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Your Ceramic Solutions Provider

Resistive Components

- > Terminations, Resistors, Attenuators (High Power)
- > Wi-Max Products
- > Low Capacitance Resistors
- > Precision Chip Resistors (Low Power)
- > Pulsed Power Products
- > Semiconductor Packages - HTCC
(High Temperature Co-Fired Ceramic)
- > LTCC (Low Temperature Co-Fired Ceramic)
- > Machining and Plating

RoHS Compliant



ISO 9001:2000 Certified by



ITAR Registered

Issue 1-2008

Barry Industries, Inc., 60 Walton Street, Attleboro, Massachusetts 02703 U.S.A.
Tel: +1-508-226-3350 Fax: +1-508-226-3317 E-mail: sales@barryind.com

About Us

Founded in 1977, Barry Industries is an internationally renowned supplier to the electronics and communications market. Our focus is to provide our customers with the highest level of product quality available, supported by world class customer service.

Barry Industries is an approved vendor to the leading manufacturers of military, commercial, aerospace, medical and fiber-optics products; the "Who's Who?" in the marketplace. Barry's products are used in telecommunications, space, and healthcare applications of all types.

We offer application assistance on your projects and leading edge technology to support your R&D efforts. With our extensive research and development capabilities, we believe that product development can be achieved in conjunction with your team, bringing the product you desire to reality.

Barry is ISO 9001:2000 Certified. We carry a complete line of RoHS Compliant products. We are also ITAR Registered.

Vertical integration is the key to our quality and success. Total in-house control of the manufacturing process using our own machine shop, lasers, and state-of-the-art electroplating facilities means that we can avoid delays in the product delivery.

We are your partner. We manufacture quality components that you need to make your programs a success.

Barry product offerings include...
High Power Terminations, Resistors, Attenuators and Surface Mount Products; Pulsed Power Devices; Wi-Max Products; Low Capacitance Resistors; Low Power Precision Chips; Semiconductor Packages-HTCC (High Temperature Co-Fired Ceramic); LTCC Products (Low Temperature Co-Fired Ceramic); Machining and Plating Services.

Carefully selected strategic alliances with best-of-breed leaders in manufacturing technology permit us to offer the broadest product line of high-reliability components available in the industry.

Barry's worldwide network ensures that you will always have a Barry representative close at hand to speak with, in your own language and time zone. This is part of our continued commitment to customer service.

We invite you to visit our facility. We know that you will like what we have to show you.



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*This catalog represents some of our most popular devices.
Barry Industries welcomes custom requests and all customer specifications.*

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Warranty Statement

Warranty

Barry Industries, Inc. warrants its products to be free of defects in materials or workmanship for a period of one year from date of shipment.

The Barry Industries, Inc. liability under this warranty is limited to replacing, repairing or issuing credit, at our option, for product which is returned by the purchaser during the warranty period, subject to the following conditions:

Barry Industries, Inc. is contacted for an RMA (Return Material Authorization) number prior to return; the defective material is returned to Barry Industries, Inc. with transportation charges prepaid by the purchaser; and upon examination of return materials by Barry Industries, Inc., it is determined that the defects were not caused by misuse, neglect, improper installation, alteration or handling. No express or implied warranties other than those expressly set forth herein shall apply to products sold by Barry Industries, Inc., and no waiver, alterations or modification of the conditions contained herein shall be valid unless made in writing and signed by an officer of Barry Industries, Inc.

Returns

Product returns are only accepted as described in the warranty to the left. If you find it necessary to return merchandise, please contact the sales department at Barry Industries, Inc. to receive an RMA (Return Material Authorization) number at sales@barryind.com. Please furnish the part number, the details of the return, the invoice number, the purchase order number, and the lot and date code.

Barry Industries reserves the right to change part number and/or process without prior notification.

All power ratings for pages 4 thru 25 of this catalog, refer to Continuous Wave (CW) dissipated power.

Please see page 26-27 for Pulsed Power Options.



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High Power Notes

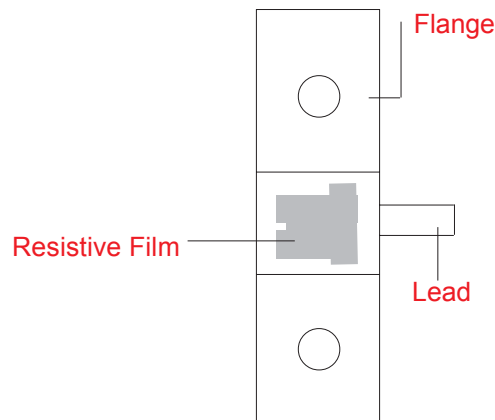
Heat Sink Characteristics: The primary thermal transfer mechanism for these devices is conduction through the mounting flange. The derating curve for each device shows the effect of elevated temperature on power handling capability. It is imperative that the heat sink be designed to maintain the design temperature while accepting the power dissipated by the device.

Circuit Construction: The electrical performance of these resistive products can vary significantly depending upon the parameters of the stripline or microstrip circuitry to which they are connected. Barry Industries has extensive experience in the design of high frequency circuits in many media and can provide assistance if desired.

Mounting Method: The use of a thermal conducting compound or preform between the mounting flange and the heat sink surface is strongly recommended. This greatly decreases the thermal resistance and therefore, the film temperature of the device. Make sure that the devices are mounted on flat surfaces, .001” under the device, to optimize the heat transfer. Drill and tap the heat sink for the appropriate thread size to be used. Position device on mounting surface and secure using socket head screws, flat and split washers. Torque screws to the appropriate value. Make sure that the device is flat against the heat sink.

Care should be taken to avoid upward pressure of the leads. Form leads to allow a small strain relief and solder leads in place using a 60/40 type solder with a temperature controlled soldering iron (210°C). Keep lead length as short as possible for RF applications. Use minimal amounts of flux and remove with solvent.

Film Temperature: As power is dissipated in the resistive film, its temperature increases until thermal equilibrium is reached. Excessive film temperature is the principal cause of device failure. Maintaining the temperature at the bottom of the flange, at or below the rated value, will ensure that the film temperature is maintained at an acceptable value.



Typical Resistive Device

These notes apply to products for CONTINUOUS WAVE applications, pages 4 thru 25 of this catalog. For applications requiring PULSED POWER or CYCLED products, see pages 26-27 of this catalog. It is also recommended that you consult sales@barryind.com with your design requirements so that we may recommend the product best suited for your PULSED POWER or CYCLED application.



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Flanged Terminations - BeO

CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K	Frequency Range	Typical VSWR	Part Number
10 watts	B	.300	.200	.100	.100	.040	.105	.140 max	.062	.116	.370 max	DC-2.0 GHz 2.0-4.0 GHz	1.30:1 1.50:1	T 50R0-10-1X
10 watts	A	.500	.200	.100	.300	.040	.105	.140 max	.062	.116	.370 max	DC-2.0 GHz 2.0-4.0 GHz	1.30:1 1.50:1	T 50R0-10-3X
30 watts	B	.515	.250	.250	.125	.060	.105	.140 max	.062	.130	.370 max	DC-6.0 GHz	1.20:1	T 50R0-30-10X
40 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.20:1	T 50R0-40-1X
60 watts	B	.515	.250	.250	.125	.060	.105	.140 max	.062	.130	.370 max	DC-6.0 GHz	1.20:1	T 50R0-60-3X
100 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz 2.0-2.5 GHz	1.20:1 1.30:1	T 50R0-100-2X
150 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz 2.0-2.5 GHz	1.20:1 1.30:1	T 50R0-150-10X
150 watts	A	.870	.375	.250	.560	.040	.105	.140 max	.062	.160	.370 max	DC-4.0 GHz	1.20:1	T 50R0-150-25X
250 watts	A	.975	.375	.375	.725	.120	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz 2.5-4.0 GHz	1.20:1 1.40:1	T 50R0-250-12X

Flanged Terminations - Aluminum Nitride

CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K	Frequency Range	Typical VSWR	Part Number
30 watts	B	.515	.250	.250	.125	.060	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.15:1	TA 50R0-30-10X
40 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.20:1	TA 50R0-40-1X
60 watts	B	.515	.250	.250	.125	.060	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.15:1	TA 50R0-60-3X
100 watts	B	.560	.375	.250	.155	.040	.105	.140 max	.062	.160	.370 max	DC-2.0 GHz 2.0-3.5 GHz	1.20:1 1.10:1	TA 50R0-100-24X*
100 watts	B	.560	.375	.250	.155	.040	.105	.140 max	.062	.160	.370 max	DC-2.0 GHz 2.0-3.5 GHz	1.20:1 1.10:1	TA 50R0-100-25X**
100 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-4.5 GHz 4.5-6.0 GHz	1.15:1 1.30:1	TA50R0-100-27X
150 watts	A	.800	.230	.350	.560- .600	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.15:1	TA 50R0-150-10X
150 watts	A	.870	.375	.250	.560- .600	.040	.105	.140 max	.062	.160	.370 max	DC-2.0 GHz 2.0-3.5 GHz	1.20:1 1.10:1	TA 50R0-150-25X
250 watts	A	.870	.375	.250	.560- .600	.040	.105	.140 max	.062	.160	.370 max	DC-2.5 GHz	1.25:1	TA 50R0-250-21X
250 watts	A	.975	.375	.375	.725	.120	.105	.140 max	.062	.130	.370 max	DC-3.0 GHz	1.25:1	TA 50R0-250-12X

* Lead comes off the left. ** Lead comes off the right.

General Specifications -

Resistive Element..... Proprietary Thick Film
 Contact Pads Silver
 Substrate BeO, ALN or BeO Free
 Mounting Flange Copper Silver Plated
 Leads Copper (.005" thick) Silver Plated

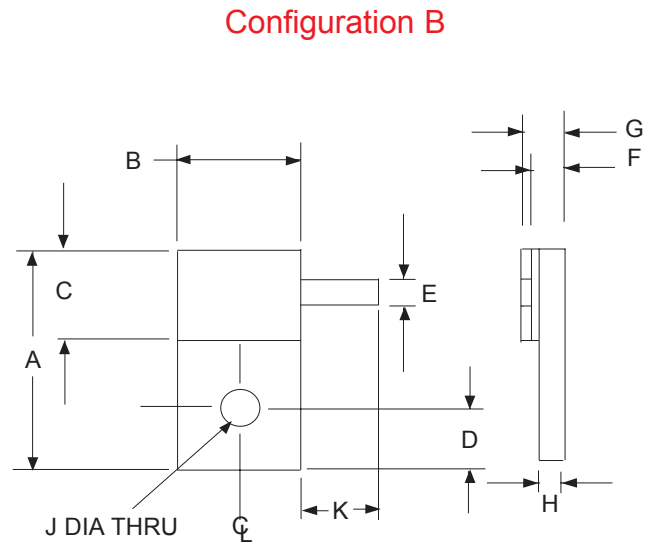
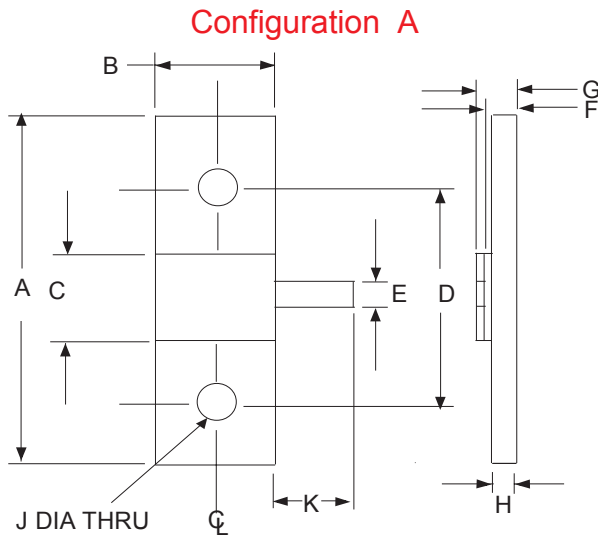


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Flanged Terminations - BeO Free

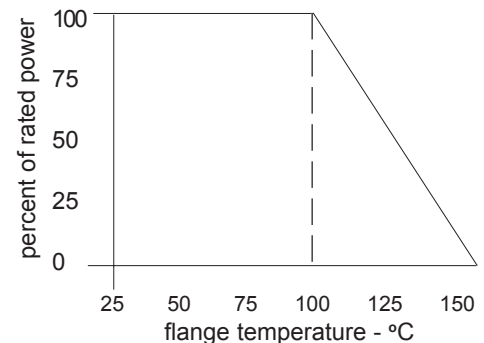
CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K	Frequency Range	Typical VSWR	Part Number
30 watts	B	.515	.250	.250	.125	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.30:1	T 50R0-30-27X
40 watts	B	.515	.250	.250	.125	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.30:1	T 50R0-40-13X
40 watts	A	.800	.230	.350	.560-.600	.040	.090	.125 max	.062	.130	.370 max	DC-2.5 GHz	1.20:1	T 50R0-40-14X
50 watts	B	.515	.250	.250	.125	.040	.090	.125 max	.062	.130	.370 max	DC-2.5 GHz	1.30:1	T 50R0-50-14X
50 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.20:1	T 50R0-50-15X
70 watts	A	.870	.375	.250	.560-.600	.040	.090	.125 max	.062	.160	.370 max	DC-2.75 GHz	1.10:1	T 50R0-70-16X
100 watts	A	.975	.375	.375	.725	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.15:1	T 50R0-100-23X
100 watts	A	.870	.375	.250	.560	.040	.090	.125 max	.062	.160	.370 max	DC-2.0 GHz	1.10:1	T 50R0-100-22X



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Minimum lead length on all devices is .125 inches.
- Individual drawings available upon request.
- *Power ratings over 250 watts available upon request, contact sales@barryind.com.*
- Other configurations available, custom requests welcome.

Derating Curve



For operations outside the derating curve, please consult with one of BARRY's application engineers.



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Leaded Terminations - BeO

CW Power Rating	A	B	C	D	E	Frequency Range	Typical VSWR	Part Number
20 watts	.100	.050	.015	.025	.370 max	DC-18 GHz	1.30:1	A01Z-50R0J96-01A36-Y
20 watts	.120	.060	.025	.040	.370 max	DC-4.0 GHz	1.20:1	B02Z-50R0J98-00C36-Y
30 watts	.200	.100	.040	.040	.370 max	DC-2.0 GHz	1.20:1	D04Z-50R0J99-01C36-X
100 watts	.230	.350	.040	.040	.370 max	DC-3.0 GHz	1.15:1	D05Z-50R0J99-02C36-X
100 watts	.250	.250	.040	.040	.370 max	DC-6.0 GHz	1.20:1	D06Z-50R0J99-00C36-X
150 watts	.375	.250	.040	.040	.370 max	DC-4.0 GHz	1.20:1	D07Z-50R0J99-03C36-X
200 watts	.375	.375	.040	.040	.370 max	DC-2.5 GHz 2.5-4.0 GHz	1.20:1 1.40:1	D08Z-50R0J99-00C36-X

Leaded Terminations - Aluminum Nitride

CW Power Rating	A	B	C	D	E	Frequency Range	Typical VSWR	Part Number
10 watts	.100	.050	.015	.025	.370 max	DC-3.0 GHz	1.15:1	A01Z-50R0J2Q-01A36-Y
20 watts	.120	.060	.025	.040	.370 max	DC-3.0 GHz	1.20:1	B02Z-50R0J2S-00C36-Y
30 watts	.200	.100	.040	.040	.370 max	DC-2.0 GHz	1.15:1	D04Z-50R0J2T-01C36-X
100 watts	.250	.250	.040	.040	.370 max	DC-2.5 GHz	1.15:1	D06Z-50R0J2T-04C36-X
100 watts	.230	.350	.040	.040	.370 max	DC-4.5 GHz 4.5-6.0 GHz	1.15:1 1.30:1	D05Z-50R0J2T-14C36-X
150 watts	.230	.350	.040	.040	.370 max	DC-2.5 GHz	1.15:1	D05Z-50R0J2T-05C36-X
150 watts	.375	.250	.040	.040	.370 max	DC-2.0 GHz 2.0-3.5 GHz	1.20:1 1.10:1	D07Z-50R0J2T-01C36-X
250 watts	.375	.250	.040	.040	.370 max	DC-2.5 GHz	1.25:1	D07Z-50R0J2T-09C36-X
250 watts	.370	.370	.040	.040	.370 max	DC-3.0 GHz	1.25:1	D08Z-50R0J2T-04C36-X

General Specifications -

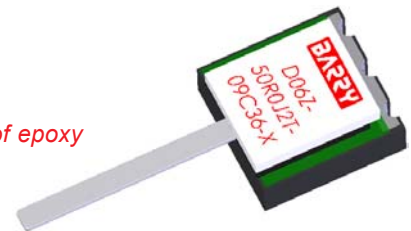
Resistive Element..... Proprietary Thick Film

Contact Pads Silver

Substrate BeO, ALN or BeO Free

Leads Copper (.005" thick) Silver Plated

Y at the end of part # Indicates part does not take a cover, but may include a dab of epoxy

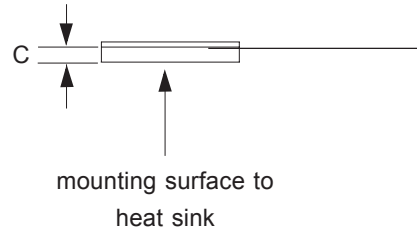
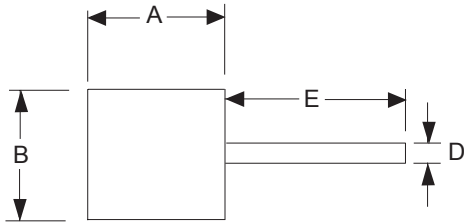


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Leaded Terminations - BeO Free

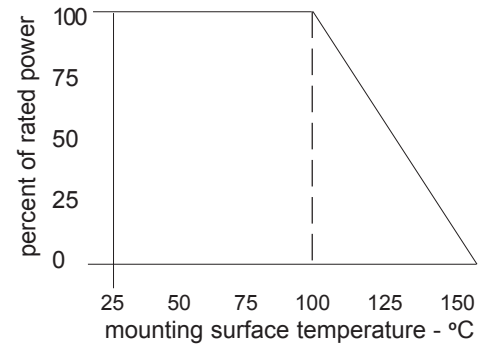
CW Power Rating	A	B	C	D	E	Frequency Range	Typical VSWR	Part Number
30 watts	.250	.250	.025	.040	.370 max	DC-2.5 GHz	1.30:1	D06Z-50R0J83-02C36-X
40 watts	.230	.350	.025	.040	.370 max	DC-2.5 GHz	1.20:1	D05Z-50R0J83-03C36-X
50 watts	.230	.350	.025	.040	.370 max	DC-2.0 GHz	1.20:1	D05Z-50R0J83-07C36-X
60 watts	.250	.250	.025	.040	.370 max	DC-5.0 GHz	1.20:1	D06Z-50R0J83-03C36-X
100 watts	.370	.370	.025	.040	.370 max	DC-2.0 GHz	1.20:1	D08Z-50R0J83-03C36-X



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Minimum lead length on all devices is .125 inches.
- Individual drawings available upon request.
- *Outline depicts a covered device, castellations where used are not shown.*
- *Power ratings over 250 watts available upon request, contact sales@barryind.com.*
- Other configurations available, custom requests welcome.

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For operations outside the derating curve, please consult with one of BARRY's application engineers.



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Power Chip Terminations - BeO

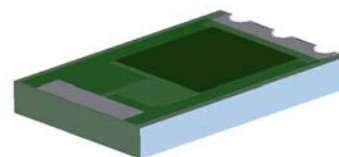
CW Power Rating	A	B	C	Frequency Range	Typical VSWR	Part Number
20 watts	.100	.050	.015	DC-18 GHz	1.30:1	TV1005CT-50R0JN-96-01
20 watts	.120	.060	.025	DC-4.0 GHz	1.20:1	TVC1206CT-50R0JN-98
30 watts	.200	.100	.040	DC-2.0 GHz	1.20:1	TVC2010CT-50R0JN-99-01
100 watts	.230	.350	.040	DC-3.0 GHz	1.20:1	TVC2335CT-50R0JN-99-02
100 watts	.250	.250	.040	DC-6.0 GHz	1.20:1	TVC2525CT-50R0JN-99
150 watts	.375	.250	.040	DC-4.0 GHz	1.20:1	TVC3725CT-50R0JN-99-03
200 watts	.375	.375	.040	DC-2.5 GHz 2.5-4.0 GHz	1.20:1 1.40:1	TVC3737CT-50R0JN-99

Power Chip Terminations - Aluminum Nitride

CW Power Rating	A	B	C	Frequency Range	Typical VSWR	Part Number
10 watts	.100	.050	.015	DC-3.0 GHz	1.10:1	TV1005CT-50R0JN-2Q-01
20 watts	.120	.060	.025	DC-3.0 GHz	1.20:1	TVC1206CT-50R0JN-2S
30 watts	.200	.100	.040	DC-2.0 GHz	1.15:1	TVC2010CT-50R0JN-2T-01
100 watts	.250	.250	.040	DC-2.5 GHz	1.15:1	TVC2525CT-50R0JN-2T-04
150 watts	.230	.350	.040	DC-2.5 GHz	1.15:1	TVC2335CT-50R0JN-2T-05
150 watts	.375	.250	.040	DC-2.0 GHz 2.0-3.5 GHz	1.20:1 1.10:1	TVC3725CT-50R0JN-2T-01
250 watts	.375	.250	.040	DC-2.5 GHz	1.25:1	TVC3725CT-50R0JN-2T-09
250 watts	.375	.375	.040	DC-3.0 GHz	1.25:1	TVC3737CT-50R0JN-2T-04

General Specifications -

Resistive Element.....Proprietary Thick Film
 Contact PadsSilver
 CT =Solderable Finish, Matte Tin over Nickel over Silver
 SubstrateBeO, ALN or BeO Free

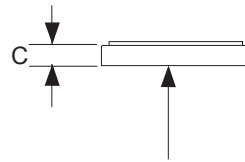
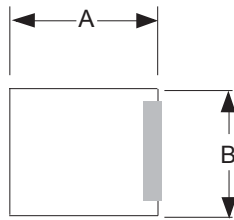


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Power Chip Terminations - BeO Free

CW Power Rating	A	B	C	Frequency Range	Typical VSWR	Part Number
5 watts	.060	.050	.025	DC-4.0 GHz	1.20:1	TV0605CT-XXXXJN-83
5 watts	.100	.050	.025	DC-4.0 GHz	1.20:1	TV1005CT-XXXXJN-83
5 watts	.120	.060	.025	DC-4.0 GHz	1.20:1	TVC1206CT-XXXXJN-83
10 watts	.190	.075	.025	DC-3.0 GHz	1.25:1	TVC1907CT-XXXXJN-83
12 watts	.190	.075	.025	DC-2.0 GHz	1.20:1	TVC1907CT-XXXXJN-83-01
20 watts	.180	.120	.025	DC-2.0 GHz	1.30:1	TVC1812CT-XXXXJN-83
30 watts	.250	.250	.025	DC-2.5 GHz	1.15:1	TVC2525CT-XXXXJN-83-02
40 watts	.230	.350	.025	DC-2.5 GHz	1.20:1	TVC2335CT-XXXXJN-83-03
50 watts	.250	.250	.025	DC-5.0 GHz	1.20:1	TVC2525CT-XXXXJN-83-03
50 watts	.230	.350	.025	DC-2.0 GHz	1.20:1	TVC2335CT-XXXXJN-83-07
70 watts	.350	.180	.025	DC-1.0 GHz	1.20:1	TVC1835CT-XXXXJN-83
100 watts	.370	.370	.025	DC-2.0 GHz	1.20:1	TVC3737CT-XXXXJN-83-03

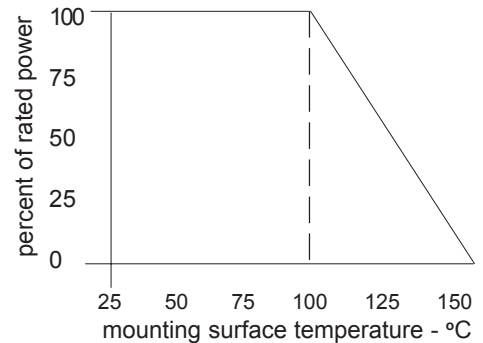


mounting surface to heat sink

General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Individual drawings available upon request.
- *Outline depicts a basic chip, castellations where used are not shown.*
- *Power ratings over 250 watts available upon request, contact sales@barryind.com.*
- Other configurations available, custom requests welcome.

Derating Curve



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Low Capacitance Flanged Resistors - BeO

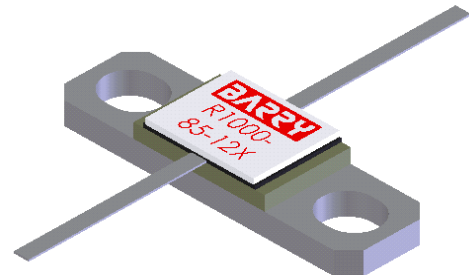
CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K Typical	Capacitance at 1 MHz	Part Number
20 watts	B	.300	.200	.100	.100	.040	.105	.140 max	.062	.116	.375	.70 pF	R 1000-20-10X
50 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.42 pF	R 1000-50-12X
85 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.42 pF	R 1000-85-12X
100 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.73 pF	R 1000-100-10X
150 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.73 pF	R 1000-150-10X
200 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	2.15 pF	R 1000-200-7X

Low Capacitance Flanged Resistors - Aluminum Nitride

CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K Typical	Capacitance at 1 MHz	Part Number
20 watts	B	.300	.200	.100	.100	.040	.105	.140 max	.062	.116	.375	.73 pF	RA 1000-20-8X
50 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.37 pF	RA 1000-50-10X
50 watts	A	.800	.230	.350	.560-.600	.040	.125	.170 max	.062	.130	.370	1.10 pF	RA 1000-50-11X
50 watts	B	.575	.230	.350	.100-.120	.040	.105	.140 max	.062	.130	.370	1.37 pF	RA 1000-50-13X
50 watts	B	.575	.230	.350	.100-.120	.040	.125	.170 max	.062	.130	.370	1.37 pF	RA 1000-50-14X
100 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370	1.73 pF	RA 1000-100-8X
100 watts	A	.800	.230	.350	.560-.600	.040	.125	.170 max	.062	.130	.370	1.58 pF	RA 1000-100-9X

General Specifications -

- Resistive Element..... Proprietary Thick Film
- Contact Pads Silver
- Substrate BeO or ALN
- Mounting Flange Copper Silver Plated
- Leads Copper (.005" thick) Silver Plated

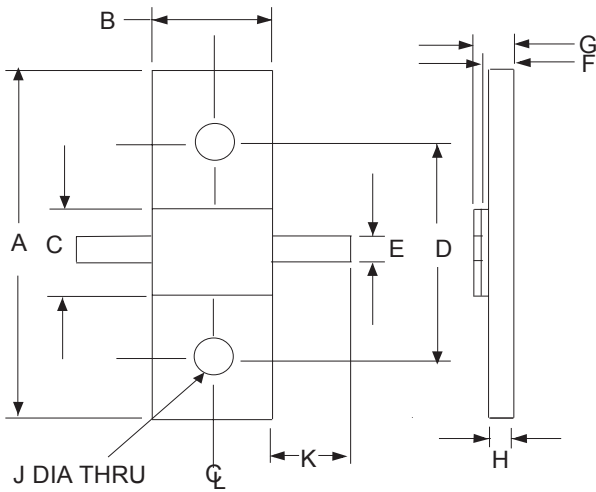


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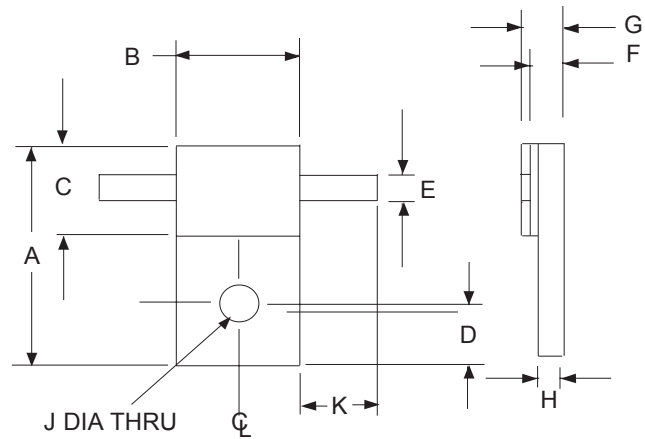


Low Capacitance Flanged Resistor Notes:

Configuration A



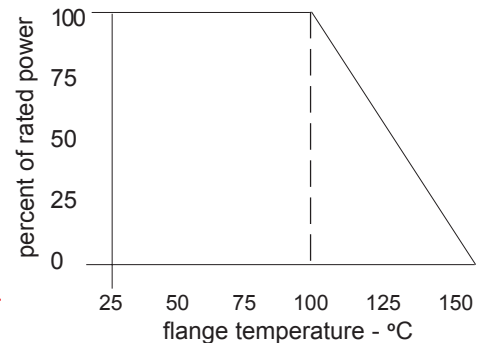
Configuration B



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Minimum lead length on all devices is .125 inches.
- Individual drawings available upon request.
- *Power ratings over 200 watts available upon request, contact sales@barryind.com.*
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Derating Curve



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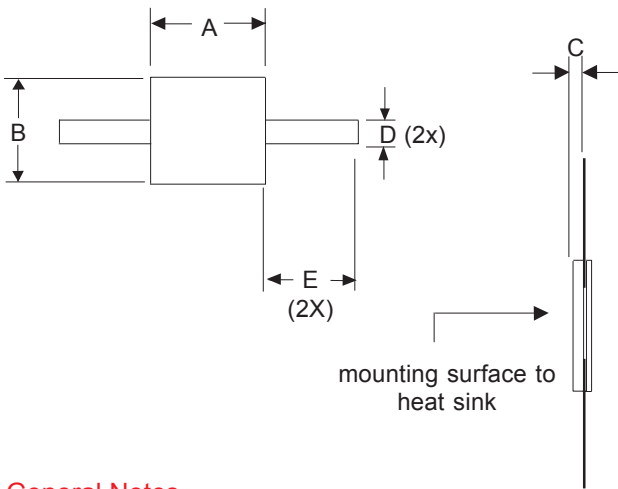


Low Capacitance Leaded Resistors - BeO

CW Power Rating	A	B	C	D	E	Capacitance at 1 MHz	Part Number
20 watts	.200	.100	.040	.040	.375 max	.70 pF	K04Z-1000G99-02C36-X
50 - 85 watts	.230	.350	.040	.040	.370 max	1.42 pF	K05Z-1000G99-05C36-X
100 - 150 watts	.230	.350	.040	.040	.370 max	1.73 pF	K05Z-1000G99-01C36-X
200 watts	.230	.350	.040	.040	.370 max	2.15 pF	K05Z-1000G99-06C36-X

Low Capacitance Leaded Resistors - Aluminum Nitride

CW Power Rating	A	B	C	D	E	Capacitance at 1 MHz	Part Number
20 watts	.200	.100	.040	.040	.375 max	.73 pF	K04Z-1000G2T-02C36-X
50 watts	.230	.350	.040	.040	.370 max	1.37 pF	K05Z-1000G2T-05C36-X
50 watts	.230	.350	.060	.040	.370 max	1.10 pF	K05Z-1000G2U-02C36-X
100 watts	.230	.350	.040	.040	.370 max	1.73 pF	K05Z-1000G2T-01C36-X
100 watts	.230	.350	.060	.040	.370 max	1.58 pF	K05Z-1000G2U-03C36-X



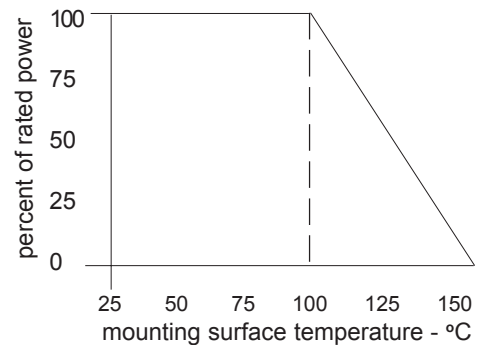
General Specifications -

- Resistive Element..... Proprietary Thick Film
- Contact Pads Silver
- Substrate BeO or ALN
- Leads Copper (.005" thick) Silver Plated

General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Minimum lead length on all devices is .125 inches.
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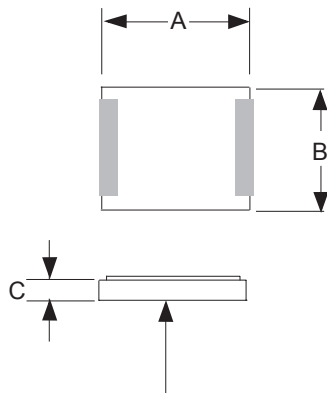


Low Capacitance Chip Resistor - BeO

CW Power Rating	A	B	C	Capacitance at 1 MHz	Part Number
20 watts	.200	.100	.040	.70 pF	RM2010CT-1000GN-99-02
50-85 watts	.230	.350	.040	1.42 pF	RM2335CT-1000GN-99-05
100-150 watts	.230	.350	.040	1.73 pF	RM2335CT-1000GN-99-01
200 watts	.230	.350	.040	2.15 pF	RM2335CT-1000GN-99-06

Low Capacitance Chip Resistor - Aluminum Nitride

CW Power Rating	A	B	C	Capacitance at 1 MHz	Part Number
20 watts	.200	.100	.040	.73 pF	RM2010CT-1000GN-2T-02
50 watts	.230	.350	.040	1.37 pF	RM2335CT-1000GN-2T-05
50 watts	.230	.350	.060	1.10 pF	RM2335CT-1000-GN-2U-02
100 watts	.230	.350	.040	1.73 pF	RM2335CT-1000GN-2T-01
100 watts	.230	.350	.060	1.58 pF	RM2335CT-1000GN-2U-03



mounting surface to heat sink

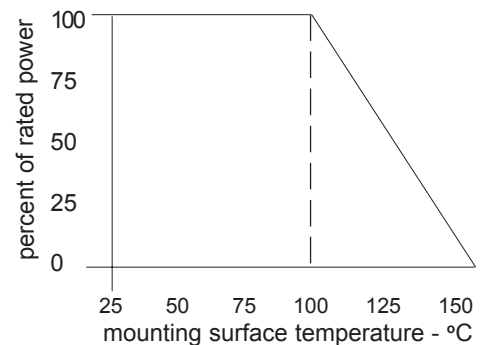
General Specifications -

Resistive Element	Proprietary Thick Film
Contact Pads	Silver
CT =	Solderable Finish, Matte Tin over Nickel over Silver
Substrate	BeO or ALN

General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- Resistance Range: 0.5 to 20,000 ohms. Standard values: 50 & 100 ohms.
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Individual drawings available upon request.
- *Outline depicts a basic chip, castellations where used are not shown.*
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Flanged Attenuators - BeO

CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	B	.300	.200	.100	.100	.040	.105	.140 max	.062	.116	.370 max	DC-4.0 GHz	1.35:1	A XXXX-10-6X	1 - 30 dB
** 20 watts	B	.515	.250	.250	.125	.048	.105	.140 max	.062	.116	.370 max	DC-2.0 GHz	1.25:1	A XXXX-20-3X	1 - 20 dB
** 40 watts	B	.515	.250	.250	.125	.048	.105	.140 max	.062	.116	.370 max	DC-2.0 GHz	1.25:1	A XXXX-40-3X	1 - 20 dB
40 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.25:1	A XXXX-40-1X	1 - 30 dB
100 watts	A	.975	.375	.375	.725	.040	.167	.210 max	.125	.130	.370 max	DC-2.0 GHz	1.25:1	A XXXX-100-2X	1 - 30 dB
150 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.5 GHz	1.25:1	A XXXX-150-1X	20 - 30 dB
250 watts	A	.870	.375	.250	.560	.060	.105	.150 max	.062	.161	.370 max	DC-2.0 GHz	1.25:1	A 3000-250-4X	30 dB

* Representative only, varies by frequency range and dB value.

** Leads are off center.

Flanged Attenuators - Aluminum Nitride

CW Power Rating	CFG	A	B	C	D	E	F	G	H	J	K	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	B	.300	.200	.100	.100	.040	.105	.140 max	.062	.116	.370 max	DC-3.0 GHz	1.30:1	AA XXXX-10-3X	1 - 30 dB
20 watts	B	.515	.250	.250	.125	.048	.105	.140 max	.062	.116	.370 max	DC-3.0 GHz	1.20:1	AA XXXX-20-3X	1 - 30 dB
40 watts	B	.515	.250	.250	.125	.048	.105	.140 max	.062	.116	.370 max	DC-2.0 GHz	1.25:1	AA XXXX-40-3X	1 - 5 dB, 11-30 dB
100 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.20:1	AA XXXX-100-9X	1 - 10 dB
100 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.20:1	AA XXXX-100-8X	11 - 30 dB
150 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.20:1	AA XXXX-150-1X	1-3, 15 & 20 dB
150 watts	A	.800	.230	.350	.560-.600	.040	.105	.140 max	.062	.130	.370 max	DC-3.0 GHz	1.20:1	AA 3000-150-5X	30 dB
250 watts	A	.975	.375	.375	.725	.040	.105	.140 max	.062	.130	.370 max	DC-2.0 GHz	1.30:1	AA 3000-250-6X	30 dB

* Representative only, varies by frequency range and dB value.

PLEASE CONTACT FACTORY AS SOME ALN ATTENUATORS ARE UNDER REDESIGN.

General Specifications -

- Resistive Element..... Proprietary Thick Film
- Contact Pads Silver
- Substrate BeO or ALN
- Mounting Flange Copper Silver Plated
- Leads Copper (.005" thick) Silver Plated

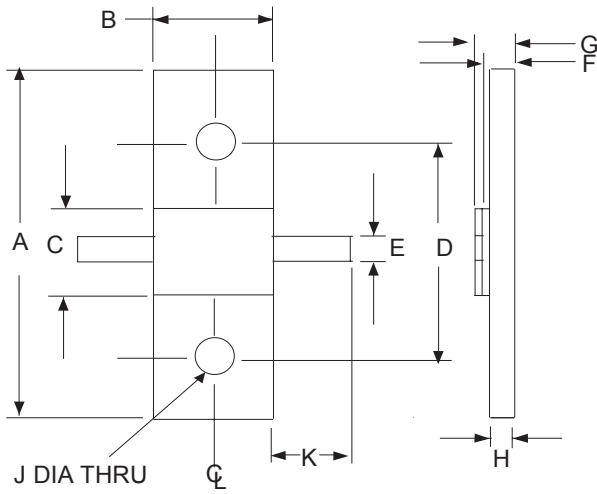


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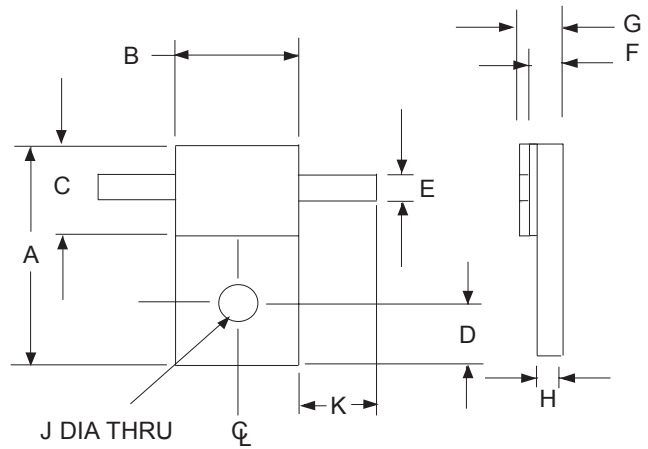


Flanged Attenuator Configurations:

Configuration A



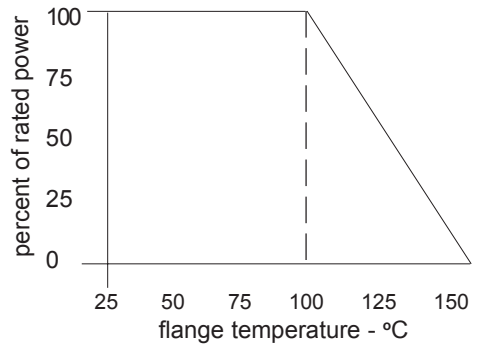
Configuration B



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- XXXX = Value in decibels (2000=20dB; 3000=30dB; 0300=3dB)
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Minimum lead length on all devices is .125 inches.
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Leaded Attenuators - BeO

CW Power Rating	CFG	A	B	C	D	E	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	A	.200	.100	.025	.040	.370 max	DC-4.0 GHz	1.35:1	H04Z-XXXXJ98-XX***C36-X	1 - 30 dB
**20-40 watts	B	.250	.250	.048	.040	.370 max	DC-2.0 GHz	1.25:1	H06Z-XXXXJ99-00C36-X	1 - 20 dB
40 watts	A	.230	.350	.040	.040	.370 max	DC-2.5 GHz	1.25:1	H05Z-XXXXJ99-00C36-X	1 - 30 dB
100 watts	A	.375	.375	.040	.040	.370 max	DC-2.0 GHz	1.25:1	H08Z-XXXXJ99-00C36-X	1 - 30 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-2.5 GHz	1.25:1	H05Z-XXXXJ99-00C36-X	20 - 30 dB
250 watts	A	.375	.250	.060	.040	.370 max	DC-2.0 GHz	1.25:1	H07Z-3000J99-13C36-X	30 dB

* Representative only, varies by frequency range and dB value.

** Leads are off center.

*** XX = Design number assigned by Engineering.

Leaded Attenuators - Aluminum Nitride

CW Power Rating	CFG	A	B	C	D	E	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	A	.200	.100	.040	.040	.370 max	DC-3.0 GHz	1.30:1	H04Z-XXXXJ2T-00C36-X	1-30 dB
20 watts	A	.250	.250	.040	.040	.370max	DC-3.0 GHz	1.20:1	H06Z-XXXXJ2T-XX***C36-X	1-30 dB
40 watts	A	.250	.250	.040	.040	.370 max	DC-2.0 GHz	1.25:1	H06Z-XXXXJ2T-XX***C36-X	1- 5 dB, 11-30 dB
100 watts	A	.230	.350	.040	.040	.370 max	DC-2.0 GHz	1.20:1	H05Z-XXXXJ2T-23C36-X	1-10 dB
100 watts	A	.230	.350	.040	.040	.370 max	DC-2.0 GHz	1.20:1	H05Z-XXXXJ2T-04C36-X	11-30 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-2.0 GHz	1.20:1	H05Z-XXXXJ2T-04C36-X	1-3 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-2.0 GHz	1.20:1	H05Z-1500J2T-10C36-X	15 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-2.0 GHz	1.20:1	H05Z-2000J2T-03C36-X	20 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-2.5 GHz	1.20:1	H05Z-3000J2T-09C36-X	30 dB
150 watts	A	.230	.350	.040	.040	.370 max	DC-3.0 GHz	1.20:1	H05Z-3000J2T-17C36-X	30 dB
250 watts	A	.375	.375	.040	.040	.370 max	DC-2.0 GHz	1.30:1	H08Z-3000J2T-02C36-X	30 dB

* Representative only, varies by frequency range and dB value.

*** XX = Design number assigned by Engineering.

General Specifications -

Resistive Element..... Proprietary Thick Film
 Contact Pads Silver
 Substrate BeO or ALN
 Leads Copper (.005" thick) Silver Plated

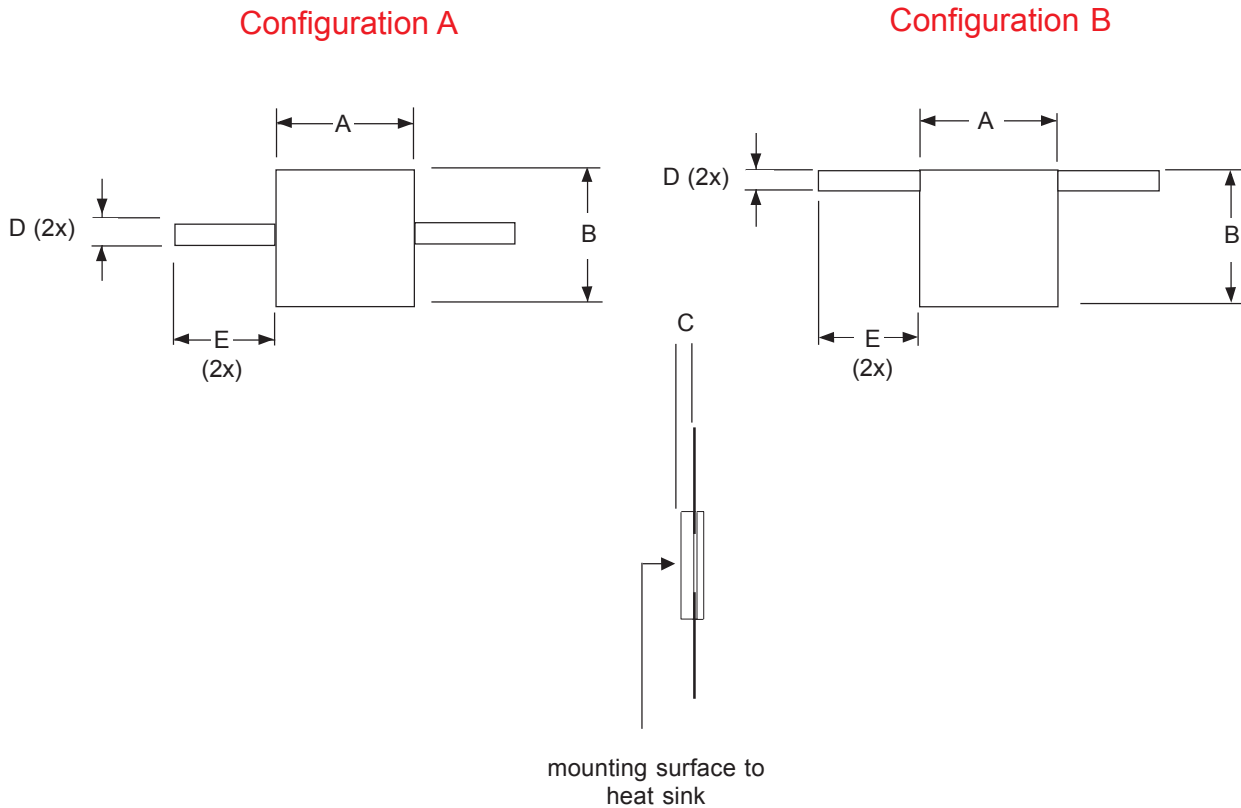
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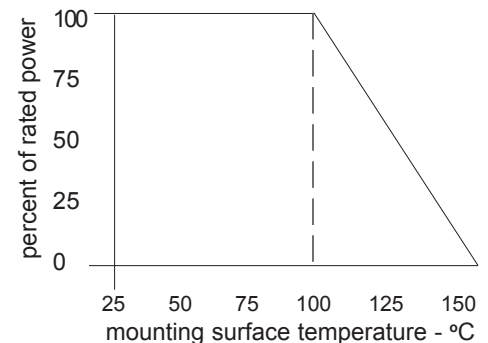
Leaded Attenuator Configurations:



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
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- XXXX = Value in decibels (2000=20dB; 3000=30dB; 0300=3dB)
- Mechanical Tolerance: +/- .010, unless otherwise specified.
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Chip Attenuators - BeO

CW Power Rating	CFG	A	B	C	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	A	.200	.100	.025	DC-4.0 GHz	1.35:1	ABC2010CT - XXXX JN - 98-XX***	1 - 30 dB
**20-40 watts	B	.250	.250	.048	DC-2.0 GHz	1.25:1	AVC2525CT - XXXX JN - 99	1 - 20 dB
40 watts	A	.230	.350	.040	DC-2.5 GHz	1.25:1	ABC2335CT - XXXX JN - 99	1 - 30 dB
100 watts	A	.375	.375	.040	DC-2.0 GHz	1.25:1	ABC3737CT - XXXX JN - 99	1 - 30 dB
150 watts	A	.230	.350	.040	DC-2.5 GHz	1.25:1	ABC2335CT - XXXX JN - 99	20 - 30 dB
250 watts	A	.375	.250	.040	DC-2.0 GHz	1.25:1	AVC3725CT - 3000 JN - 99-13	30 dB

* Representative only, varies by frequency range and dB value.

** Leads are off center.

*** XX = Design number assigned by Engineering.

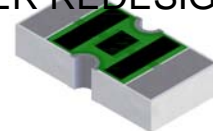
Chip Attenuators - Aluminum Nitride

CW Power Rating	CFG	A	B	C	*Frequency Range	*Typical VSWR	Part Number	Values
10 watts	A	.200	.100	.040	DC-3.0 GHz	1.30:1	ABC2010CT - XXXXJN - 2T	1-30 dB
20 watts	A	.250	.250	.040	DC-3.0 GHz	1.20:1	AVC2525CT - XXXXJN -2T-XX***	1-30 dB
40 watts	A	.250	.250	.040	DC-2.0 GHz	1.25:1	AVC2525CT - XXXXJN -2T-XX***	1-5 dB, 11-30 dB
100 watts	A	.230	.350	.040	DC-2.0 GHz	1.20:1	AVC2335CT - XXXXJN - 2T-23	1-10 dB
100 watts	A	.230	.350	.040	DC-2.0 GHz	1.20:1	AVC2335CT - XXXXJN - 2T-04	11-30 dB
150 watts	A	.230	.350	.040	DC-2.0 GHz	1.20:1	AVC2335CT - XXXXJN - 2T-04	1-3 dB
150 watts	A	.230	.350	.040	DC-2.0 GHz	1.20:1	AVC2335CT - 1500JN - 2T-10	15 dB
150 watts	A	.230	.350	.040	DC-2.0 GHz	1.20:1	AVC2335CT - 2000JN - 2T-03	20 dB
150 watts	A	.230	.350	.040	DC-2.5 GHz	1.20:1	AVC2335CT - 3000JN - 2T-09	30 dB
150 watts	A	.230	.350	.040	DC-3.0 GHz	1.20:1	AVC2335CT - 3000JN - 2T-17	30 dB
250 watts	A	.375	.375	.040	DC-2.0 GHz	1.30:1	AVC3737CT - 3000JN - 2T-02	30 dB

* Representative only, varies by frequency range and dB value.

*** XX = Design number assigned by Engineering.

PLEASE CONTACT FACTORY ON ALN ATTENUATORS AS SOME ARE UNDER REDESIGN.



General Specifications -

Resistive Element..... Proprietary Thick Film

Contact Pads Silver

CT = Solderable Finish, Matte Tin over Nickel over Silver

Substrate BeO or ALN

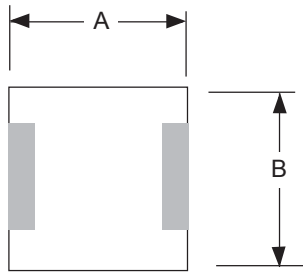


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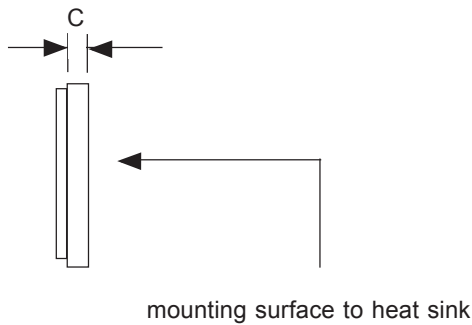
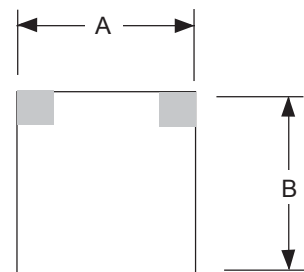


Attenuator Chip Configurations:

Configuration A



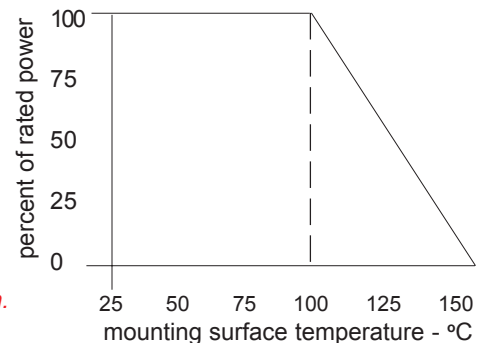
Configuration B



General Notes -

- All power ratings assume an operating base plate temperature of 100°C
- All dimension are in inches.
- Resistance Tolerance: standard is +/- 5%; +/-2% available.
- XXXX = Value in decibels (2000=20 dB; 3000=30 dB; 0300=3 dB)
- Mechanical Tolerance: +/- .010, unless otherwise specified.
- Individual drawings available upon request.
- *Outline depicts a basic chip, castellations where used are not shown.*
- *Power ratings over 250 watts available upon request, contact sales@barryind.com.*
- Other configurations available, custom requests welcome.

Derating Curve



For operations outside the derating curve, please consult with one of BARRY's application engineers.



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Power Surface Mount Resistors and Terminations

- BeO

CW Power Rating	CFG	A	B	C	D	E	F	G	H	Part Number
5 watts	RY	.080	.050	.048	.013	.020	.014	.025	_	RY0805CT- XXXX JN-98
5 watts	RZ	.080	.050	.048	.013	.020	.047	.025	_	RZ0805CT- XXXX JN-98
5 watts	RE	.080	.050	.048	.030	.020	_	.025	_	RE0805CT- XXXX JN-98
8 watts	RY	.100	.050	.046	.015	.025	.020	.025	_	RY1005CT- XXXX JN-98
8 watts	RZ	.100	.050	.046	.015	.025	.060	.025	_	RZ1005CT- XXXX JN-98
8 watts	RE	.100	.050	.046	.0375	.025	_	.025	_	RE1005CT- XXXX JN-98
12 watts	RYC	.120	.062	.060	.018	.025	.034	.025	_	RYC1206CT- XXXX JN-98
12 watts	RZC	.120	.062	.060	.018	.025	.077	.025	_	RZC1206CT- XXXX JN-98
12 watts	REC	.120	.062	.060	.0475	.025	_	.025	_	REC1206CT- XXXX JN-98
20 watts	RYC	.206	.100	.090	.035	.030	.070	.040	_	RYC2010CT- XXXX JN-99
20 watts	REC	.206	.100	.090	.085	.030	_	.040	_	REC2010CT- XXXX JN-99
30 watts	RZC	.206	.100	.090	.020	.035	.151	.040	_	RZC2010CT- XXXX JN-99
40 watts	TZC	.250	.250	.240	.030	.040	.180	.040	.120	TZC2525CT- XXXX JN-99
50 watts	TZC	.375	.250	.240	.050	.050	.275	.040	.135	TZC3725CT- XXXX JN-99

Power Surface Mount Resistors and Terminations

- Aluminum Nitride

CW Power Rating	CFG	A	B	C	D	E	F	G	H	Part Number
5 watts	RY	.080	.050	.048	.013	.020	.014	.025	_	RY0805CT- XXXX JN-2S
5 watts	RZ	.080	.050	.048	.013	.020	.047	.025	_	RZ0805CT- XXXX JN-2S
5 watts	RE	.080	.050	.048	.030	.020	_	.025	_	RE0805CT- XXXX JN-2S
8 watts	RY	.100	.050	.046	.015	.025	.020	.025	_	RY1005CT- XXXX JN-2S
8 watts	RZ	.100	.050	.046	.015	.025	.060	.025	_	RZ1005CT- XXXX JN-2S
8 watts	RE	.100	.050	.046	.0375	.025	_	.025	_	RE1005CT- XXXX JN-2S
10 watts	RYC	.120	.062	.060	.018	.025	.034	.025	_	RYC1206CT- XXXX JN-2S
10 watts	RZC	.120	.062	.060	.018	.025	.077	.025	_	RZC1206CT- XXXX JN-2S
10 watts	REC	.120	.062	.060	.0475	.025	_	.025	_	REC1206CT- XXXX JN-2S
20 watts	RYC	.206	.100	.090	.035	.030	.070	.040	_	RYC2010CT- XXXX JN-2T
20 watts	RZC	.206	.100	.090	.020	.035	.151	.040	_	RZC2010CT- XXXX JN-2T
20 watts	REC	.206	.100	.090	.085	.030	_	.040	_	REC2010CT- XXXX JN-2T
40 watts	TZC	.250	.250	.240	.030	.040	.180	.040	.120	TZC2525CT- XXXX JN-2T-02
150 watts	TZC	.375	.250	.240	.050	.050	.275	.040	.135	TZC3725CT- XXXX JN-2T-01





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Power Surface Mount Resistors and Terminations

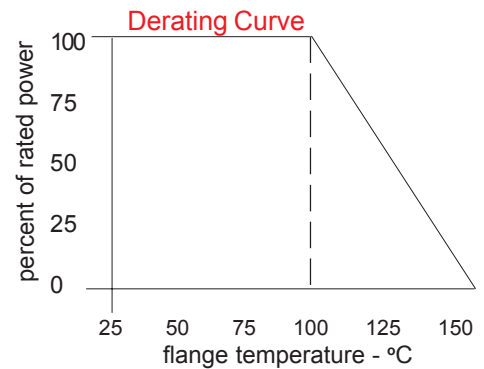
- BeO Free

CW Power Rating	CFG	A	B	C	D	E	F	G	H	Part Number
1 watt	RY	.080	.050	.048	.013	.020	.014	.025	_	RY0805CT- XXXX JN-83
1 watt	RZ	.080	.050	.048	.013	.020	.047	.025	_	RZ0805CT- XXXX JN-83
1 watt	RE	.080	.050	.048	.030	.020	_	.025	_	RE0805CT- XXXX JN-83
5 watts	RYC	.120	.062	.060	.018	.025	.034	.025	_	RYC1206CT- XXXX JN-83
5 watts	RZC	.120	.062	.060	.018	.025	.077	.025	_	RZC1206CT- XXXX JN-83
5 watts	REC	.120	.062	.060	.048	.025	_	.025	_	REC1206CT- XXXX JN-83
10 watts	RYC	.206	.100	.090	.035	.030	.070	.040	_	RYC2010CT- XXXX JN-83
10 watts	RZC	.206	.100	.090	.020	.035	.151	.040	_	RZC2010CT- XXXX JN-83
10 watts	REC	.206	.100	.090	.085	.030	_	.040	_	REC2010CT- XXXX JN-83
25 watts	TZC	.250	.250	.240	.030	.040	.180	.025	.120	TZC2525CT- XXXX JN-83-01
40 watts	RYC	.250	.250	.240	.035	.040	.090	.025	.070	RYC2525CT- XXXX JN-83

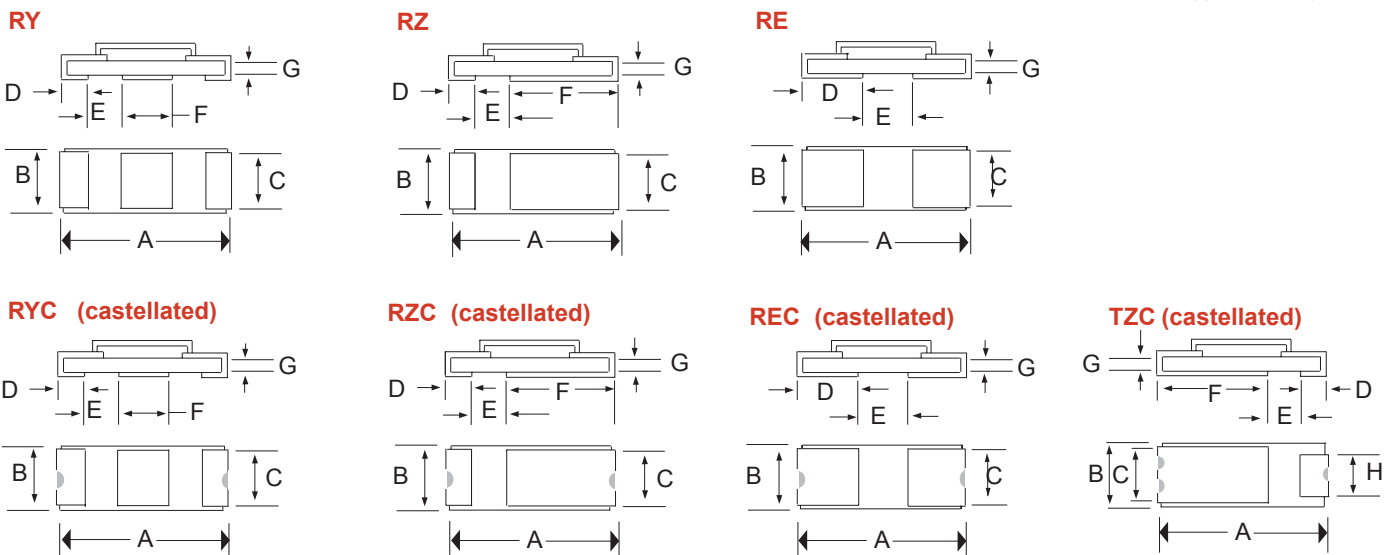
50 ohm and 100 ohm are standard values; other values and substrate thicknesses available.
 XXXX = Values in ohms (50R0 = 50 ohms; 1000 = 100 ohms)
 Available in bulk, waffle pack  or tape and reel. 

General Notes

- Power rating assumes that the PC board thermal resistance is such that mounting surface is maintained at or below the temperature indicated in the derating curve, while dissipating the rated (CW) power.
- Circuit land areas should be designed in accordance with IPC-SM-782.
- Solder joint design should assure a maximum solder thickness of .002" and voids not to exceed 30%.



For operations outside the derating curve, please consult with one of BARRY's application engineers.



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WiMax Applications 3.4 - 3.6 GHz

Attenuators:

CW Power Rating	Device	CFG.	Typical VSWR 3.4-3.6 GHz	Value	Substrate	Part Number
5 watts	Attenuator	Chip	1.35:1	1 dB	BeO Free	ABC2010CT-0100JN-84-03
5 watts	Attenuator	Chip	1.25:1	1 dB	BeO Free	ABC2010CT-0200JN-84
5 watts	Attenuator	Chip	1.15:1	10 dB	BeO Free	ABC2010CT-1000JN-84-03
5 watts	Attenuator	Chip	1.10:1	10 dB	Alumina	ATC2010CT-1000JN-93
5 watts	Attenuator	Chip	1.30:1	2 dB	BeO Free	ABC2010CT-0200JN-84-03
5 watts	Attenuator	Chip	1.05:1	20 dB	BeO Free	ABC2010CT-2000JN-84-03
5 watts	Attenuator	Chip	1.05:1	20 dB	Alumina	ATC2010CT-2000JN-93
5 watts	Attenuator	Chip	1.10:1	21 dB	Alumina	ABC2010CT-2100JN-93-05
5 watts	Attenuator	Chip	1.20:1	25 dB	Alumina	ABC2010CT-2500JN-93-05
5 watts	Attenuator	Chip	1.10:1	3 dB	BeO Free	ABC2010CT-0300JN-84-03
10 watts	Attenuator	Chip	1.35:1	20 dB	Aluminum Nitride	ABC2010CT-2000GN-2T
10 watts	Attenuator	Chip	1.22:1	3 dB	Aluminum Nitride	ABC2010CT-0300JN-2T
10 watts	Attenuator	Chip	1.15:1	6 dB	Aluminum Nitride	ABC2010CT-0600JN-2T
10 watts	Attenuator	Flanged	1.40:1	10 dB	Aluminum Nitride	AA1000-10-3X
40 watts	Attenuator	Chip	1.35:1	10 dB	Aluminum Nitride	AVC2525CT-1000GN-2T-03
40 watts	Attenuator	Leaded	1.50:1	1 dB	BeO	H06Z-0100J99-00C36-X
40 watts	Attenuator	Leaded	1.45:1	2 dB	BeO	H06Z-0200J99-00C36-X
40 watts	Attenuator	Leaded	1.45:1	3 dB	BeO	H06Z-0300J99-00C36-X
40 watts	Attenuator	Leaded	1.30:1	4 dB	BeO	H06Z-0400J99-00C36-X
40 watts	Attenuator	Leaded	1.30:1	5 dB	BeO	H06Z-0500J99-00C36-X
40 watts	Attenuator	Leaded	1.25:1	6 dB	BeO	H06Z-0600J99-00C36-X
40 watts	Attenuator	Leaded	1.20:1	10 dB	BeO	H06Z-1000J99-00C36-X
100 watts	Attenuator	Flanged	1.30:1	10 dB	BeO	A1000-100-10Y
100 watts	Attenuator	Flanged	1.45:1	3 dB	BeO	A0300-100-10Y
100 watts	Attenuator	Flanged	1.30:1	6 dB	BeO	A0600-100-10Y

Terminations:

CW Power Rating	Device	CFG.	Typical VSWR 3.4-3.6 GHz	Value	Substrate	Part Number
5 watts	Termination	Chip	1.30:1	50 ohm	BeO Free	TV1005CT-50R0JN-83
5 watts	Termination	Chip	1.10:1	50 ohm	Alumina	TVC1206CT-50R0JN-93
5 watts	Termination	Chip	1.10:1	50 ohm	BeO Free	TVC1206CT-50R0JN-83
10 watts	Termination	Flanged	1.05:1	50 ohm	BeO	T50R0-10-1X
20 watts	Termination	Chip	1.18:1	50 ohm	BeO	TV1005CT-50R0JN-96-01
20 watts	Termination	Chip	1.30:1	50 ohm	BeO	TV1005CT-50R0JN-95
20 watts	Termination	Chip	1.05:1	50 ohm	BeO	TVC1206CT-50R0JN-98
20 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-20-18X
20 watts	Termination	Leaded	1.18:1	50 ohm	BeO	A01Z-50R0J96-01A36-Y
30 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-30-2X
30 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-30-13X
50 watts	Termination	Chip	1.10:1	50 ohm	BeO Free	TVC2525CT-50R0JN-83-03
60 watts	Termination	Chip	1.05:1	50 ohm	BeO	TVC2525CT-50R0JN-99
60 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-60-9X
60 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-60-3X
60 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-60-12X
100 watts	Termination	Chip	1.10:1	50 ohm	Aluminum Nitride	TVC2525CT-50R0JN-2T-09
100 watts	Termination	Chip	1.05:1	50 ohm	Aluminum Nitride	TVC2335CT-50R0GN-2T-15
100 watts	Termination	Chip	1.15:1	50 ohm	Aluminum Nitride	TVC2335CT-50R0JN-2T-14
100 watts	Termination	Flanged	1.15:1	50 ohm	Aluminum Nitride	TA50R0-100-27X
100 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-100-4X
100 watts	Termination	Flanged	1.25:1	50 ohm	BeO	T50R0-100-21X
150 watts	Termination	Flanged	1.17:1	50 ohm	BeO	T50R0-150-25X



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WiMax Applications 3.4 - 3.6 GHz

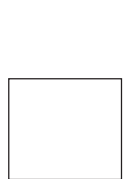
Low Capacitance Resistors:

CW Power Rating	Device	CFG.	Typ. Cap. at 1 MHz	Value	Substrate	Part Number
20 watts	Resistor	Chip	0.70 pF	100 ohm	BeO	RM2010CT-1000GN-99-02
20 watts	Resistor	Chip	0.73 pF	100 ohm	Aluminum Nitride	RM2010CT-1000GN-2T-02
20 watts	Resistor	Flanged	0.70 pF	100 ohm	BeO	R1000-20-10X
20 watts	Resistor	Flanged	0.73 pF	100 ohm	Aluminum Nitride	RA1000-20-8X
20 watts	Resistor	Leaded	0.70 pF	100 ohm	BeO	K04Z-1000G99-02C36-X
20 watts	Resistor	Leaded	0.73 pF	100 ohm	Aluminum Nitride	K04Z-1000G2T-02C36-X
50 watts	Resistor	Chip	1.37 pF	100 ohm	Aluminum Nitride	RM2335CT-1000GN-2T-05
50 watts	Resistor	Chip	1.10 pF	100 ohm	Aluminum Nitride	RM2335CT-1000GN-2U-02
50 watts	Resistor	Flanged	1.42 pF	100 ohm	BeO	R1000-50-12X
50 watts	Resistor	Flanged	1.37 pF	100 ohm	Aluminum Nitride	RA1000-50-10X
50 watts	Resistor	Flanged	1.37 pF	100 ohm	Aluminum Nitride	RA1000-50-13X
50 watts	Resistor	Flanged	1.37 pF	100 ohm	Aluminum Nitride	RA1000-50-14X
50 watts	Resistor	Flanged	1.10 pF	100 ohm	Aluminum Nitride	RA1000-50-11X
50 watts	Resistor	Leaded	1.37 pF	100 ohm	Aluminum Nitride	K05Z-1000G2T-05C36-X
50 watts	Resistor	Leaded	1.10 pF	100 ohm	Aluminum Nitride	K05Z-1000G2U-02C36-X
50-85 watts	Resistor	Chip	1.42 pF	100 ohm	BeO	RM2335CT-1000GN-99-05
50-85 watts	Resistor	Leaded	1.42 pF	100 ohm	BeO	K05Z-1000G99-05C36-X
85 watts	Resistor	Flanged	1.42 pF	100 ohm	BeO	R1000-85-12X
100 watts	Resistor	Chip	1.73 pF	100 ohm	Aluminum Nitride	RM2335CT-1000GN-2T-01
100 watts	Resistor	Chip	1.58 pF	100 ohm	Aluminum Nitride	RM2335CT-1000GN-2U-03
100 watts	Resistor	Flanged	1.73 pF	100 ohm	BeO	R1000-100-10X
100 watts	Resistor	Flanged	1.73 pF	100 ohm	Aluminum Nitride	RA1000-100-8X
100 watts	Resistor	Flanged	1.58 pF	100 ohm	Aluminum Nitride	RA1000-100-9X
100 watts	Resistor	Leaded	1.73 pF	100 ohm	Aluminum Nitride	K05Z-1000G2T-01C36-X
100 watts	Resistor	Leaded	1.58 pF	100 ohm	Aluminum Nitride	K05Z-1000G2U-03C36-X
150 watts	Resistor	Flanged	1.73 pF	100 ohm	BeO	R1000-150-10X
100-150 watts	Resistor	Leaded	1.73 pF	100 ohm	BeO	K05Z-1000G99-01C36-X
100-150 watts	Resistor	Chip	1.73 pF	100 ohm	BeO	RM2335CT-1000GN-99-01
200 watts	Resistor	Chip	2.15 pF	100 ohm	BeO	RM2335CT-1000GN-99-06
200 watts	Resistor	Flanged	2.15 pF	100 ohm	BeO	R1000-200-7X
200 watts	Resistor	Leaded	2.15 pF	100 ohm	BeO	K05Z-1000G99-06C36-X

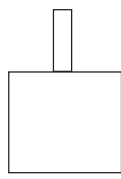
Configuration examples:

Please contact factory or visit www.barryind.com for individual data sheets.

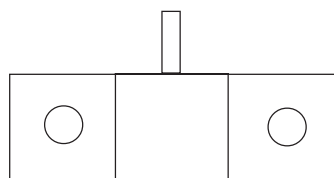
Note: Configuration examples are for terminations. For resistors and attenuators, there are two leads.



Chip

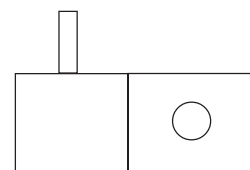


Leaded



Double-hole Flanged

or



Single-hole Flanged



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Precision Chip Configuration Guide

R P 0805 CB - 1001 J N - 91

Device Type

- A - Attenuator
- N - Network
- R - Resistor
- T - Termination
- X - Special

Conductor Information

- K - 1/4 -Wrap
 - M - Back Metallization
 - P - Wrap Around
 - S - Flip Chip
 - T - 3-Sided Wrap
 - V - 1/2 -Wrap
 - X - Special
- Other configurations available, such as castellations. Part number will be assigned by the factory.

Size (see next page)

0805 = 0.080" x .050"

Value in Ohms

1.0	1R00
1.1	1R10
10	10R0
100	1000
1,000	1001
10,000	1002
1,000,000 (1 Meg. Ohm)	1004
100,000,000 (1 Gig. Ohm).....	1007

Value in Decibels

1	0100
2.5	0250
12	1200
18.5	1850

Tolerance Resistance

- F - 1%
- G - 2%
- J - 5%
- K - 10%
- L - 20%
- X - Special

Inspection

- C - Customer Print
- N - Normal
- T - Special

Substrate*

90 .....	.010" Alumina**
91 .....	.015" Alumina
93 .....	.025" Alumina
94 .....	.040" Alumina
95 .....	.010" BeO**
96 .....	.015" BeO
98 .....	.025" BeO
99 .....	.040" BeO
9F .....	.060" BeO
9X	Special
83 .....	.025" BeO Free
84 .....	.040" BeO Free
2P .....	.010" AlN**
2Q .....	.015" AlN
2S .....	.025" AlN
2T .....	.040" AlN

* All resistive elements are passivated.

** Only RS, RM, AS and AM packages available on 10 mil material.

Resistor values range from .1 Ohm to 1 Gigohm. Attenuator values range from 0.25dB to 32 dB. All chips are available in standard 96% Alumina or in BeO, BeO Free or AlN to handle your high power requirements. Detailed drawings are available for each chip style. Please contact us for any of your special needs, chip power ratings and frequency ranges via sales@barryind.com.

Termination Material/Finish

	RoHS	BeO	Alumina	ALN	Solder	Epoxy	Wirebond
BA- Palladium Silver.....	Yes	No	Yes	Yes	No	Yes	No
CB- Tin Lead over Nickel over Silver.....	No	Yes	Yes	No	Yes	No	No
CT- Matte Tin over Nickel over Silver.....	Yes	Yes	Yes	Yes	Yes	No	No
EA* - Gold I/O with Palladium Silver Ground.....	Yes	No	Yes	Yes	Yes (GND)	Yes	Yes (I/O)
FA* - Gold I/O with Platinum Gold Ground.....	Yes	No	Yes	Yes	Yes (GND)	Yes	Yes (I/O)
GA- Gold.....	Yes	No	Yes	Yes	No	Yes	Yes
HA* - Gold over Platinum Gold I/O with Plat. Gold Ground.....	Yes	Yes	No	No	Yes (GND)	Yes	Yes (I/O)
JA- Gold over Platinum Gold.....	Yes	Yes	No	No	No	Yes	Yes

* I/O = Input/Output Pads



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Precision Chip Devices (Standard Packages)

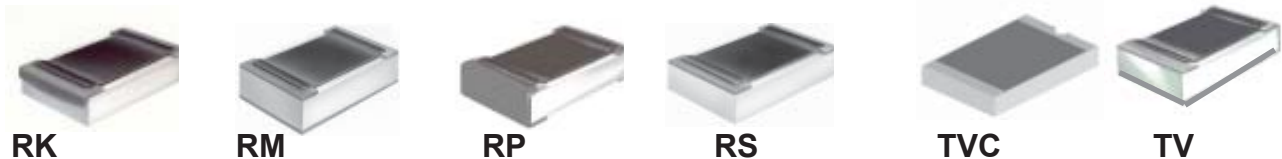
Size	AK	AP	AS	AT	AV	AM	RK	RP	RS	RM	TV	TVC
0202									*	*	*	
0302							*	*	*	*		
0402							*	*	*	*	*	
0405	*	*		*	*							
0502							*	*	*	*	*	
0503							*	*	*	*		
0504							*	*				
0505							*	*	*	*	*	
0603							*	*	*	*		
0605								*	*		*	
0706		*	*	*	*	*						
0802									*	*		
0805							*	*	*	*	*	
0904			*	*	*	*						
1005		*	*		*	*	*	*	*	*	*	
1010							*	*	*	*		
1206							*	*	*	*		*
1505							*		*	*		
1612		*	*		*	*						
1812												*
1835												*
1907												*
2010							*	*	*	*	*	*
2335					*				*	*		*
2510										*		*
2512							*	*	*	*		*
2525				*	*				*	*	*	*
3725									*	*	*	*
3737									*	*	*	*

Tape & Reel option available on size 0402 through 2525.

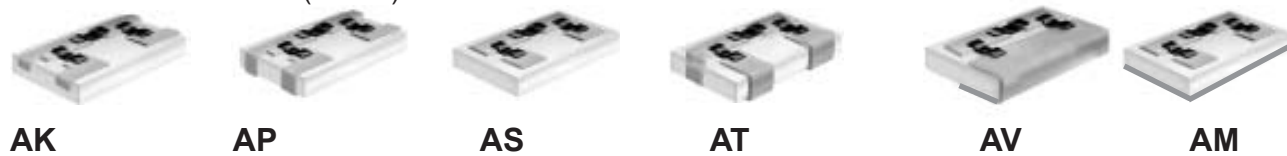
Only RS, RM, AS, and AM packages available in 10 mil substrate material.

Attenuators - Resistors

Terminations



* Microwave Attenuators (PI Pad)



* Microwave Attenuators (T Pad)



* PI-pad only available in size 0904. T-pad only available in sizes 0405, 0706, 1005 and 1612.



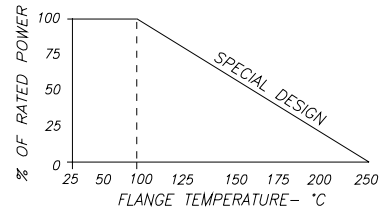
Barry Industries, Inc.
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Pulsed Power Product

Please contact factory for data sheet.

Utilizing a proprietary flange composite, Barry offers BeO Resistors and Terminations that are ideal for Pulsed Power/Cycled Applications. The devices feature all brazed construction which ensure that the assembly stays intact during interface. Devices are rated for operation at full power to 100°C and derated to 250°C.

DERATING CURVE:



Device Type	Watts	CFG.	Flange Length	Flange Width	Flange Thickness	Chip Dimensions	Max. Height	Lead Width	Hole Dim.	Part Number
Resistor	30		.515	.250	.062	.250 x .250	.140	.060	.130	R XXXX - 30 - 3E
Resistor	50		.560	.375	.125	.375 x .250	.200	.120	.161	R XXXX - 50 - 2E
Resistor	50		.515	.250	.062	.250 x .250	.140	.060	.130	R XXXX - 50 - 3E
Resistor	50		.515	.250	.125	.250 x .250	.200	.060	.130	R XXXX - 50 - 5E
Resistor	250		.975	.375	.125	.375 x .375	.190	.120	.130	R XXXX - 250 - 5E
Resistor	400		1.100	.500	.125	.500 x .500	.200	.250	.170	R XXXX - 400 - 1E
Resistor	800		1.900	1.04	.125	1.00 x 1.04	.250	.250	.170	R XXXX - 800 - 1E
Termination	60		.515	.250	.062	.250 x .250	.140	.060	.130	T XXXX - 60 - 49E
Termination	60		.515	.250	.062	.250 x .250	.140	.060	.130	T XXXX - 60 - 50E
Termination	200		.800	.230	.062	.230 x .350	.140	.040	.130	T XXXX - 200 - 1E
Termination	350		1.10	.500	.125	.500 x .500	.200	.060	.170	T XXXX - 350 - 1E
Termination	800		1.900	1.04	.125	1.00 x 1.04	.250	.250	.170	T XXXX - 800 - 1E
Termination	1500		1.900	1.64	.125	1.00 x 1.50	.220	.240	.170	T XXXX - 1500 - 1E



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Introduction

Barry Industries offers parts using flanges made from both copper tungsten (CuW) and copper (Cu) flange materials. In the case of the copper tungsten flange material, the construction is 100% brazed. Copper flange construction uses an appropriate solder material to attach the ceramic part to the flange. For higher power components the tradeoffs between the two forms of construction become a critical decision for the user.

Copper Tungsten Flange

The use of CuW flanges provides a good thermal expansion match between the ceramic and the flange. As power levels – and hence ceramic chip size – increase, this matching becomes more critical. This becomes even more important if the part is subject to power or temperature cycling. The all brazed CuW part solves this problem and provides the highest reliability part for all applications.

Unfortunately, as with any engineering solution there is always a compromise and the penalty with CuW is that there is a significant cost increase due to the high price of the flange material.

Copper Flange

Copper flanges cost significantly less than CuW and are hence widely used in many parts. However, there is a significant thermal expansion mismatch between the ceramic chip and the Cu flange. The higher power devices use larger chips and flanges and any mismatch is accentuated. Soldering of the part provides some stress relief, but for parts from approximately 500 watts and higher, this mismatch becomes a problem.

Barry Industries supplies – as do other companies – 800 watt parts on Cu. These perform adequately as long as the parts are operated at constant power levels and temperature. If they are subjected to significant temperature cycling or pulsed power application then the parts will fail at some stage.

This is neither a reflection on the Barry parts nor the processes used. It is the fundamental physics of material properties and applies to all parts mounted to copper flanges.

Authored by: Dr. Peter Barnwell, 2007



Barry offers extensive Low Temperature Co-Fired Ceramic capabilities - visit our web site www.barryltcc.com for the latest copy of our Design Guidelines.
E-mail: ltcc@barryind.com

LTCC Barry Capabilities

- DC Through Millimeter Wave Operation
- Buried Passive Components
- Foundry and Design Capabilities
- Extensive Model Library
- Complete Transmitter/Receiver Designs
- MCM Module Packages



LTCC Four Channel T/R Module

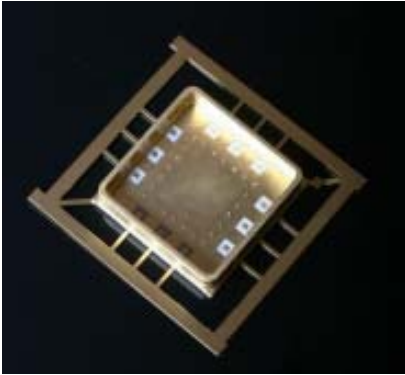
- Channels isolated physically and electrically
- Shaped seal rings with individual device isolation
- Copper alloy heat sink for thermal performance
- Integrated Manufacturing - all parts fabricated in house



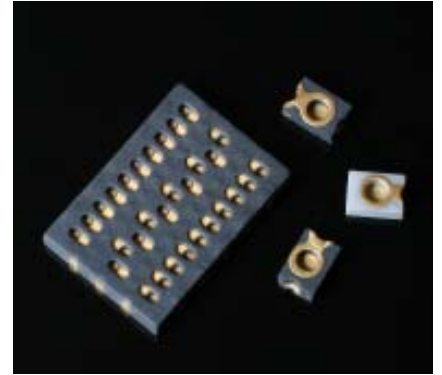
Semiconductor Enclosures, Inc.

Division of Barry Industries, Inc.

Introducing Barry Industries' new High Temperature Co-Fired Ceramic (HTCC) division, Semiconductor Enclosures, Inc. Barry's new HTCC division offers ceramic packages and components for Aerospace, RF/Microwave, Semiconductor, and Optoelectronic Devices.



High Rel and Commercial Products



Microwave Diodes/Varactors



GaAs FETs and MMICs

VCSELs, MEMS

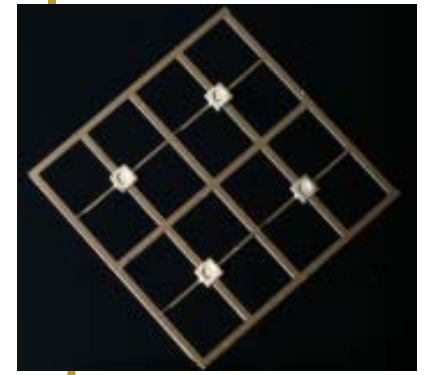
LEDs

Photodiodes

Power Semiconductors

RF Bipolar Transistors

RF LDMOS Transistors



Semiconductor Enclosures, Inc., Division of Barry Industries, Inc.
85 Parker Street . Newburyport . Massachusetts . 01950 U.S.A.

Tel: +1-978-462-1880 . Fax: +1-978-462-6886 . www.semiconductorenclosures.com



Division of Barry Industries, Inc.

Inspection:

MicroVue Comparator w/18" x 24", .0001" Readouts, Axis Skewing, Circle Centering
Gage Blocks
Gage Pins from .011" to .750" in .001 Increments
Sunnen Dial Bore Gages from .500 to 6.000 Diameter
Surface Plates to 24" x 36"
Microscopes
Full Range of Micrometers and other Measuring Instruments

Milling - CNC:

Fanuc Robodrill T14A/PC2 with FANUC 161-MA Control
Boston Digital 312-2 -SPC II CNC Control
Matsuura -1X with YASNAC Control
Matsuura MC510 VS with YASNAC MX3 CNC Control
Matsuura MC600V with YASNAC MX3 CNC Control
Santec Vertical CNC Mill



Vertical:

Bridgeport - J Series, 9" x 48" Table
Bridgeport - J Series, 9" x 42" Table
Index Mill - 2 HP, 9" x 42" Table

Stamping:

V & O OBI 30 Ton Power

Wire EDM - CNC:

Agietron Classic 2S
Camtek PEPS CAD CAM System

Programming:

Teksoft CAD-CAM System
Direct Link to CNC Machines



Turning:

TOS Engine Lathe
Clausing Engine Lathe

Laser:

CO₂ Laser and
YAG Laser Technology

Sawing:

Grob Vertical Bandsaw
Do All Model C-916A Automatic

Grinding:

Clausing Surface Grinder
Chevalier Surface Grinder 618

Miscellaneous:

Drill Presses
Tapping Heads
Trinco Grit Blaster (Glass Bead)
Emerson Disc-Belt Grinder
HARIG Grinding Fixture
Rotary Tables



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“Custom Electroplating Specialists”

Substrate Materials:

- Aluminum
- Beryllium Copper
- Brass
- Copper
- Copper Tungsten
- Copper/Molybdenum/Tungsten
- Kovar
- Phosphor Bronze
- Steel
- Molybdenum
- Nickel
- Silver



Plating Processes:

- Gold, MIL-G-45204 TYPE III Grades A
- Immersion Gold
- Sulfamate Nickel MIL-P-27418
- Tin MIL-T-10727 100% Matte
- Tin/Lead AMS-P-81728 60/40
- Boron Electroless Nickel
- Silver QQ-S-365
- Copper MIL-C-14550

Barry Reference Tools

+ dB	POWER	VOLTAGE
0.0	1.00	1.00
1.0	1.26	1.12
2.0	1.59	1.26
3.0	2.00	1.41
4.0	2.51	1.59
5.0	3.16	1.78
6.0	3.98	2.00
7.0	5.01	2.24
8.0	6.31	2.51
9.0	7.94	2.82
10.0	10.00	3.16
11.0	12.59	3.55
12.0	15.85	3.98
13.0	19.95	4.47
14.0	25.12	5.01
15.0	31.62	5.62
16.0	39.81	6.31
17.0	50.12	7.08
18.0	63.10	7.94
19.0	79.43	8.91
20.0	100.0	10.0
21.0	125.9	11.2
22.0	158.5	12.6
23.0	200.0	14.1
24.0	251.2	15.9
25.0	316.2	17.8
26.0	398.1	20.0
27.0	501.2	22.4
28.0	631.0	25.1
29.0	794.3	28.2
30.0	1000	31.6
31.0	1259	35.5
32.0	1585	39.8
33.0	1995	44.7
34.0	2512	50.1
35.0	3162	56.2
36.0	3981	63.1
37.0	5012	70.8
38.0	6310	79.4
39.0	7943	89.1
40.0	10000	100.0
41.0	12590	112.2
42.0	15850	125.9
43.0	19950	141.3
44.0	25120	158.5
45.0	31620	177.8
46.0	39810	199.5
47.0	50120	223.9
48.0	63100	251.2
49.0	79430	281.8
50.0	100000	316.2
51.0	125900	354.8
52.0	158500	398.1
53.0	199500	446.7
54.0	251200	501.2
55.0	316200	562.3
56.0	398100	631.0
57.0	501200	707.9
58.0	631000	794.3
59.0	794300	891.3
60.0	1000000	1000.0



OHM'S LAW REFERENCE

$$P = EI \quad P = E^2 / R$$

$$P = I^2 R$$

$$R = E / I \quad R = E^2 / P$$

$$R = P / I^2$$

$$I = E / R \quad I = P / E$$

$$I = \sqrt{P / R}$$

$$E = IR \quad E = P / I$$

$$E = \sqrt{PR}$$

SERIES

$$RT = R1 + R2 + R3....$$

PARALLEL

$$RT = \frac{1}{\frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}}$$

PHONETIC ALPHABET

A - ALPHA	N - NOVEMBER
B - BRAVO	O - OSCAR
C - CHARLIE	P - PAPA
D - DELTA	Q - QUEBEC
E - ECHO	R - ROMEO
F - FOXTROT	S - SIERRA
G - GOLF	T - TANGO
H - HOTEL	U - UNIFORM
I - INDIA	V - VICTOR
J - JULIETTE	W - WHISKEY
K - KILO	X - X-RAY
L - LIMA	Y - YANKEE
M - MIKE	Z - ZULU

DECIBEL (dB)

Compares one value to a reference value (1) using common logarithms of their ratio.

$$\text{Power: dB} = 10 \log (P_2 / P_1)$$

$$\text{Voltage: dB} = 20 \log ((E_2 \sqrt{Z_2}) / (E_1 \sqrt{Z_1}))$$

$$\text{Current: dB} = 20 \log ((I_2 \sqrt{Z_2}) / (I_1 \sqrt{Z_1}))$$

The NEPER (Np), which is also called the Napier, is used by some in place of the decibel.

The conversions are:

$$\begin{aligned} \text{Np} &= 8.686 \times \text{dB} \\ \text{dB} &= 0.1151 \times \text{Np} \end{aligned}$$

VOLTAGE STANDING-WAVE RATIO (VSWR)

	RETURN LOSS	TRANS. LOSS	VOLT. REFL. COEF.	POWER REFL. %	POWER TRANS. %
1.00	∞	.000	.00	.0	100.0
1.01	46.1	.000	.00	.0	100.0
1.02	40.1	.000	.01	.0	100.0
1.03	36.6	.001	.01	.0	100.0
1.04	34.2	.002	.02	.0	100.0
1.05	32.3	.003	.02	.1	99.9
1.06	30.7	.004	.03	.1	99.9
1.07	29.4	.005	.03	.1	99.9
1.08	28.3	.006	.04	.1	99.9
1.09	27.3	.008	.04	.2	99.8
1.10	26.4	.010	.05	.2	99.8
1.11	25.7	.012	.05	.3	99.7
1.12	24.9	.014	.06	.3	99.7
1.13	24.3	.016	.06	.4	99.6
1.14	23.7	.019	.07	.4	99.6
1.15	23.1	.021	.07	.5	99.5
1.16	22.6	.024	.07	.5	99.5
1.17	22.1	.027	.08	.6	99.4
1.18	21.7	.030	.08	.7	99.3
1.19	21.2	.033	.09	.8	99.2
1.20	20.8	.036	.09	.8	99.2
1.25	19.1	.054	.11	1.2	98.8
1.30	17.7	.075	.13	1.7	98.3
1.40	15.6	.122	.17	2.8	97.2
1.50	14.0	.177	.20	4.0	96.0
1.60	12.7	.238	.23	5.3	94.7
1.70	11.7	.302	.26	6.7	93.3
1.80	10.9	.370	.29	8.2	91.8
1.90	10.2	.440	.31	9.6	90.4
2.00	9.5	.512	.33	11.1	88.9
3.00	6.0	1.249	.50	25.0	75.0
4.00	4.4	1.938	.60	36.0	64.0
5.00	3.5	2.553	.67	44.4	55.6
10.00	1.7	4.807	.82	66.9	33.1
20.00	0.9	7.413	.90	81.9	18.1

DECIMAL-INCHES (SMALL DIV. = .050")
CENTIMETERS (SMALL DIV. = 1mm)



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Barry Reference Tools

Assorted Materials and Properties				Miscellaneous Reminders	
Material	M.P. °C	Thermal Conduct. W/m-°K	C.T.E. 10 ⁻⁶ /°K		
Gold	1063	316	14.1	°C = 5 / 9 (°F - 32) °F = (°C x 9 / 5) + 32	
Silver	961	427	19.6	°C = °K - 273.16 °F = °R - 459.67	
Aluminum	660	218	23.8	°K = °C + 273.16 °K = 5 / 9 (°F - 32) + 273.16	
Copper	1083	397	16.8	W / m • °K = 0.0254 (W / in • °C)	
Nickel	1453	89	12.7	W / m • °K = 0.002397 (cal • cm / sec • cm ² • °C)	
Be/Cu #25	927	12	5.2	R.M.S. = 0.707 (PEAK VOLTS)	
Stainless Steel 304	1454	17	5.2	R.M.S. = 1.11 (AVERAGE VOLTS)	
F-15 Alloy	1450	17	5.9	PEAK = 1.41 (R.M.S.)	
Tin	232	67	23.0	THREAD 4-40 6-32 8-32 10-32	
Lead	327	35	29.5	TORQUE (IN - LBS) 6 8 12 18	
Indium	157	24	33.0	1 MIL = 0.001 INCH = 25.4 MICRONS	
Sn 62	189	49	25.4	1 MICRON = 10,000 ANGSTROMS = 0.0397 MILS	
Sn 63	183	51	24.6	1 METER = 39.37 INCHES	
Sn 96	221	33	30.2	1 NAUTICAL MILE = 6076.1 FT = 1.1508 MILES	
Au/Si 94/6	370	285	13.7	SOUND SPEED = 1130 FT/SEC = 770 MILES/HR	
Au/Ge 88/12	356	276	12.8	FALLING OBJECT SPEED (FT/SEC) = 32t	
Au/Sn 80/20	280	253	16.0	t = seconds DIST. (FEET) = 16t ²	
Alumina 99%	2350	39	6.5		
Alumina 96%	2200	25	6.4		
Beryllium Oxide (BeO)	2530	196	7.6		
Aluminum Nitride (AlN)	SUB	165	5.2		
Silicon	1410	154	3.0		
Oxygen	-218	---	---		
Nitrogen	-210	---	---		
CO ₂	-78	---	---		
Helium	-272	---	---		

Thermal Approximations - Temperature, Size, Thickness

The following will simplify complicated thermal calculations needed to accurately determine temperature rise in power devices. Conduction cooling is considered, but convection, radiation and lateral heat dissipation are ignored. Complete contact to the heat sink is also assumed.

The temperature of the powered element can be estimated as follows:

$$\Delta T = \frac{PD}{KA}$$

Where P = Power (Watts) to be dissipated, D = Distance to heat sink
K = Thermal conductivity of substrate, A = Area of heat source

ΔT = Difference between heat source (T1) and the heat sink (T2) temperatures

For Example: How hot will a resistor film get if powered to 60 watts, and its dimensions are 50 x 100 mils on a 25 mil thick substrate made of Alumina?Substrate made of Beryllium Oxide?

Assumption: Heat sink is capable of maintaining a temperature of 40°C by means of its thermal conductivity and cooling methods.

Conversion of "K" needed to use same system - English.

Aluminum Oxide 99% - 39 W / m • °K Times Factor 0.0254 = 0.99 W / in °C
Beryllium Oxide 99% - 196 W / m • °K Times Factor 0.0254 = 4.97 W / in °C

$$(60 \times .025) / 0.99 (.050 \times .100) = 1.5 / 0.99 \times .005 = 1.5 / .00495 = 303 + 40 = \underline{343^\circ\text{C on Alumina}}$$

$$(60 \times .025) / 4.97 (.050 \times .100) = 1.5 / 4.97 \times .005 = 1.5 / .0249 = 60 + 40 = \underline{100^\circ\text{C on Beryllium Oxide}}$$

FRACTIONAL-INCHES (SMALL DIV. = 1/16")
POINTS - 72 / INCH (SMALL DIV. = 3 POINTS)



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Barry Divisions:

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Barry LTCC
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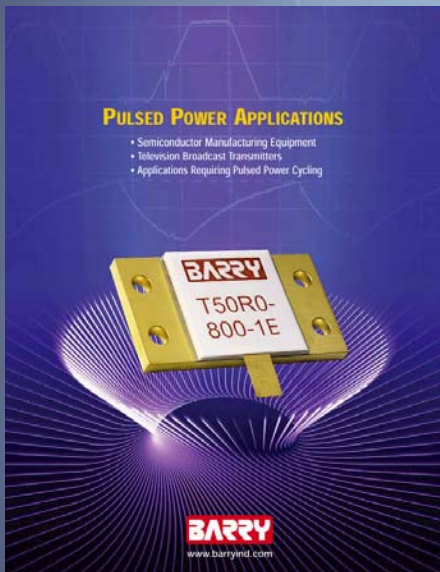
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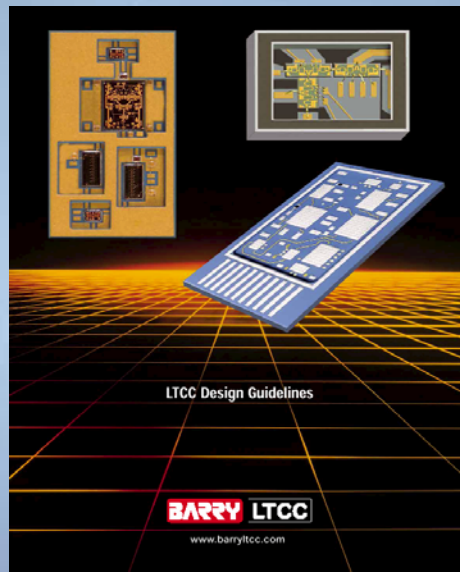
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Additional Catalogs:

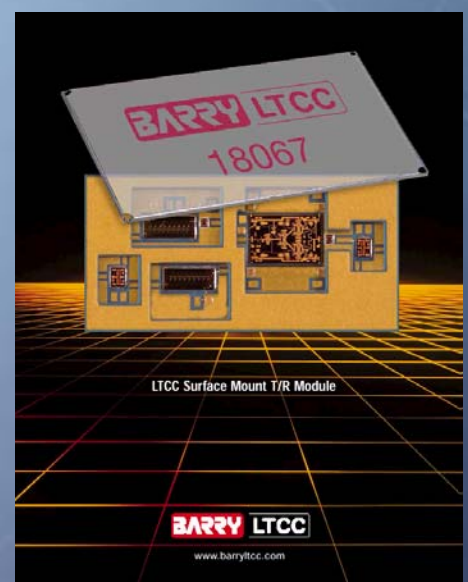
Pulsed Power Devices



LTCC Design Guidelines



LTCC T/R Module



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