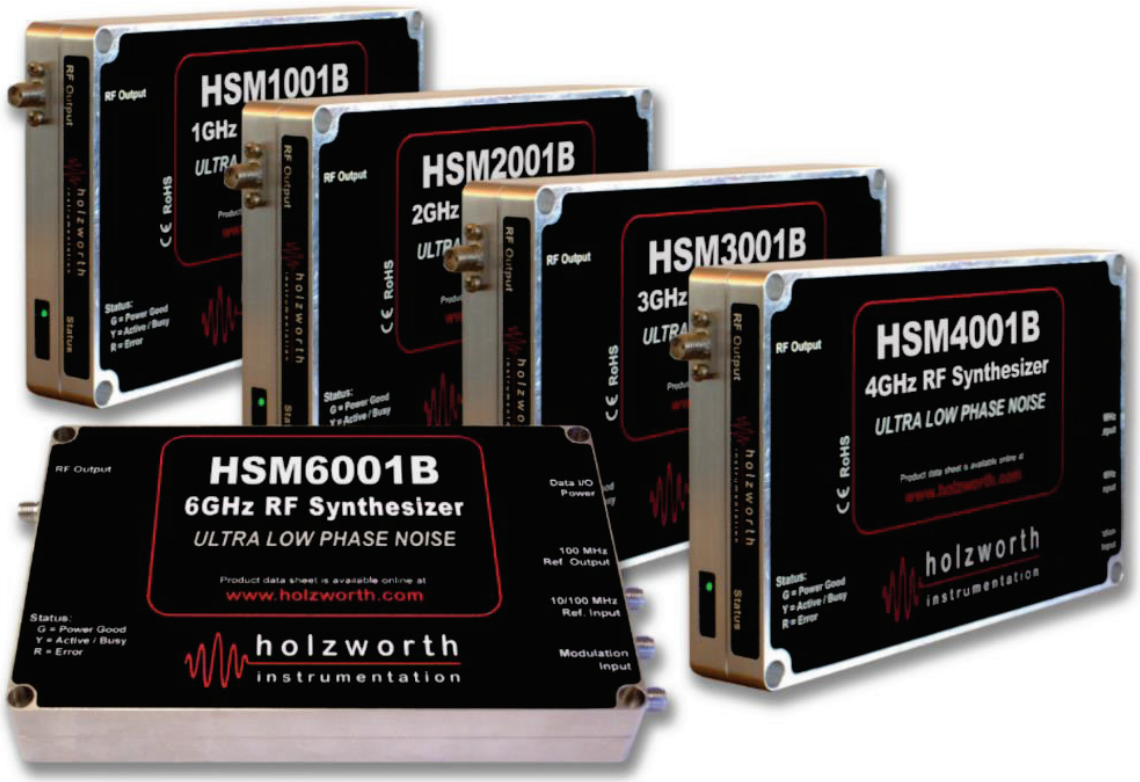
HSM Series Quick Start Operation Guide

The following is a guide to connect and control any of the HSM Series modules.



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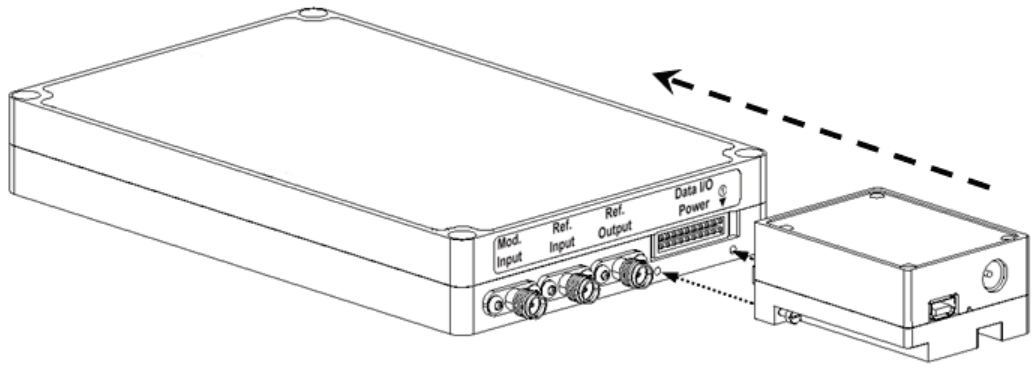
REQUIRED HARDWARE

Required hardware includes any of the above HSM units, an HCM1 or HCM3 communications module, DC power supply, USB or Ethernet communications cable, and a PC with Windows 10 or later. For general information about the modules follow this link to our website: https://holzworth.com/products/rf-synthesizer-modules

DEVICE CONNECTION

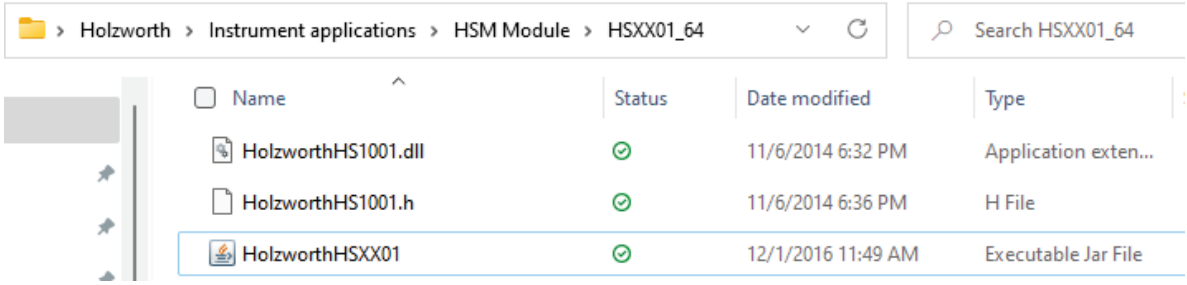
The HCM Communications Module is an SPI to USB (or Ethernet) adapter that includes a power supply adapter allowing the user to connect the RF synthesizer to standard AC power. The SPI connector on the module should be inserted into the synthesizer SPI receiving connector and the screws should be tightened for a secure communications connection (see figure below). Connect the power pin and either USB mini type B, or RJ-45 Ethernet communications cable. The HCM module creates a USB (or Ethernet) connection to a Windows PC so the Holzworth GUI can be used to control the synthesizer. No drivers are required to run the Holzworth GUI.



HCM1 USB Communications Module with power supply (displayed)
HCM3 Ethernet Communications Module with power supply (also available)

The modules are a recommended accessory for integrating the HSM Series synthesizers via the SPI bus. More information can be found on our website: https://holzworth.com/products/rf-synthesizer-modules

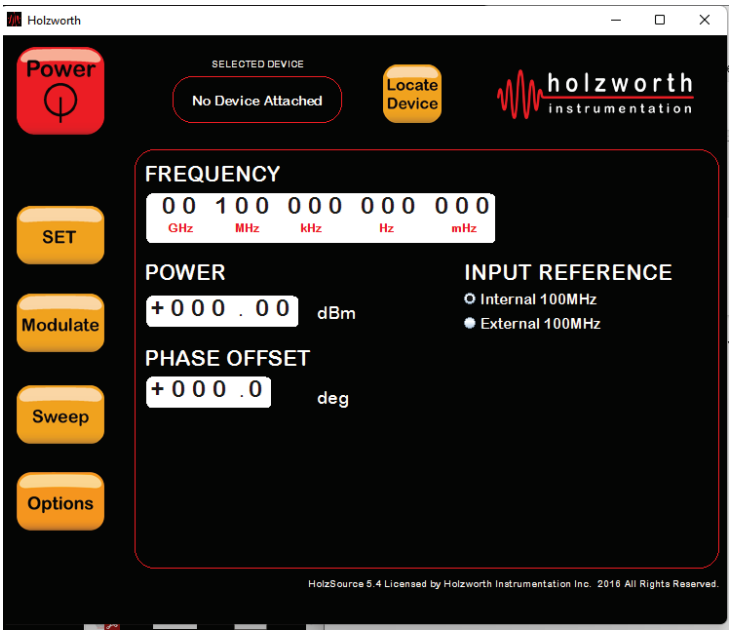
After providing power and a communications cable to the unit, locate the Holzworth Jar file on the Windows PC in the figure below. The same GUI is used for both USB and Ethernet control of the device. Making a connection is a manual operation and is dependent upon the communications module attached to the module. Follow this link to the GUI software: https://holzworth.com/resource-library/software



The application GUI is opened by double-clicking on the “HolzworthMulti.jar” executable file.

NOTE: A 32-bit or 64-bit version can be found on the website depending on the controller data bus width.

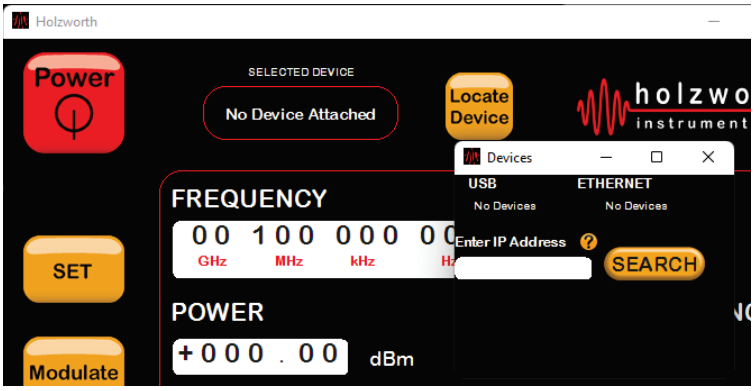
After double-clicking, the GUI default **SET** window will open as shown below.



To connect to the device, press the **Locate Device** button at the top center of the GUI window.

Pressing the button initiates the **Devices** popup window and lists all synthesizers connected to your PC.

NOTE: The **Devices** window appears with “No Devices” selected for either USB or Ethernet.



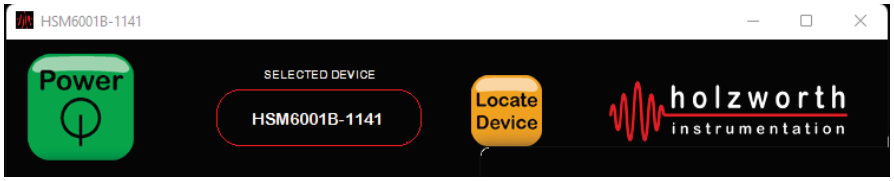
Click on the **SEARCH** button and then click directly on the “No Device Attached” text and the **Devices** window will disappear.

Re-open the **Locate Device** tab and the model and serial number should appear. If a “no connection error message,” appears ignore it and repeat the above process.

- If it does not connect, check HSM power, the communications connections, and the PC connections.
- If a connection cannot be achieved, make sure the Ethernet or USB connections are open and enabled under the windows “Network & Internet” settings.
    - Network & Internet > Advanced network settings > Hardware and connection properties.

Click on the model/serial number in the **Devices** window and the unit model/serial number will appear in the **SELECTED DEVICE** box.

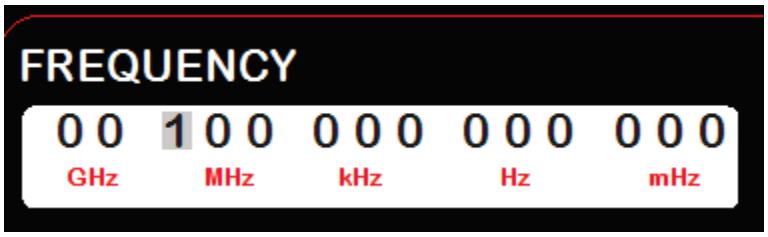
The power button will turn green and you can begin controlling the module (see figure below for connections).



DEVICE CONTROL

Once you are properly connected, the **SET** menu window is available and the GUI default values are a 100 MHz carrier frequency at 0 dBm power and 0° phase offset.

Check the unit is operating with a spectrum analyzer, phase noise analyzer, or oscilloscope to verify the output signal.



To change any setting, click on a digit in the appropriate window and the number will be highlighted (figure above). Enter the desired value and press return on the PC keyboard. Other digits can be modified by using the mouse, or the right and left arrow keys.

MODULATION WINDOW

The **Modulation** window provides access to all the internal modulation capabilities of the synthesizer. See the HSM datasheet for additional specifications on the modulation: https://holzworth.com/products/rf-synthesizer-modules

Selecting the **Modulate** button will initiate a popup window that enables the various modulation capabilities including triggered list mode for both wide and narrow band lists. The list modes provide the fastest switching speeds between points but require a CSV list of appropriate parameters.

Click on the **Enable** button to select a particular modulation type, including the **Wide Band** or **Narrow Band** list functions.

Disable Modulation returns the **SET** menu (below) control for frequency, power, phase offset, and input reference.

Enable Mode Set Button

The **Enable** mode set button displays the screen as pictured above. In this mode, the modulation type, sweep, or list type is selected via radio buttons. The specific detail of each mode is described in the following paragraphs.

FM Mode: The **FM** mode set button allows the user to set the frequency modulation deviation to within the specified limits (in Hz). The maximum deviation is 100 kHz.

PM Mode: The **PM** mode set button allows the user to set the phase modulation deviation to within the specified limits (in degrees). The maximum deviation is 180 deg.

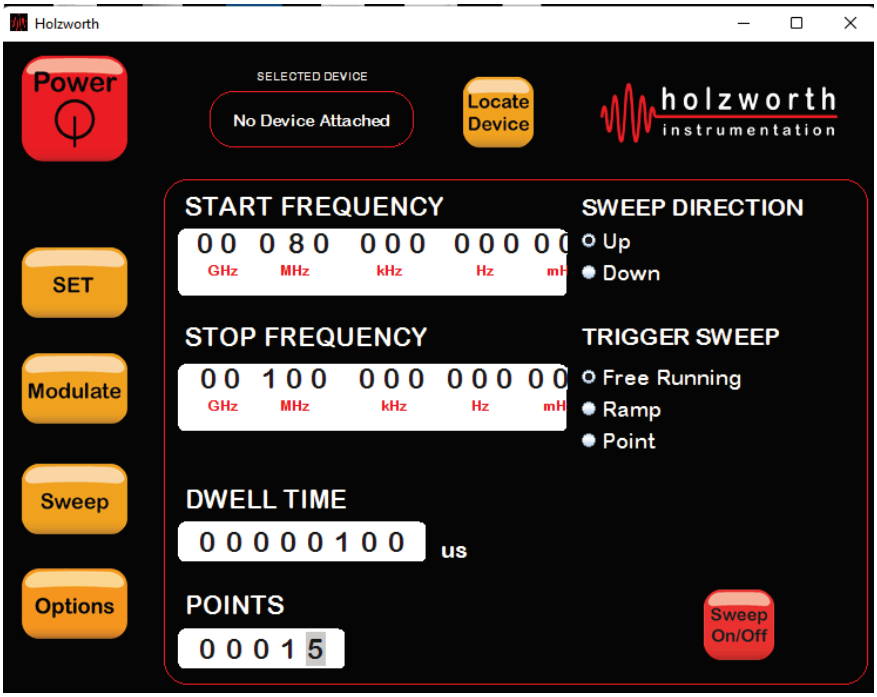
AM Mode: The **AM** mode set button allows the user to set the amplitude modulation deviation to within the specified limits. The maximum AM depth is 75%.

Pulse Mode: The **PULSE** mode set button provides access to the pulse control panel. This has panel settings for external and internal pulse modulation, or internal pulse modulation with triggers. Settings related to internal pulse modulation include pulse repetition rate, pulse width, and the number of pulses.

- **REPETITION RATE:** The pulse rep rate allows the user to set the time between rising edges of a pulse. This setting does not apply when using external pulse modulation.
- **WIDTH:** The pulse width allows the user to set the time interval between the leading edge and trailing edge of a pulse. This setting does not apply when using external pulse modulation.
- **NUMBER OF PULSES:** The number of pulses allows the user to specify the number of output pulses. This setting only applies when using internal pulse modulation with trigger. A trigger signal at the modulation input port will start the output pulsing and the counter to track the number of pulses.

SWEEP MODE WINDOW

The **Sweep** mode set button gives the user access to the sweep function control panel. The control panel allows for setting the start/stop frequencies, dwell time between points, and the number of points to use within the sweep range. The user can also set the sweep direction up/down, and the trigger sweep mode.



DWELL TIME: The **DWELL TIME** setting is for controlling the delay time (in microseconds) in between each point in the sweep bandwidth.

Number of POINTS: ***The number of points may be limited depending on the sweep bandwidth selected.***

NOTE: The maximum number of points allowed for any sweep is 65535.

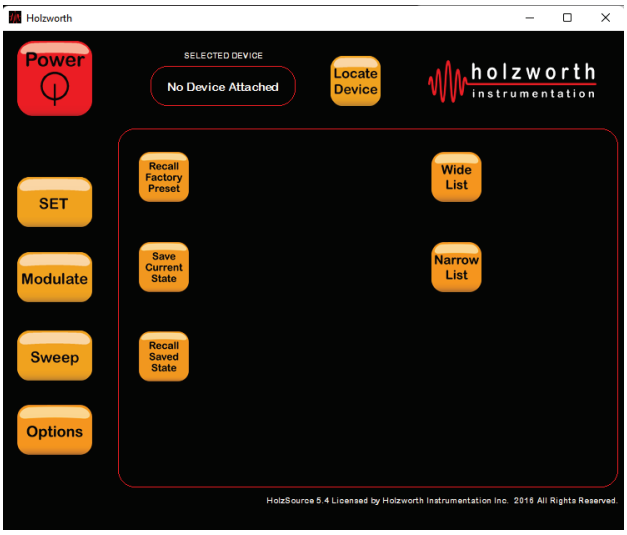
TRIGGER SWEEP Free Running: Selecting **Free Running** sweep mode will initiate the entire set bandwidth sweep to begin the moment the **Sweep** radio button is selected under the **Enable** mode.

TRIGGER SWEEP Ramp: Selecting the **Ramp** sweep mode will initiate an entire set bandwidth sweep with a trigger signal at the modulation input port.

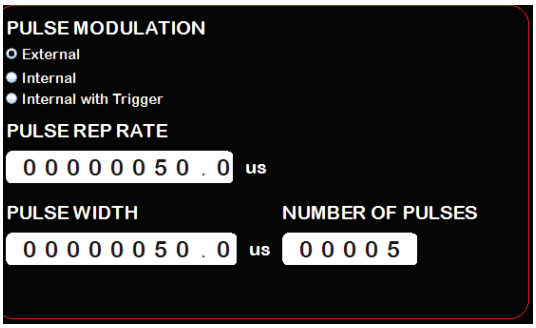
TRIGGER SWEEP Point: Selecting the **Point** sweep mode will initiate each individual point step in the sweep bandwidth at each trigger signal.

NOTE: Once sweep mode is initiated, it will loop (restart) continuously until the routine is manually interrupted.

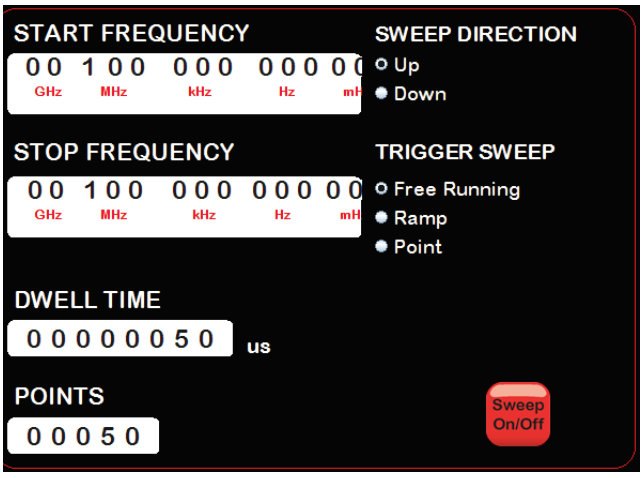
The **Options** window provides access to the factory preset, save/recall user settings, and wide/narrow CSV list files in the figure below.



The factory preset modulation is 1 kHz FM deviation, 180° phase deviation, 95% AM depth, and the pulse settings below.



The default sweep mode is in the figure below.

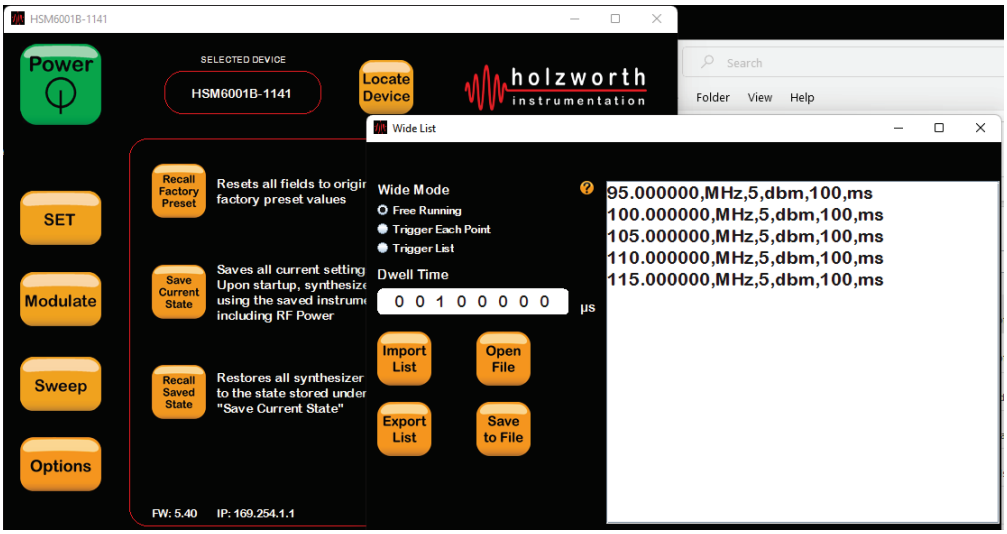


LIST MODE

List mode allows for up to 3201 points (command lines) to be stored and each command line allows for modification of any or all the following parameters: frequency, amplitude, and dwell time between points.

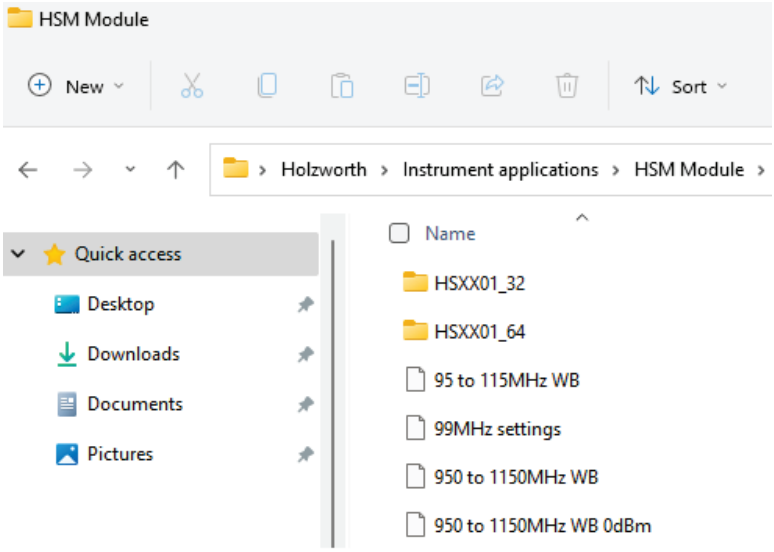
Wide List and **Narrow List** modes use identical load commands with limitations in the narrow list settings listed in the web datasheet: https://holzworth.com/products/rf-synthesizer-modules. Selecting either list button will initiate a popup window represented in the illustration below.

The list can be edited in the GUI window, or outside the software program in a text editor application.



NOTE: The recall factory preset does not include either list mode, and a CSV list must be created by the end user.

Examples of wide and narrow band list files are stored in the HSM module directory of the main Holzworth directory. These files can be created and modified to change the RF signal output.



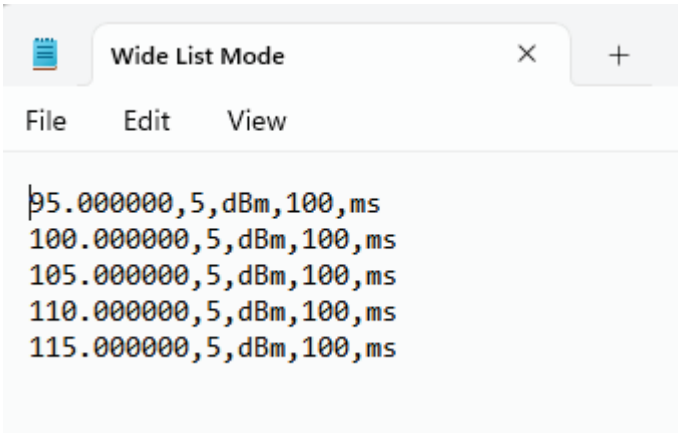
Wide List Mode Example

Below is a method to load a list via the GUI using a basic text editor like notepad.

WIDE LIST COMMAND LINE FORMAT: A,B,C,D,E,F Comma separated (.csv).

A = Frequency value (non-restricted number of decimal places)
B = Frequency units (Hz, kHz, MHz, or GHz)
C = Amplitude value (up to 2 decimal places)
D = Amplitude units (dBm)
E = Dwell Time for each point (up to 6 decimal places)
F = Dwell Time units (ms or µs)

- Example CSV list for GUI text window: “100, MHz, 10.00, dBm, 10, ms”
- Example “Wide List Mode” CSV file with 5 points that step from 95 MHz to 115 MHz in 5 MHz steps at an amplitude of +5 dBm with 100 ms dwell between samples (see figure below).
- If dwell time is not specified on every line of your list, the dwell time is set in the main menu.
- Narrow band files are created and modified the same as the wide list except the amplitude parameters (C & D) are not available.



NOTE 1: As with the **Wide List** mode command line format, setting any dwell time (E) inside the loaded list mode file will cause the global dwell time setting (at list mode control panel) to be ignored.

NOTE 2: The 5% frequency range limitation for **Narrow List** mode is defined as: the center frequency (fc) ± 2.5%.

SELECT FILE: Once the **Wide List** or **Narrow List** radio button has been selected, an **Open File** window is displayed for the user to select and load a preconfigured, comma-delimited list file. Selecting a file or pressing the **Cancel** button will then initiate the list mode control panel as shown above.

Import/Export List Buttons

This feature set is used for list file management. The function of each button is defined as follows.

Open File: The **Open File** button is used to open a pre-formatted CSV file if a file was not initially selected. Opening a file will load it into the **List Transfer** window, but not onto the channel.

NOTE: The file will still need to be imported to the module.

Import List: Once a series of list command lines have either been manually entered into the **List Transfer** window or via loading a preconfigured CSV file, the **Import List** button must be selected to finalize the loading of the list.

Export List: This feature allows a user to export a list file into the **List Transfer** window. It is useful for verifying that a specific list has been loaded.

Save to File: The **Save to File** feature is used to save a CSV file of whatever list command line data is currently loaded in the **List Transfer** window.

NOTE: Free running list mode is available on all units and triggered list mode is only available on units with the external modulation option as OPT-EXTMOD, which provides an external stimulus input port for a trigger signal.

For more information about our modules or other products, please visit our website at: https://holzworth.com