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Diamond Pixels: Galaxy S4's unique subpixel layout gets a close up

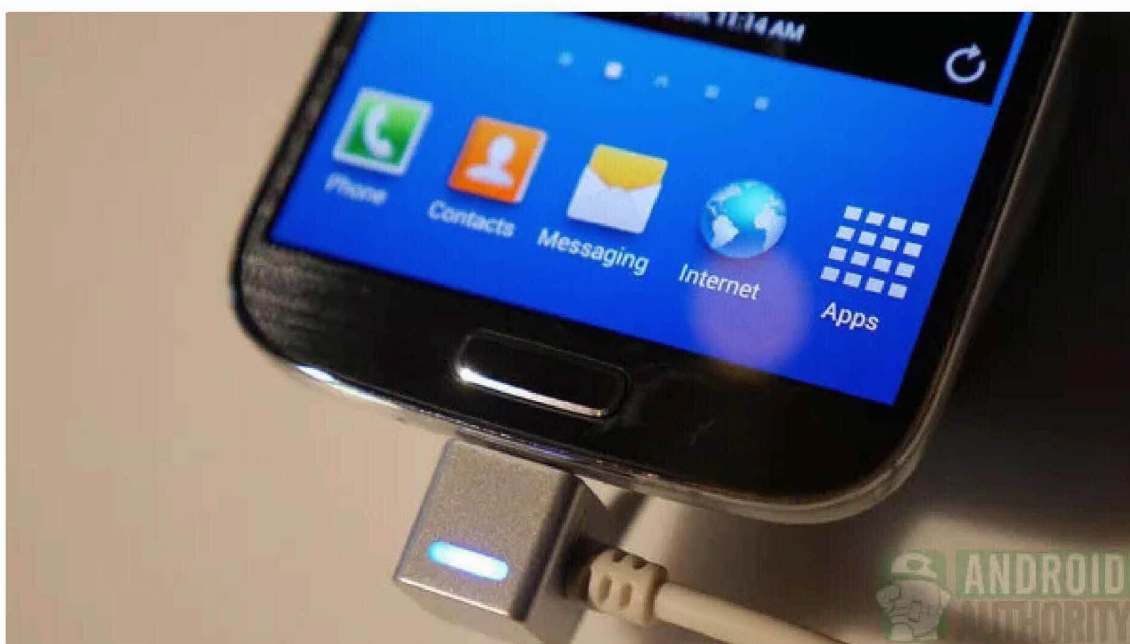
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Diamond Pixels: Galaxy S4's unique subpixel arrangement gets a close up

A high-resolution shot of the Galaxy S4's screen reveals the unique subpixel arrangement that Samsung used in order to achieve the 441ppi pixel density on an AMOLED display.

By Bogdan Petrovan • April 30, 2013



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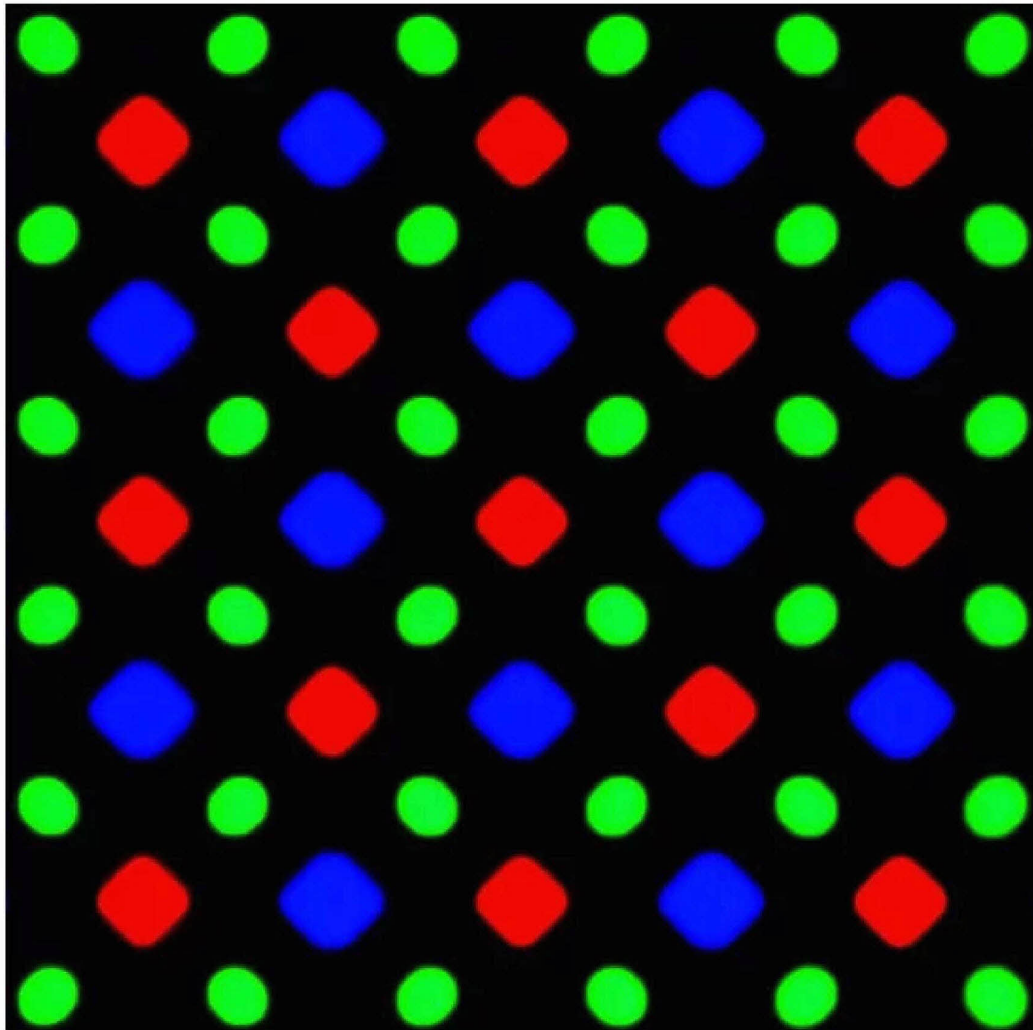
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A high-resolution shot of the Galaxy S4's screen reveals the unique subpixel arrangement that Samsung used in order to achieve the 441ppi pixel density on an AMOLED display.

In the months preceding the unveiling of the Galaxy S4, several rumors emerged about the display of the upcoming flagship. Samsung was said **to have problems** with the design and manufacturing of a full HD (1928 x 1080) AMOLED display. One report even said that the Korean smartphone maker was considering using LCD for the Galaxy S4, due to the supposed insurmountable technical difficulties that would prevent it from making enough panels for the upcoming blockbuster.

But on March 14, the Galaxy S4 was launched, with a full HD Super AMOLED screen of a whopping 441 ppi, a pixel density that is second only to the (smaller) **HTC One's**. Not only that, but, as display expert Raymond Soneira **pointed out**, the display of the Galaxy S4 is a huge improvement over the S3, and is finally closing in on the iPhone in terms of quality.

But how did Samsung manage to pack all those pixels in the display of the Galaxy S4 after all? An image that the Korean manufacturer provided to Soneira gives us a few more clues.



Credit: DisplayMate

These are the “diamond pixels” we’ve first heard about in January. As you can see, Samsung employed a combination of diamond shaped and oval subpixels, in order to maximize the number of subpixels that can go on every square inch of the display.

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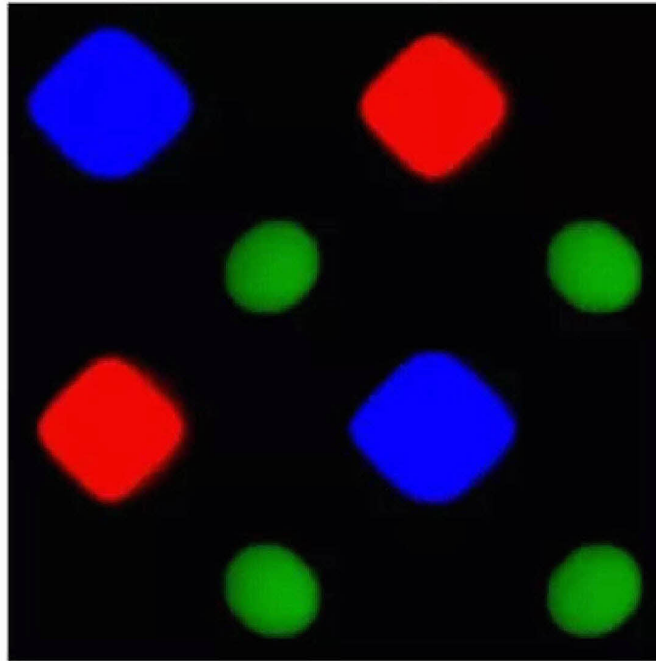
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This is still a PenTile arrangement – there are twice as many green subpixels as blue and red ones. However, at this resolution and pixel density, the drawbacks of PenTile arrangements are very hard to notice. For a primer on the difference between PenTile and the “regular” RGB displays, check out our [Galaxy S3 vs Galaxy Note 2 comparison](#).

According to Soneira, Samsung dubbed this novel subpixel arrangement Diamond Pixel, which is a bit misleading, considering that the subpixels (the “dots” of color that make up one pixel) are the ones that are actually diamond-shaped. Samsung probably wanted to distance this new layout from PenTile, which has often been the target of critics due to the “fuzziness” it shows around text and other fine graphics.

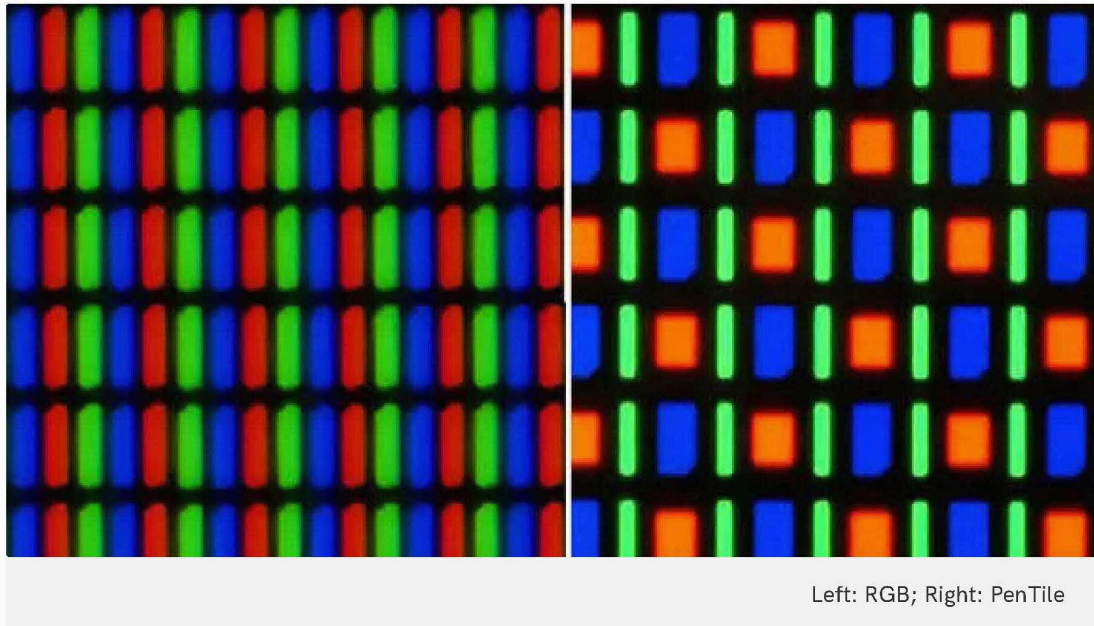
**Why are the red and blue subpixels larger than the green ones?
And why are the green ones oval?**

The reason lies in the different efficiency of the three colors. Blue subpixels are the least efficient, meaning that manufacturers have to make them bigger in order for them to output the required luminosity. If you look closely at the image, you will see that the blue subpixels are slightly larger than the red ones. On the other hand, green subpixels are very efficient, so Samsung can make them much smaller than the red and blue ones.



In order to maximize the number of subpixels that can fit on the display's surface, Samsung used the new diamond subpixels arranged in a 45-degree symmetry. Finally, the green subpixels are oval to make the most out of the limited space available between the red and blue ones.

As a comparison, last year's Galaxy S3 featured a PenTile arrangement composed of rectangular subpixels, as you can see in the image below (contrasted with a regular RGB layout).



The full HD panel of the Galaxy S4 is an impressive technical achievement in its own, one that should finally mute (most of) the critics of the PenTile technology. For the record, this is the first time Samsung acknowledged this new Diamond Pixels technology.

What is your experience with PenTile displays? Are you satisfied with the display of the Galaxy S3? Have you seen the new Galaxy S4?

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