

will'tek

Platform versatility with unique performance ...



4400
Mobile Phone Tester

Built on a future-proof platform that protects your investment as new mobile formats are introduced, new test features can be simply added with software downloads. Designed for versatility, the Willtek 4400 Mobile Phone Tester can be supplied as variants specially configured for service, manufacturing or support functions.

manufacture and aspects of mobile phones

Tests major world formats including GSM Phase 2, HSCSD, GPRS and CDMA2000 all in a single unit with fast change-over from push button or command. The 4400 provides an evolution path for 3G/UMTS, reducing capital investment in new test systems and providing versatility for production and support.

Fast measurements through a unique architecture, which enables parallel transmitter and receiver tests, efficient processes for measurements and recording results which provide a tenfold increase in measurement speed over previous generations of test equipment.

Accurate measurements are the hallmark of the 4400 with its low VSWR, improving power measurements and lowering errors. This enables tighter tolerances to be met in production systems and meets engineering and quality demands for dependable results.



... for design, support of all

GSM

GPRS

HSCSD

CDMA2000

MS Power Supply

MS Power Measurements

Audio/Codec

RAPID! Automated tests

Labwindows™ Driver

SCPI commands

Network

TCP/IP program

The built-in **RAPID!**¹ programming capability allows users to simply generate and run automated tests. The familiar BASIC-like commands can be debugged and locally stored, reducing development effort and time.

The easy-to-use graphical user interface with full VGA colour screen provides superb graphics and reduces operator fatigue. Operation can also be through a standard PC keyboard with desktop monitor and mouse.

The 4400 can also be hooked up to the Local Area Network with the **TCP/IP Option** for remote control, to upload results files for trend analysis and long-term storage or to download software updates from a network drive.

A full range of options include: an **Audio Option** together with basic and enhanced speech codec capability for measurements of GSM Codecs. The **MS Power Supply Option** providing power to the phone under test and **MS Current Measurement Option** to test the mobile phone's power consumption.

¹Run Application Programs with Integrated Development



4400 ... the truly versatile platform

4403 workhorse for Service Teams

Approved by all major mobile phone manufacturers and testing a full range of technologies of GSM, GPRS and CDMA2000, the Willtek 4400 Series provides optimum performance at a cost-effective price. Just one instrument can accurately measure all mobile RF parameters, test audio performance and MS power consumption.

The 4403 provides the solution for lower budgets, which still require standard accuracy and speed.

The familiar colour user interface speeds up service shop throughput and training time is minimised with on-screen help. Results can be stored locally or uploaded to a PC for service records and invoicing. With the Service Software up to 6 GSM channels can be tested in 10 seconds. By using the phone's AT commands for hands-off testing, manual intervention is reduced.

4405



Support for bar code readers reduces errors and paperwork. The Service Software is also available for GSM/GPRS and CDMA2000 phone testing. The RAPID! built-in programming capability allows local tests to be configured and run for specific measurements.



Flexibility and speed

dictate the choice for most manufacturing test managers. By providing test excellence for all formats of GSM¹, including GPRS, HSCSD, and now for CDMA2000, the Willtek 4400 Series increases the options for manufacturing. The platform serves as the basis for future upgrades coming from Willtek for 3G and other CDMA formats. The platform approach also ensures the right test options can be provided throughout the manufacturing line at board alignment, functional check or final test stages. The 4405 offers the additional levels of accuracy required in a production or quality assurance environment.

The series provides two operating modes for different customer usage; the asynchronous signal generator/analyser mode and the synchronous call processing mode. In synchronous mode call processing with multi-band handover enables fast measurements in different frequency bands. The asynchronous mode is aimed at board level alignment applications providing accurate generator and analyser capabilities.

Creating manufacturing savings

The architecture enables concurrent testing of the RX and the TX measurements. By testing the receiver sensitivity (BER) and the transmitter signal quality (Power/Time Template, phase/frequency error and ACPM) simultaneously, test time is reduced dramatically.

Mobile power stages at board level test can be rapidly aligned by measuring and recording individual burst results. Valuable time is normally lost by signalling procedures such as location update and call set-up. This can now be avoided with the reduced signalling features of the 4400 Series (when also supported by the mobile and the manufacturing environment). The **Turbo Option**² increases the measurement speed up to 50%, increasing throughput significantly.

Outstanding accuracy is achieved by the 4400 using a combination of a low VSWR RF front end, minimising uncertainties and signal processing techniques to provide accurate results for power and modulation quality measurements. These allows larger test tolerances to be set for the phone, which can then be optimised (for example for power consumption) to increase production yield.

Integration with the factory LAN is enabled with the **TCP/IP Option**, so test programs can be downloaded for each radio batch, or results analysed for trends in manufacturing performance. Developing test software is simplified as Labwindows™ Drivers are available as well as standard GPIB and some special SCPI commands such as triple-band testing within one call for GSM.

By utilising a common set of systems throughout the factory, test software development is reduced, problems of varying fault rates from different locations are reduced and consistency of approach is achieved.

Willtek provides a range of services for manufacturing including applications support, ATE integration, on-site integration, on-site calibration and lifetime support. Our GATE system is an example of a comprehensive turnkey solution.

¹ GSM 850, GSM 900, E-GSM, GSM-R, GSM 1800, GSM 1900, Dual Band, Triple band, Quad Band.

² available for GSM/GPRS/HSCSD

4400 ... sophisticated dependable performance

Designed by engineers for engineers

The Willtek 4400 Series uses advanced DSP and multiprocessor techniques to provide a versatile test engine.

High accuracy in the test results provides confidence in your mobile designs, especially in RF and modulation quality measurements. The low VSWR front end is engineered for high performance across the band.

Programming for repetitive tests is simplified using the built-in RAPID! capability. The BASIC-like commands provide a familiar environment and the debug feature speeds development time. Programming and operation is simplified by connecting a standard PC keyboard, mouse and monitor to the 4400.

Sophisticated audio testing is provided through a series of options.

Individual components or the complete path can be measured from microphone to loudspeaker or using the **Codec Options**¹ over the RF traffic channel. The audio performance can be evaluated with a built-in sophisticated audio analyser. Full Rate and Enhanced Full Rate codecs supplement the audio measurements. For parametric testing the test engineer can specify up to 20 points on a template, which when enabled, provides a simple Pass/Fail verdict. Standard PC Wavefiles can be used to simulate multitone audio signals or human voice for conformance testing.

¹ There is a full rate and enhanced full rate codec option available for GSM

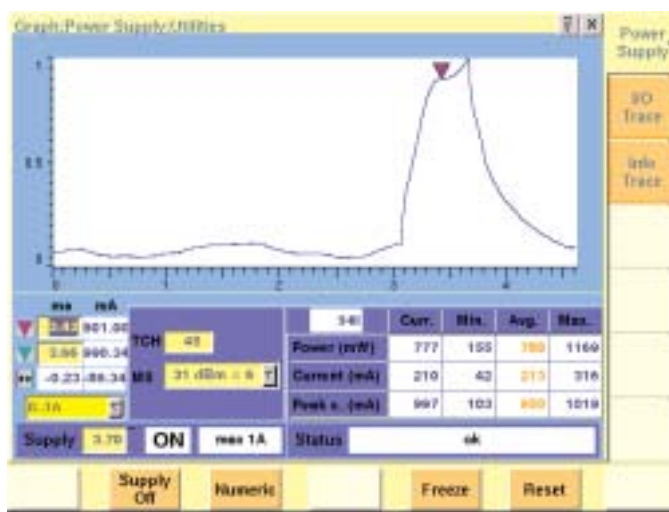


Testing with the audio template switched ON

Quality tests provide consistent results

The **MS Power Option** supplies battery-like power to the mobile and then measures burst consumption (MS current measurement option), allowing checks on phones where battery lifetime is suspect.

The **MS Current Measurement Option** provides a graphic representation of current drawn from the mobile overtime.



Llimit setting for Audio Template

Consistent test results across the full range of RF, timing and audio parameters require a stable measurement platform. The Willtek 4405 provides exceptionally high RF accuracy for power level as well as modulator measurements.

Across the enterprise having a common measurement base and a consistent methodology, avoids problems between test systems and allows accurate trend information to be used in statistical analysis.

The **RAPID!** programming capability of 4400 allows quality tests to be configured and executed at different test stations across the production line independently of the controller.

User-defined limits and mask templates can be easily generated for special tests to ensure tolerances are being met. With the **TCP/IP Option** results can be stored on any network drive for long-term trend analysis and storage.

System Options

The **GSM System Option** provides comprehensive call processing and test capability for all variants including GSM 850, GSM 900, E-GSM, GSM-R, GSM 1800, GSM 1900, Dual Band, Triple Band and Quad Band.

The **HSCSD Option** provides multislots generation and measurement capability.

The **GPRS System Option** provides additional RF generation and analyser functionality as well as supporting the GPRS call processing and associated attach/detach procedures.

The **CDMA2000 System Option** provides call processing with support for US cellular, PCS, TACS, JTACS, Korean PCS, Band 5 (NMT 450), Band 6 (IMT-2000), Band 8 and Band 9. The additional CDMA and AWGN generators are complemented with power and modulation analysers.

Superb options

General Options

The **Audio Option** comprises an AF generator and analyser with a range of tones and waveforms. Complete audio testing is provided from individual components through to the overall path. Tests can be performed for different level and frequency settings or for multitones using wavefiles (generated on a PC for example). The unique audio analyser provides numeric results or graphical linear or logarithmic display. A mask with up to 10 pairs of upper and lower limits can be set up and saved as a template for pass/fail.

Using the **MS Power Supply Option** (fed from the internal 4400 power supply), mobile test set-ups can be simplified. SCPI control and RAPID! Programming simplify automatic tests and the option avoids the expense and space problems of providing a separate power supply. Short-Circuit Protection is built-in and the graphical user interface makes it easy to set up.

The **MS Current Measurement Option** measures the MS current supplied by the **Power Supply Option** with numerical or unique graphical display showing current versus time. This is especially useful for testing the RF burst of GSM phones. Statistical analysis is also provided for min., max., average and peak during the selected time helping to track "power-hungry" mobiles that are likely to have abnormal battery drain.

The **TCP/IP Option** enables hook-up to the LAN, so an Ethernet connection can be used for control, results transfer or software download from a file server.

An **OCXO Option** provides enhanced stability if the standard fast warm-up TCXO does not provide sufficient accuracy or a locally distributed reference oscillator is not available.

System Related Options **GSM**

Adjacent Channel Power Meter Option (ORFS) provides 80 dB dynamic range for ETSI GSM 11.10 measurements.

The **Turbo Option** (available for 4405) reduces the measurement time by up to 50% using a faster DSP board and increasing manufacturing throughput.

GSM Codec Options are provided for testing over the RF channel when the audio option is fitted. The **Basic Codec Option** provides Full Rate (FR) coding whilst the **Codec Extension Option** provides Enhanced Full Rate (EFR) coding. These options allow the mobile D/A and A/D converter and analogue circuitry to be checked by stimulation through the Traffic Channel and overall signal quality from microphone through RF path can be measured.

provide user choice

The **RAPID! Service Test Software** provides workshops supporting GSM Mobile repair with automatic and comprehensive tests. Phone control via the AT interface reduces operator intervention and speeds up the checks. Support for bar code readers helps with the paperwork and reduces errors in recording phone details. Users can add features or modify the tests for local use. An auto-calibration feature allows a "Golden Phone" to be used as reference. The IMEI is used to identify phones of the same make to reuse the auto-calibration data. Streamlined performance results in only 10 seconds being needed for testing 6 channels of a GSM dual-band phone.

CDMA2000

The **RAPID! Service Test Software** provides workshops supporting CDMA Mobiles with automatic and comprehensive tests. Support for bar code readers helps with the paperwork and reduces errors in recording phone details. Users can add features or modify the tests for local use. An auto-calibration feature allows a "Golden Phone" to be used as reference.

Accessories

The **Willtek 4910 Universal Antenna Coupler** provides a very convenient mount for most types of mobiles in a service environment. The simple clip holds the device in a consistent manner and the 900 and 1800/1900 MHz antennae provide effective RF coupling.

The **Willtek 4920 RF Shield Box** compliments the coupler by providing an RF screened environment, eliminating the effect of nearby base stations transmitting within the band being tested.

Rack Mount Kits are available for 4400 series for efficient mounting in standard equipment racks.

Support for global mobile industry

Fast switching between technologies

GSM in all its forms

The Willtek 4400 Series supports all variants of GSM in the 850, 900, 1800 and 1900 bands, providing an industry standard in measurement capability.

The extensive functionality for call processing combined with exceptional RF accuracy ensure transmitter and receiver tests are precise and traceable.

User-defined parameters provide flexibility for testing and the adjustable mask, and limits capability allows custom tests to be generated. With RAPID! Programming these can be easily created and recalled from memory. Spectrum measurements using the Adjacent Channel Power Meter (ORFS) check switching transient and modulators' performance. Timing measurements are precise and are based on the accuracy of the TCXO or optional OCXO reference oscillator.

The alignment screen enhances tuning of mobile phones by providing a unique way to program measurement sequences into the 4400 as they are used in service centres. This alignment screen combines signal generator, analyzer and spectrum analyzer functionality in one screen. Test sequences are available for the most common phones.



Alignment screen: Combining generator, analyzer and spectrum analyzer functionality.

Support for 2.5G systems

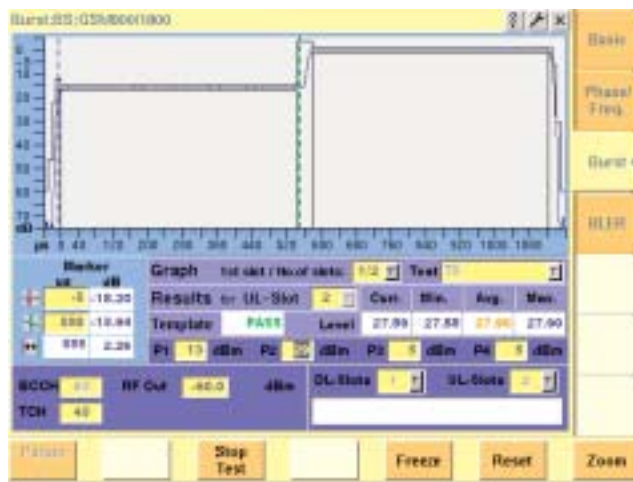
Tests for HSCSD and GPRS terminals are provided through the **Multislot and GPRS Options**.

In the GPRS Option all four coding schemes are available in generator mode and the downlink power level can be selected for each individual time slot. The burst zoom function allows the transition time between adjacent time slots to be verified. The call processing mode supports the Block Error Rate (BCR and USF) measurements to ETSI standards (Test Mode A), which can be used to characterise the multislot receiver.

makes the 4400 Series a powerful test tool across the industry

The flexibility of 4400 allows many system parameters to be set up for a specific network or to define how calls are set up. The GPRS Option's call processing capability includes GPRS attach/detach, up and downlink TBF establishment and Routing Area Update.

The Multislot Option (HSCSD) is integrated with the GSM option and adds multislot capabilities. The Willtek 4400 Series supports up to four uplink or downlink slots and the Multislot Option supports both the asynchronous and the synchronous mode. The BER measurement can be carried out for selected time slots. All other TX measurements are identical with the related GSM measurements, with the difference being the multislot capability. The RAPID! programming capability of 4400 allows quality tests to be configured and executed at different test stations across the production line independently of the controller.



The 4400 displays up to 4 timeslots transmitted at different levels.

CDMA2000 capability

The Willtek 4400 series provides call processing for cdmaONE/CDMA2000 terminals. The bands supported are: US cellular, PCS, TACS, JTACS, Korean PCS, Band 5 (NMT 450), Band 6 (IMT-2000), Band 8 and Band 9. Critical power measurements are accurately measured including: min/max power, open loop power, gated power, closed loop power and access probe power.

The modulation quality measurements include waveform quality, frequency error and rms vector error, time offset, amplitude imbalance and code domain measurements of power, code channel time offset and code channel phase.

On the receiver side sensitivity and dynamic range using FER feature are supported. A wide range of service options are supported including SCH data loopback testing (as provided in TDSO Service Option 32).

More information

To find out more about the Willtek 4400 Mobile Phone Tester, contact our Sales Offices around the world or visit our web site at www.willtek.com.

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