

Installation instructions for the Windfreak SynthNV v1.3. (Please read all the way through once before beginning.)

Drivers:

Please run serial_install.exe before plugging in the synthesizer. For Windows 7 or Vista right click and select “Run as Administrator”.

When you plug in the Synthesizer board for the first time, Windows should recognize a new device and finish installing the drivers.

Software:

After drivers are installed and the hardware plugged in there are two options.

- 1). Double click on ConfigWFNV.vi in the source code directory if you have Labview 2011 or later installed. Please contact dgoins@windfreaktech.com for older versions of labview.
- 2). Install Setup.exe from the installer directory. This installs the Labview runtime engine. It also installs ConfigWFNV which you should be able to find under Start/All Programs.

Hardware:

The Windfreak SynthNV is designed to work with USB power or external power or both. If using USB power only, make sure your USB port can supply 300mA of current before plugging in this device. (Most newer PCs are capable of this). The cable is a USB mini. Windfreak Technologies assumes no responsibility for any damage the Synthesizer may cause to customer equipment. If using external power, use an isolated voltage of between 7 and 9 volts at 300mA or more. (Lower voltage gives a cooler linear regulator.) The connector has ground on the outer conductor and positive on the inner conductor. If using only the external power you will need to make sure a frequency and power level have been saved to the eeprom. It is this setting that the synthesizer goes to when powered without a USB connection. The factory setting is typically 1GHz with a power setting of -31.5dB below max power which gives about -10dBm.

It is best to operate the synthesizer output into a proper load, especially at higher powers. It is also best not to operate the synthesizer output directly into the power detector input since the detector cannot detect more than 0dBm and can also be damaged at levels of +20dBm. Using a 20dB pad on the input to the detector may be a good idea.

Jumper J7, if left open, will force the synthesizer to run off its own internal 10MHz crystal oscillator. If Jumper J7 is shorted, the reference will be controlled by software under the “Extras” tab. (Note this setting is saved for power up operation if you press “Program EEPROM”. If running from the internal reference the 10MHz signal is available as an output on the SMA connector J5. When set for external reference the internal 10MHz crystal oscillator is muted and allows the user to apply a more stable reference as an input at SMA connector J5. If you use something different from 10MHz please go into the software and change the reference value. This will change some of the calculations for step size and may cause unstable operation of the knob and sweep functions. If possible keep the phase detector (PFd) running at 2MHz..

Pin 1 and 2 of header J9 need to be jumpered for proper operation of the RF power detector circuit. This brings the power detector voltage to the A/D input of the processor.

When using the PCB without a case, take care to keep any conductive items away from it so nothing shorts out. Also, the RF connectors are high performance and therefore need to be treated with care. Avoid torquing or bending the PCB via the RF connectors and this will keep the center pin solder from cracking. Of course, try to reduce the possibility of ESD when handling.

Operation:

Plug in at least one synthesizer to USB before starting the software.

With the Synthesizer board plugged in the Vcc LED (D1 by the USB connector) should be lit and stay lit. Wait for a few seconds for the device to register on the USB bus and then start the software. It will likely start with a dialogue box that requests you set up the right virtual serial communications port. Click OK and do this with the drop down box in the upper left hand corner of the software. You may need to click "refresh" to find the new serial port that is created by plugging in the synthesizer. Please leave all hardware plugged in until the software is closed out. This will avoid USB issues. *Click "Stop Running" to get the "X" which will allow you to kill the program.*

The software is mostly intuitive. A couple pointers are: To enter frequency and other values use the keypad, PC keyboard or knob. Press "Enter From Keypad" if you used the keypad. Otherwise hit enter on the PC keyboard if you typed in the value. Use the knob for fine tuning frequency only. Adjust the sensitivity of the knob with the Knob Step Size drop down box. Adjust RF Power with the slider on the right. There are two power ranges for more than 60dB of adjustment.

When first plugging in the SynthNV it will not be synced with the computer. Adjust frequency and power to get back into sync. If modulation is turned on when powered up, go toggle the constant modulation buttons to get back in sync.

Using the sweep function includes two modes: 1) Basic RF frequency sweep which is output only and 2) RF sweep with simultaneous power measurement. To start a sweep first enter your desired RF power then enter frequency range, step size and step time in the RF Sweeper tab. Click Start Sweep which brings up the Sweeper application. To enter mode 2 click Network Analysis On. (*Important Note: The power range of the detector is 0dBm to -70dBm. Set your power so that the detector sees about -2dBm max for best linearity and dynamic range. Use a 20 dB pad if needed.*) The device will begin measuring absolute RF Power on J11 in dBm for every step. Its best to keep the step time at 5mS for mode 2 and keep the # of points below 500. To measure relative power a calibration needs to be performed. Connect a good RF cable between J6 and J11 (keeping max power below -2dBm) and click Take Cal Data. Wait for the Take Cal Data button light to go off. This could take an entire sweep. Next click Cal On. The trace should now be in relative power mode (dB) and be reading 0dB across the band. Now you may insert your DUT to measure gain vs frequency. Keep in mind that the RF generator circuit does have fairly strong harmonics and the detector measures broadband power from 100MHz to 4GHz each measurement. This can introduce errors in your measurements.

Finally, hover with your mouse over various items in the software to get hints or instructions.

Troubleshooting:

Vcc LED D1 doesnt light: Possible problem with PC and Vusb power. Try a different PC and or cable.

RF Lock LED D2: If Lock doesnt light it could be because settings in the "PLL Cntrl" tab are faulty. Exit out of the software and restart to make sure all default settings are loaded and try again with the default settings.

D3 or D4 will toggle when the Program EEPROM button is pressed or you have started reading the RF Power detector. If they dont, try a different USB port and try different Serial Comm ports.

If you cant get it to work contact David Goins at dgoins@windfreaktech.com.