

ARN series

Thin Film High Precision Chip Resistor

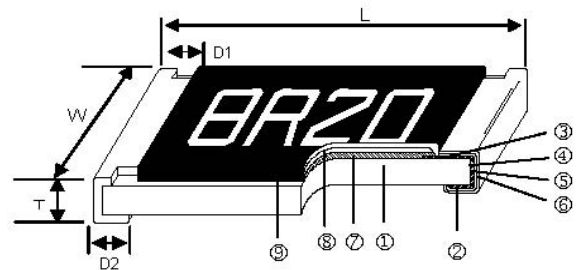
◆ Features

- » Advanced thin film technology
- » Very tight tolerance down to $\pm 0.01\%$
- » Extremely low TCR down to $\pm 5\text{ppm}/^\circ\text{C}$
- » Wide resistance range 1ohm-3Mega ohm
- » Miniature size 0201 available

◆ Applications

- » Medical equipment
- » Testing/ Measurement equipment
- » Printer equipment
- » Automatic equipment controller
- » Converters
- » Communication device, Smart phone
Navigation system

◆ Construction



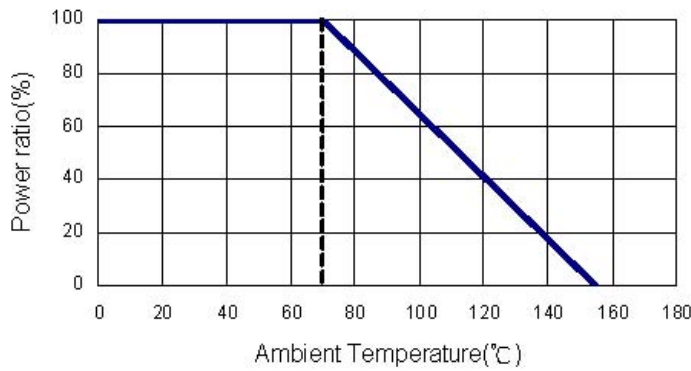
1	Alumina Substrate	4	Edge Electrode (NiCr)	7	Resistor Layer (NiCr)
2	Bottom Electrode (Ag)	5	Barrier Layer (Ni)	8	Overcoat (Epoxy)
3	Top Electrode (Ag-Pd)	6	External Electrode (Sn)	9	Marking

◆ Dimensions

Unit: mm

Type	L	W	T	D1	D2
ARN0201	0.58 \pm 0.05	0.29 \pm 0.05	0.23 \pm 0.05	0.12 \pm 0.05	0.15 \pm 0.05
ARN0402	1.00 \pm 0.10	0.50 \pm 0.05	0.30 \pm 0.05	0.20 \pm 0.10	0.20 \pm 0.10
ARN0603	1.60 \pm 0.20	0.80 \pm 0.15	0.45 \pm 0.10	0.30 \pm 0.20	0.30 \pm 0.20
ARN0805	2.00 \pm 0.20	1.25 \pm 0.15	0.55 \pm 0.10	0.30 \pm 0.20	0.40 \pm 0.25
ARN1206	3.05 \pm 0.15	1.60 \pm 0.20	0.55 \pm 0.15	0.42 \pm 0.20	0.45 \pm 0.25
ARN1210	3.10 \pm 0.15	2.50 \pm 0.20	0.55 \pm 0.15	0.40 \pm 0.20	0.55 \pm 0.25
ARN1812	4.50 \pm 0.10	3.00 \pm 0.10	0.55 \pm 0.05	0.55 \pm 0.10	0.80 \pm 0.10
ARN1218	3.10 \pm 0.15	4.60 \pm 0.10	0.55 \pm 0.10	0.45 \pm 0.10	0.40 \pm 0.10
ARN2010	5.00 \pm 0.20	2.50 \pm 0.20	0.55 \pm 0.10	0.60 \pm 0.30	0.60 \pm 0.25
ARN2512	6.30 \pm 0.20	3.10 \pm 0.20	0.55 \pm 0.10	0.60 \pm 0.30	0.60 \pm 0.25

◆ 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)	
					±0.05%	±0.1%	±0.25%	±0.5%	±1%		
ARN0201	1/32W	-55~+155°C	15V	30V	---	49.9Ω-4.99KΩ				±25	
						49.9Ω-33KΩ				±50	
ARN0402	1/16W		50V	100V	49.9Ω-12KΩ	10Ω – 205KΩ				±25	
						10Ω – 205KΩ	1Ω – 205KΩ			±50	
ARN0603	1/16W		50V	100V	4.7Ω -332KΩ	4.7Ω -1MΩ	2Ω-1MΩ				±25
							1Ω-1MΩ				±50
ARN0805	1/10W		100V	200V	4.7Ω -511KΩ	4.7Ω -2MΩ	1Ω-2MΩ				±25
											±50
ARN1206	1/8W		150V	300V	4.7Ω	4.7Ω	1Ω-2.49MΩ				±25
ARN1210	1/4W				-1MΩ	-2.49MΩ					±50
ARN1218	1/2W	150V	300V	24.9Ω -100KΩ	10Ω-499KΩ				±10		
					1Ω-1MΩ				±25		
									±50		
ARN2010	1/4W	150V	300V	4.7Ω	4.7Ω	1Ω-3MΩ				±25	
ARN2512	1/2W			-1MΩ	-3MΩ					±50	

Operating Voltage = $\sqrt{P \times R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage = $2.5 \times \sqrt{P \times R}$ or Max. overload voltage listed above whichever is lower.

Faithful Link is capable of manufacturing the optional spec based on customer's requirement.

Lower Resistance: 1~10Ω

◆ Special Electrical Specifications

Item Type	Power Rating At 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.01%	±0.05%	±0.1%	
ARN0402	1/16W	-55~+155°C	50V	100V	49.9Ω-4.99KΩ			±2 ±3 ±5
					49.9Ω-12KΩ			±10
					49.9Ω-12KΩ	49.9Ω-69.8KΩ	±15	
ARN0603	1/16W		50V	100V	24.9Ω-15KΩ			±2 ±3 ±5
					24.9Ω-100KΩ	4.7Ω-332KΩ	±10 ±15	
ARN0805	1/10W		100V	200V	24.9Ω-30KΩ			±2 ±3 ±5
					24.9Ω-200KΩ	4.7Ω-511KΩ	±10 ±15	
ARN1206	1/8W		150V	300V	24.9R-49.9KΩ			±2 ±3 ±5
					24.9Ω-499KΩ	4.7Ω-1MΩ	±10 ±15	
ARN1210	1/4W	150V	300V	24.9Ω-49.9KΩ			±2 ±3 ±5	
				24.9Ω-499KΩ	4.7Ω-1MΩ	±10 ±15		
ARN2010	1/4W	150V	300V	24.9Ω-100KΩ			±2 ±3 ±5	
				24.9Ω-499KΩ	4.7Ω-1MΩ	±10 ±15		
ARN2512	3/4W	200V	400V	49.9Ω-100KΩ			±2 ±3	
	1/2W	150V	300V	24.9Ω-100KΩ			±2 ±3 ±5	
				24.9Ω-499KΩ	4.7Ω-1MΩ	±10 ±15		

Operating Voltage = $\sqrt{P \times R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage = $2.5 \times \sqrt{P \times R}$ or Max. overload voltage listed above whichever is lower.

◆ 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)	
					±0.05%	±0.1%	±0.25%	±0.5%	±1%		
ARN0402	1/10W		50V	100V	49.9Ω-4.99KΩ					±5	
					49.9Ω-12KΩ		49.9Ω-60KΩ			±10	
					49.9Ω-12KΩ		49.9Ω-68KΩ			±15	
					49.9Ω-12KΩ	10Ω-255KΩ	4.7Ω-255KΩ			±25 ±50	
ARN0603	1/10W		75V	150V	24.9Ω-15KΩ		---			±5	
					24.9Ω	4.7Ω	4.7Ω-332KΩ			±10 ±15	
	1/8W 1/6W		100V	150V	-100KΩ	-332KΩ	4.7Ω-1MΩ	4.7Ω-1.21MΩ		±25 ±50	
					10Ω-47KΩ					±25	
10Ω-332KΩ					±50						
ARN0805	1/8W		150V	300V	24.9Ω-30KΩ					±5	
					24.9Ω		4.7Ω	4.7Ω-511KΩ			±10
					-200KΩ	-511KΩ	4.7Ω	4.7Ω-1MΩ		±15	
	1/4W		-55~+155°C	150V	300V	---		4.7Ω	1Ω-1MΩ	±25 ±50	
10Ω-499KΩ					±25 ±50						
ARN1206	1/4W		200V	400V	24.9Ω-49.9KΩ					±5	
					24.9Ω	4.7Ω-1MΩ				±10 ±15 ±25 ±50	
	1/3W		200V	400V	---					±25 ±50	
ARN1210	1/3W		200V	400V	24.9Ω-49.9KΩ					±5	
					24.9Ω	4.7Ω-1MΩ				±10 ±15 ±25 ±50	
1/3W	200V		400V	---					±25 ±50		
ARN2010	1/3W		200V	400V	24.9Ω-49.9KΩ					±5	
					24.9Ω	4.7Ω-1MΩ				±10 ±15 ±25 ±50	
1/3W	200V		400V	---					±25 ±50		
ARN2512	3/4W		200V	400V	24.9Ω	4.7Ω-2KΩ		1Ω-2KΩ		±10 ±15 ±25 ±50	
	1W				---		4.7Ω	1Ω-100Ω		±25 ±50	

-100Ω

Operating Voltage= $\sqrt{P \times R}$; Overload Voltage listed above, whichever is lower

Overload Voltage = $2.5 \times \sqrt{P \times R}$ or Max. overload voltage listed above, whichever is lower

Faithful Link is capable of manufacturing the optional spec based on customer's requirement

Lower Resistance: 1~10Ω; high Power Rating

◆ Part Number

ARN	0603	F	T	B	Y	1K
Type	size	Tolerance	Packing	TCR (ppm/°C)	Watt	R Value
ARN	0201	T: ±0.01%	T: Taping Reel	X: ±2	Blank: Standard	1Ω = 1R
	0402	A: ±0.05%		O: ±3	Y: 1/16W	4.7Ω = 4R7
	0603	B: ±0.1%		S: ±5	X: 1/10W	1KΩ = 1K
	0805	C: ±0.25%		B: ±10	W: 1/8W	1MΩ = 1M
	1206	D: ±0.5%		N: ±15	M: 1/6W	
	1210	F: ±1%		C: ±25	P: 1/5W	
	1218			D: ±50	V: 1/4W	
	2010				O: 1/3W	
	2512				U: 1/2W	
					Q: 3/4W	
					T: 1W	
					Z: 1/32W	

◆ Environmental Characteristics

(Except the tolerance 0.05%, 0.01%)

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C / +125°C, 25°C is the reference temperature	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±(0.5%+0.05Ω) No Visual damage
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Applied 100VDC for 1 minute.	≥10GΩ
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	245±5°C for 3 seconds.	>95% Coverage No Visual damage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(0.5%+0.05Ω) No Visual damage
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	>95% Coverage No Visual damage
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	±(0.5%+0.05Ω) No Visual damage
High Temperature Exposure	JIS-C-5201-1 4.25 IEC 60068-2-2	At 155±5°C for 1000 +48/-0 hours.	±(0.5%+0.05Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(0.5%+0.05Ω) No Visual damage
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"	±(0.5%+0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	±(0.5%+0.05Ω)
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	±(0.5%+0.05Ω)
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D : 0201、0402、0603、0805 = 5mm 1206、1210 = 3mm 2010、2512 = 2mm	±(0.5%+0.05Ω) No Visual damage

(for the tolerance: 0.01%, 0.05%)

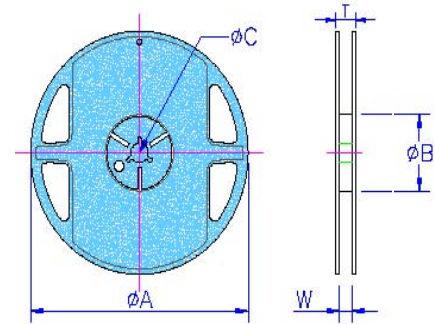
Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of Resistance (T.C.R)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C / +125°C, 25°C is the reference temperature	Refer to Standard Electrical Specifications
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±(0.1%+0.05Ω) No Visual damage
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Applied 100VDC for 1 minute.	≥10GΩ
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	245±5°C for 3 seconds.	>95% Coverage No Visual damage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260±5°C for 10 seconds.	±(0.1%+0.05Ω) No Visual damage
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260±5°C for 30 seconds.	>95% Coverage No Visual damage
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	±(0.2%+0.05Ω) No Visual damage
High Temperature Exposure	JIS-C-5201-1 4.25 IEC 60068-2-2	At 155±5°C for 1000 +48/-0 hours.	±(0.2%+0.05Ω)
Resistance to Solvent	JIS-C-5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(0.1%+0.05Ω) No Visual damage
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40±2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"	±(0.1%+0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion.	±(0.1%+0.05Ω)
Load Life (Endurance)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" .	±(0.1%+0.05Ω)
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D : 0402、0603、0805 = 5mm 1206、1210 = 3mm 2010、2512 = 2mm	±(0.1%+0.05Ω) No Visual damage

◆ Packaging

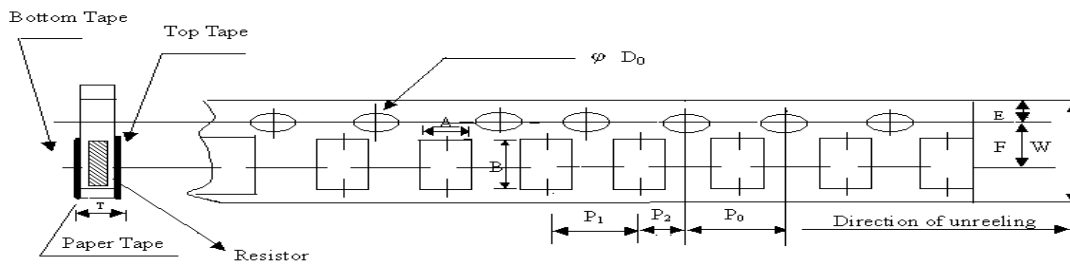
Packaging Quantity & Reel Specifications

Unit: mm

Size	øA	øB	øC	W	T	Paper Tape(EA)	Embossed Plastic Tape(EA)
ARN0201	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
ARN0402	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
ARN0603	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN0805	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN1206	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN1210	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
ARN1218	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	4,000	-
ARN2010	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
ARN2512	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000



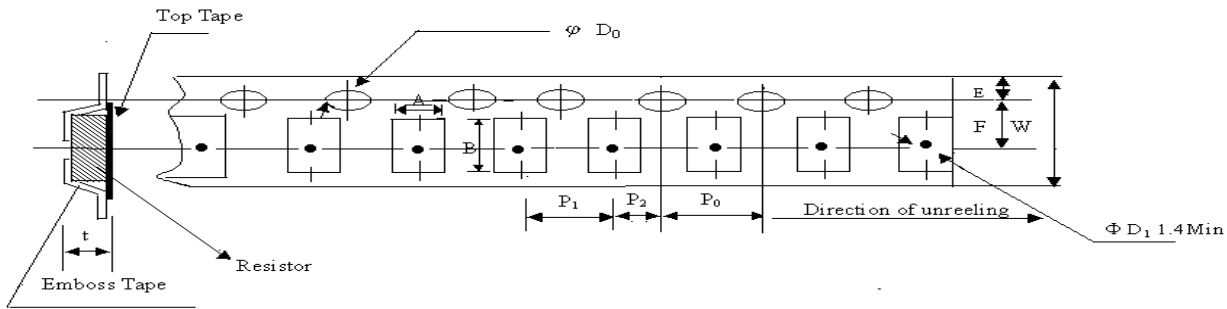
Paper Tape Specifications



Size	A	B	W	E	F	P ₀	P ₁	P ₂	øD ₀	T
ARN0201	0.40±0.05	0.70±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.0±0.10	2.0±0.05	2.0±0.05	1.55±0.03	0.42±0.02
ARN0402	0.70±0.05	1.20±0.05	8.00±0.20	1.75±0.10	3.5±0.05	4.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	0.45±0.10
ARN0603	1.10±0.05	1.90±0.20	8.00±0.20	1.75±0.10	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.05	0.60±0.10
ARN0805	1.60±0.05	2.37±0.20	8.00±0.20	1.75±0.10	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.05	0.75±0.10
ARN1206	2.00±0.05	3.55±0.20	8.00±0.20	1.75±0.10	3.5±0.05	4.0±0.10	4.0±0.10	2.0±0.05	1.55±0.05	0.75±0.10
ARN1210	2.75±0.05	3.50±0.20	8.00±0.20	1.75±0.10	3.5±0.05	4.0±0.05	4.0±0.10	2.0±0.05	1.60±0.10	0.75±0.10

Unit: mm

Embossed Plastic Tape Specifications

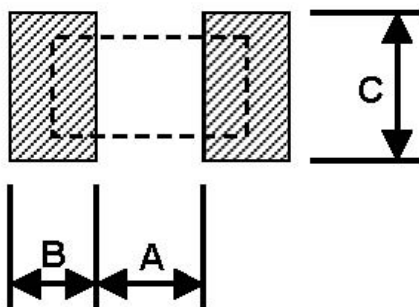


Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
ARN1218	3.30±0.20	4.60±0.20	12±0.10	1.75±0.10	5.5±0.05	4.0±0.05	4.0±0.10	2.0±0.05	1.5±0.10	0.85±0.15
ARN2010	2.85±0.20	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.0±0.05	4.0±0.10	2.0±0.05	1.5±0.10	1.00±0.20
ARN2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.0±0.05	4.0±0.10	2.0±0.05	1.5±0.10	1.00±0.20

◆ Recommend Land Pattern

Unit: mm



Size	A	B	C
ARN0201	0.25	0.30	0.40±0.2
ARN0402	0.50	0.50	0.60±0.2
ARN0603	0.80	1.00	0.90±0.2
ARN0805	1.00	1.00	1.35±0.2
ARN1206	2.00	1.15	1.70±0.2
ARN1210	2.00	1.15	2.50±0.2
ARN1812	3.11	1.40	3.00
ARN1218	2.04	1.10	4.5±0.2
ARN2010	3.60	1.40	2.50±0.2
ARN2512	4.90	1.60	3.10±0.2

◆ Storage and handling condition

1. Products are recommended to be used up within two years under the following recommendable storing conditions:

◎Ambient temperature: 5~40°C

◎Relative humidity: 20%~70%

2. Caution:

◎Don't store products in a corrosive environment such as sulfide, chloride gas, or acid. It may cause oxidization of electrode, which easily be resulted in poor soldering.

◎To store products on the shelf and avoid exposure to moisture.

◎Don't expose products to excessive shock, vibration, direct sunlight and so on.