Aluminum Nitride Thin Film Precision Chip Resistor

■ Features
- High thermal conductivity aluminum nitride substrate
- Power rating up to 6.0W
- Resistance 50Ω~30.1KΩ
- Resistor tolerance to ±1%
- TCR to ±25ppm/℃

■ Applications
- Power Supplies
- Power Switching
- Braking System

■ Typical Performance
- TCS. 25ppm/℃
- TOL. 0.1%

GENERAL SPECIFICATIONS

Item / Type	Power Rating At 70℃	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range				TCR (PPM/℃)
					±0.1%	±0.25%	±0.5%	±1%	
ARN03 (0603)	1/2W(1)	-55℃ ~ +155℃	75V	150V	50Ω~30.1KΩ				±25 ±50
ARN05 (0805)	1.0W(1)		100V	200V					
ARN06 (1206)	2.0W(1)		100V	200V					
ARN12 (2512)	6.0W(1)		100V	200V					

(1) Dependent on component mounting by user.
Operating Voltage = √(P×R) or Max. operating voltage listed above, whichever is lower.

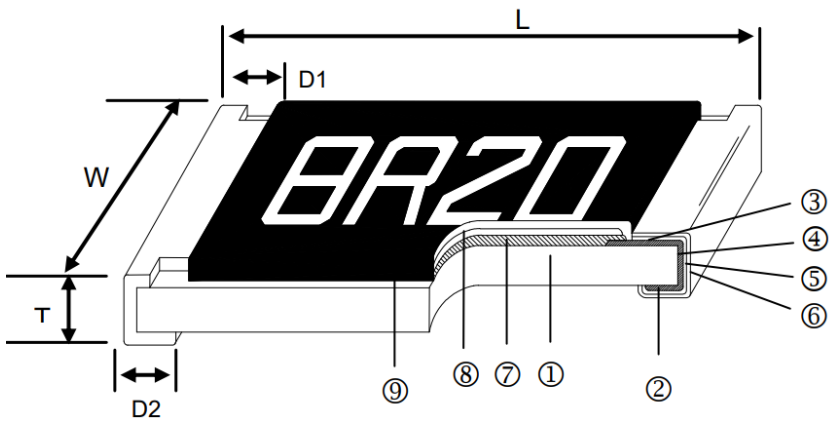
CHARACTERISTICS

Test	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	**MIL-STD-202 Method 304** +25/-55/+25/+125/+25℃
Short Time Overload	△R±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 100Vdc for 1minute
Endurance	△R±1%	**MIL-STD-202 Method 108** 70±2℃, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	△R±0.4%	**MIL-STD-202 Method 103** 40±2℃, 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℃ for 3 seconds
Resistance to Soldering Heat	△R±0.2%	**MIL-STD-202 Method 210** 260±5℃ for 10 seconds
Low Temperature Operation	△R±0.2%	**JIS-C-5201-1 4.36** 1 hour, -65℃, followed by 45 minutes of RCWV
High Temperature Exposure	△R±0.2%	**MIL-STD-202 Method 108** At +155℃ for 1000 hrs
Thermal Shock	△R±0.2%	**MIL-STD-202F Method 107** -55℃~150℃, 100 cycles

• RCWV (Rated Continuous Working Voltage) = √(P×R) or Max. operating voltage whichever is low.
■ Reference Standards : MIL-STD-202, JIS-C 5201
■ Storage Temperature : 15~28℃; Humidity < 80%RH
■ Shelf Life : 2 years from production date.

CONSTRUCTION & DIMENSIONS

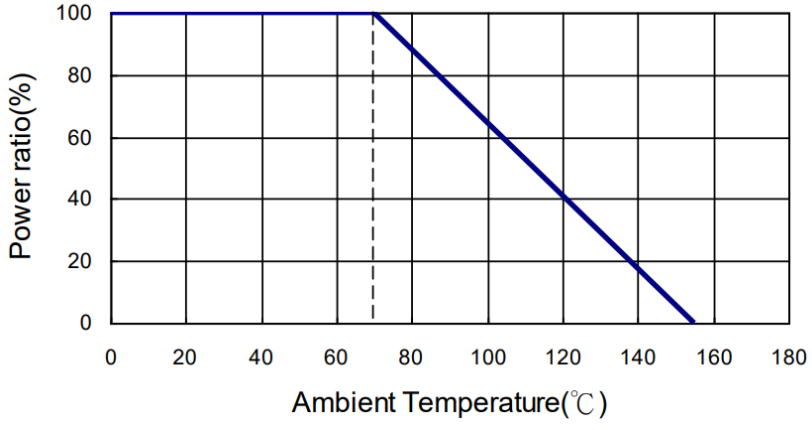
* Unit : mm



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

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

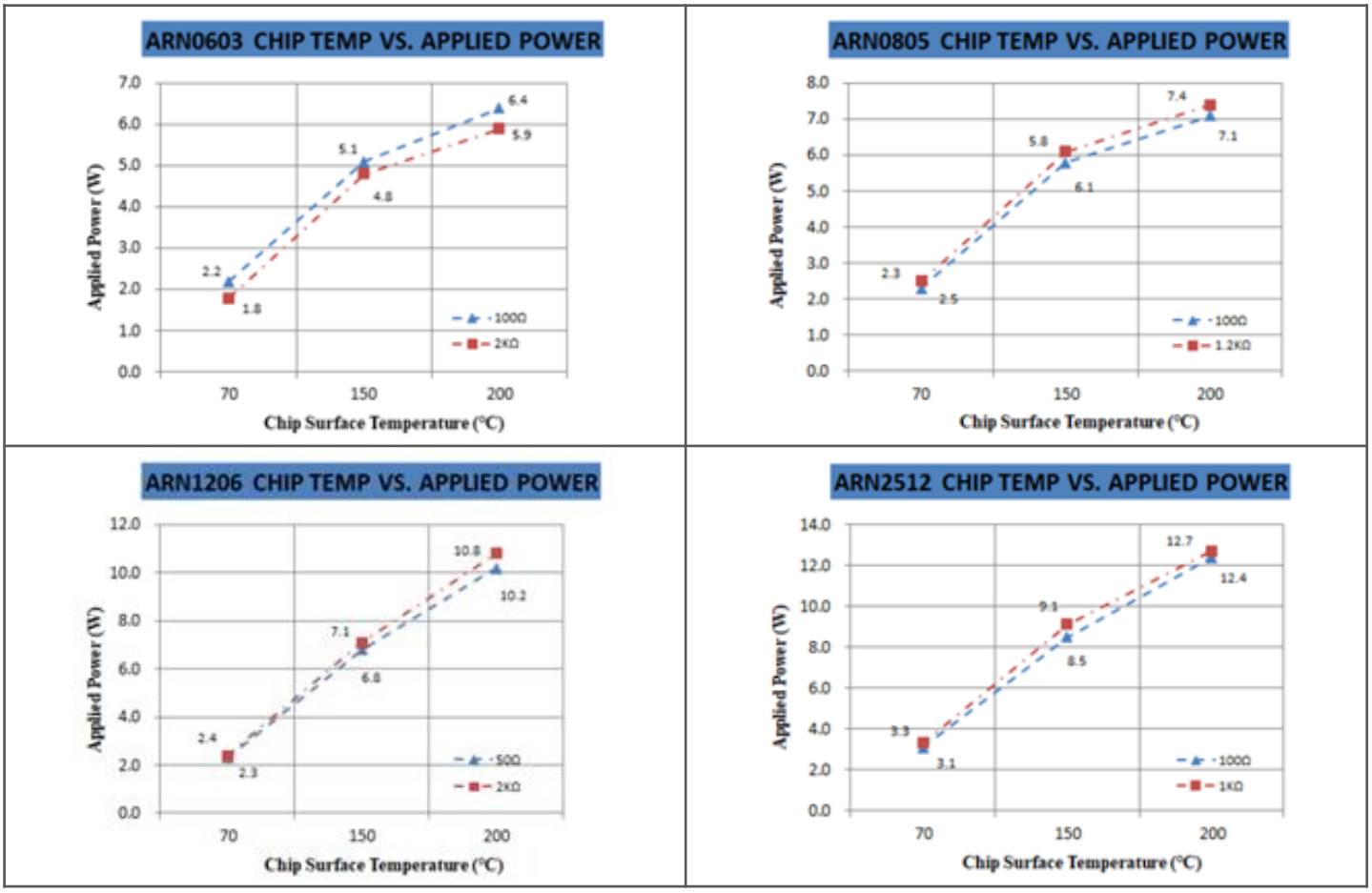
DERATING CURVE



PART NUMBERING

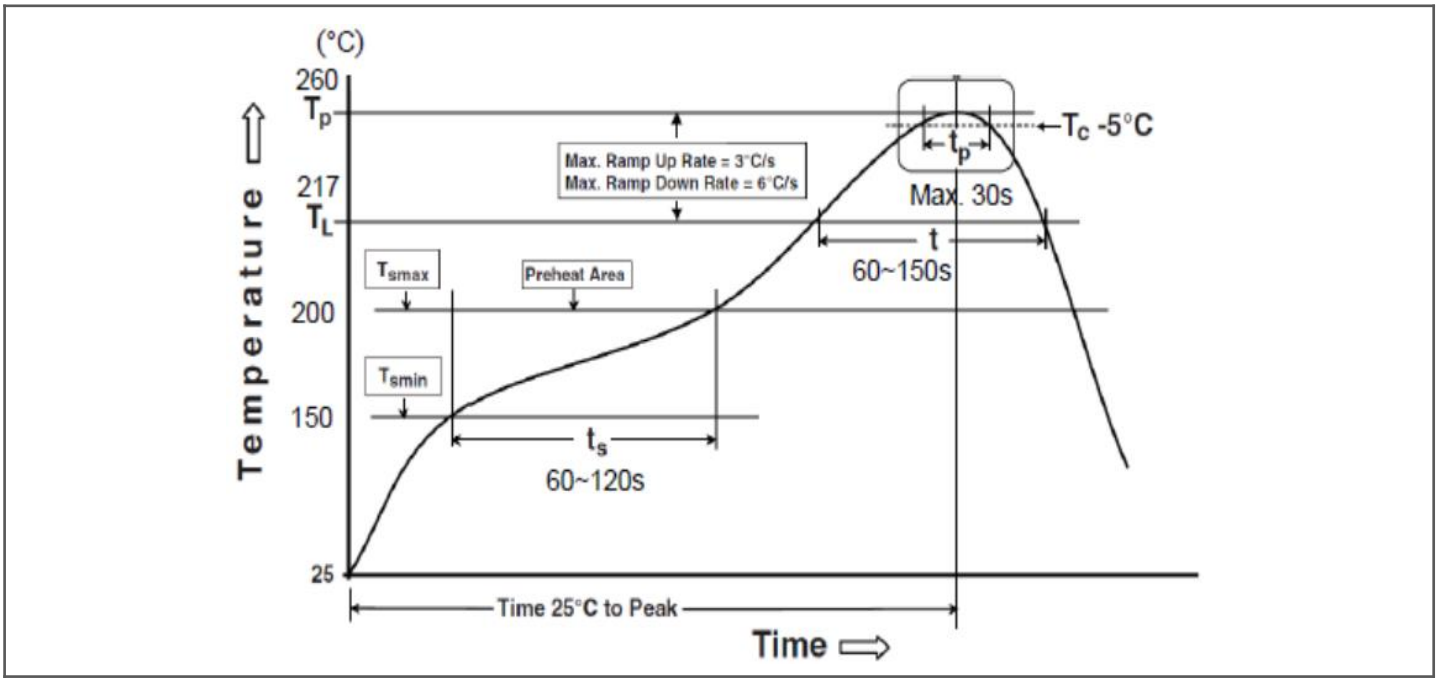
ARN	06	C	T	C	S	1000	N
Model	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/℃)	Power Rating	Resistance	Marking Code
ARN	03 : 0603 05 : 0805 06 : 1206 12 : 2512	B : ±0.1% C : ±0.25% D : ±0.5% F : ±1%	T : Taping Reel B : Bulk	C : ±25 D : ±50	U : 1/2W T : 1W S : 2W I : 6W	0500 : 50Ω 1000 :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

CHIP TEMP Vs. APPLIED POWER



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

SOLDERING CONDITION (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



MARKING

0603 3digit marking

3digitmarking for Example :

14C=13K7Ω
13C=13K3Ω
68B=4K99Ω
68X=49.9Ω

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
Multi -plier	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

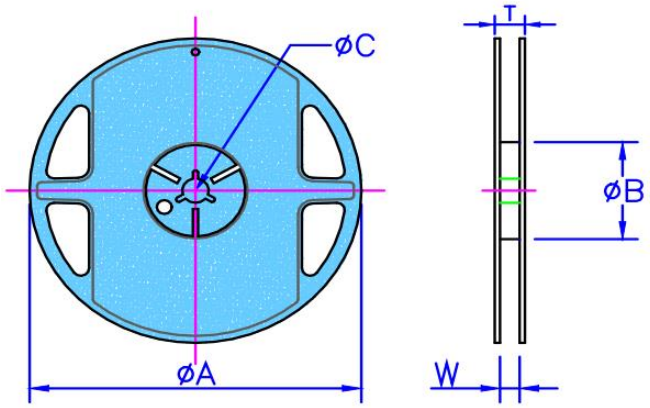
0805~2512 4digit marking
Example

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

PACKAGING

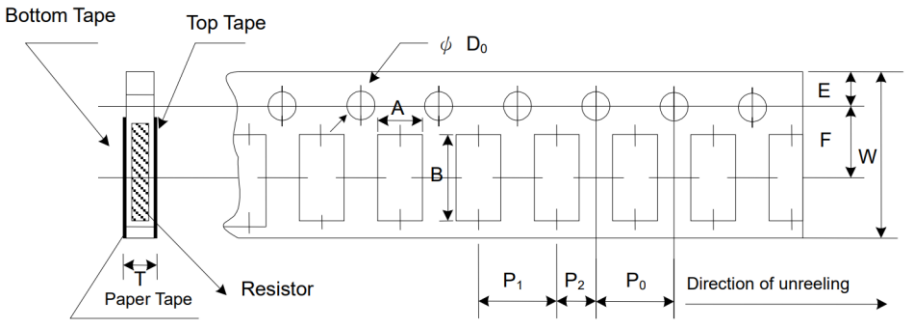
* Unit : mm

*** Reel Specifications & Packaging Quantity**



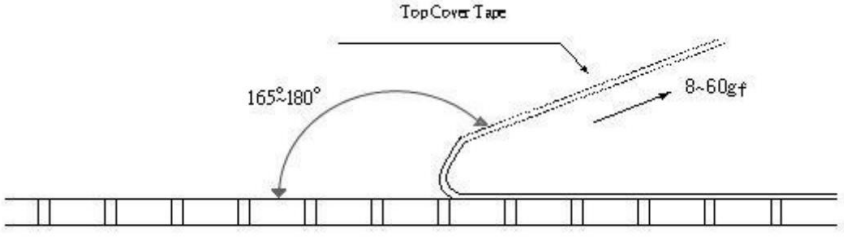
Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
ARN03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN06	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN12	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000

*** Paper Tape Specifications**



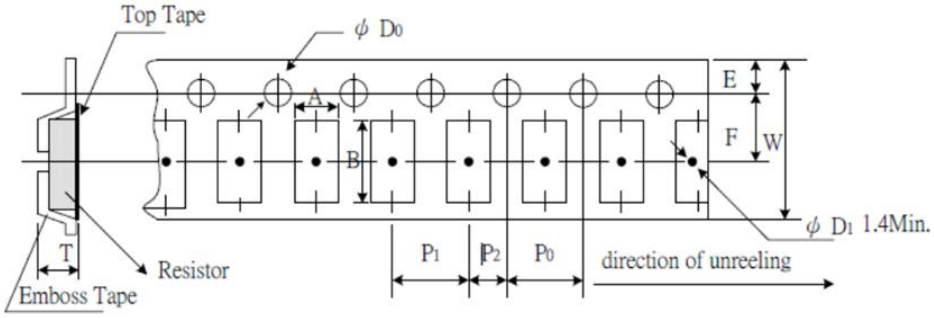
Type	A	B	W	E	F	P0	P1	P2	ØD0	T
ARN03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
ARN05	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
ARN06	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.50±0.05	4.00±0.10	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



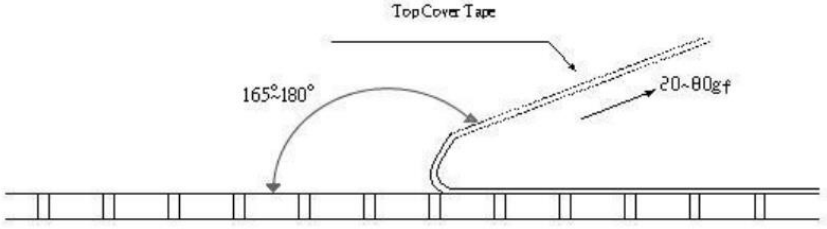
* Unit : mm

* Embossed Plastic Tape Specifications



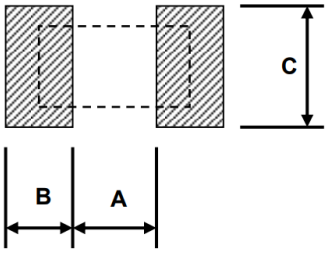
Type	A	B	W	E	F	P0	P1	P2	ØD0	T
ARN12	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

■ 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