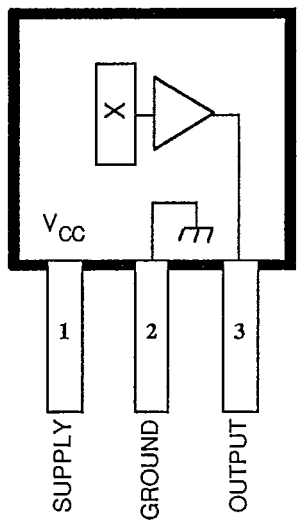
T-65-05

3503

RATIOMETRIC, LINEAR HALL EFFECT SENSORS



Dwg. PH-006

Pinning is shown viewed from branded side.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} . . . . . **8 V**
Magnetic Flux Density, B . . . . . **Unlimited**
Operating Temperature Range, T_A
UGN3503U/UA. . . . . **-20°C to +85°C**
UGS3503U/UA . . . . . **-40°C to +125°C**
Storage Temperature Range,
T_S . . . . . **-65°C to +150°C**

Type UGN3503U/UA and UGS3503U/UA Hall effect sensors accurately track extremely small changes in magnetic flux density—changes generally too small to operate Hall effect switches.

As motion detectors, gear tooth sensors, and proximity detectors, they are magnetically driven mirrors of mechanical events. As sensitive monitors of electromagnets, they can effectively measure a system's performance with negligible system loading while providing isolation from contaminated and electrically noisy environments.

Each Hall effect integrated circuit includes a Hall sensing element, linear amplifier, and emitter-follower output stage. Problems associated with handling tiny analog signals are minimized by having the Hall cell and amplifier on a single chip.

The UGN3503U and UGN3503UA are rated for continuous operation over the temperature range of -20°C to +85°C. The UGS3503U and UGS3503UA operate over an extended temperature range of -40°C to +125°C.

FEATURES

- Extremely Sensitive
- Flat Response to 23 kHz
- Low-Noise Output
- 4.5 V to 6 V Operation
- Magnetically Optimized Package

Always order by complete part number:

Part Numbers	Operating Temp.	Package
UGN3503U UGN3503UA	-20°C to +85°C	3-Pin Mini-SIP 3-Pin Ultra-Mini-SIP
UGS3503U UGS3503UA	-40°C to +125°C	3-Pin Mini-SIP 3-Pin Ultra-Mini-SIP

3503 RATIOMETRIC, LINEAR HALL-EFFECT SENSORS

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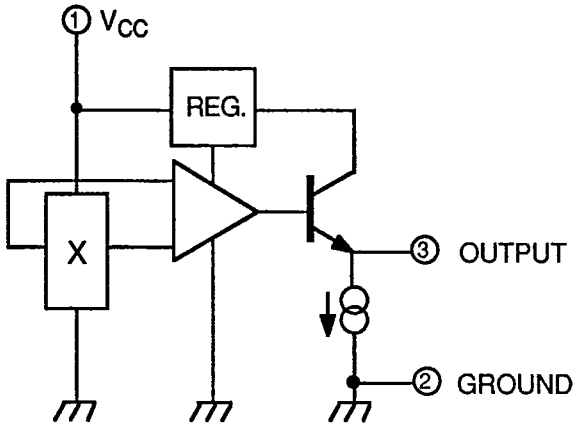
FUNCTIONAL BLOCK DIAGRAM



Dwg. FH-007

ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = 5 V

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Operating Voltage	V_{CC}		4.5	—	6.0	V
Supply Current	I_{CC}		—	9.0	14	mA
Quiescent Output Voltage	V_{OUT}	B = 0 G	2.25	2.50	2.75	V
Sensitivity	ΔV_{OUT}	B = 0 G to ±900 G	0.75	1.30	1.72	mV/G
Bandwidth (-3 dB)	BW		—	23	—	kHz
Broadband Output Noise	V_{out}	BW = 10 Hz to 10 kHz	—	90	—	μV
Output Resistance	R_{OUT}		—	50	—	Ω

All output-voltage measurements are made with a voltmeter having an input impedance of at least 10 kΩ.
Magnetic flux density is measured at most sensitive area of device located 0.016" ±0.002" (0.41 mm ±0.05 mm) below the branded face of the 'U' package.

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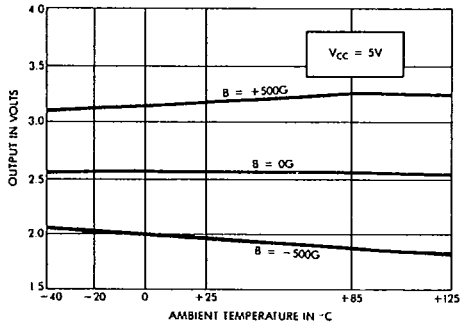
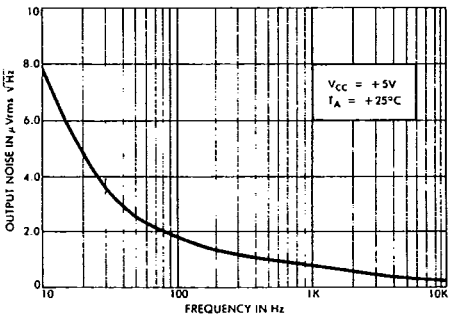
OUTPUT VOLTAGE AS A FUNCTION OF TEMPERATURE



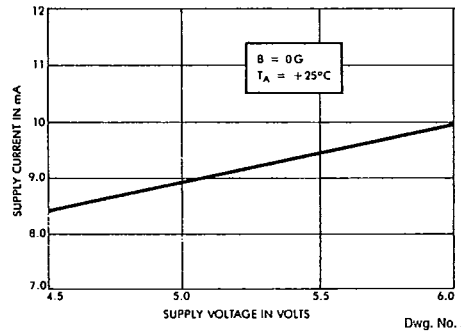
Dwg. No. A-12,573

OUTPUT NOISE AS A FUNCTION OF FREQUENCY



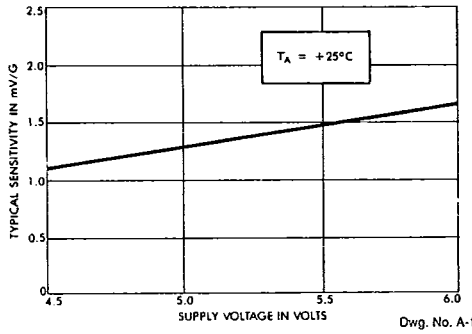
Dwg. No. A-12,505

SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



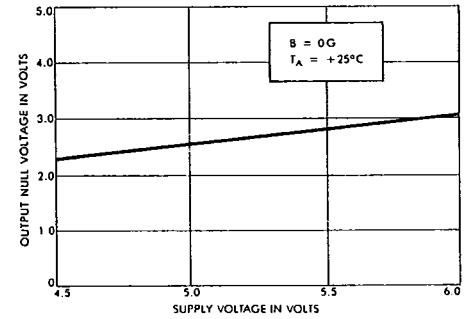
Dwg. No. A-12,506

DEVICE SENSITIVITY AS A FUNCTION OF SUPPLY VOLTAGE



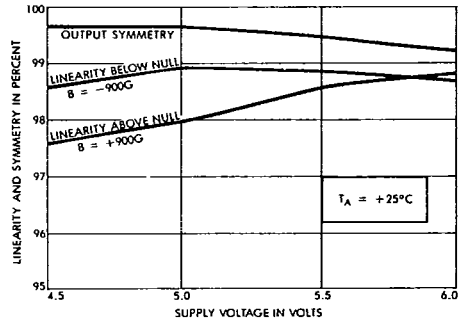
Dwg. No. A-12,507

OUTPUT NULL VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE



Dwg. No. A-12,508

LINEARITY AND SYMMETRY AS A FUNCTION OF SUPPLY VOLTAGE



Dwg. No.. A-12,509

3503
RATIOMETRIC, LINEAR HALL EFFECT SENSORS

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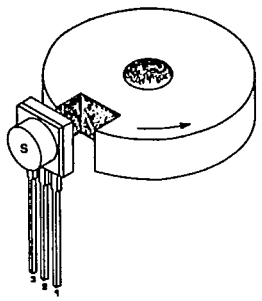
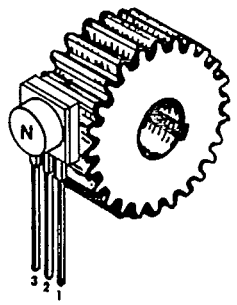
NOTCH SENSOR



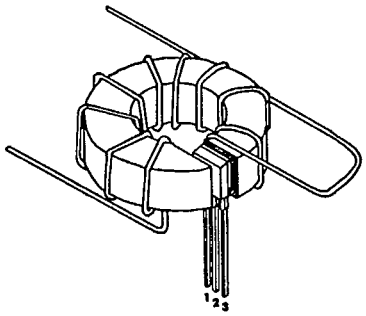
Dwg. No. A-12,574

GEAR TOOTH SENSOR



Dwg. No. A-12,512

CURRENT MONITOR



Dwg. No. A-12,513

OPERATION

The output null voltage (B = 0 G) is nominally one-half the supply voltage. A south magnetic pole, presented to the branded face of the Hall effect sensor will drive the output higher than the null voltage level. A north magnetic pole will drive the output below the null level.

In operation, instantaneous and proportional output-voltage levels are dependent on magnetic flux density at the most sensitive area of the device. Greatest sensitivity is obtained with a supply voltage of 6 V, but at the cost of increased supply current and a slight loss of output symmetry. The sensor's output is usually capacitively coupled to an amplifier that boosts the output above the millivolt level.

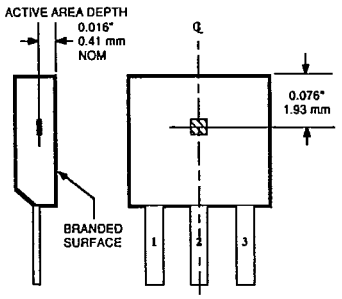
In two applications shown, a permanent bias magnet is attached with epoxy glue to the back of the epoxy package. The presence of ferrous material at the face of the package acts as a flux concentrator.

The south pole of a magnet is attached to the back of the package if the Hall effect IC is to sense the presence of ferrous material. The north pole of a magnet is attached to the back surface if the integrated circuit is to sense the absence of ferrous matrial.

Calibrated linear Hall devices, which can be used to determine the actual flux density presented to the sensor in a particular application, are available.

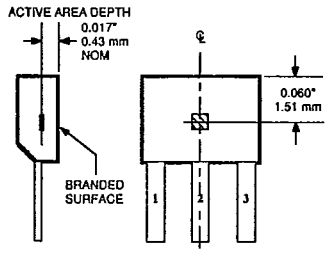
SENSOR LOCATIONS

SUFFIX "U"



Dwg. MH-002-5

SUFFIX "UA"



Dwg. MH-011-3