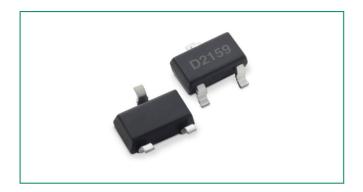
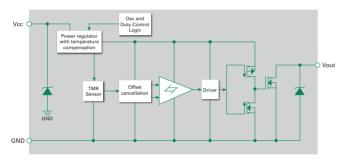


TMR Unipolar Switch 17 Gauss 200nA Open Drain Sensor

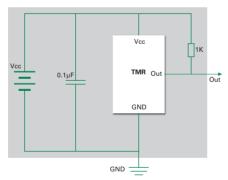
RoHS



Functional Block Diagram



TMR Switch Typical Applications Circuit



Note: It is strongly recommended that an external bypass capacitor be connected in-closeproximity 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 S0T23-3 package. The output of the LF32115TMR switches low (turns on) when the magnetic field parallel to the sensing axis exceeds the operate point threshold, $B_{\rm OP}$. When the magnetic field is reduced below the release point $B_{\rm RP}$ device output switches high (turns off). The difference between the $B_{\rm OP}$ and the $B_{\rm RP}$ is the hysteresis $B_{\rm H}$ of the device.

Features

- Tunneling Magnetoresistance (TMR) technology
- Low power consumption at 200nA
- X axis sensing direction

Benefits

- · Low switching points for high
- sensitivity
- Excellent thermal stability
- High tolerance to external magnetic field interference

Applications

- Proximity detection
- Utility meters including gas and water meters

• 1.8V to 5.5V operating range

· High frequency up to 50Hz

Operation with north or south pole

- Wider airgap capability
- Operates with smaller magnets for cost reduction
- RoHS compliant
- 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"

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.

^{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.



Symbol	Characteristics	Values	Unit
V _{cc}	Supply Voltage	7.0	V
V _{RCC}	Reverse Supply Voltage	0.3	V
l _{outsink}	Output Current	20	mA
В	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

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

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)

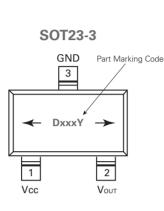
Symbol	Characteristics	Min.	Тур.	Max.	Unit	Conditions
V _{cc}	Supply Voltage	1.8	3	5.5	V	Operating
$V_{\rm stress}$	Output Stress Voltage			5.5	V	
I _{leak} (average)	Output leak current			1	μA	$\begin{array}{l} \text{Output} = \text{High}, \text{V}_{\text{cc}} = 3\text{V}, \\ \text{V}_{\text{out}} = 3\text{V} \end{array}$
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	$\begin{array}{l} \text{Output} = \text{Low, } V_{\text{cc}} = 3V, \\ I_{\text{sink}} = 3\text{mA} \end{array}$
I _{cc}	Supply Current		200		nA	Output Open
Freq	Response Frequency		50		Hz	

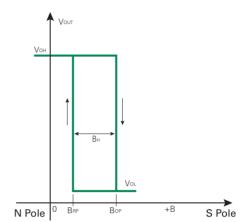
Magnetic Characteristics (@TA = +25°C, Vcc = 3.0V)

Symbol	Characteristics	Min.	Тур.	Мах.	Unit
B _{OP}	Operation Point	9	17	25	Gauss
B _{RP}	Release Point	5	13	20	Gauss
В _н	Hysteresis	-	4	-	Gauss



Pin Configuration and Sensing Direction of Magnetic Field



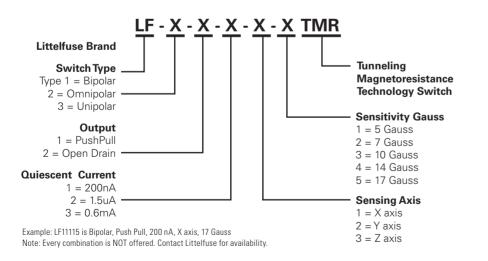


Part Marking Code:

Dxxxy: D = LF32115TMR; xxx = Julian manufactured date; y = manufactured year Moisture Sensitivity Level: Rating is 3 Pick and Place Nozzle: Samsung CN140 or equivalent

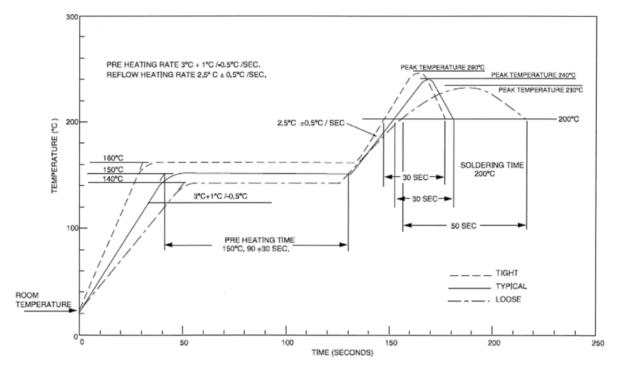
Pin Name	Pin No. SOT23-3	Pin Function
V _{OUT}	2	Output
GND	3	Ground
V _{cc}	1	Supply Voltage

Part Numbering System

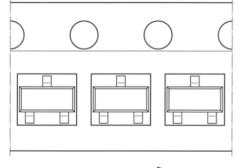




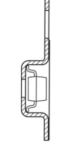
Soldering Profile for Lead-free packages



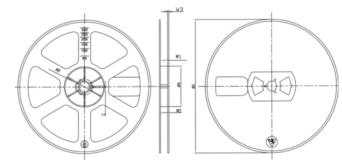
Tape and Reel



direction of feed



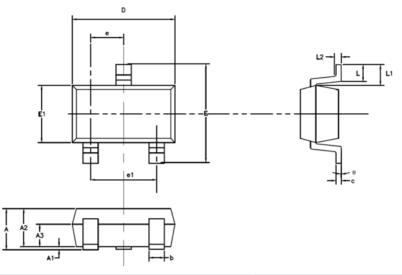
4 mm pitch



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



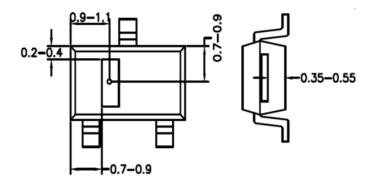
SOT23-3 Package Information



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min	Nom	Мах	Min	Nom	Мах
Α	-	-	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
е	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. 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: <u>www.littelfuse.com/disclaimer-electronics</u>.