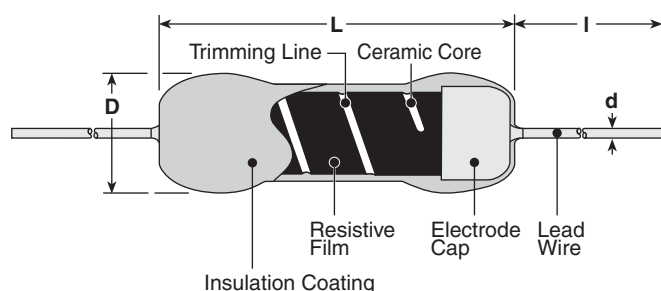


## features

- Miniature construction endurable to high voltage and high power
- Resistors excellent in anti-surge characteristics
- Wide resistance range of 0.5M $\Omega$  - 10G $\Omega$  and small T.C.R.
- Marking: Brown body color with alpha/numeric marking
- Products with lead-free terminations meet EU RoHS requirements. Pb located in glass material, electrode and resistor element is exempt per Annex 1, exemption 5 of EU directive 2005/95/EC

## dimensions and construction



| Type   | Dimensions inches (mm)               |                                    |                |                                     |
|--------|--------------------------------------|------------------------------------|----------------|-------------------------------------|
|        | L                                    | D                                  | d (Nominal)    | I                                   |
| GS 1/4 | .248 $\pm$ .039<br>(6.3 $\pm$ 1.0)   | .091 $\pm$ .020<br>(2.3 $\pm$ 0.5) | .026<br>(0.65) | 1.50 $\pm$ .118<br>(38.0 $\pm$ 3.0) |
| GS 1/2 | .374 $\pm$ .039<br>(9.5 $\pm$ 1.0)   | .138 $\pm$ .024<br>(3.5 $\pm$ 0.6) | .031<br>(0.8)  |                                     |
| GS 1   | .591 $\pm$ .059<br>(15.0 $\pm$ 1.5)  | .177 $\pm$ .039<br>(4.5 $\pm$ 1.0) |                |                                     |
| GS 2   | .945 $\pm$ .059<br>(24.0 $\pm$ 1.5)  | .311 $\pm$ .039<br>(7.9 $\pm$ 1.0) | .039<br>(1.0)  | 1.50 $\pm$ .118<br>(38.0 $\pm$ 3.0) |
| GS 3   | 2.05 $\pm$ .079<br>(52.0 $\pm$ 2.0)  |                                    |                |                                     |
| GS 5   | 2.99 $\pm$ .079<br>(76.0 $\pm$ 2.0)  |                                    |                |                                     |
| GS 7   | 3.82 $\pm$ .118<br>(97.0 $\pm$ 3.0)  |                                    |                |                                     |
| GS 10  | 4.61 $\pm$ .118<br>(117.0 $\pm$ 3.0) |                                    |                |                                     |
| GS 12  | 5.39 $\pm$ .118<br>(137.0 $\pm$ 3.0) |                                    |                |                                     |

## ordering information

| New Part # | GS | 1/2                                                                                        | L                                  | C                                                                                                     | 106                                                                                                                                           | J                                                                          |
|------------|----|--------------------------------------------------------------------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Type       |    | Power Rating                                                                               | T.C.R.                             | Termination Surface Material                                                                          | Nominal Resistance                                                                                                                            | Resistance Tolerance                                                       |
|            |    | 1/4: 0.25W<br>1/2: 0.5W<br>1: 1W<br>2: 2W<br>3: 3W<br>5: 5W<br>7: 7W<br>10: 10W<br>12: 12W | D(B): $\pm$ 100<br>L(A): $\pm$ 200 | C: SnCu                                                                                               | $\pm$ 2%, $\pm$ 5%, $\pm$ 10%:<br>2 significant figures<br>+ 1 multiplier<br>$\pm$ 0.5%, $\pm$ 1%:<br>3 significant figures<br>+ 1 multiplier | D: $\pm$ 0.5%<br>F: $\pm$ 1%<br>G: $\pm$ 2%<br>J: $\pm$ 5%<br>K: $\pm$ 10% |
|            |    |                                                                                            |                                    | Packaging quantity:<br>GS1/4: 100 pieces<br>GS1/2: 50 pieces<br>GS1: 20 pieces<br>GS2 ~ 12: 10 pieces |                                                                                                                                               |                                                                            |

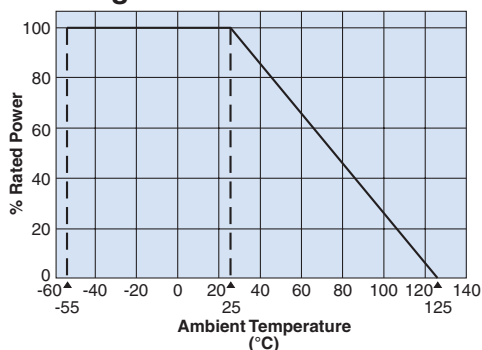
## applications and ratings

| Part Designation | Power Rating | T.C.R. (ppm/°C) Max. | Resistance Range (Ω) |               |           |           |           | Max. Working Voltage | Max. Overload Voltage | Impulse Withstand Voltage | Rated Ambient Temperature | Operating Temperature Range |
|------------------|--------------|----------------------|----------------------|---------------|-----------|-----------|-----------|----------------------|-----------------------|---------------------------|---------------------------|-----------------------------|
|                  |              |                      | (D±0.5%)             | (F±1%)        | (G±2%)    | (J±5%)    | (K±10%)   |                      |                       |                           |                           |                             |
| GS1/4*           | 0.25W        | D: ±100<br>L: ±200   | 0.5M-20M             | 0.5M<br>-100M | 0.5M-100M | 0.5M-100M | 0.5M-100M | 0.5kV                | 1kV                   | 1.25kV                    | +25°C                     | -55°C<br>to<br>+125°C       |
| GS1/2*           | 0.5W         | D: ±100<br>L: ±200   | 0.5M-50M             |               | 0.5M-200M | 0.5M-200M | 0.5M-200M | 1kV                  | 2kV                   | 2.5kV                     |                           |                             |
|                  |              | 0.5M-500M            |                      |               | 0.5M-500M | 0.5M-500M |           |                      |                       |                           |                           |                             |
| GS1              | 1W           | D: ±100<br>L: ±200   |                      |               | 0.5M-500M | 0.5M-500M | 0.5M-500M | 3kV                  | 4.5kV                 | 6kV                       |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-5G   | 0.5M-5G   |           |                      |                       |                           |                           |                             |
| GS2              | 2W           | D: ±100<br>L: ±200   |                      |               | 0.5M-500M | 0.5M-500M | 0.5M-500M | 5kV                  | 7.5kV                 | 10kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-5G   | 0.5M-5G   |           |                      |                       |                           |                           |                             |
| GS3              | 3W           | D: ±100<br>L: ±200   |                      |               | 0.5M-500M | 0.5M-500M | 0.5M-500M | 15kV                 | 20kV                  | 30kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-10G  | 0.5M-10G  |           |                      |                       |                           |                           |                             |
| GS5              | 5W           | D: ±100<br>L: ±200   |                      |               | 0.5M-500M | 0.5M-500M | 0.5M-500M | 20kV                 | 30kV                  | 40kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-10G  | 0.5M-10G  |           |                      |                       |                           |                           |                             |
| GS7              | 7W           | D: ±100<br>L: ±200   |                      |               | 1M-500M   | 1M-500M   | 1M-500M   | 30kV                 | 40kV                  | 50kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-10G  | 0.5M-10G  |           |                      |                       |                           |                           |                             |
| GS10             | 10W          | D: ±100<br>L: ±200   |                      |               | 1M-500M   | 1M-500M   | 1M-500M   | 35kV                 | 50kV                  | 60kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-10G  | 0.5M-10G  |           |                      |                       |                           |                           |                             |
| GS12             | 12W          | D: ±100<br>L: ±200   |                      |               | 1M-500M   | 1M-500M   | 1M-500M   | 40kV                 | 60kV                  | 70kV                      |                           |                             |
|                  |              | 0.5M-1G              |                      |               | 0.5M-10G  | 0.5M-10G  |           |                      |                       |                           |                           |                             |

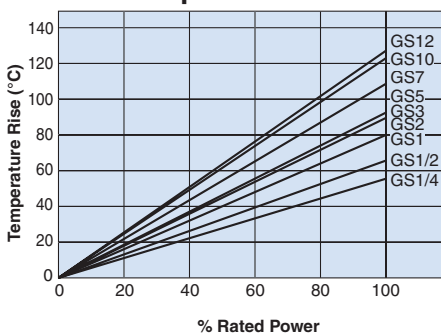
Taping packaging is available for GS1/4 and GS1/2. Please contact factory.

## environmental applications

### Derating Curve



### Surface Temperature Rise



## environmental applications

### Performance Characteristics

| Parameter                   | Requirement $\Delta R \pm\%$                                                                                 | Test Method                                                                                                                 |
|-----------------------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Resistance                  | Within regulated tolerance                                                                                   | 25°C                                                                                                                        |
| T.C.R.                      | Within specified T.C.R.                                                                                      | +25°C/125°C                                                                                                                 |
| Overload (Short time)       | 2: TCR 200x10 <sup>-6</sup> /K<br>0.5: TCR 100x10 <sup>-6</sup> /K                                           | Rated voltage x 2.5 (GS1/4, GS1/2), rated voltage x 2 (GS1-GS12) or Max. overload voltage, whichever is lower for 5 seconds |
| Resistance to Solder Heat   | 2: TCR 200x10 <sup>-6</sup> /K<br>0.5: TCR 100x10 <sup>-6</sup> /K                                           | 350°C ± 10°C, 3 seconds ± 0.5 seconds or 260°C ± 5°C, 10 seconds ± 1 second                                                 |
| Rapid Change of Temperature | 2: TCR 200x10 <sup>-6</sup> /K<br>0.5: TCR 100x10 <sup>-6</sup> /K                                           | -55°C (30 minutes)/ +125°C (30 minutes), 5 cycles                                                                           |
| Moisture Resistance         | 5: TCR 200x10 <sup>-6</sup> /K<br>2: TCR 100x10 <sup>-6</sup> /K                                             | 40°C, 90% - 95%RH, 1000h                                                                                                    |
| Endurance @ 25°C            | 3: TCR 200x10 <sup>-6</sup> /K<br>2: TCR 100x10 <sup>-6</sup> /K                                             | 25°C, 1000 hours<br>1.5 hr ON/0.5 hr OFF cycle                                                                              |
| Voltage Coefficient         | ±50x10 <sup>-6</sup> /V: TCR 200x10 <sup>-6</sup> /K<br>±10x10 <sup>-6</sup> /V: TCR 100x10 <sup>-6</sup> /K | GS1/4, 1/2 only, Rated voltage or max. working voltage, whichever is lower and 1/10 of its voltage                          |
| Voltage Characteristics     | 5: TCR 200x10 <sup>-6</sup> /K<br>3: TCR 100x10 <sup>-6</sup> /K                                             | GS1 - 12, Rated voltage or max. working voltage, whichever is lower and 1/10 of its voltage                                 |
| Resistance to Solvent       | No evidence of damage to protective coating and marking                                                      | Soaking in IPA for 1 minute and brushing 10 times -3 cycles - liquid temperature 25°C ±5°C                                  |
| Impulse Withstand Voltage   | No abnormality in appearance and flash-over                                                                  | An impulse voltage shall be applied 5 times at an interval of 1 minute                                                      |