

Single Digital Output Hall Effect Latch

Features

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



General Description

FD168Y/FD168H is a Hall sensor with latched digital output. It's suitable for electronic commutation of brushless DC motor applications. The FD168Y/FD168H 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

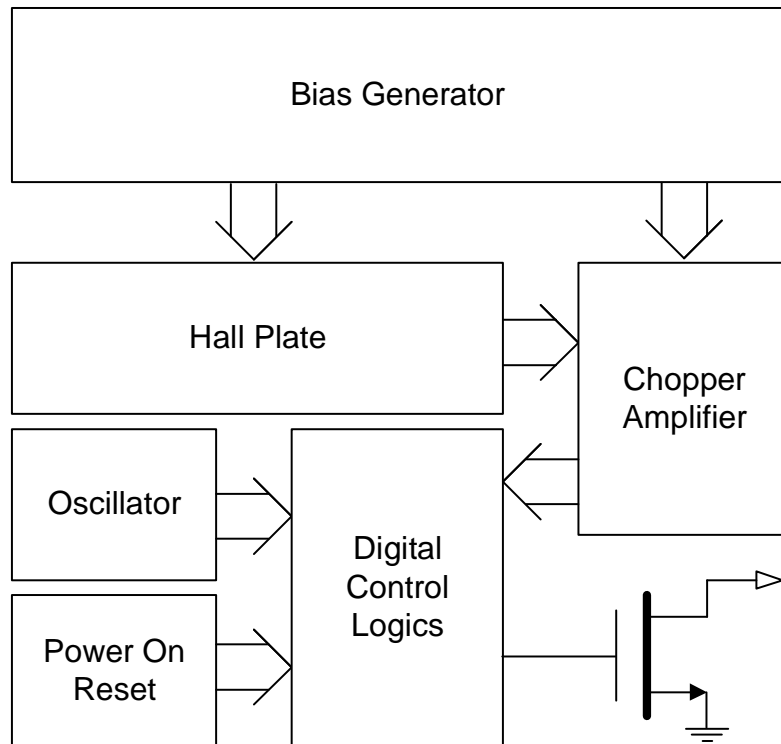


Figure.1

Pin Connection

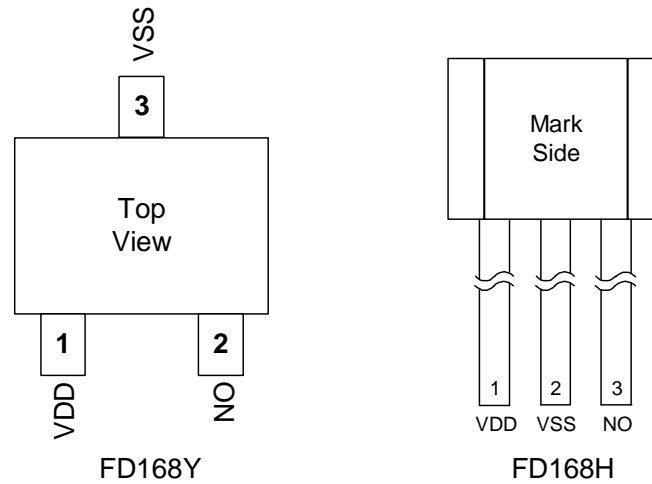


Figure.2

Pin Descriptions

Name	I/O	FD168Y	FD168H	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), FD168Y/FD168H 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

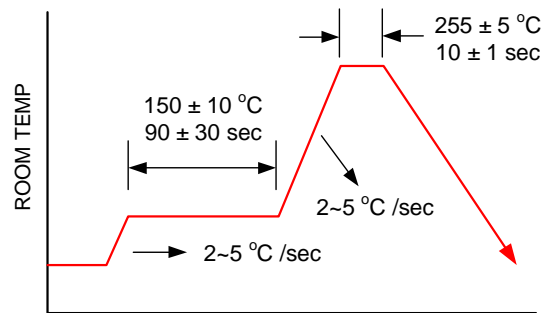
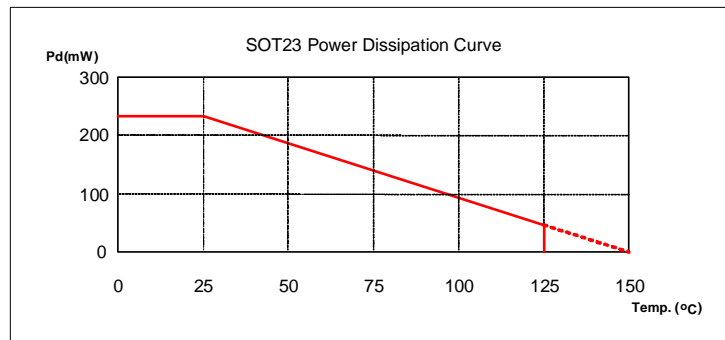
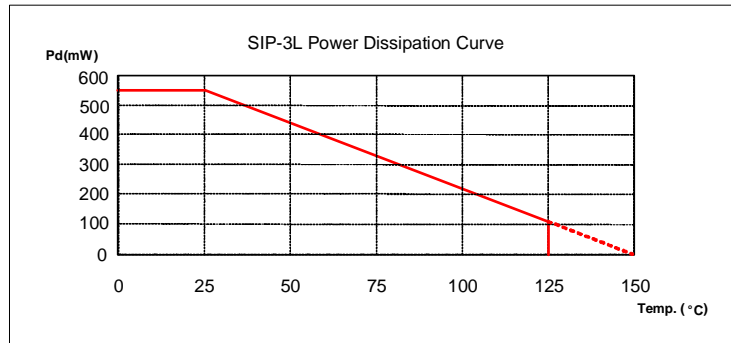
To achieve a higher magnetic sensitivity the chopper amplifier structure is adopted in this design. Use of this structure dynamically removes both the offset and flicker noise at the same time.

- 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 _{OP}	-	-40		125	°C
Storage Temperature	T _{ST}	-	-40		150	°C
DC Supply Voltage	V _{DD}	-	2.4		16	V
Supply Current	I _{DD}	-			5	mA
Continuous Current	I _{O(CONT)}				50	mA
Junction temperature	T _J				150	°C
Power Dissipation	P _D	SIP-3L			550	mW
		SOT-23			230	
IR-Reflow Lead Temperature	T _P	10 sec			260	°C


IR-ReFlow Soldering Condition

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

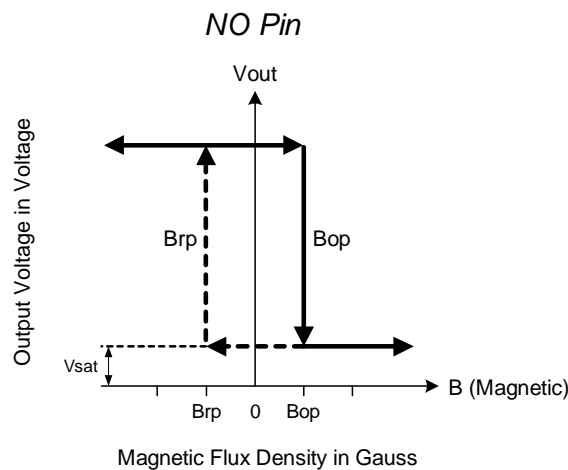
Electrical Characteristics $V_{DD}=12.0V$, $T_A=25^\circ C$ (unless otherwise specified)

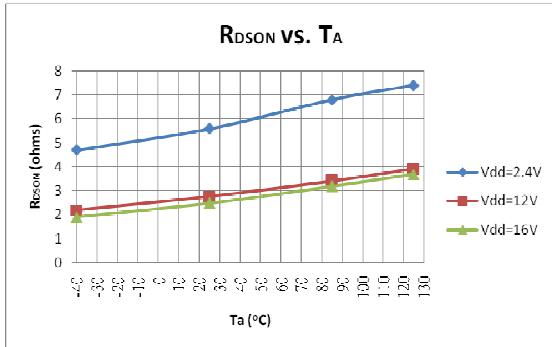
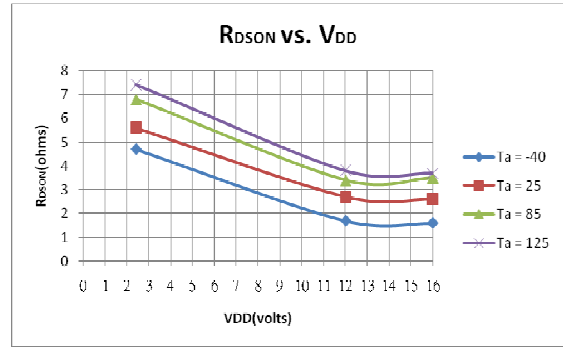
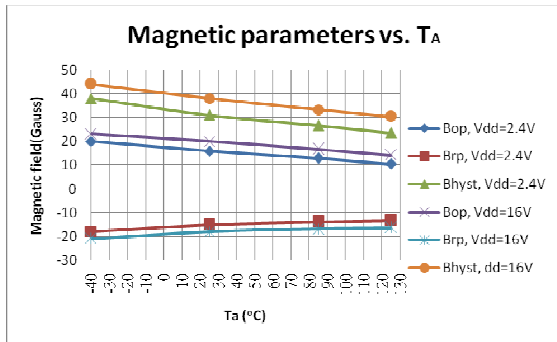
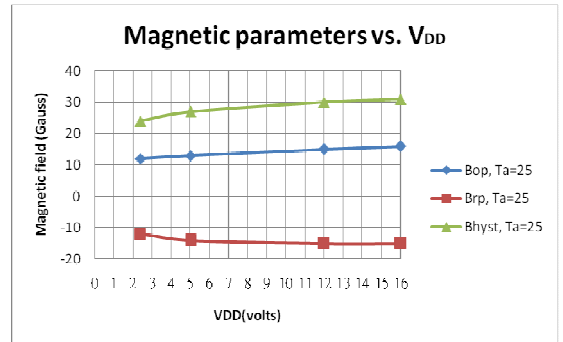
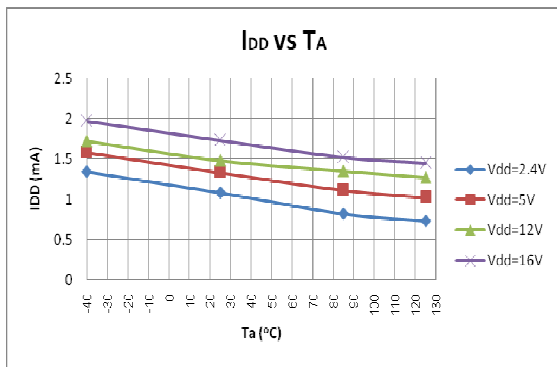
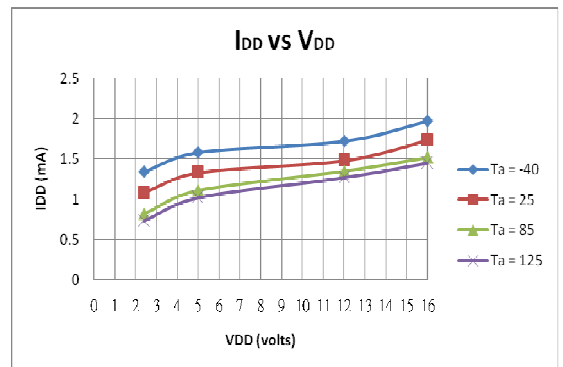
Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Average Supply Current(no load)	I_{DD}			3.0		mA
Output Saturation Voltage	V_{SAT}	$I_{out}= 50mA$		0.5	0.8	V
Output Leakage Current	I_{LK}	$V_{out}=12V$			20	μA
On Resistance(R_{NMOS})	$R_{DS(ON)}$	$I_{out}= 50mA$		10		Ω

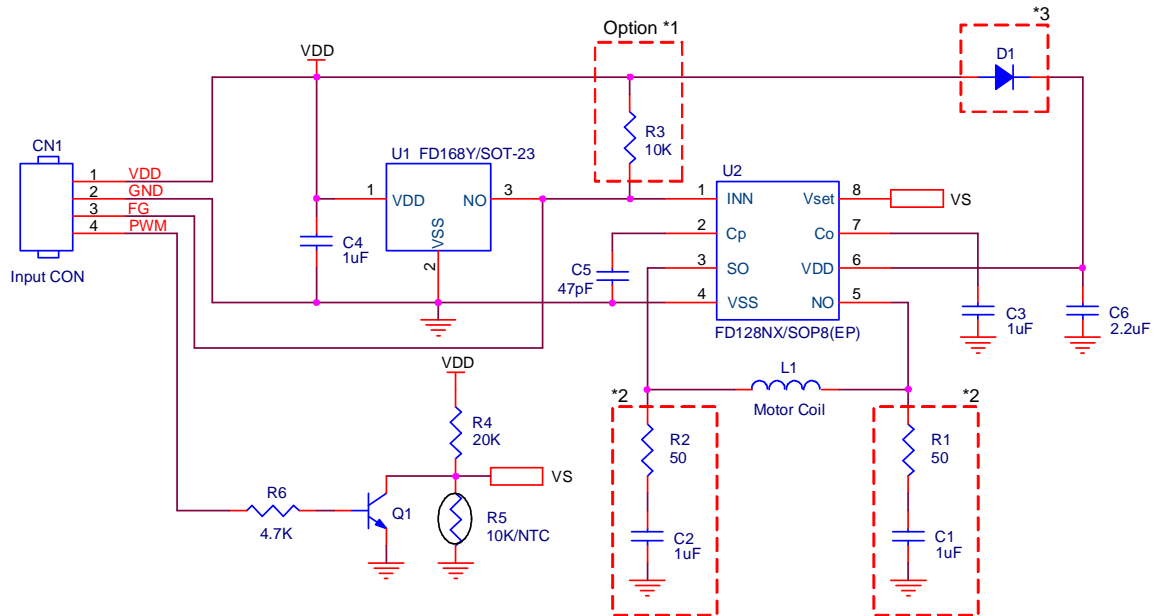
Magnetic Characteristics

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

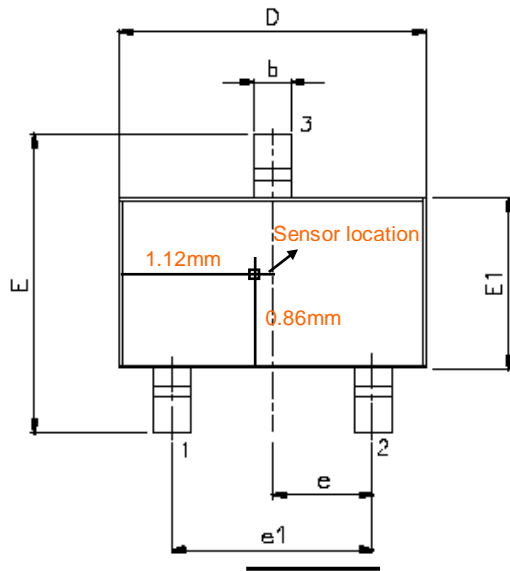


Performance Graphs

Figure.3

Figure.4

Figure.5

Figure.6

Figure.7

Figure.8

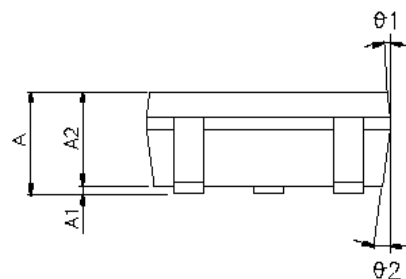
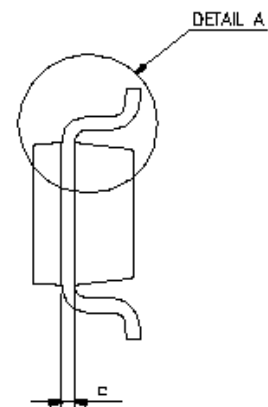
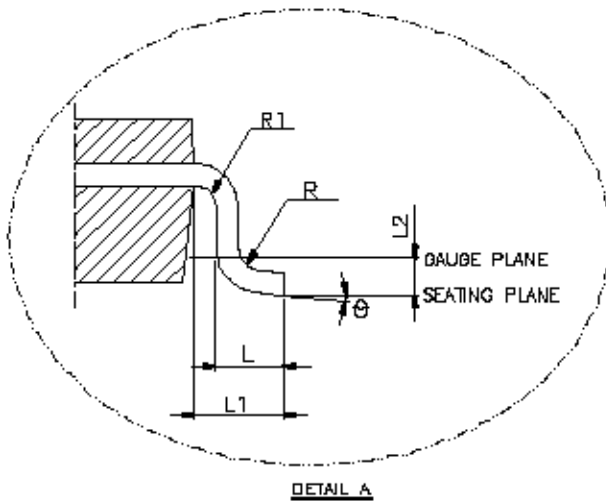
Application Circuit Reference

Note

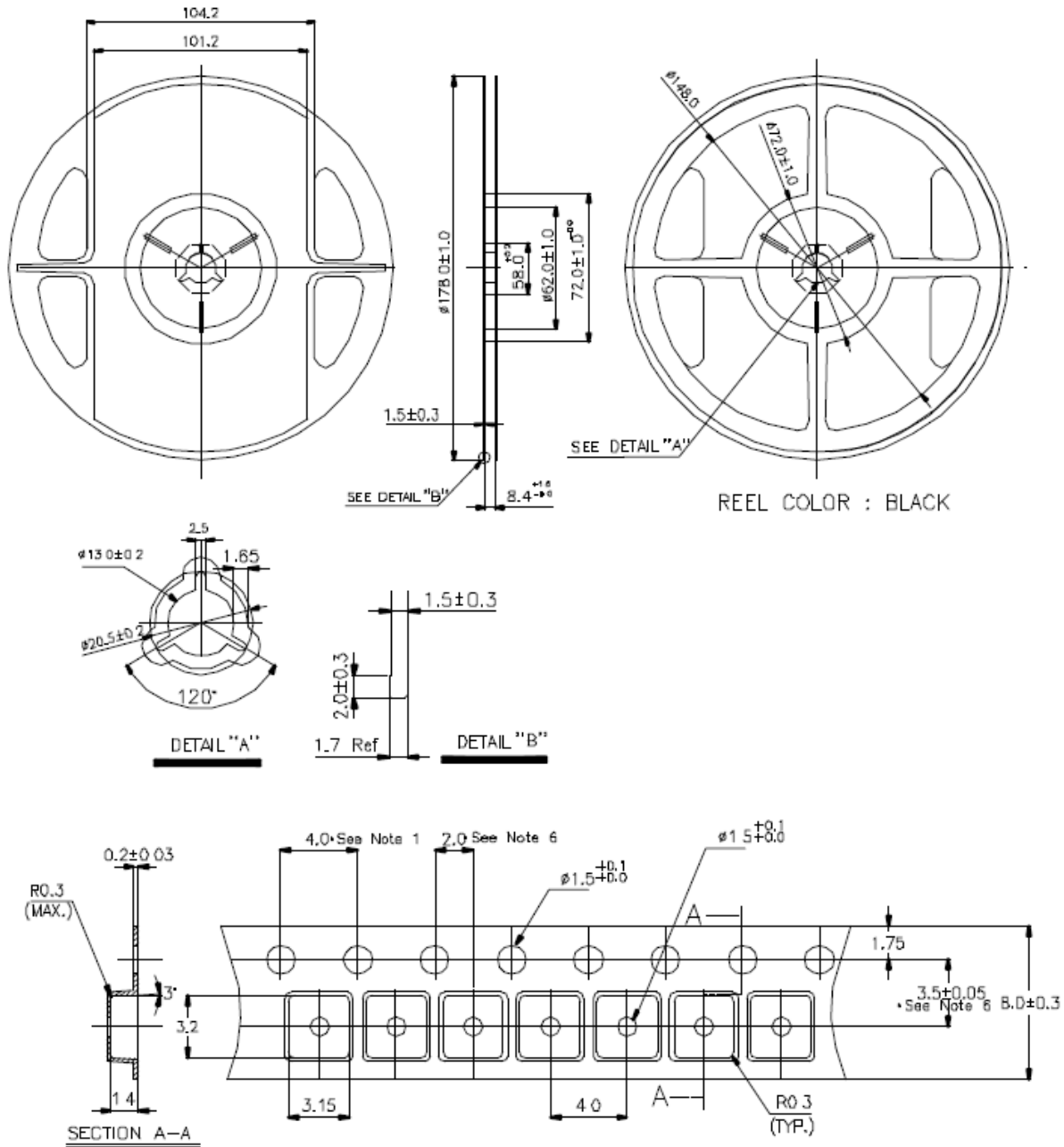
1. R3 is ignored for FG output application
2. Coil RC Snubbers are option for improved FAN noise
3. Diode D1 is used for FD128N reversed protection

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
Θ	0°	4°	8°
$\Theta 1$	5°	10°	15°

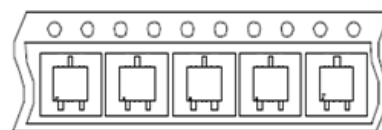


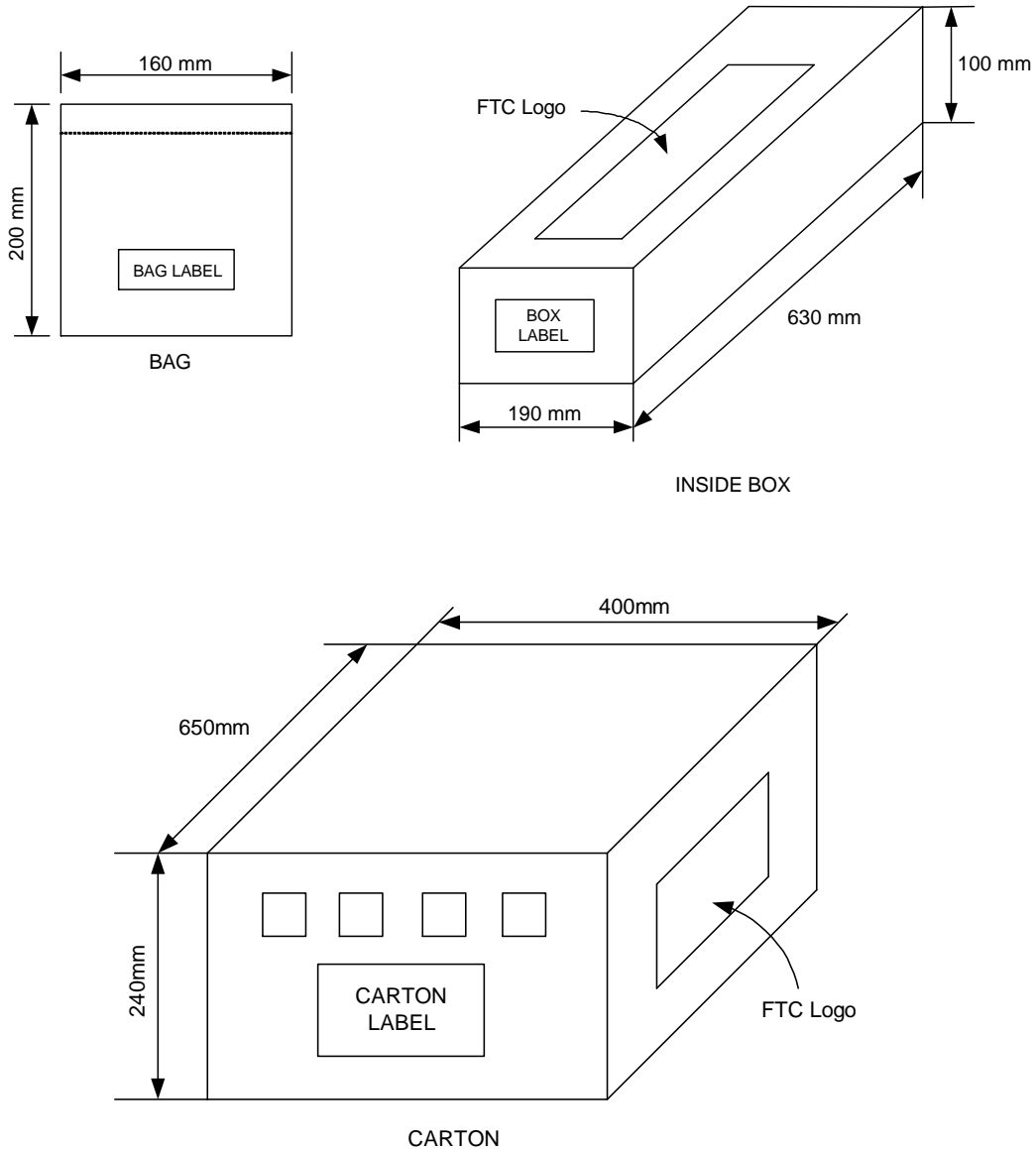
Packing Specification (Tapping Reel)
SOT-23

Packing Quantity Specification

2500ea / 1 Reel

4 Reels / 1 Inside Box

2 Inside Boxes / 1 Outside Box

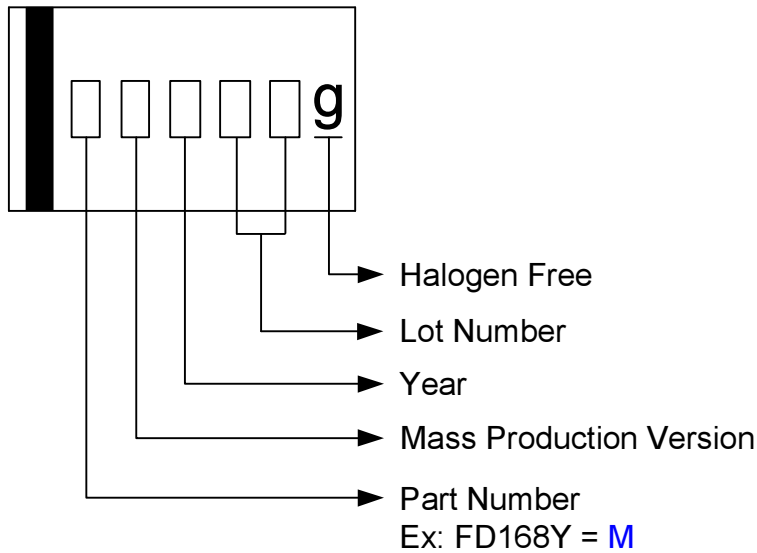


SIP-3L**Bag & Box Dimension****Packing Quantity Specification**

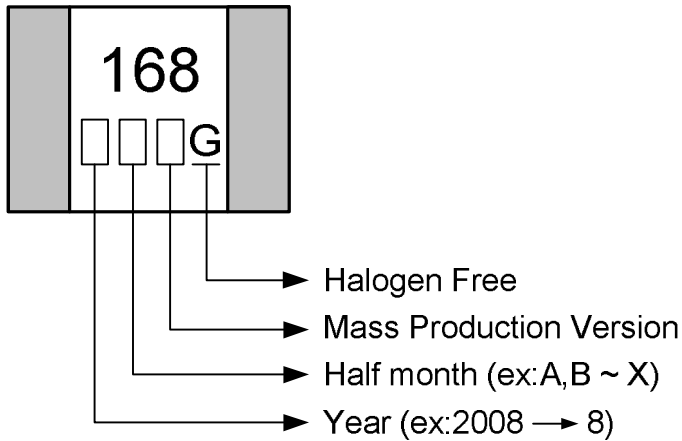
1000 ea/1 Bag

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
FD168YR-G1	-40 °C to +125 °C	SOT-23	±20G (B)	2,500ea/Reel
FD168H-G1	-40 °C to +125 °C	SIP-3L	±20G (B)	1,000ea