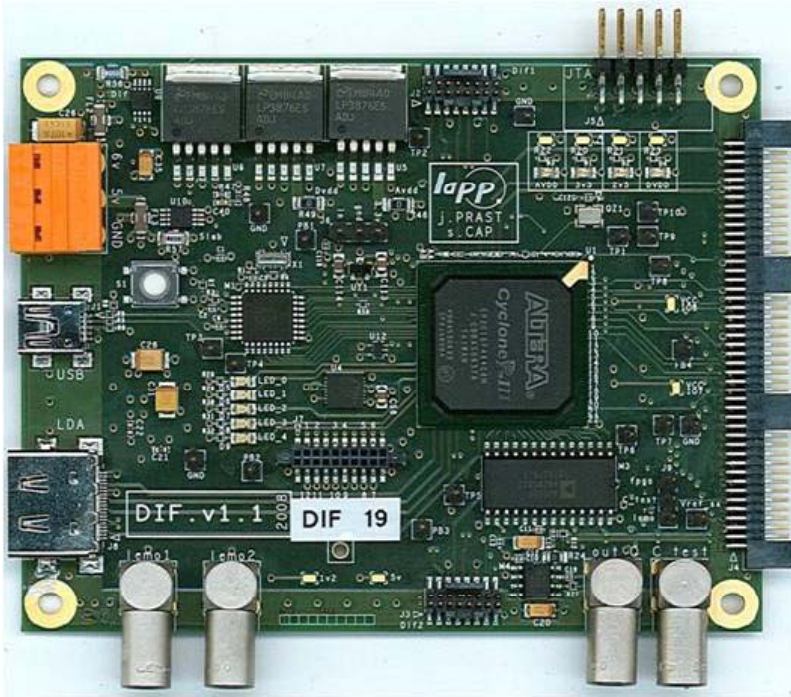# DIF status

AHCAL, DHCAL, ECAL DIF prototypes

Ongoing developments & plans

Features:

- HDMI, USB connections
- Altera Cyclone-II platform
- ADC on board
- Analog outputs, testing points
- Built-in power supplies

AHCAL DIF - Latest & greatest (size)

First prototype AHCAL DIF

- Commercial development board, Xilinx Spartan3 based
- Lots of user connectors, and USB, eth, RS232, etc
- Mezzanine for calibration (produced)
- Redesigns planned
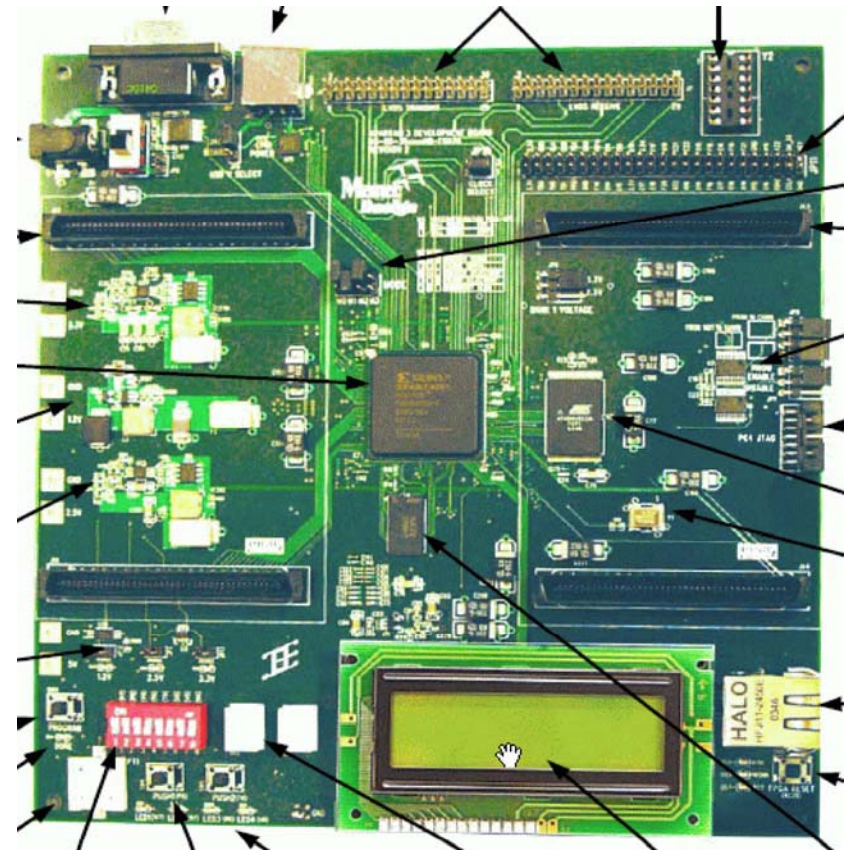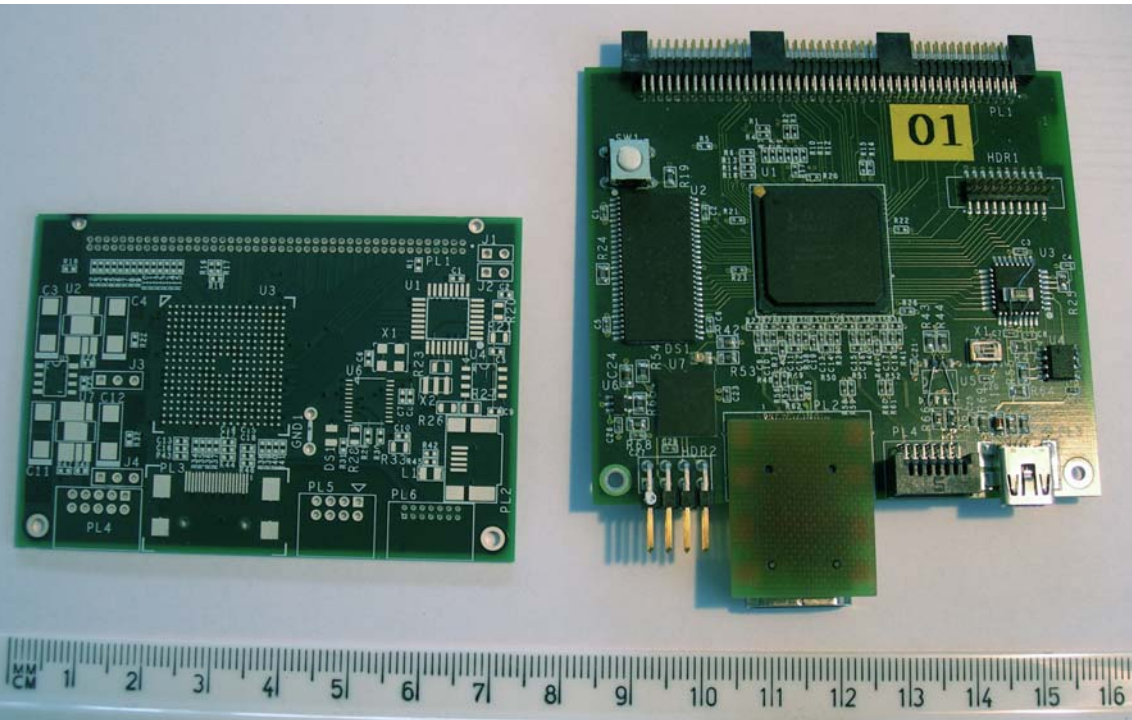
ECAL DIF - 2nd revision coming up

Status: 8 DIF prototypes now produced and commissioned

ECAL DIF: small form factor. No room for extra features!

- Xilinx Spartan3 based
- USB, HDMI connections

DIF re-spin for EUDET in credit-card size form factor. Main changes:

- No external SRAM, user connector, reset button
- SPI-flash PROM, Flash RAM for VFE config

Hardware status:
PCB designed & produced, some components still being ordered, board population, testing to be done
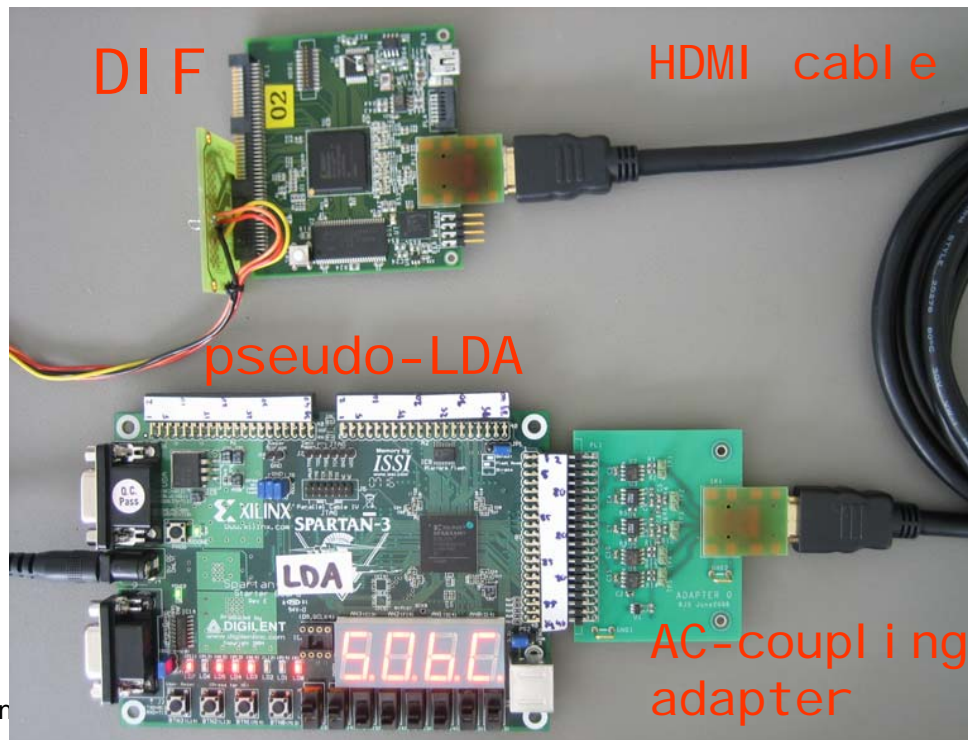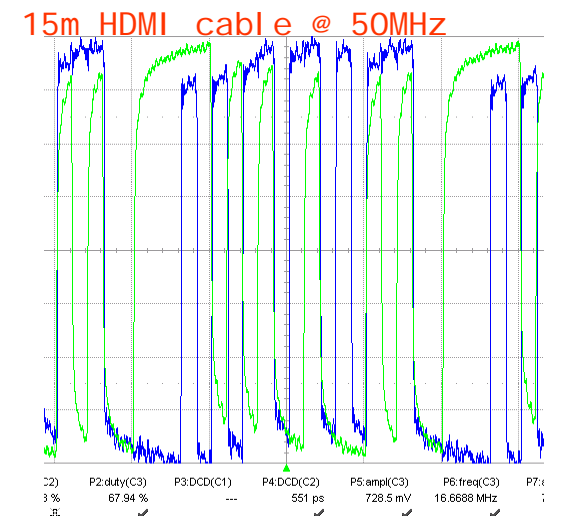
DIF Firmware specification
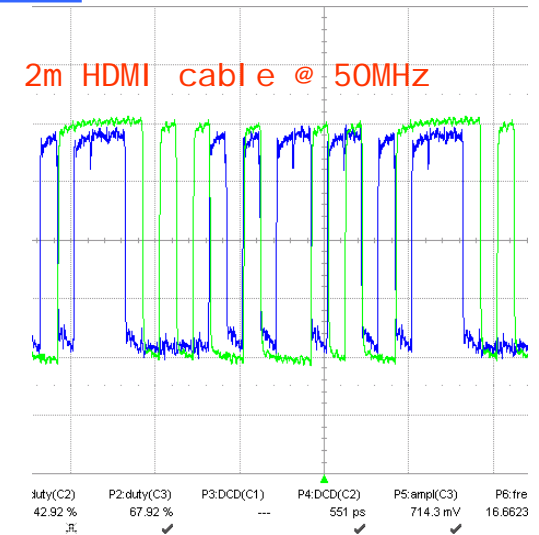
- DIF ⇔ LDA protocol layer:

- Mathias took initiative to start first version 'user guide' writeup ☺, DIF wg eager to shoot at it!

- Lively exchange of emails within DIF WG resulted in draft.v11.

  Contains specifications for:
  - Fast Command mappings
  - Block transfer data format (globally)
  - Block transfer data mapping for specific commands
 - Top-level DIF State Machine

DIF firmware development setup

- DIF firmware test bench: Pseudo-LDA with clock generation, full-duplex 8b/10b data transmission machinery - Marc Kelly's code, mostly
- DIF running link firmware as development platform for DIF firmware

2m HDMI cable @ 50MHz

| duty(C2) | P2:duty(C3) | P3:DCD(C1) | P4:DCD(C2) | P5:ampl(C3) | P6:fre |
| 42.92 % | 67.92 % | --- | 551 ps | 714.3 mV | 16.6623 |

DIF

HDMI cable

pseudo-LDA

AC-coupling adapter

15m HDMI cable @ 50MHz

| C2) | P2:duty(C3) | P3:DCD(C1) | P4:DCD(C2) | P5:ampl(C3) | P6:freq(C3) | P7:8 |
| 3 % | 67.94 % | --- | 551 ps | 728.5 mV | 16.6688 MHz | |

DIF firmware status

- Tested fast commands + block transfers (DIF->LDA) on hardware: works fine.
- DAQ system test: DIF acts as (pseudo)data source
- Temporary implementation of fast commands for DAQ test in ECAL DIF command space:
  - K28.3D5.0: Reset Spill_ID counter
  - K28.3D5.1: Increase Spill_ID counter
  - K28.3D5.3: Send single packet
  - K28.3D5.4: Send multiple packets
  - K28.3D5.5: Toggle sending of packets continuously
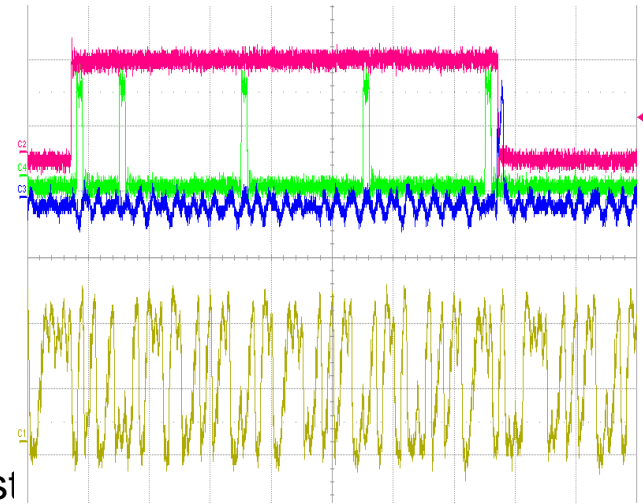
First
–and very primitive-
data transmission from dev. DIF to LDA

DIF firmware development plans:

- ➢ DIF Command Interface document is now extended rather than changed between revisions: provides well-defined starting point.

- ➢ Initial specification of data format formulated

- ➢ Strive for user transparency between LDA (HDMI) and USB interfaces. Different groups have focus on either interface: provide good integration

- ➢ All DIF developers very much aware of opportunities for sharing common code blocks - with proper naming convention

- ➢ No focus on 3rd party tools: plain old VHDL will do.

- ➢ Next: start the engines!