

Precision Metal Film Resistors

NOT RECOMMENDED FOR NEW DESIGNS

GP Series

- Meets requirements of MIL-R-10509
- Flame-retardant coatings are standard
- 10 ohm - 10 megohm resistance range
- Resistance range tolerance of $\pm 0.1\%$ - 1%
- Temperature coefficients from ± 25 to ± 100 ppm/ $^{\circ}\text{C}$



 All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

| IRC Type | IRC Power Rating (watts) | | MIL Reference | Maximum Working Voltage | Resistance Temperature Coefficient (\pm ppm/ $^{\circ}\text{C}$) | Tolerance & Resistance Range | | |
|------------|--------------------------|--------------------------|---------------|-------------------------|--|------------------------------|---------------------|----------------------------|
| | @ 70 $^{\circ}\text{C}$ | @ 125 $^{\circ}\text{C}$ | | | | +1% | $\pm 5\%$ | ± 0.25 and $\pm 0.1\%$ |
| GP-50 (T0) | 1/8 | 1/10 | RN50 | 200 | 100 | 10 - 2.37 Meg | 10 ohm - 499K ohm | 100 ohm - 100K ohm |
| GP-50 (T2) | 1/8 | 1/10 | RN50 | 200 | 50 | 10 ohm - 1 Meg | 10 ohm - 499K ohm | 100 ohm - 100K ohm |
| GP-50 (T9) | 1/8 | 1/10 | RN50 | 200 | 25 | 49.9 ohm - 499K ohm | 49.9 ohm - 499K ohm | 100 ohm - 100K ohm |
| | | | | | | | | |
| GP-55 (T0) | 1/4 | 1/8 | RN55 | 250 | 100 | 10 ohm - 10 Meg | 10 ohm - 499K ohm | 30 ohm - 300K ohm |
| GP-55 (T2) | 1/4 | 1/8 | RN55 | 250 | 50 | 10 ohm - 4.99 Meg | 10 ohm - 499K ohm | 30 ohm - 300K ohm |
| GP-55 (T9) | 1/4 | 1/8 | RN55 | 250 | 25 | 30 ohm - 499K ohm | 30 ohm - 499K ohm | 30 ohm - 300K ohm |
| | | | | | | | | |
| GP-60 (T0) | 1/2 | 1/4 | RN60 | 350 | 100 | 10 ohm - 10 Meg | 10 ohm - 499K ohm | 100 ohm - 100K ohm |
| GP-60 (T2) | 1/2 | 1/4 | RN60 | 350 | 50 | 10 ohm - 4.99 Meg | 10 ohm - 499K ohm | 100 ohm - 100K ohm |
| GP-60 (T9) | 1/2 | 1/4 | RN60 | 350 | 25 | 49.9 ohm - 499K ohm | 49.9 ohm - 499K ohm | 100 ohm - 100K ohm |

General Note

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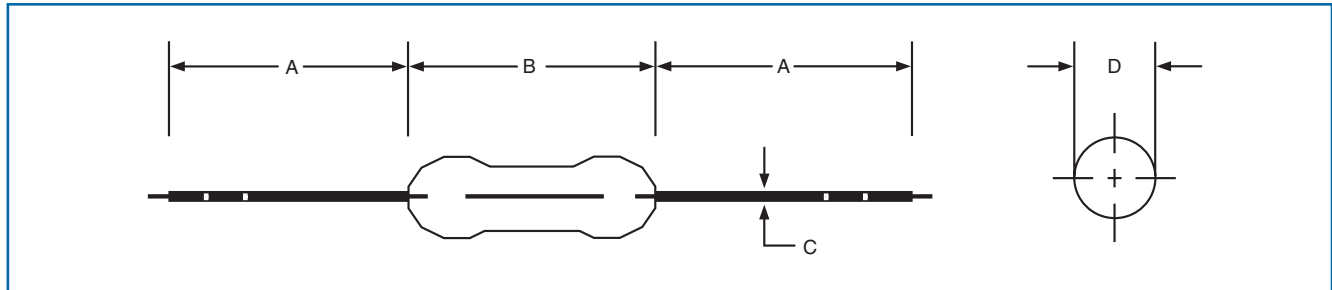
Environmental Data

| Environmental (%ΔR) | MIL-R-10509 | | Char. C | EIA RS-196 Class 1 |
|-------------------------------|---------------------------------|-----------------|-----------------|--------------------|
| | Typical | Char. D | | |
| Moisture Resistance | ±0.5 | ±1.5 | ±0.5 | ±1.5 |
| Thermal Shock | ±0.25 | ±0.5 | ±0.25 | - |
| Load life @ 70°C - 1000 hours | ±0.5 | ±1.0 | ±0.5 | ±2.0 |
| Shock and Vibration | ±0.25 | ±0.5 | ±0.25 | - |
| Resistance to Soldering Heat | ±0.1 | ±0.5 | ±0.1 | - |
| Terminal Strength | ±0.2 | ±0.2 | ±0.2 | - |
| Dielectric Withstand Voltage | ±0.25 | ±0.5 | ±0.25 | ±0.5 |
| Short Time Overload | ±0.25 | ±0.5 | ±0.25 | ±0.5 |
| Operating Temperature Range | -55°C to +165°C | -55°C to +165°C | -55°C to +165°C | |
| Maximum Pulse Voltage | GP50 400V, GP55 500V, GP60 600V | | | |
| Insulation Resistance | 10,000 meg min. | | | |
| Voltage Coefficient | 100ppm/V | | | |

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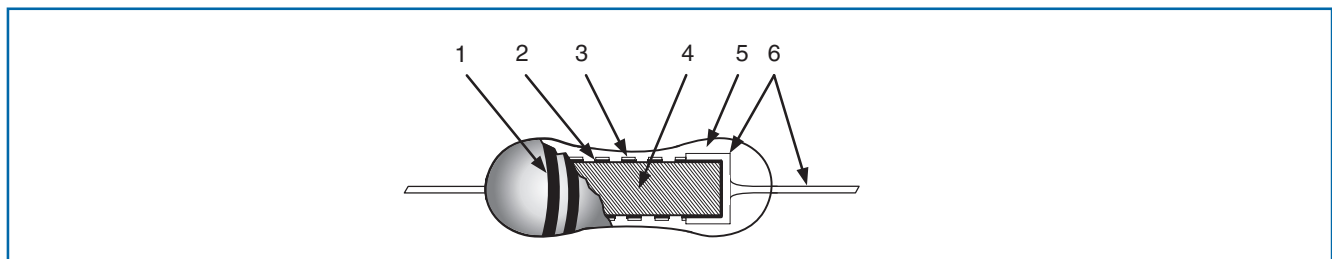
Physical Data



Dimensions (inches and (mm))

| Dimension | GP50 | GP55 | GP60 |
|-----------|-----------------------------------|----------------------------|----------------------------|
| A | 1.10 ± .08 (28.0 ± 2.0) | 1.10 ± .08 (28.0 ± 2.0) | 1.10 ± .08 (28.0 ± 2.0) |
| B | 0.13 + .01/-0.00 (3.2 + 0.2/-0.0) | 0.24 ± .01 (6.0 ± 0.3) | 0.33 ± .02 (8.5 ± 0.5) |
| C | 0.018 ± .001 (0.45 ± 0.02) | 0.023 ± .002 (0.60 ± 0.05) | 0.027 ± .002 (0.70 ± 0.05) |
| D | 0.073 ± .006 (1.85 ± 0.15) | 0.09 ± .01 (2.4 ± 0.2) | 0.11 ± .01 (2.8 ± 0.3) |

Construction



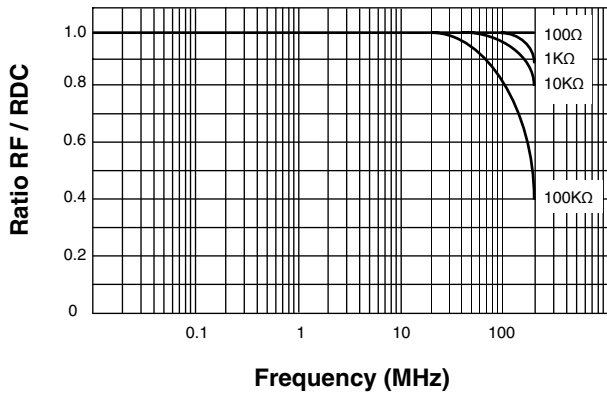
- 1. COLOR BANDS.**
The resistors are permanently color banded for resistance value and tolerance in accordance with EIA specifications.
- 2. HELIXING.**
The units are helixed to a predetermined base to final value ratio to obtain the best TCR, noise and stability characteristics.
- 3. FILM.**
Metal-film resistors have a homogeneous film of metal alloy applied by vacuum deposition.
- 4. SUBSTRATES.**
The substrates are of a proprietary non alkaline ceramic, prepared and processed under exacting conditions to guarantee the utmost in uniformity and surface characteristics.
- 5. INSULATION.**
The resistors are coated with multiple layers of a baked-on fire-retardant synthetic resin which provides the units with a high degree of mechanical and electrical protection in the most adverse operating conditions.
- 6. TERMINATIONS.**
Positive contact is provided to the resistance element by precision-made end caps. The lead wires are attached by using proprietary welding techniques.

General Note

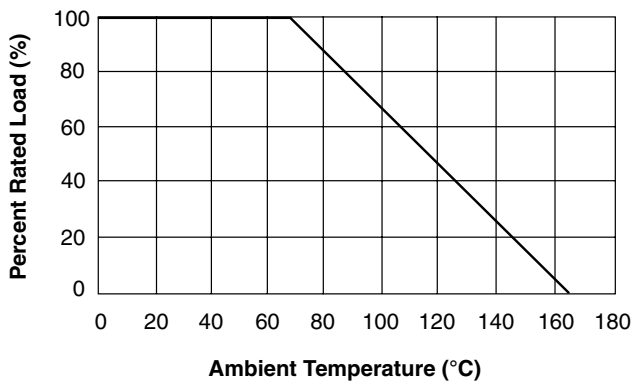
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Performance Curves

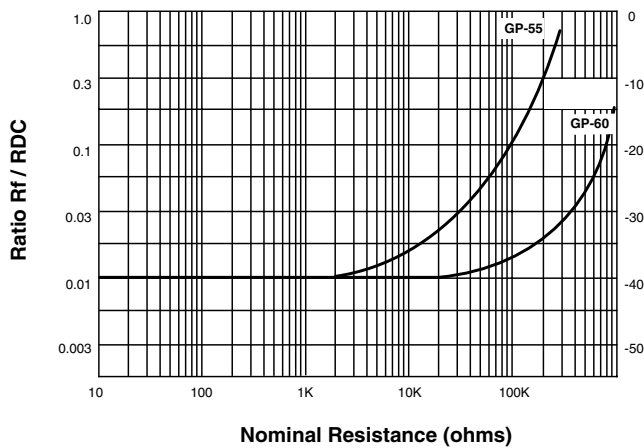
High-Frequency Characteristics (Typical)



Derating Curve (Typical)



Current Noise (Typical)



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Ordering Procedure

Example: GP551001001FLFLTR (GP55 with TCR = $\pm 100\text{ppm}/^\circ\text{C}$ at 1 kilohm $\pm 1\%$, Pb-free)

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | P | 5 | 5 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | F | L | F | L | T | R |
| 1 | | 2 | | 3 | | | 4 | 5 | | 6 | | | | | | |

| 1 | 2 | 3 | 4 | 5 | 6 |
|------|--------------------------------|-----------------------------------|------------------|--------------|-------------------|
| Type | TCR | Value | Tolerance | Finish | Packing |
| GP50 | 25 = 25ppm/ $^\circ\text{C}$ | 3 digits + multiplier | B = $\pm 0.1\%$ | LF = Pb-free | LTR = Tape & reel |
| GP55 | 50 = 50ppm/ $^\circ\text{C}$ | R = ohms for values < 100 ohms | C = $\pm 0.25\%$ | | |
| GP60 | 100 = 100ppm/ $^\circ\text{C}$ | | D = $\pm 0.5\%$ | | |
| | | | F = $\pm 1\%$ | | |

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