VMM-Hybrid quality control test system

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Overview

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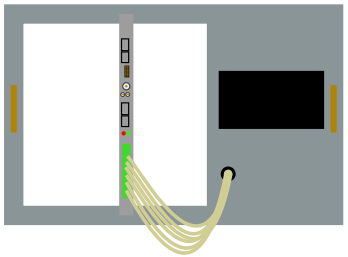
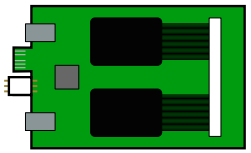
Minimal System



SRS Crate

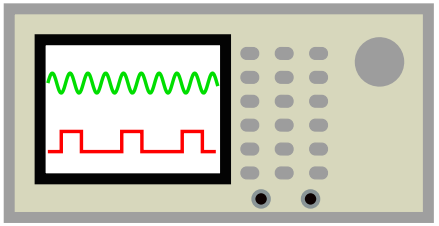
Computer
+
VMM Slow Control



VMM Hybrid

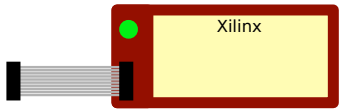
- Read VMM monitoring Output
- Read VMM data
- Many more possible

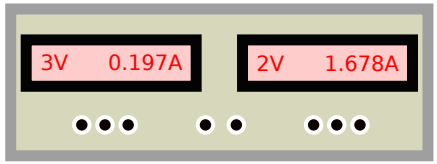
Optional "extensions"



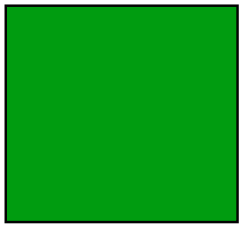
Signal Generator

JTAG Programmer





Power Supply



Multiplexer PCB

- Load Firmware
- Measure power consumption of hybrid
- Test connection detector plug $\leftrightarrow$ VMMs incl. protection circuit

Goals

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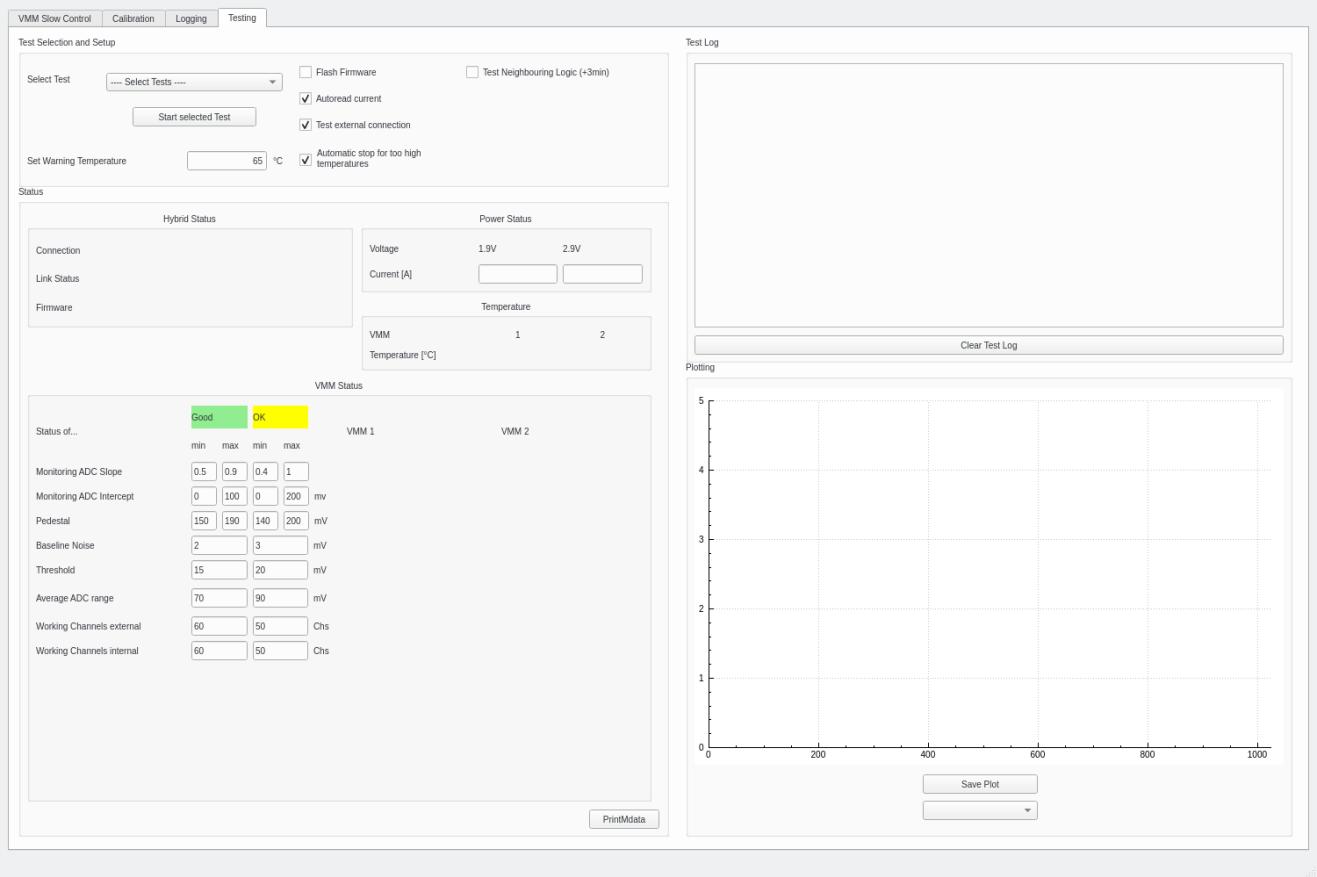
Automatization of hybrid testing as much as possible to quantify quality

- Minimize time requirements
- Minimize effort for tester
- Testing of defined properties (e.g. pedestal for each channel)
- Define quality benchmarks (e.g. $160\,\mathrm{mV} < U_{\mathrm{pedestal}} < 180\,\mathrm{mV}$) (data needed!)

$\rightarrow$ **Quantify hybrid quality, get production yield**

Testing Procedure

- Open VMM Slow Control
- Connect Hybrid to SRS, power (&optionally external test pulses)



Testing Procedure

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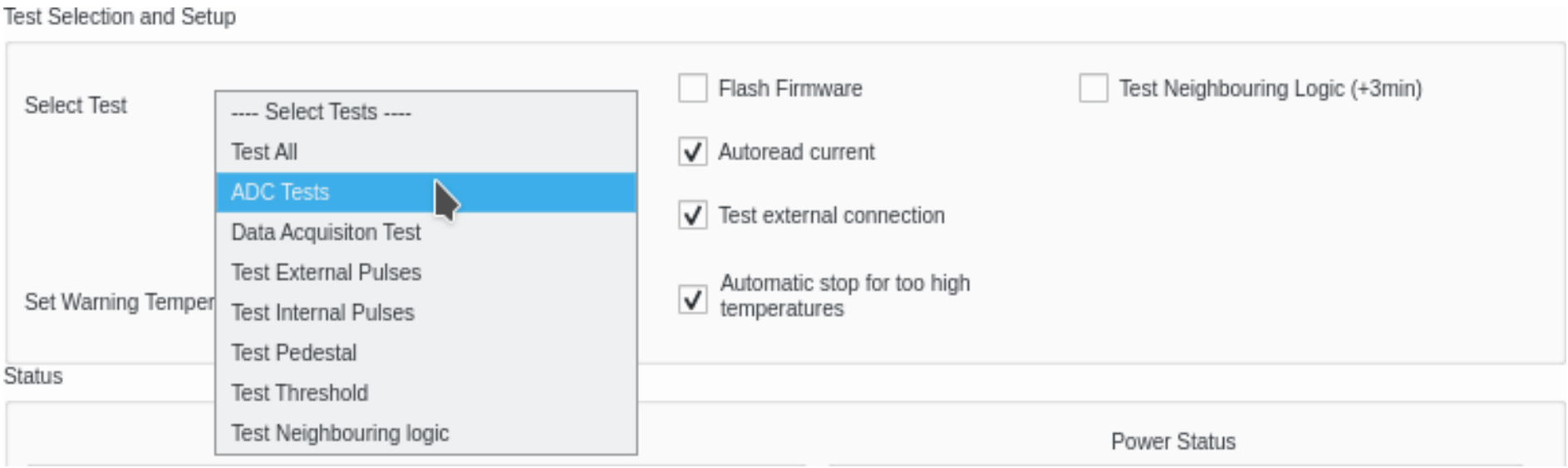
- Choose optional settings (Checkboxes)
- Select type of test



Testing Procedure

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- Optional possibility to set own criteria for “good” and “ok” values

Status of...	Good		OK		
	min	max	min	max	
Monitoring ADC Slope	0.5	0.9	0.4	1	
Monitoring ADC Intercept	0	100	0	200	mv
Pedestal	150	190	140	200	mV
Baseline Noise	2		3		mV
Threshold	15		20		mV
Average ADC range	70		90		mV
Working Channels external	60		50		Chs
Working Channels internal	60		50		Chs

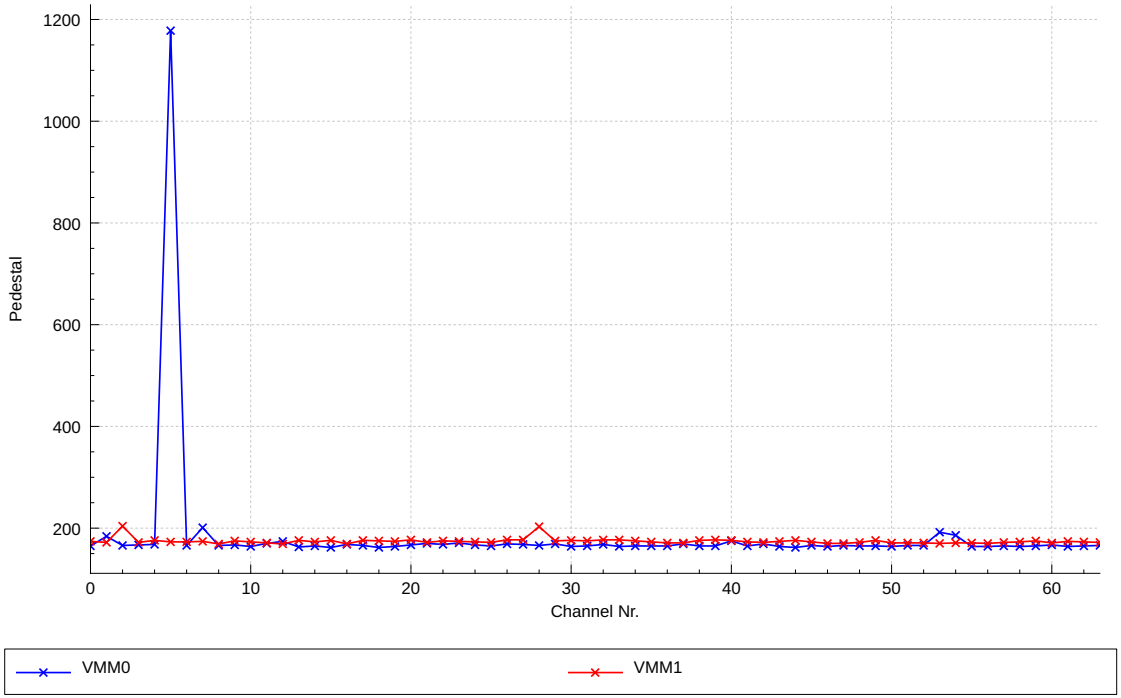
- Start test
- Wait for tests being finished ($\lesssim 5\,\text{min}$)

Testing Procedure

- Test results displayed on Slow Control
- Uploaded to database

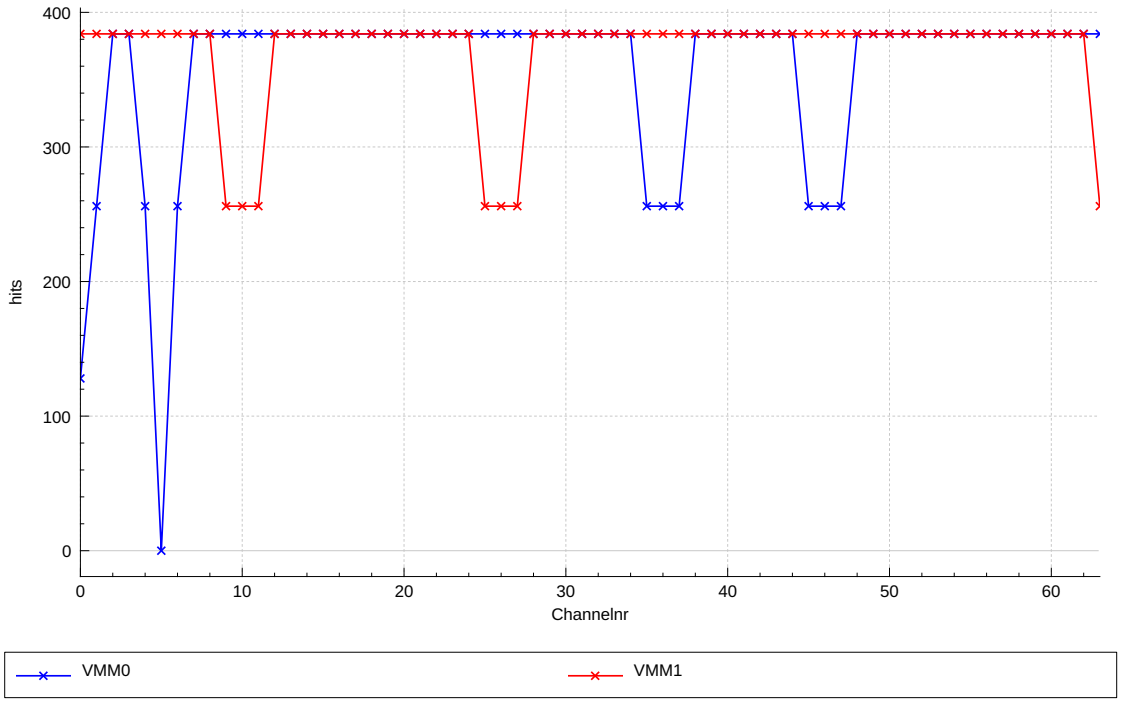
Pedestal measurement

- For each channel of both VMM do the following:
  - Set channel output onto monitoring ADC
  - Read out ADC, store result
  - Check if value is in accceptable range



Neighbouring Logic

- Enable neighbouring logic for both VMM
- For each channel of both VMM do the following:
  - Enable test pulses on channel
  - Measure amount of pulses for every channel for short time
  - Check if direct neighbours gave out pulses as well
  - Go to next channel



Update on database

- From VMM SlowControl test results automatically written into (currently local) database (PostgreSQL)
- Database browser to show test results

Database connection

Adress: localhost Port: 5432 Database: testdb

Connect Refresh

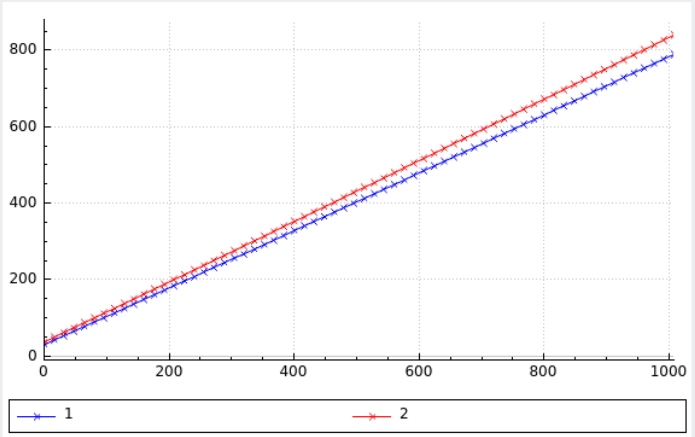
Query Database Export Results

	hybrid_id	easurement_	vmm	status	onitoradcslo	itoradcinter	baseline	basenoise	threshold	kingchannels	kingchannel	rokenchanne	avgcurr1_9v	avgcurr2_9v	date	adccurveext	adccurveint
1	24	242020061...	0		0	4095	nan		0	62	64	{2,10}	1,75615	0,107195	17.06.20	71,9239	51,7751
2	24	242020061...	1		0	4095	nan		0	62	62	{4,8}	1,75615	0,107195	17.06.20	60,7177	54,5715
3	23	232020061...	0		0,752976	30	163,5	0,676	14	61	61	{5,36,46}	1,61963	0,106103	17.06.20	62,8357	50,7834
4	23	232020061...	1		0,796627	37	168,6	0,31	14	63	63	{26}	1,61963	0,106103	17.06.20	60,6223	55,4188

Hybrid Details

Measurement ID: 2320200617181€ Measurement Type: MonitoringADC

Show Details



Custom Criteria

Status of...	Good min	Good max	OK min	OK max		VMM 1	VMM 2
Monitoring ADC Slope					mv		
Monitoring ADC Intercept					mv		
Pedestal	150	190	140	200	mV	163.5 ± 7.5 mV	168.6 ± 2.2 mV
Baseline Noise					mV		
Threshold	15		20		mV	14mV	14mV
Average ADC range					mV		
Working Channels external	60		50		Chs	61	63
Working Channels internal	60		50		Chs	61	63

Status

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- Many tests implemented
  - more tests easy to implement
- System basically ready to use
- Possibly small fixes for badly behaving hybrids needed
- Large scale measurements needed to improve quality criteria

Important for users

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- Hybrids coming from the production are **not(!)** tested by our system, responsibility of user
- Required components:
  - Minimal (required anyway for using VMM-SRS)
    - SRS-Crate
    - DVM Card
    - VMM Hybrids
  - Optional:
    - Programmable power supply (GW-Instek 4303s ($\sim$ 650€) or 3303s ($\sim$ 550€)) ($\rightarrow$ 4303s can also power up to 3 Hybrids in lab setup)
    - Signal generator (Tektronix AFG3000)
    - Multiplexier PCB ($\sim$ 100€ printing + components)
    - JTAG Programmer (Xilinx Platform Cable USB II (225$))
- There will be a documentation/tutorial and we will offer help for first tests ☺