

WOTAN - low cost ultra small formfactor console for Magnetic Particle Imaging

MPI control modul with 4 transmit channels (4x 250 kS/s, 8 bit, up to 4 MS/s possible) and one receive channel (2 MS/s, 12 bit).

Recording time: 15 ms. Data transfer over BLE (by adding the HC-05 bluetooth module or any bluetooth-UART module with 1.3 MBaud) with < 1.3 MBaud, or using the USBFS component included on the PSoC with 12.5 Mbps. Both interfaces allow writting new wave forms ("sequences") and receiving data.

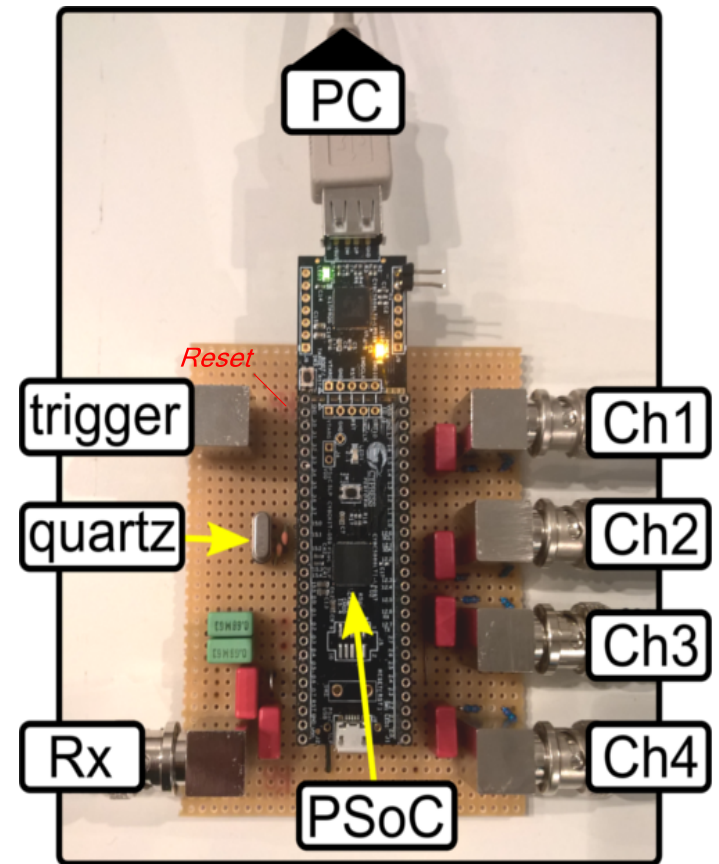
Both interfaces appear as COM ports and can be used interchangeable.

Example scripts for python 3:

These scripts work with both interfaces. Since they appear as COM port, only the port number needs to be changed. Bluetooth is slower and might require a higher value for timeout.

1) "UI_WOTAN/generate_sequence.py": writting arbitrary wave forms to the module (example code for showing the API)

2) "UI_WOTAN/run_sequence.py": running the board via bluetooth or USBFS (fullspeed USB-to-UART).



External components (see following tabs for details):

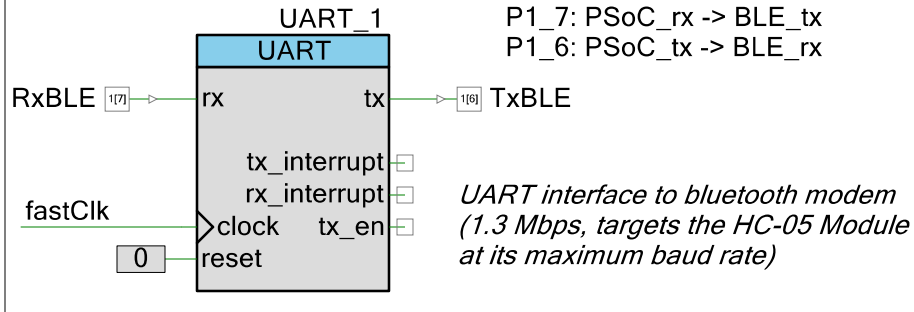
CH1..Ch4: 4x 1uF capacitors for dc-blocking (GPIO 2.0, 2.3, 2.5 and 2.7 respectively).

4x 12 kOhm resistors to adjust the output voltage of the IDAC8_n components to 2V-pp (pull GPIO 2.0, 2.3, 2.5, 2.7 to GND with 12 kohm each).

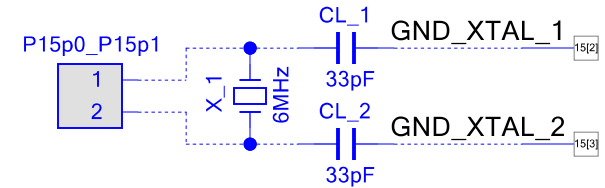
Rx: 2x 1uF capacitors for the Rx-channel (dc-block, input_p=) and 1 Mohm resistor. 2x 680nF bypass capacitors for the two SAR_ADC.

XTAL: 8MHz quartz and 2x 33pF (GPIO 15.0, 15.1, GPIO 15.2 and 15.3 are used as GND for the oscillator)

User - and debugging interface

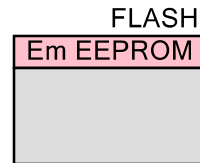


Extern 6 MHz crystal (3...24 MHz can be used)

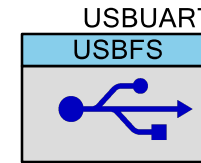


Pin 15.2 and 15.3 are used to ground the two load capacitors for the XTAL

Flash memory for DAC wave forms

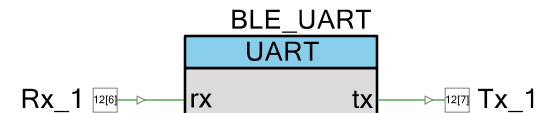
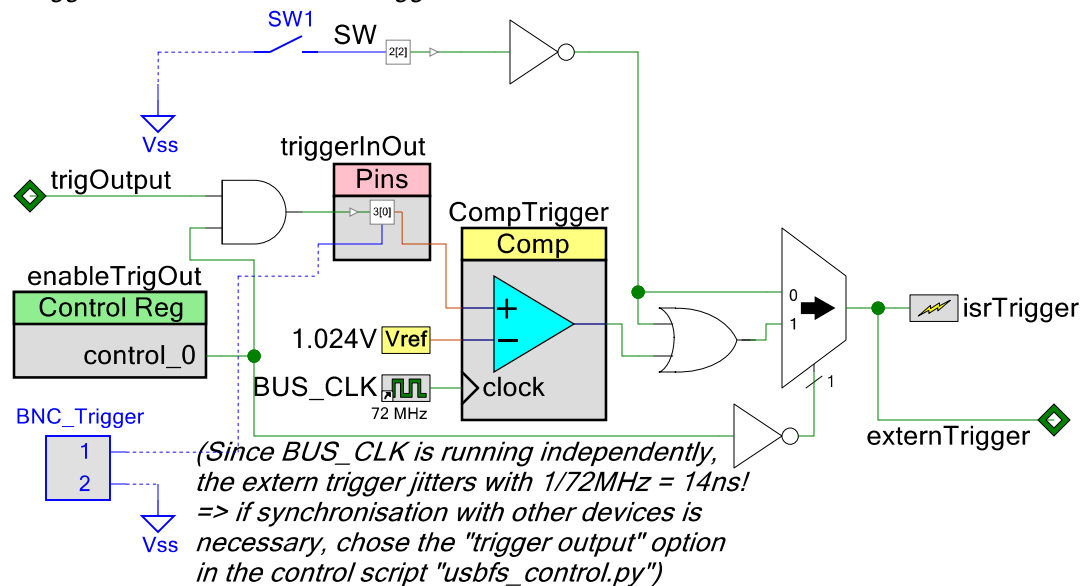


USBUART for fast data transfer (up to 12.5 Mbps, connected to micro USB Typ B)

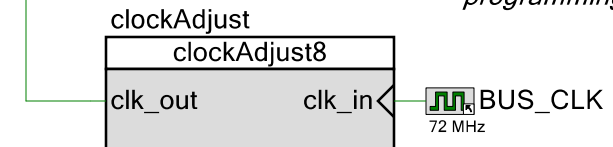


Trigger extern

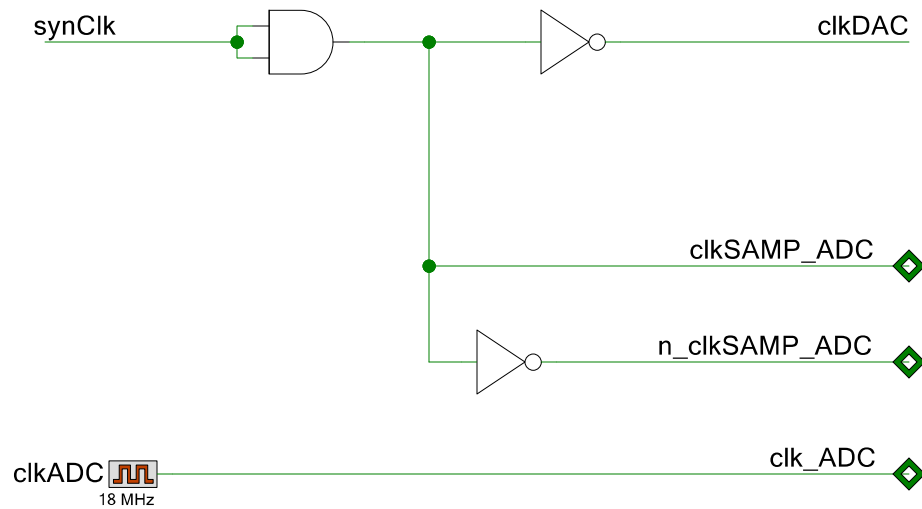
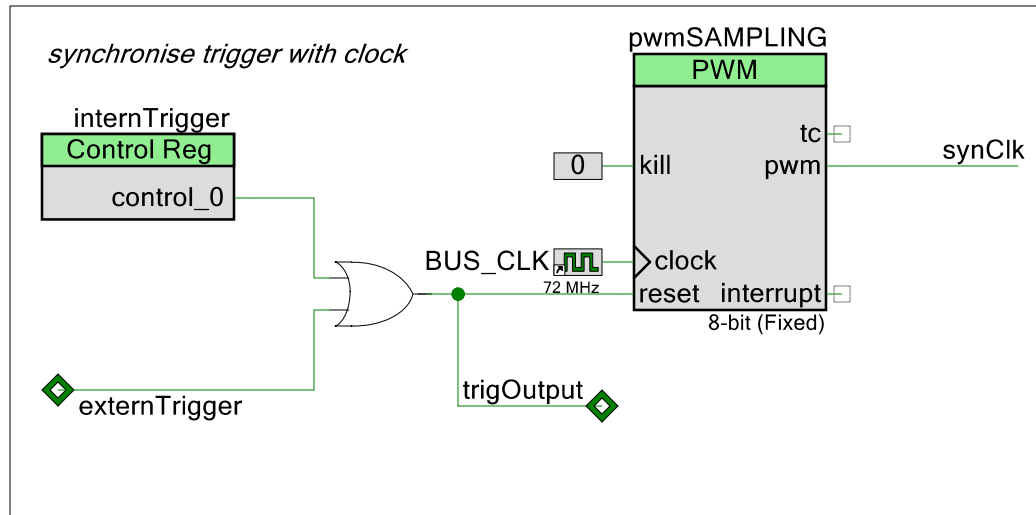
Manual trigger



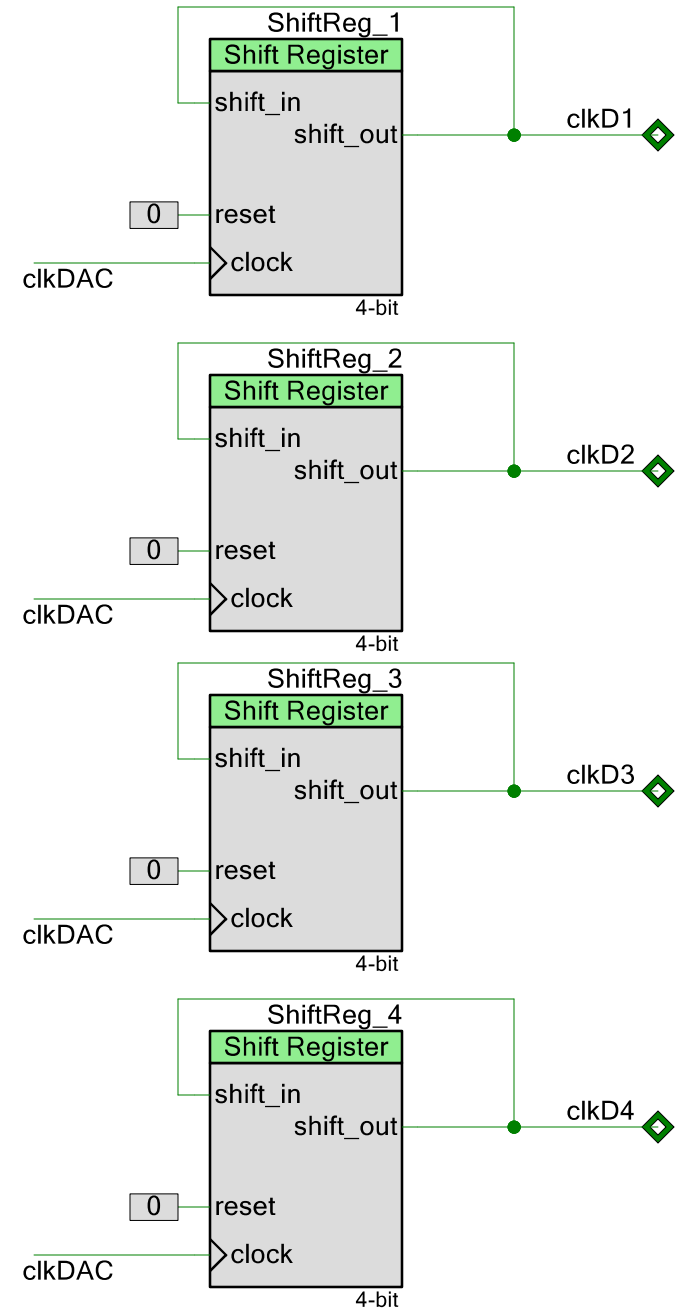
Pin 12.6 (Rx) und Pin 12.7 (Tx) are already connected to the USB-to-UART on the attached onboard programmer of the CY8CKIT-059 via the SWD programming path.

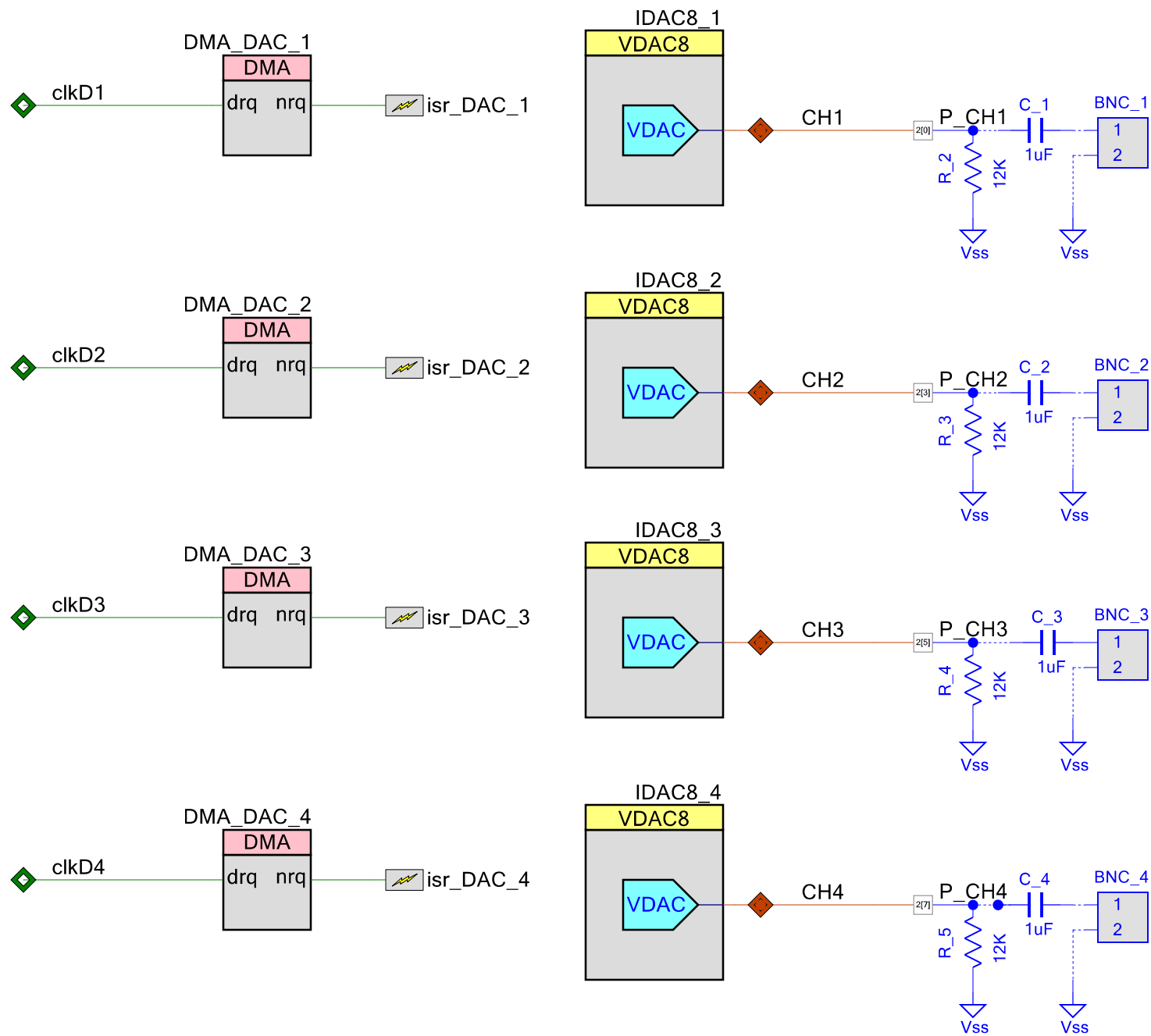


ADC- and DAC Clocks



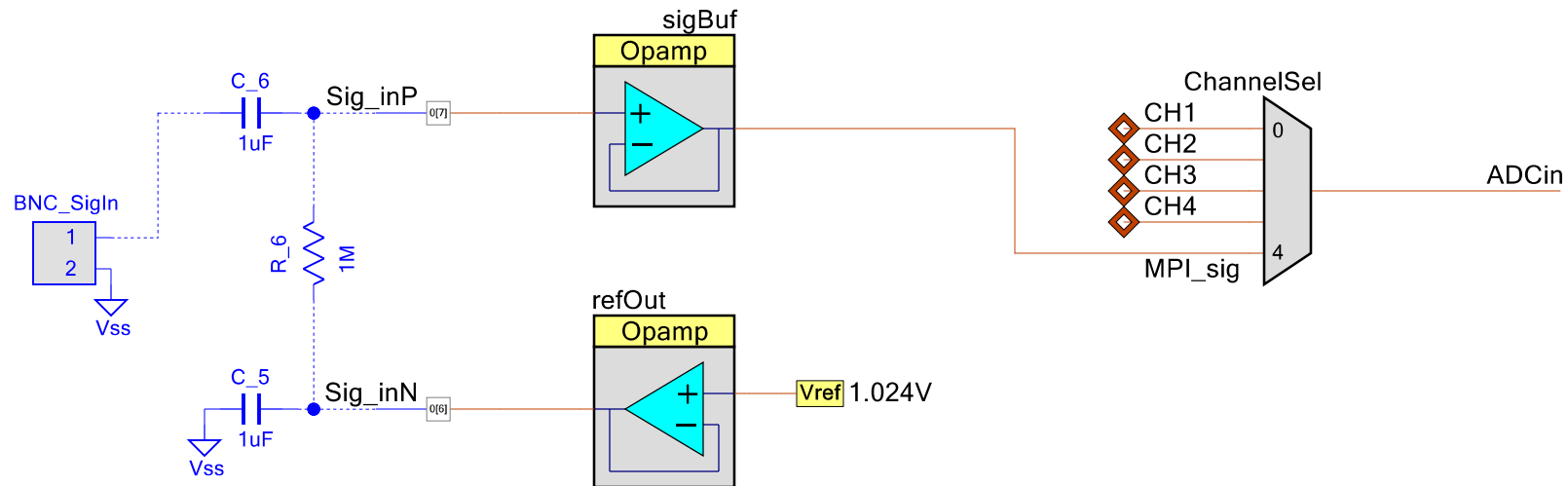
Shift DAC clock to avoid simultaneous DMA requests





*MPI signal receive channel
Input range: 0..2.048 V*

*Channel switch (for debugging
or channel monitoring)*



*track and hold for
reducing HF aliasing noise*

two ADCs for doubling the Sampling rate

