

SMD - Resistors

Product : Current Sensing Chip Resistor – SMDL Series

Size : 0201/0402/0603/0805/1206/1010/2010/2512/1225/3720/7520



official distributor of



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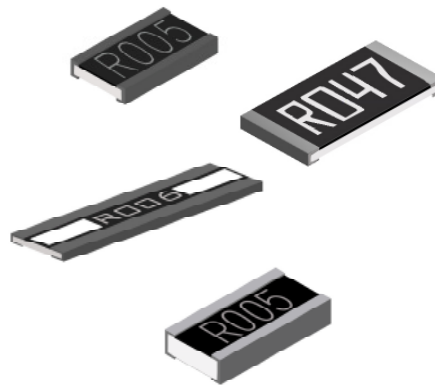
Current Sensing Chip Resistor (SMDL Series)

► 1. Features

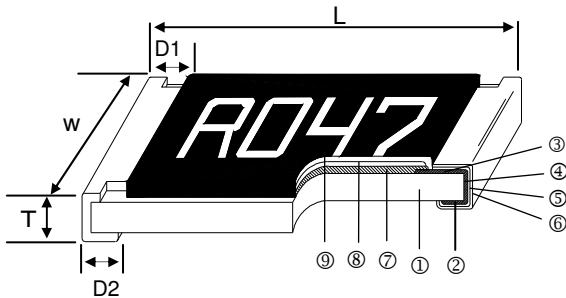
- 3 Watts power rating in 1 Watt size, 1225 package
- Low TCR of ± 100 PPM/°C
- Resistance values from 1m to 1 ohm
- High purity alumina substrate for high power dissipation
- Long side terminations with higher power rating

► 2. Applications

- Power Management Applications
- Switching Power Supply
- Over Current Protection in Audio Applications
- Voltage Regulation Module (VRM)
- DC-DC Converter, Battery Pack, Charger, Adaptor
- Automotive Engine Control
- Disk Driver
- Portable Devices (PDA, Cell Phone)



► 3. Construction



① Alumina Substrate	④ Edge Electrode (NiCr)	⑦ Resistor Layer (Ag/Pd)
② Bottom Electrode (Ag)	⑤ Barrier Layer (Ni)	⑧ Overcoat (Epoxy)
③ Top Electrode (Ag-Pd)	⑥ External Electrode (Sn)	⑨ Marking

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4. Dimensions

Unit: mm

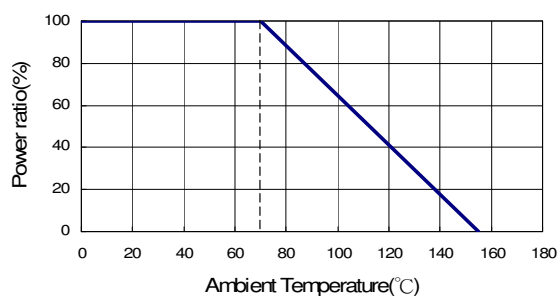
Type	Size (Inch)	L	W	T	D1	D2	Weight (g) (1000pcs)
SMDL0201	0201	0.58±0.05	0.29±0.05	0.23±0.05	0.12±0.05	0.15±0.05	0.18
SMDL0402	0402	1.00±0.05	0.50±0.05	0.32±0.10	0.25±0.10	0.20±0.10	0.7
SMDL0603	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20	1.99
SMDL0805	0805	2.00±0.15	1.25±0.15	0.55±0.10	0.30±0.20	0.40±0.25	5.3
SMDL1206	1206	3.05±0.15	1.55±0.15	0.55±0.10	0.50±0.30	0.40±0.25	8.82
SMDL1210	1210	3.00±0.15	2.50±0.15	0.55±0.10	0.50±0.30	0.50±0.25	15.5
SMDL2010	2010	5.00±0.20	2.45±0.15	0.60±0.15	0.60±0.30	0.50±0.25	27.03
SMDL2512	2512	6.35±0.20	3.15±0.15	0.60±0.10	0.60±0.30	0.55±0.25	43.08
SMDL2512 (2W)	2512 10 - 99mΩ	6.35±0.20	3.15±0.15	0.74±0.10	0.60±0.30	0.55±0.25	43.08
SMDL2512 (2W)	2512 100 - 1000mΩ	6.35±0.20	3.15±0.15	0.74±0.10	0.60±0.30	2.70±0.10	43.08
SMDL1225	1225	3.10±0.15	6.30±0.15	0.90±0.15	0.60±0.30	0.55±0.25	53.8
SMDL3720	3720	2.00±0.20	3.75±0.20	0.60±0.10	0.40±0.20	0.40±0.20	19.96
SMDL7520	7520	2.00±0.20	7.50±0.30	0.60±0.10	0.40±0.20	0.40±0.20	35.71

5. Part Numbering

SMDL	1206	F	T	G	U	R100	N
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Marking
	0201 0402 0603 0805 1206 1210 2010 2512 1225 3720 7520	F: ±1% G: ±2% J: ±5%	T: Taping Reel B: Bulk	E: ±100 F: ±200 G: ±300 H: ±400 J: ±600 K: ±150 R: ±1000	: Standard A: 1.5W Q: 3/4W S: 2W T: 1W U: 1/2W V: 1/4W W: 1/8W	R010: 0.01Ω R100: 0.1Ω 1R00: 1Ω	: Standard N: No Marking

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► 6. Derating Curve



► 7.1 Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
SMDL 0201		1/20W	-55 ~ +155°C	100 - 149 150 - 500 501 - 1000			±1000 ±600 ±300
SMDL 0402		1/16W		50 - 100 101 - 500 501 - 1000			±400 ±300 ±200
SMDL 0603		1/10W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
SMDL 0805		1/8W		20 - 50 51 - 100 101 - 500 501 - 1000			±600 ±400 ±300 ±200
SMDL 1206		1/4W		10 - 20 21 - 50			±600 ±400
SMDL 1210		1/2W		51 - 500			±300
SMDL 2010		3/4W		501 - 1000			±200
SMDL 2512		1W		3 - 5 6 - 20 21 - 30 31 - 250 251 - 8000			±300 ±200 ±150 ±100 ±200
SMDL 1225		3W		10 - 19 20 - 500			±300 ±150
SMDL 3720		1W		—			±300
SMDL 7520		2W		1 - 4 5 - 10 11 - 350			±200 ±150

► 7.2 High Power Rating Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
SMDL 0603		1/8W	-55 ~ +155°C	51 - 100m 101 - 500m 501 - 1000m			±400 ±300 ±200
SMDL 0805		1/4W		10 - 20m 21 - 50m			±600 ±400
SMDL 1206		1/2W		51 - 500m			±300
SMDL 1210		3/4W		501 - 1000m			±200
SMDL 2010		1W					
SMDL 2512		1.5W					
SMDL 2512		2W					

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7.3 Low TCR Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Resistance Range (mΩ)			TCR (PPM/°C)
				±1%	±2%	±5%	
SMDL 1206		1/4W	-55 ~ +155°C	100 - 1000			±100
SMDL 1210		1/2W		100 - 1000			±100
SMDL 2010		3/4W		100 - 1000			±100
SMDL 2512		1W		20 - 1000			±100
SMDL 3720		1W		100 - 500			±100
SMDL 7520		2W		50 - 350			±100

Operating Voltage= $\sqrt{P \cdot R}$; Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$; Operating Current= $\sqrt{P/R}$

Electronic sensor + resistor is capable of manufacturing the optional spec based on customer's requirement.

8. Marking for 0603

Type	Type
1R0	1.000Ω
R10	0.100Ω
R01	0.010Ω
<u>101</u>	0.101Ω
<u>035</u>	0.035Ω

9. Recommend Land Pattern

Pad Layout (Except For SMDL 2512:High Power Rating Series)

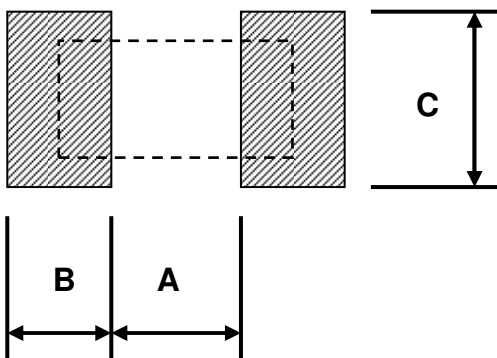
Unit : mm

Type	A	B	C
SMDL 0201	0.25	0.30	0.40±0.2
SMDL 0402	0.50	0.50	0.60±0.2
SMDL 0603	0.80	1.00	0.90±0.2
SMDL 0805	1.00	1.00	1.35±0.2
SMDL 1206	2.00	1.15	1.70±0.2
SMDL 1210	2.00	1.15	2.5±0.2
SMDL 2010	3.60	1.40	2.50±0.2
SMDL 2512	4.90	1.60	3.10±0.2
SMDL 1225	2.00	2.00	6.40±0.2
SMDL 3720	1.00	1.80	3.90±0.2
SMDL 7520	1.00	1.80	7.60±0.2

Pad Layout (For SMDL2512:High Power Rating Series)

Unit : mm

Type	Resistance	A	B	C
SMDL 2512	10~99 mΩ	4.9	1.6	3.1±0.2
SMDL 2512	100~1000mΩ	1.0	3.55	3.1±0.2



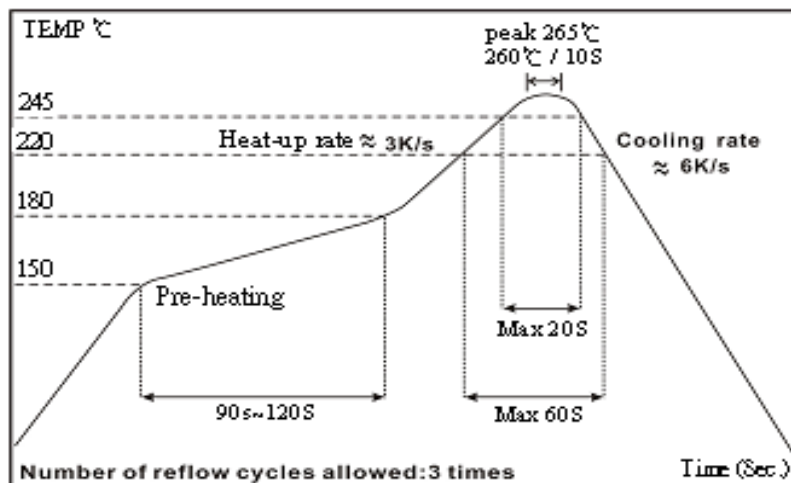
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► 10. Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	MIL-STD-202F Method 304 +25/-55/+25/+125/+25°C
Short Time Overload	±0.5%	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage for 5 seconds
	ΔR±1% for high power rating	
Insulation Resistance	>1000MΩ	MIL-STD-202F Method 302 Apply 100V _{DC} for 1 minute
Endurance	±1%	MIL-STD-202F Method 108A 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±0.5%	MIL-STD-202F Method 103B 40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	±0.5%	JIS-C-5201-1 7.2 at +155°C for 1000 hrs
Bending Strength	As Spec.	JIS-C-5201-1 6.1.4 Bending amplitude 3mm for 10 seconds
Solderability	95% min. coverage	MIL-STD-202F Method 208H 245±5°C for 3 seconds
Resistance to Soldering Heat	±0.5%	MIL-STD-202F Method 210E 260±5°C for 10 seconds
Dielectric Withstand Voltage	By Type	MIL-STD-202F Method 301 Apply Max. Overload Voltage for 1 minute
Thermal Shock	±0.5%	MIL-STD-202F Method 107G -55°C ~ 150°C, 100 cycles
Low Temperature Operation	±0.5%	JIS-C-5201-1 7.1
		1 hour, -65°C followed by 45 minutes of RCWV

Storage Temperature: 25±3°C; Humidity < 80%RH

► 11. Reflow



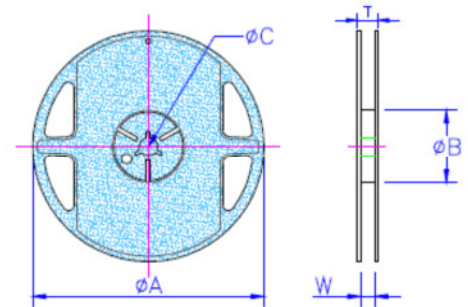
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► 12. Packaging

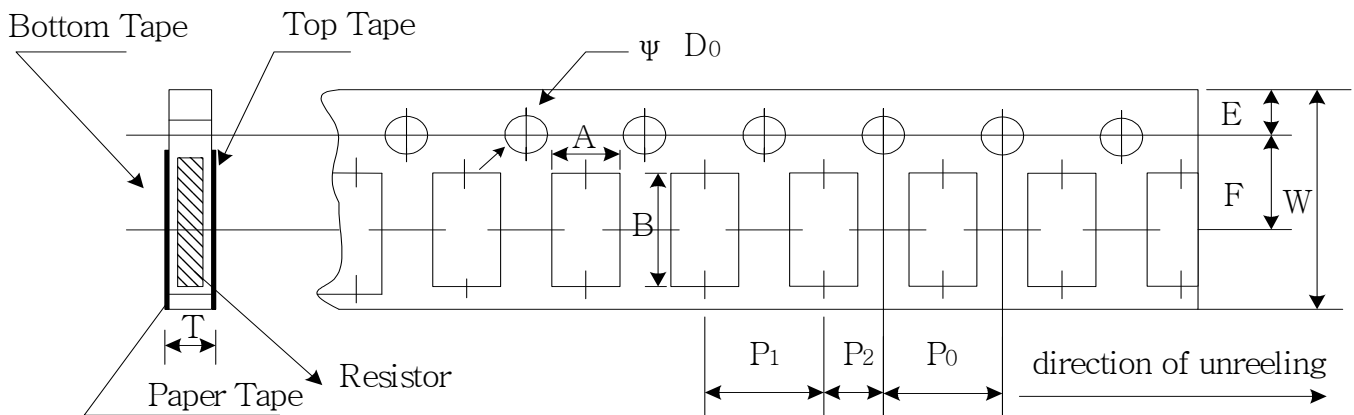
Packaging Quantity & Reel Specifications

Unit :mm

Type	ψA	ΦB	ψC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
SMDL0201	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
SMDL0402	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	10,000	-
SMDL0603	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
SMDL0805	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
SMDL1206	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
SMDL1210	178.0±1.0	60.0±1.0	13.5±0.7	9.5±0.1	11.5±1.0	5,000	-
SMDL2010	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
SMDL2512	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	4,000
SMDL1225	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
SMDL3720	178.0±1.0	60.0±1.0	13.5±0.7	13.5±1.0	15.5±1.0	-	2,000
SMDL7520	178.0±1.0	60.0±1.0	13.5±0.7	17.5±1.0	19.5±1.0	-	2,000



Paper Tape Specifications

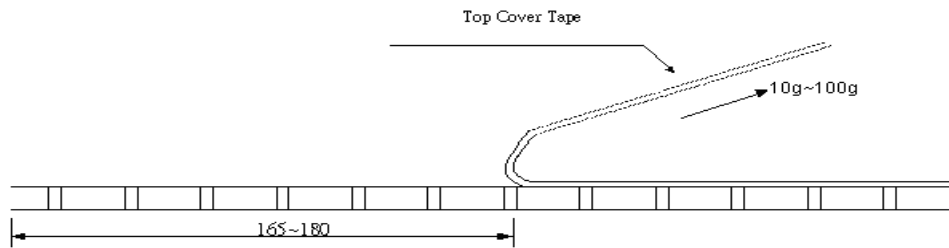


Unit: mm

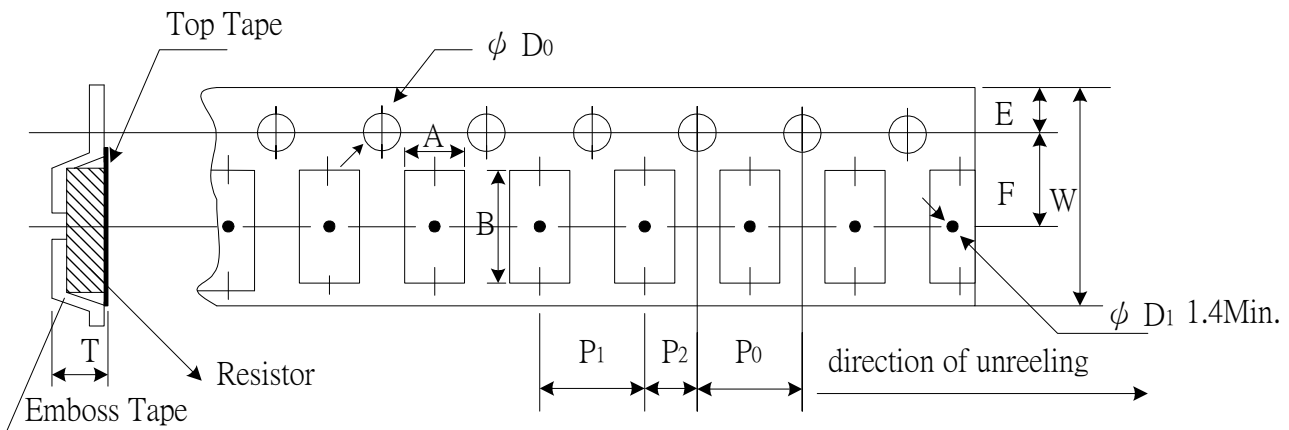
Type	A	B	W	E	F	P0	P1	P2	$\psi D0$	T
SMDL0201	0.40±0.05	0.70±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.03	0.42±0.02
SMDL0402	0.70±0.05	1.16±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	2.00±0.05	2.00±0.05	1.55±0.05	0.40±0.03
SMDL0603	1.10±0.05	1.90±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.60±0.03
SMDL0805	1.60±0.05	2.37±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
SMDL1206	2.00±0.05	3.55±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05
SMDL1210	2.75±0.05	3.4±0.05	8.00±0.10	1.75±0.05	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	0.75±0.05

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 10g and 100g

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Emboss Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P ₀	P ₁	P ₂	ψD_0	T
SMDL2010	2.85±0.10	5.45±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
SMDL2512	3.40±0.10	6.65±0.10	12.0±0.10	1.75±0.10	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.00±0.20
SMDL2512 (2W)	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	1.45±0.20
SMDL1225	3.38±0.10	6.68±0.10	12.0±0.30	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.55±0.05	1.45±0.20
SMDL3720	2.50±0.20	4.45±0.20	12.0±0.30	1.75±0.01	5.5±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.50±0.10
SMDL7520	2.50±0.20	8.30±0.20	16.0±0.30	1.75±0.01	7.8±0.05	4.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	1.50±0.10

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 10g and 130g

