

1 Impedance Analyzer Sample Application

-1 Overview

The Impedance Analyzer Sample Application is a sample application for use with impedance analyzers.

(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
- ANALYZER mode measurement
- Configuration of ANALYZER mode measurement conditions
- Display of ANALYZER mode measured values as a graph
- Display of ANALYZER mode measured values as a list
- Saving of ANALYZER mode measured value lists
- Calculation of measurement accuracy
- Calculation of the measurement range
- Acquisition of measurement screens
- Measurement of communications times

(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)
- Voltage characteristics (measurement while varying the voltage)
- Current characteristics (measurement while varying the current)
- Time interval measurement (measurement over a user-specified time interval) *1
- "Acquire by pressing ENTER" measurement (one-time measurement) *1

*1 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 impedance analyzer 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:

- IM7580A
- IM7581
- IM7583
- IM7585
- IM7587

-2 Start screen

The start screen is displayed when the Impedance Analyzer Sample Application is launched.

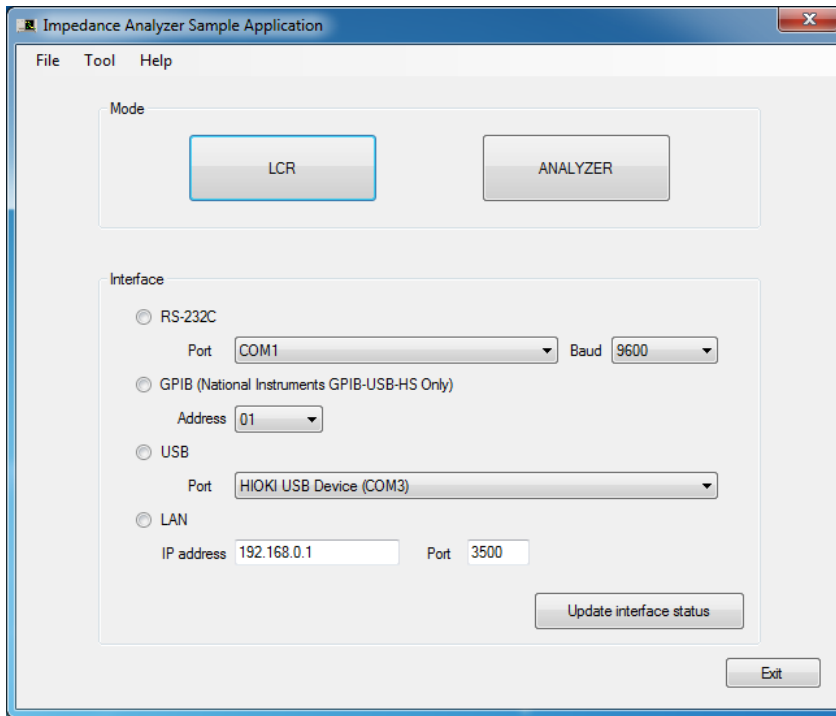


Figure 2-1 Start screen

Select the interface you're using to connect the impedance analyzer and switch to a function screen.

-3 LCR mode

You can perform LCR mode measurement.

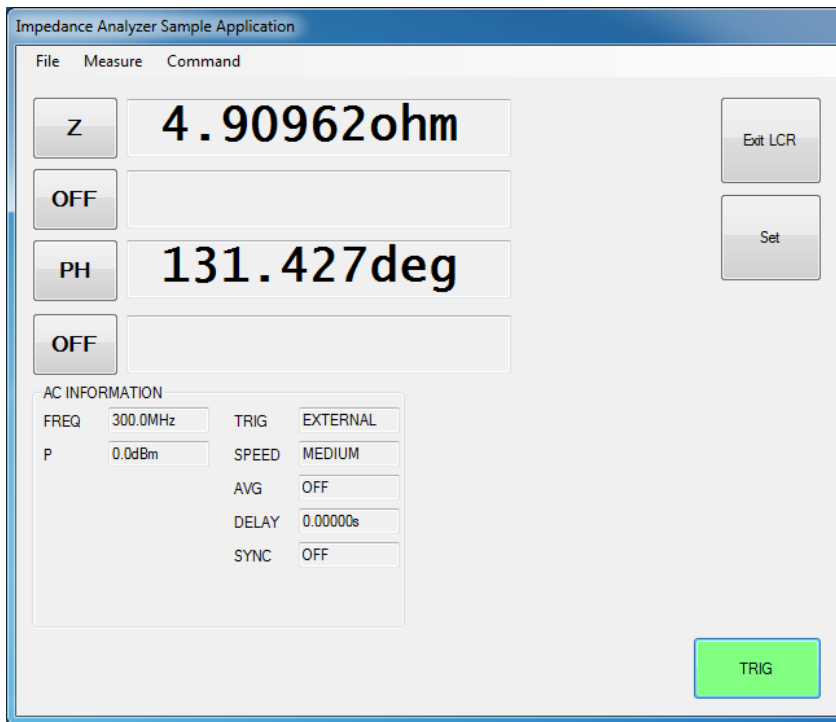


Figure 3-1 LCR mode screen

(1) LCR settings

You can set the measurement conditions used in LCR mode.

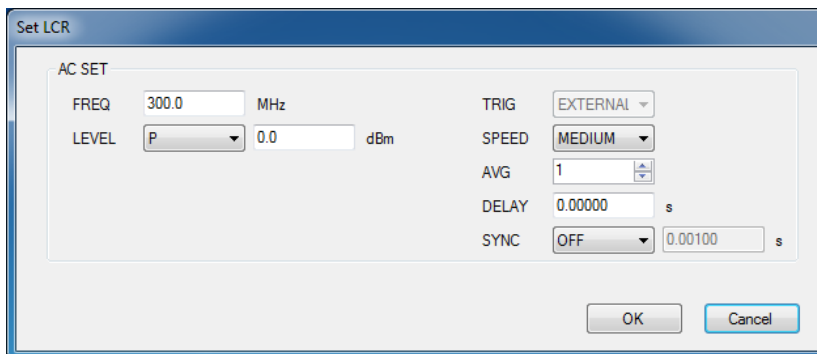


Figure 3-2 LCR settings screen

(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.

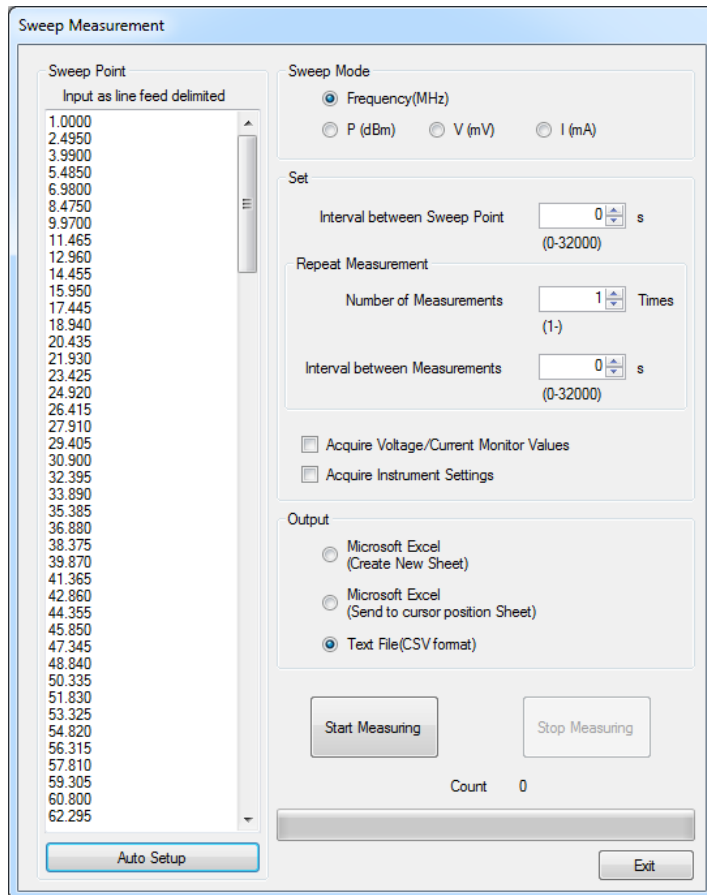


Figure 3-3 Frequency/voltage/current characteristics measurement screen

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

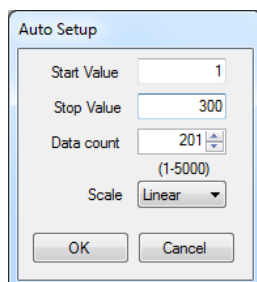


Figure 3-4 Sweep point automatic setup screen

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

```
MODEL, IM7581
Serial NO., 000000100
Ver, V1.02

DATE, 2017-05-30
TIME, 17:37:48

AC SETTINGS
FREQ, 300.00000, MHz
P, 0.0, dBm
SPEED, MEDIUM
AVG, OFF
DELAY, 0.00000, s
TRIG SYNC, OFF

Frequency(MHz), AC Status, Z, PH, AC Vmoni, AC Imoni
1.0000, 3, 217.689E+03, 113.542, 447.111E-03, 2.05390E-06
2.4950, 3, 100.361E+03, 97.396, 446.991E-03, 4.45384E-06
3.9900, 3, 64.9821E+03, 95.080, 446.870E-03, 6.87681E-06
5.4850, 3, 47.6127E+03, 95.528, 446.744E-03, 9.38288E-06
6.9800, 3, 37.2920E+03, 94.200, 446.615E-03, 11.9762E-06
:
```

(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.

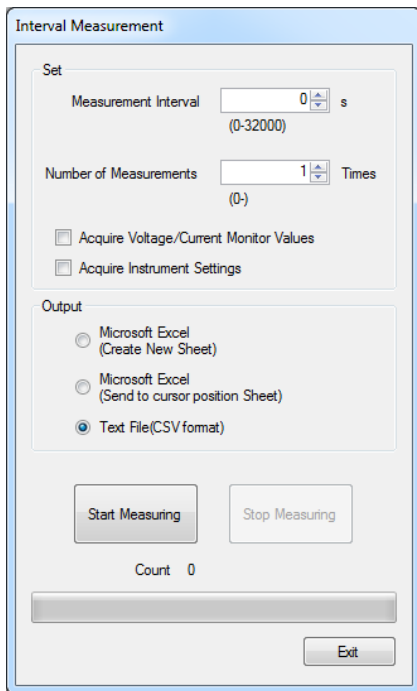


Figure 3-5 Time interval measurement screen

Example CSV file saved during time interval measurement

```
MODEL, IM7581
Serial NO., 000000100
Ver, V1.02

DATE, 2017-05-30
TIME, 17:38:34

AC SETTINGS
FREQ, 300.00000, MHz
P, 0.0, dBm
SPEED, MEDIUM
AVG, OFF
DELAY, 0.00000, s
TRIG SYNC, OFF

DATE, TIME, AC Status, Z, PH, AC Vmoni, AC Imoni
2017-05-30, 17:38:35, 3, 967.101E+00, 90.153, 425.229E-03, 439.694E-06
2017-05-30, 17:38:36, 3, 967.394E+00, 90.159, 425.235E-03, 439.568E-06
2017-05-30, 17:38:37, 3, 967.762E+00, 90.152, 425.243E-03, 439.409E-06
2017-05-30, 17:38:38, 3, 967.387E+00, 90.132, 425.235E-03, 439.571E-06
2017-05-30, 17:38:39, 3, 967.428E+00, 90.169, 425.236E-03, 439.553E-06
:
```

(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.

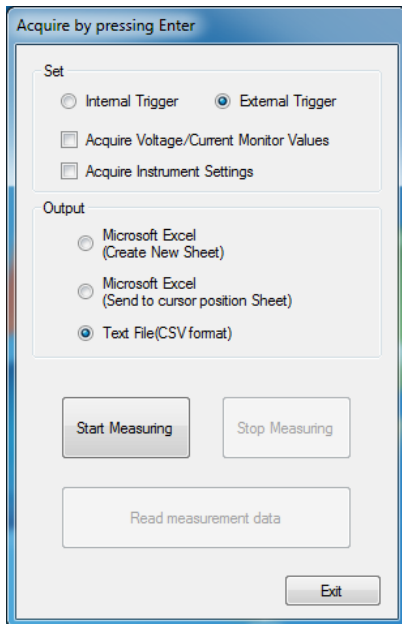


Figure 3-6 "Acquire by pressing ENTER" screen

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

```
MODEL, IM7581
Serial NO., 000000100
Ver, V1.02

DATE, 2017-05-30
TIME, 17:41:40

AC SETTINGS
FREQ, 300.00000, MHz
P, 0.0, dBm
SPEED, MEDIUM
AVG, OFF
DELAY, 0.00000, s
TRIG SYNC, OFF

DATE, TIME, AC Status, Z, PH, AC Vmoni, AC Imoni
2017-05-30, 17:41:42, 3, 967.677E+00, 90.149, 425.241E-03, 439.446E-06
2017-05-30, 17:41:42, 3, 967.451E+00, 90.131, 425.236E-03, 439.543E-06
2017-05-30, 17:41:43, 3, 967.311E+00, 90.161, 425.233E-03, 439.604E-06
2017-05-30, 17:41:43, 3, 967.495E+00, 90.157, 425.237E-03, 439.524E-06
2017-05-30, 17:41:43, 3, 967.093E+00, 90.133, 425.229E-03, 439.698E-06
:
```


(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.

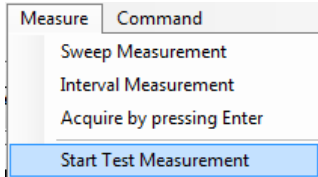


Figure 3-7 "Start Test Measurement" menu command

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

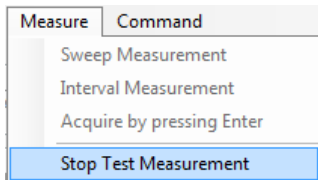


Figure 3-8 "Stop Test Measurement" menu command

-4 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.

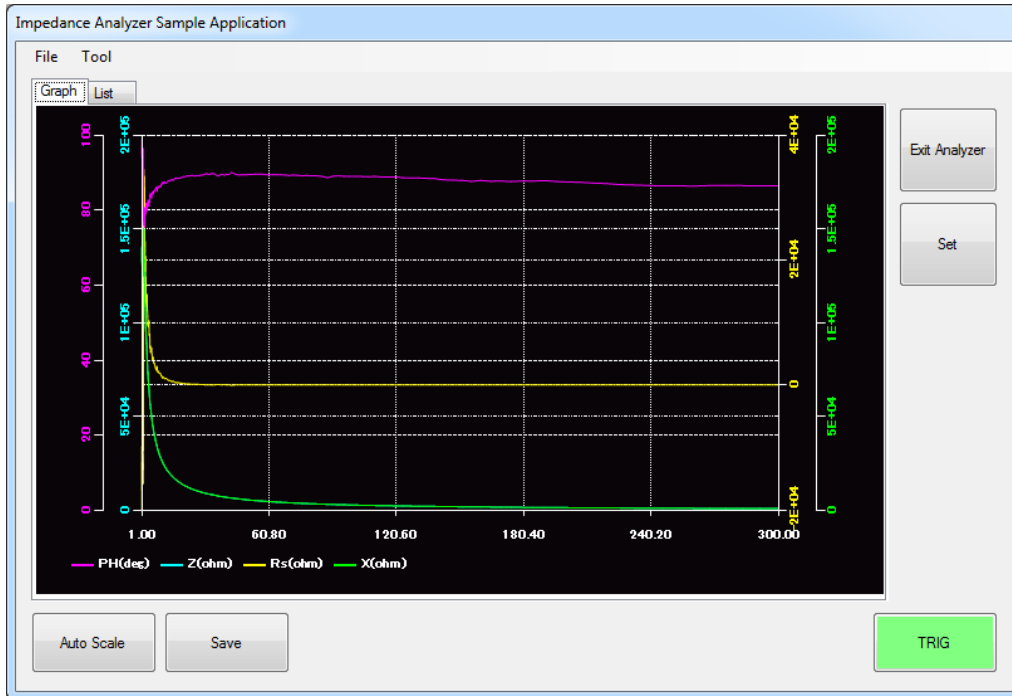


Figure 4-1 ANALYZER mode graph screen

The list screen displays a table with 17 rows of measured data. The columns are No, FREQUENCY(MHz), Z(ohm), PH(deg), Rs(ohm), and X(ohm). The first row is highlighted in blue.

No	FREQUENCY(MHz)	Z(ohm)	PH(deg)	Rs(ohm)	X(ohm)
1	1.0000	132454.0000	98.6170	-19844.9000	130959.0000
2	1.0289	140226.0000	95.0320	-12299.1000	139686.0000
3	1.0587	140632.0000	93.9750	-9749.5900	140294.0000
4	1.0893	141268.0000	96.8580	-16868.4000	140257.0000
5	1.1208	139397.0000	94.4900	-10913.2000	138969.0000
6	1.1533	145978.0000	95.9350	-15094.7000	145196.0000
7	1.1866	137827.0000	94.9660	-11929.8000	137310.0000
8	1.2210	134291.0000	95.8110	-13595.8000	133601.0000
9	1.2563	142683.0000	95.0110	-12463.6000	142138.0000
10	1.2926	137882.0000	94.5580	-10958.2000	137446.0000
11	1.3300	137427.0000	94.7800	-11452.0000	136949.0000
12	1.3685	135018.0000	94.9290	-11600.1000	134519.0000
13	1.4081	137007.0000	95.2690	-12581.2000	136428.0000
14	1.4488	140968.0000	96.2200	-15272.9000	140138.0000
15	1.4907	139884.0000	96.4570	-15729.9000	138996.0000
16	1.5339	131752.0000	95.4470	-12506.3000	131158.0000
17	1.5782	129757.0000	95.9510	-13452.4000	129058.0000

Figure 4-2 ANALYZER mode list screen

(1) ANALYZER settings

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

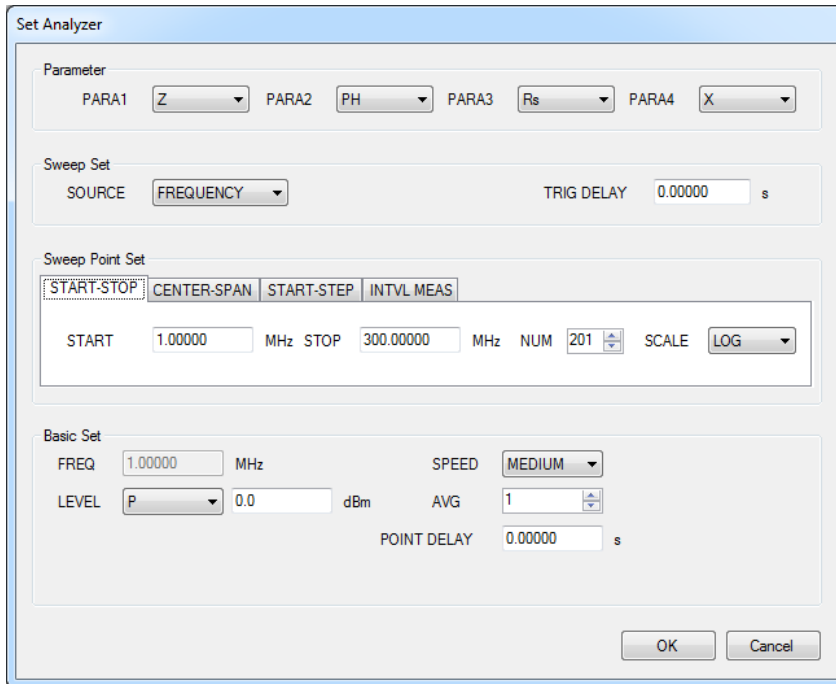


Figure 4-3 ANALYZER settings screen

(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.

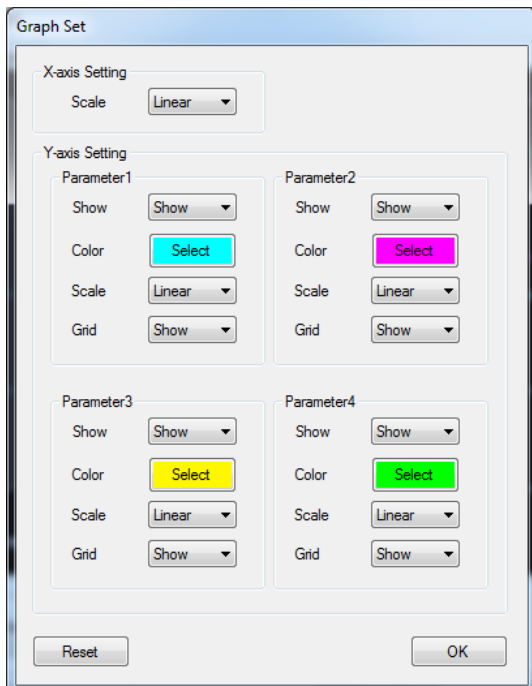
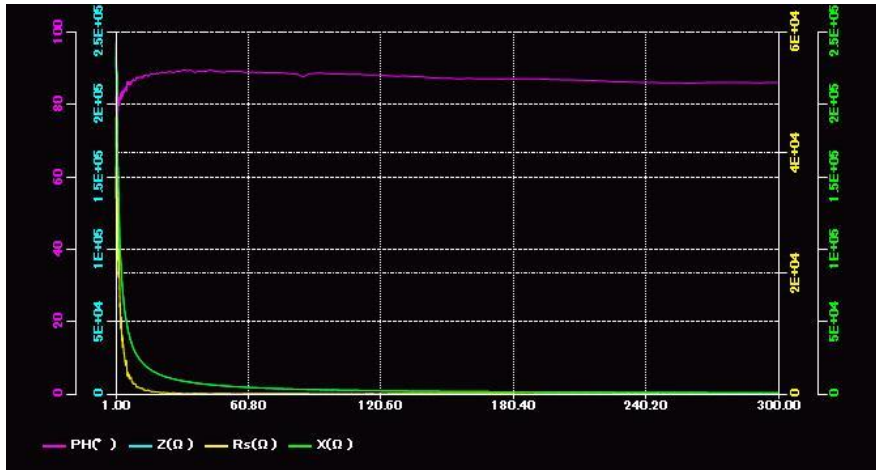


Figure 4-4 Graph settings screen

(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 (MHz) , Z, PH, Rs, X
1, 1. 0000, 219439. 0000, 110. 7870, -77879. 0000, 205154. 0000
2, 1. 0289, 217835. 0000, 109. 2170, -71700. 5000, 205697. 0000
3, 1. 0587, 227657. 0000, 114. 8600, -95709. 1000, 206562. 0000
4, 1. 0893, 215763. 0000, 111. 5610, -79290. 7000, 200666. 0000
5, 1. 1208, 214638. 0000, 111. 5450, -78821. 0000, 199642. 0000
6, 1. 1533, 203519. 0000, 110. 6760, -71859. 4000, 190411. 0000
7, 1. 1866, 213071. 0000, 111. 6570, -78634. 8000, 198030. 0000
8, 1. 2210, 197225. 0000, 109. 2250, -64943. 4000, 186225. 0000
9, 1. 2563, 203278. 0000, 108. 9010, -65850. 4000, 192317. 0000
10, 1. 2926, 194624. 0000, 108. 2740, -61027. 3000, 184809. 0000
:
```

-5 Accuracy calculation

You can set measurement conditions and calculate the measurement accuracy.

Calc Accuracy

[SET]

MODEL

PARA SPEED

FREQ (MHz) LEVEL (dBm)

[MEAS VALUE]

Z = ohm PH = deg

[MEAS Accuracy]

Z = MIN % MAX %

PH = MIN deg MAX deg

Z : 4.14795 % = 0.56000 + 3.58795

PH : 2.40581deg = 0.58000 * (0.56000 + 3.58795)

Figure 5-1 Accuracy calculation screen

-6 Measurement range calculation

You can set measurement conditions and calculate the measurement range.

Calc Measurement Range

[SET]

MODEL

FREQ (MHz)

[Measurement Range]

Z [ohm]

L [H]

C [F]

Figure 6-1 Measurement range calculation screen

-7 Screenshots

You can save the measurement screen as a BMP file.

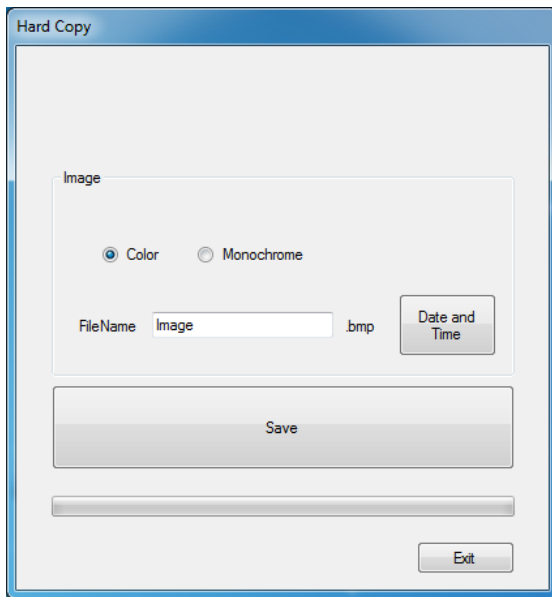


Figure 7-1 Screenshot screen



Figure 7-2 Example BMP file created by saving the measurement screen

-8 Measurement of communication times

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

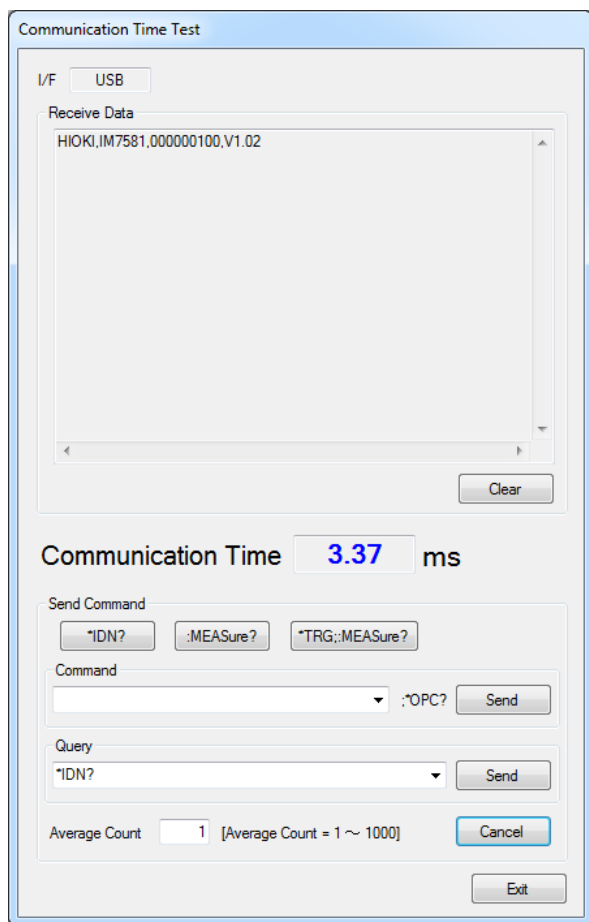


Figure 8-1 Communication time measurement screen