Unipolar Hall Effect Switch ES3144

1. Description

ES3144 is fabricated from Bipolar technology. It incorporates Hall effect plate, voltage regulator, reverse voltage protector, signal amplifiers, Schmitt trigger circuits, and transistor open-collector output drivers. ES3144 has a wide working voltage range and a wide range of operating temperatures, it is very suitable for being used as solid state electrical switch in automotive, industrial electrical and electrical home appliances products.

ES3144 has a tiny SOT-23 3L package and a single in-line TO-92S 3L (flat) package, both are RoHS compliant packages.

For TO-92S package, when the S pole faces the marked side of the package and the magnetic field perpendicular to the Hall sensor exceeds the operate point threshold (B_{OP}) (that is $B>B_{OP}>0$), the output transistor turns on, and the voltage is low. When the magnetic field is reduced below the release point (B_{RP}) (that is $0<B<B_{RP}$), the output transistor turns off, and the voltage goes high. It can't trigger the chip to work when the N pole faces the marked side of the package, but it can turn it on when the N pole faces the opposite side of the marked side of the package. The SOT-23 device is reversed from the TO-92S package, it needs the N pole to work on the marked side of the package.

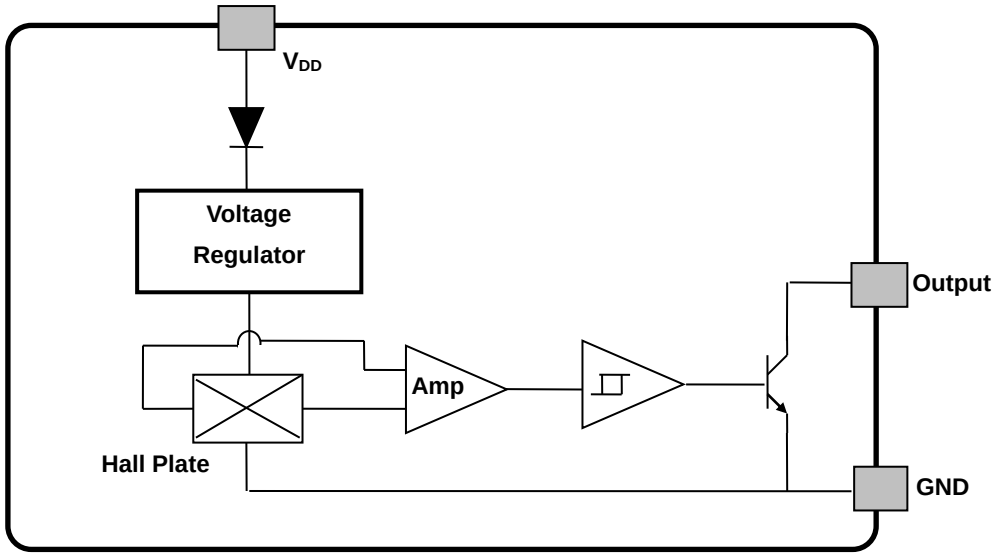
2. Features

- Reverse voltage protector in-built
- Wide operating voltage range from 3.8V to 24V
- High sensitivity, fast reaction
- Wide operating temperature range from -40℃ to 150℃
- High reliability, miniature, ultrathin package

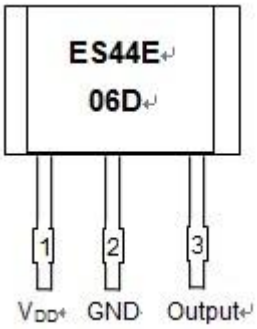
3. Applications

- Limit switch
- Current limit
- Rotation rate measurement
- Current sensor
- Magnetic location proximity switch

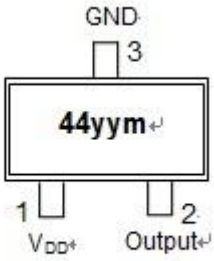
4. Functional Block Diagram



5. Pin Definitions



TO-92S Package
Pin1 - V_{DD}
Pin2 - GND
Pin3 - Output



SOT-23 Package
Pin1 - V_{DD}
Pin2 - Output
Pin3 - GND

Name	P/I/O	Pin #		Descriptions
		TO-92S Package	SOT-23 Package	
V_{DD}	P	1	1	Supply Voltage
GND	P	2	3	Ground
Output	O	3	2	Output

6. Absolute Maximum Ratings

Parameter	Symbol		Value	Units
Supply Voltage	V_{DD}		24	V
Reverse Voltage	V_{DD}		24	V
Output Voltage	V_{OUT}		30	V
Output Current	I_{OUT}		25	mA
Magnetic Flux Density	B		No Limit	
Operating Temperature Range	T_A		-40 ~ 150	℃
Storage Temperature Rang	T_S		-65 ~ 150	℃
Maximum Junction Temperature	T_J		+150	℃
Lead Temperature (Soldering, 5 sec)			+250	℃
Package Power Dissipation	P_D	TO-92S	550	mW
		SOT23-3L	230	mW

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

7. DC Electrical Characteristics

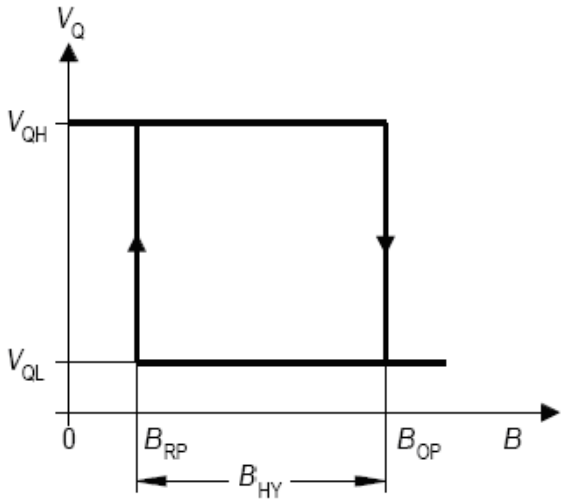
DC Operating Parameters: T_A = 25℃, V_{DD}=12V_{DC} (unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating voltage	V_{DD}	Operating	3.8		24	V
Operating current	I_{DD}	B<B_{OP}	4	5	7	mA
Saturation voltage drop	V_{DS} (on)	I_{OUT} = 20 mA, B>B_{OP}		0.3	0.5	V
Drain current of output	I_{OFF}	B<B_{RP}, V_{OUT} = 20V		0.01	10.0	μA
Rising time of output	T_R	V_{DD} = 12V, R_L = 1.1KΩ, C_L = 20pf		0.04		μs
Falling time of output	T_F	V_{DD} = 12V, R_L = 1.1KΩ, C_L = 20pf		0.18	70.0	μs

8. Magnetic Characteristics

Parameter	Symbol (Test Conditions)		Min	Typ	Max	Units
Operate point	B_{OP}（T_A=25℃，V_{DD}=12V_{DC}）	A	70		90	Gs
		B	90		120	
		C	120		180	
Release point	B_{RP}（T_A=25℃，V_{DD}=12V_{DC}）	A	20		40	Gs
		B	40		70	
		C	70		130	
Hysteresis	B_{HY}（T_A=25℃，V_{DD}=12V_{DC}）		-	50		Gs

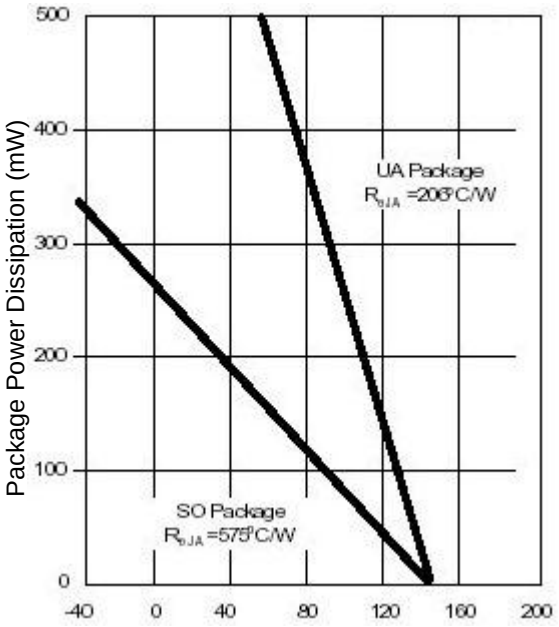
9. Magnetoelectric Transformation Characteristics



10. Performance Characteristics

Power Dissipation versus Temperature

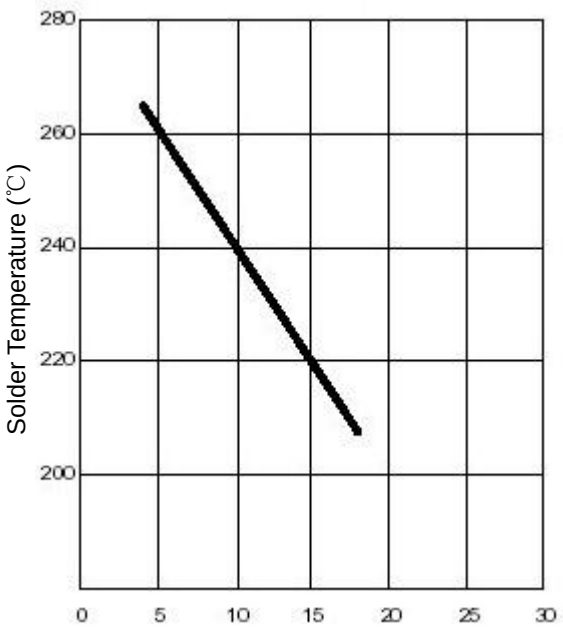
All Devices



Temperature (℃)

Wave Soldering Parameters

All Devices



Time in Wave Solder (seconds)

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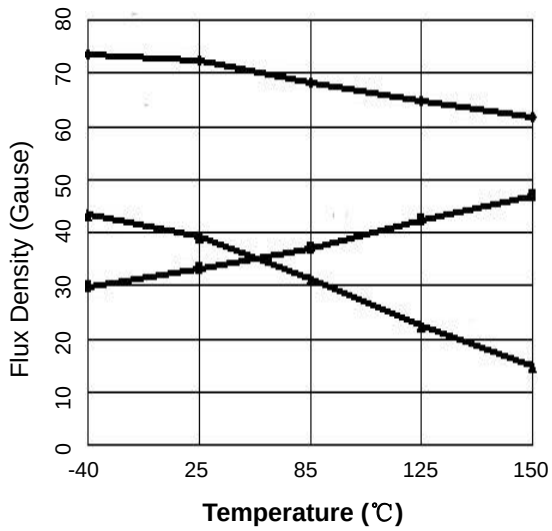
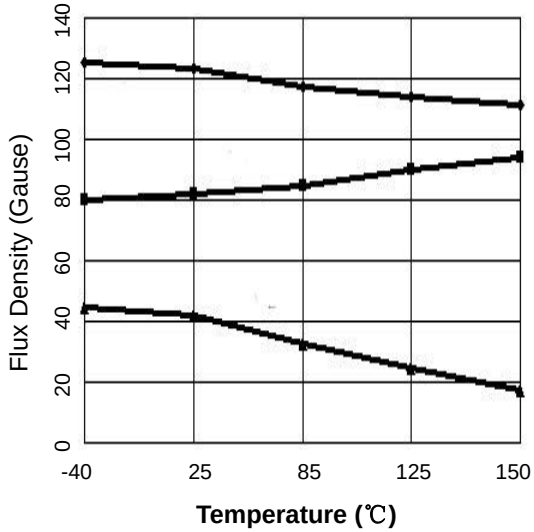
Magnetic Switch Range versus Temperature

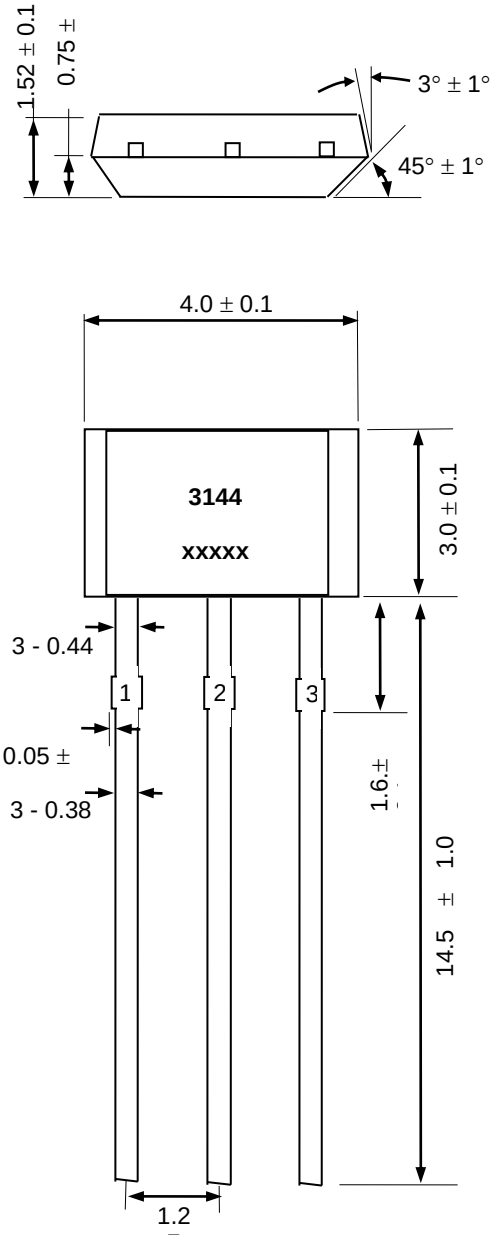


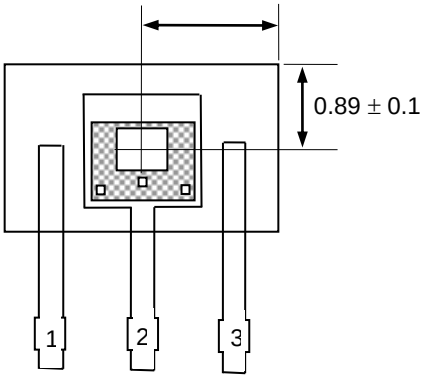
Magnetic Switch Range versus Temperature



11. Package Information

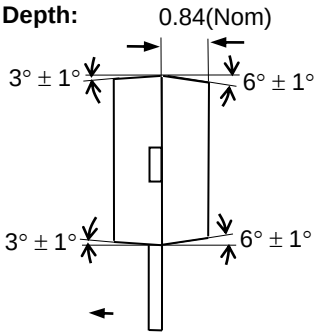
11.1 UA Package (TO-92S)





Hall plate Location

Active Area Depth:



Notes:

1). Controlling dimension: mm;

2). Leads must be free of flash and plating voids;

3). Do not bend leads within 1 mm of lead to package interface;

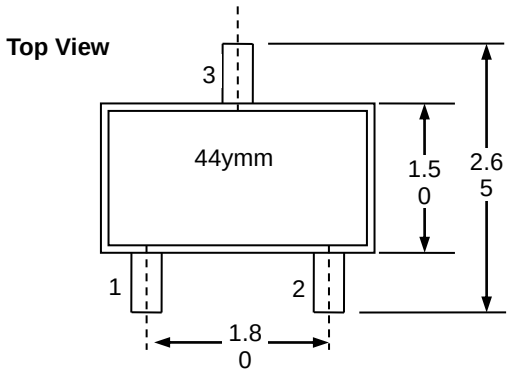
4). PINOUT: Pin 1 V_{DD}
Pin 2 GND
Pin 3 Output

Marking:

3144 -- Code of Device (ES3144);

xxxxx -- Production Lot;

11.2 SO Package (SOT23-3L)



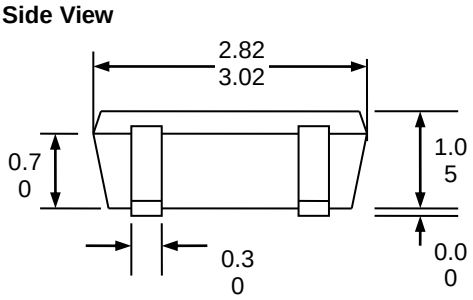
Notes:

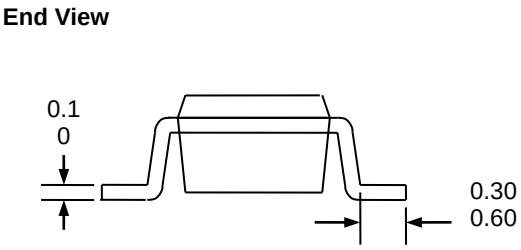
1). PINOUT: Pin 1 V_{DD}
Pin 2 Output
Pin 3 GND

2). All dimensions are in millimeters

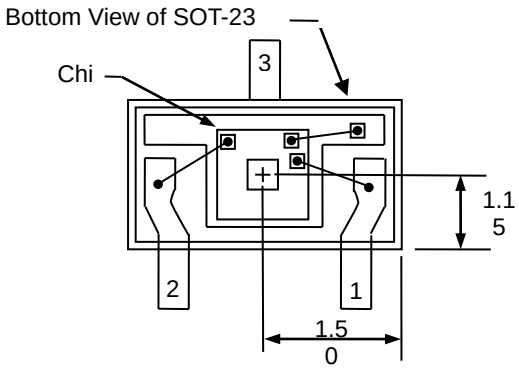
Marking:

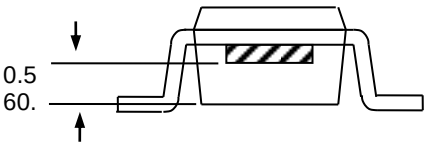
44 -- Code of Device (ES3144);
y -- last 1 digit of year;
mm -- Production Lot;





Hall plate location





11. Ordering Information

Part No.	Package Code
ES3144	UA (TO-92S)
	SO (SOT-23)

Contact Information:

Innosen Technology Co., Ltd.
TEL: 022-59812098 FAX: 022-59812096
WEB: http://www.innosensor.com