

DAK

DAKS (4 MHz – 14 GHz)

Robust, Portable, Easy-to-Use Dielectric Measurement System

The DAK System is a low cost, portable, and easy-to-use dielectric assessment system kit that combines the DAK technology with the miniature portable [R60](#) and [R140B](#) vector reflectometers from [Copper Mountain Technologies](#). The direct and rigid connection of the probe to the reflectometer allows the probe to be moved to the media under test after calibration, greatly simplifying measurements in the lab. The reflectometer communicates directly with the DAKS software via a USB port. The system is highly accurate and is especially recommended for use in specific absorption rate (SAR) compliance laboratories for routine measurement of the dielectric properties of the tissue simulating liquids directly inside the phantom.



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| System | The DAKS package includes a 3rd-party vector network analyzer (VNA), the Planar R140 or R60 from Copper Mountain Technologies. The DAKS probes, modified DAK-3.5 or DAK-12 probes, are equipped with N-type connectors. The DAKS is delivered with the probe mounted on the VNA and ready to use. |
| Application | Examples of applications include: <ul style="list-style-type: none">▪ Characterization of materials for the electronics, chemical, food, and medical industries; system portability ideal for use in production lines and field measurements▪ Evaluation and validation of tissue simulating liquids for SAR measurements or for magnetic resonance imaging safety experiments |

DAKS 12 (4 MHz – 3 GHz)



- Probe connector type: N-type
- Outer conductor inside diameter: 12 mm
- Inner conductor diameter: 3.18 mm
- Flange diameter: 48 mm
- Reflectometer: R60-CMT
- Dielectric bead material: Eccostock 0005
- Flange: Stainless steel
- Immersible length: 150 mm
- Operating temperature range: 0 – 60 °C
- High measurement repeatability (typ. within $\pm 1\%$)
- Accuracy: Uncertainty tables based on material properties and frequency are available upon request

DAKS 3.5 (200 MHz- 14 GHz)



- Probe connector type: N-type
- Outer conductor inside diameter: 3.5 mm
- Inner conductor diameter: 0.93 mm
- Flange diameter: 19 mm
- Reflectometer: R140-CMT
- Dielectric bead material: Eccostock 0005
- Flange: Stainless steel
- Immersible length: 150 mm
- Operating temperature range: 0 – 60 °C
- High measurement repeatability (typ. within $\pm 1\%$)
- Accuracy: Uncertainty tables based on material properties and frequency are available upon request

Calibration

Calibration is performed according to SPEAG's high-quality standards; DAK probe calibration included within the scope of SPEAG's [ISO/IEC 17025 accreditation](#); suitable for measurements with small and known tolerances.

Verification

The [DAK Verification Kit](#) ensures a quick and easy process to verify the DAK measurements.

Accessories

SPEAG provides all [DAKS components and accessories](#) necessary for high-precision measurements:

- Shorting block
- Probe stand
- Metallic strip set (MSS)
- Thermometer

Software

The software provide the following functionalities:

- Modern intuitive graphical user interface (GUI)
- Choice of complex permittivity parameters (ϵ' , ϵ'' , σ , $\tan \delta$) reported in a variety of data formats: linear plots, logarithmic plots, Smith charts, Cole-Cole plots, and tabular
- Robust data analysis suite enables data to be fit to analytical curves and compared with target parameters with tolerance and uncertainty ranges
- Streamlines the workflow for dielectric measurements
- Fast and robust VNA control, data acquisition, and calculation of dielectric parameters
- Includes averaging function and numerical noise filtering
- Flexible scripting for measurement automation and hardware customization

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| Computer Requirements | <p>The following computer requirements must be met:</p> <ul style="list-style-type: none"> ▪ Software must run on an external computer, not on the VNA ▪ Intel Core2 Duo 2.3 GHz CPU (or AMD equivalent) ▪ 4 GB of RAM ▪ Dedicated 3D accelerated graphics display adapter card with at least 128 MB of on-board memory that supports the latest OpenGL drivers (v3.2 or higher); note: graphics cards of the AMD Radeon™ HD 7500M/7600M series must run on the latest driver version ▪ Operating system: Windows 10, Windows 8 and 8.1, or Windows 7; Windows 8.1 is recommended; the software is running only on 64 bit Windows operating system ▪ A display with 32-bit color depth and a resolution of 1280 × 1024 pixels or better (optimum size: 1920 × 1200 pixels) |
| Unique Features | |
| State of the art probe design | Obtaining good contact with fluids, gels and bulk solids |
| Advanced Shorting Block | Achieving excellent calibration |
| Portable | Use in multiple environments |
| Cableless | Direct connection with the reflectometer eliminates phase distortions due to the RF cable movements |
| Immersible Probe Length | insert probe up to a depth of 150 mm in the sample of fluid or gel |
| Python Interface | Built-in Python interface for powerful extended control of equipment and data analysis |
| Wide Range of Dielectric Properties | ϵ_r : 1 – 200 $\tan \delta$: 0.02/ ϵ_r – >10 |
| Benefits | |
| Easy to Use | Enhanced user experience with improved GUI and software reduce the training time and operational costs, fast semi-automated measurements at a push of a button |
| Accurate, Repeatable and Reliable | Measurement uncertainty as a function of frequency and material properties, suitable for measurements with small and known tolerances |
| In-Field Measurements | First ever instrument that can be moved to the material under test |
| Flexible Operation | Enables measurements of dielectric properties of tissue simulating liquids directly inside the phantom for SAR compliance testing |
| All-in one Device | Ready to use dielectric measurement system |
| Standard Compliant | Dielectric measurement of tissue simulating liquids according the SAR standard IEC 62209 |
| Compatibility | The software is limited for use with the R60 and R140 Reflectometers; option to upgrade to the full version. Compatible with the DASY 6.x and SEMCAD X softwares. |

Product History

Release Date

Released

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