

**SURFACE
MOUNTED**

Terminations

Resistors

Attenuators



**Microwave / RF
Resistor Products**

AEROFLEX / KDI Resistor Products

is built on a foundation of over 50 years of technological advances in both thin and thick film components. A renewed FOCUS on Quality, Service, Innovation and Overall Value to the customer is the basis of this dedicated group's objectives.

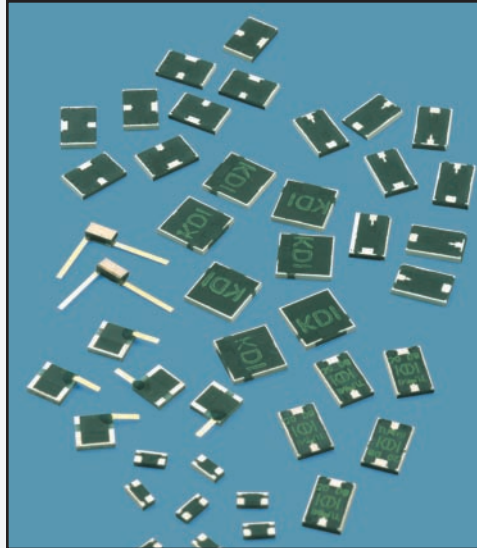


Focused on resistive film technologies, AEROFLEX / KDI Resistor Products offers a comprehensive variety of low and high power surface mounted passive devices for the wireless infrastructure and defense markets. Applications for these products include single and multi-carrier power amplifiers, dividers/combiners, isolators, circulators, and circuits requiring stripline, microstrip and surface mounted flange packages.

Recent technological advances in materials and processes have enabled AEROFLEX / KDI Resistor Products to introduce environmentally safe aluminum nitride (AlN) resistors, terminations and attenuators designed as an alternative to similar components using Beryllium oxide (BeO) ceramic. Our product offering includes flange mounted 50 and 100 Ohm resistors and terminations with power handling to 800 watts CW, coaxial cable load assemblies, and attenuators in standard values of 1-10, and 20 dB. AEROFLEX / KDI Resistor Products also offers high power chip devices, terminating attenuators where low level signal sampling is required, and drop-in pill type attenuators and terminations.

AEROFLEX / KDI Resistor Products has the technical capability and manufacturing capacity to supply application specific, high volume requirements for TDMA, CDMA, 3G and LMDS technologies.

AEROFLEX / KDI Resistor Products is located in Whippany, New Jersey and is an ISO-9001:2000 certified supplier.

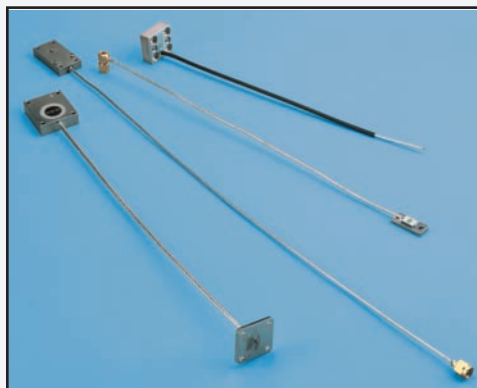


Chip and Flanged Resistors and Terminations

We offer a wide variety of Chip and Flanged Resistors and Terminations available in power levels from 10 watts up to 800 watts CW. All flanged devices are designed to operate at full rated powers with the flange (heatsink) maintained at a maximum temperature of 100°C.

Resistors and Terminations are available in standard values of 50 and 100 ohms. Other values may be requested.

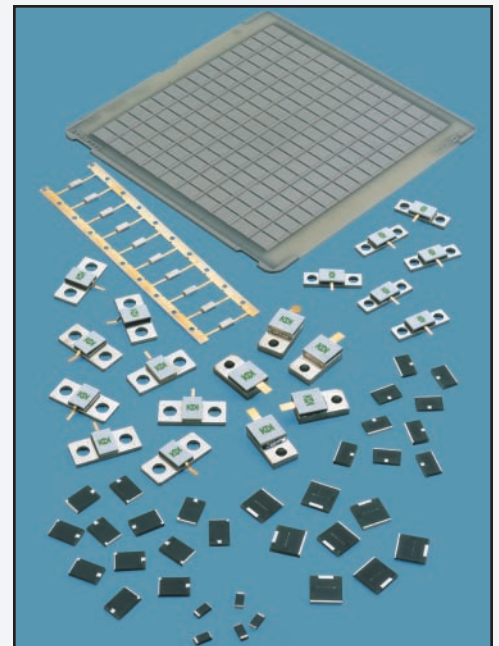
All Resistor and Termination Products are available in both Beryllium Oxide (BeO) or Aluminum Nitride (AlN).



Chip and Flanged Attenuators

We offer a wide selection of power chip and flanged attenuators for use in amplifier circuits in both stripline and microstrip packages, as well as Terminating Attenuators used in isolator designs where low level signal sampling is required. Attenuators are available in standard dB values of 1, 2, 3, 4, 5, 6, 10 and 20. Other values may be requested.

All attenuator products are available in both Beryllium Oxide (BeO) or Aluminum Nitride (AlN).



Cable Load Assemblies

We offer a wide selection of "Cable Load Assemblies," made with a choice of either Beryllium Oxide (BeO) or Aluminum Nitride (AlN) resistive elements.

CW Power Levels range from 50 to 250 watts and can be factory tuned for a VSWR as low as 1:04:1.

These Cable Load Assemblies feature semi-flexible cables in sizes of 0.080 and 0.141 diameters with SMA style connectors as standard. Other cable sizes and connectors are also available.

Application Notes

Mounting of High Power Flange Devices

When mounting High Power Flange Devices in a circuit, there are several key issues that should be taken into account.

Heat Sink Design

The heat sink the device is mounted to must be designed to maintain the temperature (design) while it is dissipating the power (heat) given it by the device. (The derating specifications are given in the applicable data sheets.)

Flatness of mating surfaces

Flatness of the heat sink and of the mounting area of the device (flange) should be 0.001" maximum. The idea is to have the best possible contact between the heat sink and the device.

Thermal Compound

To fill any microscopic voids or air gaps the use of thermal compound is recommended to a thickness of 0.002" maximum.

Stress Relief on Tab

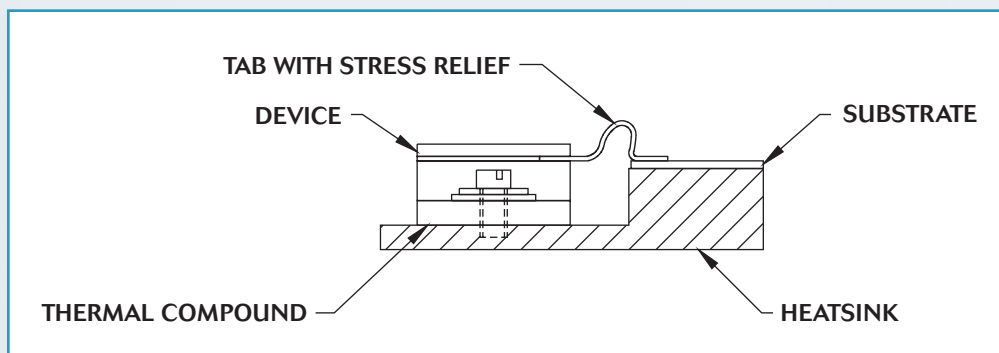
Although it is not always possible in High Frequency applications a small loop for stress relief on the solder tab is recommended. This reduces any mechanical stress on the joints.

Apply a small amount of thermal compound to the mounting area of the flange of the device. Spread it completely on the flange using a razor blade or other smooth tool. When seating the device, align the tab/tabs over the corresponding area on the circuit board. Screw down the device using the recommended torque for the appropriate screw size in the table below. Aeroflex-KDI recommends the use of a lock washer and a flat washer in the installation. See Figure 1

Thread Size	Torque Setting
2-56	4 inch-pounds
4-40	6 inch pounds
6-32	8 inch pounds
8-32	12 inch pounds
10-32	18 inch pounds

Solder the tab/tabs using SN62 (179° C eutectic) solder and a small amount of RMA flux. After all the solder is complete all of the flux must now be removed using a cleaning agent.

Figure 1: High Power Flange Device Mounting



Mounting of Chip Devices

This application note covers the recommended mounting techniques for the proper conduction cooling and RF performance of a surface mounted (flangeless) chip attenuator, termination or resistor.

Initial Considerations

There are two primary considerations for a surface mounted power device; Power Dissipation and RF Performance. In order to remove the dissipated power from this type chip they must be provided with adequate conductive cooling. This will prevent excessive chip temperatures leading to damage and early failure of the device. RF performance is also dependent on proper mounting. Since these devices are being mounted to a circuit board, inductance to ground is introduced by the vias to the ground plane. To reduce this effect and lower the thermal resistance between the component and ground plane, the following items are recommended:

1. Maximize the use of thermally conductive vias around and under the device.
2. Use of heavy copper cladding (2 oz.) on the circuit board as a heat spreader.

Solders

Aeroflex-KDI recommends the use of the solders in the chart below when installing a surface mount chip. Also listed are recommended platings for the heatsink/baseplate that a device might be mounted to instead of a circuit board.

Mounting

The first step when mounting a chip device to the circuit board is to determine the proper size and location of the solder pads. Aeroflex-KDI recommends providing pads that are 0.010" to 0.020" over the device's termination size and are centered on the axis of the chip. This allows for self-centering of the chip and a proper solder fillet formation. Skewing and "tombstoning" can occur if this is not followed. See Figure 2

Preparation

1. Before any solder attachment, parts and circuit boards must be free of any oils or dirt. Isopropyl alcohol can be used for this task.
2. Apply a small amount of RMA flux (MIL-F-14256) to the areas to be soldered.
3. SN63 solder is generally recommended for use. This may be a preform, solder paste or wire. If preforms are used, select a size that is 0.005" to 0.010" larger than the size of the pad.
4. When soldering is complete the circuit board must be cleaned to remove any flux residue. This can be done in an ultrasonic cleaner or vapor degreaser. Flux manufacturers have recommended solvents or cleaning solutions for their products.

Pretinning

Pretinning can be done with either a solder pot or by depositing and reflowing solder on the device. (Aeroflex-KDI can supply pretinned devices, SN63 or SN96).

Tabs

When attaching tabs to a device we recommend using SN96 (221° C) to attach the tab to the chip. Then, solder the tab to the circuit board using SN63 (183° C).

Wire Bonding

Attach the device to the circuit board using solder as described above. Clean and remove any flux residues. Ultrasonically bond wire or ribbon to gold termination pads using a wedge or ball bonder.

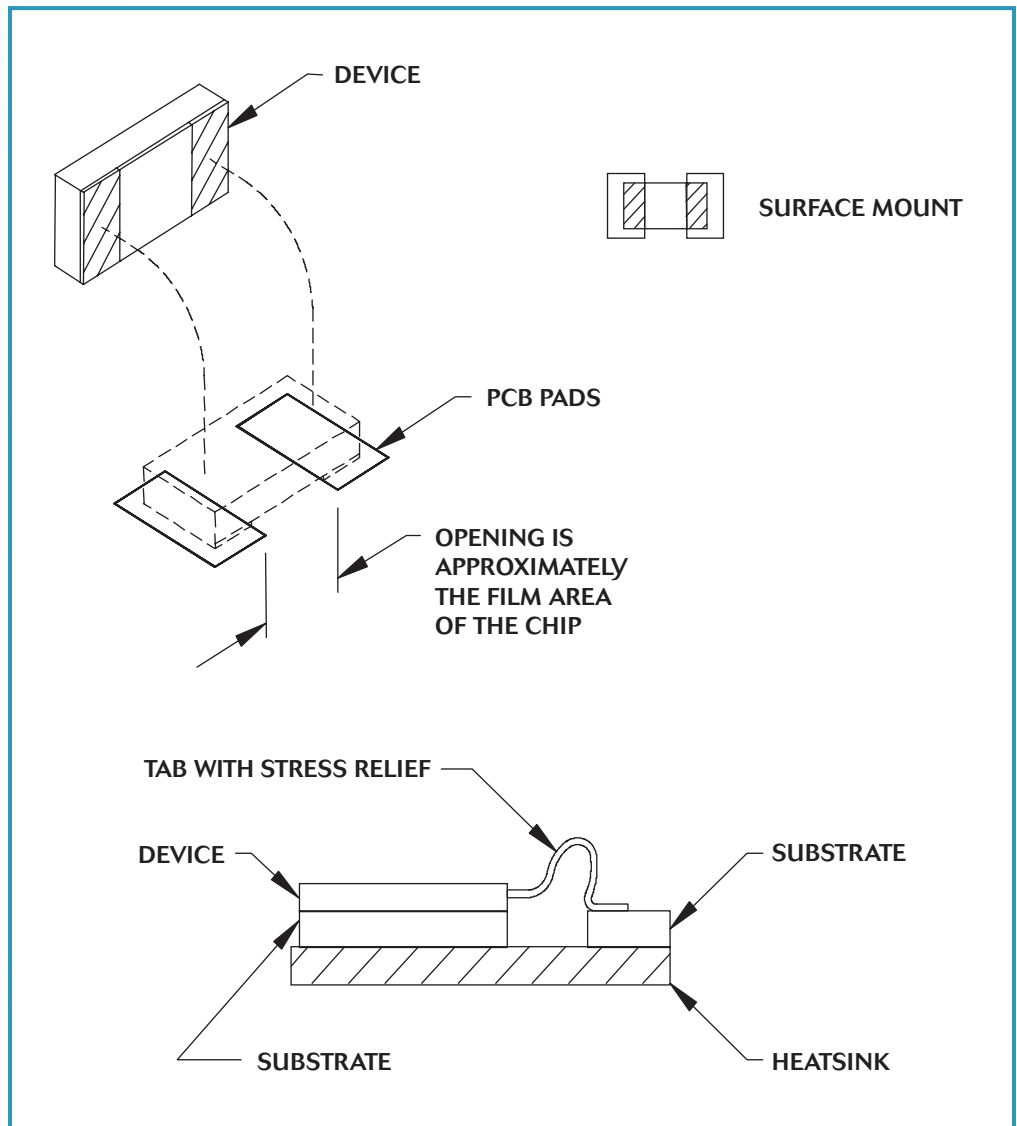
NOTE: Gold plated chips are required for this method.

Tuning

Maximum VSWR, as specified on the data sheet, can be achieved without additional tuning. Lower VSWR can be achieved with stub or lumped element tuning. However, this can result in a narrower useable bandwidth.

Solder Type	Liquidous Temp. (degrees C.)	Recommended Platings for Heatsink/Baseplates
SN63	183 eutectic	Nickel, Silver
SN96	221 eutectic	Nickel, Silver
80Au/20Sn	280 eutectic	Gold over Nickel

Figure 2: Proper Mounting Techniques



Aeroflex Microelectronic Solutions

Aeroflex Microelectronic Solutions is a growing and vital technology leader in the worldwide marketplace that stresses innovative solution-minded products. The acquisition of MCE Technologies and integration into the Aeroflex Microelectronic Solutions group firmly established the company as one of industry's most complete suppliers of RF, microwave and millimeter wave devices, components and subsystems. Our broad offering of standard products, innovative, custom-engineered designs, and comprehensive resources enable Aeroflex to support the most demanding high-performance, high-quality, product needs of our customers.

Aeroflex Microelectronic Solutions microwave products consist of strategically aligned operating units with locations throughout North America. They include:

The Aeroflex logo features a stylized blue 'A' followed by the word 'AEROFLEX' in a bold, black, sans-serif font. The logo is set against a white background with a blue swoosh above it.

AEROFLEX / KDI Resistor Products *Whippany, NJ*

Aluminum Nitride (AlN) and Beryllium Oxide (BeO) chip and flange mounted, high power fixed attenuators, resistors and terminations, custom thick and thin film devices and cable load assemblies designed and manufactured for applications in isolator / circulators, single and multi-carrier power amplifiers, dividers, combiners, phased arrays, and other wireless infrastructure and defense markets. Aeroflex / KDI Resistor Products is an ISO 9001:2000 certified supplier.

AEROFLEX / KDI Integrated Products *Whippany, NJ*

Base Station Transmit Converters, switch matrices, BTS RF diagnostics, E911 expansion kits, vector modulators, phase shifters, switches, digital attenuators, voltage variable attenuators, up / down converters, power combiners, dividers and couplers, switched time delay units, multi-function subassemblies, RF front ends, switched filter banks, cavity filters, diplexers, multiplexers and custom RF subassemblies for wireless, military and space applications.

Aeroflex / KDI Integrated Products is certified to ISO 9001:2000.

AEROFLEX / Inmet *Ann Arbor, MI*

Designs and manufactures a wide array of precision and low cost coaxial components in a variety of connector types that operate in frequency ranges from 7 kHz to 65 GHz with power handling capabilities up to 300 watts. Product offerings include over 3,000 variations of coaxial attenuators, terminations, bias tees, dc blocks, in-series and between-series adapters, connectors, fixed and adjustable gain equalizers and connectors. Aeroflex / Inmet is an ISO 9001:2000 certified supplier.

AEROFLEX / Metelics *Sunnyvale, CA*

Manufacturer of the highest performance diode products available to the commercial wireless, defense, space and broadband industries. Aeroflex / Metelics offers a complete product range of PIN and Schottky diodes, tunnel diodes, step recovery diodes (SRD), tuning varactor diodes, sampling phase detectors, MIS capacitors, and their new line of HPT Amplifiers ideally suited for cellular, PCS, 2.5/3G, MMDS, WLL and other types of wireless infrastructure applications where flat gain and good linearity are required. This facility is certified to ISO 9001:2000 standards.

AEROFLEX / Weinschel *Frederick, MD*

Product offerings include fixed attenuators for test, metrology and space applications; continuously variable, manual step, solid-state digital step and programmable step attenuators; resistive splitters and dividers; manual phase shifters. In addition to coaxial components up to 40 GHz, Aeroflex / Weinschel offers a complete range of standard and custom designed multi-path switching, combining, and attenuation subsystems for cable infrastructure and mobile wireless test applications. This facility is ISO 9001:2000 certified.

AEROFLEX / Plainview *Plainview, NY*

This division has developed ultra broadband modulator driver amplifiers, limiting amplifiers, and clock drivers for the Fiber Optic communications market. These components operate over the frequency ranges of 30 KHz to 50 GHz and are highly integrated to achieve higher performance, smaller size and lower cost. Aeroflex Plainview has leveraged their vast microwave design library and manufacturing experience to offer a wide variety of state-of-the-art broadband power amplifiers, LNAs, mixers and highly integrated RF modules for the military, commercial and aerospace markets. This facility is ISO 9000:2000; AS 9100-2000 certified and MIL-PRF-38534 Class K, H and E certified.

Aeroflex, Inc. is a multi-faceted high technology company that designs, develops, manufactures and markets a diverse range of microelectronic, test and measurement products. Aeroflex products are in worldwide use supporting communication systems, networks and automatic test systems. The success of Aeroflex in the semiconductor market is attributed to their space qualified and radiation hardened products used in satellite communications. Their cost efficient process for producing semiconductors capable of operating in the harsh environment of space has clearly demonstrated its merits and has a history of proven accomplishments. In an industry that must use trustworthy processes and vendors, Aeroflex believes that they are in the enviable position of having built an unimpeachable reputation for quality and reliability while having the requisite heritage of space experience.

A3RS91.1

High Power Chip Termination

100 Watts



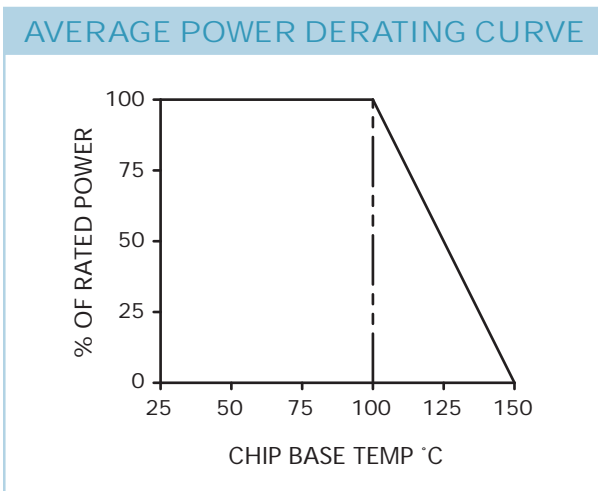
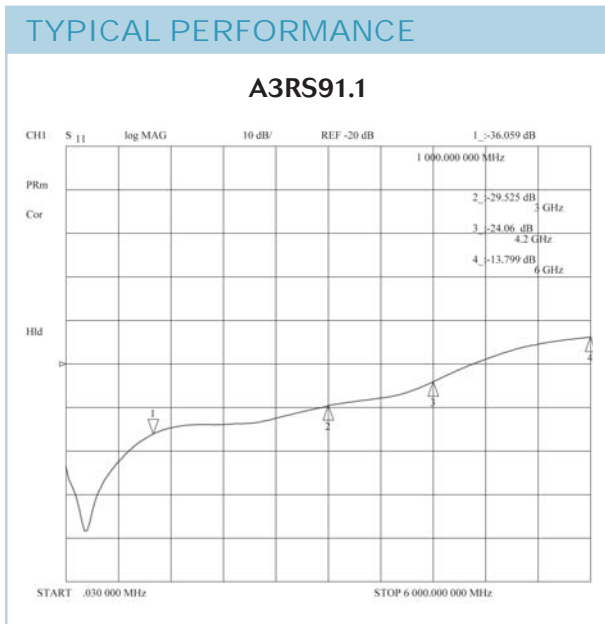
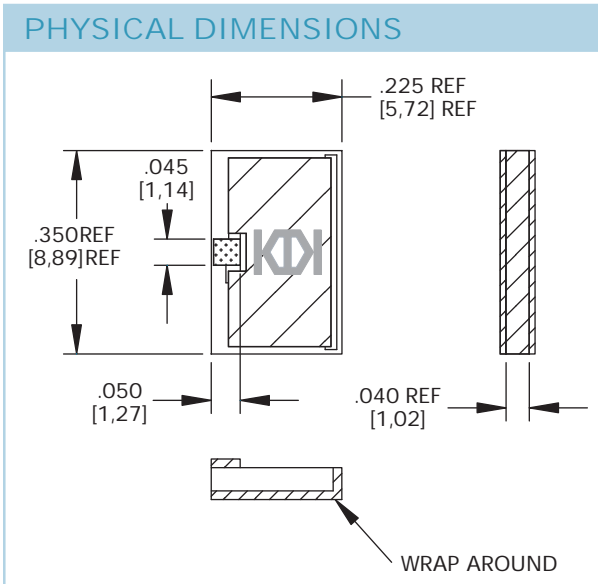
When properly mounted on an appropriate heat sink, this chip device provides high power dissipation capabilities. Ideal for ferrite isolator applications, the improved thin film design technology and laser trimming provide proven RF power capabilities to meet the demands of today's CDMA and WCDMA system requirements. Aluminum Nitride is featured for those applications where the use and disposal of Beryllium oxide is a concern.

- Environmentally friendly AlN substrate
- Hi-performance, thin film element
- Power Handling of 100 Watts
- New adhesion process results in improved terminal strength
- On-chip matching network improves frequency performance over the DC-3 GHz frequency range



SPECIFICATIONS	
Parameters	Specifications
Frequency Range	DC to 3 GHz
Power	100 Watts*
VSWR	1.10:1 max
Resistance	50 ohms +/- 5%
Operating Temperature	-55 °C to 150 °C
Substrate	Aluminum Nitride

* Refer to average power derating curve chart.



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

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SERIES PPC, NPC RESISTORS, TERMINATIONS

High Power Chip – 50 & 100 Ohms

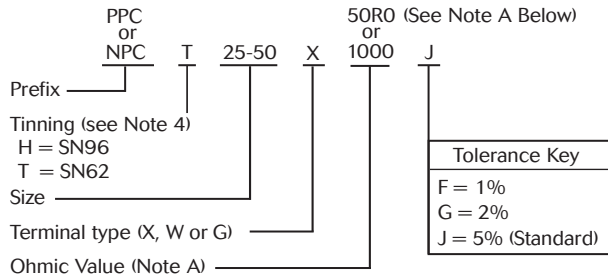


GENERAL INFORMATION

When mounted on an appropriate heat sink, these chip devices provide high power dissipation in terminations and as balancing resistors in Wilkinson power divider networks. Laser trimming provides maximum peak and average R.F. power capability.

ORDERING INFORMATION

EXAMPLE: Typical Model No.



NOTE A

Resistance value is expressed using military 4-digit call-out.
50R0 = 50 ohms
1000 = 100 ohms

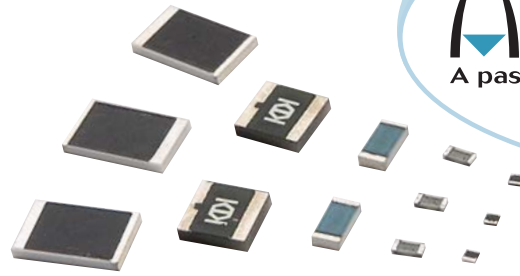
Other values from 10–500 ohms may be available as special order.
Contact factory for availability.

GENERAL SPECIFICATIONS

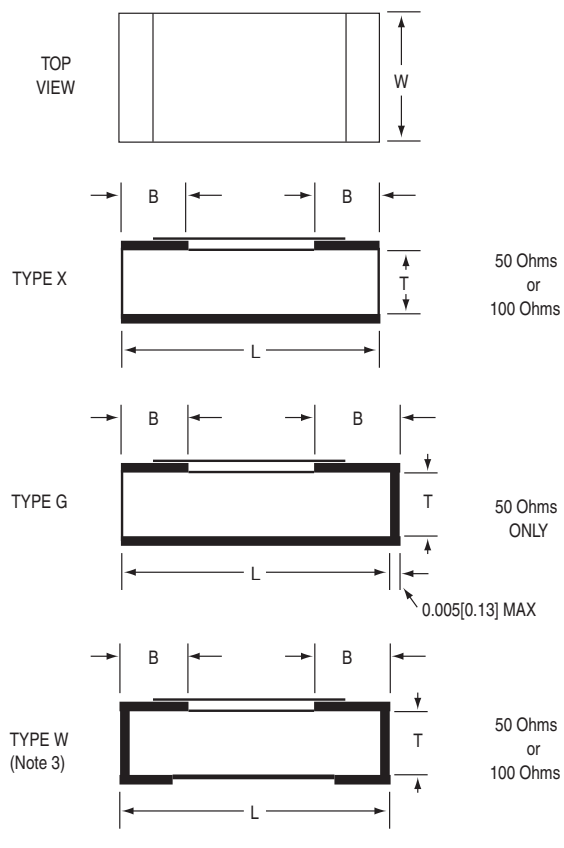
Solderable Terminals	Electroplated Silver over Nickel (PPC) Gold over Nickel alloy (NPC)
Substrate	Beryllium Oxide Ceramic
Resistive Element	Thin Film and Thick Film*

NOTES

- The "L" and "T" dimensions are for the substrate only and do not include terminal thickness or optional tinning thickness.
- Thermal Resistance (R^θ) is measured in °C/W between resistive film and mounting surface.
- The CW power rating is based on maximum film temperature of +150°C and with maximum heatsink temperature of +100°C. Power is based on infinite and ideal heatsink. Type "W" termination style does not have full back plane metallization and typically handles 1/10 the rated power.
- Tinning with SN96 "Lead Free" high temperature solder will maintain RoHS compliance.



Physical Dimensions



PERFORMANCE SPECIFICATIONS

Model Prefix	W		L (Note 1)		T (Note 1)		B	Capacitance (pf) Typical	R ^θ C/W Max. (Note 2)	C/W Power	Freq. GHz (**)	
	in	[mm]	in	[mm]	in	[mm]						in
*PPC 100-200A	0.100	[2,5]	0.200	[5,1]	0.040	[1,02]	0.030	[0,76]	0.8	0.80	20W	DC-4.0
*PPC 250-250A	0.250	[6,4]	0.250	[6,4]	0.040	[1,02]	0.050	[1,27]	1.2	0.30	40W	DC-2.5
*PPC 250-375A	0.250	[6,4]	0.375	[9,53]	0.040	[1,02]	0.050	[1,27]	3.5	0.15	150W	DC-1.0
NPC 25-50	0.025	[0,64]	0.050	[1,27]	0.010	[0,25]	0.012	[0,305]	0.3	3.90	3W	DC-12.4
*NPC 50-50	0.050	[1,27]	0.050	[1,27]	0.010	[0,25]	0.012	[0,305]	0.5	1.90	5W	DC-10
*NPC 50-100	0.050	[1,27]	0.100	[2,5]	0.010	[0,25]	0.017	[0,43]	1.0	0.72	10W	DC-4.0
NPC 75-150	0.075	[1,91]	0.150	[3,8]	0.010	[0,25]	0.020	[0,51]	1.8	0.29	15W	DC-4.0

* Low cost thick film models available on these sizes. Consult factory for specifications.

** Typical VSWR for all terminations is 1.25:1



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

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SERIES PMS, PPR, PPT RESISTORS & TERMINATIONS

High Power, Thin Film, Drop-in – 10-650 Watts, DC-4 GHz

GENERAL INFORMATION

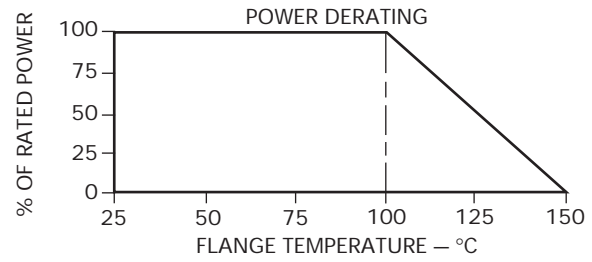
These high power devices are designed to dissipate power in R.F. circuits when mounted to an appropriate heat sink. The terminations provide a low VSWR under maximum power conditions. The resistor configurations are typically used in "Wilkinson" type power divider networks, or to terminate 3 dB stripline or microstrip hybrids.

NOTES

1. Input power ratings are based on flange temperature of 100° C maximum.
2. 50 and 100 Ohms standard. Other values from 10-500 ohms available on special order. Contact factory for details. Standard tolerance ±5%. Specify resistance value when ordering.
3. VSWR applies to termination style only.



AVERAGE POWER DERATING CURVE



GENERAL SPECIFICATIONS



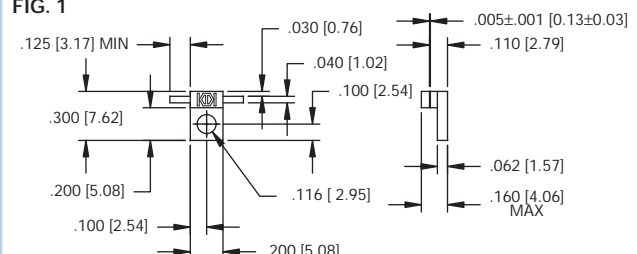


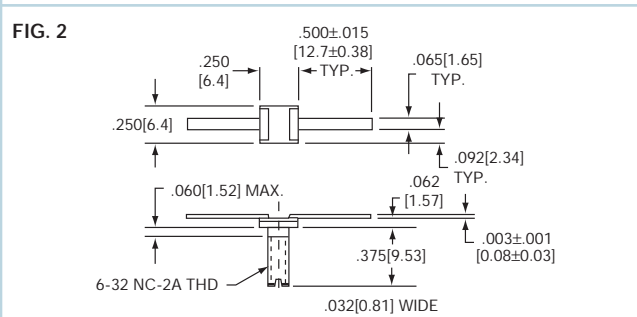
Resistive Element	Thin Film and Thick Film*
Substrate	Beryllium Oxide Ceramic
Cover	Alumina Ceramic
Mounting Flange	Copper, Nickel Plated per QQ-N-290
Tab	Beryllium Copper, Gold Plated per MIL-G-45204

* Low cost thick film models available on some sizes. Consult Factory for specifications.

PERFORMANCE SPECIFICATIONS

Model	Frequency Range	Input Power (Watts Avg.)	VSWR (Typical) (Note 3)	Capacitance (pF) (Typ.)	Figure No.
PPR & PPT 300-10-3*	DC-4.0 GHz	10	1.35:1 —DC-4.0 GHz	0.8	1
PMS-100 & PMS-200*	DC-2.0 GHz	20	1.25:1 —DC-2.0 GHz	1.2	2
PPR & PPT 515-20-3*	DC-2.0 GHz	20	1.10:1 —DC-1.0 GHz 1.25:1 —1.0-2.0 GHz	0.8	3
PPT515-30-4	DC-4.0 GHz	30	1.20:1 —DC-4 GHz	1.2	4
PPR & PPT 515-30*	DC-2.0 GHz	30	1.10:1 —DC-1.0 GHz 1.25:1 —1.0-2.0 GHz	0.8	5
PPR & PPT 800-40-3	DC-4.0 GHz	40	1.25:1 —DC-4.0 GHz	1.4	6
PPT800-100A	DC-2.0 GHz	100	1.25:1 —DC-2.0 GHz	1.4	7
PPR & PPT 870-150-3*	DC-1.0 GHz	150	1.20:1 —DC-500 MHz 1.35:1 —500-1000 MHz	3.5	8
PPR & PPT 975-250-3	DC-1.0 GHz	250	1.25:1 —DC-500 MHz 1.35:1 —500-1000 MHz	5.0	9
PPR & PPT 1250-400	DC-500 MHz	400	1.50:1 —DC-500 MHz	7.0	10
PPR & PPT 1900-800	DC-500 MHz	650	1.25:1 —DC-200 MHz 1.50:1 —200-500 MHz	10.2	11


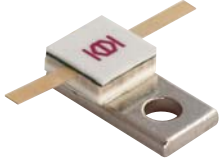
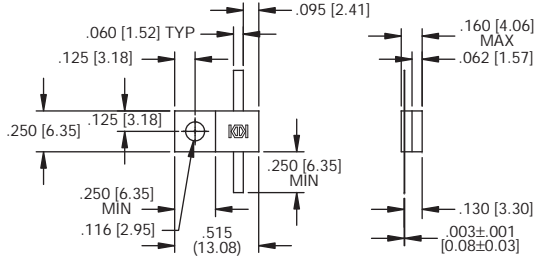
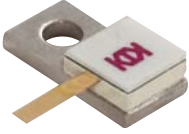
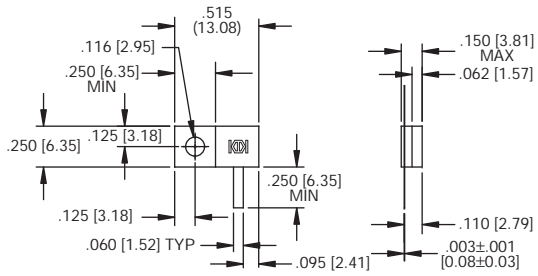

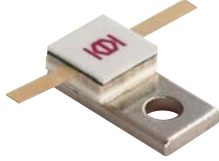
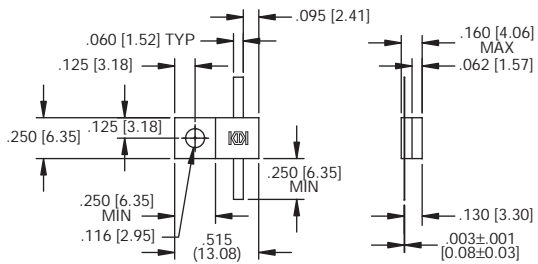


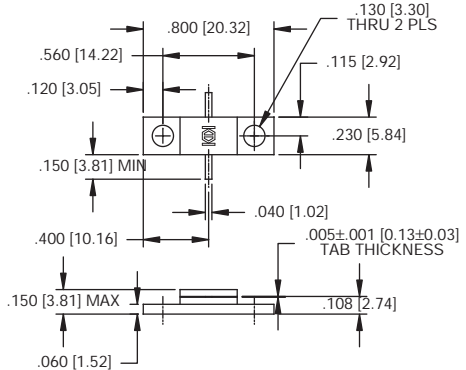
PHYSICAL DIMENSIONS

TERMINATIONS (PPT) SERIES	RESISTORS (PPR) SERIES	FIGURES
PPT 300-10-3 — 10 WATTS Flange Mounted 	PPR 300-10-3 — 10 WATTS Flange Mounted 	FIG. 1 
PMS 100 — 20 WATTS Stud Mounted 	PMS 200 — 20 WATTS Stud Mounted 	FIG. 2 

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]


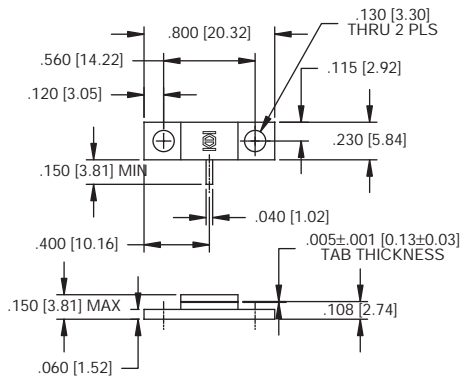


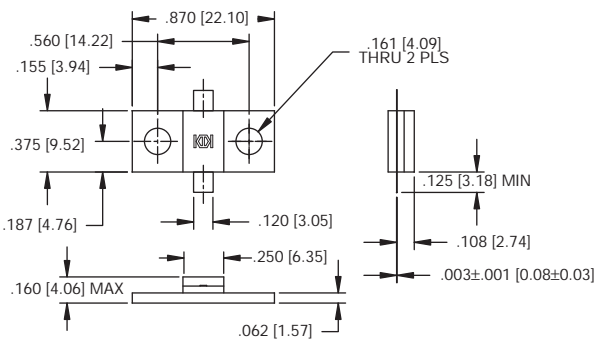


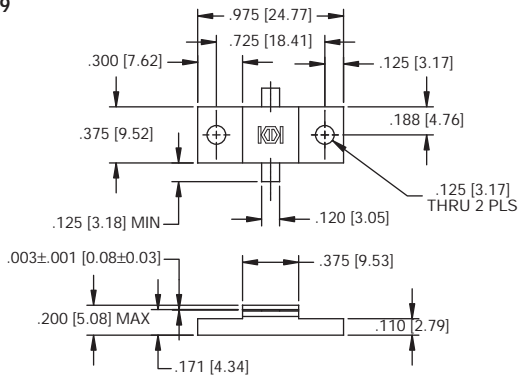


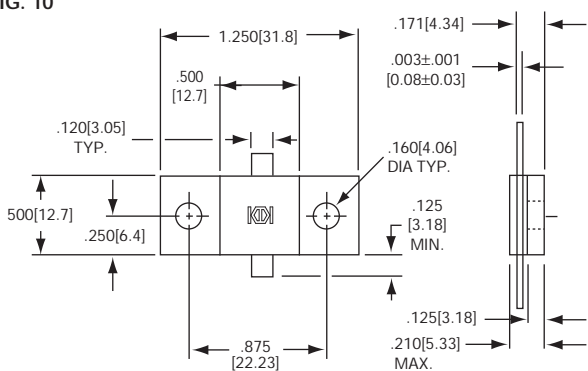
SERIES PMS, PPR, PPT RESISTORS & TERMINATIONS

PHYSICAL DIMENSIONS

TERMINATIONS (PPT) SERIES	RESISTORS (PPR) SERIES	FIGURES
<p>PPT 515-20-3 — 20 WATTS Flange Mounted</p> 	<p>PPR 515-20-3 — 20 WATTS Flange Mounted</p> 	<p>FIG. 3</p> 
<p>PPT 515-30-4 — 30 WATTS Flange Mounted</p> 	<p><i>Offered as a Termination Only!</i></p>	<p>FIG. 4</p> 
<p>PPT 515-30 — 30 WATTS Flange Mounted</p> 	<p>PPR 515-30 — 30 WATTS Flange Mounted</p> 	<p>FIG. 5</p> 
<p>PPT 800-40-3 — 40 WATTS Flange Mounted</p> 	<p>PPR 800-40-3 — 40 WATTS Flange Mounted</p> 	<p>FIG. 6</p> 



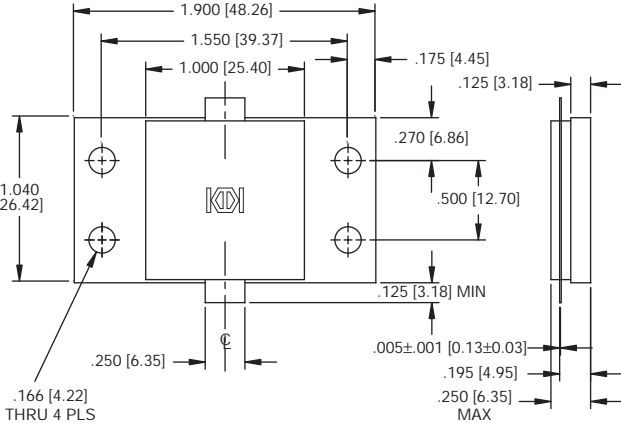
SERIES PMS, PPR, PPT RESISTORS & TERMINATIONS

PHYSICAL DIMENSIONS

TERMINATIONS (PPT) SERIES	RESISTORS (PPR) SERIES	FIGURES
<p>PPT 800-100A — 100 WATTS Flange Mounted</p> 	<p><i>Offered as a Termination Only!</i></p>	<p>FIG. 7</p> 
<p>PPT 870-150-3 — 150 WATTS Flange Mounted</p> 	<p>PPR 870-150-3 — 150 WATTS Flange Mounted</p> 	<p>FIG. 8</p> 
<p>PPT 975-250-3 — 250 WATTS Flange Mounted</p> 	<p>PPR 975-250-3 — 250 WATTS Flange Mounted</p> 	<p>FIG. 9</p> 
<p>PPT 1250-400 — 400 WATTS Flange Mounted</p> 	<p>PPR 1250-400 — 400 WATTS Flange Mounted</p> 	<p>FIG. 10</p> 

SERIES PMS, PPR, PPT RESISTORS & TERMINATIONS

PHYSICAL DIMENSIONS

TERMINATIONS (PPT) SERIES	RESISTORS (PPR) SERIES	FIGURES
<p>PPT 1900-800 — 650 WATTS Flange Mounted</p> 	<p>PPR 1900-800 — 650 WATTS Flange Mounted</p> 	<p>FIG. 11</p> 

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

SERIES PCL TERMINATIONS

Cartridge – DC-18 GHz



GENERAL INFORMATION

Aeroflex/KDI Cartridge Terminations are miniature, space saving models with high power capability to 15 watts.

The PCL Series incorporates an alignment slot to assist in accurate positioning when soldering to a stripline or microstrip circuit.

PCL SERIES FEATURES

- Alignment Slot
- Weight less than 2 grams
- Space Saver-Compact size

MATERIALS

Housing: Copper, Nickel Plated per QQ-N-290

Tab: Beryllium Copper, Gold Plated per MIL-G-45204

NOTE

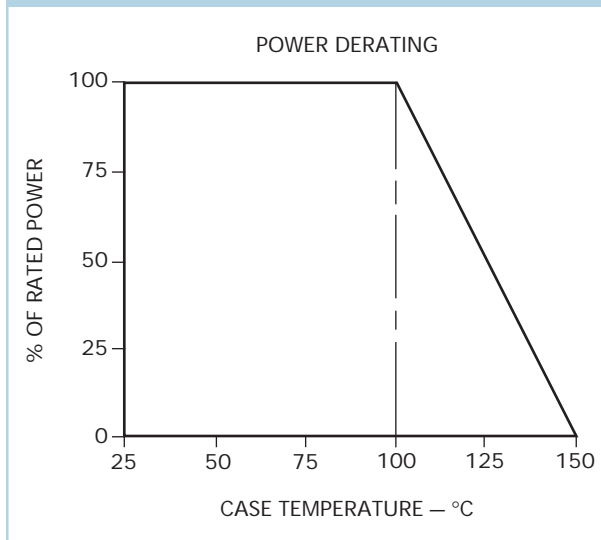
1. VSWR as measured in a 50 ohm stripline circuit.



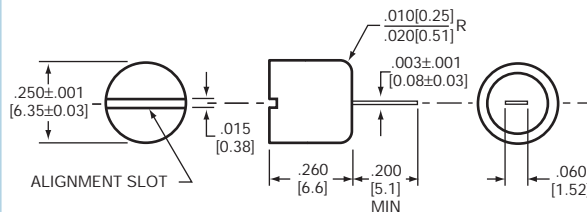
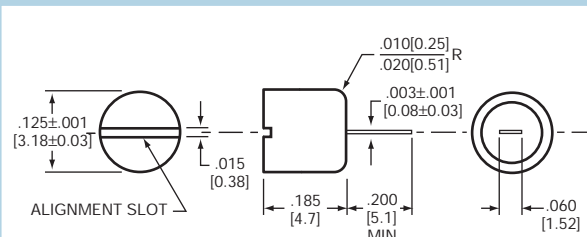
PERFORMANCE SPECIFICATIONS

Part Number	Input Frequency Range	Power (Watts)	VSWR (Typical) ⁽¹⁾
PCL3-125-3	DC-18 GHz	3	DC-4 GHz—1.10:1 4-8 GHz—1.20:1 8-12.4 GHz—1.30:1 12.4-18 GHz—1.50:1
PCL15-250-1	DC-12.4 GHz	15	DC-4 GHz—1.10:1 4-8 GHz—1.20:1 8-12.4 GHz—1.30:1

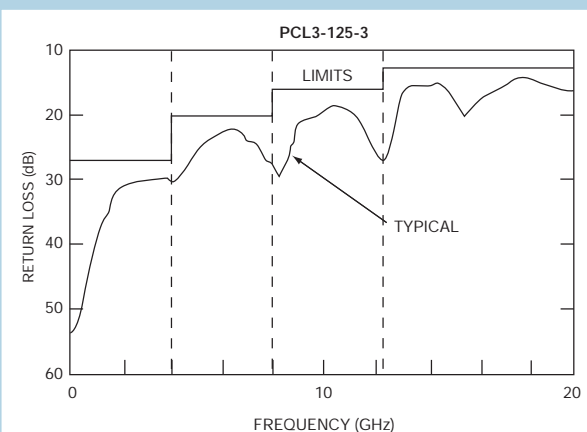
AVERAGE POWER DERATING CURVE



PHYSICAL DIMENSIONS



TYPICAL PERFORMANCE



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

60 South Jefferson Road, Whippany, NJ 07981

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SERIES PCA, PCAA ATTENUATORS, CHIP

Low Power – DC-18 GHz



FEATURES

- Laser Trimmed
- Temperature Stable

GENERAL INFORMATION

The PCA and PCAA Series consists of a laser trimmed distributed thin film element on an alumina ceramic substrate with solderable terminals. Two sizes are available. The PCA size operates to 12.4 GHz and the PCAA size operates to 18.0 GHz. Both sizes are available with leads and wrap around conductors for ease of installation. The PCAF and PCAAF options are designed for “flip-chip” application in lower frequency circuits.

PCA & PCAA SERIES DATA

- Substrate: 96% Alumina
- Solderable Terminals: Electroplated Silver over Nickel
- Resistive Element: Proprietary Thin Film
- Wrap around Ground Terminal available, “W” option
- Wrap around-all terminals—“F” option
- Standard values 1, 2, 3, 4, 5, 6, 10, 20 dB
- Non-std. values available as special order

ORDERING INFORMATION

The attenuators listed are available in 1 dB increments from 1 through 20 dB. When ordering, to specify the correct part number for the desired attenuation value, select any of the series listed and add the attenuation value desired to the basic series designation.

Options (Note 4)

L = Lead/Tab (Gold Plated BeCu)

W = Wrap around ground only

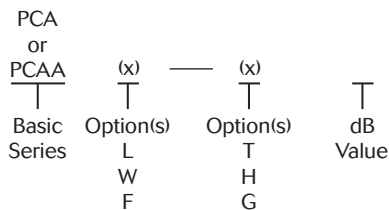
F = Wrap around all terminals (flip-chip)

T = Tinned terminals (any terminal type) SN62

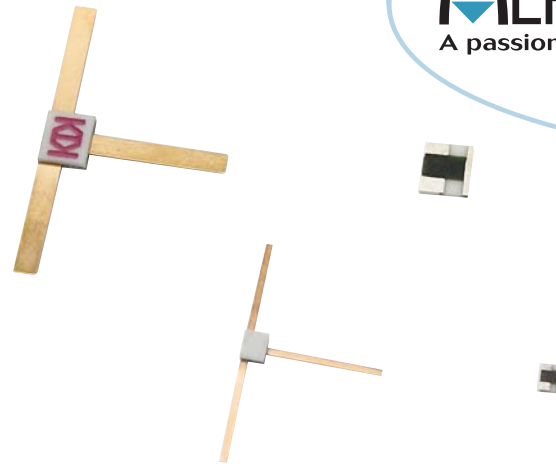
H = Tinned terminals (any terminal type) SN96

G = Gold plated terminals

EXAMPLE:



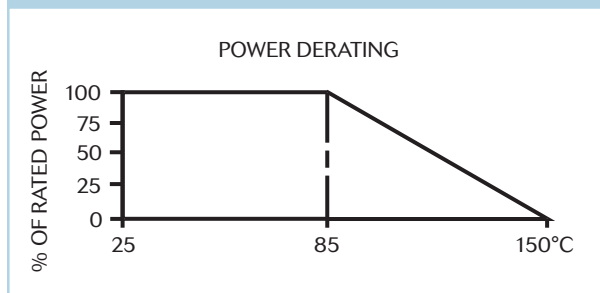
EXAMPLES: PCAW-T3
PCAAF-G3



GENERAL SPECIFICATIONS

Impedance	50 Ohms
Operating Temperature	-55°C to +150°C
Attenuation Stability	0.0001 dB/dB/°C

AVERAGE POWER DERATING CURVE



NOTES

1. Performance of other dB values vary dependent on attenuation. Contact factory for specifications for fractional dB values.
2. Performance is based on device mounted in matched 50 ohm line.
3. Rated power 1.5 watts input PCA, 100 mw PCAA.
4. Tinning with SN96 “Lead Free” high temperature solder will maintain RoHS compliance.

PERFORMANCE SPECIFICATIONS

Attenuation Increments (dB) Note 1	Attenuation Accuracy (dB) Note 2				VSWR (Typical) Note 2			
	DC - 4 GHz PCA, PCAA Series	4 - 8 GHz PCA, PCAA Series	8 - 12.4 GHz PCA, PCAA Series	12.4 - 18 GHz PCAA Series Only	DC - 4 GHz PCA, PCAA Series	4 - 8 GHz PCA, PCAA Series	8 - 12.4 GHz PCA, PCAA Series	12.4 - 18 GHz PCAA Series Only
1 - 3	0.5	0.5	0.5	0.5	1.25	1.35	1.50	1.50
4 - 6	0.5	0.5	0.5	0.75	1.25	1.35	1.50	1.50
7 - 10	0.5	0.5	0.75	1.0	1.25	1.35	1.50	1.50
11 - 15	0.75	+0.5 -3.0	+0.5 -4.0	—	1.25	1.35	1.50	—
16 - 20	1.0	+0.5 -4.0	—	—	1.25	1.35	—	—

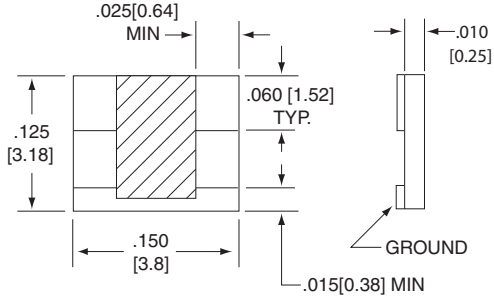
KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

SERIES PCA, PCAA ATTENUATORS, CHIP

Low Power – DC-18 GHz

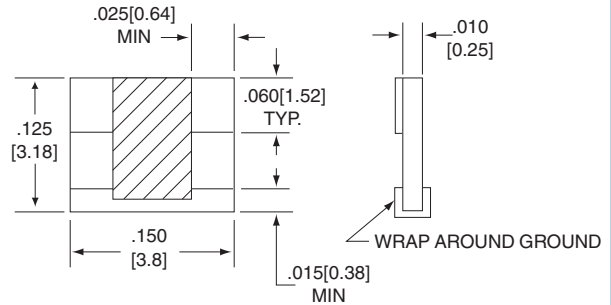
PHYSICAL DIMENSIONS

PCA

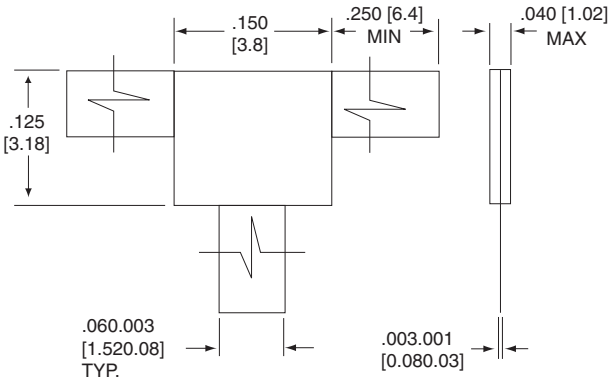


PCAW

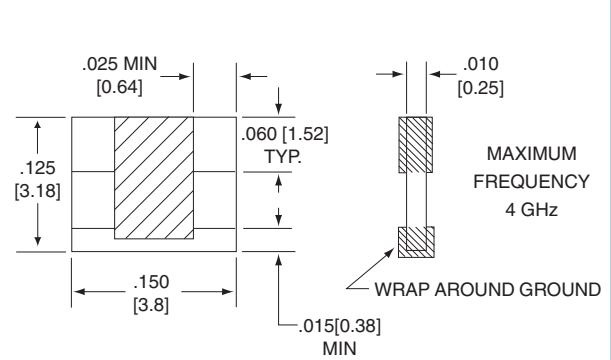
(WRAP AROUND GROUND TERMINAL ONLY)



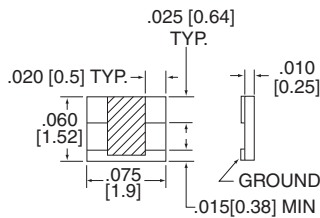
PCAL (LEAD/COVER)



PCAF (WRAP AROUND ALL TERMINALS)

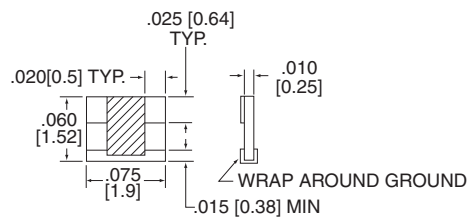


PCAA

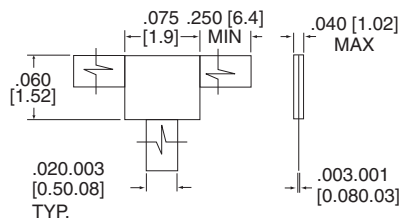


PCAAW

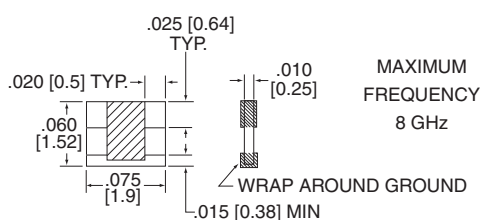
(WRAP AROUND GROUND TERMINAL ONLY)



PCAAL (LEAD/COVER)



PCAALF (WRAP AROUND ALL TERMINALS)



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 LX ±0.8 .XX ±0.25]

SERIES ANT, ANR RESISTORS & TERMINATIONS



High Power, Aluminum Nitride, Thin Film, Drop-in – 10-600 Watts, DC-4 GHz



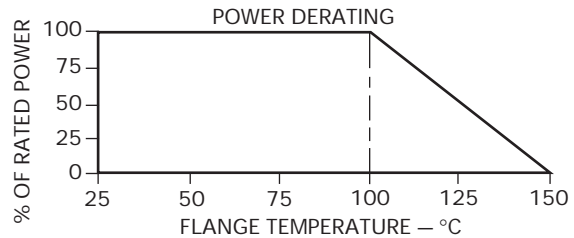
GENERAL INFORMATION

These high power devices are designed to dissipate power in R.F. circuits when mounted to an appropriate heat sink. The terminations provide a low VSWR under maximum power conditions. The resistor configurations are typically used in "Wilkinson" type power divider networks, or to terminate 3 dB stripline or microstrip hybrids. Aluminum nitride is used for those applications where the use and disposal of beryllium oxide is a concern.

NOTES

1. Input power ratings are based on flange temperature of 100° C maximum.
2. 50 and 100 Ohms standard. Other values from 10-500 ohms available on special order. Contact factory for details. Standard tolerance ±5%. Specify resistance value when ordering.
3. VSWR applies to termination style only.

AVERAGE POWER DERATING CURVE





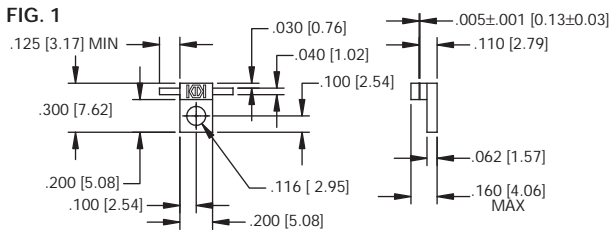

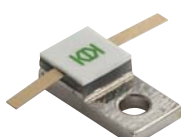
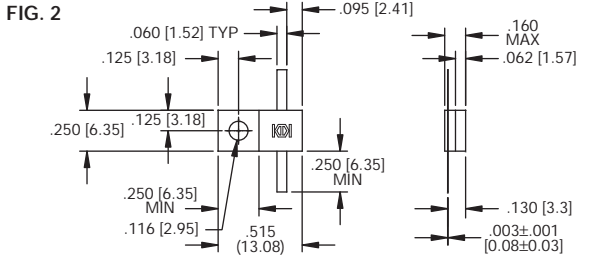

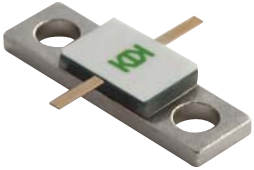
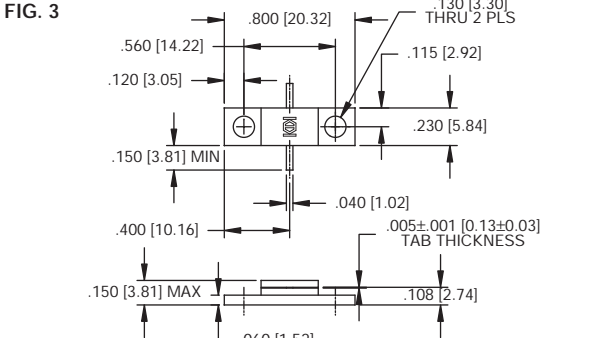
GENERAL SPECIFICATIONS

Resistive Element	Thin Film
Substrate	Aluminum Nitride
Cover	Alumina Ceramic
Mounting Flange	Copper, Nickel Plated per QQ-N-290
Tab	Beryllium Copper, Gold Plated per MIL-G-45204

PERFORMANCE SPECIFICATIONS

Model	Frequency Range	Input Power (Watts Avg.)	VSWR (Typical) (Note 3)	Capacitance (pF) (Typ.)	Figure No.
ANT & ANR 300-10	DC-4.0 GHz	10	1.25:1	1.0	1
ANT & ANR 515-40	DC-2.5 GHz	40	1.15:1	1.0	2
ANT & ANR 515-80	DC-1.0 GHz	80	1.25:1	1.6	2
ANT & ANR 800-100	DC-2.0 GHz	100	1.25:1	1.4	3
ANT & ANR 870-150	DC-2.0 GHz	150	1.25:1	4.5	4
ANT & ANR 975-200	DC-1.0 GHz	200	1.25:1	4.5	5
ANT & ANR 1250-400	DC-500 MHz	400	1.50:1	7.0	6
ANT & ANR 1900-600	DC-500 MHz	600	1.50:1	15.0	7



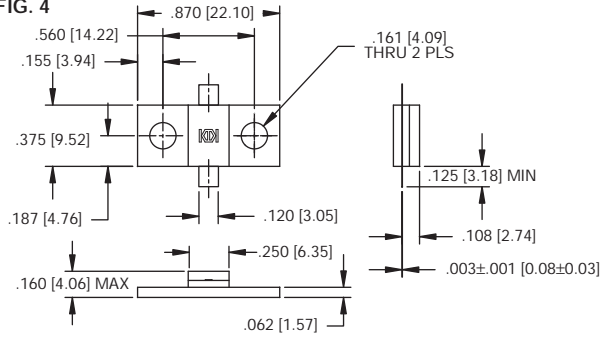

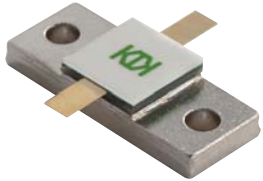
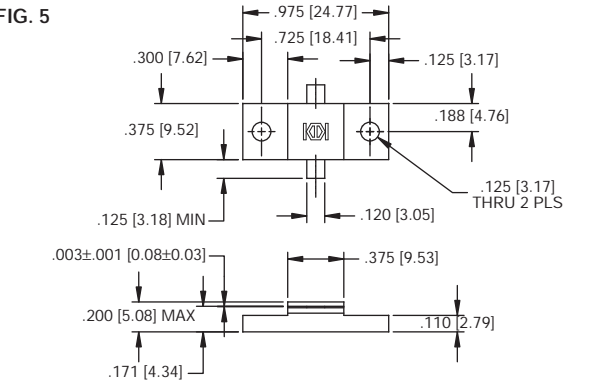


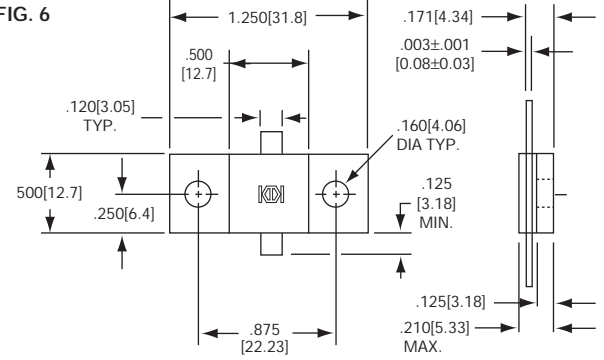

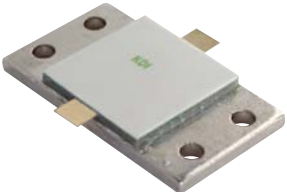
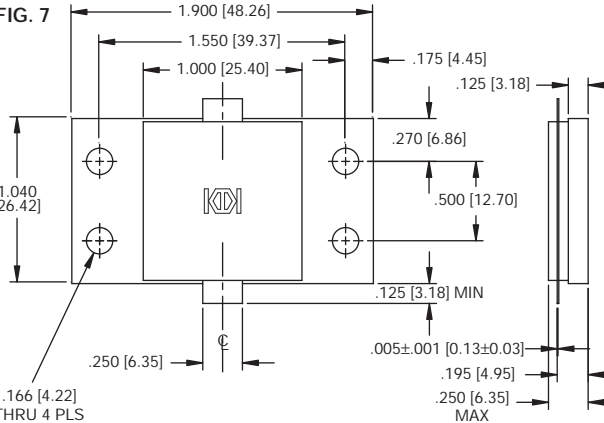
PHYSICAL DIMENSIONS

TERMINATIONS (ANT) SERIES	RESISTORS (ANR) SERIES	FIGURES
ANT 300-10 — 10 WATTS Flange Mounted 	ANR 300-10 — 10 WATTS Flange Mounted 	FIG. 1 
ANT 515-40 — 40 WATTS ANT 515-80 — 80 WATTS Flange Mounted 	ANR 515-40 — 40 WATTS ANR 515-80 — 80 WATTS Flange Mounted 	FIG. 2 
ANT 800-100 — 100 WATTS Flange Mounted 	ANR 800-100 — 100 WATTS Flange Mounted 	FIG. 3 

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

SERIES ANT, ANR RESISTORS & TERMINATIONS

PHYSICAL DIMENSIONS

TERMINATIONS (ANT) SERIES	RESISTORS (ANR) SERIES	FIGURES
ANT 870-150 — 150 WATTS Flange Mounted 	ANR 870-150 — 150 WATTS Flange Mounted 	FIG. 4  <p> .560 [14.22] .870 [22.10] .155 [3.94] .161 [4.09] THRU 2 PLS .375 [9.52] .120 [3.05] .187 [4.76] .250 [6.35] .160 [4.06] MAX .125 [3.18] MIN .108 [2.74] .003±.001 [0.08±0.03] .062 [1.57] </p>
ANT 975-200 — 200 WATTS Flange Mounted 	ANR 975-200 — 200 WATTS Flange Mounted 	FIG. 5  <p> .975 [24.77] .725 [18.41] .125 [3.17] .300 [7.62] .188 [4.76] .375 [9.52] .125 [3.18] MIN .120 [3.05] .125 [3.17] THRU 2 PLS .003±.001 [0.08±0.03] .375 [9.53] .200 [5.08] MAX .110 [2.79] .171 [4.34] </p>
ANT 1250-400 — 400 WATTS Flange Mounted 	ANR 1250-400 — 400 WATTS Flange Mounted 	FIG. 6  <p> 1.250 [31.8] .171 [4.34] .500 [12.7] .003±.001 [0.08±0.03] .120 [3.05] TYP. .160 [4.06] DIA TYP. 500 [12.7] .125 [3.18] MIN. .250 [6.4] .125 [3.18] .875 [22.23] .210 [5.33] MAX. </p>
ANT 1900-600 — 600 WATTS Flange Mounted 	ANR 1900-600 — 600 WATTS Flange Mounted 	FIG. 7  <p> 1.900 [48.26] .175 [4.45] .125 [3.18] 1.550 [39.37] .270 [6.86] 1.000 [25.40] .500 [12.70] 1.040 [26.42] .125 [3.18] MIN .250 [6.35] .005±.001 [0.13±0.03] .166 [4.22] THRU 4 PLS .195 [4.95] .250 [6.35] MAX </p>

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

SERIES ANC

RESISTORS, TERMINATIONS

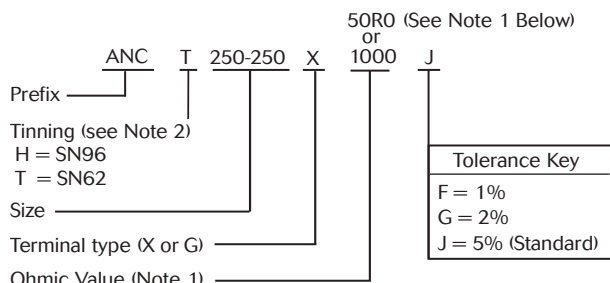
High Power Chip, Aluminum Nitride – 50 & 100 Ohms

GENERAL INFORMATION

When mounted on an appropriate heat sink, these chip devices provide high power dissipation in terminations and as balancing resistors in Wilkinson power divider networks. Laser trimming provides maximum R.F. power capability. Aluminum nitride is used for those applications where the use and disposal of beryllium oxide is a concern.

ORDERING INFORMATION

EXAMPLE: Typical Model No.



NOTE A

- Resistance value is expressed using military 4-digit call-out.
50R0 = 50 ohms
1000 = 100 ohms

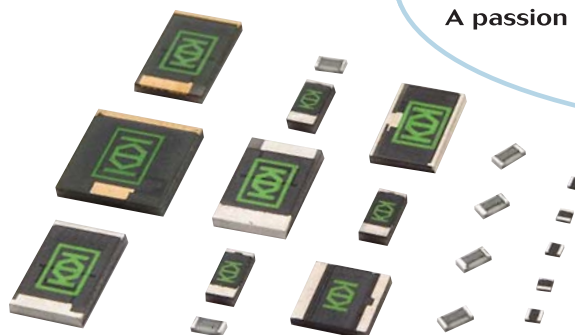
Other values from 10–500 ohms may be available as special order.
Contact factory for availability.
- Tinning with SN96 "Lead Free" high temperature solder will maintain RoHS compliance.

GENERAL SPECIFICATIONS

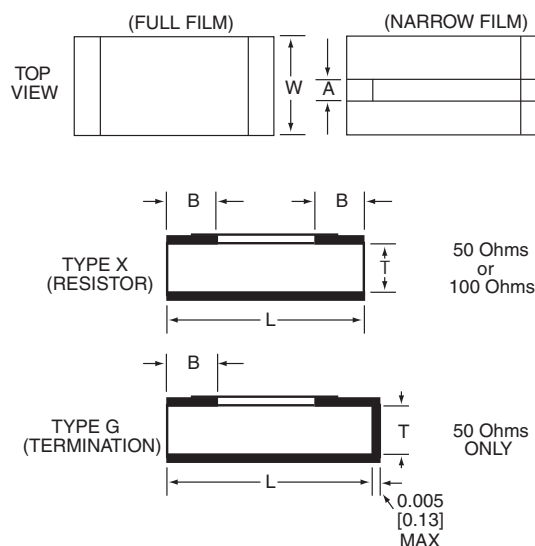
Solderable Terminals	Electroplated Silver over Nickel
Substrate	Aluminum Nitride
Resistive Element	Thin Film

PERFORMANCE SPECIFICATIONS

Model Prefix	W in [mm]	L in [mm]	T in [mm]	A in [mm]	B in [mm]	Capacitance (pF) Typical	Termination VSWR Typical	Power CW	FREQ. GHz
ANC 50-50	0.050 [1,27]	0.050 [1,27]	0.010 [0,25]	N/A	0.010 [0,25]	0.5	1.25	5	DC-4.0
ANC 50-100	0.050 [1,27]	0.100 [2,5]	0.010 [0,25]	N/A	0.020 [0,51]	1.0	1.25	10	DC-2.0
ANC 100-200	0.100 [2,5]	0.200 [5,1]	0.040 [1,02]	N/A	0.030 [0,76]	1.0	1.25	10	DC-4.0
ANC 200-200	0.200 [5,1]	0.200 [5,1]	0.040 [1,02]	0.085 [2,2]	0.040 [1,02]	1.2	1.25	30	DC-4.0
ANC 250-250-40	0.250 [6,4]	0.250 [6,4]	0.040 [1,02]	0.085 [2,2]	0.050 [1,27]	1.0	1.15	40	DC-2.5
ANC 250-250-80	0.250 [6,4]	0.250 [6,4]	0.040 [1,02]	N/A	0.050 [1,27]	1.6	1.25	80	DC-1.0
ANC 250-375	0.250 [6,4]	0.375 [9,5]	0.040 [1,02]	N/A	0.050 [1,27]	4.5	1.25	125	DC-1.0
ANC 350-225	0.350 [8,9]	0.225 [5,7]	0.040 [1,02]	0.045 [1,14]	0.050 [1,27]	1.4	1.25	100	DC-2.0
ANC 375-375	0.375 [9,5]	0.375 [9,5]	0.040 [1,02]	0.250 [6,4]	0.050 [1,27]	4.5	1.25	200	DC-1.0



PHYSICAL DIMENSIONS



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]

60 South Jefferson Road, Whippany, NJ 07981
Tel: 973-887-8100 • Fax: 973-560-1372
www.aeroflex.com/kdi-resistor • kdi-resistor-sales@aeroflex.com



SERIES PST TERMINATIONS

Pill Shape – DC-18 GHz



GENERAL INFORMATION

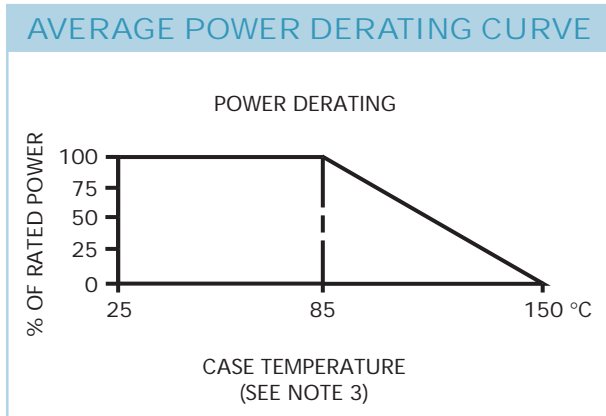
KDI's series of Pill Shape Terminations feature a superior resilient spring design which provides maximum electrical efficiency as a result of its mechanical integrity. Unlike other designs that have a single contact or mounting point, this foolproof beryllium copper resilient spring employs eight individual spring contact points; thus assuring electrical and mechanical performance at all times. Devices are 100% RF tested through 18 GHz and this package offers excellent protection from moisture.



GENERAL SPECIFICATIONS	
Frequency	DC-18 GHz
Impedance	50 Ohms
Operating Temperature	-55 to +150°C
Substrate	Alumina (1W) BeO Ceramic (3W)
Resistive Element	Proprietary Thin Film

RESILIENT PILLSHAPE TERMINATIONS			
Part Number	Frequency Range	Input Power (Watts)	VSWR (Typical) ⁽¹⁾
PST-1	DC-18 GHz	1	DC-8 GHz—1.20:1 8-12.4 GHz—1.35:1 12.4-18 GHz—1.50:1
PST-2	DC-18 GHz	3	DC-8 GHz—1.20:1 8-12.4 GHz—1.35:1 12.4-18 GHz—1.50:1

NON-RESILIENT PILLSHAPE TERMINATIONS			
Part Number	Frequency Range	Input Power (Watts)	VSWR (Typical) ⁽¹⁾
PST-62	DC-18 GHz	1	DC-8 GHz—1.30:1 8-12.4 GHz—1.35:1 12.4-18 GHz —1.70:1
PST-125	DC-18 GHz	3	DC-8 GHz—1.20:1 8-12.4 GHz—1.35:1 12.4-18 GHz—1.50:1



NOTE

1. VSWR as measured in 50 Ohm stripline circuit.

PHYSICAL DIMENSIONS

MODEL	"A"	"B"	"C"
PST-1	.135[3.43]	.121[3.07]	.060[1.52]
PST-2	.135[3.43]	.121[3.07]	.060[1.52]

MODEL	"A"	"B"
PST-62	.062[1.575]	.030[0.76]
PST-125	.125[3.18]	.060[1.52]

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [X ±0.8 .XX ±0.25]



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SERIES PSA ATTENUATORS

Pill, Drop-in – DC-12.4 GHz



FEATURES

- Laser Trimmed
- Temperature Stable
- 100% Tested
- Fixtures Available

GENERAL INFORMATION

The PSA Series attenuators are “pill” devices designed for installation in stripline circuits. The element is a thin film laser trimmed chip, en-capsulated in an epoxy. The resilient spring configuration provides positive ground plane contact, regardless of variations in ground plane spacing tolerances. The PSA Series attenuators are ideal for high-rel applications.

ORDERING INFORMATION

The attenuators are available in 1 dB increments from 1 through 20 dB. Specify desired attenuation value by adding the attenuation value to the basic series designation. (See note 4)

EXAMPLE:

PSA - X
 | |
 Basic dB
 Series Value

NOTES

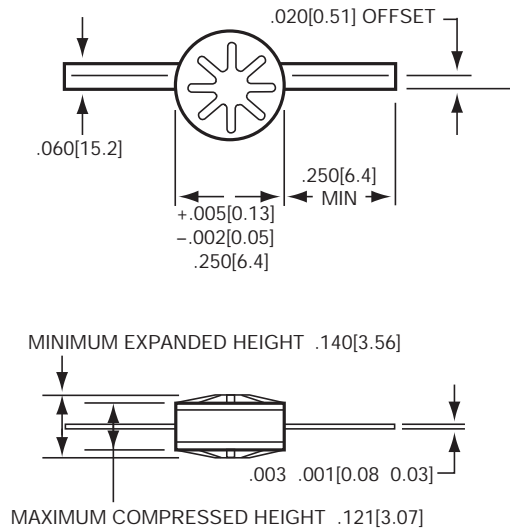
1. Performance of other dB values vary dependent on attenuation. Contact factory for specifications for fractional dB values.
2. Performance is typical and based on device mounted in matched 50 ohm line.
3. Rated power 1.5 watts input.
4. Standard values 1, 2, 3, 4, 5, 6, 10, 20 dB. Non-std values available as special order.



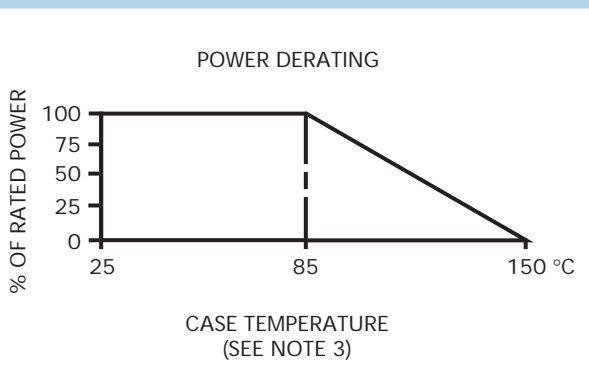
GENERAL SPECIFICATIONS

Impedance	50 ohms
Operating Temperature	-55°C to +150°C
Substrate	96% Alumina
Resistive Element	Proprietary Thin Film
Case, Cap & Tabs	Copper, Gold Plated per MIL-G-45204

PHYSICAL DIMENSIONS



AVERAGE POWER DERATING CURVE



PERFORMANCE SPECIFICATIONS

Attenuation Increment (dB) Notes 1,4	Attenuation Accuracy (dB) Note 2			VSWR (Typical) Note 2		
	DC-4 GHz	4-8 GHz	8-12.4 GHz	DC-4 GHz	4-8 GHz	8-12.4 GHz
1 - 3	±0.5	±0.5	±0.5	1.25	1.35	1.50
4 - 6	±0.5	±0.5	±0.5	1.25	1.35	1.50
7 - 10	±0.5	±0.5	±0.75	1.25	1.35	1.50
11 - 15	±0.75	+0.5 -3.0	+0.5 -4.0	1.25	1.35	1.50
16 - 20	±1.0	+0.5 -4.0	—	1.25 1.25	1.35 1.35	— —



KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [LX ±0.8 .XX ±0.25]

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SERIES PCX

HIGH POWER COAXIAL TERMINATIONS

DC to 6 GHz



GENERAL INFORMATION

The PCX Series High Power Terminations are designed to dissipate RF power when mounted to a heat sink or chill plate. Power levels up to 500 watts in 50 ohm impedance are available in units with SMA or Type N, male or female connectors. High stability thin film resistive elements on beryllium oxide substrates are used to insure stable VSWR performance over temperature and environmental conditions.

NOTES

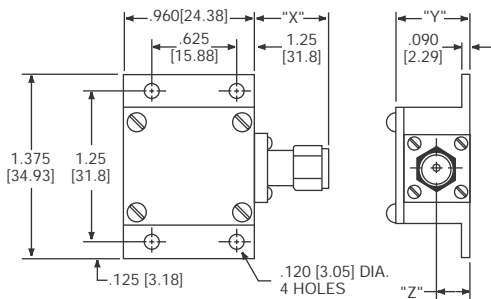
1. Input power ratings based on case temperature of 85°C maximum.
2. Connectors: SMA - Stainless Steel Passivated per MIL-C-39012, Type N - Nickel Plated Brass per MIL-C-39012
3. Housing: Copper, Nickel Plated per QQ-N-290



PERFORMANCE SPECIFICATIONS

Part Number	Input Power (Watts) (Note 1)	Frequency Range	Connector Type (Note 2)	VSWR (Typical)	Outline
PCX-050-F-50 PCX-050-M-50	50	DC - 6 GHz	SMA Female SMA Male	DC-3 GHz: 1.25:1 3 - 6 GHz: 1.35:1	A
PCX-050-F-100 PCX-050-M-100	100	DC - 3 GHz	SMA Female SMAMale	DC - 3 GHz: 1.25:1	A
PCX-050-F-150 PCX-050-M-150 PCX-100-F-150 PCX-100-M-150	150	DC - 2 GHz	SMA Female SMA Male N Female N Male	DC - 1 GHz: 1.15:1 1 - 2 GHz: 1.40:1	B
PCX-050-F-250 PCX-050-M-250 PCX-100-F-250 PCX-100-M-250	250	DC - 800 MHz	SMA Female SMA Male N Female N Male	DC - 200 MHz: 1.15:1 200 - 400 MHz: 1.40:1 400-800 MHz: 1.30:1	B
PCX-100-M-500	500	DC - 200 MHz	N Male	DC - 200 MHz: 1.15:1	B

PHYSICAL DIMENSIONS

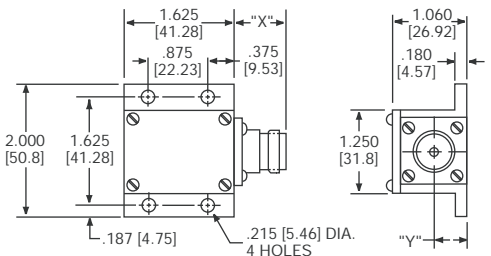


OUTLINE A (Shown with SMA)

MODEL	"X"	"Y"	"Z"
PCX050-F-50	.375 [9.53]	.560 [14.22]	.260 [6.60]
PCX050-M-50	.507 [12.88]	.560 [14.22]	.260 [6.60]
PCX050-F-100	.375 [9.53]	.560 [14.22]	.260 [6.60]
PCX050-M-100	.507 [12.88]	.560 [14.22]	.260 [6.60]



SMA 50 & 100 WATTS



OUTLINE B (Shown with TYPE N)

MODEL	"X"	"Y"
PCX050-F-150, 250	.375 [9.53]	.515 [13.08]
PCX050-M-150, 250	.375 [9.53]	.515 [13.08]
PCX100-F-150, 250, 500	.736 [18.69]	.508 [12.9]
PCX100-M-150, 250, 500	.819 [20.8]	.508 [12.9]



SMA OR N CONNECTORS
150, 250 & 500 WATTS

KEY: Inches [Millimeters] .XX ±.03 .XXX ±.010 [LX ±0.8 .XX ±0.25]



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Our passion for performance is defined by three attributes represented by these three icons: solution-minded, performance-driven and customer-focused