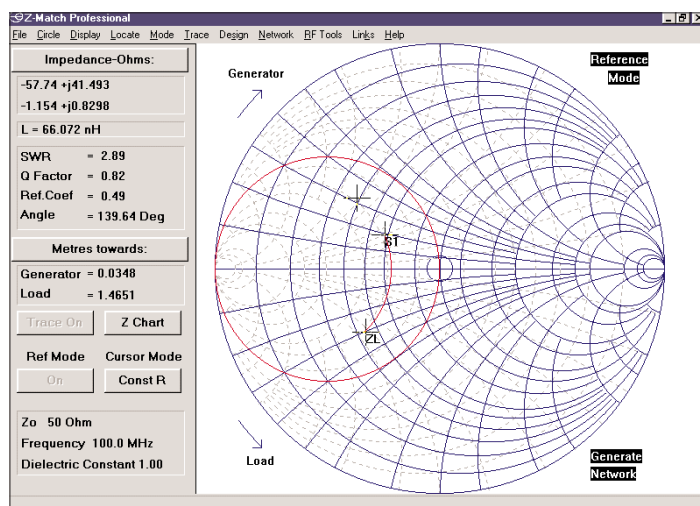## Z-Match for Windows

Z-Match Version 3

Z-Match is Number One Systems' friendly software implementation of the well known paper chart developed by Phillip Smith at Bell Laboratories in 1939. Over the past sixty years, the Smith Chart has become the standard analysis tool for RF engineers. The Smith Chart in its original form is an exceptionally versatile tool but can be difficult to use. Impedances have to be normalised to multiples or submultiples of the characteristic impedance and distances are always expressed in terms of wavelength. Z-Match overcomes all these difficulties by presenting all parameters in actual engineering units, Ohms, Farads, Henries and metres. Z-Match Version 3 is an enhanced product with a powerful set of additional plotting and design functions aimed at the professional RF design engineer.

More than a Paper Chart

Z-Match performs all of the paper Smith Chart functions and more! Three different Smith Chart operating modes provide just the right tools to meet the design task to hand. A classic Smith Chart mode replicates and enhances the functions performed on a standard paper Smith Chart. The second, S-Parameter and Noise Figure mode is optimised for small signal amplifier design, particularly where low noise and stability are important. The third chart operating mode is customised for the rapid and easy development of impedance matching circuits; it makes impedance transformation simple for even the most inexperienced rf engineer. As well the Smith Chart modes, Z-Match provides a comprehensive set of built-in calculators and dedicated design tools for the RF engineer.

Frequency Analysis

At the click of a button, matching networks synthesised in Z-Match can be passed to the Number One Systems' Linear circuit Analysis program Analyser, where the frequency responses of gain and input impedance may be plotted over any frequency range. In addition to feeding a design out to Analyser for a frequency sweep, a circuit from Analyser can be looked at on a Z-Match Smith Chart as a locus of impedance against frequency.

Lines and Discretes

Z-Match is an invaluable aid to RF engineers involved in the design of systems using transistors, LC matching networks and transmission lines. Z-Match provides many more features than the standard paper Smith Chart and enables RF design problems to be solved with greater accuracy and with less risk of error.

Engineering Units

Z-Match is ideal for solving problems such as matching for antennas and RF amplifiers. Solutions can be implemented directly using lumped LC components, coax lines, microstrips, striplines or waveguides. Z-Match takes account of line loss, dielectric constant, velocity factor, frequency and Zo, giving answers directly in terms of VSWR, reflection coefficient, actual line length or component value.

Built-in Calculators

Much of the mystique surrounding the design of RF systems is dispelled by Z-Match. Built-in calculators for Transmission Lines, System Noise Figure, Intermodulation Performance, Reactance, Resonance, Stability, Maximum Gain and VSWR make routine mathematical operations easy.

Standard Interface

Z-Match conforms strongly to the Windows user interface standard allowing new users to quickly become confident with the program. All operations are accessible through a clear and logical menu structure with button bars taking users directly to the solution with a minimum of delay.

S-parameters and Noise Figure Data

Circuits using active devices specified by S-Parameters and Noise Figure Data can be analysed by Z-Match. Stability Circles, Gain Circles, Noise Circles and Optimum Input and Output Impedances are all plotted at the click of a button. Z-Match includes a full library of S-Parameters for the popular Motorola range of RF devices. Any of the over 600 Library entries may

Z-Match for Windows

be loaded directly onto the Smith Chart. Additional libraries using the industry 'Touchstone' standard format can be downloaded free of charge from other manufacturer's web sites.

Easy to Use

New users and students will find Z-Match a painless introduction to Smith Chart techniques, removing the uncertainty and tedium of the paper chart and allowing the inherent elegance of the method to show through. The Z-Match manual contains sections explaining the background to Transmission Line Theory, Smith Charts and S-Parameters.

Worked Examples

As an introduction to Smith Chart design and to demonstrate many of the program's features, the manual supplied with Z-Match includes a comprehensive range of worked examples. The design of matching networks, the optimisation of a low noise RF amplifier, calculating a receiver's RF system performance and much more are covered in the Worked Examples section of the manual.

Features

- Fully Windows compliant
- High resolution Smith Chart display
- Linear and Circular cursor movement
- Output to Windows printers, including colour
- Impedance or Admittance charts
- Normalised or Actual parameters
- Rectangular or Polar impedances
- Wavelength and actual distance
- Polar reflect coefficient
- Standing wave radio
- Equivalent inductance or capacitance
- Characteristic impedance
- Variable chart characteristic impedance
- Location of any impedance or admittance
- Frequency in use
- Dielectric constant or Velocity vector
- Network Q value

- Display of equivalent electrical circuits
- Impedance / Admittance conversion
- Lumped 'L' and 'C' circuits
- Draw and Move cursor along:
  Constant conductance circle
  Constant resistive circle
  Constant SWR circle
- Draw:
  Cursor centred circle
  Unity conductance circle
  Unity resistance circle
  Rollett stability circles
  Noise figure circles
  Amplifier inpur and output gain circles
- Effect of line loss
- Point Reference mode
- Reference mode resets parameters
- Line transformer calculator
- Transducer gain calculator
- Maximum available gain calculator
- Location of any polar impedance
- Location of S-Parameter
- S-Parameter calculation
- Amplifier design using S-Parameters
- Optimum noise figure calculator of impedance locii from Analyser
- System noise figure and IP calculator
- Transmission line calculator
- Line transformer calculator
- Resonance, reactance and SRW calculators
- Engineering units conversion calculators
- Amplifier design tools
- Amplifier design using S-Parameters
- Selectable chart frequency
- Shunt and series transmission lines
- Displays a network circuit as it is being designed.
- Configurable display colours