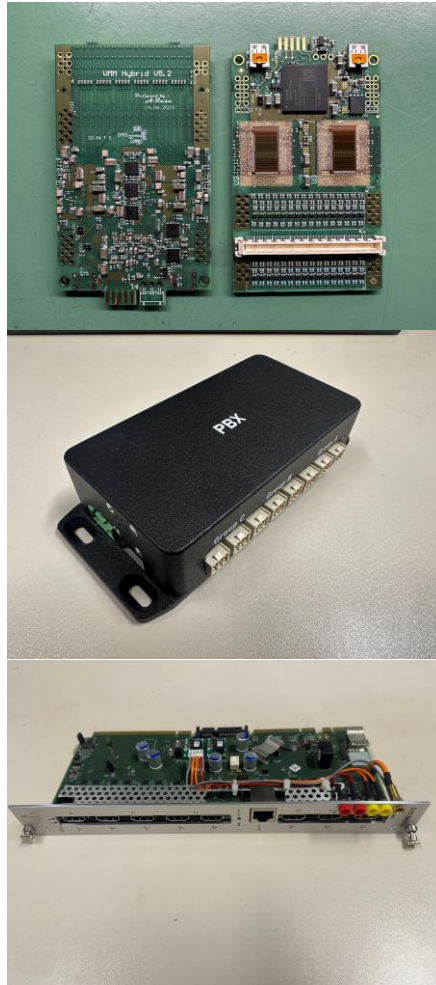


Status of the latest developments on SRS hardware

1. Status SRS Hardware Production Nr.5 from 2024



1 VMM Hybrid

- The process for the production started in fall 2023.
- After the acquisition of the components and manufacturing the PCB's dicing the wafers and producing the mechanics the material was handled to the assembly factory on 12 June 2024
- After many months (affected also by the summer vacation) 2 test phases and the mechanical mounting the boards will be finished on 16 Dec.
- There were 535 pcs produced and there will be an inspection and then prepared for shipment.

2 PBX

- The first 20 pcs batch has been produced.
- Initial difficulties appeared due to the requirement of integrating the PCB inside the mechanical box.
- The PBX's have been received at the end of November and they where tested and they will be prepared for shipment.

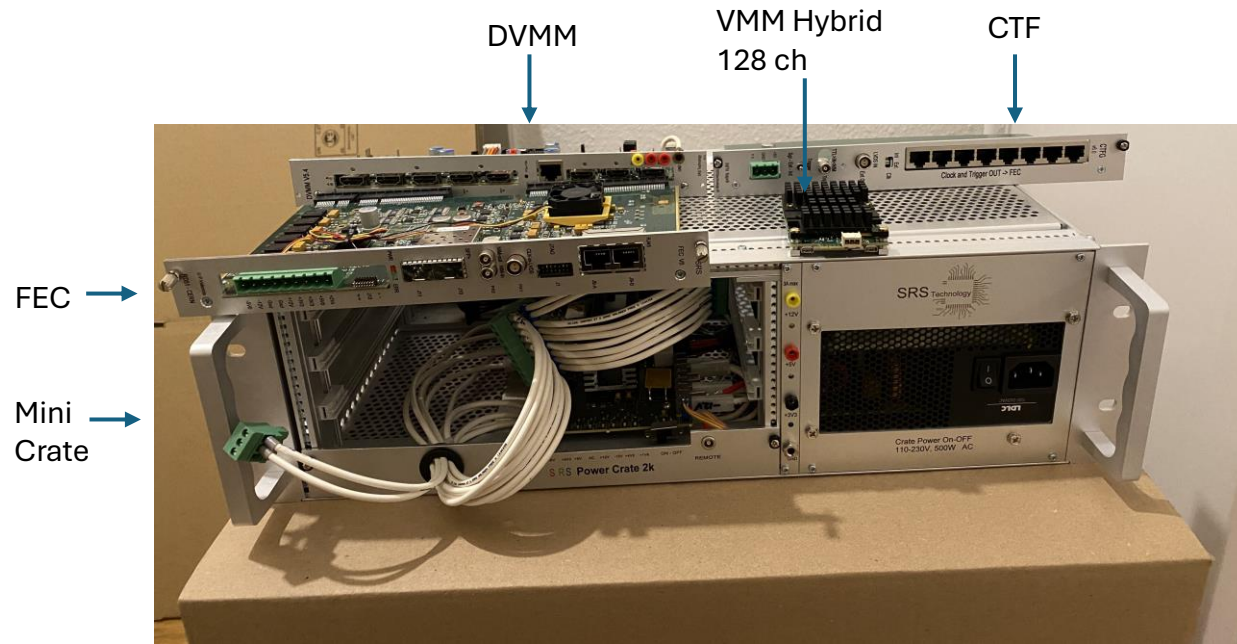
3 DVMM

- Only 15 DVMM's were produced due to electronic components limitations
- The boards have been received at the end of November and have been tested and will be prepared for shipment.

4 PBX Cables

- 160 cables have been produced and received at the end of November and all of them have been tested.

2. Migration from classic SRS to crate-less SRS



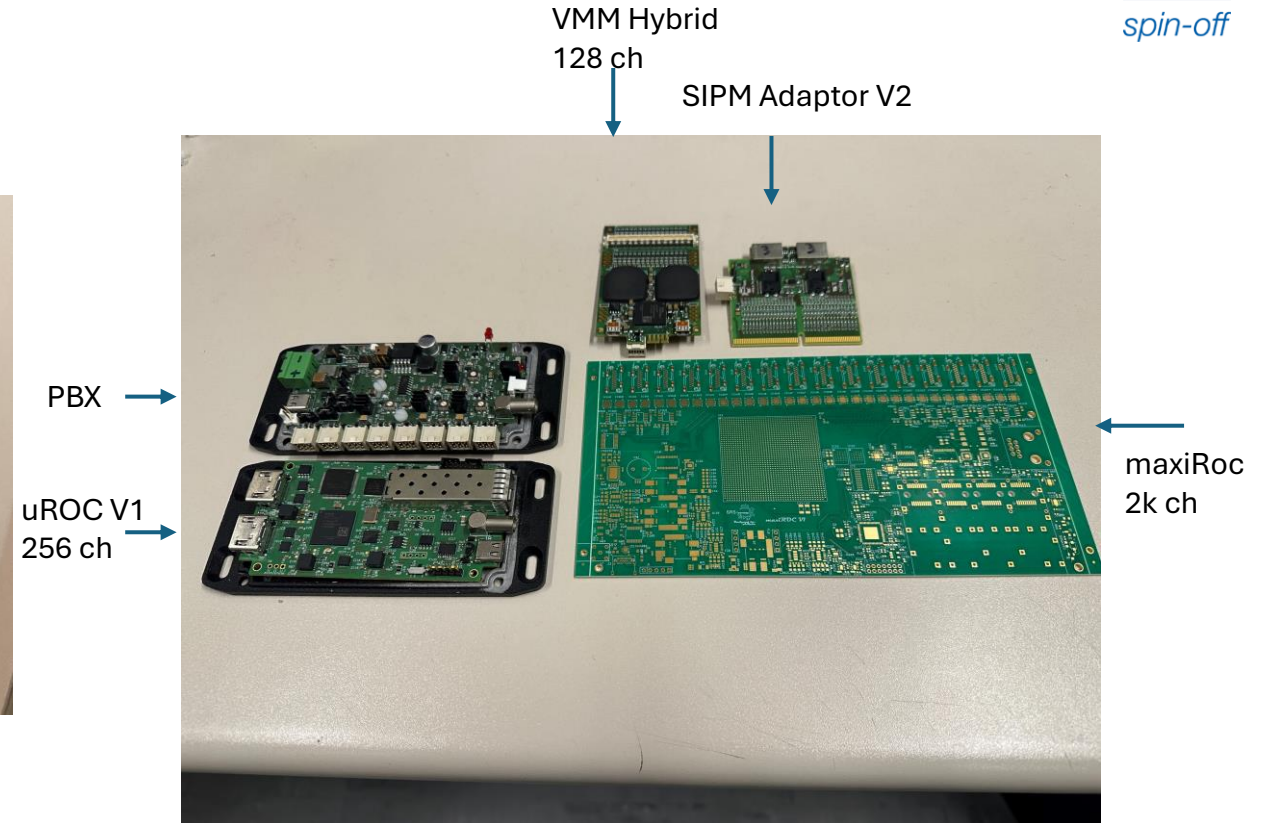
SRS Classic 1k channels configuration represented

Configuration 1k Channels:

- 8 Hybrids, 1 FEC, 1 DVMM, 1 Crate, 1 PBX

Configuration 2k Channels:

- 16 Hybrids, 2 FECs, 2 DVMMs, 1 Crate, 2 PBXs



SRS crate-less from 256 ch to 2k ch configuration represented

Configuration 256k Channels:

- 2 Hybrids, 1 uROC

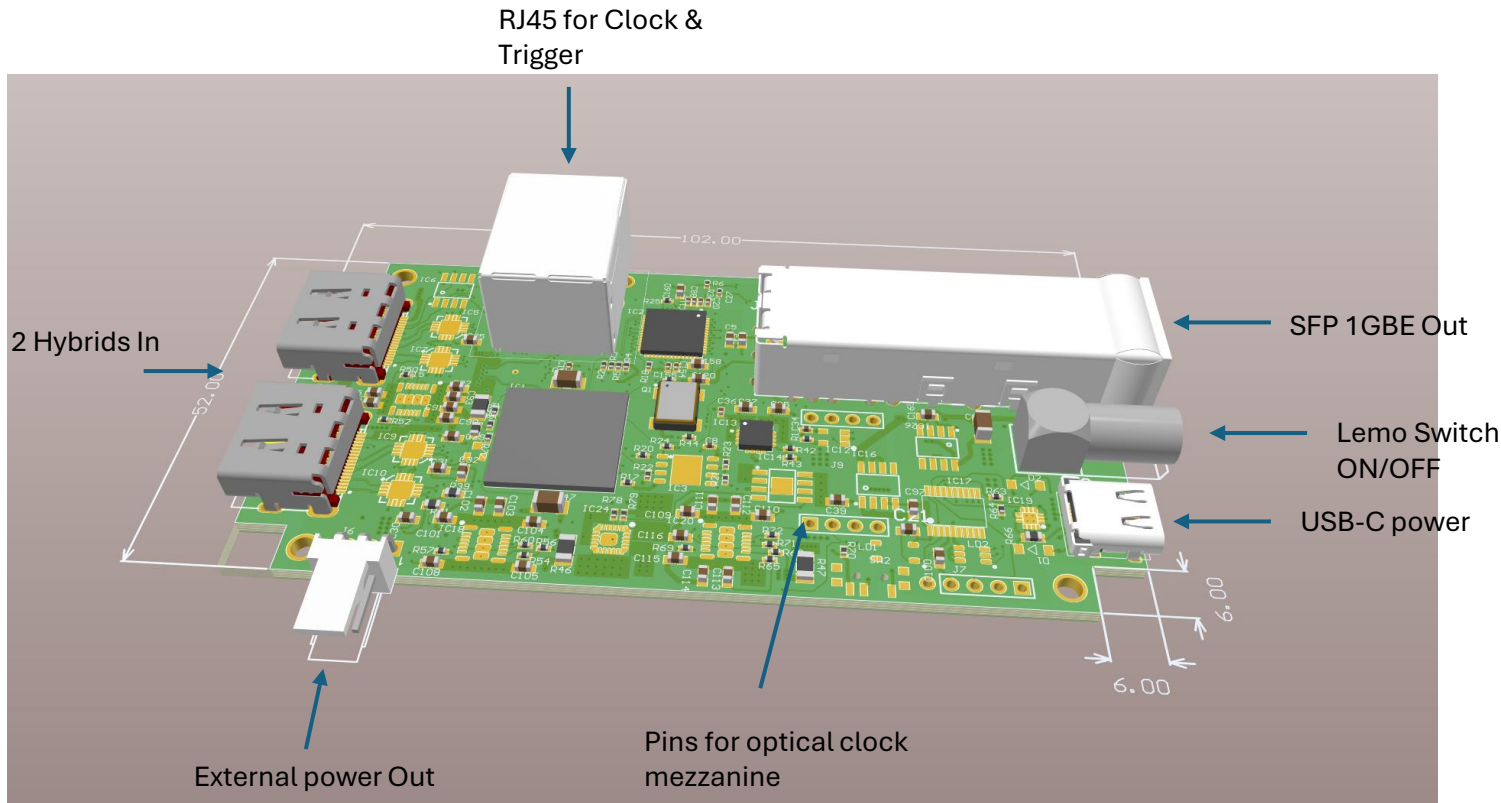
Configuration 2k Channels:

- 16 Hybrids, 1 maxiROC, 2 PBXs

VMM-SRS for SIPM based calorimetry publication

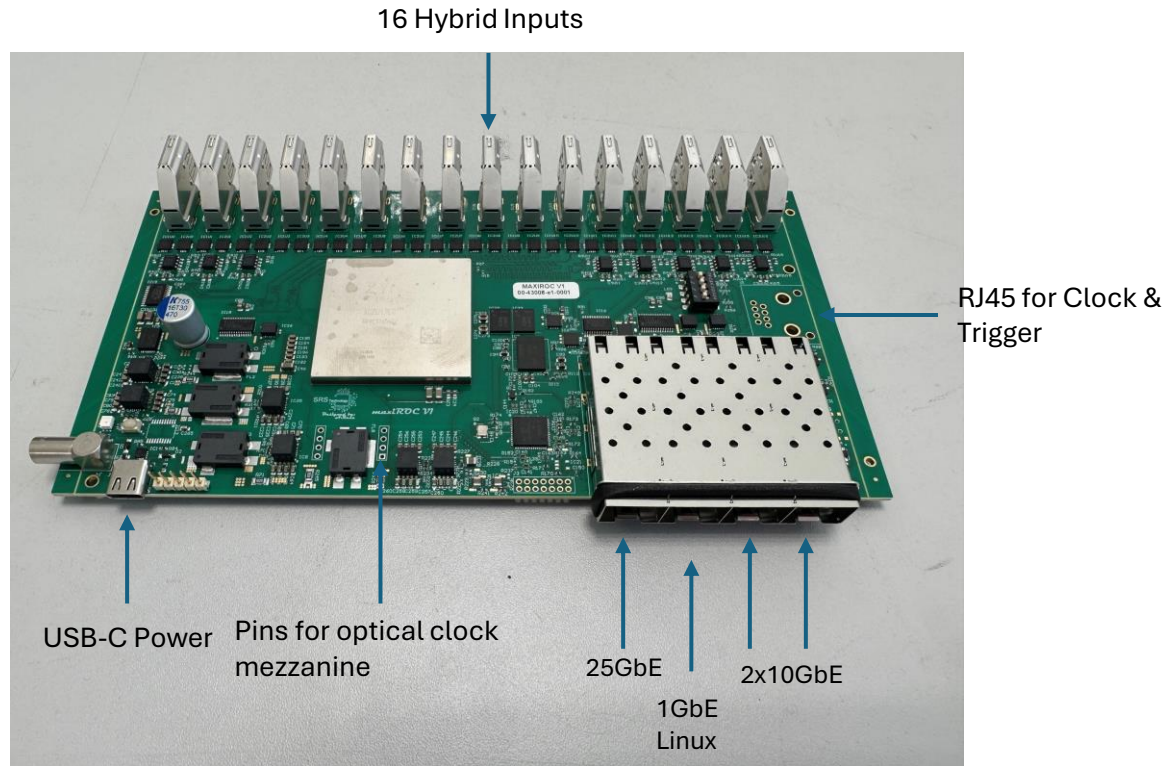
<https://cds.cern.ch/record/2903392/files/document.pdf>

3. uROC V1.1 concentrator for 256 channels

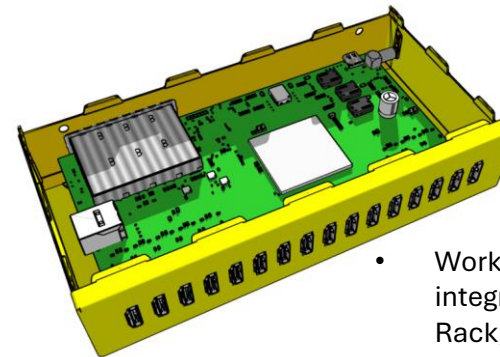


- 2 prototypes uROC V1 were produced the firmware was developed and the board was tested, debugged and validated.
- On the design version V1.1 all the bugs were corrected.
- On the V1.1 it was added an RJ45 connector for compatibility with CTF and uCTF for the common clock if multiple boards are used.
- Availability in 2025

4. maxiROC V1 Concentrator for 2048 channels



- 2 Prototypes were built.
- The PCB size is 205x108 mm and it has 12 Layers.
- The board is based on the Zynq Ultrascale + ZU17EG FPGA.
- It has the possibility to use also the integrated processor Quad-core Arm Cortex-A53 for Linux applications using the dedicated 1GbE SFP plug in.
- Programable Clock speeds with Jitter Attenuator using I2C and stored on a Prom for ranges from 100Hz to 1028Mhz.
- 4 GB DDR4 memory integrated.
- 1Gb Flash memory.
- RJ45 for CTF and uCTF compatibility for common clock if multiple maxiRoc's are used and external trigger.
- USB-C Power for the maxiRoc but No power is provided for the hybrids. Adding power for 16 hybrids would have required a larger board and an external power supply because the USB-C does not provide sufficient power for such an application.
- Availability in 2025



- Working with Schroff for developing an alu Box with cooling integration and different mounting possibilities (Wall, Rack, Desk)

5. maxiRoc V1 commercial DAQs

Model used for our test's

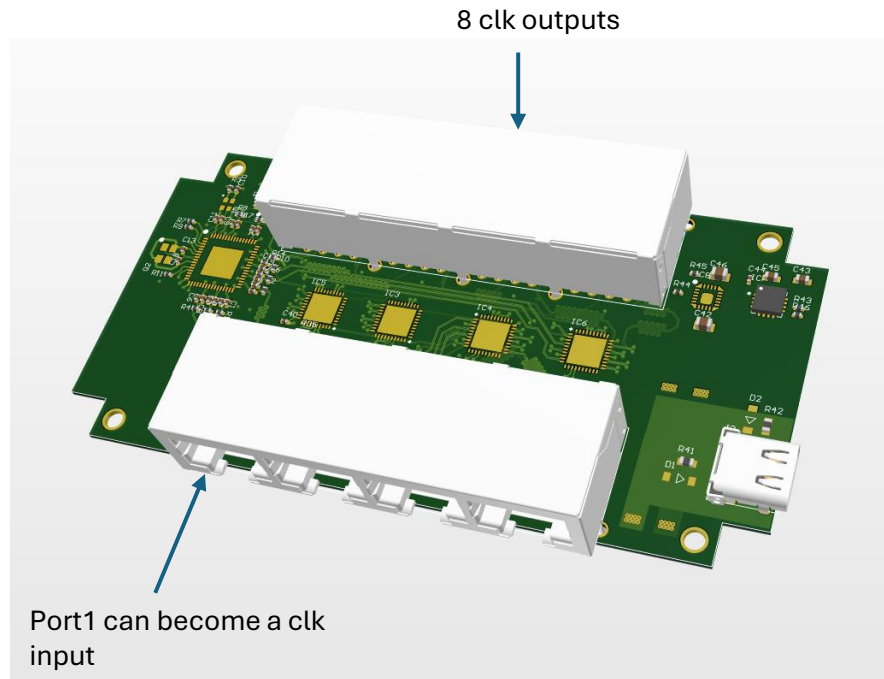


- Mellanox MCX512A-ACAT Connectx-5 with 2 ports where one can chose from 25GBE or 10GbE connected to PC Via PCIE3.0 for data acquisition at a cost of 338 Eur.



- Possible DAQ Switch version QSW-M7308R-4X that can be used for multiple maxiRoc's.
- It can be configured with 8 inputs of 25GbE from the maxiRoc and with 1 output of 100GbE or multiple to Online.
- Very optimized cost around 1,178 Chf.

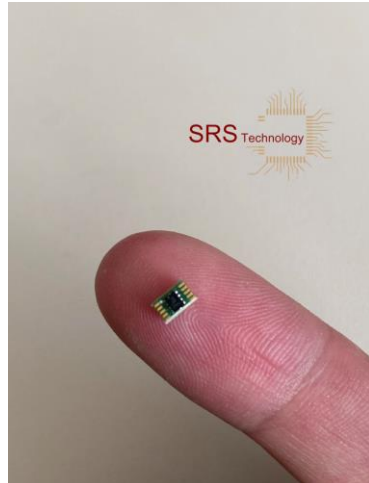
6. uCTF V1 (Clock, Trigger , Fanout)



- The uCTF is a quick solution for users that will use multiple maxiRoc's
- The board will have the same form factor as the uROC and PBX and it will be fitted in the same chassis
- The power of the board is USB-C.
- Using the same programmable clock chip as on the maxiRoc in order to deliver various frequencies to the maxiRoc's
- The clock format is LVDS.
- If more than 8 maxiRoc's are used than 1 output of the uCTF will become an input and it will require 3 uCTF's.
- Due to modern buffers the clock can be distributed over 20m Cat6 shielded ethernet cables.
- The injected trigger circuit and connector needs to be determined.
- The board will be available in 2025

7. Plans for SRS hardware production Nr. 6 in 2025

- Over the years the hardware availability has suffered due to both Covid pandemic and the semiconductor crisis.
- Another major delay where the joint productions where it was required initially for 100% of orders for a production to start later decreased at 80%. This always created delays due to administration of minimum 4 months that were added in the production cycle.
- With the new crate-less Roc based electronics simplifications are been made in the production process making it easier to estimate how much hardware is needed to be built.
- The availability strategy has been changed and a budget was allocated for building hardware on stock without any need of waiting for a joint production. This way at any point in time after the production has ended the hardware will be available for immediate delivery.
- In Jan 2025 an unallocated production will start for:



- 310 pcs VMM Hybrids V5.2
- 30 pcs uROCs V1.1 (during the production process the 1st 2 pcs assembled will be sent for test's and if OK the production will resume)
- 50 pcs maxiROCs (after the validation of the prototype, however the acquisition of the parts for the total qty needed will start in Jan)
- 20 pcs uCTFs V1.1
- 50 pcs PBXs V1.3
- 420pcs PBX power cables
- 310 pcs SIPM Adapters V3 (after the completion of design for individual channel bias calibration and validation of the prototype)

Thank you and wish you all Happy Holidays !