

DATA SHEET

LRC02

1%

**Low-ohmic chip resistors
size 1206**

Product specification
Supersedes data of 12th April 2000

2001 Apr 27 Rev.3

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FEATURES

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Low inductance design for current sensing applications.

APPLICATIONS

- Television
- Telecommunication
- Portable computers
- Battery chargers
- Lighting.

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 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. For ease of soldering the outer layer of these end terminations is a lead/tin alloy.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Resistance range	0.02 Ω to 0.99 Ω ; E96 series
Resistance tolerance	$\pm 1\%$
Temperature coefficient: 0.02 $\Omega \leq R < 0.04 \Omega$ 0.04 $\Omega \leq R < 0.10 \Omega$ 0.10 $\Omega \leq R < 0.20 \Omega$ 0.20 $\Omega \leq R < 0.50 \Omega$ 0.50 $\Omega \leq R < 0.99 \Omega$	$\pm 1500 \times 10^{-6}/K$ $\pm 600 \times 10^{-6}/K$ $\pm 300 \times 10^{-6}/K$ $\pm 150 \times 10^{-6}/K$ $\pm 75 \times 10^{-6}/K$
Absolute maximum dissipation at $T_{amb} = 70^\circ C$	0.25 W
Maximum permissible voltage	200 V (DC or RMS)
Operating temperature range	-55 to $+125^\circ C$
Climatic category (IEC 60068)	55/155/56
Basic specification	IEC 60115-8

ORDERING INFORMATION

Table 1 Ordering code indicating type and packing

TYPE	RESISTANCE RANGE	TOL. (%)	ORDERING CODE 2350 510
			PAPER TAPE ON REEL
			5000 units
LRC02	0.02 to 0.99 Ω	± 1	12...

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2350 510
- The subsequent 2 digits indicate the resistor type and packing; see Table 1.
- The remaining 3 digits indicate the resistance value:
 - The first 2 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
0.02 to 0.099 Ω	0
0.1 to 0.99 Ω	7

Ordering example

The ordering code of a LRC02 resistor, value 0.47 Ω , supplied on paper tape of 5000 units per reel is: 2350 510 12477.

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FUNCTIONAL DESCRIPTION

Product characterization

The resistors are available in the E96 series for resistors with a tolerance of 1%. The values of the E96 series are in accordance with “IEC publication 60063”.

Limiting values

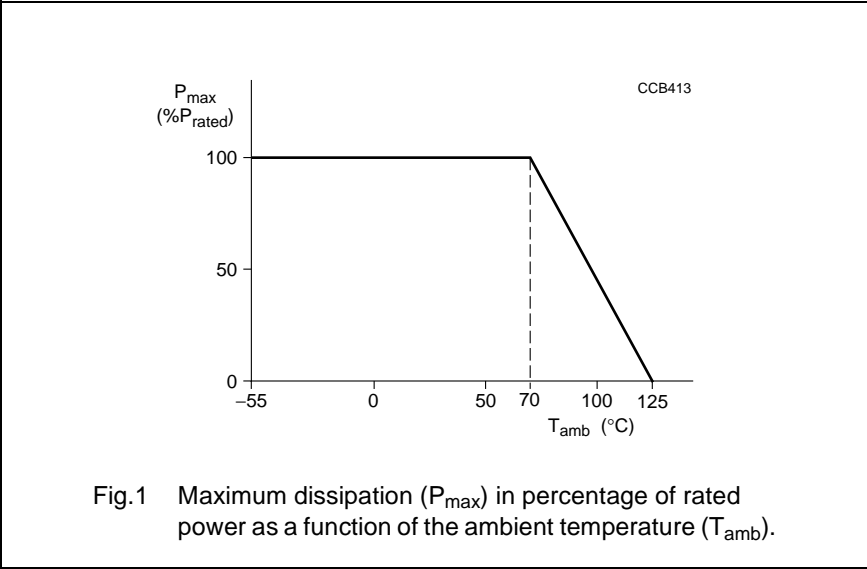
TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING POWER (W)
LRC02	200	0.25

Note

1. The maximum voltage that may be continuously applied to the resistor element, see “IEC publication 60115-8”.

DERATING

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



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MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
LRC02	1.0

Marking

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

4-DIGIT MARKING

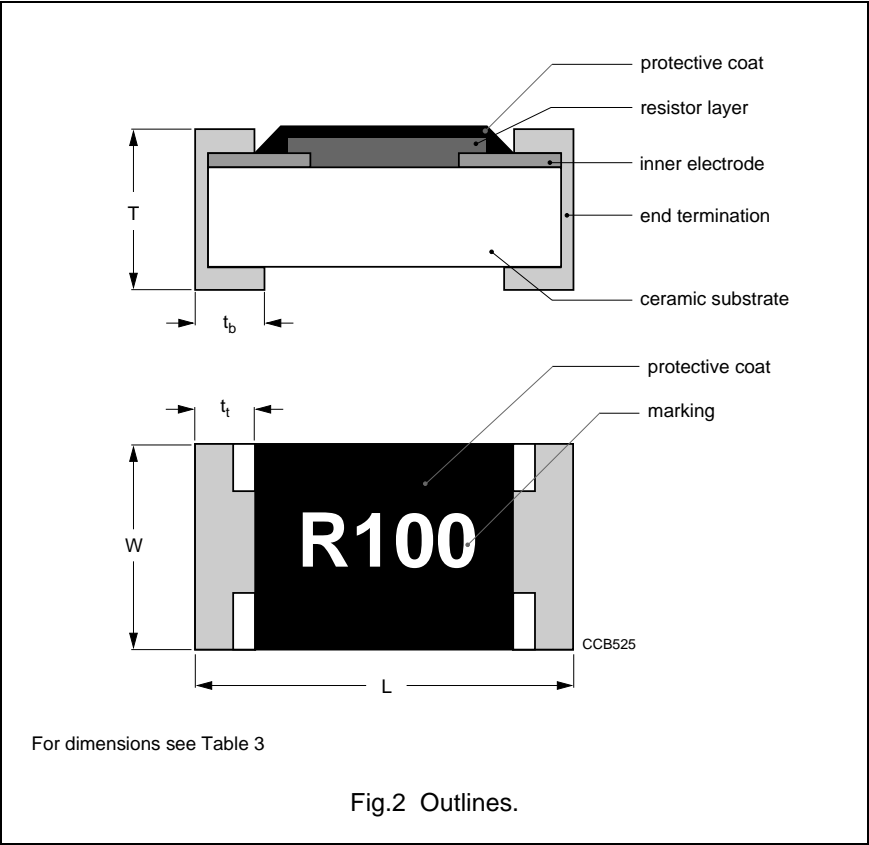
The R is used as a decimal point, the other 3 digits are significant

Example

MARKING	RESISTANCE
R220	0.220 Ω
R100	0.100 Ω
R040	0.040 Ω

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)
LRC02	3.2 +0.1/-0.2	1.6 ±0.15	0.60 ±0.10	0.45 ±0.25	0.50 ±0.25

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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 according to "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.

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/-10%): 0.1 V	$R - R_{nom}$: max. $\pm 5\%$
4.18	20 (Tb)	resistance to soldering heat	unmounted chips; 10 ± 1 s; 260 ± 5 °C	no visible damage $\Delta R/R$ max.: $\pm 1\%$
4.29	45 (Xa)	component solvent resistance	isopropyl alcohol; H ₂ O	no visible damage
4.17	20 (Ta)	solderability	unmounted chips completely immersed for 2 ± 0.5 s in a solder bath at 235 ± 2 °C	good tinning ($\geq 95\%$ covered); no damage
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 ($\geq 95\%$ covered); no damage
4.7		voltage proof on insulation	200 V (DC or RMS) during 1 minute	no breakdown or flashover
4.13		short time overload	room temperature; dissipation $6.25 \times P_n$; 5 s (voltage not more than $2 \times V_{max}$)	$\Delta R/R$ max.: $\pm 1\%$
4.33	(JIS) C 5200	bending	resistors mounted on a 90 mm glass epoxy resin printed-circuit board; bending: 5 mm	no visible damage $\Delta R/R$ max.: $\pm 1\%$
4.19	14 (Na)	rapid change of temperature	30 minutes at LCT and 30 minutes at UCT; 5 cycles	no visible damage $\Delta R/R$ max.: $\pm 1\%$
4.6.1.1		insulation resistance	100 V (DC) after 1 minute	R_{ins} min.: 10000 M Ω
4.24.2	3 (Ca)	damp heat (steady state)	56 days; 40 ± 2 °C; 93 ± 2 –3% RH; loaded with $0.01 P_n$	no visible damage $\Delta R/R$ max.: $\pm 3\%$

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IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.25.1		endurance	1000 +48/-0 hours; 70 ±2 °C; loaded with P _n or V _{max} ; 1.5 hours on and 0.5 hours off	no visible damage ΔR/R max.: ±3%
4.23.2	27 (Ba)	endurance at upper category temperature	1000 +48/-0 hours; 125 °C; no load	no visible damage ΔR/R max.: ±3%
4.8.4.2		temperature coefficient	at 20/LCT/20 °C and 20/UCT/20 °C: 0.02 Ω ≤ R < 0.04 Ω 0.04 Ω ≤ R < 0.10 Ω 0.10 Ω ≤ R < 0.20 Ω 0.20 Ω ≤ R < 0.50 Ω 0.50 Ω ≤ R < 0.99 Ω	 ±1500 × 10 ⁻⁶ /K ±600 × 10 ⁻⁶ /K ±300 × 10 ⁻⁶ /K ±150 × 10 ⁻⁶ /K ±75 × 10 ⁻⁶ /K
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 and 0.5 hours off	ΔR/R max.: ±3%

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REVISION HISTORY

Revision	Date	Change Notification	Description
Rev.3	2001 Apr 27	–	- Converted to Phycomp brand