Bluetooth®

discover...

MT8852B *Bluetooth*® Test Set Including Enhanced Data Rate

- Six new *Bluetooth* EDR transmitter and receiver test cases
- Backwards compatible with MT8852A *Bluetooth* Test Set
- All measurements performed in Test Mode including RF loopback
- Single script runs standard rate and EDR tests
- EDR dirty transmitter for receiver sensitivity test case
- *Bluetooth* EDR transmitter DEVM measurements
- Supports both 2Mbps (π/4DQPSK) and 3Mbps (8DPSK) data rates

Anritsu

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Overview

Bluetooth wireless technology has become the dominant standard for short range wireless connectivity between a wide range of consumer products, including mobile phones, PCs and PDAs. Shipments of products with *Bluetooth* interfaces continue to grow rapidly, and the technology is being integrated into an ever increasing range of consumer goods.

Anritsu is the leading supplier of instruments to test the quality of products manufactured with *Bluetooth* technology embedded. The MT8852B *Bluetooth* Test Set builds on over 6 years development of measurement instruments for manufacturers of products using *Bluetooth* technology. Anritsu understands 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. Manufacturers can ship products to customers with confidence that they will work perfectly first time, every time.

The *Bluetooth* SIG has adopted a new version of the *Bluetooth* standard, Revision 2.0, that extends the data rate for *Bluetooth* wireless connections from 1Mbps to a maximum of 3Mbps.

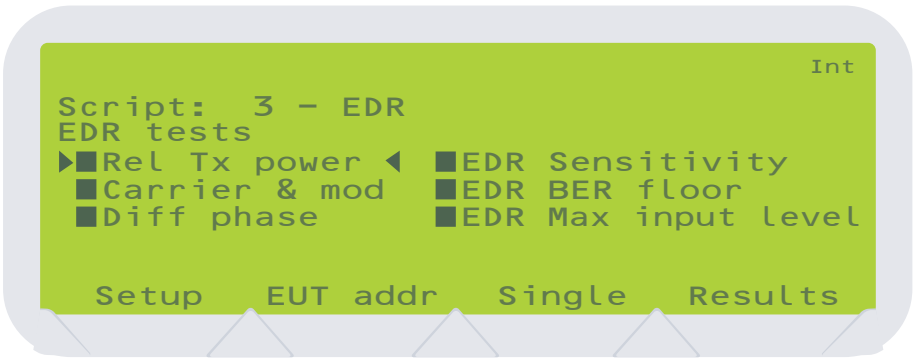
New EDR Features

The new MT8852B builds on the success of the MT8852A using the familiar instrument case and user interface. Existing MT8852A users will quickly familiarize themselves with the new measurement features and will be testing EDR devices immediately.

New EDR test cases supported are:

1. TP/TRM/CA/10/C (EDR Relative Transmit Power)
2. TP/TRM/CA/11/C (EDR Carrier Frequency Stability and Modulation Accuracy)
3. TP/TRM/CA/12/C (EDR Differential Phase Encoding)
4. TP/TRM/CA/13/C (EDR In-band Spurious Emissions)
   (Requires MT8852B and the addition of a MS2681A spectrum analyzer)
5. TP/RCV/CA/07/C (EDR Sensitivity)
6. TP/RCV/CA/08/C (EDR BER Floor Performance)
7. TP/RCV/CA/09/C (EDR C/I Performance)
   (Requires quantity 2 MT8852B)
8. TP/RCV/CA/10/C (EDR Maximum Input Level)

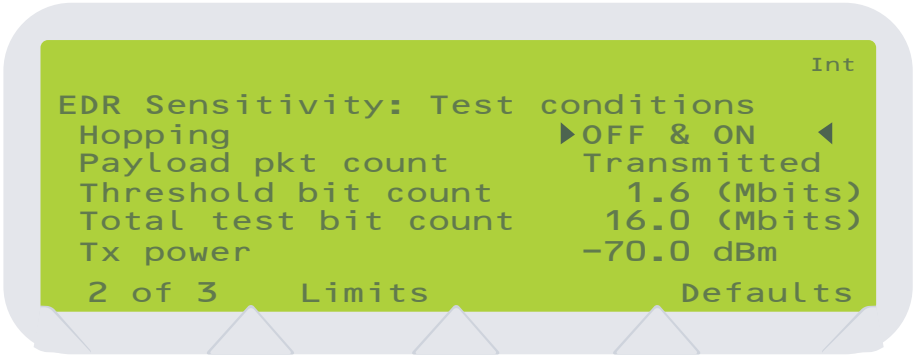
The MT8852B adds the new EDR measurements to the existing scripts so that EDR chips can be tested with a single press of the RUN key.



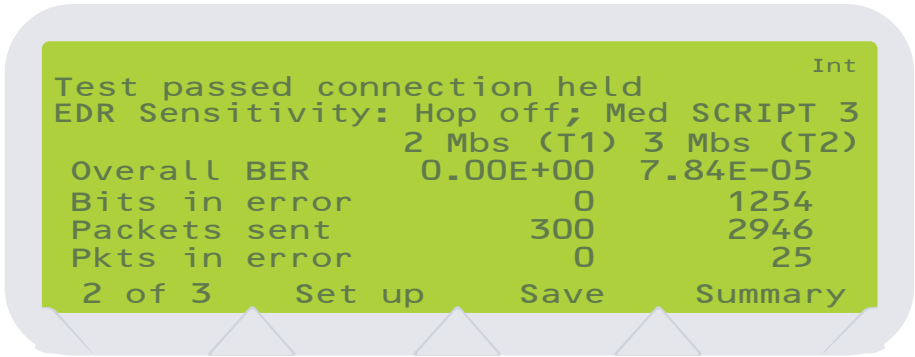
The MT8852B also includes a π4-DQPSK and 8DPSK signal generator and modulation analyzer.

Measurement Screens

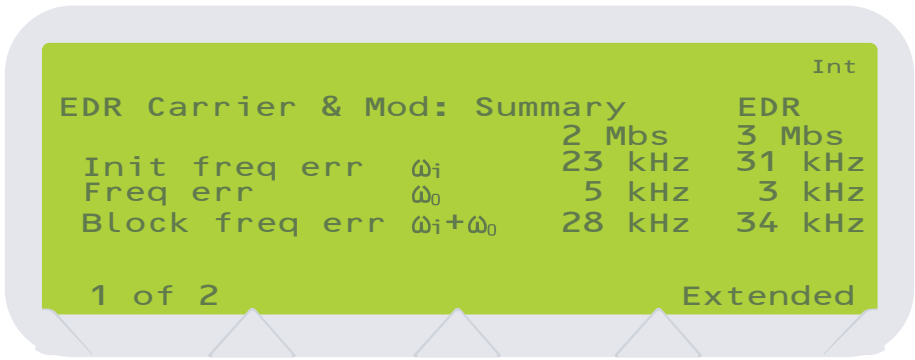
Measurement configuration and results displays follow the familiar format of the MT8852A. Each measurement can be run exactly in accordance with the *Bluetooth* SIG specification for product validation, or edited to reduce test time in a production application.



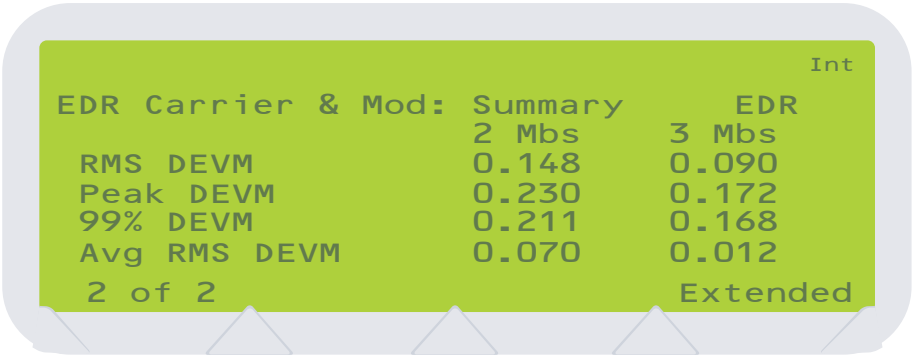
MT8852B provides full support of the EDR dirty transmitter requirements for signal impairments during receiver sensitivity testing. EDR Sensitivity results screens display BER in exponential format as defined in the test specification, as well as packet error rate and number of packets tested.



The Carrier Frequency Stability test case requires the measurement of the initial packet frequency error as well as the frequency error of the payload broken down into 50µs blocks. MT8852B automates this test, and the user can set the number of payload blocks tested – default is 200 blocks.

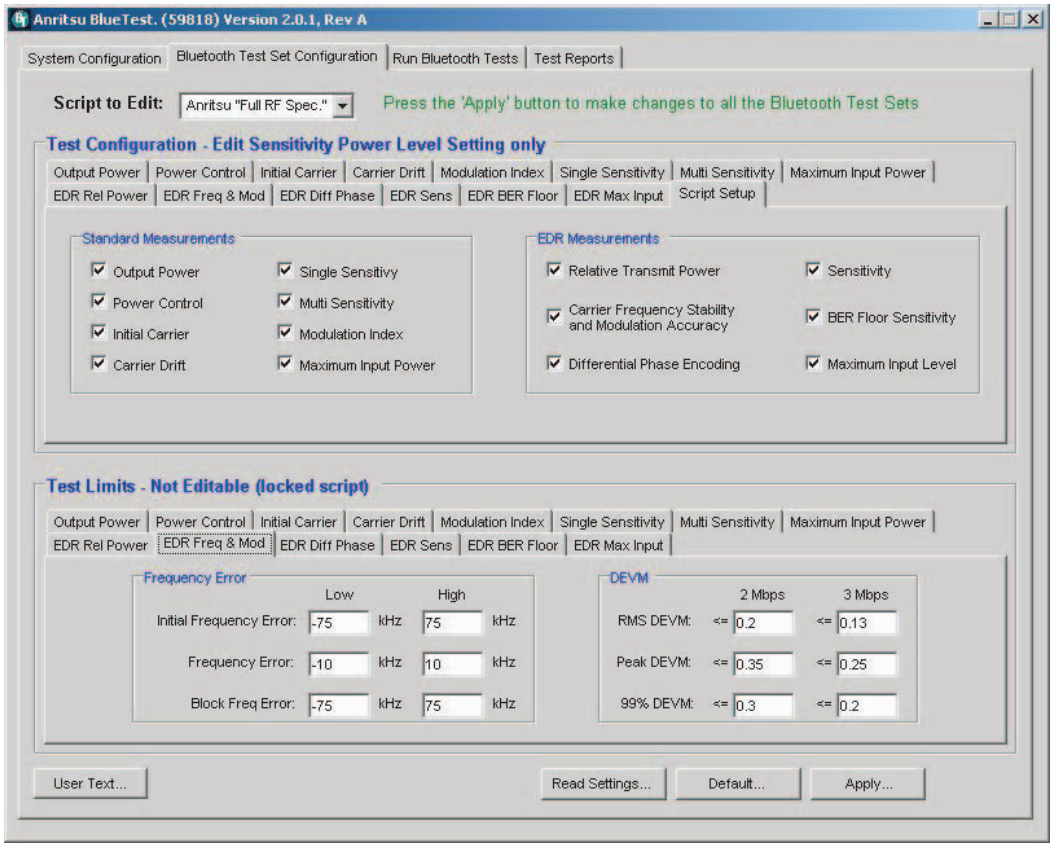


The modulation measurement requires that the DEVM of each payload block is also measured for both π4-DQPSK and 8DPSK modulations. MT8852B automatically performs this measurement on the appropriate packets as supported by the EUT.



BlueTest Production Test Software

In a high volume production facility, it is essential to rapidly test products and archive the results for statistical analysis and future reference. Anritsu supply automatic production test software in the format of the BlueTest PC program. This software controls up to 16 MT8852Bs through the GPIB interface and provides a simple user interface for test script set ups and viewing of results. All results are archived into a data base for later analysis. BlueTest software is supplied with MT8852B in both executable and source code formats (source code is Visual Basic .net release 2003). The source code can be used to customise the test program where necessary.



Bluetooth RF Measurements	**As defined in Bluetooth specification Radio Frequency Test Suite Structure, revision 2.0.E.3 dated 21st March 2005**
Output Power	**TRM/CA/01/C**
Measurement configuration	Hopping: OFF or ON – measure at Defined, All, or Any frequencies Test mode: ON Loopback or TX mode Payload: PRBS 9 Packet type: DH1, DH3, DH5
Displayed results	Average power Peak power
Number of measurement channels	User selectable, Defined (3), All, or Any
Measurement range	+22 dBm to -50 dBm average power (+23 dBm peak power)
Resolution	0.1 dB
Accuracy	+20 dBm to -35 dBm, ±1 dB +22 dBm to +20 dBm, ±1.5 dB
Power Control	**TRM/CA/03/C**
Measurement configuration	Hopping: OFF Test mode: ON Loopback or TX mode Payload: PRBS 9 Packet type: DH1, DH3, DH5
Displayed results	Maximum power Minimum power Maximum step size Minimum step size Power at each power step
Number of measurement frequencies	Three, default to qualification specification or user defined
Measurement range	+22 dBm to -35 dBm average power (+23 dBm peak power)
Resolution	0.1 dB
Accuracy	+20 dBm to -35 dBm, ±1 dB +22 dBm to +20 dBm, ±1.5 dB
Initial Carrier Frequency Tolerance	**TRM/CA/08/C**
Measurement configuration	Hopping: OFF or ON – measure at Defined, All, or Any frequencies Test mode: ON Loopback or TX mode Payload: PRBS 9 Packet type: DH1
Displayed results	Initial carrier frequency error
Number of measurement channels	User selectable, Defined (3), All, or Any
RF input measurement range	+20 dBm to -35 dBm
Initial frequency error measurement range	0 Hz to ±150 kHz
Frequency resolution	1 kHz
Accuracy	500 Hz ± Frequency Standard

MT8852B Specification continued

Carrier Frequency Drift	**TRM/CA/09/C**
Measurement configuration	Hopping: OFF or ON – measure at Defined, All, or Any frequencies Test mode: ON Loopback or TX mode Payload: 10101010 Packet type: DH1, DH3, DH5
Displayed results	Carrier frequency drift Drift rate
Number of measurement channels	User selectable, Defined (3), All, or Any
RF input measurement range	+20 dBm to -35 dBm
Frequency drift measurement range	0 Hz to 200 kHz, and > 2000/50µs
Frequency resolution	1 kHz
Sensitivity - Single Slot Packets	**RCV/CA/01/C**
Measurement configuration	Hopping: OFF or ON, user selectable Test mode: ON Loopback: ON Payload: PRBS9 Packet type: DH1 Dirty transmitter (as defined in the RF test spec): ON or OFF, user selectable
Displayed results	BER (percentage) Total number of bit errors and FER
Number of measurement frequencies	Three with hopping off, or hopping on
Number of measured bits	1 to 10,000 packets (216 to 2,160,000 bits)
MT8852B transmitter output range	0 dBm to -80 dBm, resolution 0.1 dB
BER/FER measurement range	0.000% to 100%
BER/FER resolution	0.001%
Sensitivity - Multi Slot Packets	**RCV/CA/02/C**
Measurement configuration	Hopping: OFF or ON, user selectable Test mode: ON Loopback: ON Payload: PRBS 9 Packet type: DH3, DH5 Dirty transmitter (as defined in RF test spec): ON or OFF, user selectable
Displayed results	BER (percentage) Total number of bit errors and FER
Number of measurement frequencies	Three with hopping off, or hopping on.
Number of measured bits	1 to 10,000 packets (for DH3, 1,464 to 14,640,000 bits), (for DH5, 2,712 to 27,120,000 bits)
MT8852B transmitter output range	0 dBm to -80 dBm, 0.1 dB resolution
BER/FER measurement range	0.000% to 100%
BER/FER resolution	0.001%

MT8852B Specification continued

Modulation Index	**TRM/CA/07/C**
Measurement configuration	Hopping: OFF Test mode: ON Loopback or TX mode Payload: 11110000 and 10101010 Packet type: DH1, DH3, DH5
Displayed results	Frequency deviation Δf1max Δf2max Δf1avg Δf2avg and Δf2avg/Δf1avg plus % of Δf2max < 115 kHz
Number of measurement frequencies	Three, default to qualification specification or user defined
RF input measurement range	+20 dBm to -35 dBm
Deviation measurement range	0 Hz to 350 kHz peak
Deviation resolution	1 kHz
Accuracy	1% for modulation index = 0.32
Maximum Input Power	**RCV/CA/06/C**
Measurement configuration	Hopping: OFF Test mode: ON Loopback: ON Payload: PRBS 9 Packet type: DH1
Displayed results	BER and FER for -20 dBm at receiver input
Number of measurement frequencies	Three, default to qualification specification or user defined
Number of measured bits	1 to 10,000 packets (216 – 2,160,000 bits)
Transmitter power settable range	0 dBm to -80 dBm
Resolution	0.1 dB

EDR Specific Measurements	**As defined in Bluetooth specification Radio Frequency Test Suite Structure, revision 2.0.E.3 dated 21st March 2005**
EDR Relative Transmit Power	**TRM/CA/10/C**
Measurement configuration	Modulations;- π/4DQPSK and 8DPSK Packets;- 2-DH1,3,5 and 3-DH1,3,5. Number of test packets;- default 10 Test control;- Loopback or Tx mode EUT power level;- Max and Min Hopping mode;- Off and On Test channels;- Defined, All, Any (default defined, Low, Med High)
Displayed results	Max differential power (from all packets) Min differential power (from all packets) Average differential power (over all packets)
Measurement range (Nominal)	+20 to –35dBm average power, +23dBm peak power.
Relative power resolution	0.01db, GFSK to π/4DQPSK and 8DPSK
Relative power accuracy	Relative power measurement accuracy between GFSK and π/4DQPSK or 8DPSK, 0.2dB typical for a power difference of < 6dB.
Relative power measurement range	Relative power measurement range between GFSK and π/4DQPSK or 8DPSK, (P_{GFSK}-8dB) < P_{DPSK} < (P_{GFSK} + 4dB).

MT8852B Specification continued

EDR Carrier Frequency Stability and Modulation Accuracy	**TRM/CA/11/C**
Measurement configuration	Modulations;- π/4DQPSK and 8DPSK Packets;- 2-DH1,3,5 and 3-DH1,3,5. Number of test blocks;- default 200 Test control;- Loopback or Tx mode EUT power level;- Max and Min Hopping mode;- Off and On Test channels;- Defined, All, Any (default defined, Low, Med High)
Displayed results	Initial frequency error ω_i Frequency error ω_o Frequency error $\omega_i + \omega_o$ RMS DEVM (block with greatest DEVM value displayed) Peak DEVM 99% DEVM Average RMS DEVM (average DEVM for all blocks measured)
Carrier freq stability Measurement range	0 Hz to ± 100 kHz
Carrier freq stability accuracy	500 Hz ± Frequency Standard
Carrier freq stability resolution	1 kHz
RMS DEVM range	30% π/4DQPSK, 20% 8DPSK
RMS DEVM resolution	0.1% π/4DQPSK and 8DPSK
Peak DEVM range	0 to 50% π/4DQPSK, 0 to 30% 8DPSK
Peak DEVM resolution	0.1% π/4DQPSK and 8DPSK
EDR Differential Phase Encoding	**TRM/CA/12/C**
Measurement configuration	Modulations;- π/4DQPSK and 8DPSK Packets;- 2-DH1,3,5 and 3-DH1,3,5. Number of test packets;- default 100 Test control;- Tx mode Hopping mode;- Off and On Test channels;- Defined
Displayed results	Number of packets received Number of packets with payload data errors Percentage of errored packets

MT8852B Specification continued

<table>
<tr><th>EDR Sensitivity</th><th>RCV/CA/07/C</th></tr>
<tr><td>Measurement configuration</td><td>Modulations;- π/4DQPSK and 8DPSK
Packets;- 2-DH1,3,5 and 3-DH1,3,5.
Dirty transmitter control;- On and Off
Payload bit count;- transmitted or received
Bit threshold control;-default threshold 1, 1.6 million, threshold 2, 16 million (user editable)
Test control;- Loopback
Hopping mode;- Off and On
Test channels;- Defined</td></tr>
<tr><td>Displayed results</td><td>Overall BER (displayed in exponential format)
Number of bits in error
Number of packets sent by test set
Number of packets received in error by EUT</td></tr>
<tr><td>Output power range</td><td>0 to –90dBm</td></tr>
<tr><td rowspan="5">Output power accuracy</td><td>± 1dB, 0 dBm to –80dBm</td></tr>
<tr><td>Dirty transmitter specification
Frequency modulation error sine wave, ± 10kHz deviation and 100µs period, plus table impairments below, cycled at a 20 packet rate.</td></tr>
<tr><td>Measurement Conditions | Carrier Freq. Off | Sym. Timing Error</td></tr>
<tr><td>1 | 0 kHz | 0 ppm</td></tr>
<tr><td>2 | + 65 kHz | + 20 ppm
3 | - 65 kHz | - 20 ppm</td></tr>
<tr><th>EDR BER Floor Performance</th><th>RCV/CA/08/C</th></tr>
<tr><td>Measurement configuration</td><td>Modulations;- π/4DQPSK and 8DPSK
Packets;- 2-DH1,3,5 and 3-DH1,3,5.
Payload bit count;- transmitted or received
Bit threshold control;-default threshold 1, 8 million, threshold 2, 160 million (user editable)
Test control;- Loopback
Hopping mode;- Off and On
Test channels;- Defined</td></tr>
<tr><td>Displayed results</td><td>Overall BER (displayed in exponential format)
Number of bits in error
Number of packets sent by test set
Number of packets received in error by EUT</td></tr>
<tr><td>Output power range</td><td>0 to –90dBm</td></tr>
<tr><td>Output power accuracy</td><td>± 1dB, 0 dBm to –80dBm</td></tr>
<tr><th>EDR maximum Input Level</th><th>RCV/CA/10/C</th></tr>
<tr><td>Measurement configuration</td><td>Modulations;- π/4DQPSK and 8DPSK
Packets;- 2-DH1,3,5 and 3-DH1,3,5.
Payload bit count;- transmitted or received
Number of bits;- default 1.6 million (user editable)
Test control;- Loopback
Hopping mode;- Off and On
Test channels;- Defined</td></tr>
<tr><td>Displayed results</td><td>Overall BER (displayed in exponential format)
Number of bits in error
Number of packets sent by test set
Number of packets received in error by EUT</td></tr>
<tr><td>Output power range</td><td>0 to –90dBm</td></tr>
<tr><td>Output power accuracy</td><td>± 1dB, 0 dBm to –80dBm</td></tr>
</table>

MT8852B Specification continued

MT8852B Signal Generator

Frequency	
Frequency range	2.40 to 2.5 GHz
Frequency resolution	1 kHz
Frequency accuracy	As frequency standard ± 500 Hz
Level	
Amplitude range	0 dBm to -90 dBm
Amplitude accuracy	±1 dB (0 dBm to -80 dBm)
Amplitude resolution	±0.1 dB
Output impedance	50 Ohm (nominal)
Output VSWR	1.5:1 (typically 1.3) Adjacent channels 3 or higher -40 dBc
Spurious	30 MHz to 1 GHz; -36 dBc 1 GHz to 12 GHz; -30 dBc 1.8 GHz to 1.9 GHz; -47 dBc 5.15 GHz to, 5.3 GHz; -47 dBc or -80 dBm, whichever is greater
GFSK modulation	
Modulation index	Variable, 0.25 to 0.38 (125 kHz to 190 kHz)
Mod index resolution	0.01
Mod index accuracy	1 % for Modulation Index = 0.32
Baseband filter	BT=0.5
π/4DQPSK modulation	
Mod index accuracy	< 5% RMS DEVM
Baseband filter	BT=0.4
8DPSK modulation	
Mod index accuracy	< 5% RMS DEVM
Baseband filter	BT=0.4

MT8852B Measuring Receiver

Frequency	
Range	2.40 to 2.5 GHz
Resolution	1 kHz
Accuracy	As frequency standard ± 500 Hz
Measurement channel bandwidth	2 MHz 3dB bandwidth, flat response Fc ± 550 kHz, and 1.3 MHz 3dB bandwidth, flat response Fc ± 550 kHz.
Level	
Range	+22 dBm to -55 dBm average power
Power measurement accuracy	±1 dB (+20 dBm to -35 dBm)
Input VSWR	1.5:1
Damage level	+25 dBm
Resolution	0.1 dB
GFSK Modulation	
Deviation measurement range	0 to 350 kHz peak
Accuracy	1 % for Modulation Index = 0.32

MT8852B Specification continued

EUT Control Interface

The EUT control interface provides RS232 HCI commands to the EUT through a standard RS232 interface. The interface meets the requirements of the *Bluetooth* specification for HCI UART transport layer. An RS232 cable is supplied.

The EUT control interface provides USB HCI commands to the EUT through a standard USB interface. The interface meets the requirements of the *Bluetooth* specification section H:2. A USB cable is supplied.

Audio Specifications

Number of SCO channels supported	3
Codec air interfaces supported	CVSD, A-Law, μ-Law
Frequency response:	(-3dB) measured CODEC in to CODEC out: 160Hz -3.5kHz. Measured with 50Ω source impedance and 10MΩ load impedance.
Maximum input / output signal level:	$3.4V_{pk-pk}$ = 1.2V RMS
Distortion/noise:	A law: typical –37dB @1kHz, 1V RMS μ law: typical –37dB @1kHz, 1V RMS CVSD: typical –30dB @300Hz, 1V RMS
Input/Output connectors	3.5mm audio jack plugs (one for each SCO channel)
Input impedance:	20kΩ
Minimum output load:	600Ω
Internal audio source	1kHz fixed frequency

AFH (Option 15)

Supported in ACL and SCO connections.

Displays:	Active channel vs time, FER vs time
Other features:	ACL connection timer, resolution 1 ms

Frequency Standard

Frequency	10 MHz
Temperature Stability	±0.5 ppm, -10ºC to +85ºC
Aging (1st year)	±1.0 ppm
Aging (over 10 years)	±2.5 ppm, including year 1

Rear Panel Connectors

External frequency standard input	Rear panel BNC socket, 50Ω 1 volt
Output 1	TTL output for TX ON, TX DATA, RX DATA, and correlator
Output 2	TTL output for RX ON, TX DATA, RX DATA, and correlator
Input 1	For service use only

GPIB

IEEE 488.2. Offers full instrument control as standard.

RS232

RS232 interface offering full instrument control as standard

Power Requirements

Supply	85 to 264 Volts AC 47 to 63 Hz 150 VA MAX

MT8852B Specification continued

Environmental	
Operating temperature	5 to +40ºC
Operating humidity	20% to 75%
Safety	Complies with IEC 61010-1
EMC	Conforms to the protection requirements of EEC Council Directive 89/336/EEC.

Size and Weight	
Dimensions	216.5 mm x 88 mm x 380 mm
Weight	<3.45 kg

Included Accessories	
MT8852B Operation Manual	1
MT8852B Remote Programming Manual	1
BlueSuite software (standard version)	1
RS232 HCI control interface lead	1
RS232 cable for firmware updates	1
Power cord for destination country	1
Certificate of calibration	1
USB HCI control interface lead	1
3.5 mm jack plug	3
BlueTest2 software	1

Options	
Rack Mount, single instrument	MT8850A-01
Rack Mount, side-by-side	MT8850A-03
Bluetooth antenna and adapter	MT8850A-10
Headset and Handsfree profile emulator software	MT8852A-14P/U
Adaptive Frequency Hopping	MT8852A-15
Headset and Handsfree support	MT8852A-16
IQ data output	MT8850A-17
Spare EUT/RS232 cable	MT8850A-20
Spare EUT/USB cable	MT8850A-21
Extra Operation and Programming Manual	MT8850A-30
Soft carry case with shoulder strap	D41310
BlueSuite Pro software (standard rate only)	2300-259
Z540, SO25 calibration certificate + test data	MT885xA-98
PREMIUM Z540, ISO25 calibration certificate + test data	MT885xA-99

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Specifications are subject to change without notice.

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