MT876X

RoHS

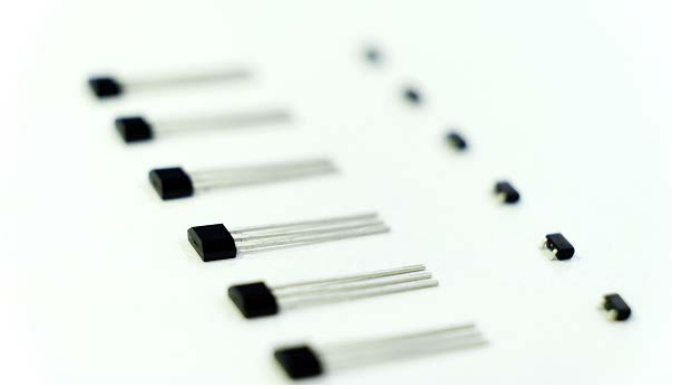
MagnTek | Now Part of NOVOSENSE

Latch, Hall-Effect Magnetic position sensor

1 Product Description

The MT876X family is produced by BCD technology with both high performance and high reliability. The Hall IC internally includes an on-chip Hall voltage generator, a voltage requlator for operation with supply voltage of 2.4V to 24V, a small signal amplifier, Hall sensors with dynamic offset cancellation, a schmitt trigger and an open-drain output with over-current protection. It features temperature compensation technique to make the magnetic switching points stable over a wide temperature range. Other key features such as reverse supply voltage protection, output over-current protection and ESD level exceeding ±6KV (HBM) make the IC extremely robust and fault tolerant, which is important in demanding application environment such as automotive. Its extremely low operating supply voltage 2.4V also makes it possible to add external resistance in series with the supply pin for even greater protection against high voltage transients from the power supply.

The MT876X family provides a variety of packages to customers: DFN, SOT-23 & SOT-23 thin outline for surface mount and flat TO-92 for through-hole mount. All packages are RoHS compliant.



2 Features

- 2.4～24V Operating Vcc Range
- -40℃~150℃ Operating Temperature
- Package Option:
  SOT-23 / SOT-23 (Thin Outline)
  DFN 1616 / Flat TO-92
- Open Drain Output
- -27V Reversed Power Supply Protection
- Output Limiting Current Protection
- RoHS Compliant: (EU)2015/863

Item	MT8762	MT8763	MT8765
Magnetic Sensitivity	BOP=20Gs, BRP=-20Gs		
Switching Frequency	100KHZ	15KHZ	100KHZ
I_{OUT} (Vsat<0.4V)	10mA	10mA	2.5mA

3 Product Overview of MT876X

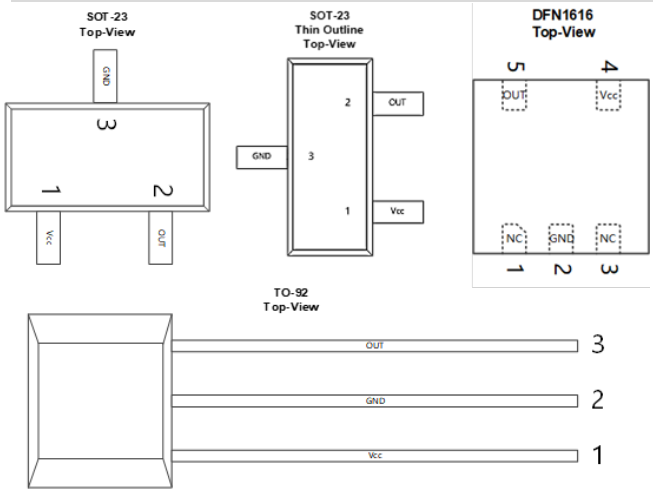
Part No.	Description
MT876XA	Flat TO-92, bulk packaging (1000pcs/bag)
MT876XAT	SOT-23, tape & reel (3000pcs/bag)
MT876XET	SOT-23 (thin outline), tape &

4 Applications

- Home appliances
- Industrial
- Position Detection
- Proximity Switch

5. Pin Configuration and Functions

	Vcc	Out	GND
SOT-23	1	2	3
SOT-23 Thin Outline	1	2	3
Flat TO-92	1	3	2
DFN1616	4	5	2
Description	Power	Output Open-Drain	Ground



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Table of Contents

1 Product Description....1
2 Features....1
3 Product Overview of MT876X....1
4 Applications....1
5 Pin Configuration and Functions....1
6 Definition of Switching Function....3
7 Function Description....3
8 Feature Description....3
9 Functional Block Diagram....4
10 Electrical and Magnetic Characteristics....4
10.1 Absolute Maximum Ratings....4
10.2 Electrical Specifications....5
10.3 Magnetic Characteristics....5
10.4 ESD Ratings....5
10.5 Characteristic Performance....6
10.6 Typical Output Waveform....7
11 Typical Application Circuit....7
12 Package Material Information....8
12.1 SOT-23 Package Information....8
12.2 SOT-23 Thin Outline Package Information....9
12.3 Flat TO-92 Package Information....10
12.4 DFN-1616 Package Information....11
13 Copy Rights and Disclaimer....12

Reversion History

Rev1.0 Originally Version
Rev1.1 Add MT8763 Series
Rev1.2 Update MT8763 Supply current
Rev1.3 Update Small SOT-23 Package Outline Dimensions
Rev1.4 Add MT8765 Series
Rev1.5 Update DFN-1616 Package

6 Definition of Switching Function

Figure.2 & Figure.3 shows the device functionality and hysteresis

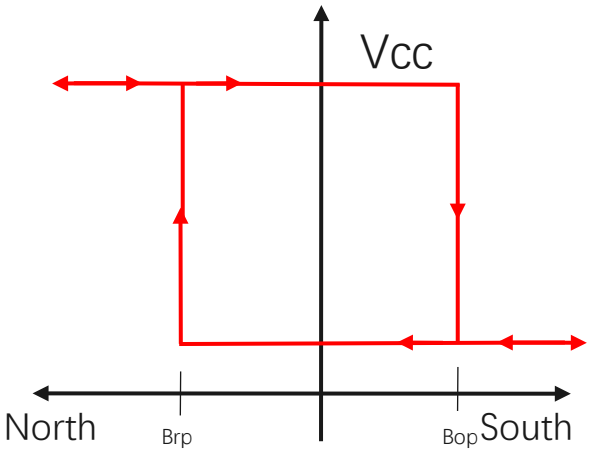


Figure.2 Switching Function of DFN & Flat TO-92 & SOT-23 (Thin outline)

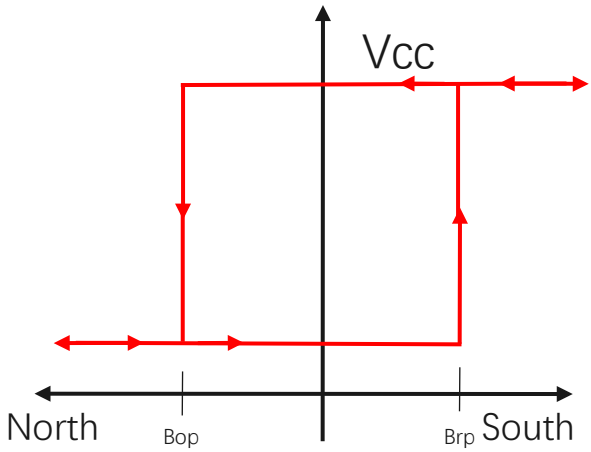


Figure.3 Switching Function of SOT-23

7 Function Description

B_{OP}: Operating Point, Magnetic flux density applied on the branded side of the package which turns the output driver ON (V_{OUT}=Low)

B_{RP}: Releasing Point, Magnetic flux density applied on the branded side of the package which turns the output driver OFF (V_{OUT}=High)

B_{HYST}: Hysteresis Window, $|B_{OP} - B_{RP}|$
Devices that have a lower magnetic threshold (V_{OUT}=High) detect magnets at a farther distance. Higher thresholds (V_{OUT}=Low) generally require a closer distance or larger magnet.

8 Feature Description

The MT876X device is sensitive to the magnetic field component that is perpendicular to the top of the package

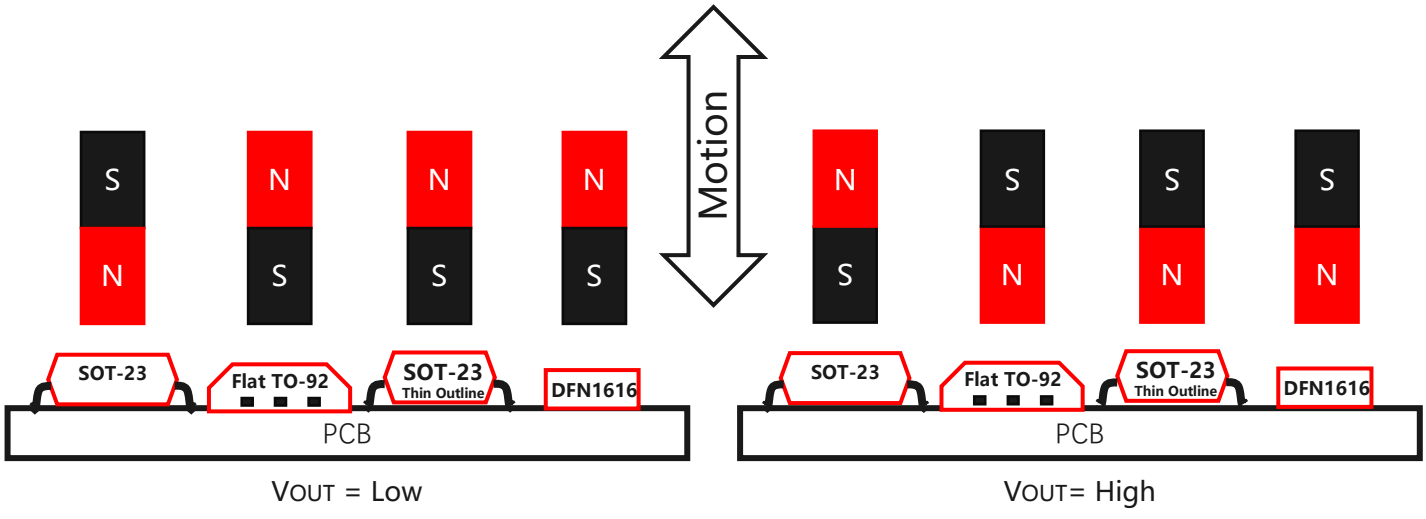


Figure.4 Flux Direction Polarity

9 Functional Block Diagram

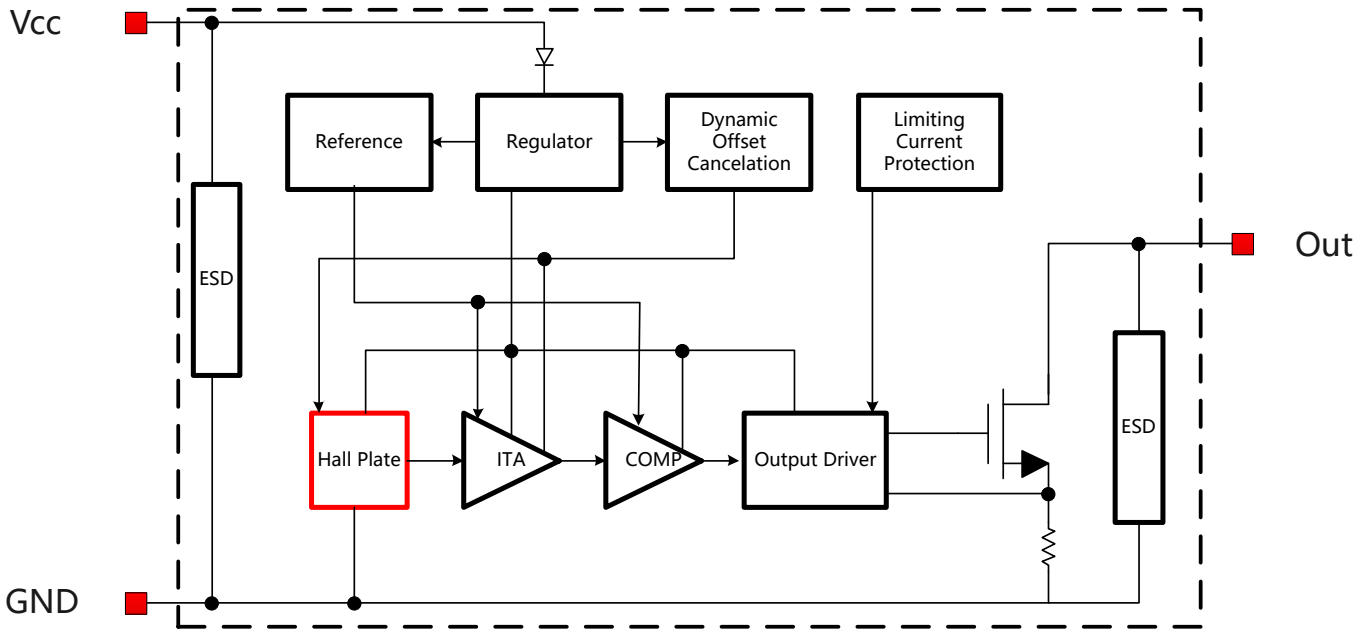


Figure.5 Functional Block Diagram

10 Electrical and Magnetic Characteristics

10.1 Absolute Maximum Ratings

Absolute maximum ratings are limited values to be applied individually, and beyond which the serviceability of the circuit may be impaired. Functional operability is not necessarily implied. Exposure to absolute maximum rating conditions for an extended period of time may affect device reliability.

Symbol	Parameters	Min	Max	Units
V_{CC}	Supply Voltage	-	27	V
V_{RCC}	Reversed Power Supply Protection	-27	-	V
V_{OUT}	Output Voltage	-	27	V
I_{OUT}	Continuous Output Current	-	25	mA
T_A	Operating Ambient Temperature	-40	150	℃
T_S	Storage Temperature	-50	150	℃
T_J	Junction Temperature	-	165	℃
B	Magnetic Flux Density	No Limit		Gs

10.2 Electrical Specifications

At T_A=-40~150℃, V_{CC}=2.4V~24V (unless otherwise specified)

Symbol	Parameters	Test Condition	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	2.4	-	24	V
I_{CC}	Supply Current	MT8762 & MT8765, V_{CC}=5V	-	1.2	-	mA
		MT8763, V_{CC}=5V	-	0.6	-	mA
I_{AW}	Awake Current	V_{CC}=5V	-	1.2	-	mA
V_{DSON}	Output Saturation Voltage	MT8762 & MT8763: I_{OUT}=10mA, |B|>|B_{OP}|	-	-	0.4	V
		MT8765: I_{OUT}=2.5mA, |B|>|B_{OP}|	-	-	0.4	V
F_{SW}	Sampling Frequency	MT8762 & MT8765, V_{CC}=5V	-	100	-	KHz
		MT8763, V_{CC}=5V	-	15	-	KHz
T_{PO}	Power on Time	dVcc/dt>5V/us, |B|>|B_{OP}|	-	-	25	us
R_{TH}	Thermal Resistance of SOT-23		-	301	-	℃/W
	Thermal Resistance of SOT-23 (Thin Outline)		-	301	-	℃/W
	Thermal Resistance of DFN		-	301	-	℃/W
	Thermal Resistance of TO-92		-	230	-	℃/W

10.3 Magnetic Characteristics

At V_{CC}=2.4V~24V (unless otherwise specified)

Part No.	Symbol	Min	Typ	Max	Unit
MT8762 Series MT8763 Series MT8765 Series	B_{OP}, T_A =25℃	10	20	30	Gs
	B_{RP}, T_A =25℃	-30	-20	-10	Gs
	B_{HYST}, T_A =25℃	20	40	60	Gs

10.4 ESD Ratings

Symbol		Reference	Values	Unit
V_{ESD}	Human-body model (HBM)	AEC-Q100-002	±6000	V
	Charged-device model (CDM)	AEC-Q100-011	±1000	V

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10.5 Characteristic Performance

At Vcc=5V

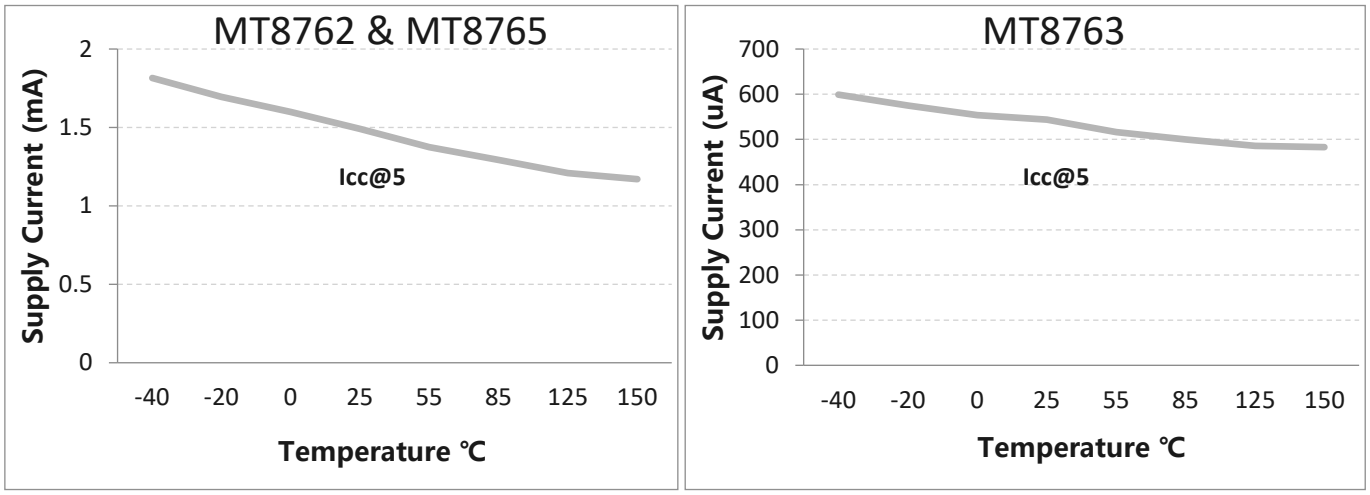


Figure.6 Supply Current vs. Temperature

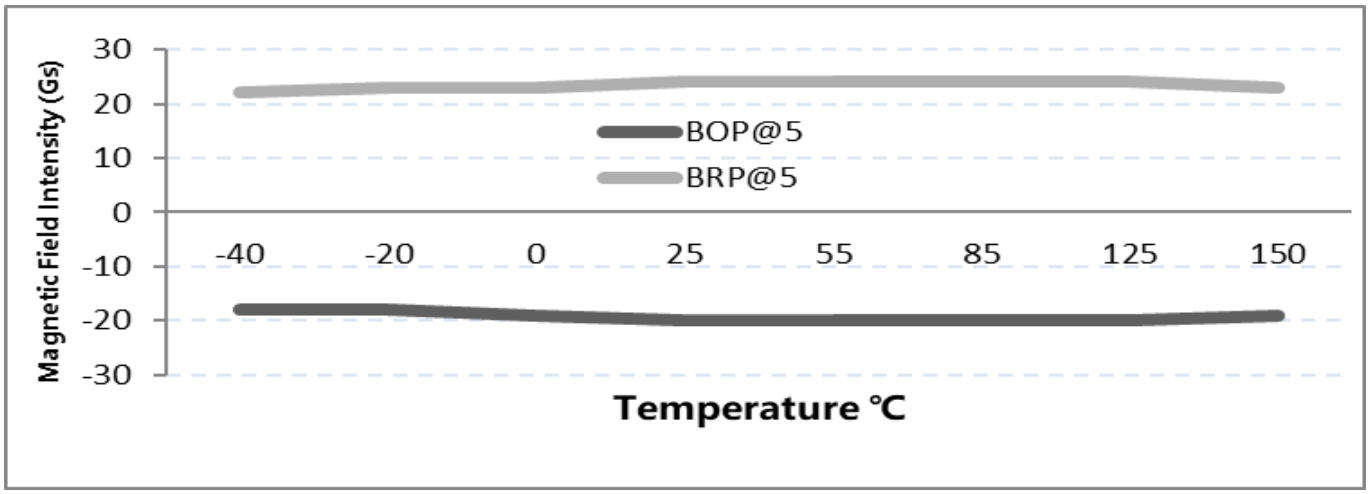


Figure.7 Magnetic Characteristics vs. Temperature (BOP & BRP)

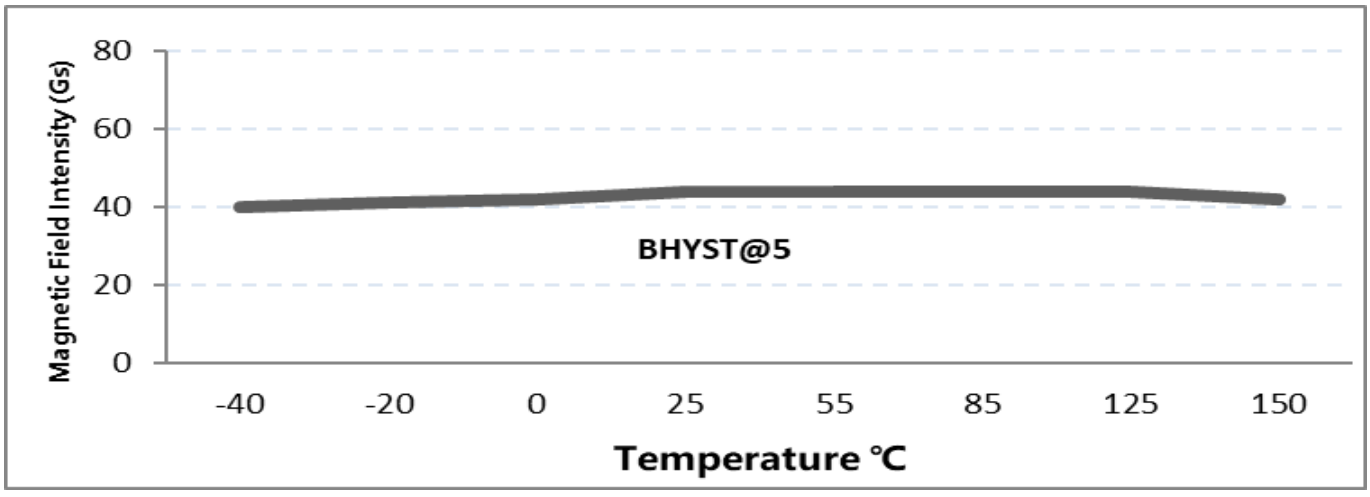


Figure.8 Magnetic Characteristics vs. Temperature (BHYST)

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10.6 Typical Output Waveform

MT876XA as example

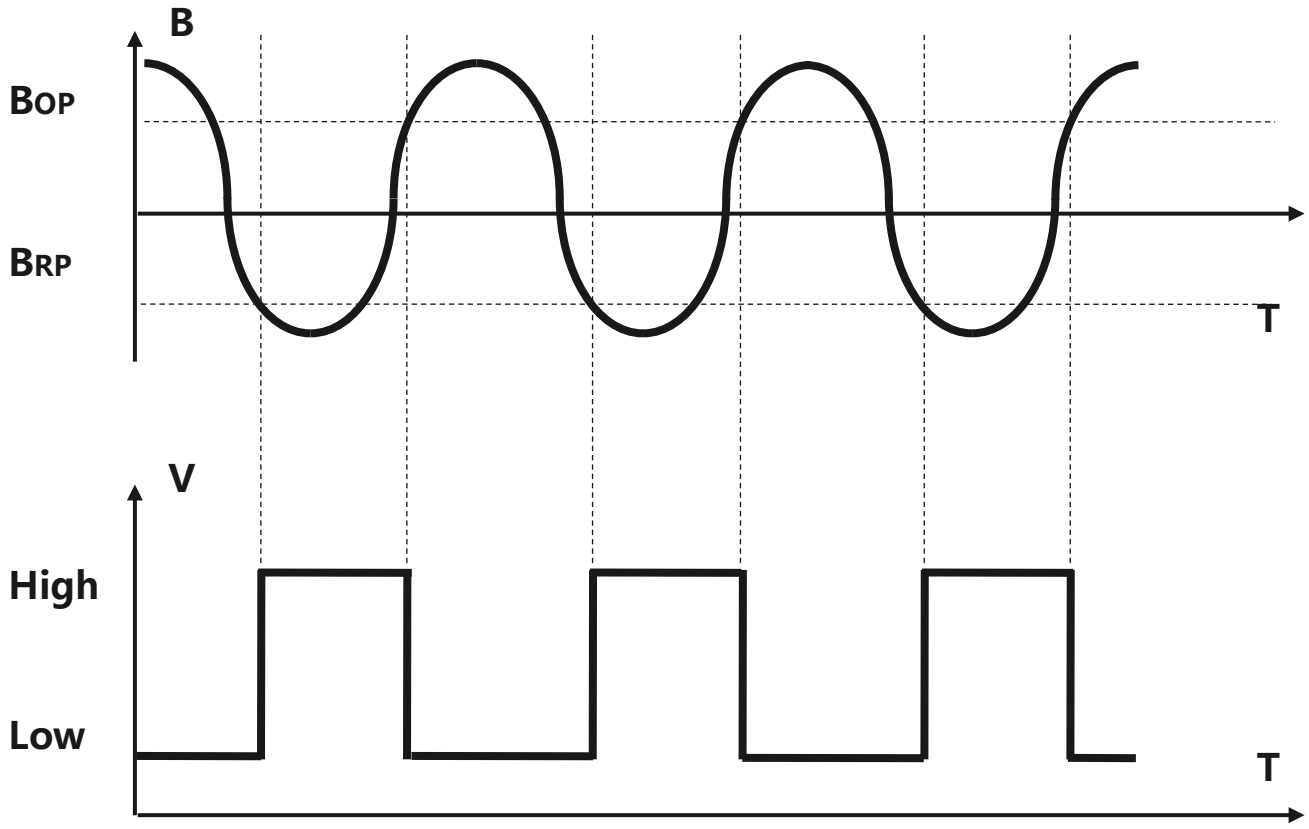


Figure.9 Digital Output vs. Magnetic Flux Density

11 Typical Application Circuit

MT876XAT as example
Note: Recommended value for RL is 4.7KOhms to 10KOhms

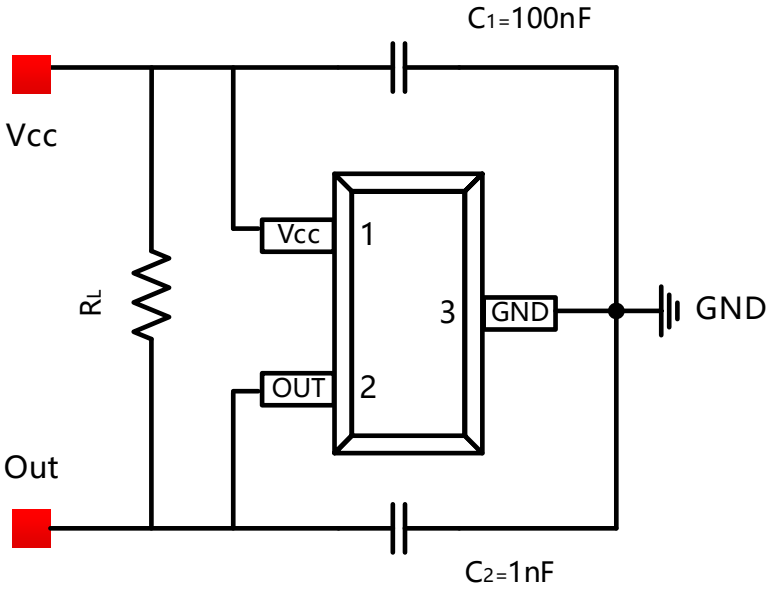


Figure.10 Typical Application Circuit

12 Package Material Information (For Reference Only – Not for Tooling Use)

12.1 SOT-23 Package Information

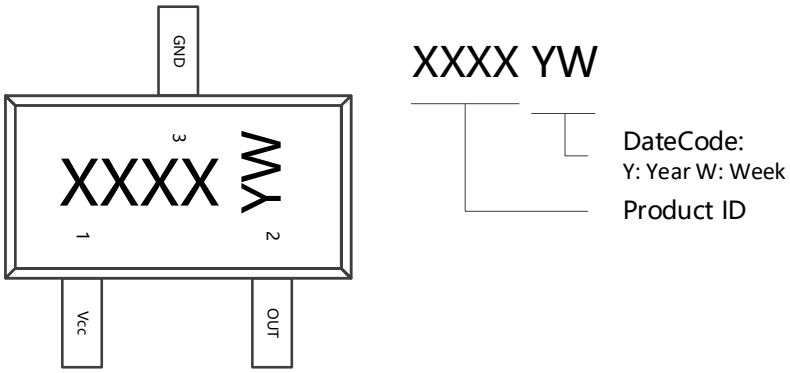


Figure.11 SOT-23 Chip Marking Spec

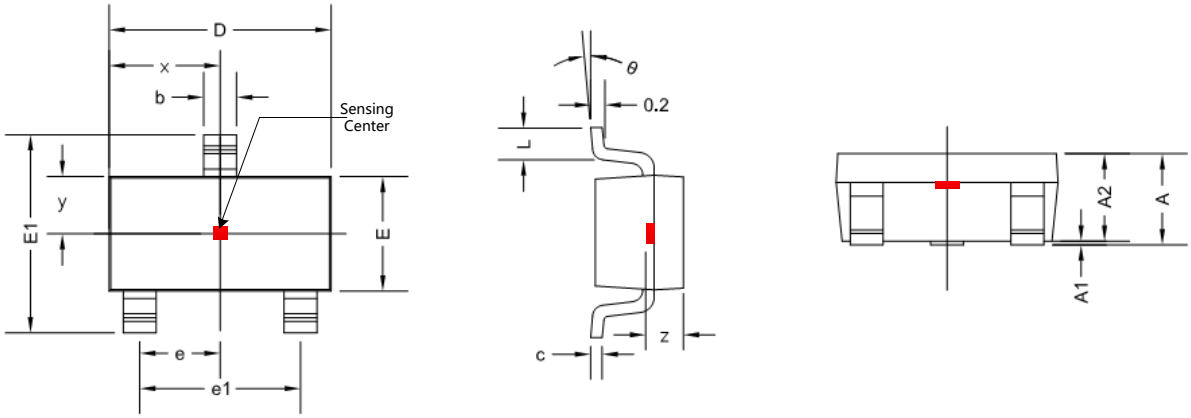


Figure.12 SOT-23 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.300	0.041	0.051
A1	0.000	0.150	0.000	0.006
A2	1.000	1.200	0.039	0.047
b	0.300	0.500	0.012	0.020
c	0.080	0.220	0.003	0.009
D	2.800	3.020	0.110	0.119
E	1.500	1.700	0.059	0.067
E1	2.600	3.000	0.102	0.118
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0 °	8 °	0 °	8 °
x	1.460 TYP		0.057 TYP	
y	0.800 TYP		0.032 TYP	
z	0.700 TYP		0.027 TYP	

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12.2 SOT-23 (Thin Outline) Package Information

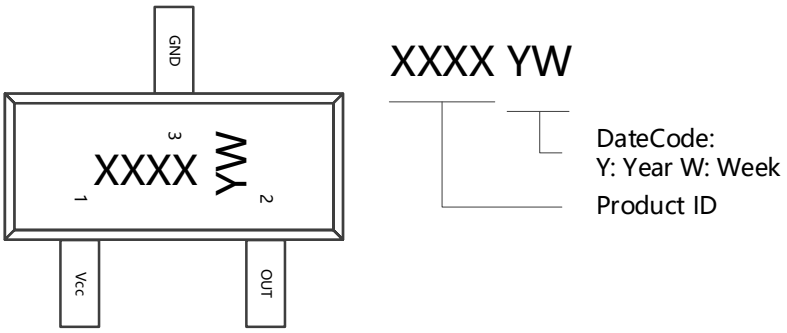


Figure.13 SOT-23 (Thin Outline) Chip Marking Spec

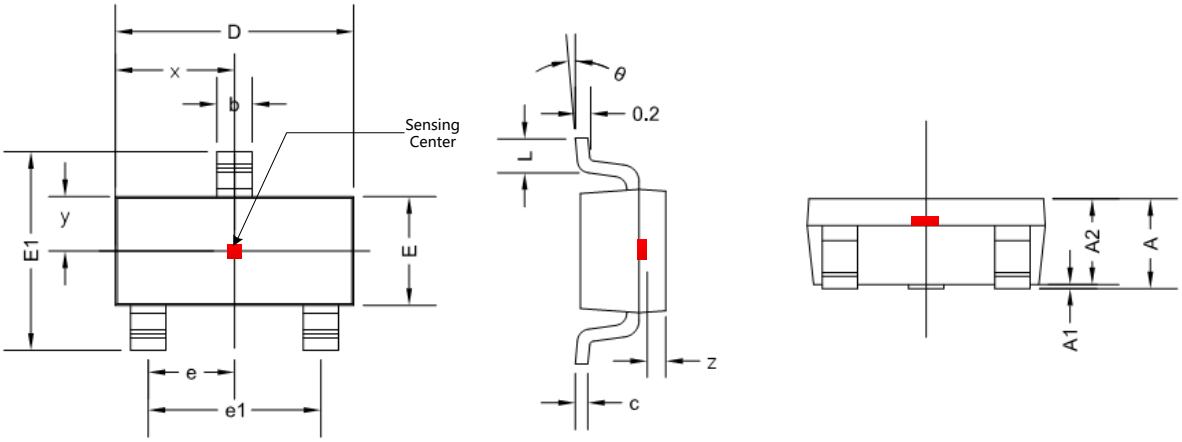


Figure.14 SOT-23 (Thin Outline) Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.100	0.035	0.043
b	0.300	0.500	0.012	0.020
c	0.132	0.202	0.005	0.008
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e		0.950 TYP		0.037 TYP
e1	1.800	2.000	0.071	0.079
L		0.550 REF		0.022 REF
L1	0.300	0.500	0.012	0.020
θ	0 °	8 °	0 °	8 °
x		1.460 TYP		0.057 TYP
y		0.650 TYP		0.026 TYP
z		0.190 TYP		0.007 TYP

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12.3 Flat TO-92 Package Information

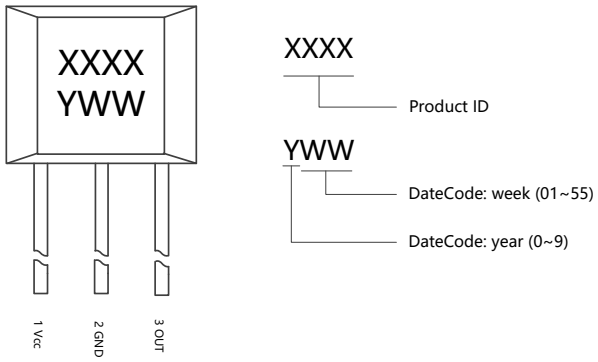


Figure.15 Flat TO-92 Chip Marking Spec

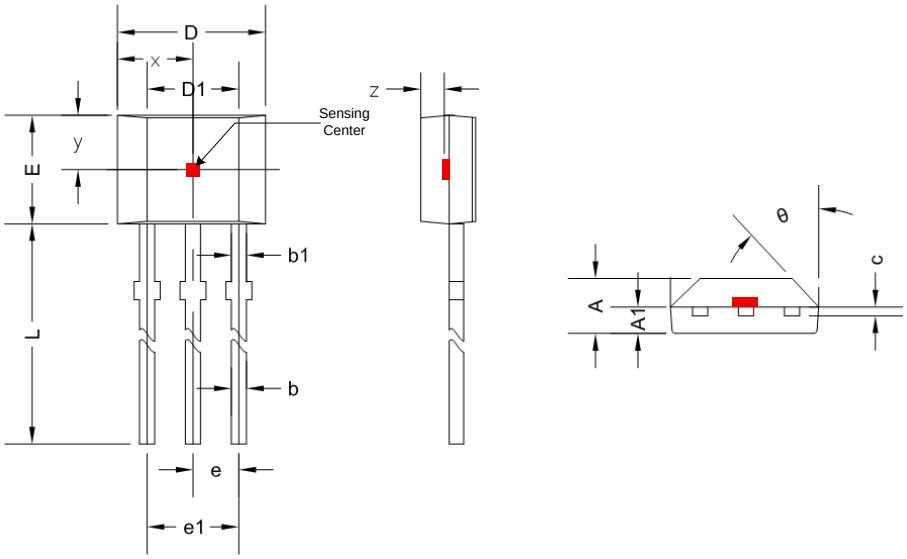


Figure.16 Flat TO-92 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.620	0.056	0.064
A1	0.660	0.910	0.026	0.036
b	0.330	0.560	0.013	0.022
b1	0.400	0.510	0.016	0.020
c	0.330	0.510	0.013	0.020
D	3.900	4.200	0.154	0.165
D1	2.280	2.680	0.090	0.106
E	2.900	3.280	0.114	0.128
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	13.500	16.200	0.531	0.638
θ	45 ° TYP		45 ° TYP	
x	2.025 TYP		0.080 TYP	
y	1.545 TYP		0.061 TYP	
z	0.500 TYP		0.020 TYP	

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12.4 DFN1616 Package Information

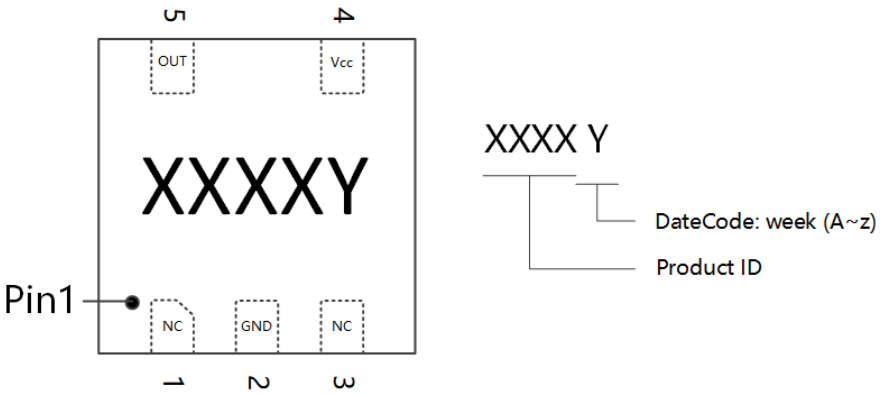


Figure.17 DFN1616 Chip Marking Spec

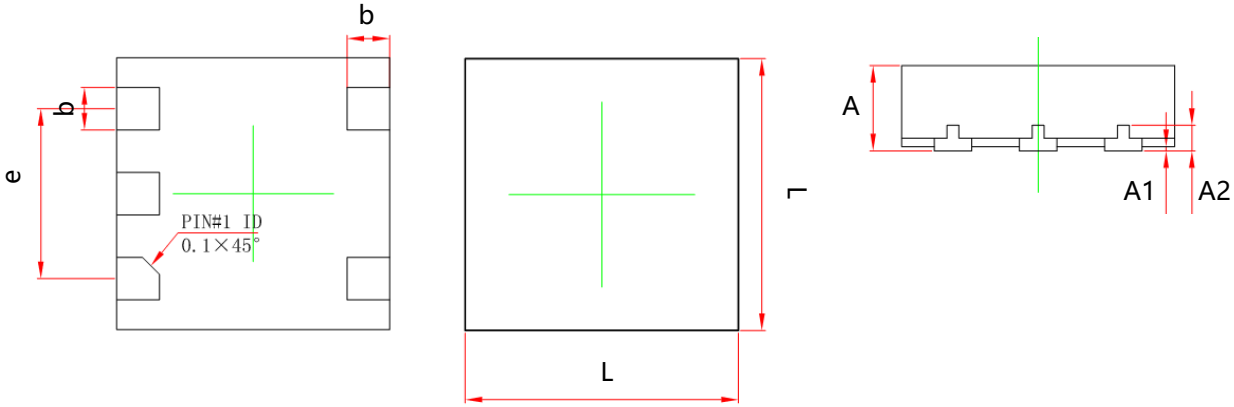


Figure.18 DFN1616 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	0.450	0.550	0.018	0.022
A1	0.000	0.050	0.000	0.002
A2		0.150 TYP		0.006 TYP
L	1.550	1.650	0.061	0.065
b	0.200	0.300	0.008	0.012
e		1.000 TYP		0.039 TYP

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