

FG Mode

The AWG500-Series Waveform Generator provides the Function Generator (FG) mode to output standard function waveforms. This section describes the FG mode.

FG mode signals are created and output using the following process:

- Select the output channel (for multiple output channel models), Select the waveform type.
- Set the output parameters such as frequency and amplitude.
- Turn the OUTPUT button to ON.

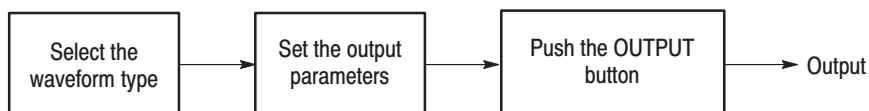


Figure 3-70: Outline flow for producing Function Generator signal

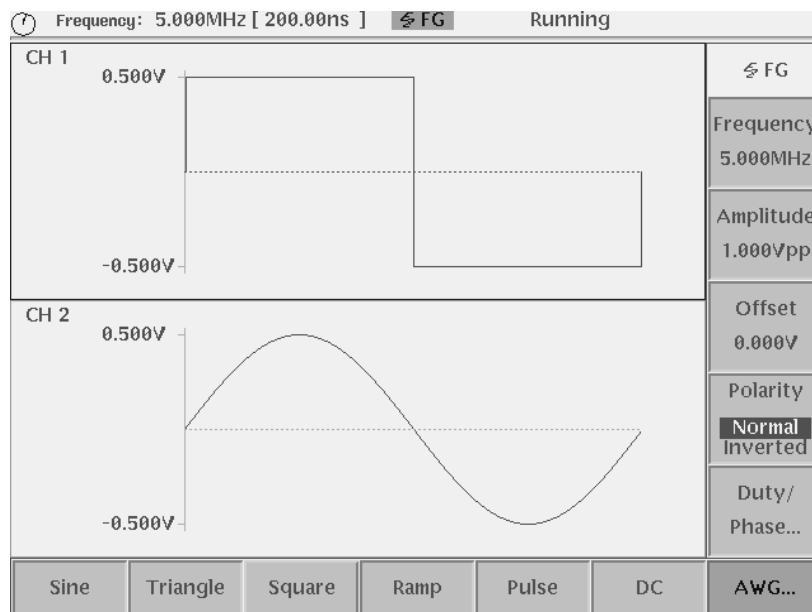


Figure 3-71: FG mode screen (AWG520)

Change the generator mode

AWG mode to FG mode The instrument initializes in the AWG mode when powered on.

Do the following to change the generator mode from AWG to FG :

1. Push **SETUP** (front-panel)→**Waveform/Sequence** (bottom)→**Ez FG...** (side) button.

The instrument displays the FG mode screen.

FG mode to AWG mode Do the following to change the generator mode from FG to AWG :

1. Push **AWG...** (bottom) button.

The instrument returns to the AWG mode.

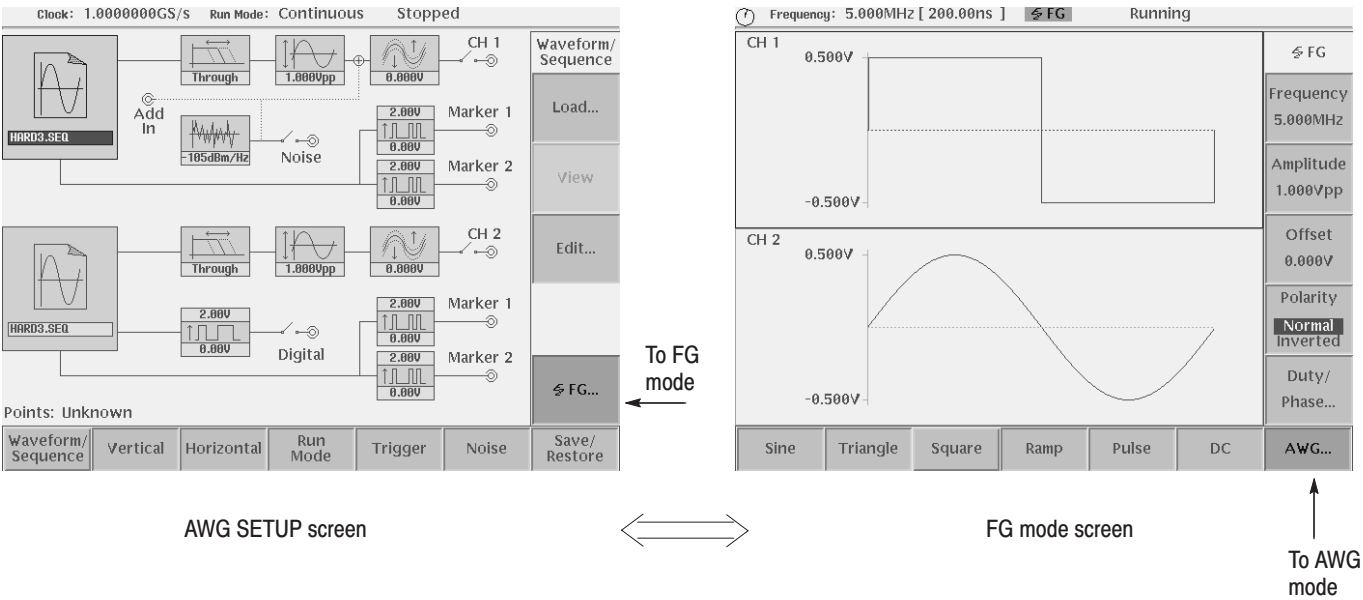


Figure 3-72: Change the generator mode (AWG520)

NOTE. All the parameters on the FG mode menu are independent of the AWG mode parameters. Therefore, the output parameters, such as frequency, amplitude and offset, have no effect on the parameters set with the SETUP menu while in the other mode.

In FG mode, the AWG 500 runs CONTINUOUS mode only.

Waveform type

Select the Channel

In the case of multiple channel models, AWG520, select the output channel first. The selected channel area is displayed enclosed in a frame. AWG510 displays only CH 1 waveform.

1. Push **CH1** or **CH2** (front) button to select the output channel.

Select the Waveform type

You can select Sine, Triangle, Square, Ramp, Pulse and DC waveform.

1. Push **Sine**, **Triangle**, **Square**, **Ramp**, **Pulse** or **DC** (bottom) button to select the desired waveform type.

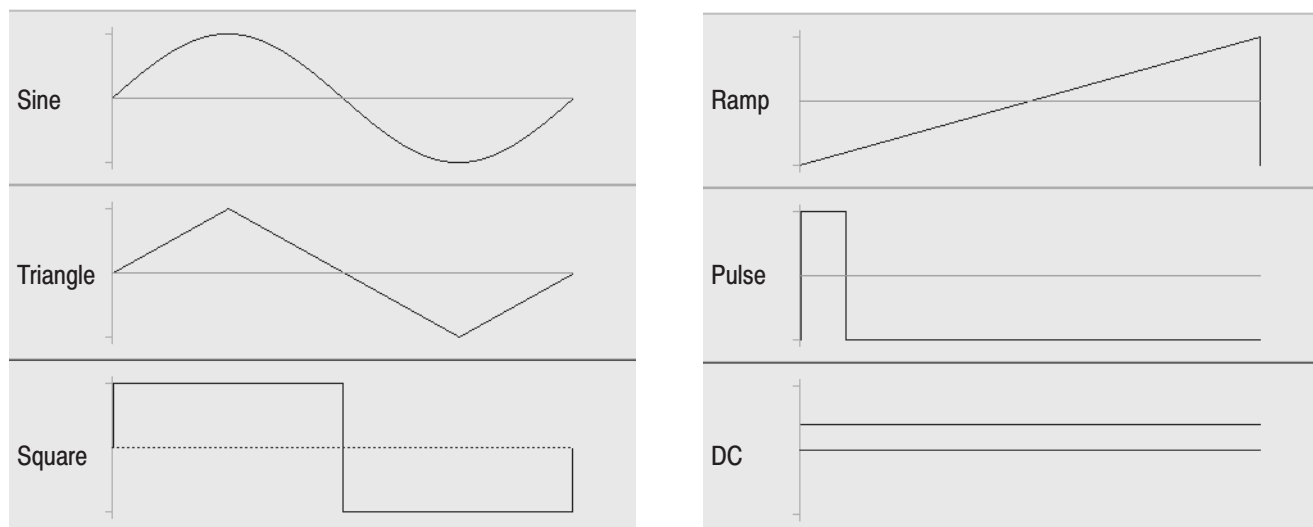


Figure 3-73: Waveform type

Parameters

Output parameters The output parameter menu selections are the same for each waveform except Pulse and DC. Pulse has one extra side menu item (Duty), and DC has only one side menu item (Offset).

A Multiple channel model, AWG520 , includes Phase side menu selection that allows you to phaseshift each channel's output.

NOTE. Frequency is the same for all channels. Amplitude, Offset and Polarity are set separately for each channel.

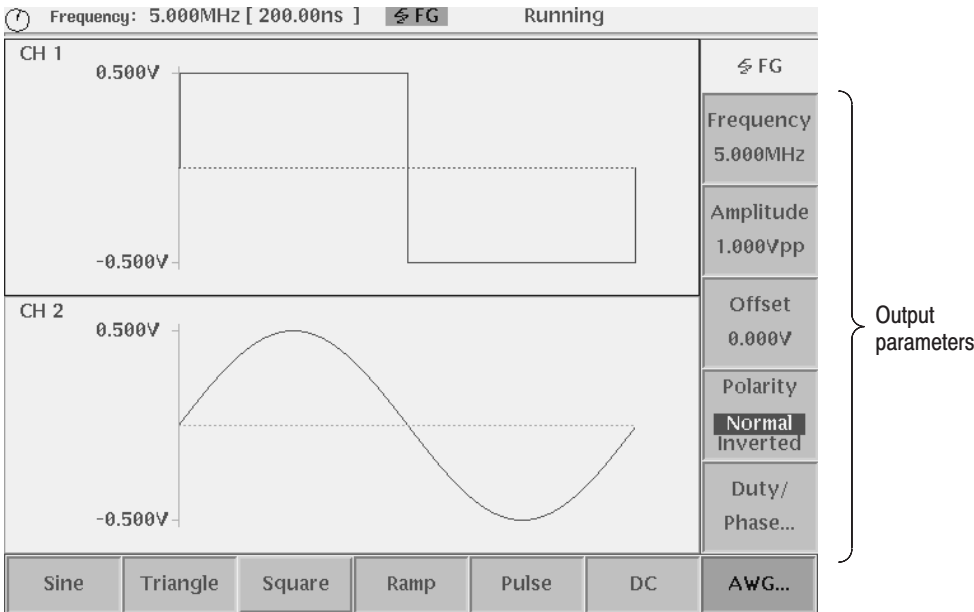


Figure 3-74: Output parameters (AWG520)

Frequency

The frequency is set with a 4-digit number from 1.000 Hz to 100.0 MHz using the SAMPLE RATE / SCALE knob, the numeric buttons or the general purpose knob.

The internal cut-off filter used is determined by the waveform type and the frequency selected. The cut-off frequencies are as follows;

Table 3–54: Output frequency and filter cut-off frequency

Waveform type	Output Frequency	Filter Cut-off Frequency
Sine	1.000 Hz to 2.000 MHz	20 MHz
	2.001 MHz to 5.000 MHz	50 MHz
	5.001 Mhz to 20.00 MHz	100 MHz

NOTE. *In case of the waveform which passed through the filter, there exists timing delay between the start points of waveform and marker.*

Amplitude

The amplitude output voltage range is from 0.020 V_{p-p} to 2.000 V_{p-p}, in 1 mV increments, terminated into 50 Ω.

Set the waveform amplitude using the LEVEL / SCALE knob, the numeric buttons or the general purpose knob.

Offset

The offset range is from –1.000 V to +1.000 V, in 1 mV increments. Use the VERTICAL OFFSET knob, the numeric buttons or the general purpose knob to set the waveform offset level.

Offset is also used for setup of DC level.

Polarity

This menu sets the output waveform polarity. Pushing the Polarity menu button toggles polarity between Normal and Inverted.

Duty

When you select Pulse waveform, Duty...(AWG510) or Duty/Phase... (AWG520) side menu is added. The Duty cycle is set from 0.1% to 99.9% using the numeric buttons or the general purpose knob. Incremental step size depends on the output frequency. Refer to Table 3–56 on page 3–199.

Phase (AWG520 only)

AWG520 have a phase shift function that allows you to shift the waveform horizontally. The Phase is set from –360 degrees to +360 degrees using the HORIZONTAL OFFSET knob, the numeric buttons or the general purpose knob. Incremental step size depends on the output frequency. Refer to Table 3–56 on page 3–199.

Marker signal Marker1 and Marker2 signals are generated and output from MARKER OUT1 and OUT2 rear connectors. The waveform marker signal has the same form as a pulse waveform. The level and width of the markers are fixed and cannot be changed. Table 3–55 describes the marker specification. Marker width depends on the output frequency. Refer to Table 3–56 on page 3–199.

Table 3–55: Predefined Marker signal

Waveform	Hi	Low	Level
Marker1	0 (phase = 0 deg.) to 20 % of one period of waveform	20 to 100 % of one period of waveform	Hi : 2V into a 50 Ω load
Marker2	0 (phase = 0 deg.) to 50 % of one period of waveform Frequency 25.01MHz to 40.00MHz 0 (phase = 0 deg.) to 52 % of one period of waveform	50 to 100 % of one period of waveform 52 to 100 % of one period of waveform	Lo : 0V into a 50 Ω load

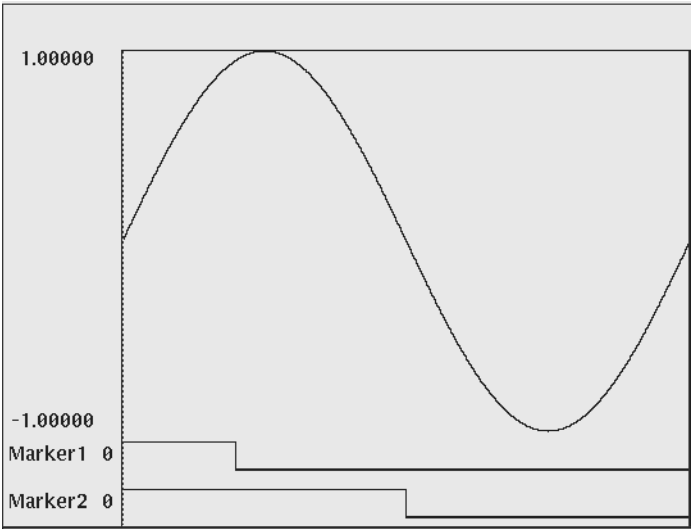


Figure 3–75: Marker pattern

Frequency and Resolution

While operating in FG mode, the output frequency determines the number of data points used to generate the waveform data and the marker data for one period. The resolution of Phase and Pulse Duty ratio and the width of Marker position corresponding to the number of data points are shown in the following table.

Table 3-56: Output Frequency and Waveform Length

Frequency	Number of Data Points	Phase Resolution (degree)	Duty Ratio Resolution (%)	Marker1 position ¹	Marker2 position ²
1.000Hz to 100.0kHz	10000	0.036	0.1	2000	5000
100.1kHz to 1.000MHz	1000	0.36	0.1	200	500
1.001MHz to 5.000MHz	200	1.8	0.5	40	100
5.001MHz to 10.00MHz	100	3.6	1	20	50
10.01MHz to 20.00MHz	50	7.2	2	10	25
20.01MHz to 25.00MHz	40	9	2.5	8	20
25.01MHz to 40.00MHz	25	14.4	4	5	13 ³
40.01MHz to 50.00MHz	20	18	5	4	10
50.01MHz to 100.0MHz	10	36	10	2	5

1: 20% position of 1 waveform period

2: 50% position of 1 waveform period

3: 52% position of 1 waveform period because of number of data points.

Operation Flow

When the AWG500 is in AWG mode, change to FG mode. Reference page 3-194.

1. Push **CH1** or **CH2** (front-panel) button to select the output channel. (AWG520 only)
2. Push **Sine**, **Triangle**, **Square**, **Ramp**, **Pulse** or **DC** (bottom) button to select the waveform.
3. Set the output parameters according to the waveform selected.
 - Duty is added to the side menu for Pulse mode.
 - Offset is only used for setup of DC level. Offset is selected on the DC side menu.

AWG520 only

- Frequency is common to all channels.
- Phase is added on the side menu.
- Amplitude, Offset, Polarity and Phase can be set for each channel

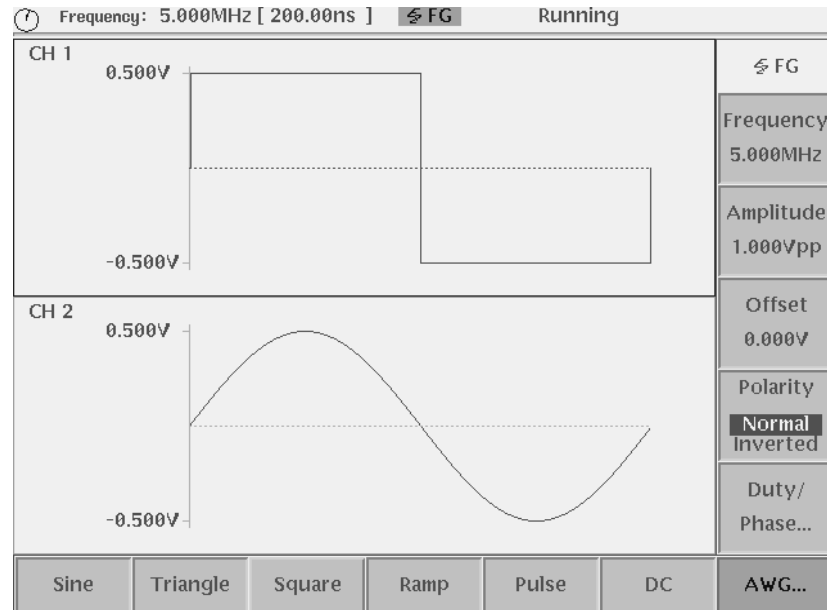


Figure 3-76: Pulse sub-side menu (AWG520)

4. Push the **RUN** (front) button to turn on the RUN LED. Usually, when it switches to FG mode from AWG mode, it automatically changes to the run state (the RUN LED is on).
5. Push the **CH(1 or 2) OUT** button to output the signal at the corresponding output connector.