TMR1341XD

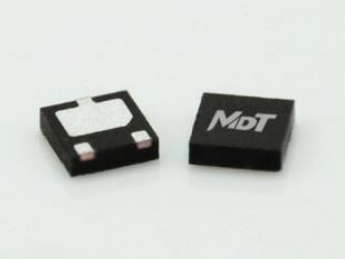
High-Sensitivity Pneumatic Cylinder Switch Sensor

General Description

TMR1341XD is a digital omnipolar magnetic switch that integrates Magneto-resistance and CMOS technology to provide a magnetically triggered digital switch with high sensitivity, high speed, and low power consumption. It is designed for pneumatic cylinder position sensing in industrial applications. It contains a push-pull full-bridge MR sensor and CMOS signal processing circuitry within the same package, including an on-chip voltage generator and MR voltage amplifier and comparator for precise magnetic sensing, 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. The TMR1341XD operates in low voltage and draws only 40μA 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 DFN2x2x0.55 -3L package.

Features and Benefits

- Low Power Consumption at 40uA
- Power-cycled Latching Operation
- Fast Internal Switching Frequency at 1kHz
- Omnipolar Operation with North or South Pole
- Low Switching Points for High Sensitivity
- Compatible with a Wide Range of Supply Voltages
- Excellent Thermal Stability
- High Tolerance to External Magnetic Field Interference
- Compact package size in DFN2x2x0.55 -3L

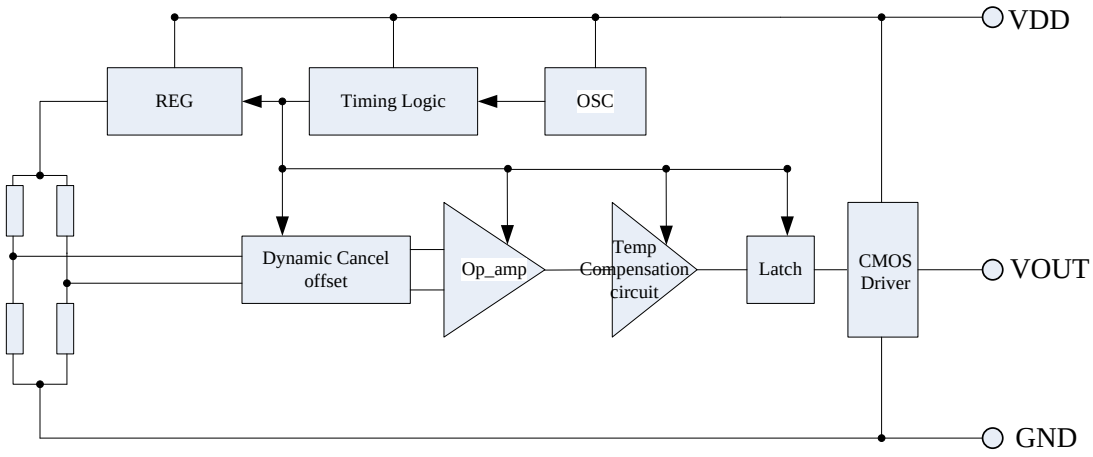


TMR1341XD

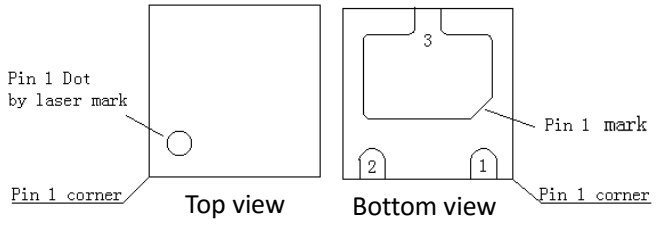
Applications

- Pneumatic Cylinder Position Switches
- Proximity Switches
- Position Detection

Block Diagram



Pin Configuration



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

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Supply Voltage	V_{CC}	7	V
Reverse Supply Voltage	V_{RCC}	0.3	V
Output Current	$I_{OUTSINK}$	20	mA
Magnetic Flux Density	B	5000	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 (T_A=25°C)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.6	1.8	5	V
Output High Voltage	V_{OH}		V_{CC}-0.2		V_{CC}	V
Output Low Voltage	V_{OL}	Output=Low, V_{CC}=3V, I_{sink}=10mA	0		0.2	V
Supply Current (Average)	I_{CC}			40		uA
Supply Current (Sleep)	$I_{CC\text{-}sleep}$			30		uA
Supply Current (Active)	$I_{CC\text{-}active}$			250		uA
Switching Frequency	F			1000		Hz

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

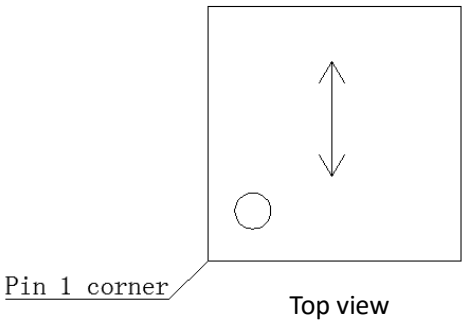
Magnetic Characteristics (T_A=25°C)

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

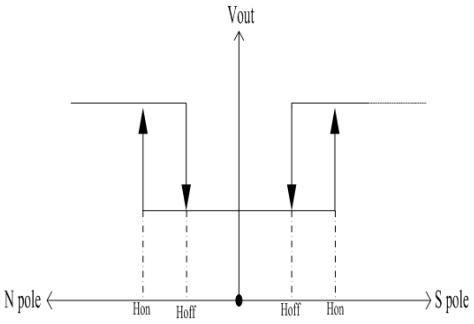
Output Behavior vs. Magnetic Polarity

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

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



Sensing Direction of Magnetic Field

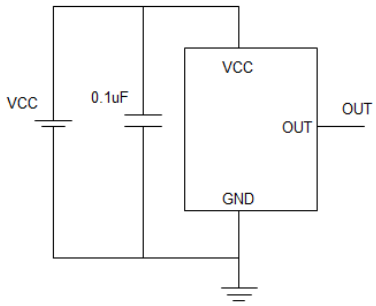


Magnetic Flux

Application Information

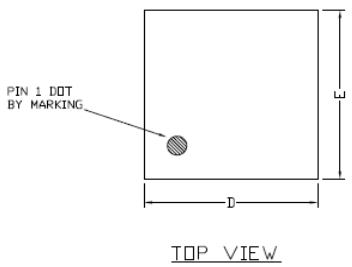
The output of the TMR1341XD switches high (turns on) when a magnetic field parallel to the sensor exceeds the operate point threshold |B_{OPS}| or |B_{OPN}|. When the magnetic field is reduced below the release point |B_{RPS}| or |B_{RPN}|, the device output goes low (turns off). The difference between the magnetic operate point and release point is the hysteresis B_H of the device.

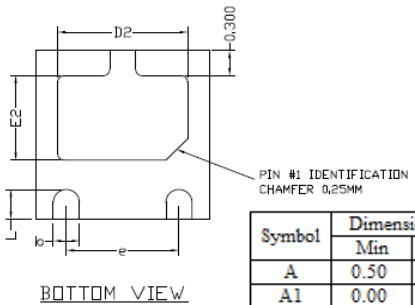
It is strongly recommended that an external bypass capacitor be connected in close proximity to the device between the supply and ground to reduce noise. The typical value of the external capacitor is 0.1μF.

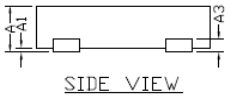


Package Information

DFN2x2x0.55-3L package drawing

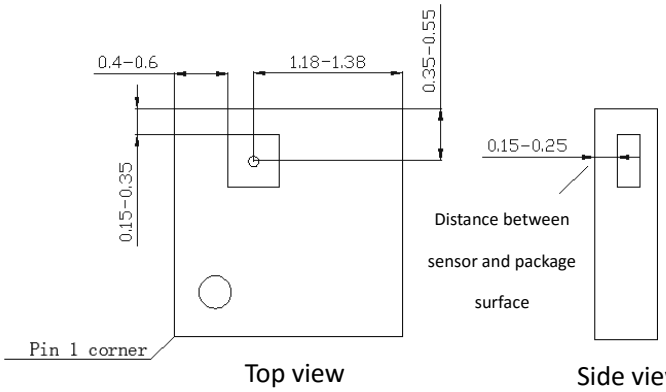






Symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	0.50	0.55	0.60	0.020	0.022	0.024
A1	0.00	-	0.05	0.000	-	0.002
A3	0.15 REF			0.006 REF		
D	1.95	2.00	2.05	0.077	0.079	0.081
E	1.95	2.00	2.05	0.077	0.079	0.081
b	0.25	0.30	0.35	0.010	0.012	0.014
L	0.30	0.35	0.40	0.012	0.014	0.016
D2	1.35	1.50	1.60	0.053	0.059	0.063
E2	0.85	1.00	1.10	0.033	0.039	0.043
e	1.30 BSC			0.051 BSC		

MR Sensor Position



Top view and side view (unit: mm)

RoHS COMPLIANT

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