AN002 – C60 Application Note

High resolution impedance plots of an ultrasonic transducer

For the vast majority of applications one thousand points is sufficient to draw a detailed graph. However sometimes this is not sufficient, especially with acoustic transducers and other very resonant devices. To simplify data acquisition a test script can be written to control the C60 to render a graph with up to 10240 points. In this example the script was written to measure a 40KHz ultrasonic transducer tested backwards from 4MHz. It was done backwards so the script could be stopped when the interesting part of the transducer's response was over. Figure 1 shows seven one thousand point plots from 2.8 KHz to 4 MHz.

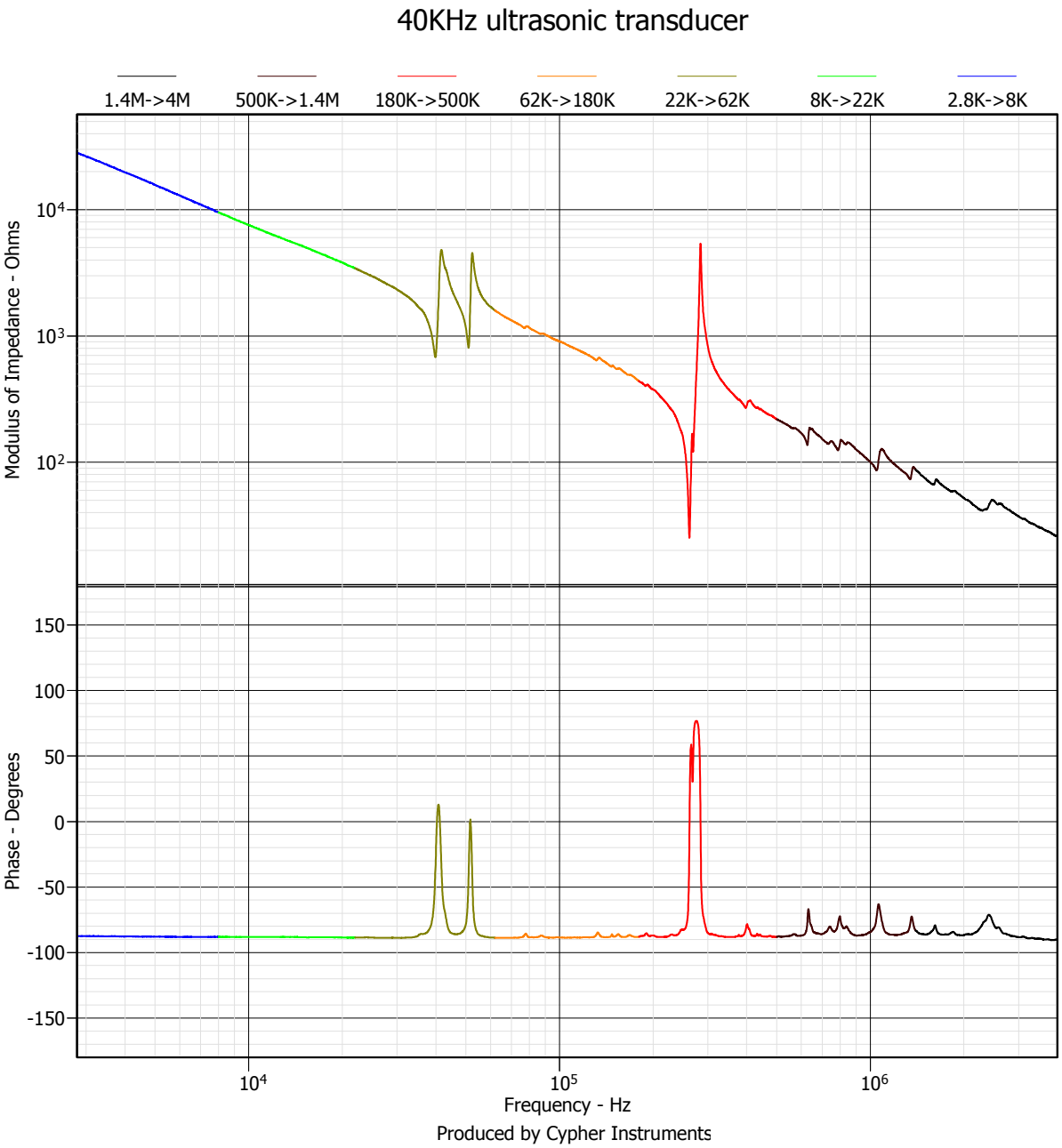

Figure 1. Complex impedance of a 40KHz ultrasonic transducer

The frequency intervals were chosen to give approximately equal sized sections to each pen on a logarithmic scale. The test script used can be seen in Figure 2. Details of the scripting language can be found in Appendix C of the C60 User Manual. A "#" or hash character at the start of a line defines a comment. For reading ease the comments are in green, the commands in blue and the data is in black text.

This form of syntax highlighting reduces syntax errors when writing test scripts. Notepad++ is a generic source editor with customisable syntax highlighting suitable for this task and can be downloaded from: http://sourceforge.net/projects/notepad-plus/. The key words in Appendix C of the C60 User Manual can simply be copied from the table and pasted into Notepad++'s key word entry field.

This example script can easily be customised for any device that requires a large number of test points. Simply change the frequency groups, sweep direction, title and pen legends to suit. When testing the modified script it is advantageous to reduce the number of test points from 1024 to 24 and therefore reduce the test time.

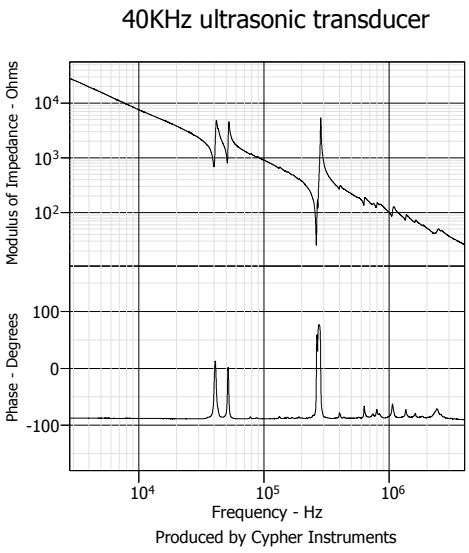

Figure 3. Monochrome graph

The graph view options dialog (style tab) was used to hide the pen legends and switch the graph to monochrome to produce the graph in Figure 3.

```
# Title:     Hi-resolution backward sweep impedance test script
# File Name: Impedance 8987 test points.cgs
# Author:    Adam Fullerton
# Date:      16/7/2005

# Load a new amplitude document and name it
newimpf Hi-resolution 4MHz to 10Hz impedance test script
# Set the number of points
points 1024
# This graph will have log points
linear 0
# Set the sweep direction [0 = a-b, 1 = b-a, 2 = alternate]
sweepmode 1
# Switch on the oscillator to the start frequency
idlefreq -1
# set the output attenuation level
atten 0
# Set the test period
period 0
# Enable phase data acquisition
phase 1
# Pop up a dialog reminding the user to connect the Device Under Test
prompt Ensure that the DUT is connected and click OK to start

# Each pen range has been designed to overlap by one point
# The frequency ranges in this script can be changed to suit the
# particular DUT

# Pen 1
imptest 1400000 4000000
# Label the line
legend 1.4M->4M
# Wait for the test to complete
wait

# Pen 2
imptest 500000 1400000
# Label the line
legend 500K->1.4M
# Wait for the test to complete
wait

# Pen 3
imptest 180000 500000
# Label the line
legend 180K->500K
# Wait for the test to complete
wait

# Pen 4
imptest 62000 180000
# Label the line
legend 62K->180K
# Wait for the test to complete
wait

# Pen 5
imptest 22000 62000
# Label the line
legend 22K->62K
# Wait for the test to complete
wait

# Pen 6
imptest 8000 22000
# Label the line
legend 8K->22K
# Wait for the test to complete
wait

# Pen 7
imptest 2800 8000
# Label the line
legend 2.8K->8K
# Wait for the test to complete
wait

# Pen 8
imptest 1000 2800
# Label the line
legend 1K->2.8K
# Wait for the test to complete
wait

# Pen 9
imptest 100 1000
# Label the line
legend 100->1K
# Wait for the test to complete
wait

# Pen 10
imptest 10 100
# Label the line
legend 10->100
# Wait for the test to complete
wait
# Print a message to show that the test has finished
message 8987 point impedance test script complete!
# End of file
```

Figure 2. Test script