

**We bring quality
to light.**



KONICA MINOLTA Group

EPIC Members New Product Release Nearfield VCSEL Testing Camera – VTC 4000

2nd Nov, '21

The Company

- ▲ Founded 1986 / 280 employees
- ▲ Member of Konica Minolta Group
- ▲ Light measurement solutions for
 - Display Industry
 - VCSEL/IR Industry
 - Automotive & Aviation Industry
- ▲ Munich site (Headquarter)
 - High-end spectrometers
 - Turnkey measuring equipment
 - Center of excellence R&D and metrology
- ▲ Berlin site
 - Center of excellence Goniophotometers
 - Turnkey automotive (exterior) lighting measuring systems (Optronik Line)



Our Global Network of Distributors



Region	
China	Shanghai
	Shenzhen
Vietnam	Hanoi
Singapore	Singapore
Korea	Seoul
Taiwan	Taipei
Various destinations	Mobile calibration kits for some products

Your application - our know-how!

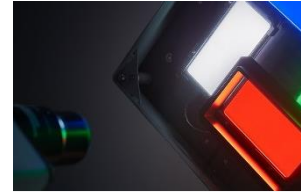
Display Measurement



AR/VR



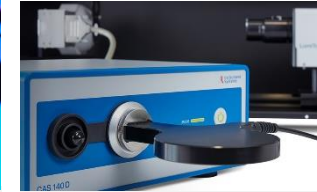
Automotive
Interior Lighting



Display
Characterization

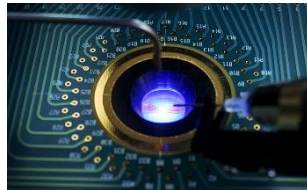


Flat Panel Display
Production



System Audit

Light Emitter Measurement



LED Production



LED / Modules



UV-LEDs



VCSEL / Laser

Lighting Products Measurement



Automotive
Exterior Lighting

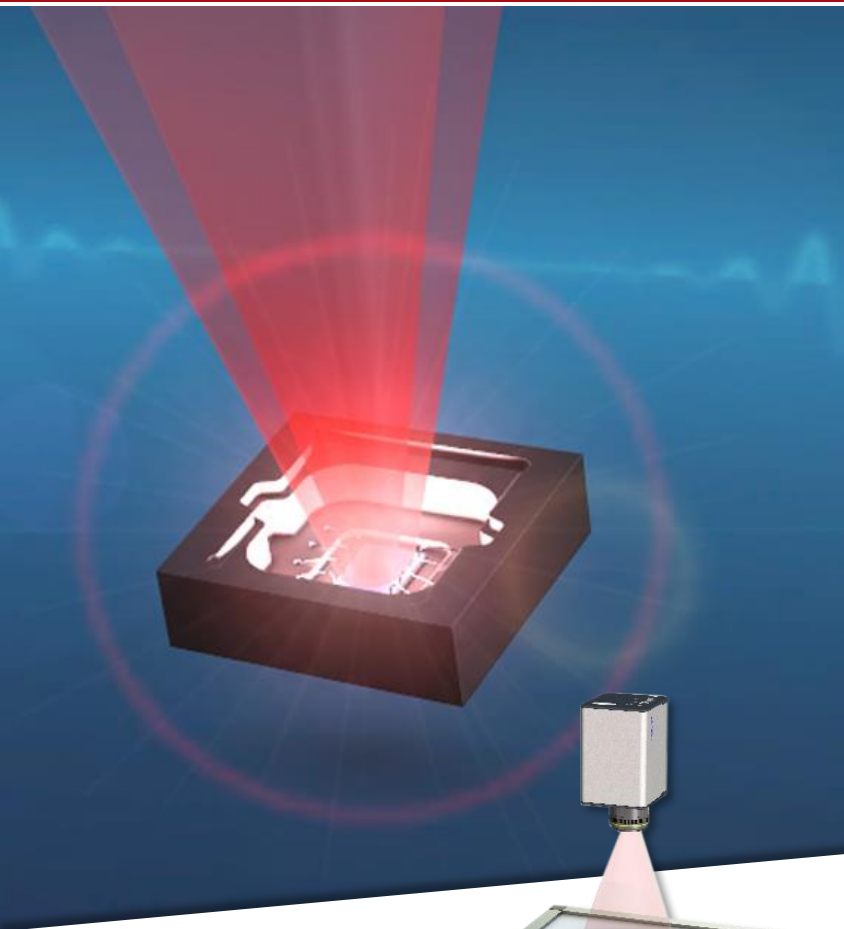


Blue Light
Hazard



Solid State
Lighting

VCSEL Testing Portfolio



**Far Field
Measurement**

VTC 2400



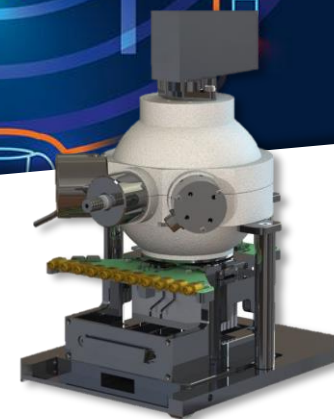
**Near Field
Measurement**

VTC 4000

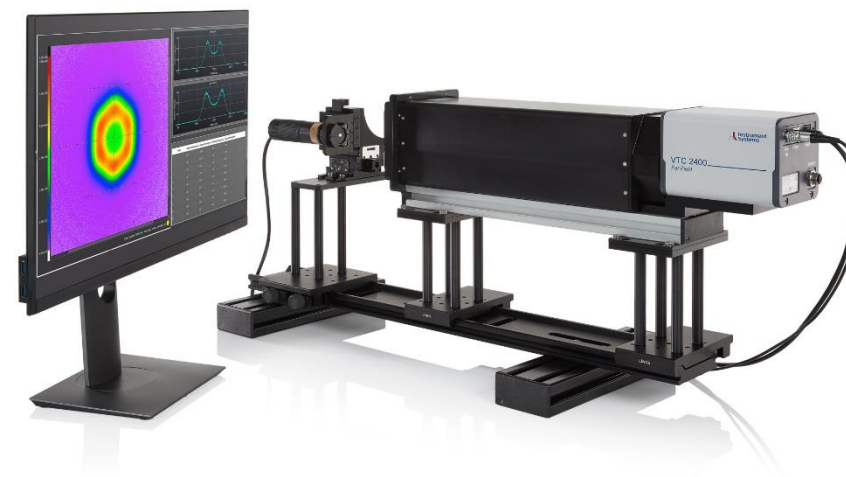
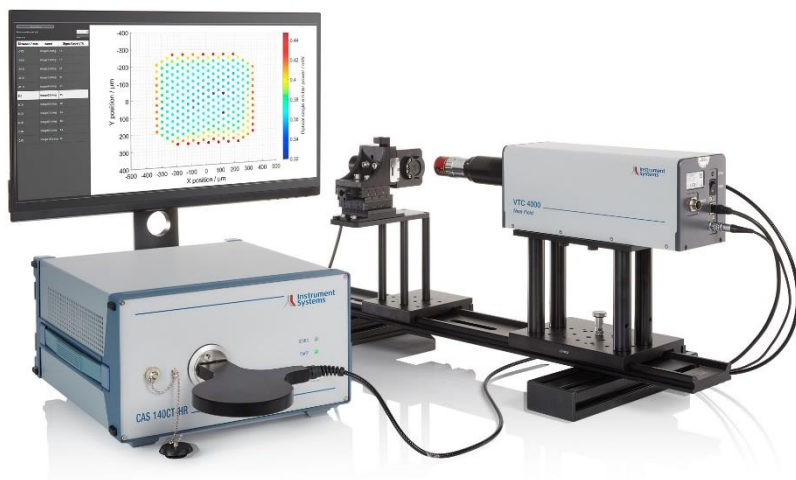
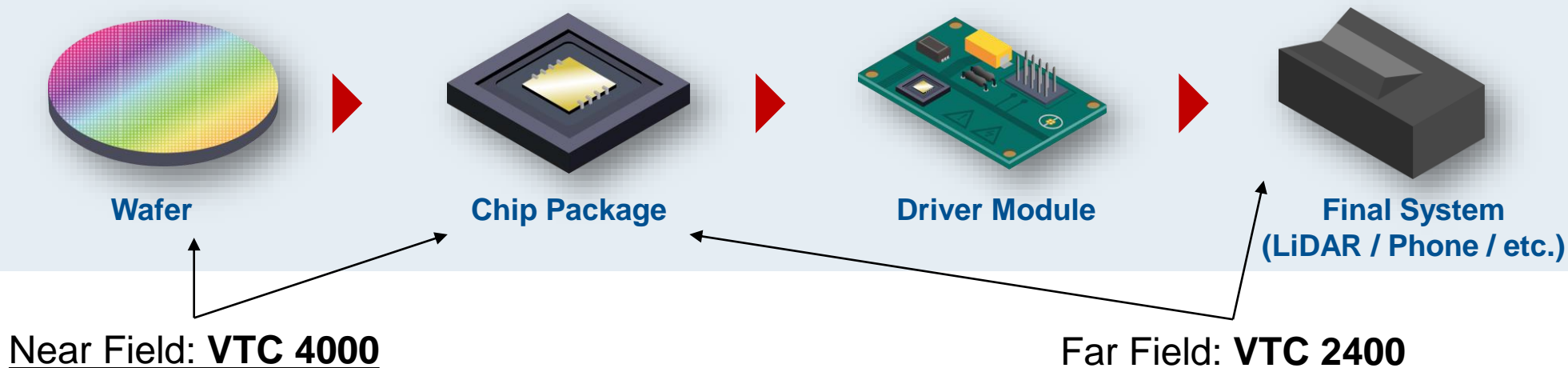


**Nanosecond
Pulsed Analysis**

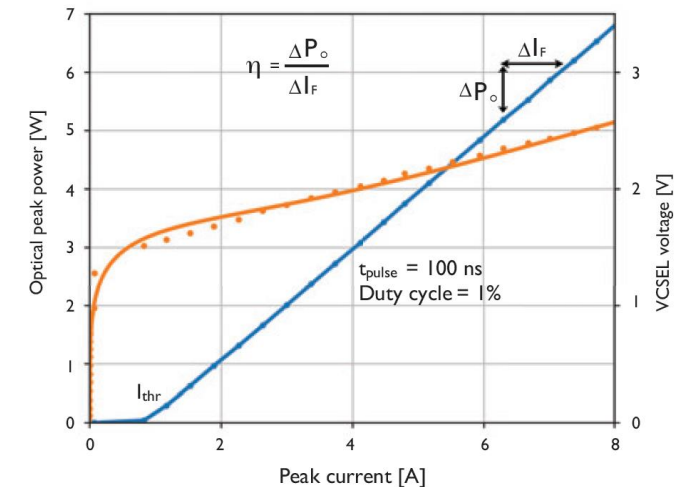
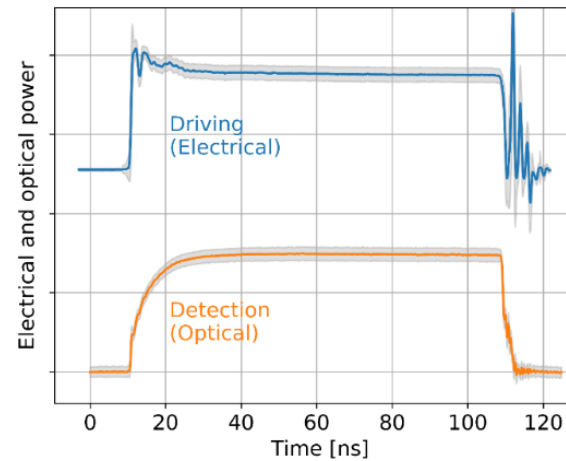
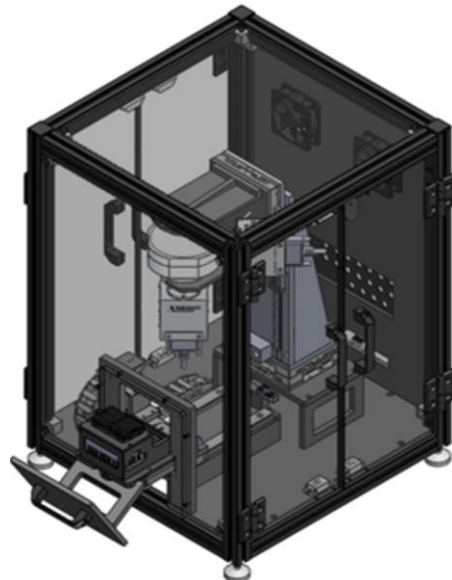
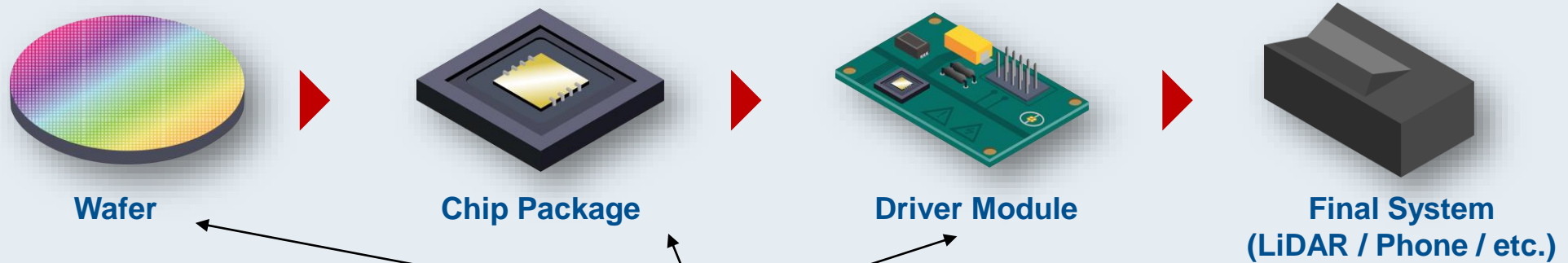
PVT 100



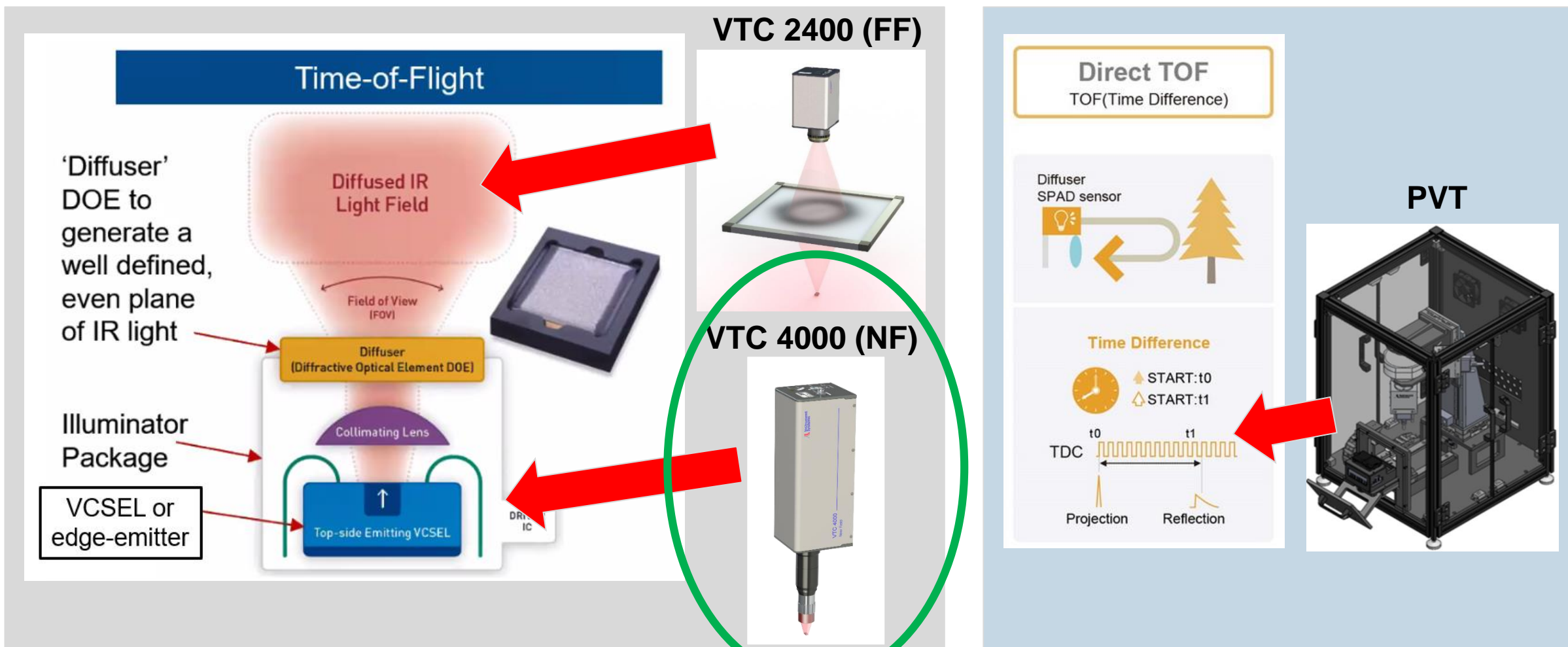
Testing solutions for the complete value chain



Testing solutions for the complete value chain



Portfolio v/s Application



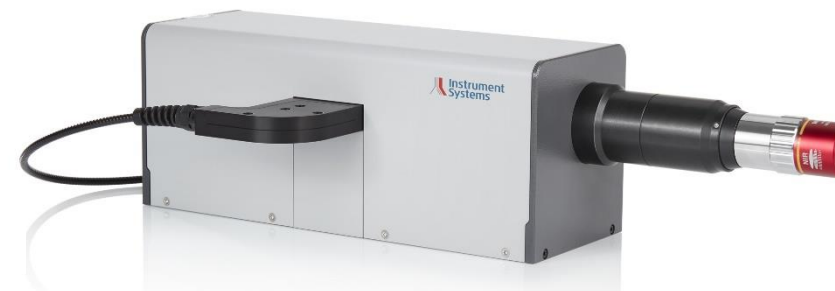
Near-Field VCSEL Testing Camera – The VTC 4000

Version w/o fiber output



- No wavelength information
- One-Shot Measurement
 - Position (x and y) on image
 - Radiant flux for each emitter
 - Polarisation angle & degree (per emitter)
 - Homogeneity
 - Beam waist parameters with z-stage

Version w/ fiber output

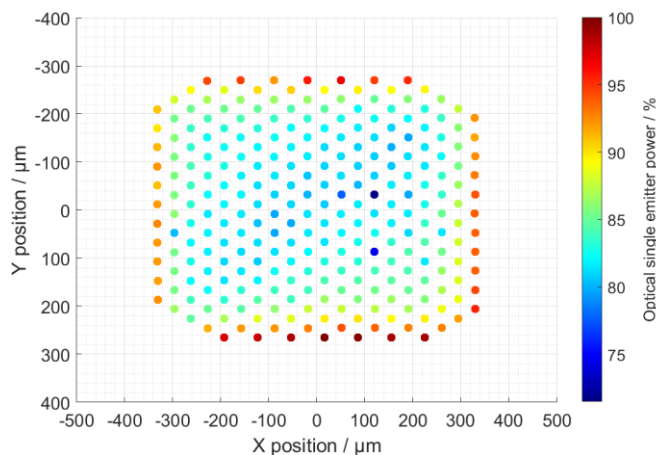


- For connection to a high-resolution array spectrometer
- Allows measuring peak wavelength within the center image position
- Translation of DUT requires xy-stage

VTC 4000: z- and xy-stages

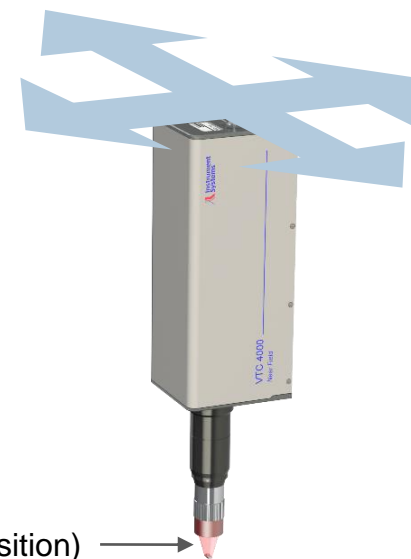
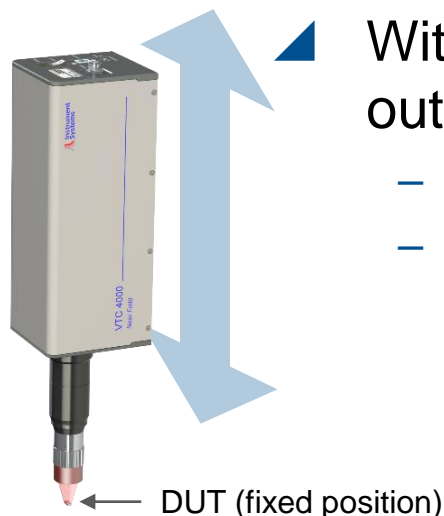
With z-stage

- Scan along focus axis
- Take several images
- Calculated results (for each single emitter):
 - Beam waist
 - Focus position
 - NA, M^2

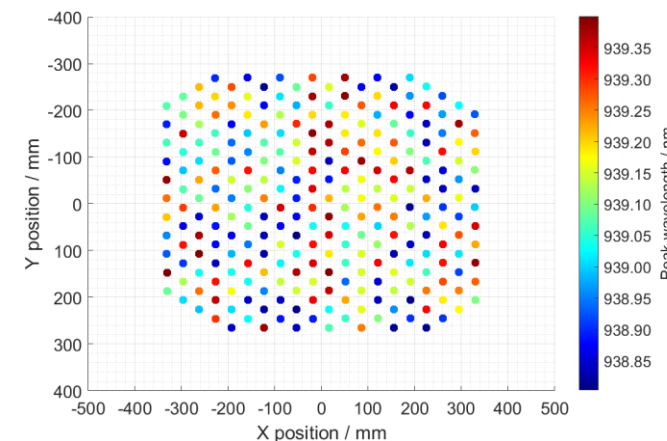


With xy-stage (Version w/ fiber output)

- Scanning over complete VCSEL
- Spectral measurement (for each single emitter)
 - peak wavelength

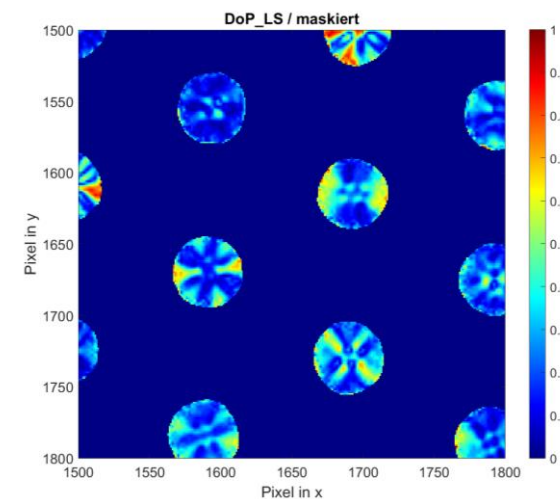


Combined XYZ stages allow full VCSEL characterization

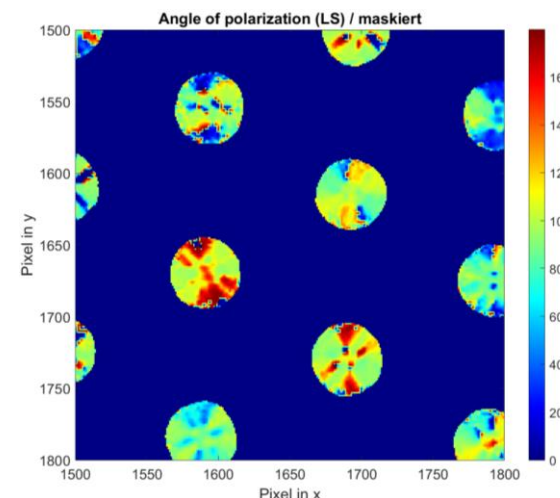


VTC 4000: Polarization

- Why necessary?
 - Each emitter of a VCSEL array individually and each emitter within can have a different polarization
- VTC 4000 measures polarization-corrected power
 - especially important for absolute power measurements relevant for laser eye safety classifications
- Furthermore, polarization characteristics can be quantified:
 - Degree of polarization
 - Angle of polarization



Degree of polarization



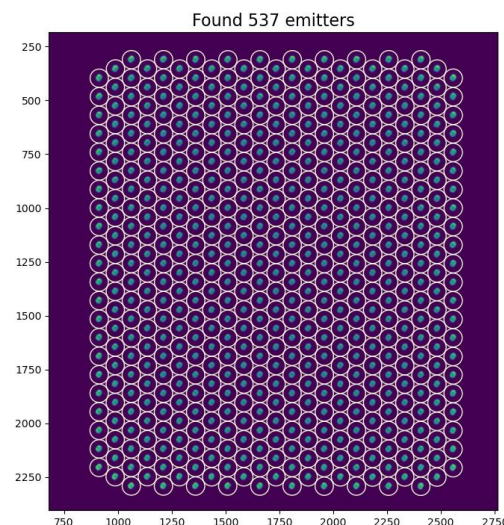
Angle of polarization

This solution can be very helpful for the researchers as well as for VCSEL manufacturers to characterize/analyze polarization controlling techniques

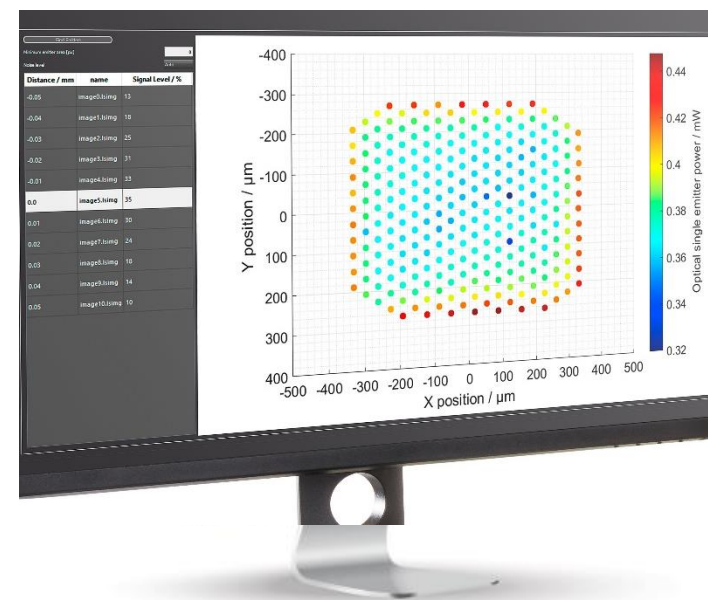
Lumisuite – A powerful software

Single Emitter Analysis

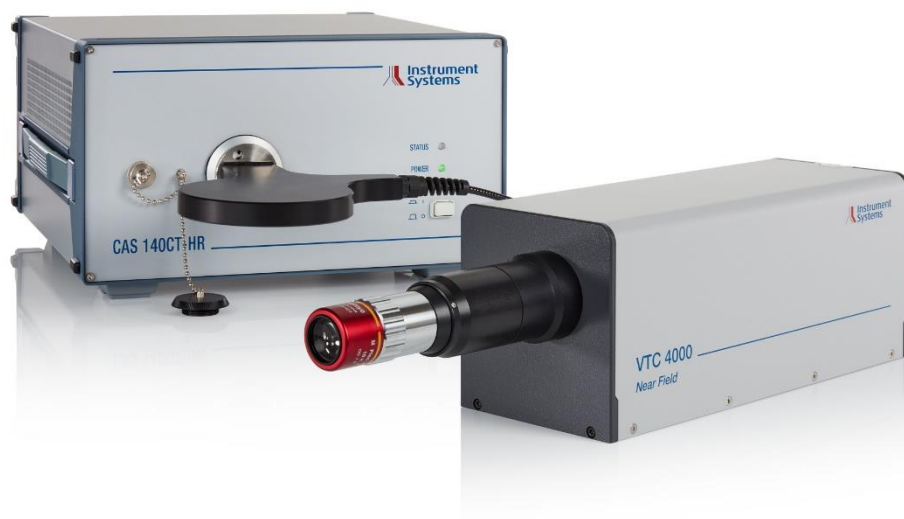
- x/y position determination
- Total Power
- Polarization Analysis
- Diameter in focus position
- Focus position
- NA, M^2
- Peak Wavelength



LumiSuite



Highlights



Technical Highlights

- **Flat-field and absolute power calibration → PTB traceable**
- **2D radiant power and polarization analysis**
- Single emitter wavelength measurement (with CAS)
- Imaged pixel size $0.35\mu\text{m}$
- One-shot images up to $1.4\text{mm} \times 1.0\text{mm}$ (stitching possible)
- NA up to $0.26 (\pm 15^\circ)$
- Calibration in range $910 - 980 \text{ nm}$ possible (e.g. $940 \pm 3 \text{ nm}$)

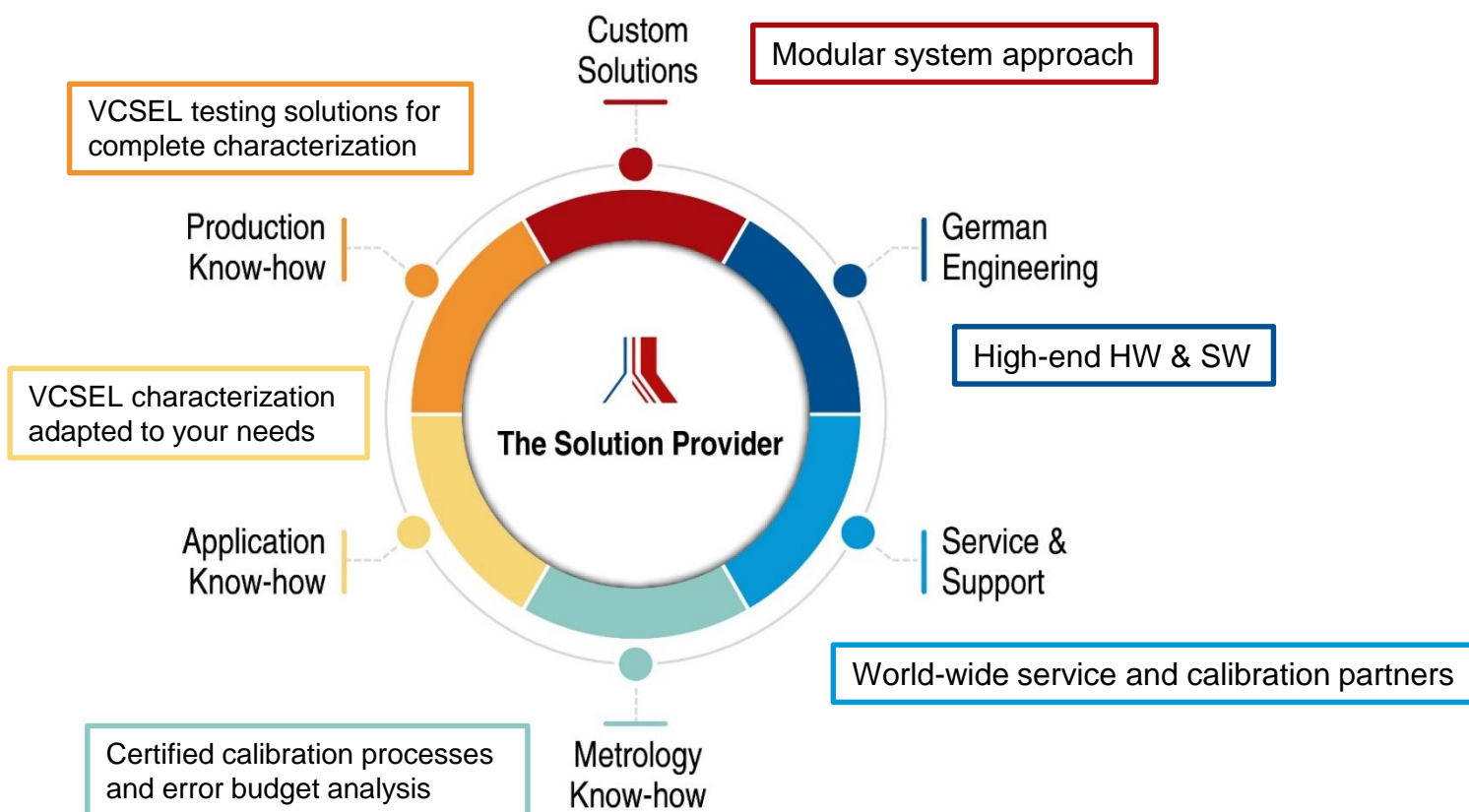
Value chain relevance:

- **Wafer or chip level, before DOE**
- Semiconductor level:
Device is integrated into final device afterwards

Target customer:

- **VCSEL manufacturers: lab and production**
- Partly end customer for quality control reasons

Thank you for your attention



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