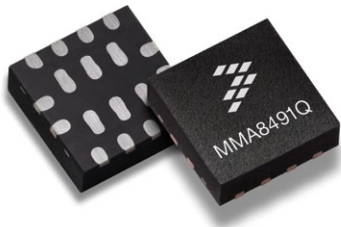Accelerometers

MMA8491Q Xtrinsic 3-Axis Accelerometer

Ultra low power and cost efficient

Target Applications

- Smart meters
- Home appliances
- Asset tracking applications
- Gaming
- Remote controls

Overview

The MMA8491Q Xtrinsic 3-axis accelerometer is an ultra-low-power tamper detection and tilt sensor that enables smart meters, home appliances, asset tracking applications, gaming and remote controls through auto-on/auto-sleep energy-efficient operation housed in a specialized industrial package. The MMA8491Q Xtrinsic accelerometer is simple, yet robust with reduced system and implementation cost for reduced development time. Its unique single sample and hold measurement method allows for ease of use.

The MMA8491Q Xtrinsic accelerometer operates with reduced power consumption by intelligently determining when the application should operate at a low-power mode or shut off, therefore prolonging battery life. The tilt threshold detection is used to enable/disable host systems or trigger actions, which reduces duty cycles and saves power. Set up is not required since the auto-on provides a short wait to the first data out, reducing average power consumption to less than one micro amp. Without software load on the core system, more sleep time is possible on the host, which also saves power.

Xtrinsic MMA8491Q 3-Axis Accelerometer Block Diagram
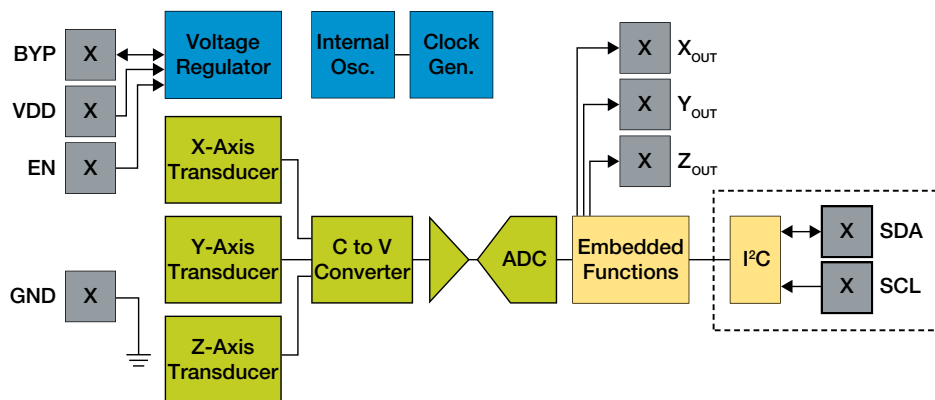
| Sensing Blocks | I/O Pins | Digital Blocks | Supporting Blocks | Optional |

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## Electronic Tamper Detection Smart Meter Reference Design

The smart grid needs to physically secure all elements that may include smart meters, data concentrators, intelligent electronic devices (IEDs) and secure gateways. The MK30ETAMP3PHMTR electronic tamper detection electricity smart meter reference design integrates an ultra-low-power Xtrinsic 3-axis tilt threshold sensor used for electronic tamper detection.

Electronic Tamper Detection Smart Meter Reference Design Using MMA8491Q Xtrinsic Tilt Threshold Sensor

Freescale: A Leader in Sensing Solutions

Expanding on more than 30 years of sensor innovation, our Xtrinsic sensing solutions are designed with the right combination of high-performance sensing capability, processing capacity and customizable software to help deliver smart, differentiated sensing applications. With Xtrinsic sensing solutions, our vision is to offer a diverse and differentiated product portfolio to meet the expanding needs of the automotive, consumer and industrial segments. Xtrinsic solutions offer ideal blends of functionality and intelligence designed to help our customers differentiate and win in highly competitive markets.
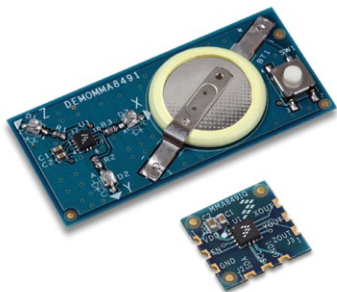
MMA8491Q Xtrinsic Accelerometer 3-Axis Tilt Threshold Sensor Demo

MMA8491Q Xtrinsic 3-Axis Accelerometer

Feature	Specification	Benefit
Power consumption	400 nA per Hz	Lower power for significant battery savings
Industrial package	Miniature 3 mm x 3 mm x 1mm, 0.65 mm lead pitch QFN 12-pin package	Lead pitch complies with industrial footprint
3-axis MEMS tilt threshold sensor	45° tilt threshold on each axis	Out-of-box tilt detection sensor saves set up time
Fast turn-on time	0.5 ms	Reduce turn-on data latency
High resolution	0.98 mg/count	Enables high-resolution application with low power consumption requirements
Digital output	I²C interface at 400 kHz	Works well with MCU-based devices
Supply voltage	1.95 to 3.6 V	Wide operating voltage

Development Tools

Part Number	Description
DEMOMMA8491	The DEMOMMA8491 includes two simple boards. The breakout board contains a sample device. The demo board can be positioned for tilt detection signaled by the LEDs that light up corresponding to each of the three axes.
LFSTBEB8491	The LFSTBEB8491 Sensor Toolbox kit contains two PCB boards: MMA8491Q accelerometer board and the interface board. It enables users to directly communicate with the MMA8491Q via USB emulator programs when used in conjunction with the LFSTBUSB communication board. You may purchase the LFSTBUSB communication board separately.
RDMMA8491	The RDMMA8491 Sensor Toolbox kit contains three PCB boards: MMA8491Q accelerometer board, interface board and the USB communication board. You may purchase this bundle if you do not already have the Sensor Toolbox USB communication board.
MK30ETAMP3PHMTR	Electronic tamper detection smart meter reference design.
RDKM3METERING1PH	Kinetis KM3x MCU single-phase metering reference design.
RDKM3METERING2PH	Kinetis KM3x MCU two-phase metering reference design.

Documentation

Document Number	Description
MMA8491Q	Product specification data sheet.
AN4296	Data manipulation and the basic setting of Xtrinsic MMA8491Q accelerometer application note.
AN4292	MMA8491Q breakout board design checklist and evaluation guidelines.

Ordering Information

Part Number	Description
MMA8491QR1	Ships in tape and reel
MMA8491QT	Ships in trays

For current information about Xtrinsic products and documentation, please visit freescale.com/MMA8491Q

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