

# DATA SHEET

## GENERAL PURPOSE CHIP RESISTORS

RC2512  
5%, 1%  
RoHS compliant



**SCOPE**

This specification describes RC2512 series chip resistors with lead-free terminations made by thick film process.

**APPLICATIONS**

- All general purpose application

**FEATURES**

- RoHS compliant
  - Products with lead free terminations meet RoHS requirements
  - Pb-glass contained in electrodes
  - Resistor 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
- Halogen Free Epoxy

**ORDERING INFORMATION - GLOBAL PART NUMBER & I2NC**

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

**YAGEO BRAND ordering code****GLOBAL PART NUMBER (PREFERRED)**

**RC2512** **X** **K** **=** **XX** **XXXX** **L**  
 (1) (2) (3) (4) (5) (6)

**(1) TOLERANCE**

F =  $\pm 1\%$

J =  $\pm 5\%$  (for Jumper ordering, use code of J)

**(2) PACKAGING TYPE**

K = Embossed taping reel

**(3) TEMPERATURE COEFFICIENT OF RESISTANCE**

– = Base on spec

**(4) TAPING REEL**

07 = 7 inch dia. Reel

**(5) RESISTANCE VALUE**

There are 2~4 digits indicated the resistor value. Letter R/K/M is decimal point, no need to mention the last zero after R/K/M, e.g. 1K2, not 1K20.

Detailed resistance rules show in table of "Resistance rule of global part number".

**(6) OPTIONAL CODE**

L = optional symbol (Note)

| Resistance rule of global part number |                           |
|---------------------------------------|---------------------------|
| Resistance code rule                  | Example                   |
| 0R                                    | 0R = Jumper               |
| XRX                                   | 1R = 1 $\Omega$           |
| (1 to 9.76 $\Omega$ )                 | 1R5 = 1.5 $\Omega$        |
|                                       | 9R76 = 9.76 $\Omega$      |
| XXRX                                  | 10R = 10 $\Omega$         |
| (10 to 97.6 $\Omega$ )                | 97R6 = 97.6 $\Omega$      |
| XXXR                                  | 100R = 100 $\Omega$       |
| (100 to 976 $\Omega$ )                |                           |
| XKXX                                  | 1K = 1,000 $\Omega$       |
| (1 to 9.76 K $\Omega$ )               | 9K76 = 9760 $\Omega$      |
| XMXX                                  | 1M = 1,000,000 $\Omega$   |
| (1 to 9.76 M $\Omega$ )               | 9M76 = 9,760,000 $\Omega$ |

**ORDERING EXAMPLE**

The ordering code of a RC2512 chip resistor, value 56  $\Omega$  with  $\pm 1\%$  tolerance, supplied in 7-inch tape reel is: RC2512FK-0756R(L).

**NOTE**

1. All our RSMD products meet RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

**PHYCOMP BRAND ordering codes**

Both GLOBAL PART NUMBER (preferred) and I2NC (traditional) codes are acceptable to order Phycomp brand products.

**GLOBAL PART NUMBER (PREFERRED)**

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

**I2NC CODE**

| 2322       | XXX XXXXX L             |          |                  |  |
|------------|-------------------------|----------|------------------|--|
| (1)        | (2)                     | (3)      | (4)              |  |
| TYPE/ 2512 | START IN <sup>(1)</sup> | TOL. (%) | RESISTANCE RANGE | EMBOSSED TAPE ON REEL (units) <sup>(2)</sup> |
|            |                         |          |                  | 4,000  |
| PRC22I     | 2322                    | ±5%      | 1 to 22 MΩ       | 762 60xxx                                    |
| PRC22I     | 2322                    | ±1%      | 1 to 10 MΩ       | 763 6xxxx                                    |
| Jumper     | 2322                    | -        | 0 Ω              | 762 90000                                    |

(1) The resistors have a 12-digit ordering code starting with 2322.

(2) The subsequent 4 or 5 digits indicate the resistor tolerance and packaging.

(3) The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in the table of "Last digit of I2NC".

(4) "L" is optional symbol <sup>(Note)</sup>.

**ORDERING EXAMPLE**

The ordering code of a PRC22I resistor, value 56 Ω with ±1% tolerance, supplied in tape of 4,000 units per reel is: 232276365609(L) or RC2512FK-0756R(L).

| Last digit of I2NC               |            |
|----------------------------------|------------|
| Resistance decade <sup>(3)</sup> | Last digit |
| 0.01 to 0.0976 Ω                 | 0          |
| 0.1 to 0.976 Ω                   | 7          |
| 1 to 9.76 Ω                      | 8          |
| 10 to 97.6 Ω                     | 9          |
| 100 to 976 Ω                     | 1          |
| 1 to 9.76 KΩ                     | 2          |
| 10 to 97.6 KΩ                    | 3          |
| 100 to 976 KΩ                    | 4          |
| 1 to 9.76 MΩ                     | 5          |
| 10 to 97.6 MΩ                    | 6          |

|          |        |   |             |
|----------|--------|---|-------------|
| Example: | 0.02 Ω | = | 0200 or 200 |
|          | 0.3 Ω  | = | 3007 or 307 |
|          | 1 Ω    | = | 1008 or 108 |
|          | 33 KΩ  | = | 3303 or 333 |
|          | 10 MΩ  | = | 1006 or 106 |

**NOTE**

1. All our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. On customized label, "LFP" or specific symbol printed and the optional "L" at the end of GLOBAL PART NUMBER / I2NC can be added (both are on customer request)

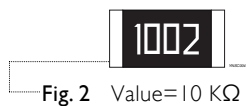
## MARKING

### RC2512



E-24 series: 3 digits

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



Both E-24 and E-96 series: 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

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 environment 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. See fig.3

## DIMENSIONS

| Table I             |             |
|---------------------|-------------|
| TYPE                | RC2512      |
| L (mm)              | 6.35 ± 0.10 |
| W (mm)              | 3.10 ± 0.15 |
| H (mm)              | 0.55 ± 0.10 |
| l <sub>1</sub> (mm) | 0.60 ± 0.20 |
| l <sub>2</sub> (mm) | 0.50 ± 0.20 |

## OUTLINES

For dimension see Table I

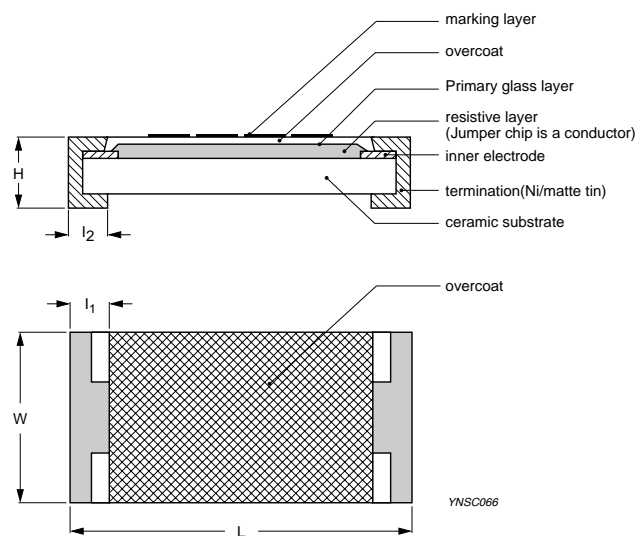


Fig. 3 Chip resistor outlines

**ELECTRICAL CHARACTERISTICS**

Table 2

| CHARACTERISTICS                 |                   | RC2512 1 W        |
|---------------------------------|-------------------|-------------------|
| Operating Temperature Range     |                   | -55 °C to +155 °C |
| Maximum Working Voltage         |                   | 200 V             |
| Maximum Overload Voltage        |                   | 500 V             |
| Dielectric Withstanding Voltage |                   | 500 V             |
| Resistance Range                | 5% (E24)          | 1 Ω to 22 MΩ      |
|                                 | 1% (E24/E96)      | 1 Ω to 10 MΩ      |
|                                 | Zero Ohm Jumper   | < 0.05 Ω          |
| Temperature Coefficient         | 1 Ω ≤ R ≤ 10 Ω    | ±200 ppm/°C       |
|                                 | 10 MΩ ≤ R ≤ 22 MΩ | ±200 ppm/°C       |
|                                 | 10 Ω < R ≤ 10 MΩ  | ±100 ppm/°C       |
| Jumper Criteria                 | Rated Current     | 2 A               |
|                                 | Maximum Current   | 10 A              |

**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

| PRODUCT TYPE | PACKING STYLE            | REEL DIMENSION | QUANTITY PER REEL |
|--------------|--------------------------|----------------|-------------------|
| RC2512       | Embossed taping reel (K) | 7" (178 mm)    | 4,000 units       |

**NOTE**

1. For embossed tape and reel specification/dimensions, please see the special data sheet “Packing” document.

**FUNCTIONAL DESCRIPTION****POWER RATING**

RC2512 rated power at 70°C is 1 W

**RATED 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 (Ω)

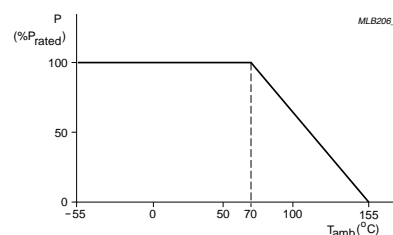


Fig. 4 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ( $T_{amb}$ )

## TESTS AND REQUIREMENTS

| TEST                              | TEST METHOD                                  | PROCEDURE  | REQUIREMENTS   |
|-----------------------------------|--|--|--|
| Solderability                     |  |  |  |
| - Wetting                         | IPC/JEDECJ-STD-002B test B<br>IEC 60068-2-58 | Electrical Test not required<br>Magnification 50X<br>SMD conditions:<br>1 <sup>st</sup> step: method B, aging 4 hours at 155 °C<br>dry heat<br>2 <sup>nd</sup> step: leadfree solder bath at 245±3 °C<br>Dipping time: 3±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage        |
| - Leaching                        | IPC/JEDECJ-STD-002B test D<br>IEC 60068-2-58 | Leadfree solder, 260 °C, 30 seconds<br>immersion time  | No visible damage                                      |
| - Resistance to<br>Soldering Heat | MIL-STD-202G-method 210F<br>IEC 60068-2-58   | Condition B, no pre-heat of samples<br>Leadfree solder, 270 °C, 10 seconds<br>immersion time<br>Procedure 2 for SMD: devices fluxed and<br>cleaned with isopropanol  | ±(1%+0.05 Ω)<br><50 mΩ for Jumper<br>No visible damage |

REVISION HISTORY

| REVISION  | DATE         | CHANGE NOTIFICATION | DESCRIPTION  |
|-----------|--------------|---------------------|--|
| Version 3 | Jul 15, 2008 | -                   | <ul style="list-style-type: none"><li>- Change to dual brand datasheet that describe RC2512 with RoHS compliant</li><li>- Description of "Halogen Free Epoxy" added</li><li>- Define global part number</li></ul>                          |
| Version 2 | Oct 06, 2004 | -                   | <ul style="list-style-type: none"><li>- New datasheet for 2512 thick film 1% and 5% with lead-free terminations</li><li>- Replace the 2512 part of pdf files: PRC221_I_6, PRC221_5_7</li><li>- Test method and procedure updated</li></ul> |

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