

AUTOMOTIVE GRADE PULSE WITHSTANDING CHIP RESISTOR

(RPA & RPAH SERIES)

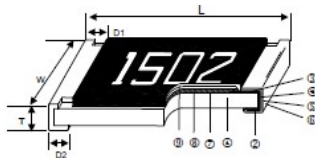
Features

- * Tolerance from $\pm 0.5\% \sim 5\%$
- * High power rating
- * Excellent pulse withstanding performance
- * improved working voltage ratings.
- * Standard package sizes of 0402~2512
- * Special construction to prevent sulfuration in a sulfur containing enviro
- * AEC-Q200 Compliance
- * 100% CCD inspection

Applications

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

Construction

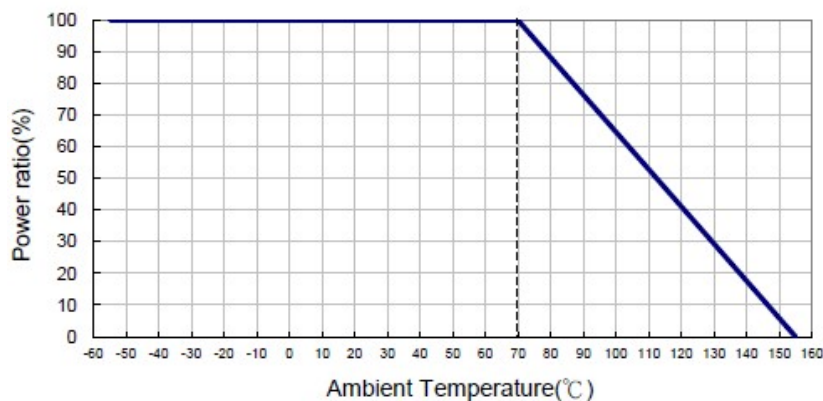


① Alumina Substrate	⑩ External Electrode
② Bottom Electrode	⑪ Resistor Layer
③ Top Electrode	⑫ Primary Overcoat
④ Edge Electrode	⑬ Secondary Overcoat
⑤ Barrier Layer	

Dimensions

Type		Dimensions (mm)				
		L	W	T	D1	D2
RPA-04	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.35 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10
RPA-06	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
RPA-10	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
RPAH-10				0.55 $\pm$ 0.10		
RPAH-10U						
RPA-18	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
RPAH-18					0.60 $\pm$ 0.25	0.55 $\pm$ 0.25
RPAH-18U						
RPA-20	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
RPAH-20						
RPA-22	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
RPAH-22						
RPA-24	2512	6.35 $\pm$ 0.10	3.10 $\pm$ 0.10	0.55 $\pm$ 0.10	0.60 $\pm$ 0.25	0.50 $\pm$ 0.20
RPAH-24U		6.35 $\pm$ 0.20	3.15 $\pm$ 0.15	0.60 $\pm$ 0.10	0.80 $\pm$ 0.25	0.60 $\pm$ 0.30

Derating Curve



General Specification

RPA 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)
RPA-04	0402	1/5W	-55~+155°C	50V	100V	±300	---	1Ω ~ 20Ω
						±100	100Ω ~ 1MΩ	20.5Ω ~ 1MΩ
RPA-06	0603	1/10W	-55~+155°C	50V	100V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 1MΩ	
RPA-10	0805	1/8W	-55~+155°C	150V	300V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 20MΩ	
RPA-18	1206	1/3W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPA-20	1210	1/2W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPA-22	2010	3/4W	-55~+155°C	400V	800V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	
RPA-24	2512	1.5W	-55~+155°C	500V	1000V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 20MΩ	

RPAH 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)
RPAH-06	0603	1/4W Jumper:5A*	-55~+155°C	75V	150V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 1MΩ	
						-		0Ω(≤8mΩ)
RPAH-10	0805	2/5W	-55~+155°C	150V	300V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 1MΩ	
RPAH-10U	0805	1/2W* Jumper:6A*	-55~+155°C	400V	600V	±200	10Ω ~ 294Ω	1Ω ~ 294Ω
						±100	300Ω ~ 1MΩ	
						-		0Ω(≤5mΩ)
RPAH-18	1206	1/2W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 1MΩ	
RPAH-18U	1206	3/4W* Jumper:10A*	-55~+155°C	500V	1000V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 1MΩ	
						-		0Ω(≤5mΩ)
RPAH-20	1210	3/4W	-55~+155°C	200V	400V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 1MΩ	
RPAH-22	2010	1W	-55~+155°C	400V	800V	±200	10Ω ~ 20Ω	1Ω ~ 20Ω
						±100	20.5Ω ~ 1MΩ	
RPAH-24U	2512	2W*	-55~+155°C	500V	1000V	±350	10Ω	1Ω ~ 10Ω
						±100	10.2Ω ~ 200K Ω	

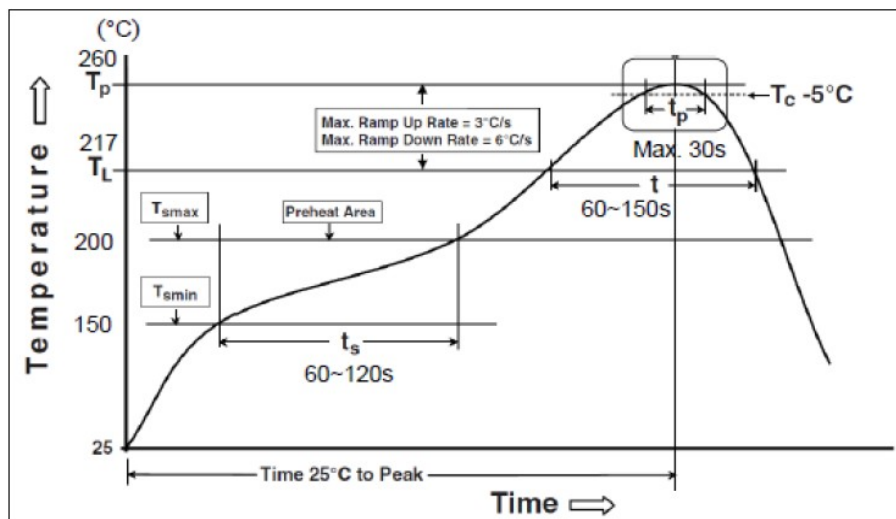
*Ultra High Power:double side printed resistor element

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 RCWV2.5 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

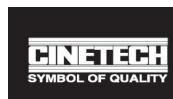
Environmental Characteristics

Test Item	Requirement		Test Method
	±5% and Below	Jumper	
Operational Life	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	MIL-STD-202 Method 108 Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion.
Biased Humidity	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power.
High Temperature Exposure	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	MIL-STD-202 Method 108 at +155°C for 1000hrs.
Board Flex	±(1.0%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	AEC-Q200-005 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.
Temperature Cycling	±(0.5%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	JESD22 Method JA-104 -55°C+125°C, 1000cycles
Mechanical Shock	±(0.25%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.05Ω)	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	MIL-STD-202 Method 204 5 g's for 20min. 12cycles each of 3 orientations, 10-2000Hz
ESD	±(3%+0.05Ω)		AEC-Q200-002 Human body model 0402/0603 : 1KV 0805 and above:2KV
Resistance to Solvents	No visible damage on appearance and marking.		MIL-STD-202 Method 215 Add Aqueous wash chemical-OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken		AEC-Q200-006 Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching or the pinewood board		UL-94 V-0 or V-1 are acceptable. Electrical test not required.
Sulfur Test	△R 1%	0603:≤8mΩ 0805:≤5mΩ 1206:≤5mΩ	EIA-977 (Condition A) 60±2°C, no power rating for 500 hrs.

RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

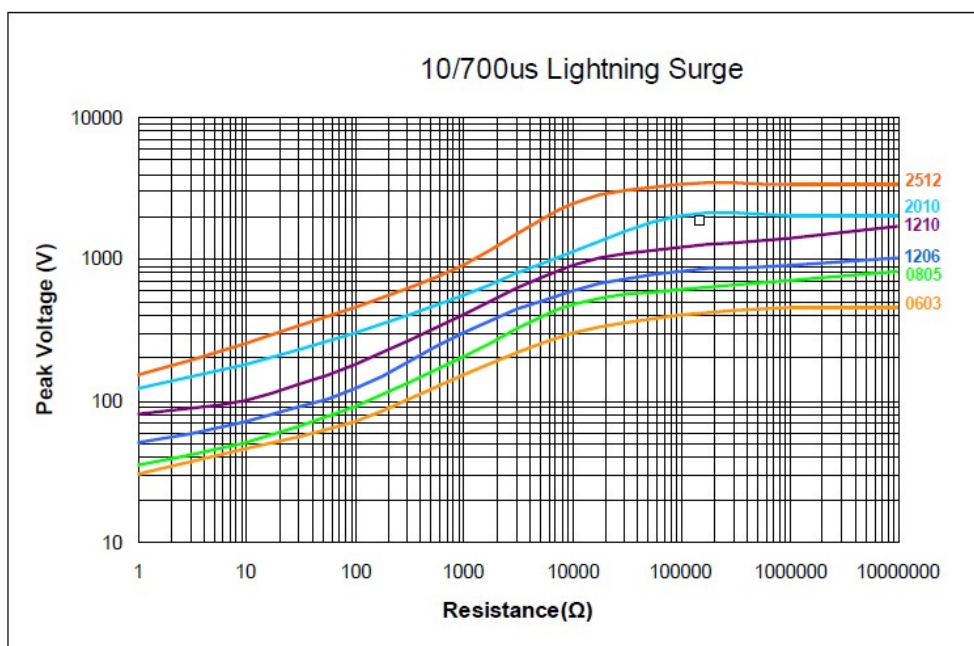
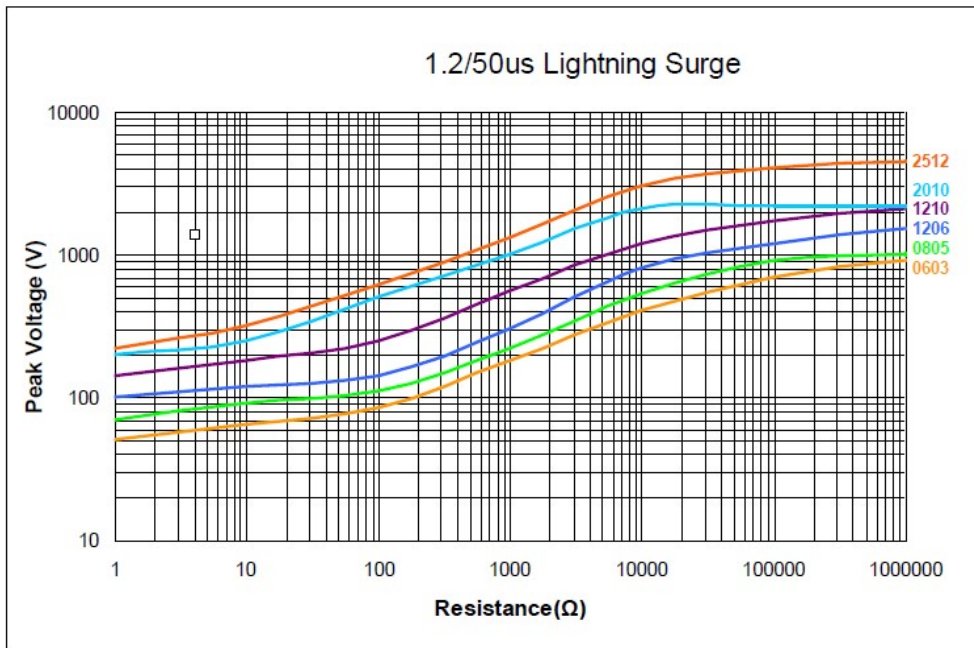
■ Storage Temperature: 15~28°C;Humidity<80% RH

■ Shelf Life: 2 years from production date.



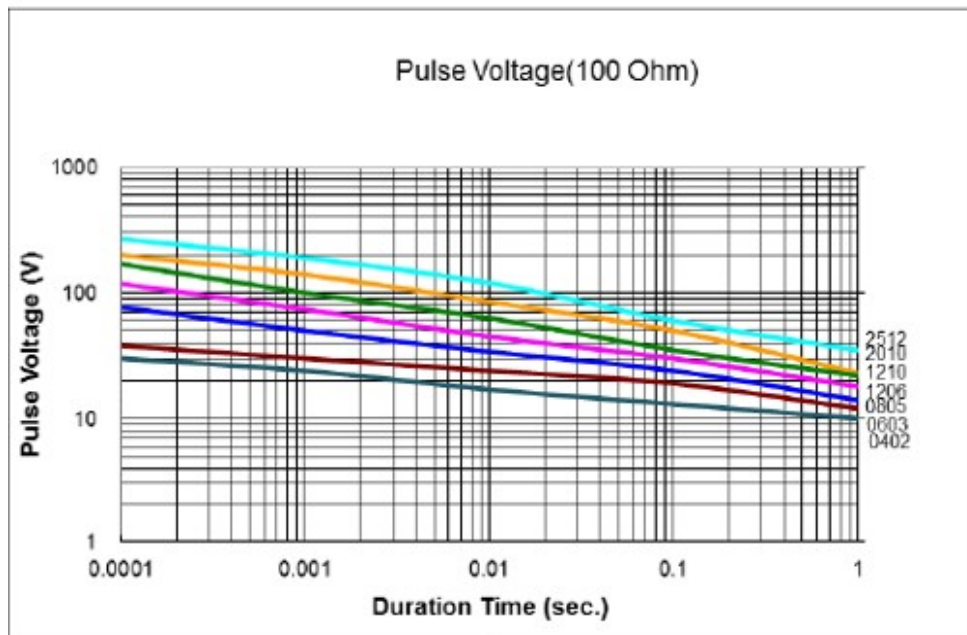
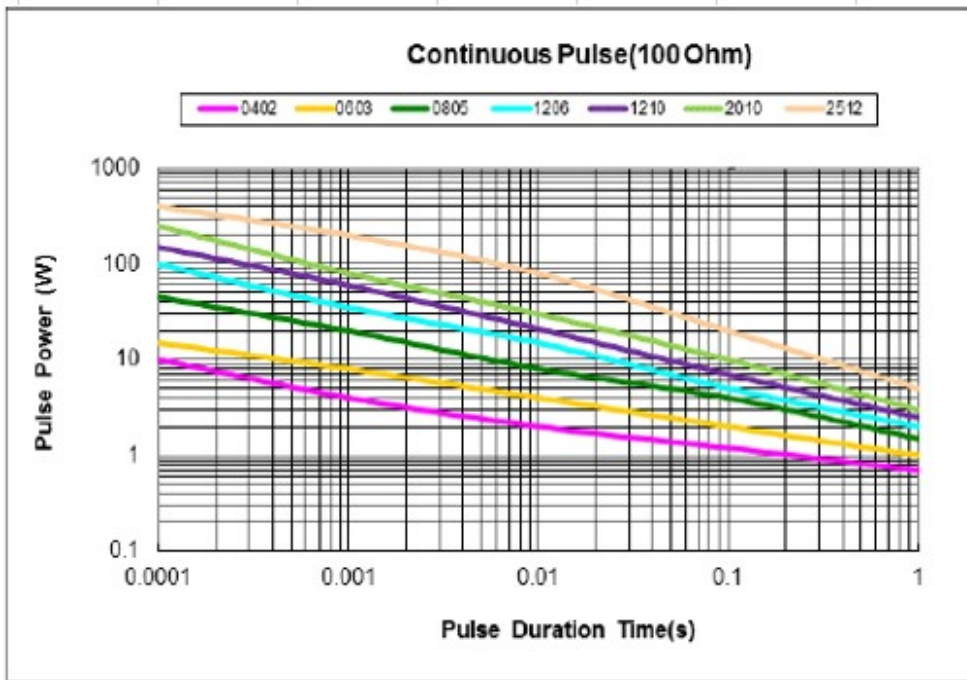
Lightning Surge

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

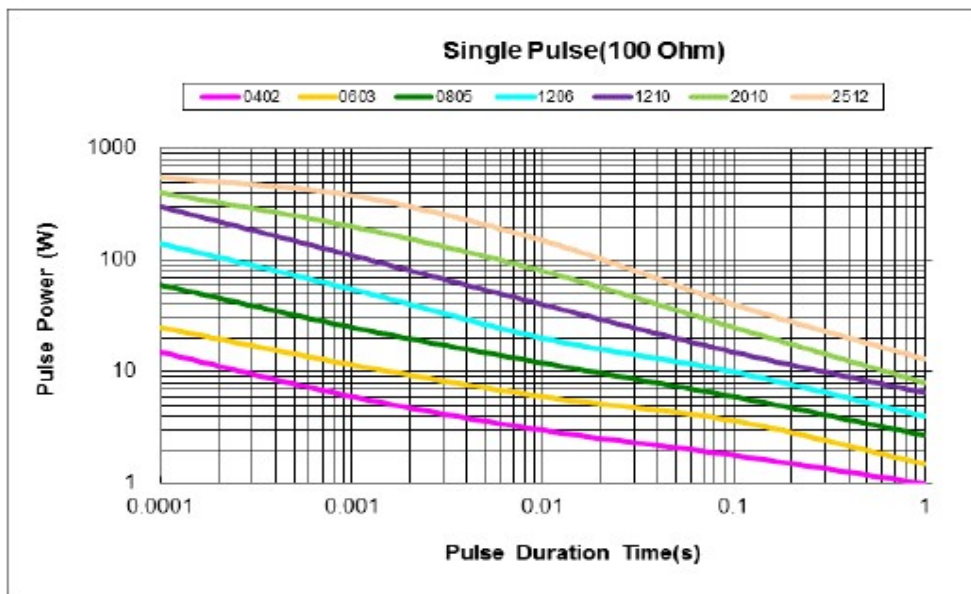
The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value.



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

RPA -	10 / (10U) -	102	J	R
Type: RPA Series Standard Power	Size 04=0402 06=0603 10=0805 18=1206 20=1210 22=2010 24=2512 Ultra High power 10U=0805 18U=1206 24U=2512	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	Tolerance D=± 0.5% J=± 5% F=± 1%	Standard Packing R=Paper tape reel K=Embossed plastic tape reel

