



Agilent 33120A

Function/Arbitrary Waveform Generator

Data Sheet

- 15 MHz sine and square wave outputs
- Sine, triangle, square, ramp, noise and more
- 12-bit, 40MSa/s, 16,000-point deep arbitrary waveforms
- Direct digital synthesis for excellent stability



Uncompromising performance for standard waveforms

The Agilent Technologies 33120A Function/Arbitrary Waveform Generator uses direct digital-synthesis techniques to create a stable, accurate output signal for clean, low-distortion sine waves. It also gives you fast rise- and fall-time square wave, and linear ramp waveforms down to 100 μ Hz.

Custom waveform generation

Use the 33120A to generate complex custom waveforms such as a heart-beat or the output of a mechanical transducer. With 12-bit resolution, and a sampling rate of 40 MSa/s, the 33120A gives you the flexibility to create any waveform you need. It also lets you store up to four 16,000-deep waveforms in nonvolatile memory.

Easy-to-use functionality

Front-panel operation of the 33120A is straightforward and intuitive.

You can access any of ten major functions with a single key press or two, then use a simple knob to adjust frequency, amplitude and offset. To save time, you can enter voltage values directly in Vp-p, Vrms or dBm.

Internal AM, FM, FSK and burst modulation make it easy to modulate waveforms without the need for a separate modulation source.

Linear and log sweeps are also built in, with sweep rates selectable from 1 ms to 500 s. GPIB and RS-232 interfaces are both standard, plus you get full programmability using SCPI commands.

Optional phase-lock capability

The Option 001 phase lock/TCXO timebase gives you the ability to generate synchronized phase-offset signals. An external clock input/output lets you synchronize with up to three other 33120As or with an external 10-MHz clock.

Option 001 also gives you a TCXO timebase for increased frequency stability. With accuracy of 4 ppm/yr, the TCXO timebase make a 33120A ideal for frequency calibrations and other demanding applications.

With Option 001, new commands let you perform phase changes on the fly, via the front panel or from a computer, allowing precise phase calibration and adjustment.

Link the Agilent 33120A to your PC

The included Agilent IntuiLink software allows you to easily create, edit, and download complex waveforms using the IntuiLink Arbitrary Waveform Editor. Or you can capture a waveform using IntuiLink Oscilloscope or DMM and send it to the 33120A for output. For programmers, ActiveX components can be used to control the instrument using SCPI commands. IntuiLink provides the tools to easily create, download, and manage waveforms for your 33120A. To find out more about IntuiLink, visit www.agilent.com/find/intuilink.

The 33120A can also be used in conjunction with the 34811A BenchLink Arb software. This Windows®-based program lets you create and edit waveforms on your PC and download them to the 33120A.

3-year warranty

With your 33120A, you get operating and service manuals, a quick reference guide, test date, and a full 3-year warranty, all for one low price.



Waveforms

| | |
|-----------------|--|
| Standard | Sine, square, triangle, ramp, noise, sin(x)/x, exponential rise exponential fall, cardiac, dc volts. |
|-----------------|--|

| | |
|----------------------|---------------------------|
| Arbitrary | |
| Waveform length | 8 to 16,000 points |
| Amplitude resolution | 12 bits (including sign) |
| Sample rate | 40 MSa/s |
| Non-volatile memory | Four (4) 16,000 waveforms |

Frequency Characteristics

| | |
|-------------|--|
| Sine | 100 μ Hz - 15 MHz |
| Square | 100 μ Hz - 15 MHz |
| Triangle | 100 μ Hz - 100 kHz |
| Ramp | 100 μ Hz - 100 kHz |
| White noise | 10 MHz bandwidth |
| Resolution | 10 μ Hz or 10 digits |
| Accuracy | 10 ppm in 90 days, 20 ppm in 1 year, 18°C - 28°C |
| Temp. Coeff | < 2 ppm/°C |
| Aging | < 10 ppm/yr |

Sinewave Spectral Purity

| | |
|----------------------------|---------|
| Harmonic distortion | |
| dc to 20 kHz | -70 dBc |
| 20 kHz to 100 kHz | -60 dBc |
| 100 kHz to 1 MHz | -45 dBc |
| 1 MHz to 15 MHz | -35 dBc |

| | |
|--------------------------------|-------------------------|
| Spurious (non-harmonic) | |
| DC to 1 MHz | < -65 dBc |
| 1 MHz to 15 MHz | < -65 dBc + 6 dB/octave |

| | |
|----------------------------------|--------|
| Total harmonic distortion | |
| DC to 20 kHz | <0.04% |

| | |
|--------------------|---------------------------|
| Phase noise | <-55 dBc in a 30 kHz band |
|--------------------|---------------------------|

Signal Characteristics

| | |
|-------------------|---|
| Squarewave | |
| Rise/Fall time | < 20 ns |
| Overshoot | 4% |
| Asymmetry | 1% + 5ns |
| Duty cycle | 20% to 80% (to 5 MHz) 40% to 60% (to 15 MHz) |

| | |
|----------------------------|--------------------------------|
| Triangle, Ramp, Arb | |
| Rise/Fall time | 40 ns (typical) |
| Linearity | <0.1% of peak output |
| Setting Time | <250 ns to 0.5% of final value |
| Jitter | <25ns |

Output Characteristics

| | |
|--|---------------------------------|
| Amplitude (into 50 Ω) | 50 mVpp - 10 Vpp ^[1] |
| Accuracy (at 1 kHz) | \pm 1% of specified output |
| Flatness (<i>sinewave relative to 1 kHz</i>) | |

| | |
|------------------|--|
| < 100 kHz | \pm 1% (0.1 dB) |
| 100 kHz to 1 MHz | \pm 1.5% (0.15 dB) |
| 1 Mz to 15 MHz | \pm 2% (0.2 dB) Ampl \geq 3Vrms \pm 3.5% (0.3 dB) Ampl < 3Vrms |

| | |
|---|----------------------------|
| Output Impedance | 50 Ω (fixed) |
| Offset (into 50 Ω) ^[2] | + 5 Vpk ac + dc |
| Accuracy | \pm 2% of setting + 2 mV |

| | |
|------------|--|
| Resolution | 3 digits, amplitude and offset |
| Units | Vpp, Vrms, dBm |
| Isolation | 42 Vpk maximum to earth |
| Protection | Short circuit protected \pm 15 Vpk overdrive < 1 minute |

Modulation

| | |
|--------------------|-------------------------------------|
| AM | |
| Carrier -3dB Freq. | 10 MHz (typical) |
| Modulation | any internal waveform including Arb |
| Frequency | 10 MHz - 20 kHz |
| Depth | 0% - 120% |
| Source | Internal/External |

| | |
|------------|-------------------------------------|
| FM | |
| Modulation | any internal waveform including Arb |
| Frequency | 10 MHz - 10 kHz |
| Deviation | 10 MHz - 15 MHz |
| Source | Internal only |

| | |
|-----------------|--------------------------------|
| FSK | |
| Internal rate | 10 MHz - 50 kHz |
| Frequency Range | 10 MHz - 15 MHz |
| Source | Internal/External (1 MHz max.) |

| | |
|---------------|-----------------------------------|
| Burst | |
| Carrier Freq. | 5 MHz max. |
| Count | 1 to 50,000 cycles or infinite |
| Start Phase | -360° to +360° |
| Internal Rate | 10 MHz - 50 kHz \pm 1% |
| Gate Source | Internal/External Gate |
| Trigger | Single, External or Internal Rate |

Sweep

| | |
|----------------|-------------------------------|
| Type | Linear or Logarithmic |
| Direction | Up or Down |
| Start F/Stop F | 10 MHz - 15 MHz |
| Speed | 1 ms to 500 s \pm 0.1% |
| Trigger | Single, External, or Internal |

Rear Panel Inputs

| | |
|-------------------------------------|---|
| Ext. AM Modulation | \pm 5 Vpk = 100% modulation 5k Ω input resistance |
| External Trigger/ FSK/Burst Gate | TTL low true |

System Characteristics^[3]

| | |
|--|---------|
| Configuration Times^[4] | |
| Function Change: ^[5] | 80 ms |
| Frequency Change: ^[5] | 30 ms |
| Amplitude Change: | 30 ms |
| Offset Change: | 10 ms |
| Select User Arb: | 100 ms |
| Modulation Parameter Change: | <350 ms |

Arb Download Times over GPIB

| Arb Length | Binary | ASCII Integer | ASCII Real ^[6] |
|---------------|---------|---------------|---------------------------|
| 16,000 points | 8 sec | 81 sec | 100 sec |
| 8,192 points | 4 sec | 42 sec | 51 sec |
| 4,096 points | 2.5 sec | 21 sec | 26 sec |
| 2,048 points | 1.5 sec | 11 sec | 13 sec |

Arb Download Times over RS-232 at 9600 Baud:^[7]

| Arb Length | Binary | ASCII Integer | ASCII Real ^[8] |
|---------------|--------|---------------|---------------------------|
| 16,000 points | 35 sec | 101 sec | 134 sec |
| 8,192 points | 18 sec | 52 sec | 69 sec |
| 4,096 points | 10 sec | 27 sec | 35 sec |
| 2,048 points | 6 sec | 14 sec | 18 sec |

[1] 100 mVpp - 20 Vpp into open circuit

[2] Offset \leq 2x pk - pk amplitude

[3] Times are typical. May vary based on controller performance

[4] Time to change parameter and output the new signal.

[5] Modulation or sweep off

[6] Times for 5-digit and 12-digit numbers

[7] For 4800 baud, multiply the download times by two; For 2400 baud, multiply the download times by four, etc.

[8] Time for 5-digit numbers; for 12-digit numbers, multiply the 5-digit numbers by two

Option 001 Phaselock/TCXO Timebase

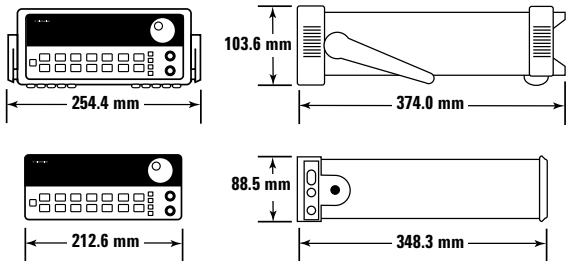
| | |
|---------------------------|---|
| Timebase Accuracy | |
| Setability | < 0.01 ppm |
| Stability | ± 1 ppm $0^\circ - 50^\circ$ |
| Aging | < 2ppm in first 30 days (continuous operation) 0.1 ppm/month (after first 30 days) |
| External Reference Input | |
| Lock Range | 10 MHz \pm 50 Hz |
| Level | -10 dBm to + 15 dBm +25 dBm or 10 Vpp max input |
| Impedance | 50 Ω \pm 2%, 42 Vpk isolation to earth |
| Lock Time | < 2 seconds |
| Internal Reference Output | |
| Frequency | 10 MHz |
| Level | > 1 Vpp into 50 Ω |
| Phase Offset | |
| Range | + 360 $^\circ$ to - 360 $^\circ$ |
| Resolution | 0.001 $^\circ$ |
| Accuracy | 25 ns |
| Trigger Output | |
| Level | 5V zero-going pulse |
| Pulse Width | > 2 μ s typical |
| Fanout | Capable of driving up to three 33120As |

Ordering Information

Agilent 33120A Function/Arb Generator
Opt. 001 Phase Lock/TCXO Timebase Option

General

| | |
|------------------------|---|
| Power Supply | 110V/120V/220V/240V \pm 10% |
| Power Line Frequency | 45 Hz to 66 Hz and 360 Hz to 440 Hz |
| Power Consumption | 50VA peak (28 W average) |
| Operating Environment | 0 $^\circ$ C to 55 $^\circ$ C |
| Storage Environment | -40 $^\circ$ C to 70 $^\circ$ C |
| State Storage Memory | Power Off state automati- cally saved, 3 User Configurable Stored States |
| Interface | IEEE-488 and RS-232 standard |
| Language | SCPI - 1993, IEEE-488.2 |
| Dimensions (W x H x D) | |
| Bench top | 254.4mm x 103.6mm x 374mm |
| Rack mount | 212.6mm x 88.5mm x 348.3mm |
| Weight | 4 kg (8.8 lbs) |
| Safety Designed to | UL-1244, CSA 1010, EN61010 |
| EMC Tested to | MIL-461C, EN55011, EN50082-1 |
| Vibration and Shock | MIL-T-28800, Type III, Class 5 |
| Acoustic Noise | 30 dBa |
| Warm-up Time | 1 hour |
| Warranty | 3 years standard |



Ordering Information

33120A Function/Arbitrary Waveform Generator

Accessories included

Operating manual, service manual, quick reference guide, IntuiLink connectivity software, test data, and power cord

Options

- Opt. 001** Phase lock/TCXO timebase
- Opt. 106** BenchLink Arb software (34811A)
- Opt. 1CM** Rack Mount Kit (34190A)*
- Opt. W50** Additional 2-year warranty (5-year total)
- Opt. 910** Extra manual set

Manual language options (please specify one)

- ABA US English
- ABD German
- ABE Spanish
- ABF French
- ABJ Japanese
- ABZ Italian
- ABO Taiwan Chinese
- AB1 Korean

Accessories

- Agilent 34161A** Accessory pouch
- Agilent 34811A** BenchLink Arb software

*For racking two side-by-side, order both items below
Lock-link Kit (P/N 5061-9694)
Flange Kit (P/N 5063-9212)

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Printed in USA May 2, 2001
5968-0125EN



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