Honeywell

SENSOR PRODUCTS

Advance Information

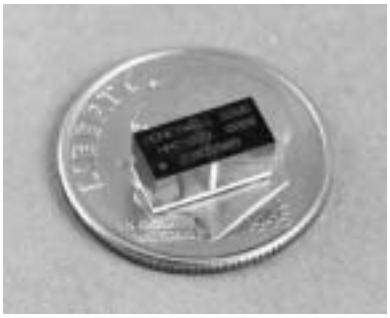
Three-Axis Magnetoresistive Sensor

HMC1023

APPLICATIONS

- Compassing
- Navigation Systems
- Attitude Reference
- Virtual Reality
- Traffic Detection
- Proximity Detection
- Medical Devices

Not actual size

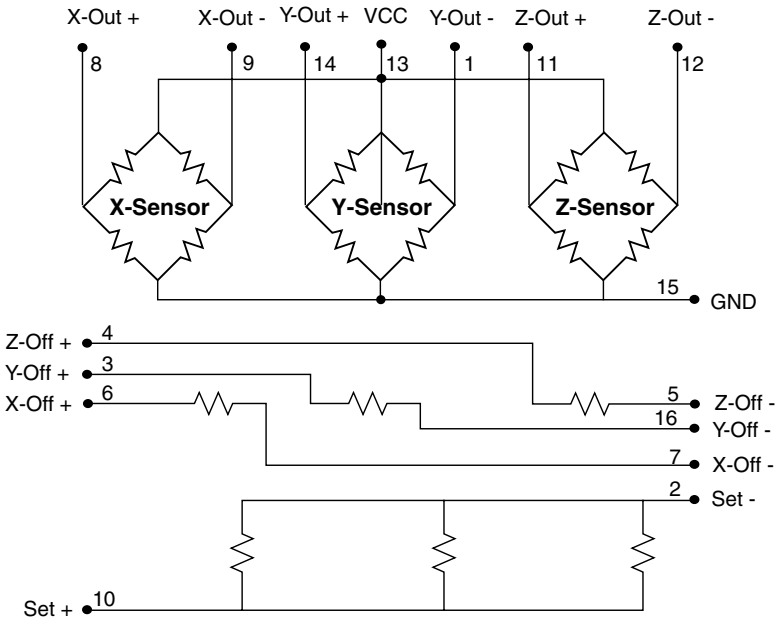


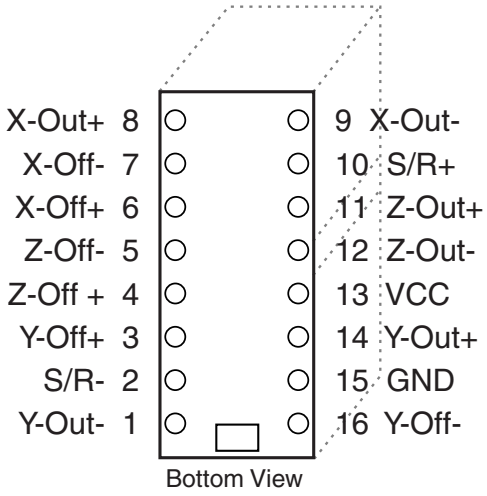
Configured as three magnetoresistive sensors in x, y and z orientation, these highly sensitive sensors convert all three magnetic field axes to a differential output voltage. This new addition to our line of magnetoresistive sensors is smaller, uses less power and is ideal for applications that require orthogonal three-axis sensing.

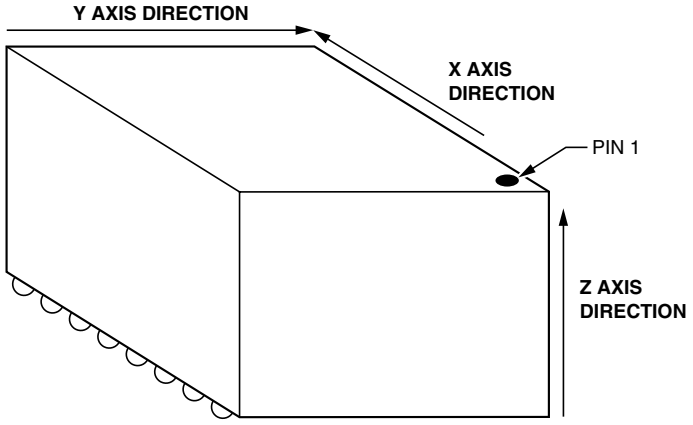
FEATURES AND BENEFITS

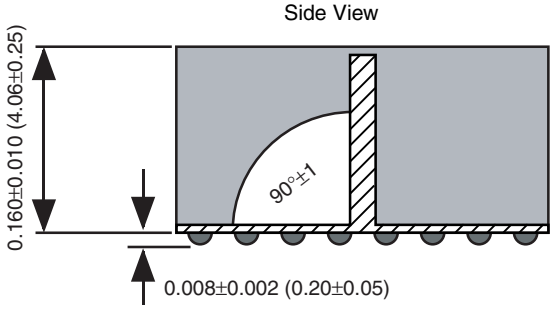
Wide Field Range	Field range of ±6 gauss, (earth's field = 0.5 gauss) while maintaining high sensitivity with a minimal detectable field down to 85 µgauss.
Small Package	Designed to work as a single stand alone three-axis (x,y,z) magnetoresistive sensing system. Custom Ball Grid Array (BGA), 1mm pitch, 16-pin miniature package provides a small footprint and accurate sensor placement for orthogonal three-axis sensing applications.
Solid State	This small device reduces board assembly costs, improves reliability and ruggedness compared to mechanical fluxgates.
Low Power	The patented on-chip set/reset and offset straps have been improved and now require 50% less power to drive the set-reset and offset functions. This sensor can be operated with a 3 to 25 volt power supply, lowering power consumption and reducing support circuitry.
Cost Effective	The sensors were specifically designed to be affordable for high volume OEM applications.

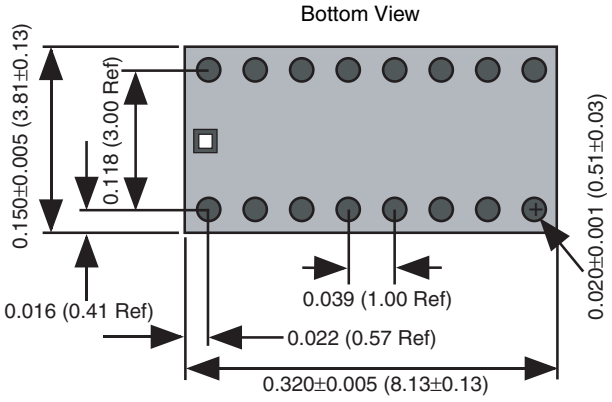
MR SENSOR CIRCUIT / PINOUT SPECIFICATIONS







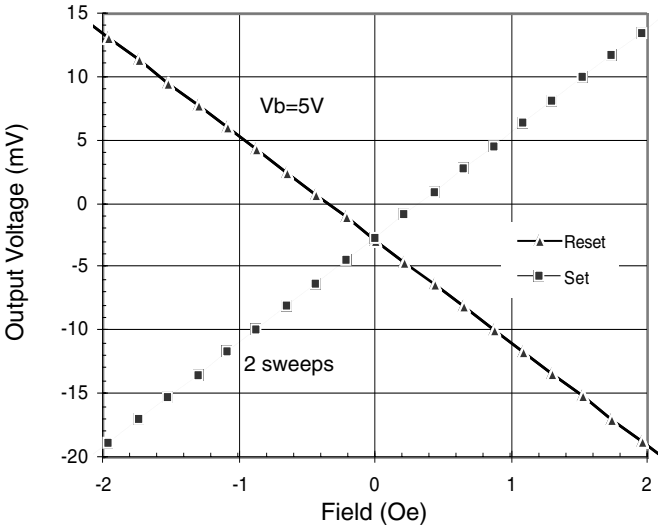




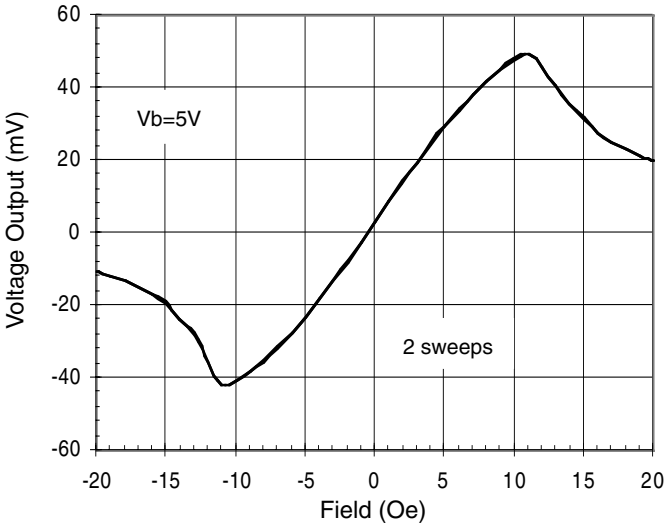
(millimeters)

KEY PERFORMANCE DATA

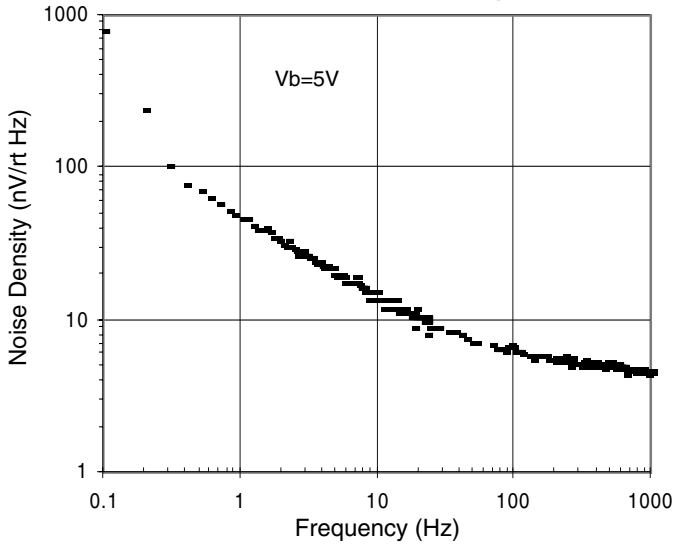
Sensor output vs magnetic field
after being set or reset



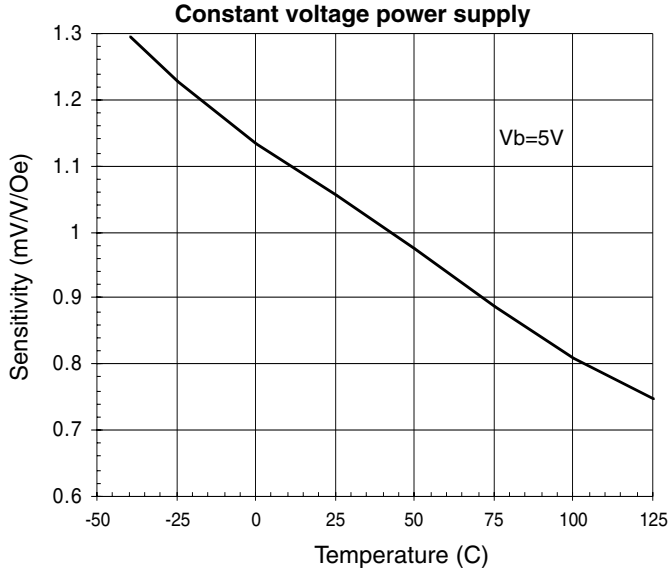
Sensor output vs magnetic field
Output is repeatable in field range ±20 Oe



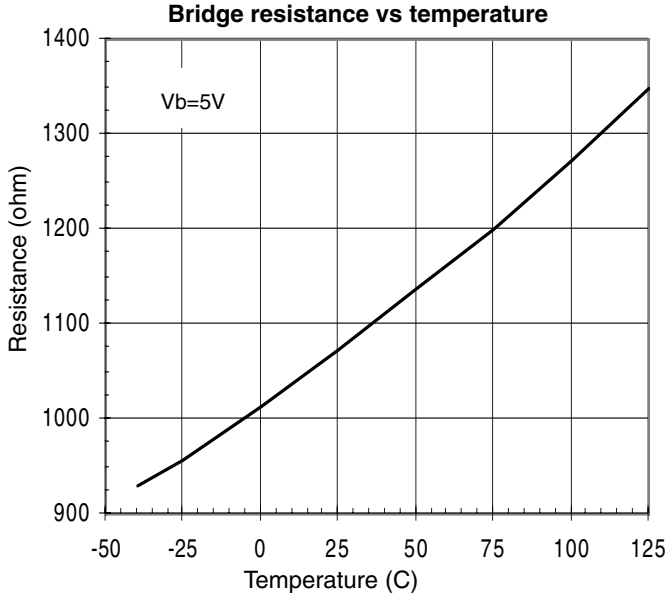
Sensor noise vs frequency



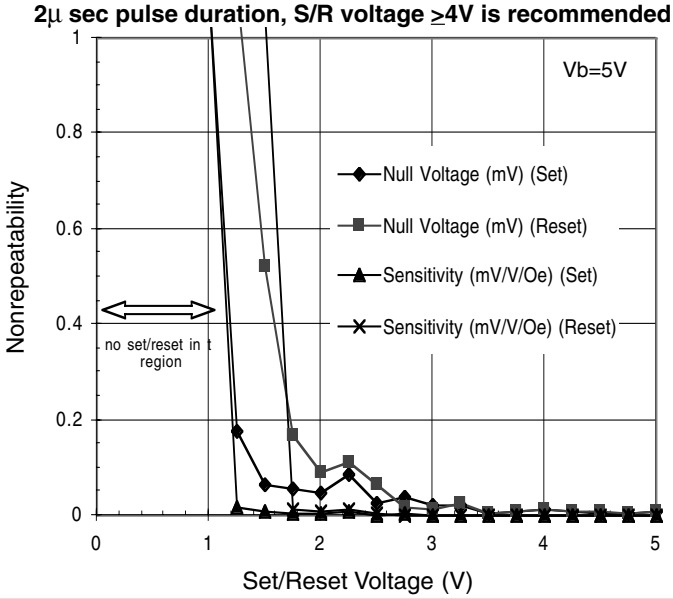
Sensitivity vs temperature
Constant voltage power supply



Bridge resistance vs temperature



Effects of set/reset pulse variation
2μ sec pulse duration, S/R voltage ≥4V is recommended



SPECIFICATIONS

Characteristic	Conditions	Min	Typ	Max	Unit
Bridge Supply	Vbridge referenced to GND	3	5	12	Volts
Bridge Resistance	Bridge current = 5mA	250	350	450	Ω
Operating Temperature	Ambient	-40		125	° C
Storage Temperature	Ambient, unbiased	-55		125	° C
Field Range	Full scale (FS) — total applied field	-6		+6	gauss
Linearity Error	Best fit straight line (at 25° C) ±1 gauss ±3 gauss ±6 gauss		0.05 0.4 1.6		%FS
Three-Axis Orthogonality	Angle from 90°		±1		degrees
Hysteresis Error	3 sweeps across ±3 gauss @ 25° C		0.08		%FS
Repeatability Error	3 sweeps across ±3 gauss @ 25° C		0.08		%FS
Bridge Offset	Offset = (OUT+) - (OUT-), Field=0 gauss after Set pulse, Vbridge=5V	-10	±2.5	+10	mV
Sensitivity	At Vbridge=5V	0.8	1.0	1.2	mV/V/gauss
Noise Density	Noise at 1Hz, Vbridge=5V		48		nV/√Hz
Resolution	Bandwidth=10Hz, Vbridge=5V		85		μgauss
Bandwidth	Magnetic signal (lower limit = DC)		5		MHz
OFFSET Strap	Measured from OFFSET+ to OFFSET-	40	50	60	Ω
OFFSET Strap ΩTempco	TA=-40 to125° C		3900		ppm/° C
OFFSET Field	Field applied in sensitive direction	4.0	4.6	6.0	mA/gauss
Set/Reset Strap (1)	Measured from S/R+ to S/R-	2.0	3.0	4.0	Ω
Set/Reset Current (1)	2μS current pulse	1.5	2.0	4.0	Amp
Disturbing Field	Sensitivity starts to degrade. Use S/R pulse to restore sensitivity.	20			gauss
Sensitivity Tempco	TA=-40 to 125° C Vbridge=5V Ibridge=5mA	-2800	-3000 -600	-3200	ppm/° C
Bridge Offset Tempco	TA=-40 to 125° C no Set/Reset Ibridge=5mA with Set/Reset		±500 ±10		ppm/° C
Resistance Tempco	Vbridge=5V, -40 to 125° C		2500		ppm/° C
Cross-Axis Effect	Cross field=1gauss (see AN-205) Happlied=±1 gauss		+0.3		%FS
Max. Exposed Field	No perming effect on zero reading			200	gauss

(1) Three in parallel.

Units: 1 gauss (G) = 1 Oersted (in air), 1G = 79.58 A/m,
1G = 10E-4 Tesla, 1G = 10E5 gamma