QC/QA plans for cold electronics
(a proposal)

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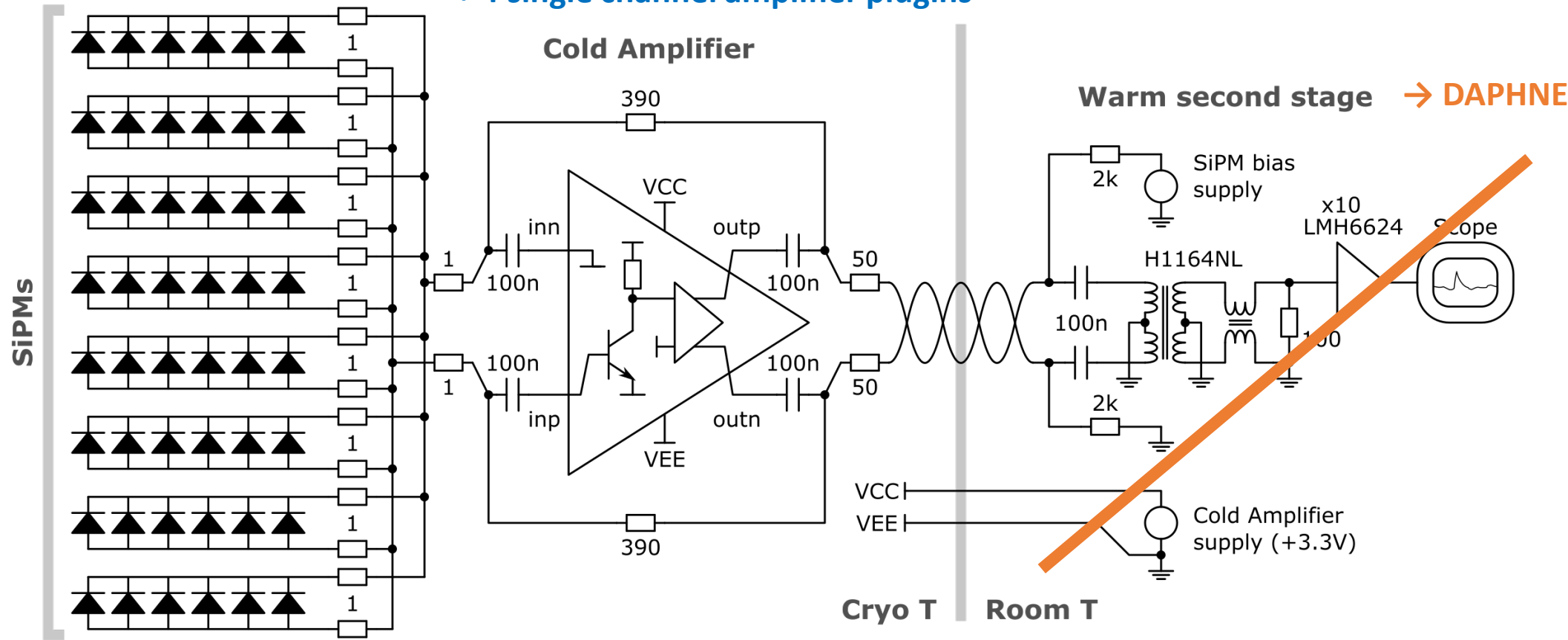
Cold electronics

Assumptions on item ID

- Items that are going to be tested before being assembled into the module deserve a unique ID

- Items that have an unique ID deserve a place in the database
  e.g.: Item X has this and that property

- Items that are identified only by production batch (i.e. most mechanical items) will likely become a property of the «module» element
  e.g.: module number X has mechanical item Y taken from batch Z

- Some of the «cold electronics» boards are almost mechanical items:
  They do not deserve a unique ID and will not be tested in cold before module assembly

- SiPM boards and cold amplifier boards are complex enough to deserve a unique ID and testing prior to module assembly.
  Not going to talk about SiPM boards here (responsibility of SiPM groups).

Cold electronics QC/QA proposal

Board	ID granularity	Notes	Tested in cold before module assembly?	Relevant properties to test
SiPM boards	QR code on each	-	**Yes**	Not discussed here
Routing boards (AKA signal lead boards)	Batch ID on silkscreen	Passive Comes in two flavours (Left/Right) → Probably easier if L/R info is included in the batch ID?	No	None?
4-channel cold amplifier board	QR code on each Or serial on silkscreen	In protoDUNE2: 1 motherboard + 4 plug in amplifiers In DUNE: A single PCB with 4 amplifiers	**Yes**	Per board: • Power consumption Per channel: • Gain • Bandwidth • Noise
«AECB»	Batch ID on silkscreen	Passive	No	None?
«SASEBO»	Batch ID on silkscreen	Passive Fixed to APA (not part of the module)	No	None?

Cold amplifier board testing

- Total number of 4-channel boards: 1500
- Need to build a setup to test ≈8-10 at a time
- Probably able to test 8-10 boards in ≈2h (cool down & warm up included)

LN2

Cold amp board (4 ch)

...x8/x10...

Cold amp board (4 ch)

Cold test board

Ribbon cables + warm mux
or cold MUX on the cold test board

MUX
8/10 to 1

PC (control)

Source/meter (3.3 V)
- Power consumption

Oscilloscope
(4 ch w/signal generator)
- Gain
- Bandwidth
- Noise (baseline RMS)