



# Micromachined Accelerometer

## ±40g

The MMAS40G 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.

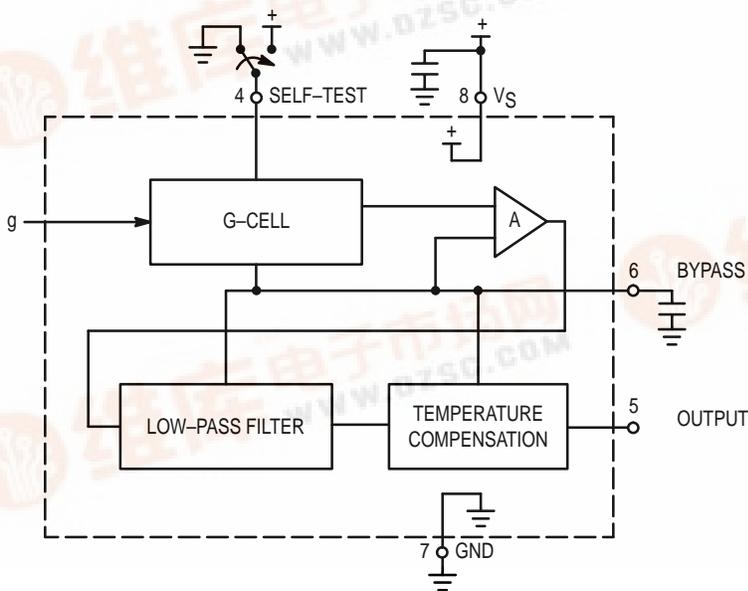
The MMAS40G incorporates a single polysilicon seismic mass, suspended between two fixed polysilicon plates (G-cell). The forces of acceleration move the seismic mass, thereby resulting in a change in capacitance. The G-cell is sealed at the wafer level, creating a particle-free environment. The G-cell features built-in damping and over-range stops to protect it from mechanical shock.

MMAS40G accelerometers are ideally suited for automotive crash detection and recording, vibration monitoring, automotive suspension control, appliance control systems, etc.

### Features

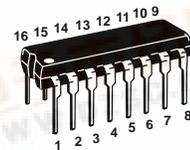
- Minimum Full Scale Measurement ±40g
- Calibrated, True Self-Test
- Standard 16-Pin Plastic DIP package
- Senses Perpendicular to the Printed Circuit Board
- Integral Signal Conditioning and 4-Pole Filter
- Linear Output
- Robust, High Shock Survivability

**SIMPLIFIED BLOCK DIAGRAM**



# MMAS40G10D

**MICROMACHINED  
 ACCELEROMETER**  
 ±40g



**DIP PACKAGE**  
 CASE 648C-03

**PIN NUMBER (DIP)**

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	V <sub>S</sub> (2)	16	N/C (1)

**NOTES:**

1. Internal connections. All N/C should be tied to gnd, except pin 11 which must be tied to pin 8.
2. Bypass to ground with 0.1 μF ceramic capacitor for specified system performance.

## MMAS40G10D

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Acceleration (biased each axis)	G	±500	g
Acceleration (unbiased each axis)	G	±2000	g
Supply Voltage	V <sub>Smax</sub>	-0.3 to +7.0	V <sub>dc</sub>
Storage Temperature	T <sub>stg</sub>	-40 to +105	°C
Operating Temperature(6)	T <sub>A</sub>	-40 to +85	°C

### OPERATING CHARACTERISTICS (V<sub>S</sub> = 5.0 V<sub>dc</sub>, T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
Acceleration Range	G	±40	±55	—	g
Output Drive Capability	—	-0.2	—	0.2	mA
Supply Voltage	V <sub>S</sub>	4.75	5.0	5.25	V
Supply Current	I <sub>O</sub>	—	5.0	7.0	mA
Full Scale Output Range	V <sub>FSO</sub>	0.3	—	V <sub>S</sub> - 0.3	V
Sensitivity (over temperature range) (2) (3)	ΔV/ΔG	36	40	44	mV/g
Zero Acceleration Output (over temperature range) (3) (4)	V <sub>off</sub>	2.2	2.5	2.8	V
Linearity	—	—	0.5	2.0	%FSO
Transverse Sensitivity	—	—	1.0	3.0	%FSO
Frequency Bandwidth	—	300	400	500	Hz
Noise	—	—	15	25	mV <sub>pk</sub>
Self-Test Output Equivalent (5)	G <sub>S</sub>	20	25	30	g
Self-Test Input Low	V <sub>STL</sub>	—	—	1.6	V
Self-Test Input High	V <sub>STH</sub>	3.4	—	—	V
Self-Test Input Current	—	10	70	200	μA

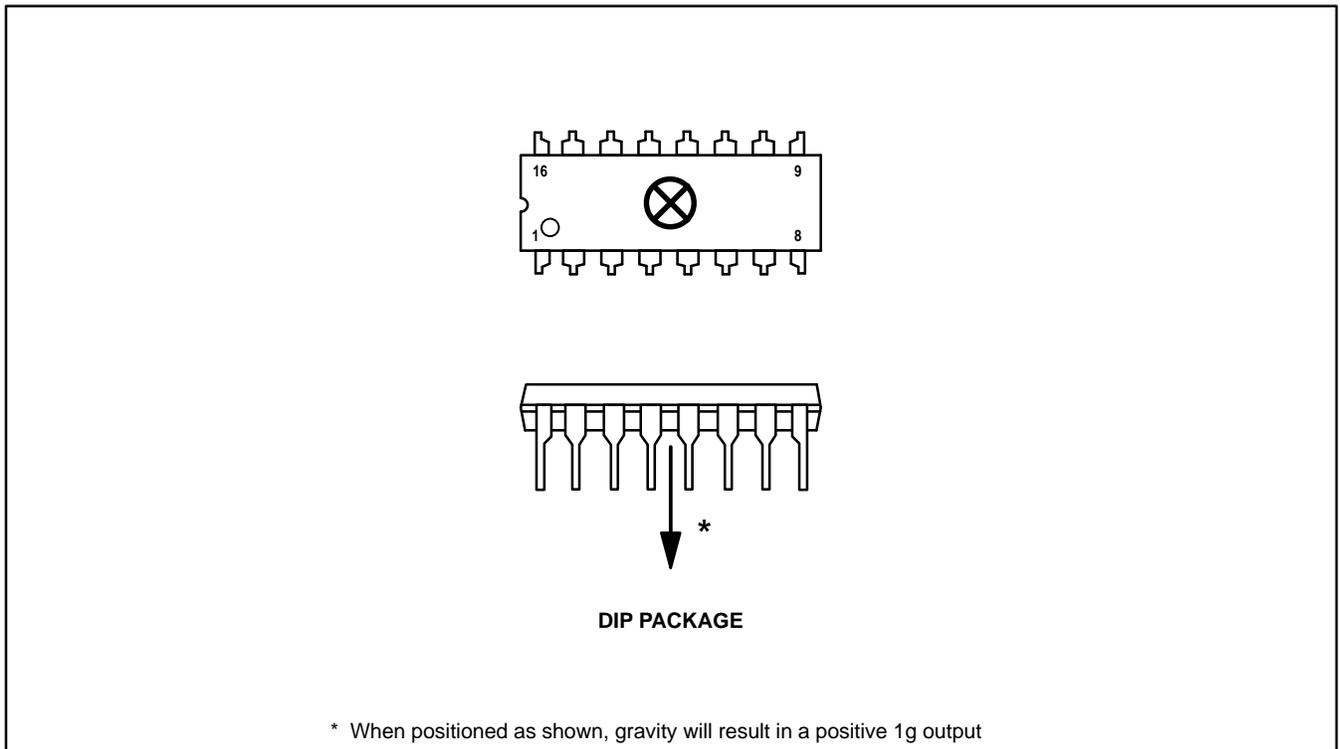
#### NOTES:

1. The output voltage increases from the Zero Acceleration Output for positive acceleration and decreases for negative acceleration. The typical sensitivity is 40 mV/g. For example, with V<sub>S</sub> = 5.0 V, a +20g input will result in a 3.3 V output. (V<sub>output</sub> = 2.5 + 0.040 x 20) and a -20g input will result in a 1.7 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 operating range is -40 to +85°C.
4. Zero Acceleration Output is a ratiometric parameter:  $V_{off}(V_S) = V_{off}(5\text{ V}) \times (V_S/5\text{ V})$ .
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
MMAS40G10D	-40 to +85°C	Case 648C-03	Plastic DIP

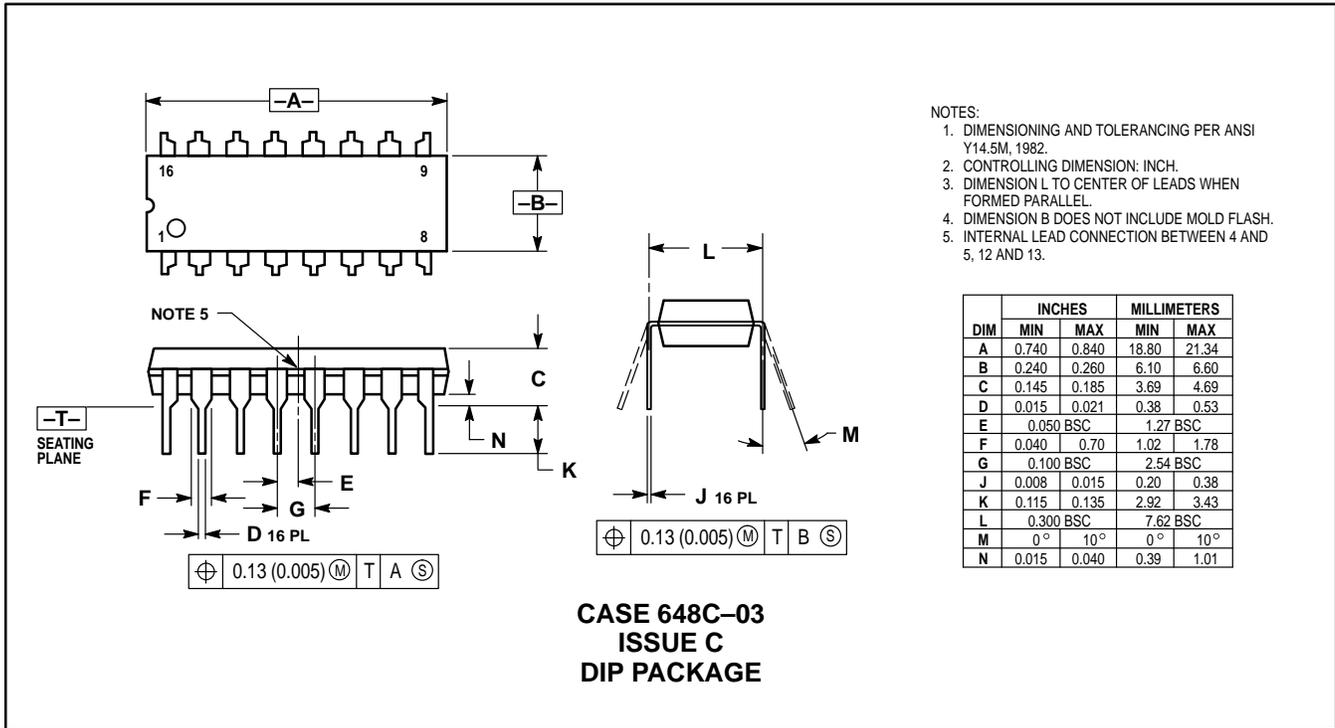
## POSITIVE ACCELERATION SENSING DIRECTION



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**MMAS40G10D**

**PACKAGE DIMENSIONS**



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