

Opto-Board Production

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Outline

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- Procedure
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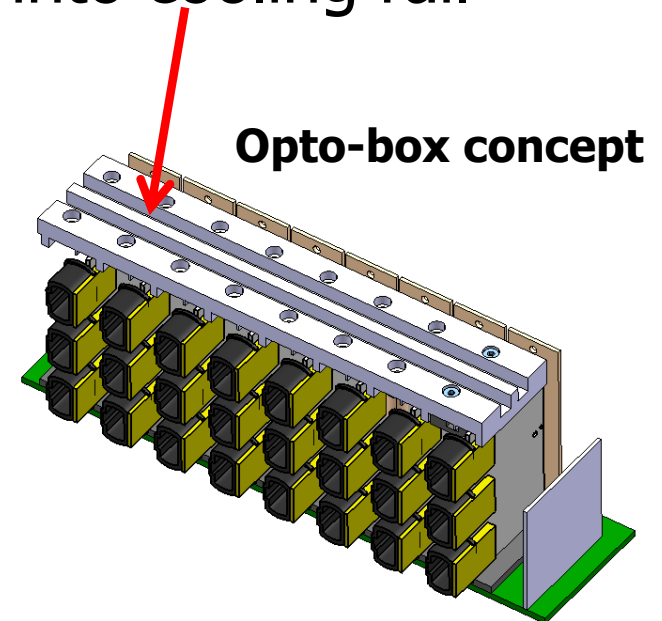
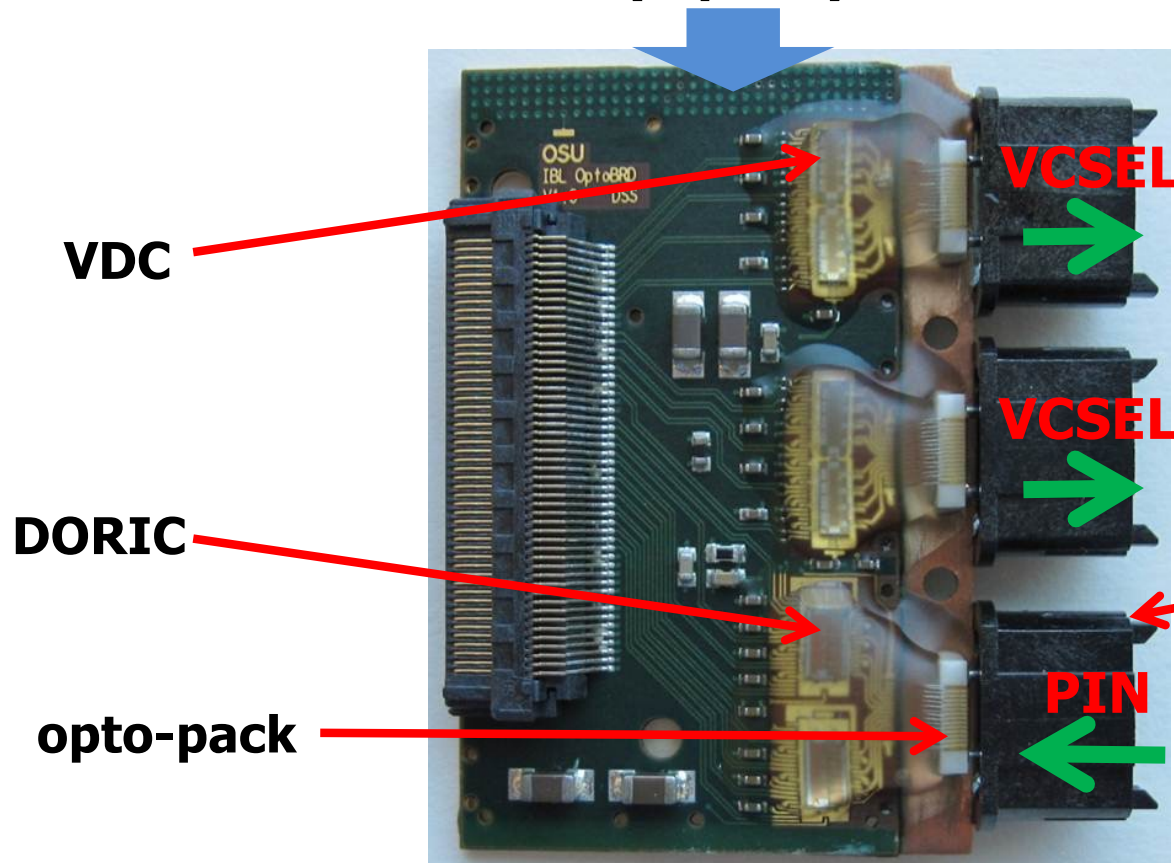
Overview

- Use same 0.25 μm DORIC / VDC ASIC chips as present pixel opto-boards
- nSQP: 2 flavors (for legacy fiber mapping)
 - B-Layer
 - D-Tall
 - All equipped with 14 DTO / 7 TTC
- IBL: 1 flavor
 - 16 DTO / 8 TTC
 - Not building this

Opto-boards

- 30 mm x 46 mm copper backed polyimide PCB
- 1 mm thick copper backing plate slides into cooling rail

cooling from here
(top rail)



MTP
Fiber
Connector

Opto-board Production Procedure

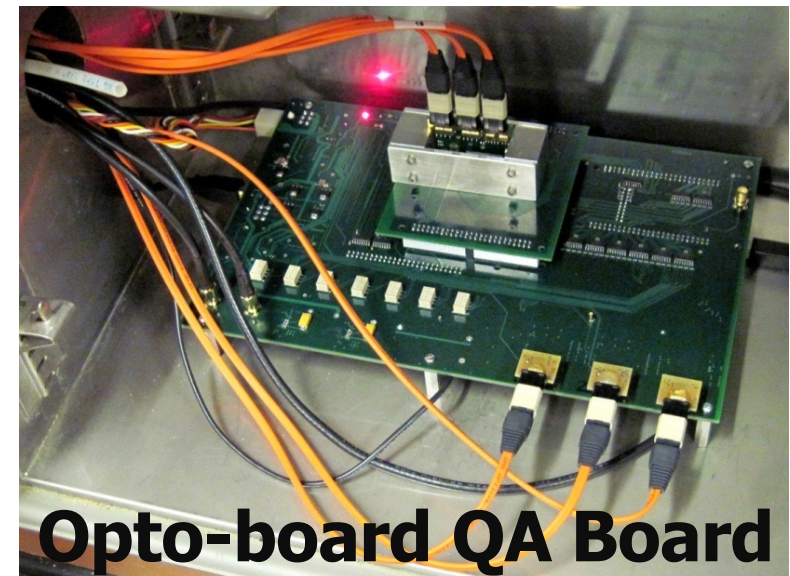
- Mounting of passive components (same outside vendor)
 - Electrical open / short test
 - Mounting of opto-packs / optical connectors
 - Mounting of DORIC/VDC
 - Wire bonding
 - Basic functionality test
 - Encapsulation
 - Full QA test
 - Burn in
 - 72 hrs @ 50° C
 - Thermal cycling
 - 0° C -> + 50° C
 - 10 cycles
 - 2 hrs per cycle
 - 1 hr soak at 50° C
 - Full electrical and optical QA at 10° C
- Propose no change
in assembly, burn-in,
thermal cycling, QA

Opto-board Production Plan

- We achieved a rate of 15 boards per week in previous production
- Plan to produce at more relaxed pace
 - 12 boards per week
 - Need to get VCSEL, PIN, and PCB procurement going ASAP

Opto-board Reception Tests at CERN

- A copy of the QA system from OSU is at CERN
 - Used in previous reception test
- Reception test
 - Optical power must be consistent with OSU QA
 - Check that delivered boards operate with no bit errors at PIN current of $100\ \mu\text{A}$ – $1\ \text{mA}$



Production Experience

- 400 opto-boards were produced in 2013/14
- 14 opto-boards have been produced with the modified PCB design in a rush for irradiation
 - Adding a resistor to allow adjustment of dim current (I_{SET})
 - 12 boards are currently in 85/85 test
 - 2 boards not in the 85/85 test due to limited number of channels in the test system
 - All channels are operational after over 1,000 hrs

Parts

- PCB: Same expensive vendor
 - \$158 per board, for 50 boards
- VCSEL and PIN: ULM?
 - Material shortage for VCSEL wafers
 - Expect 2-3 months for the delivery

Schedule

- June 3rd : PRR
- June 4th : Order parts
- Aug 5th : Start of the production
- Feb 28th : Produce 300 boards
- May 31st : Produce +100 boards

Summary

- Extensive experience in producing opto-boards
- No indication of need to modify the assembly, burn-in, thermal cycle, QA procedure
- Need to order parts asap to start production in August