WJ5000A WaveJudge 5000

This document describes the performance parameters and the main specifications of the WJ5000A WaveJudge 5000. First, the general specifications are described, and then more details are provided for each module.

Specifications

- Scalable architecture allowing up to 256 modules
- Flexibility of modules include RF, Synth, DSP, and SSD memory
- RF wideband support 380 MHz up to to 11.4 GHz up to 800 MHz BW
- mmWave module for FR2 frequency conversion (up to 42.5 GHz)
- Wide dynamic range supports use in the lab and in the field
- Coherent RF ports up to 16 per set
- Support for all transmission modes up to 8 layers
- CA (×8) support with up to 800 MHz channels
- Real-time streaming analysis of unlimited UEs for any length of time
- IQ storage in expandable SSD for minutes or hours
- Best in class close-in phase noise

WJ5000A WaveJudge 5000 Analysis

Modulation formats

• OFDMA/SC-FDMA with BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, Zadoff-Chu

Traces

- Constellation
- 2D Physical
- Time Domain Power
- EVM vs. Subcarrier
- EVM vs. Symbol Time
- MIMO Rank per Subcarrier
- MIMO Rank per Symbol
- Spectral Flatness (Frequency Domain)



- Amplitude Flatness (Time Domain)
- CCDF, PAPR
- Spectral Power
- Amplitude, Phase, Frequency during synchronization signal
- Impulse Response

Statistics (partial)

- EVM
- EVM Peak
- Reference signal EVM
- Carrier and Sampling Clock Frequency Error
- IQ Offset
- CFI Error Rate
- Payload Bits
- RSSI, RSRP, RSRQ
- MCS
- N Resources
- Modulation type

Protocol analyzer decodes

- MAC
- RLC
- PDCP
- RRC
- NAS
- TCP/IP (WireShark supported decodes available)

WJ5000A WaveJudge 5000 chasis

- Operating Temperature Range: 0°C to +55°C
- Storage Temperature Range: -40°C to +80°C
- Dimensions: 16.75" width × 1.72" height × 12" depth
- Power, Converter to Chassis: 12 V, 15 A
- Power, AC to Converter: 110 to 240 V, 2.5 A, 50 to 60 Hz

Mobility and MIMO

- No. of Ports per Chassis: 8
- No. of Synthesizers per Chassis: 2

Inputs and Outputs

- 1 Gb Ethernet 20 Gb SRIO
- GPS, ANT IN, PPS IN, PPS OUT (SMA)
- Power Jack

StoraJudge memory module

• SSD-based 1TB per module

IntelliJudge2 Analysis Module

Dual TMS320C6670 multi-core DSPs

- 4 GB DDR3 SDRAM per Module
- Gen2 SRIO 8 port switch
- Per DSP SRIO 1 port @ 5 GHz = 16 Gbps
- Backplane SRIO 3 ports @ 6 GHz = 60 Gbps
- Front plane SRIO 1 Port @ 6 GHz = 20 Gbps
- Front Panel SFP support for Gigabit Ethernet PHY
- Charts
- EVM
- Power
- CRC
- Throughput
- TB Count
- SINR, RSSI, RSRP, RSRQ
- 2D Physical
- RNTI

RXJudge RF module

General Specifications

- No. of Receiver Modules per chassis: 2
- No. of RX per Module: 4

Amplitude Specifications

- Variable Attenuator: 0 to 60 dB in 2 dB Steps
- Variable Gain Ex. at 2 GHz: -35 to +25 dB
- Measurement Range: DANL to Maximum

Input Level

- Maximum Input Level: +22 dBm
- DANL 1024 pts, 10 MHz channel BW (~15 kHz RBW) Normalized to 1 Hz, -172 dBm
- Absolute Amplitude Accuracy: ±2.5 dB
- Relative Amplitude Accuracy: (adjacent tones ~11 kHz) ±0.2 dB

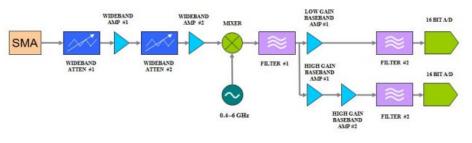
Sampling System

- A/D Bits: 16 bits
- A/D Clock (Sampling Frequency) ~90 MHz
- 2nd Harmonic Distortion: -70 dBc
- 3rd Harmonic Distortion: -70 dBc
- Two Tone intermodulation: -80 dBc
- Sample Frequency Set (Fs): 1 to 45 MHz (optimized for channel BW)
- Sample Frequency Set Accuracy: 10 Hz

Inputs

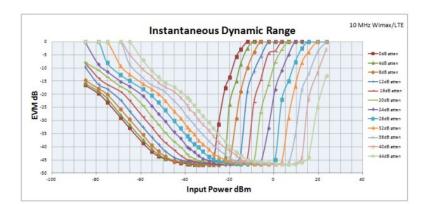
- Receive RX 1: MCX female, 50 Ohm
- Receive RX 2: MCX female, 50 Ohm
- Receive RX 3: MCX female, 50 Ohm
- Receive RX 4: MCX female, 50 Ohm

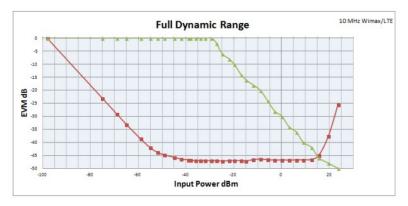
Frequency spec	cifications		
	Synthesizer	Frequency Range	.38 to 6GHz
		Center Frequency Resolution	1Hz
Conorol	Spectral Purity, Single Sideband Phase Noise (normalized to 2GHz)	1 kHz offset	-92 dBc/Hz
General		10 kHz offset	-103 dBc/Hz
		100 kHz offset	-108 dBc/Hz
		1 MHz offset	-115 dBc/Hz
	100 MHz OCXO	External Input (optional)	10 MHz MCX, AC coupled, 50ohm Terminated, Level: 0.8V – 3.3Vp-p (max)
Reference		Source	100 MHz OCXO
Frequency		Frequency Stability (0°C to +50°C)	+/- 50 ppb
		Aging per year	+/- 500 ppb
		Aging over 10 years	+/- 3 ppm
	Synth Front Panel Trigger In	Connector Type	MCX
		Input Range	0 to 4 Volts
		Input Impedance	10K Ohms
		Minimum Trigger	2 Volts Rising Edge
		Protection	Diode Clamped
Aux Inputs	Chassis Back Panel GPS In	Connector Type	SMA, Older models have SMB
		Input Range	0 – 5 Volts
		Input Current	0.1 uAmps
		Input High Level	1.2 Volts
		Input Low Level	0.9 Volts



Receiver block diagram

Measured performance		
10 MHz Channel Parameter	Measured EVM Noise Level	-98.1 dBm
	PHY Estimator Noise	2 dB
	Actual Noise Floor	-100.1 dBm
	Theoretical Noise Floor	-104 dBm
	Noise Figure (Atten = 0)	3.9 dB





SynthJudge 2-OCXO module

Carrier Frequency

- Frequency Range: 380 MHz to 6 GHz
- Center Frequency Set Resolution: 4 Hz
- Frequency Calibration Accuracy: 1 ppm ±4 Hz

Reference Frequency Source

- 100 MHz OCXO
- 10 MHz Ref Input, MCX
- Internal GPS, External 1pps
- Another WJ5000A WaveJudge 5000

OCXO

- Aging per year: ±500 ppb
- Aging over 10 years: ±3 ppm
- Temperature stability (0°C to +50°C): ±50 ppb
- Calibration accuracy: ±1 ppm
- Accuracy: ± (time since last adjust × aging rate) + temperature stability + calibration accuracy

Sideband Phase Noise (normalized to 2 GHz)

- 1 kHz offset: -96 dBc/Hz
- 10 kHz offset: -106 dBc/Hz
- 100 kHz offset: -111 dBc/Hz
- 1 MHz offset: -121 dBc/Hz

Inputs and Outputs

- 10 MHz Reference Input: MCX female, 50 Ohm
- Synth 1: 380 MHz TO 6 GHz, female (×4), 50 Ohm

RXJudge2 Digital IF (800 MHz Module)

RF Module with 2.4 Ghz -11 Ghz center frequency without frequency gap with 800 Mhz bandwidth.

Channel co	verage extent including			
	onago oxtont monaanig	Instantaneous Bandwid	Ith (range -400 to range+400)	
	Full range	2 - 11.4	GHz	
Instantaneo	us bandwidth			
	Bandwidth	800	MHz	
Card center	frequency			
	Range	2.4 - 11	GHz	
Typical pha	ase noise @ 4 GHz			
102/24:04/248c 3327/34c 102 112/24:04/248c 3327/34c 102 112/24:04/248c 3345/26 101 112/24:04/248c 112/24:04/248c 102 112/24:04/248c 112/24:04/248c 101 112/24:04/248c 112/24:04/248c 102 112/24:04/248c 112/24:04/248c 102 112/24:04/248c 112/24:04/248c 102 112/24:04/248c 112/24:04/248c 101 112/24:04/248c 112/24:04/248c 102 112/24:04/248c 112/248c 102 112/24:04/248c 112/248c 101 112/24:04/248c 112/248c 110 112/24:04/248c 112/248c 110 112/24:04/248c 112/248c 110 112/248c 112/248c		Contration Court, B		49:0% Pasetkost

Amplitude			
Input power range	Min	Мах	
Optimal	-32	-2	dBm
Absolute max		15	dBm

Front panel

REFCLK				
	Connector	SMA		
	Impedance	300	Ohm	
	Coupling	AC		
	Max P-P voltage	1.8	V p-p	
	Min P-P voltage	0.8	V р-р	
TRIG IN				
	Connector	SMA		
	Impedance	100K	Ohm	
	Coupling	DC		
	Min P-P voltage	3.3	V	
	Min P-P voltage	0	V	
	Trigger level	1.2	V	
AUX OUT				
	Connector	SMA		
	Hi-level out	3.3	V	
	Low-level out	0	V	
	Drive strength	50	mA	
LEDs				
	LOCK (Bottom)	LIT indicates baseband sampling clock is working correctly.		
	ERROR	Board failure detected. Blink indicates secondary module failed locking to primary module.		
	EXT REF			
		LIT indicates secondary module locked to primary module.		
	PROG-MEZZ	Mezz detected and running.		
	LOCK (Top)	Indicates RF synth lock		

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