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LOW OHM POWER RESISTORS

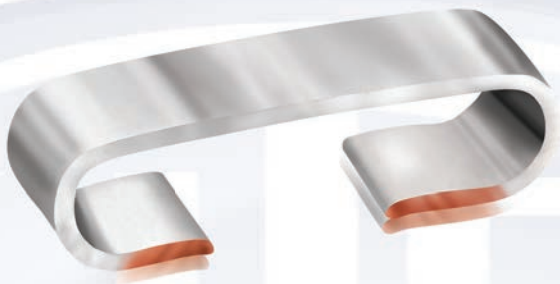
HOS

SERIES
Size 4512

- Open frame strip type.
- 2W to 5W.
- R001 to R05.

AEC-Q200 Qualified

Pb-free RoHS COMPLIANT



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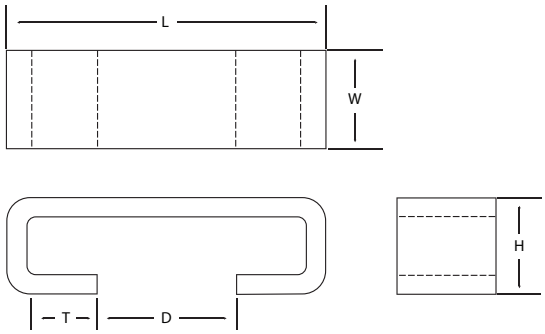
LOW OHM
POWER
RESISTORS

HOS

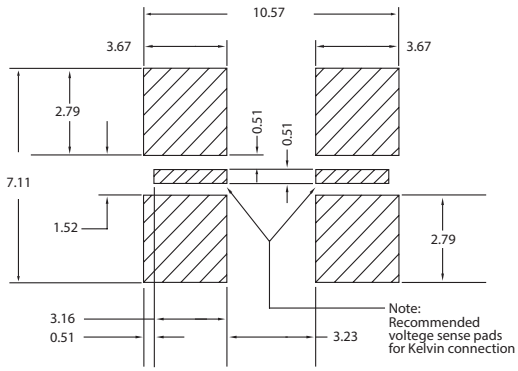
Size 4512

PHYSICAL CONFIGURATION



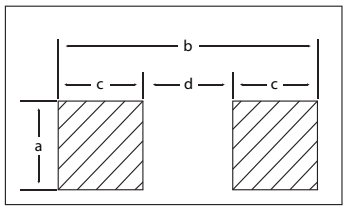
Recommended PCB layout for high precision applications : Kelvin (4 terminal pad design) is suggested as per illustration below. The high current connections are made to the two pairs of larger pads and the voltage sense connections are made to the two smaller central pads.

HOS5W* 4 terminal pad design



Dimensions in mm

Recommended PCB layout for normal application



DIMENSIONAL TABLE

Sr No.	HTR TYPE	L (MM)	H (MM)	T ± 0.25 (MM)	D ± 0.80 (MM)	W ± 0.40 (MM)	'a' NOM	'b' NOM	'c' NOM	'd' NOM	Typical weight per piece (Gms) Based on Resistance value		
											Low	Med	High
1	HOS2W* > R003 to R05	11.20 ± 0.40	3.05 ±0.80	2.36	4.83	3.20	4.07	9.37	3.07	3.23	0.45	0.25	0.05
2	HOS3W* > R003 to R05	11.20 ± 0.40	3.05 ±0.80	2.36	4.83	3.20	4.07	9.37	3.07	3.23	0.45	0.25	0.05
3	HOS2W* / HOS3W* R003	11.20 ± 0.40	3.51 ±0.80	2.36	4.83	3.20	4.07	9.37	3.07	3.23	0.45 Approx		
4	HOS2W* / HOS3W* R002	11.60 ± 0.40	3.51 ±0.80	2.36	4.70	3.60	4.45	9.37	3.07	3.23	050 Approx		
5	HOS5W* R001 to R025	10.7 to 12.0©	2.28 to 4.57©	2.36	4.83	6.35	7.24	9.58	3.18	3.23	0.55	0.35	0.13

NOTE : © Dependent on Ohmic Value

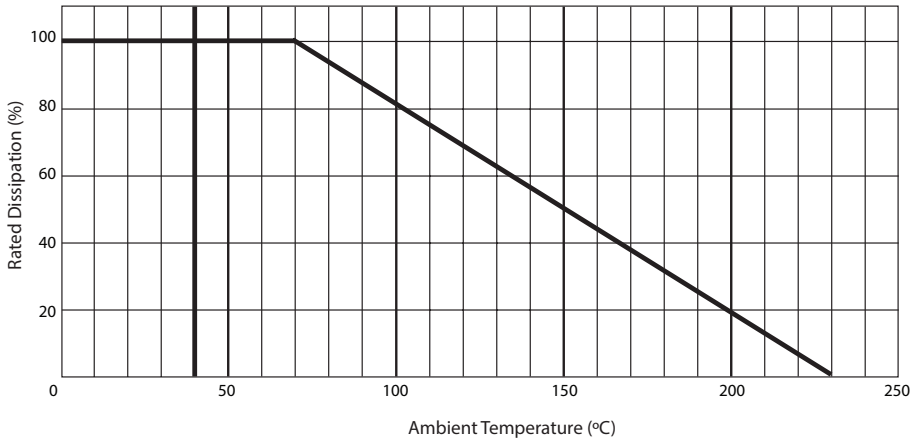
APPLICATIONS

- Current sensor for power hybrid applications
- In the automotive sector for high current applications
- Where reduced temperature is required on PCB

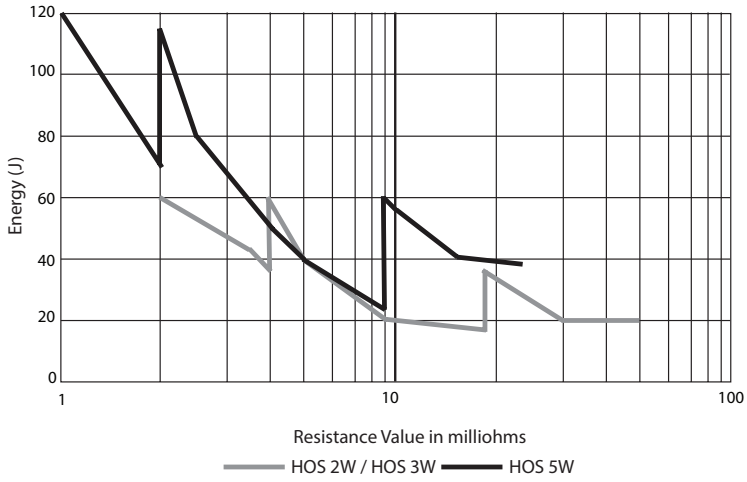
FEATURES

- Reduced PCB heating due to open air flow design as compared to flat chip format.
- Flexible nature of termination design for thermal expansions.

Temperature Derating



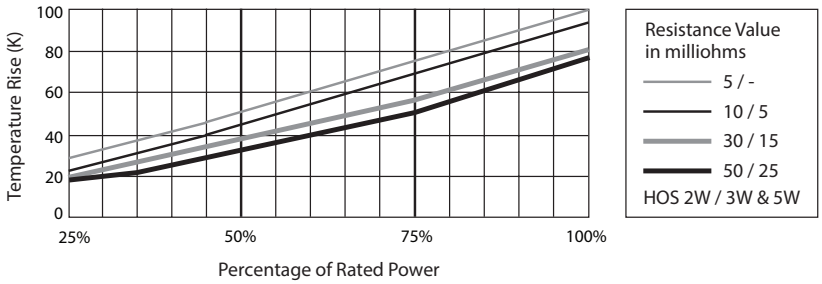
Pulse Energy Rating



NOTE : This graph relates to single pulses of short duration (≤ 100ms).
Higher energy limits apply for longer pulses and overloads.

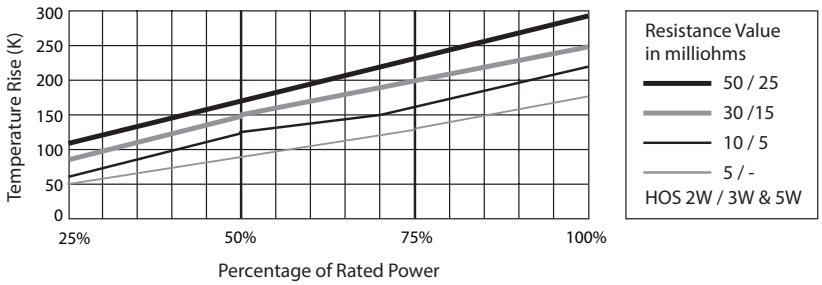
Solder Joint Temperature Rise

Mounting data : 7.6mm X 7.6mm pads, 2 oz copper on FR4, still air



Hot Spot Temperature Rise

Mounting data : 7.6mm X 7.6mm pads, 2 oz copper on FR4, still air



Note :
Temperature rise data are given here for typical mounting conditions. Actual figures depend on PCB copper weight, mounting pad size, track width and substrate type. Also, the open air format responds better to forced air cooling than chip format resistors. For values below 5 milliohms allowance should be made for heat generated in the copper tracks themselves. Application-specific guidance is available on request from our application laboratory.

ELECTRICAL AND ENVIRONMENTAL CHARACTERISTICS

PARAMETER / PERFORMANCE TEST & TEST METHOD	PERFORMANCE REQUIREMENTS
Power Rating (Rated Ambient Temperature)	Full power dissipation at 70° C and linearly de-rated to zero at + 225° C
Insulation	Not Insulated
Resistance Tolerance	± 5% (Available up to ± 1%)
Inductance	< 10 nH
Operating Temperature Range	- 55° C to +160° C
Voltage Rating / Limiting Voltage / Max. Working Voltage subject to max. terminal temperature + 120° C	$\sqrt{P \times R}$
Temperature Co-efficient of Resistance [Measured from 0°C to +125°C]	**For – HOS2W & HOS3W** 240ppm – For Resistance value < R004. 40ppm – For Resistance value R004 to R015 40ppm – For Resistance value > R015. **For – HOS5W** 240ppm – For Resistance value < R002. 40ppm – For Resistance value R002 to R007. 40ppm – For Resistance value > R007.
Thermal Shock	ΔR ± [0.75] – Average
Temperature Cycling [Room temperature⟶-55°C⟶Room temperature⟶125°C⟶ Room temperature for 5 cycles]	**For – HOS2W & HOS3W** ΔR ± [< 1.0 %] – For Resistance value < R004. ΔR ± [< 1.0 %] – For Resistance value R004 to R015. ΔR ± [< 0.75 %] – For Resistance value > R015. **For – HOS5W** ΔR ± [< 1.0 %] – For Resistance value < R002. ΔR ± [< 1.0 %] – For Resistance value R002 to R007. ΔR ± [< 0.75 %] – For Resistance value > R007.
High Temp. Exposure (125°C- For 2 Hrs.)	**For – HOS2W & HOS3W** ΔR ± [< 1.75 %] – For Resistance value < R004. ΔR ± [< 0.5 %] – For Resistance value R004 to R015. ΔR ± [< 1.0 %] – For Resistance value > R015. **For – HOS5W** ΔR ± [< 1.75 %] – For Resistance value < R002. ΔR ± [< 0.5 %] – For Resistance value R002 to R007. ΔR ± [< 1.0 %] – For Resistance value > R007.
Damp Heat (Steady State) (40°C at 93 % R.H. for 1000 Hrs. – no load applied)	ΔR ± [0.5 %] – Average
Endurance – Load Life [70°C with limiting voltage – with temperature limitation on terminal kept at 120°C 1.5 hours on / 0.5 hours off for 1000 hours]	**For – HOS2W & HOS3W** ΔR ± [< 2.0 %] – For Resistance value < R004. ΔR ± [< 1.0 %] – For Resistance value R004 to R015. ΔR ± [< 1.0 %] – For Resistance value > R015. **For – HOS5W** ΔR ± [< 2.0 %] – For Resistance value < R002. ΔR ± [< 1.0 %] – For Resistance value R002 to R007. ΔR ± [< 1.0 %] – For Resistance value > R007.
Bias Humidity [+85° C, 85% RH, 1000h]	ΔR ± 0.5% - Typical
Mechanical Shock [100 g. 6 ms half sine]	ΔR ± 0.5% - Typical
Vibration, High Frequency [20 g. 10-2000 Hz]	ΔR ± 0.5% - Typical
Low Temperature Storage and Operation [-65° C for 24 h]	ΔR ± 0.2% - Typical
Moisture Resistance [MIL-STD-202 method106]	ΔR ± 0.2% - Typical

HOT SPOT TEMPERATURE RISE (IN STILL AIR) -

From 180 °C to 280 °C at 100% power depending on the resistance value, pad and PCB thickness. Due to the nature of it's construction, the HOS resistor keeps the hot spot from a thermal point of view from the solder joints and reduces the possibility of transfer of high temperature on to the PCB in contrast to the flat chip format.

SOLDER JOINT TEMPERATURE RISE (IN STILL AIR) -

From 60 °C to 85 °C at 100% power depending upon resistance value, pad and PCB thickness.

CONSTRUCTION :

The copper terminals are electron beam welded to the requisite alloy strip and then formed. Value variations are possible by variations of width without traditional abrasion / notch trimming.

MECHANICAL SPECIFICATIONS

PARAMETER / PERFORMANCE TEST & TEST METHOD	PERFORMANCE REQUIREMENTS
Resistance to Soldering heat - (350° C for 30 Secs)	Δ R ± [0.2 %] – Typical
Solderabillity (Meets J-STD-002 Method B)	Must meet the requirements laid down
Solvent Resistance (Meets MIL-STD-002 Method 215)	Must meet the requirements laid down

RECOMMENDED SOLDER PROFILE

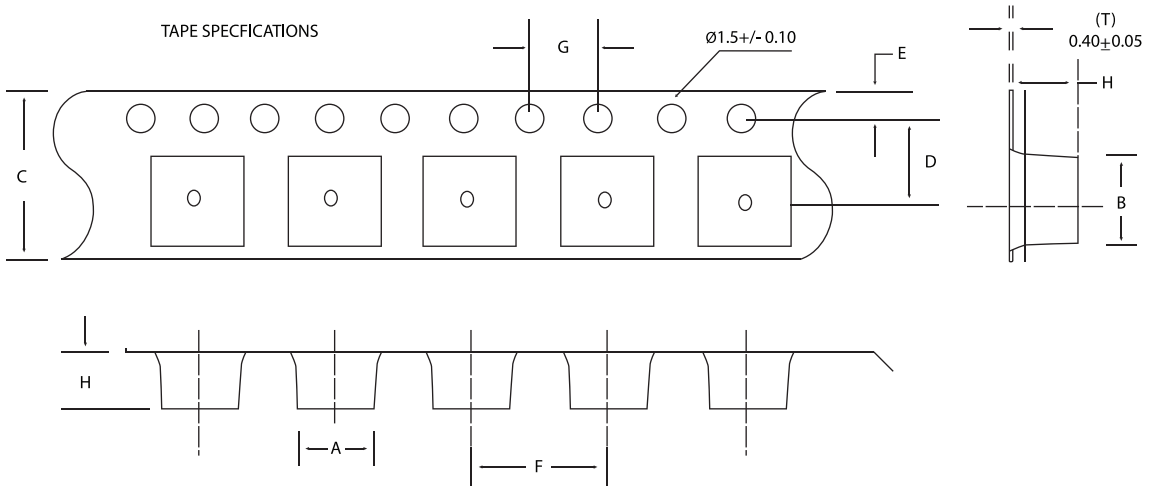
Reflow, IR - and wave soldering			
Temperature (°C)	260	255	217
Time (Sec)	Peak	40	90

PACKAGING

A. BULK

1000 resistors are packed in sealed plastic packets with silica gel pouch and place in small cardboard carton (Type 'I' box) approx size 70 x 70 x 70 mm and 4 such boxes can be packed in Type 'A' box approx size 200 x 150 x 70mm. 36 boxes (36000 pieces) of Type "I' or 6 boxes (24000 pieces) of Type 'A' can be packed in master carton of approx size 320 x 245 x 245mm.

B. TAPE & REEL PACKING



DIMENSIONAL TABLE

Sr No.	HTR TYPE	A(MM)	B(MM)	C(MM)	D(MM)	E(MM)	F(MM)	G(MM)	H(MM)	PCS/REEL
1	HOS2W & HOS3W ≥ R003	4.32±0.1	11.7±0.1	24±0.3	11.5±0.1	1.75±0.1	8.0±0.1	4.0±0.1	4.5±0.1	1800 pcs.
2	HOS2W & HOS3W R002	4.32±0.1	12.1±0.1	24±0.3	11.5±0.1	1.75±0.1	8.0±0.1	4.0±0.1	4.5±0.1	1800 pcs.
3	HOS5W	7.21±0.1	12.1±0.1	24±0.3	11.5±0.1	1.75±0.1	12.0±0.1	4.0±0.1	4.5±0.1	1100 pcs.

Storage Condition (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