Status of On-Detector Opto-Links

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Outline

- Plan for VCSEL optical package
- Plan for PIN optical package
- Status of opto-board design
- Summary

Implications of New SQP Project

- New SQP Project pushes the opto-link schedule forward:
  - FDR for VCSEL/PIN opto-pack and opto-board ~ April 2011?
  - PRR ~ September 2011?
  - accelerated IBL schedule forces merging of nSQP and IBL opto-links schedule
  - humidity is current favorite theory for the TX VCSEL problem

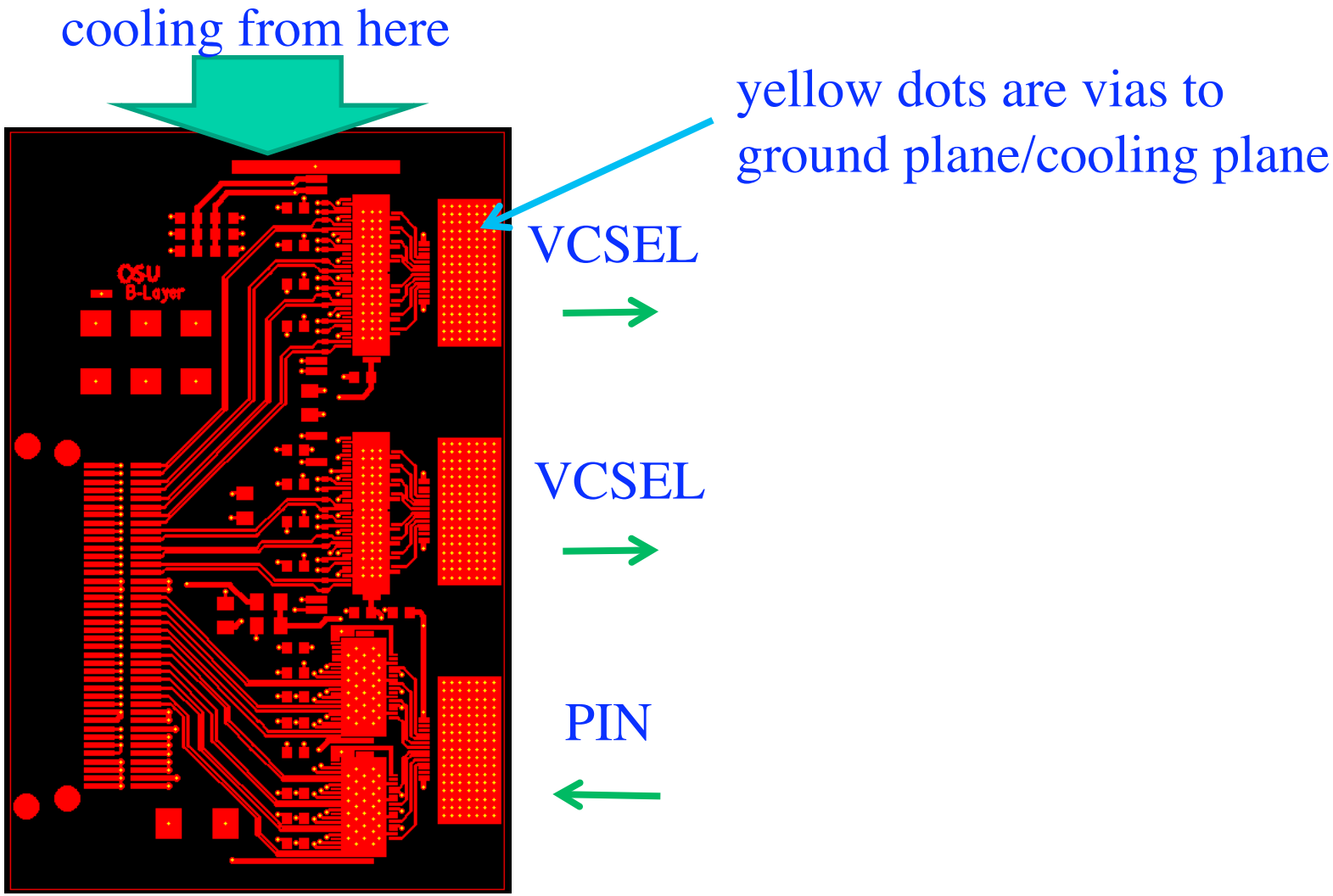
Plan for VCSEL/PIN Opto-packs

- Original plan: use OSU opto-packs with AOC arrays
  - irradiate 20 VCSEL (10 Gb/s) and 20 PIN (5 Gb/s) opto-packs and then perform long term lifetime measurement
    - packages are of final design and arrays covered with epoxy
    - PIN: awaiting return of 20 irradiated packs for measurement
    - VCSEL: irradiated 12 packs due to shipping mistake by vendor
      - awaiting return of irradiated packs for measurement
- Current plan:
  - package 20 VCSEL (5 Gb/s) arrays from AOC and ULM for long term lifetime measurement
    - irradiate packages during summer?
  - more stressful test: 85% humidity/85°C
  - investigate possible use of package by iFlame

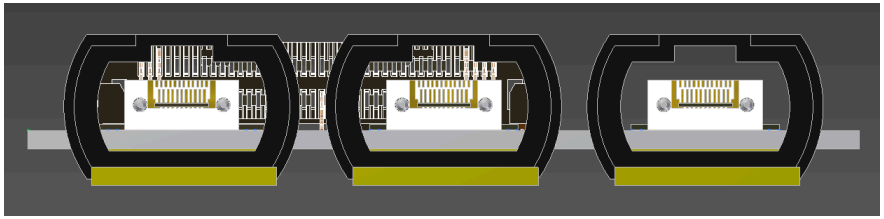
Opto-Board Design Status

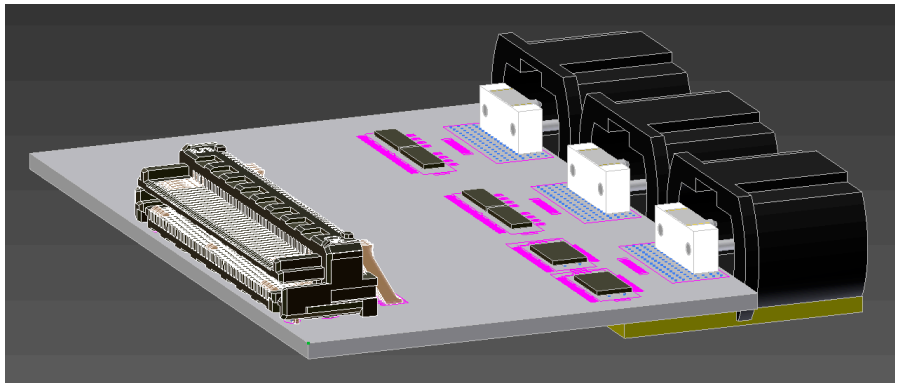
- finished design of nSQP B-layer opto-board
  - IBL opto-board will be very similar
- substrate material for heat removal:
  - BeO:
    - extensive experience with installed opto-links of pixel detector
    - expensive
  - copper backed PCB:
    - uses heat conducting dielectric layer (Thermasil) to bond PCB ground plane to copper plate for heat removal
    - Thermasil layer is electrically insulating to keep opto-board ground separate from opto-box cooling rail
    - radiation tolerance of Thermasil?
    - layout done in PCB for faster turn-around
      - switching to BeO design rules not difficult

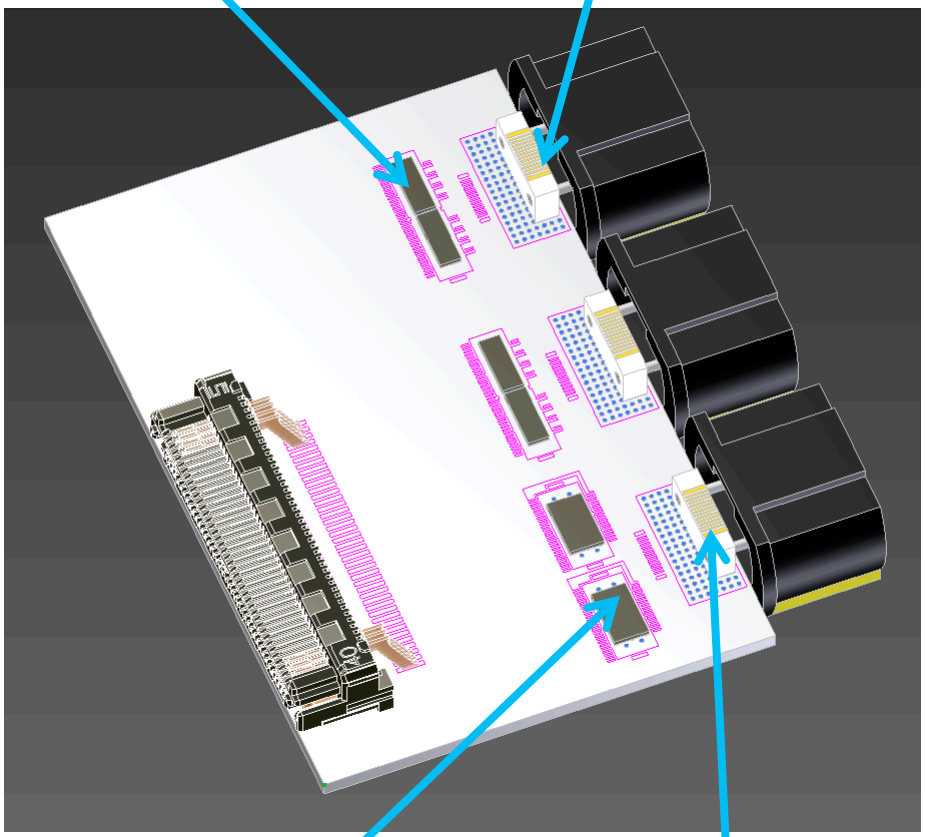
B-Layer Layout



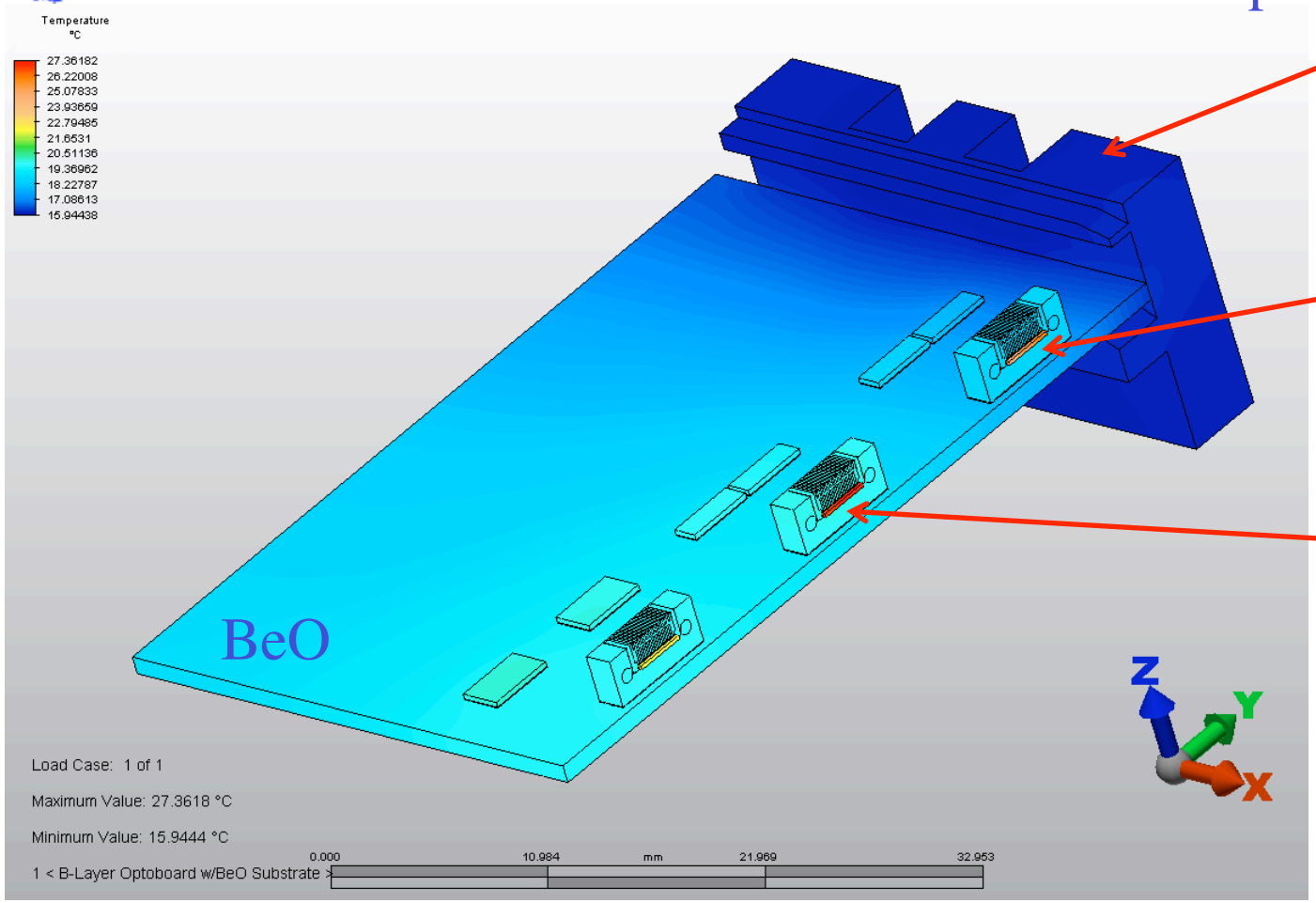
3D View of B-Layer Opto-Board







Thermal Simulation



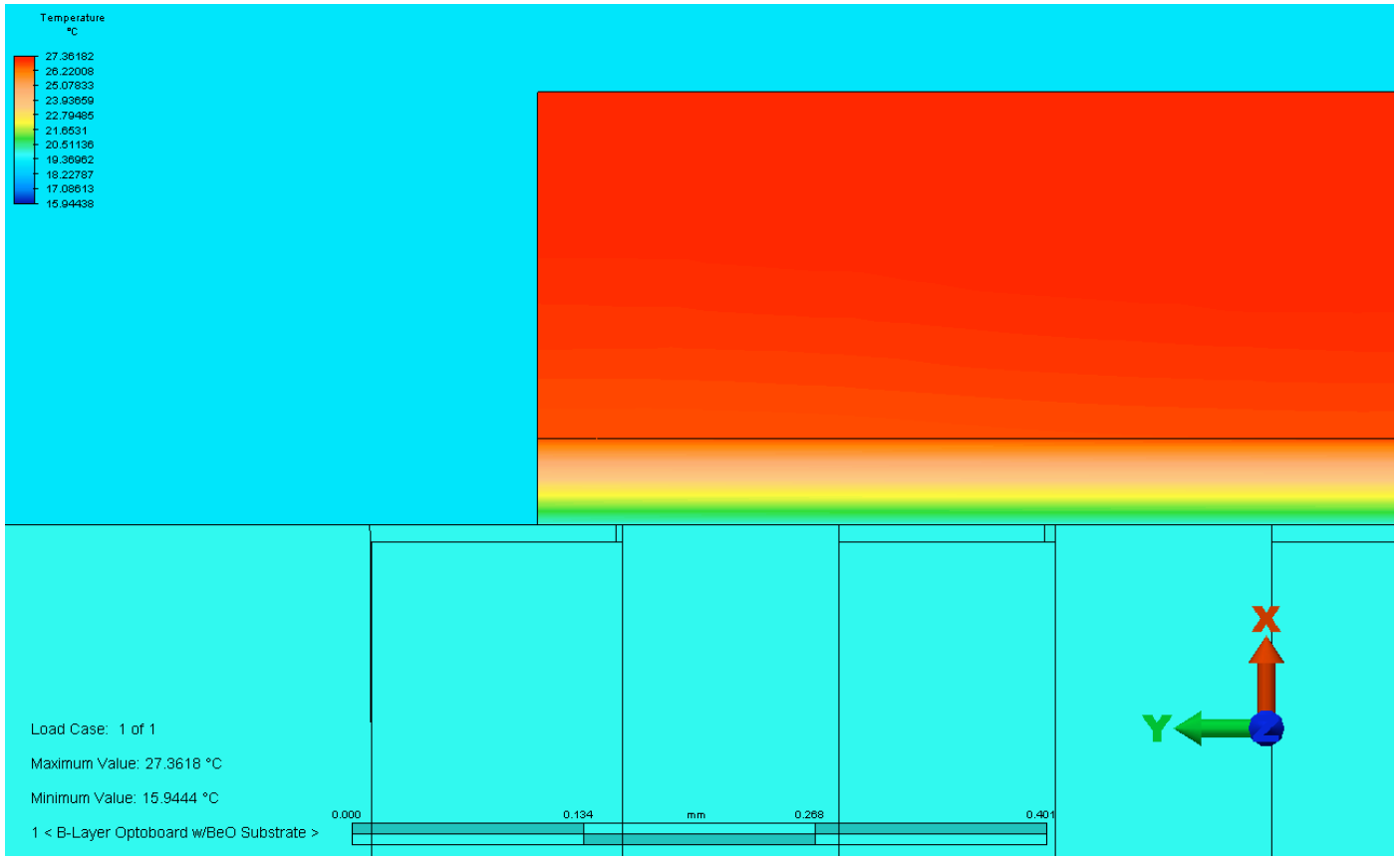
Opto-box rail at 16°C

VCSEL 1
25°C

VCSEL 2
27°C

- VCSELs at reasonable temperatures

Heat Transfer across Epoxy



VCSEL
27.4°C

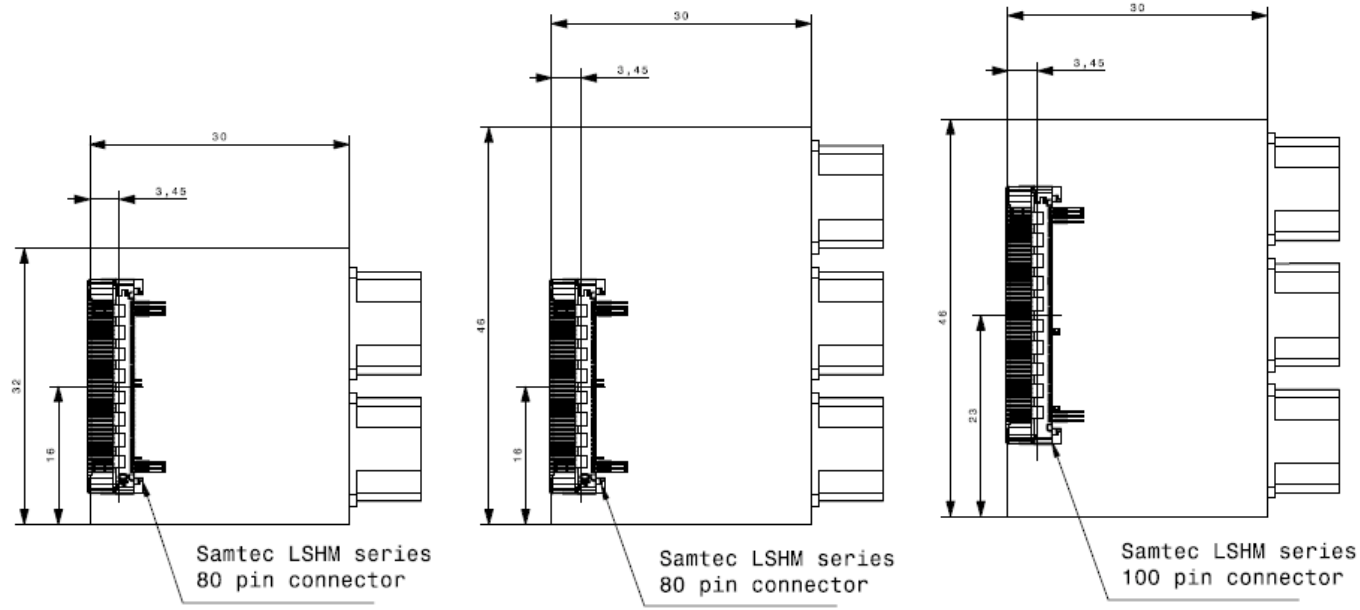
H20E

BeO opto-
pack 20°C

- epoxy limit heat flow but currently there is not a better option

nSQP vs IBL Connector

- nSQP opto-boards have 7 links:
  - use 80 pin connector just like current pixel opto-board
- IBL opto-boards have 8 links:
  - use 100 pin connector



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ATL-IP-ED-0237 v.1 (Eric Richards)

Summary

- new SQP project advances IBL opto-links schedule significantly
  - accelerated IBL schedule forces merging of nSQP and IBL opto-links schedule
- more stressful lifetime test planed for VCSEL/PIN opto-packs
- B-layer opto-board design completed