



**LASER
COMPONENTS®**

High-End Visible and Infrared Components for Aerospace and Defense Market

Pierre Chazan

Senior Business Development Manager / Laser Components S.A.S.

**/ Laser Components
Germany GmbH**

Werner-von-Siemens-Str. 15
82140 Olching
Germany

Production facility for

Optical Coatings, Precision Optics,
Fiber Optics, Photon Counters,
Laser Modules, Detector Modules
Electronics

**/ Laser Components
Detector Group, Inc.**

2277 N Nevada Street
Chandler, AZ 85225
USA

Production facility for

Avalanche Photodiodes
IR Detectors, IR Emitters
PbS/PbSe Detectors
Pyroelectric Detectors

/ Laser Components (UK), Ltd.

Goldlay House 114 Parkway
Chelmsford Essex CM2 7PR
United Kingdom

**/ Laser Components
Canada, Inc.**

195 Joseph Carrier J7V 5V5
Vaudreuil-Dorian, Quebec
Canada

Production facility for

Pulsed Laser Diodes

/ Laser Components S.A.S.

45 Bis Route des Gardes
92190 Meudon
France

**/ Laser Components
USA, Inc.**

116 South River Road
Bedford, NH 03110
USA

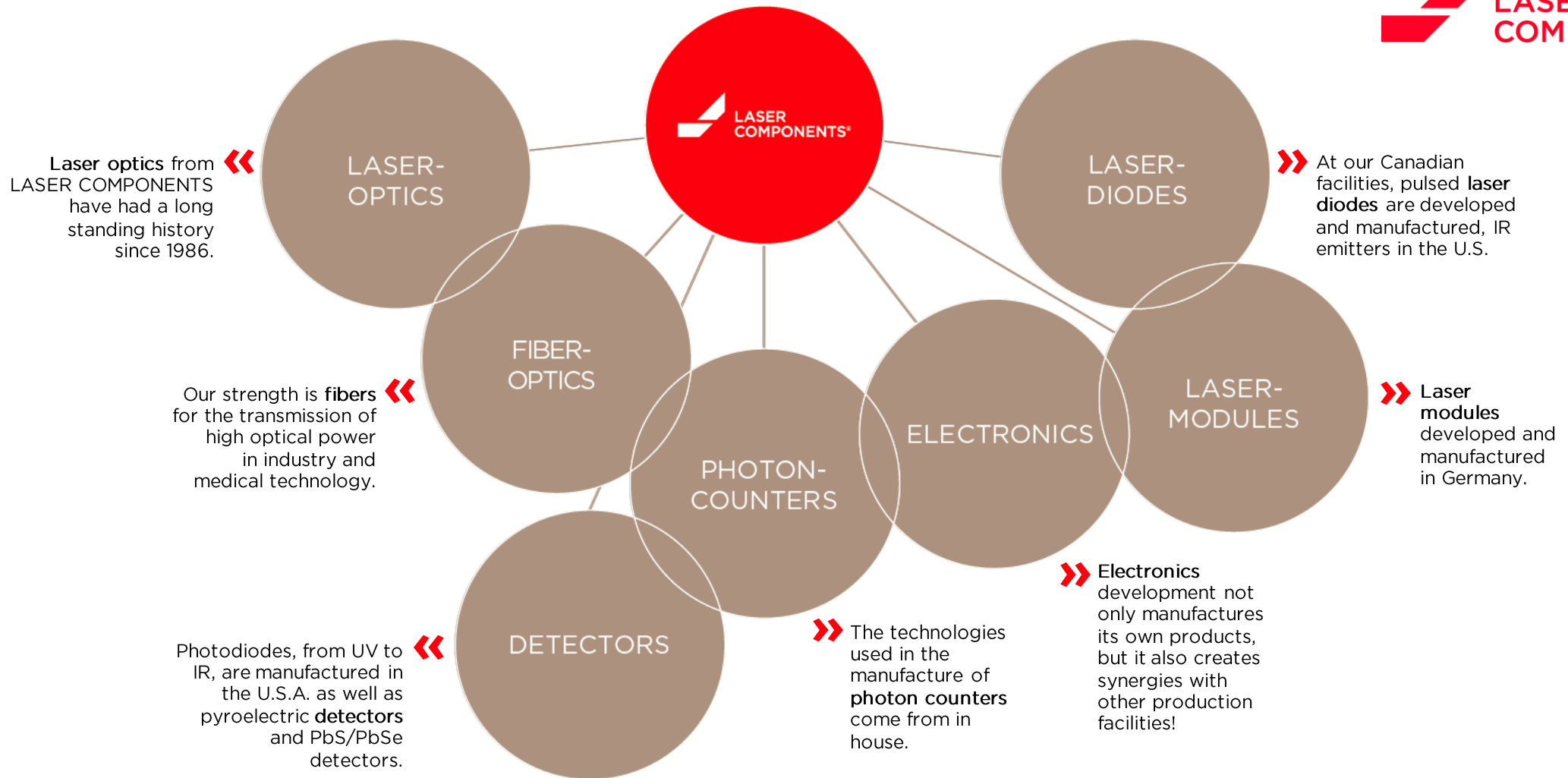
/ Laser Components Nordic AB

Skårs led 3
41263 Göteborg
Sweden



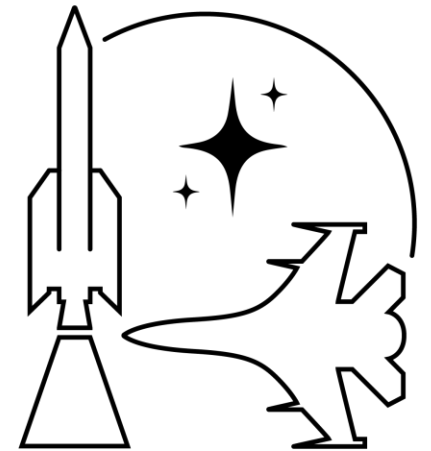
● Our Production Sites

● Our Sales Offices



HERITAGE IN DEFENSE AND AEROSPACE

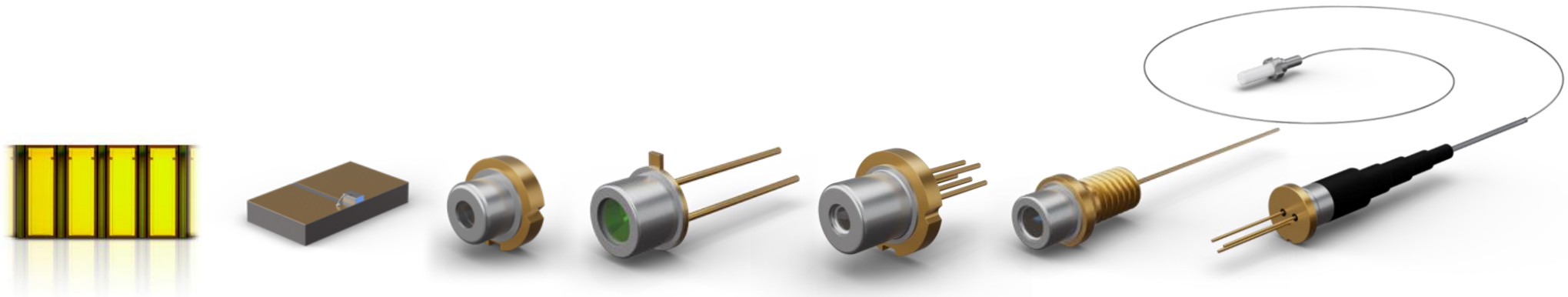
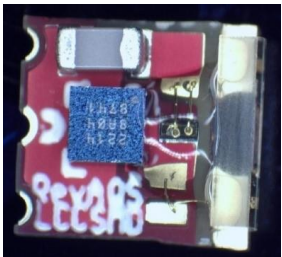
- _ 40+ years of company history, privately owned
- _ Strong footprint in Defense, Aerospace and Space business
- _ Export Control : BAFA-, CGP- and ITAR-experience
- _ ISO 9001 certified , design and production for Mil-, AEQC-, and AS9100 standards
- _ Able to sign long-term supply agreements
- _ Willingness to customize for smaller volume demand
- _ Long-term strategy for A&D



CAPABILITIES TO SUPPORT DESIGN EFFORTS

Pulsed Laser Diodes (PLDs)

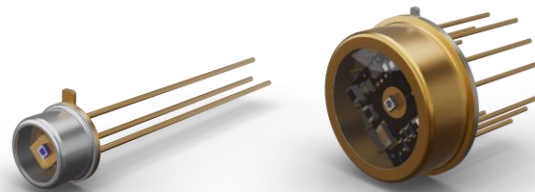
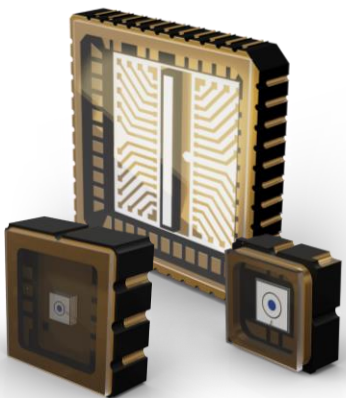
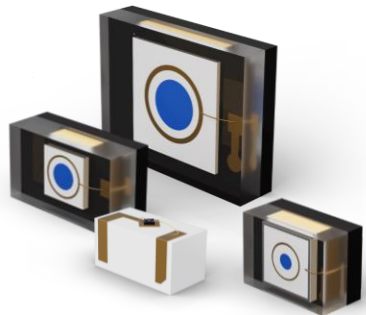
- Standard wavelengths (850, 905, 1550nm)
- Custom stripe size and length
- From single chip to arrays, single- to triple-junctions, and up to 5 stacked dies (up to 650W)
- Custom integrated collimation micro-optics for fast-axis correction and balanced divergence
- Fiber pigtailed and unique square-fibers
- QuickSwitch®: Integrated electronics for 2 ns pulse widths



CAPABILITIES TO SUPPORT DESIGN EFFORTS

Avalanche Photodiodes (APDs)

- Si APDs from UV to YAG
- InGaAs APDs with world-leading high SNR and lower-cost alternatives
- Different active areas (active diameter 80 μ m to 3mm on Si), optimized for speed, desired gain for given voltage bias range etc.
- Integrated hybrid amplifier with custom gain and bandwidth
- Monolithic linear arrays of Si APDs
- Different packaging options (SMD to TO-cans)
- Built-in TEC for instrumentation or remote differential LiDAR
- Fiber pigtailed
- AR coating and BP filters on chip or window
- Integration into Silicon photon counting modules - COUNT

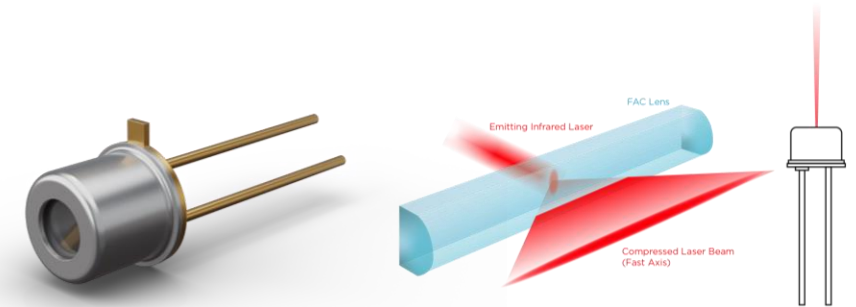


APPLICATIONS

RANGE FINDING AND LIDAR

Emitter (PLD) - Standard 850, 905 and 1550 nm PLD

- _ Powers up to 650 W@905nm ; 50W@1550nm
- _ Micro optics to optimize collimation
- _ Integrated short pulsed drivers (Q-switch)



Receiver (Silicon and InGaAs APDs)

- _ Wavelength : visible, NIR and SWIR (up to 2,6um)
- _ InGaAs Lowest Noise-equivalent power (NEP) on the market
- _ Individual diodes and hybrid receivers, up to 700 MHz
- _ SMD detectors for compactness



BATTLEFIELD SIMULATION

LASER COMPONENTS supported MILES (US) and other European training systems

Emitters

- _ Emitter mostly 905 nm and Single Junction
- _ On-going migration to 1550 nm for eye-safety and higher range resolution

Receivers

- _ Silicon PINs
- _ Si APDs for added LRF-features used for ballistic calculation and high-power/distance simulation
- _ InGaAs photodiodes for eye-safety systems



LASER PROXIMITY FUZING AND HEIGHT OF BURST

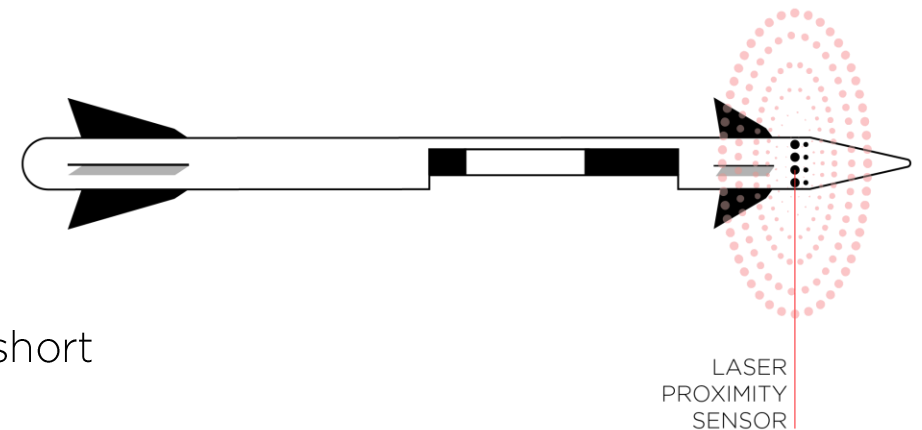
High speed range finder around missile nose or pointing towards ground for free-falling ordnance

Emitter

- _ Harsh environment: temperature >120 °C, speed, high power (>200 W), Overdrive for short operational lifetime (few minutes)
- _ Long term storage, shock and vibration testing, statistical analysis of MTTF, hard drive for a few minutes
- _ 905 nm PLD, stacked triple junction

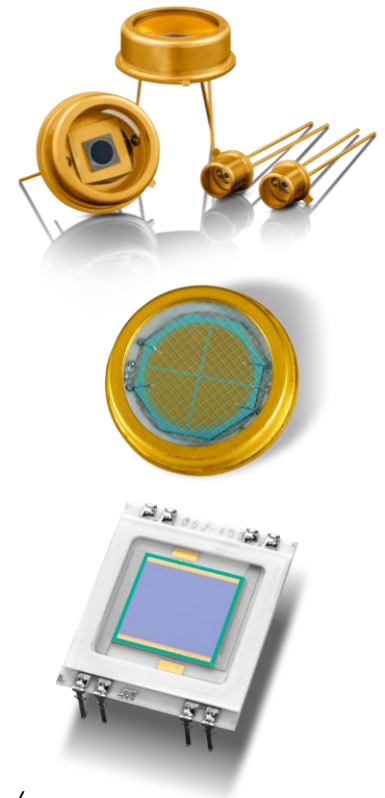
Receiver

- _ Fast Silicon PIN , custom designs (bi-cell eg)



MISSILE GUIDANCE

- _ YAG APD for distributed apertures (SAT series)
- _ Silicon PIN diodes (partner Advanced Photonix)
- _ PLDs for beam riding
- _ PSD (via SiTek)
- _ Key differentiators:
Large active area / Low noise /
TEC or heater ...

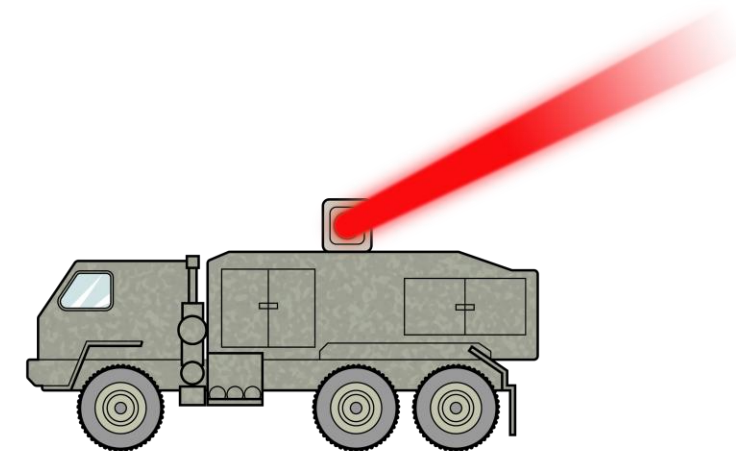
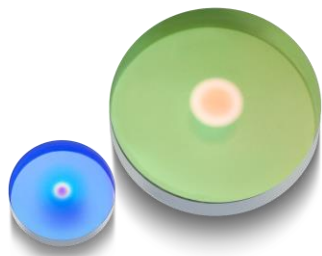


LASER WEAPONS AND DAZZLERS

High Power Lasers

- _ High energy coatings, very high Laser Induced Damage Threshold (LiDT) in CW and pulsed regimes:
 - _ 30 J/cm² (10 ns) - 5 MW/cm² for HR coatings at 1064 nm
 - _ 20 J/cm² (10 ns) - >35 MW/cm² for AR coatings at 1064 nm
- _ Gaussian Mirrors (GRM) to improve laser beam divergence

Laser Dazzler : PLD/APD for distance monitoring



REMOTE SENSING GAS DETECTION

- _ Atmospheric LiDARs with TEC-stabilized APD receivers
 - _ Ground based or Space Lidars
 - _ UV / NIR /SWIR APDs and temperature-controlled receivers
- _ Spectrometers for CBRNE defense
 - _ Pyrometers (Flamme detection)
 - _ PbS/PbSe detectors (FTIR,NDIR)



CONCLUSIONS

- _ LC has a wide range of enabling technologies for the implementation of photonics in A&D systems
- _ We are a component maker with added value
- _ We need RFQs from either Tier1s or Tier2s
- _ We are quite flexible to provide quick prototyping

LASER COMPONENTS papers presented at OPTRO 2024:

- _ **Design and Fabrication of Optical Waveguides for High-Power Density Laser Diodes for LiDAR Applications**
Wednesday, January 24 - LASER SENSOR AND SYSTEMS-1
Room 2, Session 2, 10:00
- _ **Deep ICP-RIE Etched Trenches With Sidewall Slope Control of GaAs-Based High Power 905 nm Pulsed Laser Diodes**
Wednesday, January 24 - LASER SENSOR AND SYSTEMS-2
Room 2, Session 2, 11:00

Thank you for your attention!

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