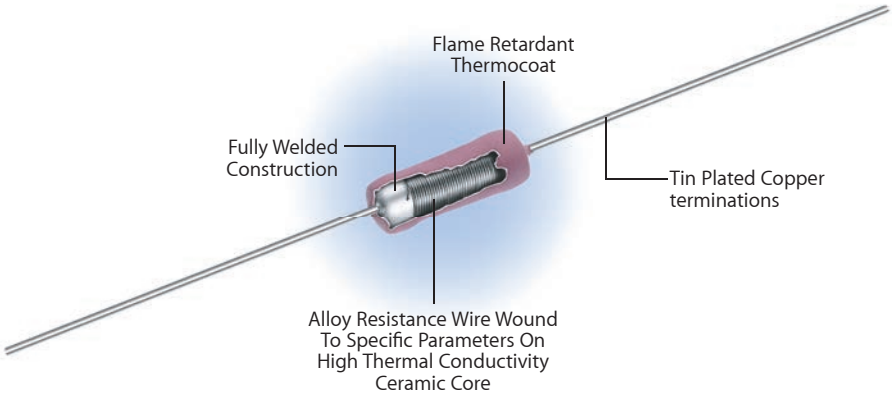


COMPACT WIRE WOUND RESISTORS SILICONE/CEMENT COATED TYPE

HAA

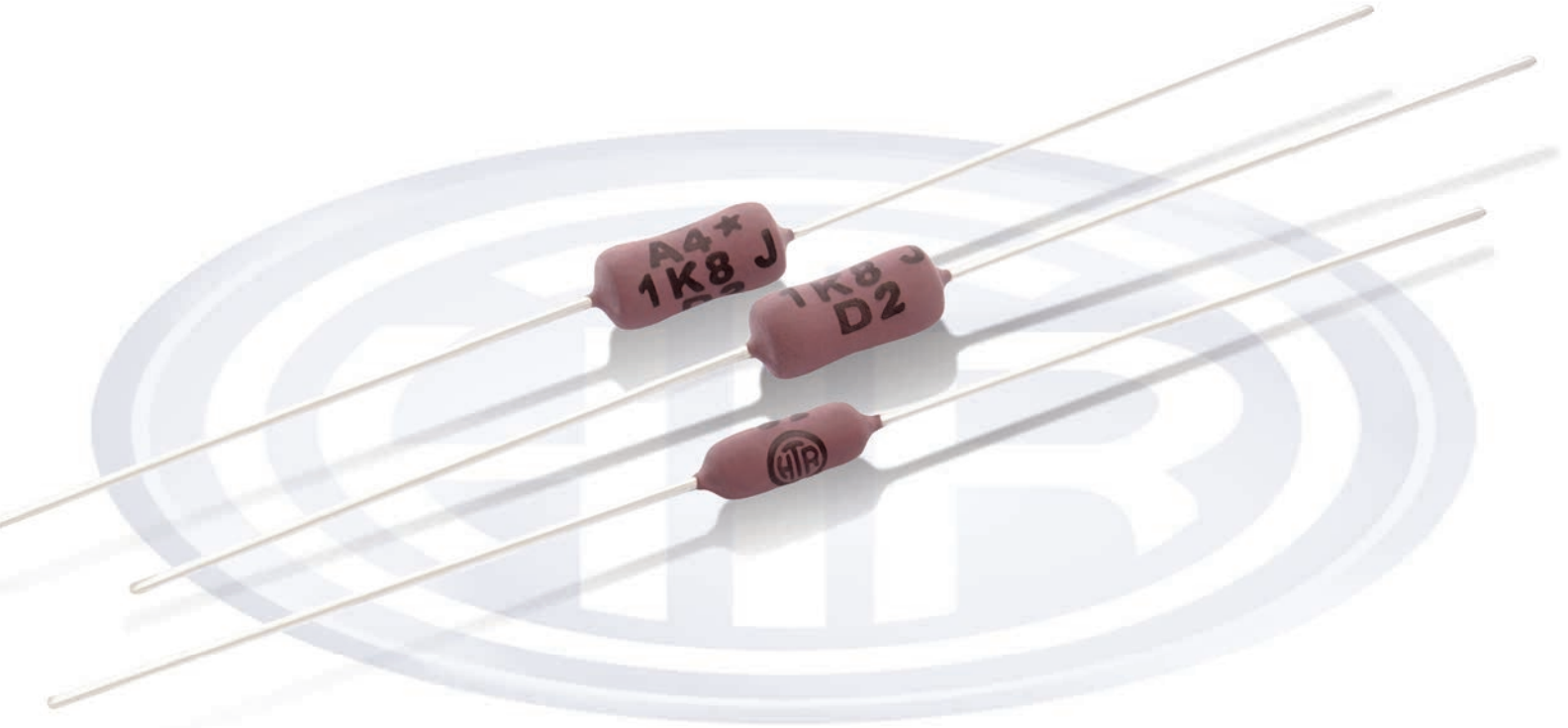
SERIES

Small Size : Power Ratio
Automotive Applications

- Flame retardant coating compatible with UL standards
- 1W to 5 Watts (at 30°C)
- Tolerances as close as 1%.
- R01 to 12K.
- TCR as low as 20ppm/°C available depending on application and resistance value.
- Pulse applications as per IEC 61000-4-5.

AEC-Q200 Qualified

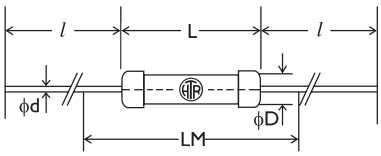
Pb Pb-free * RoHS COMPLIANT



COMPACT
WIRE WOUND
RESISTORS
SILICONE/
CEMENT
COATED TYPE

HAA

PHYSICAL CONFIGURATION



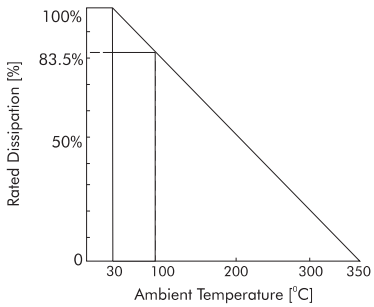
TYPE	POWER RATING at 30°C (Ambient)	DIMENSIONS (mm)					RESISTANCE RANGE		TYPICAL WT. PER PC (gms)
		L (max)	◊ D (max)	*l* ±1.5	ϕ d ±0.05	⊕ LM ±1	min	max	
A1	1W	6.6	2.6	38	0.6	30	R10	500R	0.29
A2	2W	9.2	3.6	38	0.8	30	R05	1K0	0.55
A2.5	2.5W	11.5	4.2	38	0.8	35	R05	1K0	0.65
A3	3W	11.8	4.7	38	0.8	35	R01	4K0	0.87
A4	4W	11.5	5.5	38	0.8	35	R01	10K	0.95
A5	5W	15.7	5.9	38	0.8	40	R01	12K	1.35

◊ For non-inductive types and for resistance values < 1R0 + 0.8mm allowed
⊕ For resistance values less than R10 & tolerance tighter than ±2% please measure resistance over centered length LM.

PHYSICAL CONSTRUCTION

Substrate : Alumina Ceramic Rod
Cap : Steel, tin plated.
Termination : Tinned copper wire (as per ASTM B 189-95).
Resistive Element : Wire-CuNi44 / NiCr 8020 / NiCr 20 AlSi depending on resistance value.
Coating : High temperature silicone with inert fillers, flame retardant approved to UL.

DERATING CURVE



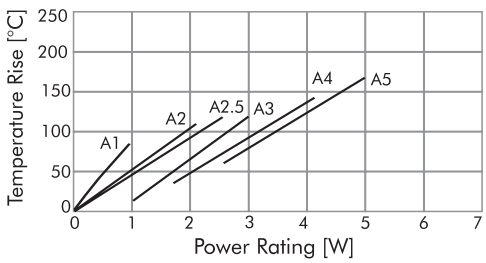
NON - INDUCTIVE RESISTORS

Low inductance Aryton-Perry winding type resistors are available in this series. The phenomena of reactance manifests itself as inductance in wirewound resistors, normally speaking when the resistance value is <1K0 and as capacitance when the resistance value is >1K0. This phenomena attains significance at high frequencies. Keeping the above scenario in mind non inductive type resistors should only be designed in, in circuits where high frequency exists and the resistance value is <1K0.

ELECTRICAL DATA / CHARACTERISTICS

PARAMETER/PERFORMANCE TEST&TEST METHOD	PERFORMANCE REQUIREMENTS
Rated Ambient Temperature	Full Power dissipation at 30°C and linearly derated down to zero at 350°C - [Refer Derating curve above].
Voltage Rating / Limiting Voltage / Max Working Voltage	$V = \sqrt{PxR}$
Dielectric Withstanding Voltage / Voltage Proof [Test method no. 301 of MIL 202F] - Based on limiting voltage x 2 or 500V whichever is applicable.	Max. ΔR ± (1% + R05). No flashover, mechanical damage, arcing or insulation breakdown.
Insulation Resistance [Test method no. 302 of MIL 202F]	> 1000M (dry) > 100M (wet)
Short Time Overload [Test Method - 5 secs at 5 times rated power for 3 watts and smaller; 5 secs at 10 times rated power for 4 watts and larger]	Max. ΔR ± (2% + R05)
Resistance Tolerances Available	±10%[K]; ±5% [J]; ±3%[H]; ±2%[G]; ±1%[F]

Resistor Temperature rise as a function of applied power
[See graph displayed]
The graph provided is general in nature and reflects temperature rise of a few selected types for the general guidance of the design engineer. Exact reading for any particular HTR type and specific resistance value can be obtained from factory on request.



COMPACT
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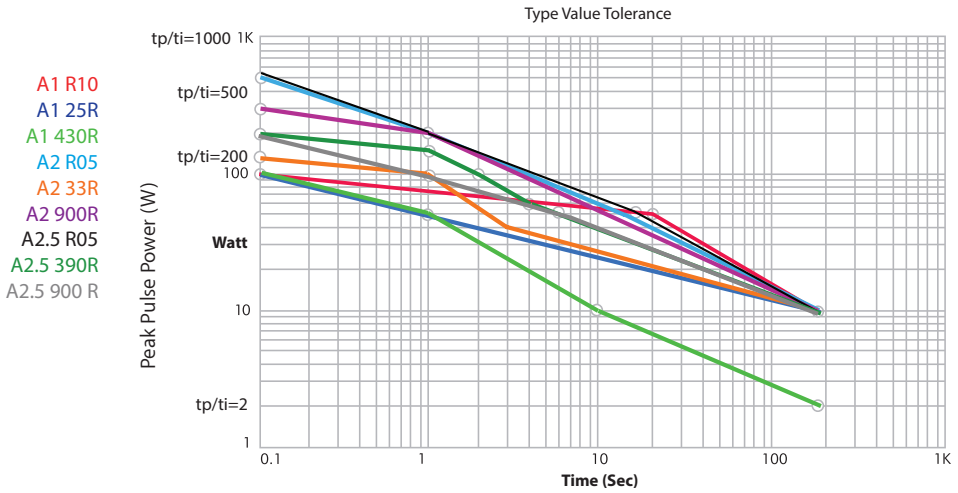
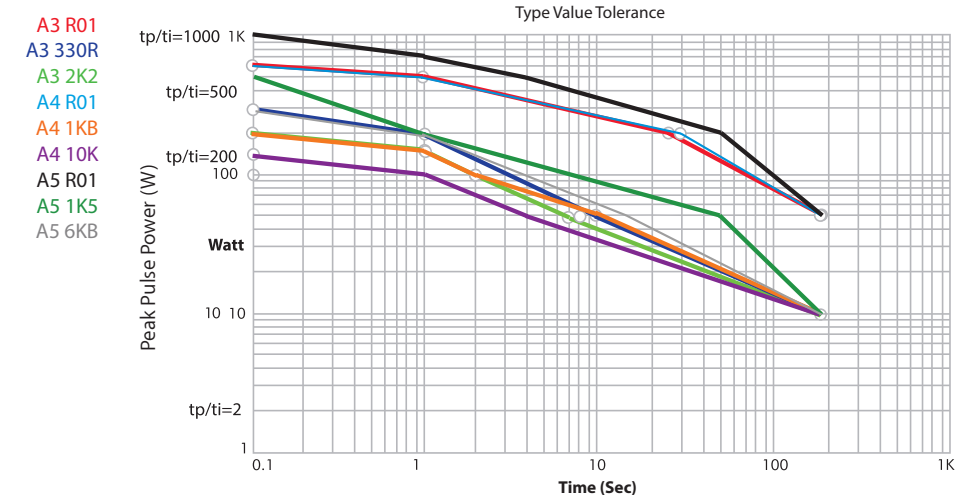
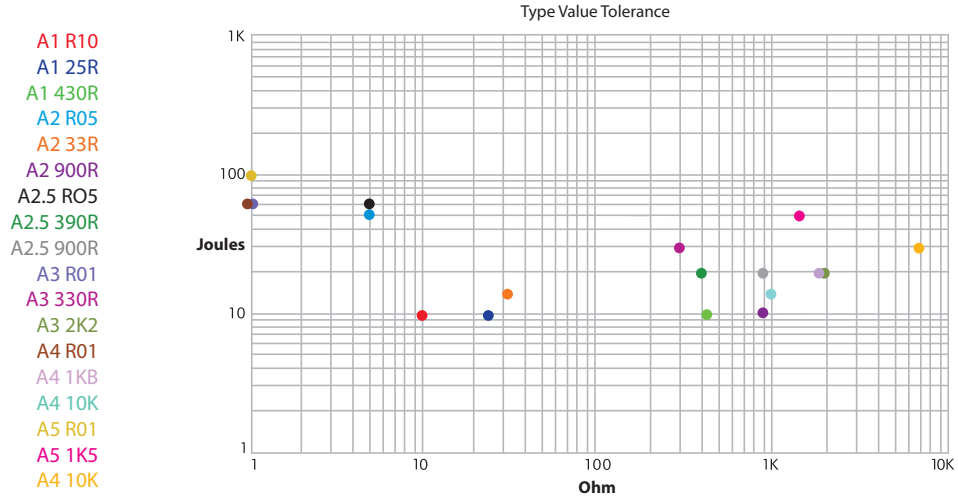
Pulse Capability :
For the design engineer HTR has selected 3 resistance volues in each type and provided below, vital data in the form of charts / graphs which illustrate two important characteristics of the pulse version of these HTR types.

Pulse On Regular Basis - The maximum allowable peak pulse power (W) as a function of pulse (T) in seconds. (Repetetive Pulse) -tp repetition time of the pulses / ti - impulse time - duration of pulse.





Pulse Capability - Energy (J) as a function of R (Ω) (Single Pulse)



COMPACT WIRE WOUND RESISTORS SILICONE/ CEMENT COATED TYPE

HAA

The design engineer is cautioned that these graphs are general in nature solely provided for his general guidance for selection of the required power rating and resistance of the device to be used for circuit protection.
It is essential that this must be validated in actual trials and HTR will be pleased to provide the necessary samples for validation and homologation.

Please suffix the HTR type with the alphabet 'I' when a pulse version of the device is required.

ENVIRONMENTAL SPECIFICATIONS

PARAMETER/PERFORMANCE TEST & TEST METHOD	PERFORMANCE REQUIREMENTS
Temperature Co-efficient [Test method 304 of MIL 202F] [TCR figures given are based on the usage of normally selected cost effective resistance elements and can be significantly lowered on request]	± 120ppm / °C for < R10); ± 80ppm / °C for <1R0; ± 60ppm /°C for < 100R; ± 90ppm / °C or ± 30ppm /°C for >100R, depending on wire selected
Temperature Cycling Test Method as per JIS-C-5202 Para 7.4 [Room Temperature ---> -55°C --->Room Temperature ---> +155°C ---> Room Temperature for 5 cycles]	ΔR ± [2% + R05] - Typical
Damp Heat (Steady State) (Test Method No. 103B of MIL 202F and test condition 'D')	Max.Δ R ± (3% + R05) - No mechanical damage
Thermal Shock (Test Method No. 107D of MIL 202F & Test Condition 'B')	Max Δ R ± (3% + R05) No physical Deterioration
Load Life (Test Method no. 108A of MIL 202F)	Max. ΔR ± (5% + R05) No mechanical damage
Dry Heat (1000 hrs at 2000 C)	Max. ΔR ± (5% + R05)
Climatic Category	55 / 200 / 56

MECHANICAL SPECIFICATIONS

PARAMETER/PERFORMANCE TEST & TEST METHOD	PERFORMANCE REQUIREMENTS
Mechanical Shock (Test Method No. 213B of MIL 202F)	Test condition & requirement to be mutually decided.
Pull Test / Robustness of Termination [Force supplied from 2 to 4.5Kgs depending on size]	No mechanical damage
Vibration (Test Method No. 201A of MIL 202F)	No physical damage Max ΔR ±(3% + R05)
Solderability [Test method no.208F of MIL 202F]	ΔR < ± [1% + R05] - Continuous and satisfactory
Resistance to Soldering Heat (Test Method 210A of MIL 202 F & Test condition C)	Max ΔR ±(2% + R05)
Resistance to Solvents	Marking must remain Legible.

ORDERING INFORMATION

Series	Type	Packing	Resistance Value	Tolerance
HAA	A5 / A5*	Bulk A5 / A5* Tape Ammo A5T / A5*T Tape & Reel A5TR / A5*TR	100R	J

1. RoHS version - A2.5 *
2. Non inductive winding - NA2.5
3. Impulse type - A2.5 I
4. Tape & Ammo pack - A2.5 T
5. Tape & Reel pack - A2.5 TR

Taping : This series is also available in taped form. Please refer Tape / Ammo specifications. Tape / Reel on request.