

Pulse Withstanding Chip Resistors



Electronics

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.

General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.

All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

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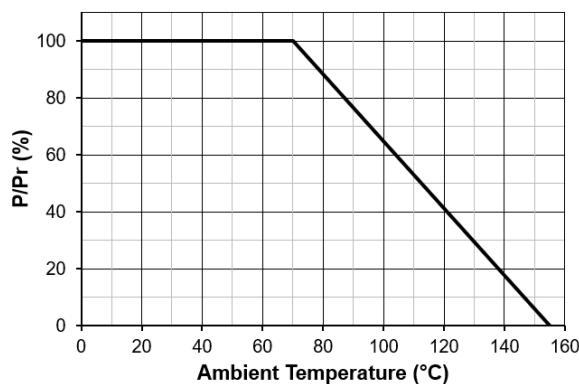


Performance Data

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

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

Temperature Derating

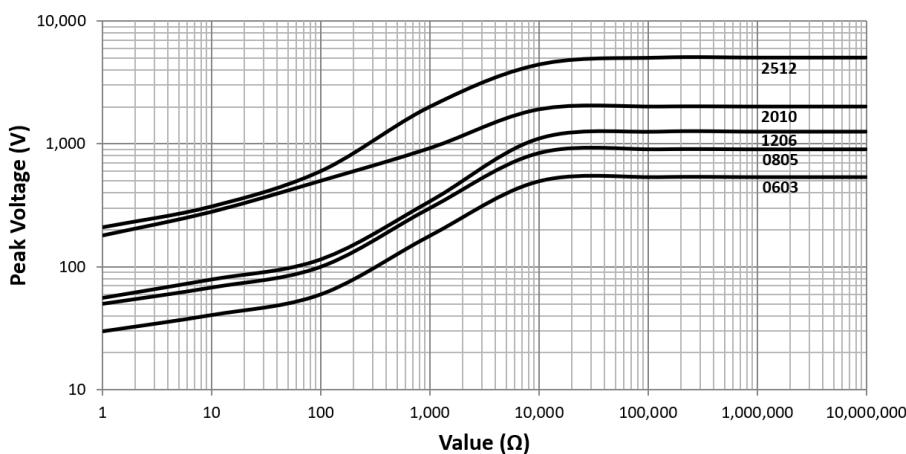


Pulse Performance Data

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.

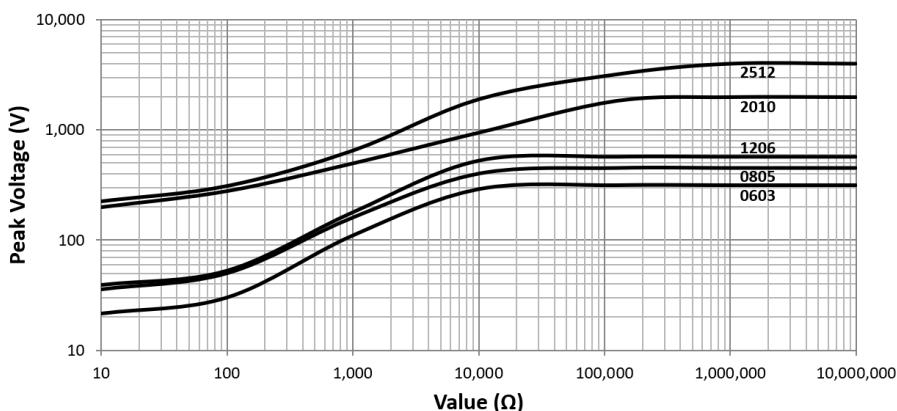
1.2/50μs Lightning Surge



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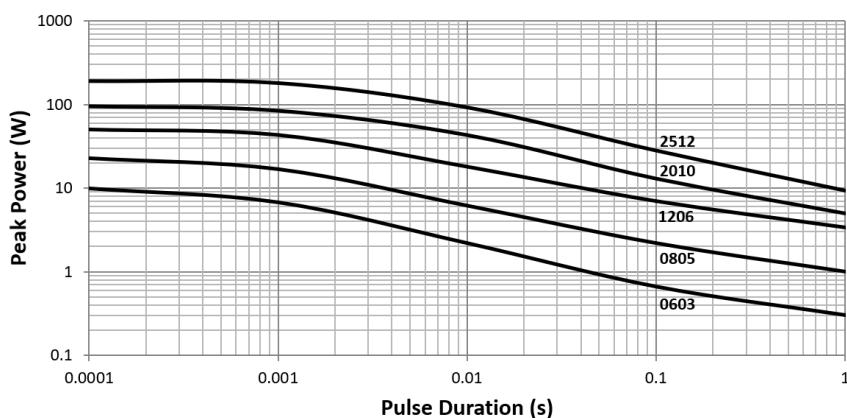
10/700μs Lightning Surge



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.

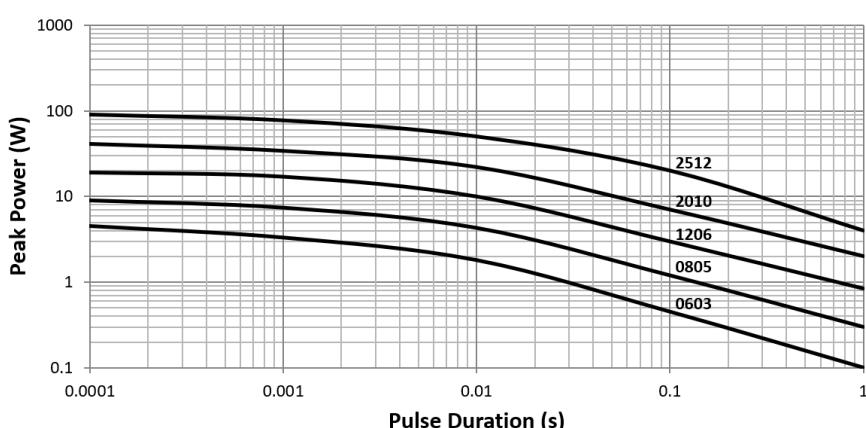
Single Pulse



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



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: PWC2512-2K0J (2512, 2 kilohms ±5%, Pb-free)



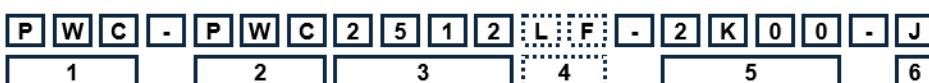
1 Series	2 Size	3 Sulphur Grade ¹	4 Value	5 Tolerance	6 Termination & Packing
PWC	0603	Omit for standard	E24 = 3/4 characters E96 = 3/4 characters R = ohms K = kilohms M = megohms	D = ±0.5%	I = Pb-free, Standard packing
	0805	AS = Anti-sulphur		F = ±1%	PB = SnPb, Standard packing
	1206	SR = Sulphur Resistant		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)



1 Family	2 Model	3 Size	4 Termination	5 Value	6 Tolerance	7 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

Mouser Electronics

Authorized Distributor

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[PWC2010LF-1000-JT](#) [PWC2512LF-36R0-JT](#) [PWC2512-20R0-F](#) [PWC2512LF-1K00-JT](#) [PWC2512LF-2K70-JT](#)
[PWC2512LF-1R00-JT](#) [PWC1206LF-1R00-FT](#) [PWC2010LF-1K00-JT](#) [PWC2010LF-100R-JT](#) [PWC2512LF-68R0-JT](#)
[PWC2512-1K00-JT](#) [PWC2512-100R-JT](#) [PWC2512-2R00-JT](#) [PWC2512-51R0-JT](#) [PWC2512LF-2K20-JT](#)
[PWC2512LF-3K30-JT](#) [PWC2512LF9R76F](#) [PWC2512LF137KF](#) [PWC1206LF8M66F](#) [PWC2512LF9M31F](#)
[PWC1206LF8M06J](#) [PWC2512LF140RF](#) [PWC1206LF7R68J](#) [PWC1206LF82K5F](#) [PWC1206LF86R6F](#)
[PWC2512LF9M09F](#) [PWC1206LF8K87J](#) [PWC2512LF9R31F](#) [PWC2512LF13R7F](#) [PWC1206LF82R5F](#)
[PWC1206LF88K7F](#) [PWC1206LF8K25F](#) [PWC2512LF9K09J](#) [PWC2512LF9R53F](#) [PWC1206LF76R8F](#)
[PWC1206LF78K7J](#) [PWC1206LF806RF](#) [PWC1206LF820RJ](#) [PWC1206LF845RJ](#) [PWC1206LF84R5F](#)
[PWC1206LF8K45F](#) [PWC1206LF820RF](#) [PWC1206LF84R5J](#) [PWC2512LF130RJ](#) [PWC1206LF825RJ](#)
[PWC1206LF76K8F](#) [PWC1206LF7K87F](#) [PWC1206LF78R7J](#) [PWC1206LF7K68F](#) [PWC2512LF127KJ](#)
[PWC2512LF12K4J](#) [PWC2512LF10K2F](#) [PWC2512LF113KJ](#) [PWC2512LF124KF](#) [PWC2512LF9R09J](#)
[PWC2010LF9M09J](#) [PWC2512LF115KF](#) [PWC2010LF931RJ](#) [PWC2512LF976KF](#) [PWC2512LF127KF](#)
[PWC2512LF909KF](#) [PWC2512LF953RF](#) [PWC2512LF102KJ](#) [PWC2512LF102RF](#) [PWC2512LF10K5J](#)
[PWC2512LF11K3F](#) [PWC2512LF11K8J](#) [PWC2010LF910RJ](#) [PWC2512LF10K2J](#) [PWC2010LF8K66J](#)
[PWC2010LF93K1F](#) [PWC2512LF90K9J](#) [PWC2512LF910RJ](#) [PWC2512LF100RJ](#) [PWC2512LF866RJ](#)
[PWC2512LF8R87F](#) [PWC2512LF102RJ](#) [PWC2512LF845RF](#) [PWC2010LF90R9F](#) [PWC2010LF95R3J](#)
[PWC2512LF909RJ](#) [PWC2512LF953KJ](#) [PWC2010LF9M31J](#) [PWC2512LF7R32J](#) [PWC2512LF825RJ](#)
[PWC2512LF8K45F](#) [PWC2010LF80K6J](#) [PWC2512LF7M68J](#) [PWC2010LF806RF](#) [PWC2010LF80R6J](#)
[PWC2010LF845RF](#) [PWC2512LF80R6F](#) [PWC2010LF887KF](#) [PWC2010LF820KF](#) [PWC2010LF82R5J](#)
[PWC2010LF88K7J](#) [PWC2512LF806RF](#) [PWC2512LF820RJ](#) [PWC2010LF750KJ](#) [PWC2010LF6K19J](#)