

General Description

TMR1350 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 is designed for use in applications that are both power-critical and performance-demanding. It contains a push-pull full-bridge TMR magnetic sensor and CMOS signal processing circuitry within the same package, including an on-chip TMR voltage generator for precise magnetic sensing, a TMR voltage amplifier and comparator plus a Schmitt trigger to provide switching hysteresis for noise rejection, and CMOS push-pull output. An internal band gap regulator is used to provide a temperature compensated supply voltage for internal circuits, permitting a wide range of supply voltages up to 40V. The TMR1350 draws only 0.6mA resulting in low power operation. It has fast response, accurate switching points, excellent thermal stability, and immunity to stray field interference. It is available in the SOT23-3 package (P/N TMR1350S) or the TO-92S package (P/N TMR1350T).

Features and Benefits

- Tunneling Magnetoresistance (TMR) Technology
- Low Power Consumption <0.6mA
- High Frequency Response > 1kHz
- Operation with North or South Pole
- Z-axis sensing direction compatible with Hall Effect
- Low Switching Points for High Sensitivity
- High Supply Voltage of 40V and 30V Reverse Voltage
- Open Drain Output
- Excellent Thermal Stability
- High Tolerance to External Magnetic Field Interference

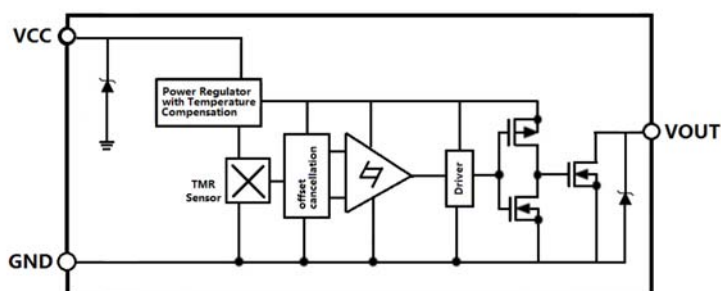


TMR1350S(Left), TMR1350T(Right)

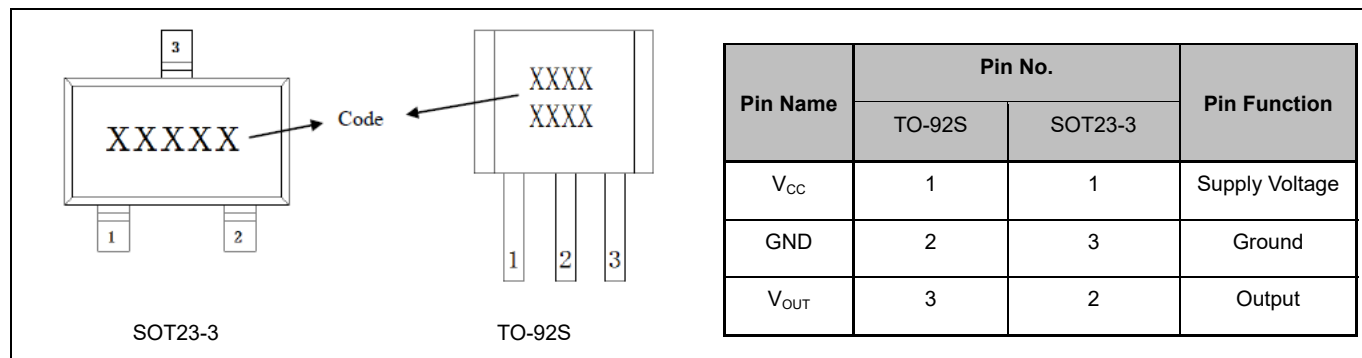
Applications

- Utility Meters including Water, Gas, and Heat Meters
- Proximity Switches
- Position and Speed Sensing
- Motor and Fan Control
- Power Window

Block Diagram



Pin Configuration



Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V _{CC}	40	V
Reverse Supply Voltage	V _{RCC}	30	V
Output Current	I _{OUTSINK}	25	mA
Magnetic Flux Density	B	4000	G
ESD level(HBM)	V _{ESD}	2	kV
Operating Ambient Temperature	T _A	-40 ~125	°C
Storage Temperature	T _{stg}	-50 ~ 150	°C

Electrical Characteristics (V_{CC}=24V, T_A=25°C)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V _{CC}	Operating	3	24	40	V
Output Stress Voltage	V _{stress}				40	V
Output leak Current	I _{leak}	OUT=H, V _{CC} =24V, V _{out} =24V		26		uA
Output Resistance of Turnoff	R _{off}	OUT=H		10		MΩ
Output Low Voltage	VOL	OUT=L, V _{CC} =24V, I _{sink} =25mA			0.3	V
Output Resistance of Turn on	R _{on}	OUT=L			10	Ω
Supply Current	I _{CC}	Output Open	0.4	0.5	0.6	mA
Response Frequency	F			1	100	KHz

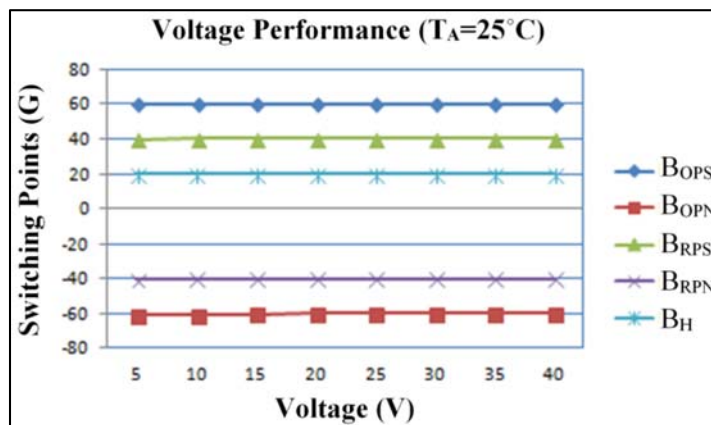
Note: a 1kOhm pull-up resistor is connected between V_{CC} and V_{OUT}, and a 100nF capacitor is connected between V_{CC} and GND during all tests in the above table.

Magnetic Characteristics (V_{CC} = 24V, T_A = 25°C)

Parameters	Symbol	Min	Typ.	Max	Units
Operate Point	B _{OPS}		60		G
	B _{OPN}		-60		G
Release Point	B _{RPS}		40		G
	B _{RPN}		-40		G
Hysteresis	B _H		20		G

Note: a 1kOhm pull-up resistor is connected between V_{CC} and V_{OUT}, and a 100nF capacitor is connected between V_{CC} and GND during all tests in the above table.

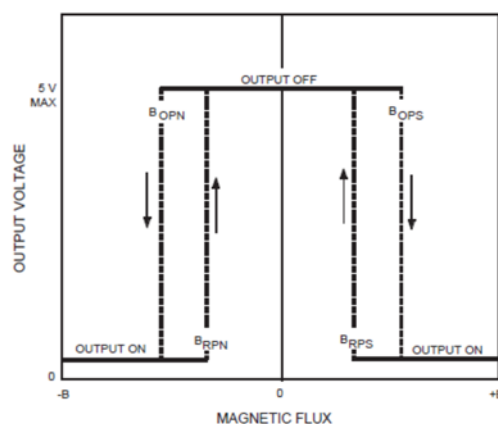
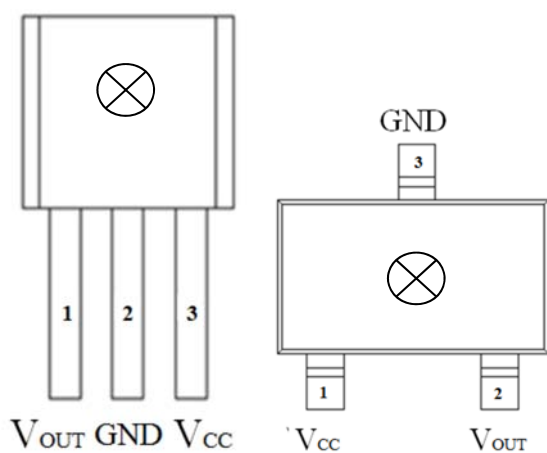
Voltage Characteristics



Output Behavior vs. Magnetic Pole

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)

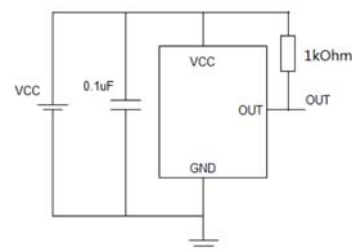
Note: when power is turned on under zero magnetic field, the output is “High”.



Application Information

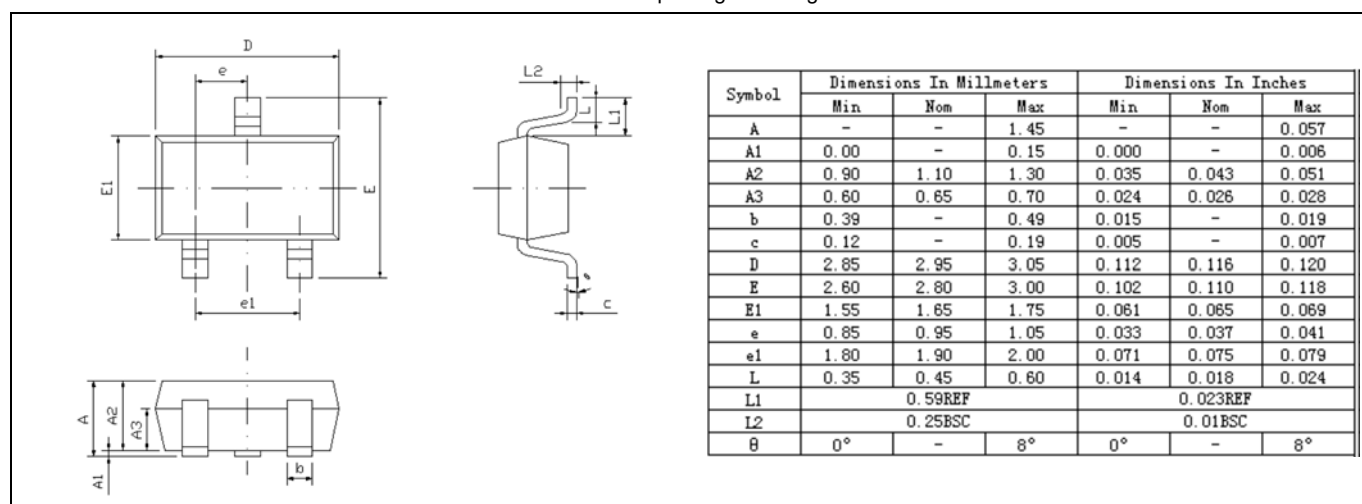
The output of the TMR1350 switches low (turns on) when a magnetic field to the sensing axis exceeds the operate point threshold, B_{OP} . When the magnetic field is reduced below the release point, B_{RP} , the device output switches high (turns off). The difference between the B_{OP} and B_{RP} is the 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 pins to reduce noise. The recommended value for the external bypass capacitor is $0.1\mu\text{F}$.

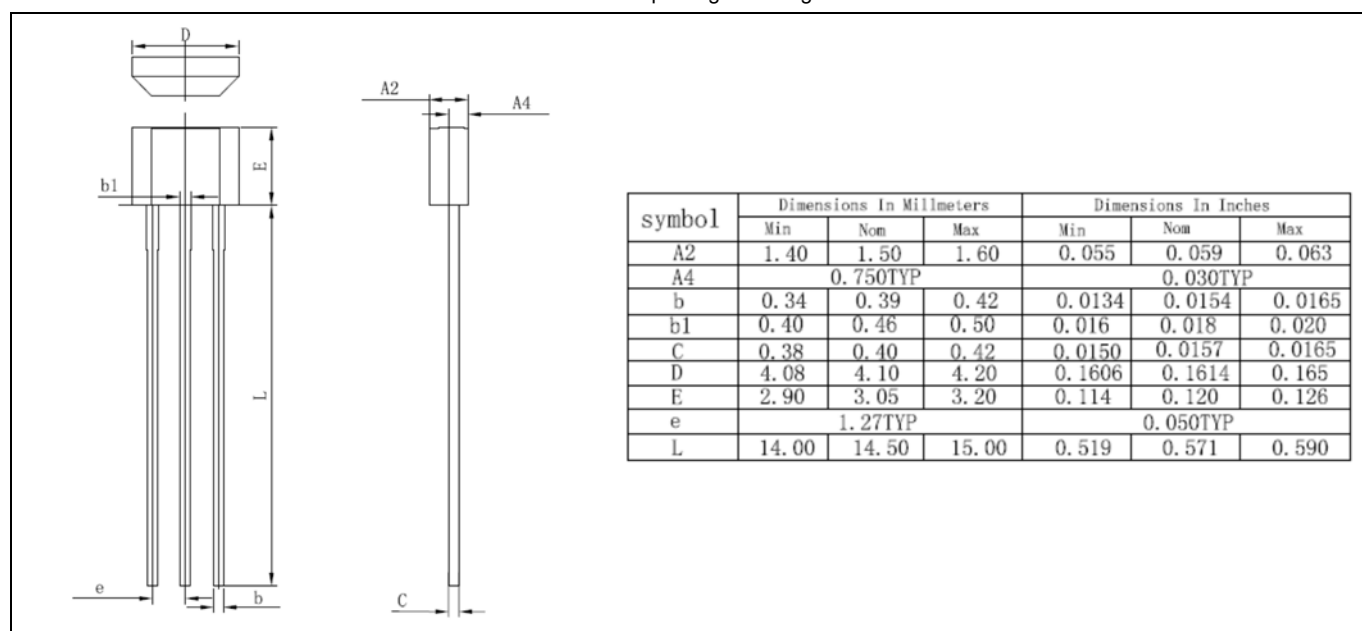


Package Information

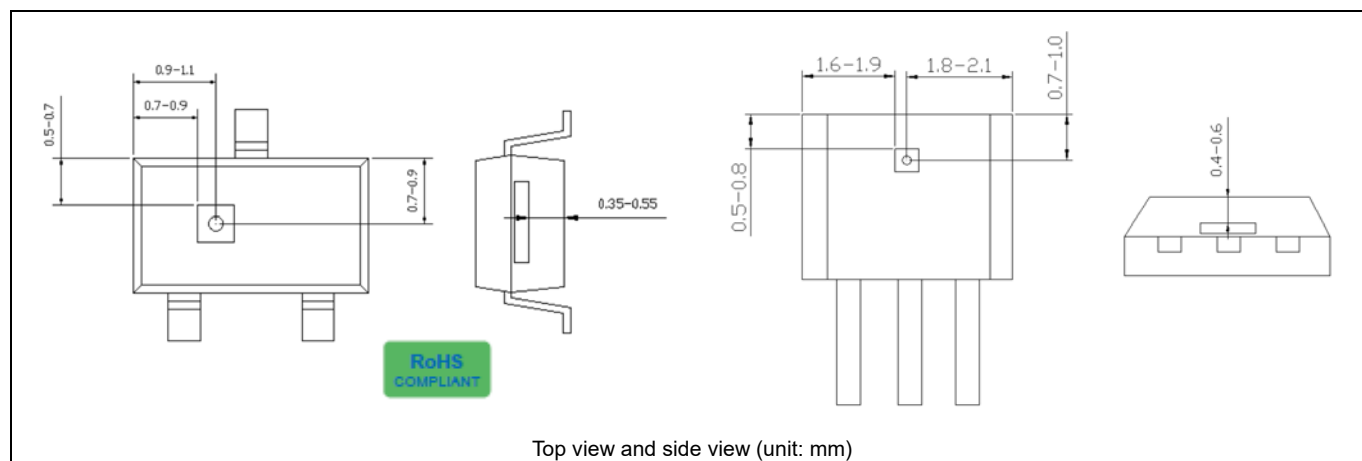
SOT23-3 package drawing



TO-92S package drawing



TMR Sensor Position





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