Data Sheet

Customer:	
Product:	Pulse Withstanding Chip Resistor - PWR Series
Size:	0402/0603/0805/1206/1210/2010/2512
Issued Date:	17-Sep-25
Edition:	REV.D6

RoHS Compliant

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17-Sep-25	17-Sep-25	17-Sep-25		
Alice Hsiao	***Susan Huang***	***Susan Huang***		

Pulse Withstanding Chip Resistor – PWR Series



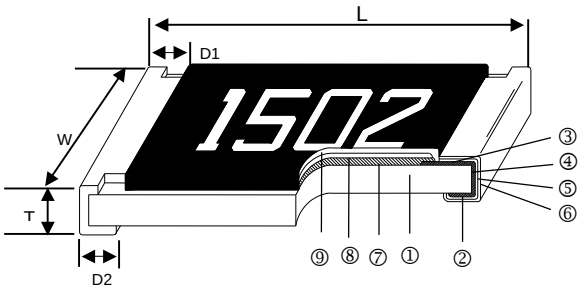
■Features

- Tolerance from ±0.5%~5%
- High power rating
- Excellent pulse withstanding performance
- Improved working voltage ratings
- Standard package sizes of 0402~2512
- AEC-Q200 Compliance
- MSL: Level 1

■Applications

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

■Construction

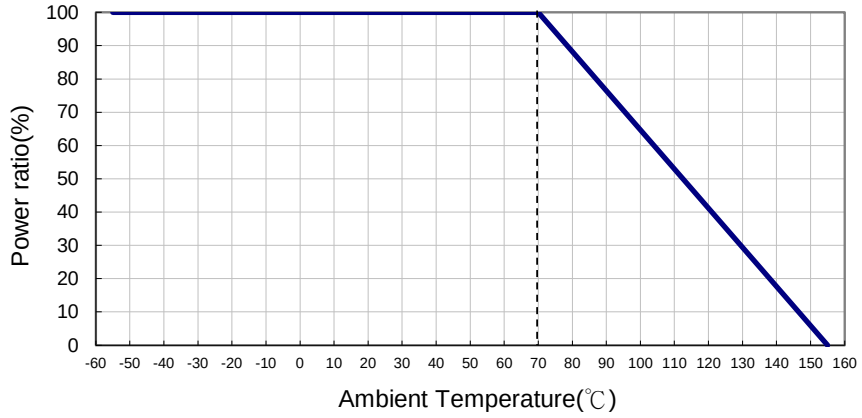


①	Alumina Substrate	⑥	External Electrode
②	Bottom Electrode	⑦	Resistor Layer
③	Top Electrode	⑧	Primary Overcoat
④	Edge Electrode	⑨	Secondary Overcoat
⑤	Barrier Layer		

■Dimensions

Type	Size (Inch)	L (mm)	W (mm)	T (mm)	D1 (mm)	D2 (mm)	Weight (g) (1000pcs)
PWR02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10	0.6
PWR03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.0
PWR05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.4
PWR05 (1/2W)	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	5.0
PWR06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.9
PWR06 (3/4W)	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	9.5
PWR13	1210	3.10±0.10	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	16.0
PWR10	2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.2
PWR12	2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.4
PWR12 (2W)	2512	6.35±0.20	3.15±0.15	0.60±0.10	0.60±0.25	0.60±0.20	42.0

Derating Curve



Part Numbering

PWR	12	J	T	E	A	1001	
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/℃)	Power Rating	Resistance	Marking
	02: 0402 03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	D: ±0.5% F: ±1% J: ±5% -: No specified (for Jumper)	T: 7"Taping Reel V:10"Taping Reel W:13"Taping Reel	E: ±100 F: ±200 G: ±300 4 : ±350 -: No specified (for Jumper)	A: 1.5W T: 1W Q: 3/4W U: 1/2W G: 2/5W O: 1/3W V : 1/4W W: 1/8W X: 1/10W P: 1/5W S: 2W K: 1.25W	1001: 1KΩ 1004: 1MΩ R0R0: 0Ω	: Standard Marking N: No Marking

Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range ±0.5% (E24,E96)	Resistance Range ±1% (E24,E96)	Resistance Range ±5% (E24)	TCR (PPM/°C)
PWR02 (0402)	1/5W	-55 ~ +155°C	50V	100V	-	1Ω-20Ω		±300
					100Ω-1MΩ	20Ω-1MΩ		±100
PWR03 (0603)	1/10W	-55 ~ +155°C	50V	100V	10Ω - 294Ω	1Ω - 294Ω		±200
					10Ω - 1MΩ			±100
PWR05 (0805)	1/8W	-55 ~ +155°C	150V	300V	10Ω - 294Ω	1Ω - 294Ω		±200
					10Ω- 20MΩ			±100
PWR06 (1206)	1/3W	-55 ~ +155°C	200V	400V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω- 20MΩ			±100
PWR13 (1210)	1/2W	-55 ~ +155°C	200V	400V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω- 20MΩ			±100
PWR10 (2010)	3/4W	-55 ~ +155°C	400V	800V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 20MΩ			±100
PWR12 (2512)	1.5W	-55 ~ +155°C	500V	1000V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 20MΩ			±100

■High Power & Ultra High Power Rating Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.5% (E24,E96)	±1% (E24,E96)	±5% (E24)	
PWR03 (0603)	1/4W 1/3W	-55 ~ +155°C	75V	150V	10Ω - 294Ω	1Ω - 294Ω		±200
					10Ω - 1MΩ			±100
PWR05 (0805)	2/5W	-55 ~ +155°C	150V	300V	10Ω - 294Ω	1Ω - 294Ω		±200
					10Ω - 1MΩ			±100
PWR05 (0805)	1/2W *	-55 ~ +155°C	400V	600V	10Ω - 294Ω	1Ω - 294Ω		±200
					10Ω - 1MΩ			±100
PWR06 (1206)	1/2W	-55 ~ +155°C	200V	400V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 1MΩ			±100
PWR06 (1206)	3/4W *	-55 ~ +155°C	500V	1000V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 1MΩ			±100
PWR13 (1210)	3/4W 1W	-55 ~ +155°C	200V	400V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 1MΩ			±100
PWR10 (2010)	1W 1.25W	-55 ~ +155°C	400V	800V	10Ω - 20Ω	1Ω - 20Ω		±200
					10Ω - 1MΩ			±100
PWR12 (2512)	2W *	-55 ~ +155°C	500V	1000V	10Ω	1Ω - 10Ω		±350
					10Ω - 200K			±100

■Jumper(0Ω)

Item / Type	Power Rating	Rated Current	Overload Current	Resistance	Operating Temp. Range
PWR02 (0402)	1/5W	3A	6A	0Ω (≦10mΩ)	-55 ~ +155°C
PWR03 (0603)	1/3W	5A	10A	0Ω (≦8mΩ)	
PWR05 (0805) *	1/2W	6A	12A	0Ω (≦5mΩ)	
PWR06 (1206) *	3/4W	10A	20A	0Ω (≦5mΩ)	
PWR13 (1210)	1W	12A	24A	0Ω (≦4mΩ)	
PWR10 (2010)	1.25W	12A	24A	0Ω (≦5mΩ)	
PWR12 (2512)	2W	16A	32A	0Ω (≦5mΩ)	

*: Ultra High Power: double side printed resistor element

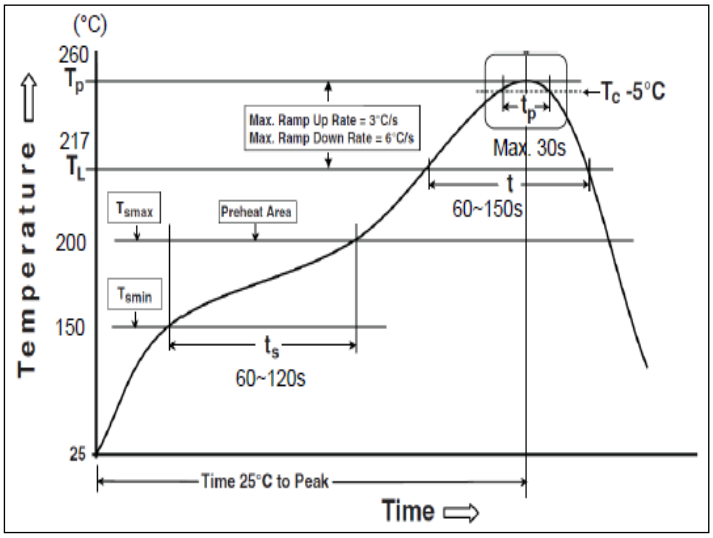
Operating Voltage=$\sqrt{}$(P*R) or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage=2.5*$\sqrt{}$(P*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℃.

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

■Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



Reflow Profiles	
Profile Feature	**Pb-Free Assembly**
Preheat Min. Temperature (Tsmin) Max Temperature (Tsmax) Preheating time (ts) from (Tsmin to Tsmax)	 150 °C 200 °C 60-120 seconds
Ramp-up rate (T_L to Tp)	3 °C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217 °C 60-150 seconds
Min. Peak temperature (Tp min)	235°C
Max. Peak temperature (Tp max)	260°C
Time (tp) within 5 °C of the specified classification temperature (Tc)	30 seconds max.
Ramp-down rate (Tp to T_L)	6 °C/second max.
Time 25 °C to peak temperature	8 minutes max.

■Environmental Characteristics

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)	As Spec.	**JIS-C-5201-1 4.13** **IEC-60115-1 4.13** RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds Jumper:2*I_{max} 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)	As Spec.	**JIS-C-5201-1 4.25** **IEC-60115-1 4.25.1** 70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Damp Heat with Load	±(0.5%+0.05Ω) **Ultra High Power** * ±(1.0%+0.05Ω)	As Spec.	**JIS-C-5201-1 4.24** **IEC-60115-1 4.24** 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF”
Dry Heat	±(0.5%+0.05Ω)	As Spec.	**JIS-C-5201-1 4.23** **IEC-60115-1 4.23.2** at +155°C for 1000 hrs
Bending Strength	±(1.0%+0.05Ω)	As Spec.	**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)	As Spec.	**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-60068-2-58 8.2.1** 260±5°C for 30 seconds

Item	Requirement		Test Method
	±5% and Below	Jumper	
Rapid Change of Temperature	±(0.5%+0.05Ω)	As Spec.	**JIS-C-5201-1 4.19** **IEC-60115-1 4.19** -55°C to +155°C, 5 cycles

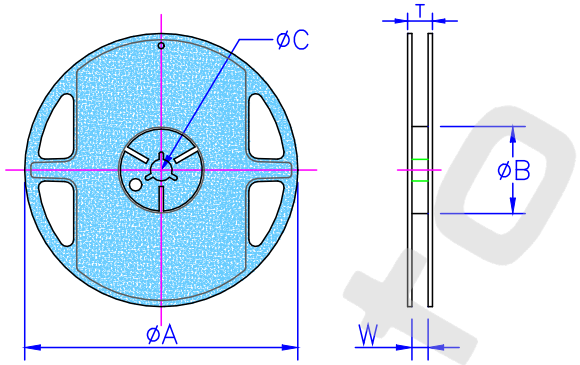
RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

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

■Shelf Life: 2 years from production date.

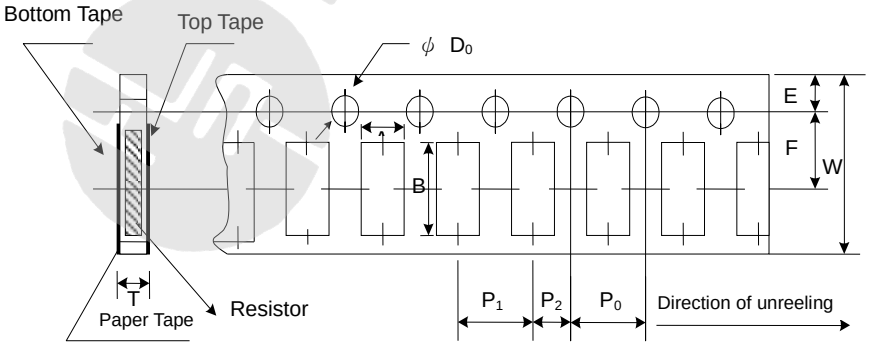
■Packaging

Reel Specifications & Packaging Quantity



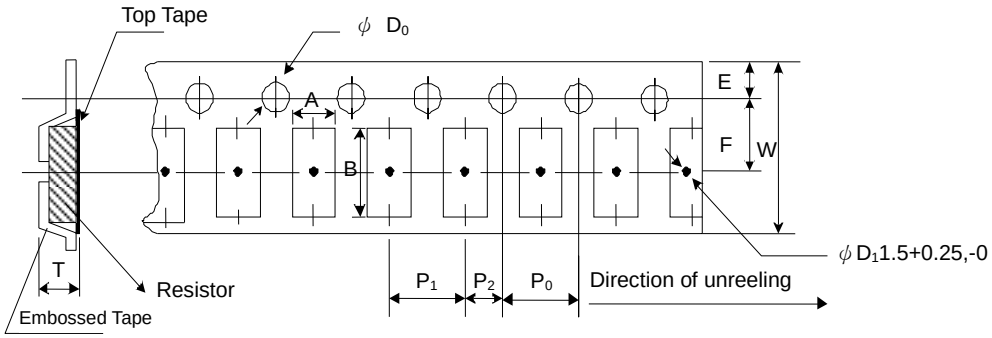
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
PWR02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
PWR03 PWR05 PWR06 PWR13	Paper	5K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		10K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		20K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
PWR10 PWR12	Embossed	4K	12mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.5	13.0±0.5	15.5±0.5
		8K	12mm	10 inch	250±1.0	62±0.5	13.0±0.5	12.5±0.5	16.5±0.5

Paper Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
PWR02	0.65±0.10	1.15±0.10	8.00±0.2	1.75±0.1	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.1
PWR03	1.10±0.10	1.90±0.1	8.00±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
PWR05	1.60±0.10	2.40±0.2	8.00±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
PWR06	1.90±0.10	3.50±0.2	8.00±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
PWR13	2.90±0.10	3.50±0.2	8.00±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1

Embossed Plastic Tape Specifications



Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
PWR10	2.80±0.10	5.40±0.20	12.0±0.3	1.75±0.1	5.50±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}
PWR12	3.50±0.10	6.70±0.10	12.0±0.3	1.75±0.1	5.50±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■Marking

No Marking for 0402

Jumper for all: Letter “0”

0805~2512 4 digits marking for Example

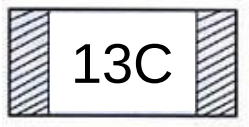
Resistance	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ	1MΩ
marking	5R60	97R6	1000	2201	1002	4992	1003	1004

0603: 3 digits marking in E24

Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

E24 code	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91

1% for 0603: 3 digits marking in E96 (E96 series except E24 series)



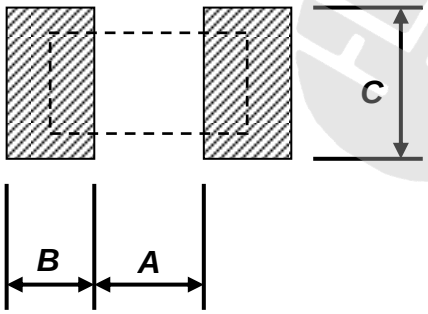
digits marking for Example: 13C=13K3Ω 68B=4K99Ω 68X=49.9Ω

Marking Table

Code	E96	Code	E96	Code	E96	Code	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

Code	A	B	C	D	E	F	G	X	Y		
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^{-1}	10^{-2}		

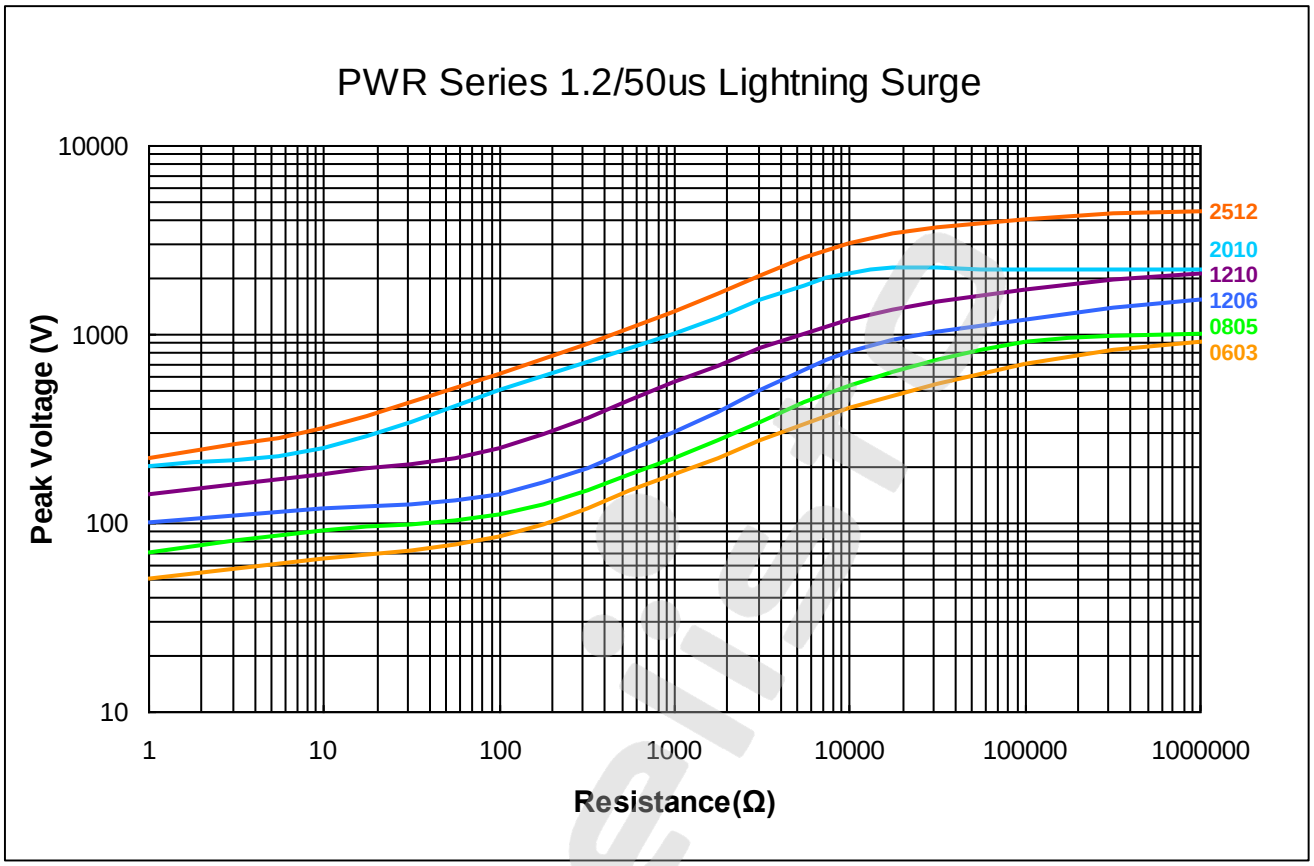
■Recommend Land Pattern

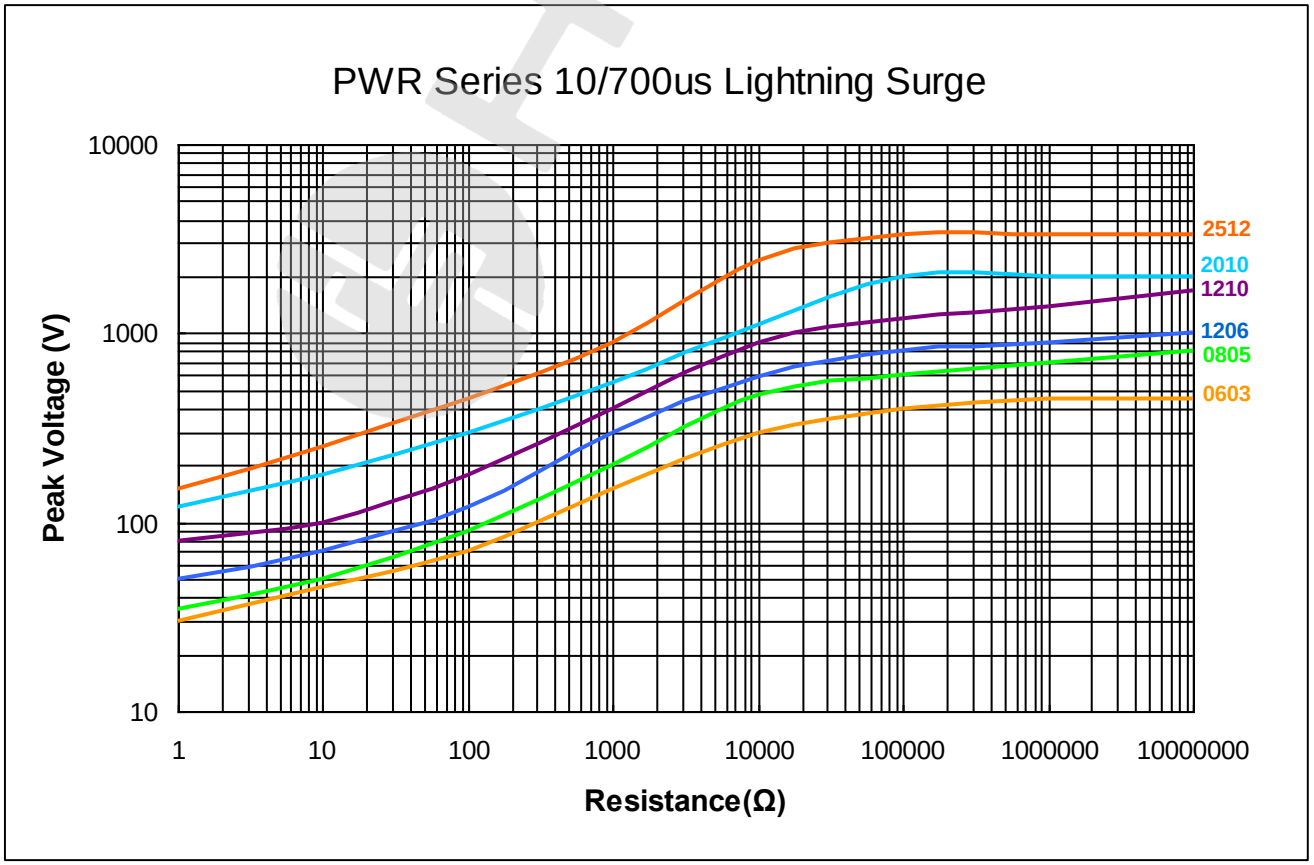


Type	A (mm)	B (mm)	C (mm)
PWR02	0.50	0.45	0.60
PWR03	0.90	0.60	0.90
PWR05	1.20	0.70	1.30
PWR06	2.00	0.90	1.60
PWR13	2.00	0.90	2.80
PWR10	3.80	0.90	2.80
PWR12	4.90	1.00	3.40

■Lightning Surge

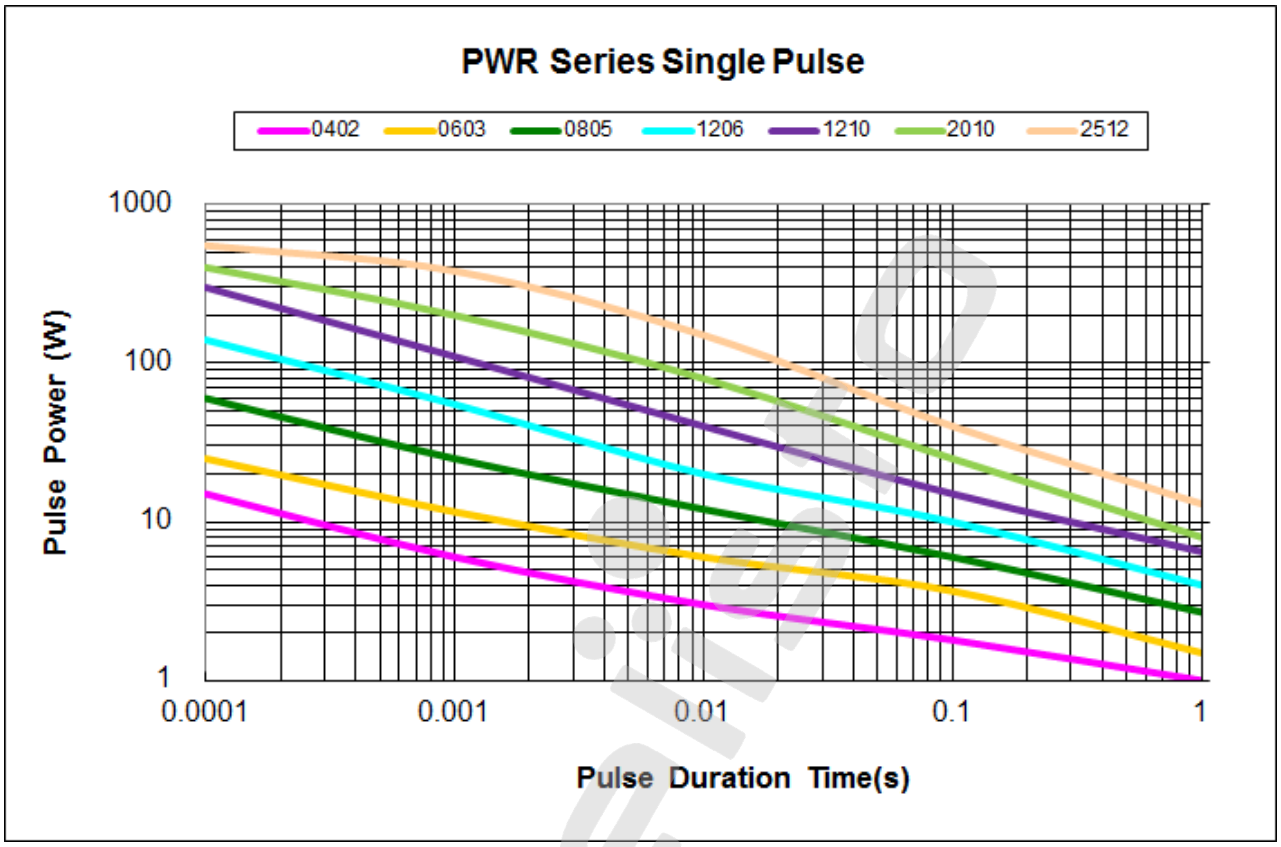
Resistors are tested in accordance with IEC 60115-1 using both 1.2/50us and 10/700 pulse shapes. The limit of acceptance is a shift in resistance of less than 1% from the initial value.





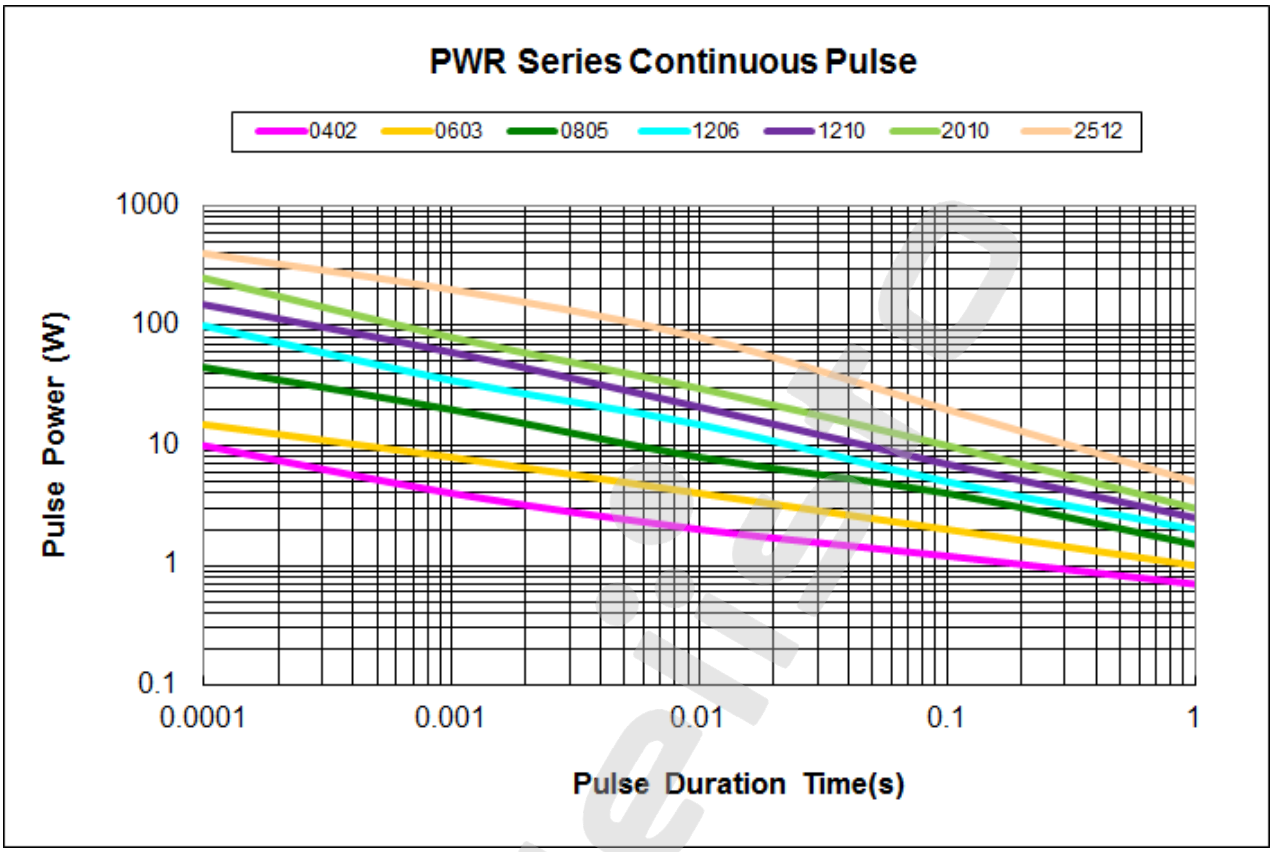
■Pulse withstanding capacity

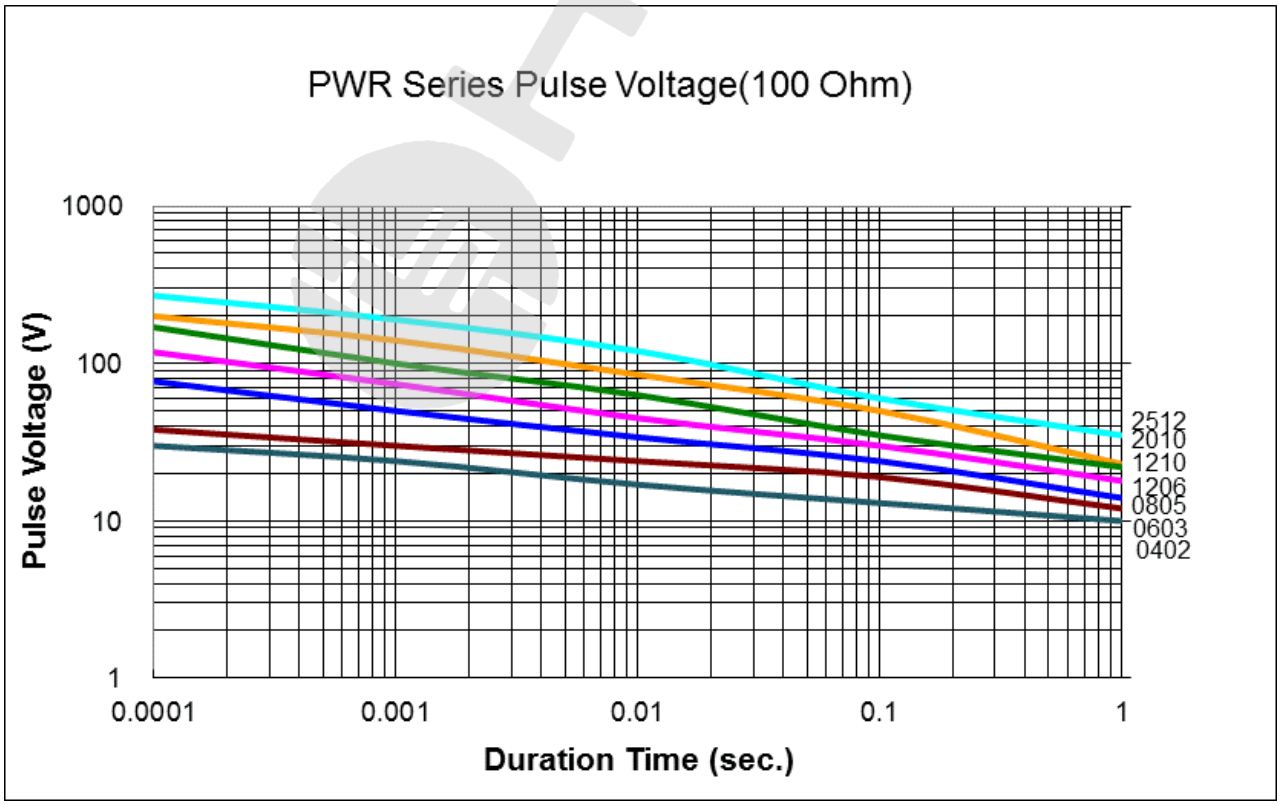
The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown.



■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.





REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version C	Jun 03, 2014	-	- Environmental Characteristics updated
Version C1	Apr 21, 2016	-	- Features increase AEC-Q200 Compliance
Version C2	Jul 15, 2016	-	- Modify Storage Temperature
Version C3	Oct 13, 2017	-	- Increase High Power Specifications
Version C4	Jul 27, 2018	-	- Increase 0402 size Electrical Specifications - Increase 0805/1206 Ultra High Power Electrical Specifications
Version C5	May 20, 2019	-	- Modify TCR Test description
Version C6	Jan 31, 2020	-	- Increase PWR2512 2W - Increase 0603 / 0805/1206 High power rating 0R (Jumper)
Version C7	Mar 10, 2021	-	- Modify Bending Test description - Increase large reel packaging code - Modify 2010 Embossed Plastic Tape B Specification - Modify Soldering Condition (IPC/JEDEC J-STD-020)
Version C8	Nov 15, 2021	-	- Increase the shelf life description
Version C9	Feb 15, 2022	-	- Derating Curve changes the temperature range
Version D	Jun 15, 2022	-	- Modify Soldering Condition
Version D1	Jan 31, 2023	-	- Increase 2010 1.25W
Version D2	Jul 06, 2023	-	- Electrical Specifications updated
Version D3	Jul 21, 2023	-	- Increase 0603 1/3W - Increase 1210 1W
Version D4	Oct 02, 2023	-	- Electrical Specifications updated
Version D5	Mar 06, 2025		- Modify the descriptions in the Features
Version D6	Sep 17, 2025	-	- Modify 0402 Dimensions - Increase 0402 / 1210 / 2010 / 2512 Jumper