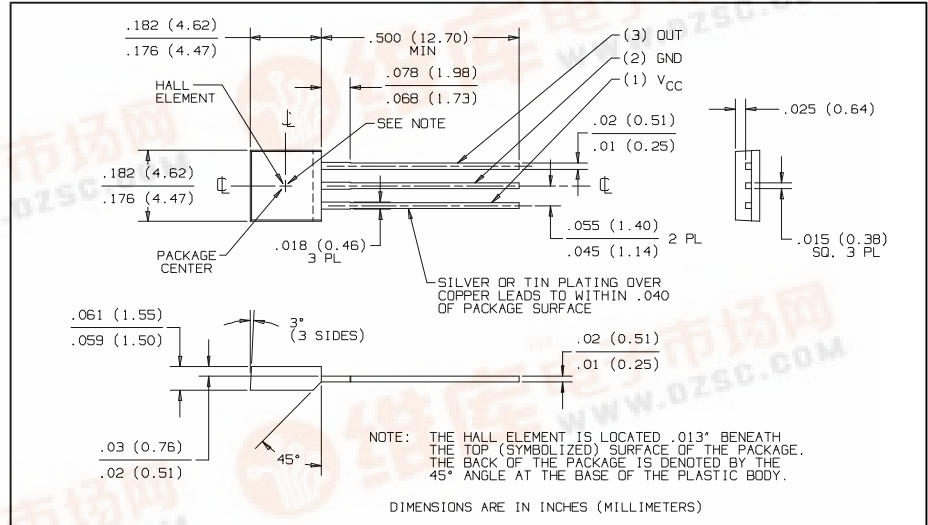
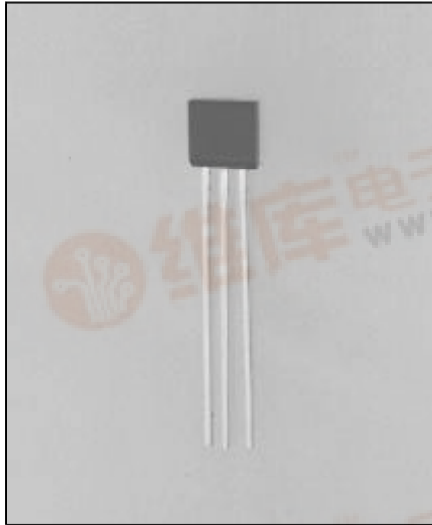


Product Bulletin OHS3150U/3151U
August 1999

Ratiometric Linear Hall Effect Sensor Types OHS3150U, OHS3151U



Features

- A ratiometric linear output capable of sinking and sourcing current
- 4.5 V to 6.0 V operation
- Responds equally to positive and negative magnetic field
- Excellent temperature stability to operate in harsh environments
- Robust package capable of withstanding harsh environments

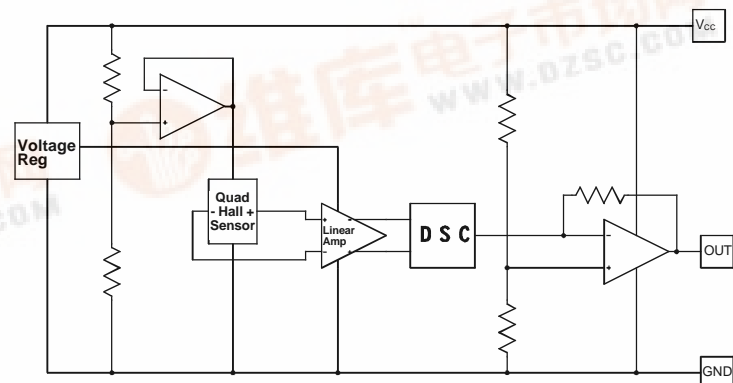
Absolute Maximum Ratings

Supply Voltage, V_{CC}	6 V
Storage Temperature Range, T_s	-65°C to +170°C
Operating Temperature Range, T_A (OHS prefix)	-40°C to +150°C
Lead Soldering Temperature (1/8 inch [3.2 mm] from case for 5 sec, with soldering iron)	260°C ⁽¹⁾
Power Dissipation, P_D	100 mW
Output Current, I_o	5 mA
Magnetic Flux Density, B	Unlimited

Description

The ratiometric linear Hall effect sensor each contain a monolithic integrated circuit on a single chip. The circuit incorporates a quadratic Hall sensing element which minimizes the effects of mechanical and thermal stress on the Hall element and temperature compensating circuitry to compensate for the inherent Hall element sensitivity change over temperature current. These ratiometric linear Hall effect sensors provide an output voltage that varies in proportion to the applied magnetic field. The voltage output will increase in response to a south pole (positive) magnetic field applied perpendicular to the package symbolization face, and decrease in response to a north pole (negative) magnetic field. These 3150U & 3151U ratiometric linear Hall effect sensors can be used as contactless sensors for rotary and linear position sensing and for current sensing. The devices in this series are similar in performance except for their allowable quiescent voltage output change over the specified operating temperature range.

Functional Block Diagram



DSC = Dual to Single Converter

Type OHS3150U, OHS3151U

Electrical Characteristics (Over Operating Temperature Range, at $V_{CC} = 5\text{ V}$, unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
V _{CC}	Supply Voltage	4.5	5.0	6.0	V	
I _{CC}	Supply Current		5.5	10	mA	V _{CC} = 6 V, I _O = 0 mA, B = OG
V _{OQ}	Quiescent Voltage Output	2.25	2.5	2.75	V	B = OG, T _A = 25° C
		2.10	2.5	2.90	V	B = OG
I _O	Sink Current	0.5			mA	
I _O	Source Current	-1.0			mA	

(1) Negative current is defined as coming out of (sourcing) the output.

Magnetic Characteristics (Over Operating Temperature, $V_{CC} = 5\text{ V}$, $I_0 = .5\text{ mA}$)

SYMBOL	PARAMETER	OHS3150U			OHS3151U			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
T _A	Operating Temperature Range	-40		150	-40		150	° C
Sens	Sensitivity @ T _A = 25° C over T _A	2.25 2.0	2.5	2.75 3.0	2.25 2.0	2.5	2.75 3.0	mV/G mV/G
ΔSens(ΔT)	Sens Change @ T _A > 25° C @ T _A < 25° C	-5 -12		10 3	-5 -12		10 3	% %
ΔV _{OQ} (ΔT)	V _{OQ} Change over T _A			±35			±50	G
ΔSens(ΔV)	Ratiometric Sens Change		100			100		%
ΔV _{OQ} (ΔV)	Ratiometric V _{OQ} Change		100			100		%
+Lin	Positive Lin ≥ 25 < 25	95 90		105 105	95 90		105 105	%
-Lin	Negative Lin ≥ 25 < 25	95 90		105 105	95 90		105 105	%
Sym	Output Symmetry	90	100	110	90	100	110	%

See characteristics definitions for test conditions and calculation formulas.

Type OHS3150U, OHS3151U

Characteristics Definitions

Quiescent Voltage Output: With no magnetic field present the device is in the quiescent state and the voltage output is approximately equal to one-half the supply voltage ($V_{OQ} \approx V_{CC}/2$) over the operating voltage and temperature range. The change in quiescent voltage output over temperature gives the device's equivalent accuracy and is specified in Gauss by the calculation.

$$\Delta V_{OQ(T)} = \frac{V_{OQ(TA)} - V_{OQ(25^{\circ}C)}}{Sens(25^{\circ}C)}$$

Sensitivity: A magnetic south pole at and perpendicular to the device's symbolized package face will increase the voltage output above the quiescent value. Conversely a magnetic north pole will decrease the voltage output below the quiescent value. This change in voltage output with applied magnetic field is sensitivity and is specified in mV/G by the calculation.

$$Sens = \frac{V_O(500G) - V_O(-500G)}{1000}$$

The change in sensitivity over temperature is specified in percent by the calculation

$$\Delta Sens(\Delta T) = \frac{Sens(TA) - Sens(25^{\circ}C)}{Sens(25^{\circ}C)} \times 100\%$$

Ratiometry: The quiescent voltage output and sensitivity of these ratiometric linear Hall effect devices are proportional to the supply voltage. The change in quiescent voltage output with supply voltage is specified in percent by the calculation.

$$\Delta V_{OQ(\Delta V)} = \frac{V_{OQ(VCC)} - V_{OQ(5V)}}{V_{CC}/5V} \times 100\%$$

The change in sensitivity with supply voltage is also specified in percent by the calculation

$$\Delta Sens(\Delta V) = \frac{Sens(VCC)/Sens(5V)}{V_{CC}/5V} \times 100\%$$

Linearity and Symmetry: The ability of the voltage output to vary in constant proportion to the applied magnetic field is linearity and is specified in percent by the calculation

$$\begin{aligned} + \text{ Lin} &= \frac{V_O(500G) - V_{OQ}}{2(V_O(250G) - V_{OQ})} \times 100\% \\ - \text{ Lin} &= \frac{V_O(-500G) - V_{OQ}}{2(V_O(-250G) - V_{OQ})} \times 100\% \end{aligned}$$

The output symmetry is also specified in percent by the calculation

$$Sym = \frac{V_O(500G) - V_{OQ}}{V_{OQ} - V_O(-500G)} \times 100\%$$