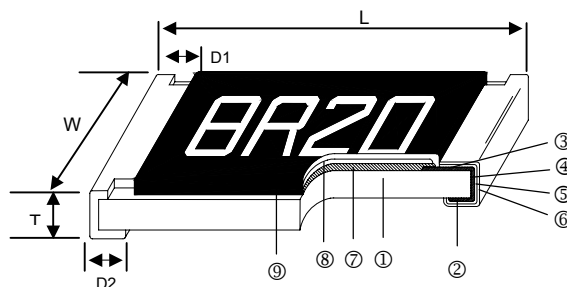


Automotive Grade Thin Film Precision Chip Resistor – AR..A Series

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 or Cu)	⑥ External Electrode (Sn)	⑨ Marking

Features

- AEC-Q200 Compliance
- Advanced thin film technology
- RoHS compliant

Applications

- Automotive
- Medical Equipment
- Testing / Measurement Equipment
- Printer Equipment
- Automatic Equipment Controller
- Converters
- Communication Device, Smart Phone, Navigation system

Dimensions

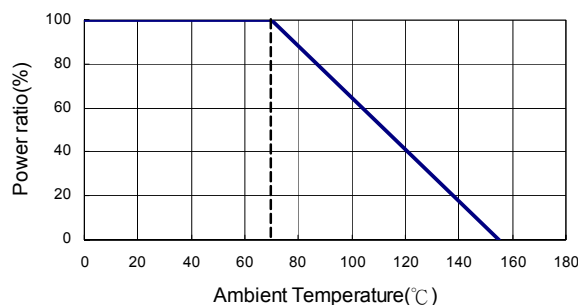
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
AR02	0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
AR03	0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
AR05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.20	4.71
AR06	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25	9.02
AR13	1210	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25	10
AR10	2010	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25	23.61
AR12	2512	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25	38.06

Part Numbering

AR	03	F	T	D		1001	A
Product Type	Dimensions	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	02: 0402 03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	C: ±25 D: ±50	: Standard X: 1/10W W: 1/8W V: 1/4W O: 1/3W	10R0: 10Ω 1000: 100Ω 1001: 1KΩ 1004: 1MΩ	A: Automotive Grade

Derating Curve



Standard Electrical Specifications

Type \ Item	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%	
AR02 (0402)	1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 10KΩ	49.9Ω - 100KΩ				±25 ±50
AR03 (0603)	1/16W	-55 ~ +155°C	50V	100V	10Ω - 49.9KΩ	10Ω - 332KΩ				±25 ±50
AR05 (0805)	1/10W	-55 ~ +155°C	100V	200V	10Ω - 100KΩ	10Ω - 1MΩ				±25 ±50
AR06 (1206)	1/8W	-55 ~ +155°C	150V	300V	10Ω - 200KΩ	10Ω - 1MΩ				±25 ±50
AR13 (1210)	1/4W	-55 ~ +155°C	150V	300V	10Ω - 499KΩ	10Ω - 1MΩ				±25 ±50
AR10 (2010)										
AR12 (2512)	1/2W	-55 ~ +155°C	150V	300V	10Ω - 499KΩ	10Ω - 1MΩ				±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.

High Power Rating Electrical Specifications

Type \ Item	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%	
AR03(0603)	1/10W	-55 ~ +155°C	75V	150V	10Ω - 49.9KΩ	10Ω - 332KΩ				±25 ±50
AR05(0805)	1/8W	-55 ~ +155°C	150V	300V	10Ω - 100KΩ	10Ω - 1MΩ				±25 ±50
AR06(1206)	1/4W	-55 ~ +155°C	200V	400V	10Ω - 200KΩ	10Ω - 1MΩ				±25 ±50
AR13(1210)	1/3W	-55 ~ +155°C	200V	400V	10Ω - 499KΩ	10Ω - 1MΩ				±25 ±50
AR10(2010)										

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
	Tol. \leq 0.05%	Tol. $>$ 0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		-55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	RCWV*2.5 or Max. overload voltage for 5 seconds
	$\Delta R \pm 0.2\%$ for high power rating		
Insulation Resistance	$>1000 \text{ M}\Omega$		Apply 100VDC for 1 minute
Endurance	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	70 \pm 2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	$>7\text{k}\Omega \Delta R \pm 0.5\%$		
	$\Delta R \pm 0.5\%$ for high power rating		
Biased Humidity	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	1000 hrs 85°C/85%RH 10% of operating power.
	$>7\text{k}\Omega \Delta R \pm 0.5\%$		
	$\Delta R \pm 0.5\%$ for high power rating		
High Temperature Exposure	$\Delta R \pm 0.05\%$		at +155°C for 1000 hrs
Temperature Cycling	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	-55°C to +125°C, 1000 cycles
Bending Strength (Board Flex)	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		245 \pm 5°C for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	260 \pm 5°C for 10 seconds
Thermal Shock	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.25\%$	-55C/+125°C. Note: Number of cycles required-300, Maximum transfer time-20 seconds, Dwell time-15minutes. Air-Air.
Terminal strength	No broken		Force of 1.8kg for 60 seconds.
Moisture Resistance	$\Delta R \pm 0.05\%$	$\Delta R \pm 0.2\%$	24 hrs/cycle
Mechanical Shock	$\Delta R \pm 0.25\%$	$\Delta R \pm 0.5\%$	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	$\Delta R \pm 0.25\%$	$\Delta R \pm 0.5\%$	5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	$\Delta R \pm 0.1\%$		Human body, 2KV
Flame Retardance	Not flame		Temperature sensing at 500°C, voltage power subjected to 32VDC current clamped up to 500ADC and decreased in 1.0VDC/hour.
Resistance to solvents	Marking Unsmearred		Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.

■ Reference Standards: MIL-STD-202, JIS-C 5201-1, AEC-Q200, IEC-60115-1, JESD22

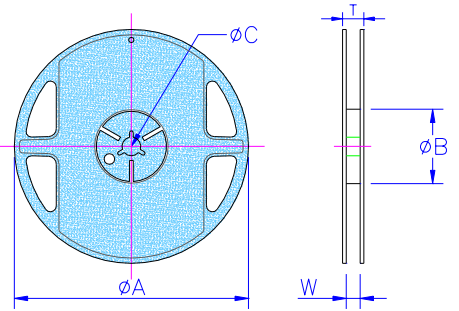
■ Storage Temperature: 25 \pm 3°C; Humidity < 80%RH

■ Packaging

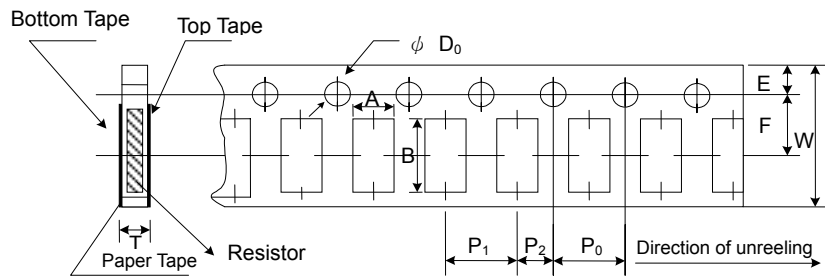
Packaging Quantity & Reel Specifications

Unit: mm

Type	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Embossed Plastic Tape (EA)
AR02	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	10,000	-
AR03	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
AR05	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
AR06	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
AR13	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000	-
AR10	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	13.5 ± 1.0	15.5 ± 1.0	-	4,000
AR12	178.0 ± 1.0	60.0 + 1.0	13.5 ± 0.7	13.5 ± 1.0	15.5 ± 1.0	-	4,000



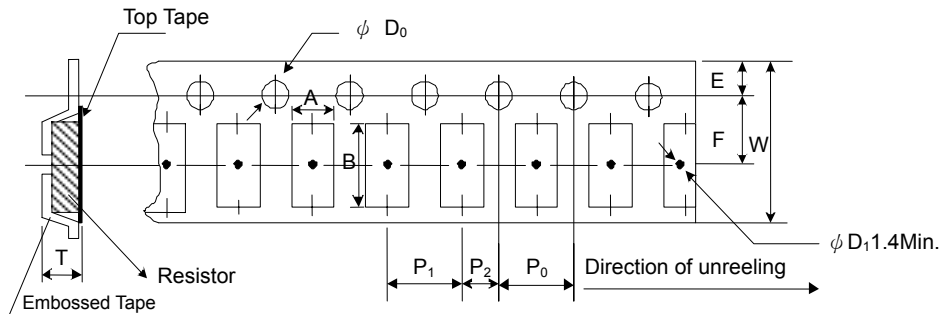
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
AR02	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
AR03	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
AR05	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
AR06	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
AR13	2.75±0.05	3.40±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.60±0.10	0.75±0.05

Embossed Plastic Tape Specifications

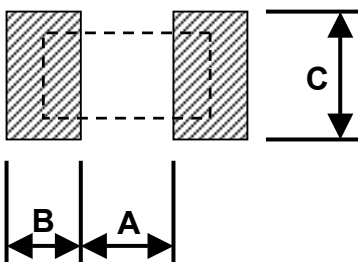


Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	T
AR10	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
AR12	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

■ Recommend Land Pattern

Unit: mm



Type	A	B	C
AR02	0.50	0.50	0.60±0.2
AR03	0.80	1.00	0.90±0.2
AR05	1.00	1.00	1.35±0.2
AR06	2.00	1.15	1.70±0.2
AR13	2.00	1.15	2.50±0.2
AR10	3.60	1.40	2.50±0.2
AR12	4.90	1.60	3.10±0.2