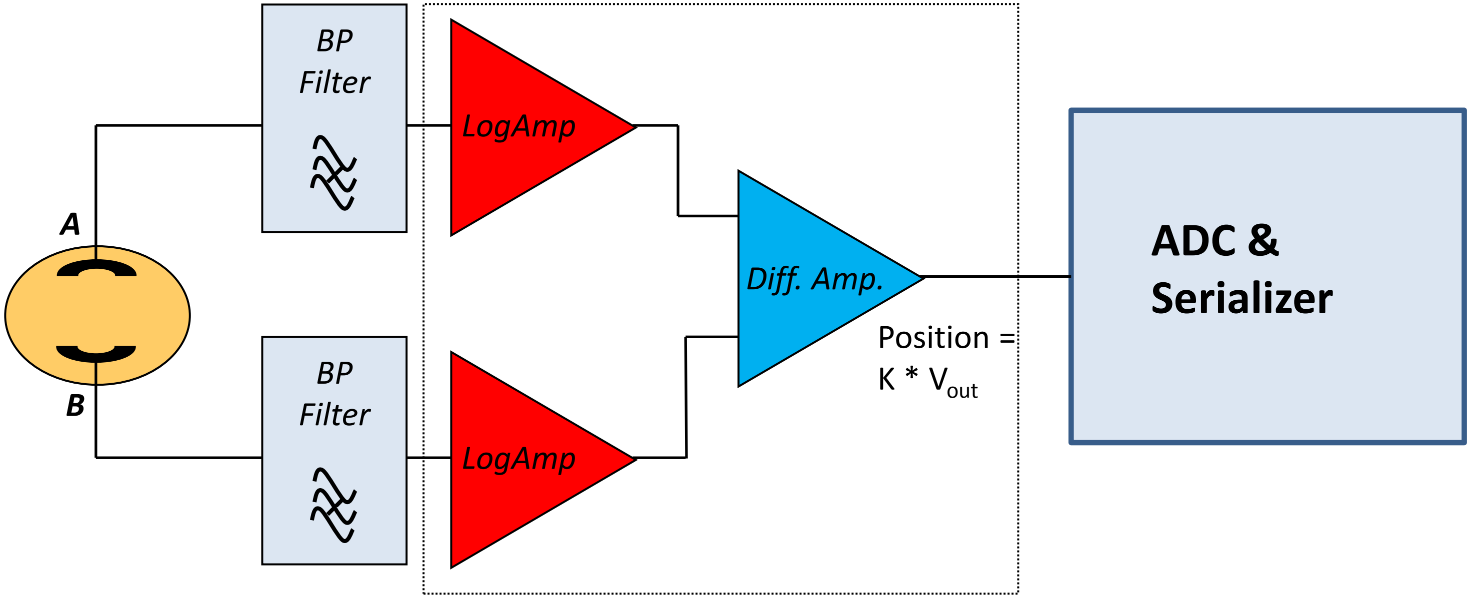
Beam Position Monitors: Front-End Components

- BPM Acquisition Architecture
- Components Selection
- Irradiation Tests

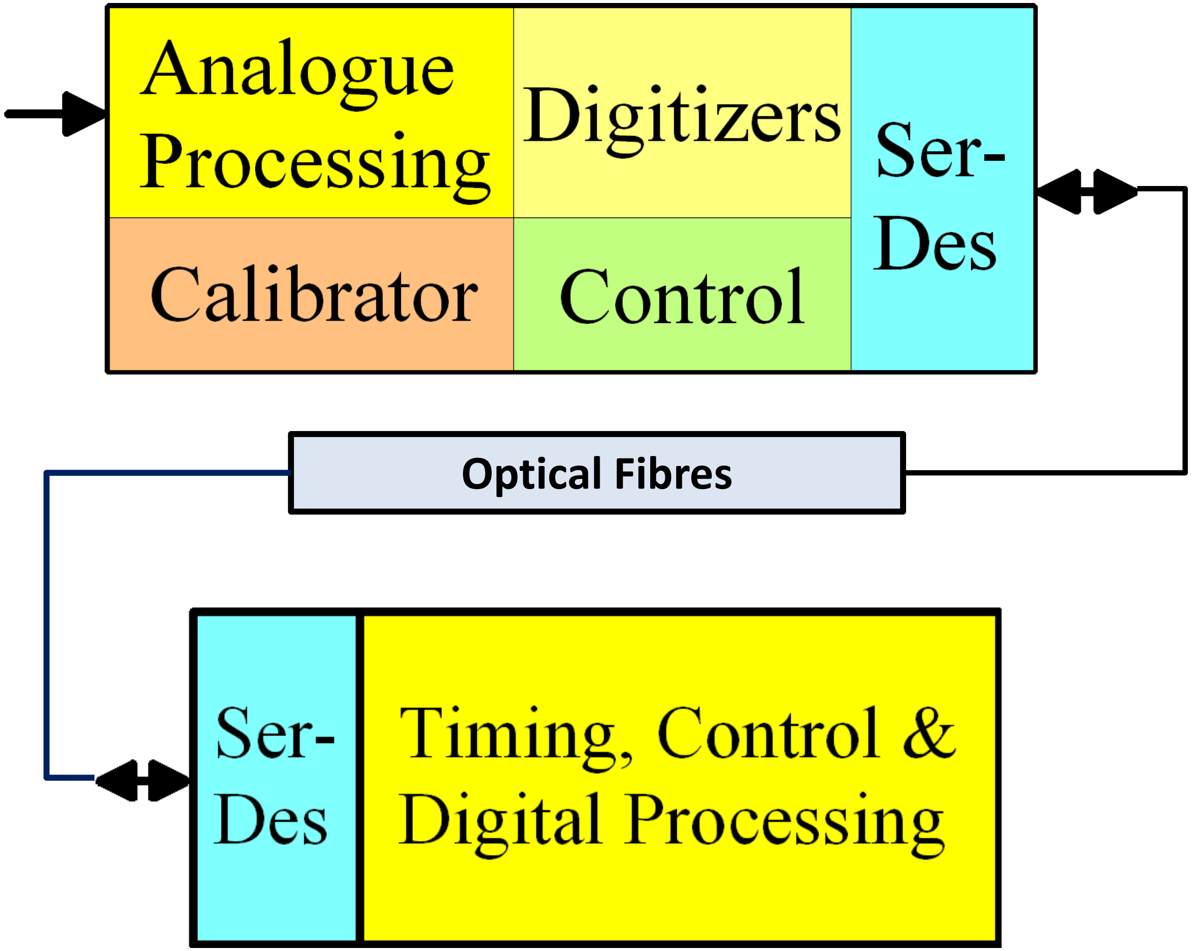
Logarithmic Amplifier Principle



Constraints on LogAmp ICs:

- Dual Channel and Integrated Difference Amp.
- Fast response: < 500ns @ 1%

MOPOS Architecture



Analogue Processing

Digitizers

Ser-Des

Calibrator

Control

Optical Fibres

Ser-Des

Timing, Control & Digital Processing

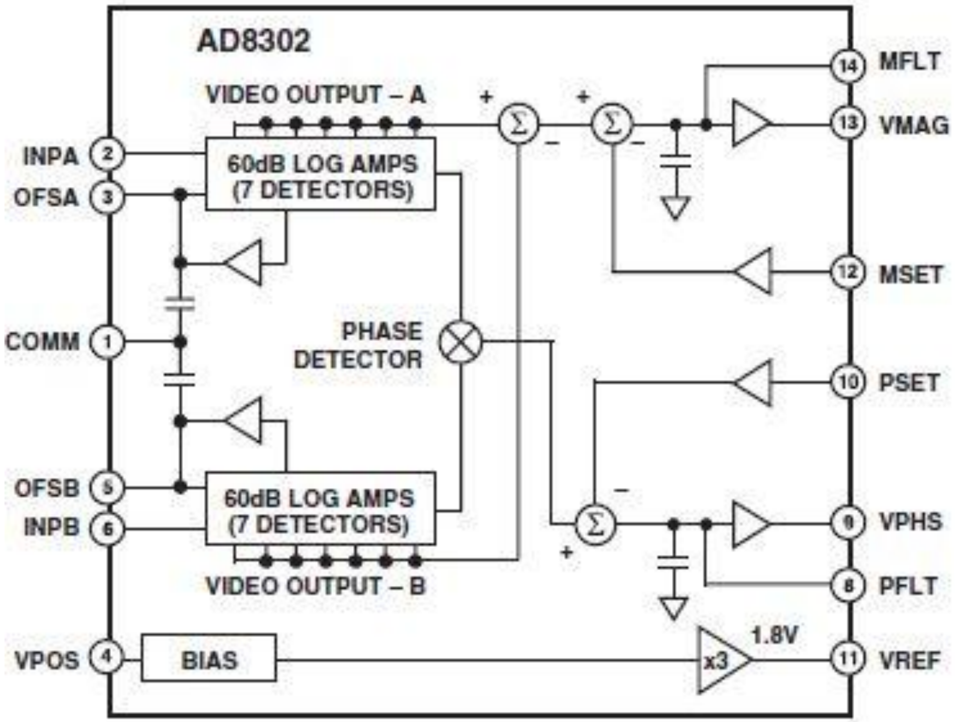
Analogue Components

The aim is to qualify the components on a test board during a single radiation period.

- LogAmps
  - AD8302: *Analog Devices* Gain and Phase Detector
  - ADL5519: *Analog Devices* Dual Log Detector
  - MAX2016: *Maxim* Dual Log Detector

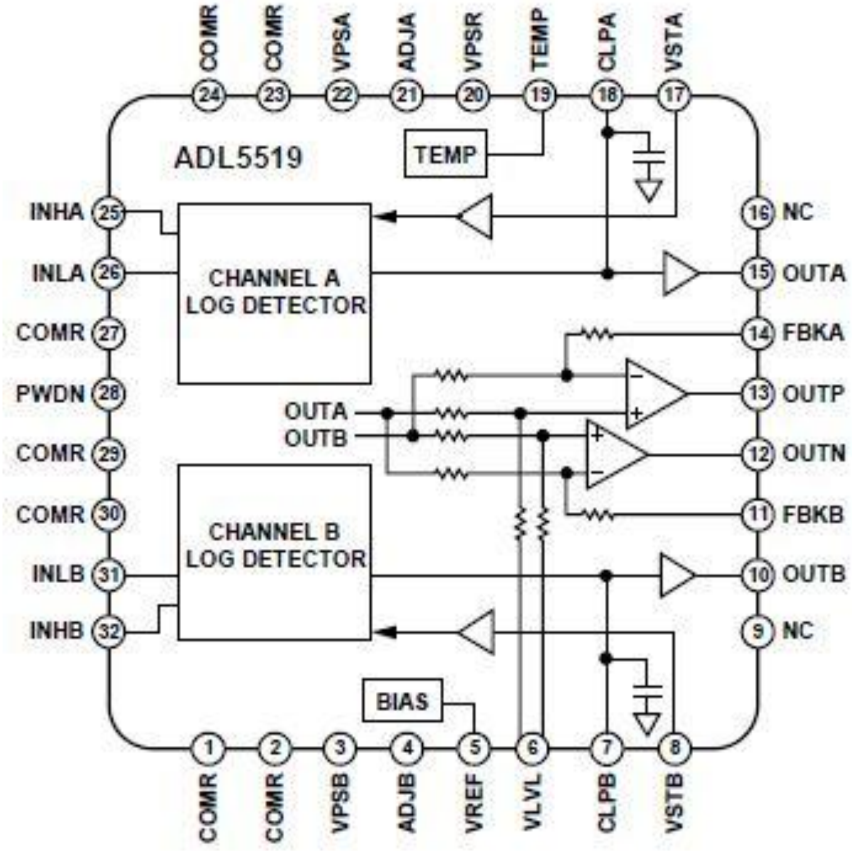
Analogue Components

- AD8302: *Analog Devices* Gain and Phase Detector



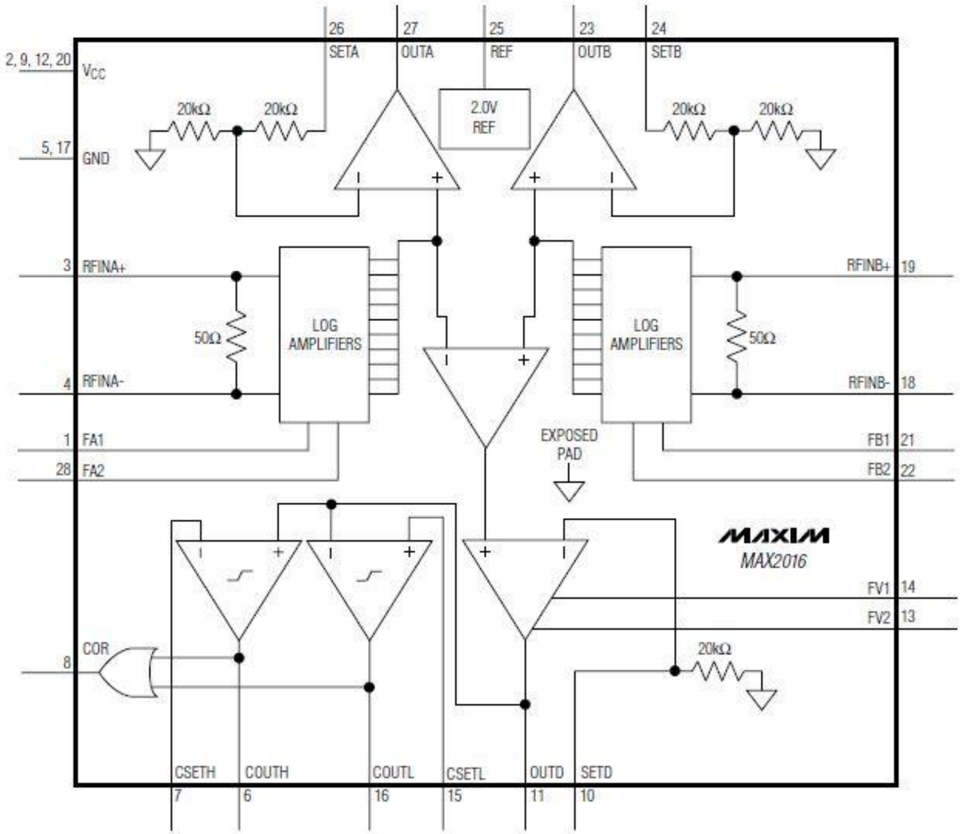
Analogue Components

- ADL5519: *Analog Devices* Dual Log Detector



Analogue Components

- MAX2016: *Maxim* Dual Log Detector



Analogue Components

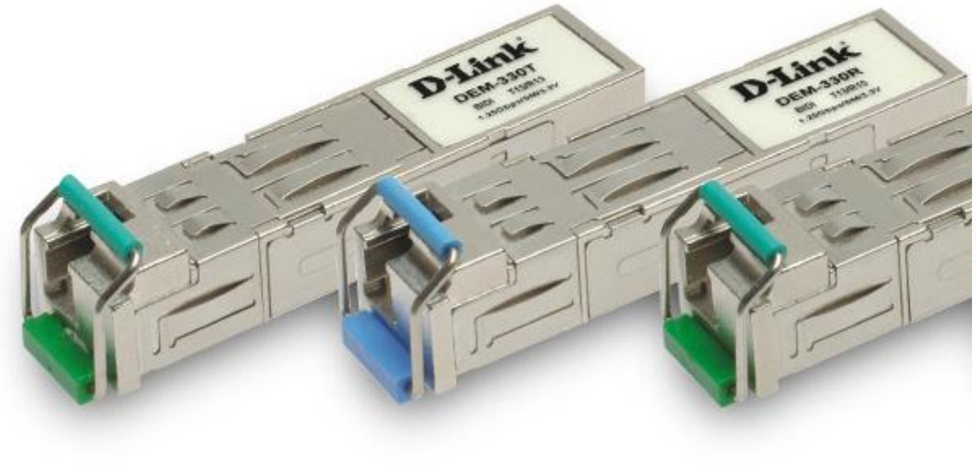
- Low Dropout Regulators
  - LT1963A: *Linear Tech.* Low Noise, LDO Regulator
  - LP3875: *National Semi.* Low Noise, LDO Regulator
  - TL1963A: *Texas Inst.* Low Noise, LDO Regulator
  - TPS7A4501: *Texas Inst.* Low Noise, LDO Regulator
- ADC Drivers
  - ADA4932: *Analog Devices* Differential ADC driver
  - THS4521: *Texas Inst.* Differential ADC driver

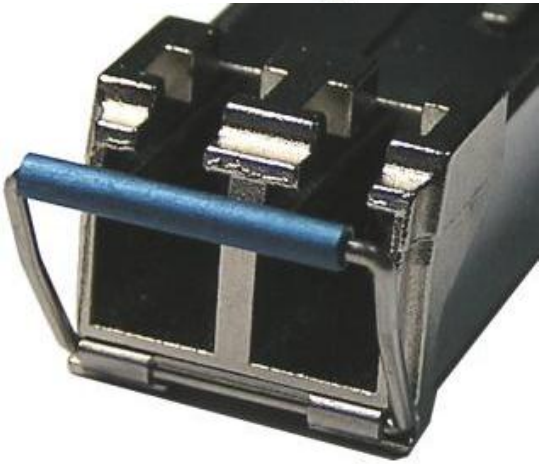
Analogue Components

- Optical transceivers (T/R: 2 fibers)
  - AFCT-5705LZ: *Avago* SFP Transceiver, 1.25Gb/s
  - FTLF1318P2BTL: *Finisar* SFP Transceiver, 1.25Gb/s

Analogue Components

- Bidirectional Gigabit Transceivers (single fiber)
  - – DEM-330T/330R: *D-Link*
  - – LTE3405/4305: *Hisense*
  - – SPL-35-GB-BX: *Source Photonics*





Radiation Tests for Belle II

Takeo Higuchi (KEK); TWEPP2011

1-year-equivalent neutron dose = 10^{11} neutrons

1-year-equivalent γ-rays dose = 100 Gy

- **4Gbps optical transceivers (850nm)**
  - **AVAGO (AFBR-57R5APZ)**: Killed by ≅ 300 Gy
  - **FINISAR (FTLF8524P2BNV):** Killed by ≅ 300 Gy
- **Voltage Regulators**
  - **LT1963:** Killed by ≅ 7 kGy

Analogue/Digital Converters

- 40Msps - Parallel ADC
  - AD9269: *Analog Devices* Dual 16-bit ADC
  - LTC2181: *Linear Tech.* Dual 16-bit ADC

- 40Msps - Serial ADC
  - LTC2264: *Linear Tech.* Dual 14-bit ADC, serial LVDS
  - ADS6242: *Texas Inst.* Dual 14-bit ADC, serial LVDS

Digital Components

- Low Voltage Buffers
  - 74VCX162244: *Fairchild* 16-bit Buffer/Line Driver
  - 74ALVCH162244: *Texas* 16-bit Buffer/Line Driver
  - 74VCX162827: *Fairchild* 20-bit Buffer/Line Driver

- LVDS Buffers
  - FIN1108: *Fairchild* 8-port LVDS Repeater

Irradiation Tests

- Tests of analogue components (CNRAD)
  - Installation of a test board during next technical stop (Nov. 7, 2011)
  - Irradiation tests in 2011 and beginning 2012
- Tests of A/D components (CNRAD)
  - Installation of a test board in March 2012
- Tests of Functional Prototype (CNRAD)
  - Installation of a board in June 2012

Project Development Plan

- Hardware Production and Test
  - – Final prototype tests (2012)
  - – Series production (2013)
  - – Qualification and test of the series (2013-2014)

- **Hardware Installation (end 2013 – mid 2014)**