Electro-Resales

Coaxial 50 Ω Dummy Load for Transmitter testing and RF experiments

Application Note.

Brief Description

Many thanks for purchasing this dummy load, it has been designed to provide constant 50 Ω impedance to a radio transmitter to allow off air tests and experiments.

Constructed of high quality PCB material and using 20 x 1KΩ 3 Watt Metal Film resistors a usable SWR of 1.0/1.2:1 is possible from 1MHz – 30 MHz, with an SWR of 1.5:1 at 50Mhz and 1.8:1 at 70 MHz

The dummy load is air cooled and capable of absorbing RF energy of 40-50 Watts continuously for 1 minute, and up to 100 Watts for a few seconds. Connection to the dummy load is via a high quality BNC jack mounted on the PCB.

The entire load is constructed as a small cylinder that is approx. 2.5" diameter and ¾" thick.

How to use your new Dummy Load

CAUTION: THE LOAD COMPONENTS ARE EXPOSED; TOUCHING THEM WHILE IN USE CAN CAUSE BOTH HEAT AND/OR RF BURNS.

The dummy load is designed to provide a constant load to your radio transmitter, impedance matched to the transmitter output at 50Ω. Connection to the transmitter is via a 50Ω coax cable terminated in a BNC connector for the dummy load and a connector suitable for the antenna port on your radio.

The dummy load can also, like an antenna, be a used as the termination point for a power meter or SWR meter to provide a balanced load to the transmitter. The dummy load should always be the last part of the transmission line, just as the antenna would be.

As with all tests on air or off air with a load, always start by using low output levels of RF, after establishing that no issues exist, and then higher power levels can be used. We suggest using 10-25 Watts as a starting level.

Technical Details

Why a coaxial dummy load?

- Dummy loads are used in radio frequency (RF) testing to provide a safe, non-transmitting load at various frequencies and power levels. This ensures that equipment being tested, tuned or calibrated is done so in a safe way.
- A coaxial load is one that has the load component(s) mounted so that they present uniform impedance over as wide a range of frequencies as is possible, taking in to account the properties of the load component(s).
- Coaxial load configurations generally have a uniform impedance with a slow 'decay' in impedance as frequency increases, non-coax loads are generally good to around 30 MHz and above that show some more random impedance issues.
- Coaxial loads generally present a lower SWR compared to no coax loads at higher frequencies.

SWR vs. Frequency

This chart shows how SWR increases with frequency for non-coax vs coax loads (refer to chart on next page).

As can be seen while both loads show an increase in SWR as frequency increases, the coaxial load increase is much lower and while unlikely to be useful at 145 MHz is still respectable at 70 MHz the non-coax load peaks at 30 MHz.

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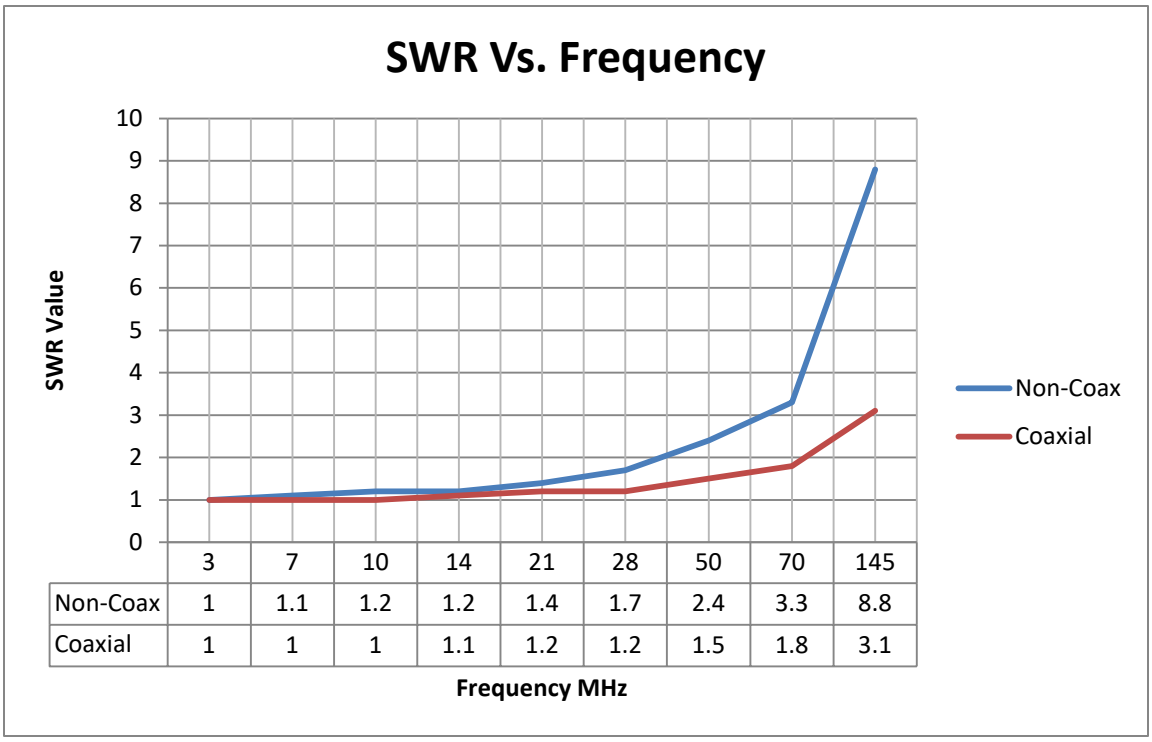
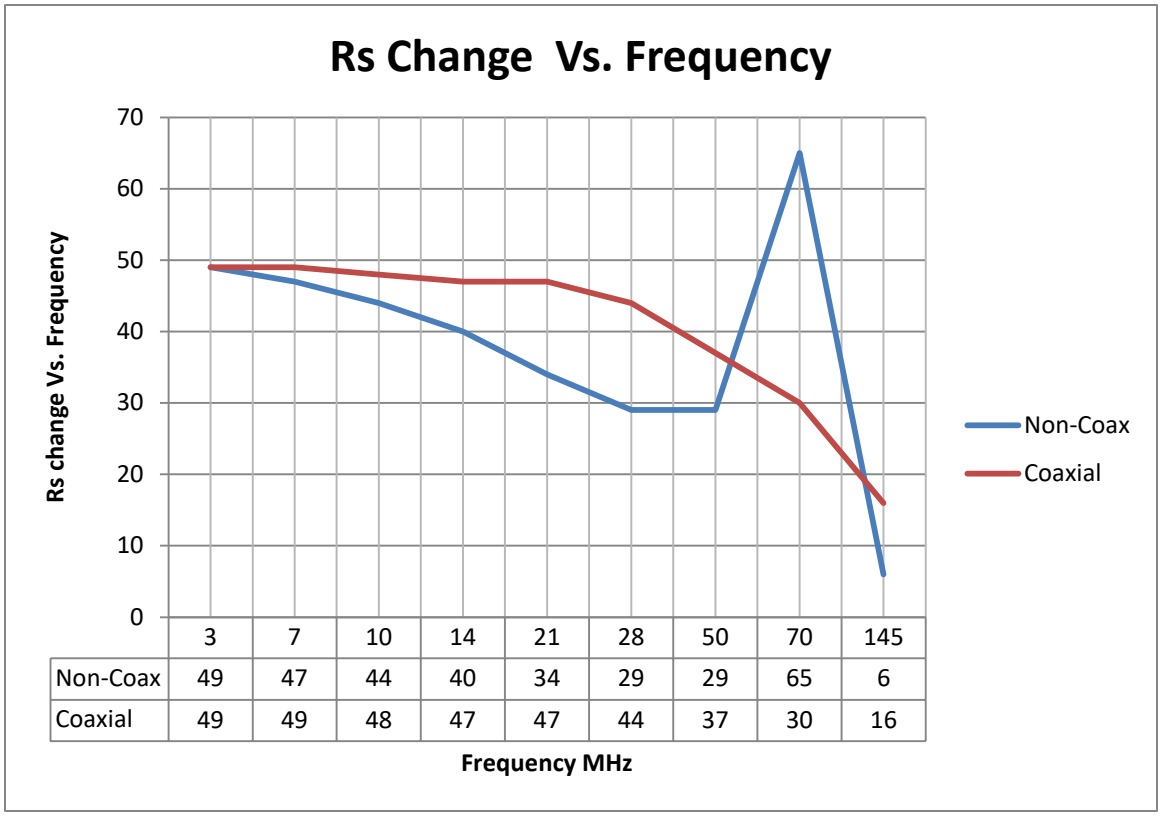


	3	7	10	14	21	28	50	70	145
Non-Coax	1	1.1	1.2	1.2	1.4	1.7	2.4	3.3	8.8
Coaxial	1	1	1	1.1	1.2	1.2	1.5	1.8	3.1

In the next chart which is of resistance change over frequency, it can be seen that the load resistance of the coaxial load decays steadily as frequency increases, while non coax loads show some anomalous changes over 25 MHz these resistance changes illustrate the reasons why a non coax load is a poor choice for higher frequency work. The coaxial load is limited by the resistor composition, and the tendency of certain resistance compositions to exhibit more reactance than others



	3	7	10	14	21	28	50	70	145
Non-Coax	49	47	44	40	34	29	29	65	6
Coaxial	49	49	48	47	47	44	37	30	16

Final note

This brief application note has introduced the load and its use as a load for RF applications. If you have questions about this or any other of our products please email;

steve@electroresales.com

The small Print

DISCLAIMER

Any person who constructs or works on electronic equipment may be exposed to hazards, including physical injury, the risk of electric shock or electrocution.. These hazards can result in health problems, injury, or death. Only qualified persons who understand and are willing to bear these risks themselves should attempt the construction of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

There is a risk of electric shock, electrocution, burns, or fires that is inherent in the construction and use of electronic equipment. By purchasing this item, the buyer acknowledges these risks.

IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE including, but not limited to, property damage, personal injury, death or legal expenses. Buyer's recovery from Seller for any claim shall not exceed the purchase price paid by Buyer for the goods, irrespective of the nature of the claim, whether in warrant, contract or otherwise. By purchasing this item, BUYER AGREES TO INDEMNIFY, DEFEND AND HOLD SELLER HARMLESS FROM ANY CLAIMS BROUGHT BY ANY PARTY REGARDING ITEMS SUPPLIED BY SELLER AND INCORPORATED INTO THE BUYER'S PRODUCT.