

NAC Series Silicon Accelerometers

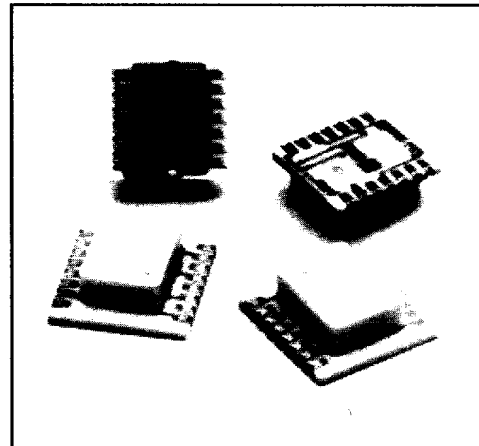
Ceramic Packages

APPLICATIONS

- Automotive: smart suspension, crash sensing, air bag systems, & anti-lock braking
- Consumer appliances
- Earthquake monitoring
- Biomedical instruments
- Computer peripherals
- Military arming and fusing

FEATURES

- Low cost, miniature size
- Available ranges: $\pm 2g$ & $\pm 50g$
(consult factory for additional ranges)
- Similar electrical performance to NAH Series accelerometers;
 - Nonlinearity < 0.25% FSO typical
 - Cross-axis sensitivity < 3% FSO maximum
- Self-test feature included on $\pm 50g$ devices; 5g at 5 VDC and 50g at 12 VDC
(consult factory for other ranges available with self-test feature)
- Output signal of up to 60mV FSO with 2.0mA excitation
- Integral offset and temperature compensated from -30 to $+85^{\circ}\text{C}$
- Maximum acceleration limit of 2000g in all three axes.



DESCRIPTION

Cost-effective ceramic package and thick-film circuit technology enables the Lucas NovaSensor NAC Series piezoresistive accelerometers to be particularly suitable for high volume OEM applications including automotive crash sensing, anti-lock braking systems (ABS), and automotive suspension control. Chip-on-ceramic technology utilizes automated batch fabrication and assembly as well as computer-aided thick-film laser-trim to reduce costs. As with all Lucas NovaSensor silicon sensors, the NAC Series accelerometer uses SenStable® processing technology for excellent signal stability over time. The NAC Series provides the same performance benefits offered by the NAH Series accelerometers such as built-in damping, Silicon Fusion Bonding, and 2000g over range protection.

NAC Series

Silicon Accelerometers — Ceramic Packages

T-65-13

OPERATING
CHARACTERISTICS

PARAMETER	VALUE	UNITS	NOTES
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GENERAL

Acceleration Range	NAC-101, -103	± 2	g	$0 \pm 2g$
	NAC-201, -203	± 50	g	$0 \pm 50g$
Acceleration Limits		2000	g	any direction

ELECTRICAL @ 2mA, 25°C (77°F) unless otherwise stated

Input Excitation		2.0	mA	3.0mA max.
Input Impedance	NAC-101, -201	2000	Ω	$\pm 25\%$
	NAC-103, -203	1300	Ω	$\pm 25\%$
Output Impedance		2000	Ω	$\pm 25\%$
Bridge Impedance		2000	Ω	$\pm 25\%$

ENVIRONMENTAL

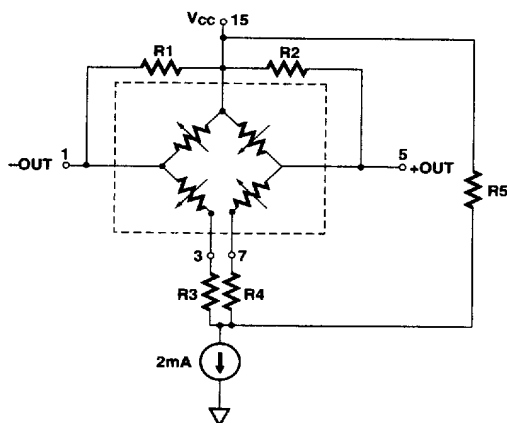
Temperature Range				
Operating ⁽⁹⁾		-40 to +100	°C	-40° to +212°F
Compensated		-30 to +85	°C	-22° to +185°F

Performance ⁽¹⁾		$\pm 2g$			$\pm 50g$			Notes
Parameter	Units	Min.	Typ.	Max.	Min.	Typ.	Max.	
Zero Acceleration Output								
NAC-101, -201	mV	-40	0	40	-40	0	40	
NAC-103, -203	mV	-2	± 1	2	-2	± 1	2	
Full Scale Output								
NAC-101, -201	mV	12	20	28	50	75	100	
NAC-103, -203	mV	8	12	16	30	45	60	
Nonlinearity	%FSO	-0.5	± 0.25	0.5	-0.5	± 0.25	0.5	
Frequency Response	Hz	200			500			
Mounted Resonant Frequency	Hz	400	600		1000	1500		
Damping Ratio		0.4	0.7	1.0	0.4	0.7	1.0	
Vibration Rectification	mg/g ²		± 1.5			± 0.15		2
Cross-axis Sensitivity	%FSO	-3	± 1	3	-3	± 1	3	3
Thermal Accuracy of Offset								
NAC-101, -201	%FSO		± 3			± 3		4
NAC-103, -203	%FSO			4	-4		4	5
Thermal Accuracy of FSO								
NAC-101, -201	%FSO		± 1			± 1		4
NAC-103, -203	%FSO	-2		2	-2		2	5
Thermal Hysteresis	%FSO		± 0.5			± 0.5		6
Self-Test Output	g	—	—	—	4	5	6	7
Short-Term Stability of Offset								
NAC-101, -201	μV		± 20			± 20		8
NAC-103, -203	μV		± 15			± 15		8

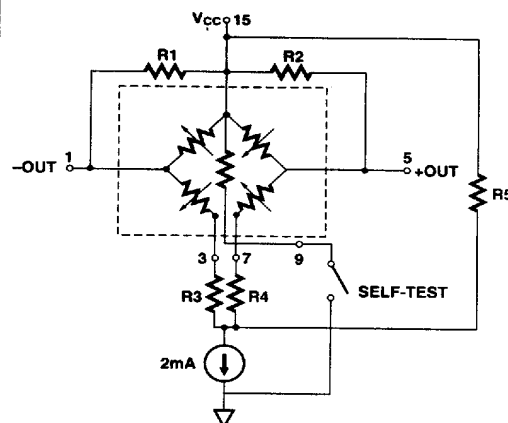
- Notes:
1. All values measured in reference to 25°C and 2mA constant current, unless otherwise noted.
 2. Offset shift under constant AC vibration.
 3. When mounted at specified angle of 9.7° (edge of pins 1 through 7 raised with respect to opposite edge).
 4. Dependent upon compensation method. When compensated using supplied resistor values and constant current excitation, thermal accuracy will be similar to the corresponding NAC-103 and NAC-203 Series accelerometers.
 5. Between -30 and +85°C reference to 25°C.
 6. -30° to 85°C.
 7. With 5 VDC actuation voltage.
 8. Normalized offset/bridge voltage — 100 hrs.
 9. Reduced performance outside compensation range.

NAC Series**Silicon Accelerometers — Ceramic Packages**

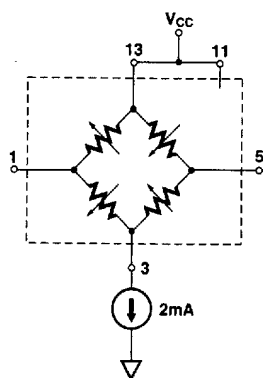
T-65-13

**SCHEMATIC
DIAGRAMS****NAC-101**

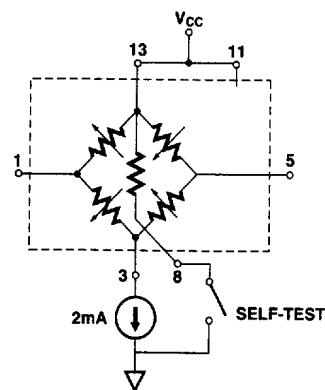
Note: A. Pin #15 connected to chip substrate.
B. R1 - R5 values supplied with sensor.

NAC-201 with Self-test Circuit

Note: A. Pin #15 connected to chip substrate.
B. R1 - R5 values supplied with sensor.
C. Self-test switch should be closed for 50msec, then output read.

NAC-103

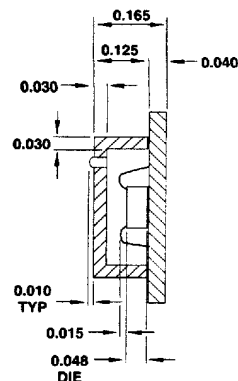
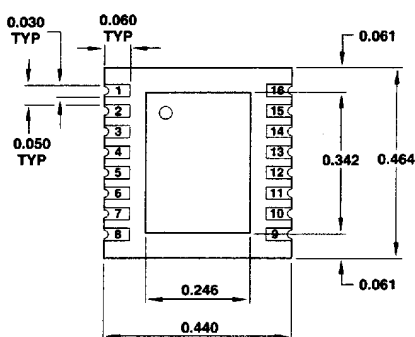
Note: A. Pin #13 connected to chip substrate.
B. Pins #11 and #13 must be shorted together by customer.

NAC-203 with Self-test Circuit

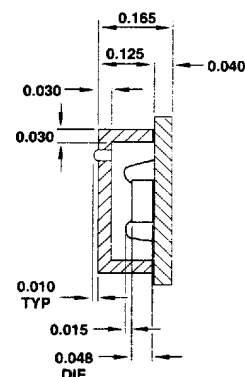
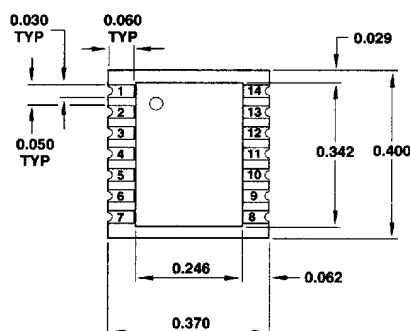
Note: A. Pin #13 connected to chip substrate.
B. Pins #11 and #13 must be shorted together by customer.
C. Self-test switch should be closed for 50msec, then output read.

NAC Series**Silicon Accelerometers — Ceramic Packages****T-65-13****PACKAGE****NAC-101, -201**

PIN	FUNCTION
1	- OUTPUT
2	NC
3	- EXCITATION B
4	NC
5	+ OUTPUT
6	NC
7	- EXCITATION A
8	NC
9	SELF-TEST ^(B)
10	NC
11	NC
12	NC
13	NC
14	NC
15	+ EXCITATION
16	NC

**NAC-103, -203**

PIN	FUNCTION
1	- OUTPUT
2	NC
3	- EXCITATION
4	NC
5	+ OUTPUT
6	NC
7	NC
8	SELF-TEST ^(C)
9	NC
10	NC
11	+ EXCITATION
12	NC
13	+ EXCITATION
14	NC



- Notes:
- A. All dimensions shown in inches.
 - B. Pin #9 is not to be connected on the NAC-101.
 - C. Pin #8 is not to be connected on the NAC-103.

ORDERING

N A C - 101

NovaSensor _____

Acceleration _____

Type = Ceramic _____

Acceleration Range

- 101 = $\pm 2g$ without compensation
- 103 = $\pm 2g$ with compensation
- 201 = $\pm 50g$ without compensation
- 203 = $\pm 50g$ with compensation

Sales Terms: Lucas NovaSensor standard sales terms apply. Prices and specifications are subject to change without notice.

Warranty: Lucas NovaSensor warrants its products against defects in material and workmanship for 12 months from date of shipment. Products not subjected to misuse will be repaired or replaced. THE FOREGOING IS IN LIEU OF ANY OTHER EXPRESSED OR IMPLIED WARRANTIES. Lucas NovaSensor reserves the right to make changes to any product herein and assumes no liability arising out of the application or use of any product or circuit described or referenced herein.

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