DATA SHEET

CURRENT SENSOR-LOW TCR
4 TERMINATION

PN series

5%, 1%

sizes 0306/0508/0612

RoHS compliant & Halogen free

YAGEO

Product specification – July 10, 2025 V.0



SCOPE

This specification describes PN 4-Terminal series current sensor – thin type chip resistors with lead-free terminations made by metal process.

APPLICATIONS

- Battery Pack
- Inverter/ Converter (DC-DC/AC-DC/DC-AC)
- Consumer Electrics
- Laptop

FEATURES

- This product with lead free terminations meet RoHS requirements.
- PFAS Free
- High component and equipment reliability
- AEC-Q200 qualified
- Ultra-low resistance and narrow tolerance can suitable for current detection.
- Reduce environmentally hazardous wastes
- None forbidden-materials used in products/production

ORDERING INFORMATION - GLOBAL PART NUMBER

Part number is identified by the series name, size, tolerance, packaging type, temperature coefficient of resistance, taping reel, resistance value

GLOBAL PART NUMBER

PN	XXXX	X	X	XX	XXXX	L
	(1)	(2)	(3)	(4)	(5)	(6)

(1) SIZE

0306/0508/0612

(2) TOLERANCE

F = ±1%

J = ±5%

(3) PACKAGING TYPE

R = Paper taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

E = ±50ppm/°C

F = ±100ppm/°C

L = ±150ppm/°C

I = ±300ppm/°C

(5) TAPING REEL

07 / 7W / 7T / 47 / 57 inch dia. Reel and specific rated power

Detailed power rating are shown in the Table 2.

(6) RESISTANCE VALUE

0.5mΩ to 10mΩ

There are 3~5 digits indicated the resistance value. Letter R is decimal point.

Detailed coding rules of resistance are shown in the table of "Resistance rule of global. part number.

(7) DEFAULT CODE

Letter L is the system default code for ordering only. (NOTE)

Resistance rule of global part number

Resistance code rule	Example
0RXXX	0R001 = 0.001Ω
0RXX	0R01 = 0.01Ω
XUX	1U5 = 0.0015Ω

ORDERING EXAMPLE

The ordering code for a PN0306 0.5W chip resistor, TCR 150, value 0.0015Ω with ±1% tolerance, supplied in 7-inch tape reel with 5Kpcs quantifies is: PN0306FRL571U5L.

NOTE

1. All our R-chip products meet RoHS compliant and Halogen Free. "LFP" of the internal 2D reel label mentions "Lead Free Process".
2. On customized label, "LFP" or specific symbol can be printed.

MARKING

PN0306/0612



Bar marking

Fig. 1

PN0508



Bar marking

Fig.2

CONSTRUCTION

The resistors are constructed using outstanding TCR level material, which makes YAGEO PA resistors excellent for current sensing application in battery charger circuit.

The composition of the resistive material is adjusted to give the approximate required resistance and is covered with a protective coating. Finally, the three external terminations (Cu / Ni / matte Tin) are added, as shown in Fig.3.

Outlines

PN0306/0612

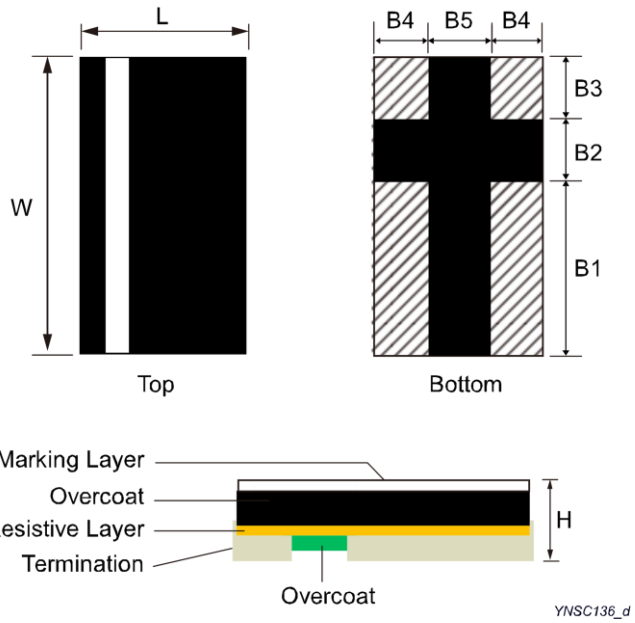


Fig. 3 Chip resistor outlines

DIMENSION

Table 1 For outlines, please refer to Fig. 5

TYPE	L (mm)	W (mm)	B1 (mm)	B2 (mm)	B3 (mm)	B4 (mm)	B5 (mm)	H (mm)
PN0306	0.80±0.15	1.60±0.20	1.10±0.20	0.25±0.10	0.25±0.10	0.20±0.10	0.40±0.20	Max. 0.40
PN0612	1.60±0.15/-0.20	3.20±0.20	2.20±0.20	0.50±0.20	0.50±0.20	0.45±0.20	0.70±0.20	Max.0.45

Note:
1. For relevant physical dimensions, please refer to construction outlines.
2. Please contact with sales offices, distributors and representatives in your region before ordering.

Outlines

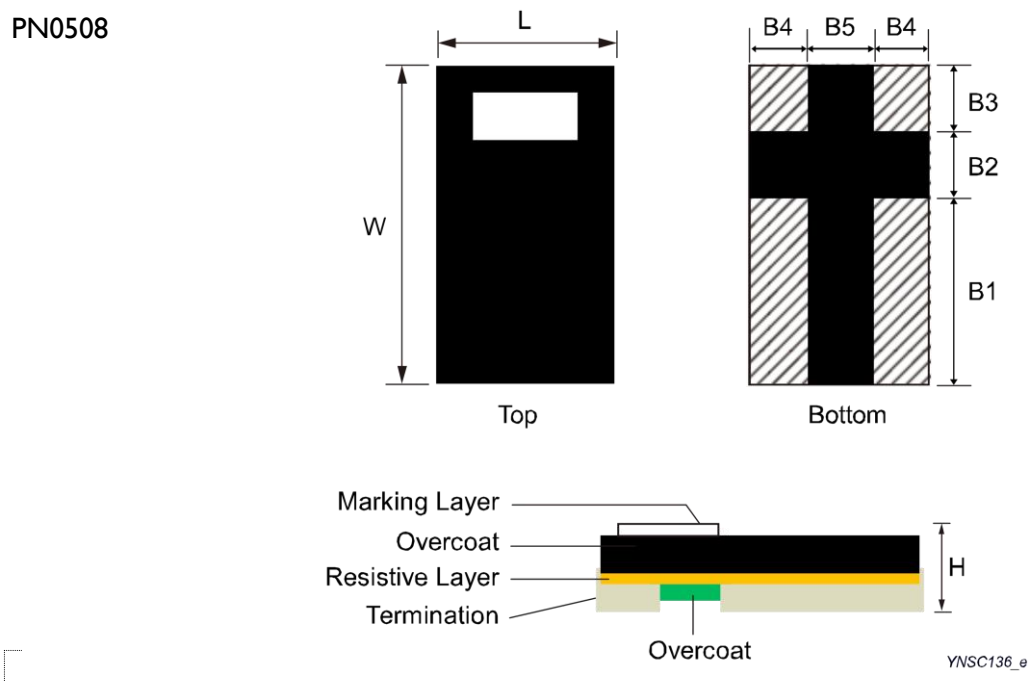


Fig. 4 Chip resistor outlines

DIMENSION

Table 2 For outlines, please refer to Fig. 4

TYPE	RESISTANCE RANGE	L (mm)	W (mm)	B1 (mm)	B2 (mm)	B3 (mm)	B4 (mm)	B5 (mm)	H (mm)
PN0508	1mΩ ≤ R ≤ 1.5mΩ	1.25±0.15	2.00±0.15	1.40±0.15	0.30±0.15	0.30±0.15	0.40±0.15	0.45±0.15	Max. 0.40
	1.5mΩ < R ≤ 2.5mΩ						0.35±0.15	0.55±0.15	

Note:
1. For relevant physical dimensions, please refer to construction outlines.
2. Please contact with sales offices, distributors and representatives in your region before ordering.

ELECTRICAL CHARACTERISTICS

Table 3

SERIES	SIZE	POWER RATING (4) 07	7W	7T	47	57	TOLERANCE (2)	RESISTANCE RANGE	TEMPERATURE COEFFICIENT OF RESISTANCE (3)
PN	0306	0.1W	0.2W	0.3W	0.4W	0.5W	±1%(F) ±5%(J)	1mΩ ≤ R ≤ 5mΩ	±100ppm/°C(F) ±150ppm/°C(L)
	0508	0.5W	1W	--	--	--	±1%(F) ±5%(J)	1mΩ ≤ R ≤ 2.5mΩ	±50ppm/°C(E) ±100ppm/°C(F)
	0612	1W	1.5W	--	--	--	±1%(F) ±5%(J))	0.5mΩ ≤ R < 1mΩ	±150ppm/°C(L) ±300ppm/°C(I)
		1W	1.5W	2W	--	--		1mΩ ≤ R ≤ 2.5mΩ	±50ppm/°C(E) ±100ppm/°C(F)
		1W	1.5W	--	--	--		2.5mΩ ≤ R ≤ 5mΩ	
		1W	--	--	--	--		5mΩ ≤ R ≤ 10mΩ	

Note : 1. Please contact with sales offices, distributors and representatives in your region before ordering.
2. Global part number (code7)
3. Global part number (code9)
4. Global part number (code10-11)

FUNCTIONAL DESCRIPTION

RATED VOLTAGE

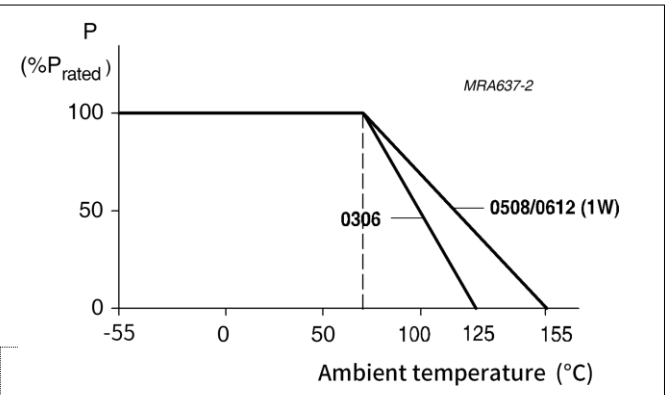


Fig. 5 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

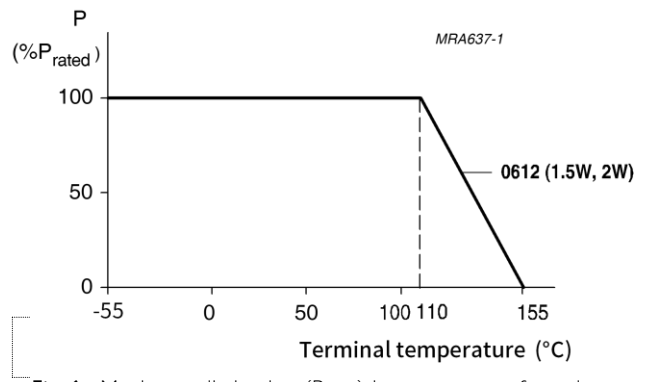


Fig. 6 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating terminal temperature ($T_{term.}$)

The DC or AC (rms) continuous working voltage corresponding to the rated power is determined by the following formula:

$V = \sqrt{(PxR)}$

Where

V=Continuous rated DC or AC (rms) working voltage (v)

P=Rated power

R=Resistance value (Ω)

PACKING STYLE AND PACKAGING QUANTITY

Table 4 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	PN0306	PN0508	PN0612
Paper Taping Reel (R)	7" (178 mm)	5,000	5,000	4,000

REEL SPECIFICATION

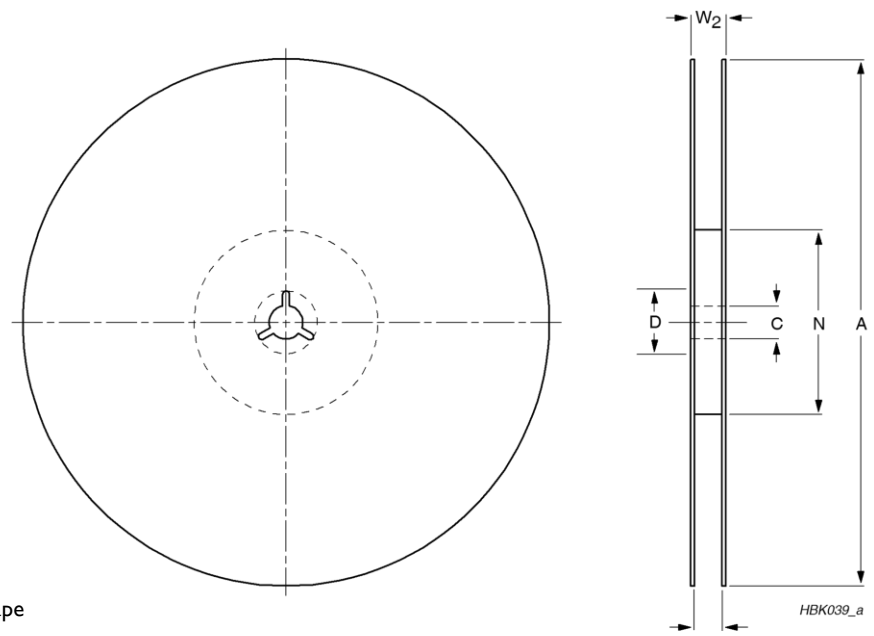


Fig. 7 Paper Tape

Table 5 Dimensions of reel specification for relevant chip resistors size

SIZE	QUANTITY PER REEL	SYMBOL				unit: mm
		TAPE WIDE (mm)	A(mm)	N(mm)	W_1(mm)	W_2 (mm)
PN0306	5000	8	178.0±1	60.0±2.0	8.4 +1/-0	Max.12.4
PN0508	5000	8	178.0±1	60.0±2.0	8.4 +1/-0	Max.12.4
PN0612	4000	8	178.0±1	60.0±2.0	8.4 +1/-0	Max.12.4

PAPER TAPE

PN0306/0612

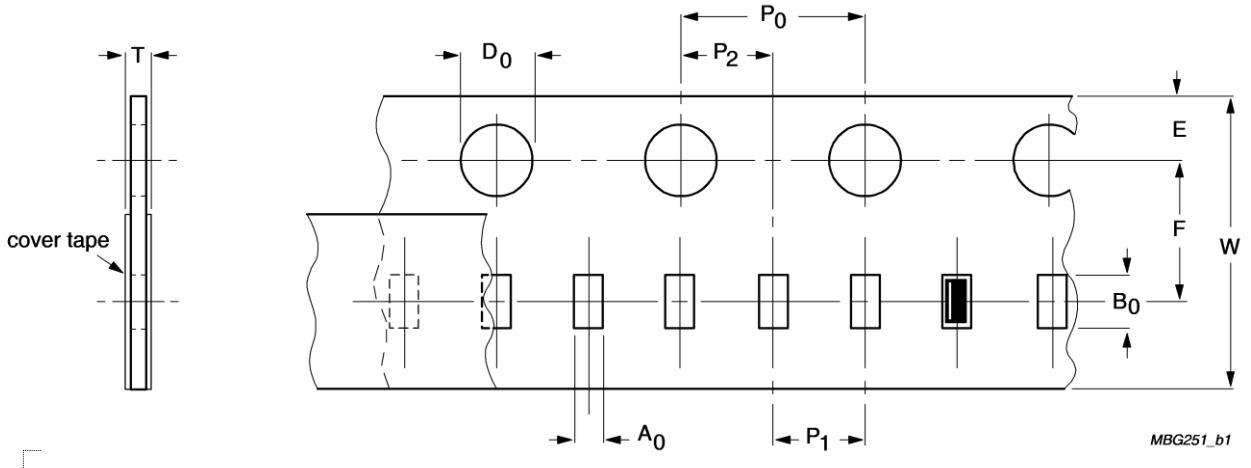


Fig. 8 Paper Tape

PN0508

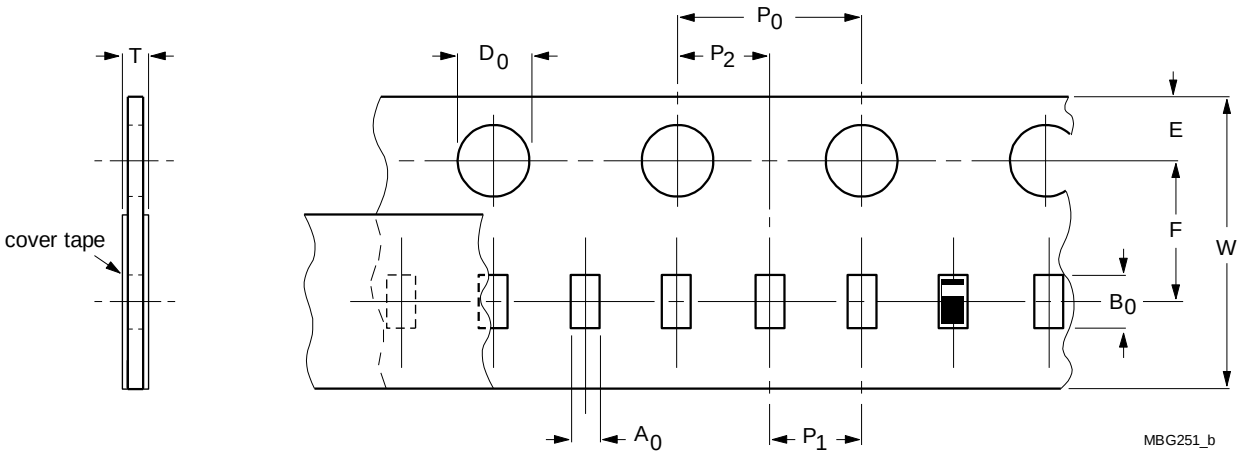


Fig. 9 Paper Tape

Table 6 Dimensions of embossed tape for relevant chip resistors size

SIZE	SYMBOL									Unit: mm
	A_0	B_0	W	E	F	P_0	P_1	P_2	ΦD_0	T
PN0306	1.10±0.10	1.85±0.10	8.00±0.30	1.75±0.10	3.50±0.10	4.00±0.10	4.00±0.10	2.00±0.10	1.50±0.10	0.50±0.10
PN0508	1.60±0.10	2.35±0.10	8.00±0.30	1.75±0.10	3.50±0.10	4.00±0.10	4.00±0.10	2.00±0.10	1.50±0.10	0.53±0.10
PN0612	1.91±0.05	3.65±0.05	8.00±0.30	1.75±0.10	3.50±0.10	4.00±0.10	4.00±0.10	2.00±0.10	1.50±0.10	0.50±0.10

LEADER/TRAILER TAPE SPECIFICATION

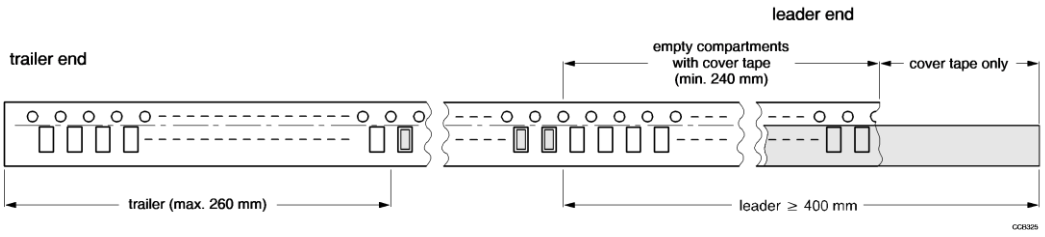


Fig. 10 Leader/Trailer Tape

FOOTPRINT AND SOLDERING PROFILES

For recommended soldering profiles, please refer to data sheet "Chip resistors mounting".

FOOTPRINT

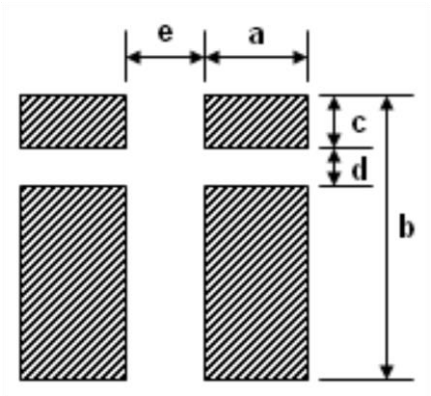


Fig. 11 Recommended Footprint Dimensions

Table 7 Footprint dimensions

SIZE footprint	Dimensions Code				Unit: mm
TYPE	a	b	c	d	e
PN0306	0.40	1.75	0.35	0.20	0.20
PN0508	0.65	2.30	0.55	0.20	0.45
PN0612	1.00	3.50	0.80	0.38	0.75

TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENT
Short time overload	IEC60115-1 4.13	5 times of rated power for 5 seconds at room temperature	±(1.0%+0.0005Ω)
High Temperature Exposure/ Endurance at Upper Category Temperature	AEC -Q200 Test 3 MIL-STD-202G-Method 108	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the par ts Tolerances: 0306 : 125±3°C 0508/1206 : 155±3°C	±(1.0%+0.0005Ω)
Temperature Cycling	AEC -Q200 Test 4 JESD22-A104	1,000 cycles, 0306: -55/+125°C 0508/0612: -55/+155°C for 1 cycle, Dwell time 15 minutes with 1,000 cycles.	±(1.0%+0.0005Ω)
Biased Humidity	AEC -Q200 Test 7 MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH 10% of operating power	±(1.0%+0.0005Ω)
Life	AEC -Q200 Test 8	1,000 hours at 70±2°C applied rated power 1.5 hours on, 0.5 hour off	0306/0508/0612(1W): ±(1.0%+0.0005Ω)
	MIL-STD-202-Method 108	1,000 hours at terminal temperature 110 °C applied rated power 1.5 hours on, 0.5 hour off	0612(1.5W, 2W): ±(1.0%+0.0005Ω)
Resistance to Solvents	AEC -Q200 Test 12 MIL-STD-202 Method 215	Immerse in isopropyl alcohol for 5 min with ultrasonic at room temperature	No visible damage
Mechanical Shock	AEC -Q200 Test 13 MIL-STD-202 Method 213	Three shocks in each direction, applied along the three mutually perpendicular axes of the test specimen (18 shocks) Peak value: 100 g's Duration: 6 ms Velocity change: 12.3 ft/s Waveform: Half sine	±(1.0%+0.0005Ω)
Vibration	AEC -Q200 Test 14 MIL-STD-202 Method 204	5 g's for 20 min., 12 cycles each of 3 orientations Test from 10-2000 Hz.	±(1.0%+0.0005Ω)

TEST	TEST METHOD	PROCEDURE	REQUIREMENT
Resistance to Soldering Heat	AEC -Q200 Test 15 MIL-STD-202 Method 210	Specimen passed 3 times reflow temperature at 260°C, with solder	±(1.0%+0.0005Ω) No visible damage
Electrostatic Discharge	AEC -Q200 Test 17 AEC-Q200-002	Human Body Model, 1 pos + 1 neg. 0306 : 1KV 0508/0612 : 2KV	±(1.0%+0.0005Ω) No visible damage
Solderability - Wetting	AEC -Q200 Test 18 J-STD-002	(1) Baking 4 hours at 155°C dry heat, dipping at 245±3°C for 5±0.5 seconds. (2) Baking 4 hours at 155°C dry heat, dipping at 260±3°C for 30±0.5 seconds.	Well tinned (>95% covered) No visible damage
Flammability	AEC -Q200 Test 20 UL94	Try to inflame a specimen by a needle flame	No ignition of specimen; V-0
Board Flex / Bending	AEC -Q200 Test 21 AEC-Q200-005	Chips mounted on a glass epoxy resin PCB (FR4), Bending 2 mm for 60+5 seconds	±(1.0%+0.0005Ω)
Terminal Strength (SMD)	AEC -Q200 Test 22 AEC-Q200-006	Applied 0306 : 9.8N 0508/0612 : 17.7N for 60+1 seconds.	±(1.0%+0.0005Ω) No visible damage
Flame Retardance	AEC -Q200 Test 24 AEC-Q200-001	Only requested, when voltage/power will increase the surface Temp. to 350°C	No flame, no explosion
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202 Method 304 IEC 60115-1 4.8	At +25/+125°C Formula: $T.C.R=\frac{R_2-R_1}{R_1(t_2-t_1)}\times 10^6(ppm/°C)$ Where t1=+25°C or specified room temperature t2=+125°C test temperature R1=resistance at reference temperature in ohms R2=resistance at test temperature in ohms	Refer to table 2

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 0	Jul. 10, 2025	-	- New datasheet for current sensor - low TCR 4 terminal PN Series

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