

KEYSIGHT TECHNOLOGIES (AGILENT HP)

33521A

The Keysight (formerly Agilent) 33521A is a 30 MHz, 1-channel Function / Arbitrary Waveform Generator from the 33500 Series. Powered by Keysight's exclusive Trueform technology, the 33521A delivers exceptional signal integrity with up to 10x lower jitter and 5x lower harmonic distortion compared to traditional DDS generators, alongside true point-by-point arbitrary waveforms.

SPECIFICATIONS

General

Interfaces	USB 2.0 Host, USB 2.0 Device, LAN (10/100 Base-T, LXI Class C) standard; GPIB (IEEE-488.2) optional
Display	4.3-inch color TFT WQVGA (480 × 272) LCD with LED backlight

Physical

Power Supply	100 V to 240 V (±10%) at 50/60 Hz; 100 V to 120 V (±10%) at 400 Hz; 150 VA maximum
Operating Temperature	0 °C to 55 °C °C
Dimensions (W×H×D)	261.2 mm × 103.8 mm × 303.2 mm (with bumpers and handle) mm
Weight	3.4 kg

Waveform Generation & Frequency Specifications

Number of Channels	1
Maximum Frequency	30 MHz
Waveform Shapes	Sine, Square, Ramp, Pulse, Triangle, Gaussian Noise, PRBS, DC, Arbitrary
Frequency Resolution	1 µHz
Standard Timebase Stability	±1 ppm (TCXO)
Optional Timebase Stability	±0.1 ppm (OCXO)

Standard Waveform Characteristics

Sine Wave Frequency Range	1 μ Hz to 30 MHz
Sine Wave Total Harmonic Distortion (THD)	< 0.04% (at 1 kHz, 1 Vpp)
Sine Wave Phase Noise	-125 dBc/Hz (typical at 10 MHz, 10 kHz offset)
Square Wave Frequency Range	1 μ Hz to 30 MHz
Square Wave Rise/Fall Time	< 8.4 ns
Square Wave Duty Cycle Range	0.01% to 99.99% (frequency dependent)
Ramp & Triangle Frequency Range	1 μ Hz to 800 kHz
Ramp Linearity	< 0.05%
Pulse Frequency Range	1 μ Hz to 30 MHz
Pulse Width Range	16 ns minimum
Pulse Edge Transition Time	8.4 ns to 1 μ s, independently variable
Noise Type	Gaussian
Noise Bandwidth	30 MHz

Arbitrary Waveform Capabilities

Arbitrary Waveform Sampling Rate	250 MSa/s
Amplitude Resolution (Vertical)	16-bit
Standard Waveform Memory	1 MSa
Optional Waveform Memory	16 MSa
Arbitrary Waveform Jitter	< 40 ps rms
Filter Types	Normal (brickwall), Step, Off

Output Characteristics

Amplitude Range into 50 Ω	1 mVpp to 10 Vpp
Amplitude Range into Open Circuit	2 mVpp to 20 Vpp
Amplitude Accuracy	$\pm$ (1% of setting + 1 mVpp) at 1 kHz, 50 Ω load
Output Impedance	50 Ω
DC Offset Range	$\pm$ 5 V into 50 Ω , $\pm$ 10 V into open circuit

Modulation, Sweep, and Burst

Modulation Types	AM, FM, PM, FSK, BPSK, PWM, Sum (carrier + noise)
Internal Modulation Source Frequency Range	1 μ Hz to 1 MHz
Sweep Type	Linear, Logarithmic, List
Sweep Time	1 ms to 250,000 s
Sweep Trigger Sources	Internal, External, Manual, Bus
Burst Type	N-Cycle, Gated
Burst Count Range	1 to 100,000,000 cycles, or infinite

Inputs & Outputs

Front Panel Connectors	Main Output, Sync Out (BNC)
Rear Panel Connectors	External Trigger/Gate Input, External Reference In, External Reference Out (BNC)
External Trigger Input Level	TTL compatible
10 MHz Reference Input Frequency	10 MHz $\pm$ 20 ppm
10 MHz Reference Input Level	100 mVpp to 5 Vpp
10 MHz Reference Output Level	632 mVpp (0 dBm) into 50 Ω

System, Software & Connectivity

Programming Language Support	SCPI-1999, IEEE-488.2
Instrument State Storage Capacity	Stored as files in non-volatile flash (64 MB) or USB

Power, Environmental & Physical

Storage Temperature Range	-30 °C to 70 °C
Operating Humidity Range	5% to 80% RH (non-condensing)
Operating Altitude	Up to 3,000 meters
Warm-up Time	1 hour
Dimensions without Bumpers and Handle	212.8 mm W $\times$ 88.3 mm H $\times$ 272.3 mm D
Safety Compliance Standards	UL 61010-1, CAN/CSA-C22.2 No. 61010-1, EN 61010-1
EMC Compliance Standards	EN 61326-1, ICES-001, AS/NZS CISPR 11

Power & Electrical

Power Consumption	< 45 VA
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Modulation Inputs

External Modulation Input Impedance	10 k Ω
External Modulation Input Range	$\pm$ 5 V full scale
External Modulation Input Bandwidth	DC to 80 kHz

Sync Output

Sync Output Level	3.3 V LVTTTL compatible
Sync Output Impedance	50 Ω nominal

Trigger Inputs & Outputs

External Trigger Input Impedance	10 k Ω nominal, DC-coupled
External Trigger Latency	< 135 ns (typical) standard, < 220 ns (typical) arbitrary
External Trigger Jitter	< 2.5 ns (rms)
External Trigger Output Level	3.3 V LVTTTL compatible
External Trigger Output Impedance	50 Ω nominal

System & Interfaces

LXI Compliance	LXI Class C (LXI Core 2011)
GPIO Connectivity	Optional (Option GPB)
Non-volatile File Storage Memory	64 MB standard

Signal Characteristics

Sine Wave Non-Harmonic Spurious Response	<-75 dBc (DC to 10 MHz), <-70 dBc (> 10 MHz to 30 MHz)
Square Wave Overshoot	< 4% (typical)
Pulse Overshoot	< 4% (typical)

Electrical Safety

Float Voltage (Isolation)	Up to ±42 Vpk relative to earth ground
Output Protection	Short-circuit protected, automatic overload shutdown

Environmental

Acoustic Noise	< 35 dBA typical (at 30 °C)
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Phase Characteristics

Phase Offset Range	-360° to +360°
Phase Offset Resolution	0.01°

Modulation

AM Modulation Depth	0.0% to 120.0%
FM Deviation Range	1 mHz to 15 MHz
PM Deviation Range	0° to 360°

PRBS Generator

PRBS Polynomials	Not supported
PRBS Bit Rate Range	Not supported

Power

Power Line Frequency	50/60 Hz (100 to 240 V), 400 Hz (100 to 120 V)
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TECHNOLOGY

Trueform Waveform Generation Technology

APPLICATIONS

Electronic Test and Measurement, Design and Debug, Sensor Simulation, Device Characterization

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