

# TMR7554-B

## Board Mounted, Precision Current Sensor

### Description

TMR7554-B is a close loop current sensor for accurate measurement of DC, AC, pulsed current and arbitrary waveform current with galvanic isolation between primary and secondary circuits.



### Features and Benefits

- High accuracy
- Excellent linearity
- Ultra low temperature coefficient
- Fast response time
- Galvanic isolation
- High immunity to external interference
- High immunity to common mode interference
- RoHS & REACH compliant

### Applications

- DC motor drives
- Inverter and variable frequency drives (VFD)
- Uninterruptible power supplies (UPS)
- Power supplies for welding application
- Battery monitoring System

### Selection Guide

Part Number	Primary Nominal Current	Primary Current Measuring Range
TMR7554-010MB	10 mA	±14 mA

### Insulation and Environmental Characteristics

Parameters	Symbol	Typ.	Unit
Dielectric Strength	$V_D$	2.5	kV(50 Hz, 1 min)
Insulation Resistance	$R_{IS}$	1000	$M\Omega$
Creepage Distance	$d_{CP}$	19.5	mm
Clearance	$d_{CL}$	19.5	mm
Ambient Operating Temperature	$T_A$	-40 to +85	$^{\circ}C$
Ambient Storage Temperature	$T_{STG}$	-40 to +85	$^{\circ}C$
Mass	$m$	22	g

## Catalogue

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## 1. Specifications

$T_A = +25\text{ }^\circ\text{C}$ ,  $V_{CC} = \pm 15\text{ V}$ ,  $R_M = 100\ \Omega$ , unless otherwise noted

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
General Electrical Data						
Primary Nominal Current	$I_{PN}$	TMR7554-010MB	-	10	-	mA
Primary Current Measuring Range	$I_{PM}$	TMR7554-010MB	-14	-	14	mA
Sensitivity	S	$I_P = 0 \sim \pm I_{PN}$	-	2.5	-	mA/mA
Turn Ratio	$K_N$	-	-	2500:1000	-	-
Output Current	$I_{OUT}$	$I_P = 0 \sim \pm I_{PM}$	-	$I_{OE} + S \times I_P$	-	mA
Supply Voltage	$V_{CC}$	$\pm 5\%$	$\pm 12$	$\pm 15$	$\pm 16$	V
Current Consumption	$I_C$	$I_P = 0$	-	$\pm 10$	-	mA
Secondary Coil Resistance	$R_S$	$T_A = +25\text{ }^\circ\text{C}$	-	-	45	$\Omega$
Measuring Resistance	$R_M$	$V_{CC} = \pm 12\text{V}$ , $I_P \leq 10\text{mA}$	30	-	190	$\Omega$
		$V_{CC} = \pm 12\text{V}$ , $I_P \leq 14\text{mA}$	30	-	100	
		$V_{CC} = \pm 15\text{V}$ , $I_P \leq 10\text{mA}$	100	-	350	
		$V_{CC} = \pm 15\text{V}$ , $I_P \leq 14\text{mA}$	100	-	190	
Static Performance Data						
Accuracy	$X_G$	$T_A = +25\text{ }^\circ\text{C}$ , $I_P = 0$ to $\pm I_{PN}$	-0.8	$\pm 0.5$	0.8	% $I_{PN}$
		$T_A = -40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$ , $I_P = 0$ to $\pm I_{PN}$	-1.5	$\pm 1$	1.5	
Linearity Error	$\epsilon_L$	$T_A = -40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$ , $I_P = 0$ to $\pm I_{PN}$	-	$\pm 0.2$	-	% $I_{PN}$
Sensitivity Error	$\epsilon_S$	$T_A = -40\text{ }^\circ\text{C}$ to $+85\text{ }^\circ\text{C}$ , $I_P = 0$ to $\pm I_{PN}$	-	$\pm 0.4$	-	%
Offset Error	$I_{OE}$	$T_A = +25\text{ }^\circ\text{C}$ , $I_P = 0$	-0.15	$\pm 0.1$	0.15	mA
Hysteresis	$I_{OH}$	$I_P = \pm I_{PN} \rightarrow 0$	-0.2	-	0.2	mA
Dynamic Performance Data						
Response Time	$t_R$	$di/dt > 50\text{ A}/\mu\text{s}$ , 10% to 90% of $I_{PN}$	-	-	40	$\mu\text{s}$
Bandwidth	BW	-3 dB	DC	-	150	kHz

## 2. Typical Output Characteristics

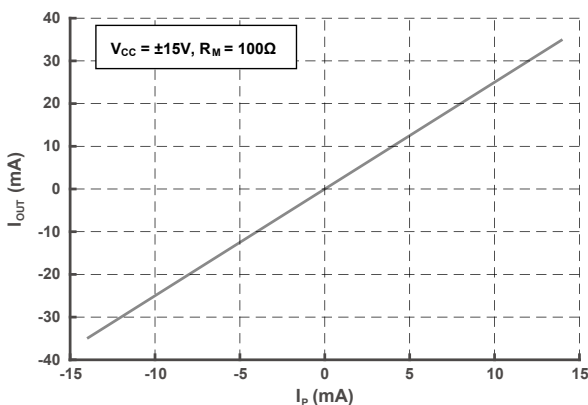


Figure 1. Output Voltage vs Primary Current

### 3. Parameters Definition and Formula

#### 1) Output Current

$$I_{OUT} = I_{OE} + S \times I_P$$

$I_{OUT}$  stands for current sensor output current at given primary current,  $I_{OE}$  stands for offset error,  $S$  stands for sensitivity,  $I_P$  stands for primary current.

#### 2) Accuracy

$$X_G = \text{MAX}_{I_P \in [-I_{PN}, I_{PN}]} \left( \frac{I_{OUT} - (S \times I_P)}{S \times I_{PN}} \times 100\% \right)$$

$I_{PN}$  stands for nominal primary current.

#### 3) Sensitivity

$$S = \frac{I_{OUT(@ I_{PN})} - I_{OUT(@ -I_{PN})}}{2 \times I_{PN}}$$

$I_{OUT(@ I_{PN})}$  and  $I_{OUT(@ -I_{PN})}$  stand for the current output at  $I_{PN}$  and  $-I_{PN}$  respectively.

#### 4) Linearity

$$\varepsilon_L = \text{MAX}_{I_P \in [-I_{PN}, I_{PN}]} \left( \frac{I_{OUT} - (\bar{I}_{OE} + \bar{S} \times I_P)}{S \times I_{PN}} \times 100\% \right)$$

$\bar{S}$  and  $\bar{I}_{OE}$  stand for the average values of the sensitivity and offset error.

#### 5) Hysteresis

$$I_{OH} = \text{MAX } \Delta H$$

$\Delta H$  is the maximum residual output current between full scale positive and negative nominal current.

## 4. Application Information

### Electrical Connection

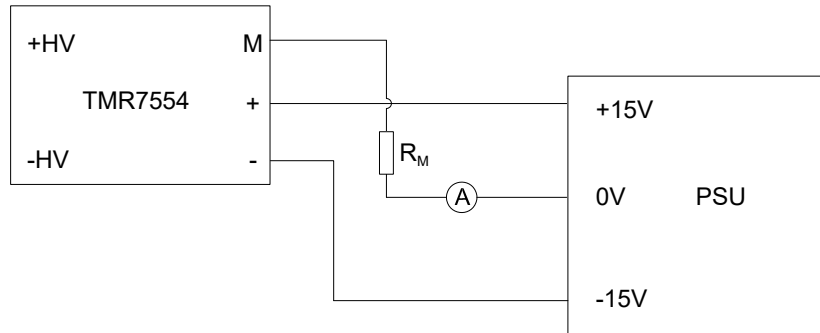


Figure 2. Electrical Connection

### Remarks

1.  $I_{OUT}$  is positive when the primary current ( $I_P$ ) is in the same direction as the arrow indication on the label and vice versa.
2. Improper connection may result in permanent damage of the sensor.
3. Sensor secondary circuitry must be powered prior primary current is being added and when depowering secondary circuitry, primary current must be close to 0A. Improper procedure may result in worse accuracy or result in permanent damage of the sensor.
4. Sensor is customizable upon request.

5. Dimensions

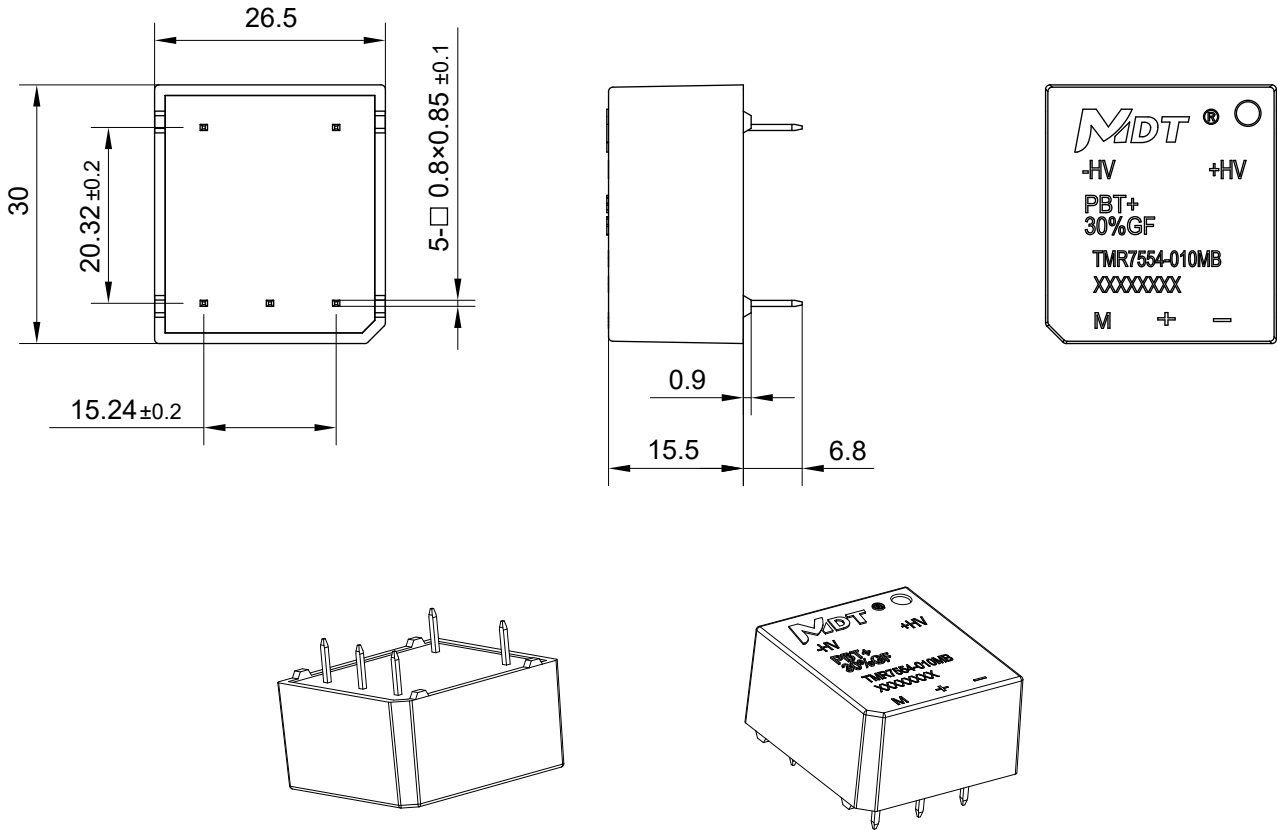


Figure 3. Dimension (unit: mm, tolerances for unmarked scales ±0.5 mm)

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No.2 Guangdong Road, Zhangjiagang Free Trade Zone, Jiangsu, China

Web: [www.dowaytech.com/en](http://www.dowaytech.com/en) E-mail: [info@dowaytech.com](mailto:info@dowaytech.com)

