Bluetooth™ Production Test System TS 7160

The complete manufacturing test solution for all Bluetooth products

- Ready-to-run test software for factory floor *Bluetooth* test scenarios
- Easy integration of application flash and PLD programming tools
- Shielded chambers for air coupling, or RF test pins and path calibration
- Very small footprint with comprehensive dual instrument architecture
- Variable integration of core instruments
- Interoperability with customary off-the-shelf products
- Flexible core system based on open industrial platform
- Cost-effective combination of electrical board test and radio test
- Highest test throughput and accurate measurements with CMU 200
- Multiple DUT testing including RF switching for reduced costs
- Available worldwide: customized and supported by local system integration centers

ROHDE&SCHWARZ

Gaining momentum for Bluetooth production

One of the main aspects contributing to the success of *Bluetooth* wireless technology will be the availability of products which communicate with each other reliably. Enabling products for the *Bluetooth* standard demands high accuracy in verifying the RF characteristics for this new generation of both consumer products and products for industrial connectivity. The *Bluetooth* interface is a new communication port contributing towards the trend that maybe someday all RF properties for a device will be handled by one chip which offers the full range of wireless data transfer with built-in RF compliance. But for the moment, products have a truly remarkable bill of materials, and it is essential that the first generation of *Bluetooth* products establish complete confidence in the new communication port. Both investors and designers have a common interest that the devices do their job properly. For manufacturing tests, the devices need to be comprehensively tested during production ramp-up, so that first manufacturers and then users can be highly confident of reliability and performance.

The power of two

The TS7160 architecture demonstrates quite clearly a main goal of the system: to provide a cost-effective combination of electrical board tester and radio tester as a combination of two core instruments.

- The CMU200 sets up a *Bluetooth* connection to a device under test (DUT) via the RF interface. The tester switches the DUT to test mode and performs a comprehensive set of RF measurements (transmit and receive) to *Bluetooth* specifications. According to the *Bluetooth* Test Mode Specification, the DUT has to be locally enabled for test mode operation. The neccessary interfacing and control software can be integrated into the test sequence.
- The TSVP (Test System Versatile Platform) provides the basis for all the additional measurement equipment required. As a modular and open standard industrial platform based on CompactPCI and PXI, the TSVP comprises a state-of-the-art embedded computer and a very flexible choice of instrument and data acquisition boards. Add modular functionality as required, using dedicated instrument boards from Rohde&Schwarz for DC and RF switching, I/O ports for fixture control, as well as customary off-the-shelf boards (COTS) for standard measurement functions like digital multimeters, timer/counters and boundary scan modules.

Accurately calculating the cost of test is a function of the system capabilities and services, provided to implement the most convincing test philosopy. For highest test throughput select the subset of all available test cases from the CMU200 to suit the test needs. The seamless integration of functional board test and tools for in-system programming provide affordable cost of test using the TS7160 solution. Another benefit of the flexible architecture is that TS7160 itself can be a building block for existing production test environments.

Core equipment: CMU200, TSVP and GTSL software toolkit for ready-to-run test cases

Integration

TS7000 family ready-to-roll production test systems: TS7160 for *Bluetooth* measurements

Integration

TS7160 in-line test station for fully automated production

TS 7160 test software library features

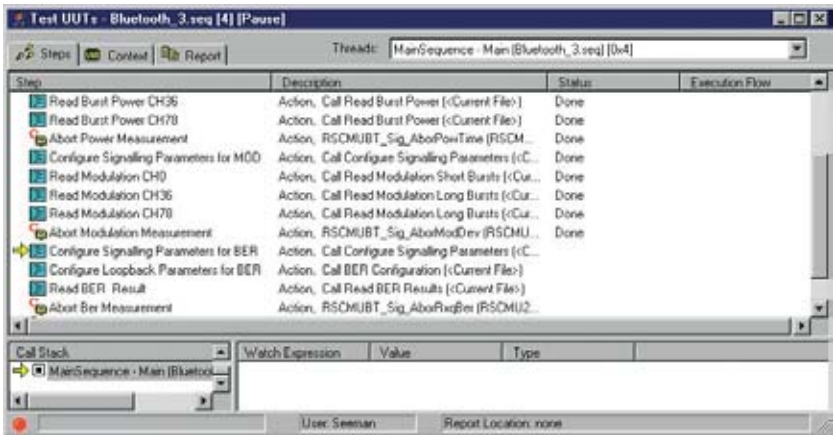
All instrument and equipment test functions are integrated as modular building blocks with seamless software support given by a standardized Generic Test Software Library (GTSL).

The software is generated using the LabWindows/CVI programming environment from National Instruments (NI). A user-friendly connection to the NI test sequencer software "TestStand" has been created for immediate use and easy customization.

The TestStand software is completely customizable, so it can be modified and enhanced to match the specific needs, including custom operator interface, report generation, and sequence execution requirements.

Built on a high-speed, multi-threaded, parallel execution engine, TestStand and the GTSL libraries also deliver the performance to meet rigorous test throughput requirements.

TS-LBT is the library for the *Bluetooth* test scenarios, which control and retrieve *Bluetooth* data from the CMU 200 with its options CMU-B53, CMU-K53 and the Signalling Unit CMU-B21.



Example of Bluetooth test sequence at work

TS 7100 – the specialist for Bluetooth enabled phones

The TS 7100 cellular phone production test platform for all major mobile phone standards like GSM, CDMA and AMPS (3G under development) can also be extended with the CMU 200 *Bluetooth* hardware options to provide a comprehensive *Bluetooth* enabled mobile phone test system. With test scenarios running TS-LBT on the CMU 200 together with mobile phone test cases implementing multi-protocol and multiband testing, the result is a very cost-effective communication test system.

Integrating *Bluetooth* test capabilities makes the TS 7100 the ideal combined test system for *Bluetooth* enabled mobile phones.

The TS-LBT library can be used with both the TS 7100 and TS 7160 test systems.

For the complete *Bluetooth* test scenarios executed by the CMU 200 a sample sequence is included, which can be reduced to selected subsets, ensuring manufacturing process stability and superior performance at the same time.

Mobile phones manufacturing

Bluetooth **modules manufacturing**

Bluetooth™

Automotive appliances manufacturing

Bluetooth **consumer electronics mass production**

The full range of benefits of an open platform concept

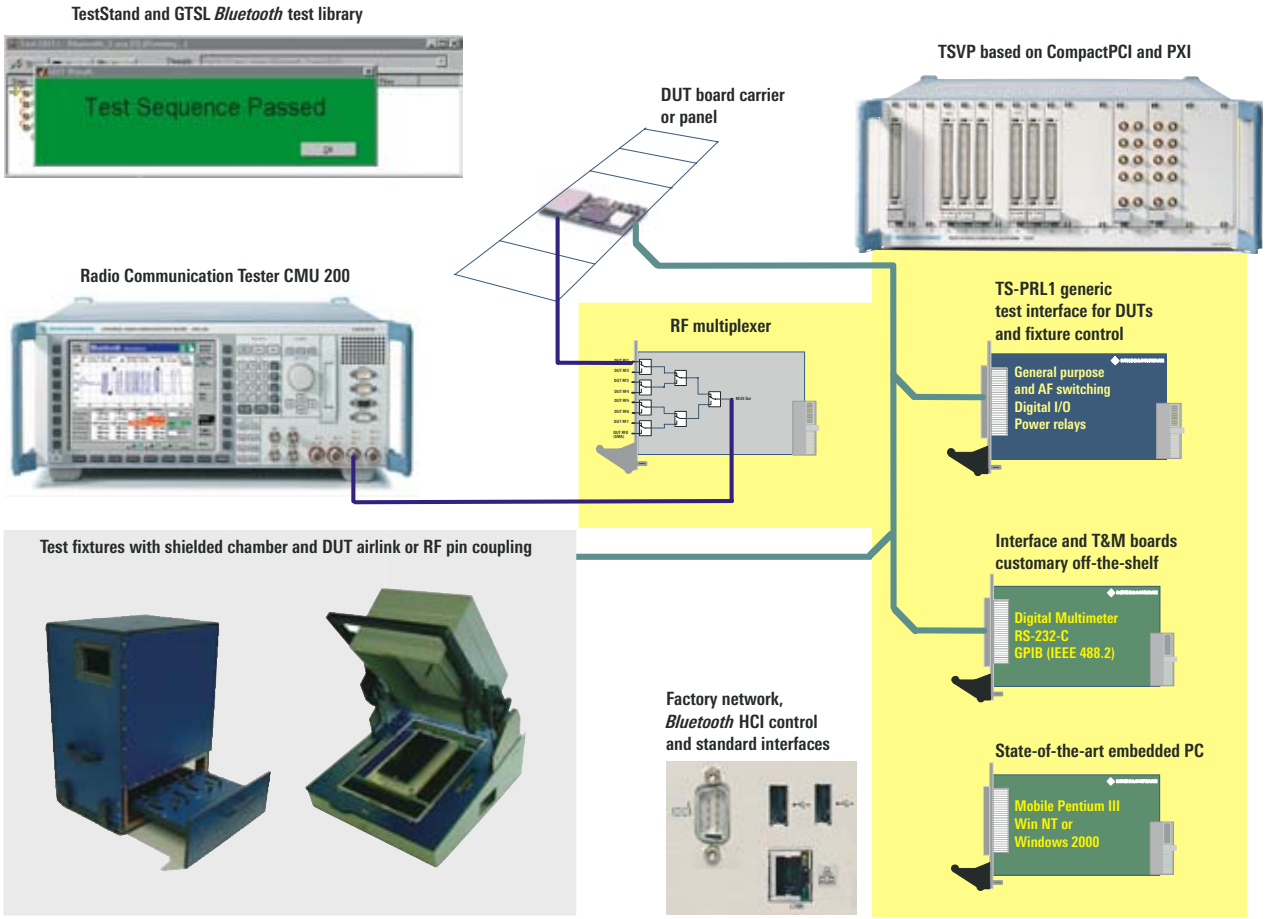
The Rohde&Schwarz TS7160 system technology gives you the full range of benefits of an open platform concept:

- Industry-standard integration tools and building blocks secure your investment, reduce development time and minimize training
- Open standards provide scalable systems, software reuse and are lowering the cost of test significantly
- Host Control Interface (HCI) software functions available
- Plugfest experience for all major chipsets proves the viability of the Rohde&Schwarz test solution
- The Rohde&Schwarz system integration centers provide optimally configured test systems customized to your production environment

TS7160 system task	**System component**
Product (DUT) identification	Barcode or dot-matrix scanning, database access
Measure DC voltages, fixture control	DMM, TS-PRL1
Download baseband and application software, give a unique BT_address to the device	Various in-system programming methods
Baseband oscillator tuning depending on chipset manufacturer's guidelines	Counter/timer board, CMU200
Connect HCI to DUT and enable test mode	RS-232-C and level shifters, USB
Inquire/page DUT and set up RF connection	CMU200
Set up test scenarios and hopping schemes	CMU200
Precise power consumption measurements in various standby and transmit modes	DMM, communication test power supplies, e.g. NGMO2
TX power measurements	CMU200
TX modulation measurements	CMU200
RX sensitivity and BER measurements	CMU200
Voice quality	PCM decoder or audio analyzer
RF switching for multiple DUTs in one panel	RF multiplexer modules, TS-PDM1
Create report to ASCII or HTML document, store via factory LAN	Embedded PC interfaces

A sample list of TS7160 system tasks - subject to be streamlined according to your requirements

TS7160 Bluetooth Production Test System



The figure above shows a simplified equipment overview of a multiplexed high-volume manufacturing test system built on one basic system platform,

- for all production steps, e.g. functional board test, final test
- for multi-protocol and multiband testing
- for worldwide supportable system configurations

ETSI MEMBER
...making the right connections.

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