

Preliminary Information
Micromachined Accelerometer
±250g Amplified

The MMAS250G family of silicon capacitive, micro-machined accelerometers features integral signal amplification, signal conditioning, a 4-pole low-pass filter and temperature compensation. Zero-G offset, full scale span and filter roll-off are factory set and require no external passives. A calibrated self-test feature mechanically displaces the seismic mass with the application of a digital self-test signal. The device is offered in either of two plastic packages, thereby accommodating various axis orientation requirements.

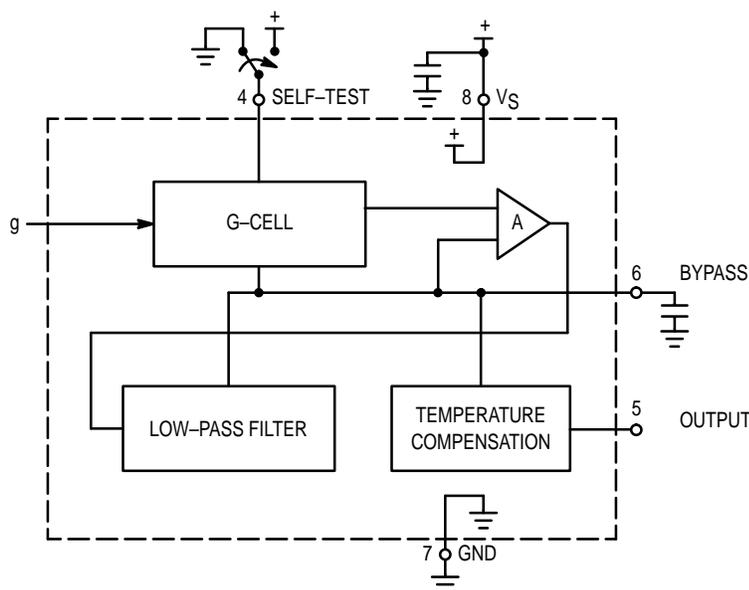
The MMAS250G incorporates a single polysilicon seismic mass, suspended between two fixed polysilicon plates (G-cell). The forces of acceleration move the seismic mass, thereby resulting in a change in capacitance. The G-cell is sealed at the die level, creating a particle-free environment. The G-cell features built-in damping and over-range stops to protect it from mechanical shock.

MMAS250G accelerometers are ideally suited for automotive crash detection and recording, vibration monitoring, automotive suspension control, appliance control systems, etc.

Features

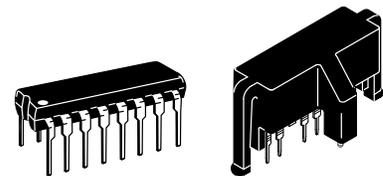
- Full Scale Measurement ±250g
- Calibrated, True Self-Test
- Standard 16-Pin Plastic DIP
- Integral Signal Conditioning and 4-Pole Filter
- Linear Output
- Robust, High Shock Survivability

SIMPLIFIED BLOCK DIAGRAM



XMMAS250G10D
XMMAS250G10S

**MICROMACHINED
ACCELEROMETER**
±250g AMPLIFIED



DIP PACKAGE
CASE 648C-03

SIP PACKAGE
CASE 447-01

PIN NUMBER

1	N/C (1)	9	N/C (1)
2	N/C (1)	10	N/C (1)
3	N/C (1)	11	N/C (1)
4	Self-Test	12	N/C (1)
5	Output	13	N/C (1)
6	Bypass (2)	14	N/C (1)
7	GND	15	N/C (1)
8	VS (2)	16	N/C (1)

NOTES:

1. Internal connections. All N/C must remain floating, except DIP's pin 11 which must be tied to pin 8.
2. Bypass to ground with 0.1 μF ceramic capacitor to improve noise performance.

This document contains information on a product under development. Motorola reserves the right to change or discontinue this product without notice.

XMMAS250G10D XMMAS250G10S

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Acceleration (biased each axis)	G	±500	g
Acceleration (unbiased each axis)	G	±2000	g
Supply Voltage	V _{Smax}	-0.3 to +7.0	Vdc
Storage Temperature	T _{stg}	-40 to +125	°C
Operating Temperature(6)	T _A	-40 to +85	°C

OPERATING CHARACTERISTICS (V_S = 5.0 Vdc, T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Acceleration Range	G	±250	—	—	g
Output Drive Capability	—	-0.2	—	0.2	mA
Supply Voltage	V _S	4.75	5.0	5.25	V
Supply Current	I _O	—	5.0	—	mA
Full Scale Output Range	V _{FSO}	0.3	—	4.7	V
Sensitivity (over temperature range) (1) (2) (3)	ΔV/ΔG	5.8	6.5	7.2	mV/g
Zero Acceleration Output (T _A = 25°C) (4)	V _{off}	2.3	2.5	2.7	V
Zero Acceleration Output (over temperature range) (3) (4)	V _{off}	2.1	2.5	2.9	V
Linearity	—	—	0.5	—	%FSO
Transverse Sensitivity	—	—	1.0	3.0	%FSO
Frequency Bandwidth	—	—	700	—	Hz
Noise	—	—	20	50	mV _{pk}
Self-Test Output Equivalent (5)	G _S	44	50	56	g
Self-Test Triggering Voltage	V _{TH}	1.6	—	3.4	V
Self-Test Input Current	—	—	10	—	μA

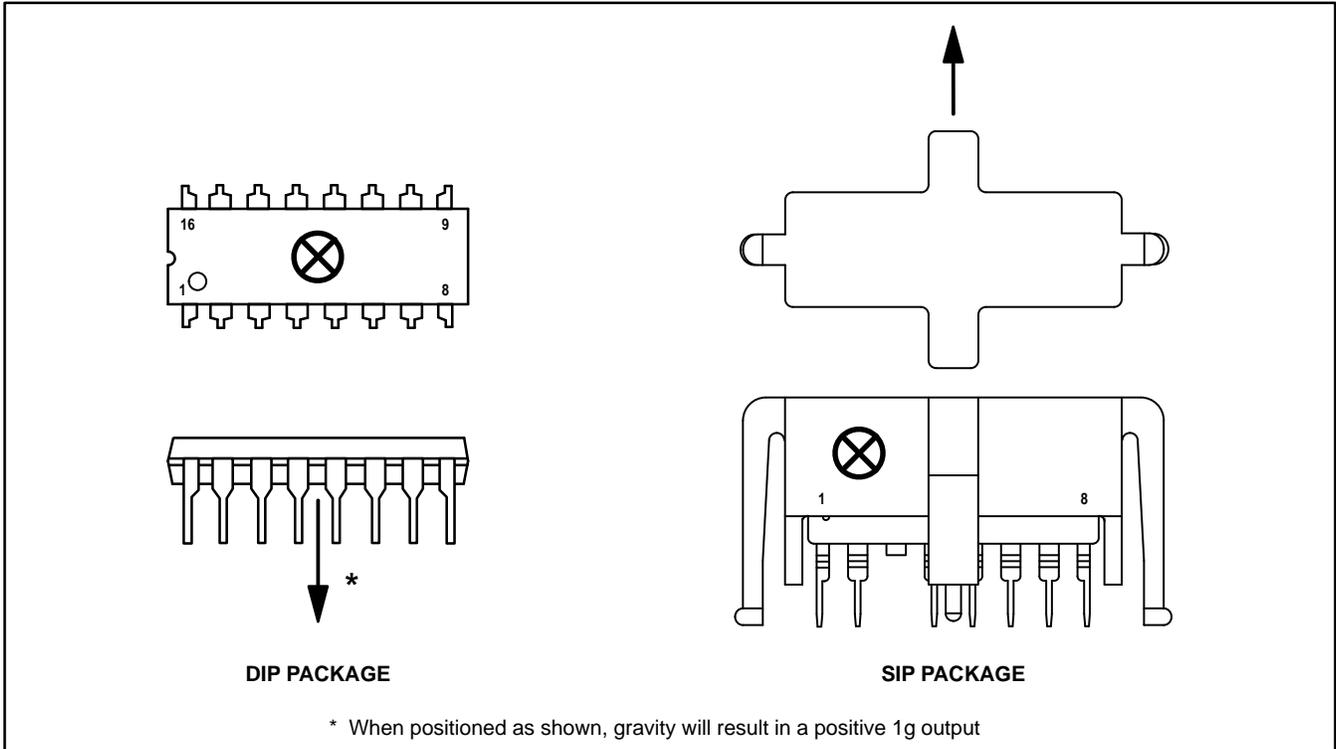
NOTES:

1. The output voltage increases from the Zero Acceleration Output for positive acceleration and decreases for negative acceleration. The typical sensitivity is 6.5 mV/g. For example, with V_S = 5.0 V, a +100g input will result in a 3.15 V output. (V_{output} = 2.5 + 0.0065 × 100) and a -100g input will result in a 1.85 V output.
2. Sensitivity is a ratiometric parameter: $\Delta V/\Delta G(V_S) = \Delta V/\Delta G(5\text{ V}) \times (V_S/5\text{ V})$.
3. The compensated temperature range is -40 to +85°C.
4. Zero Acceleration Output is a ratiometric parameter: $V_{\text{off}}(V_S) = V_{\text{off}}(5\text{ V}) \times (V_S/5\text{ V})$.
5. Equivalent output in response to a Logic Level One on the self-test pin.
6. Additional temperature range available. Consult factory.

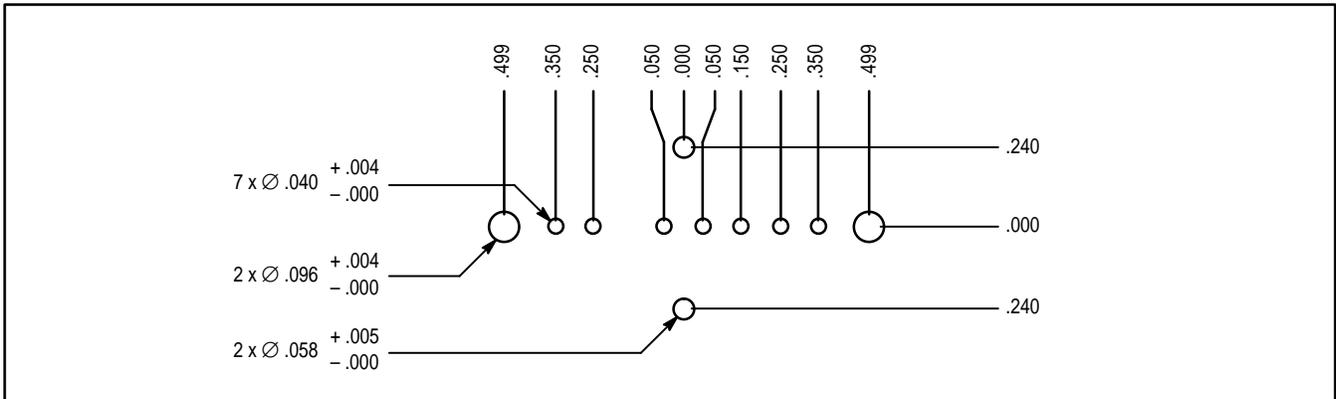
ORDERING INFORMATION

Device	Temperature Range	Case No.	Package
XMMAS250G10D	-40 to +85°C	Case 648C-03	Plastic DIP
XMMAS250G10S	-40 to +85°C	Case 447-01	Plastic SIP

POSITIVE ACCELERATION SENSING DIRECTION



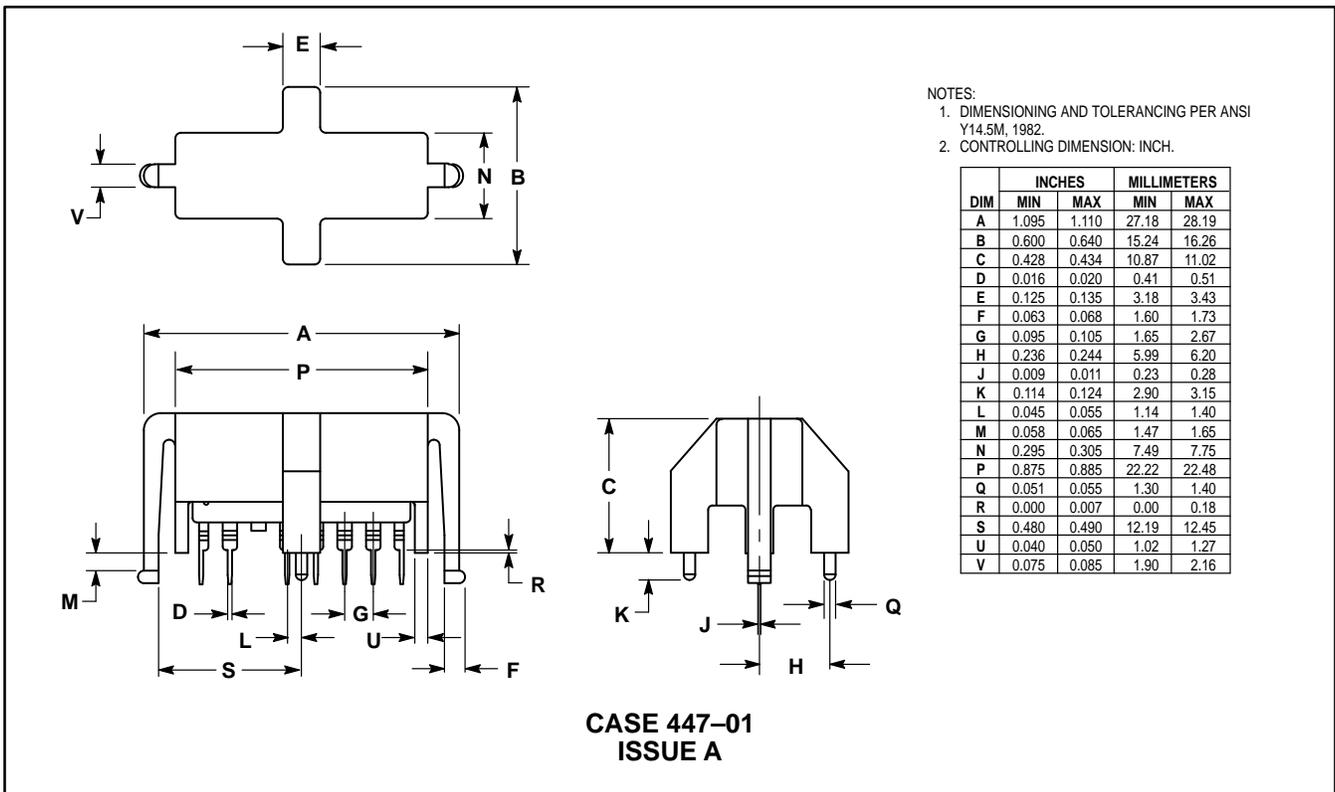
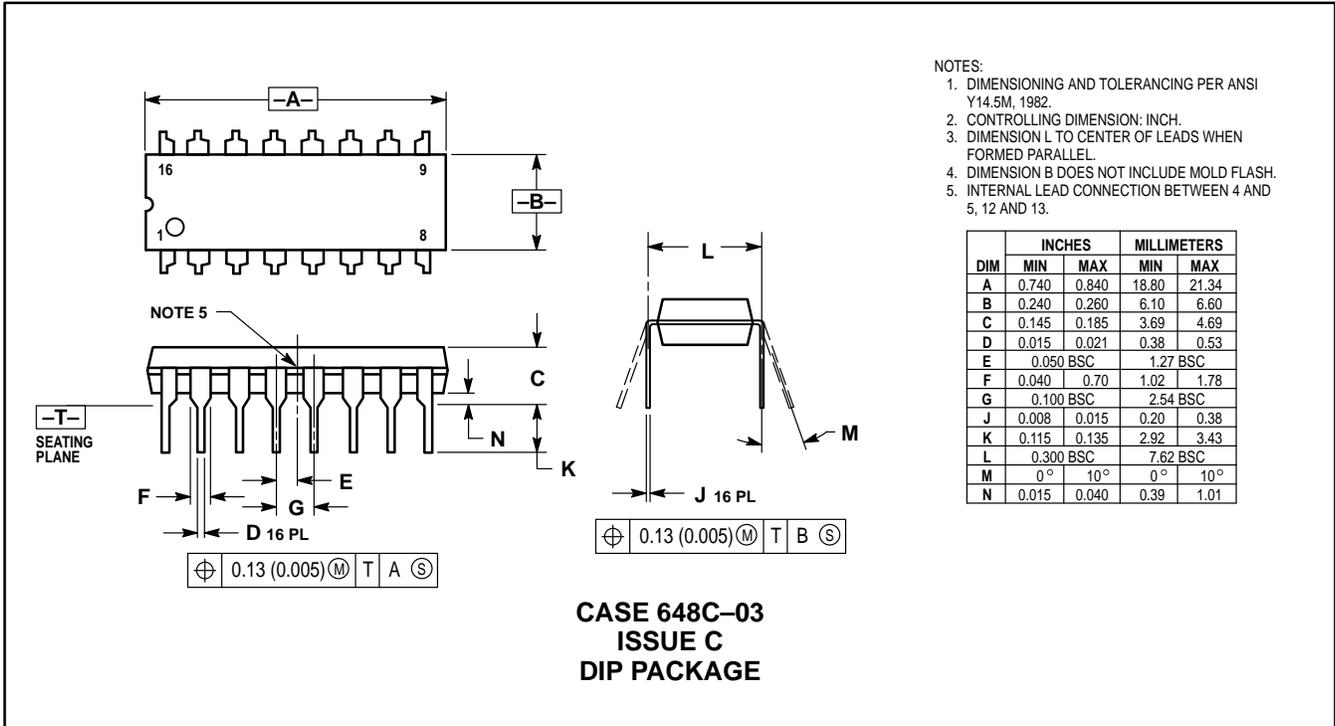
SIP PACKAGE DRILLING PATTERN



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XMMAS250G10D XMMAS250G10S

PACKAGE DIMENSIONS



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XMMAS250G/D

