

Amtery RF Synthesizer Software Panel Guide

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1. Overview

1.1. Scope

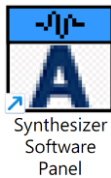
This guide introduces the Amtery USB-programmable RF synthesizer and shows how to control it using the Synthesizer Software Panel.

1.2. Getting started

- A. System requirement: Synthesizer Software Panel supports Microsoft Windows 7/8/10/11.
- B. Installation: Download the Amtery synthesizer software from Amtery web site and install it.
- C. Insert Amtery Synthesizers with USB interface.

1.3. Launch the interactive panel

- A. Launch it from desktop. Double click "Synthesizer Software Panel".



- B. Launch it from Windows start up program "Amtery Synthesizer" -> "Synthesizer Software Panel".

2. Panel Introduction

Synthesizer Software Panel controls Amtery synthesizers with USB interface without programming.

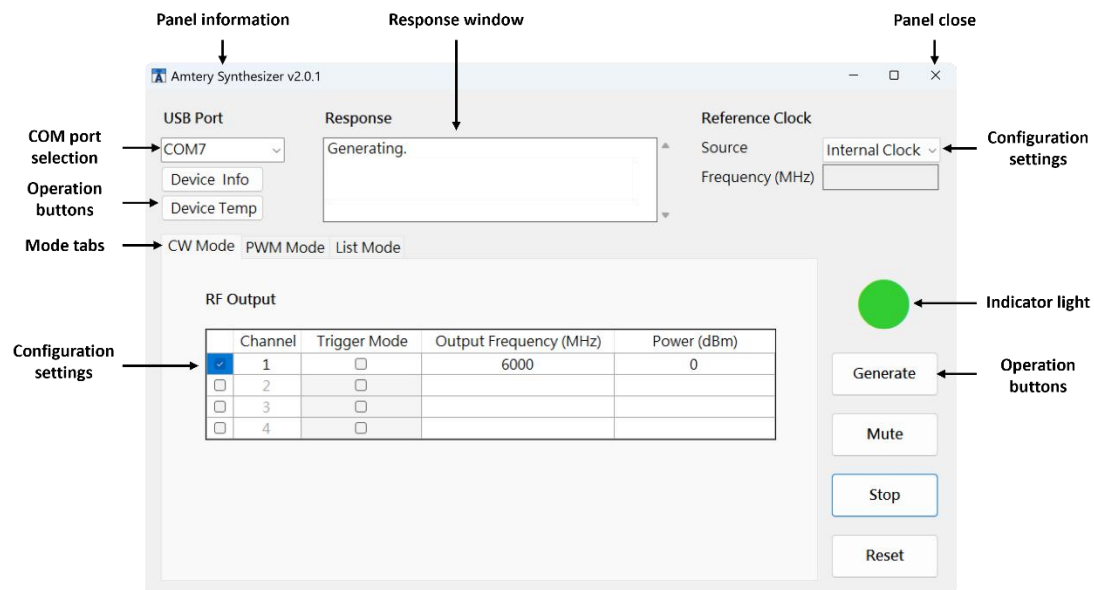


Figure 1. Panel in CW Mode.

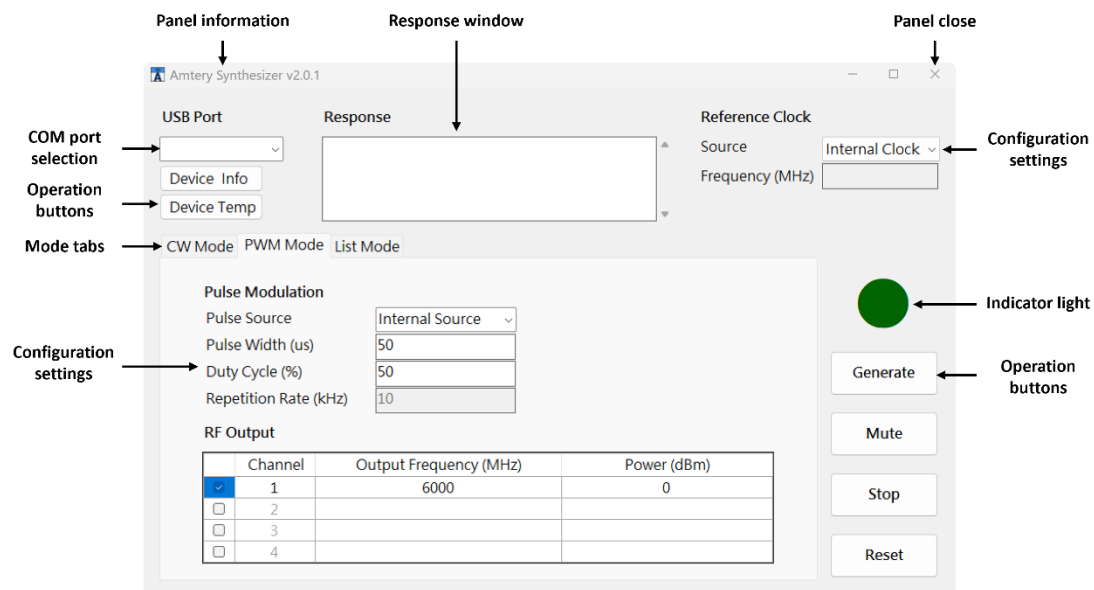


Figure 2. Panel in PWM Mode.

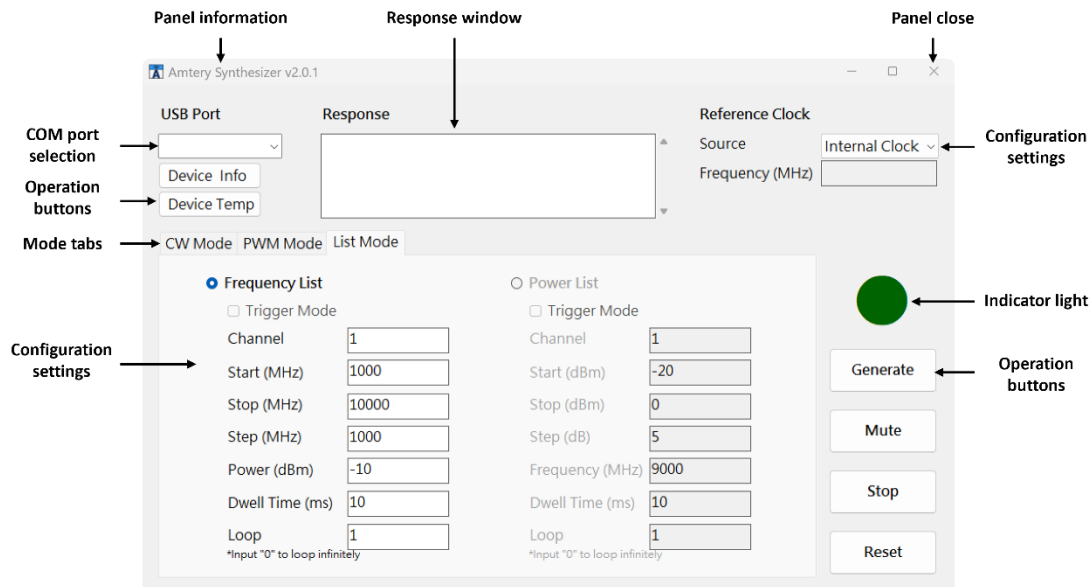


Figure 3. Panel in List Mode.

2.1. Drop down COM Port selection

Use the drop-down menu to select the synthesizer that is connected to the PC. Once selected, the panel will automatically establish a connection with the device.

2.2. Panel Close

Click the “X” icon right up the window to close both the panel and the application.

2.3. Response Column

The column at the top of the panel displays the information displays system messages and feedback after each operation (e.g., successful commands, errors, or warnings).

2.4. Mode Tabs

Click the tabs to switch between different operation modes.

- A. CW Mode: Continuous wave mode for constant frequency generation.
- B. PWM Mode: Pulse width modulation mode for pulsed output with specific pulse width and duty cycle settings.
- C. List Mode: Enables automatic frequency or power hopping through the defined range based on the user settings. See section 3 for detailed behavior.

2.5. Configuration Settings

The configuration settings are user-input. Enter the desired value before pressing “Generate”.

The settings are different from mode to mode.

2.5.1 Reference clock section

Configure the reference clock using the following settings:

- A. Source: Use the drop-down menu to select either Internal or External clock as the reference. The default is the internal clock.
- B. Frequency (MHz): Enter the frequency of the external clock in MHz. If an invalid value is entered, the system will revert to the default.

2.5.2 CW Mode

The RF Output table consists of three columns:

- A. Channel: Activate the channels by checking the box on the left of each channel number.
- B. Trigger Mode: Provide RF signal control (on/off) through trigger input. Checked to use this mode.
- C. Output Frequency (MHz): Set the output frequency in MHz. Invalid entries will trigger an error message.
- D. Power (dBm): Set the output power level in dBm. If the power set exceeds the synthesizer’s capability, a warning message will be displayed.

2.5.3 PWM Mode

This mode includes two parts: Pulse Modulations and RF Output. This section only covers pulse modulations settings. For RF Output, refer to the 2.5.2.

- A. Pulse Source: Use the drop-down menu to select either internal or external source as the pulse modulation. The following parameters are ignored if an external source is selected.
- B. Pulse Width: Set the pulse width in seconds (unit: 100 ns). Invalid entries will trigger an error message.
- C. Duty Cycle (%): Set the duty cycle of the pulse modulation. Only integer is allowed to input.
- D. Repetition Rate (Hz): A read-only field displaying the repetition rate in Hz of the pulse based on the current pulse width and duty cycle.

2.5.4 List Mode

This mode includes two sub-modes: Frequency List and Power List, each with seven configurable parameters. Selecting the corresponding label to activate the mode. See section 3 for detailed behavior.

- A. Trigger Mode: Provide RF signal control (switch frequency) through trigger input. Checked

to use this mode.

- B. Channel: Specify the output channel.
- C. Start (MHz) / Start (dBm): Set the starting frequency in MHz or start power in dBm of the list.
- D. Stop (MHz) / Stop (dBm): Set the ending frequency in MHz or stop power in dBm of the list.
- E. Step (MHz) / Step (dBm): Set the step size in MHz or in dBm of the list.
- F. Power (dBm): Set the power level in dBm in Frequency List mode.
- G. Frequency (MHz): Set output frequency in MHz in Power List mode.
- H. Dwell Time (ms): Set duration of each output point in millisecond.
- I. Loop: Set repeat time of the full list. Input "0" to loop infinitely.

2.6. Indicator light

After pressing "Generate", the indicator light will turn on (see Figure 1) if the RF output is correctly generated.

2.7. Operation Buttons

- A. Device Info: Displays the device information in format: "Amtery" + "model name" + "firmware version" + "serial number (SN)".
- B. Device Temp: Reads and displays the device's internal temperature in °C.
- C. Generate: Writes the desired settings (such as channel, frequency, power level, etc.) into the device and starts RF output.
- D. Mute: Pause RF output while keeping internal frequency generation active. This helps maintain power stability.
- E. Stop: Stops RF output.
- F. Reset: Resets the device to its default state.

3. Synthesizer List Mode

In List Mode, either Frequency List or Power List can be selected. In frequency list mode, the synthesizer generates a sequence of frequency points with the same power level based on the specified start frequency, stop frequency, and step size. The output duration for each frequency point is determined by the configured dwell time. Additionally, the number of repetitions of the frequency sequence can be set using the loop parameter. If the loop value is configured as 0, the sequenced output will repeat until either the stop button is pressed, or the device loses power.

Using the settings shown in Figure 3 as an example, since frequency list is selected, the synthesizer will generate RF output with power level -10 dBm at 1 GHz, 2 GHz, ..., up to 10 GHz, with 1 GHz increments between each point. Each frequency point will be held for 10 milliseconds before transitioning to the next point in the list. After completing the full list, the sequence will stop automatically.

If power list is selected, the synthesizer will generate RF output at 9 GHz with power level -20 dBm, -15 dBm, ..., and ending at 0 dBm, with 5 dBm increments between each point. Each point will be held for 10 milliseconds before transitioning to the next point in the list. After completing the full list, the sequence will stop automatically.

If the given step size cannot exactly divide the difference between start frequency (or power) and stop frequency (or power), the actual stop frequency (or power) point of the list will be the largest divisible value within the range. For example, assume the start frequency is 1 GHz, stop frequency is 2 GHz, and step size is 300 MHz. The range covers 1000 MHz which is not evenly divisible by 300 MHz. To ensure that the difference between each frequency point is 300 and not exceed the range, the actual stop frequency will be 1.9 GHz.

4. Trigger Mode

Trigger Mode can be enabled in both CW Mode and List Mode to control RF output via an external trigger. The trigger signal should meet the following requirements: voltage = 3.3 V, pulse width > 60 ns, and current > 400 μ A.

Enable this feature by checking the "Trigger Mode" box. The operational behavior varies by mode: In CW Mode, the trigger serves as a real-time gate, toggling the RF output On or Off based on the status of the designated trigger ports.

In List Mode, the device outputs the initial RF signal and then pauses. It will only proceed to the next programmed state upon detecting a valid external trigger pulse.