MT857X

Omni-polar, High Voltage & Low Power Consumption Hall-Effect Switch IC

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1 Product Description

The MT857X 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 regulator for operation with supply voltage of 3.0V to 24V, temperature compensation circuitry, small-signal amplifier, Hall IC with dynamic offset cancellation system, Schmitt trigger and 10K internal pull-up resistor. It also includes an clamp diode at output and reversed power supply protection enhances the robustness of Hall IC.

The product responds to either North pole or South pole magnetic fields. The output will be turned on (Low) when the magnetic flux density (B) is larger than the operating point (B_{OP}), and be turned off (High) when the magnetic flux density (B) is lower than the releasing point (B_{RP}).

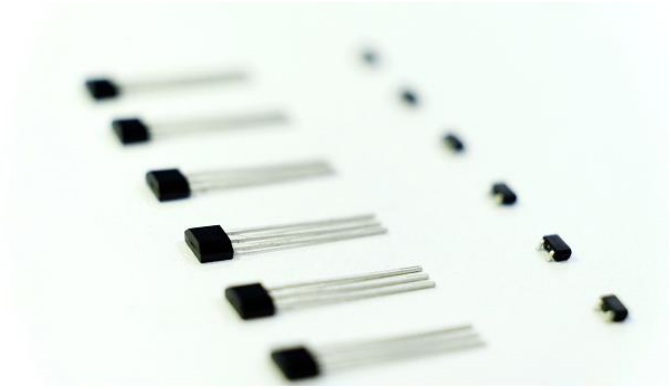
The MT857X family provides a variety of packages to customers: SOT-23 for surface mount and flat TO-92 for through-hole mount. All packages are RoHS compliant.

2 Features

- BCD Technology
- Omni-polar Switch
- 3.0~24V Operating Vcc Range
- -40℃~125℃ Operating Temperature
- Package Option:
  Flat TO-92
  SOT-23
  Magnetic Sensitivity Option:
  MT8571 (B_{OP}=±32Gs, B_{RP}=±27Gs)
  MT8572 (B_{OP}=±80Gs, B_{RP}=±60Gs)
  MT8573 (B_{OP}=±60Gs, B_{RP}=±45Gs)
- Internal 10K pull-up resistor
- -16V Reversed Power Supply Protection
- Output Limiting Current Protection
- RoHS Compliant: (EU)2015/863

3 Product Overview of MT857X

Part No.	Description
MT857XA	Flat TO-92, bulk packaging (1000pcs/bag)
MT857XAT	SOT-23, tape & reel (3000pcs/bag)

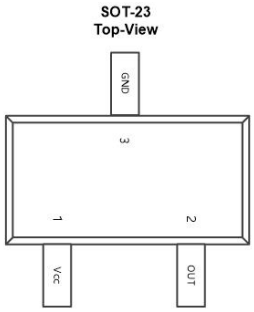


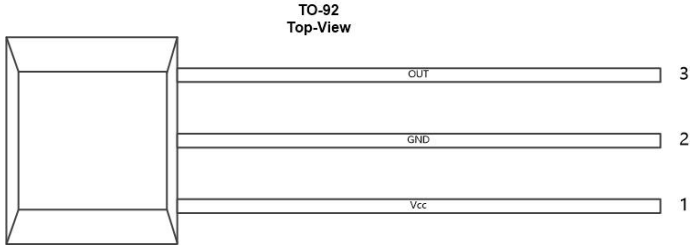
4 Applications

- Home appliances, Industrial
- Position Detection
- Magnetic Encoder
- Proximity Switch

5. Pin Configuration and Functions

	Vcc	Out	GND
SOT-23	1	2	3
Flat TO-92	1	3	2
Description	Power	Internal Pull-up Resistor	Ground





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Reversion History

1	Originally Version	
2	1.1 Version	Update Pin Configuration and Functions for SOT-23
3	1.2 Version	Update Copy Rights and Disclaimer
4	1.3 Version	Update Electrical Specifications
5	1.4 Version	Update MT8572 & MT8573 Series Update the marking spec of SOT-23
6	1.5 Version	Update the Magnetic Spec of MT8571
7	1.6 Version	Update the Magnetic Spec of MT8573
8	1.7 Version	Update the Logo of MagnTek

6 Definition of Switching Function

Figure.2 shows the device functionality and hysteresis

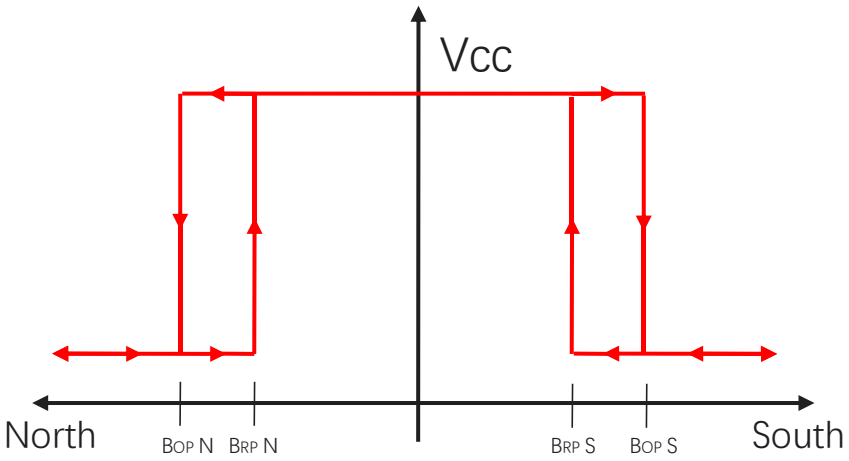


Figure.2 Omni-polar Switching Function

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 MT857X device is sensitive to the magnetic field component that is perpendicular to the top of the package

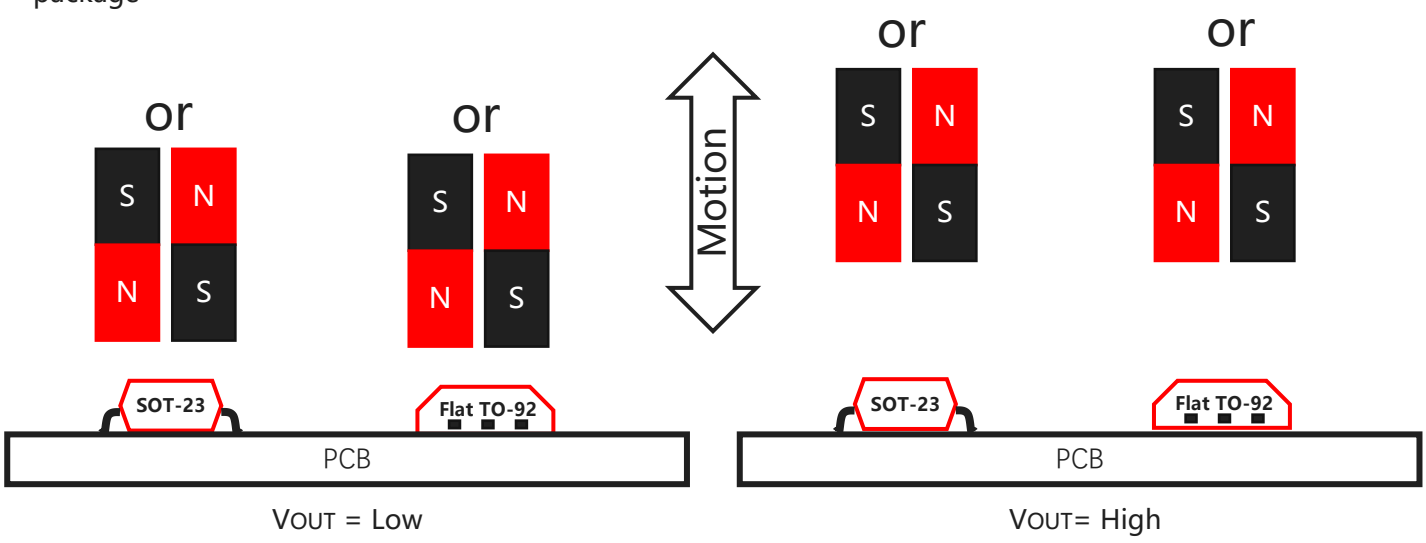


Figure.3 Flux Direction Polarity

9 Functional Block Diagram

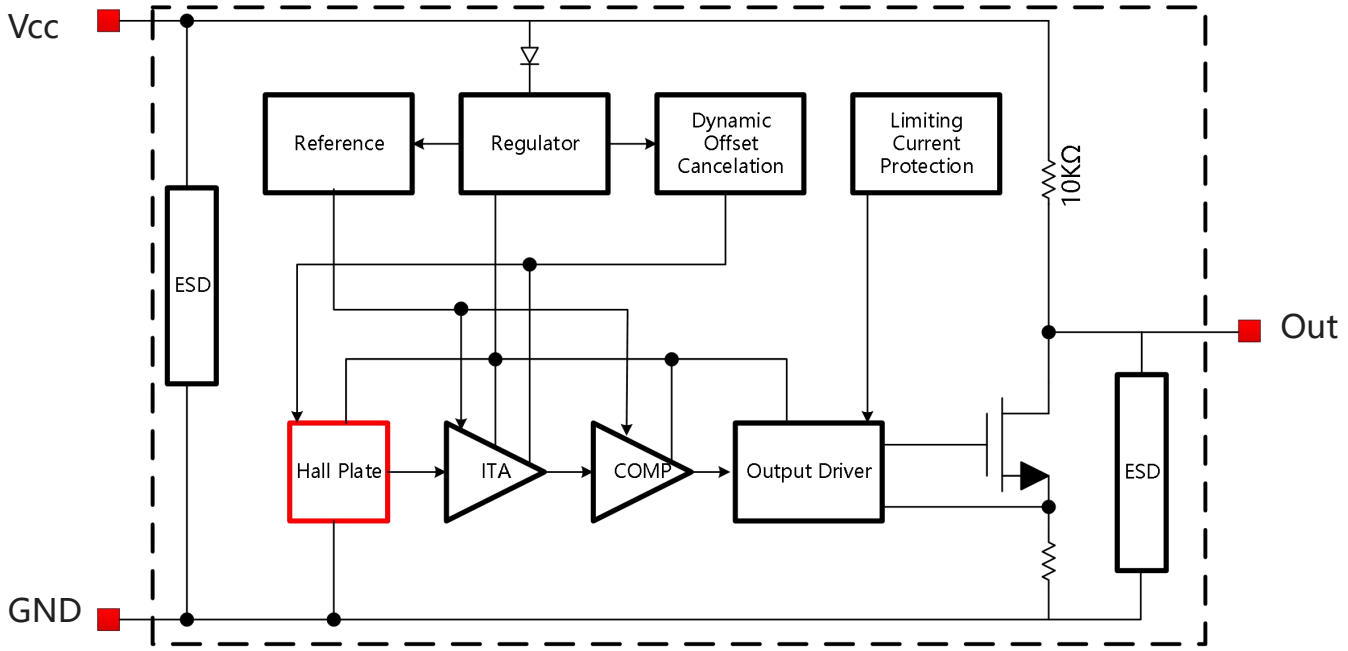


Figure.4 Functional Block Diagram

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	-	30	V
V_{RCC}	Reverse Battery Voltage	-16	-	V
V_{OUT}	Output Voltage	-	30	V
I_{OUT}	Continuous Output Current	-	55	mA
T_A	Operating Ambient Temperature	-40	125	℃
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 ℃, Vcc=3.0V~24V (unless otherwise specified)

Symbol	Parameters	Test Condition	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	3.0	-	24	V
I_{CC}	Supply Current	|B| < |B_{RP}|	-	1	1.5	mA
I_{OCP}	Short Circuit Protection Current	|B| > |B_{OP}|, V_{OUT}=V_{CC}	-	50	-	mA
V_{DSON}	Output Saturation Voltage	I_{OUT}=20mA, |B| > |B_{OP}|	-	-	0.4	V
I_{OFF}	Output Leakage Current	V_{OUT}=24V, |B| < |B_{RP}|	-	-	10	uA
T_R	Output Rise Time	C_L=20pF	-	-	1.0	us
T_F	Output Fall Time	C_L=20pF	-	-	1.0	us
T_{PO}	Power on Time	dV_{CC}/dt>5V/uS |B| > |B_{OP}| (MAX)	-	-	15	us
F_C	Chopping Frequency		-	400	-	KHz
F_S	Sampling Frequency		-	25	-	KHz
R_{TH}	Thermal Resistance of SOT-23		-	301	-	℃/W
	Thermal Resistance of TO-92		-	230	-	℃/W

10.3 Magnetic Characteristics

At V_{CC}=3.0V~24V (unless otherwise specified)

Part No.	Symbol	Min	Typ	Max	Unit
MT8571 Series	B_{OP}, T_A =25℃	±23	±32	±41	Gs
	B_{RP}, T_A =25℃	±18	±27	±36	Gs
	B_{HYST}, T_A =25℃	-	5	-	Gs
MT8572 Series	B_{OP}, T_A =25℃	±55	±80	±105	Gs
	B_{RP}, T_A =25℃	±35	±60	±85	Gs
	B_{HYST}, T_A =25℃	10	20	30	Gs
MT8573 Series	B_{OP}, T_A =25℃	±35	±60	±85	Gs
	B_{RP}, T_A =25℃	±20	±45	±70	Gs
	B_{HYST}, T_A =25℃	5	15	25	Gs

10.4 ESD Ratings

Symbol		Reference	Level	Unit
V_{ESD}	Human-body model (HBM)	AEC-Q100-002	Class H2	Grade
	Charged-device model (CDM)	AEC-Q100-011	Class C3	Grade

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10.5 Characteristic Performance

MT8571 At Vcc=5V

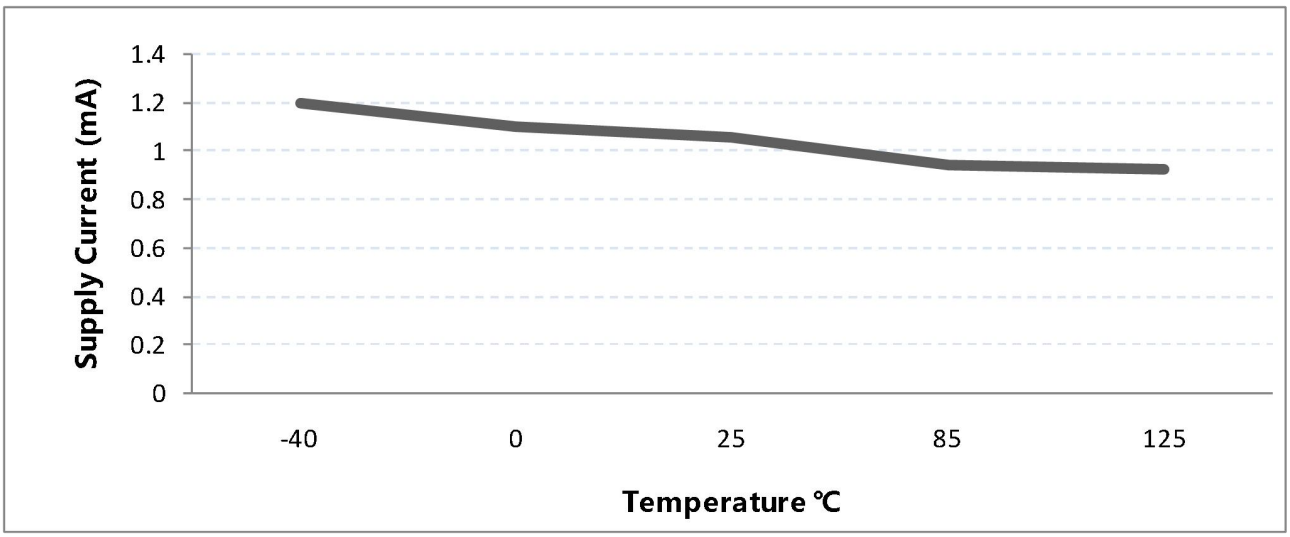


Figure.5 Supply Current vs. Temperature

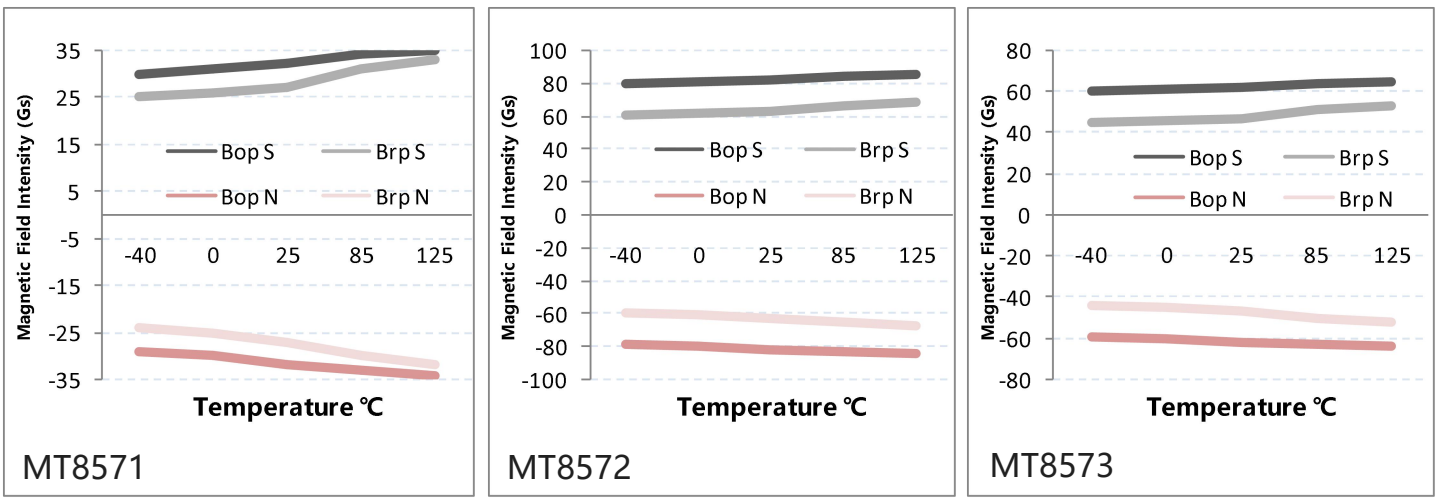


Figure.6 Magnetic Characteristics vs. Temperature (BOP & BRP)

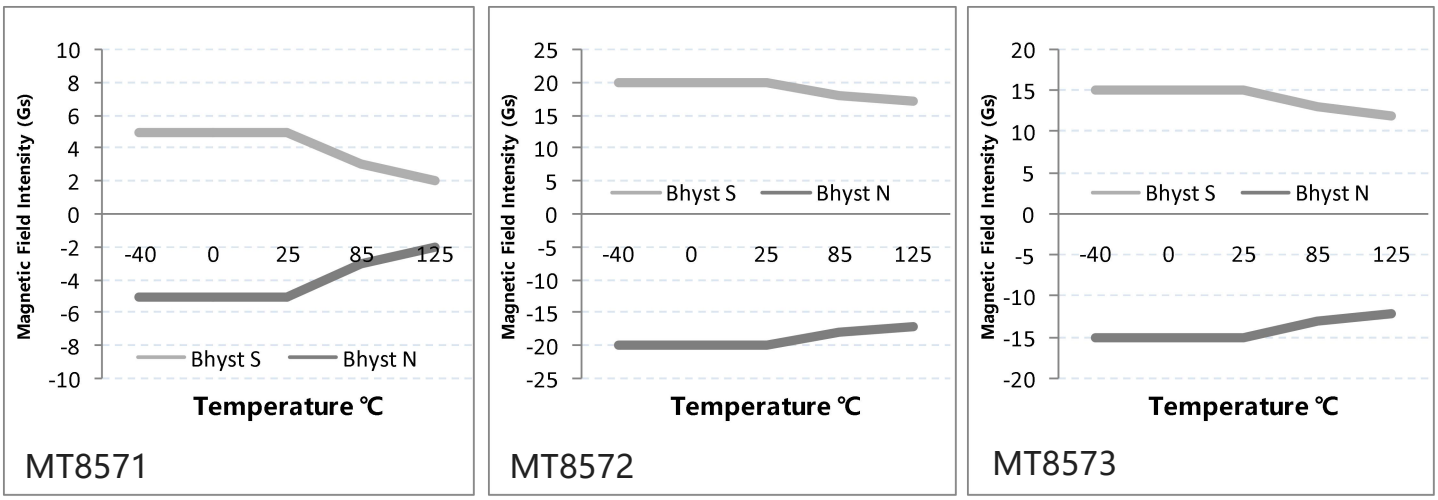


Figure.7 Magnetic Characteristics vs. Temperature (BHYST)

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10.6 Typical Output Waveform

MT8571A as example

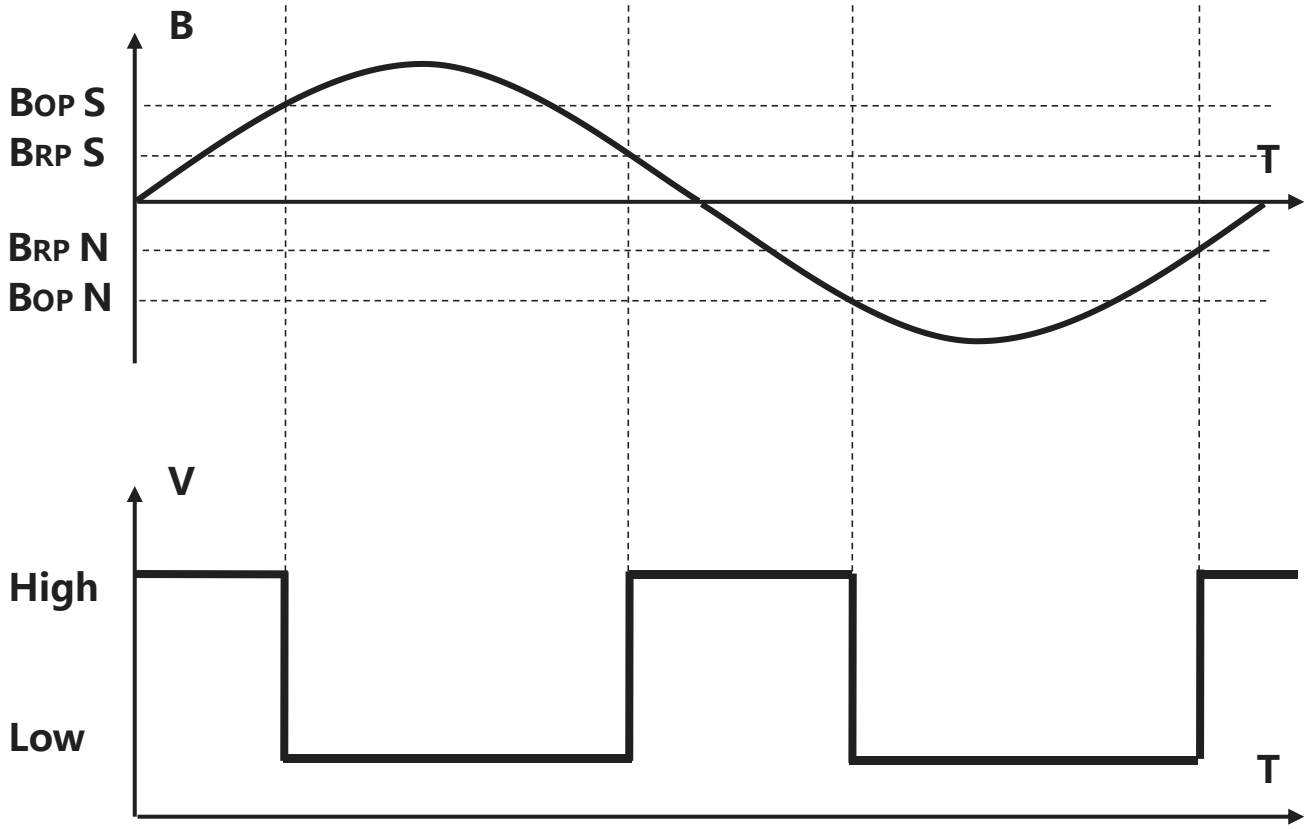


Figure.8 Digital Output vs. Magnetic Flux Density

11 Typical Application Circuit

MT8571AT as example

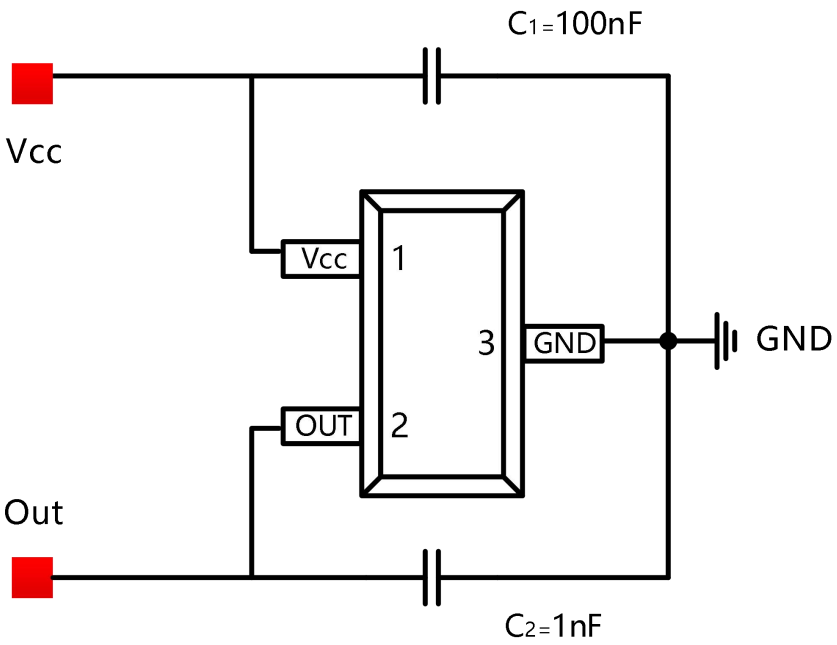


Figure.9 Typical Application Circuit

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

12.1 SOT-23 Package Information

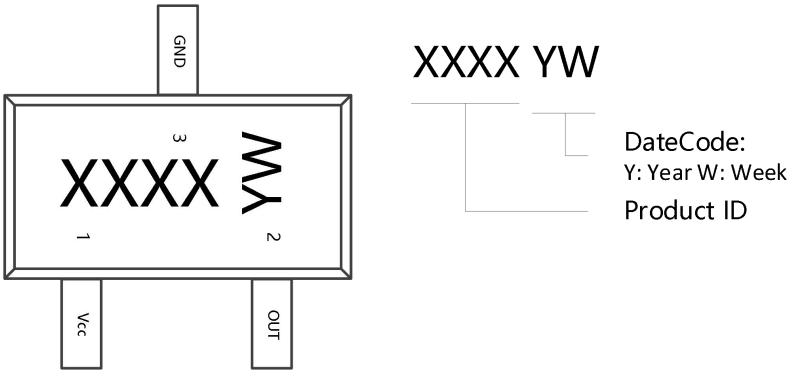


Figure.10 SOT-23 Chip Marking Spec

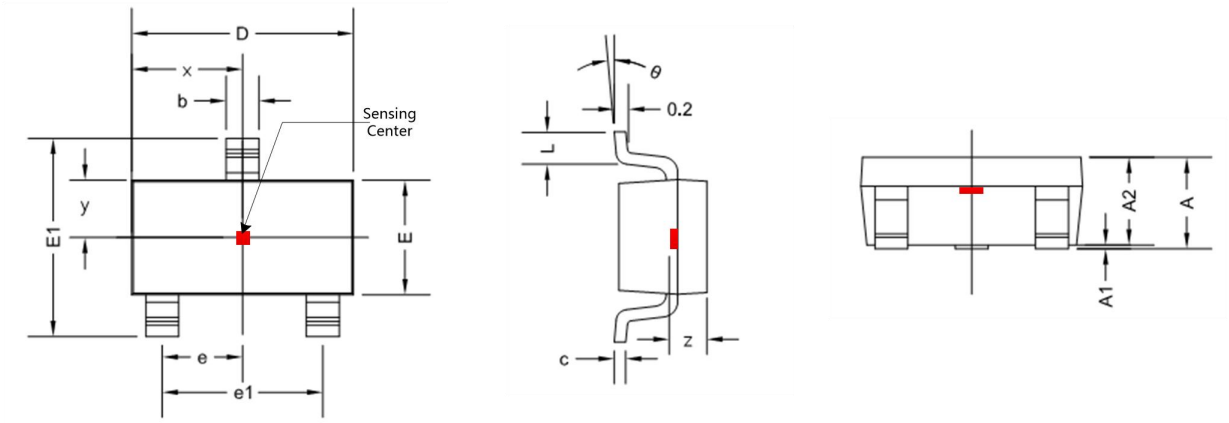


Figure.11 SOT-23 Package Drawing

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	0.600 TYP		0.024 TYP	

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12.3 Flat TO-92 Package Information

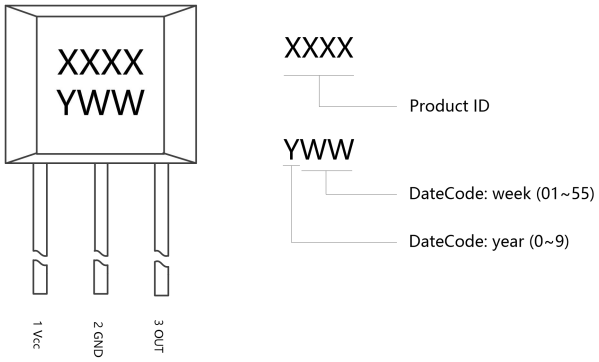


Figure.14 Flat TO-92 Chip Marking Spec

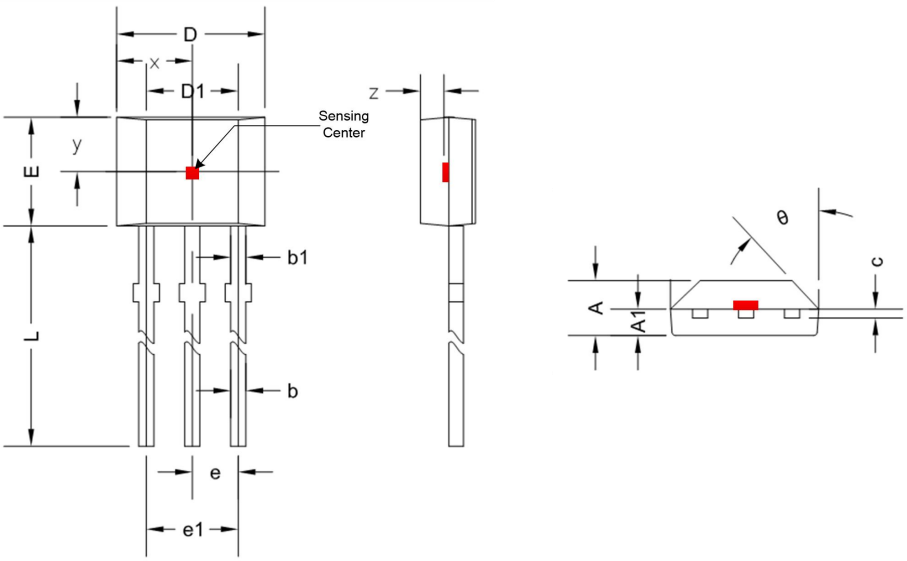


Figure.15 Flat TO-92 Package Drawing

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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