TM Series

Precision Metal-Film Resistors

Features

- Excellent overall stability
- High precision, down to ±0.1%
- Very low TCR, down to ±10ppm/°C
- High power, up to 1W



Applications

For communications, medical, test and measurement equipment.

Part Number Format

Product code	Power code	Size	TCR	Resistance code	Tolerance code	Packaging code
TM	F	0204	G	1000	B	T

Product and Rated Power Codes

Code	Rated power
E	1/8W
Q	1/5W
F	1/4W
S	2/5W
G	1/2W
J	1W

Temperature Coefficient Codes

Code	TCR (ppm/°C)
E	±10
F	±15
G	±25
H	±50
K	±100
-	Unspecified

Size Codes

Code	Dimensions (mm)
0102	2.0×1.3
0204	3.5×1.4
0207	5.9×2.2

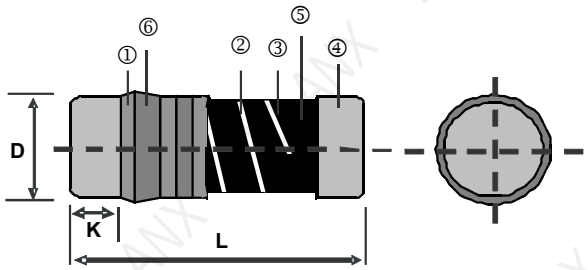
Resistance Tolerance Codes

Code	Tolerance
B	±0.1%
C	±0.25%
D	±0.5%
F	±1%
J	±5%

Product code TM: precision metal-film resistors.
Packaging code T: tape packaging.

Resistance codes: 1R00: 1Ω; 10R0: 10Ω; 1000: 100Ω; 2201: 2.2KΩ; 1001: 1KΩ; 1004: 1MΩ; 0000: 0Ω; R050: 0.05Ω; R100: 0.1Ω; 22R1: 22.1Ω

Construction



1 Protective coating 2 Trimming band 3 Ceramic rod
4 Electrode cap 5 Resistive film 6 Color bands

Dimensions

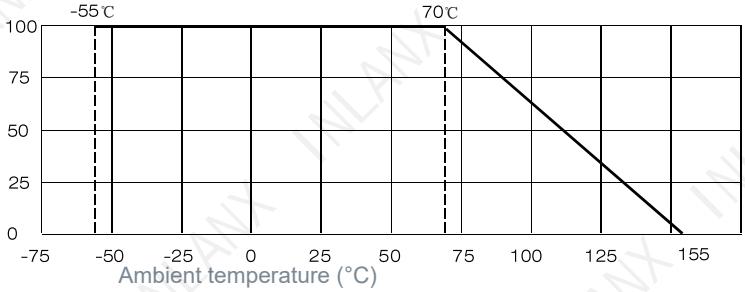
Model	L	φD	K	Weight (g) 1000PCS
0102	2.00±0.10	1.30±0.05	0.56±0.05	7.2
0204	3.50±0.20	1.40±0.15	0.80±0.10	18.7
0207	5.90±0.20	2.20±0.20	1.30±0.10	80.9

Unit: mm

Power Derating Curve

Rated load (%)

Operating range: -55°C ~ 155°C



Note: Above an ambient temperature of 70°C, rated load (rated power) is derated as shown in the curve.

Standard Product Specifications

Model	Rated power at 70°C	Operating temp. range	Max. working voltage	Max. overload voltage	Resistance					TCR (ppm/℃)
					±0.1%	±0.25%	±0.5%	±1%	±5%	
0102	1/8W	-55℃ ~ +155℃	150V	300V	100Ω ~ 56KΩ					±15
					100Ω ~ 82KΩ		49.9Ω ~ 200KΩ	49.9Ω ~ 390KΩ		±25
					---		8.2Ω ~ 1MΩ			±50
					---			8.2Ω ~ 2MΩ		±100
	Jumper: 2A				0Ω (<15mΩ)					---
0204	1/4W	-55℃ ~ +155℃	200V	400V	10Ω ~ 20KΩ					±10
					10Ω ~ 300KΩ					±15
					10Ω ~ 1MΩ			10Ω ~ 4.7MΩ		±25
					10Ω ~ 1MΩ	1Ω ~ 1MΩ		0.2Ω ~ 10MΩ		±50
					---			0.1Ω ~ 10MΩ		±100
	Jumper: 2A				0Ω (<15mΩ)					---
0207	1/2W	-55℃ ~ +155℃	300V	600V	10Ω ~ 20KΩ					±10
					10Ω ~ 300KΩ					±15
					10Ω ~ 1MΩ			10Ω ~ 4.7MΩ		±25
					10Ω ~ 1MΩ	1Ω ~ 1MΩ		0.2Ω ~ 10MΩ		±50
					---			0.1Ω ~ 10MΩ		±100
	Jumper: 4A				0Ω (<15mΩ)					---

High-Power Product Specifications

Model	Rated power at 70°C	Operating temp. range	Max. working voltage	Max. overload voltage	Resistance					TCR (ppm/℃)
					±0.1%	±0.25%	±0.5%	±1%	±5%	
0102	1/5W	-55℃ ~ +155℃	200V	400V	100Ω ~ 56KΩ					±15
					100Ω ~ 82KΩ		49.9Ω ~ 200KΩ	49.9Ω ~ 390KΩ		±25
					---		8.2Ω ~ 1MΩ			±50
					---			8.2Ω ~ 2MΩ		±100
0204	2/5W	-55℃ ~ +155℃	200V	400V	10Ω ~ 100KΩ					±15
					10Ω ~ 1MΩ					±25
					10Ω ~ 1MΩ	1Ω ~ 1MΩ		0.2Ω ~ 1MΩ		±50
					---			0.1Ω ~ 1MΩ		±100
0207	1W	-55℃ ~ +155℃	350V	700V	10Ω ~ 100KΩ					±15
					10Ω ~ 1MΩ					±25
					10Ω ~ 1MΩ	1Ω ~ 1MΩ		0.2Ω ~ 10MΩ		±50
					---			0.1Ω ~ 10MΩ		±100

Notes: 1) Voltages are DC or AC RMS.

2) E = √(P×R) or maximum working voltage, whichever is lower.

E: rated voltage (V); P: rated power (W); R: nominal resistance (Ω).

Characteristics

Item	Requirement	Test method
Temperature coefficient	Within specified limits	JIS-C-5201-1 4.8 / IEC-60115-1 4.8 -55°C ~ +125°C; reference temperature: 25°C.
Short-time overload	0204/0207: △R≤±(0.15%R+0.05Ω) 0102: △R≤±(0.5%R+0.05Ω)	JIS-C-5201-1 4.13 / IEC-60115-1 4.13 2.5 × rated voltage or maximum overload voltage (whichever is lower), for 5s.
Insulation resistance	≥10G	JIS-C-5201-1 4.6 / IEC-60115-1 4.6 Maximum overload voltage for 1 minute.

Characteristics (continued)

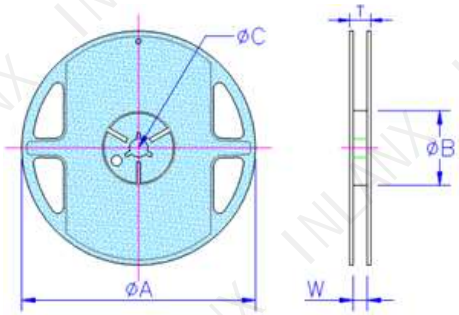
Item	Requirement	Test method
Endurance at 70°C	0204/0207: △R≤±(0.5%R+0.05Ω) 0102: △R≤±(1.5%R+0.05Ω)	JIS-C-5201-1 4.25 / IEC-60115-1 4.25.1 70°C±2°C, 1000h; rated voltage or maximum working voltage (whichever is lower); 1.5h on / 0.5h off.
Damp heat, steady state	0204/0207: △R≤±(1.0%R+0.05Ω) 0102: △R≤±(1.5%R+0.05Ω)	JIS-C-5201-1 4.24 / IEC-60115-1 4.24 40°C±2°C, 90%RH ~ 95RH, 1000h; rated voltage or maximum working voltage (whichever is lower); 1.5h on / 0.5h off.
Endurance at upper category temperature	0204/0207: △R≤±(1.0%R+0.05Ω) 0102: △R≤±(1.5%R+0.05Ω)	JIS-C-5201-1 4.23 / IEC-60115-1 4.23.2 +155°C for 1000h.
Substrate bending	△R≤±(0.5%R+0.05Ω)	JIS-C-5201-1 4.33 / IEC-60115-1 4.33 One 5s bend, 2mm deflection.
Solderability	Solderable area ≥95%	JIS-C-5201-1 4.17 / IEC-60115-1 4.17 245°C±5°C, for 3s.
Soldering heat resistance	△R≤±(0.5%R+0.05Ω)	JIS-C-5201-1 4.18 / IEC-60115-1 4.18 260°C±5°C, for 10s.
Voltage withstand	No breakdown or flashover	JIS-C-5201-1 4.7 / IEC-60115-1 4.7 Apply 1.42 × maximum working voltage for 1 minute.
Rapid temperature change	△R≤±(0.5%R+0.05Ω)	JIS-C-5201-1 4.19 / IEC-60115-1 4.19 -55°C to +155°C, 5 cycles.

Storage Temperature

25°C±3°C; humidity <80%RH

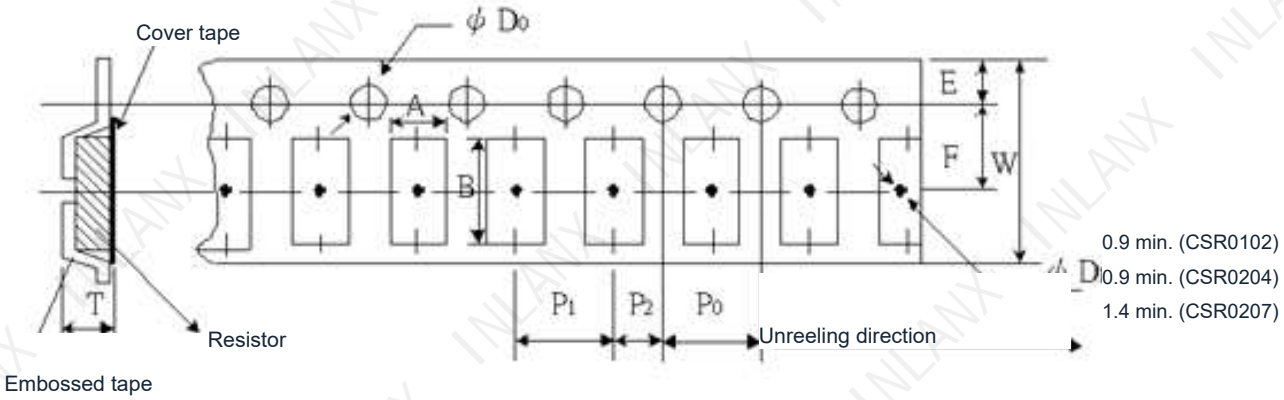
Packaging Quantity and Reel Dimensions

Model	Reel diameter	φA	φB	φC	W	T	Quantity
0102	7inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3000PCS
0204	7inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3000PCS
0207	7inch	178.5±1.5	60.0+1.0	13.0±0.5	13.0±0.5	15.5±0.5	2000PCS



Unit: mm. Models: 0102, 0204, 0207; tape packaging.

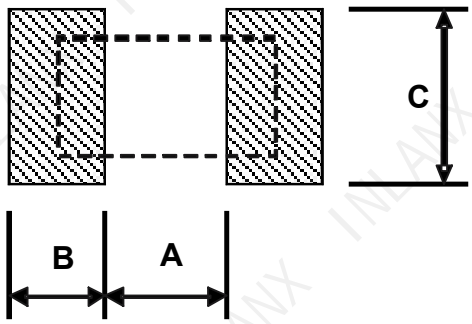
Plastic Tape Packaging



Model	A	B	W	E	F	P0	P1	P2	φD0	T
0102	1.50±0.10	2.30±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.70±0.10
0204	1.55±0.10	3.65±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.80±0.10
0207	2.40±0.10	6.15±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	2.70±0.10

Unit: mm

Recommended Pad Dimensions (Unit: mm)



Model	A	B	W
0102	1.0	0.8	1.5
0204	1.6	1.2	1.6
0207	3.0	1.7	2.4