Innovative Service Around the Globe YAGEO

DATA SHEET

CURRENT SENSOR - LOW TCR

AUTOMOTIVE GRADE

PA Series - Wide Terminal

5%, 1%, 0.5%

sizes 0508/0612/0815/1225

RoHS compliant & Halogen free

YAGEO

Product specification – January 07, 2023 V.0

SCOPE

This specification describes PA series wide-terminal current sensor - low TCR chip resistors made by metal alloy process.

APPLICATIONS

- Power supplies
- Laptop
- HDDs
- Car electronics
- Consumer goods
- Consumer
- Telecom / Datacom
- Industrial / Power supply
- Alternative Energy
- Automotive

FEATURES

- AEC-Q200 qualified
- Halogen-free Epoxy
- RoHS compliant
- Total lead free without RoHS exemption
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- None forbidden-materials used in products/production
- Low resistances applied to current sensing
- Moisture sensitivity level: MSL 1

ORDERING INFORMATION - GLOBAL PART NUMBER

Global part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

GLOBAL PART NUMBER

PA	XXXX	X	X	X	XX	XXXX	L
	(1)	(2)	(3)	(4)	(5)	(6)	(7)

(1) SIZE

0508/0612/1225

(2) TOLERANCE

F = ±1% G = ±2% J = ±5%

(3) PACKAGING TYPE

R = Paper taping reel

K= Embossed taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

E = ±50 ppm/°C

M =±75 ppm/°C

F = ±100 ppm/°C

G= ±200ppm/°C

(5) TAPING REEL

07/7W = 7 inch dia. Reel and specific rated power. Detailed power ratings are shown in the Table 2

(6) RESISTANCE VALUE

0R001 (1mΩ) ~ 0R005 (5mΩ)

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

(7) DEFAULT CODE

L = system default code for ordering only

ORDERING EXAMPLE

The ordering code for a PA0612 1W chip resistor,TC100 value 0.002Ω (2mR) with ±1% tolerance, supplied in 7-inch tape reel with 5Kpcs quantify is: PA0612FRF070R002L.

NOTE

1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead-Free Process"

MARKING

PA0508/PA0612/PA1225

Fig. 1

No marking

CONSTRUCTION

The resistors are constructed by using outstanding TCR level materials, which make Yageo PA resistors excellent for current sensing application in battery charger circuit & DC-DC converter.

The advanced resistive materials are adopted to get the precisely required resistance.

Finally, the three materials of external terminations (Cu / Ni / matte Tin) are added, as shown in Fig. 5

Outlines

For dimension see Table 1

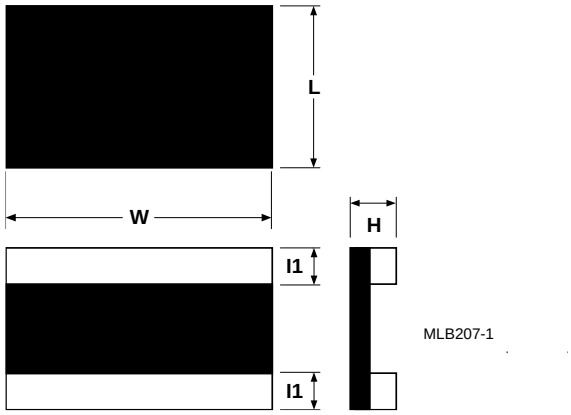

Fig. 2 Chip resistor outlines

DIMENSION

Table 1

TYPE	RESISTANCE RANGE	L (mm)	W (mm)	H (mm)	I_1 (mm)
PA0508	1 mΩ ≤ R <2 mΩ	1.20±0.15	2.00±0.15	0.42±0.15	0.35±0.25
	2 mΩ ≤ R ≤ 5 mΩ	1.20±0.15	2.00±0.15	0.28±0.15	0.35±0.25
PA0612	1 mΩ ≤ R ≤ 5 mΩ	1.6±0.20	3.2±0.20	Max.0.45	0.45±0.20
PA1225	1 mΩ ≤ R ≤ 5 mΩ	3.18±0.25	6.35±0.25	Max.0.55	0.50±0.20

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 2

TYPE	POWER RATING (1)		TOLERANCE	RESISTANCE RANGE	TEMPERATURE COEFFICIENT OF RESISTANCE
	07	7W			
PA0508	1W	---	± 0.5% (By request)	1mΩ ≤ R < 2mΩ	±200 ppm/°C
			±1%	2mΩ ≤ R ≤ 5mΩ	±100 ppm/°C
PA0612	2W	---	±5%	1mΩ ≤ R < 2mΩ	± 150 ppm/°C
				2mΩ ≤ R ≤ 5mΩ	± 100 ppm/°C
PA1225	1.5W	3W		1 mΩ ≤ R ≤ 5 mΩ	±75ppm/°C

Note: 1. Global part number (code 10 - 11)
2. Please contact with sales offices, distributors and representatives in your region before ordering.

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

PA0508/PA0612 : –55°C to +155°C

PA1225 : –55°C to +170°

POWER RATING

Standard rated power at 70°C:

PA0508 = 1W

PA0612 = 2W

PA1225 = 1.5W/3W

RATED VOLTAGE

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

$$V = \sqrt{(P*R)}$$

Where

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

P = Rated power (W)

R = Resistance value (Ω)

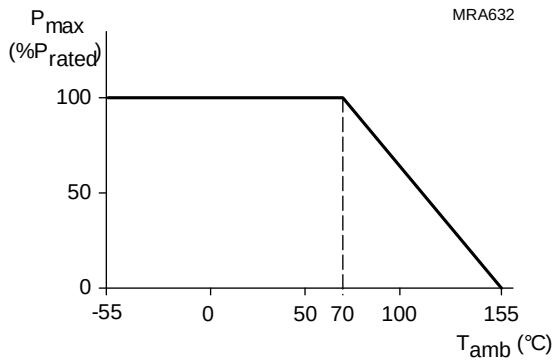

Fig. 3 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

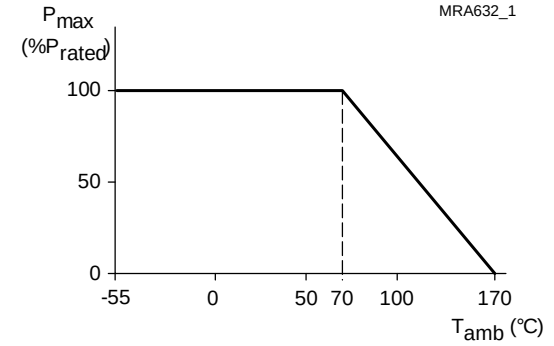

Fig. 4 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	PA0508	PA0612	PA1225
Paper taping reel (R)	7" (178 mm)	5,000	5000	---
Embossed taping reel (K)	7" (178 mm)	---	---	4000

PAPER TAPE

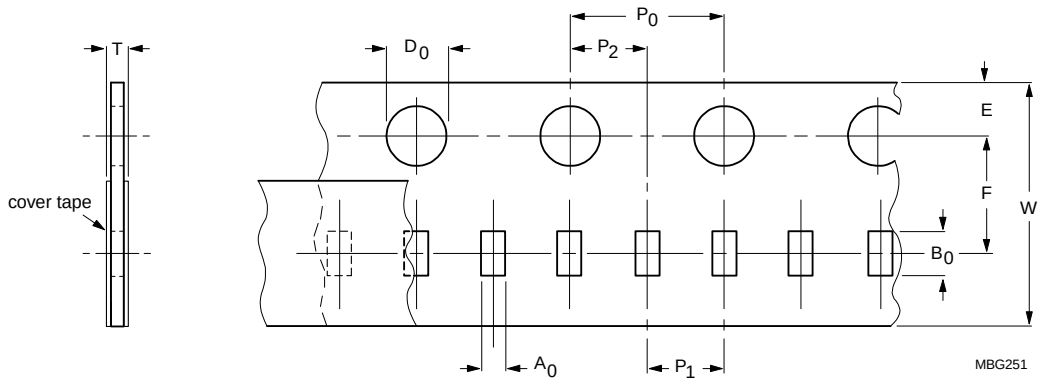

Fig. 5 Paper Tape

Table 4 Dimensions of paper tape for relevant chip resistors size

SIZE	SYMBOL									Unit: mm
	A_0	B_0	W	E	F	P_0	P_1	P_2	$\varnothing D_0$	T
PA0508	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	0.60± 0.10
PA0612	1.80±0.15	3.50±0.15	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	0.60± 0.10

EMBOSSED TAPE

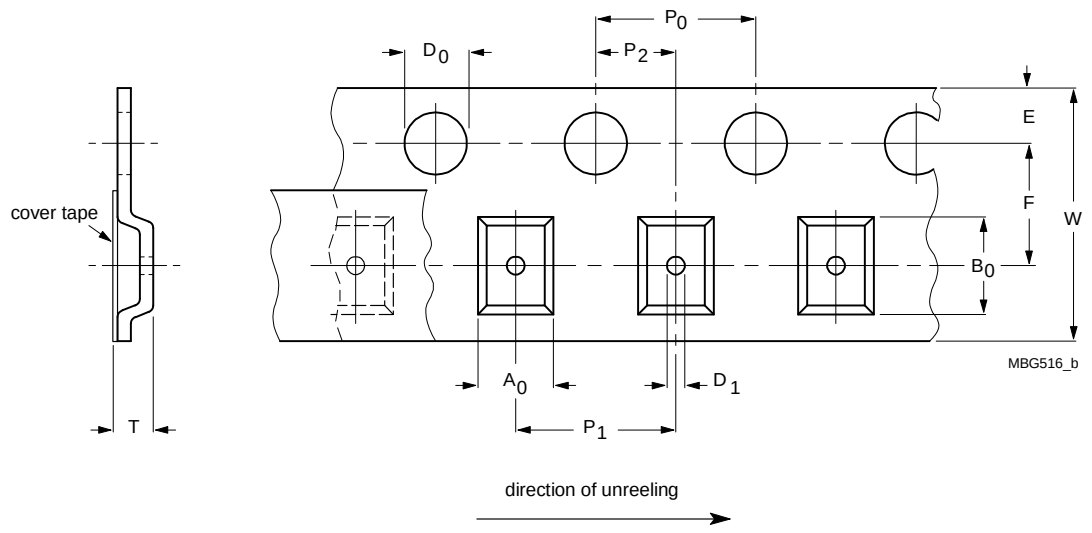

Fig. 6 Embossed Tape

Table 5 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	$\varnothing D_0$	D_1	T
PA1225	3.40±0.15	6.70± 0.15	12.0± 0.30	1.75± 0.10	5.50± 0.10	4.00± 0.10	4.00± 0.10	2.00± 0.10	1.55± 0.10	0.80± 0.15	0.75± 0.15

REEL SPECIFICATION

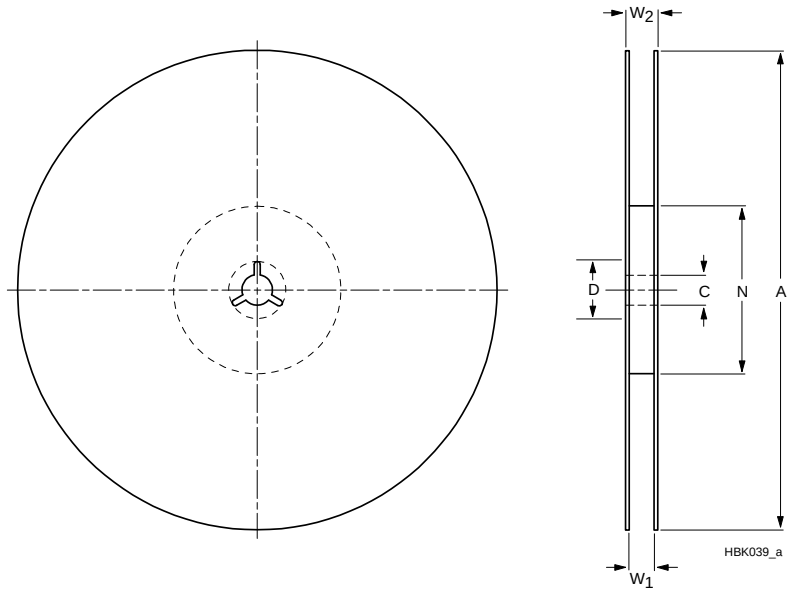

Fig. 7 Reel

Table 6 Dimensions of reel specification for relevant chip resistors size

SIZE	SYMBOL						Unit: mm
	8 mm TAPE WIDE	A	N	C	D	W_1	$W_{2\ MAX.}$
PA0508	7" (Ø178 mm)	178.0±5	60.0+1/-0	13.00±0.5	17.70±0.5	9.0± 0.5	12.4
PA0612	7" (Ø178 mm)	178.0±5	60.0+1/-0	13.00±0.5	17.70±0.5	9.0± 0.5	12.4

SIZE	SYMBOL						Unit: mm
	12 mm TAPE WIDE	A	N	C	D	W_1	$W_{2\ MAX.}$
PA2512	7" (Ø178 mm)	178.0 ±5	60.0 +1/-0	13.00±0.5	21.0±0.8	13.6±0.5	18.3+1/-0

SOLDERING PROFILES

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

FOOTPRINT

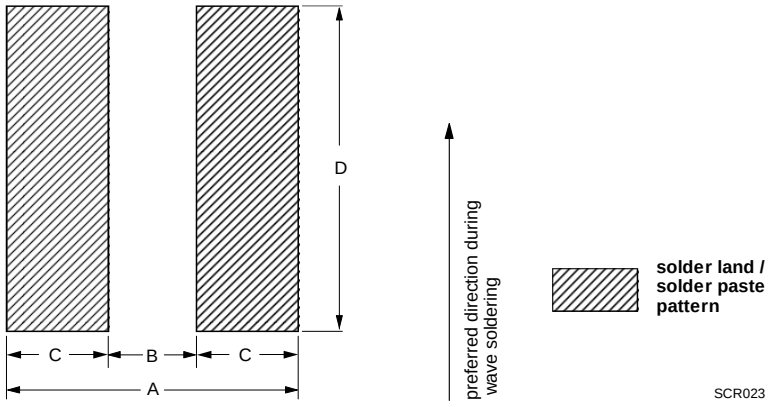

Fig. 8 Single resistor chips recommended dimensions of footprints

Table 7 Footprint dimensions

Unit: mm

SIZE	RESISTANCE RANGE	A	B	C	D
PA0508	1mΩ ≤ R ≤ 5mΩ	3.05	0.45	1.3	2.65
PA0612	1mΩ ≤ R ≤ 5mΩ	4.60	0.60	2	3.68
PA1225	1mΩ ≤ R ≤ 5mΩ	6.1	1.4	2.35	7.25

TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	IEC 60115-1 4.25.1	1,000 hours at 70±2 °C applied RCWV 1.5 hours on, 0.5 hour off, still air required	±(1%+0.0005 Ω)
High Temperature Exposure/ Endurance at Upper Category Temperature	IEC 60068-2-2	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 0508/0612: 155±3 °C 1225: 170±3 °C	±(1%+0.0005 Ω)
Moisture Resistance	MIL-STD-202 Method 106	Each temperature / humidity cycle is defined at 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25 °C / 65 °C 95% R.H, without steps 7a & 7b, unpowered Parts mounted on test-boards, without condensation on parts Measurement at 24±2 hours after test conclusion	±(0.5%+0.0005 Ω)
Short Time Overload	IEC60115-1 4.13	5 times of rated power for 5 seconds at room temperature	±(0.5%+0.0005 Ω) No visible damage
Board Flex/ Bending	IEC60068-2-21	Device mounted on glass epoxy resin PCB test board (FR4), 2 mm bending Bending time: 60±5 seconds	±(1%+0.0005 Ω) No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	J-STD-002B test B	Electrical Test not required Magnification 50X SMD conditions: 1st step: method B, aging 4 hours at 155 °C dry heat 2nd step: leadfree solder bath at 245±3 °C Dipping time: 3±0.5 seconds	Well tinned (≥95% covered) No visible damage
- Resistance to Soldering Heat	IEC 60068-2-58	Specimen passed 3 times reflow temperature at 260°C, with solder.	±(0.5%+0.0005 Ω) No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 0	Jan. 07, 2023	-	- New datasheet

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