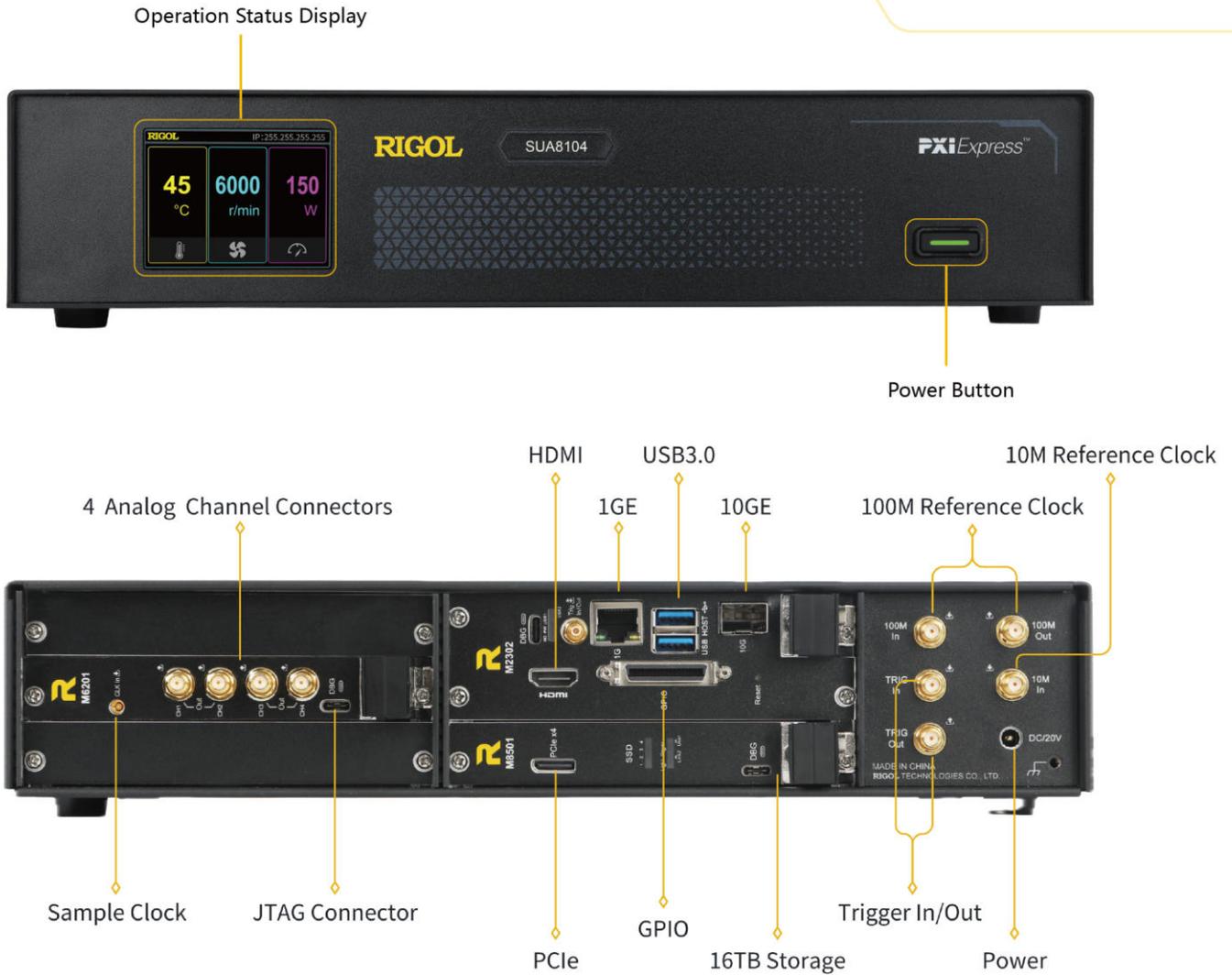


SUA8000 Series

Multi-channel Digital Transceiver



Specifications

Transmit
8GSa/s Sample Rate
14bit Vertical Resolution

Receive
4GSa/s Sample Rate
14bit Vertical Resolution

Stability
 $\leq 1\text{ps}$ In-device
 $\leq 10\text{ps}$ Inter-device

Control Type Selectable
CPU High Performance
GPU High Computing Power

8 Channels
 For a single device

1Gpts/ch
 Memory Depth

10 Gigabit Ethernet
 Standard

16TB
 Waveform Recording

Benefits

Multi-channel, Multi-function

Supports up to 8 channels for a single device and is equipped with multiple functions such as AWG, digitizer, and waveform recorder

High-stability Synchronization

Supports more than 100 devices with hundreds of channels working synchronously to enable highly stable waveform acquisition and generation

Array Operating Console

User remote control available on the array operating console, such as multi-device management, waveform editing and waveform display storage

CPU/GPU-Controlled Selectable

CPU-controlled test adopts the high-performance V2000 processor, and the GPU AI-controlled test uses the Orin AGX processing platform

High-Rate Interface

Standard 10 Gigabit Ethernet control and digital transmission interface for high-bandwidth digital transmission

Advanced Sequence Play

Supports up to 3,000 waveform segments, fast loading via high-speed interface, complex waveform sequences such as loops, jumps, nesting, etc.

User-customized Development

Provides a variety of device-driven interface functions, supporting remote and local customized/secondary development to get it quickly integrated into the user's business system

Compact Size with Highly-integrated Functions

The compact size of the device enables users to install it in their system or mounted in a standard rack

Application



Large-Scale Scientific Facility
Large-scale array data acquisition and analysis



Remote Sensing
Multi-channel receiving/transmitting and intelligent detection



Radio Astronomy
High-bandwidth acquisition and transmission of cosmic rays



Product Line Testing
With multiple functions highly integrated, easy for customized development



LEO Satellite
SDR technology combined with GPU AI master-controlled



Automotive Electronics
Control unit simulation and collision warning signal simulation



Features

The SUA8000 series digital transceiver combines arbitrary waveform generation, signal acquisition and waveform recording, designed for complex signal applications. The series features a modular architecture but is offered in standard configurations, ensuring a convenient out-of-the-box experience with superior reliability and consistency. With the combination of digital receiving/transmitting technology and AI algorithm, it can not only efficiently generate, acquire and analyze high-speed signals, but also support users to develop customized/secondary business systems and flexibly scale applications. The powerful software platform provides an open interface for customers to build automated test processes or customized solutions in remote sensing, industrial measurement, automotive electronics, and more. With leading-edge hardware performance and intelligence features, the series enables more accurate and efficient R&D validation and business applications, accelerating the innovation process.

AWG

- Up to 8 GSa/s sample rate
- 14-bit vertical resolution
- -70 dBc SFDR
- Supports importing the external waveforms
- Supports advanced sequence to define outputs of various types of complex waveforms
- Analog bandwidth (DC-3.5 GHz)

Digitizer

- Up to 4 GSa/s sample rate
- 14-bit vertical resolution
- -55 dBc SFDR
- Supports RingBuffer and Streaming operating modes
- Analog bandwidth (DC-1.5 GHz)

1 Gpts Waveform Memory Depth for Each Channel

Supports 16TB Expandable Storage Option

High Stability Synchronization (12h)

- Time-delay stability in any two channels: <1 ps
- Time-delay stability in any two devices: <10 ps

Master Control Selectable

- CPU, 25 W TDP, 3.95 GHz, high performance
- GPU, 200 TOPS high computing power

Multiple External Interfaces: 10 G/1 G LAN, USB3.0, HDMI



Specifications Overview

		SUA8104	SUA8204	SUA8208	SUA8304
Number of Channels	AWG Channels	4	-	-	2
	Digitizer Channels	-	4	8	2
AWG Parameters	Sample Rate	8 GSa/s	-	-	8 GSa/s
	Vertical Resolution	14-bit	-	-	14-bit
	Bandwidth	DC-3.5 GHz	-	-	DC-3.5 GHz
	Arbitrary Waveform Length	1 Gpts/CH	-	-	1 Gpts/CH
	Output Type	50 Ω , Single-ended	-	-	50 Ω , Single-ended
	Max. Output Amplitude	500 mVpp	-	-	500 mVpp
	Phase Noise	-117 dBc/Hz @ 1GHz offset 10 kHz	-	-	-117 dBc/Hz @ 1GHz offset 10 kHz
	Channel Stability	± 1 ps@12 h	-	-	± 1 ps@12 h
	Sequence Mode (Option)	Support	-	-	Support
	Number of Sequence	3000/CH	-	-	3000/CH

		SUA8104	SUA8204	SUA8208	SUA8304
Digitizer Parameters	Sample Rate	-	4 GSa/s	4 GSa/s	4 GSa/s
	Vertical Resolution	-	14-bit	14-bit	14-bit
	Bandwidth	-	DC-1.5 GHz	DC-1.5 GHz	DC-1.5 GHz
	Digital Pre-processing	-	DDC, Decimation, Truncation	DDC, Decimation, Truncation	DDC, Decimation, Truncation
	Cache Bandwidth	-	32 GB/s		
	Cache Depth	-	1 Gpts/CH	512 Mpts/CH	1 Gpts/CH
	Output Type	-	50 Ω , Single-ended		
	Input Amplitude	-	1 Vpp		
	Measurement Accuracy	-	$\pm 5\%$		
	Acquisition Mode		Ring Buffer Mode, Streaming Mode		
Master Control Parameters	Master Control Type	CPU-controlled test			
	CPU	AMD V2516, 6 core, 2.1 GHz-3.95 GHz			
	GPU	-			
	Memory and Storage	32 GB DDR4-3200, non-ECC, 512 GB SSD			
	Network	10 GbE SFP+, 1 GbE RJ45			
	Interface	HDMI, USB3.0 x2			
	Operating System	Linux			
Dimensions	Width x Depth x Height	340 mm (W) x 235.5 mm (D) x 68 mm (H)			
Optional		-	16 TB Waveform Recording Extension		

		SUA8104G	SUA8204G	SUA8208G	SUA8304G
Number of Channels	AWG Channels	4	-	-	2
	Digitizer Channels	-	4	8	2
AWG Parameters	Sample Rate	8 GSa/s	-	-	8 GSa/s
	Vertical Resolution	14-bit	-	-	14-bit
	Bandwidth	DC-3.5 GHz	-	-	DC-3.5 GHz
	Arbitrary Waveform Length	1 Gpts/CH	-	-	1 Gpts/CH
	Output Type	50 Ω , Single-ended	-	-	50 Ω , Single-ended
	Max. Output Amplitude	500 mVpp	-	-	500 mVpp
	Phase Noise	-117 dBc/Hz @ 1GHz offset 10 kHz	-	-	-117 dBc/Hz @ 1GHz offset 10 kHz
	Channel Stability	± 1 ps@12 h	-	-	± 1 ps@12 h
	Sequence Mode (Option)	Support	-	-	Support
	Number of Sequence	3000/CH	-	-	3000/CH

		SUA8104G	SUA8204G	SUA8208G	SUA8304G
Digitizer Parameters	Sample Rate	-	4 GSa/s	4 GSa/s	4 GSa/s
	Vertical Resolution	-	14-bit	14-bit	14-bit
	Bandwidth	-	DC-1.5 GHz	DC-1.5 GHz	DC-1.5 GHz
	Digital Pre-processing		DDC, Decimation, Truncation	DDC, Decimation, Truncation	DDC, Decimation, Truncation
	Cache Bandwidth		32 GB/s		
	Cache Depth	-	1 Gpts/CH	512 Mpts/CH	1 Gpts/CH
	Output Type	-	50 Ω , Single-ended		
	Input Amplitude	-	1 Vpp		
	Measurement Accuracy	-	$\pm 5\%$		
	Acquisition Mode		Ring Buffer Mode, Streaming Mode		
Master Control Parameters	Master Control Type	GPU AI-controlled			
	CPU	NVIDIA ORIN AGX, Carmel Armv8.2 64-bit 8 core, 2.2 GHz			
	GPU	1792-core NVIDIA Ampere architecture GPU with 56 Tensor Cores, 200TOPS AI Performance			
	Memory and Storage	32 GB 256-bit LPDDR4x, 32 GB eMMC 5.1, 4TB NVMe SSD			
	Network	10 GbE SFP+, 1 GbE RJ45			
	Interface	HDMI, USB3.0 x2			
	Operating System	Linux			
Dimensions	Width x Depth x Height	340 mm (W) x 235.5 mm (D) x 68 mm (H)			
Optional		-	16 TB Waveform Recording Extension		

Specifications

Specifications describe the warranted performance of calibrated instruments that have been stored for a minimum of 2 hours within the operating temperature range of 0 to 50°C, and a 40-minute warm-up period. Unless otherwise stated, the specifications in this manual include the measurement uncertainty.

Typical: characteristic performance, which 80% of the measurement results will meet at room temperature (approximately 25°C). This data is not warranted and does not include the measurement uncertainty.

Nominal: the expected mean or average performance or a design attribute (such as the 50 Ω connector). This data is not warranted and is measured at room temperature (approximately 25°C)

NOTE:

All charts in this manual are the measurement results from several instruments at room temperature unless otherwise noted.

Playback Channels

Analog Output	
Sample Rate	Max. 8 GSa/s
Amplitude Range	500 mVpp
Amplitude Accuracy	±2 % of setting
Analog Bandwidth	DC-3.5 GHz
Rise/Fall Time (20% to 80%)	< 120 ps @500 mVpp
Number of Channels	2/4 Channels
Output Coupling	DC
Output Impedance	50 Ω ±2%
Connector	SMA

Spurious Free Dynamic Range (Typ)

SFDR is measured @ 250 mVpp, excluding harmonics.

Output Signal	In-band Performance		Adjacent Band Performance	
	Measured Range	Specifications	Measured Range	Specifications

Spurious Free Dynamic Range (Typ)

DC-1 GHz	-70 dBc	-60 dBc
1 GHz-1.5 GHz	-55 dBc	-60 dBc
1.5 GHz-3 GHz	DC-4 GHz	4 GHz-8 GHz
	-45 dBc	-45 dBc
3 GHz-3.5 GHz	-40 dBc	-45 dBc

(image signal is not included)

Harmonics

Harmonic distortion measurement @250 mVpp

SHG	DC-1 GHz	< -45 dBc
	1 GHz-2 GHz	< -38 dBc
	2 GHz-3.5 GHz	< -33 dBc
THG	DC-1 GHz	< -55 dBc
	1 GHz-2 GHz	< -40 dBc
	2 GHz-3.5 GHz	< -36 dBc

Phase Noise

Output Phase Noise (Typ)	fc=100 MHz	-138 dBc/Hz @ offset 10 KHz
	fc=1 GHz	-117 dBc/Hz @ offset 10 KHz

IMD

IMD is measured @ 250 mVpp

100 MHz ± 1 MHz	-70 dBc
1 GHz ± 1 MHz	-50 dBc

Waveform

Waveform File Import Capacity	*.dat file format	Stored in binary format, int16 data type, with a range from -32768 to 32767.
	*.csv file format	Stored in binary format, float/double data type, with a range from -1 to +1.
Waveform Sequence		The data range is from -1 to +1
Waveform Sequence		Supports to build complex waveform sequences with the NSWave programming language.

Waveform Generator

Number of Waveform Segment	1 to 3,000
Waveform Segment Length	Waveform length: 16 KSa to 512 MSa; Minimum waveform granularity: 32 Sa
Output Sequence	Executes the steps of the sequence in specific order.
Loop	Executes 1 to 2^{32} times or infinite times in a loop.
Jump	Direct: immediately executes the step in the sequence.
	Wait: waits for internal or external trigger to play the step in the sequence.
	Delay: supports the time delay for jump between sequence steps.

DUC

Mixer Local Oscillator Frequency Accuracy	Less than 0.1 Hz	
Interpolation Ratio	8 GSa/s	1x 2x 4x 5x 10x 20x
	4 GSa/s	1x 2x 4x 5x 10x 20x
	2 GSa/s	1x 2x 5x 10x

Acquisition Channel

Analog Input

Sample Rate	Max. 4 GSa/s
Vertical Resolution	14-bit
Max. Input Voltage Range	1 Vpp
DC Accuracy	$\pm 5\%$
Analog Bandwidth	DC-1.5 GHz
Number of Channels	2/4/8-channel
Input Impedance	50 Ω $\pm 2\%$
Coupling Mode	DC
Connector	SMA/RF integrated connector

Spurious Free Dynamic Range (Typ)

SFDR is measured @ 1 Vpp, excluding harmonics.

DC-1500 MHz	-55 dBc
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Harmonics (@1 Vpp)

Harmonic distortion is measured @ 1 Vpp

SHG	DC-1 GHz	-60 dBc
	1 GHz-1.5 GHz	-55 dBc

THG	DC-1 GHz	-70 dBc
	1 GHz-1.5 GHz	-65 dBc

ENOB

ENOB is measured @ -1 dBFS

DC-1500 MHz	8-bit
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Acquisition

Ring Buffer

Ring Buffer

Trigger Mode	External input trigger, internal trigger, analog channel trigger
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8-bit Quantization Mode	Max. 4 GSa/s per channel	Total Trigger Depth	2/4 channels: 2 GSa 8-channel: 1 GSa
		Number of pre-trigger sample points	2/4 channels: 32 KSa-2 GSa 8-channel: 32 KSa-1 GSa Minimum granularity: 32 KSa
		Number of post-trigger sample points	2/4 channels: 32 KSa-2 GSa 8-channel: 32 KSa-1 GSa Minimum granularity: 32 KSa

Ring Buffer

14-bit Quantization Mode	2/4 channels: Max. 4 GSa/s per channel 8-channel: Max. 2 GSa/s per channel	Total Trigger Depth	2/4 channels: 1 GSa 8-channel: 512 MSa
		Number of pre-trigger sample points	2/4 channels: 16 KSa-1 GSa 8-channel: 16 KSa-512 MSa Minimum granularity: 16 KSa
		Number of post-trigger sample points	2/4 channels: 16 KSa-1 GSa 8-channel: 16 KSa-512 MSa Minimum granularity: 16 KSa

Streaming

Streaming

Continuous Trigger External input trigger, internal trigger, analog channel trigger

8-bit Quantization Mode	Max. 4 GSa/s per channel	Total continuous trigger depth	2/4 channels: 2 GSa 8-channel: 1 GSa
		Single trigger depth	2/4/8 channels: 64 KSa
		Pre-trigger sample points for a single trigger	64 Sa-64 KSa Minimum granularity: 64 Sa
		Post-trigger sample points for a single trigger	2/4 channels: 64 Sa-2 GSa 8-channel: 64 Sa-1 GSa Minimum granularity: 64 Sa
Continuous Trigger Sample Points	14-bit Quantization Mode	Total continuous trigger depth	2/4 channels: 1 GSa 8-channel: 512 MSa
		Single trigger depth	2/4/8 channels: 32 KSa
		Pre-trigger sample points for a single trigger	32 Sa-32 KSa Minimum granularity: 32 Sa
		Post-trigger sample points for a single trigger	2/4 channels: 32 Sa-1 GSa 8-channel: 32 Sa-512 MSa Minimum granularity: 32 Sa

Streaming

Continuous Acquisition Supports a 16 TB memory option, offers 8-bit and 14-bit quantization memory, and has a total data bandwidth of 2.4 GB/s.

DDC

Mixer Local Oscillator Frequency Accuracy Less than 0.1 Hz

	4 GSa/s	1x 2x 4x 5x 10x 20x
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Decimation Ratio	2 GSa/s	1x 2x 5x 10x
	1 GSa/s	1x 5x

Trigger

Trigger System

Trigger Source Analog channel (1-8), external trigger, internal trigger

Trigger Modes Single, continuous

External Trigger Input Level: TTL 5 V, SMA connector

Trigger Output Level: TTL 5 V, SMA connector

Clock

Clock System

Clock Source 10 MHz external input, 100 MHz external input, 100 MHz internal clock, external sample clock

100 MHz

Internal Clock Accuracy: ± 1 ppm

Temperature stability (-20-70°C): ± 0.5 ppm

Aging: ± 1 ppm/year

100 MHz Clock Output Power: 0 dBm-5 dBm

SMA connector, 50 Ω (nom)

100 MHz Clock Input Power: 0-10 dBm

SMA connector, 50 Ω (nom)

10 MHz Clock Input Power: 0 dBm-10 dBm

SMA connector, 50 Ω (nom)

Clock System

Frequency: 1 GHz-8 GHz

External Sample Clock Power: 0-10 dBm

SMB connector, 50 Ω (nom)

Processor System

GPU Processor

AI Performance 200 TOPS

GPU 1792-core NVIDIA Ampere c GPU with 56 Tensor Cores

GPU Max. Frequency 930 MHz

CPU 8-core Arm® Cortex® -A78AE v8.2 64-bit CPU 2 MB L2 + 4 MB L3

CPU Max. Frequency 2.2 GHz

Video Memory 32 GB 256-bit LPDDR5 204.8 GB/s

CPU Processor

Clock Speed 2.1 GHz base frequency, 3.95 GHz maximum frequency

Core Count 6 cores

Memory 32 GB DDR4-3200 MT/s

Instrument Characteristics

Instrument Characteristics

Operating System Linux

Display 2.8" basic status display

General Specifications

Interface

LAN Interface Electrical port: 1, RJ45 Ethernet interface, 10/100/1000 BASE-T interface

Optical port: 1, 10 Gigabit, SFP+ interface

Web Control Support Web Control (input the IP address of the product into the Web browser to display the operation interface)

Interface

HDMI	1, HDMI 1.4b, A plug; used to connect to an external monitor
USB 3.0	2, Type A interface
GPIO	1 RS232, 1 RS422, used to interconnect with the processor serial port

Power Supply

Input Interface	5.5 mm round hole
Input Voltage	DC 19.5 V, 11.8 A
Power Consumption	180 W (typ)

Environment

Temperature Range	Operating	0°C to +50°C
	Non-operating	-40°C to +70°C
Humidity Range	Operating	Up to +30°C, ≤90% RH (non-condensing)
		+30°C to +40°C, ≤75% RH (non-condensing)
		+40°C to +50°C, ≤45% RH (non-condensing)
	Non-operating	Up to 65°C, ≤90% RH (non-condensing)
Altitude	Operating	Up to 3,000 meters
	Non-operating	Up to 15,000 meters

Calibration Interval

Recommended Calibration Interval	12 months
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Regulation Standards

	Compliant with EMC Directive (2014/30/EU), compliant with or higher than the standards specified in EN 61326-1: 2013, EN 61326-2-1:2013, EN IEC 61000-3-2:2019+A1, EN 61000-3-3:2013+A1:2019	
	CISPR 11:2009+A1 Class A	
	EN IEC 61000-3-2:2019+A1	Harmonics, Class A
	EN 61000-3-3:2013+A1:2019	Voltage flicker
Electromagnetic Compatibility	EN 61000-4-2:2009	±4.0 kV (contact discharge), ±8.0 kV (air discharge)
	EN 61000-4-3:2006+A1+A2	10 V/m (80 MHz to 1 GHz); 3 V/m (1.4 GHz to 6 GHz)
	EN 61000-4-4:2004+A1	2 kV power cord
	EN 61000-4-5:2006	1 kV (phase-to-neutral voltage); 2 kV (phase-to-earth voltage); 2 kV (neutral-to-earth voltage)
	EN 61000-4-6:2009	10V, 0.15 MHz to 80 MHz
	EN 61000-4-11:2004	Voltage dip: 0% UT during half cycle; 0% UT during 1 cycle; 70% UT during 25 cycles Short interruption: 0% UT during 250 cycles
Safety	EN 61010-1:2010+A1:2019	
	IEC 61010-1:2010+A1:2016	
	UL 61010-1: 2012 R6.23	
	CAN/CSA-C22.2 NO. 61010-1-12 + GI1 + GI2 (R2017) + A1	
Vibration	Compliant with GB/T 6587, class 2 random, compliant with MIL-PRF-28800F and IEC60068-2-6, class 3 random	
Shock	Compliant with GB/T 6587-2012, class 2 random, compliant with MIL-PRF-28800F and IEC 60068-2-27, class 3 random (in non-operating conditions: 30 g, half-sine wave, 11 ms duration, 3 oscillations/axis along the main axis, a total of 18 vibrations)	

Mechanical Characteristics

Dimensions 340 mm (W) x 68 mm (H) x 230 mm (D)

Weight ≤4.5Kg

Rack Mount Mounting accessories (optional)

Order Information and Warranty Period

Order Information

Order Information	Order No.
Model	
4-channel AWG, 8 GSa/s sample rate, 3.5 GHz bandwidth, 14-bit vertical resolution, CPU master-controlled	SUA8104
4-channel Digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, CPU master-controlled	SUA8204
8-channel Digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, CPU master-controlled	SUA8208
2-channel AWG and 2-channel digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, CPU master-controlled	SUA8304
4-channel AWG, 8 GSa/s sample rate, 3.5 GHz bandwidth, 14-bit vertical resolution, GPU AI-controlled	SUA8104G
4-channel digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, GPU AI-controlled	SUA8204G
8-channel digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, GPU AI-controlled	SUA8208G
2-channel AWG and 2-channel Digitizer, 4 GSa/s sample rate, 1.5 GHz bandwidth, 14-bit vertical resolution, GPU AI-controlled	SUA8304G
Standard Accessories	
Power adapter (based on destination country)	-
Options	
16 TB waveform recording extension option	M8501
AWG advanced sequence mode	SUA8000-SQ