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	MΩ
Creepage Distance	d_{CP}	31	mm
Clearance	d_{CL}	14	mm
Ambient Operating Temperature	T_A	-40 to +70	°C
Ambient Storage Temperature	T_{STG}	-40 to +70	°C
Mass	m	200	g

Catalogue

1. Specifications

T_A = +25 °C, V_{CC} = ±15 V, R_L = 10 kΩ, 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}	±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	-	kΩ
Load Capacitance	C_L	I_P = 0 to $\pm I_{PN}$	-	100	-	pF
Static Performance Data						
Accuracy	X_G	T_A = +25 °C, I_P = 0 to $\pm I_{PN}$	-1	±0.5	1	% I_{PN}
		T_A = -40 °C to +105 °C, I_P = 0 to $\pm I_{PN}$	-3	±1.5	3	
Linearity Error	ε_L	T_A = -40 °C to +105 °C, I_P = 0 to $\pm I_{PN}$	-	±0.5	-	% I_{PN}
Symmetry	ε_{SYM}	T_A = -40 °C to +105 °C, I_P = 0 to $\pm I_{PN}$	99	100	100	%
Sensitivity Error	ε_S	T_A = -40 °C to +105 °C, I_P = 0 to $\pm I_{PN}$	-2	-	2	%
Offset Error	V_{OE}	T_A = +25 °C, I_P = 0	-30	±10	30	mV
		T_A = -40 °C to +105 °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 A/μs, 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

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

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

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

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

5) Symmetry

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

6) Hysteresis

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

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

3. Dimensions

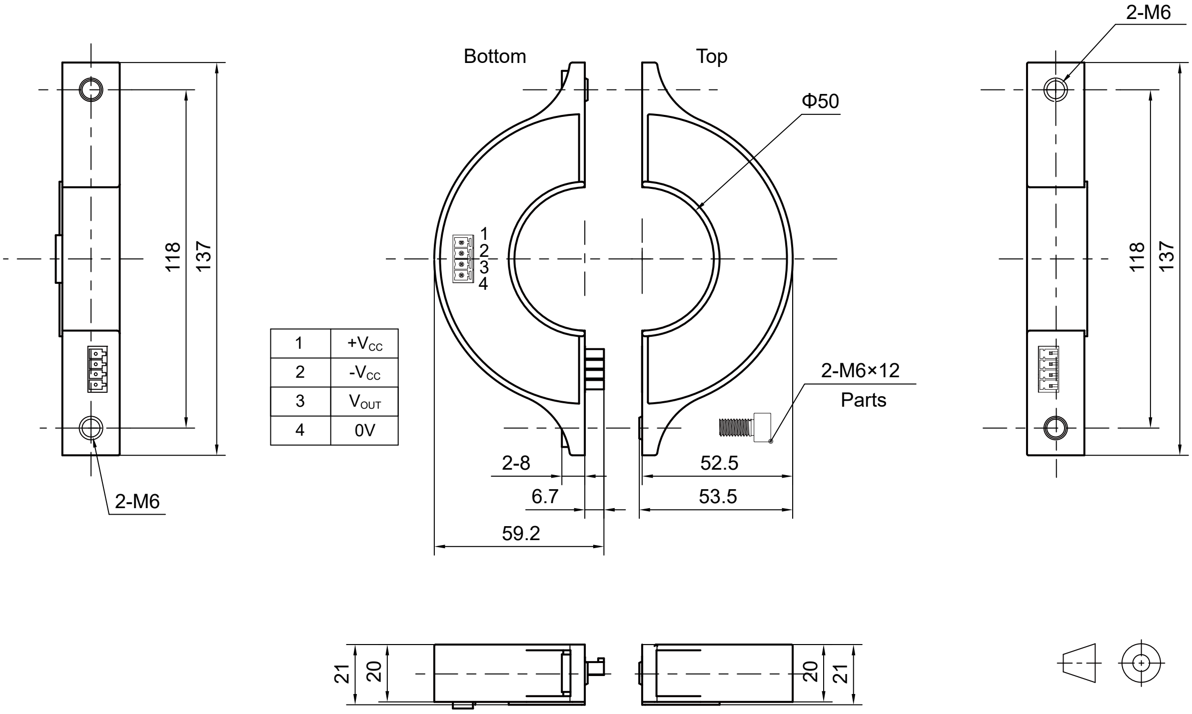

Figure 1. Dimension (unit: mm, tolerances for unmarked scales ±1 mm)

4. Application Information

Electrical Connection

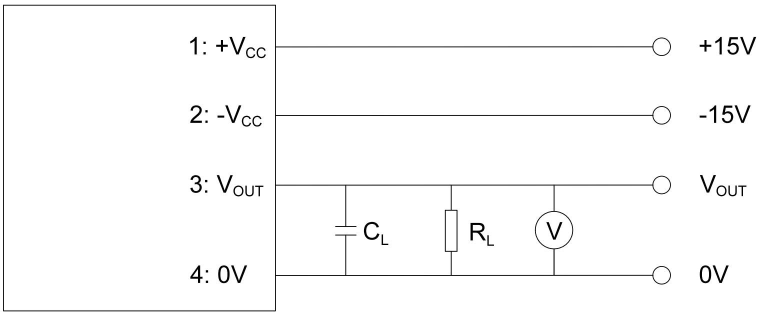

Figure 2. Electrical Connection

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

1. 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.
2. Accuracy of the current sensor may be compromised when improper conductor is used such that primary through hole is partially filled.
3. Improper connection may result in permanent damage of the sensor.
4. Excessive capacitive load may result in distortion of output signals when measuring high frequency primary signal.
5. Dynamic performances (di/dt and response time) are best with a single busbar completely filling the primary through hole.
6. Sensor is customizable upon request.

Specifications may change without notice.

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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.

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