



SCS Directory

Accreditation number: SCS 0108

International standard: ISO/IEC 17025:2017
Swiss standard: SN EN ISO/IEC 17025:2018

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Scope of accreditation see: www.sas.admin.ch
(Accredited bodies)

Scope of accreditation as of 17.09.2024

Calibration Laboratory for Electric Field, Magnetic Field and SAR Sensors and Dielectric Measurement Instrumentation

Calibration and Measurement Capability (CMC)

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
Electric field				
Calibration of E-field probes	0.8 V/m ... 800 V/m	4 MHz ... 6 GHz	5,1 %	e.g. ER3DV6x, EF3DVx, EU2DVx, EE3DVx, EL3DVx
Calibration of E-field probes	10 V/m ... 2000 V/m	750 MHz ... 6 GHz 6 GHz ... 110 GHz	5,1 % 0,98 dB	e.g. EUmmWVx
Calibration of E-field probes	2 V/m ... 420 V/m	3 kHz ... 10 MHz	1,06 dB	e.g.,MAGPy-8H3D+E3D
Magnetic field				
Calibration of H-field probes	2 mA/m ... 2 A/m	4 MHz ... 3 GHz	5,1 %	e.g. H2DVx, H3DVx, HL3DVx
Calibration of H-field probes	10 A/m ... 2200 A/m	3 kHz ... 10 MHz	0,70 dB	e.g., MAGPy-8H3D+E3D



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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
Calibration of sensitivity for magnetic field probes in the audio range	0,001 ... 0,1 V/(A/m)	1 kHz 0,1 ... 1 A/m	2,2 %	e.g. AM1DVx
Calibration of magnetic field simulator	-30 ... +40 dB A/m	1 kHz	4,1 %	e.g. TMFS (Telephone Magnetic Field Simulator)
Calibration of magnetic field simulators for validation and verification	2.5 A/m ... 800 A/m	3 kHz ... 10 MHz	1.13 dB	e.g., V-Coil500/3, V-Coil350/85, V-Coil50/400, V-Coil50/6780
Specific absorption rate (SAR)				e.g. ET3Dvx, ES3Dvx, EX3Dvx, ET1Dvx, EU2Dvx
	E* field (typical ²)			
Calibration of dosimetric E-field probes	0,5 V/m ... 500 V/m	4 MHz ... 450 MHz	6,7 % (13,3 % for SAR)	Temperature transfer calibration *) As example, the indicated range corresponds to 0,2 mW/kg ... 200 W/kg for head tissue simulating liquid and f = 450 MHz
	E* field (typical ²)			e.g. ET3Dvx, ES3Dvx, EX3Dvx, ET1Dvx, EU2Dvx
Calibration of dosimetric E-field probes	0,45 V/m ... 450 V/m	750 MHz ... 3 GHz	5,5 % (11 % for SAR)	Waveguide analytical calibration *) As example, the indicated range corresponds to 0,2 mW/kg ... 200 W/kg for head tissue simulating liquid and f = 1800 MHz
	0,4 V/m ... 450 V/m	3 GHz ... 6 GHz	6,5 % (13,1 % for SAR)	Waveguide analytical calibration *) As example, the indicated range corresponds to 0,2 mW/kg ... 200 W/kg for head tissue simulating liquid and f = 5200 MHz



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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
	0,4 V/m ... 400 V/m	6 GHz ... 10 GHz	9,3 % (18,6 % for SAR)	Waveguide analytical calibration *) As example, the indicated range corresponds to 0,2 mW/kg ... 200 W/kg for head tissue simulating liquid and f = 7 GHz
Calibration of temperature SAR probes	0 °C ... + 60 °C	Tissue simulating Liquids	0,15 K (5 % temperature gradient for SAR)	As example, the temperature gradient measured with T1Vx and T1V3LAB probes can be determined to 5 %, which is also a contribution to SAR accuracy. (Noise is dominating the lower SAR threshold to typically 0,2 W/kg)
Calibration of test system validation sources	SAR 1 g and 10 g per 1 W input power	4 MHz ... 290 MHz	18,4 % for SAR 1 g 18,0 % for SAR 10 g	e.g. CLA-6, CLA-13, CLA-30, CLA-64, CLA-128, CLA-150, CLA-220 according to IEC/IEEE 62209-1528 for 1 g and 10 g SAR
		300 MHz ... 700 MHz	18,1 % for SAR 1 g 17,6 % for SAR 10 g	e.g. D835V2 ... D3000V2 according to IEC/IEEE 62209-1528, for 1 g and 10 g SAR
	SAR 1 g and 10 g per 1 W input power	700 MHz ... 3 GHz	17,0 % for SAR 1 g 16,5 % for SAR 10 g	
		3 GHz ... 6 GHz	19,9 % for SAR 1 g 19,5 % for SAR 10 g	e.g. D3500V2 ... D5GHzV2 according to IEC/IEEE 62209-1528, for 1 g and 10 g SAR
Near-Field Calibration of dipoles in air	SAR 1 g and 10 g per 1 W input power	6 GHz ... 10 GHz	24,7 % for SAR 1 g 24,4 % for SAR 10 g	e.g. D6.5GHzV2 ... D9GHzV2 according to IEC/IEEE 62209-1528, for 1 g and 10 g SAR
	E field per 0,1 W input power 30 V/m ... 300 V/m	700 MHz ... 6 GHz	9,5 % for E field	e.g. CD835V3 ... CD5500V3 according to ANSI C 63.19, for E field and H field
	H field per 0,1 W input power 0,07 A/m ... 0,7 A/m	385 MHz – 3 GHz	8,3 % for H field	e.g. AdxxxV5 according to ANSI 14117 for H-field



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Calibration of Golden Validation Device	SAR 1 g and 10 g per GVD input power	900 MHz	15,0 % for SAR 1 g 15,1 % for SAR 10 g	e.g. GVD – SR 004001 AA
DC Voltage				
Calibration of readout units for field and SAR probes	2 mV		1,5 %	e.g. DAE3Vx, DAE4Vx, DAEasyVx
	200 mV		1 %	
	1 mV ... 500 mV		1,16 %	e.g. EASY6-DAE, DAE4ICEy
Calibration of SAR for planar array systems	SAR peak at 4 mm depth per 1 W input power	650 MHz ... 3 GHz	25,8 % for iSAR Flat 29,3 % for iSAR Head	e.g. iSAR Flat, iSAR Head
	SAR peak at 3 mm depth per 1 W input power	650 MHz ... 3 GHz	22,4 % for cSAR3D Flat 25,9 % for cSAR3D Left/Right Head	e.g., cSAR3D Flat, cSAR3D Left Head, cSAR3D Right Head
	SAR peak at 3 mm depth per 1 W input power	3 GHz ... 6 GHz	25,1 % for cSAR3D Flat 28,3 % for cSAR3D Left/Right Head	e.g., cSAR3D Flat, cSAR3D Left Head, cSAR3D Right Head
	SAR peak at 3 mm depth per 1 W input power	6 GHz ... 10 GHz	29,8 % for cSAR3D Flat	e.g. cSAR3D Flat, cSAR3D Quad
Calibration of antenna sources for transfer calibration of planar array systems	SAR peak per 1 W input power	650 MHz ... 3 GHz	17,7 % for SAR peak	e.g., SA AAE 083B, SA AAE 190 A, etc.
	SAR peak per 1 W input power	3 GHz ... 6 GHz	19,9 % for SAR peak	
Calibration of thermometers	0 °C ... + 60 °C		0,1K	
Calibration of active electro-optical E&H-field probes optimized for close near-field evaluations in air	15 mV/m ... 75 V/m	50 MHz ... 6000 MHz	3,3 dB	for antenna factor (E-field)
	42 µA/m ... 0.5 A/m	50 MHz ... 6000 MHz	3,3 dB	for antenna factor (H-field)
Calibration of active electro-optical RF over fiber systems	Gain: -55 ... 15dB	10 MHz ... 10 GHz	2,0 dB	For transfer function (gain)
Calibration of stabilized RF power sources	- 5 dBm ... + 17 dBm	600 MHz ... 6 GHz	0,43 dB	e.g. Powersource1



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Calibration Procedure for sources in air above 6 GHz	10 V/m ...2000 V/m	10 GHz... 110 GHz	1,27 dB 1,47 dB 1,54 dB	e.g. verification source e.g. validation source e.g. general source
Calibration Procedure for sources in air above 6 GHz, for H and averaged S	25 mA/m ... 2,5 A/m 2.5 W/m ² ...2,5 kW/m ²	10 GHz... 110 GHz	1,28 dB 1,63 dB 1,70 dB	e.g. verification source e.g. validation source e.g. general source
Measurement capability of the dielectric probe	Permittivity, Conductivity or Loss Tangent from	homogeneous isotropic material		Open-ended coaxial probes, e.g. DAK-12, DAK-3.5, DAK-1.2 E
Permittivity	1...15			Loss tangent: < 0,1
	10...40	4 MHz ... 20 MHz 20 MHz ... 200 MHz 200 MHz ... 3 GHz 3 GHz ... 6 GHz 6 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz 40 GHz ... 67 GHz	24,3 % 11,2 % 2,0 % 2,0 % 2,1 % 3,2 % 3,2 % 4.5%	Conductivity: > 10 S/m
	35...100	4 MHz ... 10 MHz 10 MHz ... 50 MHz 50 MHz ... 200 MHz 200 MHz ... 3 GHz 3 GHz ... 6 GHz 6 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz	6,4 % 3,8 % 1,8 % 1,8 % 2,3 % 3,7 % 4,8 % 6,4 %	Conductivity: < 0,1 S/m Conductivity: < 0,1 S/m Conductivity: 0,1 – 10 S/m Conductivity: 0,1 – 10 S/m Conductivity: 1 – 10 S/m Conductivity: > 10 S/m Conductivity: > 10 S/m Conductivity: > 10 S/m
Conductivity	1 ... 10 S/m	4 MHz ... 10 MHz 10 MHz ... 50 MHz 50 MHz ... 200 MHz 200 MHz ... 3 GHz 3 GHz ... 6 GHz 6 GHz ... 20 GHz	6,7 % 2,9 % 2,2 % 1,7 % 1,9 % 2,4 %	Conductivity: 0,1 – 1 S/m Conductivity: 0,1 – 1 S/m Conductivity: 1 – 10 S/m Conductivity: 1 – 10 S/m Conductivity: > 10 S/m
	>10 S/m	4 MHz ... 10 MHz 10 MHz ... 50 MHz 50 MHz ... 200 MHz 200 MHz ... 3 GHz 3 GHz ... 6 GHz 6 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz	3,1 % 2,9 % 2,5 % 3,2 % 3,0 % 3,0 % 3,8 % 4,7 %	Permittivity: 35 – 100 Permittivity: 35 – 100 Permittivity: 35 – 100 Permittivity: 35 – 100 Permittivity: 35 – 100 Permittivity: 10 – 40 Permittivity: 10 – 40 Permittivity: 1 – 15



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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
Loss Tangent	0 ... 0,1	4 MHz ... 20 MHz 20 MHz ... 200 MHz 200 MHz ... 3 GHz 3 GHz ... 6 GHz 6 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz	0,46 0,28 0,03 0,03 0,03 0,03 0,03	Permittivity: 1 – 15
Measurement capability of the dielectric probe for liquids and gels	Permittivity and Conductivity from	homogeneous isotropic material		Open-ended coaxial probes, e.g. DAK-12, DAK-3.5, DAK-1.2 E
Permittivity	1...100	4 MHz ... 10 MHz 10 MHz ... 20 MHz 20 MHz ... 30 MHz 30 MHz ... 50 MHz 50 MHz ... 5 GHz 5 GHz ... 20 GHz	6,4 % 3,8 % 2,3 % 1,9 % 2,2 % 3,7 %	static conductivity < 0,1 S/m
	1...100	4 MHz ... 10 MHz 10 MHz ... 20 MHz 20 MHz ... 30 MHz 30 MHz ... 50 MHz 50 MHz ... 5 GHz 5 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz	6,8 % 3,2 % 3,3 % 3,3 % 3,1 % 3,9 % 5,0 % 6,5 %	static conductivity 0,1 – 10 S/m
Conductivity	0.01 ... 0,1 S/m	300 MHz ... 500 MHz 500 MHz ... 5 GHz 5 GHz ... 20 GHz	7,5 % 4,4 % 5,4 %	Permittivity: 1 – 100
Conductivity	0,1 – 10 S/m	4 MHz ... 10 MHz 10 MHz ... 20 MHz 20 MHz ... 30 MHz 30 MHz ... 50 MHz 50 MHz ... 5 GHz 5 GHz ... 20 GHz 20 GHz ... 40 GHz 40 GHz ... 67 GHz	3,9 % 3,9 % 3,8 % 3,4 % 4,8 % 4,8 % 4,8 % 4,9 %	Permittivity: 1 – 100



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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)		Remarks
Capability of the dielectric probe to measure thin layers of solids and liquids in small volume	Permittivity, Conductivity or Loss Tangent from	Homogeneous isotropic material	Permittivity	Loss tangent	Open-ended coaxial probes, e.g. DAK12-TL2, DAK3.5-TL2, DAK1.2E-TL2
			Permittivity	Loss tangent	
			Permittivity	Loss tangent	
			Permittivity	Loss tangent	
Permittivity Loss tangent	1 < Permittivity < 10 Loss tangent < 0,05	4 MHz ... 20 MHz	---	---	0.1 < thickness < 0.2 mm
		20 MHz ... 30 MHz	---	---	
		30 MHz ... 50 MHz	---	---	
		50 MHz ... 100 MHz	---	---	
		100 MHz ... 600 MHz	32,6 %	0,06	
		600 MHz ... 3 GHz	29,5 %	0,03	
		3 GHz ... 6 GHz	12,6 %	0,03	
		6 GHz ... 20 GHz	10,0 %	0,03	
	1 < Permittivity < 10 Loss tangent < 0,05	20 GHz ... 40 GHz	9,1 %	0,03	0.2 < thickness < 1 mm
		40 GHz ... 67 GHz	4,5 %	0,03	
		4 MHz ... 20 MHz	34,6 %	0,45	
		20 MHz ... 30 MHz	27,0 %	0,27	
		30 MHz ... 50 MHz	25,6 %	0,17	
		50 MHz ... 100 MHz	20,7 %	0,10	
		100 MHz ... 600 MHz	9,1 %	0,06	
		600 MHz ... 3 GHz	6,5 %	0,03	
	1 < Permittivity < 10 Loss tangent < 0,05	3 GHz ... 6 GHz	3,7 %	0,03	1 < thickness < 10 mm
		6 GHz ... 20 GHz	3,3 %	0,03	
		20 GHz ... 40 GHz	3,9 %	0,03	
		40 GHz ... 67 GHz	3,5 %	0,03	
		4 MHz ... 20 MHz	24,3 %	0,45	
		20 MHz ... 30 MHz	11,2 %	0,27	
		30 MHz ... 50 MHz	7,1 %	0,17	
		50 MHz ... 100 MHz	4,7 %	0,10	
	1 < Permittivity < 10 Loss tangent > 0,05	100 MHz ... 600 MHz	2,7 %	0,06	0.1 < thickness < 0.2 mm
		600 MHz ... 3 GHz	2,1 %	0,03	
		3 GHz ... 6 GHz	2,0 %	0,03	
		6 GHz ... 20 GHz	2,2 %	0,03	
		20 GHz ... 40 GHz	3,9 %	0,03	
		40 GHz ... 67 GHz	3,2 %	0,03	
		4 MHz ... 20 MHz	---	---	
		20 MHz ... 30 MHz	---	---	
30 MHz ... 50 MHz	---	---			
50 MHz ... 100 MHz	---	---			
100 MHz ... 600 MHz	18,6 %	0,06			
600 MHz ... 3 GHz	24,6 %	0,03			
3 GHz ... 6 GHz	14,7 %	0,03			
6 GHz ... 20 GHz	8,3 %	0,03			
20 GHz ... 40 GHz	10,4 %	0,03			
40 GHz ... 67 GHz	4,7 %	0,05			



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	1 < Permittivity < 10 Loss tangent > 0,05	4 MHz ... 20 MHz	---	---	0.2 < thickness < 1 mm
		20 MHz ... 30 MHz	---	---	
		30 MHz ... 50 MHz	---	---	
		50 MHz ... 100 MHz	---	---	
		100 MHz ... 600 MHz	29,8 %	0,06	
		600 MHz ... 3 GHz	19,5 %	0,03	
		3 GHz ... 6 GHz	8,0 %	0,03	
		6 GHz ... 20 GHz	4,1 %	0,03	
		20 GHz ... 40 GHz	4,3 %	0,03	
		40 GHz ... 67 GHz	3,8 %	0,03	
	1 < Permittivity < 10 Loss tangent > 0,05	4 MHz ... 20 MHz	24,3 %	0,45	1 < thickness < 10 mm
		20 MHz ... 30 MHz	11,2 %	0,27	
		30 MHz ... 50 MHz	7,1 %	0,17	
		50 MHz ... 100 MHz	4,7 %	0,10	
		100 MHz ... 600 MHz	2,6 %	0,06	
		600 MHz ... 3 GHz	2,0 %	0,03	
		3 GHz ... 6 GHz	1,9 %	0,03	
		6 GHz ... 20 GHz	2,0 %	0,03	
		20 GHz ... 40 GHz	3,2 %	0,03	
		40 GHz ... 67 GHz	3,1 %	0,03	
	Permittivity > 10 Loss tangent < 0,05	4 MHz ... 20 MHz	28,4 %	0,45	0.1 < thickness < 0.2 mm
		20 MHz ... 30 MHz	18,5 %	0,27	
		30 MHz ... 50 MHz	12,6 %	0,17	
		50 MHz ... 100 MHz	8,6 %	0,10	
		100 MHz ... 600 MHz	5,7 %	0,06	
		600 MHz ... 3 GHz	5,7 %	0,03	
		3 GHz ... 6 GHz	5,7 %	0,03	
		6 GHz ... 20 GHz	4,1 %	0,03	
		20 GHz ... 40 GHz	4,6 %	0,03	
		40 GHz ... 67 GHz	6,2 %	0,03	
	Permittivity > 10 Loss tangent < 0,05	4 MHz ... 20 MHz	24,7 %	0,45	0.2 < thickness < 1 mm
		20 MHz ... 30 MHz	12,1 %	0,27	
		30 MHz ... 50 MHz	8,5 %	0,17	
		50 MHz ... 100 MHz	6,6 %	0,10	
		100 MHz ... 600 MHz	3,7 %	0,06	
		600 MHz ... 3 GHz	4,0 %	0,03	
3 GHz ... 6 GHz		3,0 %	0,03		
6 GHz ... 20 GHz		3,5 %	0,03		
20 GHz ... 40 GHz		3,8 %	0,03		
40 GHz ... 67 GHz		3,9 %	0,03		
Permittivity > 10 Loss tangent < 0,05	4 MHz ... 20 MHz	24,3 %	0,45	1 < thickness < 10 mm	
	20 MHz ... 30 MHz	11,2 %	0,27		
	30 MHz ... 50 MHz	7,1 %	0,17		
	50 MHz ... 100 MHz	4,7 %	0,10		
	100 MHz ... 600 MHz	2,6 %	0,06		
	600 MHz ... 3 GHz	1,9 %	0,03		
	3 GHz ... 6 GHz	1,9 %	0,03		
	6 GHz ... 20 GHz	2,0 %	0,03		
	20 GHz ... 40 GHz	4,5 %	0,03		
	40 GHz ... 67 GHz	3,6 %	0,03		



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Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)		Remarks		
	Permittivity >10 Loss tangent >0,05	4 MHz ... 20 MHz	20,9 %	0,35	0.1<thickness<0.2 mm		
		20 MHz ... 30 MHz	20,4 %	0,35			
		30 MHz ... 50 MHz	15,3 %	0,35			
		50 MHz ... 100 MHz	11,2 %	0,25			
		100 MHz ... 600 MHz	7,9 %	0,11			
		600 MHz ... 3 GHz	7,2 %	0,02			
		3 GHz ... 6 GHz	5,3 %	0,03			
		6 GHz ... 20 GHz	4,2 %	0,05			
	Permittivity >10 Loss tangent >0,05	20 GHz ... 40 GHz	6,4 %	0,06	0.2<thickness<1 mm		
		40 GHz ... 67 GHz	8,9 %	0,14			
		4 MHz ... 20 MHz	7,6 %	0,35			
		20 MHz ... 30 MHz	6,1 %	0,35			
		30 MHz ... 50 MHz	6,1 %	0,35			
		50 MHz ... 100 MHz	6,0 %	0,25			
		100 MHz ... 600 MHz	4,8 %	0,11			
		600 MHz ... 3 GHz	5,4 %	0,02			
	Permittivity >10 Loss tangent >0,05	3 GHz ... 6 GHz	3,5 %	0,03	1<thickness<10 mm		
		6 GHz ... 20 GHz	3,8 %	0,05			
		20 GHz ... 40 GHz	5,2 %	0,06			
		40 GHz ... 67 GHz	6,0 %	0,08			
		4 MHz ... 20 MHz	5,2 %	0,35			
		20 MHz ... 30 MHz	2,6 %	0,35			
		30 MHz ... 50 MHz	2,6 %	0,35			
		50 MHz ... 100 MHz	2,5 %	0,25			
	Permittivity Conductivity	Permittivity >10 Conductivity >0,5 S/m	100 MHz ... 600 MHz	2,5 %	0,11	1<thickness<10 mm	
			600 MHz ... 3 GHz	2,8 %	0,02		
			3 GHz ... 6 GHz	2,8 %	0,03		
			6 GHz ... 20 GHz	3,6 %	0,05		
20 GHz ... 40 GHz			3,3 %	0,06			
40 GHz ... 67 GHz			4,5 %	0,08			
			Permittivity	Conduc- tivity			
4 MHz ... 20 MHz			6,4 %	3,9 %			
20 MHz ... 30 MHz			4,3 %	3,4 %			
30 MHz ... 50 MHz			4,0 %	3,4 %			
50 MHz ... 100 MHz	2,5 %	3,4 %					
100 MHz ... 600 MHz	2,9 %	3,4 %					
600 MHz ... 3 GHz	2,8 %	5,8 %					
3 GHz ... 6 GHz	2,8 %	4,0 %					
6 GHz ... 20 GHz	3,6 %	4,0 %					
20 GHz ... 40 GHz	3,9 %	4,1 %					
40 GHz ... 67 GHz	5,1 %	5,0 %					

(2) Slightly depending on the frequency and probe type.

In case of contradictions in the language versions of the directories, the German version shall apply.

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