

DATA SHEET

LPRC221

1%

**Low-ohmic power chip resistors
size 2512**

Product specification
Supersedes data of 27th April 2001

2002 Mar 15 Rev.3

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FEATURES

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability.

APPLICATIONS

- Converters
- Printer equipment
- Computers
- Battery chargers
- Power supplies
- Automotive.

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; note 1	0.01 Ω to 0.976 Ω ; E24/E96
Resistance tolerance; note 1	$\pm 1\%$
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 $\Omega \leq R < 0.976 \Omega$	$\pm 1500 \times 10^{-6}/K$ $\pm 600 \times 10^{-6}/K$ $\pm 300 \times 10^{-6}/K$ $\pm 150 \times 10^{-6}/K$ $\pm 75 \times 10^{-6}/K$
Absolute maximum dissipation at $T_{amb} = 70^\circ C$	1 W
Maximum permissible voltage	250 V (DC or RMS)
Operating temperature range	-55 to $+125^\circ C$
Climatic category (IEC 60068)	55/125/56
Basic specification	IEC 60115-8

Note

1. Non-E96 values and special tolerances are available on request.

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LPRC221
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ORDERING INFORMATION

Table 1 Ordering code indicating type and packing

TYPE	RESISTANCE RANGE	TOL. (%)	ORDERING CODE 2322 763
			BLISTER TAPE ON REEL
			4000 units
LPRC221	0.02 to 0.099 Ω	± 1	90..0
	0.1 to 0.976 Ω		6...7

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2322 763
- The subsequent 1 or 2 digits indicate the resistor tolerance; see Table 1.
- The remaining 3 or 4 digits indicate the resistance value:
 - The first 2 or 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
0.02 to 0.099 Ω	0
0.1 to 0.976 Ω	7

ORDERING EXAMPLE

The ordering code of a LPRC221 low ohmic power chip resistor, value 0.51 Ω with a tolerance of 1%, supplied on blister tape of 4000 units per reel is: 2322 763 60517.

The ordering code of a LPRC221 low ohmic power chip resistor, value 0.028 Ω with a tolerance of 1%, supplied on blister tape of 4000 units per reel is: 2322 763 90280.

Low-ohmic power chip resistors

LPRC221

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1%

FUNCTIONAL DESCRIPTION

Product characterization

The resistors are available in the E24/E96 series for resistors with a tolerance of 1%. The values of the E24/E96 series are in accordance with “IEC publication 60063”.

Limiting values

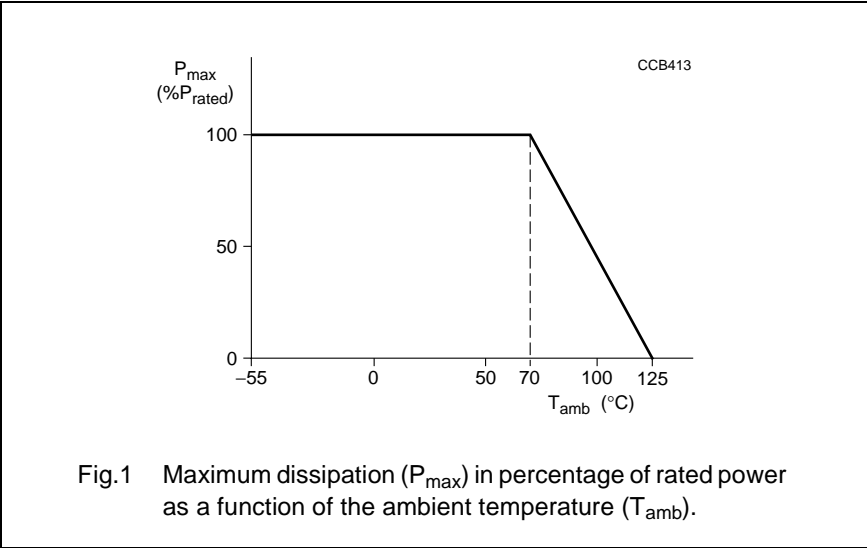
TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING POWER (W)
LPRC221	250	1.0

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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LPRC221
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MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
LPRC221	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
R020	0.02 Ω
R510	0.51 Ω

PACKAGE MARKING

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

Outlines

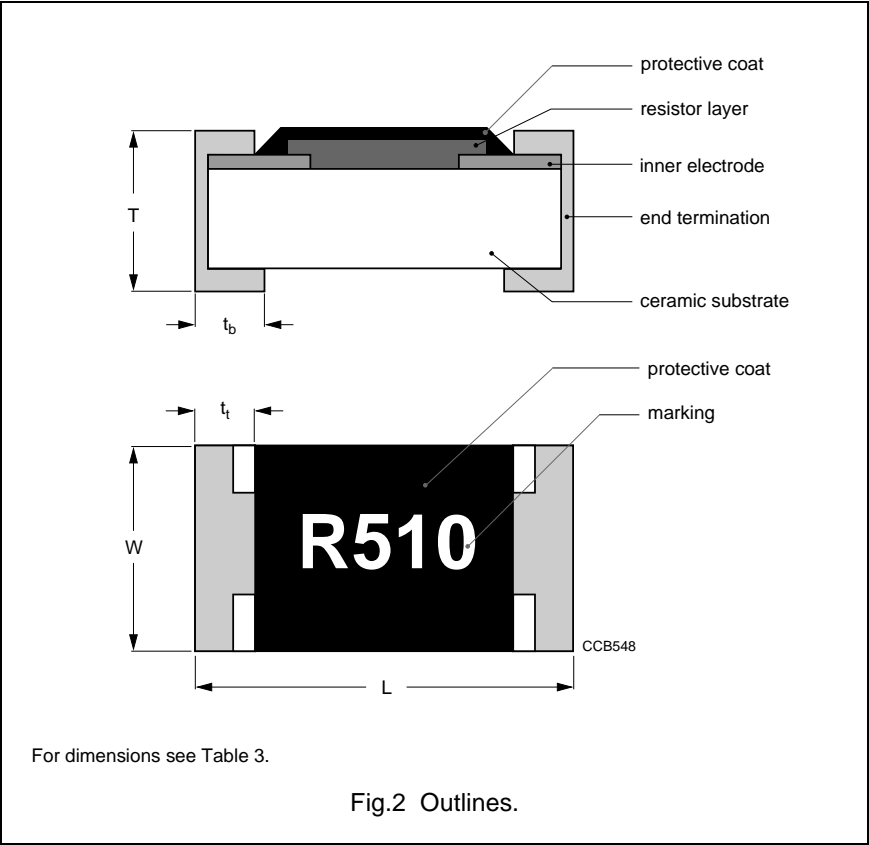


Table 3 Chip resistor type and relevant physical dimensions; see Fig.2

TYPE	L (mm)	W (mm)	T (mm)	t _t (mm)	t _b (mm)
LPRC221	6.4 ±0.20	3.2 ±0.20	0.55 ±0.10	0.65 ±0.25	1.3 ±0.25

Low-ohmic power chip resistors size 2512

LPRC221
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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
(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 requirementsProduct specification

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
Tests in accordance with the schedule of IEC publication 60115-8				
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 < 0.976 Ω	±1500 × 10 ⁻⁶ /K ±600 × 10 ⁻⁶ /K ±300 × 10 ⁻⁶ /K ±150 × 10 ⁻⁶ /K ±75 × 10 ⁻⁶ /K
4.17	20 (Ta)	soldering	unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±5 °C	good tinning (≥95% covered); no damage
4.17	20 (Tb)	solderability (after ageing)	16 hours steam or 16 hours at 155 °C; unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±5 °C	good tinning (≥95% covered); no damage
4.18	20 (Tb)	resistance to soldering heat	10 s; 260 ±5 °C	no visible damage ΔR/R max.: ±0.5%
4.33		bending test	resistors mounted on a 90 mm glass epoxy resin printed-circuit board; bending: 2 mm	no visible damage ΔR/R max.: ±0.5%
		pull strength	30 s, 500 gr on termination	no visible damage ΔR/R max.: ±1%
4.6.1.1		insulation resistance	250 V (DC) after 1 minute	R _{ins} min.: 10000 MΩ
4.13		short time overload	room temperature; dissipation 6.25 × P _n ; 5 s (voltage not more than 2 × V _{max})	no visible damage ΔR/R max.: ±1%
4.22	6 (Fc)	vibration	frequency: 10 to 500 Hz; displacement 1.55 mm or acceleration 10 g; 3 directions; total 6 hours	no visible damage ΔR/R max.: ±0.5%

Low-ohmic power chip resistors size 2512

LPRC221 1%

IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.19	14 (Na)	rapid change of temperature	30 minutes at $-55\text{ }^{\circ}\text{C}$ and 30 minutes at $+125\text{ }^{\circ}\text{C}$; 5 cycles	no visible damage $\Delta R/R$ max.: $\pm 0.5\%$
		temperature cycling (JIS)	30 minutes at $-55\text{ }^{\circ}\text{C}$; 10 minutes at $20\text{ }^{\circ}\text{C}$; 30 minutes at $125\text{ }^{\circ}\text{C}$ and 10 minutes at $20\text{ }^{\circ}\text{C}$; 5 cycles	no visible damage $\Delta R/R$ max.: $\pm 1\%$
		humidity load (JIS)	56 days; $40 \pm 2\text{ }^{\circ}\text{C}$; 90 to 95% RH; loaded with P_n or V_{\max} ; 1.5 hours on and 0.5 hours off	$\Delta R/R$ max.: $\pm 2\%$
4.24.2	3 (Ca)	damp heat (steady state)	56 days; $40 \pm 2\text{ }^{\circ}\text{C}$; 90 to 95% RH; loaded with $0.01 P_n$	$\Delta R/R$ max.: $\pm 1\%$
4.25.1		endurance	1000 hours; $70 \pm 2\text{ }^{\circ}\text{C}$; nominal dissipation; 1.5 hours on and 0.5 hours off	$\Delta R/R$ max.: $\pm 3\%$
4.12		noise	IEC publication 60195 (measured with Quatech-equipment): $R \leq 1\text{ k}\Omega$ $R \leq 10\text{ k}\Omega$ $R \leq 100\text{ k}\Omega$ $R \leq 1\text{ M}\Omega$	max. $1\text{ }\mu\text{V/V}$ (0 dB) max. $3\text{ }\mu\text{V/V}$ (9.54 dB) max. $6\text{ }\mu\text{V/V}$ (15.56 dB) max. $10\text{ }\mu\text{V/V}$ (20 dB)

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LPRC221
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REVISION HISTORY

Revision	Date	Change Notification	Description
Rev. 2	2001 Apr 27	–	- Converted to Phycomp brand
Rev. 3	2002 Mar 15	–	- Product type changed from PRC111 into LPRC111