Data Sheet

Customer:	
Product:	Automotive Grade Pulse Withstanding Chip Resistor – PWR..A Series
Size:	0402/0603/0805/1206/1210/2010/2512
Issued Date:	08-Oct-26
Edition:	REV.B4

RoHS Compliant

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08-Oct-26	08-Oct-26	08-Oct-26		
Alice Hsiao	***Susan Huang***	***Susan Huang***		

Automotive Grade Pulse Withstanding Chip Resistor – PWR..A Series



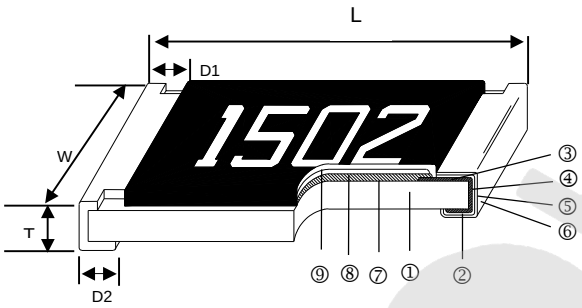
Features

- Tolerance from ±0.5%~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 environment
- AEC-Q200 Qualified
- 100% CCD inspection
- MSL: Level 1
- Products with lead-free terminations meet EU RoHS requirements. Pb-glass contained in electrodes, resistors element and glass are exempted by RoHS.

Applications

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

Construction

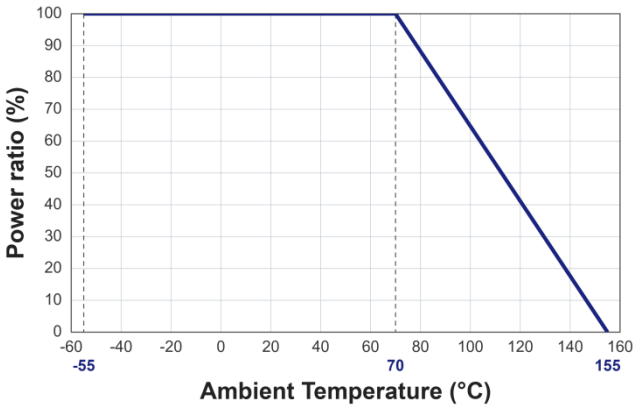


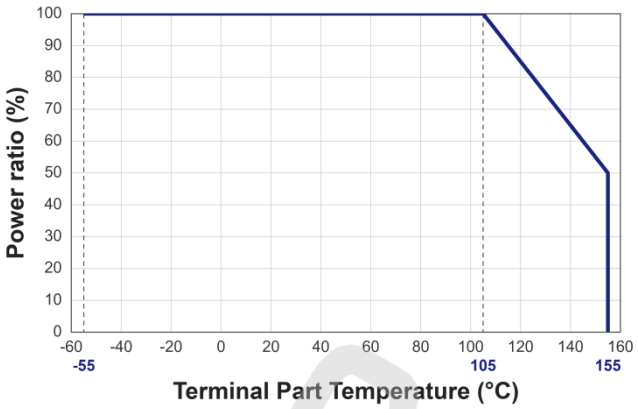
①	Alumina Substrate	⑥	External Electrode
②	Bottom Electrode	⑦	Resistor Layer
③	Top Electrode	⑧	Primary Overcoat
④	Edge Electrode	⑨	Secondary Overcoat
⑤	Barrier Layer		

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	0.55±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	0.60±0.25	0.55±0.25	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	0.80±0.25	0.60±0.30	42.0

■Derating Curve





■Part Numbering

PWR	12	J	T	E	S	1001	A
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	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)	X: 1/10W W: 1/8W P: 1/5W V : 1/4W O: 1/3W G: 2/5W U: 1/2W Q: 3/4W T: 1W K: 1.25W A: 1.5W S: 2W	1001: 1KΩ 1004: 1MΩ R0R0: 0Ω	A: Automotive Grade NA: Automotive Grade & 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	10Ω-1MΩ		±100
PWR03 (0603)	1/10W	-55 ~ +155°C	50V	100V	-	1Ω - 294Ω		±200
					10Ω – 1MΩ	2Ω - 1MΩ		±100
PWR05 (0805)	1/8W	-55 ~ +155°C	150V	300V	-	1Ω - 294Ω		±200
					10Ω – 1MΩ	1Ω - 20MΩ		±100
PWR06 (1206)	1/3W	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 20MΩ		±100
PWR13 (1210)	1/2W	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 20MΩ		±100
PWR10 (2010)	3/4W	-55 ~ +155°C	400V	800V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 20MΩ		±100
PWR12 (2512)	1.5W	-55 ~ +155°C	500V	1000V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 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	-	1Ω - 294Ω		±200
					10Ω – 1MΩ	2Ω - 1MΩ		±100
PWR05 (0805)	2/5W	-55 ~ +155°C	150V	300V	-	1Ω - 294Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR05 (0805)	1/2W *	-55 ~ +155°C	400V	600V	-	1Ω - 294Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR06 (1206)	1/2W	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR06 (1206)	3/4W *	-55 ~ +155°C	500V	1000V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR13 (1210)	3/4W 1W	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR10 (2010)	1W 1.25W	-55 ~ +155°C	400V	800V	-	1Ω - 20Ω		±200
					10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR12 (2512)	2W *	-55 ~ +155°C	500V	1000V	-	1Ω - 10Ω		±350
					10Ω – 200KΩ	1Ω - 200KΩ		±100

■Special High Power Rating Electrical Specification

Item / Type	Power Rating at 70°C	Rated Terminal Part Temp.	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)	1/2W	105℃	-55 ~ +155°C	150V	200V	-	1Ω - 294Ω		±200
						10Ω – 1MΩ	2Ω - 1MΩ		±100
PWR05 (0805)	3/4W	105℃	-55 ~ +155°C	400V	600V	-	1Ω - 294Ω		±200
						10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR06 (1206)	1W	105℃	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
						10Ω – 1MΩ	1Ω - 1MΩ		±100
PWR13 (1210)	1.5W	105℃	-55 ~ +155°C	200V	400V	-	1Ω - 20Ω		±200
						10Ω – 1MΩ	1Ω - 1MΩ		±100

■Low Ohmic Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Current	Resistance Range		TCR (PPM/°C)
				±1% (E24,E96)	±5% (E24)	
PWR06 (1206)	1/2W	-55 ~ +155°C	2.23A	100 mΩ - 976 mΩ		±200
PWR13 (1210)	3/4W	-55 ~ +155°C	2.73A	100 mΩ - 976 mΩ		±200
PWR10 (2010)	1.25W	-55 ~ +155°C	3.53A	100 mΩ - 976 mΩ		±200
PWR12 (2512)	2W	-55 ~ +155°C	4.47A	100 mΩ - 976 mΩ		±200

■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

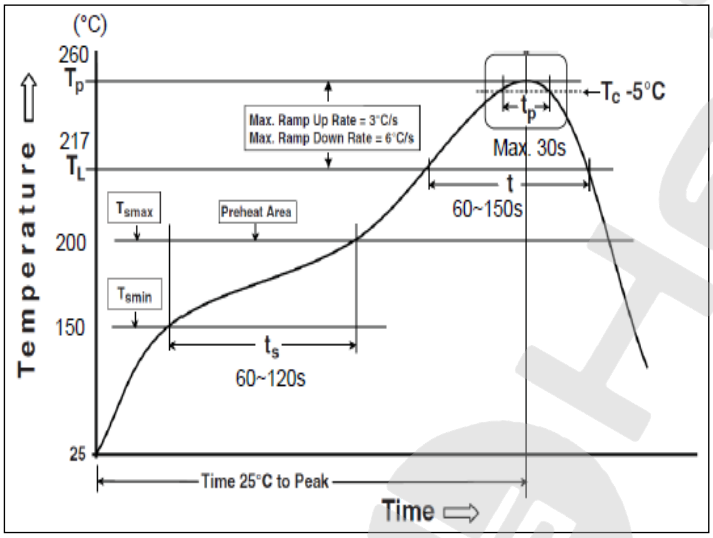
Operating Voltage=$\sqrt{}$(P*R) or Max. Operating Voltage listed above, whichever is lower.

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	ΔR:±(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 Special High Power :Overload for 5 seconds Type | 03 | 05 | 06 | 13 Overload | 2.06W | 2W | 3W | 4W
Insulation Resistance	≥10G		**JIS-C-5201-1 4.6** **IEC-60115-1 4.6** Max. Overload Voltage for 1 minute
Operational Life	ΔR:±(1.0%+0.05Ω)	As Spec.	**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	ΔR:±(1.0%+0.05Ω)	As Spec.	**MIL-STD-202 Method 103** 1000 hrs 85°C/85%RH 10% of operating power (≦100 V)
High Temperature Exposure	ΔR:±(1.0%+0.05Ω)	As Spec.	**MIL-STD-202 Method 108** at +155°C for 1000 hrs
Board Flex	ΔR:±(1.0%+0.05Ω)	As Spec.	**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	ΔR:±(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
Temperature Cycling	ΔR:±(0.5%+0.05Ω)	As Spec.	**JESD22 Method JA-104** -55°C to +125°C, 1000 cycles
Mechanical Shock	ΔR:±(0.25%+0.05Ω)	As Spec.	**MIL-STD-202 Method 213** Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	ΔR:±(0.5%+0.05Ω)	As Spec.	**MIL-STD-202 Method 204** 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	ΔR:±(3%+0.05Ω)		**AEC-Q200-002** Human body model 0402/0603: 1KV 0805 and above: 2KV

Item	Requirement		Test Method
	±5% and Below	Jumper	
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±5%	As Spec.	**EIA-977 (Condition B)** 105±2°C, no power rating for 1000 hrs.

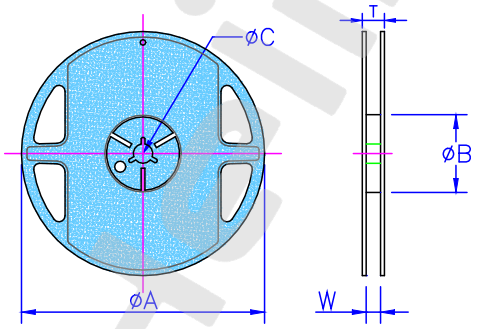
RCWV(Rated Continuous Working Voltage)=√(P*R) or Max. Operating Voltage whichever is lower.

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

■Shelf Life: 2 years from production date.

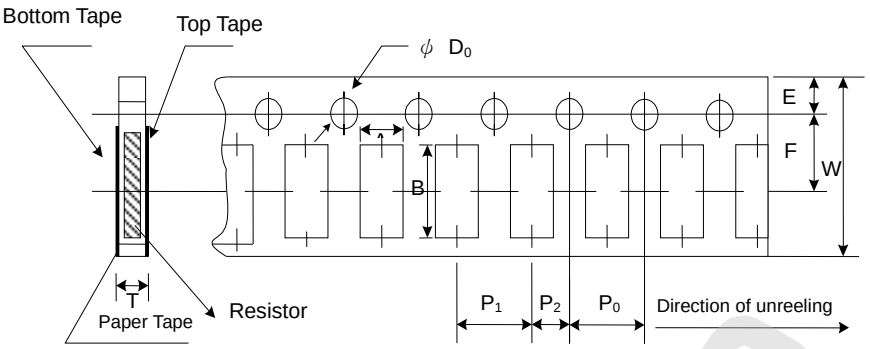
■Packaging

Reel Specifications & Packaging Quantity



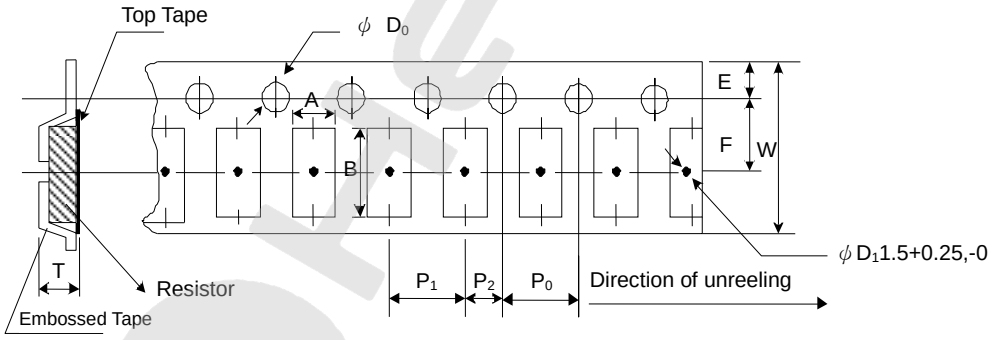
Type	Packaging Quantity		Tape Width	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)
PWR02	Paper	10K	8mm	7 inch	178.5±1.5	$60^{+1/-0}$	13.0±0.2	9.0±0.5	12.5±0.5
		20K	8mm	10 inch	254±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
		40K	8mm	13 inch	330±1.0	100±0.5	13.0±0.2	9.5±0.5	13.5±0.5
PWR03 PWR05 PWR06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



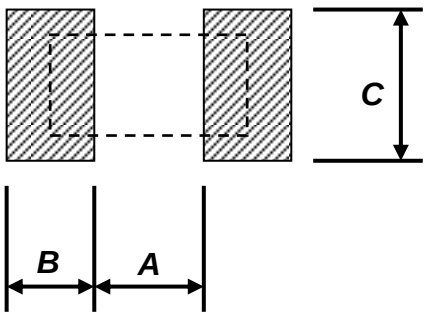
Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P_0 (mm)	P_1 (mm)	P_2 (mm)	ΦD_0 (mm)	T (mm)
PWR02	0.65±0.10	1.15±0.10	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.1
PWR03	1.10±0.10	1.90±0.10	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
PWR05	1.60±0.10	2.40±0.20	8.0±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±0.20	8.0±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±0.20	8.0±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	2.8±0.10	5.40±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}
PWR12	3.5±0.10	6.70±0.10	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2^{+0}

■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

■Marking

No Marking for 0402

Jumper for all: Letter "0"

0805~2512 4 digits marking for Example

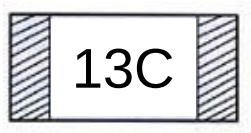
Resistance	100mΩ	5.6Ω	97.6Ω	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ	1MΩ
marking	R100	5R60	97R6	1000	2201	1002	4992	1003	1004

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

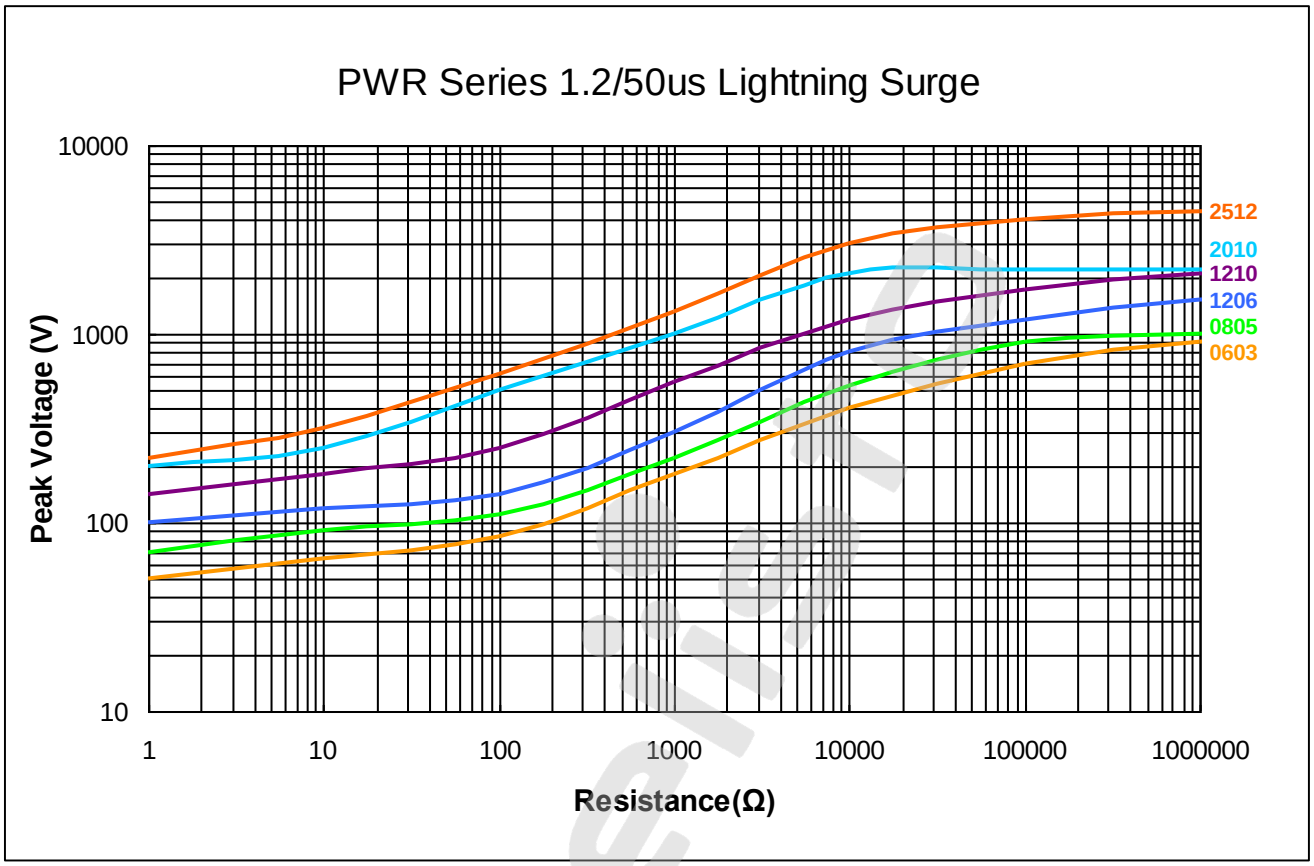
Marking Table

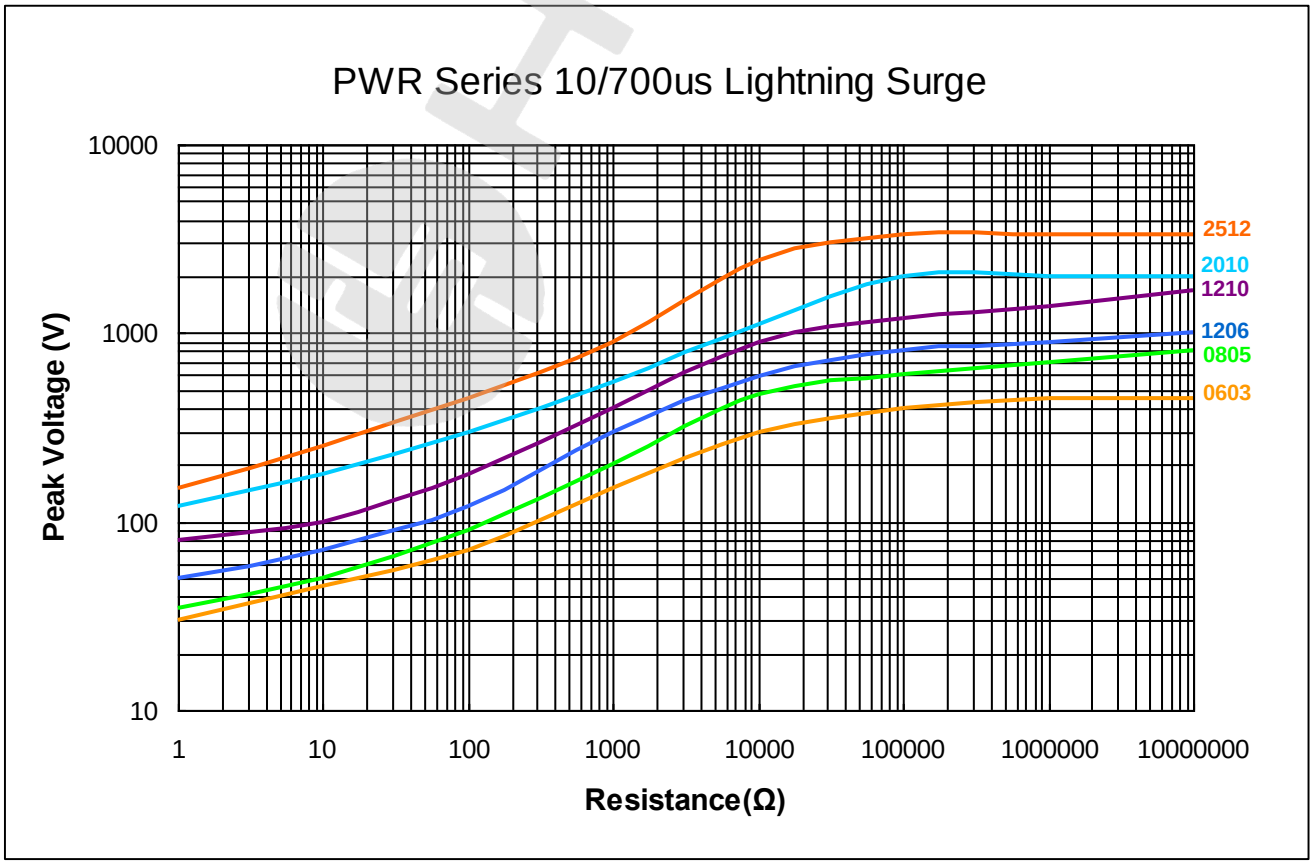
Code	E96	Code	E96	Code	E96	Code	E96
02	102	28	191	52	340	75	590
03	105	29	196	53	348	76	604
04	107	31	205	54	357	77	619
06	113	32	210	55	365	78	634
07	115	33	215	56	374	79	649
08	118	34	221	57	383	80	665
09	121	35	226	58	392	81	681
10	124	36	232	59	402	82	698
11	127	37	237	60	412	83	715
13	133	38	243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

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}		

■Lightning Surge

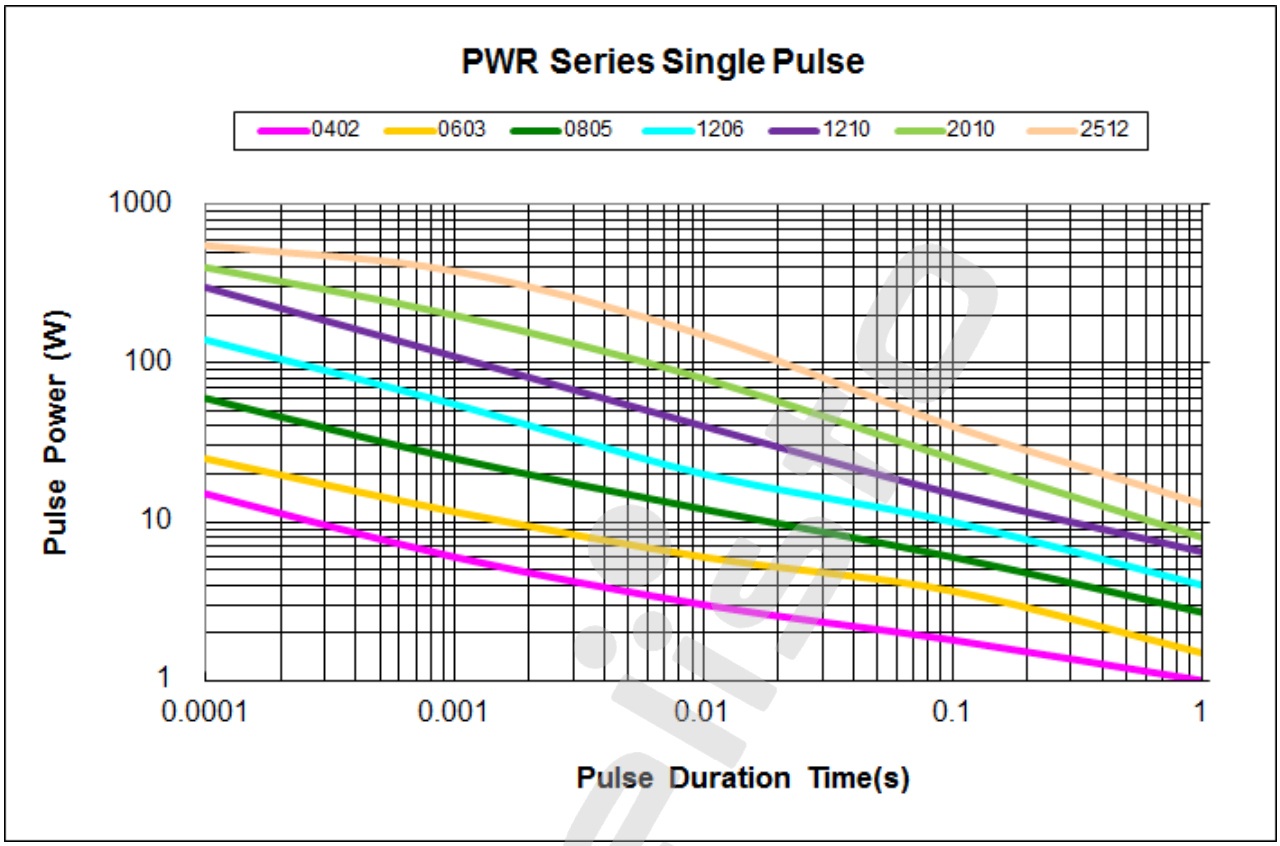
Resistors are tested in accordance with IEC 60115-1 using both 1.2/50us and 10/700 pulse shapes. The limit of acceptance is a shift in resistance of less than 1% from the initial value.





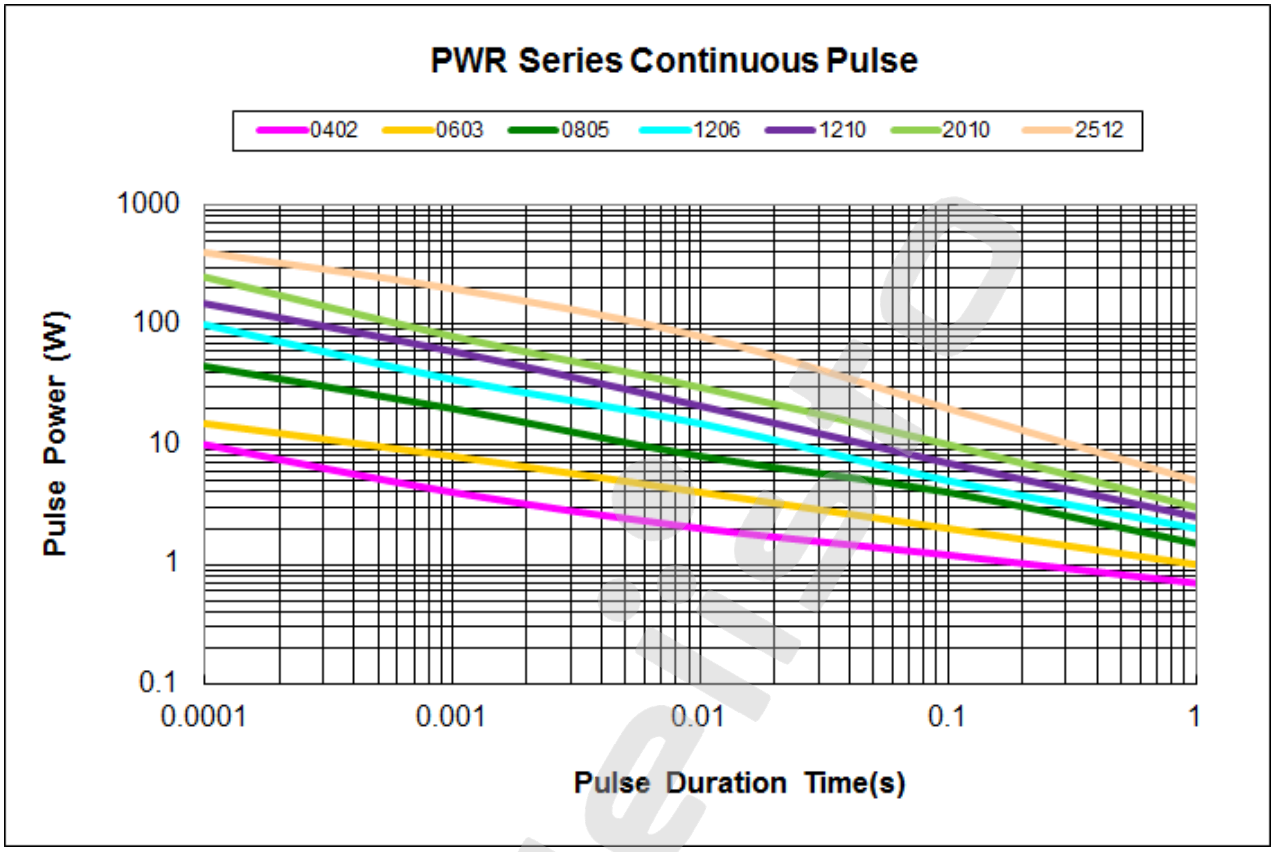
■Pulse withstanding capacity

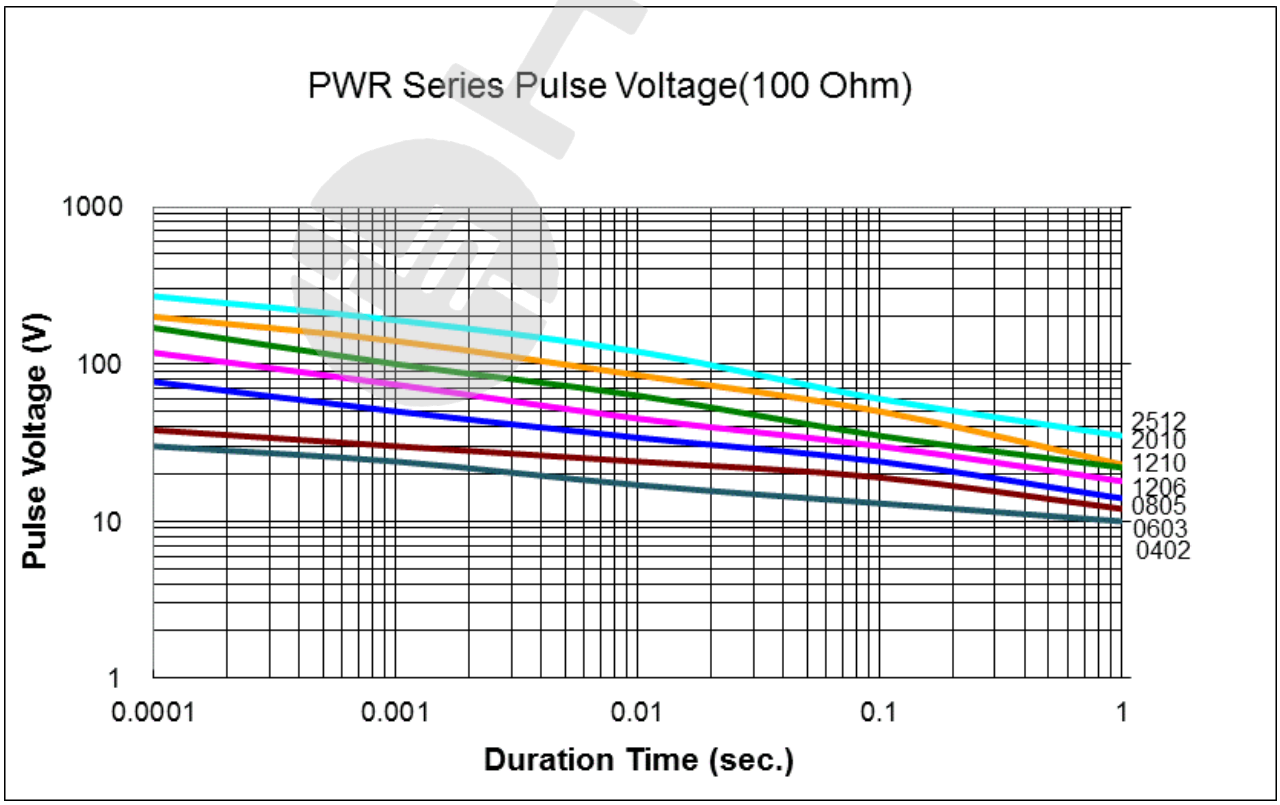
The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown.



■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 A	Mar 10, 2021	-	- New product release
Version A1	Nov 15, 2021	-	- Increase the shelf life description
Version A2	Feb 15, 2022	-	- Derating Curve changes the temperature range
Version A3	Jun 15, 2022	-	- Modify Soldering Condition
Version A4	Jan 31, 2023	-	- Increase 2010 1.25W
Version A5	Jul 06, 2023	-	- Electrical Specifications updated
Version A6	Jul 21, 2023	-	- Increase 0603 1/3W - Increase 1210 1W
Version A7	Oct 02, 2023	-	- Electrical Specifications updated
Version A8	Dec 26, 2023	-	- Electrical Specifications updated
Version A9	Jul 08, 2024	-	- Modify the descriptions in the Features
Version B	Sep 17, 2025	-	- Modify the descriptions in the Features - Modify 0402 Dimensions - Increase 0402 / 1210 / 2010 / 2512 Jumper
Version B1	Dec 01, 2025	-	- Environmental Characteristics updated
Version B2	Jun 29, 2026	-	- Added Low Ohmic Electrical Specifications
Version B3	Jul 23, 2026	-	- Added Special High Power Rating Electrical Specification
Version B4	Oct 08, 2026	-	- Electrical Specifications updated