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# BlueSuite Pro3 Operation Manual



Graphical test and analysis software for the MT8852B

# **BlueSuite Pro3 Operation Manual**

## **For Version 4.04.000**



Originated by Anritsu Ltd, SRWBU, Stevenage, U.K.

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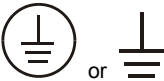
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# Safety Warnings and Symbols



Always refer to the operation manual when working near locations at which the alert mark, shown on the left, is attached. If the operation is performed without heeding the advice in the operation manual, there is a risk of personal injury. In addition, the equipment performance may be reduced. This alert mark is sometimes also used with other marks and descriptions indicating other dangers.



When supplying AC power to this equipment, connect the accessory 3-pin power cord to a 3-pin grounded power outlet. If a grounded 3-pin outlet is not available, use a conversion adapter and ground the green wire, or connect the frame ground on the rear panel of the equipment to ground. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

**WARNING**

The operator must not attempt to repair this equipment. Do not attempt to remove the equipment covers or to disassemble internal components. Only qualified service technicians with knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

## Safety Symbols

To prevent the risk of injury or loss related to equipment malfunction, Anritsu Limited uses the following symbols to indicate safety-related information. For your own safety, please read this information carefully before operating the equipment.

### Symbols Used in Documentation

- |                |   |
|----------------|---|
| <b>Danger</b>  | Indicates a very dangerous procedure that could result in serious injury or death if not performed properly.  |
| <b>Warning</b> | Indicates a hazardous procedure that could result in serious injury or death if not performed properly.   |
| <b>Caution</b> | Indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken. |

## Safety Symbols Used on Equipment and in Associated Documentation

Some or all of the following symbols may be used on Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you understand the meanings of the symbols and take the necessary precautions before operating the equipment.



This symbol indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



This symbol indicates a compulsory safety precaution. The required operation is indicated symbolically in or near the circle.



This symbol indicates warning or caution. The contents are indicated symbolically in or near the triangle.



This symbol indicates a note. The contents are described in the box.



These symbols indicate that the marked part should be recycled.

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# Chapter 1. About this Manual

## Purpose and Scope of this Manual

This manual has been designed as an introduction to the BlueSuite Pro3 software. No prior knowledge of the BlueSuite Pro3 software is assumed, although a familiarity with the purpose and operation of the MT8852B *Bluetooth* Test Set is required.

Several of the user settings found within the BlueSuite Pro3 software have direct equivalents on the MT8852B, and for this reason the reader is asked to refer to the main operation manual if detailed setting related explanations are required.

The reader is presumed to be familiar with the operation of, and terminology associated with, a Microsoft Windows operating system.

## Structure of this Manual


This manual is divided into the following chapters and appendices.

<b>Chapter 1</b>	<b>About this Manual</b> – Information about the manual itself, how it is structured and the conventions used within.
<b>Chapter 2</b>	<b>What is BlueSuite Pro3?</b> – An overview of the BlueSuite Pro3 system and the benefits of use.
<b>Chapter 3</b>	<b>Installation</b> – Details of how to install the software and of the operating environment required.
<b>Chapter 4</b>	<b>Getting Started</b> – How to establish GPIB and <i>Bluetooth</i> connections.
<b>Chapter 5</b>	<b>The [Packet] Tab</b> – How to generate a real time graphical representation of the test(s) being executed by the MT8852B.
<b>Chapter 6</b>	<b>The [Sensitivity] Tab</b> – How to configure and run sensitivity sweeps on a single channel or on all 79 channels.
<b>Chapter 7</b>	<b>The [Channel] Tab</b> – How to configure and run measurement sweeps against each of the <i>Bluetooth</i> channels.
<b>Chapter 8</b>	<b>The [Audio] Tab</b> – How to configure audio settings and display a graph of audio distortion.
<b>Chapter 9</b>	<b>The [Power] Tab</b> – How to configure and run an output power test and display the results as a graph.
<b>Chapter 10</b>	<b>Saving Data and Controlling the Graphs</b> – How to navigate and control the graphs generated, and how to save the data to a file.
<b>Chapter 11</b>	<b>Test Scripts</b> – How to configure and run test scripts from within BlueSuite Pro3.
<b>Chapter 12</b>	<b>Test Mode Signalling Tester</b> – How to step through individual LMP controls.
<b>Chapter 13</b>	<b>Acquiring Log Data</b> – How to acquire a log of the LMP messages.
<b>Appendix A</b>	<b>Command Reference</b> – A reference listing of the commands within BlueSuite Pro3.

- Appendix B**      **GPIB Setup** – The setup required for reliable GPIB communications with the test sets in the line.
- Appendix C**      **Glossary of Terminology** – Definitions of some of the terminology used throughout this manual.

## Notation Conventions used in this Manual

The notation conventions adopted in this manual are detailed below.

[File]	Commands found within the BlueSuite Pro3 windows or dialogs are enclosed in square brackets.
[Connection Control]	The names of windows and dialogs are enclosed in square brackets.
"Frequency Deviation"	Text appearing within the body of a window is enclosed in quotation marks.
[Establish Link]	The names of buttons that appear within windows or dialogs are enclosed in square brackets.
"Update"	Check boxes that appear in windows or dialogs are enclosed in quotation marks. The term "select" is used to refer to the action of placing a tick (✓) within a check box.
[Ctrl]	The names of keys that appear on the PC keyboard are enclosed by square brackets.
"EUT addr"	Soft keys on the MT8852B are enclosed in quotation marks.
	Hard keys on the MT8852B are shown in this manner.

## Notice

The information contained within this document may be subject to change without notice. **Anritsu Limited shall not be held liable for any errors or discrepancies contained within this document, nor for any consequential damages or injury resulting from the installation or use of the product contained within.**

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## Chapter 2. What is BlueSuite Pro3?

BlueSuite Pro3 is a software package designed to run in a Windows environment. The software is used to interface with, and acquire data from, the MT8852B *Bluetooth* Test Set to which a *Bluetooth* enabled product has been connected for testing. The acquired data is presented graphically on the PC, enhancing the analysis and debugging capabilities of the standard MT8852B displays.



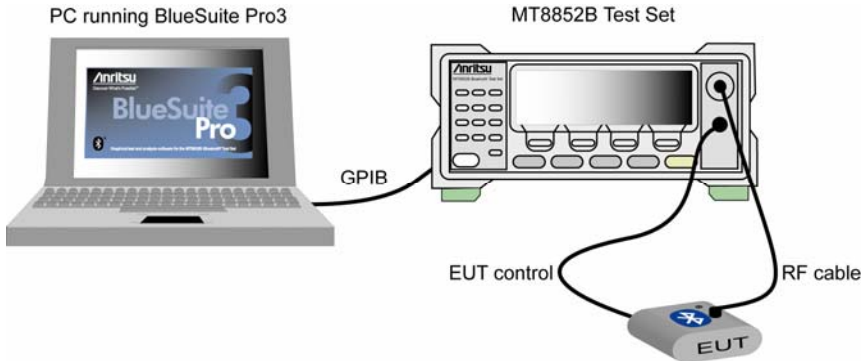
BlueSuite Pro3 allows the user to:

- Graphically monitor the real-time status of the EUT.
- Configure and run sensitivity sweeps and display the results graphically.
- Configure and run measurement sweeps for seven different tests and display the results graphically for each of the 79 *Bluetooth* channels.
- Configure and run audio tests and display the results graphically.
- Configure and run a power control test and display the results graphically.
- Read and write script and limit settings to and from the MT8852B.
- Edit and run a complete test script and generate a detailed report of the results.
- Step through individual connection and test mode controls to determine the cause of problems otherwise difficult to isolate.

# Chapter 3. Configuration and Installation

## Configuring the Equipment

Set up the equipment as shown in the figure below.



---

**Note:** Refer to Appendix B for details of the GPIB configuration.

---

## Operating Environment

The BlueSuite Pro3 software is designed to operate in English, Japanese, or Chinese versions of Windows XP and Vista operating systems. Performance cannot be guaranteed when installed on any other environment.

## Installing BlueSuite Pro3

Follow the procedure below to install the BlueSuite Pro3 software.

1. Insert the BlueSuite Pro3 CD into the CD drive.
2. Double-click the "Setup.exe" file and follow the instructions to display the Installshield Wizard.
3. Read the license agreement carefully. When you have read the agreement and agree to the terms, click the "I accept the terms in the license agreement" option and then click [Next] as prompted.
4. The installation process now begins. Click [Finish] when complete.

## Vista Configuration Settings

Follow the procedure below in order to successfully run BlueSuite Pro3 on a Windows Vista operating system.

1. Install BlueSuite Pro3 as detailed above.

2. When the installation is complete, right-click BlueSuitePro3 in the Windows Start menu and select [Properties] from the pop-up menu.
3. Click [Advanced...] on the [Shortcut] tab of the [BlueSuitePro3 Properties] dialog.
4. Select "Run as administrator" in the [Advanced Properties] dialog and then click [OK] to close the dialog.
5. Click [Apply] in the [BlueSuitePro3 Properties] dialog.
6. Click [Continue] if a dialog displays requesting administrator permission to change the settings.
7. Click [Continue] if a dialog displays requesting permission to continue.
8. Click [OK] to close the [BlueSuitePro3 Properties] dialog.
9. Start BlueSuite Pro3 in the normal manner from the Windows Start menu.

---

**Note:** If this procedure is not followed, a network initialization error displays when an attempt is made to start BlueSuite Pro3.

---

## Chapter 4. Getting Started

Point to [Programs] on the Windows [Start] menu and select [BlueSuite Pro3] > [BlueSuitePro3]. The [Connection Control] dialog box shown below displays automatically within the main window when the program is launched.

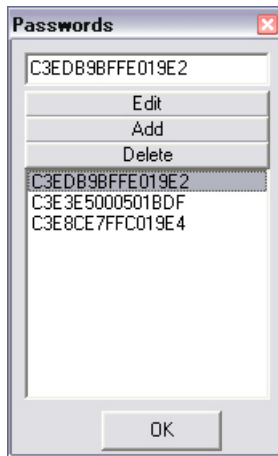


### Establishing a GPIB Connection with the MT8852B

Before a connection can be made between the EUT and the MT8852B, it is necessary to enter a password for each MT8852B in use. The password can be found on a label attached to the back of the BlueSuite Pro3 CD and will work with one MT8852B only.

**Note:** Contact Anritsu at [emd.sales@anritsu.com](mailto:emd.sales@anritsu.com) if you have misplaced or not been informed of your password(s). You will need to supply the *Bluetooth* address and serial number of your MT8852B at this time. The *Bluetooth* address and serial number can be checked on the instrument by pressing **Config** > “MT8852B” > “Identity”.

1. Click [Edit Passwords] on the [Connection Control] dialog that displays when BlueSuite Pro3 is launched. The [Passwords] dialog box shown below displays.



2. Type or paste the password into the text box at the top of the dialog, click [Add] to add the new password, and then click [OK].

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**Note:** Up to ten passwords can be held by BlueSuite Pro3 at any one time.

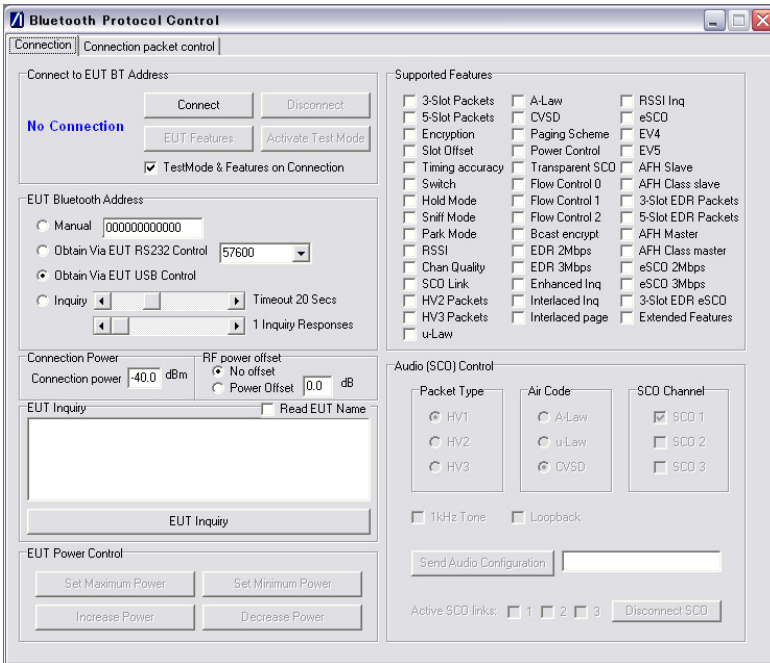
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3. Specify the GPIB address of the MT8852B at the "GPIB Address" text box. (The default GPIB address for the MT8852B is 27.)
4. Click [Establish Connection] to connect.
5. When a connection has been established the message "GPIB Connection" displays in the dialog directly beneath the [Edit Passwords] button. The [Connection Control] window can now be closed.

## Establishing a *Bluetooth* Connection with the EUT

Follow the procedure below to establish a *Bluetooth* connection between the MT8852B and the EUT.

1. Select the [Protocol Control] command from the [Tools] menu or click the  icon on the toolbar. The [Bluetooth Protocol Control] window displays as shown below.



2. The *Bluetooth* address of the EUT is required in order to establish a connection. Four methods are available to specify the address.

"Manual"

Click the option button and enter the EUT address in the entry field.

"Obtain Via EUT RS232 Control"

Click this option button if using an RS232 connection between the EUT and MT8852B. Select the appropriate baud rate from the drop-down list.

"Obtain Via EUT USB Control"

Click this option button if using a USB connection between the EUT and MT8852B.


"Inquiry"

Click the option button and then use the scroll bars to specify the timeout setting and number of responses. Click [EUT Inquiry], and select the required address that displays.

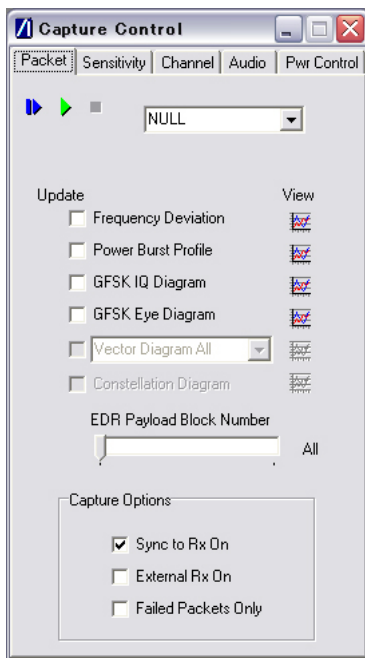


3. Select or clear the “Test Mode & Features on Connection” check box. If selected the use of test mode is automatically enabled and the EUT’s supported features are read into the area at the right of the window. If cleared, these features can be activated individually by clicking the buttons that display beneath [Connect].
4. Click [Connect] to establish a connection. When a connection is established the word “Connected” displays to the left of the [Connect] button, and an additional tab, [Loopback/TXTest] is added to the window.
5. Close or minimize the [Bluetooth Protocol Control] window.

## Selecting the Analysis Mode

Click the capture control icon  on the toolbar or select [Capture Control] from the [Tools] menu to display the [Capture Control] dialog shown below.

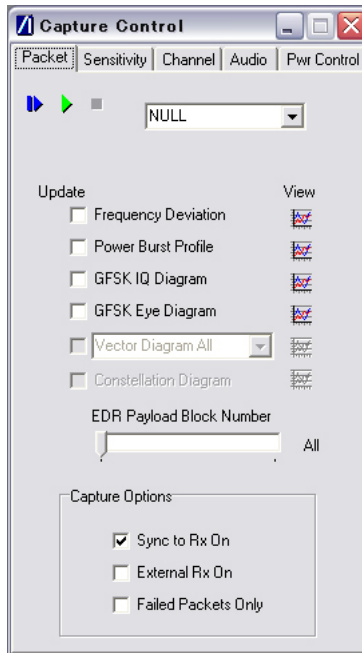
**Note:** The [Capture Control] dialog cannot be displayed until a GPIB connection has been established.




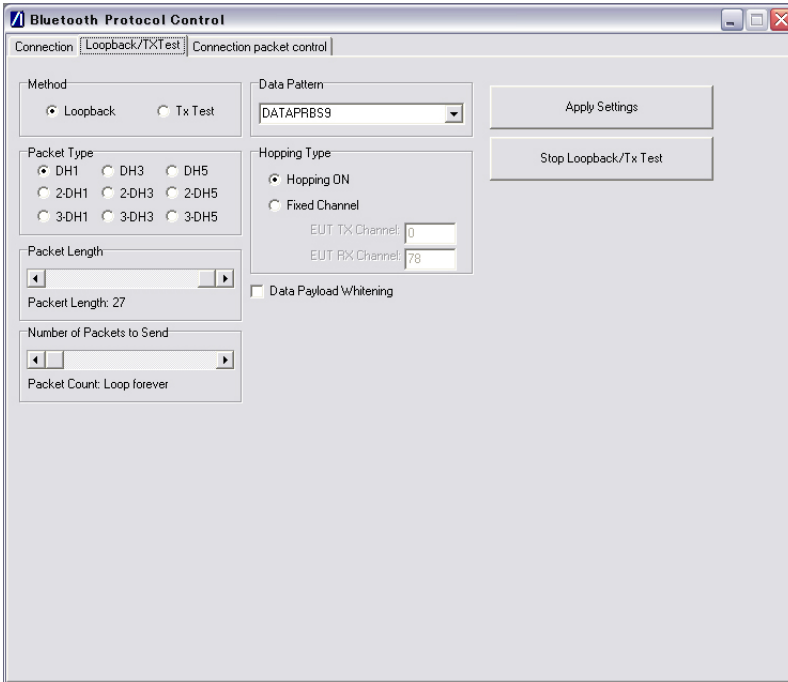
The [Capture Control] dialog box is split into the five tabbed pages that allow the user to make the required settings and display the associated graph(s). The settings and functions of each of the tabs are explained over the following chapters.

## Chapter 5. The [Packet] Tab

The [Packet] tab allows the user to acquire a real time graphical representation of the test or tests being executed by the MT8852B.



1. Select the packet type to be captured from the drop down list box. The selected packet type must match the setting at the instrument but can be specified from the [Loopback/TX Test] tab on the [Bluetooth Protocol Control] window.
2. Click the *Bluetooth* Protocol Control icon  on the toolbar of the main window to display the [Bluetooth Protocol Control] window.



3. Click the [Loopback/TXTest] tab.
4. Select the required packet type and test conditions and click [Apply Settings] to write the changes to the MT8852B.

---

**Note:** The packet types available for selection are determined by the report from the EUT of supported packet types.




---

5. Return to the [Capture Control] dialog and select the desired data capture options from the "Capture Options" check boxes.

"Sync to RX On": Selecting this option results in the capture of only packets received from the EUT in a *Bluetooth* link. If this is switched off, BlueSuite Pro3 can be used to analyze EUT transmitter properties outside of a link.

"External RX On": This option allows capture of data, with the start of a packet defined by the rising edge of a TTL signal connected to the external trigger port of the MT8852B.

- "Failed Packets Only": This feature is used to identify packets in a DUT transmission that may be failing a specific test. Follow the procedure below to use this feature.
- i. At the MT8852B, select the test case that the EUT is occasionally failing.
  - ii. Set the packet type to a setting other than "Longest", e.g. DH1.
  - iii. Press the **Scpt/Test** hard key, select the test case, and press the "Single" soft key.
  - iv. Set the limit to the value at which the failed packet will trigger.
  - v. Select **Run**.
  - vi. Start Bluesuite Pro3 and connect to the tester.
  - vii. Display the [Capture Control] dialog.
  - viii. Set the packet type to match that selected in step (ii).
  - ix. Select "Sync to RX On" and "Failed Packets Only".
  - x. Display the required graph.
  - xi. Click the blue capture button. Note, at this time, nothing will be displayed on the graph.
  - xii. Press the **Loop/Stop** hard key on the tester. The image within BlueSuite Pro3 will be updated when a packet that failed the test limit is identified.
  - xiii. Save the image and repeat the process to capture further data if required.
6. Launch the desired graph(s) by selecting the appropriate check box. There are eight graphs available:
- Frequency Deviation
  - Power Burst Profile
  - GFSK IQ Diagram
  - GFSK Eye Diagram
  - Vector Diagram All
  - Vector Diagram GFSK
  - Vector Diagram PSK
  - Constellation Diagram

7. Acquire the data from the MT8852B by clicking either of the arrow icons in the top left corner of the [Packet] tab on the [Capture Control] dialog.
  -  The single capture button instructs the MT8852B to capture one packet and acquire the test results from the device.
  -  The constant capture button instructs the MT8852B to continuously capture packets and retrieve the results until the stop button is pressed.
  -  The stop button.
8. Run additional tests as required, each time changing and applying new test conditions from the [Bluetooth Protocol Control] window.

---

**Note:** The packet type can also be configured directly at the MT8852B, but by using the [Bluetooth Protocol Control] window the user can make all the required settings from directly within BlueSuite Pro3.

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When the instruction is given by the user to acquire test data, BlueSuite Pro3 sends a request to the MT8852B for it to direct all received *Bluetooth* packets into a buffer that stores the last received packet. It then asks for the contents of that buffer at a rate in line with its ability to process the data and display it on screen. The data displayed is a snapshot of the data being received at the time of request (assuming a *Bluetooth* link is established and maintained between the MT8852B and the EUT). BlueSuite Pro3 continues to request a particular type of packet until it becomes available, although this can be aborted at any time using the Stop button.

## Results

The data used to produce the graphs is derived from the same data block used by the MT8852B for its own measurements. This data block is an array of frequency/magnitude vectors, and includes a calculated offset to the start of a packet (P0) when viewing triggered data. The graph windows can be manipulated by clicking and dragging with the mouse as detailed in chapter 10.

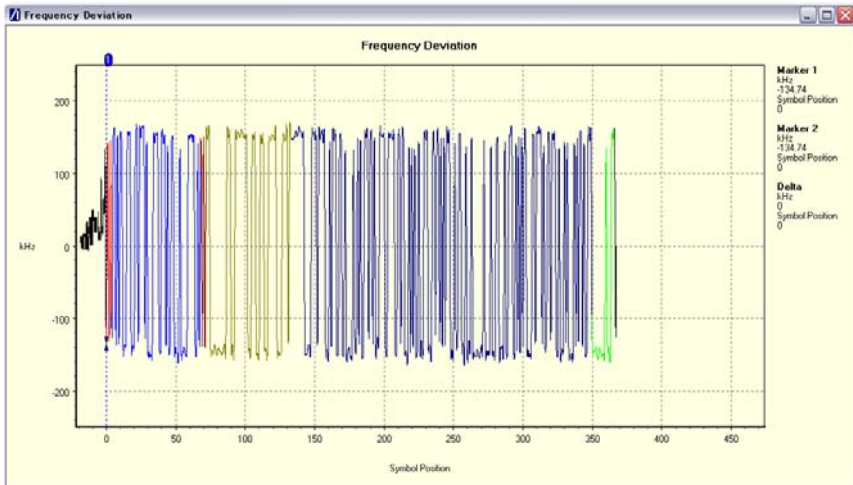
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**Note:** In BlueSuite Pro3 all bits in the packet are 16 times oversampled.

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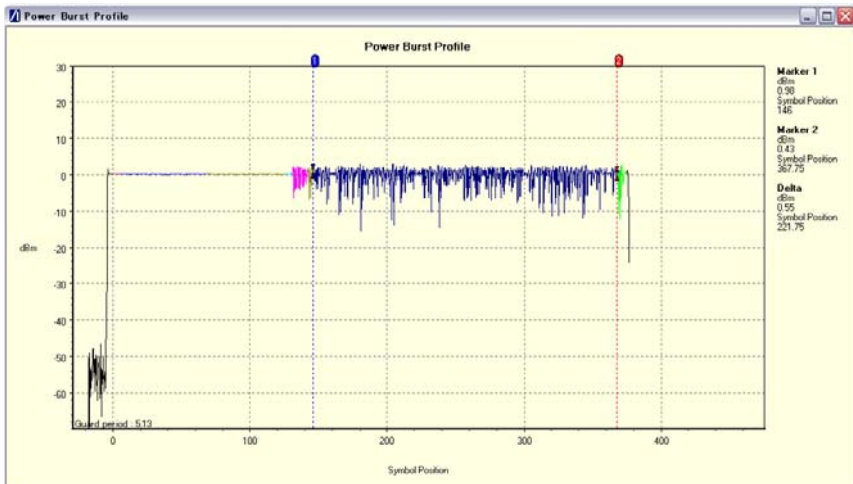
## Frequency Deviation

This graph displays frequency deviation plotted against packet bit position of the incoming signal measured at the MT8852B's receiver. The start of the data is defined in line with the triggering options.



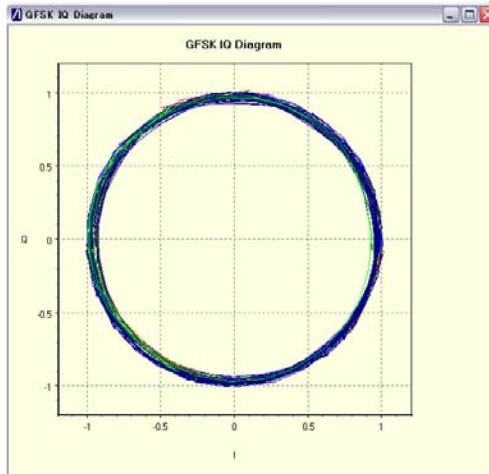
## Power Burst

This graph displays the received power level from the EUT, measured at the MT8852B's receiver, plotted against bit position. The start of the data is defined in line with the triggering options.



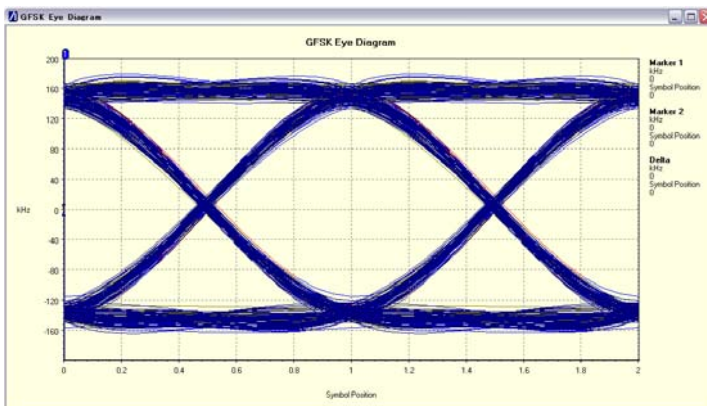
## IQ Diagram

This graph displays phase versus magnitude in polar co-ordinates. Phase is represented by rotation, and magnitude by the distance from the implied origin. This should take the form of an arc, the origin is that implied by the arc. The IQ diagram is normalized to a value of one, which is the equivalent of a received power level of 0 dBm.



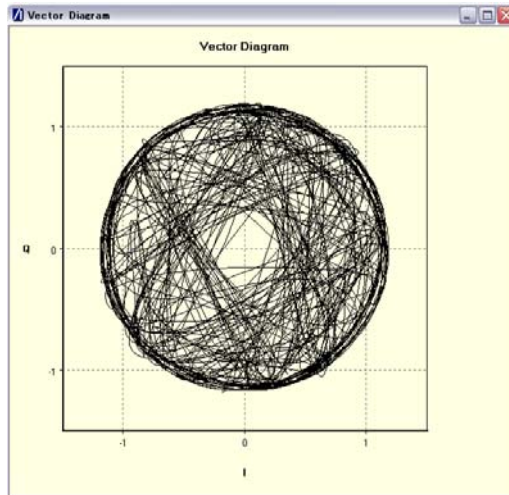
## Eye Diagram

Data received by the MT8852B is displayed as an eye diagram to provide a visual indication of an EUT's transmitter quality. The EUT should be transmitting back to the MT8852B at the highest level possible (preferably 0 dBm). The eye diagram displays distortion, such as inter-symbol interference, in the received data from the EUT. The maximum opening of the eye will correspond to the bit 1 position of the horizontal scale +/- 1 sample (0.25  $\mu$ s).



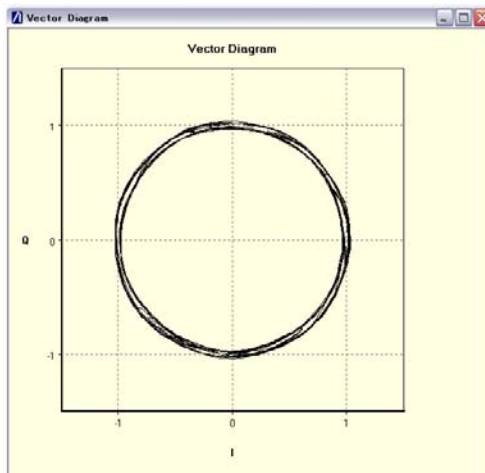
## Vector Diagram All

This graph displays the vector diagram for the full EDR packet including both the FSK access code and header as well as the PSK payload.



## Vector Diagram GFSK

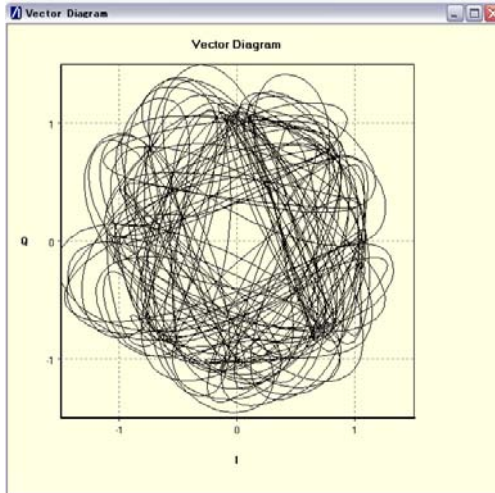
This graph shows the vector diagram for only the FSK part of the EDR packet. For typical EDR packets, the vector diagram of the FSK part has constant magnitude and so a circular trace is seen.





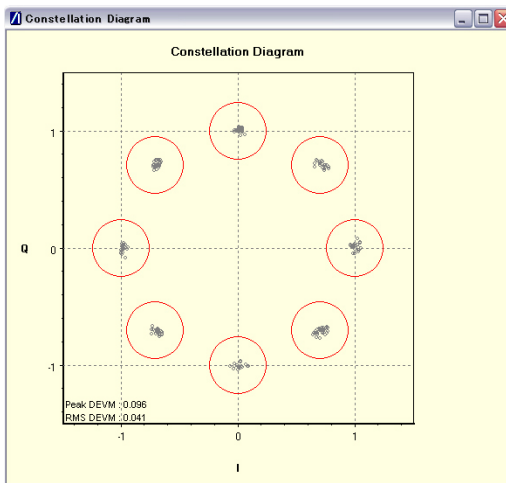
## Vector Diagram PSK

Both  $\pi/4$ DQPSK and 8DPSK modulations support transitions between symbols that can pass close to the origin. This results in variable envelope power and a vector diagram with a complex pattern. BlueSuite Pro3 displays the vector diagram of the EUT EDR payload after frequency correction has been applied. The required pulse shaping filter defined in the *Bluetooth* core specification is applied, resulting in a representation of the transitions between symbol points that would be seen in a standard *Bluetooth* receiver.



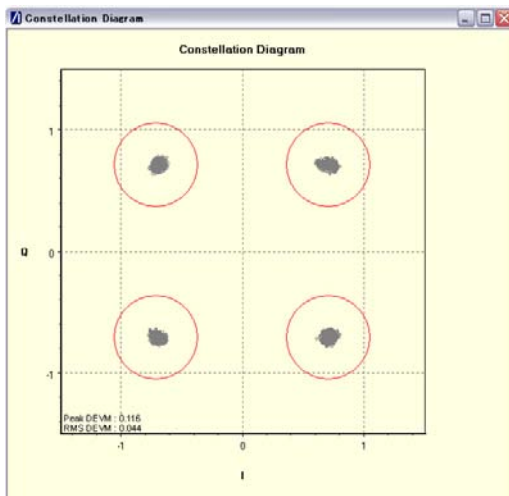
## 8DPSK Constellation Diagram

The 8DPSK constellation diagram displays the 8 symbol positions that result from the differential demodulation of the 8DPSK signal. Tolerance rings are displayed at 25%. This is the peak acceptable error defined in the core specification.



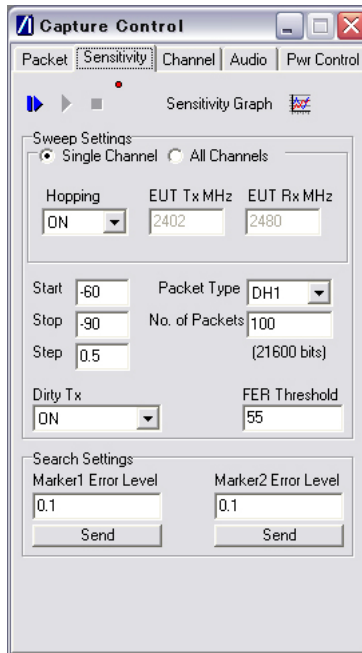
## $\pi/4$ DQPSK Constellation Diagram

The  $\pi/4$ DQPSK constellation diagram displays the 4 symbol positions that result from the differential demodulation of the  $\pi/4$ DQPSK signal. Tolerance rings are displayed at 35%. This is the peak acceptable error defined in the core specification.



## Chapter 6. The [Sensitivity] Tab

The [Sensitivity] tab allows the user to configure and run sensitivity sweeps on either a single channel or on all 79 channels.



1. Use the option buttons to run tests on either a "Single Channel" or on "All Channels". The fields that display immediately beneath the option buttons differ depending on the selection.

---

**Note:** If "All Channels" is selected, the test may take several minutes to complete as a sensitivity search is performed on all 79 channels.

---

2. Make the test settings as required.

"Hopping"

Displays for single channel settings only. This allows frequency hopping to be turned ON or OFF. If frequency hopping is turned OFF the test is performed on a single TX and a single RX frequency. Both frequencies are set in the EUT TX and EUT RX controls. These controls are unavailable when frequency hopping is ON.

"EUT Tx MHz"

Displays for single channel settings only.




"EUT Rx MHz"

Displays for single channel settings only.

"Start EUT Rx MHz"

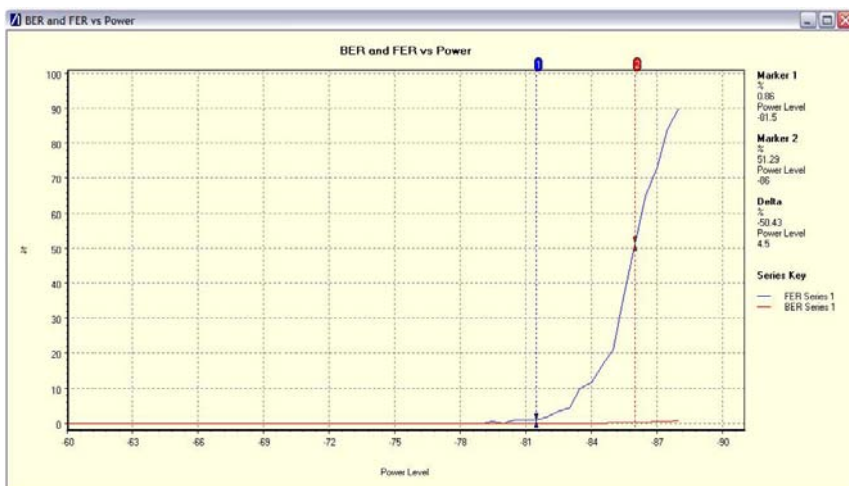
Displays only when the "All Channels" option has been selected. Specify the first channel frequency for measurement.

"Stop EUT Rx MHz"	Displays only when the "All Channels" option has been selected. Specify the last channel frequency for measurement.
"BER Search"	Displays only when the "All Channels" option has been selected. Specify the bit error rate percentage at which measurement stops.
"Start"/"Stop"	Controls the power level range for the sensitivity sweep. Enter a start and stop value in dB. Sweeps are always performed starting from the largest power level to the smallest, regardless of the order in which they are entered. The precision of values in dB is to two decimal points.
"Step"	Enables setting of the precision of the sweep. The step size is entered in dB and determines the number of measurements made within the range specified. The precision in dB is to two decimal points.
"Packet Type"	Select the packet type to be used during testing. Both standard and EDR packet types are available.
"No of Packets"	Specify the number of packets to be analyzed at each iteration of the sensitivity measurements. The percentage error value obtained from the MT8852B for each sweep point will be plotted on the graph. The number shown directly below the control shows the corresponding bits to the number of packets selected.
"Dirty TX"	Allows the selection of Dirty Transmitter "ON" or "OFF" to be used in the sweep.
"FER Threshold"	Allows the user to specify a percentage threshold level for the maximum error rate allowed. If the results returned by the unit exceed the FER threshold the test is aborted.
"Markerx Error Level"	If searching for a specific error level, a value can be entered in either of the marker control boxes. Pressing the [Send] button moves the marker to the corresponding error level on the graph. The markers are locked to the currently selected series in the graph control window.

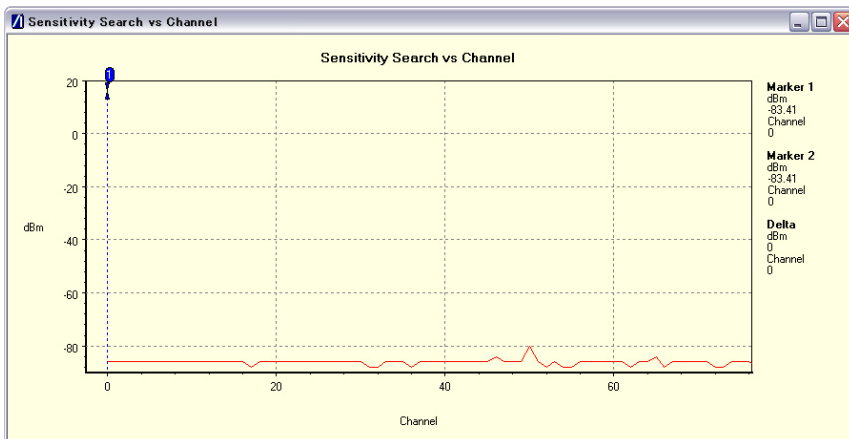
- Launch the graph by clicking on the graph icon  in the upper right corner of the page.
- Acquire the data from the MT8852B by clicking either the single sweep button  or the constant sweep  button. The settings made on this tab are automatically written to the MT8852B when the tests are commenced.

**Results:**

If the "Single Channel" option is selected, the graph plots the BER and FER vs. Power.

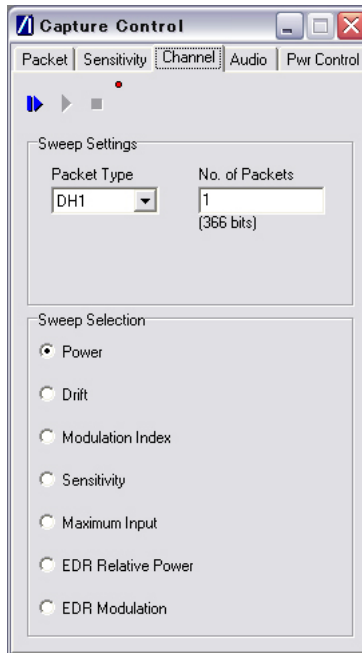


If the "All Channels" option is selected, the graph plots the 0.1% (or user set) BER sensitivity value for each channel. As a unique sensitivity search is performed for each channel, this test will typically require many minutes to complete.



## Chapter 7. The [Channel] Tab

The [Channel] tab allows the user to configure and run measurement sweeps for up to seven different tests against each of the 79 *Bluetooth* channels.



1. Make the sweep settings as detailed below.

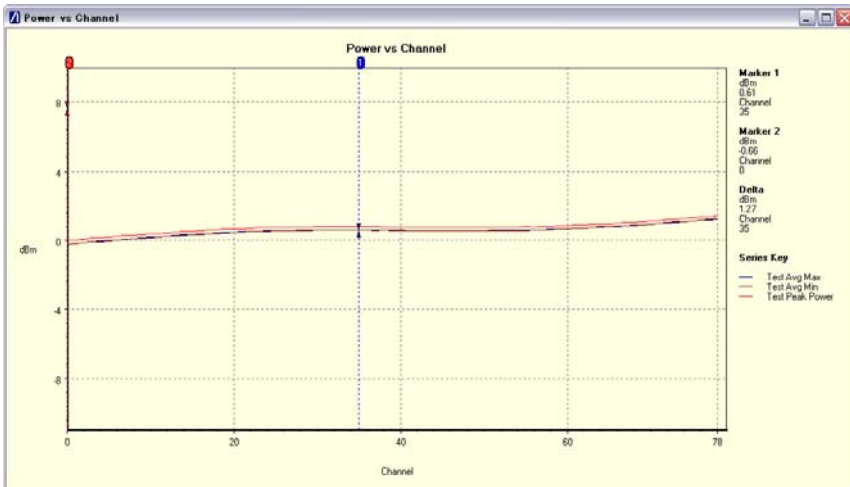
“Packet Type”	Select the packet type to be used during testing. This setting is enabled for all tests except for the Maximum Input test.
“No of Packets”	Specify the number of packets to be used during testing. The bit label is updated as the number of bits in “No of Packets” is changed. This setting is enabled for all tests.
“Level”	Used to specify the Transmit power level of the MT8852B. This setting is enabled only for the Maximum Input and Sensitivity tests.
“Dirty TX”	The dirty transmitter can be turned ON or OFF for the duration of the test. This setting is enabled only for the Sensitivity test.
“Max Power level”	Select the check box to conduct the EDR relative Tx power test at the DUT’s maximum Tx power. Applicable for the EDR relative power test only.

"Min Power level" Select the check box to conduct the EDR relative Tx power test at the DUT's minimum Tx power. Applicable for the EDR relative power test only.

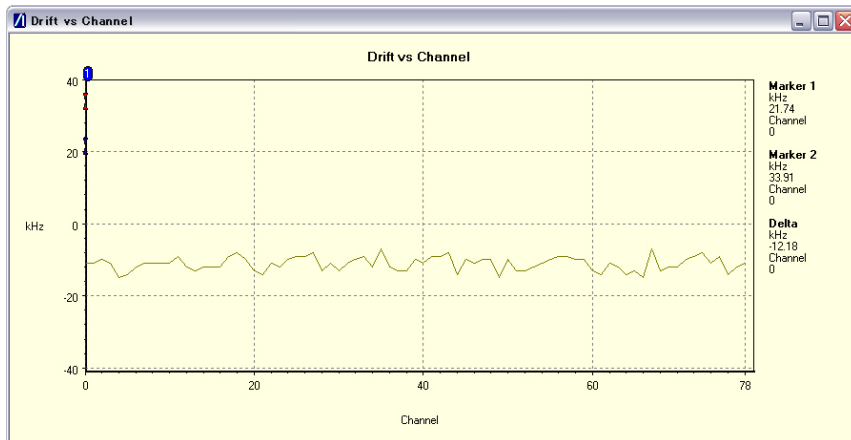
"No of Blocks" Specify the number of block to be used for the EDR carrier frequency and modulation test.

2. Select the tests to be run from the "Sweep Selection" option buttons. Selecting a sweep by clicking the option button will either launch the corresponding graph window, or bring the window to the front. The appropriate sweep settings for that test will also be enabled or disabled accordingly.
3. Acquire the data from the MT8852B by clicking the single sweep button. The settings made on this tab are automatically written to the MT8852B when the tests are commenced. When executed, the test will generate a graph of the selected parameter vs. the *Bluetooth* channels.

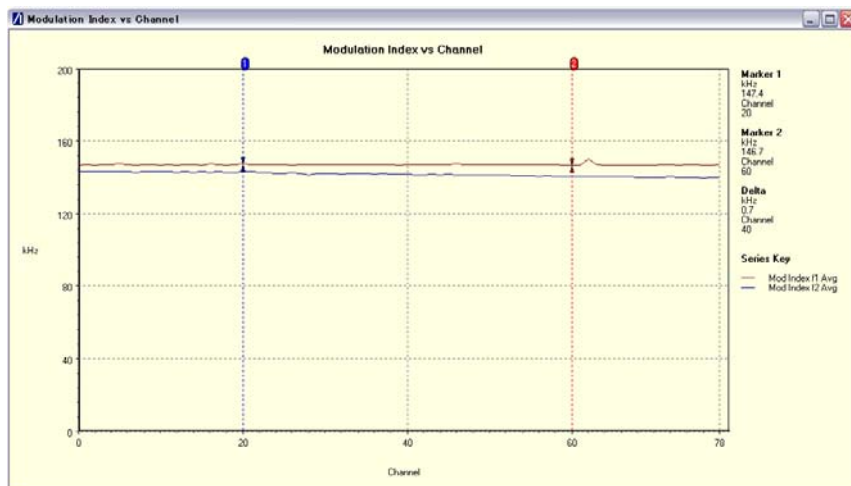
### Results:



Power vs. Channel

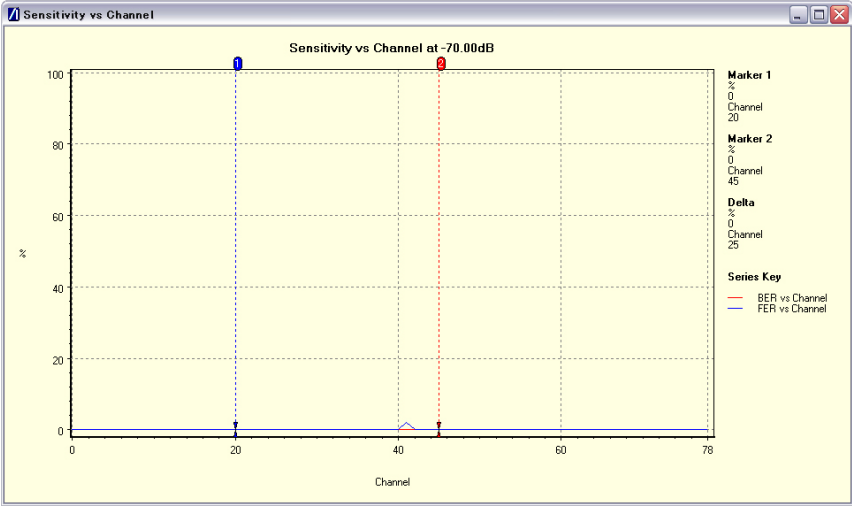


Drift vs. Channel

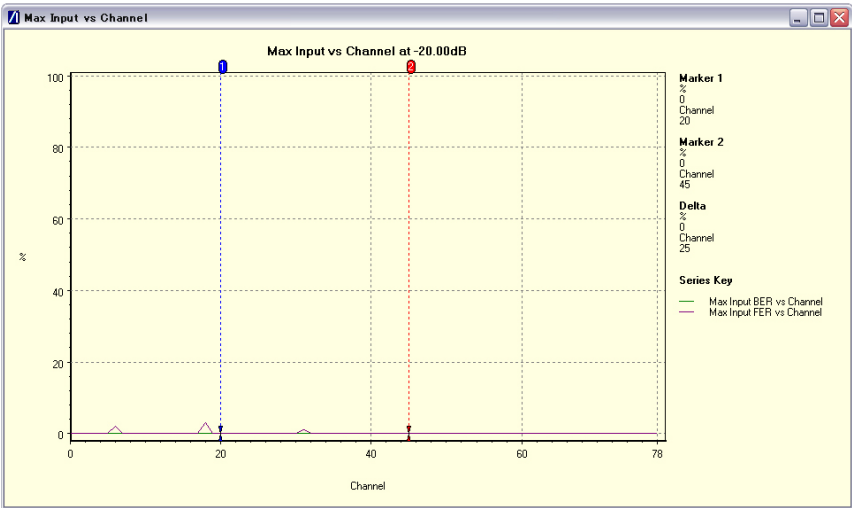


Modulation index vs. Channel

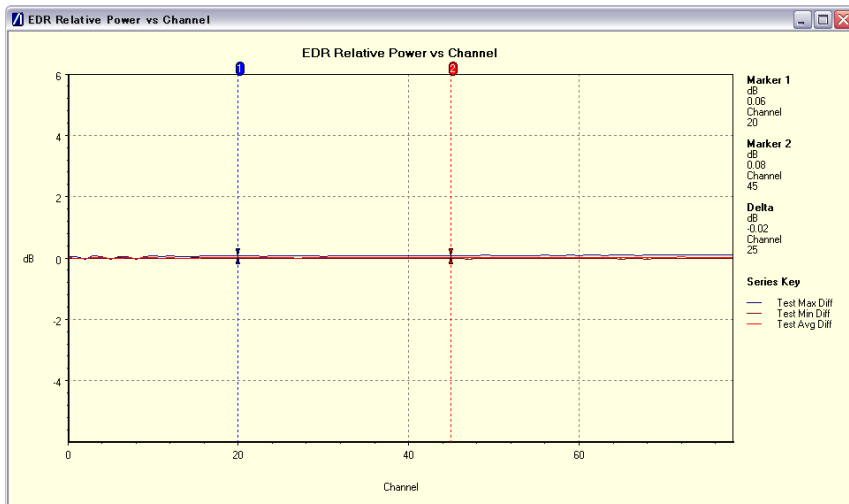




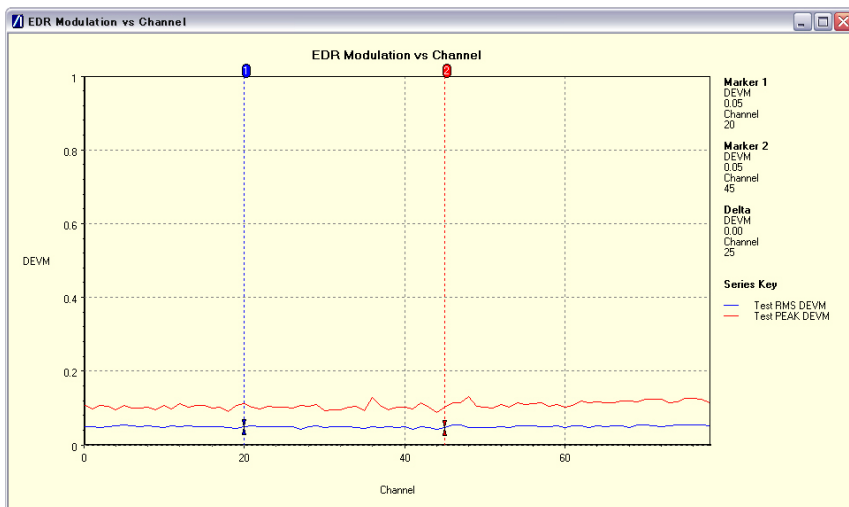
Sensitivity vs. Channel



Max input vs. Channel



EDR Relative power vs. Channel

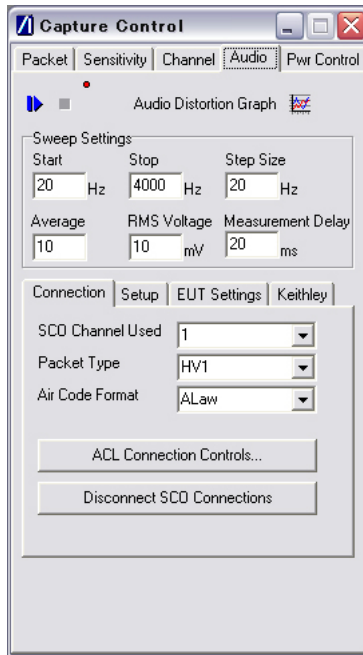


EDR Modulation vs. Channel

## Chapter 8. The [Audio] Tab

The [Audio] tab allows the user to configure audio settings and display a graph of audio frequency response and distortion. There are two requirements in order to run audio measurements:-

- The test set in use must support audio testing. The MT8852B and MT8852B-041 models both support audio testing. Audio can also be added to the MT8852B-040 or MT8852B-042 by purchasing option MT8852B-319.
- The user must have access to a digital multimeter. Anritsu recommend the use of the Keithley 2015 audio DMM.



1. Display the [Keithley] tabbed page as shown above and click [Connect] to establish a GPIB connection with the Keithley 2015.
2. The settings on the [EUT Settings] tab are applicable only if the customer is using an RS232 cable to initialise the EUT from the MT8852B using the EUT HCI interface. If this is the case, display the [EUT Settings] tab and make settings to match the audio configuration of the EUT.
3. The [Setup] tabbed page allows the user to select whether the MT8852B is put into loopback mode to return SCO packets to the device under test. If this configuration is required, the "SCO Loopback" check box must be selected prior to making a connection.
4. Display the [Connection] tabbed page and select the appropriate SCO channel and packet type. Set the air code format to match the EUT. The meanings of the settings on the four internal tabbed pages are summarised in the table below.



Tab	Item	Meaning
[Connection]	"SCO Channel Used"	Select SCO Channel 1,2, or 3.
	"Packet Type"	Select either HV1, HV2, or HV3 packet type.
	"Air Code Format"	Select either "A-Law", "u-Law" or "CVSD".
	[ACL Connection Controls...]	Click to display the [Bluetooth Protocol Control] window where a connection with the MT8852B can be established.
	[Disconnect SCO Connections]	Click to release the SCO connection with the EUT.
[Setup]	"SCO Loopback"	Select to have the modulated RF from the EUT looped back in the MT8852B.
[EUT Settings]	"Input Coding Format"	Select the EUT baseband sample input/output data format. There are three possible settings, "ALaw", "ULaw" and "LINEAR".
	"Input Data Format"	Select the EUT baseband sample data format. There are three possible settings, "1sCOMP", "2sCOMP", and "SignMag".
	"Input Sample Size"	Select either an 8 or 16 bit baseband sample size.
	"Linear PCM bit position"	Set the EUT Baseband sample offset within the 16 bit field. Specify a value within the range of 0 to 7.
[Keithley]	"Address"	Specify the GPIB address of the Keithley.
	[Connect]	Click to connect to the Keithley.

5. Make the sweep settings as required.

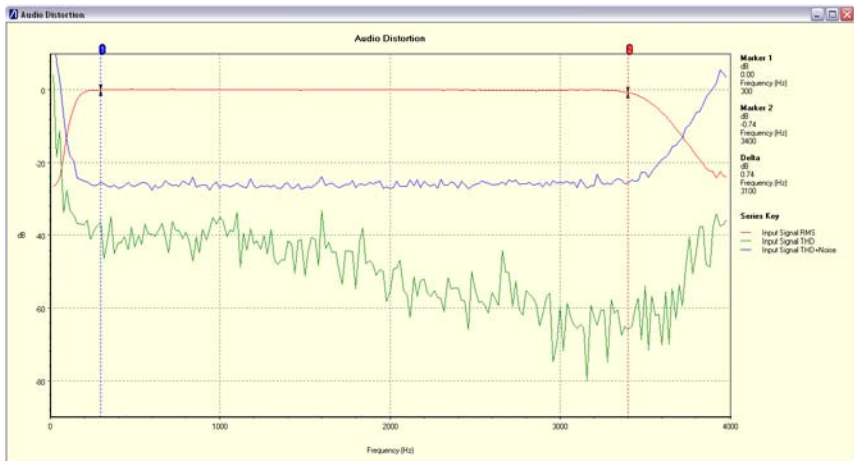
"Start"/"Stop"

Controls the frequency range for the sweep. Enter a start and stop value in Hz. Sweeps are always performed starting from the largest power level to the smallest, regardless of the order in which they are entered.

"Step Size"	Enables setting of the precision of the sweep. The step size is entered in Hz and determines the number of measurements made within the range specified.
"Average"	Specify the number of measurements taken by the Keithley and averaged together at each measurement frequency.
"RMS Voltage"	Specify the RMS voltage generated by the Keithley audio generator.
"Measurement Delay"	The delay between the step command and the time that measurement is commenced.

- Launch the graph by clicking on the graph icon  in the upper right corner of the page.
- Click the single sweep  button to establish a connection and commence measurement. The settings made on this tab are automatically written to the MT8852B when the tests are commenced.

### Results:



The red trace represents the audio channel frequency response.

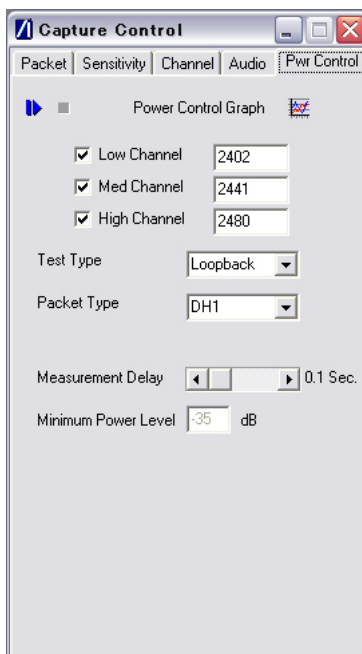
The green trace represents the audio channel total harmonic distortion.



The blue trace represents the audio channel total harmonic distortion plus noise.

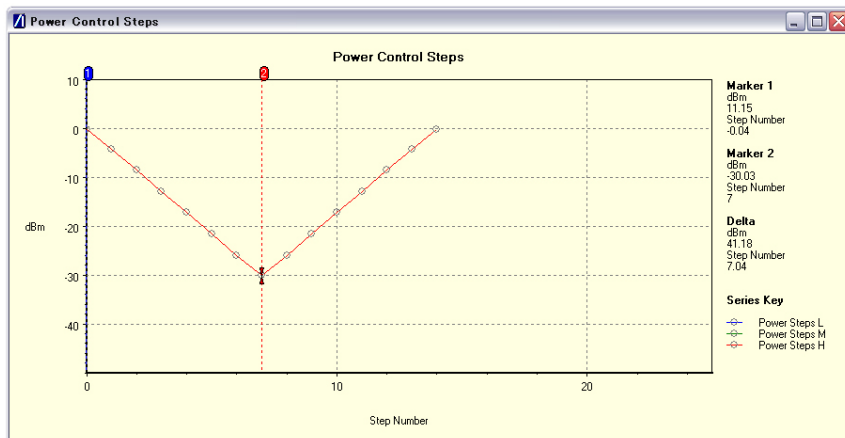
## Chapter 9. The [Pwr Control] Tab

The [Power] tab allows the user to configure and run a power control test and display the resulting steps as a graph.

**Note:** The instrument must be set to an editable script (3 to 10) prior to running a power control test.



1. Select the required channels using the “Low Channel”, “Med Channel”, and “High Channel” check boxes. Set the channel values as required.
2. Select the test and packet types from the drop down boxes.
3. Use the scroll bar to enter a measurement delay between the step command and the time that measurement is commenced.
4. Enter the minimum power level. When a power below the specified value is received by the MT8852B it will start sending increment power commands, even if it has not received a minimum power command from the EUT.
5. Launch the graph by clicking on the graph icon  in the upper right corner of the page.
6. Acquire the data from the MT8852B by clicking the single sweep  button. The settings made on this tab are automatically written to the MT8852B when the tests are commenced.

**Results:**

# Chapter 10. Saving Data and Controlling the Graphs

## Saving Graph Data

The data for any of the generated graphs can be saved from the commands in the [File] menu on the main window.

Select the [Save Data...] command to generate a .csv file of the source data. This file can then be imported into Microsoft Excel for more detailed analysis or graph generation.

Select the [Save Image...] command to save the graph in question as an individual image. The graph can be saved as a bmp, emf, or wmf file.

## Color Coding

The traces are color coded for easy recognition of each section of the data packet. The colors carry the following meanings.

Black:	Data outside the packet
Red:	Preamble
Blue:	Sync word (access code)
Maroon:	Trailer
Olive green:	Packet Header
Light blue:	Guard Time (for EDR packets only)
Pink:	EDR synchronisation sequence (for EDR packets only)
Olive green:	Payload Header
Dark blue:	Payload
Light green:	CRC

## Navigating the Graphs

Various functionality is available to allow the user to more easily view and analyze the data presented in the graph.

## Zooming

Zoom in (enlarge) any given section of the graph by holding down the mouse button and dragging the pointer around the desired area. The selected area is enlarged to fill the entire graph when the mouse button is released. Zooming can also be performed by right-clicking on the graph window to launch a pop-up menu with three options; Default scale, Undo zoom, and Zoom out 150%.



## Scrolling


Scrolling can be performed by positioning the cursor over the graph axis. The mouse pointer changes to an arrow to indicate the direction of scrolling.

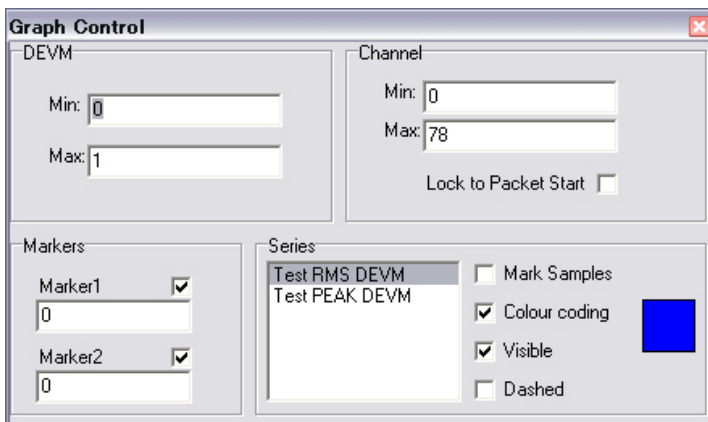
## Setting Markers

Markers are positioned by holding down [Ctrl] on the keyboard and clicking or dragging on the graph area. The markers should locate themselves under the mouse pointer while the mouse is held down. In the [Frequency Deviation] and [Power Burst] graphs, the markers lock to the active series. In the [Modulation Eye] diagram, the markers are free and can be positioned anywhere.

Markers can be also be moved by clicking on the colored flag above the graph.

## Controlling the Appearance of the Graphs

Select the [Graph Control] command from the [Tools] menu or click the  icon on the toolbar. The [Graph Control] dialog that displays gives the user control of the currently selected graph window.



The dialog box is made up of four panes.

### Upper panes

The upper two panes allow the user to specify the maximum and minimum values for the axes of the current graph. The titles assigned to these panes change to the corresponding axis on the selected graph window. The [Enter] key must be pressed before the value is sent to the graph. The pane that controls the horizontal axis of the graph allows the user to lock to packet start (not enabled for all graphs). This locks the axis minimum to zero when it is selected, and returns the graph to its previous value when it is unchecked.

**“Markers” pane**


The “Markers” pane contains a text box and a check box for each marker. The check box controls each marker’s visibility, and the text box controls its position relative to the horizontal axis.

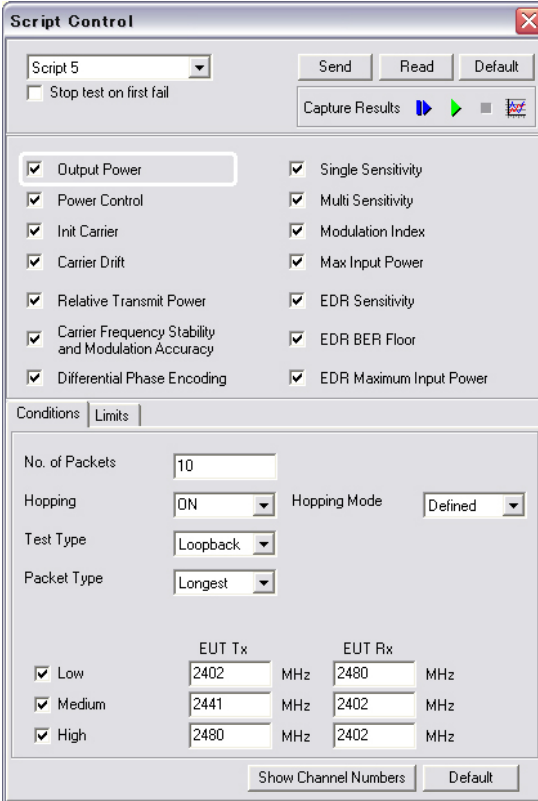
**“Series” pane**

The “Series” pane contains a list box of the series available in the current graph, identified by the series title. Once a series is selected you can control its parameters with the other controls. There are also four check boxes as detailed below.

- |                 |  |
|-----------------|--|
| “Mark Samples”  | Select to denote each data point on the graph with a small circle.   |
| “Colour coding” | This controls whether the data takes on the color assigned to it during capture, or is a single color. The colored square on the right denotes the series color used when color-coding is disabled. This can be changed by clicking the square and choosing a different color. |
| “Visible”       | Controls visibility of series.   |
| “Dashed”        | This indicates whether the selected series should be drawn with a dashed line. This may be useful for black and white printers.  |

# Chapter 11. Test Scripts

Test scripts can be configured and run from the [Script Control] window. Select the [Configure Unit] command from the [Tools] menu or click the  icon on the toolbar.




The Script Control dialog box is titled "Script Control" and features a close button (X) in the top right corner. It contains a dropdown menu for "Script 5" and buttons for "Send", "Read", and "Default". Below these is a checkbox for "Stop test on first fail" and a "Capture Results" section with a play button, a green arrow, a grey square, and a red X button. The main area is divided into two columns of checkboxes. The left column includes "Output Power", "Power Control", "Init Carrier", "Carrier Drift", "Relative Transmit Power", "Carrier Frequency Stability and Modulation Accuracy", and "Differential Phase Encoding". The right column includes "Single Sensitivity", "Multi Sensitivity", "Modulation Index", "Max Input Power", "EDR Sensitivity", "EDR BER Floor", and "EDR Maximum Input Power". Below this is a tabbed interface with "Conditions" and "Limits" tabs. The "Conditions" tab is active, showing fields for "No. of Packets" (10), "Hopping" (ON), "Hopping Mode" (Defined), "Test Type" (Loopback), and "Packet Type" (Longest). At the bottom, there are checkboxes for "Low", "Medium", and "High" under the heading "EUT Tx" and "EUT Rx", with corresponding frequency values in MHz. A "Show Channel Numbers" button and a "Default" button are at the bottom right.

	EUT Tx		EUT Rx	
<input checked="" type="checkbox"/> Low	2402	MHz	2480	MHz
<input checked="" type="checkbox"/> Medium	2441	MHz	2402	MHz
<input checked="" type="checkbox"/> High	2480	MHz	2402	MHz

## Editing a Script

Follow the procedure below to edit a script or its tests.


1. Select [Configure Unit] from the [Tools] menu or click the  icon to display the [Script Control] dialog box.
2. Select the script from the drop down menu at the top of the dialog box. Scripts 1 and 2 are fixed and cannot be edited in any way.
3. Select or clear the tests to be performed in the script.
4. The settings in the lower section of the dialog relate to the test that is currently selected in the pane above. If setting changes are required, click on the test in question and then make the changes on the [Conditions] and [Limits] tabbed pages below. The currently selected test is indicated by a white frame.

5. Press [Send] to relay the changes that have been made to the MT8852B.


**Note:** A prompt dialog displays if an attempt is made to run a script without sending changes back to the MT8852B.

---

## Reading Settings from the MT8852B

1. Select [Configure Unit] from the [Tools] menu or click the  icon to display the [Script Control] dialog box.
2. Select the script from the drop down menu at the top of the dialog.
3. Click [Read] to copy the changes that have been made at the MT8852B back to BlueSuite Pro3.

## Running Scripts

1. Select [Configure Unit] from the [Tools] menu or click the  icon to display the [Script Control] dialog.
2. Scripts can be run once or continuously in a loop until interrupted. Refer to the icons below.



Single Capture icon

Instructs the MT8852B to run a single script, and requests the results. This button is disabled when capturing data.



Constant Capture icon


Instructs the MT8852B to run a script in a loop and collect the results. This continues until the process is interrupted. This button is disabled when capturing data.



Stop Button icon

Aborts the capture process. This button is enabled only when capturing.

## Viewing Test Results

Test results display automatically when the script is run. The results display in the [Bluetooth Test Results] window as shown below. The results can be printed from within the window or saved as an html file for future reference. The most recently generated results can be viewed at any time by clicking the graph icon  in the top right corner of the window.

The results are generated in the style shown in the figure below.

**BlueSuite Test Report**

Print Save

**Anritsu  
BlueSuite Pro3 Test Report**

MT8852B Serial Number: 6K00000031 Date: 2006/11/16  
EUT Bluetooth Address: 0001A40001F6 Time: 15:47:33

**Overall Result: PASS**

**TRM/CA/01/C (Output Power)**  
Packet Length Tested: DH5

<b>Hopping ON</b>	<b><u>Low</u></b>	<b><u>Med</u></b>	<b><u>High</u></b>	<b><u>Limits</u></b>
Average Power	-0.3 dBm	0.46 dBm	1.17 dBm	
Max Power	-0.28 dBm	0.47 dBm	1.19 dBm	<20 dBm
Min Power	-0.31 dBm	0.45 dBm	1.16 dBm	<-6 dBm
Peak Power	-0.02 dBm	0.73 dBm	1.41 dBm	<23 dBm
Packets Failed	0	0	0	
Packets Tested	10	10	10	
Result	Passed	Passed	Passed	

**TRM/CA/02/C (Power Control)**  
Packet Length Tested: DH1

<b>Hopping OFF</b>	<b><u>Low</u></b>	<b><u>Med</u></b>	<b><u>High</u></b>	<b><u>Limits</u></b>
Max Power	-0.2 dBm	0.5 dBm	1.2 dBm	
Min Power	-30 dBm	-28.9 dBm	-28.6 dBm	
Max Power Step	4.5 dB	4.5 dB	4.5 dB	<8 dB
Min Power Step	4 dB	3.8 dB	4 dB	>2 dB
Packets Failed	0	0	0	
Packets Tested	14	14	14	
Result	Passed	Passed	Passed	

---

**Note:** The test report can also be imported into another program such as Microsoft Word by first generating the html file and then selecting this file from the [Open] dialog.

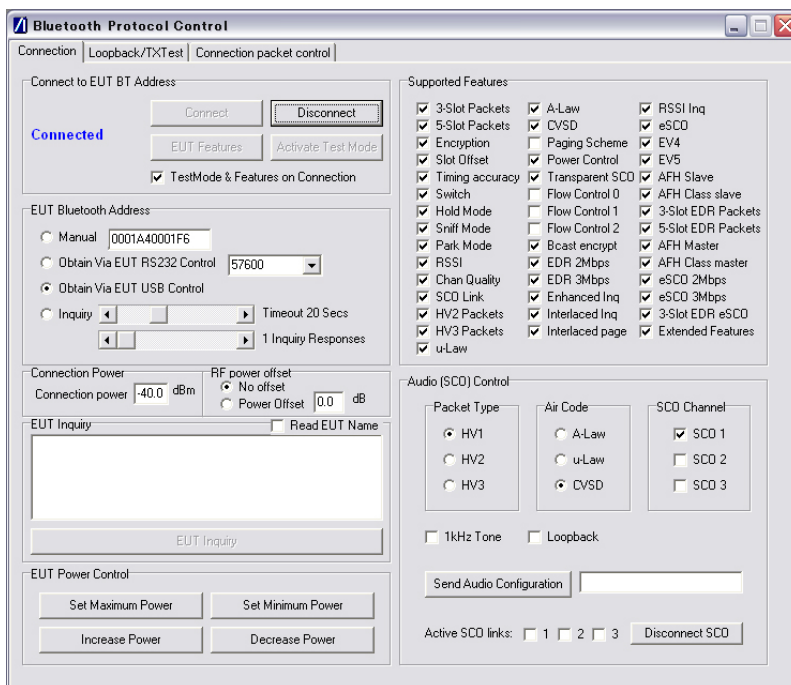
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## Chapter 12. Test Mode Signaling Tester

The [Bluetooth Protocol Control] window allows the user to step through individual LMP controls such as inquiry, paging, connection and disconnection, and read the supported features. This functionality is likely to be of benefit to isolate specific problems during debugging.

### [Connection] Tab

Click the *Bluetooth Protocol Control* icon  on the toolbar of the main window. The [Bluetooth Protocol Control] window displays as shown below.



There are three tabs on the window; [Connection], and [Loopback/TX Test] (only displays when a connection has been made) and [Connection packet control]..

The items on the [Connection] tab are detailed below.

[Connect]

Click to connect with the EUT. Test mode is not activated at this point.

[Disconnect]

Click to disconnect from the EUT.

[EUT Features]

Select to read the features supported by the EUT. The results display at the "Supported Features" check boxes to the right.

[Activate Test Mode]	Click to put the EUT into test mode.
"Test Mode & Features on Connection"	Select the activate test mode and automatically acquire the supported features when a connection is made. If this option is selected, the [EUT Features] and [Activate Test Mode] buttons are disabled.
"EUT Bluetooth Address"	Select the method of connection between the MT8852B and the EUT. (Refer to chapter 4)
"Connection Power"	Specify the transmit power level of the MT8852B.
"RF power offset"	Specify a path offset between the DUT and MT8852B if required.
"Read EUT Name"	Select to read the EUT user name on connection.
[EUT Inquiry]	Click to perform an inquiry to locate the EUT.
[Set Maximum / Minimum Power]	Click to set the EUT to maximum or minimum power. The effect can be monitored by displaying a continuously capturing power burst profile graph from the [Capture Control] dialog and watching the power level rise or fall accordingly.
[Increase / Decrease Power]	Click to increase or decrease the EUT power. The effect can be monitored by displaying a continuously capturing power burst profile graph from the [Capture Control] dialog and watching the power level rise or fall accordingly.
"Packet Type"	Select the HV packet type to be used for the SCO connection.
"Air Code"	Select the required Air Code format.
"SCO Channel"	Select the required SCO channel.
"1kHz Tone"	Turn the tone generator "ON" or "OFF" as required.
"Loop back"	Turn remote loopback "ON" or "OFF" as required.
[Send Audio Configuration]	Click to apply the selected audio settings to the connection.
[Disconnect SCO]	Click to remove the active SCO connections.

## [Loopback/TXTest] Tab

The settings on the [Loopback/TX Test] tab allow the user to change individual packet and hopping type settings without actually running a test.

The screenshot shows the 'Bluetooth Protocol Control' window with the 'Loopback/TX Test' tab selected. The window is divided into several sections for configuring the test parameters.

- Method:** Radio buttons for 'Loopback' (selected) and 'Tx Test'.
- Data Pattern:** A dropdown menu showing 'DATAPRBS9'.
- Packet Type:** Radio buttons for 'DH1' (selected), 'DH3', 'DH5', '2-DH1', '2-DH3', '2-DH5', '3-DH1', '3-DH3', and '3-DH5'.
- Hopping Type:** Radio buttons for 'Hopping ON' (selected) and 'Fixed Channel'. Below these are input fields for 'EUT TX Channel' (0) and 'EUT RX Channel' (78).
- Packet Length:** A slider and a text field showing 'Packet Length: 27'.
- Number of Packets to Send:** A slider and a text field showing 'Packet Count: Loop forever'.
- Data Payload Whitering:** A checkbox that is currently unchecked.
- Buttons:** 'Apply Settings' and 'Stop Loopback/Tx Test' are located on the right side of the window.

The settings on this page are self-explanatory and would normally be configured automatically when a test was executed. Change the settings as required and click [Apply Settings] to write the data to the MT8852B.

**Note:** Refer to the "MT8852B Operation Manual" if further details of settings are required.




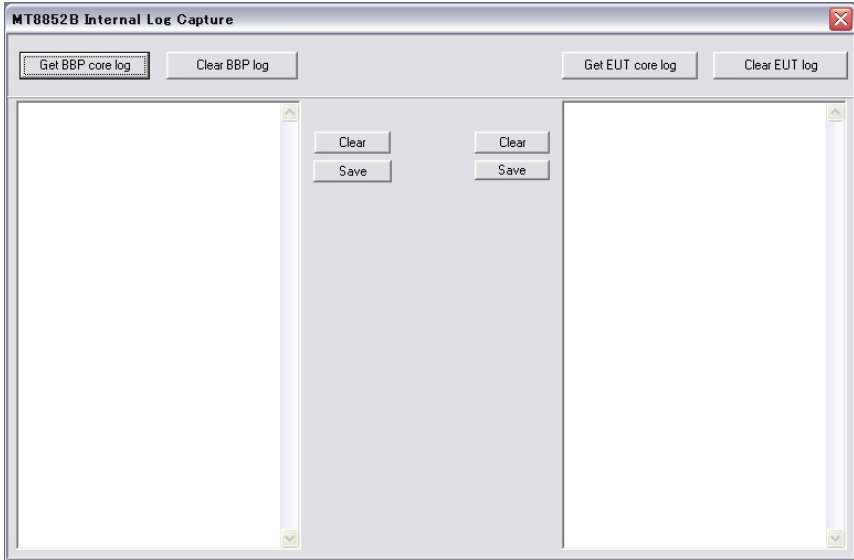
## [Connection Packet Control] Tab

The check boxes on the [Connection packet control] tab allow the user to select the packet types that may be used during connection. Deselection of EDR packets enables smooth interoperability with EUTs that do not manage all test controls correctly following a packet type negotiation.



## Chapter 13. Acquiring Log Data

In the event of interoperation issues between the MT8852B and the EUT, the log window shown below can be used to acquire a log of the link manager protocol messages passed between the MT8852B and the EUT. The log data window can be displayed by selecting the [Internal Log Capture] command from the [Tools] menu of the main window, or by clicking the  icon on the toolbar.



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




**Note:** The log data window is not available when measurements are in progress.




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[Get BBP core log]	Acquires the MT8852B's log of LMP messages.
[Clear BBP log]	Clears the MT8852B's log of LMP messages.
[Get EUT core log]	Acquires the log of LMP messages on the EUT connected to the MT8852B.
[Clear EUT log]	Clears the log of LMP messages on the EUT connected to the MT8852B.
[Clear]	Clears the corresponding list box.
[Save]	Launches a save dialog box allowing the saving of the text in the corresponding list box to a file.

# Appendix A. Command Reference

This section provides details of the commands found within the menus of the main BlueSuite Pro3 window. For ease of operation certain of the major commands have been made available as icons on the toolbar.

[File]	[Save Data] 	Used to output the data in the currently selected graph window to a .csv file. This command is only available when graph or results data is being displayed.
	[Save Image]	Used to produce an image file of the currently selected graph window. Image formats available are bitmap (.bmp) and metafiles/enhanced metafiles (.wmf, .emf). This command is only available when a graph is being displayed.
	[Print] 	Used to create a print file and send it to the selected printer context. This command is only available when graph or results data is being displayed.
	[Exit]	Closes the application.
[Tools]	[Connection Control] 	Launches the [Connection Control] dialog box.
	[Protocol Control] 	Launches the [Bluetooth Protocol Control] window. This command is only available if BlueSuite Pro3 has found the MT8852B over the GPIB.
	[Capture Control] 	Launches the [Capture Control] dialog box. This command is only available if BlueSuite Pro3 has found the MT8852B over the GPIB.
	[Graph Control] 	Launches the [Graph Control] dialog box. This command is only available when a graph is being displayed.
	[Configure Unit] 	Launches the [Script Control] dialog box.
	[Internal Log Capture] 	Used to acquire a log of the link manager protocol messages transmitted between the MT8852B and the EUT. This command is only available if BlueSuite Pro3 has found the MT8852B over GPIB.

[Window]	[Cascade] 	Used to cascade windows across the screen.
	[Tile vertically] 	Used to position windows vertically for ease of viewing.
	[Tile horizontally] 	Used to position windows horizontally for ease of viewing.
	[Minimize All]	Used to reduce all open windows to a button on the task bar.
[Help]	[About]	An [About] dialog box containing version information.

## Appendix B. GPIB Setup

The following GPIB driver configuration setup is recommended for reliable GPIB communication with the MT8852B *Bluetooth* Test Set. The setup is expressed in the terms used by the National Instruments GPIB ISA and PCI cards and drivers for Windows and DOS.

For details of how to set up and configure the National Instruments GPIB card, refer to the installation information supplied with the card itself.

### GPIB Device Template

The MT8852B Series default primary address is 27. Separate device templates for the primary address of each device can usually be set up separately. The settings for the device template for the MT8852B are:

Terminate read on EOS:	NO
Set EOI with EOS on write:	YES
Type of compare on EOS:	8 bit
EOS byte:	0x0A (10 decimal)
Send EOI at end of write:	YES
Readdressing:	YES
Secondary address:	NONE

### GPIB PCII/IIA Properties

The recommended GPIB card settings for use with the MT8852B are:

Terminate read on EOS:	NO
Set EOI with EOS on writes:	YES
Type of compare on EOS:	8 bit
EOS byte:	0x0A (10 decimal)
Send EOI at end of write:	YES
System controller:	YES
Assert REN when SC:	YES
Enable Auto Serial polling:	NO
NI card. Cable length for HS488:	OFF

## Appendix C. Glossary of Terminology

ACL	Asynchronous Connectionless Link. Packet switched connection with both synchronous and isochronous services which is suitable for both symmetric and asymmetric data transfer.
BER	Bit Error Rate.
BlueSuite Pro3	The Windows based application developed by Anritsu that communicates via GPIB to a remote MT8852B.
<i>Bluetooth</i>	The open specification designed to enable short-range wireless communication between any electronic equipment.
CRC	Cyclic Redundancy Check. A 16-bit error correction code added to a data packet to determine whether the packet has been received correctly.
CVSD	Continuous Variable Slope Delta Modulation.
DHx	Data-High rate. High speed ACL data packets occupying either 1,3, or 5 slots. DH1 packets can carry up to 28 info bytes and cover a single time slot. DH3 packets can cover up to 3 time slots and contain up to 185 info bytes. DH5 packets can cover up to 5 time slots and contain up to 341 info bytes.
EUT	Equipment Under Test. The <i>Bluetooth</i> equipment being tested by the MT8852B.
FER	Frame Error Rate.
GPIB	General Purpose Interface Bus. The communication link required to enable the BlueSuite Pro3 software to acquire data from an MT8852B. A GPIB interface card and lead must be fitted to the PC to connect to the MT8852B.
LMP	Link Manager Protocol. The protocol used by the Link Manager to perform link setup, configuration, and authentication.
MT8852B	The <i>Bluetooth</i> Test Set with which the BlueSuite Pro3 software communicates.
Packet	A self-contained unit of information, assembled to <i>Bluetooth</i> specification, and transmitted/received over a <i>Bluetooth</i> channel.
SCO	Synchronous Connection Oriented link. A synchronous (circuit-switched) connection for reserved bandwidth communications. SCO packets do not include a CRC and are never retransmitted. SCO links can be established only after an ACL link has first been established.
Script	A group of <i>Bluetooth</i> conformance tests selected by the user and run by the MT8852B consecutively.
TTL	Transistor-Transistor Logic. A common type of digital logic used to design digital systems in which the output is derived from two transistors.



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