TECHNICAL SPECIFICATIONS

IQgig-UWB™

LITEPOINT

Overview

IQgig-UWB™ is the first fully-integrated, one-box test solution for physical-layer testing of devices enabled with UWB technology. The internal Vector Signal Generator (VSG) and Vector Signal Analyzer (VSA) enable comprehensive transmitter and receiver testing with over 500 MHz of single-shot bandwidth. IQgig-UWB has a precision trigger and response mechanism to enable accurate Time of Flight (ToF) measurements with picosecond level of accuracy.

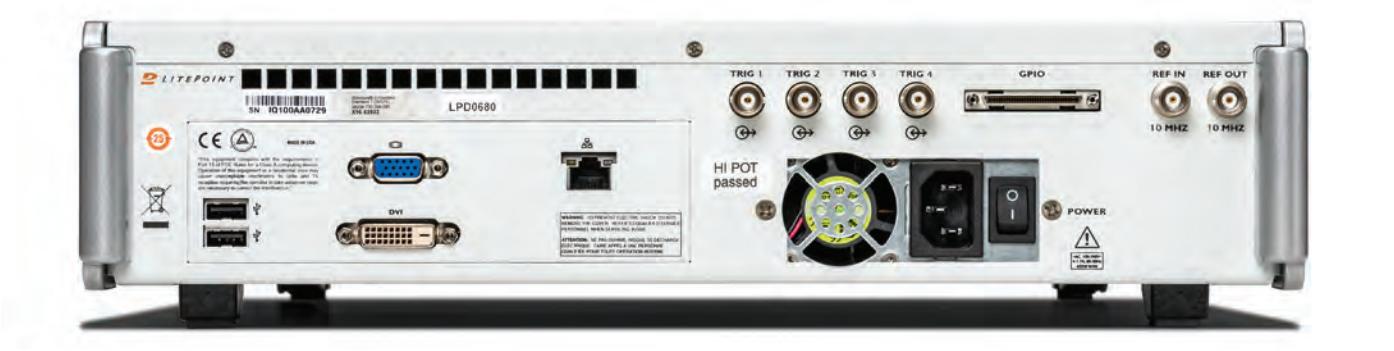
Combined with the IQ5631 Power and Delay Control Module (PDCM), IQgig-UWB enables per-antenna receiver sensitivity testing for signals below -100 dBm. Additionally the programmable delay of the IQ5631 enables picosecond resolution variable delay for validating Angle of Arrival (AoI).

IQgig-UWB is ideal for both R&D characterization as well as high-volume production, making it the perfect platform to enable a cost-effective, seamless transition from the lab to the manufacturing floor.

Port Descriptions

IQgig-UWB 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
Session Active Indicator	LED Green – remote session active LED Red – remote session lock	LED indicator
Status Indicator	LED Green – no faults/errors detected LED Orange – Software error detected LED Red – Hardware fault detected	LED indicator
Port Status Indicators (2)	LED Green – Port is a VSA input LED Red – Port is a VSG output	LED indicator
USB (2)	USB Input / Output	Type A
RF1 OUT/IN	RF Output/Input (50Ω nom, 10V DC Max)	SMA female
RF2 OUT	RF Output (50Ω nom, 10V DC Max)	SMA female



IQgig-UWB 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

IQgig-UWB Test Controller 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

RF Analyzer

Parameter	Ports	Value	
Frequency Range	RF1	5.8 to 18.5 GHz (Carrier frequency) 4.9 to 19.4 GHz (Input RF spectrum)	
IF bandwidth	RF1	1.9 GHz	
Input Power Maximum	RF1	+20 dBm	
Input Power Range	RF1	-10 to -40 dBm (Average modulated power) 0 to -40 dBm (CW)	
Input Power Accuracy	RF1	±1 dB	
Input Return Loss	RF1	> 11 dB (typical), ≤17 GHz > 9 dB (typical), >17 GHz	
Spurious[1]	RF1	< -50 dBc (CW) at Input Power = -10 dBm	
Image Rejection	RF1	< -30 dBc (CW) at Input Power = -10 dBm	
Carrier Leakage	RF1	< -45 dBc, 5.8 to 16 GHz < -35 dBc, 16 GHz to 18.5 GHz	
Spectral flatness	RF1	≤ 1.4 dB, 5.8 to 17 GHz center frequency MAX - MIN (±850 MHz)	
Inherent spurious floor	RF1	≤ -80 dBm at minimum input attenuation	
Noise figure	RF1	≤ 20 dB at minimum input attenuation	
Integrated phase noise	RF1	< 0.85 degrees (100 kHz to 100 MHz)	
VSG/VSA Isolation	RF1	> 40 dB	
Digitizer Resolution	RF1	12 bits	
Sampling data rate	RF1	2.4 GS/s	
Waveform capture duration	RF1	at 300 MHz sampling data rate	200 ms
		at 600 MHz sampling data rate	100 ms
		at 1200 MHz sampling data rate	50 ms
		at 2400 MHz sampling data rate	25 ms
Absolute minimum trigger level	RF1	-40 dBm	
Absolute maximum trigger level	RF1	0 dBm	
Trigger relative threshold	RF1	30 dB	
Trigger Level Accuracy	RF1	< ±2 dB	

1 Excludes harmonic products, image rejection, and carrier leakage

RF Generator

Parameter	Ports	Value
Frequency Range	RF1, RF2	5.8 to 18.5 GHz (Carrier frequency) 4.9 to 19.4 GHz (Output RF spectrum)
IF bandwidth	RF1, RF2	1.9 GHz
Output Power Range	RF1, RF2	0 to -30 dBm (Ave modulated power) +5 to -30 dBm (CW)
Output Power Accuracy	RF1, RF2	±1.0 dB
Output Return Loss	RF1, RF2	> 11 dB (typical), ≤17 GHz > 9 dB (typical), >17 GHz
Spurious (in channel)[2]	RF1, RF2	< -35 dBc
Image Rejection	RF1, RF2	< -30 dBc, 5.8 to 17 GHz center frequency
Spectral flatness	RF1, RF2	≤ 1.6 dB MAX - MIN (± 850 MHz), 5.8 to 17 GHz center frequency
Integrated phase noise	RF1, RF2	< 0.85 degrees (100 kHz to 100 MHz)
Carrier leakage[3]	RF1, RF2	< -30 dBc, < 12 GHz (Output power > -10 dBm) < -35 dBc, 12 to 17 GHz (Output power > -10 dBm)
Generator Resolution	RF1, RF2	14 bits
Sampling data rate	RF1, RF2	2.4 GS/s
Waveform playback duration	RF1, RF2	25 ms

Timebase

Parameters	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)	<30 minutes

2 Excludes harmonic products, image rejection, and carrier leakage
3 Relative to total transmit power against Carrier Leakage

General and Environmental

Parameters	Value
Dimensions	15.5″ W x 3.2″ H x 20″ D (394 mm x 82 mm x 508 mm)
Weight	24.1 pounds (10.95 kg)
Power consumption (maximum)	< 220 W
Power consumption (average)	155 W
Power requirements	100 - 240 VAC, 50-60 Hz
Supported browsers	Google Chrome
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 35°C (valid range for specifications)
Operating humidity	15% to 95% relative humidity, non-condensing (IEC EN60068-2-30)
EMC	EN61326-1 Class A, EN55011
EMI (Immunity)	EN61000-4
Safety	IEC 61010-1, EN61010-1, UL61010-1:2012 and CAN/CSA-C22.2 No. 61010-1-12
Mechanical vibration	IEC 60068-2-6 for Sine Vibration and MIL-STD 810G for Random Vibration
Mechanical shock	ASTM D3332-99
Recommended calibration cycle	12 months
Warranty	12 months hardware, 12 months software updates

UWB (802.15.4) Measurement Specification

Measurement	Description
Spectrum Mask	Transmit spectrum mask
Symbol Modulation Accuracy	Correlation to reference pulse (%)
Carrier Frequency Offset	Carrier frequency error (kHz)
Chip Clock Error	Error in ppm
Chip Frequency Error	Error in Hz
Pulse Main Lobe Width	Width of main lobe in time (ns)
Pulse Side Lobe Power	Power relative to main lobe (%)
Power (Preamble & Data)	Average power of complete data capture (dBm)
Peak Power (Preamble & Data)	Peak power over all symbols (dBm)
Pulse Jitter	Jitter in ps
Pulse NMSE	Normalized Mean Square Error (ppm)
RX PER	Receiver Packet Error Rate (requires DUT support)

Wireless LAN (802.11ad) Measurement Specification

Measurement	Description	Performance
EVM	EVM averaged over payload based on standard requirements	Preamble only channel estimation: MCS 1: < -35 dB Typ (-5 to -20 dBm), < -32 dB Typ (-20 to -30 dBm) MCS 12: < -33 dB Typ (-5 to -20 dBm), < -31 dB Typ (-20 to -30 dBm) Note: - 8 to 17 GHz - Averaged over 20 CPHY/SC packets, 512+/1000+ data symbols long - Measured in system loopback
TX Peak power	Peak power over all symbols (dBm)	VSA power accuracy: ±1.0 dB (-10 to -40 dBm)
TX RMS power	All: average power of complete data capture (dBm)	
	No gap: average power over all symbols after removal of any gap between packets (dBm)	
TX Max avg power	Peak value of the amplitude as a moving average over 40 samples (dBm)	
TX Frequency error	Carrier frequency error (kHz)	VSA measurement error: ≤ ±0.2 ppm calibrated

TX RMS phase noise	Integrated phase noise (degrees)	VSA residual integrated phase noise: < 0.75 degrees (100 kHz to 100 MHz)
TX PSD	Power spectral density (dBm/Hz) versus frequency offset center frequency ±850 MHz	
TX Spectral mask	Transmit spectrum mask	±3.06 GHz
TX Spectral flatness	Reflects variation of signal energy as a function of OFDM subcarrier number 802.11ad OFDM signals only	≤ 1.4 dB, MAX - MIN (±850 MHz)
TX center freq. (LO) leakage (LOFT)		VSA residual < -35 dBc with respect to overall transmit power
TX CCDF (complementary cumulative distribution function)	Probability of peak signal power being greater than a given power level versus peak-to-average power ratio (dB)	
TX Power on / power down ramp		(10 to 90% of average frame power)
RX TX Turnaround Time max.		
RX TX Switch Time max.		
TX PSDU data	Recovered binary data sequence, including the MAC header and Frame Check Sequence, if present	
TX Raw capture data	I and Q signals versus time	
TX General waveform analysis	DC offset, RMS level, minimum/maximum amplitude, peak-to peak amplitude, RMS I- and Q-channel levels	
TX CW frequency analysis	Frequency & power of CW tone	
RX Sensitivity	Receiver sensitivity	VSG power accuracy: ±1 dB
RX Maximum Input Level		VSG power range: 0 to -30 dBm

5G Measurement Specifications

3GPP TS 38.101-2	Paragraph Reference	Notes
Transmit Power	6.2	Maximum Power
Output Power Dynamics	6.3	Min Power Relative Power On/Off Time Mask
Transmit Signal Quality	6.4	Frequency Error EVM - Typical tester EVM performance = -38 dB (1.2%), MCS10/MCS14, 7 to 11GHz, system loopback Carrier Leakage In-band Emissions
Output RF Spectrum Emissions	6.5	Occupied Bandwidth Spectrum Emission Mask ACLR
Receiver Sensitivity	7.3	Reference Sensitivity Power
Receiver Level	7.4	Maximum Input Level
Receiver Blocking	7.5	Adjacent Channel Selectivity (Characterization only, not recommended for manufacturing)
	7.6	In-band Blocking (Requires DUT support)

Order Codes

Code	Product
0100-IUWB-001	IQgig-UWB Test System, including UWB license
0300-IUWB-001	WiGig 802.11ad Software License
0300-IUWB-005	WiGig 802.11ay Software License
0300-IUWB-007	5G V5GTF Software License
0300-IUWB-009	5G 3GPP Software License
0150-5631-002	IQ5631 UWB Multi-Port Extender Module

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