TMR1366

Nano-Ampere 7 Gauss High-Sensitivity TMR Omnipolar Switch

General Description

The TMR1366 is a digital omnipolar 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 TMR1366 draws only 200nA resulting in ultra-low power operation, additionally it has accurate switching points, excellent thermal stability, and immunity to stray field interference. It is available in two packaging form factors: SOT23-3 (P/N TMR1366S) or TO-92S (P/N TMR1366T).

Features and Benefits

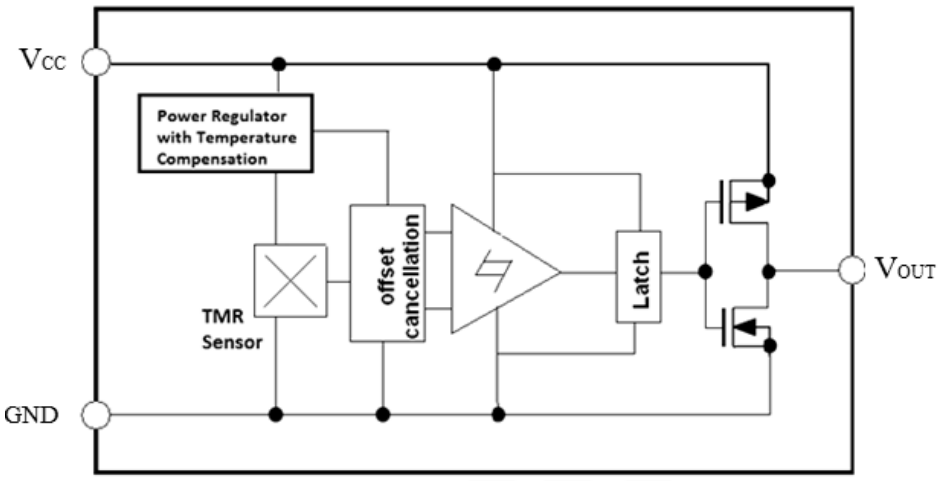
- Tunneling Magnetoresistance (TMR) Technology
- Nano-Ampere Ultra-low Power Consumption at 200nA
- Fast Internal Switching Frequency at 50Hz
- Omnipolar operation with North or South Pole
- High Sensitivity with BOP/BRP at 7/5 Gauss
- Compatible with a Wide Range of Supply Voltages
- Excellent Thermal Stability

TMR1366S(Left), TMR1366T(Right)

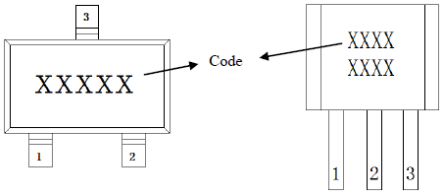
Applications

- Utility Meters including Water, Gas, and Heat Meters
- Proximity Switches
- Rotary and Linear Position Sensing
- Activation Switches for Electronic Shelf Labels (ESL)

Block Diagram



Pin Configuration



SOT23-3 TO-92S

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}	0.3	V
Output Current	$I_{OUTSINK}$	9	mA
Magnetic Flux Density	B	4000	G
ESD level(HBM)	V_{ESD}	4	kV
Operating Ambient Temperature	T_A	-40 ~125	°C
Storage Temperature	T_{stg}	-50 ~ 150	°C

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

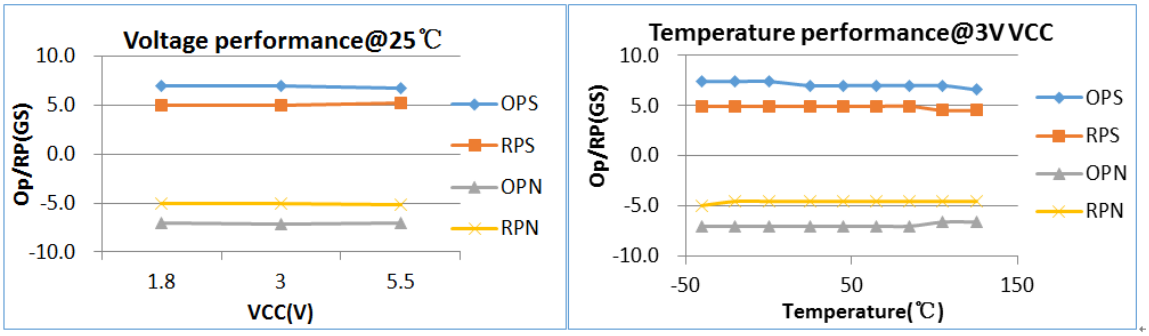
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.8	3.0	5.5	V
Output High Voltage	V_{OH}		Vcc-0.3		Vcc	V
Output Low Voltage	V_{OL}		0		0.2	V
Supply Current	I_{CC}	Output Open		200		nA
Switch Frequency	F				50	Hz

Note: a 100nF 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_{OPS}		7		G
	B_{OPN}		-7		G
Release Point	B_{RPS}		5		G
	B_{RPN}		-5		G
Hysteresis	B_H		2		G

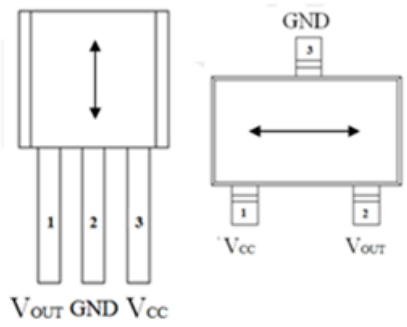
Voltage and Temperature Characteristics



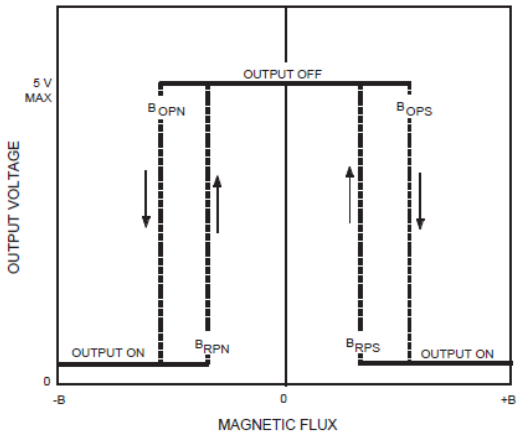
Output Behavior vs. Magnetic Polarity

Parameter	Test Conditions	Output
South Pole	B > B_{OPS}	Low (On)
	0< B < B_{RPS}	High (Off)
North Pole	B < B_{OPN}	Low (On)
	0 > B > B_{RPN}	High (Off)

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



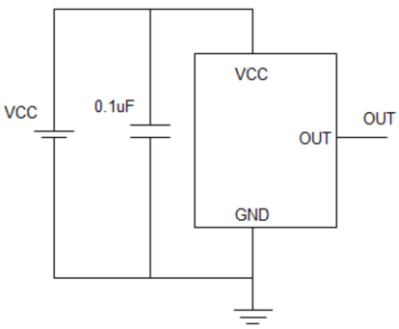
Sensing Direction



Switching Behavior of TMR1366

Application Information

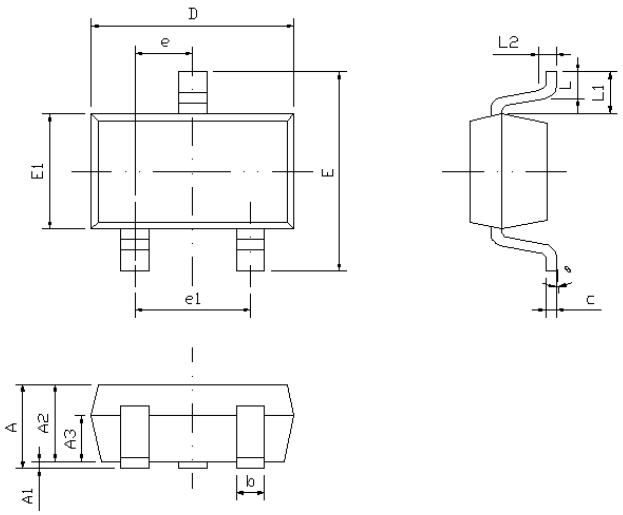
The output of the TMR1366 switches low (turns on) when a magnetic field parallel to the TMR sensor exceeds the operate point threshold, B_{OP}. When the magnetic field is reduced below the release point, B_{RP}, the device output goes high (turns off). The difference between the magnetic operate point 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 0.1μF.

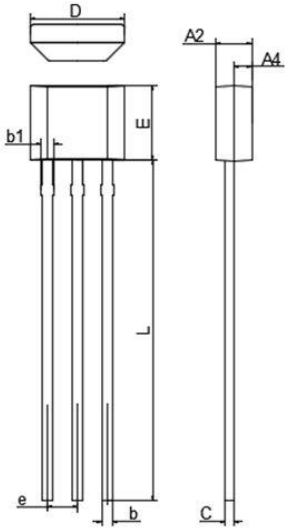
Package Information

SOT23-3 package drawing



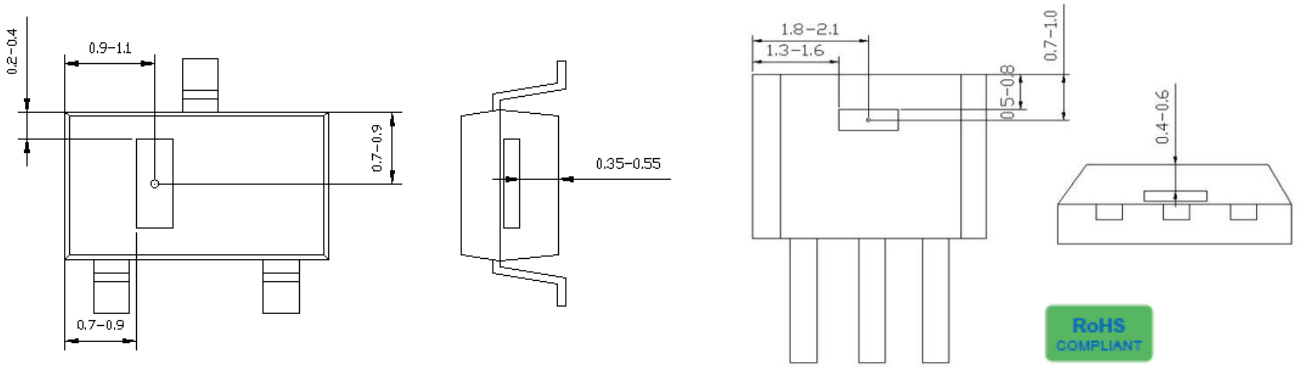
Symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	-	1.45	-	-	0.057
A1	0.00	-	0.15	0.000	-	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
A3	0.60	0.65	0.70	0.024	0.026	0.028
b	0.39	-	0.49	0.015	-	0.019
c	0.12	-	0.19	0.005	-	0.007
D	2.85	2.95	3.05	0.112	0.116	0.120
E	2.60	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	0.75 TYP			0.030 TYP		
b	0.34	0.39	0.42	0.013	0.015	0.017
b1	0.40	0.46	0.50	0.016	0.018	0.020
C	0.37	0.40	0.42	0.015	0.016	0.017
D	3.90	4.10	4.20	0.154	0.161	0.165
E	2.90	3.05	3.30	0.114	0.120	0.130
e	1.27 TYP			0.050 TYP		
L	14.00	14.50	15.00	0.551	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