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AEC-Q200 Qualified

Pb-free RoHS COMPLIANT

LOW OHM POWER RESISTORS

HSE

SERIES

Size 3920

- Open frame electron beam welded punched out type.
- Power Rating at 100°C - upto 5W.
- Power Rating at 70°C - upto 12W.
- R0002 to R005.

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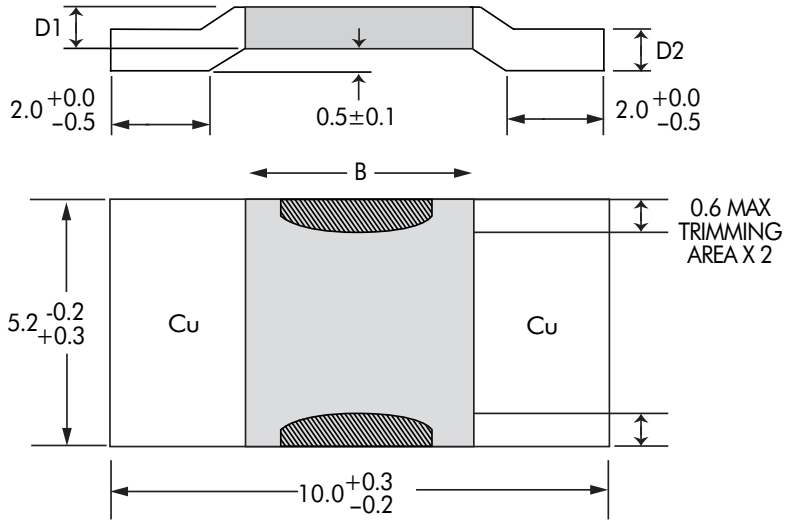
PHYSICAL CONFIGURATION



DIMENSIONAL TABLE

SR NO.	HTR TYPE	RESISTANCE VALUE	TOLERANCE	WATTAGE AT 100°C	WATTAGE AT 70°C	B (MM) + 0.2/-0.3	D1 (MM) ± 0.10	D2 ± 0.10	INTERNAL HEAT RESISTANCE (Rthi)	TCR (ppm)	TYPICAL WT. PER PC. (gms)
1	HSE5W R0002	R0002	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	5W	12W	5.0	1.42	1.42	3°K/W	< 200	0.73
2	HSE5W R0003	R0003	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	5W	10W	5.0	1.42	1.42	4.5°K/W	< 150	0.73
3	HSE5W R0005	R0005	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	5W	9W	5.0	0.84	0.84	8°K/W	< 70	0.40
4	HSE5W R0007	R0007	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	5W	8W	5.0	0.60	0.60	11°K/W	< 60	0.29
5	HSE5W R001	R001	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	5W	8W	5.0	1.36	1.36	9°K/W	< 50	0.64
6	HSE4.5W R0015	R0015	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	4.5W	7W	5.0	0.91	0.91	12°K/W	< 50	0.43
7	HSE4W R001	R001	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	4W	7W	5.0	0.42	0.42	15°K/W	< 50	0.20
8	HSE4W R002	R002	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	4W	6W	5.0	0.68	0.68	16°K/W	< 50	0.31
9	HSE3.5W R0025	R0025	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	3.5W	6W	5.0	0.54	0.54	20°K/W	< 50	0.25
10	HSE3W R0028	R0028	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	3W	5W	5.0	0.47	0.47	21°K/W	< 50	0.21
11	HSE3W R003	R003	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	3W	5W	5.0	0.45	0.45	22°K/W	< 50	0.21
12	HSE2.5W R004	R004	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	2.5W	4W	5.0	0.34	0.34	30°K/W	< 50	0.17
13	HSE2W R005	R005	± 0.25, ± 0.5, ± 1, ± 2, ± 3, ± 5%	2W	3W	5.0	0.27	0.27	50°K/W	< 50	0.15
14	HSE R000	R000		I max=160A			1mm copper				0.60

APPLICATIONS

- Accurate current sensing for power hybrid applications.
- Automotive applications that require high current capability.
- Frequency convertors.
- Power modules.

FEATURES

- Capable of carrying current upto 160amp (R0002) on continuous basis.
- Sturdy copper connectors.
- Excellent long term stability.

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ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

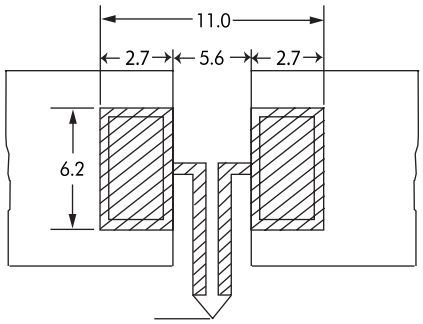
PARAMETER / PERFORMANCE TEST & TEST METHOD	PERFORMANCE REQUIREMENTS
Power Rating	For FeCrAl - Full power dissipation at 70° C and linearly derated to zero at +170° C. For Manganin (< 0.5% Improved Stability) - Full power dissipation at 100° C & linearly derated to zero at +140° C. For Manganin (< 1% Stability) - Full power dissipation at 130° C and linearly derated to zero at +170° C.
Inductance	< 3nH
Temperature Range	- 65° C to +170° C (Suitably derated as per derating curve provided)
Voltage Rating / Limiting Voltage / Max. Working Voltage (Subject to max. Terminal Temperature of 130° C)	$\sqrt{P \times R}$
Low Temperature Storage and Operation [-65° C for 250 h**]**	ΔR ± 0.1% - Average
Temperature Coefficient of Resistance (Ambient Temperature Range 20° C - 60° C)	From 50 ppm / K (Depending on Resistance Value)
Temperature Cycling -2000 cycles (-55° C to 150° C)	ΔR ± 0.5% - Average
Life Test / Operational Life - 2000 h rated power with Temperature limitation on Terminal kept at 130° C	ΔR ± 1% - Average
Moisture Resistance [MIL-STD-202 method106]	ΔR ± 0.1% - Average
Mechanical Shock [100 g. 6 ms half sine]	ΔR ± 0.2% - Typical
Vibration, High Frequency [20 g. 10-2000 Hz]	ΔR ± 0.2% - Typical
Bias Humidity [+85° C, 85% RH, 1000h]	ΔR ± 0.5% - Typical
Resistance to Soldering Heat	260°C for 10 sec / 8h steam aging
High Temperature Exposure – 2000h / 170°C	ΔR ± 1% - Average (In covered condition)

RECOMMENDED SOLDER PROFILE

Reflow and IR soldering			
Temperature (°C)	260	255	217
Time (Sec)	Peak	40	90

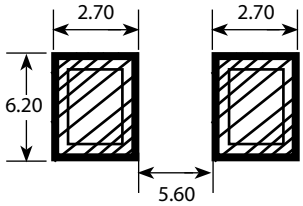
RECOMMENDED PCB - LAYOUT

Recommended PCB layout for high precision applications

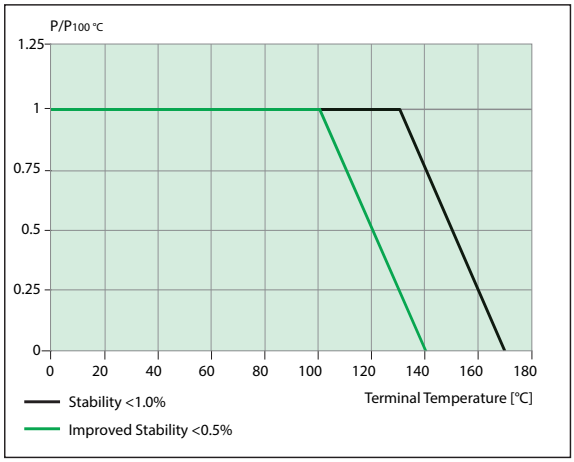


Sense Terminals

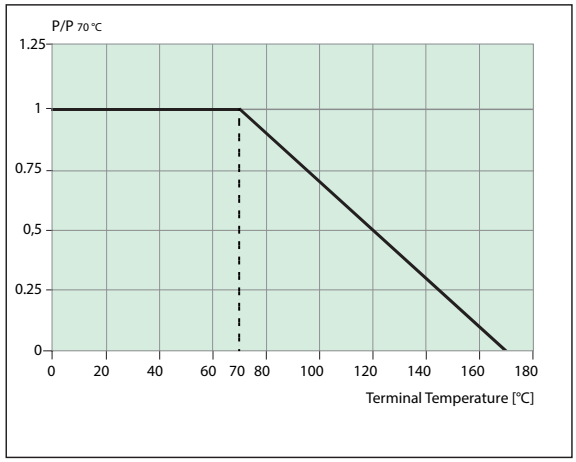
Recommended PCB layout for normal application



TYPICAL POWER DERATING CURVE FOR RESISTOR WHEN FULL POWER IS AT 100°C & 130°C

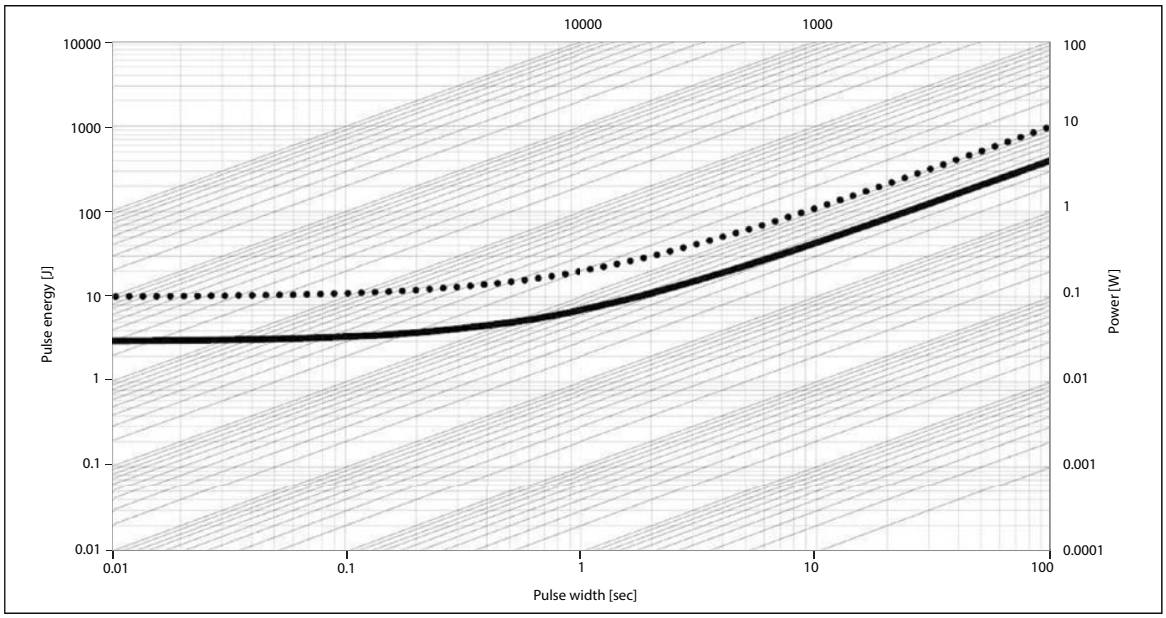


TYPICAL POWER DERATING CURVE FOR RESISTOR WHEN FULL POWER IS AT 70°C



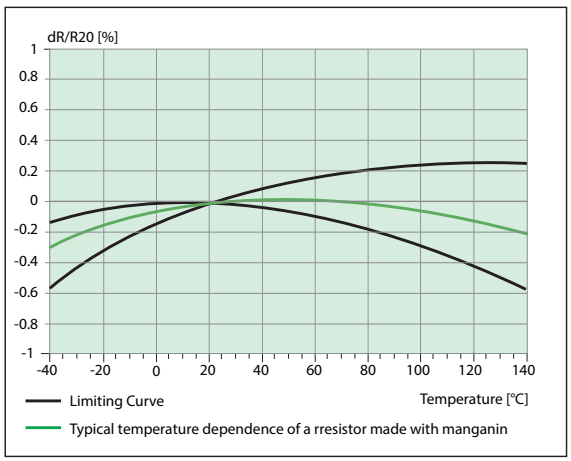
In case the Design Engineer requires a specific graph of a particular component it can be supplied on request.

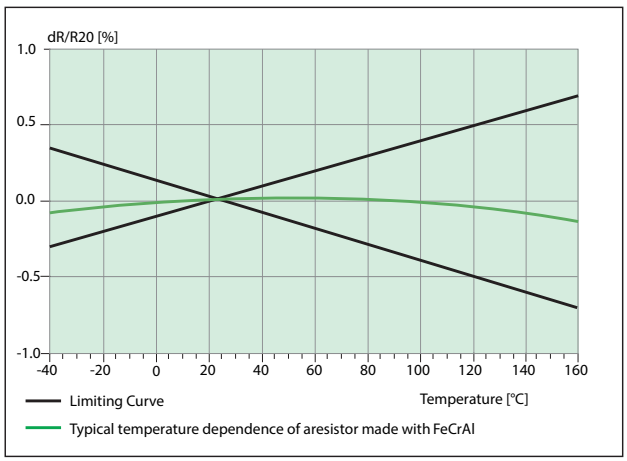
MAXIMUM PULSE ENERGY WITH RESPECT TO PULSE POWER FOR PERMANANT OPERATION



In this graph the max. & min. curve are shown as ••• and ▬ for all resistance values, the area between the max. & min. curve is applicable.
In case the Design Engineer requires a specific graph of a particular component it can be supplied on request.

TYPICAL TEMPERATURE DEPENDANCE OF THE ELECTRICAL RESISTANCE





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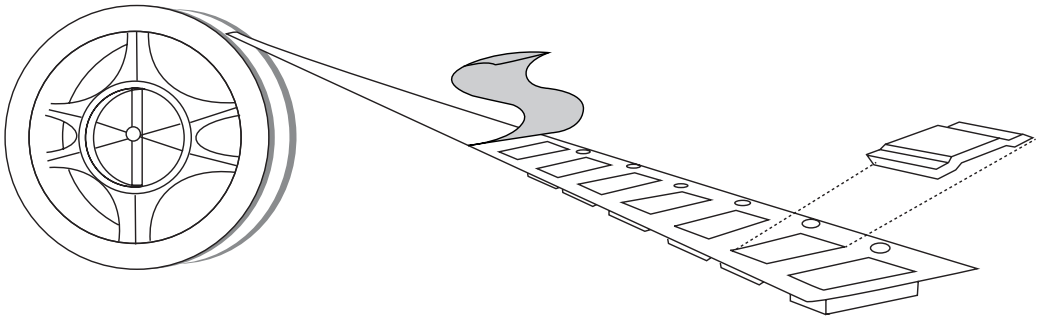
PACKAGING

A. BULK

Resistors shall be packed in plastic Box-K44 of approximate size 162x104x37mm- 2000pcs/box & this box will be vacuum sealed with polythene of 100 micron. With enclose silica gel.

B. TAPE & REEL PACKING



SPECIFICATION	TAPEWIDTH	PARTS PER REEL
EIA-481-D	16mm	3000 pcs

STORAGE CONDITION

Shelf Life (packed) : Temp 25°C to 35°C, Humidity 30 to 80% RH, Shelf life-12 months

Floor Life (unpacked) : Temp 25°C to 35°C, Humidity 30 to 80% RH, Floor life-15 days

ORDERING INFORMATION

SERIES	HTR PART NO.	TYPE	RESISTANCE VALUE	TOLERANCE	MARKING ON RESISTOR
HSE	HSE5W	Tape & Reel – HSE5WTR	R0002	± 1%	HTR HSE R0002 1% DATE CODE
HSE	HSE4.5W	Bulk - HSE4.5W	R0015	± 0.5%	HTR HSE R0015 0.5% DATE CODE
HSE	HSE3W	Tape & Reel – HSE3WTR	R003	± 5%	HTR HSE R0015 5% DATE CODE

Part no of HSE5W, Tape and reel with resistance value R0002 and 1% tolerance, will be **HSE5WTR R0002 ±1%**

Part no of HSE4.5W, Bulk with resistance value R0015 and 0.5% tolerance, will be **HSE4.5W R0015 ±0.5%**

Part no of HSE3W, Tape and reel with resistance value R003 and 5% tolerance, will be **HSE3WTR R003 ±5%**