

Anti-Corrosive Thin Film Precision Chip Resistor (PR Series)

■Features

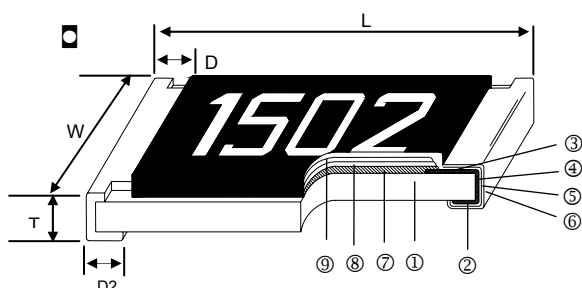
- Long term life stability and demonstrated the Anti-Corrosion claims
- Special passivated NiCr film for Anti-Acid and Anti-Damp
- Tight tolerance down to $\pm 0.1\%$
- Extremely low TCR down to $\pm 15 \text{ PPM}/^{\circ}\text{C}$
- Wide resistance range 10ohm ~ 1.5Mega ohm

■Applications

- High-end Computer
- Industrial Equipment
- Automatic Equipment Controller
- Medical Equipment
- Telecommunication Device
- High-end Multimedia Electronics
- Outdoor Electronic Applications



■Construction



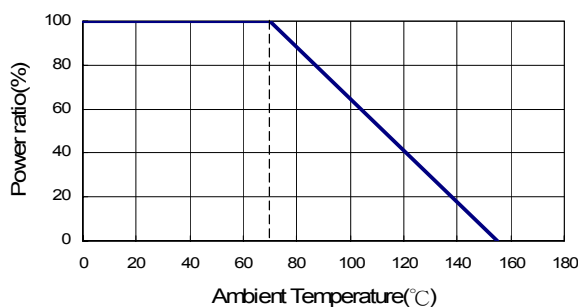
① Alumina Substrate	④ Edge Electrode	⑦ Resistor Layer
② Bottom Electrode	⑤ Barrier Layer	⑧ Passivation
③ Top Electrode	⑥ External Electrode	⑨ Overcoat

■Dimensions

Unit :mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
PR02	0402	1.00 \pm 0.05	0.50 \pm 0.05	0.30 \pm 0.05	0.20 \pm 0.10	0.20 \pm 0.10	0.55
PR03	0603	1.55 \pm 0.10	0.80 \pm 0.10	0.45 \pm 0.10	0.30 \pm 0.20	0.30 \pm 0.20	1.85
PR05	0805	2.00 \pm 0.15	1.25 \pm 0.15	0.55 \pm 0.10	0.30 \pm 0.20	0.40 \pm 0.25	4.76
PR06	1206	3.05 \pm 0.15	1.55 \pm 0.15	0.55 \pm 0.10	0.42 \pm 0.20	0.35 \pm 0.25	9.11
PR10	2010	4.90 \pm 0.15	2.40 \pm 0.15	0.55 \pm 0.10	0.60 \pm 0.30	0.50 \pm 0.25	23.82
PR12	2512	6.30 \pm 0.15	3.10 \pm 0.15	0.55 \pm 0.10	0.60 \pm 0.30	0.50 \pm 0.25	38.46

Derating Curve



Part Numbering

PR	03	D	T	D	X	1001	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	02: 0402 03: 0603 05: 0805 06: 1206 10: 2010 12: 2512	B: ±0.1% C: ±0.25% D: ±0.5%	T: Taping Reel B: Bulk	N: ±15 C: ±25 D: ±50	: Standard X: 1/10W W: 1/8W V: 1/4W	1000: 100Ω 2201: 2200Ω 1001: 1KΩ 1004: 1MΩ	: Standard Marking for E96 / E24 N: No Marking

Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	
PR02 (0402)	1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 12KΩ			±15
					24.9Ω - 24.9KΩ			±25 ±50
PR03 (0603)	1/16W	-55 ~ +155°C	50V	100V	24.9Ω - 332KΩ			±15 ±25 ±50
PR05 (0805)	1/10W	-55 ~ +155°C	100V	200V	10Ω - 1MΩ			±15 ±25 ±50
PR06 (1206)	1/8W	-55 ~ +155°C	150V	300V	10Ω - 1MΩ			±15 ±25 ±50
PR10 (2010)	1/4W	-55 ~ +155°C	150V	300V	24.9Ω - 1MΩ			±15
					10Ω - 1.5MΩ			±25 ±50
PR12 (2512)	1/2W	-55 ~ +155°C	150V	300V	24.9Ω - 1MΩ			±15
					10Ω - 1.5MΩ			±25 ±50

High Power Rating Electrical Specifications

Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	
PR03 (0603)	1/10W	-55 ~ +155°C	75V	150V	24.9Ω - 220KΩ			±15 ±25 ±50
PR05 (0805)	1/8W	-55 ~ +155°C	150V	300V	24.9Ω - 680KΩ			±15 ±25 ±50
PR06 (1206)	1/4W	-55 ~ +155°C	200V	400V	24.9Ω - 1MΩ			±15 ±25 ±50

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.

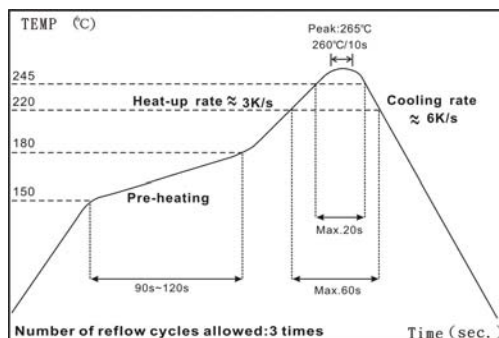
Environmental Characteristics

Item	Requirement		Test Method
	Size 0603 / 0805 / 1206 / 2010 / 2512	Size 0402	
Short Time Overload	$\leq \pm 0.02\%$ $\leq \pm 0.2\%$ for high power rating	$\leq \pm 0.1\%$	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 2 seconds
Endurance	$\leq \pm 0.05\%$ $\leq \pm 0.25\%$ for high power rating	$\leq \pm 0.25\%$	MIL-STD-202 Method 108A 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\leq \pm 0.05\%$ $\leq \pm 0.25\%$ for high power rating	$\leq \pm 0.5\%$	MIL-STD-202 Method 103B 40±2°C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	95% min. coverage		MIL-STD-202 Method 208H 245±5°C for 3 seconds
Resistance to Soldering Heat	$\leq \pm 0.02\%$	$\leq \pm 0.1\%$	MIL-STD-202 Method 210E 260±5°C for 10 seconds
Thermal Shock	$\leq \pm 0.02\%$	$\leq \pm 0.1\%$	MIL-STD-202 Method 107G -55°C ~ 150°C, 100 cycles

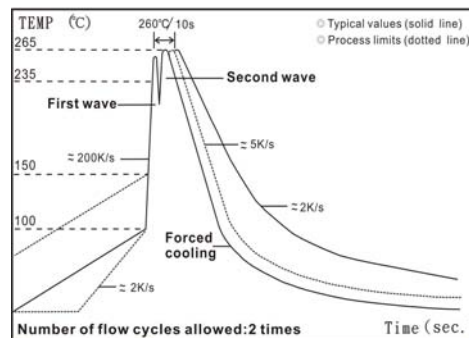
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

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

Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

■ Marking

0603 3digit marking



3digit marking for Example: 14C=13K7Ω 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	H	X	Y	Z
Multiplier	10 ⁰	10 ¹	10 ²	10 ³	10 ⁴	10 ⁵	10 ⁶	10 ⁷	10 ⁻¹	10 ⁻²	10 ⁻³

0603 3digit marking for E24

Example: 101=100Ω 102=1KΩ

E24	10	11	12	13	15	16	18	20	22	24	27	30	33	36	39	43	47	51	56	62	68	75	82	91
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0805~2512 4digit marking

Example

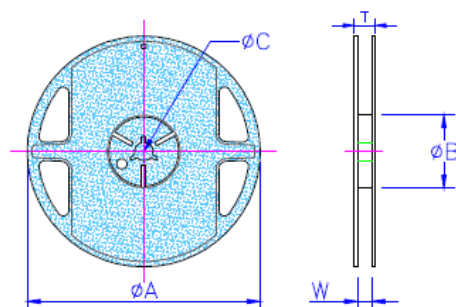
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

■ Packaging

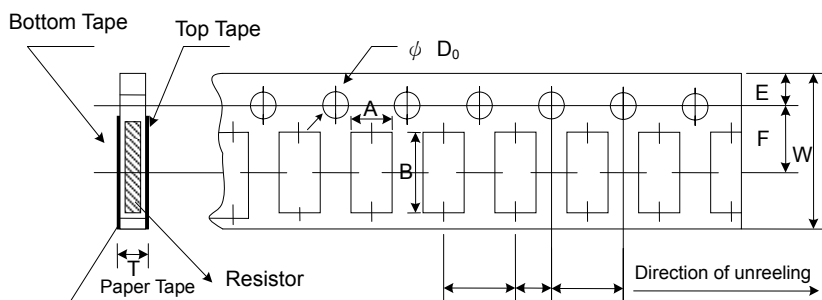
Package Quantity & Reel Specifications

Unit :mm

Type	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
PR02	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
PR03	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR05	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR06	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR10	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
PR12	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000



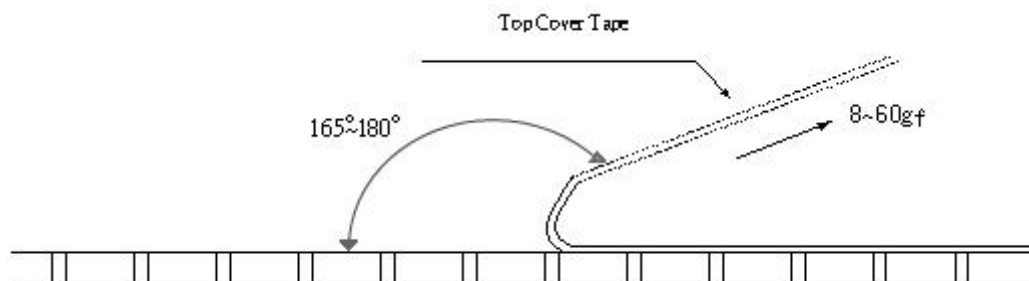
Paper Tape Specifications



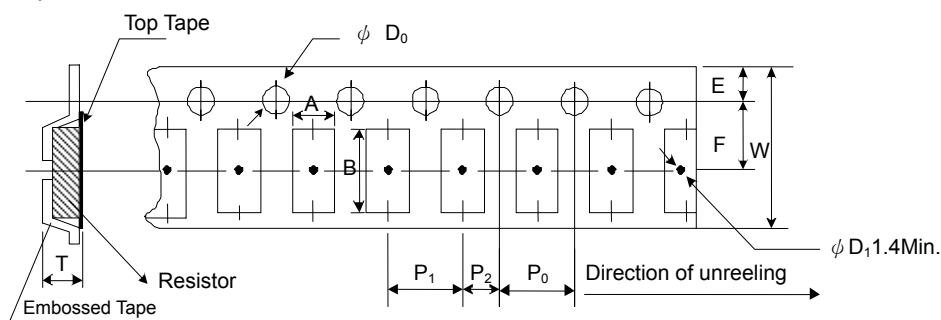
Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
PR02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
PR03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
PR05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
PR06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf



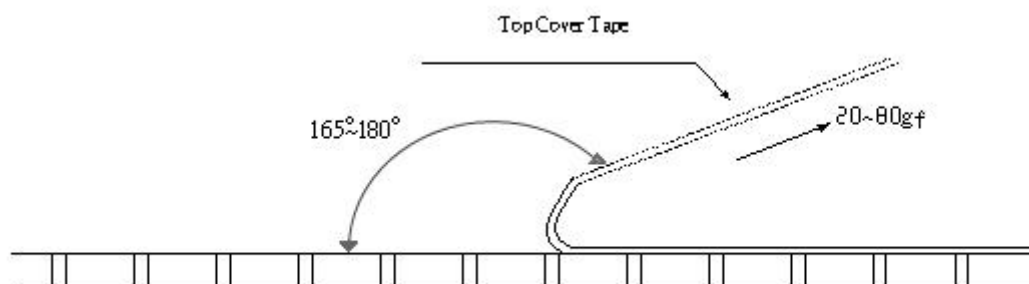
Emboss Plastic Tape Specifications



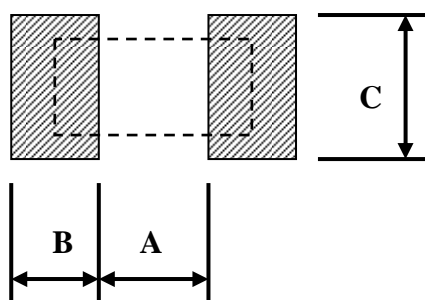
Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	ψD_0	T
PR10	2.85 ± 0.10	5.45 ± 0.10	12.0 ± 0.10	1.75 ± 0.10	5.5 ± 0.05	4.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.20
PR12	3.40 ± 0.10	6.65 ± 0.10	12.0 ± 0.10	1.75 ± 0.10	5.5 ± 0.05	4.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.20

- Peel force of top cover tape
- The peel speed shall be about 300mm/min $\pm 5\%$
- The peel force of top cover tape shall be between 20gf to 80gf



Recommend Land Pattern



Unit : mm

Type	A	B	C
PR02	0.50	0.50	0.60 ± 0.2
PR03	0.80	1.00	0.90 ± 0.2
PR05	1.00	1.00	1.35 ± 0.2
PR06	2.00	1.15	1.70 ± 0.2
PR10	3.60	1.40	2.50 ± 0.2
PR12	4.90	1.60	3.10 ± 0.2

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version B3	April 28,2014	-	- Update Features, Applications and add Wave Soldering Condition.
Version B4	Sep 25 ,2014	-	- Correct the specification of top cover tape peel force.
Version B5	May 08 ,2015	-	- Correct the element of Top Electrode.
Version B6	May 02, 2016	-	- Modify Storage Temperature. - Remove Material Description.