

A detailed technical drawing of a PCB layout, showing a large, complex, multi-layered structure with numerous traces and components. The layout is centered on the page and occupies most of the lower half.

Proto 120 ASIC Development – Measurements of Rigid Flex- and Backplane PCBs

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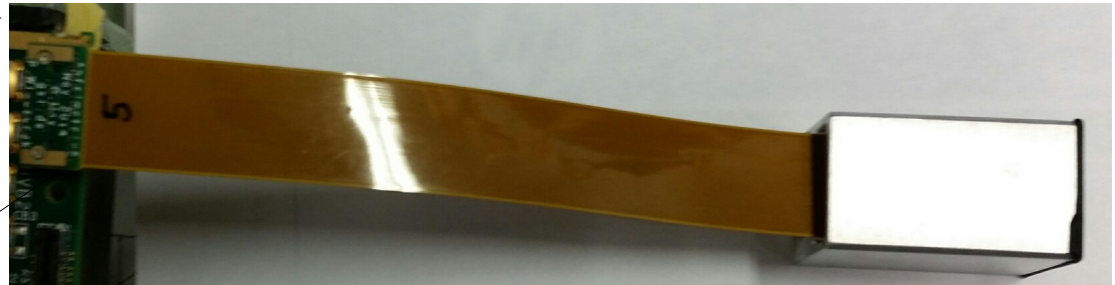
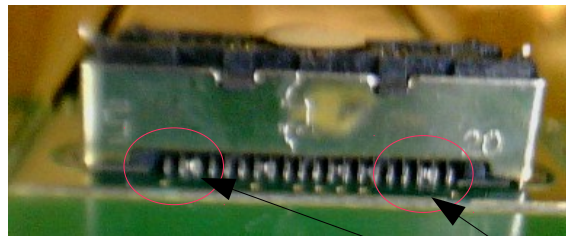
Overview

- ▶ **Summary of the Rigid Flex - and Backplane PCBs**
- ▶ **Measurements: GND vs HVGND to LAAPD**



- ▶ **Summary of the Rigid Flex - and Backplane PCBs**

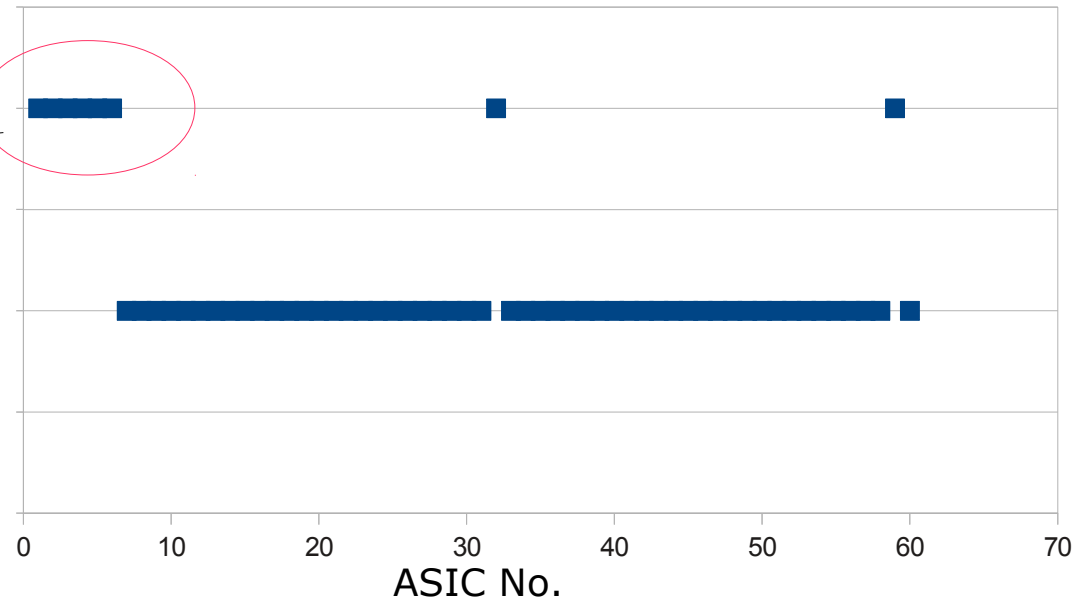
Rigid Flex PCBs from Schoeller



- 60 Rigid Flex PCBs ordered from Schoeller Electronics (6 PCBs pre order; 54 PCBs afterwards)
- 6 PCBs pre order: shorts at the connector – soldering observed on all PCBs
- Shorts were removed
- Special focus on the connector for the other 54 PCBs

Rigid Flex PCBs

- First 6 pre-samples: Failed But could be repaired
- Optimisation of assembly for the other 54 PCBs
- 2 of 54 PCBs have short connections but could be repaired

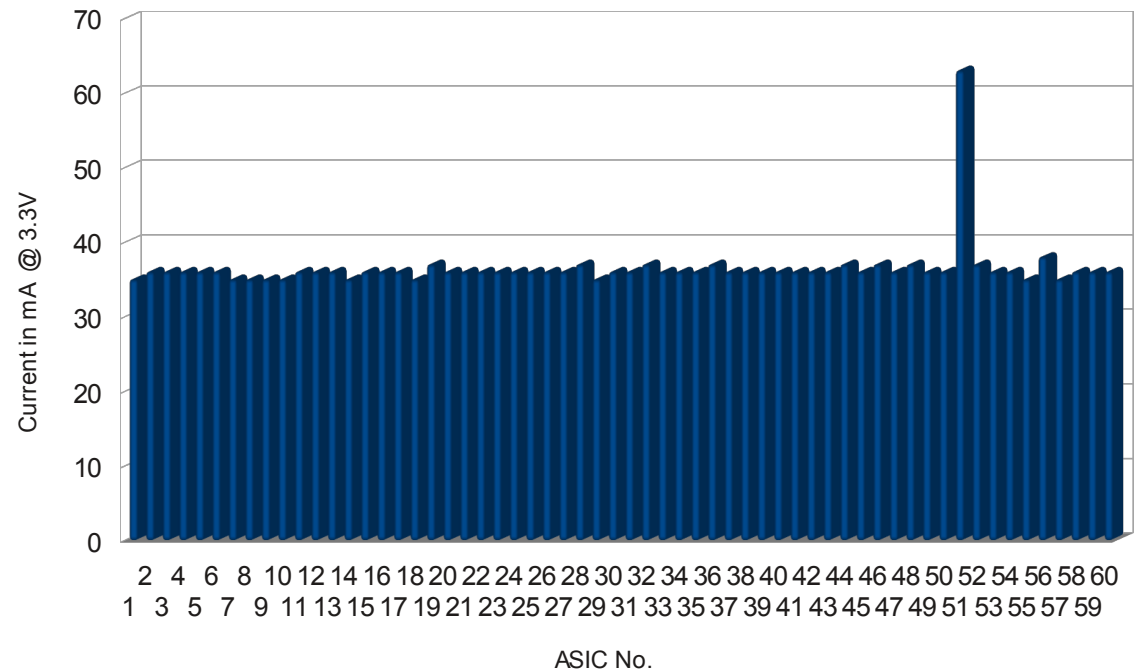


Summary: All 60 ASIC PCBs are working now!

Power Consumption

- Power consumption:
(36 ± 1) mW per ASIC @ RT
- 1/60 tested ASICs shows large deviation;
But with the expected analogue performance

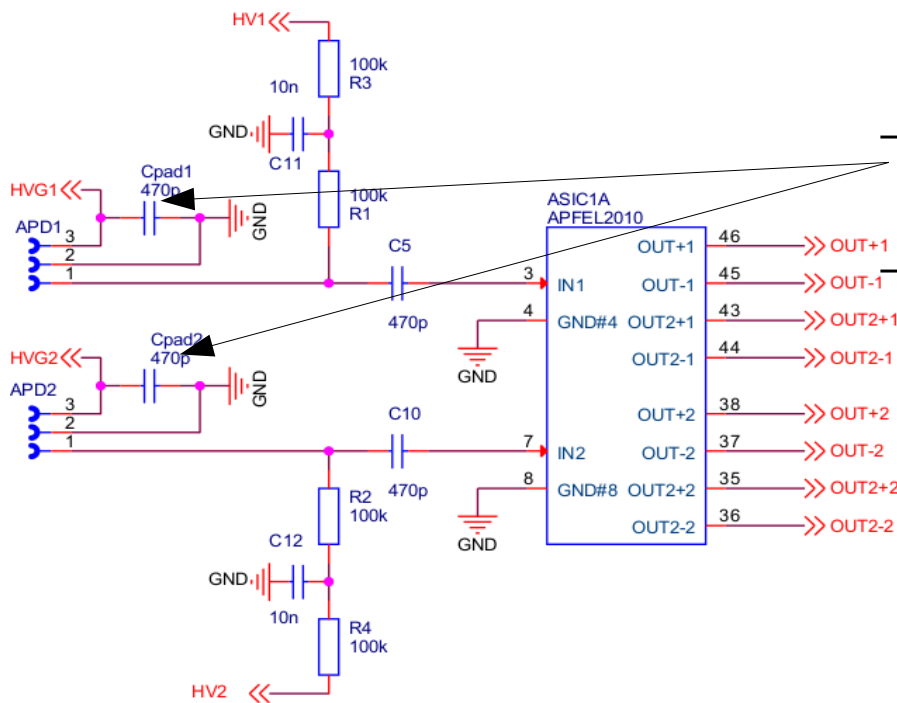
Power Consumption ASIC Flex Schoeller





► **Measurements: GND vs GNDHV to LAAPD**

GND Connection on the Rigid Flex



- Capacitive coupling between HV1GND, HV2GND and GND to reduce the noise

- Present PCB have two potentials:

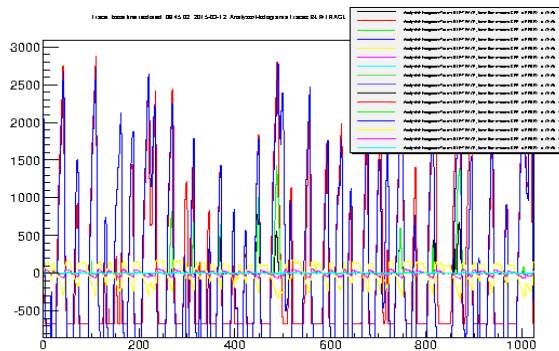
- GND: is connected over the Backplane PCB to the Rigid Flex PCB!

- GNDHV is only connected to the LAAPD

Measured Results

1 Setup:

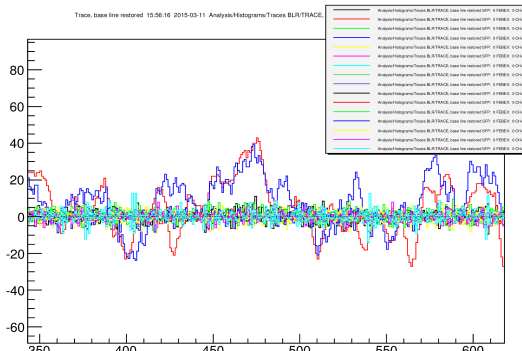
- AC coupling HVGND to GND
- ASIC is shielded (design from Mainz)
- HV @ 300V



- Noise result: !

2 Setup:

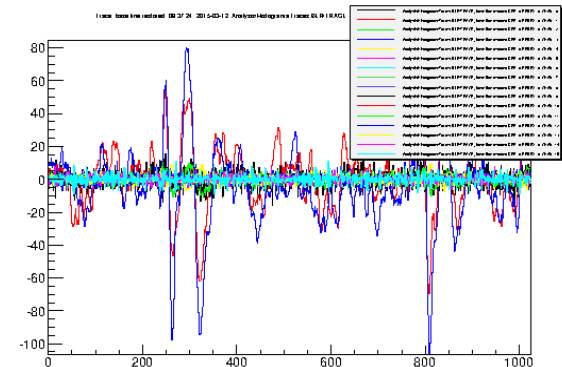
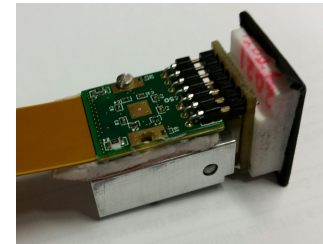
- DC coupling HVGND to GND
- ASIC is shielded (design from Mainz)
- HV @ 300V



- Noise result: 8 mV

3 Setup:

- DC coupling HVGND to GND
- ASIC not shielded
- HV @ 300V



- Noise result: 11 mV

Summary

- 60 Flex and 12 Backplane PCBs are produce and tested
- Detailed test from GI has to define the GND coupling (AC or DC coupling from GND to HVGND)
- Measurements at GSI have shown:
Main critical issue is GND connection schema/avoiding GND loops