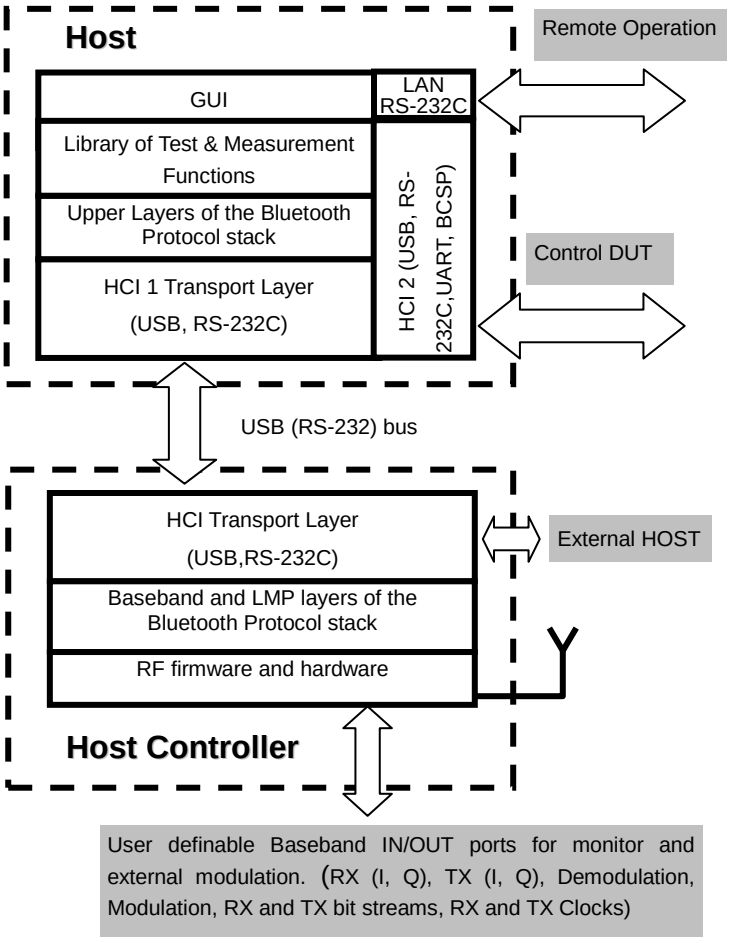
TC-3000B Bluetooth Tester

Product Description

TESCOM TC-3000B Bluetooth Tester eliminates the need for several costly testers by combining key RF, Audio, and Protocol test & measurement functions in one convenient box. Designed for a wide range of applications in R&D, manufacturing, QA and service, this feature-packed powerful instrument is simple to use, lightweight and portable, and may be operated with all standard AC voltages. In addition to Bluetooth testing applications, TC-3000B may be used for non-Bluetooth RF testing along the 2.4GHz ISM band.



User definable Baseband IN/OUT ports for monitor and external modulation. (RX (I, Q), TX (I, Q), Demodulation, Modulation, RX and TX bit streams, RX and TX Clocks)

System Architecture:

TC-3000B is made up of two main blocks, a RF/DSP module and a host CPU module, and is connected by a host controller interface (HCI) that is identical to Bluetooth system architecture. The RF/DSP module provides an RF interface to DUT, performs physical measurements and manages the Bluetooth link. The internal host CPU (PC), which runs on a Linux platform, takes care of user interface (UI) functions including display, key input and I/O controls for RS-232C, USB, LAN and other standard peripheral devices. The adoption of an open OS minimizes unnecessary constraints on system optimization. This simple, elegant system architecture takes advantage of both the power of DSP and the convenience of a PC.

Custom Protocol Stack:

The TC-3000B Bluetooth protocol stack has been developed with in-house technology in order to gain total control of the performance and feature set of the tester. Its unique protocol stack architecture positions 'queues' between protocol layers, making it conceptually simple and easy to apply. ***This approach helps guarantee the system's long-term supportability, while efficiently handling future customization and enhancement requirements.***

Versatility of TC-3000B:

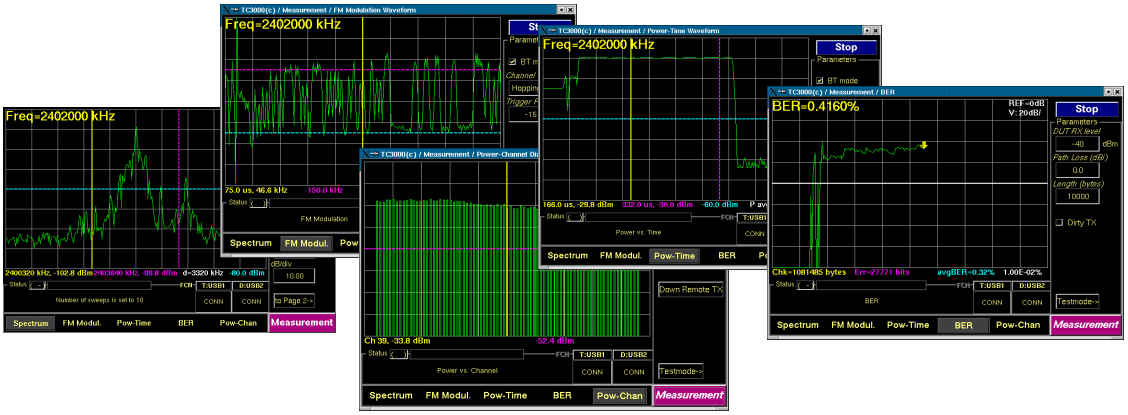
TC-3000B can interface with DUT through most known HCI interfaces. Additionally, the RF/DSP module can relinquish control to an external PC through standard HCI, allowing for an emulated Bluetooth development environment. Remote connection through TCP/IP allows the efficient control of multiple testers from a PC located practically anywhere in the world.

Speed test mode:

It is essential to minimize the test time in manufacturing. TC-3000B is capable of skipping the time-consuming INQUIRY procedure by reading the Bluetooth device (BD) address directly through HCI or presetting BD address. Test configurations can be edited to reduce the number and time of tests.

Key Features

- **Bluetooth V1.1/V1.2/V2.0 Specification Compliant**
- **RF, Audio, and Protocol Combination Tester**
- **Bluetooth Conformance Test**
  - Test Cases defined in Bluetooth Test Specifications
  - 12 RF test cases supported including dirty transmitter, spectrum
  - 13 basic Baseband test cases
  - Local and Remote HCI Loopback Test
  - User definable test parameters and limits
  - Quick Test Mode for four(4) RF test cases
- **Supports Audio (SCO Link) Functional Testing (3000-10)**
  - Verification of Audio quality(SINAD, Distortion)
  - Audio Spectrum
  - SCO Loopack Function



- **Bluetooth RF and Baseband Measurement Functions (3000-20)**
  - Basic spectrum analyzer
  - Modulation waveform
  - Power versus time

- Power versus channel
- RX Bit Error Rate (RX BER)

- **Basic Bluetooth Protocol Analyzer Functions (3000-30)**
  - Supports Master and Slave modes
  - Link test in Pico-net
  - Packet information in Baseband, LMP, HCI, SDP, RFCOMM, and Profile
  - Direct HCI command execution from the screen
- **Bluetooth EDR (3000-40)**
  - I-Q Constellation
  - DEVM (Differential Error Vector Magnitude)
  - TX Bit Error Rate (TX BER)
  - 7 EDR RF test cases supported including dirty transmitter, spectrum
- **Utility digital signal generator**
- **User definable Baseband IN/OUT ports for real time signal monitoring, external modulation, audio source and audio analyzer**
- **Device HCI Interface Options:** USB and RS-232C (UART, BCSP)
- **Remote Operation:** TCP/IP (LAN) and RS-232C
- **Easy S/W Upgrades through TCP/IP (LAN) or Diskette**
- **Listed on the Bluetooth Qualified Products List (QPL) as a Development Tool**
- **CE Compliant**: EN61010-2001, EN61326,A2:2001, EN61000-3-2, 2000, EN61000-3-3,A1:2001

Specification

RF SOURCE

Output Frequency

Range: 2.4GHz ~ 2.5GHz

Accuracy: ± 46Hz + Frequency Reference Drift

Resolution: 1 KHz

Switching Time: <160us, ± 75kHz of the final frequency

Output Level

Range: 0 ~ -80dBm

Accuracy: ± 1dB

Resolution: ± 0.1dB

Modulation

Type: GFSK BT=0.5

Deviation Range: 0.00 ~ 1MHz

Resolution: 600KHz

Modulation Rate: 0 ~ 1Mbps

RF ANALYZER

Input Frequency

Range: 2.4GHz ~ 2.483GHz

Accuracy: ±46Hz + Frequency Reference Drift

Resolution: 1 KHz

LO Switching time: <160us, ± 75kHz of the final frequency

Input Level

Range: -10 ~ -80dBm (+20dBm ~ -50dBm with 30dB attenuator ON)

Absolute Max: +25dBm

Accuracy: ± 1dB, 0.1dB resolution

Intermediate Frequency

IF Frequency: 70MHz

Filter BW: 10MHz Max,

Sampling Rate: 40MHz

1MHz Digital Filter ON/OFF

SPECTRUM ANALYZER

Frequency Range: 2.4~2.483GHz

Max Span: 10MHz

Resolution BW: ~40KHz at 10MHz Span.

Averaging: 1~50

FM MODULATION ANALYZER

Modulation: FM, GFSK

Frequency Response: 1MHz with channel filter selected

Deviation range: 0~4MHz

Resolution: 0.1KHz

Frequency Accuracy: 1KHz

POWER-TIME

Level accuracy: ± 1dB, 0.1dB resolution

Trigger Method: Access Code (BT), Power Level

POWER-CHANNEL (BT Mode)

Level accuracy: ± 1dB, 0.1dB resolution

DUT Mode: Null Packet or Test Mode

RX BER TEST (BT Mode)

DUT Mode: Requires Loopback Test Mode

Graph: Log Scale BER-Time or BER-RX Power(TBD)

Reading: %, Instantaneous, Cumulative

Parameters: RX Power, Measurement Data Length, Packet Length/Type

I-Q CONSTELLATION (EDR BT Mode)

DUT Mode: Requires EDR Test Mode

Graph: Display I-Q symbol of DPSK

Parameters: Symbol start point, Number of symbol

TX BER TEST (BT Mode)

DUT Mode: Requires EDR Transmitter Test Mode

Graph: Log Scale TX BER-Time and PER (Packet Error Rate)

Reading: %, Instantaneous, Cumulative

Parameters: Number of packet

DEVM (Differential Error Vector Magnitude)

DUT Mode: Requires EDR Test Mode

Graph: Display DEVM on time axis.

Useful for measuring DEVM variance in a packet.

FREQUENCY REFERENCE

Internal Reference Stability: ± 1ppm, -20 ~ 70℃, 0.5ppm/year

External Reference: 10MHz

FRONT PANEL

RF In/Out Port: N-type, 50 ohm, VSWR <1.6

Baseband In/Out ports: 4 BNC

- RX (I, Q), TX (I, Q), Demodulation, Modulation, RX and TX bit streams, RX and TX Clocks, Audio

REAR PANEL

HCI Interface for DUT: RS-232C, USB, PCMCIA

Remote Programming Interface: TCP/IP (LAN)

MISCELLANEOUS

Operating temperature: 5 ~ 40℃

Line Voltage: 100 to 240 VAC, 50/60Hz

Dimension: 375(w) x 432(d) x 220(h) mm

Weight: 10Kg

Bluetooth Test Platform

TC-3000B combined with a TESCOM quality test fixture provides predictable RF coupling and shielding performance, to offer an economical, quality Bluetooth test platform for production, service or R&D environments.

Since most Bluetooth devices use sealed antenna due to their size, final RF tests must be done over the air (OTA). In case of module or PCB testing, contact probes may also be used. In either case, testing must be completed under an adequately RF isolated condition with reliable RF coupling. A simple isolation box that disregards internal resonance and shielding qualification will result in unreliable RF test data. All TESCOM isolation boxes are designed to minimize this problem. In practice, OTA coupling over a wide frequency band exhibits some level of frequency slope due to antenna bandwidth or cable connector reflections. This channel-dependent residual slope may need calibration to guarantee the accuracy of TX power measurement.

TEM Cell TC-5060A/B

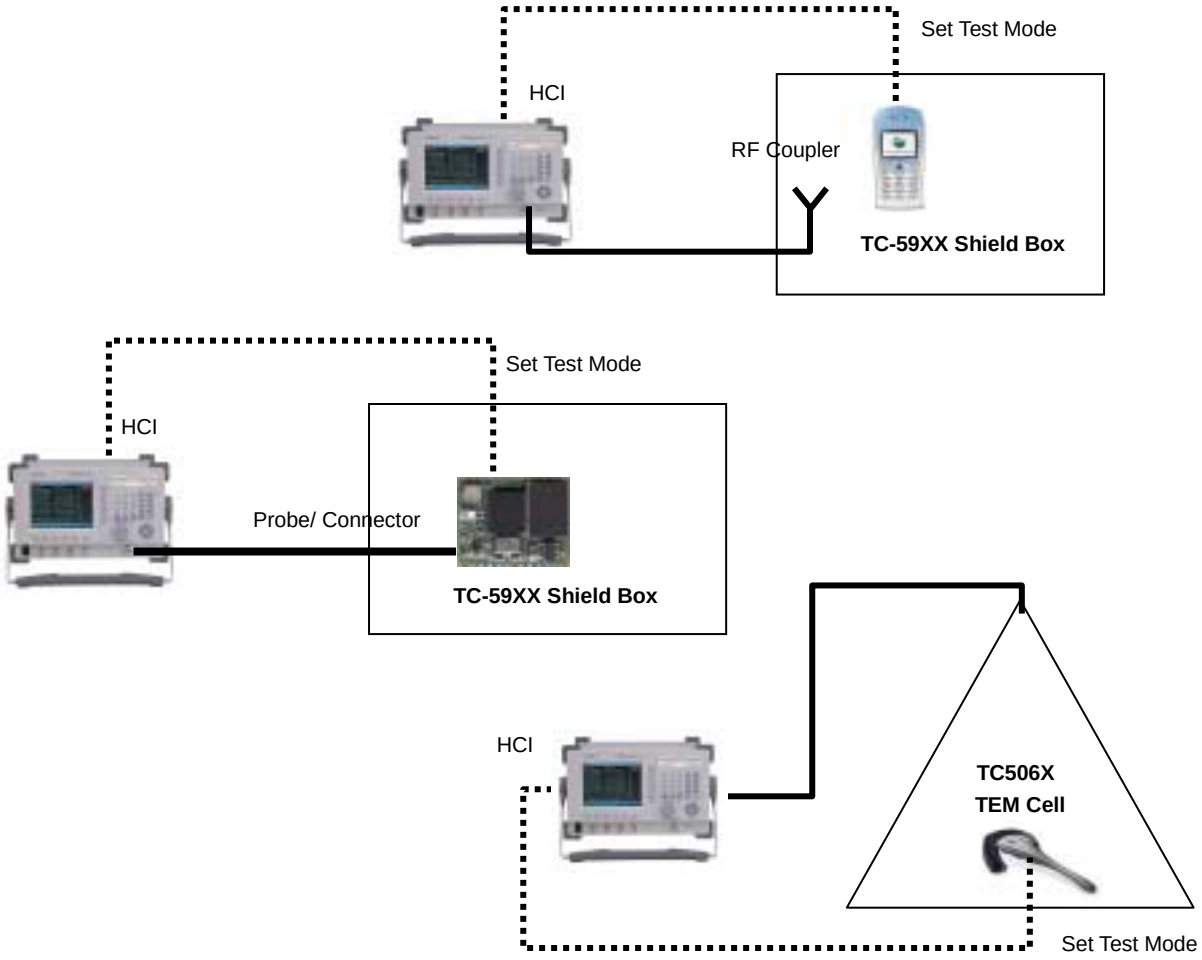
TEM Cell is a broadband radiation test cell that provides both high isolation and predictable RF coupling. The total coupling loss through typical DUT antenna to TEM Cell output is around 30dB at Bluetooth frequencies. With the additional filtered data port and power lines, the desktop-size TC-5060A/B offers an ideal radiation test platform for small RF devices, such as Bluetooth devices.

Shield Box

TESCOM's popular absorber-lined Shield Boxes are widely used for RF test fixtures in R&D, service or manufacturing worldwide. These manual or pneumatic boxes with device fixtures can handle many different types of devices, such as PC assemblies, RF modules or final products. Various RF signal connection methods, such as probe heads, OTA couplers or special connectors, can also be supplied by TESCOM. Most units also include the pneumatic operation option, which relieves operator fatigue in manufacturing. High isolation and the absence of in-band resonance in every TESCOM boxes improve test repeatability.

Test Platform Examples

TESCOM provides complete Bluetooth test solution options. Some examples are shown below:



Ordering Information

BASE UNIT

TC-3000B, Includes 12 RF Test Cases and 13 Baseband Cases.

OPTIONS

3000-10,	Audio Measurement. Includes SCO Link, Audio Test, and Audio Spectrum.
3000-20,	Additional Measurement Functions. Includes Spectrum, FM Modulation, Power Channel, Power Time, and BER.
3000-30,	Protocol Analyzer. Includes Link Analyzer (Link, Packet Information, LMP, HCI, Baseband information) and Host Analyzer (Link, L2CAP, RFCOMM, SDP, Profile).
3000-40,	EDR(Enhanced Data Rate) option. Support EDR link. Includes 7 EDR RF Test cases. EDR Measurement (Constellation, DEVM, TX BER)

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.