

TECHNICAL SPECIFICATIONS

IQcell™

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IQcell is a highly-integrated, manufacturing optimized, multi-DUT signaling test set, tailored to verifying performance of cellular devices in high-volume production environments. Optimized for end-of-line product testing, IQcell provides cellular signaling test capabilities for LTE-FDD, LTE-TDD, WCDMA, and GSM Smartphone, Tablet, Data-Card, or other devices that use cellular modules.

Optimized Multi-cell, Multi-DUT Architecture

The IQcell is designed from the ground up to provide the smallest footprint and highest throughput of any signaling capable tester. With four completely independent cells, and each cell capable of LTE-FDD, LTE-TDD, WCDMA and GSM, the IQcell provides four times the throughput with only half the footprint of single cell test solutions. In addition to the signaling capabilities, each cell has its own VSG/VSA for high speed, high accuracy, technology specific parametric measurements.

This configuration and capability fits easily into existing high volume test environments and provides the highest throughput and lowest overall cost per test of any signaling capable test set.

With the IQcell, you have confidence that your device has been calibrated accurately, the antenna has been properly connected, the SIM card is functional, and the correct software has been loaded. With its compact 2U rack-height form factor, IQcell is the highest density cellular signaling tester available on the market.

Superior User Experience

In addition to TX and RX measurements, the IQcell supports advanced signaling features such as the ability to connect multiple DUTs to a single cell – enabling mobile-to-mobile calling and verifying peak data throughput. Exercising the mobile device in its native operating mode, with real use-case scenarios, helps to ensure shipping the highest quality product and minimize customer returns.

IQcell Features

- **Cellular signaling device control:** Includes support for LTE-FDD, LTE-TDD, WCDMA/HSPA, GSM. The hardware architecture supports future enhancements up to 3GPP Release 10.
- **Technology and frequency handovers:** Supports intra-band, inter-band, and inter-RAT handover and redirection.
- **Multi-cell technology:** Four independent cells provide the highest test throughput in a high volume test environment.
- **Compact size:** Industry's highest density cellular signaling platform in 2U rack-height form factor.
- **Advanced signaling features:** Mobile-to-mobile calling and packet data throughput.

Wireless Standards Support

IQcell supports a wide variety of wireless standards and tests. As a software driven instrument, these capabilities will be updated from time to time to keep up with the changing requirements. This includes the addition of new bands or enhancements to the standards.

Currently, IQcell includes direct support for the standards-based testing documented in the following tables. In addition to the tests listed here, other measurements that provide additional information relevant to a specific test are also available. For details, see the IQcell user documentation.

IQcell supports a continuous frequency range between 400 MHz and 3800 MHz. Technology-specific frequency band support is detailed in the following section, but does not imply that frequency support is limited to only the bands listed.

GSM Frequency Bands Supported

Frequency Bands	Frequency Range (Generator)	Frequency Range (Analyzer)
GSM 850 band	869 MHz to 894 MHz	824 MHz to 849 MHz
E-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
PCS 1900 band	1930 MHz to 1990 MHz	1850 MHz to 1910 MHz

GSM Signaling Call Support (Requires UMTS Signaling License)

Supported Call Modes	Notes
Frequency Range	See general hardware specifications
Frequency Setting	Channel number
Input / Output level range	See general hardware specifications
Input / Output level accuracy	See general hardware specifications
Voice Calls	MO/MT Calls with Audio Loopback
Loopback	Voice BER: Test Mode C
In-call Handover, Redirection	Intra-band & Inter-band handover Inter-RAT redirection

WCDMA/HSPA/HSPA+ Frequency Bands

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

XIII	746 MHz to 756 MHz	777 MHz to 787 MHz
XIV	758 MHz to 768 MHz	788 MHz to 798 MHz
XIX	877.4 MHz to 887.6 MHz	832.4 MHz to 842.6 MHz
XX	791 MHz to 821 MHz	832 MHz to 862 MHz
XXI	1495 MHz to 1510.9 MHz	1447.9 MHz to 1462.9 MHz
XXII	3510 MHz to 3590 MHz	3410 MHz to 3490 MHz
XV	1930 MHz to 1995 MHz	1850 MHz to 1915 MHz
XVI	859 MHz to 894 MHz	814 MHz to 849 MHz

WCDMA Signaling Call Support (Requires UMTS Signaling Suite license)

Supported Call Modes	Notes
Standards Supported	3GPP FDD, Rel-99 to Rel-7
Frequency Range	See general hardware specifications
Frequency Setting	Channel number
Input / Output level range	See general hardware specifications
Input / Output level accuracy	See general hardware specifications
Voice Calls	MO/MT voice calls with audio loopback Mobile to mobile voice calls
Data Session	R99 packet switched up to 384 kbps HSDPA, Cat 1-14, data up to 21.1 Mbps HSUPA, Cat 1-6, data up to 5.76 Mbps
Reference Measurement Channels	RMC 12.2 kbps RMC 64 kbps
In-call Handover	Intra-band, Inter-band, & Inter-RAT handover
Loopback	CS RMC 12.2 kbps: Test Mode 1 BER

LTE Frequency Bands Supported

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
22	3510 MHz to 3590 MHz	3410 MHz to 3490 MHz	FDD
23	2180 MHz to 2200 MHz	2000 MHz to 2020 MHz	FDD
24	1525 MHz to 1559 MHz	1626.5 MHz to 1660.5 MHz	FDD
25	1930 MHz to 1995 MHz	1850 MHz to 1915 MHz	FDD
26	859 MHz to 894 MHz	814 MHz to 849 MHz	FDD
27	852 MHz to 869 MHz	807 MHz to 824 MHz	FDD
28	758 MHz to 803 MHz	703 MHz to 748 MHz	FDD
30	2350 MHz to 2360 MHz	2305 MHz to 2315 MHz	FDD
31	462.5 MHz to 467.5 MHz	452.5 MHz to 457.5 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
44	703 MHz to 803 MHz	703 MHz to 803 MHz	TDD
45	1447 MHz to 1467 MHz	1447 MHz to 1467 MHz	TDD
46	5150 MHz to 5925 MHz	5150 MHz to 5925 MHz	TDD
49	3550 MHz to 3700 MHz	3550 MHz to 3700 MHz	TDD
50	1432 MHz to 1517 MHz	1432 MHz to 1517 MHz	TDD
51	1427 MHz to 1432 MHz	1427 MHz to 1432 MHz	TDD
52	3300 MHz to 3400 MHz	3300 MHz to 3400 MHz	TDD
65	2110 MHz to 2200 MHz	1920 MHz to 2010 MHz	FDD
66	2110 MHz to 2200 MHz	1710 MHz to 1780 MHz	FDD
68	753 MHz to 783 MHz	698 MHz to 728 MHz	FDD
70	1995 MHz to 2020 MHz	1695 MHz to 1710 MHz	FDD
71	617 MHz to 652 MHz	663 MHz to 698 MHz	FDD
72	461 MHz to 466 MHz	451 MHz to 456 MHz	FDD
73	460 MHz to 465 MHz	450 MHz to 455 MHz	FDD
74	1475 MHz to 1518 MHz	1427 MHz to 1470 MHz	FDD
85	728 MHz to 746 MHz	698 MHz to 716 MHz	FDD

LTE Signaling Call Support (Requires LTE Signaling Suite license)

Supported Call Modes	Notes
Standards Supported	3GPP E-UTRA FDD & TDD
3GPP Release Version	Release 8
Supported Bandwidths	5, 10, 15, 20 MHz
UE Category	UE Cat 1-6
Voice Calls (VoLTE)	MO/MT calls with audio loopback Mobile to Mobile Voice Calls
Data Session	FDD & TDD SISO / 2x2 MIMO Uplink data rate up to: 51 Mbps Downlink data rate up to: 150 Mbps (2x2 MIMO)
In-call Handover	Intra-Band, Inter-Band, Inter-RAT Redirection to WCDMA & GSM
Loopback	Type A Downlink Packet Error Rate (PER)

CAT-M1 Module Signaling Call Support (Pre-requisite LTE Signaling SW license)

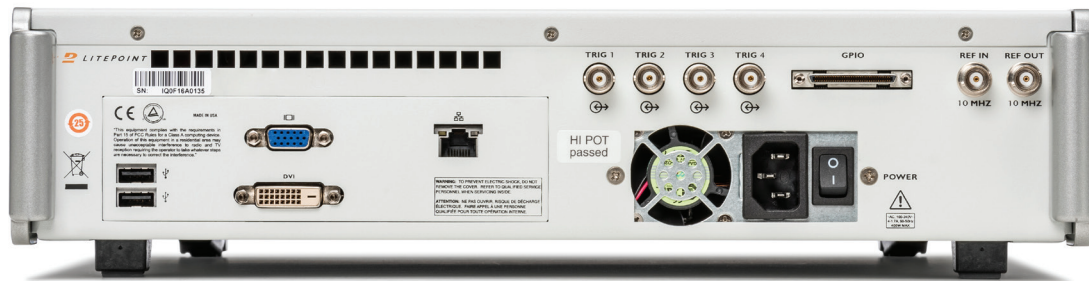
Measurements (3GPP 36.521 Release 13)	Notes
Transmitter	Max DUT Transmit Power Error Vector Magnitude (EVM)* Frequency Error* Timing Alignment* Adjacent Channel Leakage Ratio* Spectrum Emission Mask* Occupied Bandwidth*
Receiver	Block Error Rate (BLER) Received Signal Strength Indicator (RSSI) Reference Signal Receiver Power (RSRP)

*requires DUT support

Port Descriptions



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 Input / Output	Type A
ROUT 11	ANT 1	RF Input / Output Port	N female
	ANT 2	RF Input / Output Port - MIMO	N female
ROUT 12	ANT 1	RF Input / Output Port	N female
	ANT 2	RF Input / Output Port - MIMO	N female
ROUT 13	ANT 1	RF Input / Output Port	N female
	ANT 2	RF Input / Output Port - MIMO	N female
ROUT 14	ANT 1	RF Input / Output Port	N female
	ANT 2	RF Input / Output Port - MIMO	N female



Rear Panel General I/O

I/O	Function	Type
10 MHz REF In	10 MHz Reference In	BNC female
10 MHz REF Out	10 MHz Reference Out	BNC female
TRIG 1	TTL Trigger Input / Output	BNC female
TRIG 2	TTL Trigger Input / Output	BNC female
TRIG 3	TTL Trigger Input / Output	BNC female
TRIG 4	TTL Trigger Input / Output	BNC female
GPIO	General Purpose Input / Output	50-pin connector

Communication I/O

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

General Hardware Specifications

Vector Signal Analyzer (VSA)

Parameters	Ports	Value
RF Frequency Range	All RF Ports	400 MHz to 6000 MHz
RF Maximum Input Power		+36 dBm (peak envelope power)
Effective Sample Rate		61.44 Msps
Capture Memory Depth		64 Msamples
Frequency Resolution		< 5 Hz
Input Impedance		50 Ω (nominal)
Power Measurement Accuracy		< \pm 0.4 dB (signal level > -40 dBm)
Power Measurement Repeatability		< 0.1 dB (within 30 seconds of initial value), signal level > -40 dBm
Noise Figure		< 30 dB (at MIN attenuation), 400 MHz to <700 MHz < 29 dB (at MIN attenuation), 700 MHz to 3800 MHz
Signal to Noise Ratio		> 95 dB @ RBW = 1kHz, input > -10dBm, 400 MHz to <2000 MHz > 85 dB @ RBW = 1kHz, input > -10dBm, 2000 MHz to 3800 MHz
VSWR		< 1.6 : 1 (RL > 12.5 dB) 400 MHz to < 700 MHz < 1.3 : 1 (RL > 17 dB) 700 MHz to 3800 MHz
Port Switching Time ¹		< 50 μ s (to within 0.1 dB)
Isolation	ANT 1 to ANT 2	Port-to-Port, VSG Duplex Mode > 55 dB (400 MHz to <2400 MHz) > 40 dB (2400 MHz to 3800 MHz)
	ROUT to ROUT	> 100 dB
Inherent Spurious Signals Floor (no input signal applied, RLEV = -10 dBm)	All Ports	< -75 dBm (<700 MHz) < -85 dBm (700 MHz to <2700 MHz) < -75 dBm (2700 MHz to 3800 MHz)
Input third order intercept point (IIP3)		> +40 dBm (at MAX attenuation)
Non-harmonic Attenuation		> 50 dB (Input level < +15 dBm)
Harmonic Attenuation		> 40 dB
Phase Noise		< -108 dBc/Hz @ 900 MHz (250 kHz to 400 kHz offset) < -102 dBc/Hz @ 1800 MHz (250 kHz to 400 kHz offset) < -101 dBc/Hz @ 2400 MHz (250 kHz to 400 kHz offset)

¹ When using hardware sequencing control

Vector Signal Generator (VSG)

Parameters	Ports	Value
RF Frequency Range	All RF Ports	400 MHz to 6000 MHz
RF Output Power Range		-15 dBm to -120 dBm (≤ 3800 MHz) -25 dBm to -120 dBm (> 3800 MHz)
Frequency Resolution		< 5 Hz
Power Level Resolution		0.1 dB
Power Level Settling Time ¹		< 50 us to within 0.1 dB
Frequency Level Settling Time ¹		< 400 us to within 1 kHz
Output Power Accuracy		± 0.5 dB (levels ≥ -50 dBm), 400 MHz to ≤ 3800 MHz ± 0.75 dB (levels ≥ -50 dBm), 3800 MHz to 6000 MHz ± 0.75 dB (-100 to < -50 dBm), 400 MHz to ≤ 3800 MHz ± 1 dB (-100 to < -50 dBm), 3800 MHz to 6000MHz
Power Level Repeatability		± 0.1 dB (within 30 seconds of initial value)
VSWR		$< 1.6 : 1$ (RL > 12.5 dB) 400 MHz to < 700 MHz $< 1.3 : 1$ (RL > 17 dB) 700 MHz to 3800 MHz
Harmonic Attenuation		< -40 dBc (output levels < -30 dBm)
Non-harmonic Attenuation		< -40 dBc (output levels < -30 dBm)
Phase Noise		< -108 dBc/Hz @ 900 MHz (250 kHz to 400 kHz offset) < -102 dBc/Hz @ 1800 MHz (250 kHz to 400 kHz offset) < -101 dBc/Hz @ 2400 MHz (250 kHz to 400 kHz offset)

Timebase

Parameter	Value
Oscillator Type	OCCO
Frequency	10 MHz
Initial Accuracy (25°C, after 60 minute warm-up)	$< \pm 0.04$ ppm
Maximum Aging	$< \pm 0.1$ ppm per year
Temperature Stability	$< \pm 0.05$ ppm over 0°C to 50°C range, referenced to 25°C $< \pm 0.01$ ppm over 20°C to 30°C range
Warm-Up Time	60 minutes

¹ When using hardware sequencing control

Frequency Reference Input

Parameters	Value
Frequency	10 MHz
Max Frequency Variation	0.5 ppm
Input Voltage Range	0.3 Vpp to 4.0 Vpp
Impedance	200 Ω

Frequency Reference Output

Parameters	Value
Frequency	10 MHz
Output Voltage	> 0.8 Vpp
Impedance	50 Ω

General and Environmental

Parameter	Value
Dimensions	15.5" W x 3.2" H x 20" D (394 mm x 82 mm x 508 mm)
Weight	26.4 pounds (11.95 kg)
Power consumption (maximum)	<350W
Power requirements	100 - 240 VAC, 50-60 Hz
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 ¹	20°C to 35°C (valid range for specifications)
Operating humidity	15% to 95% relative humidity, non-condensing (IEC EN60068-2-30)
EMC/EMI	61326-1: 2013 Industrial Environment, CISPR11 Class A per EN61326-1:2013 , FCC Part 15 Class A, VCCI V-3 Class A, BSMI CNS-13438 Class A, ACMA AS/NZS CISPR11: 2011, ICES-003 Class A
Safety	IEC 61010-1, EN61010-1, UL61010-1:2012 and Canada: CSA C22.2 No. 61010-1, G11, G12
Mechanical vibration	MIL-STD 810G for Random Vibration
Mechanical shock	ASTM D3332-99
RF Connector Torque	13 in-lbs (147 N-cm) Recommended
Recommended calibration cycle	24 months
Warranty	12 months hardware, 12 months software updates

¹ Specifications valid over temperature range after invoking temperature compensation function. For highest accuracy, recommend to enable temperature compensation if ambient temperature changes by more than 2° C.

Order Codes

Code	Product
0100-CELL-001	IQcell Mobile Test System – 8 port version includes 1 cell enabled.
0100-CELL-002	IQcell Mobile Test System – 2 port version includes 1 cell enabled.
0150-CELL-002	Test SIM Card Micro (2FF/3FF)
0150-CELL-003	Test SIM Card Nano (4FF)
0300-CELL-001	UMTS Signaling Suite Software License includes: <ul style="list-style-type: none">• GSM Signaling Suite• WCDMA Signaling Suite
0300-CELL-003	LTE Signaling Suite Software License includes: <ul style="list-style-type: none">• LTE FDD & TDD
0300-CELL-005	Multi-Cell Signaling License. Enables a total of 4 cells.
0300-CELL-006	Dynamic Cell Switching Software License. Switching between cells for Inter-RAT & HO test
0300-CELL-008	Software tool to execute test cases per service center requirements.
0300-CELL-009	LTE Category M1 Signaling Software License.

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