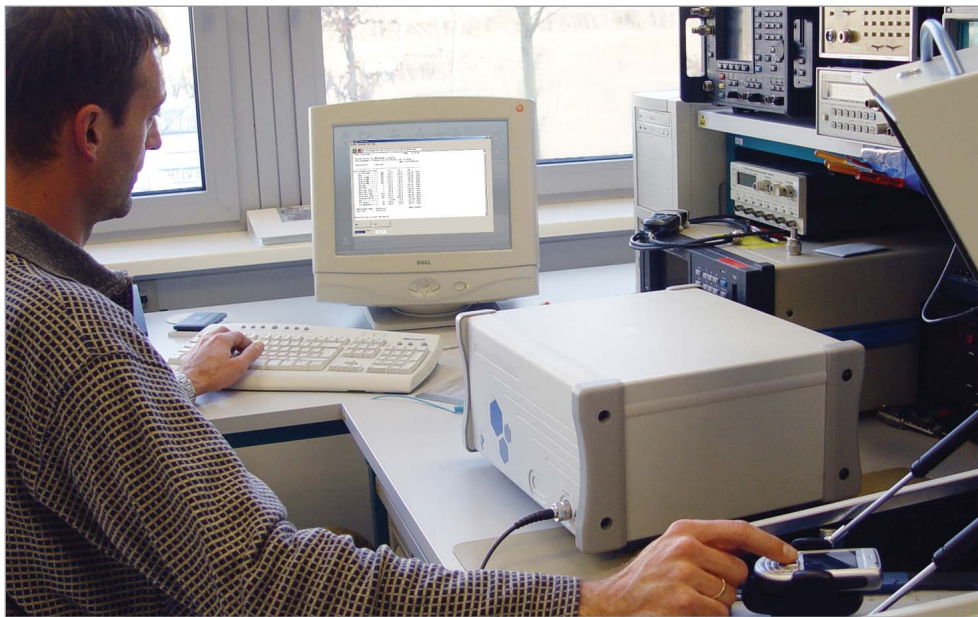will´tek

3100 Mobile Fault Finder

boosting wireless efficiency

A Go/NoGo Tester for Simple Testing of 2G/3G Mobile Devices

The Willtek 3100 Mobile Fault Finder is the ideal tool to analyze GSM/WCDMA dual-mode phones or CDMA2000 phones in a service or point-of-sale environment. The 3100 is remote controlled by the 7310 Lector PC application. Lector not only controls the 3100 but also has stored attenuation values for the most popular phones. This will allow the application to recognise the phones and apply the correct attenuation values.

The user only needs to choose whether to use the 4910 Antenna Coupler or the new 3G-capable 4916 Antenna Coupler.

The problem most service centres and sales shops are facing today with the sale of phones is the lack of Go/NoGo test equipment allowing them to conduct simple failure analysis of the phones. The 3100 Mobile Fault Finder fills this gap, enabling non-technical personnel to check a phone for errors. The intuitive PC application will provide a simple Pass of Fail verdict. For further analysis, repair technicians can print a more detailed report or store it in a file to ease the repair of these phones.

The 3100 uses the know-how of Willtek to enable easy but still thorough testing of WCDMA or CDMA2000-enabled wireless devices. In order to support the 3100 and the PC application, Willtek frequently updates the attenuation files available on its website. These updates include latest phones released to the market.

The architecture of the 3100 is flexible enough to allow for future enhancements introduced into the current 3G wireless standards by means of a simple software update. The hardware of the 3100 Mobile Fault Finder is also prepared for other technologies such as HSDPA and 1xEV-DO

Since many operators are also introducing EDGE services and phone manufacturers are launching GSM/EDGE/WCDMA phones, the 3100 also offers EDGE testing as an option.

Highlights

- Enables accurate and no-fault identification of CDMA2000, WCDMA, GSM and EDGE mobile devices

- Separates faulty and no-fault-found (NFF) mobile phones to maximise revenues

- Provides intuitive operation and Autotest features to minimise training requirements

- Simulates real-life networks for complete testing

Easily managing complex measurements

Willtek's 7310 Lector is an economical solution for service centres and repair shops testing returned mobile phones. Running on a PC, Lector provides an easy-to-use interface to the 3100 Mobile Fault Finder and the 4400 Series Mobile Phone Testers.

Automated test sequences

Testing the functionality of a wireless device in the repair shop or at the point of return does not require highly qualified test engineers: Standard test sequences are easily run, and result in a simple Pass/Fail statement. A test protocol for more detailed results can be viewed or printed on request, e.g. to forward it to a repair technician. Lector supports full functional testing by shop personnel!

Lector can be used in conjunction with Willtek's 4400 Mobile Phone Tester Series or the 3100 Mobile Fault Finder, the 4916 Antenna Coupler and the 4921 RF Shield. A PC running Microsoft Windows and Willtek's Lector can control the respective tester.

In most cases, the software takes the power attenuation between the antenna coupler and the tester into account in the measurement results: Lector usually identifies the type of mobile phone, thanks to a built-in database which is frequently being updated on Willtek's website.

The built-in test sequences support all the leading cellular technologies: WCDMA, GSM, EDGE and CDMA. Predefined parameters such as channels to test allow the operator to start testing immediately, but can be customised from within Lector. An optional password protection can secure the parameters from unauthorised access.

Test customisation

Not only can individual parameters be modified but also complete test sequences. Lector uses a modern BASIC dialect already known from the 4400 Mobile Phone Tester Series. The standard tests are well-documented and can be adapted to individual needs with the help of a standard text editor. Lector and the factory-installed test sequences leave room for inclusion of remote control commands for the wireless device and other test equipment through various interfaces.
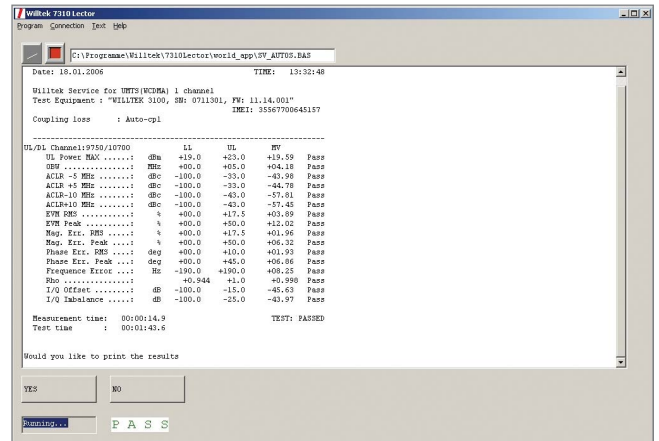

Figure 1: The simple Pass/Fail verdict is complemented by exact measurement results
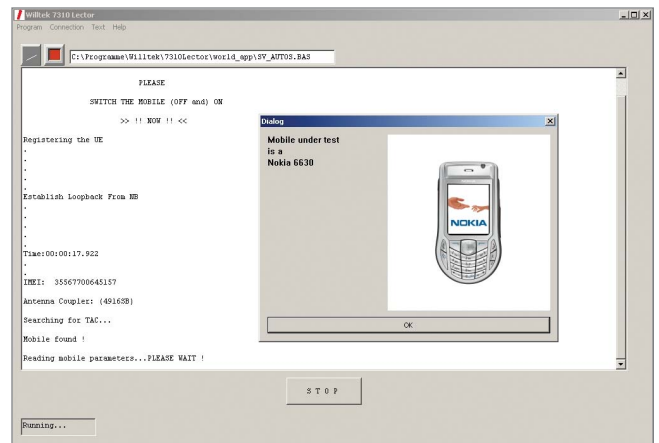

Figure 2: Lector recognises most types of mobile phones

3

Home at any repair shop

With Lector, Willtek builds on many years of experience in the design of easy-to-use instruments and PC control software. Many operators, shops and repair centres already enjoy similar products such as the RAPID! Mobile/Carrier Test Software and are positive about how Willtek's user interface software gives them a competitive edge. Lector and related products from Willtek reduce the complexities of testing modern cellular technologies to a simple Pass/Fail, with a clear indication of the potential source of a problem if any. ISO 9000-certified service centres can trace the test conditions and equipment used for measurements with Lector.

Supported connections

- TCP/IP

- GPIB

- USB

- RS-232

PC minimum requirements

- Windows NT, 2000 or XP

- 60 MB free hard disk space

- CD drive

- RS-232 or USB connection
  (for initial 3100 Mobile Fault Finder setup)

- Screen size: 1024 by 768 pixels

Functions

- WCDMA, GSM, EDGE, CDMA tests

- Supports RAPID! scripts

- Printing and storage of results
  – on the local PC or a server in the network
  – automatically or on request

- User definable coupling settings

- Channel configuration

- Automatic coupling loss calculation for phones which
  are not in database
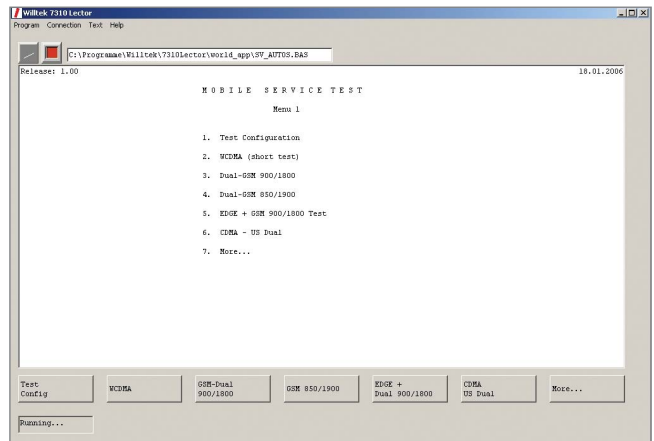
- Password protected configuration area

Figure 3: The predefined buttons allow the user to select between different technologies, but can be reprogrammed for different purposes

Specifications

Specifications valid after 60 minutes warm-up time at ambient temperature, specified environmental conditions and typical measurement range, within a period of one year after calibration.

Basic RF Data

Input/output impedance	50 Ω
VSWR	< 1.3
RF in/out	N-type female connector
Internal frequency reference	10 MHz
Temperature characteristic	1 x 10-6 max.
Aging characteristic	
	10-6 max/year (at +25°C ±2°C)

WCDMA Generator

Signal generator

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Output level range	–120 to –20 dBm
Output level uncertainty	±1.0 dB (25°C ±5°C)
	±1.5 dB (5 to 40°C)
Error vector magnitude uncertainty	< 7%
Supported physical channels	DPCH, P-CCPCH, S-CCPCH, P-CPICH, S-CPICH, SCH (P-SCH, S-SCH), AICH, PICH
Channel level range	–20 to 0 dB to absolute level
Modulation type	WCDMA

WCDMA Analyzer

Power measurement

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Level range	–60 to +35 dBm
Uncertainty	±1.0 dB (+35 to –25 dBm)
	±1.3 dB (-25 to –60 dBm)

Modulation quality measurement

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Level range	–25 dBm to +35 dBm

Error vector magnitude (EVM)

Range	Up to 30%
Uncertainty	±5.0%

Frequency error

Range	±1 kHz
Uncertainty	±20 Hz

Waveform quality

Range	0.9 to 1.0
Uncertainty	±0.004

WCDMA Call Processing

Supported bands

Band I

Uplink channels	9612 to 9888
	(1920 to 1980 MHz)
Downlink channels	10,562 to 10,838
	(2110 to 2170 MHz)

Band II

Uplink channels	9262 to 9538 and 12, 37, 62, 87, 112, 137, 162, 187, 212, 237, 262, 287 (1850 to 1910 MHz)
Downlink channels	9662 to 9938 and 412, 437, 462, 487, 512, 537, 562, 587, 612, 637, 662, 687 (1930 to 1990 MHz)

Band III

Uplink channels	8562 to 8913
	(1710 to 1785 MHz)
Downlink channels	9037 to 9388
	(1805 to 1880 MHz)
Channels	P-CPICH, P-SCH, S-SCH, P-CCPCH, PICH, DPCH; orthogonal channel noise simulation (16 channels)

Band IV

Uplink channels	8562 to 8763
	(1710 to 1755 MHz)
Downlink channels	10652 to 10763
	(2110 to 2155 MHz)

Band V

Uplink channels	4132 to 4233
	(824 to 849 MHz)
Downlink channels	
4357 to 4458	(869 to 894 MHz)

Band VI

Uplink channels	4162 to 4188
	(830 to 840 MHz)
Downlink channels	4387 to 4413
	(875 to 885 MHz)

Supported procedures

Registration
Mobile Originated Call (Voice Call)
Mobile Terminated Call (Voice Call)
Loopback mode (RMC)
Speech Loopback
Call clearing by UE
Call clearing by tester
Handover (channel change)

Transmitter measurements

Min/max. output power
Modulation quality (EVM, freq. error)
Peak code domain error
Open loop power control
Inner loop power control
Occupied bandwidth (OBW)
Adjacent leakage power ratio (ACLR)
Spectrum Emission Mask (SEM)

Receiver measurements

BER, BLER measurements
Reported RSCP (received signal code power)

GSM Generator

Signal generator

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Output level range	−120 to −15 dBm
Output level uncertainty	±1.0 dB (25°C ±5°C)
	±1.5 dB (5°C to 40°C)
Output level resolution	0.1 dB
Phase error	2.5°

GSM Analyzer

Power measurement

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Level range	−10 to +36 dBm
Output level uncertainty	±1.4 dB

Modulation measurements

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz

RMS phase error

Range	0° to 15°
Uncertainty	1.0°

Peak phase error

Range	0 to 45°
Uncertainty	4.2°

Frequency error

Range	10 kHz
Uncertainty	15 Hz (GSM 850, 900)
	25 Hz (GSM 1800, 1900)

GSM Call Processing

Supported bands

GSM 850	(channels 128 to 251)
P-GSM	(channels 1 to 124)
E-GSM	(channels 975 to 1023, 0 to 124)
R-GSM	(channels 955 to 1023, 0 to 124)
GSM 1800	(channels 512 to 885)
GSM 1900	(channels 512 to 810)

Supported procedures

Registration
Mobile originated call (voice call)
Mobile terminated call (voice call)
Speech loopback
Call clearing by UE
Call clearing by tester
Channel and band handovers

Transmitter measurements

Output power
RMS Phase error
Peak phase error
Frequency error
Burst length
Power/time template

Receiver measurements

BER, BLER
Reported RSSI

EDGE Analyzer

Power measurement

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Level Range	−25 to +36 dBm
Uncertainty	±1.4 dB

Error Vector Magnitude (EVM) RMS

Range	0 to 50%
Uncertainty	±1.0%

Error Vector Magnitude (EVM) Peak

Range	0 to 75%
Uncertainty	±3%

Frequency error

Range	±10 kHz
Uncertainty	±15 Hz (GSM 850, 900)
	±25 Hz (GSM 1800, 1900)

EDGE Call Processing

Supported bands

GSM 850	(channels 128 to 251)
P-GSM	(channels 1 to 124)
E-GSM	(channels 975 to 1023, 0 to 124)
R-GSM	(channel 955 to 1023, 0 to 124)
GSM 1800	(channels 512 to 885)
GSM 1900	(channels 512 to 810)

Supported procedures

EDGE attach
Uplink TBF establishment
ETSI Test Mode A
EDGE detach

Transmitter measurements

Output power
Frequency Error
RMS EVM
Peak EVM
Modulation spectrum*
Switching transient*
Origin Offset
95th Percentile
I/Q Imbalance
* ACPM option required

CDMA2000 Generator

Signal generator

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Output level range	−120 to −15 dBm
Output level accuracy	±1.0 dB (25°C ±5°C)
	±1.5 dB (5°C to 40°C)
Output level resolution	0.1 dB
Rho	> 0.97
Physical channels supported	
F-PICH, F-SYNC, F-PCH, F-FCH, F-OCNS	

CDMA2000 Analyzer

Power measurement

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Input range	−70 to +36 dBm
Accuracy (at 5°C to 45°C)	+1.4 dB

Modulation measurements

Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Input range	−30 to +36 dBm

Rho

Range	0.9 to 1.0
Accuracy	< +0.003

Frequency error

Range	+1000 Hz
Accuracy	< 20 Hz

Time error

Range	+5 µs
Accuracy	< +100 ns

CDMA2000 Call Processing

Supported bands

0 - US cellular	(channels 1 to 1023)
1 - PCS band	(channels 1 to 1199)
2 - TACS band	(channels 1-1000, 1329-2047)
3 - JTACS band	(channels 1-799, 801-1039,
	1041-1199, 1201-1600)
4 - Korean PCS	(channels 1 to 599)
5 - NMT-450	
	(channels 1-300, 1039-1473, 1792-2016)
6 - IMT-2000	(channels 1 to1199)
8 - 1800 MHz	(channels 1 to 1499)
9 - 900 MHz	(channels 1 to 699)

Supported procedures

Registration
MS/BS Call
MS/BS Release
Voice Loopback and Normal Voice

Handovers

Channel, Band

Transmitter measurements

Rho
Frequency error
Time offset
Maximum/minimum output power
Open & closed loop powerGated power

Receiver measurements

Rx sensitivity
Rx Dynamic Range
FER

Service options supported

1,2,3,9,17,55,32768

Radio configurations

F-RC1/R-RC1
F-RC2/R-RC2
F-RC3/R-RC3
F-RC4/R-RC3
F-RC5/R-RC4

General Data

Control Interfaces	RS-232
	USB
	TCP/IP
	GPIB (optional)
Mains power supply	94 to 132 V_{AC}
	187 to 264 V_{AC}
Power consumption	max. 140 W
Operating temperature	+5°C up to +45°C
Relative humidity	< 80%
H x W x L	202 x 392 x 355 mm
Weight	10.5 kg (without options)
Delivery includes	AC power cord
	USB cable
	USB memory stick, 256 Mb
	7310 Lector (CD)

Ordering Information

3100 Mobile Fault Finder	M 101 110
7310 Lector	M 897 289

One license is included in the standard delivery of the 3100 Mobile Fault Finder

Options

3150 GSM Option	M 248 750
3151 GSM Non-Call Mode Option	M 897 257
3152 EDGE Option	M 897 269
3153 EDGE Non-Call Mode Option	M 897 258
3154 WCDMA Option	M 248 752
3155 WCDMA Non-Call Mode Option	M 897 254
3156 CDMA2000 Option	M 248 760
3157 CDMA2000 Non-Call Mode Option	
	M 897283
3175 ACPM Option (for GSM, EDGE)	M 897 278
3180 GPIB - IEEE 488.2 Option	M 897 271
3189 Bluetooth Connectivity Test Package	
	M 248 512

General Options/Accessories

4916 Antenna Coupler Package	M 248 642
4921 RF Shield (N)	M 248 346
4921 RF Shield (N) &	
4916 Antenna Coupler Package	M 248 348
1100 Test SIM Card (for GSM)	M 860 188
1102 USIM Test SIM Card (for WCDMA)	
	M 860 173

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