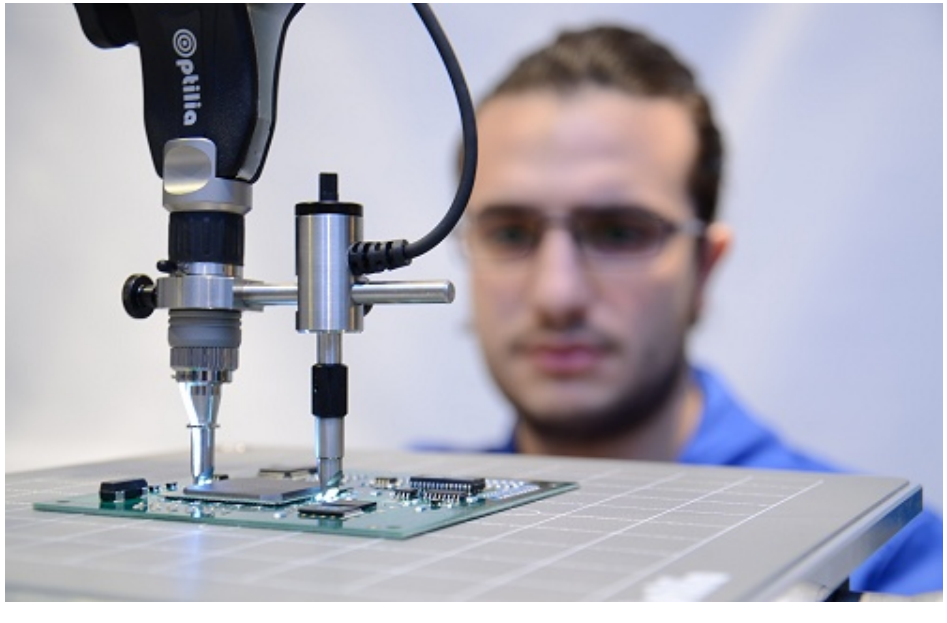
Optilia Instruments

Empowering Your Vision!

Product Review:

Optilia BGA Inspection Systems

Cutting edge technology in optical inspection of BGA, µBGA, CSP and FlipChip soldering!



Optical BGA Inspection vs. X-ray

Capabilities

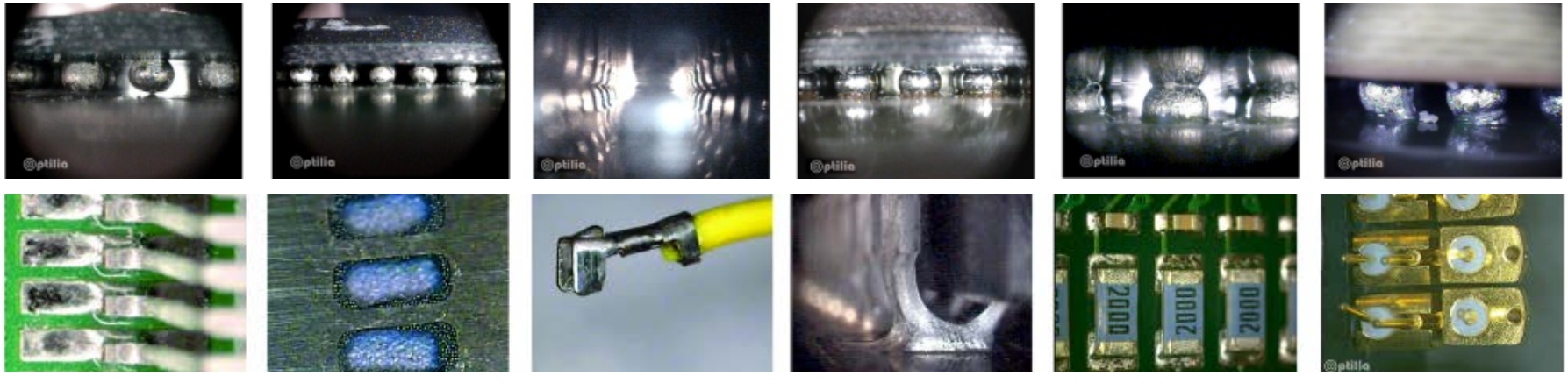
BGA	Optical Inspection	X-ray Inspection
Placement		
Bridging		
Cold Solder Joints		
Reflow Problems		
Excess Flux		
Contamination		
Ball Shape		
Voids		

PCB	Optical Inspection	X-ray Inspection
Top Inspection		
Assembly and Rework		

What are the Applications?

Optical Inspection, recording, analysis and documentation of

- BGA
- µBGA as low as 40 microns stand-off
- CSP
- Flip-Chip
- SMD Solder Joints
- Printed Solder Paste
- Assembled PCBs
- Stencil Apertures
- Components, pad, scores, connectors, cables



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Optilia BGA inspection technology

New generation, 90° side view BGA inspection system

- Specially designed patented optical system for bright image at low stand-off
- Flexible and configurable
- Reliable, easy to use and easy to maintain

Swedish patent: SE 528,286
US patent: US 7,643,136

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Optilia BGA inspection technology

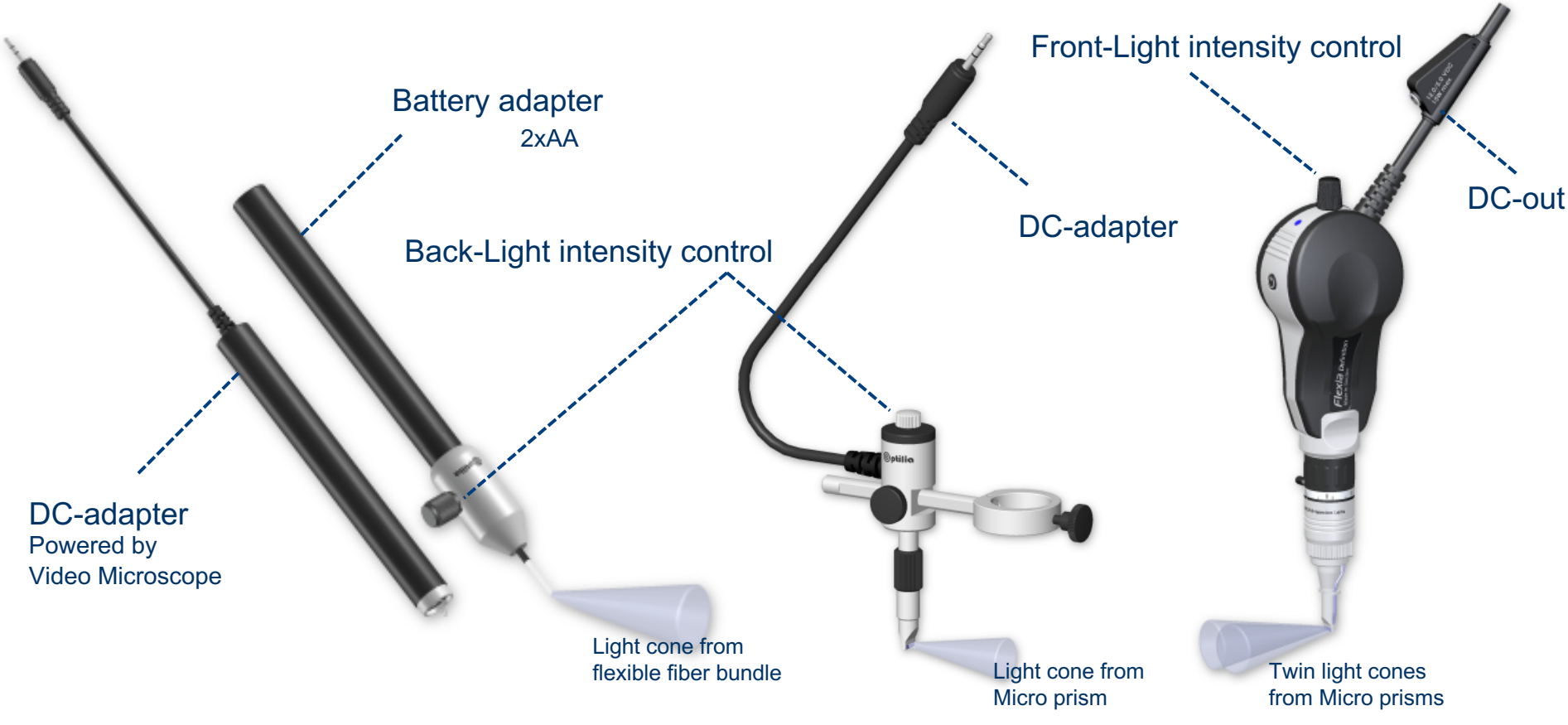
Optical system build-up

- Digital Video Microscope with 5.0MP image sensor
- Attachable BGA lens with built-in LED front illumination with exchangeable stainless-steel optical probes
- Attachable Micro-prism background illumination and/or
- Flexible Brush-light background illumination
- Attachable fix-focal length or varifocal lenses

- Variety of Stand options
- Precision XY-boards
- Different Software options

Optilia BGA inspection technology

New technology long-life multi-LED illumination system



- Built-in High intensity front LED light with electronic Dimmer. Easy to adjust for best image
- Micro-prism background illumination with electronic Dimmer. Attached to the BGA lens
- Flexible Brush-light background illumination with electronic Dimmer. Highest flexibility
- Mobile battery powered or attached to DC-output of digital video microscope

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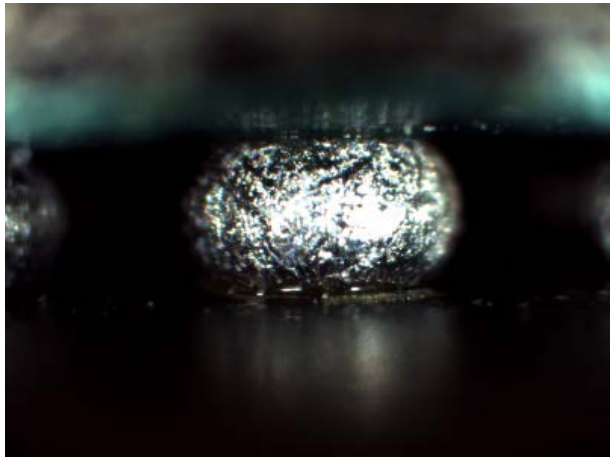
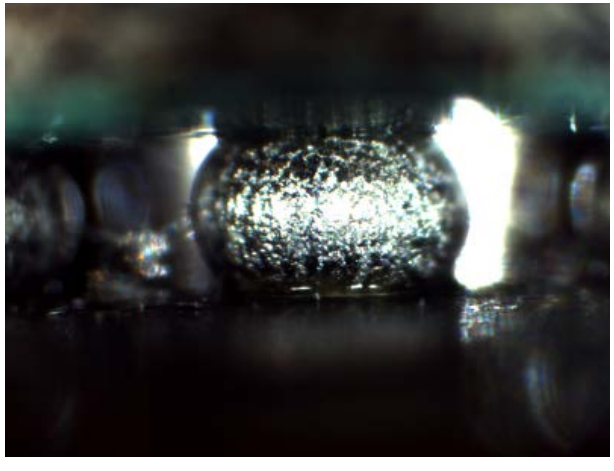
Illumination impact on image

BGA solder ball illuminated by front incident light only. Surface structure and shape are visible.



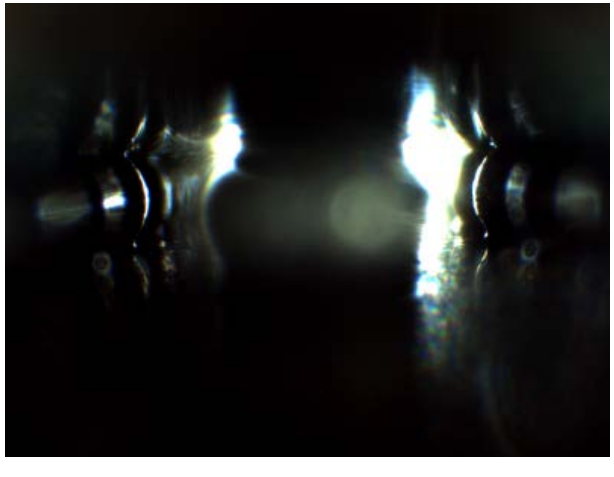
Normal intensity front-light (incident) only.

Same ball with both front- and back-illumination, normal intensity. Surface structure, shape and solder wetting are visible.



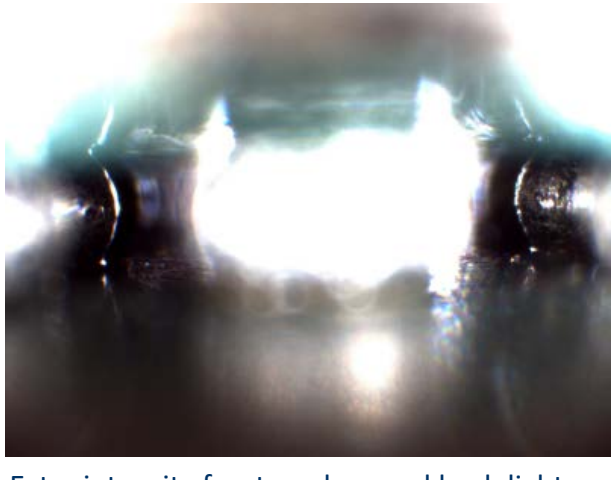
Normal intensity front and back-light.

BGA lens is Refocused. Bridges, contamination, fibers, excess flux are visible now.



Normal intensity front- and back-light. Refocused on thirds rows of bumps.

Front light intensity is increased! Surface structure of second row bumps become visible!



Extra intensity front- and normal back-light. Refocused on second rows of bumps.

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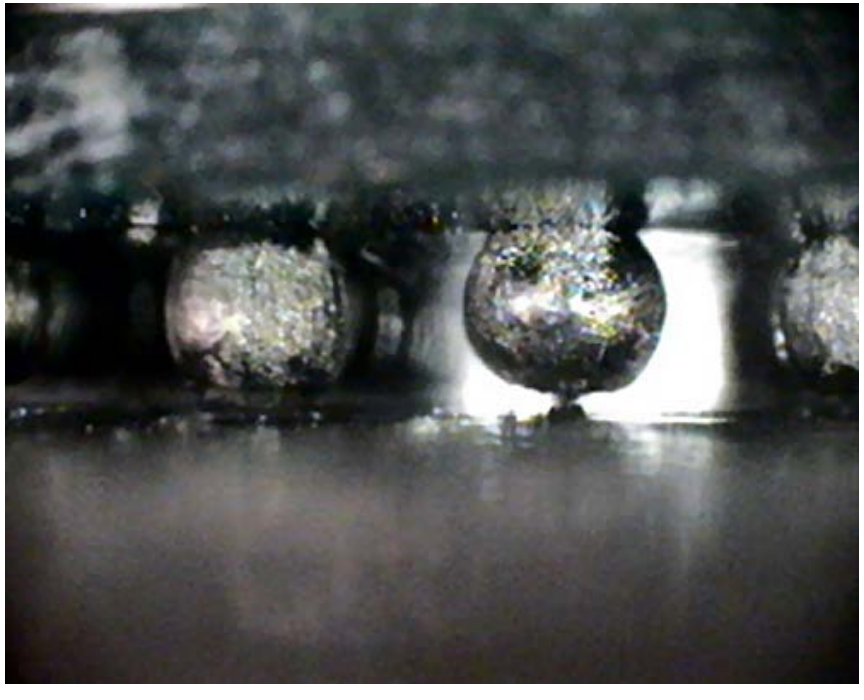
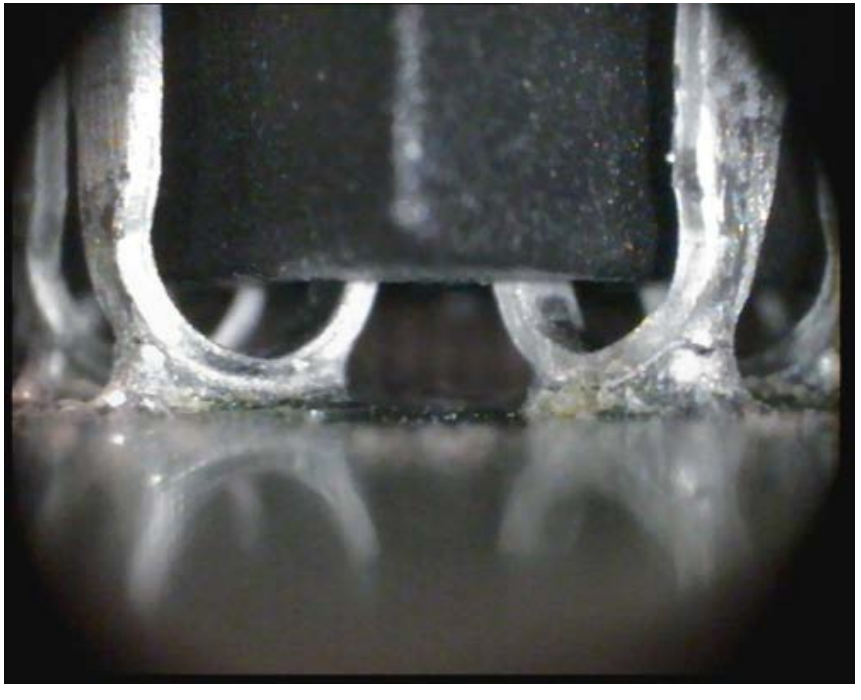
Optilia BGA inspection technology

Sample pictures



Connection failure, BGA component.



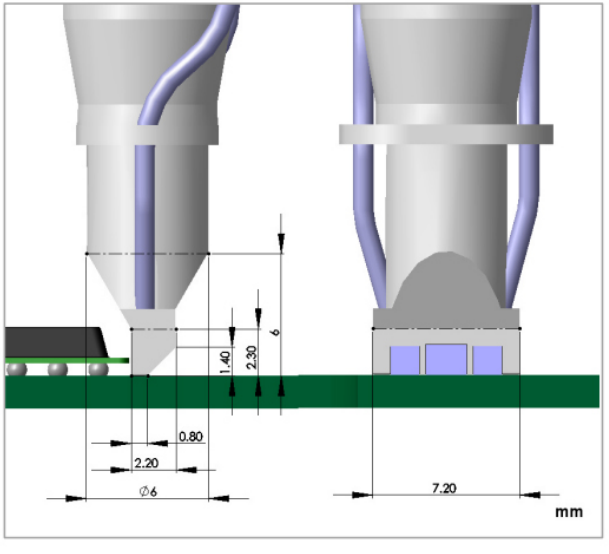
Crack on lead solders, JLCC component.

BGA lens with Low Aperture 90° Optical Probe

Robust and Long-life Operation

OP-006 550

OP-006 551



- 40 microns BGA stand-off inspection capability
- Exchangeable Optical Probe (spare part)
- Magnification Up to 280x on a 24” Monitor
- Built-in LED illumination

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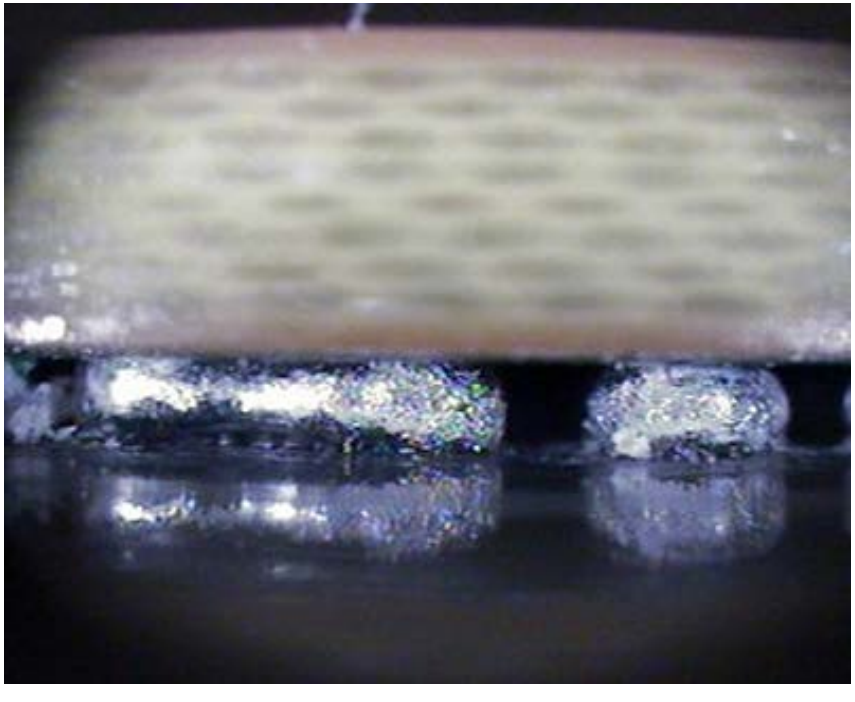
Sample pictures with Low-aperture BGA lens

Fibres between BGA balls



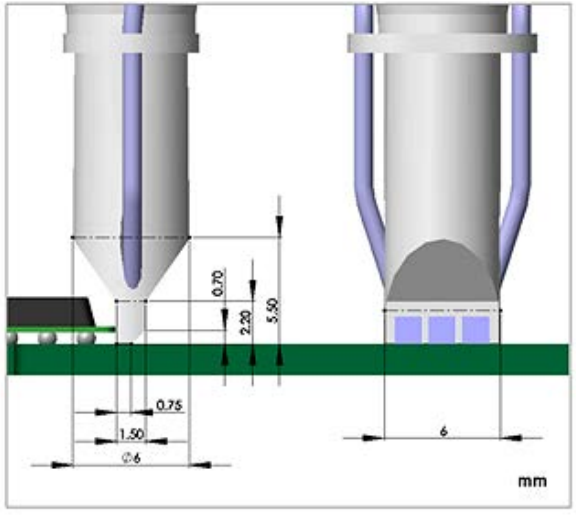
Bridge

BGA lens with Small Size 90° Optical Probe

Slim Optical Probe for Reliable Inspections

OP-006 560

OP-006 561



- 40 microns BGA stand-off inspection capability
- < 1.5 mm thin optical head (0.8 mm foot print)
- Exchangeable Optical Probe (spare part)
- Magnification Up to 350x on a 24” Monitor

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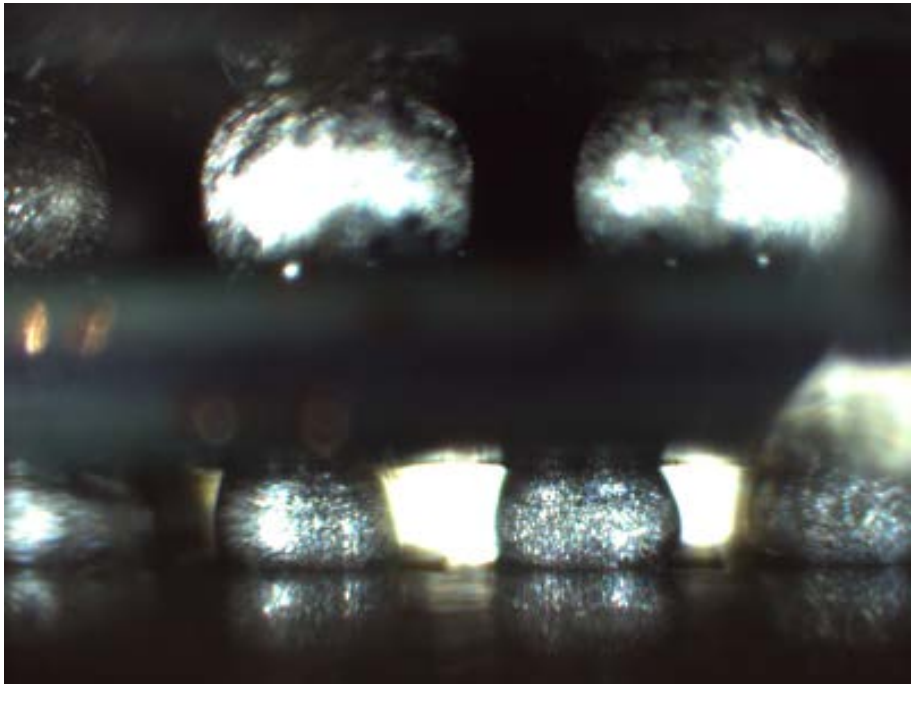
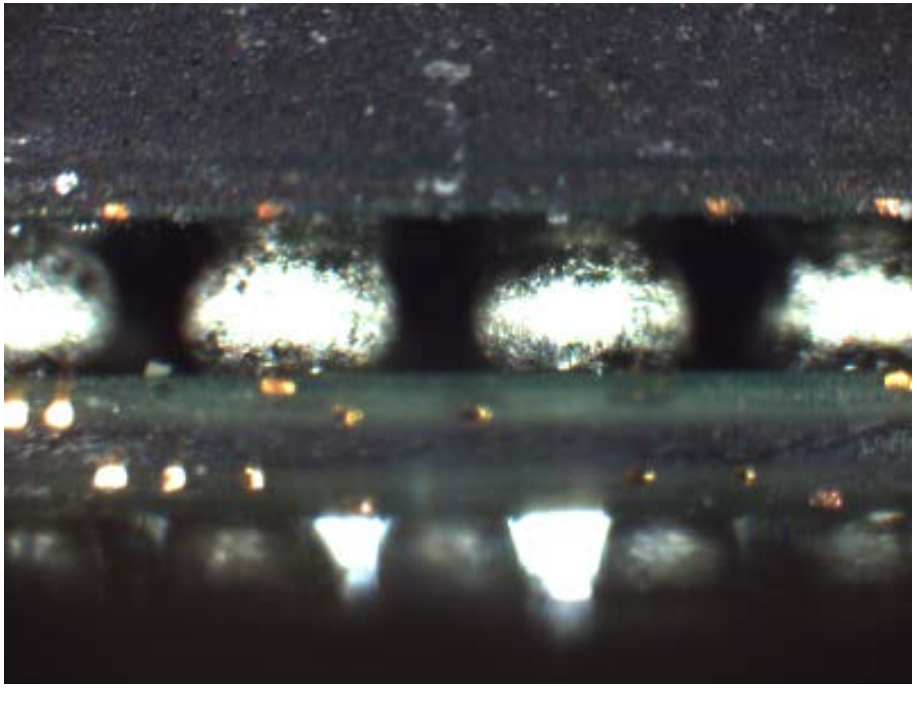
Optilia BGA inspection technology

Sample pictures with Low aperture BGA lens



Flip-chip component.



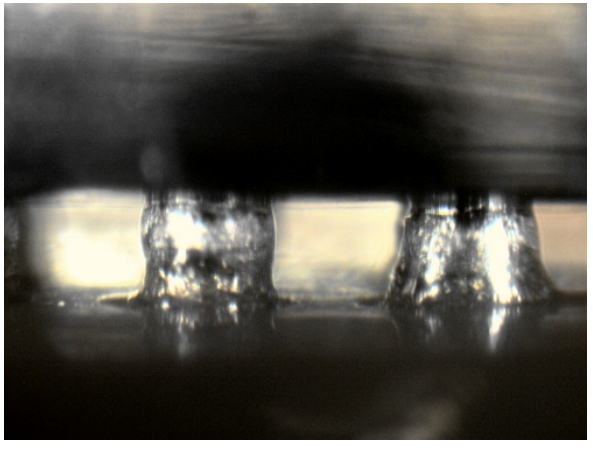
Same component. Lens is re-focused!

BGA lens with Ultra Small Size 90° Probe

Ultra Slim 0.8mm Optical Head for Narrow Inspections

OP-006 570

OP-006 571



- Tiniest BGA probe in the market (0.4x3.4 mm foot print)
- 40 microns BGA stand-off inspection capability
- Exchangeable Optical Probe (spare part)
- Magnification Up to 350x on a 24” Monitor

Comparison of BGA side viewing Lenses

Specification

Specification (with Flexia)	Low Aperture	Small Size	Ultra Small Size
24” Screen Magnification	~ 280x – 5x	~ 350x – 25x	~ 350x – 25x
Working Distance Range	~ 0.5 – 100 mm	~ 0.3 – 40 mm	~ 0.2 – 40 mm
Field of View	~ 1.2 – 50 mm	~ 1.0 – 20 mm	~ 1.0 – 20 mm
Depth of Field	~ 5 mm at 20x / ~ 0.2 mm at 250x		
Front Illumination	Integrated twin LED via Micro-Prisms		
Back Illumination	Flexible LED fiber optics Brush-light with Electronic Dimmer powered by 3xAA Batteries (mobile) or by Flexia video microscope Attachable LED Micro-Prism-light with Electronic Dimmer powered by Flexia video microscope		
Stand-off Capability	Minimum 0.04 mm (40 microns)		
Thickness of Optical Probe	2.2 mm	1.5 mm	0.8 mm
Width of Optical Probe	7.1 mm	6.0 mm	3.4 mm
Foot Print of Optical Probe	0.8 x7.1 mm (WxD)	0.8x 6.0 mm (WxD)	0.4 x3.4 mm (WxD)

Top-View Varifocal Lenses

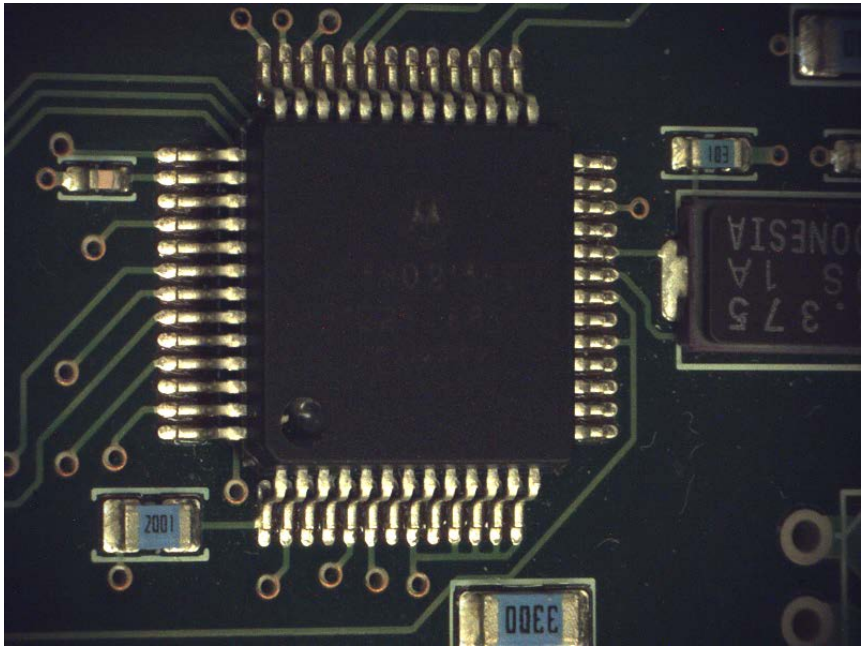
Attachable lenses with Built-in LED light for Top Inspection

1-100x varifocal lens with built-in LED RingLight, **OP-019 407**

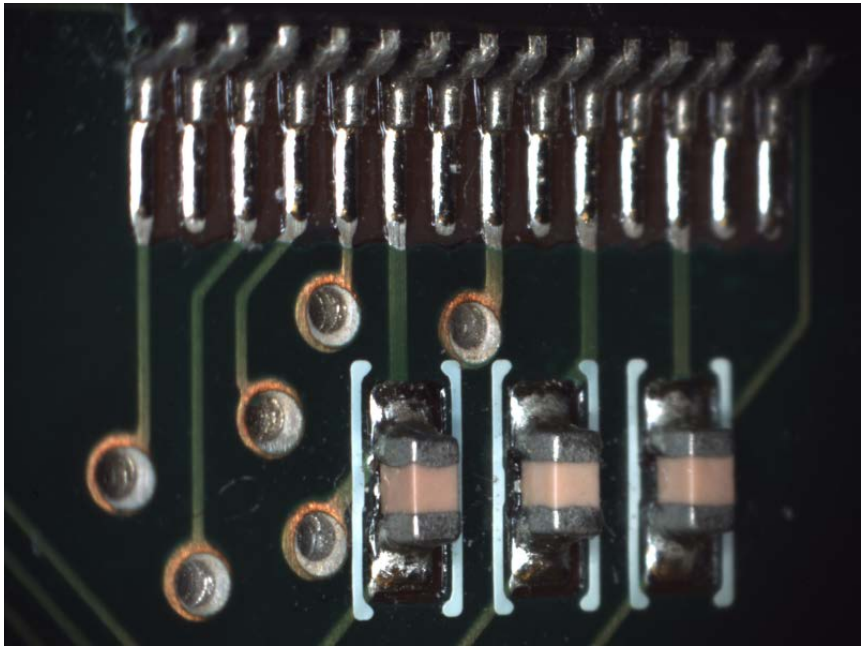
Built-in LED Light

10-50x varifocal lens with Polarized LED RingLight, **OP-019 408**

Polarized LED Light



10x magnification, built-in RingLight



50x magnification, built-in RingLight

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Top-View Fixed focal length lenses

High Magnification Fixed lenses, calibrated in the software

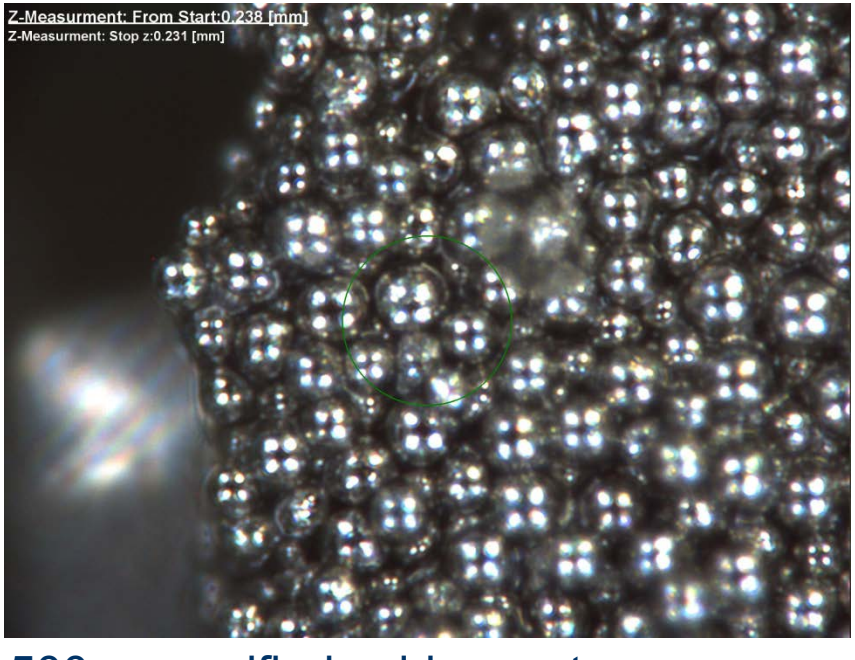
170x Objective lens

250x Objective lens

500x Objective lens

Ringlight for 100x & 170x lens

Diffuse (contact) ringlight for 250x lens & 500x lens



500x magnified solder past

250X, SOIC leads

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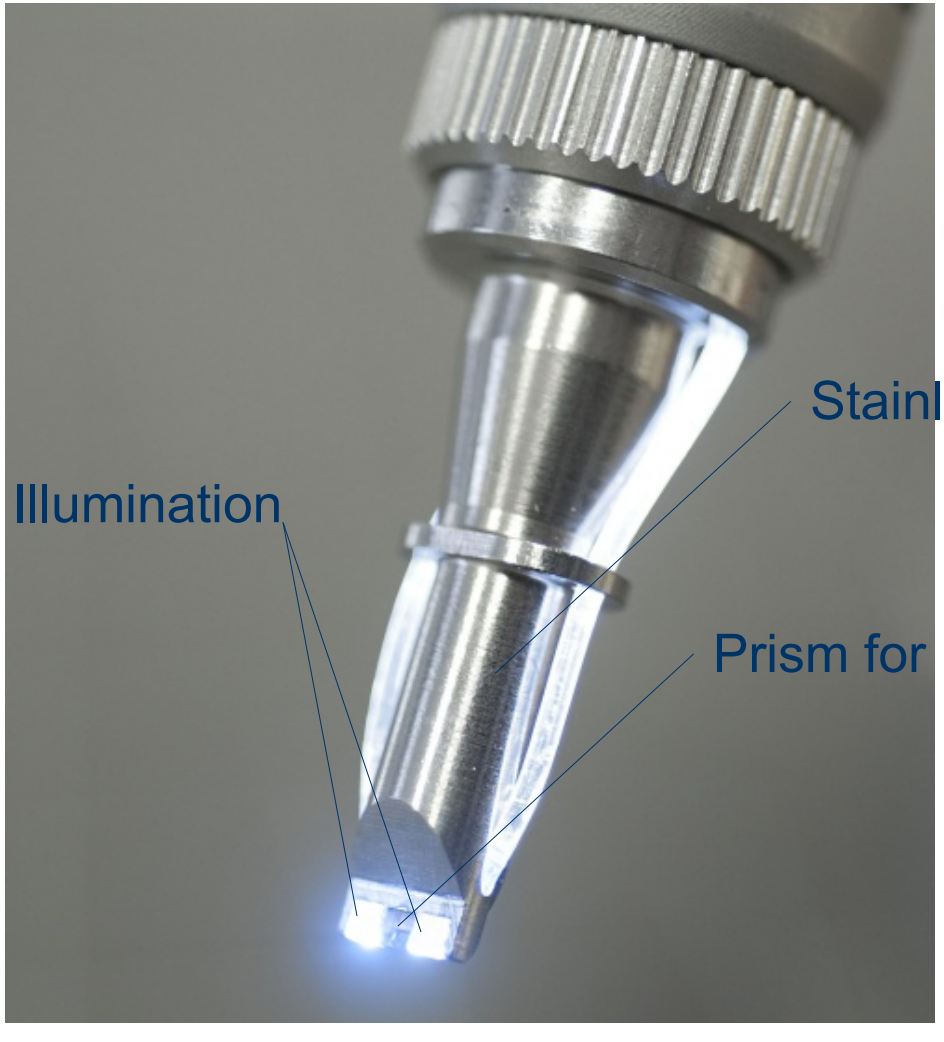
Why use Optilia BGA inspection systems?

Robust design, Micro prisms encapsulated in Steel Housing



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Why use Optilia BGA inspection systems?

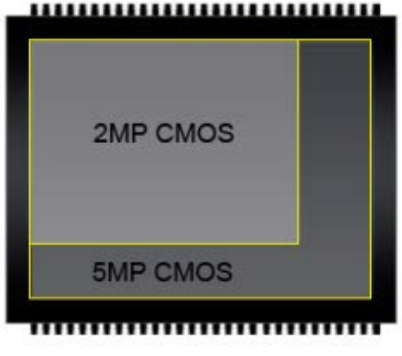
High Resolution 5.0 MP image sensor

2MP CMOS
1600H x 1200V

4.48x3.36 mm sensor size
2.6x2.6 μm pixels size

5MP CMOS
2592H x 1944V

5.7x4.28 mm sensor size
2.2x2.2 μm pixels size



60% Larger Sensor
27 % Larger Field of View
160% More Pixels

- Highest resolution BGA system in the market. Crisp picture with more details!
- Larger Field of View makes hidden balls more visible

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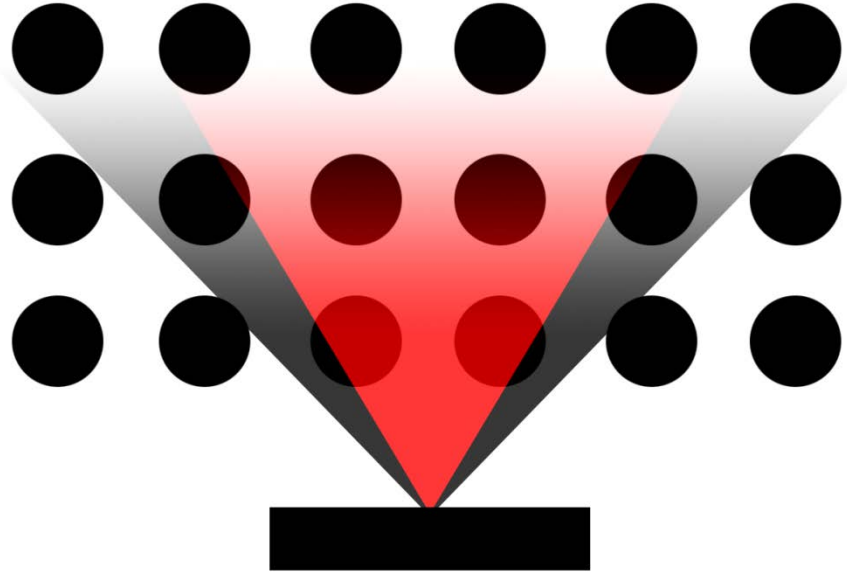
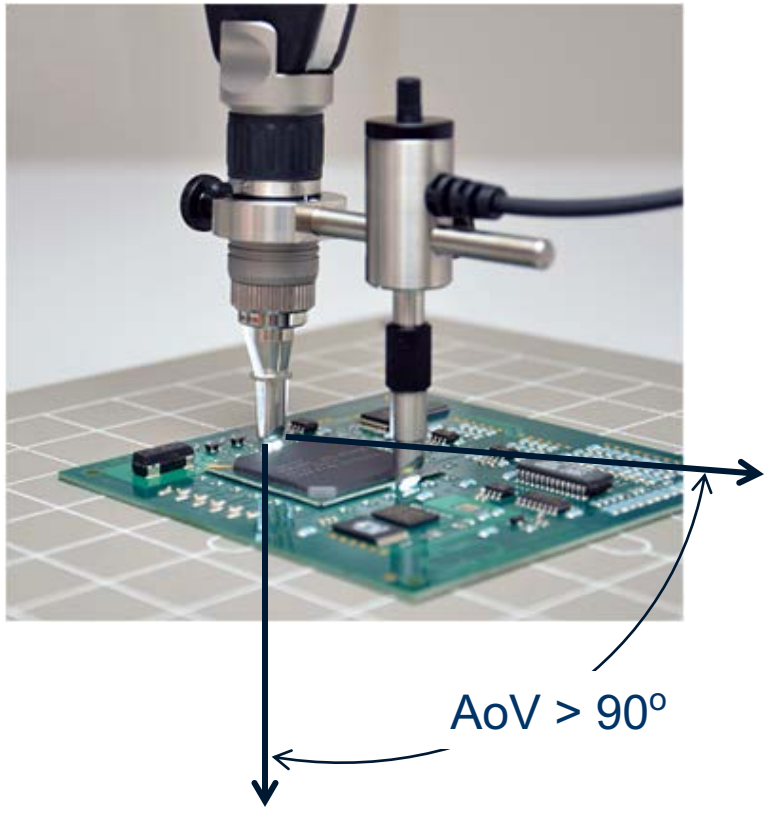
Why use Optilia BGA inspection systems?

Larger Angle of View of the system makes hidden rows more visible!

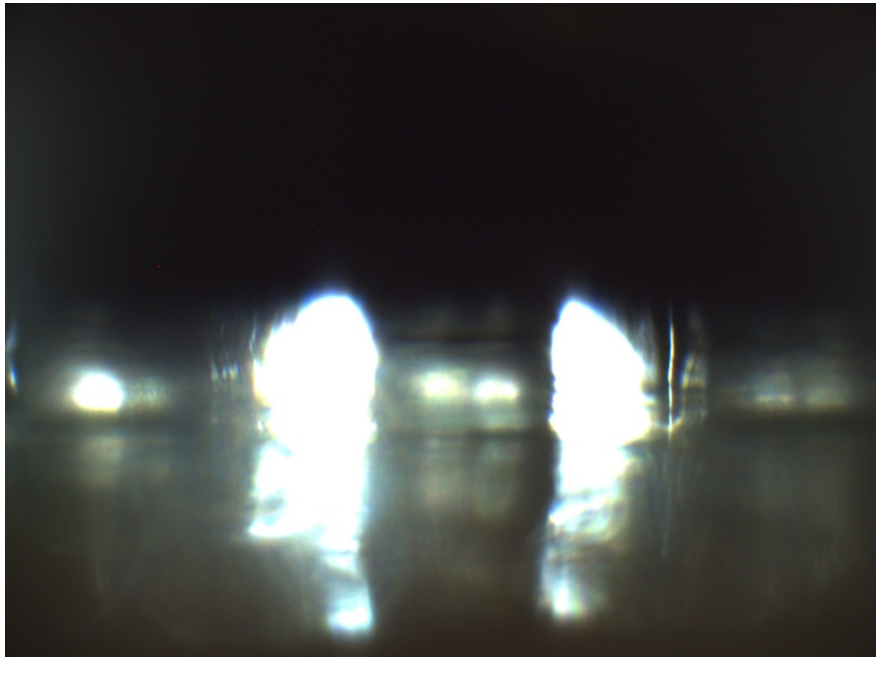




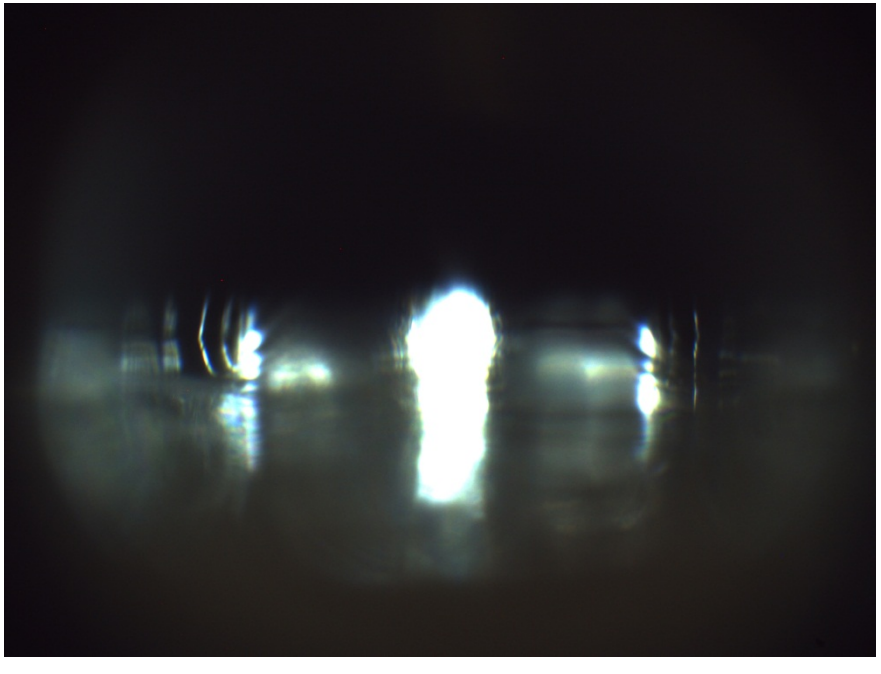
Red cone: Angle of View of the BGA lens with 2.0Mp camera
Black cone: Angle of View of the BGA lens with 5.0Mp camera

Why use Optilia BGA inspection systems?

Designed for imaging BGA components with low stand-off



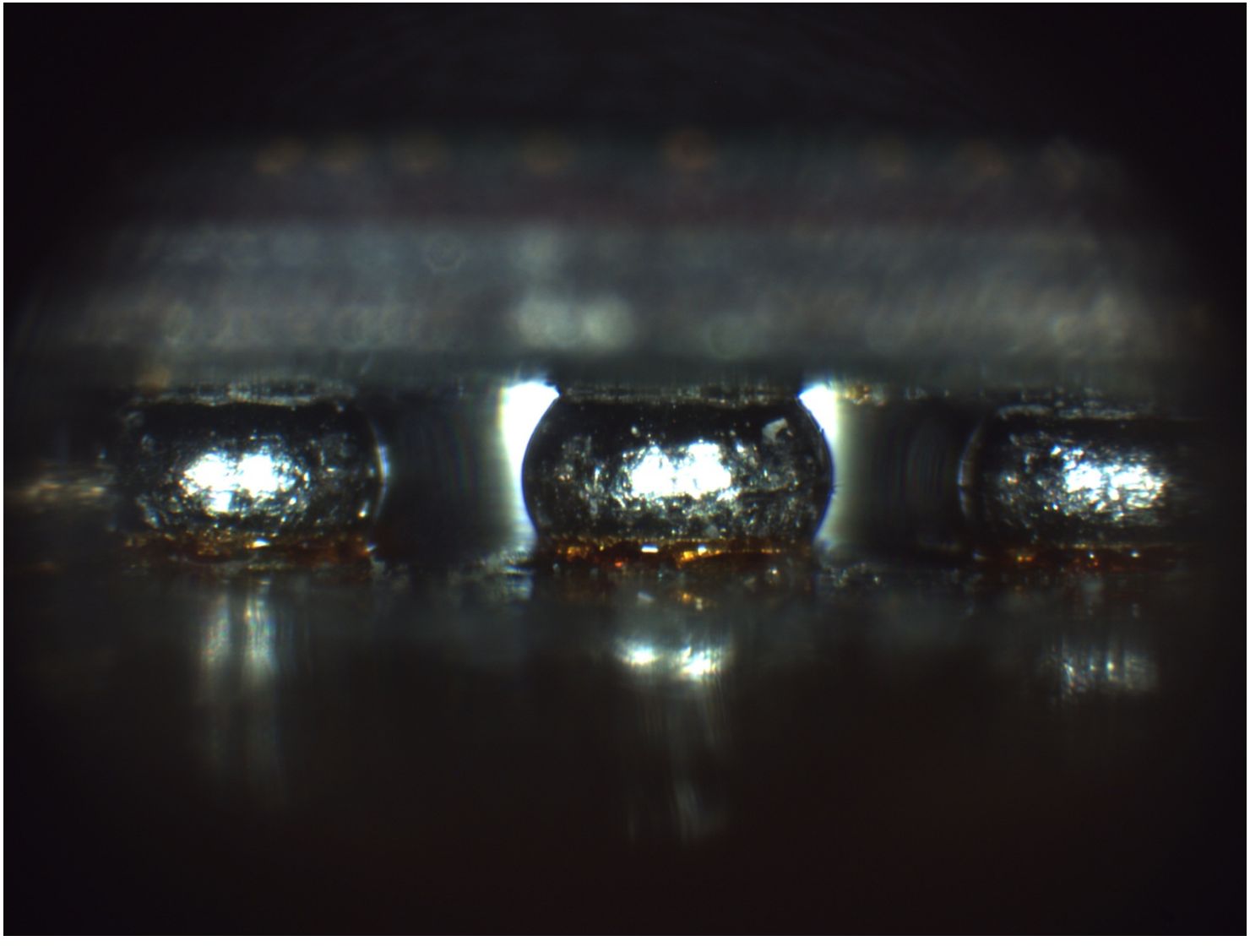
µBGA with 120 mm stand-off
Small size lens with **2.0 MP** camera



µBGA with 120 mm stand-off
Small size lens with **5.0 MP** camera

Why use Optilia BGA inspection systems?

Adjustable Focus for imaging up to 20 Rows for BGA



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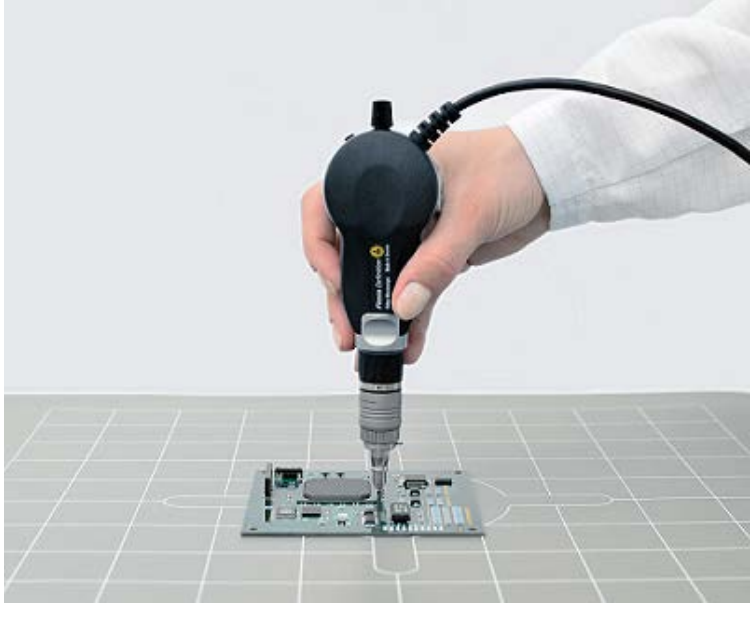
Why use Optilia BGA inspection systems?

Flexible and Configurable



- Free hand operation
- Stand mount with background light and XY-translation
- XL-configuration with PCB holder for large size PCBs

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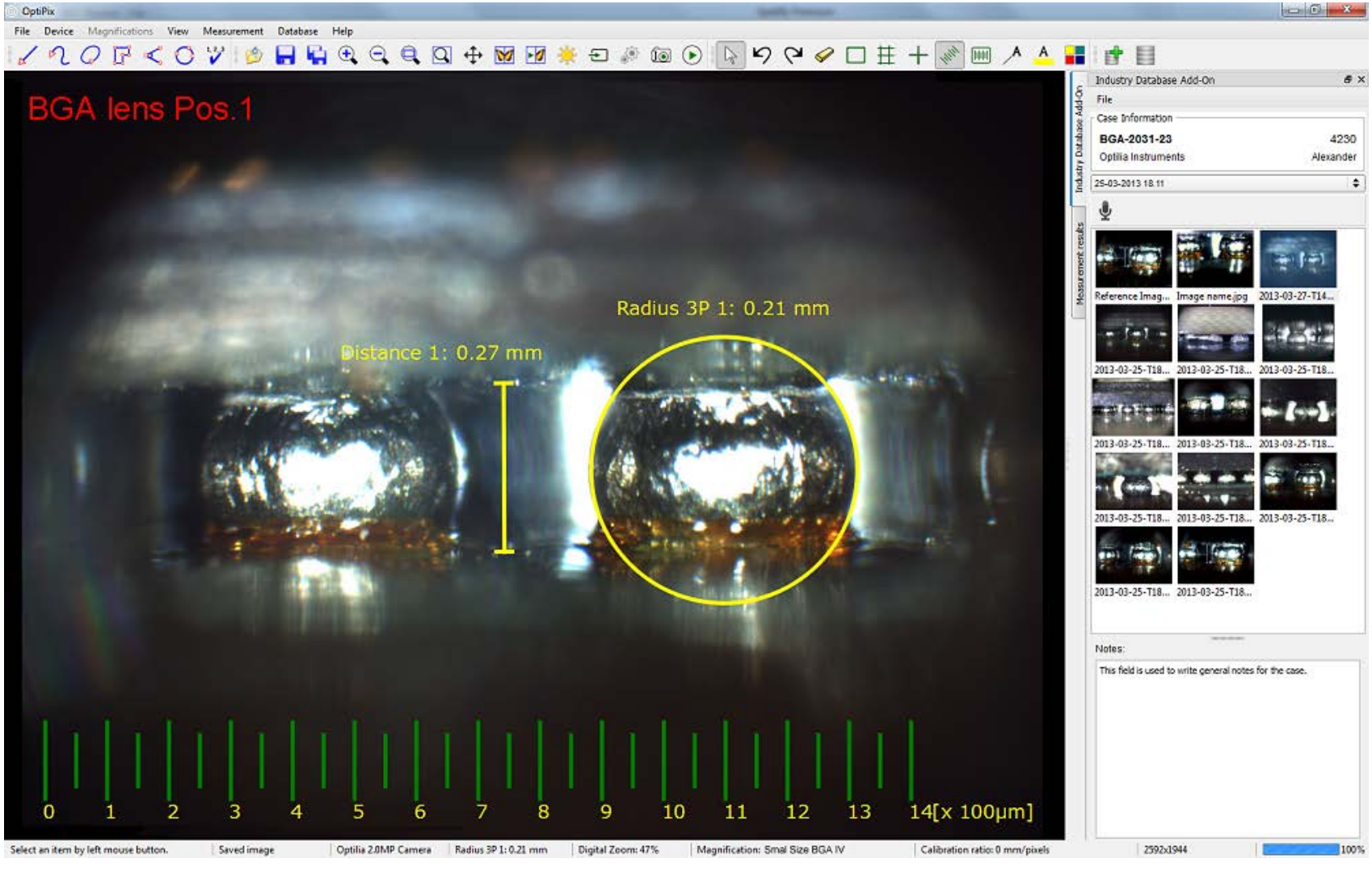
Software

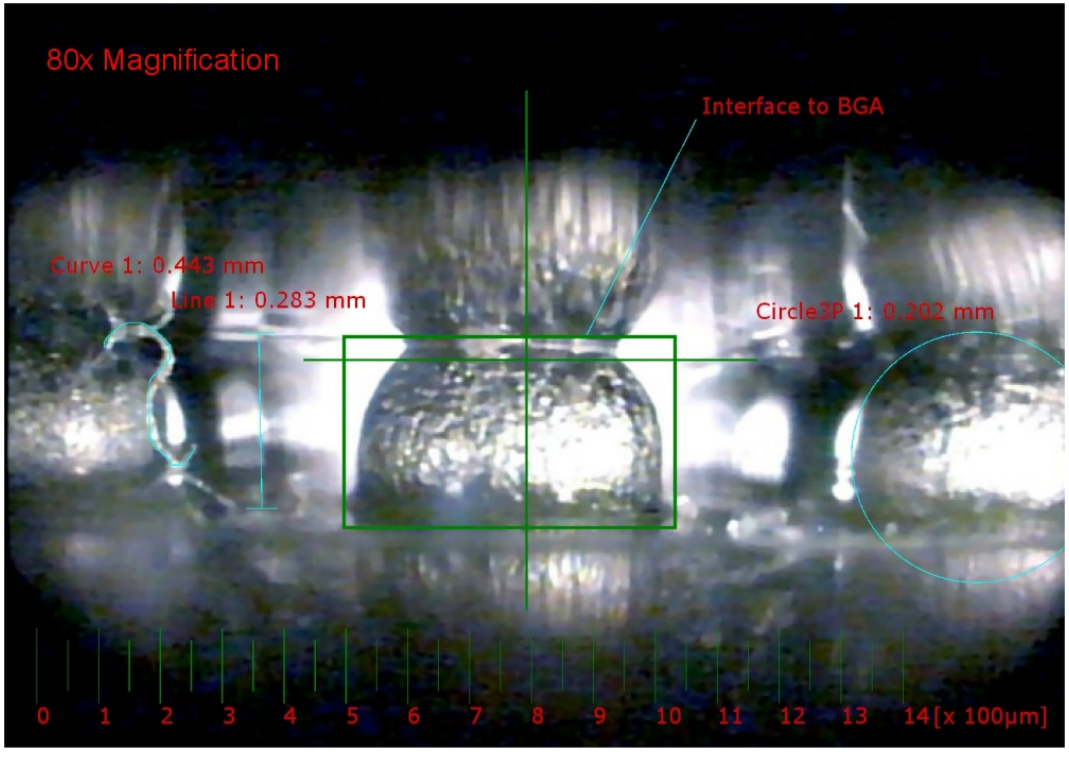
OptiPix, Image Capture, Analysis, Measurements and Archiving.



Optilia

Software

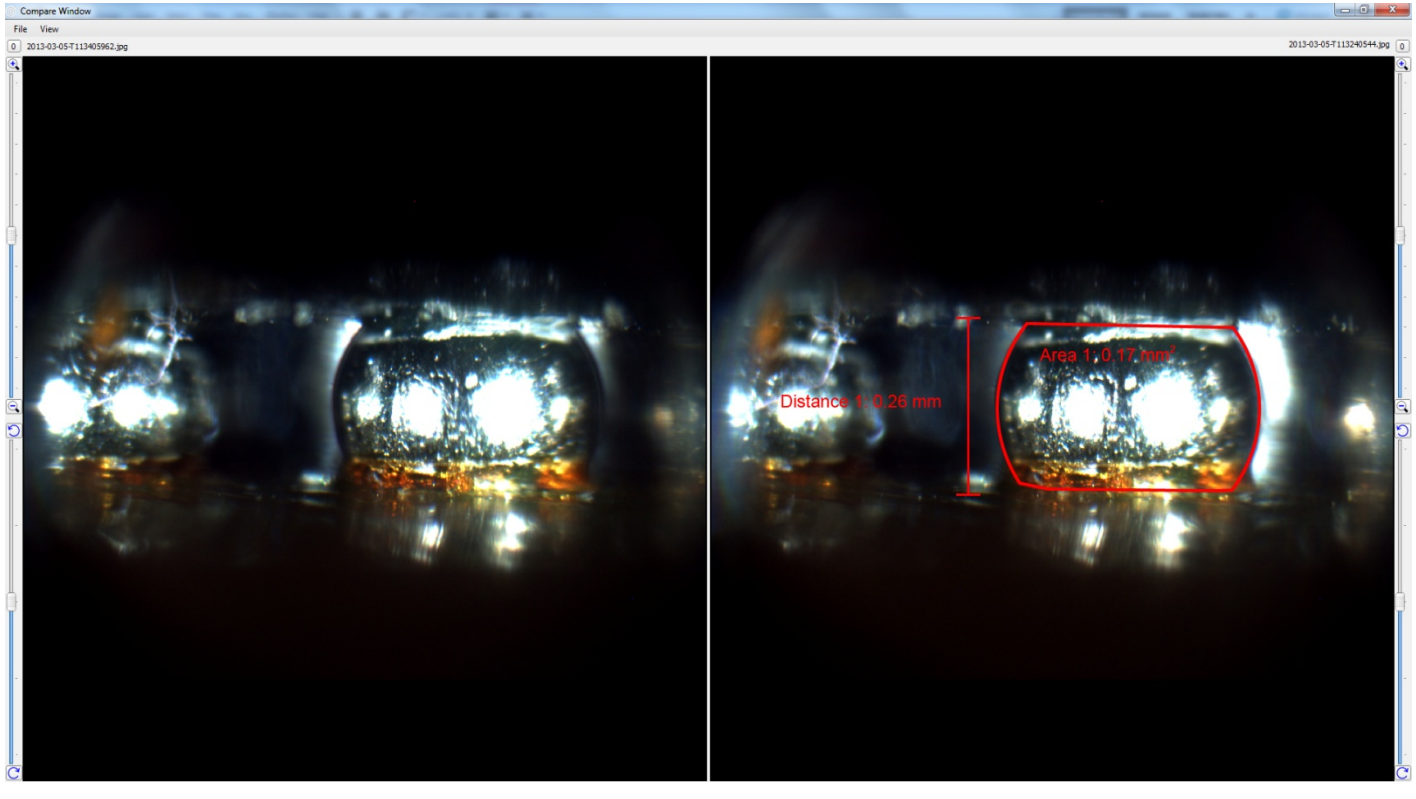
Overlays and Annotation



- Define and overlay grids, Cross-hair, rectangle and Ruler on live image to make quick analysis without capturing the image
- OptiPix enables the user to annotate and comment on each image

Software

Compare Image

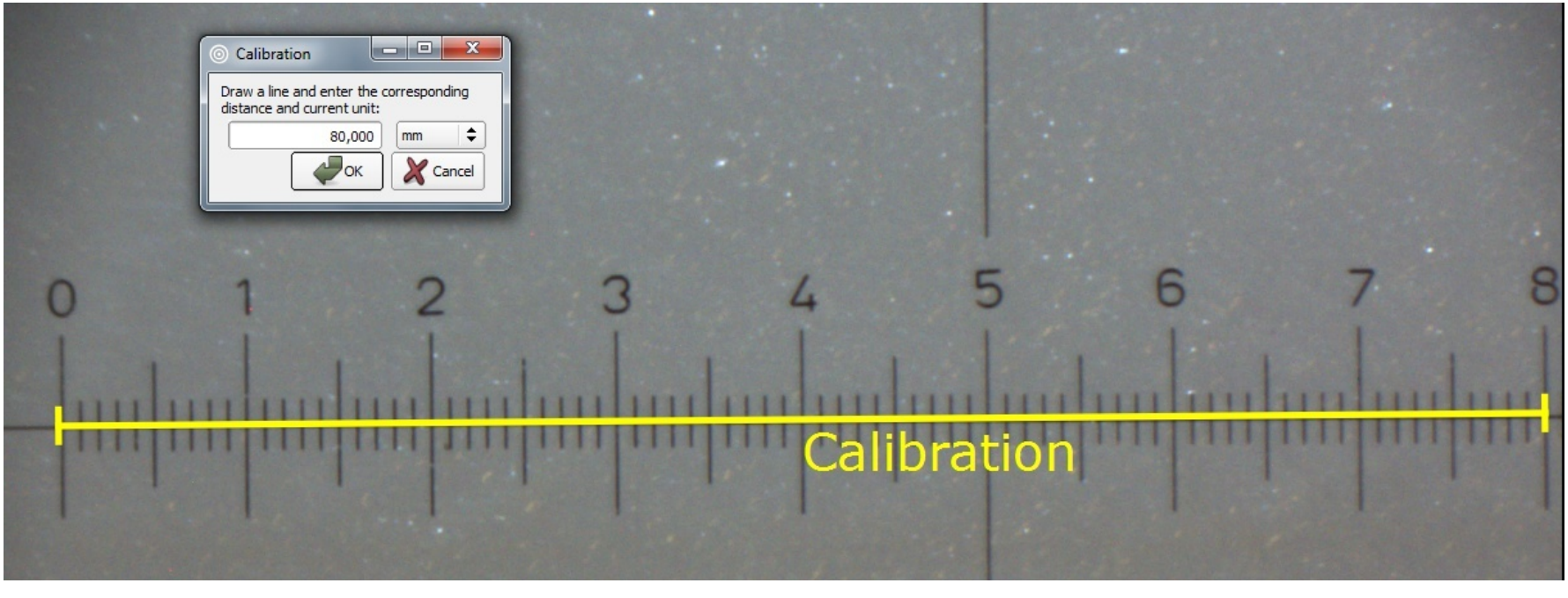


- OptiPix enables you to view and compare the live image side by side with a reference image.

Software

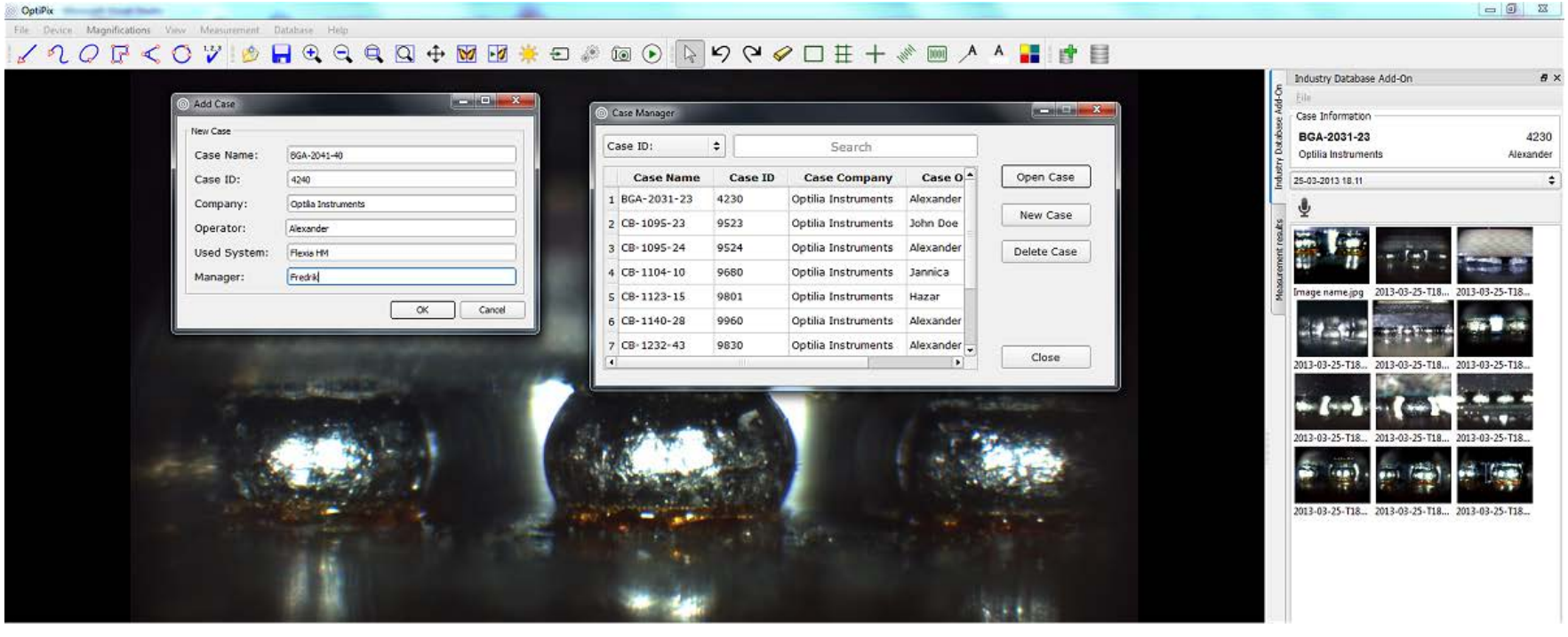
Calibrated Measurements

- All fixed focal length lenses are pre-calibrated and ready to use in software
- BGA lenses have marks for focus positions which can easily be calibrated in the software
- Unlimited amount of user-defined calibrations



Software

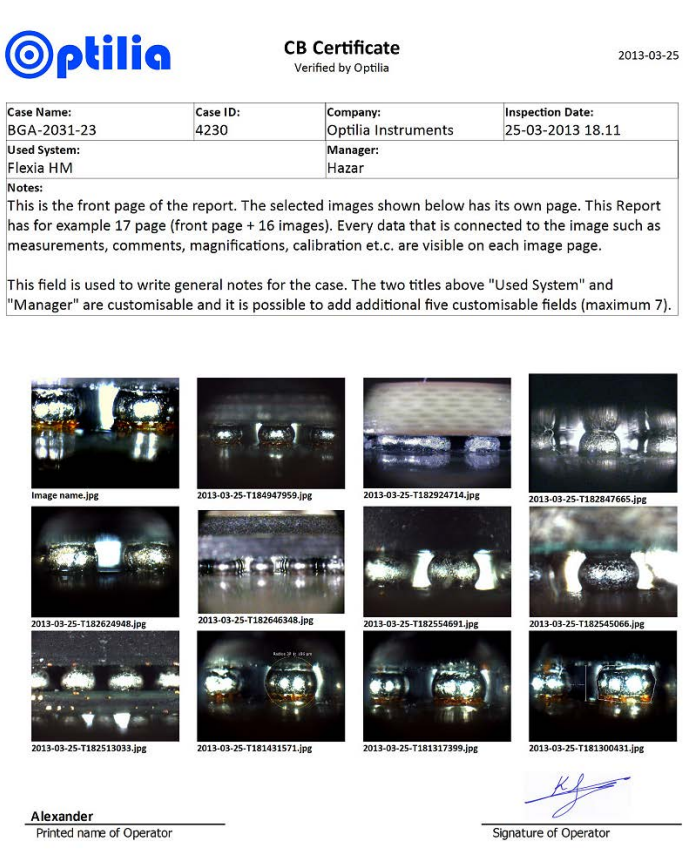
Image file structure and Database



- OptiPix is built around a file tree. The file tree serves as an overall view for categorized images
- For further organization and security the images can be stored in an encrypted database
- Sort and find images based on -for example- the operator and date

Software

Reporting



CB Certificate
Verified by Optilia

2013-03-25

Case Name:	Case ID:	Company:	Inspection Date:
BGA-2031-23	4230	Optilia Instruments	25-03-2013 18.11
Used System: Flexia HM		**Manager:** Hazar	

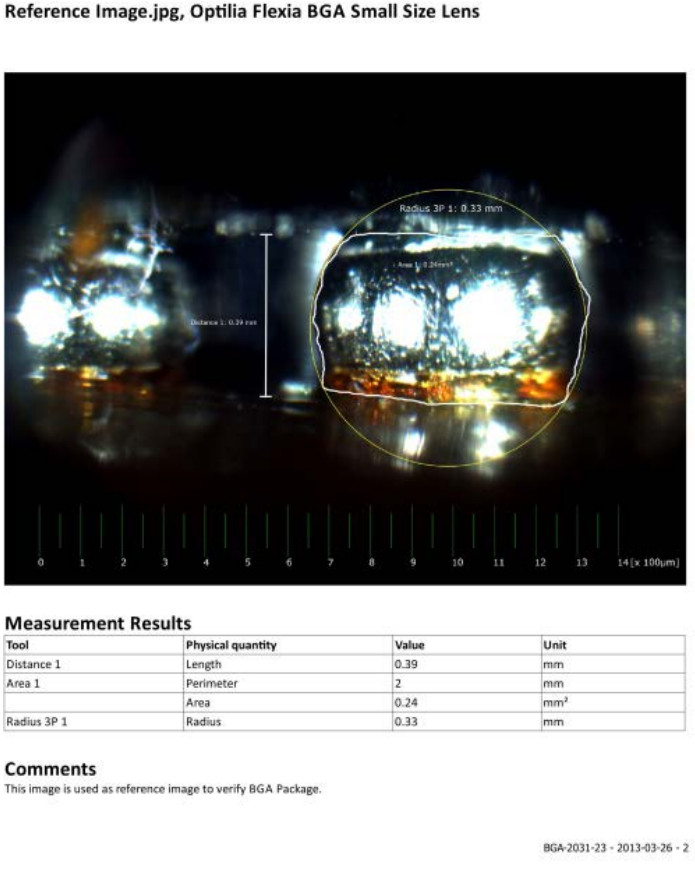
Notes:
This is the front page of the report. The selected images shown below has its own page. This Report has for example 17 page (front page + 16 images). Every data that is connected to the image such as measurements, comments, magnifications, calibration et.c. are visible on each image page.

This field is used to write general notes for the case. The two titles above "Used System" and "Manager" are customisable and it is possible to add additional five customisable fields (maximum 7).

Image name.jpg
2013-03-25-T184947959.jpg
2013-03-25-T182924714.jpg
2013-03-25-T182847665.jpg
2013-03-25-T18262494B.jpg
2013-03-25-T182646348.jpg
2013-03-25-T182554691.jpg
2013-03-25-T182545066.jpg
2013-03-25-T182513033.jpg
2013-03-25-T181431571.jpg
2013-03-25-T181317399.jpg
2013-03-25-T181300431.jpg

Alexander
Printed name of Operator

Signature of Operator



Reference Image.jpg, Optilia Flexia BGA Small Size Lens

Measurement Results

Tool	Physical quantity	Value	Unit
Distance 1	Length	0.39	mm
Area 1	Perimeter	2	mm
	Area	0.24	mm^2
Radius 3P 1	Radius	0.33	mm

Comments
This image is used as reference image to verify BGA Package.

BGA-2031-23 - 2013-03-26 - 2

- Results can be printed, copied to excel sheets or created as an inspection report

Software features

OptiPix Feature	Lite	Full	Data base
Database management			
Encrypted Databse			
Case Management			
Advanced Search and Sort			
Create Automatic Reports in pdf			
Archiving			
File Folder System Management			
Open/save Images with Calibration			
Device			
Image Capture			
Adjust Properties			
Adjust Resolution			
User-defined Magnification			
View			
Freeze Image			
Compare Image (live and freezed)			
Image manipulation			
Contrast, Brightness, Color contrast			
Flip images Vertically/Horizontaly			

OptiPix Feature	Lite	Full	Data base
Calibrated Measurements			
Calibrate user-defined Magnifications			
Distance Measurement			
Circle and Polygon Measurement			
Angle and Curve Measurement			
Free-form Area, Length and Perimeter			
Count Objects			
Overlays on Live Image			
Adjustable Grid, Crosshair			
Adjustable Rectangle			
Calibrated Ruler			
Digital Graticule Overlay			
Others			
Annotations on Image			
Change item Size, Color, Font			
Color Mapping, B/W Conversion			

Optilia BGA Inspection Configurations

XL system

Standard

Exclusive

Hand-operated

Optilia BGA Inspection Configurations

Products	XL	Exclusive	Standard	Hand-operated
Digital 5.0MP Microscope ESD-protected				
Side Viewing BGA lens, Ultra Small Size Probe				
Small Size 90° Optical probe				
Side Viewing BGA lens, Small size Probe				
Side Viewing BGA lens, Low Aperture Probe				
Background Illumination Attachable Micro-prism				
Background Illumination Fiber optics Brush Light				
Stand for Brush Light Background Illumination				
1-100x Varifocal Lens with LED RingLight				
RingLight White LED for 100x Objective				
Focusing Stand, Coarse/fine movement				
Extra large Boom Stand, Coarse/fine mov.				
PCB Holder, ESD-Protected				
Desktop Holder				
Precision XY-Translation Board				
OptiPix Software	Full, Database	Full, Database	Lite Version	Lite Version
Annual Service and Support for OptiPix				
Aluminum Transport Case				
Price	**E-mail**	**E-mail**	**E-mail**	**E-mail**

Optilia