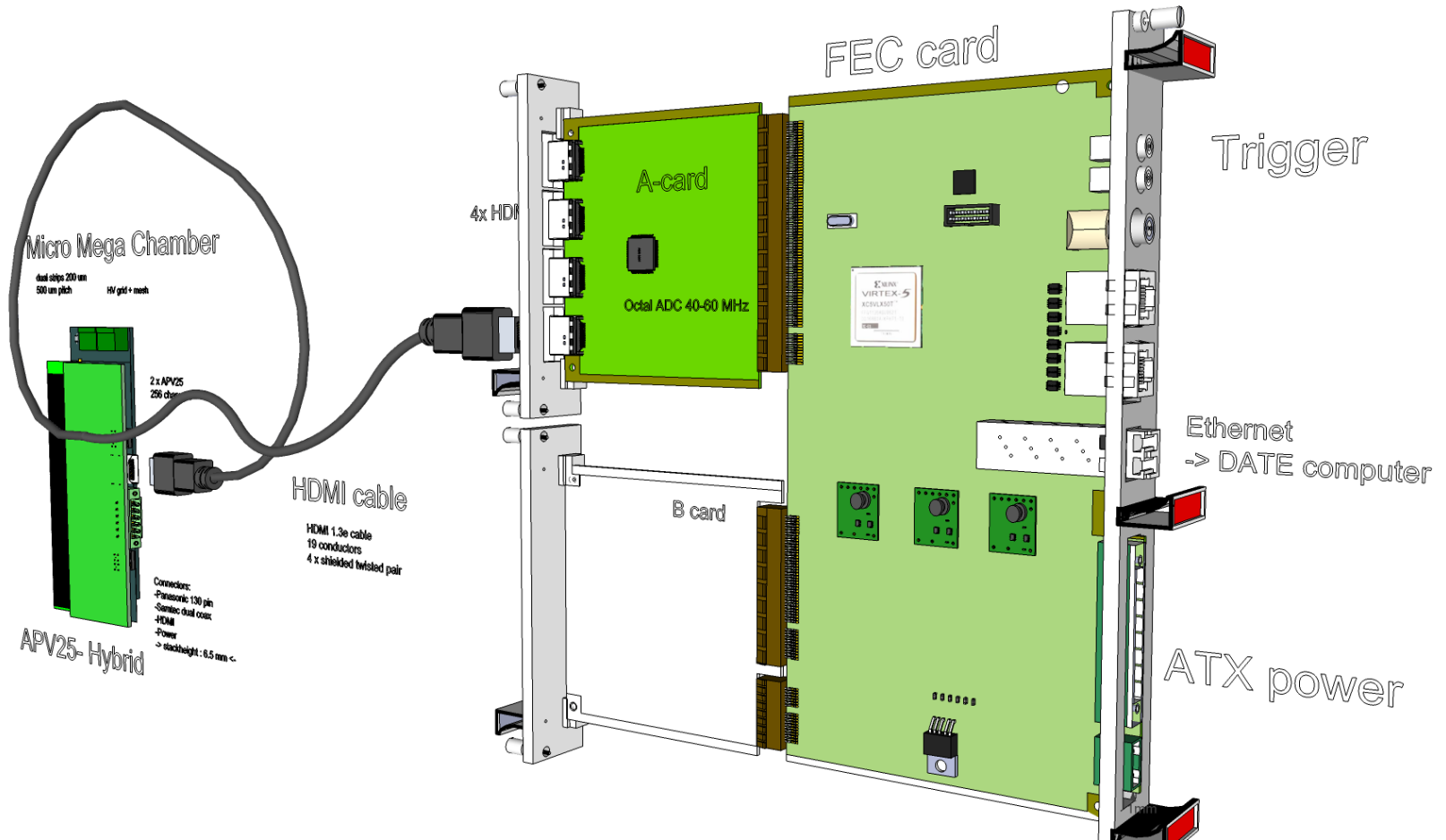


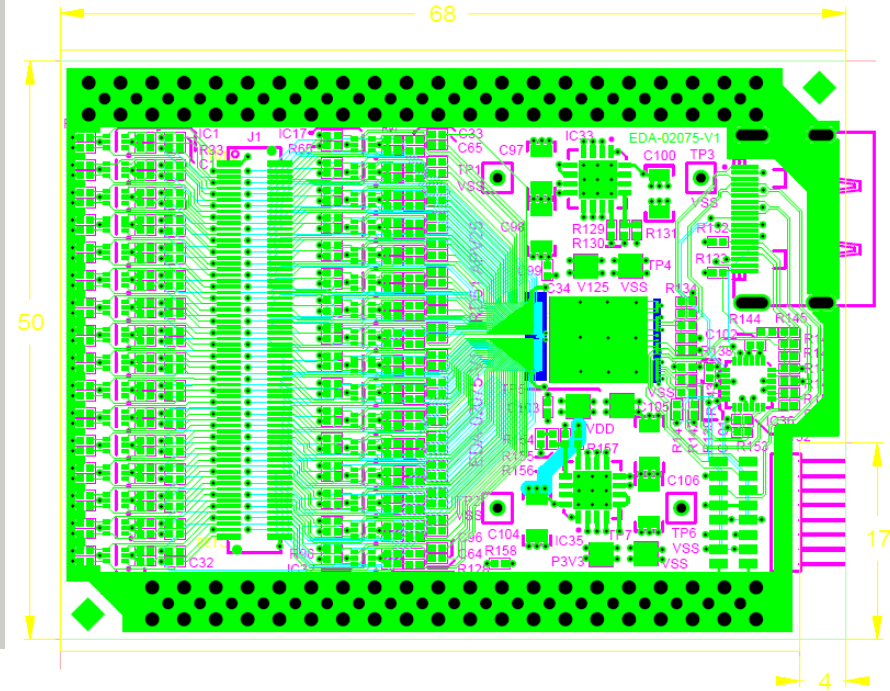
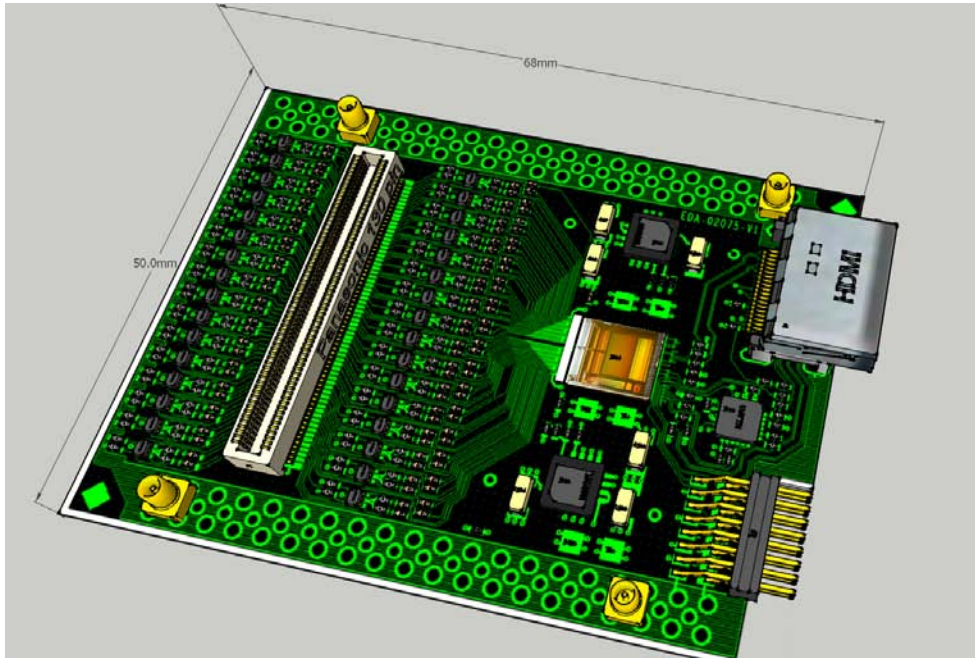
Frontend Hybrid with APV25 chip

Sorin Martoiu, CERN PH/DT

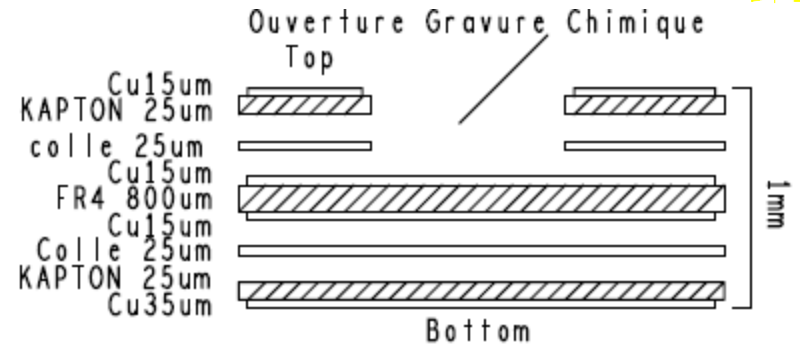
Analog Chip Adapter for SRS



Hybrid Overview



- 50mm x 68mm form factor
- 4 layers PCB/capton
- 1 mm thickness



Hybrid features

Discharge protection (NUP4114)

Power regulators (MAX8556)

HDMI connector

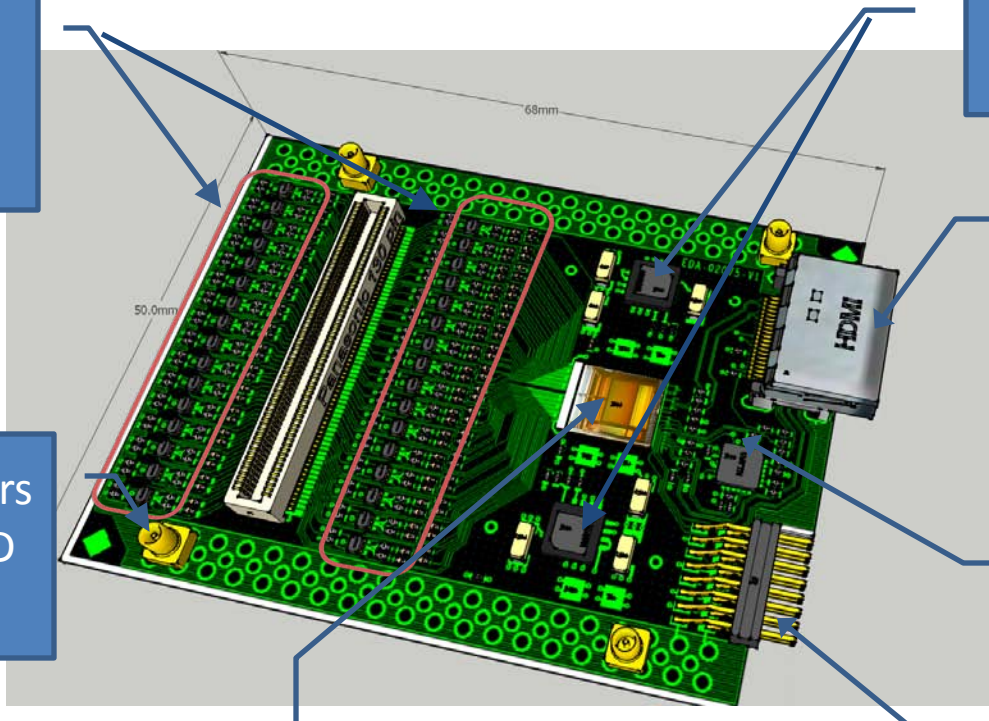
- power
- clock/trigger
- analog signals
- I2C

PLL25 rad-hard chip
clock/trigger

Extension connector for a second APV25 Hybrid

APV25 chip

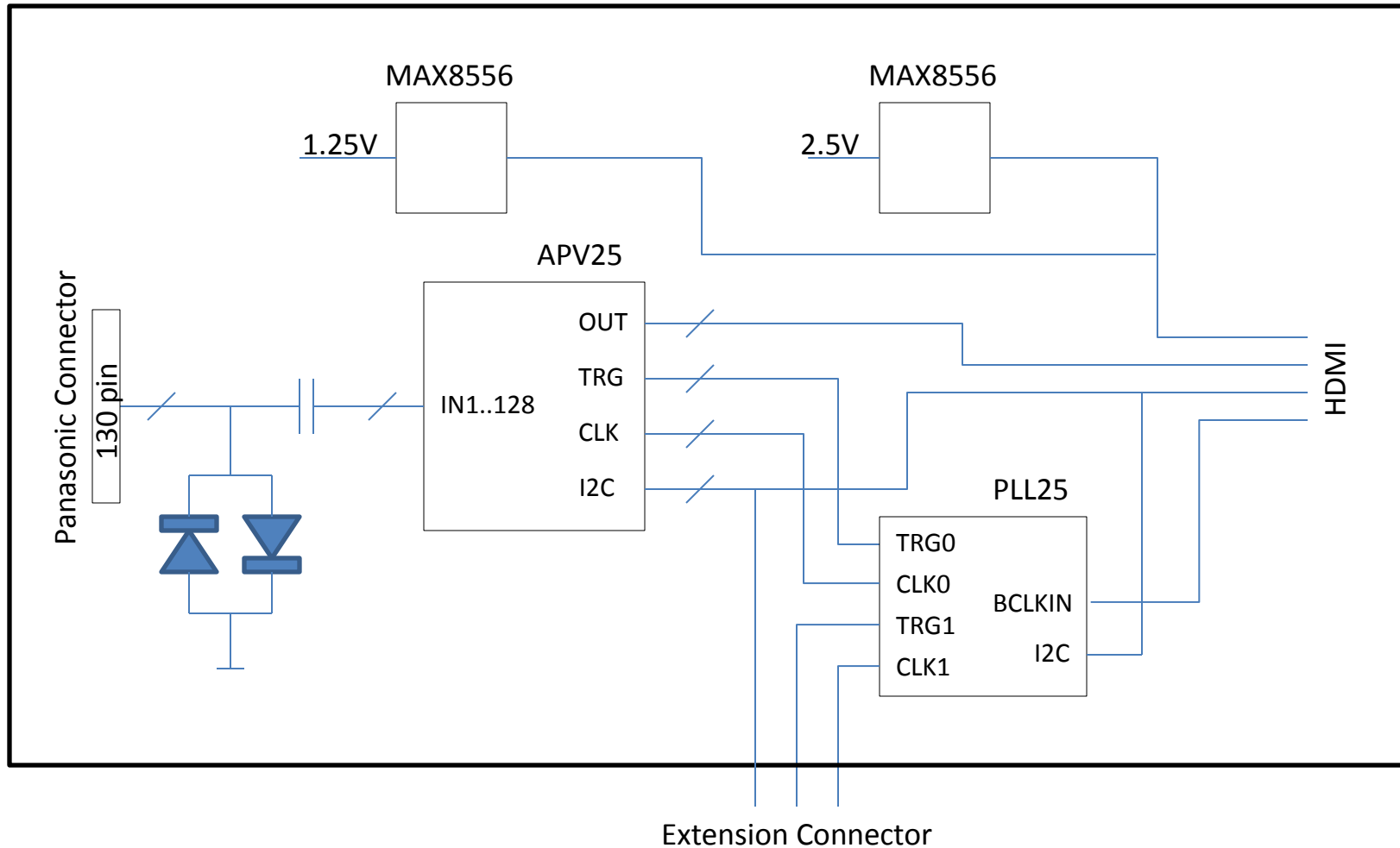
- 128 channels
- 192-deep analog sampling memory



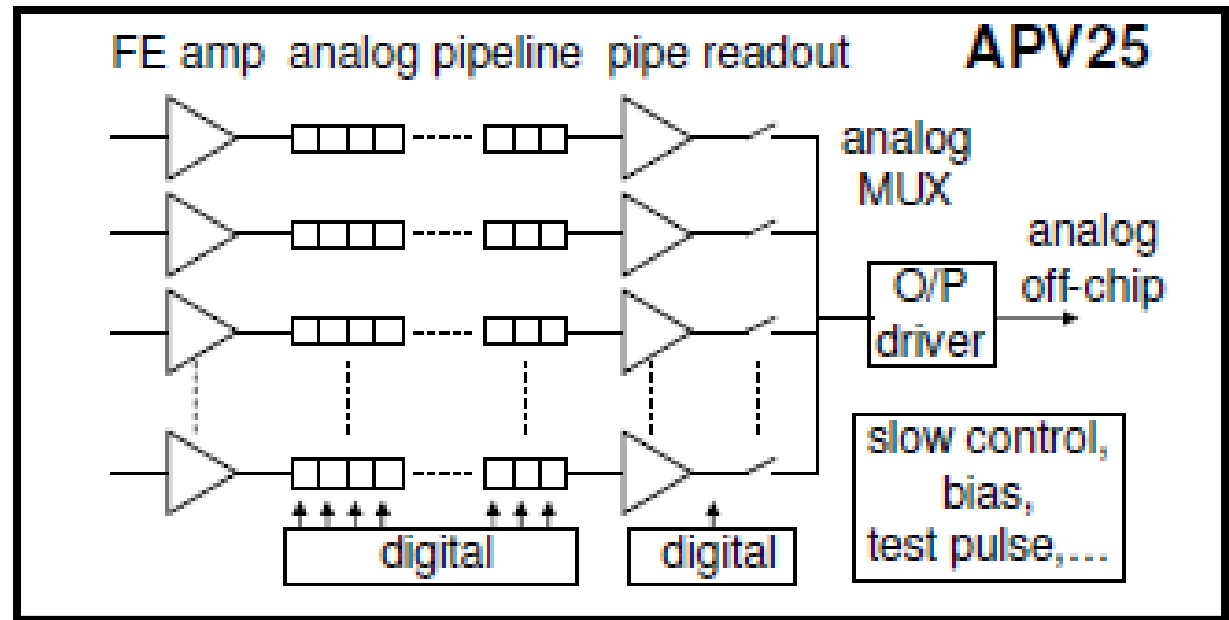
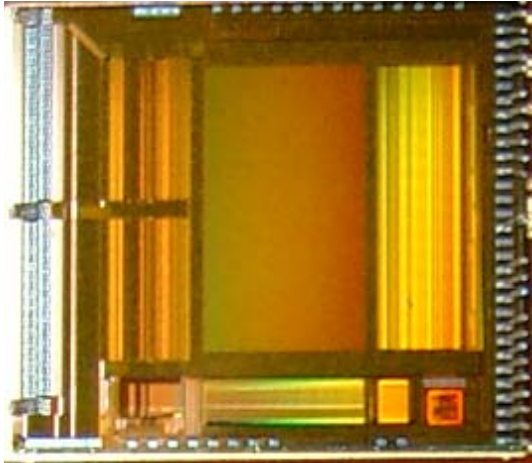
Coax Connectors

- <2mohm GND
- mechanical

Block Diagram

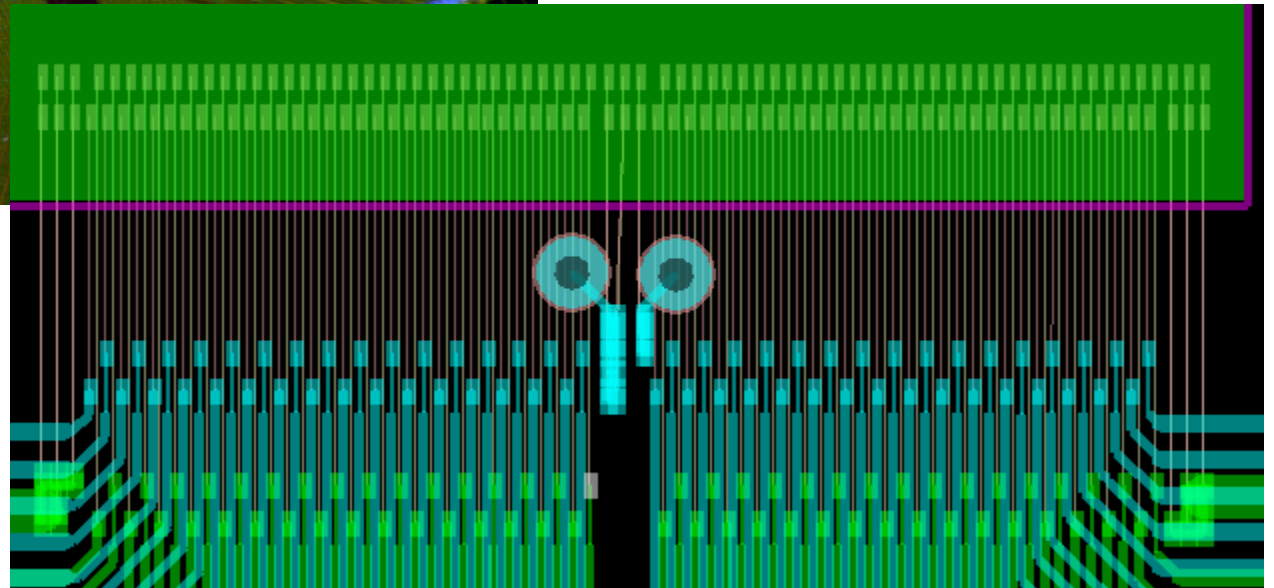
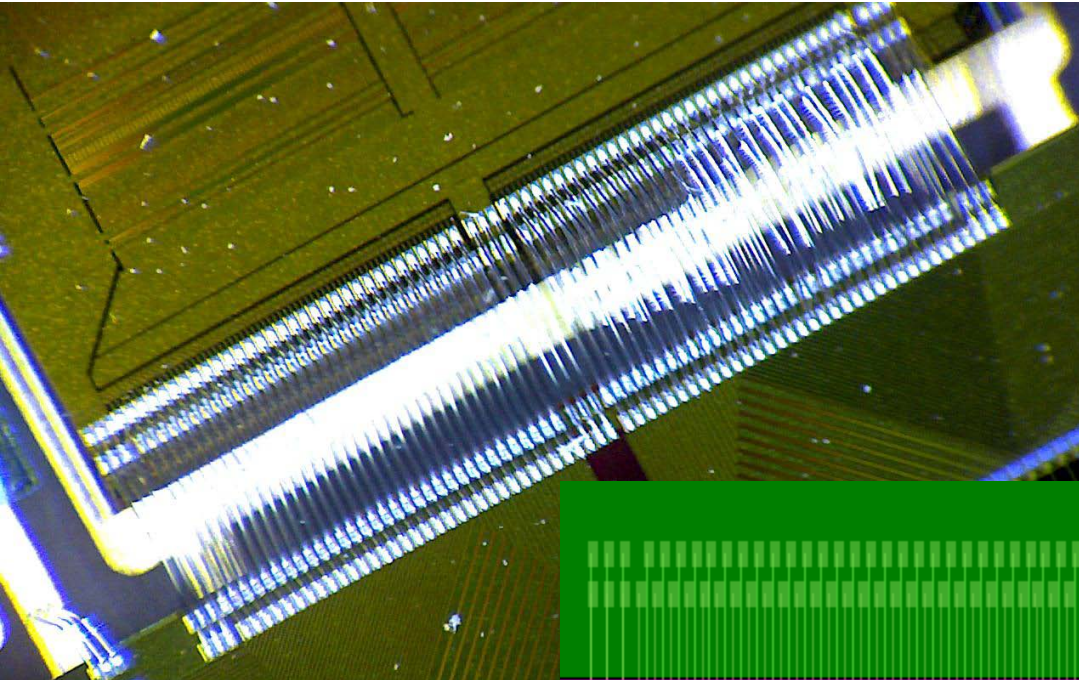


APV25

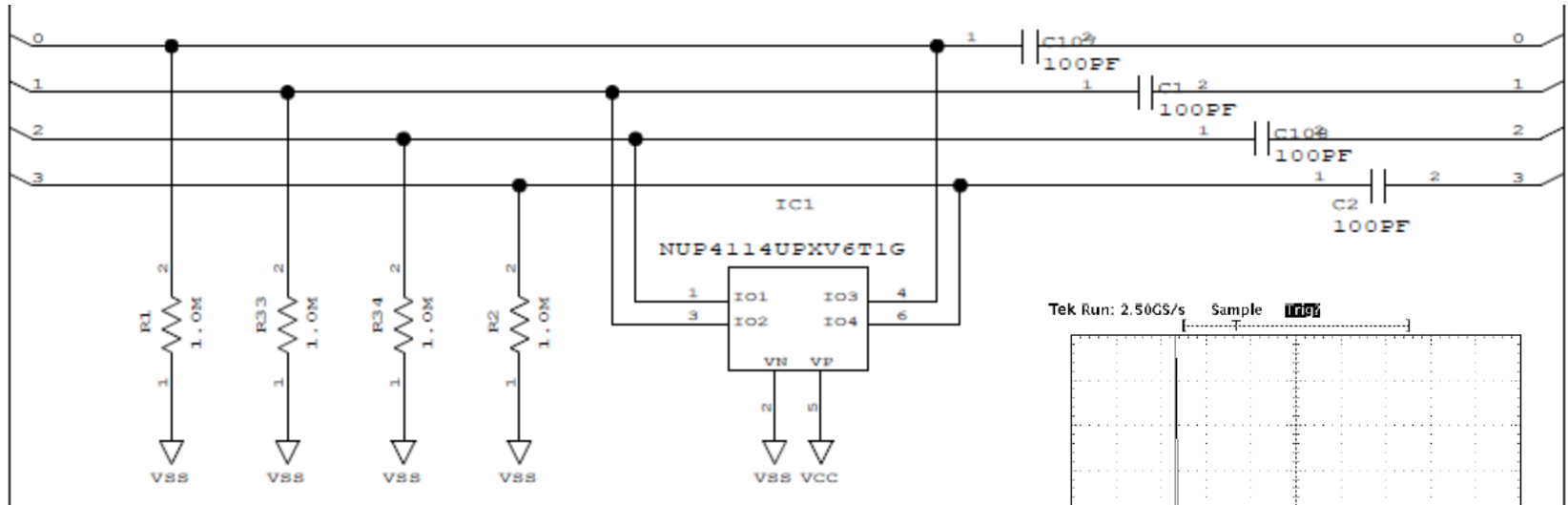


- 128 channels
- 192 samples analog pipeline
- 40 MHz sampling/RO frequency
- no TRIGGER OUT (fast-OR)
=> Beetle chip
- 50ns nominal shaping time
- ~ 2000 ENC @ 50pF
- 100mV / 25000 electrons

Bonding



Discharge Protection



OnSemiconductor NUP4114 datasheet: transient voltage suppressor designed to protect high speed data lines from ESD. Ultra-Low capacitance and high level of ESD protection makes this device well suited for use in ESB 2.0 applications.

Features: Low Capacitance (0.7 pF Typical Between I/O Lines)

- ESD Rating of Class 3B (exceeding 8kV) per Human Body Model, and Class C (exceeding 400V) per Machine Model
- Stand Off Voltage: 5 V

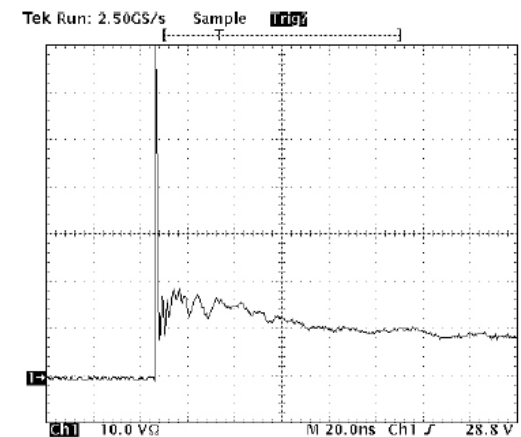
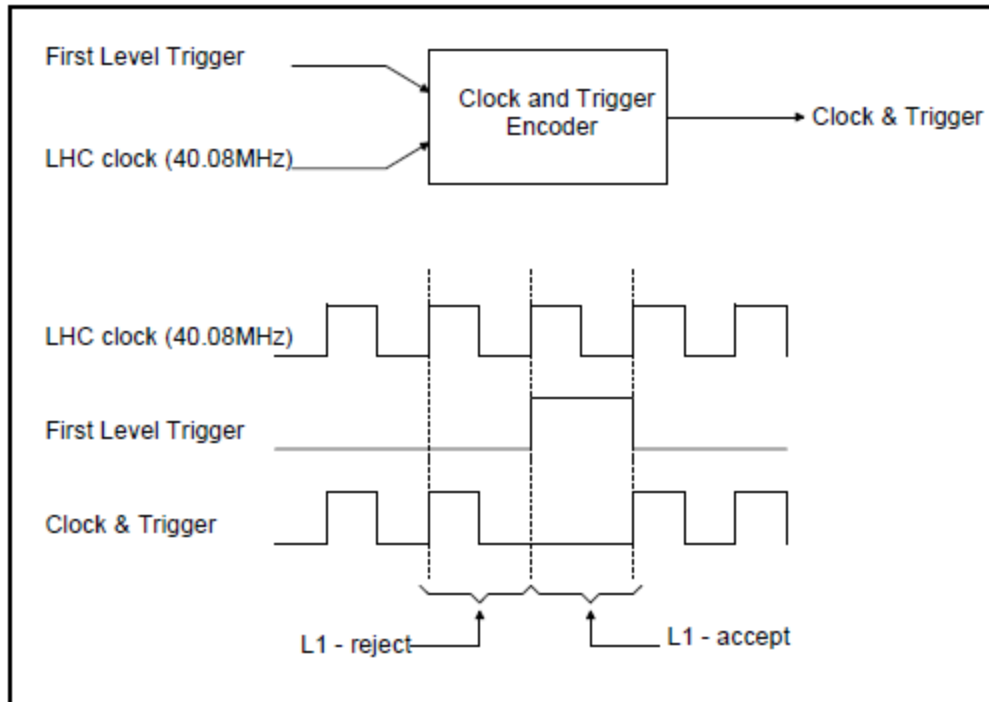


Figure 1. ESD Clamping Voltage Screenshot
Positive 8 kV Contact per IEC61000-4-2

Clock and Trigger Decoding and Distribution



CMS Tracker PLL (TPLL)

designed for *clock and trigger* distribution in the CMS central tracker.

- CMOS 0.25 μm
- Radiation tolerant
- SEU tolerant
- Configurable trigger delay
- Clock/Trigger de-skew (1.04ns bins)

P. Placidi, A. Marchioro and P. Moreira, “**CMS Tracker PLL Reference Manual**”, July 2000

HDMI



Features:

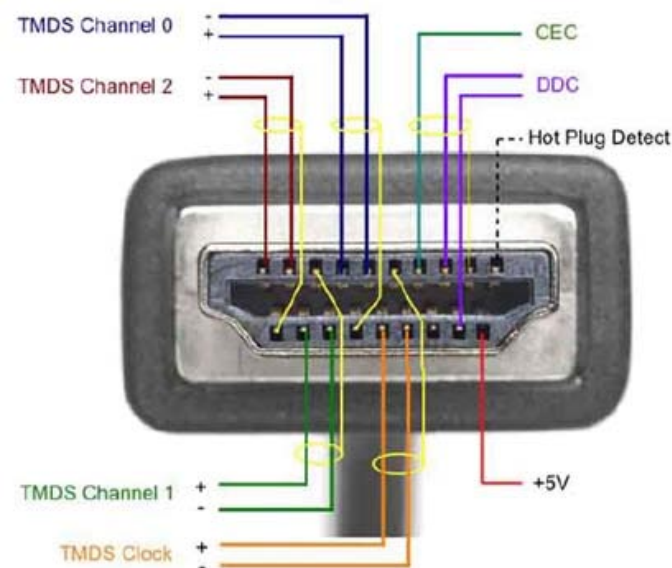
- 4 high-speed individually shielded twisted-pair cables
- one dedicated I²C interface (5th individually shielded twisted-pair on same cables)
- 5 additional lines (19 lines in total)

Electrical Characteristics:

- 100 ohm \pm 10% characteristic differential impedance
- 340 MHz bandwidth
- 111ps Maximum Cable Assembly Intra-Pair Skew
- 1.78ns Maximum Cable Assembly Inter-Pair Skew
- 0.5A/pin current rating for both cable and connectors

Hybrid pinout:

- 2 x Differential Output (analog)
- Trigger Out (Beetle chip – LVDS)
- Clock/Trigger Line (LVDS)
- nRESET (CMOS)
- I²C (Open-Drain CMOS)
- Power (3.3V)



Conclusions

- The Hybrid PCB is in production (we are expecting it to arrive in few days).
- All the parts were ordered and some were already delivered.
- We are confident about the bonding concept.
- We expect to start testing the first prototypes in a few weeks.

HDMI Roadmap



Standard

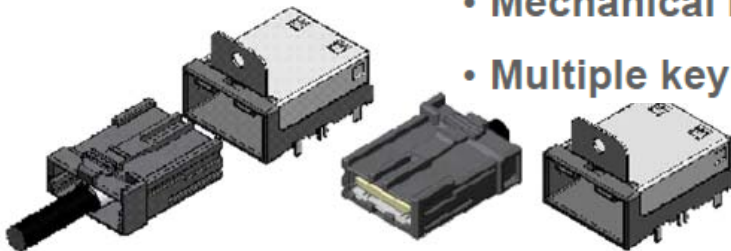


Mini



Micro

1) Automotive HDMI Type E Connector



- Mechanical lock structure
- Multiple keying variation



- New HDMI Cable Types

- **Standard HDMI Cable with Ethernet**: Supports up to 720p/1080i. Total bandwidth of 2.25Gbps. Adds support for HDMI Ethernet Channel (up to 100Mbps)
- **High Speed HDMI Cable with Ethernet**: Supports 1080p or higher. Total bandwidth of 10.2Gbps. Adds support for HDMI Ethernet Channel (up to 100Mbps)

www.hdmi.org