

## SMD - Resistors

Product: Non-magnetic Thick Film Chip Resistor-SMDN Series

Size: 0402/0603/0805/1206/1210/2010/2512



## SMD - Resistors

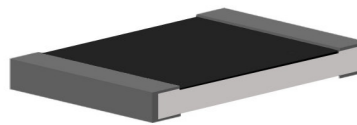
### Non-magnetic Thick Film Chip Resistor - SMDN Series

#### ► 1. Scope

- This specification applies to all sizes of rectangular-type fixed chip resistors with Ruthenium-base as material.

#### ► 2. Features

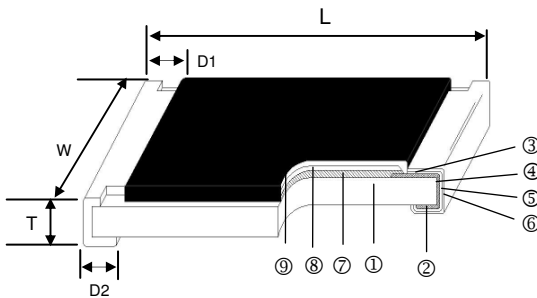
- AgPd Terminations
- Suitable for Soldering
- Non-magnetic



#### ► 3. Applications

- Medical and military equipment
- MRI coil industries
- Computer tomography (CT)

#### ► 4. Construction



①	Alumina Substrate	⑤	Resistor Layer ( $\text{RuO}_2/\text{Ag}$ )
②	Bottom Electrode (AgPd)	⑥	Primary Overcoat (Glass)
③	Top Electrode (Ag)	⑦	Secondary Overcoat (Epoxy)
④	Edge Electrode (AgPd)		

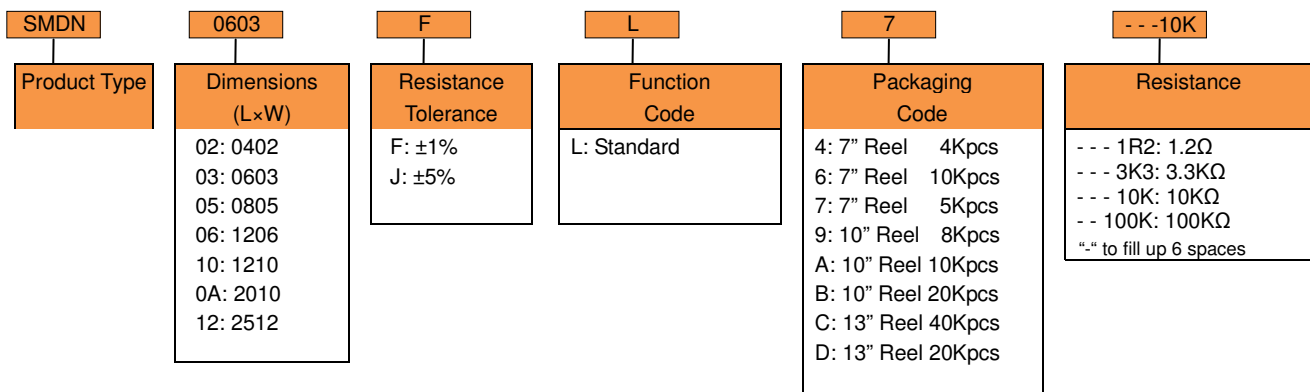
## SMD - Resistors

### ► 5. Dimensions

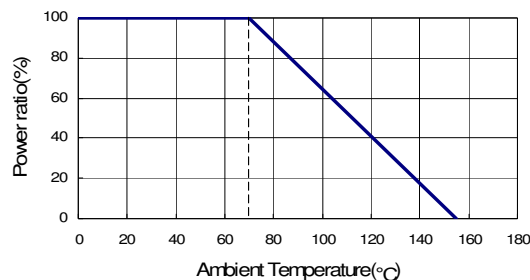
Unit: mm

Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
SMDN02	0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10	0.620
SMDN03	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	2.042
SMDN05	0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20	4.368
SMDN06	1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20	8.947
SMDN10	1210	3.20±0.20	2.60±0.15	0.55±0.10	0.50±0.25	0.50±0.20	15.959
SMDN0A	2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20	24.241
SMDN12	2512	6.35±0.20	3.20±0.15	0.55±0.10	0.60±0.25	0.50±0.20	39.448

### ► 6. Part Numbering



### ► 7. Derating Curve



## SMD - Resistors

### 8. Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
						±1%	±5%	
SMDN02 (0402)		1/16W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	<b>Jumper</b>	1A				0Ω (<50mΩ)		-
SMDN03 (0603)		1/10W	-55 ~ +155°C	50V	100V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	<b>Jumper</b>	1A				0Ω (<50mΩ)		-
SMDN05 (0805)		1/8W	-55 ~ +155°C	150V	300V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
SMDN06 (1206)		1/4W		200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
<b>Jumper</b>	2A	0Ω (<50mΩ)		-				
SMDN10 (1210)		1/3W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	<b>Jumper</b>	2.5A				0Ω (<50mΩ)		-
SMDN0A (2010)		3/4W	-55 ~ +155°C	200V	400V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	<b>Jumper</b>	3.5A				0Ω (<50mΩ)		-
SMDN12 (2512)		1W	-55 ~ +155°C	250V	500V	1Ω - 9.76Ω 10Ω - 1MΩ 1.02MΩ - 10MΩ		±200 ±100 ±200
	<b>Jumper</b>	4A				0Ω (<50mΩ)		-

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.

### 9. Environmental Characteristics

Item	Requirement			Test Method
	1%	5%	Jumper	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.			JIS C 5201-1 4.8 IEC 60115-1 4.8 -55°C~+155°C, 25°C is the reference temperature
Short Time Overload	±(1.0%+0.05Ω)	±(2.0%+0.05Ω)	<50mΩ	JIS C 5201-1 4.13 IEC 60115-1 4.13 2.5 times RCWV or Max. overload voltage for 5 seconds
Insulation Resistance	□10G			JIS C 5201-1 4.6 IEC 60115-1 4.6 Max. overload voltage for 1 minute
Endurance	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	JIS C 5201-1 4.25 IEC 60115-1 4.25.1 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(2.0%+0.10Ω)	±(3.0%+0.10Ω)	<100mΩ	JIS C 5201-1 4.24 40±2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"

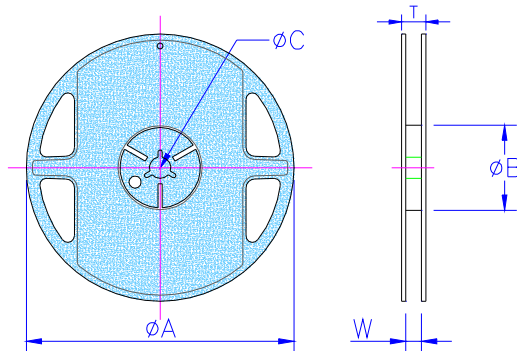
## SMD - Resistors

Dry Heat	$\pm(1.0\%+0.05\Omega)$	$\pm(1.5\%+0.10\Omega)$	<50m $\Omega$	JIS C 5201-1 4.23.2 IEC 60115-1 2.23.2 at +155°C for 1000 hrs
Voltage Proof	No breakdown or flashover			JIS C 5201-1 4.7 IEC 60115-1 4.7 1.42 times RCWV (RMS) for 1 minute
Rapid Change of Temperature	$\pm(0.5\%+0.05\Omega)$	$\pm(1.0\%+0.05\Omega)$	<50m $\Omega$	JIS C 5201-1 4.19 IEC 60115-1 4.19 -55°C to +155°C, 5 cycles

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

### ► 10. Packaging

Reel Specifications & Packaging Quantity

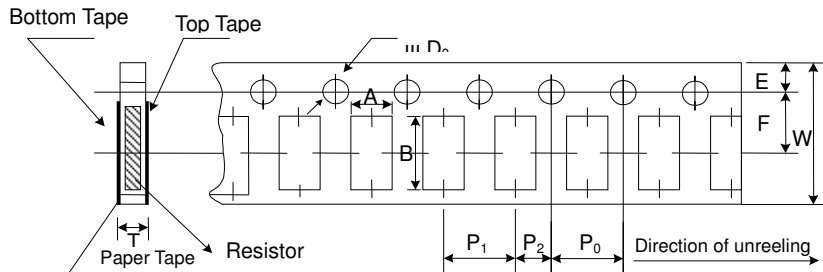


Unit: mm

Type	Packaging Quantity	Tape width	Reel Diameter	ΦA	ΦB	ΦC	W	T
SMDN02	Paper	8mm	7 inch	178.5 $\pm$ 1.5	60 <sup>+1/-0</sup>	13.0 $\pm$ 0.2	9.0 $\pm$ 0.5	12.5 $\pm$ 0.5
SMDN03				254 $\pm$ 1	100 $\pm$ 0.5	13.0 $\pm$ 0.2	9.5 $\pm$ 0.5	13.5 $\pm$ 0.5
SMDN05			13 inch	330 $\pm$ 1	100 $\pm$ 0.5	13.0 $\pm$ 0.2	9.5 $\pm$ 0.5	13.5 $\pm$ 0.5
SMDN06 SMDN10								
SMDN0A	Embossed	12mm	7 inch	178.5 $\pm$ 1.5	60 <sup>+1/-0</sup>	13.0 $\pm$ 0.5	13.0 $\pm$ 0.5	15.5 $\pm$ 0.5
SMDN12				250 $\pm$ 1	62 $\pm$ 0.5	13.0 $\pm$ 0.5	12.5 $\pm$ 0.5	16.5 $\pm$ 0.5

# SMD - Resistors

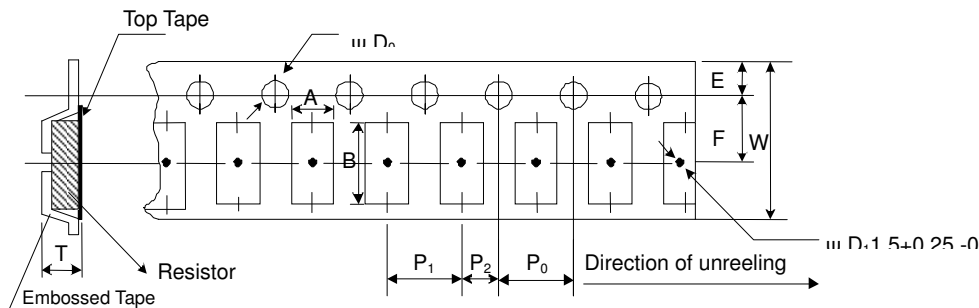
## Paper Tape Specifications



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
SMDN02	0.65±0.10	1.15±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.50+0.1,-0	0.45±0.1
SMDN03	1.10±0.10	1.90±0.1	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.70±0.1
SMDN05	1.60±0.10	2.40±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
SMDN06	1.90±0.10	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1
SMDN10	2.80±0.10	3.50±0.2	8.0±0.2	1.75±0.1	3.50±0.05	4.00±0.10	4.00±0.05	2.00±0.05	1.50+0.1,-0	0.85±0.1

## Embossed Plastic Tape Specifications

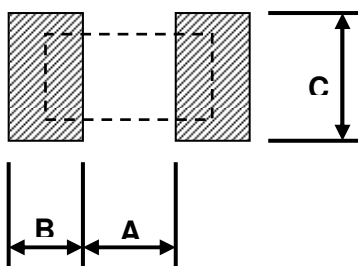


Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
SMDN0A	2.8±0.20	5.5±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>
SMDN12	3.5±0.20	6.7±0.20	12.0±0.3	1.75±0.1	5.5±0.05	4.00±0.10	4.00±0.1	2.00±0.05	1.50+0.1, -0	1.2 <sup>+0</sup>

## Recommend Land Pattern

Unit: mm



Type	A	B	C
SMDN02	0.50	0.45	0.60
SMDN03	0.90	0.60	0.90
SMDN05	1.20	0.70	1.30
SMDN06	2.00	0.90	1.60
SMDN10	2.00	0.90	2.80
SMDN0A	3.80	0.90	2.80
SMDN12	3.80	1.60	3.50