Status of Alternative Optical Package R&D

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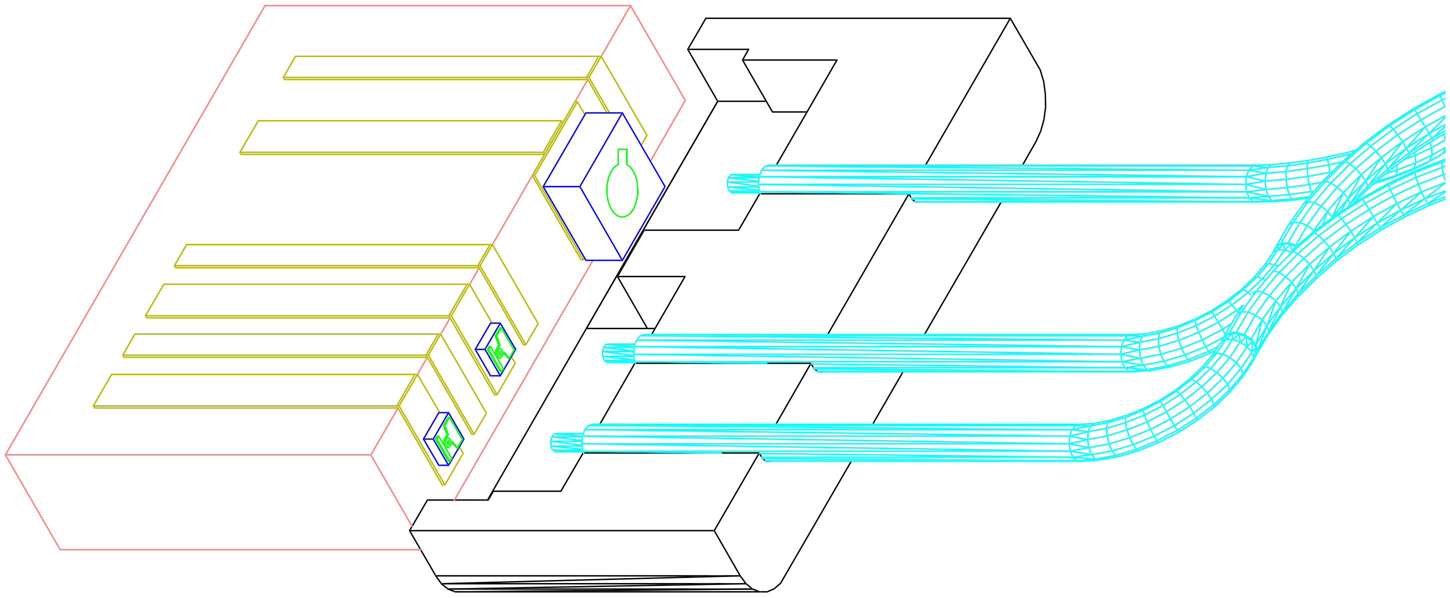
Outline of Talk

- Introduction
- Status
- Plan

Introduction

- **simple two-piece connector concept design**
  - ◇ use precisely fabricated cap and base for alignment
- **cap**
  - ◇ 3 holes for fibres
- **base**
  - ◇ fabricated using alumina
  - ◇ deposit gold traces for wire bonding, VCSEL and PIN placements

Cap and Base



Status of Base

- Hybrid-Tek delivered 20 bases in February
  - ◇ length precision within $10\mu m$ tolerance
  - ◇ trace location precision within $50\mu m$ tolerance
  - ◇ width is too wide by $200\mu m$
  - ◇ VCSEL's did not stick to traces using surface mount technique

    $\rightarrow$ use EPO-TEK H20E to glue VCSEL's to traces
- Hybrid-Tek delivered 30 bases in April
  - ◇ width within $10\mu m$ tolerance
  - ◇ 7 bases have length precision within $10\mu m$ tolerance and trace location precision within $50\mu m$ tolerance
- Hybrid-Tek delivered 100 bases in June
  - ◇ width within $10\mu m$ tolerance
  - ◇ 50% bases have length precision within $10\mu m$ tolerance and trace location precision within $50\mu m$ tolerance
- improved machining of VCSEL/PIN placement jig

  $\rightarrow$ well defined pocket for precision VCSEL placements

Status of Cap

- difficult to obtain consistent precision in machining macor caps
  - $\rightarrow$ use micro mold injection to fabricate caps
  - $\rightarrow$ use manual mold injection to save development time
  - $\rightarrow$ use Ultem (polyetherimide) for radiation tolerance (10 GRad)
  - $\rightarrow$ can fabricate several quality caps per hour

Status of Packages

- tested power coupling with two bases and two caps
  - ◇ $500 - 1300\mu W$ coupled power in both VCSELs simultaneously for different combinations of bases and caps
  - ◇ can achieve high coupled power sometimes without cap adjustment
    - $\rightarrow$ demonstrate feasibility of fabricating high precision caps and bases
- fabricated two more bases using salvaged VCSELs and one new cap
  - ◇ $300 - 500\mu W$ coupled power in both VCSELs simultaneously
    - $\rightarrow$ encouraging result given the poor VCSELs quality
- fabricated a new package using damaged die mounting jig
  - ◇ $420 - 550\mu W$ coupled power
- Plan: fabricate ~ 20 packages for irradiation testing