Unipolar Hall Switch Sensor XL542

Features

- Wide Operating Voltage Range: 3.3V~45V
- Low Quiescent Current : 1.5mA
- Device HBM ESD Classification Level Class3B
- Reverse Supply Protection
- 50mA Load Capacity
- SOT23-3 package
- Magnetic Field Operate Point : 70Gs
- Magnetic Field Release Point : 50Gs

Applications

- Docking detection and proximity sensing
- Door and window sensors
- Valve positioning
- Pulse counting

General Description

The XL542 is an unipolar Hall switch sensor that optimized for wide voltage, low quiescent current and wide temperature range. XL542 supports a power supply voltage of up to 50V and provide a load capacity of up to 50mA. Widely used in automotive electronics, industrial control and other applications. Adopting a collector open circuit output architecture, it has strong resistance to electromagnetic interference.

The XL542 integrates a reference voltage source, temperature compensation, Hall array, differential comparator, hysteresis latch, and power output stage, providing high magnetic field consistency, and strong immunity to electromagnetic interference over the full voltage range and full temperature range.

Typical application schematic

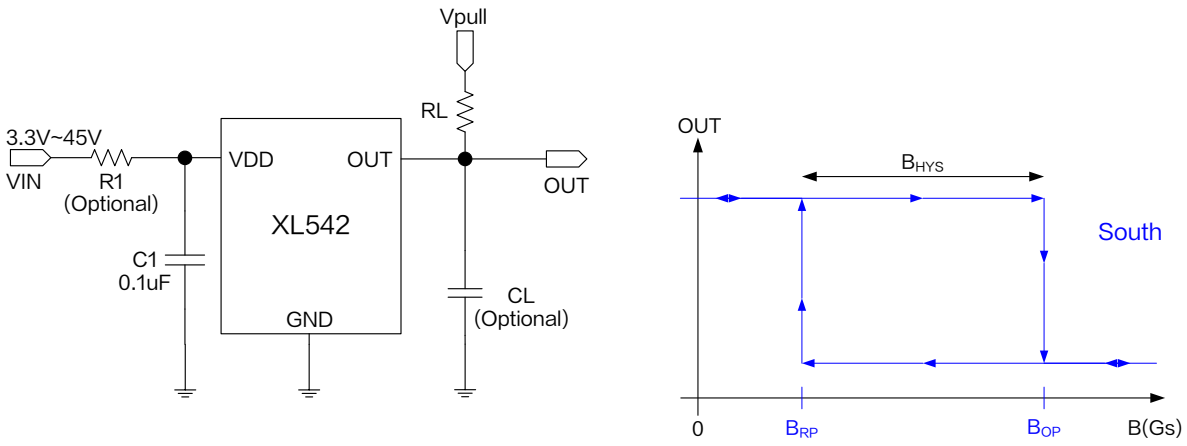


Figure1. XL542 Typical application schematic and output characteristic curve

Pin Configurations

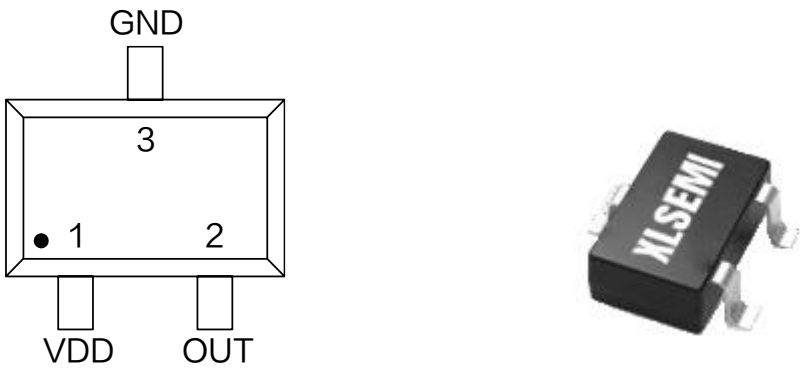


Figure2. Pin Configuration of XL542

Table 1 Pin Description

Pin Number	Pin Name	Description
1	VDD	Supply Voltage Input Pin. XL542 operates from 3.3V to 45V DC voltage.
2	OUT	Open Collector Output Pin, requires a resistor pull-up.
3	GND	Ground pin.

Ordering Information

Order Information	Marking ID	Package Type	Eco Plan	Packing Type Supplied As
XL542	XL542	SOT23-3	RoHS & HF	3000 Units Per Reel

Function Block

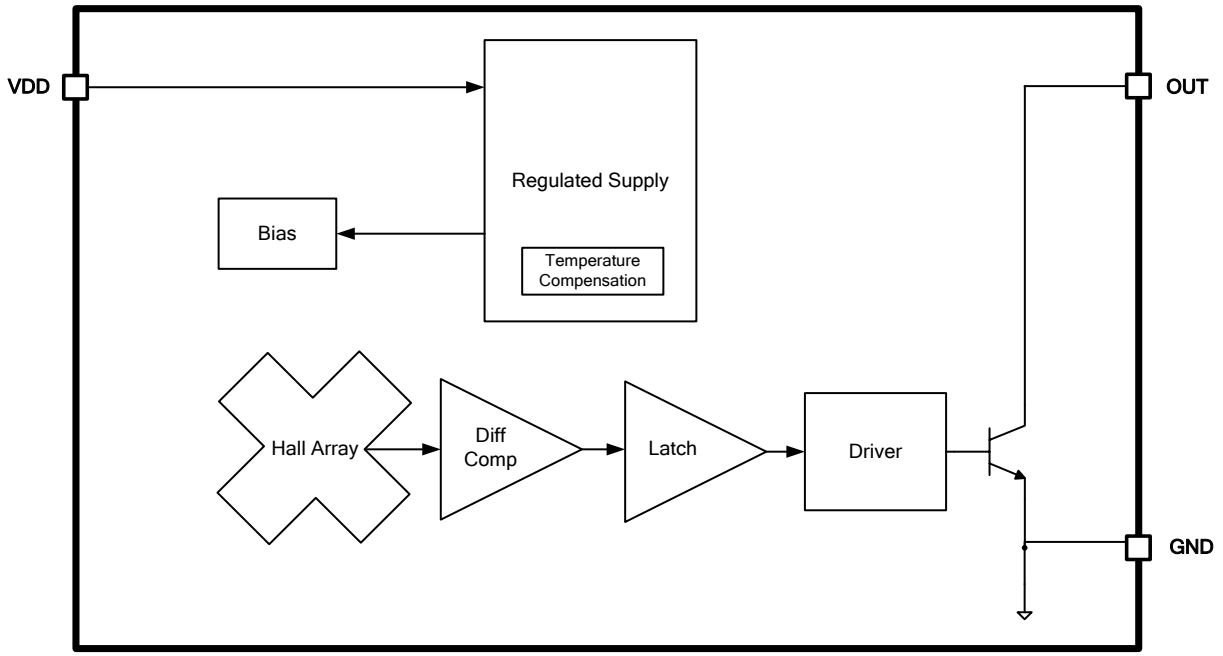


Figure3. Function Block Diagram of XL542

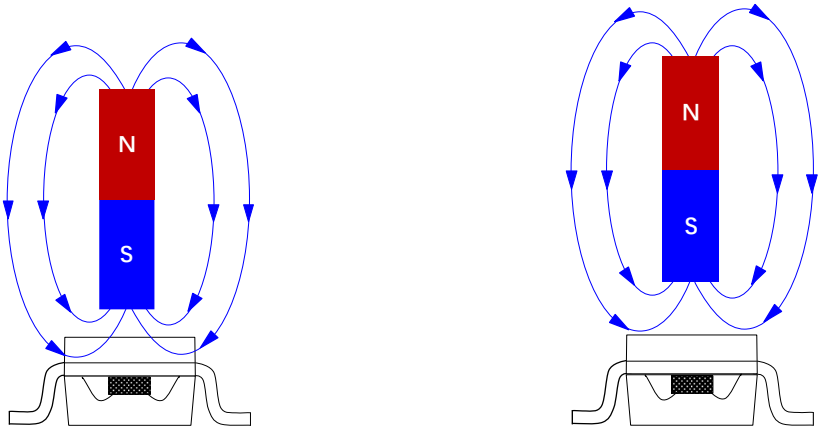


Figure4. Magnetic Field Direction Definition

Absolute Maximum Ratings（Note1）

Parameter	Symbol	Value	Unit
Input Voltage	V_{DD}	−50 ~ 50	V
Output Pin Voltage	V_{OUT}	−0.5 ~ 50	V
Output Pin Current Sink	I_{SINK}	0 ~ 50	mA
Thermal Resistance (SOT23−3) (Junction to Ambient, No Heatsink, Free Air)	R_{JA}	200	℃/W
Operating Temperature	T_A	−40 ~ 125	℃
Operating Junction Temperature	T_J	−40 ~ 150	℃
Storage Temperature	T_{STG}	−65 ~ 150	℃
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	260	℃
ESD (HBM)		>8000	V

Note1: Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

XL542 Electrical Characteristics

T_A = 25℃, V_{DD}=Vpull=5V, RL=1kΩ, R1=0Ω; system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Operation Voltage	V_{DD}		3.3		45	V
Reverse Supply Voltage	V_{DDR}		−45			V
Operation Supply Current	I_{DD_H}	OUT=H		1.5		mA
	I_{DD_L}	OUT=L		2.2		mA
Power−on time	t_{ON}			35	50	uS
Output Saturation Voltage	Vsat	I_{OUT}=30mA		0.2	0.3	V
Output Delay Time	t_d	B=B_{RP} to B_{OP}		10	25	uS
Output Rise Time	t_r	CL=50pF			0.5	uS
Output Fall Time	t_f	CL=50pF			0.2	uS

XL542 Magnetic Characteristics（Note2）

T_A = 25℃, V_{DD}=Vpull=5V, RL=1kΩ, R1=0Ω; system parameters test circuit figure1, unless otherwise specified.

Parameters	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Bandwidth	f_{BW}				100	KHz
Magnetic Field Operate Point	B_{OP}		35	70	105	Gs
Magnetic Field Release Point	B_{RP}		20	50	80	Gs
Magnetic Hysteresis	B_{HYS}			20		Gs

Note2 : A south pole near the marked side of the package is a positive magnetic field.

Typical Characteristics

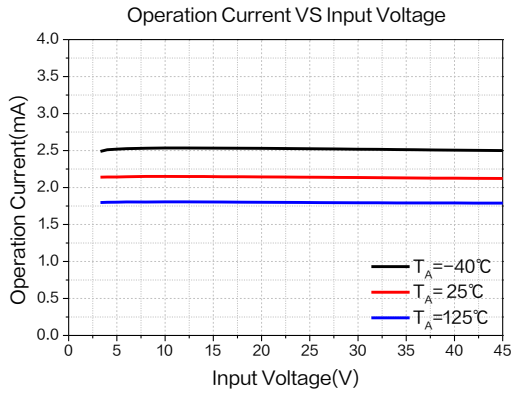


Figure 5.Operation Current

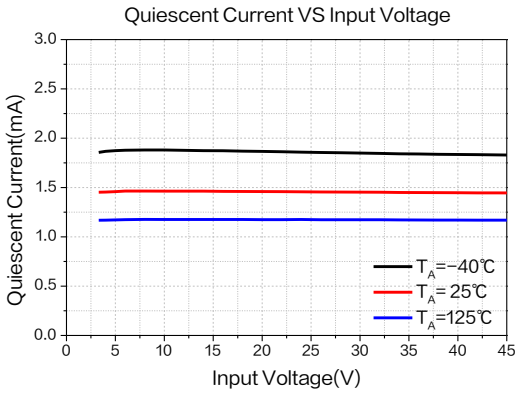
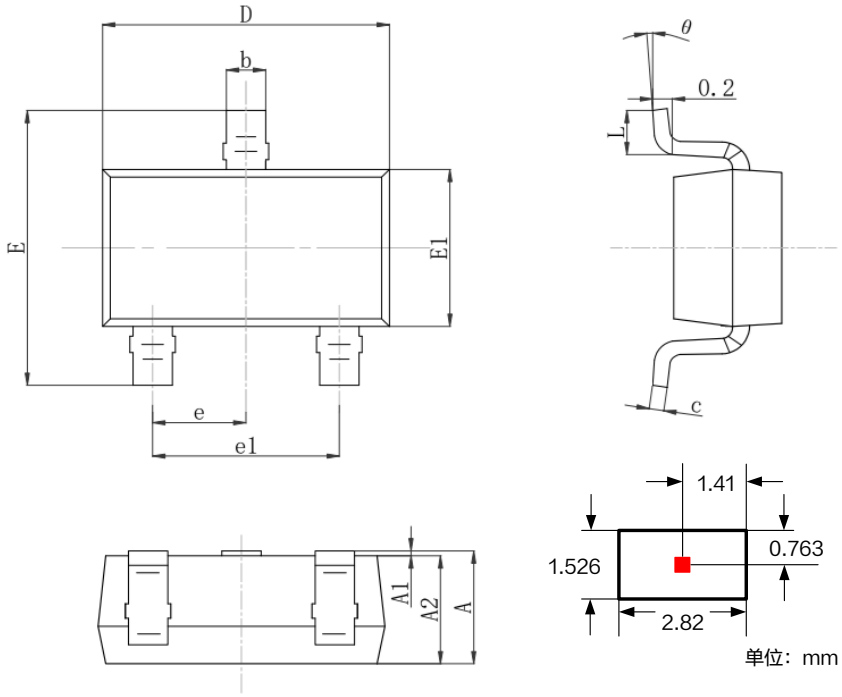


Figure 6.Quiescent Current

Package Information

SOT23-3



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.000	1.350	0.039	0.053
A1	0.000	0.150	0.000	0.006
A2	1.000	1.200	0.039	0.047
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.050	0.111	0.120
E1	1.500	1.726	0.059	0.068
E	2.600	3.000	0.102	0.118
e	0.950 REF		0.037 REF	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Important Notice

XLSEMI reserve the right to make modifications, enhancements, improvements, corrections or other changes without notice at any time. XLSEMI does not assume any liability arising out of the application or use of any product described herein; neither does it convey any license under its patent rights, nor the rights of others. XLSEMI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using XLSEMI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards. XLSEMI warrants performance of its products to the specifications applicable at the time of sale, in accordance with the warranty in XLSEMI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent XLSEMI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

For the latest product information, go to www.xlsemi.com.