MULTI DIMENSION
Sensing the Future

TMR1201

TMR Bipolar Switch

General Description

The TMR1201 is a digital latching bipolar magnetic switch that integrates TMR and CMOS technology in order to provide a magnetically triggered digital switch with high sensitivity, high speed, and 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 high accuracy applications, 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 TMR1201 features accurate switching points, fast response, a wide operating temperature range, and excellent ESD immunity. It is available in two packaging form factors: SOT23-3 (P/N TMR1201S), or TO-92S (P/N TMR1201T).

Features and Benefits

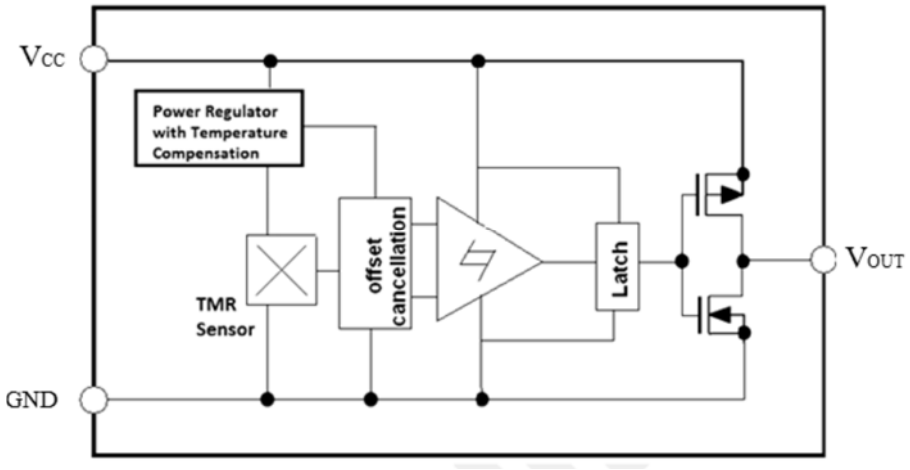
- Tunneling Magnetoresistance (TMR) Technology
- Bipolar Latching Operation
- Low Operate Points for High Sensitivity
- Very Low Power Consumption
- Compatible with a Wide Range of Supply Voltages
- Excellent Thermal Stability
- High-Speed Detection and High Frequency Response
- High ESD Tolerance

TMR1201S(Left), TMR1201T(Right)

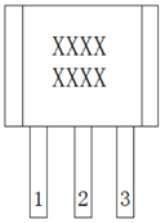
Applications

- Utility Meters including Water, Gas, and Heat Meters
- Solid State Switching
- Speed Sensing
- Rotor Position Sensing
- Linear Displacement Sensing

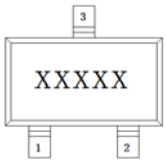
Block Diagram



Pin Configuration



TO-92S



SOT23-3

Pin Name	Pin No.		Pin Function
	TO-92S	SOT23-3	
V_{OUT}	1	2	Output
GND	2	3	Ground
V_{CC}	3	1	Supply Voltage

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V_{CC}	7	V
Reverse Supply Voltage	V_{RCC}	0.4	V
Output Current	$I_{OUTSINK}$	10	mA
Magnetic Flux Density	B	1200	G
ESD level(HBM)	V_{ESD}	6.5	kV
Operating Temperature	T_A	-40 ~125	°C
Storage Temperature	T_{stg}	-50 ~ 150	°C

Electrical Characteristics (V_{CC}=3.0V, T_A=25°C)

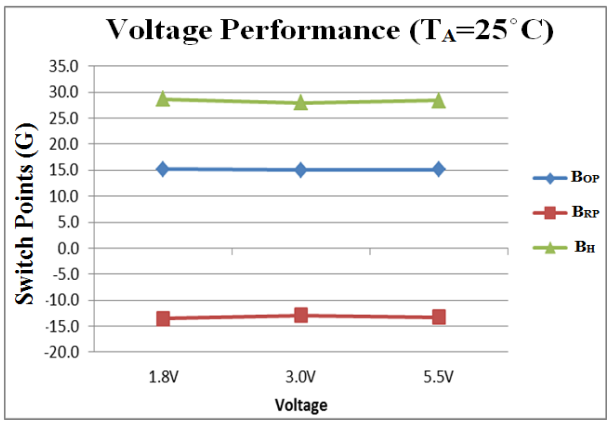
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.8	3.0	5.5	V
Output High Voltage	V_{OH}		Vcc-0.3		Vcc	V
Output Low Voltage	V_{OL}		0		0.2	V
Supply Current	I_{CC}	Output Open		3.4	5	μA
Response Frequency	F			1		kHz
Power-On Time	t_{PO}			200		μs

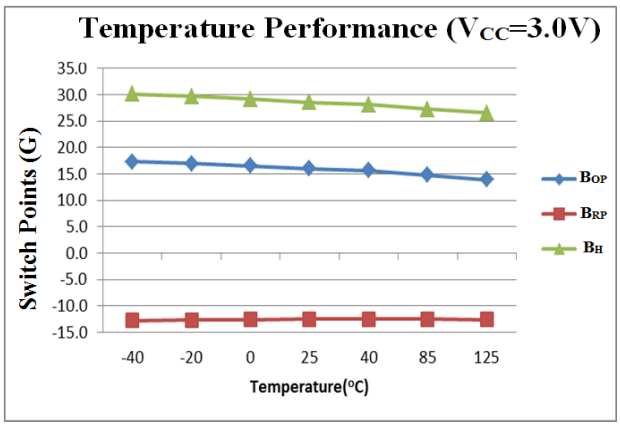
Note: A 0.1μF capacitor is connected between V_{CC} and GND during all tests in the above table.

Magnetic Characteristics (V_{CC} = 3.0V, T_A = 25°C)

Parameters	Symbol	Min	Typ.	Max	Units
Operate Point	B_{OP}	10	15	20	G
Release Point	B_{RP}	-20	-15	-10	G
Hysteresis	B_H		30		G

Voltage and Temperature Characteristics

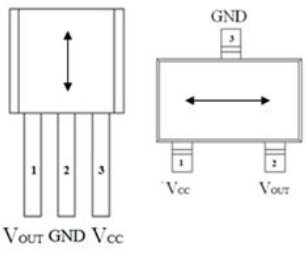




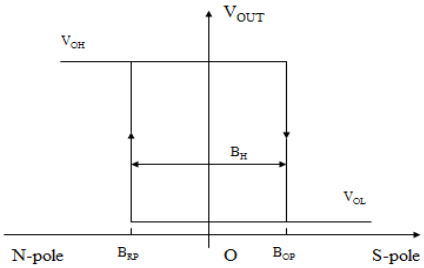
Output Behavior vs. Magnetic Pole

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

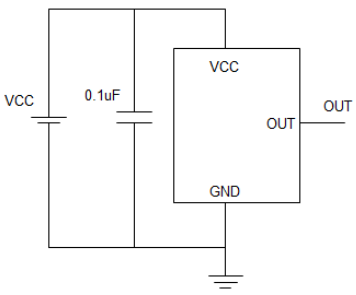


Magnetic Flux

Application Information

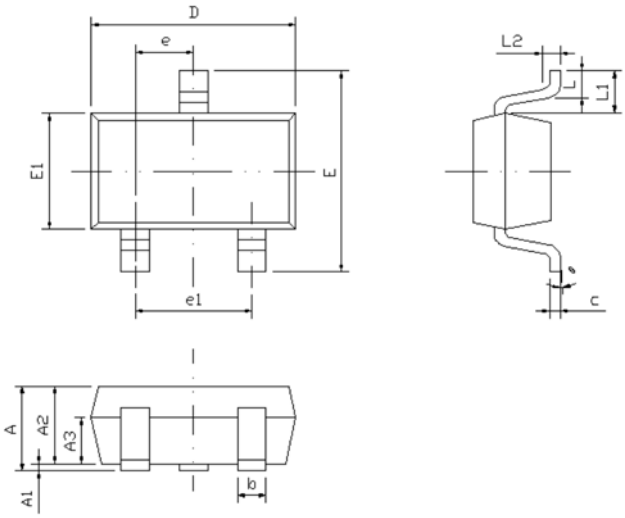
The output of the TMR1201 switches low (turns on) when a magnetic field parallel to the TMR sensor exceeds the operate point threshold, B_{OP}. When the magnetic field is reduced below the release point, B_{RP}, the device output goes high (turns off). The differences between the magnetic operate point 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 and improve switching accuracy. The typical value of the external capacitor is 0.1μF.



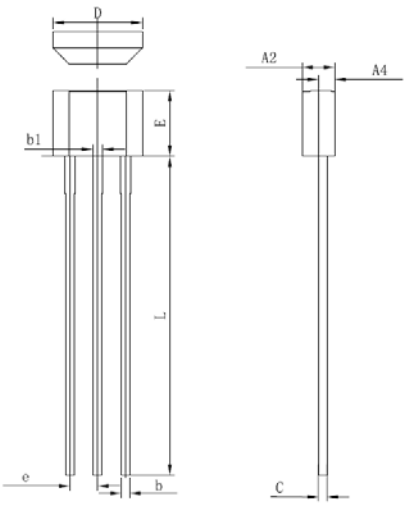
Package Information

SOT23-3 package drawing



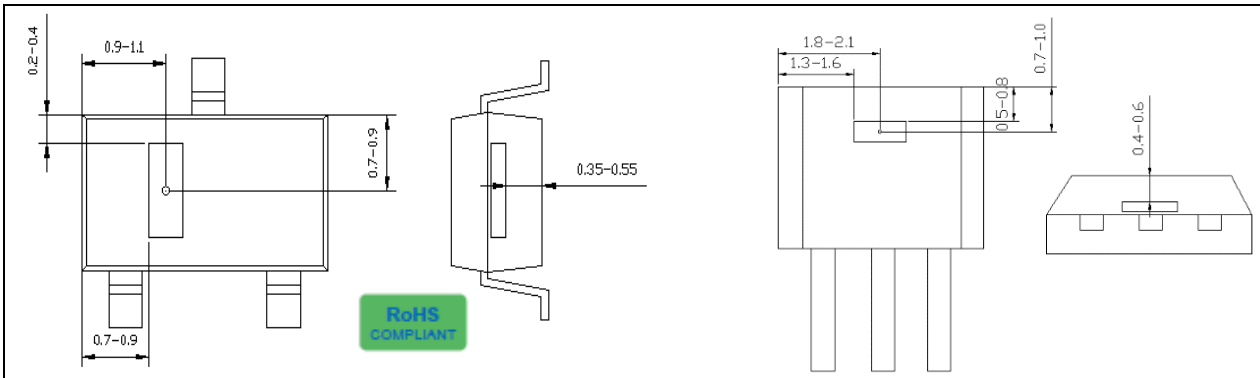
Symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	-	1.45	-	-	0.057
A1	0.00	-	0.15	0.000	-	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
A3	0.60	0.65	0.70	0.024	0.026	0.028
b	0.39	-	0.49	0.015	-	0.019
c	0.12	-	0.19	0.005	-	0.007
D	2.85	2.95	3.05	0.112	0.116	0.120
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.55	1.65	1.75	0.061	0.065	0.069
e	0.85	0.95	1.05	0.033	0.037	0.041
e1	1.80	1.90	2.00	0.071	0.075	0.079
L	0.35	0.45	0.60	0.014	0.018	0.024
L1	0.59REF			0.023REF		
L2	0.25BSC			0.01BSC		
θ	0°	-	8°	0°	-	8°

TO-92S package drawing



symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A2	1.40	1.50	1.60	0.055	0.059	0.063
A4	0.750TYP			0.030TYP		
b	0.34	0.39	0.42	0.0134	0.0154	0.0165
b1	0.40	0.46	0.50	0.016	0.018	0.020
C	0.38	0.40	0.42	0.0150	0.0157	0.0165
D	4.08	4.10	4.20	0.1606	0.1614	0.165
E	2.90	3.05	3.20	0.114	0.120	0.126
e	1.27TYP			0.050TYP		
L	14.00	14.50	15.00	0.519	0.571	0.590

TMR Sensor Position



Top view and side view (unit: mm)

MultiDimension Technology Co., Ltd.

Address:No.7 Guangdong Road, Zhangjiagang Free Trade Zone, Jiangsu, 215634, China

Web: www.dowaytech.com/en

Email: info@dowaytech.com