Instrument Systems
KONICA MINOLTA Group

# VTC 4000

## Near-field analysis of VCSEL arrays

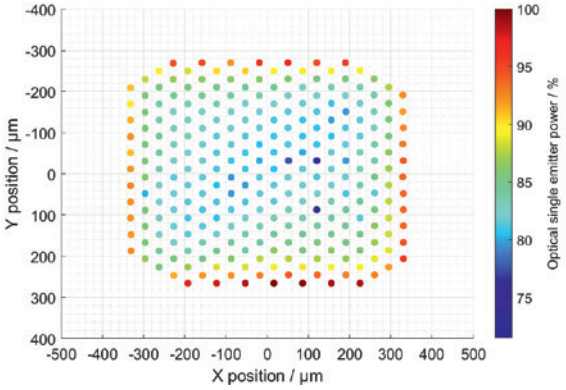
### Key features at a glance

- 2D measurement solution for near field characterization of VCSEL arrays
- Radiant power, polarization, position, divergence and peak wavelength for all single emitters
- Flat-field and absolute power calibration, traceable to national metrology standards
- Easy software integration by LumiSuite SDK

The VTC 4000 is Instrument System's VCSEL testing camera for comprehensive near-field analysis of complete VCSEL arrays. It enables the absolutely calibrated, traceable and polarization-controlled 2D characterization of all relevant parameters for every single emitter on the array. The VTC 4000, consisting of a camera and corresponding microscope optics, is capable of simultaneously determining position, radiant power and polarization of single emitters on a VCSEL array in a single-shot camera measurement. This allows quick and easy detection of defect emitters on the array. The integrated polarization analysis ensures an unprecedented radiant power measurement accuracy with minimal error budget.

## \\ SINGLE EMITTER BEAM WAIST AND SPECTRAL ANALYSIS

By implementation of a z-translation stage, the camera enables the characterization of the single emitter beam profiles. In this way, the single emitters can be characterized in terms of beam waist, numerical aperture and $M^2$ value. For analysing the spectral parameters, the camera is optionally available in a version with fiber output. Connecting the VTC 4000 to a high-resolution CAS spectroradiometer enables measuring the peak wavelength of every single emitter.
The VTC 4000 can be easily integrated into handler systems with x-, y- and z- translation stages. This enables automated characterization of complete VCSEL arrays.




*2D power measurement of single emitters on a VCSEL array.*

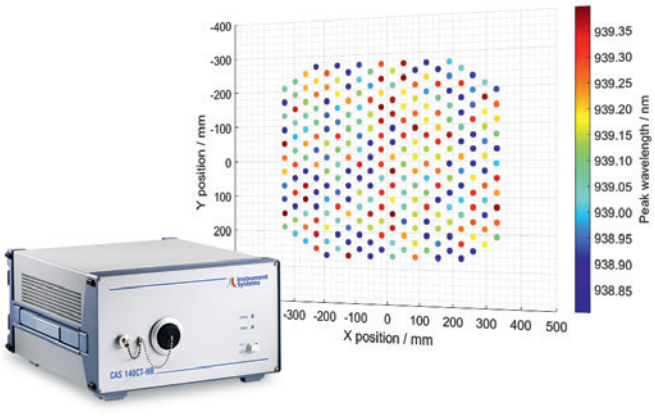
## \\ MEASUREMENT RESULTS

**For each single emitter:**

- Position (x and y)
- Radiant flux
- Polarization angle and degree
- Defect emitter analysis

**With translation stages / optional features:**

- Waist
- Numerical aperture
- $M^2$ value
- Focus position
- Peak wavelength




*2D peak wavelength analysis of single emitters on a VCSEL array with the VTC 4000 version incl. fiber output. A high-resolution CAS spectroradiometer and an xy-translation stage is required.*

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## \\ TECHNICAL SPECIFICATIONS

| VTC 4000 | |
|---|---|
| **General** | |
| Dimensions (L x W x H)<br>(including objective lens, no handle) | Version without fiber connector: 462 mm x 112.6 mm x 121 mm<br>Version with fiber connector: 462 mm x 185 mm x 121 mm |
| Weight | Version without fiber connector: approx. 3.6 kg<br>Version with fiber connector: approx. 4.2 kg |
| Power Supply | 24 V |
| Operating temperature range | 15 – 35 °C |
| Interface | Ethernet |
| Trigger I/O | Yes |
| **Camera system** | |
| Camera sensor | 12 Megapixel CMOS |
| Camera spectral range | 400 – 1000 nm |
| OD Filter | Standard OD9 (optimized for 650 – 1000 nm), others on request |
| Calibration | Possible in the range of 910 to 980 nm (e.g. 940 ±3 nm) |
| Digital resolution | 0.35 µm |
| Optical resolution | 2.2 µm (at 940 nm) |
| Field of View | 1.4 mm x 1.0 mm |
| Integration times | 100 µs – 1 s |
| Typical acquisition time [2] | ~700 ms |
| Radiometric measurement accuracy [1] | 6 % |
| NA | 0.26 |
| **Wavelength measurement with CAS spectrometer [3] (optional, for peak wavelength measurement)** | |
| Spectral range | 800 nm – 1000 nm |
| Spectral resolution (typical) | 0.12 nm – 0.4 nm |
| Data point interval (typical) | 0.05 nm – 0.16 nm |
| Filter wheel with optical density filters (typical) | OD 0.5/1/1.5/2/2.5 |
| Measuring ranges (typical) | 80 nm – 160 nm |
| Wavelength accuracy | ±0.05 nm |
| Integration time | 4 ms – 65 s |
| Spatial resolution | Diameter 20 µm |

[1] With factory calibration traceable to PTB.
[2] Including data processing and transfer time per image
[3] Exact specifications depend on the chosen high-resolution CAS model.

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