

# Type USG Ultra-Stable Precision High Voltage Resistors

**Absolute TC to 10 ppm/°C from -40°C to +85°C referenced to +25°C**

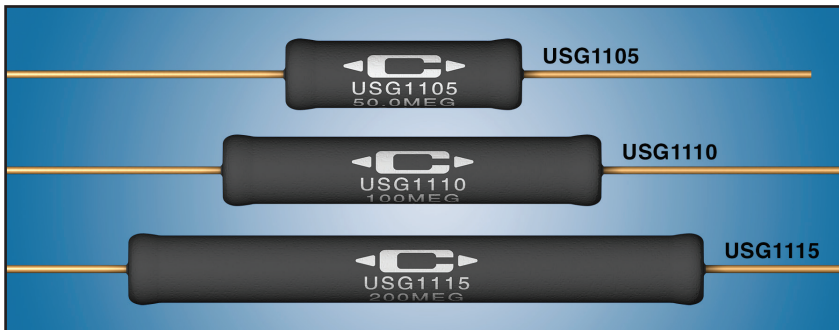
**Absolute Tol. to 0.1%, Three body sizes providing voltage ratings of 5KV, 10KV, and 15KV**

The very highest performance high voltage applications require the best possible temperature coefficient and long term stability from the high voltage resistors that are used in these applications. To meet these demanding requirements Caddock introduces the Type USG Ultra-Stable Precision High Voltage Resistors. Utilizing our proven Tetrinox<sup>®</sup> resistance film system, these Type USG resistors were developed to optimize low temperature coefficient performance and long term stability performance. By utilizing specific ceramic core materials with optimum Tetrinox<sup>®</sup> processing, we are able to control, very tightly in manufacturing, the important ultra-stable performance parameters in operating temperatures from -40°C to +85°C. This unique process is offered in specific resistance values in three body sizes. The extraordinary operating stability of the Type USG resistors will improve the performance of your high voltage system.

The performance features of the Type USG Ultra-Stable Precision High Voltage Resistors are:

- Temperature Coefficient and Tolerance: 10 ppm/°C with  $\pm 0.1\%$  or 20 ppm/°C with  $\pm 0.2\%$
- Typical Load Life Stability of 0.025% per 1,000 hours at +85°C, 0.05% per 1000 hrs. maximum.
- Three body sizes provide continuous voltage ratings of 5KV, 10KV, and 15KV.
- The specific resistances that are offered in each body size have been selected for produceability of optimum performance.
- The Ultra Low Temperature Coefficient minimizes self-heating (warm-up) drift following the application of high voltage or resulting from a change in the applied high voltage.
- Custom Low TC HV Strings are available: 50KV, 100KV, etc.

Part Number (Model-Value-Tol.-TC)	Max. Continuous Operating Voltage	Resistance ( $\Omega$ )	Tolerance ①	TC ppm/°C ②	Ambient Max. Operating Temperature	Dielectric Strength	Dimensions in inches and (millimeters)		
							A	B	C
USG1105 - 50.0M - 0.10%-10ppm	5 KV	50 Meg	0.10%	10 ppm/°C	85°C	1,000	1.250 $\pm$ 0.070 (31.75 $\pm$ 1.78)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1105 - 50.0M - 0.20%-20ppm	5 KV	50 Meg	0.20%	20 ppm/°C	85°C	1,000	1.250 $\pm$ 0.070 (31.75 $\pm$ 1.78)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1105 - 75.0M - 0.10%-10ppm	5 KV	75 Meg	0.10%	10 ppm/°C	85°C	1,000	1.250 $\pm$ 0.070 (31.75 $\pm$ 1.78)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1105 - 75.0M - 0.20%-20ppm	5 KV	75 Meg	0.20%	20 ppm/°C	85°C	1,000	1.250 $\pm$ 0.070 (31.75 $\pm$ 1.78)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1110 - 100M - 0.10%-10ppm	10 KV	100 Meg	0.10%	10 ppm/°C	85°C	1,000	2.000 $\pm$ 0.080 (50.80 $\pm$ 2.03)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1110 - 100M - 0.20%-20ppm	10 KV	100 Meg	0.20%	20 ppm/°C	85°C	1,000	2.000 $\pm$ 0.080 (50.80 $\pm$ 2.03)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1110 - 150M - 0.10%-10ppm	10 KV	150 Meg	0.10%	10 ppm/°C	85°C	1,000	2.000 $\pm$ 0.080 (50.80 $\pm$ 2.03)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1110 - 150M - 0.20%-20ppm	10 KV	150 Meg	0.20%	20 ppm/°C	85°C	1,000	2.000 $\pm$ 0.080 (50.80 $\pm$ 2.03)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1115 - 150M - 0.10%-10ppm	15 KV	150 Meg	0.10%	10 ppm/°C	85°C	1,000	3.000 $\pm$ 0.090 (76.20 $\pm$ 2.29)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1115 - 150M - 0.20%-20ppm	15 KV	150 Meg	0.20%	20 ppm/°C	85°C	1,000	3.000 $\pm$ 0.090 (76.20 $\pm$ 2.29)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1115 - 200M - 0.10%-10ppm	15 KV	200 Meg	0.10%	10 ppm/°C	85°C	1,000	3.000 $\pm$ 0.090 (76.20 $\pm$ 2.29)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)
USG1115 - 200M - 0.20%-20ppm	15 KV	200 Meg	0.20%	20 ppm/°C	85°C	1,000	3.000 $\pm$ 0.090 (76.20 $\pm$ 2.29)	.350 $\pm$ 0.040 (8.89 $\pm$ 1.02)	.040 $\pm$ 0.002 (1.02 $\pm$ 0.05)



## Precise Low TC Voltage Division

Precise Voltage Division Ratio performance can be formed using Type USG Ultra-Stable High Voltage Resistors together with Caddock's Type USF Ultra-Stable Precision Film Resistors, or "matched" with selected Type TK Low TC Precision Radial-Lead Resistors. Consult Caddock Applications Engineering to optimize voltage division ratio performance for your application. The Low TC of the Type USG resistors minimizes temperature related drift due to temperature gradients that may exist due to the placement of the resistor components in the high voltage assembly.

Low Absolute TC,  
Ultra-Precision Tolerance,  
with Type USF Resistors



Special Matched Resistors for  
Lowest Ratio TC with Type TK Low  
TC Radial Lead Resistors



## Specifications:

(Numbers inside circles reference columns in part number table above)

- ① **Tolerance:**  $\pm 0.10\%$  or  $\pm 0.20\%$  measured at room temperature (23°C  $\pm$  2°C) at 100 Vdc.
- ② **Temperature Coefficient:** 10 ppm/°C or 20 ppm/°C, referenced to 25°C.  $\Delta R$  taken at -40°C and +85°C, measured at 50% of rated voltage.

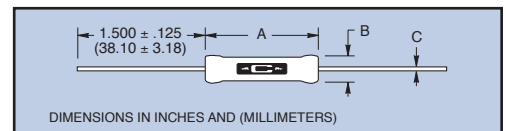
**Insulation Resistance:** 10,000 megohms, min.  
**Overvoltage:** 1.5 times maximum continuous operating voltage for 5 seconds,  $\Delta R$  0.05% max.  
**Thermal Shock:** Mil-Std-202, Method 107, condition A,  $\Delta R$  0.05% max.  
**Moisture Resistance:** Mil-Std-202, Method 106,  $\Delta R$  0.05% max.

**Load Life:** 1000 hours at +85°C at rated voltage,  $\Delta R$  0.025% typical,  $\Delta R$  0.05% max.

### Solderable Leads

**Encapsulation:** High temperature silicone conformal.

**Storage Temperature:** -40°C to +105°C.



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