



**LASER  
COMPONENTS®**

# *Components for Laser Guiding and High Power Systems*

Pierre Chazan

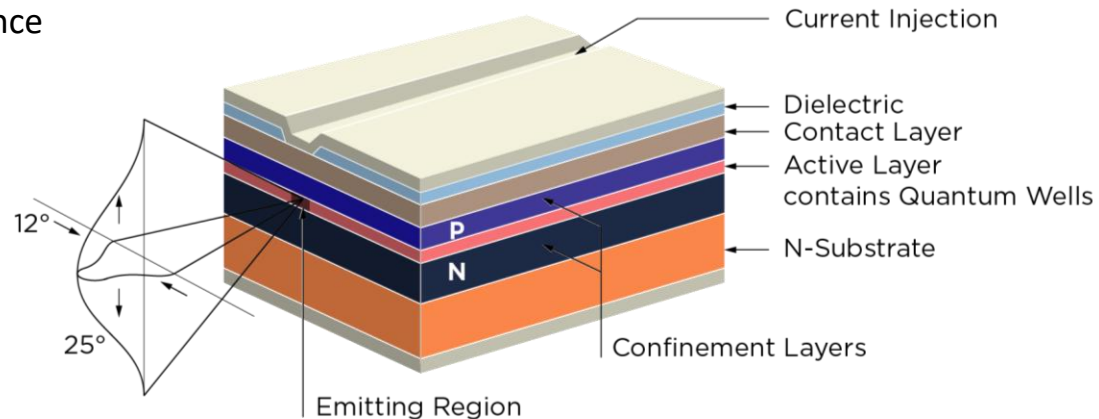
Senior Business Development Manager  
LASER COMPONENTS France

# Components for Laser Guiding systems

## 1550nm High-Power PLDs: Requirements

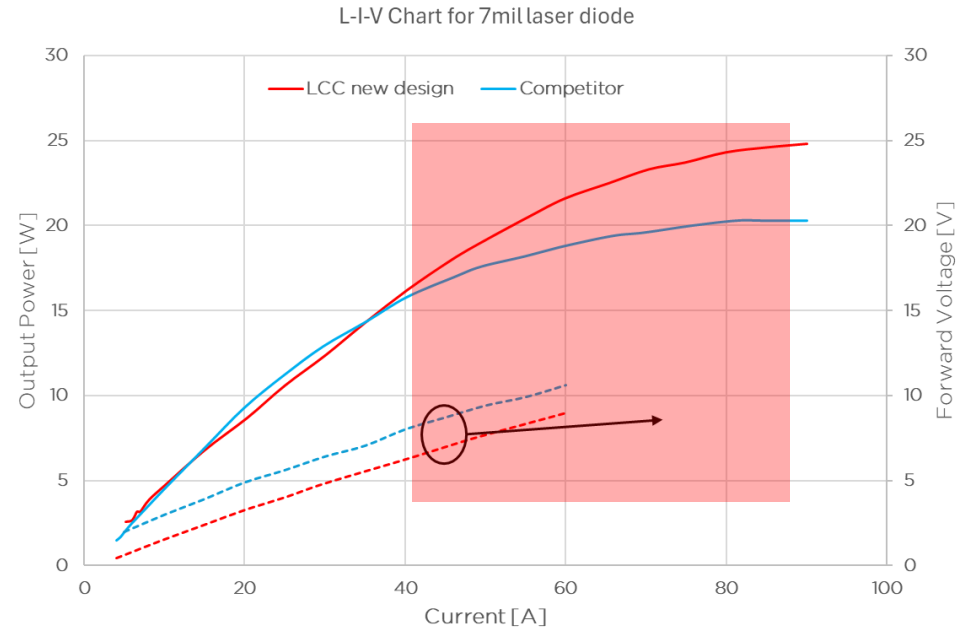
In term of requirements, 1550nm PLD must satisfy two conditions:

- / High output power:  
In several applications like LiDAR, high power is needed to reach target for long distance detection
- / Optical characteristics of the beam:  
Polarisation, low optical divergence in both axis, beam shape, etc...



# Output Power Characterisation

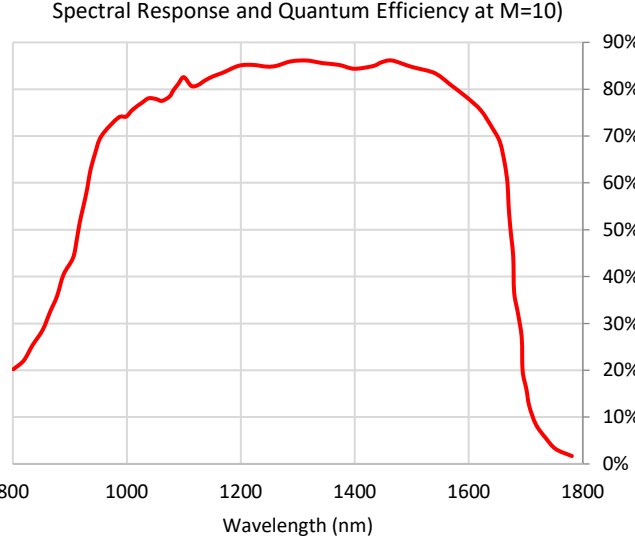
- / Our lasers have better  $V_f$
- / Early roll-over is observed on competitor's laser
- / @80A there is a difference of 4W in power
- / The fast axis divergence remains low ( $23^\circ$ )



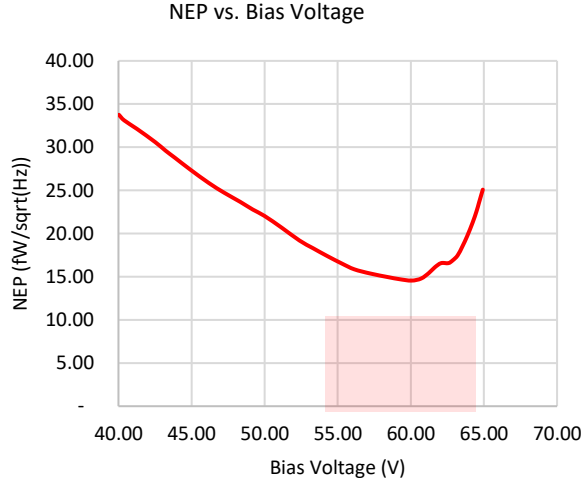
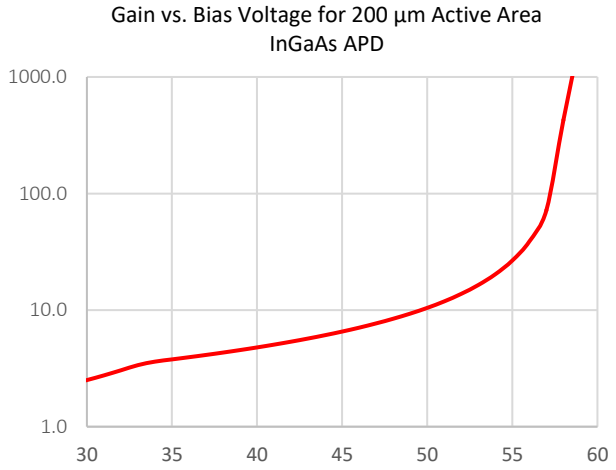
# InGaAs APD : IAG series



IAGxxx: High end InGaAs APD, High speed, Long range, Low noise, High SNR, dynamic range of >7 V



— Quantum Efficiency IAG

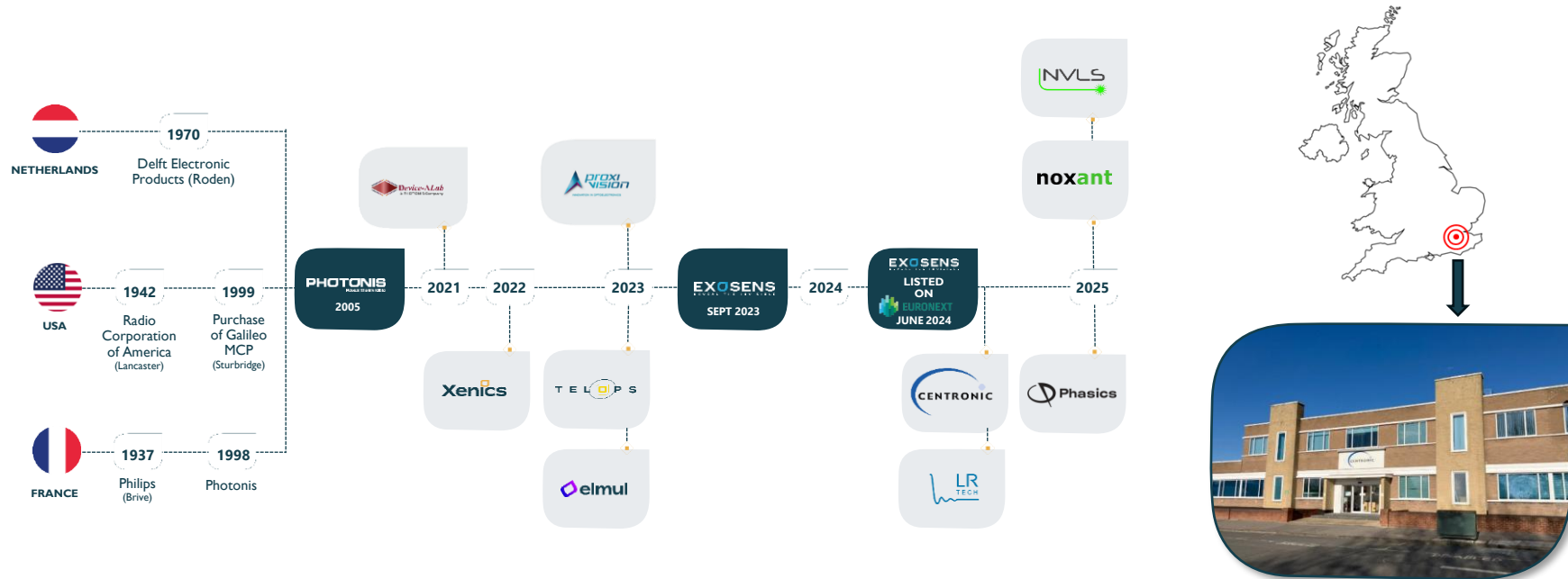


— IAG200

# EXOSENS Si PHOTODIODES

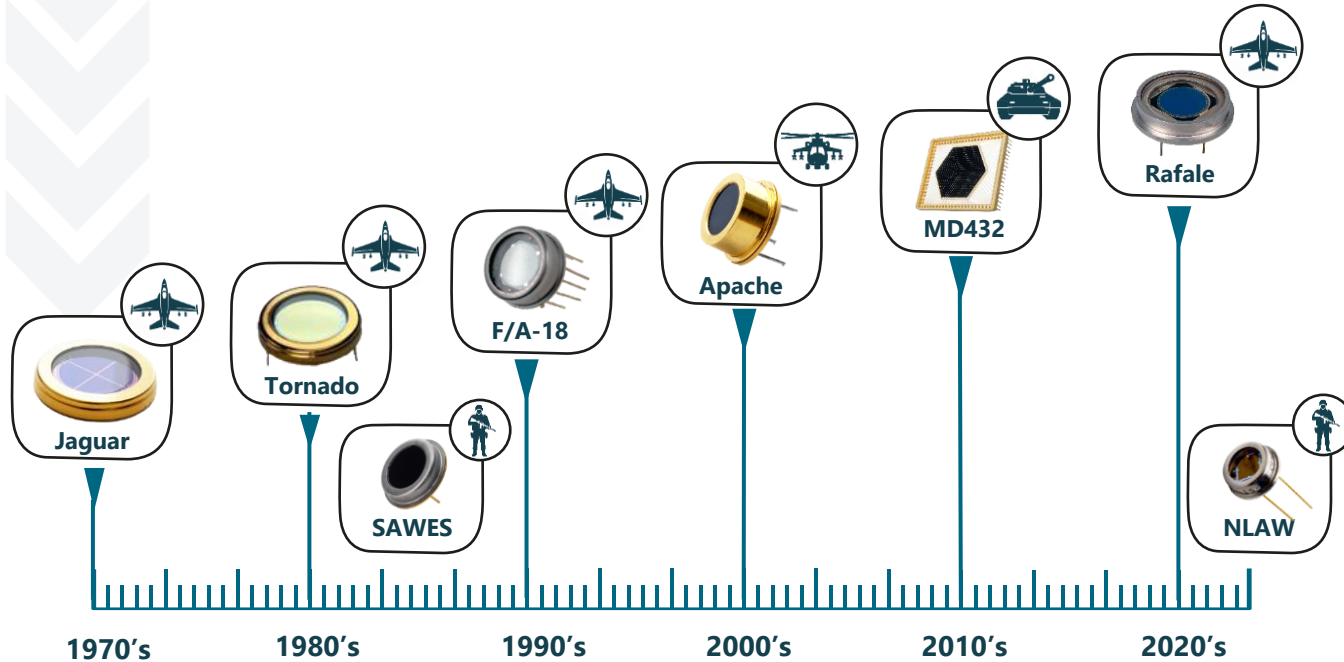
# Integration of Centronic Silicon Photodiodes

## Continuity of team at UK site



# Military Optoelectronics

SILICON PHOTODIODES 1970'S TO PRESENT DAY

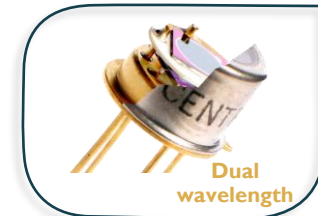
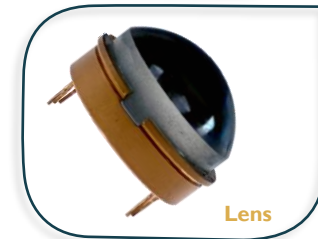
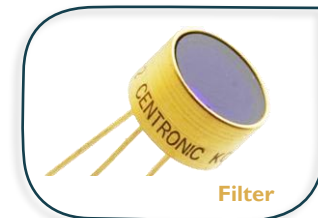
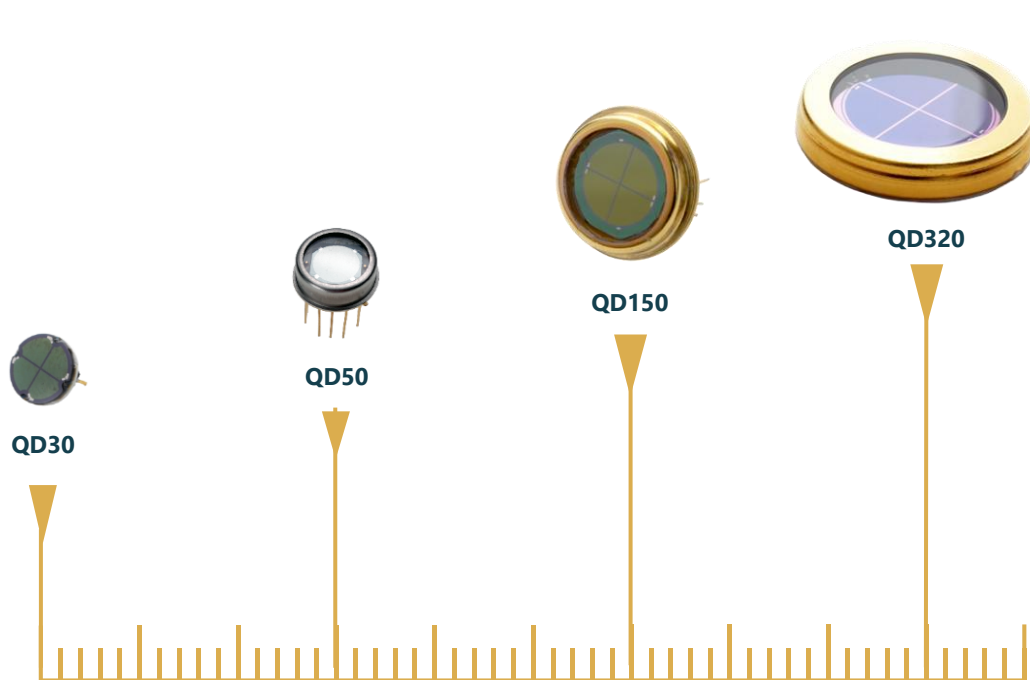


*Customers include over seven well known defence manufacturers.*

*Customer identities not published in this presentation.*

# Silicon Quadrant Photodiodes

## Custom Geometries and Packaging



# Capabilities

*Silicon PiN diodes for military infrared 800nm – 1100nm*

## ➤ Geometries

- ◆ Single element
- ◆ Quadrants
- ◆ Matrix arrays
- ◆ Laser drilling / profiling

## ➤ Junctions for sensitivity

- ◆ High resistivity silicon
- ◆ Full depletion
- ◆ Internal reflection

## ➤ Junctions for speed

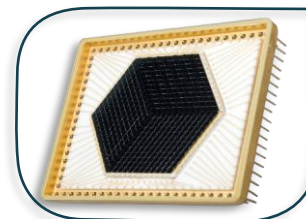
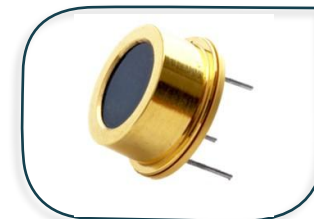
- ◆ Thin silicon
- ◆ Small active areas

## ➤ Packaging

- ◆ Hermetic
- ◆ Filters
- ◆ Vertical detector stack
- ◆ EMC screens
- ◆ Internal heater
- ◆ Chip on board

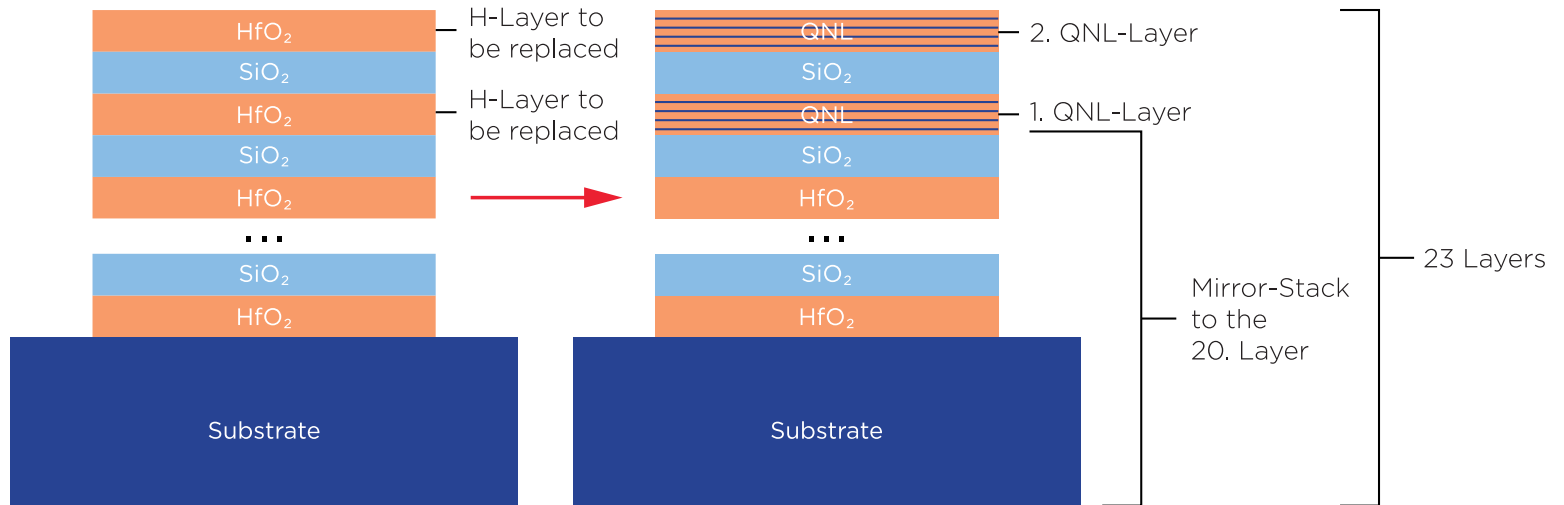
## ➤ Environmental and endurance testing

- ◆ Operating temperature
- ◆ Thermal shock
- ◆ Thermal cycling
- ◆ Vibration
- ◆ Acceleration
- ◆ Burn-in



# Components for high power laser systems

# How to optimize the damage threshold in high power systems



Inserting the QNLs into HR-Mirrors with resulting same layer number

# LIDT Test Results Comparison

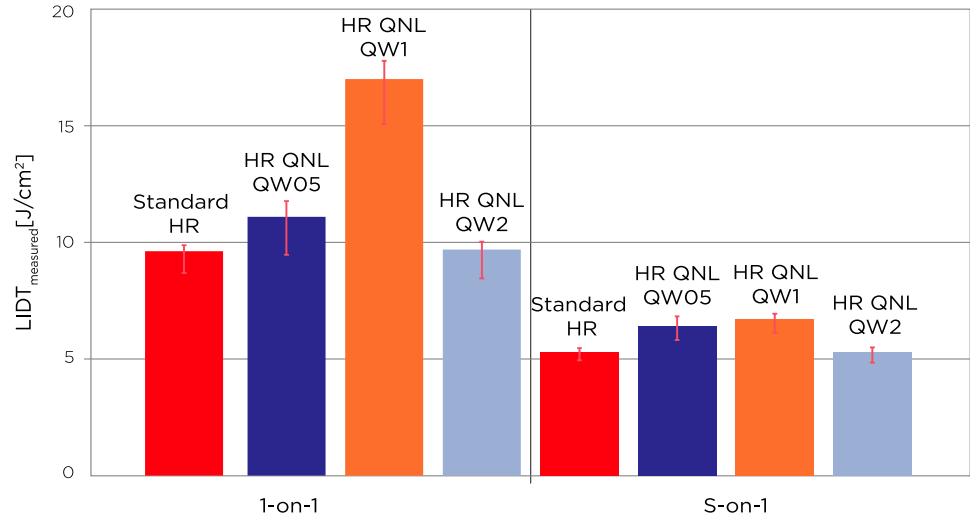
HR-mirror standard versus HR-mirror QNL

/ 1-on-1:

- higher LIDT on HR-mirror with QNL 1nm of  $\approx 67,3\%$

/ S-on-1:

- S is 1000
- higher LIDT on HR-mirror QNL QW05 of  $\approx 26,09\%$  and QNL QW1 of  $\approx 27,23\%$



## High Power and specialized Fiber assembly

### High Power - Water cooled

#### SMA Connector

Power levels up to 450W cw

Freestanding fiber SMA connector with copper ferrule

Heat sink stainless steel or copper

Optional AR Coating from UV to IR (300-1900nm)



## Conclusion

### / For Laser Guidance :

- \_ LC provides high power pulsed laser diodes @1550nm and 905nm
- \_ High performance APD detectors on InP and Si
- \_ Custom European Si Photodiodes and quadrant photodiode from @Exosens/Centronic

### / For High power laser systems

- \_ HR and AR coated optics with LIDT in excess of 20J/cm<sup>2</sup>
- \_ High Power fiber assembly

# Thank you for your attention!

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