Features:

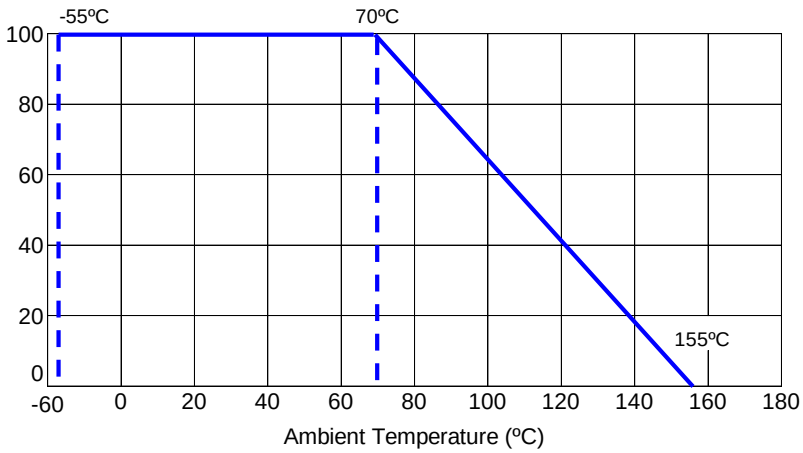
- Thin Film Technology for precision and stability
- Excellent power to size ratio
- Exhibits good pulse power characteristics
- RoHS compliant, lead-free and halogen-free

Electrical Specifications

Type/Code	Package Size	Power Rating (Watts) @ 70ºC	Maximum Working Voltage[1]	Maximum Overload Voltage	Resistance Temperature Coefficient	Ohmic Range (Ω) and Tolerance			
						0.1%	0.5%	1%	5%
MLF18	0102	0.125W	150V	300V	±15 ppm/ºC	100 - 56K			-
					±25 ppm/ºC	100 - 82K	49.9 - 200K	49.9 - 390K	-
					±50 ppm/ºC	-	40 - 1M		
					±100 ppm/ºC	-		40 - 1M	
MLFM15	0102	0.2W	200V	400V	±15 ppm/ºC	100 - 56K			-
					±25 ppm/ºC	100 - 82K	49.9 - 200K	49.9 - 390K	-
					±50 ppm/ºC	-	40 - 1M		
					±100 ppm/ºC	-		40 - 1M	
MLF14	0204	0.25W	200V	400V	±10 ppm/ºC	10 - 20K			
					±15 ppm/ºC	10 - 300K			
					±25 ppm/ºC	10 - 1M		4.02 - 4.7M	
					±50 ppm/ºC	10 - 1M	1 - 1M	0.2 - 10M	
					±100 ppm/ºC	-		0.1 - 10M	
		Jumper: 2A			-	0Ω(<15mΩ)			
MLFM25	0204	0.4W	200V	400V	±15 ppm/ºC	10 - 100K			
					±25 ppm/ºC	10 - 1M		4.02 - 1M	
					±50 ppm/ºC	10 - 1M	1 - 1M	0.2 - 1M	
					±100 ppm/ºC	-		0.1 - 1M	
MLF12	0207	0.5W	300V	600V	±10 ppm/ºC	10 - 20K			
					±15 ppm/ºC	10 - 300K			
					±25 ppm/ºC	10 - 1M		4.02 - 4.7M	
					±50 ppm/ºC	10 - 1M	1 - 1M	0.2 - 10M	
					±100 ppm/ºC	-		0.1 - 10M	
		Jumper: 4A			-	0Ω(<15mΩ)			
MLFM1	0207	1W	350V	700V	±15 ppm/ºC	49.9 - 100K			
					±25 ppm/ºC	10 - 1M		4.02 - 1M	
					±50 ppm/ºC	10 - 1M	1 - 1M	0.2 - 10M	
					±100 ppm/ºC	-		0.1 - 10M	

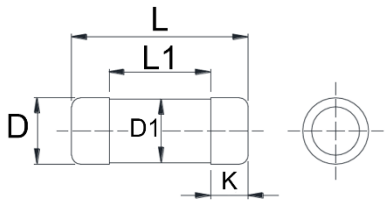
Note: [1] Lesser of √P*R or maximum working voltage

Power Derating Curve:



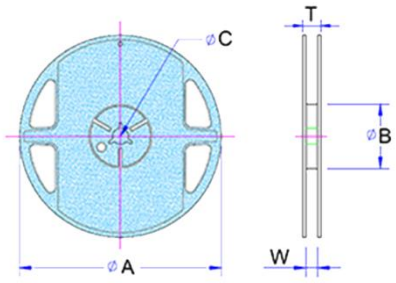
This specification may be changed at any time without prior notice
Please confirm technical specifications before you order and/or use.

Mechanical Specifications



Type/Code	Weight (g) (1000 pieces)	L Body Length	L1 (min.) Inner Body Length	D Body Diameter	D1 Middle Body Dia.	K Termination	Unit
MLF18	7.7	0.087 ± 0.004 2.20 ± 0.10	0.043 1.10	0.043 ± 0.004 1.10 ± 0.10	0.043 +0/-0.006 1.10 +0/-0.15	0.018 ± 0.002 0.45 ± 0.05	inches mm
MLFM15	7.7	0.087 ± 0.004 2.20 ± 0.10	0.043 1.10	0.043 ± 0.004 1.10 ± 0.10	0.043 +0/-0.006 1.10 +0/-0.15	0.018 ± 0.002 0.45 ± 0.05	inches mm
MLF14	18.7	0.138 ± 0.008 3.50 ± 0.20	0.138 3.50	0.055 ± 0.006 1.40 ± 0.15	0.055 +0/-0.008 1.40 +0/-0.20	0.031 ± 0.004 0.80 ± 0.10	inches mm
MLFM25	18.7	0.138 ± 0.008 3.50 ± 0.20	0.138 3.50	0.055 ± 0.006 1.40 ± 0.15	0.055 +0/-0.008 1.40 +0/-0.20	0.031 ± 0.004 0.80 ± 0.10	inches mm
MLF12	80.9	0.232 ± 0.008 5.90 ± 0.20	0.232 5.90	0.087 ± 0.008 2.20 ± 0.20	0.087 +0/-0.008 2.20 +0/-0.20	0.051 ± 0.004 1.30 ± 0.10	inches mm
MLFM1	80.9	0.232 ± 0.008 5.90 ± 0.20	0.232 5.90	0.087 ± 0.008 2.20 ± 0.20	0.087 +0/-0.008 2.20 +0/-0.20	0.051 ± 0.004 1.30 ± 0.10	inches mm

Reel Specifications



Type/Code	øA	øB	øC	W	T	Unit
MLF18	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
MLFM15	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
MLF14	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
MLFM25	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.354 ± 0.020 9.00 ± 0.50	0.492 ± 0.020 12.50 ± 0.50	inches mm
MLF12	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.020 13.00 ± 0.50	0.512 ± 0.020 13.00 ± 0.50	0.610 ± 0.020 15.50 ± 0.50	inches mm
MLFM1	7.028 ± 0.059 178.50 ± 1.50	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.020 13.00 ± 0.50	0.512 ± 0.020 13.00 ± 0.50	0.610 ± 0.020 15.50 ± 0.50	inches mm

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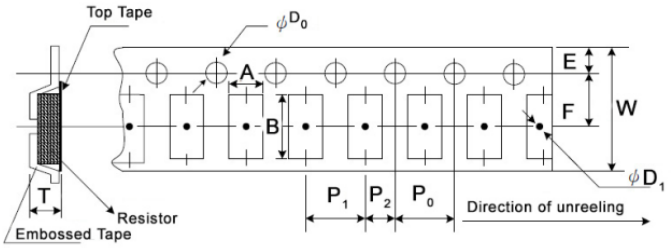
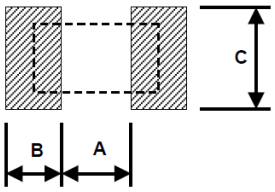
Packaging Specifications - Embossed Plastic Tape



Type/Code	A	B	W	E	F	P0	Unit
MLF18	0.051 ± 0.004 1.30 ± 0.10	0.094 ± 0.004 2.40 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
MLFM15	0.051 ± 0.004 1.30 ± 0.10	0.094 ± 0.004 2.40 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
MLF14	0.061 ± 0.004 1.55 ± 0.10	0.144 ± 0.004 3.65 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
MLFM25	0.061 ± 0.004 1.55 ± 0.10	0.144 ± 0.004 3.65 ± 0.10	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
MLF12	0.094 ± 0.004 2.40 ± 0.10	0.242 ± 0.004 6.15 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm
MLFM1	0.094 ± 0.004 2.40 ± 0.10	0.242 ± 0.004 6.15 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	inches mm

Type/Code	P1	P2	D0	D1	T	Unit
MLF18	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.035 min. 0.90 min.	0.059 ± 0.004 1.50 ± 0.10	inches mm
MLFM15	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.035 min. 0.90 min.	0.059 ± 0.004 1.50 ± 0.10	inches mm
MLF14	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.035 min. 0.90 min.	0.071 ± 0.004 1.80 ± 0.10	inches mm
MLFM25	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.035 min. 0.90 min.	0.071 ± 0.004 1.80 ± 0.10	inches mm
MLF12	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.055 min. 1.40 min.	0.106 ± 0.004 2.70 ± 0.10	inches mm
MLFM1	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.055 min. 1.40 min.	0.106 ± 0.004 2.70 ± 0.10	inches mm

Recommended Pad Layout



Type/Code	A	B	C	Unit
MLF18	0.039 1.00	0.031 0.80	0.059 1.50	inches mm
MLFM15	0.039 1.00	0.031 0.80	0.059 1.50	inches mm
MLF14	0.063 1.60	0.047 1.20	0.063 1.60	inches mm
MLFM25	0.063 1.60	0.047 1.20	0.063 1.60	inches mm
MLF12	0.118 3.00	0.067 1.70	0.094 2.40	inches mm
MLFM1	0.118 3.00	0.067 1.70	0.094 2.40	inches mm

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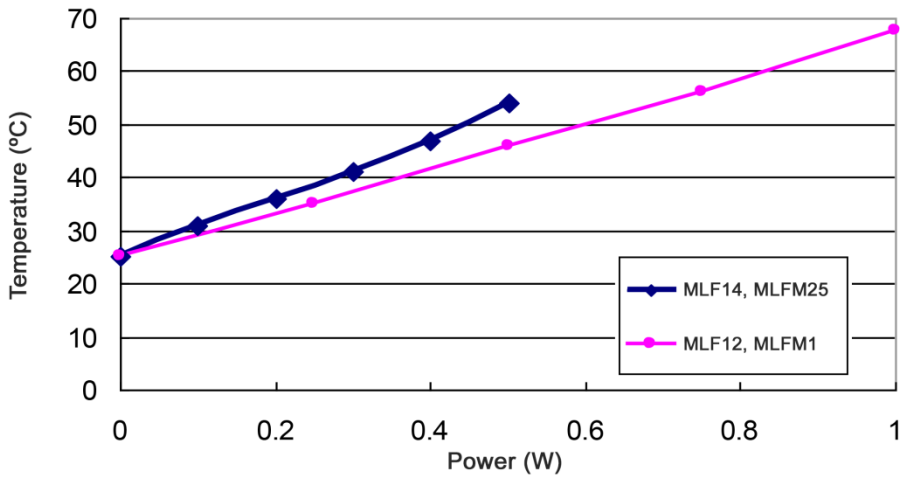
Performance Characteristics

Test	Test Method	Test Condition	Test Specification
Temperature Coefficient of Resistance (T.C.R.)	JIS-C-5201-1 4.8 IEC-60115-1 4.8	-55ºC ~ +125ºC, 25ºC is the reference temperature	As specified
Short Time Overload	JIS-C-5201-1 4.13 IEC-60115-1 4.13	RCWV*2.5 or max. overload voltage whichever is lower for 5 seconds	0204/0207: ± (0.15% + 0.05Ω) 0102: ± (0.5% + 0.05Ω)
Insulation Resistance	JIS-C-5201-1 4.6 IEC-60115-1 4.6	Max. overload voltage for 1 minute	≥10G
Endurance	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1	70 ± 2ºC, RCWV for 1000 hours with 1.5 hour "ON" and 0.5 hour "OFF"	0204/0207: ± (0.15% + 0.05Ω) 0102: ± (0.5% + 0.05Ω)
Damp Heat with Load	JIS-C-5201-1 4.24 IEC-60115-1 4.24	40 ± 2ºC, 90~95% R.H., RCWV for 1000 hours with 1.5 hour "ON" and 0.5 hour "OFF"	0204/0207: ± (1.0% + 0.05Ω) 0102: ± (1.5% + 0.05Ω)
Dry Heat	JIS-C-5201-1 4.23 IEC-60115-1 4.23.2	at +155ºC for 1000 hours	0204/0207: ± (1.0% + 0.05Ω 0102: ± (1.5% + 0.05Ω)
Bending Strength	JIS-C-5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds with 2mm	± (0.5% + 0.05Ω)
Solderability	JIS-C-5201-1 4.17 IEC-60115-1 4.17	245 ± 5ºC for 3 seconds	95% min. coverage
Resistance to Soldering Heat	JIS-C-5201-1 4.18 IEC-60115-1 4.18	260 ± 5ºC for 10 seconds	± (0.5% + 0.05Ω)
Voltage Proof	JIS-C-5201-1 4.7 IEC-60115-1 4.7	1.42 times max. operating voltage for 1 minute	No breakdown or flashover
Leaching	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1	260 ± 5ºC for 30 seconds	Individual leacing area ≤ 5% Total Leaching area ≤ 10%
Rapid Change of Temperature	JIS-C-5201-1 4.19 IEC-60115-1 4.19	-55ºC to +155ºC, 5 cycles	± (0.5% + 0.05Ω)

RCWV (rated continuous working voltage) = √(P*R) or max. operating voltage whichever is lower.
Storage temperature: 25 ± 3ºC, humidity < 80% R.H.

Temperature Rise



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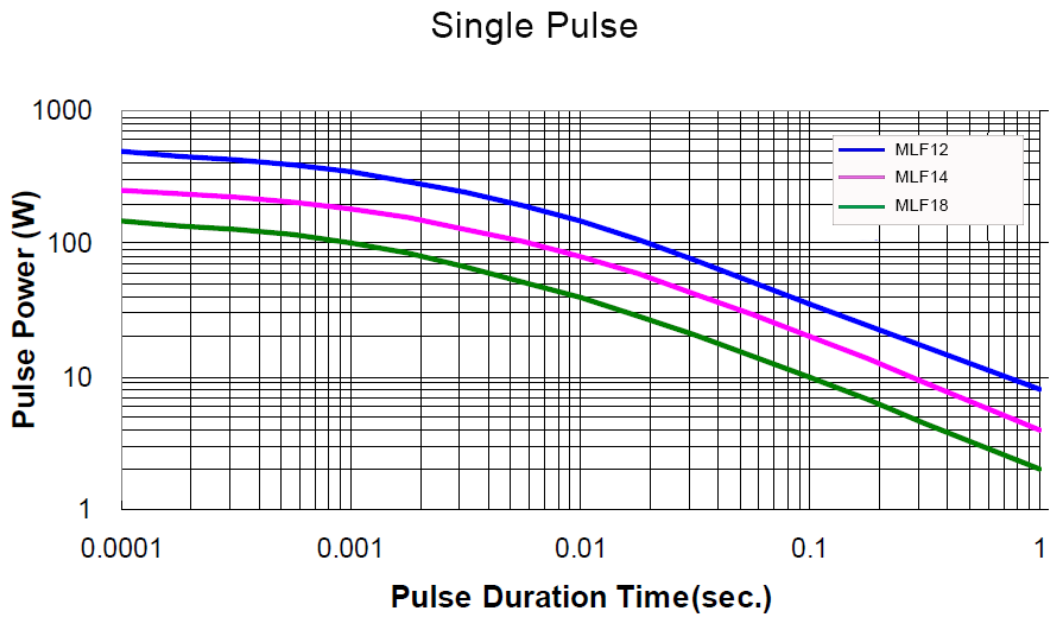
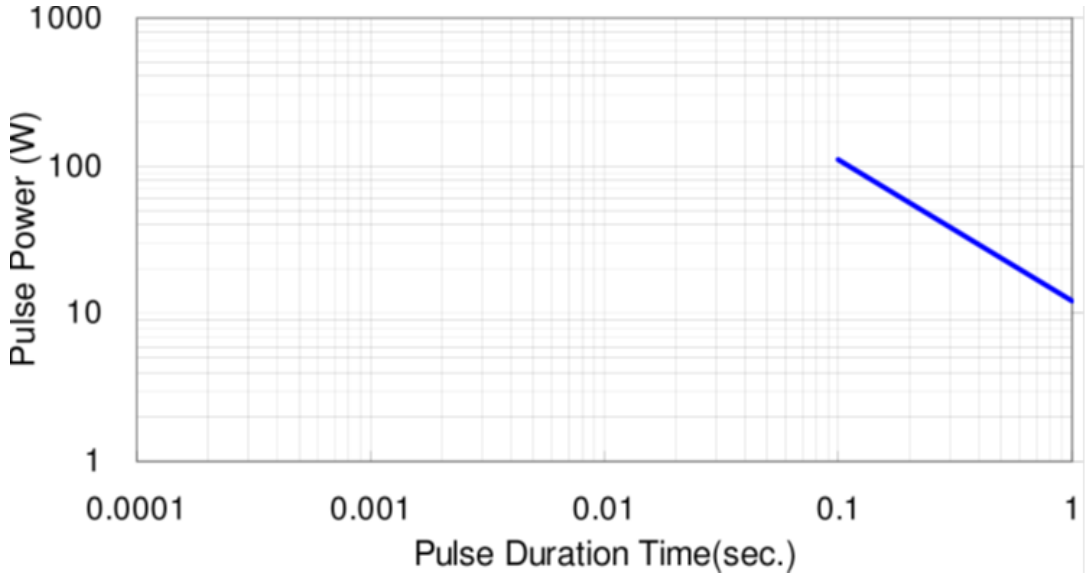
Pulse withstanding capacity

The single impulse graph is the result of 50 impulses of rectangular shape applied at one-minute intervals. The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage graph shown.



MLFM1 Single Pulse (1 Kohm)



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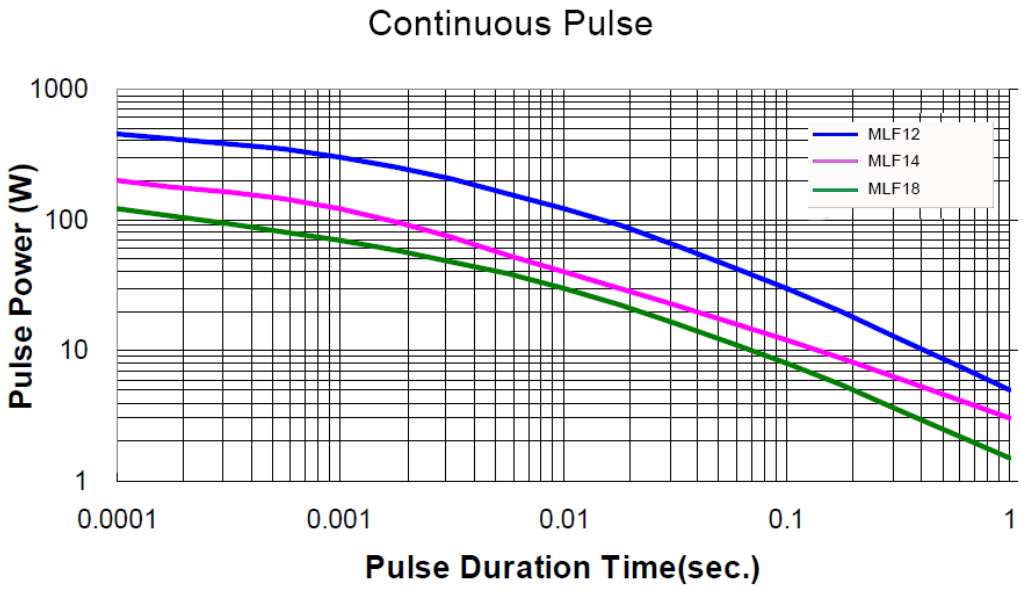
Continuous Pulse

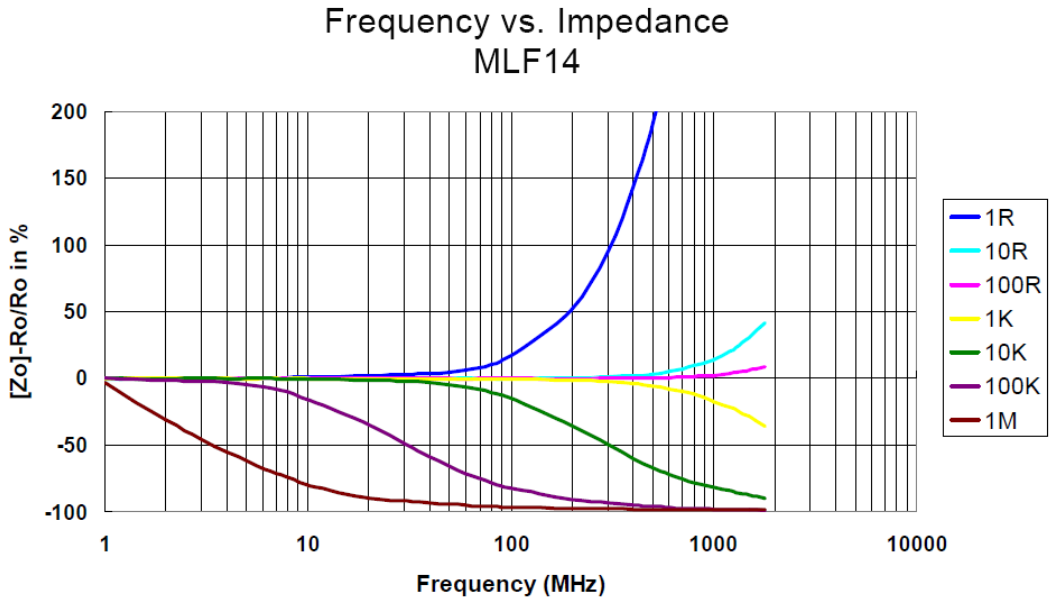
The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70ºC. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value.



Frequency behavior

Resistors are designed to function according to Ohmic laws. This is basically true of resistors for frequencies up to 100 kHz. At higher frequencies, there is an additional contribution to the impedance by an ideal resistor switched in series with a coil and both switched parallel to a capacitor. The values of the capacitance and inductance are mainly determined by the dimensions of the terminations and the conductive path length.

The environment surrounding components has a large influence on the behavior of the component on the printed-circuit board.



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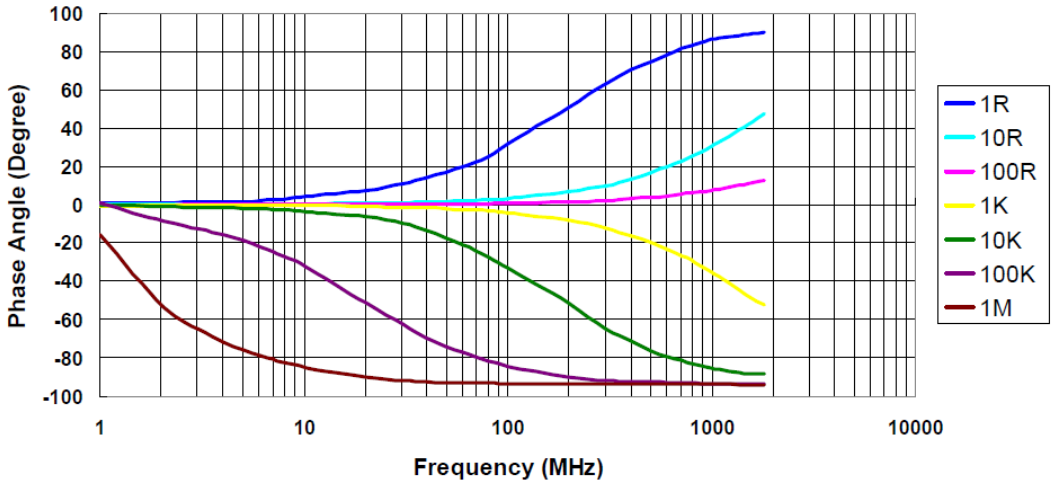
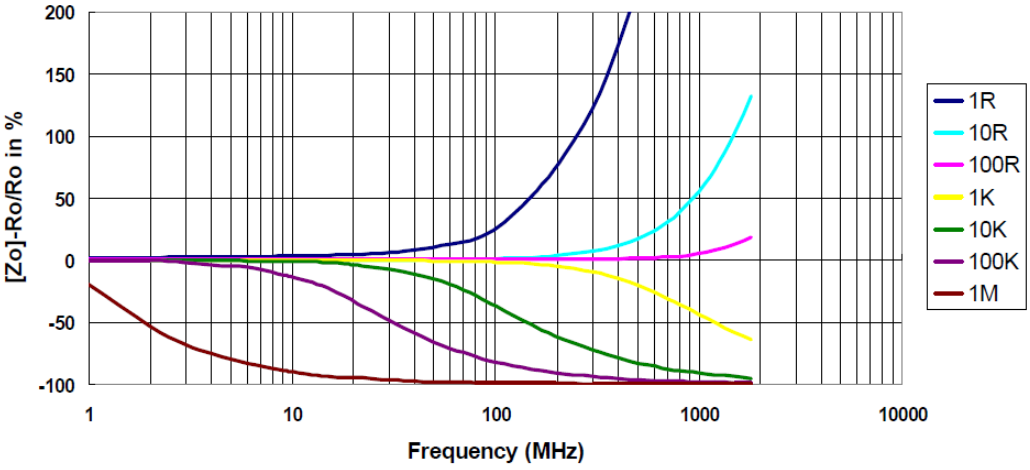
Frequency vs. Phase Angle
MLF14



Frequency vs. Impedance
MLF12



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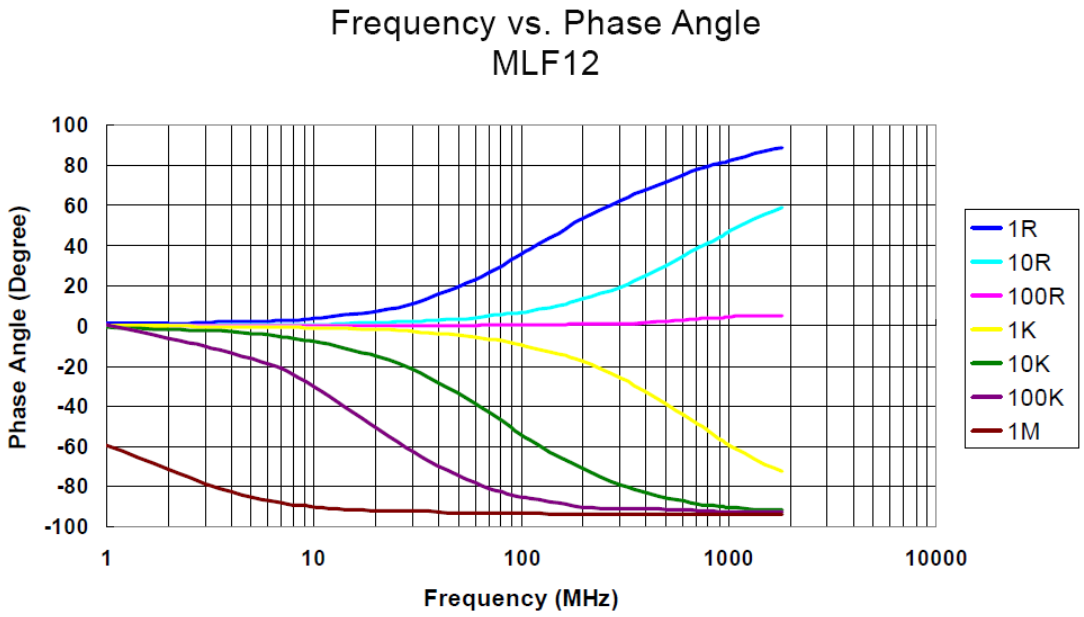
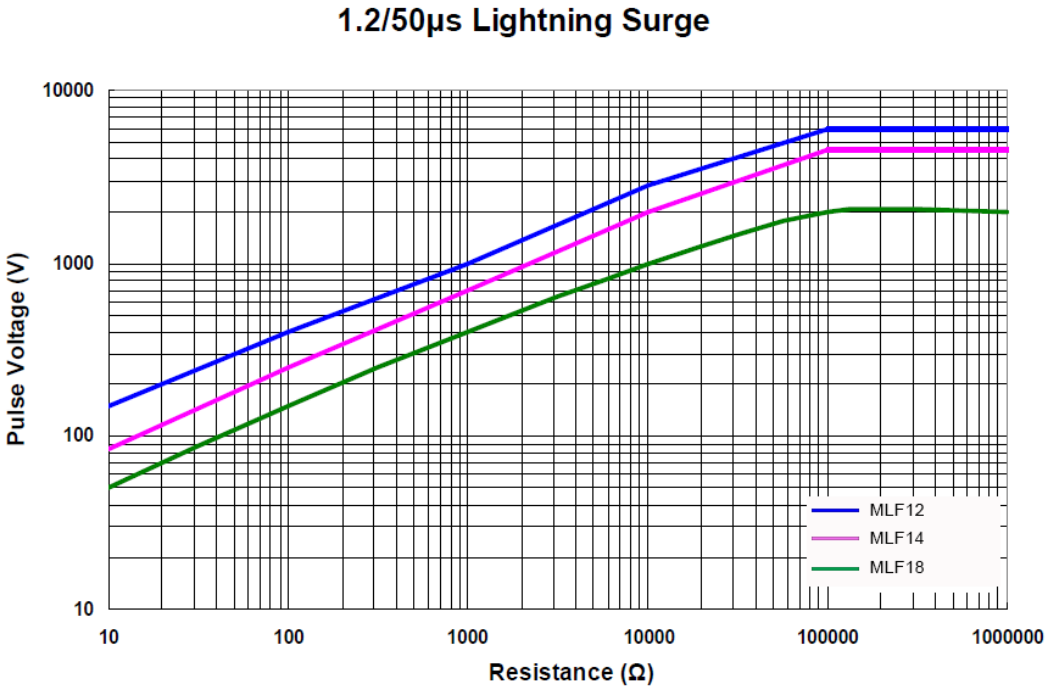


Lightning Surge

Resistors are tested in accordance with IEC 60 115-1 using both 1.2/50us and 10/700us pulse shapes. The limit of acceptance is a shift in resistance of less than 0.5% from the initial value.



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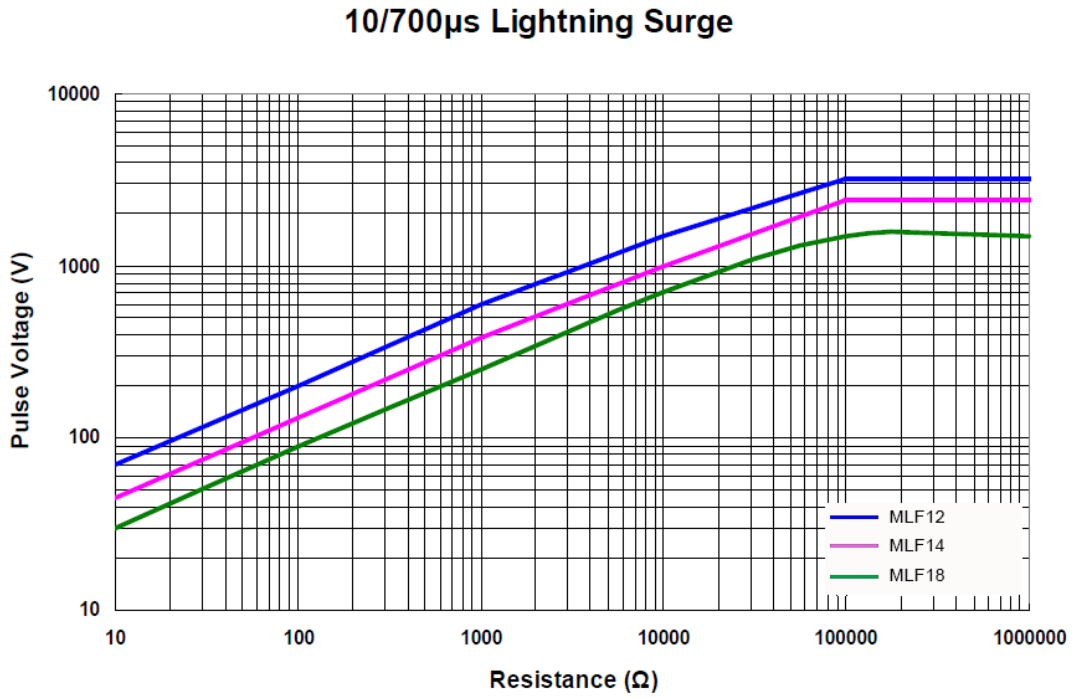

RoHS Compliance

Stackpole Electronics has joined the worldwide effort to reduce the amount of lead in electronic components and to meet the various regulatory requirements now prevalent, such as the European Union's directive regarding "Restrictions on Hazardous Substances" (RoHS 3). As part of this ongoing program, we periodically update this document with the status regarding the availability of our compliant components. All our standard part numbers are compliant to EU Directive 2011/65/EU of the European Parliament as amended by Directive (EU) 2015/863/EU as regards the list of restricted substances.

RoHS Compliance Status						
Standard Product Series	Description	Package / Termination Type	Standard Series RoHS Compliant	Lead-Free Termination Composition	Lead-Free Mfg. Effective Date (Std Product Series)	Lead-Free Effective Date Code (YY/WW)
MLF	Precision Metal Film Melf Resistor	SMD	YES	100% Matte Sn	Always	Always
MLFM	Precision Metal Film Mini Melf Resistor	SMD	YES	100% Matte Sn	Always	Always

"Conflict Metals" Commitment

We at Stackpole Electronics, Inc. are joined with our industry in opposing the use of metals mined in the "conflict region" of the eastern Democratic Republic of the Congo (DRC) in our products. Recognizing that the supply chain for metals used in the electronics industry is very complex, we work closely with our own suppliers to verify to the extent possible that the materials and products we supply do not contain metals sourced from this conflict region. As such, we are in compliance with the requirements of Dodd-Frank Act regarding Conflict Minerals.

Compliance to "REACH"

We certify that all passive components supplied by Stackpole Electronics, Inc. are SVHC (Substances of Very High Concern) free and compliant with the requirements of EU Directive 1907/2006/EC, "The Registration, Evaluation, Authorization and Restriction of Chemicals", otherwise referred to as REACH. Contact us for complete list of REACH Substance Candidate List.

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Environmental Policy

It is the policy of Stackpole Electronics, Inc. (SEI) to protect the environment in all localities in which we operate. We continually strive to improve our effect on the environment. We observe all applicable laws and regulations regarding the protection of our environment and all requests related to the environment to which we have agreed. We are committed to the prevention of all forms of pollution.

How to Order

1	2	3	4	5	6	7	8	9	10	11	12
M	**L**	**F**	**1**	**2**	**D**	**T**	**E**	**4**	**K**	**7**	**5**

Product Series	
Code	Description
MLF	Standard
MLFM	Mini

Power Rating		
Code	Size	Power
18	0102	0.125W
15	0102	0.2W
14	0204	0.25W
25	0204	0.4W
12	0207	0.5W
1	0207	1W

Tolerance		
Code	Tol	Value
B	0.1%	E96, E24
D	0.5%	
F	1%	
J	5%	E24
Z	jumper	

Packaging			
Code	Description	Product Code	Quantity
T	7" Reel Plastic Tape	MLF18, MLF14, MLFM15, MLFM25	3,000
		MLF12, MLFM1	2,000

TCR	
Code	ppm
Z	jumper
T	10
S	15
E	25
C	50
D	100

Resistance Value
Four characters with the multiplier used as the decimal holder.
10 ohm = 10R0 100 ohm = 100R 1 Kohm = 1K00 560 Kohm = 560K zero ohm jumper = 0R00

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