SEM Grid Status
ELENA Extended Commissioning Committee
Mark McLean, 18th Feb 2020
Overview

- Beam tests on seven monitors in December 2019

Remaining problems:
- Non-responding wires (largely due to bad UHV solder joints)
- Front-End Board not yet ready for mass production
- May be missing a few grids to complete the installation
Non responding wires

- During beam tests we found a number of wires that did not respond to beam.
- Also found bad connections between connector pins and the ceramic PCB. This is due to the restricted materials permitted in the UHV, and the high bakeout temperatures.
- A survey of installed grids using Time Domain Reflectometry shows that many of the installed grids have bad connections.
- We hope to be able to repair these with silver glue.
TDR Summary
TDR Info

- Connections were tested in pairs. A bad pair might be one connection, or it might be two.
- The technique sends a range of frequencies into the DUT and measures the impedance as a function of time.
- Data was captured in the instrument and subsequently processed to determine good and bad connections.
Typical results

SEM Grid for AO1 Vertical

7 faulty wire pairs
Near perfect grid for comparison

SEM Grid for #16 Vertical

1 faulty wire pairs
Front-End Boards

- So far there have been two versions of the Front-End Board, V1 produced in 2016 and V2 produced in 2019.
- V2 fixed a few things but had worse inherent noise and worse sensitivity to external noise.
- Following beam and lab tests, we believe we know the reasons for the differences.
Front-End V3 plan

- Design is complete now
- Should be manufactured by mid-April, 6 boards at CERN and 6 in Japan
- Bench tests in late April
- If results look good will order the bare circuit boards and components for ~100 units
- Beam test in May – depends on beam availability
- Order the assembly of the ~100 units
- Install on transfer lines end June
Availability of grids

• Three units have recently failed vacuum tests
• Assuming these can be repaired, we are still short of 11 units.
• Five are on their way from Japan, five more are promised “soon”.
• Hope to be able to repair bad connections with silver glue
• Need to plan and prioritise
• Discussions ongoing to make at CERN, but will take time.
Triggering

SEM Grid Triggering

Three trigger sources are connected to the Trigger Card:

- Source trigger
- LNE50 Extraction trigger
- LNE00 Extraction trigger

The extraction triggers are synchronised to the RF and thus to the bunches.

- VME Trigger Card
- VME Module
- Trigger selector TBD
- Software trigger MODULE_CTRLx.0

Local Crate - Back-End Board:

- Delay in units of 10ns PROFILE_DELAYx
- Bunch-to-bunch in units of 10ns TBD
- Index of required bunch TBD
- Local trigger enable BACK_END_CTRLx.1
- Local trigger edge BACK_END_CTRLx.1

Front-End Horizontal Trigger

Front-End Vertical Trigger

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