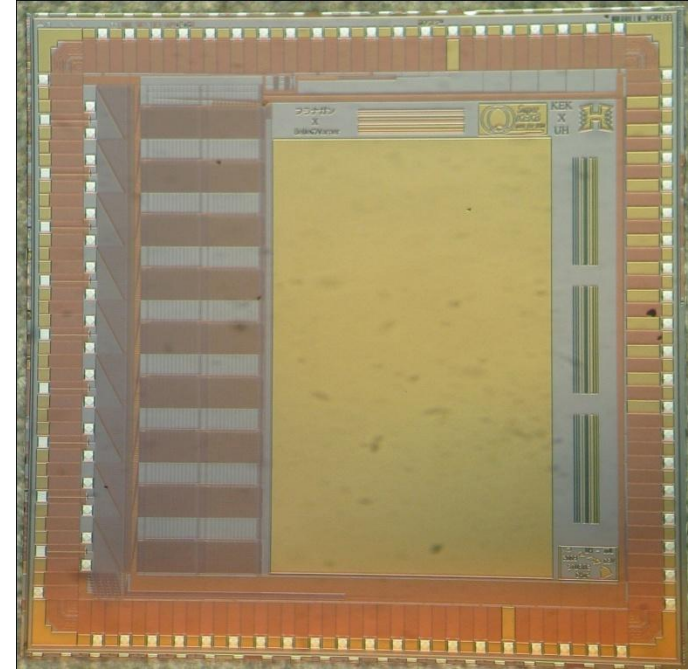


DESIGN REVIEW

STURM2

SAMPLER OF TRANSIENTS FOR THE
UNIFORMLY REDUNDANT MASK

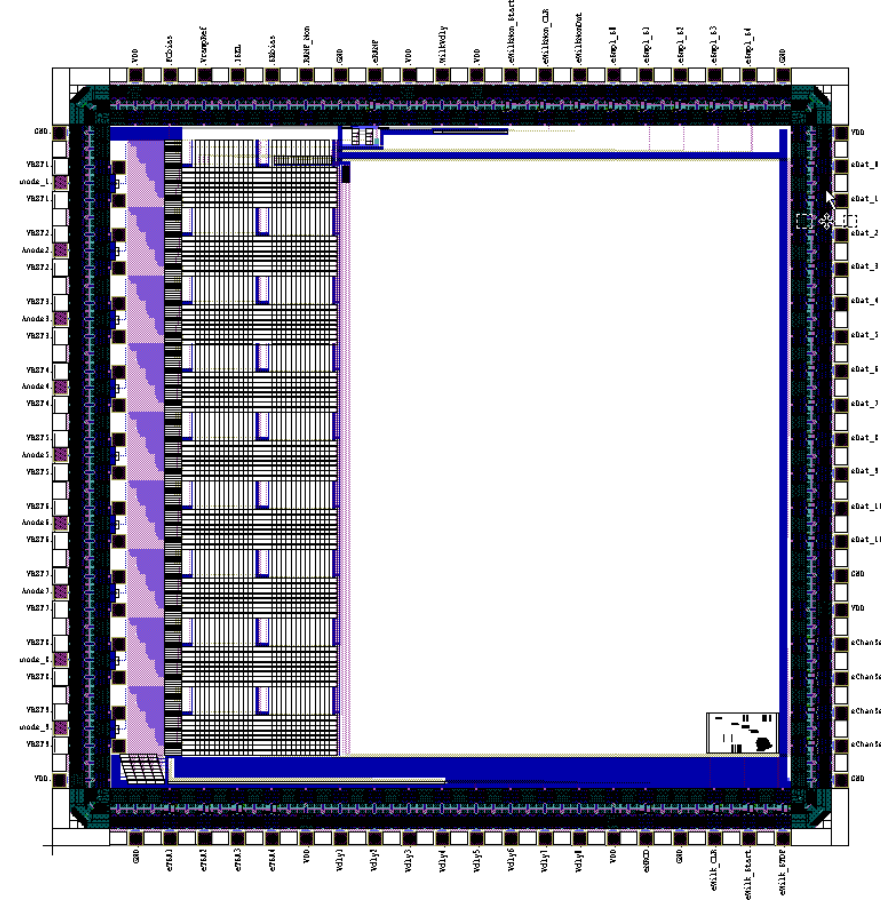


Janne Himanen

Jussi Kangaskoski

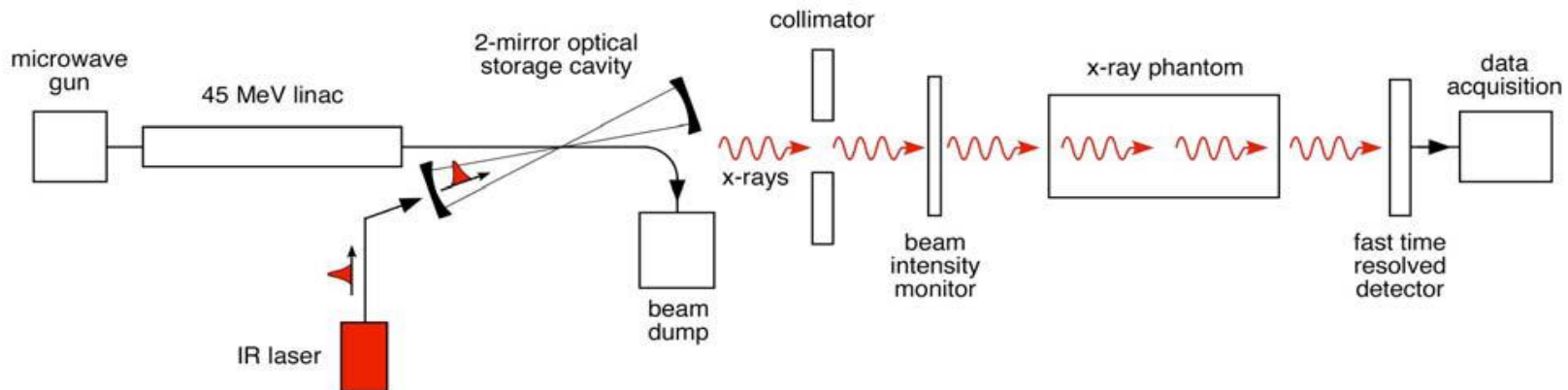
CONTENTS

- Overview
- Specification
- Block Diagram
- Problems / Solutions



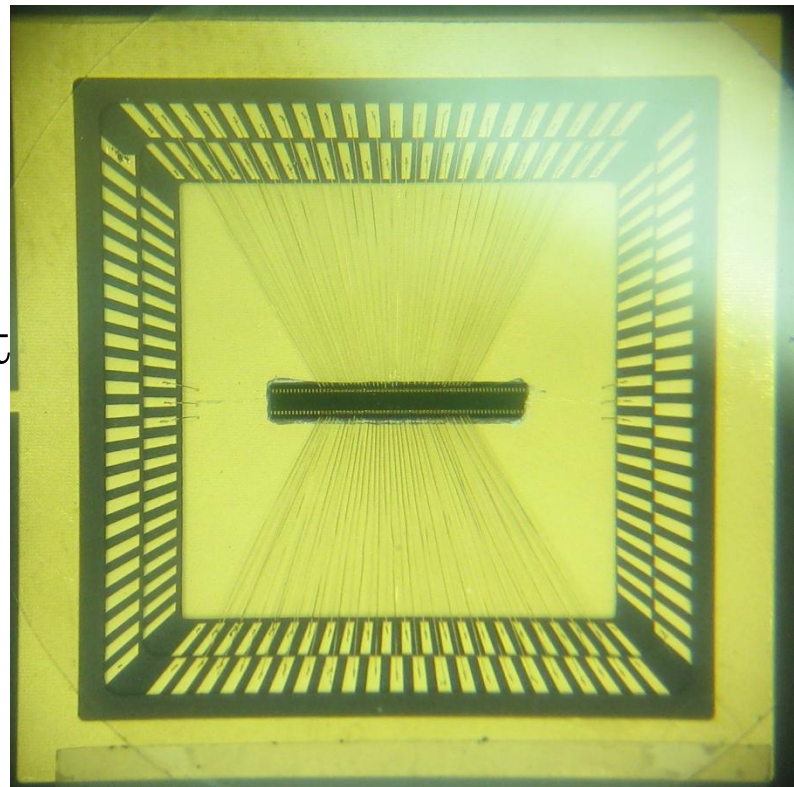
OVERVIEW

- ❑ This device is a part of the KEKB particle accelerator upgrade and it is used to monitor electron beam bunches profile
- ❑ When electron beam is bended, it emits an X-ray beam and that's focused to the fermionics sensor
- ❑ The biggest challenge in this work is to get fast sampling and lots of gain to work in one device



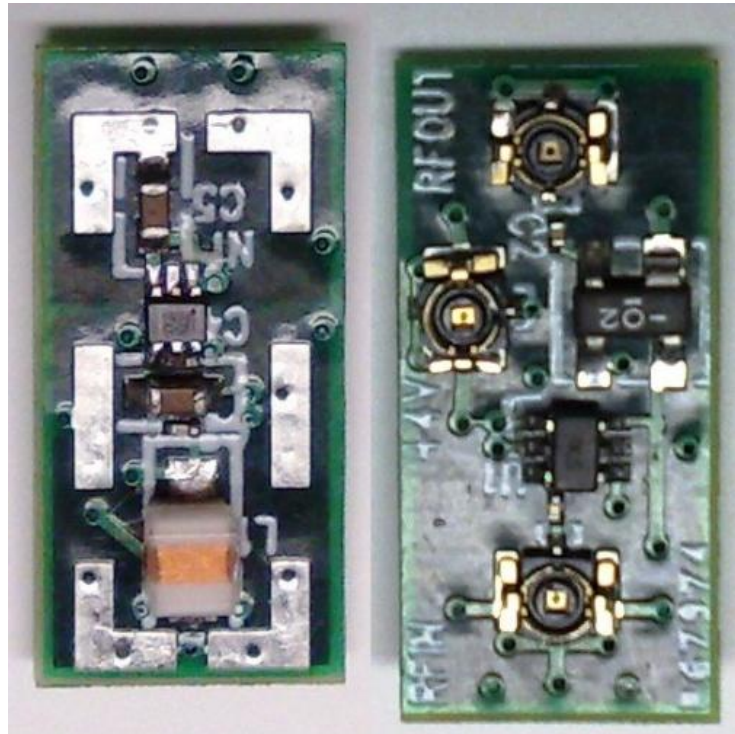
SPECIFICATIONS

- ❖ The sampling speed of the device is 10 giga samples per second
- ❖ Input signal is $35 \mu\text{V}$
- ❖ At least 10 mV is needed in order to get the signal in a reasonable resolution



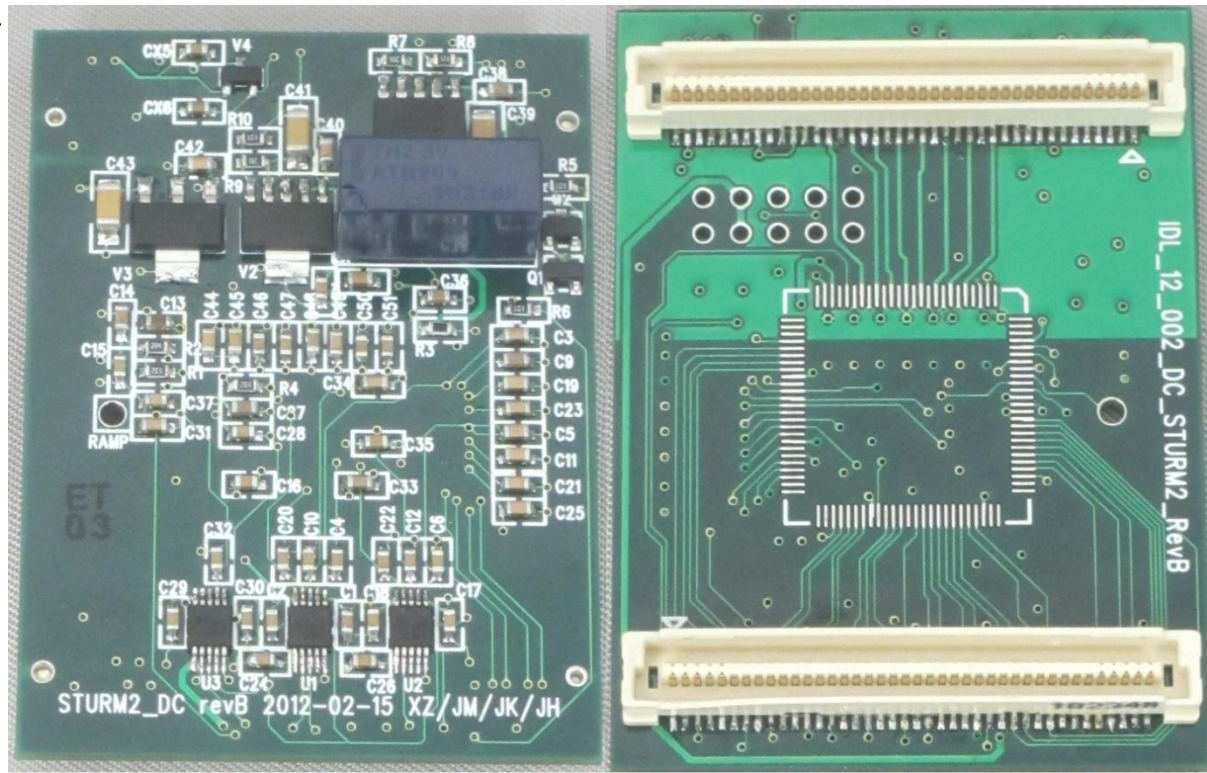
SPECIFICATIONS

- ❖ Analog input signal is amplified by 60dB with 3 x 20dB amplifier
- ❖ 8 ASICs x 8 channels x 3 amplifier stages = 192 amplifier cards



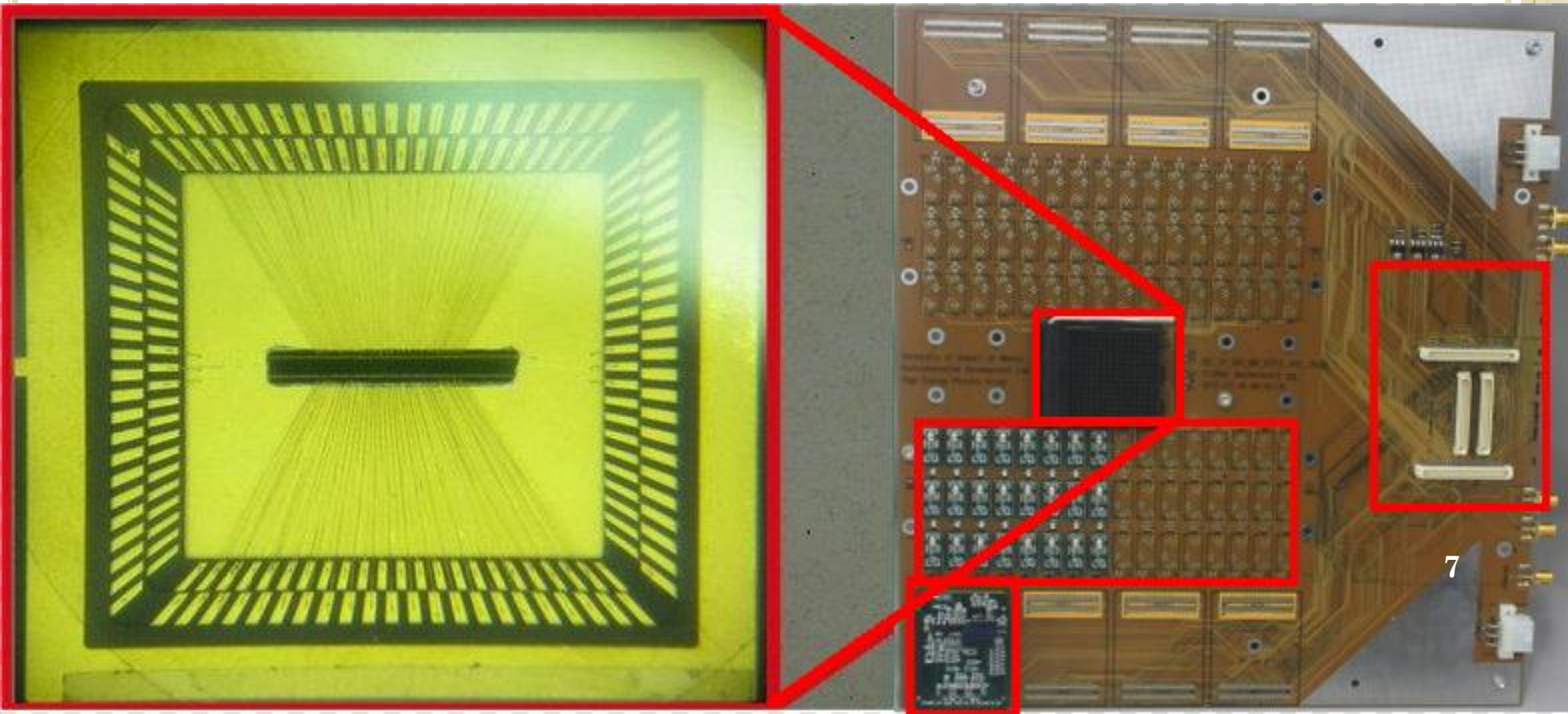
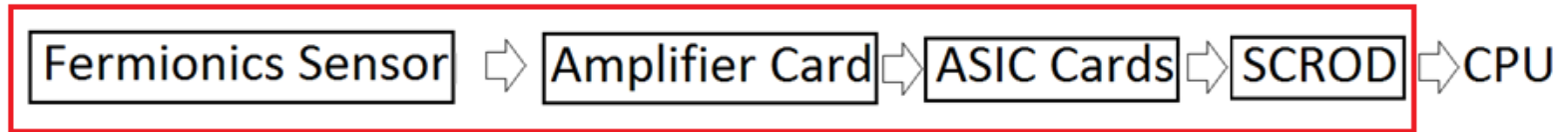
SPECIFICATIONS

- ❖ 8 ASIC cards which holds the STURM2 ASIC chip
- ❖ STURM2 cards makes an 12 bit analog / digital conversion



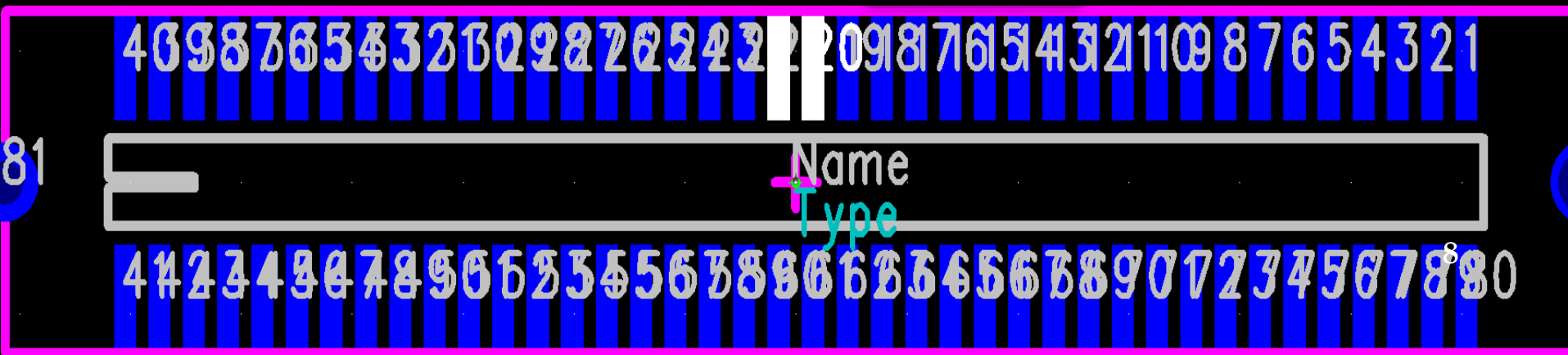
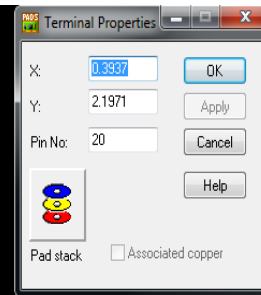
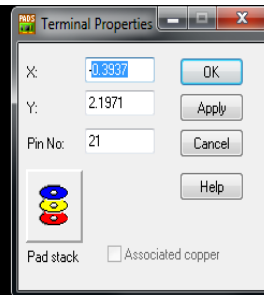
BLOCK DIAGRAM

Motherboard



PROBLEMS / SOLUTIONS

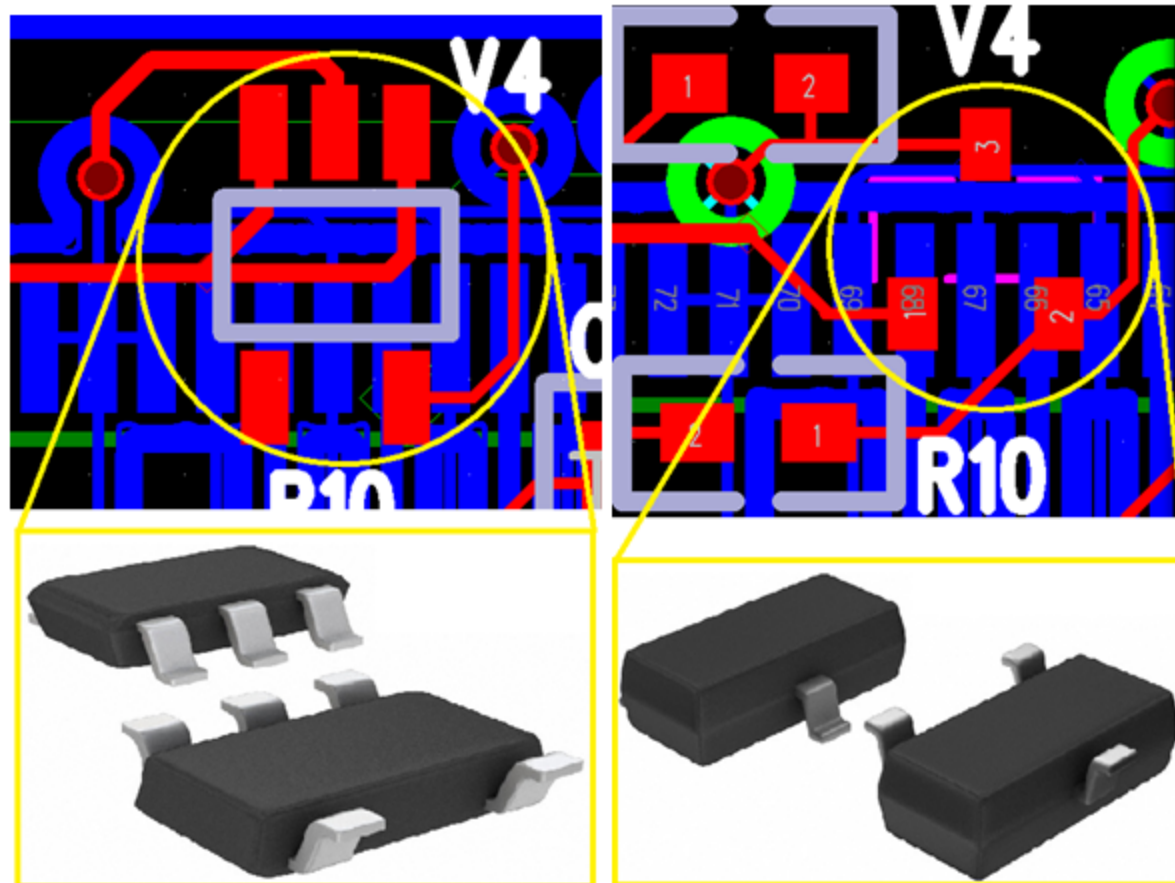
- Footprint of the connectors on the motherboard and Daughter card was wrong
 - The gap between connectors legs was 0.7875mm → supposed to be 0.8mm



$$0.3937\text{mm} - (-0.3937)\text{mm} = 0.7874\text{mm}$$

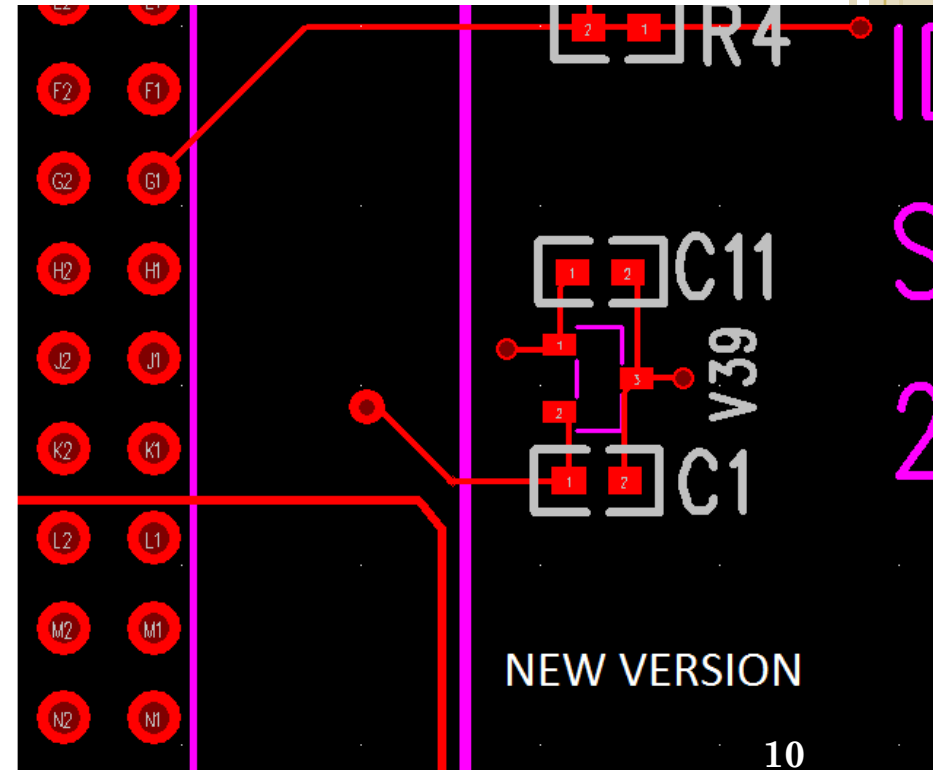
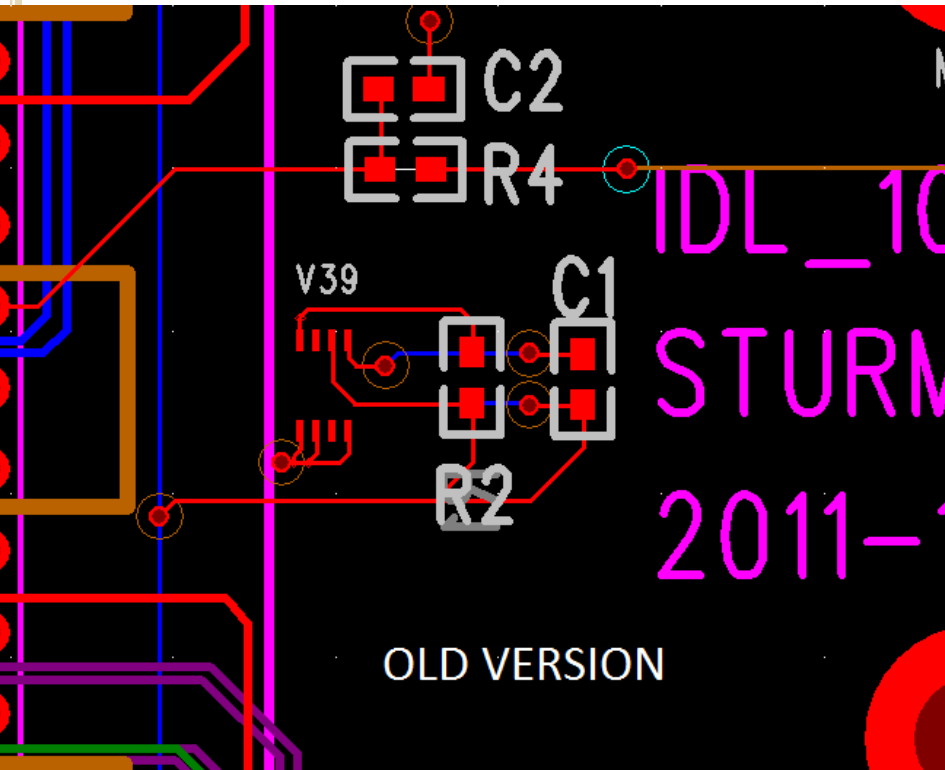
PROBLEMS / SOLUTIONS

- Changed DCs regulator LD39015 (V4) to AP7333
 - Simpler



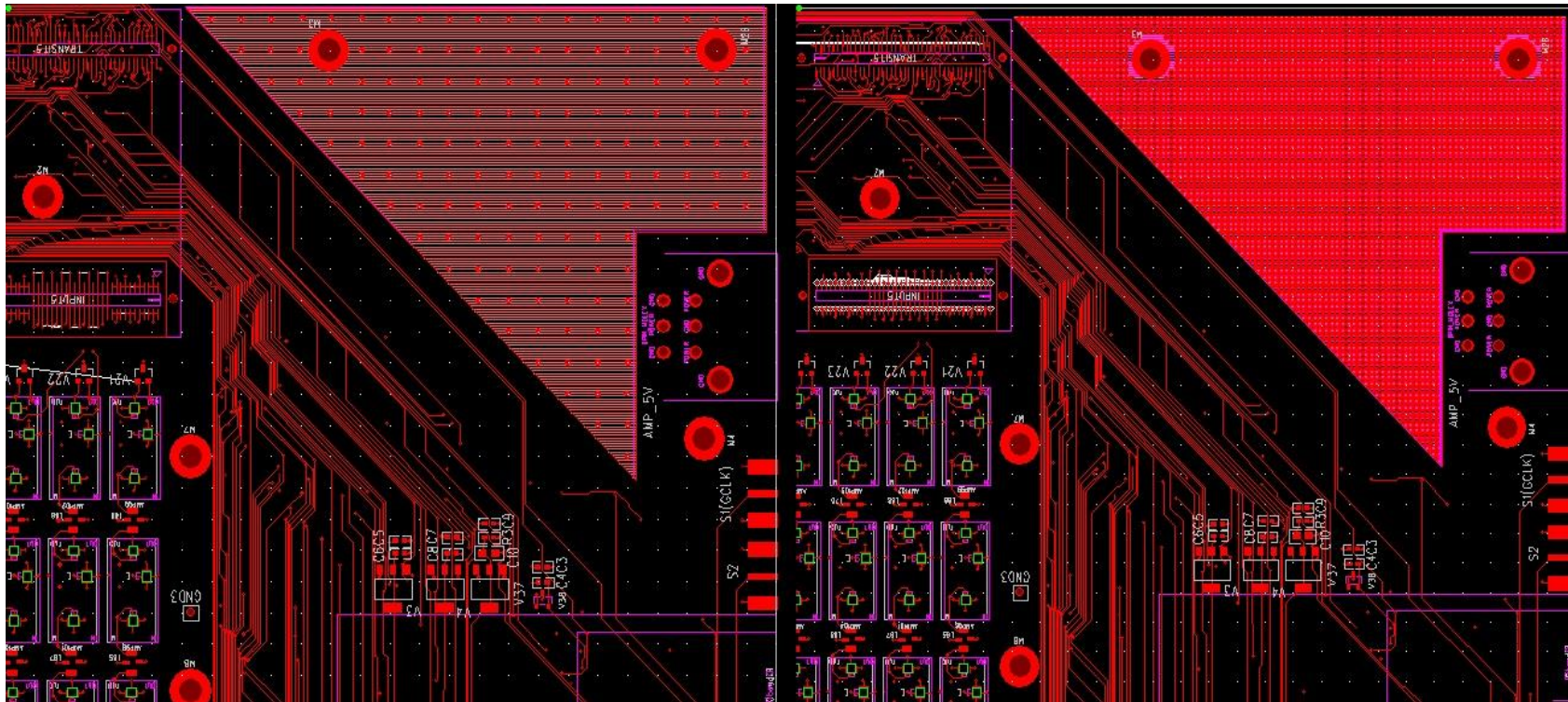
PROBLEMS / SOLUTIONS

- MBs regulator LT3020ED (V39) to AP7333
 - Simpler



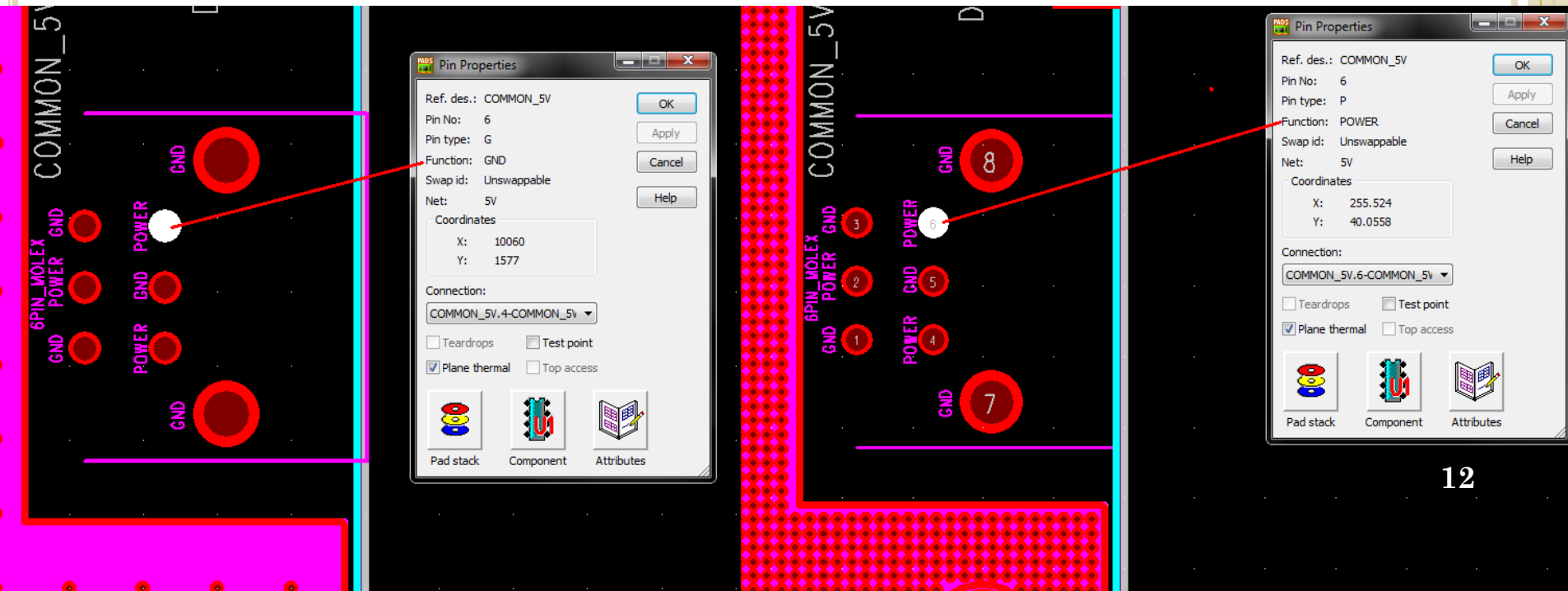
PROBLEMS / SOLUTIONS

- Part of MBs top solder mask was missing
- Added more vias to MBs cooling areas for more reliability



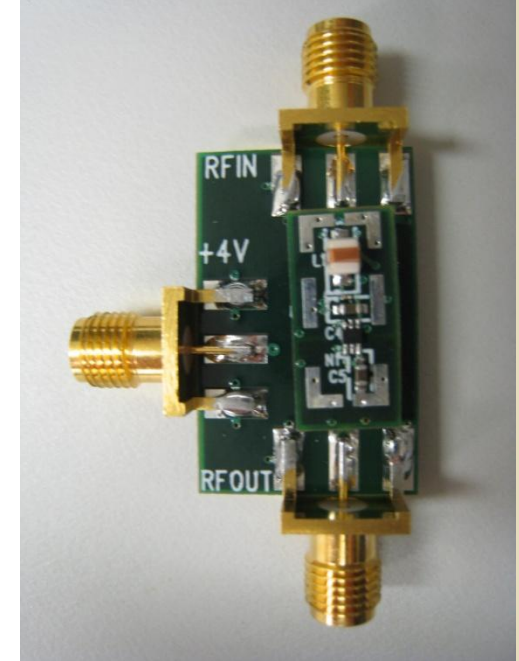
PROBLEMS / SOLUTIONS

- MBs 6PIN_MOLEX connector had wrong functions → made new decal

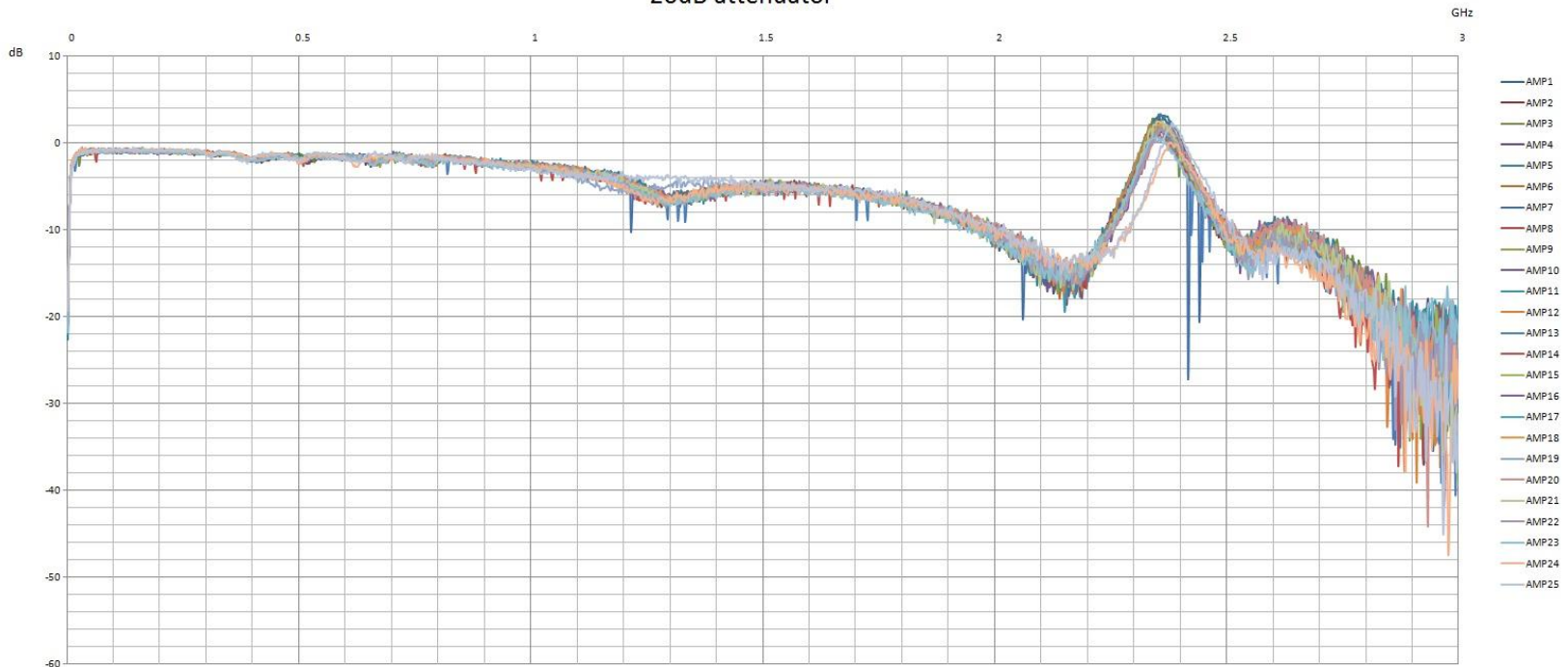


PROBLEMS / SOLUTIONS

- Amplifiers works like wanted on the carrier board



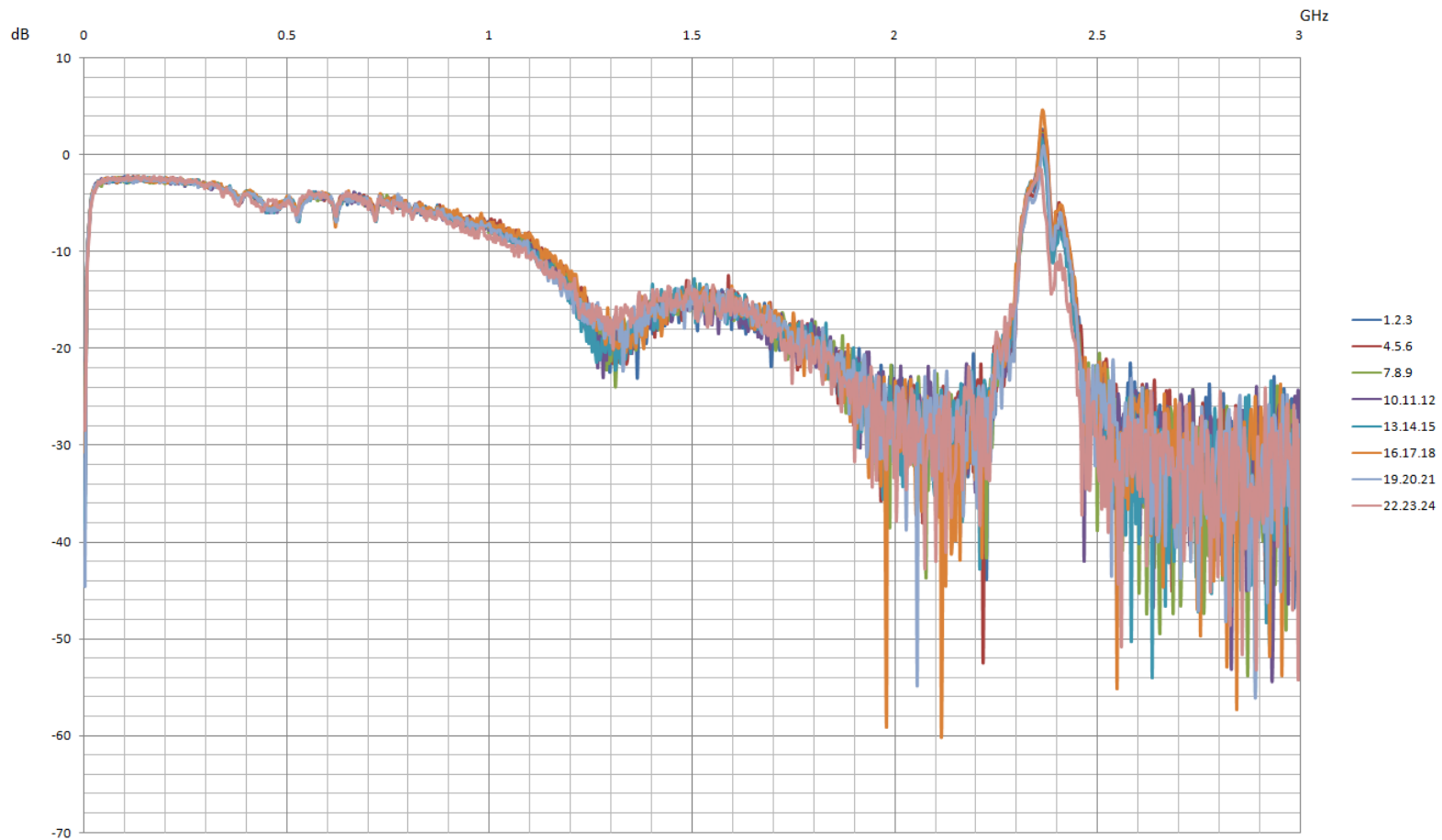
20dB attenuator



PROBLEMS / SOLUTIONS

3 AMPs in a row with 3x20dB attenuator

Power level low (-40dBm)



PROBLEMS / SOLUTIONS

- Amplifiers cause oscillations
 - Need to provide shielding
- Firmware is incomplete
 - Work on getting it working

Work continues...

THANKS FOR ATTENDING