

# FrelTec GmbH

Mathildenstr. 10A  
82319 Starnberg  
Germany

## Low Ohm - Metal Strip Chip Resistor SMD

## SMD

## SPECIFICATION

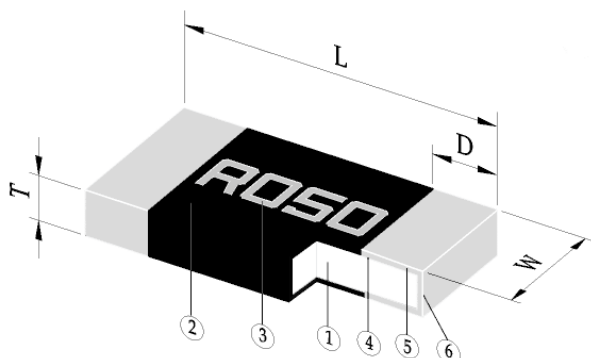
Part  
Number

045	06*	R010*	J*	T05**	O	D
Type	Size	Value	Tolerance	Packing	TCR	Power Rating
045 : SMD Low Ohm Metal Strip Chip Resistor	05 : 0805	R100 = 0,10Ohm	J : $\pm 5\%$	T05: Tape and Reel for 5k pc (7"reel)	O : $\pm 75\text{ppm}/^\circ\text{C}$	D: 1/8W
	06 : 1206	R050 = 0,05Ohm	G : $\pm 2\%$	E04: Tape and reel for 4k pc (7"reel)	F : $\pm 100\text{ppm}/^\circ\text{C}$	E: 1/4W
	20 : 2010	R001 = 0,001Ohm	F : $\pm 1\%$		G : $\pm 200\text{ppm}/^\circ\text{C}$	G: 1/3W
	25 : 2512			** T05 for 0805, 1206 Paper Type	Z : $\pm 275\text{ppm}/^\circ\text{C}$	H: 1/2W
				** E04 for 2010 and 2512 Embossed Plastic Type		I: 3/4W
						J: 1W
						K: 1,5W
						L: 2W
					* not all combination is possible	M: 3W

All products according to RoHS (2011/65/EU)

### SMD

#### Construction and Dimensions

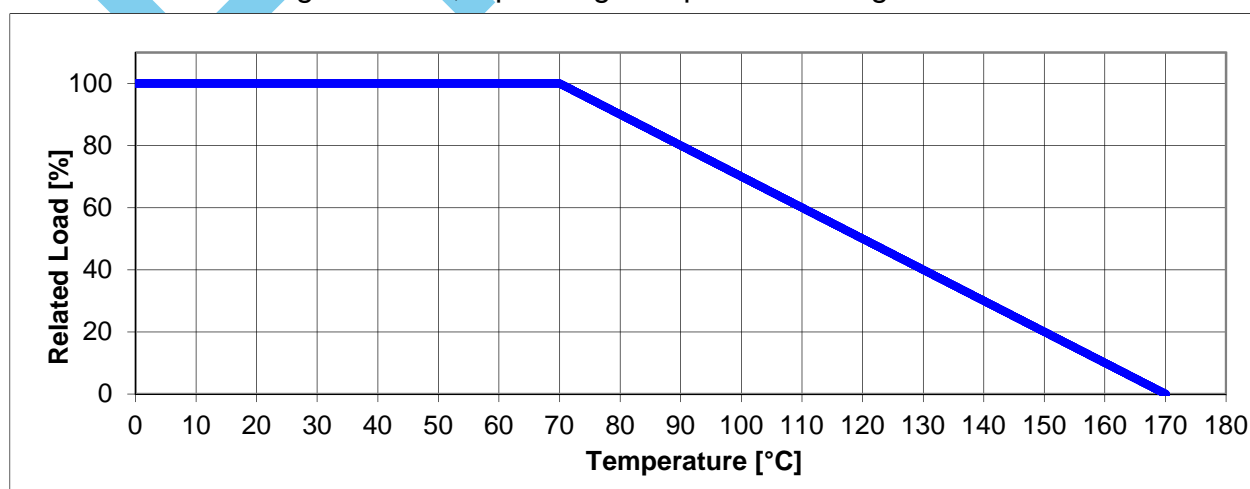


① Alloy Plate	④ Internal Electrode (Cu)
② Overcoat (molding)	⑤ Barrier Layer (Ni)
③ Marking	⑥ Solder Plating (Sn)

Size	Resistance [mΩ]	Material	L [mm]	W [mm]	T [mm]	D [mm]
0805	5, 9, 10, 20	MnCu	2,00±0,10	1,25±0,10	0,60±0,20	0,40±0,20
1206	1	MnCu	3,20±0,20	1,60±0,20	0,75±0,20	1,10±0,30
1206	2-30	MnCu	3,20±0,20	1,60±0,20	0,60±0,20	0,50±0,30
2010	5, 6, 10, 15, 20	NiCu	5,00±0,20	2,50±0,20	0,60±0,20	0,60±0,30
2512	0.5, 0.75	MnCu	6,40±0,20	3,20±0,20	0,60±0,20	2,60±0,20
2512	5, 10, 20, 25, 30, 40, 50	MnCu	6,40±0,20	3,20±0,20	0,60±0,20	0,90±0,20
2512	4-50	NiCu	6,40±0,20	3,20±0,20	0,60±0,20	0,90±0,20
2512	1, 1.5, 2, 3	NiCu	6,40±0,20	3,20±0,20	0,60±0,20	2,0±0,20
2512	2, 3, 4	NiCu	6,40±0,20	3,20±0,20	0,70±0,20	2,0±0,20
2512	10-100	NiCu	6,40±0,20	3,20±0,20	0,70±0,20	0,90±0,20

#### 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 170°C



### SMD

#### Voltage Rating:

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

E= Rated voltage [V]

P= Power rating [W]

R= Nominal resistance [ $\Omega$ ]

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

FrelTec

## SMD

**Rating****045 Series**

For MnCu Material

Type	Size	Power Rating at 70°C	Operating Temp. Range	Temperature Coefficient [TCR; ppm/°C]	Resistance Range [mΩ]	
					F(±1%)	F(±5%)
0460 5	0805	1/4W 1/2W 1W	-55 ~ +170°C	±100	5, 9, 10, 20	
0450 6	1206	1/4W 1/2W 1W		±200	1	
				±100	2, 3, 4, 5, 6, 7, 8, 9, 10	
				±75	12, 14, 15, 20, 22, 25, 30	
0452 5	2512	1W 2W		±200	0,5, 0,75	
		1W		±100	5, 10	
				±75	20, 25, 30, 40, 50	

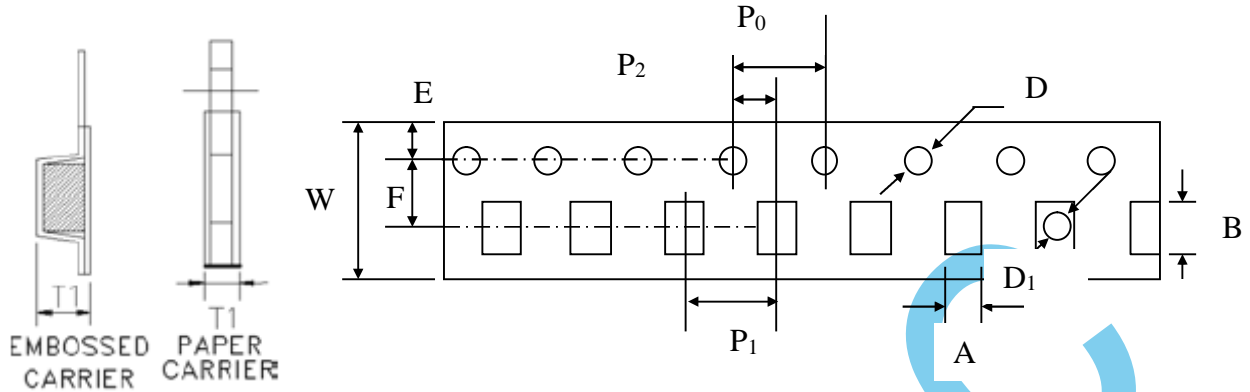
For NiCu Material

Type	Size	Power Rating at 70°C	Operating Temp. Range	Temperature Coefficient [TCR; ppm/°C]	Resistance Range [mΩ]		
					F(±1%)	G(±2%)	F(±5%)
0452 0	2010	1/2W, 3/4W, 1W, 1,5W	-55 ~ +170°C	±100	5, 6, 10		
				±75	15, 20		
0452 5	2512	1W, 2W		±275	1, 1,5		
				±100	2, 3, 4, 5, 6, 7, 8, 10		
		1W		±75	12, 15, 18, 20, 25, 30, 33, 35, 40, 50		
		1W, 2W, 3W		±75	2, 3, 4, 10, 12, 15, 18, 20, 25, 30, 39, 40, 50, 60, 70, 80, 100		

### SMD

#### SPECIFICATION

#### *Tape And Reel Package*



Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD	ΦD <sub>1</sub>	T1
0805	1,60±0,15	2,40±0,20	8,00±0,20	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,50+0,1 -0	-	0,84±0,15
1206	2,00±0,15	3,60±0,20	8,00±0,20	1,75±0,10	3,50±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,50+0,1 -0	-	0,84±0,15
2010	2,80±0,20	5,30±0,20	12,0±0,20	1,75±0,10	5,5±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,50+0,1 -0	1,50+0,25 -0	0,85±0,15
2512	3,60±0,20	6,90±0,20	12,0±0,30	1,75±0,10	5,5±0,05	4,00±0,10	4,00±0,10	2,00±0,05	1,50+0,1 -0	1,50+0,25 -0	0,85±0,15

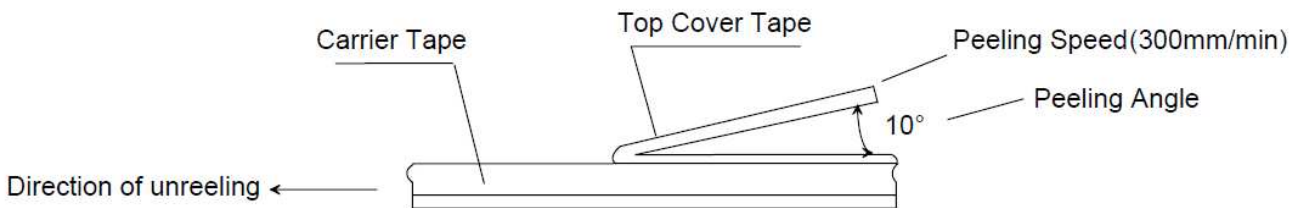
#### Cover Tape Peel off Strength

Specifications:

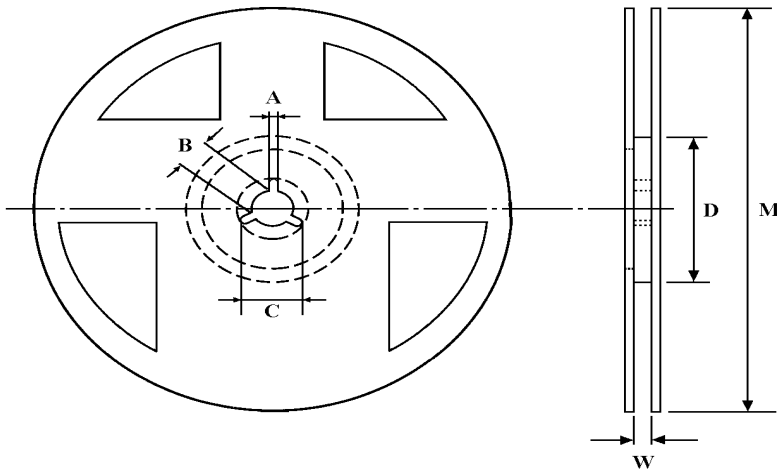
0805, 1206 – peel force of top cover tape shall be between 20 to 90g  
The peel speed shall be about 300mm/min±5%

for 2010, 2512 – peel force of top cover tape shall be between 20 to 110g

The peel speed shall be about 300mm/min±5%



### SMD

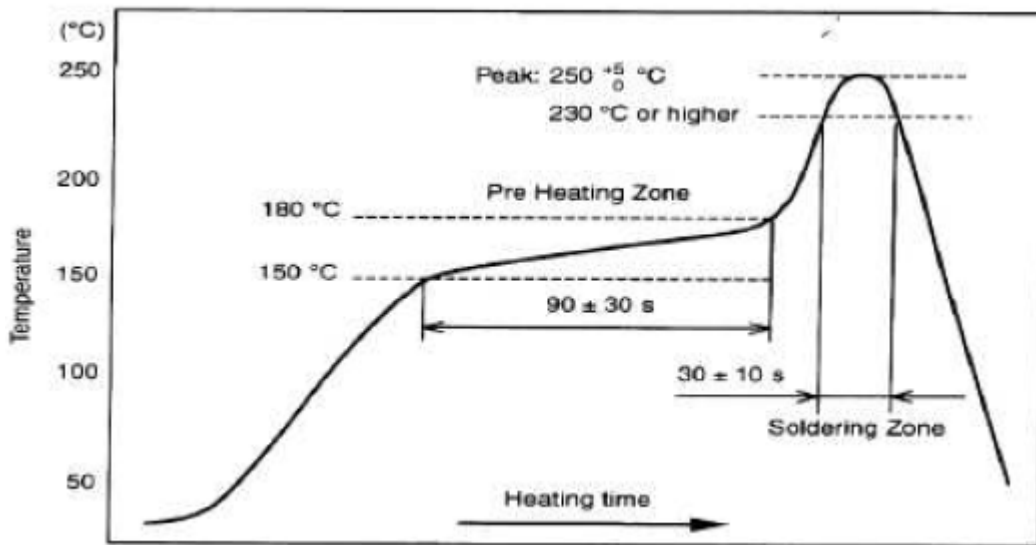


Type	Packaging	M	B	C	D	W	T
045 05 ... T05	Paper	178,5±2,0	13,0±1,0	13,0±1,0	60±1,0	9,0±1,0	11,4±1,0
045 06 ... T05	Paper						11,5±1,0
045 20 ... E04	Embossed	180+0/-3	13,0±1,0	13,0±1,0	60±1,0	13,0±1,0	15,5±1,0
045 25 ... E04	Embossed						15,4±2,0

#### Stock period

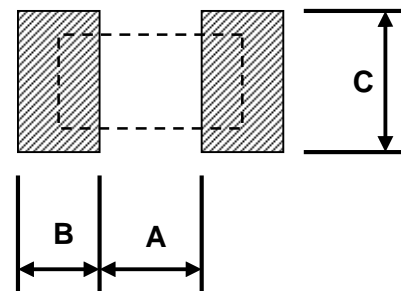
The performance of these products, including the solderability, is guaranteed for 12 month, provided that they remain packed as they were when delivered and stored at a temperature of 25°C ± 3°C and a relative humidity less than 80%RH

## Lead Free Reflow Soldering Profile



## Recommended Land Pattern Design (mm):

Size	A	B	C
0805	1,20	1,15	1,40
1206 1mΩ	1,00	2,30	1,80
1206 2~30mΩ	1,60	1,70	1,80
2010	3,50±0,2	1,50±0,2	3,40±0,2
2512 0,5~3mΩ	1,30	3,10	4,00
2512 4~100mΩ	4,10	2,10	4,00





## SMD

## Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	IEC60115-1 4.8 JIS-C-5201-1 4.8 +25/-55/+25/+125/+25°C
Short Time Overload	0805 & 2010 & 2512: ±0,5%, 1206: ±1%	IEC60115-1 4.13 JIS-C-5201-1 4.13 5*rated power for 5 seconds
Insulation Resistance	>100MΩ	IEC60115-1 4.6 JIS-C-5201-1 4.13 100V DC for 1 minute
Endurance	±1.0%	IEC60115-1 4.25.1 JIS-C-5201-1 4.25.1 70±2°C, rated power for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat no Load	2512 0,5mΩ, 0,75mΩ & 1206: ±0,5% Other sizes: ±1,0%	IEC60115-1 4.24.2.1a JIS-C-5201-1 4.24.2.1a 85°C, 85%RH, 1000 hrs
Dry Heat	±1,0%	IEC60115-1 4.23.2 JIS-C-5201-1 4.23.2 at +170°C for 1000 hrs
Bending Strength	±1,0%	JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending width 2mm once for 5 seconds
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 245±5°C for 2 seconds
Resistance to Soldering Heat	±0,5%	JIS-C-5201-1 4.18 IEC-60115-1 4.18 0805&2010: 260±5°C for 10 seconds 1206&2512: 260±5°C for 20 seconds
Thermal Shock	0805 & 2010: ±0,5% 1206 & 2512: ±1%	JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C ~ 150°C, 300 cycles, 15 min per extreme condition.
Low Temperature Storage	0805 & 2010 & 2512: ±0,5%, 1206 : ±1%	IEC60115-1 4.23.4 JIS-C-5201-1 4.23.4 at -55°C for 1000 hrs

**Published by FrelTec® GmbH**  
**Mathildenstr, 10A; 82319 Starnberg; Germany**  
© 2016 FrelTec® GmbH, All Rights Reserved,

The following applies to all products named in this publication:

1. The information describes the type of component and shall not be considered as assured characteristics,
2. Terms of delivery and rights to change design reserved,
3. Some parts of this publication contain statements about the suitability of our products for certain areas of application, These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned, Nevertheless, we explicitly point out that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application, As a rule, FrelTec® is either unfamiliar with individual customer applications or less familiar with them than the customers themselves, For these reasons, it is always ultimately incumbent on the customer to check and decide whether a FrelTec® product with the properties described in the product specification is suitable for use in a particular customer application,
4. We also point out that in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified, In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component,
5. The warnings, cautions and product-specific notes must be observed,
6. In order to satisfy certain technical requirements, some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as "hazardous"), Useful information on this will be found in our Material Data Sheets, Should you have any more detailed questions, please contact our sales offices,
7. We constantly strive to improve our products, Consequently, the products described in this publication may change from time to time, The same is true for the corresponding product specifications, Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order, We also reserve the right to discontinue production and delivery of products, Consequently, we cannot guarantee that all products named in this publication will always be available,
8. Unless otherwise agreed in individual contracts, all orders are subject to the current version of the "General conditions for the supply of products and services of the electrical and electronics industry" published by the German Electrical and Electronics Industry Association (ZVEI), available at [www.freltec.com](http://www.freltec.com),
9. As far as patents or other rights of third parties are concerned, liability is only assumed for components per se, not for applications, processes and circuits implemented within components or assemblies,
10. The trade name FrelTec® is a trademark registered or pending in Europe and in other countries,