

1:4 AIR CORE BALUN PERFORMANCE

FORM: 1.25 INCH PVC

WIRE: #14 STRANDED

TEST EQUIPMENT: ARRAY SOLUTIONS VNA-2180

12 TURNS TIGHTLY WOUND SIDE-BY-SIDE PER

<http://rogertango.com/articleread.aspx?idnumber=34232411>

AND OTHERS.

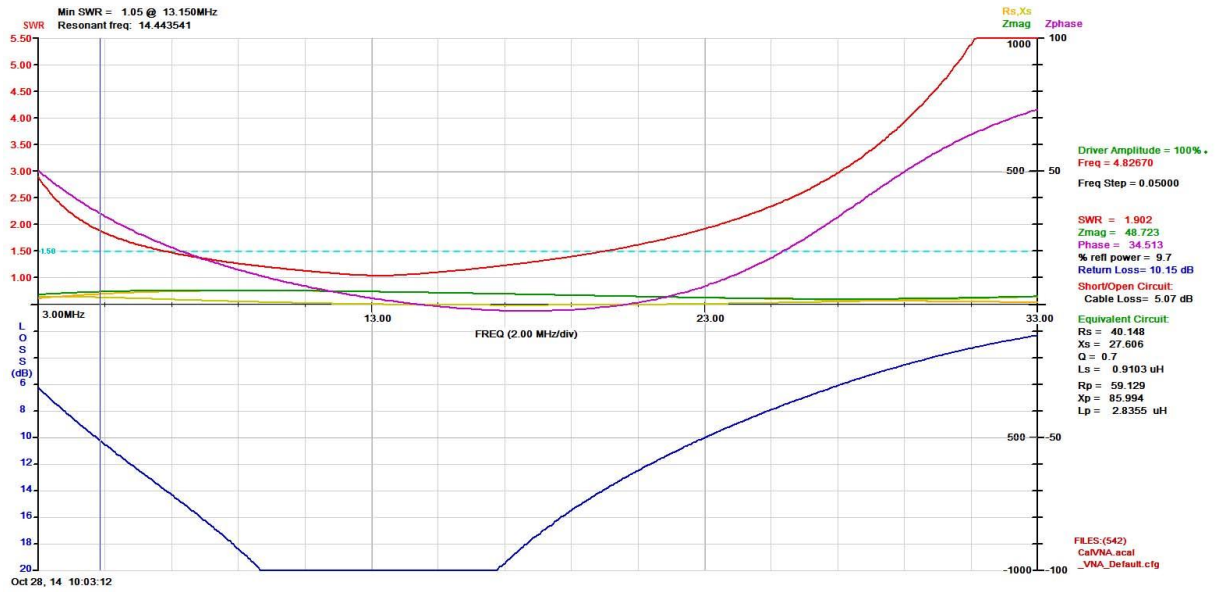
This is a Ruthroff type Voltage-balun which is an auto-transformer design intended to

Transform 50 Ohm unbalanced (coax) to 200 Ohms balanced.

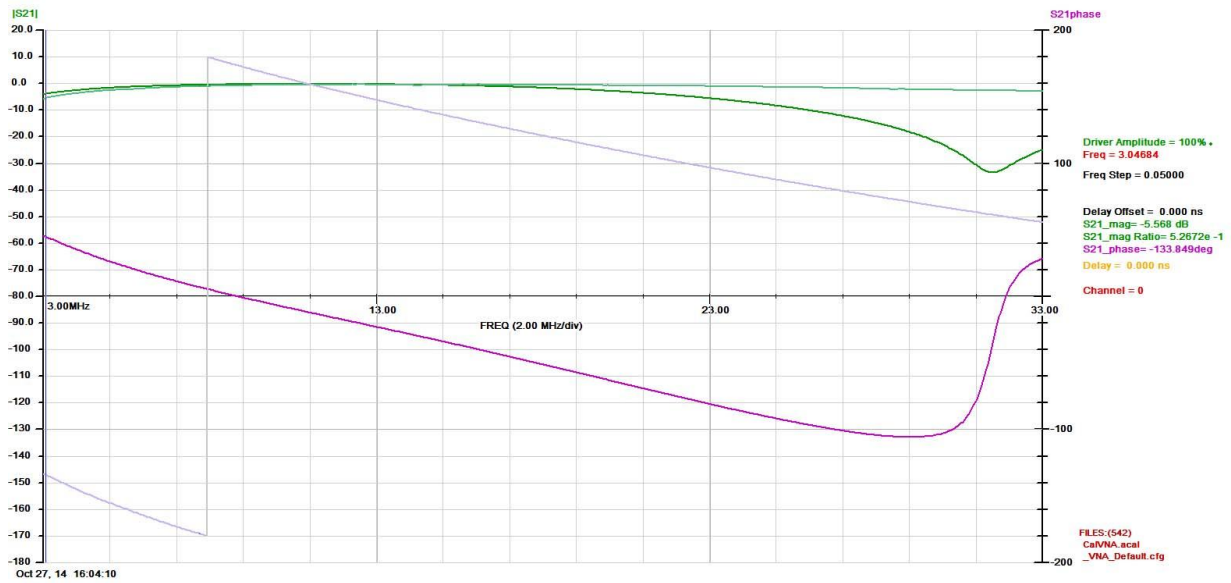
The surge impedance of #14 stranded pair, wound side by side, is 76 Ohms measured. With no core there is insufficient inductance to support frequencies below 10MHz. Voltage baluns are not well balanced at the output but this one is very poorly balance. Poor balance doesn't mean poor efficiency but affects the common mode rejection. Balun loss is typically a tenth of a dB and the half dB band of this balun is 12mHz to 15mHz.

A half-wave dipole is about 75 Ohms, 50 Ohms as an inverted Vee or closer to the ground so a 1:4 balun does not match but a 1:1 current balun would do much better. Most tuners use a 1:4 voltage balun for the "BAL" and/or "WIRE" so they poorly match a dipole. The length of ladder-line used can alter the impedance. Use TLDetails.exe, a free program, to see this change.

A half-wave dipole made with a single wire will only cover a quarter of the 75M band with less than 2:1 SWR. If it covers the whole without the help of a tuner then you've added a lot of loss somewhere. Using a 1:4 balun badly mismatched might look good for SWR but not perform very well.



SWR using a 200 Ohm resistive load



2 Baluns connected back-to-back with 50ohm source and load.