

FrelTec GmbH

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Current Sensing Metal Chip Resistor SMD

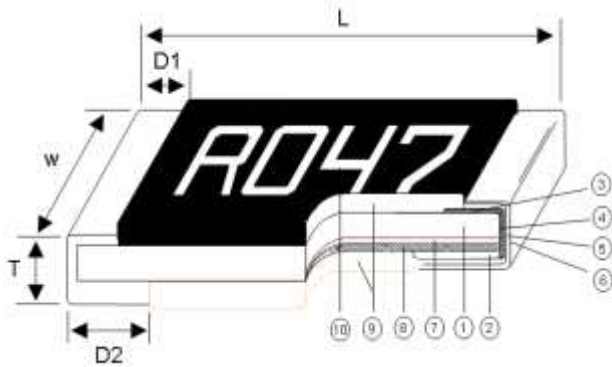
SMD

SPECIFICATION

Part
Number

046	06 [*]	R010 [*]	J [*]	T05 ^{**}	E	D
Type	Size	Value	Tolerance	Packing	TCR	Power Rating
046 : SMD Current Sensing Metal Chip Resistor	03 : 0603	The last digit is the multiplier	J : $\pm 5\%$	T05: Tape and Reel for 5k pc (7"reel)	E : $\pm 50\text{ppm}/^\circ\text{C}$	D: 1/8W
	05 : 0805	which denotes the number of zero following	G : $\pm 2\%$	E04: Tape and reel for 4k pc (7"reel)	F : $\pm 100\text{ppm}/^\circ\text{C}$	E: 1/4W
	06 : 1206		F : $\pm 1\%$			H: 1/2W
	20 : 2010	Example:		** T05 for 0603 to 1206 Paper Type		I: 3/4W
	25 : 2512	97R6=		** E04 for 2010 and 2512 Embossed Plastic Type		J: 1W
		R100 = 0,1Ohm				
		R050 = 0,05Ohm				
		9760 = 976Ohm				
		1001 = 1kOhm			not all combination is possible	

SMD Construction



① Alumina Substrate	⑥ External Electrode (Sn)
② Bottom Electrode (Ag)	⑦ Adhesive (Acrylic)
③ Top Electrode (AgPd)	⑧ Resistor Layer (Alloy)
④ Edge Electrode (NiCr)	⑨ Primary Overcoat (Epoxy)
⑤ Barrier Layer (Ni)	⑩ Marking (Epoxy)

Dimensions

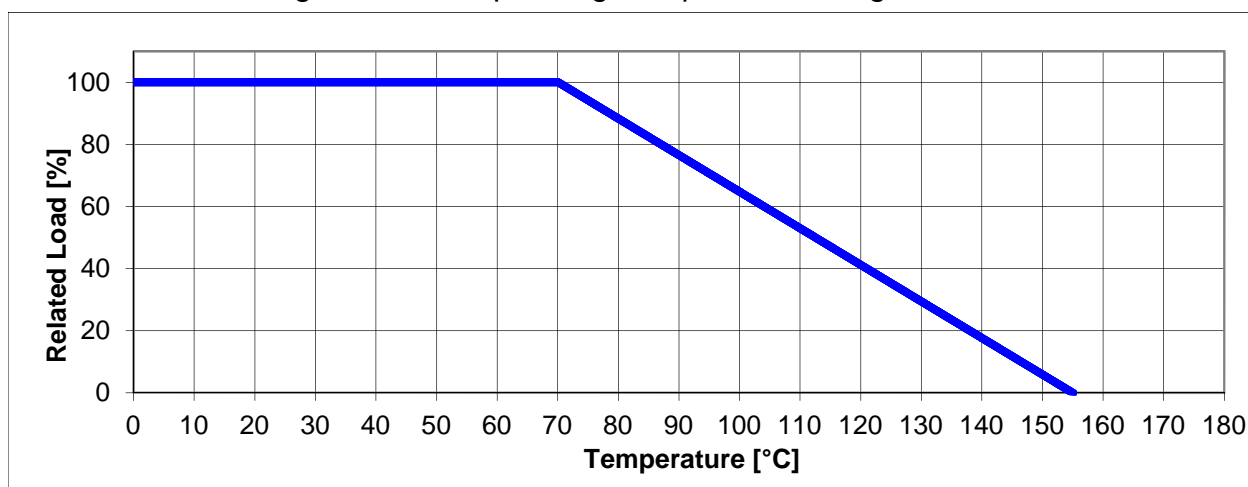
Size	Resistance range	L	W	T	D ₁	D ₂
0603	10 - 29	1,55±0,10	0,85±0,10	0,40±0,10	0,30±0,15	0,45±0,15
	30 - 100	1,55±0,10	0,85±0,10	0,40±0,10	0,30±0,15	0,35±0,15
0805	10 - 29	2,00±0,15	1,25±0,15	0,55±0,10	0,30±0,20	0,50±0,20
	30 - 100	2,00±0,15	1,25±0,15	0,52±0,10	0,30±0,20	0,35±0,20
1206	10 - 29	3,05±0,15	1,55±0,15	0,58±0,15	0,50±0,25	0,90±0,25
	30 - 100	3,05±0,15	1,55±0,15	0,55±0,15	0,50±0,25	0,60±0,25
2010	10 - 29	5,00±0,20	2,50±0,20	0,58±0,15	0,60±0,30	1,50±0,30
	30 - 100	5,00±0,20	2,50±0,20	0,55±0,15	0,60±0,30	0,90±0,30
2512	10 - 29	6,30±0,20	3,15±0,20	0,58±0,15	0,60±0,30	1,80±0,30
	30 - 100	6,30±0,20	3,15±0,20	0,55±0,15	0,60±0,30	1,20±0,30

Unit: mm

SMD

Power Derating Curve

For resistors operated in ambient temperatures above 70 °C , power rating shall be derated in accordance with figure below, Operating Temperature Range : -55°C 155°C



Operating Voltage= $\sqrt{P \cdot R}$; Overload Voltage= $2,5 \cdot \sqrt{P \cdot R}$; Operating Current= $\sqrt{P/R}$

We are capable of manufacturing the optional spec based on customer's requirement

Rating

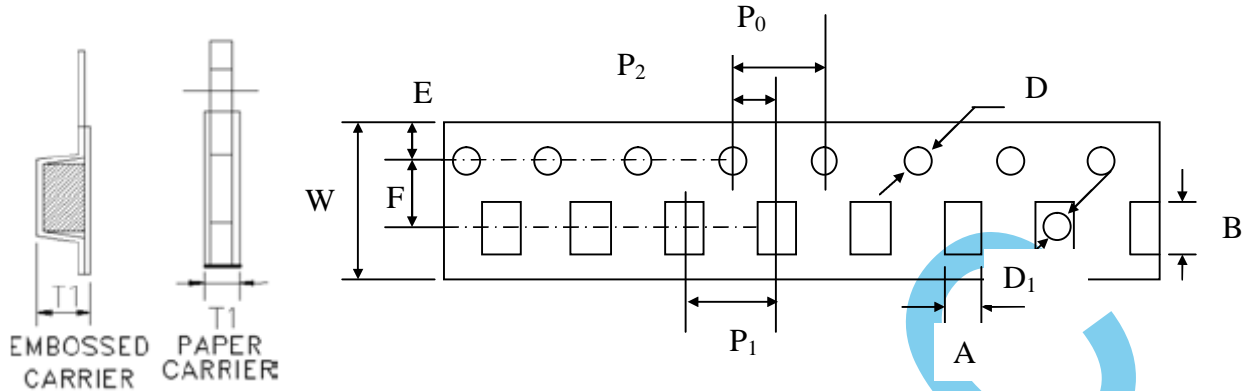
046 Series

Type	Size	Power Rating at 70°C	Operating Temp. Range	Temperature Coefficient [TCR; ppm/°C]	Resistance Range [mΩ]		
					F(±1%) E24, E96	F(±2%) E24	F(±5%) E24
04603	0603	1/8W	-55 ~ +155°	±100	10mΩ ~19mΩ		
				±50	20mΩ ~100mΩ		
04605	0805	1/4W		±100	10mΩ ~19mΩ		
				±50	20mΩ ~100mΩ		
04606	1206	1/2W		±100	10mΩ ~19mΩ		
				±50	20mΩ ~100mΩ		
04620	2010	3/4W		±100	10mΩ ~19mΩ		
				±50	20mΩ ~100mΩ		
04625	2512	1W	±100	10mΩ ~19mΩ			
			±50	20mΩ ~100mΩ			

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SPECIFICATION

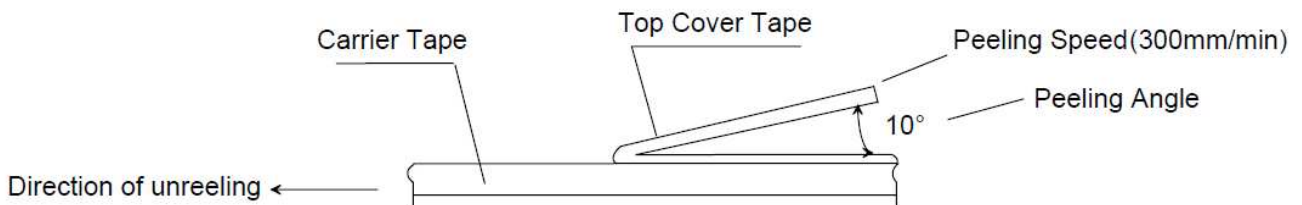
Tape And Reel Package



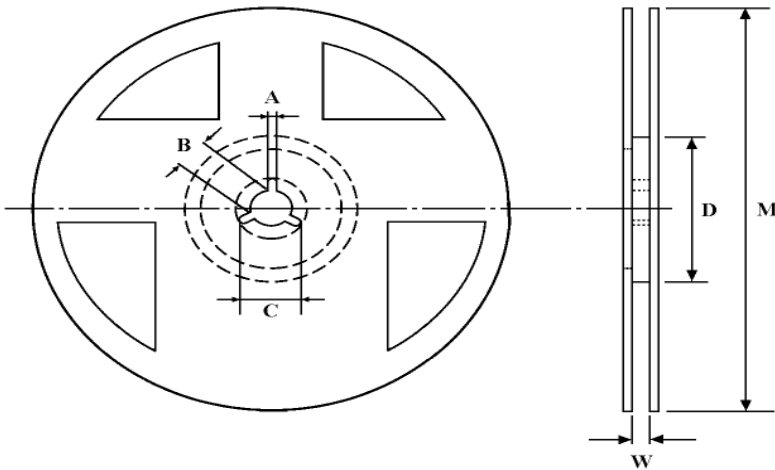
Type	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD	ΦD ₁	T1
0603	1,10±0,10	1,90±0,10	8,0±0,20	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1 -0	-	0,70±0,10
0805	1,60±0,10	2,40±0,20	8,0±0,20	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1 -0	-	0,85±0,10
1206	1,90±0,10	3,50±0,20	8,0±0,20	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,05	2,00±0,05	1,50+0,1 -0	-	0,85±0,10
2010	2,80±0,10	5,50±0,10	12,0±0,30	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	2,80±0,10
2512	3,50±0,10	6,70±0,10	12,0±0,30	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	3,50±0,10

Cover Tape Peel off Strength

Specifications: 0603, 0805, 1206 – peel force of top cover tape shall be between 10 to 60g
 The peel speed shall be about 300mm/min
 for 2010, 2512 – peel force of top cover tape shall be between 20 to 60g
 The peel speed shall be about 300mm/min



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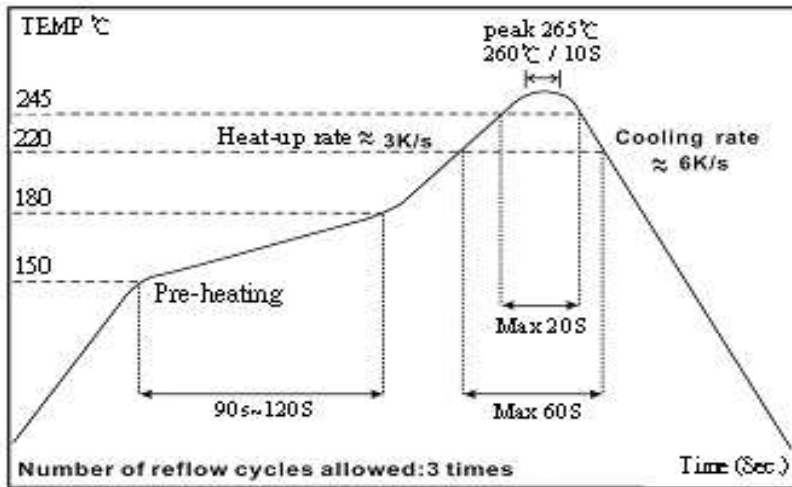


Type	Packaging	M	A	B	C	D	W	T
0603	Paper	178,0±1,0	2±0,3	13,5±0,7	21±2	60,0+1,0	9,5±0,1	11,5±1,0
0805	Paper	178,0±1,0	2±0,3	13,5±0,7	21±2	60,0+1,0	9,5±0,1	11,5±1,0
1206	Paper	178,0±1,0	2±0,3	13,5±0,7	21±2	60,0+1,0	9,5±0,1	11,5±1,0
2010	Embossed	178,0±1,0	2±0,3	13,5±0,7	21±2	60,0+1,0	13,5±1,0	15,5±1,0
2512	Embossed	178,0±1,0	2±0,3	13,5±0,7	21±2	60,0+1,0	13,5±1,0	15,5±1,0

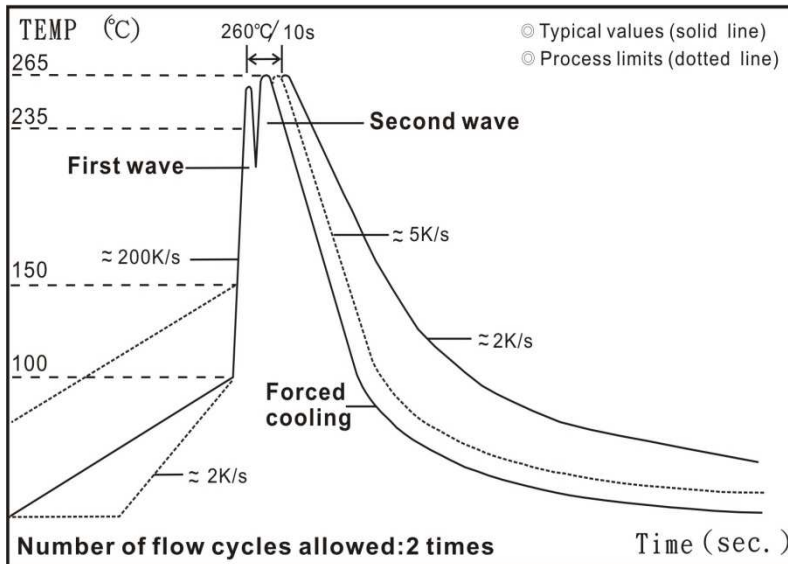
Stock period

The performance of these products, including the solderability, is guaranteed for 12 month, provided that they remain packed as they were when delivered and stored at a temperature of 25°C ± 3°C and a relative humidity less than 80%RH

Lead Free Reflow Soldering Profile

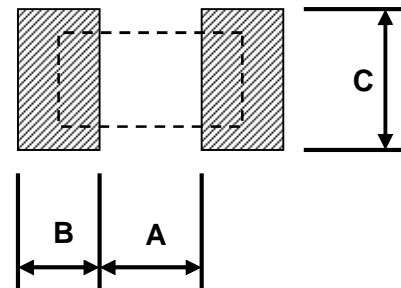


Wave Soldering (Flow Soldering)



Recommended Land Pattern Design (mm):

Size	Resistance range	A	B	C
0603	10-29mΩ	0,40	1,20	0,9
	30-100mΩ	0,70	1,05	0,9
0805	10-29mΩ	0,80	1,10	1,35
	30-100mΩ	1,00	1,00	1,35
1206	10-29mΩ	0,9	1,70	1,70
	30-100mΩ	1,50	1,40	1,70
2010	10-29mΩ	1,70	2,35	2,50
	30-100mΩ	2,80	1,80	2,50
2512	10-29mΩ	2,30	2,90	3,10
	30-100mΩ	3,60	2,25	3,10



Item	Requirement	Test Method
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	$\pm(0,5\%+0,05\Omega)$	5 X Rated Power for 5 seconds
Insulation Resistance	$\geq 10G$	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload voltage for 1 minute
Endurance	$\pm(1,0\%+0,05\Omega)$	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70 \pm 2°C, RCWV for 1000 hrs with 1,5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(1,0\%+0,05\Omega)$	JIS-C-5201-1 4.24 40 \pm 2°C, 90~95% R.H., RCWV for 1000 hrs with 1,5 hrs "ON" and 0,5 hrs "OFF"
Dry Heat	$\pm(0,5\%+0,05\Omega)$	JIS-C-5201-1 4.23 IEC-60115-1 2.23.2 at +155°C for 1000 hrs
Bending Strength	As Spec.	JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 5 seconds with 3mm 2010, 2512 sizes: 2mm
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 245 \pm 5°C for 3 seconds
Resistance to Soldering Heat	$\pm(0,5\%+0,05\Omega)$	JIS-C-5201-1 4.18 IEC-60115-1 4.18 260 \pm 5°C for 10 seconds
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 minute
Leaching	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260 \pm 5°C for 30 seconds
Rapid Change of Temperature	$\pm(0,5\%+0,05\Omega)$	JIS-C-5201-1 4.18 IEC-60115-1 4.18 -55°C to +155°C, 5 cycles

For this part: It does not use the materials that include the substances specified in RoHS, the detail refer to the part of prohibition or exclusion items in RoHS (2011/65/EC),

Cadmium and cadmium compounds (permissive content < 100 ppm)

Lead and lead compounds (permissive content < 1000 ppm)

Exceptions specified:

Lead contained in the glass of cathode ray tubes, electronic components and fluorescent tubes,

The glass material used in the electronic components, which includes resistor elements, conductive pastes (silver or copper ones), adhesives, glass frit and sealing materials,

Mercury and its mercury compounds (permissive content < 1000 ppm)

Hexavalent chromium compounds (permissive content < 1000 ppm)

Polybrominated biphenyls (PBB) (permissive content < 1000 ppm)

Polybrominated diphenylethers (PBDE) (permissive content < 1000 ppm)

FrelTec

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