Willtek

Data Sheet

3100 Mobile Fault Finder

Boosting wireless efficiency

A Go/NoGo tester for simple testing of 2G, 3G and 3.5G mobile devices

The Willtek 3100 Mobile Fault Finder is the ideal tool to analyze GSM/GPRS/EDGE/WCDMA/HSDPA multi-mode phones or CDMA2000/1xEV-DO phones in a service environment. The 3100 is remote controlled by the 7311 Lector Basic PC application. Lector not only controls the 3100 but also can store coupling factors for the most popular phones. This will allow the application to recognise the phones and apply the correct attenuation values.

Users only need to choose whether they are utilising the 4916 Antenna Coupler and 4921 RF Shield, which are almost mandatory to have achieve reliable and repeatable test results for 3G devices, or if they are utilising a user-defined connection.

Service shops and repair centres need a communication tester both to verify if a mobile phone is intact or not, and to align (calibrate) the device after repairs of the RF section. Willtek's 3100 Mobile Fault Finder is the right choice for both tasks: The intuitive, PC-based user interface will provide a simple Pass or 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. Additional functions support the RF calibration for leading mobile phone vendors.

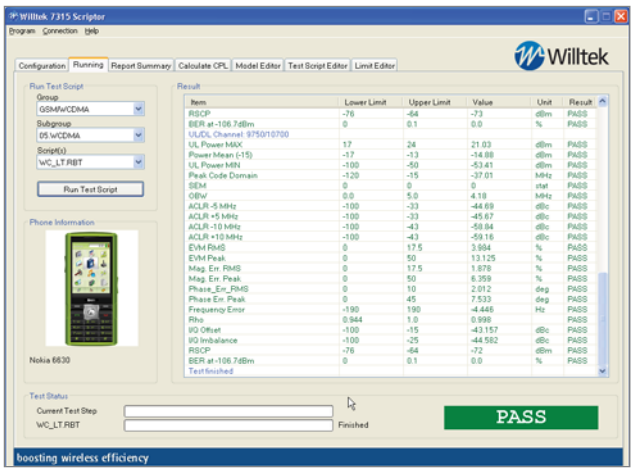
With the 3100, Willtek applied its know-how to enable easy but still thorough testing of WCDMA/HSDPA or CDMA2000/1xEV-DO-enabled wireless devices. In order to support the 3100 and the PC application, Willtek provides an option with frequent updates of attenuation values over the Internet. These updates 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.

As many GSM networks include EGPRS capabilities, phone manufacturers are offering the same combination of technologies. As a consequence, the 3100 also provides EDGE testing as an option.

Highlights

- Enables accurate and no-fault identification of CDMA2000, 1xEV-DO, HSDPA, WCDMA, GSM/GPRS and EDGE mobile devices
- Separates faulty and no-fault-found (NFF) mobile phones to maximise revenues
- Provides intuitive operation through a Windows-based operating software, minimising training requirements
- Simulates real-life networks for complete testing
- Preferred low cost solution in several calibration and alignment systems



Easily managing complex measurements

Willtek's 7311 Lector Basic software is an economic test solution for service centres and repair shops testing returned mobile phones with the 3100 Mobile Fault Finder. The Lector and Scriptor family of test automation products provides a scalable test solution for different applications around wireless device testing. It fits the needs of test operators and administrators in large service centres as well as in small repair shops. The software provides an easy-to-use interface to the 3100 Mobile Fault Finder.

7311 Lector Basic

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. Test protocols can be saved automatically or on request, on the local PC or any connected server. 7311 Lector Basic supports comprehensive functional tests by shop personnel!

Lector Basic can be used in conjunction with Willtek's 3100 Mobile Fault Finder, the 4916 Antenna Coupler and the 4921 RF Shield. A PC running Microsoft Windows and Willtek's Lector controls the respective tester.

The software takes the power attenuation between the antenna coupler and the tester into account in the measurement results: For initial setup, 7311 Lector Basic comes with a free built-in database containing coupling factors for popular phones. This eases the test system setup and saves a lot of time compared to manually adding coupling factors for all phone models.

7311 Lector Basic is delivered with each 3100 Mobile Fault Finder and can also be downloaded from Willtek's website for free.

The built-in test sequences support all the leading cellular technologies: GSM, GPRS, EDGE, WCDMA, HSDPA, AMPS, CDMA2000 and 1xEV-DO. Predefined parameters such as the channels to test and the coupling factors allow the operator to start testing immediately, but can be customised from within Lector.

7312 Lector Enhanced

7312 Lector Enhanced provides all the possibilities of 7311 Lector Basic and offers additional features The major difference between Lector Enhanced and Lector Basic is the support of the 7360 Coupling Factor Update License. Also, up to four instances of Lector Enhanced can run simultaneously on a single PC controlling different Willtek testers, increasing operator productivity. The different program windows are easily differentiated visually.

For the coupling factor calculation, Lector Enhanced includes an automatic position finder for GSM which automatically determines the best position for each new phone model.

7315 Scriptor

7315 Scriptor features all of Lector Enhanced and adds functionality for easily modifying and adding tests and mobile phone profiles. These tests can then be transferred to and used by 7311 Lector Basic and 7312 Lector Enhanced installations.

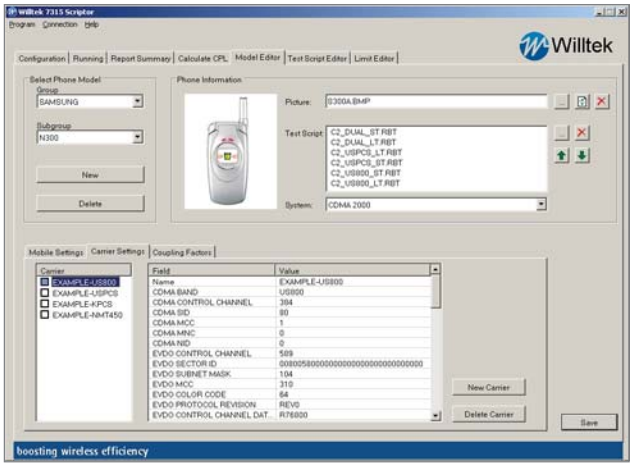
The Model Editor within Scriptor is used by administrators to create model lists for Scriptor, Lector Basic and Lector Enhanced. This tool allows you to conveniently change or add entries for mobile phone models. Pictures, test scripts, comments, user instructions can be entered and linked to a phone; the test operator will then see these when starting a test for this type of phone.

The Test Editor component provides an easy for editing test scripts or creating a new test. Separate lists for each technology allow you to conveniently choose a test step, which is copied to the new test script on the right hand side. A double-click on a test step opens an appropriate input box that allows you to change the parameters for this test step.

The Test Editor makes modifications of existing and creation of new test scripts an easy task!

The Limits Editor offers a good overview of the limits, sorted by technologies. The limits can easily be edited by the administrator and stored under the same or another file name. Each test script can be linked to a different limit file; this way, tests scripts and limit sets can be combined individually.

7360 Coupling Factor Update License



With tests over the antenna, good power and receiver measurement accuracy is only achieved with the exact knowledge of the antenna coupling factor, which depends on the phone model and the coupling device. A list of coupling factors for a number of phone models is already delivered with Lector and Scriptor, but does not cover all the phone models available on the market. Willtek offers an update service of the coupling factors for the latest models. These coupling factors are valid for the antenna connection between the phone and the Willtek 4916 Antenna Coupler installed in a 4921 RF Shield.

The 7360 Coupling Factor Update License is available as an option to 7312 Lector Enhanced and 7315 Scriptor. The option enables both applications to download actual coupling factors from the Internet. The update service is available for one year and can be renewed.

Home at any repair shop

With Lector and Scriptor, Willtek builds on many years of experience in the design of easy-to-use instruments and PC control software. 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 and Scriptor.

Supported connections:

- TCP/IP
- GPIB
- USB
- RS-232

System requirements:

- Windows NT, 2000, XP or Vista
- 60 MB free hard disk space
- CD-ROM drive
- RS-232 or USB connection

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	< 1.2
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	±0.7 dB (25°C ±5°C) ±1.0 dB (5°C to 40°C)
Output level resolution	0.1 dB
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	±0.4 dB (+35 to –25 dBm) ±1.0 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	±3.0%

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	1920 to 1980 MHz
Downlink channels	10,562 to 10,838
	2110 to 2170 MHz
Band II	
Uplink channels	1850 to 1910 MHz
Downlink channels	1930 to 1990 MHz
Band III	
Uplink channels	1710 to 1785 MHz
Downlink channels	1805 to 1880 MHz
Band IV	
Uplink channels	1710 to 1755 MHz
Downlink channels	2110 to 2155 MHz
Band V	
Uplink channels	824 to 849 MHz
Downlink channels	869 to 894 MHz
Band VI	
Uplink channels	830 to 840 MHz
Downlink channels	875 to 885 MHz
Band VIII	
Uplink channels	880 to 915 MHz
Downlink channels	925 to 960 MHz
Band IX	
Uplink channels	1749.9 to 1784.9 MHz
Downlink channels	1844.9 to 1879.9 MHz
Band X	
Uplink channels	1710 to 1770 MHz
Downlink channels	2110 to 2170 MHz
Channels	P-CPICH, P-SCH, S-SCH, P-CCPCH, PICH, DPCH; orthogonal channel noise simulation (16 channels)

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)
Handover to GSM, GPRS, EDGE

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)

HSDPA Call Processing

Supported procedures

Registration
Mobile Originated Call (Voice Call)
Mobile Terminated Call (Voice Call)
Loopback mode (RMC + H-Set 1 QPSK)
Speech Loopback
Call clearing by UE
Call clearing by tester
Handover (channel change)

Transmitter measurements

Measurements with uplink code channel HS-DPCCH

	Maximum output power
Spectrum measurements	Adjacent Channel Leakage Power Ratio (ACLR)
	Spectrum Emission Mask (SEM)

Receiver measurements

Maximum data throughput test
HS-DPCCH logging functionality

GSM Generator

Signal generator	
Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Output level range	–120 to –10 dBm
Output level uncertainty	±0.9 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	±0.8 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

RMS Error Vector Magnitude (EVM)

Range	0 to 50%
Uncertainty	±1.0%

Peak Error Vector Magnitude (EVM)

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

Receiver measurements

BLER-USF

CDMA2000 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) ±1.4 dB (5°C to 40°C)
Output level resolution	0.1 dB
Waveform quality (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
Uncertainty (at 5°C to 45°C)	±1.2 dB

Modulation measurements	
Frequency range	800 to 1000 MHz 1700 to 2300 MHz
Input range	–30 to +36 dBm

Waveform quality (Rho)	
Range	0.9 to 1.0
Uncertainty	±0.003

Frequency error	
Range	±1000 Hz
Uncertainty	±10 Hz

Time error	
Range	±5 µs
Uncertainty	±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 to 1199)
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

Waveform quality (Rho)
Frequency error
Time offset
Maximum/minimum output power
Open & closed loop power
Gated 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

1xEV-DO Generator

Signal generator	
Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Output level range	–120 to –20 dBm
Output level uncertainty	±0.7 dB (25°C ±5°C)
	±1.0 dB (5 to 40°C)
Output level resolution	0.1 dB

1xEV-DO Analyzer

Power measurement	
Frequency range	800 to 1000 MHz
	1700 to 2300 MHz
Level range	–60 to +35 dBm
Uncertainty	±0.4 dB (+35 to –25 dBm)
	±1.0 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

Waveform quality (Rho)	
Range	0.9 to 1.0
Uncertainty	±0.003

Frequency error	
Range	±1 kHz
Uncertainty	±10 Hz

Time offset	
Range	±5 µs
Accuracy	±100 ns

1xEV-DO call processing	
Supported revisions	Rev. 0

Supported bands

0 - US cellular (ch 1 to 1023)

1 - PCS band (ch 1 to 1199)

2 - TACS band (ch 1 to 1000, 1329 to 2047)

3 - JTACS band (ch 1–799, 801–1039, 1041–1199, 1201–1600)

4 - Korean PCS (ch 1 to 599)

5 - NMT-450 (ch 1 to 300, 1039 to 1473, 1792 to 2016)

6 - IMT-2000 (ch 1 to 1199)

8 - 1800 MHz (ch 1 to 1499)

9 - 900 MHz (ch 1 to 699)

Supported procedures

AT Session Open

AT & AN Connection

AT & AN Release

AT & AN Session Close

Handover

Transmitter measurements

Min/max output power

Waveform quality (rho)

Frequency error

RMS vector error

Amplitude imbalance

Adjacent channel power (ACPM)

Receiver measurements

PER

Receiver sensitivity, dynamic range

General Data

Control interfaces	RS-232
	USB
	TCP/IP
	GPIB (optional)
Mains power supply (AC)	94 to 132 V
	187 to 264 V
Power consumption	max. 140 W
Operating temperature	+5°C up to +45°C
	(40°F to 115°F)
Relative humidity	< 80%
H x W x L	202 mm x 392 mm x 355 mm
	(8″ x 15.4″ x 14″)
Weight without options	10.5 kg (23.1 lb)
Delivery includes	AC power cord
	USB cable
	USB memory stick, 256 MB
	7311 Lector Basic (CD)

Ordering Information

3100 Mobile Fault Finder	M 101 110

Options

3150 GSM Option	M 248 750
3151 GSM Non-Call Mode Option	M 897 257
3158 GPRS Option (Call Mode/Non-Call Mode)	M 897 290
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 (requires 3154 option)	M 897 254
3156 CDMA2000 Option	M 248 760
3157 CDMA2000 Non-Call Mode Option	M 897 283
3160 1xEV-DO Call Mode	M 248 753
3161 1xEV-DO Non-Call Mode	M 897 318
3162 HSDPA Non-Call Mode Option (requires 3155 option)	M 897 324
3163 HSDPA Call Mode Option (requires 3154 option)	M 897 325
3175 ACPM Option (for GSM, EDGE)	M 897 278
3180 GPIB - IEEE 488.2 Option	M 897 271
3181 AM Signal Generator Option	M 897 295
3182 MS Power Supply Option (upgrade kit)	M 248 755
3189 Bluetooth Connectivity Test Package	M 248 512

General Options and 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
1103 USIM and GSM Test SIM Card	M 860 164
1209 Downconverter & 3182 MS Power Supply Option (upgrade)	M 248 756
7312 Lector Enhanced (includes USB dongle)	M 897 310
7315 Scriptor (includes USB dongle)	M 897 311
7360 Coupling Factor Update License	M 897 312
Update from 7312 to 7315	M 897 314

Wireless Telecom Group
Sales offices

Willtek Communications GmbH
Ismaning
Germany
Tel: +49 (0)89 99641 0
Fax: +49 (0)89 99641 440
info@willtek.com
www.willtek.com

Parsippany, NJ
USA
Tel: +1 973 386 9696
Fax: +1 973 386 9191

Cheadle Hulme, Cheshire
United Kingdom
Tel: +44 (0) 161 486 3353
Fax: +44 (0) 161 486 3354

Roissy
France
Tel: +33 (0) 1 72 02 30 30
Fax: +33 (0) 1 49 38 01 06

Singapore
Tel: +65 6827 9670
Fax: +65 6827 9601

Shanghai
China
Tel: +86 21 5835 5718
Fax: +86 21 5835 5238

3100/DS344/1208/EN

Wireless Telecom Group
Boonton Microlab Noisecom Willtek