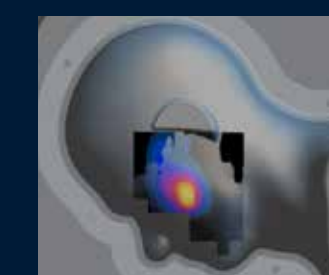


DASY6

The Gold Standard
SAR & Power Density Testing and Beyond



Description

The DASY6 system combines the novel cDASY6 V6.x software – optimized for automated time-efficient compliance testing of SAR and power density – with the widely used DASY5 V5.2 for maximally flexible performance of generalized near-field evaluations. Run on a significantly more robust platform and utilizing optimized robotic movement strategies, DASY6 offers faster scanning with no sacrifice of measurement precision.

Main Features

- Compatible: With all standards that require SAR and near-field evaluations (see Applications)
- Flexible: DASY6 natively runs cDASY6 V6.x and all DASY5 V5.2 (including the Python interface)
- Phantoms: Fully supported are Twin SAM, ELI, Base Station, MFP, Twin SAM Chin20, Face-Down, Head-Stand, Wrist/Ankle, MEM, and any customized phantom
- Probes: Supports all SPEAG probes and many third-party probes from DC to 110 GHz
- Easy-to-Use & Efficient: cDASY6 includes an expert system that substantially reduces the time required for SAR compliance testing and includes an automated report generator
- Base-Station Simulators: R&S CMW500/CMU200, Anritsu MT8820C/MT8821C, Keysight E5515C/E 8960
- Calibration: ISO17025 of all components

Applications

- Any near-field evaluation from DC to 100GHz (e.g., IEEE C95.3, EN 50392, EN 50357) and the currently drafted WPT and 5G standards
- SAR (4MHz – 10GHz) and power density (10 – 110GHz) compliance testing according to international and national standards (e.g., IEC 62209, IEC 62232, IEEE 1528, CE and FCC regulations)
- Hearing Aid Compatibility certification (e.g., ANSI-C63.19)
- Demonstration of implant safety in magnetic resonance imaging environments (e.g., ISO TS19074)

Organization Overview – Zurich43 (www.z43.swiss)

SPEAG is the leading developer and manufacturer of advanced, efficient, and reliable test equipment for the evaluation of near- and far-field electromagnetic radiation. The cornerstone of SPEAG's success is its committed investment in R&D and its strategic alliances with leading research institutions to ensure the development of innovative, cutting-edge products. Together with its partner organizations, the Foundation for Research on Information Technologies in Society (IT'IS), ZMT Zurich MedTech AG (ZMT), and SPEAG forms the Zurich43 alliance.

Schmid & Partner Engineering AG – SPEAG (www.speag.swiss)

SPEAG was founded in 1994 as a spin-off company of ETH Zurich (group of Prof. Niels Kuster) to develop and manufacture electromagnetic systems and components. SPEAG has always been dedicated to meet the ever-increasing design, R&D, and production challenges related to the complex near-fields of emerging wireless devices and other advanced technologies.

To support their capabilities, SPEAG established a calibration laboratory in 2001, certified by the Swiss Accreditation Service (SAS) for ISO/IEC 17025 Accreditation, and multilaterally recognized by EA, IFA, and ILAC.

To better provide services closer to key customers, SPEAG co-founded the SPEAG Calibration Laboratory Korea together with DYMSTEC in 2011, and the BNNSPEAG Test & Calibration Laboratory India together with BNN Communication Engineers in 2012, and in 2016 started joint activities with IndexSAR Ltd.

Foundation for Research on Information Technologies in Society – IT'IS Foundation (www.itis.swiss)

The IT'IS Foundation was established in 1999 through the initiative and with the support of the ETH Zurich, the global wireless communications industry, and several governmental agencies. IT'IS research activities are mainly dedicated to improving and advancing the quality of people's lives by advancing personalized/precision medicine and computational life sciences (IT'IS for Health) and beneficial applications of electromagnetic energy and wireless communications (EM Research). IT'IS also applies its knowhow and infrastructure to provide customized research solutions to the wireless and medical device industries, to academic and national institutions, as well as to governments and regulatory bodies.

IT'IS endeavors to provide an independent, proactive, innovative, and interdisciplinary research environment for the cultivation of sound science and good education. The Foundation also supports the R&D efforts of industrial partners, in particular SME's such as SPEAG and ZMT, to advance precompetitive and non-competitive research initiatives.

ZMT Zurich MedTech AG (www.zmt.swiss)

ZMT was founded in 2006 as a spin-off company of the ETH Zurich and the IT'IS Foundation with the mission to develop tools and best practices for targeted life sciences applications for simulation, analysis, and prediction of complex and dynamic biological processes and interactions.

ZMT's flagship product *Sim4Life*, a revolutionary simulation platform, enables simulations, analyses, and predictions of complex, multifaceted, and dynamic biological interactions within the full anatomical complexity of the human body. It includes the most advanced solvers and tissue models for electromagnetics, thermal, acoustic, flow perfusion, neuronal dynamics, tissue damage models, etc. *Sim4Life*, built upon the EM core of *SEMCAD X Matterhorn*, includes many more anatomical models, physical solvers and tissue models. SEMCAD X can be upgraded to *Sim4Life* anytime.

ZMT provides fully characterized and ISO17025 calibrated experimental systems for the validation of *in silico* based evaluations and also develops complementary measurement systems for model generation, verification, and validation. All systems are user friendly and seamlessly integrated with *Sim4Life*.

Regional Sales Channels and Partners

A complete list of local sales channels and partners can be found at our website.

s p e a g

s p e a g

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SPEAG is a member of



cSAR3D

Unequaled Repeatability
SAR Evaluation in Seconds



Description

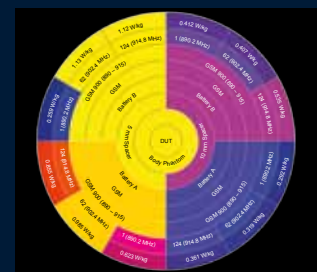
cSAR3D, our most advanced system for fast SAR evaluation of wireless devices, is based on a novel sensor concept and advanced reconstruction algorithms to determine all field components within the volumes of head and body phantoms. The software supports various testers and includes an automatic expert system to dramatically reduce costs and resources of compliance testing.

Main Features

- Precise: High absolute measurement accuracy and broad dynamic range (up to 100W/kg) over a broad frequency range (300 MHz – 6GHz extended)
- Fast: Measurement acquisition time < 1 s
- Convenient: Automated Device Positioner and integrated expert system fully automate certification process for wireless devices and incorporate fast SAR procedures in international standards
- Full SAR Information: All field components are measured over large regions of the head or body; full volumetric 3D patterns rendered with advanced reconstruction algorithms
- Supports Large Devices: cSAR3D available in Quad size (600 x 400mm) for larger devices (e.g., tablets, laptops)
- Automated: Built-in user interface for automatic connection and device control through base-station simulators; also includes scripting interface to save device settings for automated series testing
- Flexible Report Generator: Creates documents with tabular and graphical outputs; data from individual measurements may be saved in various formats (including Excel)
- Scripting: Extensive Python interface for customized automatization
- Cost Effective: Portable (< 25 kg), easy to install, low maintenance costs
- Calibration: ISO17025 of all components

Applications

- Compliance evaluation of wireless devices with cSAR3D, the combination of cSAR3D and DASY6
- Automated testing with cSAR3D-A or testing in production with cSAR3D-OA offering flexible API
- Testing of tablets, laptops and base station antennas with cSAR3D Quad
- Evaluation of device stability over time



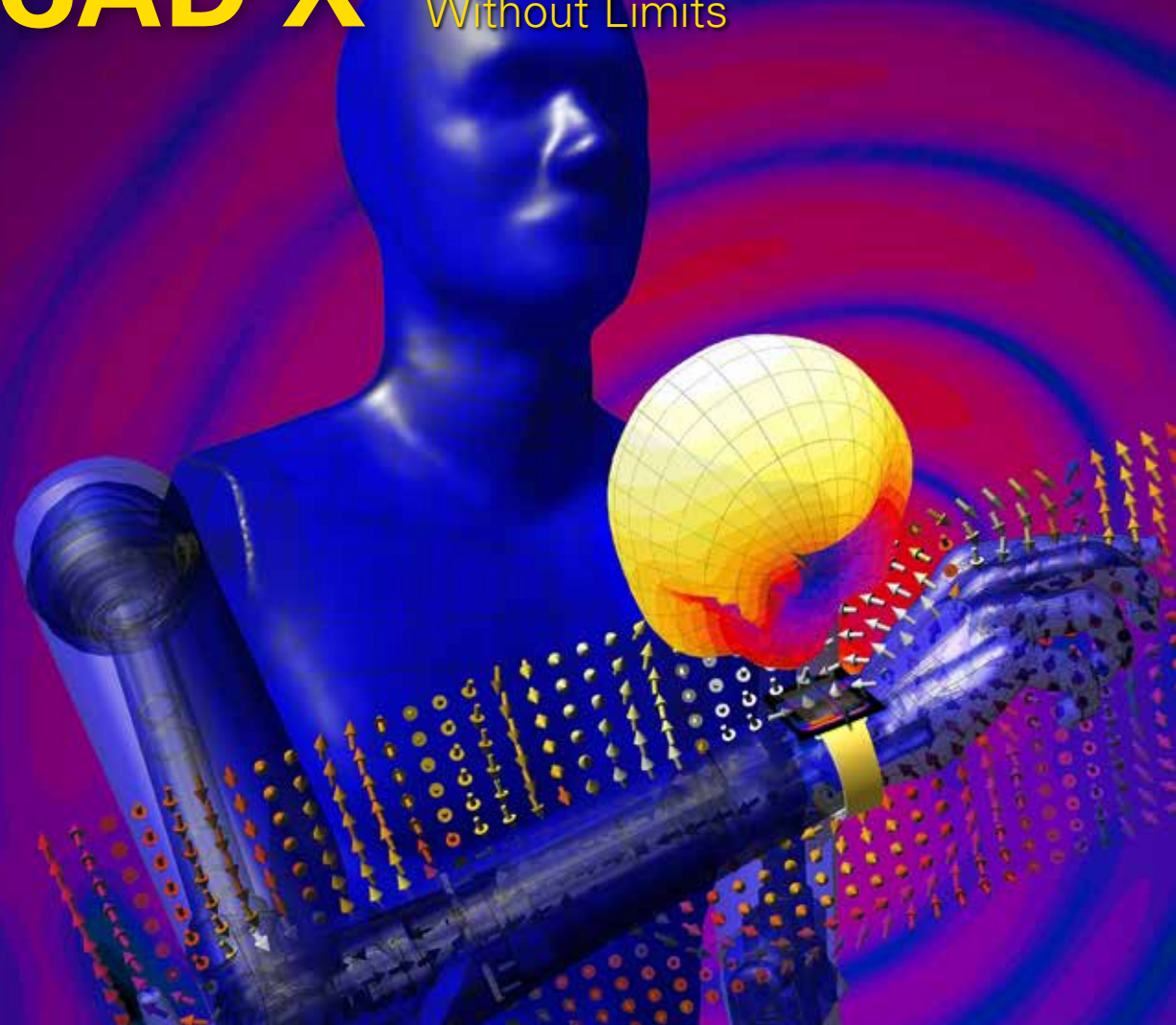
Phantoms

High Quality Solid & Shell Bodies for RF Evaluations & Optimizations



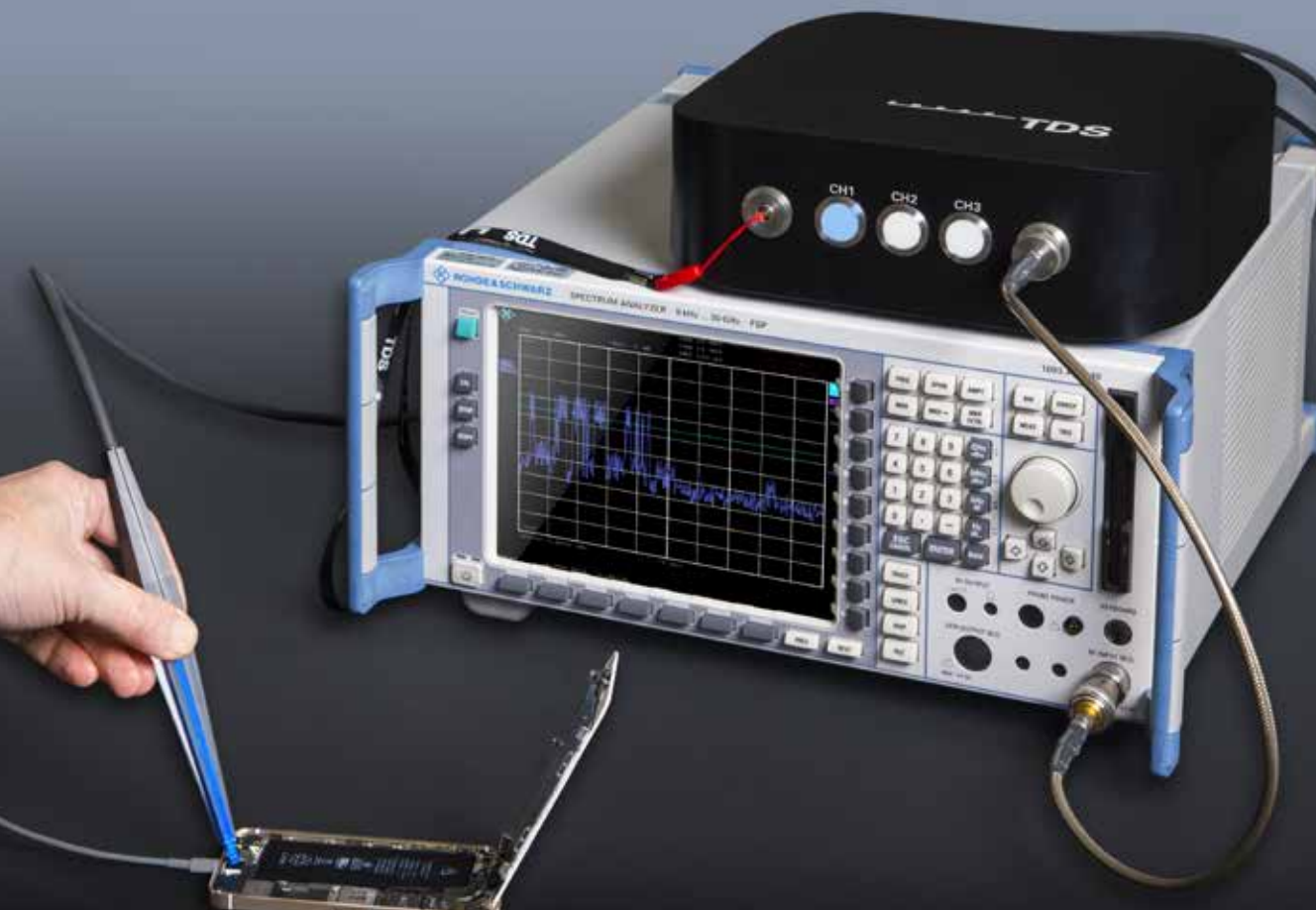
SEMCAD X

EM Simulations Without Limits



TDS & ICEy

Near-Field Test Systems for 5G, EMC & Signal Integrity Analysis



DAK Systems

Fully Automatic Dielectric Material Measurement



Description

EM phantoms, our growing family of high-quality anthropomorphically shaped phantoms, are designed for evaluation of over-the-air (OTA), SAR, and medical device performance, and on-body and implant transceiver optimization. The whole-body phantom POPEYE features poseable arms, legs, and feet. A series of specialized generic or anthropomorphically shaped homogeneous or non-homogeneous phantoms (e.g., ears, eyes, noses, hands with custom grips, torsos with lungs, and lossy blocks) are also available. Customized phantoms can be developed upon request.

Main Features

- Precise: Manufactured from carbon-loaded silicone (solid) or low loss composite (shell) with high-precision molds, filled with liquid or gel optimized for homogenous dielectric loads
- Compatible with Standards: Shape and dielectric parameters compatible with CTIA, IEEE/IEC, 3GPP requirements
- Broad Frequency Range: Application-optimized frequency range 10MHz – 110GHz
- Poseable: POPEYE simulates realistic human postures with simple adjustment of flexible joints
- Flexible: Wide range of accessories for precise, repeatable device positioning
- Customized Phantoms: Time- and cost-effective production of customized phantoms; liquids and gels with custom-defined parameters
- Calibration: ISO17025

Applications

- Optimize and evaluate wireless devices accurately and reproducibly for OTA performance in anechoic chambers
- Optimize and evaluate body-area-network (BAN) devices (e.g., smart glasses, headsets, biosensor devices), and wireless implants in any plausible usage situation
- Simplified phantoms for drive and field tests
- Test SAR with DASY6 using equivalent phantoms optimized for SAR scanning
- Evaluate SAR with implanted probes (e.g., for MRI)



Description

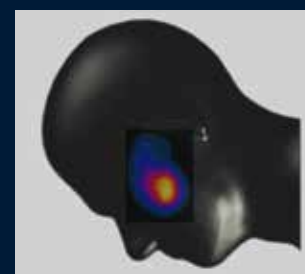
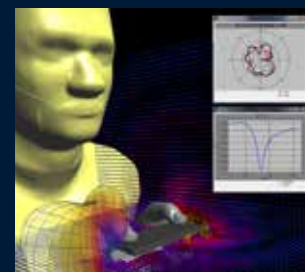
SEMCAD X, the powerful EM simulation platform, combines FDTD, FEM, and mode-matching methods with the latest HPC hardware.

Main Features

- Precision: Verified and validated solvers and platforms, benchmarked against "realworld" industrial applications and measurements
- Speed: Fastest, most robust FDTD, FEM, and MM solvers; CPU-GPU, AXE/CUDA, latest PASCAL architecture (e.g., P100, K80, Titan)
- Efficient: Novel and unique subgridding, real-time automatic mesher
- Topical: special 5G simulation package (array designer, SAPD, circuit tool interfaces, optimizer, automated design workflows, MIMO module, etc.)
- Optimization: Parameterization/sweeps, specialized antenna tools
- Multi-Scale: Generalized Huygens approach (scaling, micro-macro)
- Easy-to-Use: Novel, interactive, ergonomic GUI with pipelining, etc.
- Convenient: CEM-tool ACIS® 3D modeling engine (OTech OGL, VTK)
- Customizable: Customization and automation via Python scripting
- Visualization: Novel postprocessing engine for data extraction in TD/FD
- Export: Data transfer via direct interface to cSAR3D, DASY, DAK
- Upgrades: Upgradable to Sim4Life, the leading CLS platform

Applications

- Virtual prototyping and optimization of on-/in-body wireless devices
- Design and optimization of 5G systems, demonstration of compliance
- Compliant integration of WiMAX, WiFi, etc., indoor/outdoor propagation
- SAR and Power Density for demonstration of compliance with safety limits
- Wireless Power Transfer for mobile, automotive, etc.
- Over-the-Air performance, Hearing Aid Compatibility
- EMI/EMC and ESD analysis and optimization (e.g., PCB)



Description

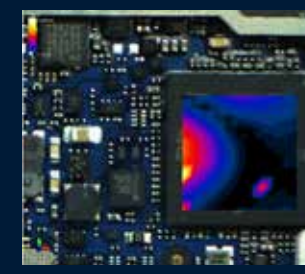
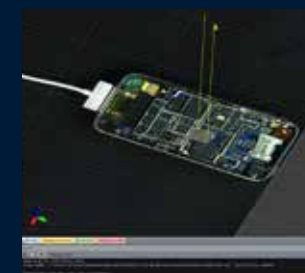
The TDS (Time-Domain Sensor) and ICEy (Interference & Compatibility Evaluation System) product family is optimized for accurate and traceable non-disturbing near-field measurement applications. TDS is an exclusively optical, miniature electromagnetic field probe technology. TDS probes and SPEAG's EUmmW millimeter wave probe technology is integrated in ICEy, our highly automated near-field scanning system providing micrometer precision.

Main Features

- Ultra-Wide Bandwidth: 10MHz – 10GHz (TDS), 10 – 110GHz (EUmmW)
- Miniature Size Sensor: Fine spatial resolution allows precise measurement in high-field gradients for both electric and magnetic fields
- Fully Isolated Sensor: Signal measurement without probe interference
- Precision: Micrometer positioning accuracy (ICEy)
- Absolute and Traceable: 5G type-approval and absolute EMC near-field emission
- Calibration: ISO17025 of all components

Applications

- 5G: Demonstration of compliance of 10 – 110GHz mobile transmitters with all international safety standards
- Radiated and Antenna Test: Correlation of the transmitters close-near-field and far-field based on a single near-field measurement
- Telecommunications: Signal integrity testing and validation of telecommunications equipment, including WLAN (802.11x), IEEE 802.15.x, RFID, LTE equipment, and line interfaces such as PSTN, xDSL, or xRI
- Medical: Wide bandwidth, high sensitivity EMC/EMI/ESD testing of electronic devices for use in hospital environments or in medical applications (according to, e.g., IEC 60601 or EN 55011)
- Automotive: High sensitivity, wide bandwidth EMC/EMI/ESD measurements of electronic automotive components (to fulfil, e.g., the CISPR 25 or ISO 11452 EMC standards)
- EM-Hostile Environments: Measurement in EM-harsh environments, when the instrument cannot be positioned near the probe, meaning that long-haul measurements have the same sensitivity and bandwidth as short-haul measurements



Description

Our product line DAK, widely used to measure the dielectric parameters of bulk materials, has been supplemented with DAK-TL. DAK-TL can determine the complex permittivity and the permeability of thin-layer materials (0.1 – 10 mm) and small volumes of liquids (0.5 – 50 ml).

Main Features

- Precise: Novel algorithms for high-precision measurements, including correction of electrode polarization at low frequencies
- Easy-to-Use: Automated, contact-free monitoring of dielectric composition of fluids, material homogeneity
- Convenient: Novel flange design achieves reliable contact with liquids, gels, and solids
- Cost Effective: Three probes and two shorting blocks cover frequencies 4MHz – 67GHz
- System Calibration: Shorting block provides excellent contact and high repeatability
- Flexible: Compatible with most commercial vector network analyzers (VNA)
- Versatile: Enhanced visualization – view your choice of dielectric parameters (ϵ' , ϵ'' , σ , $\tan \delta$) in a variety of formats (Smith chart, linear chart, log chart, ϵ'' vs. ϵ' display, tabular)
- Automated Data Analysis: Compare data to target parameters or view tolerance or uncertainty ranges
- Customization: Embedded Python script editor enables measurement automation
- Export Formats: DASY52 and SEMCAD X tabular formats
- Calibration: ISO17025

Applications

- Characterize any materials in electronics, chemical, medical, and food industries
- Evaluate standardized reference liquids (e.g., IEC 62209, IEEE 1528, CTIA V3.2, ISO TS10974)
- Monitor dielectric composition of fluids
- Monitor material homogeneity

