

TMR215x

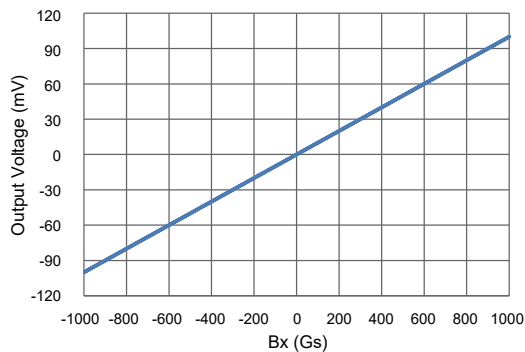
Tunneling Magnetoresistance TMR Linear Magnetic Sensor

Description

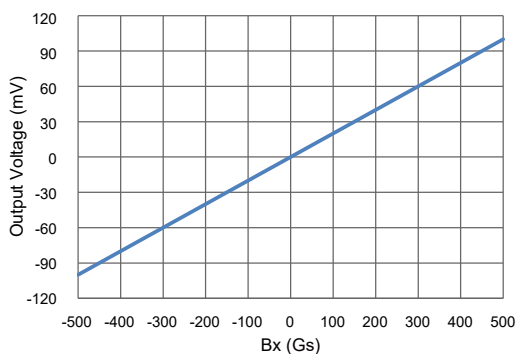
The TMR215x adopts a unique push-pull Wheatstone full-bridge structure utilizing four unshielded high-sensitivity TMR sensor elements. This Wheatstone full bridge provides differential voltage output with excellent temperature stability when the applied magnetic field changes parallel to the sensor's sensitive direction. The TMR215x delivers excellent performance and is available in an SOT23-5 package.



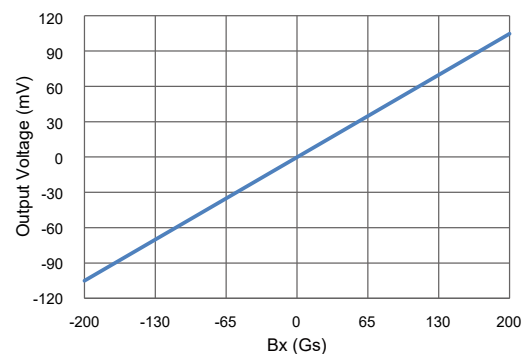
SOT23-5



TMR2151 Output Curve



TMR2152 Output Curve



TMR2153 Output Curve

Features and Benefits

- Tunneling magnetoresistance (TMR) technology
- Wide dynamic range:
 - TMR2151S ± 1000 Gs
 - TMR2152S ± 500 Gs
 - TMR2153S ± 200 Gs
- Excellent temperature stability
- Nonlinearity: 1%FS
- RoHS & REACH compliant

Applications

- Magnetometer
- Current sensor
- Position sensor
- Angel Sensor

Selection Guide

Part Number	Supply Voltage	Linear Range	Sensitivity	Package	Packing Form
TMR2151S	0.5 V to 7 V	±1000 Gs	0.1 mV/V/Gs	SOT23-5	Tape & Reel
TMR2152S	0.5 V to 7 V	±500 Gs	0.2 mV/V/Gs	SOT23-5	Tape & Reel
TMR2153S	0.5 V to 7 V	±200 Gs	0.5 mV/V/Gs	SOT23-5	Tape & Reel

Catalogue

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1. Pin Configuration

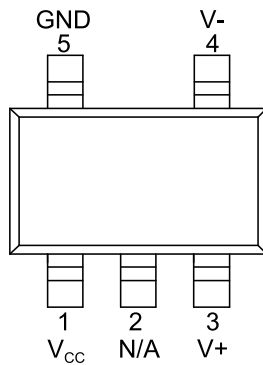


Figure 1. Pin configuration

Pin Number	Name	Function
1	V _{CC}	Power supply
2	N/A	Not connected
3	V+	Analog differential output 1
4	V-	Analog differential output 2
5	GND	Ground

2. Operating Principle

The TMR215x sensing axis is parallel to the package top-marking surface; the sensing axis is defined from the N pole toward the S pole, as indicated by the arrow in the figure below.

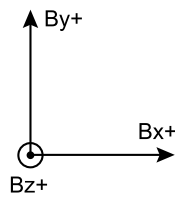


Figure 2-1. Definition of axis

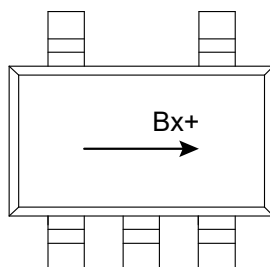


Figure 2-2. Axial diagram (SOT23-5 top view)

The TMR215x output voltage varies linearly with the magnetic field along the sensing axis.

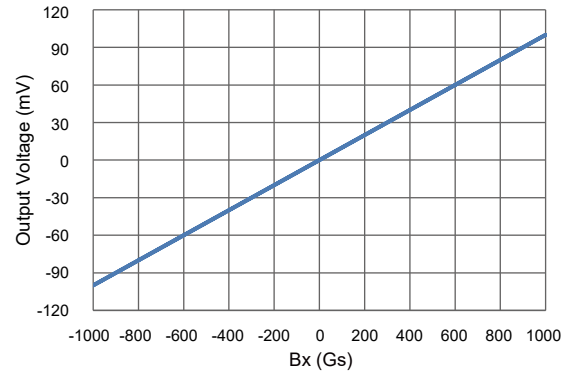


Figure 3-1. TMR2151S output curve

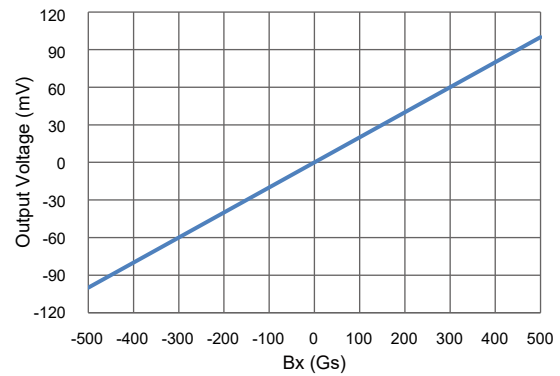


Figure 3-2. TMR2152S output curve

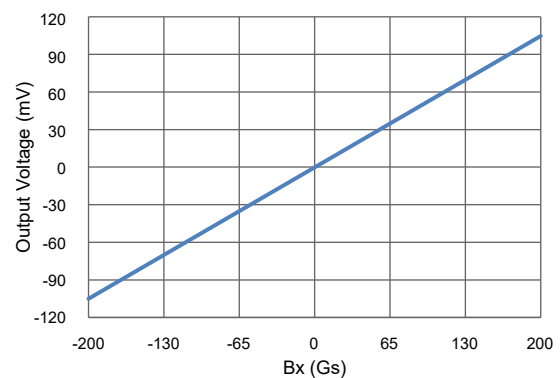


Figure 3-3. TMR2153S output curve

3. Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Supply voltage	V_{CC}	-	7	V
Reverse supply voltage	V_{RCC}	-	7	V
External magnetic field	B	-	4000	Gs
ESD performance (HBM)	V_{ESD}	-	4000	V
Operating ambient temperature	T_A	-40	125	°C
Storage ambient temperature	T_{STG}	-50	150	°C

4. Electrical Specifications^{sw}

$V_{CC} = 1.0\text{ V}$, $T_A = 25\text{ °C}$, differential output unless otherwise specified

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Applicable Part No.
Supply Voltage	V_{CC}	Operating	0.5	-	7	V	All parts
Supply Current ¹⁾	I_{CC}	Open output $V_{CC} = 1.0\text{ V}$	-	143	-	μA	TMR2151S
			-	143	-		TMR2152S
			-	10	-		TMR2153S
Resistance ¹⁾	R_B	-	-	7	-	k Ω	TMR2151S
			-	7	-		TMR2152S
			-	100	-		TMR2153S
Sensitivity	SEN	B in $\pm 1000\text{ Gs}$	-	0.1	-	mV/V/Gs	TMR2151S
		B in $\pm 500\text{ Gs}$	-	0.2	-		TMR2152S
		B in $\pm 200\text{ Gs}$	-	0.5	-		TMR2153S
Saturation Magnetic Field	B_{SAT}	-	-	± 2000	-	Gs	TMR2151S
			-	± 1000	-		TMR2152S
			-	± 500	-		TMR2153S
Nonlinearity	NONL	B in $\pm 1000\text{ Gs}$	-	1	-	%FS	TMR2151S
		B in $\pm 500\text{ Gs}$	-	1	-		TMR2152S
		B in $\pm 200\text{ Gs}$	-	1	-		TMR2153S
Offset	V_{OFFSET}	-	-10	-	10	mV/V	All parts
Hysteresis	HYS	B in $\pm 1000\text{ Gs}$	-	-	5	Gs	TMR2151S
		B in $\pm 500\text{ Gs}$	-	-	5		TMR2152S
		B in $\pm 200\text{ Gs}$	-	-	5		TMR2153S
Resistance Temperature Coefficient	TCR_B	-40 °C to 125 °C	-	-500	-	PPM/°C	All parts
Sensitivity Temperature Coefficient	TCS	-40 °C to 125 °C	-	-500	-	PPM/°C	All parts
Offset Temperature Coefficient	TCO	-40 °C to 125 °C	-	-	10	$\mu\text{V/V}/^\circ\text{C}$	All parts

1) $I_{CC} = V_{CC} / R_B$, and supply current changes linearly with supply voltage.

5. Dimensions

SOT23-5 Package

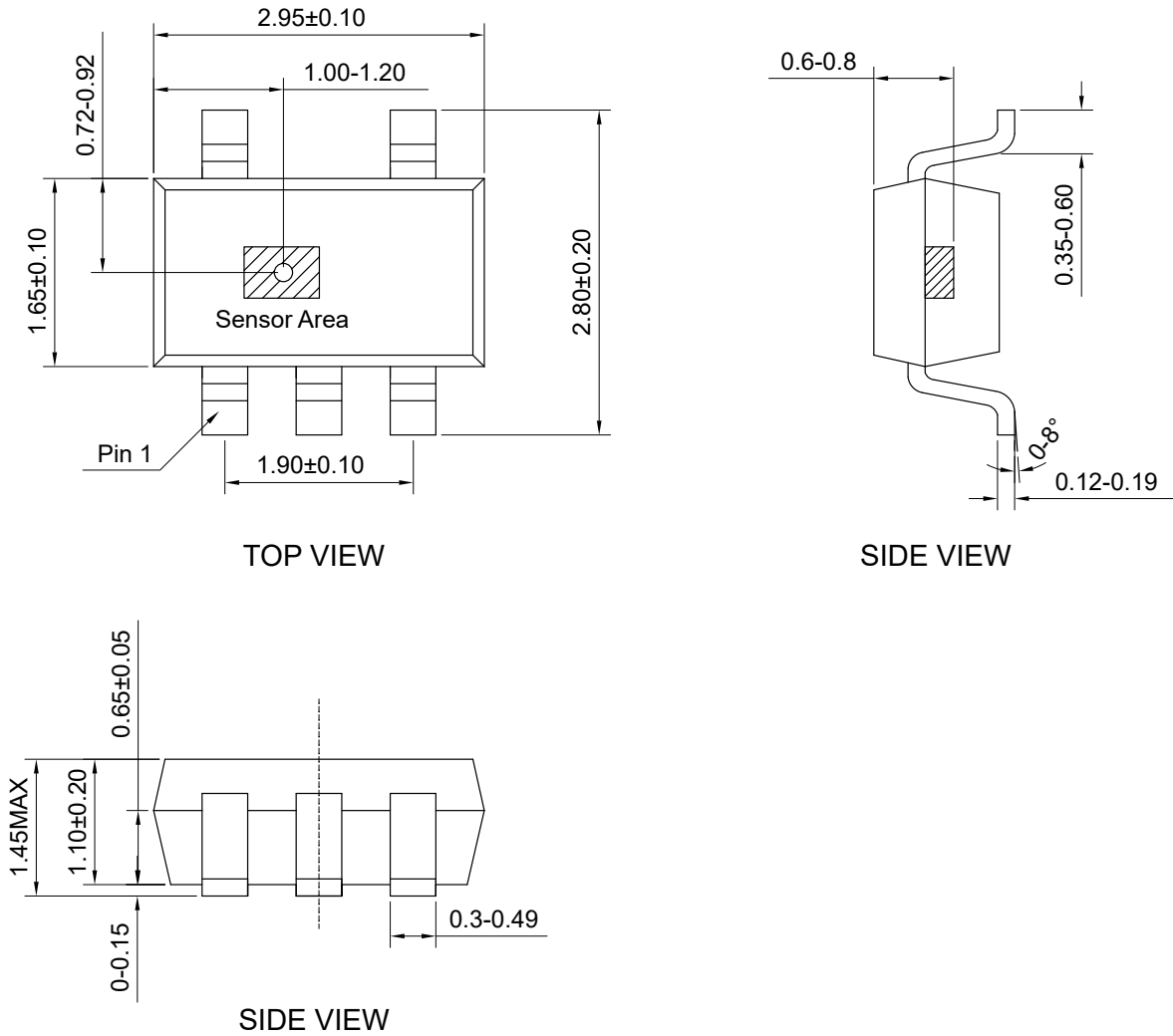


Figure 4. Package outline of SOT23-5 (unit: mm)

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