Introduction

Resistive Products

RF Power introduced its first product in 1987 and has since designed, manufactured and supported the most reliable line of high-power resistive components in the industry. Employing state-of-the-art equipment, manufacturing and quality assurance practices, our line of resistors, terminations and attenuators continue to be among the most cost effective, innovative and reputable solutions in the industry. In addition, RF Power's commitment to customer service excellence has resulted in our receiving several quality awards from major customers.

Traditionally, high-power resistive components have been constructed using a Beryllium Oxide (BeO) ceramic substrate. In recent years several governments and agencies have enacted prohibitions against the use of Beryllium Oxide. In response to these industry developments, RF Power undertook a research and development mission to develop an effective alternative to BeO, using an Aluminum Nitride (AIN) ceramic in its place. AIN has thermal and electrical properties comparable to BeO, but none of the environmental issues associated with it. The most recent addition to our product offering is a new line of RF Power Alumina (Al_2O_3) terminations. Alumina has electrical properties comparable to both BeO and AIN, but with a reduced power handling capability. This line is intended as a low-cost alternative to both BeO and AIN for less demanding applications.

RF Power high-power resistive products are widely used in the wireless industry, as well as in medical, industrial, military and aerospace applications. Our resistive products cover a wide range of communications bands, such as NMT-450, NMT-900, AMPS, ETACS, IS-95, GSM, DCS, PCS, W-CDMA, 3G, Wireless LAN, WCS, ISM and satellite communication bands. Typical applications for our products would be in splitter and combiner networks for power amplifiers, signal sensing in feed-forward amplifiers, isolator and circulator construction, delay line and cavity filter assemblies, and high power RF generators.

RF Power high-power resistive components are available in a wide variety of mechanical configurations including surface mount, chip, flanged, flangeless, coaxial and cable load.

Introduction

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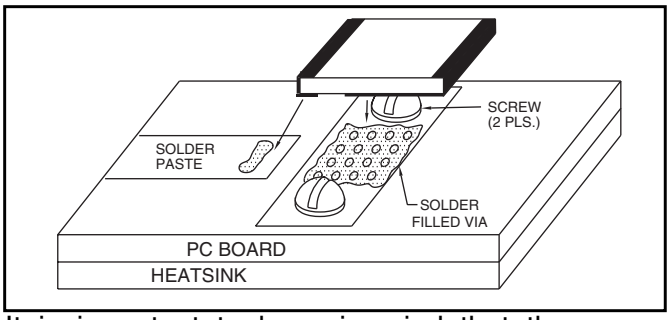
INSTALLATION DETAILS-

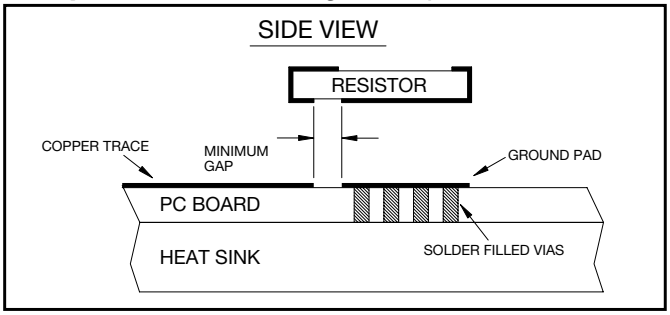
Surface Mount-

When mounting surface mount resistors, it is important to ensure that the best possible thermal path exists between the resistor and the heat sink. This should be done using solder filled vias to connect the ground pad on the resistor with the heat sink. To further improve the thermal connection, two screws should be mounted on either side of the resistor, pressing the PC board tightly against the heat sink.



It is important to keep in mind that the power handling specified for the given resistor assumes that the recommended mounting procedure is followed.

Footprint: When making a footprint for a surface

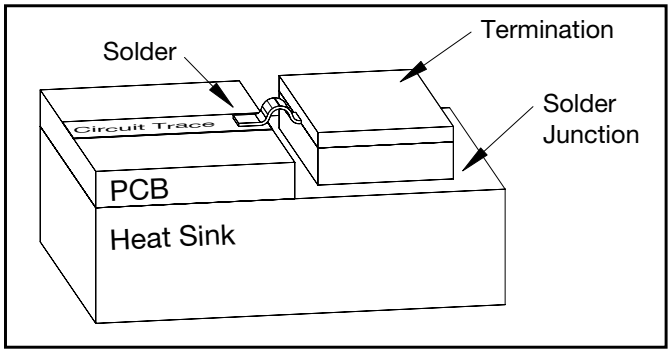


mount resistor, it is important to leave a gap between the input trace and the ground pad that is no less than the gap present on the resistor. All other footprint dimensions can be sized as desired. It is recommended to make traces 10-20 mils larger than the solder terminals on the resistors (to allow for a solder fillet).

Chip and Flangless-

Chip and flangeless resistors should be mounted directly on a flat heat sink surface (0.001" under the device) to achieve the best possible thermal connection to the heat sink. Mount the resistor using a solder with a melting point higher than the one used when attaching the lead.

When mounting the lead, make sure that a stress relief is present either in the form of a small loop or a large S-style bend.



If no stress relief is present repeated thermal cycling will cause metal fatigue in the lead and cause it to break or detach.

Epoxy-

Conductive epoxies such as silver epoxy can also be used to mount the resistor, but be aware that the silver epoxy has a much lower thermal conductivity than solder. The thickness of the silver epoxy used to mount the resistor should be kept to a minimum to avoid introducing a thermally insolating layer between the resistor and heat sink. Be aware that if the resistor is used in a sealed package, outgassing from the epoxy may contaminate other parts.

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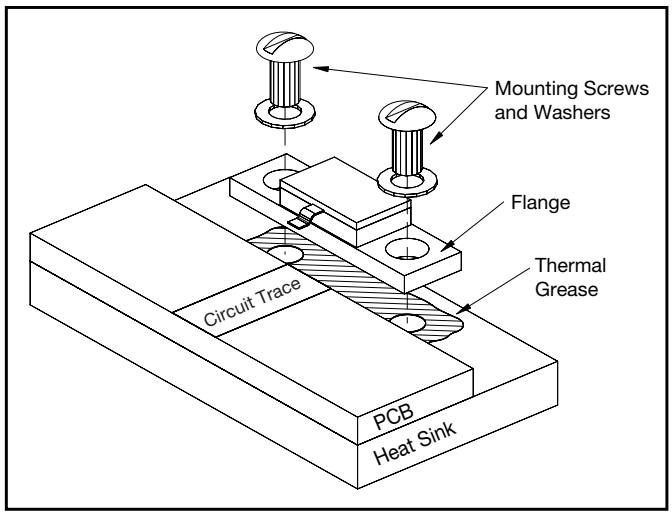
Flanged-

Flange mounted resistors should be bolted down on a flat surface (0.001" under the device) on the heat sink. The heat sink should be drilled and tapped for the appropriate screw and thread size. To further improve the heat transfer, apply a thin layer (max. 0.001") of high quality thermal grease under the device. Mount the resistor with flat and split washers, and torque screws to appropriate



value.

When mounting the lead, make sure that a stress relief is present either in the form of a small loop or a large S-style bend. If no stress relief is present repeated thermal cycling will cause metal fatigue in the lead and make it break or detach.

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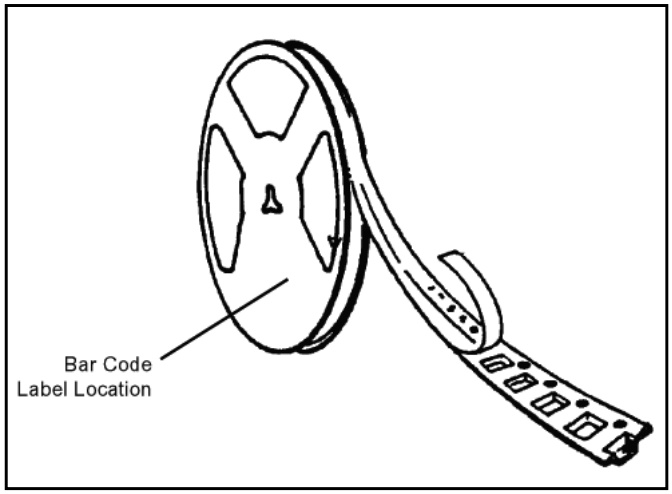
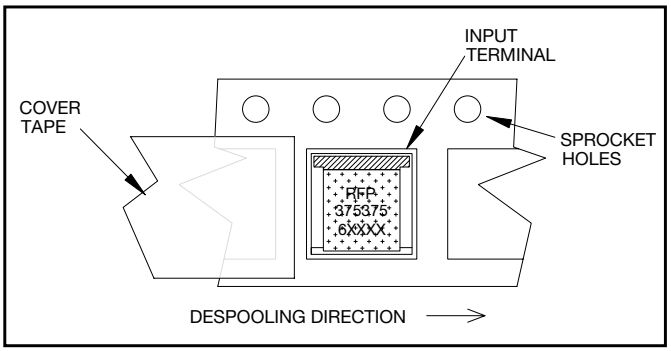
Tape and Reel-

All RF Power surface mount and chip resistors are available on tape and reel. The parts are packaged with the marking facing up, and oriented to have the input terminal towards the sprocket holes.



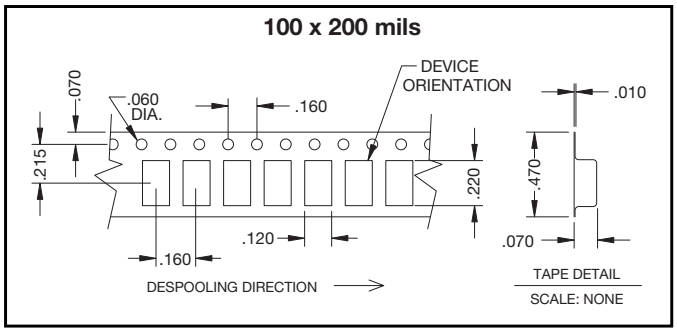
The tape and reel follow the EIA-481-2 Standards with the label mounted on the side.

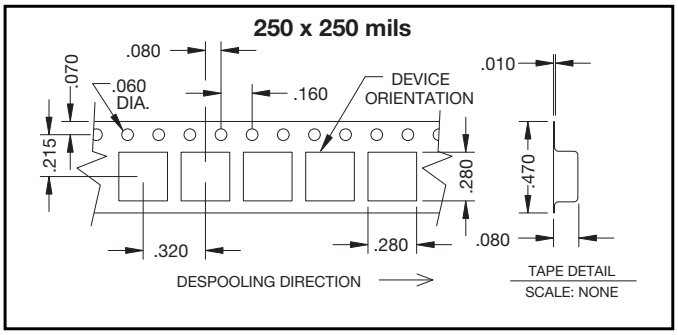


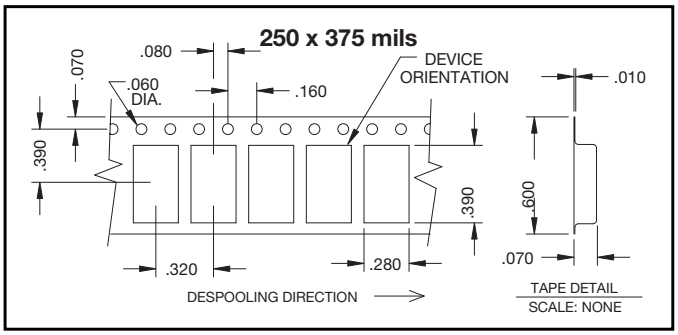
Storage of Components-

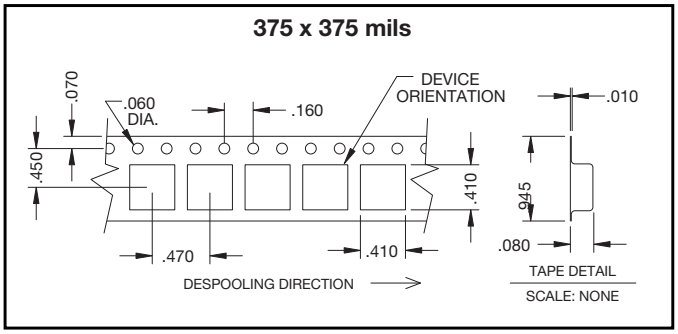
Some of the components have a tin/lead surface finish. Commonly used storage procedures used to control oxidation should be followed for these surface mount components.

Tape and Reel Dimensions-









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Flangeless Attenuators

Part Number	Power (Watts)	Values	Page
RFP-100NXXAF	100	1,2,3,4,5,6,9,10,20 and 30 dB	4.7.5

Flanged Attenuators

Part Number	Power (Watts)	Values	Page
RFP-100NXXAE	100	1,2,3,4,5,6,9,10,20 and 30 dB	4.7.7

Chip Terminations

Part Number	Power (Watts)	Frequency	VSWR Max:1	Page
RFP-100200N4X50-2	30	DC-3.0 GHz	1.25	4.7.9
RFP-250250N6X50-2	40	DC-2.5 GHz	1.30	4.7.11
RFP-250375N6X50-2	150	DC-2.0 GHz	1.30	4.7.13
RFP-375375N6X50-2	200	DC-2.5 GHz	1.30	4.7.15

Surface Mount Terminations

Part Number	Power (Watts)	Frequency	VSWR Max:1	Page
RFP-100200N4Z50-2	10	DC-2.0 GHz	1.25	4.7.17
RFP-250250N6Z50-2	16	DC-3.0 GHz	1.25	4.7.19
RFP-250375N4Z50-2	25	DC-3.0 GHz	1.25	4.7.21
RFP-375375N6Z50-2	30	DC-2.0 GHz	1.25	4.7.23

Flangeless Terminations

Part Number	Power (Watts)	Frequency	VSWR Max:1	Page
RFP-10N50T	10	DC-6.0 GHz	1.25	4.7.25
RFP-30N50T	30	DC-4.0 GHz	1.25	4.7.27
RFP-125N50TS	125	DC-5.0 GHz	1.25	4.7.29

Flanged Terminations

Part Number	Power (Watts)	Frequency	VSWR Max:1	Page
RFP-10N50TV	10	DC-6.0 GHz	1.25	4.7.31
RFP-10N50TVR	10	DC-6.0 GHz	1.25	4.7.33
RFP-20N50TP	20	DC-4.0 GHz	1.25	4.7.35
RFP-20N50TPC	20	DC-4.0 GHz	1.25	4.7.37
RFP-20N50TPR	20	DC-4.0 GHz	1.25	4.7.39
RFP-100N50TW	100	DC-5.0 GHz	1.25	4.7.41
RFP-150N50TE	150	DC-2.5 GHz	1.25	4.7.43

Aluminum Nitride

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INTRODUCTION-
The RF Power Aluminum Nitride (AIN) line of attenuators and terminations are made as an alternative to Beryllium Oxide (BeO) for countries where legislation prohibits the use of BeO. AlN has thermal and electrical properties comparable to BeO, but without the health hazards. To allow for the best power handling and performance all RF Power AlN products are made using thick film.

ATTENUATION-
Standard attenuation values are 1-6, 9, 10, 20 and 30 dB, but other values are available upon request. The attenuation value is the difference between the input signal and output signal from the attenuator. For a 10 dB attenuator this would mean that a 1 W input signal would be attenuated to 100 mW at the output port.

RESISTOR VALUE-
The standard termination value is 50Ω, but a wide range of values is available upon request. Standard resistor value tolerance is 2% for chip and surface mount terminations and 5% for flanged and flangeless terminations. Other tolerance values are available upon request.

VSWR-
All products have been optimized for low VSWR within the specified frequency band. The attenuators and terminations will also work outside the specified frequency, but with a higher VSWR. The specified VSWR for each part is measured assuming that the recommended mounting procedure is followed.

POWER HANDLING-
The RF Power AlN line has been designed to perform at 100% of the rated power handling, with heat sink temperatures up to 100°C, and at higher temperatures with de-rated power handling capability. To achieve maximum power handling capability, please follow the suggested mounting instructions for the device, to ensure that the best possible thermal path to the heat sink exists.

LEADS-
As a standard, all RF Power AlN flanged and flangeless attenuators and terminations come with 99.99% pure silver leads. This allows for excellent solderability and easy lead forming. Other types of leads are available upon request.

TERMINALS-
Chip and surface mount terminations come with a tin/lead, (90/10) solder over nickel (Ni) as a standard. Other terminal finishes are available upon request.

MOUNTING-
The RF Power AlN product line is available in several mounting types. **Surface mount** is ideal for high volume automated production. **Chip and Flangeless** allow for the best possible heat transfer to the heat sink. **Flanged** allows for easy bolt down assembly. It is important to follow the described mounting procedure for all types to achieve the best electrical and thermal performance.

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PART NUMBERING-

Part numbers are composed in the following manner for surface mount and chip devices.

SMD PART NUMBERING

RFP - 250250 N 6 X 50 - 2

- Size
- Substrate Type:
  - = BeO
  - N = AlN
  - A = Alumina
  - P = Ni/Solder Plated
- Substrate Thickness
- Case Style
- Resistor Value
- % Resistor Tolerance

Part numbers for flanged and flangeless devices are composed as follows.

PART NUMBERING

RFP - 100 N 50 T W

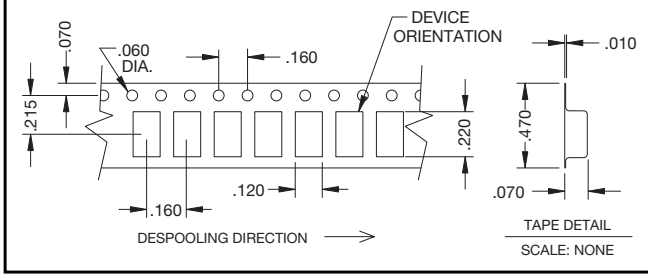
- Power (Watts)
- Substrate Type:
  - = BeO
  - H = High Temp. BeO
  - N = AlN
  - A = Alumina
- Resistor Value
- Device Type
  - T = Termination
  - R = Resistor
  - A = Attenuator
- Attenuation/
- Package Type

TAPE AND REEL -

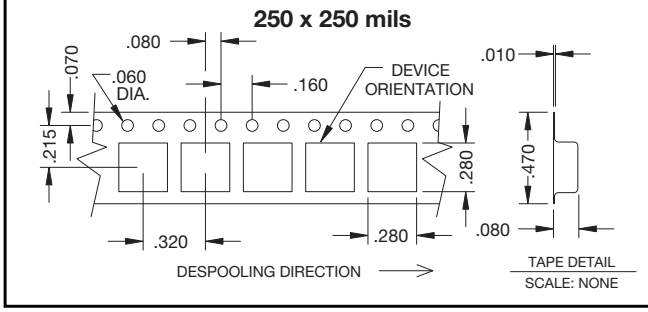
All surface mount parts are available in tape and reel for easy high volume pick and place assembly. The parts are oriented with the marking up and the input terminal facing the sprocket holes in the tape.

Tape and Reel Dimensions

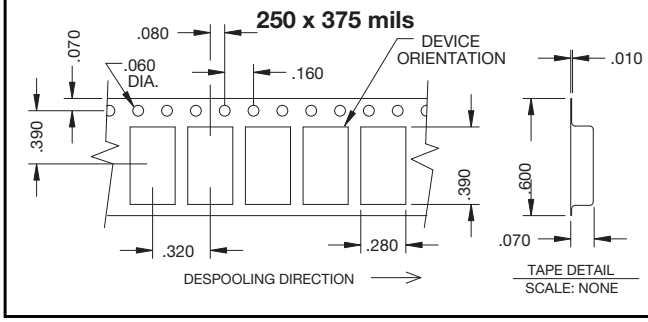
100 x 200 mils



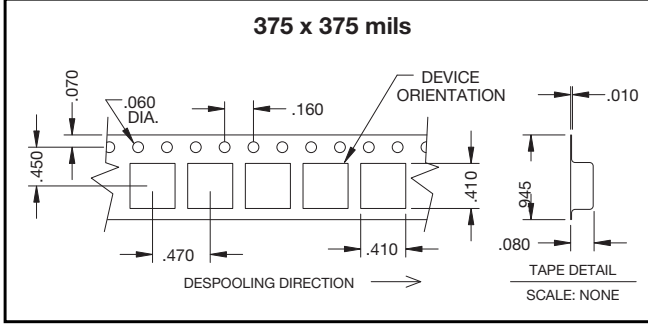
250 x 250 mils



250 x 375 mils



375 x 375 mils



Aluminum Nitride

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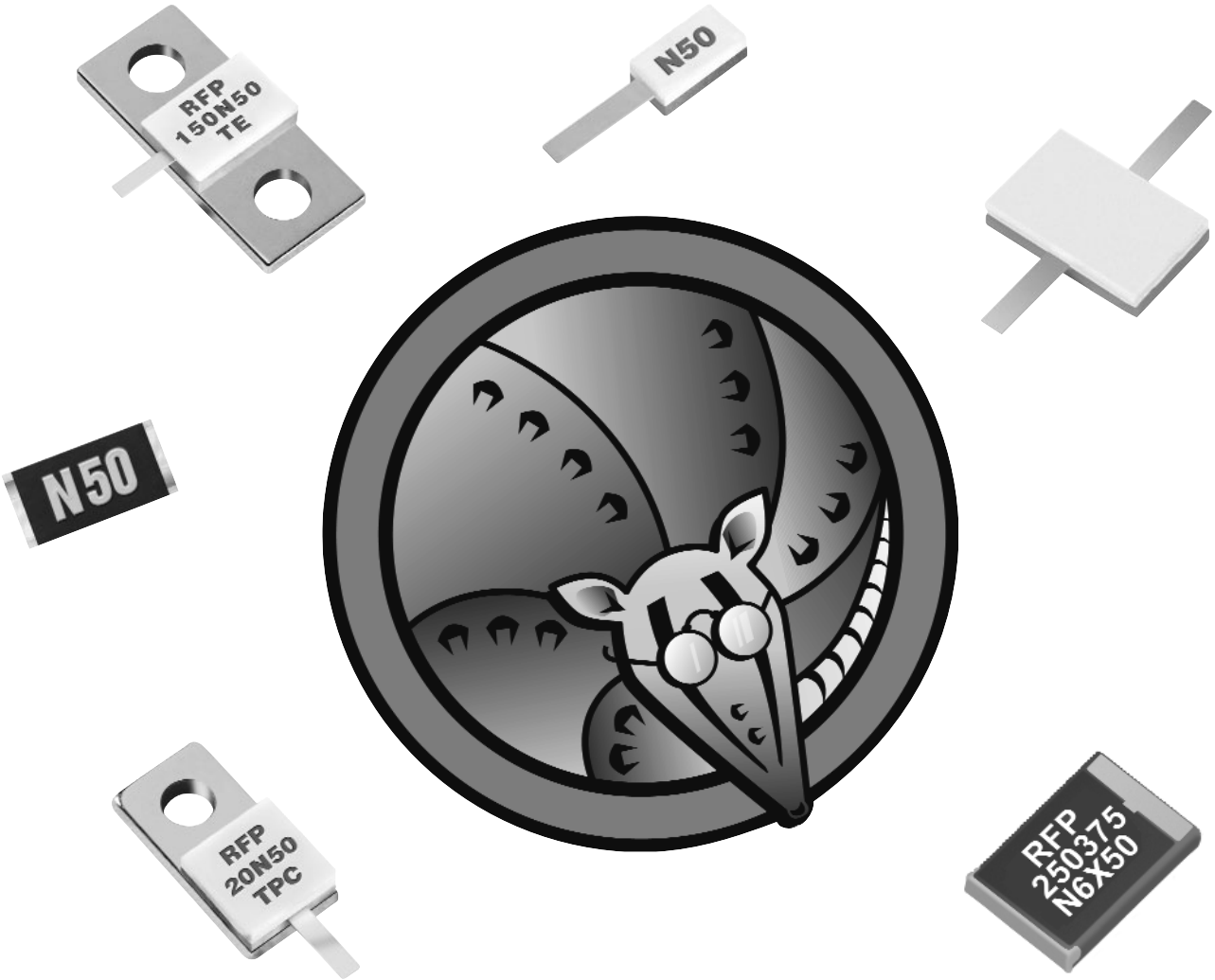
RF Power



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