

Current Detecting Chip Resistors Type TSL1

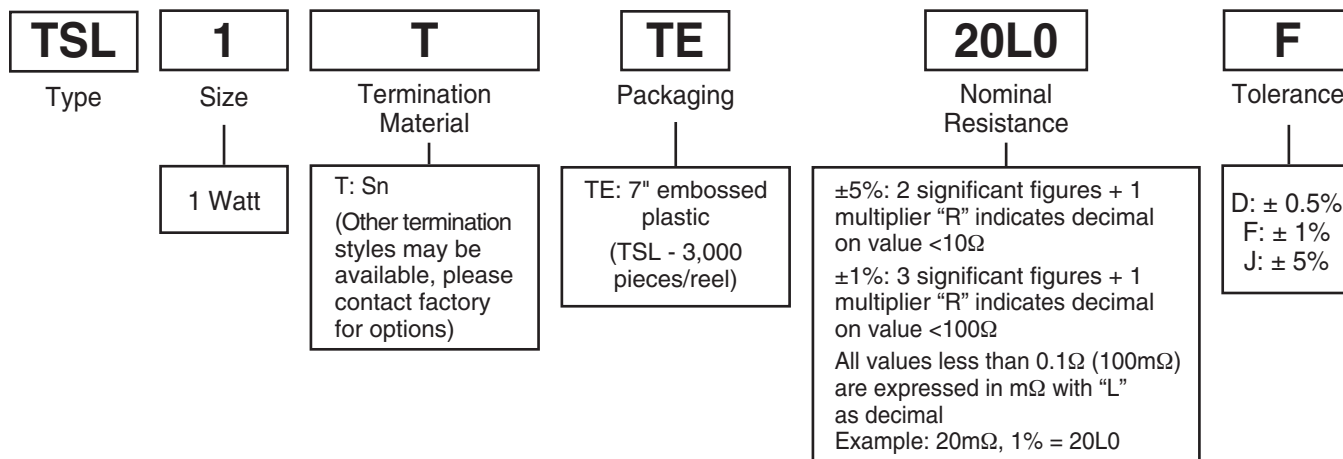
ISO 9001:2000
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TS-16949
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1. Scope of Application

This specification applies to current detecting chip resistors (TSL) manufactured by KOA Corporation.

2. Type Designation

The type designation shall be in the following form:



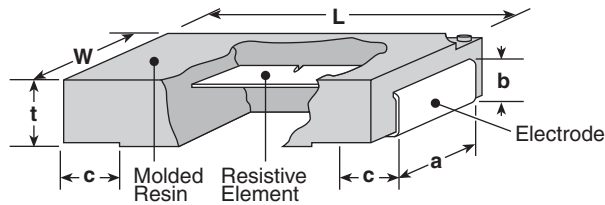
3. Rating

Part Designation	Power Rating	T.C.R. (ppm/°C) Max.	Resistance Range	Resistance Tolerance E-24*	Absolute Maximum Working Voltage	Absolute Maximum Overload Voltage	Operating Temperature Range
TSL1	1W	±180: R=<13mΩ ±100: R=>15mΩ	10mΩ - 100mΩ	(D: ±0.5%)	√P•R	√P•R	-55°C to +180°C
			5mΩ - 100mΩ	(F: ±1%) (J: ±5%)			

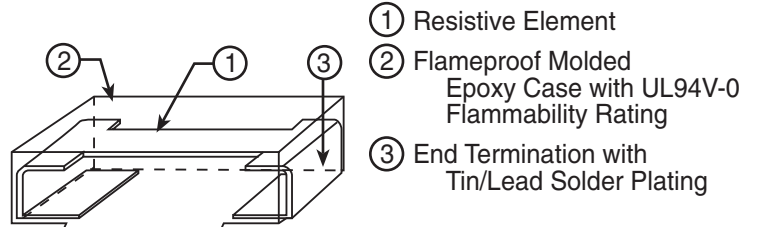
* 3m, 4m, 5m, 6m, 7m, 8m, 9m resistance values also available

4. Dimensions and Structure

4-1 Dimensions



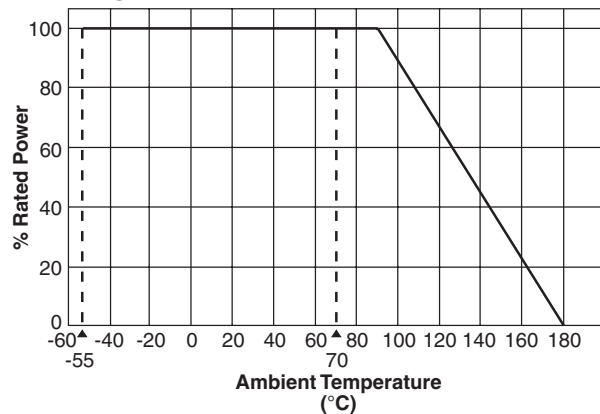
4-2 Structure



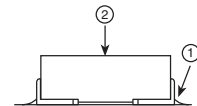
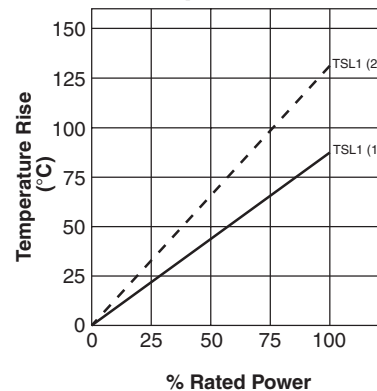
Size Code	Dimensions inches (mm)					
	L	W	t	a	b	c
TSL1	.248±.012 (6.3±0.3)	.122±.008 (3.1±0.2)	.039±.008 (1.0±0.2)	.094±.008 (2.4±0.2)	.028±.008 (0.7±0.2)	.047±.012 (1.2±0.3)

5. Rating

Derating Curve

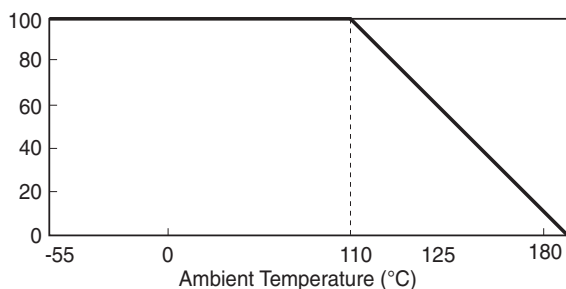


Surface Temperature Rise



5-1 Rating SL3

For temperature in excess of 110°C, the load shall be derated in accordance with the following figure.



5-2 Voltage Rating

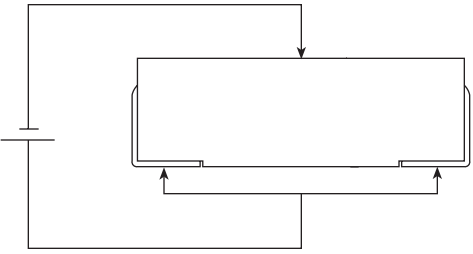
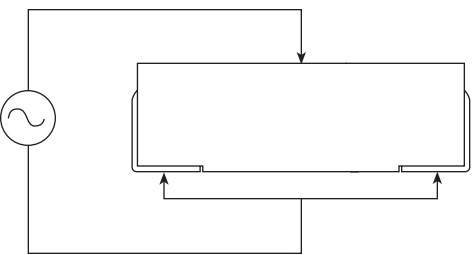
Resistors shall have a rated direct-current (DC) continuous working voltage or approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

$$E = \sqrt{P \times R}$$

Where:
 E = Rated voltage (V)
 P = Rated power (W)
 R = Nominal resistance (Ω)

6. Characteristics

6.1 Electrical Characteristics

No.	Requirement	Characteristics	Test Method
1	Resistance	Within tolerance	JIS C 5202 5.1 Measuring voltage A 25°C
2	T.C.R.	R < 13 mΩ ± 180 ppm/°C R ≥ 15 mΩ ± 100 ppm/°C	JIS C 5202 5.2 +25°C / +125°C
3	Short Time Overload	Below ±1.0%	RP x 2.5 5 sec.
4	Intermittent Overload	Below ±5.0%	JIS C 5202 5.8 RV x 5.0 1 sec. ON / 25 sec. OFF 1,000 cycles
5	Insulation	Above 10 ⁴ mΩ	JIS C 5202 5.6 Surface center to termination D.C. 500V 
6	Withstanding Voltage	Below ±0.5% No short, burning and arc	JIS C 5202 5.7 A.C. 500V 60 sec. 

6.2 Mechanical

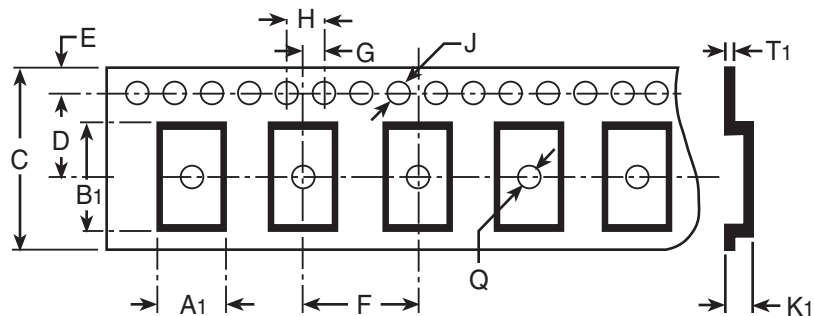
No.	Requirement	Characteristics	Test Method (JIS C 5202)
1	Resistance to Soldering Heat	Below $\pm 1.0\%$	6.10 260°C $\pm 5^\circ\text{C}$ 5 ± 0.5 sec.
2	Solderability	More than 95% of the surface of the termination must be covered with new solder	6.11 235°C $\pm 5^\circ\text{C}$ 2 ± 0.5 sec.
3	Vibration	below $\pm 0.5\%$	6.3 Condition A Each direction / 2 hrs.
4	Resistance to Solvent	No visual and mechanical damage	6.9

6.3 Environmental Characteristics

No.	Requirement	Characteristics	Test Method (JIS C 5202)
1	Damp Heat	Below $\pm 2.0\%$ No visual damage	7.9 40°C $\pm 2^\circ\text{C}$ 90 ~ 95% RH 1,000 hrs.
2	Endurance (Rated load)	Below $\pm 2.0\%$ No visual damage	7.10 70°C $\pm 2^\circ\text{C}$ 1,000 hrs.
3	Temperature Cycling	Below $\pm 1.0\%$ No mechanical damage	7.4 -55°C / +155°C Each 30 minutes 100 cycles
4	Flammability	Incombustibles	7.2 3.1 In flame / out flame 15 sec. / 15 sec. 5 cycles

7. Taping

7-1 Dimensions of Carrier Tape

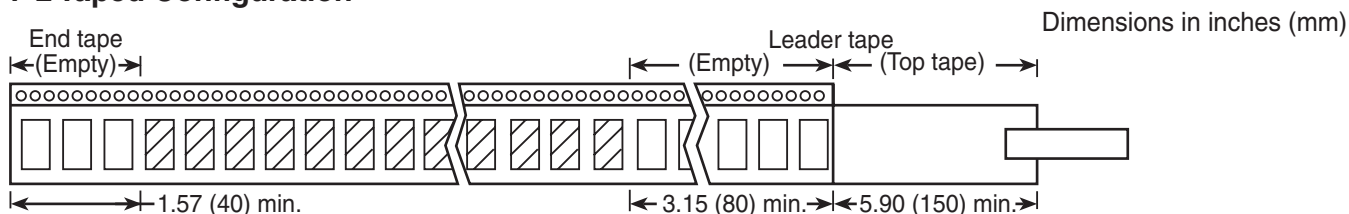


Dimensions in inches (mm)

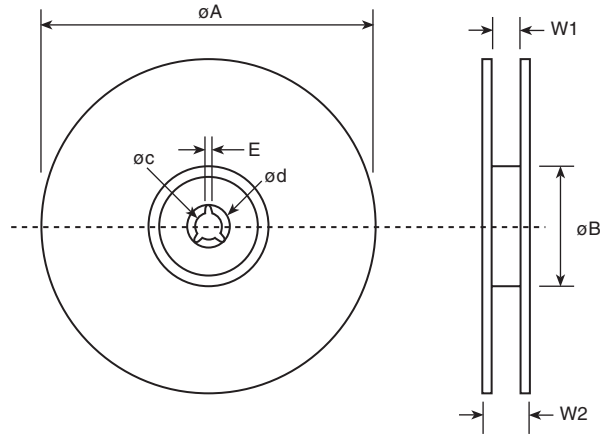
	A1	B1	C	D	E	F	G	H	J
TSL	.134 (3.4 ± 0.1)	.260 (6.6 ± 0.1)	.472 (12.0 ± 0.2)	.216 (5.5 ± 0.1)	.069 (1.75 ± 0.1)	.157 (4.0 ± 0.1)	.079 (2.0 ± 0.1)	.157 (4.0 ± 0.1)	.059 (1.5 ± 0.1)

	K1	Q	T1
TSL	.051 (1.3 ± 0.1)	.059 (1.5 ± 0.1)	.010 (0.25 ± 0.05)

7-2 Taped Configuration



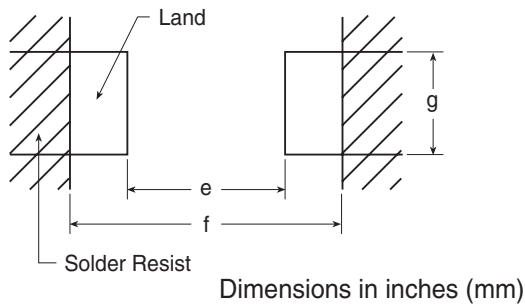
7-3 Reel Dimensions



Dimensions in inches (mm)

	ϕA	ϕB	ϕC	ϕD	E	W1	W2	Qty/ Reel
TSL	7.08 (180 ± 0.0 / 3.0)	2.36 (60 ± 1.0 / 0.0)	.511 (13.0 ± 0.2)	.826 (21.0 ± 0.8)	.079 (2.0 ± 0.2)	.511 (13.0 ± 0.3)	.606 (15.4 ± 1.0)	3,000

8. Recommended Land Pattern



Dimensions in inches (mm)

	E	F	G
TSL1	.181 (4.6)	.315 (8.0)	.118 (3.0)

8-1 Body and Marking

Body color	Black
Marking color	White
Marking items	Resistance value and tolerance