

ST-FFP Series Far Field Profilometer Instrument

ST-FFP far field measurement instrument is a stand-alone device for measuring light intensity vs output angle of light emitting components such as high optical power LASER diode bars and other high intensity light sources.

Features

- Standard input wavelength range 400-1700 nm
- Input optical power up to 100W CW
- Scanning angle range $\pm 90^\circ$
- Angular resolution 0.03°
- High dynamic range of >60 dB
- Noise free measurement of pulsed light
- USB connection, Easy to use software
- Advanced plotting features: 1D, 2D, 3D and contour plots
- Tabular data displaying FWHM and NA
- Export measurement data into various formats
- Fixtures for FC, SMA fibers and various LEDs and lasers available
- Maintenance free



Applications

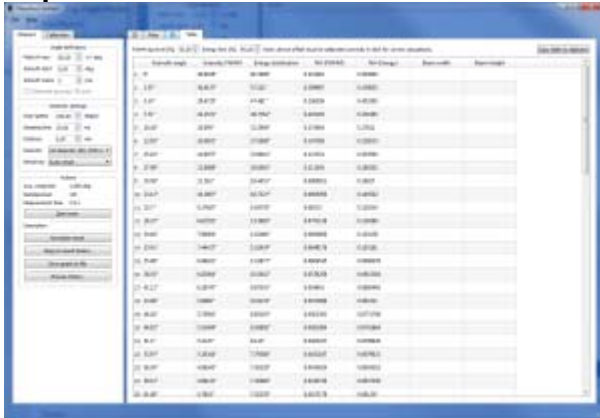
- Light emission intensity vs output angle analysis (a.k.a. far field)
- High optical input power capability
- Numerical aperture characterization of optical components
- Designed for high power laser diodes
- Automated laser diode quality assurance
- Suitable for LED, laser diode, laser bar and fibers

Specifications:

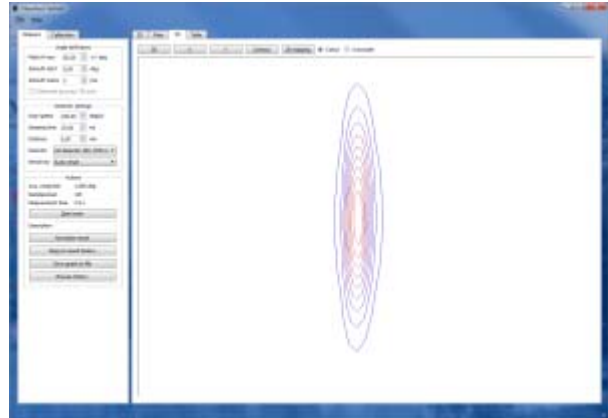
Model	ST-FFP-VIS-IR	ST-FFP-RGB	Customized
Wavelength range	500 – 1700 nm	Separate R,G,B channels	From 200 to 3000 nm
Field of view	$\pm 89^\circ$	$\pm 89^\circ$	$\pm 89^\circ$
Light input aperture	30 mm or SMA/FC fiber mount	30 mm or SMA/FC fiber mount	1-50 mm, custom shape
Angle resolution	0.03°	0.03°	0.03°
Angle resolution in 3D scans	0.05°	0.05°	0.05°
Azimuth resolution	0.01°	0.01°	0.01°
Optical input power	50 μ W – 100W	50 μ W – 100W	10 μ W – 200W
Dynamic range	>60 dB	>60 dB	Up to 90 dB
Sampling time	1.3 – 1000 ms	1.3 – 1000 ms	1 μ s – 1 h
Scanning speed	0.05 – 300 $^\circ$ /s	0.05 – 300 $^\circ$ /s	0.05 – 300 $^\circ$ /s
Photodiode sensitivity ranges	5 decades	5 decades	5 decades
PC connection	USB	USB	USB or custom
Programming interface	ASCII text commands through virtual COM port, optional C# library with examples	ASCII text commands through virtual COM port, optional C# library with examples	Standard or customized
Power	12 V DC 1.5 A	12 V DC 1.5 A	12 V DC 1.5 A
Dimension	305x331x335mm	305x331x335mm	305x331x335mm
Weight	10kg	10kg	10kg
Approvals	CE	CE	CE
Software operating system	Windows 2000 or later,	Windows 2000 or later, 32 or 64 bit OS	Windows 2000 or later,

	32 or 64 bit OS		32 or 64 bit OS
Data display	Cartesian, polar, 3D, contour, table	Cartesian, polar, 3D, contour, table	Cartesian, polar, 3D, contour, table
Export formats	CSV, PDF, PNG, PS, XML	CSV, PDF, PNG, PS, XML	CSV, PDF, PNG, PS, XML

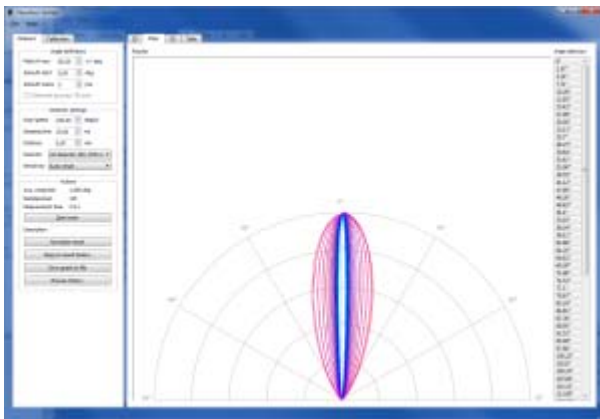
Capabilities



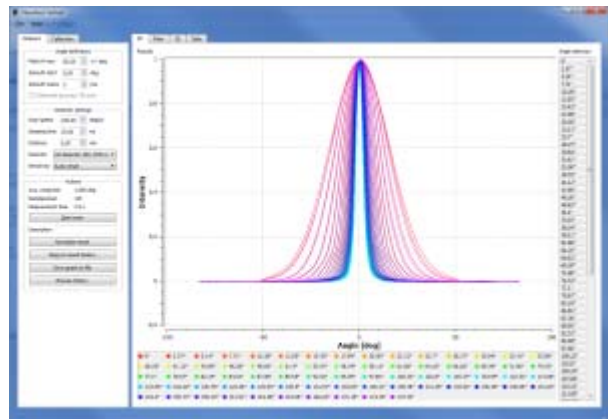
ST-FFP Laser diode measurement, tabular data view



ST-FFP Laser diode measurement, contour plot



ST-FFP Laser diode measurement, polar plot



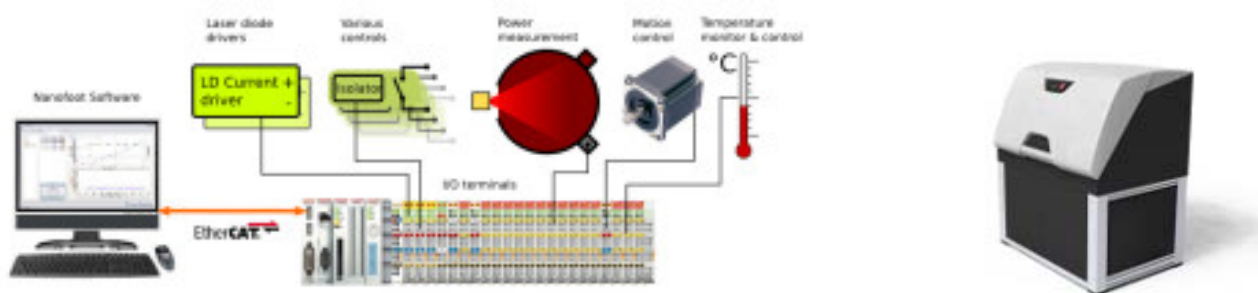
ST-FFP Laser diode measurement, cartesian plot

ST-LDC Series Automated Laser Diode/Bar Characterization & Testing Systems

ST-LDC systems are fully configurable, all-in-one laser diode and LED characterization devices for industries and R&D laboratories. They're designed to measure and analyze all major characteristics of laser diodes and LEDs in a fast and reproducible way. They're ideal tool for data sheet generation, quality control, failure analysis and research activities with semiconductor emitters.

ST-LDC systems are customizable tool to meet various needs required by different activities. They can measure devices from UV-LEDs to telecom laser diodes and high power laser bars, we can features a camera assisted pick'n'place robot capable of collecting diodes from customer supplied trays and finally marking and sorting them after the tests.

Architecture



ST-LDC systems are having modular construction based on robust field bus technology. This construction makes high scalability and easy maintenance possible while keeping number of components minimum.

On ST-LDC system without pick'n'place robotics, devices under test (DUTs) are loaded into the system on multichannel load-trays that are equipped with an individual low resistance bypass switch over each DUT to allow series connected devices operating even in case of open circuit or empty slots. Load tray also features channel specific temperature and voltage monitors and optionally a channel specific temperature control.

ST-LDC capabilities

	Value	Remarks
DUT type	Laser diode, Laser bar, LED, HB LED, UHB LED	Multiple DUT adapters are possible with single ST-LDC
DUT current driver	-> 0-500 mA (CW and/or pulsed) -> 0-5 A (CW and/or pulsed) -> 0-20A (CW and/or pulsed) -> 0-60A (CW and/or pulsed) -> 0-120A (CW and/or pulsed) -> 0-200A (pulsed only) -> 0-400A (pulsed only)	Multiple drivers are possible within single ST-LDC
Load-tray support	Yes	
Power measurement (LIV)	0-200 W optical, 300 – 3000 nm	Various accuracy and calibration options available
Spectrum measurement	200 – 2400 nm, resolution from 10 pm to 1 nm	Based on OSA or spectrometer
Far field measurement	See ST-FFP specifications	
Visual inspection	Near field integrity test	Available as low and high power type
DUT operating condition control	-> TEC/peltier based, up to 30W cooling capacity per DUT, fast temperature variation possible -> Water cooled, up to 400W	Microchannel DUT support only with water cooling

	cooling capacity per DUT -> Nitrogen atmosphere optional -> Humidity control optional	
By-emitter measurements	Spectrum, LIV, Polarity	Only laser for diode bars
Throughput	Depends on the ordered options, contact us to receive throughput calculations	
Dimensions	1200 x 900 x 1500 mm	
Weight	200 kg	
Power	220-240 V AC 5 A	
Approvals	CE	

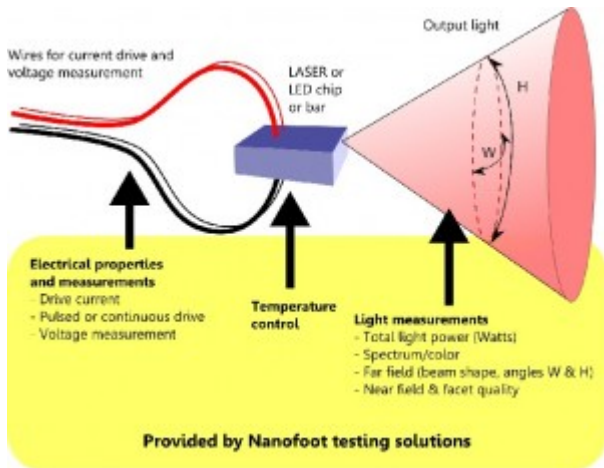
ST- LDCrobo additional capabilities

	Value	Remarks
DUT type	Laser diode, Laser bar, LED, HB LED, UHB LED	Multiple DUT adapters are possible with single ST-LDC
Functions	-> Locate and measure chip position -> Pick chip -> Align and place on testing bench -> Optionally mark chip -> Place chip: Back to the original tray, Sort to different trays, Discard	
Machine vision alignment	Included	
Throughput (standard model)	Up to 3 DUT per minute	Time varies by the tests to be performed, contact us for calculation
Throughput (high volume model)	Up to 10 DUT per minute	Tailor made system for specific testing needs, contact us for calculation
Bare chip handling	Yes	DUT's supplied in a Gel-pak™
Mounted chip handling	Yes	Customer specific DUT trays
Available accuracy grades	-> Basic: +/- 20 µm -> High: +/- 10 µm -> Extreme: +/- 1.25 µm	
Dimensions	1200 x 900 x 1500 mm	
Weight	200 kg	
Power	220-240 V AC 5 A	
Approvals	CE	

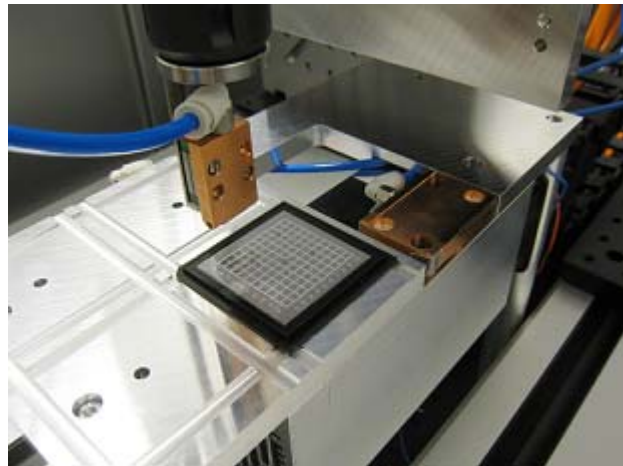
Software:

	Value	Remarks
Operating software	Measuretool	
Result viewer & analysis tool	Result browser	
Common Measurement Database (CMDB)	Yes	
Operating system	Windows 7 32 bit	Supplied within LDC computer (included)
Optical Data analysis	Ith, Slope Efficiency, Wall plug efficiency	
Electrical	Rs, Vbias	
Thermal	T0, T1	
Spectrum	dλ/dT, SMSR, peak λ, FWHM	
Far field	FWHM, Beam Steering	

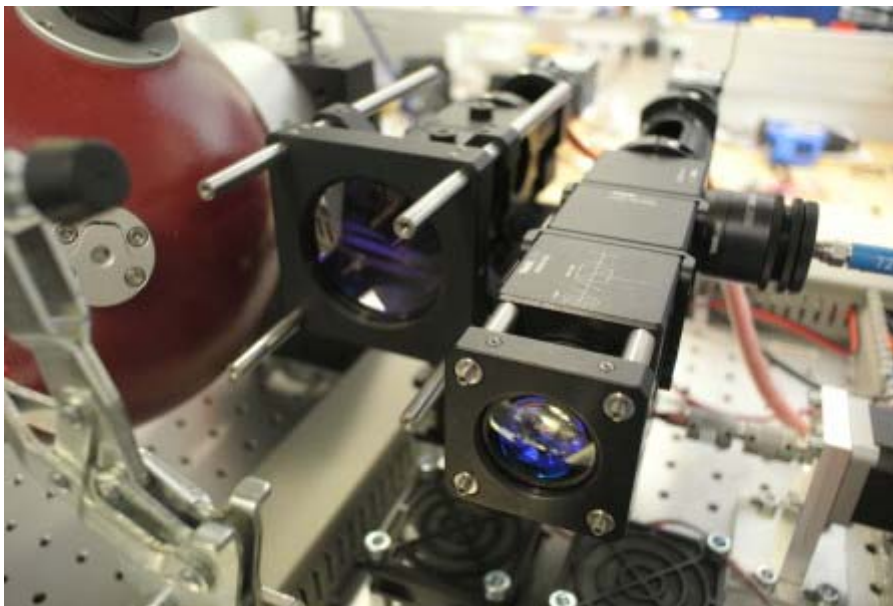
Capabilities:



Various characterization methods of a laser diode



ST-LDC automated pick'n'place robot option



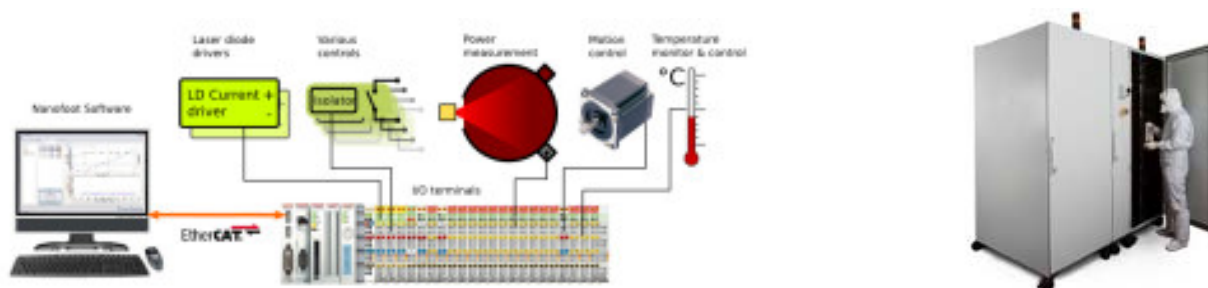
A high optical power near field measurement option

ST-BLT & ST-BLT*nano* Series

Laser diode Burn-in and Life-time testers

ST-BLT series burn-in testers are designed for laser diode manufacturing industry. Stand alone ST-BLT test stations are optimal for high power laser diode burn-in testing and quality assurance. Unique characterization features of ST-BLT testers make them also suitable for simultaneous laser diode characterization and data sheet generation. Each ST-BLT system is assembled to meet customer's specifications on laser bar optical power, mechanical dimensions, measurement features and throughput.

A typical ST-BLT system consist simultaneous burn-in station for 10 to 50 high power laser diodes or bars each emitting up to 150 W of optical power. A system uses shared measurement instruments and laser diode temperature controller for all laser bars making it very cost effective solution when compared to competing systems.



ST-BLT systems have modular construction based on robust field bus technology. This construction makes high scalability and easy maintenance possible while keeping number of components minimum. Multiple ST-BLT systems can be operated from a single control computer. Devices under test (DUTs) are loaded into the system on multichannel load-trays that are equipped with an individual low resistance bypass switch over each DUT to allow series connected devices operating even in case of open circuit or empty slots. Load tray also features channel specific temperature and voltage monitors and optionally a channel specific temperature control.

ST-BLT specifications, on-line measurement model

	Value	Remarks
Product name	ST-BLT	
Scalability	1-64 ST-BLT cabinets per one system	
DUT types	Laser diode, Laser bar, HB LED	
Load-tray support	Yes	
On-line measurements	LIV, Spectrum, Temperature	
Measurement cycle	User definable	
Current drive	Up to 200 A CW or pulsed, up to 20 kW per cabinet	
Temperature control	Water cooling with chiller TEC/peltier with individual DUT temperature setting	
Safety & DUT fault detection	E-stop, Over-temperature, Smoke detector, Short circuits, Open circuits, Optical property change	
Dimensions (W x H x D)	700 x 1800 x 1200 mm	Typical
Power	3 phase AC 380 VAC	

ST-BLT*nano*, blind, non-characterizing type

	Value	Remarks
Product name	ST-BLT <i>nano</i>	
Scalability	1-64 BLT <i>nano</i> cabinets per one system	
DUT types	Laser diode, Laser bar, LED, HB LED	
Load-tray support	Yes	
On-line measurements	Voltage, Temperature	
Measurement cycle	Continuous	
Current drive	Up to 100 A CW or pulsed / up to 1 kW	
Temperature control	Water cooling with chiller	

Safety & DUT fault detection	E-stop, Over-temperature, Smoke detector, Short circuits, Open circuits	
Dimensions (W x H x D)	700 x 500 210 mm	Typical
Power	1 phase 230 VAC	

ST-VIS Series Visual Inspection System

ST-VIS is dedicated tool for laser bar inspection in production environment. This system inspects around 50 laser bars in hour for any visible defects in (sub threshold) near field or at surface of exit facet. While doing this system provides also accurate measurement from laser bar overhang and smile.

ST-VIS classifies all images and measurement results to passed / failed by internal criteria / failed by external criteria. These rulings may be used to see which bars can be sold, when bars can be sold although they have some defects and when bars are too defective to be sold. ST-VIS also provides systematic way to find defects. For example result stored to database can be: Emitter 18 had too large defect, and its overhang was too big (22.1 μm).

Features:

- ST-VIS replaces operator in labour intensive facet inspection and provides key advantages
- Defects are found every day – every hour. System does not have bad days and it does not get tired.
- Simultaneous near field inspection provides enhanced way to find faulty devices
- All results are systematically logged and easily accessible afterwards.



Facet and Near-Field inspection

The facet inspection option can be used to detect particles, cracks and coating defects down to 1 μm in diameter. With this option a microscope is used to take an image from front facet which can be analyzed either by the user or by machine vision software.

We have developed measurement modes that work in conjugation with facet inspection using same camera and opto-mechanics. These new measurement options are sub-threshold NF imaging and overhang measurement. Sub threshold imaging of NF helps system to find defects that are difficult to find using regular machine vision imaging methods. This option provides enhanced defect detection. With this mode facet inspection (NF and visual) and overhang measurement can be done in less than 75 s per bar (19 visual inspection images, 19 NF images and overhang measurement). This enables inspection of more than 300 laser bars per day.

Overhang measurement

Second new mode, overhang measurement, allows system to use focus data from laser diode facet and from submount to determine overhang of laser bar. Overhang of the bar is measured from both edges of bar and for single emitters measurement is done at the centre. This verification is important in order to qualify bar mounting process.

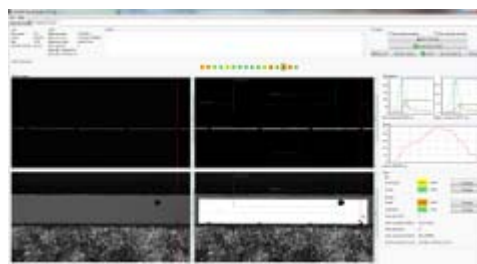
Smile measurement

High precision smile measurement entity. Contains high resolution low distortion microscope and enhanced vibration isolation. This can be used to measure laser bars smile with +/- 0.2 μm accuracy (95% of confidence). Although system is vibration isolated, due to extreme accuracy of measurement, system must be installed in space without excessive noise and vibrations to reach specified accuracy.

Configurations:



ST-VIS cameras

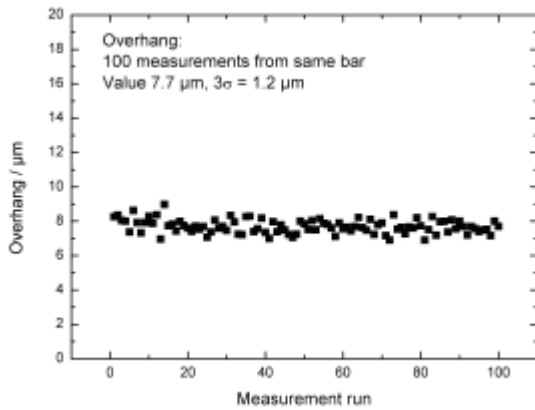


ST-VIS result studio

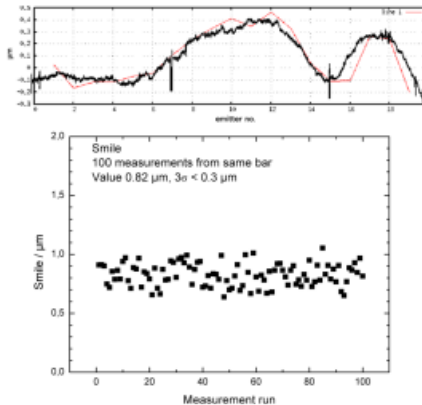
Specifications:

Property	Value	Remarks
DUT's per Load tray	8,16 or 24	
Throughput	0.5-2 DUTs/min	For 19-47 emitter bars
Particle recognition	1 μm	
Near-field continuity check	Yes	
Smile measurement resolution	100 nm	
Smile measurement repeatability	+/- 250 nm	Typical
Overhang resolution	100 nm	
Overhang repeatability	+/-1 μm	Typical
Near-field laser drive current	0.1-100 mA	Auto-adjusting
SQL database support	Yes	
Offline results browser	Yes	
Dimensions	1200 x 750 x 1500 mm	
Weight	220 kg	
Power	230 VAC, 5A, 1-phase	
Agencies	CE	

Capabilities:



Repeatability of 100 overhang measurements



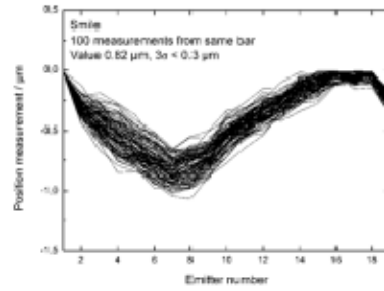
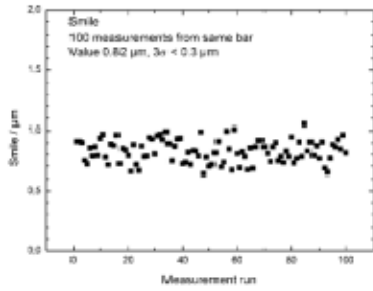
Verification of smile measurement by comparing to an optical profilometer curve (black) vs. VIS measurement (red). Below is the repeatability test of 100 runs.

LASER bar (front view)

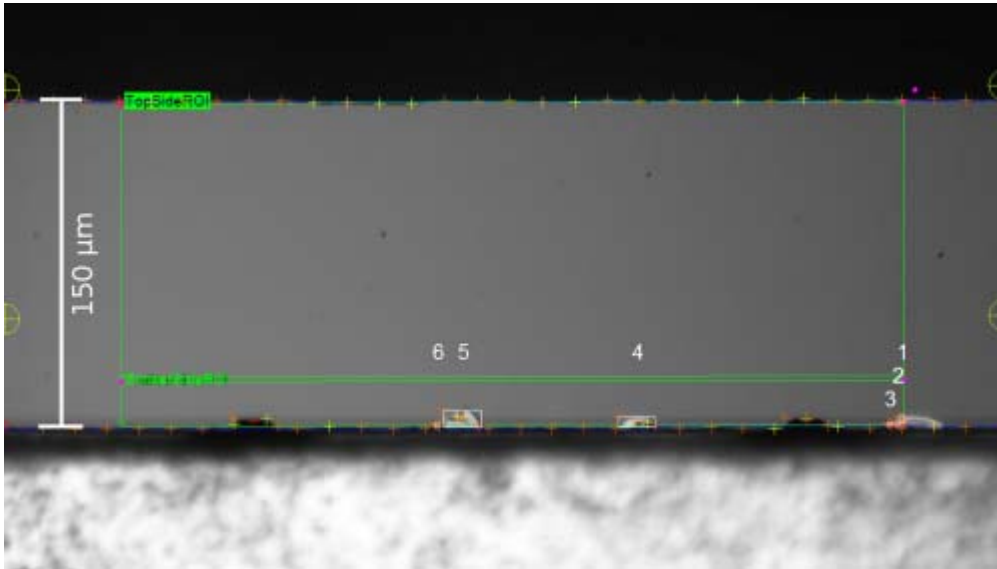


"Smile" illustration

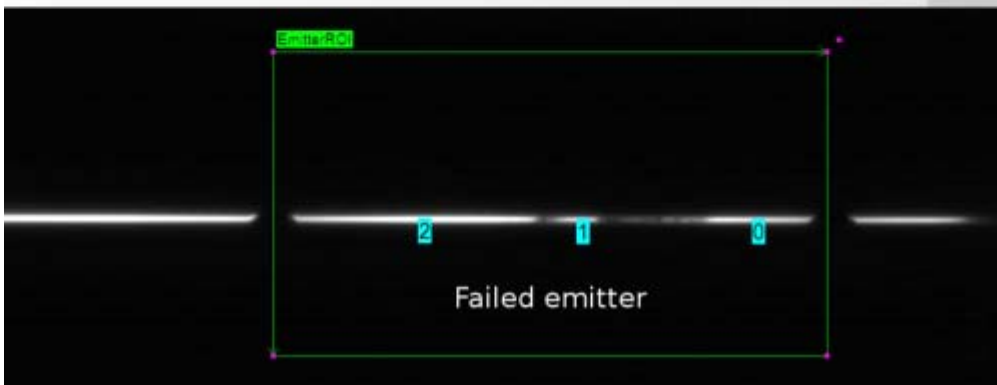
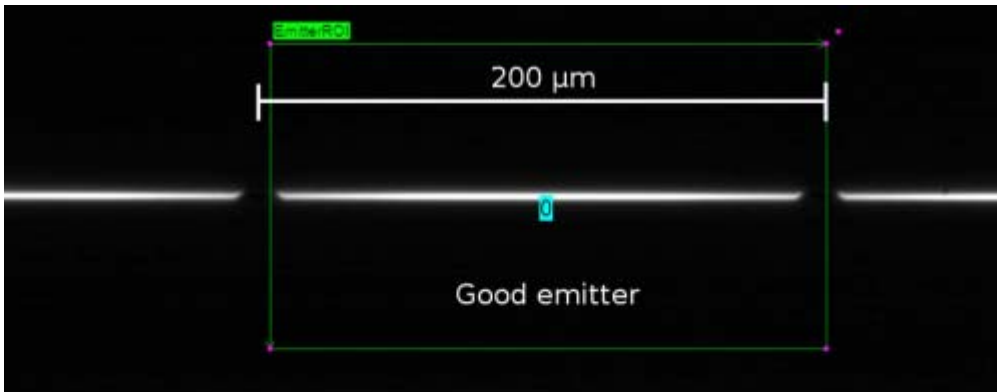
In the ideal case the bar is straight (smile 0 μm)



Smile measurement repeatability, 100 runs



Laser bar facet active area defect detection



Near field test of a good and a bad laser bar emitter