

# RT0603CRD079K76L Datasheet

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DiGi Electronics Part Number Manufacturer Manufacturer Product Number

Description

**Detailed Description** 

RT0603CRD079K76L-DG

YAGEO

RT0603CRD079K76L

RES SMD 9.76K OHM 1/10W 0603

9.76 kOhms ±0.25% 0.1W, 1/10W Chip Resistor 060 3 (1608 Metric) Thin Film

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# Purchase and inquiry

| Manufacturer Product Number: | Manufacturer:                         |
|------------------------------|---------------------------------------|
| RT0603CRD079K76L             | YAGEO                                 |
| Series:                      | Product Status:                       |
| RT                           | Active                                |
| Resistance:                  | Tolerance:                            |
| 9.76 kOhms                   | ±0.25%                                |
| Power (Watts):               | Composition:                          |
| 0.1W, 1/10W                  | Thin Film                             |
| Features:                    | Temperature Coefficient:              |
|                              | ±25ppm/°C                             |
| Operating Temperature:       | Package / Case:                       |
| -55°C ~ 155°C                | 0603 (1608 Metric)                    |
| Supplier Device Package:     | Size / Dimension:                     |
| 0603                         | 0.063" L x 0.031" W (1.60mm x 0.80mm) |
| Height - Seated (Max):       | Number of Terminations:               |
| 0.022" (0.55mm)              | 2                                     |
| Failure Rate:                |                                       |
|                              |                                       |

# **Environmental & Export classification**

| RoHS Status:     | Moisture Sensitivity Level (MSL): |
|------------------|-----------------------------------|
| ROH53 Compliant  | 1 (Unlimited)                     |
| REACH Status:    | ECCN:                             |
| REACH Unaffected | EAR99                             |
| HTSUS:           |                                   |
| 8533.21.0030     |                                   |

RT0603CRD079K76L YAGEO RES SMD 9.76K OHM 1/10W 0603





DATA SHEET

THIN FILM CHIP RESISTORS High precision - high stability RT series



YAGEO



0100 to 2512 SERIES

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#### SCOPE

This specification describes RT series high precision - high stability chip resistors with lead-free terminations made by thin film process.

#### **APPLICATIONS**

- Converters
- Printing equipment
- Server board
- Telecom
- Consumer

#### FEATURES

- Halogen Free Epoxy
- **RoHS** compliant
- 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 & 12NC

Both part numbers are identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value. YAGEO BRAND ordering code

(7)

## **GLOBAL PART NUMBER (PREFERRED)**

# RT XXXX F X X XX XXXX L

(2) (3) (4) (5) (I)(6)

#### (I) SIZE

RT0100 / 0201 / 0402 / 0603 / 0805 / 1206 / 1210 / 2010 / 2512

#### (2) TOLERANCE

| $L = \pm 0.01\%$ |  |
|------------------|--|
| $P = \pm 0.02\%$ |  |
| ₩ = ±0.05%       |  |
| $B = \pm 0.1\%$  |  |
| $C = \pm 0.25\%$ |  |
| $D = \pm 0.5\%$  |  |

 $F = \pm 1\%$ 

#### (3) PACKAGING TYPE

R = Paper/PE taping reel K = Embossed taping reel

# (4) TEMPERATURE COEFFICIENT OF RESISTANCE

- A = 5 ppm/°C
- B = 10 ppm/°C
- $C = 15 \text{ ppm/}^{\circ}C$
- D = 25 ppm/°C
- E = 50 ppm/°C

#### (5) TAPING REEL

07 = 7 inch dia. Reel 10 = 10 inch dia. Reel 7W=7 inch dia. Reel with high power (1W for 2512) 13 = 13 inch dia. Reel

#### (6) RESISTANCE VALUE

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point. Detailed resistance rules show in table of "Resistance rule of global part number".

#### (7) DEFAULT CODE

Letter L is system default code for order only <sup>(Note)</sup>

| number                        | Resistance rule of global part<br>number<br>Resistance code rule Example |  |  |  |  |  |  |  |
|-------------------------------|--|--|--|--|--|--|--|--|
| XRXX<br>(I to 9.76 Ω)         | IR = ΙΩ<br>IR5 = Ι.5 Ω<br>9R76 = 9.76 Ω                                  |  |  |  |  |  |  |  |
| XXRX                          | IOR = 10 Ω   |  |  |  |  |  |  |  |
| (10 to 97.6 Ω)                | 97R6 = 97.6 Ω  |  |  |  |  |  |  |  |
| XXXR<br>(100 to 976 <b>Ω)</b> | 100R = 100 Ω   |  |  |  |  |  |  |  |
| XKXX                          | ικ = 1,000 Ω   |  |  |  |  |  |  |  |
| (Ι to 9.76 KΩ <b>)</b>        | 9K76 = 9760 Ω  |  |  |  |  |  |  |  |
| XMXX                          | IM = 1,000,000 Ω   |  |  |  |  |  |  |  |
| (I to 9.76 MΩ <b>)</b>        | 9M76= 9,760,000 Ω  |  |  |  |  |  |  |  |

#### **ORDERING EXAMPLE**

The ordering code of a RT0603 chip resistor, TC 50 value 56  $\Omega$ with ±0.5% tolerance, supplied in 7-inch tape reel is: RT0603DRE0756RL.

#### 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



Chip Resistor Surface Mount

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## **PHYCOMP BRAND** ordering codes

Both GLOBAL PART NUMBER (preferred) and I2NC (traditional) codes are acceptable to order Phycomp brand products. For matching traditional types with size codes, please refer to "Comparison table of traditional types and sizes".

#### **GLOBAL PART NUMBER** (PREFERRED)

For detailed information of GLOBAL PART NUMBER and ordering example, please refer to page 2.

### 12NC CODE

| <b>2390</b><br>(I)           | <b>X</b> (2)                   | <b>XX</b><br>(3)                              | <b>X</b><br>(4)             | <b>XXXX</b> (5)                                 | <b>L</b><br>(6)           |            |  |                  |                                    |
|------------------------------|--------------------------------|---|-----------------------------|---|---------------------------|------------|--|------------------|------------------------------------|
| START<br>WITH <sup>(I)</sup> | TCR <sup>(2)</sup><br>(ppm/°C) | PACKING CODE<br>BY SIZE (inch) <sup>(3)</sup> | TOL . <sup>(4)</sup><br>(%) | resistance<br>Range                             | DEFAULT<br>CODE<br>(NOTE) |            | nparison ta<br>es and sizes<br><u>X</u><br>(2) |                  | litional           X           (4) |
| 2390                         |                                | 0402: 07 = 7" reel                            |                             | The remaining 4 digits represent the resistance | Letter L is               | START      | SIZE   | TCR              | TOL.                               |
|                              | $7 = \pm 15$                   | 47 = 13" reel                                 |                             | value with the last digit                       | ,                         | -          |  | (ppm/°C)         | (%)                                |
|                              | $6 = \pm 25$                   | 0603: 04 = 7'' reel                           | $5 = \pm 0.25$              | indicating the multiplier                       | code for                  | TF         | 3 = 0402                                       |                  | $0 = \pm 1$                        |
|                              | $4 = \pm 50$                   | 24 = 10'' reel                                | $4 = \pm 0.1$               | as shown in the table of                        | f order only              |            | 2 = 0603                                       | $3 = \pm 15$     | $1 = \pm 0.5$                      |
|                              |                                | 44 = 13'' reel                                | $3 = \pm 0.05$              | "Last digit of I2NC".                           | (Note)                    |            | I = 0805                                       | $I = \pm 25$     | $2 = \pm 0.25$                     |
|                              |                                | 0805: 01 = 7'' reel                           |                             | 0402: 4.7 $\Omega \le R \le 240$ KΩ             |                           |            | 0 = 1206                                       | $2 = \pm 50$     | $3 = \pm 0.1$                      |
|                              |                                | 41 = 13'' reel                                |                             | 0603:   $\Omega \leq R \leq  M\Omega $          |                           |            | 5 = 1210                                       |                  | $4 = \pm 0.05$                     |
|                              |                                | 206:    = 7'' reel                            |                             | 0805: $ \Omega \le R \le  .5 M\Omega$           |                           |            | 7 = 2010                                       |                  |                                    |
|                              |                                | 51 = 13" reel                                 |                             | 206:  Ω≤R≤ .5 MΩ                                |                           |            | 6 = 2512                                       |                  |                                    |
|                              |                                | 2 0:  2 = 7'' reel                            |                             | $1210:4.7\Omega \le R \le 1M\Omega$             |                           | \rm 🛛 Exar | nple:  |                  |                                    |
|                              |                                | 52 = 13" reel                                 |                             | 2010: 4.7 $\Omega \le R \le I M\Omega$          |                           | TF321 =    | = RT0402, <sup>-</sup>                         | FC50, ±0.5       | % tolerance                        |
|                              |                                | 2010: 15 = 7" reel                            |                             | 2512: $4.7\Omega \le R \le 1$ M $\Omega$        |                           |            |  |                  |                                    |
|                              |                                | 2512: 18 = 7'' reel                           |                             |   |                           | Resista    | nce decade                                     | e <sup>(3)</sup> | Last digit                         |
|                              |                                |   |                             |   |                           | l to 9.    | <b>76</b> Ω                                    |                  | 8                                  |

#### Exceptions to above packing code definitions:

0805 TC50 with 1%, supplied in 13" reel, the packing code is 02. 0603 TC50 with 1%, supplied in 13" reel, the packing code is 03. 2512 TC15, in 7" reel, the packing code is 35. 2010 TC15, in 7" reel, the packing code is 31.

## **ORDERING EXAMPLE**

The ordering code of a TF221 resistor, TC50, value 56  $\Omega$ , with ±0.5% tolerance, supplied in tape of 5,000 units per reel is: 239040465609L or RT0603DRE0756RL.

#### NOTE

1. 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

| TE      | )))))))     |   |
|---------|-------------|---|
| Mar. 13 | , 2023 V.I. | 5 |

9

Т

2

3

4

5

6

1008 or 108

3303 or 333

1006 or 106

10 to 97.6  $\Omega$ 

100 to 976 O

I to 9.76 kΩ

**10 to 97.6** kΩ

100 to 976 kΩ

I to 9.76 MΩ

10 to 97.6 MΩ

IΩ

**33** kΩ

**Ι0 Μ**Ω

=

=

=

Example:



# <u>MARKING</u>

RT0100 / RT0201 / RT0402 / RESISTANCE VALUE IS NOT IN E-24 / E96 SERIES

| Fig. I                         | No marking   |
|--------------------------------|--|
| RT0603                         |  |
| $fig. 2  Value = 56 \ k\Omega$ | E-24 series: exception values 10/11/13/15/20/75 of E-24 series, one short bar under marking letter |
| <b>Fig. 3</b> Value = 12.4 kΩ  | E-96 series: including values 10/11/13/15/20/75 of E-24 series, 3 digits                           |
| RT0805 / RT1206 / RT12         | 210 / RT2010 / RT2512  |
| 1007                           | Either resistance in E-24 or E-96: 4 digits  |

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".

#### **CONSTRUCTION**

Fig. 4

Value =  $10 \text{ k}\Omega$ 

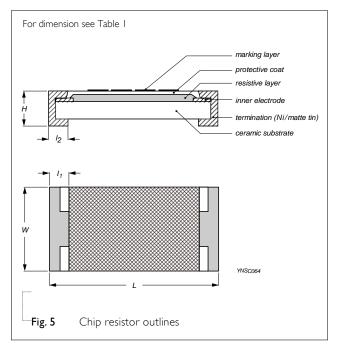
The resistors are constructed out of a high-grade ceramic body. Internal metal electrodes are added at each end and connected by a resistive layer. The resistive layer is adjusted to give the approximate required resistance and laser cutting of this resistive layer that achieves tolerance trims the value. The resistive layer is covered with a protective coat and printed with the resistance value. Finally, the two external terminations (matte tin) are added. See fig. 5.

#### **DIMENSION**

| Table I | For outlines | see fig. 5 |
|---------|--------------|------------|
|---------|--------------|------------|

| TYPE   | L (mm)     | W (mm)          | H (mm)     | l₁ (mm)    | l <sub>2</sub> (mm) |
|--------|------------|-----------------|------------|------------|---------------------|
| RT0100 | 0.40±0.02  | 0.20±0.02       | 0.13±0.02  | 0.10±0.03  | 0.10±0.03           |
| RT0201 | 0.60 ±0.03 | 0.30 ±0.03      | 0.23 ±0.03 | 0.10 ±0.05 | 0.15 ±0.05          |
| RT0402 | 1.00 ±0.10 | $0.50 \pm 0.05$ | 0.30 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10          |
| RT0603 | 1.60 ±0.10 | 0.80 ±0.10      | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15          |
| RT0805 | 2,00 ±0.10 | 1.25 ±0.10      | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20          |
| RT1206 | 3.10 ±0.10 | 1.60 ±0.10      | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20          |
| RT1210 | 3.10 ±0.10 | 2.60 ±0.15      | 0.55 ±0.10 | 0.50 ±0.20 | 0.50 ±0.20          |
| RT2010 | 5.00 ±0.10 | 2.50 ±0.15      | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20          |
| RT2512 | 6.35 ±0.10 | 3.20 ±0.15      | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20          |

#### OUTLINES





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# ELECTRICAL CHARACTERISTICS

Table 2

| ТҮРЕ   | Operating<br>Temperature | Power   | Max.<br>Work | Max.<br>Overload | T.C.R.    |                     |                     |                    | Unit weight        |                    |          |          |          |
|--------|--------------------------|---------|--------------|------------------|-----------|---------------------|---------------------|--------------------|--------------------|--------------------|----------|----------|----------|
|        | Range                    | Rating  | Vol. (I)     |                  | (ppm/°C)  | ±0.01%              | ±0.02%              | ±0.05%             | ±0.1%              | ±0.25%             | ±0.5%    | ±1.0%    | (mg/pcs) |
|        | –55°C                    |         |              |                  | ±50       |                     |                     |                    | 50R~5K             | 50R~5K             | 50R~5K   | 50R~5K   |          |
| RT0100 | to<br>+125°C             | 1/32W   | 15V          | 30V              | ±25       |                     |                     |                    | 50R~5K             | 50R~5K             | 50R~5K   | 50R~5K   | - 0.037  |
|        | 120 0                    |         |              |                  | ±50       |                     |                     |                    | 22~75K             | 22~75K             | 22~75K   | 22~75K   |          |
|        |                          |         |              |                  |           |                     |                     |                    | 22~75K             | 22~75K             | 22~75K   | 22~75K   | -        |
|        | −55°C                    |         |              |                  | ±25       |                     |                     |                    |                    |                    |          |          | -        |
| RT0201 | to                       | 1/20W   | 25V          | 50V              | ±15       |                     |                     |                    | 22~5K              | 22~5K              |          |          | 0.169    |
|        | +125°C                   |         |              |                  | ±10       |                     |                     |                    | 22~5K              | 22~5K              |          |          | _        |
|        |                          |         |              |                  | ±5        |                     |                     |                    |                    |                    |          |          |          |
|        |                          |         |              |                  | ±50       | 50.1~12K            | 50.1~12K            | 20~12K             | 4.7~500K           | 4.7~500K           | 4.7~500K | 4.7~500K | _        |
|        |                          |         |              |                  | ±25       | 50.1~12K            | 50.1~12K            | 20~12K             | 4.7~240K           | 4.7~240K           | 4.7~240K | 4.7~240K | _        |
| RT0402 |                          | 1/16W   | 50V          | 100V             | ±15       | 20~12K              | 20~12K              | 20~12K             | 10~200K            | 10~200K            |          |          | 0.564    |
|        |                          |         |              |                  | ±10       | 20~12K              | 20~12K              | 20~12K             | 10~200K            | 10~200K            |          |          | -        |
|        | -                        |         |              |                  | ±5        | 20~10K              | 20~10K              | 20~10K             | 20~10K             | 20~10K             |          |          |          |
|        |                          |         |              |                  | ±50       | 50.1~30K            | 50.1~30K            | 4.7~100K           | I~2M               | I~2M               | 1~2M     | I~2M     | -        |
|        |                          |         |              |                  | ±25       | 50.1~30K            | 50.1~30K            | 4.7~100K           | 1~IM               | 1~IM               | 1~1M     | ~ M      |          |
| RT0603 |                          | 1/10W   | 75V          | 150V             | ±15       | 50.1~100K           | 50.1~100K           | 4.7~100K           | 4.7~680K           | 4.7~680K           |          |          | 2.128    |
|        | –55°C                    |         |              |                  | ±10<br>±5 | 50.1~100K<br>20~30K | 50.1~100K<br>20~30K | 4.7~100K<br>20~30K | 4.7~680K<br>20~30K | 4.7~680K<br>20~30K |          |          | -        |
|        | to                       |         |              |                  | ±50       | 50.1~30K            | 50.1~30K            | 4.7~200K           | 1~3M               | 1~3M               | <br>I~3M | <br>I~3M |          |
|        | +155°C                   |         |              |                  | ±25       | 50.1~30K            | 50.1~30K            | 4.7~200K           | 1~1.5M             | 1~1.5M             | 1~1.5M   | 1~1.5M   | -        |
| RT0805 |                          | 1/8W    | 150V         | 300V             | ±15       | 50.1~200K           | 50.1~200K           | 4.7~200K           | 4.7~IM             | 4.7~IM             |          |          | 4.642    |
| K10003 |                          | 1/0 • • | 1500         | 2004             | ±10       | 50.1~200K           | 50.1~200K           | 4.7~200K           | 4.7~IM             | 4.7~IM             |          |          |          |
|        |                          |         |              |                  | ±5        | 20~50K              | 20~50K              | 20~50K             | 20~50K             | 20~50K             |          |          | _        |
|        | -                        |         |              |                  | ±50       | 50.1~30K            | 50.1~30K            | 5.6~500K           | 1~3M               | 1~3M               | 1~3M     | 1~3M     | ·        |
|        |                          |         |              |                  | ±25       | 50.1~30K            | 50.1~30K            | 5.6~500K           | I~1.5M             | I~I.5M             | I~1.5M   | ~ .5M    | _        |
| RT1206 |                          | 1/4W    | 200V         | 400V             | ±15       | 50.1~500K           | 50.1~500K           | 5.6~500K           | 5.6~1.5M           | 5.6~1.5M           |          |          | 9.996    |
|        |                          |         |              |                  | ±10       | 50.1~500K           | 50.1~500K           | 5.6~500K           | 5.6~1.5M           | 5.6~1.5M           |          |          | _        |
|        |                          |         |              |                  | ±5        | 20~100K             | 20~100K             | 20~100K            | 20~100K            | 20~100K            |          |          |          |
|        |                          |         |              |                  | ±50       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~IM   | 4.7~IM   |          |
|        |                          |         |              |                  | ±25       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~IM   | 4.7~IM   | =        |
| RT1210 |                          | 1/4W    | 200V         | 400V             | ±15       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          | 16.370   |
|        |                          | .,      | 2001         | 1001             | ±10       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          | =        |
|        |                          |         |              |                  | -         |                     |                     |                    |                    |                    |          |          | -        |
|        | _                        |         |              |                  | ±5        |                     |                     |                    |                    |                    |          |          |          |
|        |                          |         |              |                  | ±50       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~IM   | 4.7~IM   | -        |
|        |                          |         |              |                  | ±25       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~1M   | 4.7~IM   | _        |
| RT2010 | −55°C                    | 1/2W    | 200V         | 400V             | ±15       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          | 25.011   |
|        | to                       |         |              |                  | ±10       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          |          |
|        | +125°C                   |         |              |                  | ±5        |                     |                     |                    |                    |                    |          |          | =        |
|        | =                        |         |              |                  | ±50       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~IM   | 4.7~IM   |          |
|        |                          |         |              |                  | ±25       |                     |                     | 4.7~IM             | 4.7~IM             | 4.7~IM             | 4.7~IM   | 4.7~1M   | -        |
|        |                          | 2/414/  | 2001         | 4001/            |           |                     |                     |                    |                    |                    |          |          | -        |
|        |                          | 3/4W    | 200V         | 400V             | ±15       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          | -        |
| RT2512 |                          |         |              |                  | ±10       |                     |                     | 100~100K           | 4.7~100K           | 4.7~100K           |          |          | 40.351   |
|        |                          |         |              |                  | ±5        |                     |                     |                    |                    |                    |          |          | _        |
|        |                          | 11.4.7  | 2001         | 4001/            | ±50       |                     |                     | 0Ω~ M              | 0Ω~ M              | 10Ω~1M             | 10Ω~1M   | 10Ω~1M   | _        |
|        |                          | IW      | 200V         | 400V             | ±25       |                     |                     | 10Ω~1M             | 10Ω~1M             | 10Ω~1M             | 10Ω~1M   | 10Ω~1M   |          |

#### NOTE

I. The maximum working voltage that may be continuously applied to the resistor element, see "IEC publication 60115-8"

## 2. Value of E-192 series is on request



Chip Resistor Surface Mount RT SERIES 0100 to 2512

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#### FOOTPRINT AND SOLDERING PROFILES

For recommended footprint and soldering profiles, please see the special data sheet "Chip resistors mounting".

#### PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

| PACKING STYLE            | REEL<br>DIMENSION | RT0100 | RT0201 | RT0402 | RT0603 | RT0805 | RT1206 | RT1210 | RT2010 | RT2512 |
|--------------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Paper/PE taping reel (R) | 7" (178 mm)       | 10,000 | 10,000 | 10,000 | 5,000  | 5,000  | 5,000  | 5,000  |        |        |
|                          | 10" (254 mm)      | 20,000 | 20,000 | 20,000 | 10,000 | 10,000 | 10,000 | 10,000 |        |        |
|                          | 13" (330 mm)      | 50,000 | 50,000 | 50,000 | 20,000 | 20,000 | 20,000 | 20,000 |        |        |
| Embossed taping reel (K) | 7" (178 mm)       |        |        |        |        |        |        |        | 4,000  | 4,000  |

#### NOTE

1. For Paper/Embossed tape and reel specification/dimensions, please see the special data sheet "Chip resistors packing"

#### FUNCTIONAL DESCRIPTION

#### **POWER RATING**

Each type rated power at 70°C: RT0100=1/32W RT0201=1/20W, RT0402=1/16W, RT0603=1/10W, RT0805=1/8W, RT1206=1/4W, RT1210=1/4W, RT2010=1/2W, RT2512=3/4W, IW

# **R**ATED VOLTAGE

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

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

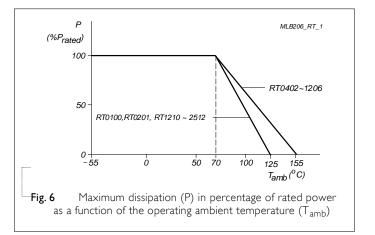
or max. working voltage whichever is less

Where

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

P=Rated power (W)

R=Resistance value ( $\Omega$ )





Chip Resistor Surface Mount RT SERIES 0100 to 2512

# TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

| TEST                            | TEST METHOD                                   | PROCEDURE   | REQUIREMENTS     |
|---------------------------------|---|---|------------------|
| Temperature<br>Coefficient of   | MIL-STD-202 Method 304                        | At +25/–55 °C and +25/+125 °C   | Refer to table 2 |
| Resistance<br>(T.C.R.)          |   | Formula:  |                  |
| (                               |   | T.C.R= $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6 \text{ (ppm/°C)}$  |                  |
|                                 |   | Where<br>t <sub>1</sub> =+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                  | IEC 60115-1 4.25.1<br>MIL-STD-202 Method 108A | At 70±5 °C for 1,000 hours, rated voltage applied for 1.5 hours on, 0.5 hour off, still air required  | ±(0.5%+0.05 Ω)   |
| High<br>Temperature<br>Exposure | IEC 60068-2-2                                 | 1000 hours at maximum operating temperature depending on specification, unpowered   | ±(0.5%+0.05 Ω)   |
| Moisture<br>Resistance          | MIL-STD-202 Method 106G                       | Each temperature / humidity cycle is defined at 8<br>hours, 3 cycles / 24 hours for 10d. with 25 °C /<br>65 °C 95% R.H, without steps 7a & 7b,<br>unpowered | ±(0.5%+0.05 Ω)   |
|                                 |   | Parts mounted on test-boards, without condensation on parts   |                  |
|                                 |   | Measurement at 24±2 hours after test conclusion   |                  |
| Thermal Shock                   | MIL-STD-202 Method 107G                       | -55/+125 °C<br>Number of cycles required is 300.<br>Devices mounted   | ±(0.5%+0.05 Ω)   |
|                                 |   | Maximum transfer time is 20 seconds.<br>Dwell time is 15 minutes. Air – Air   |                  |
| Humidity<br>(steady state)      | IEC 60115-1 4.24.2                            | Steady state for 1000 hours at 40 °C / 95% R.H.<br>rated voltage applied for 1.5 hours on and<br>0.5 hour off   | ±(0.5%+0.05 Ω)   |

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| TEST               | TEST METHOD      | PROCEDURE  | REQUIREMENTS                   |  |
|--------------------|------------------|--|--------------------------------|--|
| hort Time Overload | IEC60115-14.13   | 2.5 times of rated voltage or maximum  | ±(0.5%+0.05 Ω)                 |  |
|                    |                  | overload voltage whichever is less for 5 sec a<br>room temperature                   | <sup>t</sup> No visible damage |  |
| Board Flex/        | IEC 60115-1 4.33 | Chips mounted on a glass epoxy resin PCB   | ±(0.25%+0.05 Ω)                |  |
| Bending            |                  | (FR4)  | No visible damage              |  |
|                    |                  | Bending: see table 5 for each size   | RT0100±(0.5%+0.05 Ω)           |  |
|                    |                  | Bending time: 60±5 seconds   |                                |  |
| Solderability      | J-STD-002 test B | Electrical Test not required   | Well tinned (≥95%              |  |
| - Wetting          |                  | Magnification 50X  | covered)                       |  |
|                    |                  | SMD conditions:  | No visible damage              |  |
|                    |                  | I <sup>st</sup> step: method B, aging 4 hours at 155°C<br>dry heat                   |                                |  |
|                    |                  | 2 <sup>nd</sup> step: leadfree solder bath at 245±3°C<br>Dipping time: 3±0.5 seconds |                                |  |
| - Leaching         | J-STD-002 test D | Leadfree solder, 260 °C, 30 seconds immersion time                                   | No visible damage              |  |
| - Resistance to    | IEC 60115-1 4.18 | Condition B, no pre-heat of samples.   | ±(0.5%+0.05 Ω)                 |  |
| Soldering Heat     |                  | Leadfree solder, 260 °C, 10 seconds  | No visible damage              |  |
| -                  |                  | immersion time   | INO VISIONE CALLIAGE           |  |
|                    |                  | Procedure 2 for SMD: devices fluxed and<br>cleaned with isopropanol                  |                                |  |

| Table 5 Bending for | sizes 0100 to | 2512   |        |        |        |        |        |        |        |
|---------------------|---------------|--------|--------|--------|--------|--------|--------|--------|--------|
| TYPE                | RT0100        | RT0201 | RT0402 | RT0603 | RT0805 | RT1206 | RT1210 | RT2010 | RT2512 |
| Specification (mm)  | 5             | 5      | 5      | 3      | 3      | 2      | 2      | 2      | 2      |



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### **REVISION HISTORY**

| REVISION   | DATE          | CHANGE NOTIFICATION | DESCRIPTION  |
|------------|---------------|---------------------|--|
| Version 15 | Mar. 13, 2023 | -                   | - RT0402 extend resistance range   |
| Version 14 | Nov. 23, 2022 | -                   | - Add unit weight information  |
| Version 13 | July 07, 2022 | -                   | - RT0402/RT0603/RT0805/RT1206 Extend resistor range<br>- Add RT0100  |
| Version 12 | Apr. 21, 2020 | -                   | - Modified resistance range  |
| Version 11 | July 2, 2019  | -                   | - Add IW for 2512  |
| Version 10 | Jun. 12, 2019 | -                   | - Extend resistor value  |
| Version 9  | Sep. 12, 2017 | -                   | - Add ±0.02% tol. for 0402 to 1206   |
| Version 8  | May 31, 2017  | -                   | - Add 10" packing  |
| Version 7  | Jan. 17, 2017 | -                   | - Add ±0.01% tol. for 0402 to 1206   |
| Version 6  | May. 11, 2015 | -                   | - Extend resistor value  |
| Version 5  | Aug. 22, 2014 | -                   | <ul> <li>Add RT0201</li> <li>RT0402/0603/0805/1206: resistance range and operating temperature range updated</li> <li>Fig. 6 updated</li> </ul>  |
| Version 4  | Oct 21, 2009  | -                   | - Test Items and methods updated<br>- Test requirements upgraded   |
| Version 3  | Jul II, 2008  | -                   | <ul> <li>Change to dual brand datasheet that describe RT0402 to RT2512 with<br/>RoHS compliant</li> <li>Description of "Halogen Free Epoxy" added</li> <li>Define global part number</li> <li>Modify electrical characteristic</li> </ul>  |
| Version 2  | Dec 26, 2005  | -                   | <ul> <li>New datasheet for thin film high precision - high stability chip resistors sizes of 0201/0402/0603/0805/1206/1210/2010/2512, 1%, 0.5%, 0.25%, 0.1%, 0.05%, TC25/50 with lead-free terminations</li> <li>Replace the 0402 to 1210 parts of pdf files: TFx10_1_1, TFx115_2, TFx1225_2, TFx131_3, TFx1405_1, TFx20_1_2, TFx215_2, TFx2225_2, TFx231_2, TFx2405_1, and combine into a document.</li> <li>Test method and procedure updated</li> <li>PE tape added (paper tape will be replaced by PE tape)</li> </ul> |

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