TMR Unipolar Switch 17 Gauss 200nA Open Drain Sensor

RoHS

Functional Block Diagram

TMR Switch Typical Applications Circuit
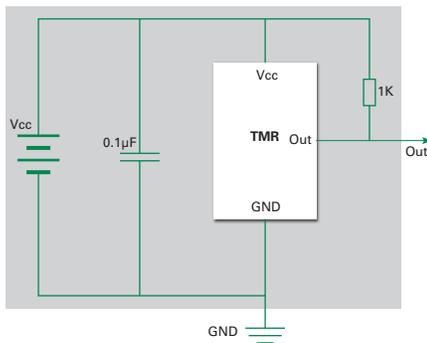
Note: It is strongly recommended that an external bypass capacitor be connected in-close-proximity to the device between the supply and ground pins to reduce noise. The recommended value for the external bypass capacitor is 0.1µF.
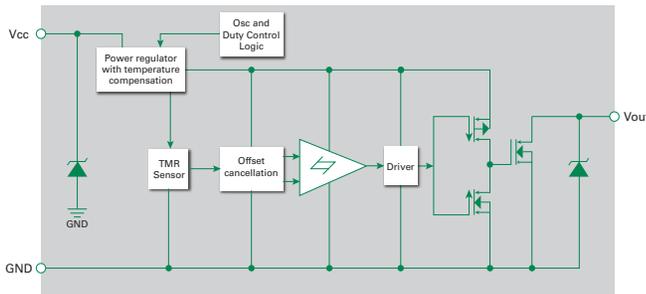
Description

The LF32115TMR TMR Switch is a digital unipolar 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 contains a 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, CMOS open drain output and X axis sensing direction.

An internal band gap regulator is used to provide a temperature compensated supply voltage for internal circuits, permitting a wide range of supply voltages. It draws only 200nA (see Features below) resulting in low power operation, additionally it has fast response, accurate switching points, excellent thermal stability, and immunity to stray field interference. It is available in the SOT23-3 package. The output of the LF32115TMR switches low (turns on) when the magnetic field parallel to the sensing axis exceeds the operate point threshold, B_{OP}. When the magnetic field is reduced below the release point B_{RP} device output switches high (turns off). The difference between the B_{OP} and the B_{RP} is the hysteresis B_H of the device.

Features

- Tunneling Magnetoresistance (TMR) technology
- Low power consumption at 200nA
- X axis sensing direction
- High frequency up to 50Hz
- Operation with north or south pole
- 1.8V to 5.5V operating range

Benefits

- Low switching points for high sensitivity
- Excellent thermal stability
- High tolerance to external magnetic field interference
- Wider airgap capability
- Operates with smaller magnets for cost reduction
- RoHS compliant

Applications

- Proximity detection
- Utility meters including gas and water meters
- Speed sensing
- Battery powered applications
- Rotary sensing

Output Behavior Versus Magnetic Pole

Parameter	Test Conditions	Output (volts)
South Pole	B > B_OPS	Low (On)
	0 < B < B_RPS	High (Off)

Note:
1. When power is turned on under zero magnetic field, the output is "High".
2. The power-on settling time of the device is 3ms, and the output latches to high level after this settling time. When a S-pole approaches the pin 1 side, Vout will transition to Low. The correct state will be obtained after first excursion of the magnetic field beyond BOP or BRP.
3. The device circuitry is activated for a short period of time as awake state, and deactivated the remainder of the period as sleep state. The device in sleep state will retain the output status of the last sampled state.

Absolute Maximum Ratings (@TA = +25°C, unless otherwise specified)

Symbol	Characteristics	Values	Unit
V_{CC}	Supply Voltage	7.0	V
V_{RCC}	Reverse Supply Voltage	0.3	V
$I_{OUTSINK}$	Output Current	20	mA
B	Magnetic Flux Density	4000	Gauss
V_{ESD}	ESD level(HBM)	4	kV
T_A	Operating Temperature	-40 ~ 125	°C
T_{stg}	Storage Temperature	-50 ~ 150	°C

Note: Stresses greater than the 'Absolute Maximum Ratings' specified above may cause permanent damage to the device. These are stress ratings only; functional operation of the device at these or any other conditions exceeding those indicated in this specification is not implied. Device reliability may be affected by exposure to absolute maximum rating conditions for extended periods of time.

Electrical Characteristics (@TA = +25°C, Vcc = 3.0V)

Symbol	Characteristics	Min.	Typ.	Max.	Unit	Conditions
V_{CC}	Supply Voltage	1.8	3	5.5	V	Operating
V_{stress}	Output Stress Voltage			5.5	V	
I_{leak} (average)	Output leak current			1	µA	Output = High, V_{cc} = 3V, V_{out} = 3V
V_{OH}	Output High Voltage	Vcc -0.2			V	Pull-up Resistance = 1Kohm
R_{off}	Output turn-off Resistance		10		MΩ	Output = High
R_{on}	Output turn-on Resistance			10	Ω	Output = Low
V_{OL}	Output Low Voltage			0.1	V	Output = Low, V_{cc} = 3V, I_{sink} = 3mA
I_{CC}	Supply Current		200		nA	Output Open
Freq	Response Frequency		50		Hz	

Magnetic Characteristics (@TA = +25°C, Vcc = 3.0V)

Symbol	Characteristics	Min.	Typ.	Max.	Unit
B_{OP}	Operation Point	9	17	25	Gauss
B_{RP}	Release Point	5	13	20	Gauss
B_H	Hysteresis	--	4	--	Gauss

Pin Configuration and Sensing Direction of Magnetic Field

SOT23-3

GND
3

Part Marking Code

← DxxxY →

1   2

Vcc   V$_{OUT}$
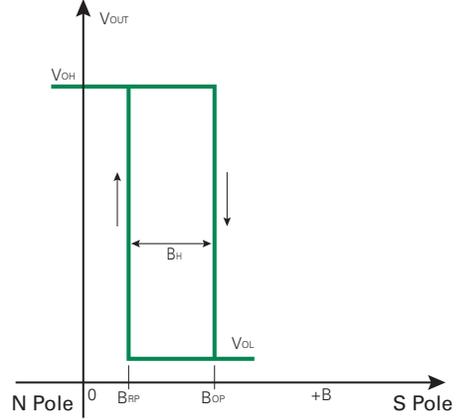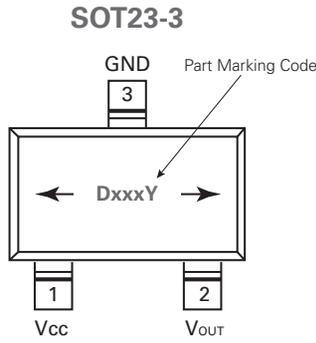
Part Marking Code:
Dxxxy: D = LF32115TMR; xxx = Julian manufactured date; y = manufactured year
Moisture Sensitivity Level: Rating is 3
Pick and Place Nozzle: Samsung CN140 or equivalent

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

Part Numbering System

LF - X - X - X - X - X TMR

Littelfuse Brand

Switch Type
Type 1 = Bipolar
2 = Omnipolar
3 = Unipolar

Output
1 = PushPull
2 = Open Drain

Quiescent Current
1 = 200nA
2 = 1.5uA
3 = 0.6mA

Tunneling Magnetoresistance Technology Switch

Sensitivity Gauss
1 = 5 Gauss
2 = 7 Gauss
3 = 10 Gauss
4 = 14 Gauss
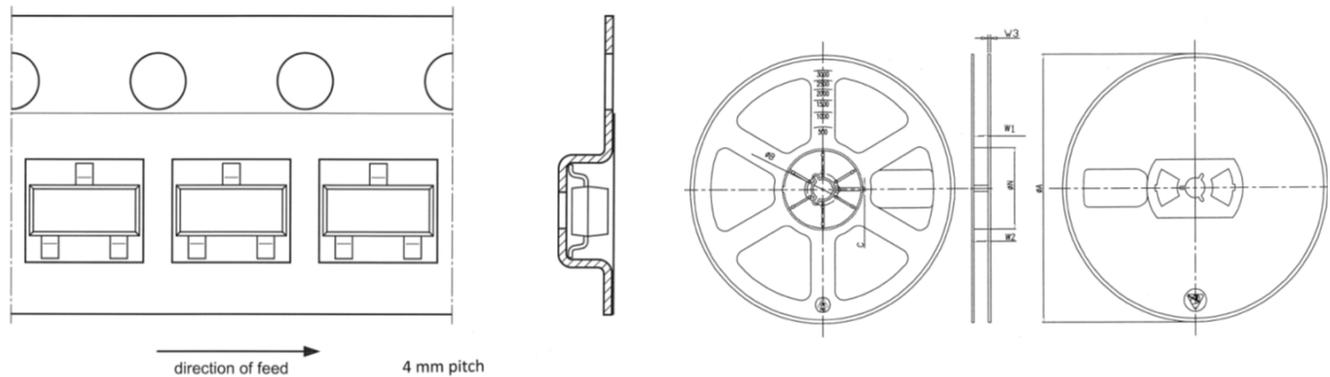5 = 17 Gauss

Sensing Axis
1 = X axis
2 = Y axis
3 = Z axis
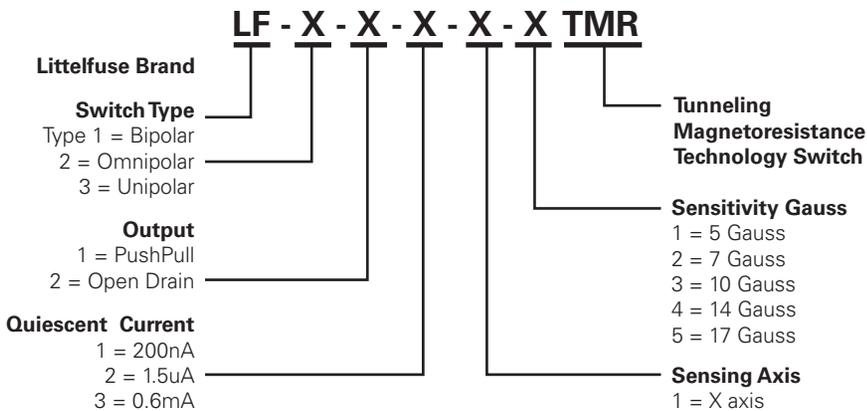
Example: LF11115 is Bipolar, Push Pull, 200 nA, X axis, 17 Gauss
Note: Every combination is NOT offered. Contact Littelfuse for availability.
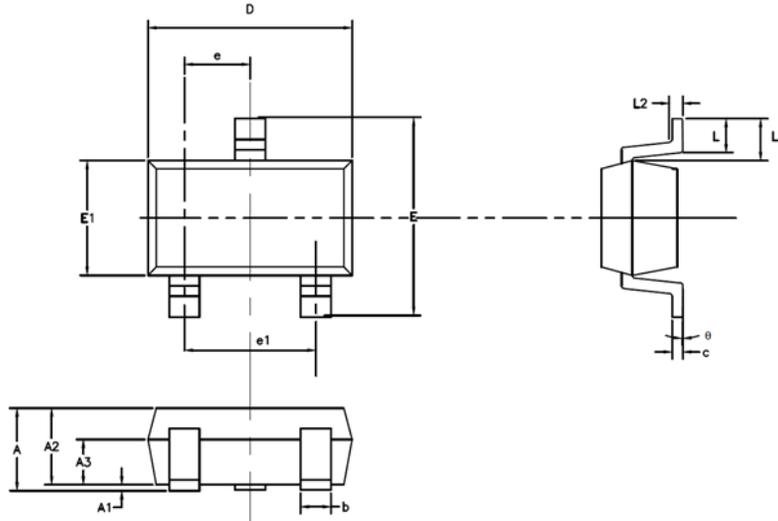
## Soldering Profile for Lead-free packages

Tape and Reel

direction of feed   4 mm pitch
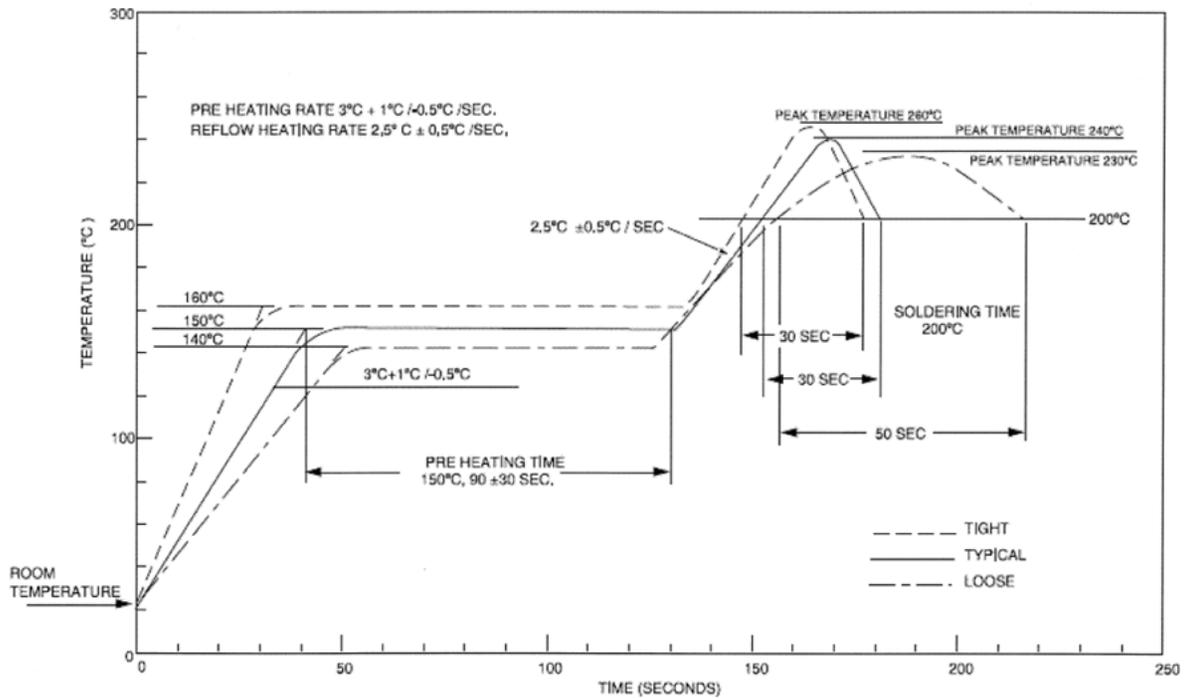
ØA	ØN	ØB	C	W1	W2	W3
178±2	54±2	13.2±0.3	2.2±0.3	8.4±1.5/0.0	12 MAX	1.4±0.4

SOT23-3 Package Information

Symbol	Dimensions in Millimeters			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		
Ø	0^0	-	8^0	0^0	-	8^0

TMR Sensor Position (SOT23-3 Elements)
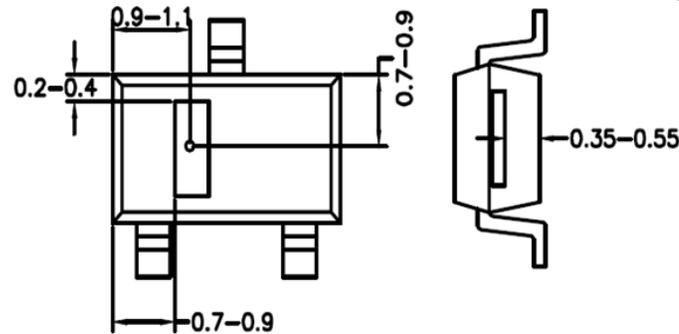
Important Notice - Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse.

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at: www.littelfuse.com/disclaimer-electronics.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Board Mount Hall Effect/Magnetic Sensors *category:*

Click to view products by Littelfuse *manufacturer:*

Other Similar products are found below :

HGPRDT005A AH1808-P-A AH277AZ4-AG1 AV-10379 AV-10448 SS41C AH1894-Z-7 ATS601LSGTN-HT-WU4-T ATS601LSGTN-LT-WU4-T TLE4917 50017859-003 TY-13101 SS85CA AH277AZ4-BG1 TLE49614MXTSA1 AH3382-P-B AH3377-P-B AH9250-W-7 AH211Z4-AG1 AH3360-FT4-7 SS460S-100SAMPLE 50065820-03 TLE4941PLUSCB AH374-P-A AH1806-P-A AH374-W-7 SS460P-T2 AH1912-FA-7 SS413F TLE5046ICAKLRHALA1 TLE49421CHAMA2 TLE4941PLUSCXAMA1 AH1912-W-EVM AH1903-FA-EVM AH3774-W-EVM AH49FNTR-EVM MMC5633NJL AH3360-FA-EVM AH8502-FDC-EVM AH3366Q-SA-EVM AH3774-P-EVM KTH1601SU-ST3 MG910 MG910M MG911 MG610 MW921 MW922 TLE4998S3XALA1 TLE5011FUMA1