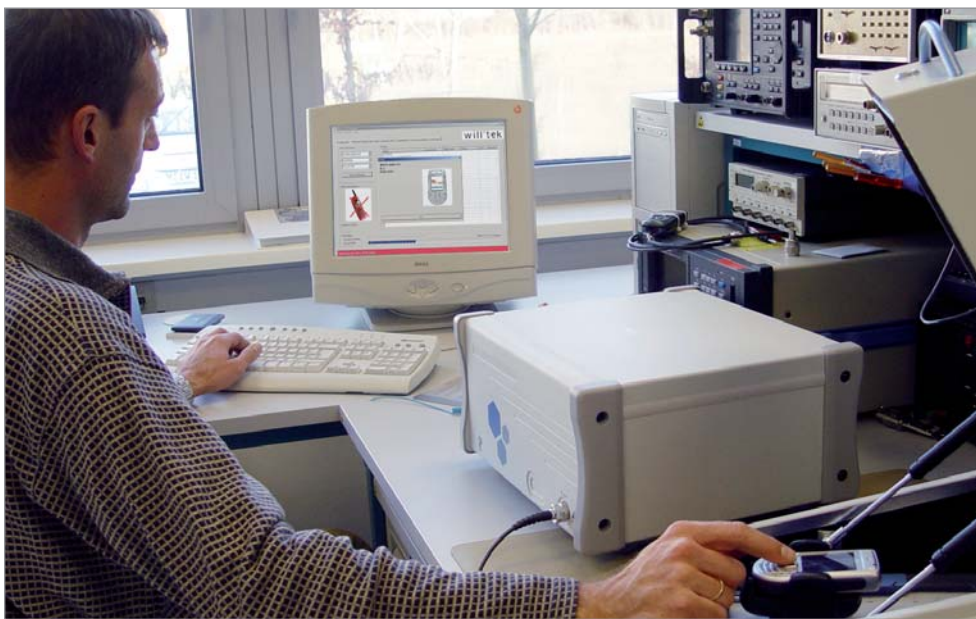


3100 Mobile Fault Finder



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 or point-of-sale 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.

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 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.

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 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.

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 and Autotest features to minimise 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.

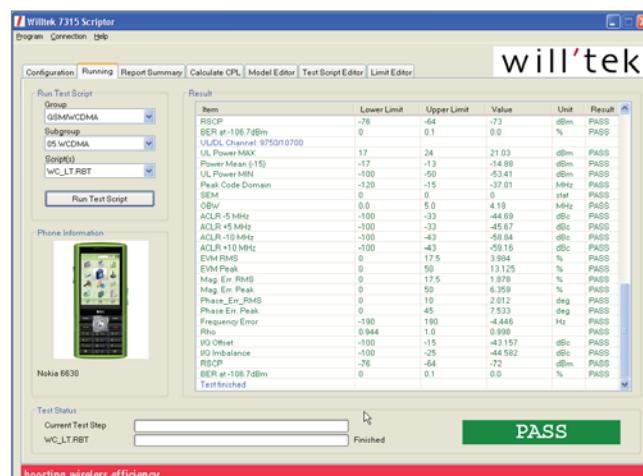
The software takes the power attenuation between the antenna coupler and the tester into account in the measurement results: For initial setup, 7311 Lector Basic comes with a free built-in database containing coupling factors for popular phones. This eases the test system setup and saves a lot of time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

istrator 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

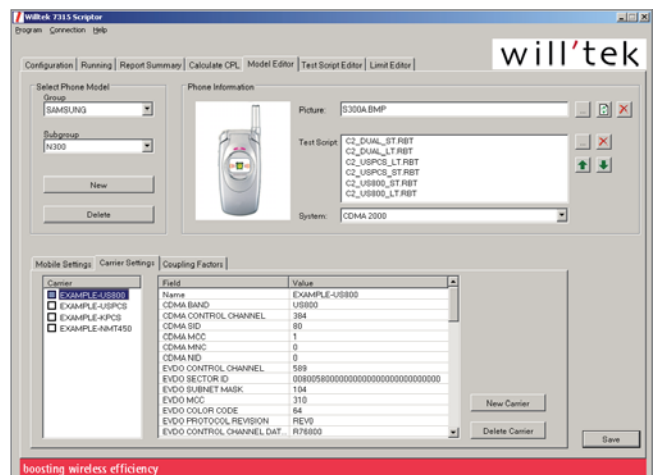
With Lector and Scriptor, Willtek builds on many years of experience in the design of easy-to-use instruments and PC control software. Lector and related products from Willtek reduce the complexities of testing modern cellular technologies to a simple Pass/Fail, with a clear indication of the potential 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 $\pm$ 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	$\pm$ 0.7 dB (25°C $\pm$ 5°C) $\pm$ 1.0 dB (5°C to 40°C)
Output level resolution	0.1 dB
Error vector magnitude uncertainty	$\pm$ 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	$\pm$ 0.4 dB (+35 to -25 dBm) $\pm$ 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	$\pm$ 3.0%

Frequency error

Range	$\pm$ 1 kHz
Uncertainty	$\pm$ 20 Hz

Waveform quality

Range	0.9 to 1.0
Uncertainty	$\pm$ 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)

HSDPA Call Processing

Transmitter measurements

Measurements on uplink code channel HS-DPCCH

Maximum power	
HS-DPCCH power control	
Modulation quality	Error vector magnitude
Spectrum measurements	ACLR SEM

Receiver measurements

Data throughput
CQI reporting
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 $\pm 5^\circ$ 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
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RMS phase error

Range	0° to 15°
Uncertainty	$\pm 1.0^\circ$

Peak phase error

Range	0 to 45°
Uncertainty	$\pm 4.2^\circ$

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	$\pm 1.0\%$

Peak Error Vector Magnitude (EVM)

Range	0 to 75%
Uncertainty	$\pm 3\%$

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
95 th 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 uncertainty	± 1.0 dB (25°C $\pm 5^\circ$ 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 μ s
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 $\pm 5^\circ$ C) ± 1.0 dB (5 to 40°C)
Output level resolution	0.1 dB
Waveform quality (Rho)	>0.97
Logical channels	Pilot, MAC, Control, Data

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 μ s
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 1-1000, 1329-2047) 3 - JTACS band(ch 1-799, 801-1039, 1041-1199, 1201-1600) 4 - Korean PCS (ch 1 to 599) 5 - NMT-450(ch 1-300, 1039-1473, 1792-2016) 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
	GPIO (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 (40°F to 115°F)
Relative humidity	< 80%
H x W x L	202 x 392 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
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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 GPIO - 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



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