Surface Mount Current Sense Resistors

OARS, OARS-XP & OARSZ Series

Features:

- Flexible leads for thermal expansion
- Open air design reduces PCB heating
- Values down to 1mΩ
- TCR to ±40ppm/°C
- Element TCR ±20ppm/°C
- Zero-ohm 65A jumper version
- AEC-Q200 qualified

All parts are Pb-free and comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

Electrical Data

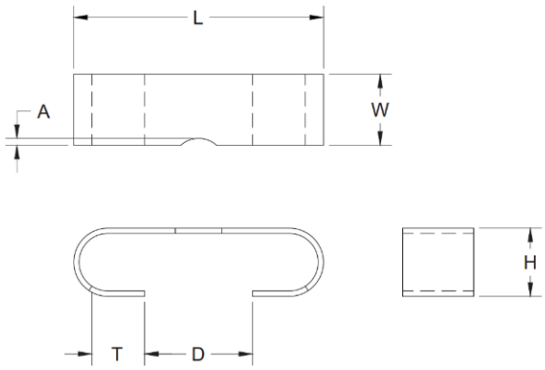
		OARS1	OARS3	OARS-XP
Power rating at 70°C ambient or 140°C terminal	W	2	3	5
Resistance range	Ω	R002 to R05	R002 to R015	R001 to R025
Resistance tolerance	%	1, 5		
Standard values (Enquire for unlisted values)	mΩ	2, 3, 4, 5, 10, 15, 20, 22, 25, 30, 40, 50	2, 3, 4, 5, 10, 15	1, 2, 2.5, 5, 7.5, 12.5, 10, 20, 25
Inductance	nH	<10		
Ambient temperature range	°C	-55 to 160		

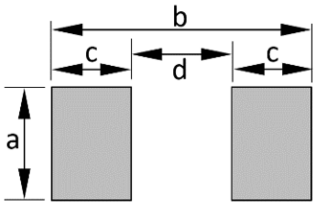
		OARS-1Z	Comments
Current rating at 25°C ambient	A	65	Zero-ohm jumper
Residual resistance	mΩ	<0.3	
Ambient temperature range	°C	-55 to 160	

Physical Data

Dimensions and recommended solder pads (mm)

Type	L	H	T	D	W	A	a nom.	b nom.	c nom.	d nom.
OARS-1Z	11.05 ±0.25	3.33 ±0.64	2.36 ±0.25	4.32 ±0.38	3.1 ±0.25	0	4.07	9.37	3.07	3.23
OARS1/3 - R002	11.56 ±0.38			4.7 ±0.76	3.38 ±0.18	0 to 0.6	4.45			
OARS1/3 - R003	11.18 ±0.38			4.57 ±0.76	3.18 ±0.38		4.07			
OARS1/3 - R004 to R04				4.83 ±0.76						
OARS1 - R05	10.8 ±0.38									
OARS-XP - R001	11.56 ±0.38			4.7 ±0.76	6.73 ±0.38	0 to 1	7.24	9.58	3.18	
OARS-XP - R002 to R02	11.18 ±0.38			4.83 ±0.76	6.35 ±0.38					
OARS-XP - R025	10.8 ±0.38				5.99 ±0.38					





General Note
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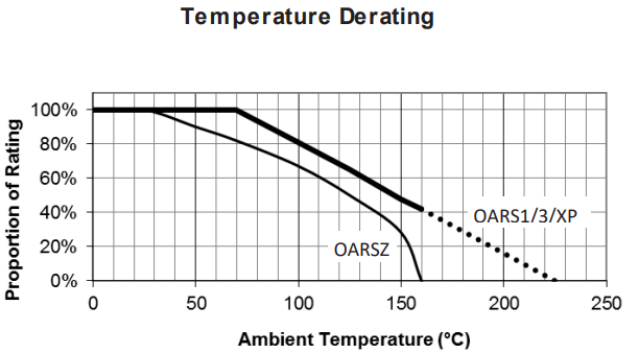
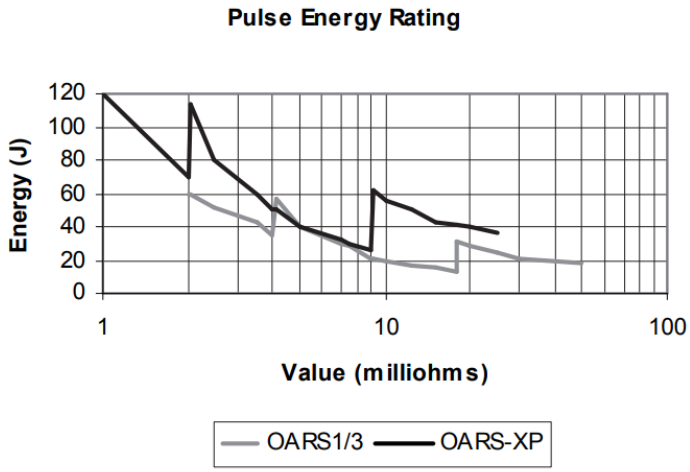
Performance Data

	OARS1/3	<R004	R004 to R015	>R015
	OARS-XP	<R002	R002 to R0075	>R0075
TCR (-55 to 125°C)	ppm/°C	240	40	40
Thermal shock	±ΔR%	0.75	0.75	0.75
High temperature exposure (125°C)	±ΔR%	1.75	0.5	1
Temperature cycling (-40 to 125°C)	±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		

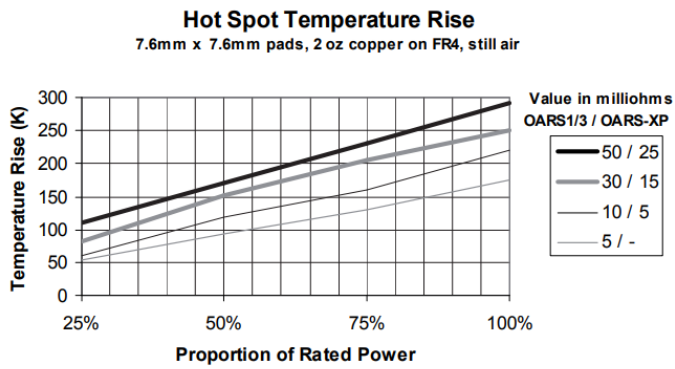
Thermal & Pulse Data

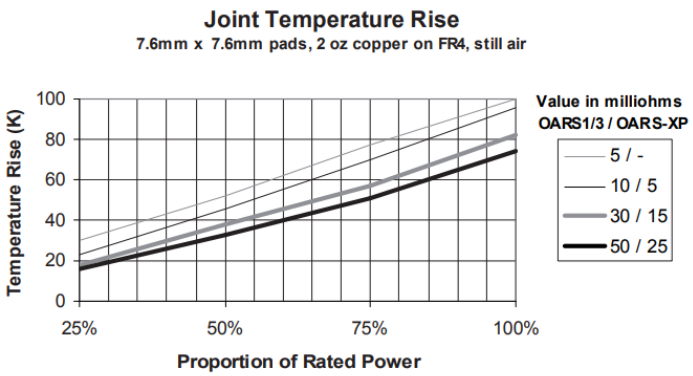


Note: For OARS1/3/XP this relates to power rating, for OARSZ it relates to current rating.



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





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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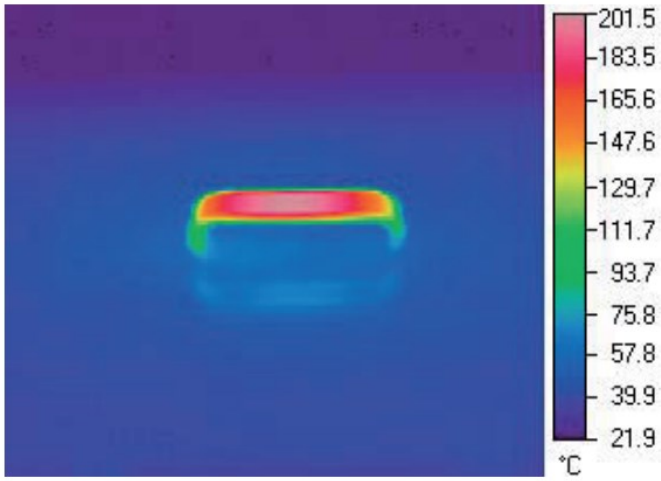
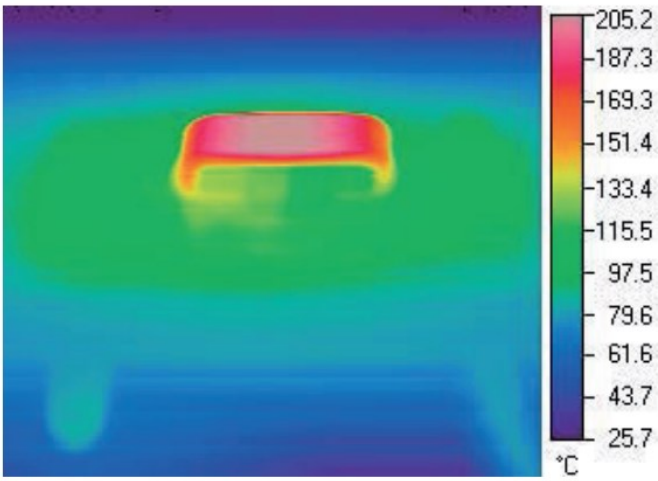
Thermal Performance & Mounting Examples

In contrast to the flat chip format, the OARS format keeps the hot spot thermally distant from the solder joints and reduces undesirable heat delivery into the PCB. The below 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.



OARS1-R005 at 2W



OARSXP-R0025 at 5W

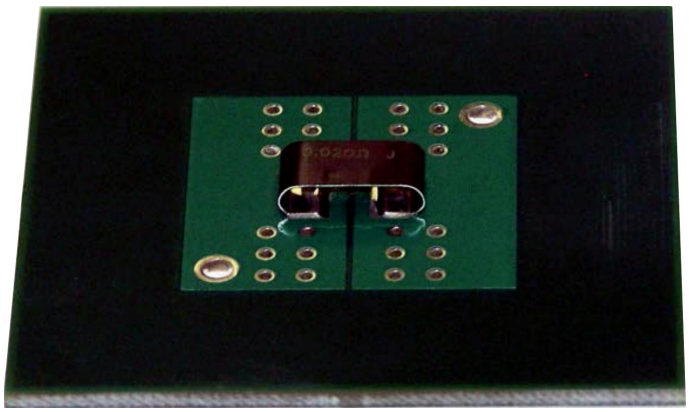
JEDEC Standard Test Board

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)

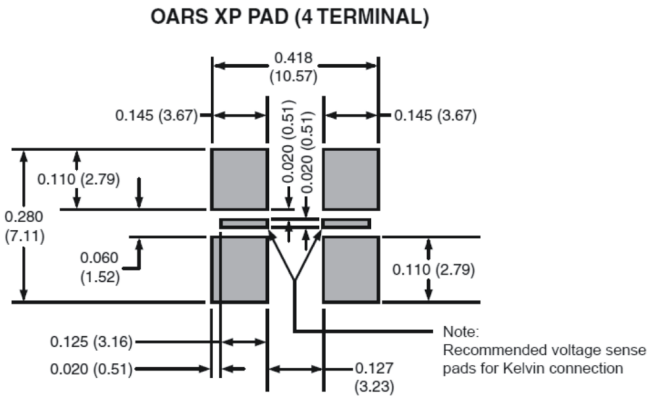
12 via holes per terminal



Kelvin 4-Terminal Mounting of OARS-XP

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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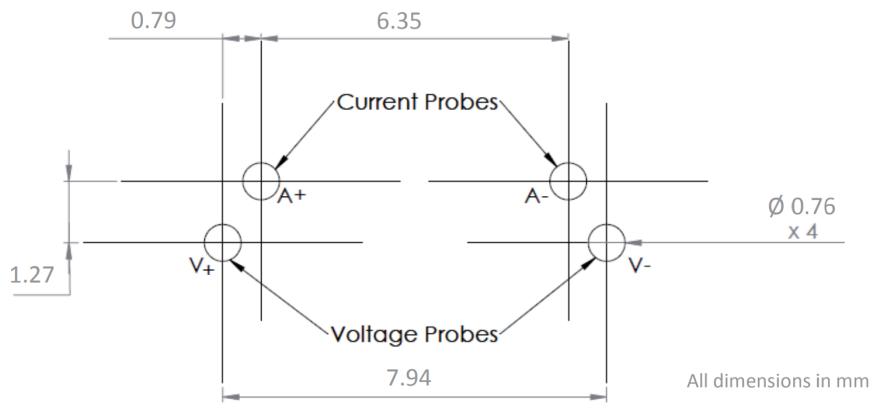
Measurement Probe Positions for Unmounted Parts



Construction

Copper terminations are welded to resistance alloy strip which is then formed. Value adjustment is achieved by control of width, together with optional notch trimming. The zero-ohm jumper is a formed copper strip. 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.

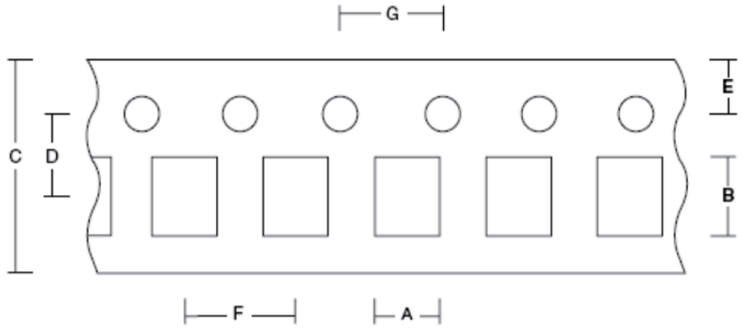
Marking

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

Packaging

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, zero-ohm jumper, Pb-free)

O	A	R	S	1			-	R	0	1			J	I
1								2					3	4

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

O	A	R	S	-	1	Z
1						

1 Type	Termination & Packing
OARS-1Z	Pb-free, tape & reel, 1900/reel

Note - no value or tolerance applies.

USA (IRC) Part Numbers:

OARS1R010JLF (OARS1, 10 milliohms ±5%, Pb-free)
OARS-1ZLF (OARS-1Z, zero-ohm jumper, Pb-free)

O	A	R	S	1			R	0	1	0		J	L	F
1							2					3	4	

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

O	A	R	S	-	1	Z	L	F
1							2	

1 Type	2 Termination & Packing
OARS-1Z	LF = Pb-free, tape & reel, 1900/reel

Note - no value or tolerance applies.

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