

# Type MG Precision High Voltage Resistors

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## Now with Extended Resistance Range to 10,000 Megohms and Additional Models

Temperature Coefficient as tight as 80 ppm/°C, Combined with Excellent Long-Term Stability and Precision Tolerances.

Caddock's Micronox® resistance films are the source of the Type MG Precision High Voltage Resistors' outstanding combination of performance features:

- Single-resistor values as high as 10,000 Megohms.
- Maximum continuous operating voltages as high as 48,000 volts ("-15" ratings).
- Overvoltage capabilities of 150% of standard working voltages for all models and values, (except "-15" ratings).
- Resistance Tolerances from  $\pm 1.0\%$  to  $\pm 0.1\%$ .
- Temperature Coefficient, for standard resistance range, of 80 ppm/°C in combination with resistance tolerances as tight as  $\pm 0.1\%$ .
- Type MG resistors have demonstrated stability of 0.01% per 1,000 hours in extended load life testing of standard resistance range values.

This exceptional performance has been proven through many years of use in equipment that demands the highest reliability and stability, including TWT amplifiers, X-ray systems, geophysical instruments, and medical electronics.

### Preconditioning for Power and Voltage Ratings

All power ratings and maximum operating voltage ratings are for continuous duty. These ratings are based on pre-stress voltage levels applied during the manufacturing process to provide for stable resistor performance even under momentary overload conditions.

Maximum operating voltages 60% higher than the values listed in the table may be specified by adding "-15" to the model number (Example: MG750-15). Note that overload and overvoltage ratings do not apply to the "-15" resistors. Resistance ranges for "-15" resistors shown in the table are from "-15 Min." to "Standard Max."

### Non-Inductive Performance

Most models are manufactured with Caddock's Non-Inductive Design which uses a serpentine resistive pattern that provides for neighboring lines to carry current in opposite directions, thereby achieving maximum cancellation of flux fields over the entire length of the resistor. This efficient non-inductive construction is accomplished without derating of any performance advantages.

| Model No. | Wattage | Max. Continuous Oper. Volt. | Overload Rating | Dielect. Strength | Resistance   |          |               |               | Dimensions in inches and (millimeters) |                                     |                                     |
|-----------|---------|-----------------------------|-----------------|-------------------|--------------|----------|---------------|---------------|----------------------------------------|-------------------------------------|-------------------------------------|
|           |         |                             |                 |                   | Min.         | -15 Min. | Standard Max. | Extended Max. | A                                      | B                                   | C                                   |
| MG650     | 0.5     | 600                         | Type 1          | 750               | 200 $\Omega$ | N/A      | 5 Meg         | N/A           | .313 $\pm$ .020<br>(7.95 $\pm$ .51)    | .094 $\pm$ .015<br>(2.39 $\pm$ .38) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG655     | 0.5     | 600                         | Type 1          | 750               | 200 $\Omega$ | N/A      | 8 Meg         | N/A           | .313 $\pm$ .030<br>(7.95 $\pm$ .76)    | .109 $\pm$ .025<br>(2.77 $\pm$ .64) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG660     | 0.6     | 1,000                       | Type 1          | 750               | 400 $\Omega$ | N/A      | 10 Meg        | N/A           | .500 $\pm$ .030<br>(12.70 $\pm$ .76)   | .094 $\pm$ .015<br>(2.39 $\pm$ .38) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG680     | 0.8     | 2,000                       | Type 1          | 750               | 600 $\Omega$ | N/A      | 20 Meg        | N/A           | .750 $\pm$ .030<br>(19.05 $\pm$ .76)   | .094 $\pm$ .015<br>(2.39 $\pm$ .38) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG710     | 1.0     | 4,000                       | Type 1          | 750               | 800 $\Omega$ | N/A      | 50 Meg        | N/A           | 1.000 $\pm$ .040<br>(25.40 $\pm$ .02)  | .094 $\pm$ .015<br>(2.39 $\pm$ .38) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG712     | 0.6     | 1,000                       | Type 2          | 750               | 800 $\Omega$ | N/A      | 20 Meg        | N/A           | .400 $\pm$ .060<br>(10.16 $\pm$ .52)   | .140 $\pm$ .030<br>(3.56 $\pm$ .76) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG714     | 1.0     | 1,000                       | Type 2          | 750               | 200 $\Omega$ | 6.5 Meg  | 20 Meg        | N/A           | .562 $\pm$ .060<br>(14.27 $\pm$ .52)   | .150 $\pm$ .030<br>(3.81 $\pm$ .76) | .032 $\pm$ .002<br>(.81 $\pm$ .05)  |
| MG715     | 1.0     | 2,000                       | Type 2          | 750               | 400 $\Omega$ | 26 Meg   | 50 Meg        | N/A           | .750 $\pm$ .060<br>(19.05 $\pm$ .52)   | .140 $\pm$ .030<br>(3.56 $\pm$ .76) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG716     | 1.5     | 4,000                       | Type 2          | 750               | 600 $\Omega$ | 70 Meg   | 75 Meg        | N/A           | 1.000 $\pm$ .060<br>(25.40 $\pm$ .52)  | .140 $\pm$ .030<br>(3.56 $\pm$ .76) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG717     | 1.5     | 2,000                       | Type 2          | 750               | 600 $\Omega$ | 17 Meg   | 75 Meg        | 225 M         | .710 $\pm$ .050<br>(18.03 $\pm$ .127)  | .240 $\pm$ .030<br>(6.10 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG720     | 2.0     | 6,000                       | Type 2          | 750               | 1 K          | N/A      | 150 Meg       | N/A           | 1.500 $\pm$ .080<br>(38.10 $\pm$ .03)  | .140 $\pm$ .030<br>(3.56 $\pm$ .76) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG721     | 2.0     | 4,000                       | Type 2          | 750               | 200 $\Omega$ | 51 Meg   | 100 Meg       | 300 M         | 1.000 $\pm$ .050<br>(25.40 $\pm$ .127) | .240 $\pm$ .030<br>(6.10 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG725     | 2.5     | 10,000                      | Type 2          | 750               | 1.5 K        | N/A      | 200 Meg       | N/A           | 2.000 $\pm$ .080<br>(50.80 $\pm$ .03)  | .140 $\pm$ .030<br>(3.56 $\pm$ .76) | .025 $\pm$ .002<br>(.64 $\pm$ .05)  |
| MG730     | 3.0     | 6,000                       | Type 2          | 1,000             | 500 $\Omega$ | 77 Meg   | 250 Meg       | 750 M         | 1.500 $\pm$ .080<br>(38.10 $\pm$ .03)  | .240 $\pm$ .030<br>(6.10 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG731     | 2.6     | 4,000                       | Type 2          | 1,000             | 200 $\Omega$ | 40 Meg   | 150 Meg       | 750 M         | 1.000 $\pm$ .060<br>(25.40 $\pm$ .52)  | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG735     | 3.6     | 10,000                      | Type 2          | 1,000             | 750 $\Omega$ | 178 Meg  | 300 Meg       | 1,000 M       | 2.000 $\pm$ .080<br>(50.80 $\pm$ .03)  | .240 $\pm$ .030<br>(6.10 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG740     | 3.6     | 6,000                       | Type 2          | 1,000             | 300 $\Omega$ | 64 Meg   | 300 Meg       | 1,500 M       | 1.500 $\pm$ .060<br>(38.10 $\pm$ .52)  | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG745     | 5.0     | 15,000                      | Type 2          | 1,000             | 1 K          | 288 Meg  | 500 Meg       | 1,500 M       | 3.000 $\pm$ .100<br>(76.20 $\pm$ .54)  | .240 $\pm$ .030<br>(6.10 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG750     | 5.0     | 10,000                      | Type 2          | 1,000             | 400 $\Omega$ | 128 Meg  | 500 Meg       | 2,500 M       | 2.125 $\pm$ .060<br>(53.98 $\pm$ .52)  | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG780     | 7.5     | 15,000                      | Type 2          | 1,000             | 600 $\Omega$ | 192 Meg  | 750 Meg       | 3,750 M       | 3.125 $\pm$ .060<br>(79.38 $\pm$ .52)  | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG785     | 8.0     | 20,000                      | Type 2          | 1,000             | 800 $\Omega$ | 320 Meg  | 1,000 Meg     | 5,000 M       | 4.000 $\pm$ .120<br>(101.60 $\pm$ .03) | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG810     | 10.0    | 25,000                      | Type 2          | 1,000             | 1 K          | 400 Meg  | 1,250 Meg     | 6,250 M       | 5.000 $\pm$ .120<br>(127.00 $\pm$ .03) | .315 $\pm$ .030<br>(8.00 $\pm$ .76) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |
| MG815     | 15.0    | 30,000                      | Type 2          | 1,000             | 1 K          | 384 Meg  | 2,000 Meg     | 10,000 M      | 6.000 $\pm$ .120<br>(152.40 $\pm$ .03) | .350 $\pm$ .040<br>(8.89 $\pm$ .02) | .040 $\pm$ .002<br>(1.02 $\pm$ .05) |

Models with low inductance construction are in shaded areas.

Models with Caddock's Non-Inductive Resistance Pattern are in non-shaded areas.

## Specifications:

### Resistance Tolerance:

| Resistance Range       | Tolerance                                            |
|------------------------|------------------------------------------------------|
| Standard               | $\pm 1\%$ , $\pm 0.5\%$ , $\pm 0.25\%$ , $\pm 0.1\%$ |
| St'd with "-15" rating | $\pm 1\%$                                            |
| Extended Range         | $\pm 1\%$                                            |

### Temperature Coefficient:

| Resistance Range                    | TC Specifications                                                                    |
|-------------------------------------|--------------------------------------------------------------------------------------|
| Standard and St'd with "-15" rating | $\pm 80$ ppm/°C from -15°C to +105°C, referenced to +25°C.                           |
| Extended Range                      | $\pm 80$ ppm/°C from +25°C to +105°C, -200 ppm/°C to +50 ppm/°C from -15°C to +25°C. |

**Insulation Resistance:** 10,000 Megohms, min.

**Overload/Overvoltage:** 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds.  
Type 1: DC Voltage  
Type 2: DC Voltage or  $V_{rms}$  AC

| Resistance Range       | Overload/Overvoltage, $\Delta R$ |
|------------------------|----------------------------------|
| Standard               | 0.5% max.                        |
| St'd with "-15" rating | N/A                              |
| Extended Range         | 0.8% max.                        |

**Thermal Shock:** Mil-Std-202, Method 107, Cond. C,  $\Delta R$  0.25% max.

**Moisture Resistance:** Mil-Std-202, Method 106,  $\Delta R$  0.4% max.

**Load Life:** 1,000 hours at +125°C at rated voltage, not to exceed rated power.

| Resistance Range       | Load Life, $\Delta R$ |
|------------------------|-----------------------|
| Standard               | 0.5% max.             |
| St'd with "-15" rating | 0.8% max.             |
| Extended Range         | 0.8% max.             |

### Solderable Leads

**Encapsulation:** High Temperature Silicone Conformal.

**Applications Engineering**  
17271 North Umpqua Hwy.  
Roseburg, Oregon 97470-9422  
Phone: (541) 496-0700  
Fax: (541) 496-0408

**CADDOCK ELECTRONICS, INC.**

e-mail: caddock@caddock.com • web: www.caddock.com  
For Caddock Distributors listed by country see caddock.com/contact/dist.html

**Sales and Corporate Office**  
1717 Chicago Avenue  
Riverside, California 92507-2364  
Phone: (951) 788-1700  
Fax: (951) 369-1151

# Type MG Precision High Voltage Resistors

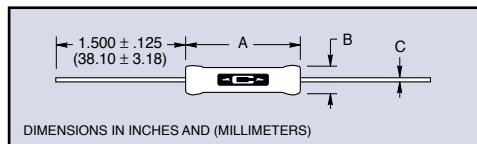
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|       |  |
|-------|--|
| MG650 |  |
| MG655 |  |
| MG660 |  |
| MG680 |  |
| MG710 |  |
| MG712 |  |
| MG714 |  |
| MG715 |  |
| MG716 |  |
| MG720 |  |
| MG725 |  |
| MG717 |  |
| MG721 |  |
| MG730 |  |
| MG735 |  |
| MG745 |  |
| MG731 |  |
| MG740 |  |
| MG750 |  |
| MG780 |  |
| MG785 |  |
| MG810 |  |
| MG815 |  |

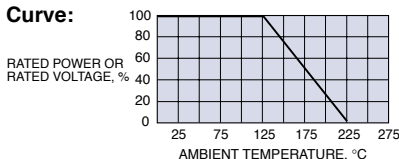
**N** Non-inductive performance with Caddock's exclusive design

Most models are available with Caddock's Non-inductive Serpentine Pattern

Certain products shown in this catalog are covered by one or more patents, there are also patents pending.



## Derating Curve:



## Design Assistance in Developing High Voltage Resistor Sets with Low TC Tracking.

For immediate engineering assistance in developing Low Ratio TC matched high voltage resistor sets, contact our Applications Engineering and we will be pleased to offer the best solution from our high voltage resistor product capabilities.

## Ordering Information:

Model Number: **MG750 -100M - 1%** Tolerance  
Resistor Value:

**Applications Engineering**  
17271 North Umpqua Hwy.  
Roseburg, Oregon 97470-9422  
Phone: (541) 496-0700  
Fax: (541) 496-0408

**CADDOCK ELECTRONICS, INC.**

e-mail: [caddock@caddock.com](mailto:caddock@caddock.com) • web: [www.caddock.com](http://www.caddock.com)  
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**Sales and Corporate Office**  
1717 Chicago Avenue  
Riverside, California 92507-2364  
Phone: (951) 788-1700  
Fax: (951) 369-1151

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- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А