DATA SHEET

RC05G/RC15G
0.1%
High-precision chip resistors sizes 1206 and 0805

Product specification
Supersedes data of 3rd November 1999

2001 Apr 27 Rev.2

Phycomp
A FORMER PHILIPS COMPANY

High-precision chip resistors sizes 1206 and 0805

RC05G/RC15G 0.1%

FEATURES

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Complete high precision SMD family.

APPLICATIONS

- Measuring instruments
- Power supplies
- EDP
- Telecom.

DESCRIPTION

The resistors are constructed on a high grade ceramic body (aluminium oxide). Internal metal electrodes are added at each end and connected by a high voltage resistive paste which is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance, by laser cutting of this resistive layer.

The resistive layer is covered with a protective coating and printed with the resistance value. Finally, the two external end terminations are added. To guarantee optimum solderability the outer layer consists of a lead-tin alloy.

QUICK REFERENCE DATA

DESCRIPTION	VALUE	
	RC05G	RC15G
Size code	1206 (3216)	0805 (2012)
Resistance range	90 Ω to 2.74 MΩ; E24/E96 series	
Resistance tolerance	±0.1%	
Temperature coefficient: 90 Ω ≤ R ≤ 2.74 MΩ	≤±50 × 10^{-6}/K	
Absolute maximum dissipation at T_{amb} = 70 °C	0.125 W	0.10 W
Maximum permissible voltage (DC or RMS)	200 V	150 V
Climatic category (IEC 60068)	55/125/56	
Basic specification	IEC 60115-8	

ORDERING INFORMATION

Table 1 Ordering code indicating resistor type and packing

TYPE	TOL. (%)	RESISTANCE VALUE (Ω)	SERIES	ORDERING CODE 2322 7.. .....
				PAPER TAPE ON REEL
				5000 units
RC05G (1206)	±0.1	90 Ω to 2.74 MΩ	E24/E96	08 2....
RC15G (0805)				10 2....

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2322 7
- The subsequent 3 digits indicates the resistor type and packing; see Table 1.
- The remaining digits indicate the resistance value:
  - The first 3 digits indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with Table 2.

Table 2 Last digit of 12NC

RESISTANCE DECADE	LAST DIGIT
90 Ω to 97.6 Ω	9
100 Ω to 976 Ω	1
1 kΩ to 9.76 kΩ	2
10 kΩ to 97.6 kΩ	3
100 kΩ to 976 kΩ	4
1 MΩ to 2.74 MΩ	5

ORDERING EXAMPLE

The ordering code of a RC05G resistor, value 100 Ω with 0.1% tolerance, supplied on paper tape of 5 000 units per reel is:
2322 708 21001.

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24/E96 series for resistors with a tolerance of ± 0.1%. The values of the E24/E96 series are in accordance with *"IEC publication 60063"*.

Limiting values

TYPE	LIMITING VOLTAGE(1) (V)	LIMITING POWER (W)
RC05G	200	0.125
RC15G	150	0.10

Note

1. The maximum voltage that may be continuously applied to the resistor element, see *"IEC publication 60115-8"* and *"IEC publication 60115-2"*.

DERATING

The rated power that the resistor can dissipate depends on the operating temperature; see Fig.1.

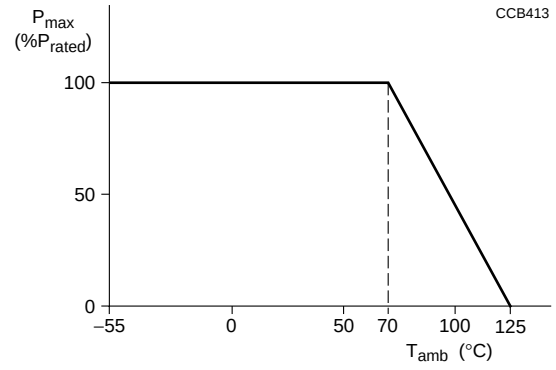


Fig.1 Maximum dissipation (P_{max}) in percentage of rated power as a function of the ambient temperature (T_{amb}).

MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
RC05G	1.0
RC15G	0.55

Marking

Each resistor is marked with a 4 digit code on the protective coating to designate the nominal resistance value.

The first 3 digits are significant and the fourth indicates the number of zeros to follow.

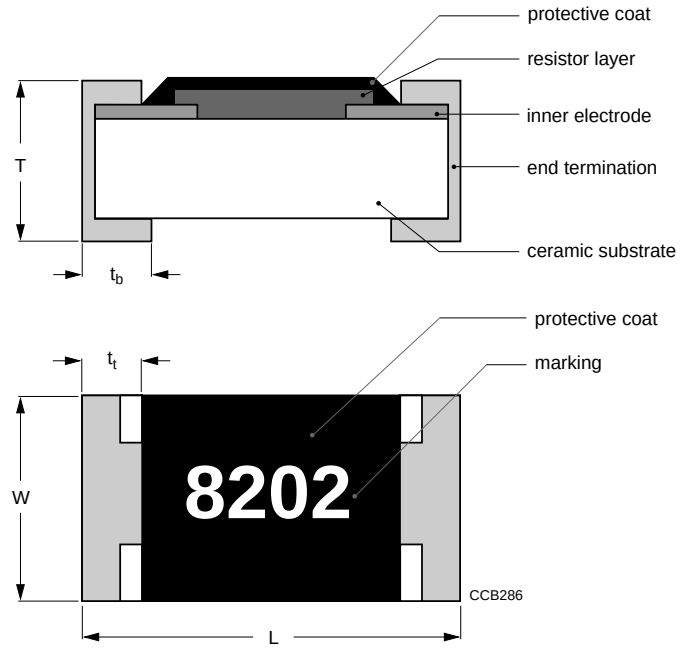
Example

MARKING	RESISTANCE
120R	120 Ω
8202	82 kΩ

PACKAGE MARKING

The packing is also marked and includes resistance value, tolerance, catalogue number, quantity, production period, batch number and source code.

Outlines



For dimensions see Table 3.

Fig.2 Outlines.

Table 3 Chip resistor type and relevant physical dimensions; see Fig.2

TYPE	L (mm)	W (mm)	T (mm)	t_t (mm)	t_b (mm)
RC05G	3.2 +0.1/–0.2	1.6 ±0.15	0.55 ±0.10	0.45 ±0.25	0.50 ±0.25
RC15G	2.00 ±0.15	1.25 ±0.15	0.55 ±0.10	0.40 ±0.2	0.40 ±0.20

TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of *"IEC publication 60115-8"*, category 55/125/56 (rated temperature range –55 to +125 °C; damp heat, long term, 56 days). The testing also covers the requirements specified by EIA and EIAJ.

The tests are carried out in accordance with IEC publication 60068, *"Recommended basic climatic and mechanical robustness testing procedure for electronic components"* and under standard atmospheric conditions in accordance with *"IEC 60068-1"*, subclause 5.3.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45% to 75%

Air pressure: 86 kPa to 106 kPa (860 mbar to 1060 mbar).

In Table 4 the tests and requirements are listed with reference to the relevant clauses of *"IEC publications 60115-8 and 60068"*; a short description of the test procedure is also given. In some instances deviations from the IEC recommendations were necessary for our method of specifying.

All soldering tests are performed with mildly activated flux.

Table 4 Test procedures and requirements

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
Tests in accordance with the schedule of IEC publication 60115-8				
4.4.1		visual examination		no holes; clean surface; no visible damage
4.5		resistance	applied voltage (0 to –10%): 90 Ω ≤ R < 100 Ω: 0.3 V 100 Ω ≤ R < 1 kΩ: 1 V 1 kΩ ≤ R < 10 kΩ: 3 V 10 kΩ ≤ R < 100 kΩ: 10 V 100 kΩ ≤ R < 1 MΩ: 25 V R ≥ 1 MΩ: 50 V	$R - R_{nom}$: max. ±0.1%
4.17	20 (Ta)	solderability	unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±2 °C	good tinning (≥95% covered); no visible damage
4.18	20 (Tb)	resistance to soldering heat	unmounted chips; 10 ±1 s; 260 ±5 °C	no visible damage ΔR/R max.: ±(0.25% + 0.05 Ω)
4.13		short time overload	room temperature; dissipation = $6.25 \times P_n$; 5 s (voltage not more than $2 \times V_{max}$)	ΔR/R max.: ±(0.5% + 0.05 Ω)
4.33		bending	resistors mounted on a 90 mm glass epoxy resin PCB (FR4), bending: 3 mm for 1206; 5 mm for 0805	no visible damage ΔR/R max.: ±(0.25% + 0.05 Ω)
4.19	14 (Na)	rapid change of temperature	30 minutes at LCT and 30 minutes at UCT; 5 cycles	no visible damage ΔR/R max.: ±(0.25% + 0.05 Ω)

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.6.1.1		insulation resistance	voltage (DC) after 1 minute, metal block method; 100 V	R_{ins} min.: 1000 MΩ
4.24.2	3 (Ca)	damp heat (steady state)	56 days; 40 ±2 °C; 93 +2/–3% RH; loaded with 0.01 P_n	
			R ≤ 1 MΩ	ΔR/R max.: ±(1.0% + 0.1 Ω)
			R > 1 MΩ	ΔR/R max.: ±(2.0% + 0.1 Ω)
4.25.1		endurance	1000 +48/–0 hours; 70 ±2 °C; loaded with P_n or V_{max}; 1.5 hours on, 0.5 hour off	
			R ≤ 1 MΩ	ΔR/R max.: ±(0.5% + 0.1 Ω)
			R > 1 MΩ	ΔR/R max.: ±(1.0% + 0.1 Ω)
4.25.1		endurance at upper category temperature	1000 +48/–0 hours, no load:	
			R ≤ 1 MΩ	ΔR/R max.: ±(0.5% + 0.1 Ω)
			R > 1 MΩ	ΔR/R max.: ±(1.0% + 0.1 Ω)
4.8.4.2		temperature coefficient	at 20/LCT/20 °C and 20/UCT/20 °C:	ΔR/R max.: $\pm 50 \times 10^{-6}$/K
Other tests in accordance with IEC 60115 clauses and IEC 60068 test method				
4.17	20 (Ta)	solderability (after ageing)	8 hours steam or 16 hours at 155 °C; unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±2 °C	good tinning (≥95% covered); no visible damage
4.12		noise	IEC publication 60195 (measured with Quantech-equipment):	
			R ≤ 100 Ω	max. 0.316 μV/V (–10 dB)
			100 Ω < R ≤ 1 kΩ	max. 1 μV/V (0 dB)
			1 kΩ < R ≤ 10 kΩ	max. 3 μV/V (9.54 dB)
			10 kΩ < R ≤ 100 kΩ	max. 6 μV/V (15.56 dB)
			100 kΩ < R ≤ 1 MΩ	max. 10 μV/V (20 dB)
			R > 1 MΩ	max. 32 μV/V (30.10 dB)
Other applicable tests				
		leaching	unmounted chips 60 ±1 s; 260 ±5 °C	good tinning; no leaching
	(JIS) C 5202 7.5	resistance to damp heat (steady state)	1000 +48/–0 hours; 40 ±2 °C; 93 +2/–3% RH; loaded with P_n or V_{max}; 1.5 hours on, 0.5 hour off	
			R ≤ 1 MΩ	ΔR/R max.: ±(1% + 0.1 Ω)
			R > 1 MΩ	ΔR/R max.: ±(2% + 0.1 Ω)

REVISION HISTORY

Revision	Date	Change Notification	Description
Rev.2	2001 Apr 27	–	- Converted to Phycomp brand