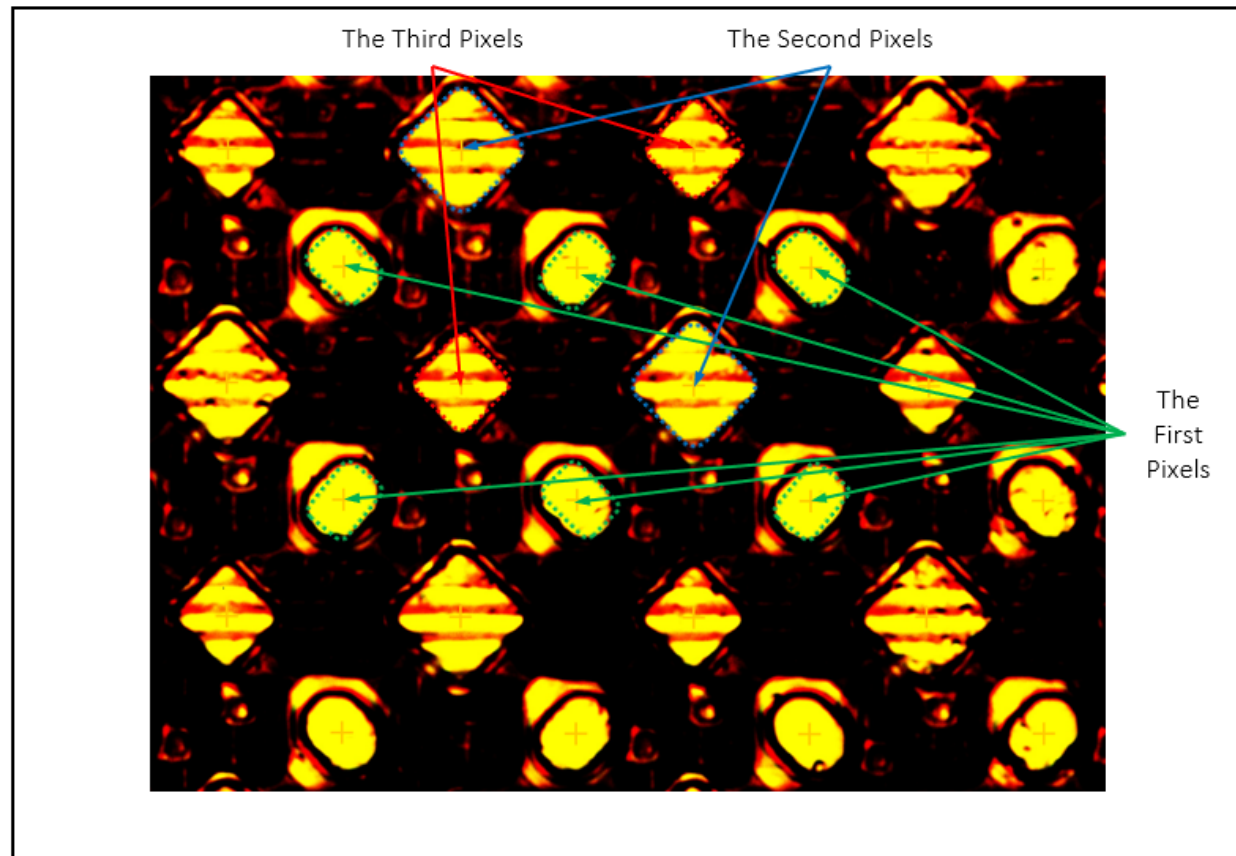
In the Samsung Galaxy S22 Ultra product, the second pixels and the third pixels have octagonal shapes. As shown in the annotated image below, the second pixels (see blue arrows) and the third pixels (see red arrows) have octagonal shapes.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

17. The pixel arrangement structure of claim 1, wherein each of the first pixels has a smaller area than the second pixels and the third pixels.

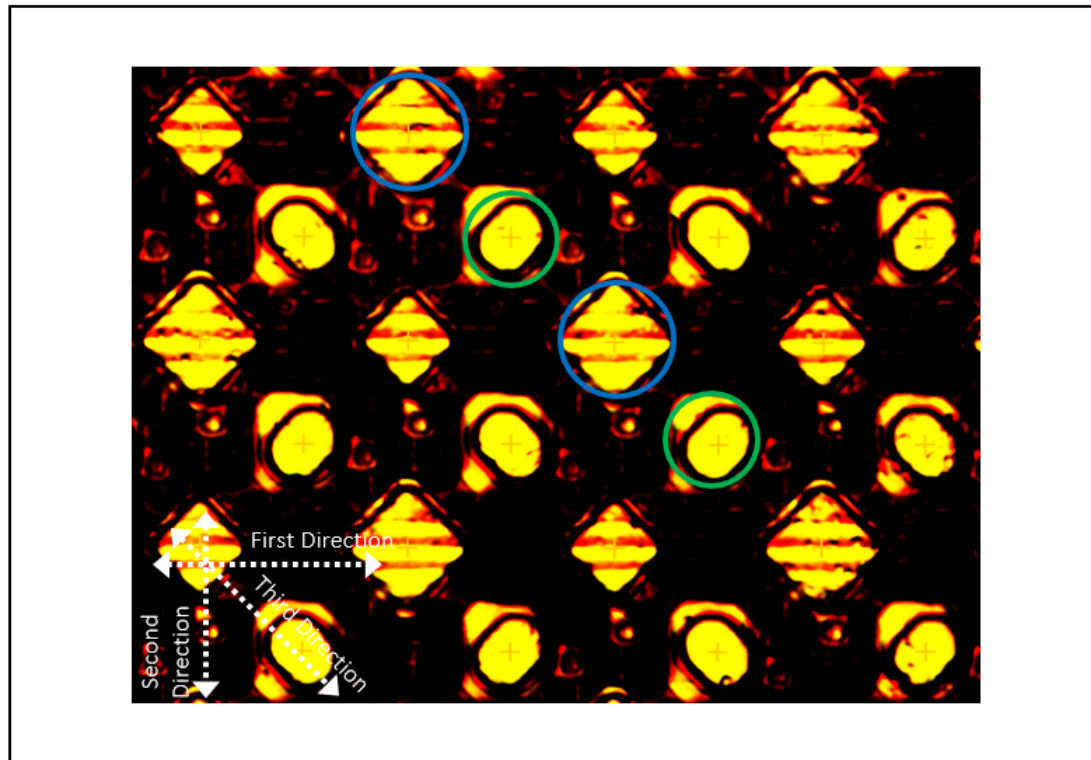
In the Samsung Galaxy S22 Ultra product, each of the first pixels has a smaller area than the second pixels and the third pixels. As shown in the annotated image below, each of the first pixels' areas (green dotted lines) are smaller than each of the second pixels' areas (dotted blue lines) and each of the third pixels' areas (dotted red lines).



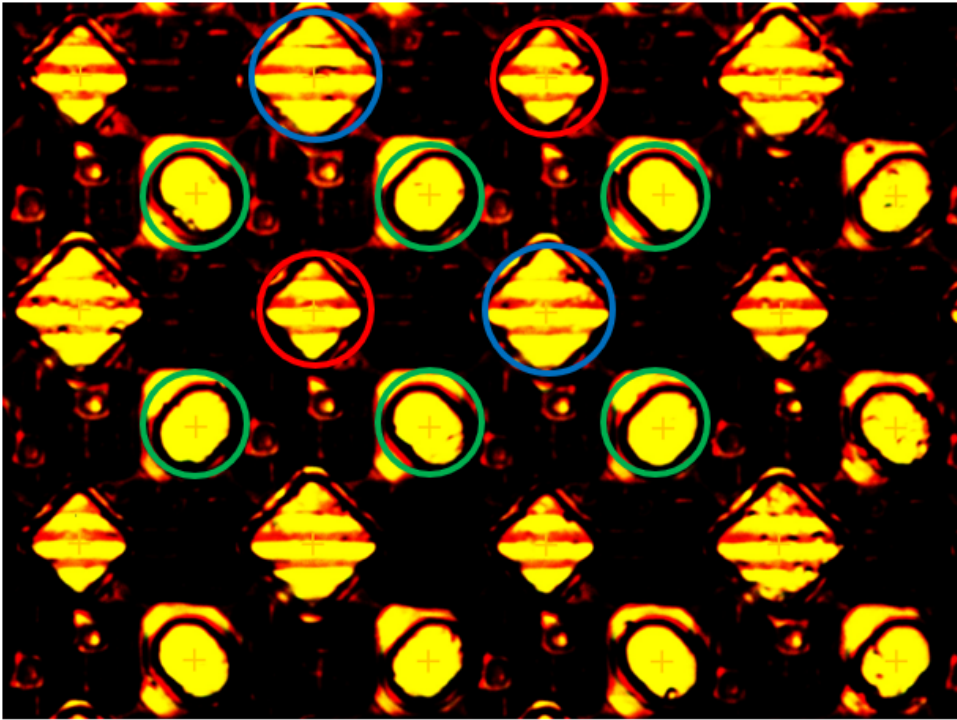
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

18[a] The pixel arrangement structure of claim 1, wherein: some of the second pixels are spaced from, and alternately arranged with, some of the first pixels in a fifth set of pixels aligned along the third direction;

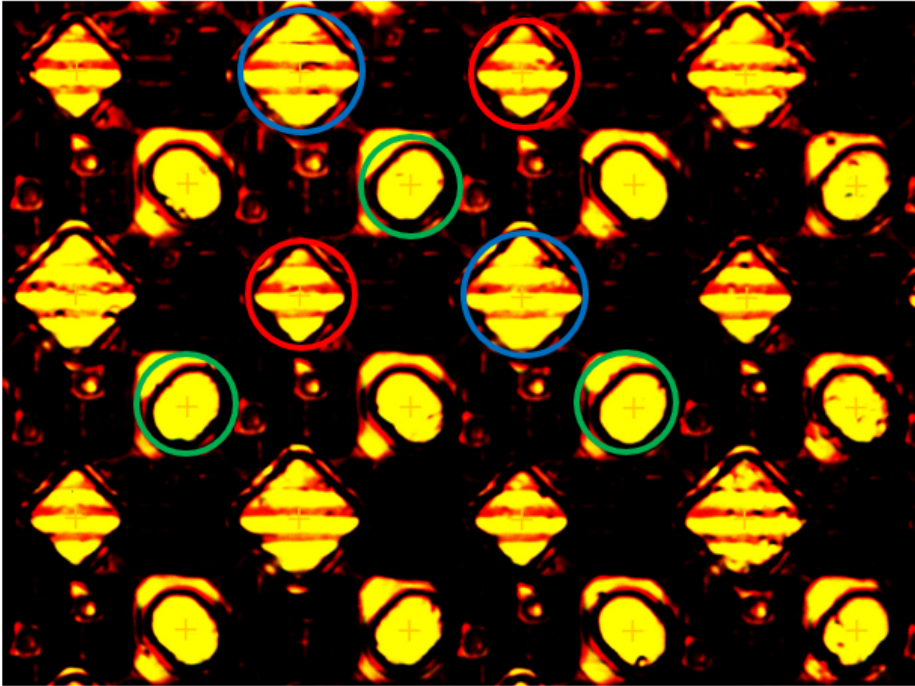
In the Samsung Galaxy S22 Ultra product, some of the second pixels are spaced from, and alternately arranged with, some of the first pixels in a fifth set of pixels aligned along the third direction. As shown in the annotated image below, some of the second pixels (blue circle) are spaced from, and alternately arranged with, some of the first pixels (green circle) in a fifth set of pixels aligned along the third direction.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

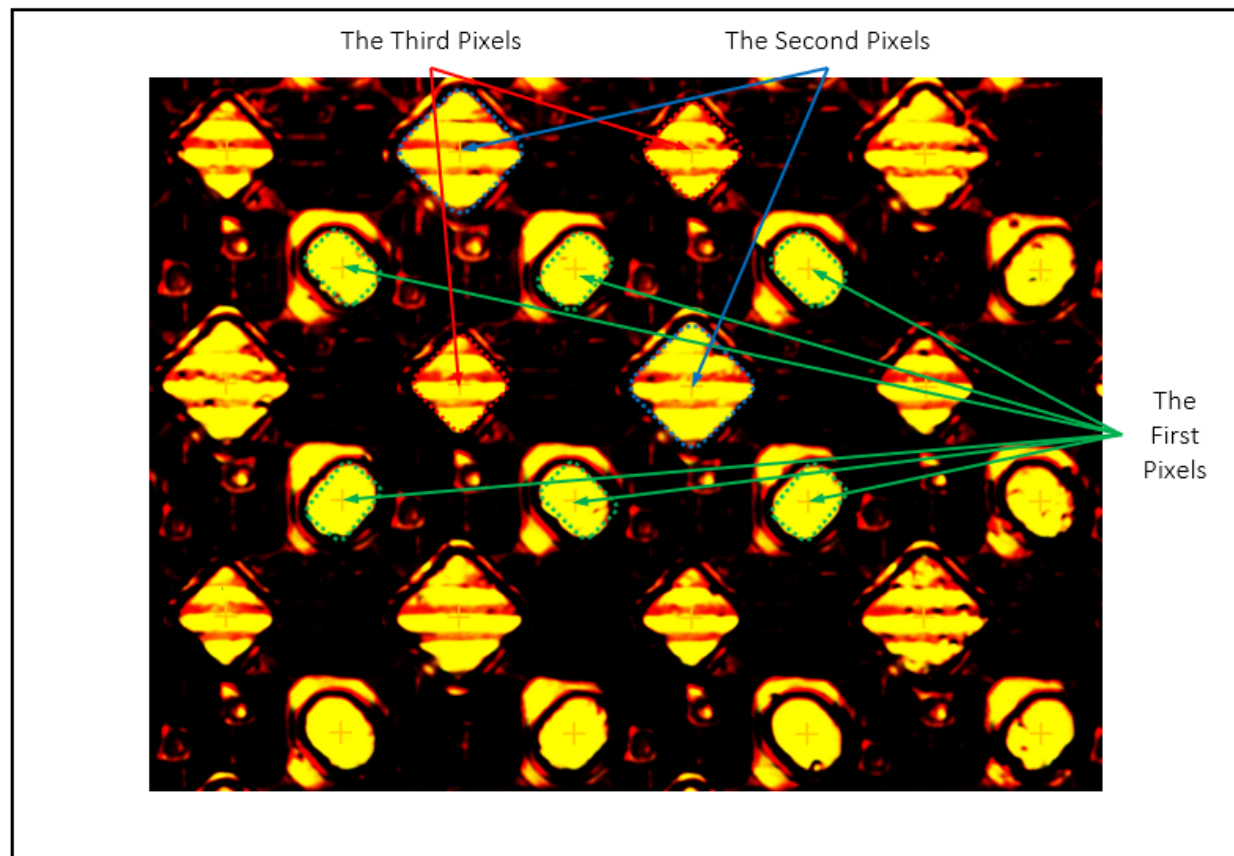
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
18[b] the third pixels are spaced from the first pixels and the second pixels;	In the Samsung Galaxy S22 Ultra product, the third pixels are spaced from the first pixels and the second pixels. As shown in the annotated image below, the third pixels (red circles) are spaced from the first pixels (green circles) and the second pixels (blue circles).  Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
18[c] some of the third pixels are alternately arranged with some of the first pixels in a sixth set of pixels aligned along a fourth direction crossing the third direction;	In the Samsung Galaxy S22 Ultra product, some of the third pixels are alternately arranged with some of the first pixels in a sixth set of pixels aligned along a fourth direction crossing the third direction. As shown in the annotated image below, some of the third pixels (red circle) are alternately arranged with some of the first pixels (green circle) in a sixth set of pixels aligned along a fourth direction crossing the third direction. The image shows a grid of pixels with four distinct directions indicated by dashed arrows and labels: 'First Direction' (horizontal), 'Second Direction' (vertical), 'Third Direction' (diagonal down-right), and 'Fourth Direction' (diagonal up-right). Red and green circles highlight specific pixel arrangements, illustrating the alternating arrangement of third and first pixels in a sixth set of pixels aligned along the fourth direction. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
18[d] the fifth set of pixels and the sixth set of pixels intersect at one of the first pixels that is in both the fifth set and the sixth set; and	In the Samsung Galaxy S22 Ultra product, the fifth set of pixels and the sixth set of pixels intersect at one of the first pixels that is in both the fifth set and the sixth set. As shown in the annotated image below, the fifth set of pixels (green circle and blue circle) and the sixth set of pixels (green circle and red circle) intersect at one of the first pixels that is in both the fifth set and the sixth set (green circle).  The image displays a grid of pixels, likely from a camera sensor, with a color gradient from dark red to bright yellow. Several pixels are circled in color to indicate specific sets of pixels. A green circle is centered on a pixel in the second row, second column. A blue circle is centered on a pixel in the first row, third column. A red circle is centered on a pixel in the first row, second column. Another green circle is centered on a pixel in the third row, second column. These circles illustrate the intersection of different sets of pixels as described in the text. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

18[e] the first pixels are different in size from at least one of the second pixels or the third pixels.

In the Samsung Galaxy S22 Ultra product, the first pixels are different in size from at least one of the second pixels or the third pixels. As shown in the annotated image below, the first pixels' areas (green dotted lines) are different from at least one of the second pixels' areas (dotted blue lines) or the third pixels' areas (dotted red lines).

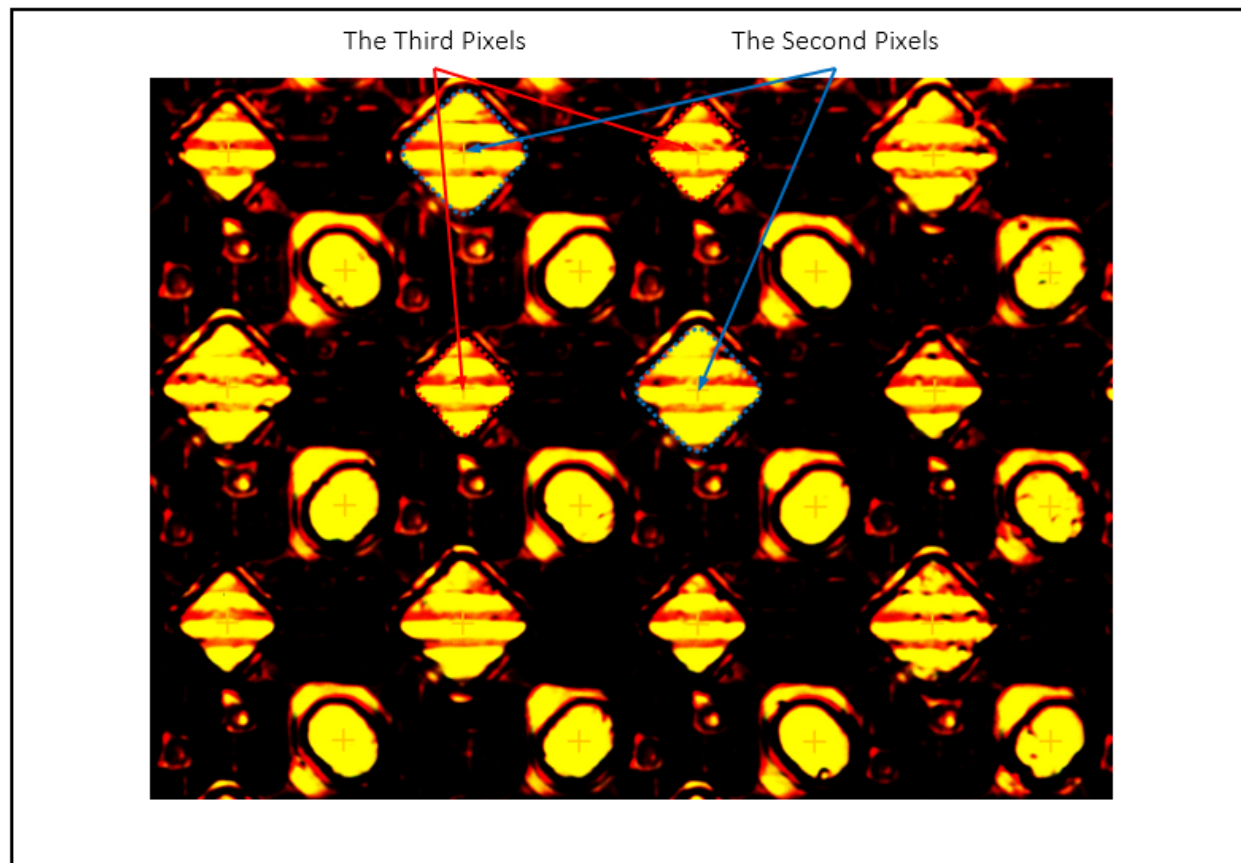


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
19. The pixel arrangement structure of claim 18, wherein the first pixels are configured to produce green light, wherein the second pixels are configured to produce blue light, and wherein the third pixels are configured to produce red light.	In the Samsung Galaxy S22 Ultra product, the first pixels are configured to produce green light, the second pixels are configured to produce blue light, and the third pixels are configured to produce red light. As shown in the annotated image below, the first pixels (see green arrows) are configured to produce green light, the second pixels (see blue arrows) are configured to produce blue light, and the third pixels (see red arrows) are configured to produce red light. Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

21. The pixel arrangement structure of claim 18, wherein the second pixels are different in size from the third pixels.

In the Samsung Galaxy S22 Ultra product, the second pixels are different in size from the third pixels. As shown in the annotated image below, the second pixels' areas (dotted blue lines) are different from the third pixels' areas (dotted red lines).

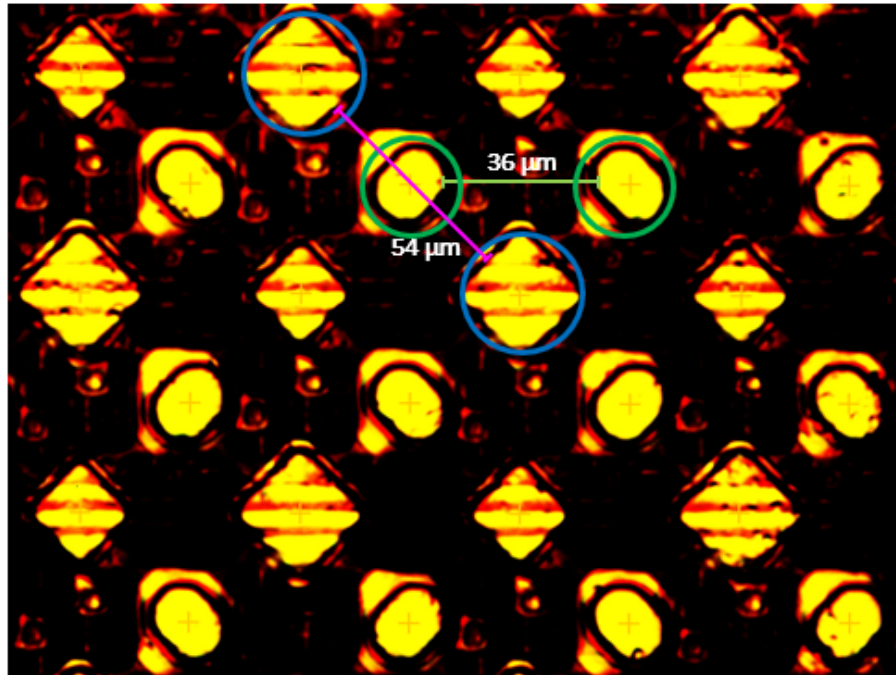


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
22[a] The pixel arrangement structure of claim 18, wherein a shortest distance between two adjacent ones of the first pixels is greater than a shortest distance between one of the second pixels and one of the third pixels that is adjacent to the one of the second pixels, and	In the Samsung Galaxy S22 Ultra product, a shortest distance between two adjacent ones of the first pixels is greater than a shortest distance between one of the second pixels and one of the third pixels that is adjacent to the one of the second pixels. As shown in the annotated image below, a shortest distance (light green) between two adjacent ones of the first pixels (green circles) of 36 micrometers is greater than a shortest distance (light blue) between one of the second pixels and one of the third pixels that is adjacent to the one of the second pixels (blue circle and red circle) of 27 micrometers. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

22[b] wherein the shortest distance between the two adjacent ones of the first pixels is different from a shortest distance between two adjacent ones of the second pixels.

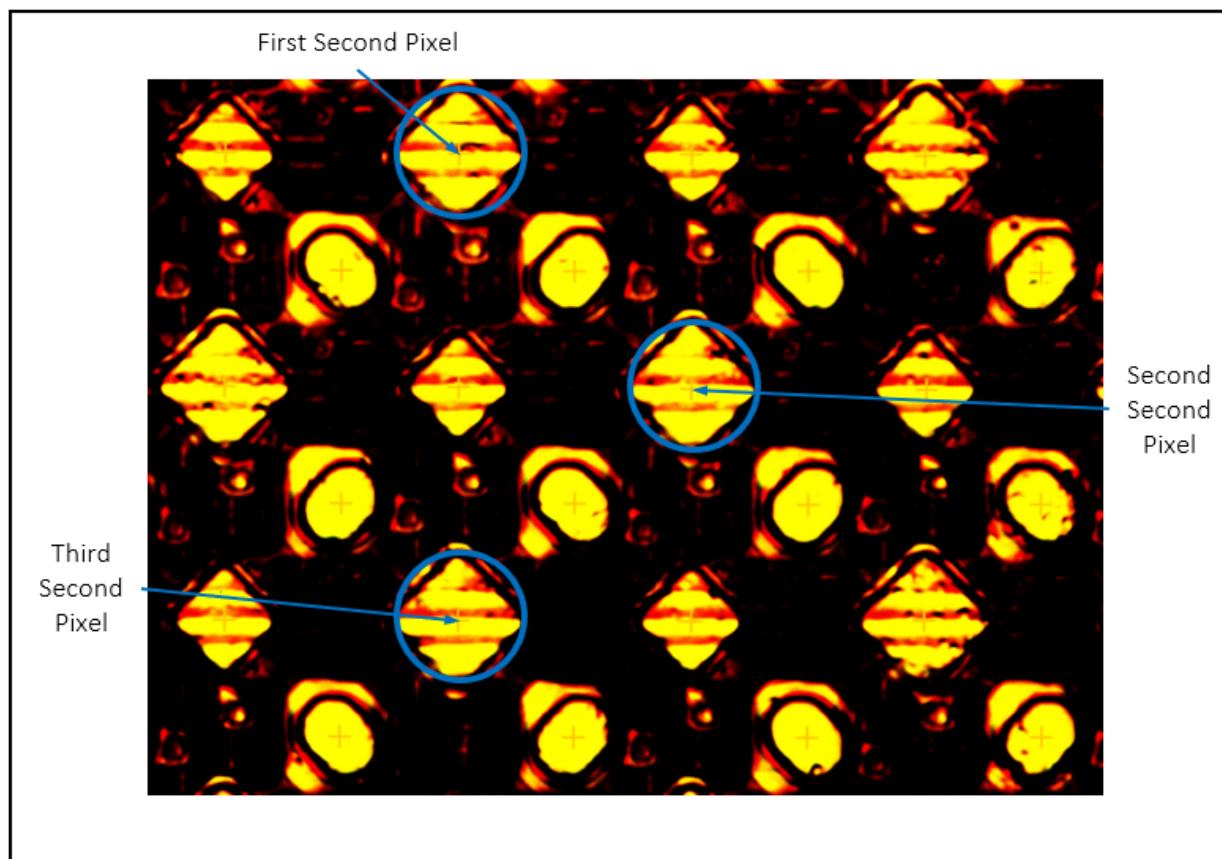
In the Samsung Galaxy S22 Ultra product, the shortest distance between the two adjacent ones of the first pixels is different from a shortest distance between two adjacent ones of the second pixels. As shown in the annotated image below, the shortest distance (light green) between the two adjacent ones of the first pixels (green circles) of 36 micrometers is different from a shortest distance (pink) between two adjacent ones of the second pixels of 54 micrometers.



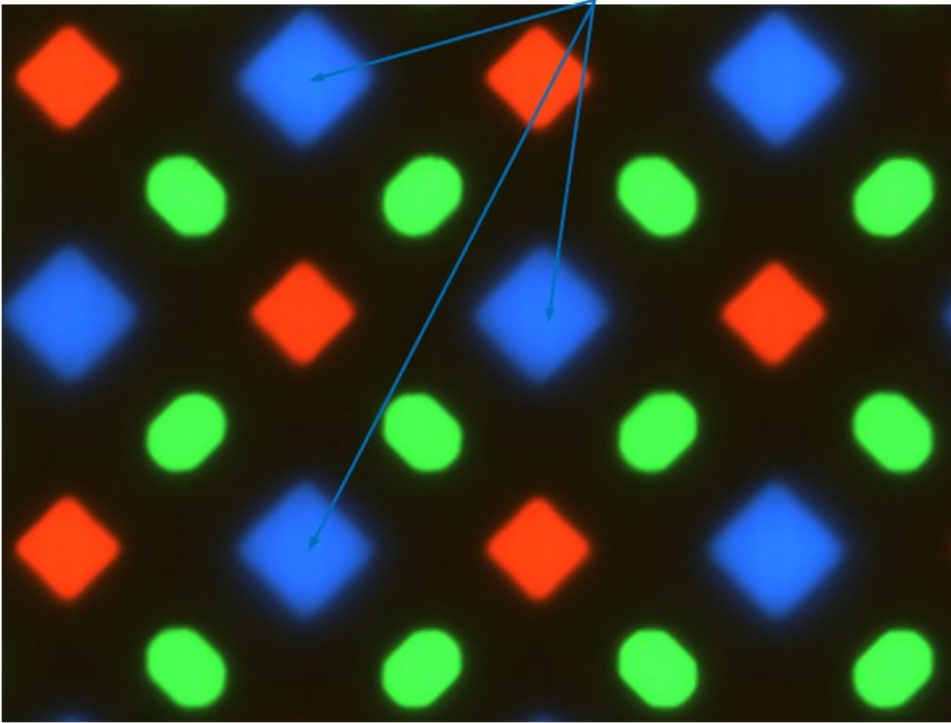
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

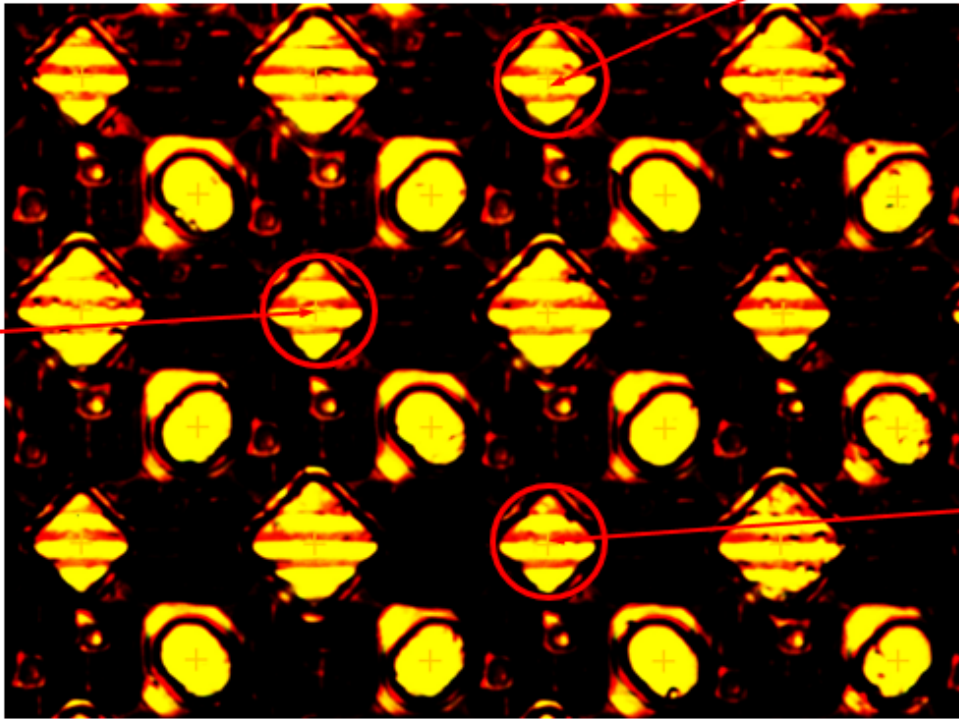
23[a] The pixel arrangement structure of claim 1, wherein: the plurality of second pixels comprises a first second pixel, a second second pixel, and a third second pixel;

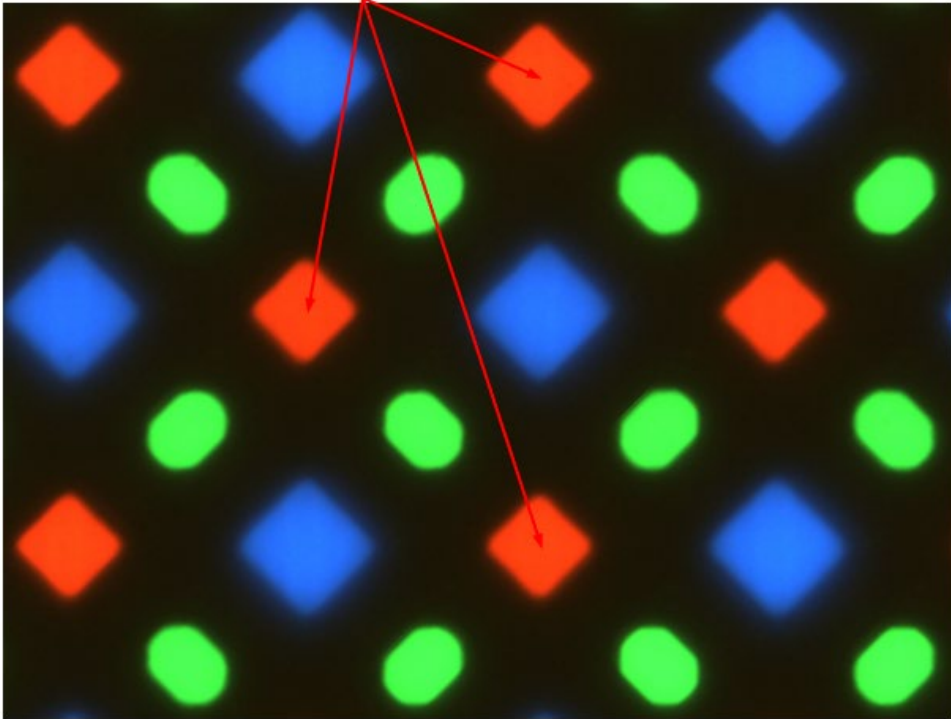
In the Samsung Galaxy S22 Ultra product, the plurality of second pixels comprises a first second pixel, a second second pixel, and a third second pixel. As shown in the annotated image below, the plurality of second pixels (blue circles) comprises a first second pixel, a second second pixel, and a third second pixel.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

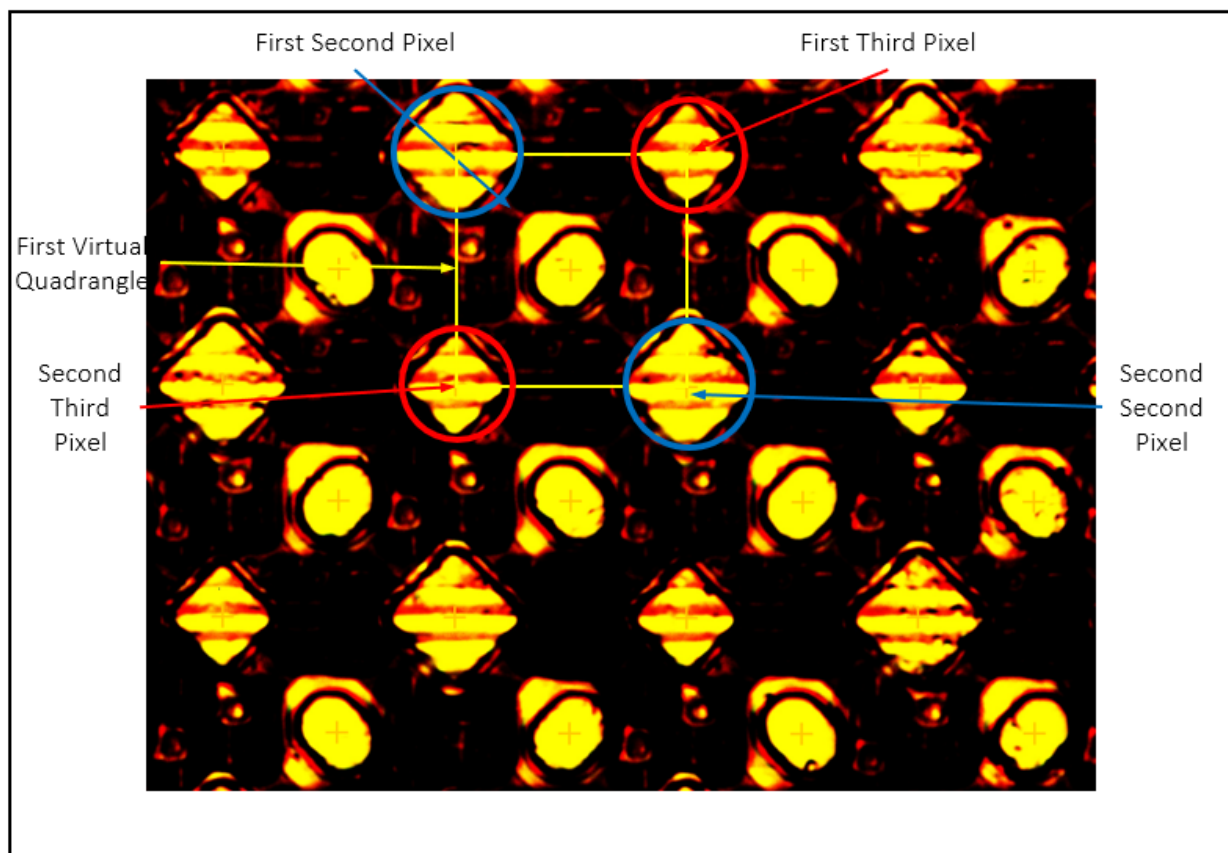
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[b] each of the second pixels is configured to produce light having a second color;	In the Samsung Galaxy S22 Ultra product, each of the second pixels is configured to produce light having a second color. As shown in the annotated image below, each of the second pixels (see blue arrows) is configured to produce light having a blue color.  The image shows a grid of subpixels on a black background. There are red diamond-shaped subpixels, green circular subpixels, and blue diamond-shaped subpixels. Three blue arrows originate from the text 'The Second Pixels' and point to three of the blue diamond-shaped subpixels. Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[c] the plurality of third pixels comprises a first third pixel, a second third pixel, and a third third pixel;	In the Samsung Galaxy S22 Ultra product, the plurality of third pixels comprises a first third pixel, a second third pixel, and a third third pixel. As shown in the annotated image below, the plurality of third pixels (red circles) comprises a first third pixel, a second third pixel, and a third third pixel.  The image shows a close-up of a sensor array with a grid of diamond-shaped pixels. Three specific pixels are highlighted with red circles and labeled with red leader lines: 'First Third Pixel' (top right), 'Second Third Pixel' (middle left), and 'Third Third Pixel' (bottom right). The array consists of alternating diamond-shaped pixels and smaller circular subpixels. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[d] each of the third pixels is configured to produce light having a third color that is different from the second color;	In the Samsung Galaxy S22 Ultra product, each of the third pixels is configured to produce light having a third color that is different from the second color. As shown in the annotated image below, each of the third pixels (see red arrows) is configured to produce light having a red color that is different from the blue color.  The image shows a grid of pixels on a black background. There are three types of pixels: red diamonds, blue diamonds, and green circles. The red diamonds are located at positions (1,1), (1,3), (2,2), (2,4), (3,1), (3,3), (3,5), (4,2), (4,4), and (4,6) in a 4x6 grid. The blue diamonds are at (1,2), (1,4), (2,1), (2,3), (2,5), (3,2), (3,4), (3,6), (4,1), (4,3), (4,5), and (4,7). The green circles are at (1,5), (1,6), (2,6), (2,7), (3,6), (3,7), (4,6), (4,7), (4,8), and (4,9). Three red arrows originate from the text 'The Third Pixels' and point to three of the red diamond pixels: (1,3), (2,2), and (3,5). Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

23[e] the first second pixel, the first third pixel, the second second pixel, and the second third pixel form a first virtual quadrangle.

In the Samsung Galaxy S22 Ultra product, the first second pixel, the first third pixel, the second second pixel, and the second third pixel form a first virtual quadrangle. As shown in the annotated image below, the first second pixel, the first third pixel, the second second pixel, and the second third pixel form a first virtual quadrangle (yellow).

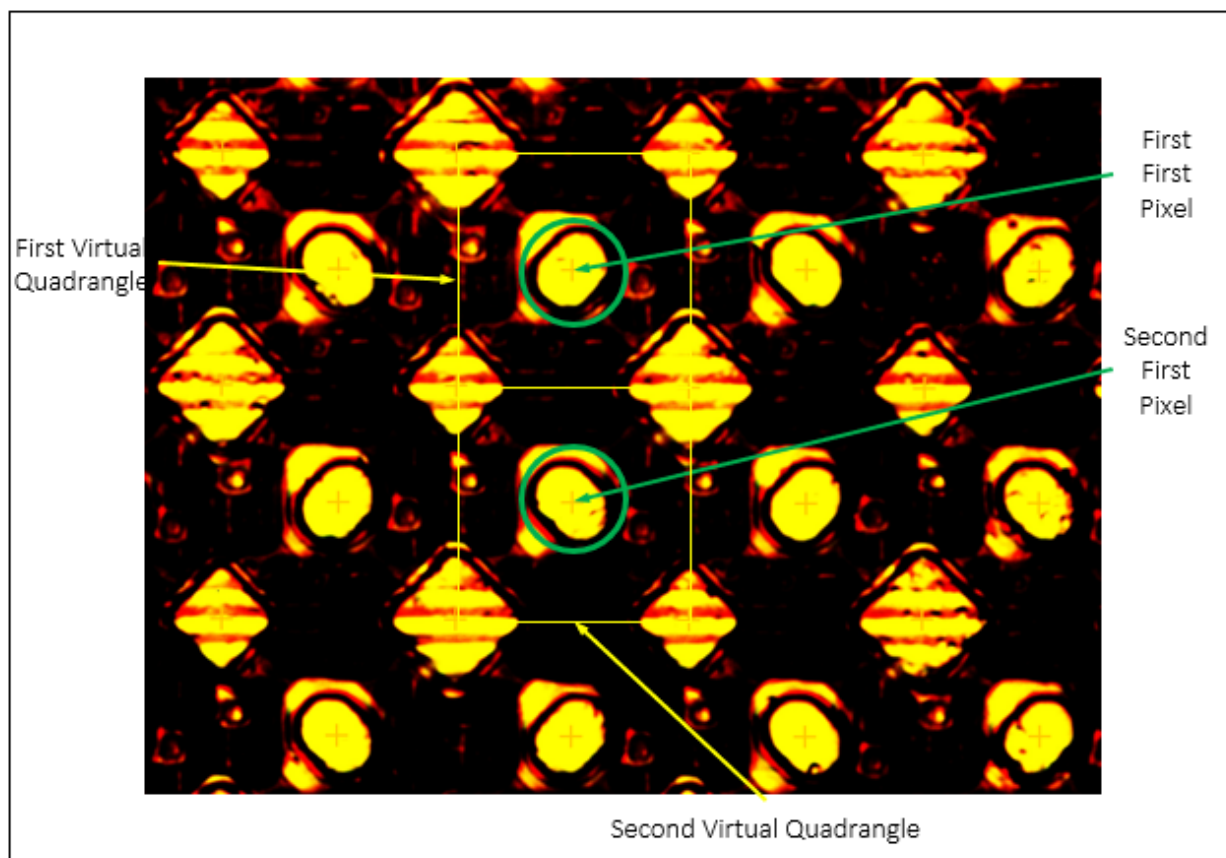


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[f] the second second pixel, the second third pixel, the third second pixel, and the third third pixel form a second virtual quadrangle;	In the Samsung Galaxy S22 Ultra product, the second second pixel, the second third pixel, the third second pixel, and the third third pixel form a second virtual quadrangle. As shown in the annotated image below, the second second pixel, the second third pixel, the third second pixel, and the third third pixel form a second virtual quadrangle (yellow). The image shows a grid of pixels with a color gradient from dark red to bright yellow. Four specific pixels are highlighted with red circles: one in the second row, third column; one in the second row, fourth column; one in the third row, third column; and one in the third row, fourth column. These four pixels are connected by a yellow quadrilateral. Labels on the left and right sides of the grid point to specific rows: 'Second Third Pixel' points to the second row, 'Third Second Pixel' points to the third row, 'Second Second Pixel' points to the second row, and 'Third Third Pixel' points to the third row. A yellow arrow points from the text 'Second Virtual Quadrangle' at the bottom to the yellow quadrilateral. Second Virtual Quadrangle Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

23[g] the plurality of first pixels comprises a first first pixel in the first virtual quadrangle and a second first pixel in the second virtual quadrangle;

In the Samsung Galaxy S22 Ultra product, the plurality of first pixels comprises a first first pixel in the first virtual quadrangle and a second first pixel in the second virtual quadrangle. As shown in the annotated image below, the plurality of first pixels (green circles) comprises a first first pixel in the first virtual quadrangle and a second first pixel in the second virtual quadrangle.

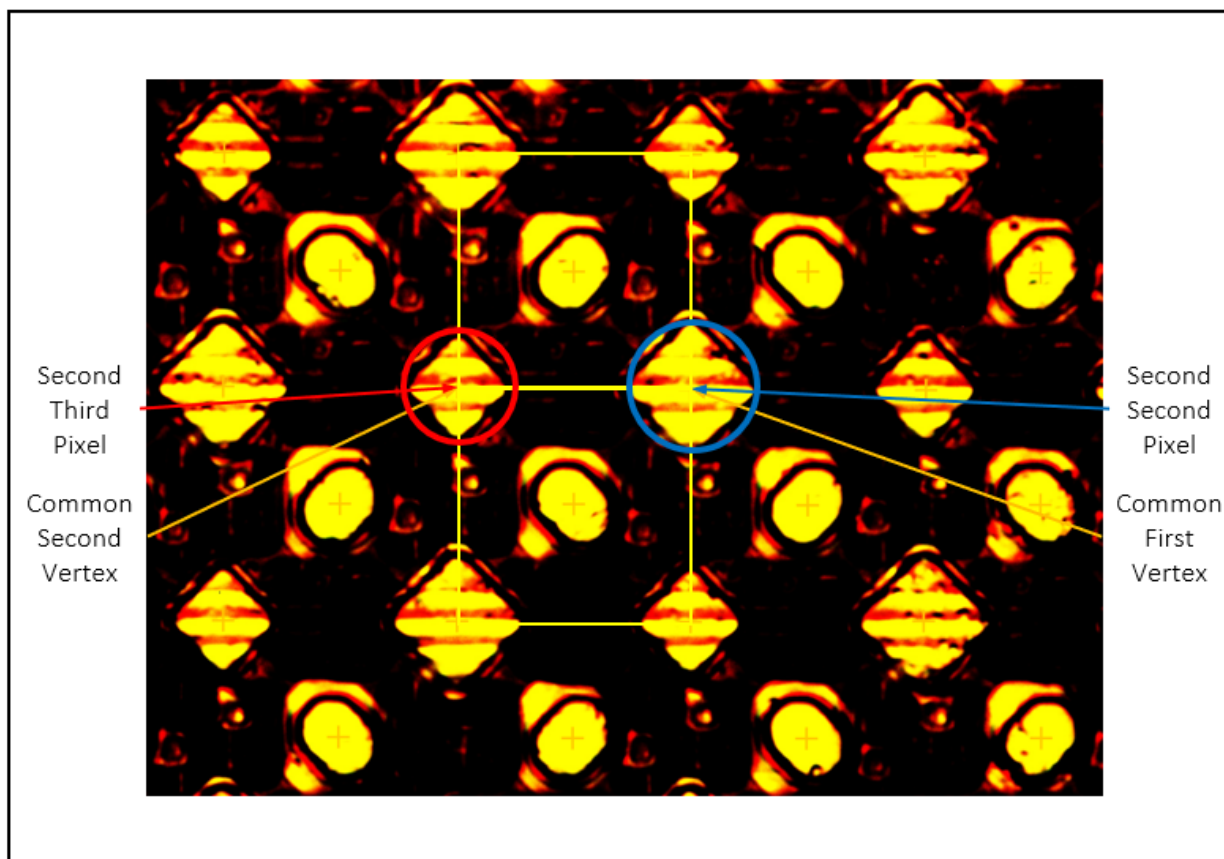


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[h] the first and second virtual quadrangles share a common side having endpoints at a common first vertex and a common second vertex of the first and second virtual quadrangles,	In the Samsung Galaxy S22 Ultra product, the first and second virtual quadrangles share a common side having endpoints at a common first vertex and a common second vertex of the first and second virtual quadrangles. As shown in the annotated image below, the first and second virtual quadrangles share a common side having endpoints at a common first vertex and a common second vertex of the first and second virtual quadrangles. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

23[i] the second second pixel is arranged at the common first vertex, and the second third pixel is arranged at the common second vertex;

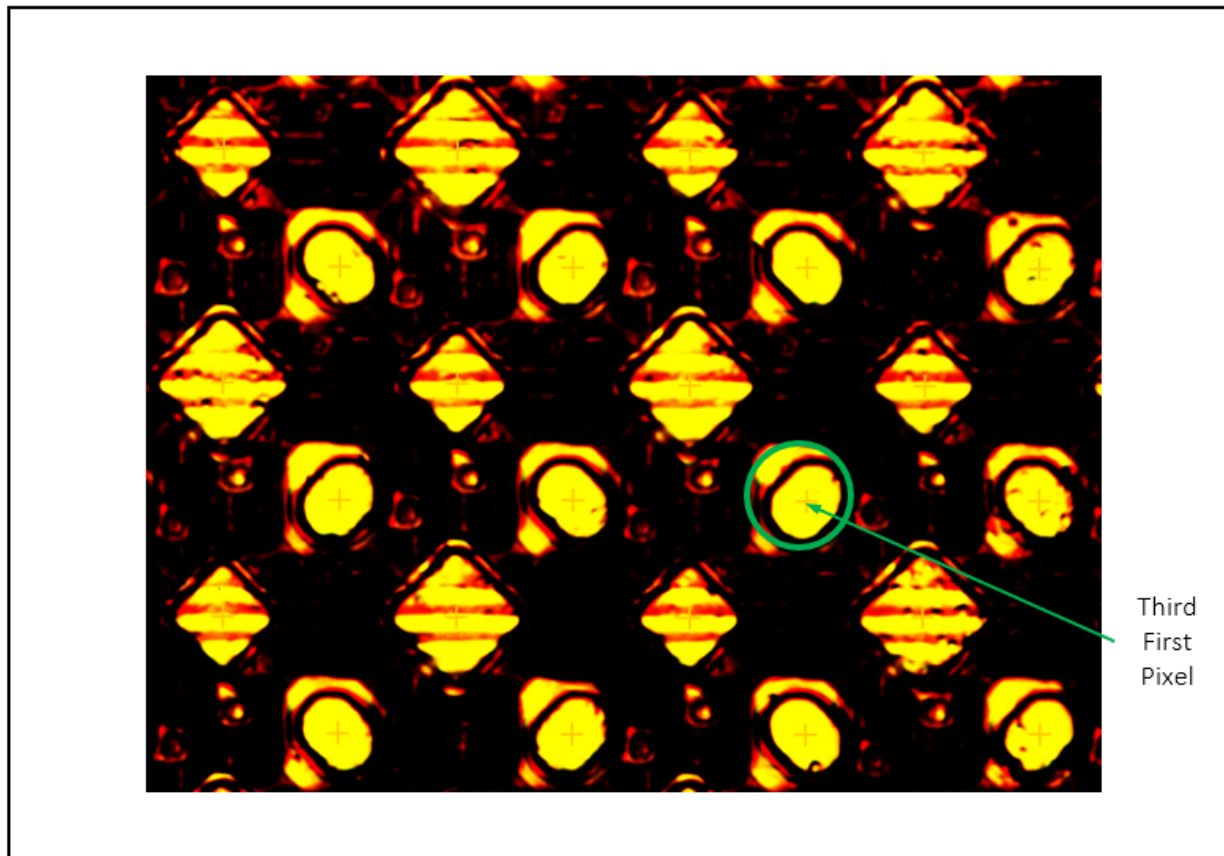
In the Samsung Galaxy S22 Ultra product, the second second pixel is arranged at the common first vertex, and the second third pixel is arranged at the common second vertex. As shown in the annotated image below, the second second pixel (blue circle) is arranged at the common first vertex, and the second third pixel (red circle) is arranged at the common second vertex.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

23[j] the plurality of first pixels further comprises a third first pixel;

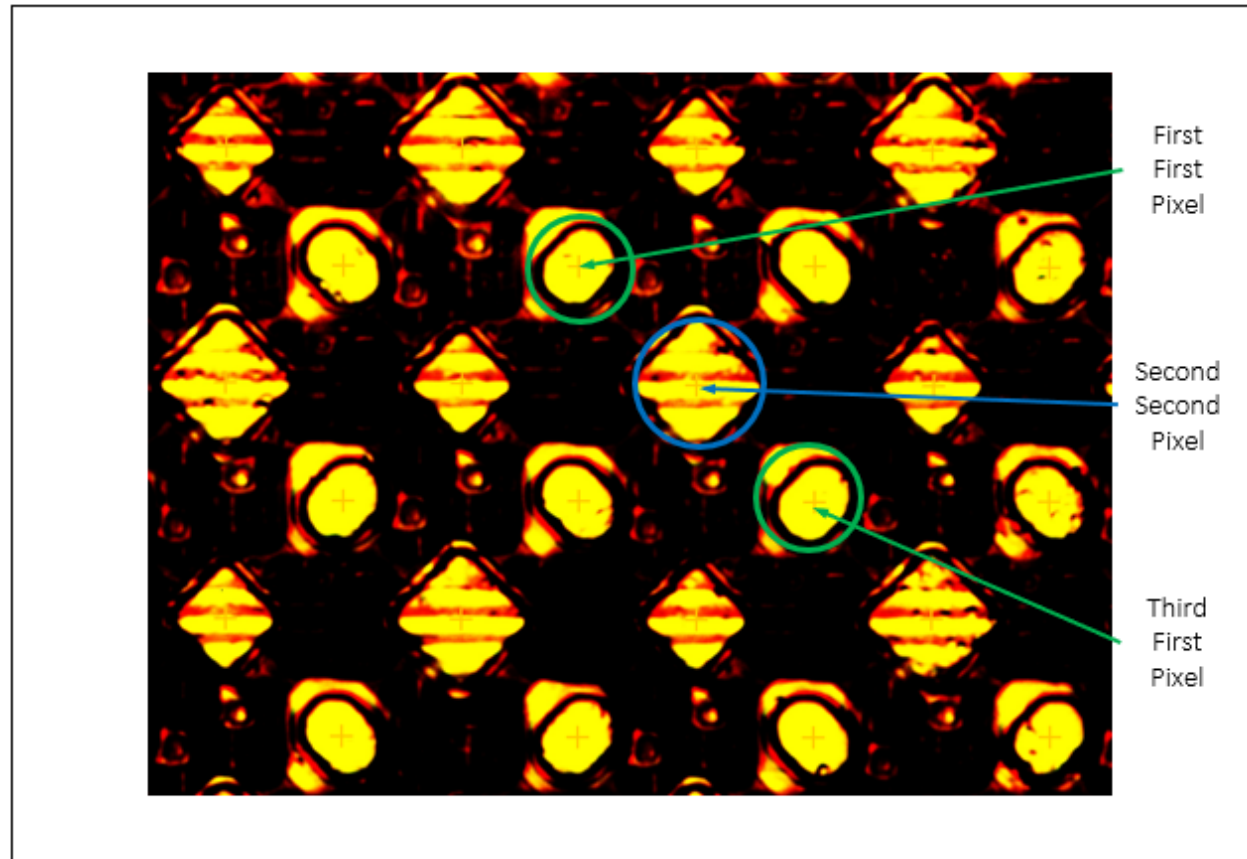
In the Samsung Galaxy S22 Ultra product, the plurality of first pixels further comprises a third first pixel. As shown in the annotated image below, the plurality of first pixels further comprises a third first pixel (green circle).



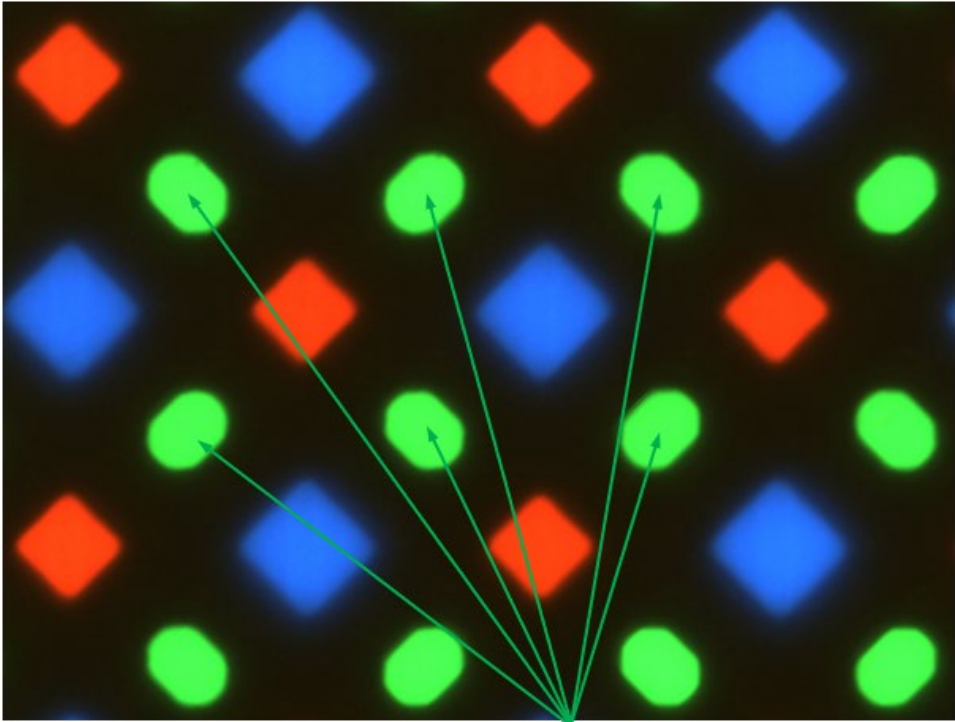
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

23[k] the first first pixel and the third first pixel are located at opposite sides of the second second pixel;

In the Samsung Galaxy S22 Ultra product, the first first pixel and the third first pixel are located at opposite sides of the second second pixel. As shown in the annotated image below, the first first pixel and the third first pixel are located at opposite sides of the second second pixel (blue circle).

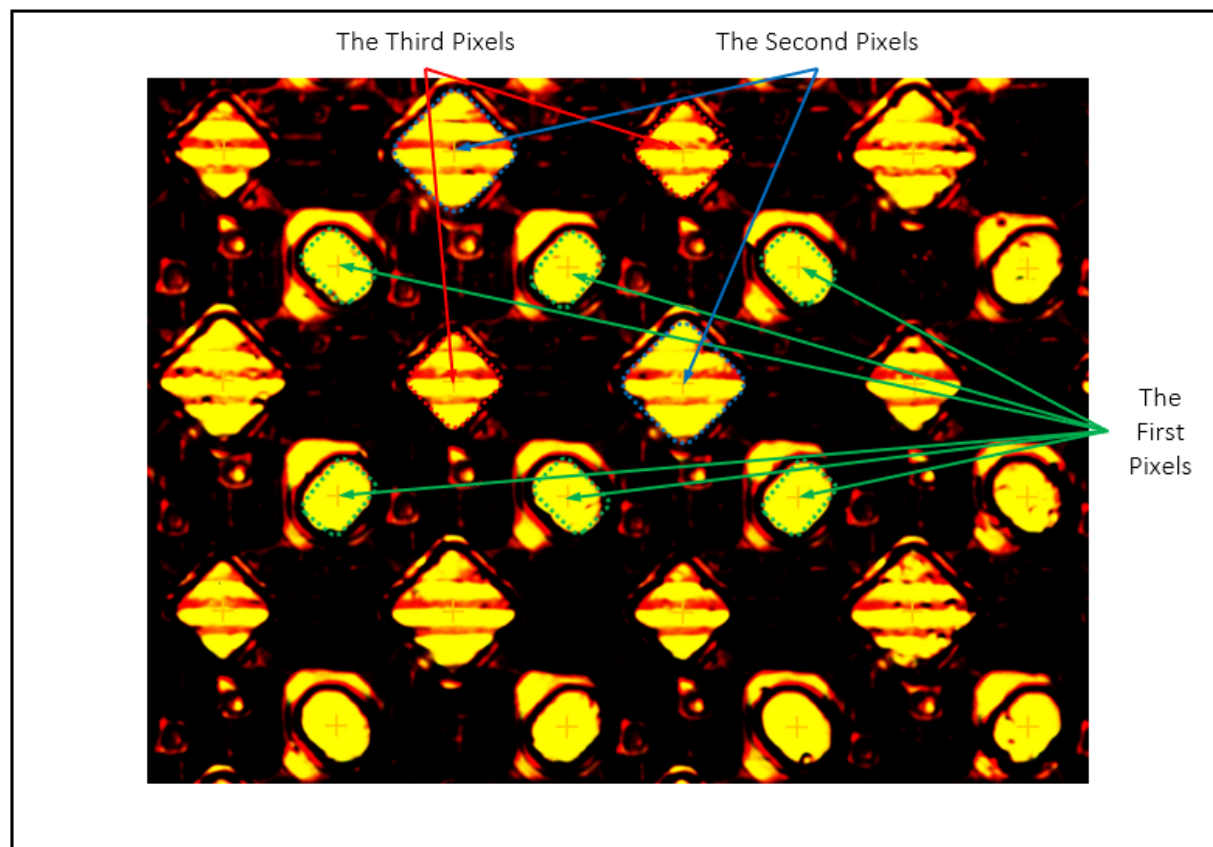


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
23[I] each of the first pixels is configured to produce light having a first color that is different from the second color and the third color; and	In the Samsung Galaxy S22 Ultra product, each of the first pixels is configured to produce light having a first color that is different from the second color and the third color. As shown in the annotated image below, each of the first pixels (see green arrows) is configured to produce light having green color that is different from the blue color and the red color.  The image shows a 4x4 grid of pixels on a black background. The pixels are colored red, blue, and green in a repeating pattern. Red pixels are at positions (1,1), (1,3), (2,2), (2,4), (3,1), (3,3), (4,2), and (4,4) assuming (0,0) is top-left. Blue pixels are at (1,2), (1,4), (2,1), (2,3), (3,2), (3,4), (4,1), and (4,3). Green pixels are at (0,0), (0,1), (0,2), (0,3), (1,0), (1,1), (1,2), (1,3), (2,0), (2,1), (2,2), (2,3), (3,0), (3,1), (3,2), (3,3), (4,0), (4,1), (4,2), and (4,3). Five green arrows originate from the bottom center and point to five green pixels at approximately (1,1), (1,2), (2,1), (2,2), and (2,3) in the grid. Below the image, the text 'The First Pixels' is centered. Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

23[m] the second pixels are larger in area than the first pixels and the third pixels.

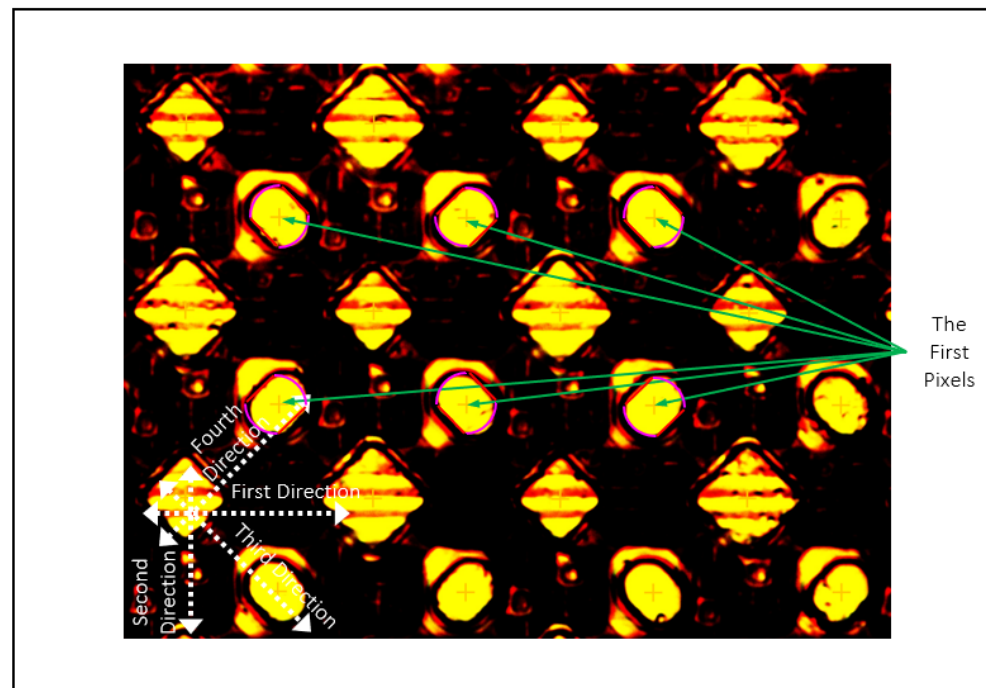
In the Samsung Galaxy S22 Ultra product, the second pixels are larger in area than the first pixels and the third pixels. As shown in the annotated image below, the second pixels' areas (dotted blue lines) are larger than the first pixels' areas (dotted green lines) and the third pixels' areas (dotted red lines).



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

40[a] The pixel arrangement structure of claim 1, wherein each of the first pixels has two elongated sides that are elongated in the third direction or a fourth direction crossing the third direction and different from the first and second directions, and two connection portions that connect the two elongated sides to each other at respective ends, and

In the Samsung Galaxy S22 Ultra product, each of the first pixels has two elongated sides that are elongated in the third direction or a fourth direction crossing the third direction and different from the first and second directions, and two connection portions that connect the two elongated sides to each other at respective ends. As shown in the annotated image below, each of the first pixels (see green arrows) has two elongated sides that are elongated in the third direction or a fourth direction crossing the third direction and different from the first and second directions (red lines), and two connection portions (pink portions) that connect the two elongated sides (red lines) to each other at respective ends.

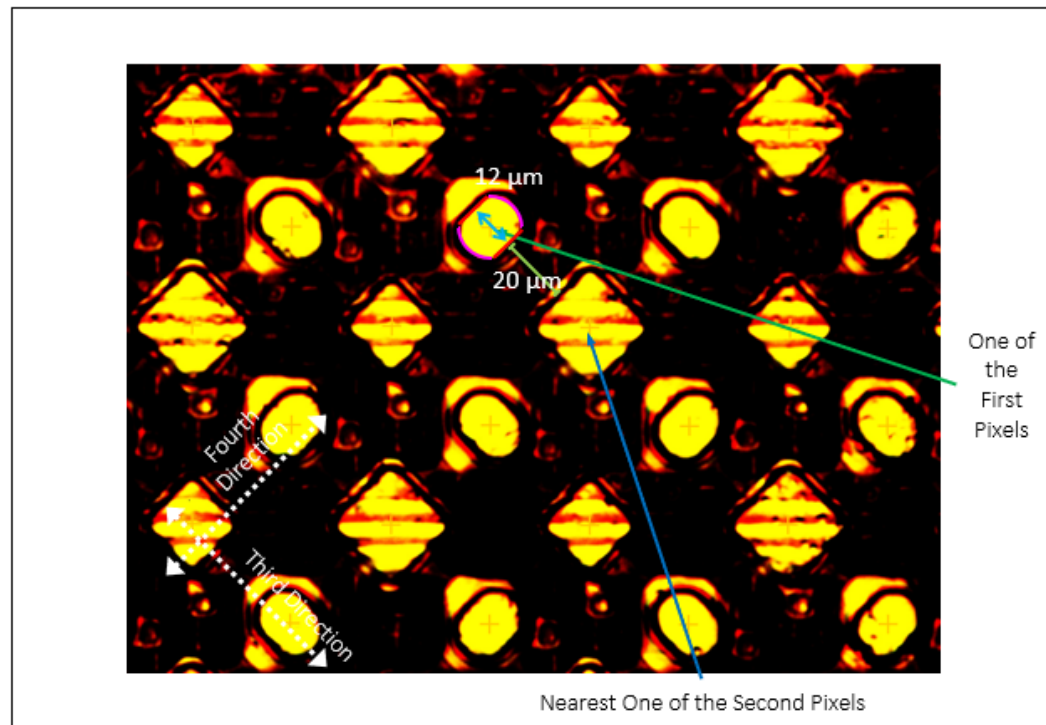


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
40[b] wherein at least one of the two connection portions has a length that is greater than a shortest distance between the two elongated sides.	In the Samsung Galaxy S22 Ultra product, at least one of the two connection portions has a length that is greater than a shortest distance between the two elongated sides. As shown in the annotated image below, at least one of the two connection portions (pink portions) has a length that is greater than a shortest distance (light blue) between the two elongated sides (red lines). Each connection portion follows the boundary of the first pixel to connect two ends of the straight elongated sides, and so has a longer length than the perpendicular distance between the two elongated sides. The image displays a grid of diamond-shaped patterns, likely representing a microscopic view of a device component. Each diamond is outlined in yellow. Within each diamond, there are two pink curved lines representing connection portions. A light blue double-headed arrow indicates the shortest distance between the two elongated sides of the diamond. The pink connection portions are longer than this light blue distance. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

41. The pixel arrangement structure of claim 1, wherein a shortest distance between two elongated sides of one of the first pixels is less than a shortest distance between the one of the first pixels and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction.

In the Samsung Galaxy S22 Ultra product, a shortest distance between two elongated sides of one of the first pixels is less than a shortest distance between the one of the first pixels and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction. As shown in the annotated image below, a shortest distance (light blue) between two elongated sides (red lines) of one of the first pixels (see green arrow) of 12 micrometers is less than a shortest distance (light green) between the one of the first pixels (see green arrow) and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction (see blue arrow) of 20 micrometers.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

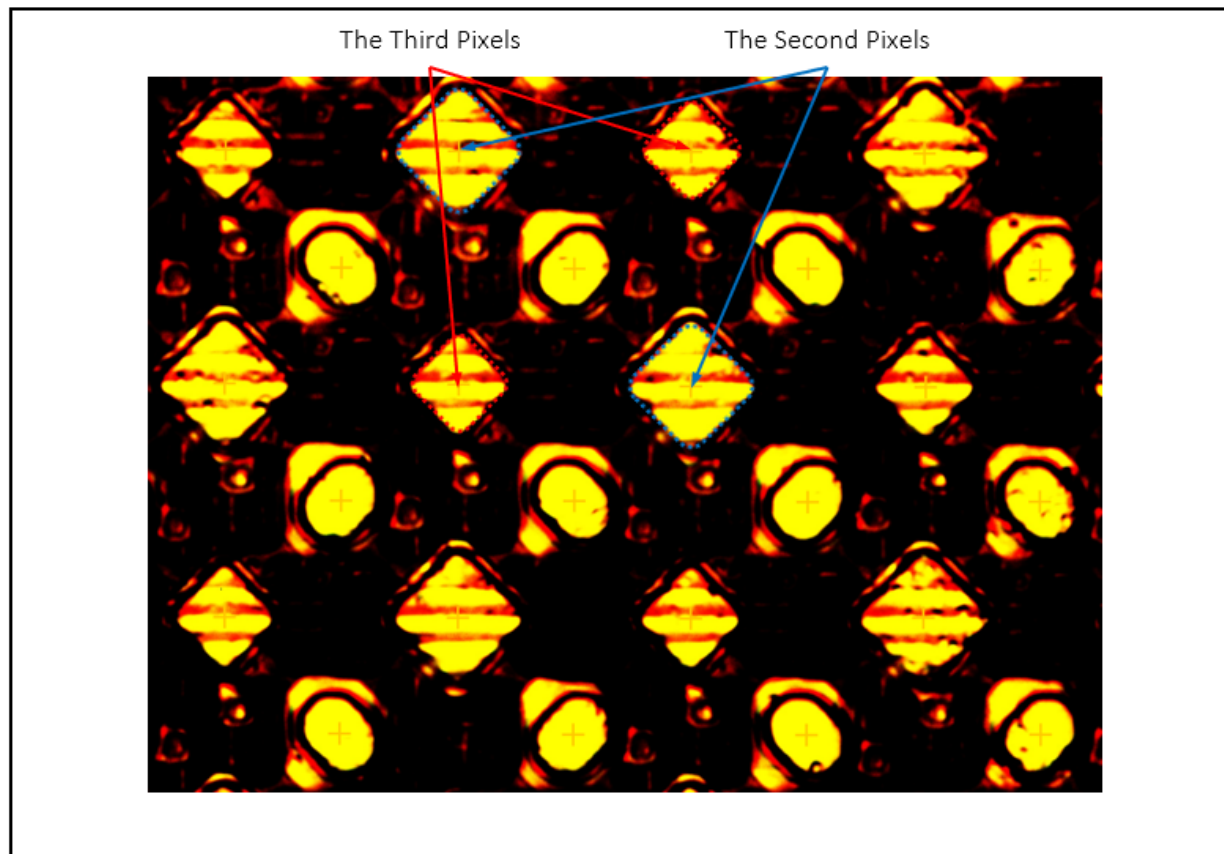
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[preamble] A pixel arrangement structure of an organic light emitting diode (OLED) display, the pixel arrangement structure comprising:	The Samsung Galaxy S22 Ultra product contains a pixel arrangement structure of an organic light emitting diode (OLED) display. <i>See, e.g.,</i> claim 1[preamble].
42[a] a plurality of first pixels;	The Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of first pixels. <i>See, e.g.,</i> claim 1[a].
42[b] a plurality of second pixels; and	The Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of second pixels. <i>See, e.g.,</i> claim 1[b].
42[c] a plurality of third pixels,	The Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of third pixels. <i>See, e.g.,</i> claim 1[c].
42[d] wherein the OLED display comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels,	The Samsung Galaxy S22 Ultra product comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels. <i>See, e.g.,</i> claim 1[d].
42[e] wherein the first pixels, the second pixels, and the third pixels are configured to emit different color lights,	In the Samsung Galaxy S22 Ultra product, the first pixels, the second pixels, and the third pixels are configured to emit different color lights. <i>See, e.g.,</i> claim 1[e].

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[f] wherein the first pixels are arranged in first sets extending along a first direction to form respective first lines,	In the Samsung Galaxy S22 Ultra product, the first pixels are arranged in first sets extending along a first direction to form respective first lines. <i>See, e.g., claim 1[f].</i>
42[g] wherein the second pixels and the third pixels are alternately arranged in second sets extending along the first direction to form respective second lines parallel to the first lines,	In the Samsung Galaxy S22 Ultra product, the second pixels and the third pixels are alternately arranged in second sets extending along the first direction to form respective second lines parallel to the first lines. <i>See, e.g., claim 1[g].</i>
42[h] wherein the first lines and the second lines are alternately arranged,	In the Samsung Galaxy S22 Ultra product, the first lines and the second lines are alternately arranged. <i>See, e.g., claim 1[i].</i>
42[i] wherein the first pixels are also arranged in third sets extending along a second direction that is perpendicular to the first direction to form respective third lines,	In the Samsung Galaxy S22 Ultra product, the first pixels are also arranged in third sets extending along a second direction that is perpendicular to the first direction to form respective third lines. <i>See, e.g., claim 1[j].</i>

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[j] wherein the second pixels and the third pixels are also alternately arranged in fourth sets extending along the second direction to form respective fourth lines that are parallel to the third lines,	In the Samsung Galaxy S22 Ultra product, the second pixels and the third pixels are also alternately arranged in fourth sets extending along the second direction to form respective fourth lines that are parallel to the third lines. <i>See, e.g., claim 1[k].</i>
42[k] wherein the third lines and the fourth lines are alternately arranged,	In the Samsung Galaxy S22 Ultra product, the third lines and the fourth lines are alternately arranged. <i>See, e.g., claim 1[l].</i>
42[l] wherein respective ones of the first pixels and respective ones of either the second pixels or the third pixels are alternately arranged along a third direction, which crosses the first direction and the second direction,	In the Samsung Galaxy S22 Ultra product, respective ones of the first pixels and respective ones of either the second pixels or the third pixels are alternately arranged along a third direction, which crosses the first direction and the second direction. <i>See, e.g., claim 1[m].</i>

42[m] wherein each of the second pixels has a larger area than each of the third pixels,

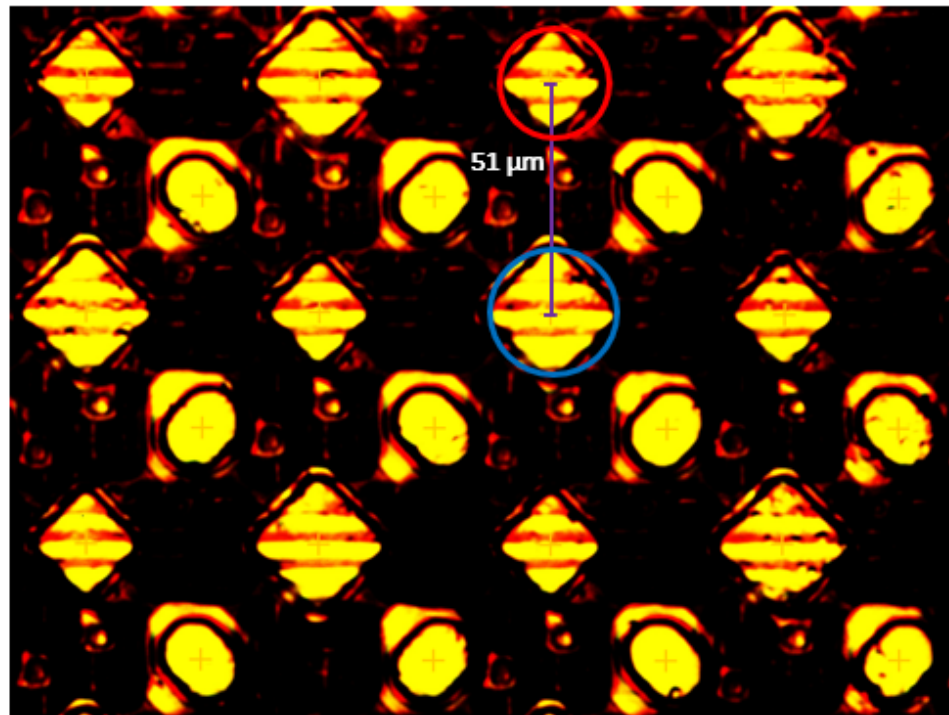
In the Samsung Galaxy S22 Ultra product, each of the second pixels has a larger area than each of the third pixels. As shown in the annotated image below, the area of each second pixel (dotted blue lines) is larger than the area of each third pixel (dotted red lines).



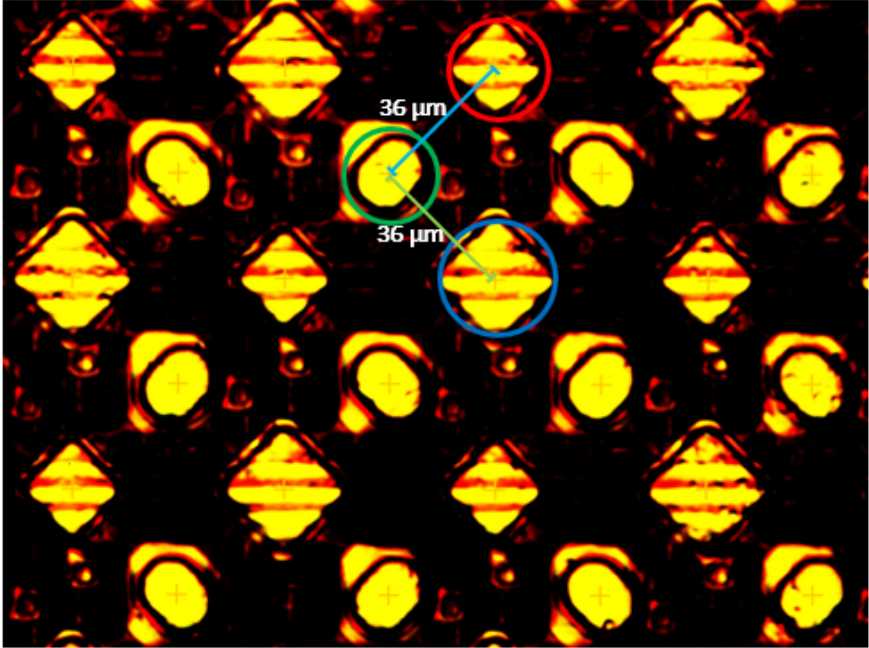
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

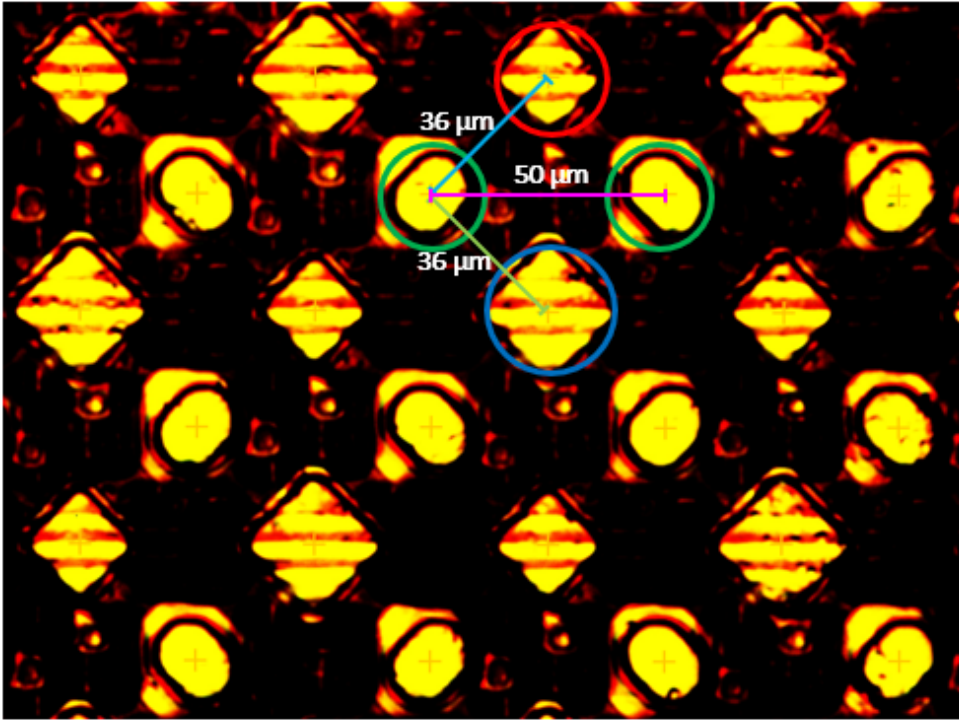
42[n] wherein a distance between centers of neighboring pixels of the second pixels and the third pixels is a first length,

In the Samsung Galaxy S22 Ultra product, a distance between centers of neighboring pixels of the second pixels and the third pixels is a first length. As shown in the annotated image below, a distance (purple) between centers of neighboring pixels of the second pixels and the third pixels (blue circle and red circle) is a first length of 51 micrometers.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

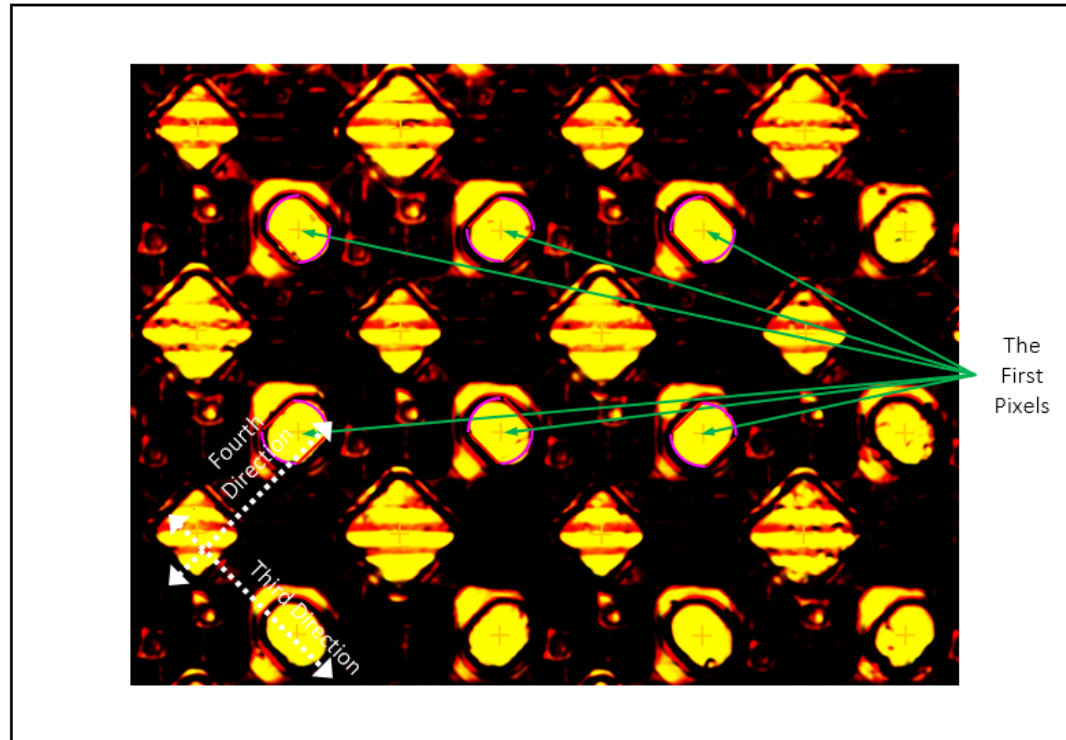
U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[o] wherein a distance between centers of neighboring pixels of the first pixels and the second pixels, and a distance between centers of neighboring pixels of the first pixels and the third pixels are a second length,	In the Samsung Galaxy S22 Ultra product, a distance between centers of neighboring pixels of the first pixels and the second pixels, and a distance between centers of neighboring pixels of the first pixels and the third pixels are a second length. As shown in the annotated image below, a distance (light green) between centers of neighboring pixels of the first pixels and the second pixels (green circle and blue circle), and a distance (light blue) between centers of neighboring pixels of the first pixels and the third pixels (green circle and red circle) are a second length of 36 micrometers.  The image shows a grid of pixel elements, each with a central bright spot and surrounding diffraction patterns. Three specific pixel centers are highlighted with colored circles: a green circle in the upper-middle, a blue circle in the middle-right, and a red circle in the upper-right. Two light green lines connect the green circle to the blue and red circles, both labeled '36 μm'. A light blue line connects the green circle to the red circle, also labeled '36 μm'. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[p] wherein a distance between centers of neighboring pixels of the first pixels is a third length that is greater than the second length, and	In the Samsung Galaxy S22 Ultra product, a distance between centers of neighboring pixels of the first pixels is a third length that is greater than the second length. As shown in the annotated image below, a distance (pink) between centers of neighboring pixels of the first pixels (green circles) is a third length of 50 micrometers that is greater than the second length of 36 micrometers.  The image shows a grid of sensor elements. Two specific elements are highlighted with green circles. A horizontal pink line connects the centers of these two green circles, labeled '50 μm'. Two other lines, one blue and one green, connect the center of a green circle to the centers of its immediate vertical neighbors (circled in red and blue respectively), both labeled '36 μm'. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
42[q] wherein a shortest distance between two nearest ones of the first pixels in one of the first sets is greater than a shortest distance between one of the second pixels and one of the third pixels that are nearest each other in one of the second sets.	In the Samsung Galaxy S22 Ultra product, a shortest distance between two nearest ones of the first pixels in one of the first sets is greater than a shortest distance between one of the second pixels and one of the third pixels that are nearest each other in one of the second sets. <i>See, e.g.,</i> claim 1[o].

43[a] The pixel arrangement structure of claim 42, wherein each of the first pixels has two parallel sides that are elongated in the third direction or a fourth direction crossing the third direction and two connection portions that connect the two parallel sides to each other at respective ends, and

In the Samsung Galaxy S22 Ultra product, each of the first pixels has two parallel sides that are elongated in the third direction or a fourth direction crossing the third direction and two connection portions that connect the two parallel sides to each other at respective ends. As shown in the annotated image below, each of the first pixels (see green arrows) has two parallel sides that are elongated in the third direction or a fourth direction crossing the third direction (red lines) and two connection portions (pink portions) that connect the two parallel sides (red lines) to each other at respective ends.

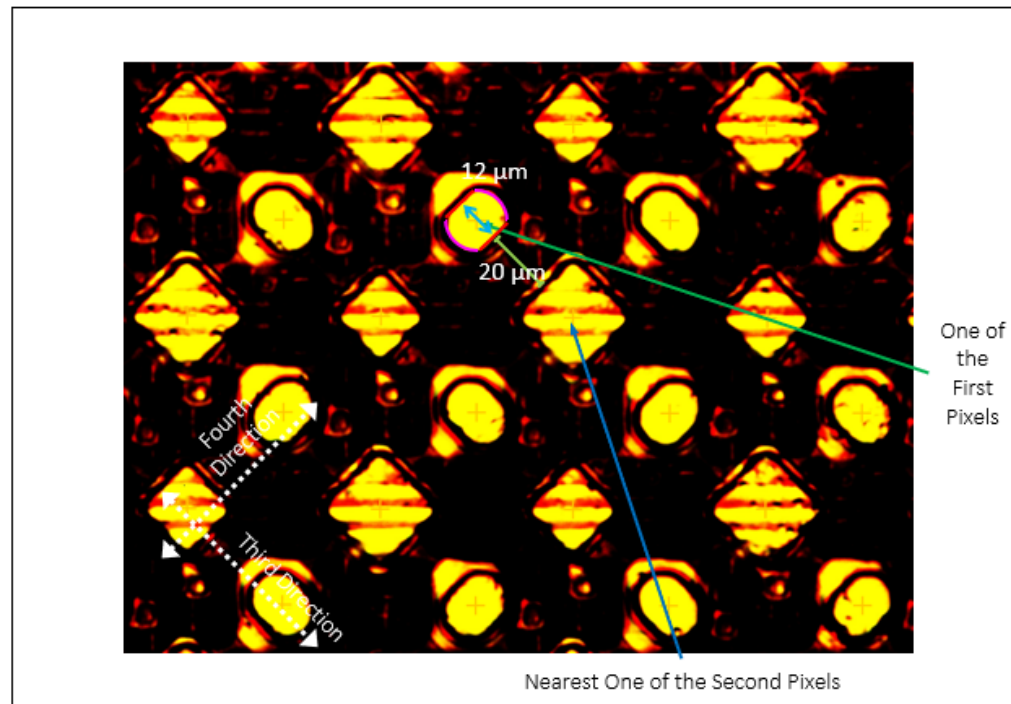


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
43[b] wherein at least one of the two connection portions has a length that is greater than a shortest distance between the two parallel sides.	In the Samsung Galaxy S22 Ultra product, at least one of the two connection portions has a length that is greater than a shortest distance between the two parallel sides. As shown in the annotated image below, at least one of the two connection portions (pink portions) has a length that is greater than a shortest distance (light blue) between the two parallel sides (red lines). Each connection portion follows the boundary of the first pixel to connect two ends of the straight parallel sides, and so has a longer length than the perpendicular distance between the two parallel sides. The image shows a grid of circular patterns, likely representing a microscopic view of a device component. Each circle contains a blue double-headed arrow pointing horizontally, indicating a distance between two parallel sides. The arrows are positioned within the circles, and the grid is composed of multiple such circles arranged in rows and columns. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

44. The pixel arrangement structure of claim 42, wherein a shortest distance between two elongated sides of one of the first pixels is less than a shortest distance between the one of the first pixels and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction.

In the Samsung Galaxy S22 Ultra product, a shortest distance between two elongated sides of one of the first pixels is less than a shortest distance between the one of the first pixels and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction. As shown in the annotated image below, a shortest distance (light blue) between two elongated sides (red lines) of one of the first pixels (see green arrow) of 12 micrometers is less than a shortest distance (light green) between the one of the first pixels (see green arrow) and a nearest one of the second pixels in the third direction or a fourth direction crossing the third direction (see blue arrow) of 20 micrometers.

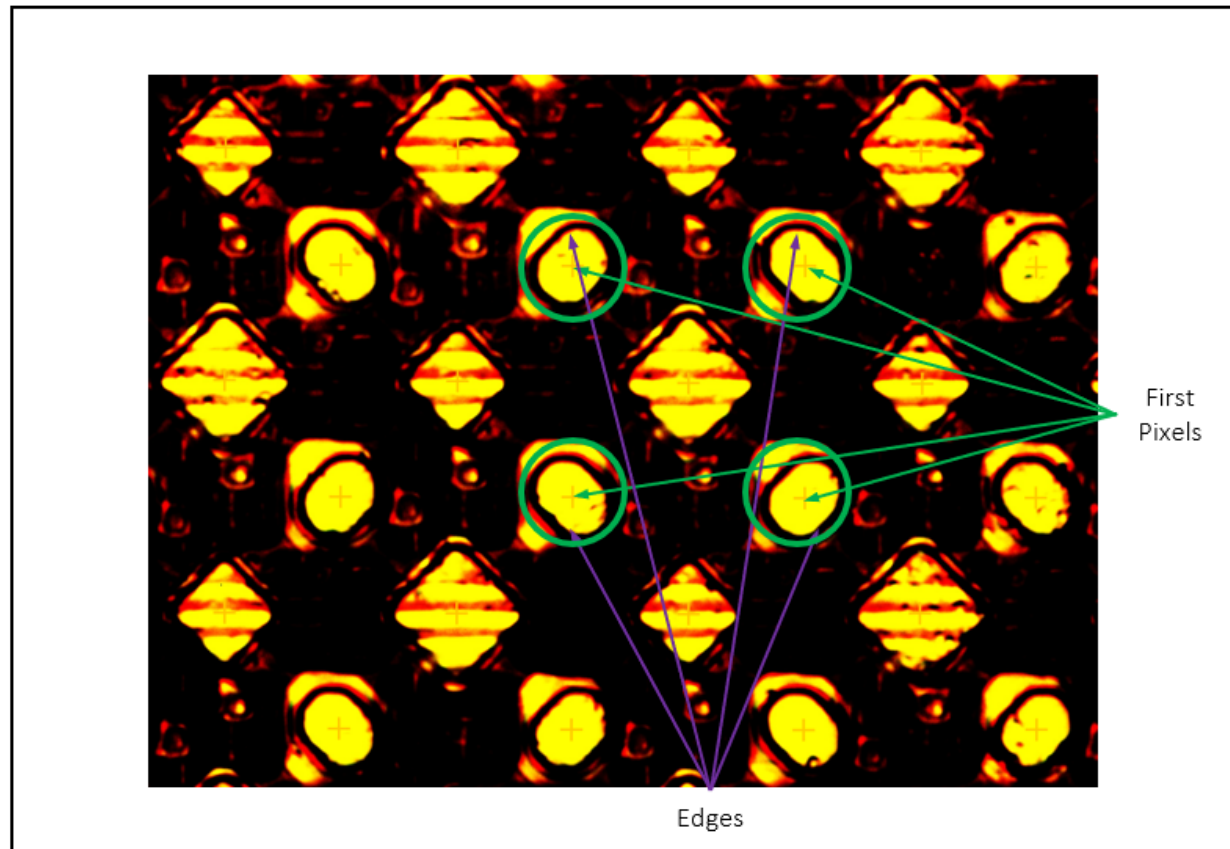


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
45[preamble] A pixel arrangement structure of an organic light emitting diode (OLED) display, the pixel arrangement structure comprising:	The Samsung Galaxy S22 Ultra product contains a pixel arrangement structure of an organic light emitting diode (OLED) display. <i>See, e.g.,</i> claim 1[preamble].

45[a] a plurality of first pixels, wherein the first pixels have a shape comprising edges;

As shown in the annotated image below, the Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of first pixels, wherein the first pixels have a shape comprising edges.

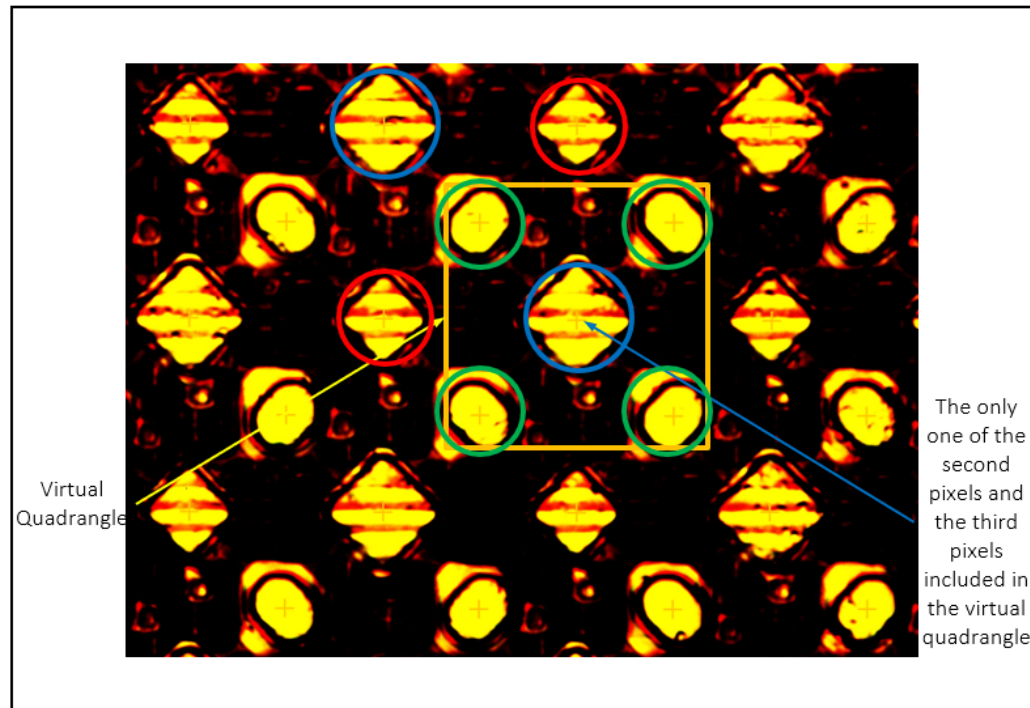


Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
45[b] a plurality of second pixels; and	The Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of second pixels. <i>See, e.g., claim 1[b].</i>
45[c] a plurality of third pixels,	The Samsung Galaxy S22 Ultra product comprises a pixel arrangement structure comprising a plurality of third pixels. <i>See, e.g., claim 1[c].</i>
45[d] wherein the OLED display comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels,	The Samsung Galaxy S22 Ultra product comprises a pixel defining layer defining areas of the first pixels, the second pixels, and the third pixels. <i>See, e.g., claim 1[d].</i>
45[e] wherein the first pixels, the second pixels, and the third pixels are configured to emit different color lights,	In the Samsung Galaxy S22 Ultra product, the first pixels, the second pixels, and the third pixels are configured to emit different color lights. <i>See, e.g., claim 1[e].</i>

45[f] wherein only one of the second pixels and the third pixels is included in a virtual quadrangle containing outer edges comprising some of the edges of a group of four neighboring ones of the plurality of first pixels, all portions of all others of the second pixels and the third pixels being outside of the virtual quadrangle, and

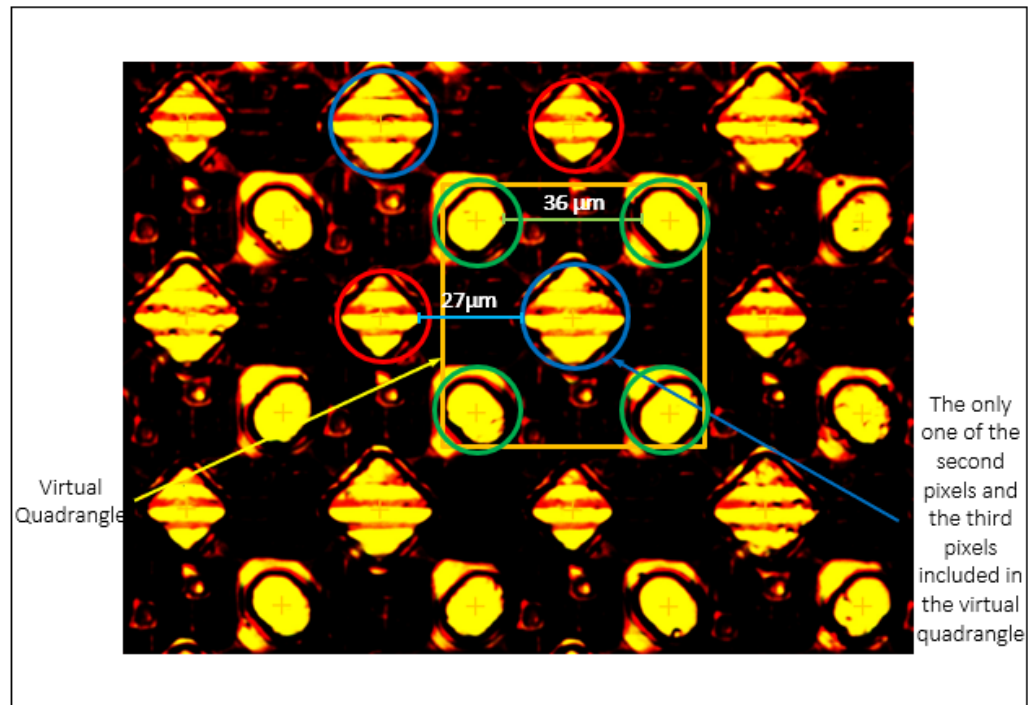
In the Samsung Galaxy S22 Ultra product, only one of the second pixels and the third pixels is included in a virtual quadrangle containing outer edges comprising some of the edges of a group of four neighboring ones of the plurality of first pixels, all portions of all others of the second pixels and the third pixels being outside of the virtual quadrangle. As shown in the annotated image below, only one of the second pixels (blue circles) and the third pixels (red circles) is included in a virtual quadrangle (orange quadrangle) containing outer edges comprising some of the edges of a group of four neighboring ones of the plurality of first pixels (green circles), all portions of all others of the second pixels (blue circles) and the third pixels (red circles) being outside of the virtual quadrangle.



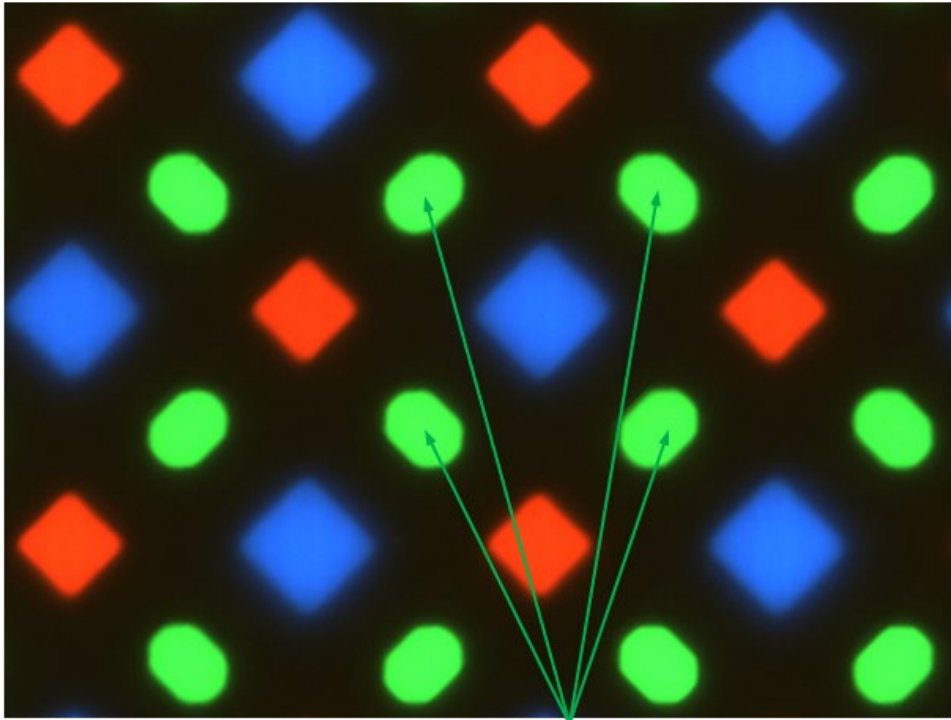
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

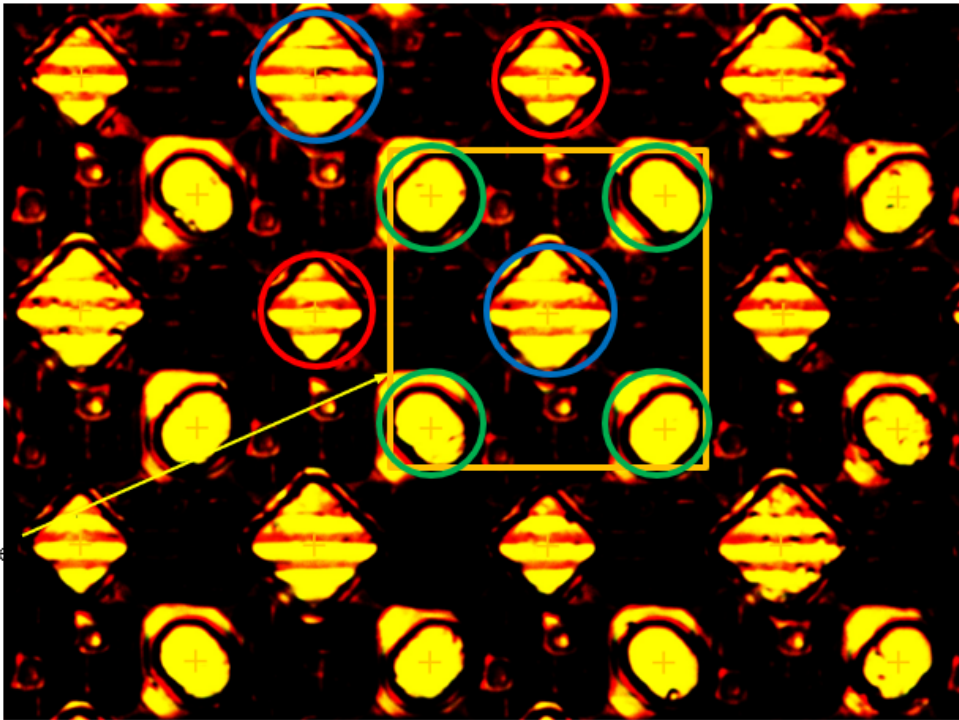
45[g] wherein a shortest distance between any two of the group of four neighboring ones of the plurality of first pixels is greater than a shortest distance between the only one of the second pixels and the third pixels included in the virtual quadrangle and a nearest one of the second pixels or the third pixels in a direction perpendicular to any side of the virtual quadrangle.

In the Samsung Galaxy S22 Ultra product, a shortest distance between any two of the group of four neighboring ones of the plurality of first pixels is greater than a shortest distance between the only one of the second pixels and the third pixels included in the virtual quadrangle and a nearest one of the second pixels or the third pixels in a direction perpendicular to any side of the virtual quadrangle. As shown in the annotated image below, a shortest distance (light green) between any two of the group of four neighboring ones of the plurality of first pixels of 36 micrometers is greater than a shortest distance (light blue) between the only one of the second pixels and the third pixels included in the virtual quadrangle and a nearest one of the second pixels or the third pixels in a direction perpendicular to any side of the virtual quadrangle of 27 micrometers.



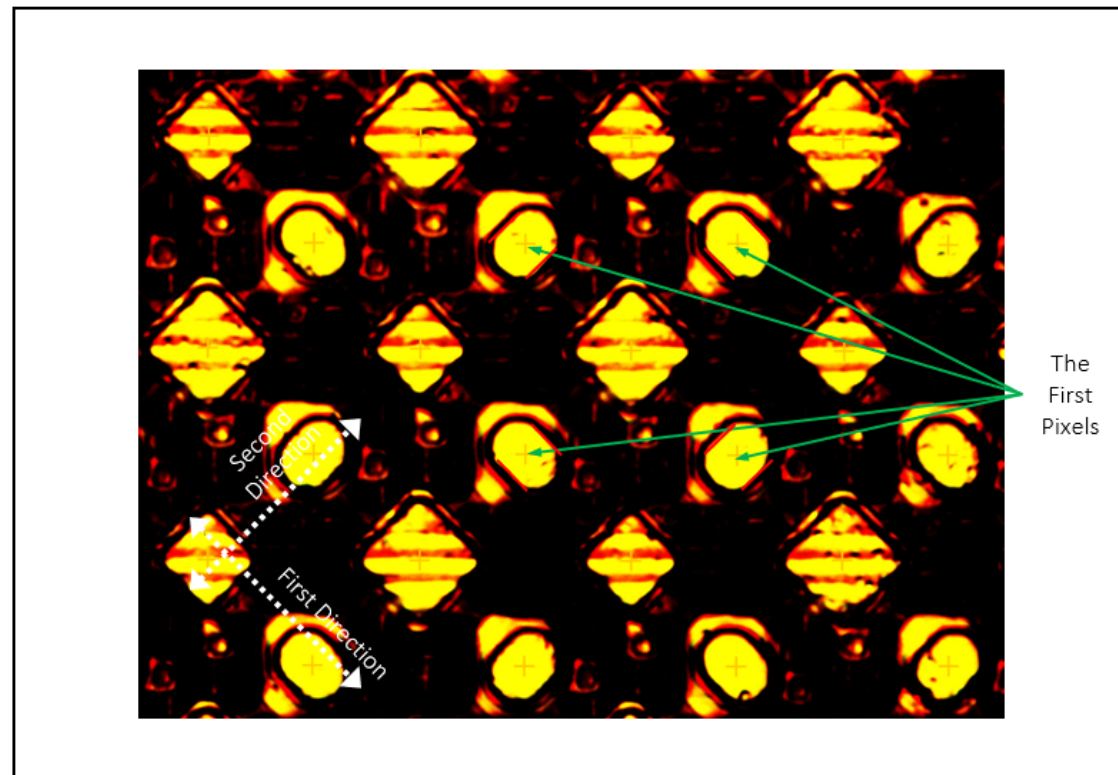
Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
46. The pixel arrangement structure of claim 45, wherein the first pixels are configured to emit green light.	In the Samsung Galaxy S22 Ultra product, the first pixels are configured to emit green light. As shown in the annotated image below, the first pixels (see green arrows) are configured to emit green light.  The First Pixels Annotated Exhibit 2029 at 5 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
47. The pixel arrangement structure of claim 45, wherein the virtual quadrangle does not cross any other of the first pixels, the second pixels, or the third pixels.	In the Samsung Galaxy S22 Ultra product, the virtual quadrangle does not cross any other of the first pixels, the second pixels, or the third pixels. As shown in the annotated image below, the virtual quadrangle (orange quadrangle) does not cross any other of the first pixels, the second pixels (blue circles), or the third pixels (red circles).  The image shows a close-up of a camera sensor with a grid of pixels. A central 2x2 area of pixels is enclosed by an orange quadrangle. Several other pixels are circled in blue and red. A label 'Virtual Quadrangle' with a line points to the orange quadrangle. Virtual Quadrangle Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

51[a] The pixel arrangement structure of claim 45, wherein two parallel edges from among the edges of each of the first pixels are elongated in a first direction or a second direction crossing the first direction,

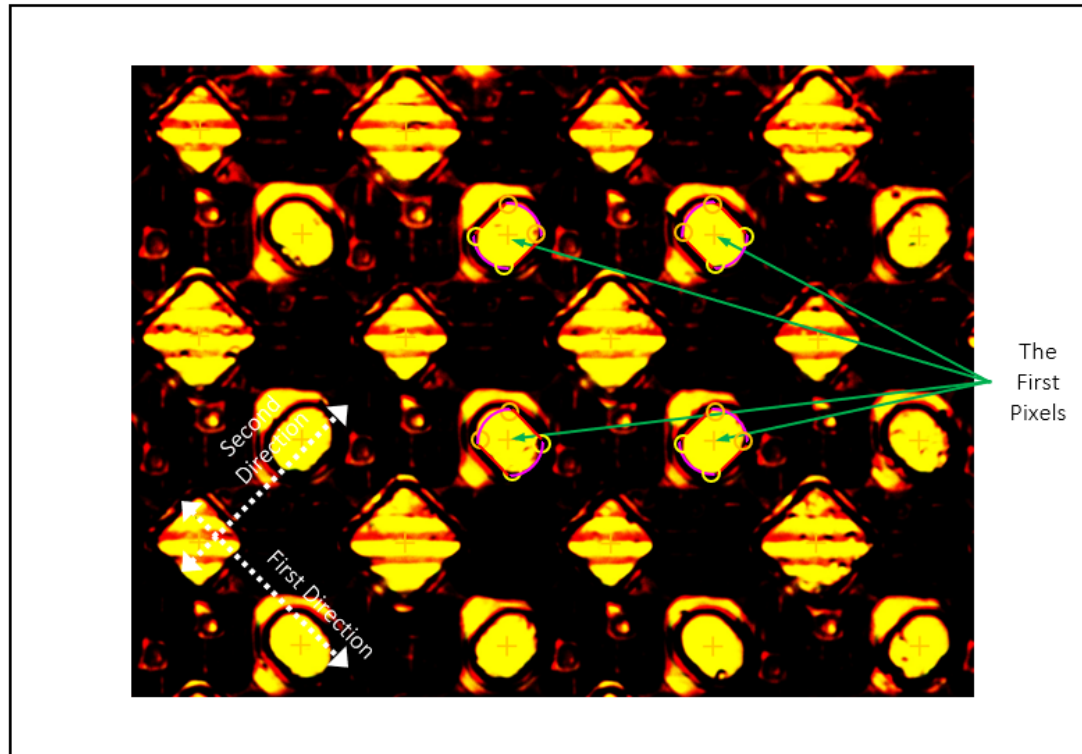
In the Samsung Galaxy S22 Ultra product, two parallel edges from among the edges of each of the first pixels are elongated in a first direction or a second direction crossing the first direction. As shown in the annotated image below, two parallel edges (red lines) from among the edges of each of the first pixels (see green arrows) are elongated in a first direction or a second direction crossing the first direction.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

51[b] wherein remaining edges from among the edges of each of the first pixels connect respective first ends of the two parallel edges to each other and connect respective second ends of the two parallel edges to each other, and

In the Samsung Galaxy S22 Ultra product, remaining edges from among the edges of each of the first pixels connect respective first ends of the two parallel edges to each other and connect respective second ends of the two parallel edges to each other. As shown in the annotated image below, remaining edges (pink portions) from among the edges of each of the first pixels (see green arrows) connect respective first ends (orange circles) of the two parallel edges (red lines) to each other and connect respective second ends (yellow circles) of the two parallel edges (red lines) to each other.



Annotated Exhibit 2029 at 4
(Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
51[c] wherein a total length of the remaining edges between at least one of the first ends or the second ends is greater than a shortest distance between the two parallel edges.	In the Samsung Galaxy S22 Ultra product, a total length of the remaining edges between at least one of the first ends or the second ends is greater than a shortest distance between the two parallel edges. As shown in the annotated image below, a total length of the remaining edges between at least one of the first ends or the second ends (pink portion connecting orange circles or pink portion connecting yellow circles) is greater than a shortest distance (light blue) between the two parallel edges (red lines). Each set of remaining edges follows the boundary of the first pixel to connect two ends of the straight parallel edges, and so has a longer total length than the perpendicular distance between the two parallel edges. The image is a teardown photograph of the Samsung Galaxy S22 Ultra, showing a grid of components. Annotations include: red lines connecting two ends of straight parallel edges; light blue lines representing the shortest distance between these edges; pink portions connecting orange circles or yellow circles; and blue arrows indicating the direction of the remaining edges. The components are arranged in a grid, with some components having yellow circles and others having orange circles. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)

U.S. Pat. No. 11,594,578	Samsung Galaxy S22 Ultra
52. The pixel arrangement structure of claim 45, wherein a shortest distance between two parallel edges that are elongated in a first direction or a second direction crossing the first direction from among the edges of one of the group of four neighboring ones of the plurality of first pixels is less than a shortest distance between the one of the group of four neighboring ones of the plurality of first pixels and the only one of the second pixels and the third pixels included in the virtual quadrangle.	In the Samsung Galaxy S22 Ultra product, a shortest distance between two parallel edges that are elongated in a first direction or a second direction crossing the first direction from among the edges of one of the group of four neighboring ones of the plurality of first pixels is less than a shortest distance between the one of the group of four neighboring ones of the plurality of first pixels and the only one of the second pixels and the third pixels included in the virtual quadrangle. As shown in the annotated image below, a shortest distance (light blue) between two parallel edges that are elongated in a first direction or a second direction crossing the first direction (red lines) from among the edges of one of the group of four neighboring ones of the plurality of first pixels (see green arrow) of 12 micrometers is less than a shortest distance (light green) between the one of the group of four neighboring ones of the plurality of first pixels (see green arrow) and the only one of the second pixels and the third pixels included in the virtual quadrangle (see blue arrow) of 20 micrometers. The image shows a grid of pixel elements. A central yellow square is labeled 'Virtual Quadrangle'. Inside this square, a light blue line segment is labeled '12 μm' and a light green line segment is labeled '20 μm'. A green arrow points to a group of four yellow pixel elements, with a label 'One of the Group of Four Neighboring Ones of the Plurality of First Pixels'. A blue arrow points to a single yellow pixel element, with a label 'The only one of the second pixels and the third pixels included in the virtual quadrangle'. A red dashed line is labeled 'First Direction' and a blue dashed line is labeled 'Second Direction'. Annotated Exhibit 2029 at 4 (Galaxy S22 Ultra Teardown Photos)