

Key Features

Up to 2 Watt
at 70°C

Low TCR to
±50PPM

Supplied on
Tape

Ideal for
Current
Detection

Moisture
sensitivity
level - MSL1

Type TLRF Series

TE Connectivity (TE) is pleased to offer this unique High Power, metal foil chip resistor for current sensing positions. It has a special metal foil resistive element and suitable barrier layers beneath the solder to prolong terminal life. This model is particularly useful for power management applications along with DC-DC converting and charging applications, overcurrent protection, and Voltage regulation Modules.

Note: SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

Characteristics – Electrical

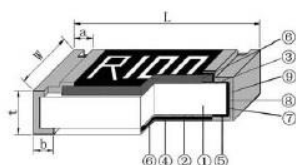
Size	Power Rating @70°C	Limiting Element Current	Max. Overload Current	Resistance Range (mΩ)			TCR PPM/°C
				±1%	±2%	±5%	
0603 (1J)	0.5W	12.9A	28.9A	3 - 9			±200
				10 - 30			±100
0805 (2A)	0.75W	15.8A	35.4A	3 - 9			±100
				10 - 47			±50
1206 (2B)	1W	18.3A	40.8A	3 - 9			±100
				10 - 68			±50
2010 (2H)	1W	18.3A	40.8A	3 - 9			±100
				10 - 100			±50
2512 (3A) 20	2W	25.8A	51.6A	2			±200
				3 - 9			±100
				10 - 100			±50

Current of DC or AC RMS value

Rated current= $\sqrt{P/R}$ or Limiting element voltage whichever is lower.

Operating Temperature Range: -55 ~ 170°C

Construction and Dimensions



① Ceramic Substrate	④ Primary Overcoat	⑦ Edge Electrode
② Alloy Plate	⑤ Cu Plating	⑧ Barrier Layer
③ Top Electrode	⑥ Secondary Overcoat	⑨ External Electrode

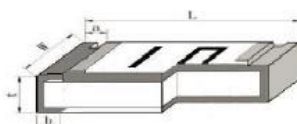


Figure1

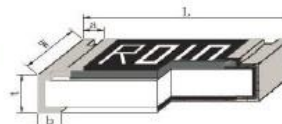
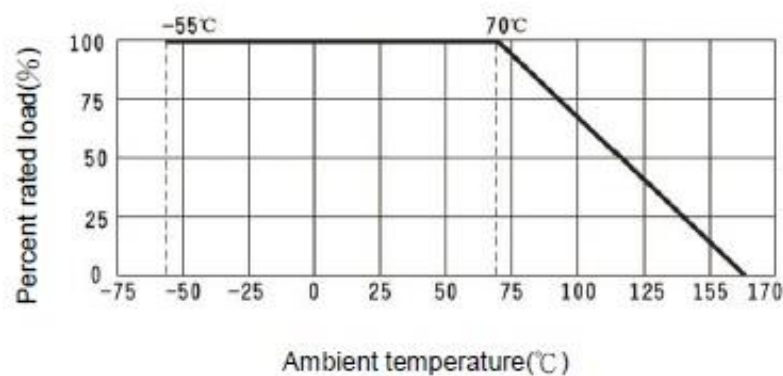


Figure2

Type	Size	Resistance mΩ	L (mm)	W (mm)	T (mm)	A (mm)	B (mm)
TLRF1J	0603	3 – 4	1.60±0.20	0.80±0.20	0.70±0.15	0.35±0.25	0.60±0.20
		5 - 30					0.35±0.20
TLRF2A	0805	3-4	2.00±0.20	1.25±0.15	0.70±0.15	0.40±0.25	0.70±0.30
		5-47					0.40±0.30
TLRF2B	1206	3 – 4	3.20±0.20	1.60±0.15	0.75±0.15	0.50±0.30	0.90±0.30
		5 - 68					0.50±0.30
TLRF2H	2010	3	5.00±0.20	2.50±0.20	0.75±0.20	0.60±0.30	1.60±0.30
		4 – 5					1.30±0.30
		6 – 100					0.80±0.30
TLRF3A	2512	2	6.40±0.20	3.20±0.20	0.75±0.20	0.90±0.30	2.30±0.30
		3					1.90±0.30
		4					1.70±0.30
		5 – 6					1.20±0.30
		7					1.10±0.30
		8 – 200					0.90±0.30

Figure 1 for 0603 / 0805<10mΩ / 2010 type ; Figure 2 for 0805≥10mΩ / 1206 type / 2512 type

Derating Curve

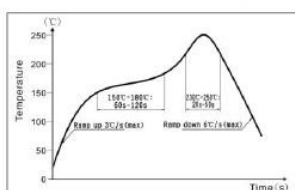


Environmental Characteristics

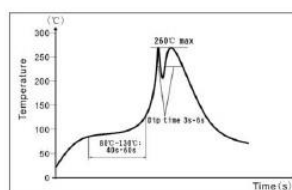
Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	IEC 60115-1 4.8 +20/-55/+20/+125/+20°C
Short Time Overload	No mechanical damage $\Delta R \leq \pm 1\%$	IEC 60115-1 4.13 1/2W&3/4W&1W: 5x rated power for 5s; 2W: 4x rated power for 5s
Endurance		IEC 60115-1 4.25.1 70±2°C, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF"
Endurance at upper Category Temperature		IEC 60115-1 4.25.3 at 170±2°C for 1000 hrs
Damp Heat Steady State		IEC 60115-1 4.24 40±2°C, 93±3% RH, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF"
Rapid Change of Temperature		IEC 60115-1 4.19 -55°C(30min) → normal temperature(5min) → 155°C(30min), 100 cycles
Solderability	95% min. coverage	IEC 60115-1 4.17 245±5°C for 3±0.3 seconds
Resistance to Soldering Heat	No mechanical damage $\Delta R \leq \pm 1\%$	IEC 60115-1 4.18 270±5°C for 10±1 seconds
Substrate Bending Test		IEC 60115-1 4.33 0603&0805:5mm; 1206:4mm; 2010&2512:2mm Duration: 60±5 seconds
Insulation Resistance	>1000MΩ	IEC 60115-1 4.6 Apply DC 100V±15V between substrate and terminations for 1min, then check insulation resistance
Voltage Proof	No breakdown or flashover	IEC 60115-1 4.7 Apply max. overload voltage of AC RMS at a rate of approximately 100V/s between substrate and terminations for 60±5 seconds
Component Solvent Resistance	No mechanical damage $\Delta R \leq \pm 1\%$	IEC 60115-1 4.29 Iso-propyl alcohol (IPA), 23±5°C, 10hrs

Soldering Condition

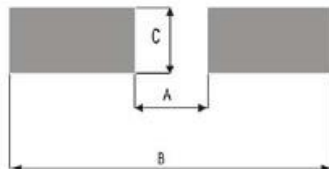
Recommended reflow profile



Recommended wave solder profile



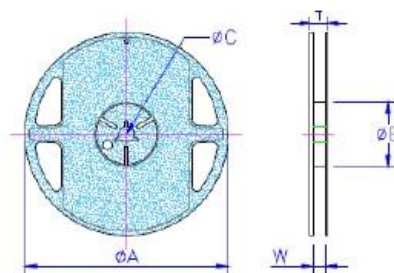
Recommended Land Pattern



Size	Resistance (mΩ)	A (mm)	B (mm)	C (mm)
0603	3 – 4	0.4	2.8	1.0
	5 – 30	0.6		
0805	3 – 4	0.5	3.2	1.4
	5 – 47	0.8		
1206	3 – 4	0.8	4.4	1.8
	5 – 68	1.8		
2010	3 – 9	1.6	6.3	2.9
	10 – 100	2.7		
2512	2 – 4	1.0	8.0	3.4
	5 – 200	3.8		

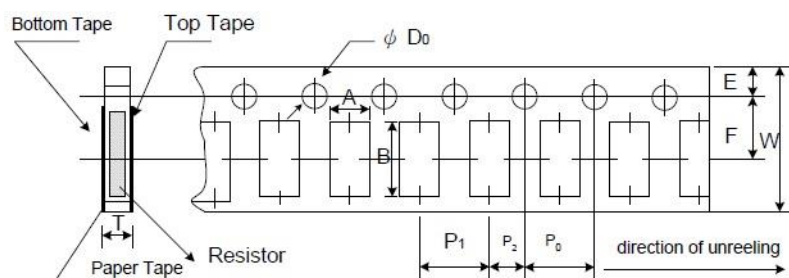
Packaging

Packing quantity and reel specification



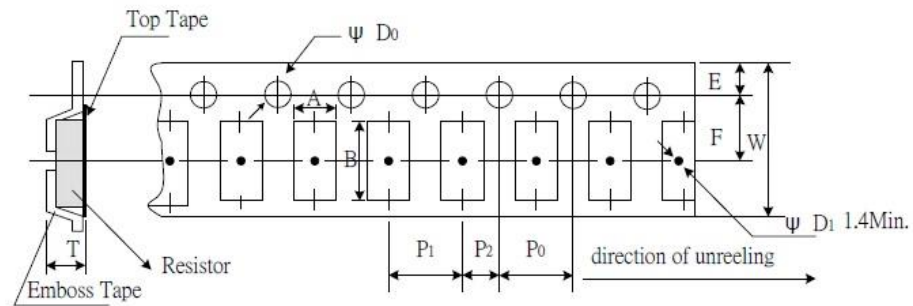
Size	ØA (mm)	ØB (mm)	ØC (mm)	W (mm)	T (mm)	Reel Quantity	Tape
0603	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5000	Paper
0805	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5		
1206	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5		
2010	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5	4000	Embossed Plastic
2512	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5		

Paper Tape Specification



Size	A (mm)	B (mm)	W (mm) ±0.20	E (mm) ±0.10	F (mm) ±0.05	P ₀ (mm) ±0.10	P ₁ (mm) ±0.10	P ₂ (mm) ±0.05	ØD ₀ (mm) ±0.10	T (mm) ±0.10
0603	1.10±0.10	1.85±0.10	8.00	1.75	3.5	4.00	4.00	2.00	1.50	0.75
0805	1.65±0.10	2.35±0.10	8.00	1.75	3.5	4.00	4.00	2.00	1.50	0.95
1206	1.90±0.20	3.50±0.20	8.00	1.75	3.5	4.00	4.00	2.00	1.50	0.95

Embossed Plastic Tape Specification



Size	A (mm) ±0.15	B (mm) ±0.15	W (mm) ±0.10	E (mm) ±0.10	F (mm) ±0.05	P ₀ (mm) ±0.05	P ₁ (mm) ±0.10	P ₂ (mm) ±0.05	ØD ₀ (mm) ±0.10	T (mm) ±0.10
2010	2.82	5.50	12.00	1.75	5.50	4.00	4.00	2.00	1.50	0.84
2512	3.45	6.78	12.00	1.75	5.50	4.00	4.00	2.00	1.50	0.81

How To Order

TLRF	2B	10	D	R010	F	TD
Common Part	Size	*Power Rating	**TCR (PPM/°C)	Resistance Code	Tolerance	Packaging
TLRF – Ultra Low Ohm Metal Foil Resistor	1J – 0603 2A – 0805 2B – 1206 2H – 2010 3A – 2512	05 = 0.5W 07 = 0.75W 10 = 1W 20 = 2W	D = ±50 E = ±100 M = ±200	R003 - 3mΩ R020 - 20mΩ R10 - 0.1Ω (100mΩ)	D = ±0.5% F = ±1% J = ±5%	TE = 4000/Reel (2010 - 2512) TD = 5000/Reel (0603 - 1206)