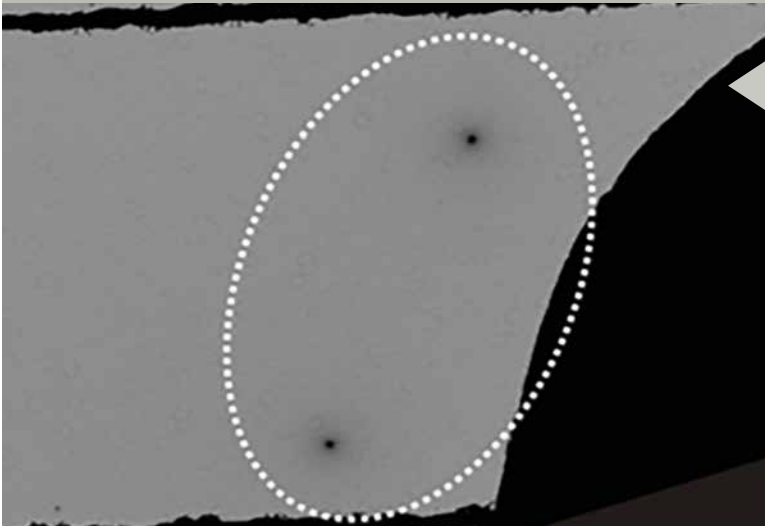
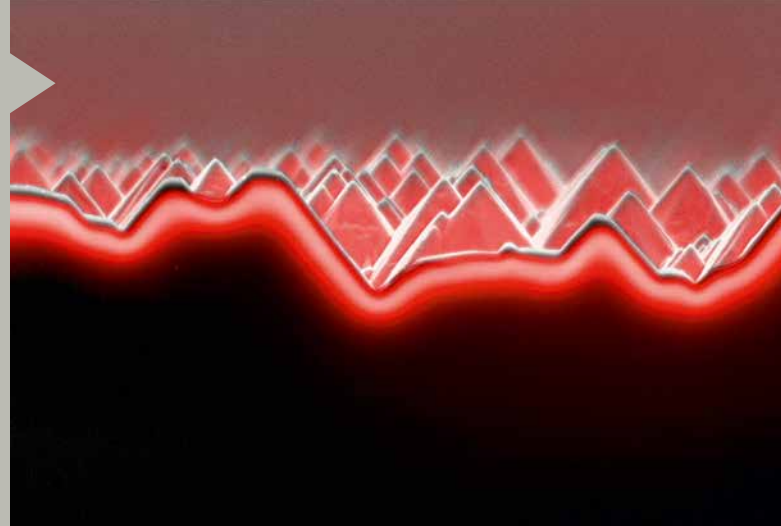


EBIC acquisition

The best quantitative electronics and software for
Electron Beam Induced Current (EBIC)

Correlate topography, composition and structure with electrical activity

- Record simultaneous EBIC, SE, BSE and EDS signals
- Colour and mix signals for spatial correlation
- Distinguish between active and passive defects

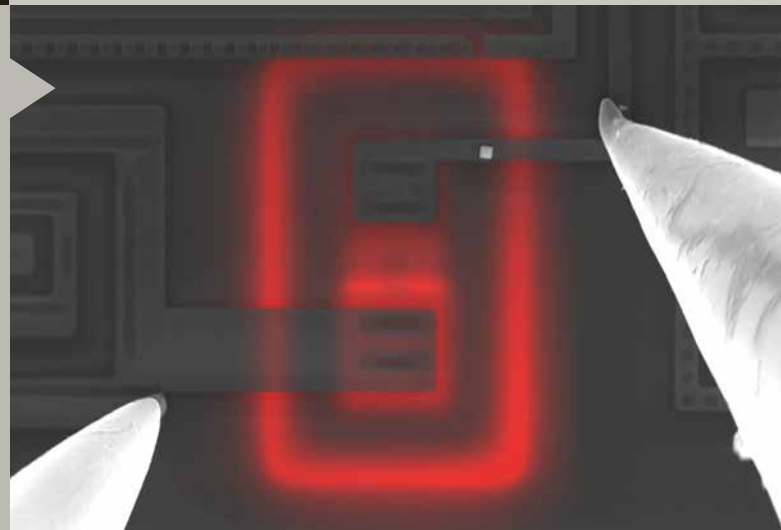


Enable TEM or atom probe microscopy sample preparation

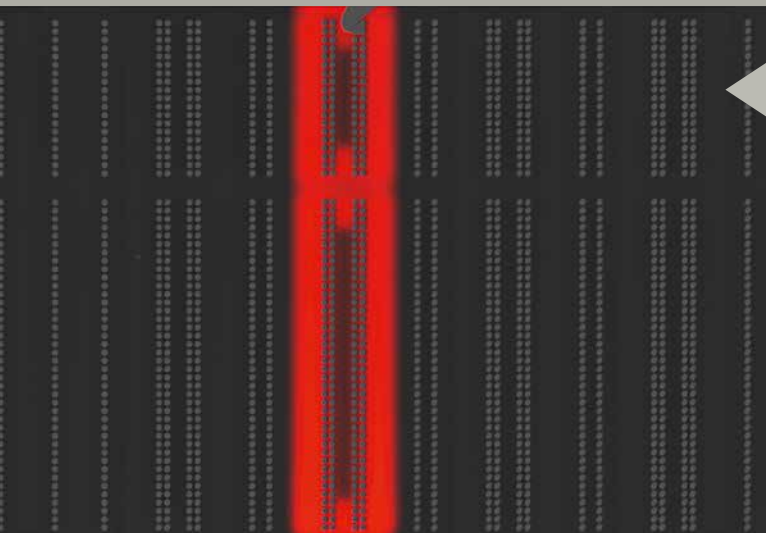
- Localise defects with sufficient resolution for TEM sample preparation
- Avoid alignment error by directly imaging defects with EBIC in FIB SEM
- Use live EBIC imaging to stop ion milling for sample preparation

Verify device operation modes with built-in DC biasing and live overlay

- Image junctions and fields in delayered devices
- Map electrical activity of solar cells under bias
- Compare imaged behaviour with device modelling



The unique benefits of EBIC



Map junctions and defects with the highest possible resolution

- Correlate structural defects with electrical activity
- Map active areas of junctions and electrical fields
- Validate doping profiles and areas

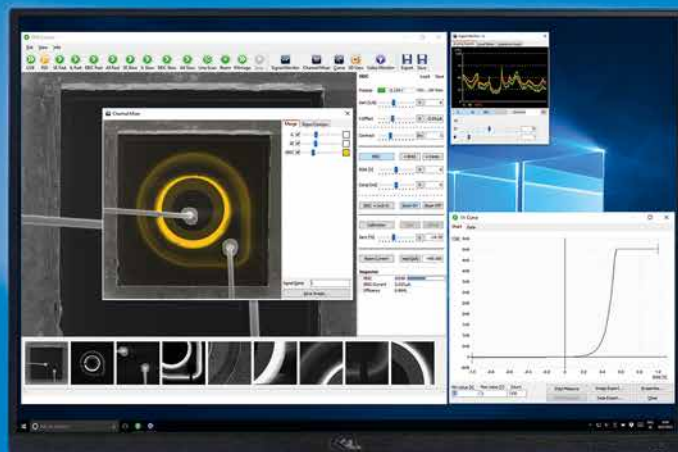
EBIC acquisition

Access third dimension with depth profiling

- Manipulate depth of EBIC signal by changing kV in SEM
- Investigate EBIC images of cross-sections in FIB-SEM
- Export EBIC depth series for 3D reconstruction



The best quantitative EBIC



The EBIC system is fully integrated and software controlled

- Image acquisition and amplifier control are fully integrated
- All amplification and acquisition parameters are software controlled
- EBIC signal is automatically quantified and displayed in current values (μA , nA , pA)



The most sophisticated and easy-to-use EBIC amplifier

- Two stage amplification for maximum range
- Built in -10...10V DC bias with current compensation
- Beam current output for SEM feedback and integration

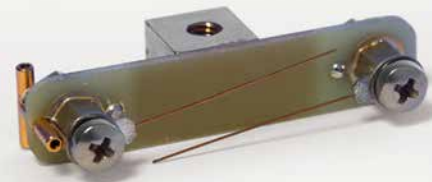


The most powerful and versatile SEM scanning system – DISS5

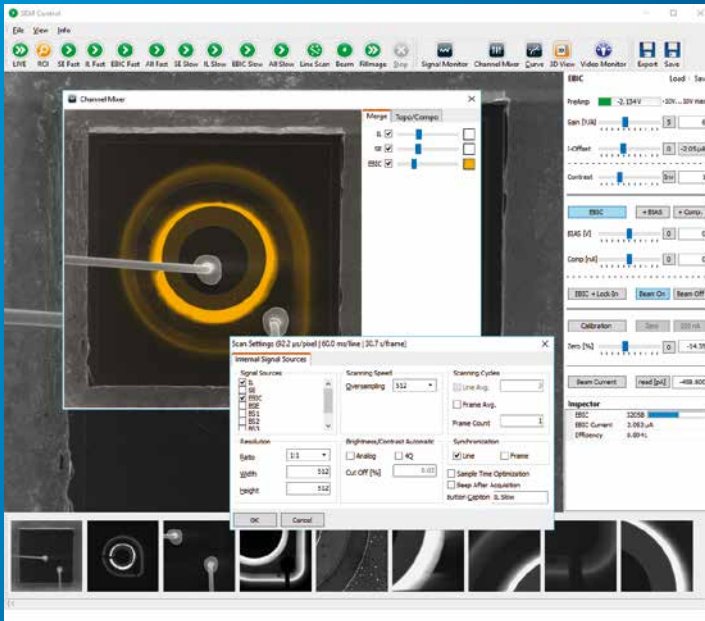
- Integrated scan generator and image acquisition
- Very large image resolution, up to 16k x 16k pixels
- Very fast scanning speed, down to 200ns dwell time
- Simultaneous 4 analog inputs and 12 digital inputs

Optional electrical sample holders for large area devices

- Suitable for solar cells and light-emitting diodes
- Flexible mount in plan-view or cross-section configuration
- Includes Faraday cups for beam current measurements



EBIC acquisition

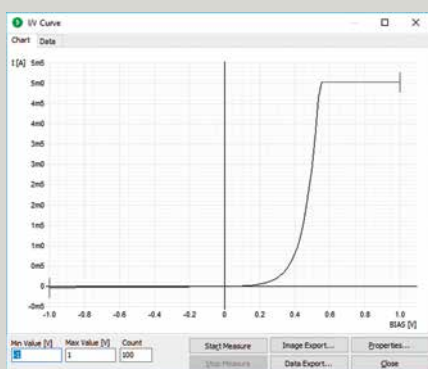
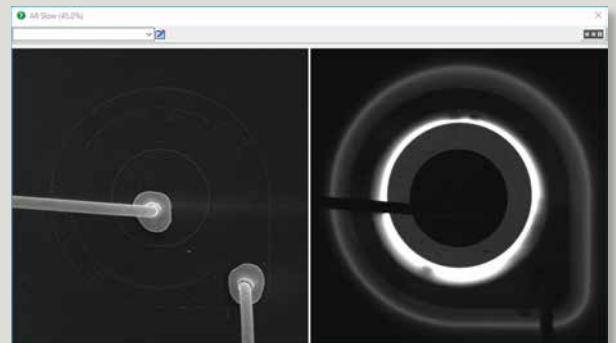


Advanced EBIC controls are provided for device calibration, biased operation, and beam control

- Flexible EBIC gain is provided from as little as 10^3 to as high as 10^{10} V/A
- Further video mixer gain and DC current compensation are added for optimum imaging conditions
- The electronics are optimised for high scanning speed, with a bandwidth of 0.5 MHz at a gain of 10^9 V/A

Simultaneous signals are mixed live for correlative microscopy

- Up to 4 simultaneous signals
- 12-bit digitization with signal integration
- Live colour mixing tool for visualisation



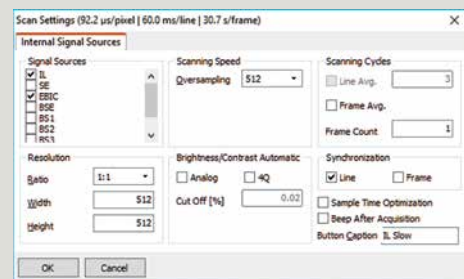
Embedded current-voltage (IV) tool to verify electrical contacts and nanoprobings

- Voltage output maximum range is from -10V to 10V
- Gain selection for current measurement is automatic
- IV may be exported for device characterisation

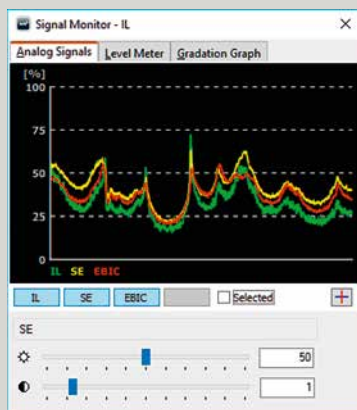
The highest level of EBIC integration and automation

Configurable scan profiles enable custom workflows for efficient microscope use

- Fast EBIC scan profile for alignment and navigation
- High resolution EBIC scan profile for mapping and analysis
- Simultaneous SE/EBIC scan profile for localization



EBIC acquisition

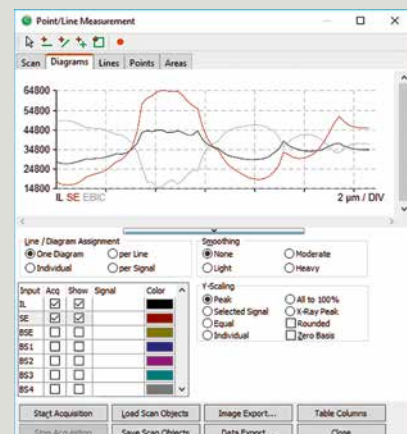


A live signal monitor assists image acquisition and calibration

- Live signals are displayed as line scans or level meters
- Multiple live signals are displayed simultaneously
- Gradation graph tool improves shadowed areas

Advanced line scan tool enables advanced beam control with plotting

- Select points, lines or areas from scanned images
- Set number of points, step size, binning and averaging
- Generate single or multiple diagrams
- Export diagrams or raw data



Detailed technical specifications

■ EBIC amplifier module

Hardware interface	USB 2.0
Pre-amplifier gain	$10^3 \dots 10^{10}$ V/A
Video gain/contrast	0.1 ... 100x
Video brightness	-1 ... 1 V, 16-bit
Bandwidth	0.5 MHz at 10^9 V/A
Bias voltage	-10 ... 10 V, 16-bit
Low-pass filter	8 levels
DC-signal suppression	16-bit
Zero-balanced pre-amplifier	User configurable - for device calibration
Calibrated internal source	Yes
Beam current input	Switchable internal or external input
Video signal inversion	Yes
Beam blanker output	Yes
Lock-in amplification (optional)	Yes

■ EBIC and SEM acquisition module (DISS 5 EBIC)

Hardware interface	USB 2.0
Simultaneous inputs (i.e. SE, BSE)	4x, 12-bit
Mapping signals (i.e. EDS)	12x, 16-bit
Scanning interface	Pre-configured for SEM and analytical add-ons
Synchronization interface	Pixel, line, frame
Scan size	16,384 x 16,384 pixels max.
Pixel dwell time	200 ns ... 6 milliseconds
Pixel over-sampling	32,000x max.
Line averaging	50x max.
Frame averaging	256x max.
Synchronization	mains power
ROI scan	Yes

■ Electrical holder

Contacting probes	2x
Contacting geometries	1 top probe and 1 bottom plate 2 top probes
Imaging geometry	Plan-view and cross-section
Faraday cage	Yes
Maximum sample size	25 mm x 50 mm
Holder height	20 mm

EBIC acquisition

■ PC/Laptop, Display

PC/Laptop	Intel Core i3 minimum 2x USB 2.0 minimum
Displays	1,280 x 1,024 resolution minimum 2x displays recommended
Operating systems	Windows 10 ... Windows XP Network connection recommended

■ Acquisition application (DISS 5 EBIC)

EBIC control	Complete software integration
EBIC operation modes	Standard, Biased, Calibration, Beam Measurement
EBIC configuration	Complete profile save/load
EBIC inspector	Quantified live current reading
Current voltage (IV) tool	Configurable, with graph and data export
SEM mag, kV information	Automated SEM communication
Image mixing tool	Colour assignment and live mixing
Scan profiles	Yes
Signal monitor	Yes
Software API	Yes
Image caption overlay	Yes
Simultaneous acquisition	Yes
Default file formats	8 and 16-bit multi-page TIFF
Export file formats	BMP, JPEG, PNG, GIF
Context sensitive help	English, German

■ Analysis application (DIPS 5)

Current quantification	Automated data management
Magnification/scale information	Automated data management
Image caption overlay	Configurable live and image export overlays
Image information	All relevant acquisition parameters
Image mix (SE, EBIC, ...)	Configurable colour assignment
Editable LUT (look up table)	False colour, GGR file format
Pseudo-surface view	Pan, zoom, rotation, tilt, lighting modes
Distance, area measurements	Yes
Line profile extraction	Multiple lines, synchronised SE, EBIC
Operating system	Windows 10 ... Windows XP
Context sensitive help	English, German

EBIC acquisition

■ Parts and Cables

EBIC amplifier module	Standard	1x
EBIC & SEM acquisition module (DISS 5 EBIC)	Standard	1x
EBIC power supply	Standard	1x
EBIC ground strap	Standard	1x
Electrical sample holder	Standard	1x
Vacuum feed	Standard	1x
EBIC input coax cables	Standard	2x
SEM & EBIC interface cable	Standard	1x
USB cables	Standard	2x
USB memory stick	Standard	1x
PC, keyboard, mouse	Optional	1x
Displays	Optional	2x

■ Software packages

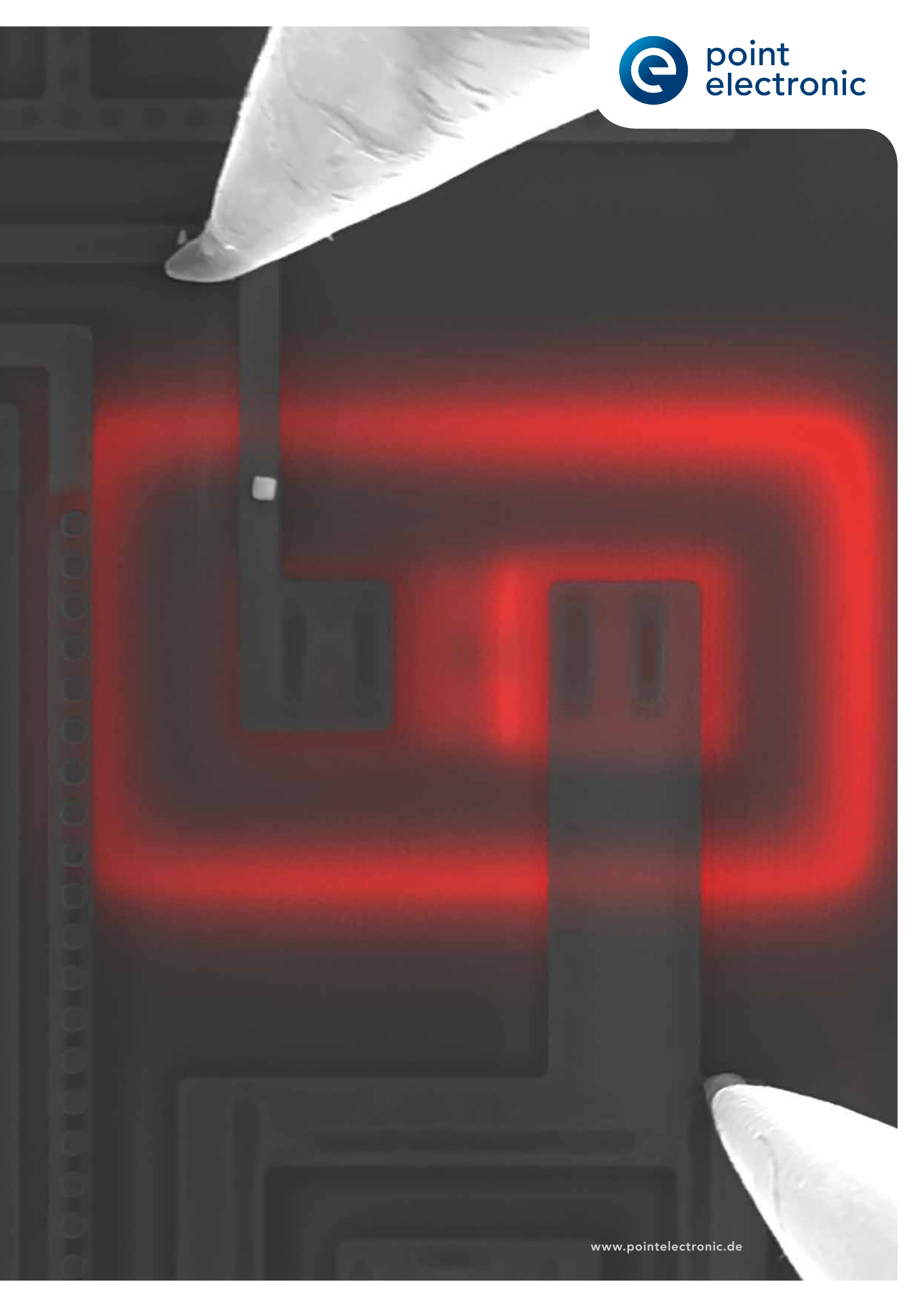
EBIC acquisition driver	EBIC Amplifier
SEM acquisition driver	Digital Image Scanning System 5
Acquisition software	DISS 5
Analysis software	DISS 5

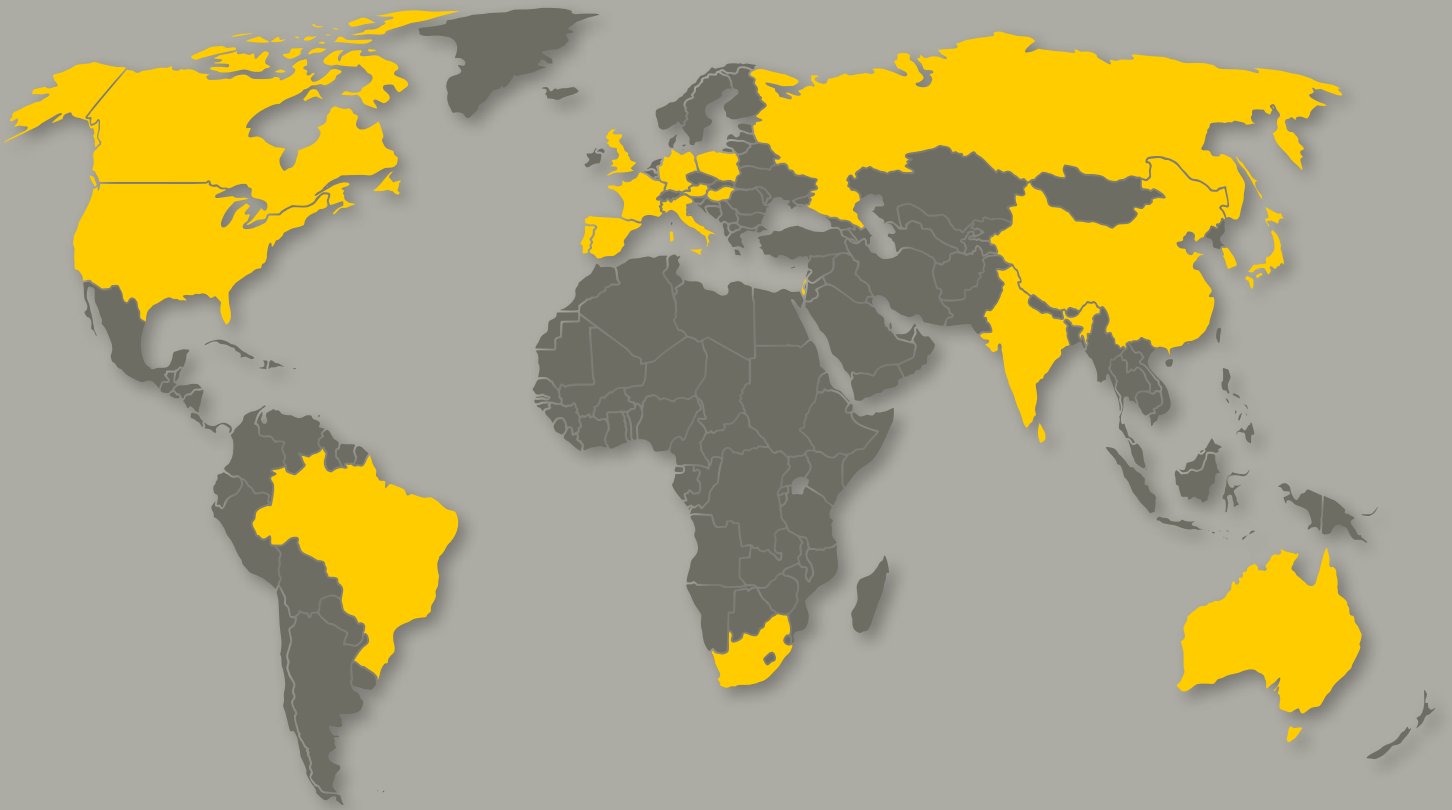
■ Weight & Dimensions

EBIC amp. module dimensions	10.5 x 6.0 x 25.0 cm typ.
EBIC amp. module weight	1.1 kg typ.
EBIC power supply dimensions	11.0 x 5.5 x 17 cm
EBIC power supply weight	1.2 kg
DISS5 module dimensions	23.5 x 8.7 x 29.5 cm
DISS5 module weight	3.4 kg
Shipping dimensions	typ. 36 x 32 x 56 cm
Shipping weight	typ. 7.5 kg

■ Site requirements

Power	1x mains 110/220 VAC single phase 50-60 Hz on the same earth as the microscope
Microscope	1x vacuum electrical feedthrough to device under test 1x connection to SEM earth 1x mixed scan interface and SEM signals connection
Space	amplifier must be placed in the proximity of SEM chamber EBIC power supply may be placed on the floor DISS5 box may be placed on the SEM bench





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