5 Results

5.1 General:

(e.g. measurement results, user instructions such as handling, transport, storage, preparation; checks to be made before the work started; information about how to install (operations)-, to maintain-, to train and to use; safety measures etc.)

	Original measurement	Verification measurement	Margin
Impedance, transformend to feed point	47.5 Ω + 0.4 jΩ	47.94 Ω + 1.32 jΩ	0.44 Ω + 0.38jΩ
Return Loss	-31.7 dB	-32.06 dB	0.36 dB
Tissue Validation εr	53.8	53.881	0.15 %
Tissue Validation σ [S/m]	1.46	1.51	3.42 %
System validation	36.08 W/kg (1g)	36.6W/kg (1g)	1.50 %
Date:	20.09.2017	13.03.2019	

5.2 Measurement uncertainty

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.
+/- 2.5 %

5.3 Results of Validation

Validated ☒
Not validated ☐

6 Operator

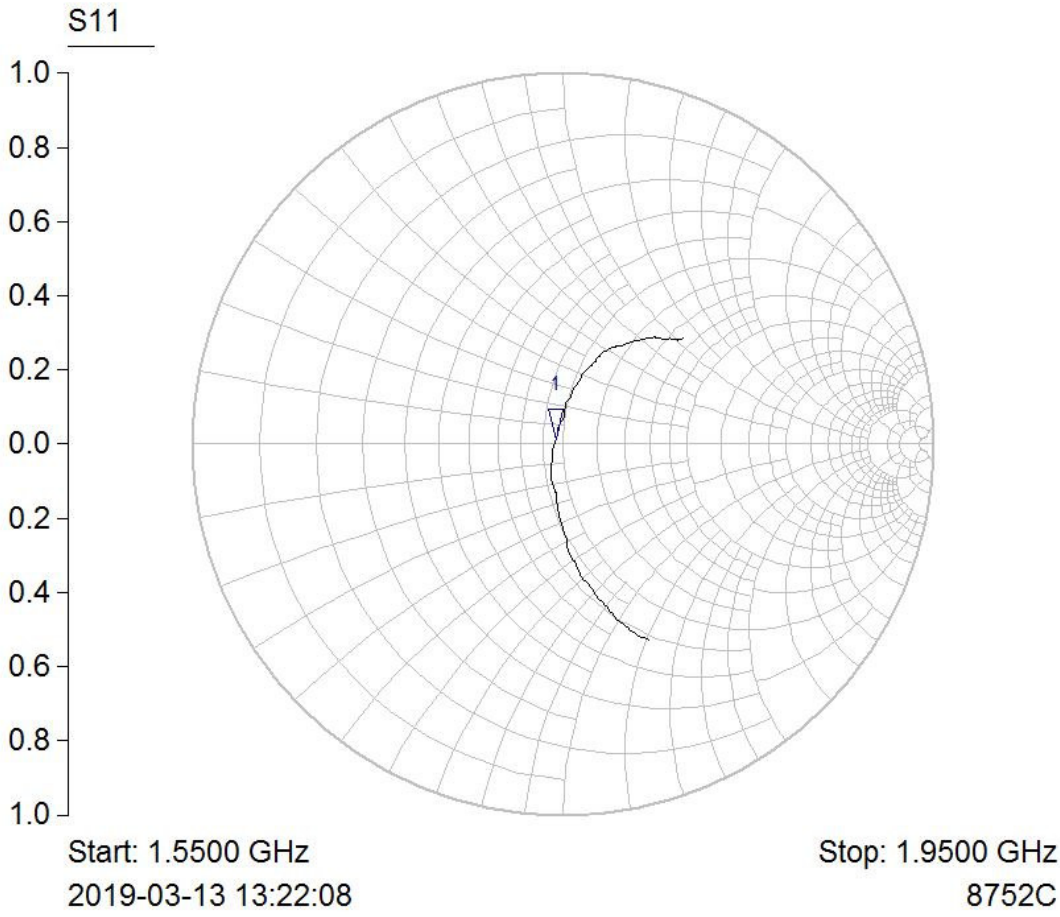
Pudell — Name
B. Pudell — Signature

Place and Date of Verification: Reichenwalde, 13.03.2019

Attachment:

Impedance, Return Loss, System validierung

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	1.7500 GHz	47.94 + j1.32 ohms	

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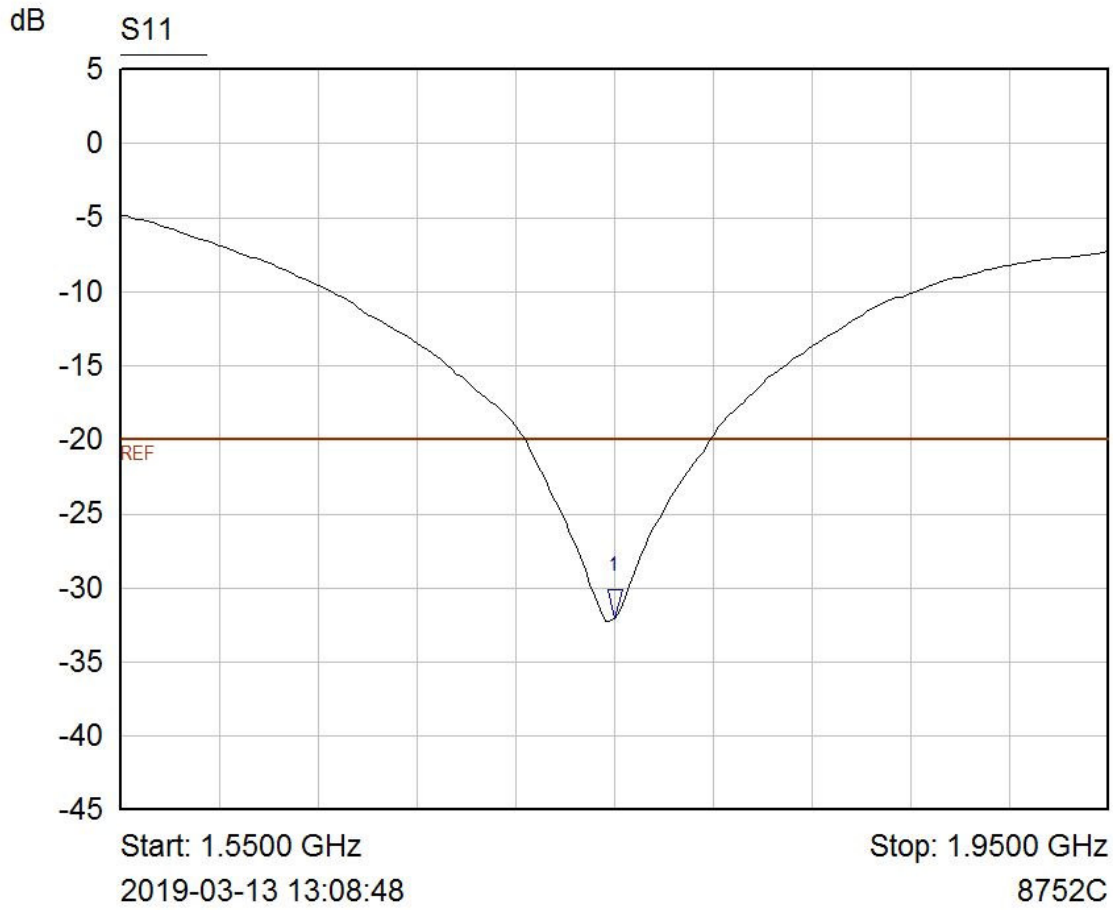
Storkower Str. 38c, 15526 Reichenwalde, Germany



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	1.7500 GHz	-32.06 dB	

Date/Time: 2019-03-13 07:33:12

Test Laboratory: Eurofins Product Service GmbH

Dipol Valid.1750 (m)_250mW ELI4_13.03.2019

DUT: Dipole 1750 MHz (D1750V2); Type: SA AAD 175 AA; Serial: 1126

Communication System: UID 0 - n/a, CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium: Muscle 1800 MHz Medium parameters used: f = 1750 MHz; σ = 1.51 S/m; ε_r = 53.881; ρ = 1000 kg/m^3
Phantom section: Flat Section

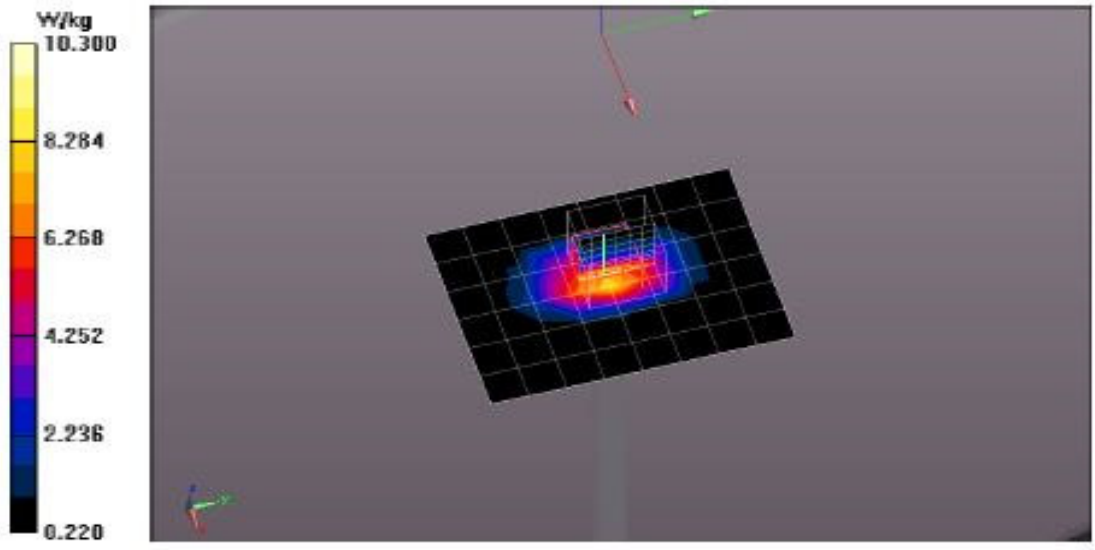
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5.2 Configuration:

- Probe: EX3DV4 - SN3893; ConvF(8.66, 8.66, 8.66); Calibrated: 2018-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn522; Calibrated: 2018-09-17
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1013
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.20 W/kg

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 82.432 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.9 W/kg
Maximum value of SAR (measured) = 10.3 W/kg



Validation Report
No. VAL_0283_EF 2019-12

Kind of doc.:
QM Template

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany

1 Customer

Eurofins Product Service GmbH

2 Object

Equipment Number	EF00283
Equipment Name:	System validation dipole
Equipment Type:	D1900V2
Serial Number:	5d025
Manufacturer:	Schmid & Partner Engineering AG

3 State of Measurement

Validation:	☒
Performance Control:	☒
Other:	☐

4 Performance of Measurement

4.1 Generals

(e.g. object of validation such as specific setup, non-standard method or SW, specification of the requirements, test set-up configuration, risk analysis etc.)

Dipol verification

4.2 Validation procedure / measurement

(e.g. comparison of results achieved with other methods, interlaboratory comparison, systematic assessment of factors influencing the result, assessment of the uncertainty of the results based on scientific understanding of the theoretical principles of the method and practical experience; criteria/requirements for approval/rejection etc.)

According KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 3.2.2 Dipole calibration

Limits for the verification: return loss <20% to the original measurement or >20 dB minimum return-loss
Impedance <5 Ω to the original measurement.

4.3 Used reference equipment

Equipment name	Equipment type	Manufacturer	Equipment number	Cal. Date	Cal. Due Date
RF Network analyzer	8752 C	Hewlett-Packard Company Santa Clara	EF00140	2019-07	2020-07

- new acquired (incl. calibration) ☐
- new calibrated ☐
- check reference standard ☒

4.4 Environmental conditions

Temperature:	_23_ °C ± 2°C
Relative Air Humidity:	_50_ rH ± 5%
Air Pressure:	_1020_ hPa ± 5%

Validation Report
No. VAL_0283_EF 2019-12

Kind of doc.:
QM Template

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany

5 Results

5.1 General:

(e.g. measurement results, user instructions such as handling, transport, storage, preparation; checks to be made before the work started; information about how to install (operations)-, to maintain-, to train and to use; safety measures etc.)

	Original measurement	Verification measurement	Margin
Impedance, transformend to feed point	47.3 Ω + 7.4 jΩ	47.5 Ω + 3.3 jΩ	0.2 Ω
Return Loss	-21.9 dB	-27.5 dB	-7.5 dB
Tissue Validation εr	53.3	52.5	-1.5 %
Tissue Validation σ [S/m]	1.52	1.57	3.3 %
System validation	39.2 W/kg (1g)	40.4 W/kg (1g)	3.1 %
Date:	14.09.2018	12.12.2019	

5.2 Measurement uncertainty

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.
+/- 2.5 %

5.3 Results of Validation

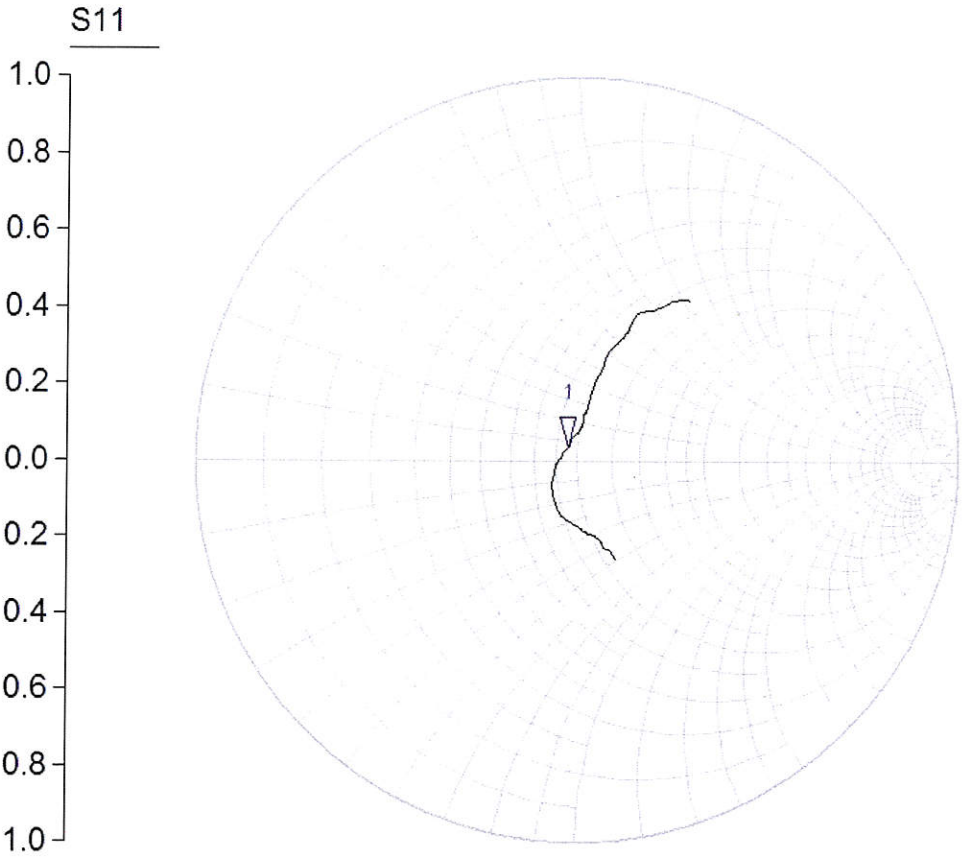
Validated ☒
Not validated ☐

6 Operator

Pudell — Name
B. Pudell — Signature

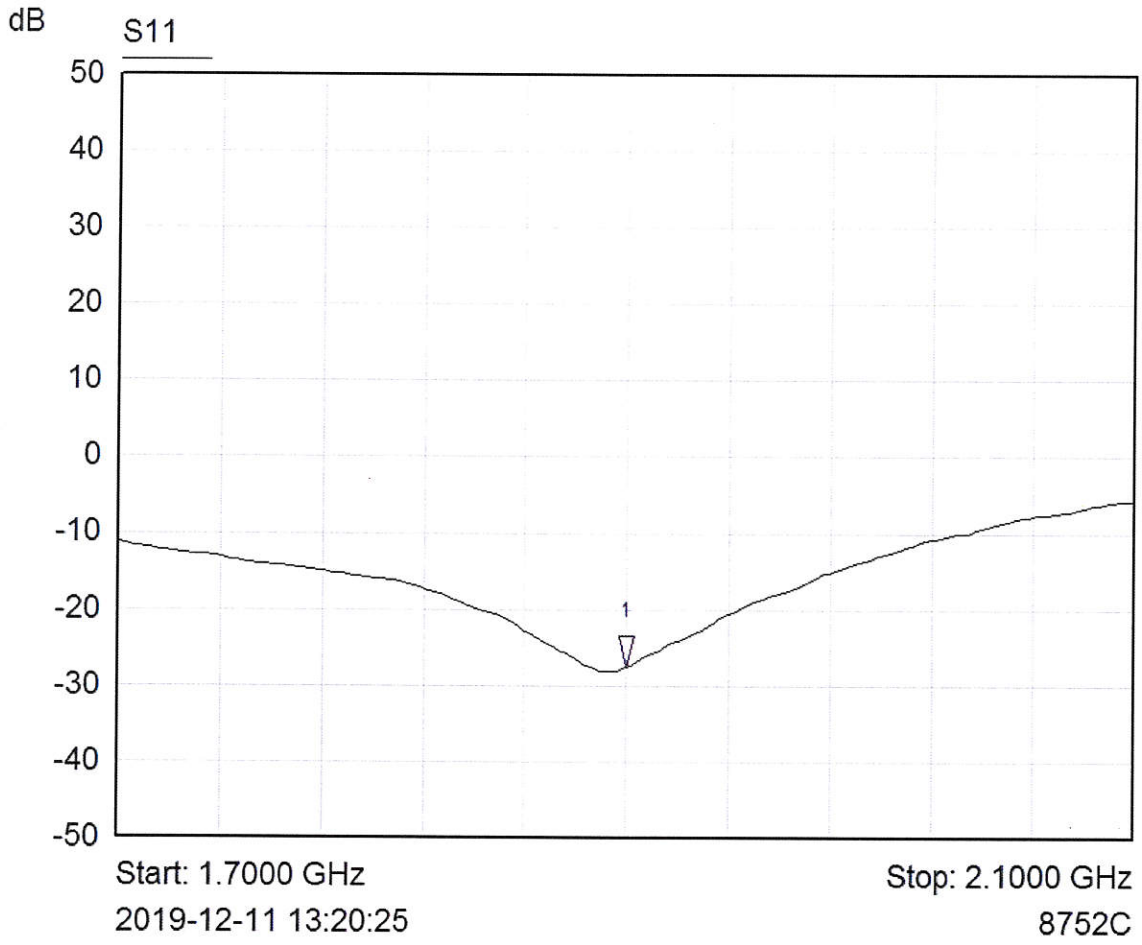
Place and Date of Verification: Reichenwalde, 12.12.2019

Attachment:
Impedance, Return Loss, System validierung



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	1.9000 GHz	47.46 + j3.31 ohms	

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	1.9000 GHz	-27.48 dB	

Date/Time: 12.12.2019 09:33:37

Test Laboratory: Eurofins Product Service GmbH

Dipol Valid.1900 (m)_250mW ELI4_12.12.2019

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d025

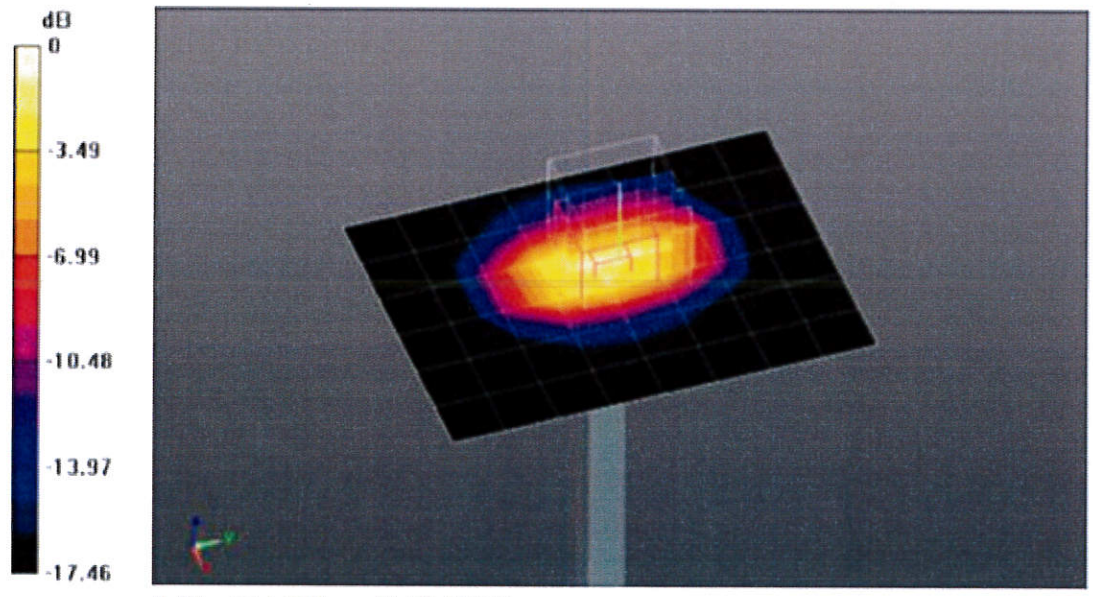
Communication System: UID 0, CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.574 S/m; ε_r = 52.498; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3893; ConvF(8.32, 8.32, 8.32) @ 1900 MHz; Calibrated: 20.09.2019
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn522; Calibrated: 11.09.2019
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP: 1013
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7470)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 8.82 W/kg

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 80.65 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.31 W/kg
Maximum value of SAR (measured) = 11.4 W/kg



0 dB = 11.4 W/kg = 10.57 dBW/kg

Validation Report
No. VAL_0946_EF 2019-03

Kind of doc.:
QM Template

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany

1 Customer

Eurofins Product Service GmbH

2 Object

Equipment Number	EF00946
Equipment Name:	System validation dipole
Equipment Type:	D750V3
Serial Number:	1125
Manufacturer:	Schmid & Partner Engineering AG

3 State of Measurement

Validation:	☒
Performance Control:	☒
Other:	☐

4 Performance of Measurement

4.1 Generals

(e.g. object of validation such as specific setup, non-standard method or SW, specification of the requirements, test set-up configuration, risk analysis etc.)

Dipol verification

4.2 Validation procedure / measurement

(e.g. comparison of results achieved with other methods, interlaboratory comparison, systematic assessment of factors influencing the result, assessment of the uncertainty of the results based on scientific understanding of the theoretical principles of the method and practical experience; criteria/requirements for approval/rejection etc.)

According KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 3.2.2 Dipole calibration

Limits for the verification: return loss <20% to the original measurement or >20 dB minimum return-loss
Impedance <5 Ω to the original measurement.

4.3 Used reference equipment

Equipment name	Equipment type	Manufacturer	Equipment number	Cal. Date	Cal. Due Date
RF Network analyzer	8752 C	Hewlett-Packard Company Santa Clara	EF00140	2018-07-25	2019-07-25

- new acquired (incl. calibration) ☐
- new calibrated ☐
- check reference standard ☒

4.4 Environmental conditions

Temperature:	_23_ °C ± 2°C
Relative Air Humidity:	_50_ rH ± 5%
Air Pressure:	_1020_ hPa ± 5%

Validation Report
No. VAL_0946_EF 2019-03

Kind of doc.:
QM Template

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany

5 Results

5.1 General:

(e.g. measurement results, user instructions such as handling, transport, storage, preparation; checks to be made before the work started; information about how to install (operations)-, to maintain-, to train and to use; safety measures etc.)

	Original measurement	Verification measurement	Margin
Impedance, transformend to feed point	50.0 Ω + 5.0 jΩ	50.15 Ω + 3.38 jΩ	0.15 Ω - 1.62 jΩ
Return Loss	-26.1 dB	-29.72 dB	3.62 dB
Tissue Validation εr	55.5	54.145	-2.44 %
Tissue Validation σ [S/m]	0.96	0.986	2.71 %
System validation	8.52 W/kg (1g)	8.64W/kg (1g)	1.41 %
Date:	21.09.2017	13.03.2019	

5.2 Measurement uncertainty

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.
+/- 2.5 %

5.3 Results of Validation

Validated ☒
Not validated ☐

6 Operator

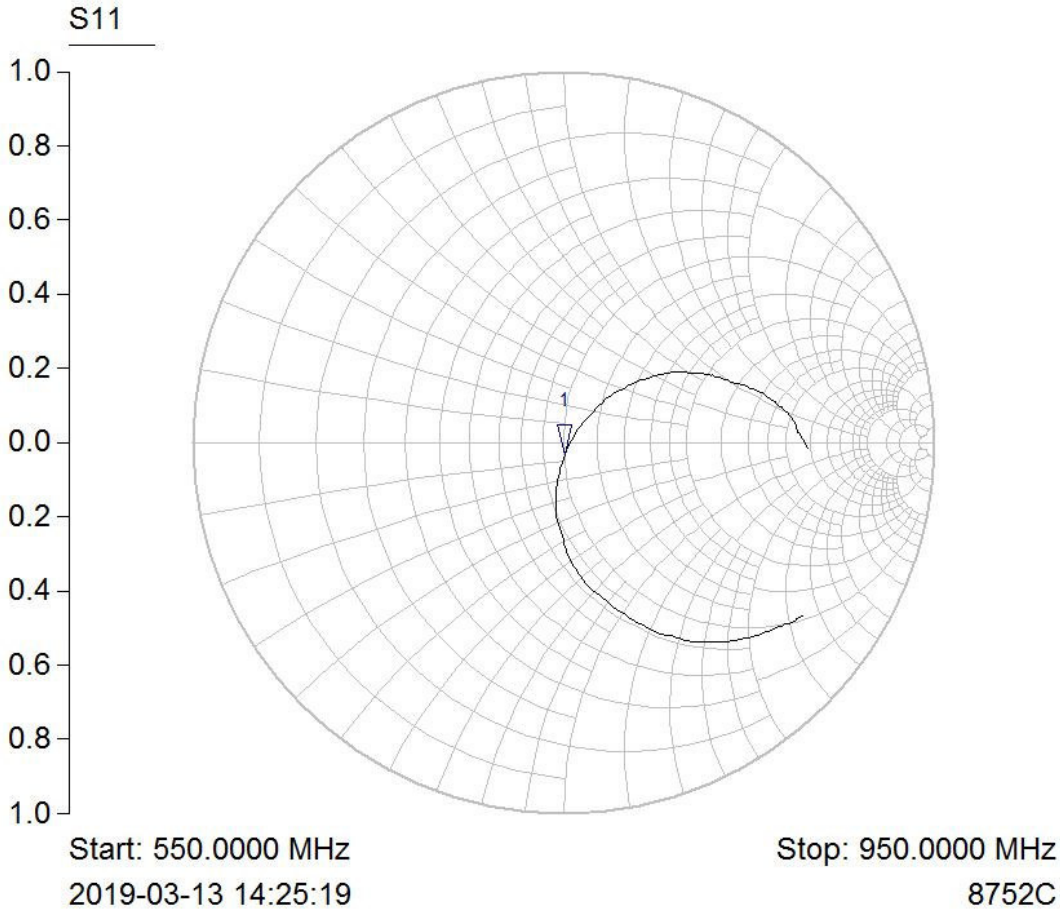
Pudell — B. Pudell
Name — Signature

Place and Date of Verification: Reichenwalde, 14.03.2019

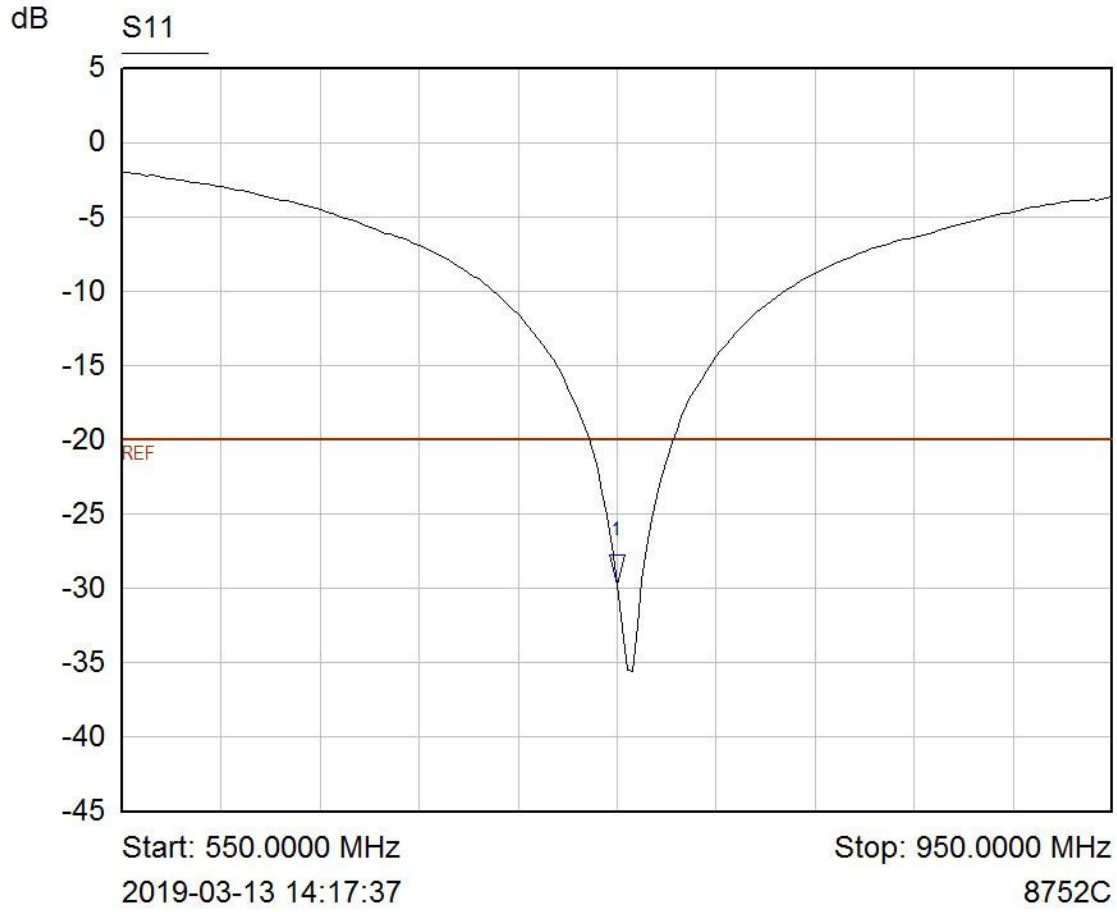
Attachment:

Impedance, Return Loss, System validierung

EUROFINS PRODUCT SERVICE GmbH
Storkower Str. 38c, 15526 Reichenwalde, Germany



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	750.0000 MHz	50.15 - j3.38 ohms	



Mkr	Trace	X-Axis	Value	Notes
1 ▽	S11	750.0000 MHz	-29.72 dB	

Date/Time: 2019-03-14 08:09:07

Test Laboratory: Eurofins Product Service GmbH

Dipol Valid.750 (m)_250mW ELI4_14.03.2019

DUT: Dipole 750 MHz; Type: D750V3; Serial: 1125

Communication System: UID 0 - n/a, CW; Frequency: 750 MHz;Duty Cycle: 1:1
Medium: Muscle 750 MHz Medium parameters used: f = 750 MHz; σ = 0.986 S/m; ε_r = 54.145; ρ = 1000 kg/m^3
Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5.2 Configuration:

- Probe: EX3DV4 - SN3893; ConvF(10.54, 10.54, 10.54); Calibrated: 2018-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn522; Calibrated: 2018-09-17
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1013
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Area Scan (7x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 2.33 W/kg

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=250 mW, dist=4.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.966 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.44 W/kg
Maximum value of SAR (measured) = 2.72 W/kg