



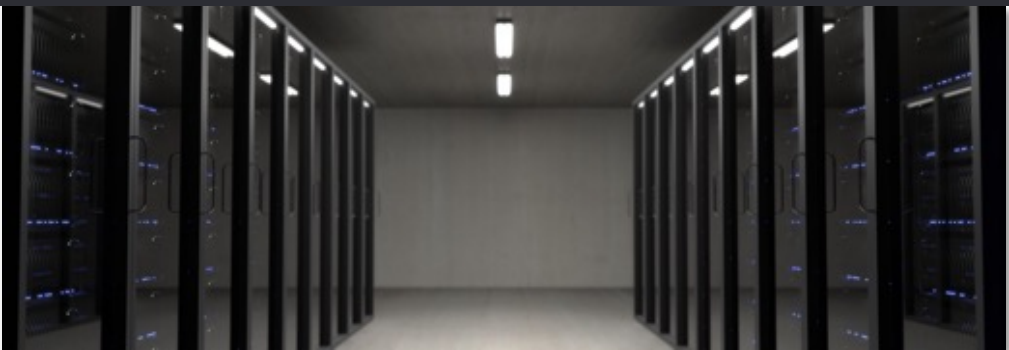
POET Technologies Inc. Next Generation Photonics

OFC
March 7 – 9, 2023

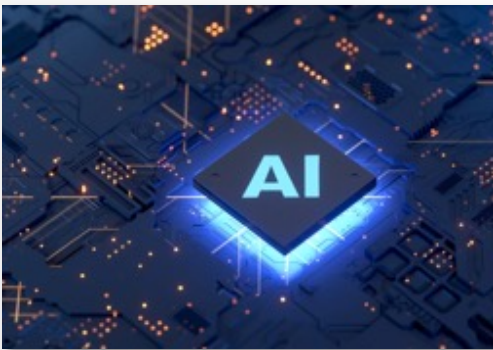


Key Challenges in Photonics

Current technologies are not scalable for applications needing 100's of millions and billions of units per year



Millions/Year



100s of Millions/Year



Billions/Year

VECTOR	CURRENT TECHNOLOGIES	POET	REASON
<i>Unit Volume</i>	X	✓	Manufacturing, test and packaging is <u>fully</u> automated
<i>Size</i>	X	✓	Components are integrated into a <u>single chip</u>
<i>Cost</i>	X	✓	Everything is done at <u>wafer-scale</u> with semiconductor technology
<i>Power Consumption</i>	X	✓	Components are <u>fully integrated</u> electrically and optically



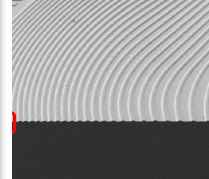
POET's Optical Interposer



Low loss
Micro Mirrors
for out of
plane
coupling



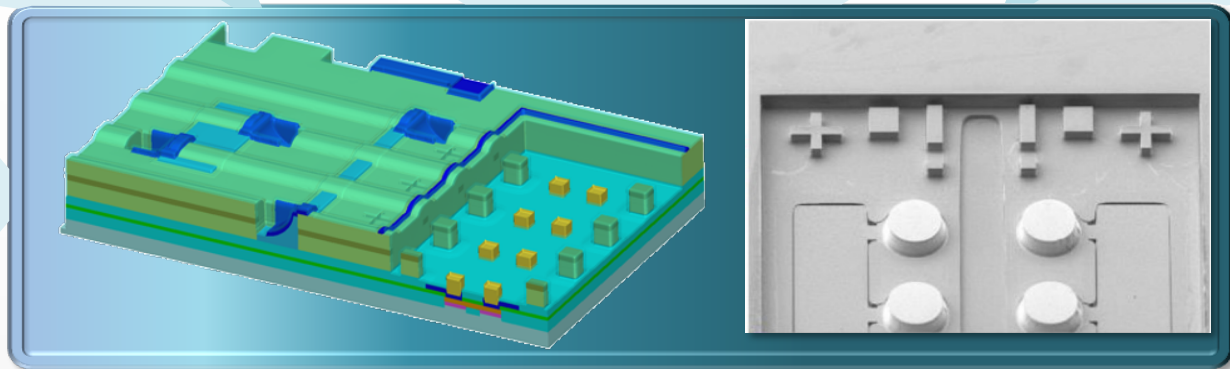
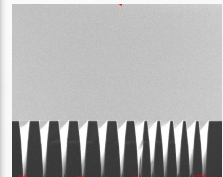
Self Aligned
and
Mechanically
Interlocking
Fiducials



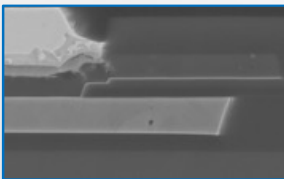
CMOS Compatible
Low Loss
Waveguides
- Compatible with a
wide range of I



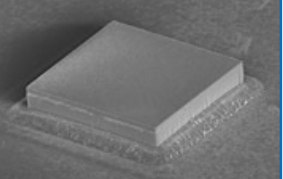
Multiple
Eutectic Solder
Configurations


External Cavity
Athermal Lasers
- Low Loss
- High Density



2.5D RF
Interposer
with
Integrated
Passives



Self Aligned Z
Referencing
Pedestals
- Compatibility
with hybrid die

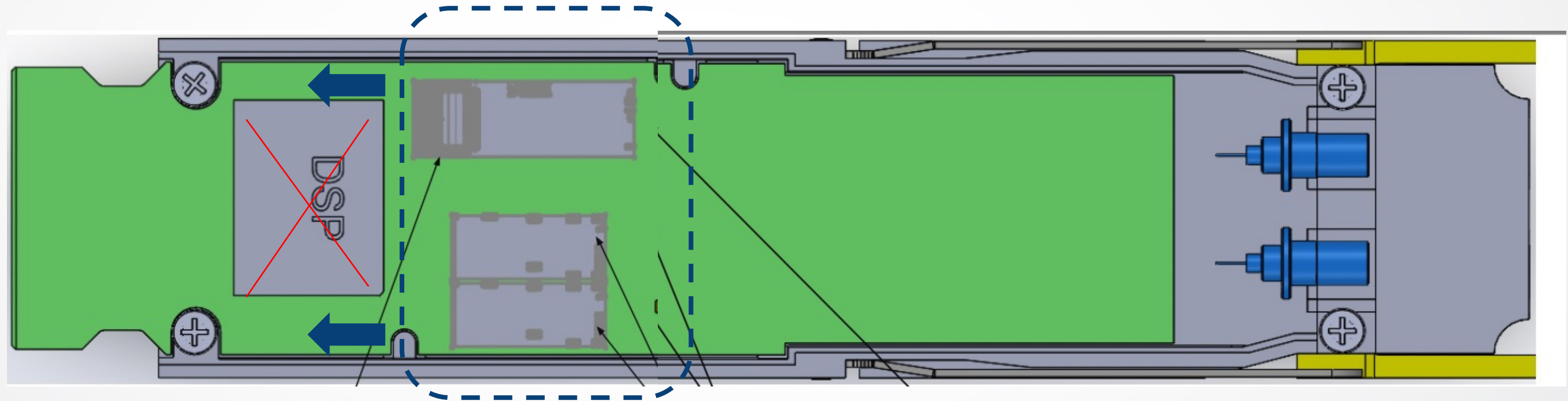


Mirror finish
etched facet
technology
- Lowest coupling
loss in industry

MOST VERSATILE PHOTONICS PACKAGING PLATFORM IN THE INDUSTRY



LINEAR DRIVE: Why Signal Integrity matters?



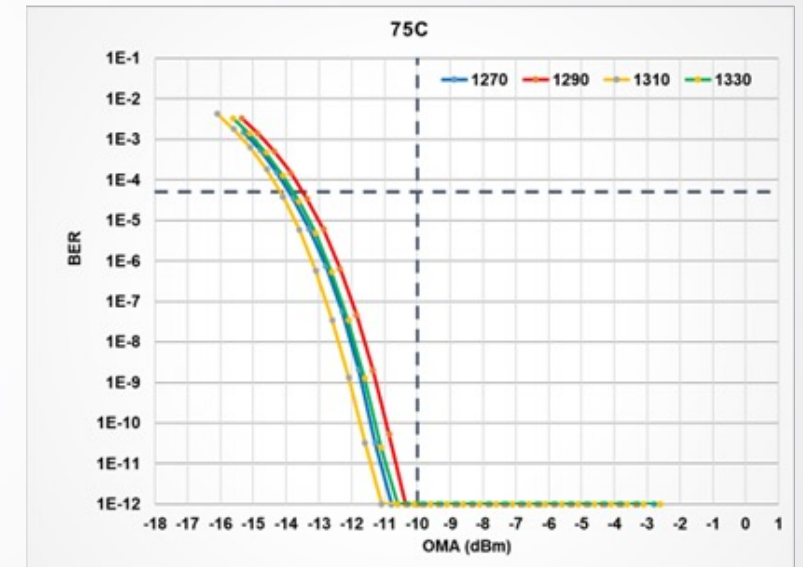
- Small Factor / Good Signal Integrity: No wirebonds, Direct access to PCB with TSVs → POET's engines can be located anywhere on the PCB – minimizing the electrical trace lengths
- For 800G and beyond – with no gear box requirements – this can enable Direct Drive capabilities directly from the Switch, eliminating the DSP requirements → 6-8W power reduction per module !!
- Can enable “CPO performance” within a Pluggable Form Factor



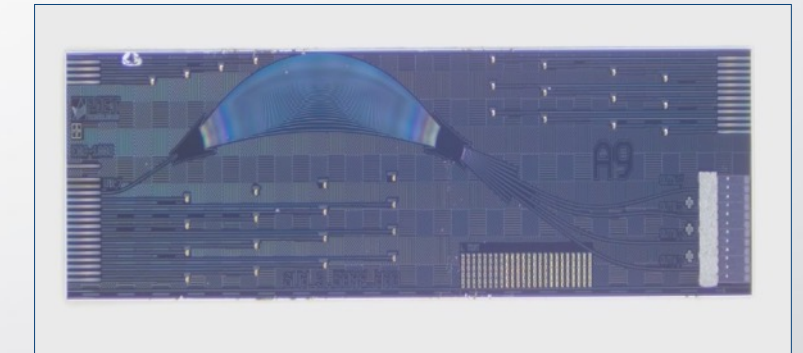
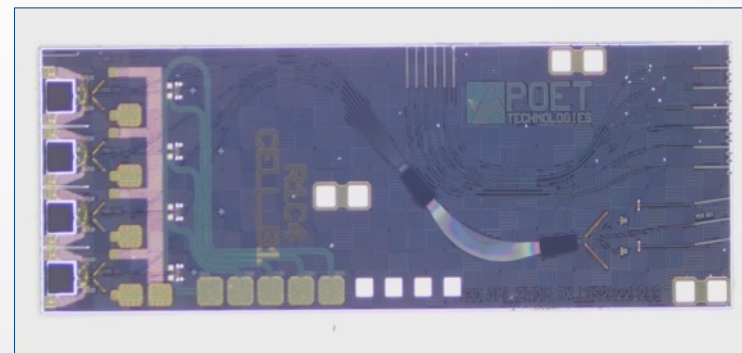
100G CWDM4

100GBASE-CWDM4

- Transmit & Receiver Optical Engines
- DMLs & PDs flip chip passively attached
- MUX & DMUX Monolithically integrated
- Non-hermetic solution
- 2km & 10km Applications
- Small Size
 - Tx OE: 9.5 x 3.3mm
 - Rx OE: 9.5 x 2.4mm

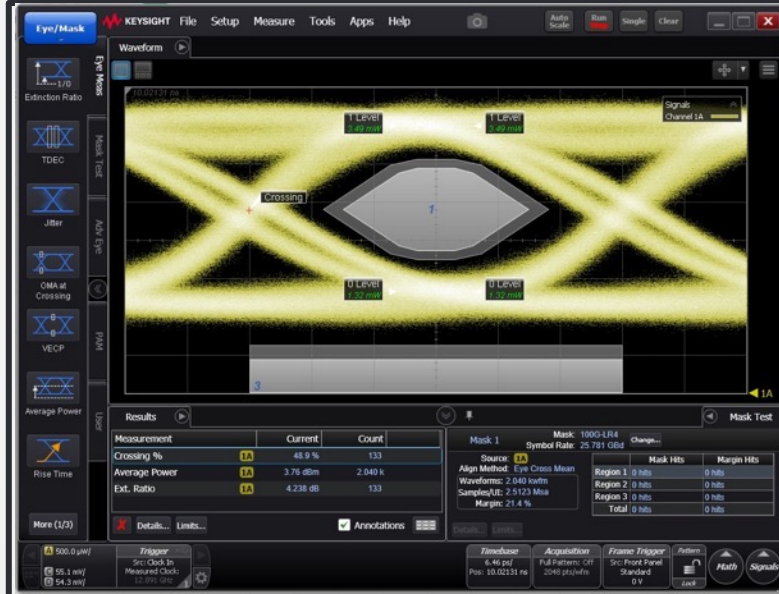


Tx & Rx Performance at 75C: ER = 4.92dB, EMM = 39.8%, Excellent BER

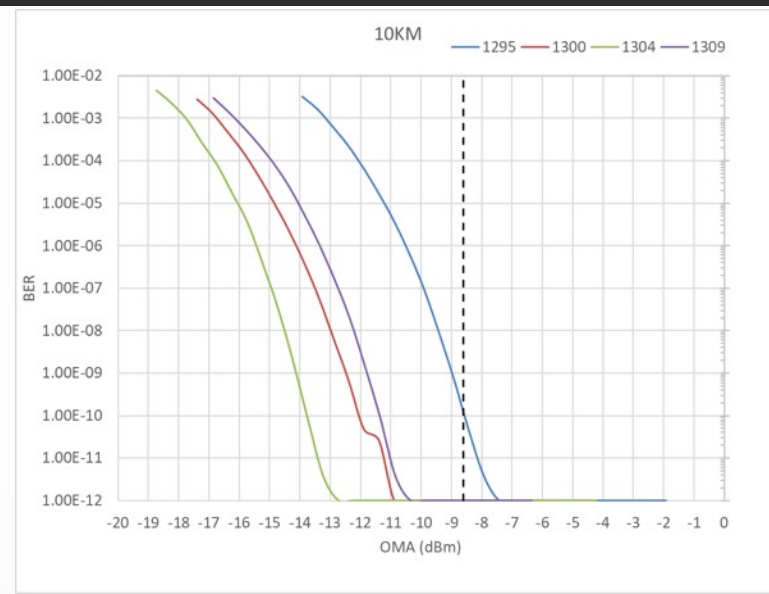


WAFER SCALE PASSIVE ASSY: LOW COST/HIGH VOLUME CWDM4

100G LR4

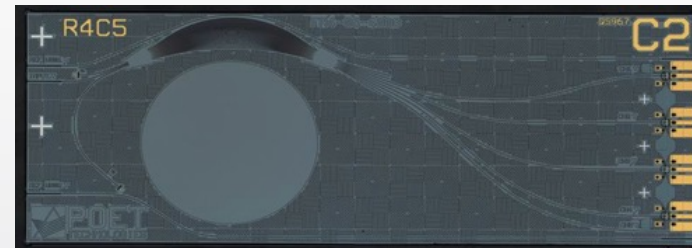
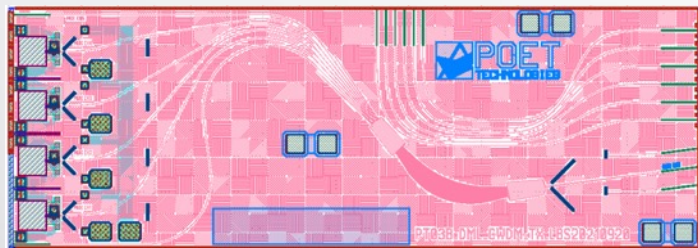


Tx & Rx Performance at 45C



100GBASE-LR4

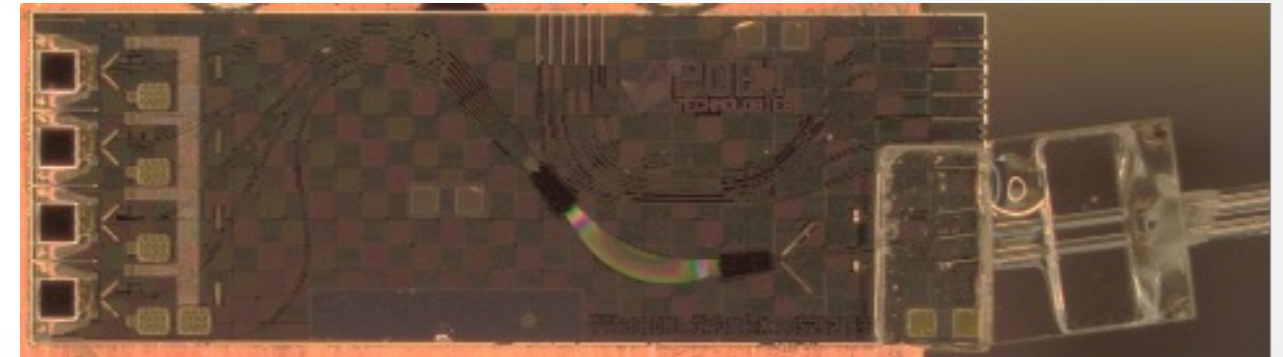
- Transmit & Receiver Optical Engines
- DMLs & PDs flip chip passively attached
- MUX & DMUX Monolithically integrated
- Built-in Thermistor for TEC control
- Non-hermetic solution
- 10km Applications: IEEE 100GBASE-LR4



CHIP ON BOARD DESIGN – LOW COST/HIGH VOLUME 100G LR4

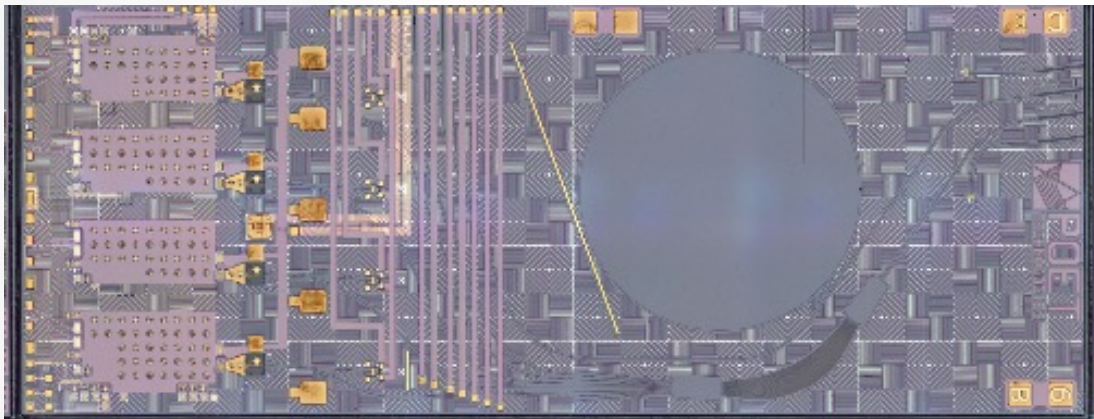
200GBASE-FR4

- ❑ Transmit & Receiver Optical Engines
- ❑ DMLs, PDs & MPDs flip chip passively attached
- ❑ MUX & DMUX Monolithically integrated
- ❑ Non-hermetic solution
- ❑ Small Size
 - ❑ Tx OE: 9.5 x 3.3mm
 - ❑ Rx OE: 9.5 x 2.4mm

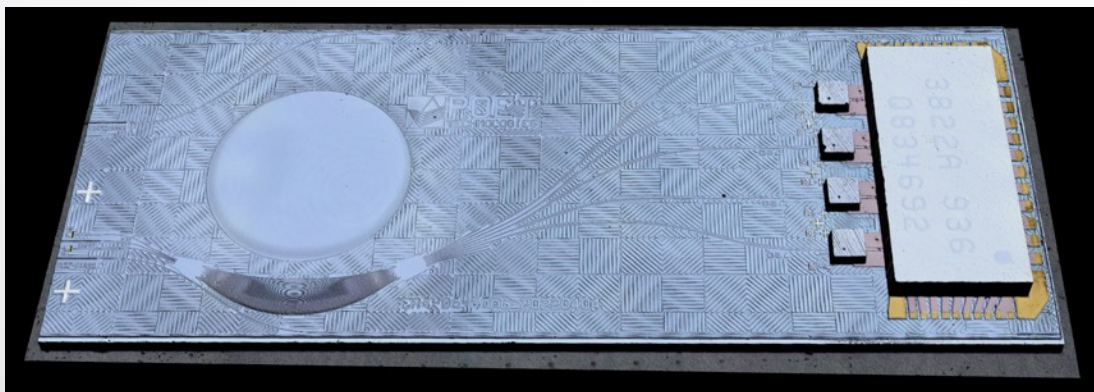


- ❑ Chip on board design
- ❑ 200GBASE-FR4 Spec compliant

WAFER SCALE PASSIVE ASSY: LOW COST/HIGH VOLUME 200G FR4



Tx: Small Size Chiplet architecture: 11.5 x 4.5mm



Rx: Small Size (with TIA): 12.2 x 4.7mm

400GBASE-FR4

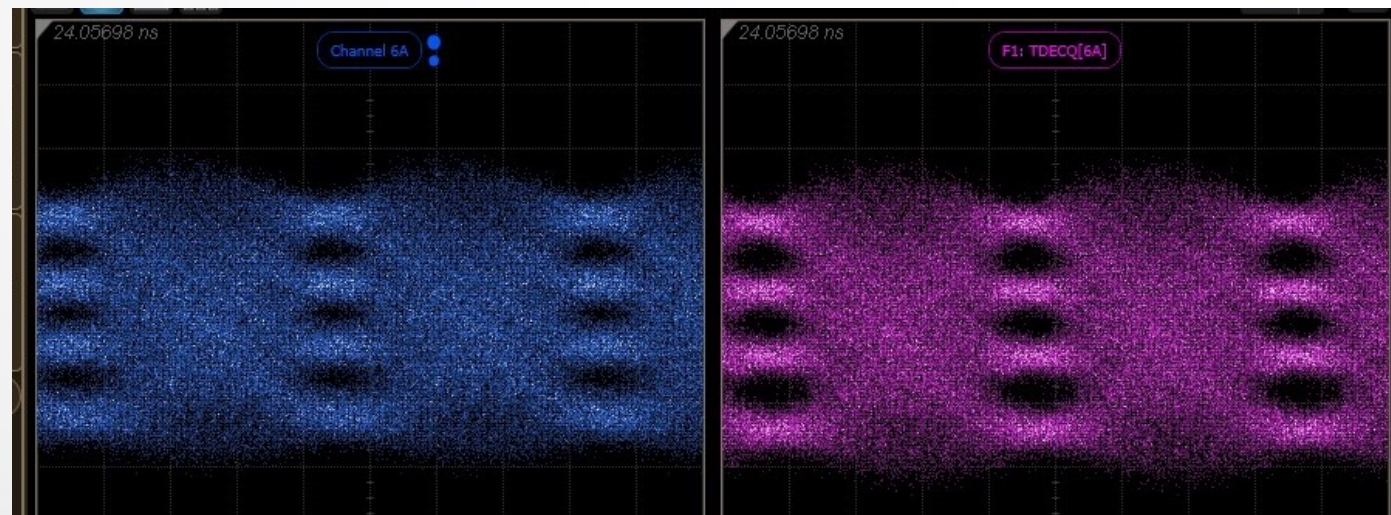
- ❑ 400G FR4 Tx:
 - ❑ 100G DMLs/ MPDs passively attached
 - ❑ Built-in Thermistor for TEC control
 - ❑ DML Driver integrated
 - ❑ MUX Monolithically integrated
 - ❑ Non-hermetic solution
- ❑ 400G FR4 Rx:
 - ❑ 56GBaud PDs passively attached
 - ❑ DMUX Monolithically integrated
 - ❑ Available with and without TIA integration

SMALL SIZE, LOW COST, HIGH VOLUME: 400G FR4

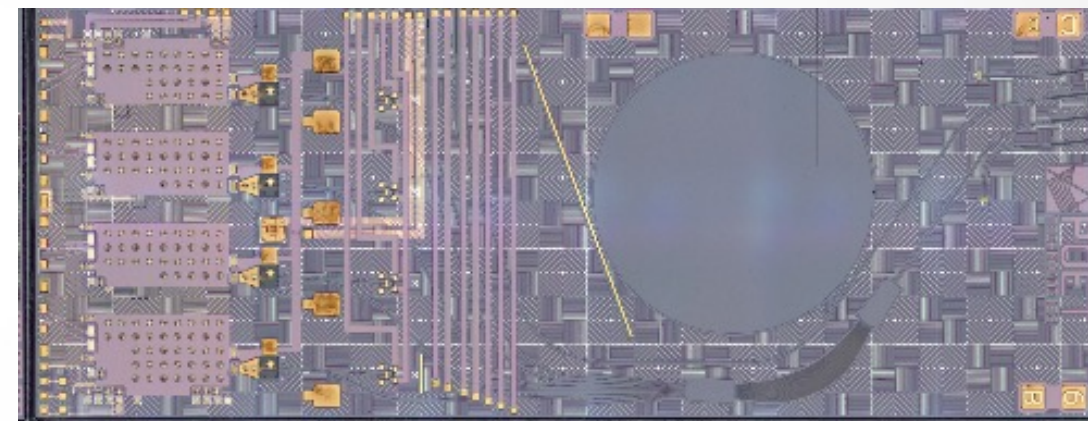


POET “Infinity”: FR4 Transmit Chiplet

FR4 Tx chiplet for 400G/800G/1.6T



TDECQ: 1.73dB

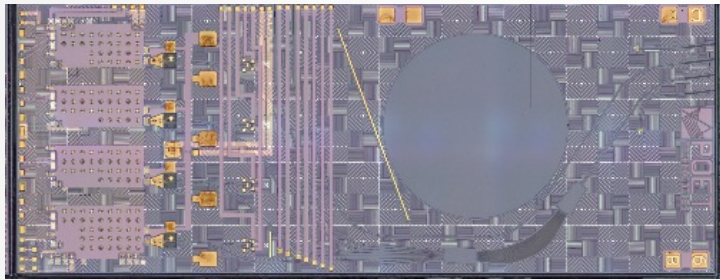


Small Size Chiplet architecture: 11.5 x 4.5mm

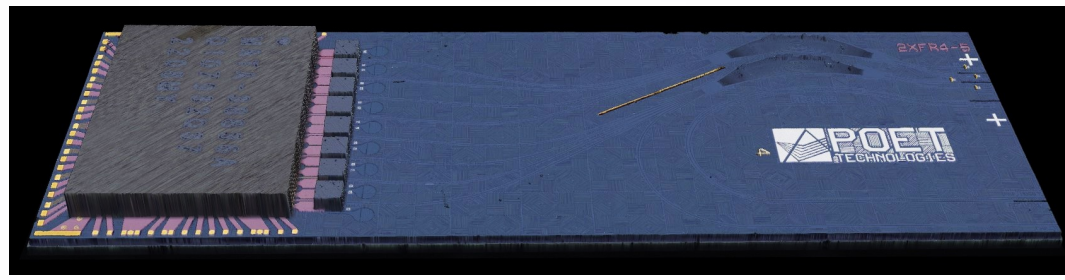
- 100G DMLs/ MPDs passively attached
- DML Driver integrated
- Built-in Thermistor for TEC control
- MUX Monolithically integrated
- Non-hermetic solution

HIGH VOLUME DML PLATFORM: 400G/800G/1.6T

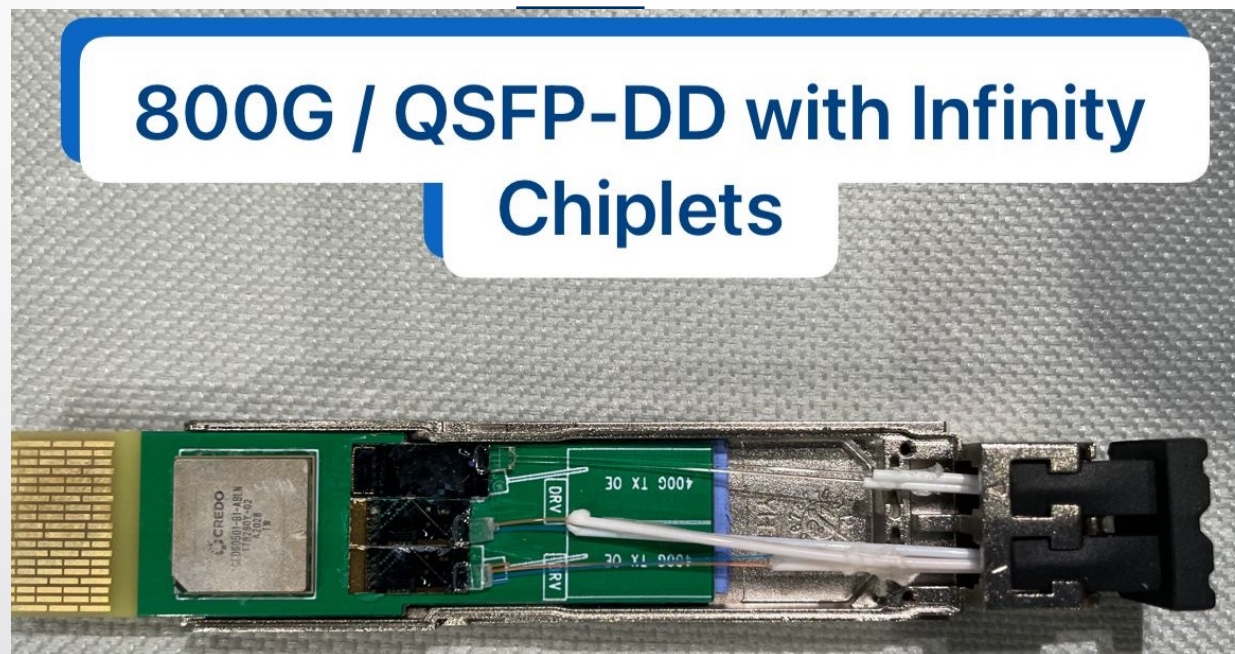
800G 2xFR4



400G Tx: Chiplet architecture:
11.5 x 4.5mm



800G 2xFR4 Rx with TIA: 14.8 x 5.1mm



❑ 400G FR4 Tx Chiplet:

- ❑ 100G DMLs/MPDs passively attached
- ❑ Built-in Thermistor for TEC control
- ❑ DML Driver integrated
- ❑ MUX Monolithically integrated
- ❑ Non-hermetic solution

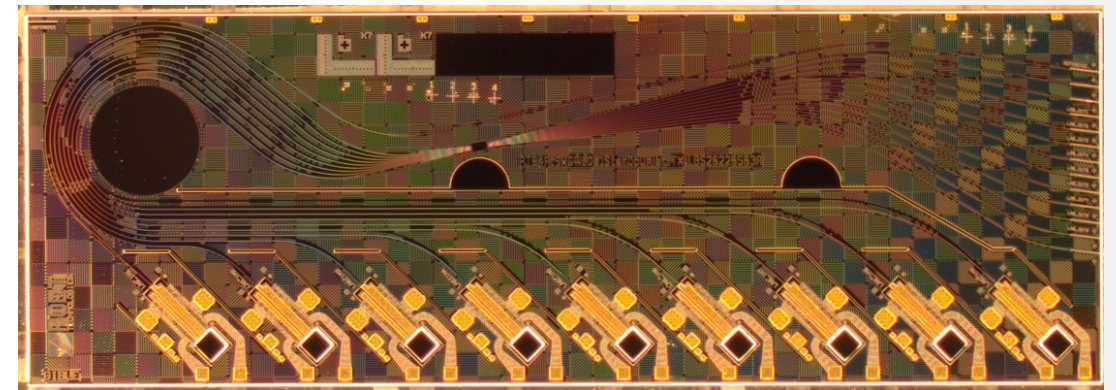
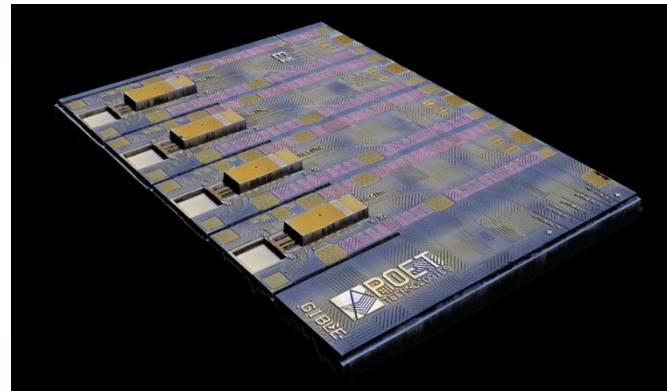
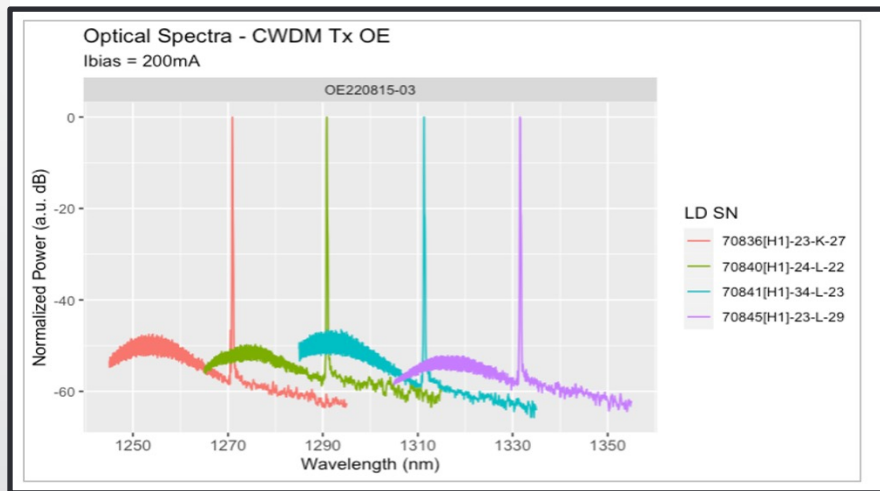
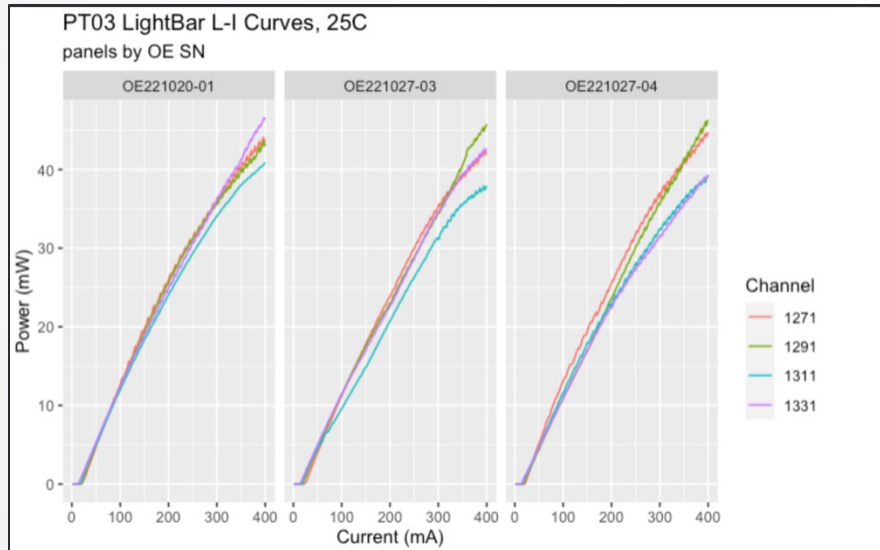
❑ 800G 2xFR4 Rx:

- ❑ 56GBaud PDs passively attached
- ❑ 2x DMUX Monolithically integrated
- ❑ 800G Octal TIA integrated

SIMPLIFIED MODULE DESIGN: 800G 2xFR4



Light Engines for CPO & AI-ML



- ❑ O-Band Wavelengths: DR4, FR4 & CW-WDM MSA
- ❑ Uncooled DFB Lasers: Passively attached
- ❑ Multiple Configurations: 4-channel, 8-channel
- ❑ Excellent SMSR and Power uniformity
- ❑ Flexibility to integrate splitters, combiners etc
- ❑ Built-in SSC for lasers and Fiber modes

Remote light source for Co-packaged optics and Chip to chip communication



PROET
Technologies