Innovative Service Around the Globe YAGEO

DATA SHEET

THICK FILM CHIP RESISTORS

Precision grade

RE series

0.1%, 0.5%, 1%, TC 50

sizes 0201/0402/0603/0805/1206

RoHS compliant & Halogen Free

YAGEO Phycomp

Product specification – June 01, 2017 V.6

SCOPE

This specification describes RE0201 to RE1206 ultra precision chip resistors with lead-free terminations made by thick film process.

APPLICATIONS

- Converters
- Printer equipment
- Server board
- Telecom
- Consumer

FEATURES

- Halogen Free Epoxy
- RoHS compliant
- Reducing environmentally hazardous wastes
- High component and equipment reliability
- Non-forbidden material used in products/production
- Moisture sensitivity level: MSL 1

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)

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

(1) SIZE

0201 / 0402 / 0603 / 0805 / 1206

(2) TOLERANCE

B = ±0.1%

D = ±0.5%

F = ±1%

(3) PACKAGING TYPE

R = Paper/PE taping reel

(4) TEMPERATURE COEFFICIENT OF RESISTANCE

E = ±50 ppm/°C

(5) TAPING REEL

07 = 7 inch dia. Reel

10 = 10 inch dia. Reel

13 = 13 inch dia. Reel

(6) 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".

(7) DEFAULT CODE

Letter L is system default code for order only (Note)

Resistance rule of global part number

Resistance code rule	Example
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 MΩ)	1M = 1,000,000 Ω

ORDERING EXAMPLE

The ordering code of a RE0603 chip resistor, TC 50 value 56Ω with ±0.5% tolerance, supplied in 7-inch tape reel is: RE0603DRE0756RL.

NOTE

1. All our R-Chip 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

MARKING

RE0805 / RE1206

Fig. 1 Value = 10 kΩ

Either resistance in E-24 or E-96: 4 digits

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

RE0603

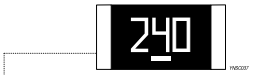

Fig. 2 Value = 24 Ω

1%, 0.5%, 0.1% E24 exception values 10/11/13/15/20/75 of E24 series

Fig. 3 Value = 12.4 kΩ

1%, 0.5%, 0.1% E96 refer to EIA-96 marking method, including values 10/11/13/15/20/75 of E24 series

RE0201/0402

Fig. 4

No marking

For further marking information, please see special 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 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 1 For outlines see fig. 5

TYPE	L (mm)	W (mm)	H (mm)	l_1 (mm)	l_2 (mm)
RE0201	0.60 ±0.03	0.30 ±0.03	0.23 ±0.03	0.10 ±0.05	0.15 ±0.05
RE0402	1.00 ±0.05	0.50 ±0.05	0.32 ±0.05	0.20 ±0.10	0.25 ±0.10
RE0603	1.60 ±0.10	0.80 ±0.10	0.45 ±0.10	0.25 ±0.15	0.25 ±0.15
RE0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.35 ±0.20
RE1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20

OUTLINES

For dimension see Table 1

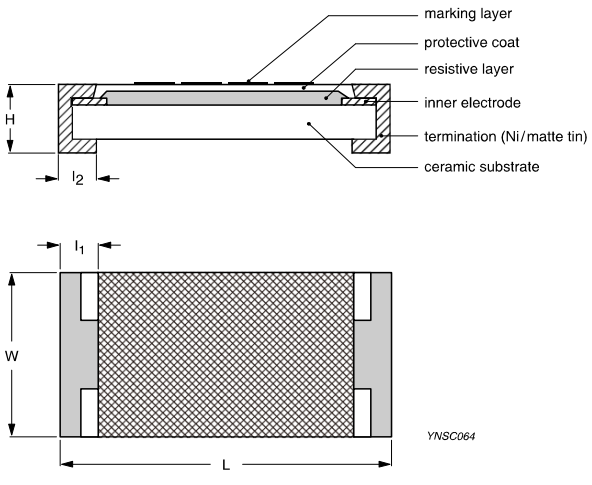

Fig. 5 Chip resistor outlines

ELECTRICAL CHARACTERISTICS

Table 2

TYPE	RESISTANCE RANGE (E24/E96)	OPERATING TEMPERATURE RANGE	POWER RATING	MAXIMUM WORKING VOLTAGE	DIELECTRIC WITHSTAND VOLTAGE	MAXIMUM OVERLOAD VOLTAGE	TEMPERATURE COEFFICIENT OF RESISTANCE
RE0201	100 Ω to 1 MΩ	–55 °C to +155 °C	1/20W	25 V	50 V	50 V	±50 ppm/°C
RE0402	10 Ω to 1 MΩ	–55 °C to +155 °C	1/16 W	50 V	100 V	100 V	±50 ppm/°C
RE0603	10 Ω to 1 MΩ	–55 °C to +155 °C	1/10 W	75 V	150 V	150 V	±50 ppm/°C
RE0805	10 Ω to 1 MΩ	–55 °C to +155 °C	1/8 W	150 V	300 V	300 V	±50 ppm/°C
RE1206	10 Ω to 1 MΩ	–55 °C to +155 °C	1/4 W	200 V	500 V	400 V	±50 ppm/°C

NOTE

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

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 DIMENSION	RE0201	RE0402	RE0603	RE0805	RE1206
Paper/PE taping reel (R)	7" (178 mm)	10,000	10,000	5,000	5,000	5,000
	10" (254 mm)	20,000	20,000	10,000	10,000	10,000
	13" (330 mm)	50,000	50,000	20,000	20,000	20,000

NOTE

1. For Paper/PE 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:
RE0201=1/20W, RE0402=1/16W, RE0603=1/10W,
RE0805=1/8 W, RE1206=1/4W

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)

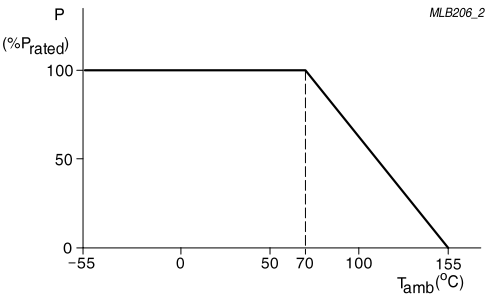

Fig. 6 Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature (T_{amb})

TESTS AND REQUIREMENTS

Table 4 Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/Endurance	IEC 60115-1 4.25.1 MIL-STD-202 Method 108A	At 70±2 °C for 1,000 hours, RCWV applied for 1.5 hours on, 0.5 hour off, still air required	±(3%+0.05 Ω)
High Temperature Exposure	IEC 60068-2-2 MIL-STD-202 Method 108A	1,000 hours at 155±5 °C, unpowered	±(3%+0.05 Ω)
Moisture Resistance	MIL-STD-202 Method 106G	Each temperature / humidity cycle is defined at 8 hours, 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	±(3%+0.05 Ω)
Thermal Shock	MIL-STD-202 Method 107G	-55/+125 °C Number of cycles required is 300. Devices mounted Maximum transfer time is 20 seconds. Dwell time is 15 minutes. Air – Air	±(1%+0.05 Ω)
Short Time Overload	IEC60115-1 4.13	2.5 times of rated voltage or maximum overload voltage whichever is less for 5 sec at room temperature	±(1%+0.05 Ω) No visible damage
Board Flex/ Bending	IEC 60115-1 4.33	Chips mounted on a 90mm glass epoxy resin PCB (FR4) Bending: see table 5 for each size Bending time: 60±5 seconds	±(1%+0.05 Ω) No visible damage

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
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	±(3%+0.05 Ω)
Solderability - Wetting	J-STD-002 test B	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	J-STD-002 test D	Leadfree solder, 260 °C, 30 seconds immersion time	No visible damage
- Resistance to Soldering Heat	IEC 60115-1 4.18	Condition B, no pre-heat of samples. Leadfree solder, 260 °C, 10 seconds immersion time Procedure 2 for SMD: devices fluxed and cleaned with isopropanol	±(1%+0.05 Ω) No visible damage

Table 5 Bending for sizes 0201 to 1206

TYPE	RE0201	RE0402	RE0603	RE0805	RE1206
Specification (mm)	5	5	3	3	2

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 6	May 31, 2017	-	-Add 10" packing
Version 5	Feb 24, 2017	-	-Delete 125℃ in derating curve
Version 4	May 03, 2016	-	-Update 0201 resistor value
Version 3	Jan. 26, 2015	-	- Update Working Voltage
Version 2	May 11, 2015	-	- Update test and requirements
Version 1	Jan 23, 2014	-	- Add RE0201 - Add 0.1% - Update TEST AND REQUIREMENTS, add Humidity test
Version 0	Dec 10, 2010	-	- New datasheet for thick film ultra precision chip resistors sizes of 0402/0603/0805/1206, 0.5%, 1%, TC50 with lead-free terminations

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RE0805FRE078K45L RE0402DRE076K2L RE0402DRE07270RL RE0805FRE07196KL RE0402DRE0713KL RE0402DRE071K1L RE1206FRE071K5L RE0603DRE077K5L RE0402FRE07200KL RE0402DRE071K8L RE0402DRE0739KL RE0402DRE07110KL RE0402DRE07180RL RE0603DRE076K8L RE0402BRE072K87L RE0402DRE075K6L RE0603DRE0749R9L RE0805FRE073K9L RE0805FRE07200KL RE0402DRE072K4L RE0402DRE07665RL RE0805FRE07150KL RE0402DRE07100RL RE0402DRE071KL RE0603DRE0710KL RE0603DRE0733KL RE0402DRE07301RL RE0603FRE071KL RE0805FRE07100KL RE0402DRE0736KL RE0603DRE07150KL RE0402DRE0747KL RE0805FRE078K2L RE0603DRE073K9L RE0402DRE0711KL RE0805FRE074K7L RE0402DRE0720KL RE1206FRE07100KL RE0402DRE071K3L RE0402DRE07953RL RE0402DRE0722KL RE0402BRE074K75L RE0402DRE07330RL RE0402DRE0756KL RE0402DRE07430RL RE0603DRE0720KL RE0805FRE0733KL RE0603DRE071K5L RE0402DRE07845RL RE0402DRE0724KL RE0603DRE071K05L RE0402DRE07470KL RE0603DRE0782KL RE0402DRE07750RL RE0603DRE07100KL RE0402DRE0768KL RE0805FRE0718KL RE0402DRE077K87L RE0805FRE0722KL RE0603DRE071K3L RE0402DRE0724K9L RE0402DRE07196RL RE0805FRE073K3L RE0402DRE07270KL RE0603DRE071KL RE0603DRE0747KL RE0402DRE07300RL RE0603DRE075K1L RE0603FRE0782KL RE0402DRE076K8L RE0402BRE07470KL RE0402DRE07360KL RE0805FRE0714KL RE0402DRE07100KL RE0603DRE072K8L RE1206FRE0727RL RE0402BRE07158KL RE0603FRE0710KL RE0603DRE073K3L RE0603DRE0712KL RE0402DRE07200RL RE0402DRE073K9L RE0603DRE07820RL RE0603DRE0768KL RE0805FRE071KL RE0402DRE078K2L RE0603DRE0718KL RE0603DRE072KL RE0805FRE07332RL RE0402DRE0782KL RE1206DRE0710RL RE0402DRE07560RL RE0402DRE075K1L RE0402DRE0744K2L RE0402DRE07220RL RE0603DRE074K99L RE0603DRE0727KL RE0603DRE0724KL RE0805FRE07220KL RE0402DRE0715KL

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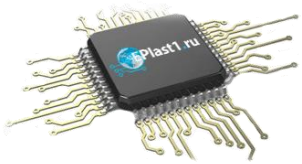

Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)
Факс: 8 (812) 320-02-42
Электронная почта: org@eplast1.ru
Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.