

# Pacific Antenna Surface Mount Dummy Load



## Introduction

A compact design using surface mount resistors and some through hole parts.

A great first time kit to learn or improve surface mount soldering skills.

Can be assembled with common soldering tools and techniques.

Provides a 50 Ohm load to RF from transmitters.

Produces DC voltages representing the Peak and RMS values of the RF voltage.

Measures RF power from less than 100mW to 10 Watts with just a digital multimeter

SWR less than 1.1:1 below 30 MHz and below 1.5:1 to 150Mhz

Includes all the components and circuit board.

Board size: 32 x 70mm

## Inspection and Inventory

Before beginning assembly, check the kit to be sure all parts are included.

Should anything be missing, please contact us for a replacement.

## Components Included:

20 – R1-R20, 1K 1/2 watt surface mount resistors: Labeled 102 (+spares)

1 – R21: 41.2K 1/4W, 1% resistor: Yellow-Brown-Red-Red-Brown

1 – R22: 100K 1/4W, 1% resistor: Brown-Black-Black-Orange-Gold

1 – D1: 1N4148 diode

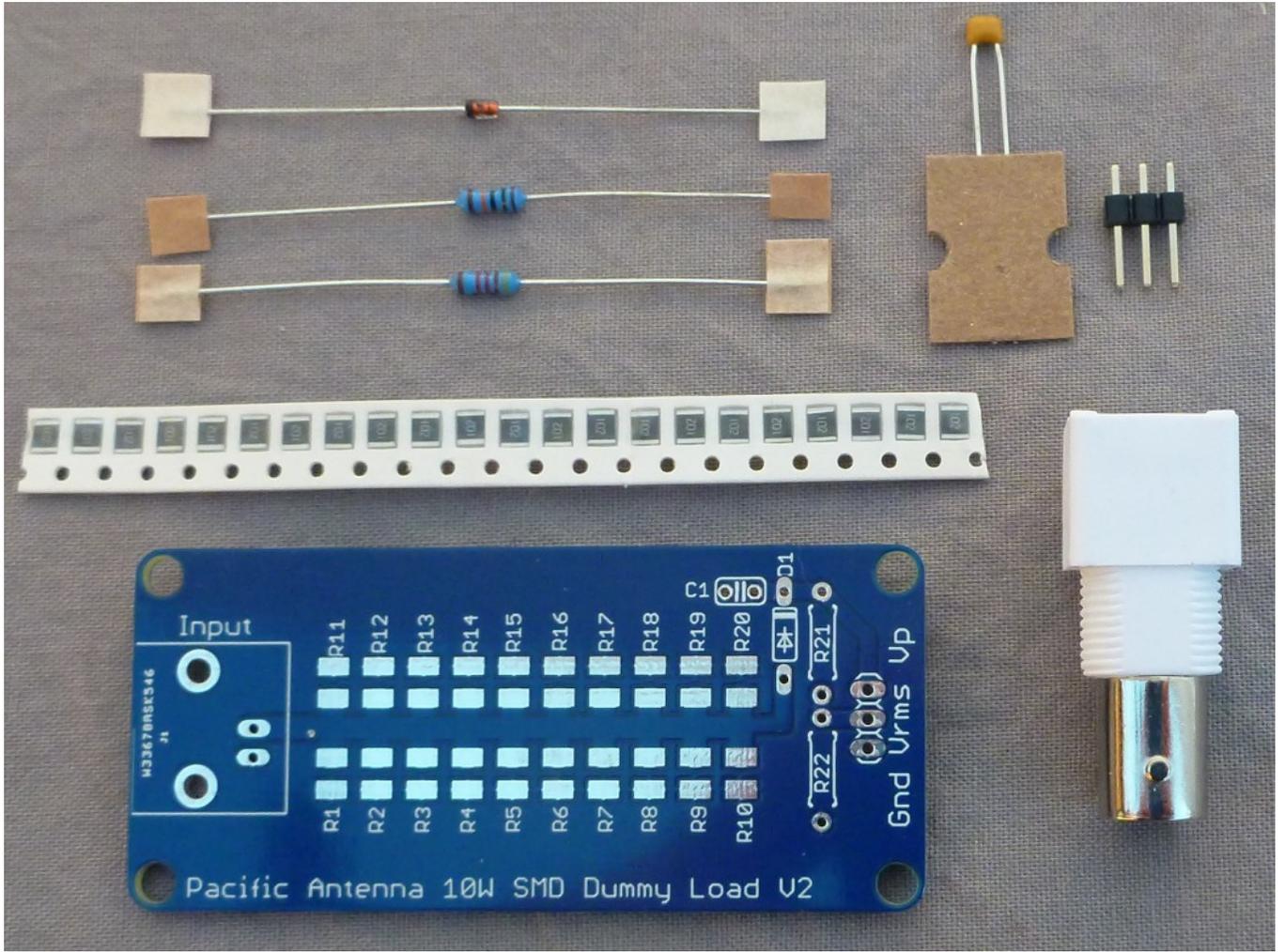
1 – C1: 0.01uF monolithic capacitor, yellow, (marked 103)

1 – J1: BNC board mount connector

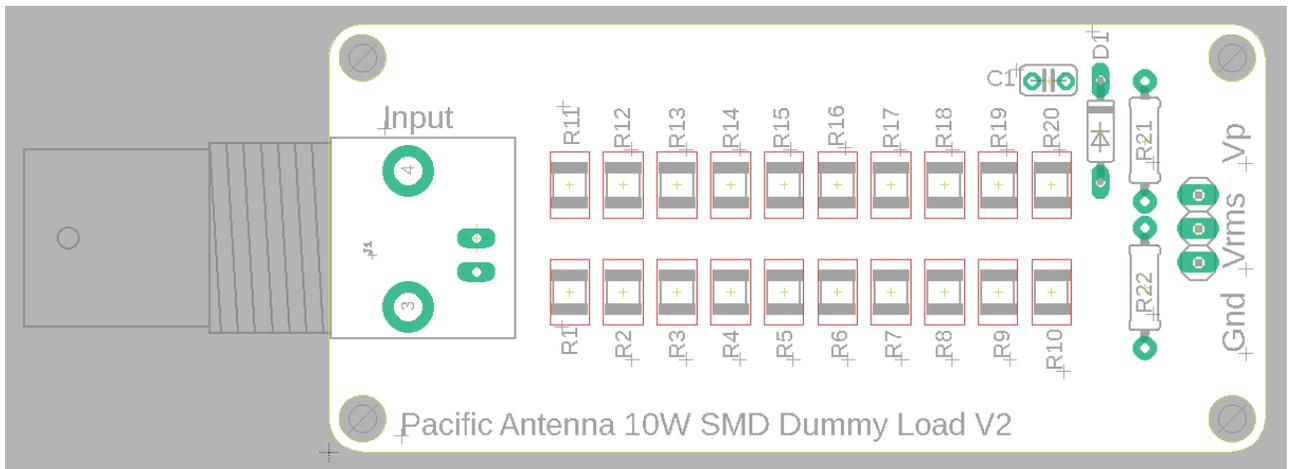
1 – SV1: 3 pin header

1 – Circuit board

# Typical Kit Components

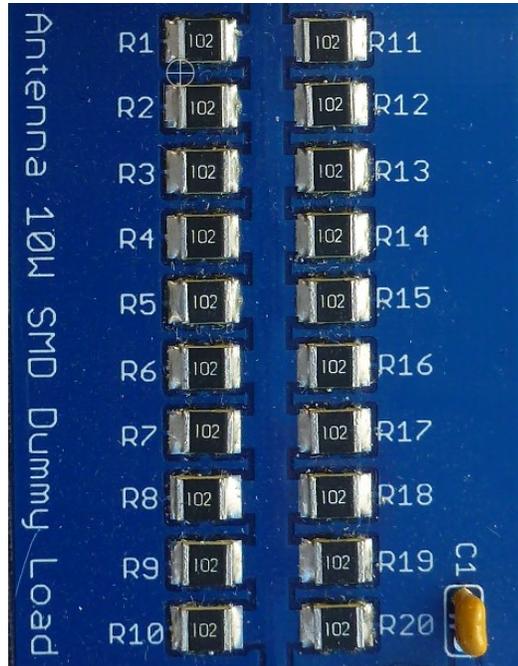


# Board Layout



## Assembly

### Installation of Surface Mount Resistors R1- R20:



These are the 1/2W, 1K ohm, 1210 size surface mount resistors and they go in the marked locations shown on the circuit board.

These resistors come in a strip package are labeled “102” on each resistor.

Spare resistors are included in case of loss or damage.

If you are using standard soldering methods, solder one end of the SMT resistor first as follows:

First melt a small amount of solder onto only one of the resistor pads.

Next, while holding the resistor in tweezers, heat the solder on that pad and slide the resistor into the molten solder.

While keeping the solder melted with a soldering iron, align the resistor with both pads and make sure it is centered and seated flat on the board before removing the soldering iron.

This may take a bit of practice to get resistors aligned and seated on board.

Allow to cool, verify position and alignment and only then, solder the opposite end.

Repeat for all of the other surface mount resistors.

If using solder paste and other SMT assembly methods, apply the paste and heat to flow, following manufacturer's recommendations.

There are a number of tutorials online for using SMT paste and heat sources to solder components.

### Installation of Through Hole Components:

Install, solder and trim the leads of D1. Be sure to match the band end to the diagram above and the outline on the circuit board.



Install R21 the 41.2K ohm (Yellow-Brown-Red-Red-Brown) resistor in the marked location on the board



Install R22, the 100K resistor (Brown-Black-Black-Orange-Brown) in the marked location on the board.

Install C1 the 0.01uF capacitor in the location marked on the board.

Install the 3 pin Header in the location SV1. You will find it helpful to just solder 1 pin and then make sure it is straight and flush to the board. If not, reheat that pin and adjust the header for alignment before soldering the additional pins.

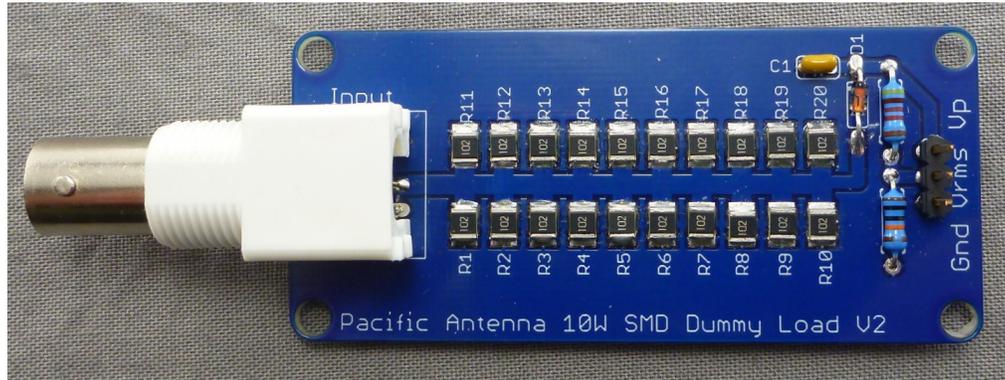
Now, solder the BNC connector, making sure to seat it fully into the board. Solder the two small wires and the two support pins.



Reheat and press the connector into the board if it is not fully seated.

The support pins may require longer time, increased temperature or a larger soldering iron to properly solder.

## Congratulations, your dummy load kit is now complete!



### Initial test

To verify proper soldering, it is recommended to use a multimeter and measure the resistance across the input BNC connector. The value should be close to 50 Ohms.

If not, there may be one or more bad solder joints in the resistors.

### Operation

The dummy load is easy to use. Simply connect your transmitter input to the BNC

To measure the RF voltage, connect a multimeter to pin 1 and either 2 or 3.

Pin 1 is ground and the DC output voltages appear on pins 2 and 3 of SV1.

Pin 2 provides the RMS value of the RF voltage and Pin 3 gives the Peak value of the RF voltage.

RF power is calculated from this relationship:  $Power = (V_{rms}^2)/50$

Example: Measured voltage = 10Vrms:  $P = (10^2)/50 = 100/50 = 2W$

**Note:** The power input should be limited to 10W to avoid damaging resistors and circuit components.

### Specifications

Recommended Power Limits:    10 watts: 1 minute  
    7 watts: 5 minutes  
    5 watts or less: continuous

Input Impedance:                    50 Ohms +/- 5%

Usable Frequency Range:        DC to 150 MHz

Outputs on pin header SV1:      1. **Ground**  
    2. **Vrms:** DC voltage representing the RMS value of the RF voltage  
    3. **Vpeak:** DC voltage representing the peak RF voltage

**Support Email:** [qrpkits.com@gmail.com](mailto:qrpkits.com@gmail.com)

# Schematic:

