## **RF Transformers** Neil Abraham VK5KA July 2019

## **RF Transformers**

Sometimes known as Baluns Ununs Choke Baluns Guanella Baluns Mystical black box !!! etc

So are Balanced to balanced ..... Balbals ???



- RF transformers are usually wound on a ferrite material and are broad band as they have no Q.
- You have to choose the core material for the frequency you want to cover.
- There are many different core materials which can make it hard to choose the right one.
- There are also several different material types that can do a similar job. Type 43 and 61 are some of the most useful.
- FYI ....Most ferrites in switch mode PSU's are the wrong type for HF frequencies.



The wire on the outside of the toroid just adds "L"  $\dots$  A binocular core has very little wire exposed







Use 43 for 1.8 to 30MHz and 61 for 3.5 to 30MHz +..... There is lots of overlap... 43 has ui = 800 61 has ui = 125





Can use something like this to measure an antenna "R" term to see if it is higher or lower than 50 ohms.



RS & Element 14 sell PTFE 22 AWG in 25m and 100m rolls but is more expensive. Use a drill bit to remove the sharp edges from the holes.

- If you use a toroid for a transformer, you need to add a parallel overwind over all the windings.
- Start at the 50 ohm tap, and wind with the same number of turns to the ground point.
- This needs to be in the same winding direction and over all of the other windings.
- This will reduce the leakage inductance and improve the freq response.









With an unbalanced transformer ... 150 ohms is 7/4 ... (153 ohms) So this is 4T +3T.

What about a balanced transformer ?? ... Start with 4T then add  $1\frac{1}{2}$ T each side which makes the 3 turns .... You can have 2 by  $\frac{1}{2}$  turns to make 1 turn total.

Sometimes there is more than one right answer.... 75 ohms can also be 5/4 = 78 ohms which will have a higher frequency range as there is less wire so less leakage inductance And less inter-winding capacity.



You can't have ½ turns in an unbalanced transformer..... There must be the same number of wires down each side.

- Where to get cores from.
- Jaycar and AZ only have a VHF balun and some ferrite EMC sleeves.
- RS and Element 14 have some useful toroids.
- Mini Kits have a reasonable selection of large and small baluns as well as toroids and they are local as well.
- Make your own binocular core from 2 x EMC sleeves if it is the right material.
- You can import from OS if you need lots.



