Apple's iPhone 3GS: What it costs to make

Arik Hesseldahl

An iSuppli teardown analysis estimates that the newest version of the smartphone costs Apple just under $180 to make.

From the outside, nearly everything about Apple's iPhone 3GS seems nearly identical to the iPhone 3G released last year. Even Apple's TV ads make light of this fact: The phone looks the same as before, the company says, but it does so much more. Still, all the new features in Apple's million-selling new phone have to come from somewhere, and there have been some important changes inside the new iPhone, according to an Apple iPhone 3GS teardown analysis by the market research firm iSuppli.

The company routinely takes apart popular consumer-electronic devices in order to determine the identities of key suppliers and also to estimate the costs of components. Last year a preliminary iSuppli analysis pegged the cost of the previous iPhone, the 3G, at $174.33. These estimates help financial analysts make better-educated guesses about the profit margins manufacturers make on each unit sold, though there are many costs that a teardown doesn't address, such as software, research and development, and patent licensing costs.

Often the cost to assemble a new generation of a product is lower than it was for the previous generation. However, the 16-gigabyte iPhone 3GS actually costs slightly more to build than last year's iPhone 3G—$178.96, a difference of $4.63. However, that is much lower than estimates for the first-generation iPhone, which pegged the cost at $220.

Chip prices on the rise

The main reason that costs may have gone up is that the price of NAND flash memory—the chips used to store music, video, and applications on the iPhone—have, after years of falling, started to go up just when Apple started packing more memory inside the phone. The 3GS comes in 16- and 32-gigabyte varieties, whereas the prior model topped out at 16 gigabytes. "It used to be that Apple could plan on doubling the amount of memory each year for the same cost," says Andrew Rassweiler, iSuppli's teardown manager. In the 16-gigabyte model of the 3GS, the cost of the NAND chips is $24, he says, and $46 in the 32-gigabyte version.

Apple (AAPL) is one of the world's biggest consumers of NAND flash memory, and has cut strategic supply deals since 2005 with chipmakers like Samsung and Hynix, among others, though in the unit used for the teardown the flash supplier was Toshiba (6502.T). "Apple has been one of the key players in driving the cost of flash memory down," Rassweiler says. "In doing so, they've also benefited from the price erosion over time." But with demand for flash declining amid a recession, manufacturers have cut back production to the point that prices have started to rise, though demand has yet to pick up. ISuppli is forecasting that overall the market for NAND flash memory will contract to $11.5 billion from $11.7 billion in 2008, before growing again in 2010.

Some components of the new iPhone are cheaper, even though they've gotten better. Take the multitouch display. While Apple has improved on the screen by adding an oleophobic coating that doesn't attract fingerprints and cleans more easily, the cost of the screen and related components have over the past year come down by $1, Rassweiler says, to $16.

No FM radio reception

Some parts have disappeared completely from the 3GS. A $1.60 Broadcom (BRMC) controller chip connected to the display found in the second-generation iPhone is missing, Rassweiler says, and seems not to have been replaced by anything else. Its function may have been

integrated into another chip, either the main applications processor, or a chip from Texas Instruments (TXN) whose precise function in the 3GS hasn't yet been determined.

Broadcom, having lost one slot, however scored an important win: a $6 chip that handles the iPhone's WiFi and Bluetooth connections. The same chip, interestingly enough, also includes a tiny FM radio receiver on board, though the iPhone has no FM-receiving features. The chip is used in the Renoir wireless phone from LG Electronics, which does support FM radio.

But before you get excited about your iPhone becoming an FM radio, Rassweiler says there's no evidence that the FM portion of the chip has been enabled or that it even can be enabled, say, by a new application. However, it's not uncommon for chipmakers to sell a single chip with several functions and then charge their customer only for the functions that are enabled. Apple had no comment on the chip nor on iSuppli's estimate.

New compass feature

The main chip that drives all the applications bears an Apple label, Rassweiler says, but was probably made by Samsung. At $14.46, it costs a dollar more than the Samsung chip used in the iPhone 3G, Rassweiler says, in part because it's made on a more advanced 65-nanometer manufacturing process than the one used in the 3G. But like the other chip, its core—the chip's central brain—is based on technology designed by ARM Holdings (ARMH), a British chip design company in which Apple used to be an investor. More recently, Apple has bought its own chip company, PA Semi, which is working on chips for use in future versions of the iPhone.

Meanwhile, German chipmaker Infineon (IFX) retained its position as an important supplier to the iPhone, selling Apple the $13 chip that handles the connection to AT&T's (T) wireless phone network, as well as two others, one that receives signals from GPS satellites and costs $2.25, and another priced at $1.25 that handles power management.

Other suppliers include Cirrus Logic (CRUS), which supplied an audio chip, and Dialog Semiconductor, which provided a power management chip that works with the Samsung applications chip. STMicroelectronics (STM) supplied the accelerometers that detect when the iPhone has been rotated, and they work closely with a silicon compass supplied by AKM Semiconductor, that drives the new compass feature.

Landing a component, even a small one, in the iPhone is important for chip companies because it helps them with marketing to other device manufacturers, Rassweiler says. That often means that Apple gets the best price possible. "When you get a part in the iPhone, there's a recognition that goes with it, and that can be good for business with others down the road," he says.

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