

# A 12 Megapixel Camera for the iPhone®

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No one wanted to carry a cell phone, a PDA, an MP3 player and a GPS device around with them all the time. It was just too many devices to handle. The solution to the problem was an integrated device such as the iPhone or RIM Blackberry. However, up until now, there are been many compromises with the integrated camera. One often

wants to take a photograph. No I don't mean a web-cam quality image but something that can be edited and printed out later. With the announcement of new chips and modules for the cell phone market, we might see a battle of the cell phones manufactures emerge to see who can provide the highest megapixel camera. Recent web rumors have suggested that perhaps the next generation Google Android will debut in the spring of 2009 with a 5MP (megapixel) camera. But as we all know such a rumor is as reliable as the person that started it.

There are several challenges in incorporating high megapixel cameras into cell phones. Such cameras require lots of memory, lots of power, lots of processing, and a lot of bandwidth to get the image out of the device. You also don't want to pair a megapixel sensor with a cheap plastic lens. It just doesn't make sense. The solution presented here doesn't try to cram everything in the cell phone but to add it as an adjunct device. There is also no need to pull a high megapixel image into the device if the user is only going to look at it on the integrated cell phone display. However one may wish to pull the high resolution images into their laptop and edit them, include them in a blog, print them, or publish them to a photo site.

If you take any common point and shoot digital camera and remove any optical view finder, all buttons, the display, that large battery which is used to power that display, and all of the extra case material which held all of those devices together, one would find they have a pretty small set of components. Now let's put all of those devices in a small package which has only 3 major discernible parts. These are the lens, a connector to fit into the bottom of an iPhone or iPod Touch and another female connector allowing for a common cord or cradle to power or charge the camera module and the iPhone.

Are such devices feasible? The answer is yes and this is demonstrated by Sony's announcement in November 2008 of their commercialization of their "IMX060PQ." The new Exmor™ sensor is a 1/2.5 CMOS device for use in camera enabled mobile phones. The sensors is claimed to have the industries smallest cell size of 1.4µm. It has a 12.25 effective megapixel resolution. Sony also announced an 8.11 effective megapixel part the "IMX046PQ" and a 5.15 effective megapixel part the "IMX045PQ." Concurrently, Sony announced lens modules for the above sensors which includes the CMOS sensors, auto focus functionality and the lens all integrated into a very thin form factor.

Putting all the pieces together we end up with:

- 1) A small integrated high megapixel camera that inserts in to the bottom of an iPhone/iPod Touch,
- 2) The device can rotate 360 degrees from front to back allowing it to act as a traditional camera or allowing the user to take an image of themselves,
- 3) A second connector allows the device to concurrently be charged with the iPhone/iPod Touch with only one cord or cradle,
- 4) All camera functions including a live preview are viewed through the iPhone/iPod Touch display,
- 5) Low resolutions images can be read

into the iPhone for viewing and then transmitted over the cellular/Wi-Fi Network, and 6) The device can be plugged into a Mac or PC allowing for a download of all high resolution images to the attached computer. 7) The optics is a high quality glass lens.

Optional designs may include:

1) Wireless control of the camera by the iPhone so the two do not have to be tethered together, 2) An integrated tripod mount, 3) An optional connector for downloading to thumb drives or other solid state memory cards, 4) Video capture capability, 5) A light source/flash which can assist in illuminating the subject, 6) A ball head allowing the camera to be pointed down as well as forward and backward or for folding the device allowing it to store behind the iPhone. 7) A zoom lens.

Future cell phone devices will ultimately integrate this functionality without the need for a separate module. However, such a module will always allow for inclusion of larger high quality optics and optionally zoom optics functionality.

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