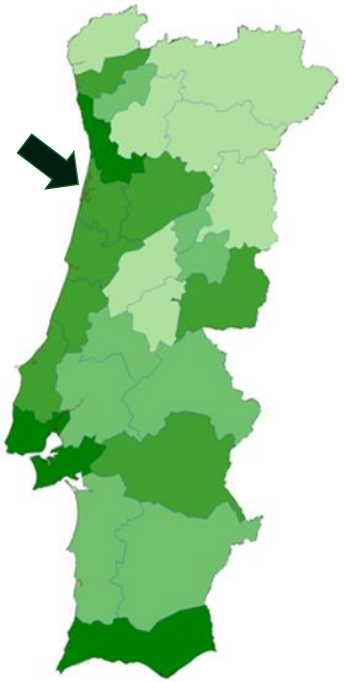
PICadvanced Overview

global@picadvanced.com

Company presentation

PICadvanced

- Portuguese startup founded in end of 2014
- Located in Aveiro
- Young and motivated team, growing quickly!



“Think outside the box, with us!”

Facilities

PICadvanced

instituto de telecomunicações universidade de aveiro

University of Aveiro and Instituto de Telecomunicações

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PICadvanced - Who are we?

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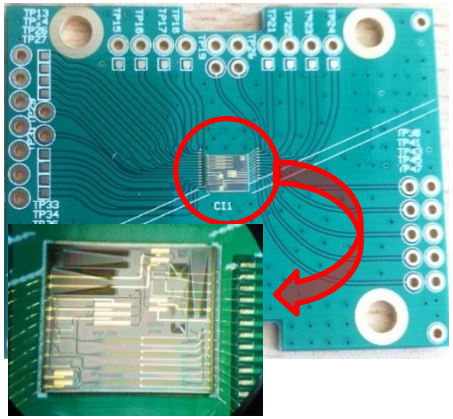
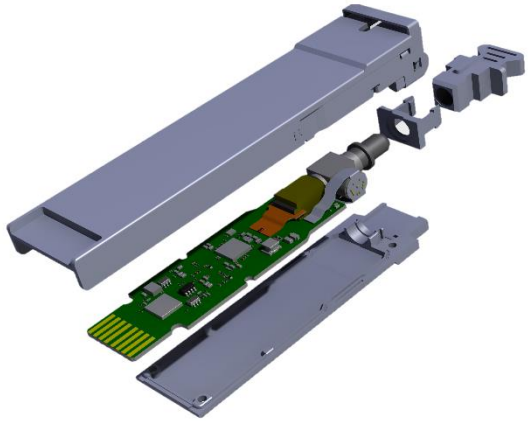
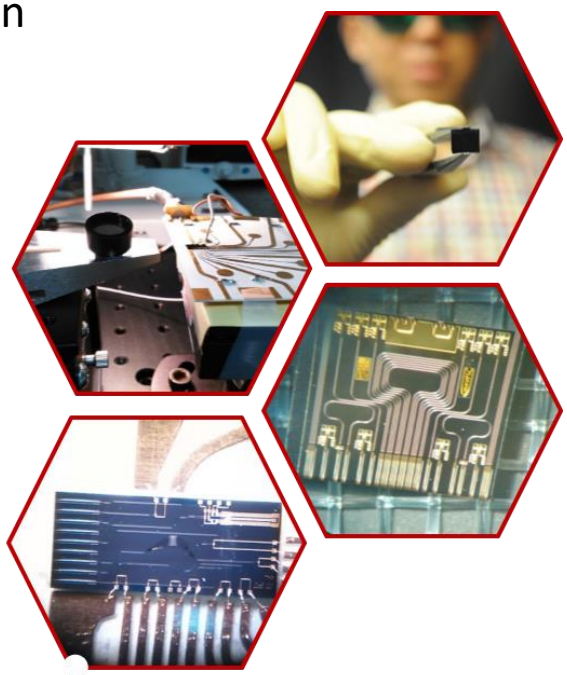
Main business is focused in **optics**

Operates through

+ Development of NGPON2 Components
+ Innovation
  - Specially in Photonic Integration Design and Packaging
+ Branding and customization







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Company structure

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Advisory board

President

Top movers

Financial

Strategic

Top scientists

Technical

Analogue concepts

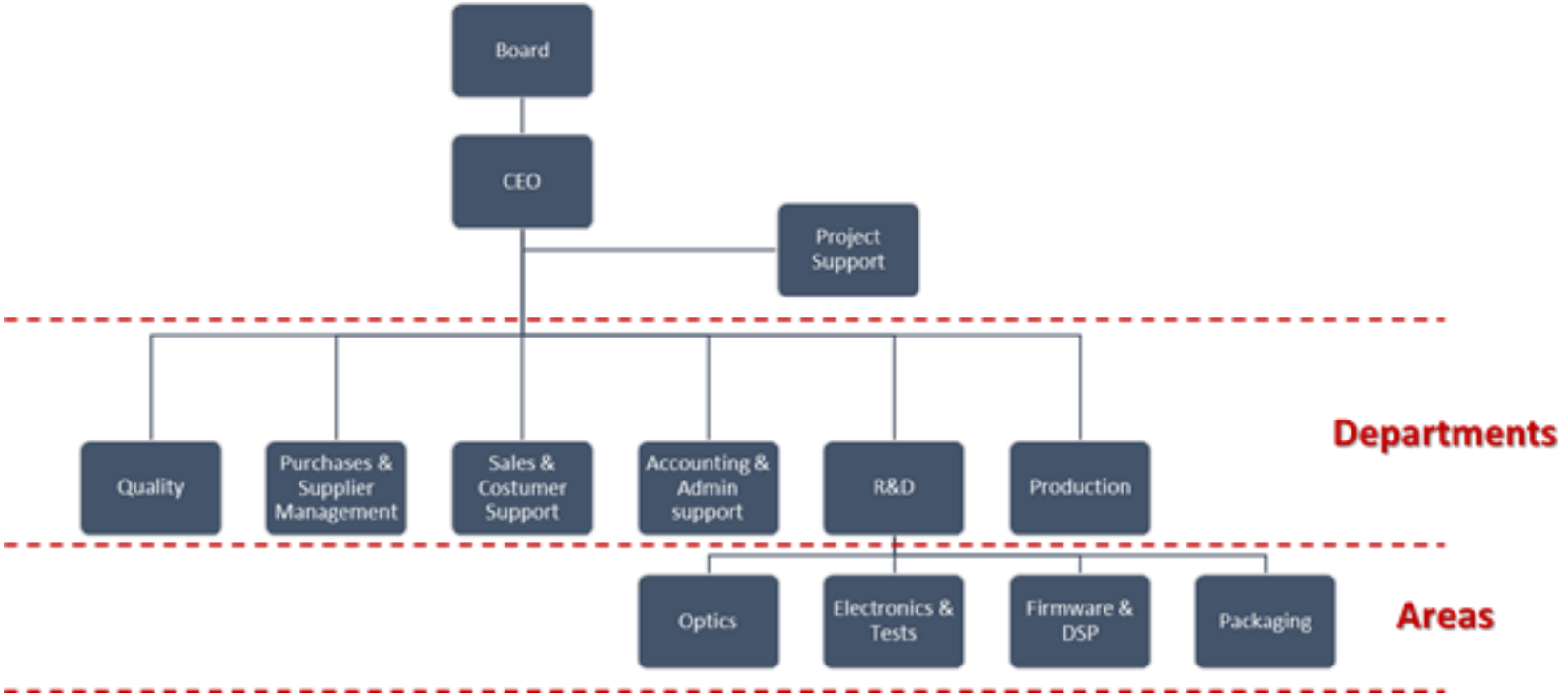
RF concepts

Investors, Equity partners

Brother company

HFA electrónica e telecomunicações

António Teixeira
Co-founder



The team

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Ana Tavares	Co-Founder
António Teixeira	Co-Founder
Carla Rodrigues	PIC designer
Carlos Alves	Management board
Cristiana Teixeira	Head of quality department
Filipe Costa	Packaging developper
Francisco Rodrigues	CEO
Guilherme Cabral	Head of project support
Hugo Neto	Head of packaging
Inês Francisco	Head of admnistrative department
João Teixeira	Head of information
José Lima	Head of R&D
Pedro Machado	Production engineer
Pedro Pissarra	FW and DSP developper
Ricardo Coelho	Production head
Ricardo Ferreira	Head of FW and DSP
Rita Teixeira	President of the board
Samuel Marques	Testing engineer

Our solutions

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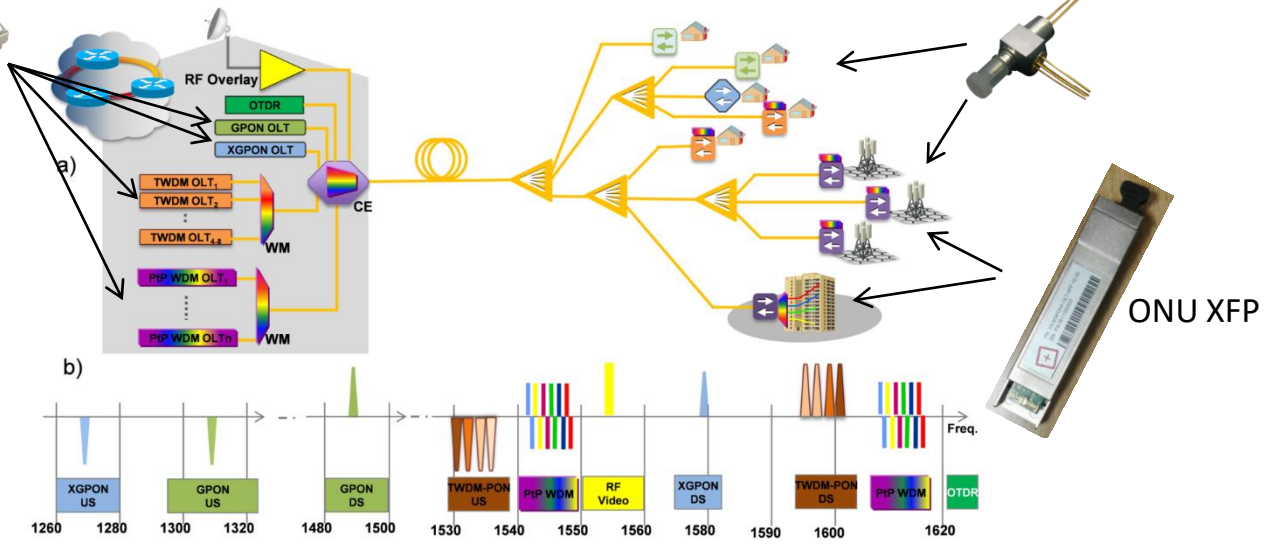
In-house and OEM products reaching access and core networks!

OLT XFP



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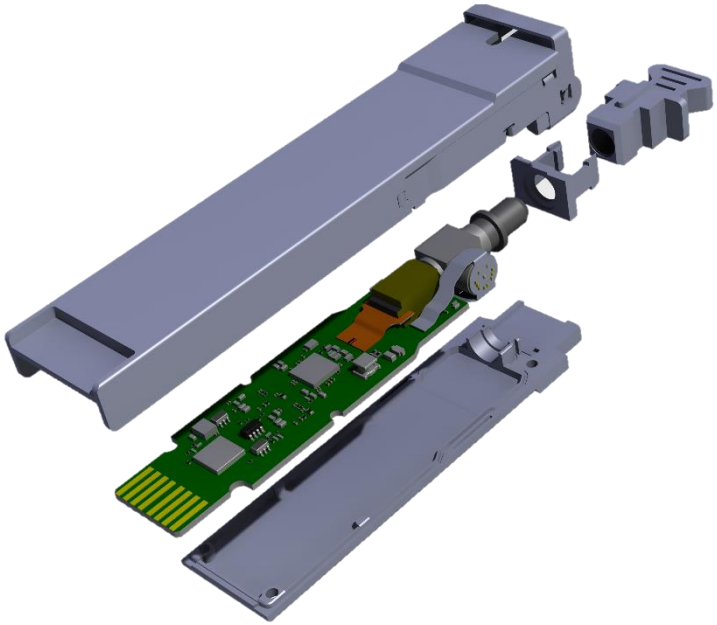
Independently of technology – the final target is to have something like a **pluggable**



What does this brings to the game:

- Size limitations
- Power limitations
- Computation power limitations
- Complexity limitations
- Form factor limitations
- Robustness limitations
- Environmental operation limitations
- Ability to be productized
- Certification (envi., robust., …)
- ….

Power and complexity main contributors

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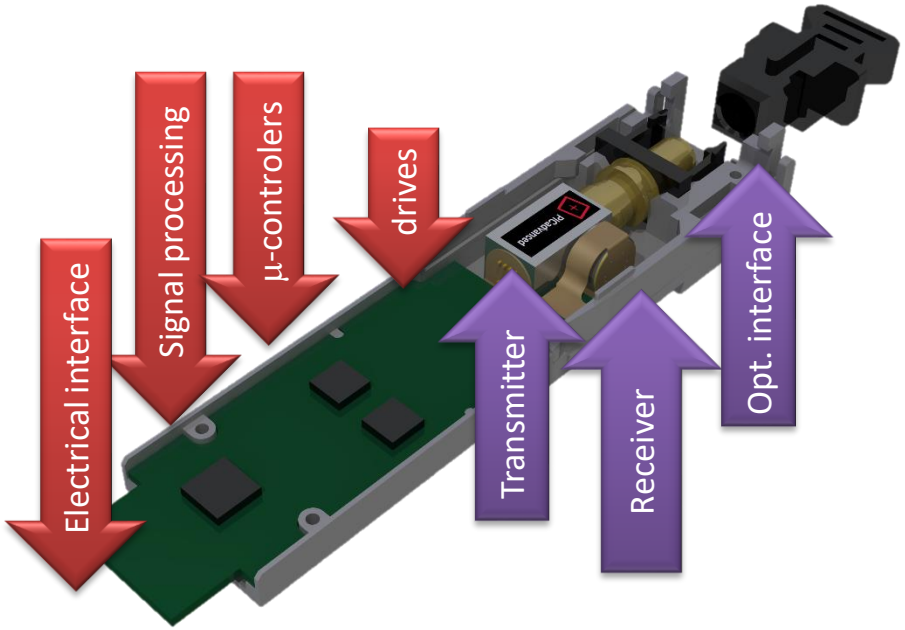

- SFP power limitations
  1.5W
- XFP power limitations
  3.5W
- Other form factors more
  CFP 8..32W

Approach to NGPON2 - ONU

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- Simple structure
  - DML
  - APD
  - When possible
    - Thermal tuning
    - TO- Type

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- Well known devices
  - BOSA structures

Approach to NGPON2 - ONU

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- Simple structure
  - DML
  - APD
  - When possible
    - Thermal tuning
    - TO- Type
- Well known devices
  - BOSA structures
- Smart control and programing
  - Flexible algorithms
  - Strong modelling

Approaches to NGPON2

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- Thermal tuning brings extra requirements for
  - Expanding the temperature range
    - From indoor
    - To commercial
    - To Industrial

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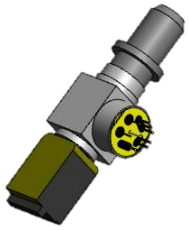
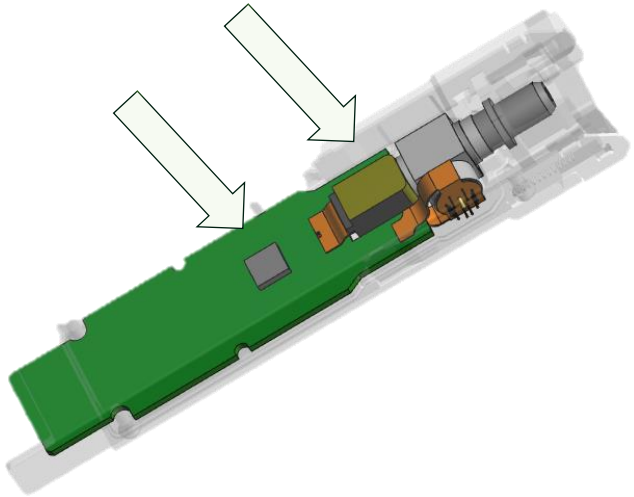


Approaches to NGPON2

PICadvanced

- DML
  - High chirp
    - Compensated with higher optical power
    - pre-processing and chip selection
  - Limited bandwidth
    - Good process control and chip selection process
  - High dependence of the temperature from the driving and biasing current
    - Inteligent fast thermal managment
  - Driving conditions independent tight Power control
  - Thermal tunning
    - Fast thermal accelerator process
    - Robust modelling and algorithms



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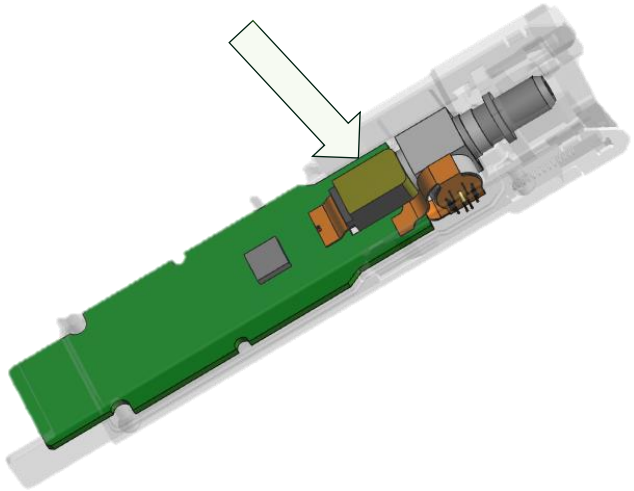

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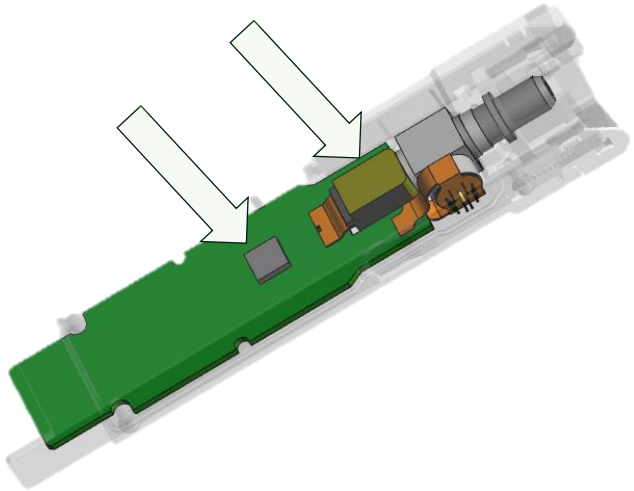

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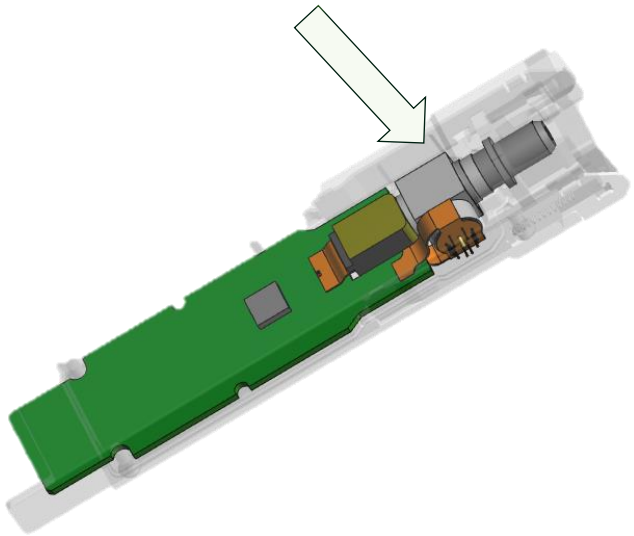

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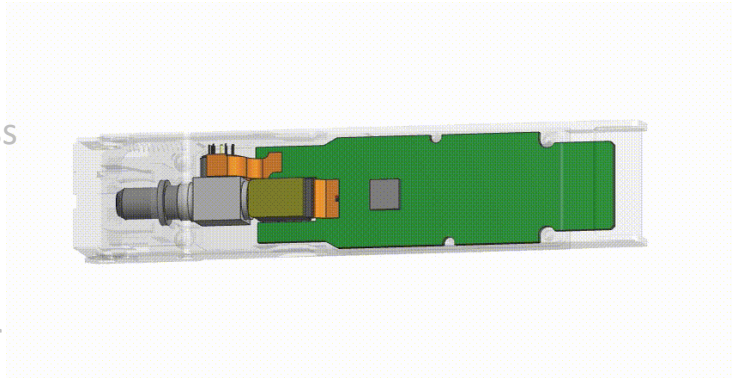
Class 3 tuning <1s



Class 2 tuning <25ms

Approaches to NGPON2

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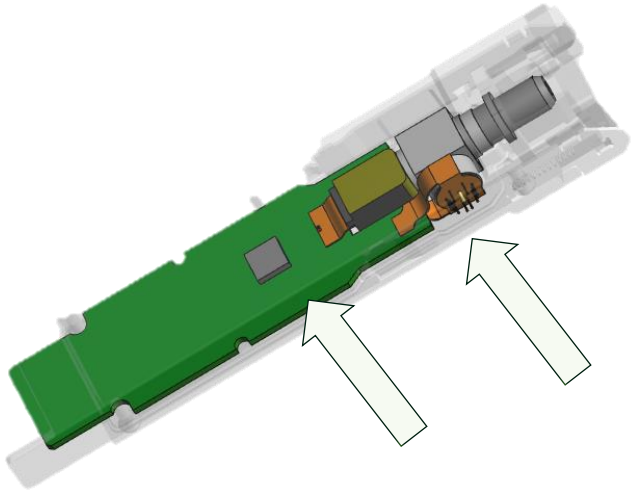
- APD
  - High sensitivity
  - Thermal tunning
    - Fast thermal accelerator process
    - Robust modelling and algorithms



Challenges stemming from tunnability

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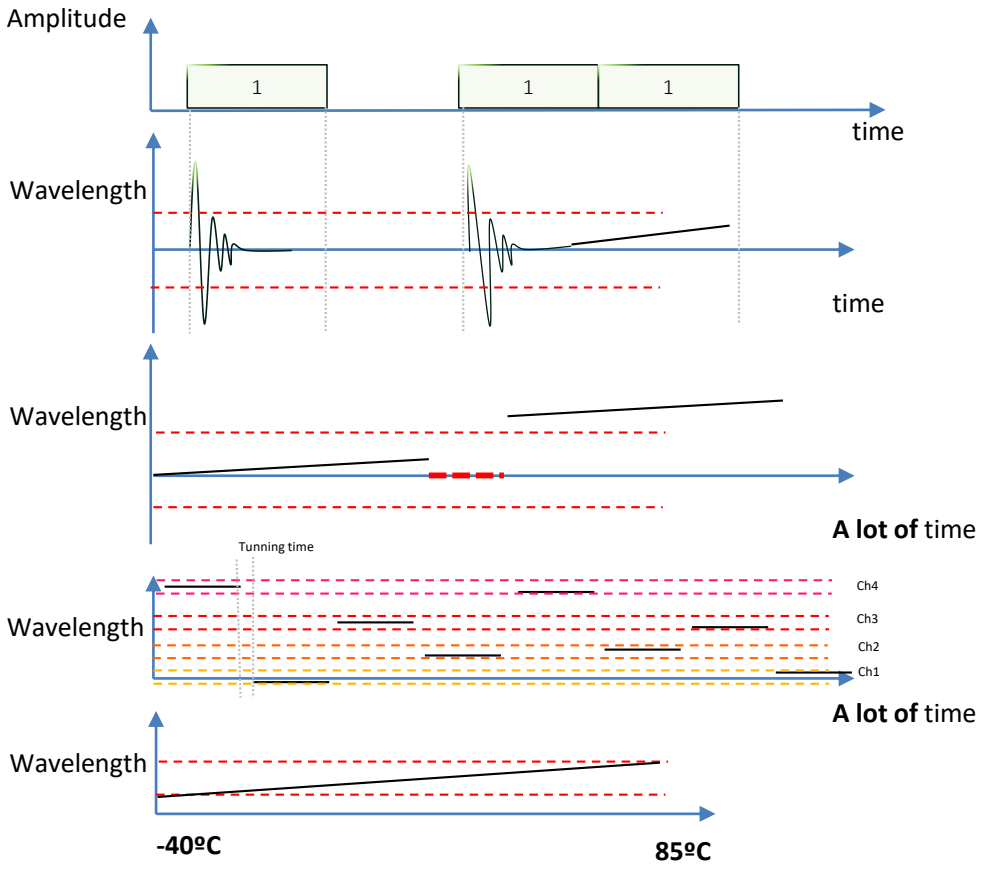
- STSE – Short Term spectral excursion
  - Within Channel
- MSE – Maximum Spectral excursion
  - +/- 20GHz
- Long term stability
  - >5000h
- Fast Fine tuning
  - Class 2 (<=25ms Tx and Rx)
  - Class 3 (<=1s Tx and Rx)
- Temperature range stability
  - Commercial Temp (0..70ºC)
  - Industrial Temp (-40..85ºC)



NG-PON2 ready

Statistics and production robustness ongoing - Transmitter

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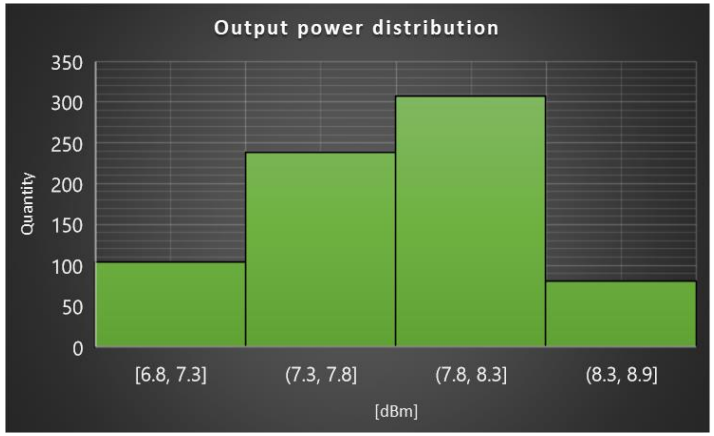

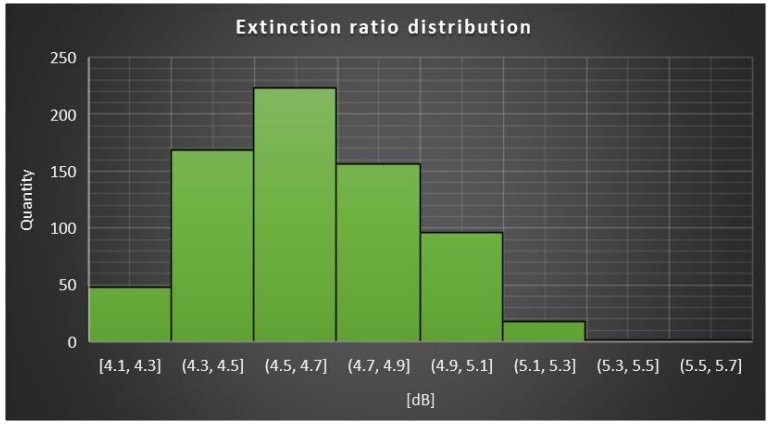

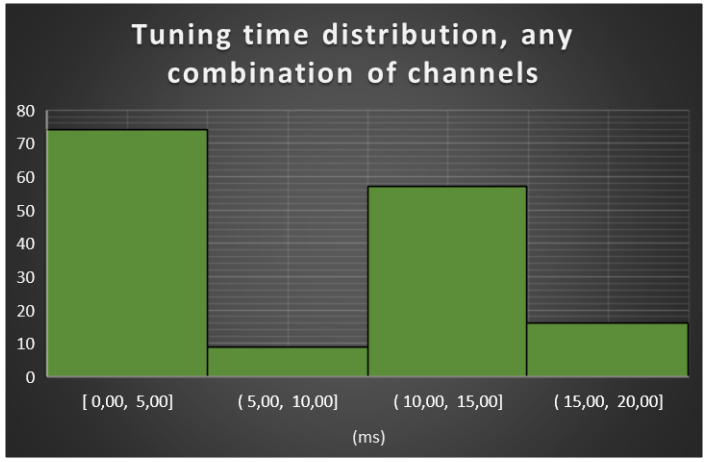

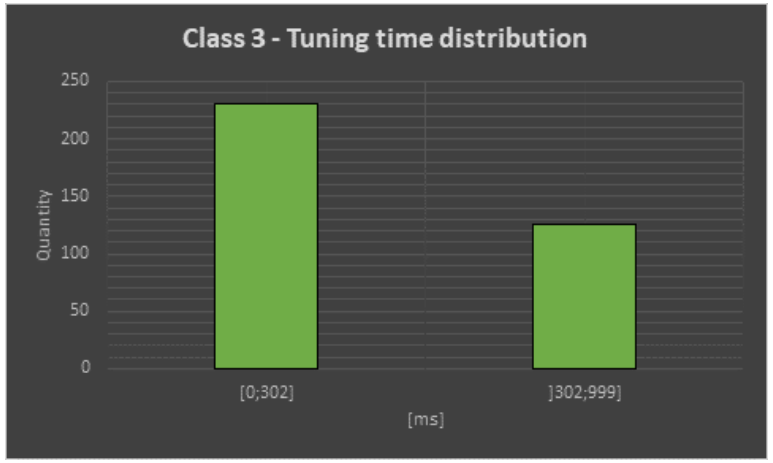

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Statistics and production robustness ongoing - Transmitter

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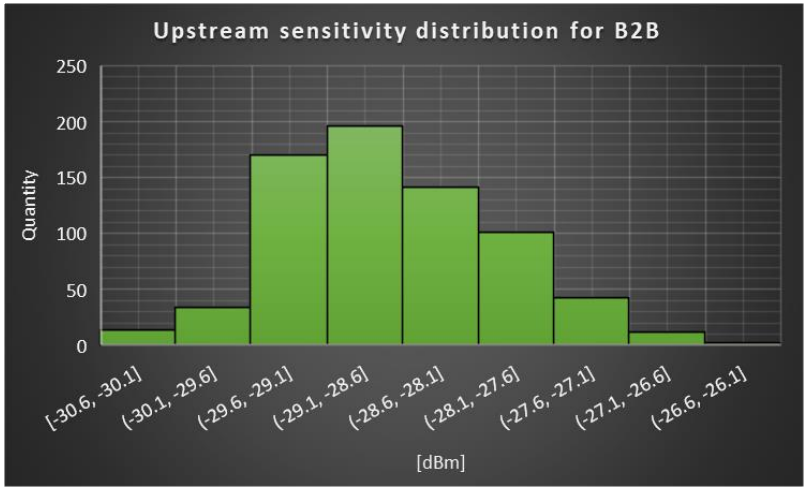

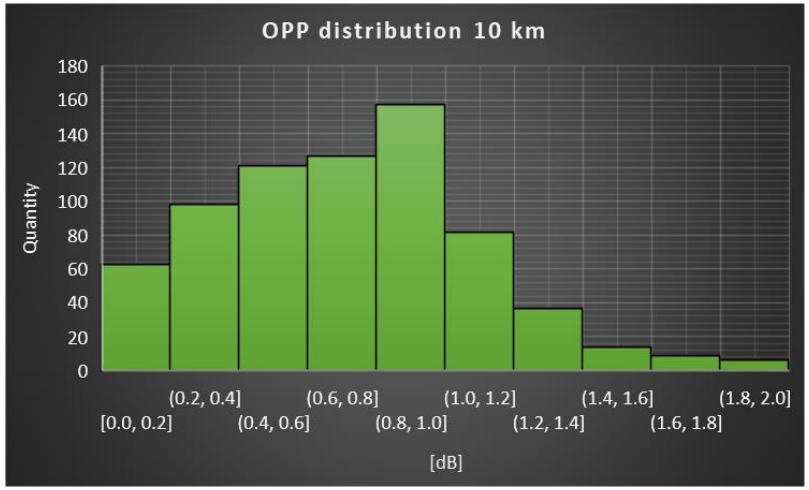

NG-PON2 ready

Transmitter MSE and eye mask

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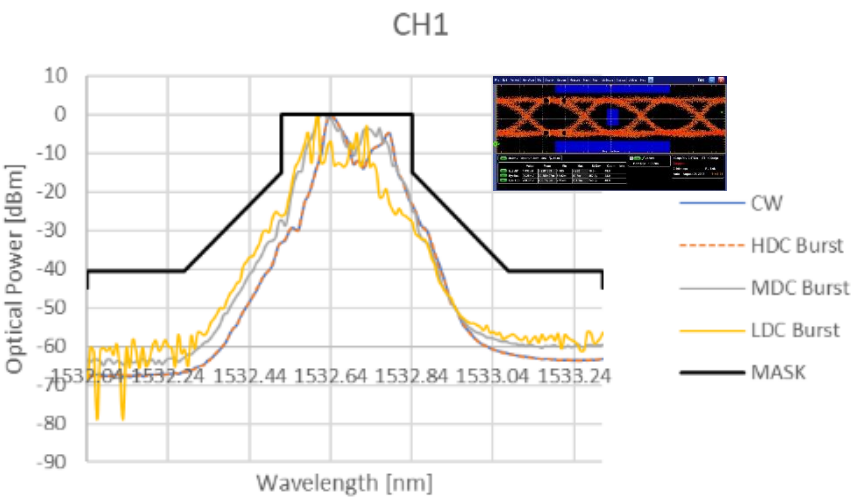

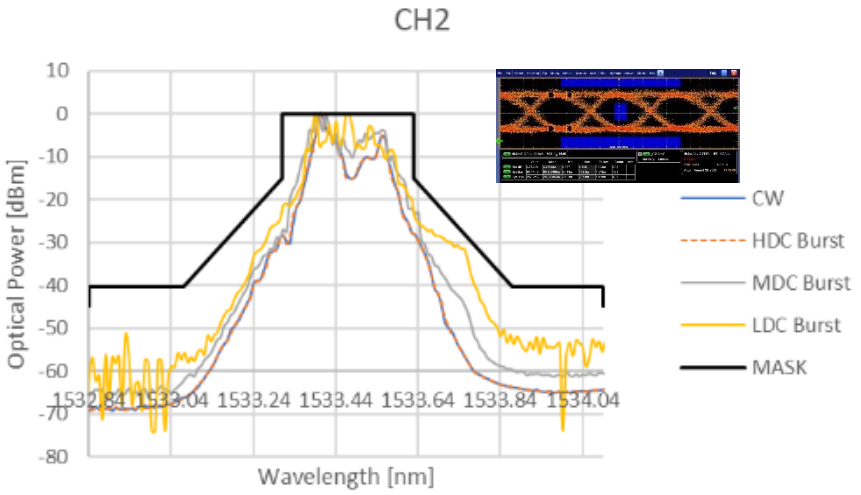

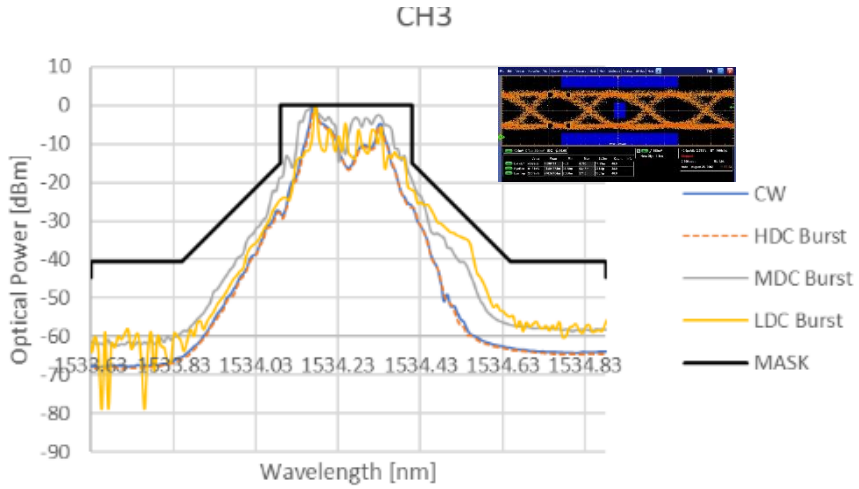

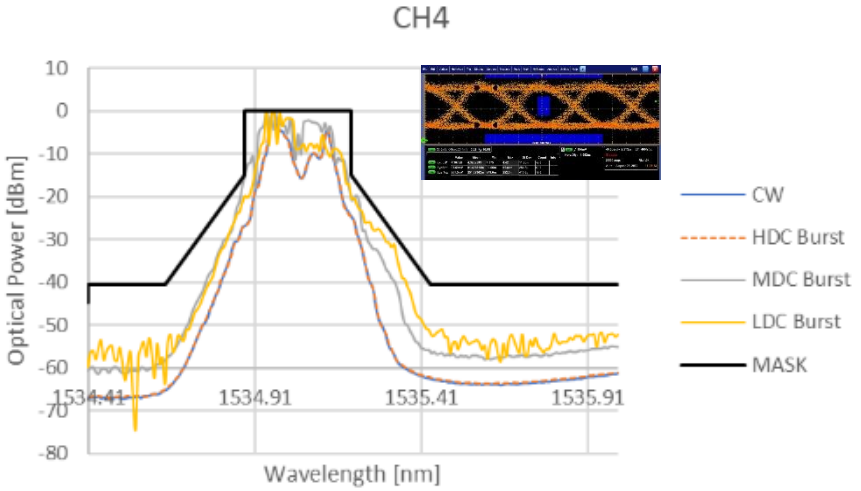

NG-PON2 ready

Transmitter OOC

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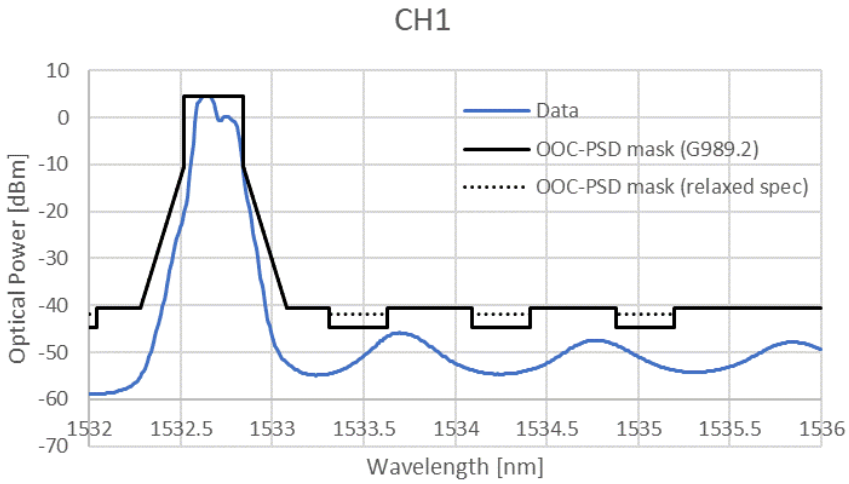

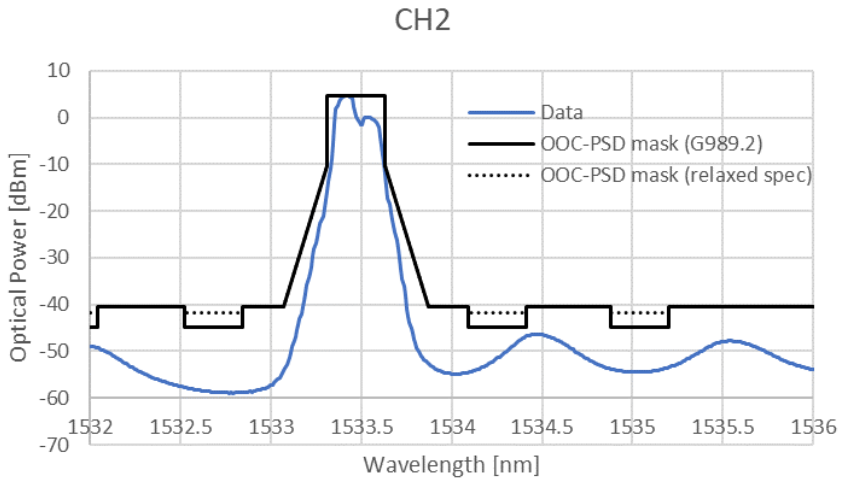

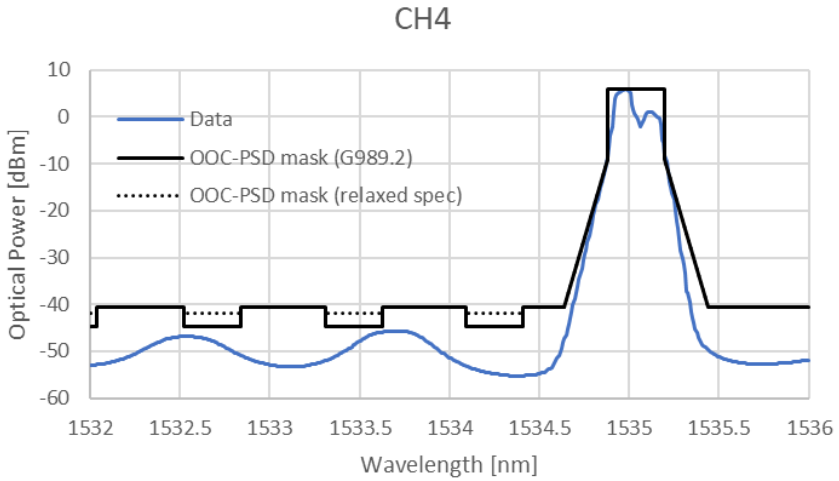

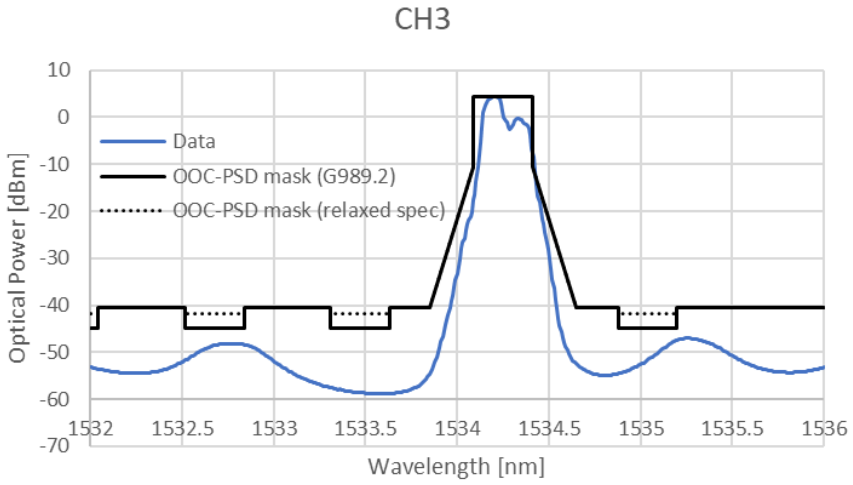

NG-PON2 ready

Statistics and production robustness ongoing - Receiver

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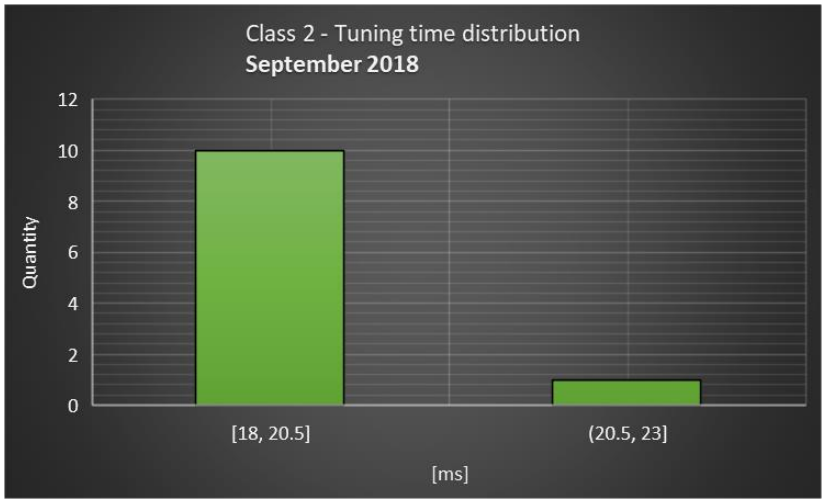
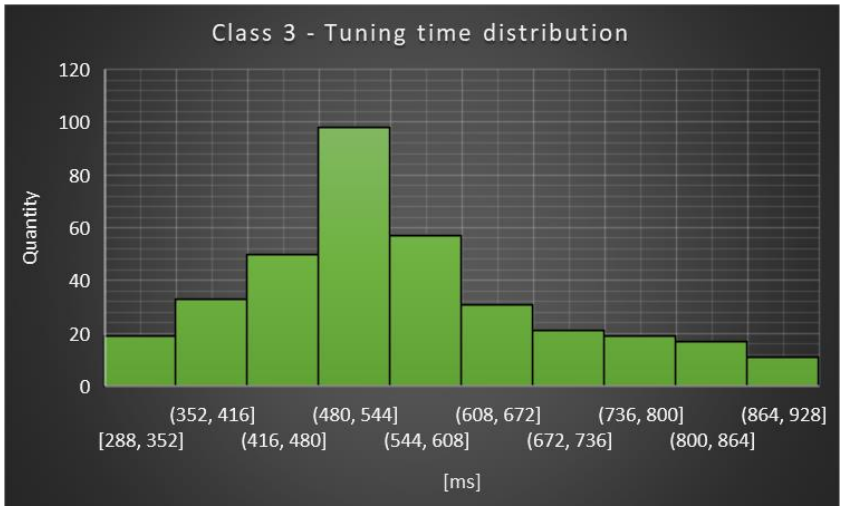
- All production units tested with senstivitiy better than -28.5 dBm





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