MT611X

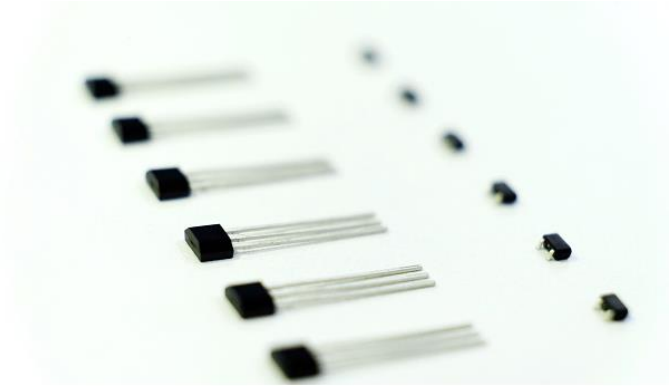
Omni-polar, Low Power AMR Switch IC

1 Product Description

The MT611X family is produced with monolithic technology. Which built AMR sensor & ASIC on one chip. The IC internally includes a Wheatstone bridge with magnetic film, a voltage regulator for operating with supply voltage from 1.8V to 5.5V, a sleep/awake logic for low power consumption requirement, small signal amplifier and Schmitt trigger comparator with dynamic offset cancellation, and an output driver with open-drain output.

When combined with a magnet, it becomes a non-contact switch with low power consumption, high sensitivity and high reliability. A horizontal magnetic field parallel to the electrode of the package can be detected by an arbitrary polarity.

The MT611X 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

- Monolithic Technology
- AMR (Anisotropic Magneto Resistance)
- Omni-polar Switch
- 1.8～5.5V Operating Vcc Range
- -40℃~125℃ Operating Temperature
- Package Option:
  SOT-23
  Flat TO-92
- Magnetic Sensitivity Option:
  B_{OP}=±18Gs, B_{RP}=±13Gs
- Open-Drain Output
- Low Power Consumption:
  Average Supply Current =1.3uA (Typ)
- RoHS Compliant: (EU)2015/863

3 Product Overview of MT611X

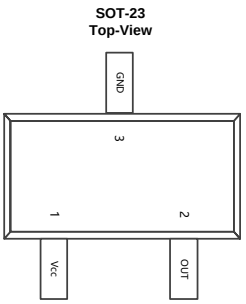
Part No.	Description
MT6111A	Flat TO-92, bulk packaging (1000pcs/bag)
MT6111AT	SOT-23, tape & reel (3000pcs/bag)

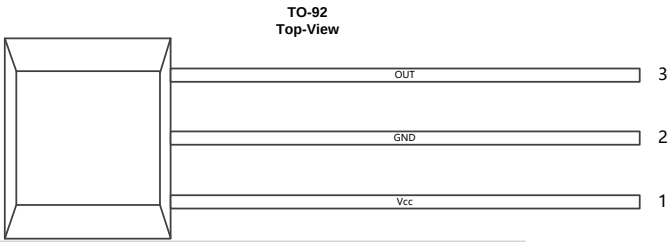
4 Application

- Home appliances, Industrial
- Position Detection
- Proximity Switch
- Smart Meter
- Speed Detection
- Handheld Device
- Consumer Device

5. Pin Configuration and Functions

	Vcc	Out	GND
SOT-23	1	2	3
Flat TO-92	1	3	2
Description	Power	Output Open-Drain	Ground





深圳市满度科技有限公司
Web:www.manduic.com
Tel:150-1290-5940
Email:sales@manduic.com
微信扫码咨询客服

Table of Contents

1 Production Description....1
2 Features....1
3 Product Overview of MT611X....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 Power on Output Waveform....8
13 Package Material Information....9
13.1 SOT-23 Package Information....9
13.2 Flat TO-92 Package Information....10
14 Copy Rights and Disclaimer....11

Reversion History

1	Originally Version	
2	1.1 Version	Update T_{PO} from 100us to 50us
3	1.2 Version	Update the marking spec of SOT-23

6 Definition of Switching Function

Figure.2 shows the device functionality and hysteresis

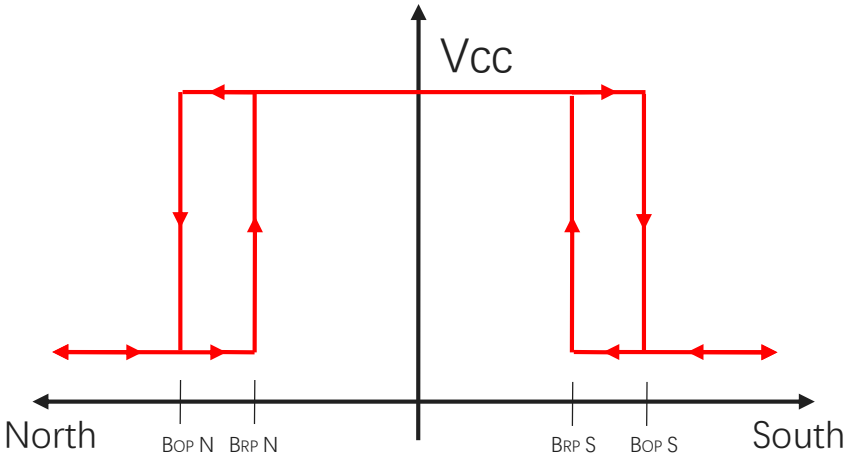


Figure.2 Omni-polar Switching Function

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)

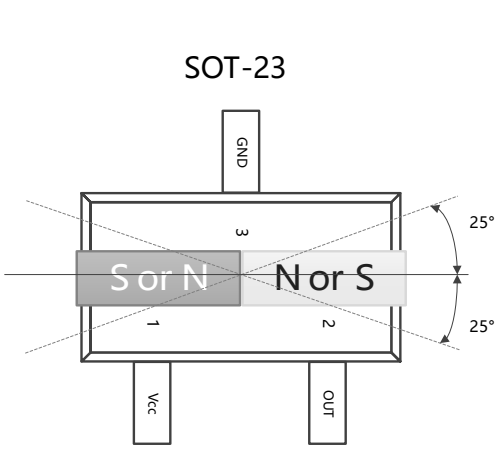
B_{RP}: Releasing Point, Magnetic flux density applied on the branded side of the package which turns the output driver OFF (V_{OUT}=High)

B_{HYST}: Hysteresis Window, $|B_{OP} - B_{RP}|$

8 Feature Description

The MT611X device is sensitive to the magnetic field that is parallel to the package





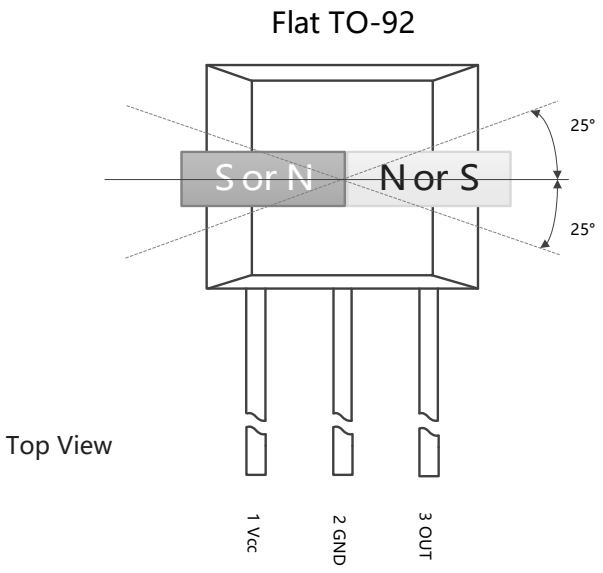


Figure.3 Flux Direction Polarity

9 Functional Block Diagram

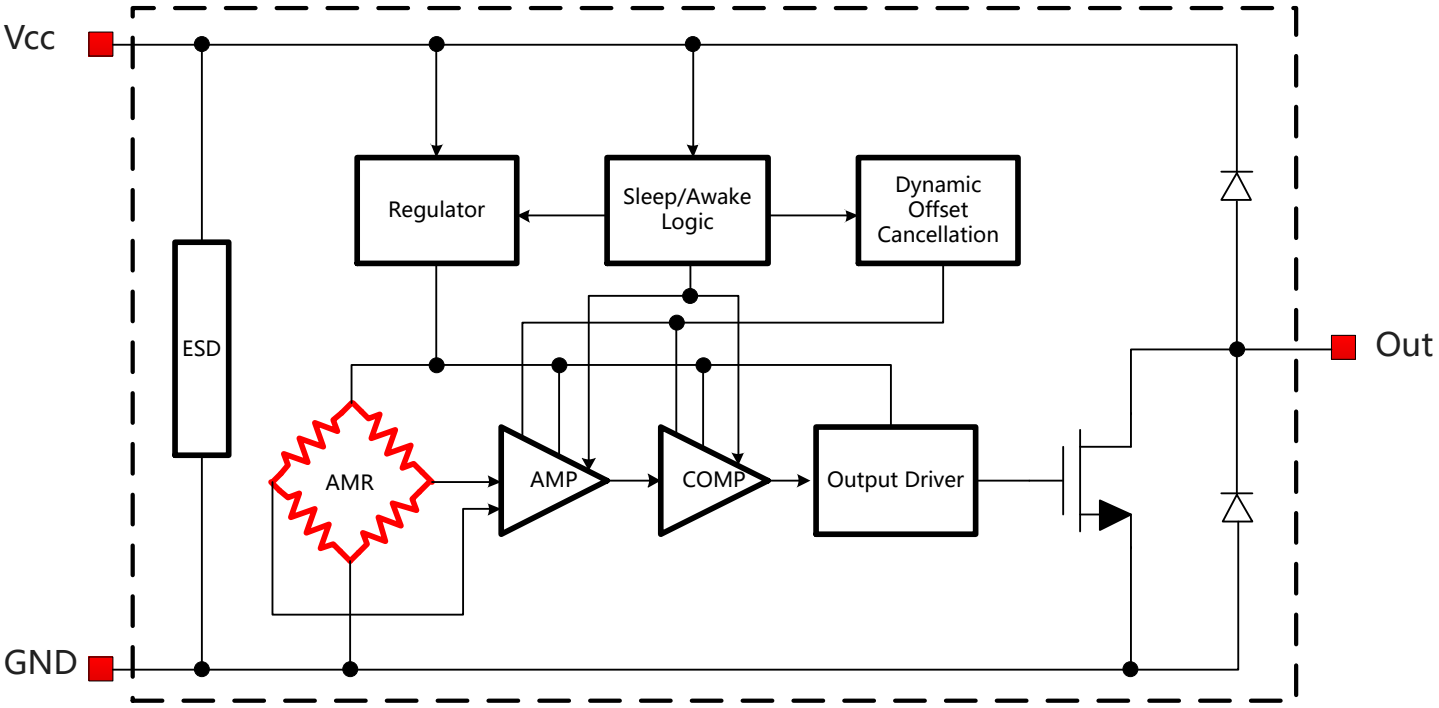


Figure.4 Functional Block Diagram

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	-	7	V
V_{RCC}	Reverse Battery Voltage	-0.5	-	V
V_{OUT}	Output Voltage	-0.5	7	V
I_{OUT}	Continuous Output Current	-	40	mA
T_A	Operating Ambient Temperature	-40	125	℃
T_S	Storage Temperature	-50	150	℃
T_J	Junction Temperature	-	165	℃
B	Magnetic Flux Density	3000		Gs

10.2 Electrical Specifications

At T_A=-40~125℃, V_{CC}=1.8V~5.5V (unless otherwise specified)

Symbol	Parameters	Test Condition	Min	Typ	Max	Unit
V_{CC}	Supply Voltage	Operating	1.8	-	5.5	V
I_{CC}	Supply Current	V_{CC}=3.6V	-	1.3	2.0	uA
V_{DSON}	Output Saturation Voltage	V_{CC}>=1.8V, I_{OUT}=15mA, |B|>|B_{OP}| V_{CC}>=3.3V, I_{OUT}=30mA, |B|>|B_{OP}|	-	-	0.4	V
I_{OFF}	Output Leakage Current	V_{OUT}=5.5V, |B|<|B_{RP}|	-	-	1	uA
T_{PO}	Power on Time	dV_{CC}/dt>3.6V/us, B>B_{OP}(MAX)	-	-	50	us
F_{SW}	Switching Frequency	V_{CC}=3.6V	-	20	-	Hz
T_{AW}	Awake Time	V_{CC}=3.6V	-	12	-	Us
T_{SL}	Sleep Time	V_{CC}=3.6V	-	50	-	ms
D.C.	Duty Cycle	V_{CC}=3.6V	-	0.02	-	%
R_{TH}	Thermal Resistance of SOT-23		-	301	-	℃/W
	Thermal Resistance of Flat TO-92		-	230	-	℃/W

10.3 Magnetic Characteristics

At V_{CC}=1.8V~5.5V (unless otherwise specified)

Part No.	Symbol	Min	Typ	Max	Unit
MT6111 Series	B_{OP}, T_A =25℃	-	±18	±25	Gs
	B_{RP}, T_A =25℃	±3	±13	-	Gs
	B_{HYST}, T_A =25℃	-	5	-	Gs

10.4 ESD Ratings

Symbol		Reference	Values	Unit
V_{ESD}	Human-body model (HBM)	AEC-Q100-002	±8000	V
	Charged-device model (CDM)	AEC-Q100-011	±1000	V

10.5 Characteristic Performance

At V_{CC}=3.6V, B<B_{RPMIN}

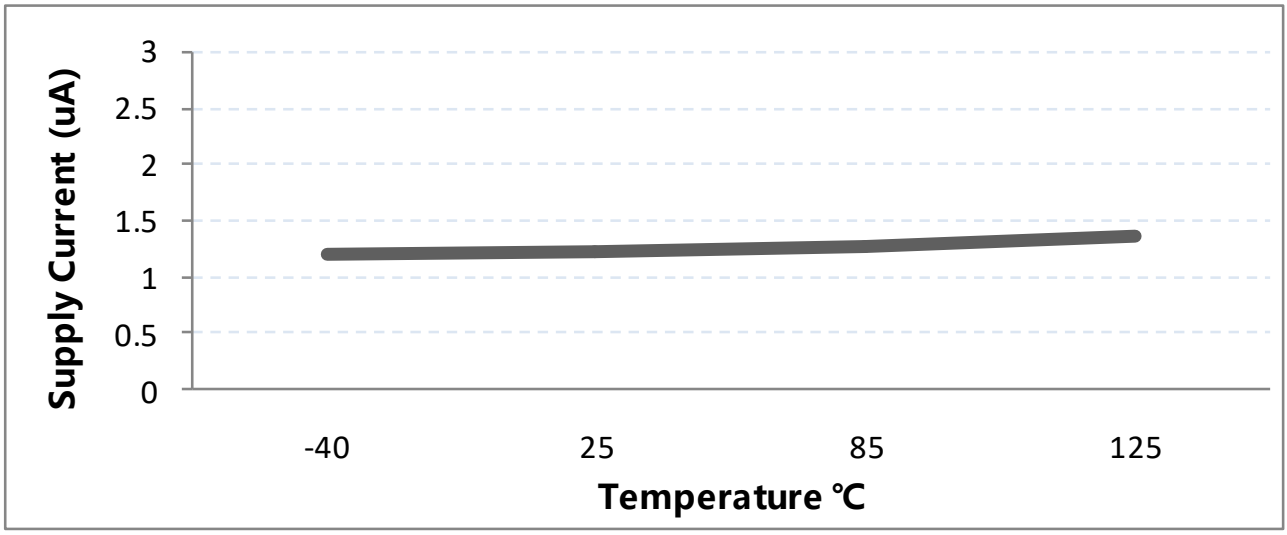


Figure.5 Supply Current vs. Temperature

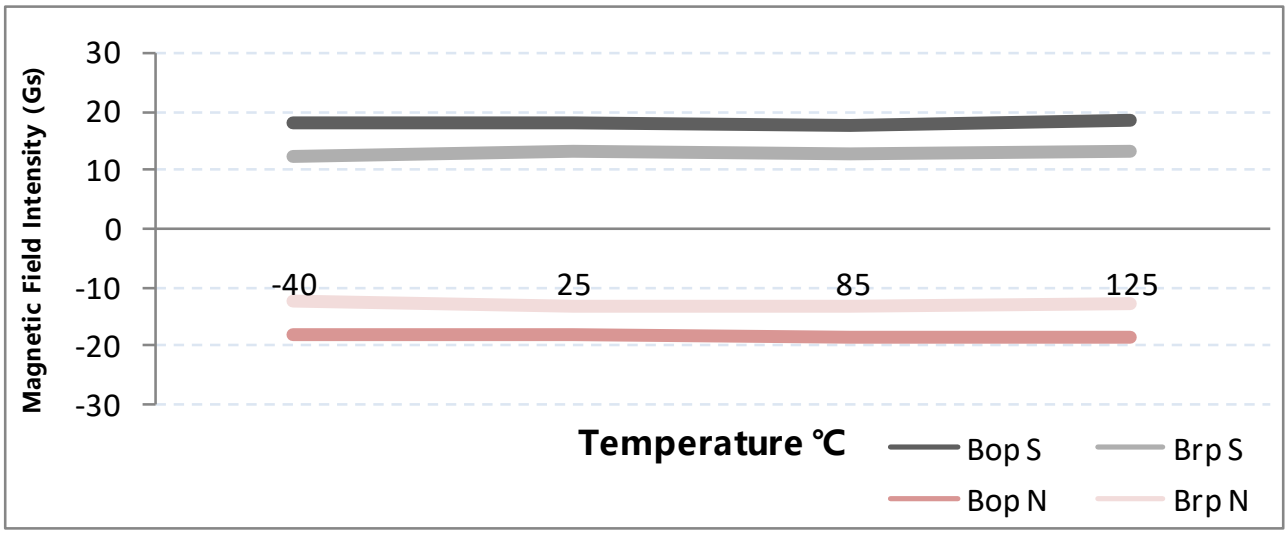


Figure.6 Magnetic Characteristics vs. Temperature (B_{OP} & B_{RP})

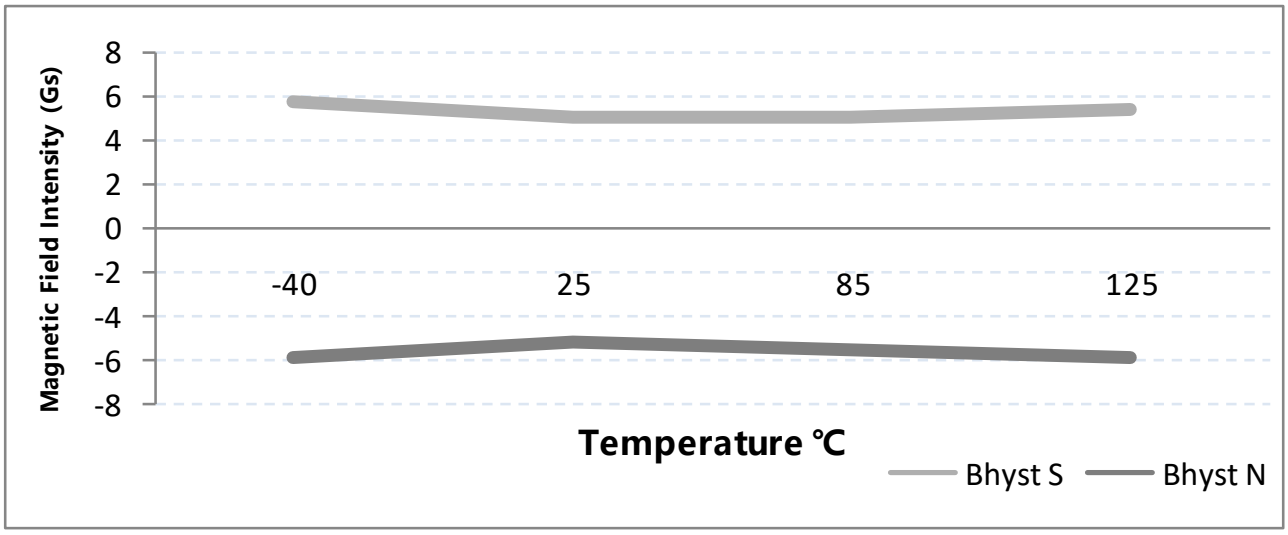


Figure.7 Magnetic Characteristics vs. Temperature (B_{HYST})

深圳市满度科技有限公司
Tel:150-1290-5940
Web:www.manduic.com
Email:sales@manduic.com

10.6 Typical Output Waveform

MT6111A as example

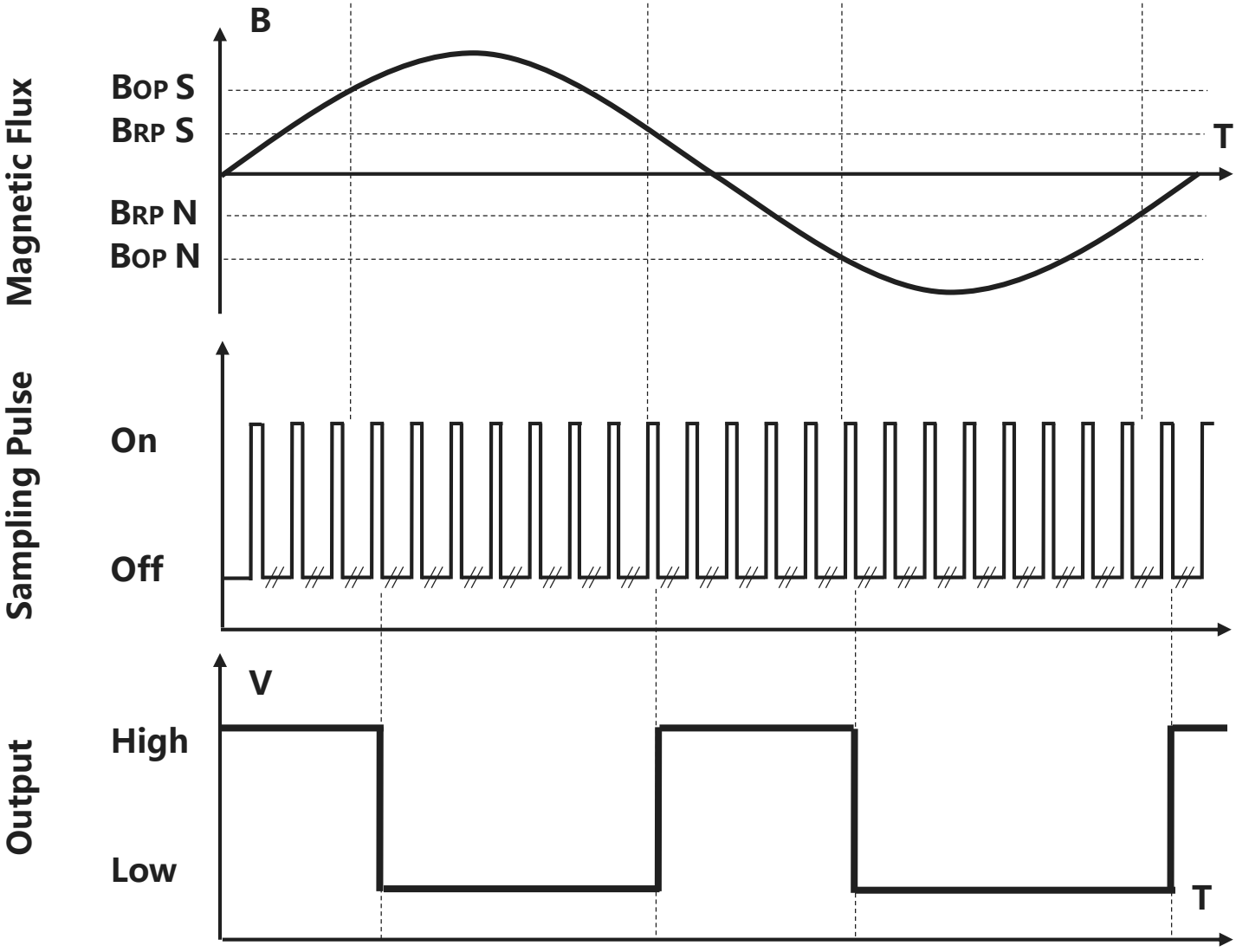


Figure.8 Digital Output vs. Magnetic Flux Density & Sampling Pulse

11 Typical Application Circuit

MT6111AT as example
Note: Recommended value for R_L is 100KOhms

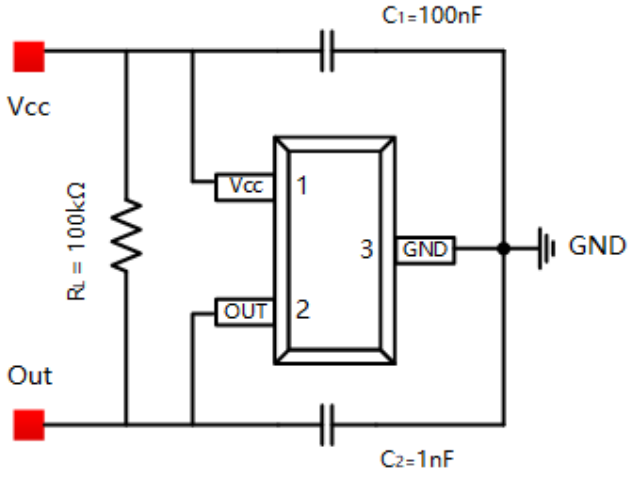


Figure.9 Typical Application Circuit

12 Power on Output Waveform

Vcc rise time < 1us, Tpo is the time from the stable point of Vcc to the valid point of output

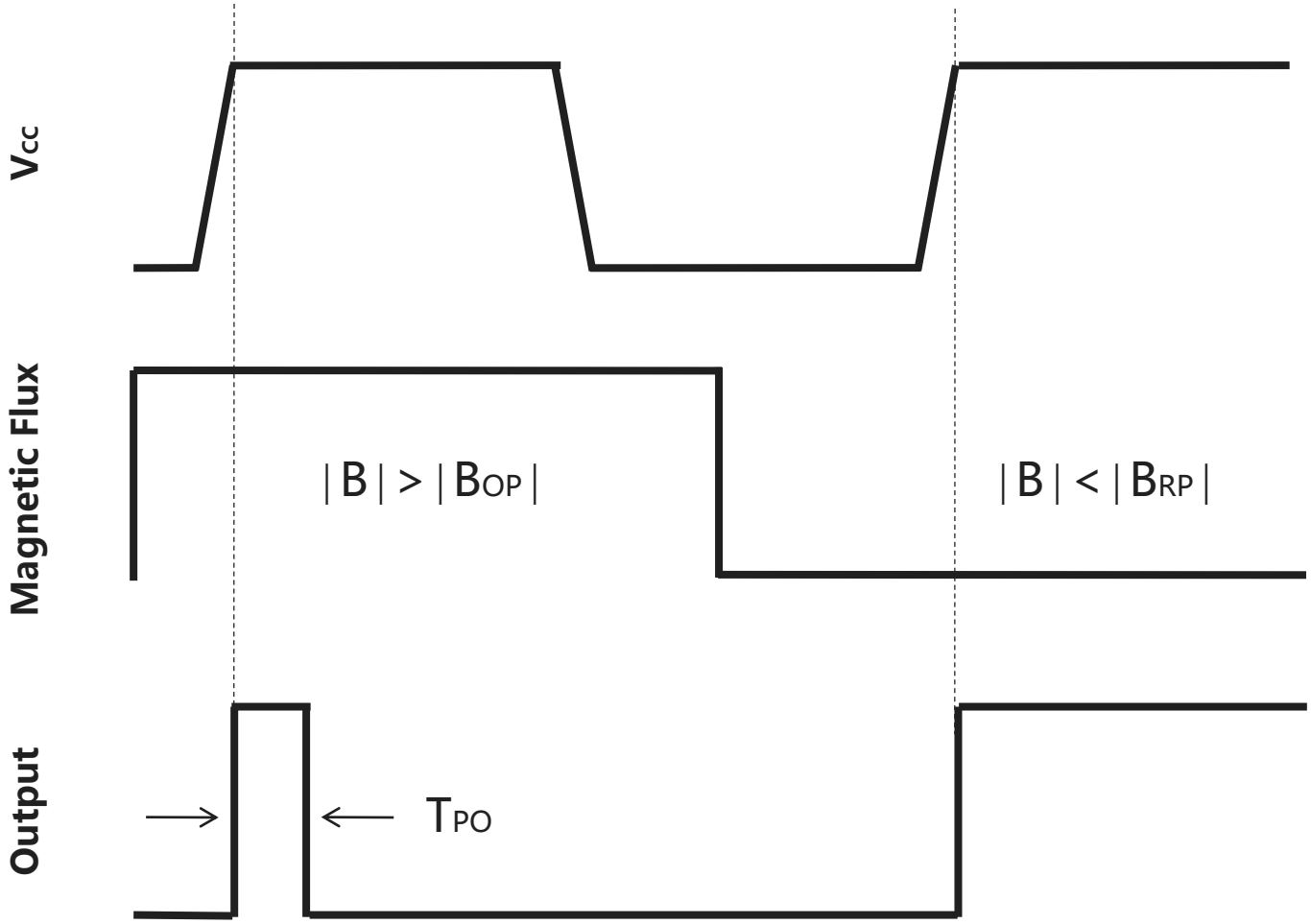


Figure.10 Power on Output Waveform

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

13.1 SOT-23 Package Information

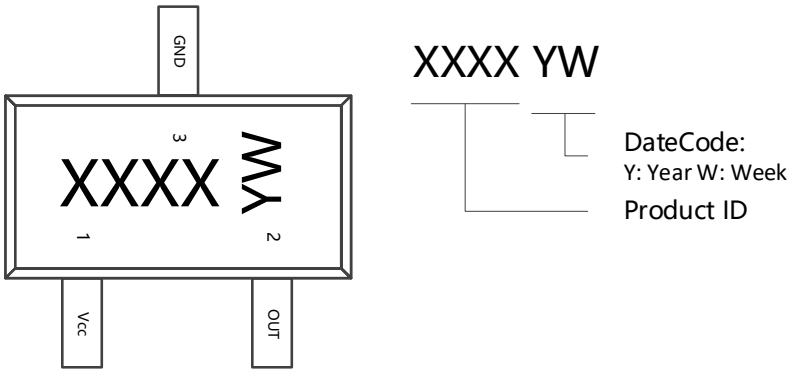


Figure.11 SOT-23 Chip Marking Spec

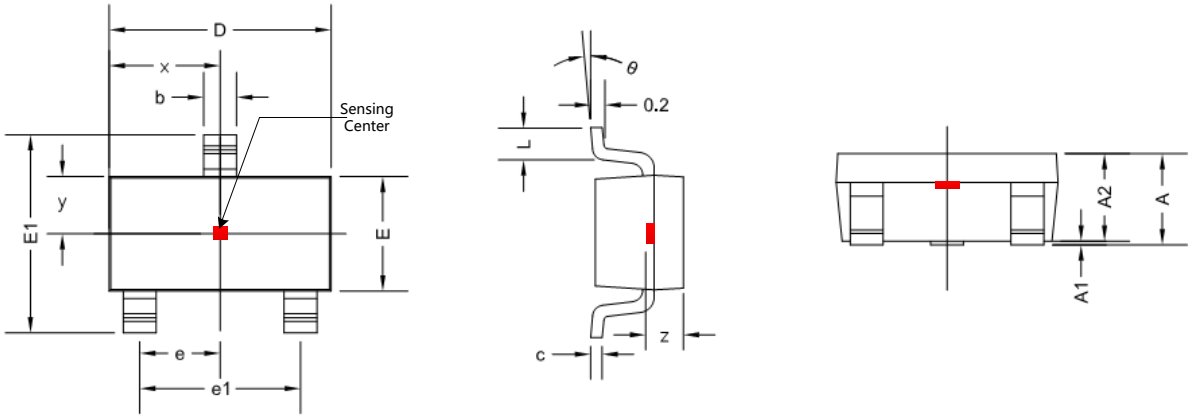


Figure.12 SOT-23 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
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	

13.2 Flat TO-92 Package Information

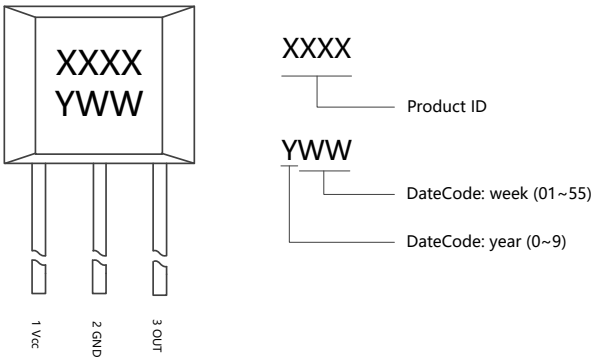


Figure.13 Flat TO-92 Chip Marking Spec

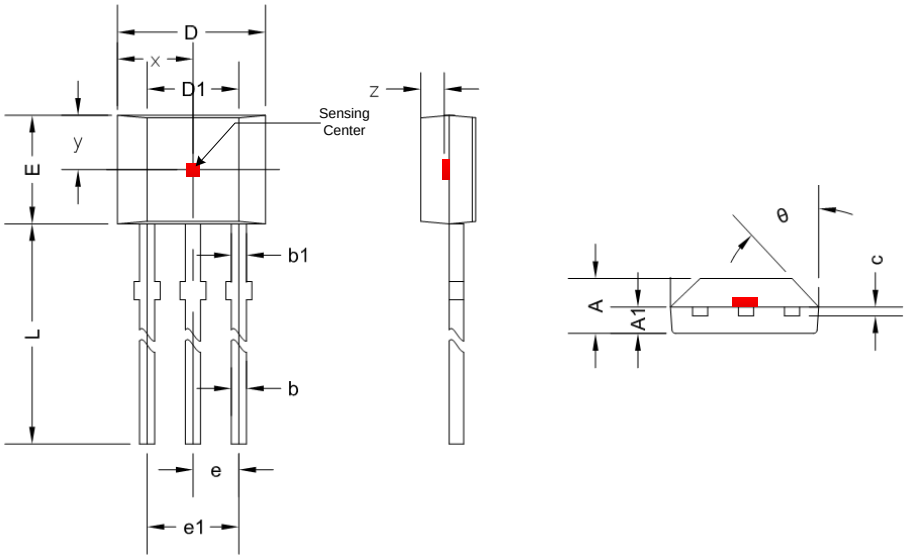


Figure.14 Flat TO-92 Package Drawing

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.420	1.620	0.056	0.064
A1	0.660	0.860	0.026	0.034
b	0.350	0.480	0.013	0.019
b1	0.400	0.510	0.016	0.020
c	0.330	0.510	0.013	0.020
D	3.900	4.100	0.154	0.161
D1	2.280	2.680	0.090	0.106
E	3.050	3.250	0.120	0.128
e	1.270 TYP		0.050 TYP	
e1	2.440	2.640	0.096	0.104
L	14.350	14.750	0.565	0.581
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	

14 Copy Rights and Disclaimer

1. This document may not be reproduced or duplicated, in any form, in whole or in part without prior written consent of MagnTek . Copyrights © 2019, MagnTek Incorporated.

2. MagnTek reserves the right to make changes to the information published in this document at anytime without notice.

3. MagnTek’ s products are limited for use in normal commercial applications. MagnTek’ s products are not to be used in any device or system, including but not limited to medical life support equipment and system.

For the latest version of this document, please visit our website: www.magntek.com.cn