Agilent 33500 Series at a Glance

The Agilent Technologies 33500 Series is a 30 MHz synthesized waveform generator with built-in arbitrary waveform and pulse capabilities. Its combination of bench-top and system features makes this waveform generator a versatile solution for your testing requirements now and in the future.

Convenient bench-top features

- 16 standard waveforms

- Built-in 16-bit 250 MSa/s arbitrary waveform capability

- Precise pulse waveform capabilities with adjustable edge time

- LCD display provides numeric and graphical views

- Easy-to-use knob and numeric keypad

- Instrument state storage with user-defined names

- Portable, ruggedized case with non-skid feet

Flexible system features

- Downloadable 1M-point or optional 16M-point arbitrary waveform memories. For details, see:
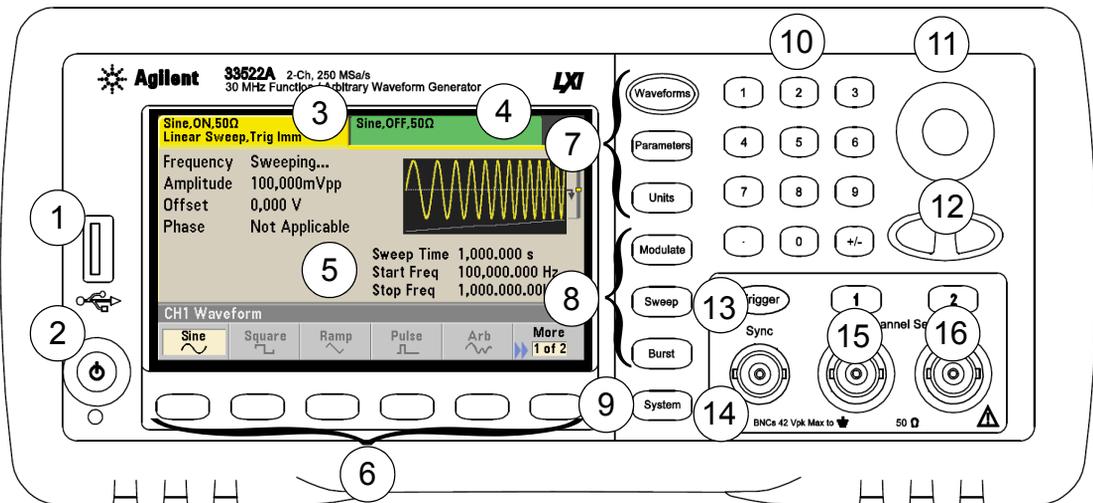
  www.agilent.com/find/33521U
  www.agilent.com/find/33522U

- Optional GPIB (IEEE-488)

- Standard USB and LAN remote interfaces

- LXI Class C Compliant

- SCPI (Standard Commands for Programmable Instruments) compatibility

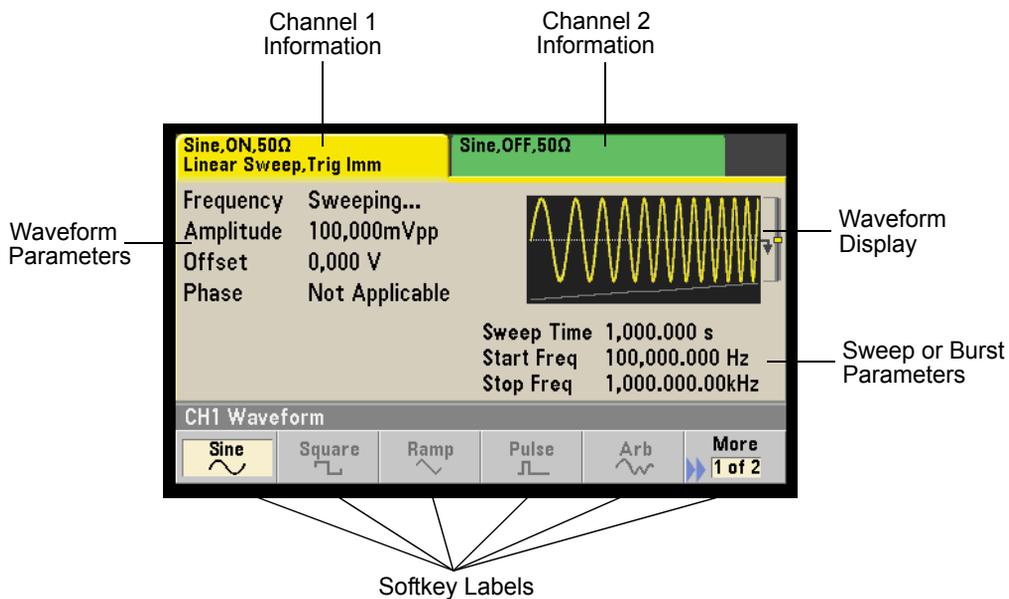**Note:** *Unless otherwise indicated, this manual applies to all Serial Numbers.*

The Front Panel at a Glance

1 USB Port	9 System Key
2 On/Off Switch	10 Numeric Keypad
3 Channel 1 Summary Tab	11 Knob
4 Channel 2 Summary Tab	12 Cursor Keys (Arrows)
5 Waveform and Parameter Display Area	13 Manual Trigger (Sweep and Burst only)
6 Menu Operation Softkeys	14 Sync Connector
7 Waveforms/Parameters/Units Keys	15 Channel 1
8 Modulate/Sweep/Burst Keys	16 Channel 2 (2-channel instrument only)

Note: *To get context-sensitive help on any front-panel key or menu softkey, press and hold down that key.*
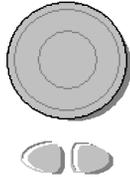
The Front-Panel Display at a Glance

Channel 1
Information

Channel 2
Information

Waveform
Parameters

Waveform
Display

Sweep or Burst
Parameters

Softkey Labels

Front-Panel Number Entry

You can enter numbers from the front-panel using one of two methods.

**Use the knob and cursor keys to modify the displayed number.**

1. Use the keys below the knob to move the cursor left or right.

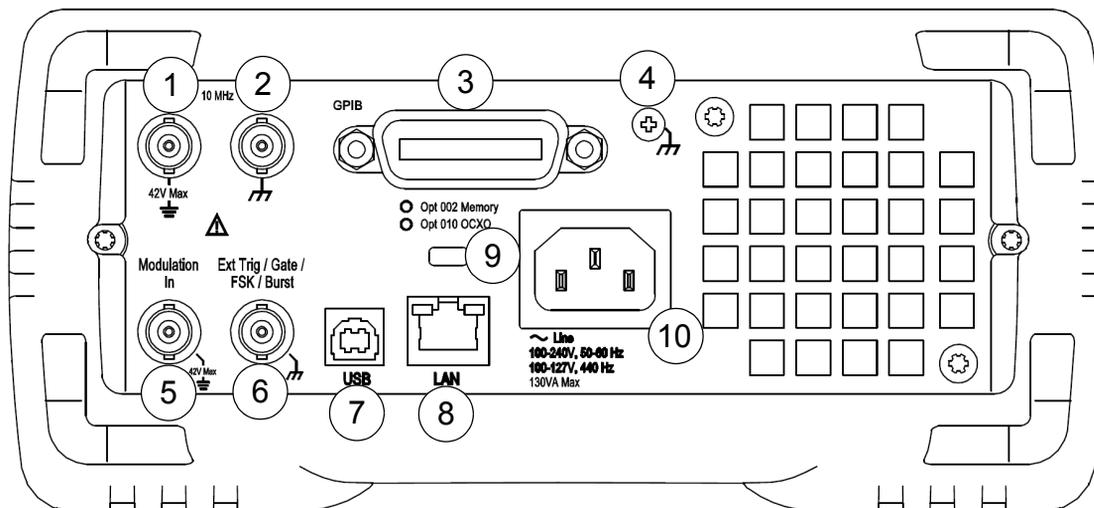**2.** Rotate the knob to change a digit (clockwise to increase).

Use the keypad to enter numbers and the softkeys to select units.

1. Key in a value using the keypad.

2. Select a unit to enter the value.

3. Use the +/- key to change the sign of the number.

4. The left arrow backspaces and clears the last digit.

| CH1 Sweep | | | | 5_ | |
| μHz | mHz | Hz | kHz | MHz | Cancel |
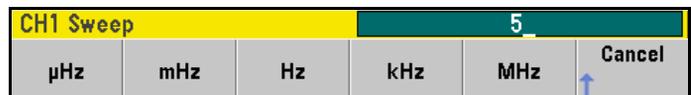
The Rear Panel at a Glance

1 External 10 MHz Reference Input Terminal
2 Internal 10 MHz Reference Output Terminal
3 GPIB Interface Connector (option 400)
4 Chassis Ground
5 External Modulation Input Terminal
6 Input: External Trig/Gate/FSK/Burst
7 USB Interface Connector
8 Local Area Network (LAN) Connector
9 Instrument Cable Lock
10 AC Power

WARNING

For protection from electrical shock, the power cord ground must not be defeated. If only a two-contact electrical outlet is available, connect the instrument's chassis ground screw (see above) to a good earth ground.

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Quick Start

One of the first things you will want to do with your waveform generator is to become acquainted with the front panel. We have written the exercises in this chapter to prepare the instrument for use and help you get familiar with some of its front-panel operations. This chapter is divided into the following sections:

To Prepare the Waveform Generator for Use

1 Check the list of supplied items.

Verify that you have received the following items with your instrument. If anything is missing, please contact your nearest Agilent Sales Office.

- Power cord (for country of destination).

- Certificate of Calibration.

- *Agilent 33500 Series Product Reference CD* (product software, programming examples, and manuals).

- *Agilent Automation-Ready CD* (Agilent IO Libraries Suite).

- USB 2.0 cable.

Note: All of the 33500 Series product documentation is provided on the *Agilent 33500 Series Product Reference CD* that comes with the product, and is also available on the Web at **www.agilent.com/find/33521A** and **www.agilent.com/find/33522A**. Printed (hardcopy) manuals are available as an extra cost option.

(ᵔ) Power
      Switch

2 Connect the power cord and turn on the waveform generator.

The instrument runs a power-on self test. When the instrument is ready for use it displays a message about how to obtain help, along with the current IP address. The instrument also displays the GPIB address if the GPIB option is installed and GPIB is enabled. The waveform generator powers up in the *sine wave* function at 1 kHz with an amplitude of 100 mV peak-to-peak (into a 50Ω termination). At power-on, the channel output connectors are disabled. To enable output on a channel connector, press the (Channel) (33521A) (1) or (2) (33522A) button and then press the **Output Off / On** softkey.

If the waveform generator *does not* turn on, verify that the power cord is firmly connected to the power receptacle on the rear panel (the power-line voltage is automatically sensed at power-on). You should also make sure that the waveform generator is connected to an energized power source. Then, verify that the waveform generator is turned on.

Also look at the LED below the power switch. If it is off, there is no AC power connected. If it is amber, the instrument is in standby mode with AC power connected, and if it is green, the instrument is on.

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To turn off the instrument, you must hold the power switch down for about 500 ms. This prevents you from accidentally turning off the instrument by brushing against the power switch.

If the power-on self test fails, the instrument shows the ERR annunciator in the upper right corner of the display. It also prominently displays the following message:

Check for error messages in the error queue.

See the *Agilent 33500 Series Service Guide* for information on error codes, and for instructions on returning the waveform generator to Agilent for service.

To Set the Output Frequency

At power-on, the waveform is configured for a sine wave at 1 kHz with an amplitude of 100 mV peak-to-peak (into a 50Ω termination).
The following steps show you how to change the frequency to 1.2 MHz.

1 Press the (Parameters) **button, followed by the** **Frequency** **softkey.**

The displayed frequency is either the power-on value or the frequency previously selected. When you change functions, the same frequency is used if the present value is valid for the new function. To set the waveform *period* instead, press (Units), then press the **Frequency** softkey to toggle to the **Period** softkey (the current **Frequency** selection is highlighted in the image below.).

2 Enter the magnitude of the desired frequency.

Using the numeric keypad, enter the value 1.2.
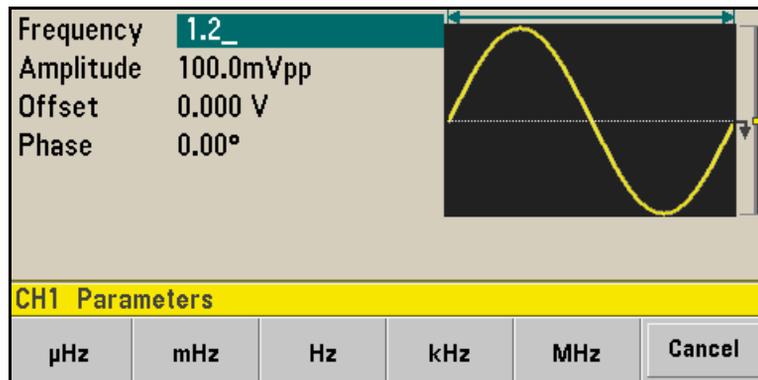
3 Select the desired units.

Press the softkey that corresponds to the desired units. When you select the units, the waveform generator outputs a waveform with the displayed frequency (if the output is enabled). For this example, press **MHz**.

Frequency	1.200,000,000MHz

Note: *You can also enter the desired value using the knob and cursor keys.*
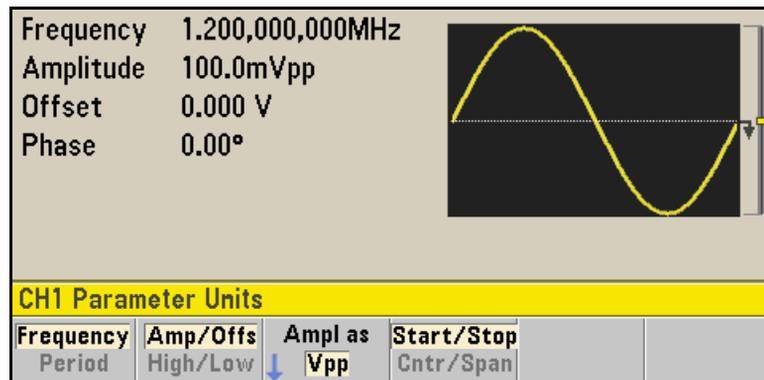
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To Set the Output Amplitude

At power-on, the waveform generator is configured for a sine wave with an amplitude of 100 mV peak-to-peak (into a 50Ω termination). *The following steps show you how to change the amplitude to 50 mVpp.*

1 Press ⊙ Units, then the softkey marked Amp/Offs or High/Low to make sure that you are in Amp/Offs.

The displayed amplitude is either the power-on value or the amplitude previously selected. When you change functions, the same amplitude is used if the present value is valid for the new function. To choose whether you want to specify voltage as amplitude and offset or high and low values, press ⊙ Units and then the second softkey. In this case, we will highlight **Amp/Offs**.

Frequency	1.200,000,000MHz
Amplitude	100.0mVpp
Offset	0.000 V
Phase	0.00°

CH1 Parameter Units

| Frequency | Amp/Offs | Ampl as | Start/Stop | | |
| Period | High/Low ↓ | Vpp | Cntr/Span | | |

2 Enter the magnitude of the desired amplitude.

Press (Parameters) and then press **Amplitude**. Using the numeric keypad, enter the number 50.
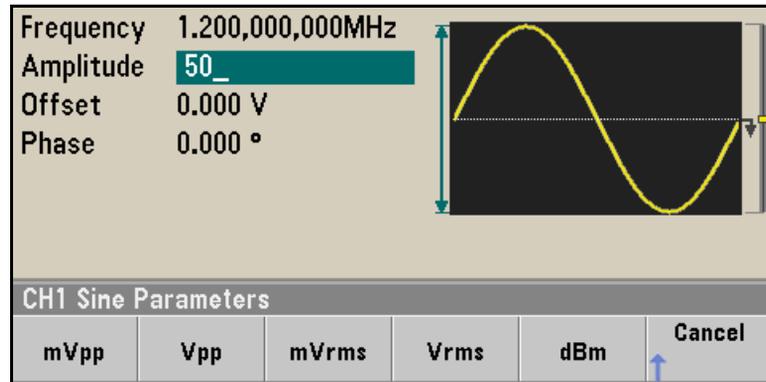
3 Select the desired units.

Press the softkey that corresponds to the desired units. When you select the units, the waveform generator outputs the waveform with the displayed amplitude (if the output is enabled). For this example, press **mVpp**.
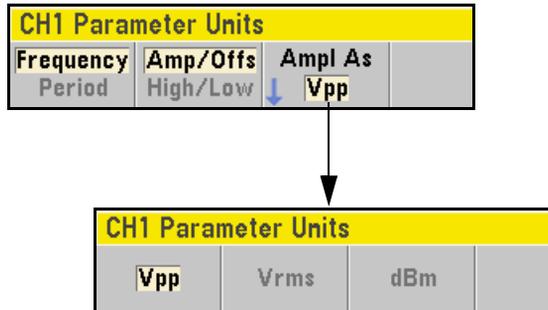

Note: *You can also enter the desired value using the knob and cursor keys. If you do so, you do not need to use a units softkey.*

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You can easily convert the displayed amplitude from one unit to another. Simply press (Units), and then press the **Ampl As** softkey and select the desired units.

To Set the Duty Cycle of a Square Wave

At power-on, the duty cycle for square waves is 50%. The duty cycle is limited by the minimum pulse width specification of 16 ns. *The following steps show you how to change the duty cycle to 75%.*

1 Select the square wave function.

Press the (Waveforms) key and choose **Square**.

2 Press the Duty Cycle softkey.

The displayed duty cycle is either the power-on value or the percentage previously selected. The duty cycle represents the amount of time per cycle that the square wave is at a *high* level.
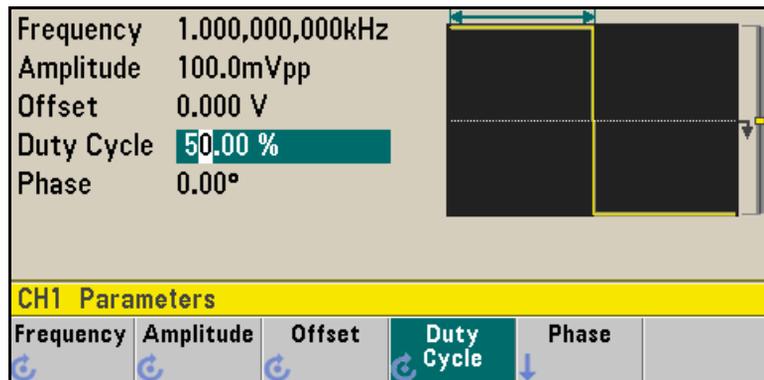
3 Enter the desired duty cycle.

Using the numeric keypad or the knob and arrows, select a duty cycle value of "75". If you are using the numeric keypad, press the **Percent** softkey to finish the entry. The waveform generator adjusts the duty cycle immediately and outputs a square wave with the specified value (if the output is enabled).