TechTalk110

Inexpensive Home-constructed Microwave Dummy Load

by John Hudson G3RFL

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In a senior moment, I managed to damage my RF dummy Load, by using it on a 13cms transmitter that was more than capable of delivering 120W. So it was time to consider a replacement and an upgrade to cope with the higher power Levels.

I started by purchasing a 50ohm 250W thick-film resistor. The flange-mount resistor I chose from Anaren has a specification (see data sheet in **Figure 5**) that will enable it to be used up to at least 2GHz, and cost £7. I have seen some on eBay for about the same price, but only 150W versions. The Henry Radio eBay store does sell 250W units manufactured by Res-Net Microwave for about US$26 in quantities of one (including free shipping inside US).

Fig 1 – Completed Dummy Load with flange-resistor and N-connector installed on Heat Sink, but no fan.

Some Construction Details

I was fortunate to find suitable heat sink in my junk box, something I suspect was left over from a computer upgrade. It was a simple task to drill and tap threads into the heat sink and mount the resistor flange applying a liberal dosage of heat transfer compound. I folded the resistor TAB back over onto the top of the resistor body. I also modified an "N" type of connector receptacle, filing the centre pin on the bottom down as much as possible. The connector is mounted centered over the resistor tab and the connector pin makes a compression electrical contact with the resistor tab, using the mounting four mounting bolts. Be careful not to over tighten the compression or you will break the resistor.

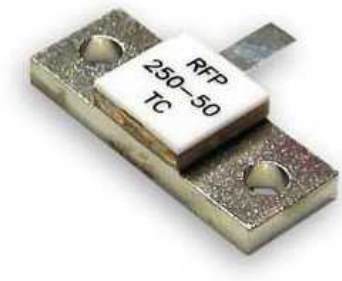

Fig 2 – 50 ohm Flange-Mounted-Termination Thick-film resistors available from Res-Net Microwave and Aranen

Heat Sink Gets Too Hot

In theory the unit should work up to 2GHz, but my first test was on 2M with just 50W, the heat sink soon got too hot to hold, after only a few minutes.

So I decided to add a fan, quick search of my junk box and I failed to come up with a suitable fan for the heat sink, probably why the heat sink was in my junk box, so it was time to invest some of my children's inheritance in a commercial product. The 12V fan I chose came from CPC and was designed for use used on PCu/P and cost just over £7.

When the fan arrived I fitted it and repeated the experiment with the two meter source without running the fan. Once the heat sink became too hot to hold, I powered up the fan, and after only a few minutes the temperature dropped to just a few degrees above room temperature. I was well pleased with my £7 investment, in what proved to be a very quiet fan, well worth the £7. See **Figure 3** for the completed dummy load construction.

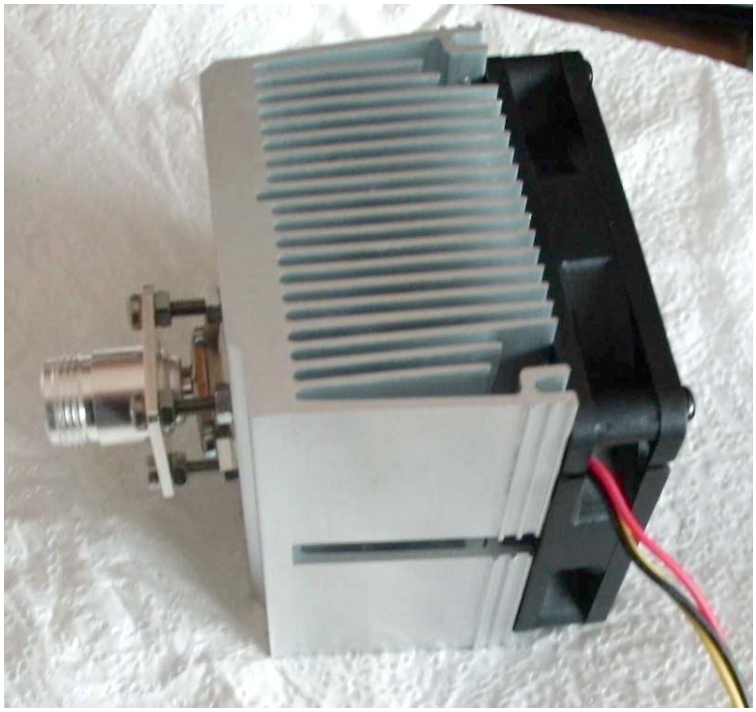

Fig 3 – Completed Dummy Load unit now fitted with a 12V cooling fan

Future Plans

The fan also has the third wire which provides pulses to indicate the fan is spinning; this might be useful for the future when I develop the unit further. But my first addition will be a voltage detector interfaced to a PIC microprocessor so I can read out the POWER via a USB lead.....watch this space.

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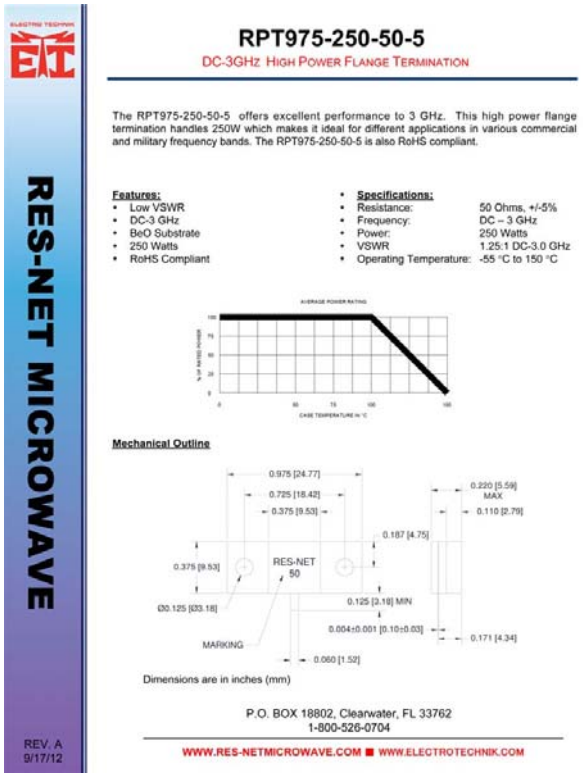

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- Low VSWR
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- RoHS Compliant

Specifications:

Resistance:	50 Ohms, +/-5%
Frequency:	DC – 3 GHz
Power:	250 Watts
VSWR	1.25:1 DC-3.0 GHz
Operating Temperature:	-55 °C to 150 °C

Mechanical Outline

Dimensions are in inches (mm)

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Fig 4 – Datasheet from Res-Net Microwave

Anaren

Model 250-50TC

RF Power

Flanged Termination
250 Watts, 50Ω

General Specifications

Resistive Element	Thick film
Substrate	Beryllium oxide ceramic
Cover	Alumina Ceramic
Mounting Flange	Copper, Nickel plated per QQ-N-290
Lead(s):	99.9% pure silver (.006 thick)

Electrical Specifications

Resistance Range:	50 ohms, ± 5%
Frequency Range;	DC – 3.0 GHz
Power:	250 Watts
VSWR:	1.30:1 DC to 3.0 GHz

Note: Tolerance is ±0.010", unless otherwise specified. Designed to meet or exceed applicable portions of MIL-E-5400. Operating temperature is -55°C to 150°C (see chart for derating temperatures).
All dimensions in inches.
Specifications subject to change with out notice.

Features:
- DC – 3.0 GHz
- 250 Watts
- BeO Ceramic
- Non-Nichrome Resistive Element
- Low VSWR
- 100% Tested

Fig 5 – Datasheet from Anaren

Related URLs:

- CQ-DATV online (free bi-monthly) e-magazine (ePub format) – see **www.CQ-DATV.mobi**
- Anaren High Power Flanged Termination Resistors – see **www.Anaren.com/products/militaryinstrumentation-resistive-products**
- Henry Radio eBay store – see **http://stores.ebay.com/Henry-Radio**
- Henry Radio online store – see **www.HenryRadio.com**
- John G3RFL home web page – see **http://G3RFL.co.uk**
- Yahoo Group for Digital ATV – see **groups.yahoo.com/group/DigitalATV/**
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