

DASY8

Module Systems



DASY8

The Dosimetric Assessment System (DASY) is a robot-based high-precision electromagnetic (EM) near-field scanning platform first introduced in 1994. Until today, more than 800 systems have been installed worldwide.

DASY8, the 8th generation of DASY, is the most precise, advanced, flexible, and versatile scanning platform for testing compliance with any national (e.g., FCC, CENELEC) and international guidelines, standards, and regulations (e.g., IEC, IEEE, ICNIRP) and can also be used for a wide range of research and development (R&D) measurement tasks related to EM exposure from 3 kHz to 110 GHz.

Five application-specific modules are available for DASY8. All modules are tightly coupled with the co-developed premier simulation platform Sim4Life (ZMT Zurich MedTech AG, Switzerland) that was designed for state-of-the-art computational life science investigations and effective device development.

DASY8^{3D}, which combines the speed of cSAR3D with the precision and versatility of DASY8, can be used for rapid automated testing of wireless devices in the context of compliance evaluation and market surveillance. SPEAG is also developing DASY8 Module APD for absorbed power density assessments above 10 GHz. In addition, ZMT will launch DASY8 Module AIMD, which is optimized for deposited power evaluations in accordance with the medical implant standards.

Module SAR



Description

DASY8 Module SAR is optimized for demonstrating the compliance of peak spatial mass-averaged and time-averaged specific absorption rate (psSAR) from 4 MHz to 10 GHz with all national and international standards and regulations. It also enables the evaluation of the absorbed power density (APD) from 6 to 10 GHz and the assessment of whole body averaged SAR (wbSAR).

DASY8 is considered the gold standard for compliance testing thanks to its reliability and precision. It is the only system that can demonstrate psSAR compliance of any device in any use case.

SPEAG continually optimizes this module to further reduce scan time without compromising measurement accuracy. We also offer all verification and validation sources required by the standards.

Applications

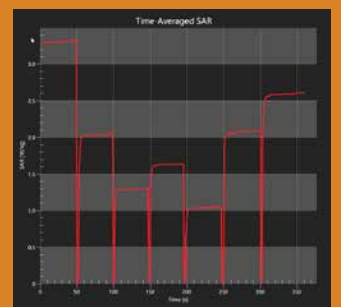
- psSAR measurements in the 4 MHz to 10 GHz frequency range according to IEC/IEEE 62209-1528, FCC, ISED, and other national regulations
- wbSAR measurements of base station antennas according to IEC 62232
- APD measurements in the 6 to 10 GHz frequency range according to IEC PAS APD

Main Features

- Reference measurement system
- Measurement in any standardized and customized phantoms
- Intuitive and workflow-oriented graphical user interface (GUI)
- Time-averaged SAR according to IEC/IEEE 62209-1528, FCC, and ISED procedures
- Compliant with surveillance testing requirements
- Multi-TX evaluations from measurements from different DASY8/6 systems
- Application Programming Interface (API) Option for further automation of measurement workflows
- Integration of base station simulators for automated call handling
- Flexible report generator to create documents with tabular and graphical outputs in various formats
- Optimized zoom scan resolution on the fly to fulfil IEC/IEEE 62209-1528 requirements (Smart Zoom Scan)

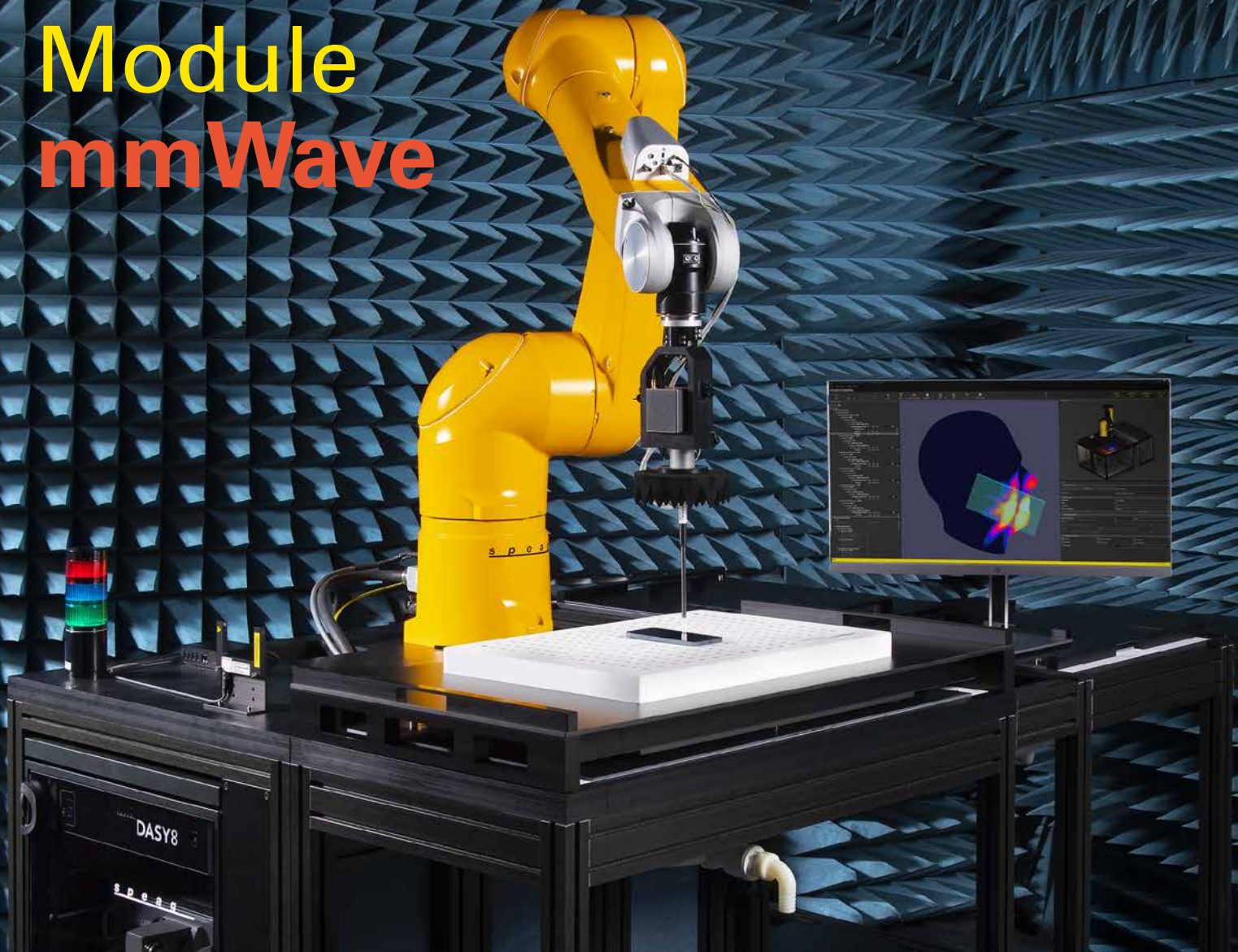


SAR Ankle phantom to test tracking or similar wireless devices



SAR variations over time for a mockup phone with time-averaged SAR feature

Module mmWave



Description

DASY8 Module mmWave is the most advanced solution for testing the compliance of incident power density (PD) from 6 to 110 GHz with all national and international standards and regulations. The module is based on the miniaturized pseudo vector EUmmWVx probe for accurate measurements as close as 2 mm from the device surface and two novel phase reconstruction algorithms for total field evaluations. SPEAG also offers the Maximum Exposure Optimizer (MEO) Option for Module mmWave for PD evaluations of multiple-input multiple-output transmitters on any 3D surface with minimal measurement efforts.

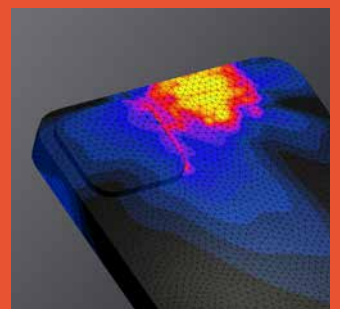
SPEAG continually optimizes this module to further reduce scan time without compromising measurement accuracy. We also offer all verification and validation sources required by the standards.

Applications

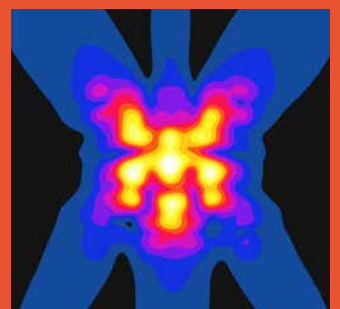
- PD evaluations according to IEC 63195-1, FCC, and other national regulations (6 – 110 GHz)
- Electric (E-) field measurements (6 – 110 GHz)

Main Features

- The most accurate, reliable, and flexible measurement system for PD compliance testing on the market
- Intuitive and workflow-oriented GUI
- Time-averaged PD measurements
- Multi-TX evaluations of measurements from different DASY8/6 systems
- PD evaluations following the device surface (e.g., goggles, smartphones with extruding camera modules)
- PD evaluations on any 3D surface, including virtual phantoms such as the SAM head (Forward Transform Evaluation (FTE) Option)
- PD evaluations of phased-array antennas from a limited set of measurements (MEO Option)
- Automation of measurement workflows via the comprehensive API Option



PD distribution at 2 mm conformal to the device surface



Reconstructed E-field at 2 mm from a 30 GHz cavity dipole array

Module WPT



Description

DASY8 Module WPT is optimized to demonstrate the compliance of magnetic field sources (e.g., wireless power transfer, WPT) operating from 3 kHz to 4 MHz with reference level limits and basic restrictions. It combines the high resolution 27-sensor EM field measurement system MAGPy V2.0 with the high-precision DASY8 scanning system.

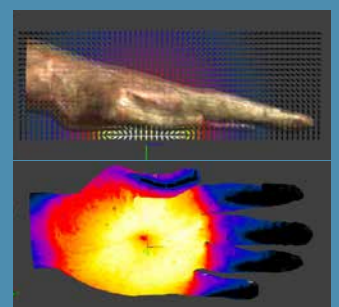
DASY8 Module WPT is the only measurement system for experimental Tier 4 evaluations according to IEC PAS 63184:2021 by converting the measured data into a Maxwell field and computing the induced fields in a tissue-simulating half-space phantom. The resulting Maxwell field can also be imported directly into the Sim4Life simulation platform for advanced postprocessing, e.g., by evaluating different realistic use cases with the Virtual Population (ViP, IT'IS Foundation) anatomical models.

Applications

- Evaluation of the electric (E-) and magnetic (H-) fields (3 kHz – 10 MHz)
- Direct evaluation of all basic restriction quantities E, j, and SAR (3 kHz – 4 MHz) according to IEC PAS 63184:2021

Main Features

- Accurate H-field values (sensor loop size: 1 cm²) in frequency and time domains
- H-field measurements in air and lossy liquid
- E-field measurements in air
- Fully automated assessments, including spectral weighting
- Demonstration of compliance for field strengths exceeding the reference levels by > 1000
- Advanced evaluations in ViP anatomical models with Sim4Life without the need to model the device under test
- Eliminates the need for the simulation and validation of WPT systems



Simulated SAR in the hand over a WPT charger using measured data



Wireless charging setup

Module R&D



Description

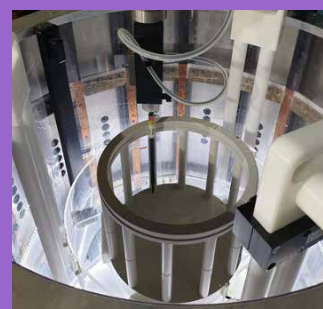
DASY8 Module R&D has been explicitly designed to provide optimal flexibility for research and development tasks that require field scanning in any volumetric space. It offers a comprehensive API for the development of customized measurement setups and supports all SPEAG probes. In addition, third-party probes can be integrated.

Applications

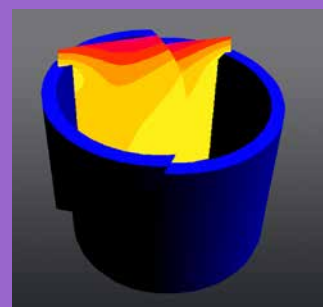
- 1D, 2D, and 3D mapping of the near field of sources (e.g., advanced antennas, magnetic resonance RF coils and gradient coils, hyperthermia applicators)
- Evaluation of large systems (e.g., radiative power transfer systems, automotive wireless systems, induction heaters)
- Experimental validation of computational EM models

Main Features

- Comprehensive API with example applications
- Accurate probe positioning system (± 0.05 mm) with integrated calibration of the probe tip location (± 0.1 mm)
- Creation of any custom-defined scan
- Easy integration of third-party probes
- Availability of DASY8 safety features (e.g., probe touch and collision detection, emergency stop)



High-resolution volume field scan inside a head coil prototype



Measurement layout for scans in a head coil prototype

Module HAC



Description

DASY8 Module HAC is the measurement system of choice for demonstrating the compliance of wireless hearing aid compatibility devices with ANSI-C63.19-2019. It includes the radiofrequency (RF) Extension for RF emission tests and the tele-coil (T-COIL) Extension for audio-band magnetic tests.

The RF audio interference level (RFail) is assessed with the RF Extension, i.e., the emitted E-field is measured with the isotropic miniaturized EF3DVx probe, averaged, and scaled with the modulation interference factor (MIF).

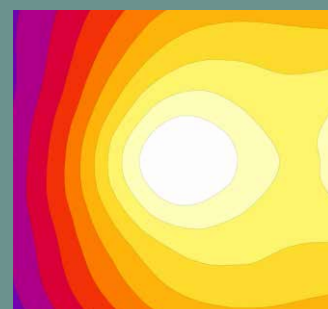
The T-COIL coupling mode requirements are computed from the desired signal and undesired field measurements in the audio magnetic band. The qualifying measurement points (primary and secondary groups) and the frequency response of the desired signal can be visualized and exported. SPEAG offers all verification sources required by ANSI-C63.19-2019, i.e., the Telephone Magnetic Field Simulator and the required dipoles.

Applications

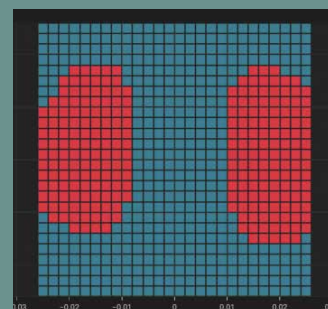
- Hearing aid compatibility evaluations according to ANSI C63.19-2019

Main Features

- Intuitive and workflow-oriented GUI
- MIF measurement using SPEAG's Modulation and Audio Interference Analyzer (MAIA)
- Numerical MIF values for a wide range of communication systems
- Computation of the RFail from E-field and MIF measurements as defined in ANSI C63.19-2019
- Generation and recording of audio signals with the Audio Magnetic Measurement Instrument (AMMI)
- On-site probe calibration using the Audio Magnetic Calibration Coil (AMCC)
- Development of custom workflow via the included API feature



RF interference measurement of a mobile phone



Qualifying points according to ANSI C63.19-2019

Organization Overview – Zurich43 www.z43.swiss

Zurich43 is a strategic alliance composed of four partner organizations: the nonprofit Foundation for Research on Information Technologies in Society (IT'IS Foundation) and three commercial SMEs – Schmid and Partner Engineering AG, ZMT Zurich MedTech AG and TI Solutions AG. Zurich43's dedicated mission is to expand the boundaries (1) for accurate evaluation of EM near- and far-fields from static to optical frequencies and (2) for predictive modeling in validated anatomical and physiological environments for precision medicine. Zurich43 is a leading global player that collaborates with over 100 research partners and serves over 500 customers worldwide.

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

SPEAG was founded in 1994 as a spin-off of the Swiss Federal Institute of Technology (ETH) Zurich's Bioelectromagnetics/EM Compatibility research group, which later became the IT'IS Foundation, to develop and manufacture EM systems and components. SPEAG is the leading developer and manufacturer of advanced, efficient, and reliable test equipment for the evaluation of the EM near- and far-fields at frequencies from a few kHz to up to 110 GHz.

SPEAG's key products are: DASY8 Modules: gold standard for compliance testing of wireless technologies from 3 kHz to 110 GHz; cSAR3D: fast SAR testing; ICEy: automated near-field scanning for EM interference and compatibility (EMI/EMC); MAGPy: *in situ* exposure assessments below 10 MHz; DAK: dielectric measurement systems; EM Phantoms: body simulators for RF testing; and SEMCAD X: RF performance modeling of devices used in and on the human body. To better serve SPEAG and ZMT customers and partners of the IT'IS Foundation, a calibration laboratory – certified by the SAS for ISO/IEC 17025 Accreditation and multilaterally recognized by EA, IFA, and ILAC – was established in 2001. The laboratory provides extensive calibration services for the entire Zurich43 family of systems, probes, antennas, dielectric probe kits, phantoms, and materials.

Additionally, a number of satellite facilities have been co-founded to bring calibration services closer to SPEAG's global customer base: SPEAG Calibration Laboratory Korea (since 2011) in collaboration with DYMSTEC, and BNN SPEAG Test & Calibration Laboratory instituted (since 2012) in India together with BNN Communication Engineers.

IT'IS Foundation – IT'IS www.itis.swiss

IT'IS was established in 1999 through the initiative and with the support of the ETH Zurich and the global wireless communications industry, together with several government agencies. IT'IS is the leading independent research institute dedicated to improving the quality of people's lives by advancing personalized medicine and computational life sciences (IT'IS for Health) and beneficial applications of EM energy and wireless communications (EM Research).

The Foundation provides an innovative, proactive, and interdisciplinary research environment for the cultivation of sound science and research and good education. IT'IS supports the R&D efforts of its many industrial partners – in particular SME's such as SPEAG and ZMT – to advance precompetitive and non-competitive research initiatives and offers a variety of customized research solutions to the wireless and medical device industries, to academic and national institutions, as well as to governments and regulatory bodies.

ZMT Zurich MedTech AG – ZMT 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 in targeted life sciences applications for simulation, analysis, and prediction of complex and dynamic biological processes and interactions. ZMT's flagship product is Sim4Life, a revolutionary simulation platform that combines computable human phantoms with incredibly powerful physics solvers and the most advanced tissue models. Sim4Life is used to analyze real-world biological phenomena and complex technical medical devices and therapies in validated computational biological and anatomical environments. ZMT also provides fully characterized and ISO17025-calibrated measurement systems for model generation, verification, and validation of *in silico*-based evaluations. All systems are user-friendly and are seamlessly integrated with Sim4Life.

TI Solutions AG – TI Solutions www.temporalinterference.com

TI Solutions is a young start-up founded in 2019 developing highly flexible stimulation devices and planning tools to support investigations of noninvasive temporal interference stimulation of brain and peripheral nervous system activity. The long-term goal is to enable personalized treatments by providing the most advanced stimulation devices.

Regional Sales Channels and Partners

A complete list of local sales channels and partners can be found at: www.speag.swiss/contact

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