QDX External Reference Clock Interface Board
Direct and Clock-Multiplier Versions

NOTE: These external reference interface boards (Direct and Multiplier, V2.1) are compatible with the **QDX Rev 4, and 5** circuit boards. These boards are not compatible with Rev 3 and previous QDX versions.

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Introduction

The QDX digital transceiver from QRP Labs is a brilliant little radio.

For most uses, just plug it in and it works. But some digital modes require a bit more frequency stability than the internal TCXO can deliver. For these applications we provide a modification kit that lets you connect an external precision reference clock (typically provided by a GPS Disciplined Oscillator) to the QDX, bypassing the internal 25 MHz oscillator.

Interface Boards

There are two options: If you already have a stable 25 MHz source, the **Direct Interface Board** provides a SMA connector, 50 Ohm termination, transient protection, and AC input and output coupling:
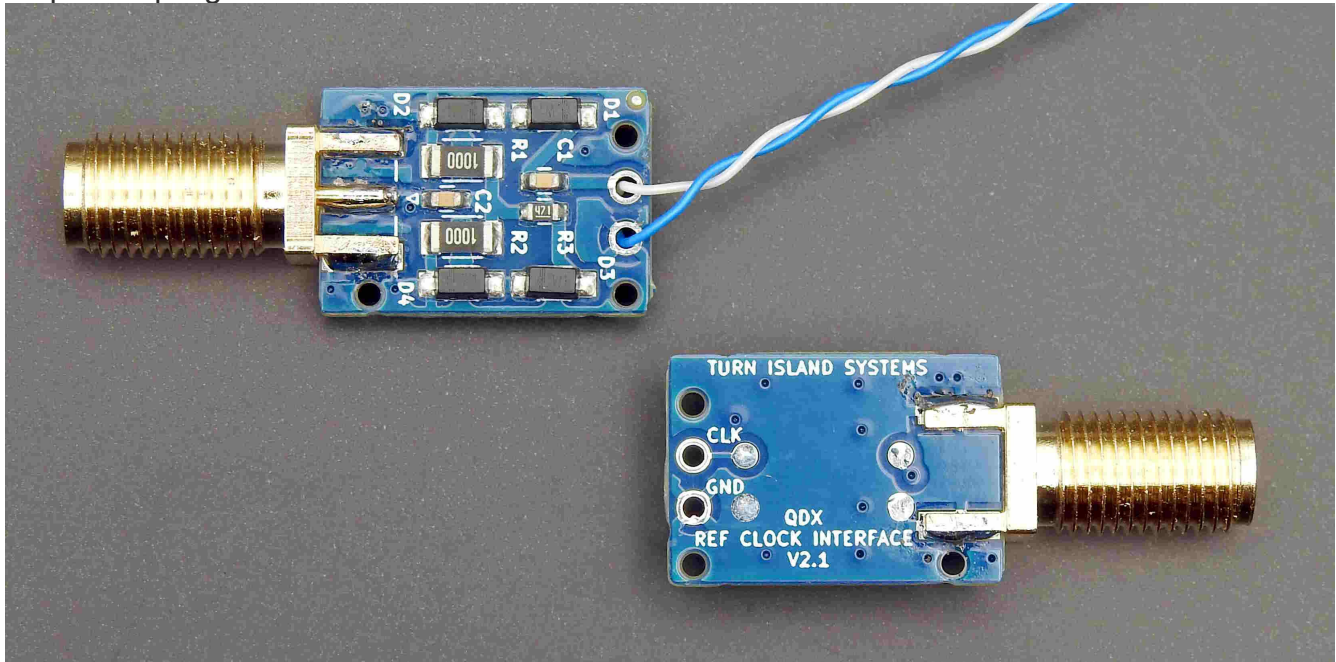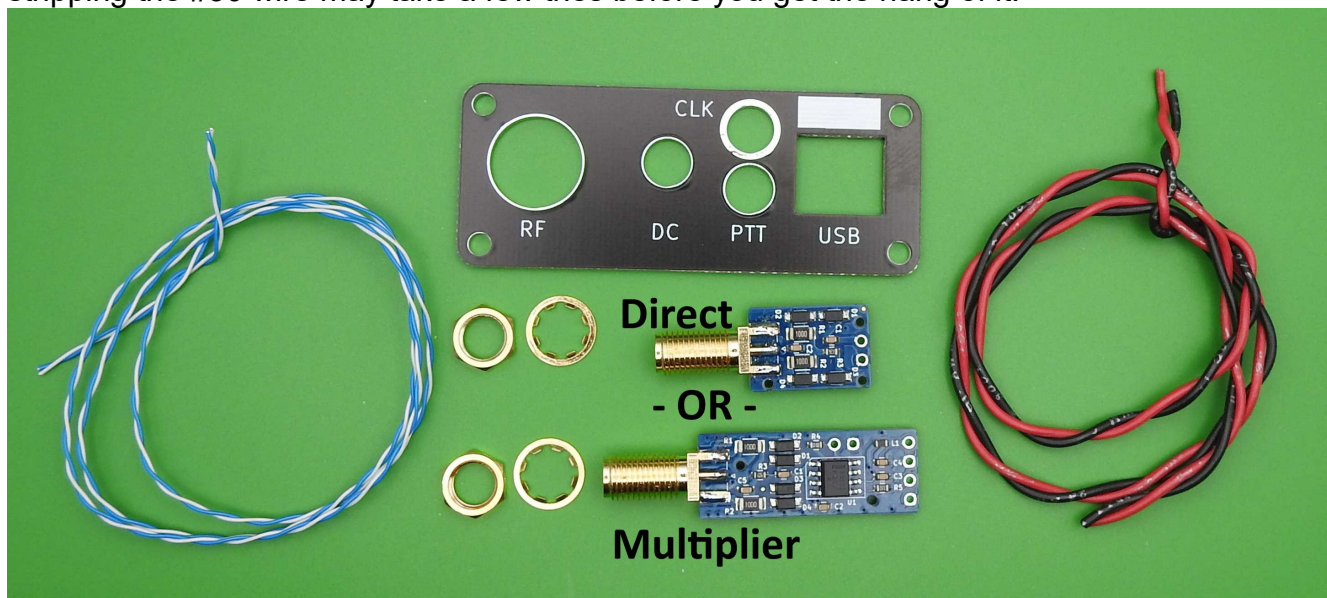

Direct Interface Board

Or, if you have a 10 MHz (or 5 MHz) source, the **Multiplier Board** will convert that input to the 25 MHz required by the QDX. This board contains a PLL chip and is powered from the QDX internal voltage regulator:
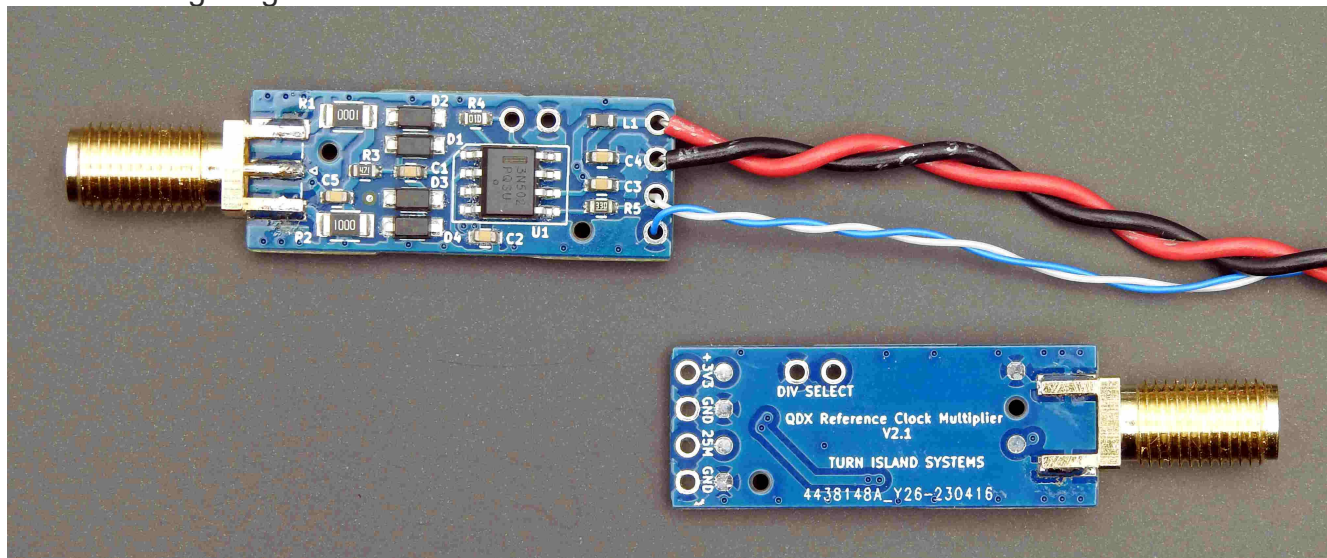

Multiplier Board

These boards are available as a kit which includes a replacement back-panel for the QDX, eliminating the need to drill a hole in the stock panel for the new SMA jack. Also included are lengths of twisted-pair #30 wire used to connect the reference clock to the QDX PC board, and twisted-pair #22 power leads. You will need to cut, strip, and solder these wires to the Interface board and to the QDX. The supplied wires are long enough to let you practice, as stripping the #30 wire may take a few tries before you get the hang of it.
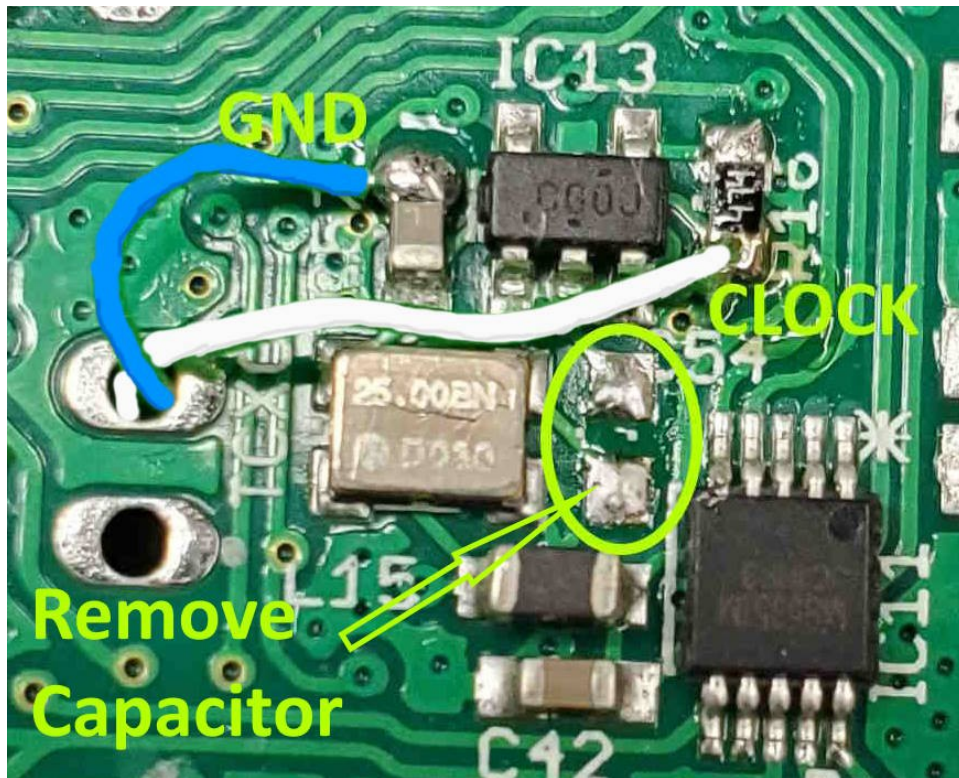

Interface Board Kit

Modifying the QDX
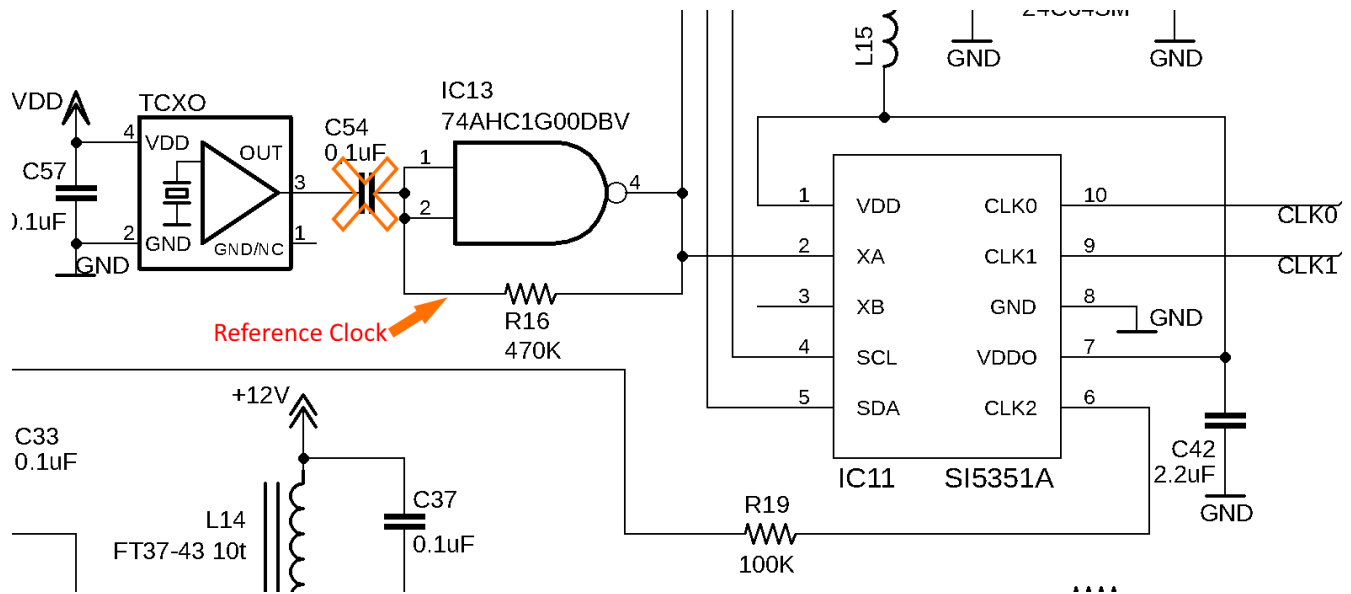
You will need to remove a small surface-mount capacitor, C54, before connecting either of the interface boards to the QDX circuit board. Unsoldering the capacitor requires steady hands, good eyesight (I use a stereo inspection microscope), and a fine-point soldering iron. Actually, two soldering irons (one in each hand, unless you are good with chopsticks) make the removal fairly easy. I understand that Hans (Mr. QRP Labs) on request has delivered some QDXs without this capacitor installed, if you have one of these then no component removal should be necessary.

25 MHz CLK/GND Leads

Before soldering the interface board wires to the QDX, it is probably easiest to attach the interface board to the replacement back-panel, and secure the back-panel to the QDX using the nut/washer on the BNC jack. The interface board attaches to the new back-panel using the included SMA star-washer and nut. I find that a 5/16" or 8mm socket from a socket-wrench set works well for tightening the nut, as my normal hand-socket-driver set does not have the throat-clearance to fully-tighten the SMA nut. Or if you're careful you can always use pliers. To keep the interface board from rotating you must tighten the SMA nut firmly.

The clock wires are the blue/white twisted pair, #30 gauge (wire-wrap wire). The pair passes through an existing small hole in the QDX board. The blue Ground wire solders to the top pad of C57, and the white Clock wire solders to the bottom pad of R16.   You could solder the clock wire to the top pad of the vacant C54, but I find it more secure to connect to a mounted component.

Again, a fine-tip soldering iron is highly recommended.

The #30 wire is pretty fragile, so be careful not to nick it when stripping the insulation. The Direct board needs no power connection, just the clock.

Power/Ground Leads

For the Multiplier board you will then need to solder the power and ground wires to the interface and QDX boards. This is pretty easy, it's a twisted black/red pair, #24 gauge solid. There are through-hole pads on the QDX board for these connections.
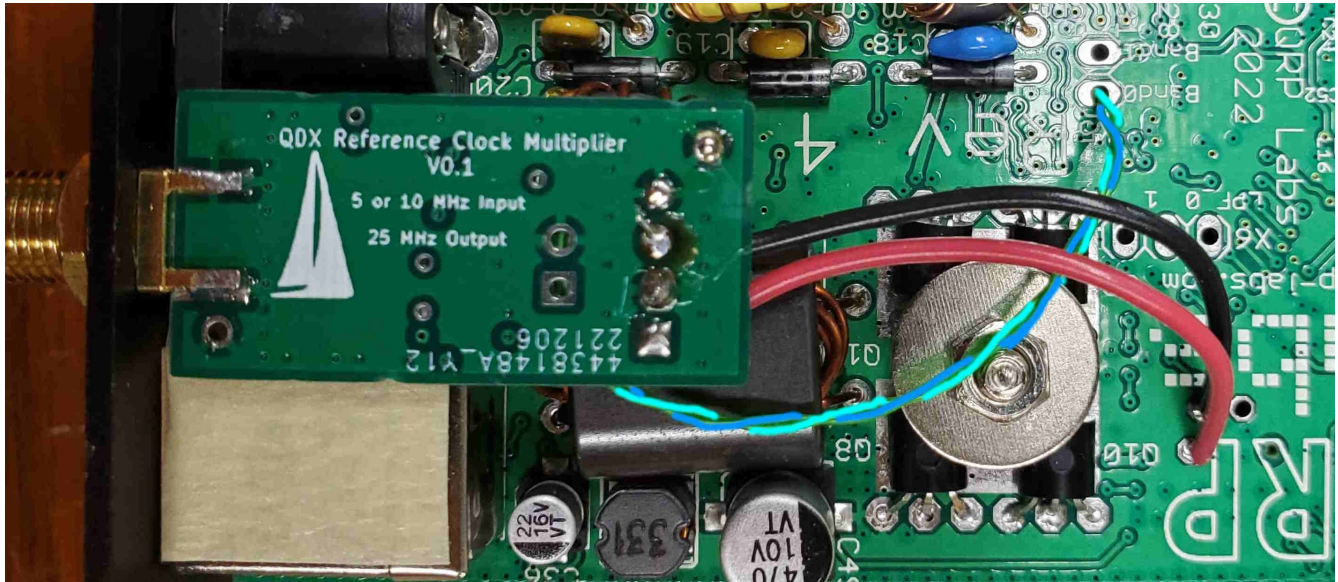
(This shows an early version of the Multiplier board)

Using the QDX With the External Clock

It is probably best to connect the active clock reference input before applying power to the QDX. In addition to enabling stable transmit and receive frequencies, this clock provides the QDX microcontroller with its clock, and without it the QDX will not run. To avoid clock-glitches, connect the reference first.
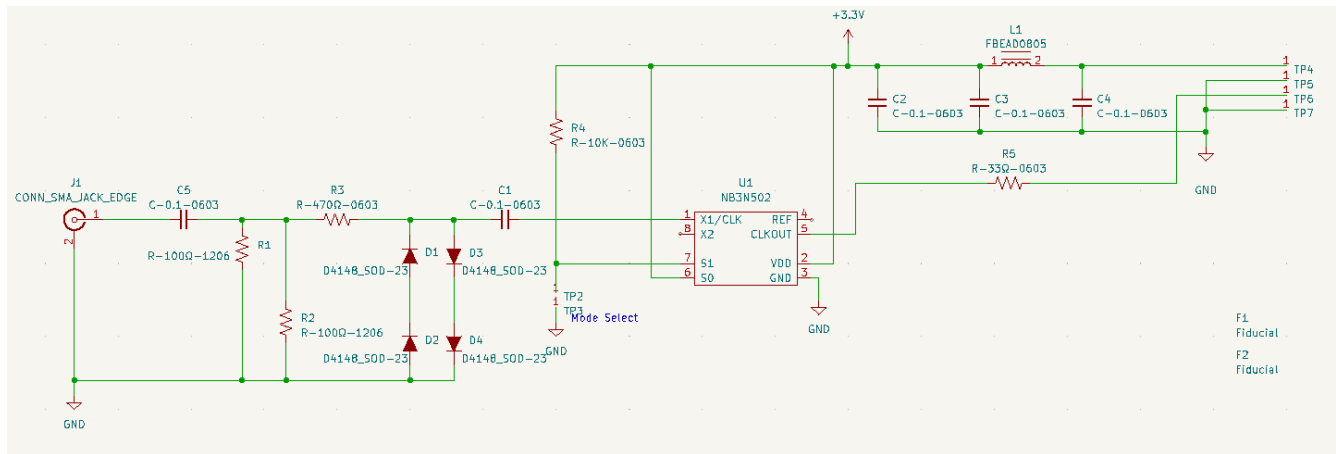
Specifications

Direct Interface
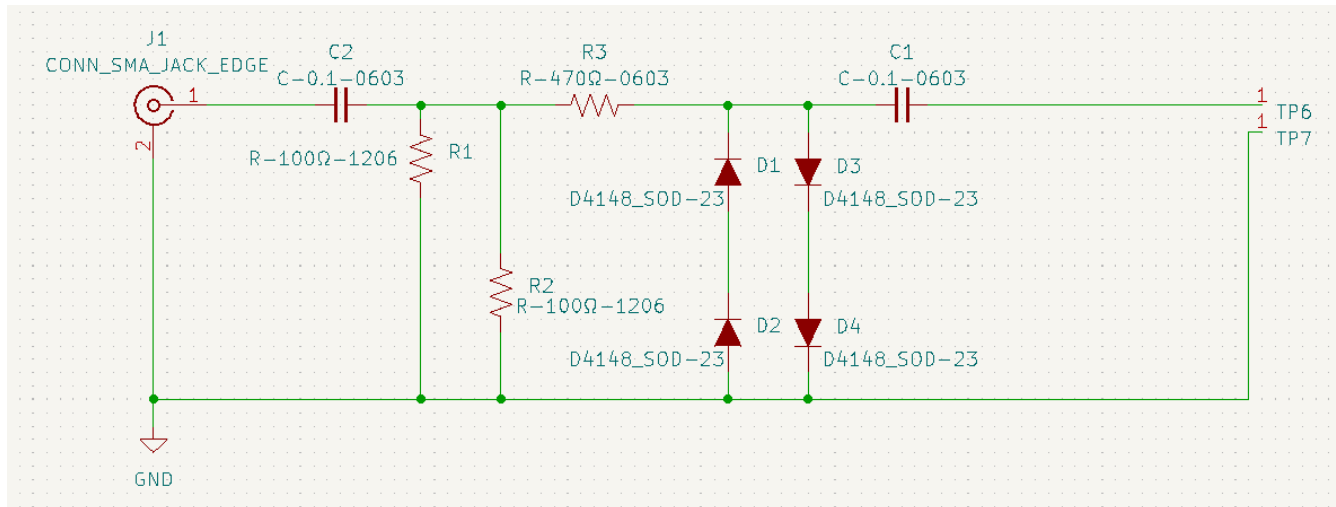
Input: 50 Ohm AC terminated, 25 MHz, 10 – 20 dBm sine or squarewave.
(Direct Bodnar GPSDO @ 32 mA drive is best.)

Multiplier Interface

Input: 50 Ohm AC terminated, 10 MHz, 0 – 20 dBm sine or squarewave.
Jumper the "DIV SELECT" pads for 5 MHz input.
Output: 25 MHz, 0-3.3V unterminated.
Voltage: 3.3V nominal (provided by QDX board).
Current Drain: < 9 mA.

Rev 2.0 Boards

The first batch of Reference Interface boards (V2.0) are functionally identical to the current V2.1 boards, but the layout is slightly different and the V2.0 Clock Interface board has an error on the silkscreen legends for the twisted-pair wire connections:
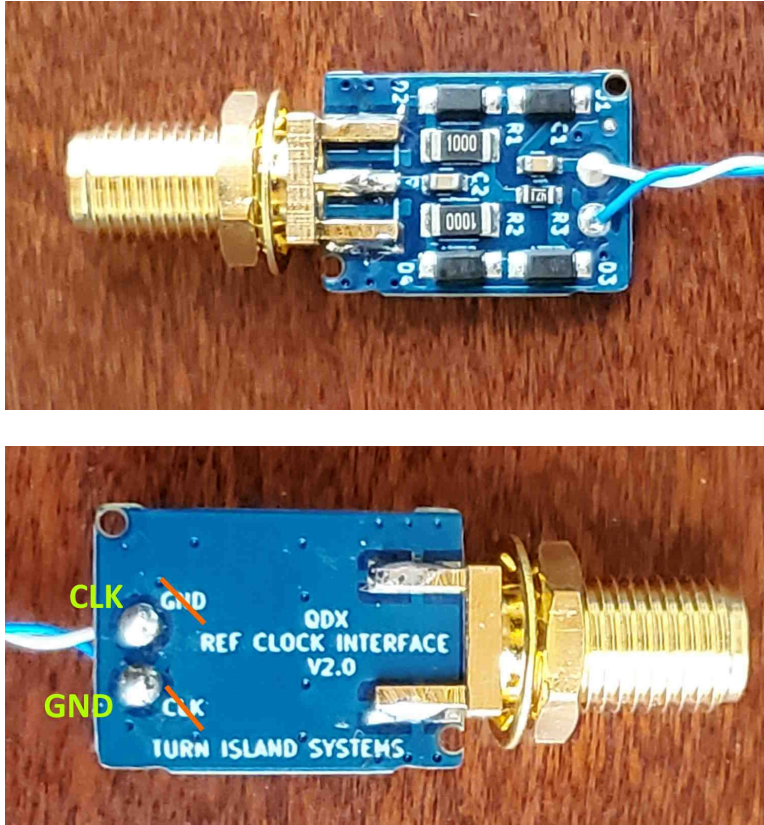
Direct Interface Board
Note the mislabeled CLK and GND connections on board Rev 2.0!
The BLUE wire is ground, the WHITE wire is clock.