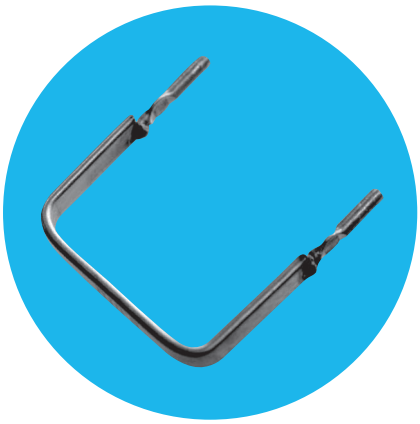
# Open Air Resistor
# Metal Element Current Sense



**OAR & OAR-TP Series**

- Power ratings of 1, 3, & 5W @ 85°C
- Superior surge performance
- Hot spot isolated from PCB material
- Resistance wire TCR ±20ppm/°C
- Tolerances to 1%

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

## Electrical Data

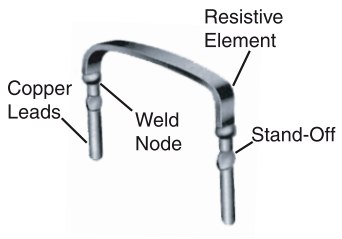
| Part Number | Power Rating @ 85°C (watts) | Resistance Range (mΩ) | Tolerance (±%) | Wire TCR (±ppm/°C) | Inductance (nH) |
|---|---|---|---|---|---|
| **OAR-1 (TP)** | 1.0 | 3, 5, 6, 8, 10, 12, 15, 20, 25, 30, 35, 40, 50, 60, 70, 80, 100 | 1, 2[1], 5 | 20 | <10 |
| **OAR-3 (TP)** | 3.0 | 2, 2.5, 3, 4, 5, 6, 7, 10, 15, 20, 25, 30, 40, 45, 50, 60, 70, 100 | | | |
| **OAR-5 (TP)** | 5.0 | 3, 4, 5, 6, 6.2, 10, 12, 15, 20, 25, 30, 40, 50 | | | |

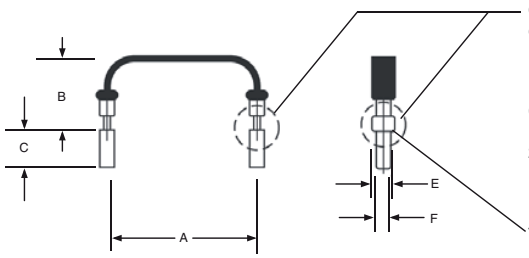
**Notes:**
[1] ±2% tolerance available <5mΩ
Please contact factory for resistance values not listed

## Environmental Data

| | |
|---|---|
| **Load Life (1000 hours @ 25°C)** | **ΔR/R <1%** |
| **Moisture (no load for 1000 hours)** | **ΔR/R <1%** |
| **Temperature Cycling (-40°C to +125°C for 1000 cycles)** | **ΔR/R <1%** |
| **Operating Temperature** | **-40°C to +125°C** |

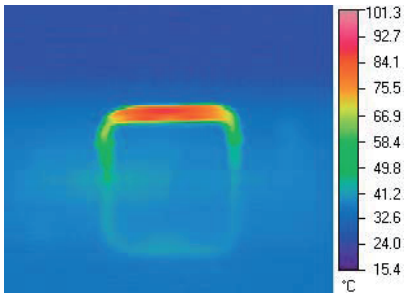
# Physical Data



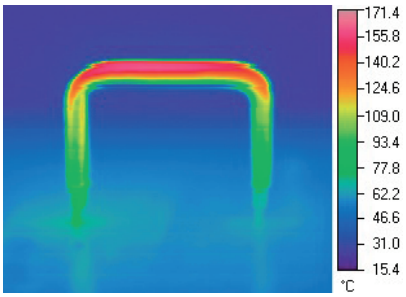

| Type | A | B max | C | E | F |
|---|---|---|---|---|---|
| OAR1 | 0.45 +0.04/-0.02 (11.43 +1.02/-0.51) | 0.32 (8.12) | 0.125 ±0.03 (3.18 ±0.76) | 0.065 +0.01/-0.005 (1.65 +0.25/-0.13) | 0.04 ±0.002 (1.02 ±0.05) |
| OAR1TP | 0.197 +0.04/-0.03 (5.0 +1.0/-0.8) | 0.45 (11.4) | | | |
| OAR3 | 0.60 +0.04/-0.02 (15.24 +1.02/-0.51) | 0.92 (23.4) | | | |
| OAR3TP <R005 | 0.275 +0.04/-0.03 (7.0 +1.0/-0.8) | 1.12 (28.5) | | | |
| OAR3TP ≥R005 | 0.197 +0.04/-0.03 (5.0 +1.0/-0.8) | | | | |
| OAR5 | 0.80 +0.04/-0.02 (20.32 +1.02/-0.51) | 0.88 (22.4) | | | |
| OAR5TP | 0.275 +0.04/-0.03 (7.0 +1.0/-0.8) | 1.14 (29) | | | |

# Thermal Image Data



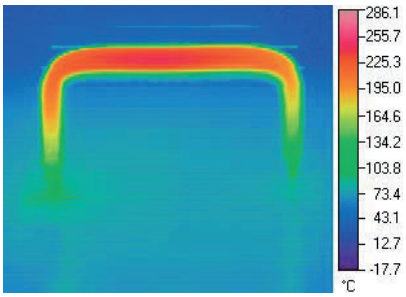

**OAR-1 5 mΩ @ 1 Watt**

**Hot Spot: 87°C**
**Solder Joint: 45°C**




**OAR-3 5 mΩ @ 3 Watt**

**Hot Spot: 160°C**
**Solder Joint: 70°C**




**OAR-5 5 mΩ @ 5 Watt**

**Hot Spot: 230°C**
**Solder Joint: 96°C**

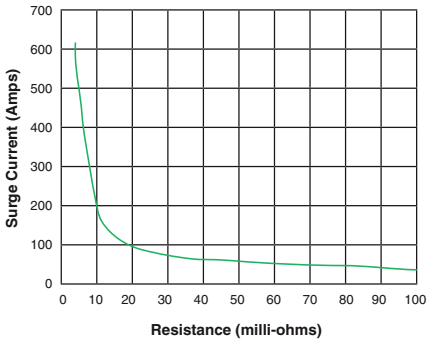
The thermal images (not simulations) above are of the OAR products at their respective power rating. Notice the solder joint temperature is much lower than the hotspot. The unique construction of the OAR isolates the temperature of the hotspot from the circuit board material preventing damage to the 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 ambient temperature conditions, approximately 22 °C with no forced air. Contact TT electronics for more details or for other thermal image test data for specific resistance values and power levels.

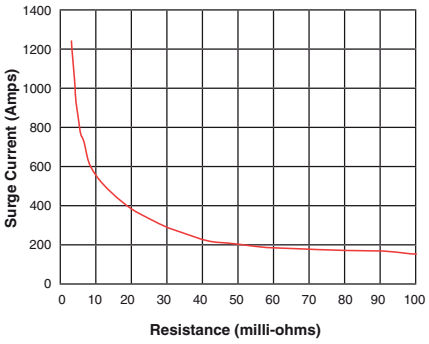
# Power Derating

The typical power derating curves are based on conservative design concepts that extend from film based products. The OAR is a solid metal alloy construction that can withstand comparably greater operating power levels than conservative design models permit. Typically the resistive alloys can withstand temperatures in excess of 300°C. Therefore, system thermal design considerations are a more significant design parameter due to the heat limitations of solder joints and/or circuit board substrate materials.

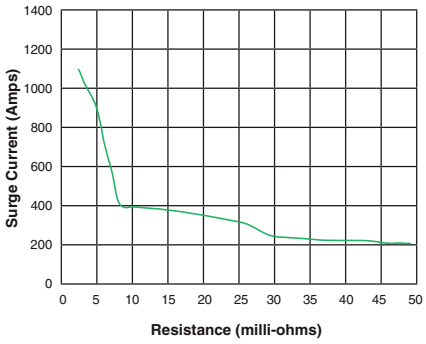
## Pulse/Surge Chart @ 50 msec duration




**OAR-1(TP)**




**OAR-3(TP)**




**OAR-5(TP)**

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.

# Ordering Data

This product has two valid part numbers:

**European (Welwyn) Part Number: OAR3-R01JI** (OAR3, 10 milliohms ±5%, Pb-free)

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

| 1<br>Type | 2<br>Pitch | 3<br>Value | 4<br>Tolerance | 5<br>Packing |
|---|---|---|---|---|
| OAR1 | Omit for standard | 3-5 characters | F = ±1% | I = Bulk |
| OAR3 | TP = Tight Pitch | See Electrical Data | G = ±2% | |
| OAR5 | | R = ohms | J = ±5% | |

**USA (IRC) Part Number: OAR3R010JLF** (OAR3, 10 milliohms ±5%, Pb-free)

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

| 1<br>Type | 2<br>Pitch | 3<br>Value | 4<br>Tolerance | 5<br>Termination |
|---|---|---|---|---|
| OAR1 | Omit for standard | 4/5 characters | F = ±1% | Omit for SnPb |
| OAR3 | TP = Tight Pitch | See Electrical Data | G = ±2% | LF = Pb-free |
| OAR5 | | R = ohms | J = ±5% | |

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

TT Electronics:

OARS1R030J OARS1R010FLF OAR1R100J OARS1R015JLF OAR1R080JLF OARS1R003JLF OAR5R005JLF OAR1R005JLF OARS1R005FLF OAR3R005JLF OARS1R004FLF OARS1R005JLF OAR3R040JLF OAR1R040JLF OAR5R040JLF OAR3R100JLF OAR5R020J OAR5R030JLF OAR3R030JLF OAR1R030JLF OARS1R003J OAR3R040J OAR5R020JLF OAR1R020JLF OAR3R020JLF OARS1R003F OAR3R030J OAR5R005J OAR1R005FLF OAR1R050FLF OAR1R100F OAR3R005F OAR3R005FLF OAR3R040F OAR3R050F OAR3R050FLF OAR5R0062F OAR5R040F 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 OAR3R015J OAR3R050J OAR3R070JLF OAR1R070JLF OAR1R100JLF OARS1R050JLF OAR3R080J OAR5R010JLF OAR3R010JLF OAR1R010JLF OARS1R010JLF OAR5R010J OAR5R015J OARS1R030JLF OAR3R050JLF OAR5R050JLF OAR1R050JLF OAR1R050J OAR5R015JLF OARS1R015FLF OARS1R010J OARS1R010F OAR3R100J OARS1R004F OAR1R030J OAR1R010J OARS1R003FLF OAR1R080J OARS1R020JLF OARS1R005J OARS1R005F OAR1R005J OAR3R020J OARS1R015J OAR3R070J OAR1R020J OAR1R015JLF OAR3R015JLF OAR1R015J OAR1R070J OARS1R020FLF OARS1R040J OARS1R020J OARS1R020F OAR5R040J OARS1R040JLF