



UVS HOST CONTROL SOFTWARE

Induction

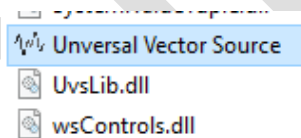
The UVS host computer control software is a free ware to control WavesLine UVS device via USB interface. The software works on Windows platform with .Net Framework 4.7.2 or higher.

Prepare to Start

- Attach UVS device to host computer via USB interface.
- Turn on UVS power (on UVS front panel)
- Wait several seconds until UVS completes hardware Initialization
- If it is the 1st time for the computer to connect a UVS device, it may take some time to install device driver to operation system. Windows 10 (or higher) is able to recognize the hardware and install proper device driver automatically, and it may consume some time to complete the whole process.

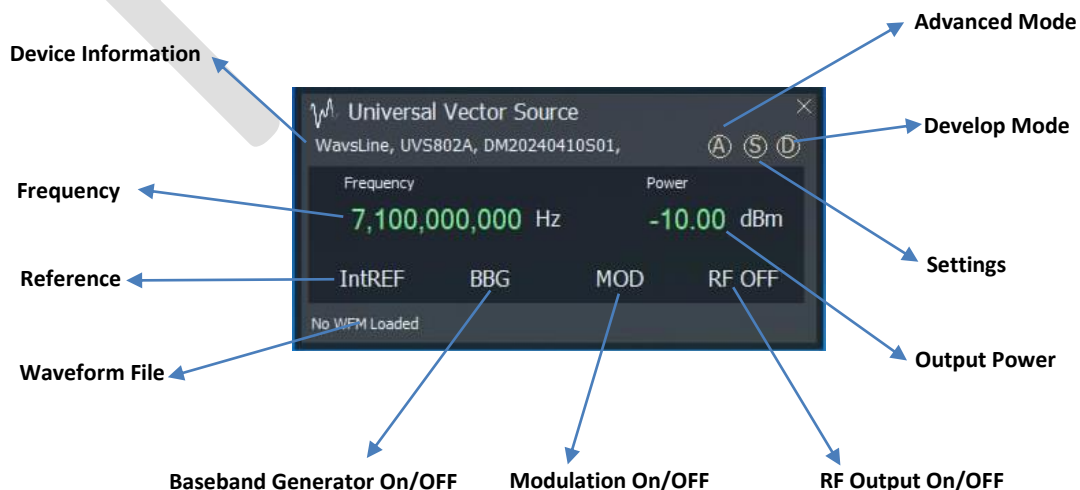
Start the Software

- Download software package form Wavesline website and unzip to a local folder.
- Run 'Universal Vector Source.exe' from the unzipped folder.



Main Window

The software main form provides basic operations to control the UVS hardware. The control details are shown in below figure.





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Device Information: device basic information including device model number as well as serial number.

Frequency: device output frequency in unit of Hz.

Reference: switch device frequency reference to external 10M input or internal source.

Waveform File: the baseband waveform file that is loaded to UVS device.

BBG: switch baseband generator output ON/OFF. Color in green when ON and in white when OFF.

MOD: switch modulation ON/OFF. Color in green when ON and in white when OFF.

RF Output: switch RF output ON/OFF. Color in green when ON and in white when OFF.

Output Power: device output power in unit of dBm. Color in green when ON and in white when OFF.

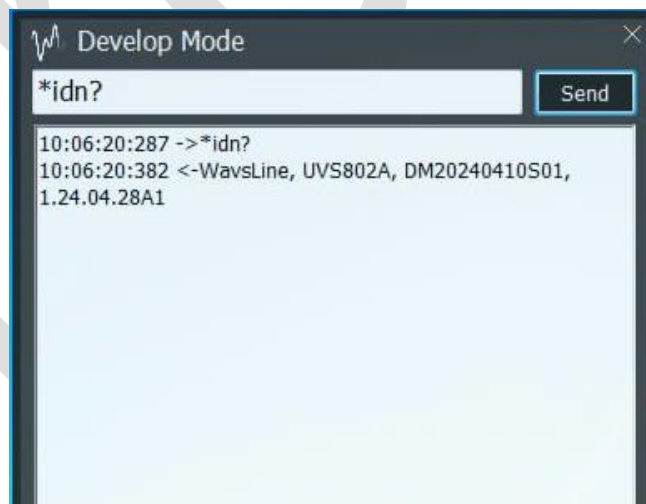
Settings: open the settings sub-window

Develop mode: open the develop sub-window

Advanced mode: switch window form to advanced mode

Develop Mode

Develop mode is a pop-up window that helps user to send command to UVS device and read back response. It is a useful tool for ATE software developer to learn and verify UVS command system.

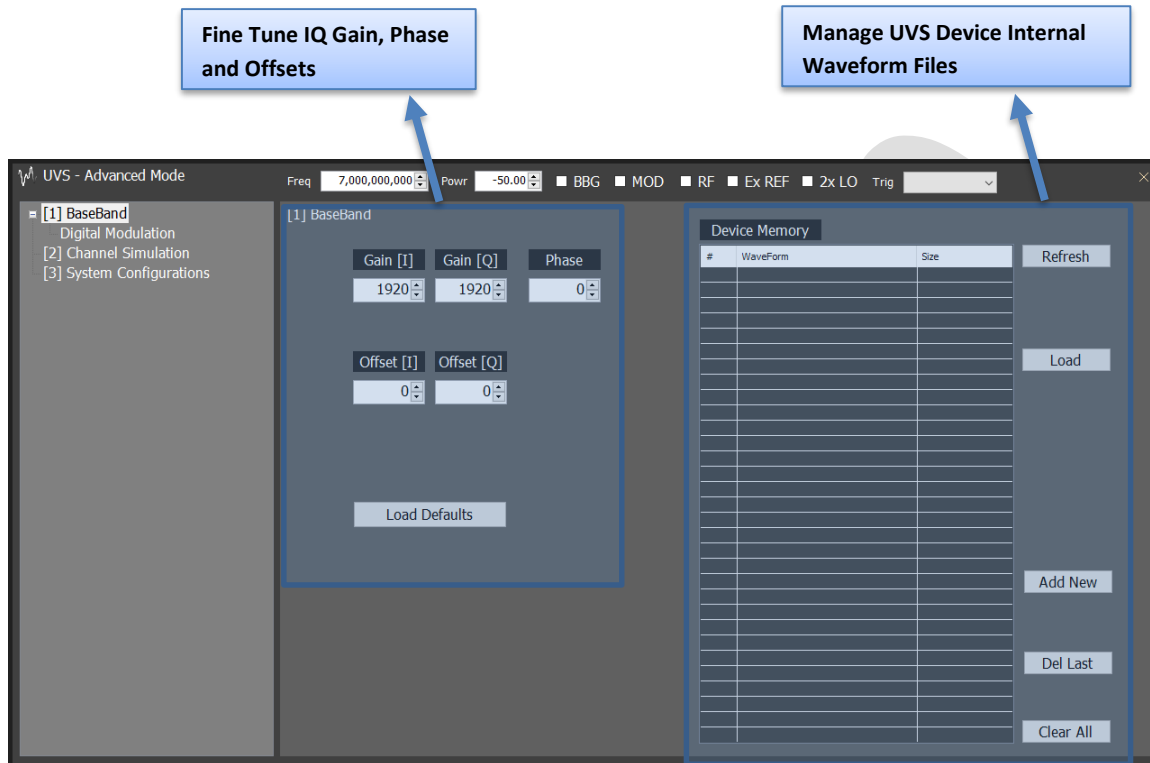




Advanced mode

The software offers more operations in advanced mode.

Base Band View



The UVS device applies IQ modulation for up-converting baseband signals to RF band. Adjusting IQ gain and phase tunes modulation sideband suppression and adjusting IQ offsets tunes modulation carrier feedthrough. To achieve the best sideband suppression and carrier feedthrough performance, the IQ tunings may vary on frequency temperature and baseband waveform changes. The UVS device stores typical tuning values that may good enough for most applications; user may perform fine tunes when the defaults are not satisfied.

User may store waveform files to UVS device, and manage them in this view. Note that, all waveform files are sored sequential in disk, thus new waveform file is always added to the tail and only the last waveform file can be deleted at one time.



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Digital Modulation View

In this view, user may create typical ASK, FSK, PSK and QAM signals.

The screenshot shows the 'UVS - Advanced Mode' window with the 'Digital Modulation' tab selected. The interface is divided into several sections:

- Waveform Settings:** A blue box highlights the top configuration area, including 'Binary Source' (Random), 'Coding' (Gray), 'Modulation' (QAM), 'Spectrum Spread' (PN Code), and 'Nyquist Filter' (SRRC). Below these are input fields for 'Length' (12,288), 'N (Bits per Symbol)' (6), 'M' (64), 'N' (15), 'Up-Sample' (4), 'Samples/Symbol' (8), 'Filter Span' (12), and 'Alpha' (0.350).
- Generate/Load Waveform:** A green box highlights the 'I/Q Data' section on the right, which includes a 'Generate' button, 'Symbols/Second' (1,000,000), 'Scale' (1.000), and a 'Load to UVS' checkbox.
- Waveform Summary:** A green box highlights the 'WaveForm' summary section, showing 'Symbol Count' (2048), 'Sample Count' (524288), 'Sample Rate' (32000000), and 'Duration (Second)' (0.002048).
- IQ Symbol Mapping:** A green box highlights the 'Symbol Mapping' section, which displays a grid of symbols.
- Filter Preview:** A green box highlights the 'Nyquist Filter' plot in the 'Time Domain' view.
- Waveform Preview:** A green box highlights the 'Waveform' plot in the 'Freq Domain' view.

Baseband waveform generation follows below procedure,

1. **Binary source**, this is the binary information that will be coded.
2. **Coding**, this is the coding rule, converts binary array to integer array.
 - Coding rule could be 'Gray' or 'Sequence'.
 - **N (bits per symbol)**: how many bits convert to a symbol.
3. **Modulation**, this is the mapping rule, ASK, FSK, PSK or QAM.
 - **M**: modulation order; it is calculated from 'N' value in 'Coding' section. M is read only.



4. **Spectrum Spread**, PN sequence is widely used in direct spectrum spreading system (DSSS).
 - **N**: defines PN sequence length = 2^N
 - **Up-Sample**: spreading factor.
 - This step can be bypassed when not used.
5. **Nyquist filter**, this is a square root raise cosine (SRRC) filter widely used in digital communication system.
 - An IQ samples is defined as an I and Q data output from baseband generator.
 - **Samples/Symbol**: how many IQ samples per symbol
 - **Filter Span**: filter length.
 - **Alpha**: filter roll-off factor.
 - This step can be bypassed when not used.
6. **I/Q Data**, generate desired waveform
 - **Symbols/second**: this is symbol rate.
 - **Scale**: IQ data amplitude scale.
 - **Plot**: control if show IQ data plot.
 - **Load to UVS**: load generated waveform IQ data to UVS and ready to play.

Symbol mapping, this is plot of symbol on signal plane. The plot updates when new waveform is generated.

Filter Preview, this is plot of Nyquist filter, auto-updates on parameter value changes. The plot could be in time domain or frequency domain.

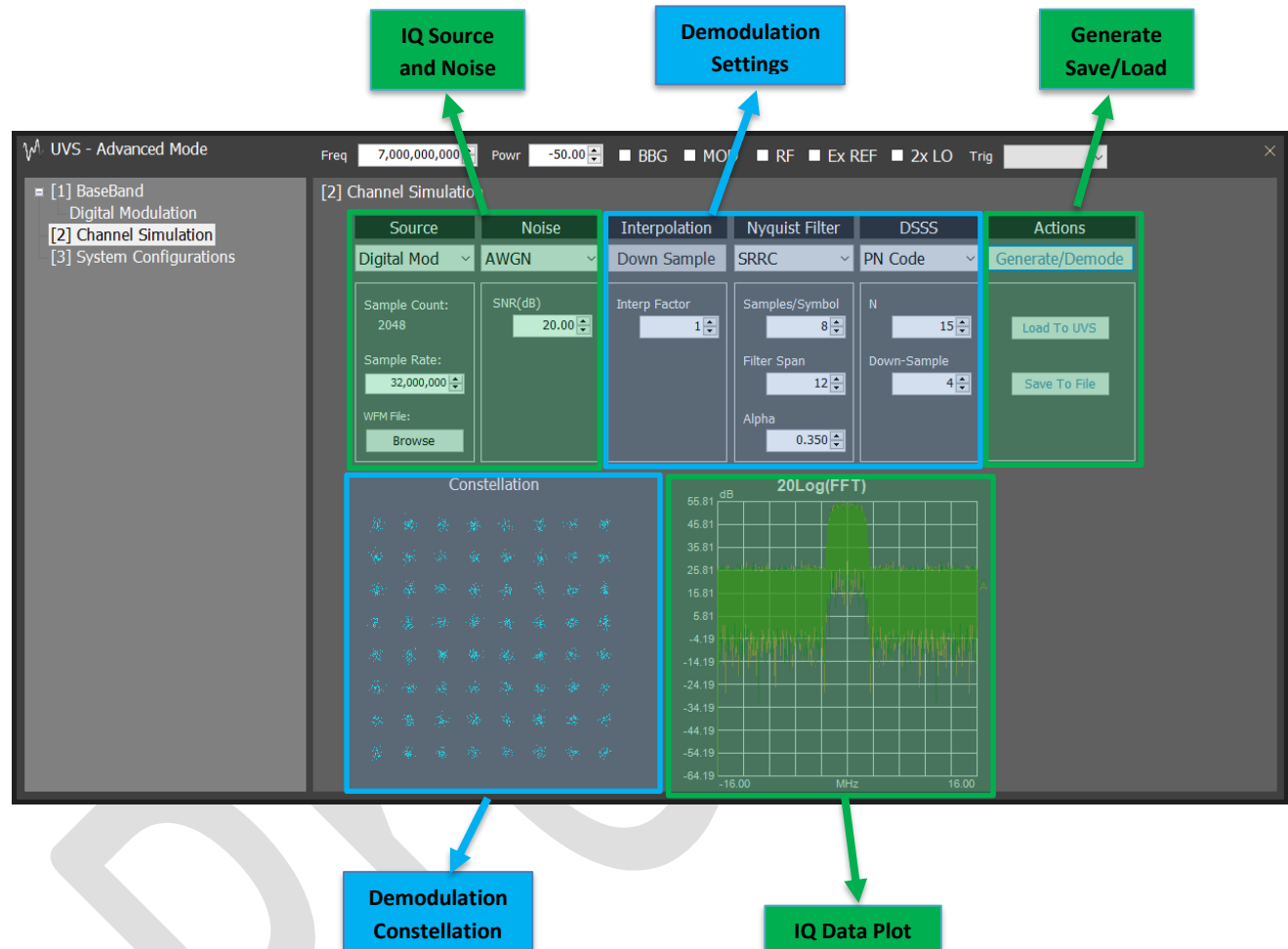
Waveform Preview, this is plot of IQ samples, thus 2 lines in plot. The maximum trace length is set to 51200 to minimize plot time consuming. When IQ samples length is greater than 51200, the software will down-sample the plot trace prior to making the plot, thus the plot may distort in this case. The plot could be in time domain or frequency domain.



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Channel Simulation

In this view, user may add noise to previous generated waveform or external IQ data file, configure demodulation settings, create and save to WFM file or load to UVS device and ready to play.



IQ Source and Noise

Source, data source could be external IQ file or previously generated from digital modulation view.

- **Sample Rate**, the IQ sample rate for baseband to replay a waveform.

Noise, add AWGN noise

Demodulation Settings

Interpolation, down sample; this simulates Rx baseband sampling.

Nyquist Filter, Rx corresponding square root raise cosine (SRRC) filter; this simulates Rx baseband filter.



Actions, generate, load to UVS device or save to WFM file.

In this view, user may check UVS device options, check or set LAN configuration settings.

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