

FrelTec GmbH

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82319 Starnberg
Germany

Current Sensing Chip Resistor SMD

SMD Low Ohm

SPECIFICATION

Part
Number

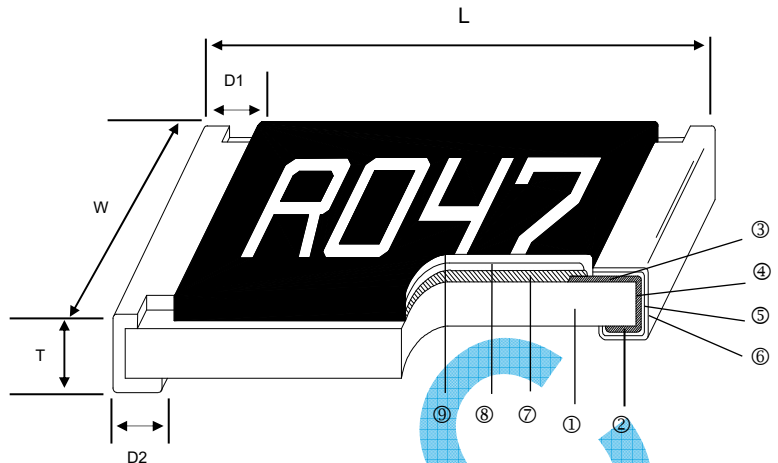
018	05*	0R010*	J*	T05**	E*
Type	Size	Value	Tolerance	Packing	Power Rating
018: SMD Current Sensing Chip Resistor	02 : 0402	R = Decimal	F : $\pm 1\%$	T10: Tape and reel for 10k pc 0402 (7" reel)	A: 1/32W
	03 : 0603	Example: R0100= 0,01Ohm	J : $\pm 5\%$	T05: Tape and reel for 5k pc 0603, 0805, 1206, 1210 (7" reel)	B: 1/16W
	05 : 0805			E04: Tape and reel for 4k pc 2010, 2512 (7" reel)	C: 1/10W
	06 : 1206	5 digit Ohm value		<u>Special packing:</u>	D: 1/8W
	10 : 1210			I40: Paper tape and reel for 40k pc 0402 (13" reel)	E: 1/4W
	20 : 2010			I20: Paper tape and reel for 20k pc 0603, 0805, 1206, 1210 (13" reel)	G: 1/3W
	25 : 2512			K08: Embossed tape and reel for 8k pc 2010, 2512 (10" reel)	H: 1/2W
					I: 3/4W
					J: 1W
				* not all combination is possible	L: 2W

All products according to RoHS (2015/863/EU)

FrelTec Current Sensing Chip Resistor

SMD Low Ohm THICK FILM CHIP RESISTORS

- 1 Alumina Substrate
- 2 Bottom Electrode
- 3 Top Electrode
- 4 Edge Electrode
- 5 Barrier Layer
- 6 External Electrode
- 7 Resistor Layer
- 8 Primary Overcoat
- 9 Secondary Overcoat



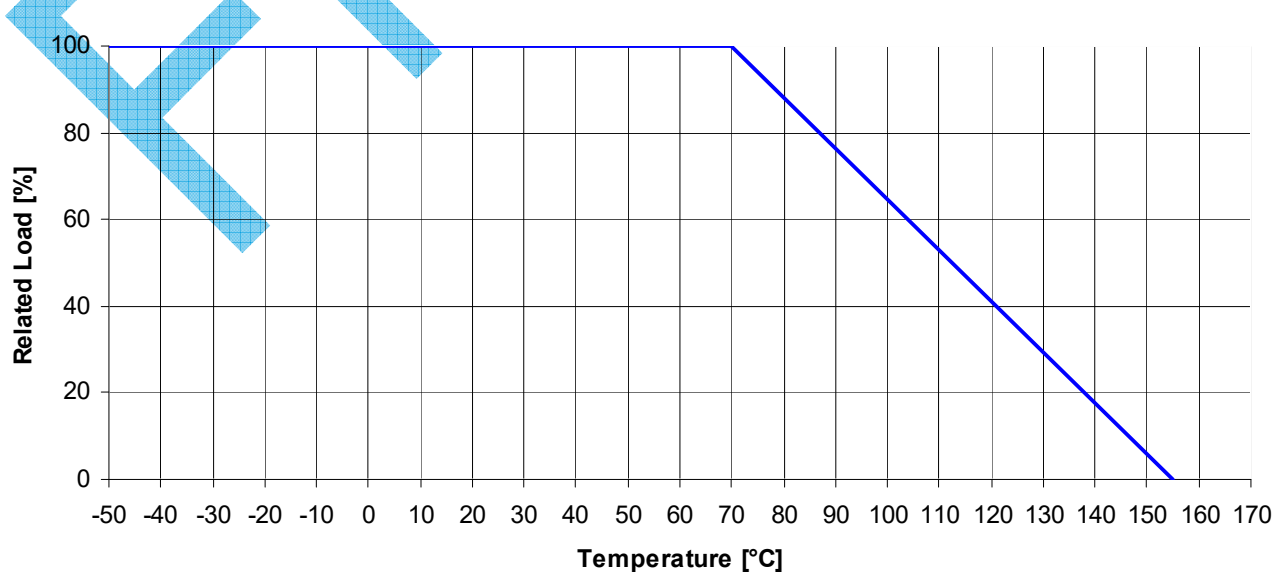
Dimensions

Size (Inch)	L	W	T	D1	D2
0402	1,00±0,05	0,50±0,05	0,35±0,05	0,20±0,10	0,20±0,10
0603	1,60±0,10	0,80±0,10	0,45±0,10	0,30±0,20	0,30±0,20
0805	2,00±0,10	1,25±0,10	0,50±0,10	0,35±0,20	0,40±0,20
1206	3,10±0,10	1,55±0,10	0,55±0,10	0,50±0,25	0,50±0,20
1210	3,10±0,10	2,60±0,15	0,55±0,10	0,50±0,25	0,50±0,20
2010	5,00±0,10	2,50±0,15	0,55±0,10	0,60±0,25	0,50±0,20
2512	6,35±0,10	3,10±0,15	0,55±0,10	0,60±0,25	0,50±0,20

(unit: mm)

Power Derating Curve

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below. Operating temperature -55°C to +155°C



Current Rating:

Rated Current: The resistor shall have a DC continuous working current or a rms AC continuous working current at commercial-line frequency and wave form corresponding to the power rating, as determined from the following:

I= Rated current [A]

P= Operating Current [W]

$$= \sqrt{\frac{P}{R}}$$

R= Nominal resistance [Ω]

Overload Voltage

$$= 2.5 \cdot \sqrt{(P \cdot R)}$$

THICK FILM CHIP RESISTORS

Rating

018 Series

Electrical Specifications

Type	Item	Power Rating at 70°C	Max. Operating Current	Operating Temp. Range	Resistance Range (m Ω)		TCR (PPM/°C)
					$\pm 1\%$ E24, E96	$\pm 5\%$ E24	
0402	1/16W	1,11A	-55 ~ +155°C	50 - 91 100 - 976	± 800 ± 500		
	1/10W	1,40A					
0603	1/10W	2,23A		20 - 47 50 - 91 100 - 976	± 1200 ± 800 ± 500		
	1/8W	2,50A					
0805	1/8W	3,53A		10 - 18 20 - 47 50 - 91 100 - 976	± 1500 ± 1200 ± 800 ± 500		
	1/4W	5,00A					
1206	1/4W	5,00A		10 - 18 20 - 91 100 - 976	± 1500 ± 800 ± 500		
	1/2W	7,07A					
1210	1/3W	5,77A		10 - 18 20 - 91 100 - 976	± 1500 ± 800 ± 500		
	1/2W	7,07A					
2010	3/4W	8,66A		10 - 18 20 - 91 100 - 976	± 1500 ± 800 ± 500		
	1W	10,0A					
2512	1W	10,0A		10 - 18 20 - 91 100 - 976	± 1500 ± 800 ± 500		
	2W	14,1A					

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

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0402 no marking

E96 and E24 (1%, 5%) 0805 to 2512



Examples R100=100mOhm
R022 = 22mOhm

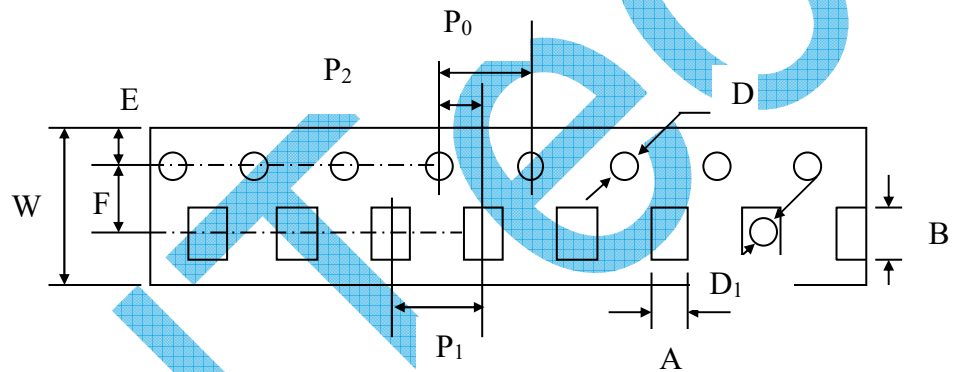
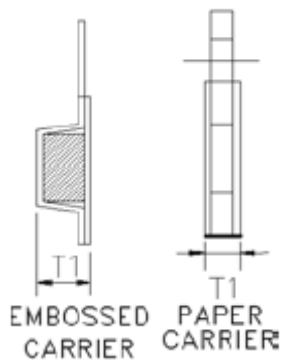
E96 and E24 (1%, 5%) 0603



1% for 0603: 3 digits marking with under-line in E96 (non-including E24 series)
3 digits marking for E24 or R value suffix is zero in E96: R10=100mΩ R28=280mΩ
3 digits marking for E96: 243=243mΩ 511=511mΩ

SPECIFICATION

Tape And Reel Package

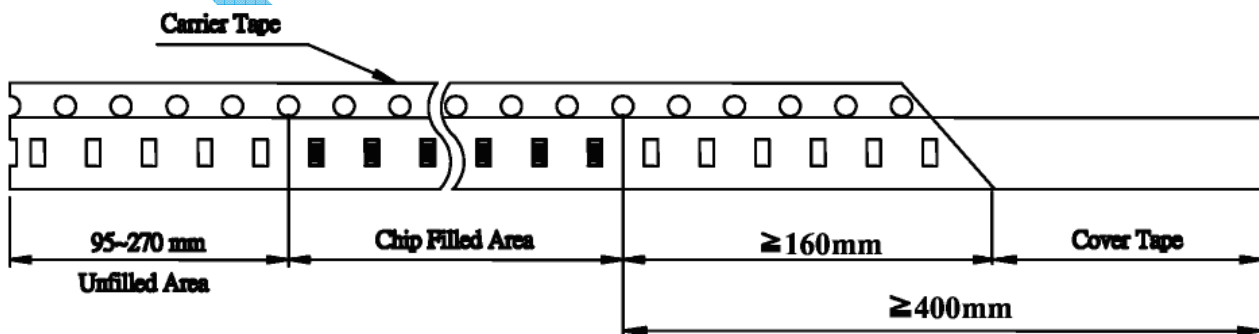


D₁ only embossed type, min 1,4mm

In Accordance with EIA RS-481

Packing	Size	A	B	W	E	F	P ₀	P ₁	P ₂	D	T ₁	D ₁
Paper Tape (T)	0402	0,65±0,10	1,15±0,1	8,0±0,2	1,75±0,10	3,50±0,05	4,00±0,10	2,00±0,05	2,00±0,05	1,50+0,1,-0	0,45±0,1	-
	0603	1,10±0,10	1,90±0,1	8,0±0,2	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1,-0	0,70±0,1	-
	0805	1,60±0,10	2,40±0,2	8,0±0,2	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1,-0	0,85±0,1	-
	1206	1,90±0,10	3,50±0,2	8,0±0,2	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1,-0	0,85±0,1	-
	1210	2,90±0,10	3,50±0,2	8,0±0,2	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1,-0	0,85±0,1	-
Embossed Tape (E)	2010	2,8±0,10	5,5±0,10	12,0±0,3	1,75±0,10	5,5±0,05	4,00±0,10	4,00±0,1	2,00±0,05	1,50+0,1,-0	1,2 ⁺⁰	1,5 ^{+0,25} ₋₀
	2512	3,5±0,10	6,7±0,10	12,0±0,3	1,75±0,10	5,5±0,05	4,00±0,10	4,00±0,1	2,00±0,05	1,50+0,1,-0	1,2 ⁺⁰	1,5 ^{+0,25} ₋₀

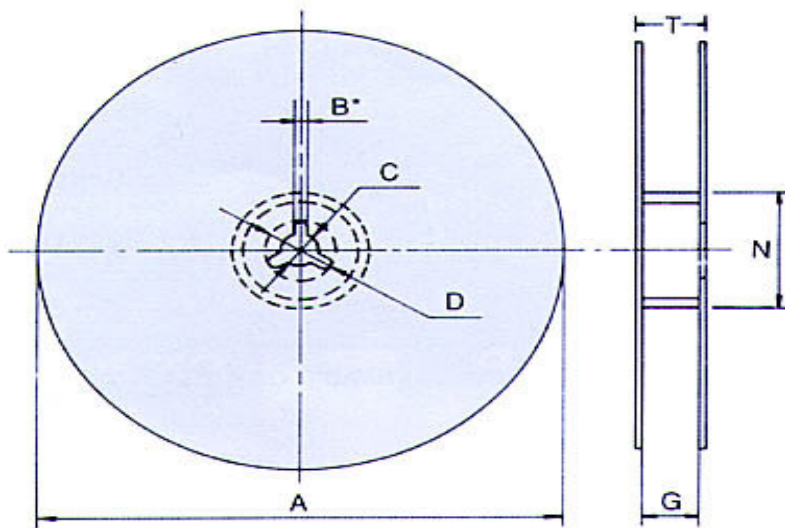
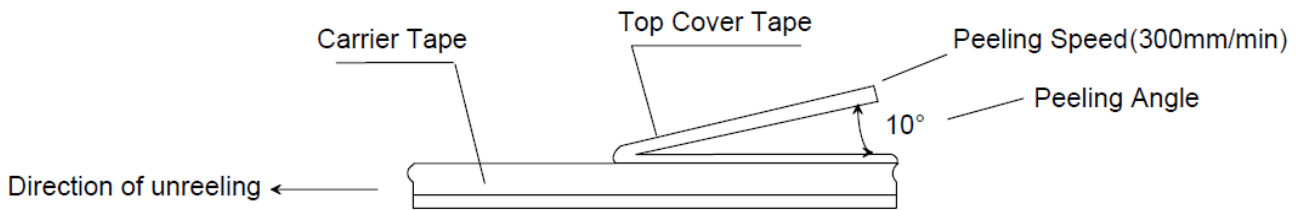
Lead Dimensions:



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Cover Tape Peel off Strength

Specifications: 0402 => 0,07~0,5N (7,1~51gf)
 0603, 0805, 1206, 1210, 2512 => 0,07~0,7N (7,1~71.4gf)



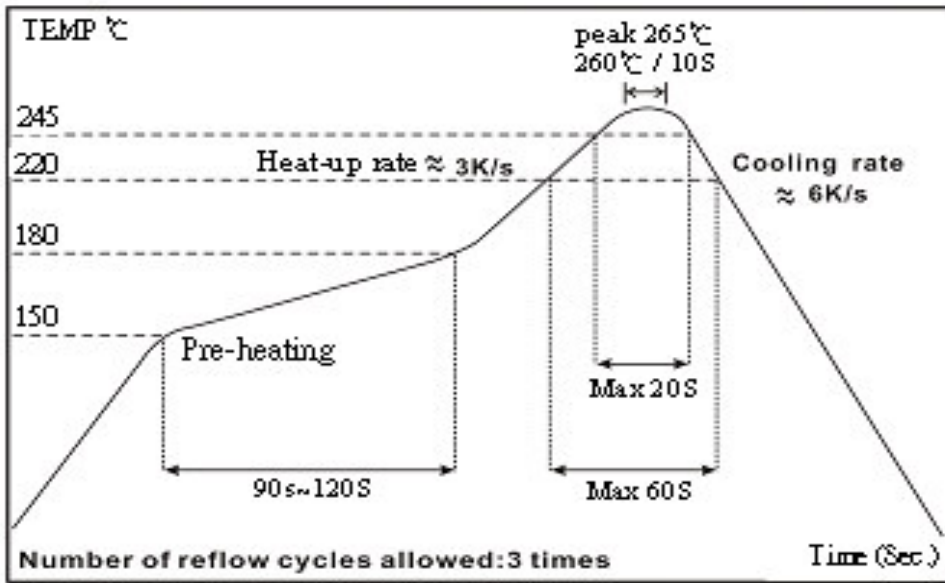
Size	Reel Diameter	ΦA	ΦN	ΦC	G	T
0402 0603 0805 1206 1210	7 inch	178,5±1,5	60 ^{+1/-0}	13,0±0,2	9,0±0,5	12,5±0,5
0603 0805 1206 1210	13 inch	330±1	100±0,5	13,0±0,2	9,5±0,5	13,5±0,5
2010 2512	7 inch	178,5±1,5	60 ^{+1/-0}	13,0±0,5	13,0±0,5	15,5±0,5
2010 2512	10 inch	250±1	62±0,5	13,0±0,5	12,5±0,5	16,5±0,5

in mm

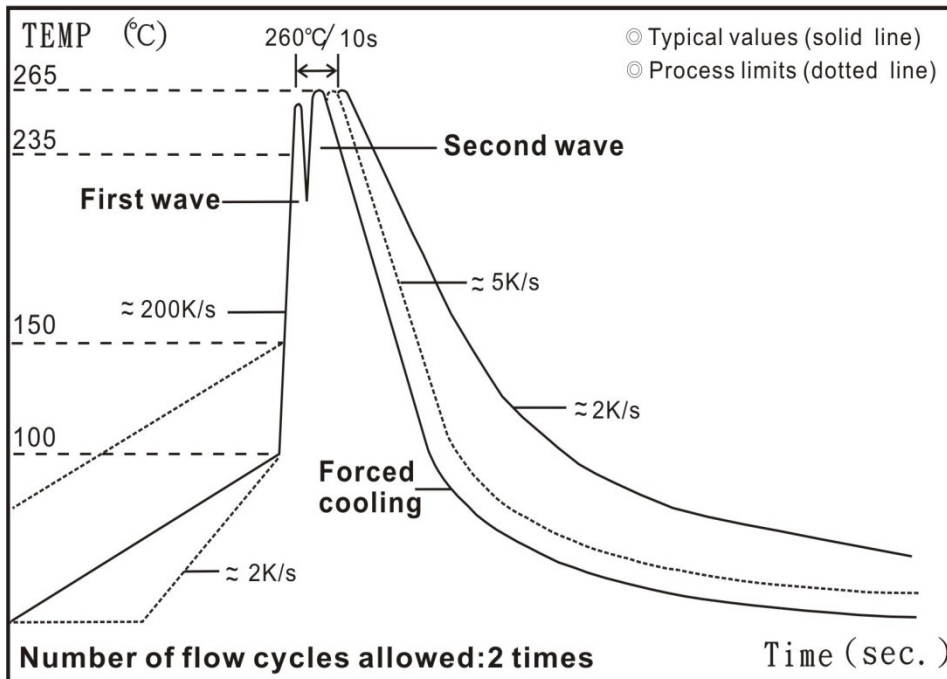
Stock period

The temperature condition must be controlled at 22± 5 °C, the R.H. must be controlled below 80% RH before soldering. The stock can maintain quality level in 12 month.

Lead Free Reflow Soldering Profile



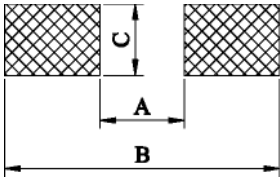
Wave soldering



Remark: The peak temperature of soldering heat is 260 °C for 10 seconds.

Soldering Iron: Temperature 410°C, dwell time shall be less than 5 seconds.

Recommended Land Pattern Design (For Reflow Soldering):



Size	A	B	C
0402	0,50	1,4	0,60
0603	0,90	2,1	0,90
0805	1,20	2,6	1,30
1206	2,00	3,8	1,60
1210	2,00	3,8	2,80
2010	3,80	5,6	2,80
2512	3,80	7,0	3,50

Unit: mm

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Environmental Characteristics

Item	Requirement		Test Method
	±1%	±5%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		JIS C 5201-1 4.8 IEC 60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	±(1,0%+0,05Ω)	±(2,0%+0,05Ω)	JIS C 5201-1 4.13 IEC 60115-1 4.13 2,5 times RCWV or Max. overload voltage for 5 seconds, 2 seconds for high power series
Insulation Resistance	≥10G		JIS C 5201-1 4.6 IEC 60115-1 4.6 Max. overload voltage for 1 minute
Endurance	±(1,0%+0,10Ω)	±(2,0%+0,10Ω)	JIS C 5201-1 4.25 IEC 60115-1 4.25.1 70±2°C, Max. working voltage for 1000 h with 1,5 h "ON" and 0,5 h "OFF"
Damp Heat with Load	±(1,0%+0,10Ω)	±(2,0%+0,10Ω)	JIS C 5201-1 4.24 IEC-60115-1 4.24 40±2°C, 90~95% R.H., Max. working voltage for 1000 h with 1,5 h "ON" and 0,5 h "OFF"
Dry Heat	±(1,0%+0,05Ω)	±(1,5%+0,10Ω)	JIS C 5201-1 4.23 IEC 60115-1 2.23.2 at +155°C for 1000 h
Bending Strength	±(1,0%+0,05Ω)	±(1,0%+0,05Ω)	JIS C 5201-1 4.33 IEC 60115-1 4.33 Bending once for 5 s 2010, 2512 sizes: 2mm Other sizes: 3mm
Solderability	≥95% coverage		JIS C 5201-1 4.17 IEC 60115-1 4.17 245±5°C for 3 s
Resistance to Soldering Heat	±(0,5%+0,05Ω)	±(1,0%+0,05Ω)	JIS C 5201-1 4.18 IEC 60115-1 4.18 260±5°C for 10 s
Voltage Proof	No breakdown or flashover		JIS C 5201-1 4.7 IEC 60115-1 4.7 1,42 times Max. Operating Voltage for 1 min
Leaching	Individual leaching area ≤5% Total leaching area ≤10%		JIS C 5201-1 4.18 IEC 60068-2-58 8.2.1 260±5°C for 30 s
Rapid Change of Temperature	±(0,5%+0,05Ω)	±(1,0%+0,05Ω)	JIS C 5201-1 4.19 IEC 60115-1 4.19 -55°C to +155°C, 5 cycles

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