

# MMA Series Acceleration Sensors

Freescale Semiconductor's micromachined accelerometer (MMA) series acceleration sensors are designed for end products or embedded systems that require measurement of forces resulting from tilt, motion, positioning, shock or vibration. We offer a broad portfolio of acceleration sensors for applications ranging from highly sensitive seismic detection to robust collision detection.

Freescale's MMA series acceleration sensing capabilities derive from micro-electromechanical systems (MEMS) technology. The acceleration sensors incorporate a surface micromachined structure.

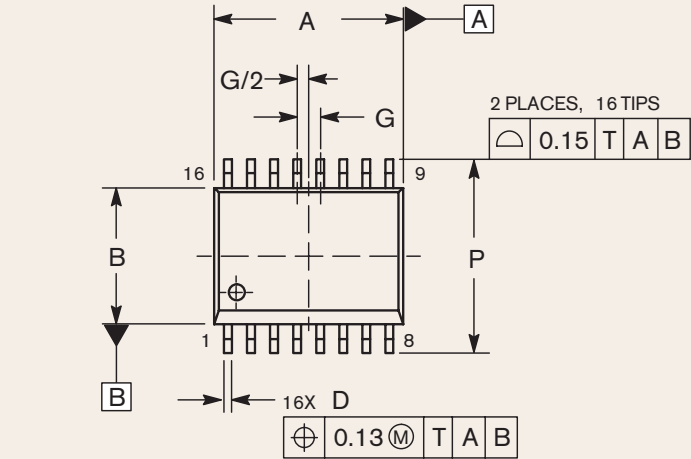
The g-cell is coupled with an ASIC, which provides the accelerometer with amplification, signal conditioning, low-pass filter and temperature compensation. This two-chip solution serves as a system-in-a-package (SIP).

| Device   | Acceleration (g) | Sensing Axis | Sensitivity (mV/g) | Frequency (Hz) | VDD Supply Voltage (Typ) (V) | Zero g Output (Typ) (V) | Packaging               |
|----------|------------------|--------------|--------------------|----------------|------------------------------|-------------------------|-------------------------|
| MMA6260Q | 1.5              | XY           | 800                | 50             | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA6261Q | 1.5              | XY           | 800                | 300            | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA6262Q | 1.5              | XY           | 800                | 150            | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA6263Q | 1.5              | XY           | 800                | 900            | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA2260D | 1.5              | X            | 1200               | 50             | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1260D | 1.5              | Z            | 1200               | 50             | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1270D | 2.5              | Z            | 750                | 50             | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1250D | 5                | Z            | 400                | 50             | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1220D | 8                | Z            | 250                | 250            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA6231Q | 10               | XY           | 120                | 300            | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA6233Q | 10               | XY           | 120                | 900            | 3.3                          | 1.65                    | Quad Flat No-Lead (QFN) |
| MMA3201D | 40               | XY           | 50                 | 400            | 5.0                          | 2.5                     | 20-pin SOIC             |
| MMA2201D | 40               | X            | 50                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA2202D | 50               | X            | 40                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1213D | 50               | Z            | 40                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA2204D | 100              | X            | 20                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1210D | 100              | Z            | 20                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1211D | 150              | Z            | 13                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1212D | 200              | Z            | 10                 | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA2300D | 250              | X            | 8                  | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |
| MMA1200D | 250              | Z            | 8                  | 400            | 5.0                          | 2.5                     | 16-pin SOIC             |

## Features

- > X, XY and Z axis 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 A to D converters
- > Hermetically sealed g-cell
- > Cost-effective plastic packages in low-dimension Quad Flat No-Lead (QFN) Pb-free package (6 mm x 6 mm x 1.98 mm) or SOIC-16 or 20 with through hole or surface mount available

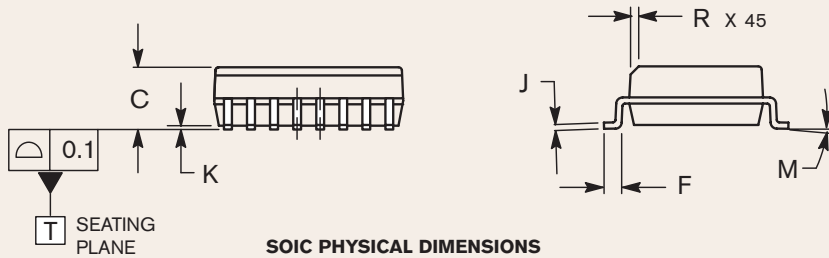
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NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS "A" AND "B" DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 PER SIDE.
4. DIMENSION "D" DOES NOT INCLUDE DAMBAR PROTRUSION. PROTRUSIONS SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED 0.75.

| DIM | MILLIMETERS |       |
|-----|-------------|-------|
|     | MIN         | MAX   |
| A   | 10.15       | 10.45 |
| B   | 7.40        | 7.60  |
| C   | 3.30        | 3.55  |
| D   | 0.35        | 0.49  |
| F   | 0.76        | 1.14  |
| G   | 1.27 BSC    |       |
| J   | 0.25        | 0.32  |
| K   | 0.10        | 0.25  |
| M   | 0°          | 7°    |
| P   | 10.16       | 10.67 |
| R   | 0.25        | 0.75  |



**Benefits**

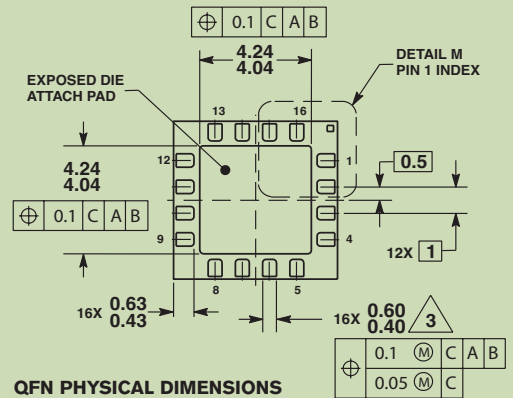
- > Single board 3-D sensing
- > Bidirectional multi-axis sensing
- > Design flexibility
- > Small package

**Typical Applications**

- > Smart portable electronics
- > Vibration monitoring
- > Computer hard drive protection
- > Sports diagnostic systems
- > Appliance balance and vibration controls

- > Seismic detection
- > Health care applications
- > Robotics
- > Automotive crash detection and suspension control
- > Motion control
- > Back-up GPS
- > Fall log
- > Smart motor maintenance

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**Learn More:** For more information about Freescale products, please visit [www.freescale.com](http://www.freescale.com).