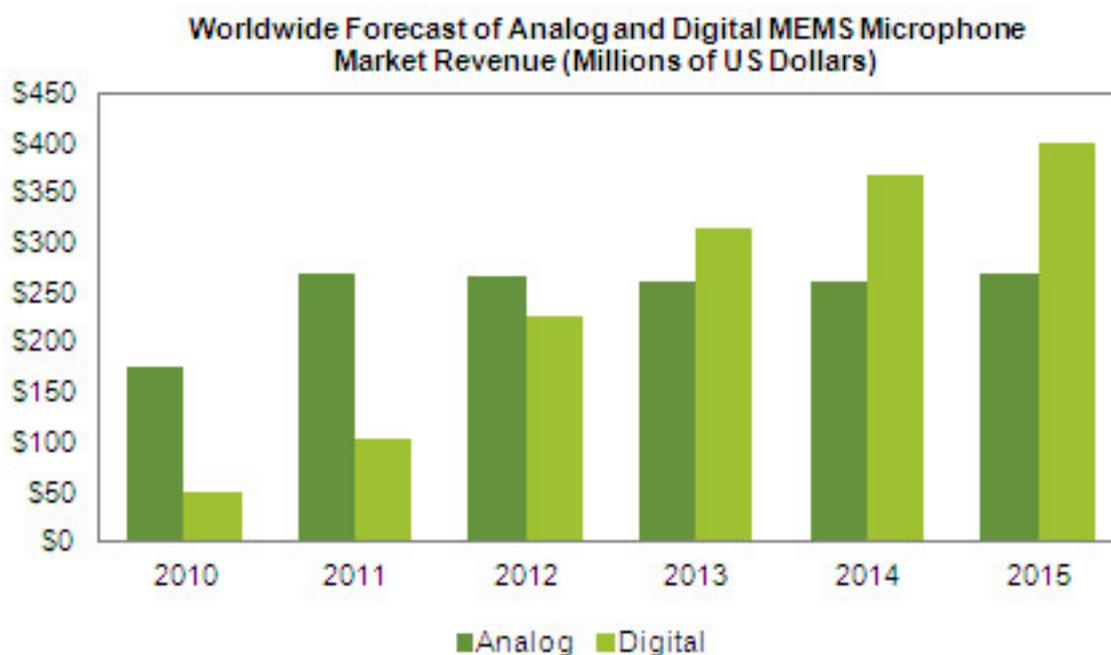


## Digital MEMS Microphone Market Expands, Partly Driven by New iPad and iPad 2 Design Wins

Driven by their widespread use in top-selling mobile devices like Apple Inc.'s new iPad and iPad 2, market revenue for digital microelectromechanical systems (MEMS) microphones is set to overtake the analog segment next year for the first time ever.

Revenue for digital MEMS microphones will reach \$315 million in 2013, compared to \$261 million for the analog MEMS equivalents, according to an [IHS iSuppli MEMS Special Report](#) [1] from information and analytics provider IHS. The market this year still will favor analog MEMS microphones, which are projected to achieve revenue of \$267.4 million compared to \$226.1 for digital. However, digital MEMS will gain the upper hand in 2013 when analog's share dips below 50 percent, as shown in the figure below.



*Source: IHS iSuppli Research, March 2012*

“Apple once again is setting the pace in the adoption of innovative new MEMS technologies,” observed Jérémie Bouchaud, director and senior principal analyst for MEMS & sensors at IHS. “Having already established the market for MEMS accelerators and gyroscopes in the iPhone and iPad lines, Apple now is leading the transition to digital MEMS microphones by employing them in its iPad 2 and the new iPad.”

The [IHS iSuppli Teardown Analysis of the new iPad](#) [2] indicates that the tablet uses a single MEMS-based digital microphone from AAC Acoustic Technologies Holdings Inc. The iPad 2 employs a digital MEMS microphone from Analog Devices Inc.

## **MEMS microphones crank up the volume**

A MEMS microphone is a tiny device that employs a pressure-sensitive diaphragm etched on a semiconductor. These microphones are commonly employed in cellphones, headsets, laptop computers, video cameras—and since last year—in tablets.

First used in 2003 on cellphones, MEMS microphones replaced conventional electret condenser microphones (ECM) in half of mobile handsets last year. Since 2010, new acoustic applications requiring multiple microphones have been driving the further penetration of MEMS. Superior temperature stability, better matching and smaller form factors afforded by MEMS are key advantages here.

While analog MEMS microphones are less expensive and still are very much used for the acoustic function in handsets, the new digital alternatives are gaining greater utilization because of their various benefits. For instance, digital microphones provide advantages in the design phase. With analog signal processing, each new design iteration requires adaptation for resistors, capacitors, and speakers. For digital microphones, however, the changes in design are easier to implement, leading to a faster time-to-market.

Digital MEMS microphones also are less sensitive to electromagnetic interference, and their increased Power Supply Rejection Ratio (PSRR) simplifies the design and improves audio quality.

In the case of noise suppression with three or more microphones, the signal from digital microphones is easier to process than that from analog. And when used in laptops, digital MEMS microphones provide better immunity to electromagnetic interference caused by the large liquid crystal display (LCD).

## **Top digital MEMS microphone suppliers**

Digital MEMS microphones have been available since 2006, when Akustica—now Bosch—started to ship them into laptops from Fujitsu. The following year, Knowles and Sonion—now part of TDK-EPC—also started shipments.

Overall, however, the penetration of digital MEMS microphones remained relatively modest because of the lack of a credible alternative source beyond Knowles, and their high price—typically 50 percent more expensive than analog MEMS.

Knowles had managed to keep the price high because of the lack of viable competitors.

All this changed in 2011 with the arrival of new players. STMicroelectronics entered

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the market and focused exclusively on digital MEMS microphones, allowing them to emerge as strong alternative volume suppliers in 2011, with more aggressive pricing policies.

Akustica introduced a new and more competitive digital MEMS microphone in early 2011 with a 30 percent die size reduction. As a result, Akustica grew its share in the laptop business from 4 percent in 2010 to 15 percent in 2011, grabbing share away from Knowles at customers such as Hewlett-Packard.

STMicroelectronics—already the No. 1 supplier of accelerometers to Nokia—started to deliver MEMS microphones to the Finnish original equipment manufacturer in 2011 and became the top source within one year ahead of Knowles. As a result, Knowles' share of digital MEMS microphone market revenue fell to 59 percent in 2011, down from 81 percent in 2010.

Overall, the arrival of new suppliers with more aggressive pricing boosted the penetration of digital MEMS microphones in laptops in 2011 from 18 percent in 2010 to 40 percent in 2011.

The top suppliers in 2011 for digital MEMS microphones included, in descending order: Knowles, for laptops, tablets and handsets; Analog Devices, for the iPad 2; Bosch (Akustica), for laptops; STMicroelectronics, to Nokia and also for laptops; Goertek, to Lenovo; AAC; and BSE.

**Posted by Ron M. Seidel, Editorial Intern**

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**Links:**

[1] <http://www.isuppli.com/MEMS-and-Sensors/Pages/MEMS-Microphones-The-Digital-Revolution.aspx>

[2] <http://www.isuppli.com/Teardowns/Pages/Apple-iPad-MC733LL-A-Hardware-Analysis.aspx>