

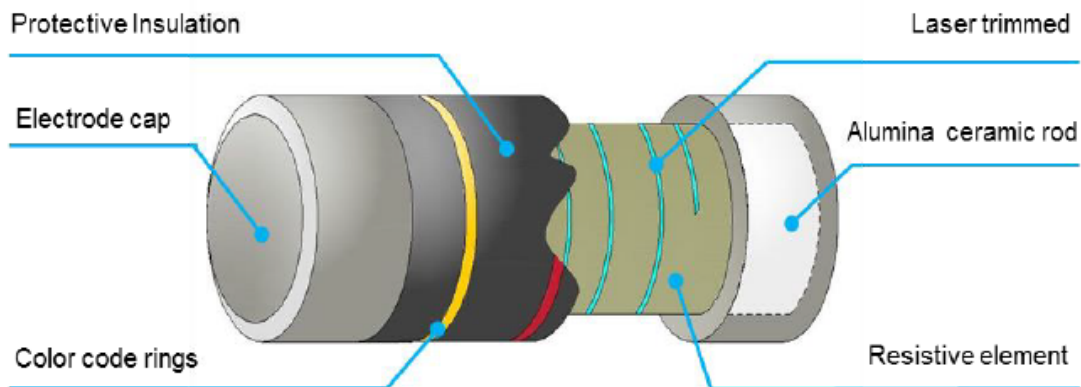


Product Family: [High Precision MELF Resistor](#)
Part Number Series: [MF Series](#)



	<p>Construction:</p> <ul style="list-style-type: none"> • High Purity Alumina Ceramic Rod • Cylindrical cap electrodes • 100% matte tin over Ni terminations (RoHS compliant and Pb Free) • AEC-Q200 Qualified Available 	<p>Features:</p> <ul style="list-style-type: none"> • 0207, and 0204 sizes • E24 and E192 resistance values • TCR's down to ± 25 ppm/$^{\circ}$C • Resistance down to 0.2Ω available • High volume production suitable for commercial and special applications
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Description:
 These high precision MELF resistors offer excellent performance and tolerance in TCR, current noise, and other applications requiring precision and stability. High volume manufacturing allows for lower costs for the customer.



Product Dimensions:

	<table border="1"> <thead> <tr> <th>Dimensions</th> <th>0207</th> <th>0204</th> </tr> </thead> <tbody> <tr> <td>L</td> <td>0.232\pm0.007 (5.90\pm0.20)</td> <td>0.137\pm0.003 (3.50\pm0.10)</td> </tr> <tr> <td>D</td> <td>0.086\pm0.003 (2.20\pm0.10)</td> <td>0.055\pm0.005 (1.40\pm0.15)</td> </tr> <tr> <td>K</td> <td>0.055\pm0.003 (1.40\pm0.10)</td> <td>0.035\pm0.003 (0.90\pm0.10)</td> </tr> <tr> <td>Weight (g) 1000 pieces</td> <td>79.6</td> <td>19.75</td> </tr> </tbody> </table>	Dimensions	0207	0204	L	0.232 \pm 0.007 (5.90 \pm 0.20)	0.137 \pm 0.003 (3.50 \pm 0.10)	D	0.086 \pm 0.003 (2.20 \pm 0.10)	0.055 \pm 0.005 (1.40 \pm 0.15)	K	0.055 \pm 0.003 (1.40 \pm 0.10)	0.035 \pm 0.003 (0.90 \pm 0.10)	Weight (g) 1000 pieces	79.6	19.75
Dimensions	0207	0204														
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<p>All dimensions are shown in inches. Metric case sizes are shown in parenthesis.</p>																

Part Numbering Example: MF0204HE1001DA-T3

Product Designator	Size L x W English	Power	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	Automotive Grade	T&R Packaging Quantity
MF	0207 0204	H = High Power** L = Normal Power	E = ± 25 ppm/ $^{\circ}$ C Q = ± 50 ppm/ $^{\circ}$ C	For all sizes, use 4 digit code for all values. "R" denotes decimal position as necessary	B = $\pm 0.10\%$ C = $\pm 0.25\%$ D = $\pm 0.50\%$ F = $\pm 1.00\%$	A= Automotive AEC-Q200 Leave Blank for Non AEC-Q200	-T2 = 2,000 PCS (0702) -T3 = 3,000 PCS (0402)

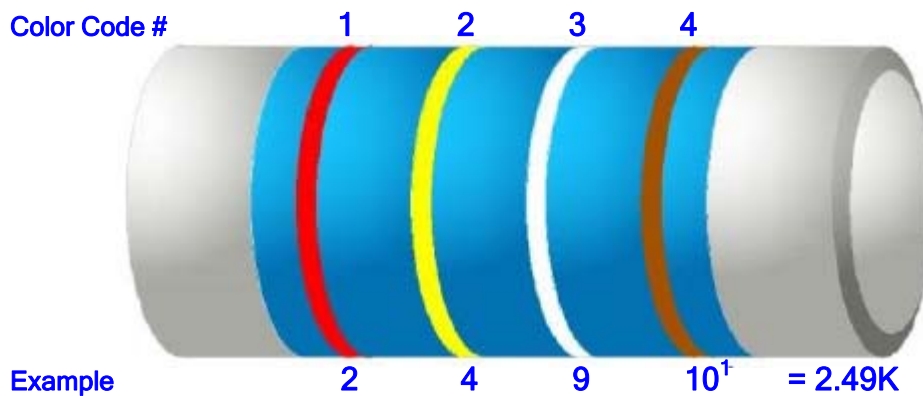
**NOTE: TCR of ± 25 ppm (E) and ± 50 ppm (Q) are offered in both L and H Power Code, see electrical specifications for power specifications for power ratings

Electrical Specifications:

Item	0207				0204			
Tolerance % (code)	±0.1%, ±0.25%, ±0.5%, ±1%*							
Power (watts)	1W		1/2W		2/5W		1/4W	
TCR ppm/°C (code)	±50ppm/C°*	±25ppm/C°	±50ppm/C°	±25ppm/C°	±50ppm/C°	±25ppm/C°	±50ppm/C°	±25ppm/C°
Resistance Range	0.2Ω~1MΩ	10Ω~1MΩ	0.2Ω~1MΩ	10Ω~1MΩ	0.2Ω~1MΩ	10Ω~1MΩ	0.2Ω~1MΩ	10Ω~1MΩ
Mac Operating Voltage	350V		300V		200V		200V	
Max Overload Voltage	700V		600V		400V		400V	
Operating Temperature	-55~+155°C		-55~+125°C		-55~+155°C		-55~+125°C	
Packaging	2,000pcs/reel				3,000pcs/reel			

*Note: 0.2Ω ~ 10Ω is available only in ±1% with ±50ppm

Marking & Resistance Range / Tolerance:

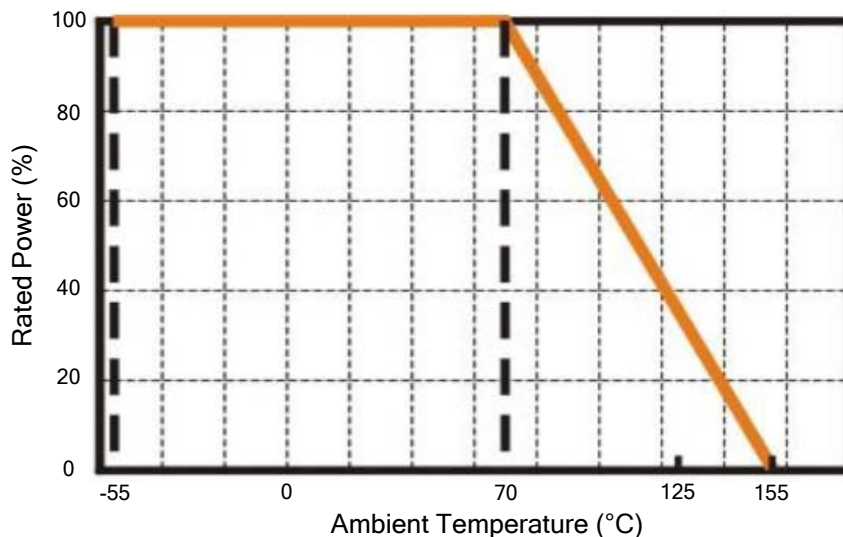


Color 1 Coding	Color 2 Coding	Color 3 Coding	Color 4 Coding
	0	0	10 ⁰
1	1	1	10 ¹
2	2	2	10 ²
3	3	3	10 ³
4	4	4	10 ⁴
5	5	5	10 ⁵
6	6	6	
7	7	7	
8	8	8	10 ⁻¹
9	9	9	10 ⁻²

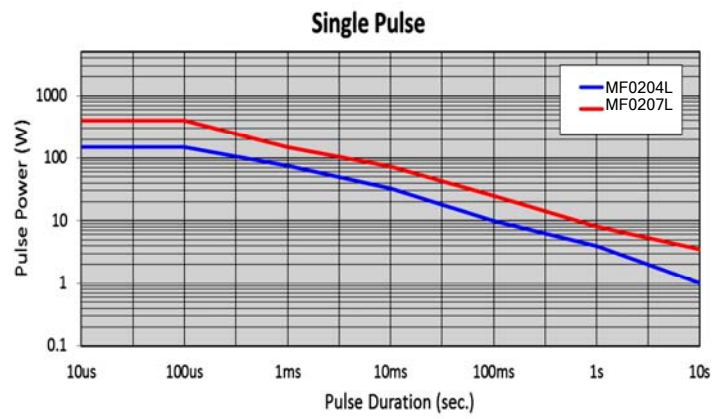
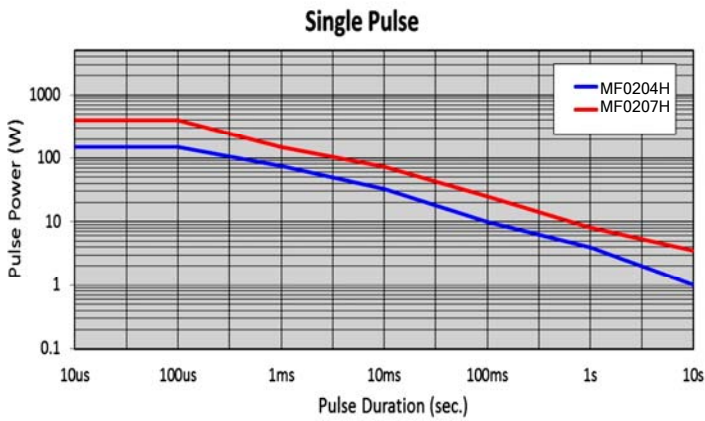
Reliability Specifications:

Test	Procedure	Requirement	
		10Ω to 270KΩ	<10Ω & >270KΩ
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. $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (ppm/°C) $t_1: 20^\circ\text{C}+5^\circ\text{C}-1^\circ\text{C}$ R_1 : Resistance at reference temperature (20°C+5°C/-1°C R_2 :Resistance at test temperature (-55°C or +125°C)	Refer to "QUICK REFERENCE DATA"	
Short Time Overload (S.T.O.L) IEC 60115-1 4.13	Permanent resistance change after a 5 second application of a voltage. 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	±0.1%+0.05Ω	±0.15%+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±5°C	±0.1%+0.05Ω	±0.25%+0.05Ω
Solderability IEC-60115-1 4.17	Un-mounted chips completely immersed for 2±0.5 seconds in a SAC solder bath at 235°C±5°C	Good tinning (>95% covered) No visible damage	
Temperature Cycling JESD22 Method JA-104	Test 1000 cycles (-55°C to +125°C), dwell time 30 min maximum. Measurement at 24±4 hours after test conclusion.	±0.25%+0.05Ω	±0.5%+0.05Ω
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	±0.5%+0.05Ω	±1%+0.05Ω
Endurance IEC 60115-1 4.25	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2°Cm 1.5 hours on and 0.5 hours off	±0.25%+0.05Ω	±0.5%/+0.05Ω
High Temperature Exposure MIL-STD-202 Method 108	1000 hrs @ +155°C, un-powered	±0.25%+0.05Ω	±1%+0.05Ω
Moisture Resistance AC-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	Δ R/R max ±(0.25%+0.05Ω)	
Vibration MIL-STD-202 Method 204	5 g's for 20 min, 12 cycles each of 3 orientations	Δ R/R max ±(0.5%+0.05Ω)	
Terminal Strength AEC-Q200-006	1.8 kg for 60 sec	No broken	
Board Flex AEC-Q200-005	Bending 2mm for 60 sec	±0.1%+0.05Ω	±0.5%+0.05Ω

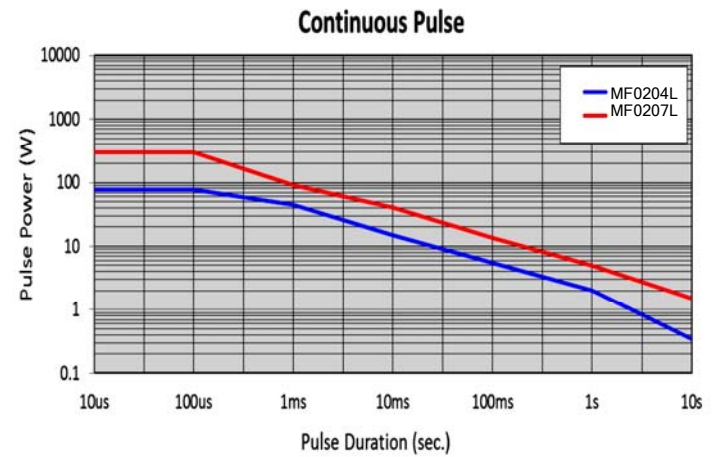
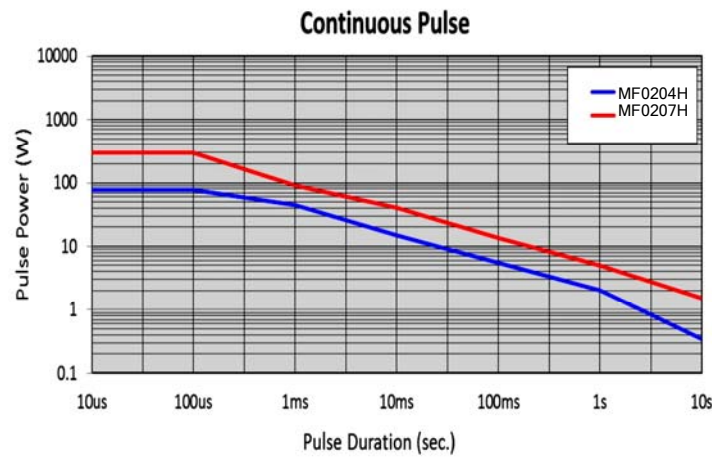
Derating Curve:



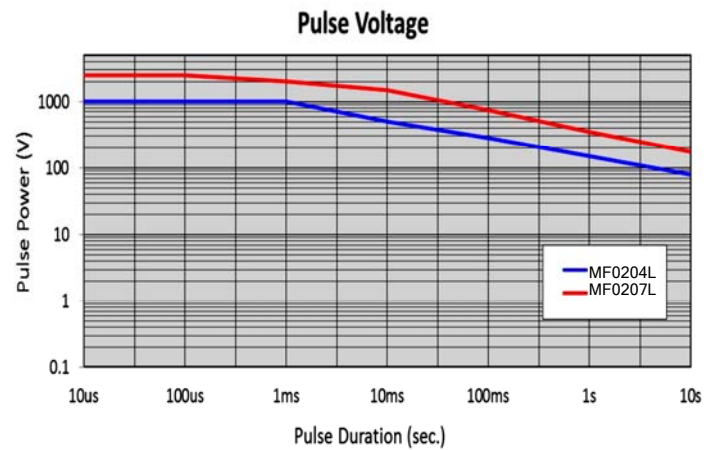
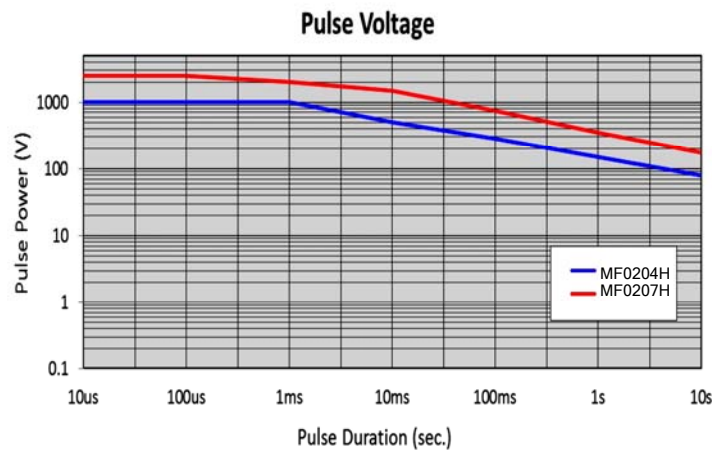
Pulse Load Performance:



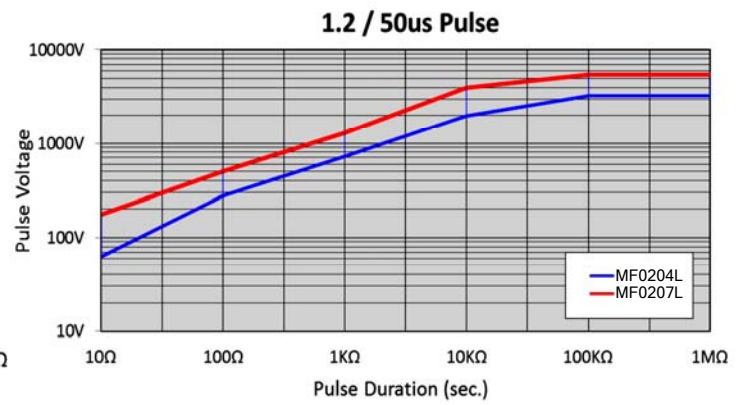
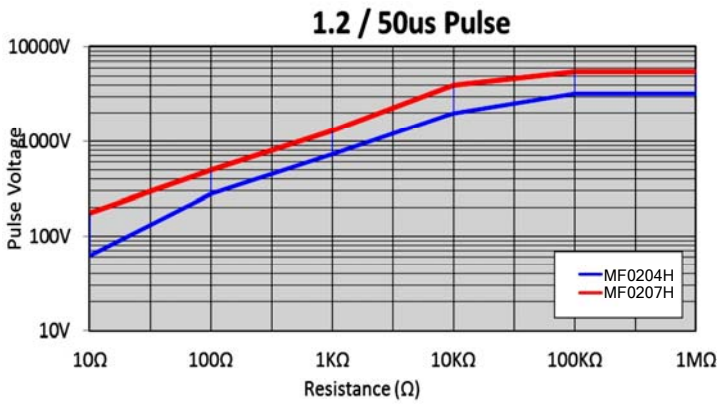
50 rectangular pulse amplitudes are applied to the component at intervals of 60 seconds, permissible the resistance to be varied by $\pm(0.5\% R + 0.01\Omega)$.



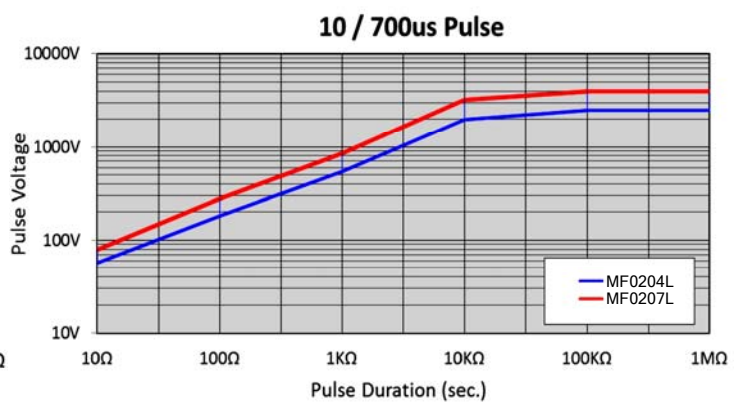
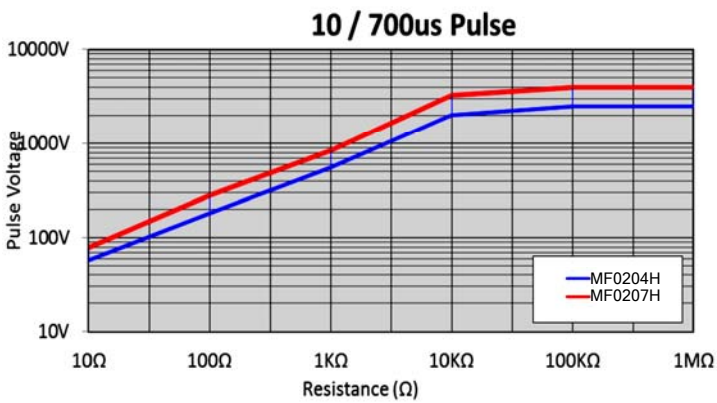
Continuous load is a pulse period generated by the repetitive rectangular pulse amplitude, the applied power dissipation as at a rated power of 70°C. Permissible the resistance to be varied by $\pm (0.5\% R + 0.01\Omega)$.



Pulse Load Performance:

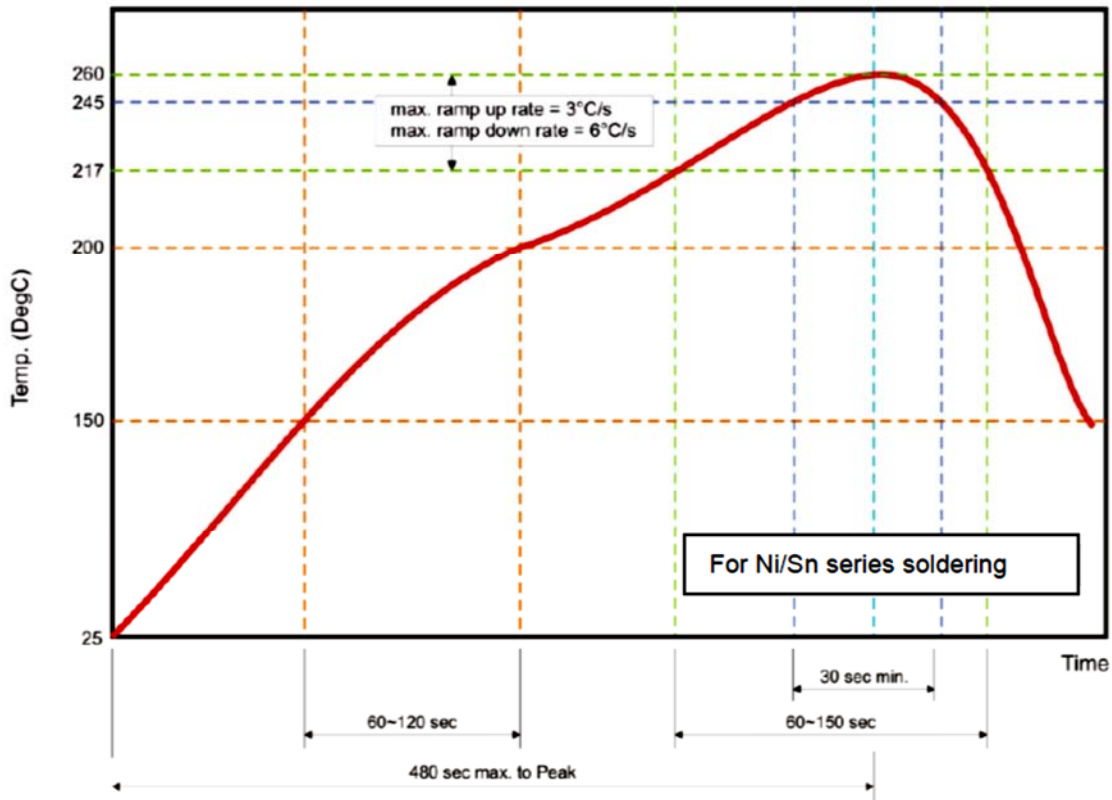


According to IEC 60115-1 4.27 1.2 / 50us use 5 pulses at 12 second intervals pulse shapes test resistor, permissible the resistance to be varied by $\pm (0.5\% R + 0.01\Omega)$.

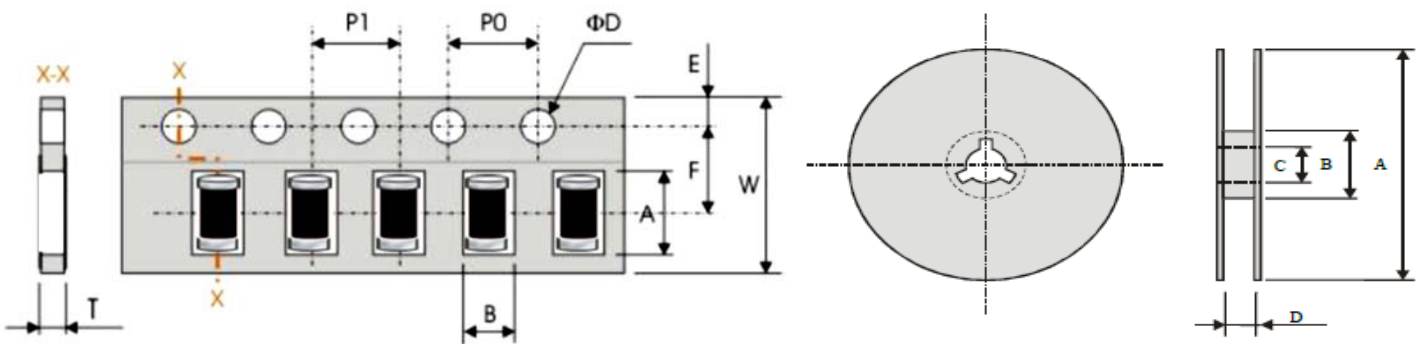


According to IEC 60115-1 4.27 / 700us use 10 pulses at 60 second intervals pulse shapes test resistor, permissible the resistance to be varied by $\pm (0.5\% R + 0.01\Omega)$.

Soldering Condition:



Temperature Condition	Exposure Time
Average ramp-up rate (217°C to 260°C)	Less than 3°C/second
Between 150 and 200°C	Between 60-120 seconds
> 217°C	Between 60-150 seconds
Peak Temperature	260°C +0/-5°C
Time within 245°C	Min. 30 seconds
Ramp-down rater (Peak to 217°C)	Less than 6°C/seconds
Time from 25°C to Peak	No greater than 480 seconds



Dimensions are shown in millimeters

	A	B	W	E	F
0207	6.15±0.10	2.40±0.10	12.0±0.10	1.75±0.10	5.50±0.05
0204	3.65±0.10	1.55±0.10	8.0±0.10	1.75±0.10	3.50±0.05

	A	B	C	D
0207	Φ178.0±2.0	Φ60.0±1.0	13.0±0.5	13.0±0.5
0204	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5

	P0	P1	P2	ΦD0	T
0207	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.05	2.70±0.1
0204	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.05	1.80±0.1