

Mini-Circuits Smart Power Sensor
PWR-6G+/ 6GHS+
“Measurement Application”
User’s Guide

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Mini-Circuits Smart Power Sensor PWR-6G+
“Measurement Application” User’s Guide

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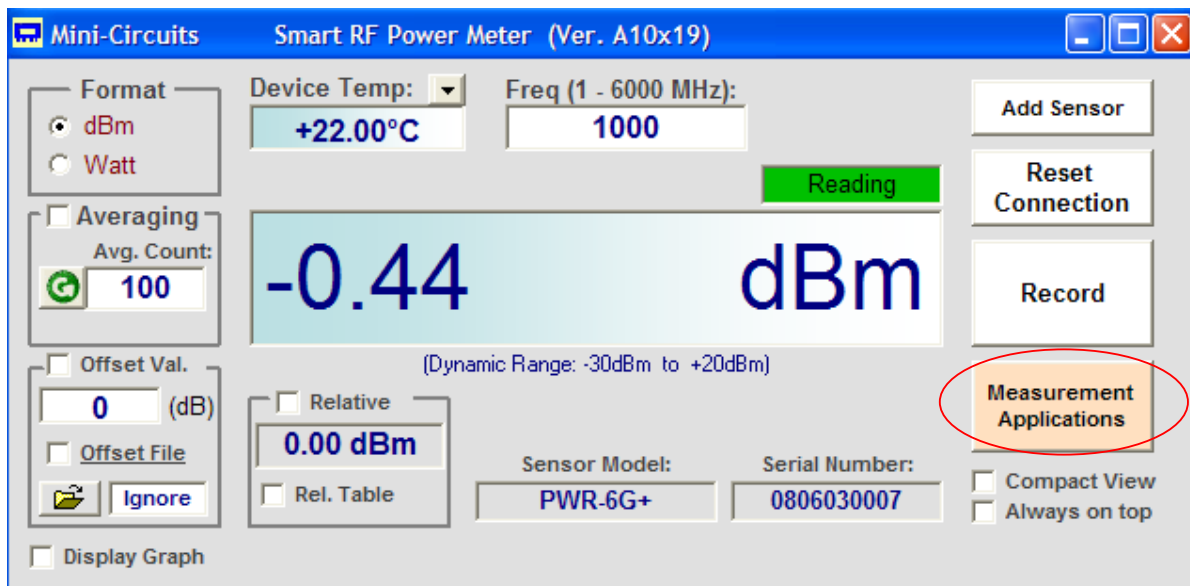
Mini-Circuits Smart Power Sensor PWR-6G+ “Measurement Application” User’s Guide

1.0 Introduction

This chapter describes the basics of what is the “Measurement Application”.

- “Measurement Application” is a powerful function of the Power Meter Program. (see **Figure 1**).
- For information on the Mini-Circuits Smart Power Sensor & Power Meter Software consult User Guide : http://minicircuits.com/pages/pdfs/PWR-6G+_guide.pdf
- You can select a suitable measurement by choosing one of the ten measurement options seen in (**Figure 2**).
- You can create easily your own measurement project.
 - Set desired testing points (Frequency and Power),
 - Set the spec. limit of each point
 - Use either remote or local control of an external RF source.
 - Take reference measurements and measure any number of units
- You can use the “on-line Graph” feature to get another look at the D.U.T’s performance.
- You can save or recall your project at any time with both the specified test parameters and the previously measured data available.

Figure 1: Smart RF Power Meter



Clicking on the Measurement Applications button will open the “Meas. Applications” window shown in **Figure 2**.

1.1 Mini-Circuits Smart RF Power Meter PWR-6G+ Features:

- RF source Power Measurements
- High Power Measurements (Up to +53 dBm by using Virtual Coupler)
- Continuous Power Monitoring(Low or High by using Virtual Coupler)
- Gain measurements
- 2-3 Port Devices Insertion Loss Measurements (optional Virtual Attenuator for increasing Dynamic Range)
- Return Loss Measurement Using Coupler.
- Creating a Virtual Coupler file (to extend a coupler's frequency range for use in various measurements)
- Creating a Virtual Attenuator file(to calibrate an attenuator to its nominal value for use as a safe attenuator in various measurements)
- Calibrating Thru - Path (creation of a file containing system loss/gain without the D.U.T to compensate for existing setup loss/gain or to use as an offset file).
- An On-Line Graph for visual representation in all measurements.
- Printing of all data readings.

2.0 Measurement Applications Features.

This chapter explains how to set the communication commands in order to control an external RF source and a brief description of the various measurement applications available.

Sensor serial number detects automatically by the Program.

You can open an existing Project (by clicking on the **Recall** key) but you can also start building a New Project. Select one specific option from Measurement Application list, then Click Next to approve your selection.

The **Setup** key will send to Setup Information screen (see **Figure 3**).

Figure 2 Meas. Application Screen

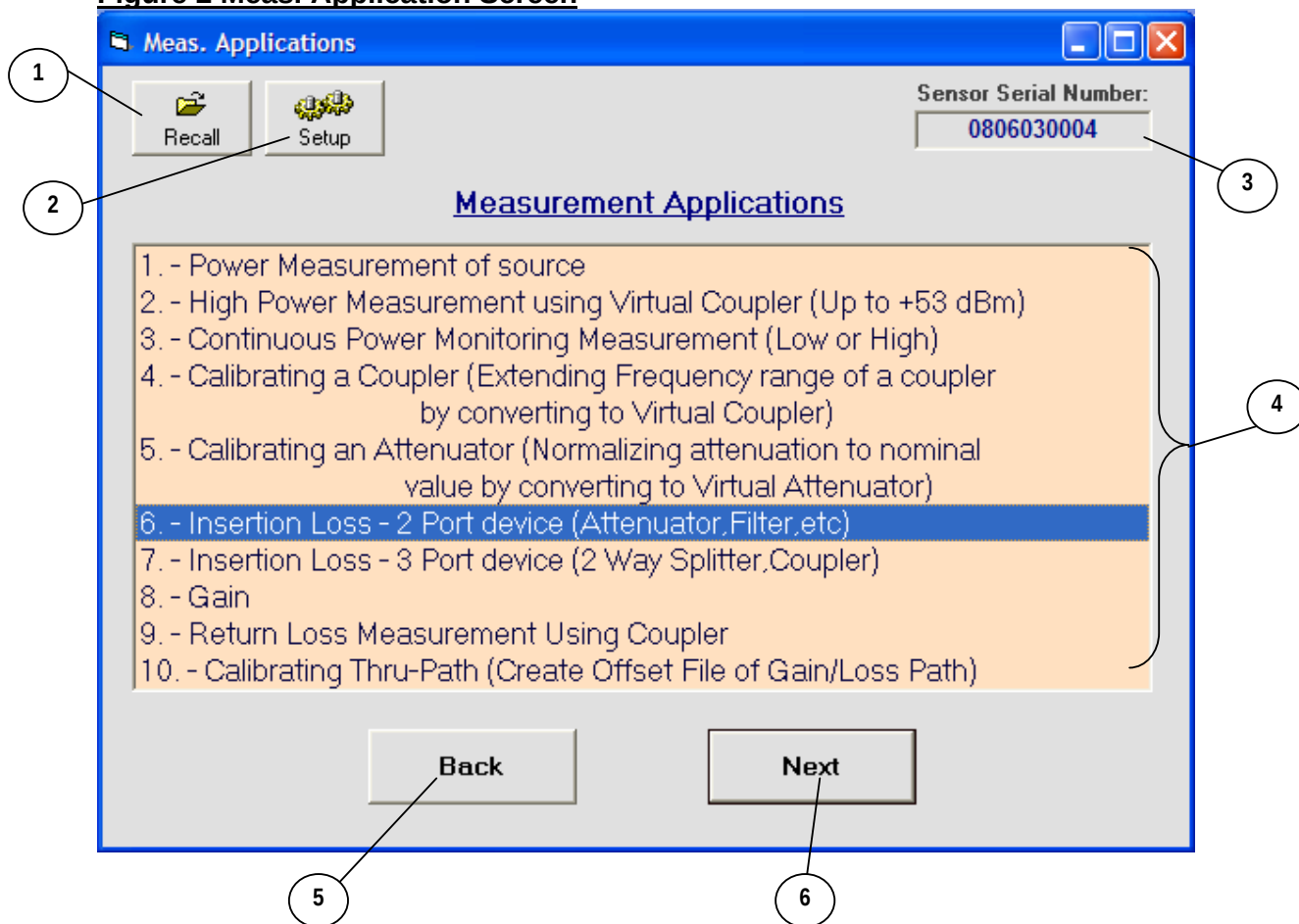


Table1: Measurement Applications item description.

Item	Item	Description
1	Recall	Load existing project. See 3.3.1.3 (Page 13) for further explanation.
2	Setup	Define communication setup. See 2.1 below for further explanation.
3	Sensor serial number	Sensor S/N. indicator detected automatically by the program
4	Measurement applications list	List of measurement options available See 2.2 (Page 7).
5	Back	Return to smart RF power meter window
6	Next	Proceed to selected measurement window

2.1. Setting communication/commands in order to control an external source.[Setup]

Figure 3: Setting External Generator Control(example: Ethernet connection selected)

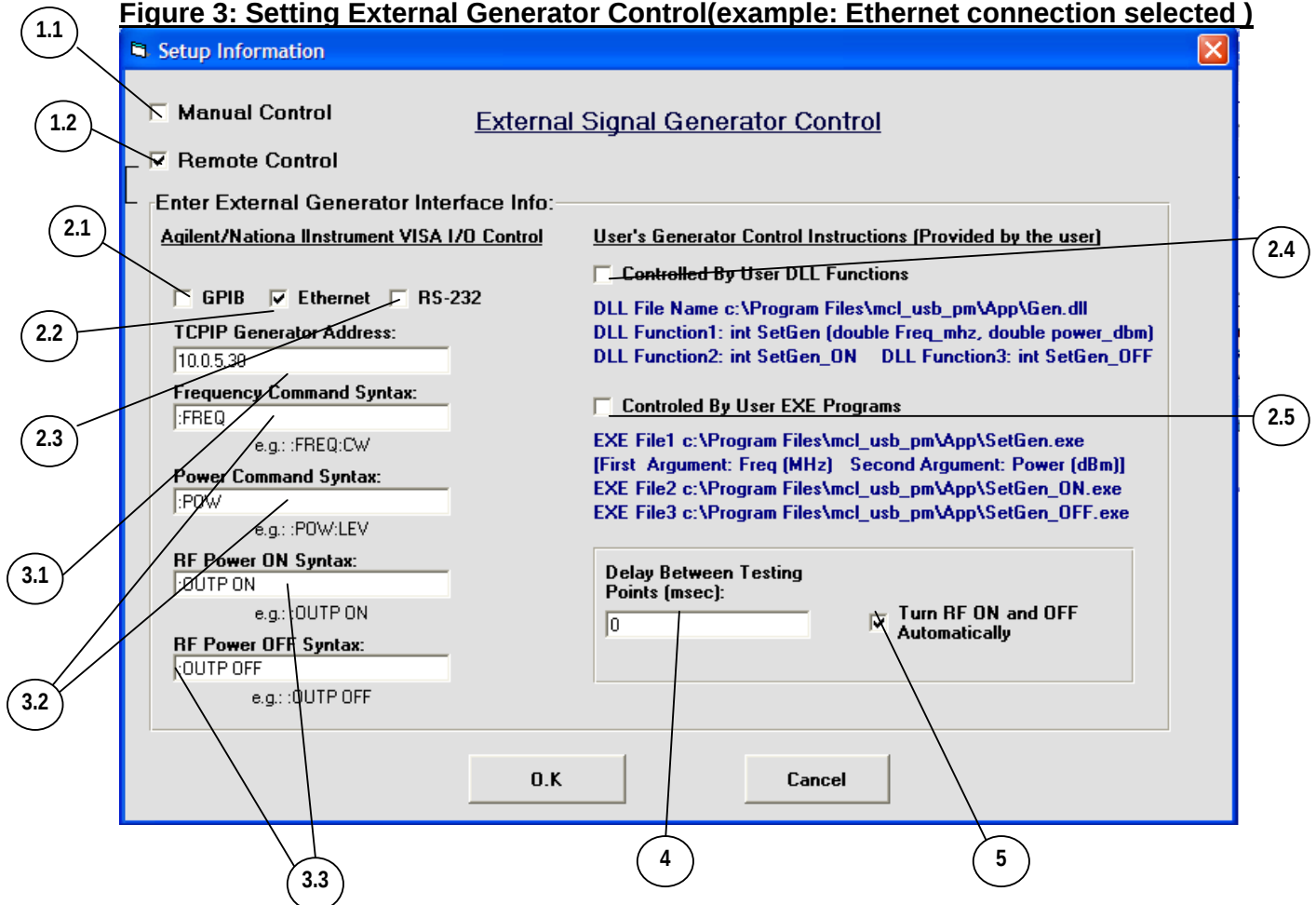


Table2: Setup information item description

Item	Option	Description
1.1	Manual	Manual control of the RF source power and frequency. All adjustments of power and frequency must be preformed by the user.
1.2	Remote	Remote control of the RF source. see Items 2 - 5
2.1	GPIB	Selects the named communications option for remote control of the RF source. Options 2.4 and 2.5 are generally used when the user does not use the one of the standard communication protocols offered in options 2.1,2.2 and 2.3.
2.2	Ethernet	
2.3	RS232	
2.4	Customer DLL	
2.5	Customer EXE	
3.1	Generator Address	The address of the RF source to be controlled. Title indicates automatically which communication protocol is currently in use.
3.2	Frequency/Power command syntax	The command syntax to prefix any changes in power and frequency settings of the RF source. Must be entered by the user according to the specific RF source in use if Remote is selected.
3.3	RF Power ON/OFF Syntax	The command syntax to start and stop RF transmission by the RF source. Must be entered by the user according to the specific RF source in use if Remote is selected.
4	Delay Between Testing Points(msec)	When Remote is selected sets the delay between setting the RF source state and beginning the measurement point.
5	Turn RF ON and OFF Automatically	Allows the program to start and stop the RF source's transmission when in Remote. If this option is not checked the User must manually start the RF source before beginning measurements and stop it afterwards.

2.2 A brief description of the selection list(Figure 2):

1. **Power Measurement of source-** Measures power output of the RF source.
2. **High Power Measurement using Virtual Coupler (Up to +53dBm)** - Measures a High Power Signal from your D.U.T/System, (the Virtual Coupler allows an expansion of the Dynamic Range of the Power Sensor).The power out measurement will be in dBm.
3. **Continuous Power Monitoring (Low or High)** - This option enables you to monitor the power out of your D.U.T/System/Module using a previously defined coupler (using **Calibrating a Coupler**). The power out measurement will be in dBm.
4. **Calibrating a Coupler (Extending frequency range of a coupler by converting to Virtual Coupler)** – Creating a Virtual Coupler file for use in future measurement applications. Virtual Coupler files are used in High Power and Continuous Power.

5. **Calibrating an Attenuator (Normalizing attenuation to nominal value by converting to Virtual Attenuator)** - Creating a Virtual Attenuator file for use in future Measurement Applications. Virtual Attenuator files can be used in all measurements as safe attenuator (to prevent excess power entering the sensor) after the D.U.T, or when using a filter as a Harmonic suppression filter. To compensate for system line attenuation use Calibration Thru- Path option.
6. **Insertion Loss -2 port device (Attenuator, Filter, etc)** –Measures the Insertion Loss of a two port D.U.T The Insertion Loss measurement will be in -dB. For amplifiers it is recommended to use the Gain measurement option.
7. **Insertion Loss -3 port device (2 Way Splitter, Coupler)** –Measures the Insertion Loss of a three port D.U.T The Insertion Loss measurement will be in -dB.
8. **Gain** –Measures the gain of your D.U.T/System/Module. The Gain measurement will be in dB. This is the recommended selection for testing Amplifiers.
9. **Return Loss Measurement Using Coupler-** Measures the Return Loss of a one or two port D.U.T The Return Loss measurement will be in -dB. Coupler used in Return Loss measurement is not a virtual coupler file.
10. **Calibration Thru - Path (Create offset file of Gain/Loss Path)** – Measures the system line gain/loss without the D.U.T This measurement is used to create a calibration offset file for future measurements or to compensate for existing setup loss/gain.

3.0 Measurement Application Sequence

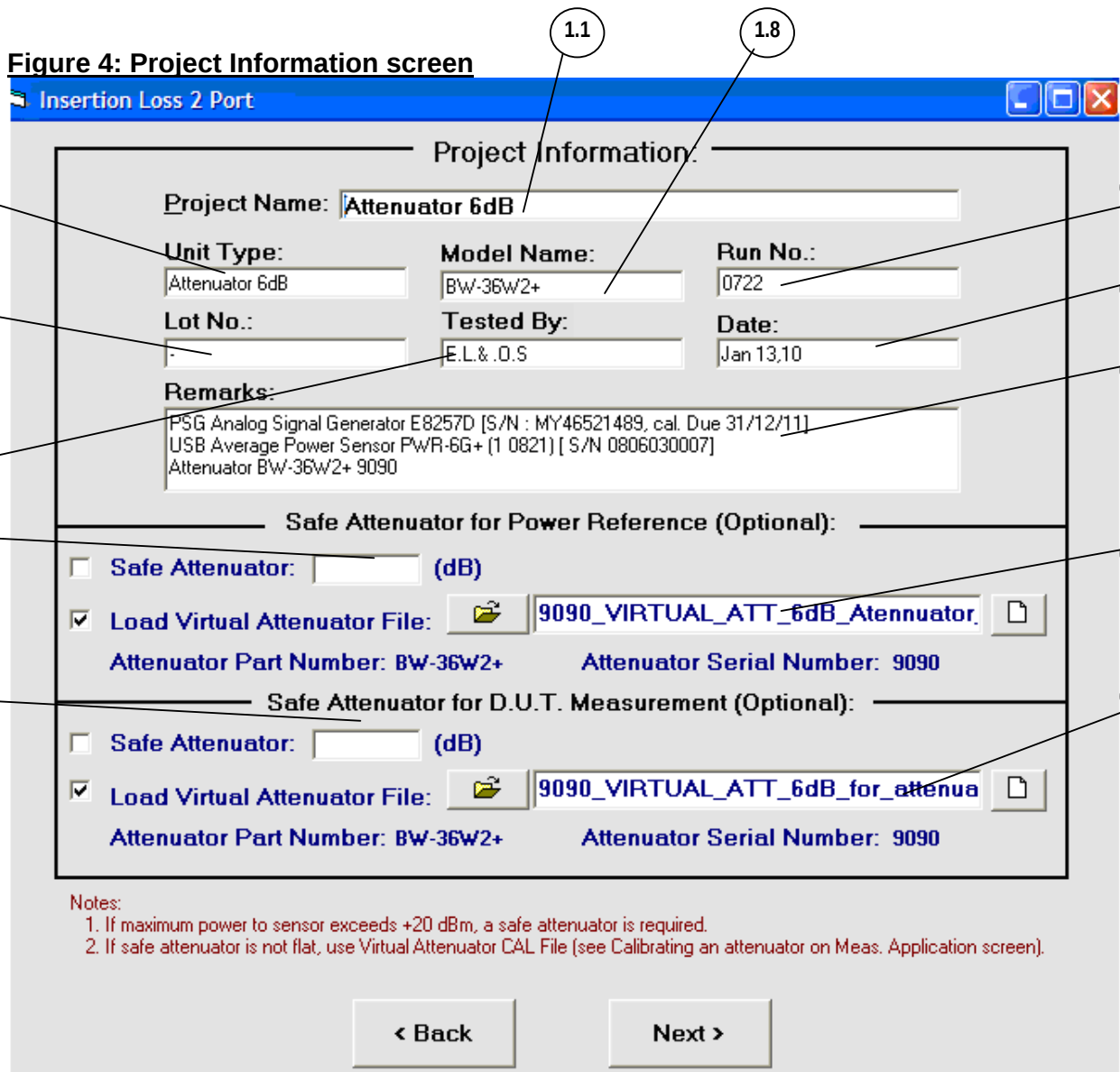
This chapter describes the creation of a measurement project step by step and explains file management.

3.1 Start New Project

Step 1: Selecting the “Meas. Application” button on the Smart Power meter main screen (**Figure 1**) will transfer you to the Measurement Application first screen shown in **Figure 2**.

Step 2: You can select a specific measurement option (see **chapter 2.0**) by clicking on the appropriate measurement option and clicking on **Next** key. Selecting a measurement option will transfer you to the “Project Information” screen. See **Figure 4**.

Figure 4: Project Information screen



The screenshot shows the "Project Information" screen for "Insertion Loss 2 Port". The form contains the following fields and sections:

- Project Name:** Attenuator 6dB (1.1)
- Unit Type:** Attenuator 6dB (1.2)
- Model Name:** BW-36W2+ (1.8)
- Run No.:** 0722 (1.3)
- Lot No.:** - (1.4)
- Tested By:** E.L. & O.S. (1.6)
- Date:** Jan 13,10 (1.7)
- Remarks:** PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
USB Average Power Sensor PWR-6G+ [1 0821] [S/N 0806030007]
Attenuator BW-36W2+ 9090 (1.5)
- Safe Attenuator for Power Reference (Optional):**
 - ☐ Safe Attenuator: (dB) (2.3)
 - ☒ Load Virtual Attenuator File: 9090_VIRTUAL_ATT_6dB_Attenuator. (2.1)
 - Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090
- Safe Attenuator for D.U.T. Measurement (Optional):**
 - ☐ Safe Attenuator: (dB) (2.4)
 - ☒ Load Virtual Attenuator File: 9090_VIRTUAL_ATT_6dB_for_attenua (2.2)
 - Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090

Notes:

1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

Navigation buttons: < Back, Next >

Table3: Project Information item description

Item	Field name	Description
1.1	Project Name	Specify your own Project Name
1.2	Unit Type	Specify D.U.T type
1.3	Run No	Specify Run No. (If exists)
1.4	Lot No	Specify Lot No. (If exists)
1.5	Test By	Tester Name
1.6	Date	Date project tests preformed
1.7	Remarks	Specify your Setup equipment (no character limit)
1.8	Model Name	D.U.T Model Name
2.1	Safe Attenuator for power reference	Virtual Attenuator or Coupler file for power reference (optional)
2.2	Safe Attenuator for D.U.T measurement	Virtual Attenuator or Coupler file for D.U.T measurement (optional)
2.3	Safe Attenuator for power reference	Manual entry of safe attenuator value for power reference
2.4	Safe Attenuator for D.U.T measurement	Manual entry of safe attenuator value for D.U.T measurement.

The **Back** key will navigate back to Meas. Application first screen (see **Figure 2**)

The **Next** key will navigate to Frequency Measurements Point screen (see **Figure 5**)

3.2 Building the set of measurement points (for all various measurements including Virtual Attenuators and Couplers)

Figure 5: Frequency Measurements Points screen (with Segment use example)

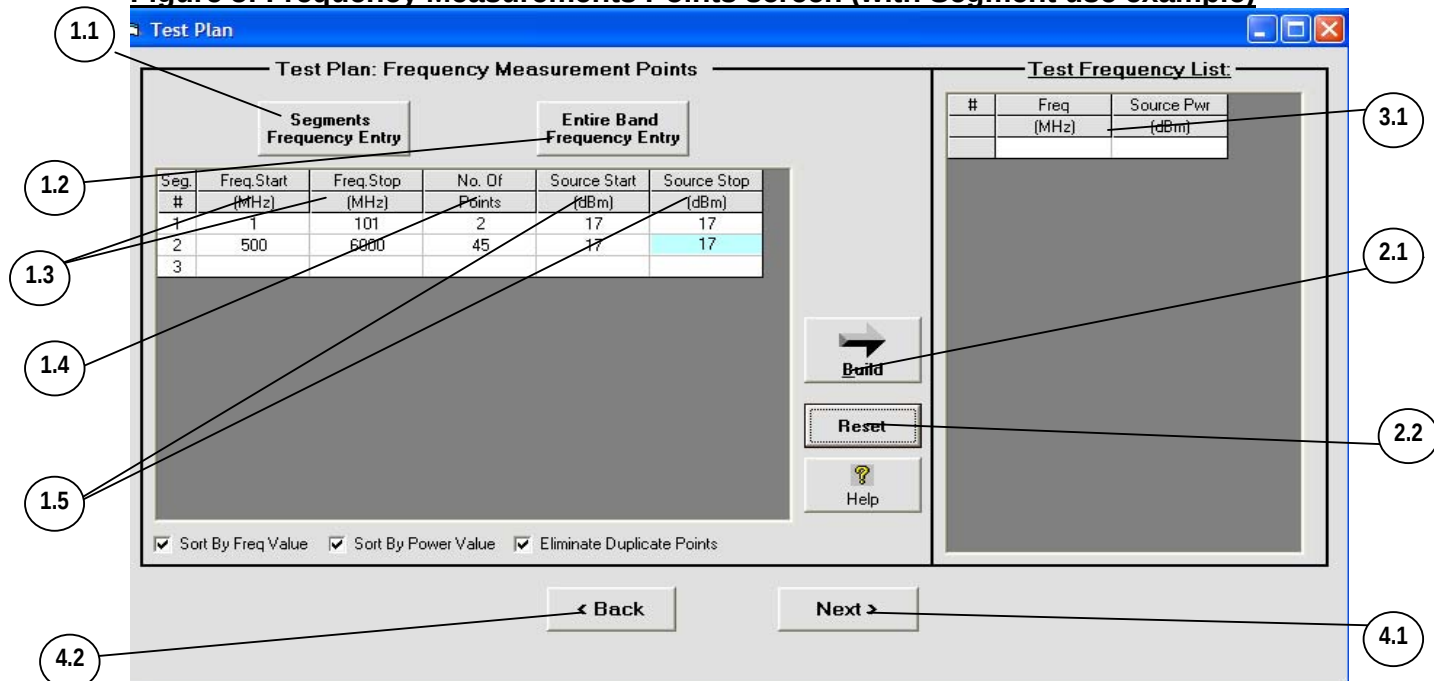
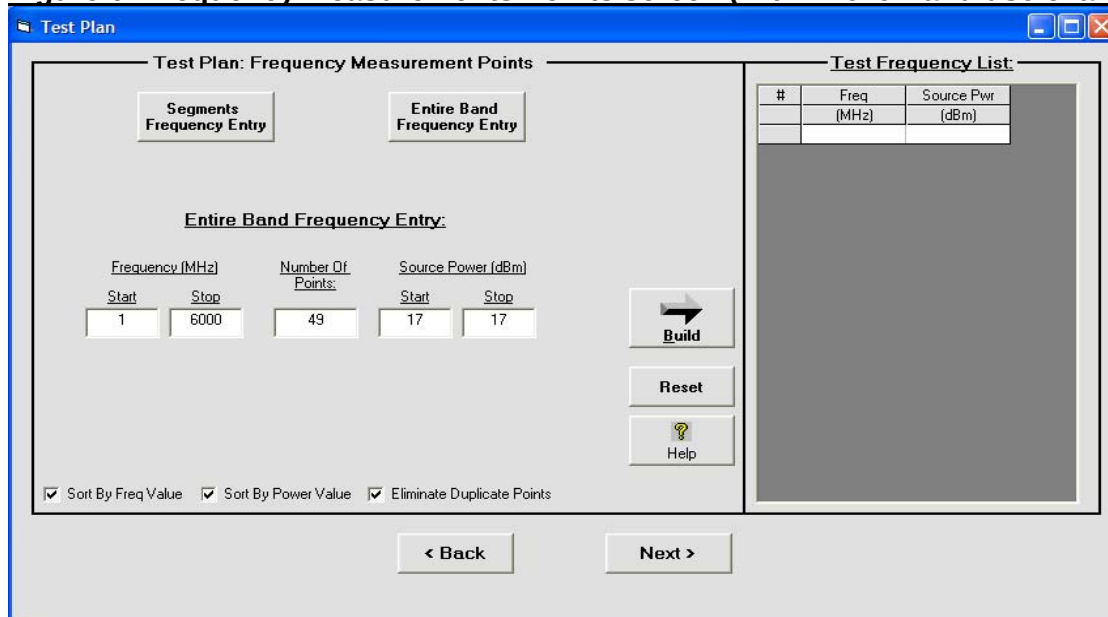


Table4: Frequency Measurement Points item description

Item	Field name	Description
1.1	Segments Frequency Entry	Allows measurement points to be entered in a number of separate segments, each one with it's own parameters.
1.2	Entire Band Frequency Entry	Allows measurement points to be entered in a single measurement segment, with only one set of parameters. (see Figure 6)
1.3	Freq. Start/Stop	Initial and final measurement point frequencies in a given measurement segment (In MHz). All other points in the segment will be spaced evenly over the span between them.
1.4	No. of points	Total number of points in measurement segment including start and stop points.
1.5	Source Start/Stop	Required RF Source output at Initial and final measurements points in a given measurement segment (in dBm). All other points in the segment will be spaced evenly over the span between them.
2.1	Build	Select to generate a listing of the measurement points (Power and Freq.) (see Figure 7)
2.2	Reset	Delete all entries in the screen
3.1	Frequency list	Display of the actual measurement points (Power and Freq.) generated from the previous instructions.
4.1	Next	Proceed to the Measurements screen (in the case of D.U.T measurements) or the Measurements & Virtual Component creation (in case of Virtual Component file creation) (see Figure 8)
4.2	Back	Return to the project information screen (see Figure 4)

Figure 6: Frequency Measurements Points screen (with Entire Band use example)



The screenshot shows the 'Test Plan: Frequency Measurement Points' window. It features two main entry methods: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Entire Band Frequency Entry' section is active, showing input fields for Frequency (MHz) with 'Start' at 1 and 'Stop' at 6000, 'Number Of Points' at 49, and 'Source Power (dBm)' with 'Start' and 'Stop' both at 17. Below these fields are checkboxes for 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right, the 'Test Frequency List' table is visible, with columns for '#', 'Freq (MHz)', and 'Source Pwr (dBm)'. At the bottom of the window are 'Back' and 'Next' navigation buttons.

See (Table 4 and Figure 5) for explanation of items.

Figure 7: Creating Test Frequency

Test Plan

Test Plan: Frequency Measurement Points

Segments Frequency Entry

Entire Band Frequency Entry

Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	1	101	2	17	17
2	500	6000	45	17	17
3					

Build

Reset

Help

☒ Sort By Freq Value
 ☒ Sort By Power Value
 ☒ Eliminate Duplicate Points

Test Frequency List:

#	Freq (MHz)	Source Pwr (dBm)
1	1.000000	17.00
2	101.000000	17.00
3	500.000000	17.00
4	625.000000	17.00
5	750.000000	17.00
6	875.000000	17.00
7	1000.000000	17.00
8	1125.000000	17.00
9	1250.000000	17.00
10	1375.000000	17.00
11	1500.000000	17.00
12	1625.000000	17.00
13	1750.000000	17.00
14	1875.000000	17.00
15	2000.000000	17.00
16	2125.000000	17.00
17	2250.000000	17.00
18	2375.000000	17.00
19	2500.000000	17.00

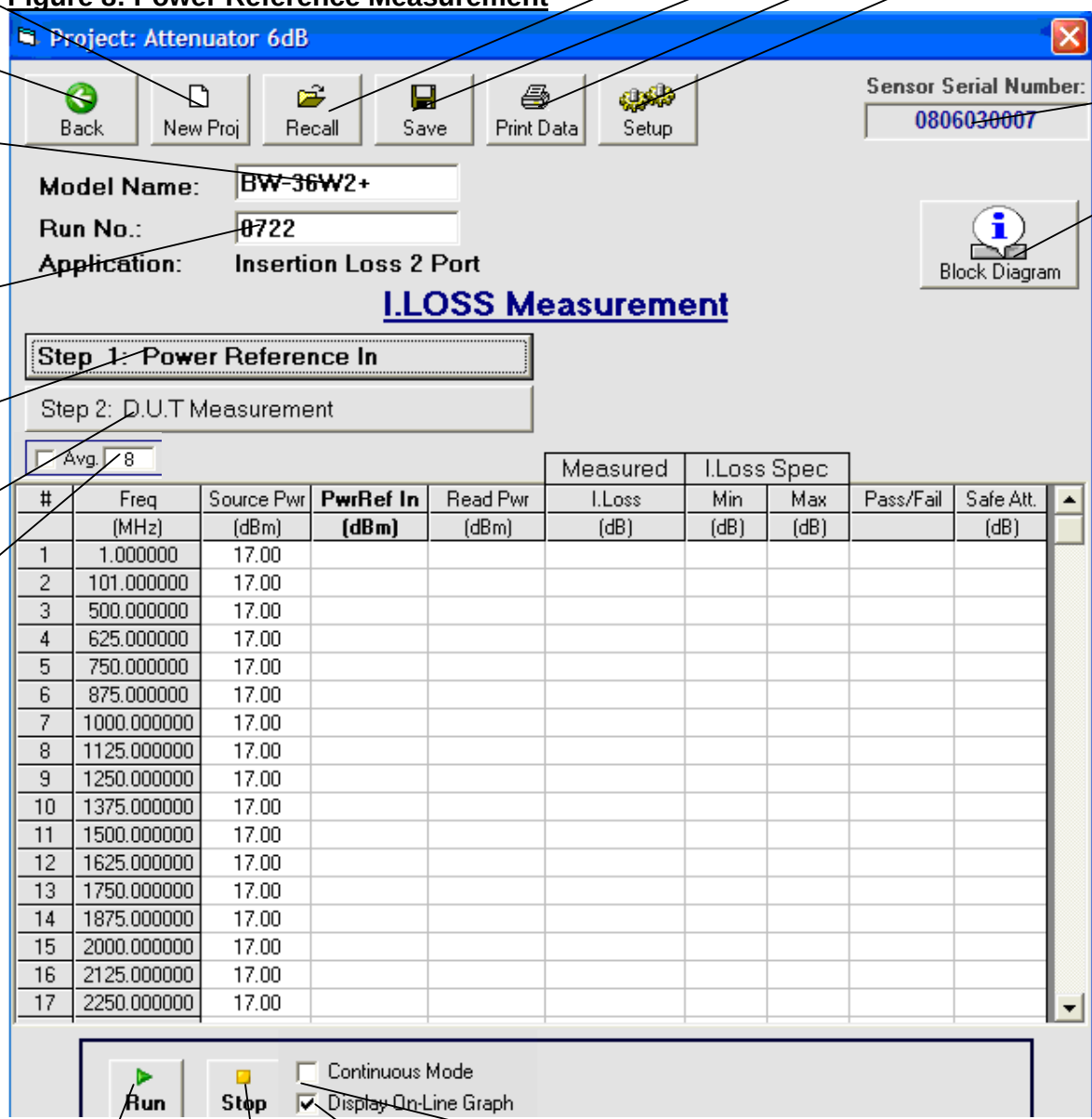
< Back

Next >

3.3 Power Reference Measurement

Power Reference measurement must be performed before any other measurement except Power Out (dBm) can be performed. This step will provide a reference for the relative measurement in dB. In this step we connect the Power Sensor to the RF Source's RF out line and start the measurement by clicking on the **Run** key (see Figure 8)

Figure 8: Power Reference Measurement



1.2 Figure 8: Power Reference Measurement

1.1 Back

8 New Proj

1.3 Recall

1.4 Save

1.5 Print Data

1.6 Setup

2 Sensor Serial Number: 0806030007

3 Block Diagram

7 Model Name: BW-36W2+

6.1 Run No.: 0722

6.2 Application: Insertion Loss 2 Port

9 I.LOSS Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

Avg: 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured I.Loss (dB)	I.Loss Spec Min (dB)	I.Loss Spec Max (dB)	Pass/Fail	Safe Att. (dB)
1	1.000000	17.00							
2	101.000000	17.00							
3	500.000000	17.00							
4	625.000000	17.00							
5	750.000000	17.00							
6	875.000000	17.00							
7	1000.000000	17.00							
8	1125.000000	17.00							
9	1250.000000	17.00							
10	1375.000000	17.00							
11	1500.000000	17.00							
12	1625.000000	17.00							
13	1750.000000	17.00							
14	1875.000000	17.00							
15	2000.000000	17.00							
16	2125.000000	17.00							
17	2250.000000	17.00							

5.2 Run

5.1 Stop

4.2 Continuous Mode

4.1 Display On-Line Graph

3.3.1 Power Reference Measurement First Step

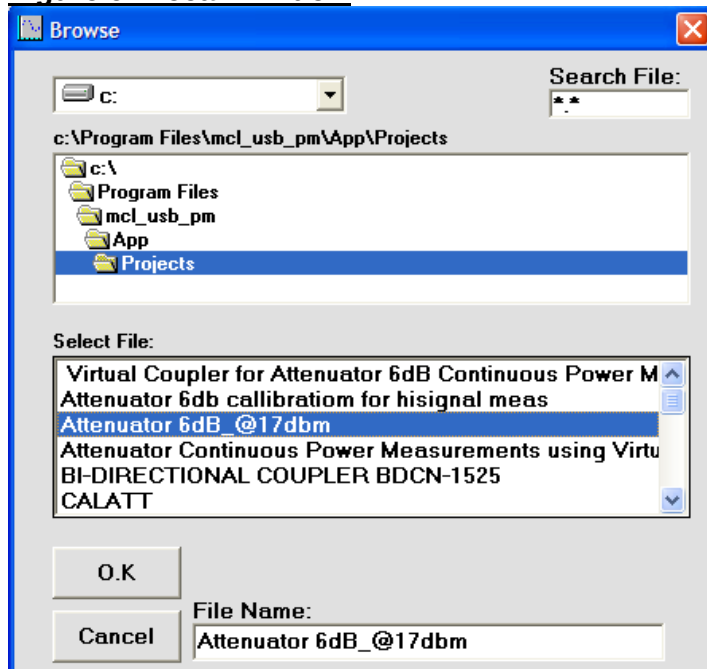
Table 5: Power Reference Measurement First Step Button Items review:

Item	Button/Field	Description
1.1	Back	Back to previous screen (see Figure 9)
1.2	New Proj.	Starting a new project , navigation to Meas. Application screen (see Figure 2 on page 5)
1.3	Recall	Load existing project .See paragraph 3.3.1.2 on page 14 for further details.
1.4	Save	Save current project data .See paragraph 3.3.1.2 on page 15 for further details
1.5	Print Data	Printing current project data. See section 3.6 on page 22 for further details
1.6	Setup	See chapter 2.1 on page 6
2	Sensor serial number	Sensor S/N. Indicator detected automatically by the program.
3	Block Diagram	Setup schematic suitable for current measurement step. See section 3.7 on page 25 for further details
4.1	Continuous Mode	Selecting this option causes the current measurement step to repeat in a loop until interrupted.
4.2	On-Line Graph	When selected activates an on line graphical data presentation (see detailed explanation below)
5.1	Stop	Stop measurement
5.2	Run	Begin measurement
6.1	Step1	Current measurement step
6.2	Step2	Next measurement step
7	Run No.	See Table 2
8	Model Name	See Table 2
9	Averaging	See explanation bellow

3.3.1.1 Averaging Increased averaging provides more accurate measurement results. However this increases the time required to perform the measurement. The maximum number of averages possible is 32 .The default value is 8.

3.3.1.2 Recall function.

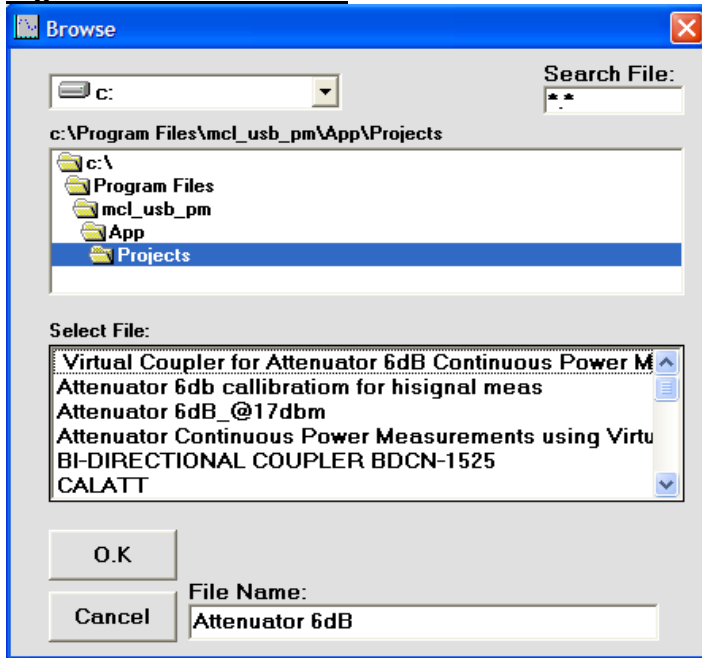
Figure 9: Recall window



- You can load a saved project by selecting from the list of saved projects (see **Figure 9**) and clicking **O.K** key.
- You can delete saved Project by selecting from the list and using keyboard's **Delete** button.
- Clicking the **Cancel** key will return you to the previous window.

3.3.1.3 Save function.

Figure 10: Save window



- You can save your project data by clicking the **Save** key. (see **Figure 10**)
- You can save the Project under a new name by typing the new name in the '**File Name**' field.
- You can delete a saved project by selecting the project from the list and using the keyboard's **Delete** button.
- Clicking the **Cancel** key will return you to the previous window.

3.3.2 Power Reference Measurement First Step Data Fields review:

Figure 10: Power Reference Measurement First Step Data Fields review:

Project: Attenuator 6dB

Back New Proj Recall Save Print Data Setup

Sensor Serial Number: 0806030007

Model Name: BW-36W2+

Run No.: 0722

Application: Insertion Loss 2 Port

I.LOSS Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured I.Loss (dB)	I.Loss Spec		Pass/Fail	Safe Att. (dB)
						Min (dB)	Max (dB)		
1	1.000000	17.00							
2	101.000000	17.00							
3	500.000000	17.00							
4	625.000000	17.00							
5	750.000000	17.00							
6	875.000000	17.00							
7	1000.000000	17.00							
8	1125.000000	17.00							
9	1250.000000	17.00							
10	1375.000000	17.00							
11	1500.000000	17.00							
12	1625.000000	17.00							
13	1750.000000	17.00							
14	1875.000000	17.00							
15	2000.000000	17.00							
16	2125.000000	17.00							
17	2250.000000	17.00							

Run Stop ☐ Continuous Mode ☒ Display On-Line Graph

Table 6: Power Reference Measurement First Step Data Fields Items

Item	Data Field	Description
1	[#]	Measurement points settings are explained in 3.2 Building the set of measurement points (see Figure 11)
2	Freq [MHz]	Frequency settings are explained in 3.2 Building the set of measurement points (see Figure 12)
3	Source Pwr [dBm]	Source power settings are explained in 3.2 Building the Set of measurement points (see Figure 13)
4	Pwr.Ref In [dBm]	Bold Data- Data measured in current step

3.4 D.U.T Measurements

When the Reference Measurement is complete we can proceed to testing components by selecting the option D.U.T Measurements. You can see that the **Block Diagram** setup schematic has also changed to Step 2 D.U.T Measurement after pressing the **Step 2** key.

3.4.1 D.U.T Measurements new Keys review:

Figure 12 D.U.T Measurements new Keys review

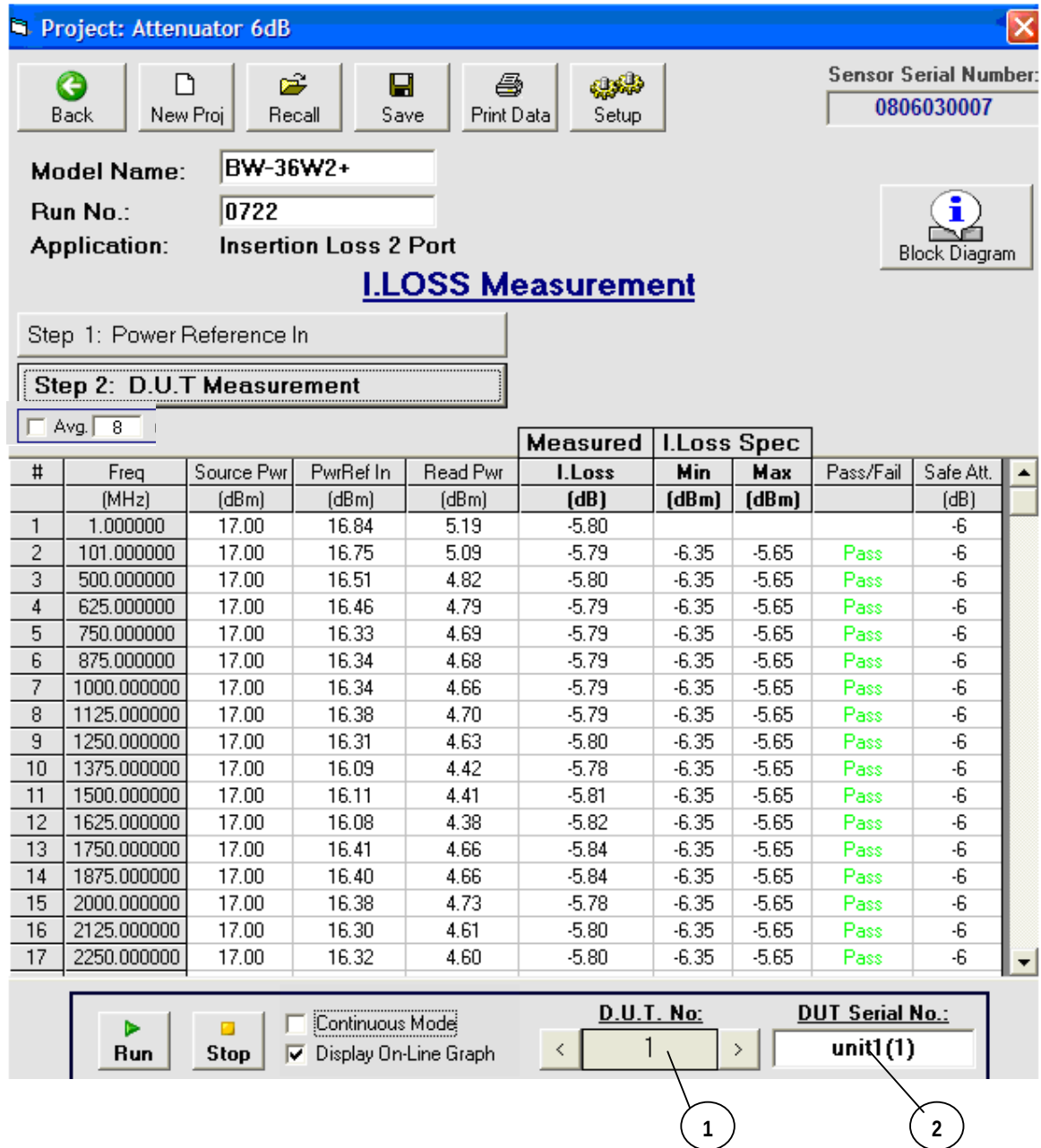


Table 7: D.U.T Measurements new Keys review

Item	Button name	Description
1	D.U.T No.	Allows you to scroll between results of all units measured. Number is the position of currently viewed D.U.T in the series
2	D.U.T Serial No.	Serial number of D.U.T currently displayed in data fields.

3.4.2 D.U.T Measurements new Data Fields review:

Figure 13 D.U.T Measurements new Data Fields review.

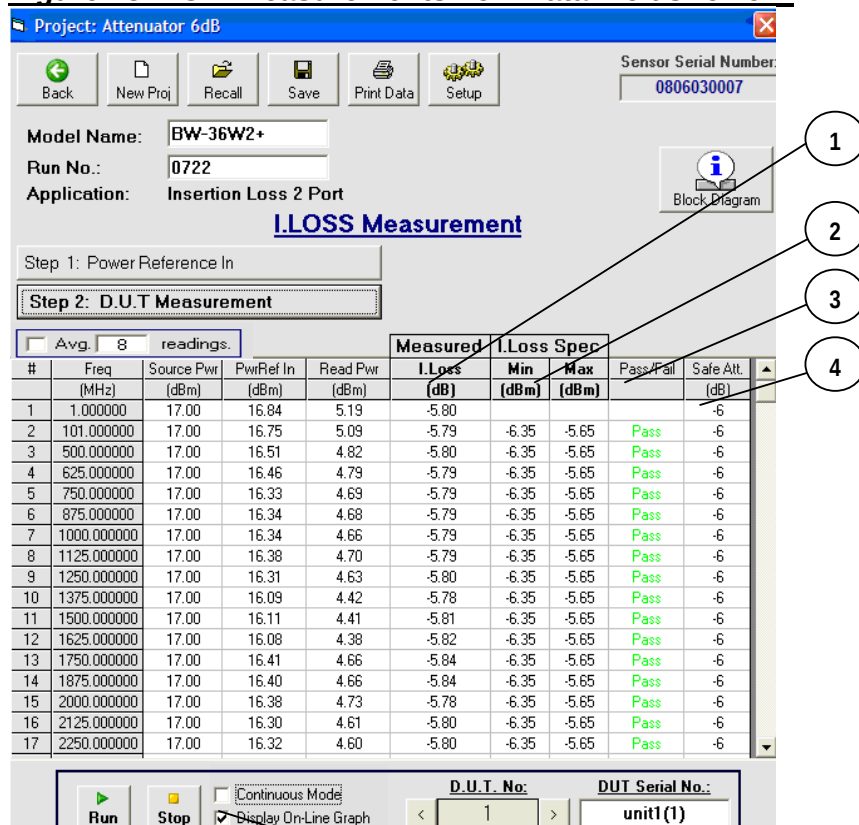


Figure 13a: On-Line Graph



Table 8: D.U.T Measurements new data fields item description.

Item	Data Field [dBm]	Description
1	I. Loss	Bold Data- Measured data in this particular step
2	Spec I. Loss (Min. ,Max.) [dBm]	Spec I. Data .Will be entered manually by the user from T.Spec/Data Sheet's. see 3.4.2.2 on page 21
3	Pass/Fail result	Pass – Measured data is within the range specified. Fail – Measured data is outside the range specified.
4	Safe Att.	Virtual Safe Attenuator 6dB uploaded see Table 3 Item 2.1
5	Include On-Line Graph	See Figure 15

3.4.2.2 Spec. Definitions:

- To enable Spec. Definitions double click on any data field.
- The Edit Spec. Limit window (**Figure 15**) will pop up.
- Set Low/Up Spec. Limits, determine applicable points range(based on frequency range specified)
- Update data.

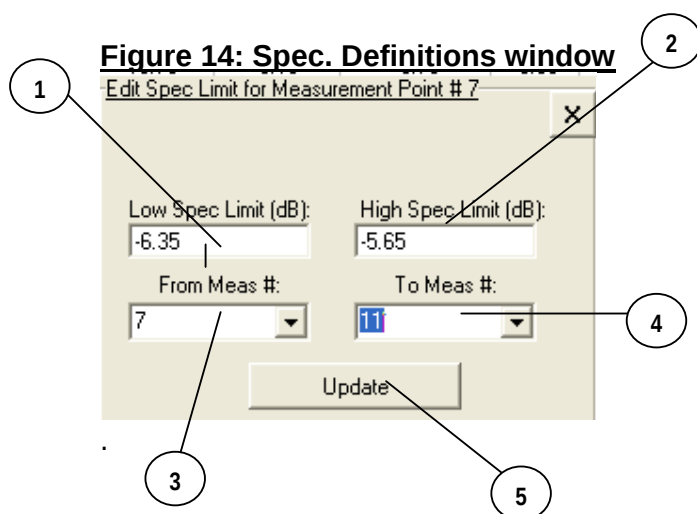


Table 9: Spec. Definitions item description

Item	Field	Description
1	Low Spec Limit [dB]	Low Spec. Limit [dB]
2	High Spec Limit [dB]	High Spec. Limit [dB]
3	From Meas. #	First applicable point
4	To Meas. #	Last applicable point
5	Update	Update the Spec. with currently shown figures

3.5 On-Line Graph features

When the “Display On-Line Graph” check box is selected a small window will appear beside the measurement screen containing a graphical representation of the measurement table data (see **Figures 13a-15**).

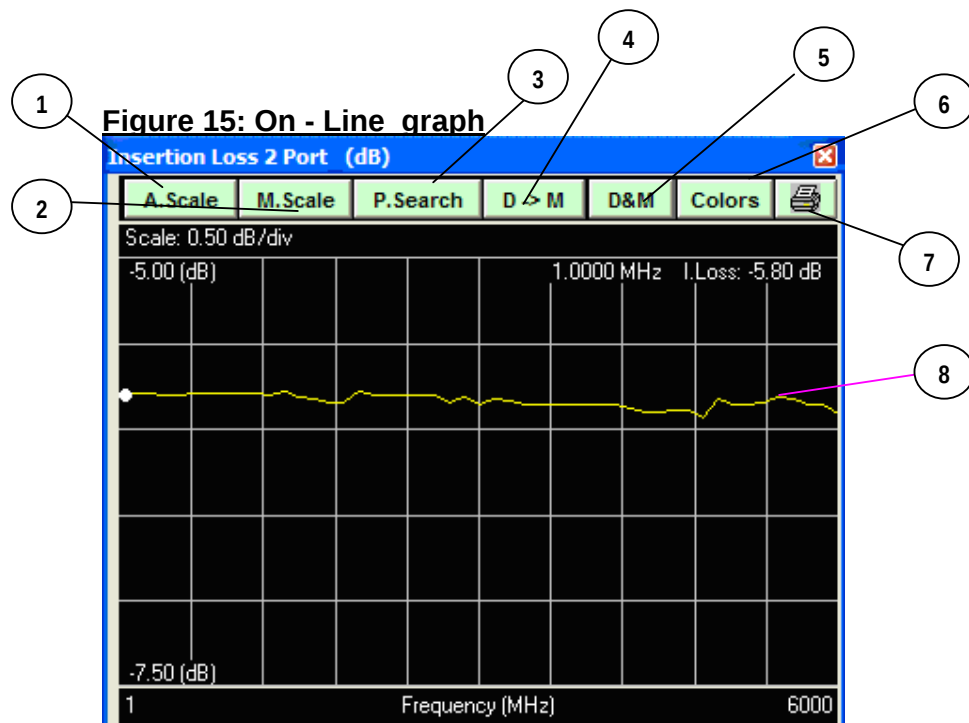


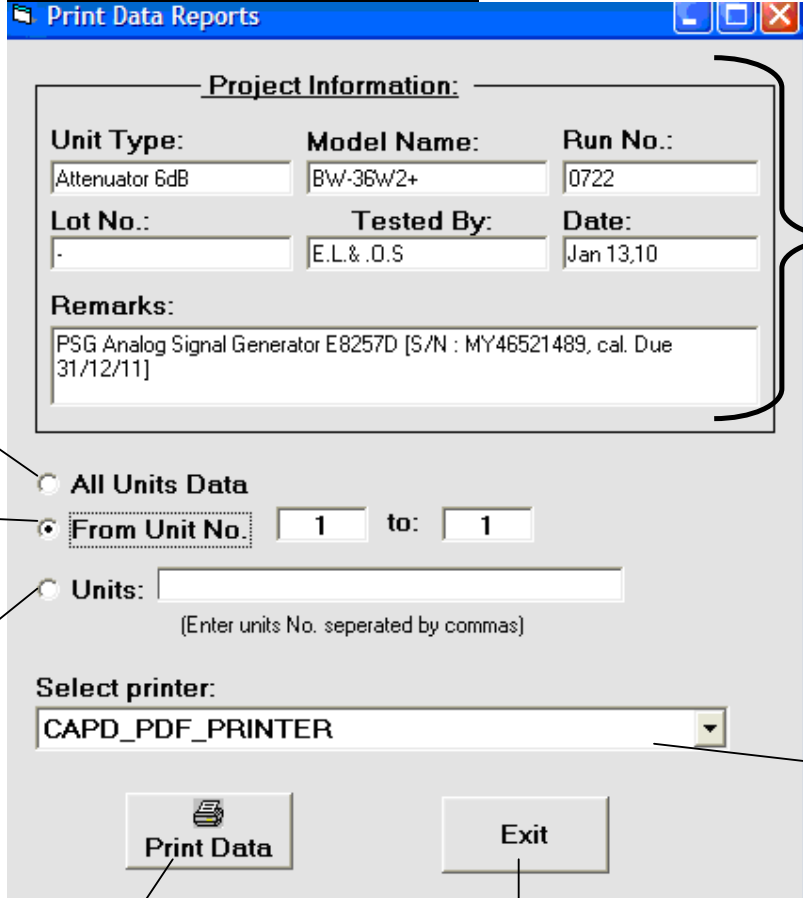
Table 10: On-Line Graph Items Features

Item	Button	Description
1	A. Scale	Auto Scale – Resets the scale automatically to show all of the data trace.
2	M. Scale	Manual Scale – Allows the user to manually determine the Y axis scale.
3	P. Search	Peak Search function , sending marker to highest graph point
4	D->M	Save current data trace to memory.
5	D&M	Display both saved memory trace and current data trace.
6	Colors	Set the colors of the various graphical elements. Once changed, the new color choices will be saved automatically.
7	Printing	Print current graph
8	Marker	Marker Value is always shown on the right side of the window screen and you can set the marker by moving the mouse across the graph or by using the arrow keys with the On-Line-Graph window selected.

3.6 Printing Data Function.

Clicking on the printer icon located on the top of the screen (see **Figure 8, Item 5**) will open the 'Print Data Reports' window which allows the user to print measurement data and insert or change certain parameters before printing (see **Figure 16**).

Figure 16 : Printing Data Window



The screenshot shows the 'Print Data Reports' window. It contains a 'Project Information' section with fields for Unit Type, Model Name, Run No., Lot No., Tested By, and Date. Below this is a 'Remarks' section. The 'All Units Data' radio button is selected. The 'From Unit No.' is set to 1 and 'to' is set to 1. The 'Units' field is empty. The 'Select printer' dropdown menu is set to 'CAPD_PDF_PRINTER'. At the bottom are 'Print Data' and 'Exit' buttons.

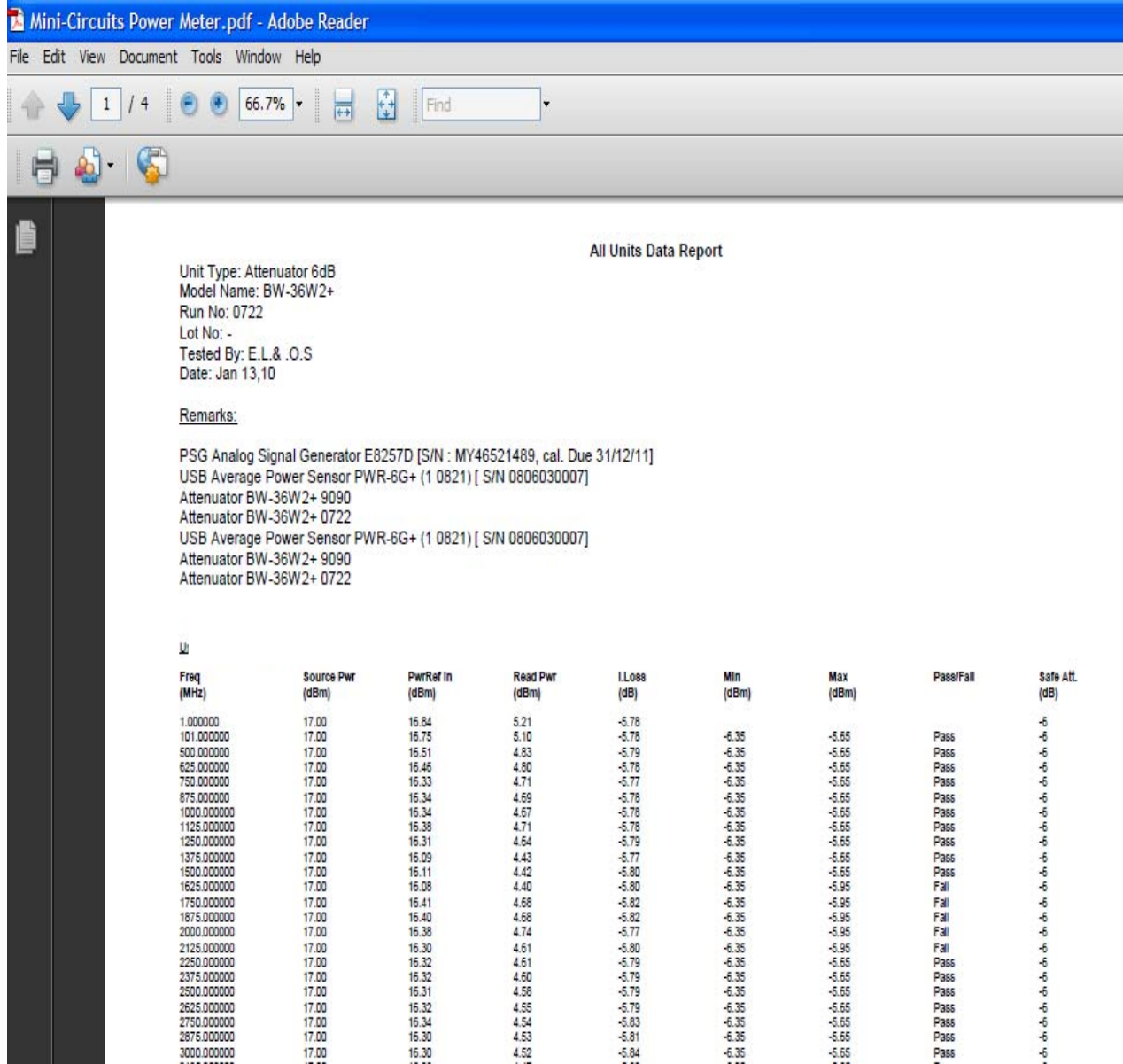
Numbered callouts:

- 1: Project Information section
- 2: All Units Data radio button
- 3: From Unit No. field
- 4: Units field
- 5: Select printer dropdown menu
- 6: Exit button
- 7: Print Data button

Table 11: Printing Data window items

Item	Field/Button	Description
1	Project Information	See table 3 Items 1.1-1.7 for descriptions. Project Information can be altered for specific print jobs but can not be saved from the Print Data Reports window.
2	All Units Data	Print the data for all available units.
3	From Unit No. X to Y	Print the data for units from Unit No. X to Unit No. Y, inclusive.
4	Units	Print the data for the units whose numbers appear in the field. Numbers represent single units and are to be separated by commas.
5	Select printer	Pick a specific printer from those available in system (PDF printer, physical printer, or other)
6	Exit	Close print window, returning to the project.
7	Print Data	Send data to selected printer (see Figure 18 for format)

Figure 17: Print data example.



Mini-Circuits Power Meter.pdf - Adobe Reader

File Edit View Document Tools Window Help

1 / 4 66.7% Find

Unit Type: Attenuator 6dB
 Model Name: BW-36W2+
 Run No: 0722
 Lot No: -
 Tested By: E.L.& .O.S
 Date: Jan 13,10

Remarks:

PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 Attenuator BW-36W2+ 9090
 Attenuator BW-36W2+ 0722
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 Attenuator BW-36W2+ 9090
 Attenuator BW-36W2+ 0722

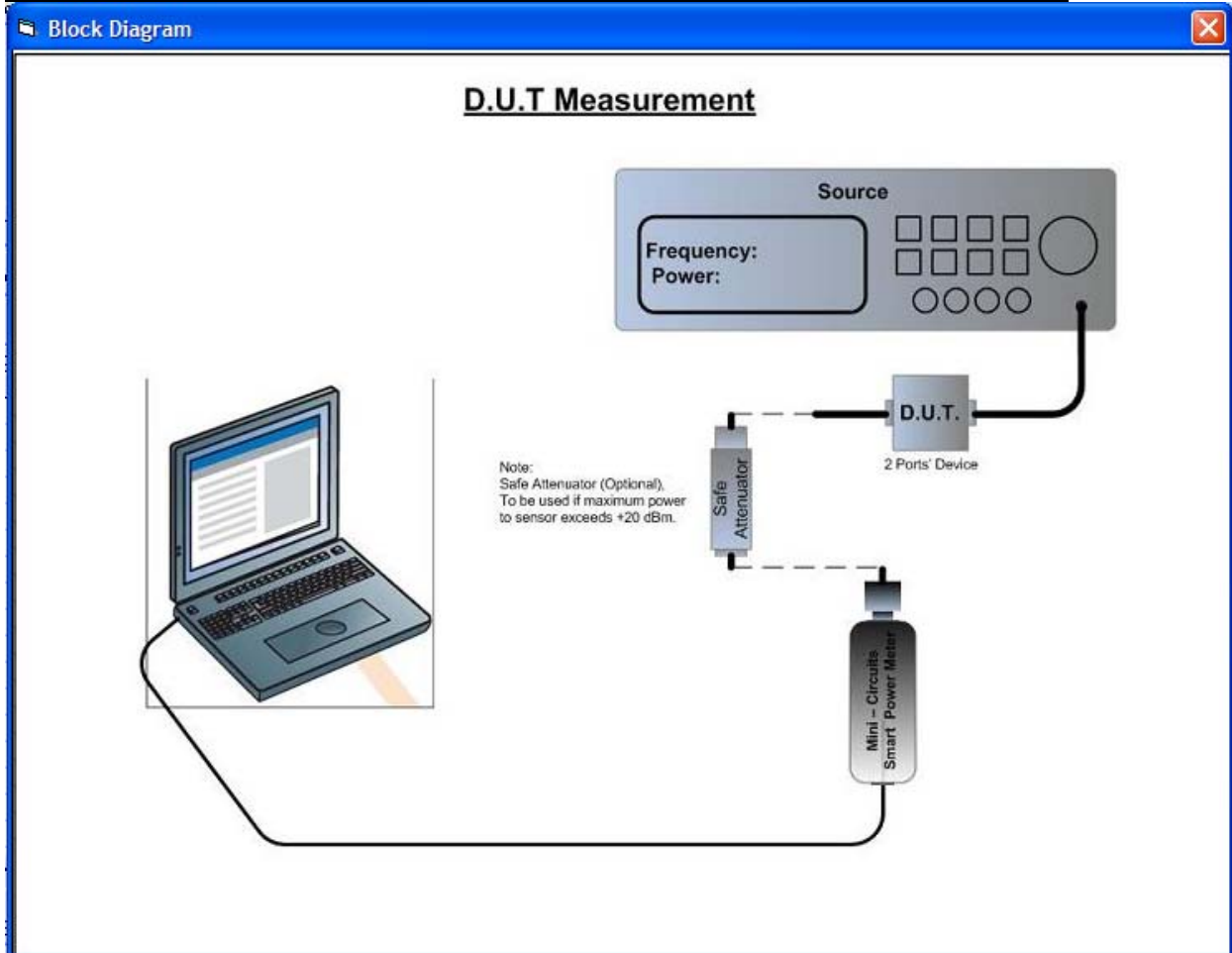
All Units Data Report

Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Loss (dB)	Min (dBm)	Max (dBm)	Pass/Fail	Safe Att. (dB)
1.000000	17.00	16.84	5.21	-5.78	-	-	-	-6
101.000000	17.00	16.75	5.10	-5.78	-6.35	-5.65	Pass	-6
500.000000	17.00	16.51	4.83	-5.79	-6.35	-5.65	Pass	-6
625.000000	17.00	16.46	4.80	-5.78	-6.35	-5.65	Pass	-6
750.000000	17.00	16.33	4.71	-5.77	-6.35	-5.65	Pass	-6
875.000000	17.00	16.34	4.69	-5.78	-6.35	-5.65	Pass	-6
1000.000000	17.00	16.34	4.67	-5.78	-6.35	-5.65	Pass	-6
1125.000000	17.00	16.38	4.71	-5.78	-6.35	-5.65	Pass	-6
1250.000000	17.00	16.31	4.64	-5.79	-6.35	-5.65	Pass	-6
1375.000000	17.00	16.09	4.43	-5.77	-6.35	-5.65	Pass	-6
1500.000000	17.00	16.11	4.42	-5.80	-6.35	-5.65	Pass	-6
1625.000000	17.00	16.08	4.40	-5.80	-6.35	-5.95	Fail	-6
1750.000000	17.00	16.41	4.66	-5.82	-6.35	-5.95	Fail	-6
1875.000000	17.00	16.40	4.68	-5.82	-6.35	-5.95	Fail	-6
2000.000000	17.00	16.38	4.74	-5.77	-6.35	-5.95	Fail	-6
2125.000000	17.00	16.30	4.61	-5.80	-6.35	-5.95	Fail	-6
2250.000000	17.00	16.32	4.61	-5.79	-6.35	-5.65	Pass	-6
2375.000000	17.00	16.32	4.60	-5.79	-6.35	-5.65	Pass	-6
2500.000000	17.00	16.31	4.58	-5.79	-6.35	-5.65	Pass	-6
2625.000000	17.00	16.32	4.65	-5.79	-6.35	-5.65	Pass	-6
2750.000000	17.00	16.34	4.54	-5.83	-6.35	-5.65	Pass	-6
2875.000000	17.00	16.30	4.53	-5.81	-6.35	-5.65	Pass	-6
3000.000000	17.00	16.30	4.52	-5.84	-6.35	-5.65	Pass	-6

3.7 Block Diagram

Block Diagram represents the equipment setup configuration used in the measurement. All measurements start from a **Reference In** setup. When proceeding to the next step, first review and assemble the measurement step's setup (for example see **Insertion Loss 2 Ports D.U.T Measurement** in **Figure 18**)

Figure 18: Insertion Loss 2 Ports D.U.T Measurement Block Diagram setup

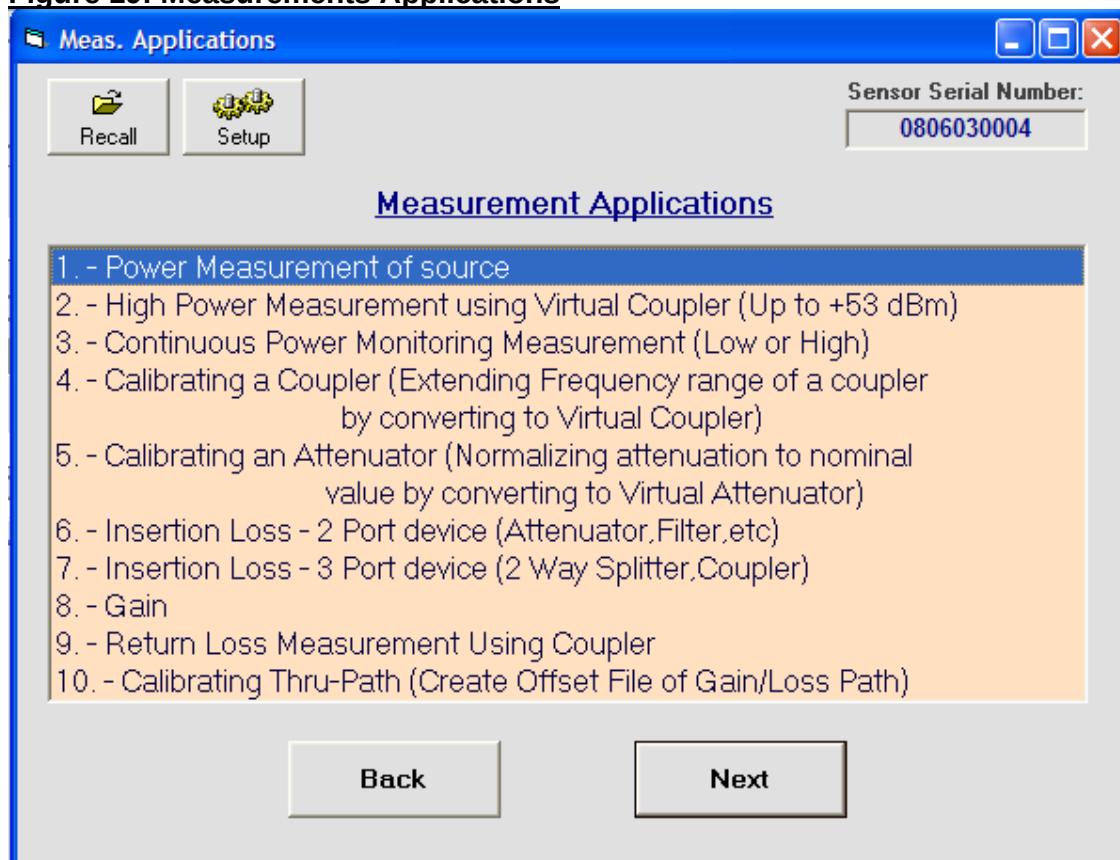


4.0 Application # 1- Power measurement of source.

This chapter describes the process of performing Power out measurements of an RF source. This measurement can be used to calibrate an RF source or verify its output. Data output is in [dBm] units.

- **Step 1.** Open a project from **Measurement Application** screen (see **Figure 19**)

Figure 19: Measurements Applications

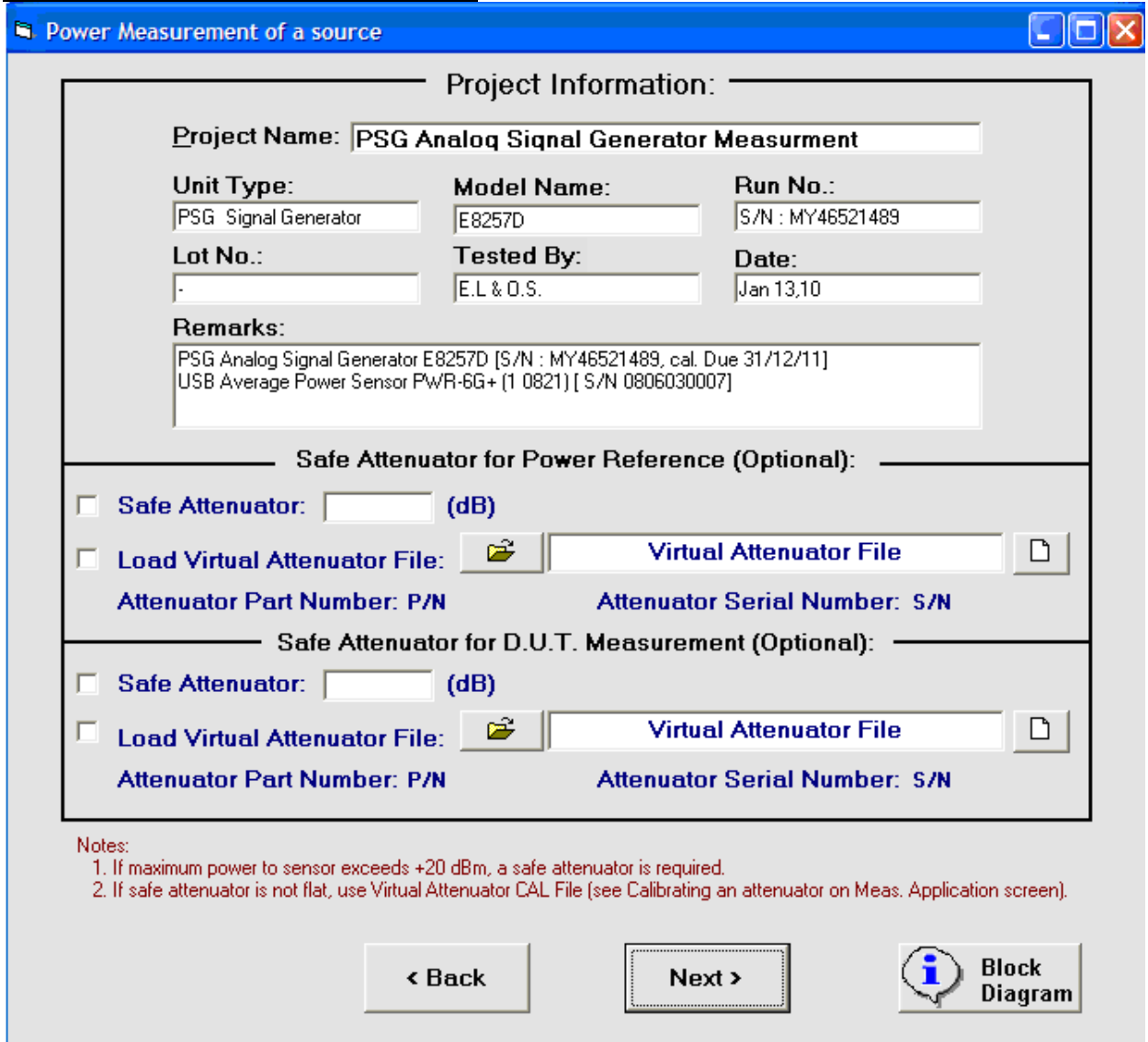


- **Step 2.** The **Project Information** menu will open (see **Figure 20**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **page 10**.

Note

1. If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.
-

Figure 20: Project Information menu



The screenshot shows a software window titled "Power Measurement of a source". Inside, there is a "Project Information:" section with the following fields:

- Project Name:** PSG Analog Signal Generator Measurement
- Unit Type:** PSG Signal Generator
- Model Name:** E8257D
- Run No.:** S/N : MY46521489
- Lot No.:** -
- Tested By:** E.L & O.S.
- Date:** Jan 13,10
- Remarks:** PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]

Below this is a section for "Safe Attenuator for Power Reference (Optional):"

- ☐ Safe Attenuator: (dB)
- ☐ Load Virtual Attenuator File: [Browse icon] Virtual Attenuator File [File icon]
- Attenuator Part Number: P/N
- Attenuator Serial Number: S/N

Below that is a section for "Safe Attenuator for D.U.T. Measurement (Optional):"

- ☐ Safe Attenuator: (dB)
- ☐ Load Virtual Attenuator File: [Browse icon] Virtual Attenuator File [File icon]
- Attenuator Part Number: P/N
- Attenuator Serial Number: S/N

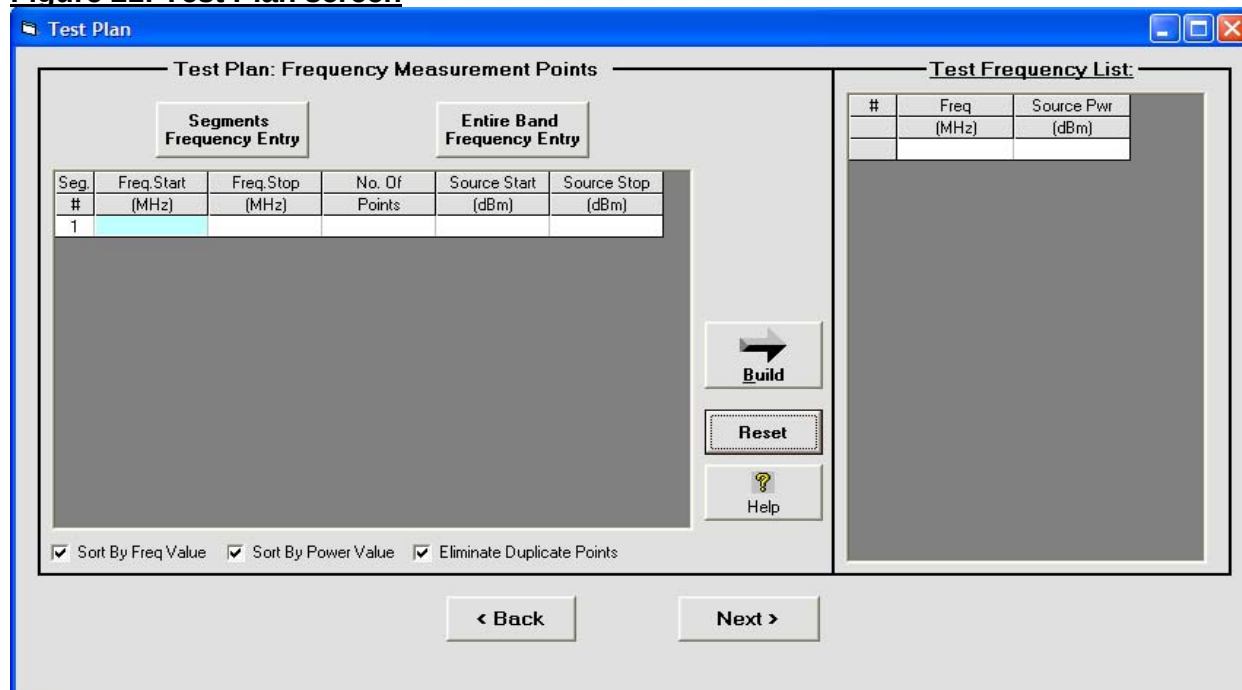
At the bottom, there are "Notes:"

1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

Navigation buttons at the bottom include "< Back", "Next >", and a "Block Diagram" button with an information icon.

- **Step 4.** Press **Next** key.
The **Test Plan** screen will open (see **Figure 21**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 10-11**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **page 10**).

Figure 21: Test Plan screen



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Entire Band Frequency Entry

Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1					

Test Frequency List:

#	Freq (MHz)	Source Pwr (dBm)
---	------------	------------------

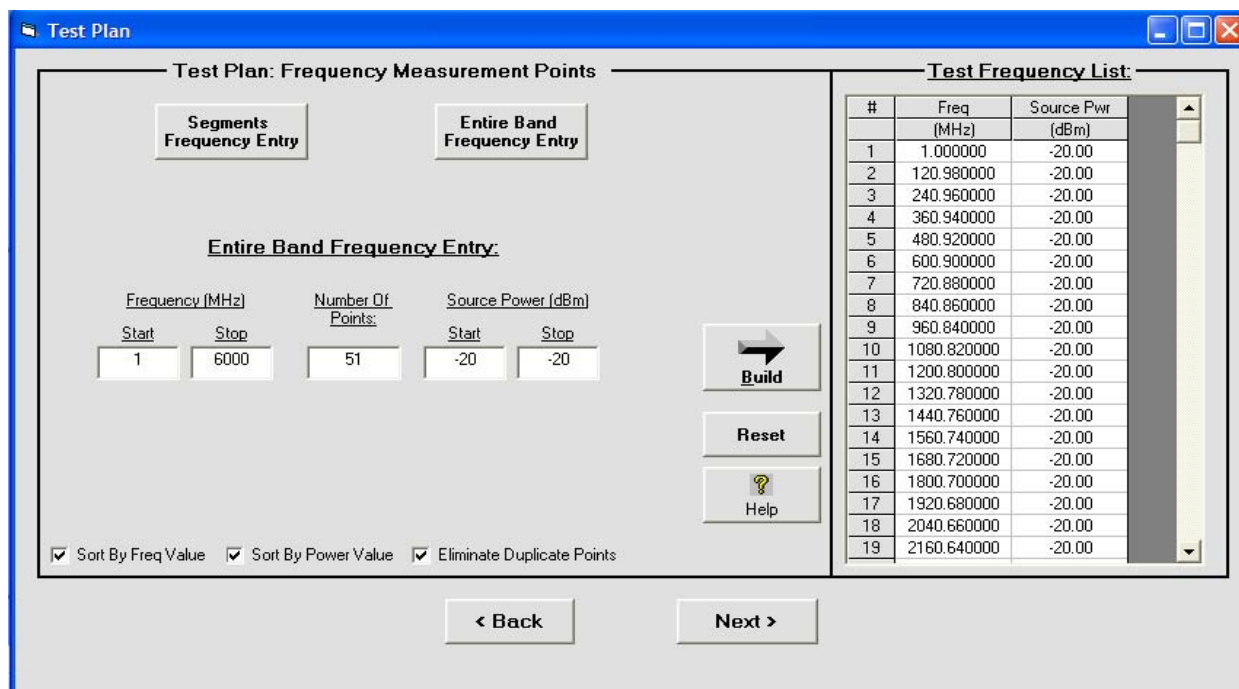
Build **Reset** **Help**

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

< Back **Next >**

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 22**).

Figure 22 : creating Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Entire Band Frequency Entry

Entire Band Frequency Entry:

Frequency (MHz)		Number Of Points	Source Power (dBm)	
Start	Stop		Start	Stop
1	6000	51	-20	-20

Build **Reset** **Help**

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

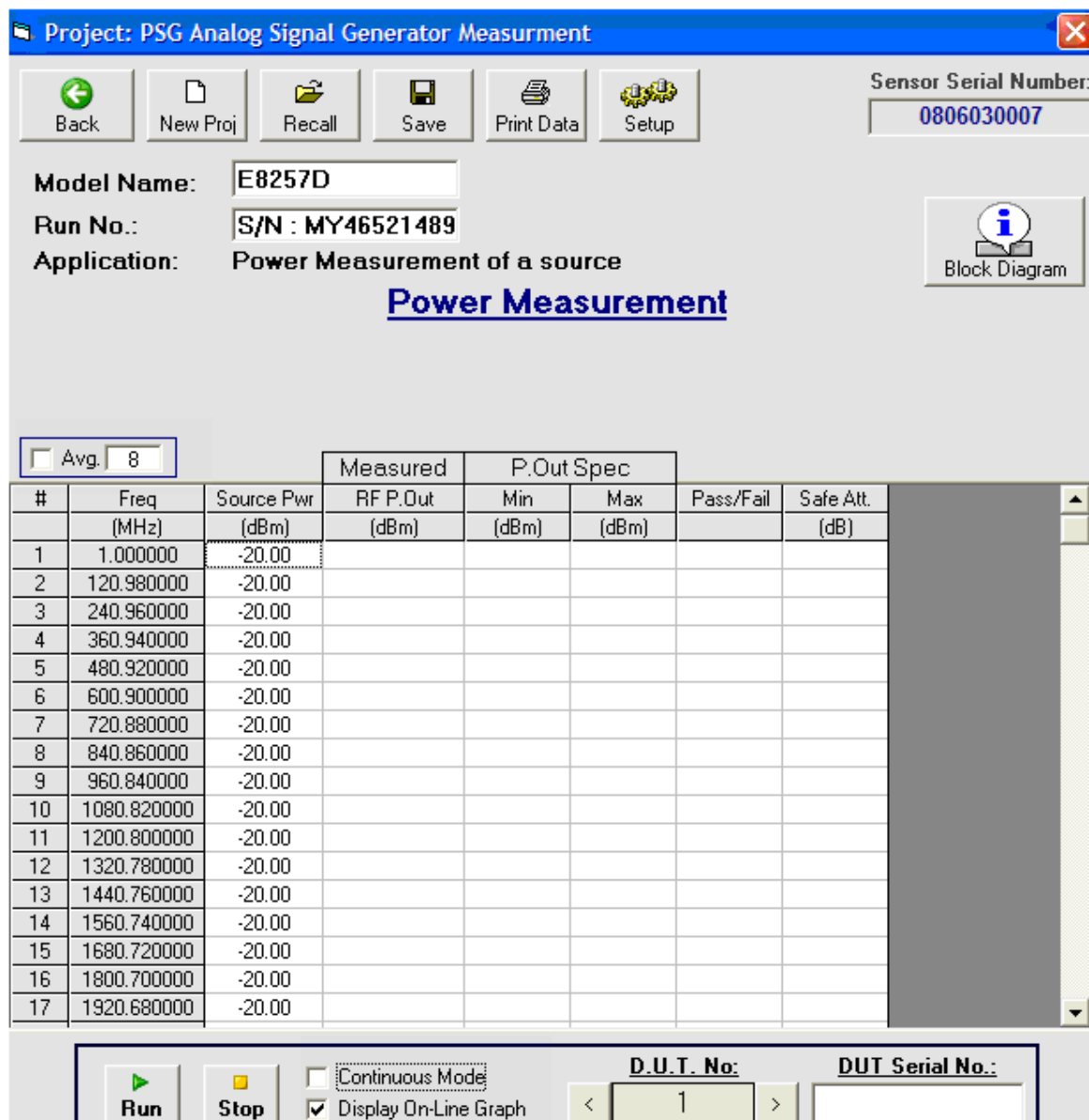
< Back **Next >**

Test Frequency List:

#	Freq (MHz)	Source Pwr (dBm)
1	1.000000	-20.00
2	120.980000	-20.00
3	240.960000	-20.00
4	360.940000	-20.00
5	480.920000	-20.00
6	600.900000	-20.00
7	720.880000	-20.00
8	840.860000	-20.00
9	960.840000	-20.00
10	1080.820000	-20.00
11	1200.800000	-20.00
12	1320.780000	-20.00
13	1440.760000	-20.00
14	1560.740000	-20.00
15	1680.720000	-20.00
16	1800.700000	-20.00
17	1920.680000	-20.00
18	2040.660000	-20.00
19	2160.640000	-20.00

- **Step 8.** Press **Next** key.
The **Power Measurements** screen will open. (see **Figure 21**).
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation)
- **Step 9.** Open measurement's **Block Diagram** setup (see **Figure 24**).
- **Step 10.** Assemble the **Power Measurements of a source** equipment setup.

Figure 23: The Power Measurements screen



Project: PSG Analog Signal Generator Measurement

Back New Proj Recall Save Print Data Setup

Sensor Serial Number: 0806030007

Model Name: E8257D

Run No.: S/N : MY46521489

Application: Power Measurement of a source

Power Measurement

Block Diagram

Avg: 8

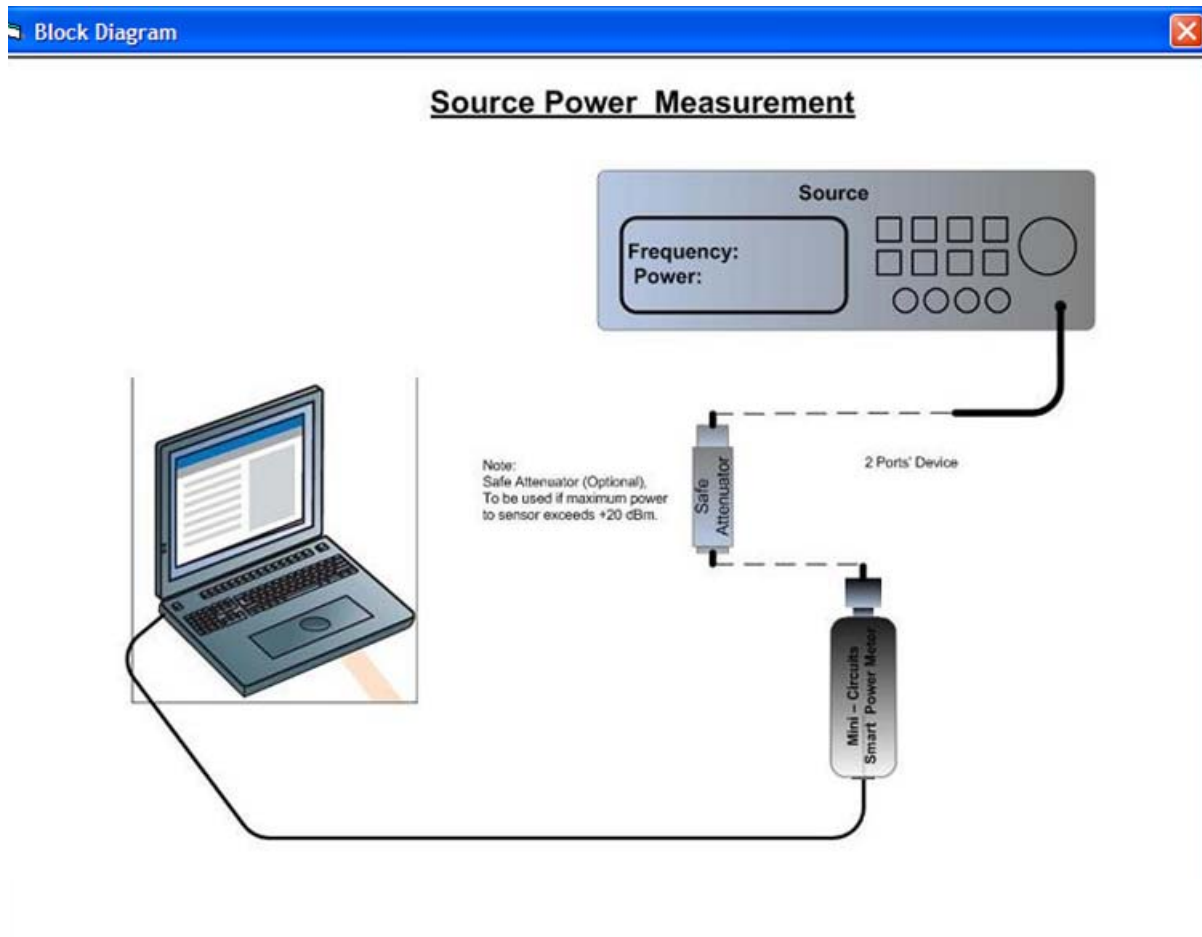
#	Freq (MHz)	Source Pwr (dBm)	Measured		P.Out Spec		Pass/Fail	Safe Att. (dB)
			RF P.Out (dBm)	Min (dBm)	Max (dBm)			
1	1.000000	-20.00						
2	120.980000	-20.00						
3	240.960000	-20.00						
4	360.940000	-20.00						
5	480.920000	-20.00						
6	600.900000	-20.00						
7	720.880000	-20.00						
8	840.860000	-20.00						
9	960.840000	-20.00						
10	1080.820000	-20.00						
11	1200.800000	-20.00						
12	1320.780000	-20.00						
13	1440.760000	-20.00						
14	1560.740000	-20.00						
15	1680.720000	-20.00						
16	1800.700000	-20.00						
17	1920.680000	-20.00						

Run Stop Continuous Mode Display On-Line Graph

D.U.T. No: 1 DUT Serial No.:

- **Step 11.** Define/Confirm **Setup** settings (see 2.1. Setting communication/commands in order to control an external source. on page 5)

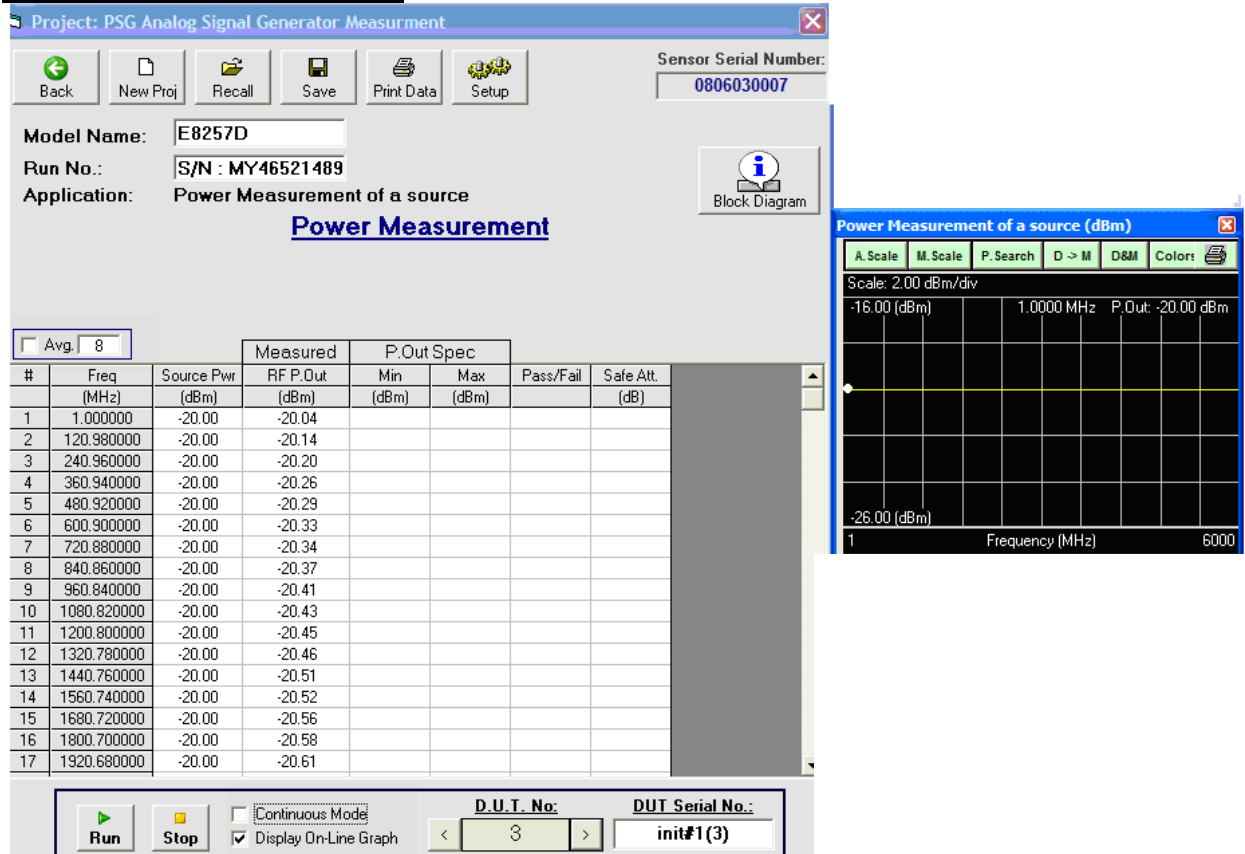
Figure 24: Source Power Measurement's Block Diagram setup



- **Step 11.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 12.** You can enable **Continuous Mode** if necessary for your application.
- **Step 13.** You can enable the **On-Line Graph** option.
(see 3.5 On-Line Graph features page 22).
- **Step 14.** Enter **D.U.T Serial No:** (If available).
- **Step 15.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.

- **Step 16.** If you have more than one D.U.T to test, repeat **Steps 12-15** for next test (see **Figure 25**).

Figure 25: Final Data screen



- **Step 17.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation).
- **Step 18.** You can print your test data (see **3.6 Printing Data Function** on **page 23** for explanation).

5.0. Application # 2- High Power Measurement using Virtual Coupler (Up to +53 dBm)

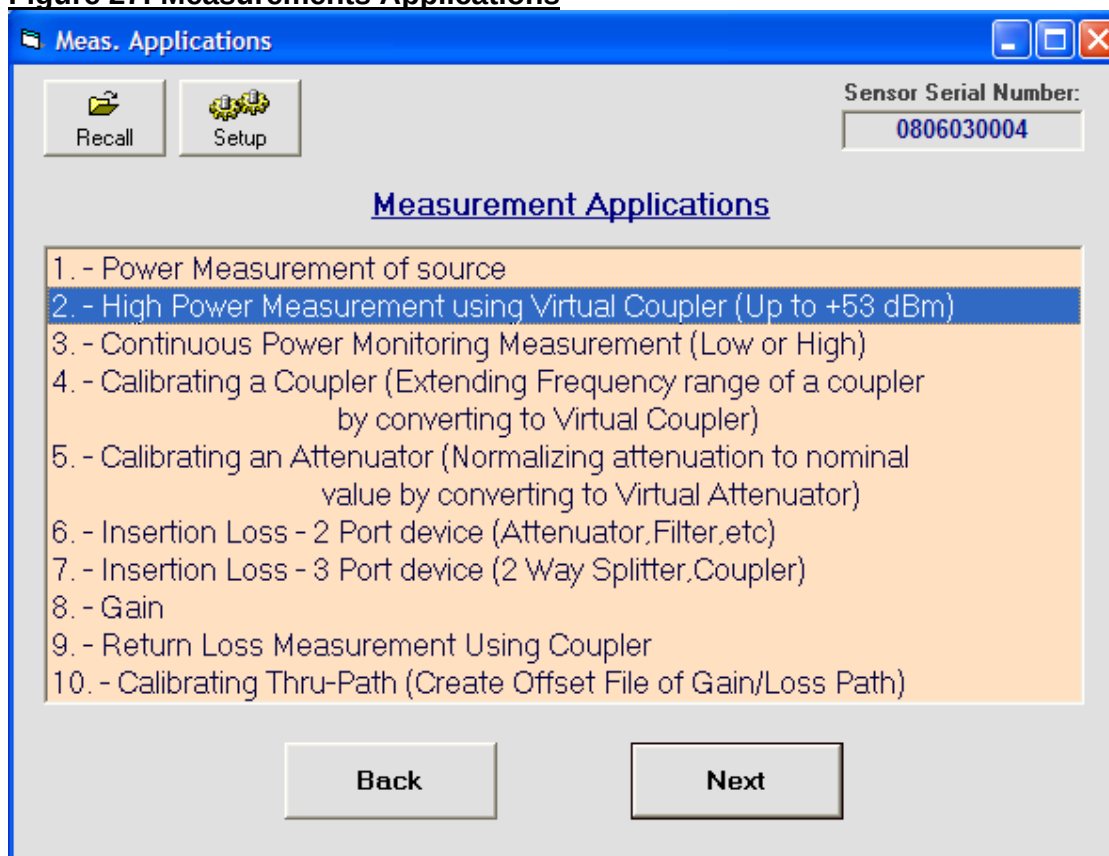
This chapter describes the process of performing High power measurements using a coupler. Before proceeding with this measurement you must generate a Virtual Coupler file described in **chapter 7**. High power measurements using a coupler allow you to extend the power sensor's dynamic range to measure signals of greater than +20dBm power. In some cases the coupler's coupling factor is insufficient protection and an additional safe attenuator may be needed to prevent damage to the sensor. If the Safe Attenuator is not flat use a Virtual Attenuator CAL file (see Virtual Attenuator in **chapter 8**). Data output is in [dBm] units.

Note

1. Before proceedings with the measurement insure the power rating of your coupler is not exceeded by the signal strength entering it and that the actual signal entering the power sensor does not exceed +20dBm.
2. If the D.U.T will enter compression during the test consider using filters as Virtual Attenuators (see **chapter 8, page 60**) to suppress harmonics.

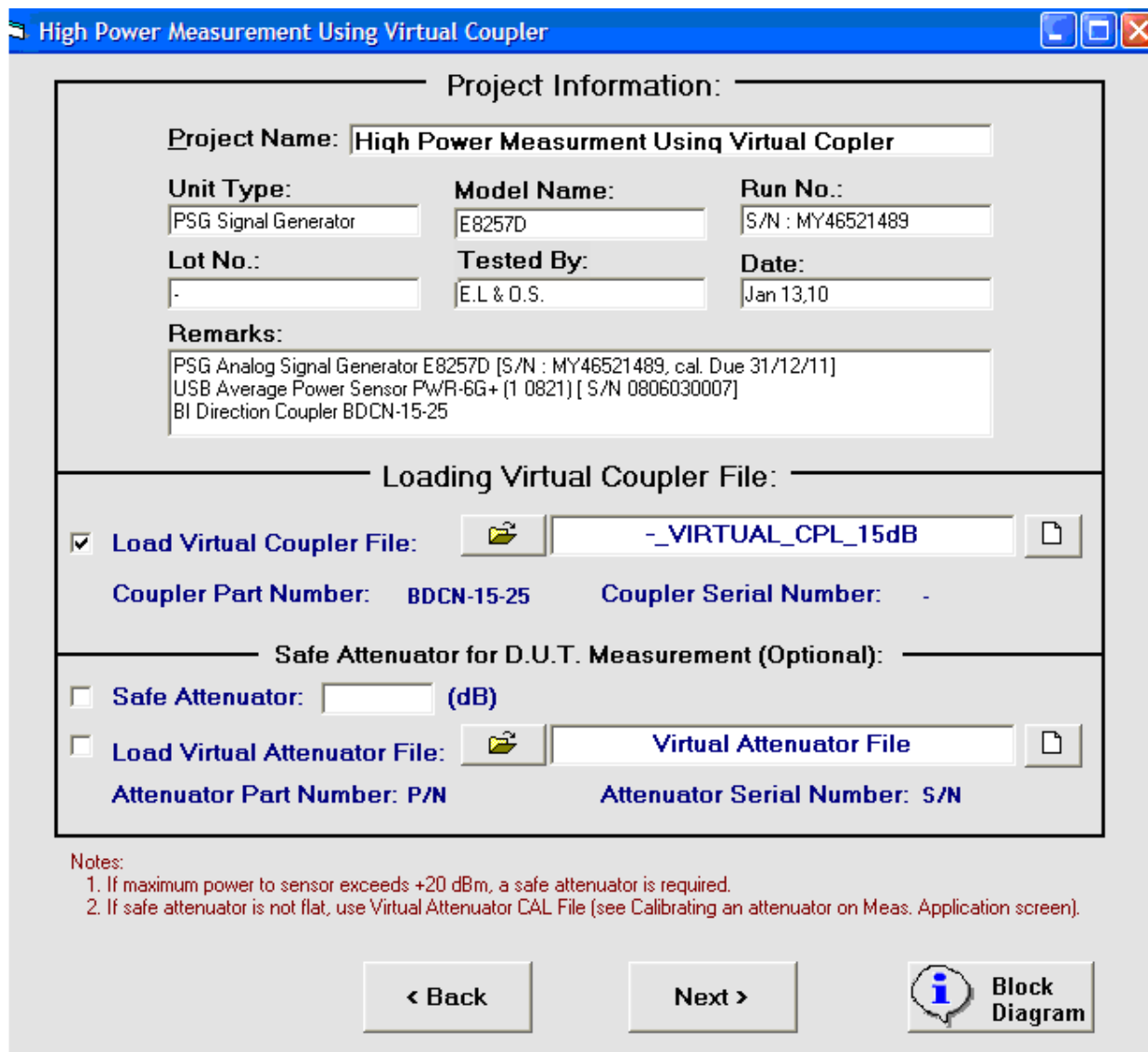
- **Step 1.** Open a project from **Measurement Application** screen (see **Figure 27**).

Figure 27: Measurements Applications



- **Step 2.** The **Project Information** menu will open (see **Figure 28**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **page 10**.

Figure 28: Project Information menu



The screenshot shows a software window titled "High Power Measurement Using Virtual Coupler". Inside, there is a "Project Information:" section with the following fields:

- Project Name:** High Power Measurment Using Virtual Copler
- Unit Type:** PSG Signal Generator
- Model Name:** E8257D
- Run No.:** S/N : MY46521489
- Lot No.:** -
- Tested By:** E.L & O.S.
- Date:** Jan 13,10
- Remarks:** PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
BI Direction Coupler BDCN-15-25

Below this is the "Loading Virtual Coupler File:" section:

- ☒ **Load Virtual Coupler File:** [Browse icon] [File icon]
- Coupler Part Number:** BDCN-15-25 **Coupler Serial Number:** -

Next is the "Safe Attenuator for D.U.T. Measurement (Optional):" section:

- ☐ **Safe Attenuator:** (dB)
- ☐ **Load Virtual Attenuator File:** [Browse icon] [File icon]
- Attenuator Part Number:** P/N **Attenuator Serial Number:** S/N

At the bottom, there are "Notes:"

1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

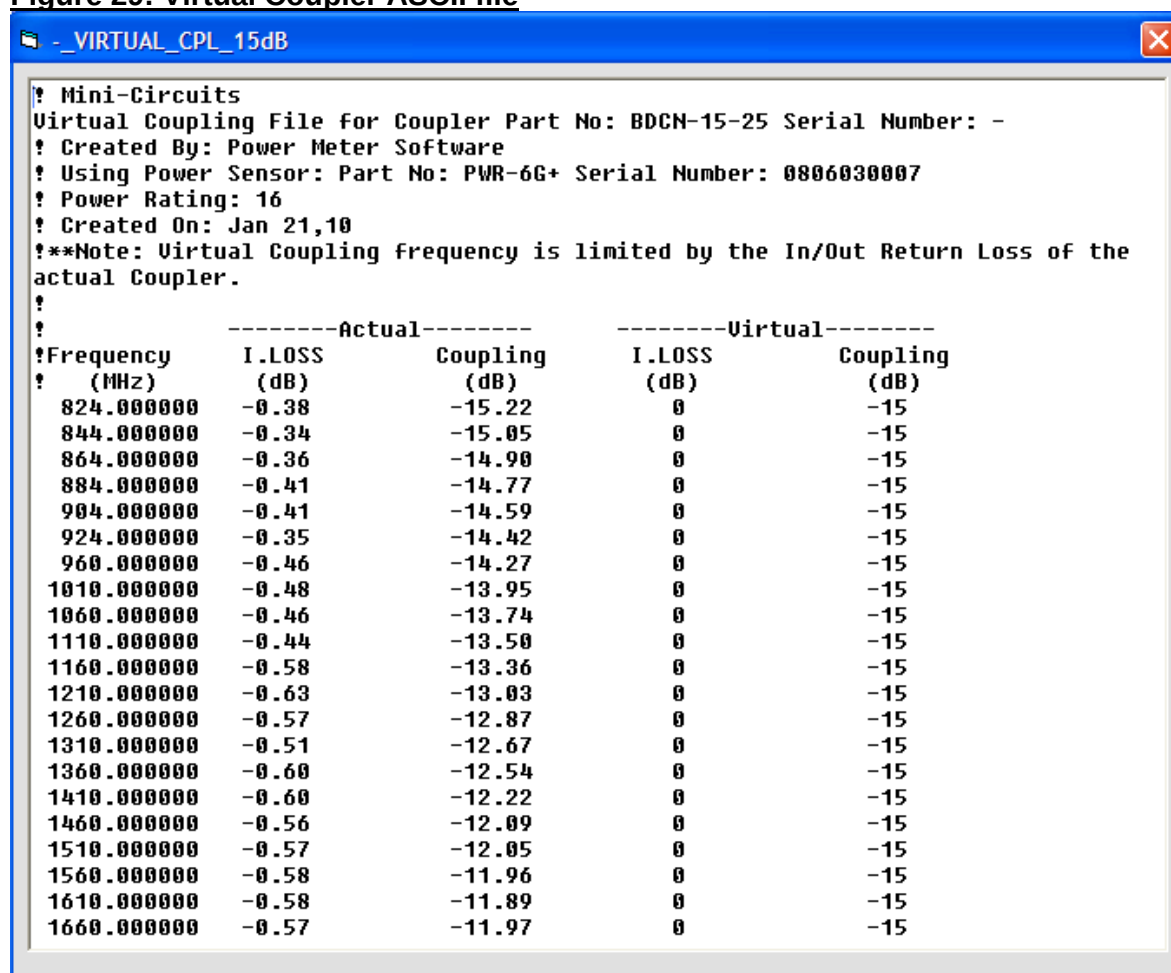
Navigation buttons at the bottom include "< Back", "Next >", and a "Block Diagram" button with an information icon.

- **Step 4.** Load previously created Virtual Coupler (see **chapter 7**)[mandatory] see **Figure 29** for an example of a Virtual Coupler file.

Note

High power measurements using a Virtual Coupler beyond the Coupler's rated frequency range will result in inaccurate measurements unless a suitable filter is used in order to suppress harmonics. In order to prevent errors due to the filter's insertion loss you must compensate for its loss while it's connected. Create an Offset file using the Virtual Attenuator option (see **chapter 8, page 60**). In the Project Information menu, Safe Attenuator section (see **Figure 28**). Load the offset file created previously as a virtual attenuator. When measuring points outside the coupler's official frequency range connect the filter as shown and enable the Load Virtual **Attenuator File** option. For all other points remove the filter and disable the **Offset file**

Figure 29: Virtual Coupler ASCII file



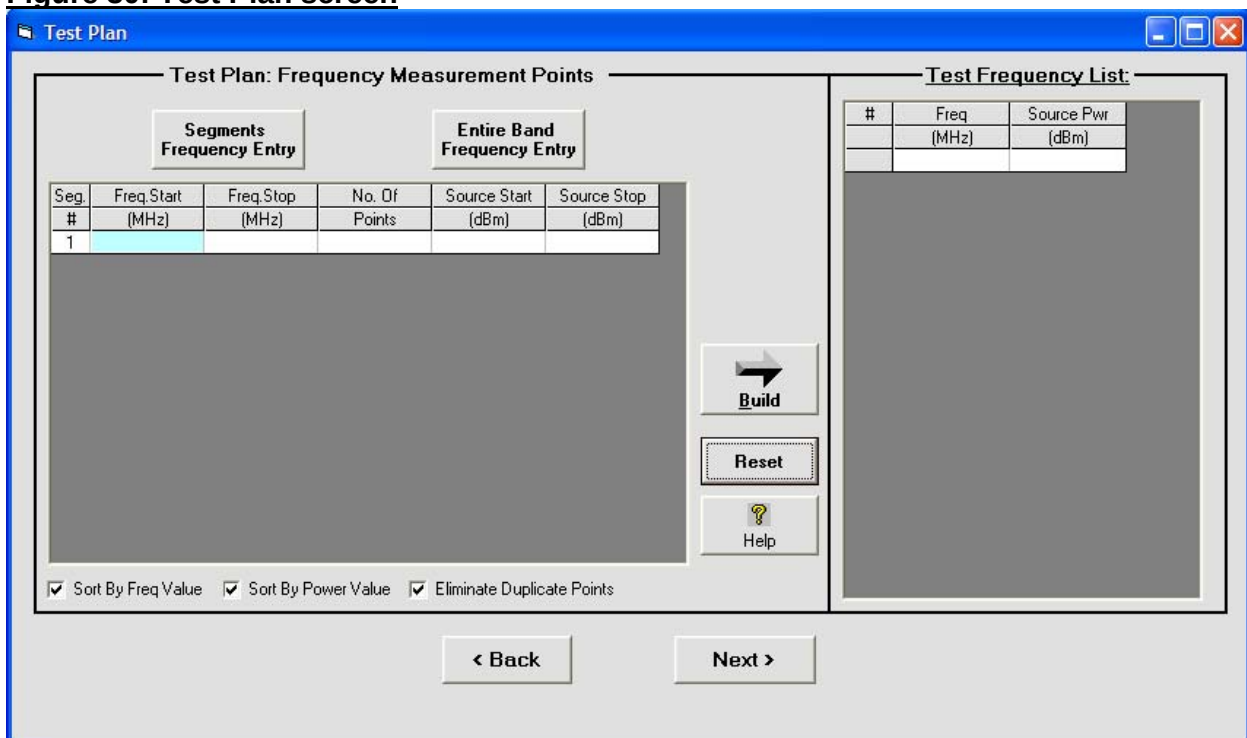
```

? Mini-Circuits
Virtual Coupling File for Coupler Part No: BDCN-15-25 Serial Number: -
? Created By: Power Meter Software
? Using Power Sensor: Part No: PWR-6G+ Serial Number: 0806030007
? Power Rating: 16
? Created On: Jan 21,10
? **Note: Virtual Coupling frequency is limited by the In/Out Return Loss of the
actual Coupler.
?
?
? -----Actual-----
? Frequency      I.LOSS      Coupling
? (MHz)          (dB)        (dB)
824.000000      -0.38       -15.22
844.000000      -0.34       -15.05
864.000000      -0.36       -14.90
884.000000      -0.41       -14.77
904.000000      -0.41       -14.59
924.000000      -0.35       -14.42
960.000000      -0.46       -14.27
1010.000000     -0.48       -13.95
1060.000000     -0.46       -13.74
1110.000000     -0.44       -13.50
1160.000000     -0.58       -13.36
1210.000000     -0.63       -13.03
1260.000000     -0.57       -12.87
1310.000000     -0.51       -12.67
1360.000000     -0.60       -12.54
1410.000000     -0.60       -12.22
1460.000000     -0.56       -12.09
1510.000000     -0.57       -12.05
1560.000000     -0.58       -11.96
1610.000000     -0.58       -11.89
1660.000000     -0.57       -11.97
?
? -----Virtual-----
? Frequency      I.LOSS      Coupling
? (MHz)          (dB)        (dB)
824.000000      0           -15
844.000000      0           -15
864.000000      0           -15
884.000000      0           -15
904.000000      0           -15
924.000000      0           -15
960.000000      0           -15
1010.000000     0           -15
1060.000000     0           -15
1110.000000     0           -15
1160.000000     0           -15
1210.000000     0           -15
1260.000000     0           -15
1310.000000     0           -15
1360.000000     0           -15
1410.000000     0           -15
1460.000000     0           -15
1510.000000     0           -15
1560.000000     0           -15
1610.000000     0           -15
1660.000000     0           -15

```

- **Step 6.** Press **Next** key.
The **Test Plan** screen will open (see **Figure 30**).
- **Step 7.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 10-11**).
- **Step 8.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **page 10**).

Figure 30: Test Plan screen



The screenshot shows the 'Test Plan' window with a blue title bar. The main area is divided into two sections: 'Test Plan: Frequency Measurement Points' on the left and 'Test Frequency List' on the right.

Test Plan: Frequency Measurement Points

At the top of this section are two buttons: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. Below them is a table with the following columns: 'Seg. #', 'Freq. Start (MHz)', 'Freq. Stop (MHz)', 'No. Of Points', 'Source Start (dBm)', and 'Source Stop (dBm)'. The first row is highlighted in light blue.

Below the table is a large grey rectangular area for data entry. To the right of this area are three buttons: 'Build' (with a right-pointing arrow), 'Reset', and 'Help' (with a question mark icon). At the bottom of this section are three checked checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points'.

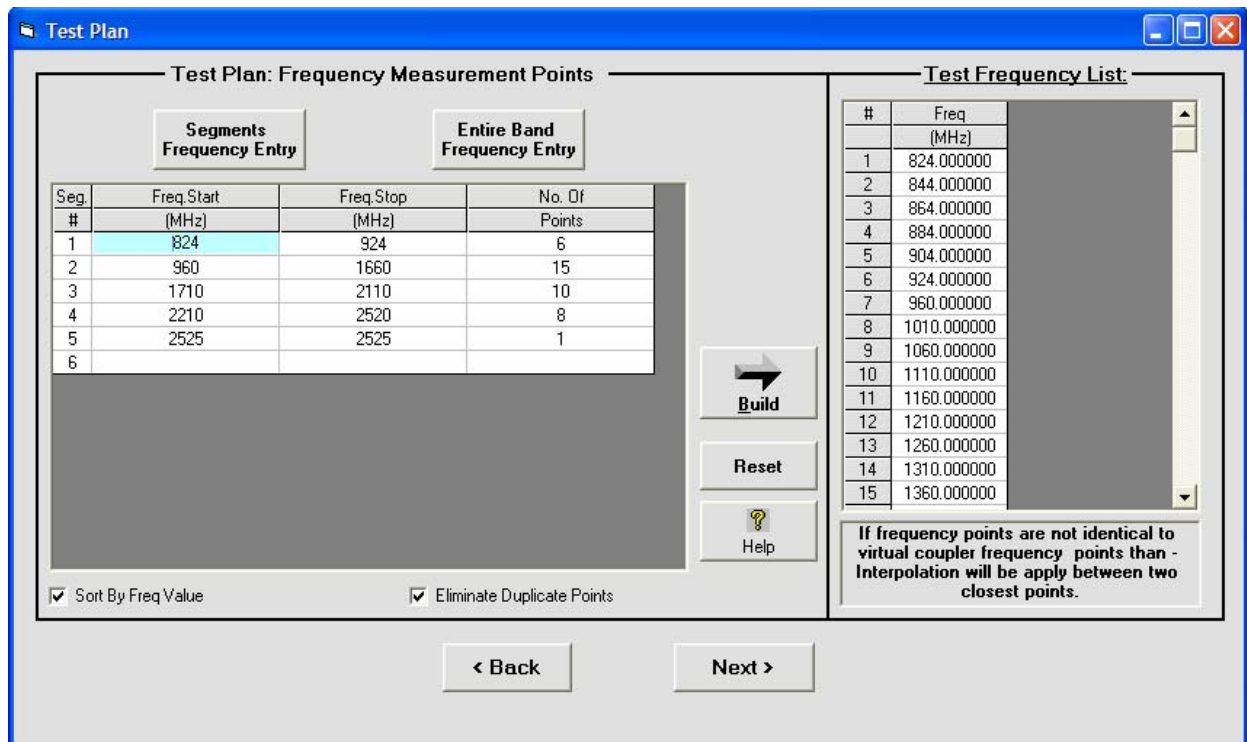
Test Frequency List

This section has a table with three columns: '#', 'Freq (MHz)', and 'Source Pwr (dBm)'. Below the table is a large grey rectangular area for the list.

At the bottom of the window are two buttons: '< Back' and 'Next >'.

- **Step 9.** Press **Build** key to create a **Test Frequency List** (see **Figure 31**).

Figure 31: Test Frequency List



The screenshot shows the 'Test Plan' window with the 'Test Frequency List' tab selected. The window is divided into two main sections: 'Test Plan: Frequency Measurement Points' on the left and 'Test Frequency List' on the right.

Test Plan: Frequency Measurement Points

At the top of this section are two buttons: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. Below them is a table with the following data:

Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points
1	824	924	6
2	960	1660	15
3	1710	2110	10
4	2210	2520	8
5	2525	2525	1
6			

Below the table are two checkboxes: ☒ Sort By Freq Value and ☒ Eliminate Duplicate Points. To the right of the table are three buttons: 'Build', 'Reset', and 'Help'.

Test Frequency List

This section contains a table with the following data:

#	Freq (MHz)
1	824.000000
2	844.000000
3	864.000000
4	884.000000
5	904.000000
6	924.000000
7	960.000000
8	1010.000000
9	1060.000000
10	1110.000000
11	1160.000000
12	1210.000000
13	1260.000000
14	1310.000000
15	1360.000000

Below the table is a note: 'If frequency points are not identical to virtual coupler frequency points then - Interpolation will be apply between two closest points.'

At the bottom of the window are two buttons: '< Back' and 'Next >'.

- **Step 10.** Press **Next** key.
The **Power Measurement** screen will open (see **Figure 32**).
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages (see **3.3.1.2 Recall** on **page 15**, **3.3.1.2 Save** on **page 16** for explanation).
- **Step 11.** Open measurement **Block Diagram** setup (see **Figure 33**).
- **Step 12.** Assemble the High power measurements using Virtual Coupler equipment setup.

Figure 32: Power Measurement screen

Project: High Power Measurement Using Virtual Copler
✕

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:

0806030007

Model Name:

E8257D

Run No.:

S/N : MY46521489

Application: High Power Measurement Using Virtual Copler


 Block Diagram

Power Measurement

Coupler Part Number: BDCN-15-25
Coupler Serial Number: -

☐ Avg

8

#	Freq (MHz)	Measured	P.Out Spec		Pass/Fail	P.In (dBm)	Virtual CPL (dB)	Safe Att. (dB)
		RF P.Out Coupler (dBm)	Min (dBm)	Max (dBm)				
1	824.000000							
2	844.000000							
3	864.000000							
4	884.000000							
5	904.000000							
6	924.000000							
7	960.000000							
8	1010.000000							
9	1060.000000							
10	1110.000000							
11	1160.000000							
12	1210.000000							
13	1260.000000							
14	1310.000000							
15	1360.000000							
16	1410.000000							
17	1460.000000							

Run

Stop

☐ Continuous Mode

☒ Display On-Line Graph

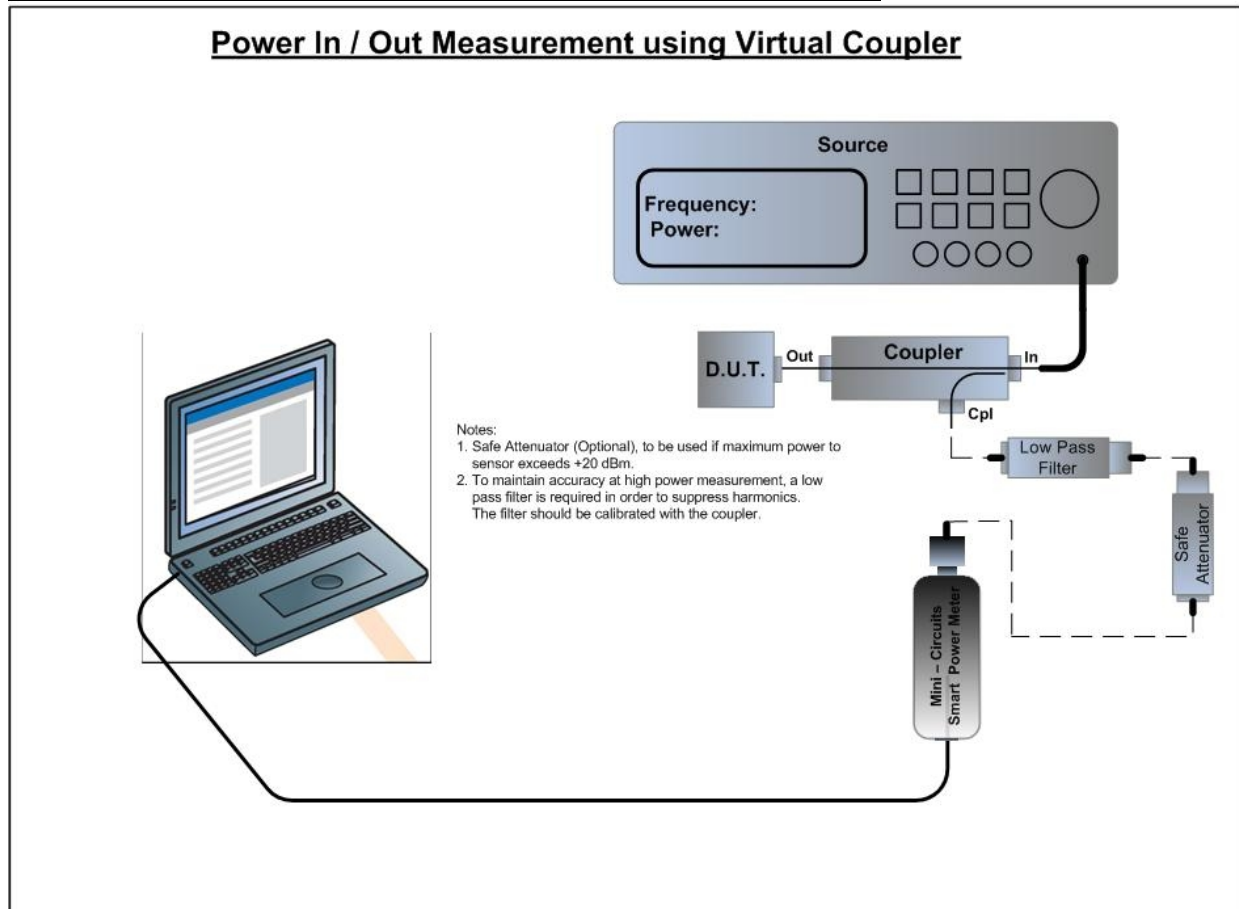
D.U.T. No:

1

DUT Serial No.:

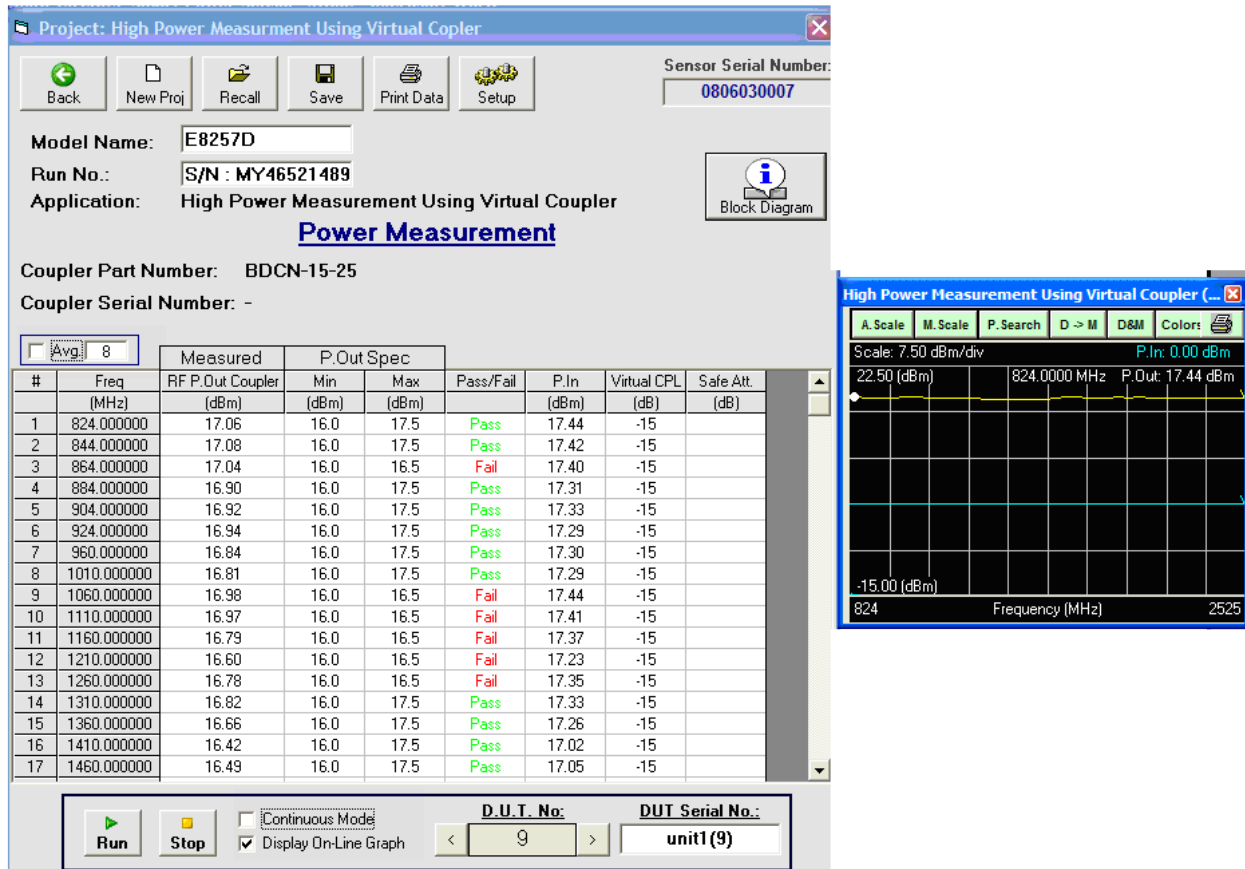
- **Step 13.** Define/Confirm Setup settings (see **2.1. Setting communication/commands in order to control an external source** on page 5).
- **Step 14.** Enter spec. data (If available). [see explanation **3.4.2.2 Spec. Definitions** on page 21].

Figure 33: Power In/Out Measurement's Block Diagram setup



- **Step 15.** You can enable **Continuous Mode** if necessary for your application.
- **Step 16.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features** on **page 22**)
- **Step 17.** Enter **D.U.T Serial No:** (If available).
- **Step 18.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 19.** If you have more than one D.U.T to test repeat **Steps 15-18** for next test
(see **Figure 34**)

Figure 34: Final Data screen



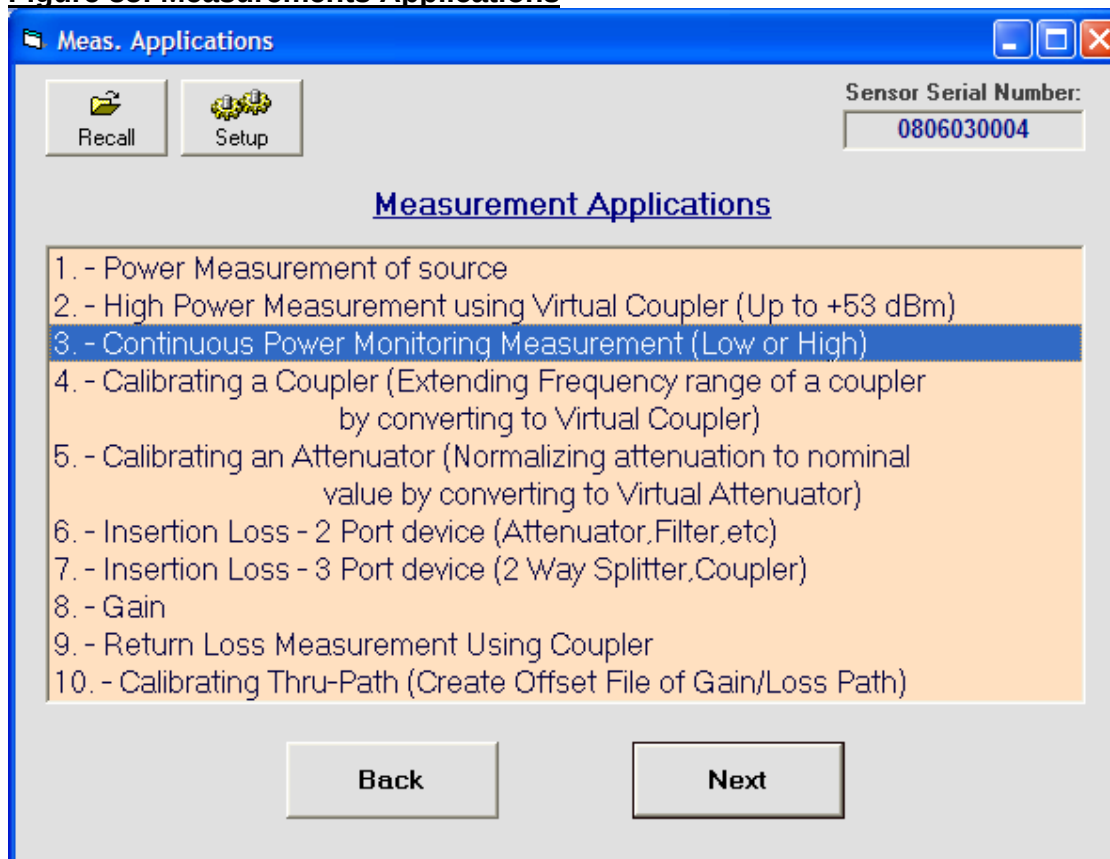
- **Step 20.** Save your project data (see **3.3.1.3 Save Function** on page 16 for explanation).
- **Step 21.** You can print your test data (see **3.6 Printing Data Function** on page 23 for explanation).

6.0 Application # 3 - Continuous Power Monitoring Measurement (Low or High)

This chapter describes the process of setting up and using a continuous power monitoring setup using a virtual coupler. This setup allows you constant monitoring of power out from an RF source (at the coupler's coupling port) to a D.U.T without interrupting the power. Before proceeding with this measurement you must generate a Virtual Coupler file described in **chapter 7**. Data output of this measurement will be in [dBm] units.

Step 1. Open a project from **Measurement Application** screen (see **Figure 35**).

Figure 35: Measurements Applications

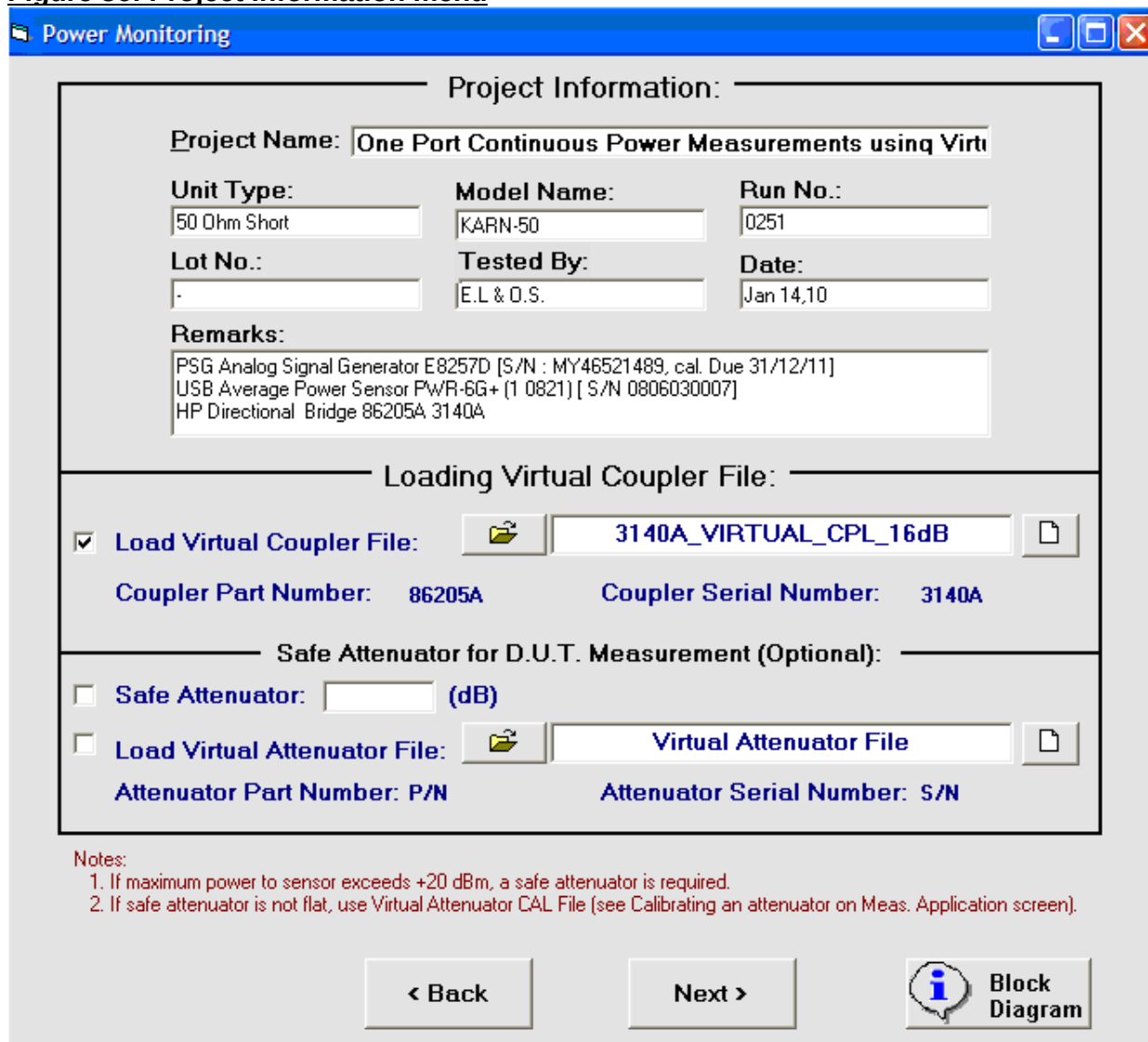


Note

If the D.U.T will approach to compression during the test consider using filter as Virtual Attenuators (see **chapter 8, page 60**) to suppress harmonics.

- **Step 2.** The **Project Information** menu will open (see **Figure 36**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 8-9**.

Figure 36: Project Information menu



Power Monitoring

Project Information:

Project Name: One Port Continuous Power Measurements using Virtu

Unit Type: 50 Ohm Short **Model Name:** KARN-50 **Run No.:** 0251

Lot No.: - **Tested By:** E.L & O.S. **Date:** Jan 14,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 HP Directional Bridge 86205A 3140A

Loading Virtual Coupler File:

☒ **Load Virtual Coupler File:**  3140A_VIRTUAL_CPL_16dB 

Coupler Part Number: 86205A **Coupler Serial Number:** 3140A

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:**  Virtual Attenuator File 

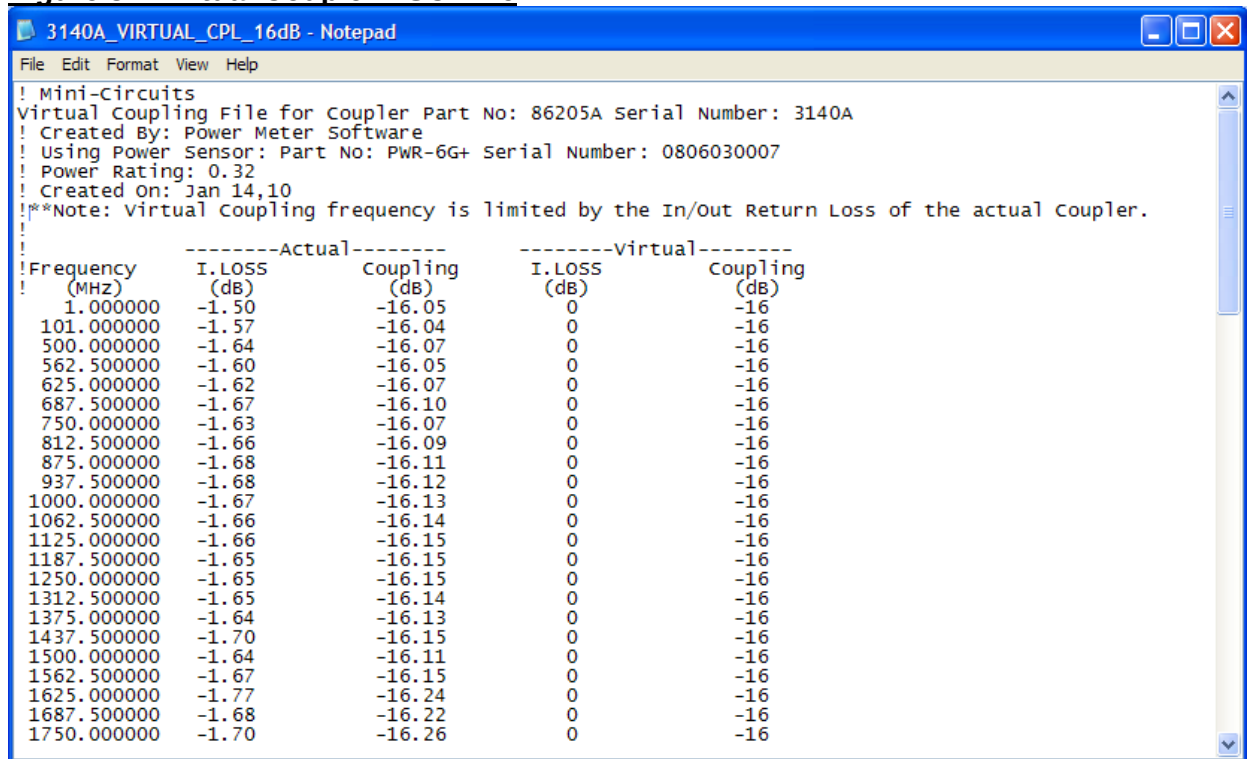
Attenuator Part Number: P/N **Attenuator Serial Number:** S/N

Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

< Back **Next >**  **Block Diagram**

- **Step 4.** Load previously created Virtual Coupler (see **chapter 7**) [mandatory] (see **Figure 37** for an example of a Virtual Coupler file)

Figure 37: Virtual Coupler ASCII file



```

! Mini-Circuits
Virtual Coupling File for Coupler Part No: 86205A Serial Number: 3140A
! Created By: Power Meter Software
! Using Power Sensor: Part No: PWR-6G+ Serial Number: 0806030007
! Power Rating: 0.32
! Created On: Jan 14,10
! **Note: Virtual Coupling frequency is limited by the In/Out Return Loss of the actual Coupler.
!
!-----Actual-----
!Frequency      I.LOSS      Coupling
! (MHz)         (dB)        (dB)
! 1.000000     -1.50       -16.05
! 101.000000    -1.57       -16.04
! 500.000000    -1.64       -16.07
! 562.500000    -1.60       -16.05
! 625.000000    -1.62       -16.07
! 687.500000    -1.67       -16.10
! 750.000000    -1.63       -16.07
! 812.500000    -1.66       -16.09
! 875.000000    -1.68       -16.11
! 937.500000    -1.68       -16.12
! 1000.000000   -1.67       -16.13
! 1062.500000   -1.66       -16.14
! 1125.000000   -1.66       -16.15
! 1187.500000   -1.65       -16.15
! 1250.000000   -1.65       -16.15
! 1312.500000   -1.65       -16.14
! 1375.000000   -1.64       -16.13
! 1437.500000   -1.70       -16.15
! 1500.000000   -1.64       -16.11
! 1562.500000   -1.67       -16.15
! 1625.000000   -1.77       -16.24
! 1687.500000   -1.68       -16.22
! 1750.000000   -1.70       -16.26
!-----Virtual-----
!Frequency      I.LOSS      Coupling
! (MHz)         (dB)        (dB)
! 1.000000      0         -16
! 101.000000     0         -16
! 500.000000     0         -16
! 562.500000     0         -16
! 625.000000     0         -16
! 687.500000     0         -16
! 750.000000     0         -16
! 812.500000     0         -16
! 875.000000     0         -16
! 937.500000     0         -16
! 1000.000000    0         -16
! 1062.500000    0         -16
! 1125.000000    0         -16
! 1187.500000    0         -16
! 1250.000000    0         -16
! 1312.500000    0         -16
! 1375.000000    0         -16
! 1437.500000    0         -16
! 1500.000000    0         -16
! 1562.500000    0         -16
! 1625.000000    0         -16
! 1687.500000    0         -16
! 1750.000000    0         -16

```

- **Step 5.** Load previously created Virtual Attenuator (see **chapter 8**)[Optional]
- **Step 6.** Press **Next** key.
The **Test Plan** screen will open (see **Figure 38**).
- **Step 7.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6 on pages 10-11**).
- **Step 8.** Create the measurement points and set input power (you can see an explanation and example in **Figure 5 on page 10**).

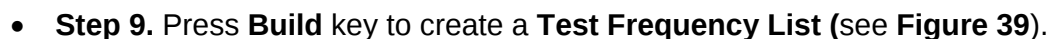
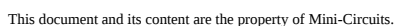
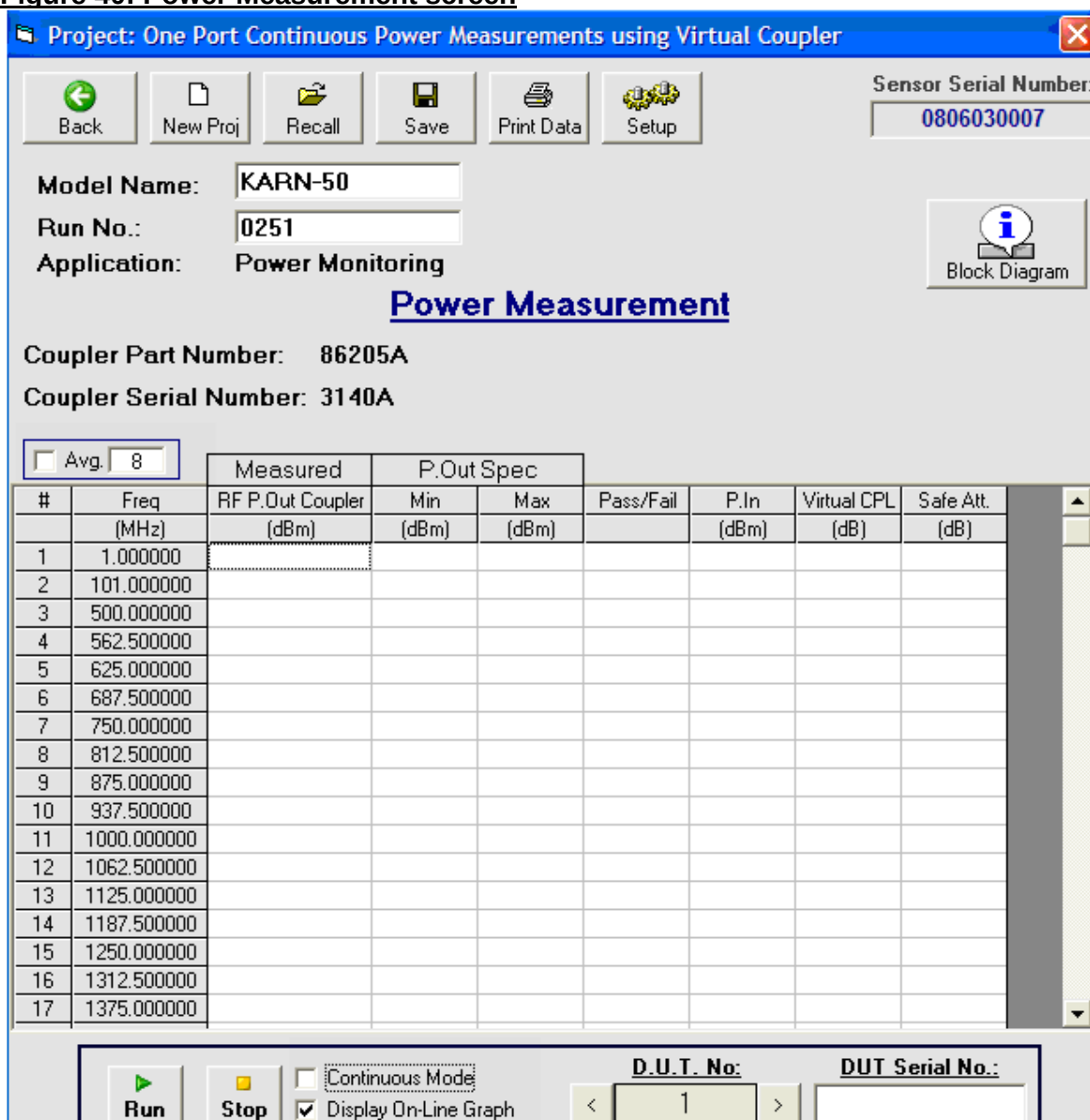


Figure 39: Test Frequency List



- **Step 10.** Press **Next** key. The **Power Measurements** screen will open.
(see **Figure 40**) Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation).
- **Step 11.** Open measurement's **Block Diagram** setup (see **Figure 41**).
- **Step 12.** Assemble the **Continuous Power Monitoring Measurement (Low or High)** equipment setup.

Figure 40: Power Measurement screen



Project: One Port Continuous Power Measurements using Virtual Coupler

Back New Proj Recall Save Print Data Setup

Sensor Serial Number: 0806030007

Model Name: KARN-50

Run No.: 0251

Application: Power Monitoring

Power Measurement

Coupler Part Number: 86205A

Coupler Serial Number: 3140A

☐ Avg. 8

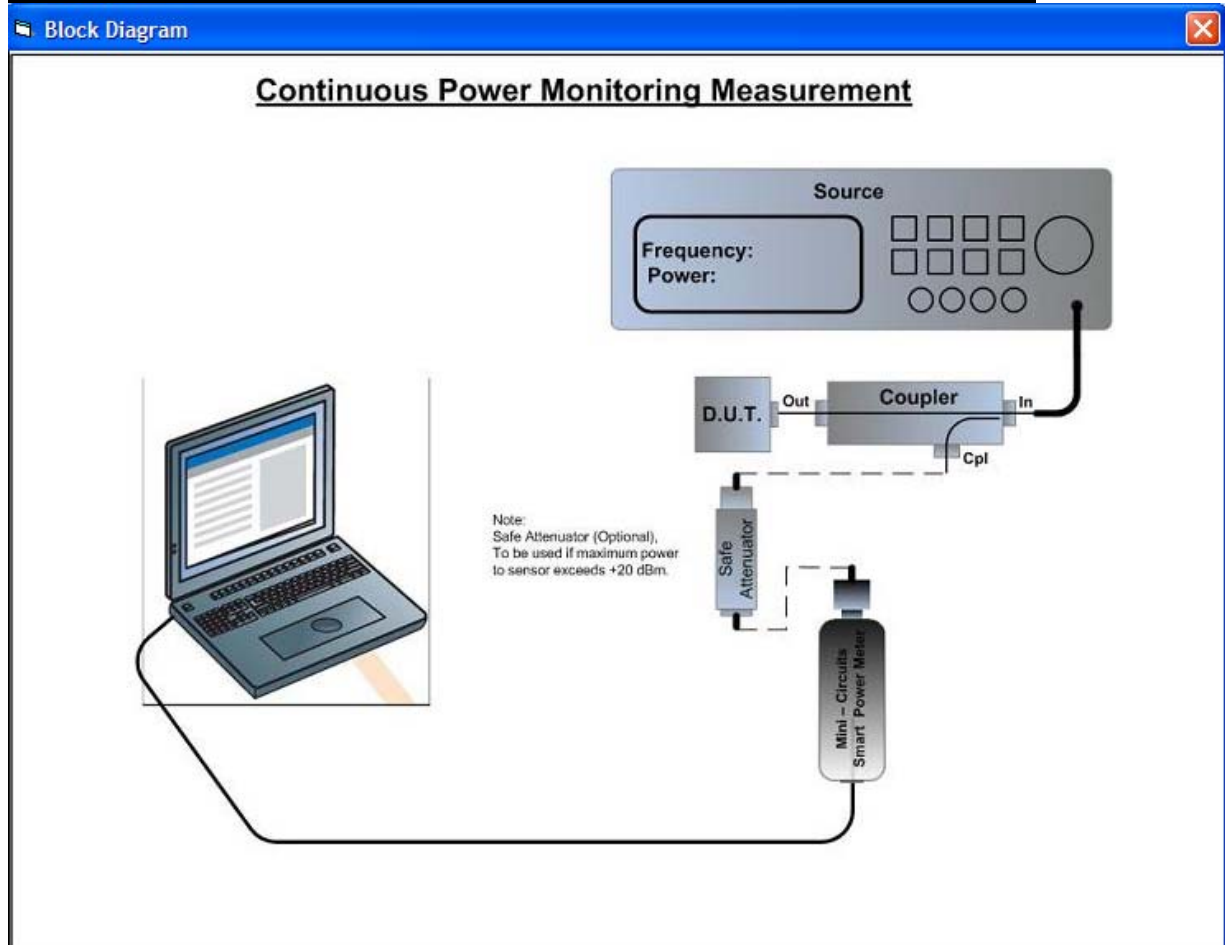
#	Freq (MHz)	Measured	P.Out Spec		Pass/Fail	P.In (dBm)	Virtual CPL (dB)	Safe Att. (dB)
		RF P.Out Coupler (dBm)	Min (dBm)	Max (dBm)				
1	1.000000							
2	101.000000							
3	500.000000							
4	562.500000							
5	625.000000							
6	687.500000							
7	750.000000							
8	812.500000							
9	875.000000							
10	937.500000							
11	1000.000000							
12	1062.500000							
13	1125.000000							
14	1187.500000							
15	1250.000000							
16	1312.500000							
17	1375.000000							

Run Stop ☐ Continuous Mode ☒ Display On-Line Graph

D.U.T. No: 1 DUT Serial No.:

- **Step 13.** Define/Confirm **Setup** settings (see **2.1. Setting communication/commands in order to control an external source.** on page 5).
- **Step 14.** Enter spec. data (If available).
[see explanation **3.4.2.2 Spec. Definitions** on page 21].

Figure 41: Continuous Power Monitoring Measurement Block Diagram .



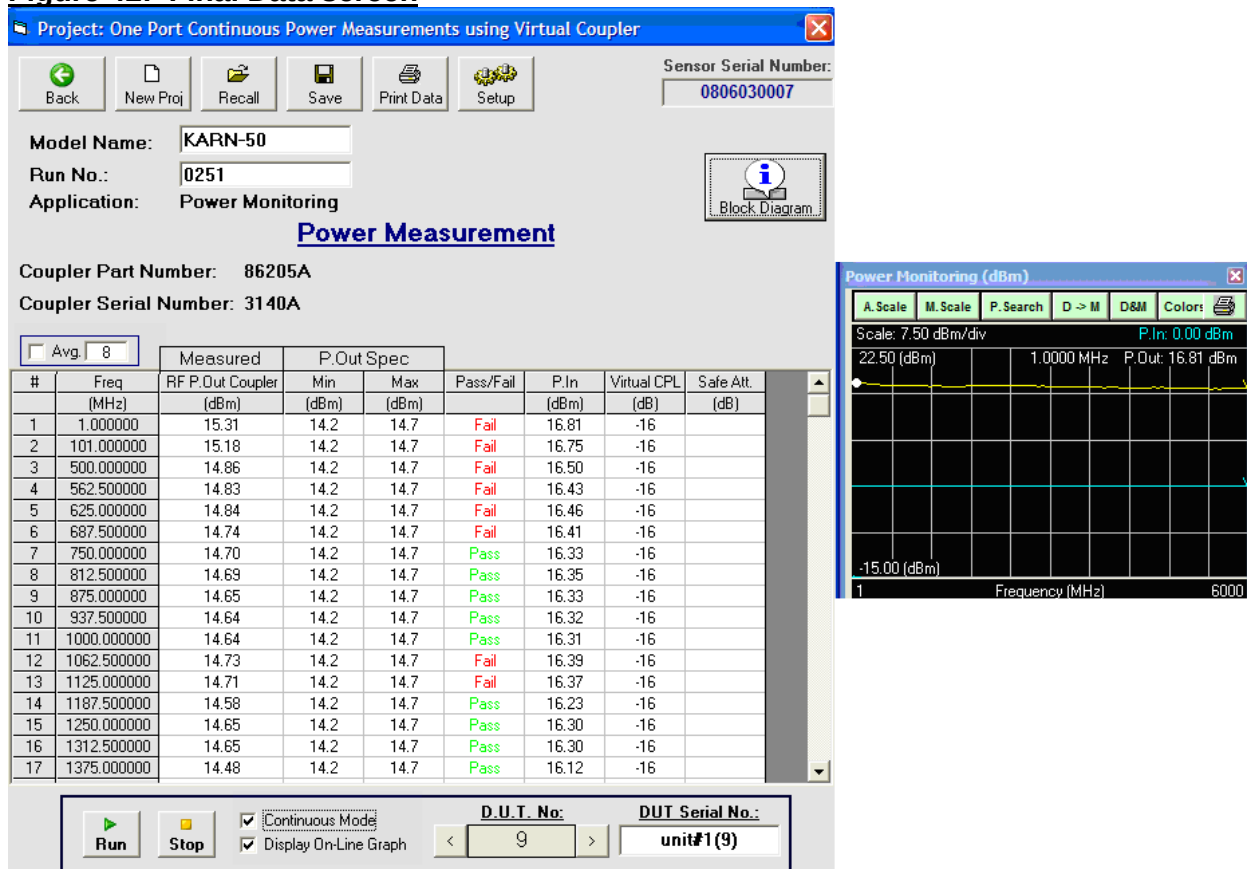
- **Step 15.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features** on page 22).

Note

Insure final signal power at coupling port exceeds -30dBm to allowing accurate reading by Power Sensor.

- **Step 16.** Enter **D.U.T Serial No:** (If available).
- **Step 17.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 18.** If you have more than one D.U.T to test repeat **Steps 15-17** for next test (see **Figure 42**).

Figure 42: Final Data screen



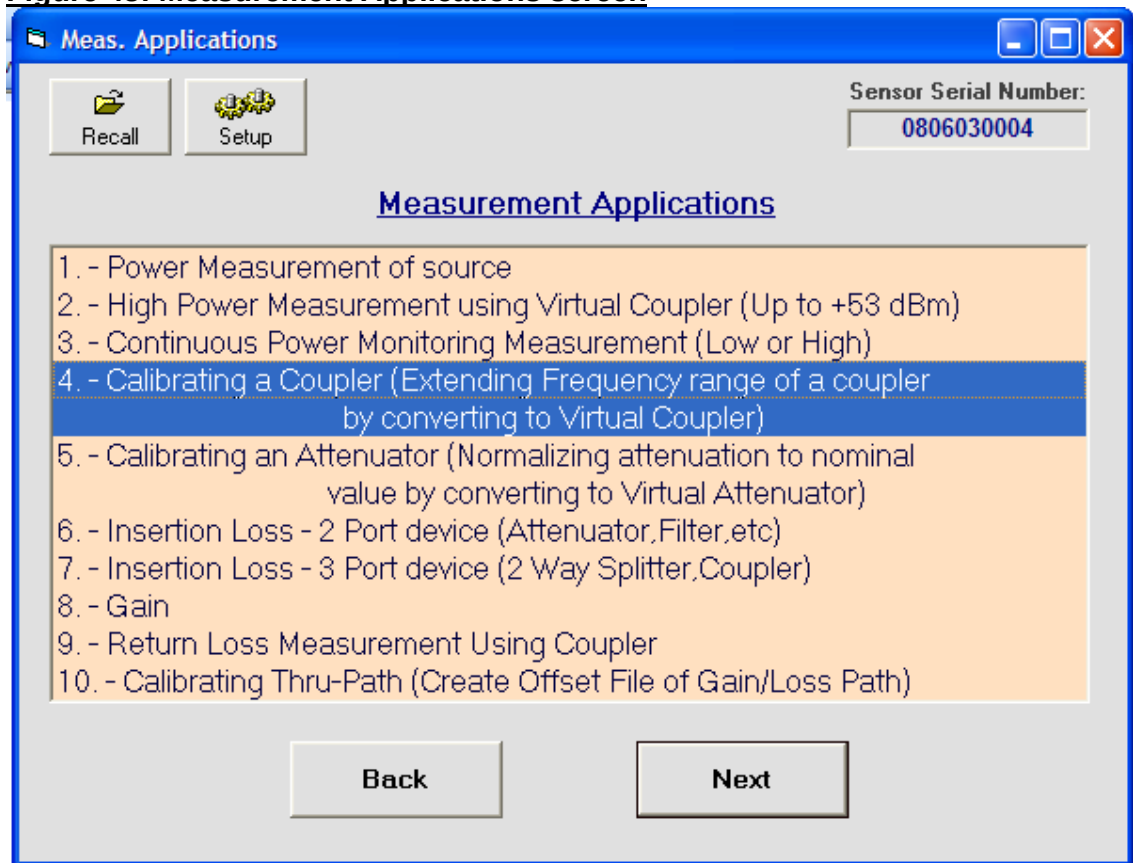
- **Step 19.** Save your project data (see **3.3.1.3 Save Function** on page 16 for explanation).
- **Step 20.** You can print your test data (see **3.6 Printing Data Function** on page 23 for explanation).

7.0 Application # 4- Calibrating a Coupler (Extending Frequency range of a coupler by converting to Virtual Coupler).

This chapter describes the process of calibrating a coupler and creating a Virtual Coupler – allowing the extension of the coupler's frequency range beyond its rated specifications to the limits established by its Return Loss values and the user's required accuracy. Virtual couplers are required for Continuous Power monitoring (**chapter 6**) and High power measurements (**chapter 5**). Before you can calibrate a coupler you must establish a Reference Power measurement described in **3.3** on **page 11**.

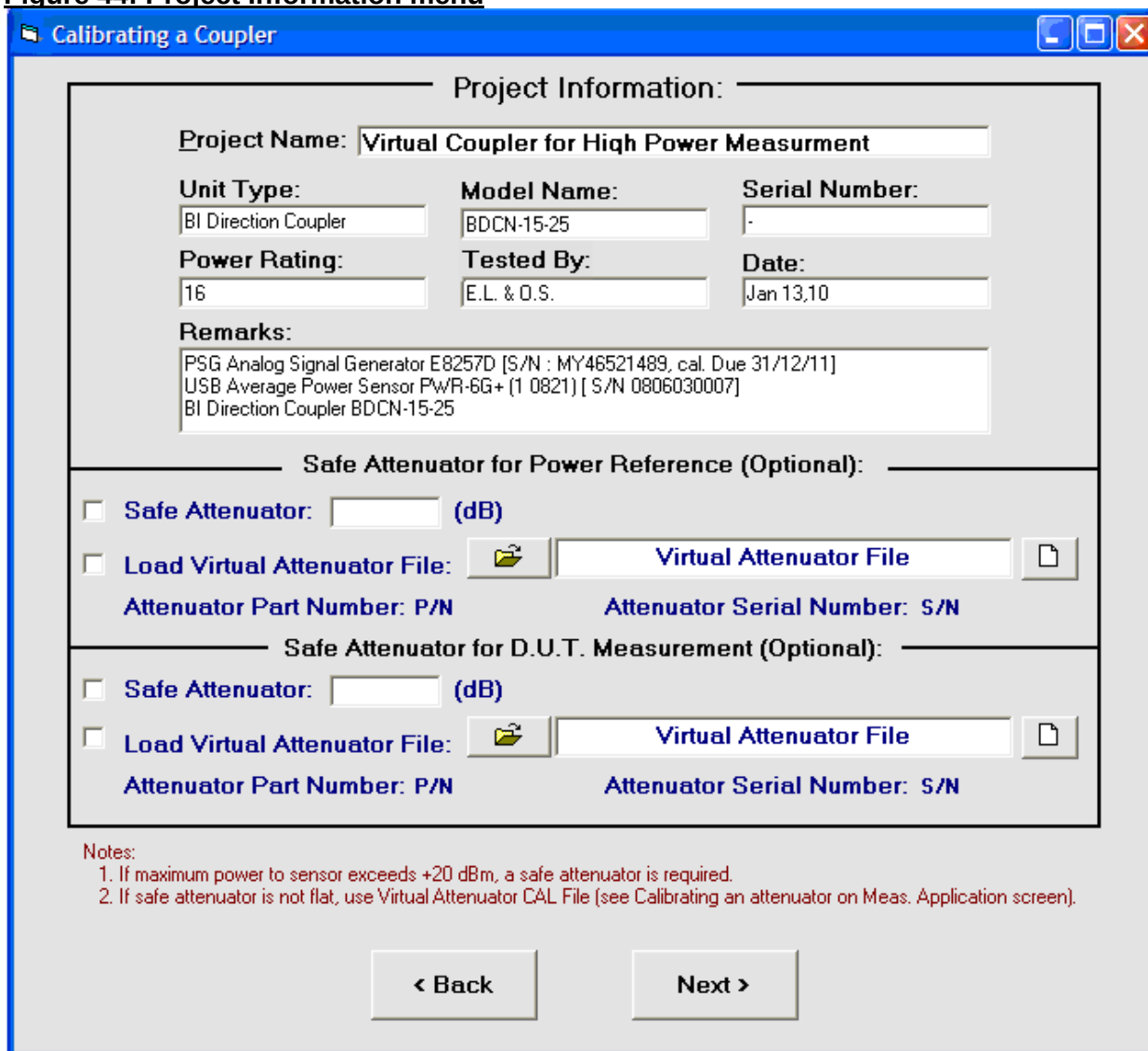
- **Step 1.** Open a project from the **Measurement Applications** screen (see **Figure 43**).

Figure 43: Measurement Applications screen



- **Step 2.** The **Project Information** menu will open (see **Figure 44**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **page 10**.

Figure 44: Project Information menu



Project Information:

Project Name: Virtual Coupler for High Power Measurement

Unit Type: BI Direction Coupler **Model Name:** BDCN-15-25 **Serial Number:** .

Power Rating: 16 **Tested By:** E.L. & O.S. **Date:** Jan 13,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 BI Direction Coupler BDCN-15-25

Safe Attenuator for Power Reference (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:** Virtual Attenuator File

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:** Virtual Attenuator File

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

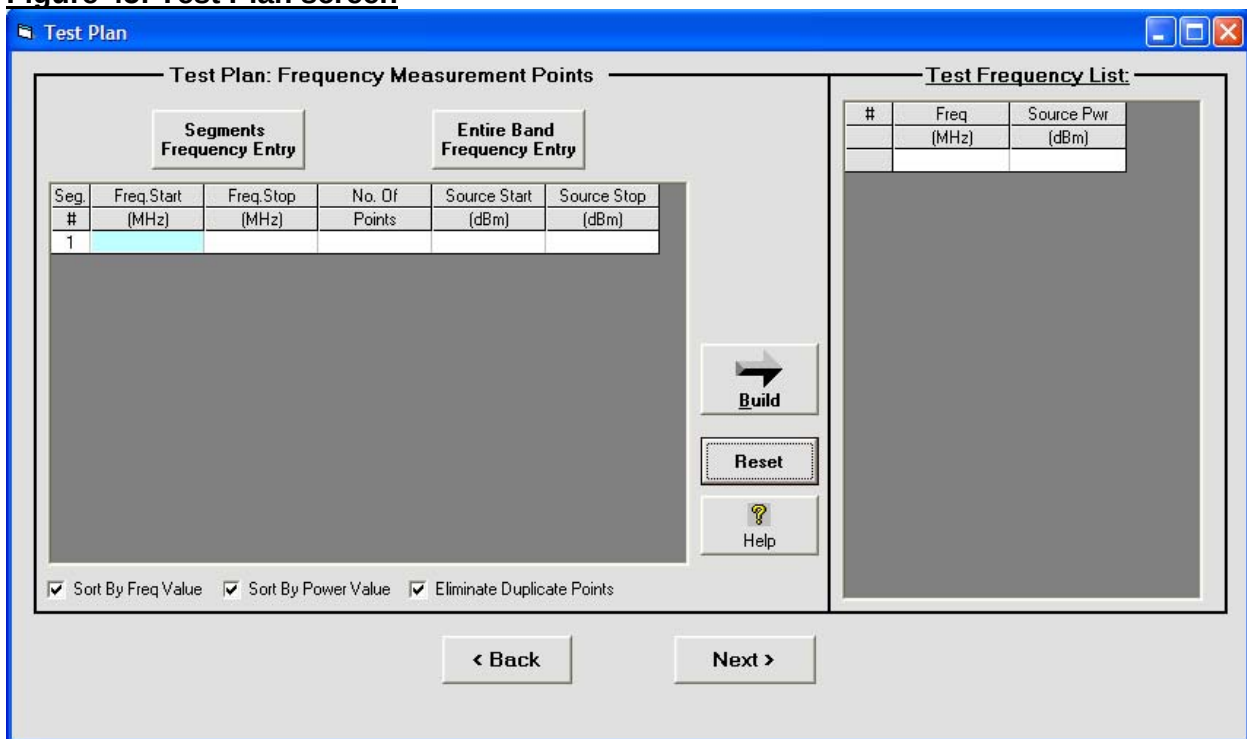
< Back **Next >**

- **Step 4.** Load previously created Virtual Attenuator (see **chapter 8**) [Optional].
- **Step 5.** Press **Next** key. The **Test Plan** screen will open (see **Figure 45**).
- **Step 6.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 10-11**).
- **Step 7.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **page 10**).

Note

1. Build a Virtual Coupler for a specific
(Source power from Virtual Coupler will be used in Measurement Application see **chapters 6-7**).
2. Choose as high power as available in Measurement Applications (see **chapters 6-7**) that does not reach the maximum limit of power sensor.
That will guaranty minimum distortion dynamic range available for measurement.

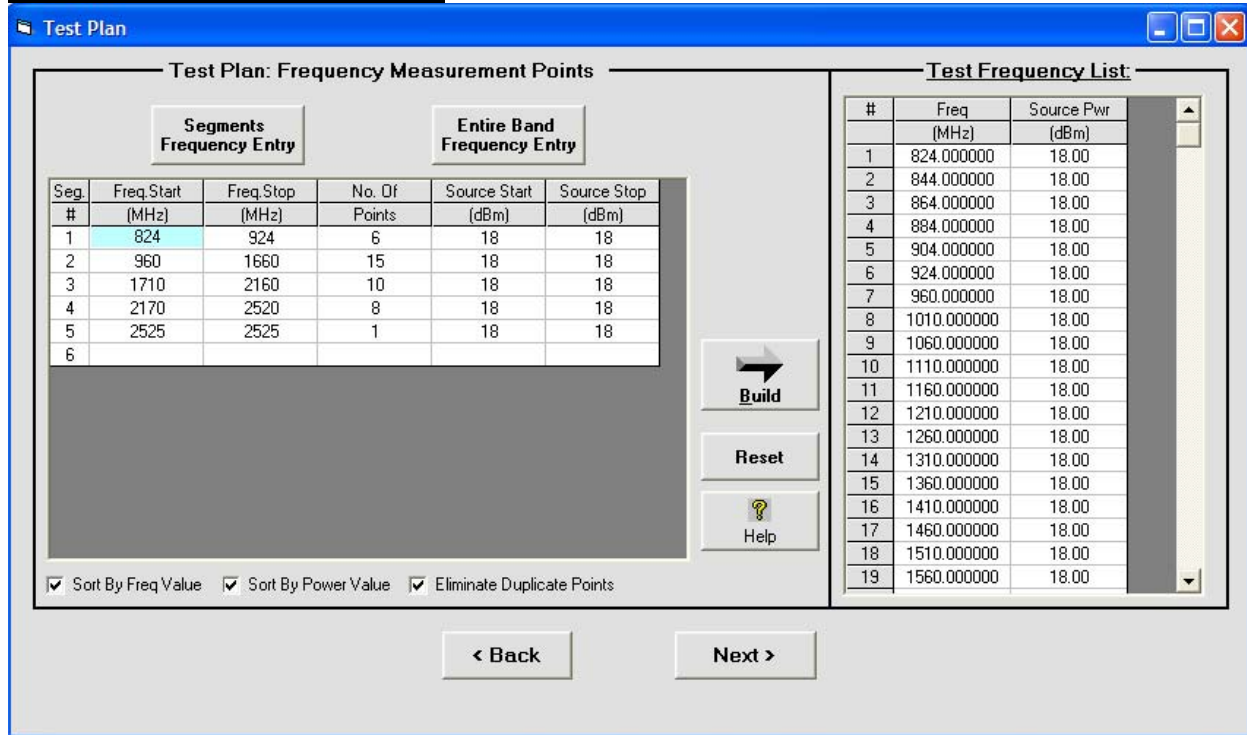
Figure 45: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg. #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg. #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build', 'Reset', and 'Help'. The 'Test Frequency List' section on the right contains a table with columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 8.** Press **Build** key to create a **Test Frequency List** (see **Figure 46**).

Figure 46: Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	824	924	6	18	18
2	960	1660	15	18	18
3	1710	2160	10	18	18
4	2170	2520	8	18	18
5	2525	2525	1	18	18
6					

Entire Band Frequency Entry

Test Frequency List:

#	Freq (MHz)	Source Pwr (dBm)
1	824.000000	18.00
2	844.000000	18.00
3	864.000000	18.00
4	884.000000	18.00
5	904.000000	18.00
6	924.000000	18.00
7	960.000000	18.00
8	1010.000000	18.00
9	1060.000000	18.00
10	1110.000000	18.00
11	1160.000000	18.00
12	1210.000000	18.00
13	1260.000000	18.00
14	1310.000000	18.00
15	1360.000000	18.00
16	1410.000000	18.00
17	1460.000000	18.00
18	1510.000000	18.00
19	1560.000000	18.00

Build **Reset** **Help**

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

< Back **Next >**

- **Step 9.** Press **Next** key .The **Coupler Measurement** screen will open.
(see **Figure 47**) Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.3.2 Save** on **page 16** for explanation).
- **Step 10.** Press  key.
- **Step 11.** Open **Power Reference In** measurement's **Block Diagram** setup
(see **Figure 48**).
- **Step 12.** Assemble the **Power Reference In** equipment setup.
- **Step 13.** Define/Confirm **Setup** settings (see **2.1. Setting communication/commands in order to control an external source.** on **page 5**).

Figure 47: Coupler Measurement screen

Project: Virtual Coupler for High Power Measurement

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: BDCN-15-25

Serial No.: -

Application: Calibrating a Coupler

Block Diagram

Coupler Measurement

Step 1: Power Reference In

Step 2: I.Loss Measurement

Step 3: Coupling Measurement

Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr RefIn (dBm)	I.Loss (dB)	CPL (dB)	V.CPL (dB)
1	824.000000	18.00				
2	844.000000	18.00				
3	864.000000	18.00				
4	884.000000	18.00				
5	904.000000	18.00				
6	924.000000	18.00				
7	960.000000	18.00				
8	1010.000000	18.00				
9	1060.000000	18.00				
10	1110.000000	18.00				
11	1160.000000	18.00				
12	1210.000000	18.00				
13	1260.000000	18.00				
14	1310.000000	18.00				
15	1360.000000	18.00				
16	1410.000000	18.00				
17	1460.000000	18.00				

Run

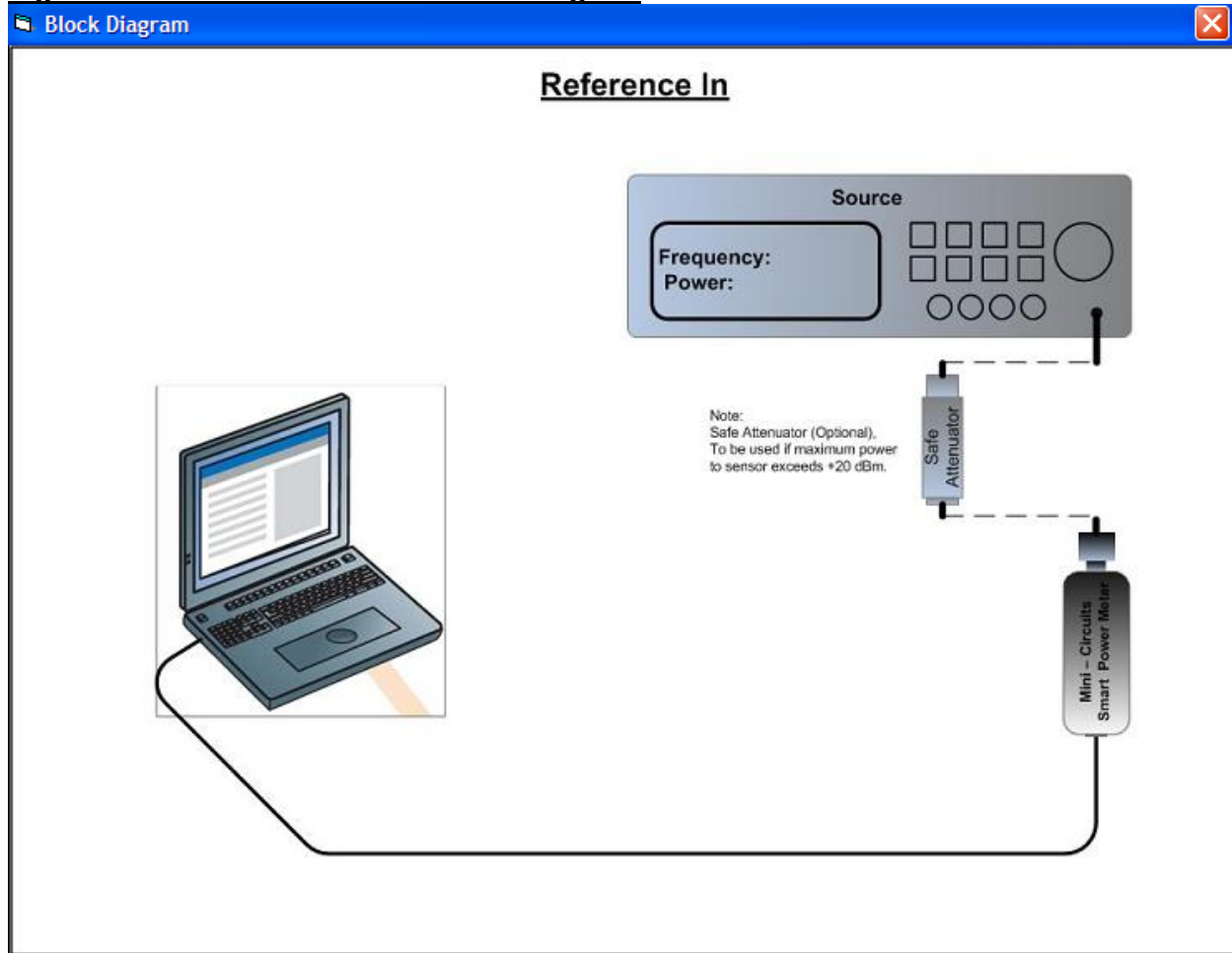
Stop

☐ Continuous Mode
☒ Display On-Line Graph

Create Virtual Coupler File

- **Step 14.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.

Figure 48: Power Reference In Block Diagram



- **Step 15.** Press **Step 2: I Loss Measurements** key.

The **I Loss Measurements** screen will open (see **Figure 48**).

- **Step 16.** Open **I Loss** measurement's **Block Diagram** setup (see **Figure 49**).
- **Step 17.** Assemble the **I Loss Measurement** equipment setup.

Figure 48: I. Loss Measurement screen

Project: Virtual Coupler for Attenuator 6dB Continuous Power Measurements
✕

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: 86205A
Serial No.: 3140A
Application: Calibrating a Coupler


 Block Diagram

Coupler Measurement

Step 1: Power Reference In

Step 3: Coupling Measurement

Step 2: I.Loss Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr RefIn (dBm)	I.Loss (dB)	CPL (dB)	V.CPL (dB)
1	1.000000	17.00	16.79			
2	101.000000	17.00	16.73			
3	500.000000	17.00	16.47			
4	562.500000	17.00	16.40			
5	625.000000	17.00	16.43			
6	687.500000	17.00	16.38			
7	750.000000	17.00	16.30			
8	812.500000	17.00	16.32			
9	875.000000	17.00	16.30			
10	937.500000	17.00	16.29			
11	1000.000000	17.00	16.28			
12	1062.500000	17.00	16.36			
13	1125.000000	17.00	16.34			
14	1187.500000	17.00	16.19			
15	1250.000000	17.00	16.27			
16	1312.500000	17.00	16.27			
17	1375.000000	17.00	16.09			

Run

Stop

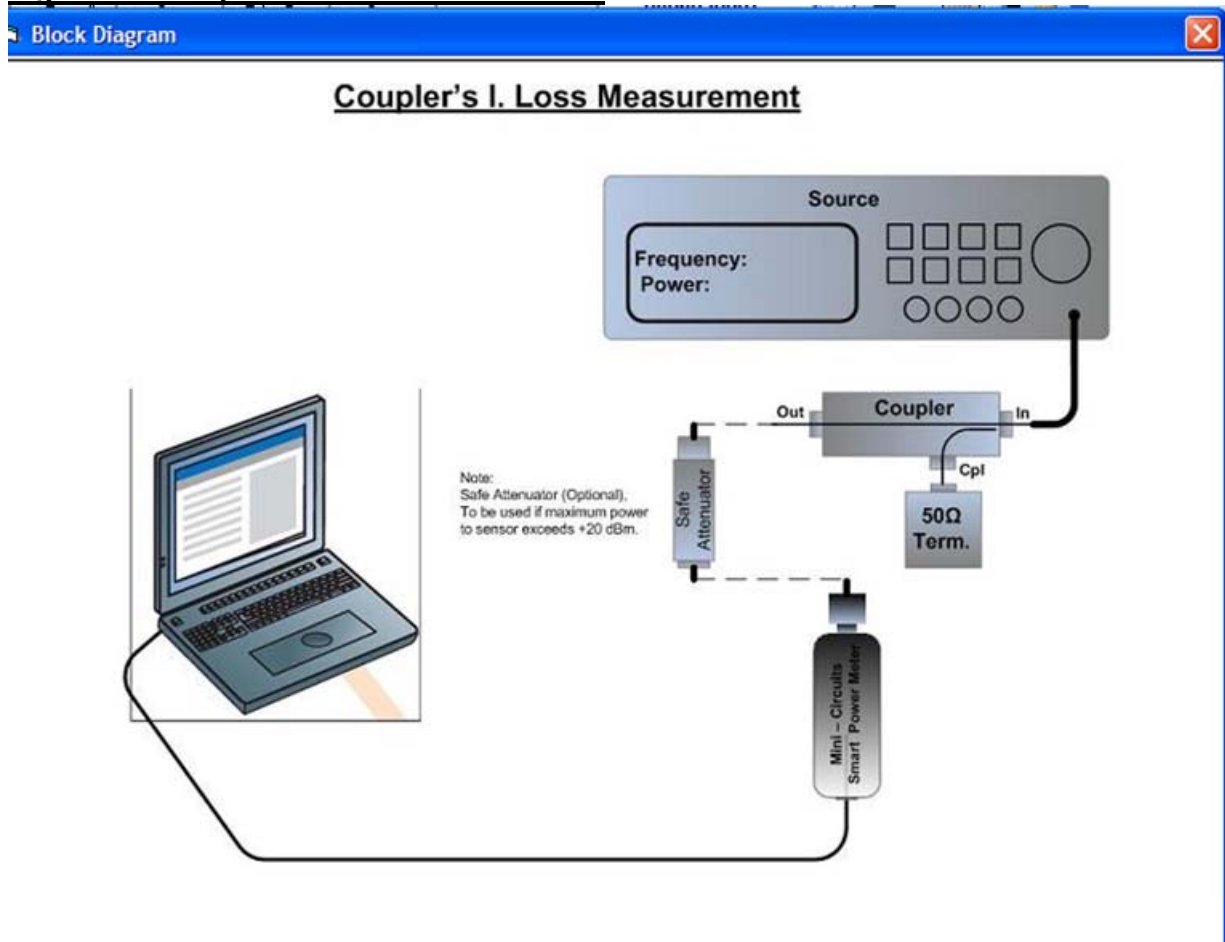
☐ Continuous Mode
 ☒ Display On-Line Graph


 Create Virtual Coupler File

Note

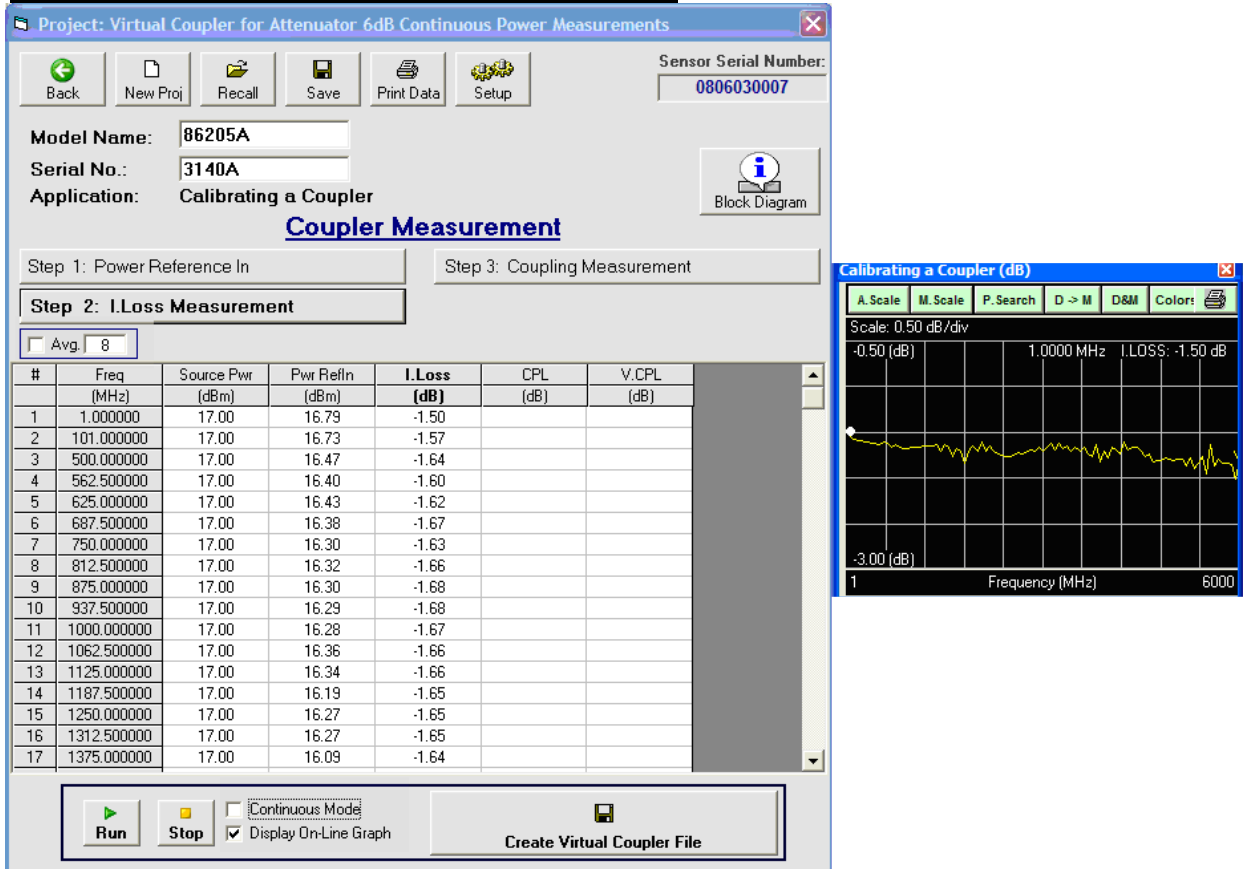
Insure that of your source power does not exceed +20dBm. (In this step I. Loss will be minimal and source power will be close to power entering to the Power Sensor. See **Figure 49**)
 If power does exceed +20dBm use a Safe Attenuator (see **chapter 8**.)

Figure 49: Coupler's I. Loss Measurement



- **Step 18.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 19.** **I. Loss Measurements data** received (see **Figure 50**).

Figure 50: I. Loss Measurements data received



- **Step 20.** Press **Step 3: Coupling Measurement** key.

The **Coupling Measurement** screen will open (see **Figure 51**).

- **Step 21.** Open **Coupling Measurement's Block Diagram** setup (see **Figure 52**).
- **Step 22.** Assemble the **Coupler Measurement** equipment setup.

Figure 51: Coupling Measurement screen

Back
 New Proj
 Recall
 Save
 Print Data
 Setup

Sensor Serial Number:
0806030007

Model Name: **86205A**
 Serial No.: **3140A**
 Application: **Calibrating a Coupler**

Block Diagram

Coupler Measurement

Step 1: Power Reference In

Step 2: I.Loss Measurement

Step 3: Coupling Measurement

☐ Avg.

#	Freq (MHz)	Source Pwr (dBm)	Pwr RefIn (dBm)	I.Loss (dB)	CPL (dB)	V.CPL (dB)
1	1.000000	17.00	16.79	-1.50		
2	101.000000	17.00	16.73	-1.57		
3	500.000000	17.00	16.47	-1.64		
4	562.500000	17.00	16.40	-1.60		
5	625.000000	17.00	16.43	-1.62		
6	687.500000	17.00	16.38	-1.67		
7	750.000000	17.00	16.30	-1.63		
8	812.500000	17.00	16.32	-1.66		
9	875.000000	17.00	16.30	-1.68		
10	937.500000	17.00	16.29	-1.68		
11	1000.000000	17.00	16.28	-1.67		
12	1062.500000	17.00	16.36	-1.66		
13	1125.000000	17.00	16.34	-1.66		
14	1187.500000	17.00	16.19	-1.65		
15	1250.000000	17.00	16.27	-1.65		
16	1312.500000	17.00	16.27	-1.65		
17	1375.000000	17.00	16.09	-1.64		

Run
 Stop

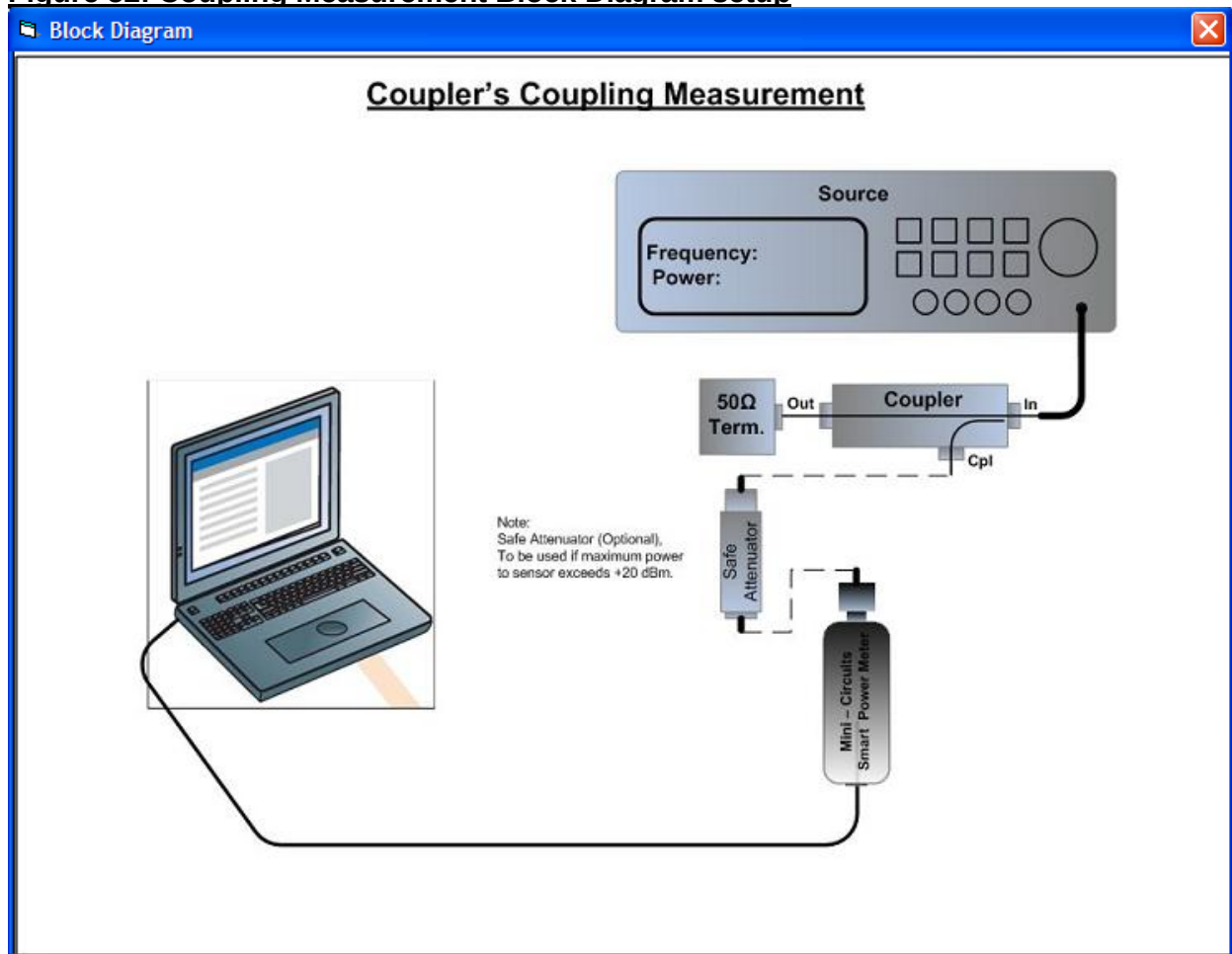
☐ Continuous Mode
☒ Display On-Line Graph

Create Virtual Coupler File

Note

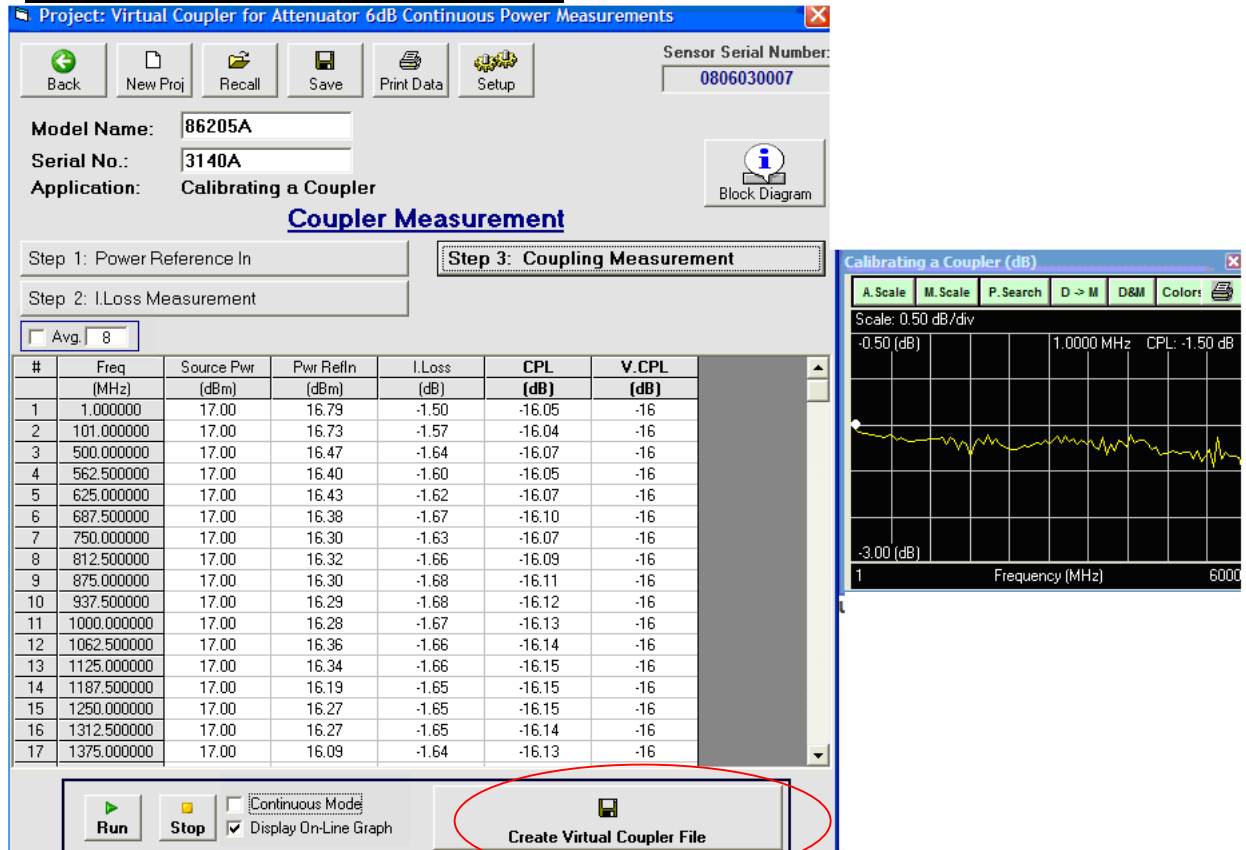
Insure final signal power at coupling port exceeds -30dBm to allowing accurate reading by Power Sensor (see Figure 52).

Figure 52: Coupling Measurement Block Diagram setup



- **Step 23.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 24.** Final **Coupler Measurement** data received (see **Figure 53**).

Figure 53: Coupler Measurement data



- **Step 25.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation).
- **Step 26.** Press **Create Virtual Coupler File** key to create a Virtual Coupler. (see a sample **Virtual Coupler** created as an **ASCII File** in **Figure 54**).
- **Step 27.** You can print your test data (see **3.6 Printing Data Function** on **page 23** for explanation).

Figure 54: Virtual Coupler ASCII file

3140A_VIRTUAL_CPL_16dB - Notepad

File Edit Format View Help

```

! Mini-Circuits
Virtual Coupling File for Coupler Part No: 86205A Serial Number: 3140A
! Created By: Power Meter Software
! Using Power Sensor: Part No: PWR-6G+ Serial Number: 0806030007
! Power Rating: 0.32
! Created On: Jan 14,10
! **Note: virtual coupling frequency is limited by the In/out Return Loss of the actual coupler.
!
!
!-----Actual-----
! Frequency      I.LOSS      Coupling
! (MHz)          (dB)        (dB)
!-----
! 1.000000      -1.50       -16.05
! 101.000000    -1.57       -16.04
! 500.000000    -1.64       -16.07
! 562.500000    -1.60       -16.05
! 625.000000    -1.62       -16.07
! 687.500000    -1.67       -16.10
! 750.000000    -1.63       -16.07
! 812.500000    -1.66       -16.09
! 875.000000    -1.68       -16.11
! 937.500000    -1.68       -16.12
! 1000.000000   -1.67       -16.13
! 1062.500000   -1.66       -16.14
! 1125.000000   -1.66       -16.15
! 1187.500000   -1.65       -16.15
! 1250.000000   -1.65       -16.15
! 1312.500000   -1.65       -16.14
! 1375.000000   -1.64       -16.13
! 1437.500000   -1.70       -16.15
! 1500.000000   -1.64       -16.11
! 1562.500000   -1.67       -16.15
! 1625.000000   -1.77       -16.24
! 1687.500000   -1.68       -16.22
! 1750.000000   -1.70       -16.26
!
!-----Virtual-----
! Frequency      I.LOSS      Coupling
! (MHz)          (dB)        (dB)
!-----
! 1.000000      0          -16
! 101.000000    0          -16
! 500.000000    0          -16
! 562.500000    0          -16
! 625.000000    0          -16
! 687.500000    0          -16
! 750.000000    0          -16
! 812.500000    0          -16
! 875.000000    0          -16
! 937.500000    0          -16
! 1000.000000   0          -16
! 1062.500000   0          -16
! 1125.000000   0          -16
! 1187.500000   0          -16
! 1250.000000   0          -16
! 1312.500000   0          -16
! 1375.000000   0          -16
! 1437.500000   0          -16
! 1500.000000   0          -16
! 1562.500000   0          -16
! 1625.000000   0          -16
! 1687.500000   0          -16
! 1750.000000   0          -16
!

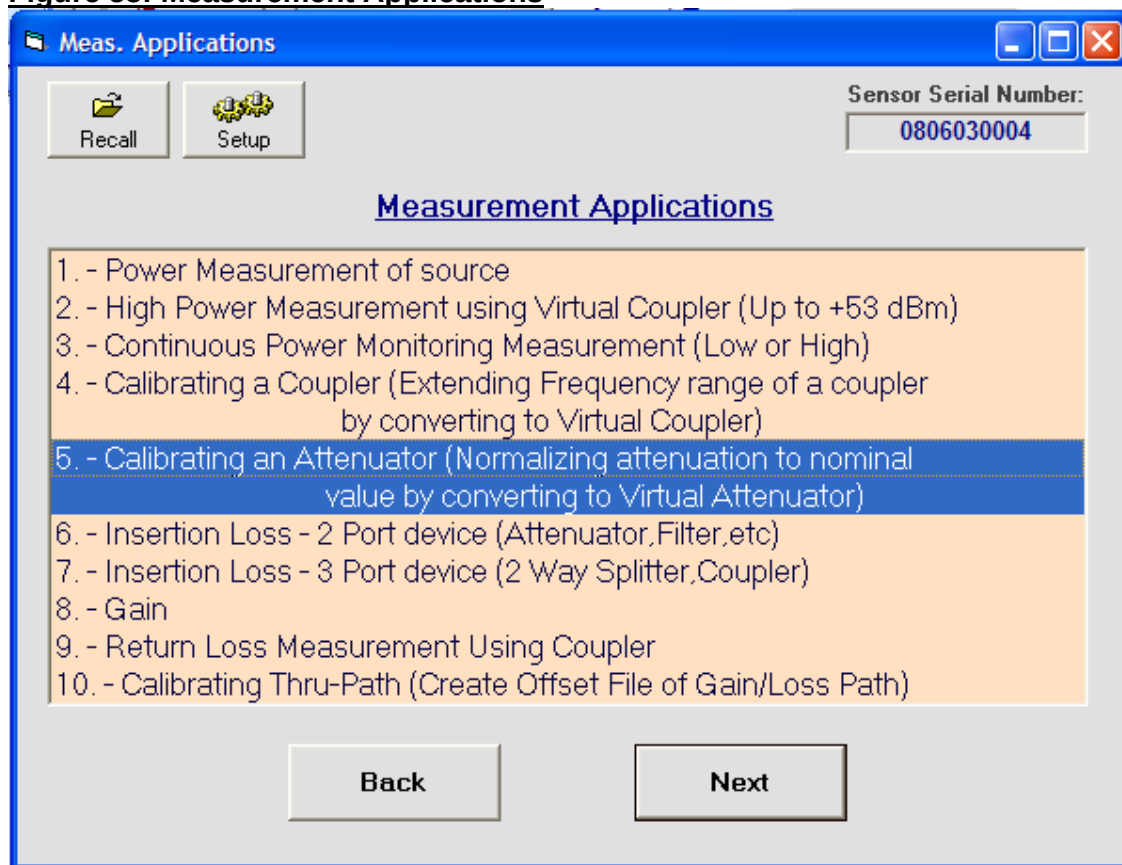
```

8.0 Application # 5- Calibrating an Attenuator.

This chapter describes the process of calibrating an attenuator or filter and creating a Virtual Attenuator file allowing the use of a safe attenuator or harmonic suppression filter in future measurements without reducing measurement accuracy. Safe attenuators are needed for any measurement involving power over +20dBm to prevent damage to the power sensor. Harmonic suppression filters are used when D.U.T is in compression or in combination with a Virtual Coupler. Before you can calibrate an Attenuator you must establish a Reference Power measurement described in **3.3** on **page 11**.

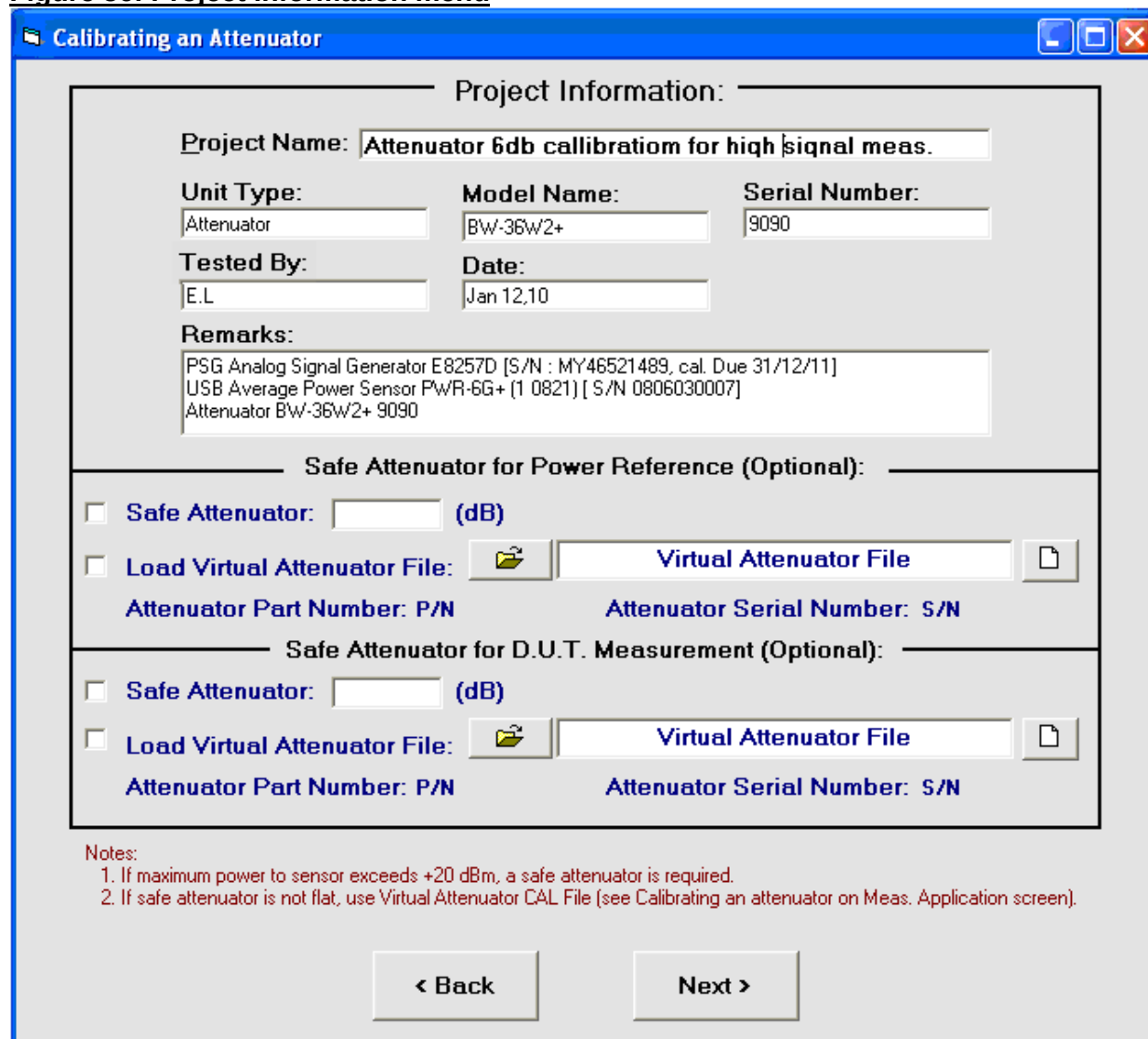
- **Step 1.** Open a project from the **Measurement Applications** screen (see **Figure 55**).

Figure 55: Measurement Applications



- **Step 2.** The **Project Information** menu will open (see **Figure 56**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **page 9**.

Figure 56: Project Information menu



Calibrating an Attenuator

Project Information:

Project Name: Attenuator 6db callibration for high signal meas.

Unit Type: Attenuator **Model Name:** BW-36W2+ **Serial Number:** 9090

Tested By: E.L. **Date:** Jan 12,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ [1 0821] [S/N 0806030007]
 Attenuator BW-36W2+ 9090

Safe Attenuator for Power Reference (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:**  **Virtual Attenuator File** 

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:**  **Virtual Attenuator File** 

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Notes:

1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

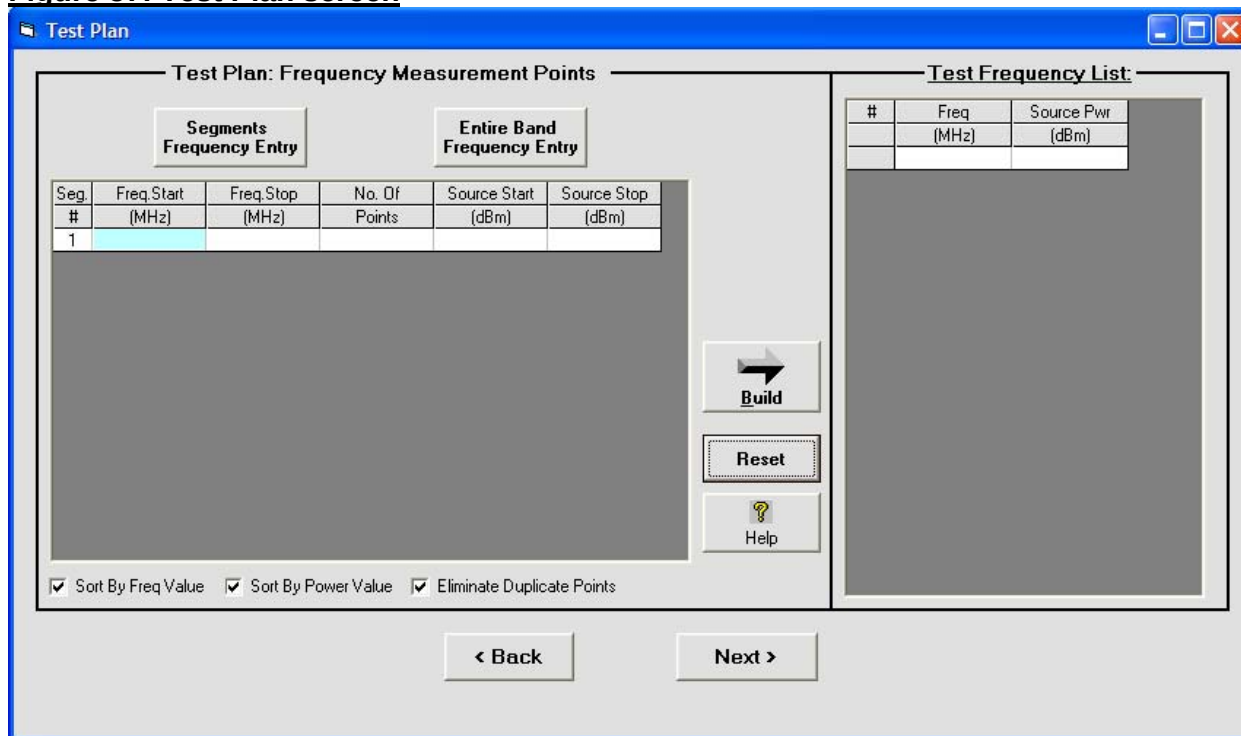
< Back **Next >**

- **Step 4.** Press **Next** key The **Test Plan** screen will open (see **Figure 57**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 10-11**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **page 10**).

Note

Choose as high power as available in Measurement Applications that does not reach the maximum limit of power sensor, or the compression level of the measurement setup components.
This will guaranty minimum distortion in the dynamic range available for measurement.

Figure 57: Test Plan screen



The screenshot shows the 'Test Plan' window with the title bar 'Test Plan'. The main area is divided into two sections: 'Test Plan: Frequency Measurement Points' on the left and 'Test Frequency List' on the right.

Test Plan: Frequency Measurement Points

At the top of this section are two buttons: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'.

Below these buttons is a table with the following columns: Seg #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg #' column and is highlighted in light blue.

Below the table is a large grey rectangular area for data entry.

At the bottom of this section are three checkboxes: ☒ Sort By Freq. Value, ☒ Sort By Power Value, and ☒ Eliminate Duplicate Points.

On the right side of this section are three buttons: 'Build' (with a right arrow icon), 'Reset', and 'Help' (with a question mark icon).

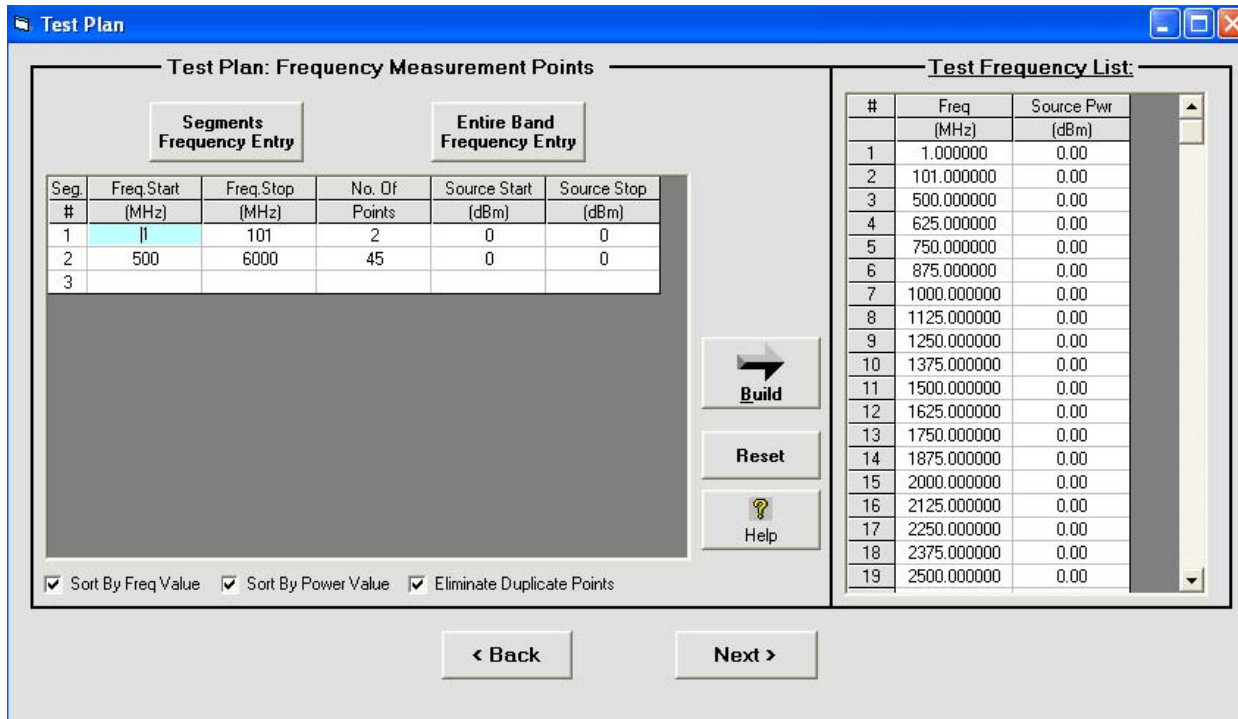
Test Frequency List:

At the top of this section is a table with the following columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

At the bottom of the window are two buttons: '< Back' and 'Next >'.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 58**).

Figure 58: creating Test Frequency List



Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. of Points	Source Start (dBm)	Source Stop (dBm)
1	1	101	2	0	0
2	500	6000	45	0	0
3					

#	Freq (MHz)	Source Pwr (dBm)
1	1.000000	0.00
2	101.000000	0.00
3	500.000000	0.00
4	625.000000	0.00
5	750.000000	0.00
6	875.000000	0.00
7	1000.000000	0.00
8	1125.000000	0.00
9	1250.000000	0.00
10	1375.000000	0.00
11	1500.000000	0.00
12	1625.000000	0.00
13	1750.000000	0.00
14	1875.000000	0.00
15	2000.000000	0.00
16	2125.000000	0.00
17	2250.000000	0.00
18	2375.000000	0.00
19	2500.000000	0.00

- **Step 8.** Press **Next** key.
The **Attenuator Measurement** screen will open. (see **Figure 59**).
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15** , **3.3.1.3 Save** on **page 16** for explanation).

- **Step 9.** Press  key.

Figure 59: Attenuator Measurement screen

Project: Attenuator 6db calibration for hisignal meas. X

Back
New Proj
Recall
Save
Print Data
Setup

Sensor Serial Number:
0806030007

Model Name: **BW-36W2+**

Serial No.: **9090**

Application: **Calibrating an Attenuator**


 Block Diagram

Attenuator Measurement

Step 1: Power Reference In

Step 2: Attenuation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr Refln (dBm)	Read Pwr (dBm)	Att. (dB)	V.Att (dB)
1	1.000000	0.00				
2	101.000000	0.00				
3	500.000000	0.00				
4	625.000000	0.00				
5	750.000000	0.00				
6	875.000000	0.00				
7	1000.000000	0.00				
8	1125.000000	0.00				
9	1250.000000	0.00				
10	1375.000000	0.00				
11	1500.000000	0.00				
12	1625.000000	0.00				
13	1750.000000	0.00				
14	1875.000000	0.00				
15	2000.000000	0.00				
16	2125.000000	0.00				
17	2250.000000	0.00				

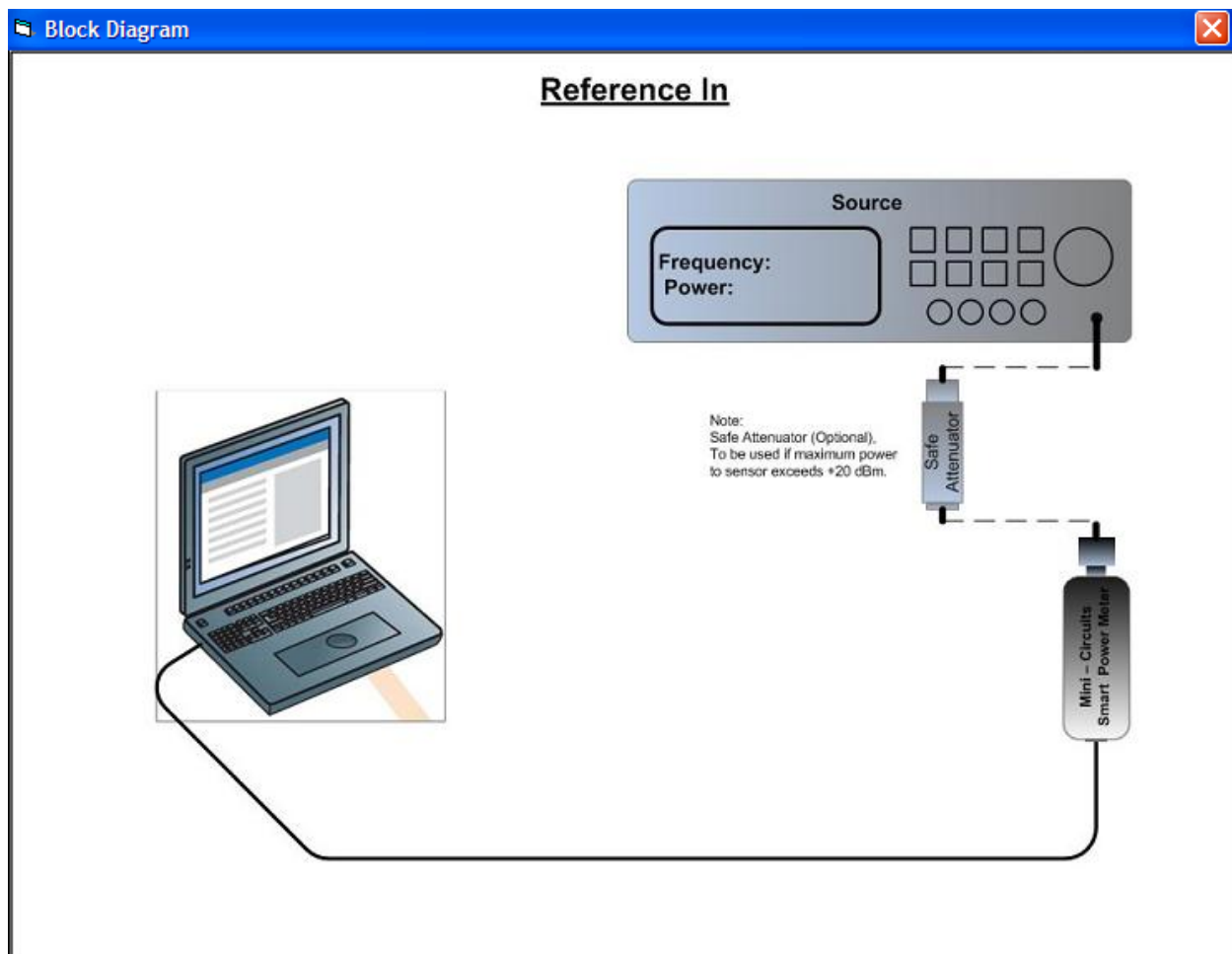
Run
Stop

☐ Continuous Mode
☒ Display On-Line Graph


Create Attenuator File

- **Step 10.** Open **Power Reference In** measurement's **Block Diagram** setup (see **Figure 60**).
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings (see 2.1. **Setting communication/commands in order to control an external source.** on page 5).

Figure 60: Power Reference In Block Diagram .



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14** See results in **Figure 61**.

Figure 61: Attenuator Measurement screen

Project: Attenuator 6db calibration for hisignal meas.

Sensor Serial Number: 0806030007

Model Name: BW-36W2+
 Serial No.: 9090
 Application: Calibrating an Attenuator

Attenuator Measurement

Step 1: Power Reference In

Step 2: Attenuation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr Refln (dBm)	Read Pwr (dBm)	Att. (dB)	V.Att (dB)
1	1.000000	0.00	-0.03			
2	101.000000	0.00	-0.11			
3	500.000000	0.00	-0.32			
4	625.000000	0.00	-0.37			
5	750.000000	0.00	-0.41			
6	875.000000	0.00	-0.43			
7	1000.000000	0.00	-0.45			
8	1125.000000	0.00	-0.47			
9	1250.000000	0.00	-0.50			
10	1375.000000	0.00	-0.55			
11	1500.000000	0.00	-0.59			
12	1625.000000	0.00	-0.61			
13	1750.000000	0.00	-0.56			
14	1875.000000	0.00	-0.61			
15	2000.000000	0.00	-0.69			
16	2125.000000	0.00	-0.70			
17	2250.000000	0.00	-0.68			

☐ Continuous Mode
☒ Display On-Line Graph

Create Attenuator File

- Step 15. Press **Step 2: Attenuation Measurement** key.

The **Attenuation Measurement** screen will open (see **Figure 62**).

- **Step 16.** Open **Attenuation Measurement's Block Diagram** setup (see **Figure 63**).
- **Step 17.** Assemble the Attenuation measurement equipment setup.

- **Step 18.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.

Figure 62: Attenuator Measurement screen

Project: Attenuator 6db callibration for hisignal meas.
X

 Back

 New Proj

 Recall

 Save

 Print Data

 Setup

Sensor Serial Number:

0806030007

Model Name:

BW-36W2+

Serial No.:

9090

Application:

Calibrating an Attenuator


 Block Diagram

Attenuator Measurement

Step 1: Power Reference In

Step 2: Attenuation Measurement

☐ Avg.

8

#	Freq (MHz)	Source Pwr (dBm)	Pwr Refln (dBm)	Read Pwr (dBm)	Att. (dB)	V.Att (dB)
1	1.000000	0.00	-0.03			
2	101.000000	0.00	-0.11			
3	500.000000	0.00	-0.32			
4	625.000000	0.00	-0.37			
5	750.000000	0.00	-0.41			
6	875.000000	0.00	-0.43			
7	1000.000000	0.00	-0.45			
8	1125.000000	0.00	-0.47			
9	1250.000000	0.00	-0.50			
10	1375.000000	0.00	-0.55			
11	1500.000000	0.00	-0.59			
12	1625.000000	0.00	-0.61			
13	1750.000000	0.00	-0.56			
14	1875.000000	0.00	-0.61			
15	2000.000000	0.00	-0.69			
16	2125.000000	0.00	-0.70			
17	2250.000000	0.00	-0.68			

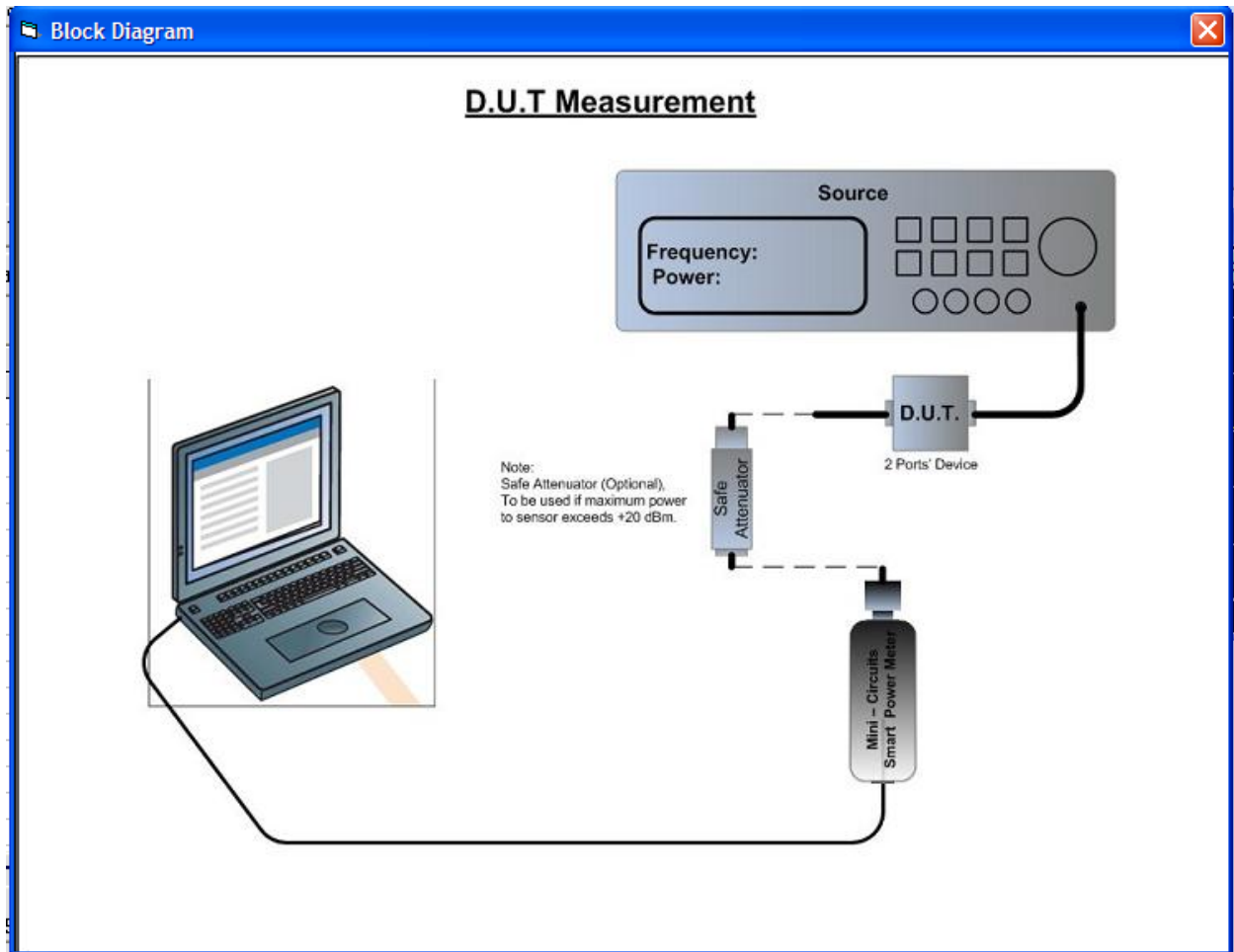
 Run

 Stop

☒ Continued Mode
 ☒ Include On-Line Graph

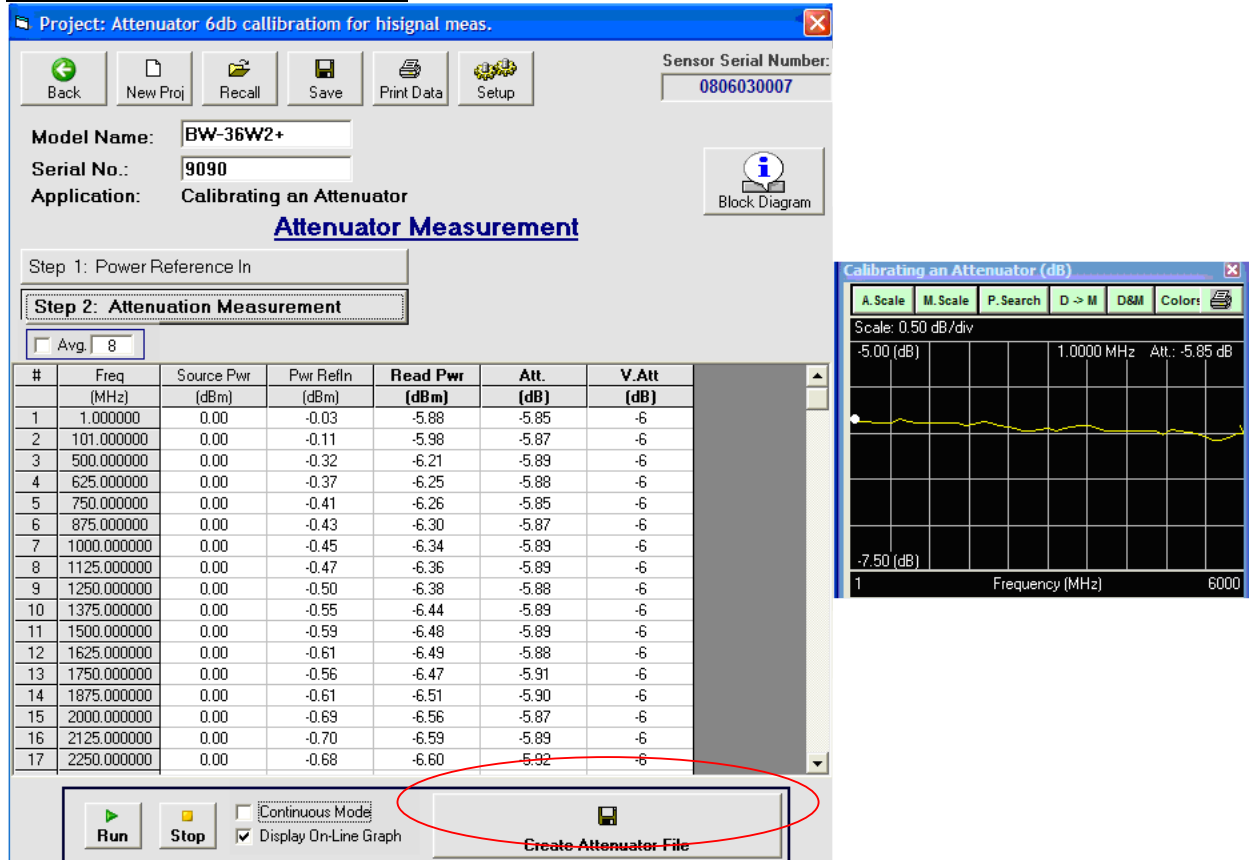

Create Attenuator File

Figure 63: D.U.T measurement Block Diagram.



- **Step 19.** You can enable **On-Line Graph** option.
(see 3.5 **On-Line Graph** features page 22).
- **Step 20 Final Attenuation** data received (see **Figure 64**).

Figure 64: Final Data screen



- **Step 21.** Save your project data (see **3.3.1.3 Save Function** on page 16 for explanation).
- **Step 22.** You can print your test data (see **3.6 Printing Data Function** on page 23 for an explanation)
- **Step 23.** Press **Create Attenuator File** key to create Virtual Attenuator. (see a sample **Virtual Attenuator** created as an ASCII file in **Figure 65**).

Figure 65: Virtual Attenuator ASCII file

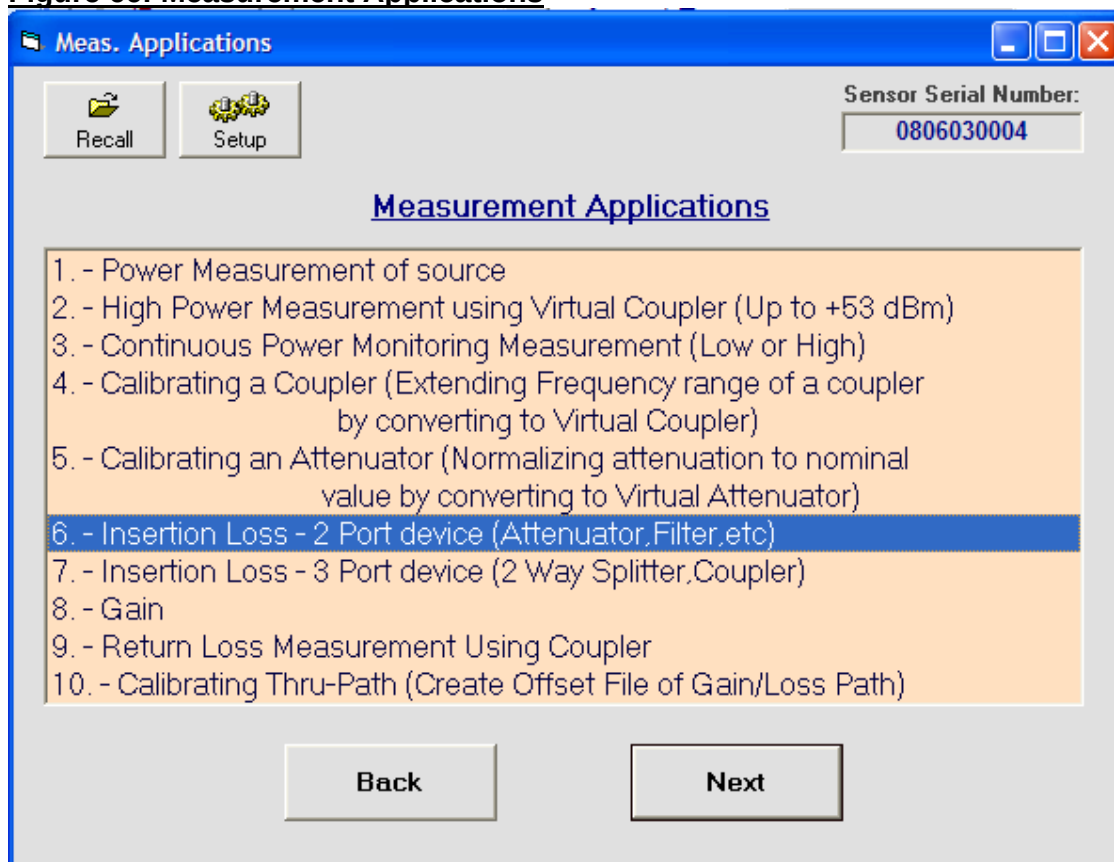
9090_VIRTUAL_ATT_6dB_Atenuuator_6db		
! Mini-Circuits		
Virtual Attenuation File for Attenuator Part No: BW-36W2+ Serial Number: 9090		
! Created By: Power Meter Software		
! Using Power Sensor: Part No: PWR-6G+ Serial Number: 0806030007		
! Created On: Jan 13,10		
!		
! ---Actual--- ----Virtual---		
! Frequency	I.LOSS	I.LOSS
! (MHz)	(dB)	(dB)
1.000000	-5.87	-6
101.000000	-5.87	-6
500.000000	-5.90	-6
625.000000	-5.88	-6
750.000000	-5.85	-6
875.000000	-5.87	-6
1000.000000	-5.88	-6
1125.000000	-5.88	-6
1250.000000	-5.88	-6
1375.000000	-5.89	-6
1500.000000	-5.90	-6
1625.000000	-5.89	-6
1750.000000	-5.92	-6
1875.000000	-5.92	-6
2000.000000	-5.87	-6
2125.000000	-5.87	-6
2250.000000	-5.90	-6
2375.000000	-5.91	-6
2500.000000	-5.92	-6
2625.000000	-5.95	-6
2750.000000	-5.96	-6
2875.000000	-5.94	-6
3000.000000	-5.94	-6
3125.000000	-5.97	-6

9.0 Application # 6- Insertion Loss – 2 Port device (Attenuator, Filter, etc).

This chapter describes the process of measuring the insertion loss of a two port device (for example a filter or attenuator). Before you can begin measurements you must establish a Reference Power measurement described in **3.3** on **page 11**. If the measurements are preformed with high power (above +20dBm) you will need safe attenuator at the power sensor input to prevent damage. If the Safe Attenuator is not flat use a Virtual Attenuator CAL file (see Virtual Attenuator in **chapter 8**.) Data output of this measurement will be in [-dB] units.

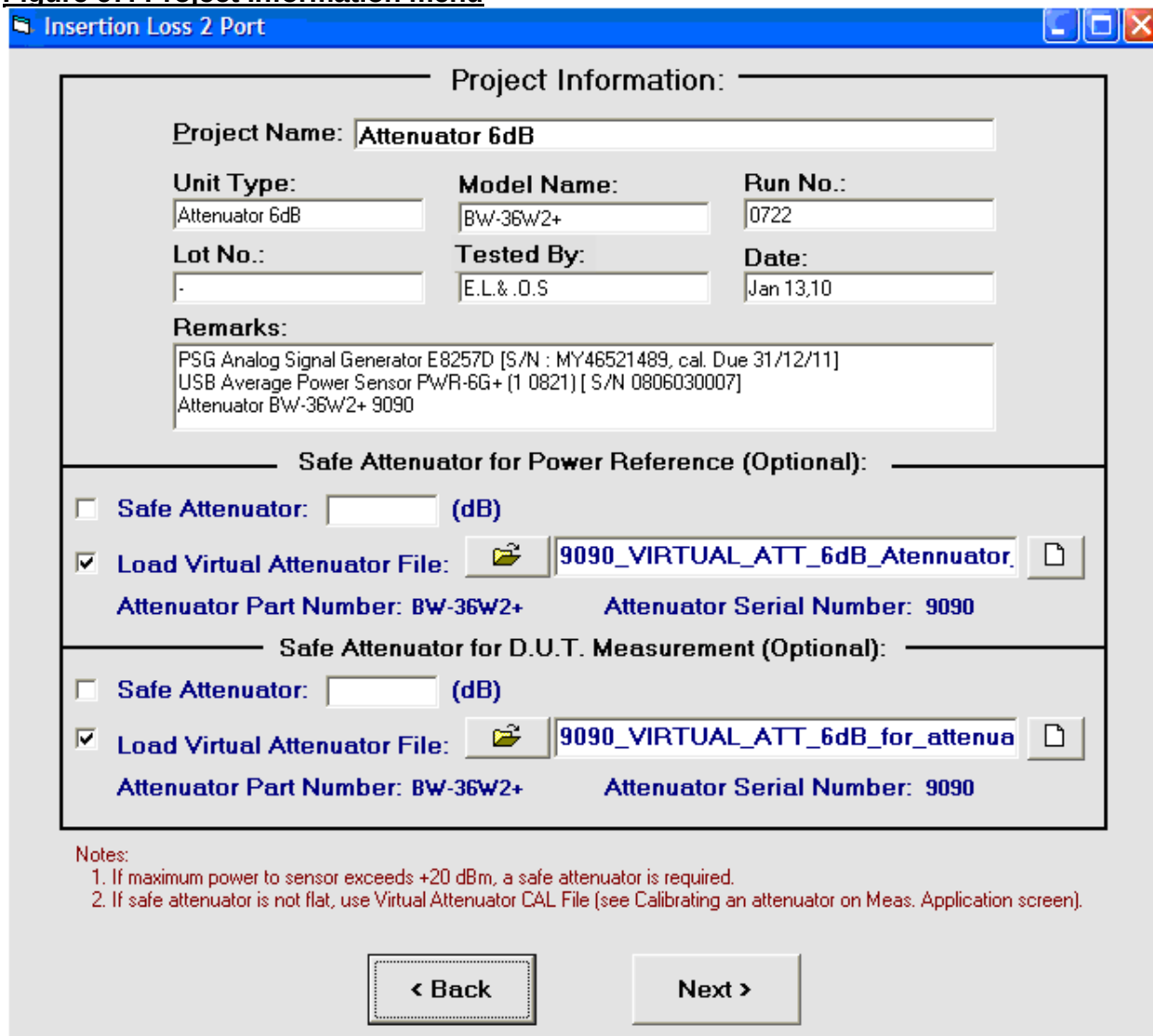
- **Step 1.** Open a project from the **Measurement Applications** screen (see **Figure 66**)

Figure 66: Measurement Applications



- **Step 2.** The **Project Information** menu will open (see **Figure 67**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 9-10**.

Figure 67: Project Information menu



Project Information:

Project Name:

Unit Type: Model Name: Run No.:

Lot No.: Tested By: Date:

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ [1 0821] [S/N 0806030007]
 Attenuator BW-36W2+ 9090

Safe Attenuator for Power Reference (Optional):

☐ Safe Attenuator: (dB)

☒ Load Virtual Attenuator File: 

Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090

Safe Attenuator for D.U.T. Measurement (Optional):

☐ Safe Attenuator: (dB)

☒ Load Virtual Attenuator File: 

Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090

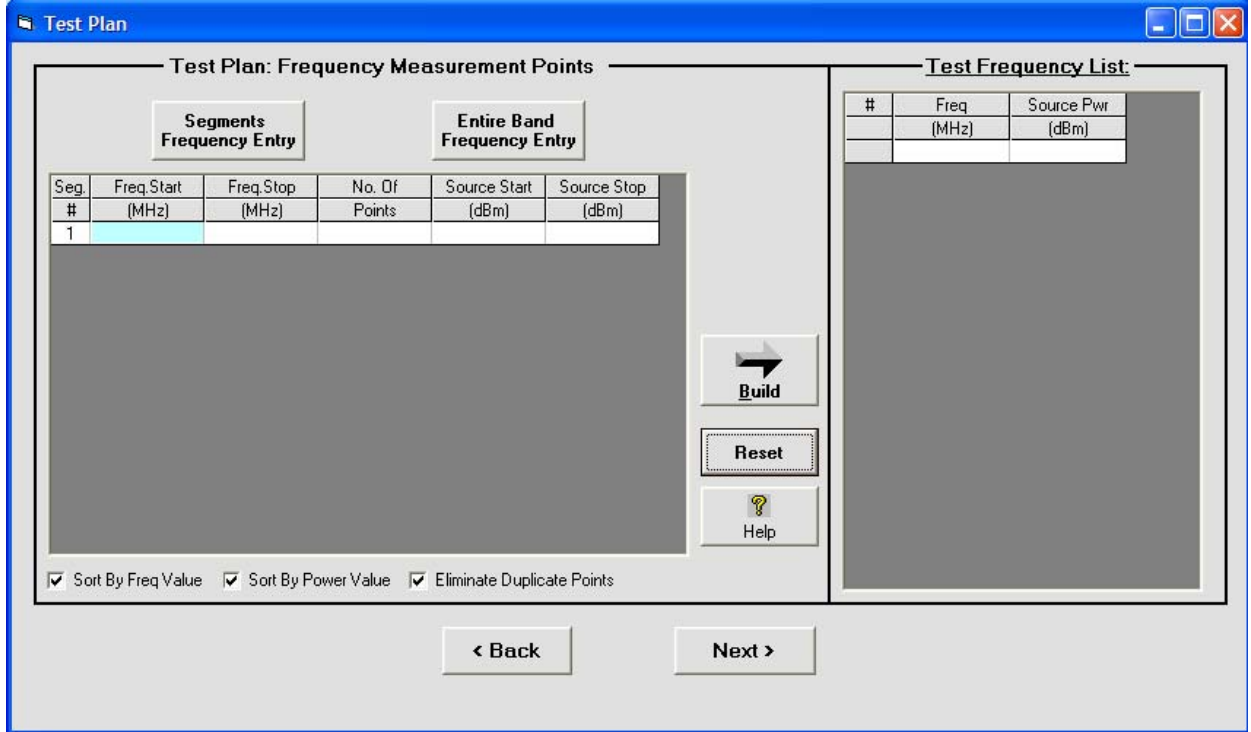
Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

-
- Note**
1. If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**
-

- **Step 4.** Press **Next** key.
The **Test Plan** screen will open (see **Figure 68**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 10-11**).

- **Step 6.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **page 9**).

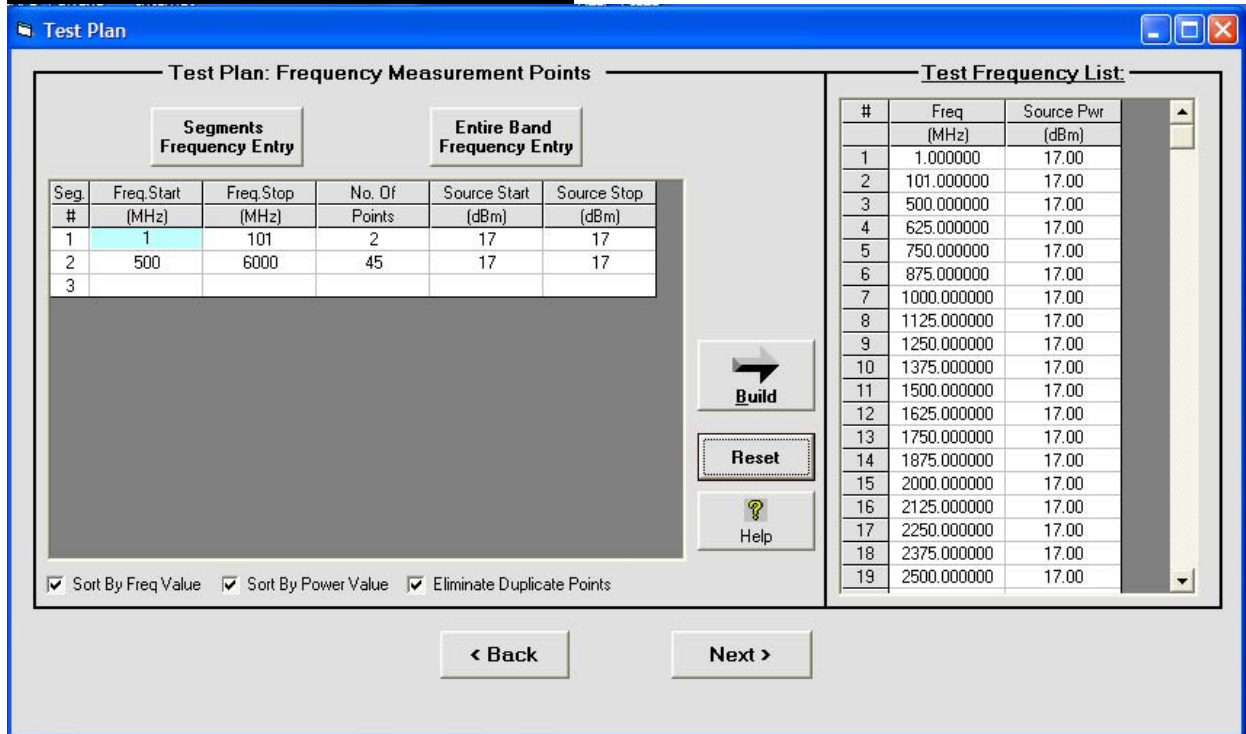
Figure 68: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg. #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg. #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build' (with a right arrow icon), 'Reset', and 'Help' (with a question mark icon). The 'Entire Band Frequency Entry' section is currently empty. At the bottom of the window are two navigation buttons: '< Back' and 'Next >'. On the right side of the window, there is a 'Test Frequency List' section with a table that has columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 69**).

Figure 69: Creating Test Frequency List



Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	1	101	2	17	17
2	500	6000	45	17	17
3					

#	Freq (MHz)	Source Pwr (dBm)
1	1.000000	17.00
2	101.000000	17.00
3	500.000000	17.00
4	625.000000	17.00
5	750.000000	17.00
6	875.000000	17.00
7	1000.000000	17.00
8	1125.000000	17.00
9	1250.000000	17.00
10	1375.000000	17.00
11	1500.000000	17.00
12	1625.000000	17.00
13	1750.000000	17.00
14	1875.000000	17.00
15	2000.000000	17.00
16	2125.000000	17.00
17	2250.000000	17.00
18	2375.000000	17.00
19	2500.000000	17.00

- **Step 8.** Press **Next** key. The **I.LOSS Measurement** screen will open.
(see **Figure 70**) Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15** , **3.3.1.3 Save** on **page 16** for explanation).
- **Step 9.** Press  key.
- **Step 10.** Open **Power Reference In** measurement's **Block Diagram** setup
(see **Figure 71**).
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings (see **2.1. Setting communication/commands in order to control an external source.** on **page 5**).

Figure 70: I.LOSS Measurement screen

Project: Attenuator 6dB

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: BW-36W2+

Run No.: 0722

Application: Insertion Loss 2 Port

Block Diagram

I.LOSS Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

Avg. 8

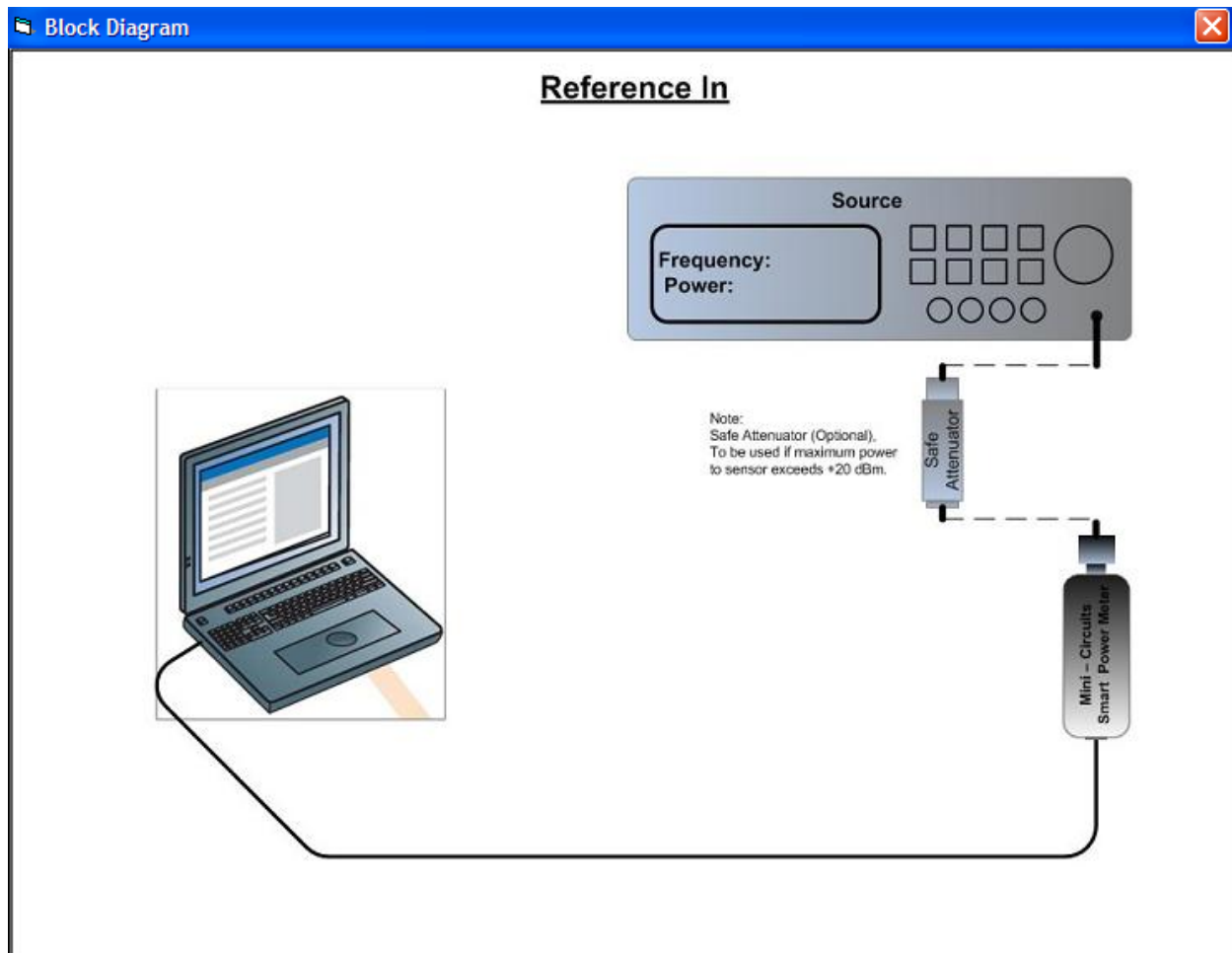
#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	I.Loss Spec		Pass/Fail	Safe Att. (dB)
					I.Loss (dB)	Min (dB)	Max (dB)		
1	1.000000	17.00							
2	101.000000	17.00							
3	500.000000	17.00							
4	625.000000	17.00							
5	750.000000	17.00							
6	875.000000	17.00							
7	1000.000000	17.00							
8	1125.000000	17.00							
9	1250.000000	17.00							
10	1375.000000	17.00							
11	1500.000000	17.00							
12	1625.000000	17.00							
13	1750.000000	17.00							
14	1875.000000	17.00							
15	2000.000000	17.00							
16	2125.000000	17.00							
17	2250.000000	17.00							

Run

Stop

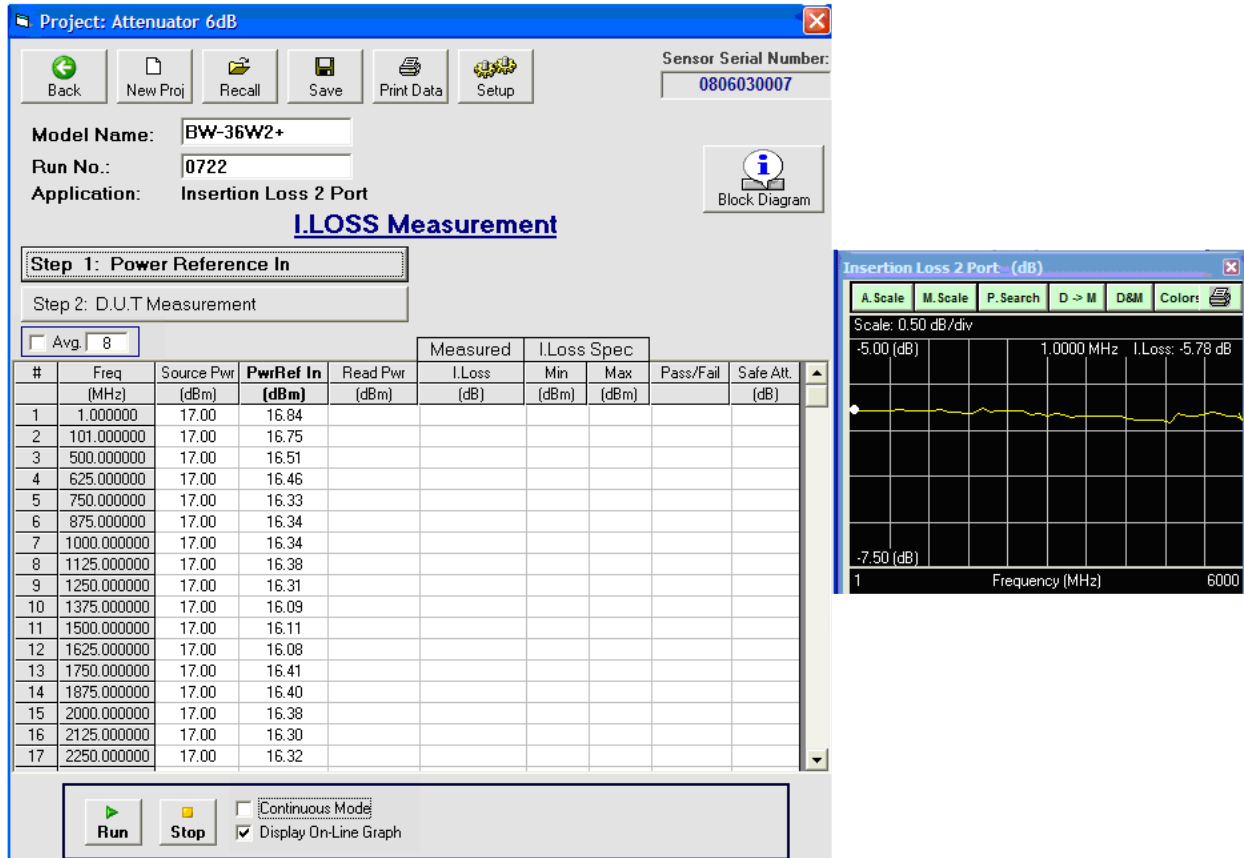
☐ Continuous Mode
☒ Display On-Line Graph

Figure 71: Power Reference In Block Diagram



- **Step 13.** Press **Run key** to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14** See results in **Figure 72**.

Figure 72: Power Reference In



- **Step 15.** Press **Step 2: D.U.T Measurement** key.

The **D.U.T Measurement** screen will open (see **Figure 73**).

- **Step 16.** Open **D.U.T Measurement's Block Diagram** setup (see **Figure 74**).
- **Step 17.** Assemble the **D.U.T Measurement** equipment setup.

Figure 73: D.U.T Measurement screen

Project: Attenuator 6dB

Sensor Serial Number: **0806030007**

Model Name: **BW-36W2+**
 Run No.: **0722**
 Application: **Insertion Loss 2 Port**

I.LOSS Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

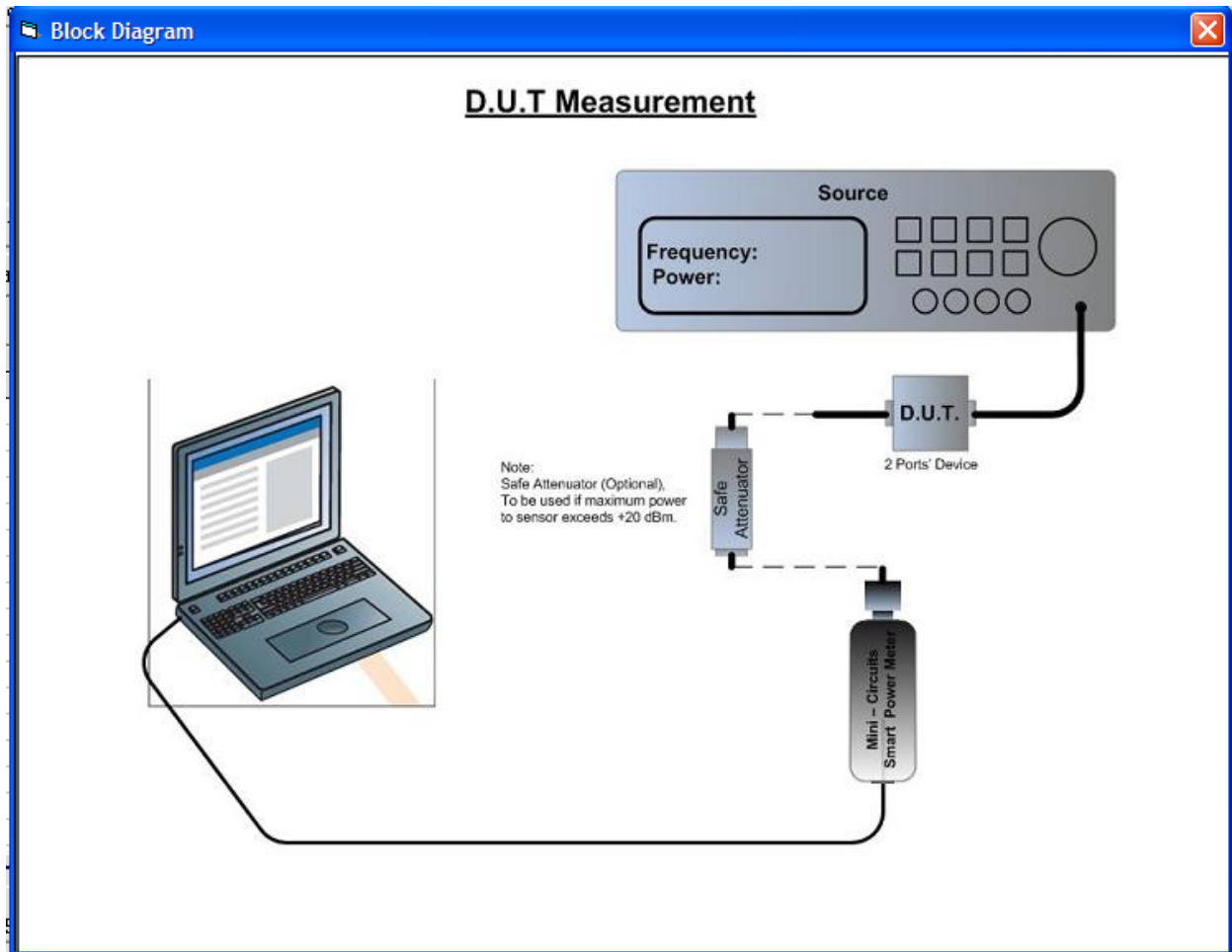
☐ Avg.

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	I.Loss Spec		Pass/Fail	Safe Att. (dB)
					I.Loss (dB)	Min (dBm)	Max (dBm)		
1	1.000000	17.00	16.84						
2	101.000000	17.00	16.75						
3	500.000000	17.00	16.51						
4	625.000000	17.00	16.46						
5	750.000000	17.00	16.33						
6	875.000000	17.00	16.34						
7	1000.000000	17.00	16.34						
8	1125.000000	17.00	16.38						
9	1250.000000	17.00	16.31						
10	1375.000000	17.00	16.09						
11	1500.000000	17.00	16.11						
12	1625.000000	17.00	16.08						
13	1750.000000	17.00	16.41						
14	1875.000000	17.00	16.40						
15	2000.000000	17.00	16.38						
16	2125.000000	17.00	16.30						
17	2250.000000	17.00	16.32						

☐ Continuous Mode
 ☒ Display On-Line Graph
 D.U.T. No:
 DUT Serial No.:

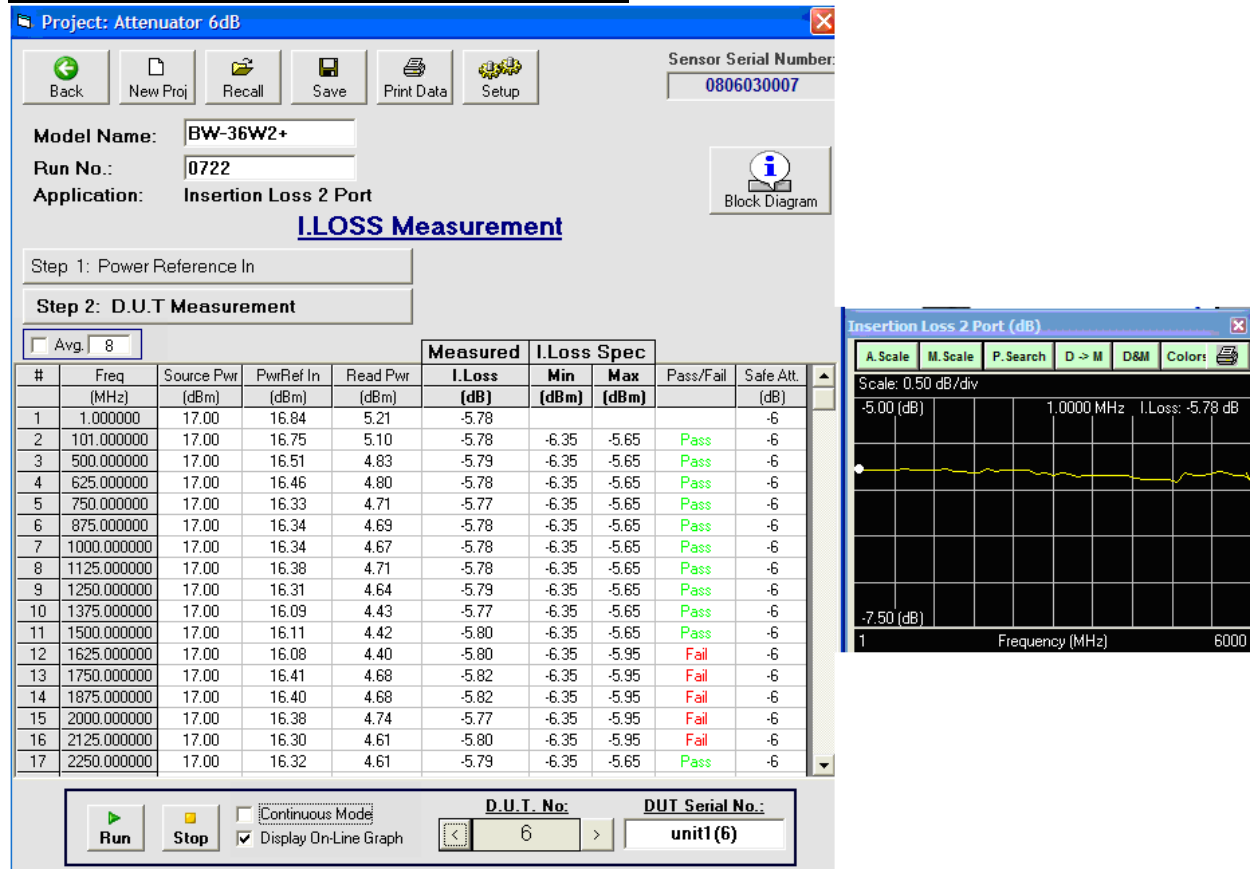
- **Step 18.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 19.** You can enable **Continuous Mode** if necessary for your application.

Figure 74: D.U.T measurement Block Diagram .



- **Step 20.** You can enable the **On-Line Graph** option. (see 3.5 **On-Line Graph features** page 22).
- **Step 21.** Enter **D.U.T Serial No.:** (If available).
- **Step 22.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 23.** If you have more than one D.U.T to test repeat **Steps 19-22** for next test.
- **Step 24.** You can enable **On-Line Graph** option. (see 3.5 **On-Line Graph features** on page 22).
- **Step 25.** **Final D.U.T Data** received (see **Figure 75**).

Figure 75: Insertion Loss 2 Ports Final Data



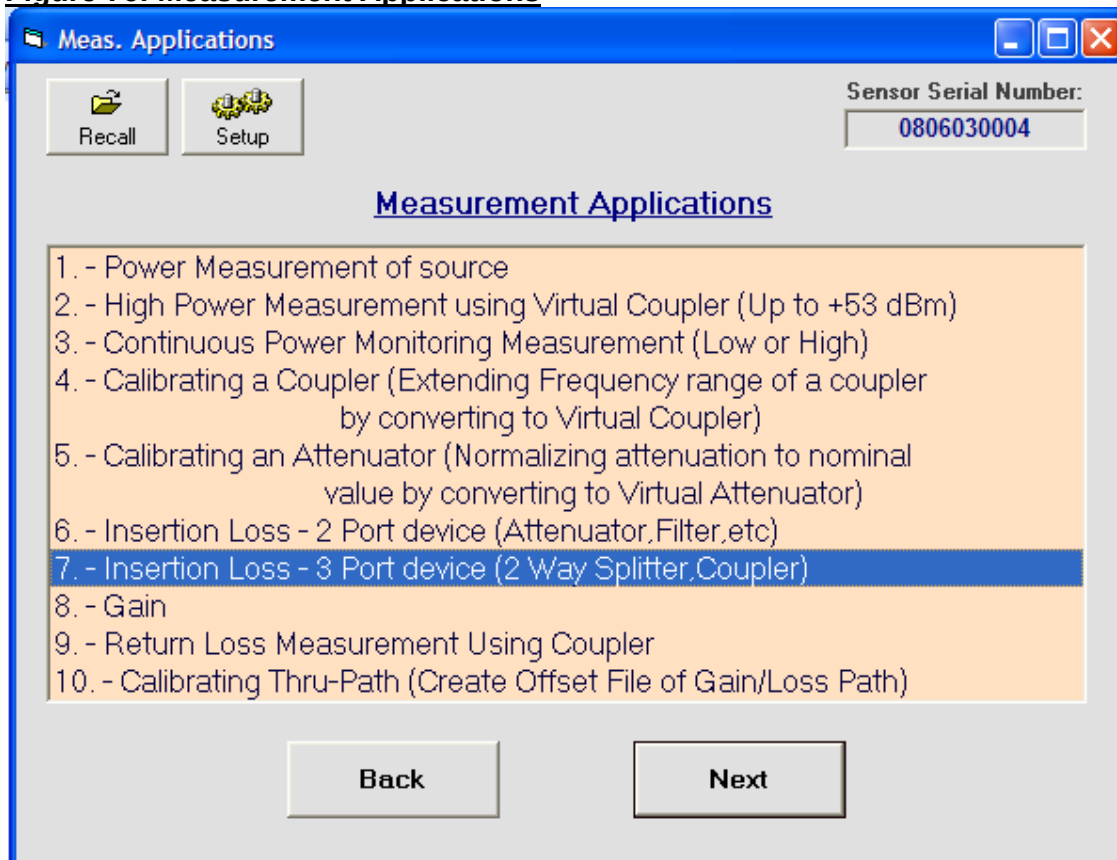
- **Step 26.** Save your project data (see 3.3.1.3 Save Function on page 16 for explanation).
- **Step 27.** You can print your test data (see 3.6 Printing Data Function on page 23 for explanation).

10.0 Application # 7- Insertion Loss 3 Port Device (2 Way Splitter, Coupler).

This chapter describes the process of measuring the insertion loss of a three port device (for example a directional coupler or 2-way power splitter). Before you can begin measurements you must establish a Reference Power measurement described in **3.3** on **page 11**. If the measurements are preformed with high power (above +20dBm) you will need a safe attenuator at the power sensor input to prevent damage. If the Safe Attenuator is not flat use a Virtual Attenuator CAL file (see Virtual Attenuator in **chapter 8**.) Data output of this measurement will be in [-dB]

- Open a project from the **Measurement Applications** screen (see **Figure 76**).

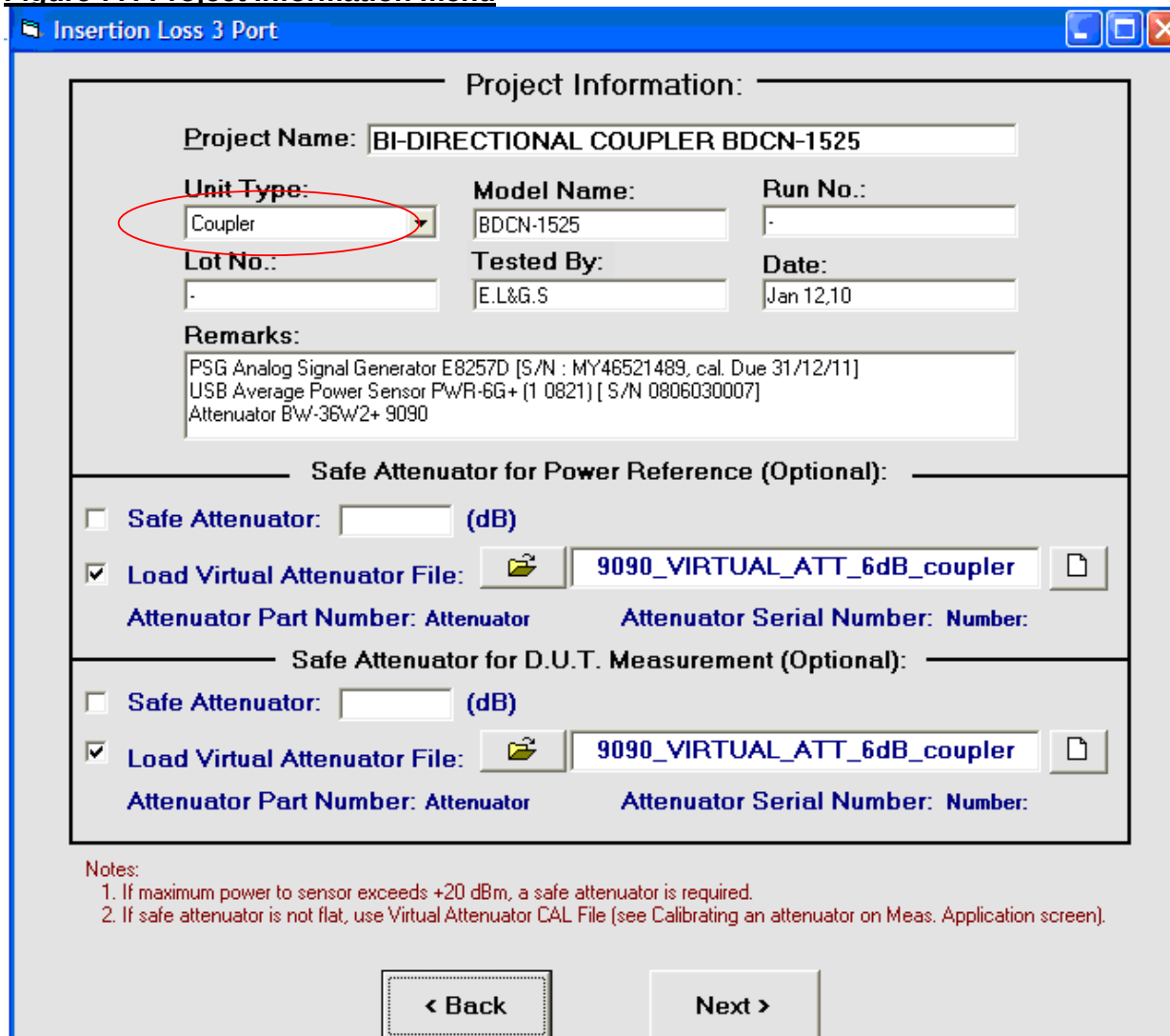
Figure 76: Measurement Applications



10.1 Coupler Measurements.

- **Step 1.** The **Project Information** menu is now open (see **Figure 77**).
- **Step 2.** Select **Unit Type: Coupler** in the **Project Information** menu.
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 9-10**.

Figure 77: Project Information menu



Insertion Loss 3 Port

Project Information:

Project Name: BI-DIRECTIONAL COUPLER BDCN-1525

Unit Type: Coupler

Model Name: BDCN-1525

Run No.: -

Lot No.: -

Tested By: E.L&G.S

Date: Jan 12,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 Attenuator BW-36W2+ 9090

Safe Attenuator for Power Reference (Optional):

☐ **Safe Attenuator:** (dB)

☒ **Load Virtual Attenuator File:** 9090_VIRTUAL_ATT_6dB_coupler

Attenuator Part Number: Attenuator **Attenuator Serial Number:** Number:

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☒ **Load Virtual Attenuator File:** 9090_VIRTUAL_ATT_6dB_coupler

Attenuator Part Number: Attenuator **Attenuator Serial Number:** Number:

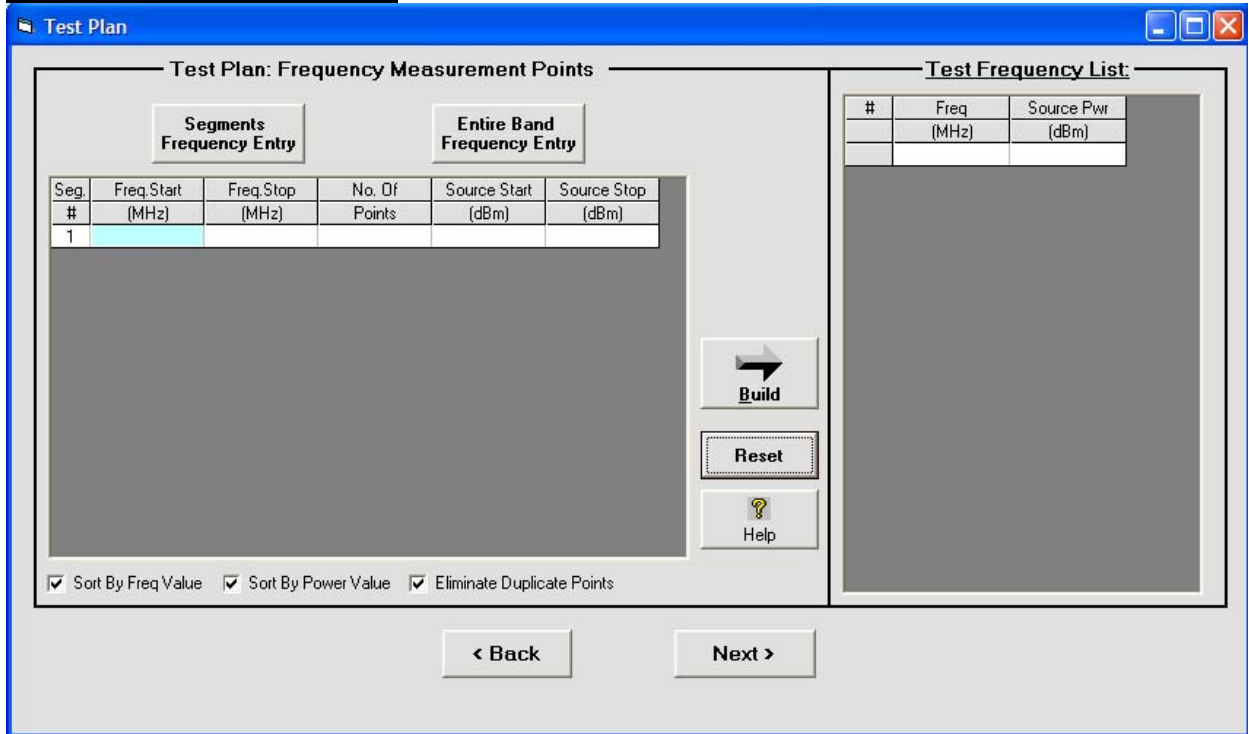
Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

< Back **Next >**

- Note**
1. If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.

- **Step 4.** Press **Next** key. The **Test Plan** screen will open (see **Figure 78**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **page 9**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and example in **Figure 5** on **pages 10-11**).

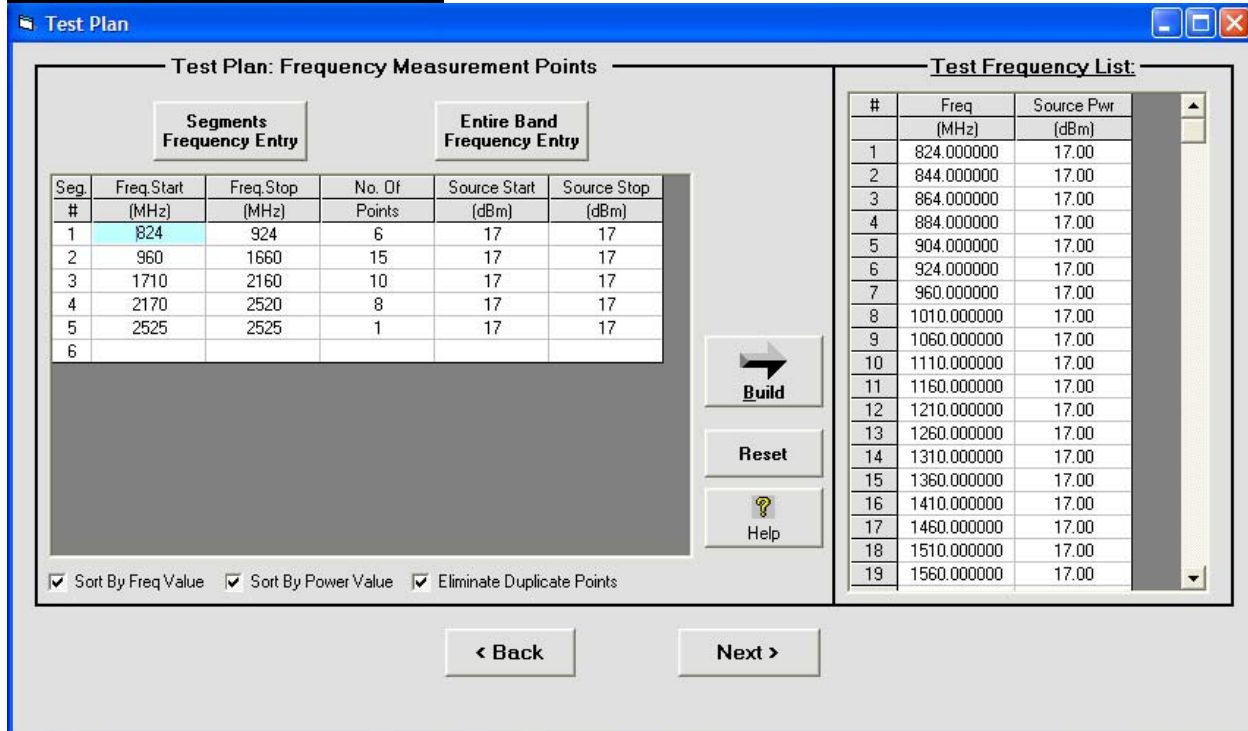
Figure 78: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg. #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg. #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build', 'Reset', and 'Help'. The 'Entire Band Frequency Entry' section is currently empty. At the bottom of the window are two navigation buttons: '< Back' and 'Next >'. On the right side of the window, there is a 'Test Frequency List' section with a table that has columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 79**).

Figure 79: Test Frequency List



Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	824	924	6	17	17
2	960	1660	15	17	17
3	1710	2160	10	17	17
4	2170	2520	8	17	17
5	2525	2525	1	17	17
6					

#	Freq (MHz)	Source Pwr (dBm)
1	824.000000	17.00
2	844.000000	17.00
3	864.000000	17.00
4	884.000000	17.00
5	904.000000	17.00
6	924.000000	17.00
7	960.000000	17.00
8	1010.000000	17.00
9	1060.000000	17.00
10	1110.000000	17.00
11	1160.000000	17.00
12	1210.000000	17.00
13	1260.000000	17.00
14	1310.000000	17.00
15	1360.000000	17.00
16	1410.000000	17.00
17	1460.000000	17.00
18	1510.000000	17.00
19	1560.000000	17.00

- **Step 8.** Press **Next** key.
The **Insertion Loss -Coupler** screen will open. (see **Figure 80**)
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation).

- **Step 9.** Press  key.
- **Step 10.** Open **Power Reference In** measurement's **Block Diagram** setup
(see **Figure 81**).
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings
(see **2.1. Setting communication/commands in order to control an external source.** on **page 5**).

Figure 80: Insertion Loss -Coupler screen

Project: BI-DIRECTIONAL COUPLER BDCN-1525
✕

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:

0806030007

Model Name:

BDCN-1525

Run No.:

-

Application: Insertion Loss 3 Port - Coupler


 Block Diagram

I.LOSS Measurement

Step 1: Power Reference In

Step 3: In-Cpl Measurement

Step 2: In-Out Measurement

Step 4: Isolation Measurement

☐ Avg.

8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)	▲
				In-Out (dB)	In-CPL (dB)	ISO (dB)	Dirct (dB)	Min (dB)	Max (dB)			
1	824.000000	17.00										
2	844.000000	17.00										
3	864.000000	17.00										
4	884.000000	17.00										
5	904.000000	17.00										
6	924.000000	17.00										
7	960.000000	17.00										
8	1010.000000	17.00										
9	1060.000000	17.00										
10	1110.000000	17.00										
11	1160.000000	17.00										
12	1210.000000	17.00										
13	1260.000000	17.00										
14	1310.000000	17.00										
15	1360.000000	17.00										
16	1410.000000	17.00										
17	1460.000000	17.00										

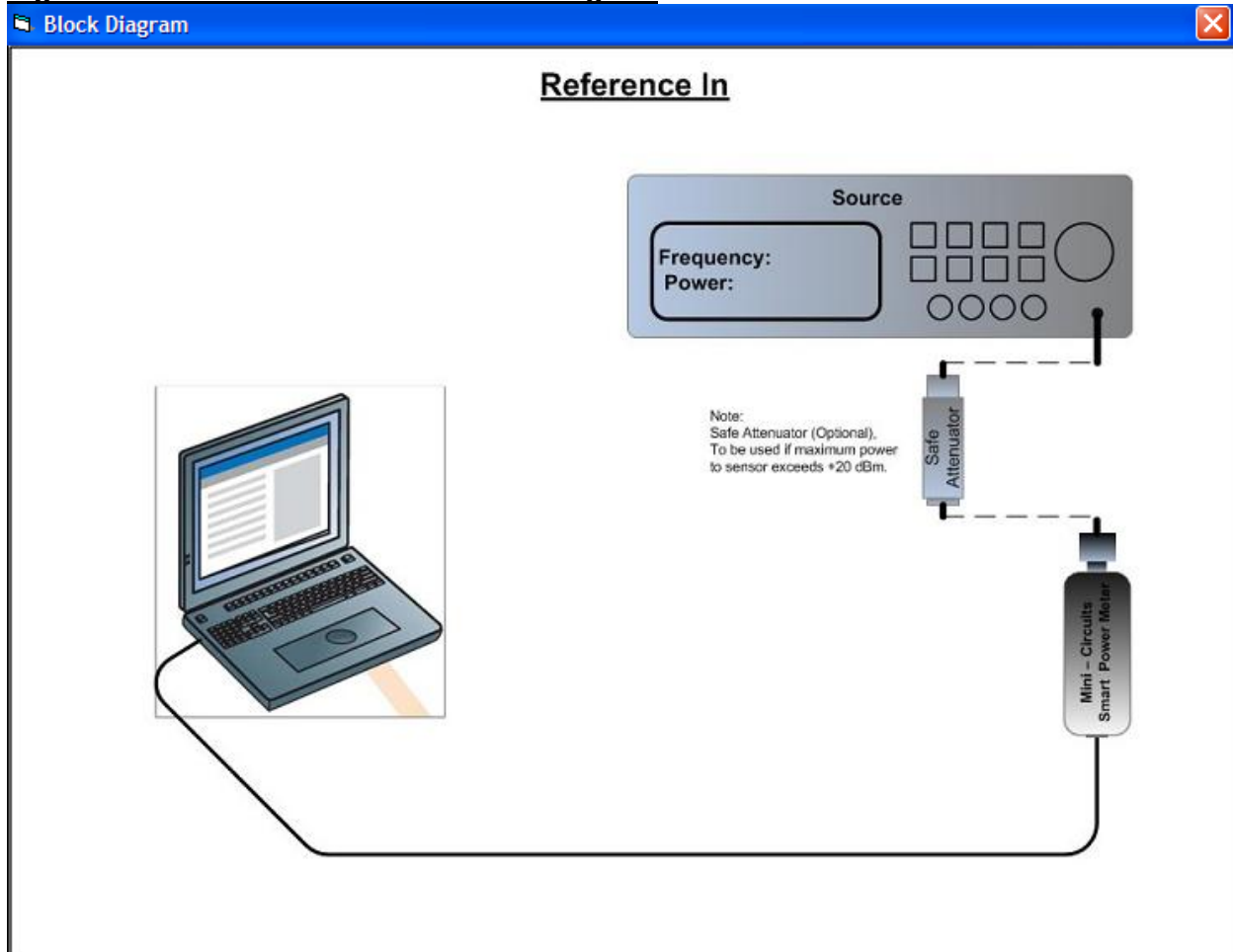
Run

Stop

☐ Continuous Mode

☒ Display On-Line Graph

Figure 81 : Power Reference In Block Diagram



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14.** See **Power Reference In** results (Figure 82).

Figure 82: Power Reference In

Project: BI-DIRECTIONAL COUPLER BDCN-1525

Back New Proj Recall Save Print Data Setup

Sensor Serial Number: 0806030007

Model Name: BDCN-1525

Run No.: -

Application: Insertion Loss 3 Port - Coupler

I.LOSS Measurement

Step 1: Power Reference In Step 3: In-Cpl Measurement

Step 2: In-Out Measurement Step 4: Isolation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				In-Out (dB)	In-CPL (dB)	ISO (dB)	Dirct (dB)	Min (dB)	Max (dB)		
1	824.000000	17.00	16.37								
2	844.000000	17.00	16.38								
3	864.000000	17.00	16.37								
4	884.000000	17.00	16.33								
5	904.000000	17.00	16.32								
6	924.000000	17.00	16.31								
7	960.000000	17.00	16.31								
8	1010.000000	17.00	16.32								
9	1060.000000	17.00	16.39								
10	1110.000000	17.00	16.37								
11	1160.000000	17.00	16.34								
12	1210.000000	17.00	16.26								
13	1260.000000	17.00	16.31								
14	1310.000000	17.00	16.30								
15	1360.000000	17.00	16.23								
16	1410.000000	17.00	16.06								
17	1460.000000	17.00	16.07								

Run Stop ☐ Continuous Mode ☒ Display On-Line Graph

- **Step 15.** Press **Step 2: In Out Measurement** key.

The Coupler's **In Out Measurement** screen will open (see **Figure 83**).

- **Step 16.** Open **In Out Measurement's Block Diagram** setup (see **Figure 84**).
- **Step 17.** Assemble the Coupler's **In Out Measurement** equipment setup.

Figure 83: In Out Measurement

Project: BI-DIRECTIONAL COUPLER BDCN-1525
✕

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: BDCN-1525

Run No.: -

Application: Insertion Loss 3 Port - Coupler

I.LOSS Measurement

Step 1: Power Reference In

Step 3: In-Cpl Measurement

Step 2: In-Out Measurement

Step 4: Isolation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)	▲
				In-Out (dB)	In-CPL (dB)	ISO (dB)	Dirct (dB)	Min (dB)	Max (dB)			
1	824.000000	17.00	16.37									
2	844.000000	17.00	16.38									
3	864.000000	17.00	16.37									
4	884.000000	17.00	16.33									
5	904.000000	17.00	16.32									
6	924.000000	17.00	16.31									
7	960.000000	17.00	16.31									
8	1010.000000	17.00	16.32									
9	1060.000000	17.00	16.39									
10	1110.000000	17.00	16.37									
11	1160.000000	17.00	16.34									
12	1210.000000	17.00	16.26									
13	1260.000000	17.00	16.31									
14	1310.000000	17.00	16.30									
15	1360.000000	17.00	16.23									
16	1410.000000	17.00	16.06									
17	1460.000000	17.00	16.07									

Run

Stop

☐ Continuous Mode

☒ Display On-Line Graph

D.U.T. No:

10

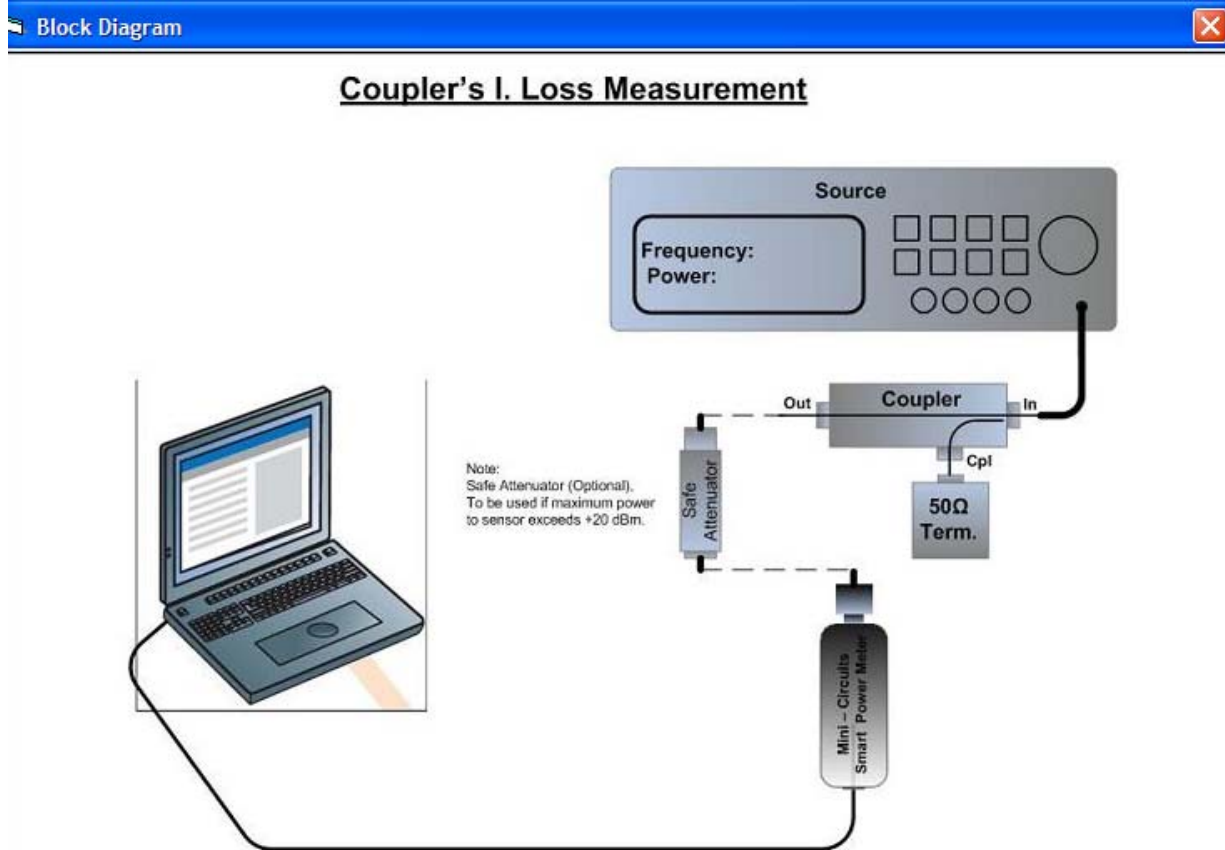
DUT Serial No.:

- **Step 18.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 19.** You can enable **Continuous Mode** if necessary for your application.

Note

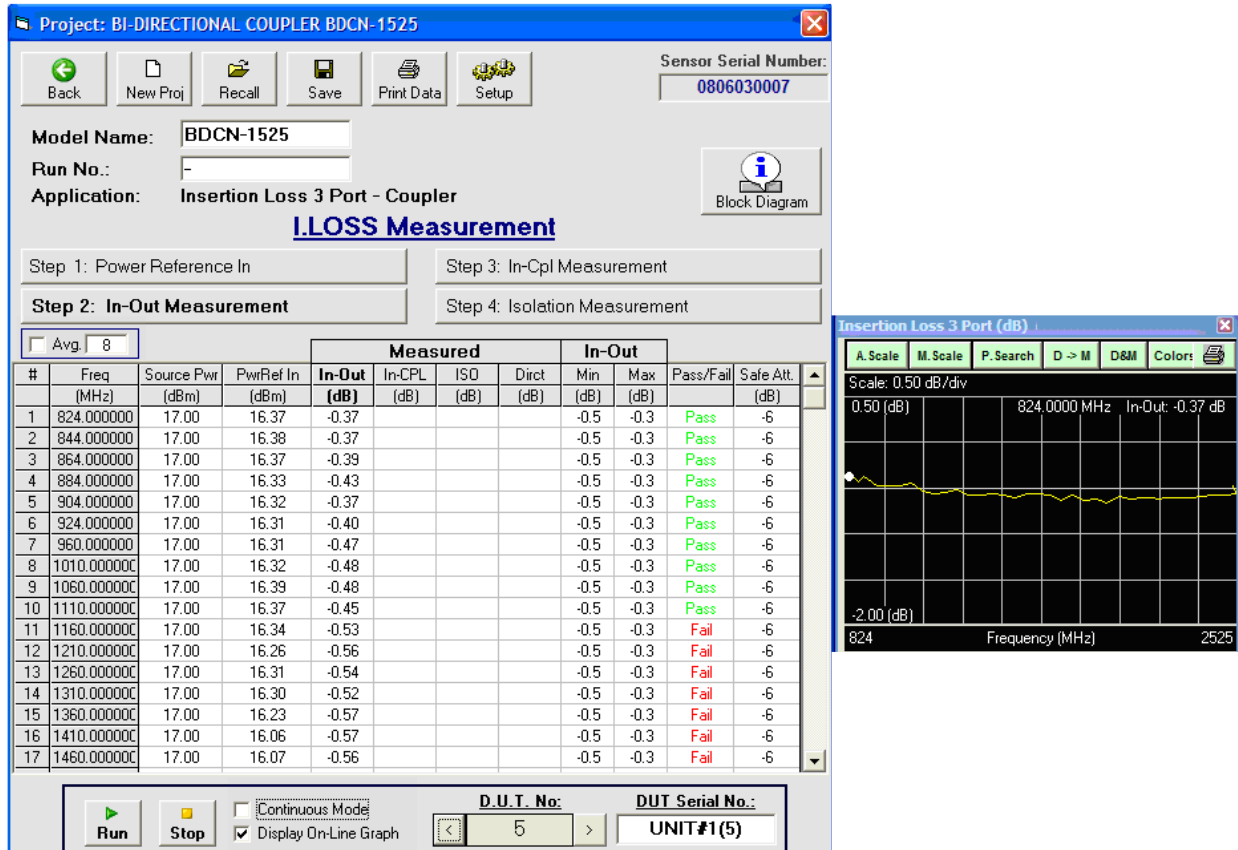
Insure that of your source power does not exceed +20dBm. (In this step I. Loss will be minimal and source power will be close to power entering to the Power Sensor. See Figure 84).
If power does exceed +20dBm use a Safe Attenuator (see **chapter 8**.)

Figure 84: In-Out Measurement In Block Diagram



- **Step 20.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features** on **page 22**).
- **Step 21.** Enter **D.U.T Serial No.:** (If available).
- **Step 22.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 23.** If you have more than one D.U.T to test repeat **Steps 19-22** for next test.
- **Step 24.** **In Out Measurement data** received
(see **Figure 85**).

Figure 85: In-Out Measurements



- **Step 25.** Press **Step 3: In-Cpl Measurement** key.

The Coupler's **In-Cpl Measurement** screen will open (see **Figure 86**).

- **Step 26.** Open **In-Cpl Measurement's Block Diagram** setup (see **Figure 87**).
- **Step 27.** Assemble the Coupler's **In - Cpl Measurement** equipment setup.

Figure 86: In-Cpl Measurement

Project: BI-DIRECTIONAL COUPLER BDCN-1525

Sensor Serial Number: 0806030007

Model Name: BDCN-1525

Run No.: -

Application: Insertion Loss 3 Port - Coupler

I.LOSS Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	In-Out (dB)	Measured			In-Out		Pass/Fail	Safe Att. (dB)
					In-CPL (dB)	ISO (dB)	Direct (dB)	Min (dB)	Max (dB)		
1	824.000000	17.00	16.37	-0.37							-6
2	844.000000	17.00	16.38	-0.37							-6
3	864.000000	17.00	16.37	-0.39							-6
4	884.000000	17.00	16.33	-0.43							-6
5	904.000000	17.00	16.32	-0.37							-6
6	924.000000	17.00	16.31	-0.40							-6
7	960.000000	17.00	16.31	-0.47							-6
8	1010.000000	17.00	16.32	-0.48							-6
9	1060.000000	17.00	16.39	-0.48							-6
10	1110.000000	17.00	16.37	-0.45							-6
11	1160.000000	17.00	16.34	-0.53							-6
12	1210.000000	17.00	16.26	-0.56							-6
13	1260.000000	17.00	16.31	-0.54							-6
14	1310.000000	17.00	16.30	-0.52							-6
15	1360.000000	17.00	16.23	-0.57							-6
16	1410.000000	17.00	16.06	-0.57							-6
17	1460.000000	17.00	16.07	-0.56							-6

☐ Continuous Mode
 ☒ Display On-Line Graph

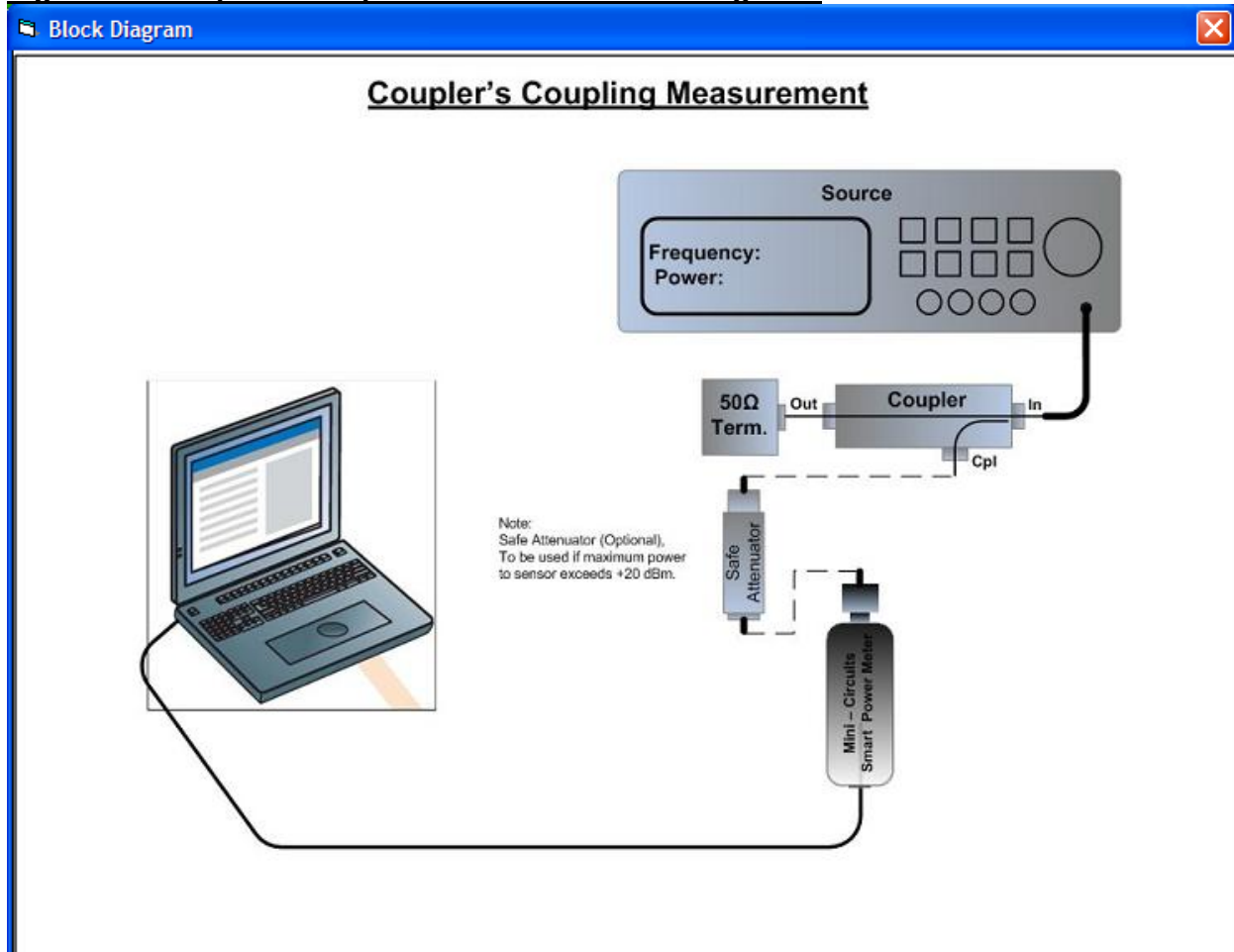
D.U.T. No: 5 DUT Serial No.: UNIT#1(5)

- **Step 28.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 29.** You can enable **Continuous Mode** if necessary for your application.

Note

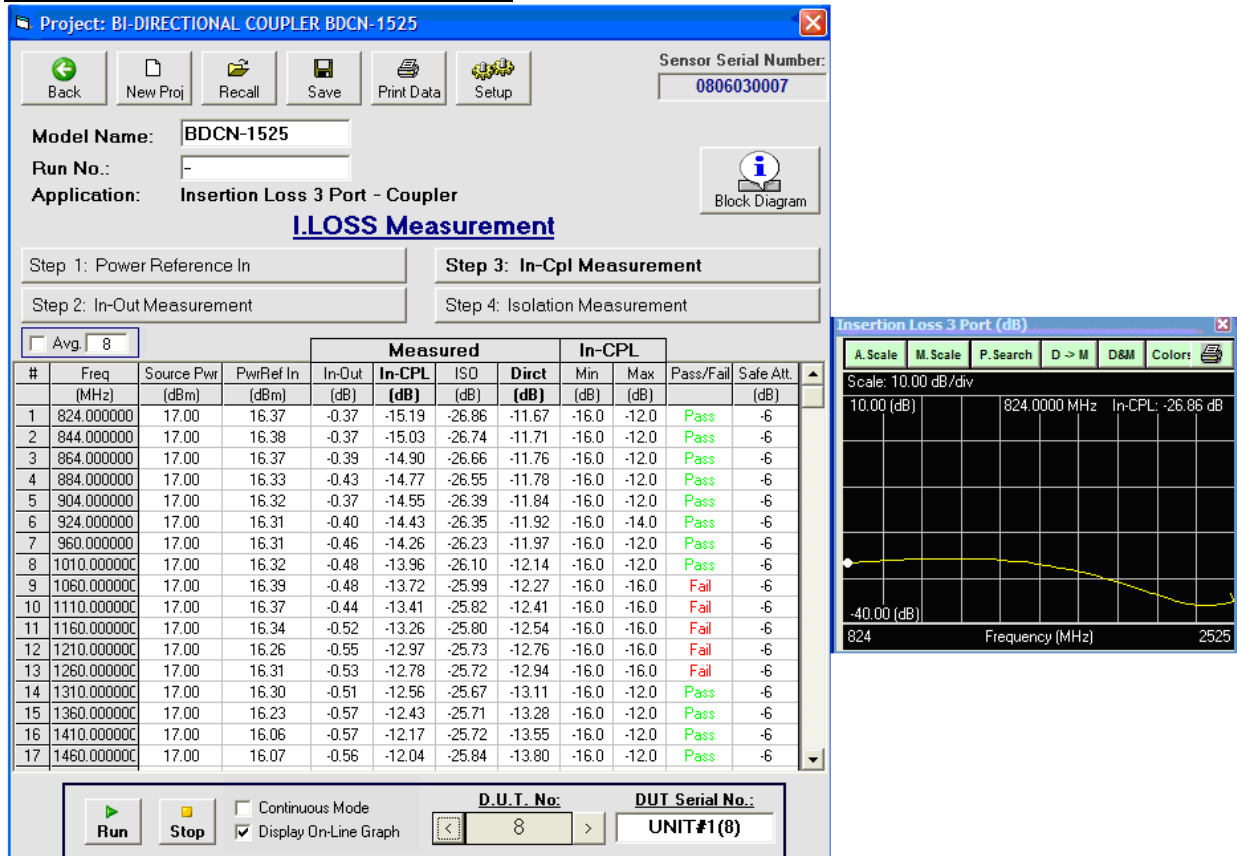
Insure final signal power at coupling port exceeds -30dBm to allowing accurate reading by Power Sensor.

Figure 87: Coupler's In-Cpl Measurement Block Diagram .



- **Step 30.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features page 22**).
- **Step 31.** Enter **D.U.T Serial No.:** (If available).
- **Step 32.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 33.** If you have more than one D.U.T to test repeat **Steps 29-32** for next test.
- **Step 34.** In - Cpl Measurement data received (see **Figure 88**).

Figure 88: In Cpl Measurement data



- **Step 35.** Press **Step 4: Isolation Measurement** key.

The Coupler's **Isolation Measurement** screen will open (see **Figure 89**).

- **Step 36.** Open **Isolation Measurement's Block Diagram** (see **Figure 90**).
- **Step 37.** Assemble the Coupler's **Isolation Measurement** setup.

Figure 89: Isolation Measurement

Project: BI-DIRECTIONAL COUPLER BDCN-1525

Sensor Serial Number: 0806030007

Model Name: BDCN-1525

Run No.: -

Application: Insertion Loss 3 Port - Coupler

I.LOSS Measurement

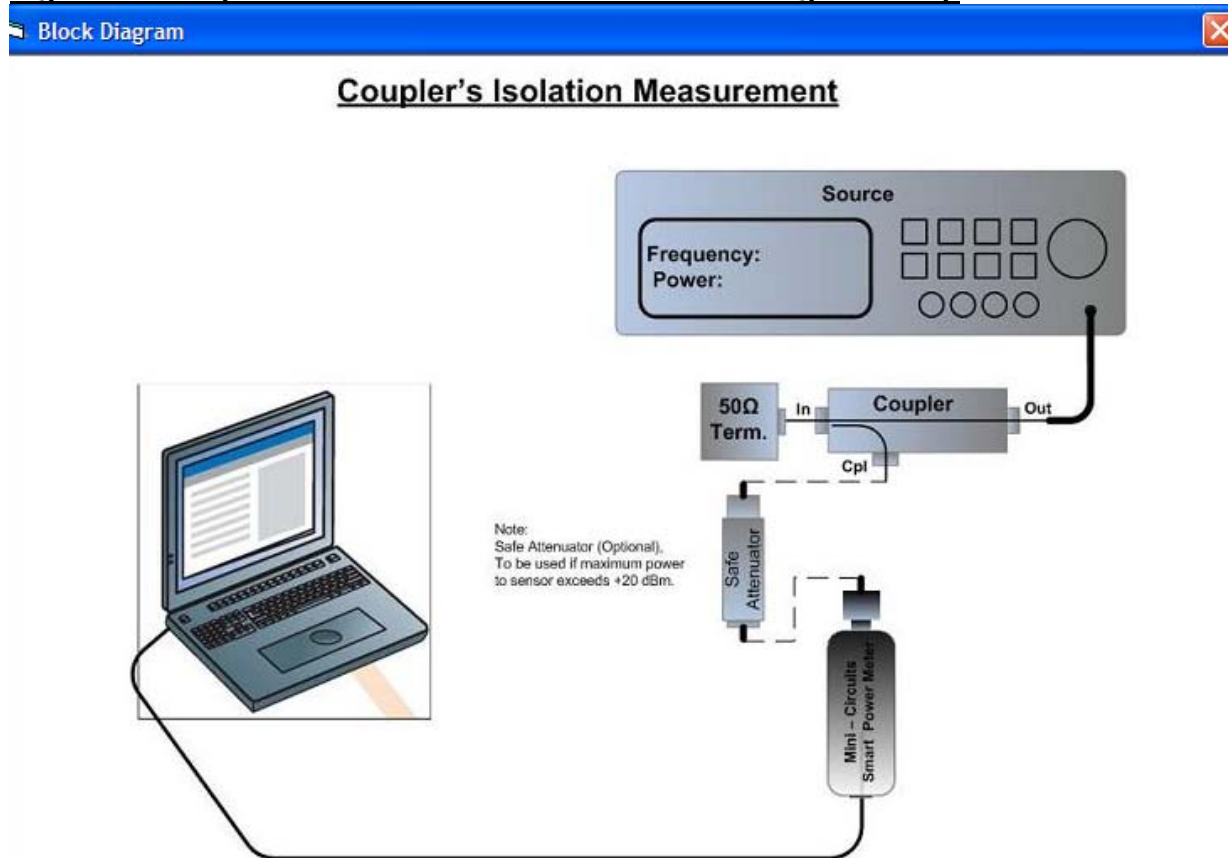
☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				In-Out (dB)	In-CPL (dB)	ISO (dB)	Dirct (dB)	Min (dB)	Max (dB)		
1	824.000000	17.00	16.37	-0.37	-15.17		-11.69				-6
2	844.000000	17.00	16.38	-0.37	-15.02		-11.73				-6
3	864.000000	17.00	16.37	-0.40	-14.89		-11.78				-6
4	884.000000	17.00	16.33	-0.44	-14.76		-11.79				-6
5	904.000000	17.00	16.32	-0.38	-14.54		-11.86				-6
6	924.000000	17.00	16.31	-0.40	-14.42		-11.93				-6
7	960.000000	17.00	16.31	-0.47	-14.25		-11.99				-6
8	1010.000000	17.00	16.32	-0.49	-13.95		-12.15				-6
9	1060.000000	17.00	16.39	-0.48	-13.71		-12.29				-6
10	1110.000000	17.00	16.37	-0.45	-13.41		-12.42				-6
11	1160.000000	17.00	16.34	-0.53	-13.25		-12.55				-6
12	1210.000000	17.00	16.26	-0.56	-12.96		-12.77				-6
13	1260.000000	17.00	16.31	-0.54	-12.77		-12.96				-6
14	1310.000000	17.00	16.30	-0.52	-12.56		-13.11				-6
15	1360.000000	17.00	16.23	-0.57	-12.43		-13.28				-6
16	1410.000000	17.00	16.06	-0.58	-12.16		-13.56				-6
17	1460.000000	17.00	16.07	-0.56	-12.04		-13.80				-6

☐ Continuous Mode
 ☒ Display On-Line Graph
 D.U.T. No: 9
 DUT Serial No.: UNIT#1(9)

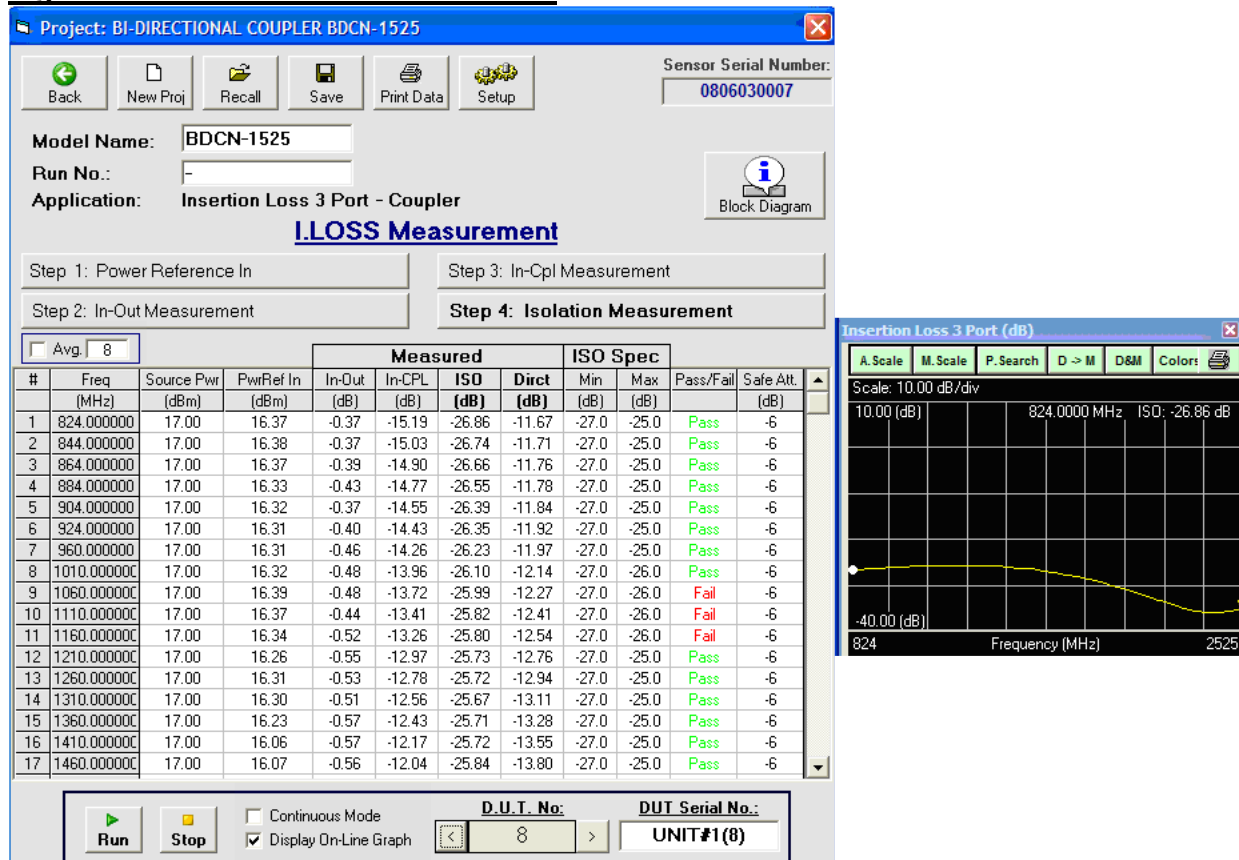
- **Step 38.** Enter spec. data (If available).
[see explanation **3.4.2.2 Spec. Definitions** on **page 21**].
- **Step 39.** You can enable **Continuous Mode** if necessary for your application.

Figure 90: Couplers's Isolation Measurement Block Diagram setup



- **Step 40.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features** page 22).
- **Step 41.** Enter **D.U.T Serial No.:** (If available).
- **Step 42.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 43.** If you have more than one D.U.T to test repeat **Steps 39-42** for next test.
- **Step 44.** **Isolation Measurement** data received (see **Figure 91**).

Figure 91: Isolation Measurement data

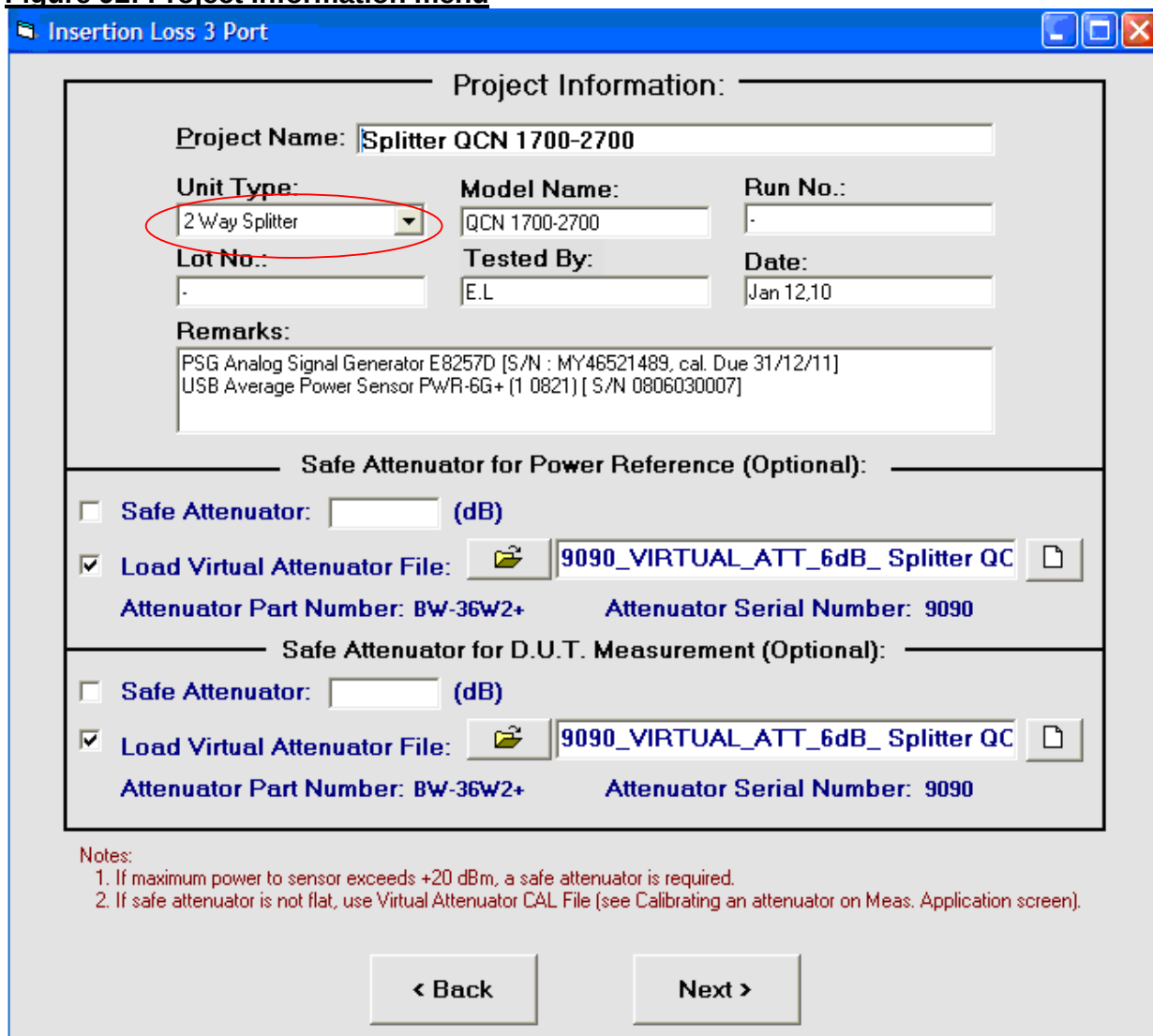


- **Step 45.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation).
- **Step 46.** You can print your test data (see **3.6 Printing Data Function** on **page 23** explanation).

10.2 2-Way Splitter/Combiner Measurements:

- **Step 1.** The Project Information Menu is now open (see **Figure 92**).
- **Step 2.** Select **Unit Type: 2 Way Splitter** in the **Project Information** menu.
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu. see detailed explanation **Figure 4** and **Table 3** at **pages 9-10**.

Figure 92: Project Information menu



Project Information:

Project Name: Splitter QCN 1700-2700

Unit Type: 2 Way Splitter

Model Name: QCN 1700-2700

Run No.: .

Lot No.: -

Tested By: E.L

Date: Jan 12,10

Remarks:
PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
USB Average Power Sensor PWR-6G+ [1 0821] [S/N 0806030007]

Safe Attenuator for Power Reference (Optional):

☐ Safe Attenuator: (dB)

☒ Load Virtual Attenuator File: 9090_VIRTUAL_ATT_6dB_Splitter QC

Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090

Safe Attenuator for D.U.T. Measurement (Optional):

☐ Safe Attenuator: (dB)

☒ Load Virtual Attenuator File: 9090_VIRTUAL_ATT_6dB_Splitter QC

Attenuator Part Number: BW-36W2+ Attenuator Serial Number: 9090

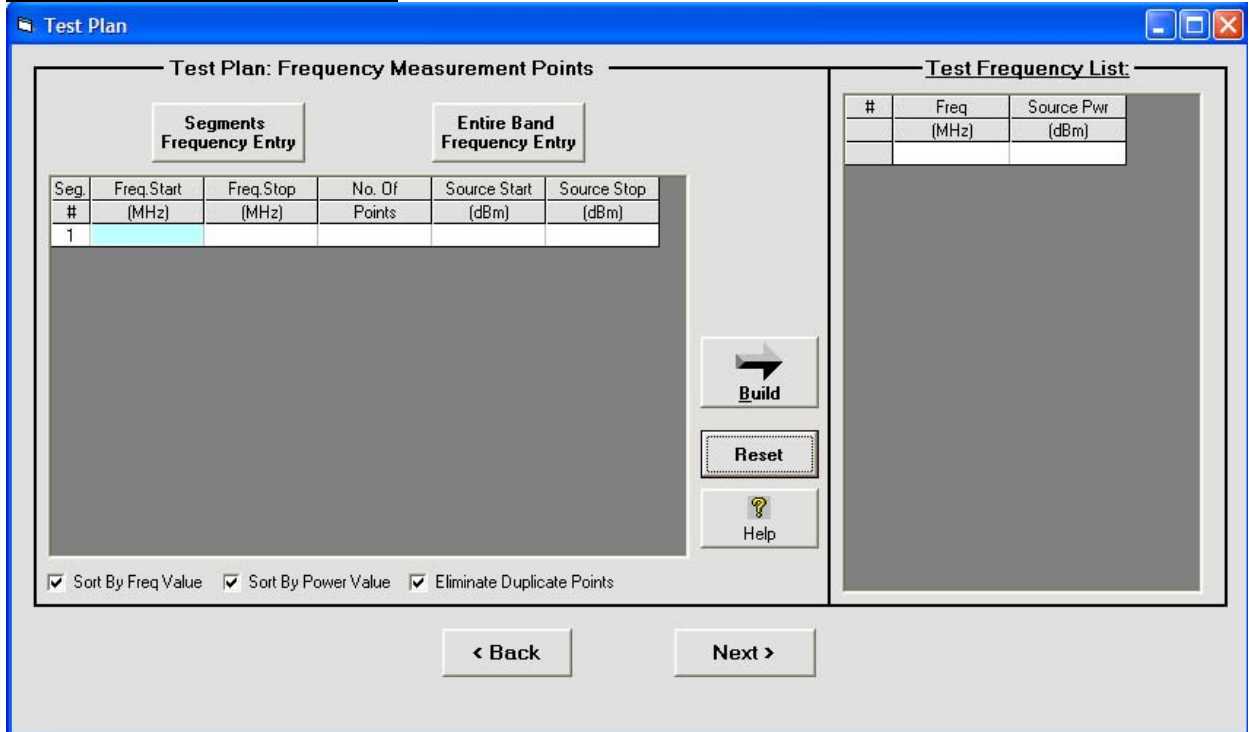
Notes:
1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

< Back Next >

-
- Note**
1. If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.
-

- **Step 4.** Press **Next** key. The **Test Plan** screen will open (see **Figure 93**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 9-10**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and example in **Figure 5** on **page 10**).

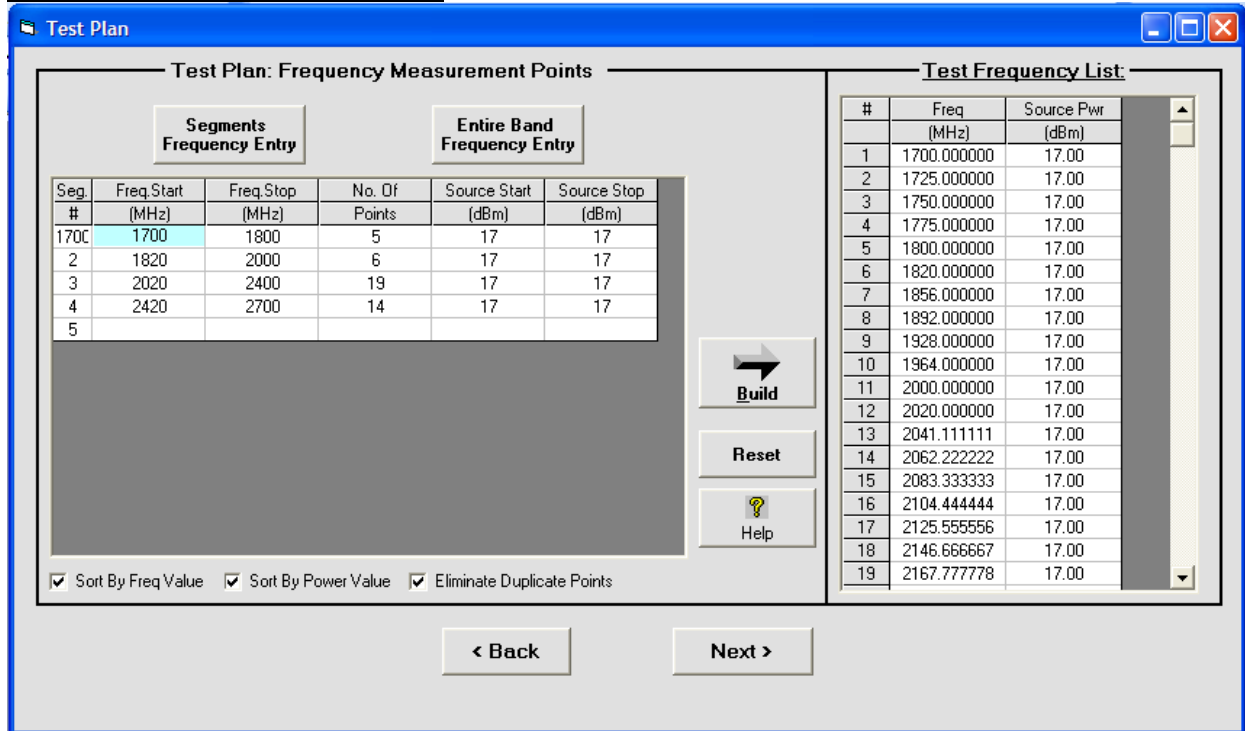
Figure 93: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build' (with a right arrow icon), 'Reset', and 'Help' (with a question mark icon). The 'Entire Band Frequency Entry' section is currently empty. At the bottom of the window are two buttons: '< Back' and 'Next >'. On the right side of the window, there is a 'Test Frequency List' section with a table that has columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 94**).

Figure 94: Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Seg #	Freq Start (MHz)	Freq Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	1700	1800	5	17	17
2	1820	2000	6	17	17
3	2020	2400	19	17	17
4	2420	2700	14	17	17
5					

Entire Band Frequency Entry

Build

Reset

Help

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

Test Frequency List

#	Freq (MHz)	Source Pwr (dBm)
1	1700.000000	17.00
2	1725.000000	17.00
3	1750.000000	17.00
4	1775.000000	17.00
5	1800.000000	17.00
6	1820.000000	17.00
7	1856.000000	17.00
8	1892.000000	17.00
9	1928.000000	17.00
10	1964.000000	17.00
11	2000.000000	17.00
12	2020.000000	17.00
13	2041.111111	17.00
14	2062.222222	17.00
15	2083.333333	17.00
16	2104.444444	17.00
17	2125.555556	17.00
18	2146.666667	17.00
19	2167.777778	17.00

< Back **Next >**

- **Step 8.** Press **Next** key.
The **Insertion Loss 3 Ports-2 Way Splitter** screen will open. (see **Figure 95**).
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.1.2 Save** on **page 16** for explanation).

- **Step 9.** Press **Step 1: Power Reference In** key.
- **Step 10.** Open **Power Reference In** measurement's **Block Diagram** setup
(see **Figure 96**).
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings
(see **2.1. Setting communication/commands in order to control an external source.** on **page 5**)

Figure 95: Insertion Loss 3 Ports - 2 Way Splitter screen

Project: Splitter QCN 1700-2700
X

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:

0806030007

Model Name:

QCN 1700-2700

Run No.:

-

Application: Insertion Loss 3 Port - 2 Way Splitter


 Block Diagram

I.LOSS Measurement

Step 1: Power Reference In

Step 3: S-2 Measurement

Step 2: S-1 Measurement

Step 4: Isolation Measurement

☐ Avg.

8

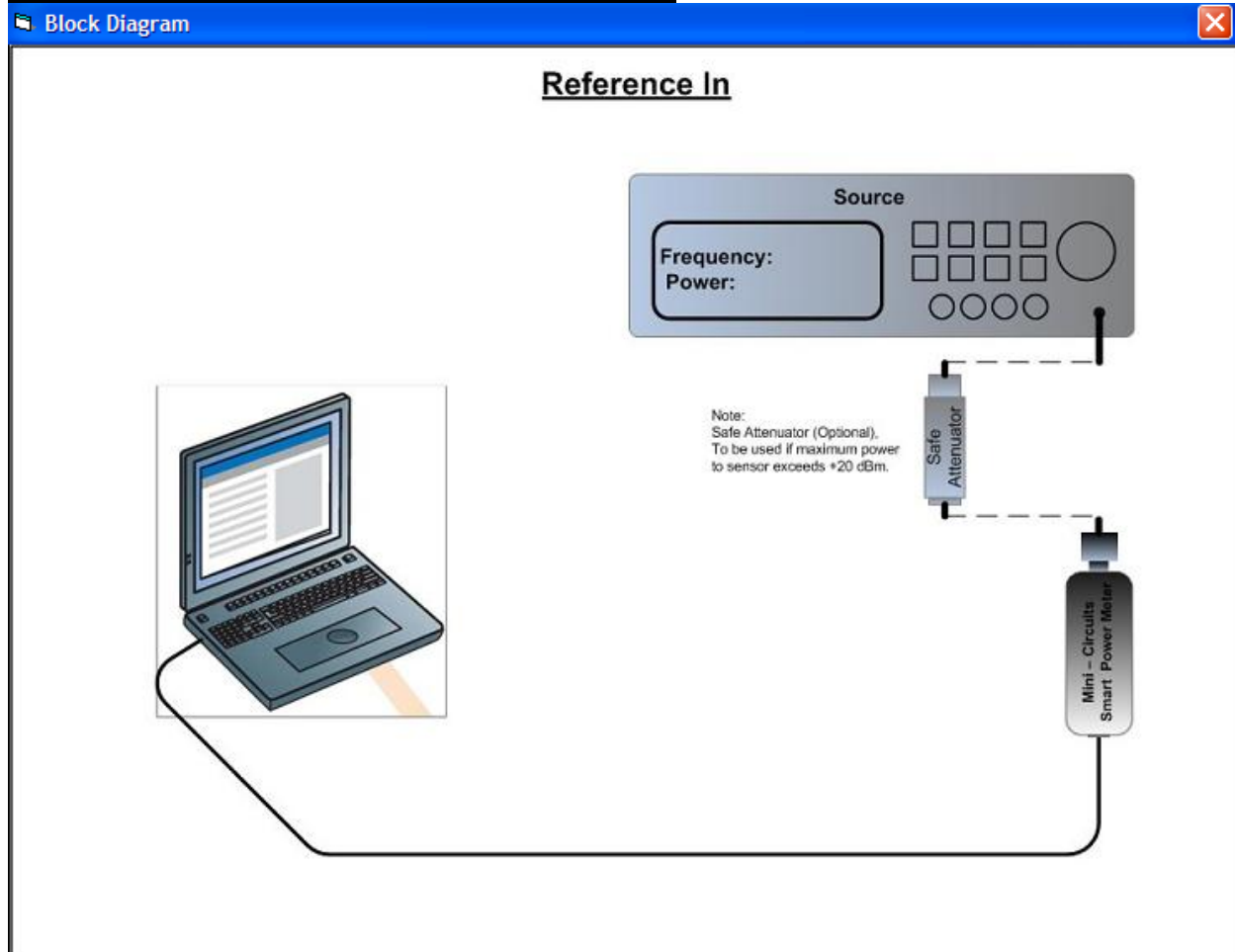
#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				S-1 (dB)	S-2 (dB)	Unbl (dB)	ISO (dB)	Min (dB)	Max (dB)		
1	1700.00000C	17.00									
2	1725.00000C	17.00									
3	1750.00000C	17.00									
4	1775.00000C	17.00									
5	1800.00000C	17.00									
6	1820.00000C	17.00									
7	1856.00000C	17.00									
8	1892.00000C	17.00									
9	1928.00000C	17.00									
10	1964.00000C	17.00									
11	2000.00000C	17.00									
12	2020.00000C	17.00									
13	2041.11100C	17.00									
14	2062.22200C	17.00									
15	2083.33300C	17.00									
16	2104.44400C	17.00									
17	2125.55600C	17.00									

Run

Stop

☐ Continuous Mode
☒ Display On-Line Graph

Figure 96 : Power Reference In Block Diagram .



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step14.** See results: **Figure 97: Power Reference In.**

Figure 97: Power Reference In

Project: Splitter QCN 1700-2700

Sensor Serial Number: 0806030007

Model Name: QCN 1700-2700

Run No.: -

Application: Insertion Loss 3 Port - 2 Way Splitter

I.LOSS Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				S-1 (dB)	S-2 (dB)	Unbl (dB)	ISO (dB)	Min (dB)	Max (dB)		
1	1700.00000C	17.00	16.29								
2	1725.00000C	17.00	16.36								
3	1750.00000C	17.00	16.42								
4	1775.00000C	17.00	16.46								
5	1800.00000C	17.00	16.43								
6	1820.00000C	17.00	16.45								
7	1856.00000C	17.00	16.37								
8	1892.00000C	17.00	16.39								
9	1928.00000C	17.00	16.36								
10	1964.00000C	17.00	16.42								
11	2000.00000C	17.00	16.40								
12	2020.00000C	17.00	16.35								
13	2041.11100C	17.00	16.36								
14	2062.22200C	17.00	16.38								
15	2083.33300C	17.00	16.36								
16	2104.44400C	17.00	16.34								
17	2125.55600C	17.00	16.33								

☐ Continuous Mode
 ☒ Display On-Line Graph

- **Step 15.** Press key.

The 2 Way Splitter's **S-1 Measurement** screen will open (see **Figure 98**).

- **Step 16.** Open **S-1 Measurement's Block Diagram** setup (see **Figure 99**).
- **Step 17.** Assemble the 2 Way Splitter's **S-1 Measurement** setup.

Figure 98: S-1 Measurement screen

Project: Splitter QCN 1700-2700 X

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: QCN 1700-2700

Run No.: -

Application: Insertion Loss 3 Port - 2 Way Splitter

I.LOSS Measurement

Step 1: Power Reference In

Step 3: S-2 Measurement

Step 2: S-1 Measurement

Step 4: Isolation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				S-1 (dB)	S-2 (dB)	Unbl (dB)	ISO (dB)	Min (dB)	Max (dB)		
1	1700.00000C	17.00	16.29								-6
2	1725.00000C	17.00	16.36								-6
3	1750.00000C	17.00	16.42								-6
4	1775.00000C	17.00	16.46								-6
5	1800.00000C	17.00	16.43								-6
6	1820.00000C	17.00	16.45								-6
7	1856.00000C	17.00	16.37								-6
8	1892.00000C	17.00	16.39								-6
9	1928.00000C	17.00	16.36								-6
10	1964.00000C	17.00	16.42								-6
11	2000.00000C	17.00	16.40								-6
12	2020.00000C	17.00	16.35								-6
13	2041.11100C	17.00	16.36								-6
14	2062.22200C	17.00	16.38								-6
15	2083.33300C	17.00	16.36								-6
16	2104.44400C	17.00	16.34								-6
17	2125.55600C	17.00	16.33								-6

Run

Stop

☐ Continuous Mode
 ☒ Display On-Line Graph

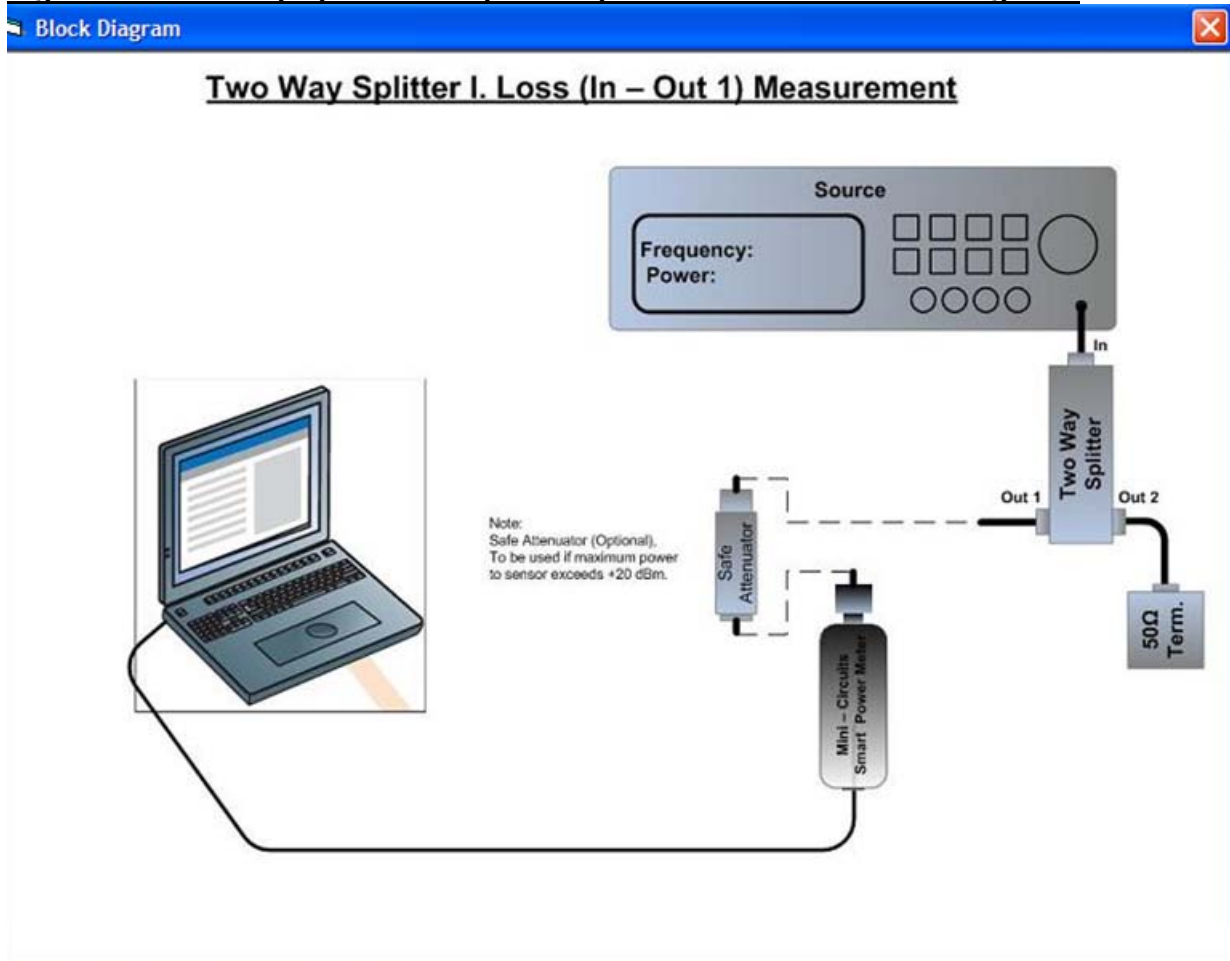
D.U.T. No:

1

DUT Serial No.:

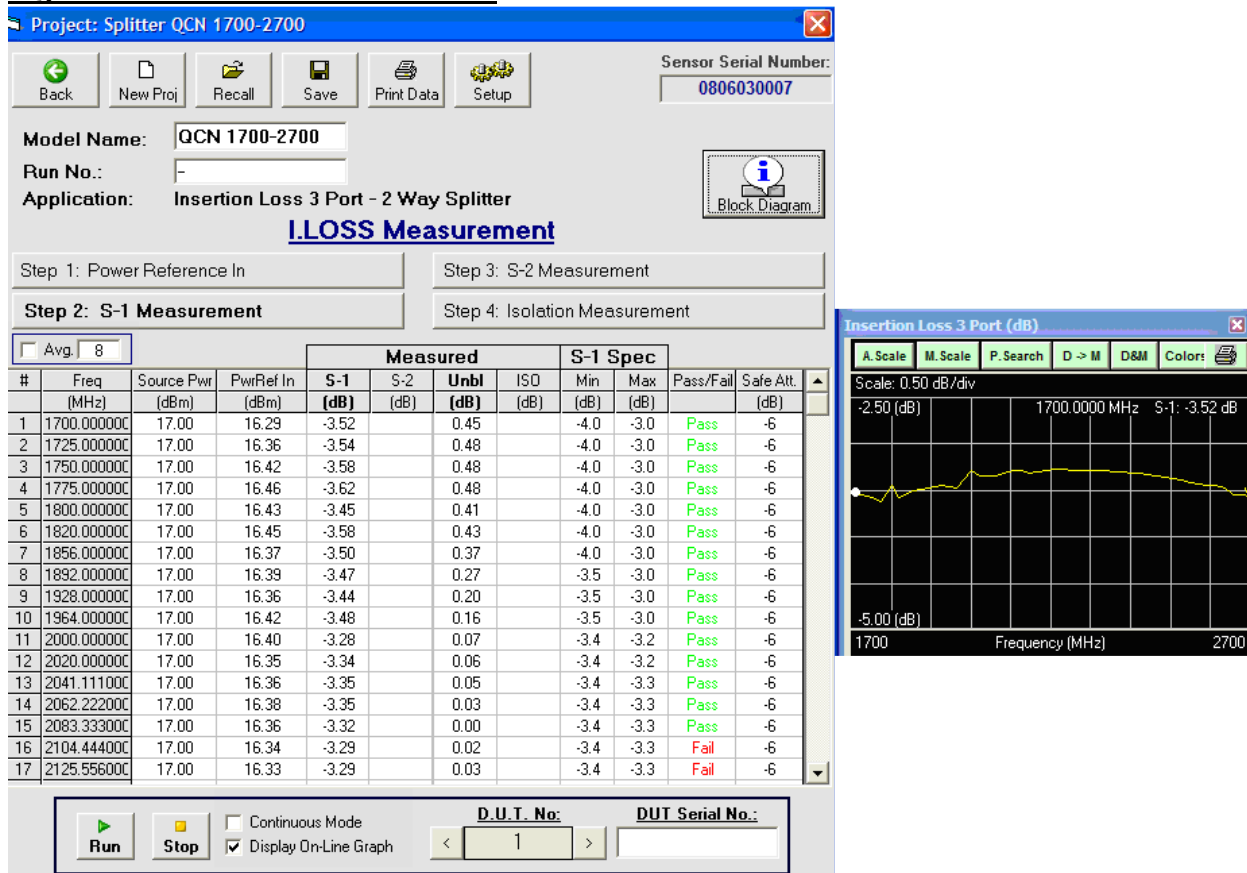
- **Step 18.** Enter spec. data (If available).
[see explanation **3.4.2.2 Spec. Definitions** on **page 21**].
- **Step 19.** You can enable **Continuous Mode** if necessary for your application.

Figure 99: Two Way Splitter's S-1(In-Out1) Measurement In Block Diagram .



- **Step 20.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features page 22**).
- **Step 21.** Enter **D.U.T Serial No.:** (If available).
- **Step 22.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 23.** If you have more than one D.U.T to test repeat **Steps 19-22** for next test.
- **Step 24.** 2 Way Splitter's **S-1 Measurement** data received (see **Figure 100**).

Figure 100: S-1 Measurement data



- **Step 25.** Press **Step 3: S-2 Measurement** key.

The 2 Way Splitter's **S-2 Measurement** screen will open (see **Figure 101**).

- **Step 26.** Open **S-2 Measurement's Block Diagram** setup (see **Figure 102**).
- **Step 27.** Assemble the 2 Way Splitter's **S-2 Measurement** setup.

Figure 101: S-2 Measurement

Project: Splitter QCN 1700-2700

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: QCN 1700-2700

Run No.: -

Application: Insertion Loss 3 Port - 2 Way Splitter

Block Diagram

I.LOSS Measurement

Step 1: Power Reference In

Step 3: S-2 Measurement

Step 2: S-1 Measurement

Step 4: Isolation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured				Spec		Pass/Fail	Safe Att. (dB)
				S-1 (dB)	S-2 (dB)	Unbl (dB)	ISO (dB)	Min (dB)	Max (dB)		
1	1700.00000C	17.00	16.29	-3.52							-6
2	1725.00000C	17.00	16.36	-3.54							-6
3	1750.00000C	17.00	16.42	-3.58							-6
4	1775.00000C	17.00	16.46	-3.62							-6
5	1800.00000C	17.00	16.43	-3.45							-6
6	1820.00000C	17.00	16.45	-3.58							-6
7	1856.00000C	17.00	16.37	-3.50							-6
8	1892.00000C	17.00	16.39	-3.47							-6
9	1928.00000C	17.00	16.36	-3.44							-6
10	1964.00000C	17.00	16.42	-3.48							-6
11	2000.00000C	17.00	16.40	-3.28							-6
12	2020.00000C	17.00	16.35	-3.34							-6
13	2041.11100C	17.00	16.36	-3.35							-6
14	2062.22200C	17.00	16.38	-3.35							-6
15	2083.33300C	17.00	16.36	-3.32							-6
16	2104.44400C	17.00	16.34	-3.29							-6
17	2125.55600C	17.00	16.33	-3.29							-6

Run

Stop

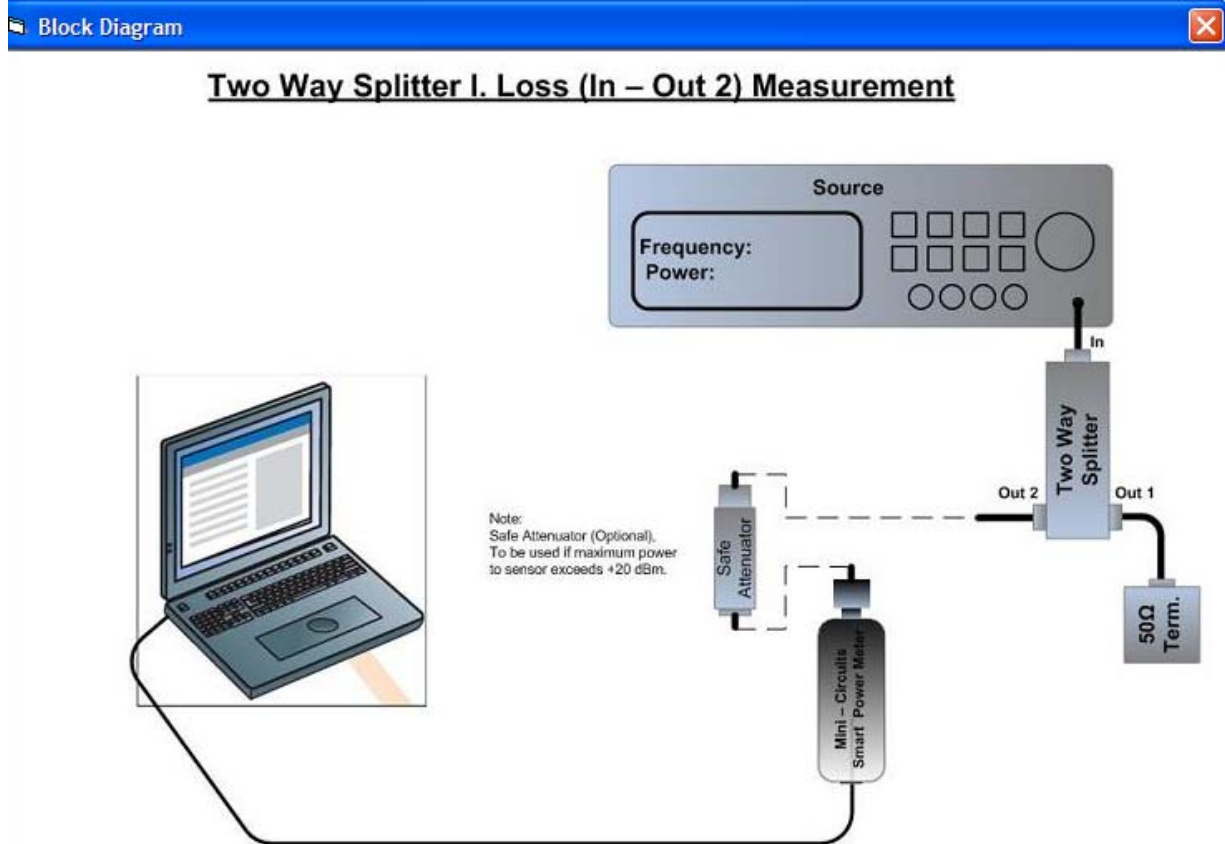
☐ Continuous Mode
☒ Display On-Line Graph

D.U.T. No: 1

DUT Serial No.:

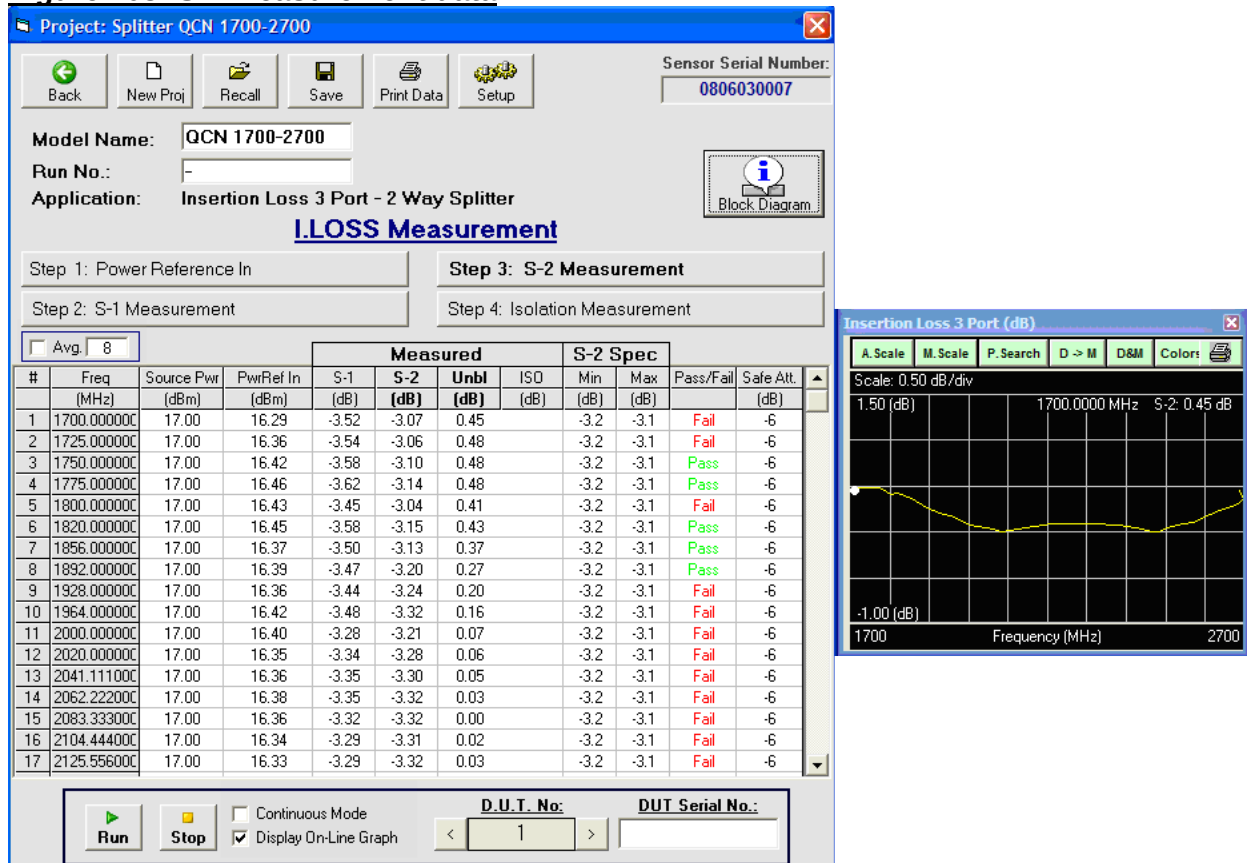
- **Step 28.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 29.** You can enable **Continuous Mode** if necessary for your application.

Figure102: Two Way Splitter's S-2 (In-Out 2) Measurement Block Diagram .



- **Step 30.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features page 22**).
- **Step 31.** Enter **D.U.T Serial No.:** (If available).
- **Step 32.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 33.** If you have more than one D.U.T to test repeat **Steps 29-32** for next test.
- **Step 34.** 2 Way Splitter's **S-2 Measurement** data received (see **Figure 103**).

Figure 103: S-2 Measurement data



- Step 35. Press **Step 4: Isolation Measurement** key.

The 2 Way Splitter's **Isolation Measurement** screen will open (see **Figure 104**).

- Step 36. Open **Isolation Measurement's** Block Diagram setup (see **Figure 105**).
- Step 37. Assemble the 2 Way Splitter's **Isolation Measurement** equipment setup.

Figure 104: Isolation Measurement

Project: Splitter QCN 1700-2700
✕

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: QCN 1700-2700

Run No.: -

Application: Insertion Loss 3 Port - 2 Way Splitter

Block Diagram

I.LOSS Measurement

Step 1: Power Reference In

Step 3: S-2 Measurement

Step 2: S-1 Measurement

Step 4: Isolation Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Measured			ISO Spec		Pass/Fail	Safe Att. (dB)
				S-1 (dB)	S-2 (dB)	Unbl (dB)	ISO (dB)	Min (dB)		
1	1700.000000	17.00	16.29	-3.52	-3.07	0.45				-6
2	1725.000000	17.00	16.36	-3.54	-3.06	0.48				-6
3	1750.000000	17.00	16.42	-3.58	-3.10	0.48				-6
4	1775.000000	17.00	16.46	-3.62	-3.14	0.48				-6
5	1800.000000	17.00	16.43	-3.45	-3.04	0.41				-6
6	1820.000000	17.00	16.45	-3.58	-3.15	0.43				-6
7	1856.000000	17.00	16.37	-3.50	-3.13	0.37				-6
8	1892.000000	17.00	16.39	-3.47	-3.20	0.27				-6
9	1928.000000	17.00	16.36	-3.44	-3.24	0.20				-6
10	1964.000000	17.00	16.42	-3.48	-3.32	0.16				-6
11	2000.000000	17.00	16.40	-3.28	-3.21	0.07				-6
12	2020.000000	17.00	16.35	-3.34	-3.28	0.06				-6
13	2041.111000	17.00	16.36	-3.35	-3.30	0.05				-6
14	2062.222000	17.00	16.38	-3.35	-3.32	0.03				-6
15	2083.333000	17.00	16.36	-3.32	-3.32	0.00				-6
16	2104.444000	17.00	16.34	-3.29	-3.31	0.02				-6
17	2125.556000	17.00	16.33	-3.29	-3.32	0.03				-6

Run

Stop

☐ Continuous Mode
☒ Display On-Line Graph

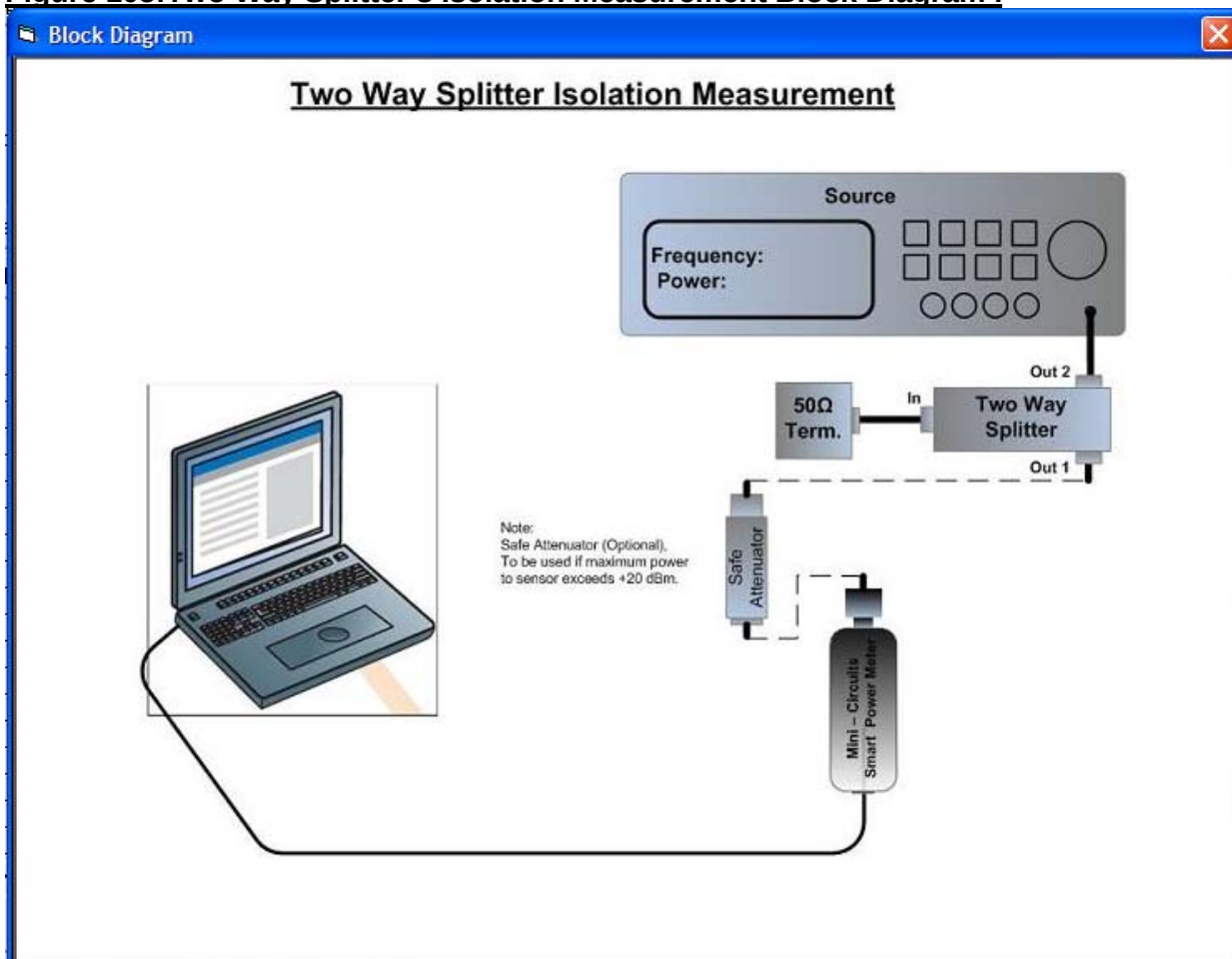
D.U.T. No:

1

DUT Serial No.:

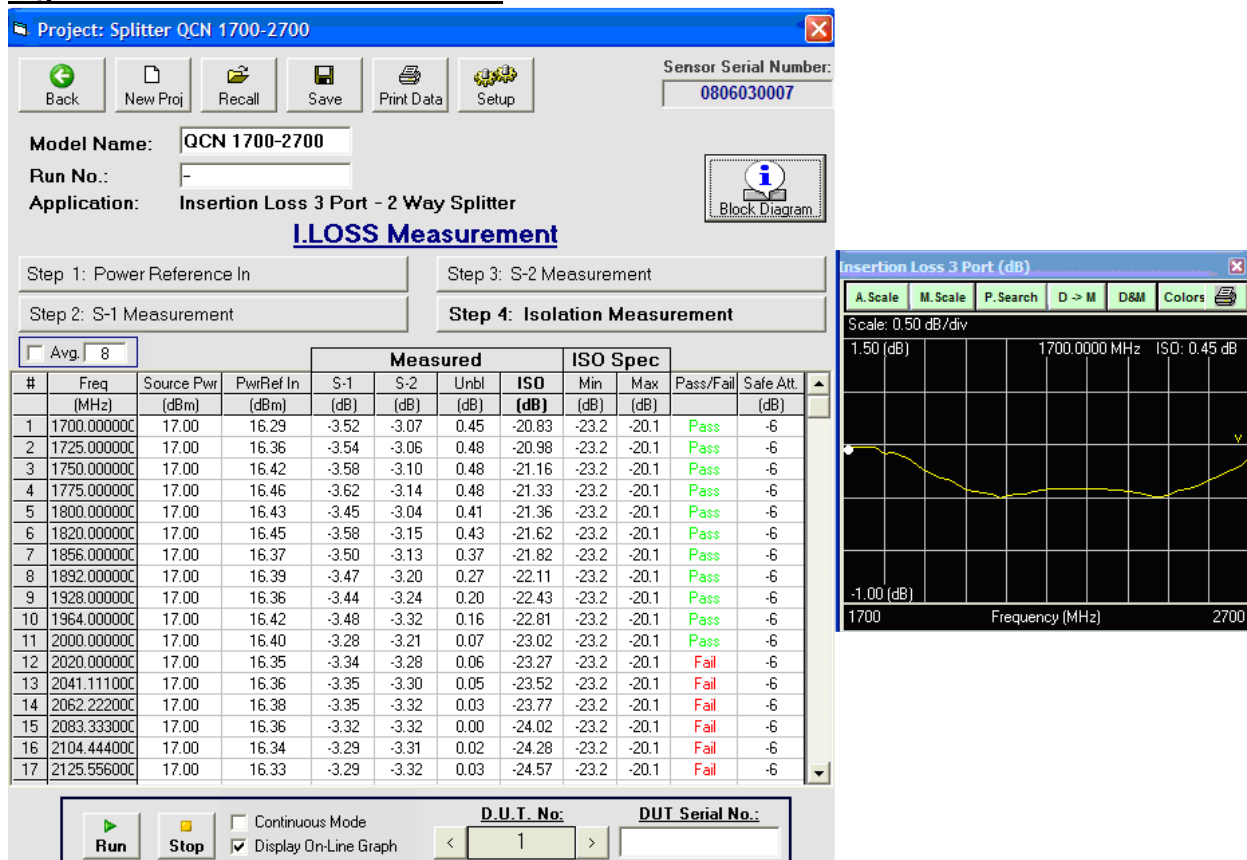
- **Step 38.** Enter spec. data (If available).
[see explanation **3.4.2.2 Spec. Definitions** on **page 21**].
- **Step 39.** You can enable **Continuous Mode** if necessary for your application.

Figure 105: Two Way Splitter's Isolation Measurement Block Diagram .



- **Step 40.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features page 22**).
- **Step 41.** Enter **D.U.T Serial No.:** (If available).
- **Step 42.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 43.** If you have more than one D.U.T to test repeat **Steps 39-42** for next test.
- **Step 44.** 2 Way Splitter's **Isolation Measurement** data received (see **Figure 106**).

Figure 106: Isolation Measurement



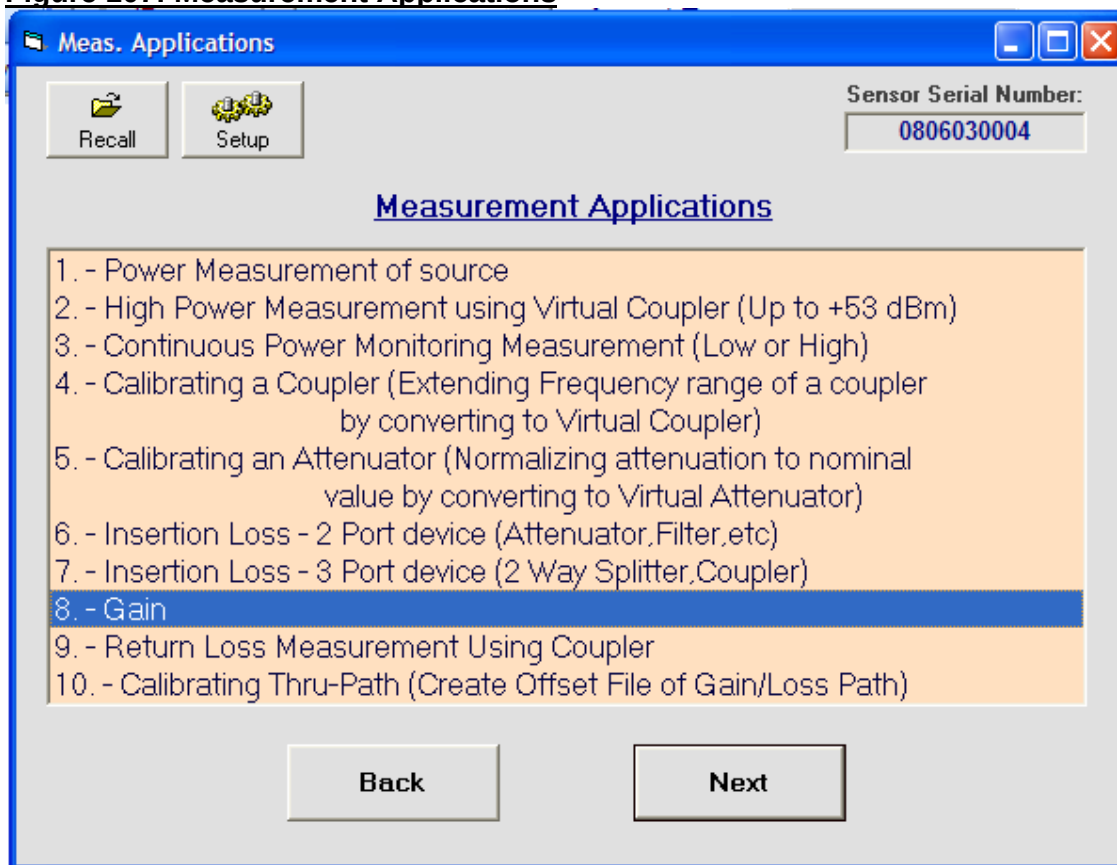
- **Step 45.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation).
- **Step 46.** You can print your test data (see **3.6 Printing Data Function** on **page 23** explanation).

11.0 Application # 8- Gain.

This chapter describes the process of measuring the Gain of a device. Before you can begin measurements you must establish a Reference Power measurement described in **3.3** on **page 13**. If the device's power output is expected to approach or exceed +20dBm you will need a safe attenuator at the power sensor input to prevent damage. If the Safe Attenuator is not flat use a Virtual Attenuator CAL file (see Virtual Attenuator in **chapter 8**.) Data output of this measurement will be in [dB]

- **Step 1.** Open a project from **Measurement Applications** screen (see **Figure 107**).

Figure 107: Measurement Applications

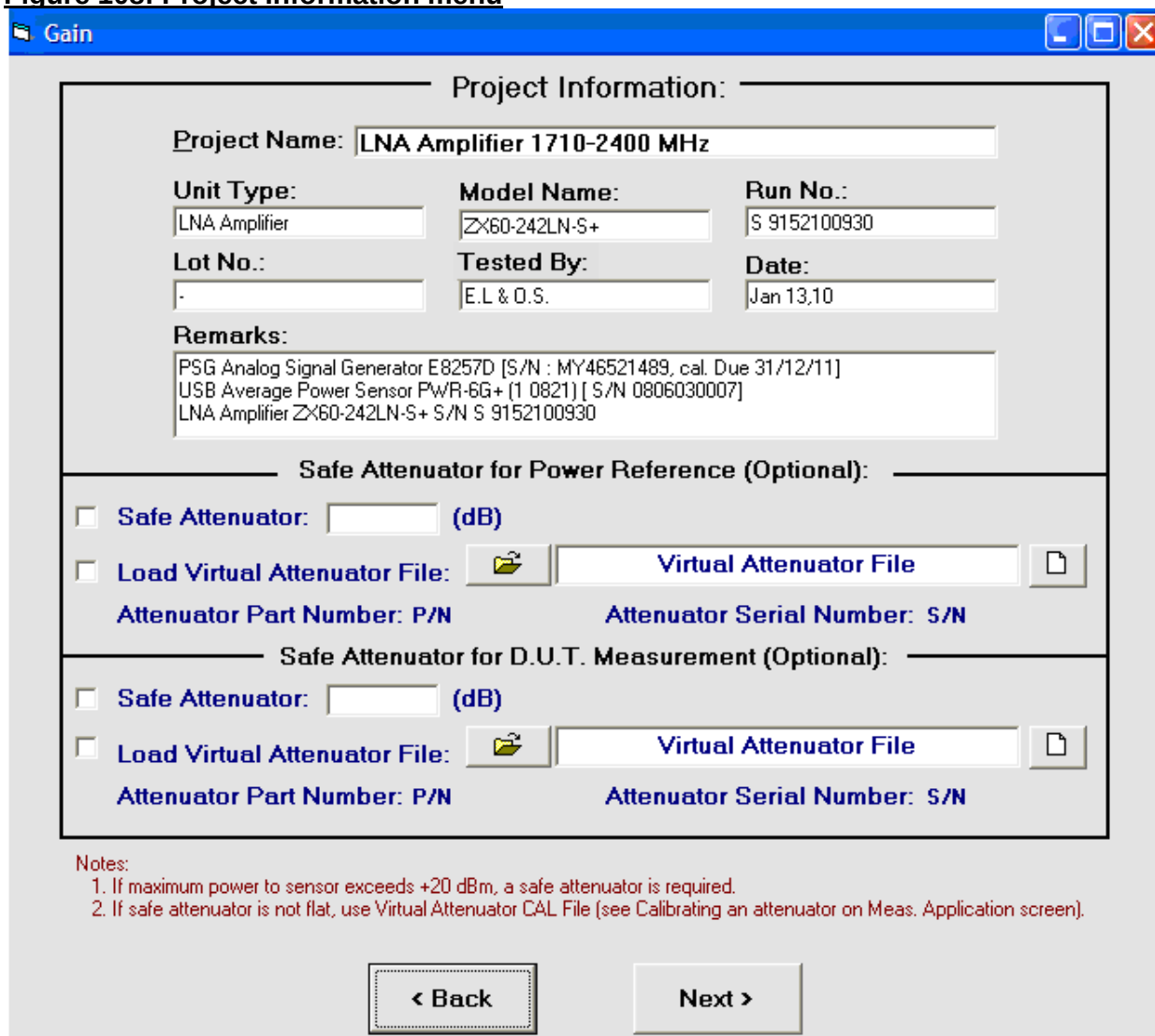


Note

If the D.U.T will enter compression during the test consider using filters as Virtual Attenuators (see **chapter 8, page 60**) to suppress harmonics.

- **Step 2.** The **Project Information** menu will open (see **Figure 108**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 8-9**.

Figure 108: Project Information menu



Project Information:

Project Name: LNA Amplifier 1710-2400 MHz

Unit Type: LNA Amplifier **Model Name:** ZX60-242LN-S+ **Run No.:** S 9152100930

Lot No.: **Tested By:** E.L & O.S. **Date:** Jan 13,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 LNA Amplifier ZX60-242LN-S+ S/N S 9152100930

Safe Attenuator for Power Reference (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:** **Virtual Attenuator File**

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:** **Virtual Attenuator File**

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

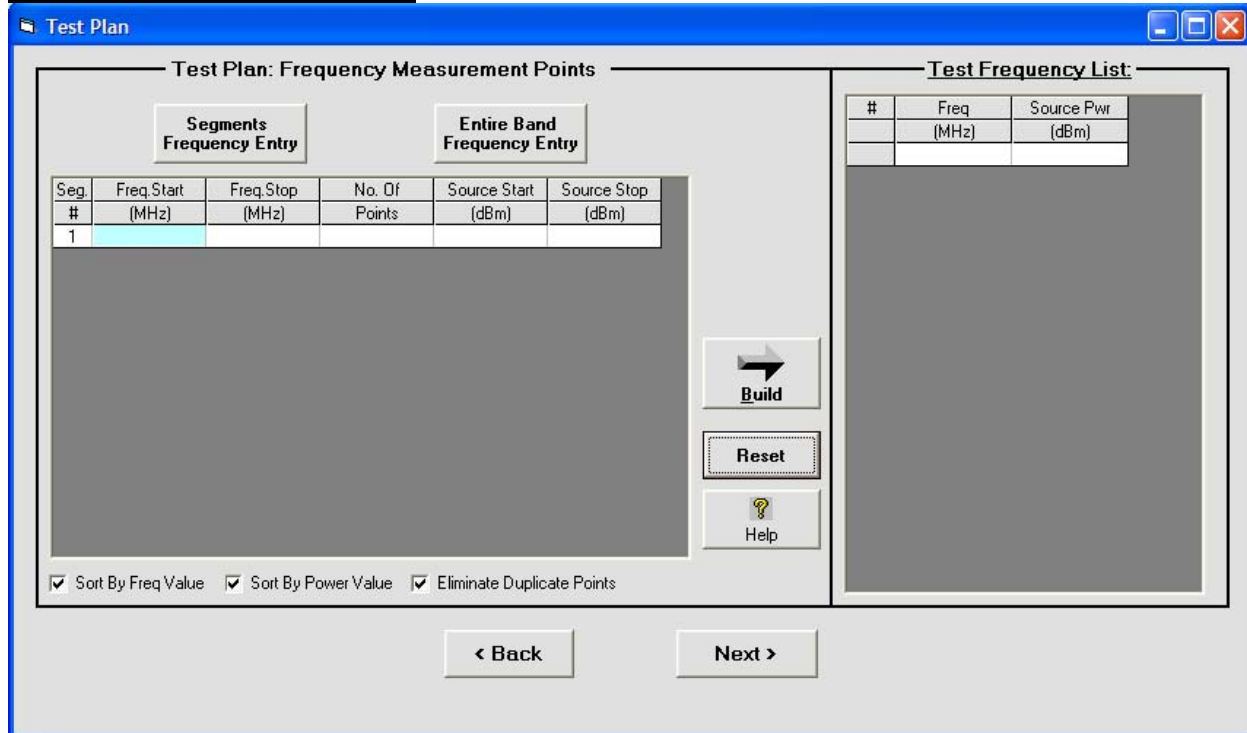
< Back **Next >**

-
- Note**
- 1.If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.
-

- **Step 4.** Press **Next** key.
 The **Test Plan** screen will open (see **Figure 109**).

- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 9-10**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and an example in **Figure 5** on **pages 10-11**).

Figure 109: Test Plan screen



The screenshot shows the 'Test Plan' window with two main sections: 'Test Plan: Frequency Measurement Points' and 'Test Frequency List'.

Test Plan: Frequency Measurement Points

At the top, there are two buttons: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'.

Below these buttons is a table with the following columns: Seg. #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg. #' column.

Below the table is a large gray area for data entry.

On the right side of this section are three buttons: 'Build' (with a right arrow icon), 'Reset', and 'Help' (with a question mark icon).

At the bottom of this section are three checkboxes: ☒ Sort By Freq Value, ☒ Sort By Power Value, and ☒ Eliminate Duplicate Points.

Test Frequency List

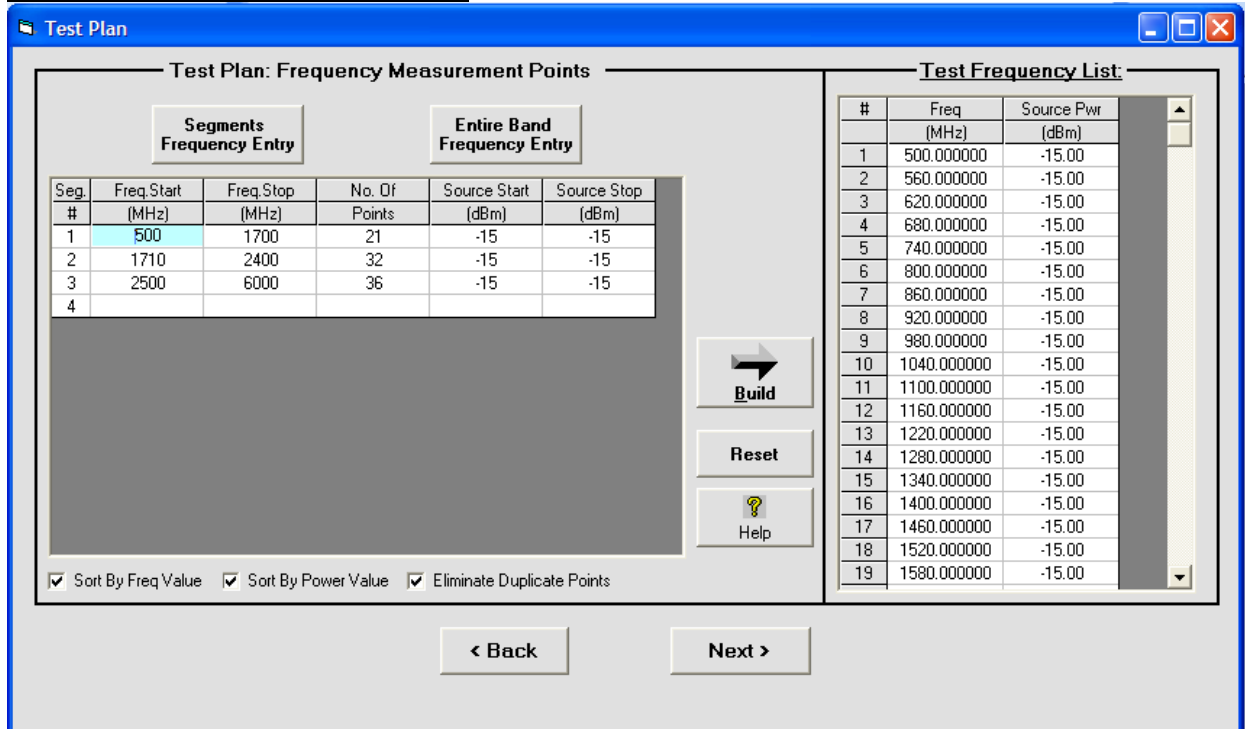
At the top of this section is a table with the following columns: #, Freq (MHz), and Source Pwr (dBm). The first row shows '1' in the '#' column.

Below the table is a large gray area for data entry.

At the bottom of the window are two buttons: '< Back' and 'Next >'.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 110**).

Figure 110: Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Seg. #	Freq. Start (MHz)	Freq. Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	500	1700	21	-15	-15
2	1710	2400	32	-15	-15
3	2500	6000	36	-15	-15
4					

Entire Band Frequency Entry

Test Frequency List:

#	Freq (MHz)	Source Pwr (dBm)
1	500.000000	-15.00
2	560.000000	-15.00
3	620.000000	-15.00
4	680.000000	-15.00
5	740.000000	-15.00
6	800.000000	-15.00
7	860.000000	-15.00
8	920.000000	-15.00
9	980.000000	-15.00
10	1040.000000	-15.00
11	1100.000000	-15.00
12	1160.000000	-15.00
13	1220.000000	-15.00
14	1280.000000	-15.00
15	1340.000000	-15.00
16	1400.000000	-15.00
17	1460.000000	-15.00
18	1520.000000	-15.00
19	1580.000000	-15.00

☒ Sort By Freq Value
 ☒ Sort By Power Value
 ☒ Eliminate Duplicate Points

< Back Next >

- **Step 8.** Press **Next** key. The **Gain Measurement** screen will open. (see **Figure 111**)
 Validate desirable data transferred from the previous screen.
 During all following steps you can use **Recall** and **Save** keys at all stages
 (see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation)

- **Step 9.** Press  key.
- **Step 10.** Open **Power Reference In** measurement **Block Diagram** setup
 (see **Figure 112**).
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings (see **2.1. Setting communication/commands in order to control an external source.** on **page 5**).

Figure 111: Power Reference In Measurement screen

Project: LNA Amplifier 1710-2400 MHz

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: ZX60-242LN-S+

Run No.: S 9152100930

Application: Gain


 Block Diagram

Gain Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

☐ Avg.

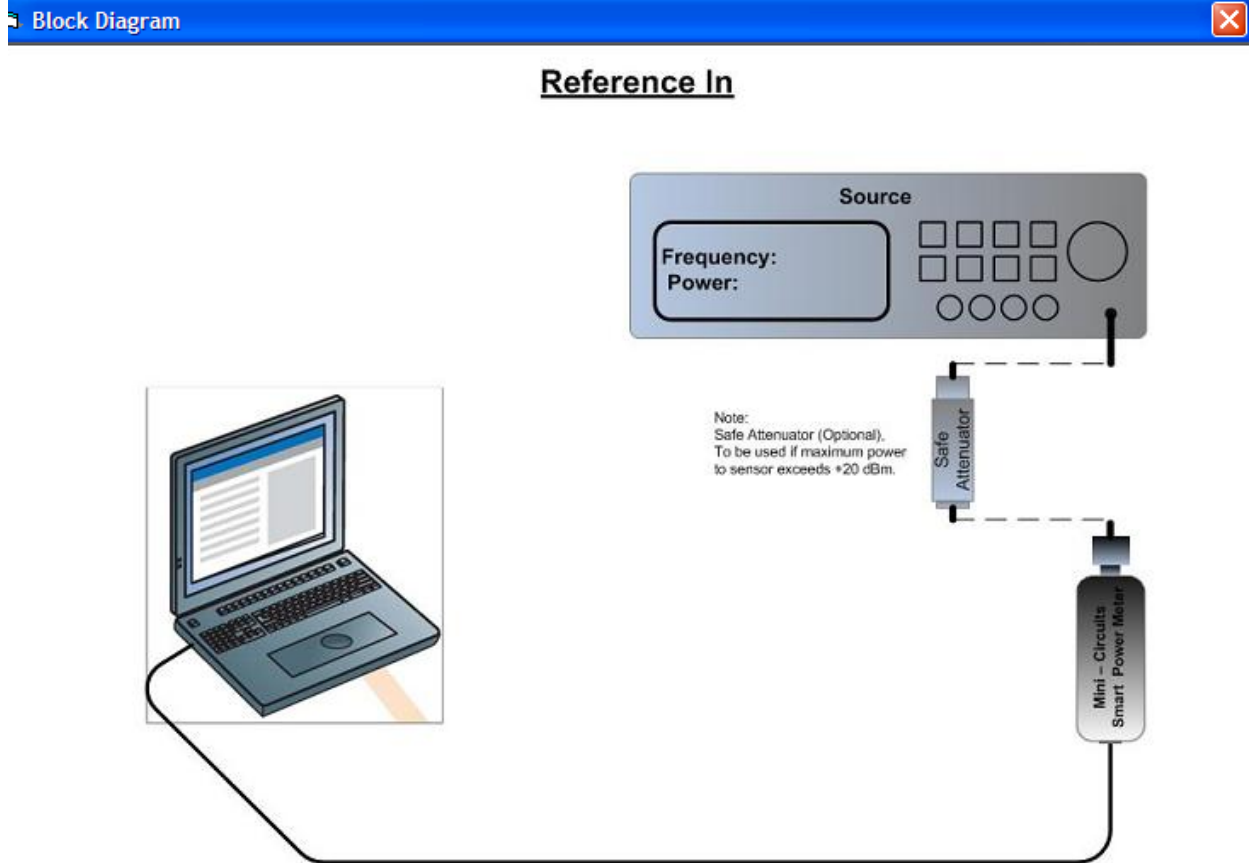
#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	Gain Spec		Pass/Fail	Safe Att. (dB)
					Gain (dB)	Min (dB)	Max (dB)		
1	500.000000	-15.00							
2	560.000000	-15.00							
3	620.000000	-15.00							
4	680.000000	-15.00							
5	740.000000	-15.00							
6	800.000000	-15.00							
7	860.000000	-15.00							
8	920.000000	-15.00							
9	980.000000	-15.00							
10	1040.000000	-15.00							
11	1100.000000	-15.00							
12	1160.000000	-15.00							
13	1220.000000	-15.00							
14	1280.000000	-15.00							
15	1340.000000	-15.00							
16	1400.000000	-15.00							
17	1460.000000	-15.00							

Run

Stop

☐ Continuous Mode
☒ Display On-Line Graph

Figure 112: Power Reference In Block Diagram setup



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14.** See results: **Figure 113: Power Reference In.**

Figure 113: Power Reference In

Project: LNA Amplifier 1710-2400 MHz
X

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:

0806030007

Model Name: ZX60-242LN-S+
Run No.: S 9152100930
Application: Gain


 Block Diagram

Gain Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	Gain Spec		Pass/Fail	Safe Att. (dB)
					Gain (dB)	Min (dBm)	Max (dBm)		
1	500.000000	-15.00	-15.32						
2	560.000000	-15.00	-15.36						
3	620.000000	-15.00	-15.36						
4	680.000000	-15.00	-15.36						
5	740.000000	-15.00	-15.36						
6	800.000000	-15.00	-15.37						
7	860.000000	-15.00	-15.39						
8	920.000000	-15.00	-15.40						
9	980.000000	-15.00	-15.42						
10	1040.000000	-15.00	-15.43						
11	1100.000000	-15.00	-15.44						
12	1160.000000	-15.00	-15.46						
13	1220.000000	-15.00	-15.46						
14	1280.000000	-15.00	-15.47						
15	1340.000000	-15.00	-15.48						
16	1400.000000	-15.00	-15.53						
17	1460.000000	-15.00	-15.54						

Run

Stop

☐ Continuous Mode
☒ Display On-Line Graph

- **Step 15.** Press

Step 2: D.U.T. Measurement

 key.

The Gain's **D.U.T Measurement** screen will open (see **Figure 114**).

- **Step 16.** Open **D.U.T Measurement's Block Diagram** setup (see **Figure 115**)
- **Step 17.** Assemble the Gain's **D.U.T Measurement** equipment setup.

Figure 114: D.U.T Measurement screen

Project: LNA Amplifier 1710-2400 MHz
✕


Back


New Proj


Recall


Save


Print Data


Setup

Sensor Serial Number:

0806030007

Model Name:

ZX60-242LN-S+

Run No.:

S 9152100930

Application:

Gain


 Block Diagram

Gain Measurement

Step 1: Power Reference In

Step 2: D.U.T Measurement

☐ Avg.

8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	Gain Spec		Pass/Fail	Safe Att. (dB)
					Gain (dB)	Min (dBm)	Max (dBm)		
1	500.000000	-15.00	-15.32						
2	560.000000	-15.00	-15.36						
3	620.000000	-15.00	-15.36						
4	680.000000	-15.00	-15.36						
5	740.000000	-15.00	-15.36						
6	800.000000	-15.00	-15.37						
7	860.000000	-15.00	-15.39						
8	920.000000	-15.00	-15.40						
9	980.000000	-15.00	-15.42						
10	1040.000000	-15.00	-15.43						
11	1100.000000	-15.00	-15.44						
12	1160.000000	-15.00	-15.46						
13	1220.000000	-15.00	-15.46						
14	1280.000000	-15.00	-15.47						
15	1340.000000	-15.00	-15.48						
16	1400.000000	-15.00	-15.53						
17	1460.000000	-15.00	-15.54						


Run


Stop

☐ Continuous Mode
☒ Display On-Line Graph

D.U.T. No:

<

1

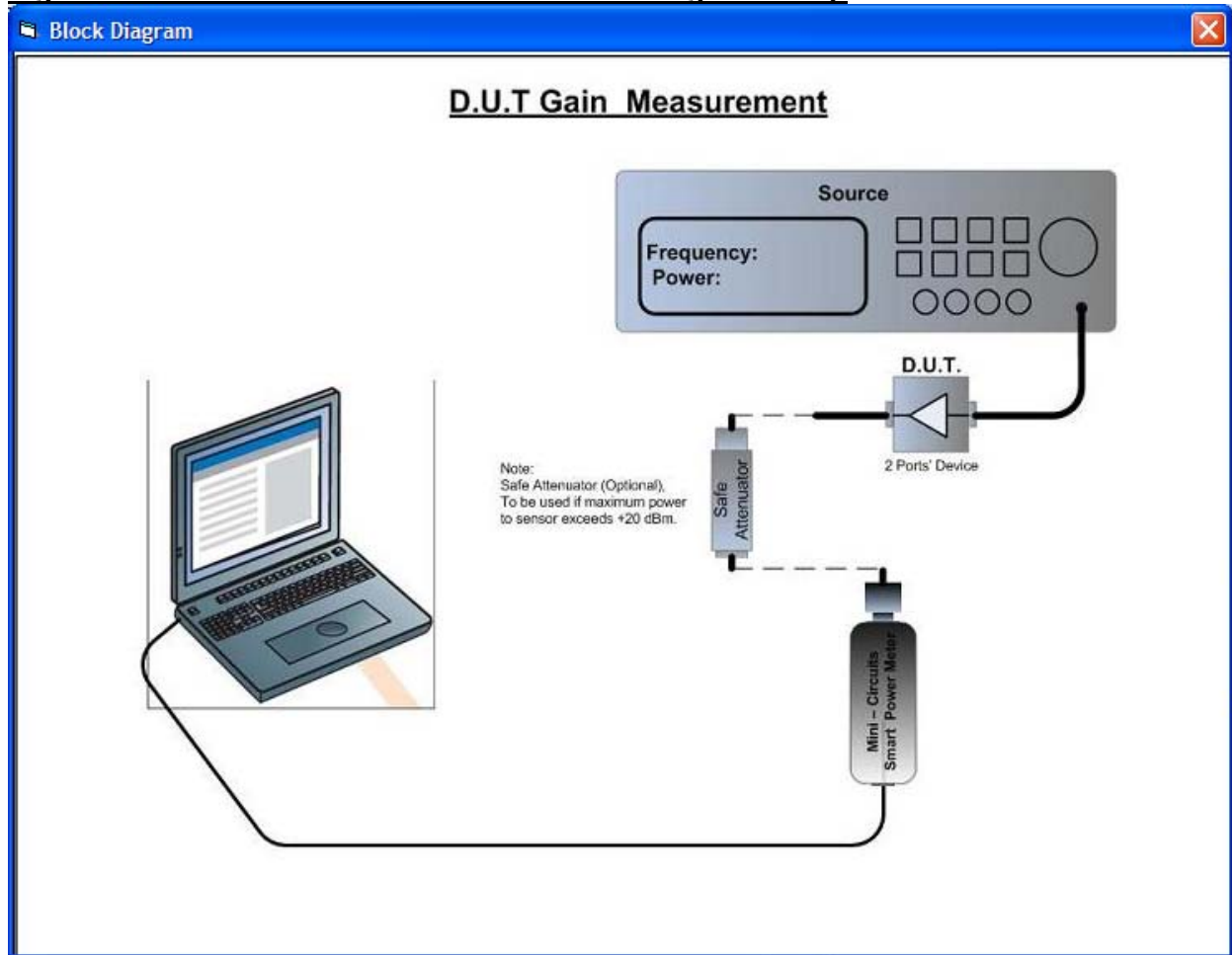
>

DUT Serial No.:

unit#1(1)

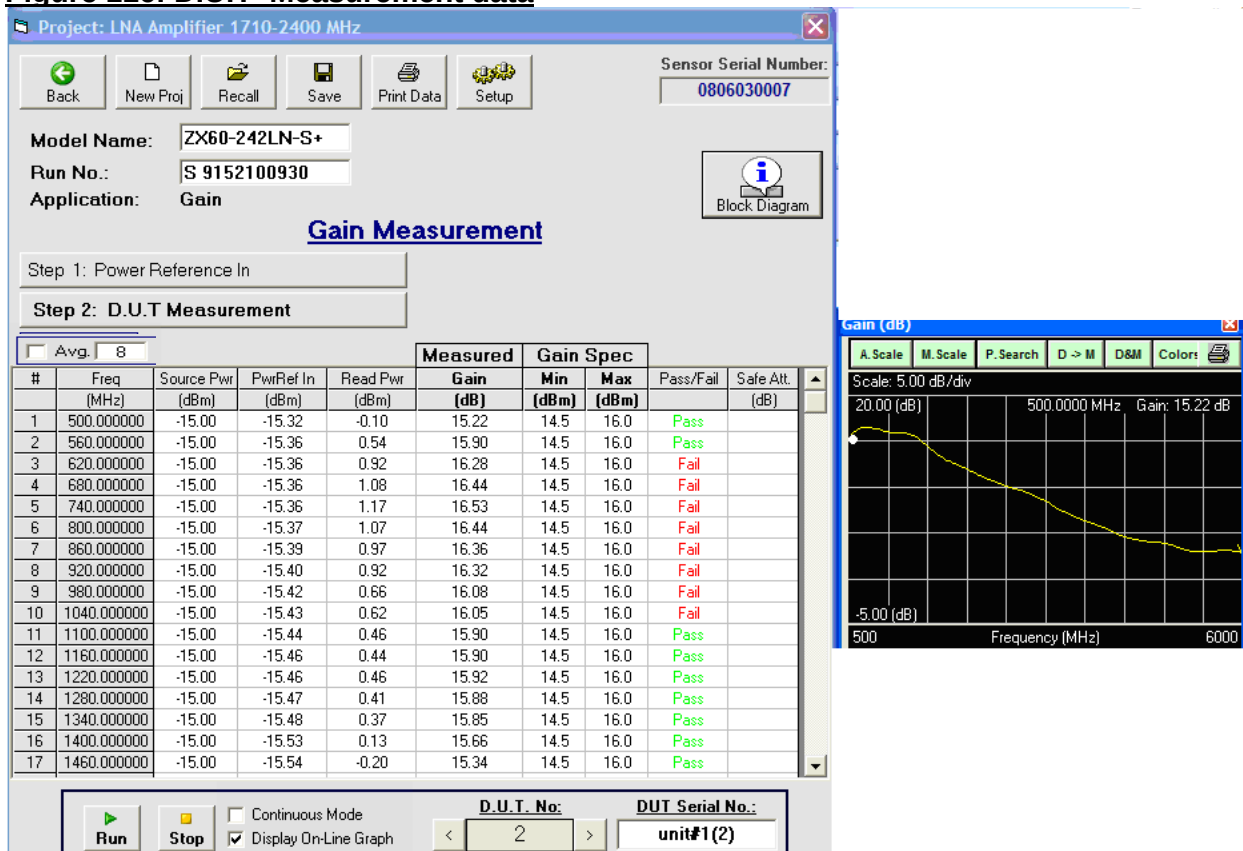
- **Step 18.** Enter spec. data (If available).
[see explanation **3.4.2.2 Spec. Definitions** on **page 21**].
- **Step 19.** You can enable **Continuous Mode** if necessary for your application.

Figure 115: D.U.T Gain Measurement Block Diagram setup



- **Step 20.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features** page 22).
- **Step 21.** Enter **D.U.T Serial No:** (If available)
- **Step 22.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 23.** If you have more than one D.U.T to test repeat **Steps 19-22** for next test.
- **Step 24.** D.U.T Measurement data received (see **Figure 116**).

Figure 116: D.U.T Measurement data



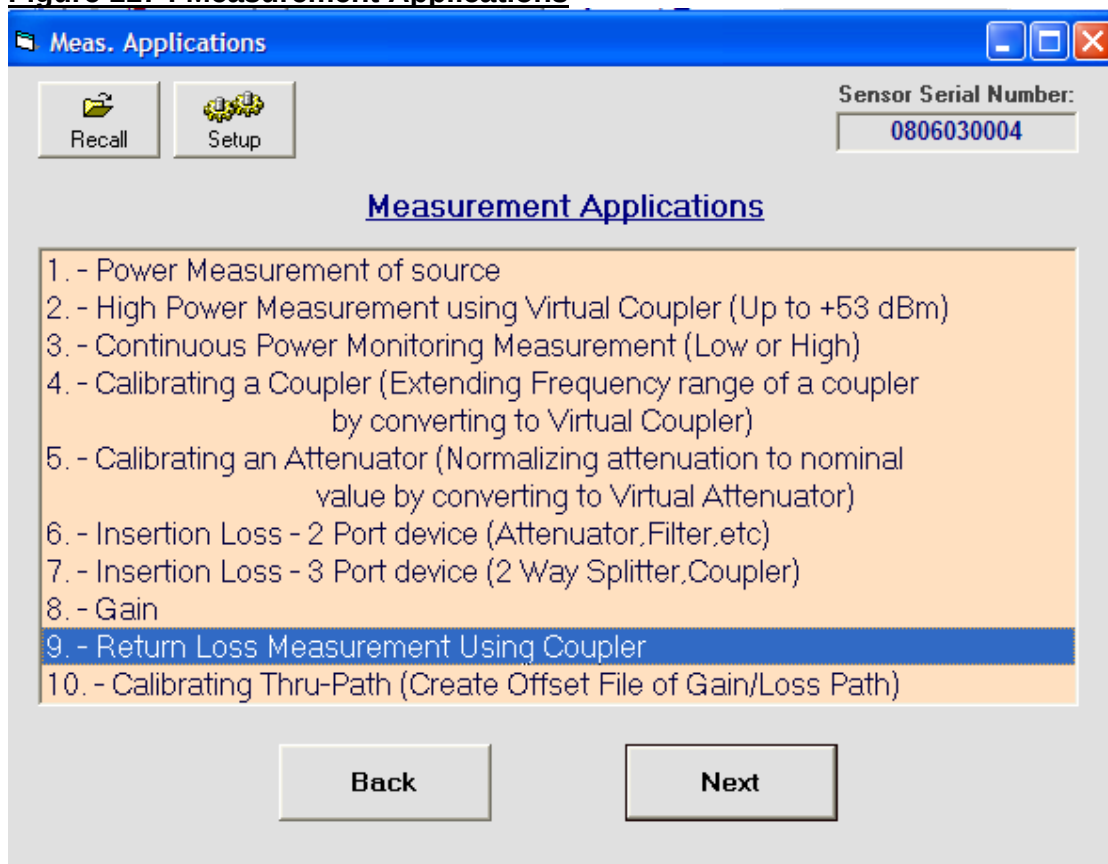
- **Step 25.** Save your project data (see 3.3.1.3 Save Function page on 16 for explanation).
- **Step 26.** You can print your test data (see 3.6 Printing Data Function on page 23 for explanation).

12.0 Application # 9- Return Loss Measurement Using Coupler.

This chapter describes the process of measuring the return loss of a one or more port device using a coupler (Virtual Coupler option is not used). Before you can begin measurements you must establish a Reference Power measurement described in 3.3 on **page 11**. Please note that the power sensor is unable to reliably detect signals below -30dBm absolute and plan input power accordingly. Data output of this measurement will be in [-dB]

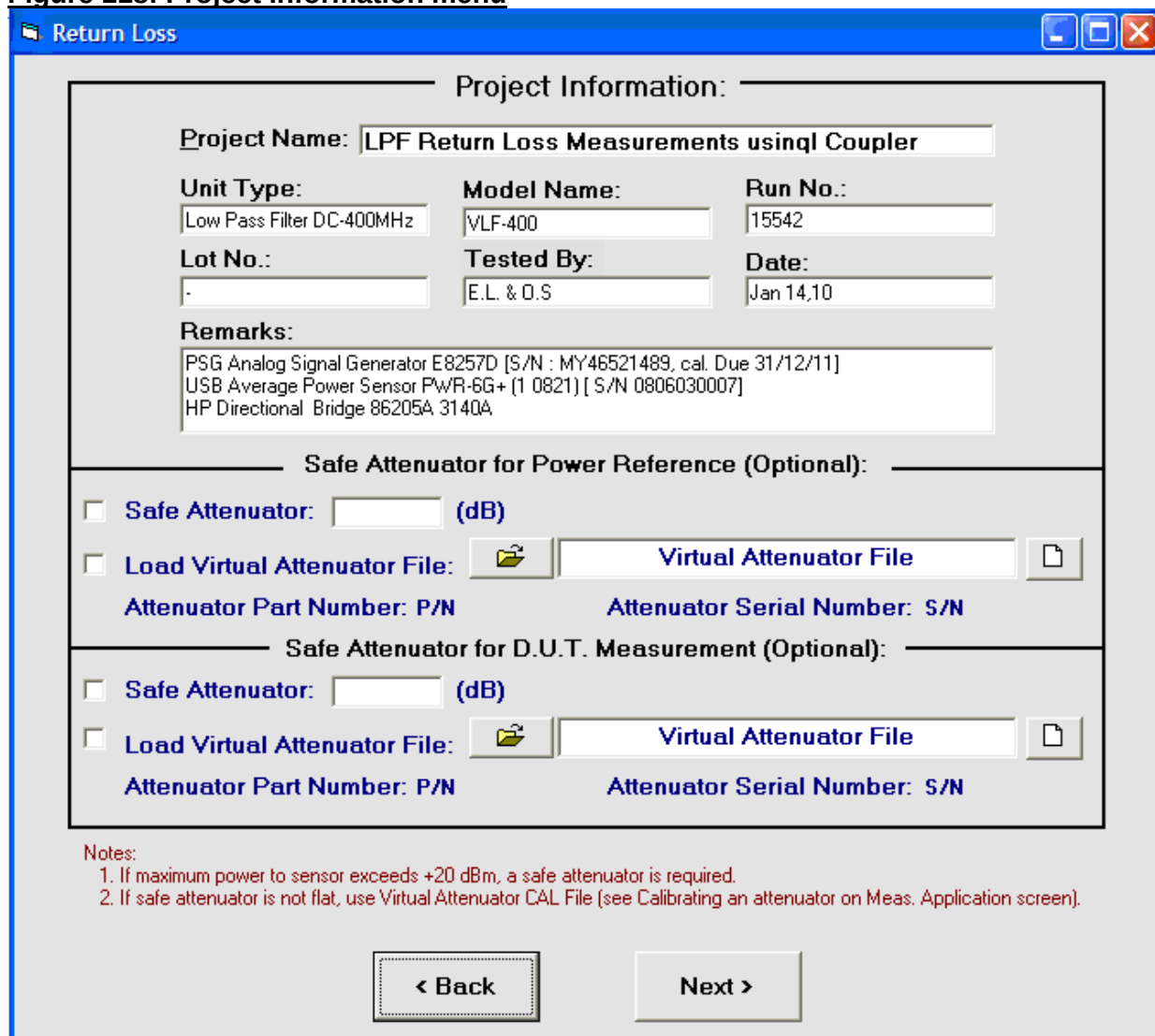
- **Step 1.** Open a project from the **Measurement Applications** screen (see **Figure 117**)

Figure 117 : Measurement Applications



- **Step 2.** The **Project Information** menu will open (see **Figure 118**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 8-9**.

Figure 118: Project Information menu



Return Loss

Project Information:

Project Name: LPF Return Loss Measurements using Coupler

Unit Type: Low Pass Filter DC-400MHz

Model Name: VLF-400

Run No.: 15542

Lot No.: -

Tested By: E.L. & O.S.

Date: Jan 14,10

Remarks:
 PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
 HP Directional Bridge 86205A 3140A

Safe Attenuator for Power Reference (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:**  **Virtual Attenuator File** 

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

Safe Attenuator for D.U.T. Measurement (Optional):

☐ **Safe Attenuator:** (dB)

☐ **Load Virtual Attenuator File:**  **Virtual Attenuator File** 

Attenuator Part Number: P/N **Attenuator Serial Number: S/N**

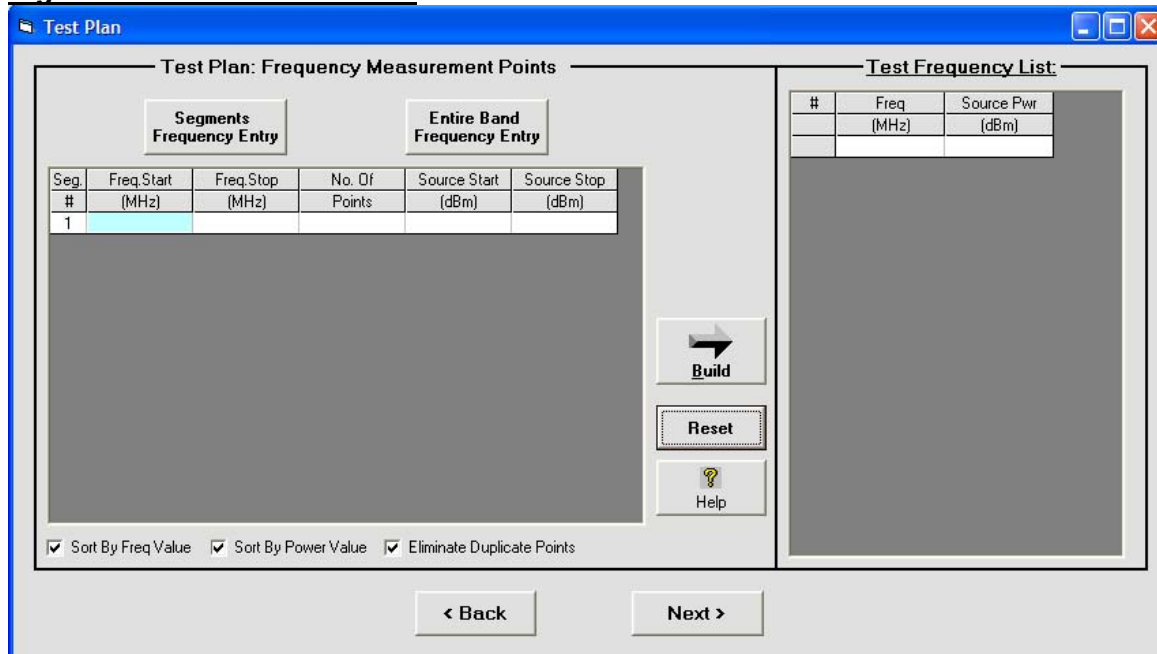
Notes:
 1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
 2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

< Back **Next >**

- Note**
- 1.If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.

- **Step 4.** Press **Next** key. The **Test Plan** screen will open (see **Figure 119**)
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **pages 9-10**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and example in **Figure 5** on **pages 10-11**).

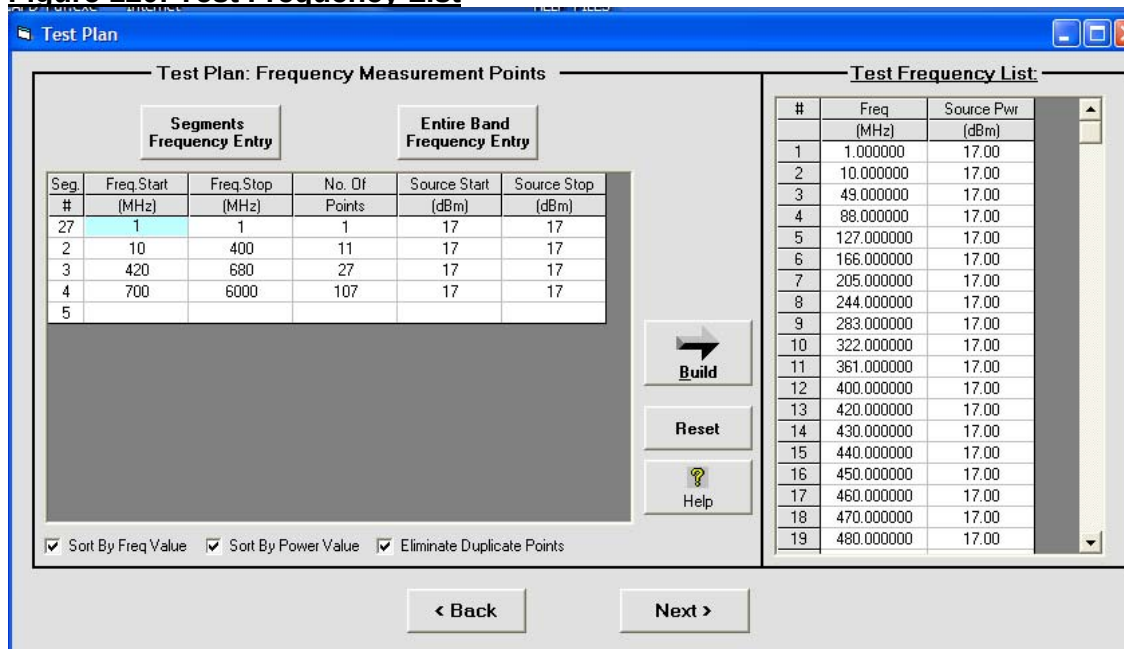
Figure 119: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg #, Freq. Start (MHz), Freq. Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build', 'Reset', and 'Help'. The 'Test Frequency List' section on the right contains a table with columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 120**).

Figure 120: Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Seg	#	Freq Start (MHz)	Freq Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
27	1	1	1	1	17	17
2	10	400	11	17	17	
3	420	680	27	17	17	
4	700	6000	107	17	17	
5						

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

Build **Reset** **Help**

Test Frequency List

#	Freq (MHz)	Source Pwr (dBm)
1	1.000000	17.00
2	10.000000	17.00
3	49.000000	17.00
4	88.000000	17.00
5	127.000000	17.00
6	166.000000	17.00
7	205.000000	17.00
8	244.000000	17.00
9	283.000000	17.00
10	322.000000	17.00
11	361.000000	17.00
12	400.000000	17.00
13	420.000000	17.00
14	430.000000	17.00
15	440.000000	17.00
16	450.000000	17.00
17	460.000000	17.00
18	470.000000	17.00
19	480.000000	17.00

< Back **Next >**

- **Step 8.** Press **Next** key The **R. Loss Measurement** screen will open.
(see **Figure 121**) Validate desirable data transferred from the previous screen. During all following steps you can use **Recall** and **Save** keys at all stages (see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation)
- **Step 9.** Press  key.
- **Step 10.** Open **Return Loss Reference** measurement's **Block Diagram** setup (see **Figure 122**).
- **Step 11.** Assemble the **Return Loss Reference** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings
(see **2.1. Setting communication/commands in order to control an external source.** on **page 5**)

Figure 121: Return Loss Reference screen

Project: LPF Return Loss Measurements using I Coupler

Back

New Proj

Recall

Save

Print Data

Setup

Sensor Serial Number:
0806030007

Model Name: VLF-400

Run No.: 15542

Application: Return Loss

Block Diagram

R.LOSS Measurement

Step 1: Return Loss Reference

Step 2: D.U.T Measurement

Avg. 8

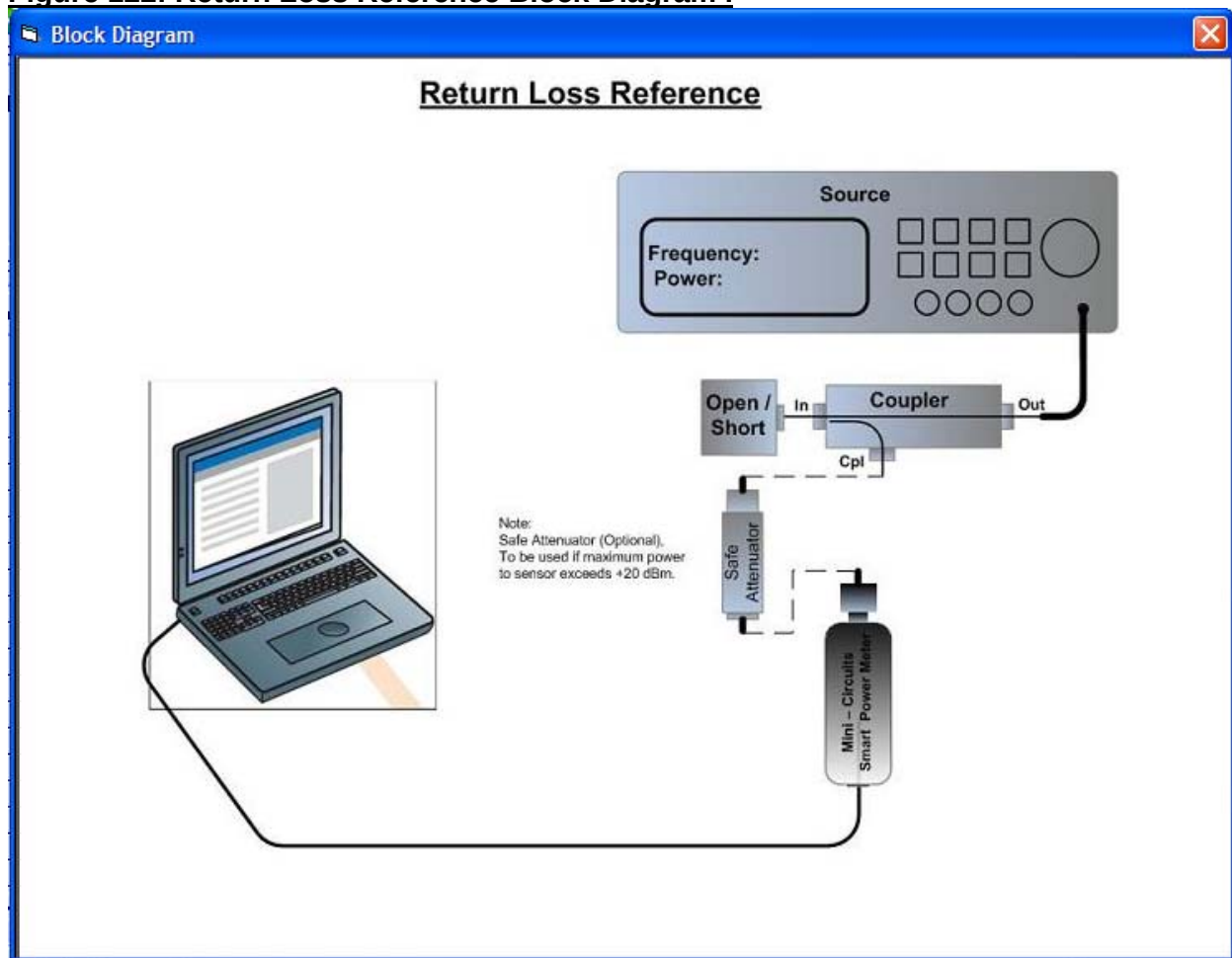
#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	R.Loss Spec		Pass/Fail	Safe Att. (dB)
					R.Loss (dB)	Min (dB)	Max (dB)		
1	1.000000	17.00							
2	10.000000	17.00							
3	49.000000	17.00							
4	88.000000	17.00							
5	127.000000	17.00							
6	166.000000	17.00							
7	205.000000	17.00							
8	244.000000	17.00							
9	283.000000	17.00							
10	322.000000	17.00							
11	361.000000	17.00							
12	400.000000	17.00							
13	420.000000	17.00							
14	430.000000	17.00							
15	440.000000	17.00							
16	450.000000	17.00							
17	460.000000	17.00							

Run

Stop

☐ Continuous Mode
☒ Display On-Line Graph

Figure 122: Return Loss Reference Block Diagram .



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14.** See results **Figure 123: Return Loss Reference.**

Figure 123: Return Loss Reference.

Project: LPF Return Loss Measurements using 1 Coupler

Sensor Serial Number: 0806030007

Model Name: VLF-400
 Run No.: 15542
 Application: Return Loss

R.LOSS Measurement

Step 1: Return Loss Reference

Step 2: D.U.T Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	R.Loss Spec		Pass/Fail	Safe Att. (dB)
					R.Loss (dB)	Min (dB)	Max (dB)		
1	1.000000	17.00	-0.47						
2	10.000000	17.00	-0.57						
3	49.000000	17.00	-0.86						
4	88.000000	17.00	-0.91						
5	127.000000	17.00	-0.88						
6	166.000000	17.00	-0.64						
7	205.000000	17.00	-1.20						
8	244.000000	17.00	-1.08						
9	283.000000	17.00	-1.14						
10	322.000000	17.00	-1.52						
11	361.000000	17.00	-1.33						
12	400.000000	17.00	-1.15						
13	420.000000	17.00	-1.25						
14	430.000000	17.00	-1.64						
15	440.000000	17.00	-1.71						
16	450.000000	17.00	-1.54						
17	460.000000	17.00	-1.54						

☐ Continuous Mode
☒ Display On-Line Graph

- **Step 15.** Press key.

The D.U.T Measurement screen will open (see **Figure 124**).

- **Step 16.** Open D.U.T Measurement's **Block Diagram** setup (see **Figure 125**).
- **Step 17.** Assemble the R. Loss's **D.U.T Measurement** equipment setup.

Figure 124 : D.U.T Measurement

Project: LPF Return Loss Measurements using Coupler

Sensor Serial Number: 0806030007

Model Name: VLF-400
 Run No.: 15542
 Application: Return Loss

R.LOSS Measurement

Step 1: Return Loss Reference

Step 2: D.U.T Measurement

☐ Avg. 8

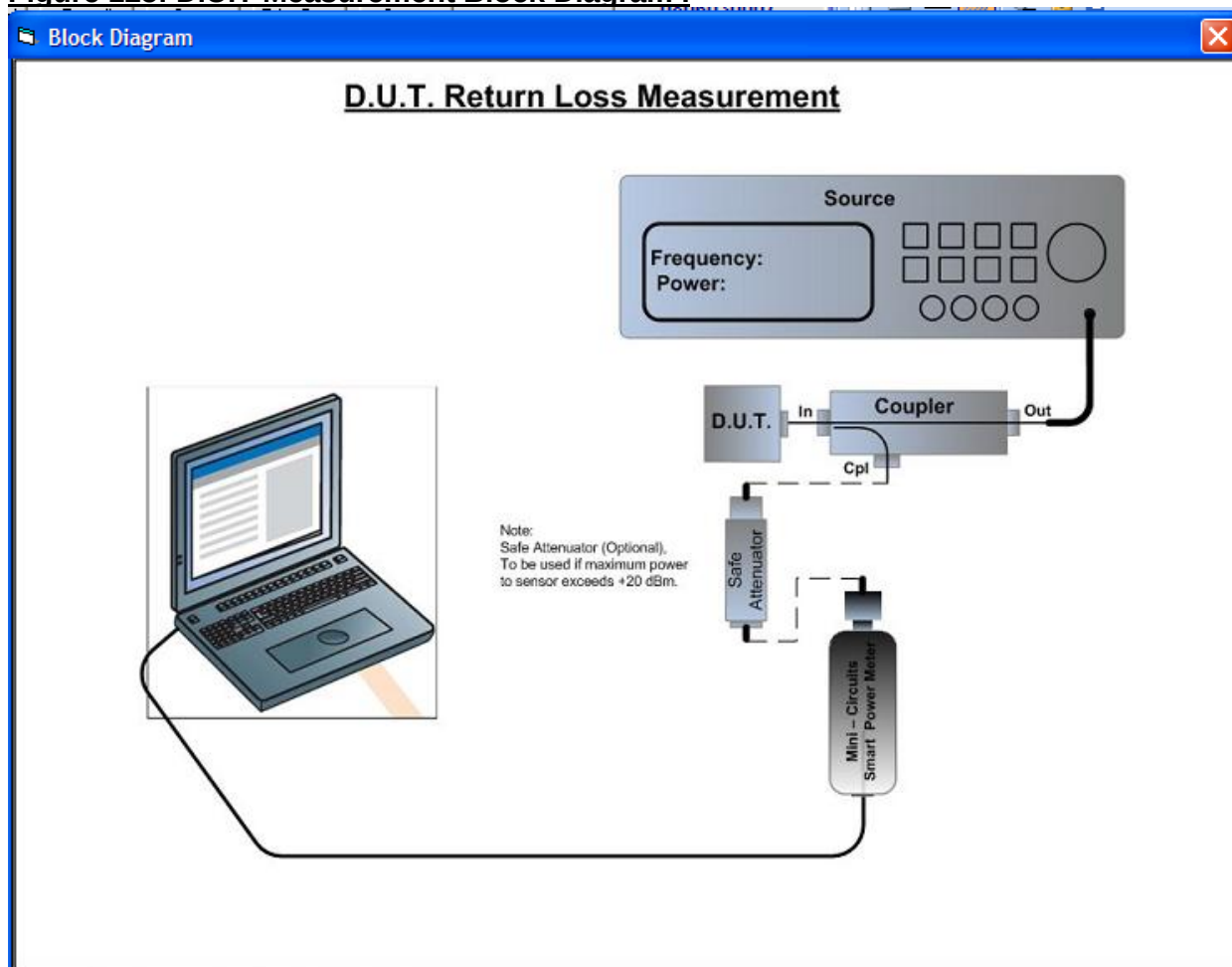
#	Freq (MHz)	Source Pwr (dBm)	PwrRef In (dBm)	Read Pwr (dBm)	Measured	R.Loss Spec		Pass/Fail	Safe Att. (dB)
					R.Loss (dB)	Min (dB)	Max (dB)		
1	1.000000	17.00	-0.47						
2	10.000000	17.00	-0.57						
3	49.000000	17.00	-0.86						
4	88.000000	17.00	-0.91						
5	127.000000	17.00	-0.88						
6	166.000000	17.00	-0.64						
7	205.000000	17.00	-1.20						
8	244.000000	17.00	-1.08						
9	283.000000	17.00	-1.14						
10	322.000000	17.00	-1.52						
11	361.000000	17.00	-1.33						
12	400.000000	17.00	-1.15						
13	420.000000	17.00	-1.25						
14	430.000000	17.00	-1.64						
15	440.000000	17.00	-1.71						
16	450.000000	17.00	-1.54						
17	460.000000	17.00	-1.54						

☐ Continuous Mode
 ☒ Display On-Line Graph

D.U.T. No: 1
 DUT Serial No.: unit#1(1)

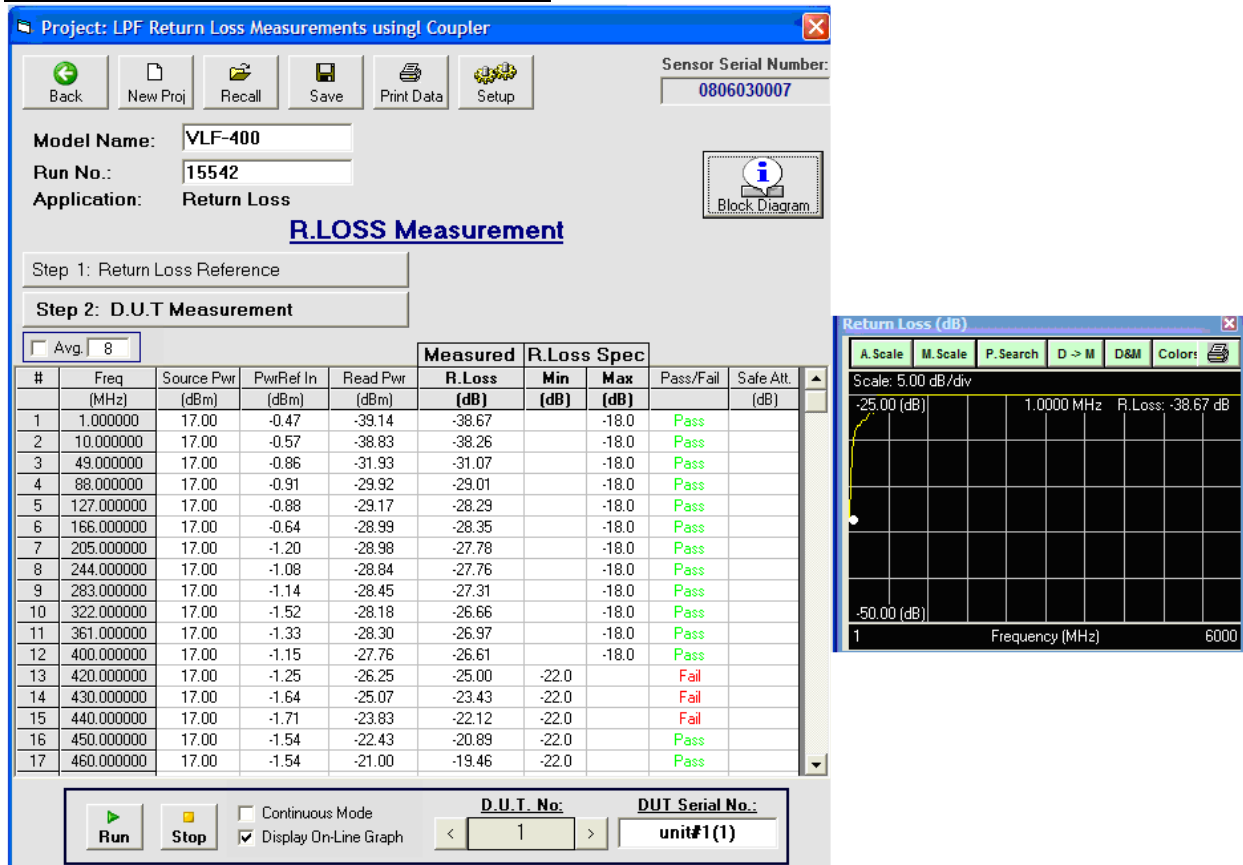
- **Step 18.** Enter spec. data (If available).
[see explanation 3.4.2.2 Spec. Definitions on page 21].
- **Step 19.** You can enable **Continuous Mode** if necessary for your application.

Figure 125: D.U.T Measurement Block Diagram .



- **Step 20.** You can enable the **On-Line Graph** option.
(see **3.5 On-Line Graph features page 22**).
- **Step 21.** Enter **D.U.T Serial No:** (If available).
- **Step 22.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 23.** If you have more than one D.U.T to test repeat **Steps 19-22** for next test.
- **Step 24.** **Return Loss Measurement** received (see **Figure 126**).

Figure 126: Return Loss Measurement



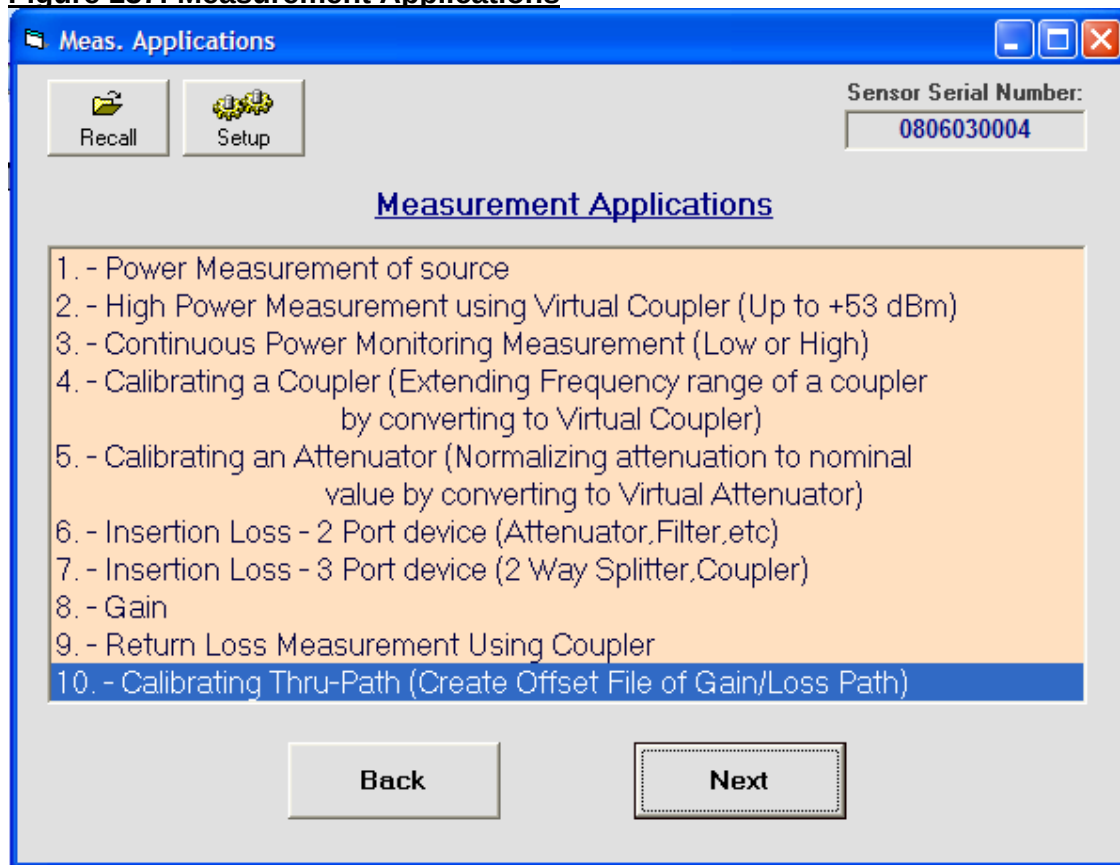
- **Step 25.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation).
- **Step 26.** You can print your test data (see **3.6 Printing Data Function** on **page 23** explanation).

13.0 Application # 10- Calibrating Thru -Path (create Offset file of Gain/Loss Path)

This chapter describes the process of creating a calibration offset file containing the system loss/gain without the D.U.T .The file can be used as either an offset file to compensate for existing setup loss/gain.

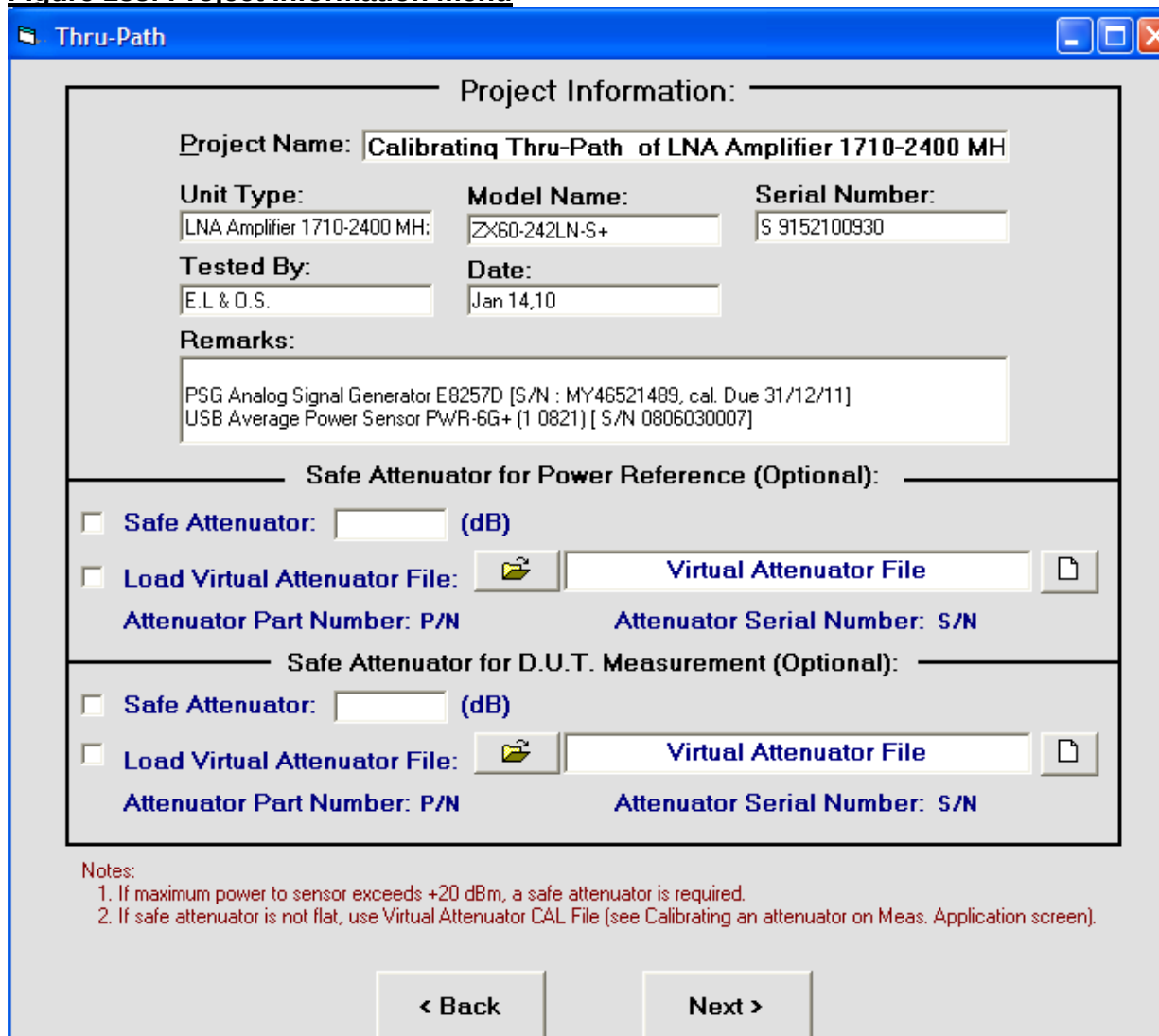
- **Step 1.** Open a project from the **Measurement Applications** screen (see **Figure 137**)

Figure 137: Measurement Applications



- **Step 2.** The **Project Information** menu will open (see **Figure 138**).
- **Step 3.** Review and fill all necessary fields in the **Project Information** menu see detailed explanation **Figure 4** and **Table 3** at **pages 9-10**.

Figure 138: Project Information menu



The screenshot shows a software window titled "Thru-Path" with a "Project Information:" section. The form contains the following fields and options:

- Project Name:** Calibrating Thru-Path of LNA Amplifier 1710-2400 MH
- Unit Type:** LNA Amplifier 1710-2400 MH;
- Model Name:** ZX60-242LN-S+
- Serial Number:** S 9152100930
- Tested By:** E.L & O.S.
- Date:** Jan 14,10
- Remarks:**

PSG Analog Signal Generator E8257D [S/N : MY46521489, cal. Due 31/12/11]
 USB Average Power Sensor PWR-6G+ (1 0821) [S/N 0806030007]
- Safe Attenuator for Power Reference (Optional):**
 - ☐ Safe Attenuator: [] (dB)
 - ☐ Load Virtual Attenuator File: [Browse] Virtual Attenuator File [File]
 - Attenuator Part Number: P/N
 - Attenuator Serial Number: S/N
- Safe Attenuator for D.U.T. Measurement (Optional):**
 - ☐ Safe Attenuator: [] (dB)
 - ☐ Load Virtual Attenuator File: [Browse] Virtual Attenuator File [File]
 - Attenuator Part Number: P/N
 - Attenuator Serial Number: S/N

Notes:

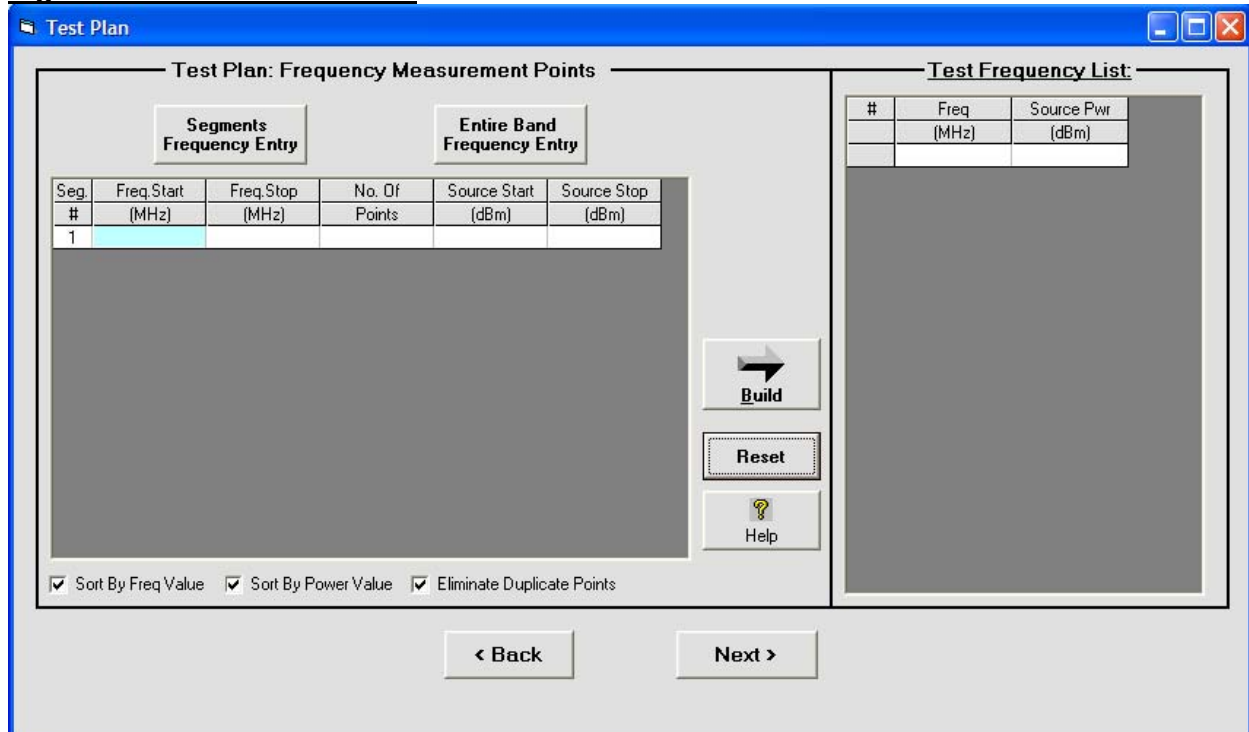
1. If maximum power to sensor exceeds +20 dBm, a safe attenuator is required.
2. If safe attenuator is not flat, use Virtual Attenuator CAL File (see Calibrating an attenuator on Meas. Application screen).

Navigation buttons: < Back, Next >

-
- Note**
1. If maximum power to sensor exceeds +20dBm, a safe attenuator is required
 2. If safe attenuator is not flat, use Virtual Attenuator file. See creation of Virtual Attenuator **Chapter 8**.
-

- **Step 4.** Press **Next** key.
The **Test Plan** screen will open (see **Figure 139**).
- **Step 5.** You can choose one of two options to build the measurement points set (see **Chapter 3.2, Figures 5-6** on **page 10**).
- **Step 6.** Create the measurement points and set input power (you can see an explanation and example in **Figure 5** on **pages 10-11**).

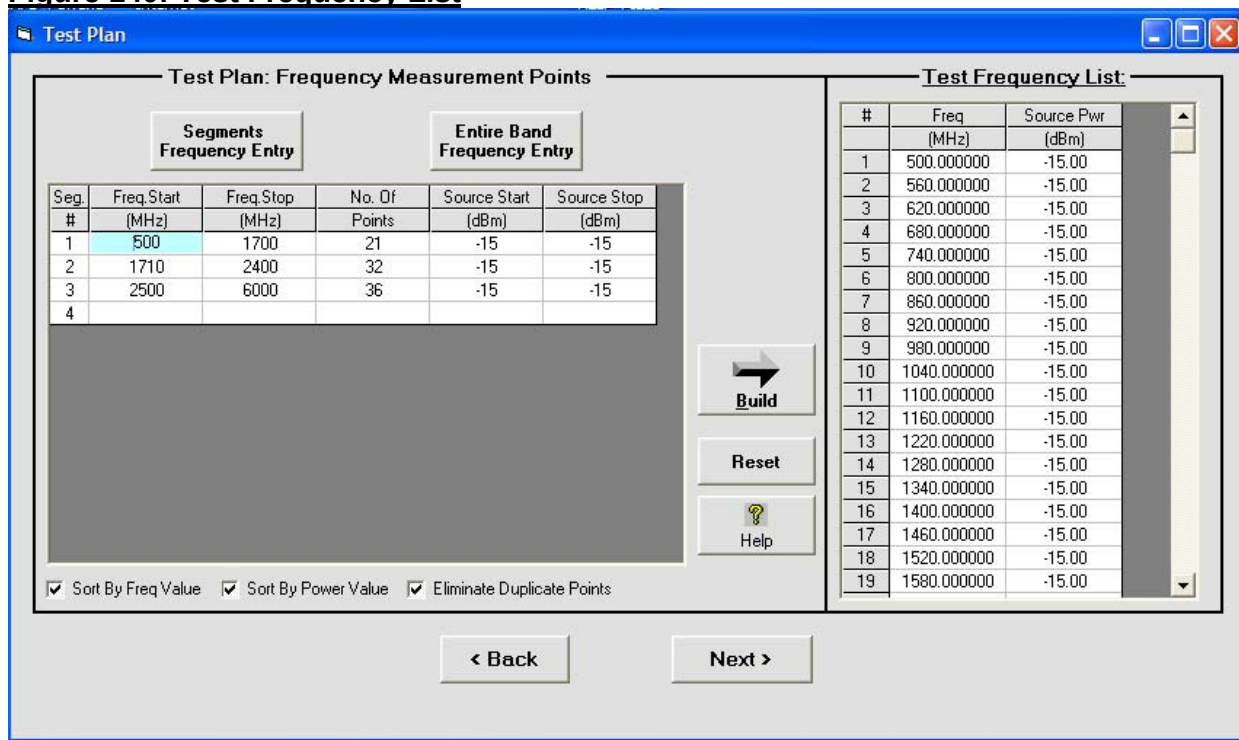
Figure 139: Test Plan screen



The screenshot shows the 'Test Plan' window with the title 'Test Plan: Frequency Measurement Points'. It features two main sections: 'Segments Frequency Entry' and 'Entire Band Frequency Entry'. The 'Segments Frequency Entry' section contains a table with columns: Seg #, Freq Start (MHz), Freq Stop (MHz), No. Of Points, Source Start (dBm), and Source Stop (dBm). The first row shows '1' in the 'Seg #' column. Below the table are three checkboxes: 'Sort By Freq Value', 'Sort By Power Value', and 'Eliminate Duplicate Points', all of which are checked. To the right of the table are three buttons: 'Build' (with a right arrow icon), 'Reset', and 'Help' (with a question mark icon). The 'Entire Band Frequency Entry' section is currently empty. At the bottom of the window are two navigation buttons: '< Back' and 'Next >'. On the right side of the window, there is a 'Test Frequency List' section with a table that has columns: #, Freq (MHz), and Source Pwr (dBm). The table is currently empty.

- **Step 7.** Press **Build** key to create a **Test Frequency List** (see **Figure 140**).

Figure 140: Test Frequency List



Test Plan: Frequency Measurement Points

Segments Frequency Entry

Seg. #	Freq Start (MHz)	Freq Stop (MHz)	No. Of Points	Source Start (dBm)	Source Stop (dBm)
1	500	1700	21	-15	-15
2	1710	2400	32	-15	-15
3	2500	6000	36	-15	-15
4					

Test Frequency List

#	Freq (MHz)	Source Pwr (dBm)
1	500.000000	-15.00
2	560.000000	-15.00
3	620.000000	-15.00
4	680.000000	-15.00
5	740.000000	-15.00
6	800.000000	-15.00
7	860.000000	-15.00
8	920.000000	-15.00
9	980.000000	-15.00
10	1040.000000	-15.00
11	1100.000000	-15.00
12	1160.000000	-15.00
13	1220.000000	-15.00
14	1280.000000	-15.00
15	1340.000000	-15.00
16	1400.000000	-15.00
17	1460.000000	-15.00
18	1520.000000	-15.00
19	1580.000000	-15.00

Build Reset Help

☒ Sort By Freq Value ☒ Sort By Power Value ☒ Eliminate Duplicate Points

< Back Next >

- **Step 8.** Press **Next** key .The **Thru- Path** screen will open. (see **Figure 141**)
Validate desirable data transferred from the previous screen.
During all following steps you can use **Recall** and **Save** keys at all stages
(see **3.3.1.2 Recall** on **page 15**, **3.3.1.3 Save** on **page 16** for explanation)
- **Step 9.** Press  key.
- **Step 10.** Open **Power Reference In** measurement's **Block Diagram** setup
(see **Figure 142**)
- **Step 11.** Assemble the **Power Reference In** equipment setup.
- **Step 12.** Define/Confirm **Setup** settings
(see **2.1. Setting communication/commands in order to control an external source.** on **page 5**).

Figure 141: Power Reference In

Project: Calibrating Thru-Path of LNA Amplifier 1710-2400 MHz
✕


Back


New Proj


Recall


Save


Print Data


Setup

Sensor Serial Number

0806030007

Model Name: ZX60-242LN-S+
Serial No.: S 9152100930
Application: Thru-Path


 Block Diagram

Thru-Path Measurement

Step 1: Power Reference In

Step 2: Thru-Path Measurement

☐ Avg.

#	Freq (MHz)	Source Pwr (dBm)	Pwr RefIn (dBm)	Read Pwr (dBm)	Gain/Loss (dB)
1	500.000000	-15.00			
2	560.000000	-15.00			
3	620.000000	-15.00			
4	680.000000	-15.00			
5	740.000000	-15.00			
6	800.000000	-15.00			
7	860.000000	-15.00			
8	920.000000	-15.00			
9	980.000000	-15.00			
10	1040.000000	-15.00			
11	1100.000000	-15.00			
12	1160.000000	-15.00			
13	1220.000000	-15.00			
14	1280.000000	-15.00			
15	1340.000000	-15.00			
16	1400.000000	-15.00			
17	1460.000000	-15.00			

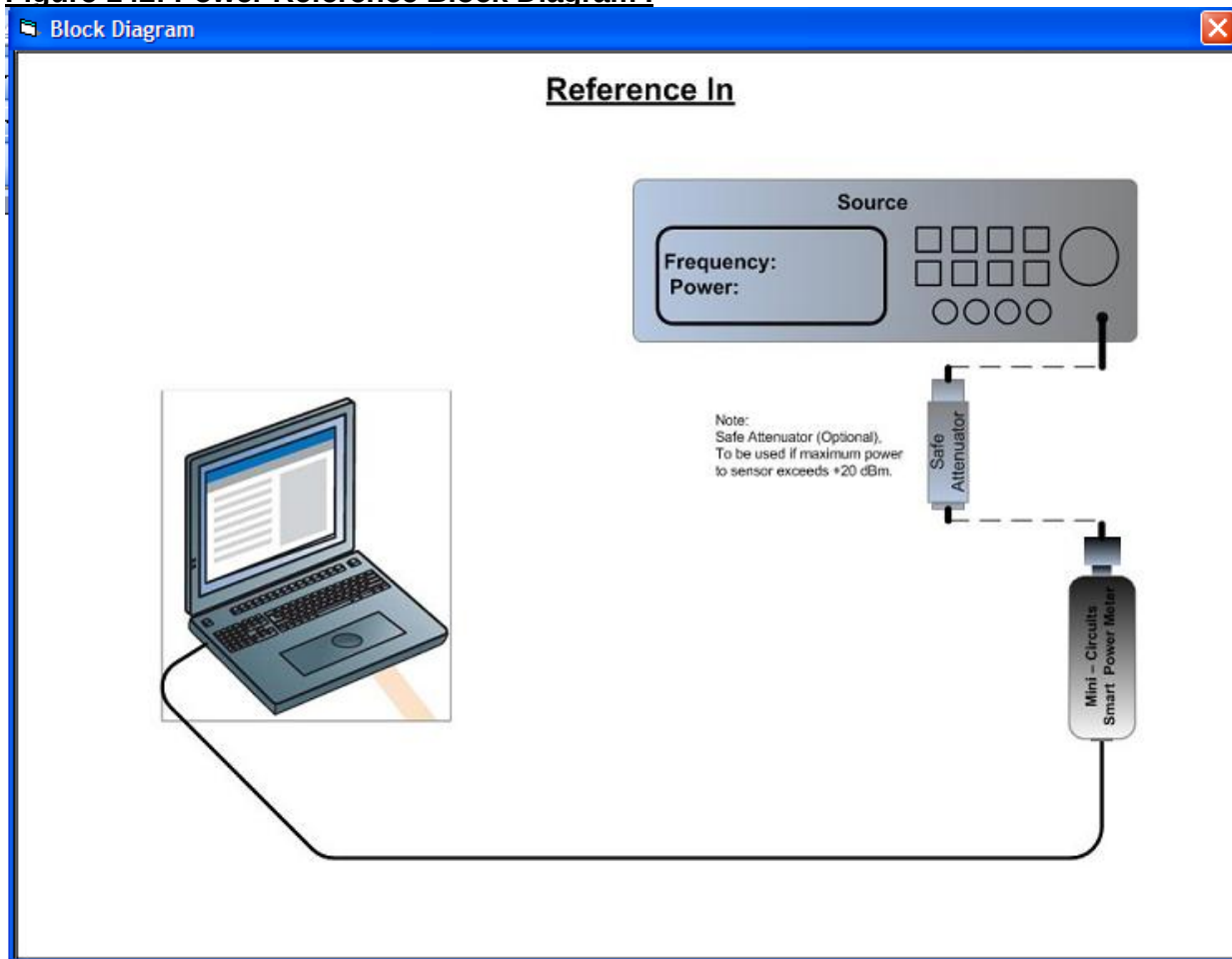
 **Run**

 **Stop**

☐ Continuous Mode
☒ Display On-Line Graph

 **Create Cal. Path File**

Figure 142: Power Reference Block Diagram .



- **Step 13.** Press **Run** key to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 14.** See results: **Figure 143, Power Reference In.**

Figure 143: Power Reference In

Project: Calibrating Thru-Path of LNA Amplifier 1710-2400 MHz

Back New Proj Recall Save Print Data Setup

Sensor Serial Number: 0806030007

Model Name: ZX60-242LN-S+
 Serial No.: S 9152100930
 Application: Thru-Path

Thru-Path Measurement

Step 1: Power Reference In
 Step 2: Thru-Path Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr Refln (dBm)	Read Pwr (dBm)	Gain/Loss (dB)
1	500.000000	-15.00	-15.29		
2	560.000000	-15.00	-15.34		
3	620.000000	-15.00	-15.33		
4	680.000000	-15.00	-15.34		
5	740.000000	-15.00	-15.35		
6	800.000000	-15.00	-15.35		
7	860.000000	-15.00	-15.38		
8	920.000000	-15.00	-15.38		
9	980.000000	-15.00	-15.41		
10	1040.000000	-15.00	-15.42		
11	1100.000000	-15.00	-15.42		
12	1160.000000	-15.00	-15.45		
13	1220.000000	-15.00	-15.43		
14	1280.000000	-15.00	-15.46		
15	1340.000000	-15.00	-15.46		
16	1400.000000	-15.00	-15.50		
17	1460.000000	-15.00	-15.51		

Run Stop ☐ Continued Mode ☒ Include On-Line Graph Create Cal. Path File

- Step 15. Press **Step 2: Path-Thru Measurement** key.

The Thru- Path Measurement screen will open (see Figure 144).

- Step 16. Open Thru- Path Measurement's Block Diagram setup (see Figure 145).
- Step 17. Assemble the Thru- Path Measurement equipment setup.

Figure 144: Thru- Path Measurement screen

Project: Calibrating Thru-Path of LNA Amplifier 1710-2400 MHz
✕


Back


New Proj


Recall


Save


Print Data


Setup

Sensor Serial Number:
0806030007

Model Name: ZX60-242LN-S+
Serial No.: S 9152100930
Application: Thru-Path



Thru-Path Measurement

Step 1: Power Reference In

Step 2: Thru-Path Measurement

☐ Avg. 8

#	Freq (MHz)	Source Pwr (dBm)	Pwr RefIn (dBm)	Read Pwr (dBm)	Gain/Loss (dB)
1	500.000000	-15.00	-15.29		
2	560.000000	-15.00	-15.34		
3	620.000000	-15.00	-15.33		
4	680.000000	-15.00	-15.34		
5	740.000000	-15.00	-15.35		
6	800.000000	-15.00	-15.35		
7	860.000000	-15.00	-15.38		
8	920.000000	-15.00	-15.38		
9	980.000000	-15.00	-15.41		
10	1040.000000	-15.00	-15.42		
11	1100.000000	-15.00	-15.42		
12	1160.000000	-15.00	-15.45		
13	1220.000000	-15.00	-15.43		
14	1280.000000	-15.00	-15.46		
15	1340.000000	-15.00	-15.46		
16	1400.000000	-15.00	-15.50		
17	1460.000000	-15.00	-15.51		

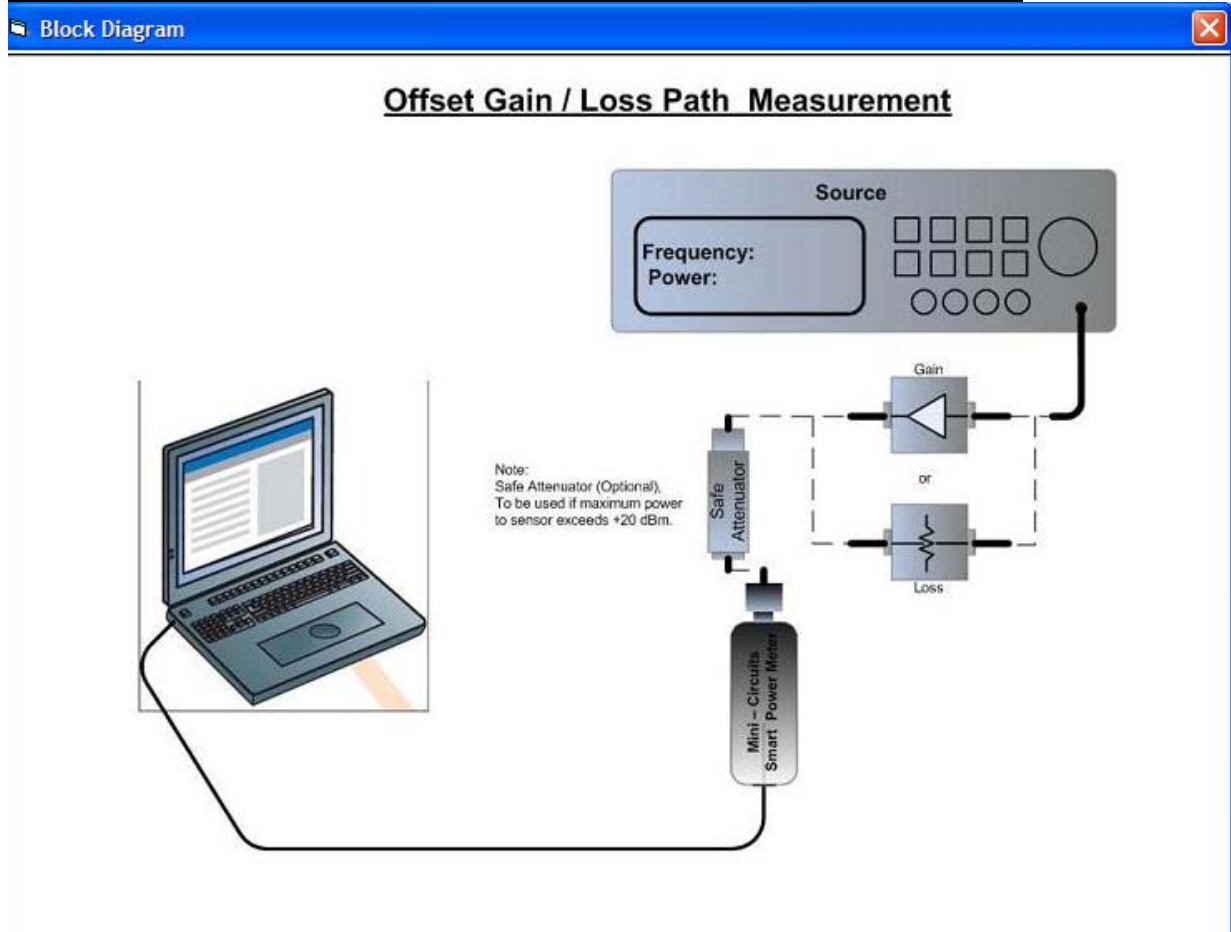

Run


Stop

☐ Continuous Mode
 ☒ Display On-Line Graph

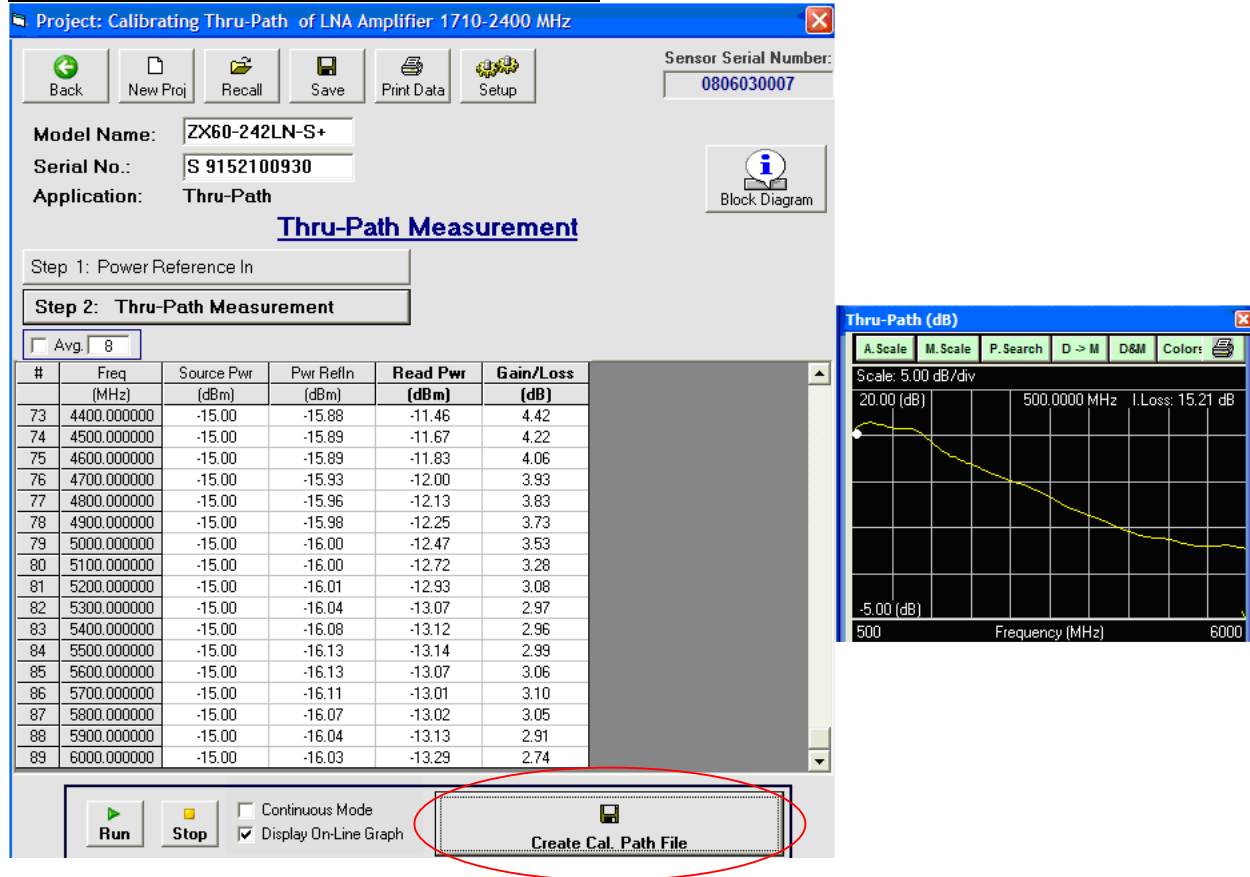

Create Cal. Path File

Figure 145 : Offset Gain/Loss Thru- Path Measurement Block Diagram .



- **Step 18.** Press **Run** to launch test. You can stop the test at any stage by pressing the **Stop** key. If **Continuous Mode** is not enabled test will finish after sweeping all segments. If **Continuous Mode** is enabled test will repeat until interrupted by **Stop** key.
- **Step 19.** Thru- Path Measurement data received (see **Figure 146**).

Figure 146: Thru- Path Measurement data



- **Step 20.** Save your project data (see **3.3.1.3 Save Function** on **page 16** for explanation)
- **Step 21.** You can print your test data (see **3.6 Printing Data Function** on **page 23** for explanation).
- **Step 22.** Press **Create Cal. Path. File** key to create **Path-Thru** offset file.

14.0 The Operation of Signal Generator

Measuring units using “Measurement Applications” requires using a signal generator. Two basic options are available:

1. Operate the generator manually.
2. Let the program Remote control the generator.

The big advantage of selecting option 2 is that you can set many testing points. While in manual mode it will be much more reasonable to measure very few points. Selecting option 1 – will cause the program to tell the user to make the necessary change request to the generator in each testing step.

14.1 Generator – Remote Control

There are two options to remote control the signal generator. One way is to use The VISA IO Library objects (GPIB, Ethernet or RS232) and the other way is to build your own generator interface programs (DLL or EXE file)

If you choose to work with the VISA IO then, installation of the VISA IO is required. The VISA IO software can be downloaded from Agilent or NI web sites.

Agilent-VISA:

<http://www.home.agilent.com/agilent/product.jsp?nid=-34466.816598.00&cc=US&lc=eng>

NI-VISA:

<http://joule.ni.com/nidu/cds/view/p/id/1370/lang/en>

if you choose to work with your own “home made” Signal Generator interface then the way to do it is to build a small simple DLL file or to build executable programs to control your signal generator.

DLL option:

Build “Gen.DLL” file and locate it in “c:\Program Files\mcl_usb_pm\App” folder

The DLL file should include 3 functions:

1. int SetGen (double Freq_mhz, double power_dbm)
(this function should set the Frequency and power accordingly)
2. int SetGen_ON
3. int SetGen_OFF

Selecting DLL option will cause the Meas. Application to search for these functions in the DLL.

Execute files option:

Build the following 3 program files and locate them in “c:\Program Files\mcl_usb_pm\App” folder

1. SetGen.exe
(Program to control Frequency and Power, the program should accept 2

Arguments. The first argument is the Frequency in MHz and the second argument is the Power in dBm.

2. SetGen_ON.exe (program that turn on the Generator)
3. SetGen_OFF.exe (program that turn off the Generator)

In addition to the Remote control information there is one important parameter “Delay between Testing Points (msec)” – this parameter describes the delay in milliseconds that comes right after setting the generator and before taking the next measurement. This delay is important, to let the system stabilize before taking the measurement. Another parameter is a check box to check if to let the measurement program control turning ON and OFF of the RF power generator.

All relevant information regarding the Remote control and setup need to be set in the Setup Screen (**figure 17**). Access to the Setup Screen is available from the main measurement screen by clicking on the Setup Button.

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