



CYS1309 High Sensitive Omnipolar TMR Switch IC

CYS1309 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 half-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 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 CYS1309 draws only 1.5µA resulting in ultra-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.



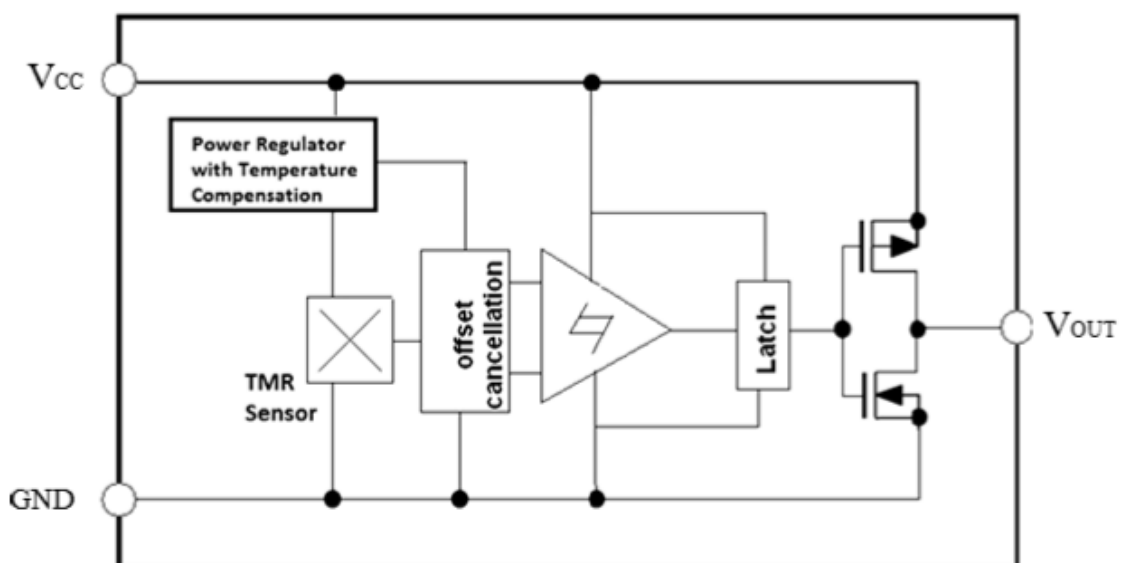
Features

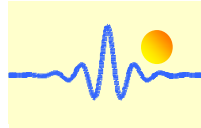
- Operation with North or South Pole
- Low power consumption (<1.5µA)
- High tolerance to external magnetic field interference
- Low switch points for high sensitivity
- Excellent thermal stability

Typical Applications

- Water, gas and heat meters
- Proximity Switches
- DC Brushless Motor
- DC Brushless Fan
- Position and speed sensing

Functional Block Diagram





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	2800	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 ($V_{CC}=3.0V$, $T_A=25^\circ C$)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Supply Voltage	V_{CC}	Operating	1.5	3.0	5.5	V
Output High Voltage	V_{OH}		$V_{CC}-0.3$		V_{CC}	V
Output Low Voltage	V_{OL}		0		0.2	V
Supply Current	I_{CC}	Output open		1.5		μA
Response Frequency	F			1000		Hz

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

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

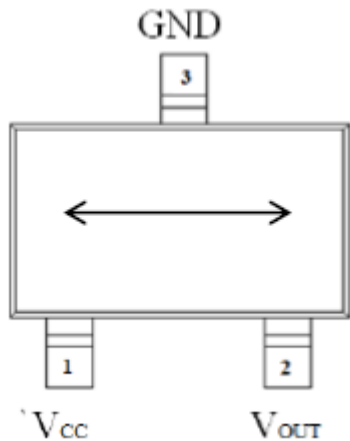
Parameters	Symbol	Min	Typ.	Max	Unit
Operate Point	B_{OPS}	2.2		3.4	G
	B_{OPN}	-3.4		-2.2	G
Release Point	B_{RPS}	1.0			G
	B_{RPN}			-1.0	G
Hysteresis	B_H	0.1			G

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

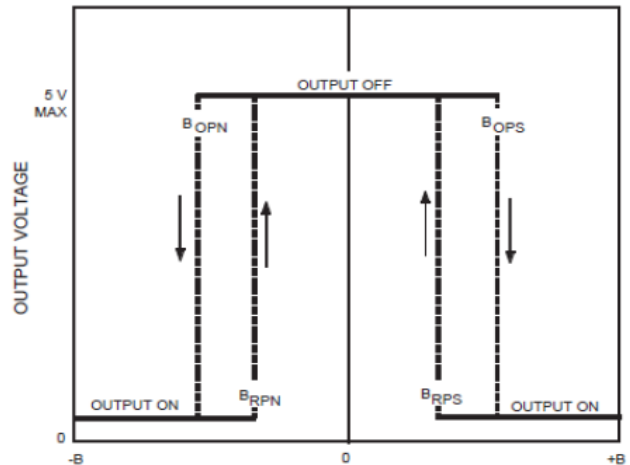
Output Behavior vs. Magnetic Pole

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

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

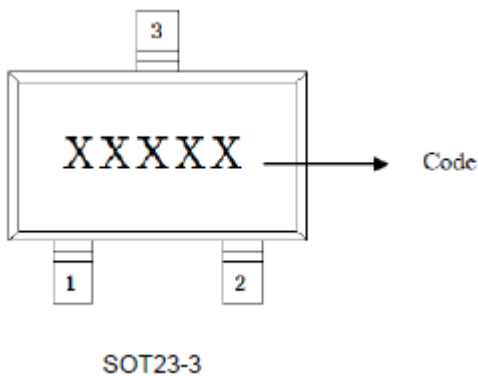


Sensing direction of magnetic field



Magnetic Flux

Pin Configuration

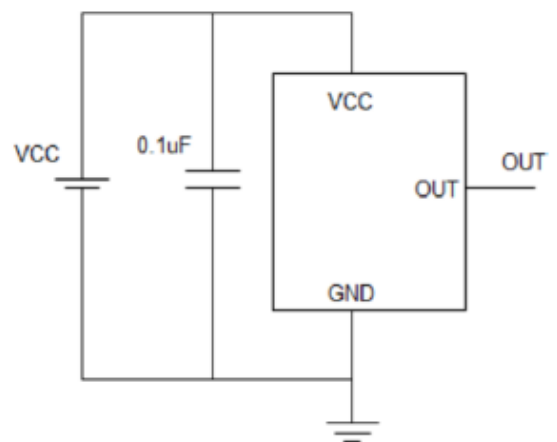


Pin Name	Pin No.	Pin Function
VCC	1	Supply Voltage
GND	3	Ground
VOUT	2	Output

Application Information

The output of the CYS1309 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.

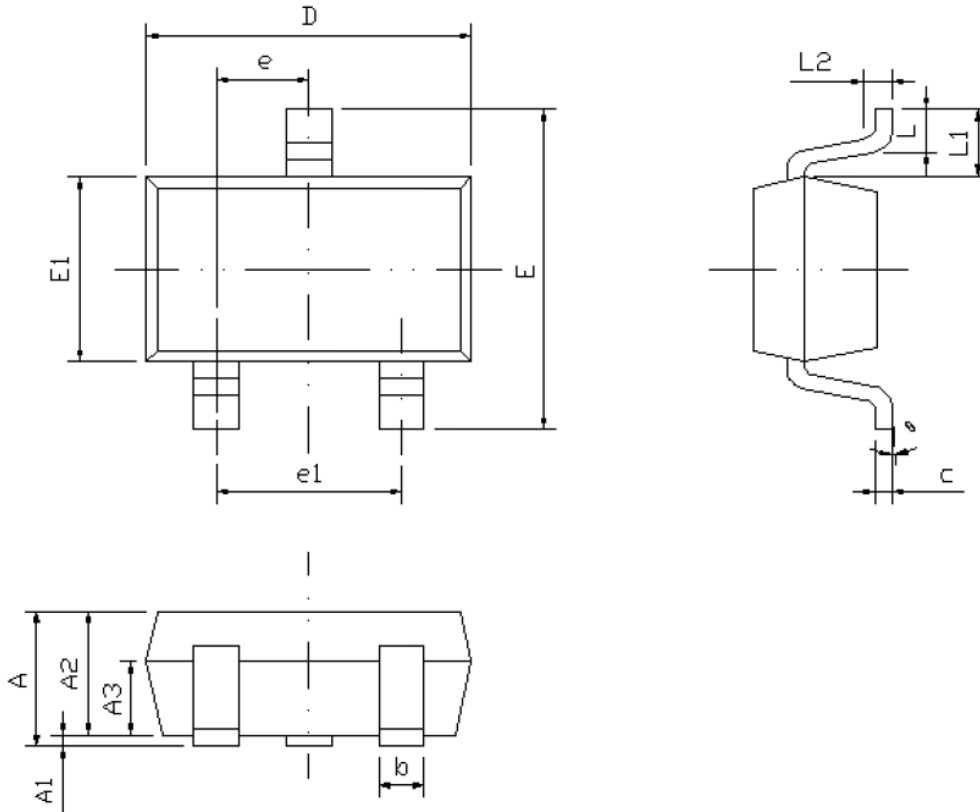
It is strongly recommended that an external bypass capacitor be connected in close proximity to the device between the supply and ground to reduce noise. The typical value of the external capacitor is $0.1\mu\text{F}$.



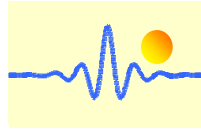


Package Information

SOT23-3 Package Drawing

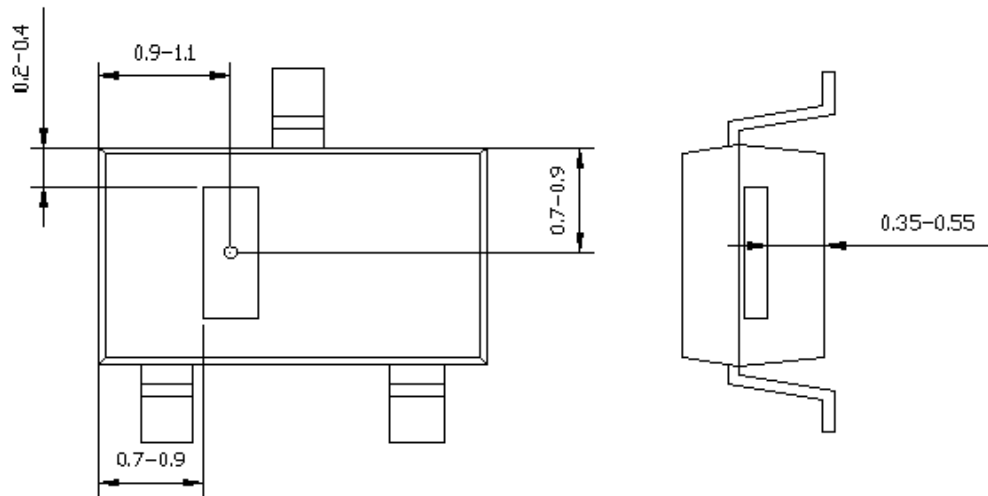


Symbol	Dimensions in mm			Dimensions in inches		
	min	nom	max	min	nom	max
A	-	-	1.45	-	-	0.057
A1	0.00	-	0.15	0.000	-	0.006
A2	0.90	1.10	1.30	0.035	0.043	0.051
A3	0.60	0.65	0.70	0.024	0.026	0.028
b	0.39	-	0.49	0.015	-	0.019
c	0.12	-	0.19	0.005	-	0.007
D	2.85	2.95	3.05	0.112	0.116	0.120
E	2.60	2.80	3.00	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			0.010BSC		
θ	0°	-	8°	0°	-	8°



TMR Sensor Position (unit: mm)

SOT23-3



Part number

Part number	Response Frequency	Operating Temperature	Package
CYS1309S	1000Hz	-40°C ~ 125°C	SOT23-3