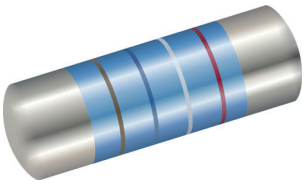
MELFC SERIES
COATED THIN FILM PRECISION RESISTORS

VENKEL LTD.



FEATURES:

- Precision TCR of 10, 15, 25 & 50ppm/˚C
- High reliability and stability of ±0.1 and ±0.5%
- Excellent pulse load capability
- Strong mechanical body due to cylindrical shape
- AEC-Q200 compliant
- Anti-Sulfur - Prevents the formation of Silver Sulfide (Ag2S)

RoHS Compliant | REACH Compliant | HF Halogen FREE | Conflict Minerals FREE 3TG

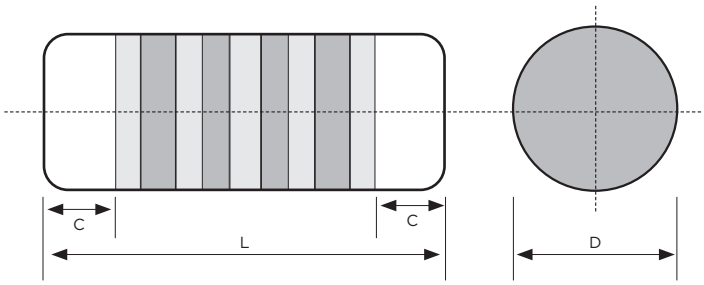
PART NUMBER STRUCTURE

MELF C	0207	-	V	E	-	1002	B	T
Series	**Size**		**Power Rating**	**TCR**		**Resistance Value**	**Resistance Tolerance**	**Packaging**
MELF C	0102		R = 0.125W	N = 10ppm/˚C		49R9 = 49.9Ω	B = ± 0.10%	T = Tape & Reel
	0204		U = 0.20W	Z = 15ppm/˚C		1000 = 100Ω	C = ± 0.25%	
	0207		T = 0.25W	E = 25ppm/˚C		1001 = 1KΩ	D = ± 0.50%	
			Y = 0.30W	C = 50ppm/˚C		1003 = 100KΩ	F = ± 1%	
			Z = 0.40W	K = 100ppm/˚C				
			V = 0.50W					
			X = 1.0W					

Example P/N: MELFC0207-VE-1002BT

Standard temination finish is 100% matte Tin (Sn) over Nickel.

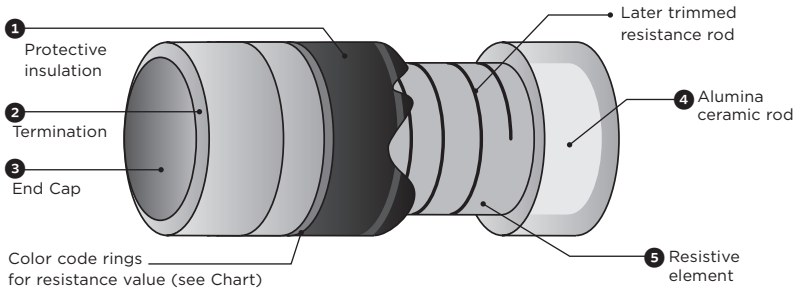
DIMENSIONS



Unit: inches (mm)

SIZE	L	D	C
0102	0.087 ± 0.004 (2.20 ± 0.10)	0.043 ± 0.004 (1.10 ± 0.10)	0.018 ± 0.002 (0.45 ± 0.05)
0204	0.137 ± 0.004 (3.50 ± 0.10)	0.055 ± 0.006 (1.40 ± 0.15)	0.035 ± 0.004 (0.90 ± 0.10)
0207	0.232 ± 0.007 (5.90 ± 0.20)	0.087 ± 0.004 (2.20 ± 0.20)	0.055 ± 0.004 (1.40 ± 0.10)

STRUCTURE



1	Epoxy Coating
2	100% Matte Tin (Sn) over Nickel (Ni)
3	End Cap
4	Alumina (AL2O3)
5	Nickel Chromium (NiCr)

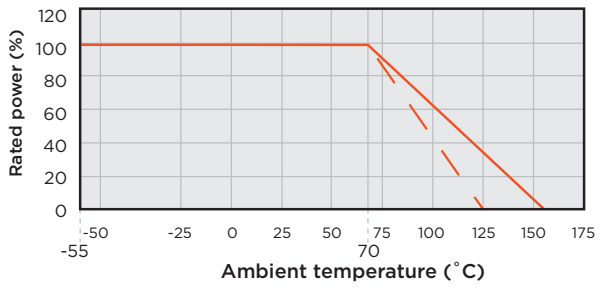
ELECTRICAL SPECIFICATIONS & RANGE

	SIZE (MM)	0102			0204		0207	
	Power Rating at 70°C (W)	0.125W (1/8W)	0.20W (1/5W)	0.30W (3/10W)	0.25W (1/4W)	0.40W (2/5W)	0.50W (1/2W)	1.0W
	Max. Working Voltage (DC or rms)	150V	200V	200V	200V		300V	350V
	Max. Overload Voltage (DC or rms)	300V	400V	400V	400V		600V	700V
	Operating Temp. Range	-55°C to +155°C						
Tolerance	**TCR**	**--- Resistance Range ---**						
±0.10%	±10ppm	-	-	-	49.9Ω - 20KΩ	-	49.9Ω - 20kΩ	-
	±15ppm	100Ω - 56KΩ	100Ω - 56KΩ	-	49.9Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ
	±25ppm	100Ω - 82KΩ	-	-	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ
	±50ppm	-	-	-	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ
	±100ppm	-	-	-	-	-	-	-
±0.25%	±10ppm	-	-	-	49.9Ω - 20KΩ	-	49.9Ω - 20KΩ	-
	±15ppm	100Ω - 56KΩ	100Ω - 56KΩ	-	49.9Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ
	±25ppm	100Ω - 82KΩ	100Ω - 82KΩ	-	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ	10Ω - 1MΩ
	±50ppm	-	-	-	1Ω - 1MΩ	1Ω - 1MΩ	1Ω - 1MΩ	1Ω - 1MΩ
	±100ppm	-	-	-	-	-	-	-
±0.50%	±10ppm	-	-	-	49.9Ω - 20KΩ	-	49.9Ω - 20KΩ	-
	±15ppm	100Ω - 56KΩ	100Ω - 56KΩ	-	49.9Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ
	±25ppm	49.9Ω - 200KΩ	49.9Ω - 200KΩ	-	10Ω - 3.4MΩ	10Ω - 3.4MΩ	10Ω - 3.4MΩ	10Ω - 3.4MΩ
	±50ppm	1Ω - 1MΩ	8.2Ω - 1MΩ	1Ω - 1MΩ	1Ω - 3.4MΩ	1Ω - 3.4MΩ	1Ω - 3.4MΩ	1Ω - 3.4MΩ
	±100ppm	-	-	-	-	-	-	-
±1%	±10ppm	-	-	-	49.9Ω - 20KΩ	-	49.9Ω - 20KΩ	-
	±15ppm	100Ω - 56KΩ	100Ω - 56KΩ	-	49.9Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ	10Ω - 300KΩ
	±25ppm	49.9Ω - 390KΩ	49.9Ω - 390KΩ	-	10Ω - 3.4MΩ	1Ω - 3.4MΩ	1Ω - 3.4MΩ	1Ω - 3.4MΩ
	±50ppm	1Ω - 1MΩ	1.0Ω - 1MΩ	1Ω - 1MΩ	0.2Ω - 3.4MΩ	0.2Ω - 3.4MΩ	0.2Ω - 3.4MΩ	0.2Ω - 3.4MΩ
	±100ppm	1Ω - 1MΩ	43Ω - 1MΩ	1Ω - 1MΩ	0.1Ω - 3.4MΩ	0.1Ω - 3.4MΩ	0.1Ω - 3.4MΩ	0.1Ω - 3.4MΩ

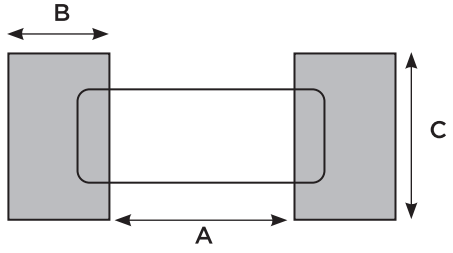
Zero Ohm Jumper is also available (<15mΩ). Zero Ohm Current ratings are : 0102 = 2A, 0204 = 3A, 0207 = 5A

NOTE: Max Working Voltage is listed above or √ (P*R), whichever is lower. Max Overload Voltage is listed above or 2.5*√ (P*R), whichever is lower. This is the maximum voltage that may be continuously supplied to the resistor element. see "IEC publication 60115-8".

DERATING CURVE



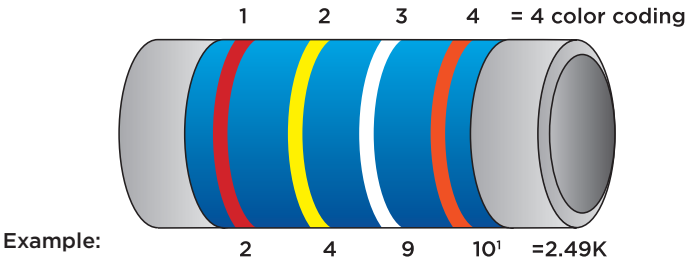
RECOMMENDED LAND PATTERN



Unit: mm

	0102	0204	0207
A (mm)	1.0	1.6	3.0
B (mm)	0.8	1.2	1.7
C (mm)	1.5	1.6	2.4

MARKING CODES FOR RESISTANCE VALUES



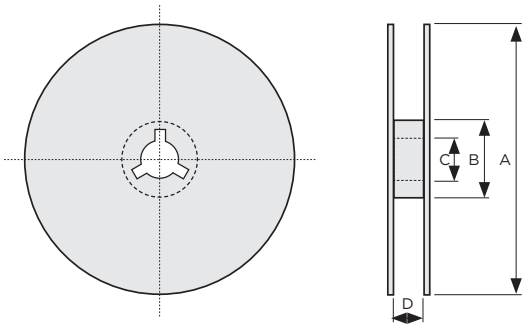
STANDARD RESISTANCE VALUES															
±1% ±0.5% ±0.25% ±0.1%															
E192															
100	115	133	154	182	210	243	280	324	374	432	499	576	665	768	887
101	117	135	156	184	213	246	284	328	379	437	505	583	673	777	898
102	118	137	158	187	215	249	287	332	383	442	511	590	681	787	909
104	120	138	160	189	218	252	291	336	388	448	517	597	690	796	920
105	121	140	162	191	221	255	294	340	392	453	523	604	698	806	931
106	123	142	164	193	223	258	298	344	397	459	530	612	706	816	942
107	124	143	165	196	226	261	301	348	402	464	536	619	715	825	953
109	126	145	167	198	229	264	305	352	407	470	542	626	723	835	965
110	127	147	169	200	232	267	309	357	412	475	549	634	732	845	976
111	129	149	174	203	234	271	312	361	417	481	556	642	741	856	988
113	130	150	178	205	237	274	316	365	422	487	562	649	750	866	
114	132	152	180	208	240	277	320	370	427	493	569	657	759	876	

COLOR 1 CODING	COLOR 2 CODING	COLOR 3 CODING	COLOR 4 CODING
	0	0	10^0
1	1	1	10^1
2	2	2	10^2
3	3	3	10^3
4	4	4	10^4
5	5	5	10^5
6	6	6	
7	7	7	
8	8	8	10^{-1}
			10^{-2}

Resistance values more than two digits (<1Ω) or more than three digits (>1Ω) will not be marked.

TAPE & REEL SPECIFICATIONS

REEL



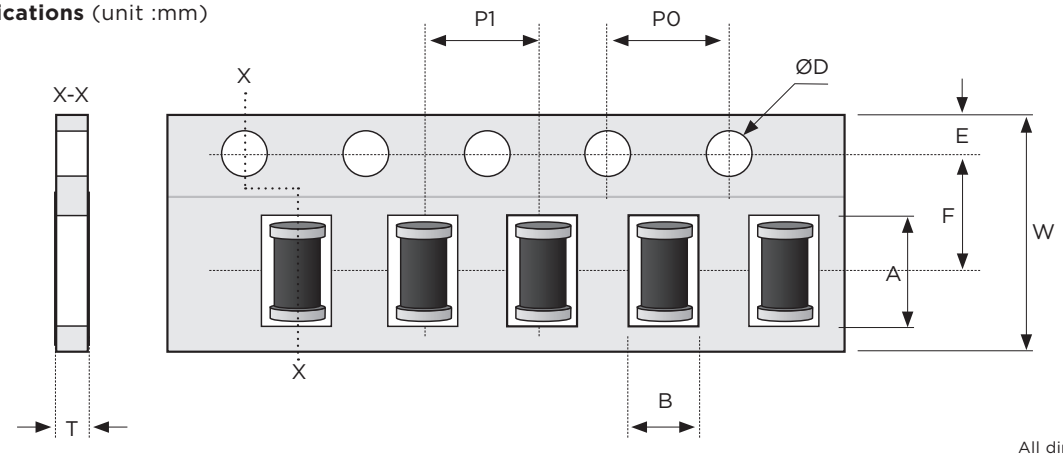
All dimensions in mm.

SIZE	A	B	C	D
0102	Ø 178.0±2.0	Ø 60.0±1.0	13.0±1.0	9.0±0.5
0204	Ø 178.0±2.0	Ø 60.0±1.0	13.0±1.0	9.0±0.5
0207	Ø 178.0±2.0	Ø 60.0±1.0	15.0±1.0	13.0±0.5

Taping quantity per reel:
3,000 pcs per reel (0102)
3,000 pcs per reel (0204)
2,000 pcs per reel (0207)

TAPE

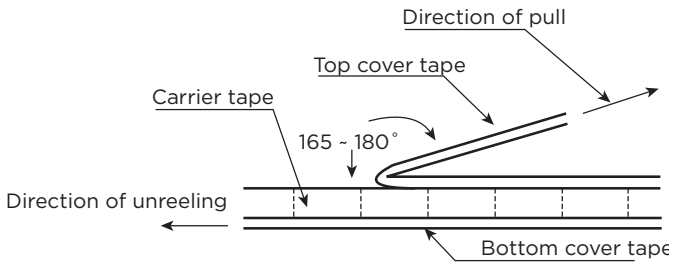
Paper Tape specifications (unit :mm)



All dimensions in mm.

SIZE	A	B	W	E	F	P0	P1	ØD	T
0102	2.40±0.10	1.30±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	1.50±0.10	1.50±0.1
0204	3.65±0.10	1.55±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	1.50±0.10	1.80±0.1
0207	6.15±0.10	2.40±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	1.50±0.10	2.70±0.1

PEEL BACK FORCE & DIRECTION DIAGRAM



Peel back force and direction of peel back angle should follow EIA481-1-A. Peel back force should be between 0.1N – 1.3N and peel back angle of 165° – 180°.

SOLDERING CONDITIONS

The robust construction of cylindrical resistors allows them to be completely immersed in a solder bath of 260˚C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).
Surface Mount Resistors are tested for solderability at 235˚C during 2 seconds within lead-free solder bath. The test condition for no leaching is 260C for 30 seconds. Typical examples of soldering profile and condition that provide reliable solder joints without any damage are provided below:

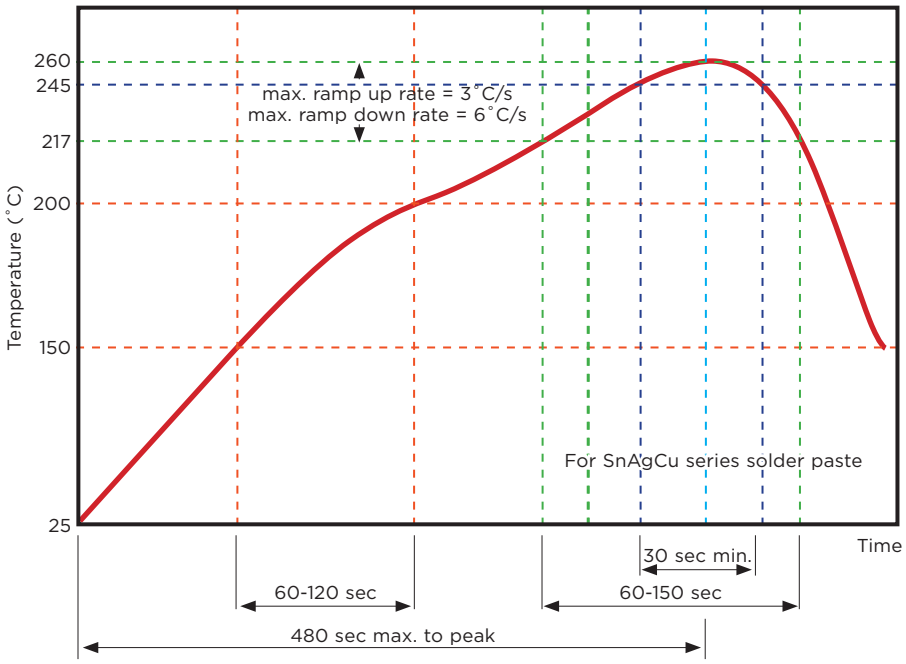


Table 1: Infrared soldering condition for MELF Resistors

TEMPERATURE CONDITION	EXPOSURE TIME
Average ramp-up rate (217˚C to 260˚C)	<3˚C/second
Between 150 and 200˚C	Between 60-120 seconds
> 217˚C	Between 60-150 seconds
Peak Temperature	260ºC
Time within 245˚C	Min. 30 seconds
Ramp-down rate (Peak to 217˚C)	≤5˚C/second
Time from 25˚C to Peak	No greater than 480 seconds

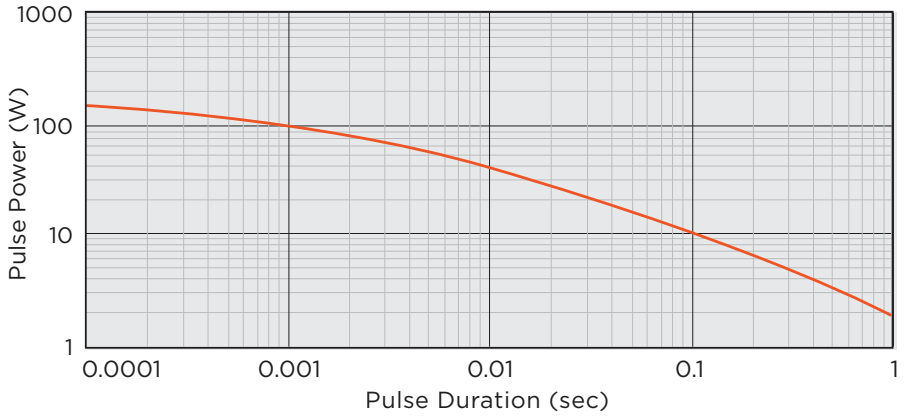
ENVIRONMENTAL CHARACTERISTICS

TEST	PROCEDURE	REQUIREMENT
Electrical Characteristics IEC 60115-1 4.8	- DC resistance values measurement - Temperature Coefficient of Resistance (T.C.R) Natural resistance change per change in degree centigrade. $\frac{R2 - R2}{R1(t2 - t1)}$ x105 (ppc.˚C) t1: 20˚C+5˚C-1˚C R1 : Resistance at reference temperature (20°C+5°C/-1°C) R2 : Resistance at test temperature (-55°C or +125°C)	Refer to IEC60115-1 for maximum allowable change and specifications
Short time overload (S.T.O.L) IEC60115-1 4.13	Permanent resistance change after a 5 second application of a voltage 2.5 times RCWV or the maximum overload voltage specified, whichever is less.	±(0.1%+0.05Ω)
Resistance to soldering heat(R.S.H) MIL-STD-202 Method 210	Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 260˚C ±5ºC	±(0.1%+0.05Ω) no visible damage
Solderability IEC-60115-1 4.17	Un-mounted chips completely immersed for 2±0.5 second in a SAC solder bath at 235˚C ±5	good tinning (>95% covered) no visible damage
Temperature cycling JESD22 method JA-104	Test 1000 cycles (-55˚C to +125˚C), dwell time 30min. maximum. Measurement at 24±4 hours after test conclusion	±0.25%+0.05Ω no visible damage
Biased Humidity MIL-STD-202 Method 103	1000 +48/-0 hours, loaded with 10% rated power in humidity chamber controller at +85˚C /85%RH	±(0.30%+0.05Ω)
Operational Life AEC Q200-8 MIL-STD-202 -108	1000 hours at 70 ±2°C, loaded with continuous rated power	±(0.25%+0.05Ω)
High Temperature Exposure MIL-STD-202 Method 108	1000 hours @ +125˚C , un-powered	±(0.25%+0.05Ω)
Moisture Resistance AEC-Q200 -6 MIL-STD-202 Method 106	65±2˚C, 80-100% RH, 10 cycles, 24 hours/ cycle	±(0.25%+0.05Ω)
Mechanical Shock MIL-STD-202 Method 213	1/2 Sine Pulse / 100g Peak / Normal duration 6	±(0.20%+0.05Ω)
Vibration MIL-STD-202 Method 204	5 g's for 20 min , 12 cycles each of 3 orientations	±(0.20%+0.05Ω)
Terminal strength AEC-Q200-006	Apply 1.8 kg for 60 sec	Not broken or peeling off
Board flex AEC-Q200-005	Bending 2mm for 60 sec	±(0.20%+0.05Ω)

PULSE LOAD PERFORMANCE FOR ALL POWER RATINGS

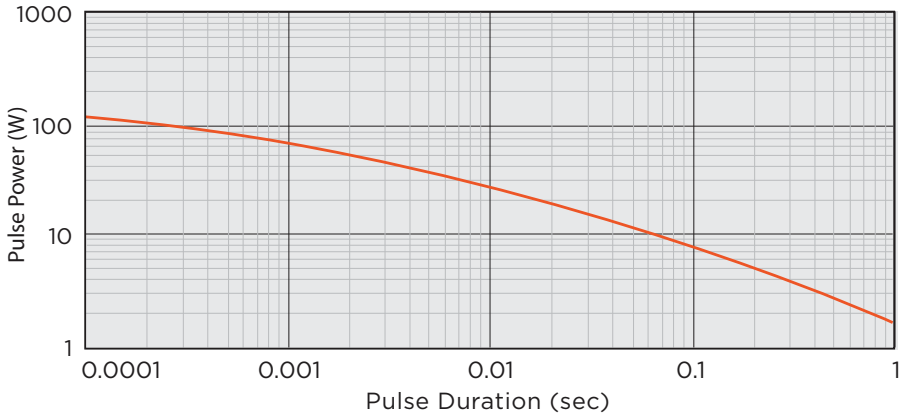
[Single and Continous Pulse data is for ohmic values ≥10 Ohm]

MELFC 0102 Single Pulse



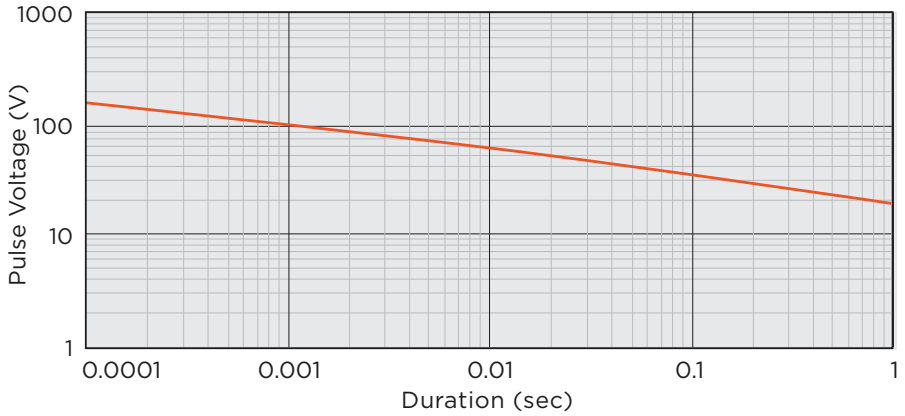
50 rectangular pulse amplitudes are applied to the component at intervals of 60 seconds with allowable resistance variability or change of ±(0.5% R + 0.01Ω).

MELFC 0102 Continuous Pulse

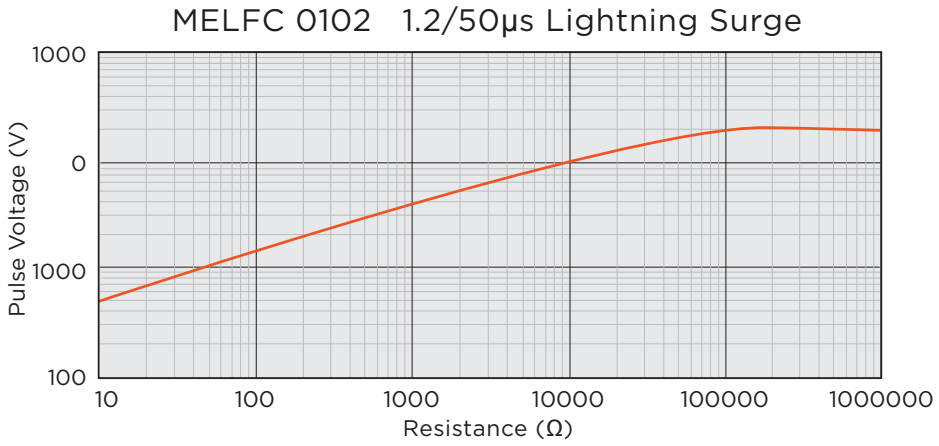


Continuous load is a pulse period generated by the repetitive rectangular pulse amplitude, the applied power dissipation is at a rated power of 70˚C. Allowable resistance variability or change is ±(0.5% R + 0.01Ω).

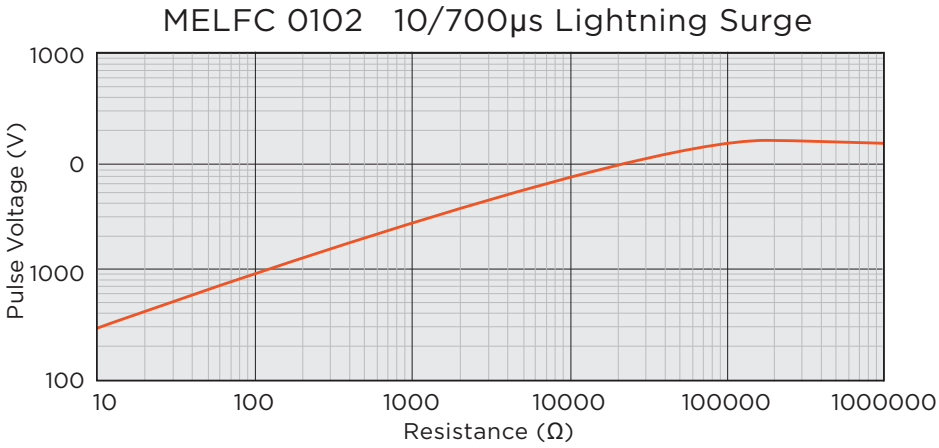
MELFC 0102 Pulse Voltage



PULSE LOAD PERFORMANCE FOR ALL POWER RATINGS



According to IEC 60115-1, 4.27; 1.2/50µs Testing Pulse shapes and parameters applies 5 pulses at 12 second intervals to test resistor performance with allowable resistance variability of ±(0.5% R + 0.01Ω).

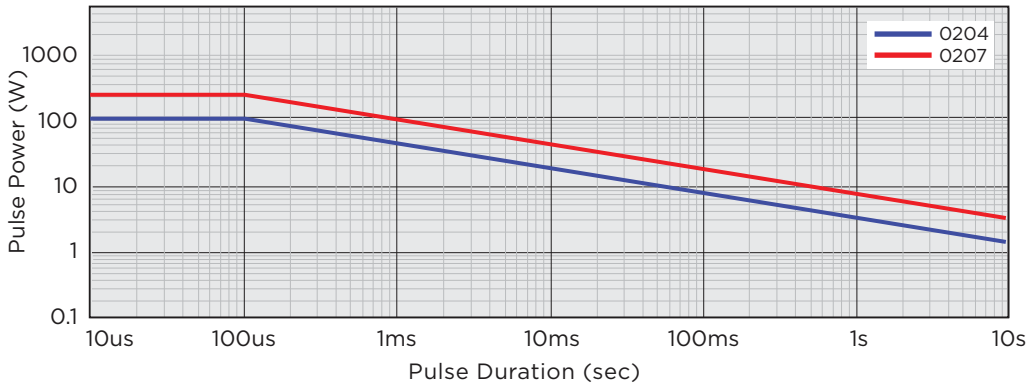


According to IEC 60115-1, 4.27; 10/700µs Testing Pulse shapes and parameters applies 10 pulses at 60 second intervals to test resistor performance with allowable resistance variability of ±(0.5% R + 0.01Ω).

PULSE LOAD PERFORMANCE FOR ALL POWER RATINGS

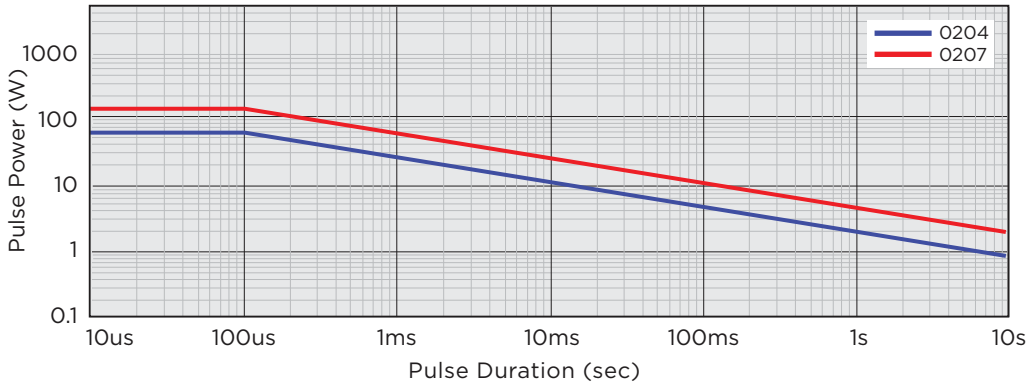
[Single and Continous Pulse data is for ohmic values ≥10 Ohm]

Single Pulse



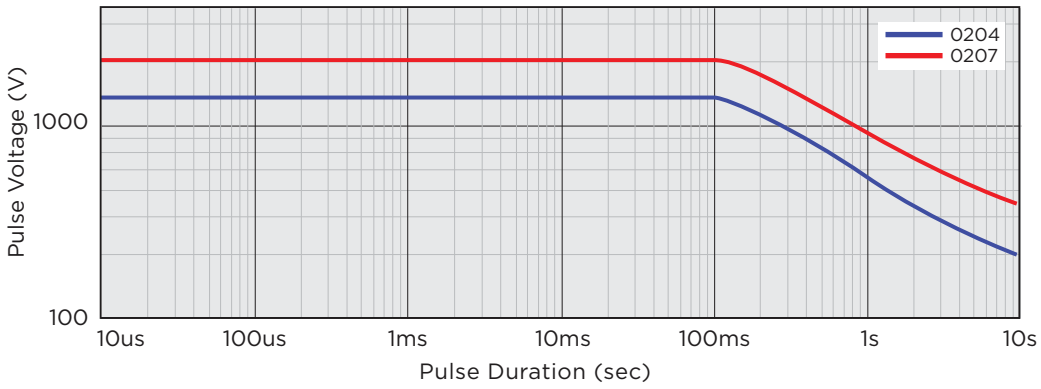
50 rectangular pulse amplitudes are applied to the component at intervals of 60 seconds with allowable resistance variability or change of ±(0.5% R + 0.01Ω).

Continuous Pulse



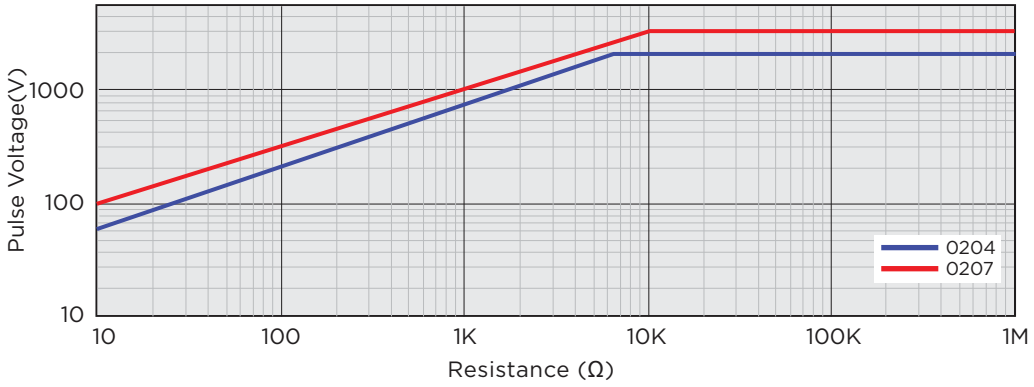
Continuous load is a pulse period generated by the repetitive rectangular pulse amplitude, the applied power dissipation is at a rated power of 70˚C. Allowable resistance variability or change is ±(0.5% R + 0.01Ω).

Pulse Voltage



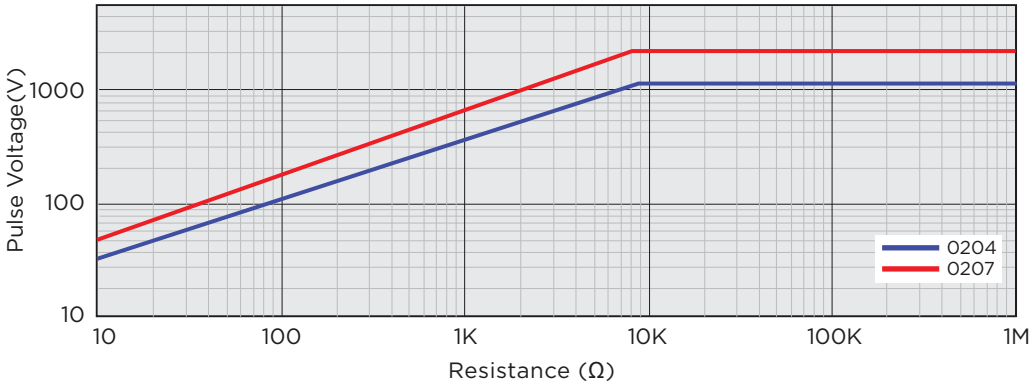
PULSE LOAD PERFORMANCE FOR ALL POWER RATINGS

1.2/50µs Pulse Voltage



According to IEC 60115-1, 4.27; 1.2/50µs Testing Pulse shapes and parameters applies 5 pulses at 12 second intervals to test resistor performance with allowable resistance variability of ±(0.5% R + 0.01Ω).

10/700µs Pulse Voltage



According to IEC 60115-1, 4.27; 10/700µs Testing Pulse shapes and parameters applies 10 pulses at 60 second intervals to test resistor performance with allowable resistance variability of ±(0.5% R + 0.01Ω).