



SCS Directory

Accreditation number: SCS 0108

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

Schmid & Partner Engineering AG
Zeughausstrasse 43
8004 Zürich
(Switzerland)

Head: Dr Katja Poković
Responsible for MS: Prof. Dr Niels Kuster
Telephone: +41 44 245 97 00
E-Mail: info@speag.swiss
Internet: <http://www.speag.swiss>
Initial accreditation: 17.09.2004
Current accreditation: 17.09.2019 to 16.09.2024
Scope of accreditation see: www.sas.admin.ch
(Accredited bodies)

Scope of accreditation as of 17.09.2019

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
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 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



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
Calibration of magnetic field simulator	-30 ... +40 dB A/m	1 kHz	4,1 %	e.g. TMFS (Telephone Magnetic Field Simulator)
Specific absorption rate (SAR)	E* field (typical ²)			e.g. ET3Dvx, ES3Dvx, EX3Dvx, ET1Dvx, EU2Dvx
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
	E* field (typical ²)			e.g. EX3DVx, ET1DVx
	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
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 of T1Vx and T1V3LAB probes can be determined to 5 %, which is also contribution to SAR accuracy. (Noise is dominating the lower SAR threshold to typically 0,2 W/kg)



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
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
		300 MHz ... 450 MHz	18,1 % for SAR 1 g 17,6 % for SAR 10 g	e.g. D835V2 ... D3000V2 according to IEEE 1528, IEC 62209-1/2, for 1 g and 10 g SAR
		750 MHz ... 3 GHz	17,0 % for SAR 1 g 16,5 % for SAR 10 g	*) SAR given (as example) for head tissue simulating liquid
	SAR* 1 g and 10 g per 1 W input power	3 GHz ... 6 GHz	19,9 % for SAR 1 g 19,5 % for SAR 10 g	e.g. D3500V2 ... D5GHzV2 according to IEC 62209-2, for 1 g and 10 g SAR *) SAR given (as example) for head tissue simulating liquid
Near-Field Calibration of dipoles in air	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
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 %	
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 also possible in the Subsidiary



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks	
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		
Measurement capability of the dielectric probe	Permittivity, Conductivity or Loss Tangent from 4 MHz ... 67 GHz	homogeneous isotropic material		Open-ended coaxial probes, e.g. DAK-12, DAK-3.5, DAK-1.2 E	
Permittivity	1...15				
		4 MHz ... 20 MHz	24,3 %	Loss tangent < 0,1	
		20 MHz ... 200 MHz	11,2 %		
		200 MHz ... 3 GHz	2,0 %		
		3 GHz ... 6 GHz	2,0 %		
		6 GHz ... 20 GHz	2,1 %		
		20 GHz ... 40 GHz	3,2 %		
		40 GHz ... 67 GHz	3,2 %		
		40 GHz ... 67 GHz	4,5 %		
	10...40	4 MHz ... 10 MHz	6,4 %	Conductivity < 0,1 S/m	
		10 MHz ... 50 MHz	3,8 %	Conductivity < 0,1 S/m	
		50 MHz ... 200 MHz	1,8 %	Conductivity: 0,1 – 10 S/m	
		200 MHz ... 3 GHz	1,8 %	Conductivity: 0,1 – 10 S/m	
		3 GHz ... 6 GHz	2,3 %	Conductivity: 1 – 10 S/m	
		6 GHz ... 20 GHz	3,7 %	Conductivity: > 10 S/m	
		20 GHz ... 40 GHz	4,8 %	Conductivity: > 10 S/m	
		40 GHz ... 67 GHz	6,4 %	Conductivity: > 10 S/m	
	35...100	4 MHz ... 10 MHz	6,7 %	Conductivity: 0,1 – 1 S/m	
		10 MHz ... 50 MHz	2,9 %	Conductivity: 0,1 – 1 S/m	
		50 MHz ... 200 MHz	2,2 %	Conductivity: 1 – 10 S/m	
		200 MHz ... 3 GHz	1,7 %	Conductivity: 1 – 10 S/m	
		3 GHz ... 6 GHz	1,9 %	Conductivity: > 10 S/m	
		6 GHz ... 20 GHz	2,4 %		



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)	Remarks
Conductivity	1 ... 10 S/m	4 MHz ... 10 MHz	3,1 %	Permittivity: 35 – 100
		10 MHz ... 50 MHz	2,9 %	
		50 MHz ... 200 MHz	2,5 %	
		200 MHz ... 3 GHz	3,2 %	
	>10 S/m	3 GHz ... 6 GHz	3,0 %	Permittivity:35 – 100
		6 GHz ... 20 GHz	3,0 %	
		20 GHz ... 40 GHz	3,8 %	
		40 GHz ... 67 GHz	4,7 %	
Loss Tangent	0 ... 0,1	4 MHz ... 20 MHz	0,46	Permittivity: 1 – 15
		20 MHz ... 200 MHz	0,28	
		200 MHz ... 3 GHz	0,03	
		3 GHz ... 6 GHz	0,03	
		6 GHz ... 20 GHz	0,03	
		20 GHz ... 40 GHz	0,03	
		40 GHz ... 67 GHz	0,03	
		Measurement capability of the dielectric probe for liquids and gels	Permittivity and Conductivity from 4 MHz ... 67GHz	
Permittivity	1...100		4 MHz ... 10 MHz	6,4 %
		10 MHz ... 20 MHz	3,8 %	
		20 MHz ... 30 MHz	2,3 %	
		30 MHz ... 50 MHz	1,9 %	
		50 MHz ... 5 GHz	2,2 %	
		5 GHz ... 20 GHz	3,7 %	
	1...100	4 MHz ... 10 MHz	6,8 %	static conductivity 0,1 – 10 S/m
		10 MHz ... 20 MHz	3,2 %	
		20 MHz ... 30 MHz	3,3 %	
		30 MHz ... 50 MHz	3,3 %	
		50 MHz ... 5 GHz	3,1 %	
		5 GHz ... 20 GHz	3,9 %	
		20 GHz ... 40 GHz	5,0 %	
		40 GHz ... 67 GHz	6,5 %	
Conductivity	0.01 ... 0,1 S/m	300 MHz ... 500 MHz	7,5 %	Permittivity: 1 – 100
		500 MHz ... 5 GHz	4,4 %	
		5 GHz ... 20 GHz	5,4 %	



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)		Remarks
Conductivity	0,1 – 10 S/m	4 MHz ... 10 MHz	3,9 %		Permittivity: 1 – 100
		10 MHz ... 20 MHz	3,9 %		
		20 MHz ... 30 MHz	3,8 %		
		30 MHz ... 50 MHz	3,4 %		
		50 MHz ... 5 GHz	4,8 %		
		5 GHz ... 20 GHz	4,8 %		
		20 GHz ... 40 GHz	4,8 %		
		40 GHz ... 67 GHz	4,9 %		
Capability of the dielectric probe to measure thin layers of solids and liquids in small volume	Permittivity, Conductivity or Loss Tangent from 4 MHz ... 67 GHz	Homogeneous isotropic material	Permittivity	Loss tangent	Open-ended coaxial probes, e.g. DAK-TL-12, DAKTL-3.5, DAKTL-1.2 E
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	
		20 GHz ... 40 GHz	9,1 %	0.03	
		40 GHz ... 67 GHz	4,5 %	0.03	
Permittivity Loss tangent	1 < Permittivity < 10 Loss tangent < 0,05	4 MHz ... 20 MHz	34,6 %	0.45	0.2 < thickness < 1 mm
		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	
		3 GHz ... 6 GHz	3,7 %	0.03	
		6 GHz ... 20 GHz	3,3 %	0.03	
		20 GHz ... 40 GHz	3,9 %	0.03	
		40 GHz ... 67 GHz	3,5 %	0.03	
Permittivity Loss tangent	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	2,7 %	0.06	
		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	



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)		Remarks
	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	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		
	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			



SCS Directory

Accreditation number: SCS 0108

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	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		
	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	
		20 GHz ... 40 GHz	6,4 %	0.06	
	40 GHz ... 67 GHz	8,9 %	0.14		
	Permittivity > 10 Loss tangent > 0,05	4 MHz ... 20 MHz	7,6 %	0.35	0.2 <thickness < 1 mm
		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	
		3 GHz ... 6 GHz	3,5 %	0.03	
		6 GHz ... 20 GHz	3,8 %	0.05	
		20 GHz ... 40 GHz	5,2 %	0.06	
	40 GHz ... 67 GHz	6,0 %	0.08		
	Permittivity > 10 Loss tangent > 0,05	4 MHz ... 20 MHz	5,2 %	0.35	1 <thickness < 10 mm
		20 MHz ... 30 MHz	2,6 %	0.35	
		30 MHz ... 50 MHz	2,6 %	0.35	
		50 MHz ... 100 MHz	2,5 %	0.25	
		100 MHz ... 600 MHz	2,5 %	0.11	
		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	Conductivity	



SCS Directory

Accreditation number: SCS 0108

Measured Quantity / Instrument or Gauge	Measurement Range	Measurement Conditions	Best Measurement Uncertainty CMC at (22 ± 3) °C (1)		Remarks
Permittivity Conductivity	Permittivity >10 Conductivity > 0,5 S/m	4 MHz ... 20 MHz	6.4 %	3.9 %	1 <thickness<10 mm
		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 %			
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
Calibration Procedure for sources in air above 6 GHz	10 V/m ... 2000 V/m	10 GHz... 110 GHz	1,27 dB		e.g. verification source
			1,47 dB		e.g. validation source
			1,54 dB		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		e.g. verification source
			1,63 dB		e.g. validation source
			1,70 dB		e.g. general source

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

* / * / * / * / *