

MMS201H TMR Omnipolar Switch

Features and Benefits

- Tunneling Magnetoresistance (TMR) Technology
- Operation with North or South Pole
- 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

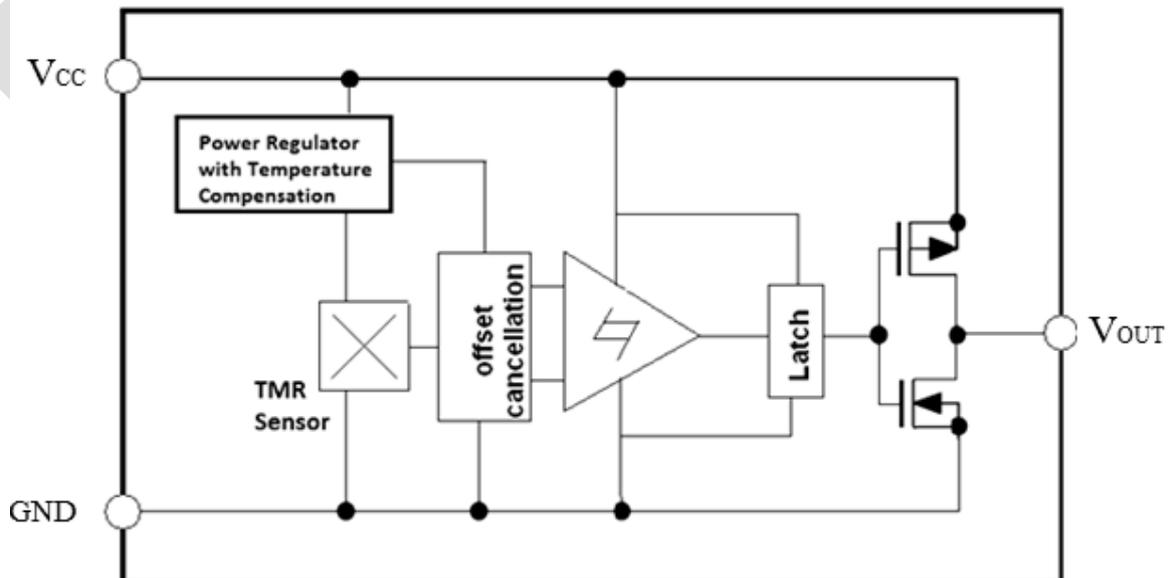
Applications

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

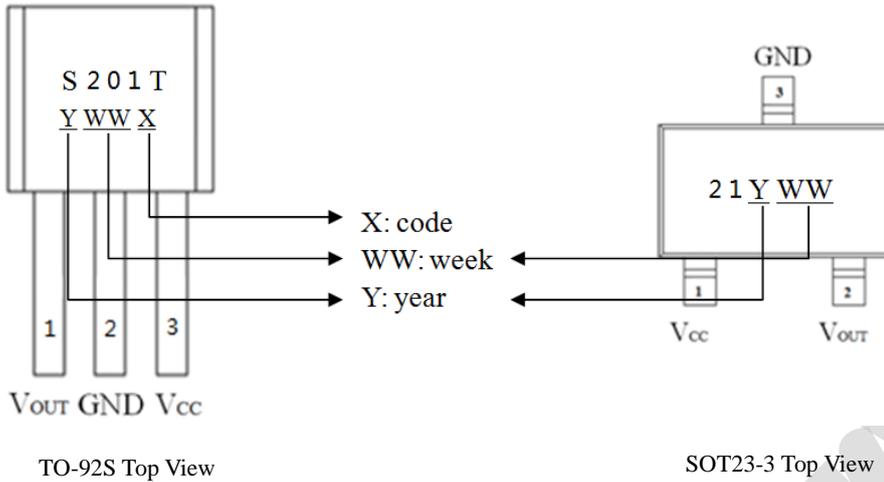
General Description

The MMS201H 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 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 MMS201H 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 MMS201HS), or TO-92S (P/N MMS201HT).

Block Diagram



Pin Configuration



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}	5.5	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)

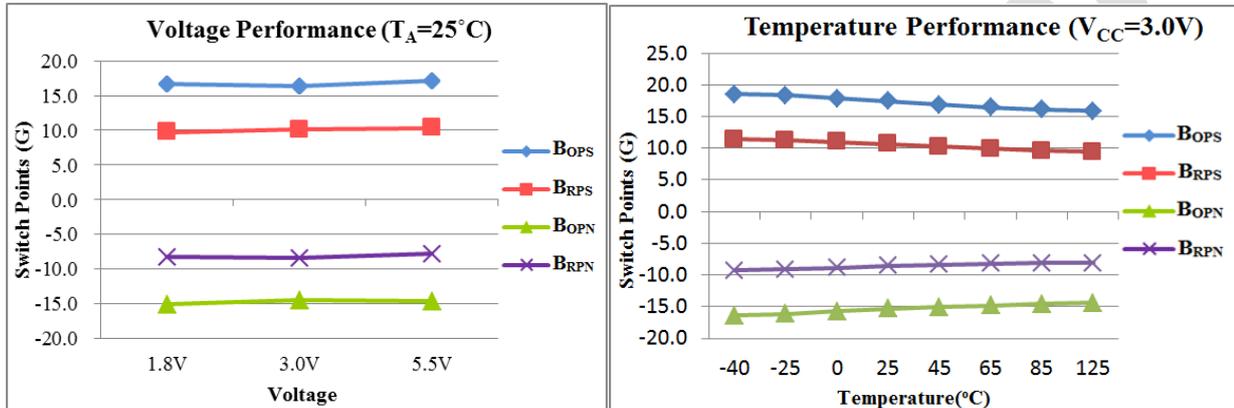
Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V _{CC}	Operating	1.8	3.0	5.5	V
Output High Voltage	V _{OH}		2.7		3	V
Output Low Voltage	V _{OL}		0		0.2	V
Supply Current	I _{CC}	Output Open		4.5	5.5	μA
Response Frequency	F			1		kHz
Power-On Time	t _{PO}			200		μs

Note: a 100nF capacitor is connected between V_{CC} and GND during all tests in the above table.

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

Parameters	Symbol	Min	Typ.	Max	Units
Operate Point	B_{OPS}	10	15	20	G
	B_{OPN}	-20	-15	-10	G
Release Point	B_{RPS}	5	10	15	G
	B_{RPN}	-15	-10	-5	G
Hysteresis	B_H		5		G

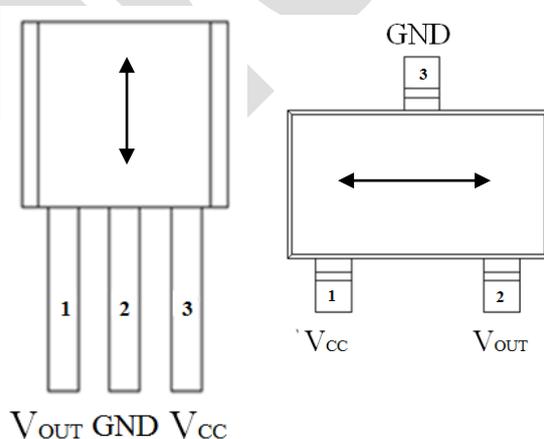
Voltage and Temperature Characteristics



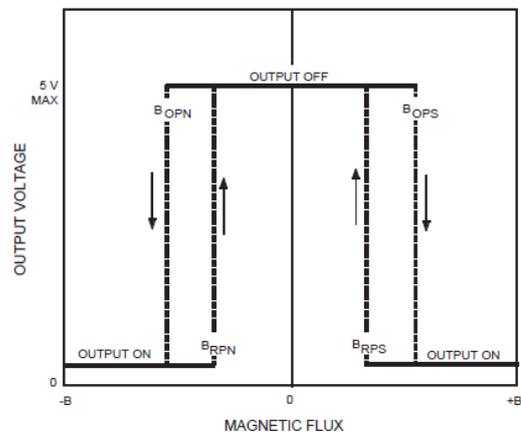
Output Behavior vs. Magnetic Pole

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".



Sensing Direction of Magnetic Field

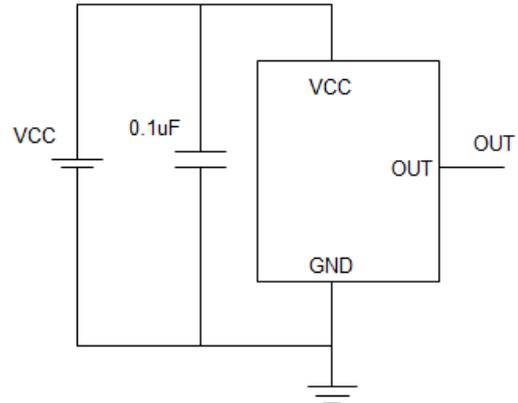


Magnetic Flux

Application Information

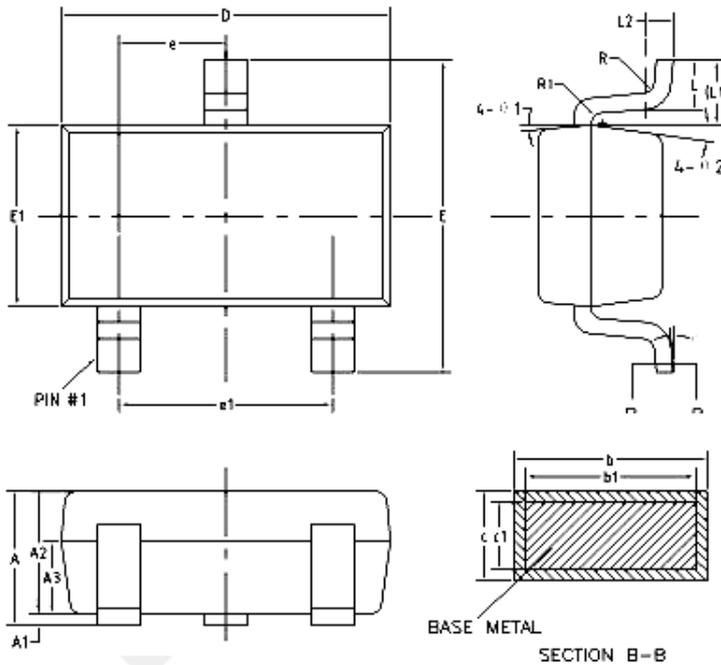
The output of the MMS201H switches low (turns on) when a magnetic field parallel to the TMR sensor exceeds the operate point threshold, B_{OP} . When the magnetic field is reduced below the release point, B_{RP} , the device output goes high (turns off). The differences between the magnetic operate point 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. The typical value of the external capacitor is $0.1\mu\text{F}$.



Package Information

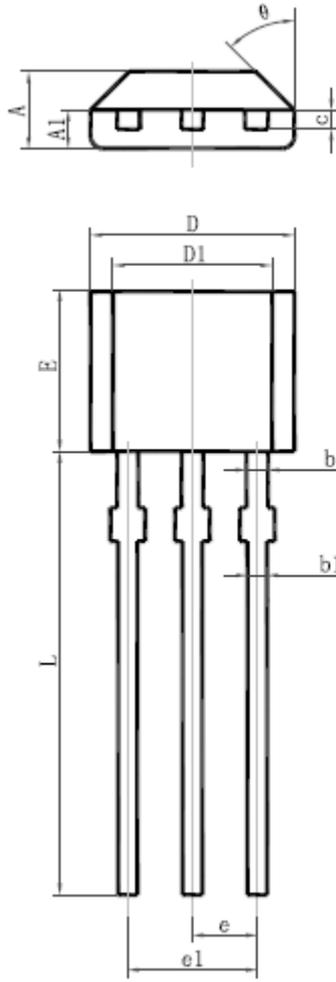
SOT23-3 package drawing:



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

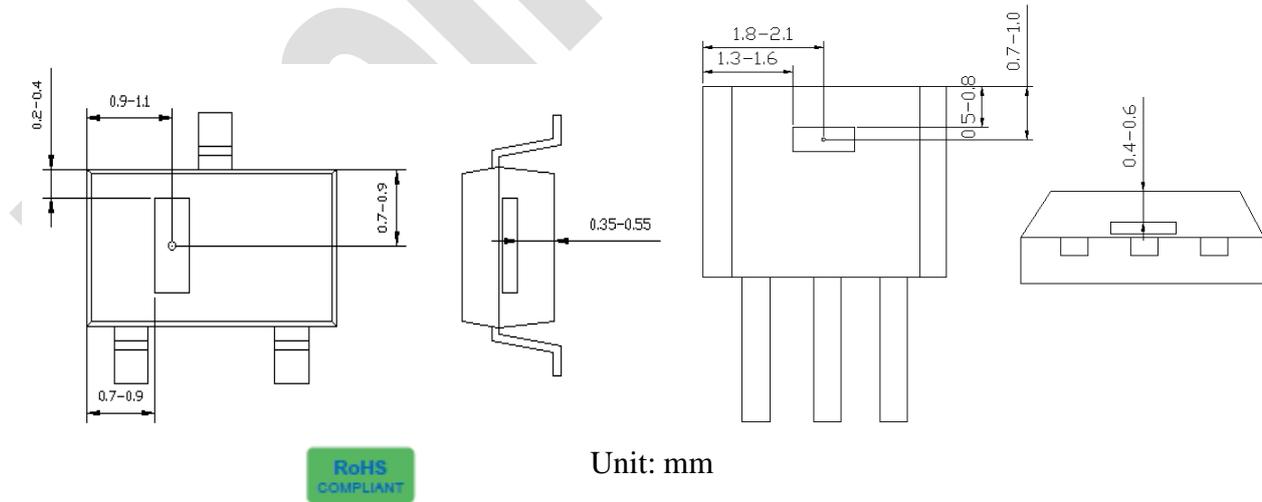
SYMBOL	MIN	NOM	MAX
A	—	—	1.45
A1	0	—	0.15
A2	0.90	1.10	1.30
A3	0.60	0.65	0.70
b	0.39	—	0.49
b1	0.38	0.40	0.45
c	0.12	—	0.19
c1	0.11	0.13	0.15
D	2.85	2.95	3.05
E	2.60	2.80	3.00
E1	1.55	1.65	1.75
e	0.85	0.95	1.05
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.05	—	—
R1	0.05	—	0.20
∅	0'	—	8'
∅ 1	8'	10'	12'
∅ 2	8'	10'	12'

TO-92S package drawing:



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.420	1.620
A1	0.660	0.860
b	0.420	0.550
b1	0.360	0.480
c	0.360	0.510
D	3.900	4.100
D1	2.970	3.270
E	3.050	3.250
e	1.270 TYP	
e1	2.440	2.640
L	15.100	15.500
θ	45° TYP	

TMR Sensor Position



Unit: mm

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