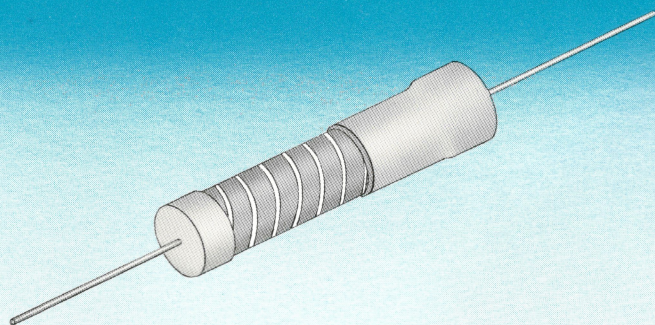


HA series

PRECISION THICK FILM RESISTORS



CONSTRUCTION FEATURES

CERAMIC CORE: Closely dimensioned high purity ceramic cores made specifically for cermet resistors.

RESISTIVE ELEMENT: A cermet film 100 times thicker than conventional thin films is thermally bonded to the ceramic core at temperatures in excess of 1400°F. Because of its thickness and high forming temperatures, the cermet film has exceptional electrical properties.

CAP & LEADS: Oxygen free tin plated copper wire is welded to a silver plated 90-10 copper cup that is press fit for maximum terminal strength.

INSULATION: A specially formulated coating designed to provide maximum mechanical and environmental protection.

- 1/4 Watt to 5 Watts
- 20K to 100 Megohm Range
- TC ± 25 PPM to ± 100 PPM
- $\pm .1\%$ to $\pm 2\%$ Tolerance

SPECIFICATIONS

HMC TYPE	POWER RATING AT 70°C (WATTS)	VOLTAGE RATING (VOLTS)	RESISTANCE RANGE (OHMS)	AVAILABLE* TOLERANCES ($\pm\%$)	AVAILABLE TCR'S ($\pm$ PPM/°C)	VCR* IN PPM/VOLT	
						MIN.	MAX.
HA-55	.25W	500V	20K to 100M	.1, .25, .5, 1	25, 50, 100	-1.0	-10
HA-60	.5W	750V	50K to 100M	.1, .25, .5, 1	25, 50, 100	-.75	-7.0
HA-600	.75W	1000V	100K to 100M	.1, .25, .5, 1	25, 50, 100	-.6	-6.0
HA-65	1W	1500V	300K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0
HA-650	1.5W	3000V	500K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0
HA-70	2W	3500V	500K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0
HA-80	3W	5000V	500K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0
HA-100	4W	7500V	500K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0
HA-120	5W	10,000V	500K to 100M	.1, .25, .5, 1	25, 50, 100	0	-5.0

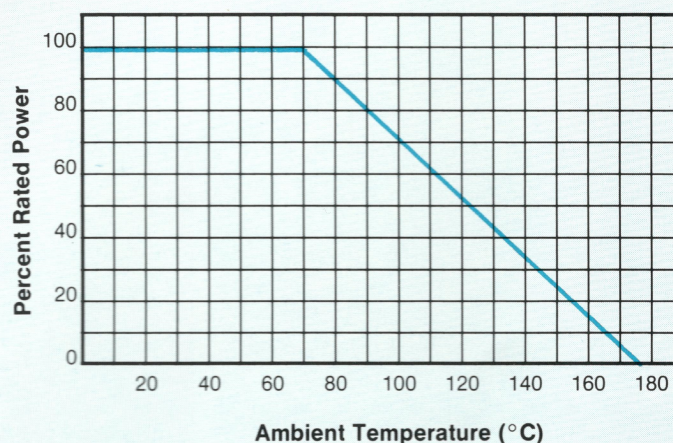
*For other tolerances consult factory.

**Tighter VCR's can be supplied upon request and are read 100% if requested.

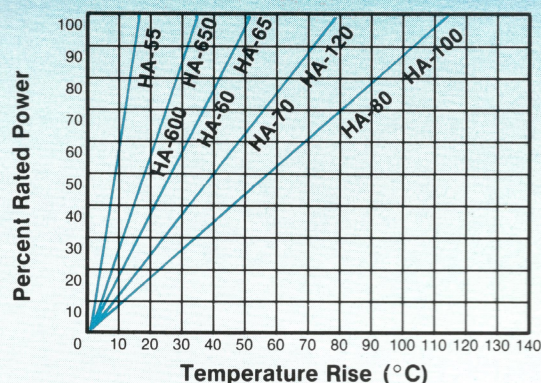
ENVIRONMENTAL PERFORMANCE SPECIFICATIONS

HA SERIES	TYPICAL ΔR	MAX. DR ($\pm 3\sigma$)
Loadlife (1000 hrs. rated voltage at 70°C)	$\pm .1\%$	$\pm .25\%$
Overload (1.5 times rated voltage for 10 sec.)	$\pm .1\%$	$\pm .2\%$
Moisture resistance (no load or polar)	$\pm .2\%$	$\pm .5\%$
Thermal shock	$\pm .1\%$	$\pm .25\%$
Solder effect	$\pm .05\%$	$\pm .1\%$
Terminal strength	$\pm .05\%$	$\pm .2\%$
Shelf life (1 yr. at 25°C)	$\pm .03\%$	$\pm .1\%$
Insulation resistance (at 500 VDC)	10^{11} ohms	10^9 ohms min.
Low temperature operation	$\pm .1\%$	$\pm .25\%$
High-temperature exposure		
150°C for 2000 hrs.	$\pm .2\%$	$\pm .5\%$
175°C for 2000 hrs.	$\pm .4\%$	$\pm .75\%$
Dielectric strength	$\pm .1\%$	$\pm .25\%$

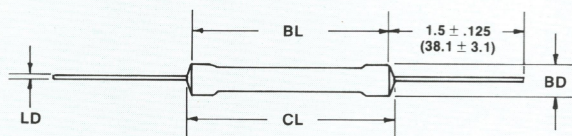
POWER DERATING CURVE



TEMPERATURE RISE CURVES



DIMENSIONS inches (mm)



HMC TYPE	BODY LENGTH BL	BODY DIAMETER BD	CLEAN LEAD TO CLEAN LEAD CL	LEAD DIAMETER LD
HA-55	.260 ± .015 (6.604 ± .381)	.094 ± .006 (2.387 ± .152)	.266 ± .015 (6.756 ± .381)	.025 (.635)
HA-60	.343 ± .020 (8.712 ± .508)	.135 ± .030 (3.429 ± .762)	.375 ± .030 (9.525 ± .762)	.032 (.812)
HA-600	.500 ± .020 (12.700 ± .508)	.135 ± .030 (3.429 ± .762)	.560 ± .030 (14.224 ± .762)	.032 (.812)
HA-65	.531 ± .030 (13.487 ± .762)	.165 ± .030 (4.191 ± .762)	.590 ± .030 (14.986 ± .762)	.032 (.812)
HA-650	1.125 ± .030 (28.575 ± .762)	.165 ± .030 (4.191 ± .762)	1.180 ± .030 (29.972 ± .762)	.032 (.812)
HA-70	.780 ± .030 (19.812 ± .762)	.225 ± .030 (5.715 ± .762)	.810 ± .025 (20.574 ± .635)	.032 (.812)
HA-80	.906 ± .040 (23.012 ± 1.016)	.310 ± .030 (7.874 ± .762)	.940 ± .025 (23.876 ± .635)	.032 (.812)
HA-100	1.750 ± .040 (44.450 ± 1.016)	.310 ± .030 (7.874 ± .762)	1.790 ± .025 (45.466 ± .635)	.032 (.812)
HA-120	2.000 ± .040 (50.800 ± 1.016)	.310 ± .030 (7.874 ± .762)	2.100 ± .030 (53.340 ± .762)	.032 (.812)

VOLTAGE HANDLING CAPABILITY

HMC TYPE	VOLTAGE RATING (VOLTS)	ABSOLUTE MAX. DC VOLTAGE (VOLTS)	CRITICAL RESISTANCE (OHMS)	ABSOLUTE MAX. RMS AC VOLTAGE (VOLTS)
HA-55	500	750	1.0 MΩ	500
HA-60	750	1125	1.125 MΩ	750
HA-600	1000	1500	1.33 MΩ	1000
HA-65	1500	2250	2.25 MΩ	1500
HA-650	3000	4500	6.0 MΩ	3000
HA-70	3500	5250	6.125 MΩ	3500
HA-80	5000	7500	8.33 MΩ	5000
HA-100	7500	11,250	14.06 MΩ	7500
HA-120	10,000	15,000	20 MΩ	10,000

ABSOLUTE MAXIMUM AC VOLTAGE

For sinusoidal AC operation, where the peak voltage is 1.41 times the RMS value, the absolute maximum AC voltage is the same as the rated voltage. For nonsinusoidal AC waveforms the peak voltage should not exceed the DC absolute maximum voltage rating shown.

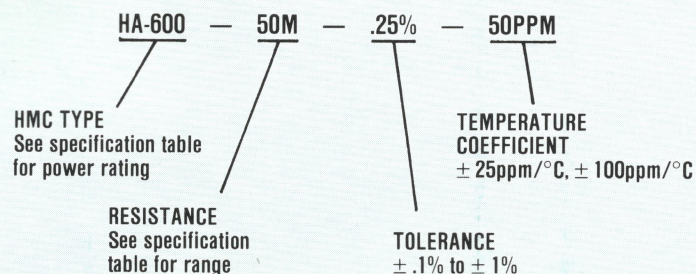
ABSOLUTE MAXIMUM DC VOLTAGE

This table is used in conjunction with short-time overloads or pulsed conditions of 10 seconds or less duration. The absolute maximum DC voltage relates to resistance values equal to or greater than the "critical resistance." For resistance values that are less than the critical resistance, a short-time overload or DC pulsed voltage can be applied for up to 10 seconds, provided it is less than 1.5 times the voltage that draws rated power. Note that this voltage must be less than the absolute maximum DC voltage.

CRITICAL RESISTANCE

Critical resistance is defined as the value of resistance that draws maximum rated power when maximum rated voltage is applied.

HOW TO ORDER



AVAILABLE OPTIONS

- Guaranteed voltage coefficients to customer specifications
- Non-standard tolerances
- Special temperature coefficients to customer specifications
- Lead diameters to customer requirements
- Special coatings for high humidity applications
- Flame proof coating
- Marking to customer specifications
- Packaging supplied in bulk, tape and reel, or ammo pack