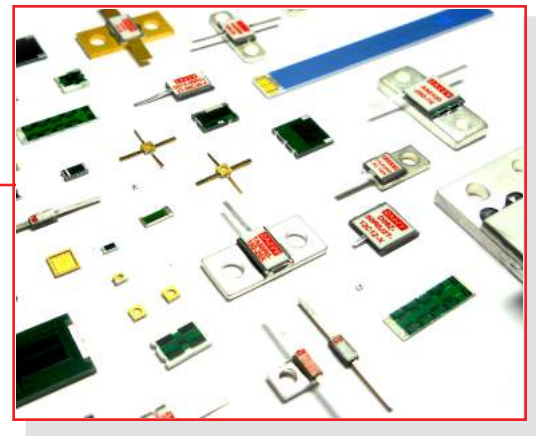# BARRY

# Design Parameters



For decades, Barry Industries has been working with engineers to create precise ceramic component solutions. We can build ceramic components from your existing drawing or design a new component to fit your exact specifications. Barry has the inhouse capabilities and experience to fulfill almost any ceramic requirement.

Vertical Integration is the key to our quality and success. Unsurpassed quality standards, precise attention to detail, excellent customer service and in-house control of our manufacturing process are some of the reasons to choose Barry as your ceramic component supplier.

## Design & Simulation Software:

- Solidworks
- Sonnet EM
- ANSYS DesignSpace
- CST Microwave Studio

**ISO CERTIFIED**  **ITAR REGISTERED**

## Ceramics:

### Ceramics & Properties (Typical):

|  | 96% Alumina ($Al_2O_3$) | Aluminum Nitride (AlN) | Beryllium Oxide (BeO) |
|---|---|---|---|
| Thermal Conductivity @25°C (W/mK): | 20 - 30 | 170 - 200 | 261 |
| Dielectric Constant (at 1MHz): | 9.5 | 8.6 | 6.5 |
| CTE (PPM/° 25-150°C): | 6.5 | 4.5 | 7.6 |

### Ceramic Standard Thicknesses:

|  | 0.010 [.254] | 0.015 [.381] | 0.025 [.635] | 0.040 [1.016] | 0.060 [1.524]◊ |
|---|---|---|---|---|---|
| 96% Alumina ($Al_2O_3$) | • | • | • | • |  |
| Aluminum Nitride (AlN) | • | • | • | • | • |
| Beryllium Oxide (BeO | • | • | • | • | • |

### Single Ceramic Piece Dimensions:

|  | Min. | Max. |
|---|---|---|
| A. | 0.02 [0.508] | 6.0 [152.4] |
| B. | 0.02 [0.508] | 6.0 [152.4] |

Dimensions in inches [mm]. Tolerance is ± 0.010 [0.254] unless otherwise stated

## Conductors:

### Conductor & Via Guidelines:

| Parameter: | Min. | Standard◊ |
|---|---|---|
| 1. Conductor-to-Edge | .003 [0.0762] | .005 [0.1270] |
| 2. Conductor Width | .002 [0.0508] | .005 [0.1270] |
| 3. Conductor-to-Conductor Space | .002 [0.0508] | .008 [0.2032] |
| 4. Conductor-to-Conductor Space (Dissimilar Metallizations) | .006 [0.1524] | .010 [0.2540] |
| 5. Via Diameter to Ceramic Thickness Ratio | 0.3:1 | 1.0:1 |
| 6. Pad-to-Edge Space | .003 [0.0762] | .005 [0.1270] |
| 7. Pad Dimension | .008 [0.2032] | .010 [0.2540] |
| 8. Pad-to-Pad Space | .008 [0.2032] | .010 [0.2540] |
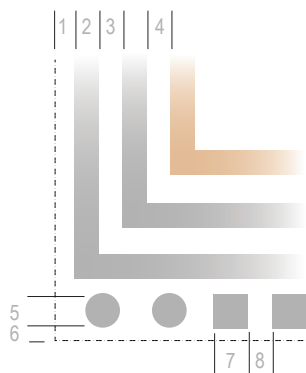
### Conductor Edge Wrap Types:

Edge Wrap

Conductor Through Castellation

| Parameter: | Min. | Standard◊ |
|---|---|---|
| 9. Wrap onto Top or Bottom Surface | .005 [0.1270] | .010 [0.2540] |
| 10. Width of Wrap | .015 [0.3810] | .020 [0.5080] |
| 11. Castellation Diameter to Ceramic Thickness Ratio | 0.3:1 | 1.0:1 |
| 12. Annular Ring Around Via | .010 [0.2540] | .020 [0.5080] |

Barry Industries maintains an ISO9001 Certified Quality Management System.

◊ Greater Dimensions Available

| ORIG. | REV. | No. |
|---|---|---|
| APR 1 2015 | MAY 2 2016 | A |

## Resistive Element:

### Resistor Element, Terminal & Passivation Guidelines:

| Parameter: | Min. | Standard◊ |
|---|---|---|
| A. Resistor Length | .008 [0.2032] | .010 [0.2540] |
| B. Resistor Width | .008 [0.2032] | .010 [0.2540] |
| C. Resistor / Terminal Overlap | .003 [0.0762] | .005 [0.1270] |
| D. Terminal Extension (Lengthwise) | .003 [0.0762] | .010 [0.2540] |
| E. Terminal Extension (Widthwise) | .002 [0.0508] | .005 [0.1270] |
| F. Passivation Coverage (Lengthwise) | .003 [0.0762] | .005 [0.1270] |
| G. Passivation Coverage (Widthwise) | .003 [0.0762] | .005 [0.1270] |
| H. Resistor Edge to Nearby Conductor | .010 [0.2540] | .015 [0.3810] |
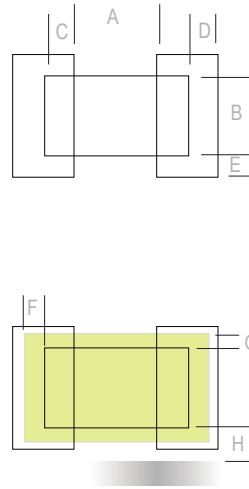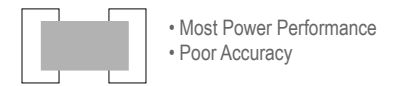
### Resistor Electrical Parameters:

| | |
|---|---|
| $Al_2O_3$ & BeO Value Range: | 0.1Ω to 1GΩ |
| AlN Value Range: | 10Ω to 1KΩ |
| Resistor Tolerance: | To ±1% (Value Dependant) |
| TCR: | 200PPM/°C (Typical) |

### Laser Trim Types:

'L' Cut
• Improved RF Performance

Edge Trim
• Improved Power & RF Performance

### No Trim Option:

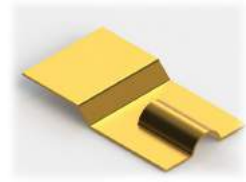• Most Power Performance
• Poor Accuracy

Dimensions in inches [mm]. Tolerance is ± 0.010 [0.254]
unless otherwise stated

## Flange & Leads:

### Flange Metal Properties (Typical):

| Material: | Thermal Conductivity @25°C (W/mK): | Density (g/cm$^3$): | CTE (PPM/° 25-150°C): | Bend Strength (MPa): | Young's Modulus (GPa): |
|---|---|---|---|---|---|
| Copper (Cu) | 398 | 8.96 | 17.8 | 330 | 131 |
| Copper Tungsten (CuW) | 180 - 200 | 15.7 - 17 | 6.5 - 8.3 | 1172 | 367 |

### Flange Guidelines:

| Parameter: | Min.◊ |
|---|---|
| A. Flange Length (Single Screw Hole) | .200 [5.080] |
| B. Flange Width (Single Screw Hole) | .100 [2.540] |
| C. Diameter of Screw Hole | .100 [2.540] |
| D. Length of Lead | .050 [1.270] |
| E. Width of Lead | .020 [0.508] |

### Custom Lead Examples:

◊ Greater Dimensions Available
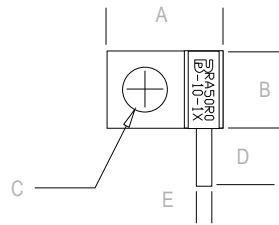
## Customer Defined Testing:
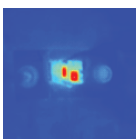
Vector Analyzer to 65GHz

Optical CMM

Thermal Cycle Testing

Pulsed Power Testing
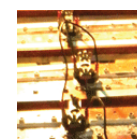
Thermal Imaging

XRF Imaging

High Voltage Testing

Hi-Rel Life Testing

Barry Industries maintains an ISO9001 Certified Quality Management System.