# Agilent 33220A

## Agilent 33220A 20MHz Function Arbitray Waveform Generator

**Features:**

* 20 MHz Sine and Square waveforms
* Pulse, Ramp, Triangle, Noise, and DC waveforms
* 14-bit, 50 MSa/s, 64 k-point arbitrary waveforms
* AM, FM, PM, FSK, and PWM modulation types
* Linear & logarithmic sweeps and burst operation
* 10 mVpp to 10 Vpp amplitude range
* Graph mode for visual verification of signal settings
* Connect via USB, GPIB and LAN

The Agilent Technologies 33220Ais a 20 MHz synthesizedfunction generator with built-in arbitrarywaveform and pulse capabilities.

Its combination of bench-top and system features makes this function generator a versatile solution for your testing requirements now and in the future.
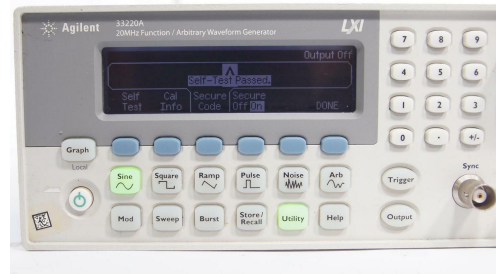
# Common Characteristics

## Amplitude

Range:
| | |
|---|---|
| Into 50 Ω: | 10 mVpp to 10 Vpp |
| Into open circuit: | 20 mVpp to 20 Vpp |

| | |
|---|---|
| Accuracy (at 1 kHz): [1], [2] | ± 1% of setting<br>± 1 mVpp |
| Units: | Vpp, Vrms, dBm |
| Resolution: | 4 digits |

## DC Offset

| | |
|---|---|
| Range (peak AC + DC): | ± 5 V into 50 Ω<br>±10 V into open circuit |
| Accuracy: [1], [2] | ± 2% of offset setting<br>± 0.5% of ampl. ± 2 mV |
| Resolution: | 4 digits |

## Main Output

| | |
|---|---|
| Impedance: | 50 Ω typical |
| Isolation: | 42 Vpk maximum to earth |
| Protection: | Short-circuit protected, overload automatically disables main output |

## Internal Frequency Reference

| | |
|---|---|
| Accuracy: [5] | ± 10 ppm in 90 days,<br>± 20 ppm in 1 year |

## External Frequency Reference (Option 001)

Rear Panel Input:
| | |
|---|---|
| Lock Range: | 10 MHz ± 500 Hz |
| Level: | 100 mVpp to 5 Vpp |
| Impedance: | 1 kΩ typical, AC coupled |
| Lock Time: | < 2 seconds |

Rear Panel Output:
| | |
|---|---|
| Frequency: | 10 MHz |
| Level: | 632 mVpp (0 dBm), typical |
| Impedance: | 50 Ω typical, AC coupled |

Phase Offset:
| | |
|---|---|
| Range: | +360 to -360 degrees |
| Resolution: | 0.001 degrees |
| Accuracy: | 20 ns |

# Modulation

## AM

| | |
|---|---|
| Carrier Waveforms: | Sine, Square, Ramp, Arb |
| Source: | Internal/External |
| Internal Modulation: | Sine, Square, Ramp, Triangle, Noise, Arb (2 mHz to 20 kHz) |
| Depth: | 0.0% to 120.0% |

## FM

| | |
|---|---|
| Carrier Waveforms: | Sine, Square, Ramp, Arb |
| Source: | Internal/External |
| Internal Modulation: | Sine, Square, Ramp, Triangle, Noise, Arb (2 mHz to 20 kHz) |
| Deviation: | DC to 10 MHz |

## PM

| | |
|---|---|
| Carrier Waveforms: | Sine, Square, Ramp, Arb |
| Source: | Internal/External |
| Internal Modulation: | Sine, Square, Ramp, Triangle, Noise, Arb (2 mHz to 20 kHz) |
| Deviation: | 0.0 to 360.0 degrees |

## PWM

| | |
|---|---|
| Carrier Waveforms: | Pulse |
| Source: | Internal/External |
| Internal Modulation: | Sine, Square, Ramp, Triangle, Noise, Arb (2 mHz to 20 kHz) |
| Deviation: | 0% to 100% of pulse width |

## FSK

| | |
|---|---|
| Carrier Waveforms: | Sine, Square, Ramp, Arb |
| Source: | Internal/External |
| Internal Modulation: | 50% duty cycle square (2 mHz to 100 kHz) |

## External Modulation Input [6] (for AM, FM, PM, PWM)

| | |
|---|---|
| Voltage Range: | ± 5 V full scale |
| Input Resistance: | 5 kΩ typical |
| Bandwidth: | DC to 20 kHz |

# Sweep

| | |
|---|---|
| Waveforms: | Sine, Square, Ramp, Arb |
| Type: | Linear or Logarithmic |
| Direction: | Up or Down |
| Sweep Time: | 1 ms to 500 s |
| Trigger: | Single, External or Internal |
| Marker | Falling edge of Sync signal (programmable frequency) |

# Burst [7]

| | |
|---|---|
| Waveforms: | Sine, Square, Ramp, Triangle, Pulse, Noise, Arb |
| Type: | Counted (1 to 50,000 cycles), Infinite, Gated |
| Start/Stop Phase: | -360 to +360 degrees |
| Internal Period: | 1 µs to 500 s |
| Gate Source: | External Trigger |
| Trigger Source: | Single, External, or Internal |

# Trigger Characteristics

| | |
|---|---|
| Trigger Input: | |
| Input Level: | TTL compatible |
| Slope: | Rising or falling, selectable |
| Pulse Width: | > 100 ns |
| Input Impedance: | > 10 kΩ, DC coupled |
| Latency: | < 500 ns |
| Jitter (RMS) | 6 ns (3.5 ns for Pulse) |
| Trigger Output: | |
| Level: | TTL compatible into ≥ 1 kΩ |
| Pulse Width: | > 400 ns |
| Output Impedance: | 50 Ω, typical |
| Maximum Rate: | 1 MHz |
| Fanout: | ≤ 4 Agilent 33220As |

# Programming Times (typical)

## Configuration Times

| | USB 2.0 | LAN (VXI-11) | GPIB |
|---|---|---|---|
| Function Change | 111 ms | 111 ms | 111 ms |
| Frequency Change | 1.5 ms | 2.7 ms | 1.2 ms |
| Amplitude Change | 30 ms | 30 ms | 30 ms |
| Select User Arb | 124 ms | 124 ms | 123 ms |

## Arb Download Times (binary transfer)

| | USB 2.0 | LAN (VXI-11) | GPIB |
|---|---|---|---|
| 64 K points | 96.9 ms | 191.7 ms | 336.5 ms |
| 16 K points | 24.5 ms | 48.4 ms | 80.7 ms |
| 4 K points | 7.3 ms | 14.6 ms | 19.8 ms |

Download times do not include setup or output time.

# General

| | |
|---|---|
| Power Supply: | CAT II |
| | 100 to 240 V @ 50/60 Hz (-5%, +10%) |
| | 100 to 120 V @ 400 Hz (± 10%) |
| Power Consumption: | 50 VA maximum |
| Operating Environment: | IEC 61010 Pollution Degree 2 Indoor Location |
| Operating Temperature: | 0 °C to 55 °C |
| Operating Humidity: | 5% to 80% RH, non-condensing |
| Operating Altitude: | Up to 3000 meters |
| Storage Temperature: | -30 °C to 70 °C |
| State Storage Memory: | Power off state automatically saved. Four user-configurable stored states. |
| Interface: | GPIB, USB, and LAN standard |
| Language: | SCPI - 1993, IEEE-488.2 |
| Dimensions (W x H x D): | |
| Bench Top: | 261.1 mm by 103.8 mm by 303.2 mm |
| Rack Mount: | 212.8 mm by 88.3 mm by 272.3 mm |
| Weight: | 3.4 kg (7.5 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 |

**Note:** *Specifications are subject to change without notice. For the latest specifications, go to the Agilent 33220A product page and find the 33220A Datasheet.*
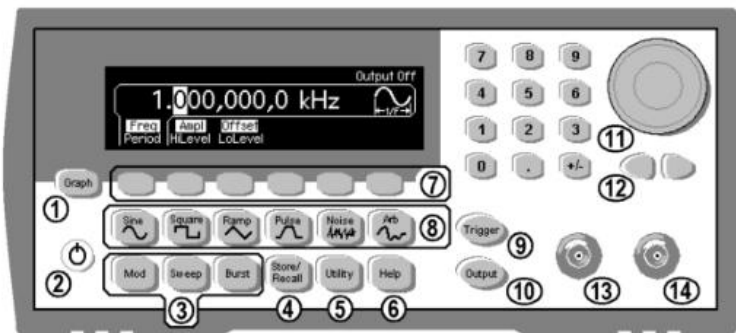
## www.agilent.com/find/33220A

*This ISM device complies with Canadian ICES-001.*

*Cet appareil ISM est conforme à la norme NMB-001 du Canada.*

N10149

## The Front Panel at a Glance



| | |
|---|---|
| **1** Graph Mode/Local Key | **9** Manual Trigger Key (*used for Sweep and Burst only*) |
| **2** On/Off Switch | |
| **3** Modulation/Sweep/Burst Keys | **10** Output Enable/Disable Key |
| **4** State Storage Menu Key | **11** Knob |
| **5** Utility Menu Key | **12** Cursor Keys |
| **6** Help Menu Key | **13** Sync Connector |
| **7** Menu Operation Softkeys | **14** Output Connector |
| **8** Waveform Selection Keys | |

**Note:** *To get context-sensitive help on any front-panel key or menu softkey, press and hold down that key.*