



Micromachined Accelerometer $\pm 40g$

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.

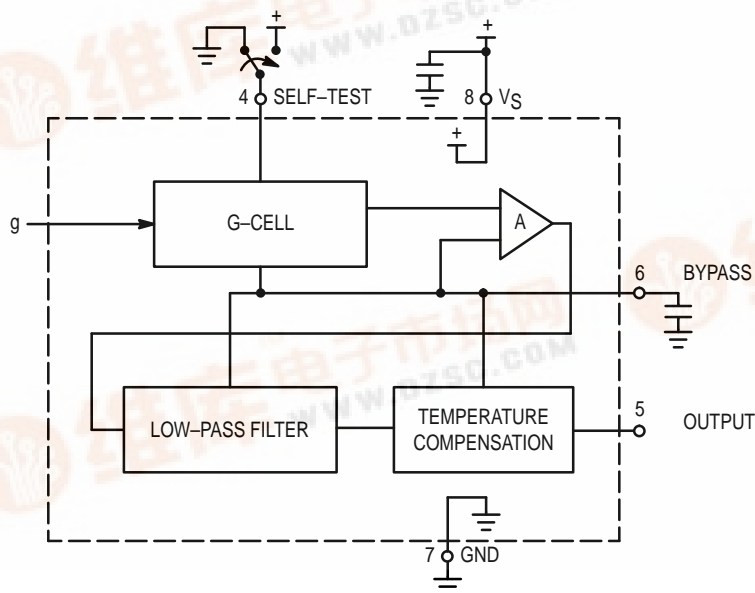
The MMAS40G incorporates a single polysilicon seismic mass, suspended between two fixed polysilicon plates (G-cell). The forces of acceleration move the seismic mass, thereby resulting in a change in capacitance. The G-cell is sealed at the wafer level, creating a particle-free environment. The G-cell 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

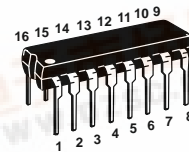
- Minimum Full Scale Measurement $\pm 40g$
- Calibrated, True Self-Test
- Standard 16-Pin Plastic DIP package
- Senses Perpendicular to the Printed Circuit Board
- Integral Signal Conditioning and 4-Pole Filter
- Linear Output
- Robust, High Shock Survivability

SIMPLIFIED BLOCK DIAGRAM



MMAS40G10D

MICROMACHINED ACCELEROMETER $\pm 40g$



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 _S (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 _{Smax}	−0.3 to +7.0	V _{dc}
Storage Temperature	T _{stg}	−40 to +105	°C
Operating Temperature(6)	T _A	−40 to +85	°C

OPERATING CHARACTERISTICS (V_S = 5.0 V_{dc}, T_A = 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 _S	4.75	5.0	5.25	V
Supply Current	I _O	—	5.0	7.0	mA
Full Scale Output Range	V _{FSO}	0.3	—	V _S − 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 _{off}	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 _{pk}
Self-Test Output Equivalent (5)	G _S	20	25	30	g
Self-Test Input Low	V _{STL}	—	—	1.6	V
Self-Test Input High	V _{STH}	3.4	—	—	V
Self-Test Input Current	—	10	70	200	μA

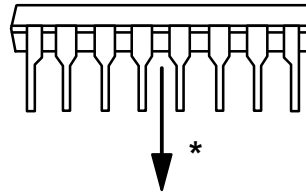
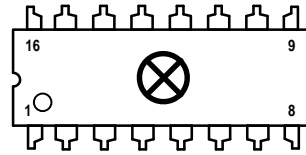
NOTES:

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_S = 5.0 V, a +20g input will result in a 3.3 V output. (V_{output} = 2.5 + 0.040 × 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: $V_{\text{off}}(V_S) = V_{\text{off}}(5\text{ V}) \times (V_S/5\text{ V})$.
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
MMAS40G10D	−40 to +85°C	Case 648C−03	Plastic DIP

POSITIVE ACCELERATION SENSING DIRECTION



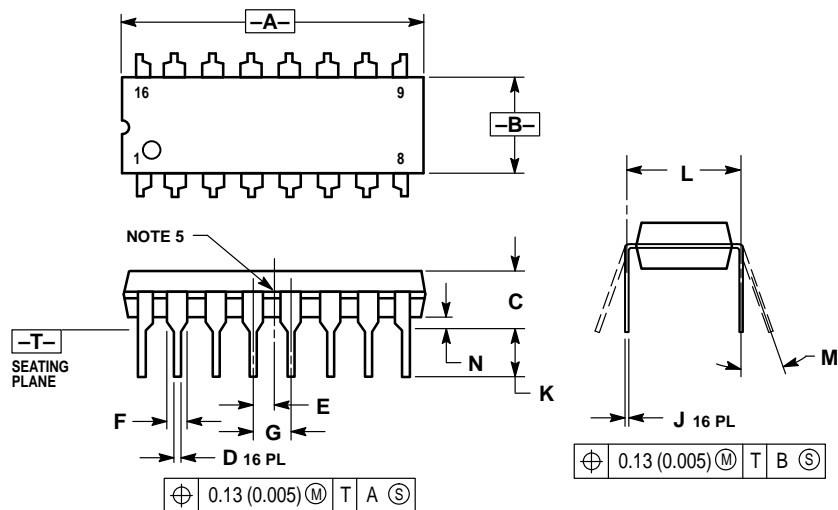
DIP PACKAGE

* When positioned as shown, gravity will result in a positive 1g output

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MMAS40G10D

PACKAGE DIMENSIONS



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. INTERNAL LEAD CONNECTION BETWEEN 4 AND 5, 12 AND 13.

CASE 648C-03 ISSUE C DIP PACKAGE

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