Innovative Service Around the Globe YAGEO

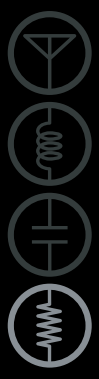
DATA SHEET

GENERAL PURPOSE CHIP RESISTORS

RC2512

5%, 1%

RoHS compliant



YAGEO Phicomp

Product specification – Jul 15, 2008 V.3

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 & 12NC

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 = ±1%
J = ±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
XRXX (1 to 9.76 Ω)	1R = 1 Ω 1R5 = 1.5 Ω 9R76 = 9.76 Ω
XXRX (10 to 97.6 Ω)	10R = 10 Ω 97R6 = 97.6 Ω
XXXR (100 to 976 Ω)	100R = 100 Ω
XKXX (1 to 9.76 KΩ)	1K = 1,000 Ω 9K76 = 9760 Ω
XMXX (1 to 9.76 MΩ)	1M = 1,000,000 Ω 9M76= 9,760,000 Ω

ORDERING EXAMPLE

The ordering code of a RC2512 chip resistor, value 56 Ω with ±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 / 12NC can be added (both are on customer request)

PHYCOMP BRAND ordering codes

Both GLOBAL PART NUMBER (preferred) and 12NC (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.

12NC CODE

2322 XXX XXXXX L
(1) (2) (3) (4)

TYPE/ 2512	START IN (1)	TOL. (%)	RESISTANCE RANGE	EMBOSSED TAPE ON REEL (units) (2) 4,000
PRC221	2322	±5%	1 to 22 MΩ	762 60xxx
PRC221	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 12NC".

(4) "L" is optional symbol (Note).

Last digit of 12NC

Resistance decade (3)	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

ORDERING EXAMPLE

The ordering code of a PRC221 resistor, value 56 Ω with ±1% tolerance, supplied in tape of 4,000 units per reel is: 232276365609(L) or RC2512FK-0756R(L).

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 / 12NC can be added (both are on customer request)

MARKING

RC2512

Fig. 1 Value=10 KΩ

E-24 series: 3 digits

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

Fig. 2 Value=10 KΩ

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 1

TYPE	RC2512
L (mm)	6.35 ± 0.10
W (mm)	3.10 ± 0.15
H (mm)	0.55 ± 0.10
I_1 (mm)	0.60 ± 0.20
I_2 (mm)	0.50 ± 0.20

OUTLINES

For dimension see Table 1

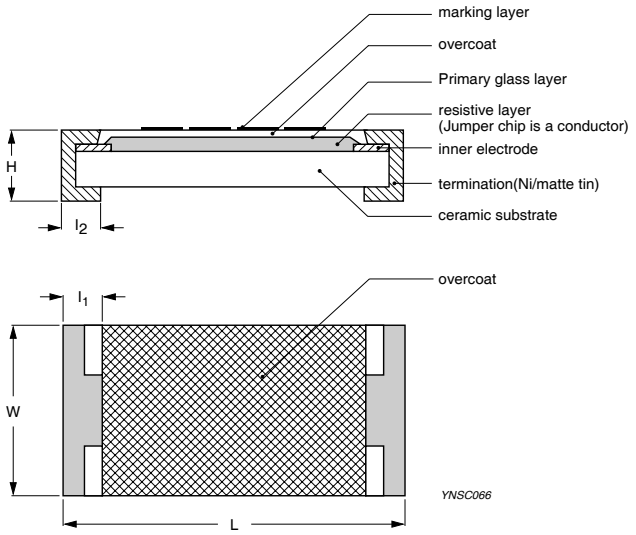


Fig. 3 Chip resistor outlines

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)

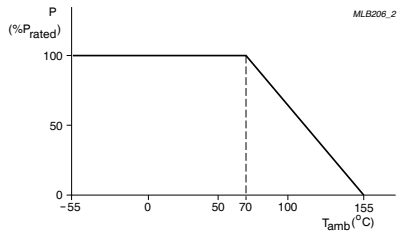


Fig. 4 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A IEC 60115-1 4.25.1 JIS C 5202-7.10	1,000 hours at 70±5 °C applied RCWV 1.5 hours on, 0.5 hour off, still air required	±(2%+0.05 Ω) <100 mΩ for Jumper
High Temperature Exposure/ Endurance at upper category temperature	MIL-STD-202G-method 108A IEC 60115-1 4.25.3 JIS C 5202-7.11	1,000 hours at maximum operating temperature depending on specification, unpowered No direct impingement of forced air to the parts Tolerances: 125±3 °C	±(1%+0.05 Ω) <50 mΩ for Jumper
Moisture Resistance	MIL-STD-202G-method 106F IEC 60115-1 4.24.2	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	±(2%+0.05 Ω) <100 mΩ for Jumper
Thermal Shock	MIL-STD-202G-method 107G	-55/+125 °C Note: Number of cycles required is 300. Devices unmounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	±(0.5%+0.05 Ω) for 10 KΩ to 10 MΩ ±(1%+0.05 Ω) for others <50 mΩ for Jumper
Short time overload	MIL-R-55342D-para 4.7.5 IEC60115-1 4.13	2.5 times RCWV or maximum overload voltage whichever is less for 5 sec at room temperature	±(2%+0.05 Ω) <50 mΩ for Jumper No visible damage
Board Flex/ Bending	IEC60115-1 4.33	Device mounted on PCB test board as described, only 1 board bending required 3 mm bending Bending time: 60±5 seconds Ohmic value checked during bending	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Solderability - Wetting	IPC/JEDECJ-STD-002B test B IEC 60068-2-58	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
- Leaching	IPC/JEDECJ-STD-002B test D IEC 60068-2-58	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	MIL-STD-202G-method 210F IEC 60068-2-58	Condition B, no pre-heat of samples Leadfree solder, 270 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(1%+0.05 Ω) <50 mΩ for Jumper No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 3	Jul 15, 2008	-	- Change to dual brand datasheet that describe RC2512 with RoHS compliant - Description of "Halogen Free Epoxy" added - Define global part number
Version 2	Oct 06, 2004	-	- New datasheet for 2512 thick film 1% and 5% with lead-free terminations - Replace the 2512 part of pdf files: PRC221_1_6, PRC221_5_7 - Test method and procedure updated