

APPLICATIONS

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

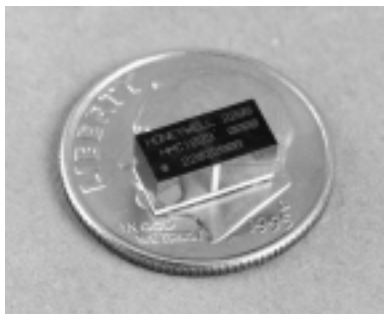
Three-Axis Magnetoresistive Sensor

HMC1023



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 μ gauss.

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.

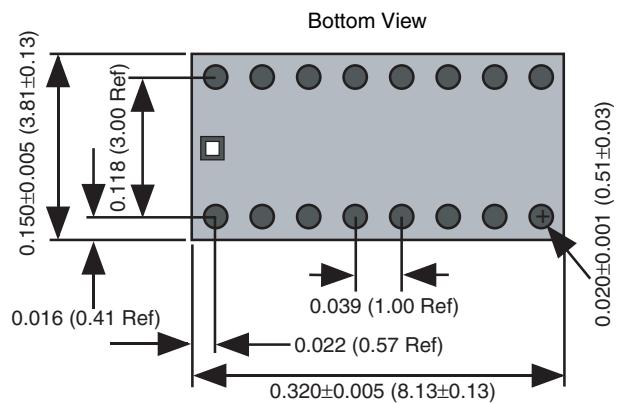
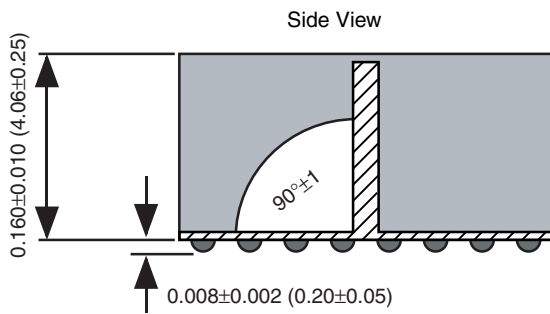
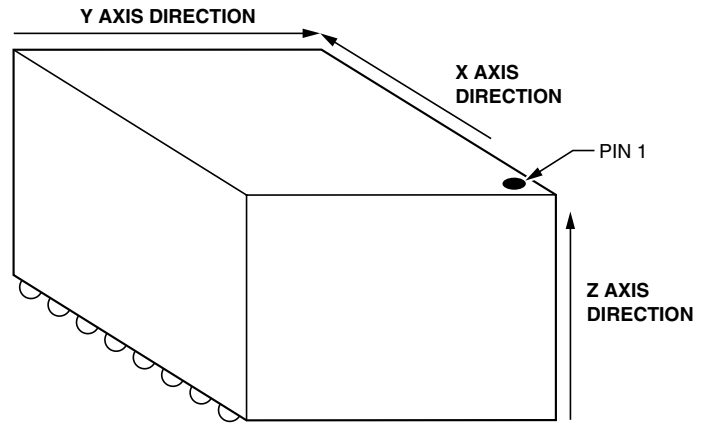
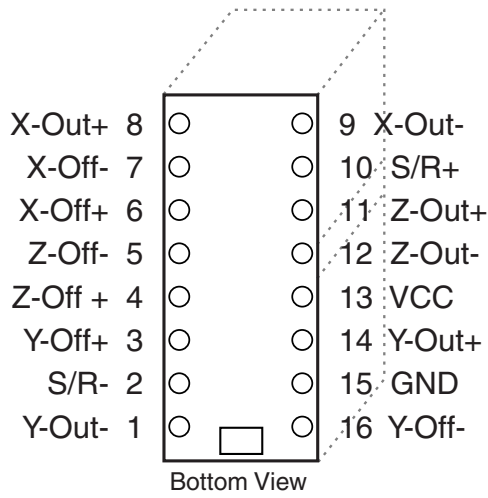
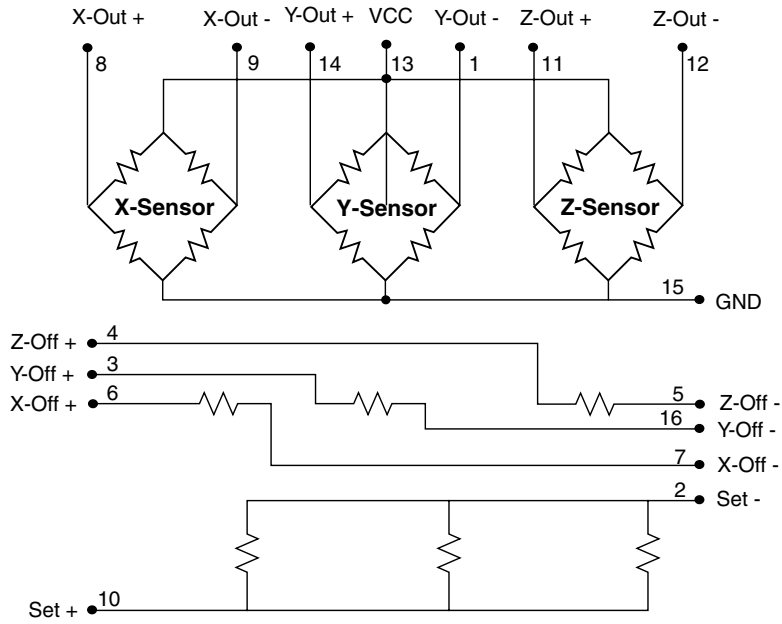
Solid State This small device reduces board assembly costs, improves reliability and ruggedness compared to mechanical fluxgates.

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.

HMC1023

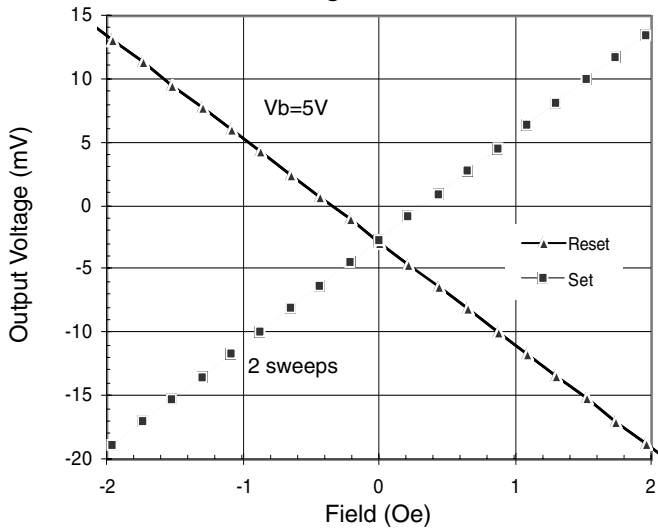
MR SENSOR CIRCUIT / PINOUT SPECIFICATIONS



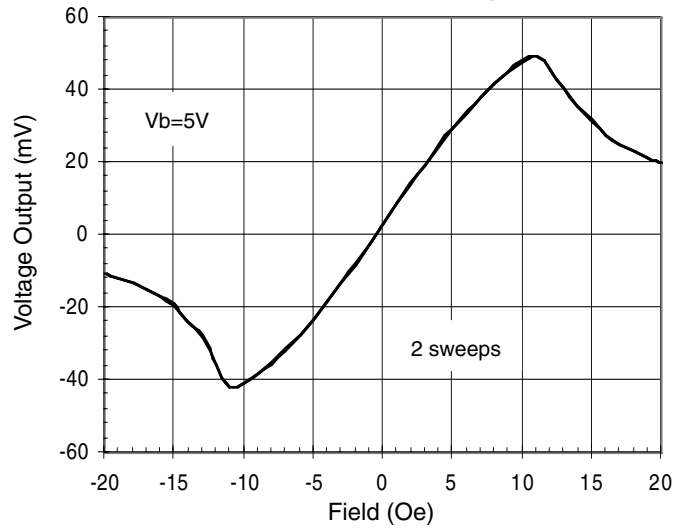
(millimeters)

KEY PERFORMANCE DATA

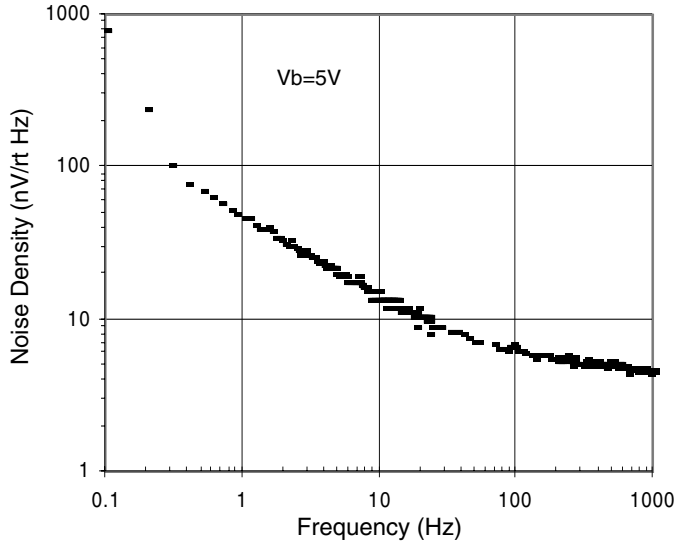
Sensor output vs magnetic field after being set or reset



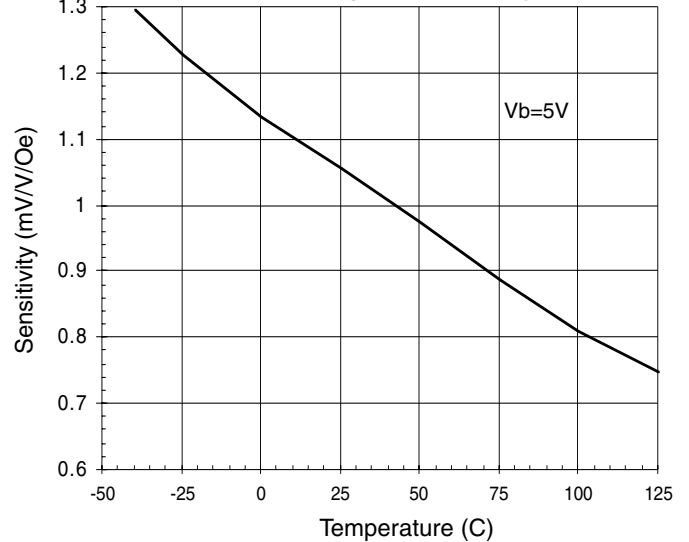
Sensor output vs magnetic field
Output is repeatable in field range ± 20 Oe



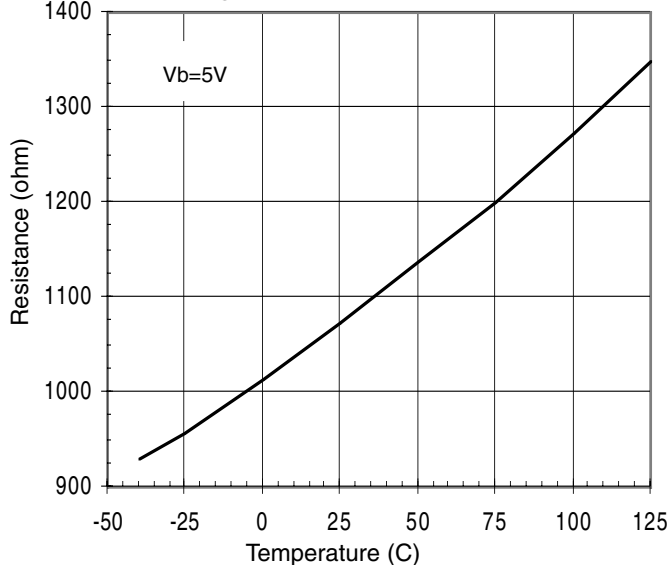
Sensor noise vs frequency



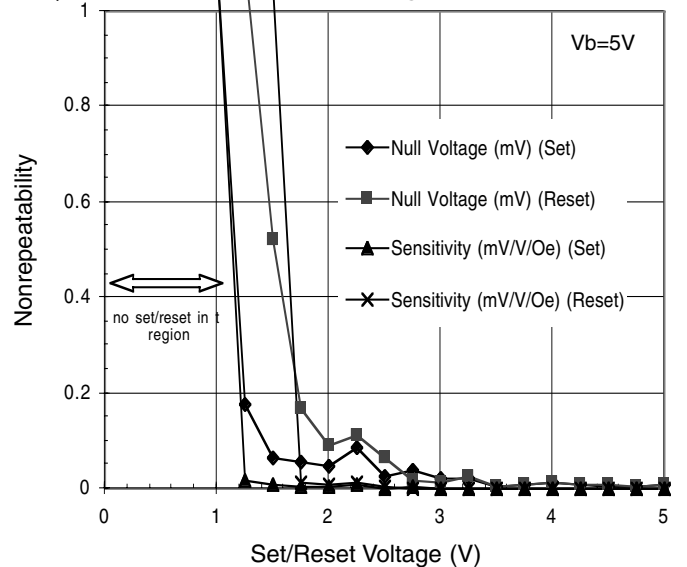
Sensitivity vs temperature
Constant voltage power supply



Bridge resistance vs temperature



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



SPECIFICATIONS

| Characteristic | Conditions | Min | Typ | Max | Unit |
|--------------------------|--|----------------------------------|--------------------|-------|------------|
| Bridge Supply | V _{bridge} 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, V _{bridge} =5V | -10 | ±2.5 | +10 | mV |
| Sensitivity | At V _{bridge} =5V | 0.8 | 1.0 | 1.2 | mV/V/gauss |
| Noise Density | Noise at 1Hz, V _{bridge} =5V | | 48 | | nV/√Hz |
| Resolution | Bandwidth=10Hz, V _{bridge} =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 | T _A =-40 to 125° 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 | T _A =-40 to 125° C V _{bridge} =5V I _{bridge} =5mA | -2800 | -3000 -600 | -3200 | ppm/° C |
| Bridge Offset Tempco | T _A =-40 to 125° C Set/Reset I _{bridge} =5mA | | no ±500 ±10 | | ppm/° C |
| Resistance Tempco | V _{bridge} =5V, -40 to 125° C | | 2500 | | ppm/° C |
| Cross-Axis Effect | Cross field=1gauss (see AN-205) H _{applied} =±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

Honeywell reserves the right to make changes to any products or technology herein to improve reliability, function or design. Honeywell does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights nor the rights of others.