

DATA SHEET

GENERAL PURPOSE CHIP RESISTORS

RC_L series ±0.1%, ±0.5%, ±1%, ±5%

Sizes 0075/0100/0201/0402/0603/0805/ 1206/1210/1218/2010/2512

RoHS compliant & Halogen free



YAGEO Phicomp



SCOPE

This specification describes RC series chip resistors with lead free terminations made by thick film process.

<u>APPLICATIONS</u>

• All general purpose application

FEATURES

- Halogen Free Epoxy
- RoHS compliant
 - · Products with lead free terminations meet RoHS requirements
 - · Pb-glass contained in electrodes, resistors element and glass are exempted by **RoHS**
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Saving of PCB space
- None forbidden-materials used in products/production

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

RC XXXX X X X XX XXXX L

(2) (3) (4) (5) (1)

(I) SIZE

0075/0100/0201/0402/0603/0805/1206/1210/1218/2010/2512

(2) TOLERANCE

 $B = \pm 0.1\%$

 $D = \pm 0.5\%$

 $F = \pm 1.0\%$

 $J = \pm 5.0\%$ (for jumper ordering, use code of J)

(3) PACKAGING TYPE

R = Paper taping reel

K = Embossed taping reel

S = ESD safe reel (0075/0100 only)

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

- = Based on spec.

(5) TAPING REEL

07= 7 inch dia, Reel

10=10 inch dia. Reel

13=13 inch dia. Reel

7W = 7 inch dia. Reel & $2 \times$ standard power

7N = 7 inch dia. Reel, ESD safe reel (0075/0100 only)

3W = 13 inch dia. Reel & 2 x standard power

(6) RESISTANCE VALUE

There are 2~4 digits indicated the resistance value.

Letter R/K/M is decimal point

Example:

 $97R6 = 97.6\Omega$

 $9K76 = 9760\Omega$

 $IM = 1,000,000\Omega$

(7) DEFAULT CODE

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

ORDERING EXAMPLE

The ordering code for a RC0402 0.0625W chip resistor value $100K\Omega$ with ±5% tolerance, supplied in 7-inch tape reel of 10,000 units per reel is: RC0402JR-07100KL.

NOTE

- I. All our RSMD 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.



SERIES

0075 to 2512

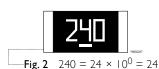
MARKING

RC0075 / RC0100 / RC0201 / RC0402



No Marking

RC0603



1%, 0.5%,E24 exception values 10/11/13/15/20/75 of E24 series



1%, 0.5%, E96 refer to EIA-96 marking method, including values 10/11/13/15/20/75 of E24 series



5%, E24 series: 3 digits

First two digits for significant figure and 3rd digit for number of zeros

RC0805 / RC1206 / RC1210 / RC2010 / RC2512

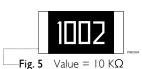
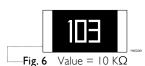


Fig. 4 Value = $10 \text{ K}\Omega$

1%, 0.5%, E24/E96 series: 4 digits

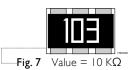
First three digits for significant figure and 4th digit for number of zeros



5%, E24 series: 3 digits

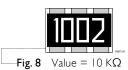
First two digits for significant figure and 3rd digit for number of zeros

RC1218



E-24 series: 3 digits, ±5%

First two digits for significant figure and 3rd digit for number of zeros



Both E-24 and E-96 series: 4 digits, ±1% & ±0.5%

First three digits for significant figure and 4th digit for number of zeros

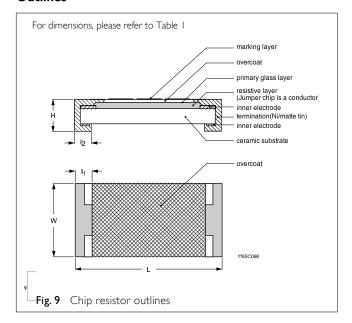
For further marking information, please see special data sheet "Chip resistors marking".

<u>4</u>

CONSTRUCTION

The resistor is constructed on top of a high-grade ceramic body. Internal metal electrodes are added on each end to make the contacts to the thick film resistive element. The composition of the resistive element is a noble metal imbedded into a glass and covered by a second glass to prevent environmental influences. The resistor is laser trimmed to the rated resistance value. The resistor is covered with a protective epoxy coat, finally the two external terminations (matte tin on Ni-barrier) are added, as shown in Fig. 9.

Outlines



DIMENSION

-Table I

| TYPE | L (mm) | W (mm) | H (mm) | I _I (mm) | I ₂ (mm) |
|--------|------------|------------|-----------|---------------------|---------------------|
| RC0075 | 0.30±0.015 | 0.15±0.015 | 0.13±0.02 | 0.08±0.03 | 0.08±0.03 |
| RC0100 | 0.40±0.02 | 0.20±0.02 | 0.13±0.02 | 0.10±0.03 | 0.10±0.03 |
| RC0201 | 0.60±0.03 | 0.30±0.03 | 0.23±0.03 | 0.10±0.05 | 0.15±0.05 |
| RC0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| RC0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.25±0.15 | 0.25±0.15 |
| RC0805 | 2.00±0.10 | 1.25±0.10 | 0.50±0.10 | 0.35±0.20 | 0.35±0.20 |
| RC1206 | 3.10±0.10 | 1.60±0.10 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RC1210 | 3.10±0.10 | 2.60±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| RC1218 | 3.10±0.10 | 4.60±0.10 | 0.55±0.10 | 0.45±0.20 | 0.40±0.20 |
| RC2010 | 5.00±0.10 | 2.50±0.15 | 0.55±0.10 | 0.45±0.15 | 0.50±0.20 |
| RC2512 | 6.35±0.10 | 3.10±0.15 | 0.55±0.10 | 0.60±0.20 | 0.50±0.20 |

ELECTRICAL CHARACTERISTICS

Table 2

| CHARAC- TERISTICS | POWER | OPERATING TEMPERATURE RANGE | MAXIMUM WORKING VOLTAGE | MAXIMUM OVERLOAD VOLTAGE | DIELECTRIC WITHSTANDING VOLTAGE | resistance range | TEMPERATURE COEFFICIENT | JUMPER CRITERIA |
|----------------------|--------|-----------------------------------|-------------------------------|--------------------------------|---------------------------------------|--|--|---|
| RC0075 | 1/50 W | -55°C to 125°C | 10V | 25V | 25V | 5% (E24) 10Ω≦R≦1MΩ 1% (E24/E96) 10Ω≦R≦1MΩ Jumper<50mΩ | 10Ω≦R<100Ω -200~+600ppm°C 100Ω≦R≦1MΩ ±200ppm°C | Rated Current 0.5A Maximum Current 1.0A |
| RC0100 | 1/32 W | -55°C to 125°C | 15V | 30V | 30V | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.5% (E24/E96) 33Ω≦R≦470KΩ Jumper<50mΩ | IΩ≦R <i0ω -200~+600ppm°c="" 22mω:="" <="" i00ω:="" i00ω≤="" i0mω:="" i0mω<="" i0ω≤="" r="" td="" °c="" °c<="" ±200ppm="" ±250ppm="" ±300ppm="" ≤=""><td>Rated Current 0.5A Maximum Current I.0A</td></i0ω> | Rated Current 0.5A Maximum Current I.0A |



Chip Resistor Surface Mount SERIES 0075 to 2512 RC_L

| - | | | _ |
|---|-----|----|---|
| | Iab | ıe | 2 |

| | | | | | | | | Table 2 |
|---|--|---|---------------------------------------|--------------------------------|-------------------------------|-----------------------------------|--------|----------------------|
| JUMPER CRITERIA | TEMPERATURE COEFFICIENT | resistance range | DIELECTRIC WITHSTANDING VOLTAGE | MAXIMUM OVERLOAD VOLTAGE | MAXIMUM WORKING VOLTAGE | OPERATING TEMPERATURE RANGE | POWER | CHARAC- TERISTICS |
| Rated Current 0.5A Maximum Current 1.0A | IΩ≦R≦I0Ω -I00~+350ppm°C I0Ω <r≦i0mω ±200ppm°C</r≦i0mω | 5% (E24) IΩ≦R≦I0MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | 50V | 50V | 25V | -55°C to 125°C | 1/20 W | RC0201 |
| Rated Current I.0A Maximum Current 2.0A | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | 100V | 100V | 50V | -55°C to 155°C | 1/16 W | RC0402 |
| | IΩ≦R≦IMΩ ±200ppm°C | 5% (E24) ΙΩ≦R≦ΙΜΩ Ι% (E24/E96) ΙΩ≦R≦ΙΜΩ | 100V | 100∨ | 50V | -55°C to 155°C | I/8W | |
| Rated Current I.0A Maximum Current 2.0A | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | 150V | 150V | 75 V | -55°C to 155°C | 1/10 W | RC0603 |
| | IΩ≦R≦IMΩ ±200ppm°C | 5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ | 150V | 150V | 75V | -55℃ to 155℃ | 1/5 W | |
| Rated Current 2.0A Maximum Current 5.0A | $\begin{split} & \hspace{0.1cm} 0.1c$ | 5% (E24) IΩ≦R≦I00MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ I0%, 20% (E24) 24MΩ≦R≦I00MΩ Jumper<50mΩ | 300V | 300V | 150V | -55°C to 155°C | 1/8 W | RC0805 |
| | IΩ≦R≦IMΩ ±200ppm°C | 5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ | 300V | 300V | 150V | -55℃ to 155℃ | 1/4 W | |

SERIES

FOOTPRINT AND SOLDERING PROFILES

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

Table 2

| CHARAC- TERISTICS | POWER | OPERATING TEMPERATURE RANGE | MAXIMUM WORKING VOLTAGE | MAXIMUM OVERLOAD VOLTAGE | DIELECTRIC WITHSTANDING VOLTAGE | resistance range | TEMPERATURE COEFFICIENT | JUMPER CRITERIA |
|----------------------|-------|-----------------------------------|-------------------------------|--------------------------------|---------------------------------------|---|--|--|
| RC1206 | 1/4 W | -55°C to 155°C | 200V | 400V | 500V | 5% (E24) IΩ≦R≦I00MΩ I% (E24/E96) IΩ≦R≦I0MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ I0%, 20% (E24) 24MΩ≦R≦I00MΩ Jumper<50mΩ | $\begin{split} & \hspace{0.1cm} 0.1c$ | Rated Current 2.0A Maximum Current 10.0A |
| | 1/2 W | -55°C to 155°C | 200V | 400V | 500V | 5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ | IΩ≦R≦IMΩ ±200ppm°C | |
| RC1210 | 1/2 W | -55°C to 155°C | 200V | 500V | 500V | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω | Rated Current 2.0A Maximum Current 10.0A |
| RC1218 | ıw | -55°C to 155°C | 200V | 500V | 500V | 5% (E24) IΩ≦R≦IMΩ I% (E24/E96) IΩ≦R≦IMΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦imω ±I00ppm°C</r≦imω | Rated Current 6.0A Maximum Current 10.0A |
| RC2010 | 3/4 W | -55°C to 155°C | 200V | 500V | 500V | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω | Rated Current 2.0A Maximum Current 10.0A |
| RC2512 | ΙW | -55°C to 155°C | 200V | 500V | 500V | 5% (E24) IΩ≦R≦22MΩ I% (E24/E96) IΩ≦R≦10MΩ 0.1%, 0.5% (E24/E96) I0Ω≦R≦IMΩ Jumper<50mΩ | IΩ≦R≦I0Ω ±200ppm°C I0Ω <r≦i0mω ±I00ppm°C I0MΩ<r≦22mω ±200ppm°C</r≦22mω </r≦i0mω | Rated Current 2.0A Maximum Current 10.0A |
| | 2 W | -55°C to 155°C | 200V | 400V | 500V | 5% (E24) ΙΩ≦R≦ΙΜΩ Ι% (E24/E96) ΙΩ≦R≦ΙΜΩ | IΩ≦R≦IMΩ ±200ppm°C | |



Chip Resistor Surface Mount

RC_L

SERIES

0075 to 2512

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

| PACKING STYLE | PAPER TAPING REEL (R) | | | ESD SAFE REEL (S) (4MM WIDTH, IMM PITCH PLASTIC EMBOSSED) | EMBOSSED TAPING REEL |
|----------------|-----------------------|-------------|--------------|--|-------------------------|
| REEL DIMENSION | 7" (178 mm) | 10" (254mm) | 13" (330 mm) | 7" (178 mm) | 7" (178 mm) |
| RC0075 | | | | 20000 | |
| RC0100 | 20000 | | 80000 | 40000 | |
| RC0201 | 10000 | 20000 | 50000 | | |
| RC0402 | 10000 | 20000 | 50000 | | |
| RC0603 | 5000 | 10000 | 20000 | | |
| RC0805 | 5000 | 10000 | 20000 | | |
| RC1206 | 5000 | 10000 | 20000 | | |
| RC1210 | 5000 | 10000 | 20000 | | |
| RC1218 | | | | | 4000 |
| RC2010 | | | | | 4000 |
| RC2512 | | | | | 4000 |

NOTE

For tape and reel specification/dimensions, please refer to data sheet "Chip resistors packing".

FUNCTIONAL DESCRIPTION

OPERATING TEMPERATURE RANGE

RC0402 to RC2512 Range: -55°C to +155°C (Fig. 10-1)

RC0075 to RC0201 Range: -55°C to +125°C (Fig. 10-2)

POWER RATING

Each type rated power at 70 °C:

RC0075=1/50W

RC0100=1/32W

RC0201=1/20W

RC0402=1/16W, 1/8W

RC0603=1/10W, 1/5W

RC0805=1/8W, 1/4W

RC1206=1/4W, 1/2W

RC1210=1/2W

RC1218=1W

RC2010=3/4W

RC2512=1W, 2W

RATED VOLTAGE

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

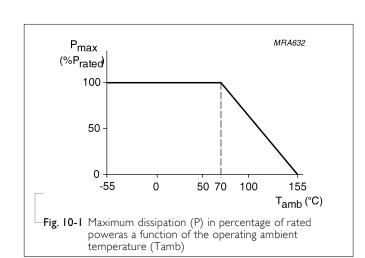
$$V = \sqrt{(PxR)}$$

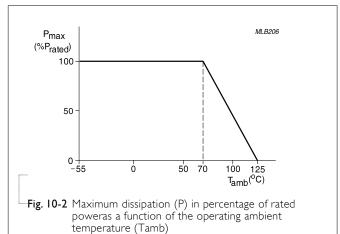
or max. working voltage whichever is less

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

P = Rated power (W)

 $R = Resistance value (\Omega)$





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TESTS AND REQUIREMENTS

Table 8 Test condition, procedure and requirements

| TEST | TEST METHOD | PROCEDURE | REQUIREMENTS | |
|---|---|---|--|--|
| Temperature Coefficient of Resistance | MIL-STD-202 Method 304 | At +25/–55°C and +25/+125°C Formula: | Refer to table 2 | |
| (T.C.R.) | | T.C.R= $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ | | |
| | | Where t_1 =+25 °C or specified room temperature | | |
| | | t_2 =-55 °C or +125 °C test temperature R_1 =resistance at reference temperature in ohms R_2 =resistance at test temperature in ohms | | |
| Life/ Endurance | MIL-STD-202 Method 108A IEC 60115-1 4.25.1 | At 70±2°C for 1,000 hours; RCWV applied for 1.5 hours on and 0.5 hour off, still air required | $0075: \pm (5\% + 100 \text{m}\Omega)$ $< 100 \text{m}\Omega \text{ for jumper}$ $01005: \pm (3\% + 50 \text{m}\Omega)$ $< 100 \text{m}\Omega \text{f or jumper}$ $Others:$ $\pm (1\% + 50 \text{m}\Omega) \text{ for B/D/F tol}$ $\pm (3\% + 50 \text{m}\Omega) \text{ for J tol}$ $< 100 \text{mR for jumper}$ | |
| High Temperature Exposure | MIL-STD-202 Method 108A IEC 60068-2-2 | I,000 hours at maximum operating temperature depending on specification, unpowered. | 0075 : \pm (5%+100m Ω) <100m Ω for jumper 01005 : \pm (1% +50m Ω) < 50m Ω f or jumper Others: \pm (1%+50m Ω) for B/D/F tol \pm (2%+50m Ω) for J tol <50mR for jumper | |
| Moisture Resistance | MIL-STD-202 Method 106G | 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 | 0075: \pm (2%+100mΩ) <100mΩ for jumper 01005: \pm (2% +50mΩ) <100mΩf or jumper Others: \pm (0.5%+50mΩ) for B/ D/F tol \pm (2%+50mΩ) for J tol <100mR for jumper | |
| Humidity | IEC 60115-1 4.24.2 | Steady state for 1000 hours at 40°C / 95% R.H. RCWV applied for 1.5 hours on and 0.5 hour off | 0075: \pm (5%+100m Ω) no visible damage 01005: \pm (3% +50m Ω) < 100m Ω f or jumper Others: \pm (1%+50m Ω) for B/D/F tol \pm (2%+50m Ω) for J tol <100mR for jumper | |

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Chip Resistor Surface Mount

RC_L

SERIES 0075 to 2512

| Thermal Shock | MIL-STD-202 Method 107G | -55/+125°C Note Number of cycles required is 300. Devices mounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air - Air | $0075/01005: \pm (1\% + 50 m\Omega) \\ < 50 m\Omega f \ or \ jumper \\ Others: \\ \pm (0.5\% + 50 m\Omega) \ for \ B/D/F \ tol \\ \pm (1\% + 50 m\Omega) \ for \ J \ tol \\ < 50 mR \ for \ jumper \\$ |
|----------------------------------|---|---|--|
| Short Time Overload | IEC 60115-1 4.13 | 2.5 times RCWV or maximum overload voltage which is less for 5 seconds at room temperature | $0075/01005: \pm (2\% + 50m\Omega)$ $< 50m\Omega f \ or \ jumper$ Others: $\pm (1\% + 50m\Omega) \ for \ B/D/F \ tol$ $\pm (2\% + 50m\Omega) \ for \ J \ tol$ $< 50mR \ for \ jumper$ No visible damage |
| Board Flex/ Bending | IEC 60115-1 4.33 | Device mounted or as described only I board bending required bending time: 60±5 seconds 0075/0100/0201/0402:5mm; 0603/0805:3mm; I 206 and above:2mm | 0075/01005: \pm (1% +50m Ω) < 50m Ω f or jumper Others: \pm (1%+50m Ω) for B/D/F/J tol <50mR for jumper No visible damage |
| Solderability - Wetting | J-STD-002 test B | Electrical Test not required Magnification 50X SMD conditions: Ist step: method B, aging 4 hours at I55°C dry heat 2nd step: leadfree solder bath at 245±3°C Dipping time: 3±0.5 seconds | W ell tinned (>95% covered) No visible damage |
| -Leaching | J-STD-002 test D | Leadfree solder ,260°C, 30 seconds immersion time | No visible damage |
| -Resistance to Soldering Heat | MIL-STD-202 Method 210F IEC 60115-1 4.18 | Condition B, no pre-heat of samples Leadfree solder, $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$, 10 ± 1 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol | $0075: \pm (3\% + 50 \text{m}\Omega)$ $< 50 \text{m}\Omega \text{ for jumper}$ $01005: \pm (1\% + 50 \text{m}\Omega)$ $< 50 \text{m}\Omega \text{f or jumper}$ Others: $\pm (0.5\% + 50 \text{m}\Omega) \text{ for B/D/F tol.}$ $\pm (1\% + 50 \text{m}\Omega) \text{ for J tol.}$ $< 50 \text{mR for jumper}$ No visible damage |

REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|------------|---------------|---------------------|--|
| Version 10 | Dec. 12, 2018 | - | - Updated 0075 dimensions |
| Version 9 | Mar. 06, 2018 | - | - Add 0.5%/1% marking rule for RC0603 \sim RC2512 based on marking datasheet |
| Version 8 | July 10, 2017 | - | - Add "3W" part number coding for 13" Reel & double power |
| Version 7 | Mar. 7, 2017 | - | - Add 10" packing |
| Version 6 | Feb.15, 2017 | - | - Extend RC0805 and RC1206 resistance range to 100Mohm |
| Version 5 | Oct. 06, 2016 | - | - Description: Update Dimension of I2 of RC2512 (2W) |
| Version 4 | Jan. 22, 2016 | - | - Update resistance range |
| Version 3 | Dec. 24, 2015 | - | - Updated test and requirements |
| Version 2 | Jul. 23, 2015 | - | - Updated test and requirements |
| Version I | Jan. 21, 2015 | - | - ESD Safe Reel update |
| Version 0 | Dec. 15, 2014 | - | - First issue of this specification |

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Yageo:

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