1 LCR Meter Sample Application

-1 Overview

The LCR Meter Sample Application is a sample application software for LCR meters.

(1) Functionality

This software provides the following functionality:

- LCR mode measurement
- Configuration of LCR mode measurement conditions
- Display of LCR mode measured values
- Saving of LCR mode measurement data
- TRANSFORMER mode measurement *1
- Configuration of TRANSFORMER mode measurement conditions *1
- Display of TRANSFORMER mode measured values *1
- ANALYZER mode measurement *2
- Configuration of ANALYZER mode measurement conditions *2
- Display of ANALYZER mode measured values as a graph *2
- Display of ANALYZER mode measured values as a list *2
- Saving of ANALYZER mode measured value lists *2
- Calculation of measurement accuracy
- Calculation of the measurement range
- Acquisition of measurement screens
- Measurement of communications times
- Saving and loading of LCR meter settings *3

(2) Measurement methods

The sample application provides the following six measurement methods:

- Frequency characteristics (measurement while varying the frequency)
- Power characteristics (measurement while varying the power) *4
- Voltage characteristics (measurement while varying the voltage)
- Current characteristics (measurement while varying the current)
- Time interval measurement (measurement over a user-specified time interval) *5
- "Acquire by pressing ENTER" measurement (one-time measurement) *5

*1 IM3533 and IM3533-01 only
*2 IM3533-01, IM3570, IM3590, and IM7580 only
*3 IM3523 only
*4 IM7580 only
*5 LCR mode only

(3) Operating environment

Supported operating systems	Windows Vista SP1 or later (32-bit/64-bit) Windows 7 (32-bit/64-bit) Windows 8 (32-bit/64-bit) Windows 10 (32-bit/64-bit)
Software environment	Microsoft .NET Framework 4.0
CPU	1 GHz or greater
RAM	512 MB or greater
Display resolution	1024 X 768 pixels or greater
Hard disk	At least 5 MB available (If .NET Framework 4.0 has not yet been installed, an additional 900 MB of space is required. Additional space is required in order to store recorded data.)
Communications interfaces	RS-232C, GPIB, USB, LAN

Table 1-1 Operating environment

The following cables are required in order to connect the LCR meter to a computer:

- RS-232C connection: RS-232C cross cable (9-pin female to 9-pin female)
- GPIB connection: National Instruments GPIB-USB-HS
- USB connection: USB cable (AB type)
- LAN connection: LAN cross cable

(4) Supported products

This software can be used with the following products:

- IM3523
- IM3533
- IM3533-01
- IM3536
- IM3570
- IM3590
- IM7580

-2 Start screen

The start screen is displayed when the LCR Meter Sample Application is launched.

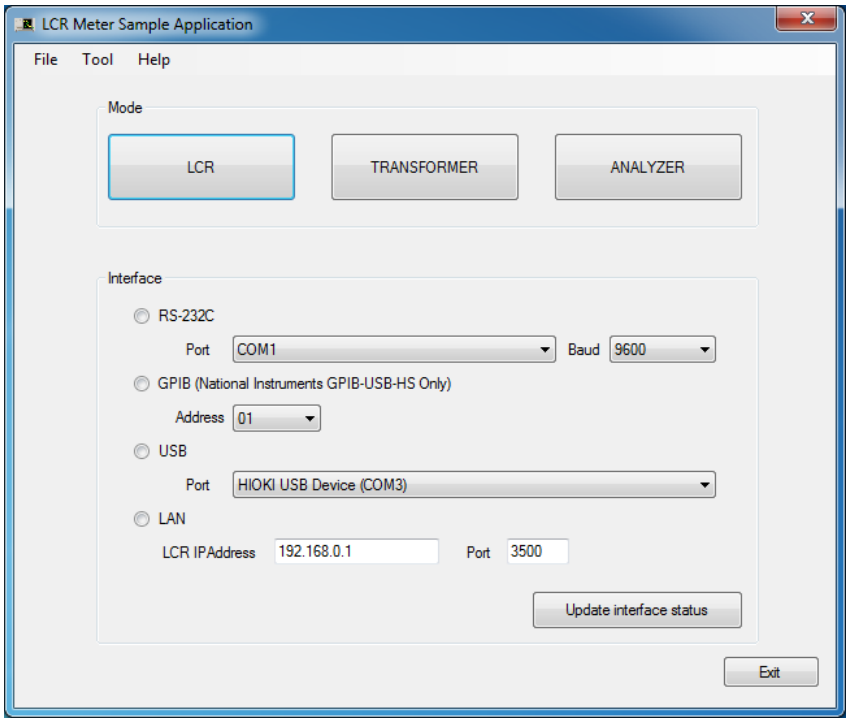


Figure 2-1 Start screen

Select the interface you're using to connect the LCR meter and switch to a function screen.

-3 LCR mode

You can perform LCR mode measurement.

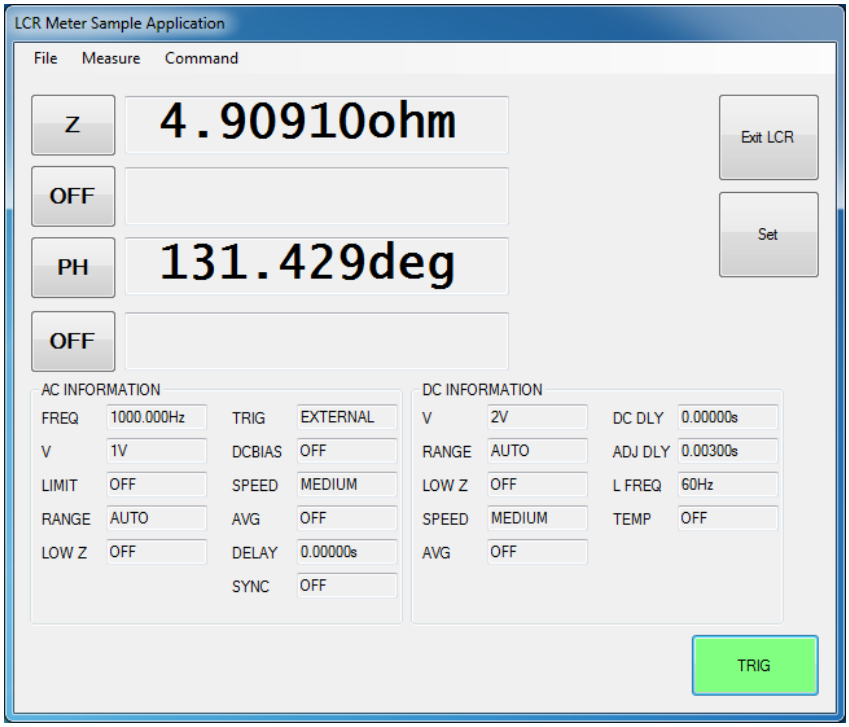


Figure 3-1 LCR mode screen

(1) LCR settings

You can set the measurement conditions used in LCR mode.

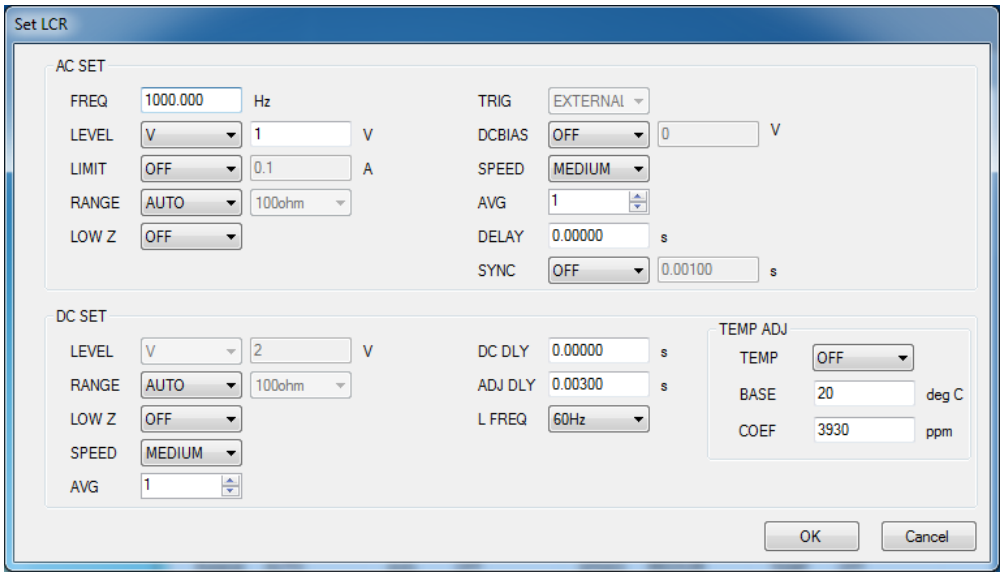


Figure 3-2 LCR settings screen

(2) Frequency, voltage, and current characteristics measurement

You can make measurements while varying the frequency, power, voltage, or current. Measurement data can be saved as a Microsoft Excel or CSV file.

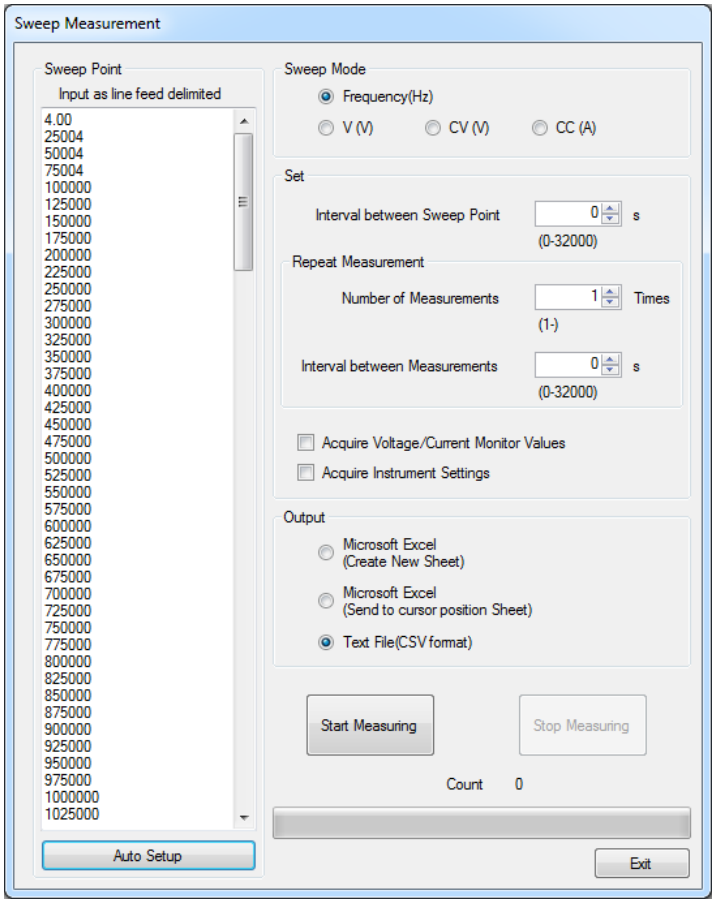


Figure 3-3 Frequency/voltage/current characteristics measurement screen

You can set automatically set sweep points by specifying the start value, end value, and number of data points.

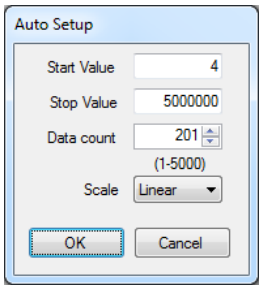


Figure 3-4 Sweep point automatic setup screen

Example CSV file saved during frequency/voltage/current characteristics measurement

```
MODEL,IM3570
Ver,V3.11

DATE,2017-05-30
TIME,18:31:12

AC SETTINGS
FREQ,5000000.00,Hz
V,1,V
LIMIT,OFF
RANGE,HOLD,1Mohm
LOW Z,OFF
SPEED,SLOW2
AVG,OFF
DELAY,0.00000,s
DC BIAS,OFF

Frequency(MHz),AC Status,Z,PH,AC Vmoni,AC Imoni,DC Vmoni,DC Imoni
4.00,3,  25.29198E+09,-146.204,1.000838E+00,3.881721E-11,0.000000E+00,0.000000E+00
25004,2,  1.033173E+09,-104.054,1.030344E-01,2.236199E-10,0.000000E+00,0.000000E+00
50004,2,  181.9796E+06,  -39.037,5.201070E-02,3.421480E-10,0.000000E+00,0.000000E+00
75004,2,  167.5964E+06,    3.175,3.482143E-02,1.536798E-10,0.000000E+00,0.000000E+00
100000,2,  167.1980E+06,   -5.768,2.618488E-02,1.546787E-10,0.000000E+00,0.000000E+00
                                                    :
```

(3) Time interval measurement

You can make measurements at a user-specified time interval. Measurement data can be saved as a Microsoft Excel or CSV file.

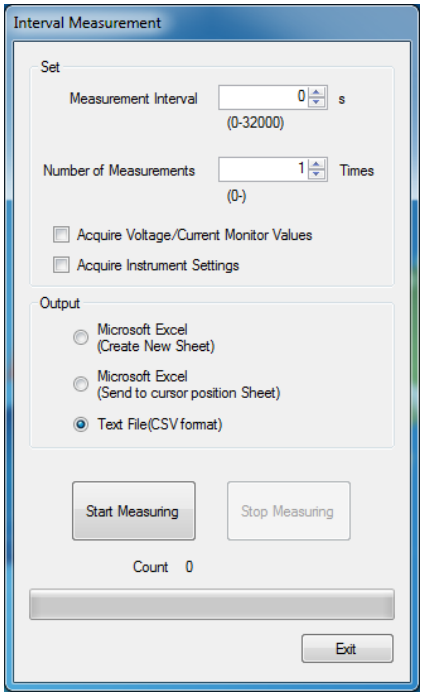


Figure 3-5 Time interval measurement screen

Example CSV file saved during time interval measurement

```
MODEL,IM3570
Ver,V3.11

DATE,2017-05-30
TIME,18:32:10

AC SETTINGS
FREQ,5000000.00,Hz
V,1,V
LIMIT,OFF
RANGE,HOLD,1Mohm
LOW Z,OFF
SPEED,SLOW2
AVG,OFF
DELAY,0.00000,s
DC BIAS,OFF

DATE,TIME,AC Status,Z,PH,AC Vmoni,AC Imoni,DC Vmoni,DC Imoni
2017-05-30,18:32:11,0,  523.3394E+03,   67.336,1.404615E-03,2.865997E-10,0.000000E+00,0.000000E+00
2017-05-30,18:32:12,0,  513.1694E+03,   67.007,1.404616E-03,3.339377E-10,0.000000E+00,0.000000E+00
2017-05-30,18:32:13,0,  517.9510E+03,   69.294,1.404422E-03,3.282056E-10,0.000000E+00,0.000000E+00
2017-05-30,18:32:14,0,  530.5060E+03,   66.928,1.404592E-03,2.526029E-10,0.000000E+00,0.000000E+00
2017-05-30,18:32:15,0,  514.8023E+03,   68.124,1.404715E-03,3.310959E-10,0.000000E+00,0.000000E+00
                                                    :
```

(4) "Acquire by pressing ENTER" measurement

You can make measurements whenever the ENTER key is pressed. Measurement data can be saved as a Microsoft Excel or CSV file.

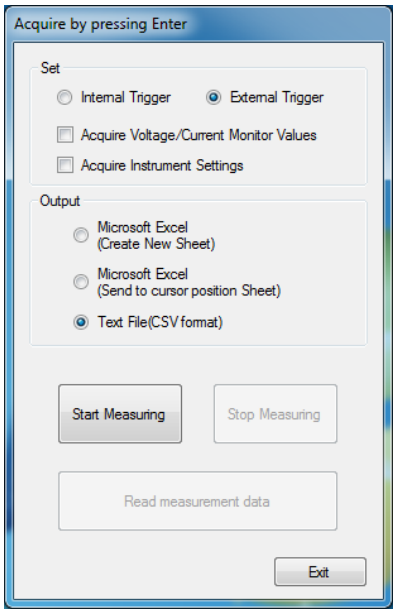


Figure 3-6 "Acquire by pressing ENTER" screen

Example CSV file saved during "acquire by pressing ENTER" measurement

```
MODEL,IM3570
Ver,V3.11

DATE,2017-05-30
TIME,18:34:20

AC SETTINGS
FREQ,5000000.00,Hz
V,1,V
LIMIT,OFF
RANGE,HOLD,1Mohm
LOW Z,OFF
SPEED,SLOW2
AVG,OFF
DELAY,0.00000,s
DC BIAS,OFF

DATE,TIME,AC Status,Z,PH,AC Vmoni,AC Imoni,DC Vmoni,DC Imoni
2017-05-30,18:34:21,0,  508.4468E+03,   68.327,1.404104E-03,3.629821E-10,0.000000E+00,0.000000E+00
2017-05-30,18:34:22,0,  547.1544E+03,   68.523,1.403642E-03,1.933452E-10,0.000000E+00,0.000000E+00
2017-05-30,18:34:22,0,  522.5415E+03,   68.767,1.403694E-03,3.009092E-10,0.000000E+00,0.000000E+00
2017-05-30,18:34:22,0,  523.5633E+03,   67.072,1.403521E-03,2.845311E-10,0.000000E+00,0.000000E+00
2017-05-30,18:34:22,0,  514.7413E+03,   68.428,1.403768E-03,3.335621E-10,0.000000E+00,0.000000E+00
                                                    :
```

(5) Test measurement

You can perform a series of measurements under the set measurement conditions and display the results.

To start test measurement, choose [Start Test Measurement] on the [Measure] menu.

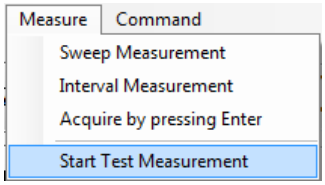


Figure 3-7 "Start Test Measurement" menu command

To stop test measurement, choose [Stop Test Measurement] on the [Measure] menu.

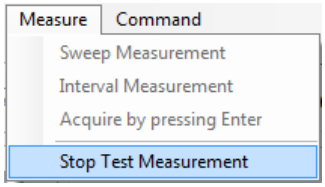


Figure 3-8 "Stop Test Measurement" menu command

-4 TRANSFORMER mode

You can perform measurements in TRANSFORMER mode.

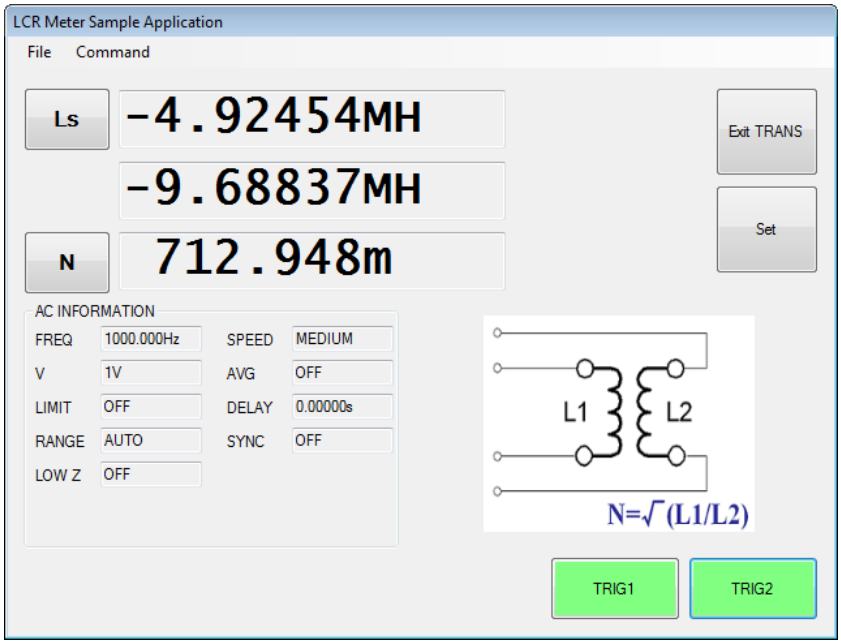


Figure 4-1 TRANSFORMER mode screen

(1) TRANSFORMER settings

You can set the measurement conditions used in TRANSFORMER mode.

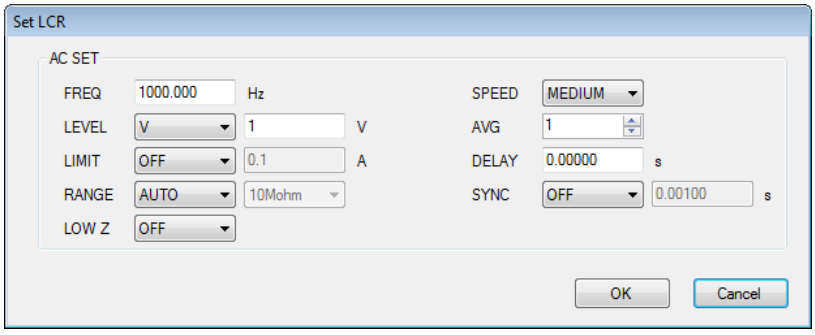


Figure 4-2 TRANSFORMER settings screen

-5 ANALYZER mode

You can perform measurements in ANALYZER mode. You can save a graph of measured values as a BMP file, or a list of measured values as a CSV file.

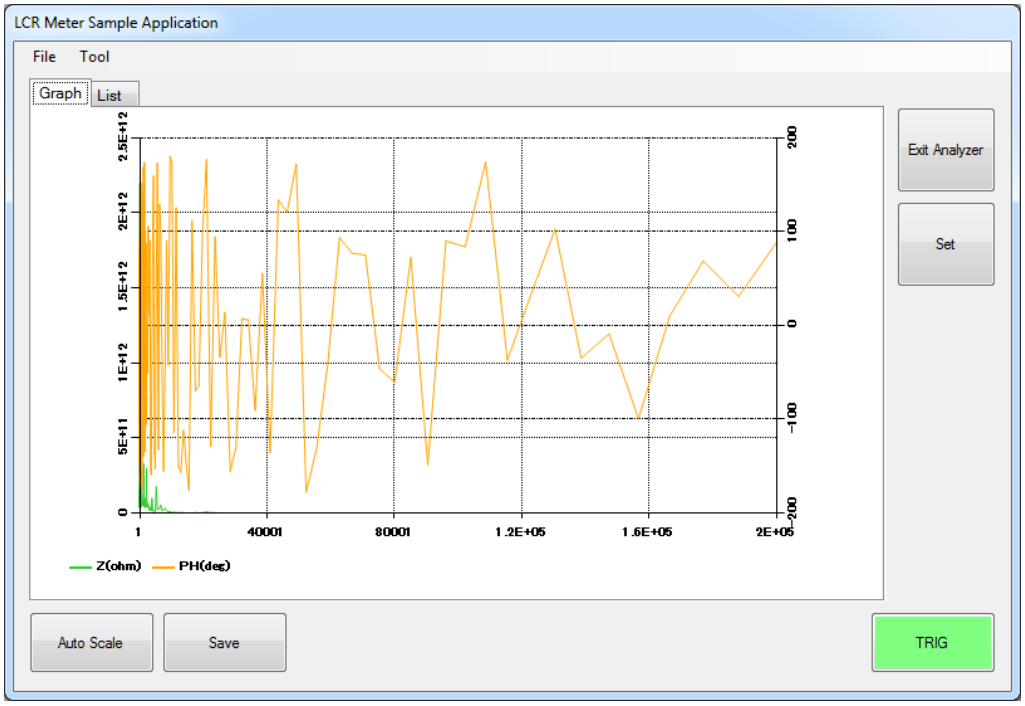


Figure 5-1 ANALYZER mode graph screen

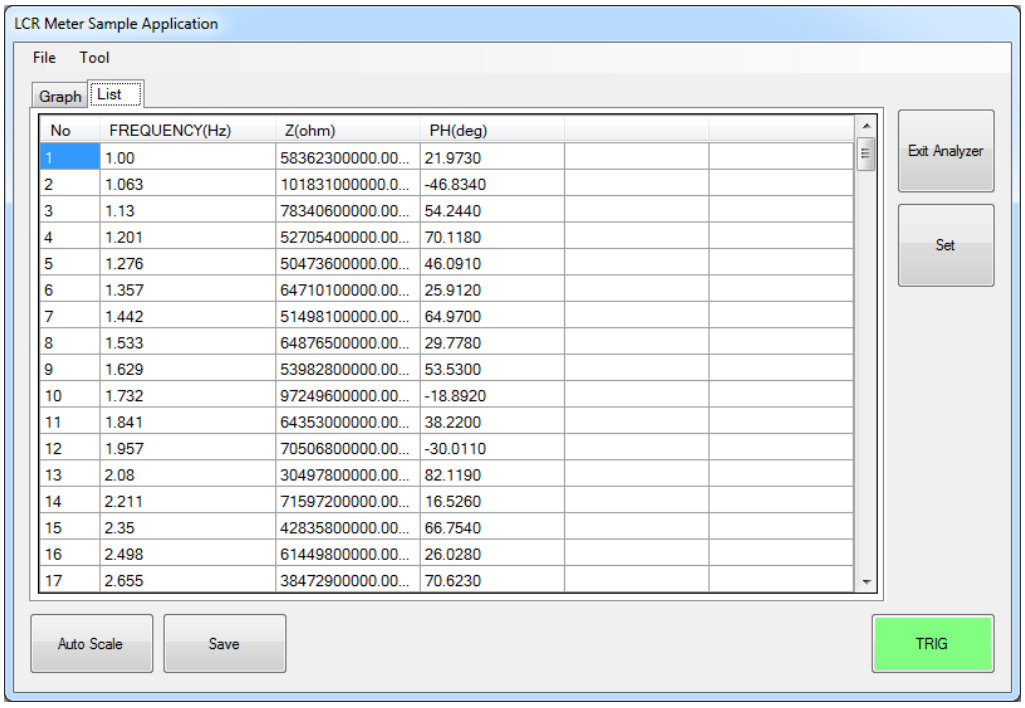


Figure 5-2 ANALYZER mode list screen

(1) ANALYZER settings

You can set the measurement conditions to use in ANALYZER mode.

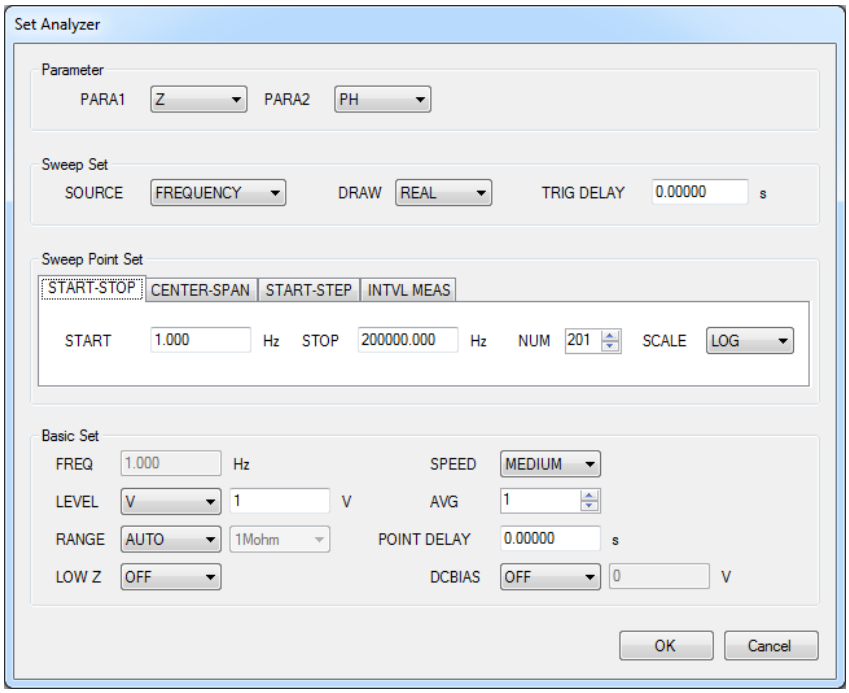


Figure 5-3 ANALYZER settings screen

(2) Graph settings

You can set whether to show each parameter on the graph screen in ANALYZER mode as well as each parameter's color and scale, and you can set whether to show the grid.

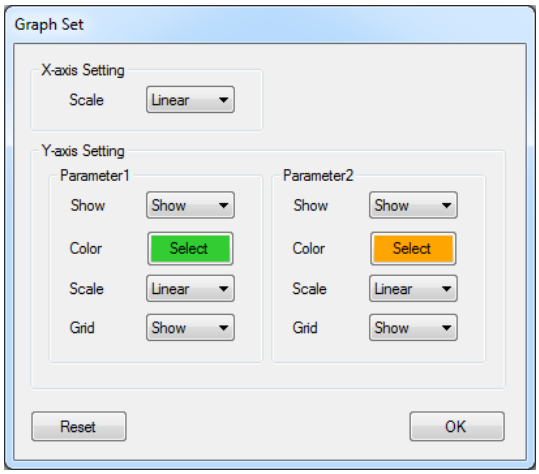
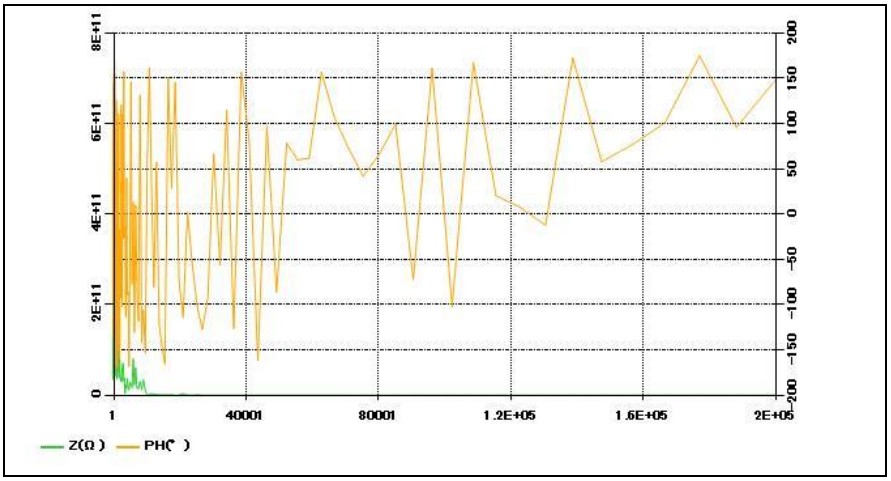


Figure 5-4 Graph settings screen

(3) Example BMP file created by saving a measured value graph in ANALYZER mode



(4) Example CSV file created by saving a measured value list in ANALYZER mode

```
No.,FREQUENCY(Hz),Z,PH
1,1.00,48787500000.0000,17.6920
2,1.063,57611300000.0000,46.0820
3,1.13,36199600000.0000,81.7180
4,1.201,42558200000.0000,61.6280
5,1.276,95780500000.0000,-44.2260
6,1.357,118187000000.0000,-71.5620
7,1.442,67025000000.0000,29.4440
8,1.533,141748000000.0000,-83.1220
9,1.629,111160000000.0000,-50.5320
10,1.732,57342600000.0000,21.6520
                    :
```

-6 Accuracy calculation

You can set measurement conditions and calculate the measurement accuracy.

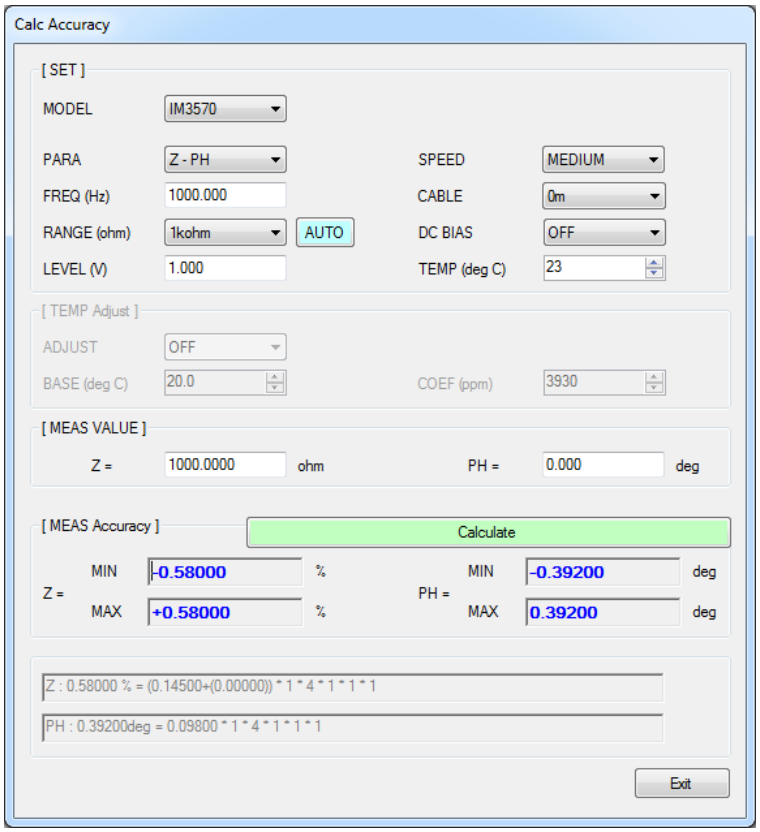


Figure 6-1 Accuracy calculation screen

-7 Measurement range calculation

You can set measurement conditions and calculate the measurement range.

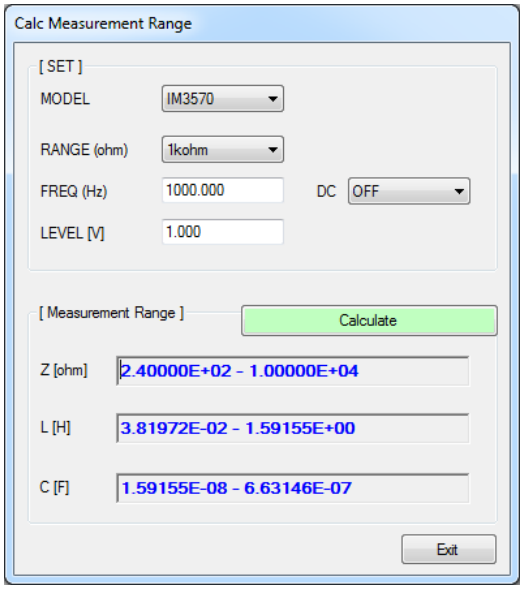


Figure 7-1 Measurement range calculation screen

-8 Screenshots

You can save the measurement screen as a BMP file.

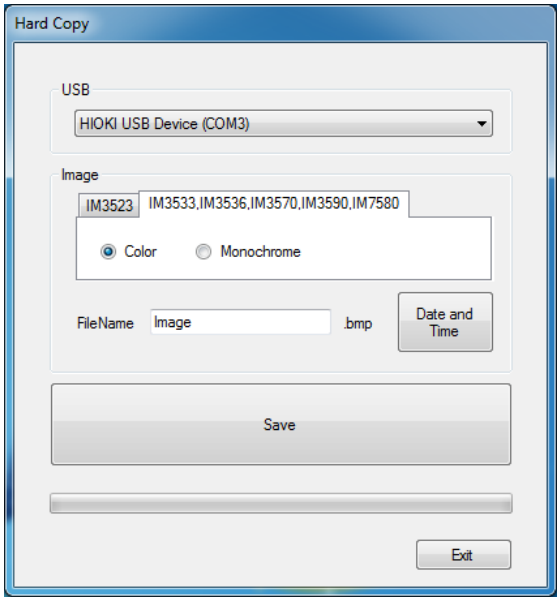


Figure 8-1 Screenshot screen

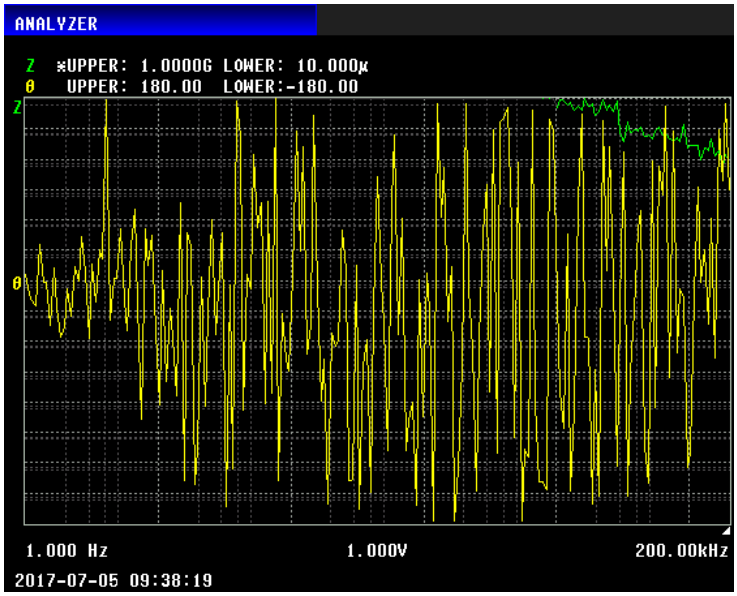


Figure 8-2 Example BMP file created by saving the measurement screen

-9 Measurement of communication times

You can send a communications command and measure the communication time.

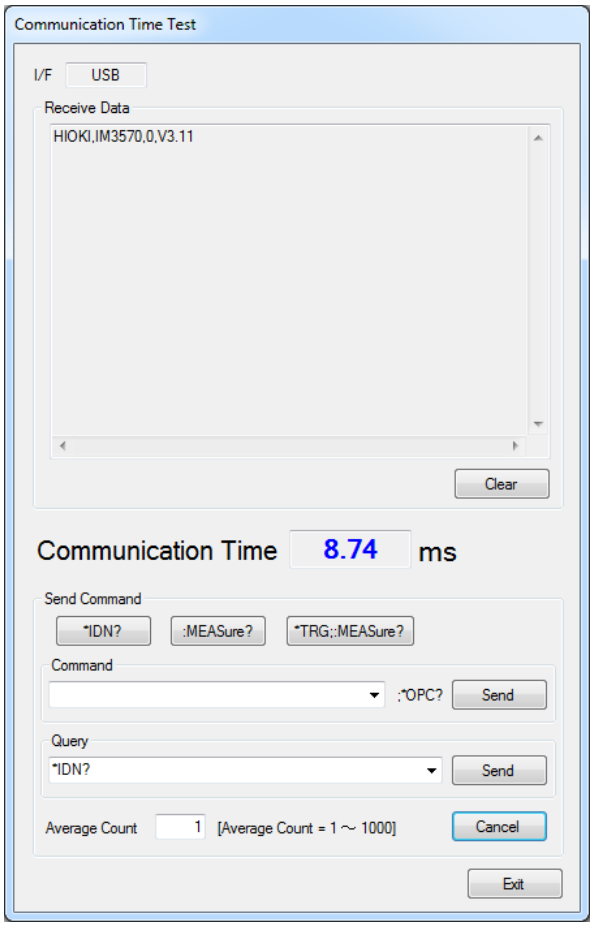


Figure 9-1 Communication time measurement screen

-10 Saving and loading of settings

(1) Saving of settings

You can save LCR meter settings to a file.

*This functionality is limited to the IM3523.

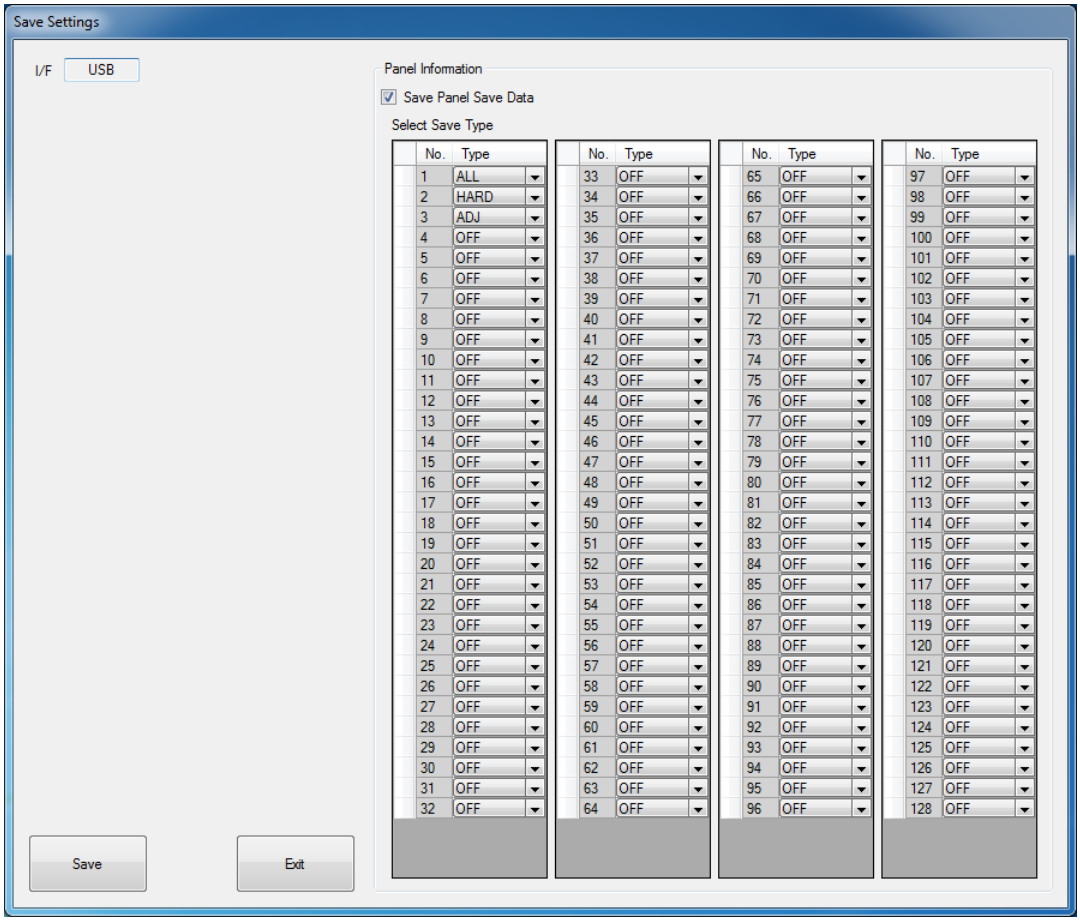


Figure 10-1 Save settings screen

(2) Loading of settings

You can restore previously saved settings.

*This functionality is limited to the IM3523.

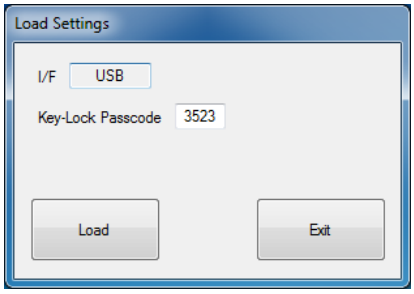


Figure 10-2 Load settings screen