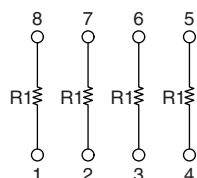
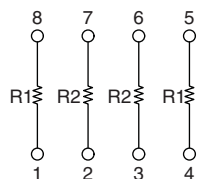


## Molded, 50 mil Pitch, Dual-In-Line Thin Film Resistor, Precision Automotive, AEC-Q200 Qualified, Networks



The AORN series features a narrow body (0.150") small outline SMT package. The network is constructed with a tantalum nitride resistor film on a high purity alumina substrate for improved ESD and moisture protection.

### SCHEMATICS



#### Note

- Consult Factory for additional divider ratios and resistance values.

### FEATURES

- Moisture resistant tantalum nitride resistive film (MIL STD 202, method 106)
- Standard 8 pin count (0.150" narrow body) JEDEC MS-012
- Rugged molded case construction
- Excellent long term ratio stability ( $\Delta R \pm 0.015\%$ )
- Low TCR tracking  $\pm 5$  ppm/°C
- Passes Sulfur Resistance Test per ASTM B 809
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS\***  
Available  
**HALOGEN  
FREE**

#### Note

\* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

### TYPICAL APPLICATIONS

- Voltage divider circuits
- Engine control units
- Signal conditioning
- Feedback circuits

### TYPICAL PERFORMANCE

|      | ABSOLUTE | TRACKING |
|------|----------|----------|
| TCR  | 25       | 5        |
|      | ABSOLUTE | RATIO    |
| TOL. | 0.10     | 0.05     |

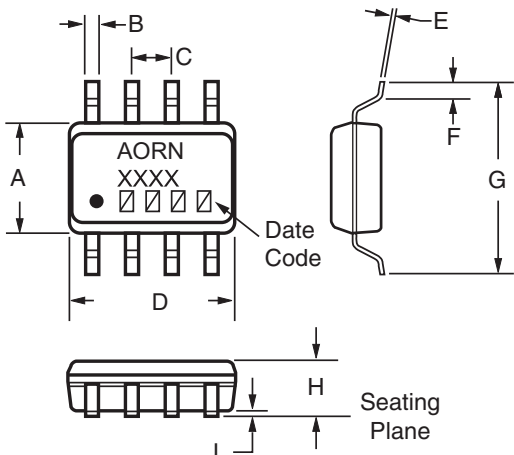
### STANDARD DIVIDER VALUES

| RATIO $R_1/R_2$ | $R_1$   | $R_2$ |
|-----------------|---------|-------|
| 100:1           | 100 kΩ  | 1 kΩ  |
| 50:1            | 50 kΩ   | 1 kΩ  |
| 25:1            | 25 kΩ   | 1 kΩ  |
| 20:1            | 20 kΩ   | 1 kΩ  |
| 10:1            | 10 kΩ   | 1 kΩ  |
| 5:1             | 10 kΩ   | 2 kΩ  |
| 2:1             | 10 kΩ   | 5 kΩ  |
| 1:1             | 100 kΩ  |       |
|                 | 100 kΩ  |       |
|                 | 49.9 kΩ |       |
|                 | 24.9 kΩ |       |
|                 | 20.0 kΩ |       |
|                 | 10.0 kΩ |       |
|                 | 4.99 kΩ |       |
|                 | 2.0 kΩ  |       |
|                 | 1.0 kΩ  |       |

**STANDARD ELECTRICAL SPECIFICATIONS**

| TEST                           | SPECIFICATIONS                               | CONDITIONS                            |
|--------------------------------|----------------------------------------------|---------------------------------------|
| Material                       | Tantalum nitride (Ta <sub>2</sub> N)         | -                                     |
| Pin/Lead Number                | 8                                            | -                                     |
| Resistance Range               | 1 k $\Omega$ to 100 k $\Omega$ per resistor  | -                                     |
| TCR: Absolute                  | $\pm 25$ ppm/ $^{\circ}$ C (standard)        | -55 $^{\circ}$ C to +155 $^{\circ}$ C |
| TCR: Tracking                  | $\pm 5$ ppm/ $^{\circ}$ C (typical)          | -55 $^{\circ}$ C to +155 $^{\circ}$ C |
| Tolerance: Absolute            | $\pm 0.10$ % to $\pm 1$ %                    | At +25 $^{\circ}$ C temperature       |
| Tolerance: Ratio               | $\pm 0.05$ % to $\pm 0.1$ %                  | At +25 $^{\circ}$ C temperature       |
| Power Rating: Resistor         | 100 mW                                       | Maximum at +70 $^{\circ}$ C           |
| Power Rating: Package          | 400 mW                                       | Maximum at +70 $^{\circ}$ C           |
| Stability: Absolute            | $\Delta R \pm 0.05$ %                        | 1000 h at +155 $^{\circ}$ C           |
| Stability: Ratio               | $\Delta R \pm 0.015$ %                       | 1000 h at +155 $^{\circ}$ C           |
| Voltage Coefficient            | < 0.1 ppm/V                                  | -                                     |
| Working Voltage                | 100 V max. not to exceed $\sqrt{P \times R}$ | -                                     |
| Operating Temperature Range    | -55 $^{\circ}$ C to +155 $^{\circ}$ C        | -                                     |
| Storage Temperature Range      | -55 $^{\circ}$ C to +155 $^{\circ}$ C        | -                                     |
| Noise                          | $\leq -30$ dB                                | -                                     |
| Thermal EMF                    | 0.08 $\mu$ V/ $^{\circ}$ C                   | -                                     |
| Shelf Life Stability: Absolute | $\Delta R \pm 0.01$ %                        | 1 year at +25 $^{\circ}$ C            |
| Shelf Life Stability: Ratio    | $\Delta R \pm 0.002$ %                       | 1 year at +25 $^{\circ}$ C            |

**DIMENSIONS AND IMPRINTING** in inches and millimeters

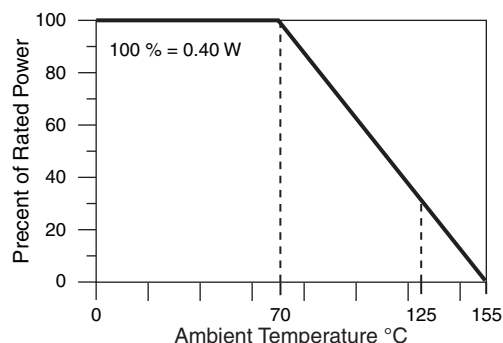
|  | DIMENSION | INCHES              | MILLIMETERS     |
|-------------------------------------------------------------------------------------|-----------|---------------------|-----------------|
|                                                                                     | A         | 0.157               | 3.99            |
|                                                                                     | B         | 0.0165 $\pm$ 0.0025 | 0.4 $\pm$ 0.06  |
|                                                                                     | C         | 0.050               | 1.27            |
|                                                                                     | D         | 0.195 max.          | 4.93 max.       |
|                                                                                     | E         | 0.008 $\pm$ 0.001   | 0.20 $\pm$ 0.03 |
|                                                                                     | F         | 0.028 $\pm$ 0.001   | 0.71 $\pm$ 0.02 |
|                                                                                     | G         | 0.239 $\pm$ 0.001   | 6.07 $\pm$ 0.13 |
|                                                                                     | H         | 0.068 max.          | 1.73 max.       |
|                                                                                     | I         | 0.008 $\pm$ 0.002   | 6.07 $\pm$ 0.13 |

**MECHANICAL SPECIFICATIONS**

|                    |                                      |
|--------------------|--------------------------------------|
| Resistive Element  | Tantalum nitride (Ta <sub>2</sub> N) |
| Substrate Material | Ceramic                              |
| Body               | Molded epoxy                         |
| Terminals          | Copper alloy                         |
| Lead Frame Finish  | Ni/Pd/Au solder free <sup>(1)</sup>  |

**Note**

- Gold thickness less than 10  $\mu$ ".

**DERATING CURVE**


**ENVIRONMENTAL TESTS**

| ENVIRONMENTAL TEST                         | CONDITONS                                          | SUGGESTED<br>PRODUCT<br>LIMITS | TYPICAL VISHAY<br>PERFORMANCE<br>< 10K | TYPICAL VISHAY<br>PERFORMANCE<br>> 10K |
|--------------------------------------------|----------------------------------------------------|--------------------------------|----------------------------------------|----------------------------------------|
| Max. Ambient Temperature at Rated Wattage  |                                                    | +70 °C                         | +70 °C                                 | +70 °C                                 |
| Max. Ambient Temperature at Power Derating |                                                    | +155 °C                        | +155 °C                                | +155 °C                                |
| High Temperature Exposure $\Delta R$       | MIL-STD-202, 108, 1000 h at 155 °C                 | $\pm 0.20 \%$                  | 0.08 %                                 | 0.045 %                                |
| Temperature Cycling $\Delta R$             | JESD22, A104, 1000 cycles, -55 °C to +155 °C       | $\pm 0.25 \%$                  | 0.012 %                                | 0.010 %                                |
| Moisture Resistance $\Delta R$             | MIL-STD-202 method 106                             | $\pm 0.20 \%$                  | 0.007 %                                | 0.007 %                                |
| Biased Humidity $\Delta R$                 | MIL-STD-202, 103, 1000 h at 85 °C, 85 % RH, 10 % P | $\pm 0.25 \%$                  | 0.075 %                                | 0.075 %                                |
| Life $\Delta R$                            | MIL-STD-202, 108, 1000 h at 155 °C                 | $\pm 0.50 \%$                  | 0.199 %                                | 0.221 %                                |
| Mechanical Shock $\Delta R$                | MIL-STD-202 method 213, condition C                | $\pm 0.25 \%$                  | 0.004 %                                | 0.002 %                                |
| Vibration $\Delta R$                       | MIL-STD-202 method 204, 10 Hz to 2 kHz             | $\pm 0.25 \%$                  | 0.004 %                                | 0.002 %                                |
| Resistance to Soldering Heat $\Delta R$    | MIL-STD-202, 204, condition B                      | $\pm 0.10 \%$                  | -0.008 %                               | 0.016 %                                |
| Electrostatic Discharge $\Delta R$         | AEC-Q200-002 at 1 kV, human body                   | $\pm 0.50 \%$                  | -0.028 %                               |                                        |
|                                            | AEC-Q200-002 at 2 kV, human body                   | $\pm 0.50 \%$                  |                                        | 0.108 %                                |
| Solderability                              | J-STD-002 method B and B1                          | 95 %                           | Acceptable                             | Acceptable                             |
| Terminal Strenght $\Delta R$               | AEC-Q200-006 at 1 kg for 60 s                      |                                | Acceptable                             | Acceptable                             |
| Flame Retardance                           | AEC-Q200-001 Para 4.0                              |                                | Acceptable                             | Acceptable                             |

**GLOBAL PART NUMBER INFORMATION**

New Global Part Numbering: AORN 5-1

|                                           |  |  |  |                                                                                                                                           |  |  |  |                                                                                                                                                                                           |  |  |  |
|-------------------------------------------|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| A O R N                                   |  |  |  | 5 - 1                                                                                                                                     |  |  |  | A U F                                                                                                                                                                                     |  |  |  |
| A O R N                                   |  |  |  | 1 0 0 1                                                                                                                                   |  |  |  | A U F                                                                                                                                                                                     |  |  |  |
| GLOBAL MODEL<br>(4 digits)                |  |  |  | DIVIDER <sup>(1)</sup> or RESISTANCE<br>(3, 4 or 5 digits)                                                                                |  |  |  | TOLERANCE %<br>(ABSOLUTE / RATIO)                                                                                                                                                         |  |  |  |
| AORN<br>8 pin SOIC, surface mount<br>(e4) |  |  |  | 2 - 1      1001<br>5 - 1      2001<br>10 - 1     4991<br>20 - 1     1002<br>25 - 1     2002<br>50 - 1     2492<br>100 - 1    4992<br>1003 |  |  |  | A = 0.1 / 0.05<br>B = 0.1 / 0.1<br>C = 0.25 / 0.1<br>D = 0.5 / 0.1<br>F = 1.0 / 0.5                                                                                                       |  |  |  |
|                                           |  |  |  |                                                                                                                                           |  |  |  | PACKAGING                                                                                                                                                                                 |  |  |  |
|                                           |  |  |  |                                                                                                                                           |  |  |  | TAPE AND REEL<br>T0 = 100 min., 100 mult<br>T1 = 1000 min., 1000 mult<br>T3 = 300 min., 300 mult<br>T5 = 500 min., 500 mult<br>TF = Full reel 3000<br>TS = 100 min., 1 mult<br>UF = TUBED |  |  |  |

**Note**<sup>(1)</sup> Examples:

- 2-1 = ratio between resistance values
- 1001 = four 1K resistors



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