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

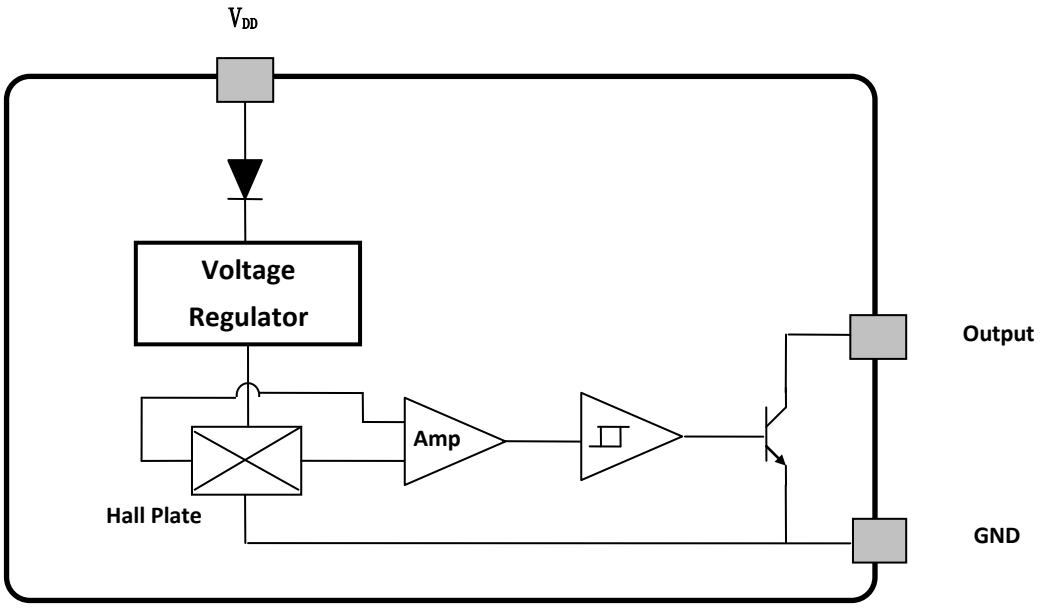
Application Examples

- 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 SS133 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 Bop, Output is turned on (low). When a magnetic flux density reversal falls below Brp, Output will be turned off (high).

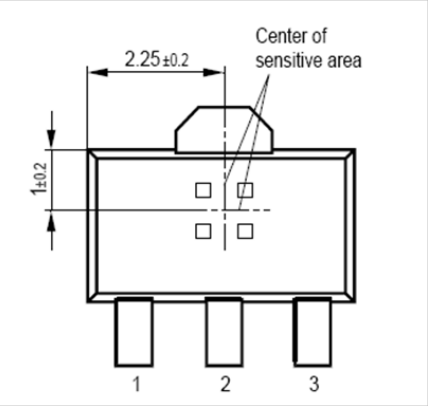
Thanks to its wide operating voltage range, extended choice of temperature range and high reliability, it is quite suitable for use in automotive, industrial and consumer applications.

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 (B_{RP})	Magnetic flux density applied on the branded side of the package which turns the output driver OFF (V_{OUT} = 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(Solding, 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

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General Electrical Specifications

DC Operating Parameters T_A = 25°C, V_{DD}= 3.8V to 24V (unless otherwise specified)

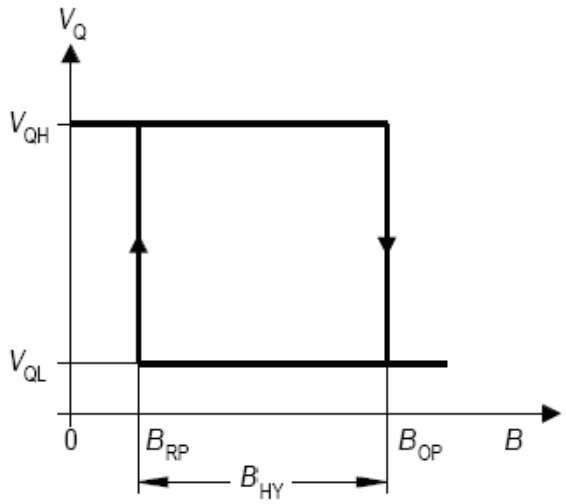
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	3.8		24	V
Supply Current	I_{DD}	V_{DD}=12V		5	10	mA
Output Saturation Voltage	V_{DSon}	I_{OUT} = 20mA, B > B_{OP}		0.45	0.6	V
Output Current	I_{ON}	B > B_{OP}			10	mA
Output Leakage Current	I_{OFF}	B < B_{RP}		0.1	10	μA
Output Rise Time	tr	V_{CC}=12V, RL = 1.1KΩ, CL = 20pF		0.2	1.5	μs
Output Fall Time	tf	V_{CC}=12V, RL = 1.1KΩ, CL = 20pF		0.5	1.0	μs

Magnetic Specifications

DC Operating Parameters V_{DD} = 5V, T_A = 25°C (unless otherwise specified)

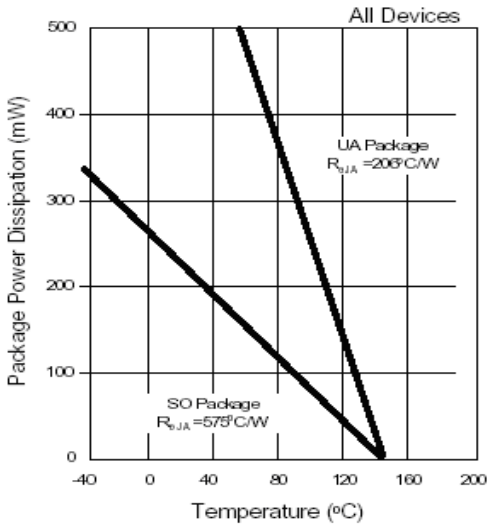
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating Point	B_{OP}	T_a=25°C,V_{dd}=5V DC	100		200	G
Release Point	B_{RP}		50		160	G
Hysteresis	B_{HYS}			50		G

Magnetic Characteristics

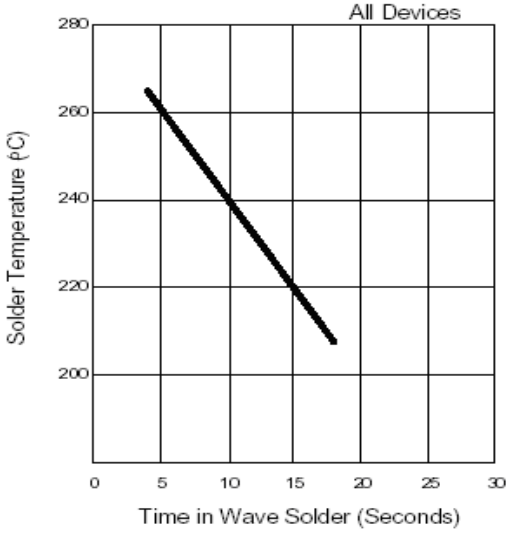


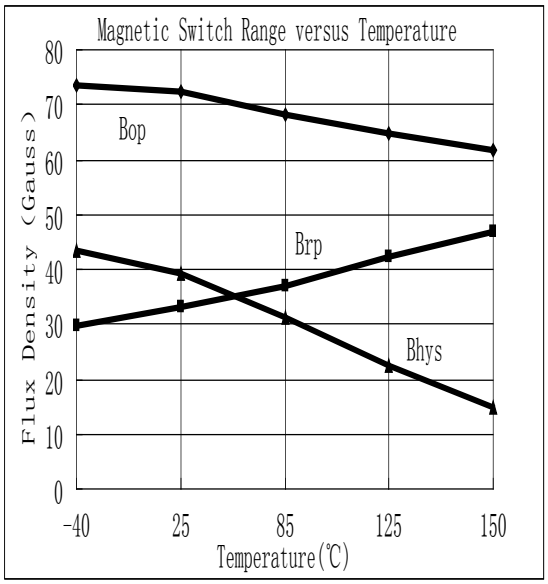
Performance Characteristics

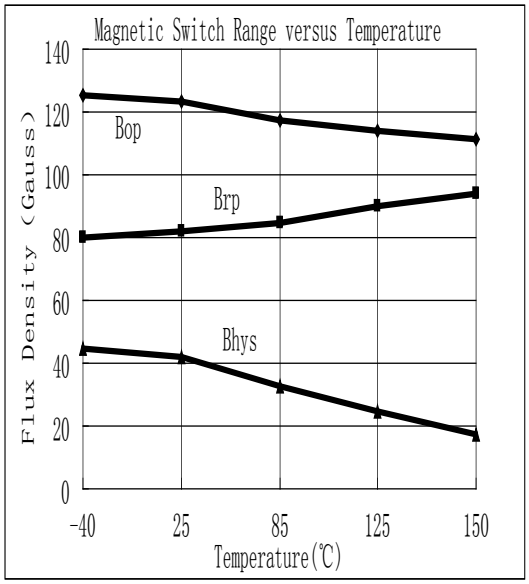
Power Dissipation versus Temperature



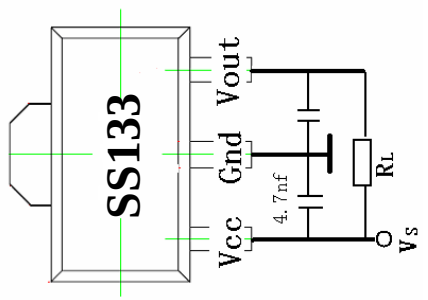
Wave Soldering Parameters



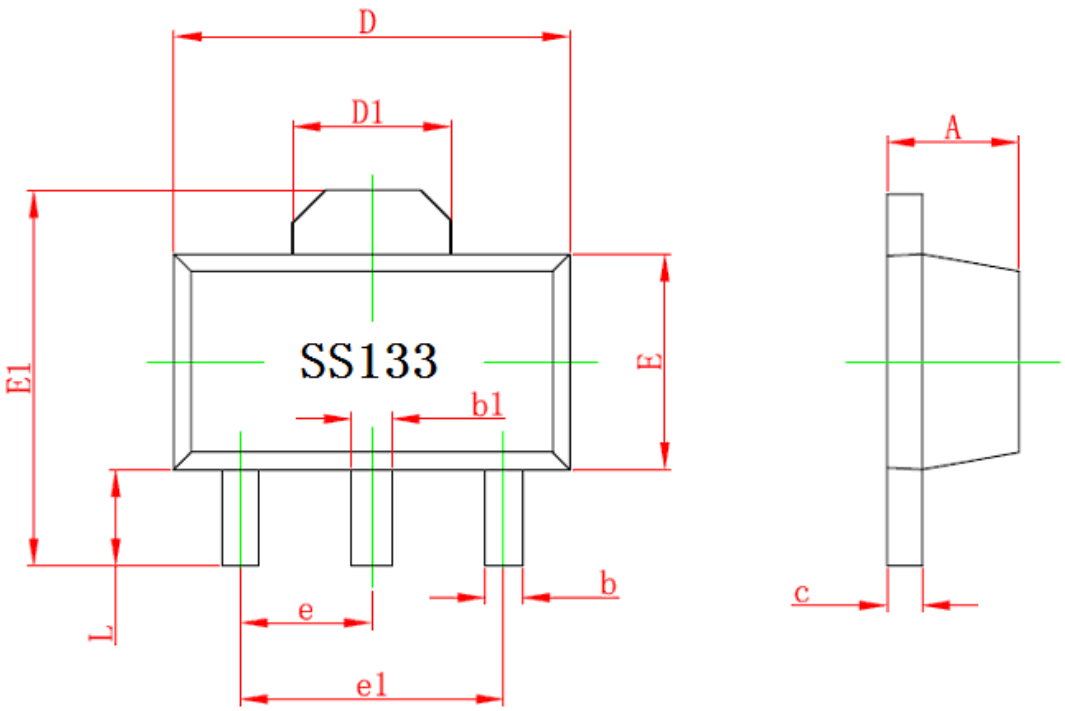




Application Information



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
SS133ESPT	YES	-40°C to 85°C	SOT-89	7-in. reel, 3000 pieces/reel
SS133KSPT	YES	-40°C to 125°C	SOT-89	7-in. reel, 3000 pieces/reel
SS133LSPT	YES	-40°C to 150°C	SOT-89	7-in. reel, 3000 pieces/reel