ICEy

Integrated Traceable EMC / Emission Test System

What is ICEy?

ICEy (Interference & Compatibility Evaluation System) is the most advanced reactive near-field scanning system for analyzing EM interference and compatibility (EMI/EMC) in highly integrated electronics. ICEy is the only system that provides accurate EM measurements traceable to international calibration standards, and also allows independent interlaboratory comparability of EMI/EMC measurement results. ICEy is a turnkey test bed, supporting all features for precise, user-friendly, efficient, fast, and highly autonomous EMI/EMC near-field analyses, developed in close collaboration with industry for the chipset, EM packaging, mobile communications, and medical markets.

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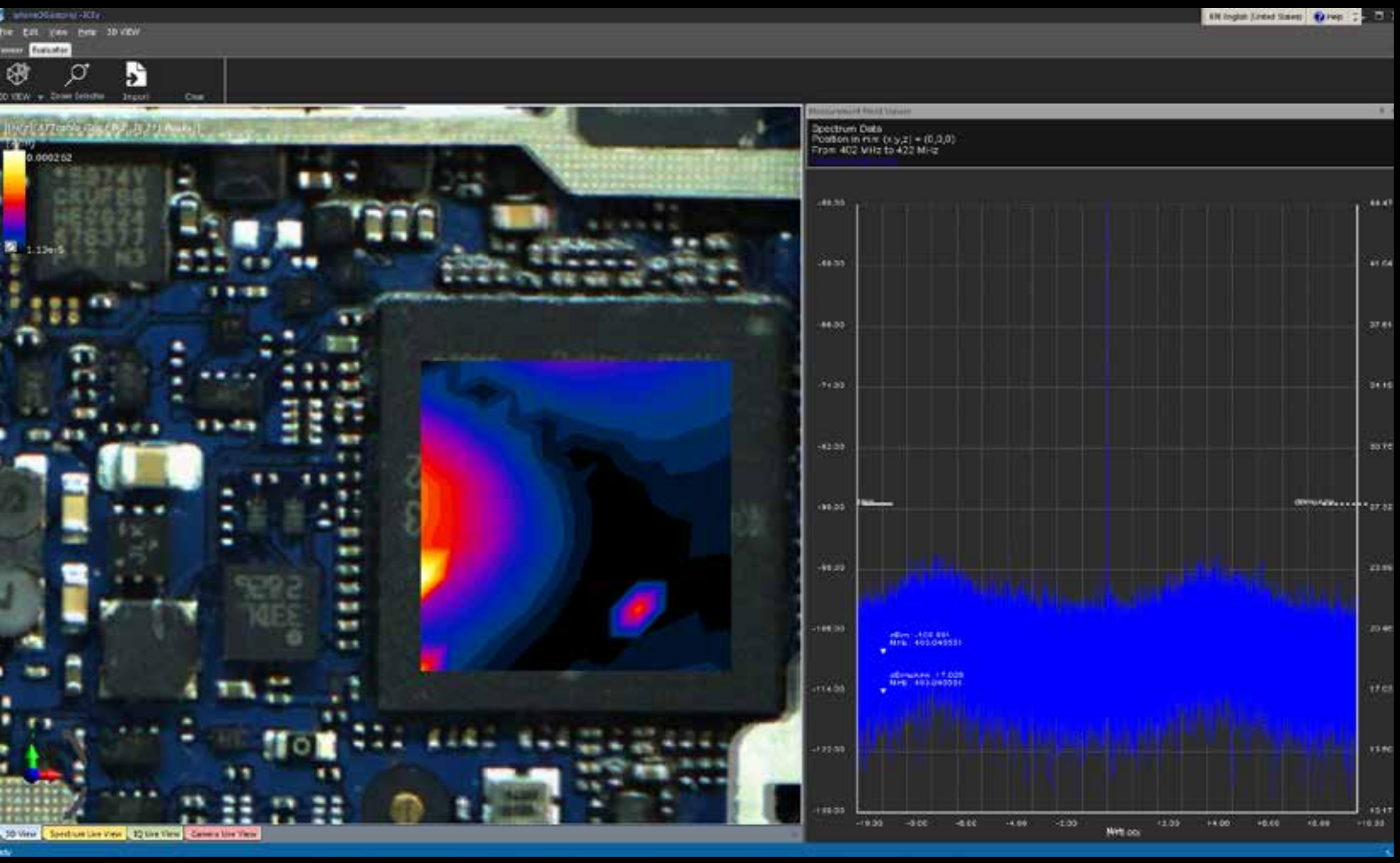


ICEy The Future of Interference & Compatibility Evaluations

Technology

SPEAG is the world's leading developer and provider of close near-field radiofrequency EM measurement systems. With the introduction of our Time-Domain Sensor (TDS) active electro-optical probe technology, we revolutionized EMI/EMC evaluations in the reactive near-field of emitters with the ideal probing solution. TDS miniaturized probes provide unparalleled sensitivity while maintaining full EM transparency by isolating the sensor with fiber optics.

ICEy is the ultimate scanning solution, integrating our unique sensor technology in a turnkey close near-field EMI/EMC test bed. The system combines µm-precision with a scanning range that covers entire printed circuit boards or electronic modules, allowing for EM evaluations from chip- to system-level within a single system. As the main design requirements were user-friendliness, high precision, and automation of the measurement, postprocessing and data output flow, the system offers novel features including contactless surface reconstruction of the device under test (DUT) using advanced computer vision techniques, fully automated exchange of the measurement probes, and fully integrated measurement control and postprocessing software optimized for EMI/EMC analysis. ICEy is the world's first EMI/EMC scanner that is able to provide full phasor information of the measured EM field distribution resolved in the frequency- or time-domains.

Applications

- Interference and cross-talk mapping in highly integrated electronic devices and components, such as for the detection of high order harmonics of digital clocks in sensitive communication bands, e.g., GPS, or of cross-talk from RF signal lines to secondary components, and the minimization of these effects.
- Preproduction and production screening of chipsets or module level RF EM emission characteristics for integrator design specifications or as a source input to system level EM simulations. Creating valuable specifications to support any integrator.
- Troubleshooting EM interference and crosstalk effects in highly integrated electronic systems. Detecting failures during the design cycle.
- Optimization of packaging and shielding.
- Verification of device and system performance.
- Antenna reactive near-field mapping of the complex-valued EM phasor with possible near-to-far-field radiation pattern transformation.
- Near-field mapping of unintentional radiated emissions with possible near-to-far-field radiation pattern transformation.

Special Features

- Precision: Provides µm scan resolutions, fully traceable calibrated equipment, and specified measurement uncertainties for arbitrary sources.

· Speed: An advanced GUI accelerates measurement and setup by providing efficient guidance for visually planning measurement campaigns based on computer vision support and advanced evaluation libraries. Millions of measurement samples can be acquired within a second. Unparalleled measurement speeds are achieved by integrating the vector signal analyzer directly to the PCI-express bus of the control PC.

· Versatility: A large scanning volume and a fully screened, anechoic EM environment supports a wide range of near-field scanning applications.

· Turnkey: ICEy is a turnkey system integrating all equipment (also RF vector signal analyzers). Measurement-ready after system setup and extensive on-site training by our engineers.

· Customization: A powerful scripting environment allows the user to control external equipment during the scan and to write custom extensions to the control and postprocessing environment. Hardware components, such as probes, can be customized.

· Automation: The advanced GUI enables computer-aided measurement setup. Measurements can be planned based on a stereoscopic image of the DUT. Contactless, high-resolution 3D images of the DUT surface structure are automatically acquired using high-precision computer vision reconstruction techniques before the measurement. Fully autonomous actual measurements can be performed with the computer-controlled robotic scanning system.

Calibration

ICEy integrated TDS probes are calibrated in our ISO17025 certified laboratory. Traceable calibration and known measurement uncertainties are essential for achieving excellent interlaboratory comparability of EMI/EMC measurement results. Calibrated validation sources are also integrated in ICEy for automatic system verification before a measurement campaign, ensuring the reliability of each measurement. Automatic calibration routines and calibration tools for on-site recalibration by the customer also ensure high mechanical integrity for the precise alignment of the computer vision surface reconstruction systems.

Benefits

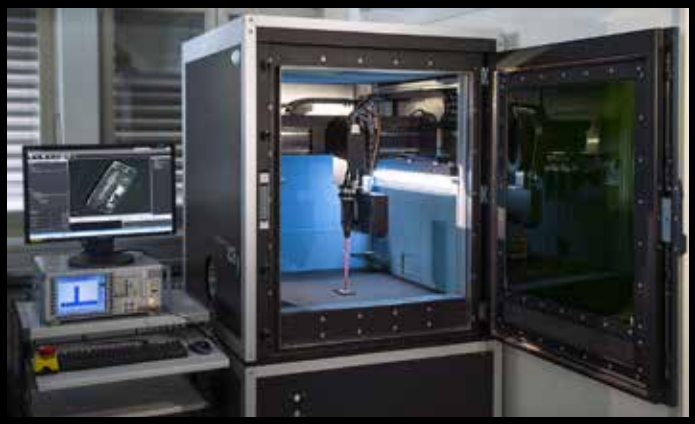
· Sensor Isolation: Traditional EMI/EMC scanner probes are connected via conductive wires that modify the local field distribution and the sensor's receiving pattern. Only SPEAG's isolated (fiber optic) TDS probes offer truly known measurement characteristics and do not alter the measured EM field.

· Accuracy: High precision probe positioning and high resolution sensors are required in the presence of extremely strong field gradients in the close near-field. ICEy and the TDS probes offer high position accuracy on arbitrary DUT surfaces using our advanced contactless surface structure reconstruction techniques and miniature sensor design.

· Interlaboratory Comparability: ICEy is the only near-field EMI/EMC scanning system that integrates TDS field probes calibrated to a traceable standard, providing true interlaboratory comparability, e.g., between your measurements and the measurements of your customers or test laboratories.

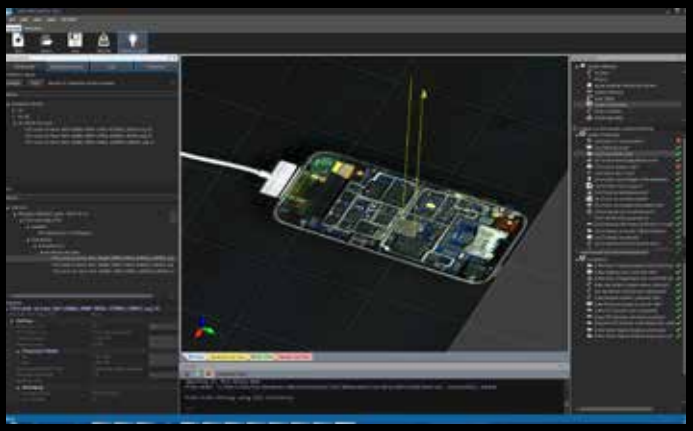
· Reduction of Design Cycles: EM emissions measured with ICEy have a known measurement uncertainty independent of the DUT and field distribution. EM mapping with ICEy reduces design cycle times, as failures can be detected at an early design stage.

· Proactive EMI/EMC Design: EM emission maps of chipsets or modules measured with calibrated equipment can verify system performance. Scan and verify device performance prior to emission testing. Provide immediate EMI/EMC design customer support.

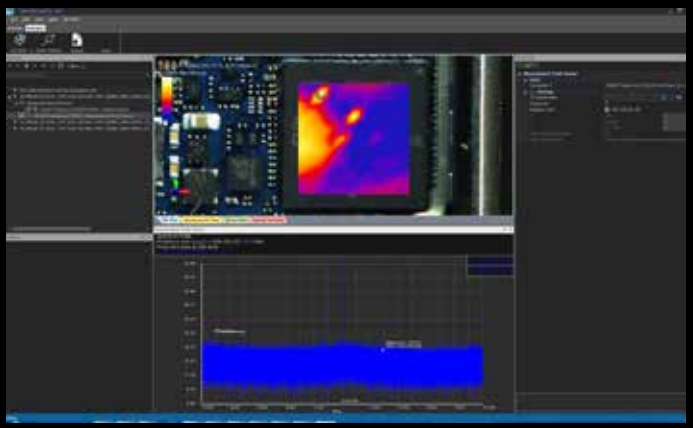


ICEy testbed (right) and operator station with DUT radio-communication tester (left) in a typical close near-field EMI/EMC measurement situation.

Contactless high-precision reconstruction of the DUT surface using LASER-triangulation based advanced computer vision techniques.



A scan job is created from a geometrical scan definition (measurement grid) and the defined evaluation list. An evaluation list comprises a scan list of spectral or time-domain acquisitions performed at every grid location.



ICEy postprocessor spatial map of the CPU clock 2nd harmonic after passing the data through a frequency domain windowed peak filter to remove jitter from the measured spurs and spectrum at a selected location.

ICEy Preliminary Specifications

Positioning System	
Axis Travel (x, y, z, roll)	600 x 500 x 120 mm³ 360 degrees
Scanning Volume (x, y, z)	450 x 450 x 115 mm³
Absolute Positioning Unc.	<+/– 25 µm, 1 degree
Relative Positioning Unc.	<+/– 12 µm, 0.1 degree
Probe Alignment	2 orthogonal fork LASER light barriers

Test Chamber	
Probe Repository	holds up to 4 probes, automatic exchange
RF Shielding	fully shielded test chamber with shielded door
RF EM Test Environment	anechoic using ECCOSORB FHY-NRL around scanning area
Cable Feedthroughs	customizable feedthrough inserts on either side of the chamber

DUT Detection	
DUT Image Acquisition	1296 x 966 pixels, 16 mm lens resolution: 0.07 x 0.07 mm²/pixel
DUT surface detection	LASER triangulation system with sub-pixel LASER line recognition Detection limit: +/– <20 µm

RF M&T Equipment – Probes	
H1TDSx ICEy (H-field radial)	Tip size: 3.5 x 3.5 mm² Sensor size: 2.0 x 2.0 mm² Sensitivity: 0.4 µA/m/sqrt(Hz)@2 GHz f-range: 10 MHz – 6 GHz
H1TDSz ICEy (H-field axial):	Tip size: 3.5 x 3.5 mm² Sensor size: 2.0 x 2.0 mm² Sensitivity: 0.4 µA/m/sqrt(Hz)@2GHz f-range: 10 MHz – 6 GHz
E1TDSx ICEy (E-field radial)	Tip size: 3.5 x 3.5 mm² Sensor size: 2.8 mm Sensitivity: 0.15 mV/m/sqrt (Hz) f-range: 10 MHz – 6 GHz
E1TDSz ICEy (E-field axial)	Tip size: 3.5 x 3.5 mm² Sensor size: 2.8 mm Sensitivity: 0.15 mV/m/sqrt (Hz) f-range: 10 MHz – 6 GHz
Remote Unit	1RU1TDS (PXI module)
Vector Signal Analyzer	NI PXIe-5665: frequency range: 20 Hz to 14 GHz noise floor: – 165 dBm/Hz@1GHz 3 dB bandwidth: 50 MHz amplitude uncertainty: +/– 1dB (typical)

Equipment Rack / Scanner Support Table	
4Control, Postprocessing	4U 19", Intel i7, >=8GB RAM, Win7, inside Rack
Interface and Control Electron	3U 19", inside Rack
PXI Chassis	18slots, 4U 19", inside Rack

External Peripherals	
USB	4 ports on both sides of scanner support
Ethernet	1 port on either side of scanner support
HDMI	1 port on either side of scanner support
Peripherals	1 Mouse 1 Keyboard 1 24" LCD Screen

Validation and Calibration Sources	
TDS Validation Device	microstripline validation device, 2 striplines with single external feed and power reference output
LASER Camera Calibration Body	calibration body for the DUT surface reconstruction system
Camera Calibration Pattern	calibration patten for the cameras in the ICEy system
Fork LASER Barrier Calibration Body	calibration body to calibrate the camera systems to the fork light barrier

System Software	
General	The system includes our advanced initegrated measurement, control, postprocessing, visualization and data export software for close-near-field EMI /EMC scanning.

Overall System	
Overall System	1100 x 1100 x 1900 mm³
Total Mass	900 kg
AC Power	2 x 110–230 V IEC power inlets 2 x 10A@110V
Heat Load	0.75 kW (typical)

For further information and technical specifications, visit **www.speag.swiss**

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