By eliminating wires and simplifying connections between everyday appliances, Bluetooth® wireless technology has become the dominant standard for short-range wireless connectivity. Over 2.5 billion devices are now shipped each year with Bluetooth technology embedded. Mobile phones connect seamlessly to headsets and car kits for hands-free speech or to other phones for picture sharing and file transfer. But Bluetooth is not confined to the phone—other applications include streaming high quality music from music players to a new generation of stereo headsets and desk speakers plus wireless gaming controllers.

The introduction of the new Bluetooth Smart standard opens up a whole new range of applications including sports and fitness monitoring and health and wellbeing sensors.

The future success of the Bluetooth standard will depend on users of the technology enjoying reliable, high-quality connections. We will expect to use products “out of the box” to provide immediate connectivity.

Anritsu recognizes the importance of Bluetooth link quality to the success of the technology and to the reputation of the products in which it is embedded. We have developed a series of test solutions to help in development and production test of Bluetooth modules and Bluetooth products – quickly and at low cost.

Anritsu is the leading supplier of instruments to test the quality of products manufactured with Bluetooth technology embedded. As members of the Bluetooth Special Interest Group (SIG) since 1999, Anritsu has actively participated in the development of the standard from the first Core Specification version 1.0 release through to the current Core Specification version 4.2 release. The MT8852B Bluetooth Test Set builds on this experience to offer an optimized radio layer test instrument.

As a manufacturer of Bluetooth products, you need above all else to maintain your reputation for quality and reliability. The complex demands of new technologies such as Bluetooth will require the adoption of new testing techniques. By bringing our experience to bear on these demanding test requirements, Anritsu can offer you the test capability you need.

The MT8852B Bluetooth Test Set gives you a one-button test to fully characterize your Bluetooth implementation and ensure that your reputation for quality is maintained. Working with RF, especially RF at over 2 GHz, is not easy, but with Anritsu as your test partner you can be certain of having the most up-to-date and relevant testing capabilities for your Bluetooth products. Anritsu understand the need to quickly and accurately verify the performance of products in a high volume manufacturing environment, thereby ensuring excellent and reliable performance from new Bluetooth products. When tested on the MT8852B, you can ship products to your customers with confidence that they will work perfectly first time, every time.

The Bluetooth® mark and logos are owned by Bluetooth SIG, Inc. and are used by Anritsu under license.
Bluetooth Test Set MT8852B

- Qualified by Bluetooth SIG for measurements
- Compliant with Bluetooth Core Specification v1.2, 2.0, 2.1, 3.0 + HS, 4.0, 4.1 and 4.2 RF test suite
- Measurements performed in Bluetooth test mode – Loopback or Tx mode supported
- Signal generator and transmitter analyzer modes for protocol free applications
- “Quick Test” script validates Basic Rate, EDR and Bluetooth low energy test performance in under 15 seconds
- “Full Test” script performs full Bluetooth SIG compliant testing from single key press
- For design proving and production test
- Full implementation of Basic Rate, EDR and Bluetooth low energy dirty transmitter for Bluetooth SIG RF test specification compliant measurements
- Audio test capability, 3 SCO channels with CVSD, μ-Law and A-Law air interface
- Adaptive Frequency Hopping (AFH) measurements (MT8852B-015)
- BlueSuite Pro3 PC software displays; FSK modulation, power burst profile, PSK constellation diagrams and sensitivity searches graphically
- CombiTest program automates production test software with test script generator and results data base
- Easy operation – one-touch testing with “Run” key
- GPIB and RS232 remote programming interfaces
- Initialization and control of test devices through USB, RS232 and USB-Adaptor HCI control port
- Built-in support for Bluetooth low energy 2-Wire control interface
- Small size (half rack) and low weight (≤3.45 kg)
Applications

Module Testing

Anritsu understands the requirements of the manufacturers of Bluetooth modules. Test times must be minimized yet performance must be assured. The MT8852B can establish a link with the module under test and perform a comprehensive set of transceiver measurements in under 10 seconds. If the module address is unknown, MT8852B can read it through the module HCI (RS232, USB or USB-Adaptor), or perform an inquiry. An integrated CW frequency counter can be used for crystal trimming. Module testing requires a test fixture, ideally in a shielded box, to interface the Bluetooth module to the MT8852B. The test fixture should provide a direct RF connection plus, if required, connection to the modules HCI interface.

For fault finding and analysis, BlueSuite Pro3 software is a PC based tool kit that tests EUTs systematically on all channels. BlueSuite Pro3 also graphically displays the essential waveforms of power burst profile, modulation deviation and IQ diagrams. In the early stages of development, the signal generator and transmitter analyzer can be used to test the device without forming any protocol connection to the test set.

Consumer Product Testing

Bluetooth interfaces are now standard on many consumer products including; digital music players, notebook PCs, gaming handsets, printers, portable credit card readers and headsets. For many manufacturers, it will be the first time that RF measurements have been made in their production environment.

The MT8852B is a highly targeted instrument that has been designed to offer Bluetooth test capability in a compact, economical and easy to operate package. The pre-programmed test scripts provide a fast solution that can quickly be integrated into existing production facilities. By using the CombiTest production test software, the MT8852B can be quickly integrated in to the production flow with automatic archiving of all test results to a database.

Mobile Phone Testing

Mobile phones are the highest volume product to benefit from Bluetooth technology. Manufacturers need to prove the performance of both the Bluetooth and mobile phone radios. Test is typically a bottleneck in any mobile phone production line and so testing the Bluetooth interface must be performed with no increment to total test time. It is also vital to confirm that both radios can be active simultaneously without any interference between them. These demands result in the need for parallel testing of the Bluetooth and mobile phone radios. MT8852B is the ideal instrument used alongside a radio communications analyzer to perform parallel testing.

Should the mobile phone also include an 802.11b/g WLAN radio, the AFH feature of the MT8852B is ideal for validating that both radios can be used simultaneously without mutual interference. For mobile phones without an RF test connector, MT8852B can make all its measurements over the air interface. You simply use your test fixture to position the EUT accurately with respect to the test antenna. Correction values for the path loss at each frequency can be entered into MT8852B path loss table and all results are corrected accordingly.

Design Proving

Each new revision of a Bluetooth chip requires full verification for RF performance. The MT8852B forms the heart of a design and verification test system. With the addition of other Anritsu test instruments including a second MT8852B as the Bluetooth modulated interferer, a MG3692C as the CW interferer and a MS2830A spectrum analyzer, all 16 standard rates and 8 EDR test cases can be executed.

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Add BlueSuite Pro3 Software for Greater Insight into the Device’s Performance

BlueSuite Pro3 is a comprehensive software tool that enables a greater understanding of all aspects of a device’s RF characteristics. Running on a standard PC, BlueSuite Pro3 interfaces to the MT8852B through a GPIB interface. With BlueSuite Pro3 you can:

- Monitor the real-time state of the EUT through the display of frequency deviation, power burst, IQ constellation and vector graphs.
- 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.

BlueSuite Pro3 displays the IQ constellation pattern for all payload symbols, or any user defined 50 µs block. Limit circles are preset to the core specification requirement for π/4DQPSK or 8DPSK modulation standards.

Power Burst profile display of 3-DH1 packet. Color coding highlights each element of the packet; for example, red - preamble, light blue - access code and dark blue - PSK payload.

Automatic sensitivity search measurements display the FER/BER performance of an EUT with decreasing power into the receiver. Tests can be performed on all supported standard rates and EDR packet types.
Introducing CombiTest

CombiTest is a software application used to remotely control Anritsu WLAN and Bluetooth test sets using a user-configured test plan of measurements. It is ideal for creating design-verification or production test plans for the new generation of wireless combo modules including 802.11 and Bluetooth radios. CombiTest allows users to install plug-ins as required for each test instrument.

CombiTest Features
• Plug-ins for MT8852B Bluetooth Test Set
• Bluetooth test mode measurements
• Rapid creation and execution of test plans
• Calibration, validation, and EEPROM programming of modules
• Run an entire test plan or just the selected components
• Detailed report of test results with database of previous tests
• CombiTest application source code available on request

Setup
Test the Interference Rejection Capability of your Bluetooth Devices with the AFH Option

When two Bluetooth devices connect under normal circumstances, they establish a basic frequency hopping scheme across 79 frequency channels in the 2.4 GHz ISM band, hopping at a rate of 1600 times per second. However, as is becoming increasingly common, interference may be encountered in environments where other wireless technologies, such as 802.11 WLAN or DECT are also active. Blocked channels, caused by interference, result in a deterioration in the performance of the connection, and this in turn results in poor voice quality or reduced data transfer rates. To limit the impact of this interference, an adaptation of frequency hopping, known as Adaptive Frequency Hopping (AFH) was introduced by the Bluetooth SIG in the Bluetooth v1.2. AFH aims to restore the performance of a Bluetooth connection by identifying channels with high error rates and excluding the use of these channels thereafter.

MT8852B Implementation of AFH

When Bluetooth devices that implement the Bluetooth v1.2 are connected, each device can create its own Local Assessment Scheme. This is a channel map that defines which channels the device assesses to be clear and which are experiencing interference. The MT8852B is designed to respond to the EUT assessment of which channels are experiencing interference. The MT8852B, being the Master device, creates an Active Channel Map that is the combination of the EUT’s local assessment scheme and any channels that the user has manually masked from the MT8852B user interface.

With the MT8852B-015 AFH Option You Can:

• Connect to an EUT using the Bluetooth v1.2 faster connection and display the connection time in milliseconds.
• Display the EUT Bluetooth v1.2 supported features map, including AFH capabilities.
• Create an AFH connection to the EUT.
• Read the EUT Local Assessment Scheme in the presence of an external interfering signal (e.g. WLAN).
• Manually define additional channels to mask in the MT8852B Pseudo Local Assessment Map.
• Display a graph of channel utilization against time to measure the speed with which an EUT masks channels when an interfering source is activated.
• Display a graph of Frame Error Rate (FER) against time to validate that an EUT identifies all “Bad” channels and maintains a zero or low FER.
• Establish an audio SCO link so that the audio quality can be monitored in the presence of interfering signals, and ensure that the AFH functionality maintains a high quality audio path.

Channel Utilization Against Time

This screen presents a graph with 1 second resolution of the number of channels masked by the EUT. It can be used to measure the time that the EUT takes to respond to the introduction of an interfering signal source. When the interfering source is removed, the same display shows the time that the EUT takes to re-introduce the now clear channels into the hopping scheme.

Frame Error Rate (FER) Against Time

This screen presents a graph with 1 second resolution of the FER of the Bluetooth link with AFH enabled. When an interfering source such as a 802.11 WLAN access point is activated, the FER can be seen to increase immediately. As the EUT’s local assessment scheme identifies the “bad” channels and reports its assessment to the MT8852B, the FER will decrease as the channels are removed from the hopping plan.

Audio Measurements with AFH

The MT8852B also supports SCO connections with AFH active. This facilitates analysis of the impact of an interfering source on the quality of an audio signal.
Add MT8852B-027/034 to Test and Characterise Bluetooth Smart and Smart Ready Devices

Bluetooth Smart is the latest addition to the Bluetooth Core Specification. It is designed specifically for small, button-cell battery powered devices for which low power-consumption and low cost are the primary concerns. Bluetooth Smart is designed to work side by side with existing Bluetooth devices. It operates in the 2.4 GHz ISM band and offers data rates of 1 Mbps over a range of over 10 meters. Devices ideally suited to Bluetooth Smart include wireless health care equipment such as wireless blood sugar monitors, fitness performance equipment such as heart rate monitors, and remote displays (such as a wrist watch display) for displaying data from sensing devices.

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The MT8852B Bluetooth low energy PC application displays the power burst profile and modulation versus symbol graphs of Bluetooth low energy test reference packets. This is an invaluable tool during the design verification process for viewing and fully characterising the performance of a Bluetooth Smart radio. The [Tx Testing] tab shown here allows the user to set the conditions under which data is transmitted from the device. Tx measurements are selected and the results displayed numerically and in colour-coded traces. The [Rx Testing] tab allows the user to transmit Bluetooth low energy reference packets to the device so that Packet Error Rate (PER) can be calculated. For EUTs that support the UART/USB/USB-Adaptor or 2-Wire interface, the number of received packets can be read by the MT8852B, thus automating receiver sensitivity testing. The application can generate and display a receiver sensitivity curve so that the true sensitivity performance of the EUT can be measured.

There are two types of Bluetooth Smart devices, Smart Ready devices integrate Basic Rate, EDR and Bluetooth Smart functionality into a single chip, while Bluetooth Smart devices support only the Bluetooth Smart standard. Mobile phones and PCs are expected to support Bluetooth Smart Ready devices and sensors and peripherals will only support the Bluetooth Smart standard.

Unlike the standard for Basic Rate and EDR testing, the Bluetooth Smart specification does not define a signalling based test mode connection to the EUT. The EUT must be controlled using defined test control commands sent through the EUT HCI interface. A simple 2-Wire control interface is provided for EUTs that do not have an HCI interface. The MT8852B, with Bluetooth low energy measurements option MT8852B-027, sends these test controls to the EUT to deliver fully automated testing. With the use of this integrated interface, the MT8852B can run a single test script that with a single key press can test the Basic Rate, EDR and Bluetooth Smart performance of an EUT. With the BLE Data length Extension MT8852B-034 option, the instrument can test Bluetooth Smart and Smart Ready devices that support the data length extension defined in Bluetooth v4.2.

For EUT transmitter tests, test controls sent from the MT8852B configure the Bluetooth Smart or Smart Ready device to transmit test reference packets that are captured and analyzed by the MT8852B receiver.

The MT8852B-027/034 options are supplied with a Bluetooth low energy measurement application. During the design verification stages this application can be used to display the reference test packets transmitted by the EUT.

Key Features of MT8852B-027/034
- Fully compliant with Bluetooth SIG Core Specification v4.0, 4.1 and 4.2 for Bluetooth Smart and Smart Ready
- Test Dual Mode (Basic Rate, EDR and Bluetooth Smart) and Single Mode (Bluetooth Smart) devices
- Control EUT directly from MT8852B through UART, USB, USB-Adaptor and 2-Wire interfaces
- Configure a single script to run Basic Rate, EDR and Bluetooth Smart measurements from one key press

Includes PC Application
- Configure test reference packets
- View Power Burst Profile and Modulation vs. Symbol
- Automated receiver sensitivity trace
- Numeric display of all test cases with Pass/Fail status
## Supported Measurements

### Basic Rate
Compliant with the following Bluetooth Core Specification v1.2, 2.0, 2.1, 3.0 + HS, 4.0, 4.1 and 4.2

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM/CA/BV-01-C</td>
<td>Output Power</td>
</tr>
<tr>
<td>TRM/CA/BV-03-C</td>
<td>Power Control</td>
</tr>
<tr>
<td>TRM/CA/BV-07-C</td>
<td>Modulation Characteristics</td>
</tr>
<tr>
<td>TRM/CA/BV-08-C</td>
<td>Initial Carrier Frequency Tolerance</td>
</tr>
<tr>
<td>TRM/CA/BV-09-C</td>
<td>Carrier Frequency Drift</td>
</tr>
<tr>
<td>TRM/CA/BV-14-C</td>
<td>Enhanced Power Control</td>
</tr>
<tr>
<td>RCV/CA/BV-01-C</td>
<td>Sensitivity – single slot packets</td>
</tr>
<tr>
<td>RCV/CA/BV-02-C</td>
<td>Sensitivity – multi-slot packets</td>
</tr>
<tr>
<td>RCV/CA/BV-06-C</td>
<td>Maximum Input Level</td>
</tr>
</tbody>
</table>

### Enhanced Data Rate (EDR)
Compliant with the following Bluetooth Core Specification v1.2, 2.0, 2.1, 3.0 + HS, 4.0, 4.1 and 4.2

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM/CA/BV-10-C</td>
<td>EDR Relative Transmit Power</td>
</tr>
<tr>
<td>TRM/CA/BV-11-C</td>
<td>EDR Carrier Frequency Stability and Modulation Accuracy</td>
</tr>
<tr>
<td>TRM/CA/BV-12-C</td>
<td>EDR Differential Phase Encoding</td>
</tr>
<tr>
<td>RCV/CA/BV-07-C</td>
<td>EDR Sensitivity</td>
</tr>
<tr>
<td>RCV/CA/BV-08-C</td>
<td>EDR BER Floor Performance</td>
</tr>
<tr>
<td>RCV/CA/BV-10-C</td>
<td>EDR Maximum Input Level</td>
</tr>
</tbody>
</table>

### Bluetooth low energy
Compliant with the following Bluetooth Core Specification v4.0, 4.1 and 4.2

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRM-LE/CA/BV-01-C</td>
<td>Output power at NOC</td>
</tr>
<tr>
<td>TRM-LE/CA/BV-02-C</td>
<td>Output power at EOC</td>
</tr>
<tr>
<td>TRM-LE/CA/BV-05-C</td>
<td>Modulation characteristics</td>
</tr>
<tr>
<td>TRM-LE/CA/BV-06-C</td>
<td>Carrier frequency offset and drift at NOC</td>
</tr>
<tr>
<td>TRM-LE/CA/BV-07-C</td>
<td>Carrier frequency offset and drift at EOC</td>
</tr>
<tr>
<td>RCV-LE/CA/BV-01-C</td>
<td>Receiver sensitivity at NOC</td>
</tr>
<tr>
<td>RCV-LE/CA/BV-02-C</td>
<td>Receiver sensitivity at EOC</td>
</tr>
<tr>
<td>RCV-LE/CA/BV-06-C</td>
<td>Maximum input signal level</td>
</tr>
<tr>
<td>RCV-LE/CA/BV-07-C</td>
<td>PER Report Integrity</td>
</tr>
</tbody>
</table>

NOC: Normal Operating Conditions  
EOC: Extreme Operating Conditions  
See Bluetooth low energy RF PHY Test Specification for details

### Adaptive Frequency Hopping (AFH)
Compliant with the following Bluetooth Core Specification v1.2, 2.0, 2.1, 3.0 + HS, 4.0, 4.1 and 4.2

<table>
<thead>
<tr>
<th>Description</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel utilisation against time</td>
<td>Display number of active channels as reported by EUT Local Assessment Scheme</td>
</tr>
<tr>
<td>Frame error rate against time</td>
<td>Display of link FER with 1 second reporting interval</td>
</tr>
<tr>
<td>Active channel map</td>
<td>Display of Active and Masked channels as reported by EUT Local Assessment Scheme</td>
</tr>
</tbody>
</table>
## Ordering Information

Please specify the model/order number, name and quantity when ordering.
The names listed in the chart below are Order Names.
The actual name of the item may differ from the Order Name.

<table>
<thead>
<tr>
<th>Model/Order No.</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT8852B</td>
<td>Main frame</td>
</tr>
<tr>
<td>MT8852B-040</td>
<td>Bluetooth Test Set with EDR and Audio</td>
</tr>
<tr>
<td>MT8852B-041</td>
<td>Bluetooth Test Set with no EDR and no Audio</td>
</tr>
<tr>
<td>MT8852B-042</td>
<td>Bluetooth Test Set with EDR and with Audio</td>
</tr>
<tr>
<td>MT8852B-043</td>
<td>Bluetooth Test Set with low energy Measurements only</td>
</tr>
</tbody>
</table>

### Standard accessories

- BlueSuite (Software, Standard version)
- RS232 HCI Control Interface Lead
- USB HCI Control Interface Lead
- RS232 Cable for Firmware Updates
- Power Cord for Destination Country
- Certificate of Calibration
- 3.5 mm Jack Plugs (Qty. 3, Audio Versions Only)
- BlueTest2 (Software)

### Options and accessories

- MT8852B-001   | Rack Mount Kit, Single Unit                          |
- MT8852B-003   | Rack Mount Kit, Side by Side                         |
- MT8852B-015   | Adaptive Frequency Hopping                           |
- MT8852B-017   | IQ Data Output                                       |
- MT8852B-027   | Bluetooth low energy Measurements                    |
- MT8852B-034*  | BLE Data Length Extension                            |
- MT8852B-319   | Retrofit Audio to MT8852B                            |
- MT8852B-325   | Retrofit EDR to MT8852B                              |
- MT8852B-327   | Retrofit Bluetooth low energy Measurements          |
- MT8852B-330   | Retrofit Basic Rate Measurements to MT8852B-043     |
- MT8852B-334*  | Retrofit BLE Data Length Extension                  |
- MT8852B-098   | Standard Calibration to ANSI/NCSL Z540               |
- MT8852B-099   | Premium Calibration to ANSI/NCSL Z540 (Test report and uncertainty data included) |
- MX885201B     | BlueSuite Pro3 (Application)                         |
- 2000-1613-R    | Bluetooth Antenna and Adaptor                        |
- D41310         | Soft Carry Bag                                       |

*: MT8852B-034 (334) requires MT8852B-027 (327) or MT8852B-043.
The Bluetooth Audio Test Set MT8855A is the world’s first test set designed specifically to perform high-quality audio measurements on products using the Bluetooth Advanced Audio Distribution Profile (A2DP), the headset profile, or the hands-free profile. The MT8855A is the ideal instrument for both design validation and manufacturing test. Typical Bluetooth products that can be tested with the MT8855A include stereo and mono headsets, mobile phones, digital music players, integrated and accessory car kits, and desktop speakers.

**Key Features:**
- 20 Hz to 20 kHz frequency coverage
- THD, THD+N, SINAD distortion measurements
- Stereo phase and stereo separation
- Graphical measurements of frequency response, plus THD+N vs. level and frequency
- A2DP profile support for stereo headset testing
- Headset and hands-free profile support for mono headsets
- Audio FFT analyzer aids fault finding
- Direct connection of accessory microphones and speakers
- Under 10 seconds test time for typical headset

The BlueAudio software, supplied with each MT8855A, is installed on a PC that connects to the MT8855A using a standard USB cable. BlueAudio serves as the MT8855A’s front panel and is used to configure the instrument and display graphical and numeric measurement results. It communicates with the MT8855A by means of the class library dll file. For full specification and ordering information on MT8855A, go to www.anritsu.com.

BlueAudio screen displays full audio characteristics of a stereo headset.
Specifications are subject to change without notice.