

Description:

The Quad RF Driver contains four independent RF channels, each with an RF synthesizer, variable attenuator, and 1W power amplifier. The RF signal can originate from either the internal synthesizer or an external source via SMA input. All channels have independent frequency, phase, and gain settings and can be operated in one of two modes. The “Wideband” mode operates from 35MHz to 2GHz with a 3.472KHz resolution; over this range the frequency roll-off is approximately 0.5dB/100MHz. “Int-N Phase Adjust” mode allows the user to set and maintain a fixed phase relationship between all four channels. This mode is designed to operate between 300 and 460MHz with a 2MHz resolution. Two additional inputs are provided for an external frequency reference and digital modulation. All functions are controlled and monitored via USB and Windows software.

**USB Driver:**

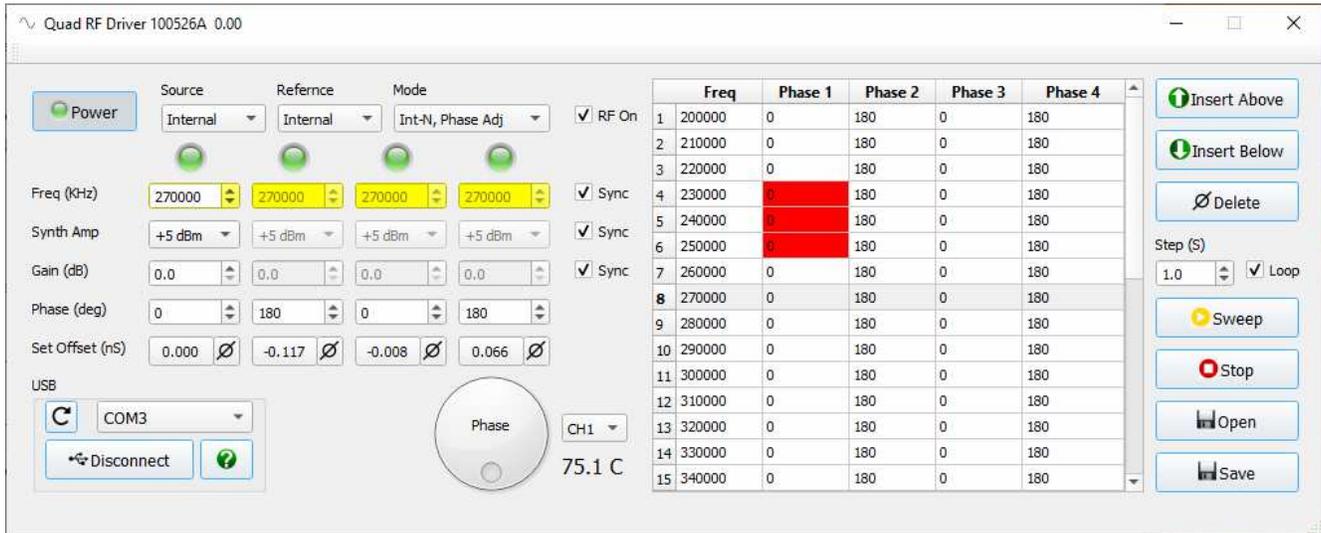
In order for Windows to recognize the device the USB driver must first be installed, after which the unit appears as an additional COM port on the computer. Currently Windows XP, Vista, and 7, 8, and 10 are supported.

1. Copy the file “cdc_NTXPV764.inf” from the supplied CD to the hard drive.
2. Plug the device into a free USB port. When the hardware installation wizard asks for the driver location, browse to the “cdc_NTXPVista.inf” file on the hard drive.
3. After the driver has been installed right click “my computer” and select “properties”. In the properties window select the “hardware” tab. Click on “device manager” and expand the “Ports (COM & LPT)” item. Locate the “Spectronix, Inc.” entry and note the assigned COM number, (ie “COM4”). This is the COM port that the software will use to communicate with the device.

Note, on some operating systems such as Window 7, manual USB driver installation may be necessary. If the hardware installation wizard fails, go to “My Computer” > “Properties” > “Hardware” > “Device Manager”, and find the “Spectronix” or “SERIAL DEMO” entry under “Other Devices” and select “Update Driver”. At this point you will be able to browse to the location of the driver.

USB and Power:

The unit processor is powered by the USB port and enters low power standby mode when connected as indicated by a flashing blue LED. When the application is started or the USB refresh button is pressed, the dropdown COM list is populated with a list of connected devices. Pressing the “Connect” button initiates connection with the selected device. Pressing the “Power” button turns on the RF circuitry which is indicated by a solid green LED. Internal fans turn on with the RF power and the amplifier temperature is displayed next to the “Phase” knob. The amplifier temperature should be kept below 85°C; external fans can help lower the temperature in necessary.



Connections and RF Setup

The operating mode is determined by the three dropdown boxes as the top of the application.

- Source: Select between the internal RF synthesizer or external RF input (0dBm max).
- Reference: Internal or external 10MHz synthesizer frequency reference (3.3V CMOS level).
- Mode: Select “Int-N Phase Adj” to maintain and control phase between channels or “Wideband” for extended frequency coverage and random phase between channels.
- RF On: Enables the RF signal. If using the modulation input port, this should be set to “disabled” as the RF output enable signal is the logical OR of this control and the modulation input (3.3V CMOS level).

Manual RF Control

Independent frequency, phase, and amplitude controls are provided for each channel.

- Freq: Sets the synthesizer frequency in KHz. During editing, this control will be highlighted yellow to indicate a possible frequency discrepancy due to tuning resolution. After editing is complete, the control is updated with the nearest supported synthesizer frequency and the highlighting is removed. The four LEDs above the frequency adjust boxes give an indication of RF output power. This can be useful in determining if the synthesizer is locked although not completely accurate.
- Synth Amp: Sets the RF power at the synthesizer output giving the user extended control over the output power range.
- Gain: Sets the RF gain for both the internal and external sources in 0.5dB steps. This setting is relative to 0dB and adjustable from 0 to 31.5dB. Actual System gain is approximately 10dB + the gain setting.
- Phase: In “Int-N” mode this control sets the phase from 0 to 359° in 1° increments relative to the other channels. Even though this control changes the phase in “Wideband” mode, there is no predictable phase relationship between channels. For convenience, the phase

can also be set using the “Phase” knob and the channel select dropdown box. Phase needs to be manually updated after changing modes.

- **Offset:** The offset boxes let the user calibrate each channel for fixed differences in propagation delay. Since delay is relative, it's suggested to use one channel as the reference; leaving it set to zero. For each channel use the phase adjust box to set the phase to the desired 0° value and press the corresponding offset button. After pressing the button, offset timing will be calculated based on the current phase setting and frequency. The offset value (nS) will be stored in the offset box and used to adjust all subsequent phase settings. The \emptyset button next to the offset button can be used to reset the offset to zero.
- Placing a check mark in the Freq, Synth Amp, or Gain “Sync” box will slave all channels together allowing the first channel to control all channels.

Automatic RF Control

Frequency and phase values can be automatically changed by using the frequency/phase table. Each row in the table represents a step in time. The columns list the common frequency and phase offset for each channel. Stepping is initiated by pressing the “Sweep” button and begins at the currently selected row; each row is highlighted as it's executed. During execution, if a cell turns red, there is a good chance that the synthesizer may not be locked (see the frequency adjustment section above for more information). The step period is adjustable and the “Stop” button stops the sequence. Indefinite looping can be enabled by selecting the “Loop” option.

The table can be edited in place by typing new values into the existing cells, and rows can be added or deleted using the insert and delete buttons. The “Save” button is used to save the current table as a CSV file. This file or a CSV file generated by another application can be loaded for use and editing by selecting the “Open” button.

Testing Channel to Channel Phase

Combining two RF outputs using an RF power splitter is a simple way to test the phase relationship in “Int-N Phase Adjust” mode. With the channels operating at the same frequency and amplitude maximum RF power should be observed at 0° phase offset and minimum power at 180° offset.