

## Single Digital Output Hall Effect Latch

### Features

- Internal pull high pre-driver
- 50mA maximum sink output current
- Precise magnetic switching thresholds
- Available in SOT-23 and SIP-3L packages

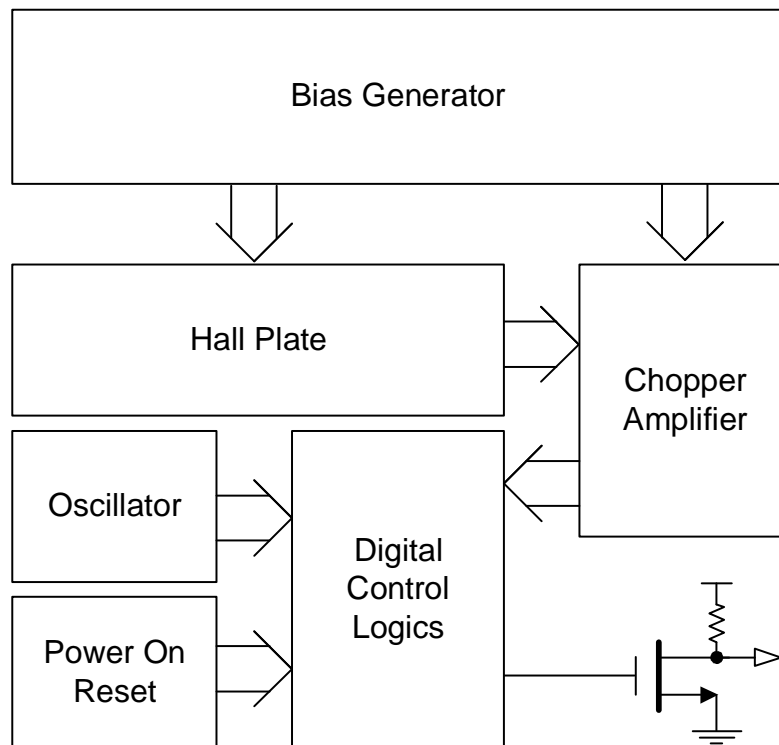


### General Description

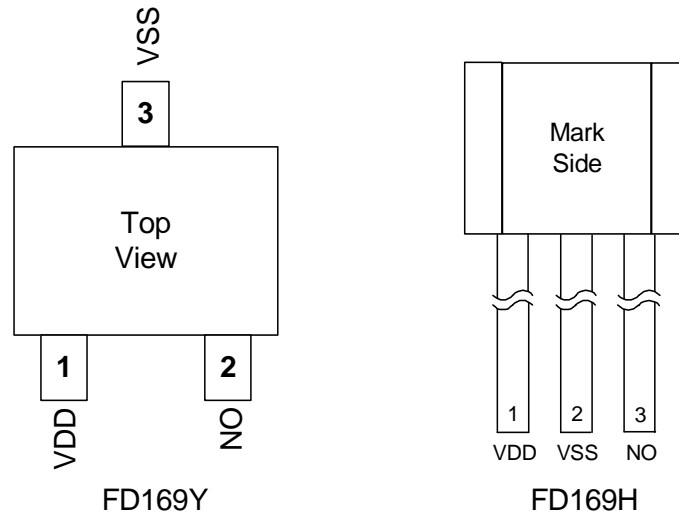
FD169Y/FD169H is a Hall sensor with latched digital output. It's suitable for electronic commutation of brushless DC motor applications. The FD169Y/FD169H uses a chopper amplifier for magnetic signal amplification, which can achieve a low offset and thus precise magnetic switching threshold.

The output of NO pin is active low or high depends on flux density of the external magnetic source which is larger than threshold of  $B_{OP}$  or  $B_{RP}$ .

### Block Diagram



**Figure.1**

**Pin Connection**

**Figure.2**
**Pin Descriptions**

Name	I/O	FD169Y	FD169H	Description
VDD	P	1	1	Positive power supply
VSS	G	3	2	Ground
NO	O	2	3	Driver output

Legend: I=input, O=output, I/O=input/output, P=power supply, G=ground

**Functional Descriptions**

Refer to the block diagram (Figure.1), FD169Y/FD169H is composed of the following building blocks:

- Bias Generator

The bias generator provides precise, temperature- and process-insensitive bias references for the analog blocks. These references guarantee proper operation of the chip under all conditions specified in this specification.

- Oscillator

Built-in oscillator provides the clock signal.

- Power on Reset

Used to detect the power-up ramp and reset the digital circuits to attain correct operation as soon as the power is ready.

- Chopper Amplifier

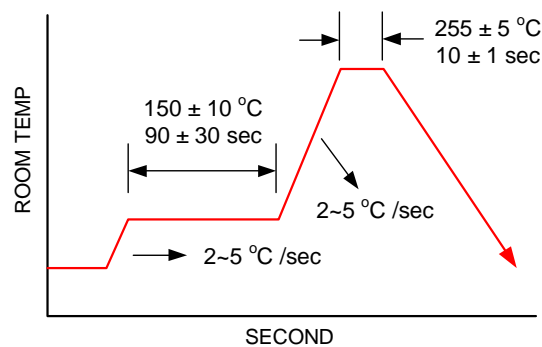
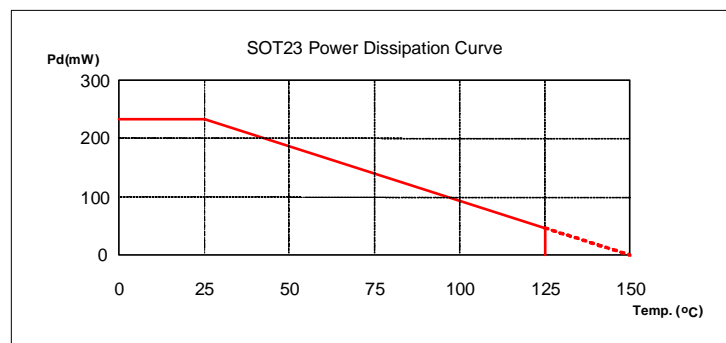
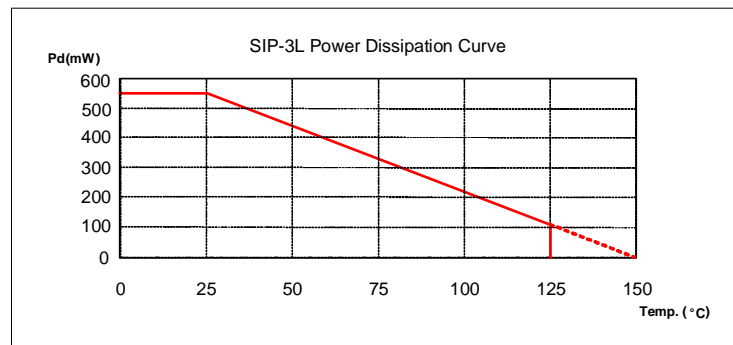
To achieve a higher magnetic sensitivity the chopper amplifier structure is adopted in this design. Use of this structure dynamically removes both the offset and flicker noise at the same time.

- Digital control logics

To generate an output switching signal from the chopper amplifier.

**Absolute Maximum Ratings**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operating Temperature	T <sub>OP</sub>	-	-40		125	°C
Storage Temperature	T <sub>ST</sub>	-	-40		150	°C
DC Supply Voltage	V <sub>DD</sub>	-	2.4		16	V
Supply Current	I <sub>DD</sub>	-			5	mA
Continuous Current	I <sub>O(CONT)</sub>				50	mA
Junction temperature	T <sub>J</sub>				150	°C
Power Dissipation	P <sub>D</sub>	SIP-3L			550	mW
		SOT-23			230	
IR-Reflow Lead Temperature	T <sub>P</sub>	10 sec			260	°C



### Recommended Operating Conditions

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Supply Voltage	$V_{DD}$	-	2.4		16.0	V
Operating Temperature Range	$T_A$	-	-40		125	°C

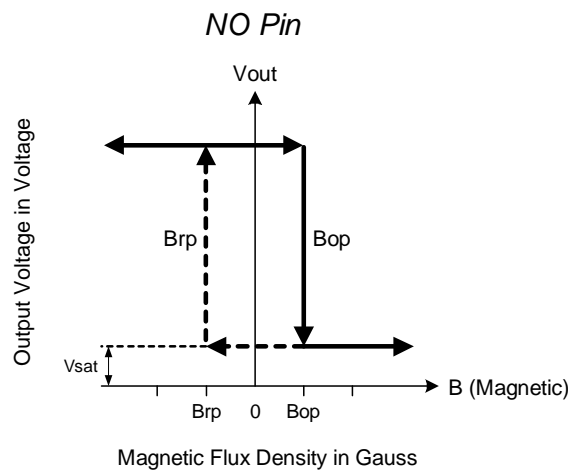
### Electrical Characteristics $V_{DD}=12.0V$ , $T_A=25^\circ C$ (unless otherwise specified)

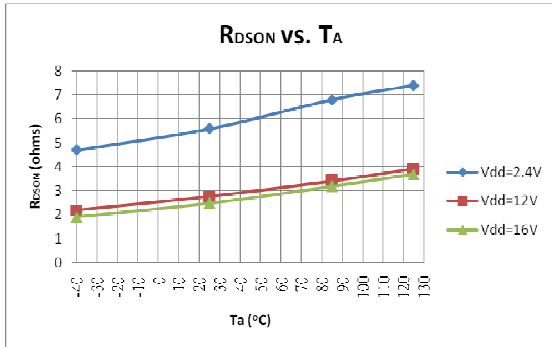
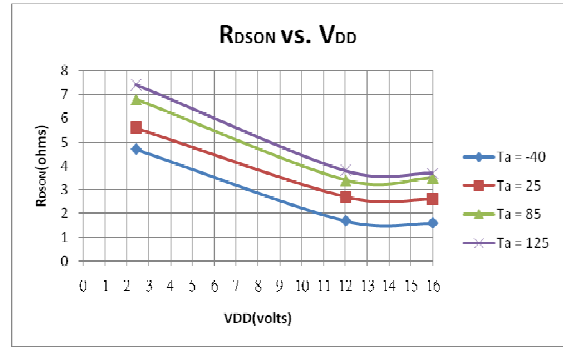
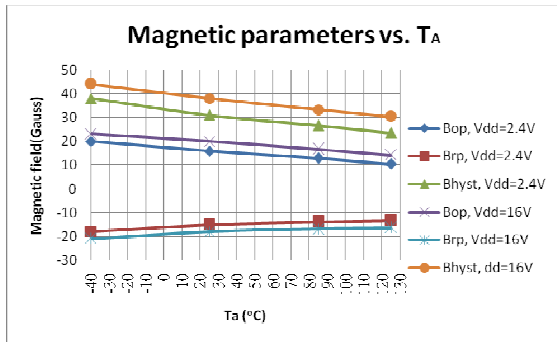
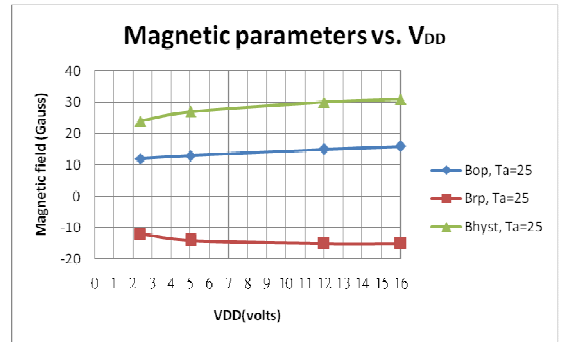
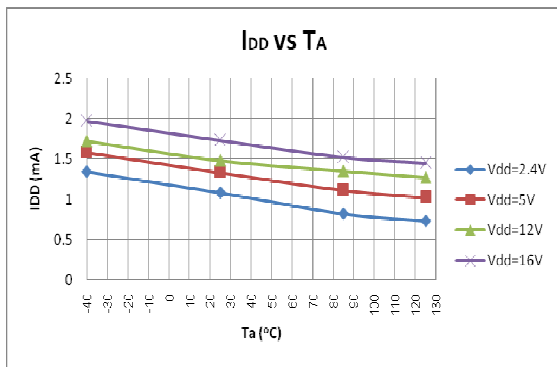
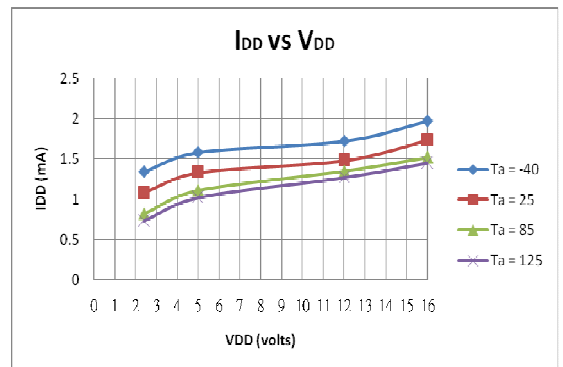
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Average Supply Current(no load)	$I_{DD}$			3.0		mA
Output Saturation Voltage	$V_{SAT}$	$I_{out}= 50mA$		0.5	0.8	V
Output Leakage Current	$I_{LK}$	$V_{out}=12V$			20	$\mu A$
On Resistance( $R_{NMOS}$ )	$R_{DS(ON)}$	$I_{out}= 50mA$		10		$\Omega$

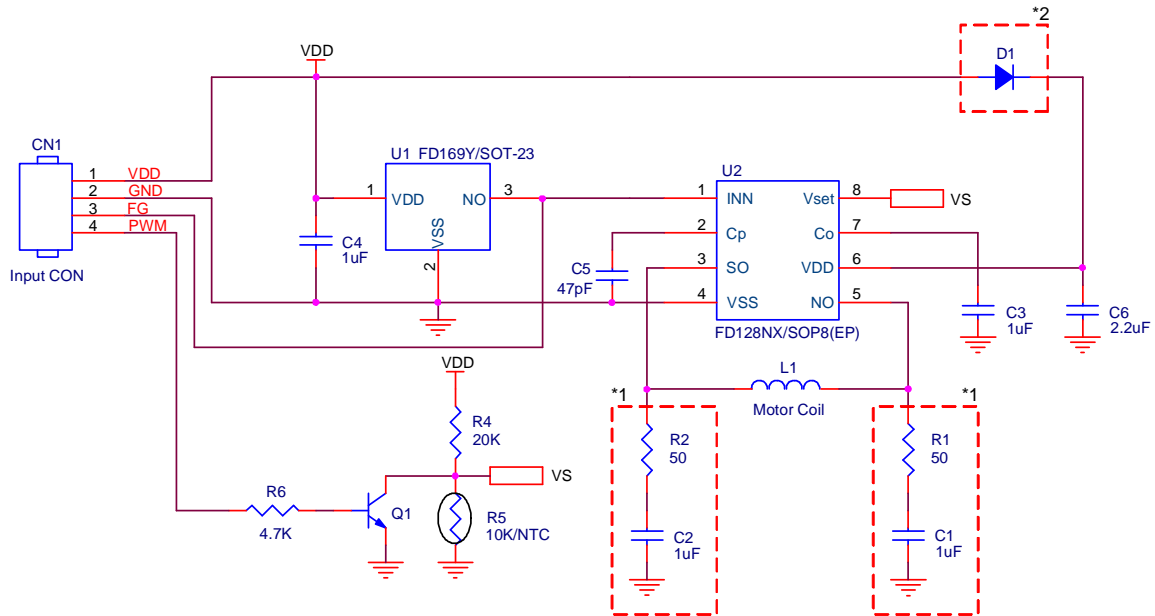
### Magnetic Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Operate Points ( $B_{OP}$ )	$B_{OP}$			20		G
Release Points ( $B_{RP}$ )	$B_{RP}$			-20		G
Hysteresis	$B_{HYS}$			40		G

### Hysteresis Characteristics

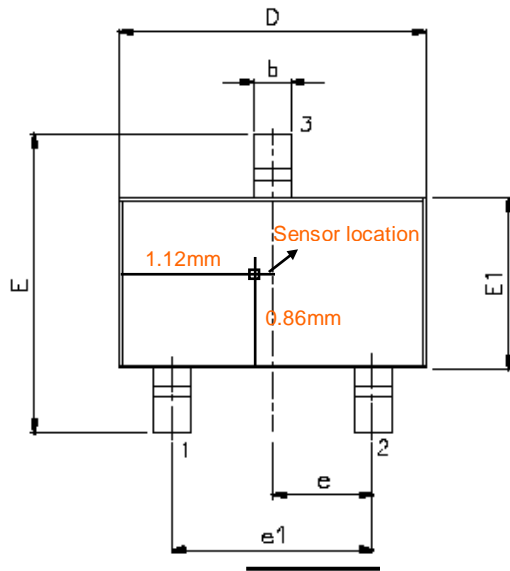


**Performance Graphs**

**Figure.3**

**Figure.4**

**Figure.5**

**Figure.6**

**Figure.7**

**Figure.8**

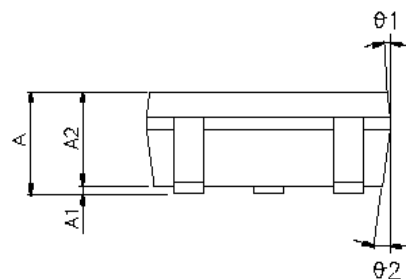
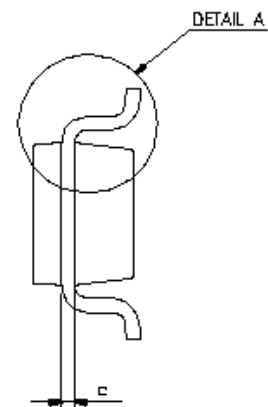
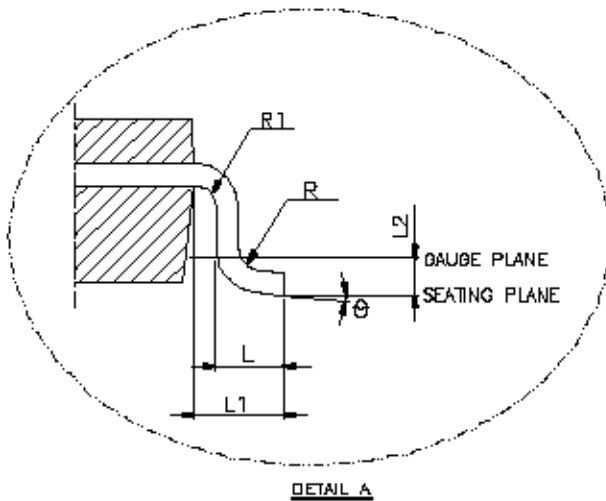
**Application Circuit Reference**

**Note**

1. Coil RC Snubbers are option for improved FAN noise
2. Diode D1 is used for FD128N reversed protection

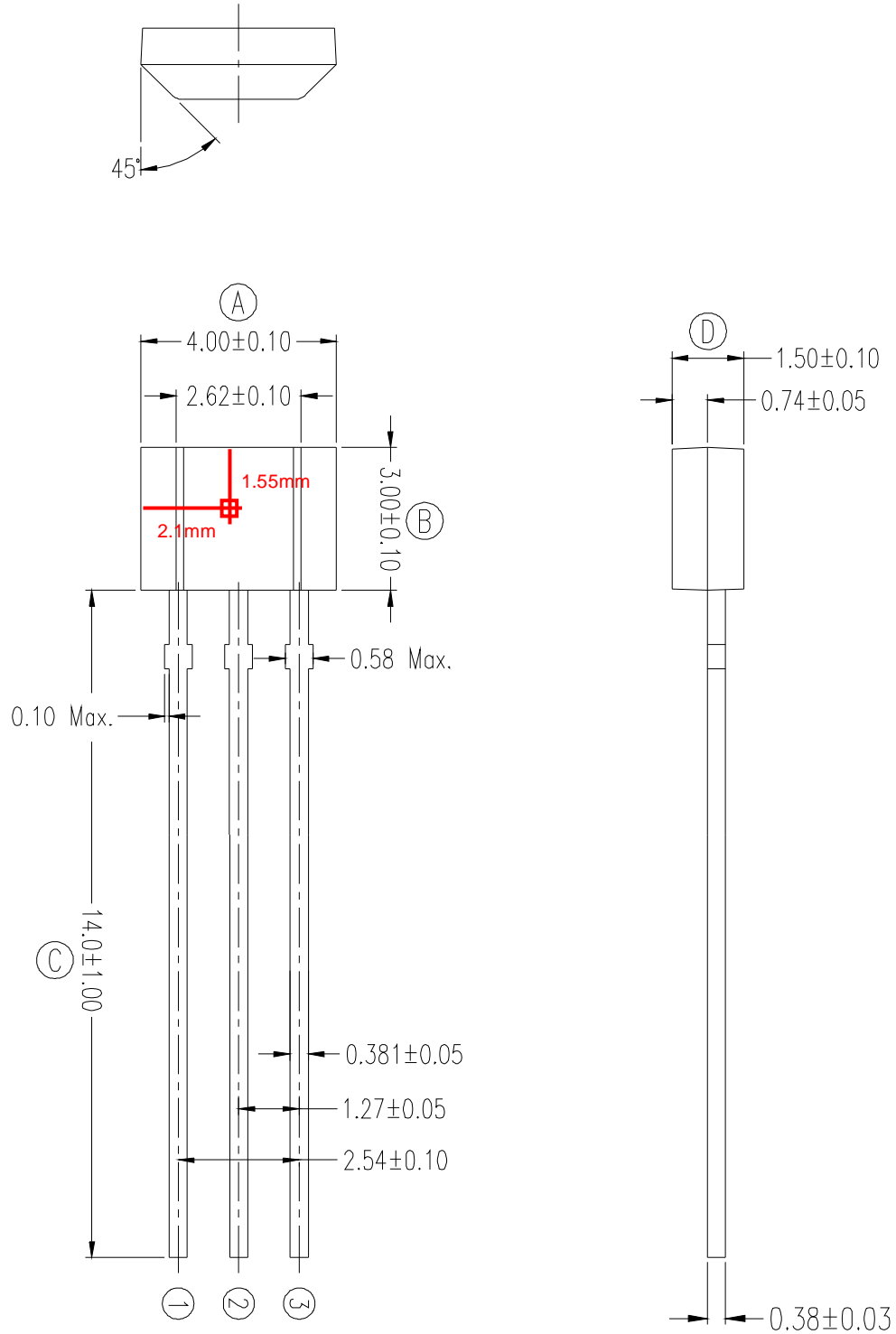
**Figure.9**

**Package Dimension  
SOT-23**


Symbols	Dimension In Millimeters		
	Min	Nom	Max
A	-	-	1.45
A1	-	-	0.15
A2	0.90	1.15	1.30
b	0.30	-	0.50
c	0.08	-	0.22
D	2.90BSC		
E	2.80BSC		
E1	1.60BSC		
e	0.95BSC		
e1	1.90BSC		
L	0.30	0.45	0.60
L1	0.60REF		
L2	0.25BSC		
R	0.10	-	-
R1	0.10	-	0.25
$\theta$	0°	4°	8°
$\theta 1$	5°	10°	15°

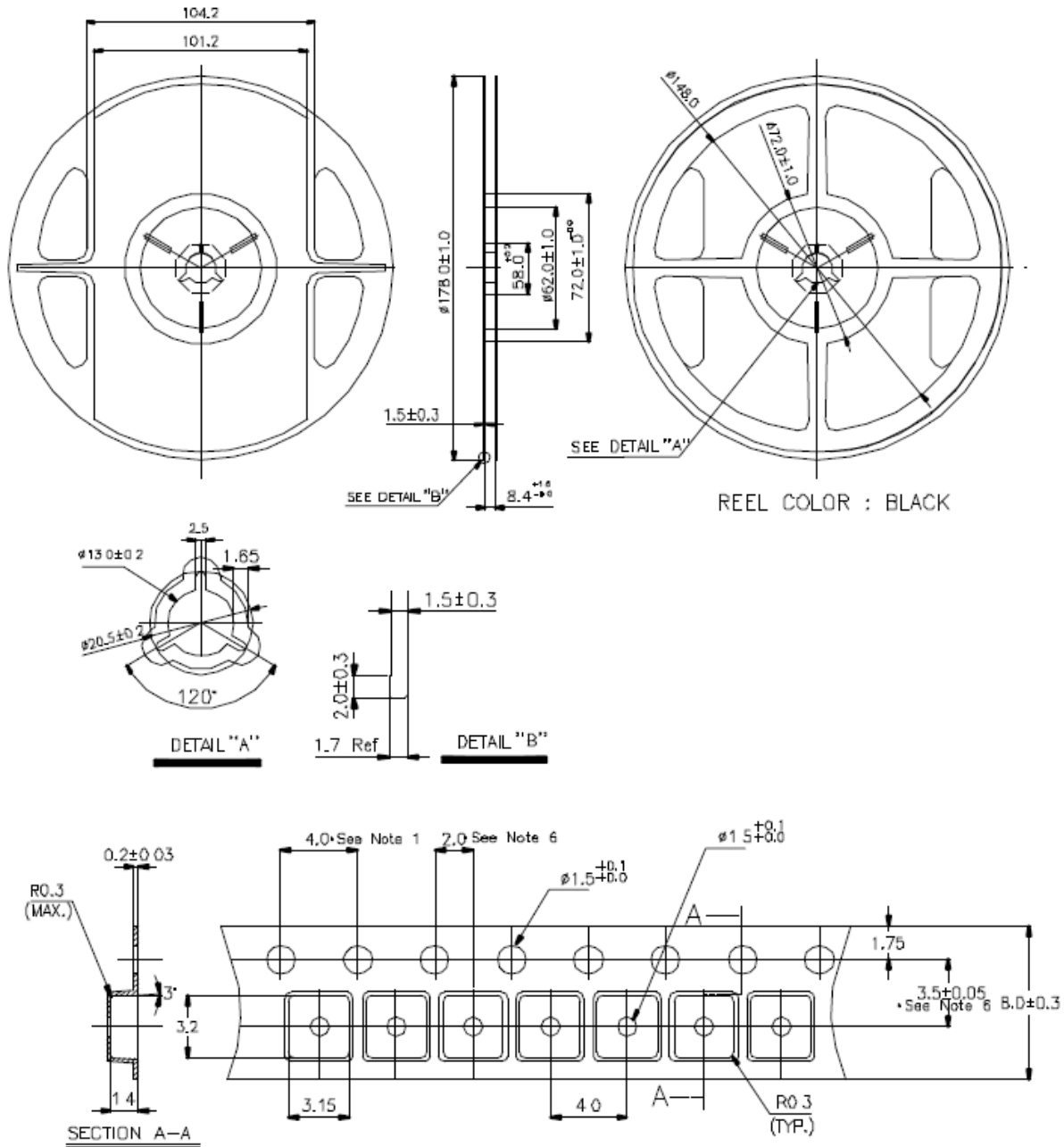


**SIP-3L**



Unit:mm

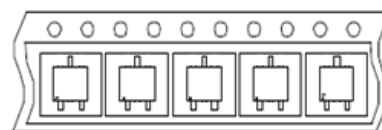


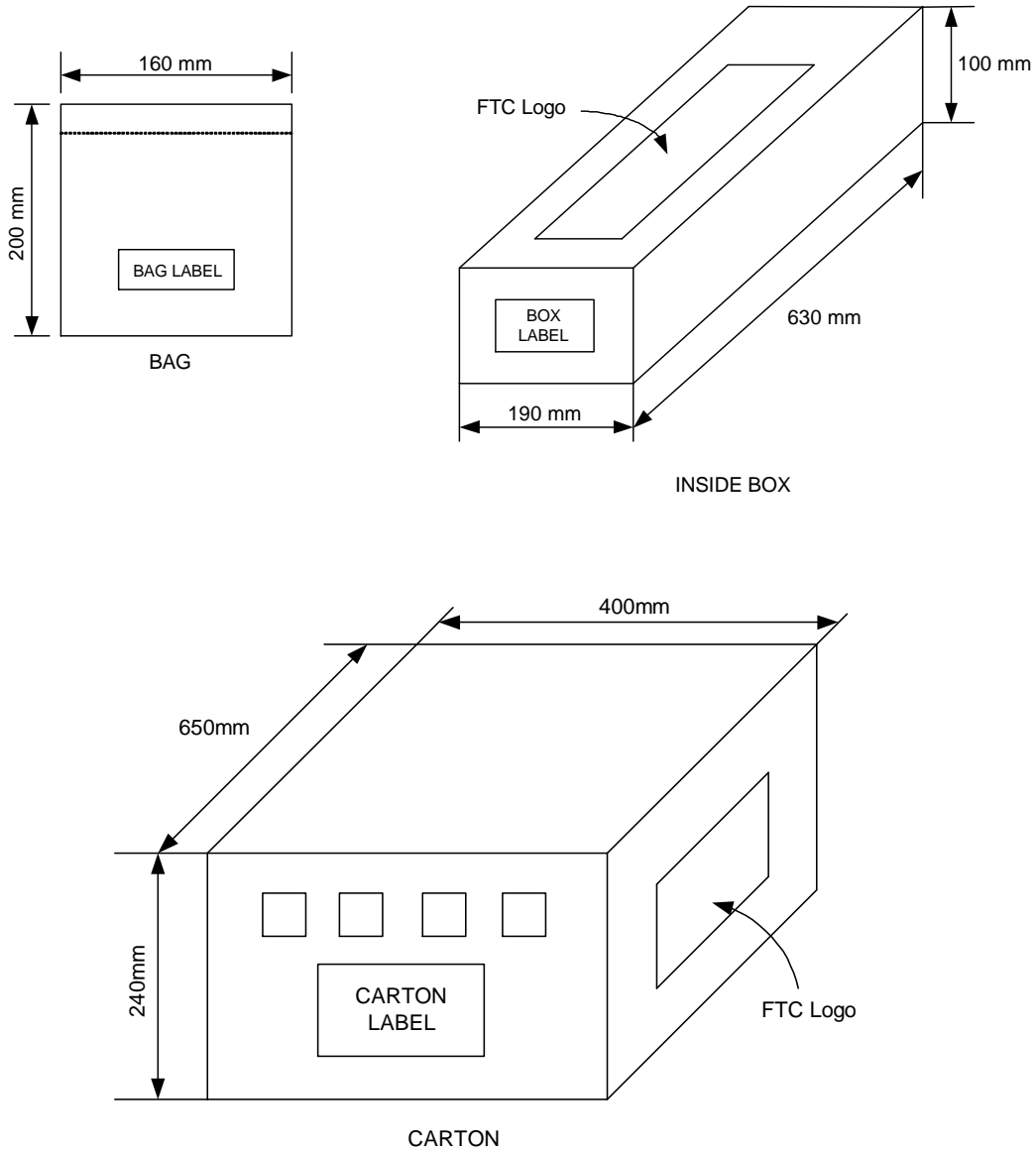
**Packing Specification (Tapping Reel)**
**SOT-23**

**Packing Quantity Specification**

2500ea / 1 Reel

4 Reels / 1 Inside Box

2 Inside Boxes / 1 Outside Box

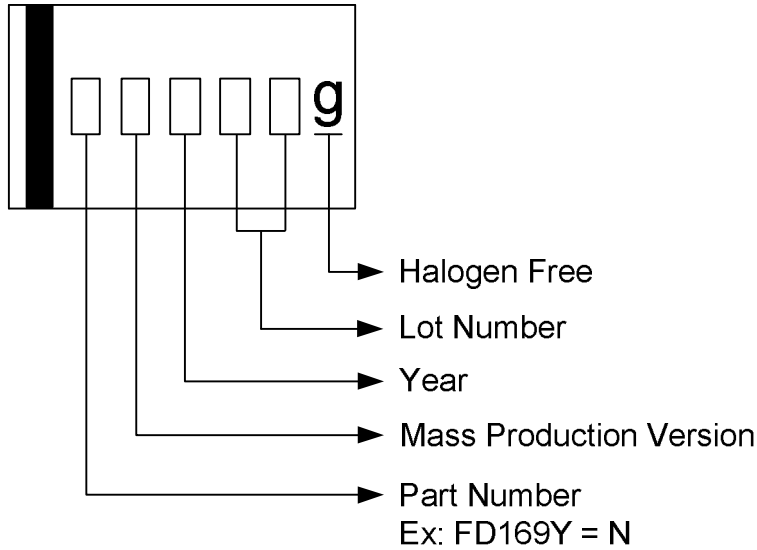


**SIP-3L****Bag & Box Dimension****Packing Quantity Specification**

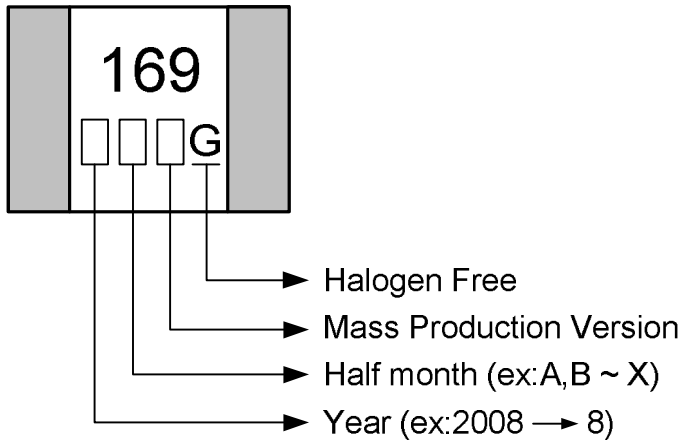
1000 ea/1 Bag

25 Bags/1 Inside Box

4 Inside Boxes/1 Carton

**IC Date Code Distinguish (SOT-23 / SIP-3L)**


[Top View]


**Order Information**

Part Number	Operating Temperature	Package	Description	MOQ
FD169YR-G1	-40 °C to +125 °C	SOT-23	±20G (B)	2,500ea/Reel
FD169H-G1	-40 °C to +125 °C	SIP-3L	±20G (B)	1,000ea