

# Viking Tech Corporation

## Thin Film Precision Chip Resistor (AR Series)



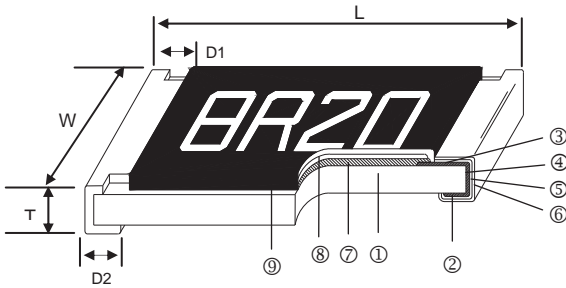
### ■ Features

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

### ■ Applications

- Medical Equipment
- Testing / Measurement Equipment
- Printer Equipment
- Automatic Equipment Controller
- Converters
- Communication Device, Cell Phone, GPS, PDA

### ■ 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

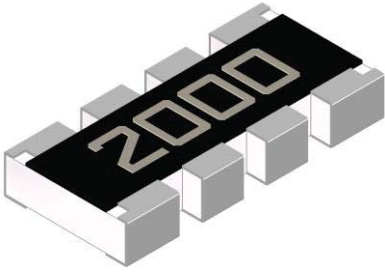
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
AR01	0201	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	0.14
AR02	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.30 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10	0.54
AR03	0603	1.55 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	1.83
AR05	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.20	4.71
AR06	1206	3.05 $\pm$ 0.15	1.55 $\pm$ 0.15	0.55 $\pm$ 0.10	0.42 $\pm$ 0.20	0.35 $\pm$ 0.25	9.02
AR13	1210	3.10 $\pm$ 0.15	2.40 $\pm$ 0.15	0.55 $\pm$ 0.10	0.40 $\pm$ 0.20	0.55 $\pm$ 0.25	10
AR10	2010	4.90 $\pm$ 0.15	2.40 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	23.61
AR12	2512	6.30 $\pm$ 0.15	3.10 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	38.06

### ■ Part Numbering

AR	03	T	T	B	Y	1001	N
Product Type	Dimensions (LxW)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	01: 0201 02: 0402 03: 0603 05: 0805 06: 1206 13: 1210 10: 2010 12: 2512	T: $\pm 0.01\%$ A: $\pm 0.05\%$ B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$	T: Taping Reel B: Bulk	S: $\pm 5$ B: $\pm 10$ N: $\pm 15$ C: $\pm 25$ D: $\pm 50$	: Standard Y: 1/16W X: 1/10W W: 1/8W M: 1/6W P: 1/5W V: 1/4W O: 1/3W U: 1/2W Q: 3/4W T: 1W	0010: 1Ω 4R70: 4.7Ω 1001: 1KΩ 1004: 1MΩ	: Standard Marking for E96 / E24 N: No Marking

## Thin Film Array Chip Resistor (TFAN Series)



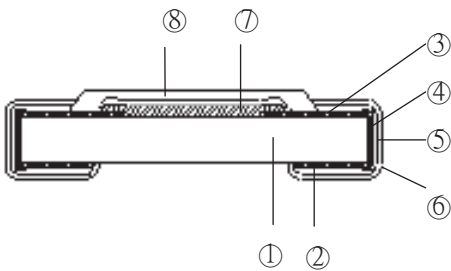
### ■ Features

- Advanced thin film technology
- Very tight tolerance down to  $\pm 0.1\%$
- Extremely low TCR down to  $\pm 10\text{PPM}/\text{C}$
- TCR tracking down to  $15\text{ppm}(\pm 7.5\text{ppm})$  and tolerance matching down to  $0.1\%(\pm 0.05\%)$
- RoHS compliant component, compatible with lead (Pb)-free

### ■ Applications

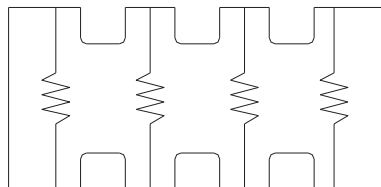
- Voltage divider
- Feedback circuits
- Signal conditioning

### ■ Construction



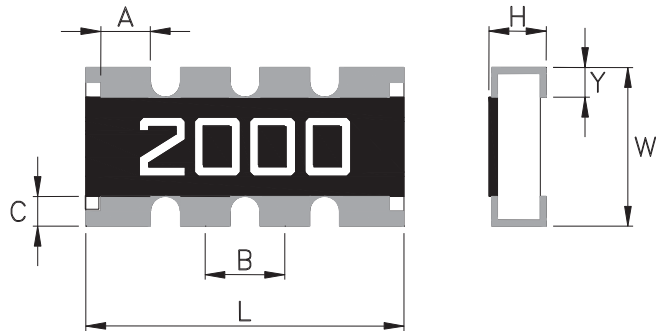
①	Alumina Substrate	④	Edge Electrode (Ag)	⑦	Resistor Layer (NiCr)
②	Bottom Electrode (Ag)	⑤	Barrier Layer (Ni)	⑧	Overcoat (Epoxy)
③	Top Electrode (Ag-Pd)	⑥	External Electrode (Sn)		

### ■ Equivalent Circuit Diagram



TFAN

## ■ Dimensions



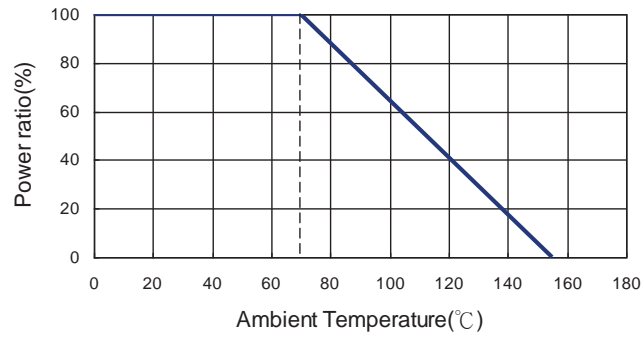
Type	Number of Resistors	L	W	H	A	B	C	Y
TFAN43	4	3.20±0.15	1.60±0.15	0.55±0.10	0.50±0.15	0.80±0.05	0.30±0.15	0.30±0.15

## ■ Part Numbering

TFAN	43	B0	T	C0	Y	1001	N
Product Type	Dimensions	Tolerance Grade	Packaging Code	TCR Grade	Power Rating	Resistance	Marking Code
	0603X4	Reference Tolerance Grade Table	T: Taping Reel B: Bulk	Reference TCR Grade Table	: Standard Y: 1/16W	0010: 1Ω 4R70: 4.7Ω 1001: 1KΩ 1004: 1MΩ	: Standard Marking for E96 N: No Marking

Accuracy Grade Table							
Tolerance Grade				TCR Grade			
Code	Absolute Tolerance	Tolerance Matching	Resistance Value	Code	Absolute TCR	TCR Tracking	Resistance Value
B0	±0.1%	N/A	100~33K	B0	±10ppm	N/A	100~2K
B3	±0.1%	0.1%	100~33K	B3	±10ppm	15ppm	100~2K
C0	±0.25%	N/A	100~33K	N0	±15ppm	N/A	100~2K
C2	±0.25%	0.25%	100~33K	N3	±15ppm	15ppm	100~2K
C3	±0.25%	0.1%	100~33K	C0	±25ppm	N/A	100~33K
D0	±0.5%	N/A	100~33K	C2	±25ppm	25ppm	100~33K
D1	±0.5%	0.5%	100~33K	C3	±25ppm	15ppm	100~33K
D2	±0.5%	0.25%	100~33K	D0	±50ppm	N/A	100~33K
F0	±1%	N/A	100~33K	D1	±50ppm	50ppm	100~33K
F1	±1%	0.5%	100~33K	D2	±50ppm	25ppm	100~33K

## Derating Curve



## Electrical Specifications

Type	Item	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%	
TFAN 43		1/16W	-55 ~ +155°C	50V	100V	100Ω~33KΩ			±25 ±50

## Special Specifications

Type	Item	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%	
TFAN 43		1/16W	-55 ~ +155°C	50V	100V	100Ω~2KΩ			±10 ±15

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.

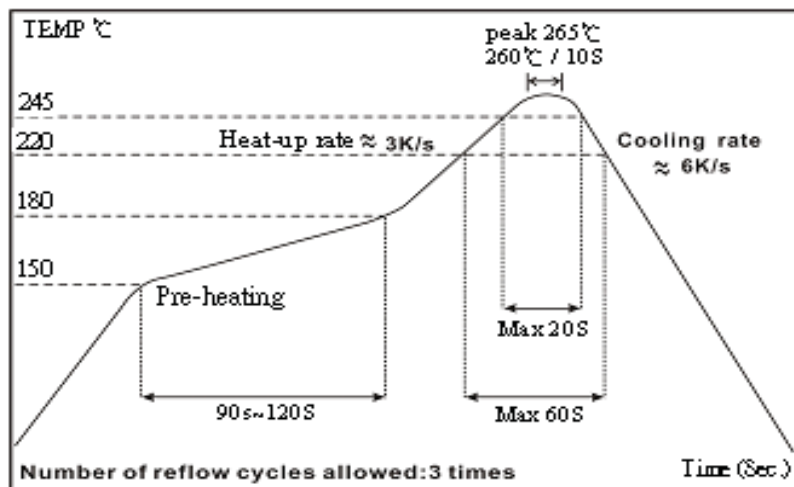
## Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	<b>MIL-STD-202 Method 304</b> +25/-55/+25/+125/+25 C
Short Time Overload	$\Delta R \pm 0.1\%$	<b>JIS-C-5201-1 5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	>1000 M $\Omega$	<b>MIL-STD-202 Method 302</b> Apply 100V <sub>DC</sub> for 1 minute
Endurance	1000Hr : $\Delta R \pm 0.15\%$ 8000Hr : $\Delta R \pm 0.3\%$	<b>MIL-STD-202 Method 108A</b> 70 $\pm$ 2 C, RCWV with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\Delta R \pm 0.25\%$	<b>MIL-STD-202 Method 103B</b> 40 $\pm$ 2 C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load(85 C/85% R.H)	$\Delta R \pm 0.5\%$	85 $\pm$ 2 C, 80~90% R.H. 10% of RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	1000Hr : $\Delta R \pm 0.25\%$ 8000Hr : $\Delta R \pm 0.5\%$	At +125 $^{\circ}$ C
Bending Strength	$\Delta R \pm 0.2\%$	<b>JIS-C-5201-1 6.1.4</b> Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage	<b>MIL-STD-202 Method 208H</b> 245 $\pm$ 5 C for 3 seconds
Resistance to Soldering Heat	$\Delta R \pm 0.2\%$	<b>MIL-STD-202 Method 210E</b> 260 $\pm$ 5 C for 10 seconds
Dielectric Withstand Voltage	100V	<b>MIL-STD-202 Method 301</b> Max. overload voltage for 1 minute
Thermal Shock	$\Delta R \pm 0.25\%$	<b>MIL-STD-202 Method 107G</b> -55 C ~150 C, 100 cycles
Low Temperature Operation	$\Delta R \pm 0.25\%$	<b>JIS-C-5201-1 7.1</b> 1 hour, -65 C, followed by 45 minutes of RCWV

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

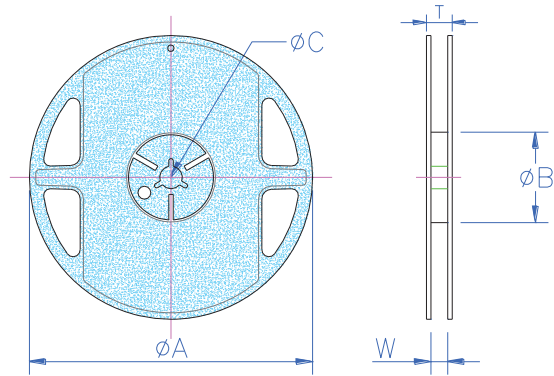
■ Storage Temperature: 25 $\pm$ 3 $^{\circ}$ C; Humidity < 80%RH

## Reflow



## ■ Packaging

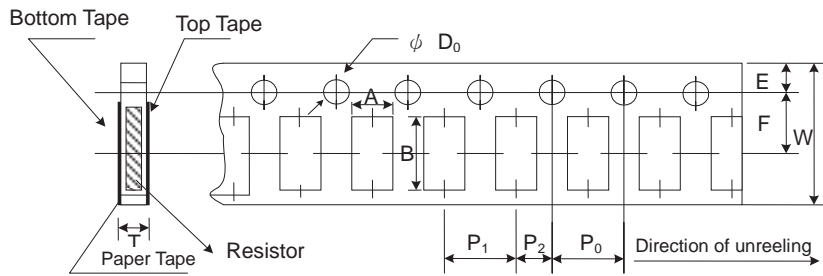
### Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity	Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T
TFAN 43	Paper	5K	7 inch	178.5±1.5	60 <sup>+1/-0</sup>	13.0±0.2	9.0±0.5	12.5±0.5

### Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
TFAN-43	1.95±0.1	3.50±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.05	2.0±0.05	1.5 <sup>+0.1/-0</sup>	0.85±0.1

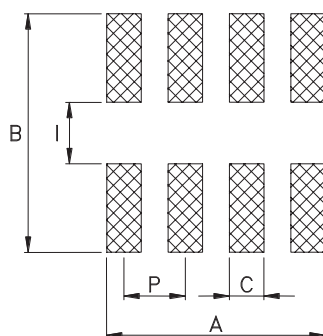
## ■ Marking

### TFAN 43: 4 digits marking

Example:

Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Recommend Land Pattern



Unit: mm

Type	A	B	C	I	P
TFAN-43	2.85	3.10	0.45	0.80	0.80

# Thin Film Current Sensing Chip Resistor (TCS Series)



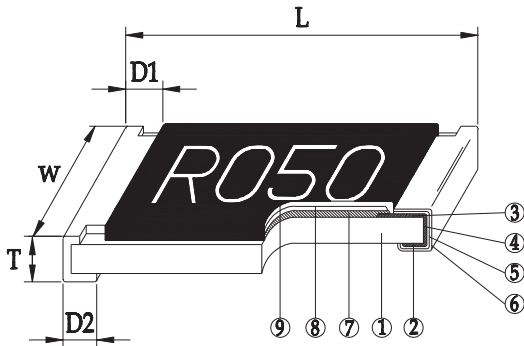
## ■ Features

- Thin film process
- High power rating up to 3 Watts in 2512 size
- Tight tolerance down to  $\pm 0.5\%$
- Extremely low TCR down to  $\pm 50$  PPM/ $^{\circ}\text{C}$
- Resistance values from 50m to 1ohm
- High purity alumina substrate for high power dissipation

## ■ Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver
- Portable Devices (PDA, Cell Phone)

## ■ 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

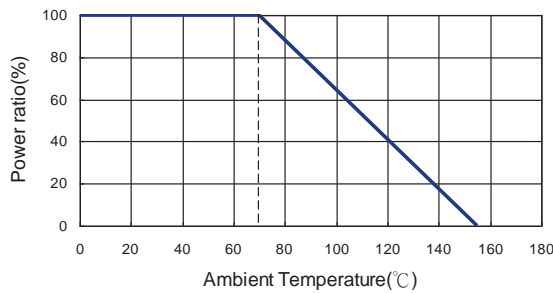
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
TCS02	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.32 $\pm$ 0.10	0.25 $\pm$ 0.10	0.20 $\pm$ 0.10	0.56
TCS03	0603	1.60 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	3.1
TCS05	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.25	5.6
TCS06	1206	3.05 $\pm$ 0.15	1.55 $\pm$ 0.15	0.55 $\pm$ 0.10	0.50 $\pm$ 0.30	0.40 $\pm$ 0.25	12.3
TCS10	2010	5.00 $\pm$ 0.20	2.45 $\pm$ 0.15	0.60 $\pm$ 0.15	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	26.7
TCS12	2512	6.35 $\pm$ 0.20	3.15 $\pm$ 0.15	0.60 $\pm$ 0.10	0.60 $\pm$ 0.30	0.55 $\pm$ 0.25	49.6

## Part Numbering

TCS	12	F	T	F		R010	N
Product Type	Dimensions (LxW)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	02: 0402 03: 0603 05: 0805 06: 1206 10: 2010 12: 2512	D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	D: ±50 E: ±100 F: ±200	: Standard R: 3W	R010: 0.01Ω R100: 0.1Ω 1R00: 1Ω	: Standard N: No Marking

## Derating Curve



## Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)		TCR (PPM/°C)
			±0.5%	±1%	
TCS02 (0402)	1/16W	-55~+155 C	500 - 1000		±100 ±50
TCS03 (0603)	1/10W		200 - 300 301 - 1000	±100 ±50	
TCS05 (0805)	1/8W		200 - 300 301 - 1000	±100 ±50	
TCS06 (1206)	1/4W	-55~+155 C	—	50 - 100	±200 ±100 ±50
			101 - 300 301 - 1000		
TCS10 (2010)	3/4W	-55~+155 C	50 - 100 101 - 300 301 - 1000	±200 ±100 ±50	
TCS12 (2512)	1W		50 - 100 101 - 300 301 - 1000	±200 ±100 ±50	

## High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)	TCR (PPM/°C)
			±1%	
TCS12 (2512)	3W	-55~+155 C	100 - 1000	±100

Operating Voltage= $\sqrt{P \cdot R}$

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$

■ V king is capable of manufacturing the optional spec based on customer's requirement.



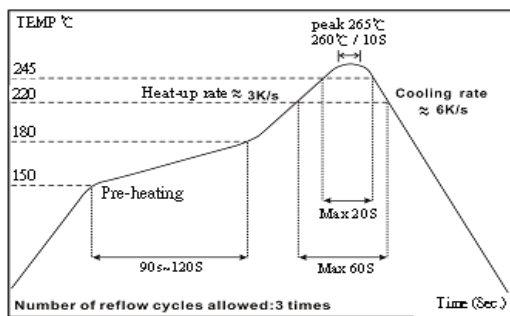
## Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	<b>MIL-STD-202 Method 304</b> +25/-55/+25/+125/+25 C
Short Time Overload	±1%	<b>JIS-C-5201-1 5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 5seconds
Insulation Resistance	>1000MΩ	<b>MIL-STD-202 Method 302</b> Apply 100V <sub>DC</sub> for 1 minute
Endurance	±1%	<b>MIL-STD-202 Method 108A</b> 70±2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±0.5%	<b>MIL-STD-202 Method 103B</b> 40±2 C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Bending Strength	As Spec.	<b>JIS-C-5201-1 6.1.4</b> Bending amplitude 3mm for 10 seconds
Solderability	95% min. coverage	<b>MIL-STD-202 Method 208H</b> 245±5 C for 3 seconds
Resistance to Soldering Heat	±0.5%	<b>MIL-STD-202 Method 210E</b> 260±5 C for 10 seconds
Dielectric Withstand Voltage	By Type	<b>MIL-STD-202 Method 301</b> Apply Max. Overload Voltage for 1 minute
Thermal Shock	±0.5%	<b>MIL-STD-202 Method 107G</b> -55 C ~ 150 C, 100 cycles
Low Temperature Operation	±0.5%	<b>JIS-C-5201-1 7.1</b> 1 hour, -65 C followed by 45 minutes of RCWV

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

■ **Storage Temperature: 25±3°C; Humidity < 80%RH**

## Reflow



## Marking

### 0603 3digit marking

Example :

Resistance	1Ω	0.1Ω	0.15Ω	0.01Ω	0.101Ω	0.035Ω
Codes	1R0	R10	R15	R01	<u>101</u>	<u>035</u>

### 0805-2512 4digit marking

Example :

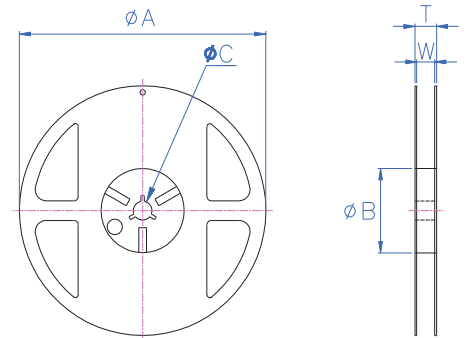
Resistance	1Ω	0.1Ω	0.05Ω	0.015Ω	0.01Ω
Codes	1R00	R100	R050	R015	R010

## ■ Packaging

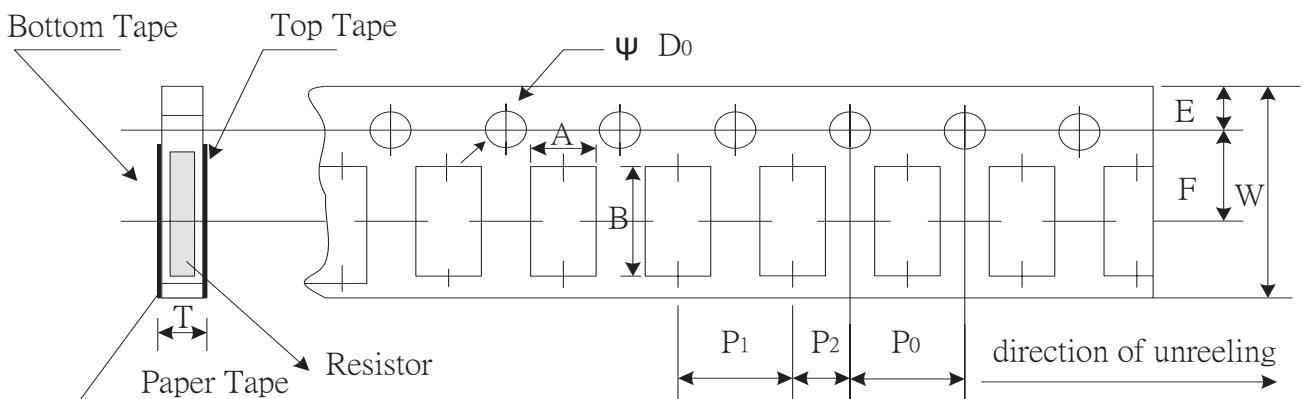
### Packaging Quantity & Reel Specifications

Unit :mm

Type	∅A	∅B	∅C	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
TCS02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	
TCS03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TCS05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TCS06	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TCS10	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.00	15.5±1.0	-	4,000
TCS12	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.00	15.5±1.0	-	4,000



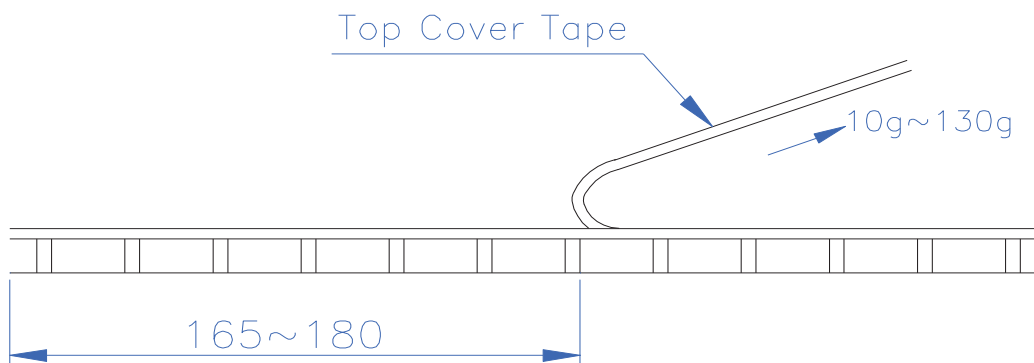
### Paper Tape Specifications



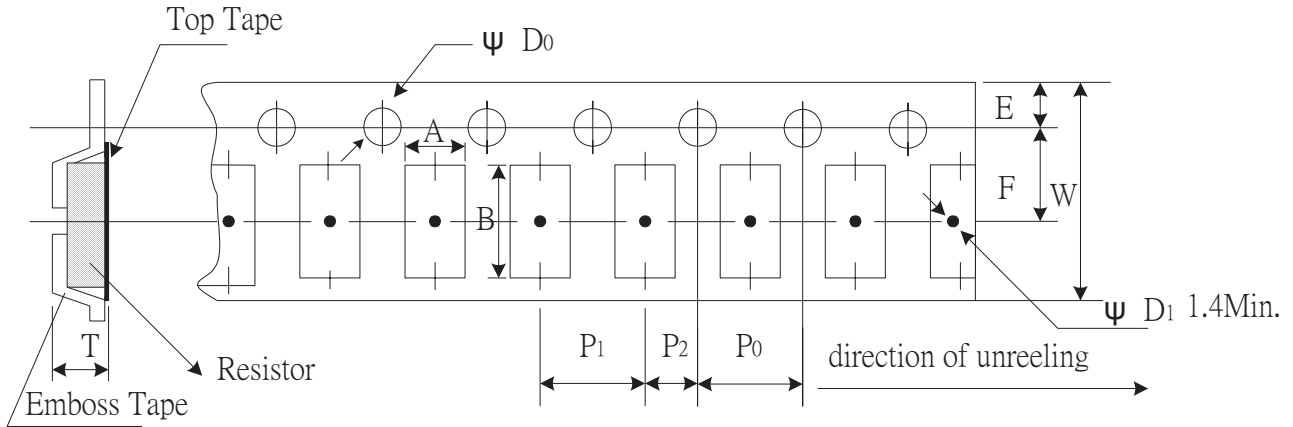
Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ψD0	T
TCS02	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
TCS03	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
TCS05	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
TCS06	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 10 to 100g



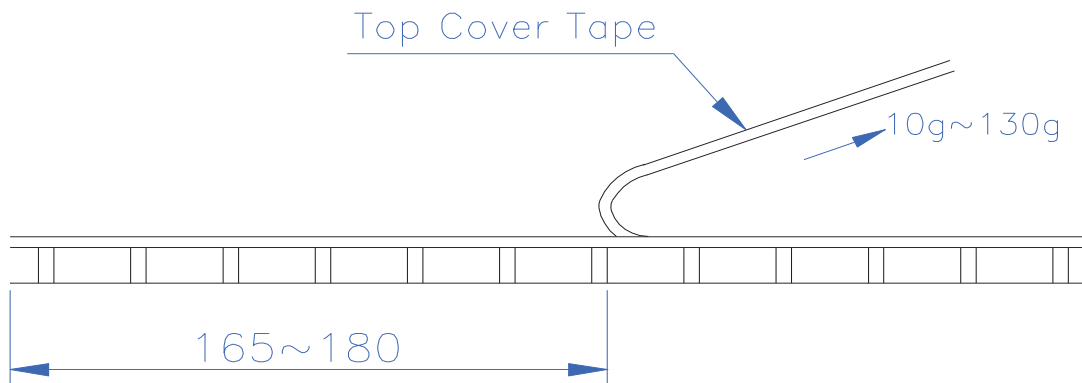
Emboss Plastic Tape Specifications



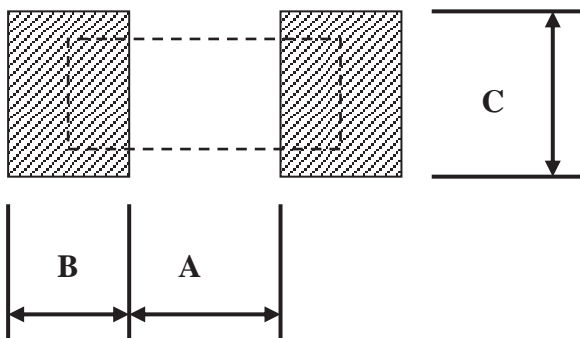
Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ψD <sub>0</sub>	T
TCS10	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
TCS12	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

- 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 10 to 130g



■ Recommend Land Pattern



Unit : mm

Type	A	B	C
TCS02	0.50	0.50	0.60±0.2
TCS03	0.80	1.00	0.90±0.2
TCS05	1.00	1.00	1.35±0.2
TCS06	2.00	1.15	1.70±0.2
TCS10	3.60	1.40	2.50±0.2
TCS12	4.90	1.60	3.10±0.2

# Thin Film Anti-Sulfurated Chip Resistor (TAS Series)

## Features

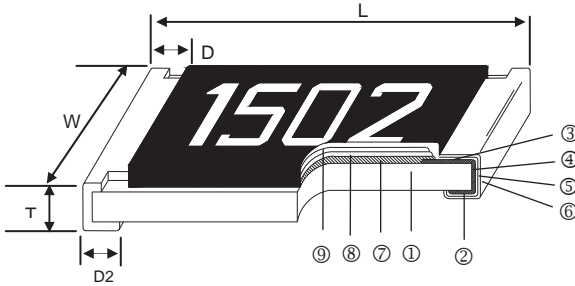
- Special materials, design, and processing for high sulfur applications
- Tolerances as low as 0.05% and TCR's as low as 10 ppm.
- Test proven immunity to humidity, moisture, and sulfur
- RoHS Compliant / Lead Free

## Applications

- Precision automotive and industrial motor controls, pump controls, dispensing systems
- Welding equipment
- Audio / video amplifiers
- Notebook and laptop motherboard
- Handheld instruments such as printers, scanners, and test instruments
- Base station and remote telecom applications
- Medical test and monitoring equipment.



## Construction



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

## Dimensions

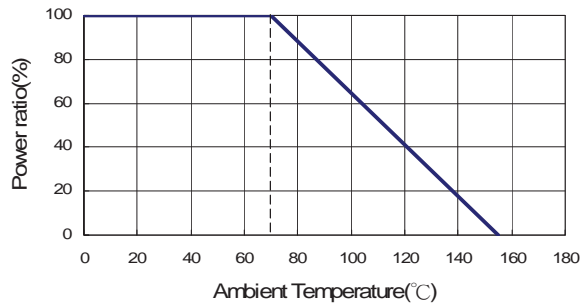
Unit :mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
TAS02	0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.20±0.10	0.54
TAS03	0603	1.55±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.83
TAS05	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	4.71

## Part Numbering

Product Type	Dimensions (LxW)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
TAS	03	A	T	B		1001	N
	02: 0402 03: 0603 05: 0805	A: ±0.05% B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	T: Taping Reel B: Bulk	B: ±10 N: ±15 C: ±25 D: ±50	: Standard	24R9: 24.9Ω 1001: 1KΩ 5003:500KΩ	: Standard Marking for E96 / E24 N: No Marking

## 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%		
TAS02 (0402)		1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 10KΩ	49.9Ω - 100KΩ					±25 ±50
TAS03 (0603)		1/16W	-55 ~ +155°C	50V	100V	10Ω - 49.9KΩ	10Ω - 332KΩ					±25 ±50
TAS05 (0805)		1/10W	-55 ~ +155°C	100V	200V	10Ω - 100KΩ	10Ω - 499KΩ					±25 ±50

## Special 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%	
TAS03 (0603)		1/16W	-55 ~ +155°C	50V	100V	24.9Ω - 12KΩ		±10
						-	12.1KΩ - 332KΩ	±15
TAS05 (0805)		1/10W	-55 ~ +155°C	100V	200V	24.9Ω - 15KΩ		±10
						-	15.4KΩ - 499KΩ	±15

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.

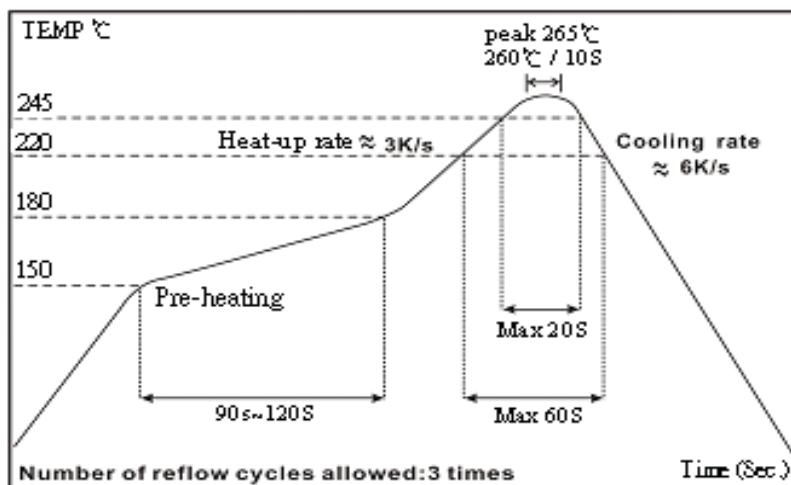
## Environmental Characteristics

Item	Requirement		Test Method
	Tol. ≤ 0.05%	Tol. > 0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		<b>MIL-STD-202 Method 304</b> +25/-55/+25/+125/+25 C
Short Time Overload	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
	ΔR±0.2% for high power rating		
Insulation Resistance	>1000 MΩ		<b>MIL-STD-202 Method 302</b> Apply 100V <sub>DC</sub> for 1 minute
Endurance	ΔR±0.05%	ΔR±0.2%	<b>MIL-STD-202 Method 108A</b> 70±2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	>7kΩ ΔR±0.5%		
	ΔR±0.5% for high power rating		
Damp Heat with Load	ΔR±0.05%	ΔR±0.3%	<b>MIL-STD-202 Method 103B</b> 40±2 C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	ΔR±0.5% for high power rating		
Bending Strength	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 6.1.4</b> Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		<b>MIL-STD-202 Method 208H</b> 245±5 C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	<b>MIL-STD-202 Method 210E</b> 260±5 C for 10 seconds
Dielectric Withstand Voltage	By Type		<b>MIL-STD-202 Method 301</b> Max. overload voltage for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.25%	<b>MIL-STD-202 Method 107G</b> -55 C ~150 C, 100 cycles
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 7.1</b> 1 hour, -65 C, followed by 45 minutes of RCWV
	ΔR±0.5% for high power rating		
Sulfur Test	± 0.5%		<b>ASTM-B-809-95</b> 3~5ppm H <sub>2</sub> S, 50±2°C, 91~93% R.H., no power rating for 1000 hrs

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

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

## Reflow



## ■ 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 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

### 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 4digit marking

Example

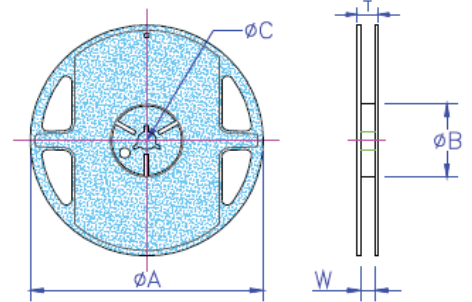
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Packaging

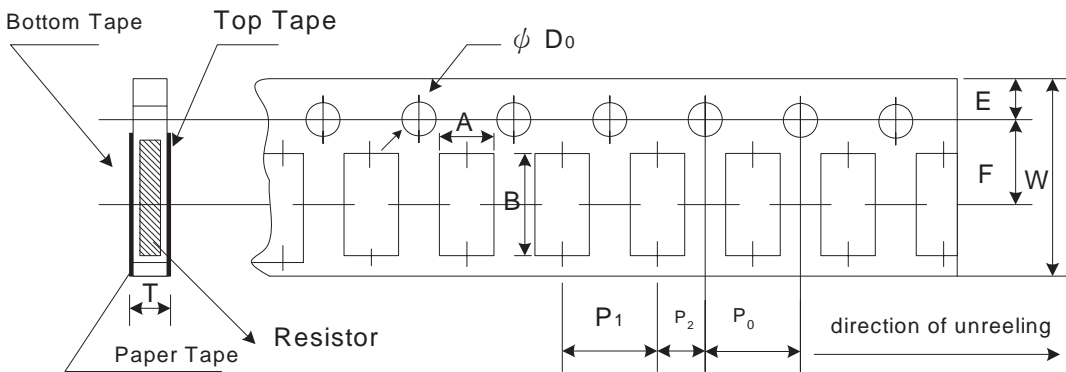
### Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
TAS02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
TAS03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
TAS05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-



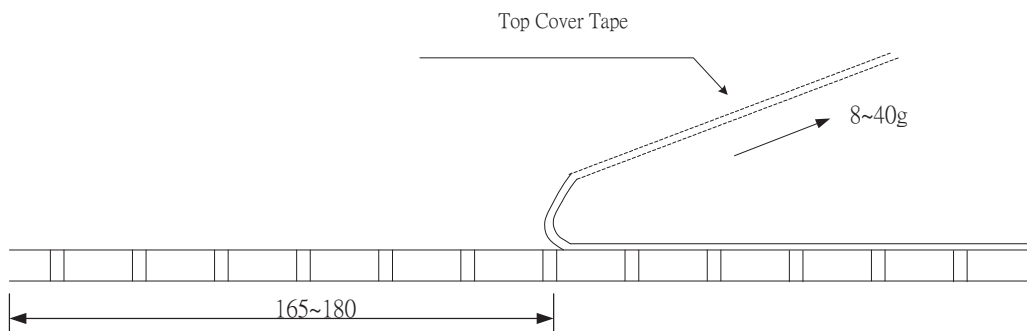
### Paper Tape Specifications



Unit: mm

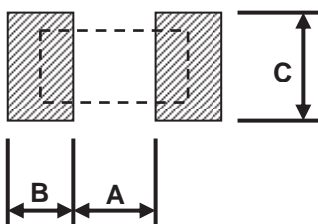
Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	φD <sub>0</sub>	T
TAS02	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
TAS03	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
TAS05	1.60±0.05	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

- 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 8g to 40g



## ■ Recommend Land Pattern

Unit: mm



Type	A	B	C
TAS02	0.50	0.50	0.60±0.2
TAS03	0.80	1.00	0.90±0.2
TAS05	1.00	1.00	1.35±0.2



## **REVISION HISTORY**

<b>REVISION</b>	<b>DATE</b>	<b>CHANGE NOTIFICATION</b>	<b>DESCRIPTION</b>
Version A4	Jan 22,2013	-	- Add TAS02 specification, change the resistance range of TAS0603&0805 - Change the mockup.
Version A5	Apr 10,2013	-	- Add "RCWV" description in Environment Characteristic Test Method
Version A6	Aug 10,2013	-	- Modify the Features description to meet the product capability.

# Anti-Corrosive Thin Film Precision Chip Resistor (PR Series)

## ■ Features

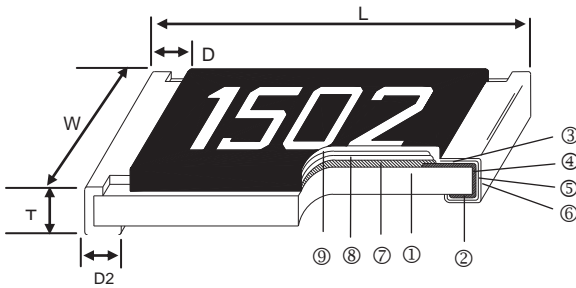
- Long term life stability and demonstrated the Anti-Corrosion claims characterized by Ta<sub>2</sub>N
- Special passivated NiCr film for Anti-Acid and Anti-Damp
- Tight tolerance down to  $\pm 0.1\%$
- Extremely low TCR down to  $\pm 15$  PPM/ $^{\circ}$ C
- Wide resistance range 10ohm ~ 1.5Mega ohm



## ■ Applications

- Automotive
- High-end Computer
- Industrial Equipment
- Automatic Equipment Controller
- Medical Equipment
- Telecommunication Device
- High-end Multimedia Electronics
- Outdoor Electronic Applications

## ■ Construction



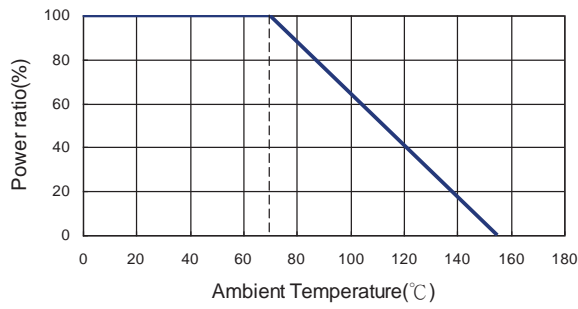
① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (NiCr)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Passivation
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Overcoat

## ■ Dimensions

Unit :mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
PR02	0402	1.00 $\pm$ 0.05	0.50 $\pm$ 0.05	0.30 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10	0.55
PR03	0603	1.55 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20	1.85
PR05	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.30 $\pm$ 0.20	0.40 $\pm$ 0.25	4.76
PR06	1206	3.05 $\pm$ 0.15	1.55 $\pm$ 0.15	0.55 $\pm$ 0.10	0.42 $\pm$ 0.20	0.35 $\pm$ 0.25	9.11
PR10	2010	4.90 $\pm$ 0.15	2.40 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	23.82
PR12	2512	6.30 $\pm$ 0.15	3.10 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.30	0.50 $\pm$ 0.25	38.46

## Derating Curve



## Part Numbering

PR	03	D	T	D	X	1001	N
Product Type	Dimensions (LxW)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking Code
	02: 0402 03: 0603 05: 0805 06: 1206 10: 2010 12: 2512	B: ±0.1% C: ±0.25% D: ±0.5%	T: Taping Reel B: Bulk	N: ±15 C: ±25 D: ±50	: Standard X: 1/10W W: 1/8W V: 1/4W	1000: 100Ω 2201: 2200Ω 1001: 1KΩ 1004: 1MΩ	: Standard Marking for E96 / E24 N: No Marking

## 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%	
PR02 (0402)	1/16W	-55 ~ +155 C	25V	50V	49.9Ω - 12KΩ			±15
					24.9Ω - 24.9KΩ			±25 ±50
PR03 (0603)	1/16W	-55 ~ +155 C	50V	100V	24.9Ω - 332KΩ			±15 ±25 ±50
PR05 (0805)	1/10W	-55 ~ +155 C	100V	200V	10Ω - 1MΩ			±15 ±25 ±50
PR06 (1206)	1/8W	-55 ~ +155 C	150V	300V	10Ω - 1MΩ			±15 ±25 ±50
PR10 (2010)	1/4W	-55 ~ +155 C	150V	300V	24.9Ω - 1MΩ			±15
					10Ω - 1.5MΩ			±25 ±50
PR12 (2512)	1/2W	-55 ~ +155 C	150V	300V	24.9Ω - 1MΩ			±15
					10Ω - 1.5MΩ			±25 ±50

## 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)
					±0.1%	±0.25%	±0.5%	
PR03 (0603)	1/10W	-55 ~ +155 C	75V	150V	24.9Ω - 220KΩ			±15 ±25 ±50
PR05 (0805)	1/8W	-55 ~ +155 C	150V	300V	24.9Ω - 680KΩ			±15 ±25 ±50
PR06 (1206)	1/4W	-55 ~ +155 C	200V	400V	24.9Ω - 1MΩ			±15 ±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.

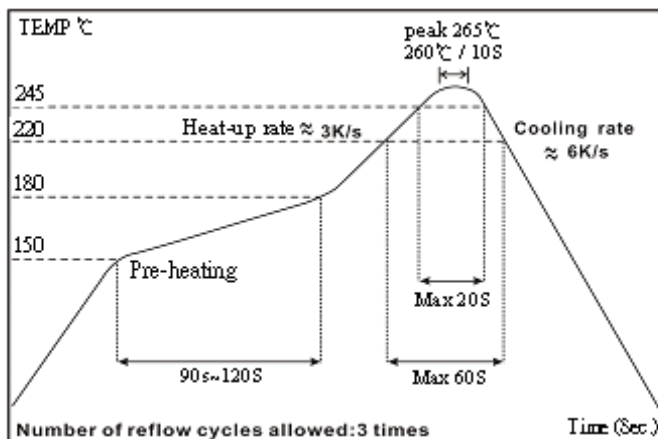
## Environmental Characteristics

Item	Requirement		Test Method
	Size 0603 / 0805 / 1206 / 2010 / 2512	Size 0402	
Short Time Overload	$\leq \pm 0.02\%$ $\leq \pm 0.2\%$ for high power rating	$\leq \pm 0.1\%$	<b>JIS-C-5201-1 5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 2 seconds
Endurance	$\leq \pm 0.05\%$ $\leq \pm 0.25\%$ for high power rating	$\leq \pm 0.25\%$	<b>MIL-STD-202 Method 108A</b> 70±2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\leq \pm 0.05\%$ $\leq \pm 0.25\%$ for high power rating	$\leq \pm 0.5\%$	<b>MIL-STD-202 Method 103B</b> 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		<b>MIL-STD-202 Method 208H</b> 245±5 C for 3 seconds
Resistance to Soldering Heat	$\leq \pm 0.02\%$	$\leq \pm 0.1\%$	<b>MIL-STD-202 Method 210E</b> 260±5 C for 10 seconds
Thermal Shock	$\leq \pm 0.02\%$	$\leq \pm 0.1\%$	<b>MIL-STD-202 Method 107G</b> -55 C ~ 150 C, 100 cycles

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

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

## Reflow



## ■ 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 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

### 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

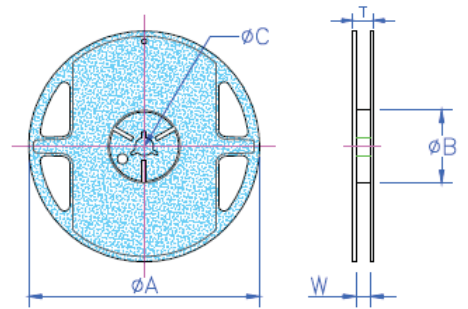
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Packaging

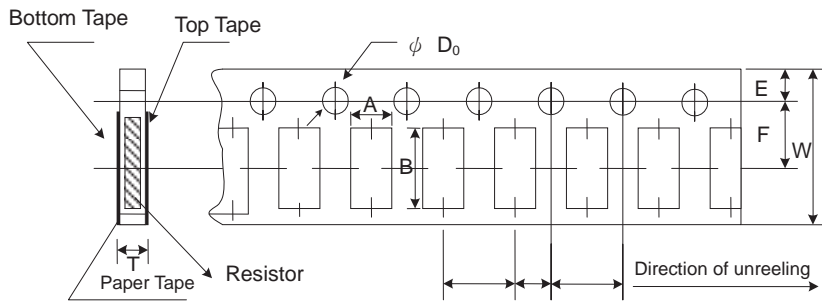
### Package Quantity & Reel Specifications

Unit : mm

Type	ΦA	ΦB	ΦC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
PR02	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	10,000	-
PR03	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR05	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR06	178.0±1.0	60.0+1.0	13.5±0.7	9.5±1.0	11.5±1.0	5,000	-
PR10	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
PR12	178.0±1.0	60.0+1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000



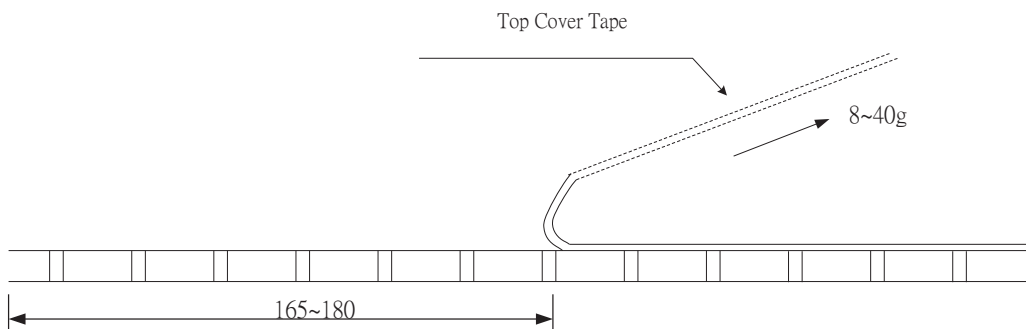
### Paper Tape Specifications



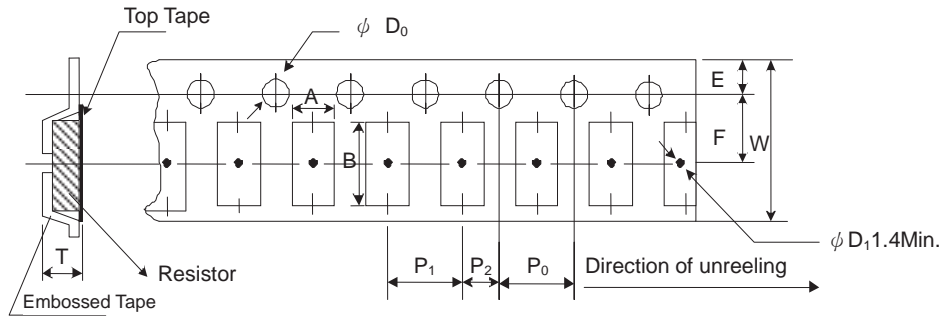
Unit: mm

Type	A	B	W	E	F	P0	P1	P2	ΦD0	T
PR02	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
PR03	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
PR05	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
PR06	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 8g to 40g



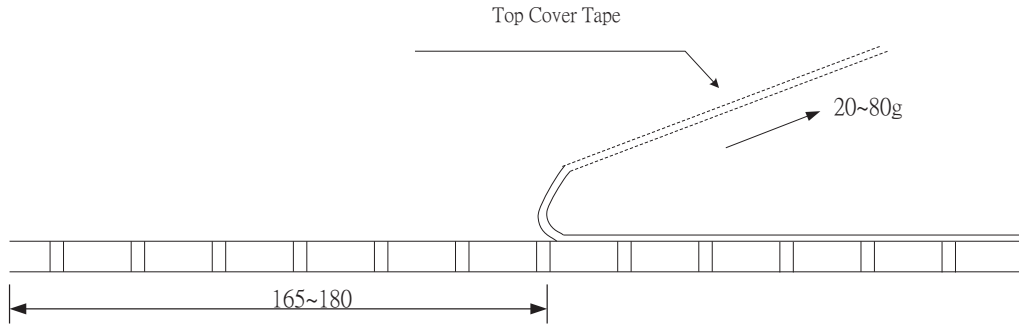
## Emboss Plastic Tape Specifications



Unit: mm

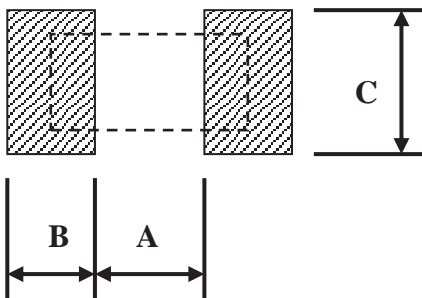
Type	A	B	W	E	F	$P_0$	$P_1$	$P_2$	$\psi D_0$	T
PR10	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20
PR12	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.20

- 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 20g to 80g



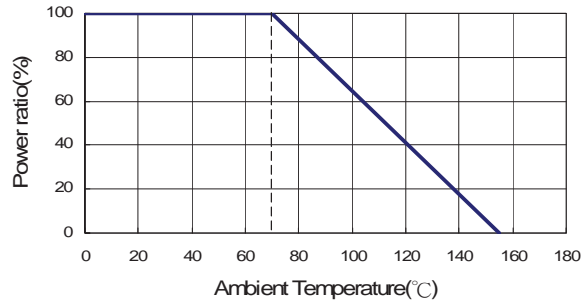
## Recommend Land Pattern

Unit : mm



Type	A	B	C
PR02	0.50	0.50	0.60±0.2
PR03	0.80	1.00	0.90±0.2
PR05	1.00	1.00	1.35±0.2
PR06	2.00	1.15	1.70±0.2
PR10	3.60	1.40	2.50±0.2
PR12	4.90	1.60	3.10±0.2

## 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%	
AR01 (0201)	1/32W	-55 ~ +155°C	15V	30V	—					±25 ±50
AR02 (0402)	1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 12KΩ	10Ω - 255KΩ				±25 ±50
AR03 (0603)	1/16W	-55 ~ +155°C	50V	100V	4.7Ω - 332KΩ	4.7Ω - 1MΩ	2Ω - 1MΩ			±25 ±50
AR05 (0805)	1/10W	-55 ~ +155°C	100V	200V	4.7Ω - 511KΩ	4.7Ω - 2MΩ	1Ω - 2MΩ			±25 ±50
AR06 (1206)	1/8W	-55 ~ +155°C	150V	300V	4.7Ω - 1MΩ	4.7Ω - 2.49MΩ	1Ω - 2.49MΩ			±25 ±50
AR13 (1210)	1/4W									
AR10 (2010)	1/4W	-55 ~ +155°C	150V	300V	4.7Ω - 1MΩ	4.7Ω - 3MΩ	1Ω - 3MΩ			±25 ±50
AR12 (2512)	1/2W									

■ 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%	±0.25%	±0.5%	±1%	
AR02 (0402)	1/16W	-55 ~ +155°C	25V	50V	49.9Ω - 4.99KΩ						±5
					49.9Ω - 12KΩ						±10
					49.9Ω - 12KΩ	49.9Ω - 69.8KΩ					±15
AR03 (0603)	1/16W	-55 ~ +155°C	50V	100V	24.9Ω - 15KΩ						±5
					24.9Ω - 100KΩ	4.7Ω - 332KΩ					±10 ±15
AR05 (0805)	1/10W	-55 ~ +155°C	100V	200V	24.9Ω - 30KΩ						±5
					24.9Ω - 200KΩ	4.7Ω - 511KΩ					±10 ±15
AR06 (1206)	1/8W	-55 ~ +155°C	150V	300V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15
AR13 (1210)	1/ 4W	-55 ~ +155°C	150V	300V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15
AR10 (2010)	1/4W	-55 ~ +155°C	150V	300V	24.9Ω - 100KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15
AR12 (2512)	1/2W	-55 ~ +155°C	150V	300V	24.9Ω - 100KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ					±10 ±15



## 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)
					±0.01%	±0.05%	±0.1%	±0.25%	±0.5%	±1%	
AR03 (0603)	1/10W	-55 ~ +155 C	75V	150V	24.9Ω - 15KΩ						±5
					24.9Ω - 100KΩ	4.7Ω - 332KΩ	4.7Ω - 332KΩ				±10
	4.7Ω - 1MΩ						±15				
1/6W	-55 ~ +155 C	100V	150V	—	10Ω - 332KΩ				±25 ±50		
AR05 (0805)	1/8W	-55 ~ +155 C	150V	300V	24.9Ω - 30KΩ						±5
					24.9Ω - 200KΩ	4.7Ω - 511KΩ	4.7Ω - 511KΩ				±10
							4.7Ω - 1MΩ				±15
	1/4W	-55 ~ +155 C	150V	300V	—	4.7Ω - 1MΩ	1Ω - 1MΩ	±25 ±50			
					10Ω - 499KΩ				±25 ±50		
AR06 (1206)	1/4W	-55 ~ +155 C	200V	400V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ				±10 ±15 ±25 ±50	
1/3W	-55 ~ +155 C	200V	400V	—	10Ω ~ 1MΩ				±25 ±50		
AR13 (1210)	1/3W	-55 ~ +155 C	200V	400V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ				±10 ±15 ±25 ±50	
AR10(2010)	1/3W	-55 ~ +155 C	200V	400V	24.9Ω - 49.9KΩ						±5
					24.9Ω - 499KΩ	4.7Ω - 1MΩ				±10 ±15 ±25 ±50	
AR12(2512)	3/4W	-55 ~ +155 C	200V	400V	24.9Ω - 2KΩ	4.7Ω - 2KΩ		1Ω - 2KΩ		±10 ±15 ±25 ±50	
	1W	-55 ~ +155 C	200V	400V	-		4.7Ω - 100Ω	1Ω - 100Ω		±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.

**(Lower Resistance: 1~10Ω ; High Power Rating)**

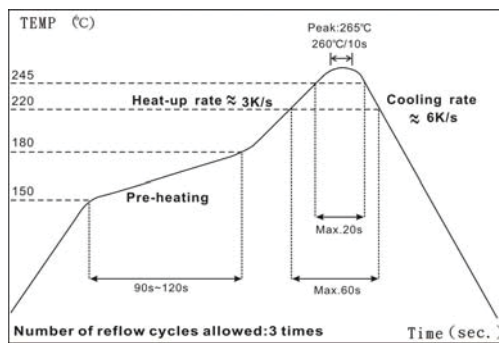
## ■ Environmental Characteristics

Item	Requirement		Test Method
	Tol. ≤ 0.05%	Tol. > 0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		<b>MIL-STD-202 Method 304</b> +25/-55/+25/+125/+25 C
Short Time Overload	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
	ΔR±0.2% for high power rating		
Insulation Resistance	>1000 MΩ		<b>MIL-STD-202 Method 302</b> Apply 100V <sub>DC</sub> for 1 minute
Endurance	ΔR±0.05%	ΔR±0.2%	<b>MIL-STD-202 Method 108A</b> 70±2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	>7kΩ ΔR±0.5%		
	ΔR±0.5% for high power rating		
Damp Heat with Load	ΔR±0.05%	ΔR±0.3%	<b>MIL-STD-202 Method 103B</b> 40±2 C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
	ΔR±0.5% for high power rating		
Bending Strength	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 6.1.4</b> Bending amplitude 3 mm for 10 seconds
Solderability	95% min. coverage		<b>MIL-STD-202 Method 208H</b> 245±5 C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.2%	<b>MIL-STD-202 Method 210E</b> 260±5 C for 10 seconds
Dielectric Withstand Voltage	By Type		<b>MIL-STD-202 Method 301</b> Max. overload voltage for 1 minute
Thermal Shock	ΔR±0.05%	ΔR±0.25%	<b>MIL-STD-202 Method 107G</b> -55 C ~150 C, 100 cycles
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	<b>JIS-C-5201-1 7.1</b> 1 hour, -65 C, followed by 45 minutes of RCWV
	ΔR±0.5% for high power rating		

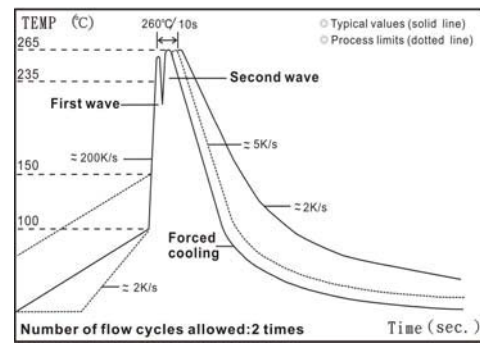
RCWV(Rated continuous working voltage)=  $\sqrt{P \cdot R}$  or Max. Operating voltage whichever is lower

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

## ■ Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260 C : 10s
- (2) Time of wave soldering at maximum temperature point 260 C : 10s
- (3) Time of soldering iron at maximum temperature point 410 C : 5s

## ■ 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 <sup>0</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>5</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>-1</sup>	10 <sup>-2</sup>	10 <sup>-3</sup>

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

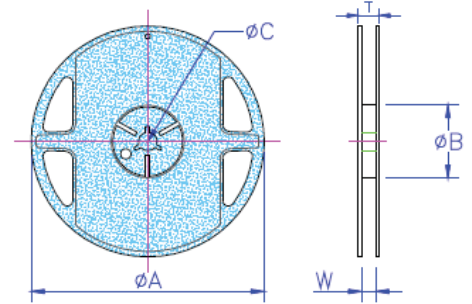
Resistance	100Ω	2.2KΩ	10KΩ	49.9KΩ	100KΩ
marking	1000	2201	1002	4992	1003

## ■ Packaging

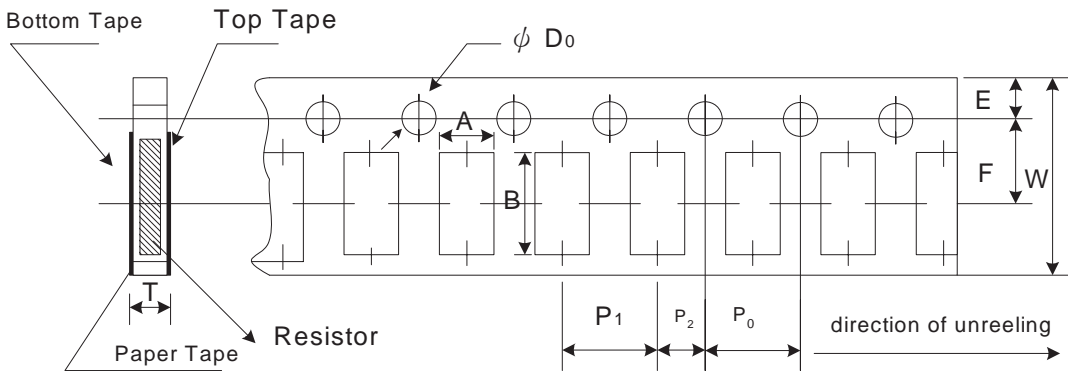
### Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
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



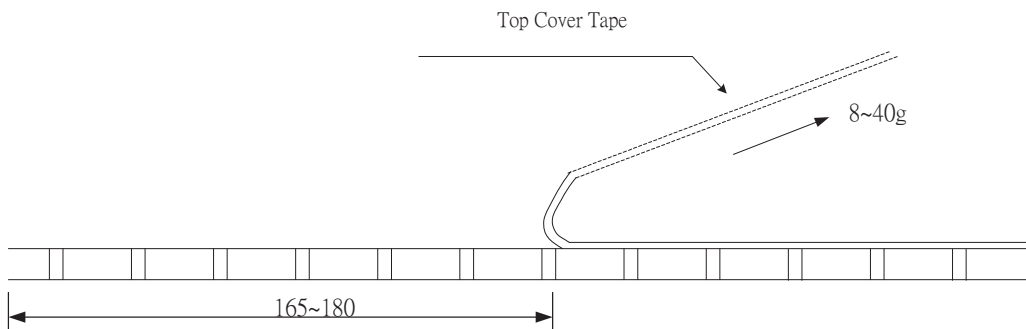
### Paper Tape Specifications



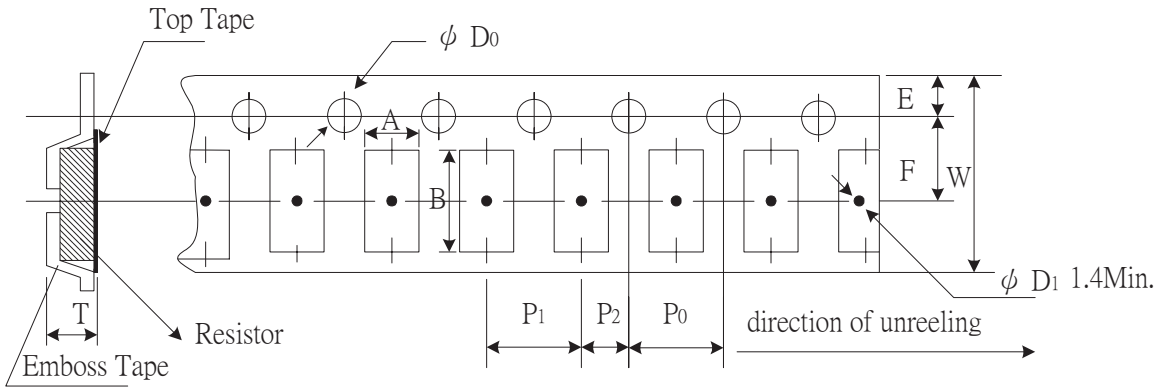
Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	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±0.03	0.42±0.02
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

- 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 8g to 40g



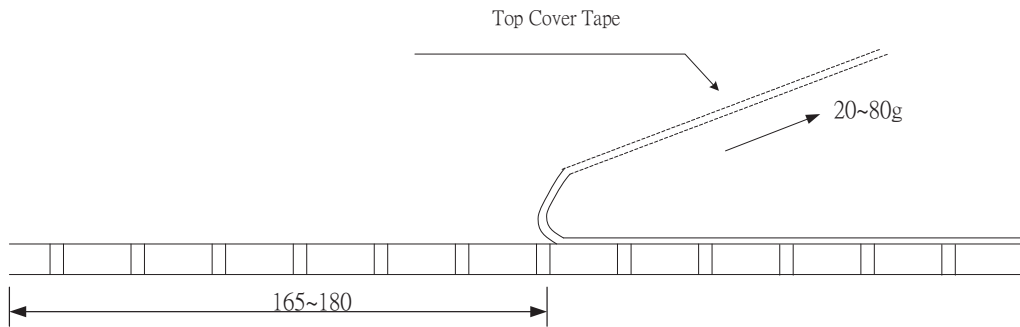
**Emboss Plastic Tape Specifications**



Unit: mm

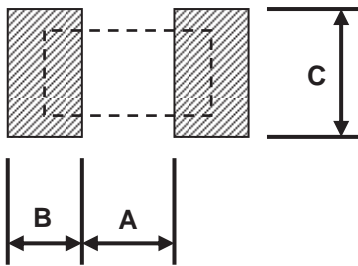
Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ØD <sub>0</sub>	T
AR10	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
AR12	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20

- 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 20g to 80g



**Recommend Land Pattern**

Unit: mm



Type	A	B	C
AR01	0.25	0.30	0.40±0.2
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

## REVISION HISTORY

<u>REVISION</u>	<u>DATE</u>	<u>CHANGE NOTIFICATION</u>	<u>DESCRIPTION</u>
Version D3	Jan 14,2013	-	- Add resistance range for Special Electrical and High Power Rating Electrical Specifications. - Adjust the mockup.
Version D4	Apr 10,2013	-	- Add "RCWV" description in Environment Characteristic Test Method