Pulse Withstanding Chip Resistors

PWC Series

Features:

- Excellent pulse withstand performance
- Improved working voltage
- Improved power rating
- Anti-sulphur version available

All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

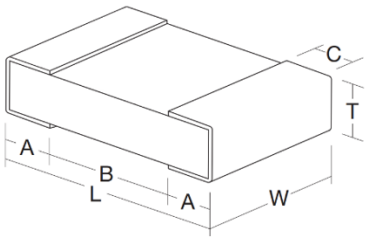
Electrical Data

		PWC0603	PWC0805	PWC1206		PWC2010		PWC2512	
Power rating @70°C	W	0.125	0.25	0.33	0.5	0.75	1	1.5	2
Pad & trace area [1] for full power operation	mm^2	30	40	50	125	60	250	100	500
Thermal impedance mounted as recommended	°C/W	302	220	160	145	80	70	55	40
Limiting element voltage	V	75	150	200		400		500	
Resistance range	ohms	1R0 to 10M							
Resistance tolerance	%	<10R: 1, 5, 10R to 1M0: 0.5, 1, 5, >1M0: 1, 5							
TCR	ppm/°C	<10R: 200, ≥10R: 100							
Ambient temperature range	°C	-55 to +155							
Standard values		E24 & E96 preferred							
Pulse capability		See Pulse Performance Data							

Note 1: Recommended minimum pad & adjacent trace area for each termination for rated power dissipation on FR4 PCB.

Physical Data

Dimensions in mm and weight in mg							
	L	W	T_{max}	A	B_{min}	C	$Wt._{nom}$
0603	1.6 ± 0.1	0.8 ± 0.1	0.55	0.3 ± 0.15	0.6	0.3 ± 0.15	2.2
0805	2 ± 0.15	1.25 ± 0.15	0.6		0.9	0.3 ± 0.1	4.7
1206	3.2 ± 0.2	1.6 ± 0.2	0.7	0.4 ± 0.2	1.7	0.4 ± 0.15	8.5
2010	5.1 ± 0.3	2.5 ± 0.2	0.8	0.6 ± 0.3	3	0.6 ± 0.25	36
2512	6.5 ± 0.3	3.2 ± 0.2			4.4		55



Construction

Thick film resistor material, overglaze and organic protection are screen printed on a 96% alumina substrate. Wrap-around terminations have an electroplated nickel barrier and solder coating, this ensures excellent 'leach' resistance properties and solderability.

Note that anti-sulphur version parts below 5R0 are produced in flip-chip format with the resistor element on the underside.

Marking

Components are not marked. Reels are marked with type, value, tolerance, date code and quantity.

Solvent Resistance

The body protection is resistant to all normal industrial cleaning solvents suitable for printed circuits.

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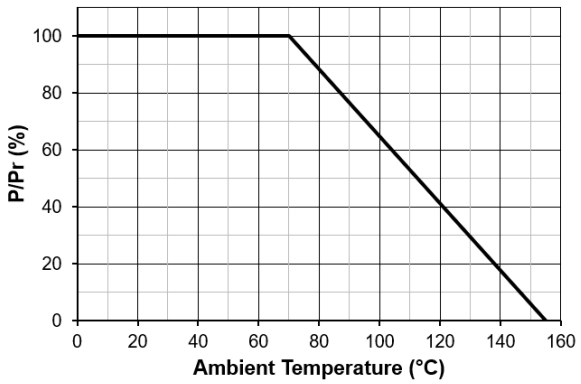
Performance Data

			Maximum [1]	Typical
Load at rated power: 1000 hours at 70°C		±ΔR%	1	0.25
Shelf-life test: 12 months at room temperature		±ΔR%	0.1	0.02
Short-term overload: 6.25 x rated power for 2s		±ΔR%	1	0.1
Dry heat: 1000 hours at 155°C		±ΔR%	1	0.2
Long term damp heat		±ΔR%	1	0.25
Temperature rapid change		±ΔR%	0.25	0.05
Resistance to solder heat		±ΔR%	0.25	0.05
Anti-sulphur grade (AS)	ASTM-B-809: 1000 hours, 50°C, 91-93%RH	±ΔR%	0.25	0.05
Sulphur-resistant grade (SR)	EIA-977: 750 hours, 105°C	±ΔR%	0.25	0.05
	ASTM-B-809: 1000 hours, 50°C, 91-93%RH	±ΔR%	0.25	0.05
	Modified ASTM-B-809: 1000 hours, 105°C, 85%RH	±ΔR%	1	0.25
Voltage proof		V	500	

Note 1: A 0.01Ω addition applies for resistor values <10R.

Temperature Derating

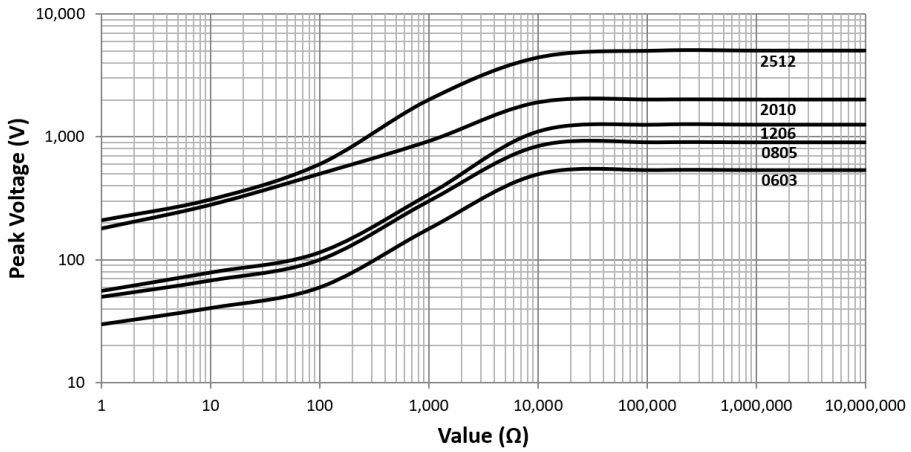


Pulse Performance Data

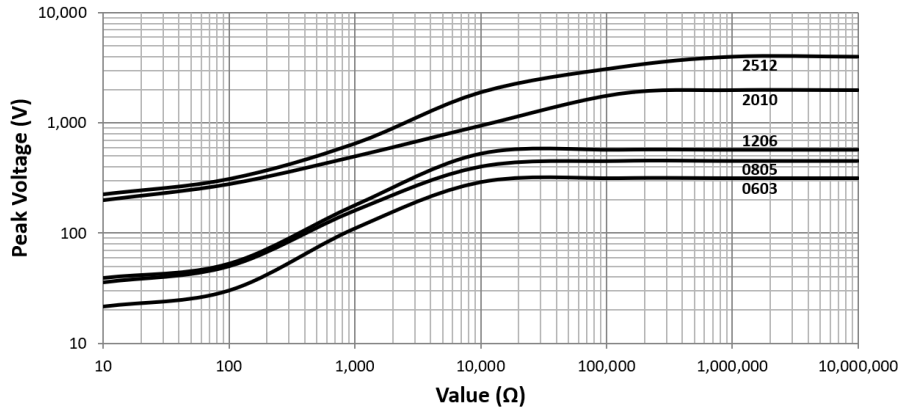
Lightning Surge

Tested in accordance with IEC 60 115-1 using both 1.2/50µs and 10/700µs pulse shapes. 10 pulses are applied. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

1.2/50µs Lightning Surge



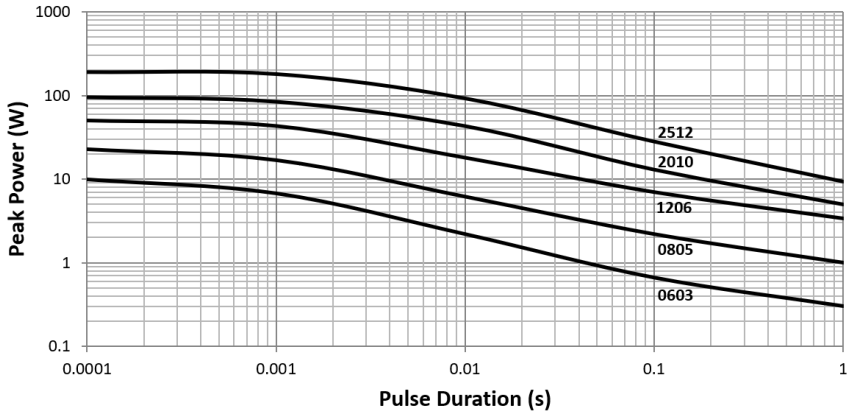
10/700µs Lightning Surge



Single Pulse

50 rectangular pulses are applied at 1 minute intervals to avoid cumulative heating. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

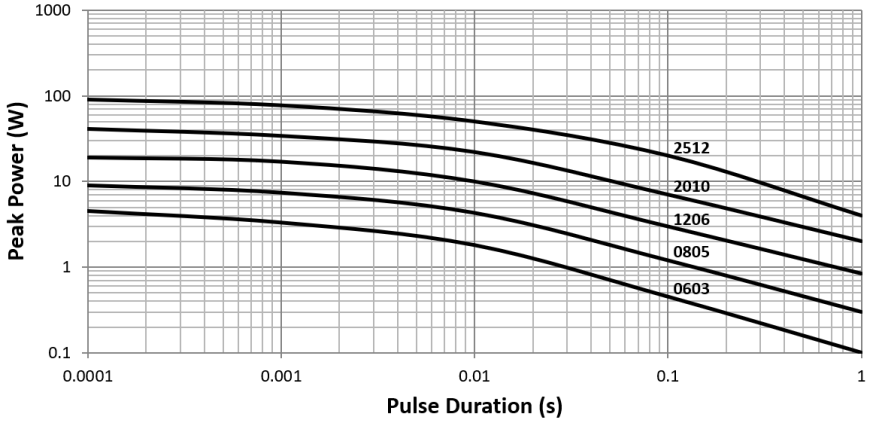
Single Pulse



Continuous Pulses

Repetitive rectangular pulses are applied at a frequency which causes the mean power to equal the rated power. The limit of acceptance is a shift in resistance of less than 1% from the initial value.

Continuous Pulses



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Packaging

0603, 0805 and 1206 resistors are supplied on 8mm carrier tape and 2010 and 2512 resistors are supplied on 12mm carrier tape, all on 7 inch reels as per IEC 286-3. For full details of tape and reel dimensions see: https://www.ttelectronics.com/TTElectronics/media/ProductFiles/Application-Note/PS003-Packing-of-Specialist-Chip-Resistors.pdf.

Application Note

PWC resistors themselves can operate at a maximum temperature of 155°C. For soldered resistors, the joint temperature should not exceed 110°C. This condition is met when the stated power levels at 70°C and recommended pad and trace areas are used. Pad and trace area is defined as the total area of the solder pad plus all copper trace within two squares of the edge of the solder pad. Allowance should be made if smaller areas of copper are used.

Ordering Procedure

Global Part Number Example: PWC2512-2K0JI (2512, 2 kilohms ±5%, Pb-free)

P	W	C	2	5	1	2			-	2	K	0		J	I	
1			2				3			4				5	6	

1 Series	2 Size	3 Sulphur Grade [1]	4 Value	5 Tolerance	6 Termination & Packing	
PWC	0603	Omit for standard	E24 = 3/4 characters E96 = 3/4 characters R = ohms K = kilohms M = megohms	D = ±0.5%	I = Pb-free, Standard packing	
	0805	AS = Anti-sulphur		F = ±1%	PB = SnPb, Standard packing	
	1206	SR = Sulphur Resistant		J = ±5%	Standard Packing	
	2010				0603	5000/reel
	2512				0805, 1206, 2010	3000/reel
					2512	1800/reel
					T1 = Pb-free, 1K reel packing	
					1K Reel Packing (non-standard)	
					All sizes	1000/reel

Note 1: For new designs requiring resistance to sulphur-bearing gas, SR grade is preferred.

Legacy Part Numbers

This product has a legacy part number format for 1206 and larger sizes only. This is still available for ordering, but for new designs use of the Global Part Number is recommended.

Legacy Part Number Example: PWC-PWC2512LF-2K00-J (2512, 2 kilohms ±5%, Pb-free)

P	W	C	-	P	W	C	2	5	1	2	L	F	-	2	K	0	0	-	J
1				2			3				4			5					6

1 Family	2 Model	3 Size	4 Termination	5 Value	6 Tolerance	Packing	
PWC	PWC	1206	Omit for SnPb	E24 = 4 characters E96 = 4 characters R = ohms K = kilohms M = megohms	D = ±0.5%	Plastic tape	
		2010	LF = Pb-free		F = ±1%	1206, 2010	3000/reel
		2512			J = ±5%	2512	1800/reel