

# MLF14FTC2K20 Datasheet



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|                              |  |
|------------------------------|--|
| DiGi Electronics Part Number | MLF14FTC2K20-DG  |
| Manufacturer                 | <a href="#">Stackpole Electronics Inc</a>                    |
| Manufacturer Product Number  | MLF14FTC2K20   |
| Description                  | RES 2.2K OHM 1% 1/4W MELF 0204                               |
| Detailed Description         | 2.2 kOhms ±1% 0.25W, 1/4W Chip Resistor MELF, 0204 Thin Film |

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## Purchase and inquiry

Manufacturer Product Number:

MLF14FTC2K20

Series:

MLF

Resistance:

2.2 kOhms

Power (Watts):

0.25W, 1/4W

Features:

-

Operating Temperature:

-55°C ~ 155°C

Supplier Device Package:

0204

Height - Seated (Max):

-

Failure Rate:

-

Manufacturer:

Stackpole Electronics Inc

Product Status:

Active

Tolerance:

±1%

Composition:

Thin Film

Temperature Coefficient:

±50ppm/°C

Package / Case:

MELF, 0204

Size / Dimension:

0.055" Dia x 0.138" L (1.40mm x 3.50mm)

Number of Terminations:

2

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8533.21.0090

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

# MLF / MLFM Series

## Metal Film Melf Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

### Features:

- Thin film technology for precision and stability
- Excellent power to size ratio
- Exhibits good pulse power characteristics
- Part is inherently anti-sulfur
- RoHS compliant, REACH compliant, lead free, and halogen free



### Electrical Specifications

| Type/Code   | Package Size | Power Rating (W) @ 70°C | Maximum Working Voltage (V) <sup>(1)</sup> | Maximum Overload Voltage (V) | TCR (ppm/°C) | Ohmic Range (Ω) and Tolerance |              |             |    |
|-------------|--------------|-------------------------|--|------------------------------|--------------|-------------------------------|--------------|-------------|----|
|             |              |                         |  |                              |              | 0.1%                          | 0.5%         | 1%          | 5% |
| MLF18       | 0102         | 0.125                   | 150  | 300                          | ± 15         | 100 - 56K                     |              |             | -  |
|             |              |                         |  |                              | ± 25         | 100 - 82K                     | 49.9 - 200K  | 49.9 - 390K | -  |
|             |              |                         |  |                              | ± 50         | -                             | 1 - 1M       |             |    |
|             |              |                         |  |                              | ± 100        | -                             | 1 - 1M       |             |    |
|             |              |                         |  |                              | Jumper: 2 A  | -                             | 0 Ω (< 15mΩ) |             |    |
| MLFM15      | 0102         | 0.2                     | 200  | 400                          | ± 15         | 100 - 56K                     |              |             | -  |
|             |              |                         |  |                              | ± 25         | 100 - 82K                     | 49.9 - 200K  | 49.9 - 390K | -  |
|             |              | 0.3                     |  |                              | ± 50         | -                             | 1 - 1M       |             |    |
|             |              | ± 100                   |  |                              | -            | 1 - 1M                        |              |             |    |
|             |              | Jumper: 2 A             |  |                              | -            | 0 Ω (< 15mΩ)                  |              |             |    |
| MLF14       | 0204         | 0.25                    | 200  | 400                          | ± 5          | 10 - 332K                     | -            |             |    |
|             |              |                         |  |                              | ± 10         | 10 - 20K                      |              |             |    |
|             |              |                         |  |                              | ± 15         | 10 - 300K                     |              |             |    |
|             |              |                         |  |                              | ± 25         | 10 - 1M                       | 10 - 3.4M    | 1 - 3.4M    |    |
|             |              |                         |  |                              | ± 50         | 10 - 1M                       | 1 - 3.4M     | 0.2 - 10M   |    |
|             |              |                         |  |                              | ± 100        | -                             | 0.1 - 10M    |             |    |
|             |              | Jumper: 3 A             |  |                              | -            | 0 Ω (< 15mΩ)                  |              |             |    |
| MLFM25      | 0204         | 0.4                     | 200  | 400                          | ± 5          | 10 - 332K                     | -            |             |    |
|             |              |                         |  |                              | ± 15         | 10 - 100K                     |              |             |    |
|             |              |                         |  |                              | ± 25         | 10 - 1M                       |              | 1 - 3.4M    |    |
|             |              |                         |  |                              | ± 50         | 10 - 1M                       | 1 - 1M       | 0.2 - 1M    |    |
|             |              |                         |  |                              | ± 100        | -                             | 0.1 - 1M     |             |    |
|             |              | Jumper: 3 A             |  |                              | -            | 0 Ω (< 15mΩ)                  |              |             |    |
| MLF12       | 0207         | 0.5                     | 300  | 600                          | ± 5          | 10 - 332K                     | -            |             |    |
|             |              |                         |  |                              | ± 10         | 10 - 20K                      |              |             |    |
|             |              |                         |  |                              | ± 15         | 10 - 300K                     |              |             |    |
|             |              |                         |  |                              | ± 25         | 10 - 1M                       | 10 - 3.4M    | 1 - 3.4M    |    |
|             |              |                         |  |                              | ± 50         | 10 - 1M                       | 1 - 3.4M     | 0.2 - 10M   |    |
|             |              |                         |  |                              | ± 100        | -                             | 0.1 - 10M    |             |    |
|             |              | Jumper: 5 A             |  |                              | -            | 0 Ω (< 15mΩ)                  |              |             |    |
| MLFM1       | 0207         | 1                       | 350  | 700                          | ± 5          | 10 - 332K                     | -            |             |    |
|             |              |                         |  |                              | ± 15         | 10 - 100K                     |              |             |    |
|             |              |                         |  |                              | ± 25         | 10 - 1M                       |              | 1 - 3.4M    |    |
|             |              |                         |  |                              | ± 50         | 10 - 1M                       | 1 - 1M       | 0.2 - 10M   |    |
|             |              | ± 100                   |  |                              | -            | 0.1 - 10M                     |              |             |    |
| Jumper: 5 A | -            | 0 Ω (< 15mΩ)            |  |                              |              |                               |              |             |    |

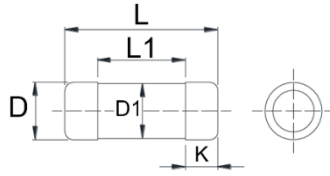
Note: (1) Lesser of  $\sqrt{P \cdot R}$  or maximum working voltage

# MLF / MLFM Series

## Metal Film Melf Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

### Mechanical Specifications



| Type/Code | Typical Unit Weight (mg) | L<br>Body Length             | L1 (min.)<br>Inner Body Length | D<br>Body Diameter           | D1<br>Middle Body Dia.           | K<br>Termination             | Unit         |
|-----------|--------------------------|------------------------------|--------------------------------|------------------------------|----------------------------------|------------------------------|--------------|
| MLF18     | 7.7                      | 0.087 ± 0.004<br>2.20 ± 0.10 | 0.043<br>1.10                  | 0.043 ± 0.004<br>1.10 ± 0.10 | 0.043 +0/-0.006<br>1.10 +0/-0.15 | 0.018 ± 0.002<br>0.45 ± 0.05 | inches<br>mm |
| MLFM15    | 7.7                      | 0.087 ± 0.004<br>2.20 ± 0.10 | 0.043<br>1.10                  | 0.043 ± 0.004<br>1.10 ± 0.10 | 0.043 +0/-0.006<br>1.10 +0/-0.15 | 0.018 ± 0.002<br>0.45 ± 0.05 | inches<br>mm |
| MLF14     | 18.7                     | 0.138 ± 0.008<br>3.50 ± 0.20 | 0.067<br>1.70                  | 0.055 ± 0.006<br>1.40 ± 0.15 | 0.055 +0/-0.008<br>1.40 +0/-0.20 | 0.031 ± 0.004<br>0.80 ± 0.10 | inches<br>mm |
| MLFM25    | 18.7                     | 0.138 ± 0.008<br>3.50 ± 0.20 | 0.067<br>1.70                  | 0.055 ± 0.006<br>1.40 ± 0.15 | 0.055 +0/-0.008<br>1.40 +0/-0.20 | 0.031 ± 0.004<br>0.80 ± 0.10 | inches<br>mm |
| MLF12     | 80.9                     | 0.232 ± 0.008<br>5.90 ± 0.20 | 0.114<br>2.90                  | 0.087 ± 0.008<br>2.20 ± 0.20 | 0.087 +0/-0.008<br>2.20 +0/-0.20 | 0.051 ± 0.004<br>1.30 ± 0.10 | inches<br>mm |
| MLFM1     | 80.9                     | 0.232 ± 0.008<br>5.90 ± 0.20 | 0.114<br>2.90                  | 0.087 ± 0.008<br>2.20 ± 0.20 | 0.087 +0/-0.008<br>2.20 +0/-0.20 | 0.051 ± 0.004<br>1.30 ± 0.10 | inches<br>mm |

### Performance Characteristics

| Test   | Test Method                               | Test Condition   | Test Specification  |        |
|--|---|--|---|--------|
|  |   |  | 5% and below  | Jumper |
| Temperature Coefficient of Resistance (T.C.R.) | JIS-C-5201-1 4.8<br>IEC-60115-1 4.8       | At 25°C/-55°C and 25°C/+125°C, 25°C is the reference temperature.<br>5ppm: At 25°C/-10°C and 25°C/+85°C, 25°C is the reference temperature | As specified  |        |
| Short Time Overload                            | JIS-C-5201-1 4.13<br>IEC-60115-1 4.13     | RCWV*2.5 or max. overload voltage whichever is lower for 5 seconds   | 0204/0207: ± (0.15% + 0.05Ω)<br>0102: ± (0.15% + 0.01Ω)<br>5 ppm: ± (0.05% + 0.01Ω) | < 15mΩ |
| Insulation Resistance                          | JIS-C-5201-1 4.6<br>IEC-60115-1 4.6       | Max. overload voltage for 1 minute   | ≥10G  |        |
| Endurance                                      | JIS-C-5201-1 4.25<br>IEC-60115-1 4.25.1   | 70 ± 2°C, RCWV for 1000 hours with 1.5 hour "ON" and 0.5 hour "OFF"  | 0204/0207: ± (0.15% + 0.05Ω)<br>0102: ± (0.5% + 0.05Ω)<br>5 ppm: ± (0.25% + 0.01Ω)  | < 15mΩ |
| Damp Heat with Load                            | JIS-C-5201-1 4.24<br>IEC-60115-1 4.24     | 40 ± 2°C, 90 ~ 95% R.H., RCWV for 1000 hours with 1.5 hour "ON" and 0.5 hour "OFF"   | 0204/0207: ± (1% + 0.05Ω)<br>5 ppm: ± (0.25% + 0.01Ω)                               | < 15mΩ |
| Dry Heat                                       | JIS-C-5201-1 4.23<br>IEC-60115-1 4.23.2   | At +125°C / +155°C for 1000 hours  | 0204/0207: ± (1% + 0.05Ω)<br>0102: ± (1% + 0.05Ω)<br>5 ppm: ± (0.25% + 0.01Ω)       | < 15mΩ |
| Bending Strength                               | JIS-C-5201-1 4.33<br>IEC-60115-1 4.33     | Bending once for 5 seconds with 2 mm   | ± (0.5% + 0.05Ω)<br>5 ppm: ± (0.1% + 0.01Ω)   | < 15mΩ |
| Solderability                                  | JIS-C-5201-1 4.17<br>IEC-60115-1 4.17     | 245 ± 5°C for 3 seconds  | 95% min. coverage   |        |
| Resistance to Soldering Heat                   | JIS-C-5201-1 4.18<br>IEC-60115-1 4.18     | 260 ± 5°C for 10 seconds   | ± (0.5% + 0.05Ω)<br>5 ppm: ± (0.05% + 0.01Ω)  | < 15mΩ |
| Voltage Proof                                  | JIS-C-5201-1 4.7<br>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<br>IEC-60068-2-58 8.2.1 | 260 ± 5°C for 30 seconds   | Individual leaching area ≤ 5%<br>Total Leaching area ≤ 10%                          |        |
| Rapid Change of Temperature                    | JIS-C-5201-1 4.19<br>IEC-60115-1 4.19     | -55 to +125°C / +155°C, 5 cycles   | ± (0.5% + 0.05Ω)<br>5 ppm: ± (0.2% + 0.01Ω)   | < 15mΩ |

RCWV (rated continuous working voltage) =  $\sqrt{P \cdot R}$  or max. operating voltage whichever is lower.

Recommended storage temperature: 25 ± 3°C, humidity < 80% R.H.

Operating temperature range is -55 to +155°C except for 5 ppm/°C.

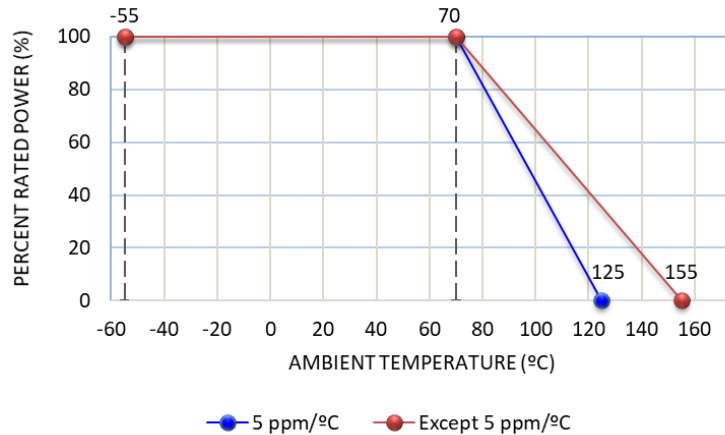
Operating temperature range for 5 ppm/°C is -55 to +125°C.

# MLF / MLFM Series

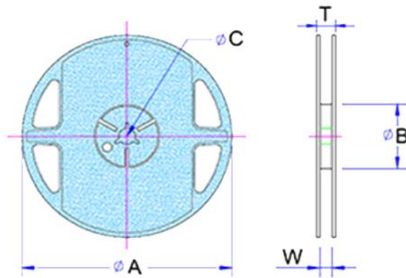
## Metal Film Melf Resistor

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Power Derating Curve:



### Reel Specifications



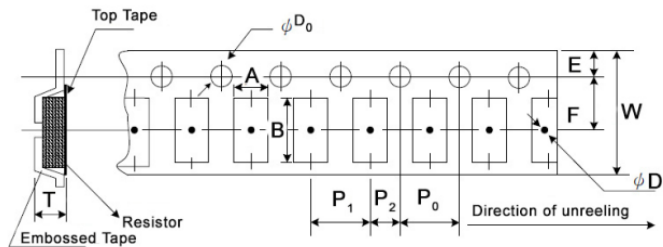
| Type/Code | Reel Diameter | øA                              | øB                             | øC                            | W                            | T                             | Unit         |
|-----------|---------------|---------------------------------|--------------------------------|-------------------------------|------------------------------|-------------------------------|--------------|
| MLF18     | 7 inches      | 7.028 ± 0.059<br>178.50 ± 1.50  | 2.362 ± 0.039<br>60.00 ± 1.00  | 0.512 ± 0.008<br>13.00 ± 0.20 | 0.354 ± 0.020<br>9.00 ± 0.50 | 0.492 ± 0.020<br>12.50 ± 0.50 | inches<br>mm |
| MLFM15    |               |                                 |                                |                               |                              |                               |              |
| MLF14     |               |                                 |                                |                               |                              |                               |              |
| MLFM25    |               |                                 |                                |                               |                              |                               |              |
| MLF12     |               |                                 |                                |                               |                              |                               |              |
| MLF18     | 13 inches     | 12.992 ± 0.039<br>330.00 ± 1.00 | 3.937 ± 0.020<br>100.00 ± 0.50 | 0.512 ± 0.008<br>13.00 ± 0.20 | 0.374 ± 0.020<br>9.50 ± 0.50 | 0.531 ± 0.020<br>13.50 ± 0.50 | inches<br>mm |
| MLFM15    |               |                                 |                                |                               |                              |                               |              |
| MLF14     |               |                                 |                                |                               |                              |                               |              |
| MLFM25    |               |                                 |                                |                               |                              |                               |              |
| MLF12     |               |                                 |                                |                               |                              |                               |              |

# MLF / MLFM Series

## Metal Film Melf Resistor

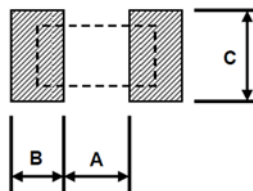
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Resistive Product Solutions

### Packaging Specifications - Plastic Tape



| Type/Code | A             | B             | W             | E             | F             | P0            | Unit   |
|-----------|---------------|---------------|---------------|---------------|---------------|---------------|--------|
| MLF18     | 0.051 ± 0.008 | 0.094 ± 0.008 |               |               |               |               | inches |
| MLFM15    | 1.30 ± 0.20   | 2.40 ± 0.20   |               |               |               |               | mm     |
| MLF14     | 0.061 ± 0.008 | 0.144 ± 0.008 | 0.315 ± 0.004 | 0.069 ± 0.004 | 0.138 ± 0.002 | 0.157 ± 0.004 | inches |
| MLFM25    | 1.55 ± 0.20   | 3.65 ± 0.20   | 8.00 ± 0.10   | 1.75 ± 0.10   | 3.50 ± 0.05   | 4.00 ± 0.10   | mm     |
| MLF12     | 0.094 ± 0.004 | 0.242 ± 0.004 | 0.472 ± 0.004 |               | 0.217 ± 0.002 |               | inches |
| MLFM1     | 2.40 ± 0.10   | 6.15 ± 0.10   | 12.00 ± 0.10  |               | 5.50 ± 0.05   |               | mm     |
| Type/Code | P1            | P2            | D0            | D1            | T             | Unit          |        |
| MLF18     |               |               |               |               | 0.059 ± 0.004 | inches        |        |
| MLFM15    |               |               |               |               | 1.50 ± 0.10   | mm            |        |
| MLF14     | 0.157 ± 0.004 | 0.079 ± 0.002 | 0.059 ± 0.004 | 0.035 min.    | 0.071 ± 0.004 | inches        |        |
| MLFM25    | 4.00 ± 0.10   | 2.00 ± 0.05   | 1.50 ± 0.10   | 0.90 min.     | 1.80 ± 0.10   | mm            |        |
| MLF12     |               |               |               | 0.055 min.    | 0.106 ± 0.004 | inches        |        |
| MLFM1     |               |               |               | 1.40 min.     | 2.70 ± 0.10   | mm            |        |

### Recommended Pad Layout



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

# MLF / MLFM Series

## Metal Film Melf Resistor

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### Recommended Solder Profile

This information is intended as a reference for solder profiles for Stackpole resistive components. These profiles should be compatible with most soldering processes. These are only recommendations. Actual numbers will depend on board density, geometry, packages used, etc., especially those cells labeled with “\*”.

### 100% Matte Tin / RoHS Compliant Terminations

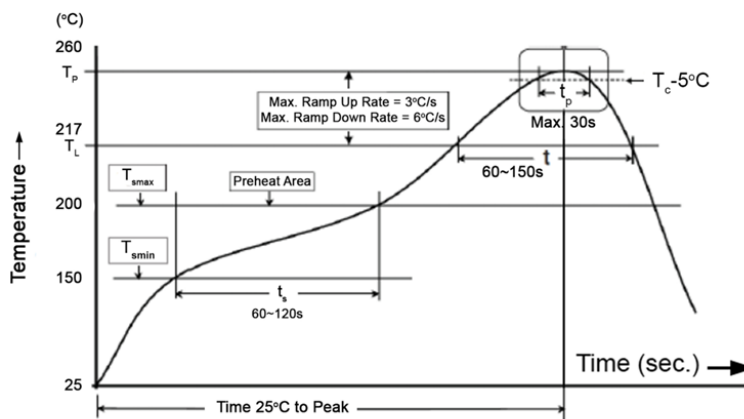
Soldering iron recommended temperatures: 330 to 350°C with minimum duration.  
Maximum number of reflow cycles: 3.

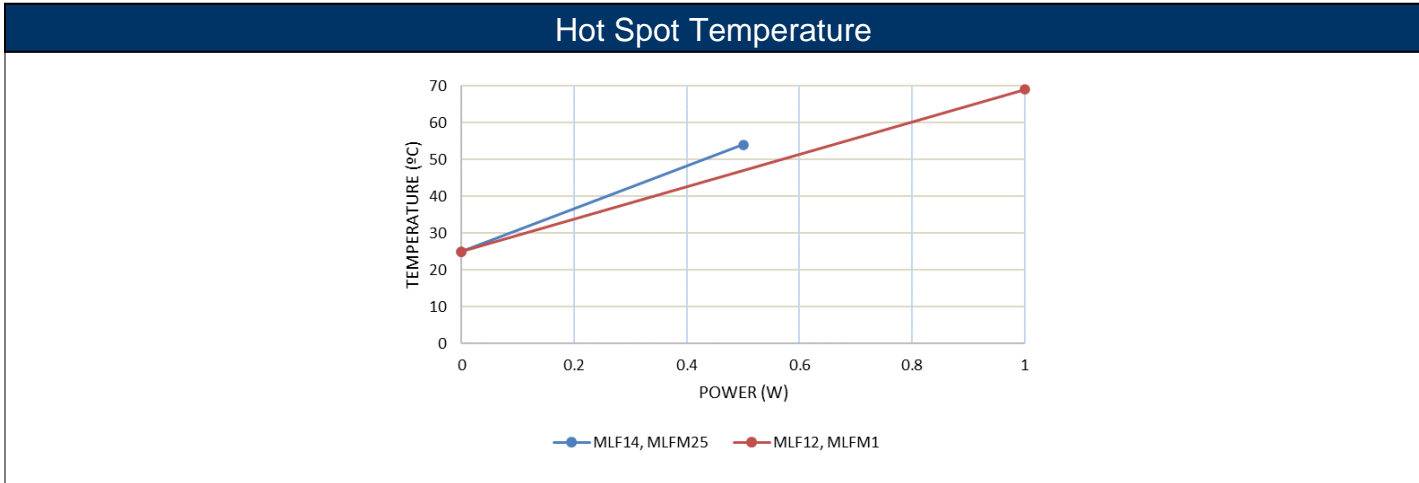
| Wave Soldering     |            |             |            |
|--------------------|------------|-------------|------------|
| Description        | Maximum    | Recommended | Minimum    |
| Preheat Time       | 80 seconds | 70 seconds  | 60 seconds |
| Temperature Diff.  | 140°C      | 120°C       | 100°C      |
| Solder Temp.       | 260°C      | 250°C       | 240°C      |
| Dwell Time at Max. | 10 seconds | 5 seconds   | *          |
| Ramp DN (°C/sec)   | N/A        | N/A         | N/A        |

Temperature Diff. = Difference between final preheat stage and soldering stage.

| Convection IR Reflow |             |             |            |
|----------------------|-------------|-------------|------------|
| Description          | Maximum     | Recommended | Minimum    |
| Ramp Up (°C/sec)     | 3°C/sec     | 2°C/sec     | *          |
| Dwell Time > 217°C   | 150 seconds | 90 seconds  | 60 seconds |
| Solder Temp.         | 260°C       | 245°C       | *          |
| Dwell Time at Max.   | 30 seconds  | 15 seconds  | 10 seconds |
| Ramp DN (°C/sec)     | 6°C/sec     | 3°C/sec     | *          |

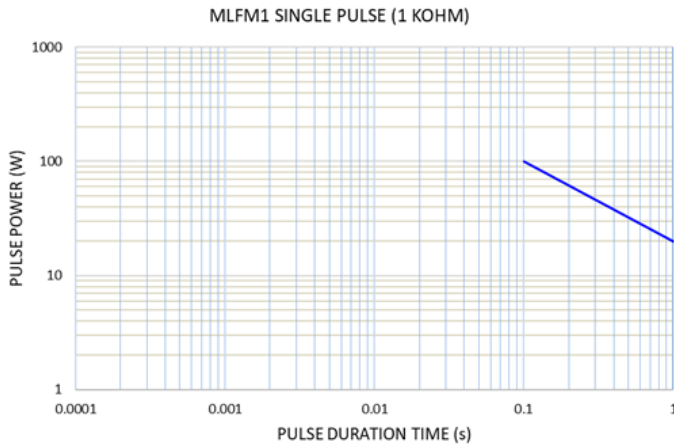
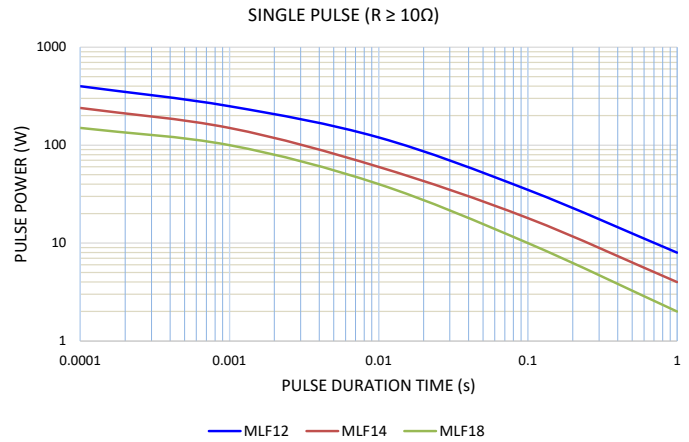
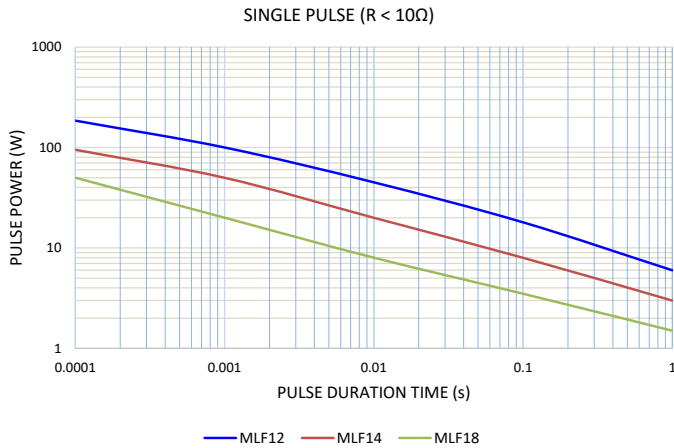
### Recommended Resistor Reflow Profile





### 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.



### Continuous Pulse

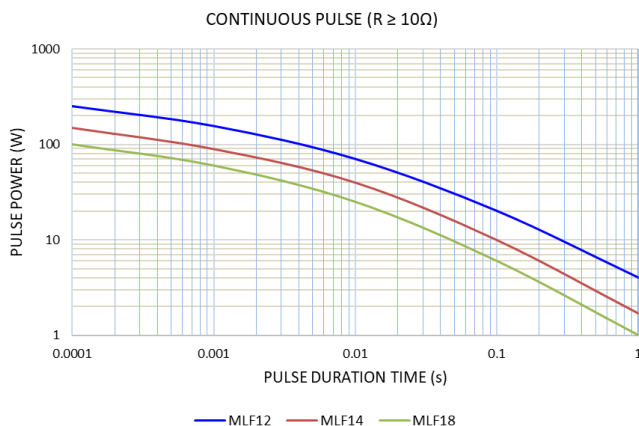
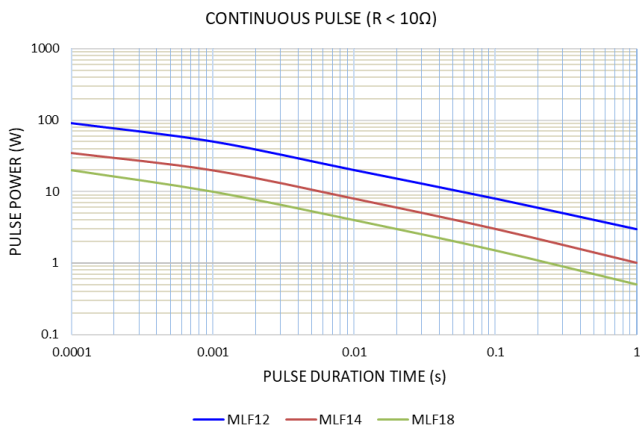
Rev Date: 9/23/2024

This specification may be changed at any time without prior notice. Please confirm technical specifications before use.

# MLF / MLFM Series

## Metal Film Melf Resistor

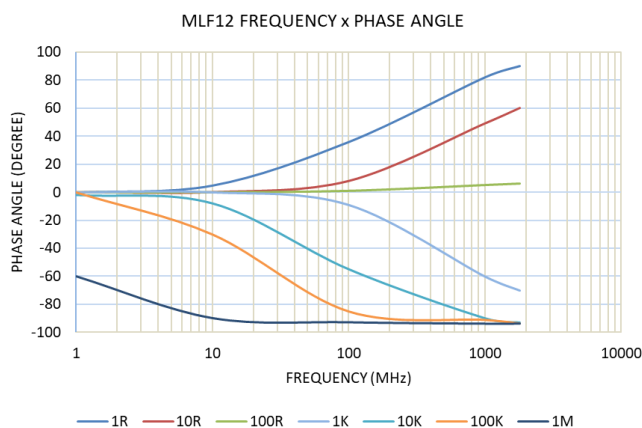
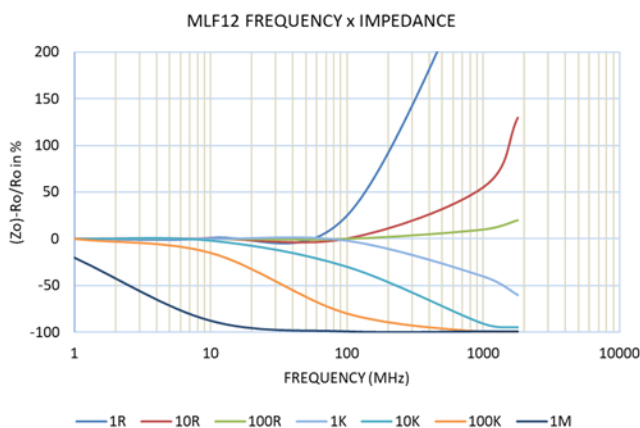
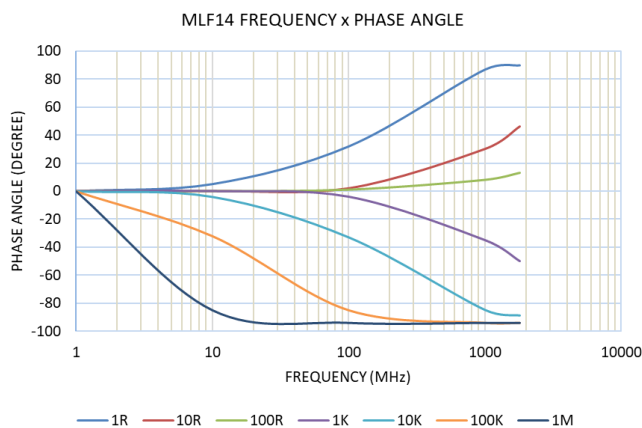
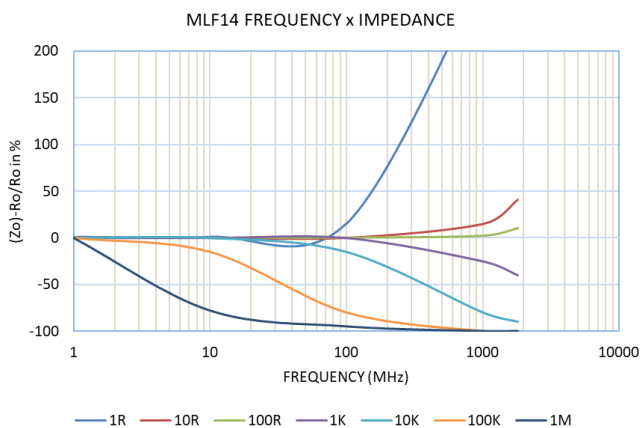
The continuous load graph was obtained by applying repetitive rectangular pulses where the pulse period was adjusted so that the average power dissipated in the resistor was equal to its rated power at 70°C. Again the limit of acceptance was a shift in resistance of less than 1% from the initial value.



### 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.



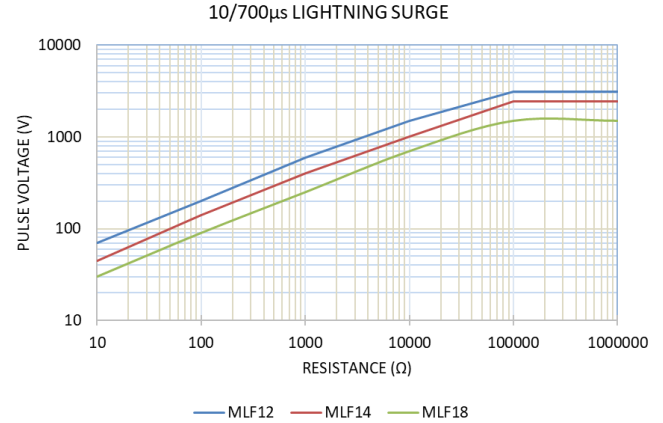
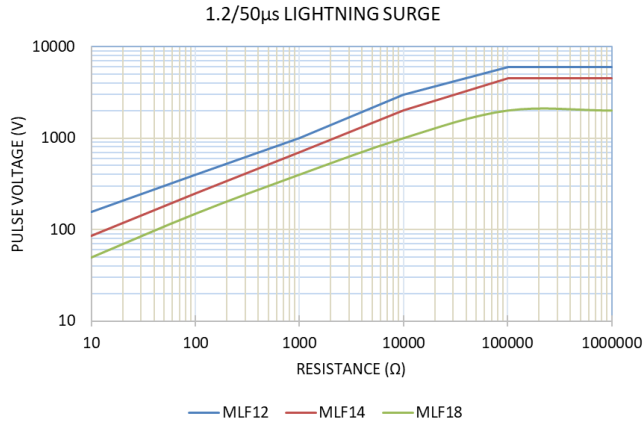
# MLF / MLFM Series

## Metal Film Melf Resistor

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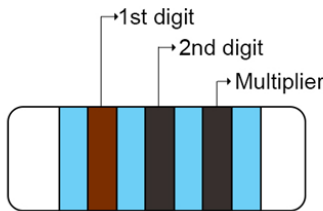
### Lightning Surge

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

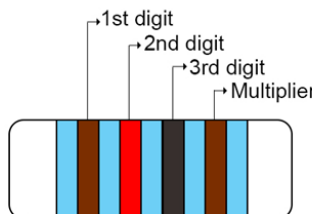


**MLF / MLFM Series**  
Metal Film Melf Resistor

**Color Marking Instructions**



|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| ±5% | E24 | 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 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|



|        |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ±1%    | E96  | 1.00 | 1.02 | 1.05 | 1.07 | 1.10 | 1.13 | 1.15 | 1.18 | 1.21 | 1.24 | 1.27 | 1.30 | 1.33 | 1.37 | 1.40 | 1.43 | 1.47 | 1.50 | 1.54 | 1.58 | 1.62 | 1.65 | 1.69 | 1.74 |
|        |      | 1.78 | 1.82 | 1.87 | 1.91 | 1.96 | 2.00 | 2.05 | 2.10 | 2.15 | 2.21 | 2.26 | 2.32 | 2.37 | 2.43 | 2.49 | 2.55 | 2.61 | 2.67 | 2.74 | 2.80 | 2.87 | 2.94 | 3.01 | 3.09 |
|        |      | 3.16 | 3.24 | 3.32 | 3.40 | 3.48 | 3.57 | 3.65 | 3.74 | 3.83 | 3.92 | 4.02 | 4.12 | 4.22 | 4.32 | 4.42 | 4.53 | 4.64 | 4.75 | 4.87 | 4.99 | 5.11 | 5.23 | 5.36 | 5.49 |
|        |      | 5.62 | 5.76 | 5.90 | 6.04 | 6.19 | 6.34 | 6.49 | 6.65 | 6.81 | 6.98 | 7.15 | 7.32 | 7.50 | 7.68 | 7.87 | 8.06 | 8.25 | 8.45 | 8.66 | 8.87 | 9.09 | 9.31 | 9.53 | 9.76 |
| ±0.5%  | E192 | 10.0 | 10.1 | 10.2 | 10.4 | 10.5 | 10.6 | 10.7 | 10.9 | 11.0 | 11.1 | 11.3 | 11.4 | 11.5 | 11.7 | 11.8 | 12.0 | 12.1 | 12.3 | 12.4 | 12.6 | 12.7 | 12.9 | 13.0 | 13.2 |
|        |      | 13.3 | 13.5 | 13.7 | 13.8 | 14.0 | 14.2 | 14.3 | 14.5 | 14.7 | 14.9 | 15.0 | 15.2 | 15.4 | 15.6 | 15.8 | 16.0 | 16.2 | 16.4 | 16.5 | 16.7 | 16.9 | 17.2 | 17.4 | 17.6 |
|        |      | 17.8 | 18.0 | 18.2 | 18.4 | 18.7 | 18.9 | 19.1 | 19.3 | 19.6 | 19.8 | 20.0 | 20.3 | 20.5 | 20.8 | 21.0 | 21.3 | 21.5 | 21.8 | 22.1 | 22.3 | 22.6 | 22.9 | 23.2 | 23.4 |
|        |      | 23.7 | 24.0 | 24.3 | 24.6 | 24.9 | 25.2 | 25.5 | 25.8 | 26.1 | 26.4 | 26.7 | 27.1 | 27.4 | 27.7 | 28.0 | 28.4 | 28.7 | 29.1 | 29.4 | 29.8 | 30.1 | 30.5 | 30.9 | 31.2 |
|        |      | 31.6 | 32.0 | 32.4 | 32.8 | 33.2 | 33.6 | 34.0 | 34.4 | 34.8 | 35.2 | 35.7 | 36.1 | 36.5 | 37.0 | 37.4 | 37.9 | 38.3 | 38.8 | 39.2 | 39.7 | 40.2 | 40.7 | 41.2 | 41.7 |
|        |      | 42.2 | 42.7 | 43.2 | 43.7 | 44.2 | 44.8 | 45.3 | 45.9 | 46.4 | 47.0 | 47.5 | 48.1 | 48.7 | 49.3 | 49.9 | 50.5 | 51.1 | 51.7 | 52.3 | 53.0 | 53.6 | 54.2 | 54.9 | 55.6 |
| ±0.25% |      | 56.2 | 56.9 | 57.6 | 58.3 | 59.0 | 59.7 | 60.4 | 61.2 | 61.9 | 62.6 | 63.4 | 64.2 | 64.9 | 65.7 | 66.5 | 67.3 | 68.1 | 69.0 | 69.8 | 70.6 | 71.5 | 72.3 | 73.2 | 74.1 |
| ±0.1%  |      | 75.0 | 75.9 | 76.8 | 77.7 | 78.7 | 79.6 | 80.6 | 81.6 | 82.5 | 83.5 | 84.5 | 85.6 | 86.6 | 87.6 | 88.7 | 89.8 | 90.9 | 92.0 | 93.1 | 94.2 | 95.3 | 96.5 | 97.6 | 98.8 |

| COLOR  | DIGIT | MULTIPLIER       |
|--------|-------|------------------|
| silver | -     | 10 <sup>-2</sup> |
| gold   | -     | 10 <sup>-1</sup> |
| black  | 0     | 10 <sup>0</sup>  |
| brown  | 1     | 10 <sup>1</sup>  |
| red    | 2     | 10 <sup>2</sup>  |
| orange | 3     | 10 <sup>3</sup>  |
| yellow | 4     | 10 <sup>4</sup>  |
| green  | 5     | 10 <sup>5</sup>  |
| blue   | 6     | 10 <sup>6</sup>  |
| violet | 7     | 10 <sup>7</sup>  |
| grey   | 8     | 10 <sup>8</sup>  |
| white  | 9     | 10 <sup>9</sup>  |

Note: Resistance with more than 2 significant figures (<1Ω) or more than 3 significant figures (>1Ω) will not be color coded.

# MLF / MLFM Series

## Metal Film Melf Resistor

Stackpole Electronics, Inc.  
Resistive Product Solutions

### 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                     | Metal Film Melf Resistor      | SMD                        | YES                            | 100% Matte Sn over Ni             | Always   | Always                                |
| MLFM                    | Metal Film Mini Melf Resistor |                            |                                |                                   |  |                                       |

### "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.

### 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

| M L F 1 2 D T E 4 K 7 5 |             |              |      |          |           |        |          |           |                          |                                 |              |      |        |  |
|-------------------------|-------------|--------------|------|----------|-----------|--------|----------|-----------|--------------------------|---------------------------------|--------------|------|--------|--|
| Product Series          |             | Power Rating |      |          | Tolerance |        |          | Packaging |                          |                                 |              | TCR  |        | Resistance Value   |
| Code                    | Description | Code         | Size | W        | Code      | Tol    | Value    | Code      | Description              | Product Code                    | Quantity     | Code | ppm    | Four characters with the multiplier used as the decimal holder.<br><br>10 ohm = 10R0<br>100 ohm = 100R<br>1 Kohm = 1K00<br>560 Kohm = 560K<br>zero ohm jumper = 0R00 |
| MLF                     | Standard    | 18           | 0102 | 0.125    | B         | 0.1%   | E96, E24 | T         | 7" Reel<br>Plastic Tape  | MLF18, MLF14,<br>MLFM15, MLFM25 | 3000         | Z    | jumper |  |
| MLFM                    | Mini        | 15           | 0102 | 0.2, 0.3 | D         | 0.5%   |          | F         |                          | 1%                              | MLF12, MLFM1 | 2000 | Y      | 5  |
|                         |             | 14           | 0204 | 0.25     | J         | 5%     | E24      | J         | 13" Reel<br>Plastic Tape | MLF18, MLF14,<br>MLFM15, MLFM25 | 10000        | T    | 10     |  |
|                         |             | 25           | 0204 | 0.4      | Z         | jumper |          |           |                          | MLF12, MLFM1                    | 6000         | S    | 15     |  |
|                         |             | 12           | 0207 | 0.5      |           |        |          |           |                          |                                 |              | E    | 25     |  |
|                         |             | 1            | 0207 | 1        |           |        |          |           |                          |                                 |              | C    | 50     |  |
|                         |             |              |      |          |           |        |          |           |                          |                                 |              | D    | 100    |  |

## OUR CERTIFICATE

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DiGi is a global authorized distributor of electronic components.