UGN-3503U AND UGS-3503U
RATIOMETRIC, LINEAR HALL EFFECT SENSORS

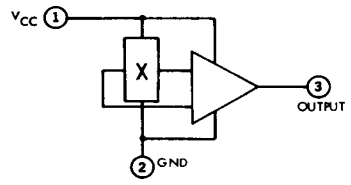
FEATURES

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

TYPE UGN-3503U AND UGS-3503U 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.



Dwg. No. A-12,538

FUNCTIONAL BLOCK DIAGRAM

The sensors are supplied in a three-pin plastic package only 61 mils (1.54 mm) thick. Type UGN-3503U is rated for continuous operation over the temperature range of −20°C to +85°C. Type UGS-3503U operates over an extended temperature range of −40°C to +125°C.

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ABSOLUTE MAXIMUM RATINGS

Supply Voltage, V_{CC} . . . . . 8 V
Magnetic Flux Density, B . . . . . Unlimited
Operating Temperature Range, T_A
UGN-3503U . . . . . −20°C to +85°C
UGS-3503U . . . . . −40°C to +125°C
Storage Temperature Range, T_S . . . . . −65°C to +150°C

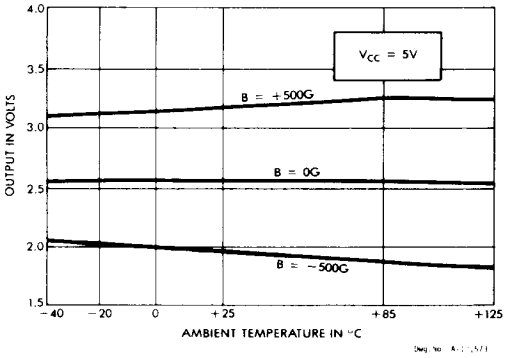
ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = 5 V

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 = 0G	2.25	2.50	2.75	V
Sensitivity	ΔV_{OUT}	B = 0G to ±900G	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

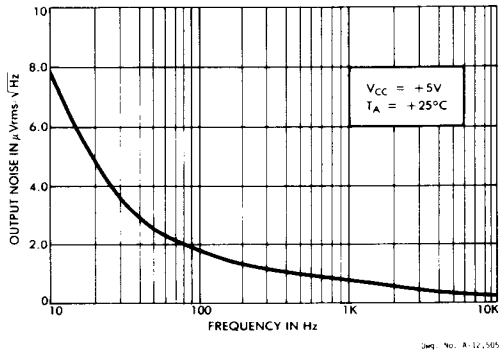
All output voltage measurements are made with a voltmeter having an input impedance of 10 kΩ.
Magnetic flux density is measured at the most sensitive area of the device located 0.017" ±0.001" (0.43 mm ±0.03 mm) below the branded face of the 'U' package.

These Hall Effect sensors are also supplied in a low profile "U" package. The low profile "U" is specified by substituting a "UA" for the last character of the part number.

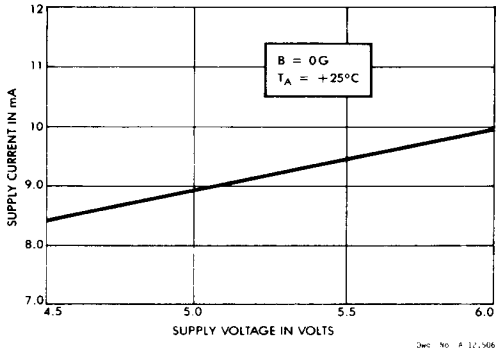
OUTPUT VOLTAGE AS A FUNCTION OF TEMPERATURE



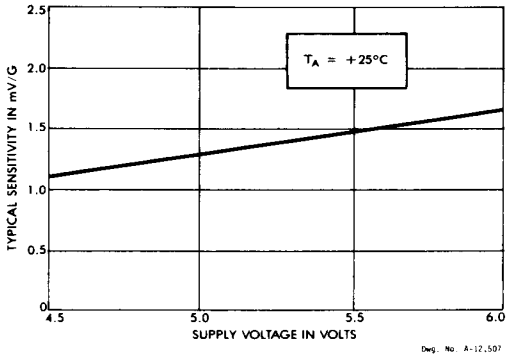
OUTPUT NOISE AS A FUNCTION OF FREQUENCY



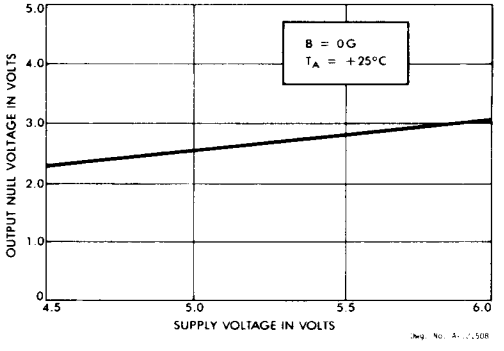
SUPPLY CURRENT AS A FUNCTION OF SUPPLY VOLTAGE



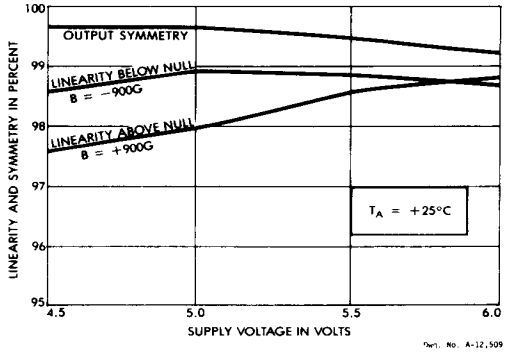
DEVICE SENSITIVITY AS A FUNCTION OF SUPPLY VOLTAGE



OUTPUT NULL VOLTAGE AS A FUNCTION OF SUPPLY VOLTAGE



LINEARITY AND SYMMETRY AS A FUNCTION OF SUPPLY VOLTAGE



OPERATION

The output null voltage (see preceding graph) is nominally one-half the supply voltage. A south magnetic pole, presented to the branded face of the Hall Effect sensor, will drive the ouput higher than the null voltage level. A north magnetic pole will drive the output below the null level.

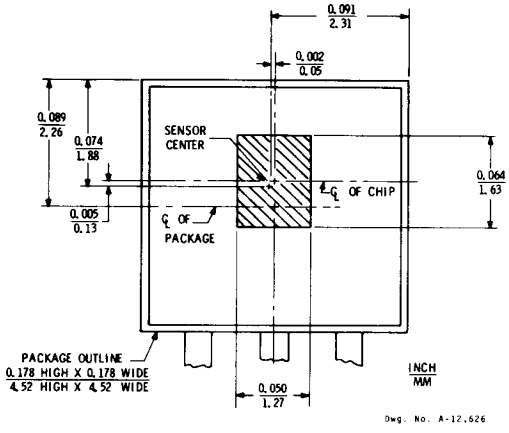
In operation, instantaneous and proportional output-voltage levels are dependent on magnetic flux density at the most sensitive area of the device. Greatest sensitivity is obtained with a supply voltage of 6 V, but at the cost of increased supply current and a slight loss of output symmetry. The sensor's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

In two applications shown below, 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 material.

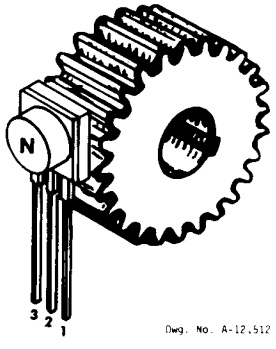
Calibrated linear Hall devices, which can be used to determine the actual flux density presented to the Type 3503 sensor in a particular application, are available from Hall Effect Applications Engineering, Sprague Electric Co., Concord, N.H.

SENSOR-CENTER LOCATION



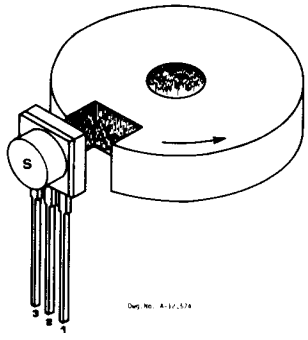
Dwg. No. A-12,626

GEAR TOOTH SENSOR

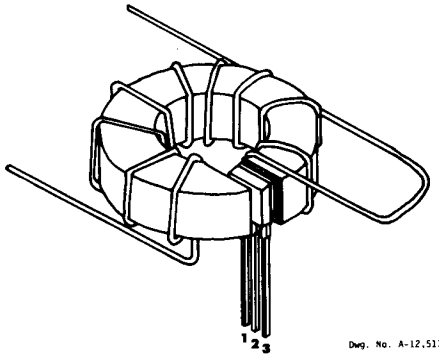


Dwg. No. A-12,512

NOTCH SENSOR



CURRENT MONITOR



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