

MELF Carbon Film

FrelTec

Resistors

FrelTec GmbH

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MELF Carbon Film Resistors

SPECIFICATION

Part Number

056	24*	D*	-----	J*	E03*
Type	Size	Power Rating	Value	Tolerance	Packing Type
056 : MELF Carbon Film Resistors	24 : 0204	D: 1/8W	The last digit is the	G : ±2%	E03 : Embossed tape and reel for 3k pcs (7"reel)
	27 : 0207	E: 1/4W	multiplier which denotes	J : ±5%	E02 : Embossed tape and reel for 2k pcs (7"reel)
	39 : 0309	H: 1/2W	the number of zero following		
		J: 1W	First digit is "0"		
		L: 2W	0000 = 00hm		
			R = Decimal		
			Example:		
			01R1=		
			1,10hm		
			0102 = 1k0hm		

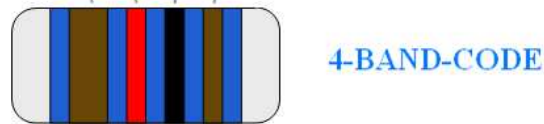
1. Applicable Scope:

This specification is for use in MELF Carbon Film Resistors
 Characteristics and specifications are according to those of:
 JIS C 5201-1 (Please see detail in item "Characteristics")

2. Marking

Colour code indication for nominal resistance value and tolerance.

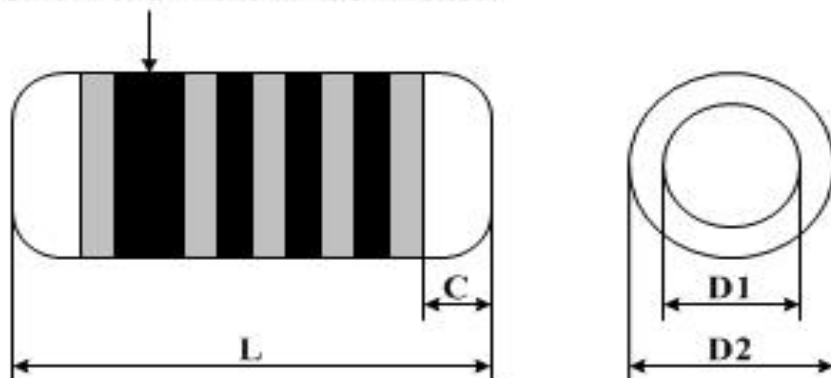
COLOR	1ST BAND	2ND BAND	3RD BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1	
BROWN	1	1	1	10	± 1% (F)
RED	2	2	2	100	± 2% (G)
ORANGE	3	3	3	1K	
YELLOW	4	4	4	10K	
GREEN	5	5	5	100K	± 0.5% (D)
BLUE	6	6	6	1M	± 0.25% (C)
VIOLET	7	7	7	10M	± 0.10% (B)
GREY	8	8	8		± 0.05%
WHITE	9	9	9		
GOLD				0.1	± 5% (J)
SILVER				0.01	± 10% (K)



Color code (4 color bands)
 Normal size $\frac{1}{8}W$, $\frac{1}{4}W$, $\frac{1}{2}W$
 Small Size $\frac{1}{4}W$, $\frac{1}{2}W$, $1W$ and
 Ultra small: $1W$ and $2W$

3. DIMENSIONS:

Start read value at the thickest

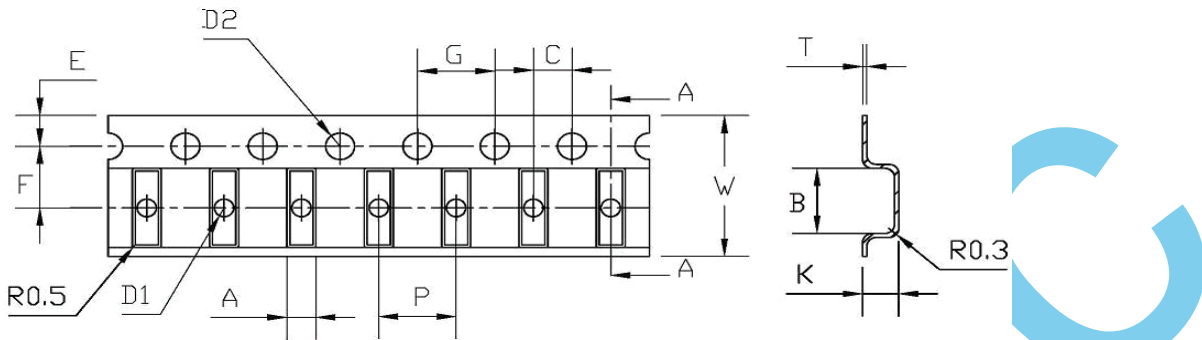


Type	Dimension (mm)				
	Power Rating	L	C Min	D1	D2 Max
056 24 0204	0,125W (1/8 W)	3,5±0,2	0,5	1,40±0,15	1,55
	0,25W (1/4 W)				
056 27 0207	0,25W (1/4 W)	5,9±0,2		2,2±0,1	2,4
	0,5W (1/2W)				
	1W				
056 39 0309	0,5W (1/2W)	8,5±0,2		3,2±0,2	3,4
	1W				
	2W				

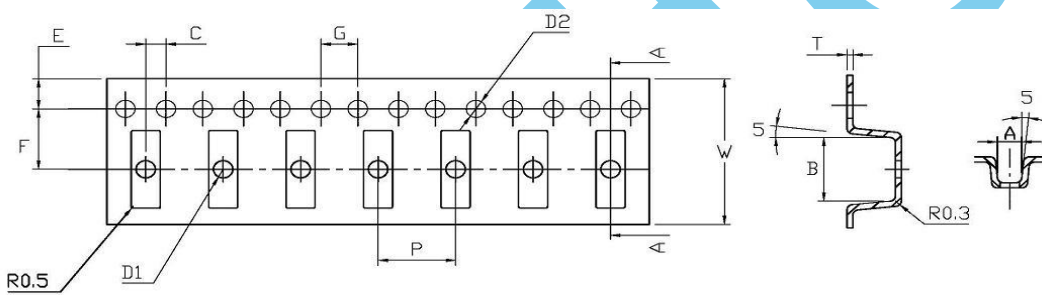
4. Packing

Tape Packing

0204 and 0207:



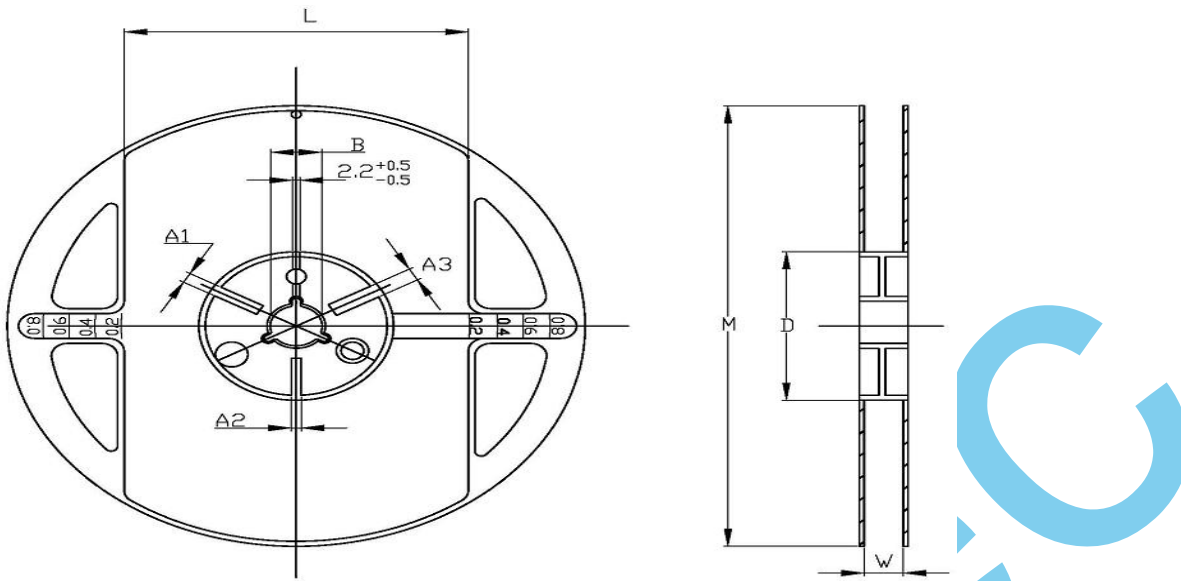
0309:



Type	A	B	C	D1	D2	E	F	G	K	P	T	W
0204	1,60 ± 0,10	3,70 ± 0,10	2,0 ± 0,50	1,0 ± 0,10	1,50 + 0,1 - 0	1,75 ± 0,10	3,50 ± 0,50	4,0 ± 0,10	1,65 ± 0,10	4,0 ± 0,10	0,22 ± 0,05	8,0 ± 0,10
0207	2,30 ± 0,10	6,05 ± 0,10	2,0 ± 0,10	1,5 ± 0,10	1,50 + 0,1 - 0	1,75 ± 0,10	5,50 ± 0,10	4,0 ± 0,10	2,50 ± 0,10	4,0 ± 0,10	0,30 ± 0,05	12,0 ± 0,10
0309	3,50 ± 0,10	8,85 ± 0,10	2,0 ± 0,10	1,5 ± 0,10	1,50 + 0,1 - 0	1,75 ± 0,10	7,50 ± 0,10	4,0 ± 0,10	3,50 ± 0,10	8,0 ± 0,10	0,35 ± 0,05	16,0 ± 0,30

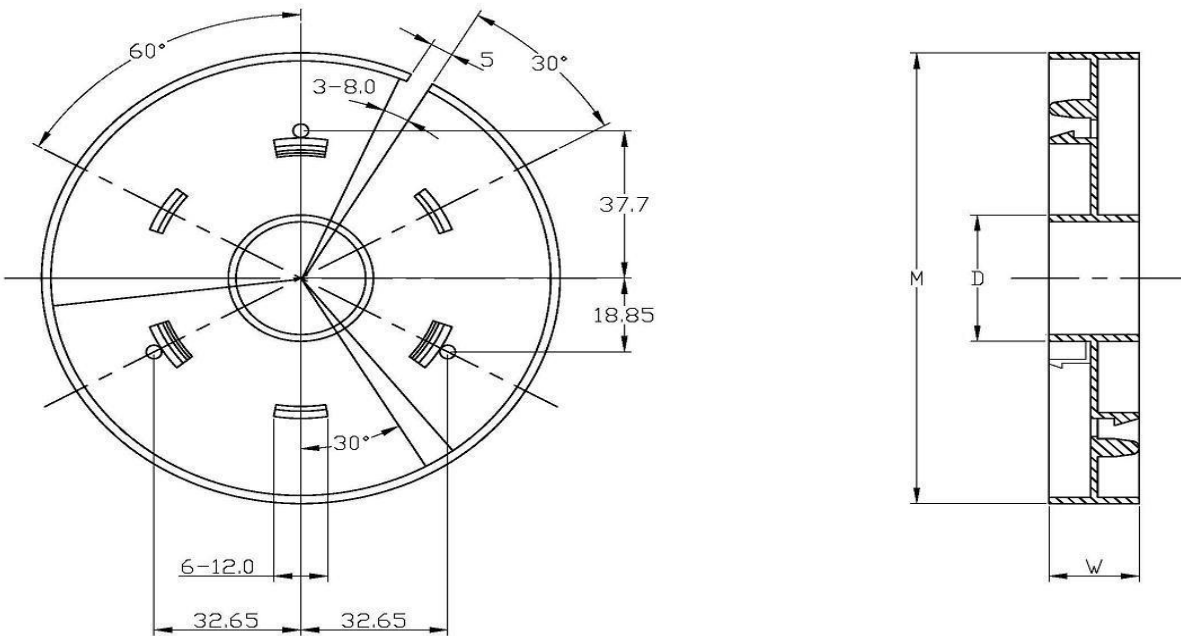
unit mm

Tape in Reel packing:



Type	Quantity Per Reel	A1	A2	A3	B	D	L	M	W
0204	3.000	4,0 +0,5 -0,0	3,0 +0,5 -0,0	5,0 +0,5 -0,0	13 ±0,2	60 +0,5 -0,0	110 +0,3 -0,5	178 ±0,1	9,0 ±0,5
0207	2.000	4,0 +0,5 -0,0	3,0 +0,5 -0,0	5,0 +0,5 -0,0	13 ±0,2	60 +0,5 -0,0	110 +0,3 -0,5	178 ±0,1	9,0 ±0,5

unit mm



Type	Quantity Per Reel	D	M	W
0309	2.500	28± 1	99± 1	17,4± 1

unit mm

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year after production date code, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and a relative humidity of $60\% \text{ RH} \pm 10\% \text{ RH}$

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures:

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2 , H_2S , NH_3 , SO_2 , or NO_2
2. In direct sunlight

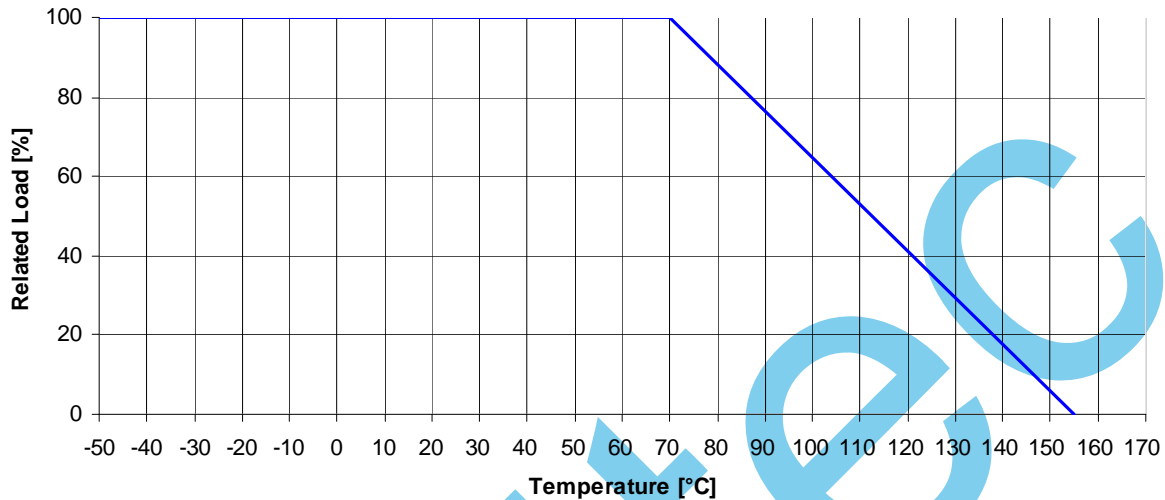
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5. Specification

Type	Power Rating at 70 °C	Tolerance [%]	Resistance Range	T.C.R [PPM/°C]	Max. Working Voltage	Max. Overload Voltage	Nominal Resistance	Temperature Range	Ambient Temperature					
0204	0,125 W	± 5	1Ω to 1kΩ	350	200V	400V	100Ω	-55°C ~ +155°C	70°C					
			1,1kΩ to 47kΩ	600										
			51kΩ to 470kΩ	1000										
			510kΩ to 1MΩ	1500										
		± 2	1Ω to 1kΩ	350										
			1,1kΩ to 47kΩ	600										
			51kΩ to 470kΩ	1000										
			510kΩ to 1MΩ	1500										
0207	0,25 W	± 5	1Ω to 1kΩ	350	300V	600V								
			1,1kΩ to 150kΩ	600										
			160kΩ to 1MkΩ	1000										
			1Ω to 1kΩ	350										
		± 2	1,1kΩ to 150kΩ	600										
			160kΩ to 1MkΩ	1000										
			0309	0,50 W						± 5	1Ω to 1kΩ	350	350V	700V
											1,1kΩ to 150kΩ	600		
160kΩ to 1MkΩ	1000													
1Ω to 1kΩ	350													
± 2	1,1kΩ to 150kΩ	600												
	160kΩ to 1MkΩ	1000												
	0204	0,25 W			± 5	1Ω to 1kΩ	350	250V	500V					
						1,1kΩ to 150kΩ	600							
160kΩ to 1MkΩ			1000											
10Ω to 1kΩ			350											
± 2			1,1kΩ to 150kΩ	600										
			160kΩ to 1MkΩ	1000										
			0207	0,5 W	± 5	1Ω to 1kΩ	350			300V	600V			
						1,1kΩ to 150kΩ	600							
160kΩ to 1MkΩ	1000													
± 2	1Ω to 1kΩ	350												
	1,1kΩ to 150kΩ	600												
	160kΩ to 1MkΩ	1000												
1W	± 5	1Ω to 1kΩ		350	350V	700V								
		1,1kΩ to 150kΩ		600										
		160kΩ to 1MkΩ	1000											
		1Ω to 1kΩ	350											
± 2	1,1kΩ to 150kΩ	600												
	160kΩ to 1MkΩ	1000												
	0309	1W	± 5	1Ω to 1kΩ	350	350V	700V							
				1,1kΩ to 150kΩ	600									
160kΩ to 1MkΩ				1000										
± 2			1Ω to 1kΩ	350										
			1,1kΩ to 150kΩ	600										
			160kΩ to 1MkΩ	1000										
2W		± 5	1Ω to 1kΩ	350	350V	700V								
			1,1kΩ to 150kΩ	600										
	160kΩ to 1MkΩ		1000											
	± 2		1Ω to 1kΩ	350										
1,1kΩ to 150kΩ		600												
160kΩ to 1MkΩ		1000												

6. Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 °C. For temperature in excess of 70 °C, the load shall be derated as shown in the figure below.

**7. Voltage rating:**

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

Where:

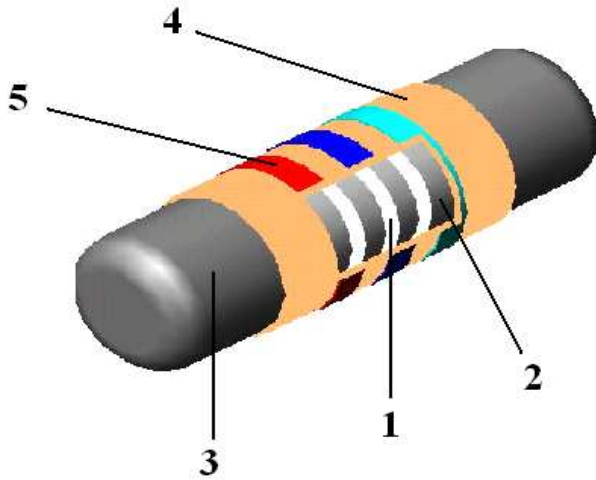
RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform [V]

P = Power Rating [W]

R = Nominal Resistance [Ω]

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

8. Structure Diagram



No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Carbon Film
3	End Cap	Steel (Tin plated iron surface)
4	Coating	Insulated epoxy resin (Color : Ivory)
5	Color Code	Epoxy Resin

9. Nominal Resistance

Effective figures of nominal resistance shall be in accordance with E-24 series.

± 5%	E-24	1,0	1,1	1,2	1,3	1,5	1,6	1,8	2,0	2,2	2,4	2,7	3,0	3,3	3,6	3,9	4,3	4,7	5,1	5,6	6,2	6,8	7,5	8,2	9,1
± 2%																									

10. Characteristics

Characteristics	Limits		Test Methods (JIS C 5201-1)
Temperature coefficient	Refer to "specification" above.		Natural resistance change per temp. degree centigrade R2-R1 x 106 (PPM/°C) $\frac{R1(t2-t1)}{R1}$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)
Short time overload	Resistance change rate is $\pm (1\% + 0,05\Omega)$ Max. with no evidence of mechanical damage		Permanent resistance change after the application of a potential of 2,5 times RCWV for 5 seconds (Sub-clause 4.13)
Solderability	95 % coverage Min.		The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. of solder : 245°C \pm 3°C Dwell time in solder : 2 ~ 3 seconds (Sub-clause 4.17)
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0,05\Omega)$ Max. with no evidence of mechanical damage		Permanent resistance change when immersed in 260°C \pm 5°C solder for 10s \pm 1s leads immersed to 3,2 to 4,8 mm from the body in 350°C \pm 10 °C solder for 3 \pm 0,5 seconds (Sub-clause 4.18)
Load life in humidity	Resistance value	$\Delta R/R$	Resistance change after 1.000 hours (1,5 hours "on", 0,5 hour "off") at RCWV in a humidity test chamber controlled at 40 °C \pm 2 °C and 90 to 95 % relative humidity (Sub-clause 4.24.2.1)
	Normal type	$\pm 1,5 \%$	
Load life	Resistance value	$\Delta R/R$	Permanent resistance change after 1.000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70°C \pm 2°C ambient (Sub-clause 4.25.1)
	Normal type	$\pm 1,5 \%$	
Pulse overload	Resistance change rate is $\pm (1\% + 0,05\Omega)$ Max. with no evidence of mechanical damage		Resistance change after 10.000 cycles (1 sec. "on" , 25 secs. "off") at 4 times RCWV (Sub-clause 5.8)

Environment Related Substance:

This product comply to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

This product is not manufacture using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

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