FD2H001A/Ba-LF

Low-Power Hall Switch

FEATURES

- Micro power consumption
- 2.4V to 5.5V battery operation
- Chopper Amplifier based design:
  Insensitive to noise and offset caused by process variations, operating temperatures and mechanical stress
- Digital output
- Programmable output direction
- CMOS process

GENERAL DESCRIPTION

FD2H001A/Ba-LF is a low-power integrated Hall switch designed to sense the applied magnetic flux density and give a digital output, which indicates the present condition of the magnitude sensed. One example of the applications is the on/off switch in cellular flip-phones.

The micro power design is especially suitable for battery-operated systems such as cellular phones or laptop computers, in which power consumption is one major concern. The typical power consumption of FD2H001A/Ba-LF is below 10μW at 2.7V.

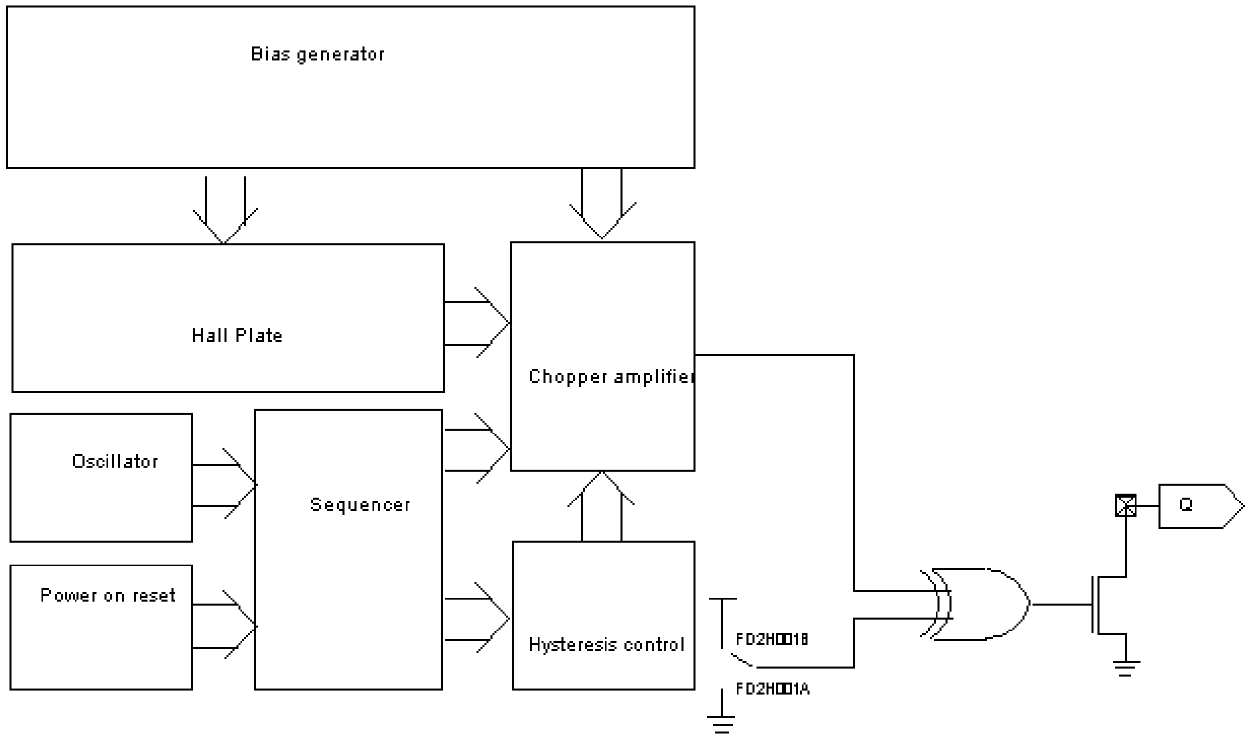
The magnetic switching points are precise and insensitive to process and temperature variations.

For FD2H001Aa-LF, the output will be at the “low” level when no magnetic field is applied. When the applied magnetic flux density is stronger than the switching threshold, the output would be at the “high” level.

For FD2H001Ba-LF, the output will be at the “high” level when no magnetic field is applied. When the applied magnetic flux density is stronger than the switching threshold, the output would be at the “low” level.

BLOCK DIAGRAM

Figure.1



PIN CONNECTION (TSOT23-3L)

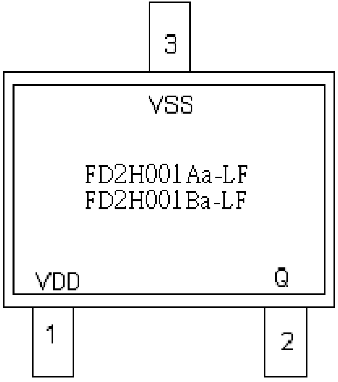


Figure.2

PIN DESCRIPTIONS

Name	I/O	Description
Q	O	Open Drain output
VDD	P	Positive supply
VSS	G	Ground

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

2.0 FUNCTIONAL DESCRIPTIONS

Refer to the block diagram (Figure.1), FD2H001A/Ba-LF is composed of the following building blocks:

- Bias generator

The bias generator provides precise, temperature and process insensitive current sources for both the Hall plate and the chopper amplifier. These current sources in turn guarantee proper operation of the chip and precise switching thresholds under all kinds of environments specified in the specification.

- Oscillator + Sequencer

The built-in oscillator provides the clock signal, which is taken by the sequencer to determine the periods of the operating phase and the stand-by phase. Typically the operating time is about 60us and the stand-by time is 150ms. Using such a clocking scheme, the average power consumption is almost equal to that in the stand-by phase, which is under 10μW at 2.7V.

- 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

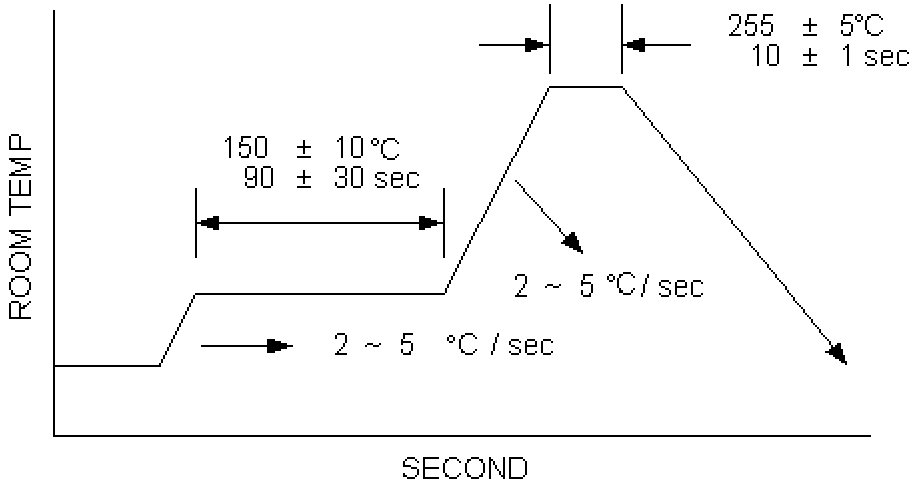
To achieve a higher resolution the chopper amplifier structure is adopted in this design. Use of this structure dynamically removes both the offset and flicker noise at the same time.

- Hysteresis Control

This block determines the switching threshold of the Hall switch in different situations.

ABSOLUTE MAXIMUM RATINGS

Parameter	**Conditions**	**Values**		**Unit**
		min.	**max.**	
Ambient Operating Temperature	-	-40	85	℃
Storage Temperature	-	-40	150	℃
DC Supply Voltage	-	2.4	5.5	V
Supply Current	-	-1	2.5	mA
Programming Pin Voltage (only available for FD2H001L-LF)	With respect to VSS	-0.3	5.5	V
Magnetic Flux Density	-		unlimited	mT
Lead Temperature	10sec	-	260	℃



Soldering Condition

OPERATING CONDITIONS

Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Supply Voltage	-	2.4	2.7	5.5	V
Output Voltage	-	-0.3	2.7	5.5	V
Ambient Temperature	-	-40	25	85	℃

ELECTRICAL CHARACTERISTICS

Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Average Supply Current			3[1]	20	μA
Average Supply Current (operating phase)			1.1[1]		mA
Average Supply Current (stand-by phase)			2.5[1]		μA
Output Saturation Voltage			0.1		V
Output Leakage Current			0.01		μA
Operating time			60		μs
Standby time			150		ms
Duty cycle			0.04		%

1. operating voltage 2.7V

MAGNETIC CHARACTERISTICS

FD2H001Aa-LF

Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Operate Points ($\lvert B_{OP} \rvert$)		30	45	60	G
Release Points ($\lvert B_{RP} \rvert$)		40	55	70	G
Hysteresis		5	10	15	G

FD2H001Ba-LF

Parameter	Conditions	Values			Unit
		min.	typ.	max.	
Operate Points ($\lvert B_{OP} \rvert$)		40	55	70	G
Release Points ($\lvert B_{RP} \rvert$)		30	45	60	G
Hysteresis		5	10	15	G

MAGNETIC FLUX

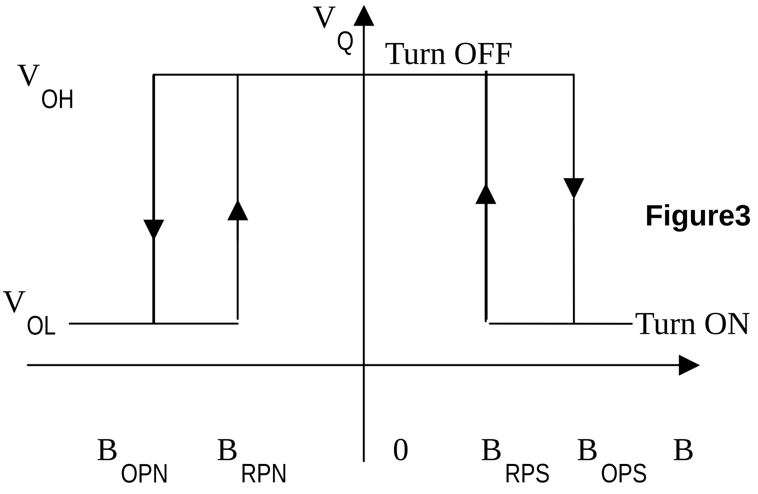


Figure3 . FD2H001Ba-LF

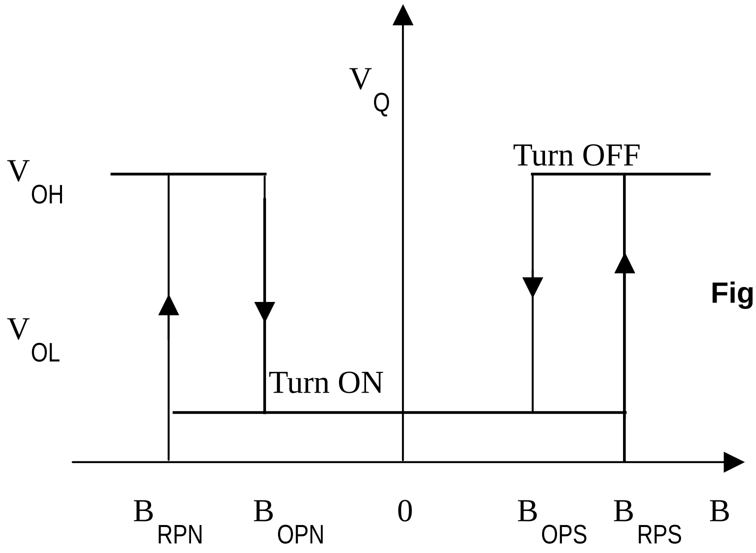


Figure4 . FD2H001Aa-LF

TYPICAL CHARACTERISTICS (For Example FD2H001Ba-LF)

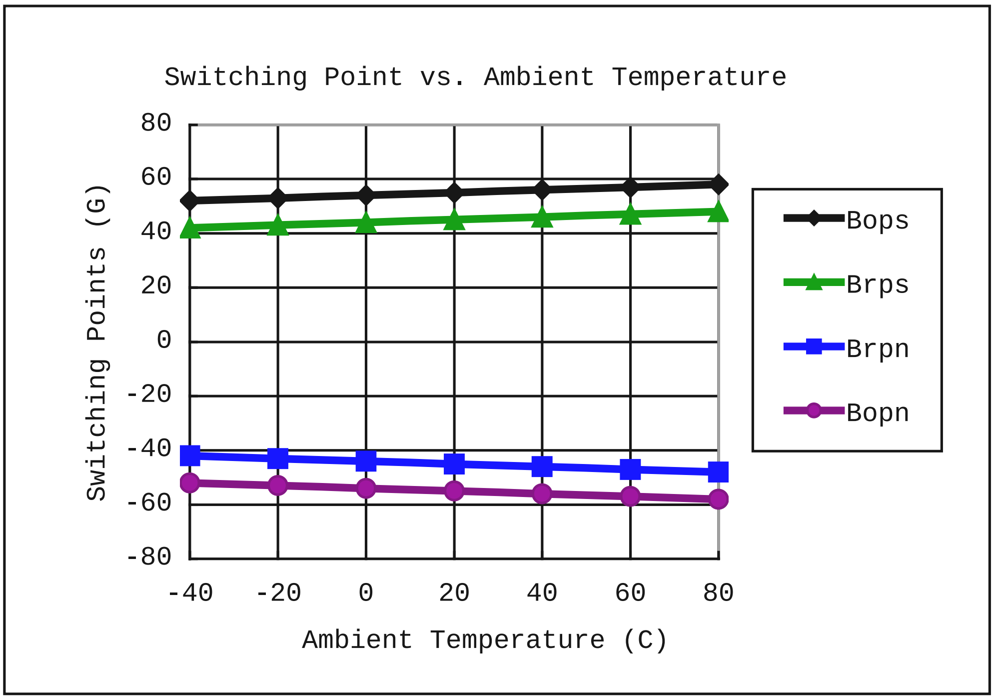


Figure.5 Magnetic Switch Points Versus Ambient Temperature (VDD=2.7V)

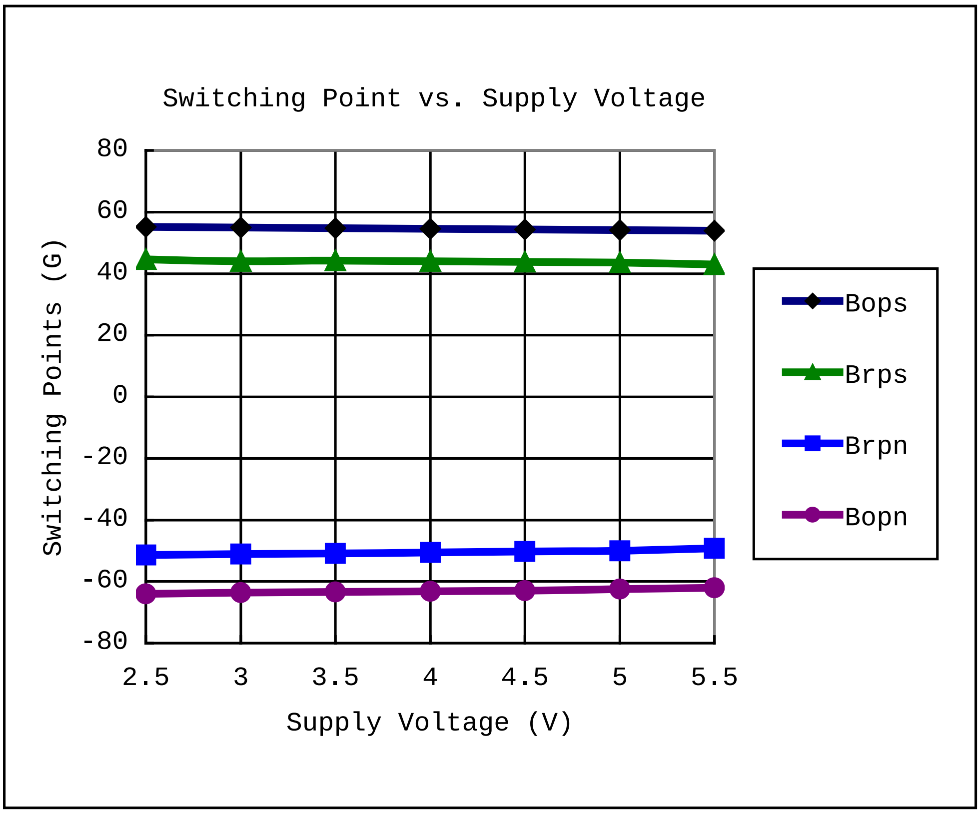


Figure.6 Magnetic Switch Points Versus Supply Voltage (Ta=25C degree)

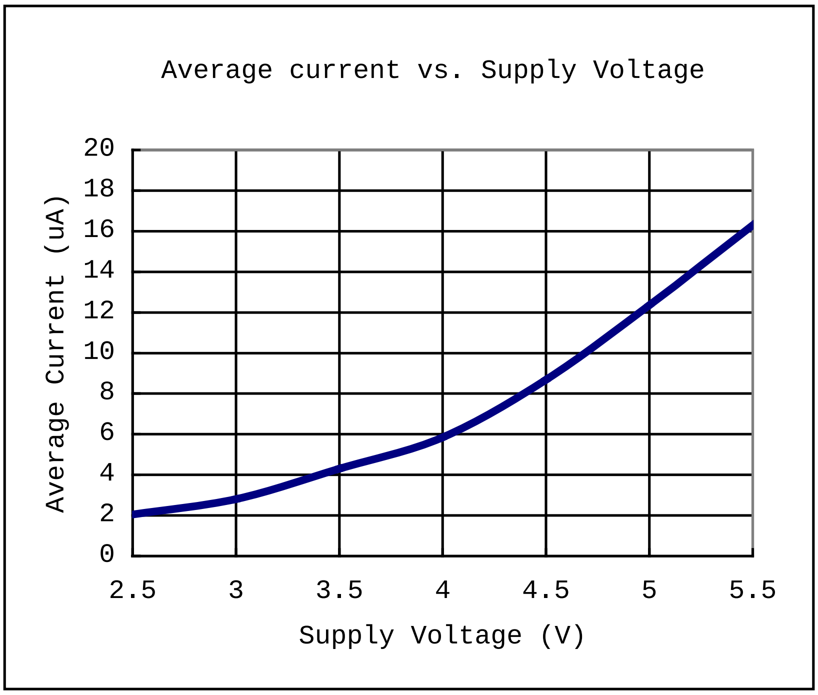


Figure.7 Average Current Versus Supply Voltage (Ta=25C degree)

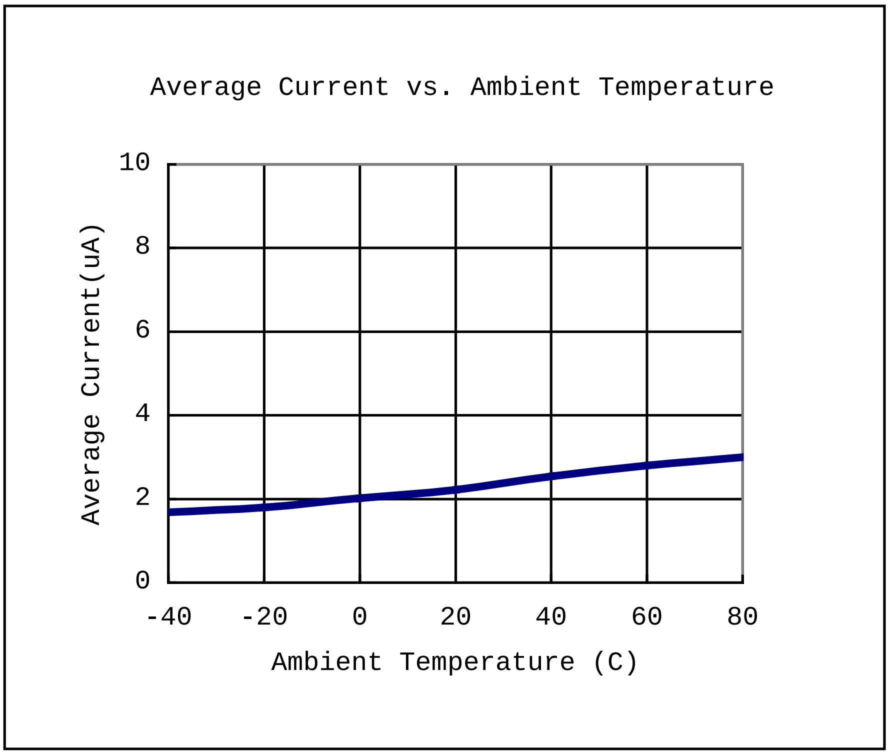
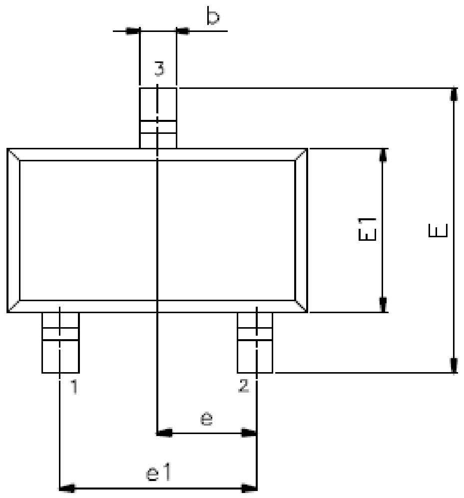


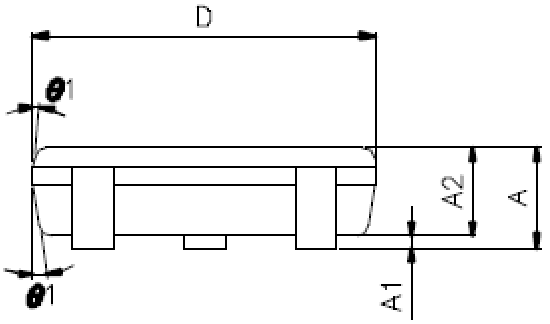
Figure.8 Average Current Versus Ambient Temperature (VDD=2.7V)

PACKAGE DIMENSION

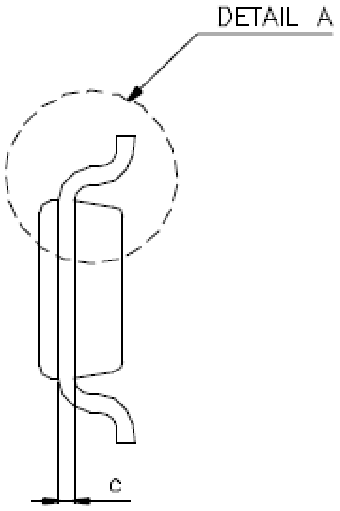
Unit : MM

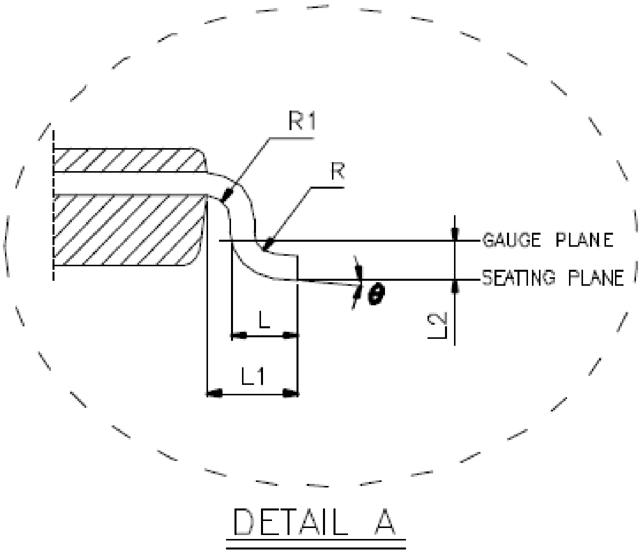
TSOT23-3L



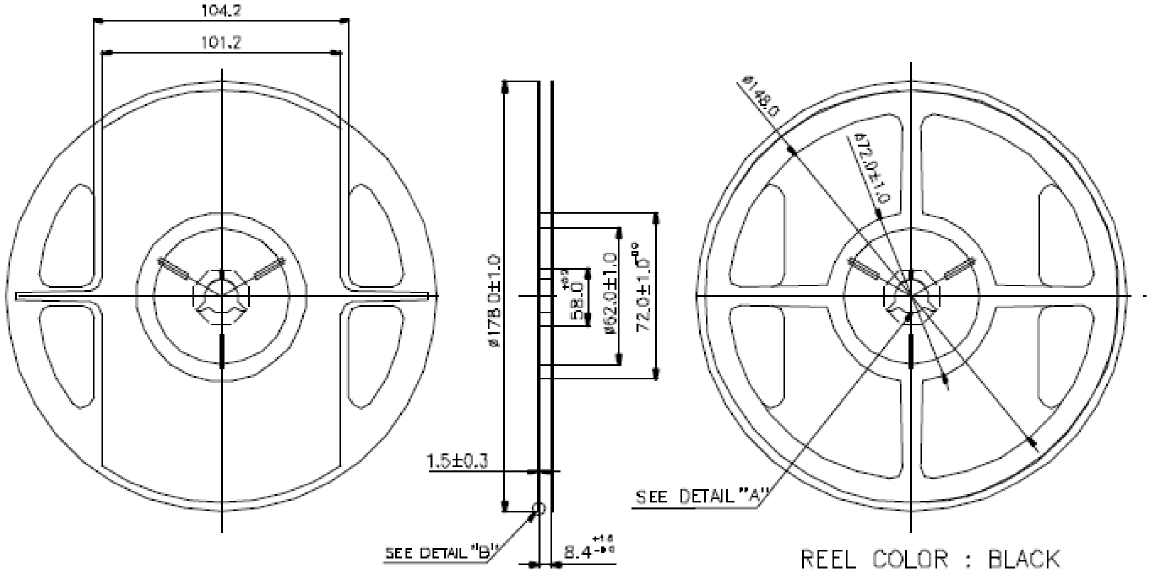


Symbols	Dimension In Millimeters		
	Min	Nom	Max
A	0.750	-	0.800
A1	0.025	-	0.050
A2	0.700	0.750	0.775
b	0.350	-	0.500
c	0.100	-	0.200
D	2.800	2.900	3.000
E	2.600	2.800	3.000
E1	1.500	1.600	1.700
e	0.950 BSC		
e1	1.900 BSC		
L	0.370	0.450	0.600
L1	0.600 REF		
L2	0.250 BSC		
R	0.100	-	-
R1	0..100	-	0.250
Θ	0°	4°	8°
Θ1	4°	10°	12°

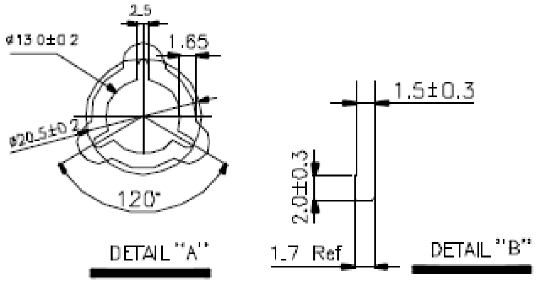


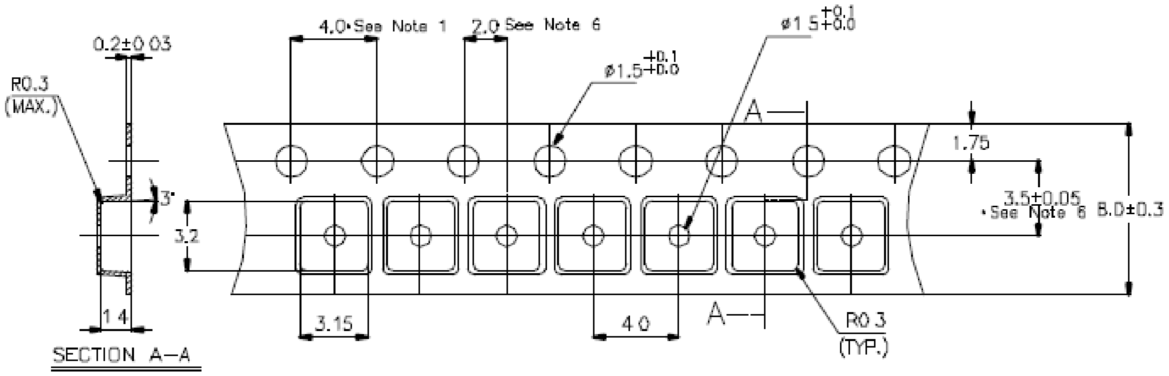


PACKING SPECIFICATION (Tapping Reel)



REEL COLOR : BLACK





PACKING QUANTITY SPECIFICATION

2500ea / 1 Reel

4 Reels / 1 INSIDE BOX

2 INSIDE BOXes / 1 OUTSIDE BOX

APPLICATION REFERENCE

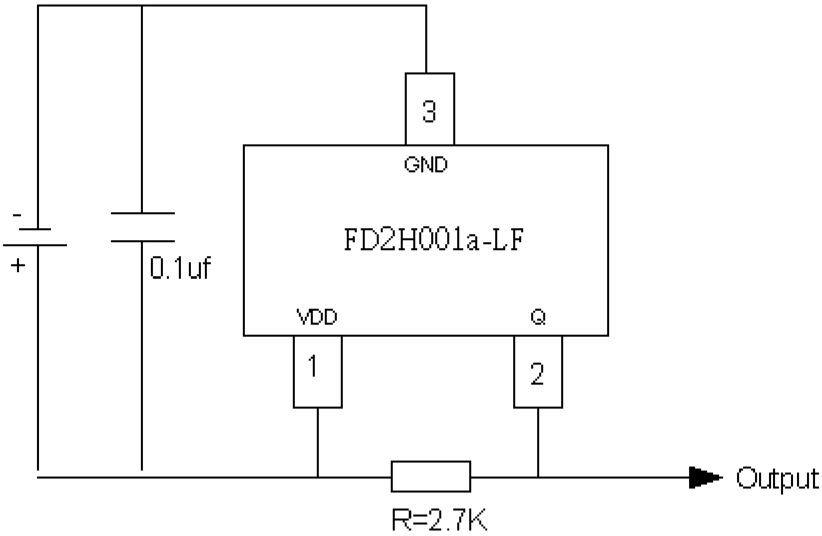
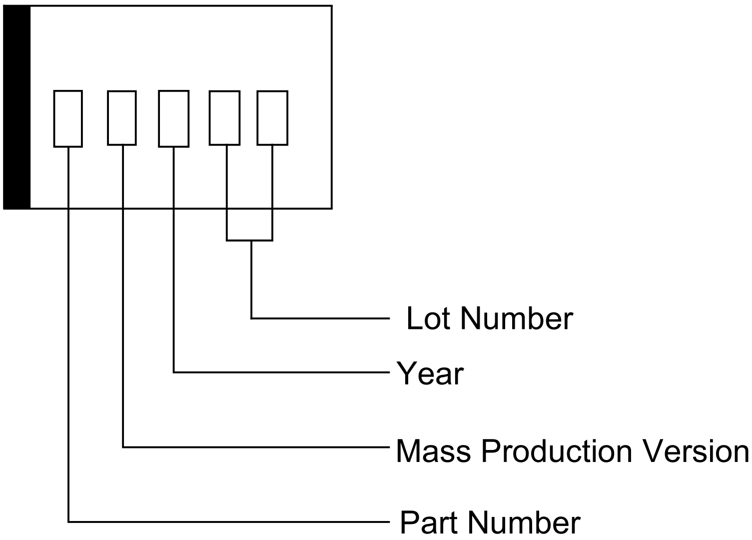


Figure10 . FD2H001A/Ba-LF Application Circuit

IC DATE CODE DISTINGUISH



ORDER INFORMATION

Tapping Reel :

Type	Marking	Package
FD2H001AaR-LF	BCYNN	TSOT23-3L
FD2H001BaR-LF	CCYNN	TSOT23-3L