

Update on the WG5.1 activities

Synchronisation of activities and developments related to VMM3a/SRS

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Yield estimation (chips)

- First estimation of yield with 57 hybrids for ESS (done by Dorothea Pfeiffer)
- Test performed with the calibration module within the slow control software
- Results:

quality class VMM	N	%	description
A*	2	2%	All channels working without stlc
A	95	83%	All channels working with stlc flag
B	7	6%	One channel not working
C	2	2%	Two or three channels not working
D	2	2%	Many channels working badly
E	6	5%	VMM not working
	114	100%	total VMMs

- Important: the SBIP flag (here the STLC flag was used, but SBIP is even better) has to be enabled! Set by default in new slow control version.

Yield estimation (hybrids)

- Keep in mind that each hybrid contains **two** chips, so hybrid yield may not be the same as the chip yield!
- Results of the tests with the 57 ESS hybrids:

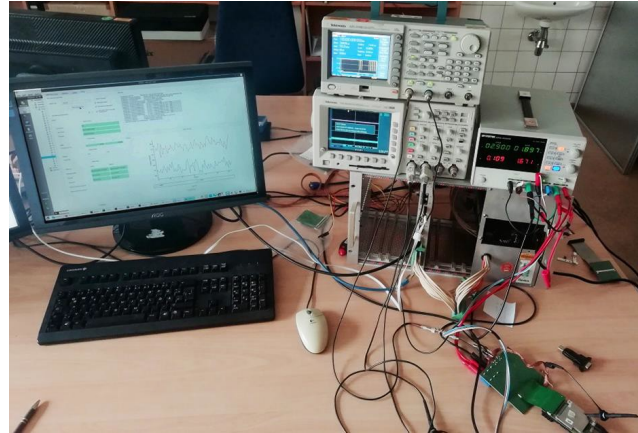
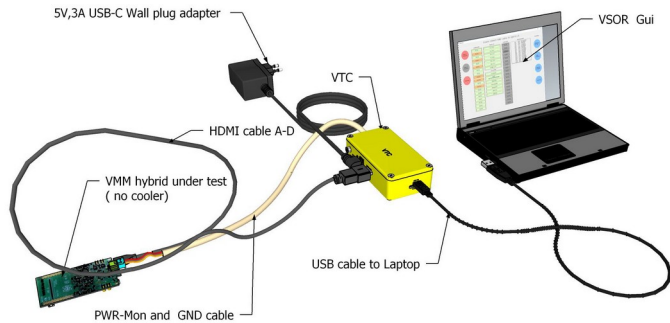
one VMM	one VMM	quality class hybrid	N	%	class N	class %
A*	A	a (Two good VMMs)	2	4%	42	74%
A	A		40	70%		
A	B	b (1-3 channels broken)	6	11%	8	14%
A	C		2	4%		
A	D	c (one OK VMM)	2	4%	6	11%
A	E		3	5%		
B	E		1	2%		
E	E	d (broken)	1	2%	1	2%
Total			57	100%	57	100%

quality class VMM	description
A*	All channels working without stlc flag
A	All channels working with stlc flag
B	One channel not working
C	Two or three channels not working
D	Many channels working badly
E	VMM not working

- If **1 broken channel** per hybrid is fine with you, the yield is **ca. 84 %**
- Possible improvements during production, i.e. electrical tests of hybrids before and after bonding, including replacement of broken VMMs possible (not unlimited of course). Thanks to Alexandru Rusu for this. More precise numbers on the yield will be known after the ongoing production!
- Nonetheless, you may need to purchase more hybrid-channels than your experiment has readout-channels. Please cross check this at the time of order.

Testing systems

- Two complementary systems for testing and characterising the hybrids and VMMs available: VTC from CERN/ESS and VMM-Hybrid quality control test system from BONN



- VTC: electronic functionality tests (connectivity, power, I2C scan, FPGA, clock, temperature, ID chip, default config + success check, EEprom config, baseline)
- VMM-Hybrid quality control test system: response characterisation (baseline, threshold, temperature, active channels, connectivity, external pulser, DAC and ADC monitoring/scan, quality evaluation and hybrid classification, power monitoring, flashing)

Testing systems

- Planned to test and characterise ~150 hybrids for LSBB with both systems to get more statistics for the yield estimation and for the qualification database of BONN's system
- Originally planned to be done in summer in person (Finn Jaekel from BONN), but now with remote assistance, because of travel restrictions
- Remote assistance is possible
- Updated version of VTC (5 produced with financial support from ESS)
- Up to 2 VTCs will be available for users coming to CERN or for distribution between the users.
- For more on the VTC status see presentation from Marek Hracek.

Current production status

- Finalised the coordination of next production batch
- The currently ongoing production has a volume of ~ **400 RD51 VMM-hybrids**
- In total, for all productions, **10 wafers** from RD51 and **2 wafers** from ESS have been used
- RD51 has **5 wafers remaining** → we should be able to cover existing expression of interest that are not participating in the ongoing production.
- If you are interested in VMM3a/SRS and have not expressed your interest yet, please contact Hans Muller (Hans.Muller@cern.ch). A new wafer production that could be organised via GlobalFoundries @ CERN may be needed. Depending on the response, we will decide on how to proceed.

News on existing hardware

- Power through HDMI → CERN store changed supplier.
- New **5 m** cables have some issues (the power lines are too thin)
- Search for alternatives is ongoing. In case you have experience with alternative HDMI cables, please let us know.
- If you bought recently an ABC Minicrate → test if the power is correct. Recently a manufacturing issue (cables too thin) was detected.
- Quickfix is available here:
<https://drive.google.com/file/d/1owOSFq1mBsLWZu5ul-m-hAREgZpirWvw/view>
- We have also updates on self-made Eurocrates → see presentation from Michael Lupberger

Further news

- For the VMM a new adapter card is needed (new chip = new adapter card)
- DVMM card (Digital VMM adapter card)
- Direct readout of up to 8 VMM hybrids incl. power over max. 5 m HDMI cables (with upcoming powerbox read out for up to 16 hybrids over long HDMI cables)
- User manual:
<https://drive.google.com/file/d/1SUgd3WgkUPArSNw3KYoxqYmI8785Ai4Y/view?usp=sharing>
- Power consumption of VMM hybrids is quite large, so good grounding is required.
- DVMM card available via SRSTechnology, ground cable (for 4 hybrids) can be made by yourself. Manual can be found here:
https://drive.google.com/file/d/1NbDpsS5acaWVrNh59kGIE_u4qrMxdImK/view?usp=sharing

VMM3a/SRS procurement news



Procurement **without** CERN TEAM account (**settled**):

- Direct purchase from companies (SRS Technology spin-off already licensed by CERN)
- Aiming to have all parts sold by licensed companies, single purchase
- Prices will depend on ordered quantities → grouped orders, as we did for the ongoing production
- Taxes have to be applied

Procurement **via** CERN TEAM account (**to be settled**):

- CERN store (several components to be added)
- Taxes have to be paid if your hardware will move out of CERN

Important: do NOT use CERN EDH DAI to buy SRS/VMM UNTIL FURTHER NOTICE.

EDH Purchase Requisition (DAI) will not be approved till future procurement procedures will be defined

Meeting with CERN Store, Procurement and Knowledge Transfer officers next week (15th of October) to discuss about this topic

VMM3a/SRS software

- New repository for slow control software:
<https://gitlab.cern.ch/rd51-slow-control/vmm3a>
- Virtual machine available to distribute the full installation of all VMM3a/SRS related software (see screenshot)
- Only problem: no simple way to distribute it (the VM file is quite large...). Contacted IT department, but if you have ideas, input would be appreciated.
- Alternative with containers (Docker) planned

