Sensors

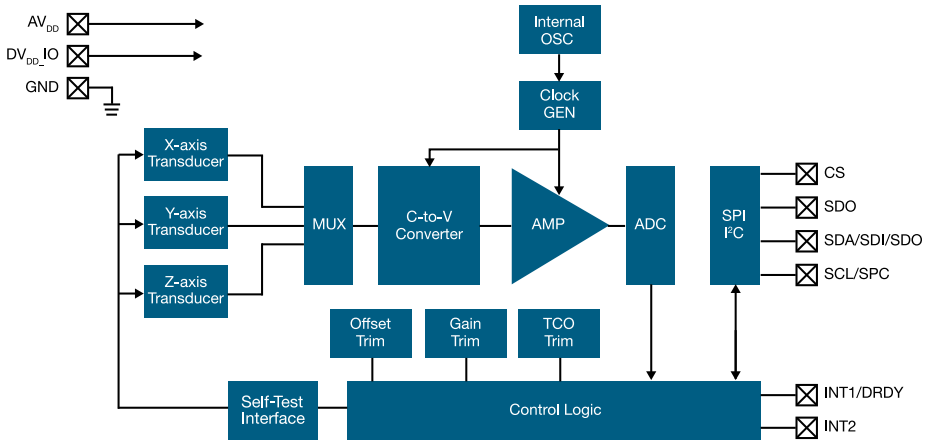
MMA745xL

Three-axis low g digital acceleration sensor family

Overview

Freescale's first digital three-axis accelerometer family in a 1.0 mm thin package provides designers simple and easy processor integration for feature-rich portable devices. The MMA745xL devices provide a digital output which is extremely important and advantageous for customers' applications where an analog-to-digital converter is not contained in the microcontroller or microprocessor—this accelerometer provides the digital output on board. The MMA745xL can communicate on both I²C and SPI interface buses. This digital output functionality eliminates the need for an external analog-to-digital converter. By providing both I²C and SPI, the MMA745xL has a direct interface to the main system processor for communication flexibility and simplicity.

MMA745xL Block Diagram



The MMA745xL digital output accelerometers are configurable to detect 0g through interrupt pins (INT1 or INT2), and threshold and pulse (click) detect for quick motion detection. Additionally, the 0g offset can be calibrated using assigned 0g registers. The MMA745xL feature g-Select allows for command selection for three sensitivities (2g/4g/8g). For consumer electronics that require a fast response time, high sensitivity, low current consumption, low-voltage operation and a standby mode in a profile package, the MMA745xL are ideal solutions. Target markets include consumer, appliance, industrial, health care, mobile and computer peripherals.

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Selector Guide

Part Number	Acceleration (g)	High Sensitivity (LSB/g)	I_{DD} Measurement Mode	Analog V_{DD} Supply Voltage (Typical) (V)	Digital I/O Pins V_{DD} Supply Voltage (Typical)	Frequency (Hz)	Package
MMA7455L	2/4/8	64	400 µA	2.8	1.8	62.5/125	3 x 5 x 1.0 mm LGA
MMA7456L	2/4/8	64	400 µA	2.8	1.8	62.5/125	3 x 5 x 1.0 mm LGA

Development Tool

Part Number	Description
KIT3468MMA7456L	Evaluation board to demonstrate key accelerometer features
KIT3468MMA7455L	Evaluation board to demonstrate key accelerometer features

Documentation

Freescale Document Number	Title	Description
MMA7455L	MMA7455L Data Sheet	This data sheet presents the specifications for this product
MMA7456L	MMA7456L Data Sheet	This data sheet presents the specifications for this product
AN3468	Using the MMA745xL Evaluation Board	Presents how to use the MMA745xL evaluation board

MMA745xL Applications

- Cell phones: motion dialing, text scroll, e-compass, portrait/landscape, image stability
- Laptop PC: free-fall detection, anti-theft, event recorder
- HDD: free-fall detection
- GPS navigation: dead reckoning, e-compass tilt compensation
- Portable media players: free-fall detection
- PDA: text scroll
- Gaming: tilt and motion sensing, event recorder
- Digital camera & digital video camera: image stability, portrait/landscape
- Pedometer: motion sensing
- Robotics: motion sensing for industrial applications

MMA745xL Benefits

- Digital output with I²C/SPI for processor system performance
- Small, low-profile package enables motion in handheld products
- Flexibility to select 2g, 4g or 8g of acceleration for multifunctional applications
- Low power for extended battery life
- Fast power-up response time
- Standby mode is ideal for handheld battery-powered electronics
- Customer assigned registers for offset calibration
- Programmable threshold interrupt output
- Freefall interrupt output—reduces the processing requirements of freefall detection
- Low component count—saves cost, saves space
- Highly sensitive
- Adaptable functionality

MMA745xL Features

- Digital output (I²C/SPI)
- Low-profile 14-pin 3 mm x 5 mm x 1 mm package
- LGA volume is 77 percent smaller than Quad Flat No-Lead (QFN) package
- XYZ: three axes of sensitivity in one device
- Low current consumption: 400 µA
- Standby mode: 5 µA
- Low-voltage operation: 2.4–3.6V
- Customer assigned registers for offset calibration
- Programmable threshold interrupt output
- Cost-effective pricing
- Level detection for motion recognition (shock, vibration, freefall)
- Single or double click recognition
- High sensitivity
  - 64 LSB/g at 2g
  - 64 LSB/g at 8g in 10-bit mode
- Selectable sensitivity for any of these values: ±2g, ±4g or ±8g
- Self-test function
- Robust design and high shock survivability up to 10,000g
- Restriction of hazardous substances (RoHS) compliant
- Integrated signal conditioning with low pass filter

Learn More: For more information about Freescale products, please visit **www.freescale.com/xyz** or **www.freescale.com/sensors**.

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