

Thin-Film Precision Chip Resistors

Chip Thin-Film Resistors (AR) Take Precision Pole Position & Add Powerful New Options.

▶ Preview

In response to market demands for increased precision and stability, Token Passive Components has expanded its AR Series of nichrome thin-film chip resistors into three sectors, Standard, High-Precision, and High-Power resistor.

Offering a wide value range with closer tolerances and low TCR figures, Token offers a surface mount resistor with a defined total contour that provides high stability under temperature fluctuations of 5ppm/°C and with a tolerance down to ± 0.01%.

The AR Series offering solutions to precision test and measurement and voltage regulation across industrial, military and medical monitoring equipment markets proposing superior tight tolerance, low TCR, and high power rating performance.

The range now also offers additional chip sizes. Key features of the enhanced AR Series include the availability of all standard sizes from AR01(0201), AR02(0402), AR03(0603), AR05(0805), AR06(1206), AR13(1210), AR10(2010), to AR12(2512).

The AR benefits from an impervious internal passivation layer applied in addition to the normal protective coating. When constructing the AR Chip Series, a Ni/Cr thin-film material is selectively deposited on an alumina substrate, together with Ni and Sn metallic contacts at each end layer plating. The AR chips are heat treated to give the required temperature coefficient (TCR) and stability, and then a precisely controlled laser trim process adjusts the resistance value.

The AR Series is available in taping packaging and is RoHS compliant and lead free.

For non-standard technical requirements and special applications, please contact us with your specific needs.



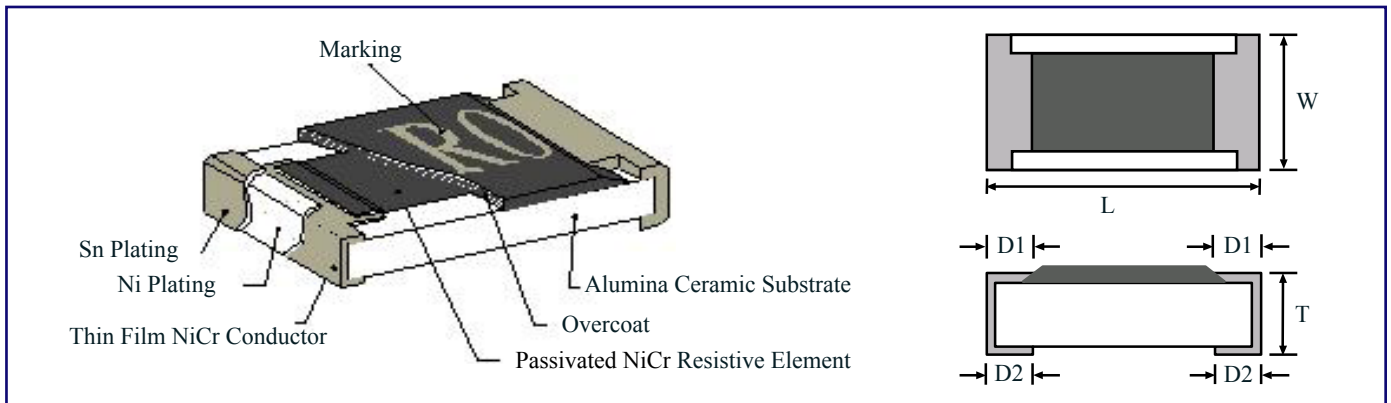
▶ Features

- Miniature Size 0210 available
- Thin Film Passivated NiCr Chips
- Very Tight Tolerance Down to ±0.01%
- Extremely Low TCR Down to ±5PPM/°C
- Wide Resistance Value Range 1 Ω - 3Mega Ω
- Products with Pb-free Terminations Meet RoHS Requirements

▶ Applications

- Converters
- Medical Equipment
- Automatic Equipment Controller
- Testing / Measurement instrument
- Printer Equipment, Consumer Product
- Communication Device, Cell phone, GPS, PDA

► Dimensions (Unit: mm)



Codes	L (Unit: mm)	W (Unit: mm)	T (Unit: mm)	D1 (Unit: mm)	D2 (Unit: mm)
AR01 (0201)	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05
AR02 (0402)	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10
AR03 (0603)	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
AR05 (0805)	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25
AR06 (1206)	3.05±0.15	1.55±0.15	0.55±0.10	0.42±0.20	0.35±0.25
AR13 (1210)	3.10±0.15	2.40±0.15	0.55±0.10	0.40±0.20	0.55±0.25
AR10 (2010)	4.90±0.15	2.40±0.15	0.55±0.10	0.60±0.30	0.50±0.25
AR12 (2512)	6.30±0.15	3.10±0.15	0.55±0.10	0.60±0.30	0.50±0.25

► (AR) Standard Electrical Standard Electrical Specifications

Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR
AR01 (0201)	1/32W	-55 ~+155°C	15V	30V	±0.5%	50Ω~5KΩ	±25PPM/°C
					±1.0%	50Ω~33KΩ	±50PPM/°C
AR02 (0402)	1/16W	-55 ~+155°C	25V	50V	±0.10%	10Ω~205KΩ	±25PPM/°C ±50PPM/°C
					±0.25%		
AR03 (0603)	1/16W	-55 ~+155°C	50V	100V	±0.05%	4.7Ω~150KΩ	±25PPM/°C ±50PPM/°C
					±0.10%	4.7Ω~1MΩ	
					±0.25% ±0.50%	2Ω~1MΩ	
AR05 (0805)	1/10W	-55 ~+155°C	100V	200V	±0.05%	4.7Ω~500KΩ	±25PPM/°C ±50PPM/°C
					±0.10%	4.7Ω~2MΩ	
					±0.25% ±0.50%	1Ω~2MΩ	
AR06 (1206)	1/8W	-55 ~+155°C	150V	300V	±0.05%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C
					±0.10%	4.7Ω~2.5MΩ	
					±0.25% ±0.50%	1Ω~2.5MΩ	

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Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR
AR13 (1210)	1/5W	-55 ~+155°C	150V	300V	±0.05%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C
					±0.10%	4.7Ω~2.5MΩ	
					±0.25% ±0.50%	1Ω~2.5MΩ	
AR10 (2010)	1/4W	-55 ~+155°C	150V	300V	±0.05%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C
AR12 (2512)	1/2W				±0.10%	4.7Ω~3MΩ	
					±0.25% ±0.50%	1Ω~3MΩ	

▶ (AR) High-Precision Electrical Specifications

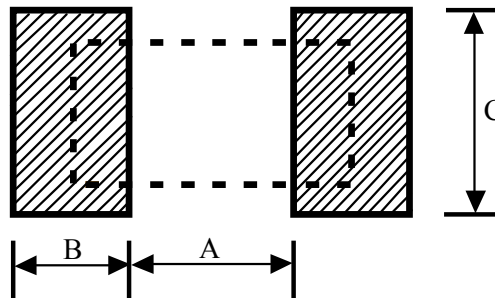
Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR
AR02 (0402)	1/16W	-55 ~ +155°C	25V	50V	±0.01%	49.9Ω~3KΩ	±5PPM/°C
					±0.05%	49.9Ω~12KΩ	±10PPM/°C
					±0.10%		±15PPM/°C
AR03 (0603)	1/16W	-55 ~ +155°C	50V	100V	±0.01%	25Ω~15KΩ	±5PPM/°C
					±0.05%	25Ω~100KΩ	±10PPM/°C
					±0.10%		±15PPM/°C
AR05 (0805)	1/10W	-55 ~ +155°C	100V	200V	±0.01%	25Ω~30KΩ	±5PPM/°C
					±0.05%	25Ω~200KΩ	±10PPM/°C
					±0.10%		±15PPM/°C
AR06 (1206)	1/8W	-55 ~ +155°C	150V	300V	±0.05%	4.7Ω~500KΩ	±10PPM/°C
					±0.10%	25Ω~50KΩ	±5PPM/°C
						25Ω~500KΩ	±10PPM/°C ±15PPM/°C
AR13 (1210)	1/5W	-55 ~ +155°C	150V	300V	±0.01%	25Ω~50KΩ	±5PPM/°C
					±0.05%	25Ω~500KΩ	±10PPM/°C
					±0.10%		±15PPM/°C
AR10 (2010)	1/4W	-55 ~ +155°C	150V	300V	±0.10%	4.7Ω~1MΩ	±10PPM/°C
					±0.01%	25Ω~100KΩ	±5PPM/°C
						±0.05%	25Ω~500KΩ
AR12 (2512)	1/2W	-55 ~ +155°C	150V	300V	±0.10%	4.7Ω~1MΩ	±10PPM/°C
					±0.01%	25Ω~100KΩ	±5PPM/°C
						±0.05%	25Ω~500KΩ

▶ (AR) High-Power Rating Electrical Specifications

Type	Power Rating at 70°C	Operating Temp. Range	Max Operating Voltage	Max Overloading Voltage	Resistance Tolerance	Resistance Range	TCR
AR03 (0603)	1/10W	-55 ~ +155°C	50V	100V	±0.10% ±0.25% ±0.50%	10Ω~332KΩ	±25PPM/°C ±50PPM/°C
AR05 (0805)	1/8W	-55 ~ +155°C	150V	300V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C
AR06 (1206)	1/4W	-55 ~ +155°C	200V	400V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C
AR13 (1210)	1/3W	-55 ~ +155°C	200V	400V	±0.10% ±0.25% ±0.50%	4.7Ω~1MΩ	±25PPM/°C ±50PPM/°C

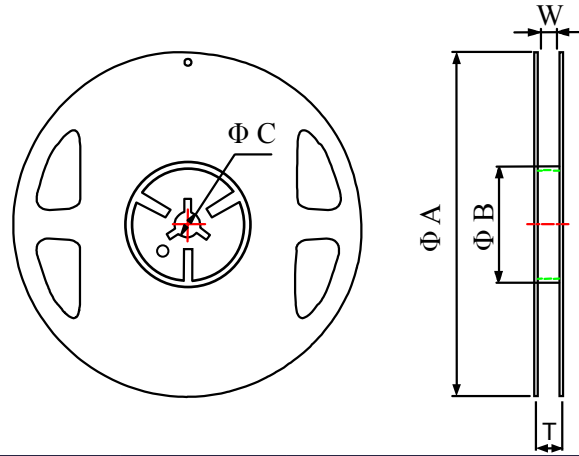
Note: Token has the ability to manufacture above options based on customer's requirement.

▶ Recommend Land Pattern (Unit: mm)



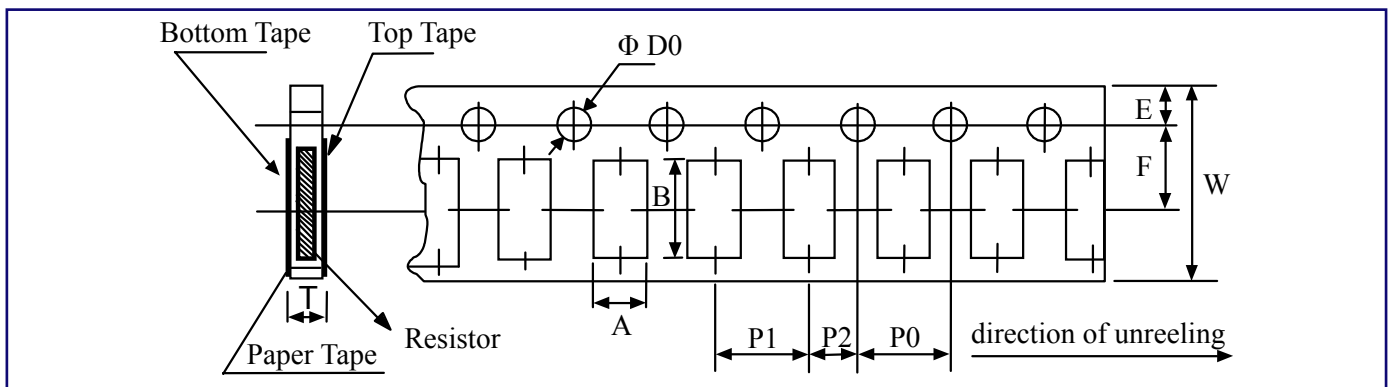
Codes	A	B	C
AR12	4.90	1.60	3.10±0.2
AR10	3.60	1.40	2.50±0.2
AR13	2.00	1.15	2.50±0.2
AR06	2.00	1.15	1.70±0.2
AR05	1.00	1.00	1.35±0.2
AR03	0.80	1.00	0.90±0.2
AR02	0.50	0.50	0.60±0.2
AR01	0.25	0.30	0.40±0.2

► Packaging



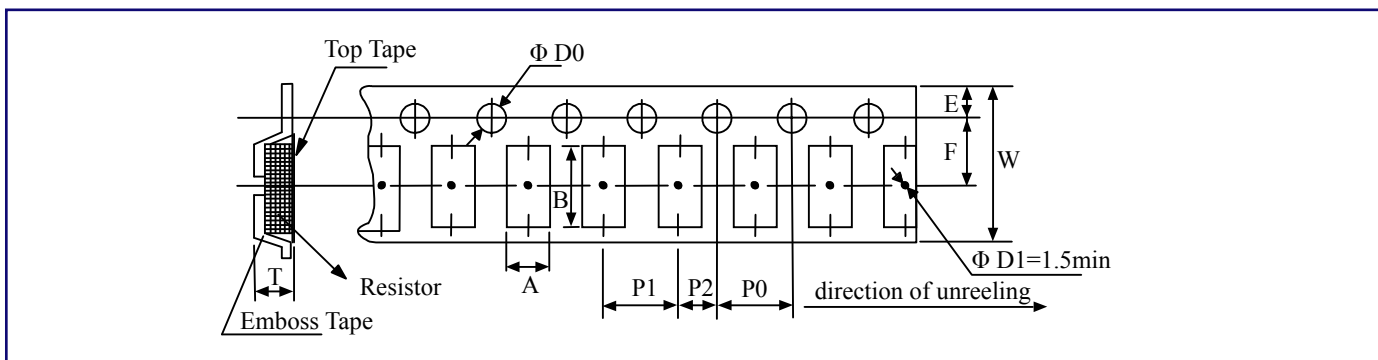
Codes	ΦA	ΦB	ΦC	W	T	PaperTape (PCS)	Emboss PlasticTape (PCS)
AR01	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
AR02	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
AR03	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
AR05	178.0±1.0	60.0±1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
AR06	178.0±1.0	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

► Tape Specifications



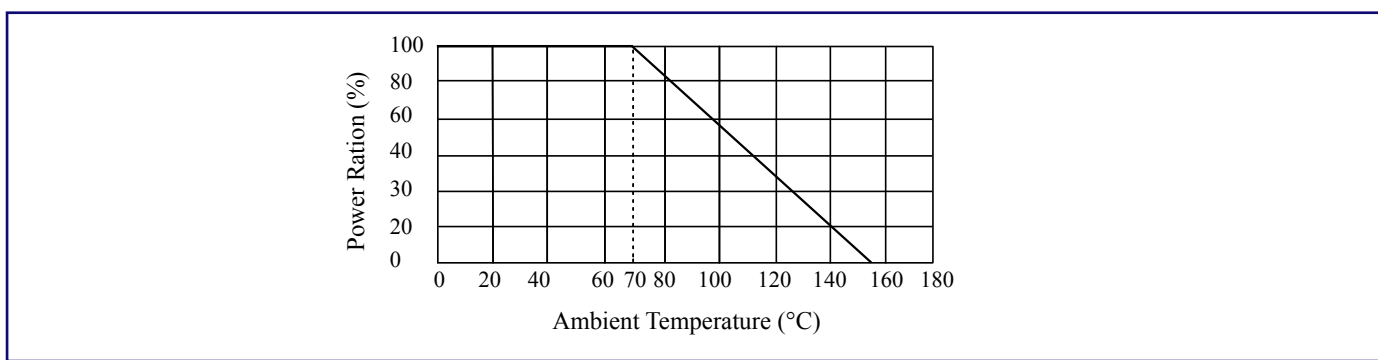
Codes	A	B	W	E	F	P0	P1	P2	ΦD0	T
AR01	0.40±0.05	0.70±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.265±0.05
AR02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
AR03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	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	8.0±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.60±0.10	0.75±0.05

▶ Emboss Plastic Tape Specifications



Codes	A	B	W	E	F	P0	P1	P2	ΦD0	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

▶ Emboss Plastic Tape Specifications



Item	Specification		Test Method
	Tol. ≤0.05%	Tol. >0.05%	
Temperature Coefficient of Resistance	AS Spec		MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	ΔR±0.05%	ΔR±0.5%	JIS-C-5202-5.5 RCWV*2.5 or Max Overloading Voltage , 5 seconds.
	ΔR±0.5% for high power rating		
Dielectric Withstand Voltage	By type		MIL-STD-202F Method 301 Apply Max Overload Voltage for 1 minute
Insulation Resistance	>1000M Ω		MIL-STD-202F Method 302 Apply 100VDC for 1minute
Thermal Shock	ΔR±0.05%	ΔR±0.25%	MIL-STD-202F Method 107G -55°C~150°C, 100cycles
Load Life	ΔR±0.05%	ΔR±0.2%	MIL-STD-202F Method 108A RCWV, 70°C, 1.5 hours ON, 0.5 hours OFF, 1000~1048 hours
	>7KΩ ΔR±0.5%		
	ΔR±0.5% for high power rating		
humidity (Steady State)	ΔR±0.05%	ΔR±0.3%	MIL-STD-202F Method 103B 40°C, 90~95%RH, RCWV 1.5 hours ON, 0.5 hours OFF, total 1000~1048 hours
	ΔR±0.5% for high power rating		

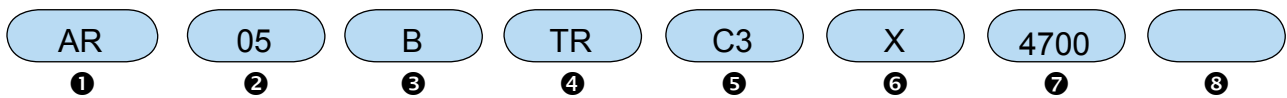
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Item	Specification		Test Method
	Tol.≤0.05%	Tol.>0.05%	
Resistance to dry heat	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-7.2 ; 96 hours @ +155°C without load
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-7.1
	ΔR±0.5% for high power rating		1 hour, -65°C, followed by 45minutes of RCWV
Bending Strength	ΔR±0.05%	ΔR±0.2%	JIS-C-5202-6.1.4; Bending Amplitude 3mm for 10seconds
Solderability	95% min coverage		MIL-STD-202F Method 208H; 260°C±5°C, 2±0.5(sec)
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	MIL-STD-202F Method 210E; 260±5°C, 10±1 second

Note: Remark: Storage Temperature: 25±3°C; Humidity < 80%RH

▶ How to Order



① Part Number: AR

② Dimensions(L×W)

Code	Dimensions(L×W)	
01	0.58×0.29mm	EIA0201
02	1.00×0.50mm	EIA0402
03	1.60×0.80mm	EIA0603
05	2.00×1.25mm	EIA0805
06	3.00×1.50mm	EIA1206
13	3.10×2.40mm	EIA1210
10	4.90×2.40mm	EIA2010
12	6.30×3.10mm	EIA2512

③ Resistance Tolerance

Code	Resistance Tolerance
T	±0.01%
A	±0.05%
B	±0.10%
C	±0.25%
D	±0.50%
F	±1.00%

④ Package

Code	Packaging
P	Bulk
TR	Taping Reel

⑤ TCR

Code	TCR
C7	±5ppm /°C
C6	±10ppm /°C
C5	±15ppm /°C
C3	±25ppm /°C
C2	±50ppm /°C

⑥ Power Rating

Code	Power Rating
T	1W
U	1/2W
O	1/3W
V	1/4W
P	1/5W
W	1/8W
X	1/10W
Y	1/16W
Z	1/32W

⑦ Resistance

Code	Resistance
0010	1Ω
4R70	4.7Ω
1000	100Ω
4992	49900Ω
1003	100000Ω

⑧ Marking

Code	Marking
	Standard Marking for E96/ E24
N	No Marking

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