

# Open Air Resistor Metal Element Current Sense

## OAR Series

### Features:

- Power ratings of 1, 3 & 5W @ 85°C
- Superior surge performance
- Hot spot isolated from PCB material
- Resistance wire TCR to  $\pm 20\text{ppm}/^\circ\text{C}$
- Tolerances to 1%
- Tight pitch (TP) option



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

## Electrical Data

		OAR1	OAR3	OAR5
Power rating at 85°C	W	1	3	5
Resistance range	$\Omega$	R003 to R10	R0025 to R10	R003 to R05
Resistance tolerance <sup>1</sup>	%	1, 2, 5		
TCR (element)	ppm/°C	<R005: 180, R005 - <R025: 20, ≥R025: 30	<R004: 180, R004 - <R04: 20, ≥R04: 30	<R005: 180, R005 - <R025: 20, ≥R025: 30
Standard values <sup>2</sup>	m $\Omega$	3, 5, 6, 8, 10, 12, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100	2.5, 3, 4, 5, 6, 7, 10, 15, 20, 25, 30, 40, 45, 50, 60, 70, 100	3, 4, 5, 6, 6.2, 10, 12, 15, 20, 25, 30, 40, 50
Inductance	nH	<10		
Ambient temperature range	°C	-40 to 125		

Note 1: 1 & 5% tolerances are preferred but 2% may be available on request. Note 2: Please enquire for values not listed.

## Physical Data

Dimensions in inches (mm)							
Type	Value	A		B <sub>max.</sub> <sup>1</sup>	C	E	F
OAR1	All	0.45 +0.04/-0.02	(11.43 +1.02/-0.51)	0.36 (9.14)	0.125 ±0.03 (3.18 ±0.76)	0.065 +0.01/-0.005 (1.65 +0.25/-0.13)	0.04 ±0.002 (1.02 ±0.05)
OAR1TP	All	0.197 +0.04/-0.03	(5 +1/-0.8)	0.45 (11.4)			
OAR3	All	0.6 +0.04/-0.02	(15.24 +1.02/-0.51)	0.92 (23.4)			
OAR3TP	<R005	0.275 +0.04/-0.03	(7 +1/-0.8)	1.12 (28.5)			
	≥R005	0.197 +0.04/-0.03	(5 +1/-0.8)				
OAR5	All	0.8 +0.04/-0.02	(20.32 +1.02/-0.51)	0.88 (22.4)			
OAR5TP	All	0.275 +0.04/-0.03	(7 +1/-0.8)	1.14 (29)			

Resistive Element

Copper Leads

Weld Node

Stand-Off

On lower ranges stand-off may be eliminated

NOTE:  
Contact factory for:  
1. Variations of "A" dimension.  
2. Different lead diameter.

Test Point (Kelvin connection)

Note 1: Nominal height varies with ohmic value.

### General Note

TT Electronics reserves the right to make changes in product specification without notice or liability.  
All information is subject to TT Electronics' own data and is considered accurate at time of going to print.

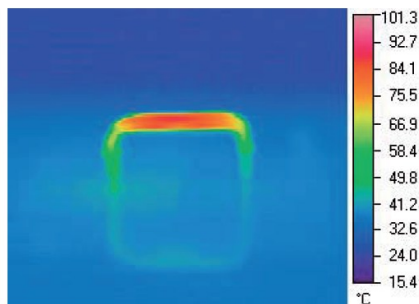
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## OAR Series

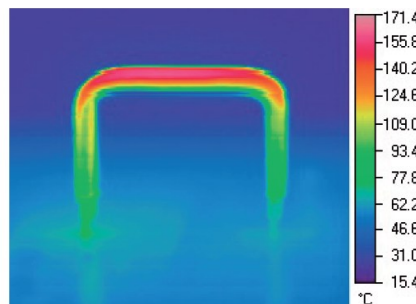
### Performance Data

		Maximum
Load life: 1000 hours at P <sub>r</sub>	±ΔR%	1
Moisture: 1000 hours, no load	±ΔR%	1
Temperature cycling: 1000 cycles, -40 to 125°C	±ΔR%	1

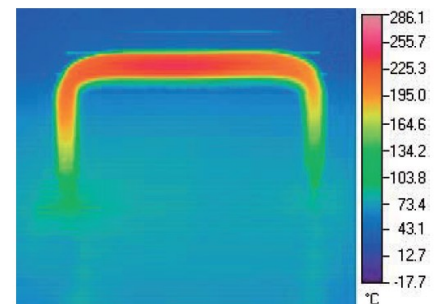
### Thermal & Pulse Data



**OAR1-R005 at 1W**  
Hot spot: 87°C  
Solder joint: 45°C



**OAR3-R005 at 3W**  
Hot spot: 160°C  
Solder joint: 70°C

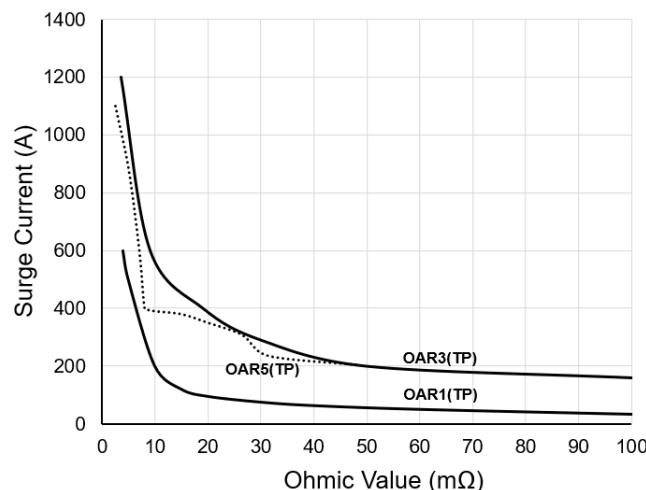


**OAR5-R005 at 5W**  
Hot spot: 230°C  
Solder joint: 96°C

The thermal images (not simulations) above are of the OAR products at their respective power ratings. Notice the solder joint temperature is much lower than the hotspot. The unique construction of the OAR isolates the temperature of the hotspot from the circuit board material preventing damage to the circuit board. Additionally, the thermal energy is dissipated to the air instead of being conducted into the circuit board potentially causing a nearby power component to exceed its rating.

The standard test circuit board consists of a four layer FR4 material with 2 ounce (70μm) outer layers and 1 ounce (35μm) inner layers, which is typical of many industry designs. The test conditions were in still air at 22°C.

### 50ms Surge Current Limits



The surge current charts are approximations of the capabilities of the OAR product and should not be used to the exclusion of actual testing. The relative high surge currents depicted in the charts are as a result of the robust all metal welded construction and the heat carrying capability of metal. Additionally the OAR resistive wire provides large relative cross section for current flow as compared to other resistor technologies, such as thin film, thick film, or metal strip.

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### Packaging

OAR resistors are supplied bulk packed in boxes of 500.

### Ordering Procedure

**Global Part Number Example:**    **OAR3R010JLF** (OAR3, 10 milliohms  $\pm 5\%$ , Pb-free)

O	A	R	3			R	0	1	0		J	L	F
1				2		3				4	5		

1 Type	2 Pitch	3 Value	4 Tolerance <sup>1</sup>	5 Termination & Packing	
OAR1	Omit for standard	4 / 5 characters	F = $\pm 1\%$	Omit for SnPb	
OAR3	TP = Tight pitch	R = ohms	G = $\pm 2\%$	LF = Pb-free	
OAR5			J = $\pm 5\%$	All sizes	500/box

Note 1: 1 & 5% tolerances are preferred but 2% may be available on request.

### Legacy Part Numbers

This product has a legacy part number format. This is still available for ordering, but for new designs use of the Global Part Number is recommended.

**Legacy Part Number Example:**    **OAR3-R01JI** (OAR3, 10 milliohms  $\pm 5\%$ , Pb-free)

O	A	R	3			-	R	0	1			J	I
1				2			3				4	5	

1 Type	2 Pitch	3 Value	4 Tolerance <sup>1</sup>	5 Packing	
OAR1	Omit for standard	3 - 5 characters	F = $\pm 1\%$	I = Bulk	
OAR3	TP = Tight pitch	R = ohms	G = $\pm 2\%$	All sizes	500/box
OAR5			J = $\pm 5\%$		

Note 1: 1 & 5% tolerances are preferred but 2% may be available on request.