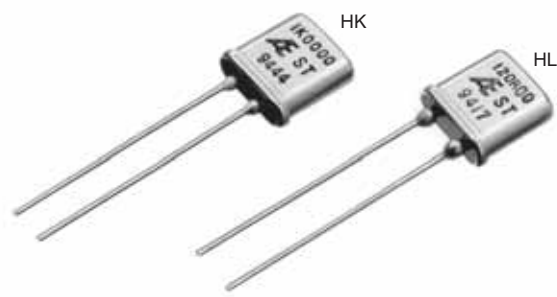


Zero-TCR Ultra-Precision Resistor (Hermetically Sealed)

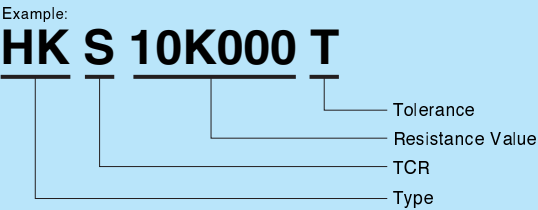


TCR, Resistance Range, Tolerance, Rated Power

Type	TCR	Resistance Range (Ω)	Resistance Tolerance (%)*	Rated Power (W) at 70°C
HK HL	Char. S	100 to 100k	± 0.005 (V) ± 0.01 (T) ± 0.02 (Q) ± 0.05 (A) ± 0.1 (B) ± 0.5 (D) ± 1 (F)	0.3

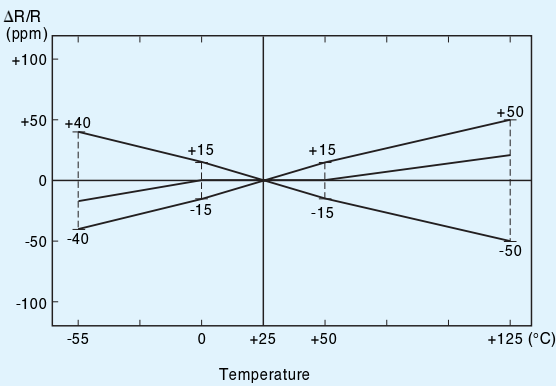
Symbols parenthesized are for type number composition.
*Resistance figures are obtained by measuring the leads at point 12.7 \pm 3.2mm away from the root.

Composition of Type Number



Resistance value, in ohm, is expressed by a series of six characters, five of which represent significant digits. The sixth R or K is a dual-purpose letter that designates both the value range (R for ohmic; K for kilo-ohm) and the location of decimal point.

Temperature Characteristics of Resistance

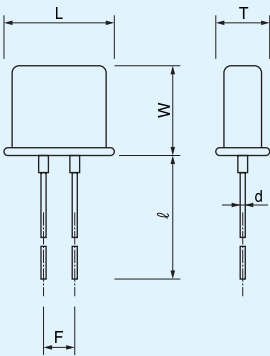


Temperature (°C)	$\Delta R/R$ (ppm)
-55	0 \pm 40
0	0 \pm 15
+50	0 \pm 15
+125	0 \pm 50

Reference Temperature +25°C

Configuration

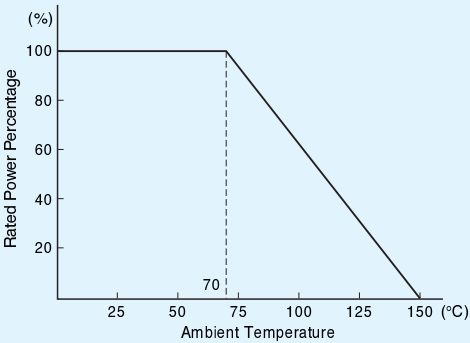
HK, HL



Type	HK	HL
L	10.7 \pm 0.3	
W	10.7 \pm 0.3	
T	4.3 \pm 0.3	
F	3.81 \pm 0.25	5.08 \pm 0.25
ℓ	30 \pm 10	
d	ϕ 0.65 \pm 0.05	

Dimensions in mm

Power Derating Curve

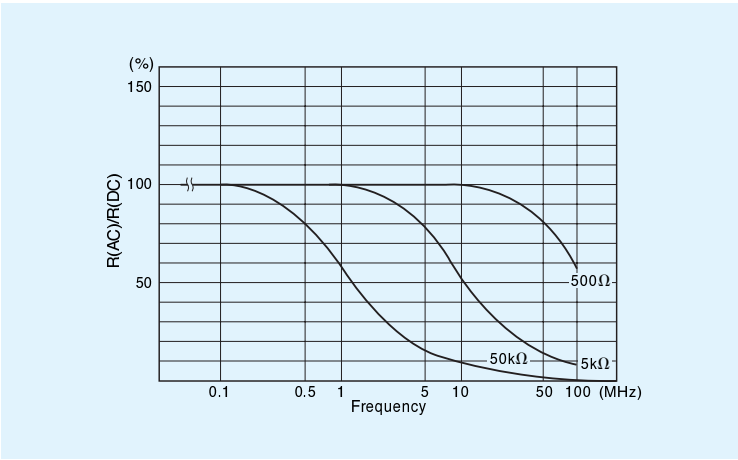




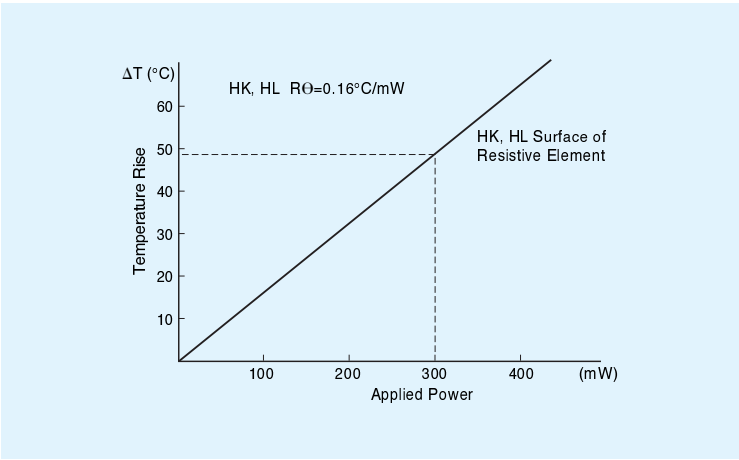
Performance

Parameters	Test Condition	ALPHA Specification	ALPHA Typical Test Data
Maximum Rated Operating Temperature Working Temperature Range Maximum Working Voltage		70°C -65°C to +150°C 300V	
Power Conditioning Thermal Shock Overload	25°C, Rated Voltage, 96 hrs. -65°C/30 min. ↔ +150°C/30 min., 5 cycles Rated Voltage x 2.5, 5 sec.	±0.02%	±0.0025%
Solderability	245°C, 5 sec.	over 95% coverage	over 95% coverage
Resistance to Solvents	① Isopropyl Alcohol + Mineral Spirits ② Water + Butyl Cellosolve + Monoethanolamine	no damage	no damage
Low Temperature Storage Terminal Strength	-65°C, No Load, 24 hrs. → Rated Voltage, 45 min. 0.908kg (2 pounds), 10 sec.	±0.01% ±0.01%	±0.0025% ±0.001%
Dielectric Withstanding Voltage Insulation Resistance Resistance to Soldering Heat Moisture Resistance	Atmospheric: AC 300V, 1 min. Barometric: 8mmHg, AC 200V, 1 min. DC 500V, 2 min. 350°C, 3 sec. +65°C to -10°C, 90% RH to 98% RH, Rated Voltage, 10 cycles (240 hrs.)	±0.01% over 10,000MΩ ±0.01% ±0.01%	±0.0025% over 10,000MΩ ±0.0025% ±0.0025%
Shock Vibration, High Frequency	100G, 6ms., Sawtooth Wave, X, Y, Z, each 10 shocks 20G, 10Hz to 2,000Hz to 10Hz, 20 min., X, Y, Z, each 2.5 hrs.	±0.01% ±0.01%	±0.0025% ±0.0025%
Life	70°C, Rated Power, 1.5 hrs. - ON, 0.5 hr. - OFF, 2,000 hrs.	±0.05%	±0.01%
Storage Life	15°C to 35°C, 15% RH to 75% RH, No Load, 10,000 hrs.	±0.0025 %	±0.0005 %
High Temperature Exposure	150°C, No Load, 2,000 hrs.	±0.02 %	±0.01 %
Current Noise Voltage Coefficient Thermal EMF		-32dB 0.0001%/V 1.0μV/°C	-42dB 0.00003%/V 0.1μV/°C

Frequency Characteristics



Temperature of Resistor Surface



Precaution in Using HK or HL Resistors

When soldering to mount HK or HL on a board, keep the resistor over 10mm away from the board surface by using an insulating tube.