

OctoClock

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The OctoClock is an affordable solution for high-accuracy time and frequency reference distribution. The OctoClock accepts 10 MHz and PPS signals from an external source, and distributed each signal 8 ways. This is a useful accessory for users that would like to build multi-channel systems that are synchronized to a common timing source.

- 8-Way Time and Frequency Distribution (1 PPS and 10 MHz)
- Convenient Solution for Multi-Channel Synchronization
- Use with MIMO Capable N-Series Devices for Coherent System
- External 10 MHz/1 PPS Source Required
- 19" Rackmount ? 1U

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- 0-40 °C

OctoClock Schematics

- Ethernet Controller - [ENC28J60?DIG](#)
- Microcontroller - [ATmega128](#)
- SMT OCXO-Based GPSDO - [M9107](#)
- VOLTAGE-LEVEL TRANSLATOR - [SN74AUP1T57](#)
- Output Clock Programmable Buffer - [CDCE18005?PWR](#)
- Binary Ripple Counter - [74HC4020](#)
- Power Module - [LMZ12001](#)

4 x 17.187x 1.75 inches

2.6 lbs

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[Octoclock Spec Sheet](#)

[FPGA Resources](#)

[UHD Stable Binaries](#)

[UHD Source Code on Github](#)

• What is the OctoClock

The OctoClock is a USRP-compatible accessory that allows you to easily synchronize up to 8 USRP radios. Multiple OctoClock devices can be combined for synchronization of larger numbers of USRP radios.

• When would I use the OctoClock

The OctoClock is useful for synchronizing multiple USRP devices for high channel count systems.

The following applications can benefit from OctoClock clock distribution:

- Direction Finding
- Beamforming
- Adaptive Beamforming
- Multiple-In-Multiple-Out (MIMO) Prototyping
- Geolocation Systems that Use Time-Difference-of-Arrival (TDOA)
- Multi-Channel, Multi-Static, and Passive RADAR
- Multi-Band GPS Record and Playback
- Multi-Band Cellular Monitoring

Essentially, anything that requires from synchronization or the distribution of timing information would benefit from the use of the OctoClock.

• Are there example applications that could benefit from the OctoClock

32-Channel Phased-Array Receiver Built with QR210 - OctoClock a Component in the System

Afford 8x8 MIMO Testbed

Share your applications with us and we will add them to the list.

• How does the OctoClock work

The OctoClock accepts 10 MHz and PPS signals from an external source. Active circuits are used to amplify and split the signals 8-ways. Matched-length traces minimize phase differences between all 10 MHz and 1 PPS outputs

The OctoClock-G includes an internal GPSDO (GPS Disciplined Oscillator) which provides an internal source for 10 MHz and PPS from an OCXO high precision oscillator. Add a GPS antenna (optional) with a clear view of the sky for GPS Disciplining of the OCXO that further enhances frequency accuracy of the OCXO and global time synchronization.

• Where can I find user manuals for the OctoClock and USRP

Here is helpful document. Sync. and MIMO w/ the USRP

Also, here is some documentation on how to use UHD? to interact with multi-USRP systems.

• What USRP model do you recommend for MIMO systems

The USRP N200 or N210 and USRP X300 or X310 are recommended for building high channel count and MIMO systems. These models provide external PPS and 10 MHz reference inputs. The USRP N200 and N210 support the USRP MIMO cable.

The USRP B100, B200, B210, E100, E110, and E310 can be synchronized with 10 MHz/PPS but are not phase coherent MIMO capable devices. The USRP1 cannot be synchronized with 10 MHz/PPS.

• How does the automatic switchover functionality work

When using the OctoClock-G, the Internal/External switch on the front panel allows the user to choose between the internal GPSDO and external source 10 MHz/PPS source. If the selected source is not available, the device will automatically switch over to the backup frequency source. When switchover is active the corresponding LED indicator will illuminate.

If neither source is present, the internal, external and status LEDs will not be illuminated and the user will not receive valid 10 MHz/PPS outputs.

• What do the LED indications mean

The following list describes the behavior when each of the 6 LED status indicators is illuminated:

- Internal - internal GPSDO is selected and present.
- External - external source is selected and present
- Status - Either the internal GPSDO or external source is selected. If neither source is present this LED will turn off (no signals are output).
- PPS - selected PPS pulse high.
- GPS Locked - GPS is receiving signals and has valid time/position lock.
- Power - Power is applied - smoke is still inside.

• What are the input and output specifications

- 10 MHz Input ? 0-10 dBm

- 10 MHz Outputs - ~1.4 Vpp Square Wave, Impedance 50 ohm nominal
- 1 PPS Input - Logic-level pulse, 2.5V - 5V
- 1 PPS Outputs - Logic-level pulse, 2.5V - 5V

- **What is the function of the Ethernet port**

Currently, the Ethernet port is non-functional. In the future the Ethernet port may be used to provide a method for reading GPS time and NMEA sentences.

- **What is the input voltage rating**

The OctoClock can be powered at any voltage between 6 and 15Vdc.

- **Are the design files open source**

As with all of our products, the driver code is free & open source, and can be found in our UHD repository. The schematics are also available.