

**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°C to 150°C
- ◆ High reliability, miniature, ultrathin package

3. Applications

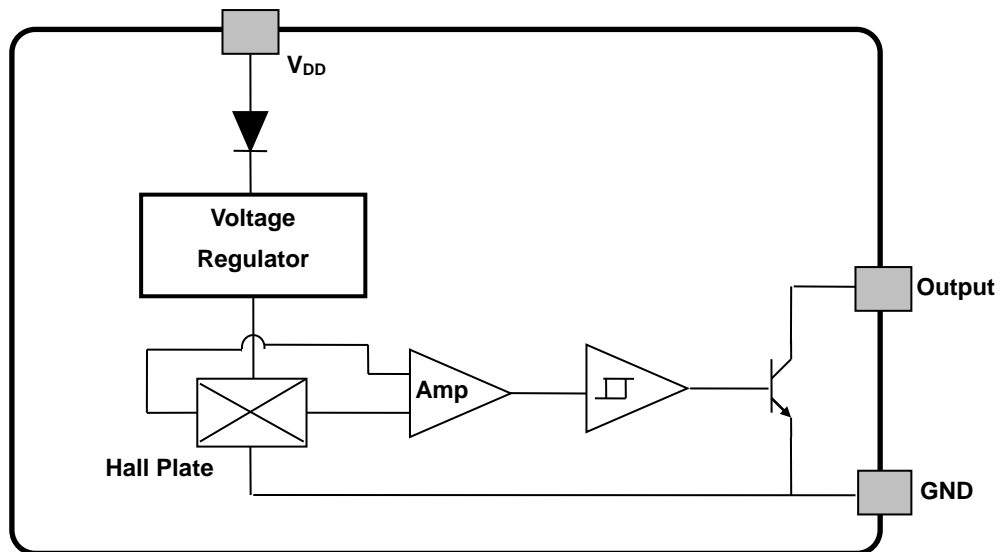
- ◆ Limit switch
- ◆ Current limit
- ◆ Rotation rate measurement
- ◆ Current sensor
- ◆ Magnetic location proximity switch



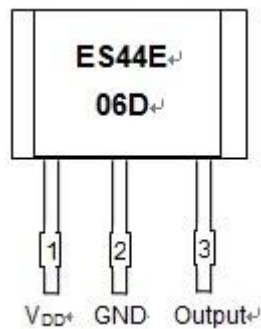
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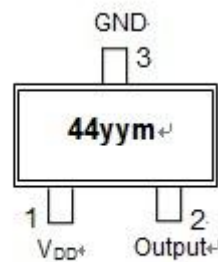
4. Functional Block Diagram



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



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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	°C
Storage Temperature Rang	T _S		-65 ~ 150	°C
Maximum Junction Temperature	T _J		+150	°C
Lead Temperature (Soldering, 5 sec)			+250	°C
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: $T_A = 25^\circ\text{C}$, $V_{DD} = 12V_{DC}$ (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	$V_{DS} (on)$	$I_{OUT} = 20 \text{ mA}$, $B > B_{OP}$		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	$V_{DD} = 12V$, $R_L = 1.1K\Omega$, $C_L = 20\text{pf}$		0.04		μs
Falling time of output	T_F	$V_{DD} = 12V$, $R_L = 1.1K\Omega$, $C_L = 20\text{pf}$		0.18	70.0	μs

8. Magnetic Characteristics

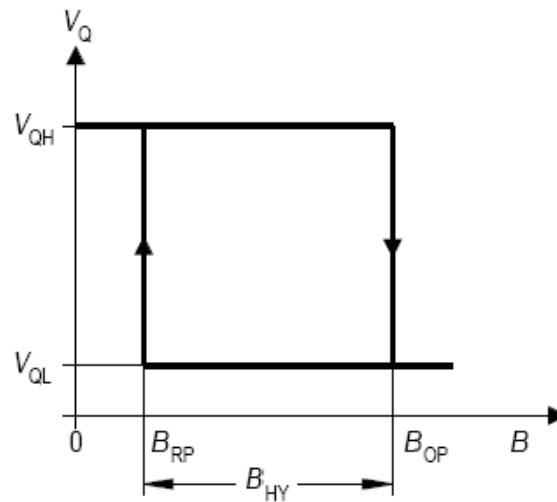
Parameter	Symbol (Test Conditions)	Min	Typ	Max	Units
Operate point	$B_{OP} (T_A = 25^\circ\text{C}, V_{DD} = 12V_{DC})$	A	70	90	Gs
		B	90	120	
		C	120	180	
Release point	$B_{RP} (T_A = 25^\circ\text{C}, V_{DD} = 12V_{DC})$	A	20	40	Gs
		B	40	70	
		C	70	130	
Hysteresis	$B_{HY} (T_A = 25^\circ\text{C},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



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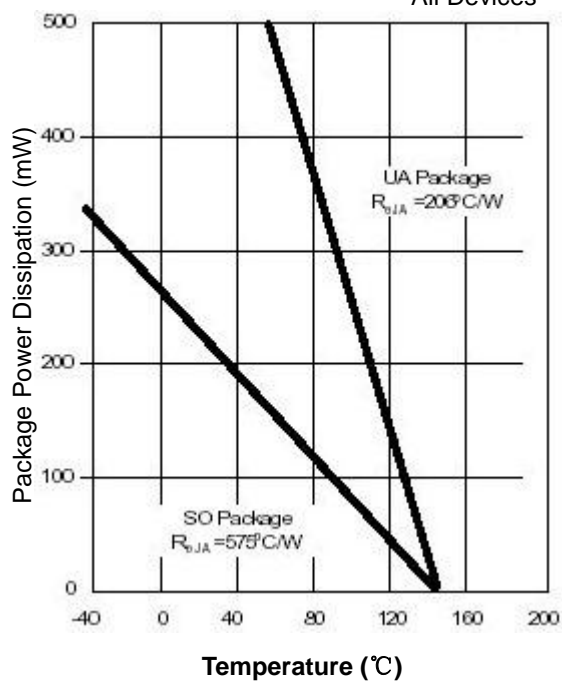
9. Magnetoelectric Transformation Characteristics



10. Performance Characteristics

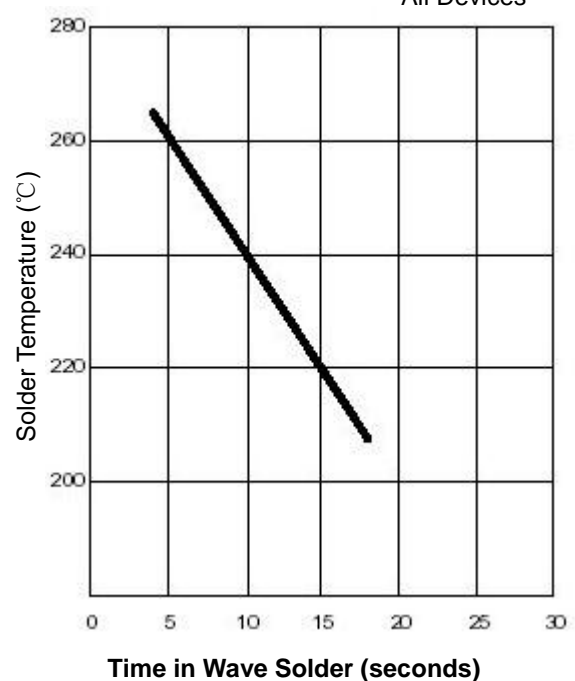
Power Dissipation versus Temperature

All Devices



Wave Soldering Parameters

All Devices

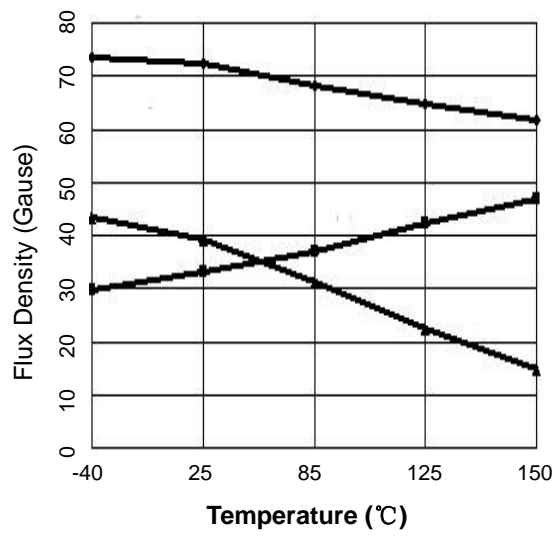




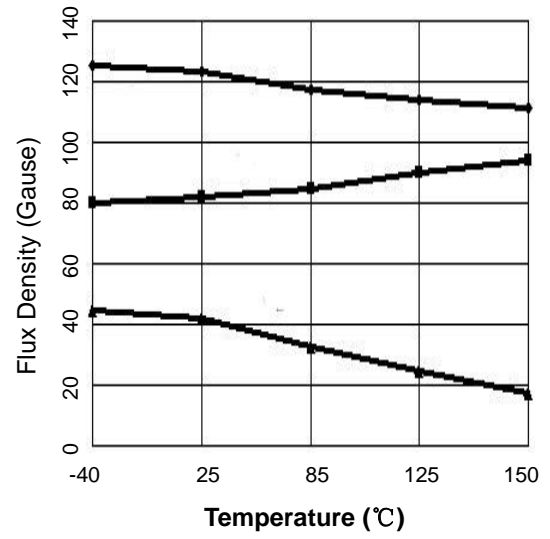
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Magnetic Switch Range versus Temperature



Magnetic Switch Range versus Temperature



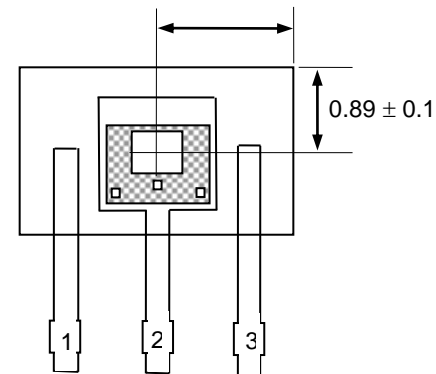
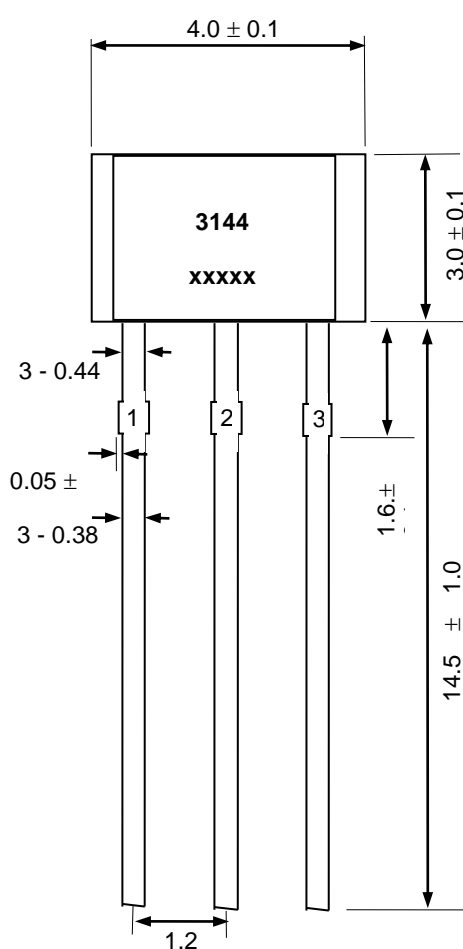
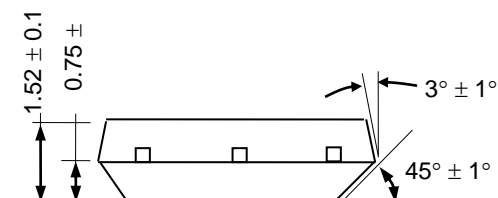


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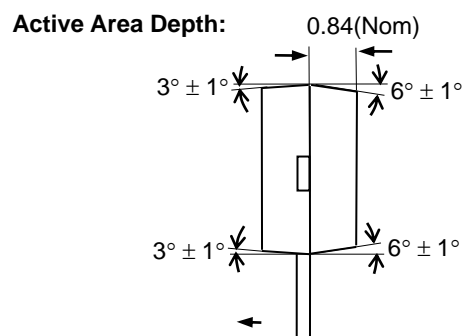
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11. Package Information

11.1 UA Package (TO-92S)



Hall plate Location



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:

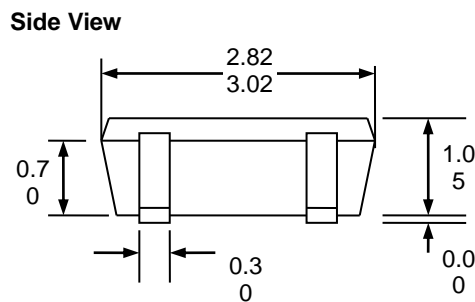
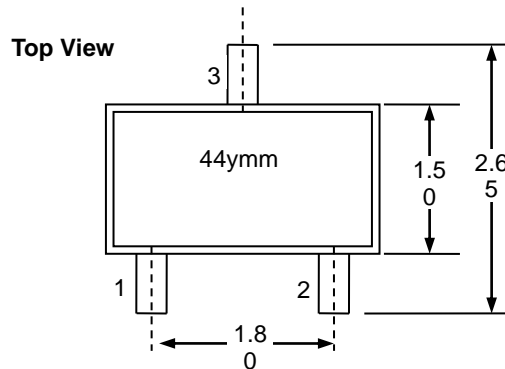
3144 -- Code of Device (ES3144);
xxxxx -- Production Lot;



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11.2 SO Package (SOT23-3L)



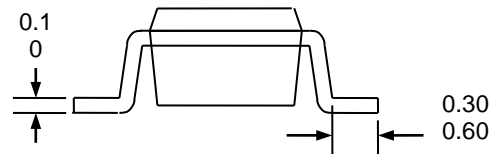
Notes:

- PINOUT: Pin 1 V_{DD}
Pin 2 Output
Pin 3 GND
- All dimensions are in millimeters

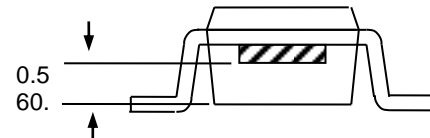
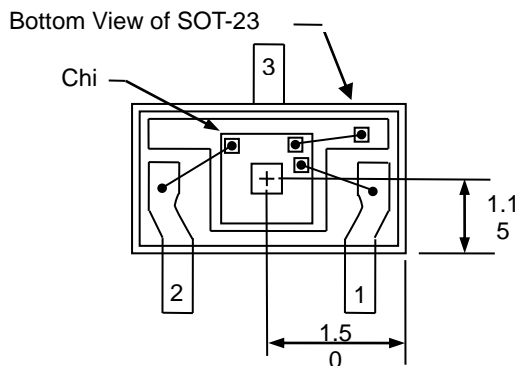
Marking:

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

End View



Hall plate location



11. Ordering Information

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