

# 7210 Clocker

## Features

- Low-jitter clock signal distribution
- SMA & MMCX input
- 4 SMA & 6 MMCX output
- <100 fs RMS jitter

## Applications

- Distribute clock signals
- Amplify clock signals
- Drive clock input for:
  - 4410/4412 DDS Urukul
  - 4456 Synthesizer Mirny
  - 4624 Phaser

## General Description

The 7210 Clocker card is a 4hp EEM module, capable of distributing clock signals with <100 fs RMS jitter.

Clock input can be supplied to Clocker through the external SMA connector or the internal MMCX connector. The input source is selected using an SPDT switch.

Each Clocker card distributes an input to 10 outputs. 4 outputs are interfaced with SMA connectors, the other 6 with MMCX connectors.

Clocker can be powered externally or internally. To provide external power, connect an external 12V power source either through front panel power jack or rear connector. Alternatively, connect it to a carrier card (e.g. 1124 Kasli, 1125 Kasli-SoC) using the EEM port.

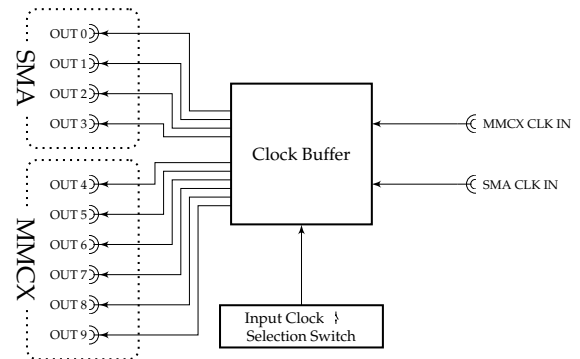


Figure 1: Simplified Block Diagram

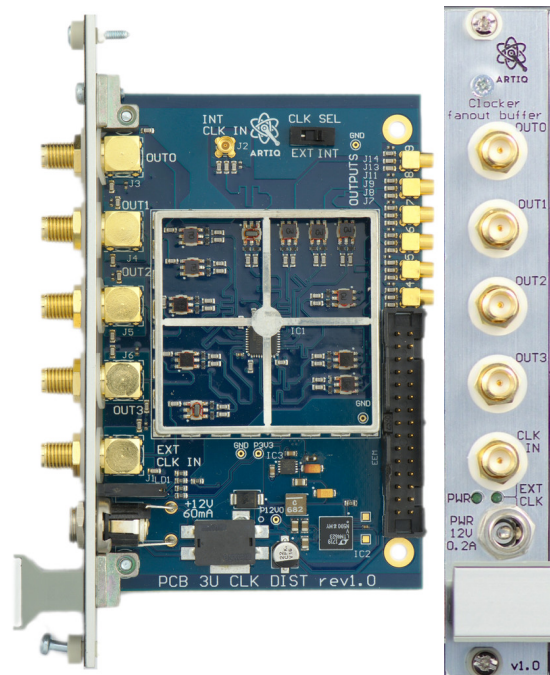


Figure 2: Clocker card and front panel

## Source

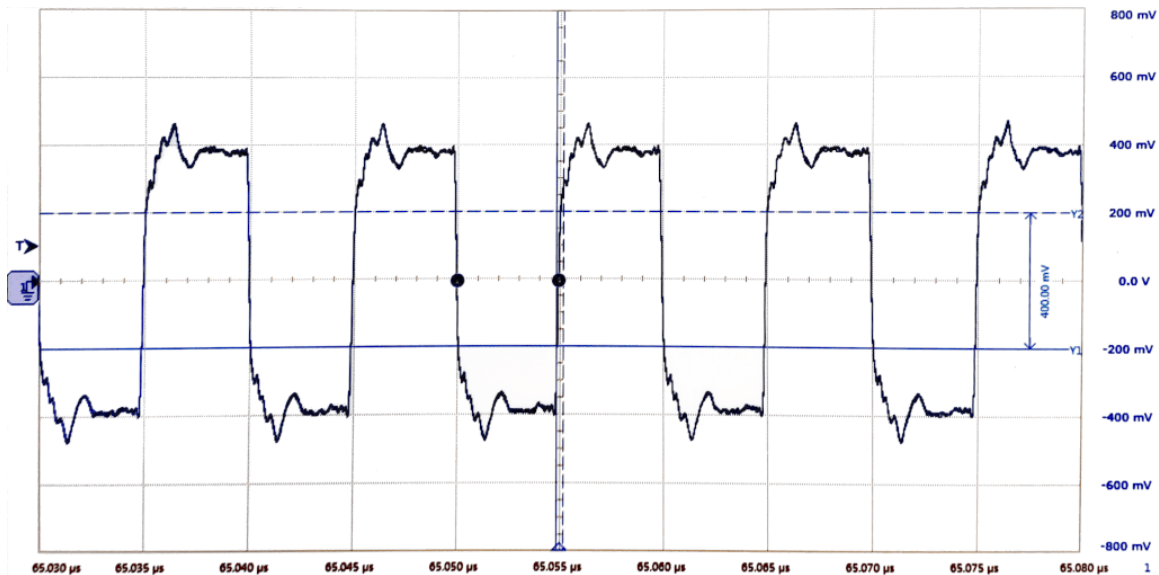
Clocker, like all the Sinara hardware family, is open-source hardware, and design files (schematics, PCB layouts, BOMs) can be found in detail at the repository <https://github.com/sinara-hw/Clocker>.

## Electrical Specifications

Specifications are derived based on the datasheets of the clock buffer (ADCLK950BCPZ<sup>1</sup>) and the RF transformer (TCM2-43X+<sup>2</sup>) used. Clock output specifications are tested by supplying a 100 MHz DDS signal to the SMA input connector<sup>3</sup>. The output is connected to an oscilloscope with 50Ω termination.

**Table 1: Clock Specifications**

Parameter	Min.	Typ.	Max.	Unit	Conditions
Clock input					
Peak-to-peak voltage	0.40		2.40	V <sub>p-p</sub>	
Frequency	10		4000	MHz	
Clock output		0.8		V <sub>p-p</sub>	50Ω load, 100 MHz
		5		dBm	



**Figure 3: Waveform of Clocker at 100 MHz<sup>3</sup>**

<sup>1</sup><https://www.analog.com/media/en/technical-documentation/data-sheets/ADCLK950.pdf>

<sup>2</sup><https://www.minicircuits.com/pdfs/TCM2-43X+.pdf>

<sup>3</sup><https://github.com/sinara-hw/Clocker/issues/6#issuecomment-414048168>

## Phase-Noise Performance

Performance measured against 100 MHz Wenzel Quartz, phase-locked to 10MHz Wenzel Blue Top oscillator<sup>4</sup>. Blue trace represents measurement against itself for reference.

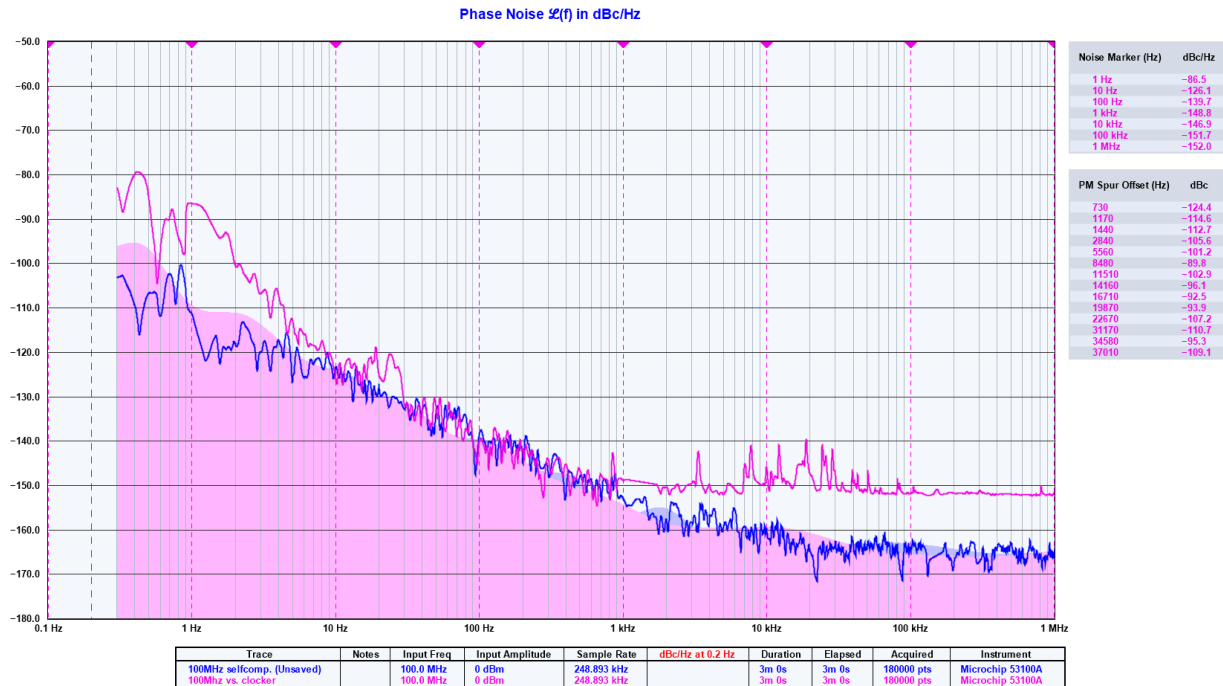


Figure 4: Absolute phase noise of Clocker measured @ 100 MHz (pink trace)<sup>4</sup>

## Selecting Clock Source

Clock input can be supplied to 7210 Clocker using either the internal MMCX connector or the external SMA connector on the front panel. The selection of clock input is configurable by an SPDT switch, located between the MMCX input connector (INT CLK IN) and the MMCX output connectors. See Figure 4.

Either INT or EXT can be selected.

- Internal MMCX (INT)  
Clock signal from the MMCX connector INT CLK IN is distributed to all outputs.
- External SMA (EXT)  
Clock signal from the SMA connector CLK IN on the front panel is distributed to all outputs.

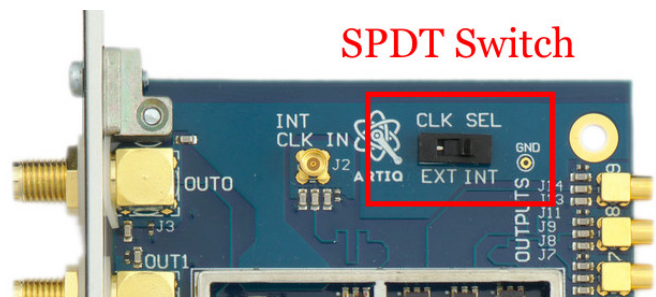


Figure 5: Position of the SPDT switch

<sup>4</sup><https://github.com/sinara-hw/Clocker/issues/4#issuecomment-1310591042>

## Ordering Information

To order, please visit <https://m-labs.hk> and select 7210 Clocker in the ARTIQ/Sinara crate configuration tool. Cards may also be ordered separately by writing to <mailto:sales@m-labs.hk>.

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