Resistors

Surface Mount Sense Resistors

OARS, OARS-XP, OARSZ Series

- Flexible leads for thermal expansion
- Open-air design reduces PCB heating
- Values down to 1milliohm
- Element TCR ±20ppm/°C
- Zero-ohm 65A jumper version

All parts are Pb-free and comply with EU Directive 2011/65/EU (RoHS2)

Electrical Data

		OARS1	OARS3	OARS-XP
Power rating at 70°C ambient, or 140°C terminal temperature	watts	2	3	5
Resistance range	ohms	R002 to R050	R002 to R015	R001 to R025
Resistance Tolerance	%	≤ R002: 5, > R002: 1, 5		
Standard Values (Enquire for unlisted values)	milliohms	2, 3, 4, 5, 10, 15, 20, 22, 25, 30, 40, 50	2, 3, 4, 5, 10, 15	1, 2, 2.5, 5, 7.5, 12.5, 10, 20, 25
Inductance	nH	<10		
Ambient temperature range	°C	-55 to +160		

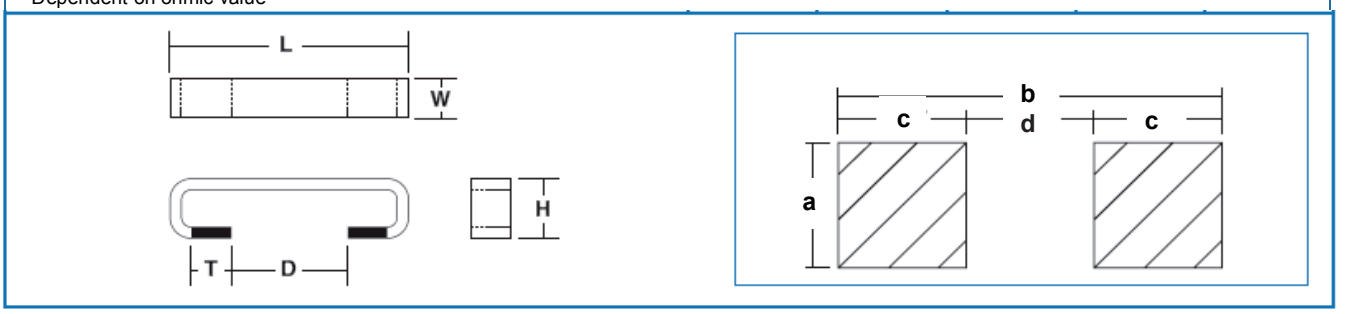
		OARS-1Z	Comments
Current rating at 25°C ambient	amps	65	Zero-ohm jumper
Max residual resistance	milliohms	0.3	
Ambient temperature range	°C	-55 to +160	

Physical Data

Dimensions (mm) and recommended solder pads

Type	L	H	T	D	W	a nom.	b nom.	c nom.	d nom.
OARS1/3 > R003, OARS-1Z	11.18 ±0.38	3.05 ±0.76	2.36 ±0.25	4.83 ±0.76	3.18 ±0.38	4.07	9.37	3.07	3.23
OARS1/3 - R003		3.51 ±0.76							
OARS1/3 - R002	11.56 ±0.38			4.7 ±0.76	3.56 ±0.38	4.45			
OARS-XP	10.7 to 12.0*	2.28 to 4.57*		4.83 ±0.76	6.35 ±0.38	7.24	9.58	3.18	

* Dependent on ohmic value



General Note

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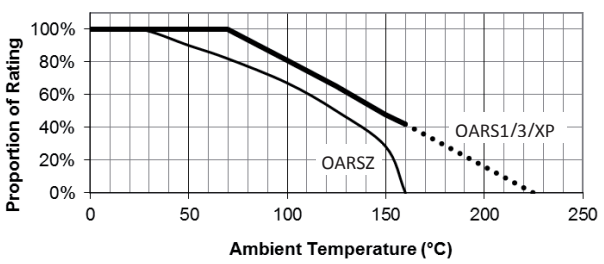
Performance Data (AEC-Q200)

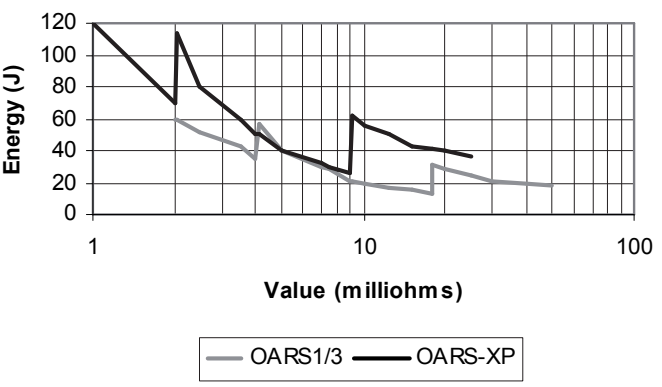
	OARS1/3	<R004	R004 to R015	>R015
	OARS-XP	<R002	R002 to R007	>R007
TCR (-55 to 125ºC)	ppm/ºC	240	40	40
Thermal Shock	ΔR%	0.75	0.75	0.75
High Temp. Exposure (125ºC)	ΔR%	1.75	0.5	1
Temp. Cycling (-40 to 125ºC)	ΔR%	1	1	0.75
Operational Life	ΔR%	2	1	1
Biased Humidity	ΔR%	0.75	0.5	0.5
Mechanical Shock	ΔR%	1.5	1	1
Vibration	ΔR%	1	1	1
Terminal Strength		Meets JIS-C-6429		
Solvent Resistance		Meets MIL-STD-002 Method 215		
Solderability		Meets J-STD-002 Method B		

Temperature Derating



Note: For OARS1/3/XP this relates to power rating, for OARSZ it relates to current rating.

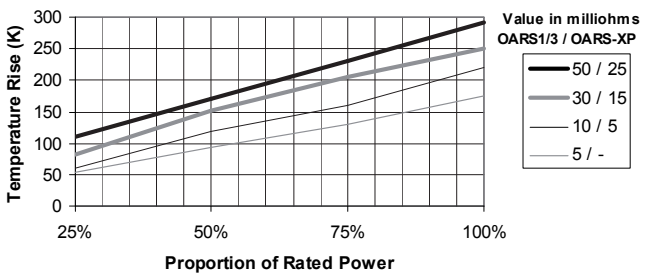
Pulse Energy Rating



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

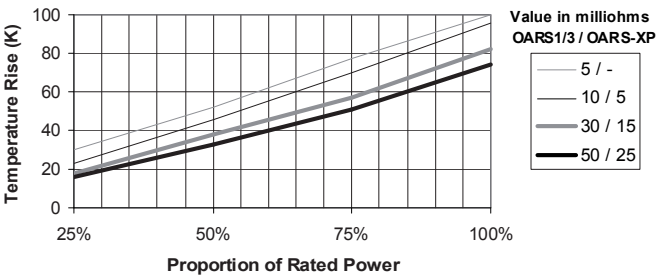
Hot Spot Temperature Rise

7.6mm x 7.6mm pads, 2 oz copper on FR4, still air



Joint Temperature Rise

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.

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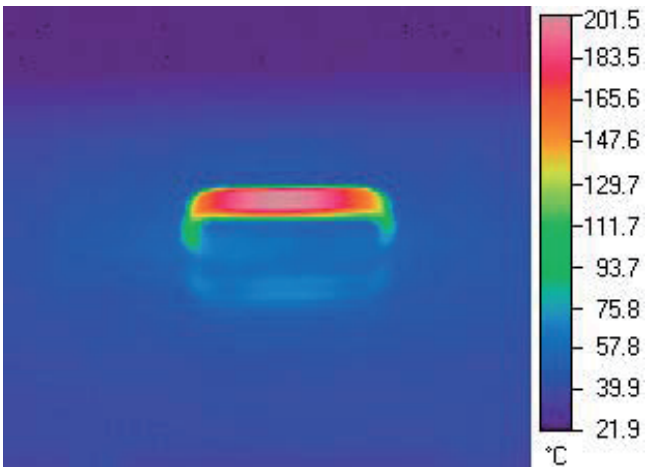
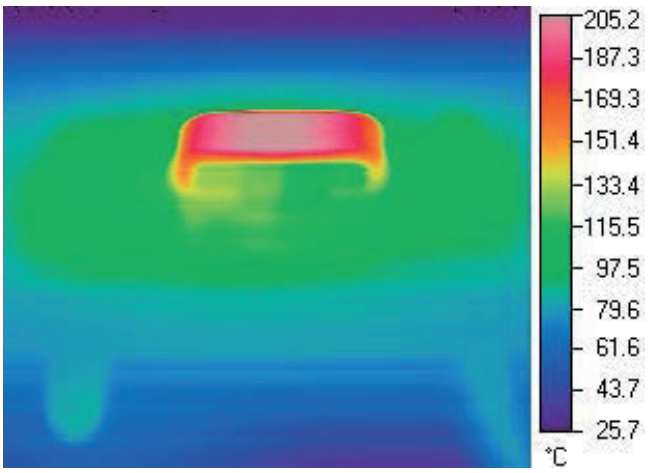
Thermal Performance Examples



OARS1-R005 at 2W



OARSXP-R0025 at 5W

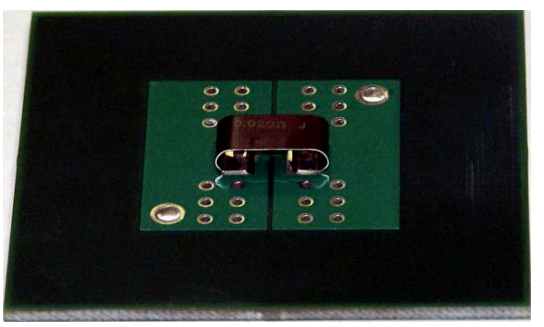
These thermal images were taken under ambient conditions of still air at 25°C with the components mounted on horizontal standard test boards as defined below.

JEDEC standard circuit board:

2” (50.8mm) square FR4

2 outer power planes, 2 ounce (70µ) Cu
1” (25.4mm) square exposed

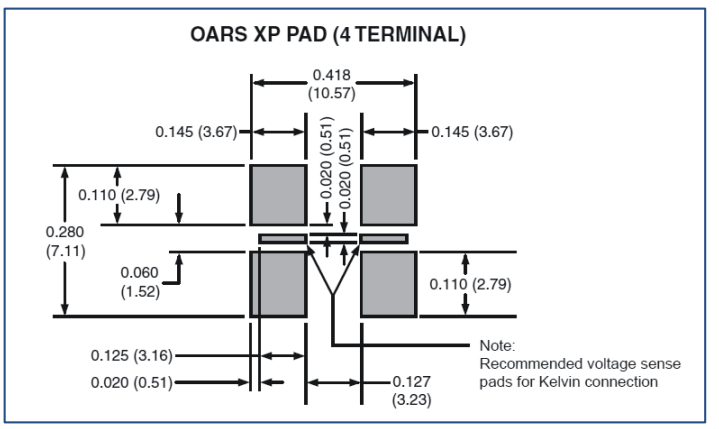
2 inner signal planes, 1 ounce (35µ) Cu
(continuous planes)



In contrast to the flat chip format, the OARS format keeps the hot spot thermally distant from the solder j oints and reduces undesirable heat delivery into the PCB. Further thermal images for other ohmic values and power dissipations are available on request.

Kelvin (4 Terminal) Mounting

For high precision applications a Kelvin (4 Terminal) mounting method is recommended. An example to illustrate the design principle is shown. High current connections are made to the two pairs of larger pads, whilst the voltage sense connections are made to the two smaller central pads.



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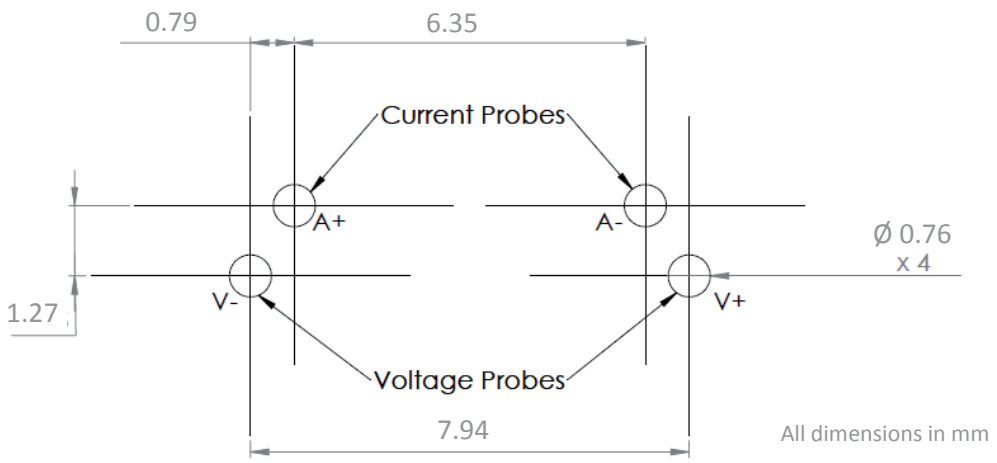
Standard 4-Terminal Probe Positions for Measuring Unmounted Parts



Construction

Copper terminations are welded to resistance alloy strip which is then formed. Value adjustment is achieved by control of width, without the need for subsequent abrasion or notch trimming.
Pb-free termination finish is 96% Sn / 4% Ag alloy.

Flammability

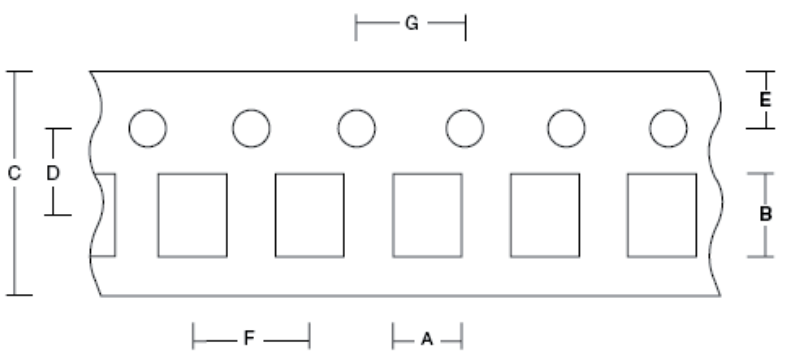
The resistor will not burn or emit incandescent particles under any condition of applied temperature or overload.

Marking

The parts are legend marked with ohmic value and tolerance code.

Packaging Data

Dimensions (mm)							
Type	A	B	C	D	E	F	G
OARS1/3, OARS-1Z	4.32±0.08	11.7±0.08	24±0.3	11.5±0.1	1.75±0.1	8±0.1	4±0.1
OARS-XP-R001	7.21±0.1	11.94±0.1				12±0.1	
OARS-XP >R001		11.56±0.1					



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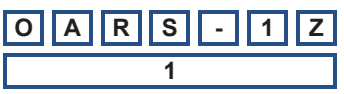
Ordering Procedure

This product has two valid part numbers:

European (Welwyn) Part Numbers: **OARS1-R01JI** (OARS1, 10 milliohms ±5%, Pb-free)
OARS-1Z (OARS-1Z, Pb-free)

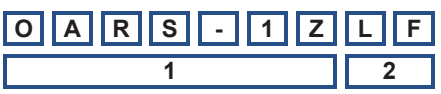
1 Type	2 Value	3 Tolerance	4 Termination & Packing	
OARS1	3-5 characters See Electrical Data R = ohms	F = ±1%	I = Pb-free, Tape & Reel	
OARS3		J = ±5%	OARS1, OARS3	1900/reel
OARS-XP			OARS-XP	1200/reel



1 Type	
OARS-1Z	No value or tolerance applies. Termination is Pb-free. Packing is Tape & Reel, 1900/reel.

USA (IRC) Part Numbers: **OARS1R010JLF** (OARS1, 10 milliohms ±5%, Pb-free)
OARS-1ZLF (OARS-1Z, Pb-free)

1 Type	2 Value	3 Tolerance	4 Termination & Packing	
OARS1	4/5 characters See Electrical Data R = ohms	F = ±1%	LF = Pb-free	
OARS3		J = ±5%	OARS1, OARS3	1900/reel
OARS-XP			OARS-XP	1200/reel



1 Type		2 Termination & Packing
OARS-1Z	No value or tolerance applies.	LF= Pb-free, Tape & Reel, 1900/reel.

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TT Electronics:

OARS1R030J OARS1R010FLF OARS1R015JLF OARS1R003JLF OARS1R005FLF OARS1R004FLF OARS1R005JLF OARS1R003J OARS1R003F OARS1R003FTR-LF OARS1R005FTR-LF OARS1R005JTR-LF OARS1R010FTR-LF OARS1R010JTR-LF OARS1R015FTR OARS1R015JTR-LF OARS1R020FTR-LF OARS1R022FTR-LF OARS1R025FTR-LF OARS1R030FTR-LF OARS1R030JTR-LF OARS1R040FTR OARS1R050FTR-LF OARS1R050JTR OARS1R050JTR-LF OARS1R050JLF OARS1R010JLF OARS1R030JLF OARS1R015FLF OARS1R010J OARS1R010F OARS1R004F OARS1R003FLF OARS1R020JLF OARS1R005J OARS1R005F OARS1R015J OARS1R020FLF OARS1R040J OARS1R020J OARS1R020F OARS1R040JLF OARS1R015F OARS1R050J OARS1R015JTR OARS1R050FLF OARS1R040JTR-LF OARS1ZEROHMTR-LF OARS1ZEROHMTR OARSXPR001FLF OARSXPR0025FLF OARSXPR020FLF OARSXPR002FLF OARSXPR005FLF OARSXPR010FLF OARSXPR025FLF OARSR025FLF OARSR020FLF OARSR030FLF OARSR005FLF OARSR010FLF OARSR015FLF OARSR003FLF OARS3R002JLF OARS3R003FLF OARS3R004FLF OARS3R005FLF OARS3R010FLF OARS3R015FLF OARS1R002FLF OARSXPR0075FLF OARSXPR005JLF OARS1R025FLF OARS1R002JLF OARS1R030FLF OARS1R040FLF OARSXPR002JLF OARSXPR001JLF OARSXPR0025JLF OARSXPR0075JLF OARS3R015JLF OARS1R025JLF OARSXPR010JLF OARSXPR020JLF OARS3R003JLF OARS3R005JLF OARS3R002FLF OARS3R004JLF OARS3R010JLF OARSXPR025JLF OARSXPR0125JLF OARS1R004JLF OARS1R022JLF OARSXPR0125FLF OARS1R022FLF OARS-1ZLF