

# QA/QC for TMS Electronics

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# QA/QC Tasks Overview

1. **SiPM** (Hamamatsu MPPC S13360-2050VE)
2. **Front-end boards** (CAEN A5202 + custom interface board)
3. **Concentrator Modules** (CAEN DT5215)
4. **Electronics Power System** (Wiener PL512 + custom distrib.)
5. **Cables/Connectors** (SamTech HLCD-10, fiber optics)
6. **Interfaces**

# 1. QA/QC for MPPCs

Hamamatsu MPPC S13360-2050VE

**Quantity:** 19,200 + spares mounted in groups of 8 onto custom PCB

**Checks** (after MPPC mounting onto PCB):

To be performed in lab

- Mounting accuracy
  - (x,y)-position *by assembly company*; possibly z-position (e.g. height)
- Optical inspection with microscope/camera of photosensitive area
- Functional performance test:
  - Minimal:
    - Record p.e. spectra in response to LED signal (fixed T)
    - Dark rate versus threshold at nominal operating  $V_{\text{bias}}$
  - Extended (likely not needed):
    - Record p.e. spectra and dark rate as function of  $V_{\text{bias}}$
    - PDE, ...

# 2. QA/QC for Frontend Boards

CAEN 5202 + custom interface board

**Quantity:** 300 + spares

To be performed in lab

**Checks** (for all 64 channels; includes custom interface boards to MPPC cables)

- Channel alive and able to record p.e. spectra in response to MPPC+LED signal
- Time stamping and ToT
- high gain and low gain preamps for expected range of parameter settings
- Bias voltage modulation
- Sample internal and external trigger configurations
- LED pulse generation
- TD Link to concentrator module (timing synchronization, data throughput, communication)
- ...

# 3. QA/QC for Concentrator Modules

CAEN DT5215

**Quantity:** 4 + spares

To be performed in lab

**Checks** (details of tests TBD) :

- Timing synchronization
- Data readout and event building
- TDLinks to 8 Frontend boards
- Communication to host computer
- ...

# 4. QA/QC for Electronics Power

Wiener PL512 + Custom distribution system

**Quantity:** 3 + spare

To be performed in lab

**Checks** (details of tests TBD) :

- output voltage stability under load for standalone PS

To be rechecked once connected to facility power

- Cooling functionality of electronics enclosures (fan speed/air flow) with dummy heat load

To be performed at TMS site

- Measure voltage levels at locations of electronics boxes once distribution system is installed and under dummy load
- ...

# 5. QA/QC for Cables/Connectors

SamTech HLCD-10, fiber optics

**Quantity:** 2400 + spares

**Checks** (details of tests TBD) :

- Connect to MPPC board and FE board for integrity test
- Interconnect CAEN 5202 and DT5215 with fiber optics for integrity test
- ...

To be performed in lab

To be performed post installation

# 6. QA/QC for Interfaces

**Quantity:** various

**Checks** (details of tests TBD) :

- MPPC to WLS-fiber connection
- Integral check: MPPC to CAEN A5202
- ...

Prior to and after module installation

Immediately following module installation

