Magnetic Sensor IC

Latch Detection High Performance Hall-Effect Sensor IC

AS1643

General Description

Using BiCMOS process, the AS1643 is designed for high performance latch detection hall-effect application, such as automotive, industrial, electric tools, home appliances, rotor position sensing, brushless DC motor etc. The hall IC integrated an on-chip hall voltage generator for magnetic sensing, a comparator that amplifiers the hall voltage, hall sensor with dynamic offset cancellation system, an pull-up resistance, and a Schmitt trigger to provide switching hysteresis for noise rejection, and a voltage regulator for operation with supply voltage of 3.2V to 30V.

AS1643 is designed to respond to alternating North and South poles. White the magnetic flux density (B) is larger than operate point (B_{OP}), the output will be turned on (low), the output is held until the magnetic flux density (B) is lower than release point (B_{RP}), then turn off (high).

The device is available in SIP-3L and SOT23-3L Package and is rated over the -40°C to 1250°C. the package is RoHS compliant.

Features

- High Performance BiCMOS Process Tech.
- Input Voltage Range : 3.2V to 30V
- Resistant to physical stress
- Bipolar Latch Operation
- High Sensitivity Hall Sensor
- High Chopping Frequency
- Magnetic Sensitivity (typical)
  B_{OP}=30Gauss, B_{RP}=-30Gauss
- Integrated Pull-up Resistance
- Small Solution Size
- RoHS Compliant
- SIP-3L and SOT23-3L Packages
- -40℃ to +125 ℃ Temperature Range

Applications

- Electric Tools
- Automotive, Home appliances, Industrial
- Rotor Position Sensing and Flow Meters
- Brushless DC Motor/Fan
- Speed Measurement
- Revolution Counting
- Valve and Solenoid Status
- Proximity Sensing
- Tachometers
- Magnetic Encoder

Ordering Information

AS1643XXX

Package:	Packing:	Temperature Grade:
M:SIP-3L	B: Bulk	Y: -40°C~125°C
W: SOT23-3L	R: Tape&Reel	

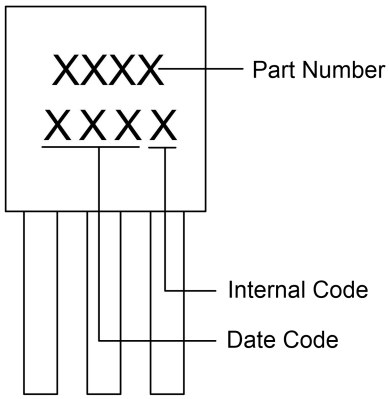
Part Number	B_{OP}/B_{RP} (Gauss)	Package Type	Package Qty	Temperature	Eco Plan	Lead
AS1643MBY	±30	SIP-3L	1K/Package	-40～125℃	RoHS	Cu
AS1643WRY	±30	SOT23-3L	7-in reel 3000pcs/reel	-40～125℃	RoHS	Cu

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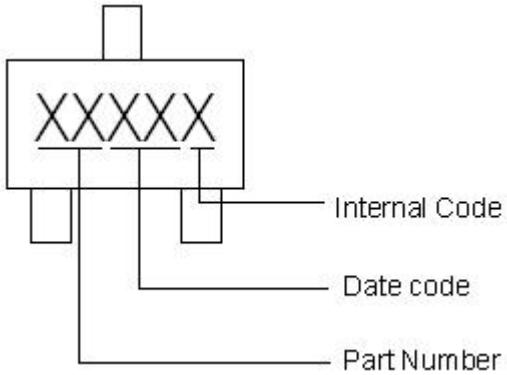
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■ Marking Information

SIP-3L



SOT23-3L



■ Typical Application Circuit

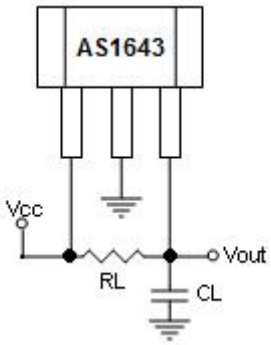
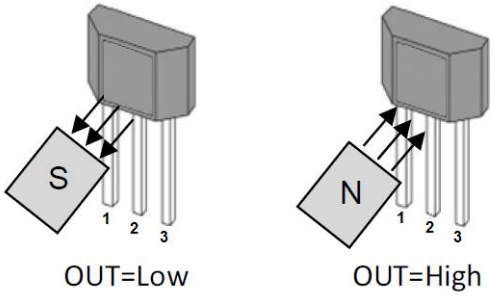


Figure 1, Typical Application Circuit of AS1643

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■ Pin Configuration

SIP-3L (Top View)



SOT23-3L (Top View)

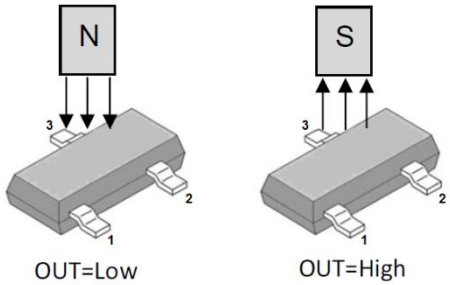


Figure 2, Pin Assignments of AS1643

Pin Name	Pin No.		I/O	Pin Function
	SIP-3L	SOT23-3L		
VCC	1	1	P	Input Power Supply
GND	2	3	P	Ground
OUTPUT	3	2	O	Open Collector Output

■ Block Diagram

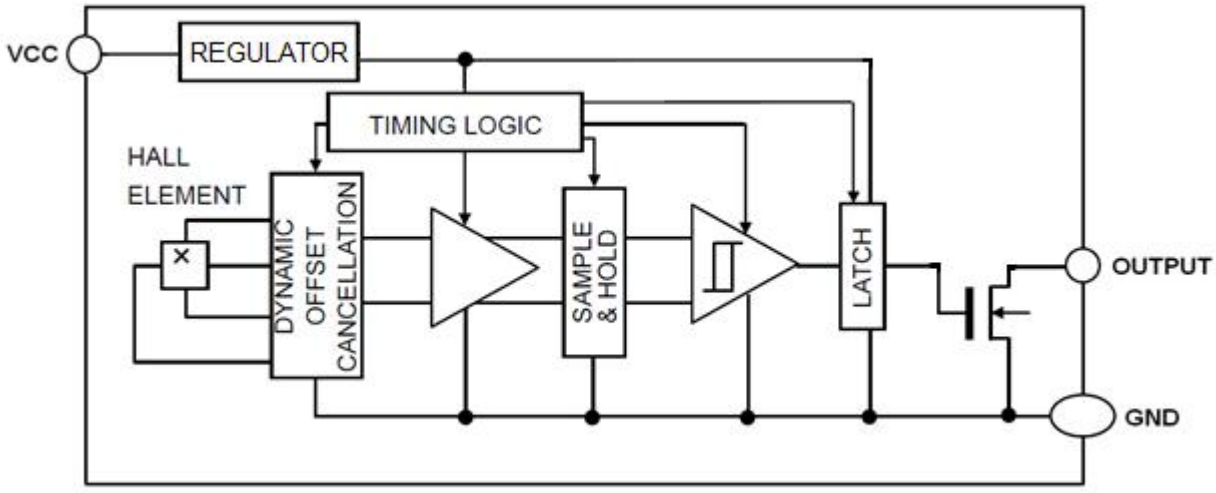


Figure 3, Block Diagram of AS1643

■ Absolute Maximum Ratings[1] (T_A=25°C, unless otherwise noted)

Parameter		Symbol	Rating	Unit
V_{CC} Pin to GND		V_{CC}	-24 to 35	V
Output Pin to GND		V_{OUTPUT}	-0.3 to 35	V
Max. Continuous Output Current		I_{OUTMAX}	30	mA
Thermal Resistance	SIP-3L	T_{JA}	230	℃/W
	SOT23-3L		310	
Storage Temperature Range		T_S	-55 to +150	℃
Operating Junction Temperature Range		T_{OP}	-40 to +125	℃
Maximum Soldering Temperature (at leads, 10 sec)		T_{LEAD}	300	℃

■ Recommended Operating Conditions[2]

Parameter	Symbol	Rating	Unit
V_{CC} Pin to GND	V_{CC}	3.2 to 30	V
Continuous Output Current	I_{OUT}	20	mA
Operating Temperature Range	T_{OP}	-40 to +125	℃

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■ Electrical Characteristics

(T_A = -40 to +125℃ unless otherwise noted. Typical values are at T_A = +25℃, V_{CC} = 3.2V to 30V)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Input Voltage		3.2	-	30	V
I_Q	Supply Current		-	2.0	5.0	mA
t_{ON}	Power On Time		-	40	60	uS
V_{SON}	Output Saturation Voltage	V_{CC} = 5V, I_{OUT}=10mA	-	0.2	0.5	V
I_{OFF}	Off-state Leakage Current	Output Hi-Z	-	-	10	uA
T_R	Output Rise Time	R_L=1K, C_L=50pF	-	-	0.5	uS
T_F	Output Fall Time	R_L=1K, C_L=50pF	-	-	0.2	uS
T_D	Output Delay Time	B=B_{RP}-100Gs to B_{OP}+100Gs	-	13	30	uS
f_{BW}	Operation Bandwidth		20	-	-	KHz
B_{OP}	Magnetic Operating Point	T_A = +25℃	5	30	50	Gauss
B_{RP}	Magnetic Release Point	T_A = +25℃	-50	-30	-5	Gauss
B_{HYS}	Hysteresis Window	T_A = +25℃	-	60	-	Gauss

Note: 1: Stresses above those listed in absolute maximum ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one absolute maximum rating should be applied at any one time.

2: The device is not guaranteed to function outside of its operating conditions.

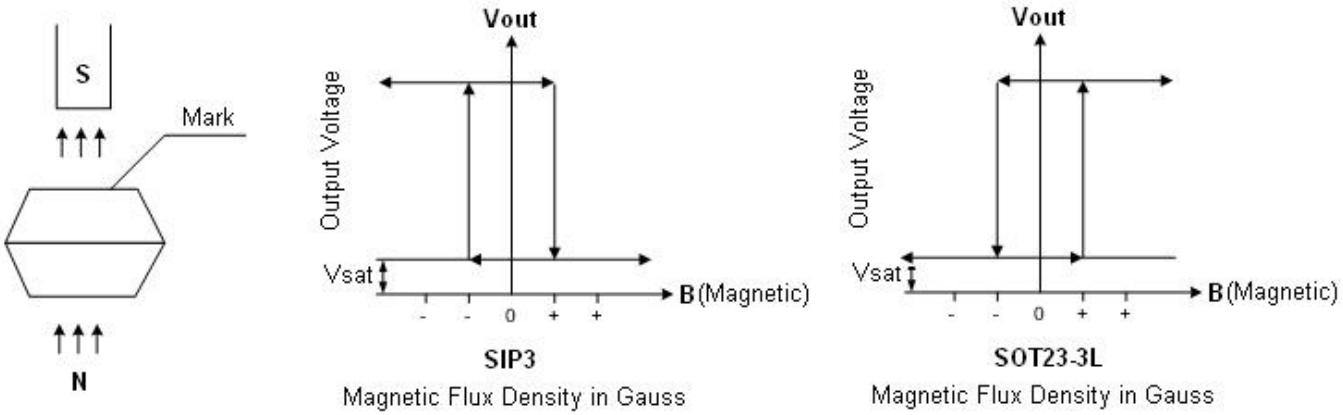


Fig 4, Magnetic Operation Characteristic of AS1643

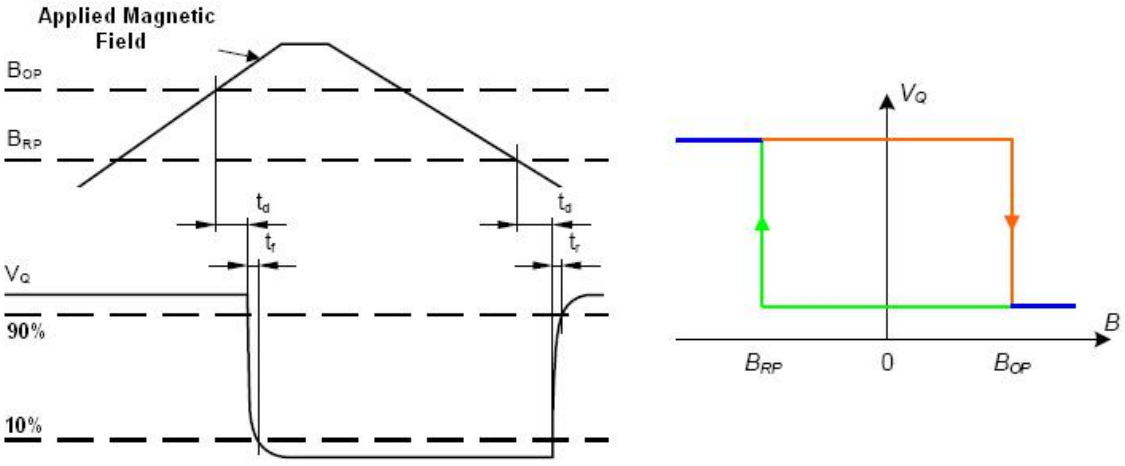
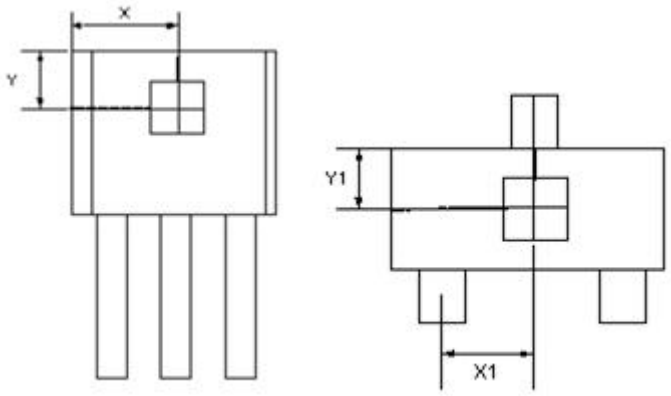


Fig 5, SIP-3L Package Magnetic Operation Theory of AS1643

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■ Hall Sensor Location

The Fig 7 is hall sensor location, where marks the IC number.

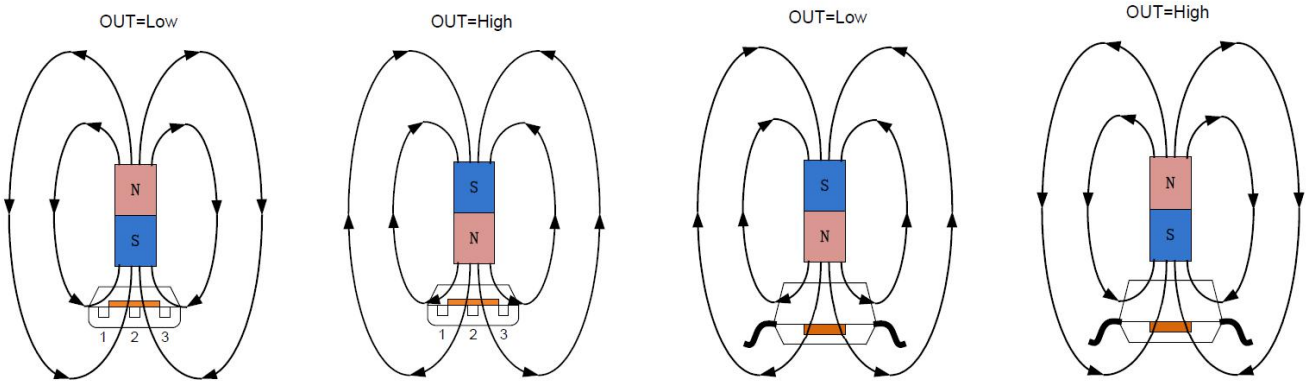


		unit
X	2.00	mm
Y	1.44	mm
X1	0.95	mm
Y1	0.8±0.05	mm

Fig 7, AS1643 Hall Sensor Location

■ Hall Sensor Location

A positive magnetic field is defined as a south pole near the marked side of the package.



If the device is powered on with a magnetic field strength between BRP and BOP, then the device output is determinate High. For SIP-3L package, if the field strength is greater than BOP, then the output is pulled low. If the field strength is less than BRP, the output is released. For SOT23-3L package, however, if the field strength is less than BOP, then the output is pulled low. If the field strength is greater than BRP, the output is released.

■ Typical Output Waveform:

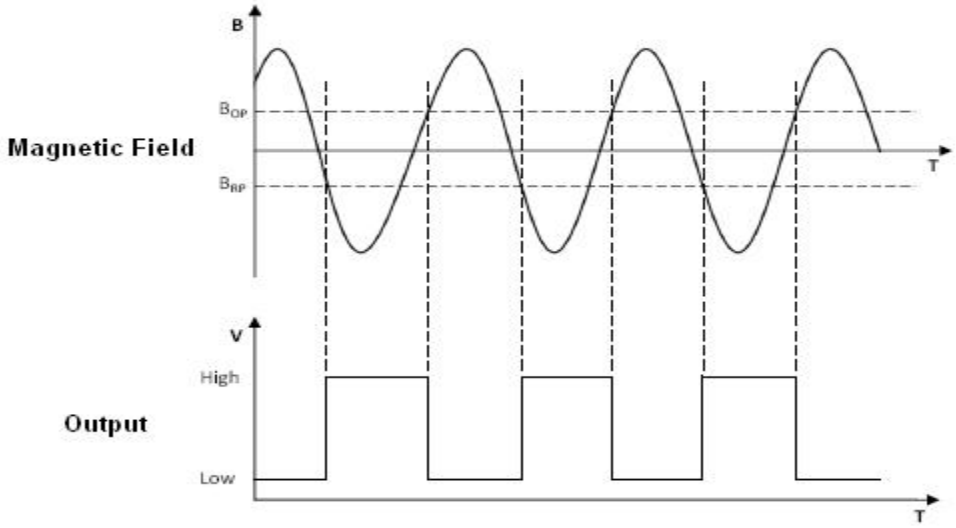


Fig 6, Typical Output Waveform of AS1643

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Thermal Considerations

The maximum IC junction temperature should be restricted to 125°C under normal operating conditions. This restriction limits the power dissipation of the AS1643. Calculate the maximum allowable dissipation, $P_{D(max)}$, and keep the actual dissipation less than or equal to $P_{D(max)}$. The maximum-power-dissipation limit is determined using following equation:

$$P_{D(MAX)} = \frac{125℃ - T_A}{R_{\theta JA}}$$

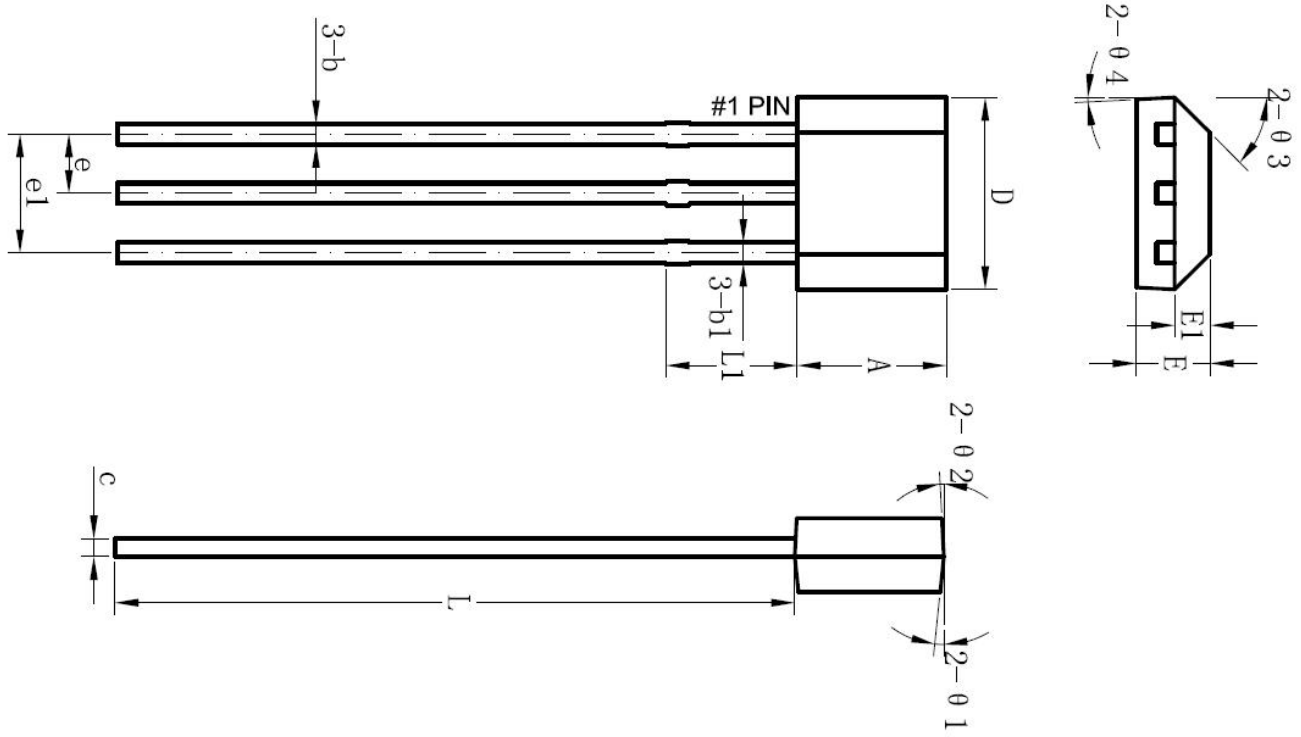
Where, T_A is the maximum ambient temperature for the application. $R_{\theta JA}$ is the thermal resistance junction-to-ambient given in Power Dissipation Table.

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■ Package Information

SIP-3L:

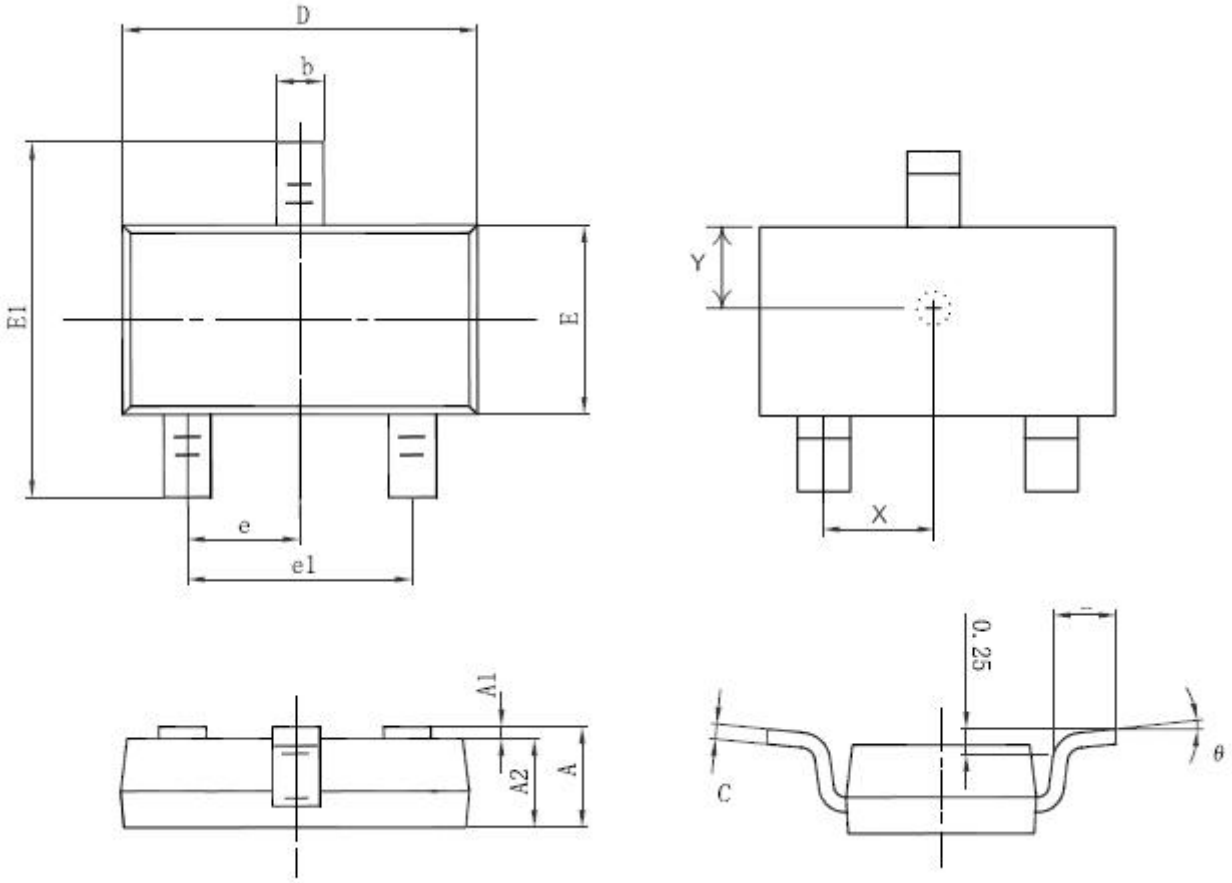


Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.900	3.000	3.100	0.114	0.118	0.122
b	0.350	0.390	0.560	0.014	0.015	0.022
b1	-	0.440	-	-	0.017	-
C	0.360	0.380	0.510	0.014	0.015	0.020
D	3.900	4.000	4.100	0.153	0.157	0.161
E	1.420	1.520	1.620	0.056	0.060	0.064
E1	-	0.750	-	-	0.030	-
E	-	1.270	-	-	0.050	-
e1	-	2.540	-	-	0.100	-
L	13.50	14.50	15.50	0.531	0.571	0.610
L1	-	1.600	-	-	0.063	-
θ1	-	6°	-	-	6°	-
θ2	-	3°	-	-	3°	-
θ3	-	45°	-	-	45°	-
θ4	-	3°	-	-	3°	-

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SOT23-3L:

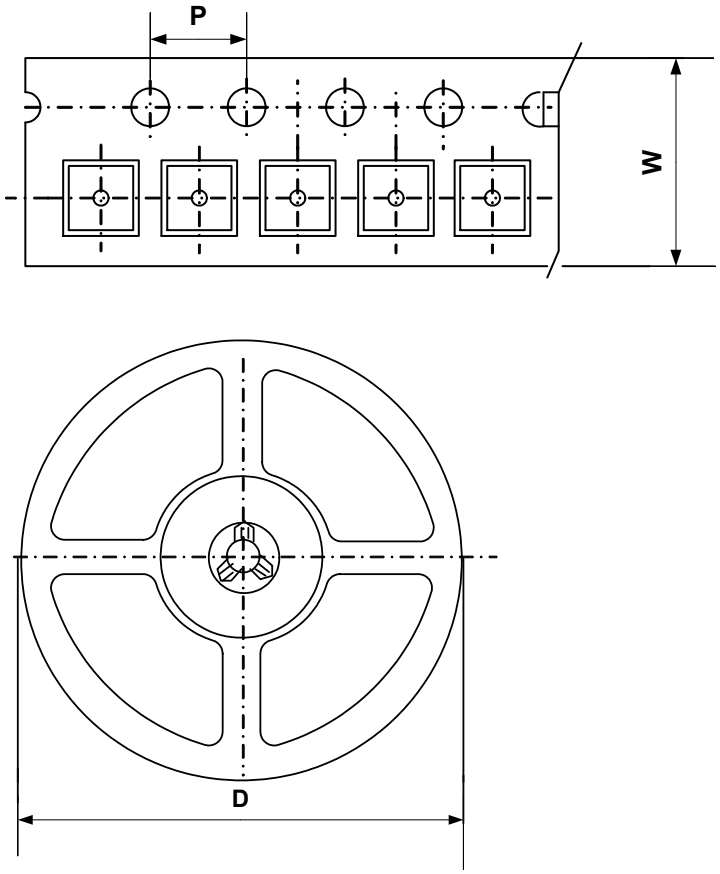


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
B	0.300	0.500	0.012	0.020
C	0.100	0.200	0.004	0.008
D	2.82	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.95	0.104	0.116
e	0.950(BSC)		0.037（BSC）	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°
X	0.950(BSC)		0.037(BSC)	
Y	0.750	0.850	0.030	0.033

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■ Packing Information

SOT23-3L



Package Type	Carrier Width (W)	Pitch (P)	Reel Size(D)	Packing Minimum
SOT23-3L	8.0±0.1 mm	4.0±0.1 mm	180±1 mm	3000pcs

Note: Carrier Tape Dimension, Reel Size and Packing Minimum

■ Packing Information

1. Packing type: Bulk
2. Packing minimum: 1000pcs

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