

## 17.4 Calibration Certificate for D750V3 – SN1058, D835V2 - SN 4d149, D1750V2 - SN 1089

### Calibration Certificate for D750

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
 Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
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 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **UL Japan (Vitec)**

Certificate No: **D750V3-1058\_May15**

#### CALIBRATION CERTIFICATE

Object **D750V3 - SN:1058**

Calibration procedure(s) **QA-CAL-05.v9**  
 Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **May 28, 2015**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature  $(22 \pm 3)^{\circ}\text{C}$  and humidity  $< 70\%$ .

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
| Power meter EPM-442A        | GB37490704         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | US37292783         | 07-Oct-14 (No. 217-02020)         | Oct-15                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-14 (No. 217-02021)         | Oct-15                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 01-Apr-15 (No. 217-02131)         | Mar-16                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134)         | Mar-16                 |
| Reference Probe ES3DV3      | SN: 3205           | 30-Dec-14 (No. ES3-3205_Dec14)    | Dec-15                 |
| DAE4                        | SN: 601            | 18-Aug-14 (No. DAE4-601_Aug14)    | Aug-15                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100005             | 04-Aug-99 (in house check Oct-13) | In house check: Oct-16 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-14) | In house check: Oct-15 |

|                |                |                       |           |
|----------------|----------------|-----------------------|-----------|
|                | Name           | Function              | Signature |
| Calibrated by: | Jeton Kastrali | Laboratory Technician |           |
| Approved by:   | Katja Pokovic  | Technical Manager     |           |

Issued: May 28, 2015

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D750V3-1058\_May15

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Accreditation No.: SCS 0108

**Glossary:**

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:* SAR measured at the stated antenna input power.
- SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

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

### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 750 MHz $\pm$ 1 MHz    |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.9           | 0.89 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 42.2 $\pm$ 6 % | 0.90 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 2.06 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 8.18 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.35 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 5.37 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 55.5           | 0.96 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 55.4 $\pm$ 6 % | 0.97 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 2.16 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 8.57 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.43 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 5.68 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 54.4 $\Omega$ - 0.9 j $\Omega$ |
| Return Loss                          | - 27.2 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.9 $\Omega$ - 3.2 j $\Omega$ |
| Return Loss                          | - 29.4 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.035 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                |
|-----------------|----------------|
| Manufactured by | SPEAG          |
| Manufactured on | March 06, 2012 |

## DASY5 Validation Report for Head TSL

Date: 27.05.2015

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1058**

Communication System: UID 0 - CW; Frequency: 750 MHz

Medium parameters used:  $f = 750$  MHz;  $\sigma = 0.9$  S/m;  $\epsilon_r = 42.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.44, 6.44, 6.44); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

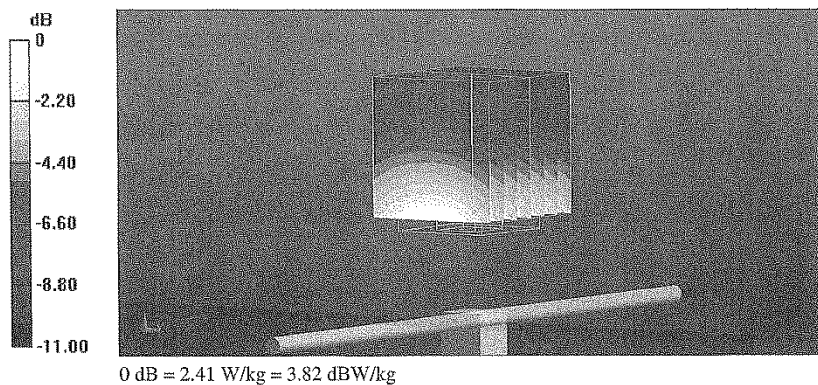
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 53.35 V/m; Power Drift = 0.01 dB

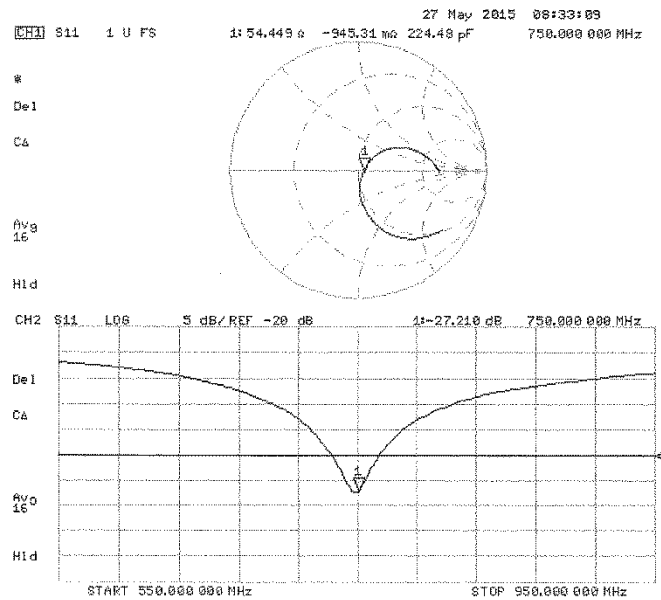
Peak SAR (extrapolated) = 3.06 W/kg

**SAR(1 g) = 2.06 W/kg; SAR(10 g) = 1.35 W/kg**

Maximum value of SAR (measured) = 2.41 W/kg



# Impedance Measurement Plot for Head TSL



## D750V2 Calibration for Impedance and Return-loss

|             |                               |        |        |
|-------------|-------------------------------|--------|--------|
| Equipment   | Dipole Antenna                | Model  | D835V2 |
| Manufacture | Schmid&Partner Engineering AG | Serial | 4d149  |
| Tested by   | Tomohisa Nakagawa             |        |        |

### 1. Test environment

|                     |             |                   |       |
|---------------------|-------------|-------------------|-------|
| Date                | May 8, 2016 |                   |       |
| Ambient Temperature | 24.0 deg.C  | Relative humidity | 45%RH |

|                     |              |                   |       |
|---------------------|--------------|-------------------|-------|
| Date                | May 31, 2017 |                   |       |
| Ambient Temperature | 23.0 deg.C   | Relative humidity | 46%RH |

### 2. Equipment used calibration at 2016

| Control No. | Instrument                      | Manufacturer                  | Model No   | Serial No     | Test Item | Calibration Date * Interval(month) |
|-------------|---------------------------------|-------------------------------|------------|---------------|-----------|------------------------------------|
| EST-30      | Network Analyzer                | Agilent                       | N5230A     | MY46400314    | SAR       | 2015/08/27 * 12                    |
| EST-30      | Calibration Kit                 | Agilent                       | 85056A     | MY44300225    | SAR       | 2015/08/27 * 12                    |
| MOS-26      | Thermo-Hygrometer               | CUSTOM                        | CTH-201    | A08Q29        | SAR       | 2016/04/19 * 12                    |
| MPF-02      | 2mm Oval Flat Phantom           | Schmid&Partner Engineering AG | QDOVA001BB | 1045          | SAR       | 2016/05/07 * 12                    |
| MPSAM-02    | SAM Phantom                     | Schmid&Partner Engineering AG | QD000P40CB | 1333          | SAR       | 2016/05/07 * 12                    |
| MMSL0750    | Tissue simulation liquid (Body) | Schmid&Partner Engineering AG | MSL750V2   | SL AAM 075 AA | SAR       | Pre Check                          |
| MHSL0750    | Tissue simulation liquid (Head) | Schmid&Partner Engineering AG | HSL750V2   | SL AAH 075 AA | SAR       | Pre Check                          |
| SAR room3   |                                 |                               |            |               |           | Daily check                        |

### Equipment used calibration at 2017

| Control No. | Instrument                      | Manufacturer                  | Model No   | Serial No     | Test Item | Calibration Date * Interval(month) |
|-------------|---------------------------------|-------------------------------|------------|---------------|-----------|------------------------------------|
| EST-30      | Network Analyzer                | Agilent                       | N5230A     | MY46400314    | SAR       | 2016/08/26 * 12                    |
| EST-57      | 2.4mm Calibration Kit           | Agilent                       | 85056A     | MY44300225    | SAR       | 2016/08/30 * 12                    |
| MOS-30      | Thermo-Hygrometer               | Custom                        | CTH-201    | 3001          | SAR       | 2016/07/28 * 12                    |
| MMSL0750    | Tissue simulation liquid (Body) | Schmid&Partner Engineering AG | MSL750V2   | SL AAM 075 AA | SAR       | Pre Check                          |
| MHSL0750    | Tissue simulation liquid (Head) | Schmid&Partner Engineering AG | HSL750V2   | SL AAH 075 AA | SAR       | Pre Check                          |
| MPF-02      | 2mm Oval Flat Phantom           | Schmid&Partner Engineering AG | QDOVA001BB | 1045          | SAR       | 2014/04/14 * 12                    |
| SAR room1   |                                 |                               |            |               |           | Daily check                        |

### 3. Test Result

| Impeadance,Transformed to feed point | cal day   | Head (real part) [ $\Omega$ ] | Head (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance                  | Result   |
|--------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|----------------------------|----------|
| Calibration (SPEAG)                  | 2015/5/28 | 54.40                         | -0.90                         | -                                  | -                                  | -                          | -        |
| Calibration(ULJ)                     | 2016/5/8  | 55.10                         | -0.69                         | 0.70                               | 0.22                               | $\pm 5\Omega \pm 5j\Omega$ | Complied |
| Calibration(ULJ)                     | 2017/5/31 | 55.64                         | 1.38                          | 1.24                               | 2.28                               | $\pm 5\Omega \pm 5j\Omega$ | Complied |

| Return loss         | cal day   | Head [dB] | Deviation [dB] | Tolerance [+/-dB] | Result   |
|---------------------|-----------|-----------|----------------|-------------------|----------|
| Calibration (SPEAG) | 2015/5/28 | -27.20    | -              | -                 | -        |
| Calibration(ULJ)    | 2016/5/8  | -26.23    | 0.97           | 5.44              | Complied |
| Calibration(ULJ)    | 2017/5/31 | -25.20    | 2.00           | 5.44              | Complied |

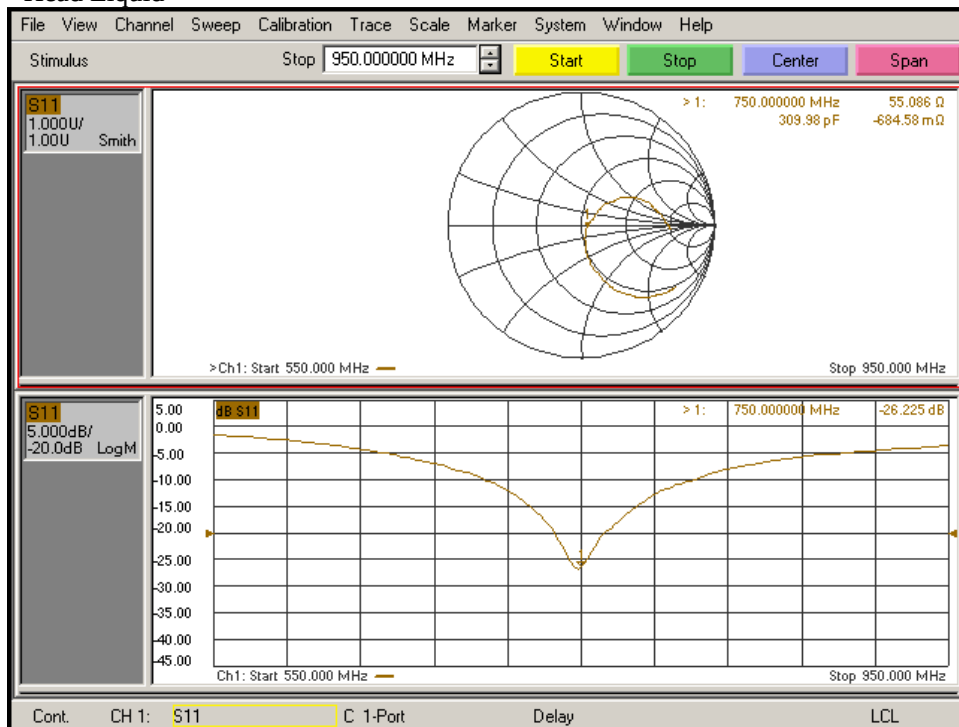
| Impeadance,Transformed to feed point | cal day   | Body (real part) [ $\Omega$ ] | Body (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance                  | Result   |
|--------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|----------------------------|----------|
| Calibration (SPEAG)                  | 2015/5/28 | 48.90                         | -3.20                         | -                                  | -                                  | -                          | -        |
| Calibration(ULJ)                     | 2016/5/8  | 51.24                         | -3.35                         | 2.34                               | -0.15                              | $\pm 5\Omega \pm 5j\Omega$ | Complied |
| Calibration(ULJ)                     | 2017/5/31 | 51.106                        | -1.95                         | 2.21                               | 1.25                               | $\pm 5\Omega \pm 5j\Omega$ | Complied |

| Return loss         | cal day   | Body [dB] | Deviation [dB] | Tolerance [+/-dB] | Result   |
|---------------------|-----------|-----------|----------------|-------------------|----------|
| Calibration (SPEAG) | 2015/5/28 | -29.39    | -              | -                 | -        |
| Calibration(ULJ)    | 2016/5/8  | -29.05    | 0.34           | 5.88              | Complied |
| Calibration(ULJ)    | 2017/5/31 | -33.08    | -4.03          | 5.88              | Complied |

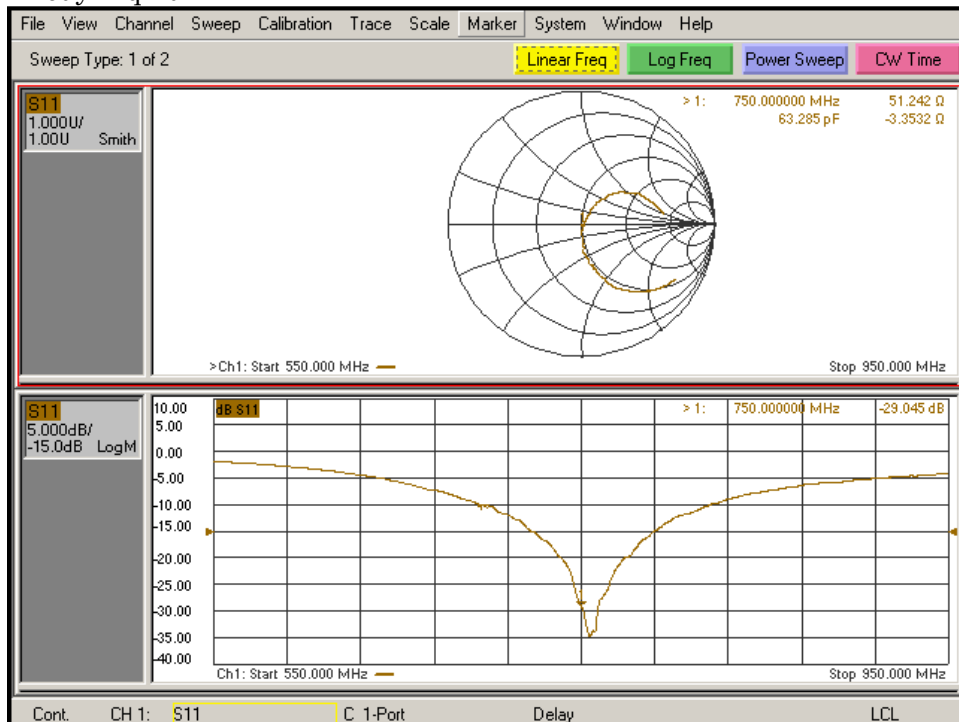
\*Tolerance : According to the KDB865664D01

## Measurement Plots 2016/5/8

### <Head Liquid>

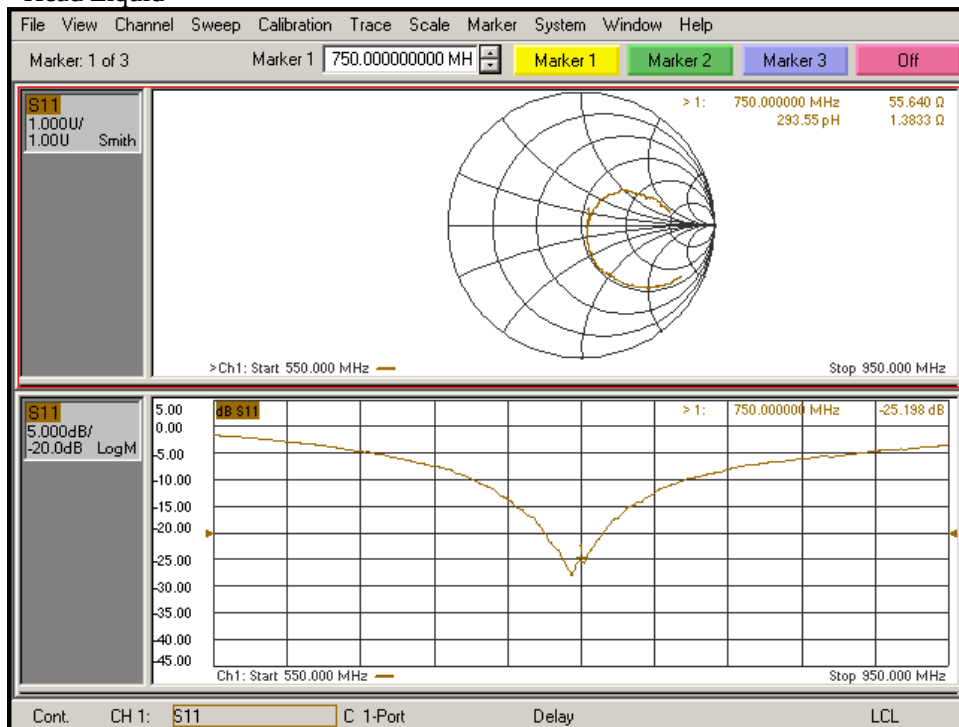


### <Body Liquid>

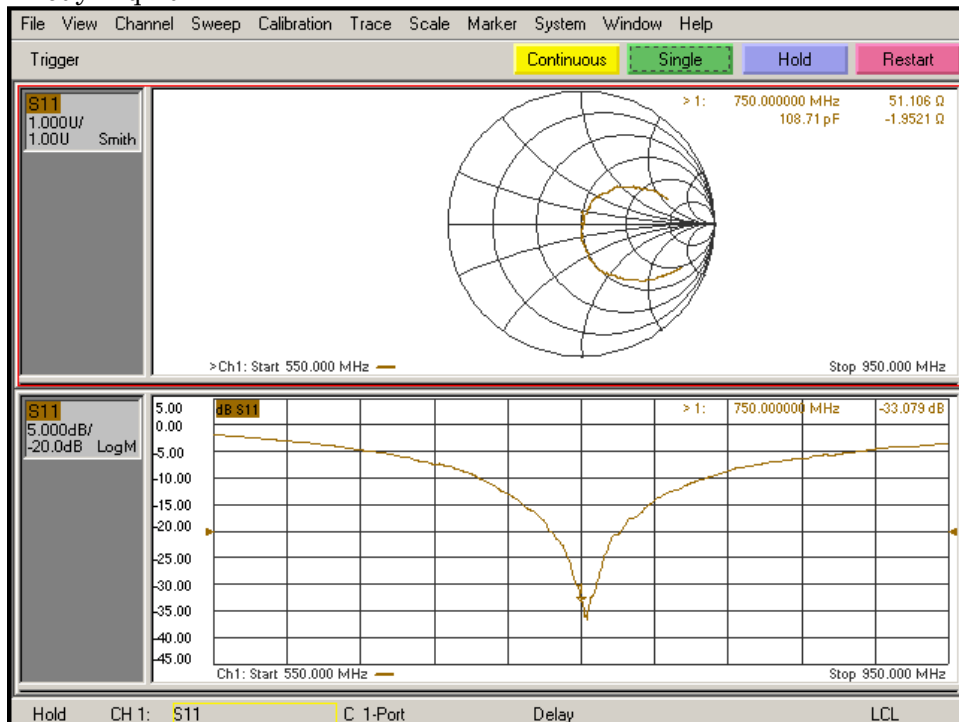


## Measurement Plots 2017/5/31

### <Head Liquid>



### <Body Liquid>



## Calibration Certificate for D835V2 - SN 4d149

**Calibration Laboratory of  
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Accreditation No.: **SCS 0108**

Client **UL Japan HQ (Vitec)**

Certificate No: **D835V2-4d149\_Mar16**

### CALIBRATION CERTIFICATE

Object **D835V2 - SN:4d149**

Calibration procedure(s) **QA CAL-05.v9  
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 08, 2016**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)        | Scheduled Calibration  |
|-----------------------------|--------------------|-----------------------------------|------------------------|
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| Power sensor HP 8481A       | US37292783         | 07-Oct-15 (No. 217-02222)         | Oct-16                 |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-15 (No. 217-02223)         | Oct-16                 |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 01-Apr-15 (No. 217-02131)         | Mar-16                 |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134)         | Mar-16                 |
| Reference Probe EX3DV4      | SN: 7349           | 31-Dec-15 (No. EX3-7349_Dec15)    | Dec-16                 |
| DAE4                        | SN: 601            | 30-Dec-15 (No. DAE4-601_Dec15)    | Dec-16                 |
| Secondary Standards         | ID #               | Check Date (in house)             | Scheduled Check        |
| RF generator R&S SMT-06     | 100972             | 15-Jun-15 (in house check Jun-15) | In house check: Jun-18 |
| Network Analyzer HP 8753E   | US37390585 S4206   | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

Calibrated by: **Name** **Function**  
**Claudio Leubler** **Laboratory Technician**

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: March 9, 2016

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Certificate No: D835V2-4d149\_Mar16

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Accreditation No.: **SCS 0108**

**Glossary:**

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 15 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 835 MHz $\pm$ 1 MHz    |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 41.5           | 0.90 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 41.7 $\pm$ 6 % | 0.93 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 2.39 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 9.34 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.55 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 6.08 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 55.2           | 0.97 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 54.5 $\pm$ 6 % | 1.01 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 2.46 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 9.52 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 1.61 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 6.28 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 52.4 $\Omega$ - 4.1 j $\Omega$ |
| Return Loss                          | - 26.7 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.3 $\Omega$ - 6.1 j $\Omega$ |
| Return Loss                          | - 23.8 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.390 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                |
|-----------------|----------------|
| Manufactured by | SPEAG          |
| Manufactured on | March 27, 2012 |

## DASY5 Validation Report for Head TSL

Date: 08.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d149**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 0.93$  S/m;  $\epsilon_r = 41.7$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.83, 9.83, 9.83); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P49AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

### Dipole Calibration for Head Tissue EX-Probe/Pin=250 mW, d=15mm/Zoom Scan

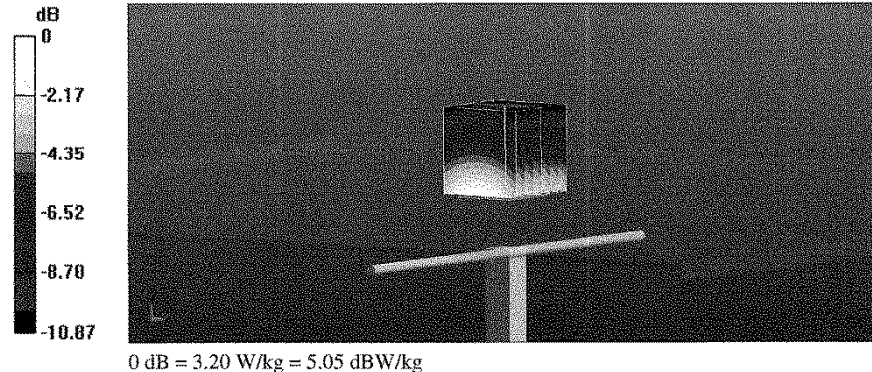
(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 61.51 V/m; Power Drift = -0.00 dB

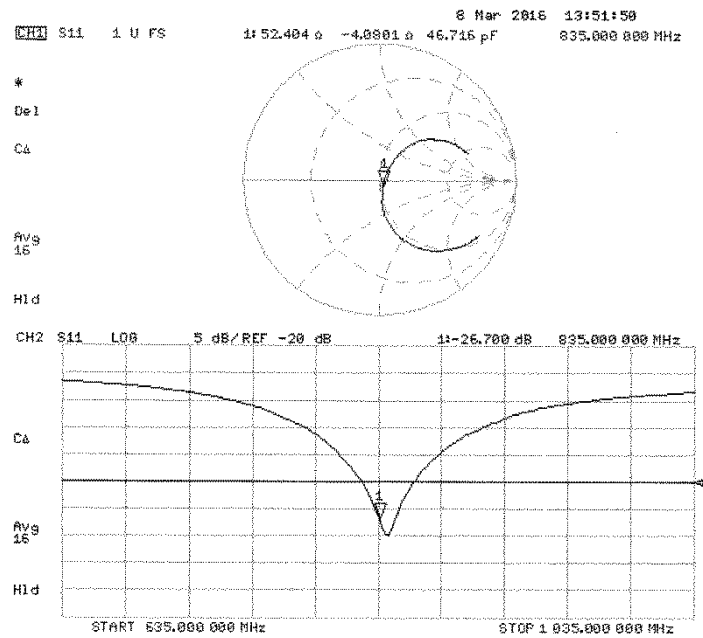
Peak SAR (extrapolated) = 3.60 W/kg

**SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.55 W/kg**

Maximum value of SAR (measured) = 3.20 W/kg



Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 08.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d149**

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used:  $f = 835$  MHz;  $\sigma = 1.01$  S/m;  $\epsilon_r = 54.5$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.73, 9.73, 9.73); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P49AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

### Dipole Calibration for Body Tissue EX-Probe/Pin=250 mW, d=15mm/Zoom Scan

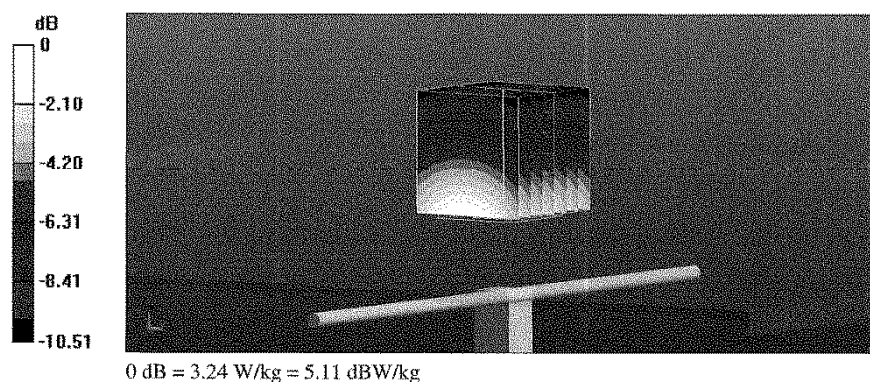
(7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.80 V/m; Power Drift = -0.01 dB

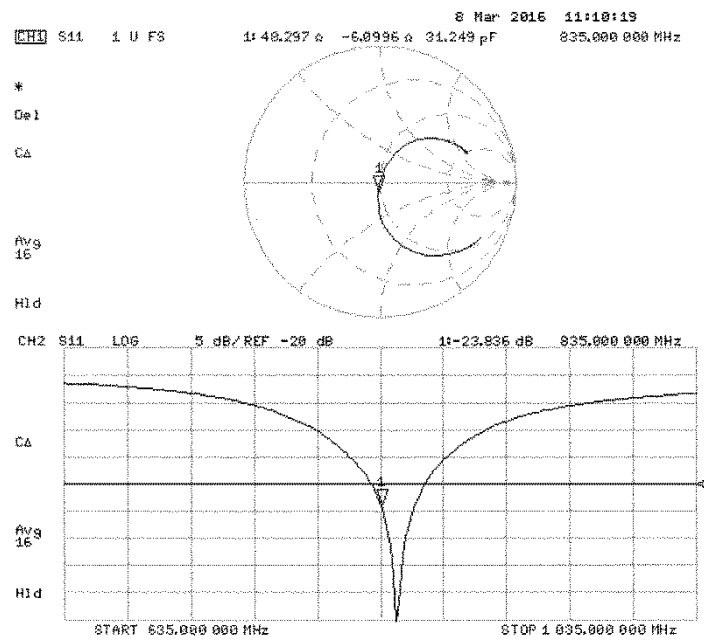
Peak SAR (extrapolated) = 3.61 W/kg

**SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg**

Maximum value of SAR (measured) = 3.24 W/kg



# Impedance Measurement Plot for Body TSL



## D835V2 Calibration for Impedance and Return-loss

|             |                               |        |        |
|-------------|-------------------------------|--------|--------|
| Equipment   | Dipole Antenna                | Model  | D835V2 |
| Manufacture | Schmid&Partner Engineering AG | Serial | 4d149  |
| Tested by   | Tomohisa Nakagawa             |        |        |

### 1. Test environment

|                     |                |                   |       |
|---------------------|----------------|-------------------|-------|
| Date                | March 29, 2017 |                   |       |
| Ambient Temperature | 24.0 deg.C     | Relative humidity | 45%RH |

### 2. Equipment used

| Control No. | Instrument                      | Manufacturer                  | Model No   | Serial No     | Test Item                              | Calibration Date * Interval(month) |
|-------------|---------------------------------|-------------------------------|------------|---------------|----------------------------------------|------------------------------------|
| MOS-37      | Digital thermometer             | LKM electronic                | DTM3000    | -             | SAR                                    | 2016/07/28 * 12                    |
| MPF-02      | 2mm Oval Flat Phantom           | Schmid&Partner Engineering AG | QDOVA001BB | 1045          | SAR                                    | 2016/05/07 * 12                    |
| MOS-26      | Thermo-Hygrometer               | CUSTOM                        | CTH-201    | A08Q29        | SAR                                    | 2016/04/19 * 12                    |
| SSDA-04     | Dipole Antenna                  | Schmid&Partner Engineering AG | D835V2     | 4d149         | SAR(D835)                              | 2016/03/08 * 12                    |
| MMSL0900    | Tissue simulation liquid (Body) | Schmid&Partner Engineering AG | MSL900V2   | SL AAM 090 CA | SAR*Daily Check Target Value $\pm 5\%$ | Pre Check                          |
| MHSL0900    | Tissue simulation liquid (Head) | Schmid&Partner Engineering AG | HSL900V2   | SL AAH 090 BB | SAR*Daily Check Target Value $\pm 5\%$ | Pre Check                          |
| EST-63      | Network Analyzer                | KEYSIGHT                      | E5071C     | MY46523746    | SAR                                    | 2017/02/03 * 12                    |
| EST-64      | Calibration Kit                 | KEYSIGHT                      | 85032F     | MY53201709    | SAR                                    | 2017/02/02 * 12                    |

### 3. Test Result

| Impedance, Transformed to feed point | cal day   | Head (real part) [ $\Omega$ ] | Head (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance     | Result   |
|--------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|---------------|----------|
| Calibration (SPEAG)                  | 2016/3/19 | 52.40                         | -4.10                         | -                                  | -                                  | -             | -        |
| Calibration(ULJ)                     | 2017/3/29 | 53.28                         | -0.39                         | 0.88                               | 3.71                               | $\pm 5\Omega$ | Complied |

| Return loss         | cal day   | Head [dB] | Deviation [dB] | Tolerance [dB] | Result   |
|---------------------|-----------|-----------|----------------|----------------|----------|
| Calibration (SPEAG) | 2016/3/19 | -26.70    | -              | -              | -        |
| Calibration(ULJ)    | 2017/3/29 | -29.83    | -3.13          | 5.34           | Complied |

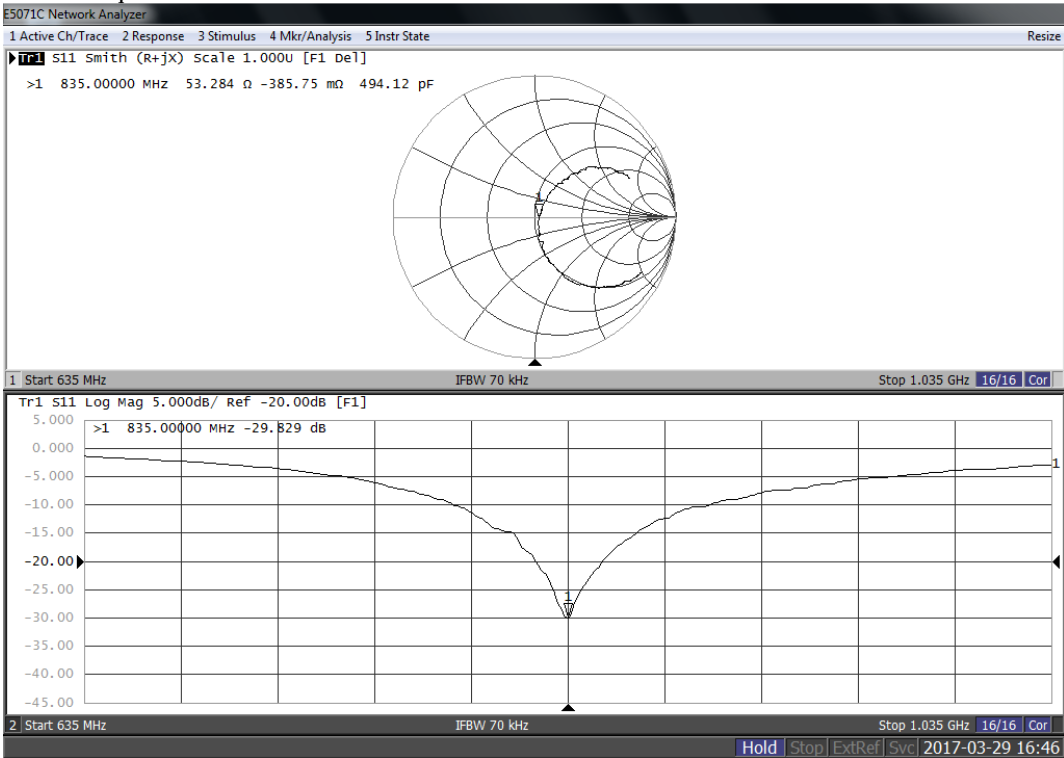
| Impedance, Transformed to feed point | cal day   | Body (real part) [ $\Omega$ ] | Body (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance     | Result   |
|--------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|---------------|----------|
| Calibration (SPEAG)                  | 2016/3/19 | 48.30                         | -6.10                         | -                                  | -                                  | -             | -        |
| Calibration(ULJ)                     | 2017/3/29 | 48.885                        | -4.5311                       | 0.59                               | 1.57                               | $\pm 5\Omega$ | Complied |

| Return loss         | cal day   | Body [dB] | Deviation [dB] | Tolerance [dB] | Result   |
|---------------------|-----------|-----------|----------------|----------------|----------|
| Calibration (SPEAG) | 2016/3/19 | -23.80    | -              | -              | -        |
| Calibration(ULJ)    | 2017/3/29 | -26.507   | -2.71          | 4.76           | Complied |

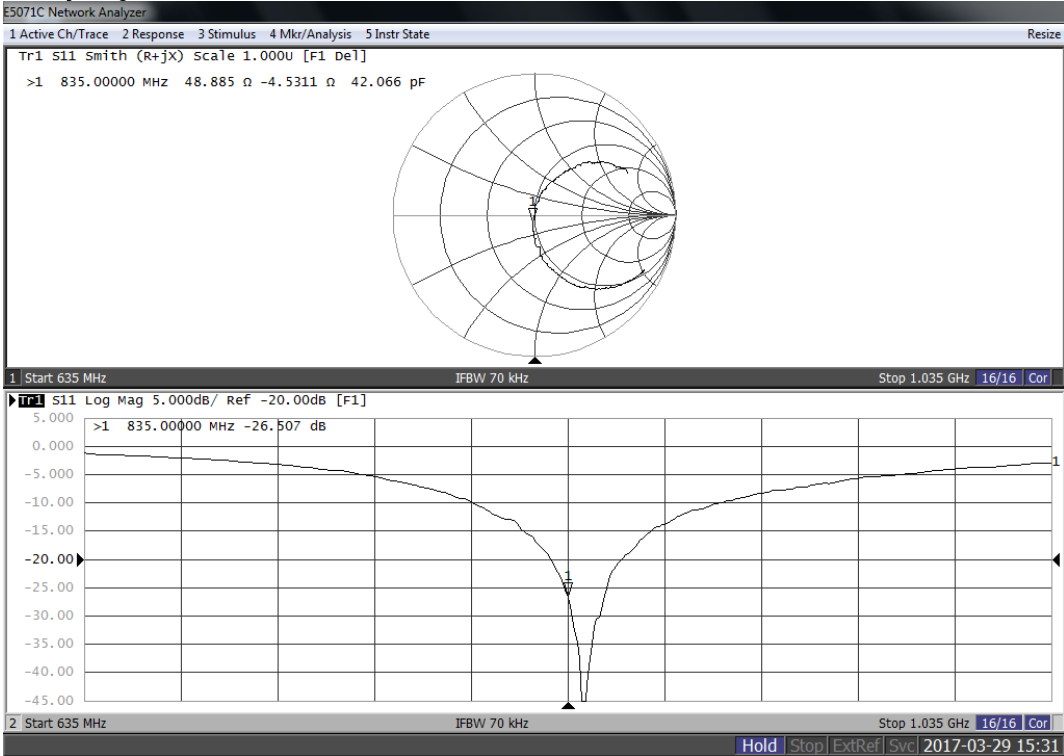
\*Tolerance : According to the KDB450824D02

Measurement Plots

<Head Liquid>



<Body Liquid>



## Calibration Certificate for D1750V2 - SN 1089

**Calibration Laboratory of**  
**Schmid & Partner**  
**Engineering AG**  
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S** Schweizerischer Kalibrierdienst  
**C** Service suisse d'étalonnage  
**S** Servizio svizzero di taratura  
**S** Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)  
The Swiss Accreditation Service is one of the signatories to the EA  
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **UL Japan HQ (Vitec)**

Certificate No: **D1750V2-1089\_Mar16**

### CALIBRATION CERTIFICATE

Object **D1750V2 - SN: 1089**

Calibration procedure(s) **QA CAL-05.v9**  
**Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **March 11, 2016**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).  
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature ( $22 \pm 3$ )°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards           | ID #               | Cal Date (Certificate No.)     | Scheduled Calibration |
|-----------------------------|--------------------|--------------------------------|-----------------------|
| Power meter EPM-442A        | GB37480704         | 07-Oct-15 (No. 217-02222)      | Oct-16                |
| Power sensor HP 8481A       | US37292783         | 07-Oct-15 (No. 217-02222)      | Oct-16                |
| Power sensor HP 8481A       | MY41092317         | 07-Oct-15 (No. 217-02223)      | Oct-16                |
| Reference 20 dB Attenuator  | SN: 5058 (20k)     | 01-Apr-15 (No. 217-02131)      | Mar-16                |
| Type-N mismatch combination | SN: 5047.2 / 06327 | 01-Apr-15 (No. 217-02134)      | Mar-16                |
| Reference Probe EX3DV4      | SN: 7349           | 31-Dec-15 (No. EX3-7349_Dec15) | Dec-16                |
| DAE4                        | SN: 601            | 30-Dec-15 (No. DAE4-601_Dec15) | Dec-16                |

| Secondary Standards       | ID #             | Check Date (in house)             | Scheduled Check        |
|---------------------------|------------------|-----------------------------------|------------------------|
| RF generator R&S SMT-06   | 100972           | 15-Jun-15 (in house check Jun-15) | In house check: Jun-18 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-15) | In house check: Oct-16 |

|                |                              |                                          |               |
|----------------|------------------------------|------------------------------------------|---------------|
| Calibrated by: | Name<br><b>Michael Weber</b> | Function<br><b>Laboratory Technician</b> | Signature<br> |
| Approved by:   | Name<br><b>Katja Pokovic</b> | Function<br><b>Technical Manager</b>     | Signature<br> |

Issued: March 11, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1750V2-1089\_Mar16

Page 1 of 8

**Calibration Laboratory of**  
**Schmid & Partner**  
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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

**Glossary:**

|       |                                 |
|-------|---------------------------------|
| TSL   | tissue simulating liquid        |
| ConvF | sensitivity in TSL / NORM x,y,z |
| N/A   | not applicable or not measured  |

**Calibration is Performed According to the Following Standards:**

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

**Additional Documentation:**

- DASY4/5 System Handbook

**Methods Applied and Interpretation of Parameters:**

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

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

### Measurement Conditions

DASY system configuration, as far as not given on page 1.

|                              |                        |             |
|------------------------------|------------------------|-------------|
| DASY Version                 | DASY5                  | V52.8.8     |
| Extrapolation                | Advanced Extrapolation |             |
| Phantom                      | Modular Flat Phantom   |             |
| Distance Dipole Center - TSL | 10 mm                  | with Spacer |
| Zoom Scan Resolution         | dx, dy, dz = 5 mm      |             |
| Frequency                    | 1750 MHz $\pm$ 1 MHz   |             |

### Head TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 40.1           | 1.37 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 39.9 $\pm$ 6 % | 1.35 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Head TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 8.97 W/kg                    |
| SAR for nominal Head TSL parameters                   | normalized to 1W   | 36.2 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 4.76 W/kg                    |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 19.1 W/kg $\pm$ 16.5 % (k=2) |

### Body TSL parameters

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Body TSL parameters             | 22.0 °C             | 53.4           | 1.49 mho/m           |
| Measured Body TSL parameters            | (22.0 $\pm$ 0.2) °C | 53.0 $\pm$ 6 % | 1.46 mho/m $\pm$ 6 % |
| Body TSL temperature change during test | < 0.5 °C            | ----           | ----                 |

### SAR result with Body TSL

|                                                       |                    |                              |
|-------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL | Condition          |                              |
| SAR measured                                          | 250 mW input power | 8.95 W/kg                    |
| SAR for nominal Body TSL parameters                   | normalized to 1W   | 36.2 W/kg $\pm$ 17.0 % (k=2) |

|                                                         |                    |                              |
|---------------------------------------------------------|--------------------|------------------------------|
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | condition          |                              |
| SAR measured                                            | 250 mW input power | 4.77 W/kg                    |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 19.2 W/kg $\pm$ 16.5 % (k=2) |

## Appendix (Additional assessments outside the scope of SCS 0108)

### Antenna Parameters with Head TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 48.9 $\Omega$ - 2.0 j $\Omega$ |
| Return Loss                          | - 32.6 dB                      |

### Antenna Parameters with Body TSL

|                                      |                                |
|--------------------------------------|--------------------------------|
| Impedance, transformed to feed point | 46.1 $\Omega$ - 2.0 j $\Omega$ |
| Return Loss                          | - 26.7 dB                      |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.217 ns |
|----------------------------------|----------|

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

### Additional EUT Data

|                 |                   |
|-----------------|-------------------|
| Manufactured by | SPEAG             |
| Manufactured on | November 07, 2012 |

## DASY5 Validation Report for Head TSL

Date: 11.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1089**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.35$  S/m;  $\epsilon_r = 39.9$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.54, 8.54, 8.54); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P50AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

### Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

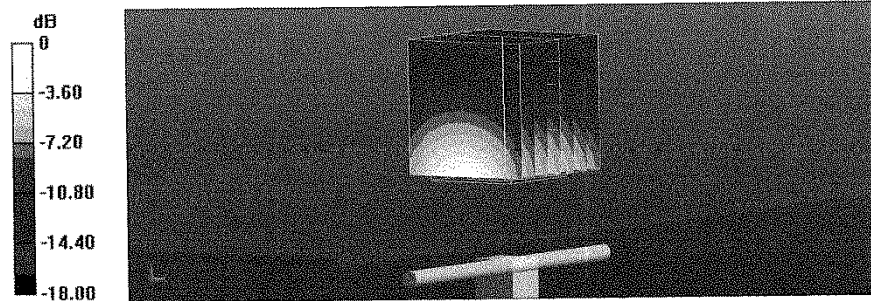
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 104.4 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 16.2 W/kg

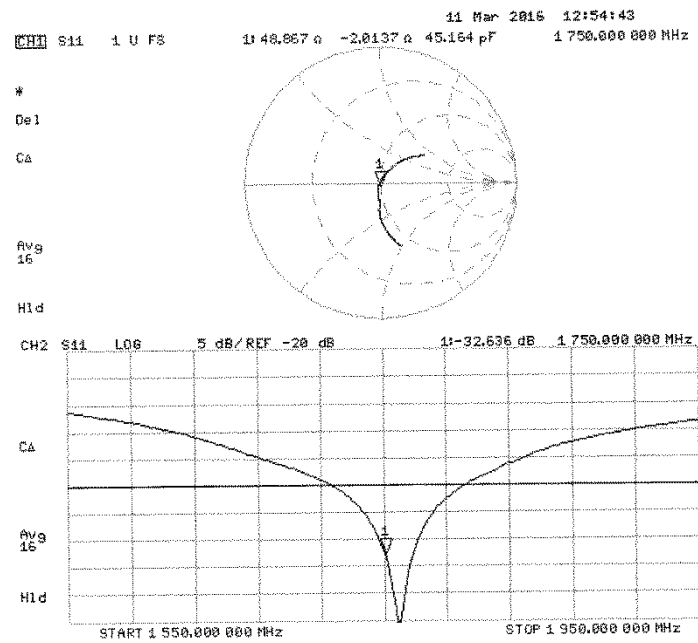
**SAR(1 g) = 8.97 W/kg; SAR(10 g) = 4.76 W/kg**

Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

# Impedance Measurement Plot for Head TSL



## DASY5 Validation Report for Body TSL

Date: 11.03.2016

Test Laboratory: SPEAG, Zurich, Switzerland

**DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1089**

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.46$  S/m;  $\epsilon_r = 53$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.25, 8.25, 8.25); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom Type: QD000P50AA
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

### Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

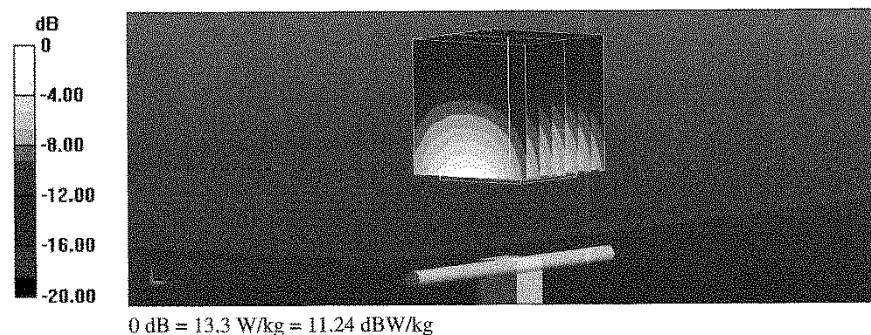
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.98 V/m; Power Drift = 0.00 dB

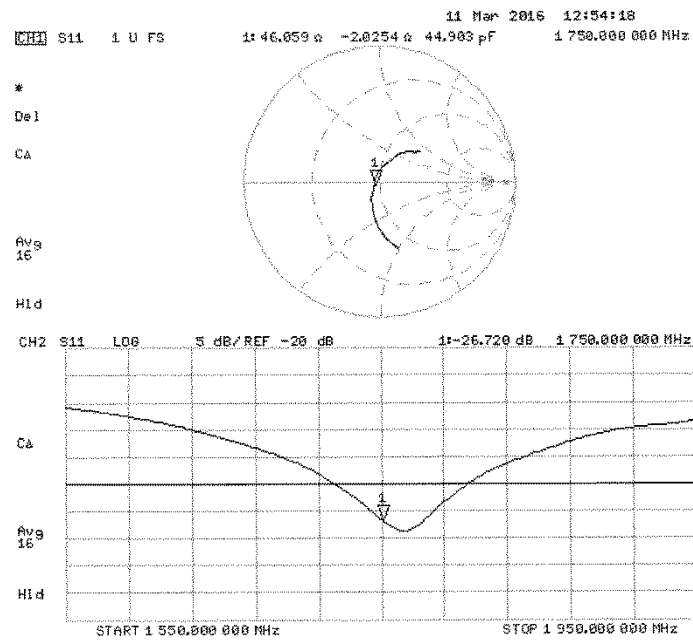
Peak SAR (extrapolated) = 15.6 W/kg

**SAR(1 g) = 8.95 W/kg; SAR(10 g) = 4.77 W/kg**

Maximum value of SAR (measured) = 13.3 W/kg



# Impedance Measurement Plot for Body TSL



## D1750V2 Calibration for Impedance and Return-loss

|             |                               |        |         |
|-------------|-------------------------------|--------|---------|
| Equipment   | Dipole Antenna                | Model  | D1750V2 |
| Manufacture | Schmid&Partner Engineering AG | Serial | 1089    |
| Tested by   | Tomohisa Nakagawa             |        |         |

### 1. Test environment

|                     |                       |                   |       |
|---------------------|-----------------------|-------------------|-------|
| Date                | March 27 and 28, 2017 |                   |       |
| Ambient Temperature | 24.0 deg.C            | Relative humidity | 50%RH |

### 2. Equipment used

| Control No. | Instrument                              | Manufacturer                  | Model No      | Serial No  | Test Item                              | Calibration Date * Interval(month) |
|-------------|-----------------------------------------|-------------------------------|---------------|------------|----------------------------------------|------------------------------------|
| MOS-37      | Digital thermometer                     | LKM electronic                | DTM3000       | -          | SAR                                    | 2016/07/28 * 12                    |
| MPF-02      | 2mm Oval Flat Phantom                   | Schmid&Partner Engineering AG | QDOVA001BB    | 1045       | SAR                                    | 2016/05/07 * 12                    |
| MOS-26      | Thermo-Hygrometer                       | CUSTOM                        | CTH-201       | A08Q29     | SAR                                    | 2016/04/19 * 12                    |
| SSDA-06     | Dipole Antenna                          | Schmid&Partner Engineering AG | D1750V2       | 1089       | SAR(D1750)                             | 2016/03/11 * 12                    |
| SSLM175-01  | Tissue simulation liquid (1750MHz,body) | Schmid&Partner Engineering AG | SL AAM 175 AA | -          | SAR*Daily Check Target Value $\pm 5\%$ | Pre-check                          |
| SSLH175-01  | Tissue simulation liquid (1750MHz,head) | Schmid&Partner Engineering AG | SL AAH 175 AA | -          | SAR*Daily Check Target Value $\pm 5\%$ | Pre-check                          |
| EST-63      | Network Analyzer                        | KEYSIGHT                      | E5071C        | MY46523746 | SAR                                    | 2017/02/03 * 12                    |
| EST-64      | Calibration Kit                         | KEYSIGHT                      | 85032F        | MY53201709 | SAR                                    | 2017/02/02 * 12                    |

### 3. Test Result

| Impedance,Transformed to feed point | cal day   | Head (real part) [ $\Omega$ ] | Head (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance     | Result   |
|-------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|---------------|----------|
| Calibration (SPEAG)                 | 2016/3/11 | 48.90                         | -2.00                         | -                                  | -                                  | -             | -        |
| Calibration(ULJ)                    | 2017/3/28 | 49.16                         | -1.69                         | 0.26                               | 0.31                               | $\pm 5\Omega$ | Complied |

| Return loss         | cal day   | Head [dB] | Deviation [dB] | Tolerance [dB] | Result   |
|---------------------|-----------|-----------|----------------|----------------|----------|
| Calibration (SPEAG) | 2016/3/11 | -32.60    | -              | -              | -        |
| Calibration(ULJ)    | 2017/3/28 | -34.69    | -2.09          | 6.52           | Complied |

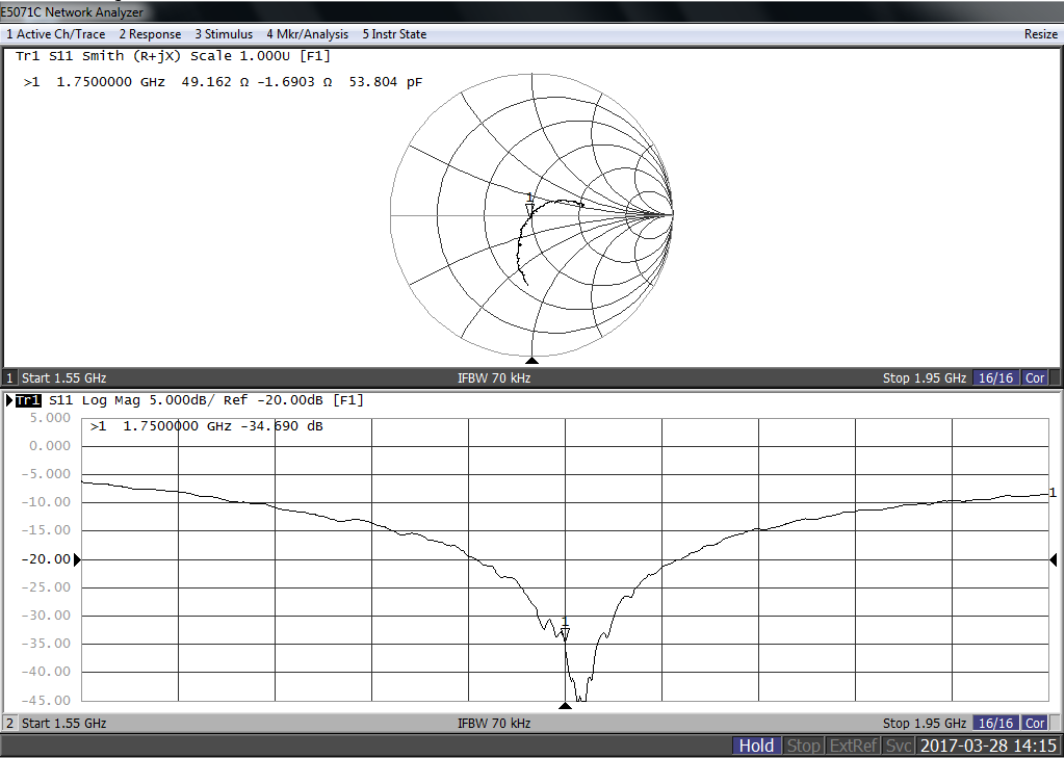
| Impedance,Transformed to feed point | cal day   | Body (real part) [ $\Omega$ ] | Body (img part) [ $j\Omega$ ] | Deviation (real part) [ $\Omega$ ] | Deviation (img part) [ $j\Omega$ ] | Tolerance     | Result   |
|-------------------------------------|-----------|-------------------------------|-------------------------------|------------------------------------|------------------------------------|---------------|----------|
| Calibration (SPEAG)                 | 2016/3/11 | 46.10                         | -2.00                         | -                                  | -                                  | -             | -        |
| Calibration(ULJ)                    | 2017/3/27 | 45.959                        | 0.22943                       | -0.14                              | 2.23                               | $\pm 5\Omega$ | Complied |

| Return loss         | cal day   | Body [dB] | Deviation [dB] | Tolerance [dB] | Result   |
|---------------------|-----------|-----------|----------------|----------------|----------|
| Calibration (SPEAG) | 2016/3/11 | -26.70    | -              | -              | -        |
| Calibration(ULJ)    | 2017/3/27 | -28.299   | -1.60          | 5.34           | Complied |

\*Tolerance : According to the KDB450824D02

Measurement Plots

<Head Liquid>



<Body Liquid>

