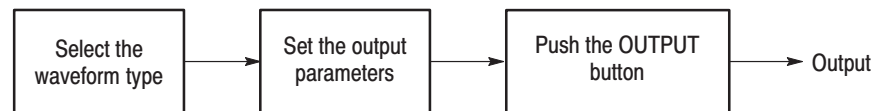


# FG Mode

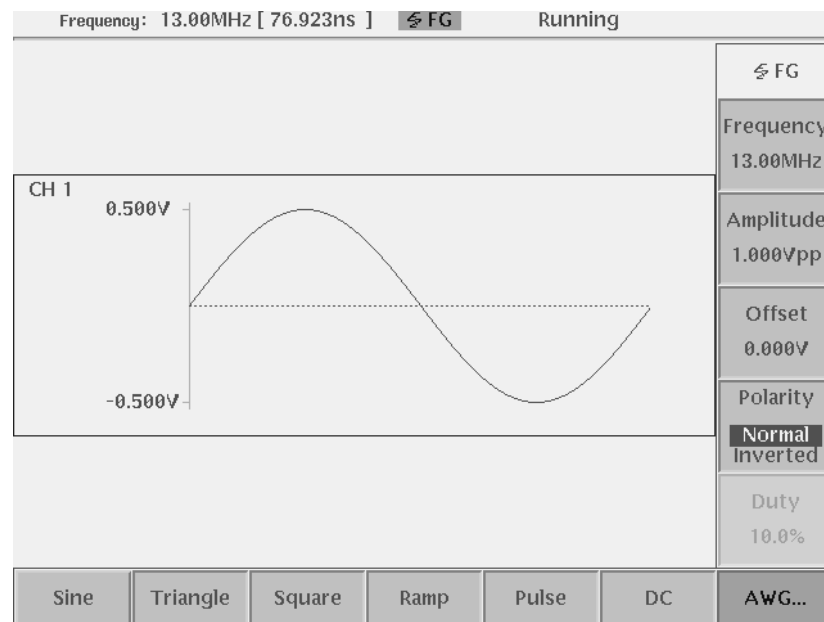
The AWG610 Arbitrary Waveform Generator provides the Function Generator (FG) mode to output standard function waveform. This section describes the FG mode.

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

- Select the waveform type.
- Set the output parameters such as frequency and amplitude.
- Turn the OUTPUT button to ON.



**Figure 3-71: Outline flow for producing Function Generator signal**



**Figure 3-72: FG mode screen**

# 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.

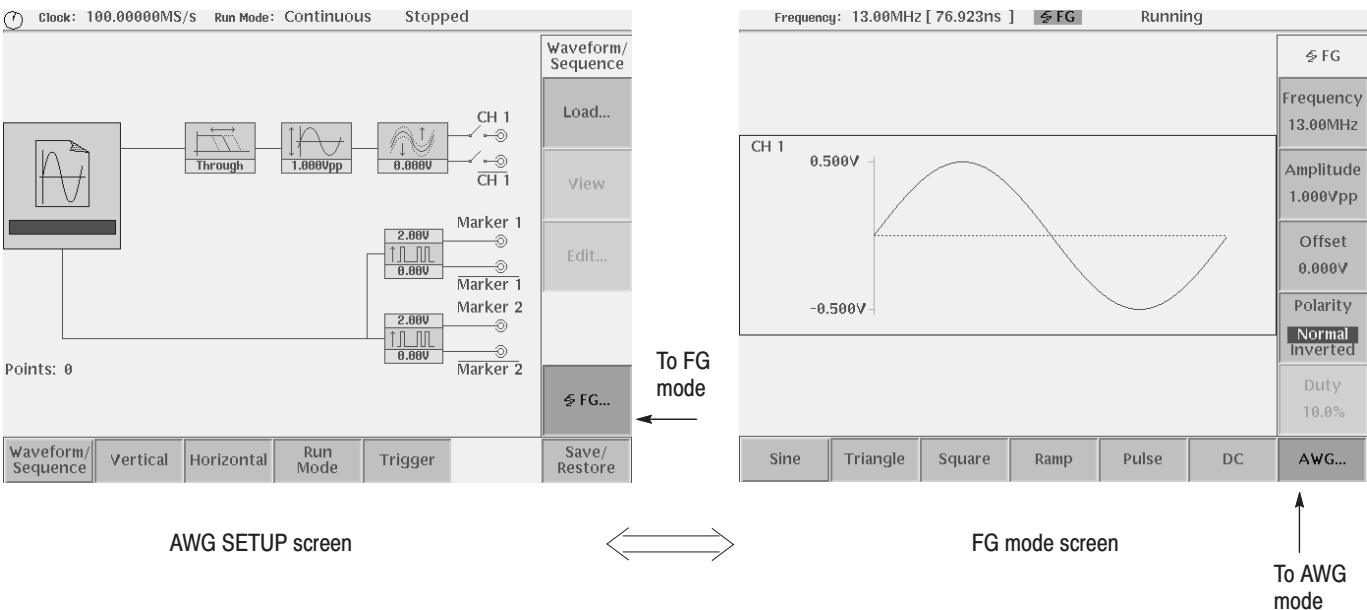


Figure 3-73: Change the generator mode

**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 610 runs CONTINUOUS mode only.

## Waveform type

### 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.

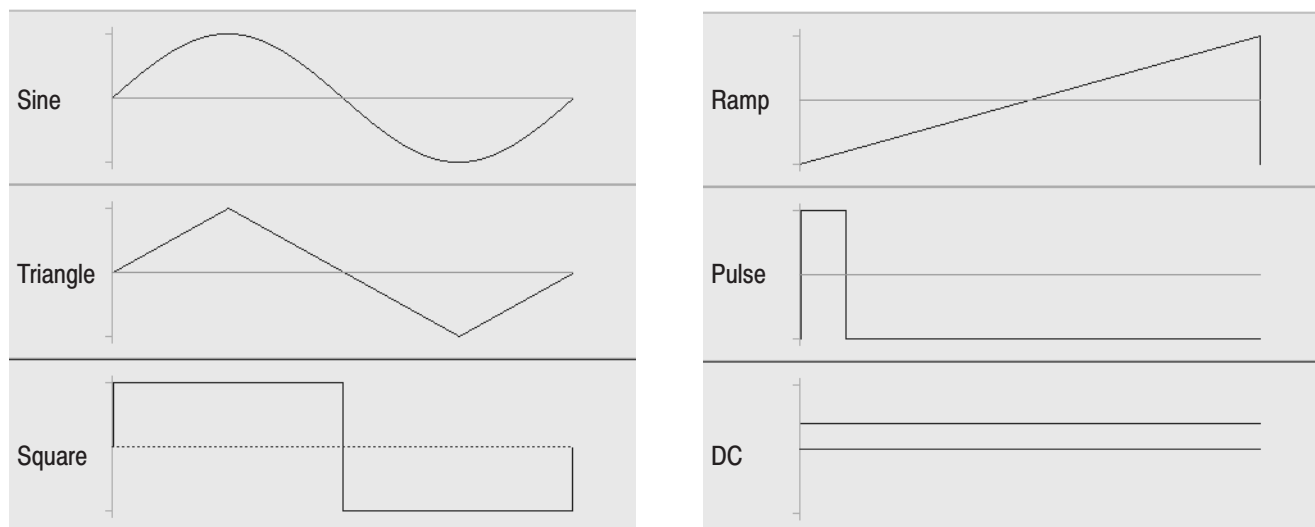
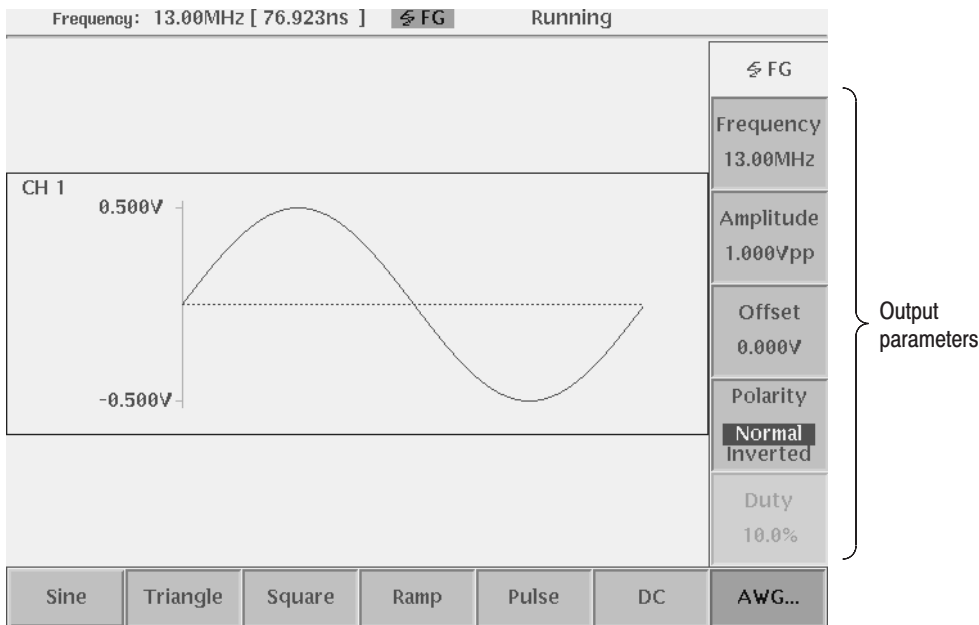


Figure 3-74: Waveform type

### 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).



**Figure 3-75: Output parameters**

### Frequency

The frequency is set with a 4-digit number from 1.000 Hz to 260.0 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 260.0 KHz	20 MHz
	260.1 KHz to 2.600 MHz	50 MHz
	2.601 MHz to 8.000 MHz	100 MHz
	8.001 MHz to 15.00 MHz	200 MHz

**Amplitude**

The amplitude output voltage range is from 0.020 V<sub>p-p</sub> to 2.000 V<sub>p-p</sub>, in 1 mV increments, terminated into a 50  $\Omega$  load. 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**

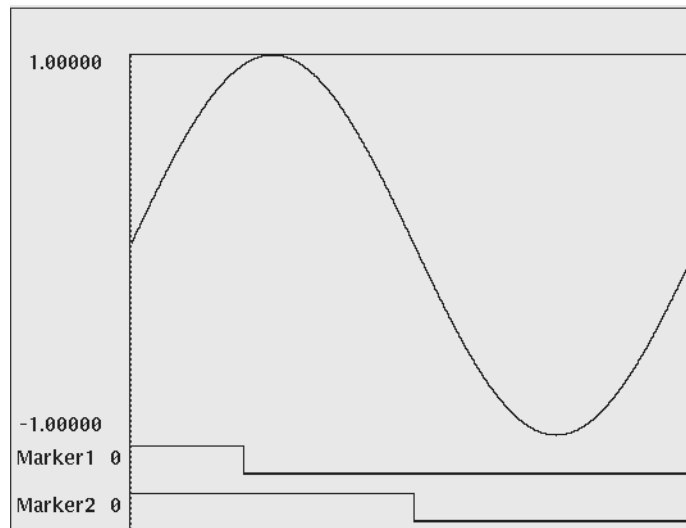
When you select Pulse waveform, Duty... side menu is added. The Duty cycle is set from 0.1% to 99.9% using the numeric buttons or the general purpose knob. Increment step size depends on the output frequency. Refer to Table 3–56 on page 3–227.

**Marker signal**

Marker1 and Marker2 signals are generated and output from MARKER OUT1, MARKER OUT1, MARKER OUT2 and MARKER OUT2 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 Table3–56 on page 3–227.

**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 : 2.0V Low : 0.0V
Marker2	0 (phase = 0 deg.) to 50 % of one period of waveform  Frequency: 65.01MHz to 104.0MHz 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	Hi : 2.0V Low : 0.0V

**Figure 3–76: 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 Pulse Duty cycle 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	Duty Ratio Resolution (%)	Marker1 position <sup>1</sup>	Marker2 position <sup>2</sup>
1.000Hz to 260.0kHz	10000	0.1	2000	5000
260.1kHz to 2.600MHz	1000	0.1	200	500
2.601MHz to 13.00MHz	200	0.5	40	100
13.01MHz to 26.00MHz	100	1	20	50
26.01MHz to 52.00MHz	50	2	10	25
52.01MHz to 65.00MHz	40	2.5	8	20
65.01MHz to 104.0MHz	25	4	5	13 <sup>3</sup>
104.1MHz to 130.0MHz	20	5	4	10
130.1MHz to 260.0MHz	10	10	2	5

1: 20% position of 1 waveform period

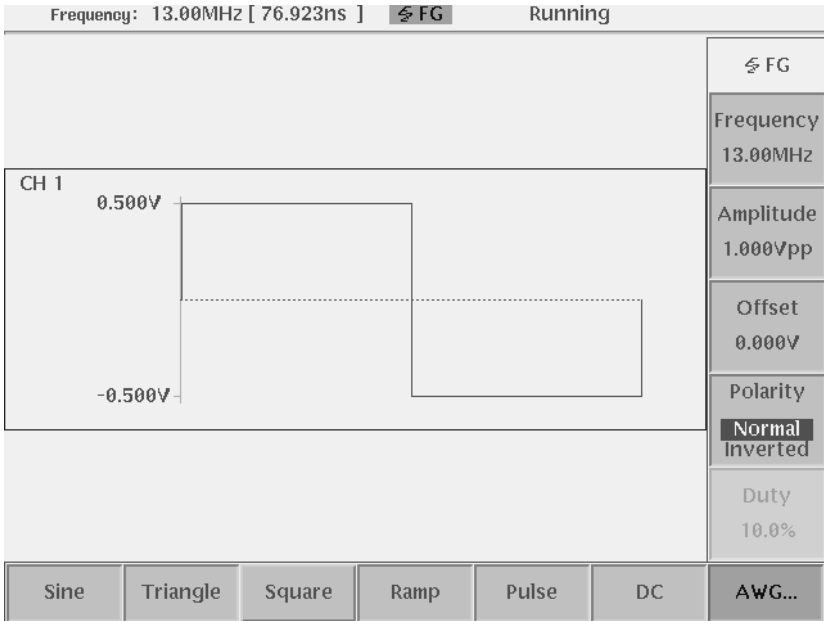
2: 50% position of 1 waveform period

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

## Operation Flow

When the AWG610 is in AWG mode, change to FG mode. Reference page 3-222.

1. Push **Sine**, **Triangle**, **Square**, **Ramp**, **Pulse** or **DC** (bottom) button to select the waveform.
2. 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.



**Figure 3-77: Pulse sub-side menu**

3. 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).
4. Push the **CH1 OUT** button to output the signal tat the corresponding output connector.