

TMR7204-C

Split Core Low Temperature Coefficient Current Sensor

Description

TMR7204-C is a TMR array 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

- Low temperature coefficient
- Galvanic isolation
- High immunity to external interference
- RoHS & REACH compliant

Applications

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

Selection Guide

| Model | Primary Nominal Current | Primary Current Measuring Range |
|---------------|-------------------------|---------------------------------|
| TMR7204-2001C | 2000 A | ±4000 A |

Insulation and Environmental Characteristics

| Parameters | Symbol | Typical | Unit |
|-------------------------------|-----------|------------|----------------|
| Dielectric Strength | V_D | 5 | kV(50Hz, 1min) |
| Insulation Resistance | R_{IS} | 1000 | $M\Omega$ |
| Creepage Distance | d_{CP} | 31 | mm |
| Clearance | d_{CL} | 14 | mm |
| Ambient Operating Temperature | T_A | -40 to +70 | $^{\circ}C$ |
| Ambient Storage Temperature | T_{STG} | -40 to +70 | $^{\circ}C$ |
| Mass | m | 200 | g |

Catalogue

| | |
|---|----|
| 1. Specifications | 03 |
| 2. Parameters Definition and Formula..... | 04 |
| 3. Dimensions | 05 |
| 4. Application Information | 06 |

1. Specifications

$T_A = +25\text{ }^\circ\text{C}$, $V_{CC} = \pm 15\text{ V}$, $R_L = 10\text{ k}\Omega$, unless otherwise noted

| Parameter | Symbol | Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|------------------|---|-------|-------------------------|------|---------------|
| General Electrical Data | | | | | | |
| Primary Nominal Current | I_{PN} | TMR7204-2001C | - | 2000 | - | A |
| Primary Current Measuring Range | I_{PM} | TMR7204-2001C | -4000 | - | 4000 | A |
| Sensitivity | S | $I_P = 0$ to $\pm I_{PN}$ TMR7204-2001C | - | 2.00 | - | mV/A |
| Output Voltage | V_{OUT} | $I_P = 0$ to $\pm I_{PM}$ | - | $V_{OE} + S \times I_P$ | - | V |
| Supply Voltage | V_{CC} | $\pm 5\%$ | - | ± 15 | - | V |
| Current Consumption | I_C | $I_P = 0$ | - | +25/-5 | - | mA |
| Load Resistance | R_L | $I_P = 0$ to $\pm I_{PN}$ | 1 | 10 | - | k Ω |
| Load Capacitance | C_L | $I_P = 0$ to $\pm I_{PN}$ | - | 100 | - | pF |
| Static Performance Data | | | | | | |
| Accuracy | X_G | $T_A = +25\text{ }^\circ\text{C}$, $I_P = 0$ to $\pm I_{PN}$ | -1 | ± 0.5 | 1 | % I_{PN} |
| | | $T_A = -40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$, $I_P = 0$ to $\pm I_{PN}$ | -3 | ± 1.5 | 3 | |
| Linearity Error | ϵ_L | $T_A = -40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$, $I_P = 0$ to $\pm I_{PN}$ | - | ± 0.5 | - | % I_{PN} |
| Symmetry | ϵ_{SYM} | $T_A = -40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$, $I_P = 0$ to $\pm I_{PN}$ | 99 | 100 | 100 | % |
| Sensitivity Error | ϵ_S | $T_A = -40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$, $I_P = 0$ to $\pm I_{PN}$ | -2 | - | 2 | % |
| Offset Error | V_{OE} | $T_A = +25\text{ }^\circ\text{C}$, $I_P = 0$ | -30 | ± 10 | 30 | mV |
| | | $T_A = -40\text{ }^\circ\text{C}$ to $+105\text{ }^\circ\text{C}$, $I_P = 0$ | -50 | ± 20 | 50 | |
| Hysteresis | V_{OH} | $I_P = \pm I_{PN} \rightarrow 0$ | -10 | ± 5 | 10 | mV |
| Dynamic Performance Data | | | | | | |
| Response Time | t_R | $di/dt > 50\text{ A}/\mu\text{s}$, 10% to 90% of I_{PN} | - | 5 | - | μs |
| Bandwidth | BW | -3 dB | DC | 50 | - | kHz |

2. Parameters Definition and Formula

1) Output Voltage

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

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

2) Accuracy

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

I_{PN} stands for nominal primary current

3) Sensitivity

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

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

4) Linearity

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

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

5) Symmetry

$$\varepsilon_{SYM} = \left| \frac{V_{OUT(@ I_{PN})} - \bar{V}_{OE}}{V_{OUT(@ -I_{PN})} - \bar{V}_{OE}} \right| \times 100\%$$

6) Hysteresis

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

ΔH is the maximum residual voltage between full scale positive and negative nominal current.

3. Dimensions

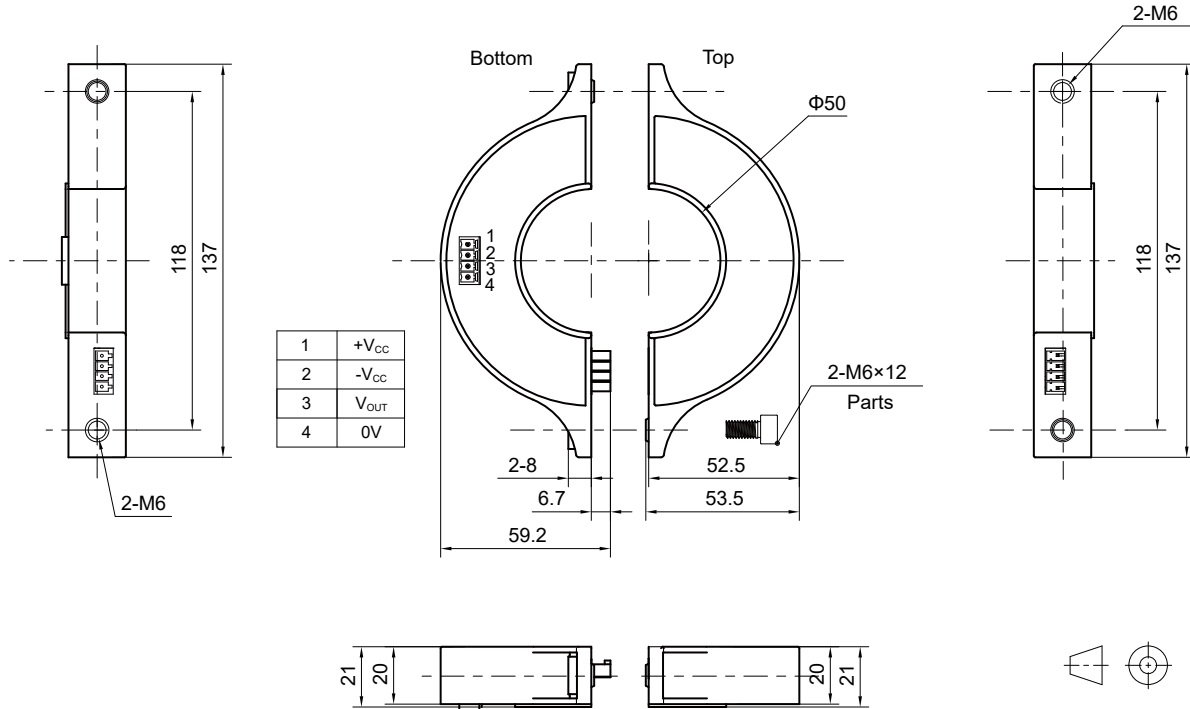


Figure 1. Dimension (unit: mm, tolerances for unmarked scales ± 1 mm)

4. Application Information

Electrical Connection

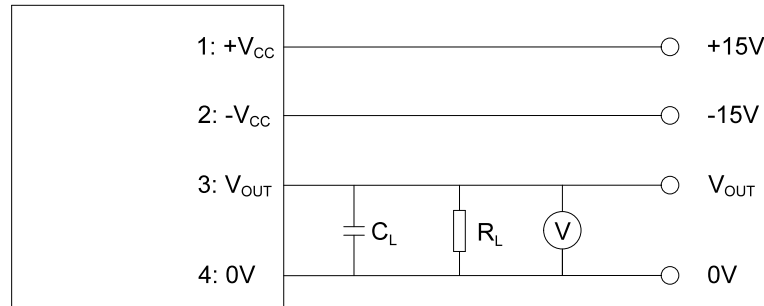


Figure 2. Electrical Connection

Mounting Recommendation

- | | |
|-------------------------------------|--|
| 1. Mounting method: | 2 × M6 copper or SS304 screws (Recommended torque 2.5 N·m) |
| 2. Primary through hole dimensions: | Φ 50mm |
| 3. Secondary electrical connection: | PHOENIXCONTACT MCV 1,5/ 4-G-3,81 |
| Mating connection: | PHOENIXCONTACT FMC 1,5/ 4-ST-3,81 |
| Wire dimension: | ≤ 1.5 mm ² |

Remarks

- V_{OUT} is positive when the primary current (I_p) is in the same direction as the arrow indication on the label and vice versa.
- Accuracy of the current sensor may be compromised when improper conductor is used such that primary through hole is partially filled.
- Improper connection may result in permanent damage of the sensor.
- Excessive capacitive load may result in distortion of output signals when measuring high frequency primary signal.
- Dynamic performances (di/dt and response time) are best with a single busbar completely filling the primary through hole.
- Sensor is customizable upon request.

Copyright © 2023 by MultiDimension Technology Co., Ltd.

Information furnished herein by MultiDimension Technology Co., Ltd. (hereinafter MDT) is believed to be accurate and reliable. However, MDT disclaims any and all warranties and liabilities of any kind, with respect to any examples, hints or any performance or use of technical data as described herein and/or any information regarding the application of the product, including without limitation warranties of non-infringement of intellectual property rights of any third party. This document neither conveys nor implies any license under patent or other industrial or intellectual property rights. Customer or any third-party must further determine the suitability of the MDT products for its applications to avoid the applications default of customer or third-party. MDT accept no liability in this respect.

MDT does not assume any liabilities of any indirect, incidental, punitive, special or consequential damages (including without limitation of lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, MDT's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the terms and conditions of commercial sale of MDT.

Absolute maximum ratings are the extreme limits the device will withstand without damage to the MDT product. However, the electrical and mechanical characteristics are not guaranteed as the maximum limits (above recommended operating conditions) are approached. MDT disclaims any and all warranties and liabilities of the MDT product will operate at absolute maximum ratings.

Specifications may change without notice.

Please download latest document from our official website www.dowaytech.com/en.

Recycling

The product(s) in this document need to be handed over to a qualified solid waste management services company for recycling in accordance with relevant regulations on waste classification after the end of the product(s) life.



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

Web: www.dowaytech.com/en E-mail: info@dowaytech.com

