

DATA SHEET

HIGH VOLTAGE CHIP RESISTORS

RV series (Pb Free)
5%, 1%
sizes 0805/1206/2512



SCOPE

This specification describes RV0805/1206/2512 high voltage chip resistors with lead-free terminations made by thick film process.

ORDERING INFORMATION

Part number is identified by the series, size, tolerance, packing type, temperature coefficient, taping reel and resistance value.

YAGEO ORDERING CODE**CTC CODE**

RV XXXX X X X XX XXXX L
 (1) (2) (3) (4) (5) (6) (7)

(1) SIZE

0805/1206/2512

(2) TOLERANCE

F = $\pm 1\%$

J = $\pm 5\%$

(3) PACKAGING TYPE

R = Paper/PE taping reel

K = Embossed taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

– = Base on spec

(5) TAPING REEL

07 = 7 inch dia. Reel

(6) RESISTANCE VALUE

5R6, 56R, 560R, 56K, 27M

(7) RESISTOR TERMINATIONS ^(a)

L = Lead-free terminations (matte tin)

APPLICATIONS

- Converter
- Printer equipment
- Battery charger
- Computer
- Automotive industry
- Power supply

ORDERING EXAMPLE

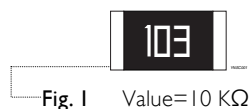
The ordering code of a RV1206 chip resistor, value 1M Ω with $\pm 5\%$ tolerance, supplied in 7-inch tape reel is: RV1206JR-071ML.

NOTE

- The “L” at the end of the code is only for ordering. On the reel label, the standard CTC or I2NC will be mentioned an additional stamp “LFP”= lead free production.
- Products with lead in terminations fulfil the same requirements as mentioned in this datasheet.
- Products with lead in terminations will be phased out in the coming months (before July 1st, 2006)

MARKING

RV0805/1206/2512



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 marking codes, please see EIA-marking code rules in data sheet “Chip resistors marking”.

CONSTRUCTION

The resistors are constructed out of a high-grade ceramic body. Internal metal electrodes are added at each end and connected by a high voltage resistive paste. The composition of the paste 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 an overcoat and printed with the resistance value. Finally, the two external terminations (matte tin) are added. See fig. 3.

DIMENSIONS

Table I For outlines see fig. 3

TYPE	L (mm)	W (mm)	H (mm)	l_1 (mm)	l_2 (mm)
RV0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.35 ± 0.20
RV1206	3.10 ± 0.10	1.60 ± 0.15	0.55 ± 0.10	0.45 ± 0.20	0.40 ± 0.20
RV2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.20	0.50 ± 0.20

OUTLINES

For dimension see Table I

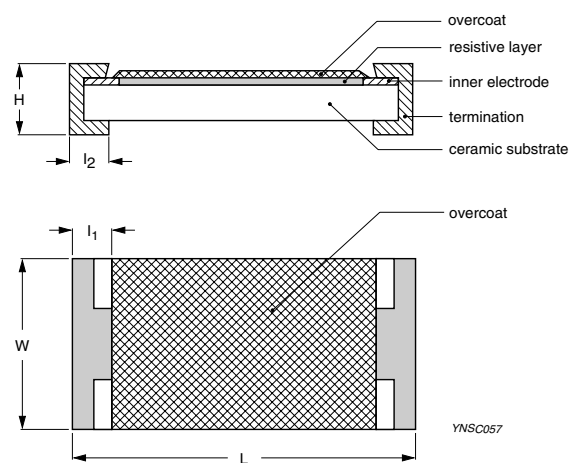


Fig. 3 Chip resistor outlines

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	RESISTANCE RANGE	CHARACTERISTICS					
		Rated Power	Operating Temperature Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Temperature Coefficient of Resistance
RV0805	5% (E-24) 100K Ω to 10M Ω 1% (E-24/E-96) 100K Ω to 10M Ω	1/8 W	-55 °C to +155 °C	400 V	800 V	800 V	± 200 ppm/°C
RV1206	5% (E-24) 100K Ω to 27M Ω 1% (E-24/E-96) 100K Ω to 10M Ω	1/4 W		500 V	1,000 V	1,000 V	
RV2512	5% (E-24) 4.7M Ω to 16M Ω	1 W		500 V	1,000 V	1,000 V	

FOOTPRINT AND SOLDERING PROFILES

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

ENVIRONMENTAL DATA

For material declaration information (IMDS-data) of the products, please see the separated info “Environmental data” conformed to EU RoHS.

PACKING STYLE AND PACKAGING QUANTITY

Table 3 Packing style and packaging quantity

PACKING STYLE	REEL DIMENSION	RV0805	RV1206	RV2512
Paper/PE taping reel (R)	7" (178 mm)	5,000	5,000	---
Embossed taping reel (K)	7" (178 mm)	---	---	4,000

NOTE

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

FUNCTIONAL DESCRIPTION

PRODUCT CHARACTERIZATION

Standard values of nominal resistance are taken from the E24 series or E96 series for resistors with a tolerance of 5% or 1%. The values of the E24/E96 series are in accordance with "IEC publication 60063".

OPERATING TEMPERATURE RANGE

Range: -55°C to +155°C

LIMITING VALUES

Table 4

TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING POWER ⁽²⁾ (W)
VR0805	400	1/8
VR1206	500	1/4
VR2512	500	1

NOTES

1. The maximum voltage that may be continuously applied to the resistor element, see "IEC publication 60115-8" and "IEC publication 60115-2".
2. Each type rated power at 70°C.

POWER RATING

The power that the resistor can dissipate depends on the operating temperature; see Fig. 4.

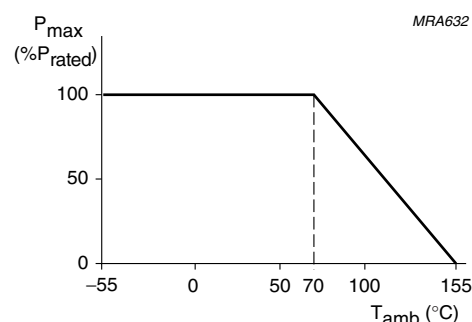


Fig. 4 Maximum dissipation (P_{max}) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

RATED VOLTAGE

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

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

Where

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

P = Rated power (W)

R = Resistance value (Ω)

TESTS AND REQUIREMENTS

Table 5 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Temperature Coefficient of Resistance (T.C.R.)	MIL-STD-202F-method 304; JIS C 5202-4.8	At +25/−55 °C and +25/+125 °C Formula: $T.C.R = \frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}$ 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	Refer to table 2
Thermal Shock	MIL-STD-202F-method 107G; IEC 60115-1 4.19	At −65 (+0/−10) °C for 2 minutes and at +155 (+10/−0) °C for 2 minutes; 25 cycles	±(0.5%+0.05 Ω) for 1% tol. ±(1.0%+0.05 Ω) for 5% tol.
Low Temperature Operation	MIL-R-55342D-Para 4.7.4	At −65 (+0/−5) °C for 1 hour; RCWV applied for 45 (+5/−0) minutes	±(0.5%+0.05 Ω) for 1% tol. ±(1.0%+0.05 Ω) for 5% tol. No visible damage
Short Time Overload	MIL-R-55342D-Para 4.7.5; IEC 60115-1 4.13	2.5 × RCWV applied for 5 seconds (V _{otage} ≤ 2 × V _{max}) at room temperature	±(1.0%+0.05 Ω) for 1% tol. ±(2.0%+0.05 Ω) for 5% tol. No visible damage
Insulation Resistance	MIL-STD-202F-method 302; IEC 60115-1 4.6.1.1	One DC voltage applied for 1 minute Details see below table 6	≥10 GΩ
Dielectric Withstand Voltage	MIL-STD-202F-method 301; IEC 60115-1 4.6.1.1	One DC voltage applied for 1 minute Details see below table 6	No breakdown or flashover
Resistance to Soldering Heat	MIL-STD-202F-method 210C; IEC 60115-1 4.18	Unmounted chips; 260 ±5 °C for 10 ±1 seconds	±(0.5%+0.05 Ω) for 1% tol. ±(1.0%+0.05 Ω) for 5% tol. No visible damage
Life	MIL-STD-202F-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	±(1%+0.05 Ω) for 1% tol. ±(3%+0.05 Ω) for 5% tol.

Table 5 Test condition, procedure and requirements (continued)

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS	
Solderability	MIL-STD-202F-method 208A; IEC 60115-1 4.17	Solder bath at 245 ± 3 °C Dipping time: 2 ± 0.5 seconds	Well tinned ($\geq 95\%$ covered) No visible damage	
Bending Strength	JIS C 5202.6.14; IEC 60115-1 4.15	Resistors mounted on a 90 mm glass epoxy resin PCB (FR4) Bending: 5 mm	$\pm(1.0\%+0.05 \Omega)$ for 1% tol. $\pm(1.0\%+0.05 \Omega)$ for 5% tol. No visible damage	
Resistance to Solvent	MIL-STD-202F-method 215; IEC 60115-1 4.29	Isopropylalcohol (C_3H_7OH) or dichloromethane (CH_2Cl_2) followed by brushing	No smeared	
Noise	JIS C 5202 5.9; IEC 60115-1 4.12	Maximum voltage (V_{rms}) applied.	Resistors range	Value
			$R < 100 \Omega$	10 dB
			$100 \Omega \leq R < 1 K\Omega$	20 dB
			$1 K\Omega \leq R < 10 K\Omega$	30 dB
			$10 K\Omega \leq R < 100 K\Omega$	40 dB
			$100 K\Omega \leq R < 1 M\Omega$	46 dB
			$1 M\Omega \leq R \leq 22 M\Omega$	48 dB
Humidity (steady state)	JIS C 5202 7.5; IEC 60115-8 4.24.8	1,000 hours; 40 ± 2 °C; $93(+2/-3)\%$ RH RCWV applied for 1.5 hours on and 0.5 hour off	$\pm(0.5\%+0.05 \Omega)$ for 1% tol. $\pm(2.0\%+0.05 \Omega)$ for 5% tol.	
Leaching	EIA/IS 4.13B; IEC 60115-8 4.18	Solder bath at 260 ± 5 °C Dipping time: 30 ± 1 seconds	No visible damage	
Intermittent Overload	JIS C 5202 5.8	At room temperature; $2.5 \times$ RCWV applied for 1 second on and 25 seconds off; total 10,000 cycles	$\pm(1.0\%+0.05 \Omega)$ for 1% tol. $\pm(2.0\%+0.05 \Omega)$ for 5% tol.	
Resistance to Vibration	On request	On request		
Moisture Resistance Heat	MIL-STD-202F-method 106F; IEC 60115-1 4.24.2	42 cycles; total 1,000 hours Shown as Fig. 5	$\pm(0.5\%+0.05\Omega)$ for 1% tol. $\pm(2.0\%+0.05\Omega)$ for 5% tol. No visible damage	

Table 6 Criteria of rated continued working voltage and overload voltage

TYPE	RV0805	RV1206	RV2512
Voltage (DC/unit: V)	800	1,000	1,000

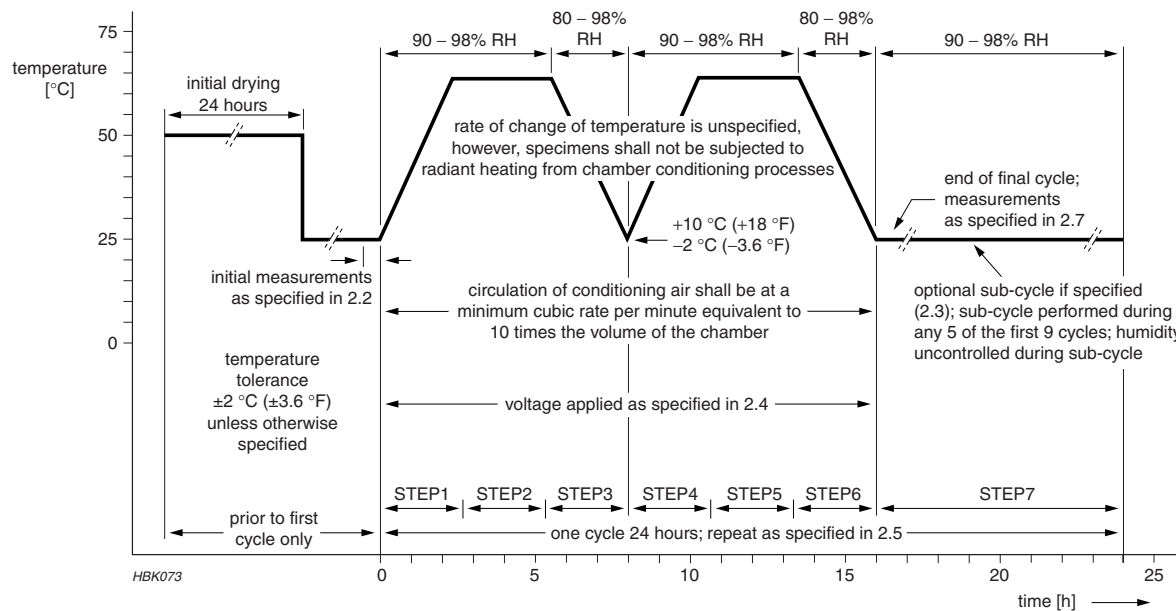


Fig. 5 Moisture resistance test requirements

REVISION HISTORYREVISION DATE CHANGE NOTIFICATION DESCRIPTION

Version 0	Feb 14, 2006	-	- New datasheet for high voltage chip resistors sizes of 0805/1206/2512, 5%, 1% tolerance with lead-free terminations
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