# RX-888 Clock Kit

# Table of Contents

# Introduction
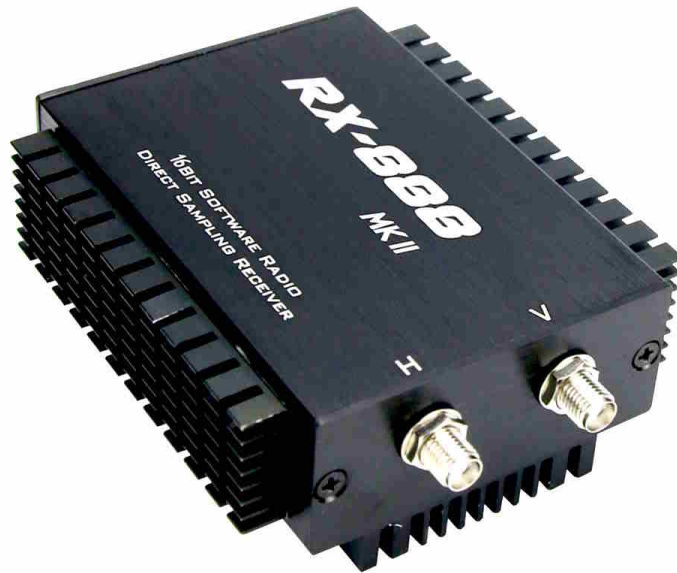


The RX-888 is a high-performance SDR, and has proven very useful in applications that can make use of the full HF-band and beyond coverage. Many of these applications will benefit from a sampling clock having higher-accuracy than is provided by the RX-888 internal oscillator. Fortunately, this SDR includes a small connector on the circuit board that can be connected to an external 27 MHz reference clock.

This connector, however, is tied more or less directly to the input of the RX-888s clock generator chip, and so is a very high impedance port. There are clamp diodes on this connection which will cause asymmetrical clipping if the input clock is not AC-coupled. The clamps and unterminated cable can cause distortion and ringing on the clock signal, which will cause improper operation of the RX-888 clock generator.

The Turn Island Systems RX-888 Clock Kit includes an interface board that provides the appropriate termination, attenuation, and isolation for an external reference clock, as generated by a Bodnar or similar GPSDO. The kit also includes a replacement back-panel and a 10 cm jumper cable.

**Please note that once this modification has been completed the RX-888 will not operate without the external clock.** This modification can be easily reversed, restoring normal operation.

The RX-888 can get pretty hot. To reduce any thermal problems, two changes are suggested:

- Reduce the sampling rate. This is a matter of software and is not covered in this document.

- Add a large thermal pad to the bottom of the board. This makes good contact to the chassis and heatsink. Details are provided in this document.

# Installation
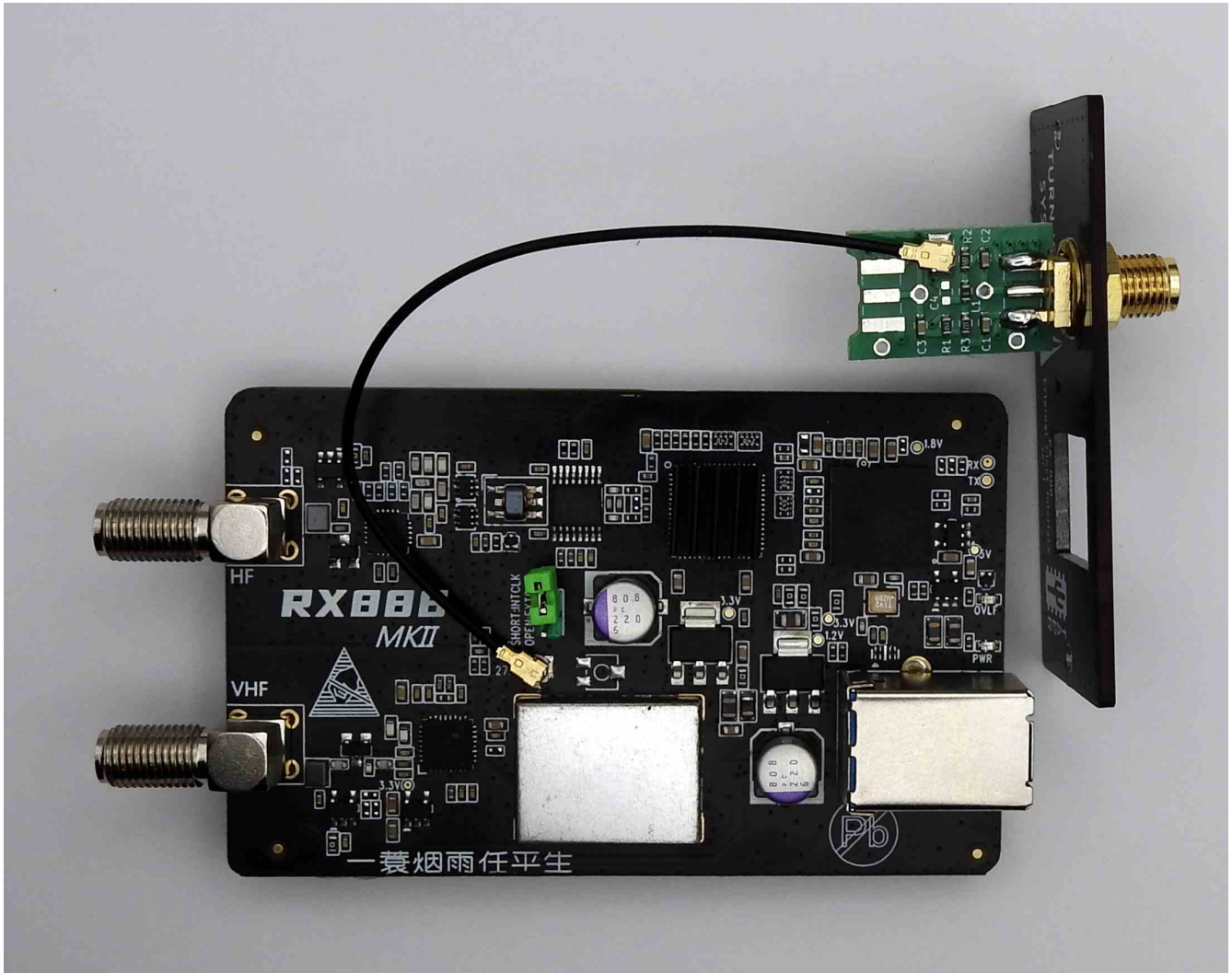


*Illustration 1: Clock Adapter Connections*

- Remove the SMA nuts and washers from the RX-888 front panel jacks.

- Remove the RX-888 back panel.  Save the screws.

- Slide the PC board from the chassis.  If you haven't already added the thermal pad to the bottom of the board, now is a good time to do it.

- Disconnect the jumper on the two-pin header labeled "SHORT: INTCLK, OPEN: EXTCLK". Store the jumper on one of the header pins (should you desire to reverse this modification)

- Attach the interface board to the replacement back-panel.  Use the included star washers, one on either side of the panel, to prevent card rotation.

- Carefully push one of the U.FL cable connectors onto the mating plug of the RX888.  These connectors are fragile.

- Connect the other end of the U.FL cable to the interface board

- Carefully slide the RX-888 board back into the chassis, being careful to not strain the U.FL cable or damage the thermal pad.  A wide putty knife can be used to help guide the pad.

- Install the replacement rear panel, using the previously-saved screws.

- Replace the front-panel SMA washers and nuts.
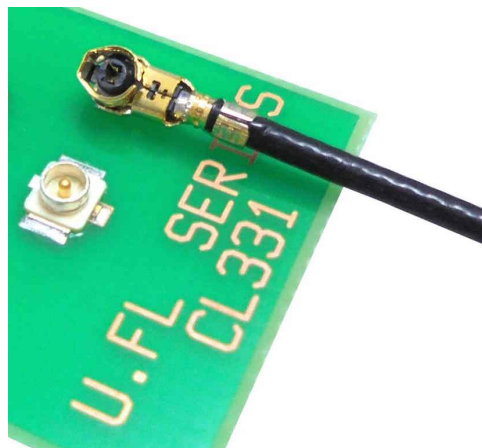


*Illustration 2: U.FL Board Connector*
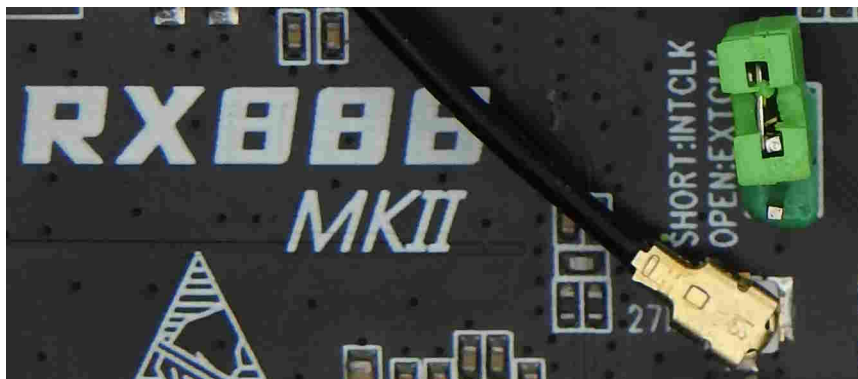
*Illustration 3: RX-888 U.FL Connector and Clock Enable Jumper*



*Illustration 4: RX-888 With Replacement Back-Panel*

## Connecting the External Clock

The Interface Board is designed to be driven from the reference clock source, typically a GPSDO with a 27 MHz square wave output of approximately 1.5V P-P into a 50 Ohm load.

If the external clock amplitude drops below 0.5V P-P the RX-888 will not operate correctly. 1V P-P should be a safe minimum input level.

The signal and ground connections are both AC-coupled in the interface to eliminate DC ground-loop issues. If you have severe RF ground-loop problems, an isolation transformer is recommended. It's probably a good idea to connect the external clock signal before applying power to the RX-888, but I've seen no issues when randomly disconnecting and connecting the reference clock.

If you wish to use one reference clock source to feed multiple RX-888 receivers, it is best to maintain a 50 Ohm impedance on all connections. We don't recommend using a "tee" connection, as this double-termination will cause signal distortion. For two radios you can probably get away with using a 1:2 splitter (6 dB loss) at the output of the GPSDO, but it is better to use a powered clock distribution unit, such as the ones available from Turn Island Systems or TAPR. For more than two radios the distribution unit is essential.
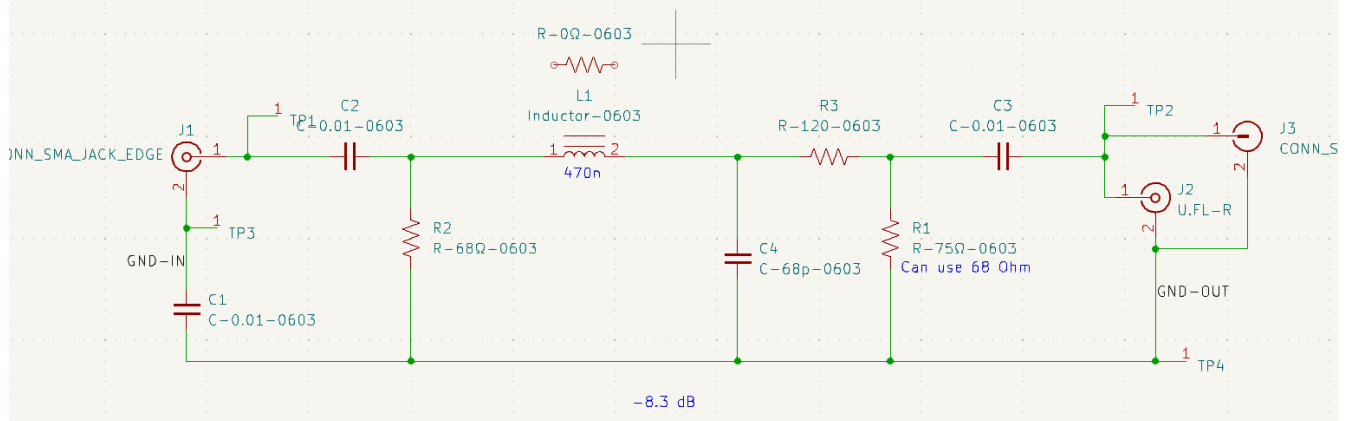
# Schematic



*Illustration 5: Adapter Schematic*

# Thermal Pad Installation

The RX-888 Clock Adaptor Kit includes a thermal pad assembly, which allows for a much improved transfer of heat from the RX-888 circuit board to the external heat sinks.  The materials used are:
Thermal pad: Laird Technologies A51340-01
( https://www.digikey.com/en/products/detail/laird-technologies-thermal-materials/A15340-01/2496314 )

Copper foil tape: https://www.amazon.com/dp/B09Z6F9RFG

Both sides of the thermal pad have adhesive, and the copper foil allows the pad to slide into the RX-888 enclosure while providing good thermal conductivity.  In the kit, the foil has already been applied to the pad.
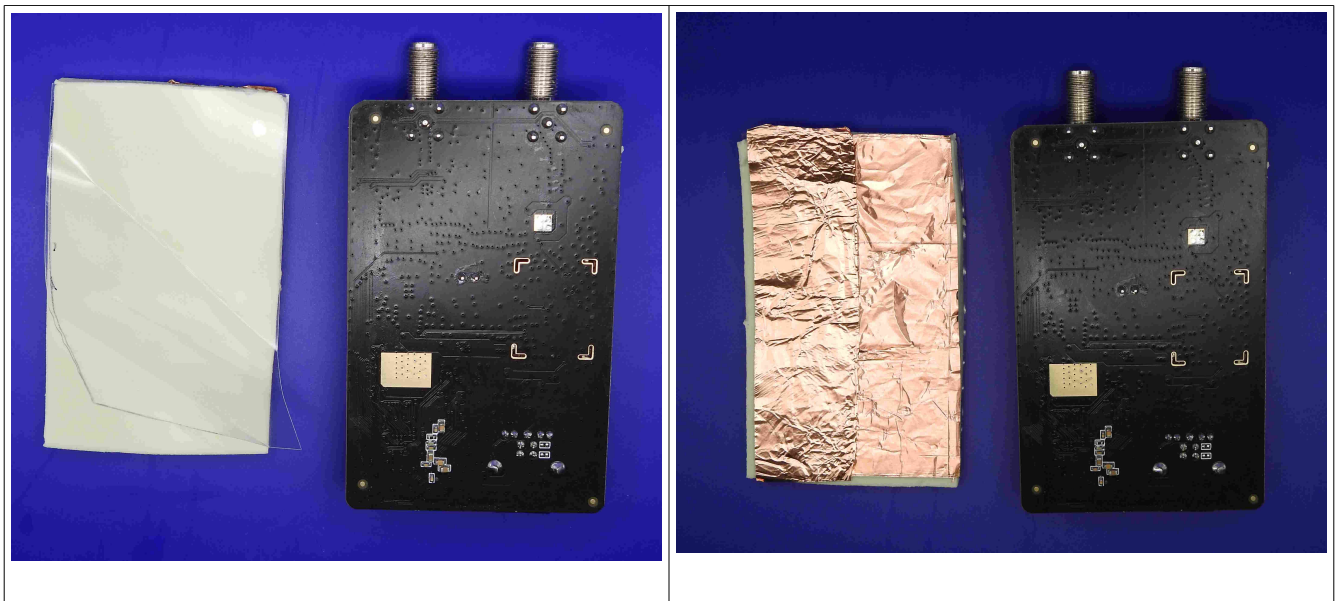


After removing the RX-888 board from the enclosure, carefully peel off the transparent plastic film from the thermal pad.  The copper foil is somewhat fragile, so use caution during the following steps. Should the foil become irretrievably damaged, a replacement made from household aluminum foil will be perfectly adequate.

Apply the thermal pad, sticky-side down, to the RX-888 circuit board,  If the Clock Adaptor board isn't already installed, do this now, before you slide the RX-888 board back into the enclosure.  A thin putty knife can be used to compress the pad and help guide the board (with pad) back into the case.
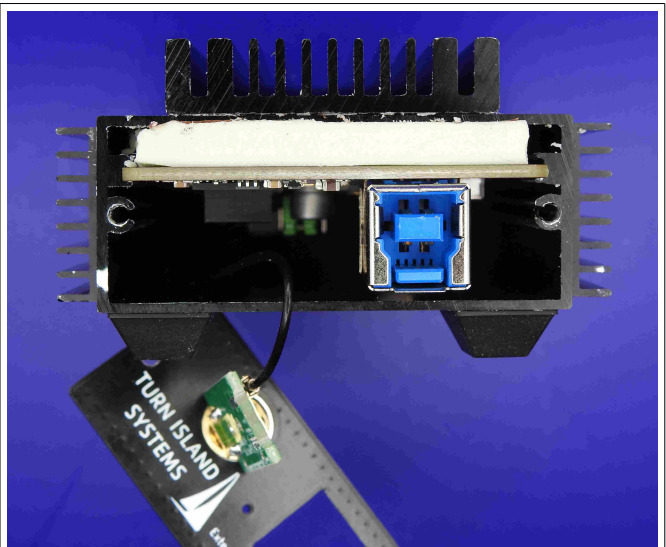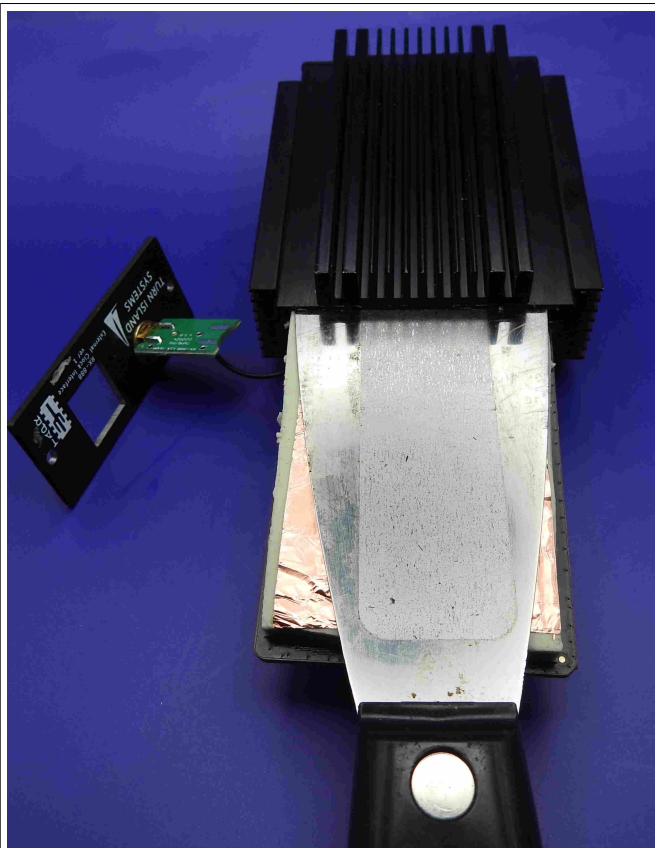




Slide the board and putty knife into the enclosure, then carefully remove the putty knife.  Attach the RX-888 back-panel.