Identifying Unknown Ferrites With an Antenna Analyzer

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A LITTLE FUN

Something – Once you it see it – you never forget

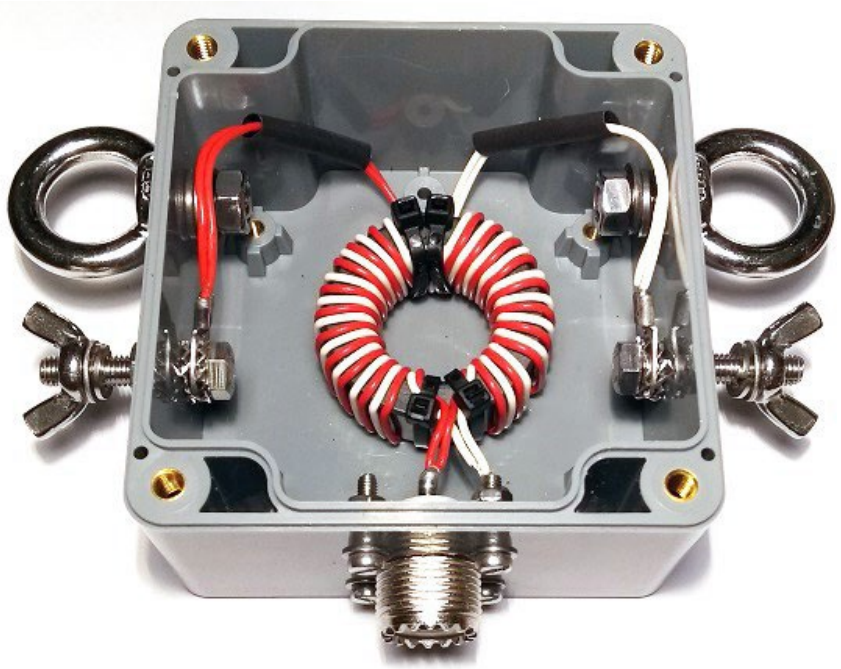
E.g. Dots in the movie theater

Movie cue marks

Movie Cue Mark

I Pledge Alegiance to the Flag of the United States of America

...and to the Republic Forwhicitstan



Toroid Baluns Largely a Mystery

Most hams don't know how to design with a ferrite toroids Especially from UNKNOWN Cores

Snap-On's

Toroids

Leutzelschwab

Based on his article "Name That Core"

Name That Core

Carl Luetzelschwab K9LA

If you've been active in Amateur Radio for a number of years, perhaps you've accumulated a junk box full of components. These components could be resistors, transistors, tubes (I still have some of these!), capacitors, inductors, knobs, meters, cores, connectors, etc.

Of those components, it's likely that the characteristics of most of them are identified by a color code (resistors, for example), by performing a mathematical calculation (air-wound inductors, for example), by reading labeling (transistors, for example) or by doing a visual inspection (connectors, for example). The one exception seems to be cores – generally ferrite cores have no marking to identify their characteristics (there are iron powder cores that are color coded – more on this later).

A great example of 'no marking' is a box full of half-cores that I have. The idea here is to put a wire or cable in one of these half-cores and then add another half-core to fully encase the wire or cable. But I have no idea what these cores are. One way to answer the 'what are they?' question is to stick a short wire through the core and measure the resulting impedance – its series resistance Rs and its series reactance Xs. You can easily do this with an MFJ-259B (HF/VHF SWR analyzer) or something similar, with one end of the wire to the center conductor of the RF connector and the other end to the ground side of the RF connector.

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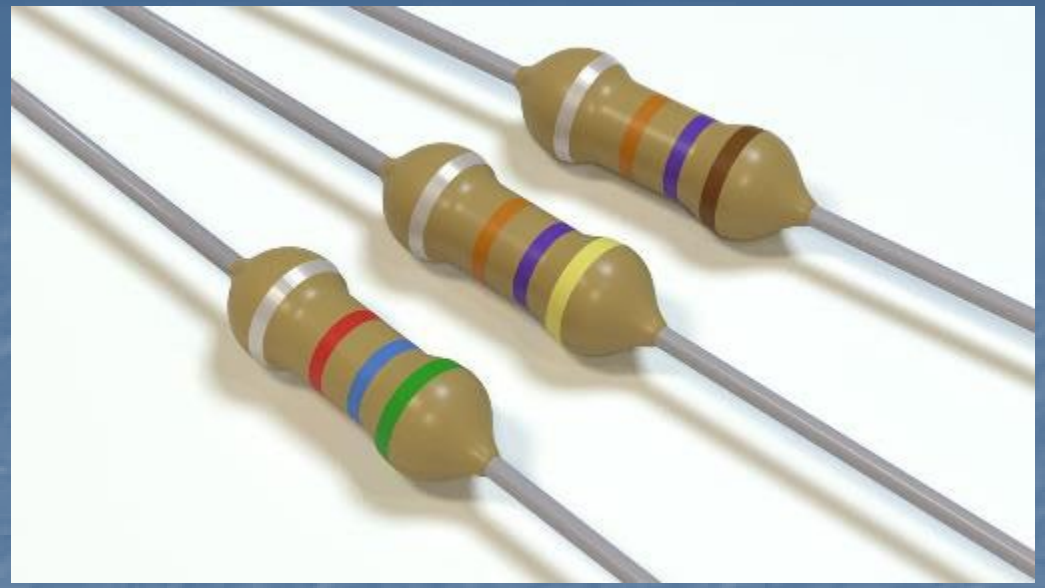



CMD 9324
PRN10116N
4701J

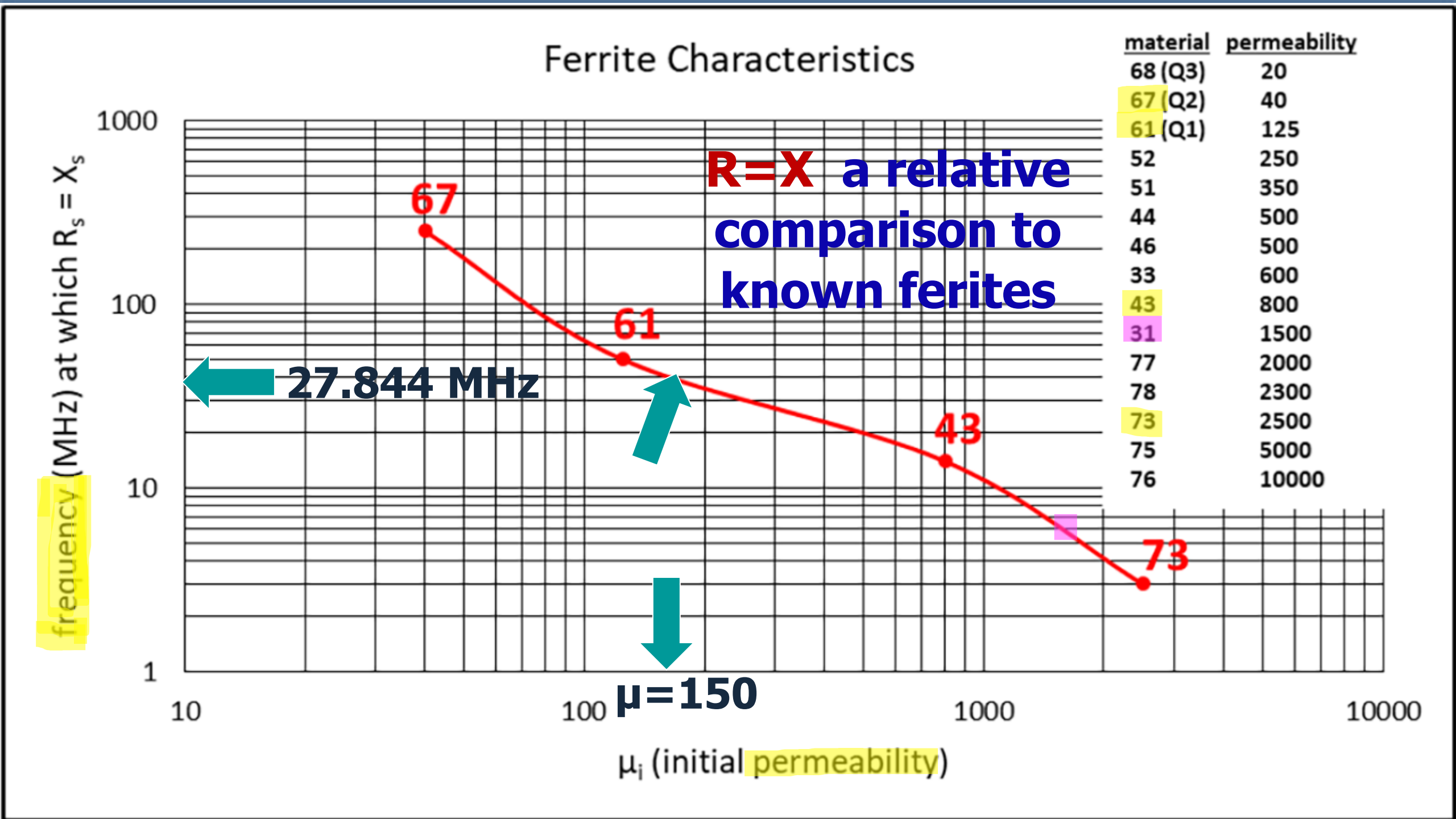

PH
2N4
870
2N 2

FT-240-61

MFJ-259D

Procedure

- On the Home Screen
- Pick a Frequency Band
- TUNE knob → top or bottom
- Tune up/down until R = X
  - Change bands if you can't
- Note the Frequency 27.844
- Refer to his Permeability Chart for the Mix


Ferrite Characteristics
material
permeability
68 (Q3) 20
67 (Q2) 40
61 (Q1) 125
52 250
51 350
44 500
46 500
33 600
43 800
31 1500
77 2000
78 2300
73 2500
75 5000
76 10000
R=X a relative comparison to known ferites
67
61
43
73
27.844 MHz
μ=150
1000
100
10
1
frequency (MHz) at which $R_s = X_s$
10
100
1000
10000
μ_i (initial permeability)

Comet
CAA-500

MFJ-259
All models

Rig Expert

NanoVNA

Now that you have:
The MIX and SIZE
of the core

A MUST HAVE
Free On-Line Calculator

https://coil32.net/onlie-calculators/amidon-ferrite- torroid-calculator.html

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https://coil32.net/online-calculators/amidon-ferrite-torroid-calculator.html

SELECT THE TOROID:

Material type of the toroid –

Dimension type of the toroid –

Available information about the toroid:

Initial magnetic permeability (μ): 850

Saturation flux density (B_s): 2950 Gs

Residual flux density (B_r): 1310 Gs

Coercive Force (H_c): 0.45 Oe

Curie Temperature: 135 °C

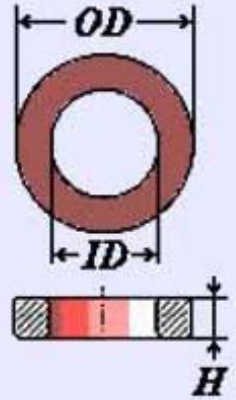
Dimensions (OD x ID x H): 35.6 x 12.7 mm

A_L factor: 885 nH/N^2

ENTER THE INPUT DATA:

L = μH – **Required inductance**

Calculate



THREE INPUTS (STEPS)

RESULT:

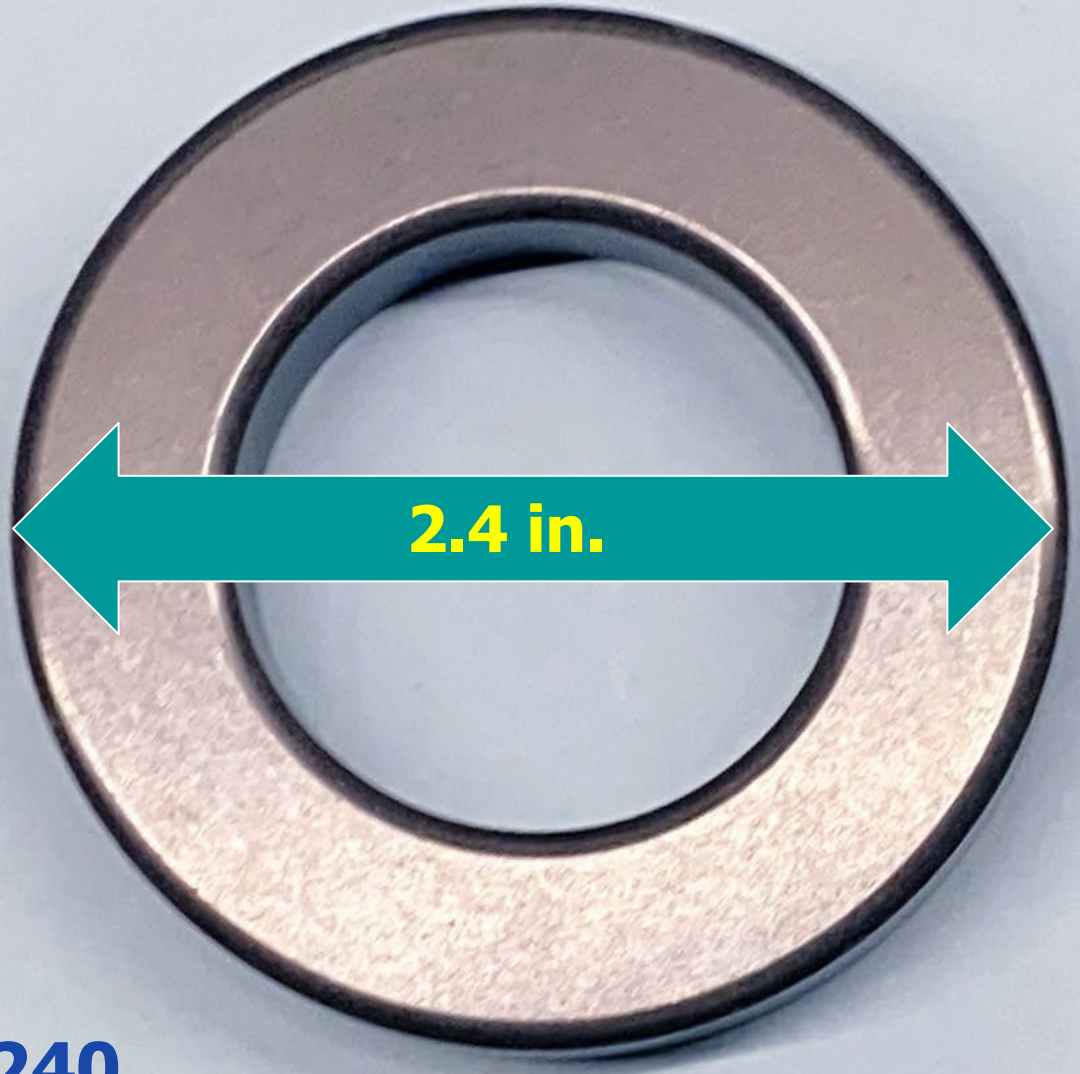
N = – Number of turns

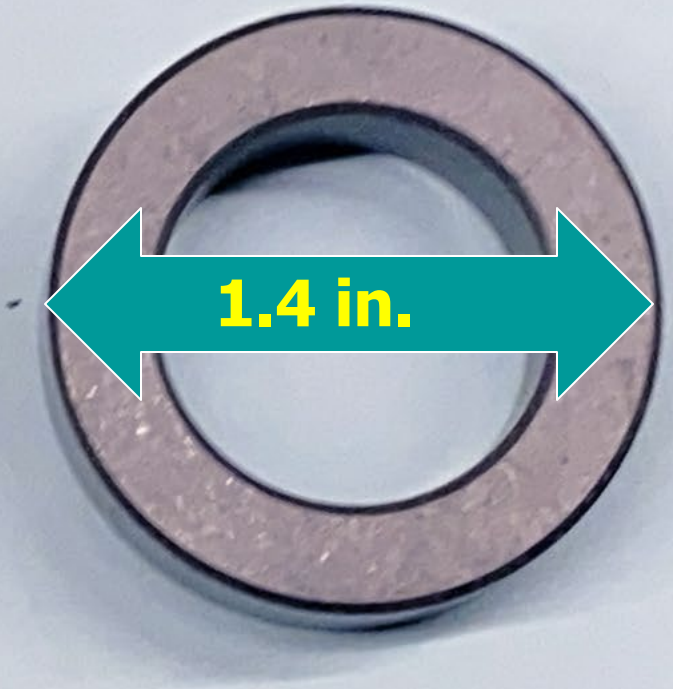
Results

E.G. FT-240-43

Power

Only two size choices





FT-240

Full Limit

Stack of 2

FT-140

100 Watts

RF resistance = 200 Ω min.

4 times coax impedance 50 Ω

$RF_{Resistance}$ $X_L = 2\pi f L$

$L_{\mu H} = 200\ \Omega / 6.28 \times f_{MHz}$

No More Mystery

And you can thank Carl Leutzelschwab

Leutzelschwab

Based on his article "Name That Core"

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