

Features and Benefits

- 3.8V to 24V Operation
- -40°C to 150°C Superior temperature operation
- Bipolar technology
- Open-collector 50 mA output
- Reverse battery protection
- Small Size SOT89 3L
- Solid-state reliability
- Resistant to 60V supply voltage
- Sensitivity of temperature compensation circuitry

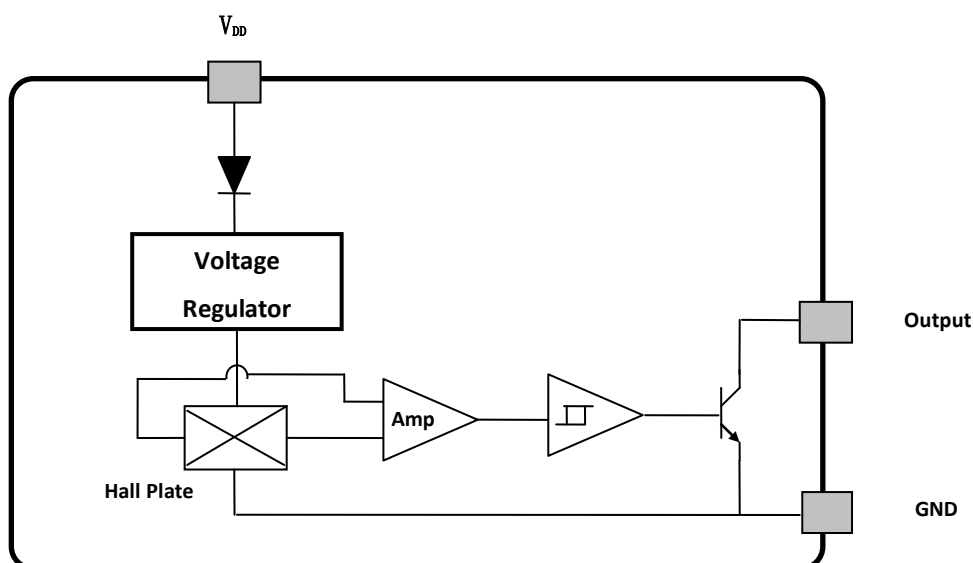
Application Examples

- Automotive, Consumer and Industrial
- Solid-state switch
- Brushless DC motor commutation
- Speed detection
- Linear position detection
- Angular position detection
- Proximity detection



3 pin SOT89 (suffix SP)

Functional Block Diagram



General Description

The SS1139 is a unipolar Hall-effect sensor IC fabricated from bipolar technology. The device integrates a voltage regulator, reverse battery protection diode, Hall sensor with dynamic offset cancellation system, temperature compensation circuitry, small signal amplifier, Schmitt trigger and an open-collector output to sink up to 50 mA. With suitable output pull up, they can be used with bipolar or CMOS logic circuits.

These Hall-effect switches are monolithic integrated circuits with tighter magnetic specifications, designed to operate continuously over extended temperatures to +150°C, and are more stable with both

temperature and supply voltage changes. Internal compensation characteristic makes the sensitivity increase slightly with temperature increasing, so that this IC is particularly suitable to be used with the commonly low-cost magnets. If a magnetic flux density larger than threshold B_{OP} , Output is turned on (low). When a magnetic flux density reversal falls below B_{RP} , Output will be turned off (high).

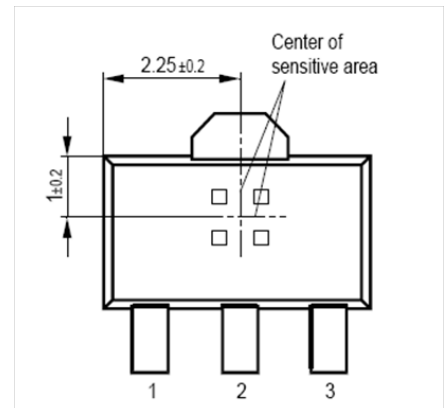
Thanks to its wide operating voltage range, extended choice of temperature range and high reliability, it is quite suitable for use in automotive, industrial and consumer applications.

Glossary of Terms

MilliTesla (mT), Gauss	Units of magnetic flux density: 1mT = 10 Gauss
RoHS	Restriction of Hazardous Substances
Operating Point (B_{OP})	Magnetic flux density applied on the branded side of the package which turns the output driver ON ($V_{OUT} = V_{DSon}$)
Release Point (BRP)	Magnetic flux density applied on the branded side of the package which turns the output driver OFF ($V_{OUT} = \text{high}$)

Pin Definitions and Descriptions

SOT Pin №	Name	Type	Function
1	V _{DD}	Supply	Supply Voltage pin
2	GND	Ground	Ground pin
3	OUT	Output	Open Collector Output pin


Absolute Maximum Ratings

Parameter	Symbol	Value	Units
Supply Voltage	V _{DD}	60	V
Reverse Voltage	V _{DD}	-24	V
Output Voltage	V _{OUT}	30	V
Output Current	I _{OUT}	50	mA
Magnetic Flux Density	B	No limit	
Operating Temperature Range	T _A	-40 to +150	°C
Storage Temperature Range	T _S	-65 to 170	°C
Maximum Junction Temperature	T _J	+150	°C
Lead Temperature(Soldering, 5 sec)	T _L	+250	°C
Package Power Dissipation	P _D	450	mW

Operating Temperature Range	Symbol	Value	Units
Temperature Suffix “E”	T _A	-40 to 85	°C
Temperature Suffix “K”	T _A	-40 to 125	°C
Temperature Suffix “L”	T _A	-40 to 150	°C

Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute-maximum- rated conditions for extended periods may affect device reliability

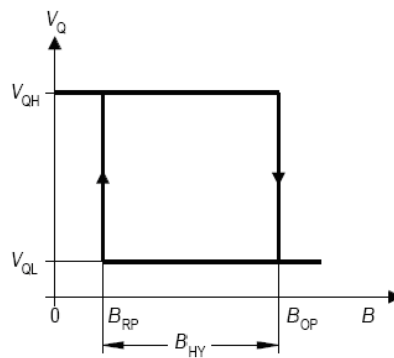
General Electrical Specifications

DC Operating Parameters $T_A = 25^\circ\text{C}$, $V_{DD} = 3.8\text{V}$ to 24V (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	3.8		24	V
Supply Current	I_{DD}	$V_{DD} = 12\text{V}$		5	10	mA
Output Saturation Voltage	V_{DSon}	$I_{OUT} = 20\text{mA}$, $B > B_{OP}$		0.45	0.6	V
Output Current	I_{ON}	$B > B_{OP}$			10	mA
Output Leakage Current	I_{OFF}	$B < B_{RP}$		0.1	10	μA
Output Rise Time	t_r	$V_{CC} = 12\text{V}$, $R_L = 1.1\text{K}\Omega$, $C_L = 20\text{pF}$		0.2	1.5	μs
Output Fall Time	t_f	$V_{CC} = 12\text{V}$, $R_L = 1.1\text{K}\Omega$, $C_L = 20\text{pF}$		0.5	1.0	μs

Magnetic Specifications

Package	Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
SP	Operating Point	B_{OP}	$T_a = 25^\circ\text{C}$, $V_{DD} = 12\text{V DC}$	75		120	G
	Release Point	B_{RP}		25		80	G
	Hysteresis	B_{HYST}			50		G



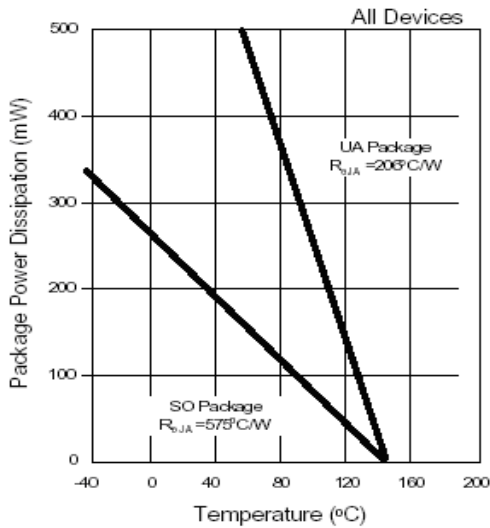
Output Behavior versus Magnetic Pole

DC Operating Parameters $T_A = -40^\circ\text{C}$ to 150°C , $V_{DD} = 3.8\text{V}$ to 24V (unless otherwise specified)

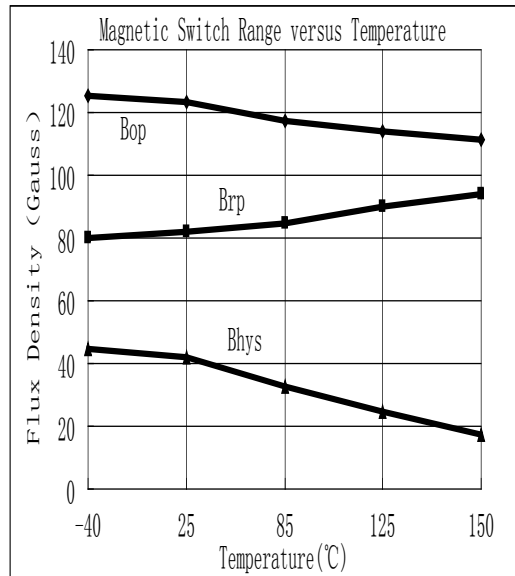
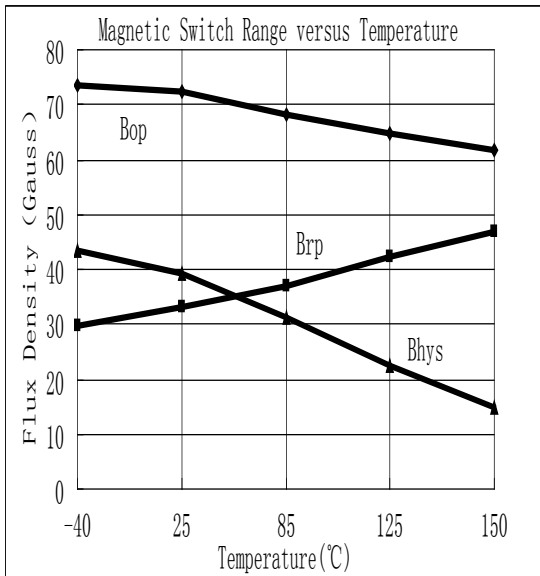
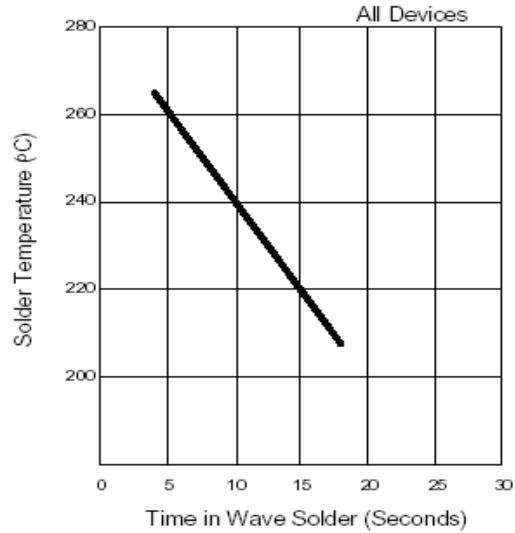
Test Conditions (SP)	OUT
$B < B_{RP}$	High
$B > B_{OP}$	Low

Performance Characteristics

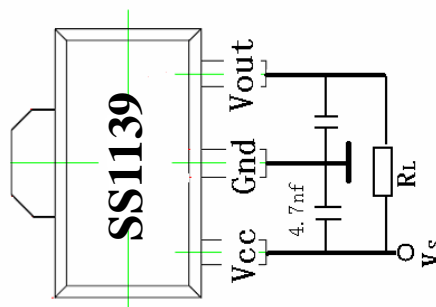
Power Dissipation versus Temperature



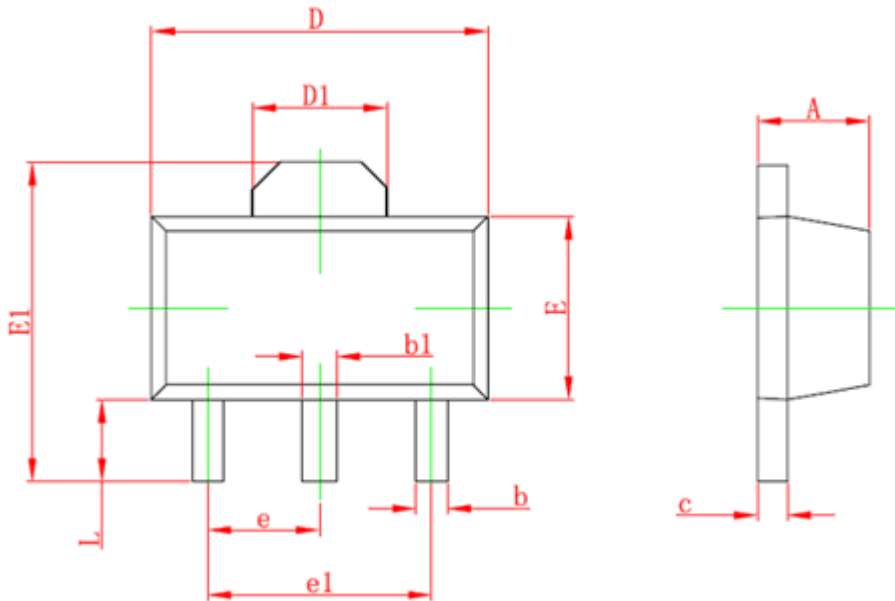
Wave Soldering Parameters



Application Information



Package SP, 3-Pin SOT-89:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.400	1.600	0.055	0.063
b	0.320	0.520	0.013	0.197
b1	0.400	0.580	0.016	0.023
c	0.350	0.440	0.014	0.017
D	4.400	4.600	0.173	0.181
D1	1.550 REF		0.061 REF	
E	2.300	2.600	0.091	0.102
E1	3.940	4.250	0.155	0.167
e	1.500 TYP		0.060TYP	
e1	3.000 TYP		0.118TYP	
L	0.900	1.200	0.035	0.047

Ordering Information

Part No.	Pb-free	Temperature Code	Package Code	Packing
SS1139ESPT	YES	-40°C to 85°C	SOT-89	7-in. reel, 3000 pieces/reel
SS1139KSPT	YES	-40°C to 125°C	SOT-89	7-in. reel, 3000 pieces/reel
SS1139LSPT	YES	-40°C to 150°C	SOT-89	7-in. reel, 3000 pieces/reel