

## General Description

The TMR1208 is a digital bipolar magnetic switch that integrates TMR and CMOS technology in order to provide a magnetically triggered digital switch with high sensitivity, high speed, and ultra-low power consumption. It integrates a push-pull half-bridge TMR magnetic sensor and CMOS signal processing circuitry within the same package. Designed for use in applications that are both power-critical and performance-demanding, this device includes an on-chip TMR voltage generator for precise magnetic sensing, TMR voltage amplifier and comparator, a Schmitt trigger to provide switching hysteresis for noise rejection, and CMOS push-pull output. An internal band gap regulator is used to provide temperature compensated supply voltage for internal circuits, and it allows a wide range of operating supply voltages. The TMR1208 draws only 1.5 $\mu$ A resulting in ultra-low power operation, additionally it has fast response, accurate switching points, excellent thermal stability, and immunity to stray field interference. It is available in two packaging form factors: SOT23-3 (P/N TMR1208S), or TO-92S (P/N TMR1208T).

## Features and Benefits

- Tunneling Magnetoresistance (TMR) Technology
- Ultra Low Power Consumption at 1.5 $\mu$ A
- High Frequency Response >1KHz
- Bipolar Latching Operation
- Very Low Switching Points for Ultra High Sensitivity
- Compatible with a Wide Range of Supply Voltages
- Excellent Thermal Stability
- High Tolerance to External Magnetic Field Interference

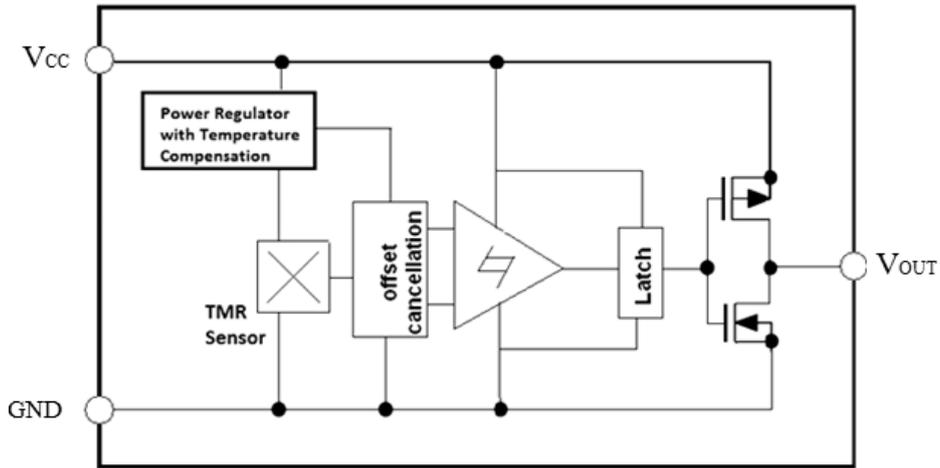
## Applications

- Utility Meters including Water, Gas, and Heat Meters
- Solid State Switches
- Speed Sensing
- Rotary and Linear Position Sensing



TMR1208S(Left), TMR1208T(Right)

### Block Diagram



### Pin Configuration

SOT23-3

TO-92S

Pin Name	Pin No.		Pin Function
	TO-92S	SOT23-3	
V <sub>OUT</sub>	1	2	Output
GND	2	3	Ground
V <sub>CC</sub>	3	1	Supply Voltage

### Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V <sub>CC</sub>	7	V
Reverse Supply Voltage	V <sub>RCC</sub>	0.3	V
Output Current	I <sub>OUTSINK</sub>	9	mA
Magnetic Flux Density	B	2800	G
ESD level(HBM)	V <sub>ESD</sub>	2	kV
Operating Temperature	T <sub>A</sub>	-40 ~ 125	°C
Storage Temperature	T <sub>stg</sub>	-50 ~ 150	°C

### Electrical Characteristics (V<sub>CC</sub>=3.0V, T<sub>A</sub>=25°C)

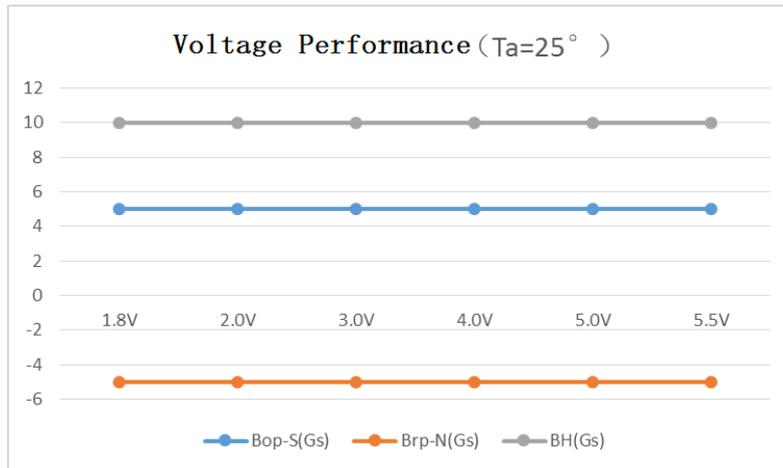
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V <sub>CC</sub>	Operating	1.8	3.0	5.5	V
Output High Voltage	V <sub>OH</sub>		V <sub>CC</sub> -0.3		V <sub>CC</sub>	V
Output Low Voltage	V <sub>OL</sub>		0		0.2	V
Supply Current	I <sub>CC</sub>	Output Open		1.5		μA
Response Frequency	F			1000		Hz

**Note:** A 0.1μF capacitor is connected between V<sub>CC</sub> and GND during all tests in the above table.

### Magnetic Characteristics ( $V_{CC} = 3.0V, T_A = 25^{\circ}C$ )

Parameters	Symbol	Min	Typ.	Max	Units
Operate Point	$B_{OP}$		5		G
Release Point	$B_{RP}$		-5		G
Hysteresis	$B_H$		10		G

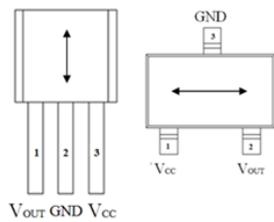
### Voltage and Temperature Characteristics



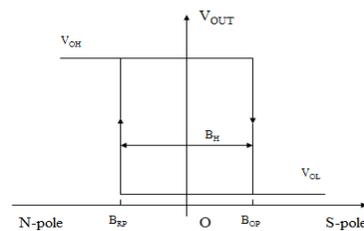
### Output Behavior vs. Magnetic Pole

Parameter	Test Conditions	Output
South Pole	$B > B_{OP}$	Low (On)
North Pole	$B < B_{RP}$	High (Off)

Note: when power is turned on under zero magnetic field, the output is "High".



Sensing Direction of Magnetic Field

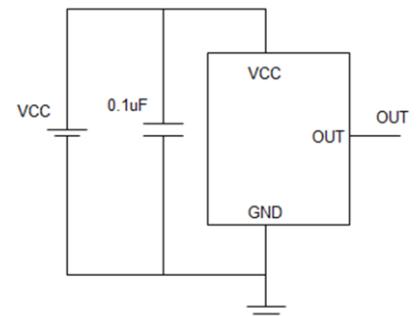


Magnetic Flux

### Application Information

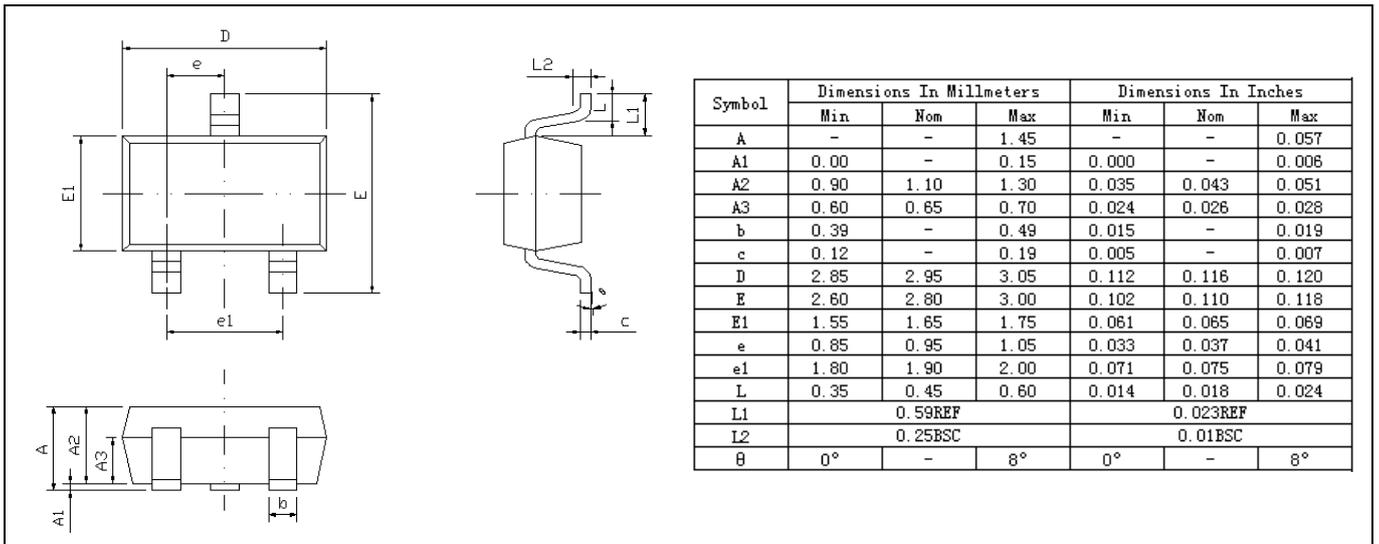
The output of the TMR1208 switches low (turns on) when a magnetic field parallel to the TMR sensor exceeds the operate point threshold,  $B_{OP}$ . When the magnetic field is reduced below the release point,  $B_{RP}$ , the device output goes high (turns off). The difference between the magnetic operate point and release point is the hysteresis  $B_H$  of the device.

It is strongly recommended that an external bypass capacitor be connected in close proximity to the device between the supply and ground to reduce noise. The typical value of the external capacitor is 0.1 $\mu$ F.

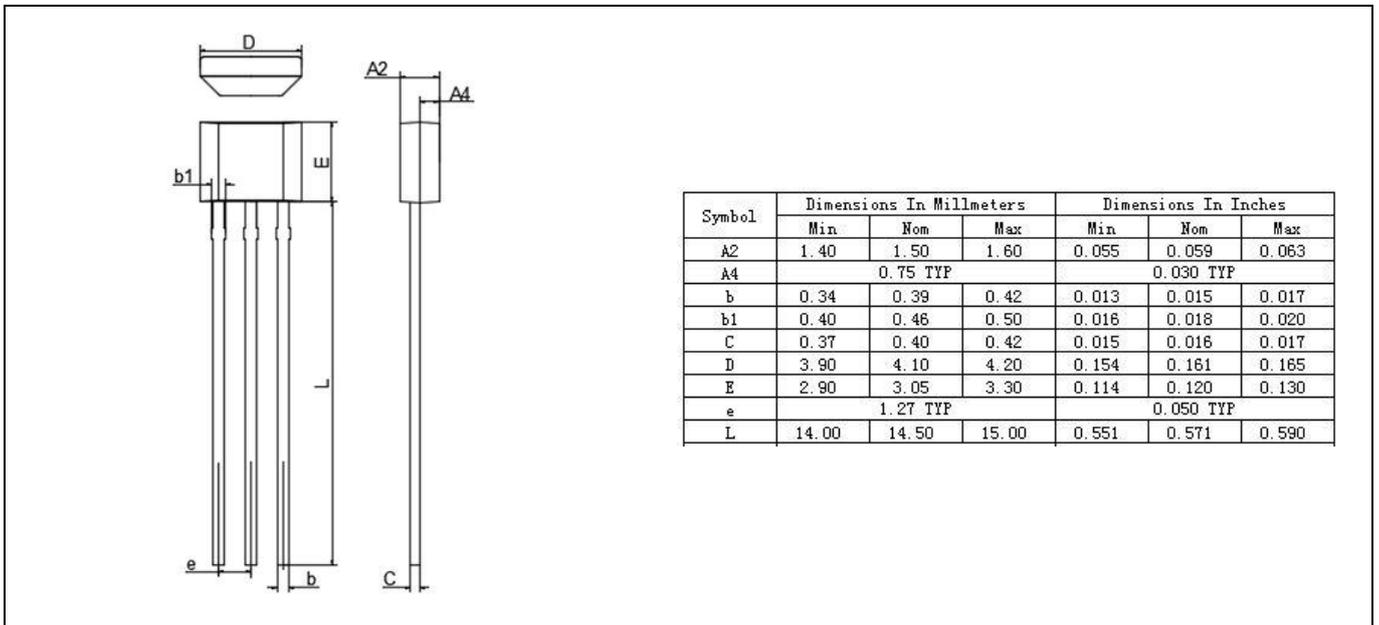


# Package Information

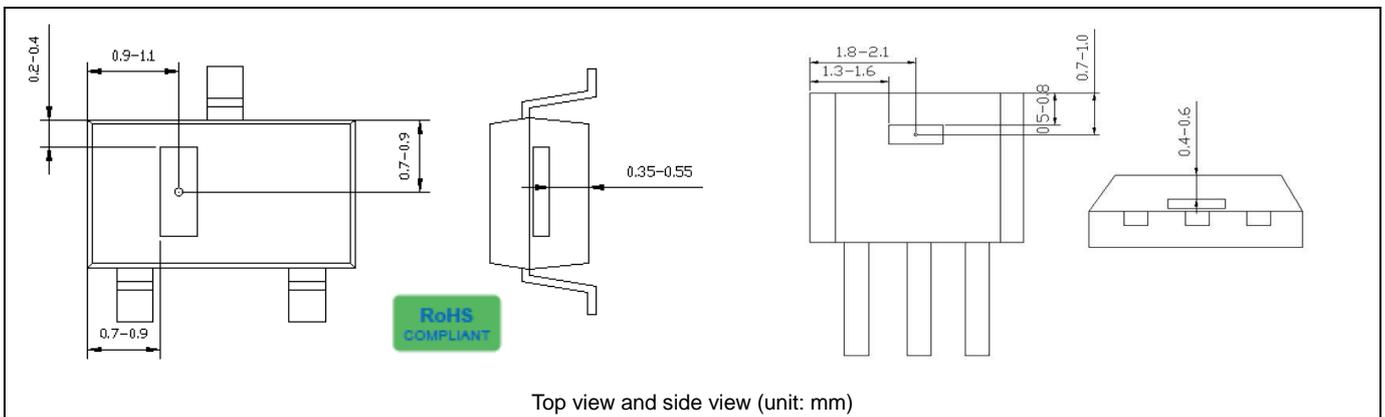
SOT23-3 package drawing



TO-92S package drawing



# TMR Sensor Position





**American Electronic Components Inc.**

1101 Lafayette Street, Elkhart, Indiana 46516, United States of America.

Web: [www.aecensors.com](http://www.aecensors.com) Email: [sales@aecensors.com](mailto:sales@aecensors.com)

Toll: 888 847 6552, Tel: +1 574 293 8013

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