Tracker Week, Pixel Upgrade
- 01. February 2012 -

Cooling Box

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Andrej Starodumov, Rainer Wallny

Cooling Box

used to thermal cycle Modules for qualification and testing

Requirements

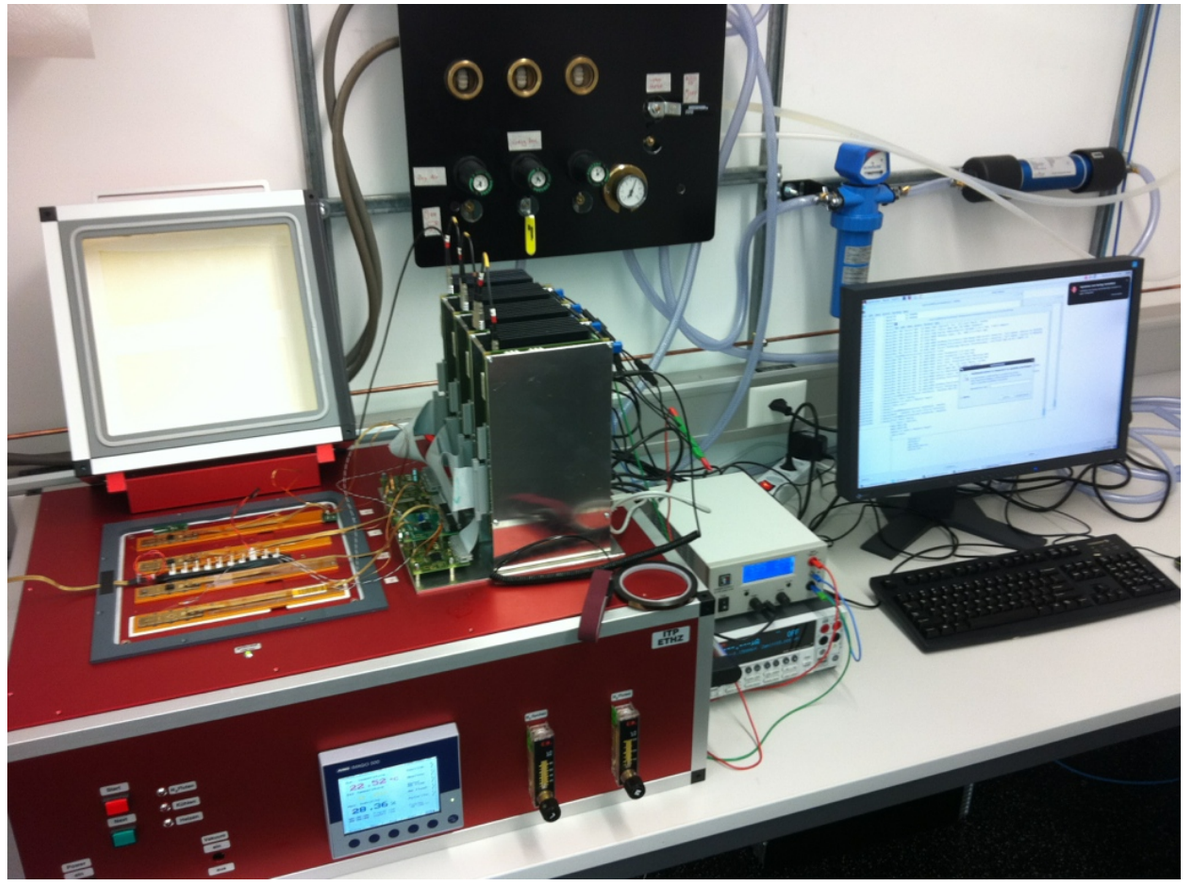
- temp. range: [-20,30] °C
- low humidity (O(few %))
- fast cycling
- vacuum to fix modules

and improve thermal conductivity

- test several Modules in parallel
- thermal stability

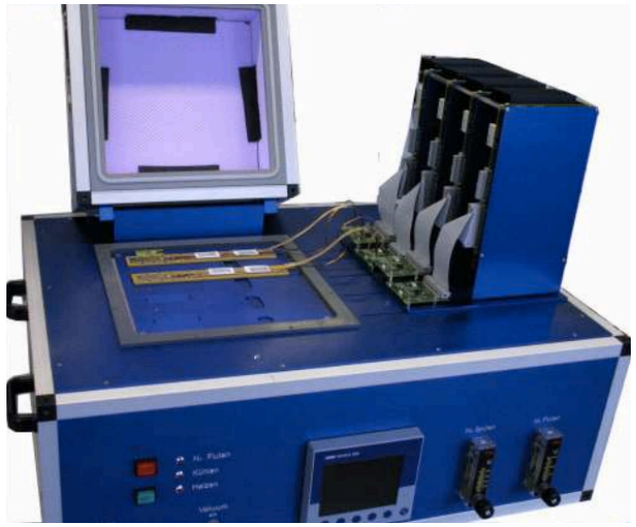
(+/- 1 °C around set point temperature)

- controllable by computer



current design based on the PSI version

key features:
- Active cooling and heating by Peltier elements
- Possible to operate 4 Lines (Modules with Testboards) in parallel.
- Tests at -10 °C at +17 °C



PAUL SCHERRER INSTITUT PSI

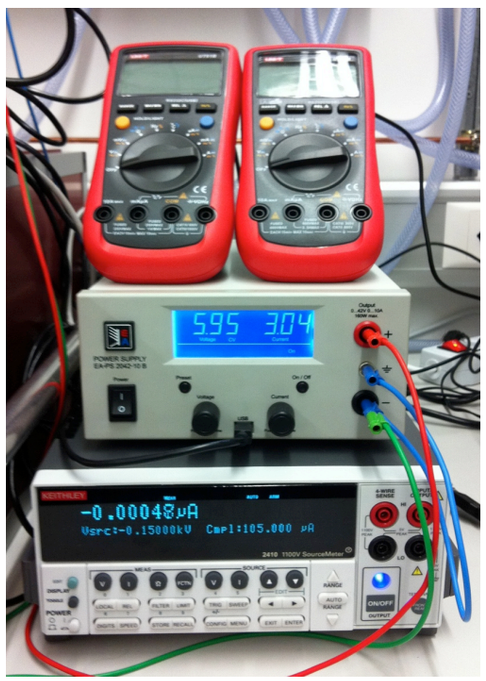
Changes made with respect to the PSI Version:

- higher cooling power (ca. 830 W)
- higher cooling water flow rate
- improved vacuum flow path
- module holder problem (Flatness)
- thermal conductivity foil
- extended Isolation
- dry air (instead of flow limited N_2)

Schematic

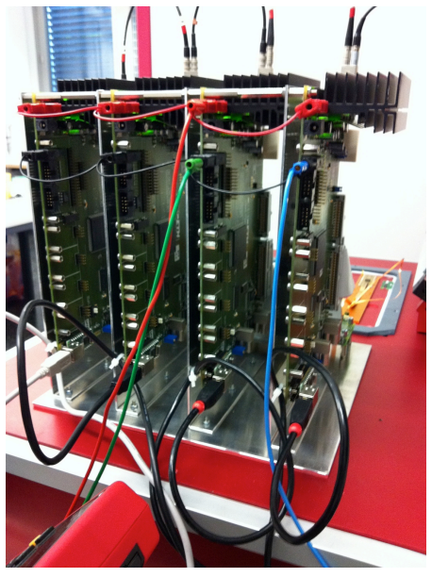
Schematic

PC with supervisor and psi46expert

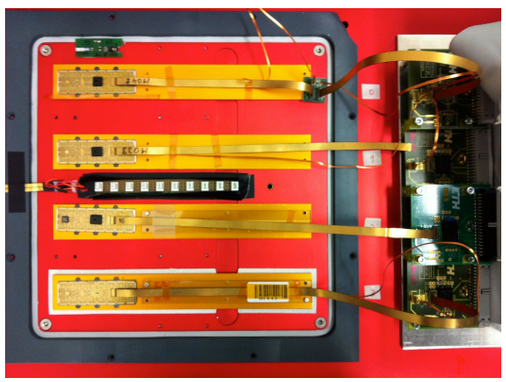


LV power supply

Keythley Sourcemeter (HV power supply)



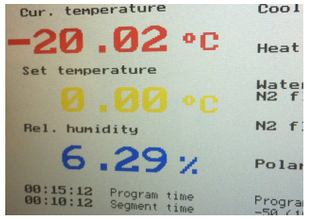
Testboards + Interfaces

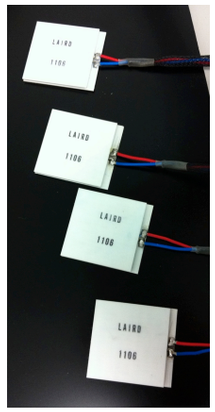


Modules

Schematic

Controller (Jumo)

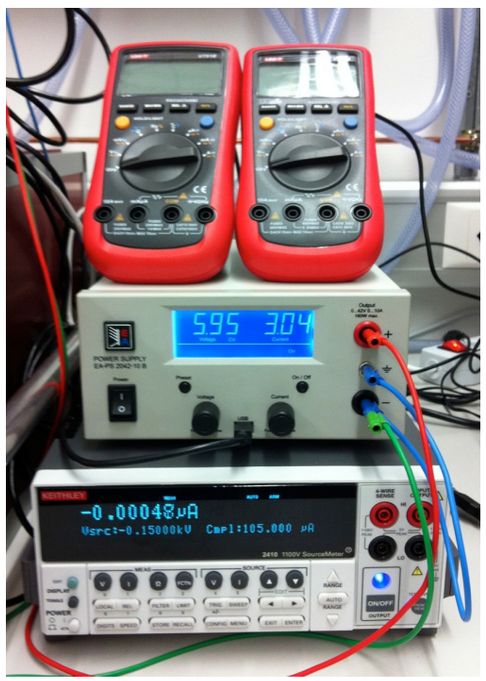




Cooling Water

Peltier Elements

PC with supervisor and psi46expert



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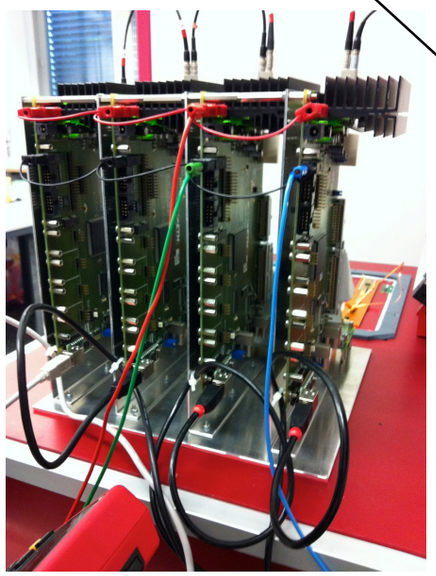
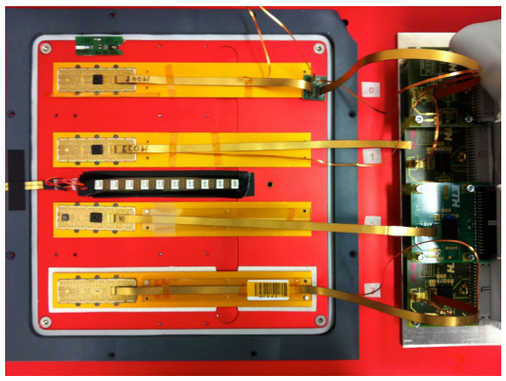


Groundplate



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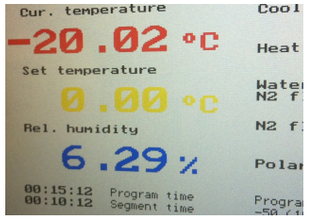
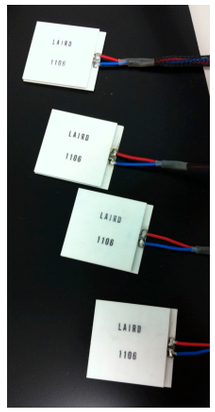


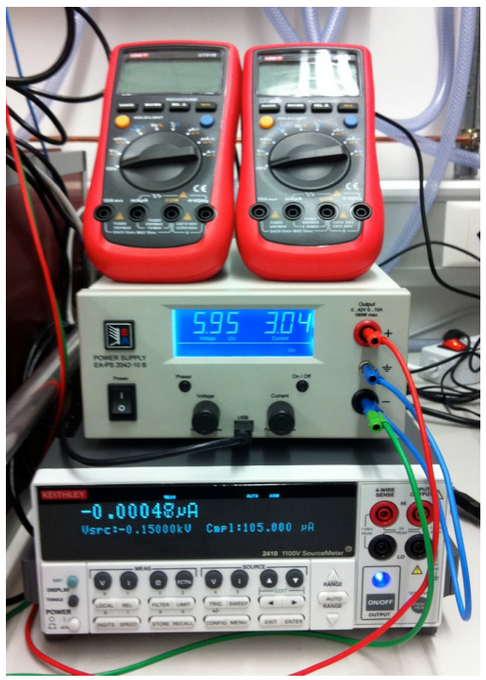


Cooling Water

microfilter

air dryer

PC with supervisor and psi46expert



Peltier Elements

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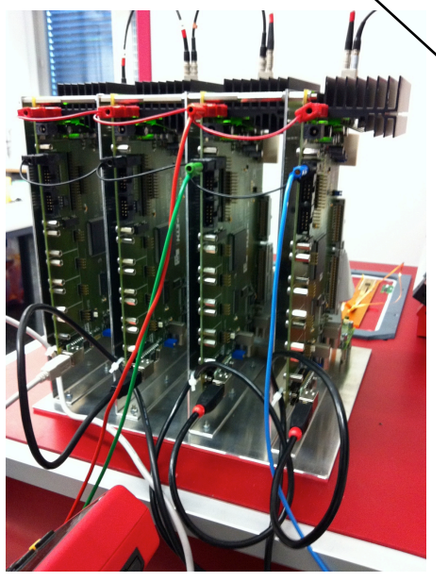

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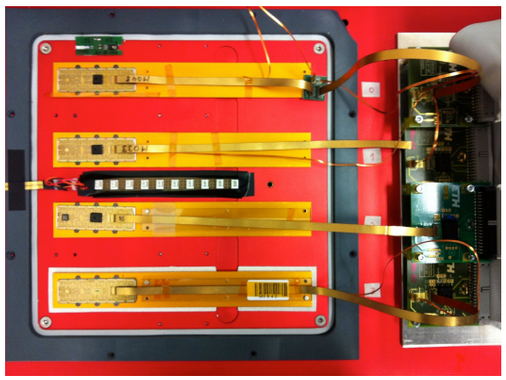

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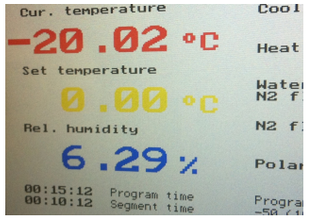

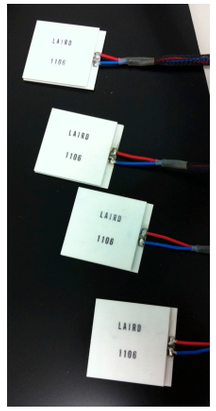

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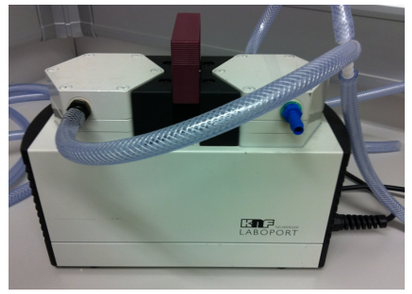
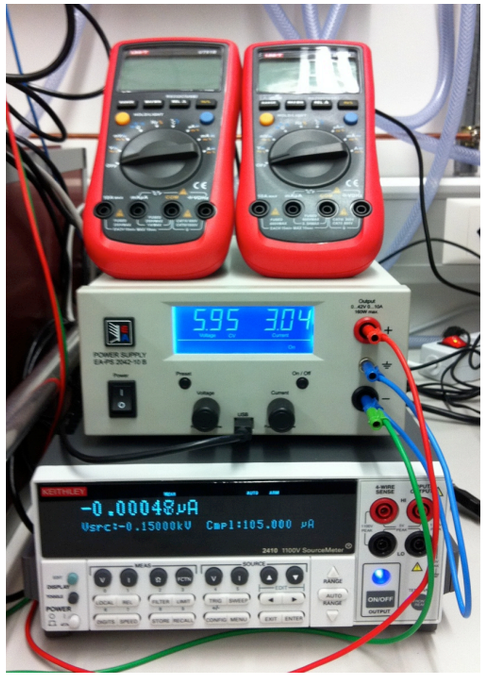


Vacuum pump

Peltier Elements

PC with supervisor and psi46expert



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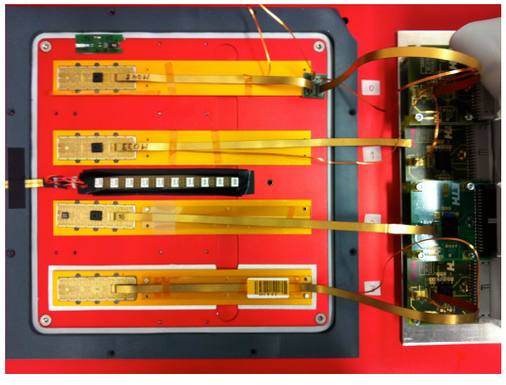
Groundplate



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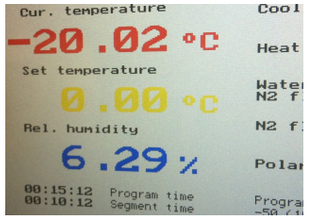

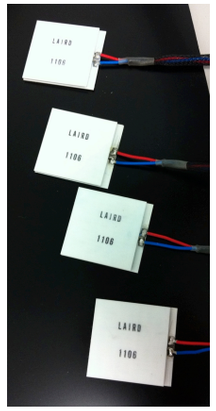

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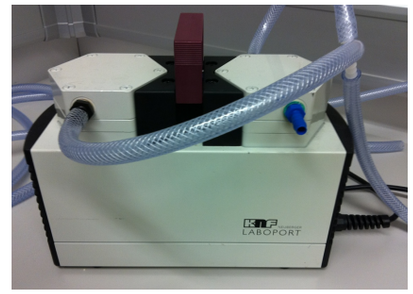

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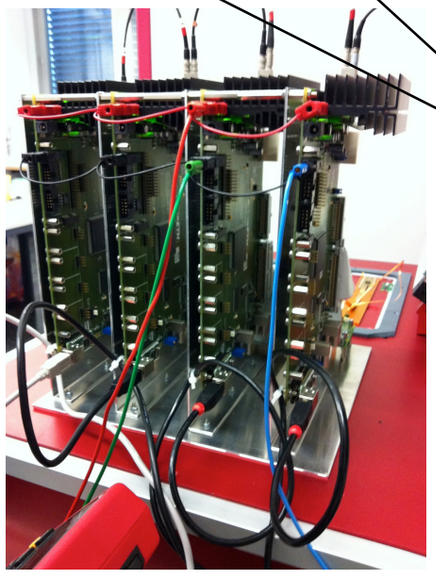
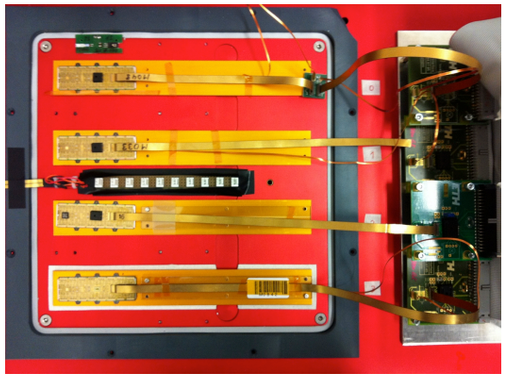
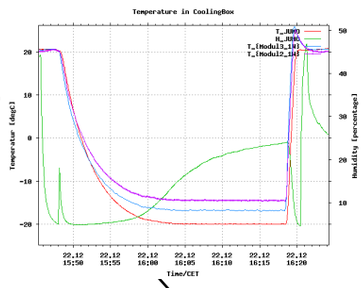
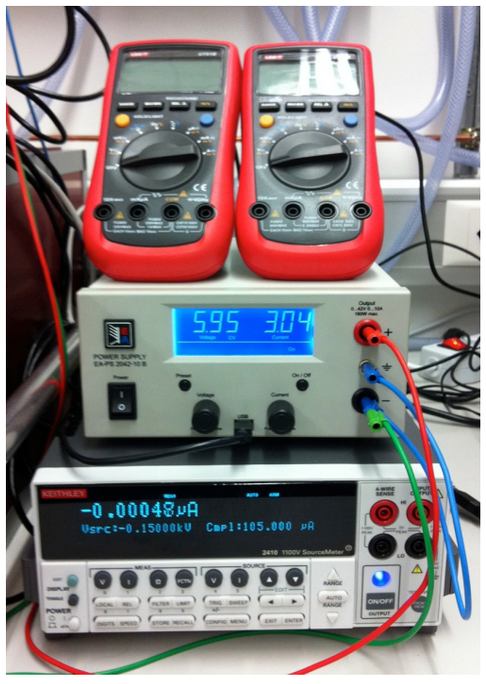




PC with supervisor and psi46expert

temp. monitoring





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Testboards + Interfaces

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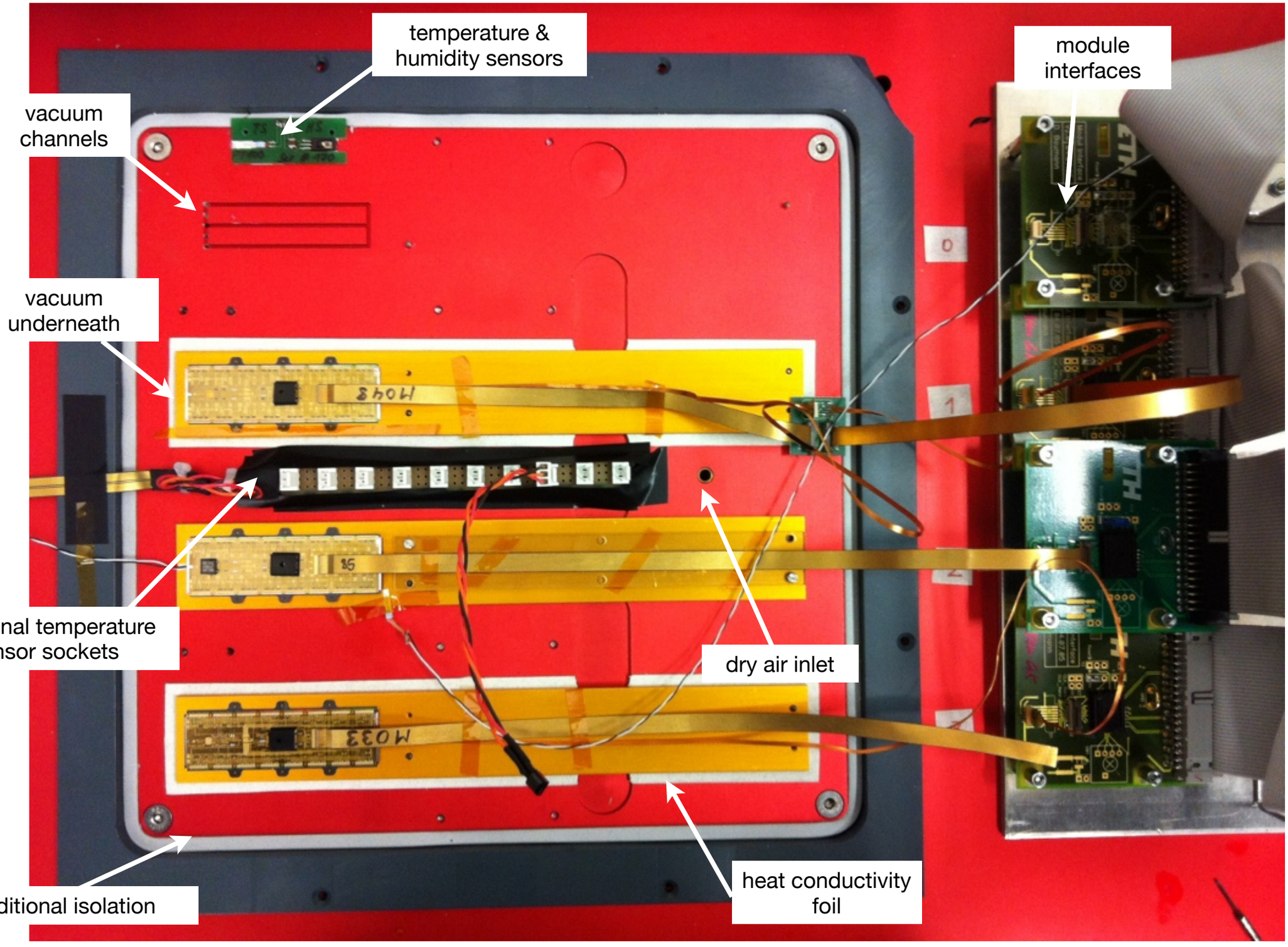
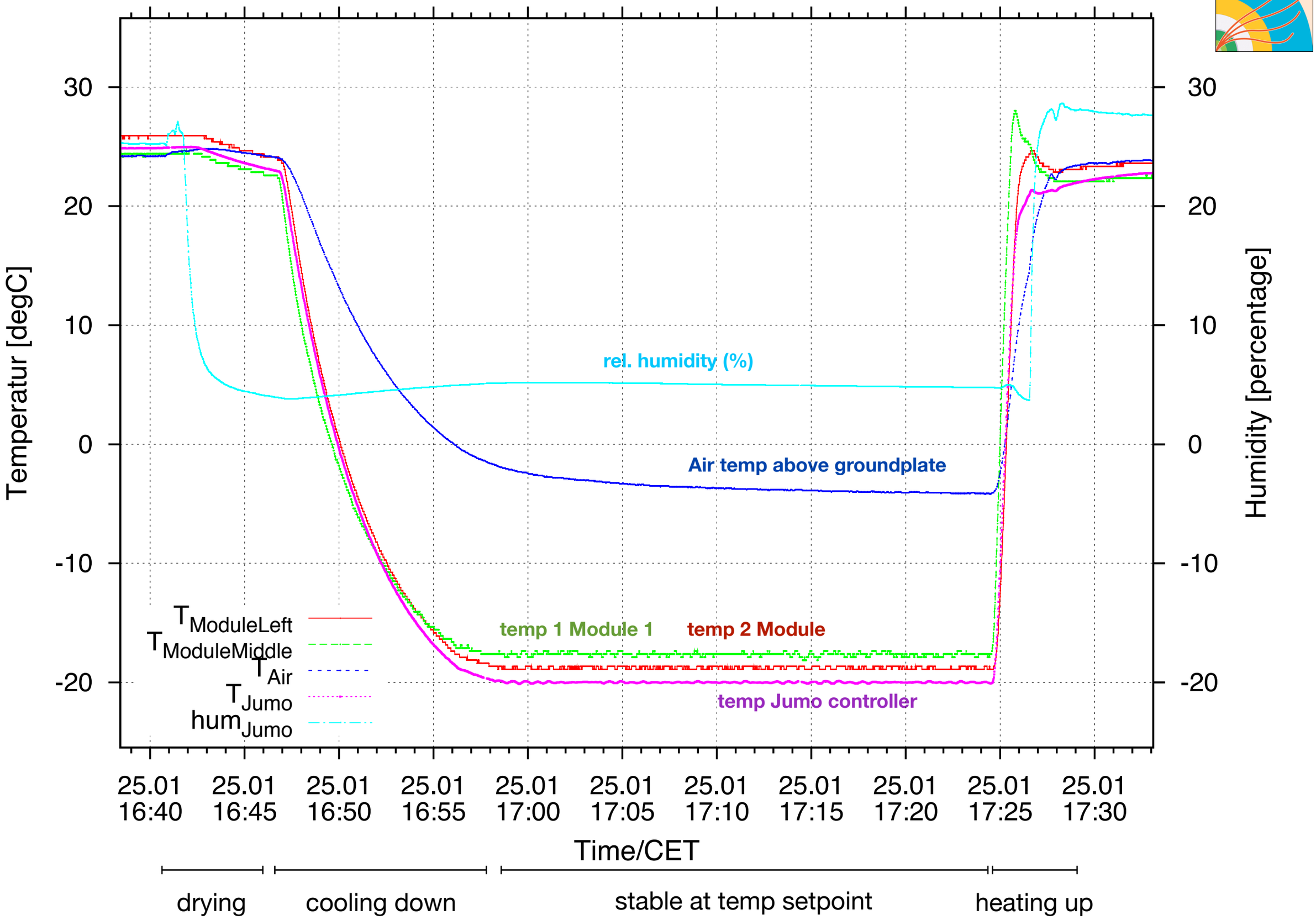

temperature & humidity sensors
module interfaces
vacuum channels
vacuum underneath
additional temperature sensor sockets
dry air inlet
additional isolation
heat conductivity foil

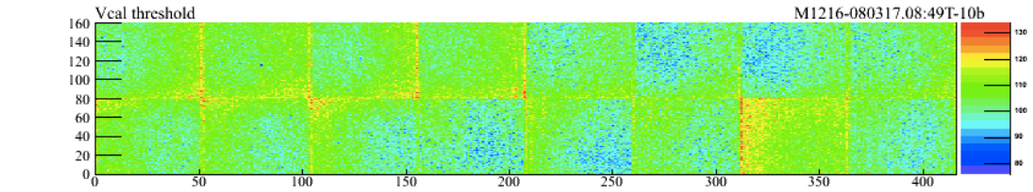
Example

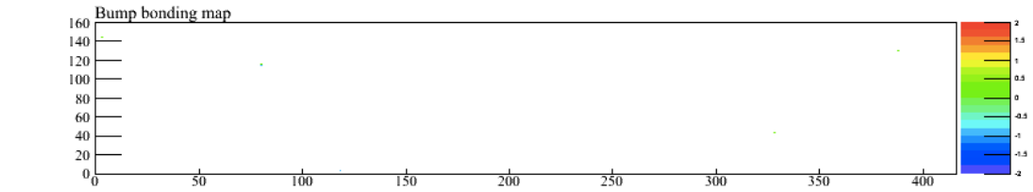
Temperature in CoolingBox ETH

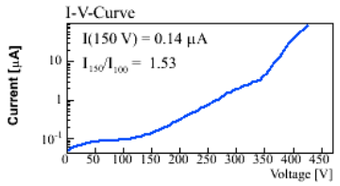


Control Procedure, that runs the full testing software:

- psi46expert
- temperature control
- HV control (IV curves)
- error handling
- test evaluation
- web upload to database

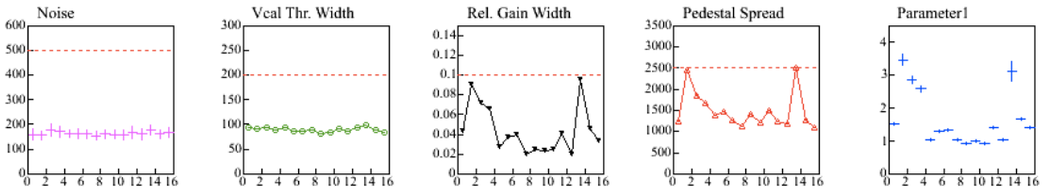


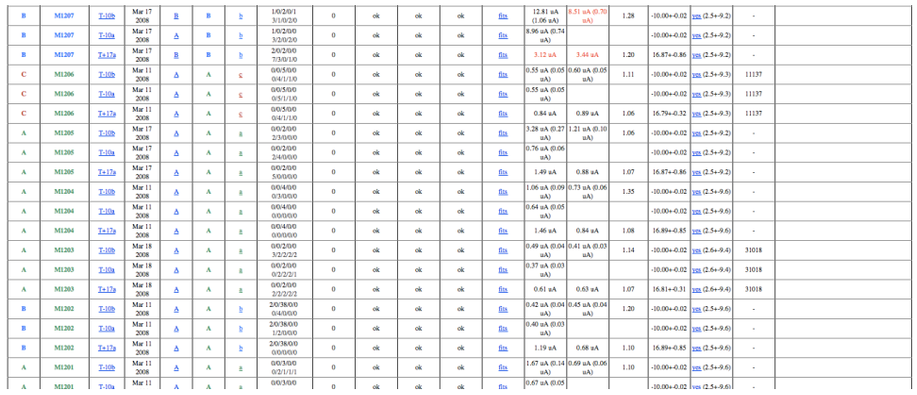




Test Summary of M1216 T-10b **GRADE: B**

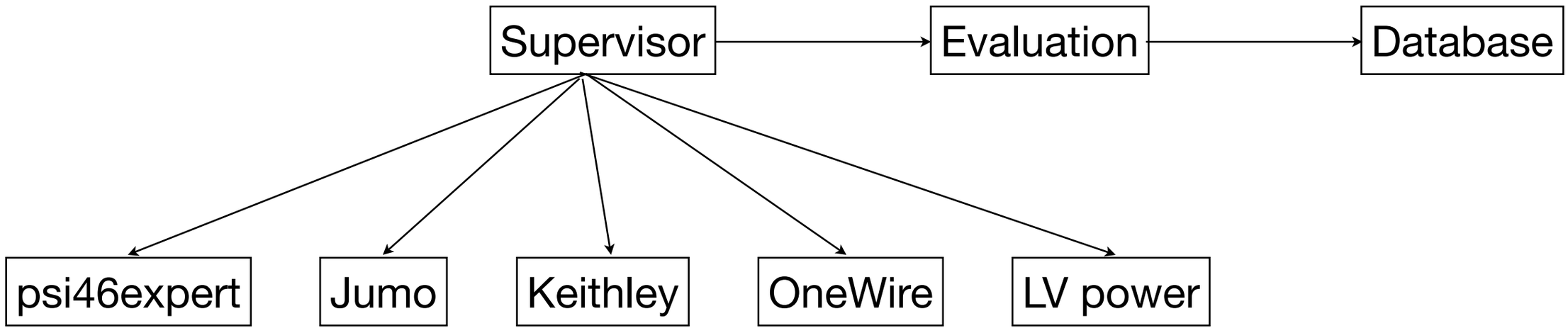
ROCs > 1% defects:	0	Tested on:	Mar 17	Noise [e]	163.5
Dead Pixel:	0	Temp. [°C]:	-10.0 +- 0.0	Vcal Thr. Width [e]	89.2
Mask Defects:	0	Trim / phCal:	yes / yes	Rel. Gain Width [%]	4.4
Dead Bumps:	6	Therm. cycl.:	yes	Pedestal Spread [e]	1490.1
Noisy Pixel:	1	TBM1:	ok	Parameter1 []	1.7
Trim Problems:	0	TBM2:	ok	I(150 V) [T = 17 °C]	1.72 µA
PH Defects:	0/ 2/ 0			I_{150}/I_{100} [T = 17 °C]	1.53





Problems with existing Version:
- change of OS (SL4->SL5)
- change of hardware

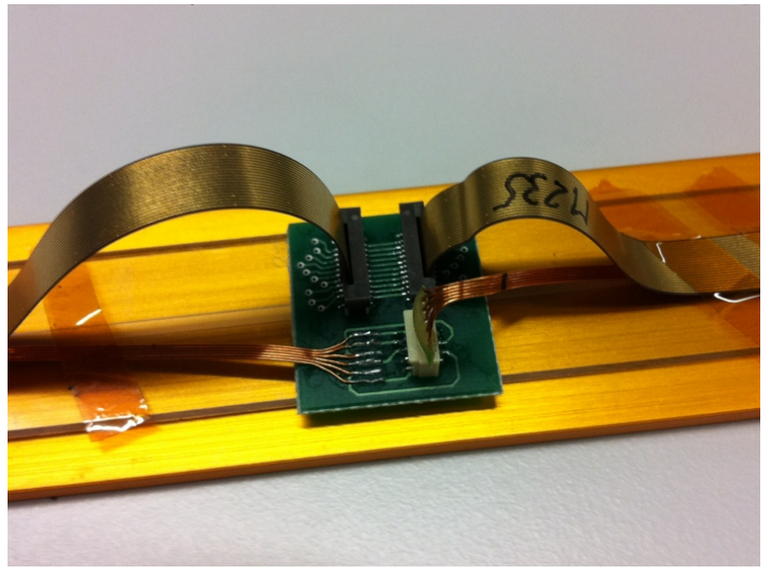
new Version for ETH under development

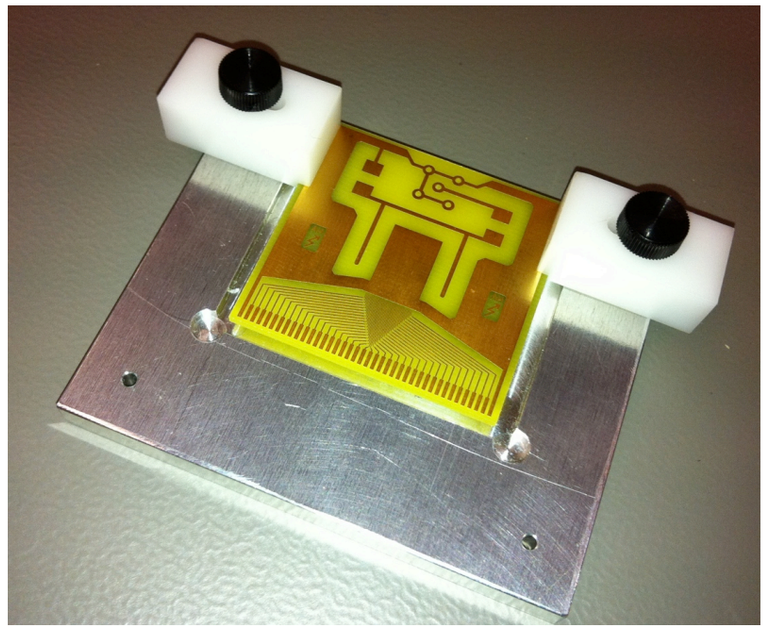


Plan

- retest existing Modules at PSI
(from Pilot setup and other remaining Modules)
- retest the same Modules at ETH
(consistency check and transportation rehearsal)

Extension of Signal and Power cable to test Modules with shortened cables (from Pilot setup at PSI)



- test ROCs (and Modules) with the new ROC design

holders for new ROC PCB for mounting in coolingbox