

DATA SHEET

PRC201
5%; 2%; 1%
Power chip resistor
size 1218

Product specification
Supersedes data of 22nd July 1999
File under Advanced Ceramics and Modules, ACM2

1999 Dec 02

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FEATURES

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Excellent performance at high frequency.

APPLICATIONS

- Power supplies in small sized equipment
- Camcorders
- Portable radio, CD and cassette players
- Automotive.

QUICK REFERENCE DATA

DESCRIPTION	VALUE
Resistance range	1Ω to 1 MΩ
Resistance tolerance and series: $1\ \Omega \leq R \leq 1\ \text{M}\Omega$	±5%, ±2%, ±1%; E24/E96 series
Temperature coefficient: $1\ \Omega \leq R < 10\ \Omega$ $10\ \Omega \leq R \leq 1\ \text{M}\Omega$	$\leq \pm 200 \times 10^{-6}/\text{K}$ $\leq \pm 100 \times 10^{-6}/\text{K}$
Absolute maximum dissipation at $T_{\text{amb}} = 70\ ^\circ\text{C}$	1 W
Maximum permissible voltage	200 V (DC or RMS)
Maximum permissible current	6 A (DC or RMS)
Operating temperature range	-55 °C to +155 °C
Basic specification	IEC 60115-8

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. To guarantee optimum solderability the outer layer consists of a lead-tin alloy.

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ORDERING INFORMATION

Table 1 Ordering code indicating resistor type and packaging

TYPE	TOL. (%)	ORDERING CODE 2322 735
		BLISTER TAPE ON REEL
		5000 units
PRC201	±5	60...
	±2	80...
	±1	2....
Jumper 0 Ω		
PRC201; note 1	—	90006

Note

- The jumper has a maximum resistance $R_{\max} = 20 \text{ m}\Omega$ and a rated current $I_R = 6 \text{ A}$.

Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2322
- The subsequent four or five digits indicate the resistor type and packaging; see Table 1.
- The remaining digits indicate the resistance value:
 - The first 2 digits for 5% and 2% or 3 digits for 1% tolerance products 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
1 to 9.1 Ω	8
10 to 91 Ω	9
100 to 910 Ω	1
1 to 9.1 kΩ	2
10 to 91 kΩ	3
100 to 910 kΩ	4
1 MΩ	5

ORDERING EXAMPLE

The ordering code of a PRC201 resistor, value 470 Ω with 5% tolerance, supplied on blister tape of 5 000 units per reel is: 2322 735 60471.

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FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 or E96 series for resistors with a tolerance of $\pm 5\%$, $\pm 2\%$ or $\pm 1\%$. The values of the E24/E96 series are in accordance with "IEC publication 60063".

Limiting values

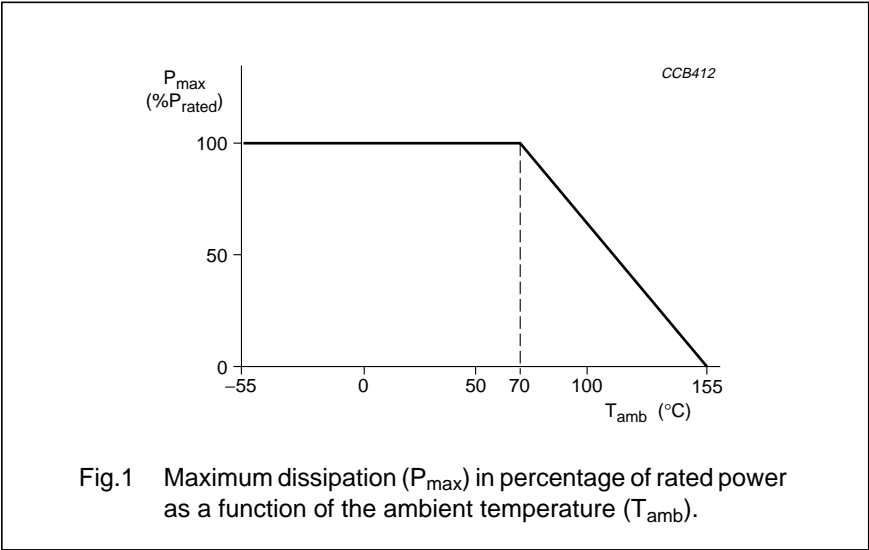
TYPE	LIMITING VOLTAGE ⁽¹⁾ (V)	LIMITING CURRENT (A)	LIMITING POWER (W)
PRC201	200	6	1

Note

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

DERATING

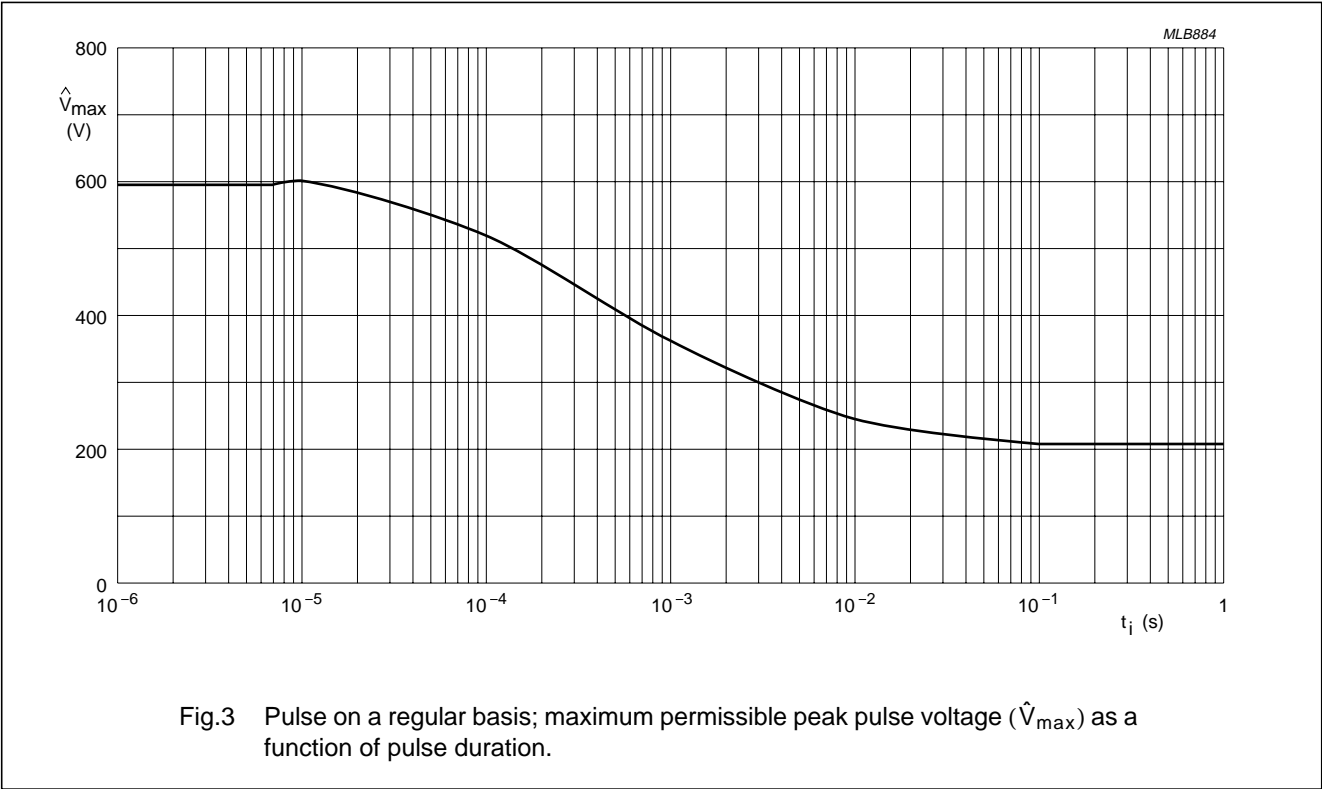
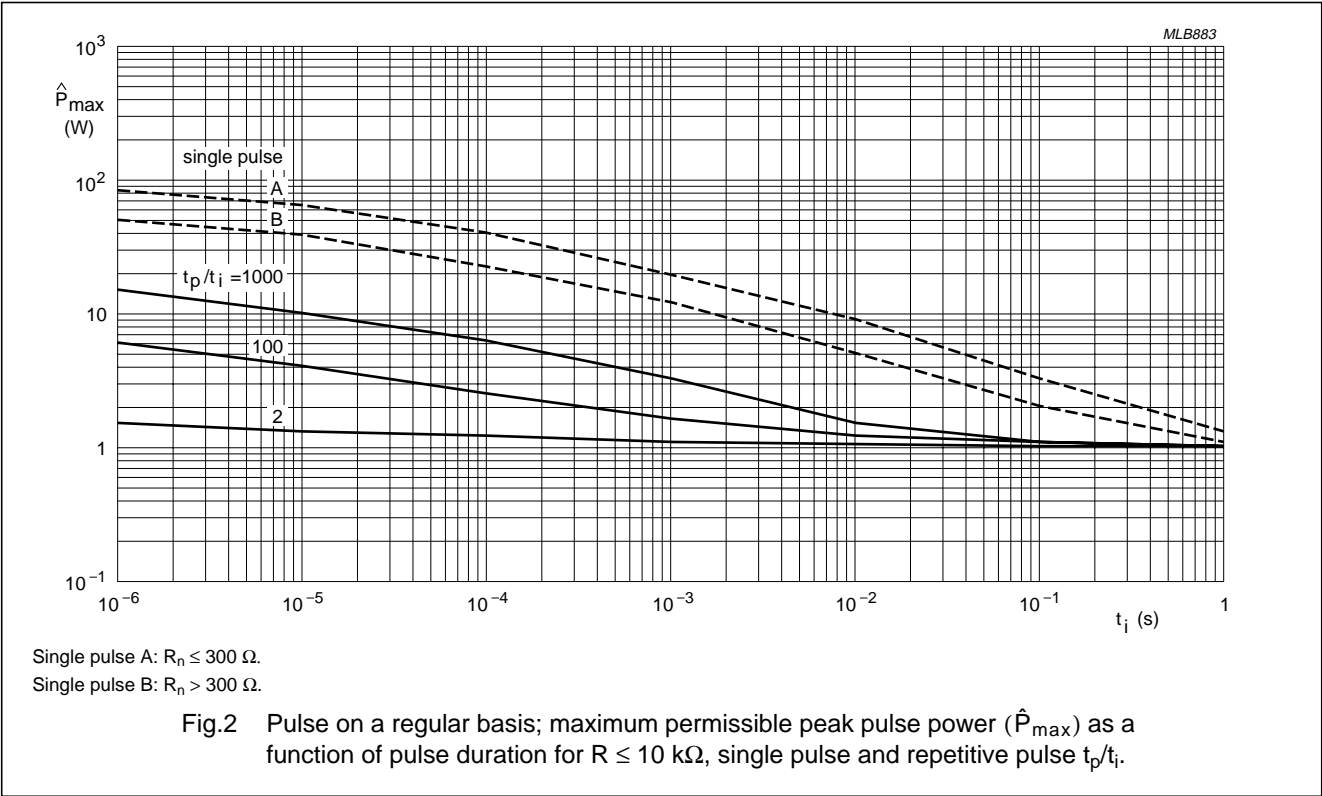
The power that the resistor can dissipate depends on the operating temperature; see Fig.1.



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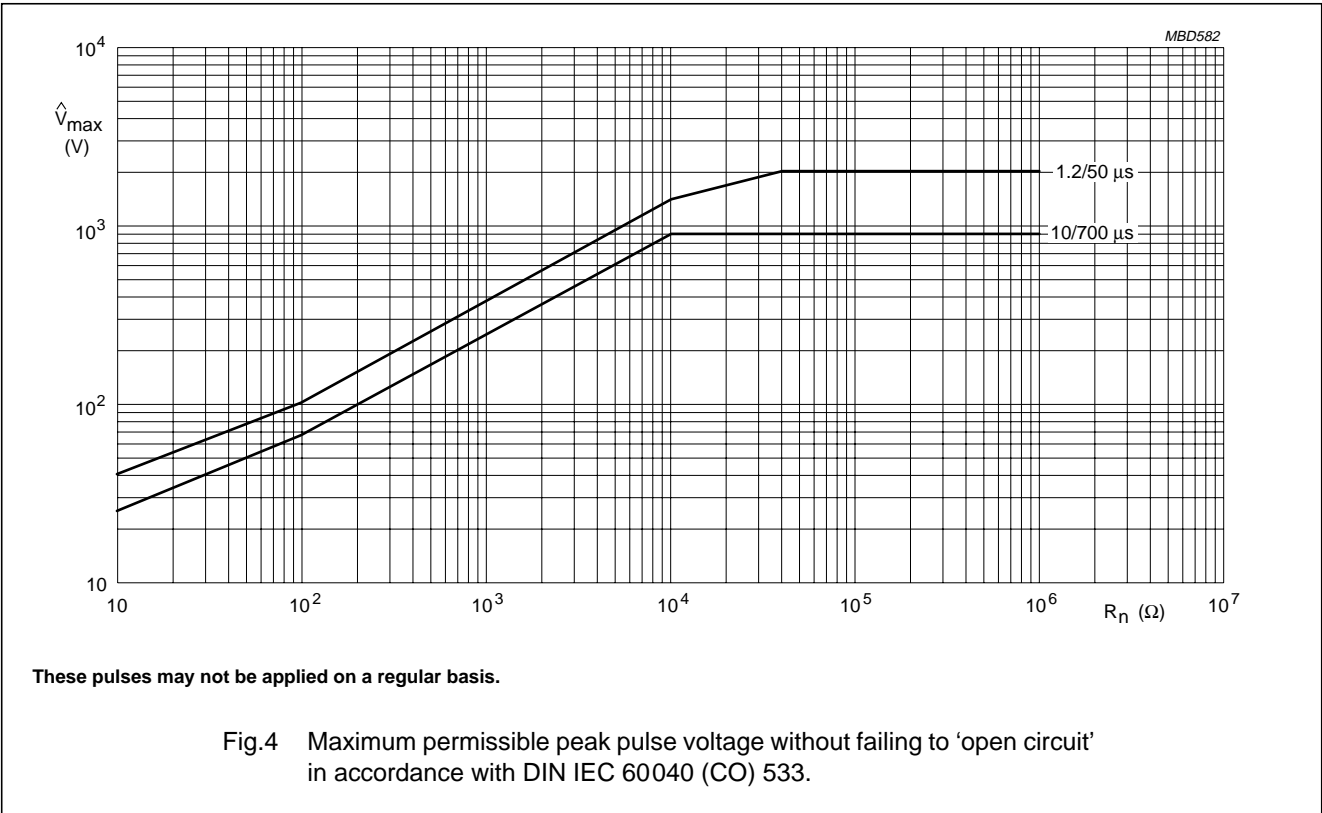
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PULSE LOADING CAPABILITIES



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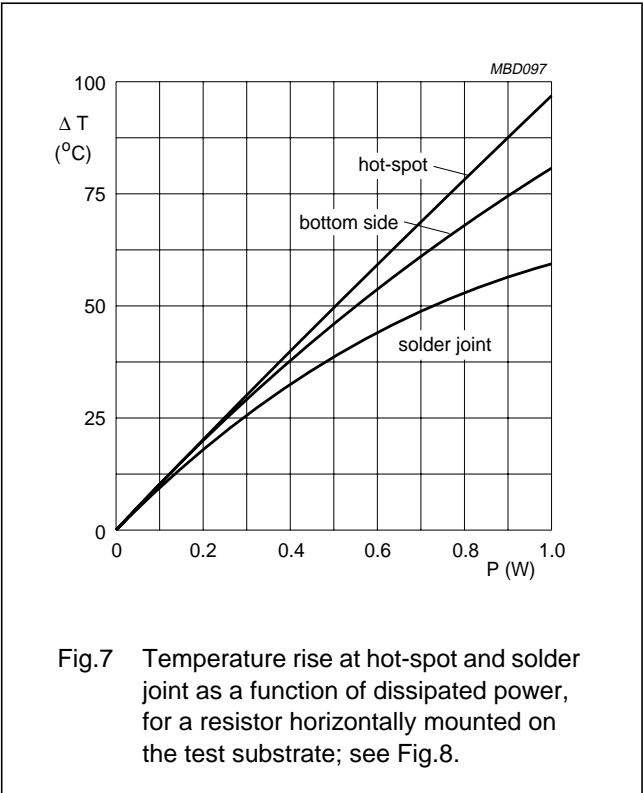
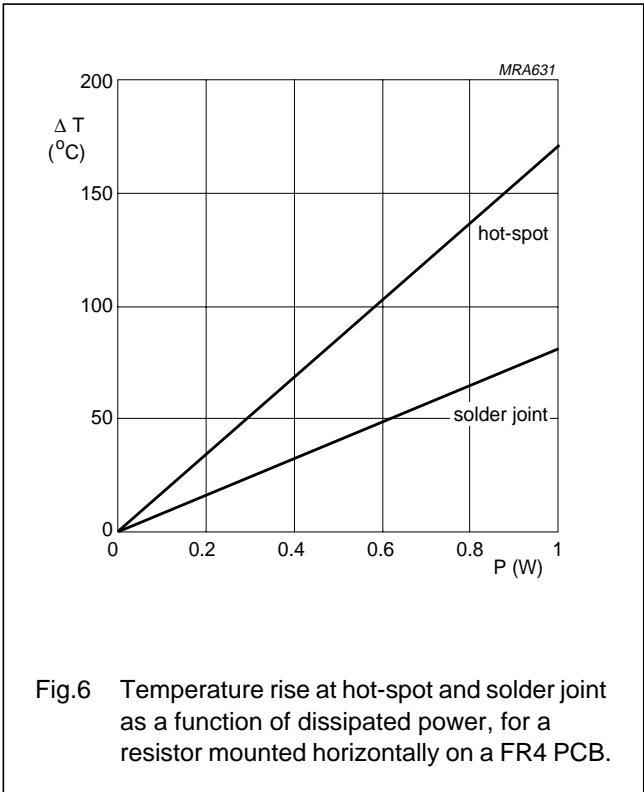
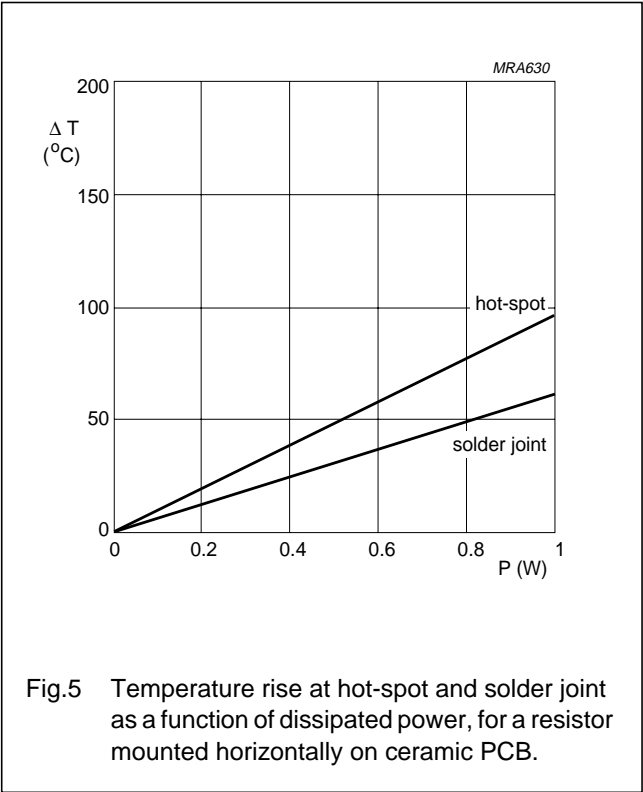
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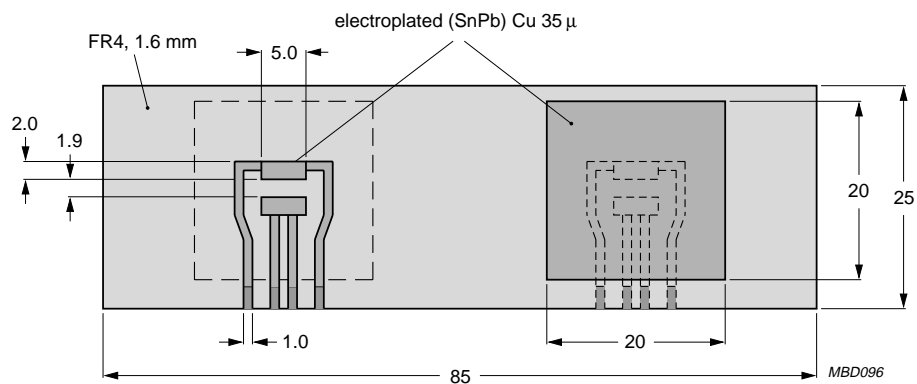
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Application information



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Dimensions in mm.

Fig.8 Test substrate layout. The tracks on the substrate for values below 33 mΩ are wider. With this substrate, the resistance of the tracks becomes significant compared to the resistor tested. Due to the current loading required for resistor testing these tracks may be damaged.

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MECHANICAL DATA

Mass per 100 units

TYPE	MASS (g)
PRC201	3

Marking

Each resistor is marked with the nominal resistance value.

4-DIGIT MARKING

For values up to 910 Ω the R is used as a decimal point. For values of 1 kΩ or greater the letter K or M is used as the decimal point for the kΩ or MΩ indication.

Magnitude indicators

RESISTANCE	INDICATOR
1 to 910 Ω	R
1 to 910 kΩ	K
1 MΩ	M

Example

MARKING	RESISTANCE
120R	120 Ω
4K70	4.70 kΩ

PACKAGE MARKING

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

Outlines

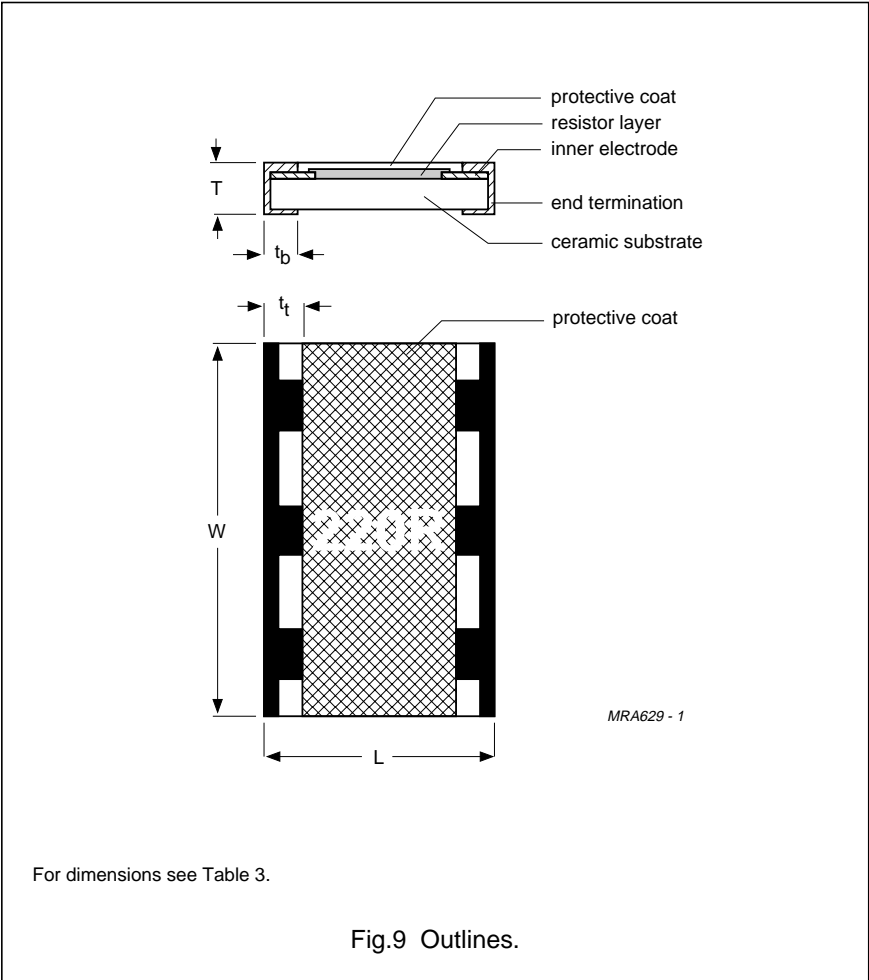


Table 3 Chip resistor type and relevant physical dimensions; see Fig.9

TYPE	L (mm)	W (mm)	T (mm)	t_t (mm)	t_b (mm)
PRC201	3.05 ±0.15	4.60 ±0.20	0.55 ±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 55/155/56 (rated temperature range -55 to +155 °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 damage
4.4.2		dimensions (outline)	gauge	$0.45 \text{ mm} \leq T \leq 0.65 \text{ mm}$ $4.4 \text{ mm} \leq W \leq 4.8 \text{ mm}$ $2.9 \text{ mm} \leq L \leq 3.2 \text{ mm}$
4.5		resistance	applied voltage (+0/-10%): R < 10 Ω: 0.1 V 10 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 1 MΩ: 50 V	R - R _{nom} : max. ±5% or 1%
4.18	20 (Tb)	resistance to soldering heat	unmounted chips; 10 ±1 s; 260 ±5 °C: 1 Ω ≤ R ≤ 1 MΩ	ΔR/R max.: ±(1% +0.05 Ω)
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 (≥95% covered); no damage
4.7		voltage proof on insulation	200 V (RMS) during 1 minute	no breakdown or flashover
4.13		short time overload	room temperature; dissipation 6.25 × P _n ; 5 s (voltage not more than 2 × V _{max})	ΔR/R max.: ±(1% +0.05 Ω)

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IEC 60115-8 CLAUSE	IEC 60068-2 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.33		bending	resistors mounted on a 90 mm glass epoxy resin PCB (FR4), bending: 2 mm	no damage $\Delta R/R$ max.: $\pm(1\% + 0.05 \Omega)$
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.: $\pm(1.0\% + 0.05 \Omega)$
4.6.1.1		insulation resistance	100 V (DC) after 1 minute	R_{ins} min.: 1000 M Ω
4.24.2	3 (Ca)	damp heat (steady state)	56 days; 40 ± 2 °C; $93 \pm 2/-3\%$ RH; loaded with $0.01P_n$	no visible damage $\Delta R/R$ max.: $\pm(3\% + 0.1 \Omega)$
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: $1 \Omega \leq R \leq 1 \text{ M}\Omega$	no visible damage $\Delta R/R$ max.: $\pm(3\% + 0.1 \Omega)$
4.23.2	27 (Ba)	endurance at upper category temperature	1000 +48/-0 hours; no load	no visible damage $\Delta R/R$ max.: $\pm(3\% + 0.1 \Omega)$
4.8.4.2s ⁱ		temperature coefficient	at 20/LCT/20 °C and 20/UCT/20 °C: $1 \Omega \leq R < 10 \Omega$ $10 \Omega \leq R$	$\Delta R/R$ max.: $\pm 200 \times 10^{-6}/K$ $\Delta R/R$ max.: $\pm 100 \times 10^{-6}/K$
Other tests in accordance with IEC 60115 clauses and IEC 60068 test method				
4.17	20 (Ta)	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 ± 2 °C	good tinning ($\geq 95\%$ covered); no damage
Other applicable tests				
		leaching	unmounted chips 60 ± 1 s; 260 ± 5 °C	good tinning; no leaching