

## **Freescale Xtrinsic accelerometers optimize resolution and battery life in consumer devices**

Medical Design Technology

The global MEMS market is expected to expand by 11 percent in 2010, propelled by strong sales in mobile handsets, gaming controllers and digital cameras, according to iSuppli Corp. The majority of these devices use motion sensing technology for features such as image stability, tap to control, anti-theft and orientation detection. As market demand continues to grow for next-generation applications such as intuitive user interfaces and location-based services, advances in accuracy and battery life are critical.

To address these requirements, Freescale Semiconductor today unveiled an advanced 3-axis accelerometer family designed to deliver enhanced battery life for smart mobile devices with industry-leading resolution, low noise and embedded feature performance. Utilizing the MMA845xQ family, system designers can easily integrate standard functions like orientation detection as well as more advanced real time applications like pedometers and games into their products. In addition, the new Freescale accelerometers extend the battery life of smart mobile devices such as smartphones, personal navigation devices, MP3 players, eReaders and netbooks.

*“Adding to our recently released Xtrinsic sensor product portfolio, we have designed the MMA845xQ family to deliver outstanding motion/shock/ tilt/vibration detection within dramatically aggressive power efficiency,”* said **Demetre Kondylis**, vice president and general manager of Freescale’s Sensor & Actuator Solutions Division. *“Freescale’s customers now have a comprehensive motion sensing portfolio that is not only pin compatible, but also offers an ideal blend of performance, portability and battery life to consumers.”*

As part of Freescale’s Xtrinsic sensing solutions line, the accelerometer family offers a new level of sensor intelligence through embedded algorithms and computation in three advanced accelerometers. Together with the host processor, the embedded accelerometers help make decisions on contextual environmental sensing and enable the ability to record highly precise movement for a wide-range of consumer devices from smartphones to tablets to eReaders to remote controls.

Battery applications benefit from the accelerometer’s low current consumption at 1.8 microamps in standby mode and as low as 6 microamps in active mode. The Freescale products contain four power modes from high resolution to low power, offering best in class savings in supply current and extremely high resolution for very small motion detection.

The MMA845xQ accelerometers include a wide range of real-time features such as directional shake and the detection of orientation, tap, jolt and freefall. The devices

are highly versatile to support low-end applications for basic gestures such as lasso and flick, mid-range applications for more complex gestures such as position and 3-D gesture detection, and high-end applications such as dead reckoning or precision tilt detection.

In addition to the already released MMA8450Q, Freescale today extends the MMA845xQ family and introduces the 14-bit MMA8451Q and the 12-bit MMA8452Q devices. These devices are pin-for-pin compatible with register map alignment between the accelerometers to maximize hardware and software re-use between 12- and 14-bit designs, requiring minimal cost to migrate and reducing time to market. To help support various applications, the MMA845xQ accelerometers offer wide bandwidth with user configurable sample rates ranging from 1.5 to 800 Hz and operate with an I/O interface voltage range of 1.62V to 3.6V.

The MMA8451Q accelerometer incorporates an on-chip FIFO (first-in/first-out) memory buffer that stores up to 32 sample sets of X, Y, and Z data. This improves overall system power savings and response time by offloading functions from the host processor. Utilizing the FIFO buffer along with the other embedded functions allows the host processor to analyze only the required data while at the same time, protecting from the possibility of data loss when multiplexing other sensors on the same IIC bus. The FIFO combined with the host processor contributes to a current consumption savings that can range from 78 percent up to 96 percent or higher depending on conditions of the microcontroller and output data rates chosen.

## Feature Summary:

- \* 14- and 12- bit digital output
- \* Resolution: (14-bit) - 0.25mg; (12-bit) - 1mg
- \* Low noise: 99 micro g per root Hertz (independent of resolution)
- \* Low power mode: 6 micro amps
- \* I/O interface supply: 1.62 to 3.6 V
- \* Supply voltage : 1.95 to 3.6 V
- \* Output data rate: 1.5 to 800 Hz
- \* Two programmable interrupt pins for 7 interrupt sources
- \* Embedded motion detection features:
  - o Freefall or motion detection
  - o Pulse detection
  - o Jolt detection
  - o Orientation (portrait/landscape) detection with hysteresis
  - o Automatic output data rate change for auto-wake/sleep
  - o Self test
- \* Embedded 32 sample FIFO buffer
- \* High pass filtered data available per sample and through the FIFO
- \* Low-profile 3 x 3 x 1.0 mm QFN package

## Development support, price and availability

The MMA845xQ accelerometers are available now for a suggested resale price (USD) starting at \$0.95 for the MMA8451Q and \$0.85 for the MMA8452Q in 100K quantities.

Freescale's Sensor Toolbox offers hardware, software and accessories in a common platform for accelerometers, as well as pressure and touch sensors. The LFSTBEB845x development boards for evaluating each of the accelerometers are the latest addition to the Sensor Toolbox. Complimentary software algorithms that demonstrate the embedded functions of the MMA845xQ accelerometer family through the GUI interface are available at [www.freescale.com/sensortoolbox](http://www.freescale.com/sensortoolbox).

The LFSTBEB845x development boards are available in one kit for a suggested resale price of \$75 (USD). In addition, for customers that may not have purchased the Sensor Toolbox accelerometer USB board, the RDMMA845x includes all three MMA845xQ accelerometer development boards as well as the accelerometer USB board for a suggested resale price of \$99 (USD).

Freescale is a leading provider of pressure, inertial and touch sensors and has offered MEMS-based sensors for over 30 years. Building on its heritage of sensor innovation, Freescale has introduced Xtrinsic sensing solutions that offer the right combination of intelligent integration, logic and customizable software to deliver smarter, more differentiated applications. Freescale sensors complement Freescale's broad portfolio of ZigBee® technology, microcontrollers, microprocessors, digital signal processors, analog ICs and development tools to offer system solutions to customers. For more information, visit [www.freescale.com/sensors](http://www.freescale.com/sensors).

## About Freescale Semiconductor

Freescale Semiconductor is a global leader in the design and manufacture of embedded semiconductors for the automotive, consumer, industrial and networking markets. The privately held company is based in Austin, Texas, and has design, research and development, manufacturing or sales operations around the world. <http://www.freescale.com/>.

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