



FEATURES:

- TCR as low as $\pm 25\text{ppm}$
- Higher operating frequency with less parasitics
- Noise characteristics superior to standard thick film resistors
- Reference standards of EIA JIS C 5201-1
- Tolerance as low as $\pm 0.1\%$



PART NUMBER STRUCTURE

TFCR	1206	-	8W	-	E	-	1001	B	T	M
Series	Size		Power Rating		TCR		Resistance Value	Resistance Tolerance	Packaging	Optional Reel Identifier
	0201		32W = 0.03W		E = $\pm 25\text{ppm}/^\circ\text{C}$		1001 = $1\text{K}\Omega$	B = $\pm 0.1\%$	T = Tape & Reel	Leave blank for standard quantity.
	0402		20W = 0.05W		C = $\pm 50\text{ppm}/^\circ\text{C}$		4 digit code e.g.	C = $\pm 0.25\%$		
	0603		16W = 0.063W		K = $\pm 100\text{ppm}/^\circ\text{C}$		4R70 = 4.7Ω	D = $\pm 0.50\%$		
	0805		10W = 0.10W				1001 = $1\text{K}\Omega$	F = $\pm 1\%$		
	1206		8W = 0.125W				2494 = $2.49\text{M}\Omega$			Add "-1K" if 1000 piece reel is required
	1210		4W = 0.25W							
	2010		2W = 0.50W							
	2512									

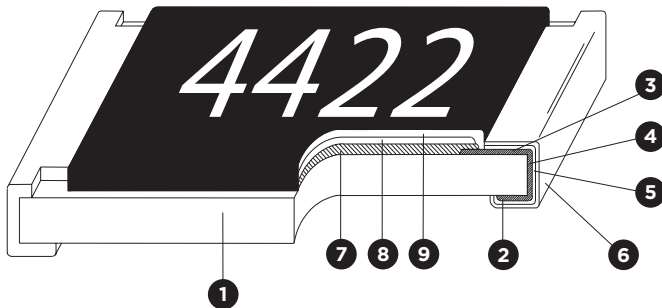
Example P/N: TFCR1206-8W-E-1001BT

Standard Termination is 100% matte Tin over Nickel.

DIMENSIONS

Unit: inches (mm)					
SIZE	L	W	T	d ₁	d ₂
0201	0.023 $\pm$ 0.001 (0.60 $\pm$ 0.03)	0.011 $\pm$ 0.001 (0.30 $\pm$ 0.03)	0.009 $\pm$ 0.001 (0.23 $\pm$ 0.03)	0.006 $\pm$ 0.002 (0.15 $\pm$ 0.05)	0.006 $\pm$ 0.002 (0.15 $\pm$ 0.05)
0402	0.040 $\pm$ 0.002 (1.0 $\pm$ 0.05)	0.019 $\pm$ 0.002 (0.5 $\pm$ 0.05)	0.012 $\pm$ 0.002 (0.30 $\pm$ 0.05)	0.008 $\pm$ 0.006 (0.20 $\pm$ 0.15)	0.008 $\pm$ 0.004 (0.2 $\pm$ 0.10)
0603	0.061 $\pm$ 0.004 (1.55 $\pm$ 0.10)	0.031 $\pm$ 0.004 (0.8 $\pm$ 0.1)	0.018 $\pm$ 0.004 (0.45 $\pm$ 0.10)	0.012 $\pm$ 0.010 (0.30 $\pm$ 0.25)	0.012 $\pm$ 0.008 (0.30 $\pm$ 0.20)
0805	0.079 $\pm$ 0.006 (2.0 $\pm$ 0.15)	0.049 $\pm$ 0.006 (1.25 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.012 $\pm$ 0.010 (0.30 $\pm$ 0.25)	0.016 $\pm$ 0.010 (0.40 $\pm$ 0.25)
1206	0.120 $\pm$ 0.006 (3.05 $\pm$ 0.15)	0.061 $\pm$ 0.006 (1.55 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.017 $\pm$ 0.012 (0.42 $\pm$ 0.30)	0.014 $\pm$ 0.010 (0.35 $\pm$ 0.25)
1210	0.122 $\pm$ 0.006 (3.10 $\pm$ 0.15)	0.094 $\pm$ 0.006 (2.40 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.016 $\pm$ 0.012 (0.40 $\pm$ 0.30)	0.022 $\pm$ 0.010 (0.55 $\pm$ 0.25)
2010	0.193 $\pm$ 0.006 (4.90 $\pm$ 0.15)	0.094 $\pm$ 0.006 (2.40 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.024 $\pm$ 0.016 (0.60 $\pm$ 0.40)	0.020 $\pm$ 0.010 (0.50 $\pm$ 0.25)
2512	0.248 $\pm$ 0.006 (6.30 $\pm$ 0.15)	0.122 $\pm$ 0.006 (3.10 $\pm$ 0.15)	0.022 $\pm$ 0.004 (0.55 $\pm$ 0.10)	0.024 $\pm$ 0.016 (0.60 $\pm$ 0.40)	0.020 $\pm$ 0.010 (0.50 $\pm$ 0.25)

STRUCTURE

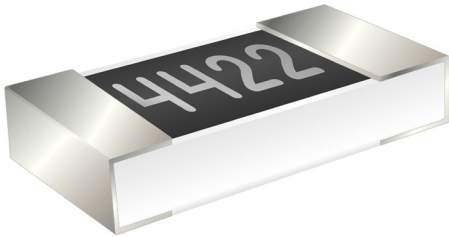
			
1	Alumina Substrate	6	Solder Plating (Sn)
2	Bottomside Electrode	7	Resistive Element
3	Topside Electrode	8	Resistive Element Overcoat
4	Edge Electrode	9	Primary Overcoat
5	Barrier Layer (Ni)		

ELECTRICAL SPECIFICATION & RANGE

SIZE	0201		0402	0603		0805		1206		1210	2010	2512
Power Rating at 70°C (W)	0.03W (1/32W)	0.05W (1/20W)	0.063W (1/16W)	0.063W (1/16W)	0.10W (1/10W)	0.10W (1/10W)	0.125W (1/8W)	0.125W (1/8W)	0.25W (1/4W)	0.25W (1/4W)	0.25W (1/4W)	0.50W (1/2W)
Max. Working Voltage	15V	25V	50V	50V	75V	100V	150V	150V	200V	150V	150V	150V
Max. Overload Voltage	30V	50V	100V	100V	150V	200V	300V	300V	400V	300V	300V	300V
Operating Temp. Range	-55°C to +125°C		-55°C to +155°C	-55°C to +155°C		-55°C to +155°C		-55°C to +155°C		-55°C to +155°C	-55°C to +155°C	-55°C to +155°C
Tolerance	TCR	Resistance Range		Resistance Range	Resistance Range	Resistance Range		Resistance Range		Resistance Range	Resistance Range	Resistance Range
±0.1% (B)	±25ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±50ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±100ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
±0.25% (C)	±25ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±50ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±100ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
±0.5% (D)	±25ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±50ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±100ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
±1% (F)	±25ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±50ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ
	±100ppm	22Ω - 75KΩ	22Ω - 75KΩ	4.02Ω - 511KΩ	1Ω - 1MΩ	1Ω - 2MΩ	1Ω - 2MΩ	1Ω - 3MΩ	1Ω - 3MΩ	1Ω - 2.49MΩ	1Ω - 3MΩ	1Ω - 3MΩ

NOTE: Max Working Voltage is listed above or $\sqrt{P \cdot R}$, whichever is lower. Max overload Voltage is listed above or $2.5 \cdot \sqrt{P \cdot R}$, whichever is lower.

MARKING CODE

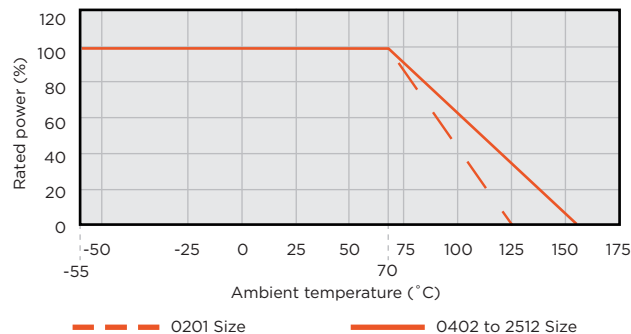


- E-24 values for 0603 size maybe marked with the standard 3 digit marking code.
- E-96 values for 0805 size and larger, will be marked with standard 4 digit marking code.
- E-24 values for 0603 size and larger, will be marked with standard 3 digit marking code.
- 0603 - E-96 values will be marked with a standard 3 digit alpha numeric code

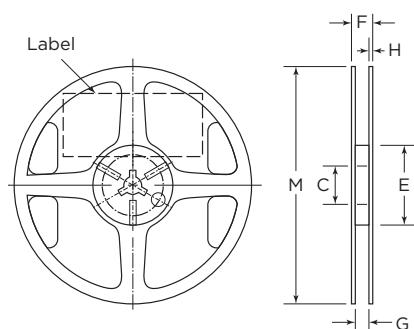
Please see 0603 marking codes PDF.

Note: 0201 and 0402 cannot be marked.

DERATING CURVE



REEL SPECIFICATIONS

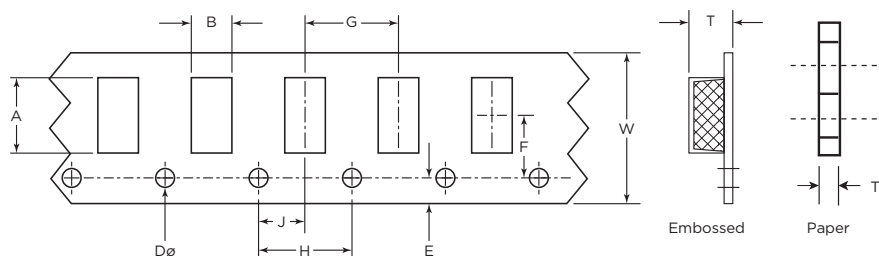


Unit: mm (inch)

C	E	F	G	H	M
13.0 ± 0.2 (0.51 ± 0.008)	60.0 ± 1.0 (2.36 ± 0.03)	11.4 ± 1.0 (0.45 ± 0.04)	9.0 ± .3 (0.35 ± 0.012)	1.5 ± .3 (0.06 ± 0.012)	180 ± 2.0 (7.09 ± 0.08)

Minimum of 30 empty pockets at the beginning of reel, 65 minimum empty pockets at the end.

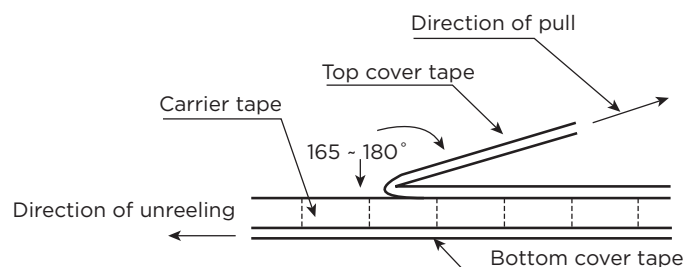
TAPE SPECIFICATIONS



Units: mm

TAPE	SIZE (in)	A	B	W	E	F	T	G	H	J	Dø
Paper	0201	0.70±0.05	0.40±0.05	8.0±0.10	1.75±0.05	3.50±0.05	0.42±0.02	2.00±0.05	4.00±0.10	2.00±0.05	1.55±0.03
	0402	1.16±0.10	0.70±0.10	8.0±0.10	1.75±0.05	3.50±0.05	0.40±0.03	2.00±0.05	4.00±0.10	2.00±0.05	1.55±0.05
	0603	1.90±0.10	1.10±0.05	8.0±0.10	1.75±0.05	3.50±0.05	0.60±0.03	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05
	0805	2.37±0.20	1.60±0.05	8.0±0.10	1.75±0.05	3.50±0.05	0.75±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05
	1206	3.55±0.05	2.00±0.05	8.0±0.10	1.75±0.05	3.50±0.05	0.75±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05
	1210	3.40±0.05	2.75±0.05	8.0±0.10	1.75±0.05	3.50±0.05	0.75±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.60±0.10
Embossed	2010	5.45±0.10	2.85±0.10	12.00±0.10	1.75±0.10	5.50±0.05	1.00 +0.20, -0	4.00±0.10	4.00±0.10	2.00±0.05	1.50 +0.1, -0
	2512	6.65±0.10	3.40±0.10	12.00±0.10	1.75±0.10	5.50±0.05	1.00 +0.20, -0	4.00±0.10	4.00±0.10	2.00±0.05	1.50 +0.1, -0

PEEL BACK FORCE AND DIRECTION DIAGRAM



Peel back force and direction of peel back angle should follow EIA481-1-A. Peel back force should be between 0.1N - 1.3N and peel back angle of 165° - 180°.

ENVIRONMENTAL CHARACTERISTICS

TEST	REQUIREMENT		TEST METHOD
	Tol. ≤0.05%	Tol. >0.05%	
Temperature Coefficient of Resistance (T.C.R.)	As Specified.		MIL-STD-202 Method 304 +25/-55/+125/+25°C
Short Time Overload	ΔR±0.05 %	ΔR±0.1%	JIS-C-5201-1 4.13 RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
	ΔR±0.2% for high power rating		
Insulation Resistance	>9999MΩ		MIL-STD-202 Method 302 Apply 100VDC for 1 minute
Endurance	ΔR±0.05%	ΔR±0.1%	MIL-STD-202 Method 108A 70±2°C RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”
	0201: ΔR≤(±1%+0.05Ω)		
	ΔR±0.5% for high power rating		
Damp Heat with Load	ΔR±0.05%	ΔR±0.1%	MIL-STD-202 Method 103B 40±2°C 90-95% R.H. RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”
Bending Strength	ΔR±0.05%	ΔR±0.1%	JIS-C-5201-1 4.33 Bending amplitude 3mm for 60 seconds 2010 / 2512 sizes: 2mm Other sizes: 3mm
Solderability	95% min. coverage		MIL-STD-202 Method 208H 245±5°C for 3 seconds
Resistance to Soldering Heat	ΔR±0.05%	ΔR±0.1%	MIL-STD-202 Method 210E 260±5°C for 10 seconds
Dielectric Withstanding Voltage	By Type		MIL-STD-202 Method 301 Max. Overload Voltage for 1 minute
Low Temperature Operation	ΔR±0.05%	ΔR±0.2%	JIS-C-5201-1 4.36 1 hour, -65°C, followed by 45 minutes of RCWV
	ΔR±0.5% for high power rating		
High Temperature Exposure	ΔR±0.5%		MIL-STD-202 Method 108 at +155°C 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