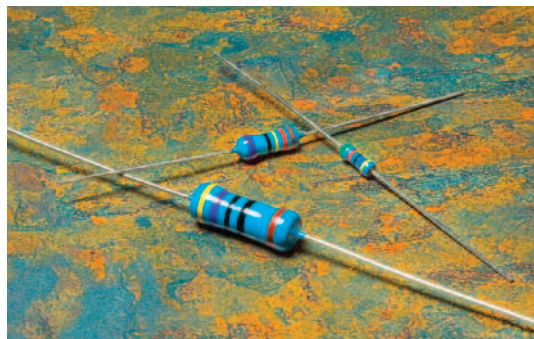
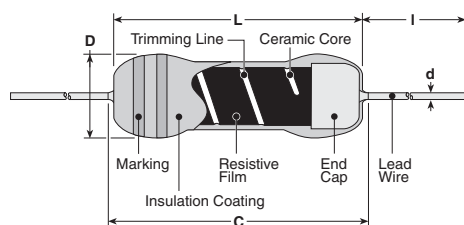




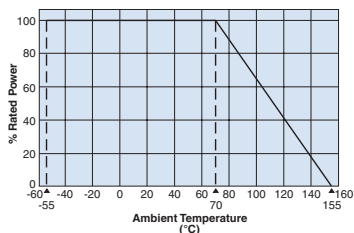
## features

- Semi-precision metal film resistors
- Meets requirements of MIL-R-22684
- Suitable for automatic machine insertion
- MFS two times the power rating of the standard body type
- Products with lead-free terminations meet EU RoHS and China RoHS requirements
- AEC-Q200 Qualified: MF1/4, MFS1/4, MFS1/2

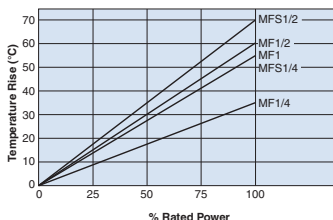
## dimensions and construction



### Derating Curve



### Surface Temperature Rise



| Type             | Dimensions inches (mm)                                                         |                |                                                                                 |                          | I*                                                  |
|------------------|--------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------|--------------------------|-----------------------------------------------------|
|                  | L (ref.)                                                                       | C (max.)       | D                                                                               | d (nom.)                 |                                                     |
| MFS1/4           | .126 <sup>+02</sup> <sub>-.008</sub><br>(3.2 <sup>+0.5</sup> <sub>-.02</sub> ) | .133<br>(3.4)  | .066 <sup>+016</sup> <sub>-.004</sub><br>(1.7 <sup>+0.4</sup> <sub>-.01</sub> ) | .018<br>(0.45)           | 1.10±.118<br>(28.0±3.0)                             |
| MF1/4            | .248±.02<br>(6.3±0.5)                                                          | .280<br>(7.1)  | .091±.012<br>(2.3±0.3)                                                          | .024<br>(0.6)            |                                                     |
| MFS1/2           | .248±.02<br>(6.3±0.5)                                                          | .280<br>(7.1)  | .091±.012<br>(2.3±0.3)                                                          | .024<br>(0.6)            |                                                     |
| MF1/2C<br>MF1/2D | .354±.04<br>(9.0±1.0)                                                          | .437<br>(11.1) | .138 <sup>+016</sup> <sub>-.02</sub><br>(3.5 <sup>+0.4</sup> <sub>-.05</sub> )  | .024<br>(0.6)            | 1.10 <sup>+012</sup> <sub>-.016</sub><br>(28.0±3.0) |
| MF1/2L           | .354±.04<br>(9.0±1.0)                                                          | .437<br>(11.1) | .138±.016<br>(3.5±0.4)                                                          | .024/.031<br>(0.6)/(0.8) | 1.10±.118<br>(28.0±3.0)                             |
| MF1              | .610±.02<br>(15.5±0.5)                                                         | .721<br>(18.3) | .217±.04<br>(5.5±1.0)                                                           | .031<br>(0.8)            | 1.50 <sup>+012</sup> <sub>-.016</sub><br>(38.0±5.0) |
| RK1/4            | .248±.02<br>(6.3±0.5)                                                          | .280<br>(7.1)  | .091±.012<br>(2.3±0.3)                                                          | .024<br>(0.6)            | 0.94 min.<br>(24.0 min.)                            |
| RK1/2            | .374±.04<br>(9.5±1.0)                                                          | .437<br>(11.1) | .138±.016<br>(3.5±0.4)                                                          | .024<br>(0.6)            |                                                     |
| RK1              | .610±.04<br>(15.5±1.0)                                                         | .720<br>(18.3) | .217±.02<br>(5.5±0.5)                                                           | .031<br>(0.8)            |                                                     |

\* Lead length changes depending on taping and forming.

## ordering information

| MF              | 1/4                               | L                                                            | C                    | T52                                                                                                 | 8                                                                                       | R                  | R20                                                                                                                                      | J                                                               |
|-----------------|-----------------------------------|--------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Type            | Power Rating                      | T.C.R.                                                       | Termination Material | Taping and Forming                                                                                  | Lead Diameter                                                                           | Packaging          | Nominal Resistance                                                                                                                       | Tolerance                                                       |
| MF<br>MFS<br>RK | 1/4: 0.25W<br>1/2: 0.50W<br>1: 1W | E: ±25<br>C: ±50<br>D: ±100<br>L: ±200<br>G: ±250<br>B: ±350 | C: SnCu              | 1/4: T26, T52, VT, VTP, VTE, MT, M, U, M10, M12.5<br>1/2: T26, T52, VTP, VTE, M12.5, M15<br>1: T521 | MF1/2L: T52 & Bulk Only:<br>6: 0.6mm<br>8: 0.8mm<br>Blank: All others sizes & packaging | A: Ammo<br>R: Reel | +2%: 2 significant figures + 1 multiplier<br>+0.5%, +1%: 3 significant figures + 1 multiplier<br>"R" indicates decimal on value<br><100Ω | B: ±0.1%<br>C: ±0.25%<br>D: ±0.5%<br>F: ±1%<br>G: ±2%<br>J: ±5% |

For further information on packaging, please refer to Appendix C.

## applications and ratings

| Part Designation | Power Rating @ 70°C | Minimum Dielectric Withstanding Voltage | T.C.R. (ppm/°C) | Resistance Range (Ω) |                |                     |                    |               |               | Absolute Maximum Working Voltage | Absolute Maximum Overload Voltage | Operating Temperature Range |
|------------------|---------------------|-----------------------------------------|-----------------|----------------------|----------------|---------------------|--------------------|---------------|---------------|----------------------------------|-----------------------------------|-----------------------------|
|                  |                     |                                         |                 | (B±0.1%) E-96        | (C±0.25%) E-96 | (D±0.5%) E-24 E-192 | (F±1.0%) E-24 E-96 | (G±2.0%) E-24 | (J±5.0%) E-24 |                                  |                                   |                             |
| MFS1/4C          | 0.25W               | 300V                                    | C: ±50          | —                    | —              | 49.9 - 562k         | 10 - 1M            | —             | —             | 250V                             | 500V                              | -55°C to +155°C             |
| MFS1/4D          |                     |                                         | D: ±100         | —                    | —              | —                   | —                  | —             | —             | —                                | —                                 |                             |

## applications and ratings (continued)

| Part Designation | Power Rating @ 70°C | Minimum Dielectric Withstanding Voltage | T.C.R. (ppm/°C) | Resistance Range (Ω) |                |                     |                    |               |               | Absolute Maximum Working Voltage | Absolute Maximum Overload Voltage | Operating Temperature Range |
|------------------|---------------------|-----------------------------------------|-----------------|----------------------|----------------|---------------------|--------------------|---------------|---------------|----------------------------------|-----------------------------------|-----------------------------|
|                  |                     |                                         |                 | (B±0.1%) E-96        | (C±0.25%) E-96 | (D±0.5%) E-24 E-192 | (F±1.0%) E-24 E-96 | (G±2.0%) E-24 | (J±5.0%) E-24 |                                  |                                   |                             |
| MF1/4C           | 0.25W               | 500V                                    | C: ±50          | —                    | —              | 10 - 2.21M          | 10 - 2.21M         | —             | —             | 250V                             | 500V                              | -55°C to +155°C             |
| MF1/4D           |                     |                                         | D: ±100         | —                    | —              |                     |                    | —             |               |                                  |                                   |                             |
| MF1/4L           |                     |                                         | L: ±200         | —                    | —              |                     |                    | 1.0 - 10      |               |                                  |                                   |                             |
| MFS1/2C          | 0.50W               | 500V                                    | C: ±50          | —                    | —              | 10 - 1M             | 10 - 2.21M         | 10 - 2.2M     | —             | 350V                             | 700V                              |                             |
| MFS1/2D          |                     |                                         | D: ±100         |                      |                |                     |                    |               |               |                                  |                                   |                             |
| MF1/2C           | 0.50W               | 700V                                    | C: ±50          | —                    | —              | 10 - 5.05M          | 10 - 4.99M         | —             | —             | 350V                             | 700V                              |                             |
| MF1/2D           |                     |                                         | D: ±100         | —                    | —              |                     | 10 - 5.11M         |               |               |                                  |                                   |                             |
| MF1/2L           |                     |                                         | L: ±200         | —                    | —              |                     | 1.0 - 10           |               |               |                                  |                                   |                             |
| MF1C             | 1W                  | 700V                                    | C: ±50          | 5.1 - 2.0M           | 5.1 - 2.49M    | 5.1 - 5.11M         | 1.0 - 6.81M        | —             | —             | 350V                             | 700V                              |                             |
| MF1D             |                     |                                         | D: ±100         | —                    | —              |                     |                    | —             | —             |                                  |                                   |                             |
| MF1E             |                     |                                         | E: ±25          | 5.1 - 2.0M           | 5.1 - 2.49M    |                     |                    | 5.1 - 4.64M   | 1.0 - 5.11M   |                                  |                                   |                             |
| RK1/4D           | 0.25W               | 500V                                    | D: ±100         | —                    | —              | —                   | 3.09M - 25M        | —             | —             | 500V                             | 700V                              |                             |
| RK1/4L           |                     |                                         | L: ±200         | —                    | —              | —                   | —                  | 3.3M - 33M    | 3.3M - 33M    |                                  |                                   |                             |
| RK1/4B           |                     |                                         | B: ±350         | —                    | —              | —                   | 100k - 25M         | 100k - 33M    | 100k - 33M    |                                  |                                   |                             |
| RK1/2D           | 0.50W               | 700V                                    | D: ±100         | —                    | —              | —                   | 5.11M - 33M        | —             | —             | 700V                             | 1000V                             |                             |
| RK1/2L           |                     |                                         | L: ±200         | —                    | —              | —                   | —                  | 6.2M - 33M    | 6.2M - 33M    |                                  |                                   |                             |
| RK1/2B           |                     |                                         | B: ±350         | —                    | —              | —                   | 100k - 35M         | 100k - 51M    | 100k - 51M    |                                  |                                   |                             |
| RK1BC            | 1W                  | 1000V                                   | B: ±350         | —                    | —              | —                   | 100k - 51M         | 100k - 100M   | 100k - 100M   | 1000V                            | 1500V                             |                             |
| RK1/2G*          | 0.50W               | 700V                                    | G: ±250         | —                    | —              | —                   | —                  | —             | 1M - 12M      | 350V                             | 700V                              |                             |

\* Discharge path resistor

## environmental applications

### Performance Characteristics

| Parameter                       | Requirement $\Delta R \pm (\% + 0.05\Omega)$                     | Limit                                                               | Typical | Test Method                                                                                                                                                        |
|---------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Resistance                      | Within specified tolerance                                       | —                                                                   | —       | 25°C                                                                                                                                                               |
| T.C.R.                          | Within specified T.C.R.                                          | —                                                                   | —       | Room temperature, +100°C, RK: +25°C/+125°C                                                                                                                         |
| Overload (Short Time)           | RK: ±1%; RK1/2G: ±2.5%; MF: ±0.5%                                | RK: ±0.6%; RK1/2G: ±1%; MF: ±0.3%                                   | —       | Rated voltage x 2.5 or max. overload voltage for 5 seconds, whichever is less; MFS1/2: Rated voltage x 2 or max. overload voltage for 5 seconds, whichever is less |
| Resistance to Solder Heat       | RK: ±1%; RK1/2G: ±5%; MFS: ±0.75%; MF1/4, MFS1/2, MF1/2: ±0.5%   | RK: ±0.5%; RK1/2G: ±1%; MFS1/4: ±0.4%; MF1/4, MFS1/2, MF1/2: ±0.25% | —       | 260°C ± 5°C, 10 seconds ± 1 second or 350°C ± 10°C, 3.5 seconds ± 0.5 second                                                                                       |
| Dielectric Withstanding Voltage | No breakdown                                                     | —                                                                   | —       | 1 minute                                                                                                                                                           |
| Insulation Resistance           | Not less than 10,000MΩ                                           | —                                                                   | —       | 100V, 1 minute                                                                                                                                                     |
| Rapid Change of Temperature     | RK, MF: ±1%; RK1/2G: ±5%                                         | MF: ±0.3%; RK: ±0.5%; RK1/2G: ±1%                                   | —       | -55°C (30 minutes), +155°C (30 minutes), 5 cycles                                                                                                                  |
| Moisture Resistance             | RK: ±5%; RK1/2G: ±10%; MFS1/4: ±1.5%; MF1/4, MFS1/2, MF1/2: ±1%  | RK: ±2%; RK1/2G: ±5%; MFS1/4: ±1%; MF1/4, MFS1/2, MF1/2: ±0.75%     | —       | 40°C ± 2°C, 90 - 95% RH, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle                                                                                                   |
| Endurance at 70°C               | RK: ±5%; RK1/2G: ±10%; MFS1/4: ±1.5%; MF1/4, MFS1/2, MF1/2: ±1%  | RK: ±2%; RK1/2G: ±5%; MFS1/4: ±1%; MF1/4, MFS1/2, MF1/2: ±0.75%     | —       | 70°C ± 2°C, 1000 hours, 1.5 hr ON, 0.5 hr OFF cycle                                                                                                                |
| Resistance to Solvent           | No abnormality in appearance. Marking shall be easily legible    | —                                                                   | —       | The resistor shall be immersed for 5 seconds in IPA                                                                                                                |
| Impulse                         | No such abnormalities as short-circuit, burnout, breakdown, etc. | —                                                                   | —       | Discharge from 1000pF capacitor 50 pulses. Internal 2.5 seconds. Charge voltage: 1.25kV (RK1/4), 2.5kV (RK1/2) and 6kV (RK1)                                       |