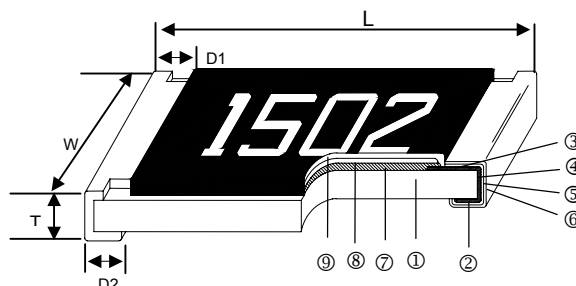


Pulse Withstanding Chip Resistor – PWR Series

Construction



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (RuO ₂ /Ag)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Primary Overcoat (Glass)
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Secondary Overcoat (Epoxy)

Features

- Tolerance from $\pm 0.5\%$ ~ 5%
- High power rating
- Excellent pulse withstanding performance
- Improved working voltage ratings
- Standard package sizes of 0603~2512

Applications

- Metering (Testing/Measurement)
- Diagnostic Equipment
- Medical Devices
- Industrial Controls
- Plasma
- LCD Video Monitors

Dimensions

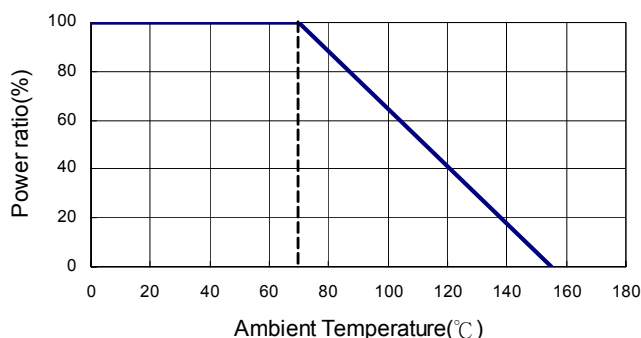
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
PWR03	0603	1.60 \pm 0.10	0.80 \pm 0.10	0.45 \pm 0.10	0.30 \pm 0.20	0.30 \pm 0.20	2.042
PWR05	0805	2.00 \pm 0.10	1.25 \pm 0.10	0.50 \pm 0.10	0.35 \pm 0.20	0.40 \pm 0.20	4.368
PWR06	1206	3.10 \pm 0.10	1.55 \pm 0.10	0.55 \pm 0.10	0.50 \pm 0.25	0.50 \pm 0.20	8.947
PWR13	1210	3.10 \pm 0.10	2.60 \pm 0.15	0.55 \pm 0.10	0.50 \pm 0.25	0.50 \pm 0.20	15.959
PWR10	2010	5.00 \pm 0.10	2.50 \pm 0.15	0.55 \pm 0.10	0.60 \pm 0.25	0.50 \pm 0.20	24.241
PWR12	2512	6.35 \pm 0.10	3.10 \pm 0.15	0.55 \pm 0.10	0.60 \pm 0.25	0.50 \pm 0.20	39.448

Part Numbering

PWR	12	J	T	E	A	1001	N
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	D: $\pm 0.5\%$ F: $\pm 1\%$ J: $\pm 5\%$	T: Taping Reel B: Bulk	E: ± 100 F: ± 200	A: 1.5W T: 1W Q: 3/4W U: 1/2W O: 1/3W V: 1/4W P: 1/5W W: 1/8W X: 1/10W	1001: 1K Ω 1004: 1M Ω 1005: 10M Ω	: Standard Marking N: No Marking

Derating Curve



Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Resistance Range			TCR (PPM/°C)
				±0.5%	±1%	±5%	
PWR03 (0603)	1/10W	-55 ~ +155°C	50V	10Ω - 299Ω	1Ω - 299Ω		±200
				300Ω - 1MΩ			±100
PWR05 (0805)	1/8W	-55 ~ +155°C	150V	10Ω - 299Ω	1Ω - 299Ω		±200
				300Ω - 20MΩ			±100
PWR06 (1206)	1/3W	-55 ~ +155°C	200V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100
PWR13 (1210)	1/2W	-55 ~ +155°C	200V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100
PWR10 (2010)	3/4W	-55 ~ +155°C	400V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100
PWR12 (2512)	1.5W	-55 ~ +155°C	500V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100

High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Resistance Range			TCR (PPM/°C)
				±0.5%	±1%	±5%	
PWR03 (0603)	1/8W	-55 ~ +155°C	50V	10Ω - 299Ω	1Ω - 299Ω		±200
	1/5W			300Ω - 1MΩ			±100
PWR05 (0805)	1/4W	-55 ~ +155°C	150V	10Ω - 299Ω	1Ω - 299Ω		±200
				300Ω - 20MΩ			±100
PWR06 (1206)	1/2W	-55 ~ +155°C	200V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100
PWR10 (2010)	1W	-55 ~ +155°C	400V	10Ω - 20Ω	1Ω - 20Ω		±200
				20.1Ω - 20MΩ			±100

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

■ Viking is capable of manufacturing the optional spec based on customer's requirement.

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	-55°C~+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	RCWV*2.5 or Max. overload voltage for 5 seconds
Insulation Resistance	≥10G	Max. overload voltage for 1 minute
Endurance	±(1.0%+0.05Ω)	70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(0.5%+0.05Ω)	40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±(0.5%+0.05Ω)	at +155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	Bending once for 5 seconds 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage	245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%	260±5°C for 30 seconds
Rapid Change of Temperature	±(0.5%+0.05Ω)	-55°C to +155°C, 5 cycles

■ Reference Standards: IEC 60115-1, 60068-2-58; JIS-C 5201-1

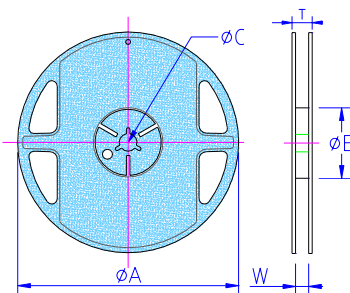
■ Storage Temperature: 25±3°C; Humidity < 80%RH

Packaging

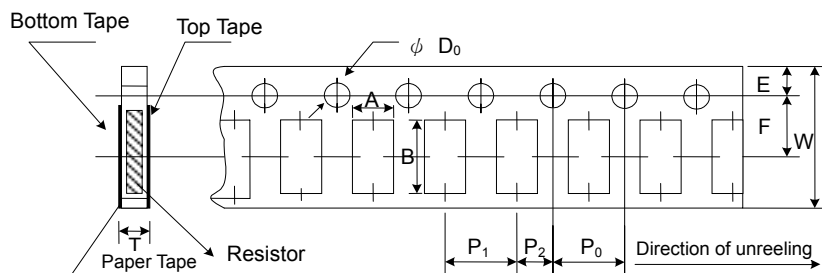
Reel Specifications & Packaging Quantity

Unit: mm

Type	Packaging Quantity	Tape Width	Reel Diameter	ΦA	ΦB	ΦC	W	T
PWR03	Paper	5K	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.2	9.0±0.5	12.5±0.5
PWR05		10K	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
PWR06		20K	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
PWR13	Embossed	4K	7 inch	178.5±1.5	60 ^{+1/-0}	13.0±0.5	13.0±0.5	15.5±0.5
PWR12		8K	10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5



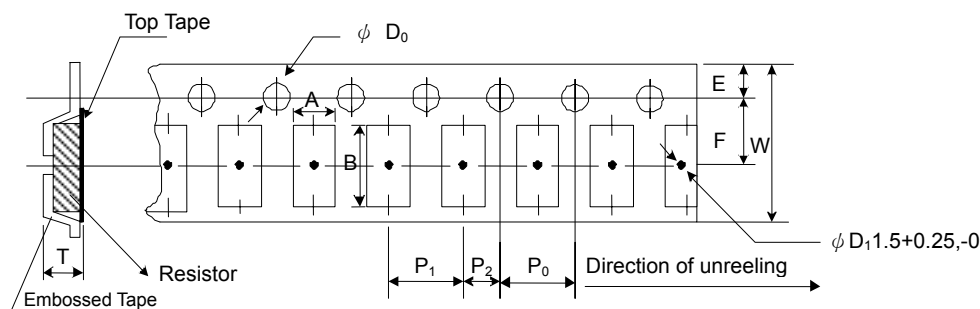
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
PWR03	1.10±0.10	1.90±0.10	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.10
PWR05	1.60±0.10	2.40±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
PWR06	1.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10
PWR13	2.90±0.10	3.50±0.20	8.0±0.20	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.10

Embossed Plastic Tape Specifications

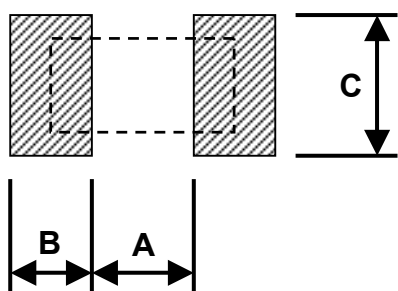


Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
PWR10	2.8±0.10	5.5±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1,-0	1.2 ⁺⁰
PWR12	3.5±0.10	6.7±0.10	12.0±0.30	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.1,-0	1.2 ⁺⁰

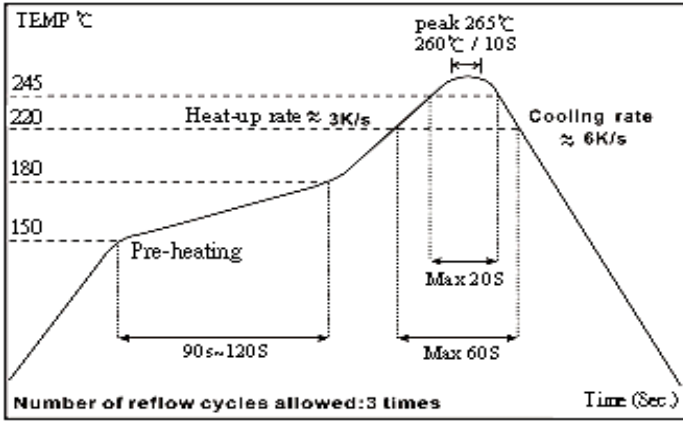
Recommend Land Pattern

Unit: mm



Type	A	B	C
PWR03	0.90	0.60	0.90
PWR05	1.20	0.70	1.30
PWR06	2.00	0.90	1.60
PWR13	2.00	0.90	2.80
PWR10	3.80	0.90	2.80
PWR12	3.80	1.60	3.50

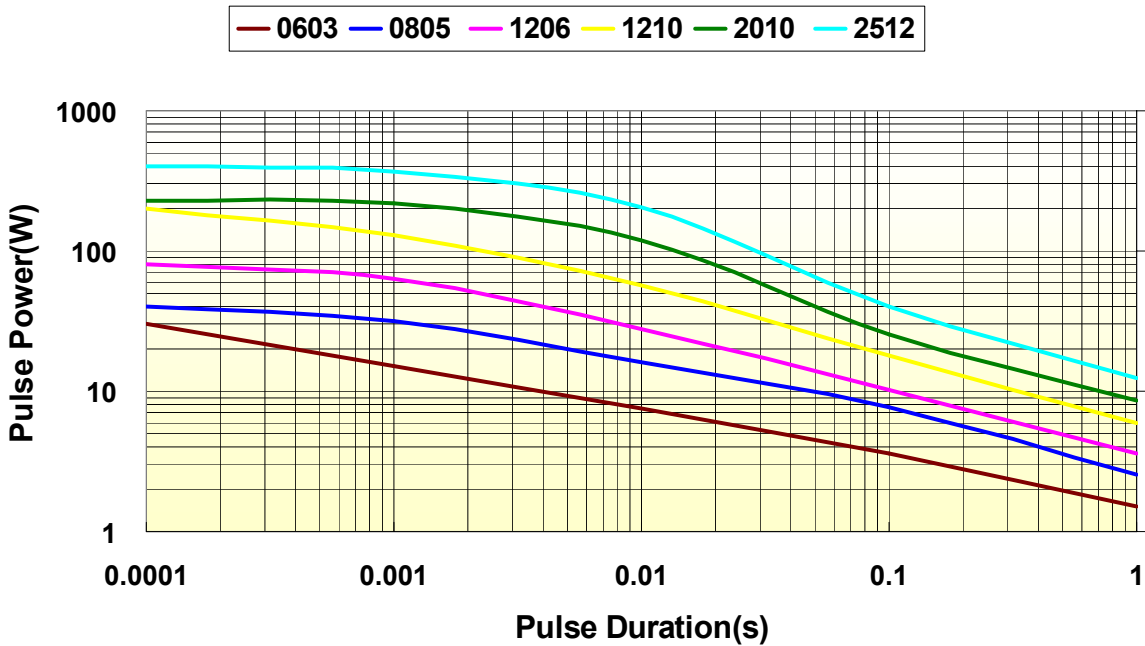
Derating Curve



Pulse withstand capacity

The single impulse graph is the result of 50 impulses of rectangular shape applied at one-minute intervals. The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown.

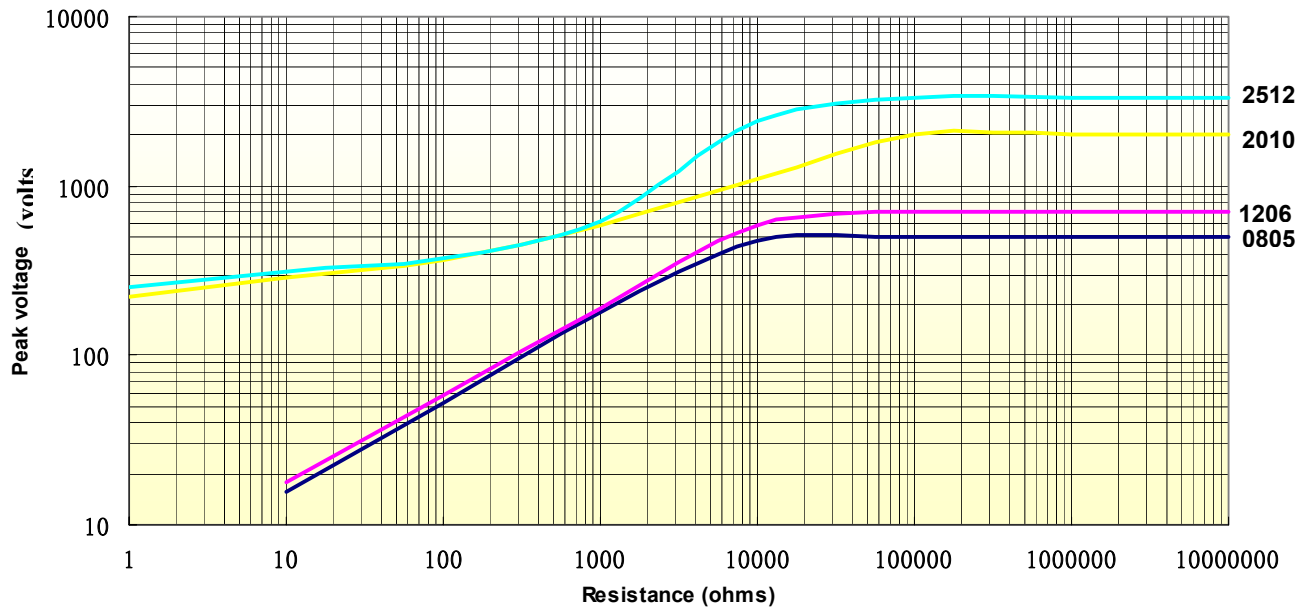
Single Pulse (100 Ohm)



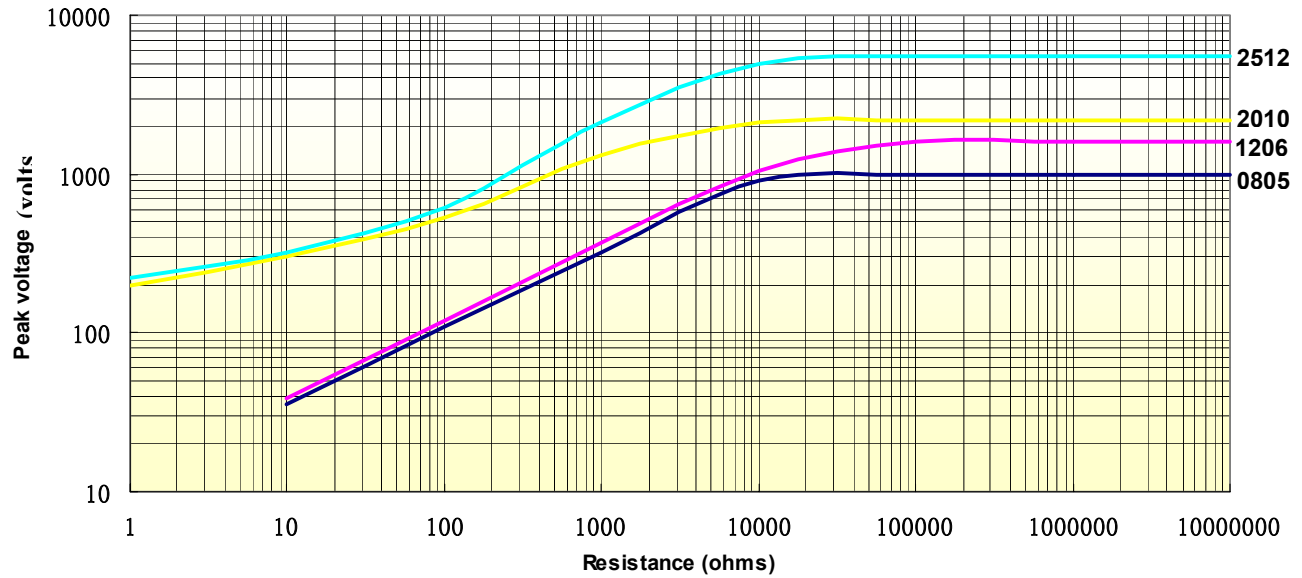
■ Lightning Surge

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

10/700us Lightning Surge



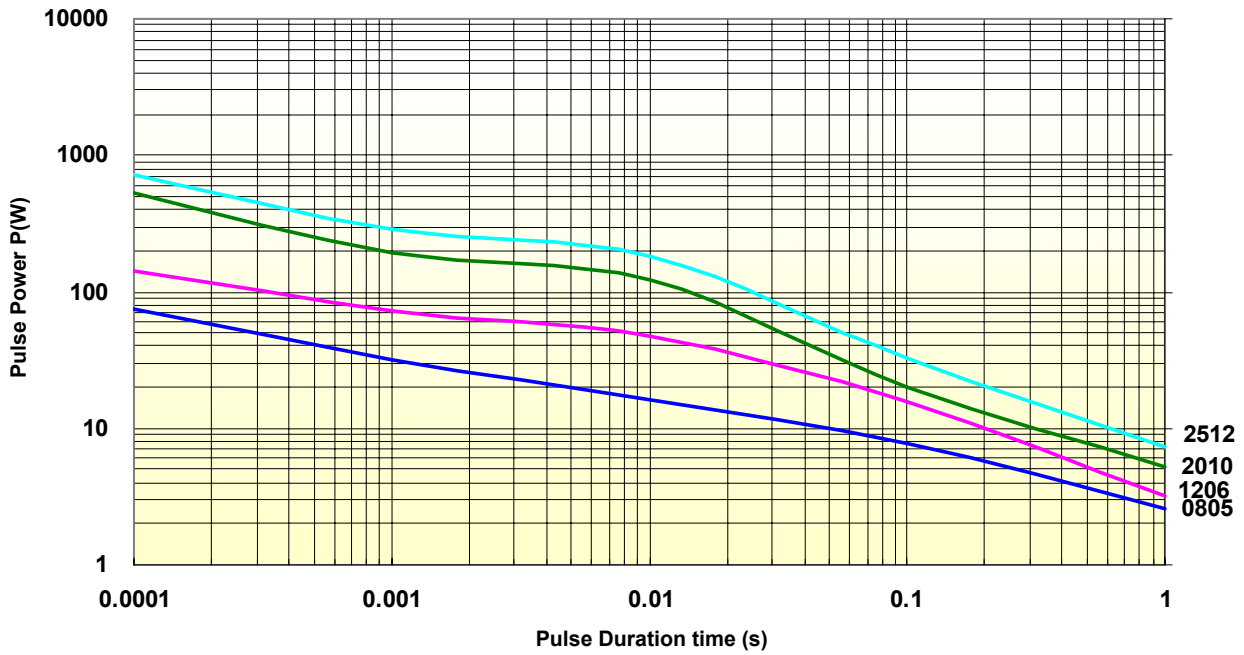
1.2/50 us Lightning Surge



Continuous Pulse

The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value.

Continuous Pulse (100 Ohm)



Pulse Voltage(100 ohm)

