

# TMR7102-D, TMR7102-E

## CAN Bus Digital Output Current Sensor

### Description

TMR7102 series are closed loop current sensors for accurate measurement of DC current with galvanic isolation between primary and secondary circuits.



### Features and Benefits

- Low temperature coefficient
- Galvanic isolation
- High immunity to external interference
- High accuracy among all temperature ranges
- CAN bus output

### Applications

- Full electric vehicle current measurement
- Hybrid vehicle current measurement
- Battery energy storage systems (BESS)

### Selection Guide

Model	Primary Nominal Current	Primary Current Measuring Range	Output Format	Baud Rate
TMR7102-5000D	500 A	±580 A	CAN2.0B	500 kbps
TMR7102-5000E	500 A	±580 A	CAN2.0B	250 kbps

### Insulation and Environmental Characteristics

Parameters	Symbol	Typical	Unit
Load Dump Over Voltage	$V_{CC}$	32	V (400 ms)
Over Voltage	$V_{CC}$	24	V (1 min)
Reverse Polarity	$V_{CC}$	-16	V (1 min)
Dielectric Strength	$V_D$	2.5	kV(50 Hz, 1 min)
Insulation Resistance	$R_{IS}$	500	MΩ
Creepage Distance	$d_{CP}$	7.3	mm
Clearance	$d_{CL}$	6	mm
Ambient Operating Temperature	$T_A$	-40 ~ +85	°C
Ambient Storage Temperature	$T_{STG}$	-40 ~ +85	°C
Mass	$m$	80	g

## Catalogue

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## 1. Specifications

$T_A = +25\text{ }^\circ\text{C}$ ,  $V_{CC} = +13.5\text{ V}$ , unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
General Electrical Data						
Primary Nominal Current	$I_{PN}$	-	-	500	-	A
Primary Current Measuring Range	$I_{PM}$	-	-580	-	+580	A
Supply Voltage	$V_{CC}$	$\pm 5\%$	+9	+13.5*	+16	V
Over Voltage Protection	OVP	$\pm 5\%$	-	+18	-	V
Current Consumption	$I_C$	$T_A = +25\text{ }^\circ\text{C}$ , $V_{CC} = +13.5\text{ V}$ , $I_P = 0\text{ A}$	-	30	-	mA
		$T_A = +25\text{ }^\circ\text{C}$ , $V_{CC} = +13.5\text{ V}$ , $I_P = 500\text{ A}$	-	280	-	
Static Performance Data						
Electric Offset	$I_{OE}$	$T_A = +25\text{ }^\circ\text{C}$ , $I_P = 0\text{ A}$	-	$\pm 0.1$	-	A
		$T_A = -40\text{ }^\circ\text{C} \sim +85\text{ }^\circ\text{C}$ , $I_P = 0 \sim \pm I_{PN}$	-	$\pm 0.25$	-	A
Accuracy	$X_G$	$T_A = +25\text{ }^\circ\text{C}$ , $I_P = 0 \sim \pm I_{PN}$	-0.5	-	+0.5	% $I_{PN}$
		$T_A = -40\text{ }^\circ\text{C} \sim +85\text{ }^\circ\text{C}$ , $I_P = 0 \sim \pm I_{PN}$	-0.6	-	+0.6	% $I_{PN}$
Linearity Error	$\varepsilon_L$	$T_A = +25\text{ }^\circ\text{C}$ , $I_P = 0 \sim \pm I_{PN}$	-	$\pm 0.2$	-	% $I_{PN}$

\*Mean value for 12V lead acid battery system

## 2. CAN2.0 Output Format

Component	Properties	Unit	Applicable Part Number
Output Mode	CAN2.0B	-	All parts
Baud Rate	500	kbps	TMR7102-5000D
	250	kbps	TMR7102-5000E
Start Bit	big endian	-	All parts
CAN Report Rate	100	Hz	All parts

CAN ID	Data Length	Signal Name	Signal Description	Start Bit	End Bit
0x3C2	8	Current Value	0x80000000 = 0 mA	0	31
			0x80000001 = 1 mA		
			0x7FFFFFFF = -1 mA		
		Error Indicator	0-No error, 1-Error	32	32
		Error Information	Default 0x64, see error lookup table for detail	33	39
		Product Name	Default 0x48	40	55
		Software Revision	Default 0x00	56	63

## 3. Error Lookup Table

Failure Mode	Signal Value	Error Indicator	Error Information
Flash Error	0xFFFFFFFF	1	0x40
Over Current > 580A	0xFFFFFFFF	1	0x41
$V_{CC}$ Out of Range	0xFFFFFFFF	1	0x46

## 4. Output Error

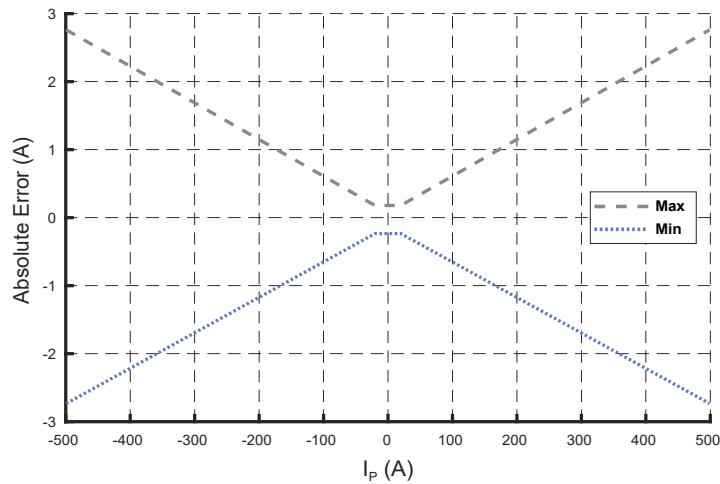


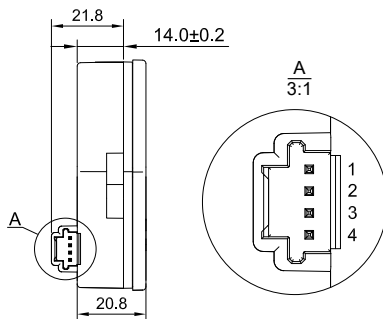
Figure 1. Output Error @ -40 °C ~ +85 °C

## 5. Application Information

### Electrical Connection

Primary through hole dimension:  $\leq \Phi 24$  mm

Secondary electrical connection: 4 Position TYCO 1473672-1, wiring info shown in Figure.



Pin Number	Name	Function
1	CAN-L	CAN-L
2	CAN-H	CAN-H
3	GND	Ground
4	V <sub>CC</sub>	Power supply

Figure 2. Pin configuration and wiring Diagram

### Mounting method

2 × M6 copper or SS304 screws (Recommended torque 2.5 N•m).

### TMR7102 Guidelines

- 1) V<sub>OUT</sub> is positive when the primary current (I<sub>P</sub>) 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 is customizable upon request.

## 6. Dimensions

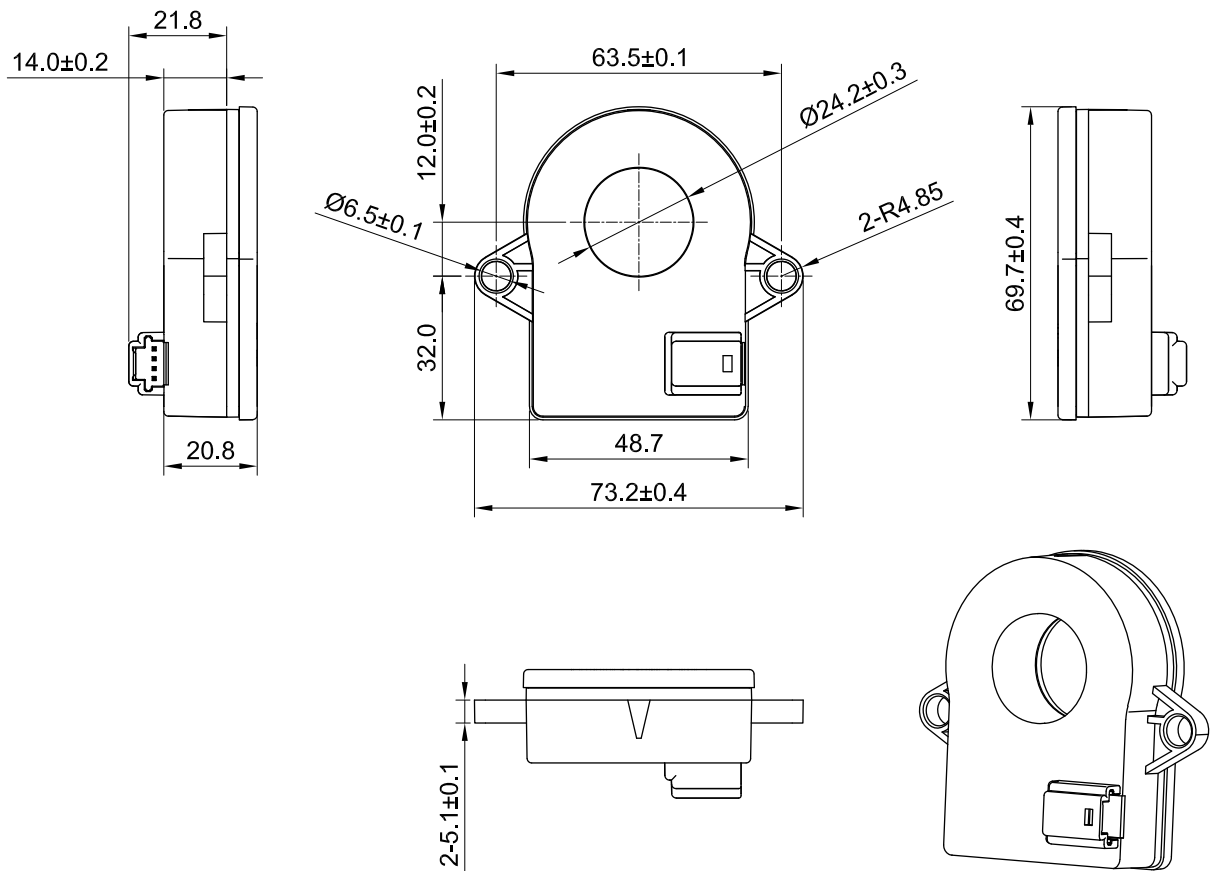


Figure 3. Dimension (unit: mm, tolerances for unmarked scales  $\pm 1$  mm)

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