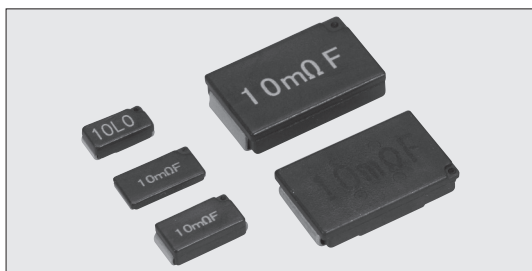
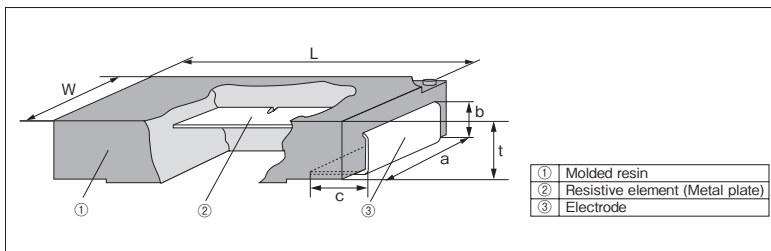


## TSL·SL (Metal plate)·SLN Current Detecting Chip Resistors



Coating color : Black

### Construction



### Features

- SMD type of small size, ultra-low resistance ( $3\text{m}\Omega \sim$ ) and high accuracy ( $\pm 0.5\%$ ) resistor for current sensing.
- Encapsulated with flame retardant resin molding. (UL94 V-0)
- Excellent dimension accuracy, mountability and shock-resistance due to molded products.
- Excellent terminal strength and solderability due to structure of a metal plate terminal electrode.
- Easy to absorb the thermal expansion and shrinkage because of a metal plate terminal structure.
- Suitable for flow, reflow and iron solderings.
- Products with lead free termination meet EU-RoHS requirements.
- AEC-Q200 qualified.

### Applications

Automotive  
Note PCs  
Battery packs  
AC Adapters  
DC-DC converters, etc.

### Reference Standards

IEC 60115-1  
JIS C 5201-1

### Dimensions

Type (Inch Size Code)	Dimensions (mm)						Weight (g) (1000pcs)
	L $\pm 0.3$	W $\pm 0.2$	t $\pm 0.2$	a $\pm 0.2$	b $\pm 0.2$	c	
SL07 (2010)	5.0	2.5	1.7	2.0	0.9	1.2 $\pm 0.3$	45
TSL1 (2512)	6.3	3.1	1.0	2.4	0.7	1.2 $\pm 0.3$	41
SL1·SLZ1 (2512)	6.3	3.1	1.9	2.4	1.2	1.2 $\pm 0.3$	90
SL2 (4527)	11.5	7.0	2.5	5.0	1.7	2.6 $\pm 0.5$	476
SLN2 (4527)	11.5	7.0	2.4	5.5	1.6	2.55 $\pm 0.4$	500

### Type Designation

Example

SL	1	T	TE	20L0	F	75
Product Code	Power Rating	Terminal Surface Material	Taping	Nominal Resistance	Resistance Tolerance	T.C.R. ( $\times 10^{-6}/\text{K}$ )
TSL SL SLN	07: 0.75W 1: 1.0W 2: 2.0W	T: Sn	TE: Plastic embossed BK: Bulk	D, F: 4 digits J, G: 3 digits Ex. 0.1 $\Omega$ : R10 5m $\Omega$ : 5L0	D: $\pm 0.5\%$ F: $\pm 1\%$ G: $\pm 2\%$ J: $\pm 5\%$	Nil: 0~150 0~200 $\pm 75$ : SLN2 $\pm 100$ $\pm 110$ $\pm 180$ 50: $\pm 50$ : SL1 75: $\pm 75$ : SL1

Resistance Value ( $\Omega$ )	3 digits	Resistance Value ( $\Omega$ )	4 digits
3m~9.1m	3L0~9L1	5m~9.1m	5L00~9L10
10m~91m	10L~91L	10m~91m	10L0~91L0
0.1~0.36	R10~R36	0.1~0.36	R100~R360

The terminal surface material lead free is standard.

Contact us when you have control request for environmental hazardous material other than the substance specified by EU-RoHS.

For further information on taping, please refer to APPENDIX C on the back pages.

### Jumper Ratings

Type	Resistance	Current Rating	T.C.R. ( $\times 10^{-6}/\text{K}$ )
SLZ1	0.5m $\Omega$ max.	44A	4000 max.

### Ratings

Type	Power Rating	Rated Ambient Temp.	Rated Terminal Part Temp.	Resistance Range ( $\Omega$ ) <sup>*1</sup>				T.C.R. ( $\times 10^{-6}/\text{K}$ )	Operating Temp. Range	Taping & Q'ty/Reel (pcs)
				D: $\pm 0.5\%$ E24·E96 <sup>*2</sup>	F: $\pm 1\%$ E24·E96 <sup>*2</sup>	G: $\pm 2\%$ E24	J: $\pm 5\%$ E24			TE
SL07	0.75W	70°C	125°C	—	5m~100m	—	5m~100m	0~200: R<11m $\Omega$ 0~150: R $\geq 11\text{m}\Omega$	-55°C~+180°C	2,000
TSL1	1W			10m~100m	5m~100m	—	5m~100m	$\pm 180$ : R<15m $\Omega$ $\pm 100$ : R $\geq 15\text{m}\Omega$		3,000
SL1	1W			10m~102m	5m~102m	3m, 4m	5m~100m	$\pm 180$ : R<15m $\Omega$ $\pm 100$ : R $\geq 15\text{m}\Omega$		1,000
SL1 (TCR $\pm 50\text{ppm}$ )	1W			34.8m~200m $\Omega$	34.8m~200m $\Omega$	—	36m~200m $\Omega$	$\pm 50\text{ppm}$		
SL1 (TCR $\pm 75\text{ppm}$ )	1W			20m~300m $\Omega$	20m~300m $\Omega$	—	20m~300m $\Omega$	$\pm 75\text{ppm}$		
SL2	2W			10m~360m $\Omega$	5m~360m $\Omega$	3m, 4m	3m~360m $\Omega$	$\pm 180$ : R<11m $\Omega$ $\pm 100$ : R $\geq 11\text{m}\Omega$		
SLN2	2W	105°C	105°C	5m~200m	5m~200m	—	5m~200m	$\pm 110$ : R<10m $\Omega$ $\pm 75$ : R $\geq 10\text{m}\Omega$		

Rated voltage =  $\sqrt{\text{Power Rating} \times \text{Resistance value}}$  or Max. working voltage, whichever is lower.

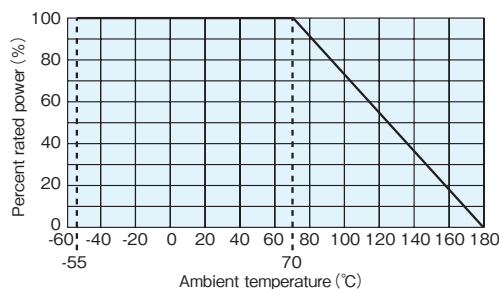
\*1 3m, 4m, 5m, 6m, 7m, 8m and 9m $\Omega$  are available in each resistance range.

\*2 SL07 and SL1 (T.C.R:  $\pm 50\text{ppm}$ , 102m $\Omega \leq R \leq 200\text{m}\Omega$ ) offer only E24 series.

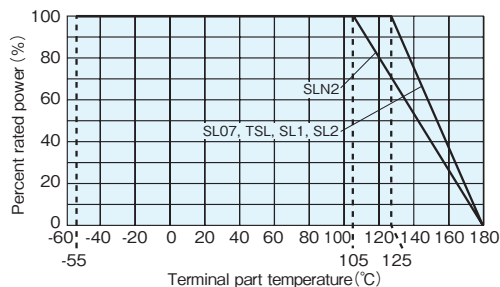
If any questions arise whether to use the "Rated Ambient Temperature" or the "Rated Terminal Part Temperature" in your usage conditions, please give priority to the "Rated Terminal Part Temperature".

For more details, please refer to "Introduction of the derating curves based on the terminal part temperature" on the beginning of our catalog.

## Derating Curve



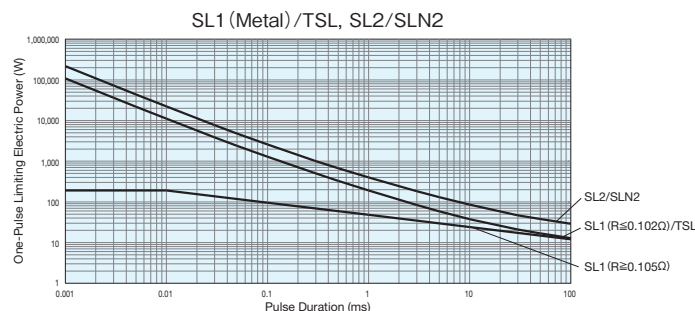
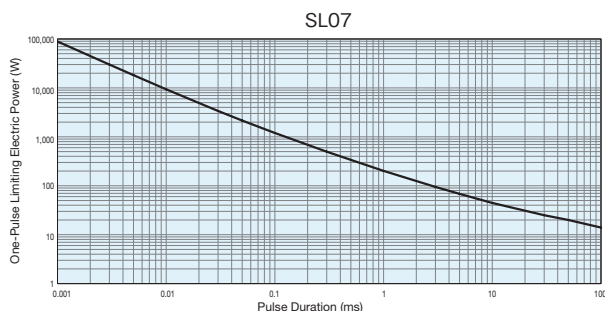
For resistors operated at an ambient temperature of 70°C or higher, the power shall be derated in accordance with the above derating curve.



When the terminal part temperature of the resistor exceeds the rated terminal part temperature shown above, the power shall be derated according to the derating curve.  
 ※ Please refer to "Introduction of the derating curve based on the terminal part temperature" on the beginning of our catalog before use.

## One-Pulse Limiting Electric Power

※ The maximum applicable voltage is equal to the max. overload voltage.  
 Please ask us about the resistance characteristic of continuous applied pulse.  
 The pulse endurance values are not assured values, so be sure to check the products on actual equipment when you use them.



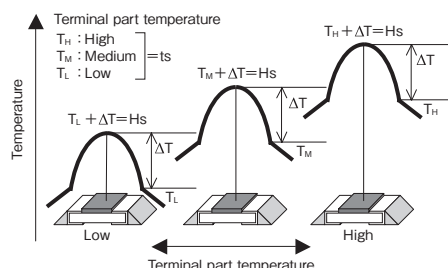
## Thermal Resistance

Type	Resistance (Ω)	Rth (°C/W)
SL07	5m	26
	22m	48
	100m	78
SL1	5m	16
	20m	39
	100m	59
SL2	5m	16
	20m	41
	200m	55
SLN2	5m	19
	11m	24
	200m	46

$$R_{th} = (H_s - t_s) / \text{Power}$$

Regarding the temperature rise, the value of the temperature varies per conditions and board for use since the temperature is measured under our measuring conditions. Please refer to us before use.

The temperature of the resistor will increase the same  $\Delta T$  from the standard terminal part temperature regardless of the ambient temperature when the same power is applied. This is because there is hardly any heat dissipation from the resistor surface to the ambient air.



## Performance

Test Items	Performance Requirements $\Delta R \pm \%$		Test Methods
	Limit	Typical	
Resistance	Within specified tolerance	—	25°C
T.C.R.	Within specified T.C.R.	—	+25°C / +125°C
Overload (Short time)	1 : SL07, TSL1, SL1, SL2 0.5 : SLN2	1 : SL07, TSL1, SL1, SL2 0.25 : SLN2	SL07 : Rated power × 4 for 5s TSL1 : Rated power × 2.5 for 5s SL1, SL2, SLN2 : Rated power × 5 for 5s (SL1 (T.C.R. : $\pm 50/\pm 75$ ) : Rated power × 4 for 5s)
Resistance to soldering heat	1 : SL07, TSL1, SL1, SL2 0.5 : SLN2	1 : SL07, TSL1, SL1, SL2 0.5 : SLN2	260°C ± 5°C, 10s ± 1s 260°C ± 5°C, 10s ~ 12s
Rapid change of temperature	1 : SL07, TSL1, SL1, SL2 0.5 : SLN2	0.5 : SL07, TSL1, SL1, SL2 0.25 : SLN2	-55°C (30min.) / +150°C (30min.) 100 cycles -55°C (15min.) / +150°C (15min.) 1000 cycles
Moisture resistance	2 : SL07, TSL1, SL1, SL2 0.5 : SLN2	0.5 : SL07, TSL1, SL1, SL2 0.25 : SLN2	40°C ± 2°C, 90% ~ 95%RH, 1000h 1.5h ON/0.5h OFF cycle 85°C ± 2°C, 85%RH ± 3%RH, 1000h Rated power × 0.1
Endurance at 70°C	2 : SL07, TSL1, SL1, SL2 1 : SLN2	1	70°C ± 2°C, 1000h 1.5h ON/0.5h OFF cycle
Low temperature exposure	0.5	0.25	SL07, TSL1, SL1, SL2 : -55°C, 1h SLN2 : -65°C, 24h

## Precautions for Use

- In case of using the low ohm resistors as shunt resistors, please lay out a pattern considering the electromagnetic induction with surrounding inductors.
- In the resistance values of 50mΩ or under, the resistance value after soldering may change depending on the size of pad pattern or solder amount. Make sure the effect of decline/increase of resistance value before designing.