Adafruit Si5351 Oscillator Board Calibration Routine

The Adafruit si5351 oscillator board has the capability to have its master oscillator frequency fine tuned for accuracy. Once the one time calibration procedure is completed, accuracy is assured within specifications throughout the board's frequency range.

While many builders may not have access to an accurate frequency counter, they likely have a HF receiver capable of receiving the Federal Government's extremely accurate frequency reference WWV. During this procedure, you will 'zero beat' the output of the si5351 with the signal from WWV.

We assume you have successfully constructed the necessary circuitry to control the si5351 with an Arduino. No display is required on the Arduino as the IDE serial monitor operating at 115200 baud is used throughout the procedure. Two files, Si5351.h and Si5351.cpp are required to be in the sketch folder with si5351_Calibrate.ino.

To complete the procedure the output from CLK2 should be loosely coupled to input of your HF receiver. We suggest a UHF tee be installed between the PL259 on your antenna feedline and the SO239 on your receiver. (Connectors may vary depending on your particular shack setup.) Strip one inch of outer jacket and shield from the coax connected to the CLK2 output of your si5351. Do not strip the insulation from the center lead.



To protect the si5351, tape the very end of the insulated center lead to assure it does not make contact with the center conductor of the UHF tee. Simply place the taped center conductor into the open UHF tee to couple the signals.

Tune the receiver to WWV on 10, 15 or 20 Mhz., whichever has the best signal. Next load the sketch. When the upload is complete, you will notice the UNO led blink 3 times. If you are not using an Arduino with a built in LED on pin 13, that is okay as it is only used as indication the sketch is loaded and executing properly. Next start the 'serial monitor' in the IDE. It is invoked from the tools dropdown.

Select the frequency for 'zero beating' from the first screen by typing 10, 15 or 20 in the box at the top of the serial monitor and pressing return. Two things should happen at this point. The si5351 will produce RF on the select frequency and the currently stored calibration factor will be read from your si5351 and displayed on the screen. You may, or may not hear a warbling oscillation in the audio output of your received WWV audio. It is easiest to detect when they are broadcasting a tone. Please take note of the displayed calibration factor. We believe Adafruit attempts calibration during board production, so your board may be very close to 'on frequency.' We suggest you move the coax lead from your board around a bit, even remove it from the UHF tee, to change the coupling. If you still cannot hear the warble, change the calibration factor by 5 to see if you can then hear the warble. The calibration factor is changed by entering the number 2 in the box at the top of the serial monitor screen. The next screen prompts you to enter the new calibration factor, it then returns to the calibration factor display screen. Once you are sure you hear the warble, continue the process until you have adjusted the value to a point where you no longer hear an oscillation in the audio output. In practice, you will likely still hear a very gradual warble or roll with a period of a second or so. That likely represents a frequency of less than 1 hz off frequency. When you are satisfied with your results, select 1 on the display screen to exit the procedure. You're finished!