Libera

Electron Beam Position Processor

Rok Uršič

Instrumentation Technologies
Slovenia
Libera

All-In-One
Customizable
Feedback-Ready

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Libera Family

- **Common to all members**
  - Digital Board
  - Core Software

- **Specific for each Member**
  - Analog Board
  - Member specific Virtex II Pro embedded software
    - Member and user specific Virtex II Pro embedded software
  - Member specific SBC software
    - Member and user specific SBC software

- **Electron beam position processor is the first member** (see references for details)
Programming Modules
SBC Software Architecture

Linux

- Custom Applications
- TANGO
- EPICS
- Generic Server

Control System Programming Interface (CSPI) Library

Kernel

- Kernel Driver

Hardware

- FPGA Embedded Software

Libera

To Control System

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Functional Block Diagram

Electron beam position proc.
Feedback Building

• Rich connectivity
  – Public network (3 x Ethernet)
  – Private Network (8 x reconfigurable Rocket IO via front panel SFP connectors)
• A variety of architectures possible
  – Soleil
  – Diamond
  – ... your choice
Performance Results

• The results that follow are preliminary with no signal conditioning

• Final performance results will be:
  – Based on statistics of 100+ modules,
  – with signal conditioning.

• CE certified
  – LVD
  – EMC
    • Emission
    • Immunity, test level: special 50 V/m up to 1 GHz
Resolution - CW

- RF = 499.654 MHz CW
- fsampling = 117.44 MHz
- Serial number: DL3
- kx = 10 mm
Beam current dependence - absolute

$f_{RF} = 352.202$ MHz CW
$f_{\text{sampling}} = 108.369$ MHz
$ky = 11.4$ mm
Beam current dependence - relative

- $f_{RF} = 352.202 \text{ MHz CW}$
- $f_{sampling} = 108.369 \text{ MHz}$
- $k_y = 11.4 \text{ mm}$
Temperature stability

Temperature / °C

Y position / µm

Time / hours

YRF = 352.202 MHz CW
fsampling = 108.369 MHz
ky = 11.4 mm

Y = 0.0033x² - 0.2849x - 129.5
Summary

• Libera is a product family

• Most of performance requirements of electron beam position processor already met without signal conditioning including EM immunity

• Feedback building block with rich connectivity – variety of architectures possible

• 100 + production units fabricated and tested
  – Very good manufacturing yield
  – Excellent module to module reproducibility

• First deliveries to clients
  – 150 units: Dec 2004
  – First round of Tryouts: Jan 2005