

PULSE WITHSTANDING CHIP RESISTORS

(RPW & RPWH SERIES)

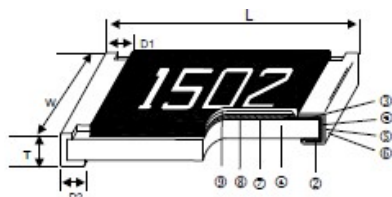
Features

- * Tolerance from $\pm 0.5\% \sim 5\%$
- * High power rating
- * Excellent pulse withstanding performance
- * improved working voltage ratings.
- * Standard package sizes of 0402~2512
- * AEC-Q200 Compliance

Applications

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

Construction

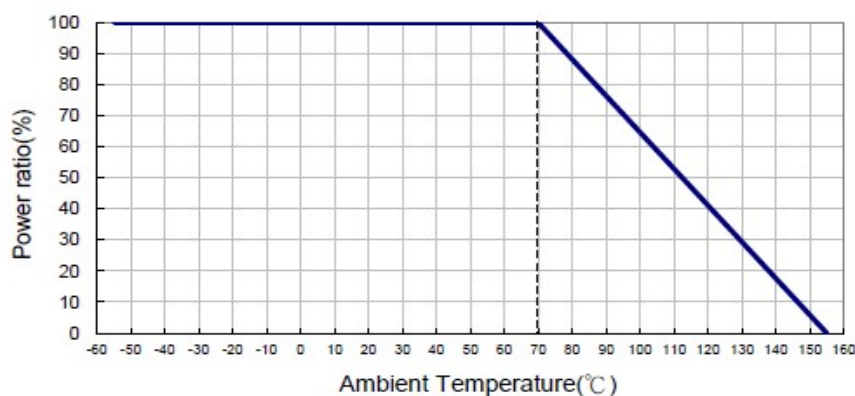


① Alumina Substrate	⑥ External Electrode
② Bottom Electrode	⑦ Resistor Layer
③ Top Electrode	⑧ Primary Overcoat
④ Edge Electrode	⑨ Secondary Overcoat
⑤ Barrier Layer	

Dimensions

Type		Dimensions (mm)				
		L	W	T	D1	D2
RPW-04	0402	1.00 ± 0.05	0.50 ± 0.05	0.35 ± 0.05	0.20 ± 0.10	0.20 ± 0.10
RPW-06	0603	1.60 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20
RPWH-06						
RPW-10	0805	2.00 ± 0.10	1.25 ± 0.10	0.50 ± 0.10	0.35 ± 0.20	0.40 ± 0.20
RPWH-10						
RPWH-10U						
RPW-18	1206	3.10 ± 0.10	1.55 ± 0.10	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RPWH-18						
RPWH-18U						
RPW-20	1210	3.10 ± 0.10	2.60 ± 0.15	0.55 ± 0.10	0.50 ± 0.25	0.50 ± 0.20
RPWH-20						
RPW-22	2010	5.00 ± 0.10	2.50 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
RPWH-22						
RPW-24	2512	6.35 ± 0.10	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.25	0.50 ± 0.20
RPWH-24U		6.35 ± 0.20	3.15 ± 0.15	0.60 ± 0.10	0.60 ± 0.25	0.60 ± 0.20

Derating Curve



General Specification

RPW Series (Standard Electrical Specification)

Type	Size	Power Rating at 70 °C	Operating Temp.Range	Max Operating Voltage	Max Overload Voltage	TCR ppm/°C	Resistance Range	
							±0.5%(D)	±1%(F),±5%(J)
RPW-04	0402	1/5W	-55~+155°C	50V	100V	±300	---	1Ω ~ 20Ω
						±100	100Ω ~ 1MΩ	20.5Ω ~ 1MΩ
RPW-06	0603	1/10W	-55~+155°C	50V	100V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 1MΩ	
RPW-10	0805	1/8W	-55~+155°C	150V	300V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 20MΩ	
RPW-18	1206	1/3W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPW-20	1210	1/2W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPW-22	2010	3/4W	-55~+155°C	400V	800V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPW-24	2512	1.5W	-55~+155°C	500V	1000V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	

RPWH Series (High Power & Ultra High Power Rating Electrical Specification)

Type	Size	Power Rating at 70 °C	Operating Temp.Range	Max Operating Voltage	Max Overload Voltage	TCR ppm/°C	Resistance Range	
							±0.5%(D)	±1%(F),±5%(J)
RPWH-06	0603	1/4W	-55~+155°C	75V	150V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
		±100				300Ω ~ 1MΩ		
		Jumper:5A*				-		0Ω(≤8mΩ)
RPWH-10	0805	2/5W	-55~+155°C	150V	300V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
		±100				300Ω ~ 1MΩ		
RPWH-10U	0805	1/2W*	-55~+155°C	400V	600V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
		±100				300Ω ~ 1MΩ		
		Jumper:6A*				-		0Ω(≤5mΩ)
RPWH-18	1206	1/2W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
		±100				20.5Ω ~ 1MΩ		
RPWH-18U	1206	3/4W*	-55~+155°C	500V	1000V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
		±100				20.5Ω ~ 1MΩ		
		Jumper:10A*				-		0Ω(≤5mΩ)
RPWH-20	1210	3/4W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
		±100				20.5Ω ~ 1MΩ		
RPWH-22	2010	1W	-55~+155°C	400V	800V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
		±100				20.5Ω ~ 1MΩ		
RPWH-24U	2512	2W*	-55~+155°C	500V	1000V	±350	10Ω	1Ω ~ 10Ω
		±100				10.2Ω ~ 200K Ω		

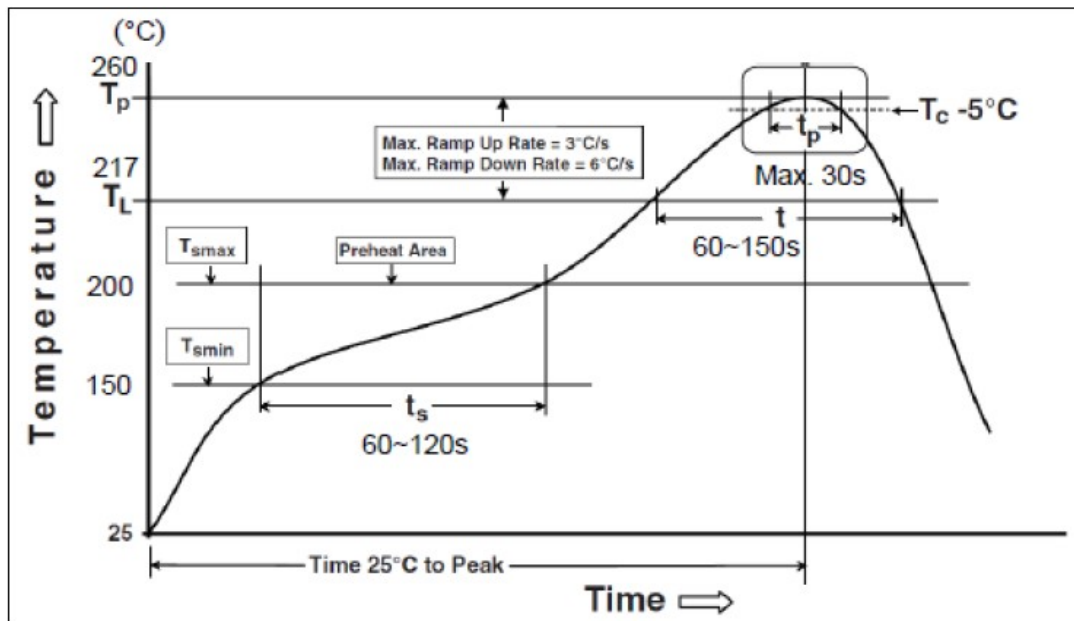
*Ultra High Power:double side printed resistor element

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

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

The power rating depends on the maximum temperature of the resistive element. Due to the power dissipation of the resistor, the temperature of the resistive element will rise depending on the condition of heat dissipation from PCB. The maximum power rating in application only applies if the temperature of the resistive element is not exceed 155°C





Reflow Profiles	
Profile Feature	Pb-Free Assembly
Preheat Min. Temperature (T_{smin}) Max Temperature (T_{smax}) Preheating time (t_s) from (T_{smin} to T_{smax})	150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to T_p)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
Min. Peak temperature (T_p min)	235°C
Max. Peak temperature (T_p max)	260°C
Time (t_p) within 5 °C of the specified classification temperature (T_c)	30 seconds max.
Ramp-down rate (T_p to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

Environmental Characteristics

Test Item	Requirement		Test Method
	±5% and Below	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		JIS-C-5201-1 4.8 IEC-60115-1 4.8 At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS C 5201-1 4.13 IEC-60115-1 4.13 RCWV 2.5 times or Max. overload voltage, whichever is lower for 5 seconds. Jumper: 2*1max for 5 seconds
Insulation Resistance	≥10G		JIS C 5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute
Endurance	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS C 5201-1 4.25 IEC-60115-1 4.25.1 70±2°C RCWV for 1000hrs with 1.5hrs"ON" and 0.5hr"OFF"
Damp Heat with Load	±(0.5%+0.05Ω) Ultra High Power* ±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS C 5201-1 4.24 IEC-60115-1 4.24 40±2°C, 90~95% R.H. RCWV for 1000hrs with 1.5hrs "ON" and 0.5hr
Dry Heat	±(0.5%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS-C--5201-1 4.23 IEC-60115-1 4.23.2 at+155°C for 1000hrs
Bending Strength	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS-C--5201-1 4.33 IEC-60115-1 4.33 Bending once for 60 seconds 2010,2512 sizes:2mm other sizes:3mm
Solderability	95 % min. coverage		JIS-C--5201-1 4.17 IEC-60115-1 4.17 245±5°C for 3 seconds
Resistance to Soldering Heat	±(0.5%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS-C--5201-1 4.18 IEC-60115-1 4.18 260±5°C for 10 seconds.
Voltage Proof	No breakdown or flashover		JIS-C--5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute.
Leaching	Individual leaching area≤5% Total leaching area≤10%		JIS-C--5201-1 4.18 IEC-6068-2-58 8.2.1 260±5°C for 30 seconds.
Rapid Change of Temperature	±(0.5%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JIS-C--5201-1 4.19 IEC-60115-1 4.19 -55°C to 155°C, 5 cycles

RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$ or Max. Operating Voltage whichever is lower.

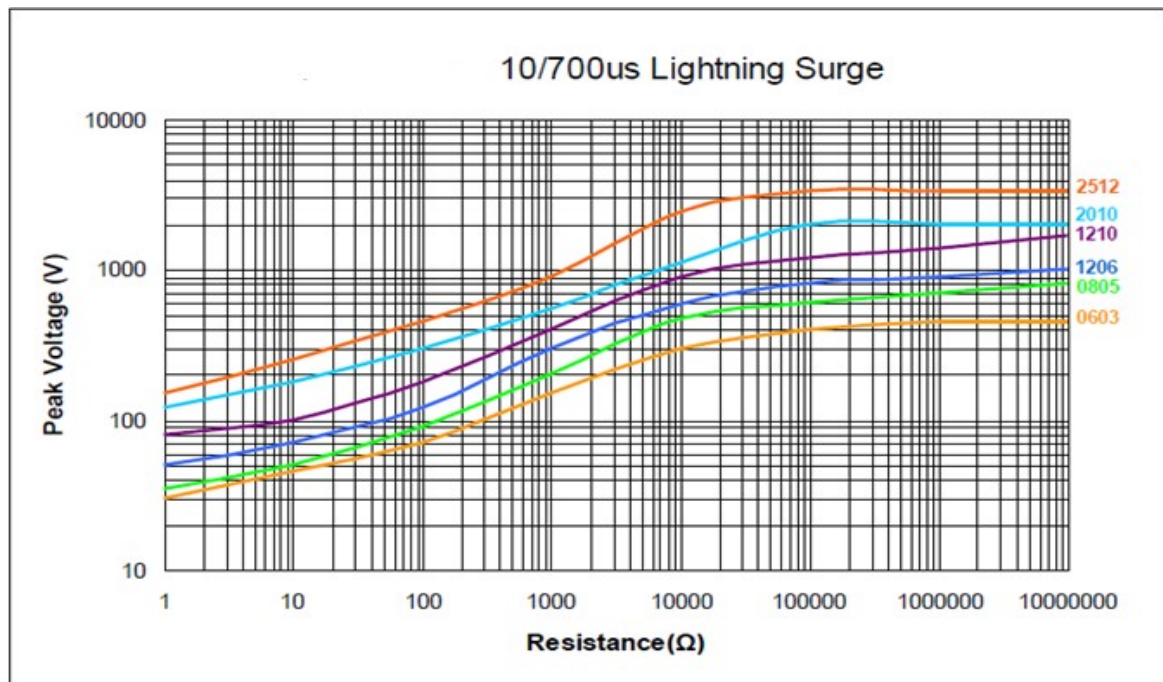
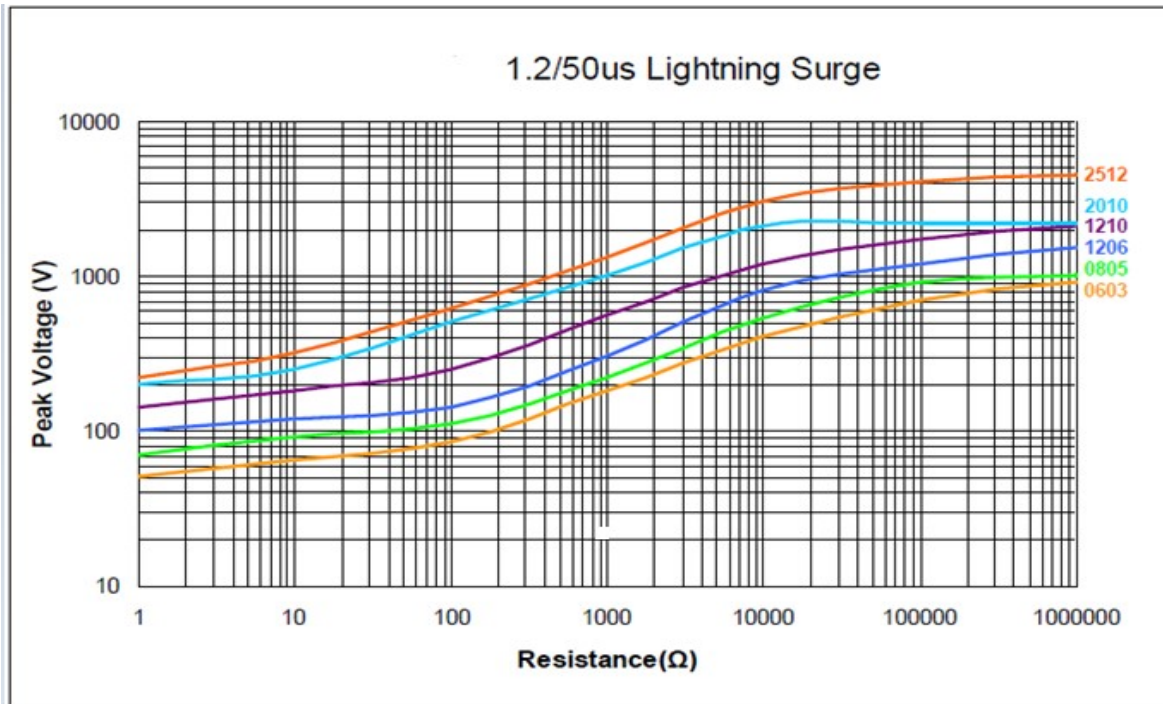
■ Storage Temperature: 15~28°C; Humidity<80% RH

■ Shelf Life: 2 years from production date.



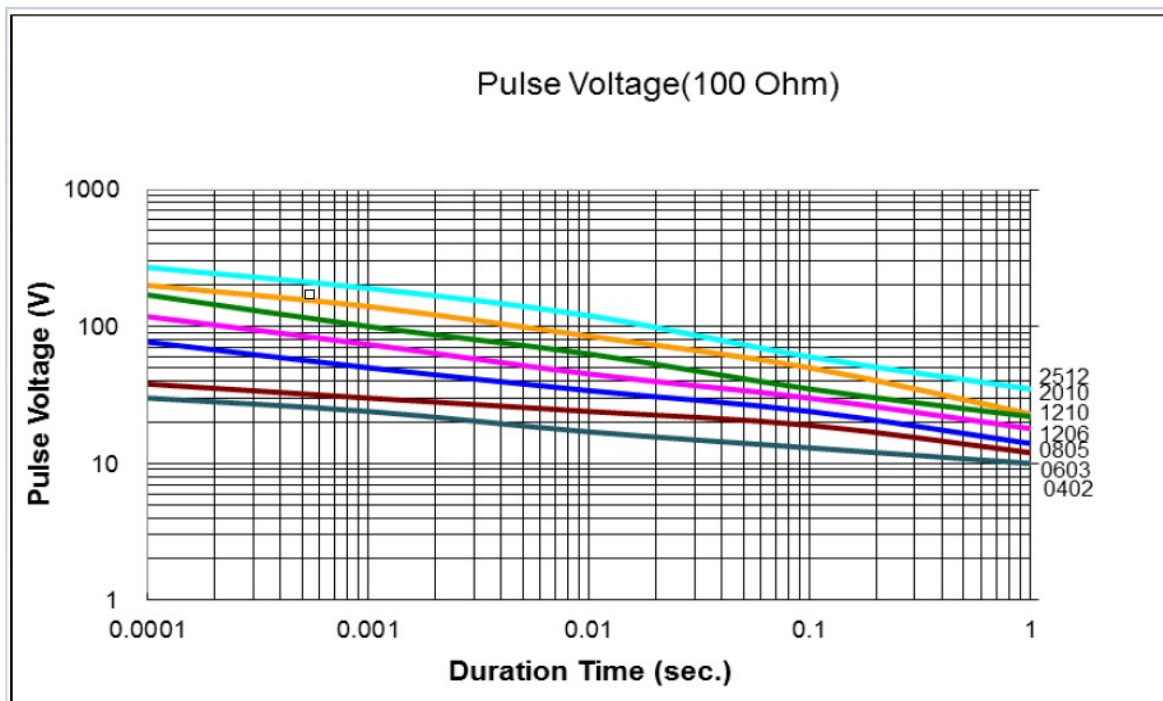
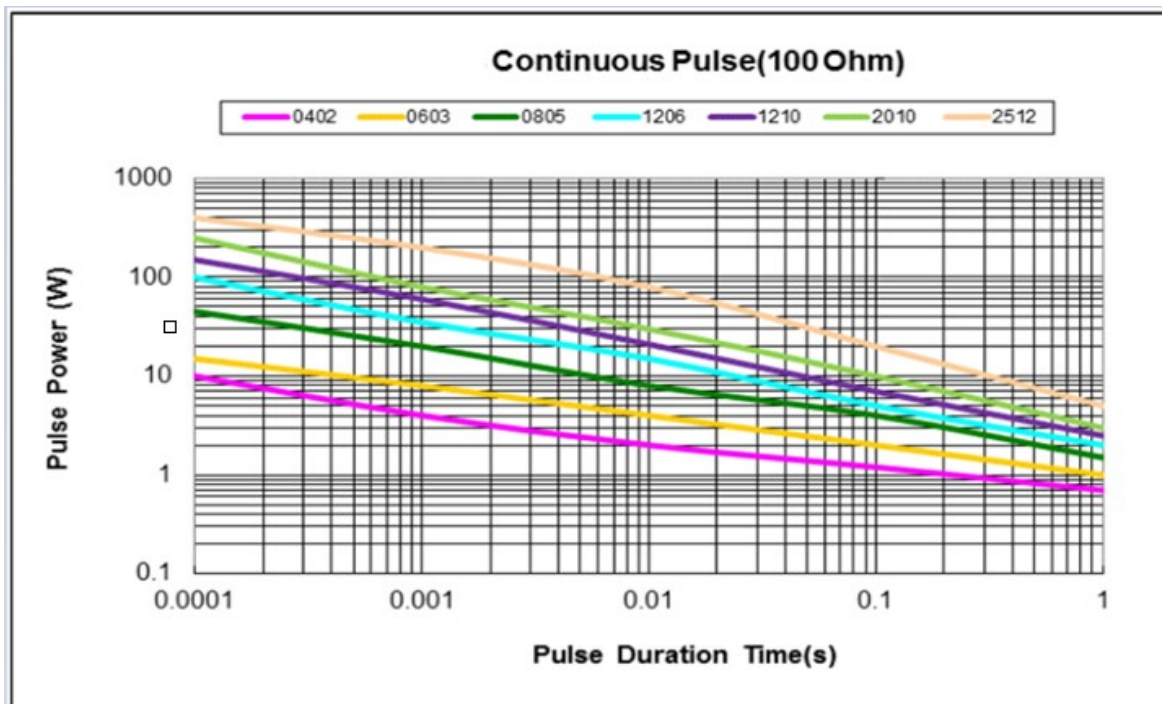
Lightning Surge

Resistors are tested in accordance with IEC 60115-1 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.



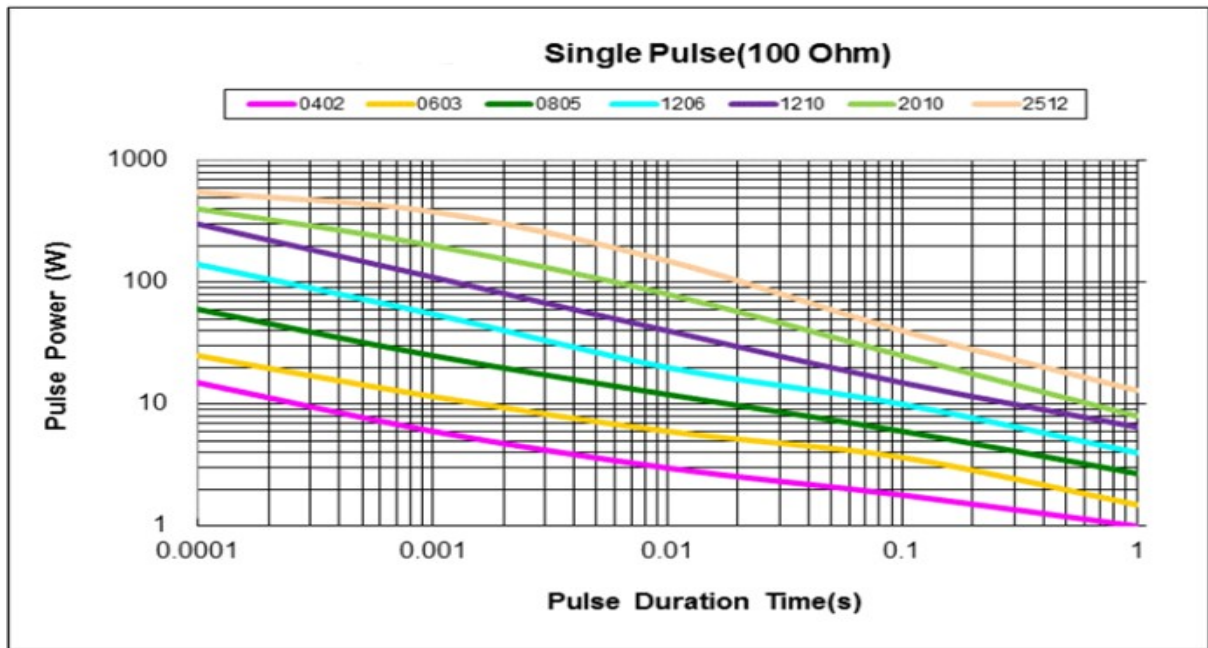
Continuous Pulse

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.



Pulse withstanding capacity

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.



Parts Number System

RPW - Type RPW Series Standard Power RPWH Series High power and Ultra High power	10 / (10U) Size 04=0402, 06=0603 10=0805, 18=1206 20=1210, 22=2010 24=2512 Ultra High Power 10U=0805 18U=1206 24U=2512	102 Resistance 3 Digits: for 5% First 2 digits are significant figure third Digits is number of zero 4 Digits: for 1%, 0.5% 10K=1002	J Tolerance D=± 0.5% J=± 5% F=± 1%	R Standard Packing R=Paper tape reel K=Embossed plastic tape reel
--	---	---	--	--