Innovative Service Around the Globe YAGEO

DATA SHEET

CURRENT SENSOR - LOW TCR

PA0603 series

5%, 1%

sizes 0603

RoHS compliant & Halogen free

YAGEO Phycomp

Product specification– December 24, 2019 V.1

SCOPE

This specification describes PA0603 series current sensor - low TCR with lead-free terminations metal substrate.

APPLICATIONS

- Consumer goods
- Computer
- Telecom / Datacom
- Industrial / Power supply
- Alternative Energy
- Car electronics

FEATURES

- AEC-Q200 qualified
- Halogen-free Epoxy
- RoHS compliant
- Reduce environmentally hazardous wastes
- High component and equipment reliability
- Non-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

0603

(2) TOLERANCE

F = ±1%

J = ±5%

(3) PACKAGING TYPE

R = Paper taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

E = ±50 ppm/°C

M = ±75 ppm/°C

L = ±150 ppm/°C

G = ±200 ppm/°C

(5) TAPING REEL

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

Detailed power rating are shown in the Table 2.

(6) RESISTANCE VALUE

1 mΩ to 20 mΩ

(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 = 1 mΩ
(1 to 20 mΩ)	0R02 = 20 mΩ

ORDERING EXAMPLE

The ordering code for a PA0603 0.5W chip resistor,TC75 value 0.01Ω (10mR) with ±1% tolerance, supplied in 7-inch tape reel with 5Kpcs quantify is:

PA0603FRM570R01L.

NOTE

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

MARKING

PA0603

No Marking

Fig. 1 Value = 10 mΩ

CONSTRUCTION

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

The composition of the resistive material is adjusted to give the approximate required resistance and is covered with a protective coating. Marking is printed on the top side of the resistor.

Finally, the three external terminations (Cu / Ni / matte Tin) are added, as shown in Fig. 2.

Outlines

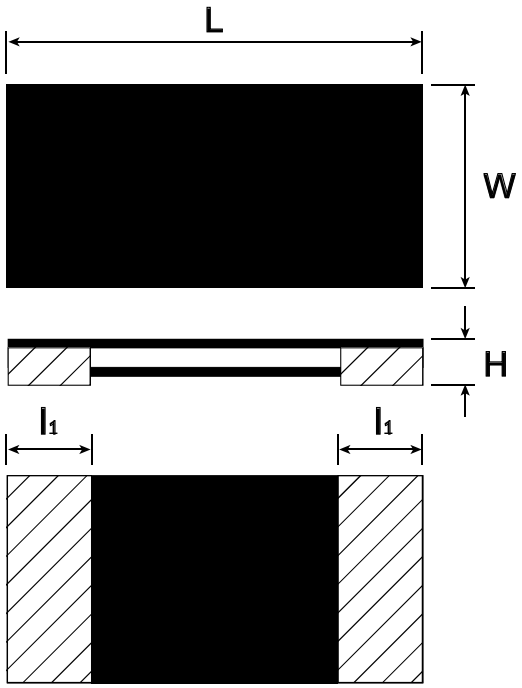

Fig. 2 Chip resistor outlines

DIMENSION

Table 1 For outlines, please refer to Fig. 4

TYPE	RESISTANCE RANGE	POWER RATING	L (mm)	W (mm)	H (mm)	I_1 (mm)
PA0603	1mΩ	1/10 W 1/5 W	1.60±0.20	0.80±0.20	0.55±0.15	0.38±0.12
	1mΩ < R ≤ 20mΩ	3/10 W 2/5 W 1/2 W	1.60±0.20	0.80+0.1/-0.20	0.45±0.15	0.38±0.12

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

SERIES	SIZE	POWER RATING					TOLERANCE	RESISTANCE RANGE	TEMPERATURE COEFFICIENT OF RESISTANCE
		07	7W	7T	47	57			
PA	0603	1/10W	1/5W	3/10W	2/5W	1/2W	±1% , ±5%	1mΩ	±200 ppm/°C
								2mΩ / 2.5mΩ	±150 ppm/°C
								3mΩ ≤ R ≤ 20mΩ	±50 ppm/°C, ±75 ppm/°C

Note: Please contact with sales offices, distributors and representatives in your region before ordering.

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

PA0603 Range: –55°C to +155°C

POWER RATING

Standard rated power at 70°C:

For detail power value, please refer to Table 2.

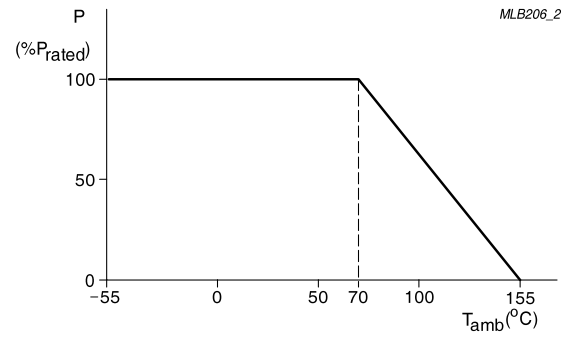

Fig. 3 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

RATED VOLTAGE

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 (W)

R = Resistance value (Ω)

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	PA0603
Paper taping reel (R)	7" (178 mm)	5,000

PAPER TAPE

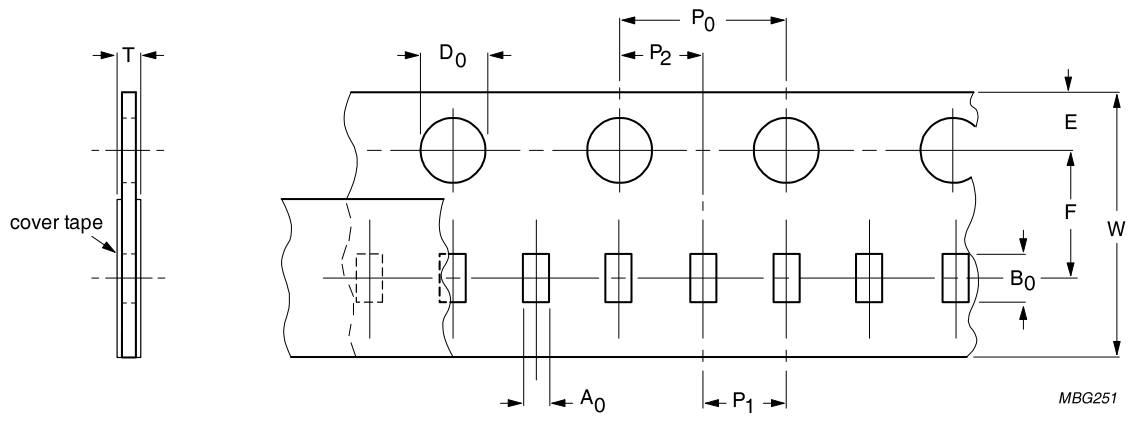

Fig. 4 Paper Tape

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	$\varnothing D_0$	$\varnothing D_1$	T
PA0603	1.08± 0.10	1.90±0.10	8.00±0.10	1.75±0.10	3.50±0.10	4.00±0.10	2.0± 0.10	2.00±0.10	1.55±0.05	1.50±0.10	0.60± 0.10

REEL SPECIFICATION

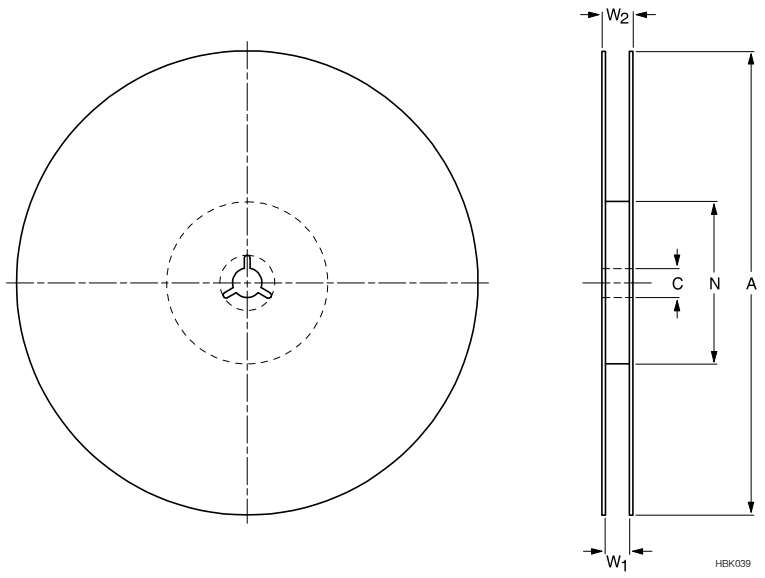

Fig. 5 Reel

Table 5 Dimensions of reel specification for relevant chip resistors size

SIZE	QUANTITY PER REEL	REEL SIZE	SYMBOL					Unit: mm
		8 mm TAPE WIDE	A	N	C	D	W_1	$W_{2\ MAX.}$
PA0603	5,000	7" (Ø178 mm)	178.0±1.0	60.0+1/-0	13.50±0.5	21.0±0.8	9.0±0.5	12.0±0.2

LEADER/TRAILER TAPE SPECIFICATION

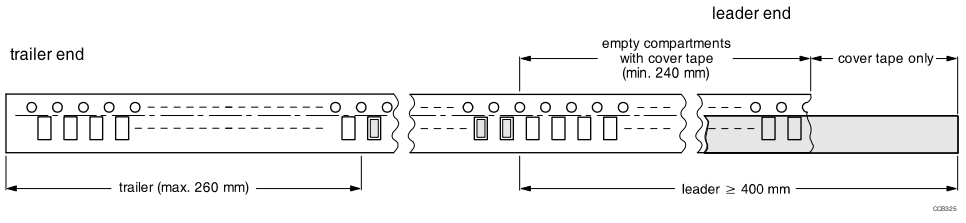

Fig. 6 Leader/Trailer Tape

FOOTPRINT AND SOLDERING PROFILES

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

FOOTPRINT

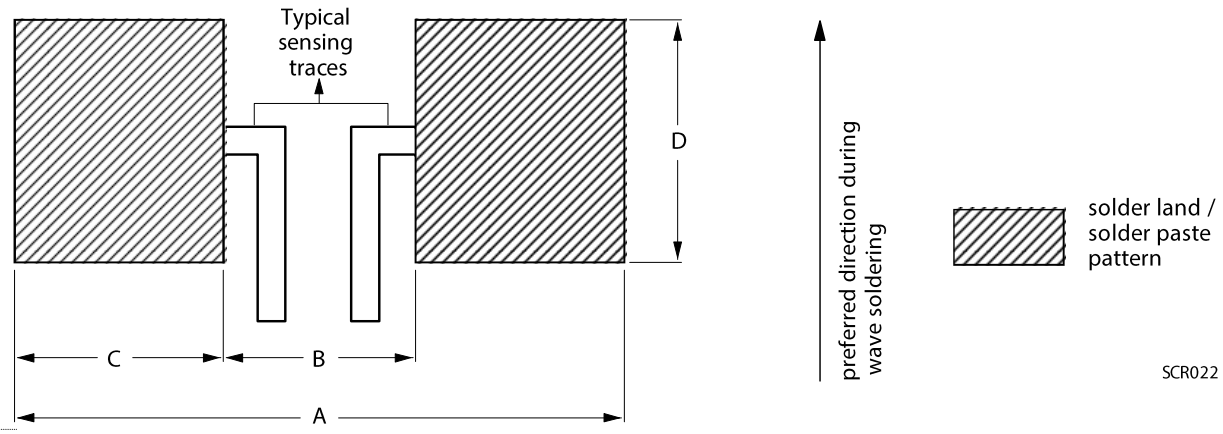

Fig. 7 Single resistor chips recommended dimensions of footprints

Table 6 Footprint dimensions

Unit: mm

SIZE	RESISTANCE RANGE	A	B	C	D
PA0603	1mΩ	2.2	0.5	0.7	0.9
	1mΩ < R ≤ 20mΩ	2.2	0.8	0.7	0.9

TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENT
Short time overload	IEC60115-1 4.13	2.5 times of rated power for 5 seconds at room temperature	±(1%+0.0005Ω) No visible damage
High Temperature Exposure	MIL-STD-202-Method 108	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 155±5°C	±(1.0%+0.0005Ω)
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	±(0.5%+0.0005Ω)
Operational Life/ Endurance	MIL-STD-202 Method 108 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%+0.0005Ω)
Resistance to Soldering Heat	MIL-STD-202-method 210	Condition B, no pre-heat of samples Leadfree solder, 260°C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(0.5%+0.0005Ω) No visible damage
Thermal Shock	MIL-STD-202 Method 107	-55/+125°C, Number of cycles is 300. Devices mounted. Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air -Air	±(1%+0.0005Ω) No visible damage
Solderability - Wetting	J-STD-002 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
Board Flex / Bending	IEC 60115-1 4.33	Chips mounted on a 90mm glass epoxy resin PCB (FR4), Bending for 0603=3 mm Holding time: Min.60 seconds	±(1.0%+0.0005Ω)

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 1	Dec. 23, 2019	-	- Update 1mΩ dimensions and TCR
Version 0	Jan. 09, 2018	-	- New datasheet for automotive grade current sensor – PA0603 series.

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