

# DATA SHEET

## LOW OHMIC HIGH POWER CHIP RESISTORS

RL-High power series

5%, 2%, 1%

sizes 0805/1206

RoHS compliant



SCOPE

This specification describes RL0805/1206 low ohmic chip resistors with lead-free terminations made by thick film process.

APPLICATIONS

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

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
- Low resistances applied to current sensing

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)**

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

**(1) SIZE**

0805 / 1206

**(2) TOLERANCE**

F = ±1%  
 G = ±2%  
 J = ±5%

**(3) PACKAGING TYPE**

R = Paper taping reel

**(4) TEMPERATURE COEFFICIENT OF RESISTANCE**

- = Base on spec

**(5) TAPING REEL**

7W = 7 inch reel and double power type

**(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) OPTIONAL CODE**

L = optional symbol (Note)

**Resistance rule of global part number**

Resistance code rule	Example
0RXXX (1 to 976 mΩ)	0R1 = 0.1 Ω 0R12 = 0.12 Ω 0R105 = 0.105 Ω
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
XXXXR (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 RL0805 chip resistor, value 0.56 Ω with ±1% tolerance, supplied in 1/4W tape reel is: RL0805FR-7W0R56 (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. 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.

**I2NC CODE**

		<b>2350</b>	<b>XXX XXXXX L</b>				
		(1)	(2)	(3)	(4)		
SIZE	TYPE	START IN <sup>(1)</sup>	TOL. (%)	RESISTANCE RANGE	PAPER/PE TAPE ON REEL (units) <sup>(2)</sup>		
						5,000	
0805	LRC11P	2350	±5%	0.01 to 1 Ω	511 15xxx		
	LRC12P	2350	±1%	0.01 to 1 Ω	511 17xxx		
1206	LRC01P	2350	±5%	0.01 to 1 Ω	519 01xxx		
	LRC02P	2350	±1%	0.01 to 1 Ω	519 1xxxx		

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

- (1) The resistors have a 12-digit ordering code starting with 2350.
- (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>.

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**

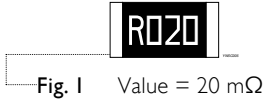
The ordering code of a RL0805 chip resistor, value 0.56 Ω with ±1% tolerance, supplied 1/4W tape per reel is: 235051117567 (L) or RL0805FR-7W0R56 (L).

**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 / I2NC can be added (both are on customer request)

**MARKING**

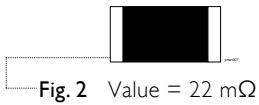
RL0805 / RL1206, R = 10/20/30/40/50/60 mΩ



E-24 series: 4 digits

The “R” is used as a decimal point; the other 3 digits are significant.

SPECIALITY EXCEPT 10/20/30/40/50/60 mΩ



No marking

For further marking information, please see special data sheet “Chip resistors marking”.

**CONSTRUCTION**

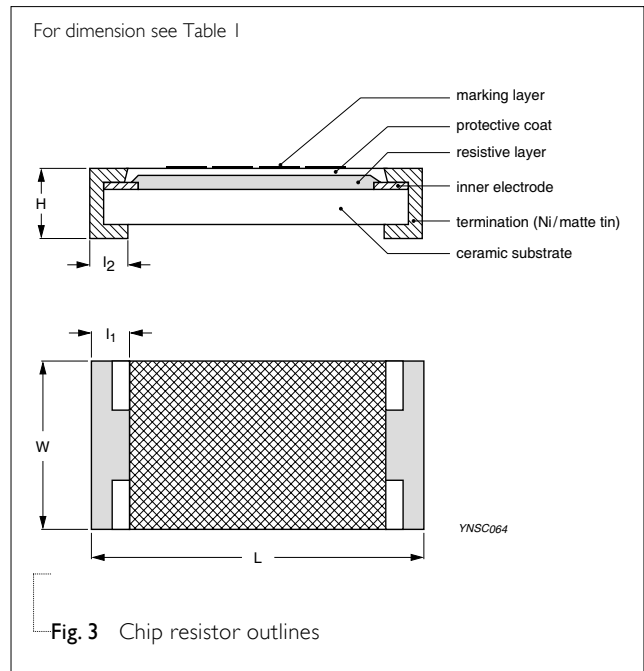
The resistors are constructed out of a high-grade ceramic body. Internal metal electrodes are added at each end and connected by a resistive paste. The composition of the paste is adjusted to give the approximate required resistance and laser cutting of this resistive layer that achieves tolerance trims the value. The resistive layer is covered with a protective coat 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 <sub>1</sub> (mm)	l <sub>2</sub> (mm)
RL0805	2.00 ±0.10	1.25 ±0.10	0.50 ±0.10	0.35 ±0.20	0.35 ±0.20
RL1206	3.10 ±0.10	1.60 ±0.10	0.55 ±0.10	0.45 ±0.20	0.40 ±0.20

**OUTLINES**



**ELECTRICAL CHARACTERISTICS**

Table 2

TYPE / RESISTANCE RANGE	TEMPERATURE COEFFICIENT OF RESISTANCE					
	10mΩ≤R≤18mΩ	18mΩ<R≤47mΩ	47mΩ<R≤91mΩ	91mΩ<R≤360mΩ	360mΩ<R≤500mΩ	500mΩ<R<1Ω
RL0805	±1,500 ppm/°C	±1,200 ppm/°C	±1,000 ppm/°C	±600 ppm/°C	±300 ppm/°C	±200 ppm/°C
RL1206	±1,500 ppm/°C	±1,200 ppm/°C	±1,000 ppm/°C	±600 ppm/°C	±300 ppm/°C	±200 ppm/°C

**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	RL0805	RL1206
Paper/PE taping reel (R)	7" (178 mm)	5,000	5,000

**NOTE**

1. For paper/embossed tape and reel specification/dimensions, please see the special data sheet “Chip resistors packing”.

**FUNCTIONAL DESCRIPTION**

**OPERATING TEMPERATURE RANGE**

Range: -55°C to +125°C

**POWER RATING**

Each type rated power at 70°C:  
RL0805=1/4 W; RL1206=1/2 W.

**RATED VOLTAGE**

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

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

Where

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

P = Rated power (W)

R = Resistance value (Ω)

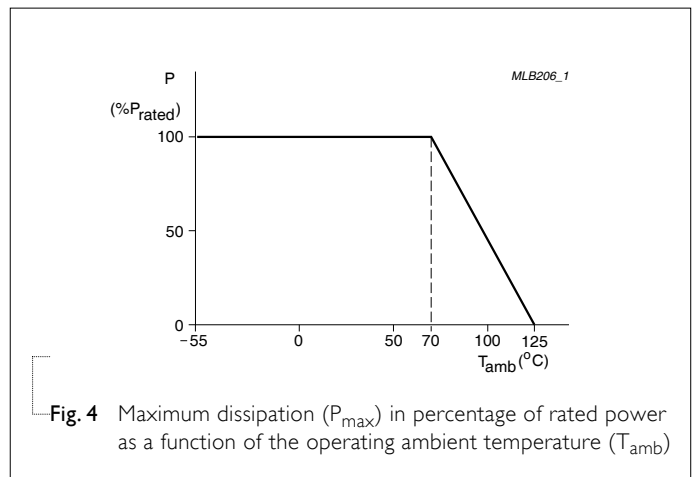


Fig. 4 Maximum dissipation (P<sub>max</sub>) in percentage of rated power as a function of the operating ambient temperature (T<sub>amb</sub>)

**TESTS AND REQUIREMENTS**
**Table 4** Test condition, procedure and requirements

TEST	TEST METHOD	PROCEDURE	REQUIREMENTS
Life/ Operational Life/ Endurance	MIL-STD-202G-method 108A	1,000 hours at 70±5 °C applied RCWV	±2%
	IEC 60115-1 4.25.1	1.5 hours on, 0.5 hour off, still air required	
	JIS C 5202-7.10		
High Temperature Exposure/ Endurance at upper category temperature	MIL-STD-202G-method 108A	1,000 hours at maximum operating temperature	±1%
	IEC 60115-1 4.25.3	depending on specification, unpowered	
	JIS C 5202-7.11	No direct impingement of forced air to the parts Tolerances: 125±3 °C	
Moisture Resistance	MIL-STD-202G-method 106F	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%
	IEC 60115-1 4.24.2		
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	±1%
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% 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% 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: 1 <sup>st</sup> step: method B, aging 4 hours at 155 °C dry heat 2 <sup>nd</sup> 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% No visible damage

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version 2	Aug 27, 2008	-	<ul style="list-style-type: none"> <li>- Change to dual brand datasheet that describe high power low ohmic chip resistors sizes of 0805/1206 1%, 2% and 5% with RoHS compliant</li> <li>- Define global part number</li> <li>- Replace the 0805 to 1206 parts of pdf files : Pu-RL-HP_51_PbFree_L_1.pdf &amp; Yu-RL-HP_51_PbFree_L_0.pdf</li> </ul>
Version 1	June 21, 2005	-	<ul style="list-style-type: none"> <li>- 12 NC of size 1206 revised</li> </ul>
Version 0	May 30, 2005	-	<ul style="list-style-type: none"> <li>- New datasheet for low ohmic high power chip resistors sizes of 0805/1206 1% and 5% with lead-free terminations</li> <li>- Replace the 0805 to 1206 parts of pdf files: LRC01P_02P_51_0, LRC11P_12P_51_3, 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>

*“ Yageo reserves all the rights for revising the content of this datasheet without further notification, as long as the products itself are unchanged. Any product change will be announced by PCN.”*