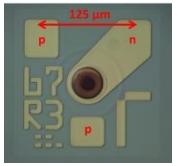
Single Mode and Multi Mode Long Wavelength VCSELs for Optical Communications and Sensing

VERTILAS®

Christian Neumeyr, CEO



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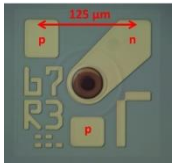


VERTILAS Overview

World Wide Customer Base

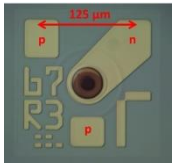
Leading ww supplier of lw VCSELs

Garching (near Munich), Germany

QMS ISO9001

Founded in 2001

Spin-Out from TUM/WSI



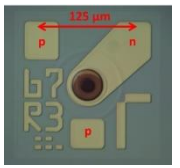
VCSEL Technology Offers Major Advantages

Cost Effective

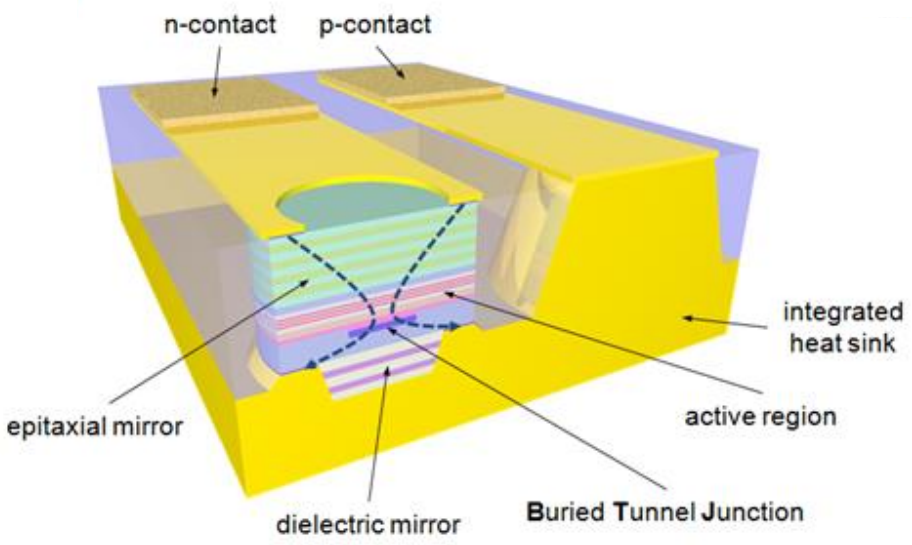
GREEN Photonics
Energy Efficiency

High Performance
& Reliability

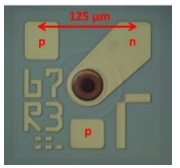
Very High Integration
Small Form Factor



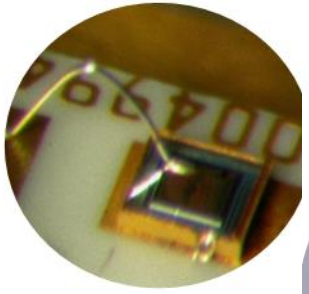
VERTILAS InP Buried Tunnel Junction (BTJ)-VCSEL



InP VCSEL with Buried Tunnel Junction
Wavelengths: 1.3 µm to 2.3 µm



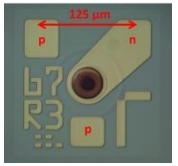
VCSELs - Key Markets for Industry and Communications



NIR Sensing TDLS

Tunable Diode Laser Spectroscopy

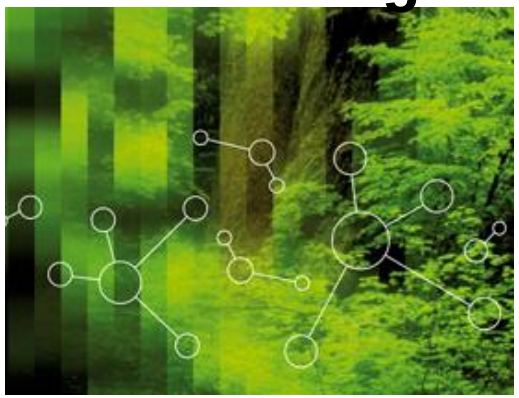
Optical Communications

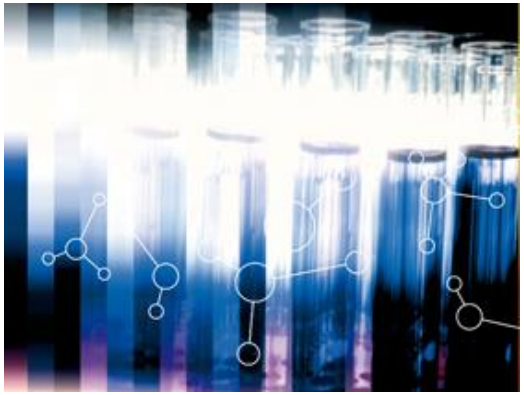


Market Segments: TDLS Sensing with VCSELs

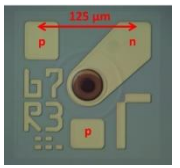
Industry and Safety

Environmental Monitoring

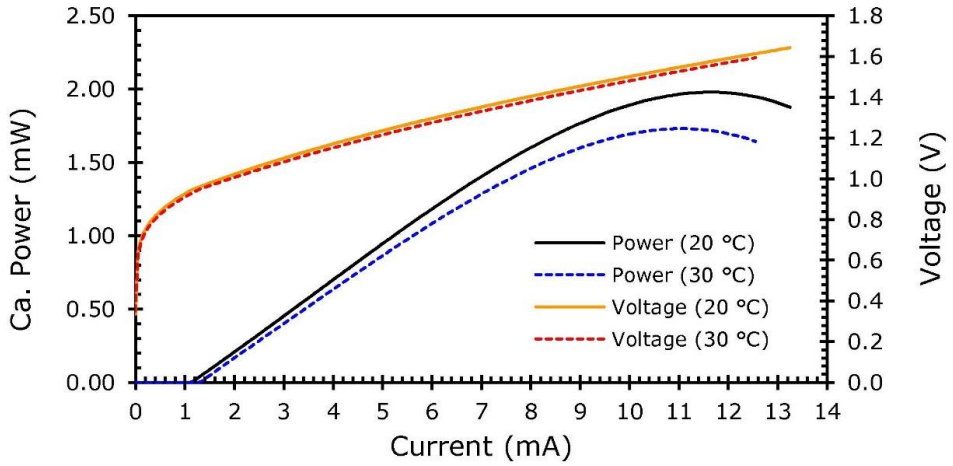




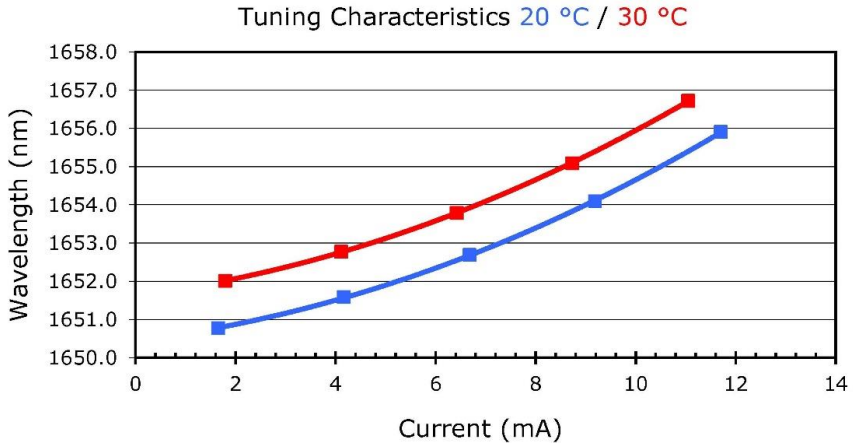
Medical and Analysis



Tunable Laser for Sensing: 1654 nm VCSEL for CH4 Detection

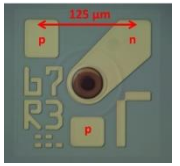


- Po max = 2mW
- Ith < 2mA
- I max < 11mA
- V < 1.8V



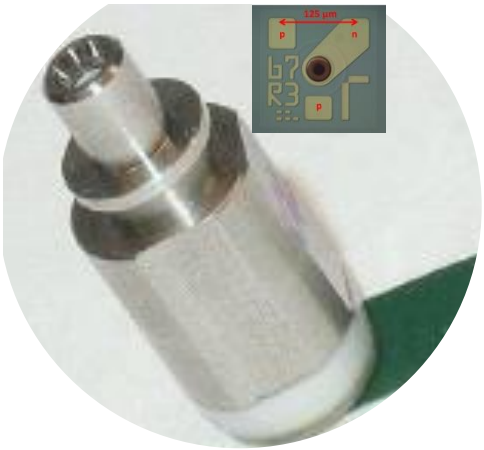
Ibias tuning range:

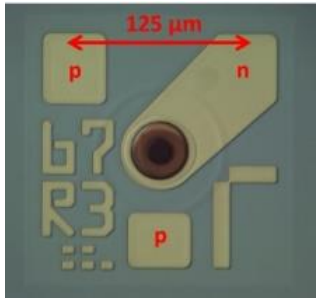
4-5 nm



High Speed InP VCSELs for Communications

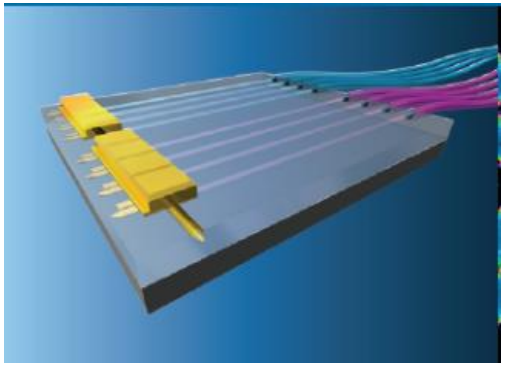
Data Center

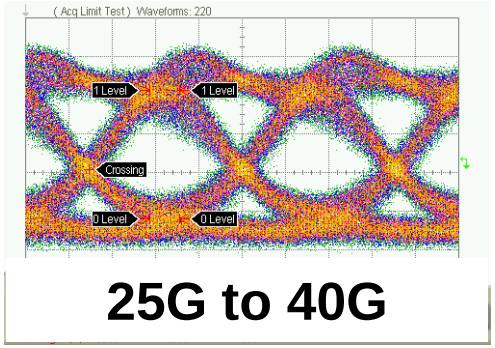




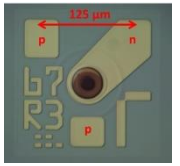
1.3 µm to 1.6 µm

Integration with Silicon Photonics



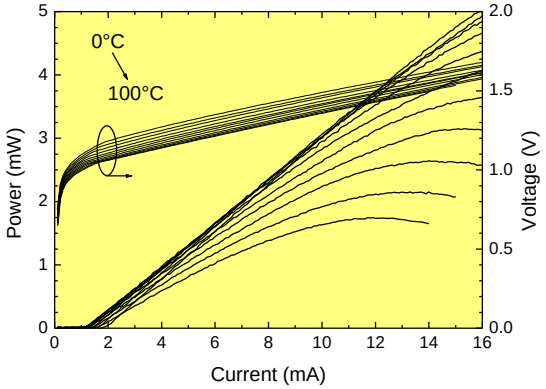


25G to 40G

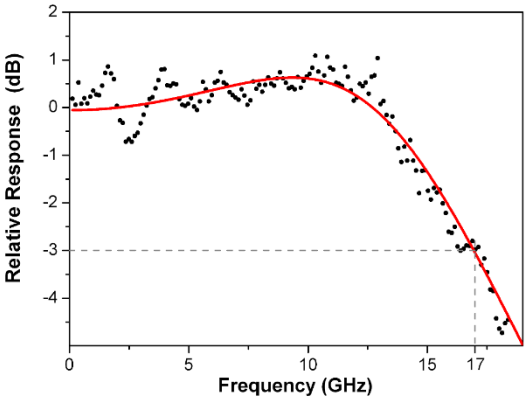


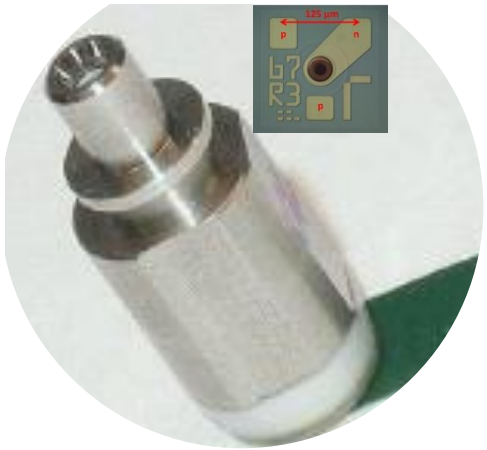
Vertilas LW VCSEL – Excellent Performance

-40 °C to +90°C Optical Power

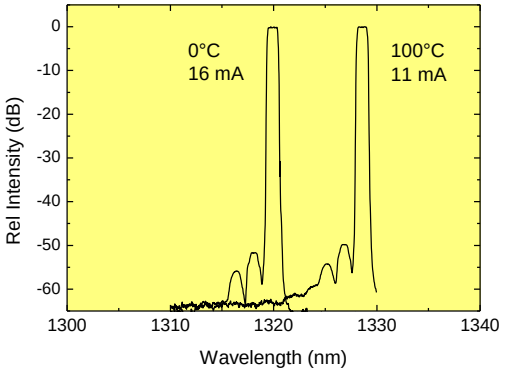


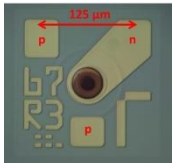
S21 = 18 GHz





SMSR typ > 40 dB





Joint European EU FP7 and H2020 and German BMBF funded R&D Projects

1)

PASSION

1)

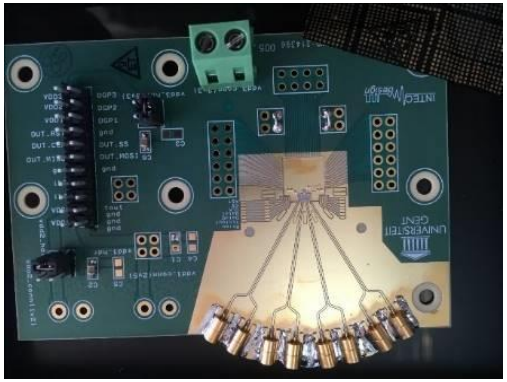
RAPIDO

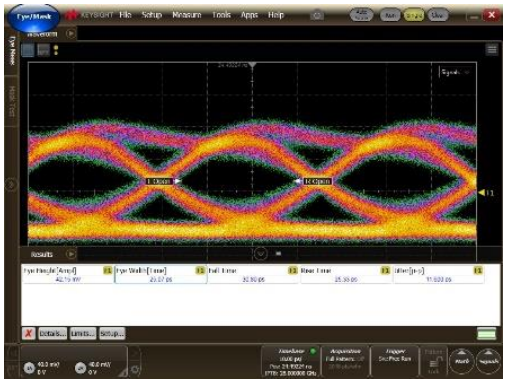
SPEED 2)

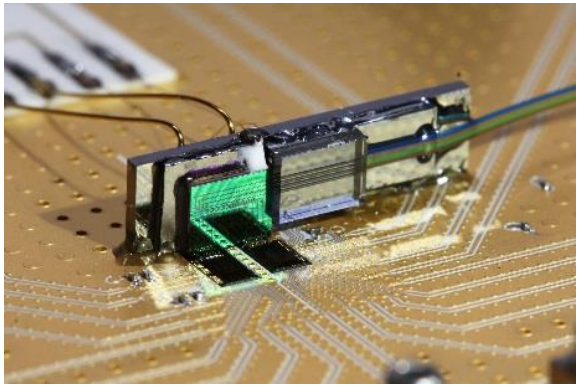
1)

PhoxTroT

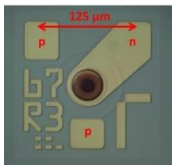
Photonics for High-Performance, Low-Cost & Low-Energy Data Centers, High Performace Computing Systems: Terabit/s Optical Interconnect Technologies for On-Board, Board-to-Board, Rack-to-Rack data links







1) Projects received funding from EU FP7 and EU H2020
2) Project received funding from German BMBF.



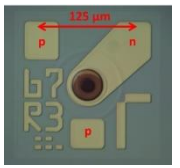
Outlook and Roadmap

100 nm Tunable Single Mode VCSEL

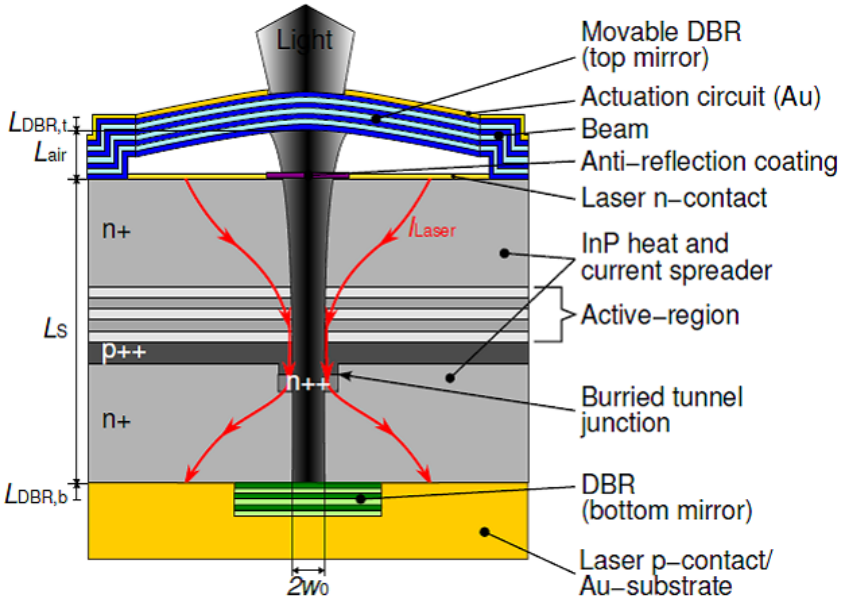
High Power 2D VCSEL Arrays

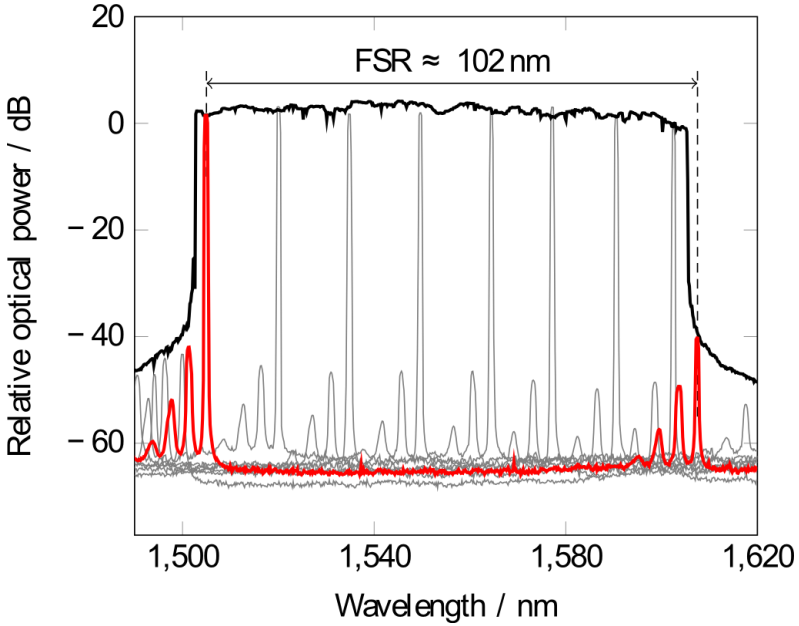
Wavelengths > 2.3 µm (GaSb)

Integration with Silicon Photonics



Tunable VCSEL and Tuning Range up to 100 nm (TUD, WSI, Vertilas)

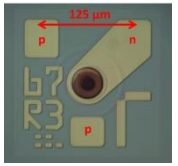




Source: C: Gierl at all

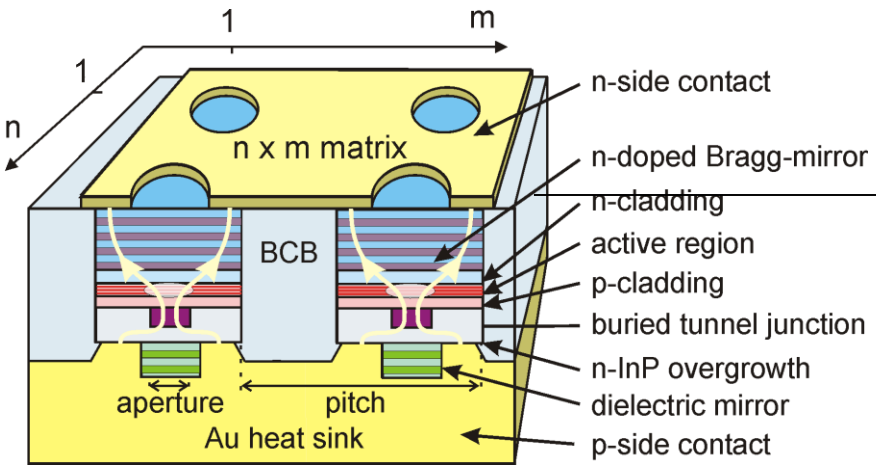
Applications

- WDM networks
- Fiber Bragg Gratings (FBG)
- Gas sensing

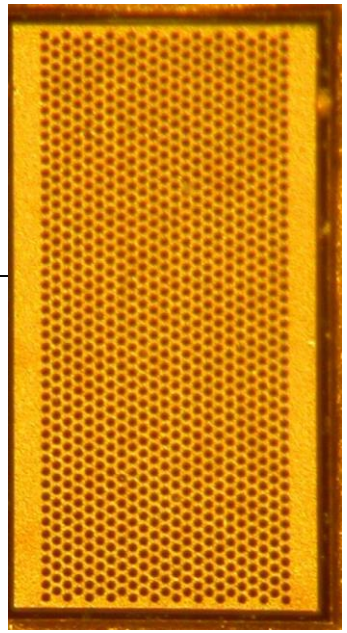


High Power 2D-VCSEL-Arrays for 3D-Sensing (Several Watts of cw Optical Power)

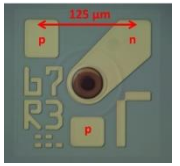
2D VCSEL Array Cross Section



X x Y 2D Array

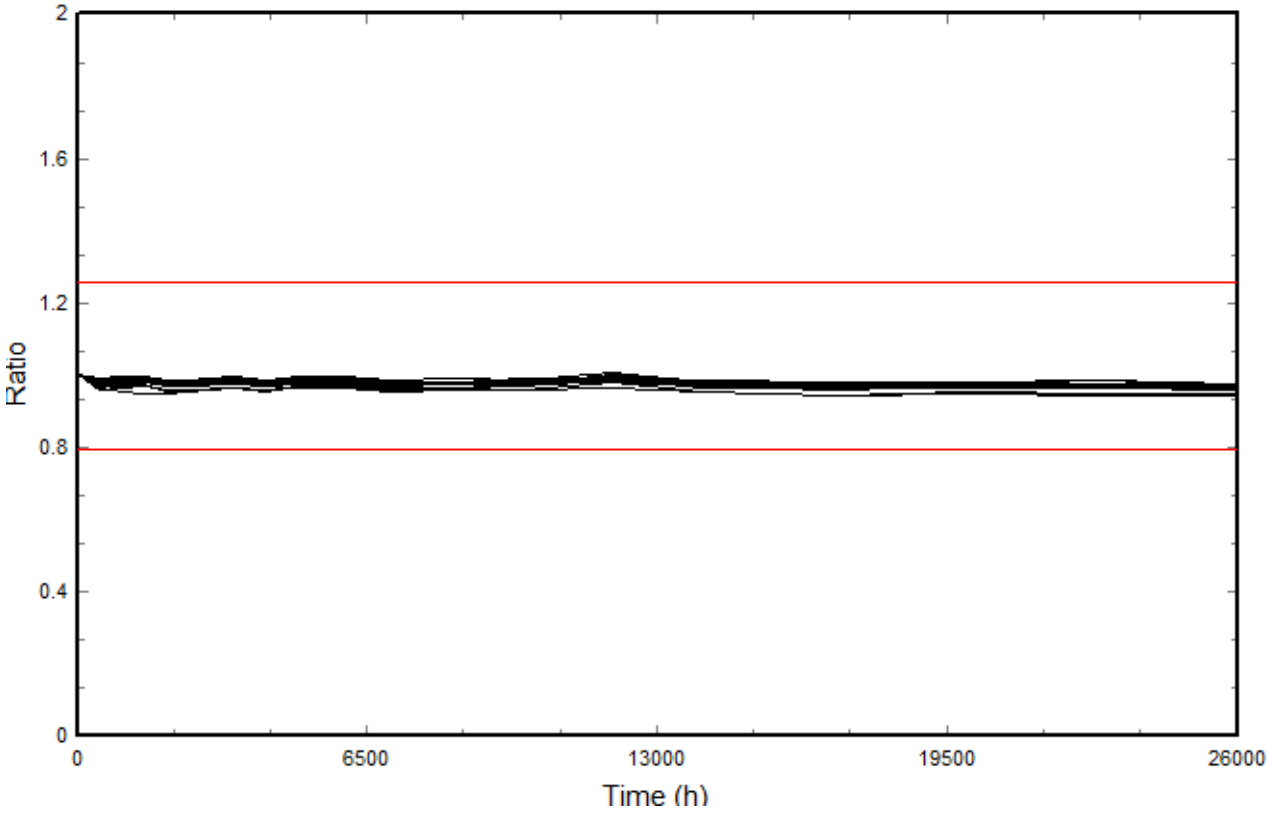


2.5 W Arrays
(40 µm pitch,
hex,
10 µm BTJ,
1047 elements)



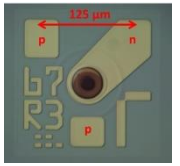
Reliability HTOL

1512 nm VCSEL - Popt HTOL - 90°C 7mA



Key Benefits VCSEL Technology

- Excellent performance and tunability
- Extremely low power dissipation for highly integrated and portable systems
- High volume scalability
- High yield to enable cost sensitive high volume applications
- Full on-wafer characterisation
- Support of wide range of wavelengths and applications



Thank You for Your Attention

Long Wavelength VCSELs – design your system for optimised performance and lower cost

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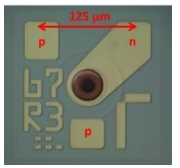
www.vertilas.com



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