

Acceleration Sensors

Overview

Freescale's micro-electromechanical systems (MEMS)-based acceleration sensors are designed for end products and embedded systems that require measurement of forces resulting from fall, orientation, tap, double tap, tilt, jolt, motion, positioning, shake, shock or vibration. We offer a broad portfolio of acceleration sensors from 1.5g to 250g for applications ranging from highly sensitive seismic detection to robust collision detection. Target markets include consumer, appliance, automotive, industrial, health care and computer peripherals.

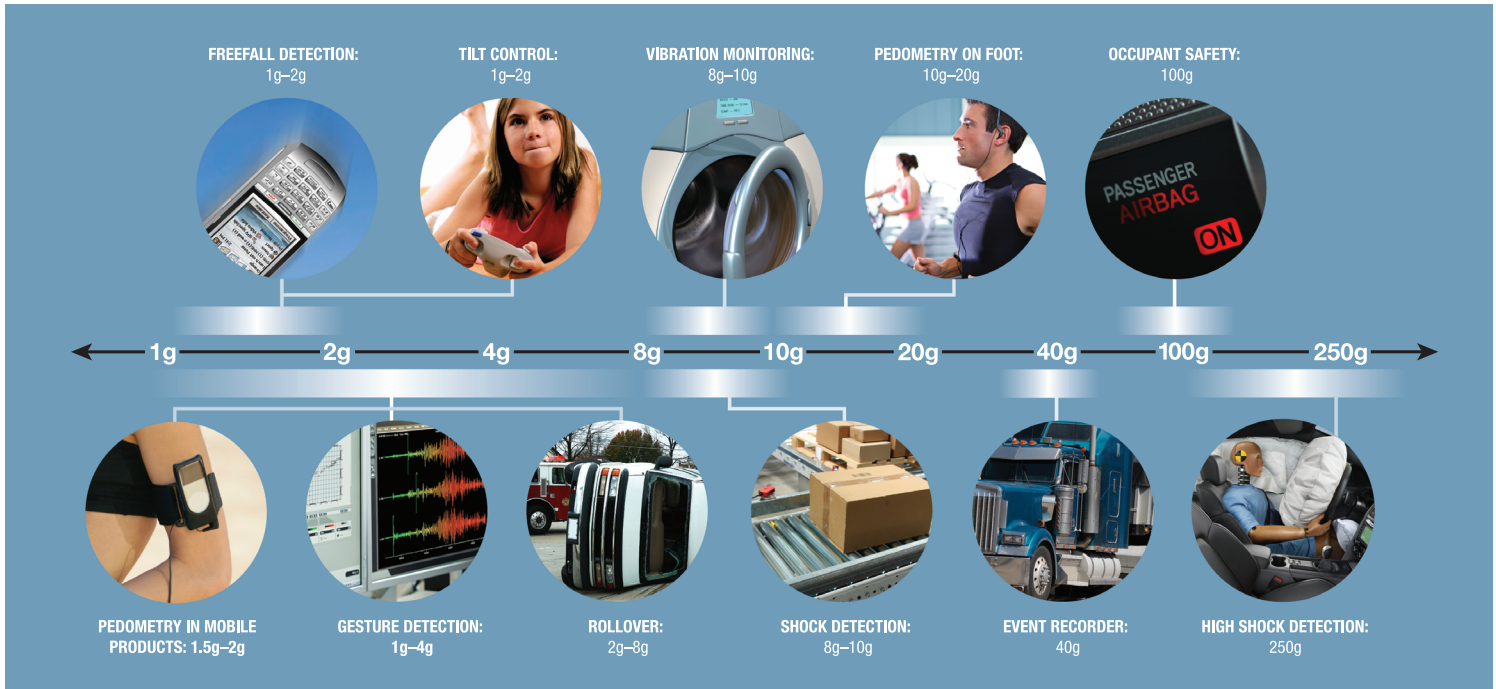
Freescale's acceleration sensors incorporate a surface micromachined structure. The g-cell is coupled with an application-specific integrated circuit (ASIC), which provides the accelerometer with amplification, signal conditioning, low-pass filter and temperature compensation. This two-die solution serves as a system-in-package.

Analog and Digital Solutions

- X, XY, XZ, XYZ and Z axes of sensitivity
- 1.5g–250g for a wide variety of applications
- Sensitivity as high as $\pm 1,200$ mV/g
- Signal conditioned with internal filter
- Calibrated self-test for functional verification
- Linear output
- Ratiometric, ideally suited to interface with analog-to-digital converters
- Hermetically sealed g-cell
- Cost-effective plastic packages in low-dimension land grid array (LGA) Pb-free package, quad flat no-lead (QFN) Pb-free package or SOIC-16 or 20 with through hole or surface mount available

Device	Sensing Range (g)	Sensing Axis	Sensitivity	Frequency (Hz)	VDD Supply Voltage (Typ) (V)	Packaging
Digital						
MMA8450Q	2/4/8	XYZ	1024 LSB/g	0.625/200	1.8	16-pin QFN
MMA7660FC	1.5	XYZ	21 LSB/g	0.5/60	2.8	10-pin DFN
MMA7455L	2/4/8	XYZ	64 LSB/g	62.5/125	2.8	14-pin LGA
MMA6222EG	20/20	XY	24 counts/g	400	5.0	20-pin SOIC
MMA6255EG	50/50	XY	9.76 counts/g	400	5.0	20-pin SOIC
MMA621010EG	100/100	XY	4.88 counts/g	400	5.0	20-pin SOIC
Analog						
MMA7361L	1.5 or 6	XYZ	800 or 200 mV/g	400/300	3.3	14-pin LGA
MMA7368L	1.5	XYZ	800 mV/g	400/300	3.3	14-pin LGA
MMA7341L	3 or 12	XYZ	440 or 110 mV/g	400/300	3.3	14-pin LGA
MMA7331L	4 or 16	XYZ	308 or 77 mV/g	400/300	2.8	14-pin LGA
MMA2260EG	1.5	X	1200 mV/g	50	5.0	16-pin SOIC
MMA1260EG	1.5	Z	1200 mV/g	50	5.0	16-pin SOIC
MMA1270EG	2.5	Z	750 mV/g	50	5.0	16-pin SOIC
MMA1250EG	5	Z	400 mV/g	50	5.0	16-pin SOIC
MMA1220EG	8	Z	250 mV/g	250	5.0	16-pin SOIC
MMA6222AEG	20/20	XY	24 counts/g	400	5.0	20-pin SOIC
MMA3201EG	40	XY	50 mV/g	400	5.0	20-pin SOIC
MMA2201EG	40	X	50 mV/g	400	5.0	16-pin SOIC
MMA6255AEG	50/50	XY	9.76 counts/g	400	5.0	20-pin SOIC
MMA2202EG	50	X	40 mV/g	400	5.0	16-pin SOIC
MMA3204EG	100/30	XY	20/66.67 mV/g	400	5.0	20-pin SOIC
MMA1213EG	50	Z	40 mV/g	400	5.0	16-pin SOIC
MMA621010AEG	100/100	XY	4.88 counts/g	400	5.0	20-pin SOIC
MMA2204EG	100	X	20 mV/g	400	5.0	16-pin SOIC
MMA1210EG	100	Z	20 mV/g	400	5.0	16-pin SOIC
MMA1211EG	150	Z	13 mV/g	400	5.0	16-pin SOIC
MMA2301EG	150	X	10 mV/g	400	5.0	16-pin SOIC
MMA1212EG	200	Z	10 mV/g	400	5.0	16-pin SOIC
MMA2300EG	250	X	8 mV/g	400	5.0	16-pin SOIC
MMA1200EG	250	Z	8 mV/g	400	5.0	16-pin SOIC

Suggested g Levels for Various Applications



Typical Applications

- Anti-theft devices
- Appliance balance/monitoring
- Automobile rollover detection
- Automotive crash detection and suspension control
- Backup GPS
- Exercise equipment
- Fall detection
- Fleet management
- HDD protection
- Health care applications
- Image stability
- Motion control
- Physical therapy
- Portable electronics
- Robotics
- Seismic monitoring
- Shipping/handling monitor
- Smart motor maintenance
- Sports diagnostic systems
- Vehicle dynamic control
- Vibration monitoring

Analog and Digital Solutions for Design Flexibility

- Digital output with I²C/SPI for processor system performance
- Customer assigned registers for offset calibration
- Programmable bandwidth and data rate
- Single board 3-D sensing
- Bidirectional multi-axis sensing
- Direction detection
- Adaptable functionality
- Design flexibility
- Smaller package size reduces board space
- g-Select products offer flexibility to select acceleration level for multifunctional applications
- Click and double click recognition
- Low power for extended battery life
- Signal conditioned with an internal filter, reducing the number of external components.

- Low component count saves cost and space
- Highly sensitive with low noise
- High frequency and resolution for accurate fall, tilt, motion, positioning, shock and vibration sensing
- Two-die solution utilizes partitioning, allowing greater design flexibility and maximizes product performance

Learn More:

For current information about Freescale products and documentation, please visit www.freescale.com/xyz or www.freescale.com/sensors.