

Data Sheet

Customer :

Product : Aluminum Nitride Thin Film Precision Chip
Resistor – ARN Series

Size: 0603/0805/1206/2512

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Aluminum Nitride Thin Film Precision Chip Resistor (ARN Series)



Features

- High thermal conductivity aluminum nitride substrate
- Power rating up to 6.0W
- Resistance 50Ω ~ 30.1KΩ
- Resistor tolerance to $\pm 0.1\%$
- TCR to $\pm 25\text{ppm}/^\circ\text{C}$

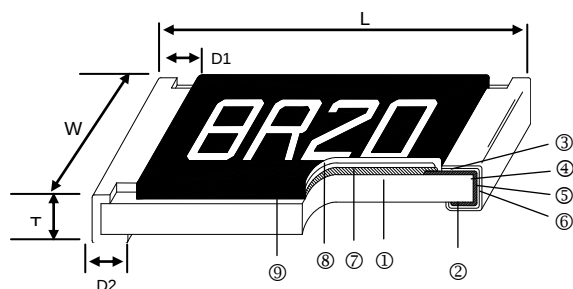
Applications

- Power Supplies
- Power Switching

Typical Performance

- TCR. 25 ppm/ $^\circ\text{C}$
- TOL. 0.1 %

Construction



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

Dimensions

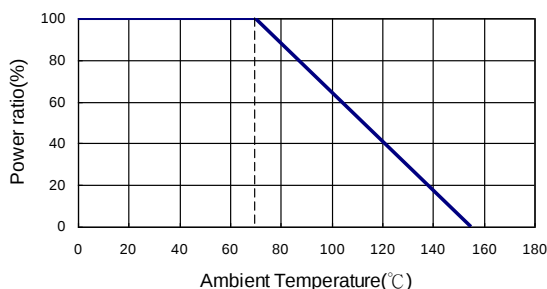
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
ARN03	0603	1.55 $\pm$ 0.10	0.80 $\pm$ 0.10	0.43 $\pm$ 0.15	0.30 $\pm$ 0.15	0.50 $\pm$ 0.20	1.73
ARN05	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.43 $\pm$ 0.15	0.35 $\pm$ 0.15	0.60 $\pm$ 0.20	3.95
ARN06	1206	3.05 $\pm$ 0.20	1.55 $\pm$ 0.20	0.43 $\pm$ 0.15	0.50 $\pm$ 0.15	1.20 $\pm$ 0.20	10.98
ARN12	2512	6.30 $\pm$ 0.20	3.10 $\pm$ 0.20	0.43 $\pm$ 0.15	0.70 $\pm$ 0.25	1.60 $\pm$ 0.25	42.32

Part Numbering

ARN	06	C	T	C	S	1000	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/ $^\circ\text{C}$)	Power Rating	Resistance	Marking Code
	03: 0603 05: 0805 06: 1206 12: 2512	B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$	T: Taping Reel B: Bulk	C: ± 25 D: ± 50	U : 1/2W T : 1W S : 2W I : 6W	0500: 50Ω 1000: 100Ω 5000: 500Ω 1002: 10KΩ	:Standard Marking N: No Marking

Derating Curve



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%	±1%	
ARN03 (0603)	1/2W ⁽¹⁾	-55°C ~ +155°C	75V	150V	50Ω~30.1KΩ				±25 ±50
ARN05(0805)	1.0W ⁽¹⁾	-55°C ~ +155°C	100V	200V	50Ω~30.1KΩ				±25 ±50
ARN06 (1206)	2.0W ⁽¹⁾	-55°C ~ +155°C	100V	200V	50Ω~30.1KΩ				±25 ±50
ARN12 (2512)	6.0W ⁽¹⁾	-55°C ~ +155°C	100V	200V	50Ω~30.1KΩ				±25 ±50

⁽¹⁾ Dependant on component mounting by user.

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating 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
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C
Short Time Overload ⁽²⁾	$\Delta R \pm 0.5 \%$	Actual power handling capability is limited by the end user mounting process. As with any high power chip resistor the ability to remove the heat is critical to the overall performance of the device
Insulation Resistance	>9999MΩ	MIL-STD-202 Method 302 Apply 100V _{DC} for 1 minute
Endurance	$\Delta R \pm 1 \%$	MIL-STD-202 Method 108 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\Delta R \pm 0.4 \%$	MIL-STD-202 Method 103 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 208 245±5°C for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.2 \%$	MIL-STD-202 Method 210 260±5°C for 10 seconds
Low Temperature Operation	$\Delta R \pm 0.2 \%$	JIS-C-5201-1 4.36 1 hour, -65°C, followed by 45 minutes of RCWV
High Temperature Exposure	$\Delta R \pm 0.2 \%$	MIL-STD-202 Method 108 At + 155°C for 1000hrs
Thermal Shock	$\Delta R \pm 0.2 \%$	MIL-STD-202F Method 107 -55°C ~150°C, 100 cycles

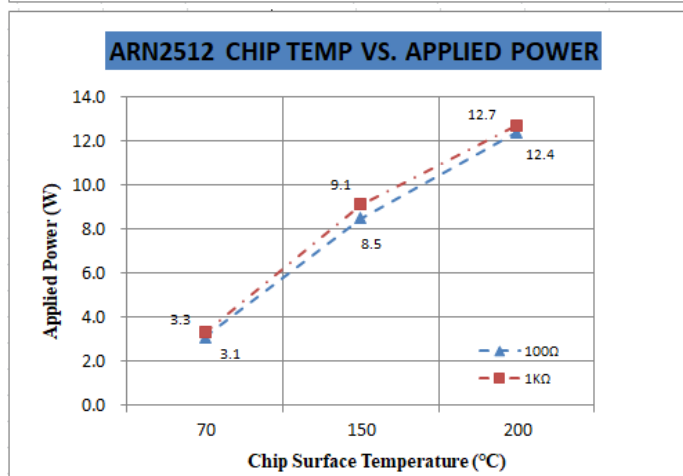
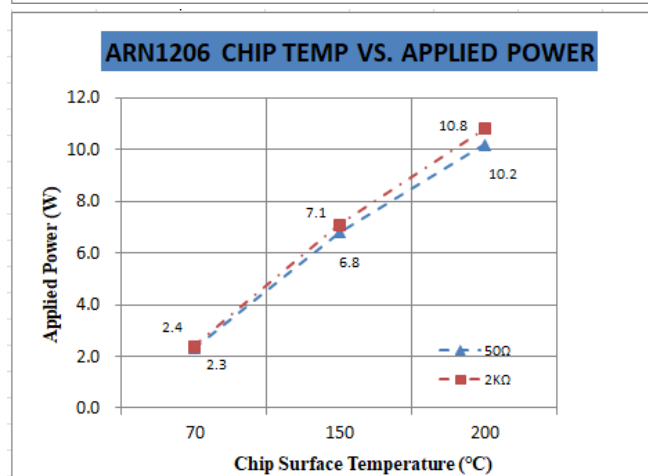
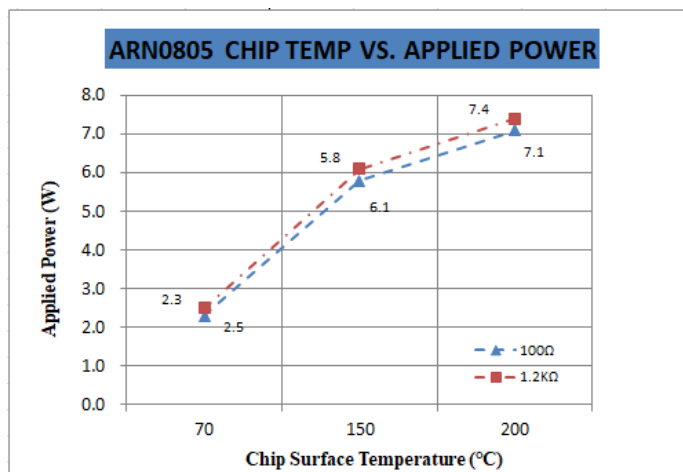
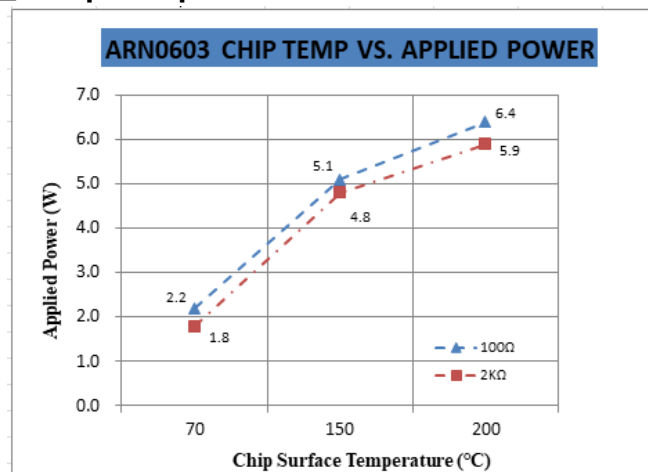
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

■ Reference Standards: MIL-STD-202, JIS-C 5201

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

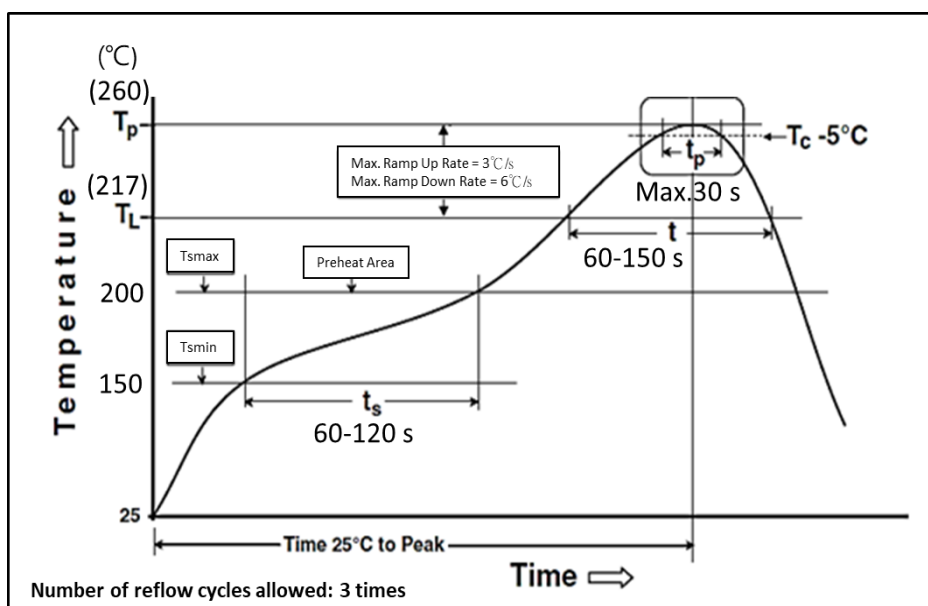
■ Shelf Life: 2 years from production date.

■ Chip Temp Vs. APPLIED POWER



(2) Chip surface temperature measured using FLIR ETS-320 thermal imaging system with an approximate test card surface temperature

■ Soldering Condition (IPC/JEDEC J-STD-020)



■ 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

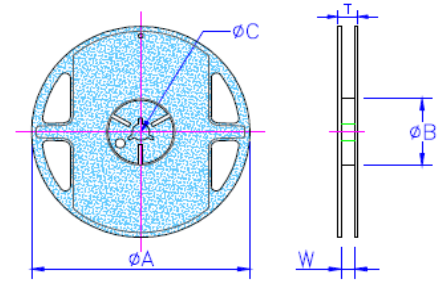
Resistance	500Ω	2.2KΩ	10KΩ	12.5KΩ
marking	5000	2201	1002	1252

Packaging

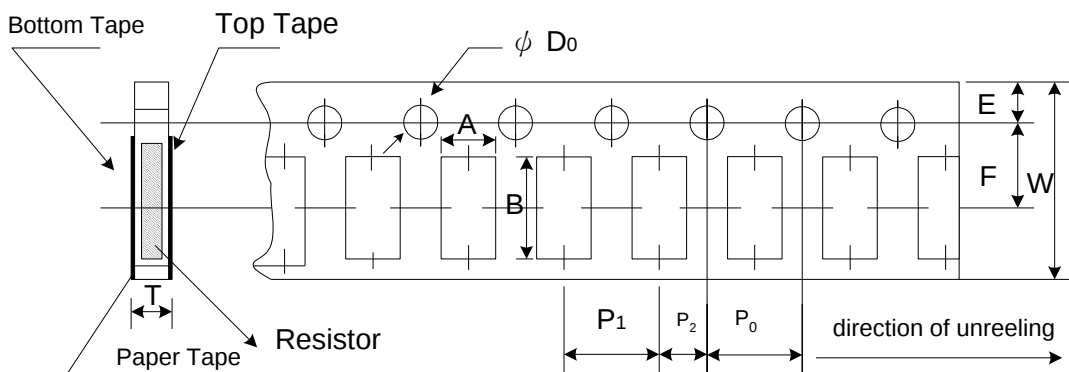
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARN03	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN05	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN06	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN12	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000



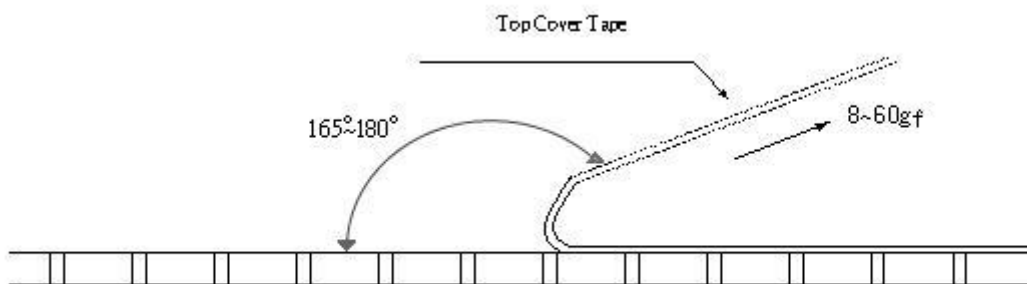
Paper Tape Specifications



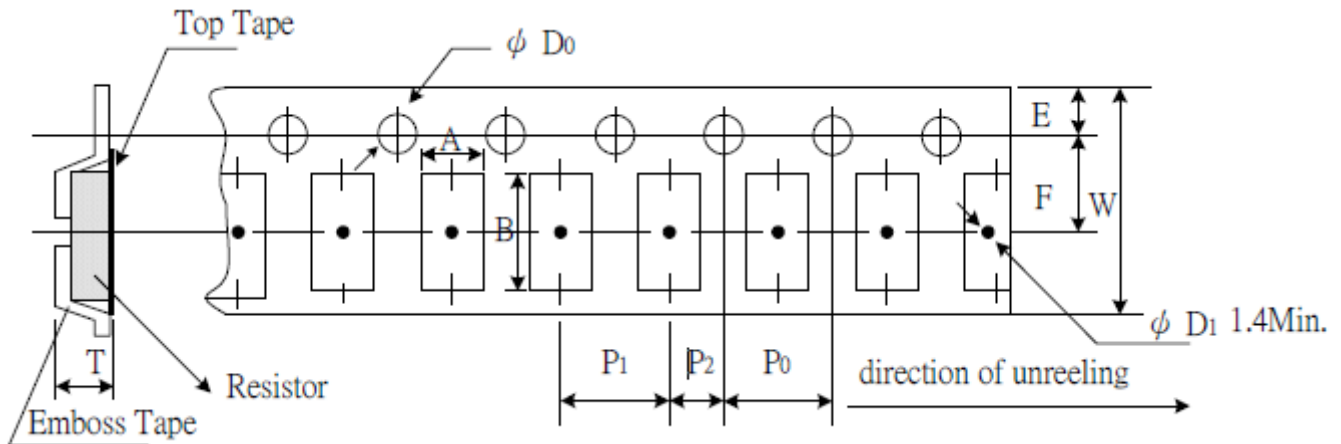
Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
ARN03	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
ARN05	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
ARN06	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

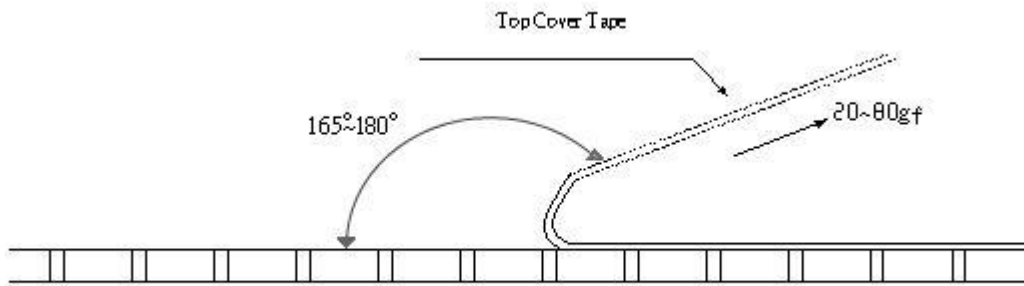


Emboss Plastic Tape Specifications

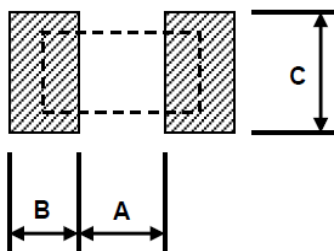


Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
ARN12	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

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



Recommend Land Pattern



Unit: mm

Type	A	B	C
ARN03	0.37	0.99	0.86±0.1
ARN05	0.50	1.08	1.32±0.1
ARN06	0.60	1.90	1.80±0.1
ARN12	2.77	2.31	3.20±0.2

- Use a board with a copper thickness of two ounces