TMR1383

High-Voltage TMR Omnipolar Switch

General Description

TMR1383 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 low power consumption. It is designed for use in applications that are both power-critical and performance-demanding. It contains a push-pull TMR sensor bridge 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 an open-drain 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 from 3V up to 40V. The TMR1383 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 an SOT23-3 package (P/N TMR1383S).

Features and Benefits

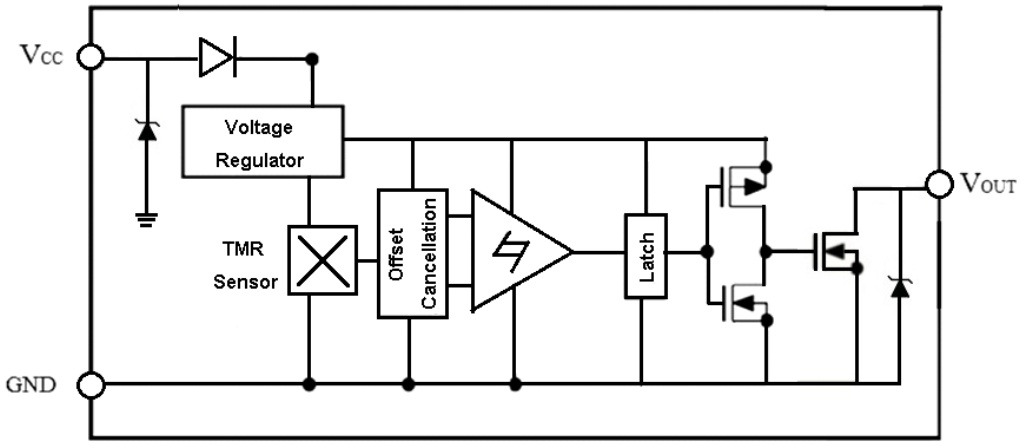
- Tunneling Magnetoresistance (TMR) Technology
- Low Power Consumption < 0.6mA
- High Frequency Response > 1KHz
- Omnipolar Operation
- In-plane X-Axis sensing
- High Supply Voltages of 40V and 30V Reverse Voltage
- Open-Drain Output
- Excellent Thermal Stability
- High Tolerance to External Magnetic Field Interference

TMR1383S

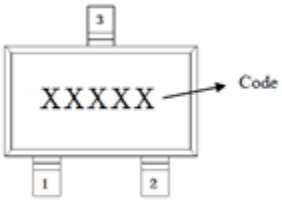
Applications

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

Block Diagram



Pin Configuration



SOT23-3

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

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 Temperature	T_A	-40 ~125	°C
Storage Temperature	T_{stg}	-50 ~ 150	°C

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

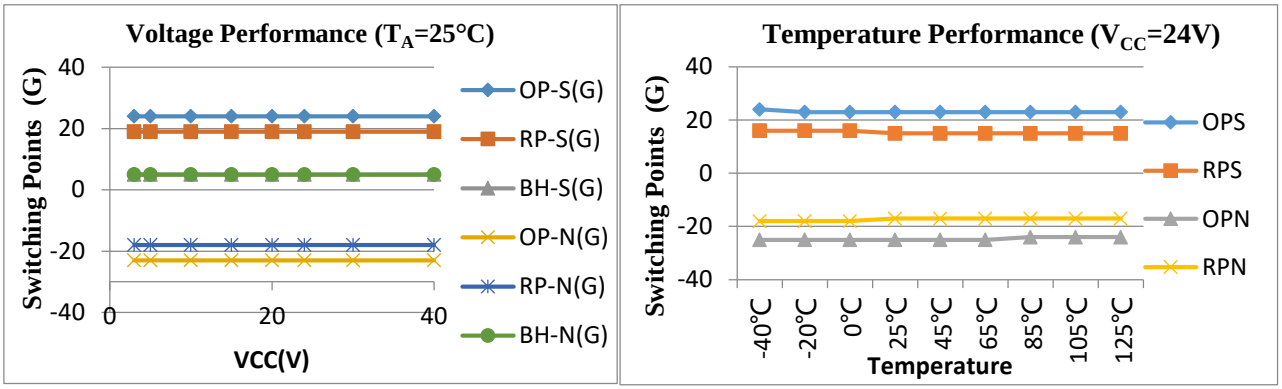
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	3	24	40	V
Output Stress Voltage	V_{stress}				40	V
Output Leakage Current	I_{leak}	OUT=High, V_{cc}=24V, V_{out}=24V		3		μA
Output Turn-off Resistance	R_{off}	OUT=High		10		MΩ
Output Low Voltage	V_{ol}	OUT=Low, V_{cc}=24V, I_{sink}=25mV			0.3	V
Output Turn-on Resistance	R_{on}	OUT=Low			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 VCC and VOUT, and a 0.1μF capacitor is connected between VCC and GND during all tests in the table above.

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

Parameters	Symbol	Min	Typ.	Max	Units
Operate Point	B_{OPS}		26		G
	B_{OPN}		-26		G
Release Point	B_{RPS}		19		G
	B_{RPN}		-19		G
Hysteresis	B_H		7		G

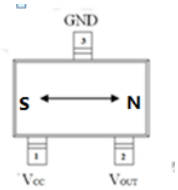
Voltage and Temperature Characteristics



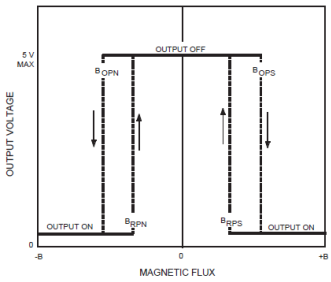
Output Behavior vs. Magnetic Polarity

Magnetic Polarity	Test Conditions	Output
South	B > B_{OPS}	Low (On)
	0< B < B_{RPS}	High (Off)
North	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 of Magnetic Field

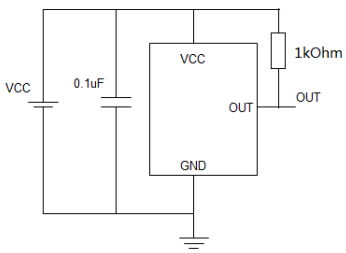


Magnetic Flux

Application Information

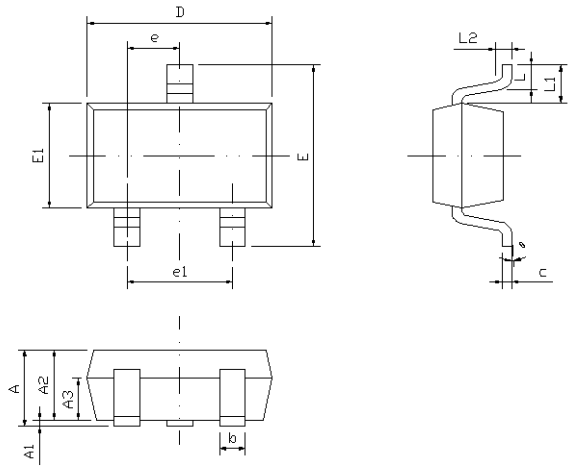
The output of the TMR1383 switches low (turns on) when a magnetic field parallel to the TMR sensor exceeds the operate point threshold |B_{OPS}| or |B_{OPN}|. When the magnetic field is reduced below the release point |B_{RPS}| or |B_{RPN}|, the device output goes high (turns off). The difference between 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.



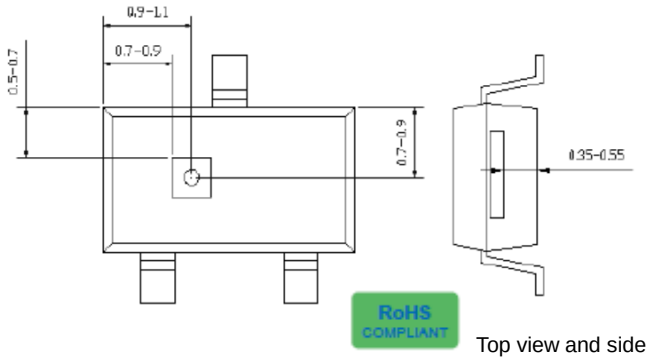
Package Information

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°

TMR Sensor Position



Top view and side view (unit: mm)

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