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LTE

7100 Digital Radio Test Set

AEROFLEX
A passion for performance.



Advanced R&D test tool for LTE UE

- LTE FDD and TDD signalling network emulation
- Development and Call Box modes of operation
- Broad RF test coverage
  - Comprehensive suite of RF parametric measurements
  - Extensive preconfigured 36.521 RF Test Case coverage
  - TTCN-3 support
- 6 GHz frequency range, covering all LTE spectrum allocations
- Integrated -3GPP Rel-8/Rel-9 LTE compliant physical layer and protocol stack included
- Real time protocol logging and analysis
- Multi-cell and Inter-RAT handover support
- Multi-RAT testing:
  - GSM, GPRS, EGPRS, HSPA, e-HSPA, eHRPD, 1xRTT and TD-SCDMA*
- Automatic network simulation
- Functional testing
- End-to-end IP packet data test
- Integrated Fading/AWGN option
- MIMO 2x2 and MIMO 4x4*
- Automation support using remote APIs
- Embedded controller PC with Windows XP
- State of the art 12" touch-screen GUI

The Aeroflex 7100 LTE Digital Radio Test Set is an innovative software defined test platform designed to enable testing of multiple wireless technologies throughout all layers of the protocol stack. Released to support the design and development of LTE mobile devices it provides all the tools required during the design, development and test stages of UE chip sets and terminals meeting 3GPP Rel-8 and Rel-9 standards. All the key measurements are provided for characterizing the performance of LTE mobile devices, both at the radio interface and throughout the protocol stack, including the PDCP and IMS layers.

With the 7100s Call Box mode, end-to-end performance can be accurately assessed, along with correct idle mode and connected mode behaviour. The flexibility of the platform combined with an intuitive touch screen GUI establishes the 7100 as the platform of choice for future wireless test technology.

The 7100 protocol stack has been designed to allow testing to build up in a logical fashion. Using Development mode testing is possible at each sub-layer, eg MAC-to-MAC, RLC-to-RLC etc, in the absence of the above layers.

The 7100 LTE Digital Radio Test Set has been adopted by RF developers, protocol stack teams, integration test groups and pre-conformance labs that are developing sub-systems and integrated designs that meet the requirements of the LTE standards. The 7100 also supports end-of-production-line manufacturing test, allowing sample tests on high-volume production lines to be executed. These teams benefit from the ease of use, comprehensive test capability, speed and low cost of ownership offered by the 7100.

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LTE Physical Layer Features and Capability

The 7100 simulates the E-UTRAN and EPC (Evolved Packet Core) to provide a realistic test environment for LTE terminals. Test procedures control the characteristics of the simulated network to allow a wide range of repeatable test scenarios to be created.

An RF interface, suitable for direct cable connection to the device under test is provided. The interface supports the following features for LTE testing:

All E-UTRA frequency bands (currently Bands 1 to 40)

UE power classes supported: 1 to 4

Channel bandwidths: 1.4, 3, 5, 10, 15 and 20 MHz

Sub-carrier bandwidths 7.5 KHz* and 15 KHz

Upgradeable to second RF carrier for two-cell support

2 × 2 MIMO

Uplink frequency hopping

Integrated Fading and AWGN (optional)

OFDMA downlink

SC-FDMA uplink

QPSK, 16QAM and 64QAM downlink modulation schemes

QPSK, 16QAM uplink modulation schemes

One-third rate turbo coding

Normal Cyclic Prefix (CP)

Extended Cyclic Prefix*

Reference measurement channel

Loop-back mode*

PROTOCOL FEATURES

The 7100 includes an integrated LTE protocol stack that is used to establish the required signal conditions for performing RF measurements whilst a call is in process. All the required sub-layers are included in the stack, allowing the RF engineer to concentrate on the measurements without needing to have a detailed knowledge of the protocol. Test configuration options are provided, giving the user control over major parameters such as uplink and downlink frequency and power levels.

THE 7100 TEST ENVIRONMENT

The 7100 offers two modes of operation to address the specific testing requirements at the different development stages of the wireless device go-to-market process. Development mode is geared towards in-depth sub-layer testing, particularly useful for development of the protocol stack and for debugging integration using scripts for controlling testing procedures. The second mode of operation, Call Box mode, provides automatic network simulation, simplifying setup and thus reducing complexity and test time during integration testing, regression testing, performance testing, and pre-conformance testing including RF.

DEVELOPMENT MODE

For protocol testing, the Development mode in the 7100 provides three modes to give the software engineer the ability to fully exercise all aspects of the protocol stack including negative testing, error handling and timeouts as well as normal behavior. Development mode provides access to:

- L1/L2 Command Line Mode
- Scenario Wizard
- Script Development Environment
- Scripted parameter setup
- TTCN-3 support

Command Line Mode provides precise L1/L2 control. Industry standard IDE's (e.g MSVisual Studio) and the open 7100 API, provide complete control for development of test scripts. Test scenarios using all LTE sub-layers can be easily created using the simple drag-and-drop graphical interface provided with the Scenario Wizard.

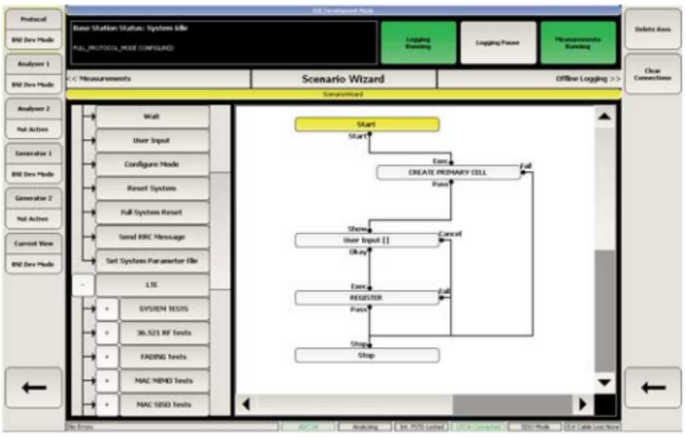


Figure 1. Scenario Wizard

Advanced logging capabilities for L1, L2 and L3 layers are provided to debug and resolve issues during development. Message filtering and search functions are provided to facilitate navigation.

Protocol testing with the 7100 can be done in the following modes:

- MAC mode
- RLC mode
- PDCP mode
- Full protocol mode, including RRC and NAS

This enables a progressive build-up of testing as the UE protocol stack is developed and integrated. In each mode a range of test facilities is provided, including connections to either the internal Data Test Entity or IP connections using PPPoE (PPP over Ethernet) and UDP. The Data Test Entity is a data generator and evaluator, providing uplink, downlink or bi-directional data, which can be connected at any sub-layer, eg Access Bearer at PDCP layer, Radio Bearer at RLC or to the logical channel at the MAC level. The Data Test Entity produces any of the following data streams:

- PN32
- PN15
- PN9
- Inverse PN32
- Inverse PN15
- Inverse PN9

In PDCP or full protocol mode, a TCP/IP connection can be established allowing standard IP network test tools to be used, eg Iperf to assess data throughput.

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CALL BOX MODE

In Call Box mode the 7100 DRTS is capable of simulating an LTE network to test the signalling procedures in the mobile under test. One-button tests such as call setup, call termination and handover can be easily completed with minimal configuration effort.

With the 7100's Call Box mode, end-to-end performance can be accurately assessed, along with correct idle mode and connected mode behaviour. Performance and application tests can be readily performed including packet latency, end-to-end throughput measurements, VoIP, peer-to-peer, video on demand, and IMS application tests, among others.

Call Box mode enables:

- Automatic network simulation
- On-the-fly parameter setup
- Packaged protocol and RF pre-conformance test cases
- Access to the test campaign manager
- Live report generation



Figure 2. Call Box Status Screen

Test Campaign Manager

Using the Test Campaign Manager, automated test sequences can be defined and run from the 7100 touch-screen GUI. The user can simply drag and drop test blocks into a table to create the desired test sequence. The sequences can then be stored for future use. Any test from the left menu may be used and loops can be quickly created for stress/load tests. The pass/fail criteria for each test in a sequence can be easily set. Live reports can be generated and reviewed during execution in the Test Report page.



Figure 3. Campaign Manager Test Report

TEST FEATURES AND MEASUREMENTS

The 7100 LTE Digital Radio Test Set provides a comprehensive range of tests covering both Protocol and RF measurements, as well as system-level functional and performance tests.

PHYSICAL LAYER TESTING

The RF tests are a mixture of standard parametric measurements (for example spectrum analysis) and LTE-specific, 3GPP-defined test procedures, as specified in TS 36.521-1. These tests use the protocol stack built into the 7100 LTE Digital Radio Test Set to configure the appropriate test conditions.

RF Test Cases

3GPP 36.521-1 Transmitter (Section 6) and Receiver (Section 7) test cases are supported using one 7100. Using an additional signal analyzer and signal generator the spurious measurements and signal blocking tests are also covered. The integrated Fading/AWGN option available with the 7100 enables support of Section 8 and 9 tests within one box.

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36-521-1 Reference	Test
6.2.2	UE Maximum Output Power
6.2.3	Maximum Power Reduction
6.2.4[1]	Additional Maximum Power Reduction
6.2.5[1]	Configured UE Transmitted Output Power
6.3.2	UE Minimum Output Power
6.3.3	Transmit OFF power (FDD only)
6.5.1	Frequency Error
6.5.2.1	Error Vector Magnitude
6.5.2.2[1]	Carrier Leakage
6.5.2.3[1]	In-band emissions for non allocated RB
6.5.2.4[1]	EVM equalizer spectrum flatness
6.6.1	Occupied Bandwidth
6.6.2.1	Spectrum Emission Mask
6.6.2.2	Additional Spectrum Emission Mask (TDD only)
6.6.2.3	Adjacent Channel Leakage power Ratio
7.3	Reference Sensitivity Level
7.4	Maximum input level
7.5	Adjacent Channel Selectivity (ACS)
7.6.3	Narrow band blocking
Non-3GPP	Absolute Sensitivity Test
Non-3GPP	Power Level/Steps
Non-3GPP	Soak Test
Non-3GPP	Latency Test

Test Cases marked with [1] require Option 400

36-521-1 RF Test Cases for LTE FDD and LTE-TDD

VECTOR SIGNAL ANALYZER/VECTOR SIGNAL GENERATOR MODE

To characterize the RF parametric performance of the device under test, the 7100 provides a VSA/VSG mode in accordance with the requirements of the relevant communications standard. The key measurements to characterize transmitter and receiver performance of the device under test are provided. As standard, general purpose spectrum or time domain analysis for the RF interface can be performed. Trace displays and numerical measurements are provided each permitting close examination of underlying problems specific to each radio access technology.

Also standard is the vector signal generator software which enables users to easily create Arbitrary Waveform Generator (ARB) files by using modifiable library templates for generic or specific modulation schemes. The VSG is suitable for the generation of single carrier generic or framed signals as well as multi-carrier and multi-tone signals. IQ data files generated using Aeroflex IQCreator® or third party software tools such as MATLAB can be played back for performing customized receiver tests with the 7100 Digital Radio Test Set.

Transmitter Measurements

Spectrum

Captured power vs time, power vs. resource block, power vs slot

Complementary cumulative distribution function (CCDF)

Constellation

EVM, EVM vs symbol, EVM vs carrier

Frequency error

Phase error

Magnitude error

Spectrum flatness

Adjacent channel leakage ratio

Spectrum Emissions Mask

Receiver Tests

Reference sensitivity

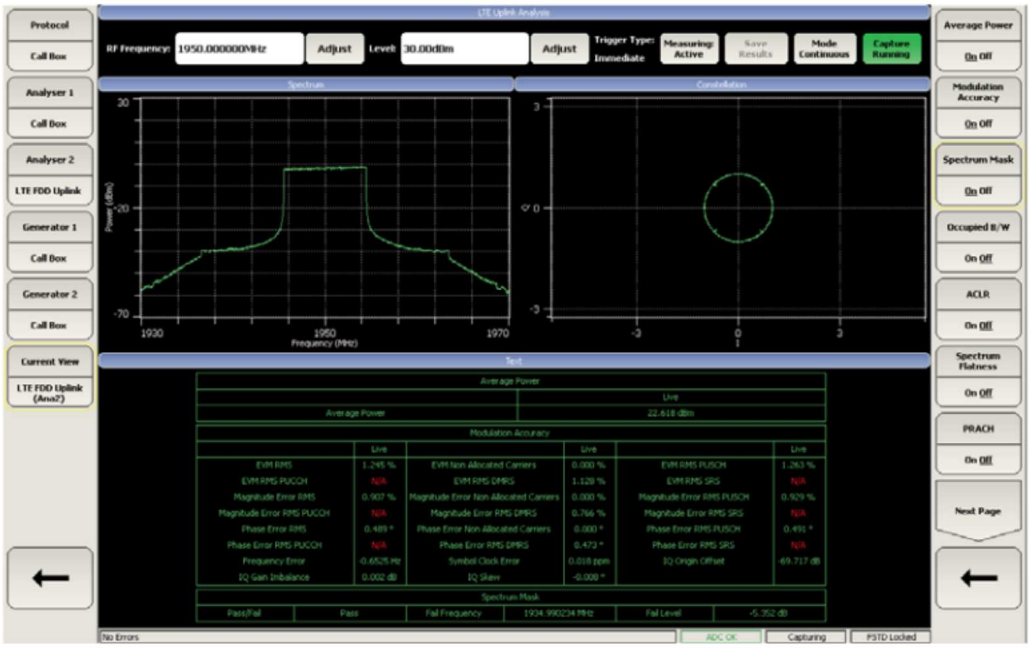


Figure 4. VSA/VSG LTE Measurements

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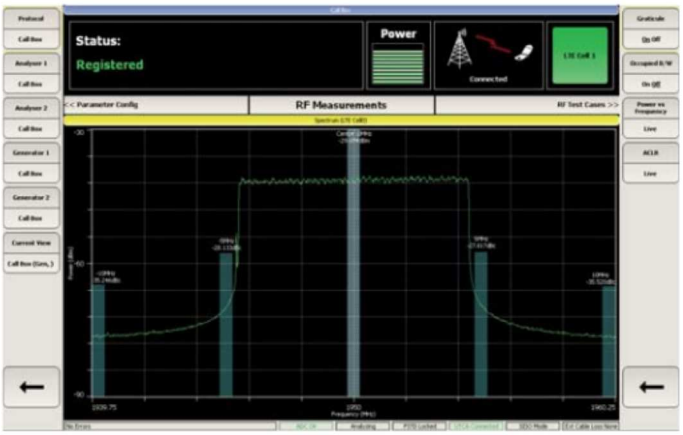


Figure 5. LTE Spectrum and ACLR Measurement

SIGNALING MODE MEASUREMENTS

Protocol Tests

Cell selection

RRC connection and release

Context activation and release

Location update

Session establishment (UE originating, UE terminating)

Session release (UE originating, UE terminating)

Ciphering

Handover (channel change) interruption time

Transmit timing accuracy

Measurement reporting

NAS message transfer

Performance Measurements

Bit error rate

Block error rate

End-to-end Tests

Data throughput

Packet latency

Voice over IP call

User-corrupted packets

Back-to-back test configuration (requires 2 units)

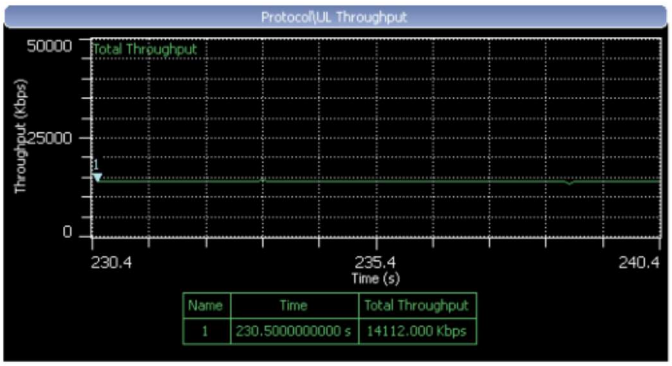


Figure 6. LTE UL Data Throughput Trace

Application Test

Voice over IP call

Peer to peer (Skype)

FTP multicast IPTV

Video on demand (RTSP)

HTTP SMTP & POP3

RTP (media only)

SMS over IMS

Cell broadcast

HANDOVER AND MULTI-RAT TESTS

Handover between different Radio Access Technologies is a key feature to guarantee seamless data coverage for new LTE devices. The 7100 LTE Digital Radio Test Set enables emulation of inter-RAT system selection and system reselection procedures. Handover between LTE and any of the supported wireless standards can be achieved with the 7100 Radio Test Set. Inter-RAT handover between the non-LTE standards, 2G and 3G, is also supported by extension of the system.

	LTE FDD	*LTE TDD*
LTE TDD	✓	✓
GSM	✓	✓
GPRS	✓	✓
EDGE	✓	✓
HRPD Rev.0	✓	✓
HRPD Rev.A	✓	✓
1xRTT	✓	✓
eHPRD	✓	✓
WCDMA	✓	✓
Evolved HSPA (3GPP Rel7/8)[1]	✓	✓
TD-SCDMA[1]		✓

FADING AND AWGN

An integrated Fading and AWGN option is available for the 7100. This is a baseband implementation requiring no additional RF hardware or calibration. The capability offered includes up to 9 taps for multipath simulation, with each path independently varying gain and phase. Variations can be Rayleighian, Doppler or log-normal. The Fading option meets or exceeds all requirements defined in 3GPP TS 36.521-1 Annex B, with all scenarios supported, including High Speed Train. Both MIMO and SISO configurations are supported.

A separate data sheet is available with a complete description of this optional feature, which can be specified at the time of purchase or as a customer-installable software upgrade for units already in the field.

TTCN-3 Support

TTCN-3 (Test and Test Control Notation) is a standard scripting language developed by ETSI that is becoming widely used for conformance testing of communications protocols (see www.ttcn-3.org). Test scripts can be written abstracted from the details of the test platform which are then compiled in conjunction with a platform-specific test adapter. The result is an executable test that can be run using, in this case, the 7100 test set. Aeroflex has teamed up with

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Testing Technologies, a market-leading specialist in TTCN-3 test solutions, to offer TTWorkbench Professional in conjunction with a 7100-specific Test Adapter. TTWorkbench Professional is a full-featured test development and execution environment offering both graphical and text-based test generation and debug facilities. In combination with the 7100 Test Adapter, it can be used to quickly develop new test cases or compile the LTE protocol test cases found in 3GPP TS 36.523-3.

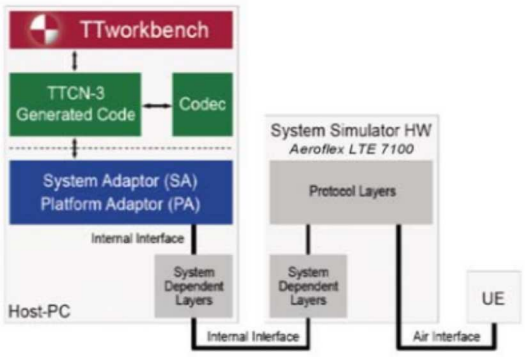


Figure 7. Aeroflex TTCN-3 Setup using 7100 Test Adapter

AUTOMATION AND INTEGRATION

The 7100 introduces an innovative approach to integration and automation of testing procedures. Application Programming Interfaces (APIs) are provided to facilitate the implementation of test scripts to suit the most demanding test requirements.

Text based L1/L2 scripts can be created using the 7100 BSE Command Line Interface which provides a fine degree of control in manipulating the protocol stack. The BSE command line interface provides the instruction set that enables direct access to configure and control the specific LTE functional entities at Layer 2: MAC, RLC and PDCP sublayers. Physical and logical channels at Layer 1, RRC signalling and channel emulation can also be controlled from the Command Line Interface. The completed test scripts can then be seamlessly integrated as virtual buttons making for a fully customized 7100 GUI screen.

The BSE Application Programming Interface provides generic functions to configure and control the RRC/NAS layer, generate test scenarios, capture parametric measurement results, and control logging. Alternatively a higher level approach is available by using the API's Call Box mode functions reducing complexity by hidding the details of the intermediate layers from the user. Dedicated APIs enable the user to configure and control the multiple Radio Access Technologies supported in the 7100 DRTS to test handover scenarios.

VALUE THROUGH PARTNERSHIPS

In addition to being a flexible R&D test tool, the 7100 is also used by system integrators to build test solutions for other applications. The 7100 emulates the SAE network and LTE RF interface for use as a building block for third party test solution developments. The application programming interfaces available in the 7100 DRTS provide the necessary flexibility to third party integrators to gain full control of the LTE protocol stack. Multiple successful integrated tets solutions have been released using the 7100 as the network emulator, examples include RF conformance test cases, LTE generic test cases and operator-specific test plans.

USER INTERFACE

The 7100 user interface is based on a large (12.1") LCD touch-screen, providing an innovative and easy-to-learn means of accessing all functionality very quickly. Large, clear screens provide clear unambiguous graphical information. Up to four graphical measurements can be simultaneously displayed, providing comprehensive insight into the signal being analyzed.

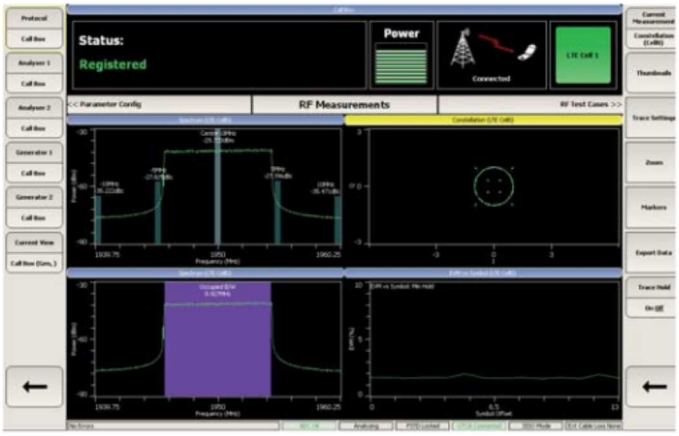


Figure 8. LTE RF Measurements GUI in CBM

The touch-screen interface presents familiar-looking soft 'keys' for accessing configuration menus as well as allowing easy on-screen dragging to define marker positions, zoom regions, axis re-scaling amongst other functions. The touch screen provides an intuitive and easy to use test system. In addition to the touch screen the 7100 can be fully controlled by a mouse and keyboard. A monitor port is available for other display alternatives.

POST-SALES SUPPORT

Support of the instrument is an essential element in maximizing efficiency and return on investment of your equipment. There are several features of the support available, including routine hardware calibration and warranty support for repairs plus software support, essential for keeping your equipment up to date. Hardware and software support for the first two years of ownership are included in the purchase price of the 7100.

With a new technology such as LTE it is essential to track changes in the 3GPP standards. Software updates for the 7100 are made available via the internet-based Aeroflex Customer Download Portal. Under the software support scheme you will be provided with an account, giving instant, round-the-clock access to all relevant releases, updates and release notes. Subscribing to the software support service is a very efficient and effective way to keep up to date.

The support service also provides access to the Aeroflex Helpdesk, which provides the first point of contact in case of a need for support. The Helpdesk provides a guaranteed response, allocating a reference number for internal tracking of progress and reporting.

Due to Aeroflex's global presence, technical support is available in region to help you get the best out of your instrument. Local, factory-trained Application Support Engineers keep you up to date via phone calls, e-mail or, if necessary on site visits.

Users can elect to purchase the 7100 LTE Digital Radio Test Set with optional warranty extensions. Standard Extended Warranty provides either 36 months or 60 months warranty period plus the benefits of guaranteed product repair times in the event of failure. Standard Extended Warranty can also be provided inclusive of scheduled calibration.

On request Aeroflex can provide customized Premium Warranty support designed around your specific needs.

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SPECIFICATION

SIGNAL GENERATOR

FREQUENCY

Range

70 MHz to 6 GHz continuous

Resolution

Up to 3 GHz: 1 Hz

Above 3 GHz: 2 Hz

Accuracy

As per frequency reference

LEVEL

RF In/Out Port

Output level

CW -8 dBm 70 MHz to 3 GHz, -14 dBm 3 GHz to 3.5 GHz, -16 dBm 3.5 GHz to 5 GHz, -19 dBm 5 GHz to 6 GHz

PEP -11 dBm 70 MHz to 3 GHz, -17 dBm 3 GHz to 3.5 GHz, -19 dBm 3.5 GHz to 5 GHz, -22 dBm 5 GHz to 6 GHz

-25 dBm Modulated RMS with 14 dB PAR 70 MHz to 3 GHz, -31 dBm 3 GHz to 3.5 GHz, -33 dBm 3.5 GHz to 5 GHz, -36 dBm 5 GHz to 6 GHz

Max Reverse Power: +33 dBm

VSWR: 1.5:1, 70 MHz to 5 GHz, 1.6:1, 5 GHz to 6 GHz

RF Out Port

Output level

CW 0 dBm 70 MHz to 3 GHz, -6 dBm 3 GHz to 5 GHz, -7 dBm 5 GHz to 6 GHz

PEP -3 dBm 70 MHz to 3 GHz, -9 dBm 3 GHz to 5 GHz, -10 dBm 5 GHz to 6 GHz

-17 dBm Modulated RMS with 14 dB PAR 70 MHz to 3 GHz, -23 dBm 3 GHz to 5 GHz, -24 dBm 5 GHz to 6 GHz

Max reverse power: +27 dBm

VSWR: 1.5:1, 1 MHz to 5 GHz, 1.7:1, 5 GHz to 6 GHz

Output Level Accuracy (23˚C ±5˚C):

Above -90 dBm:

<3 GHz typically ±0.4 dB

>3 GHz typically ±0.7 dB

From -90 dBm to -110 dBm

70 MHz to 500 MHz typically ±0.5 dB, 500 MHz to 3 GHz typically ±0.8 dB, 3 GHz to 6 GHz typically ±2.0 dB

SPECTRAL PURITY

SSB Phase Noise

Typical at 2 GHz and at ambient room temperature: -115 dBm/Hz at 20 kHz offset

Phase noise below 100 Hz offset is dependent upon reference phase noise.

Typical phase noise at 5 GHz -108 dBc/Hz 20 kHz offset

Noise Floor (10 MHz offset from 2 GHz)

Typically -140 dBc/Hz

Non-Harmonic Related Spurious

Typically -60 dBc at >10 kHz

Typically -65 dBc at >10 kHz offset for CW signals

Sub Harmonics

-30 dBc, typically -55 dBc

Harmonics

2nd Harmonic: <-28 dBc, (typ -40 dBc)

3rd Harmonic: <-30 dBc, (typ -55 dBc)

SIGNAL ANALYZER

FREQUENCY

Range

70 MHz to 6 GHz

Resolution

Up to 3 GHz: 1 Hz

Above 3 GHz: 2 Hz

Measurement Bandwidth

Maximum instantaneous bandwidth: 90 MHz

Accuracy

As per frequency reference

LEVEL

Maximum RF Input

RF In/Out Port:

+33 dBm

Level Accuracy (23˚C ±5˚C):

RF In/Out Port:

At levels > -40 dBm:

<3 GHz, typically ±0.5 dB

>3 GHz, typically ±1 dB

SPECTRAL PURITY

SSB Phase Noise

Typical at 2 GHz and at ambient room temperature:-116 dBm/Hz at 20 kHz offset

Phase noise below 100 Hz is dependent upon reference phase noise.

Typical phase noise at 5 GHz: –108 dBc/Hz 20 kHz offset

LINEARITY AND NOISE

Intermodulation

Typically 75 dB intermodulation free dynamic range (2 tone input with maximum +14 dBm input power for each tone)

Adjacent Channel Leakage Ratio

Better than 60 dB ACLR on 3GPP (downlink test model 1)

Typically 65 dB ACLR on 3GPP uplink

Spurious

Typically -70 dBc

Residual Responses (No input)

<-81 dBm, typically -86 dBm to 3 GHz with RF input terminated into 50 ohms and minimum RF and IF attenuation

<-78 dBm, typically -83 dBm 3 GHz to 5 GHz,

<-76 dBm, typically -81 dBm 5 GHz to 6 GHz

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FREQUENCY REFERENCE

Frequency

10 MHz

Aging Rate

1 in 10^9 per day, 1 in 10^7 per year.

Temperature Stability (0 to 50°C)

Typically better than $\pm 1 \times 10^{-8}$

Warm up Time

<5 minutes

SPECTRUM ANALYZER MEASUREMENTS

Frequency Span

Variable between 2 kHz to 200 MHz and zero span, Resolution 1 Hz

RBW

Variable between 1 Hz to 10 MHz, Resolution 1 Hz

Window Type

NEBW: Gaussian 3 dB: Gaussian fixed: Blackman Harris 5 term

Sample Time

Up to 333 seconds resolution 1 ns

LTE MEASUREMENTS

This section will be expanded as specification 3GPP TS 36.521-1 is developed.

Tx Measurements

Occupied Bandwidth

Percentage range: 1% to 99.99%

CCDF

Peak to average power distribution

Markers

4 markers plus delta marker

Marker Functions

Marker peak search, next peak, peak track

Power and time

Frequency and time

Traces

Live, avg, max. min. hold

Spectrum trace

Power versus time trace

ACLR

Spectrum emission mask

EVM, including EVM/Symbol and EVM/subcarrier

Frequency error

IQ component (Origin offset or carrier leakage power)

INTERFACES

RF

Front Panel

RF In/Out: Duplex port N Type (x2)

RF Out: RF output N Type

RF In: RF input N Type

Rear Panel

Freq standard: 10 MHz I/O BNC rear panel

Trigger input TTL BNC (Trigger Generator, Trigger Analyzer System Trigger)

Connectivity

Front Panel

2 x USB 2.0 (keyboard and mouse)

12.1" LCD touch-screen display, 1280 × 768 resolution

Ethernet

Rear Panel

VGA, 15 pin D-type connector

2x USB 2 .0

Ethernet

Power Supply

Voltage range: 100 to 240 VAC

Frequency range: 50 to 60 Hz

Power consumption: 650 W

GENERAL

Standard Warranty

24 months

Calibration Interval

Recommended 24 months

Electromagnetic Compatibility

EN 61326-1:2006, Emissions Class A, Immunity Table 1

Safety

EN 61010-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use-Part 1, General requirements

Certification

CE Compliant, Class A

RATED RANGE OF USE

Operating Temperature

0 to 40°C, meets IEC-60068-2-1 and 60068-2-2

Operating Humidity

10 to 90% non-condensing, meets IEC-60068-2-56

WEIGHT AND DIMENSIONS

Dimensions W×D×H

Without handles:

443 mm × 580 mm × 237 mm (17.4" x 22.8" x 9.3")

With handles:

480 mm x 632 mm x 237 mm (18.9" x 24.9" x 9.3")

Mass

Minimum: 21 Kg (46.3 lbs.)

Maximum: 22.5 Kg (49.6 lbs.)

CONDITIONS OF STORAGE AND TRANSPORT

Storage Temperature

-20 to +70°C, meets IEC-60068-2-1 and 60068-2-2

Storage Humidity

5 to 93% non-condensing, tested to IEC-60068-2-56

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ORDERING INFORMATION

When ordering please quote the full ordering number information.

Ordering Numbers	Versions
7100	Digital Radio Test Set, including LTE protocol and measurements

Requires one of the following:

Option 500	Development Mode software (includes Option 7100-501)
Option 501	Call Box Mode software

Options

Option 01	Second RF transmitter/receiver Required for all handover options, MIMO, fading and AWGN testing
Option 02	RF Combiner Required to link two 7100 units
Option 03	Data Services PC Required for CDMA and IMS testing
Option 04	Test USIM
Option 100	LTE TDD Mode
Option 101	Fading and AWGN
Option 102	2x2 MIMO and Measurements
Option 103	GSM/GPRS/EDGE Handover and Measurements
Option 104	CDMA2000 (eHRPD and 1xRTT) Handover and Measurements
Option 105	WCDMA Handover and Measurements
Option 106	TTCN-3 Test Adapter
Option 108	TTWorkbench Professional, including LTE plug-ins
Option 109	TD-SCDMA Handover and Measurements*
Option 202	4x2 MIMO **
Option 207	HSPA+ Handover and Measurements (requires 7100-105)**
Option 400	LTE RF Test Case expansion pack Requires 7100-01

Q-Generic® Options

7100-300 LTE Q-GENERIC® Execution Platform

7100-340 LTE Data Throughput Test Plan

7100-341 LTE Type 1 GMSS Test Plan

7100-342 LTE Type 2 GMSS Test Plan

7100-343 LTE Data Retry Test Plan

7100-346 LTE SMS Test Plan

Service Options

W7100/203	Standard Extended Warranty 36 months
W7100/205	Standard Extended Warranty 60 months
W7100/203C	Extended Standard Warranty 36 Months with scheduled calibration
W7100/205C	Extended Standard Warranty 60 Months with scheduled calibration

Optional Accessories

46885/433	Storm case for 7000 Series
46885/402	Rack-mount brackets for 7000 Series

*Future release

**Future release - requires two 7100 units

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