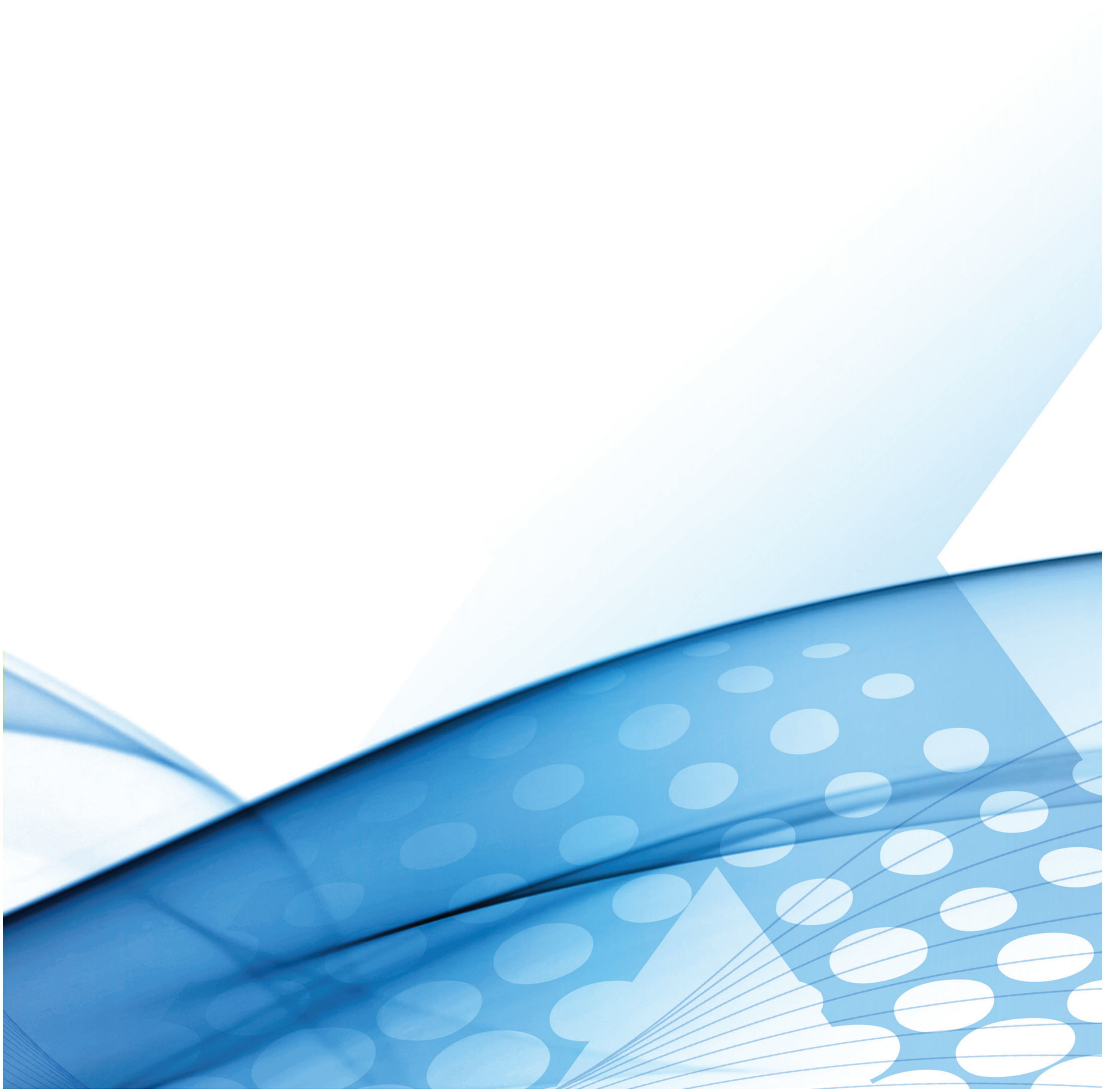
DATA SHEET

LitePoint IQxstream™

For 2G, 3G, LTE smartphones and tablets



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Overview

IQxstream™ is a smartphone / data-card test solution addressing key technologies including: GSM / EDGE, W-CDMA / HSPA / HSPA+, CDMA2000 / 1xEV-DO, LTE.

IQxstream delivers large test cost reduction for smartphone and data card testing with a parallel test architecture. IQxstream provides a step function reduction of test costs as four devices can now be tested in nearly the same time as one device would require with a traditional test methodology.

The IQxstream Advanced Cellular RF Test System covers a frequency range of 400 MHz to 3000 MHz. RF generator and analyzer bandwidths are both 100 MHz enabling wide signal capture and analysis, ensuring hardware compatibility with future standards.

RF generator, analyzer and RF switch matrix resources feed four bidirectional and one unidirectional RF ports for greatest DUT connection flexibility. IQxstream supports MIMO architectures using an optional second VSA/VSG with its included switch matrix and RF ports. This unique test instrument achieves maximum performance by using signal processors capable of independently servicing up to four DUTs in a test sequence.

IQxstream reduces operational costs through innovative calibration and service methods. All VSA and VSG hardware with requisite calibration is contained in field replaceable modules. These modules may be replaced in minutes and all calibration data is stored on the modules, allowing a unit to be returned to service in less than 30 minutes.

Figure 1. IQxstream Test System

Key Test Challenges Addressed

- Cost of Test

  Test cost reduction with parallel test

  - IQxstream can test 4 DUTs in less time than 2 DUTs using traditional methods due to unique parallel processing architecture

  Test cost reduction with hardware DUT control

  - Fastest absolute test time based upon hardware sequence based testing: test time is now limited only by the speed of the DUT

- Next Generation Cellular Technology

  4G (Long Term Evolution – LTE)

  - Quickest test of 20 MHz channel LTE ACLR (Adjacent Channel Leakage Ratio) in a single capture using 100 MHz IF (Intermediate Frequency) bandwidth

  MIMO-ready

  - Fully verify 1x2 and 2x2 UE (user equipment) devices using dual independent vector signal generator (VSG) resources

- Operational Costs

  Ease of Field Maintenance

  - Re-calibration and repair in as little as 30 minutes due to self-contained RF module assemblies containing all calibration data

- Multi-platform user interface

  - Browser-based graphical user interface operates on multiple operating systems
  - Allows access to the tester remotely over a TCP/IP network for remote debugging

Specification Highlights

- Wide range of supported cellular standards
  - GSM / EDGE
  - W-CDMA / HSPA / HSPA+
  - CDMA2000/ 1xEV-DO rev. 0, A, B
  - LTE (FDD / TDD)
- Innovative port matrix architecture for multiple DUT testing
  - Up to 8 RF input / output ports
  - Up to 2 RF output streaming ports for RX only standards testing
- Frequency Range
  - 400 MHz to 3000 MHz (RF1A to RF4A, RF1B to RF4B, STRM1A, STRM1B)
- Output power (maximum)
  - -8 dBm (duplex mode)
  - -20 dBm (broadcast mode)
  - +10 dBm (streaming ports)

Parallel Test Drives Cost Reduction

Parallel testing is the most effective way to dramatically reduce mobile device test costs. With ever-increasing volumes and highly-optimized test times, testing multiple DUTs at one test station provides a path to doubling device-test throughput.

The IQxstream has been carefully designed to maximize parallel test capabilities while minimizing capital costs. When looking at a typical transmit test scenario for a mobile device, the capture time is generally much less than the processing time. Traditional architectures have often linked the processing and capture resources one to one. This results in expensive capture hardware that is underutilized much of the time, while the processing hardware is performing at maximum capacity.

Figure 2. Parallel Testing

IQxstream employs one capture engine with four independent processing engines ensuring that signal processing, which dominates test time, is performed in parallel. One capture engine is used in a sequential capture method resulting in full hardware utilization (i.e. the capture engine is being used a large percentage of the time during test) while minimizing hardware cost.

As shown in Figure 3, IQxstream can test four mobile DUTs in less time than necessary for a traditional architecture to test two DUTs.

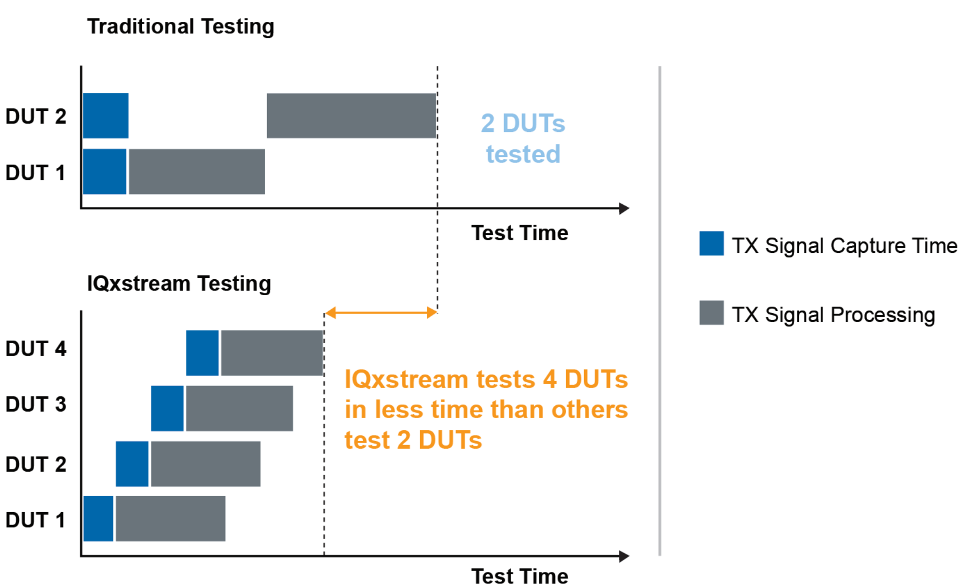

Figure 3. Traditional Testing vs. Using IQxstream

Parallel Test Built In

IQxstream is available in two configurations. The first configuration, whose block diagram is shown in Figure 4, employs a single VSA/VSG module. A second VSA/VSG can be added to the system to obtain the dual-VSA/VSG configuration, as shown in Figure 5. In each is a built-in switch matrix and signal conditioning hardware to ease multi-DUT testing. All instrument ports are fully calibrated to the connector plane removing from the user the complexity of dealing with signal routing for multiple DUTs.

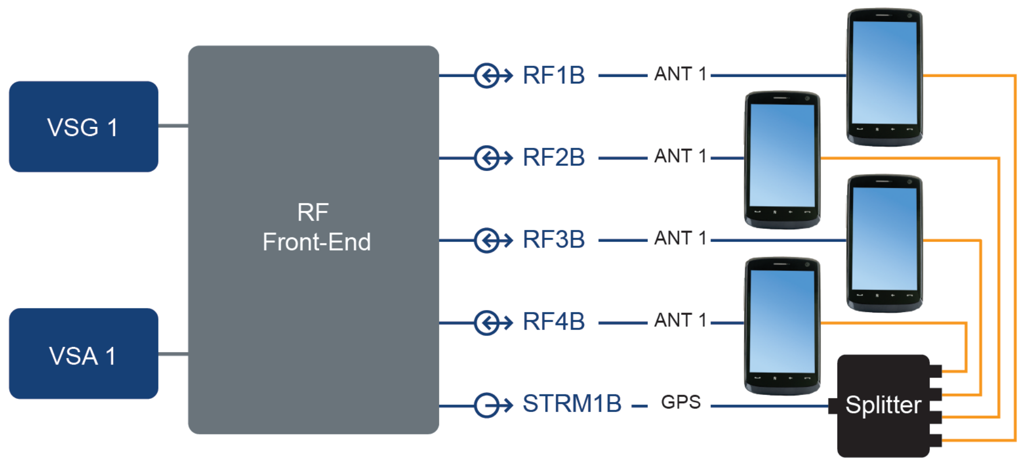

Figure 4. IQxstream—Functional Block Diagram, Single VSA/VSG Configuration

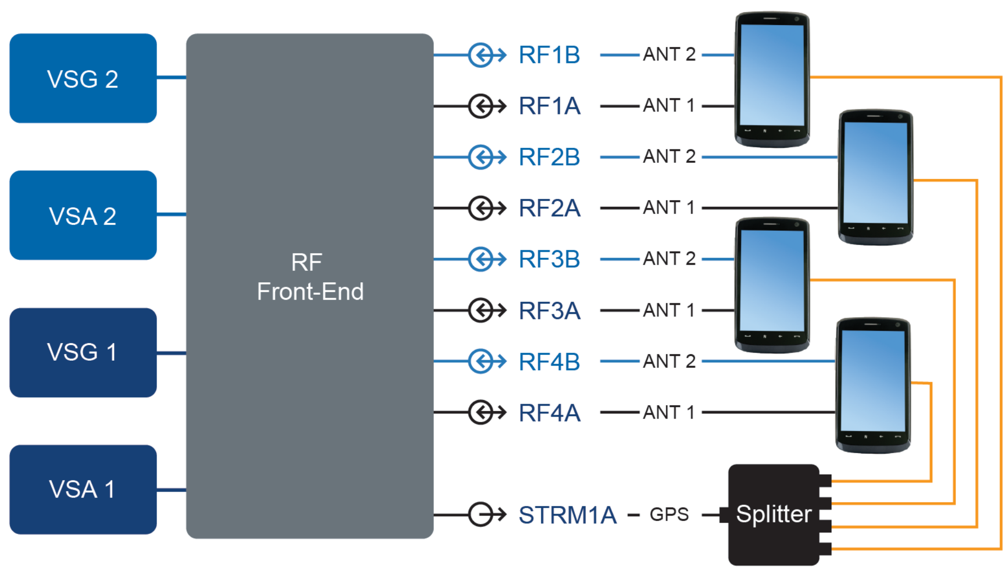

Figure 5. IQxstream—Functional Block Diagram, Dual VSA/VSG Configuration Testing a MIMO Smartphone

Hardware DUT Control with Sequence-Based Testing

Traditional test approaches require sending setup instructions to the DUT at the beginning of each measurement in a series of tests. Contrary to these time-consuming methods, the IQxstream enables loading a "sequence" in the tester just once before the series of tests starts, followed by significantly shorter setups between several measurements. This innovative approach reduces test time by 50% or more, as shown in Figure 6.

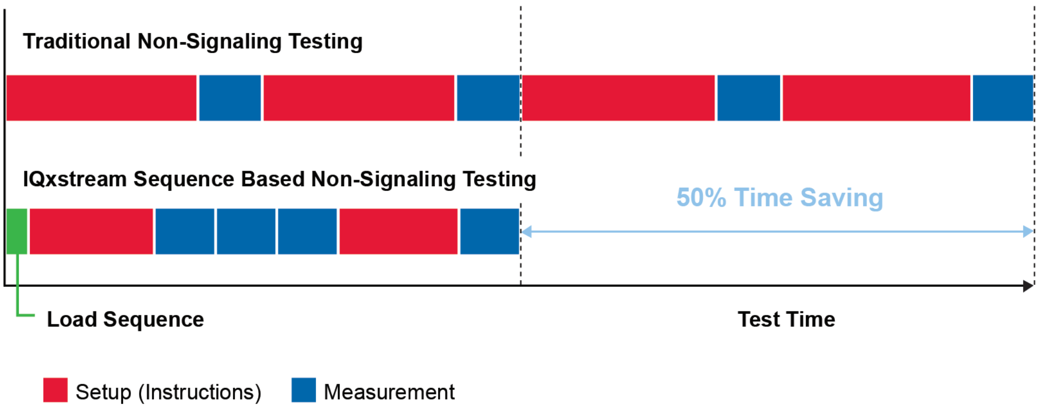

Figure 6. IQxstream Sequence-Based Non-Signaling Testing Enables Significant Time Saving over Traditional Non-Signal Testing

Ready for 4G

LitePoint has developed years of wideband measurement expertise in WLAN systems. These wideband approaches are now being employed in 4G (Long Term Evolution – LTE) systems.

IQxstream has been designed to handle all the challenges of LTE cellular technologies and deliver complete test coverage with less test time. LTE systems use up to a 20 MHz channel bandwidth; when making Adjacent Channel Leakage Ratio (ACLR) measurements, up to 100 MHz of bandwidth is required to measure all channels. With wideband capture architecture of 100 MHz IF bandwidth, as shown in Figure 7, the IQxstream can make these measurements in one acquisition, greatly reducing the "stepping" time needed in narrowband instrument designs.

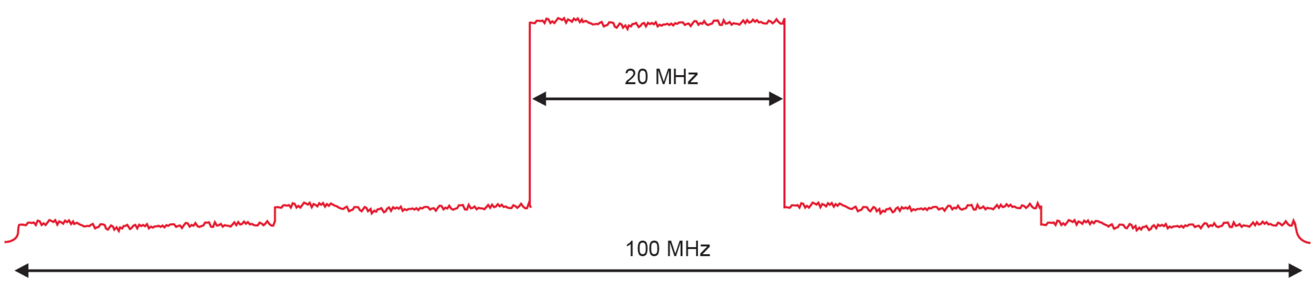

Figure 7. 100 MHz Bandwidth (IF) for Single Capture ACLR Measurements

Ready for MIMO

In addition to wider bandwidth, both LTE and HSPA+ based cellular systems use MIMO technologies. In order to properly test MIMO receivers, independent data streams must be sent to the DUT to verify these performance aspects. The second VSA/VSG option for IQxstream allows two fully independent waveforms to ensure proper test of these features in 1x2 or 2x2 MIMO devices.

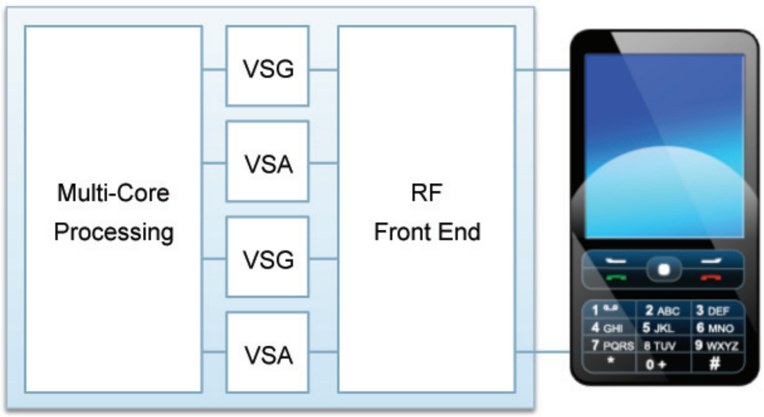

Figure 8. IQxstream—Dual-VSG Architecture for Independent Data Streams

Ease of Field Maintenance

Cell phone manufacturing environments must deal with rapid ramp-ups in production volume and the downtime due to instrument maintenance must be minimized. IQxstream was designed with high-volume production environments in mind to guarantee ease of field maintenance and minimize operational costs.

IQxstream's RF modules are fully serviceable by the end customer and are calibrated from the LitePoint service center or factory. Each module may be replaced in less than 30 minutes with no subsequent calibration required. Traditional instrument repair cycles with trips to far away service centers are a thing of the past.

Figure 9. IQxstream — Field-Replaceable RF Modules

Multiplatform User Interface

Today's R&D labs and factories increasingly employ a diverse mix of operating systems. IQxstream has been designed to allow seamless display of data and instrument control over virtually any operating system using a TCP/IP connection and a web browser. IQxstream's browser-based, easy-to-use graphical user interface (GUI) is shown in Figure 10.

Figure 10. IQxstream—Multiplatform GUI for Remote or Local Instrument Control

Flexible Data Formats

IQxstream has been designed to provide users fast and easy access to raw I/Q capture data during testing. The I/Q capture data can be saved as a file, offering IQxstream users the ability to leverage external programs, such as MatLab® for further analysis.

An additional benefit to obtaining the I/Q capture data is that any signal obtained by IQxstream may be downloaded and analyzed by external programs, or it may be replayed as a wave file. This capability enables users to reproduce and analyze signals of unknown content, and is especially useful if the signals do not conform to commercial wireless standards.

High-Throughput Measurement Methodologies

IQxstream supports cutting-edge measurement methods that significantly increase throughput during testing of cellular devices. The IQxstream can perform multiple measurements from the same data capture, offering large reductions in test time.

For example, IQxstream can perform Adjacent Channel Rejection Ratio (ACLR), Error Vector Magnitude (EVM), I/Q Imbalance, and more at each power level within the desired range during an Inner Loop Power Control (ILPC, also called Fast Closed Loop Power Control) test for W-CDMA devices. ILPC verifies the ability of the UE transmitter to adjust its output power within the desired range in accordance with one or more Transmit Power Control (TPC) commands received in the downlink, in order to keep the received uplink Signal-to-Interference Ratio (SIR) at a given SIR target. An example of ILPC plot is shown in Figure 11.

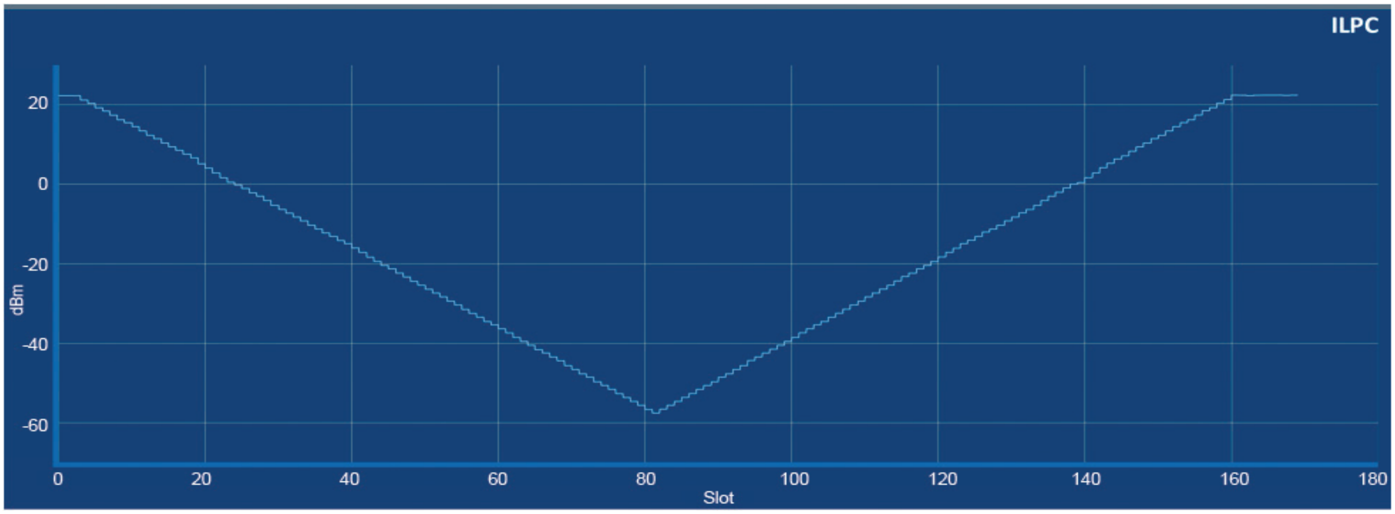

Figure 11. Inner Loop Power Control Plot

IQxstream can perform these multiple calculations in tens or hundreds of microseconds without the need for additional DUT signal captures, without any timing restrictions, and without having to pre-define the measurements before the capture. As shown in Figure 12, this is a fraction of the time required for traditional testers to perform the equivalent individual measurements. IQxstream does so while maintaining the capture data in memory, where it can be retrieved to be re-processed as desired. In addition, since all of the calculations can be done on the same signal capture, this very unique and powerful capability guarantees that all of the measurements correlate to each other in the time domain.

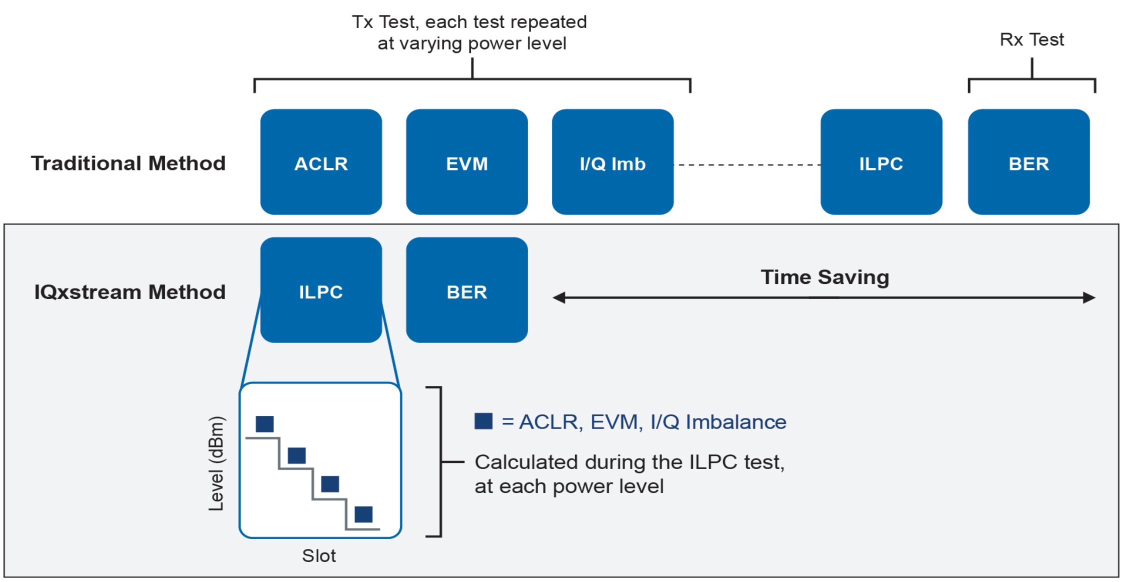

Figure 12. Significant Time Savings Allowed by IQxstream Method for ILPC Testing

In addition to IQxstream's approach to ILPC testing, significant high throughput is made possible thanks to an innovative approach that guarantees the ability to extract data while the hardware sequence is running.

General Hardware Specifications

Analyzer

Parameter	Ports	Value
RF Frequency Range	RF1A to RF4A	400 MHz to 3000 MHz
RF Maximum Input Power	RF1A to RF4A	+33 dBm (average power) +36 dBm (peak envelope power PEP)
Capture (IF) Bandwidth	RF1A to RF4A	100 MHz
Digitizer Resolution		14 bits
Effective Sample Rates		150 MHz, 37.5 MHz, 9.375 MHz
Capture Memory Depth		8 Msamples
Frequency Resolution		0.1 Hz
Input Impedance	RF1A to RF4A	50 Ω (Nominal)
Power Measurement Accuracy	RF1A to RF4A	< +/- 0.5 dB (Signal Level >-40 dBm) < +/- 0.3 dB typical (Signal Level > -40 dBm)
Signal-to-Noise-Ratio (SNR)	RF1A to RF4A	≥ 100 dB (RBW = 1 kHz) (Level > 0 dBm)
Voltage Standing Wave Ratio (VSWR)	RF1A to RF4A	< 1.5 : 1 (RL > 14 dB), typical 20 dB
Port Switching Time[1]		< 50 µs to within 0.1 dB power level
Isolation	1 Port to Other 3 Broadcast Ports (disabled)	60 dB
	Between Ports (all ports enabled)	30 dB
Inherent Spurious Signals Floor	RF1A to RF4A	≤ -95 dBm (no input signal applied)
Input Third Order Intercept Point (IIP3)	RF1A to RF4A	> 45 dBm
Non-Harmonic Attenuation	RF1A to RF4A	> 50 dB (Input Levels < +5 dBm) (700 MHz ≤ frequency ≤ 3000 MHz)
		> 45 dB (Input Levels < +5 dBm) (frequency < 700 MHz)
Trigger Level Absolute Range	RF1A to RF4A	-50 to+ 33 dBm (at 9.375 MHz sample rate)
Trigger Level Relative Range	RF1A to RF4A	0 to -40 dB (relative to input signal)
Phase Noise		< -110 dBc/Hz (250 kHz to 400 kHz offset)

1 When Using Hardware Sequencing Control

Generator

Parameter	Ports	Value
RF Frequency Range	RF1A to RF4A, RF1B to RF4B	400 MHz to 3000 MHz
	STRM 1A, STRM 1B	
RF Output Power Range	RF1A to RF4A, RF1B to RF4B	-8 dBm to -130 dBm (duplex) -20 dBm to -130 dBm (broadcast)
	STRM 1A, STRM 1B	+10 dBm to -140 dBm
Frequency Resolution		0.1 Hz
Power Level Resolution		0.01 dB
Digitizer Resolution		16 bits
Effective Sample Rates		150 MHz, 37.5 MHz, 9.375 MHz
Memory Depth		64 Msamples
Signal Generation Bandwidth (IF)	RF1A to RF4A, RF1B to RF4B	100 MHz
	STRM1A, STRM1B	
Output Power Accuracy (Duplex)	RF1A to RF4A, RF1B to RF4B	+/- 0.7 dB (levels ≥ -50 dBm)
		+/- 1.0 dB (-100 dBm < level < -50 dBm)
		+/- 0.5 dB (typical, levels >-100 dBm)
Output Power Accuracy (Broadcast)	RF1A to RF4A, RF1B to RF4B	+/- 1.2 dB (levels ≥ -50 dBm)
		+/- 1.5 dB (-100 dBm < level < -50 dBm)
		+/- 0.8 dB (typical, levels >-100 dBm)
Power Level Repeatability	RF1A to RF4A, RF1B to RF4B	+/- 0.05 dB (within 30 seconds of initial value)
	STRM 1A, STRM 1B	+/- 0.1 dB (within 30 seconds of initial value)
Power Level Settling Time		< 50 µs to within 0.1 dB (in sequence mode operation)
Frequency Settling Time		< 400 µs within 1 kHz
Voltage Standing Wave Ratio (VSWR)	RF1A to RF4A, RF1B to RF4B	< 1.5 : 1 (RL > 14 dB)
	STRM1A, STRM1B	< 1.7 : 1 (RL >12 dB)
Harmonic Attenuation (duplex)	RF1A to RF4A, RF1B to RF4B	> 30 dB (output levels < -15 dBm)
Harmonic Attenuation (broadcast)	RF1A to RF4A, RF1B to RF4B	> 30 dB (output levels < -30 dBm)
Harmonic Attenuation (streaming)	STRM1A, STRM1B	> 30 dB (output levels < 0 dBm)
Non-Harmonic Attenuation	RF1A to RF4A, RF1B to RF4B	> 50 dB (output levels < +5 dBm) (700 MHz < frequency <3000 MHz)
	STRM1A, STRM1B	> 45 dB (output levels < +5 dBm) (frequency < 700 MHz)
Phase Noise		< -110 dBc/Hz (250 kHz to 400 kHz offset)

Time Base

Parameter	Value
Oscillator Type	OCXO
Frequency	10 MHz
Initial Accuracy (25°C, After 60 Minute Warm-Up)	< +/- 0.05 ppm
Maximum Aging	< +/- 0.1 ppm per year
Temperature Stability	< +/-0.05 ppm over 0°C to 50°C Range, Referenced to 25°C
Warm-Up Time (To Within +/-0.1ppm At 25°C)	60 minutes

General Purpose RF

Vector Signal Generator

Controls	Description	Setting Range
Frequency	Sets the VSG Center Frequency	See General HW Specifications
Output Power Level	Sets the VSG Output Power Level	See General HW Specifications
Sample Rate	Sets the VSG Sampling Rate	See General HW Specifications
Marker	Sets the Marker Source	VSA1, VSA2, VSG1, VSG2, EXT
Waveform Selection	Selects Waveforms from Included Library	
Temperature Stability	< +/-0.05 ppm Over 0°C to 50°C Range, Referenced to 25°C	

Vector Signal Analyzer

Controls	Description	Setting Range
Frequency	Sets the VSA Center Frequency	See General HW Specifications
Reference Level	Sets the VSA Input Power Range	See General HW Specifications
Resolution Bandwidth (RBW)	Sets the VSA Resolution Bandwidth	See General HW Specifications
Sample Rate	Sets the VSA Sample Rate	9.375 MHz, 37.5 MHz, 150 MHz
Capture Length	Sets the Capture Time	106.7 ms at 150 MHz sampling rate 426.7 ms at 37.5 MHz sampling rate 1706.7 ms at 9.375 MHz sampling rate
Trigger Source	Sets the Trigger Input Source	VSA1, VSA2, VSG1, VSG2, EXT
Trigger Level	Sets the RF Trigger Level	
Edge Level	Sets Rising or Falling Edge Trigger Direction	

Power Meter

Controls	Description	Setting Range
Filter Bandwidth	Time Domain Filter Bandwidth	10 kHz to 100 MHz
Offset Frequency	Allows power measurements at differing center frequencies within the IF bandwidth. Multiple frequencies can be specified in a single measurement.	+/- 50 MHz

Graphical Display

Results Display	Description
Power in Band Table	Integrated Power Results (up to 10 Results)
Spectrum (PSD)	Spectrum Display (Power vs. Frequency), up to 100 MHz Span

GSM / EDGE

Frequency Bands	Frequency Range (Generator)	Frequency Range (Analyzer)
GSM 450 Band	460 MHz to 468 MHz	450 MHz to 458 MHz
GSM 480 Band	488 MHz to 496 MHz	478 MHz to 486 MHz
GSM 750 Band	747 MHz to 762 MHz	777 MHz to 792 MHz
GSM 850 Band	869 MHz to 894 MHz	824 MHz to 849 MHz
R-GSM 900 Band	921 MHz to 960 MHz	876 MHz to 915 MHz
DCS 1800 Band	1805 MHz to 1880 MHz	1710 MHz to 1785 MHz
GSM 1900 Band	1930 MHz to 1990 MHz	1850 MHz to 1910 MHz

Test Item	Test Item Number	Description	Performance
Average Burst Power	3GPP TS 51.010-1: 13.3, 13.17.3	Average Power of Useful Portion of Burst	See General Analyzer Section
Time Mask (Power vs. Time)	3GPP TS 51.010-1: 13.3, 13.17.3	Burst Time Mask Verification	
Phase Error	3GPP TS 51.010-1: 13.1, 13.17.1	Phase Error (GMSK modulation)	Residual Phase Error ≤ 1° RMS
EVM	3GPP TS 51.010-1: 13.17.1	Error Vector Magnitude (8-PSK Modulation)	Residual EVM ≤ 1.5%
Frequency Error	3GPP TS 51.010-1: 13.1, 13.17.1	Frequency Error	See General Analyzer Section
I/Q Mismatch		Amplitude and Phase Imbalance	
I/Q Offset	3GPP TS 51.010-1: 13.17.1	Origin Offset	
Output RF Spectrum Due to Modulation (M-ORFS)	3GPP TS 51.010-1: 13.4, 13.17.4	Results for Frequency Offsets of: 100,200,250, 400, 600, 800, 1000, 1200, 1400, 1600, 1800 kHz (+/-)	
Output RF Spectrum Due to Switching (S-ORFS)	3GPP TS 51.010-1: 13.4, 13.17.4	Results for Frequency Offsets of: 100,200,250, 400, 600, 800, 1000, 1200, 1400, 1600, 1800 kHz (+/-)	
Modulation Analysis Range			+33 dBm to -30 dBm

W-CDMA / HSPA / HSPA+ / Dual Carrier HSPA+

Frequency Bands	Frequency Range (Analyzer)	Frequency Range (Generator)
I	1920 - 1980 MHz	2110 - 2170 MHz
II	1850 - 1910 MHz	1930 - 1990 MHz
III	1710 - 1785 MHz	1805 - 1880 MHz
IV	1710 - 1755 MHz	2110 - 2155 MHz
V	824 - 849 MHz	869 - 894 MHz
VI	830 - 840 MHz	875 - 885 MHz
VII	2500 - 2570 MHz	2620 - 2690 MHz
VIII	880 - 915 MHz	925 - 960 MHz
IX	1749.9 - 1784.9 MHz	1844.9 - 1879.9 MHz
X	1710 - 1770 MHz	2110 - 2170 MHz
XI	1427.9 - 1447.9 MHz	1475.9 - 1495.9 MHz
XII	698 - 716 MHz	728 - 746 MHz
XIII	777 - 787 MHz	746 - 756 MHz
XIV	788 - 798 MHz	758 - 768 MHz

Test Item	Test Item Number	Description	Performance
Transmit Off Power	3GPP TS 34.121-1: 5.5	Off Power Mode Measurement	See General Analyzer Section
Maximum Output Power	3GPP TS 34.121-1: 5.2	Maximum UE Transmit Power	See General Analyzer Section
Minimum Output Power	3GPP TS 34.121-1: 5.4.3	Minimum UE Transmit Power	See General Analyzer Section
UE Power vs. Slot (ILPC)	3GPP TS 34.121-1: 5.4.2		
EVM (Per Slot, Per Chip)	3GPP TS 34.121-1: 5.13.1	Error Vector Magnitude on a Per Time Slot or Per Chip Basis	Residual EVM < 2%
I/Q Mismatch			< -50 dB
Frequency Error vs. Slot	3GPP TS 34.121-1: 5.3		
Phase Discontinuity	3GPP TS 34.121-1: 5.13.1AA, 5.13.3		
ACLR	3GPP TS 34.121-1: 5.10	Adjacent Channel Leakage Ratio	<-55 dB (QPSK 5 MHz Signal at +5 dBm Input Power Measured with RRC (a =0.22) with 3.84 MHz Integration BW)
Spectrum Emission Mask (SEM)	3GPP TS 34.121-1: 5.9		

W-CDMA / HSPA / HSPA+ / Dual Carrier HSPA+ Continued

Test Item	Test Item Number	Description	Performance
Occupied BW	3GPP TS 34.121-1: 5.8		
Code Domain Power	3GPP TS 34.121-1: 5.13.2		
Code Domain Error	3GPP TS 34.121-1: 5.13.2		
Modulation Analysis Range			+33 dBm to -30 dBm

CDMA2000 / 1xEV-DO Rev. 0, A, B

Frequency Bands	Frequency Range (Generator)	Frequency Range (Analyzer)
Band Class 0	860.025 MHz to 893.985 MHz	815.025 MHz to 848.985 MHz
Band Class 1	1930.000 MHz to 1990.000 MHz	1850.000 MHz to 1910.000 MHz
Band Class 2	917.0125 MHz to 959.9875 MHz	872.0125 MHz to 914.9875 MHz
Band Class 3	1840.000 MHz to 1870.000 MHz	887.0125 MHz to 924.9875 MHz
Band Class 4	421.675 MHz to 493.480 MHz	1750.000 MHz to 1780.000 MHz
Band Class 5	421.675 MHz to 493.480 MHz	411.675 MHz to 483.480 MHz
Band Class 6	2110.000 MHz to 2169.950 MHz	1920.000 MHz to 1979.950 MHz
Band Class 7	746.000 MHz to 764.000 MHz	776.000 MHz to 794.000 MHz
Band Class 8	1805.000 MHz to 1879.950 MHz	1710.000 MHz to 1784.950 MHz
Band Class 9	925.000 MHz to 958.750 MHz	880.000 MHz to 913.750 MHz
Band Class 10	851.000 MHz to 939.975 MHz	806.000 MHz to 900.975 MHz
Band Class 11	421.675 MHz to 493.475 MHz	411.675 MHz to 483.475 MHz
Band Class 12	915.0125 MHz to 920.9875 MHz	870.0125 MHz to 875.9875 MHz
Band Class 13	2620.000 MHz to 2690.000 MHz	2500.000 MHz to 2570.000 MHz
Band Class 14	1930.000 MHz to 1995.000 MHz	1850.000 MHz to 1915.000 MHz
Band Class 15	2110.000 MHz to 2155.000 MHz	1710.000 MHz to 1755.000 MHz
Band Class 16	2624.000 MHz to 2690.000 MHz	2502.000 MHz to 2568.000 MHz
Band Class 17	2624.000 MHz to 2690.000 MHz	

CDMA2000 / 1xEV-DO Rev. 0, A, B Continued

Test Item	Test Item Number	Description	Performance
TX Power	CDMA2000: 3GPP2 C.S0011-C Section 4.4 EV-DO: 3GPP2 C.S0033-B Section 4.3	Transmit Power Measurement	The power measurement filter options are: • 1.25 MHz bandpass filter • 2 MHz bandpass filter • 4 MHz bandpass filter • 8 MHz bandpass filter • 10 MHz bandpass filter • No filter The measurement interval is: Configurable Measurement Length: 1.25 ms (default) or 0.625 ms for CDMA2000; One slot or Half slot (default) duration for EV-DO
Rho(p)	CDMA2000: 3GPP2 C.S0011-C Section 4.3.4 EV-DO: 3GPP2 C.S0033-B Section 4.2.2	Modulation Quality	Generator: Output Waveform Quality Rho(p) > 0.99 Analyzer: Uncertainty < 0.03 for Rho(p) 0.9 to 1 Configurable Measurement Length: 1.25 ms default for CDMA2000, configurable to 0.5 ms; half slot duration default for EV-DO, configurable to one slot duration
EVM	N.A.	Error Vector Magnitude	Residual EVM < 2.0%
Phase Error	CDMA2000: 3GPP2 C.S0011-C Section 6.4.2 EV-DO: 3GPP2 C.S0033-B Section 8.4.2		
Carrier Feedthrough	CDMA2000: 3GPP2 C.S0011-C Section 6.4.2 EV-DO: 3GPP2 C.S033-B Section 8.4.2		< -50 dB
Frequency Error	CDMA2000: 3GPP2 C.S0011-C Section 4.1 EV-DO: 3GPP2 C.S0033-B Section 4.1		Measurement Range: <+/- 5 kHz
I/Q Mismatch	N.A.		< -50 dB
Code Domain Error	CDMA2000: 3GPP2 C.S0011-C Section 4.3.5 EV-DO 3GPP2 C.S0033-B Section 4.3.8	Code Domain Error vs. code	
Modulation Analysis Range			+33 dBm to -30 dBm

CDMA2000 / 1xEV-DO Rev. 0, A, B Continued

ACP (Adjacent Channel Power)	CDMA2000: 3GPP2 C.S0011-C Section 4.5.1 EV-DO: 3GPP2 C.S0033-B Section 4.4.1	Adjacent Channel Leakage Ratio	<-55 dB (Input Signal at +5 dBm Input Power Measured in a 30 kHz Gaussian filter Measurement interval length: same as TX Power
Code Domain Power	CDMA2000: 3GPP2 C.S0011-C Section 4.3.8 EV-DO: 3GPP2 C.S0033-B Section 4.3.8	Code Domain Power vs. Code	

LTE

Frequency Bands	Frequency Range (Generator)	Frequency Range (Analyzer)	Duplex Mode
1	2110 MHz to 2170 MHz	1920 MHz to 1980 MHz	FDD
2	1930 MHz to 1990 MHz	1850 MHz to 1910 MHz	FDD
3	1805 MHz to 1880 MHz	1710 MHz to 1785 MHz	FDD
4	2110 MHz to 2155 MHz	1710 MHz to 1755 MHz	FDD
5	869 MHz to 894 MHz	824 MHz to 849 MHz	FDD
7	2620 MHz to 2690 MHz	2500 MHz to 2570 MHz	FDD
8	925 MHz to 960 MHz	880 MHz to 915 MHz	FDD
9	1845 MHz to 1880 MHz	1750 MHz to 1785 MHz	FDD
10	2110 MHz to 2170 MHz	1710 MHz to 1770 MHz	FDD
11	1476 MHz to 1496 MHz	1428 MHz to 1448 MHz	FDD
12	728 MHz to 746 MHz	698 MHz to 716 MHz	FDD
13	746 MHz to 756 MHz	777 MHz to 787 MHz	FDD
14	758 MHz to 768 MHz	788 MHz to 798 MHz	FDD
17	734 MHz to 746 MHz	704 MHz to 716 MHz	FDD
18	860 MHz to 875 MHz	815 MHz to 830 MHz	FDD
19	875 MHz to 890 MHz	830 MHz to 845 MHz	FDD
20	791 MHz to 821 MHz	832 MHz to 862 MHz	FDD
21	1495.9 MHz to 1510.9 MHz	1447.9 MHz to 1462.9 MHz	FDD
33	1900 MHz to 1920 MHz	1900 MHz to 1920 MHz	TDD
34	2010 MHz to 2025 MHz	2010 MHz to 2025 MHz	TDD
35	1850 MHz to 1910 MHz	1850 MHz to 1910 MHz	TDD
36	1930 MHz to 1990 MHz	1930 MHz to 1990 MHz	TDD
37	1910 MHz to 1930 MHz	1910 MHz to 1930 MHz	TDD
38	2570 MHz to 2620 MHz	2570 MHz to 2620 MHz	TDD
39	1880 MHz to 1920 MHz	1880 MHz to 1920 MHz	TDD
40	2300 MHz to 2400 MHz	2300 MHz to 2400 MHz	TDD
41	2496 MHz to 2690 MHz	2496 MHz to 2690 MHz	TDD

LTE Continued

Test Item	Test Item Number	Description	Performance
UE Maximum Power	3GPP TS 36.521-1: 6.2.2	UE Maximum TX Power	See General Analyzer Section
Power Control	3GPP TS 36.521-1: 6.3.5		
Minimum Output Power	3GPP TS 36.521-1: 6.3.2	UE Minimum TX Power	
Transmit ON / OFF Power	3GPP TS 36.521-1: 6.3.4		
Frequency Error	3GPP TS 36.521-1: 6.5.1	UE Frequency Error	
Error Vector Magnitude (EVM)	3GPP TS 36.521-1: 6.5.2.1	Modulation Quality Measurement	Residual EVM < 1.0%
Carrier Leakage	3GPP TS 36.521-1: 6.5.2.2	Modulation Quality Measurement	
In-band Emissions for Non- Allocated RB	3GPP TS 36.521-1: 6.5.2.3	Spectral Quality	
EVM Equalizer Spectrum Flatness	3GPP TS 36.521-1: 6.5.2.4	Spectral Quality	
Occupied Bandwidth	3GPP TS 36.521-1: 6.6.1	Spectral Quality	

Test Item	Test Item Number	Description	Performance
Spectrum Emission Mask (SEM)	3GPP TS 36.521-1: 6.6.2.1	Spectral Quality	See General Analyzer Section
ACLR	3GPP TS 36.521, 6.6.2.3	Adjacent Channel Leakage Ratio	<-40 dB (Input signal at +5 dBm Input Power Measured in a 100 kHz RBW with 10 MHz Integration BW)
Reference Sensitivity Level	3GPP TS 36.521-1: 7.3		
Maximum Input Level	3GPP TS 36.521-1: 7.4		
Modulation Analysis Range			+33 dBm to -40 dBm (10 MHz Channel BW)

GPS

Signal	Description	Performance
Frequency (L1)	1575.42 MHz Band	
Power Range		+10 to -140 dBm
Power Accuracy		+/- 1.0 dB (+10 to -140 dBm)

Port Descriptions–Front Panel

I/O	Function	Type
Power Switch	Power On/Off	Pushbutton Switch
Power Indicator	LED Red – Powered Up, Standby LED Green – Powered Up, Running	LED Indicator
USB (2)	USB I/O	Type A
RF1A	VSG / VSA Port	N Female
RF2A	VSG / VSA Port	N Female
RF3A	VSG / VSA Port	N Female
RF4A	VSG / VSA Port	N Female
STRM1A	GPS Output	N Female
RF1B	2nd VSG / VSA Port	N Female
RF2B	2nd VSG / VSA Port	N Female
RF3B	2nd VSG / VSA Port	N Female
RF4B	2nd VSG / VSA Port	N Female
STRM1B	Future Use	N Female

Port Descriptions–Rear Panel

General I/O

I/O	Function	Type	Value
10 MHz REF In	10 MHz Reference In	BNC Female	200 Ohm Input Impedance 0.3 Vpp Minimum Input Level 4.0 Vpp Maximum Input Level
10 MHz REF Out	10 MHz Reference Out	BNC Female	5 dBm Nominal Output Level
TRIG 1	TTL Trigger Input / Output	BNC Female	50 Ohm Output Impedance High Input Impedance TTL level 2 V High, 0.8 V Low 5 V Tolerant
TRIG 2	TTL Trigger Input / Output	BNC Female	
TRIG 3	TTL Trigger Input / Output	BNC Female	
TRIG 4	TTL Trigger Input / Output	BNC Female	

Communication I/O

I/O	Function	Type
VGA	Video Output	15 pin DSUB
USB 1	USB I/O – Keyboard	Type A
USB 2	USB I/O – Mouse	Type A
LAN	1000 Base-T LAN	RJ-45

General Environmental

Parameter	Value
Dimensions	15" W x 7.0" H x 22" D (381mm x 178mm x 560mm)
Weight	49 pounds (22.2 kg)
Power Consumption	<750 W
Power Requirements	100 – 240 VAC, 50 – 60 Hz, 7.5 – 3.2 A
Recommended PC	Intel Core i5 2.5 GHz with 1GB of RAM or better
Recommended Browser for Optimal Performance	Google Chrome R10 Release
Operating Temperature	+10°C to +55°C (IEC EN60068-2-1, 2, 14)
Storage Temperature	-20°C to +70°C (IEC EN60068-2-1, 2, 14)
Specification Validity Temperature	20°C to 30°C (Valid Range for Specifications)
Operating Humidity	15% to 95% Relative Humidity, Non-Condensing (IEC EN60068-2-30)
EMC	EN 61326 Immunity for Industrial Environment, Class B Emissions
Safety	IEC 61010-1, EN61010-1, UL3111-1, CAN/CSA-C22.2 No. 1010.1
Mechanical Vibration	IEC 60068, IEC 61010 and MIL-T-28800D, Class 5
Mechanical Shock	ASTM D3332-99, Method B
Recommended Calibration Cycle	24 Months
Warranty	36 Months Hardware

Order Codes

Code	Product
0100-XSTR-001	IQxstream Mobile Test System – 2 Port Version
0100-XSTR-002	IQxstream Mobile Test System – 5 Port Version
0100-XSTR-005	IQxstream Second VSA/VSG Hardware Option
0300-XSTR-001	UMTS Measurement Suite Software License for IQxstream Includes: • GSM / EDGE Measurement Suite • W-CMDA / HSPA Measurement Suite • W-CDMA / HSPA+ Measurement Suite
0300-XSTR-002	CDMA2000 Measurement Suite Software License for IQxstream Includes: • cdmaOne, EV-DO Rev 0, Rev A, Rev B Measurement Suite
0300-XSTR-003	LTE FDD / TDD Measurement Suite

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