

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 333 of 356

### ANNEX L: D5GHzV2 Dipole Calibration Certificate



In Collaboration with  
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CALIBRATION LABORATORY

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China  
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Client **TA-Shanghai** Certificate No: **J13-2-3045**

#### CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1151**

Calibration Procedure(s) **TMC-OS-E-02-194**  
**Calibration procedure for dipole validation kits**

Calibration date: **December 30, 2013**

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±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards       | ID #       | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|-------------------------|------------|------------------------------------------|-----------------------|
| Power Meter NRVD        | 102083     | 11-Sep-13 (TMC, No.JZ13-443)             | Sep-14                |
| Power sensor NRV-Z5     | 100595     | 11-Sep-13 (TMC, No. JZ13-443)            | Sep -14               |
| Reference Probe EX3DV4  | SN 3846    | 3- Sep-13 (SPEAG, No.EX3-3846_Sep13)     | Sep-14                |
| DAE4                    | SN 777     | 22-Feb-13 (SPEAG, DAE4-777_Feb13)        | Feb -14               |
| Signal Generator E4438C | MY49070393 | 13-Nov-13 (TMC, No.JZ13-394)             | Nov-14                |
| Network Analyzer N5230C | MY49000861 | 31-Jan-13 (TMC, No.JZ13-633)             | Jan-14                |

|                | Name        | Function                          | Signature |
|----------------|-------------|-----------------------------------|-----------|
| Calibrated by: | Zhao Jing   | SAR Test Engineer                 |           |
| Reviewed by:   | Qi Dianyuan | SAR Project Leader                |           |
| Approved by:   | Lu Bingsong | Deputy Director of the laboratory |           |

Issued: January 3, 2014

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

Certificate No: J13-2-3045

Page 1 of 15

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RXA1406-0060SAR

Page 334 of 356



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**Glossary:**

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

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

- a) 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
- b) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Field from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- c) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

**Additional Documentation:**

- d) 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%.

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 335 of 356



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### Measurement Conditions

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

|                              |                                                                                              |                                  |
|------------------------------|----------------------------------------------------------------------------------------------|----------------------------------|
| DASY Version                 | DASY52                                                                                       | 52.8.7.1137                      |
| Extrapolation                | Advanced Extrapolation                                                                       |                                  |
| Phantom                      | ELI 4.0                                                                                      |                                  |
| Distance Dipole Center - TSL | 10 mm                                                                                        | with Spacer                      |
| Zoom Scan Resolution         | dx, dy = 4 mm, dz = 1.4 mm                                                                   | Graded Ratio = 1.4 (Z direction) |
| Frequency                    | 5200 MHz $\pm$ 1 MHz<br>5300 MHz $\pm$ 1 MHz<br>5600 MHz $\pm$ 1 MHz<br>5800 MHz $\pm$ 1 MHz |                                  |

### Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature         | Permittivity   | Conductivity         |
|-----------------------------------------|---------------------|----------------|----------------------|
| Nominal Head TSL parameters             | 22.0 °C             | 36.0           | 4.66 mho/m           |
| Measured Head TSL parameters            | (22.0 $\pm$ 0.2) °C | 36.4 $\pm$ 6 % | 4.58 mho/m $\pm$ 6 % |
| Head TSL temperature change during test | <1.0 °C             | ----           | ----                 |

### SAR result with Head TSL at 5200 MHz

|                                                         |                    |                               |
|---------------------------------------------------------|--------------------|-------------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | Condition          |                               |
| SAR measured                                            | 100 mW input power | 7.63 mW / g                   |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 76.5 mW /g $\pm$ 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                               |
| SAR measured                                            | 100 mW input power | 2.22 mW / g                   |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.3 mW /g $\pm$ 22.2 % (k=2) |



# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 336 of 356



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### Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.9         | 4.76 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 36.2 ± 6 %   | 4.71 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ----         | ----             |

### SAR result with Head TSL at 5300 MHz

|                                                         |                    |                           |
|---------------------------------------------------------|--------------------|---------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | Condition          |                           |
| SAR measured                                            | 100 mW input power | 8.02 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 80.3 mW /g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                           |
| SAR measured                                            | 100 mW input power | 2.33 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 23.3 mW /g ± 22.2 % (k=2) |

### Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.5         | 5.07 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.6 ± 6 %   | 5.11 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ----         | ----             |

### SAR result with Head TSL at 5600 MHz

|                                                         |                    |                           |
|---------------------------------------------------------|--------------------|---------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | Condition          |                           |
| SAR measured                                            | 100 mW input power | 7.94 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 78.5 mW /g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                           |
| SAR measured                                            | 100 mW input power | 2.29 mW / g               |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.9 mW /g ± 22.2 % (k=2) |

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 337 of 356



### Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Head TSL parameters             | 22.0 °C         | 35.3         | 5.27 mho/m       |
| Measured Head TSL parameters            | (22.0 ± 0.2) °C | 35.1 ± 6 %   | 5.36 mho/m ± 6 % |
| Head TSL temperature change during test | <1.0 °C         | ---          | ---              |

### SAR result with Head TSL at 5800 MHz

|                                                         |                    |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL   | Condition          |                            |
| SAR measured                                            | 100 mW input power | 7.67 mW / g                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 76.7 mW / g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL | Condition          |                            |
| SAR measured                                            | 100 mW input power | 2.22 mW / g                |
| SAR for nominal Head TSL parameters                     | normalized to 1W   | 22.2 mW / g ± 22.2 % (k=2) |

### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 49.0         | 5.30 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 48.6 ± 6 %   | 5.38 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C         | ---          | ---              |

### SAR result with Body TSL at 5200 MHz

|                                                         |                    |                            |
|---------------------------------------------------------|--------------------|----------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL   | Condition          |                            |
| SAR measured                                            | 100 mW input power | 7.48 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 74.7 mW / g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | Condition          |                            |
| SAR measured                                            | 100 mW input power | 2.17 mW / g                |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 21.7 mW / g ± 22.2 % (k=2) |

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 338 of 356



### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.9         | 5.42 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 48.5 ± 6 %   | 5.50 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C         | ----         | ----             |

### SAR result with Body TSL at 5300 MHz

|                                                         |                    |                           |
|---------------------------------------------------------|--------------------|---------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL   | Condition          |                           |
| SAR measured                                            | 100 mW input power | 7.70 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 76.9 mW /g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | Condition          |                           |
| SAR measured                                            | 100 mW input power | 2.20 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 22.0 mW /g ± 22.2 % (k=2) |

### Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.5         | 5.77 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 48.1 ± 6 %   | 5.85 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C         | ----         | ----             |

### SAR result with Body TSL at 5600 MHz

|                                                         |                    |                           |
|---------------------------------------------------------|--------------------|---------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL   | Condition          |                           |
| SAR measured                                            | 100 mW input power | 8.08 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 80.7 mW /g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | Condition          |                           |
| SAR measured                                            | 100 mW input power | 2.27 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 22.7 mW /g ± 22.2 % (k=2) |



# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 339 of 356



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### Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

|                                         | Temperature     | Permittivity | Conductivity     |
|-----------------------------------------|-----------------|--------------|------------------|
| Nominal Body TSL parameters             | 22.0 °C         | 48.2         | 6.00 mho/m       |
| Measured Body TSL parameters            | (22.0 ± 0.2) °C | 47.8 ± 6 %   | 6.09 mho/m ± 6 % |
| Body TSL temperature change during test | <1.0 °C         | ----         | ----             |

### SAR result with Body TSL at 5800 MHz

|                                                         |                    |                           |
|---------------------------------------------------------|--------------------|---------------------------|
| SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL   | Condition          |                           |
| SAR measured                                            | 100 mW input power | 7.26 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 72.5 mW /g ± 23.0 % (k=2) |
| SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL | Condition          |                           |
| SAR measured                                            | 100 mW input power | 2.04 mW / g               |
| SAR for nominal Body TSL parameters                     | normalized to 1W   | 20.4 mW /g ± 22.2 % (k=2) |

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RXA1406-0060SAR

Page 340 of 356



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## Appendix

### Antenna Parameters with Head TSL at 5200 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $54.6\Omega - 3.74j\Omega$ |
| Return Loss                          | - 24.9dB                   |

### Antenna Parameters with Head TSL at 5300 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $45.2\Omega - 4.88j\Omega$ |
| Return Loss                          | - 22.8dB                   |

### Antenna Parameters with Head TSL at 5600 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $57.6\Omega + 3.63j\Omega$ |
| Return Loss                          | - 22.1dB                   |

### Antenna Parameters with Head TSL at 5800 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $50.6\Omega - 9.91j\Omega$ |
| Return Loss                          | - 20.2dB                   |

### Antenna Parameters with Body TSL at 5200 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $53.8\Omega - 3.44j\Omega$ |
| Return Loss                          | - 26.2dB                   |

### Antenna Parameters with Body TSL at 5300 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $46.4\Omega - 3.33j\Omega$ |
| Return Loss                          | - 25.8dB                   |

### Antenna Parameters with Body TSL at 5600 MHz

|                                      |                            |
|--------------------------------------|----------------------------|
| Impedance, transformed to feed point | $58.1\Omega - 2.54j\Omega$ |
| Return Loss                          | - 22.1dB                   |



# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 341 of 356



### Antenna Parameters with Body TSL at 5800 MHz

|                                      |                |
|--------------------------------------|----------------|
| Impedance, transformed to feed point | 47.9Ω - 8.33jΩ |
| Return Loss                          | - 21.2dB       |

### General Antenna Parameters and Design

|                                  |          |
|----------------------------------|----------|
| Electrical Delay (one direction) | 1.197 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 |
|-----------------|-------|

**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RXA1406-0060SAR

Page 342 of 356



In Collaboration with

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**DASY5 Validation Report for Head TSL**

Date: 30.12.2013

Test Laboratory: TMC, Beijing, China

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz,  
Frequency: 5600 MHz, Frequency: 5800 MHz;  
Medium parameters used: f = 5200 MHz;  $\sigma = 4.58$  mho/m;  $\epsilon_r = 36.42$ ;  $\rho = 1000$  kg/m<sup>3</sup>,  
Medium parameters used: f = 5300 MHz;  $\sigma = 4.71$  mho/m;  $\epsilon_r = 36.19$ ;  $\rho = 1000$  kg/m<sup>3</sup>,  
Medium parameters used: f = 5600 MHz;  $\sigma = 5.11$  mho/m;  $\epsilon_r = 35.62$ ;  $\rho = 1000$  kg/m<sup>3</sup>,  
Medium parameters used: f = 5800 MHz;  $\sigma = 5.36$  mho/m;  $\epsilon_r = 35.11$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: ELI 4.0

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

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3846; ConvF(5.25,5.25,5.25); Calibrated: 2013/9/3,  
ConvF(5.04,5.04,5.04); Calibrated: 2013/9/3, ConvF(4.52,4.52,4.52);  
Calibrated: 2013/9/3, ConvF(4.51,4.51,4.51); Calibrated: 2013/9/3,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 22/2/2013
- Phantom: ELI 4.0; Type: QDOVA001BA;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

**Dipole Calibration for Head Tissue/Pin=100mW, d=10mm, f=5200**

**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm,  
dy=4mm, dz=1.4mm

Reference Value = 67.621 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 32.8 W/kg

**SAR(1 g) = 7.63 W/kg; SAR(10 g) = 2.22 W/kg**

Maximum value of SAR (measured) = 18.0 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, d=10mm, f=5300**

**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm,  
dy=4mm, dz=1.4mm

Reference Value = 69.925 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 35.5 W/kg

**SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.33 W/kg**

Maximum value of SAR (measured) = 18.8 W/kg

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 343 of 356



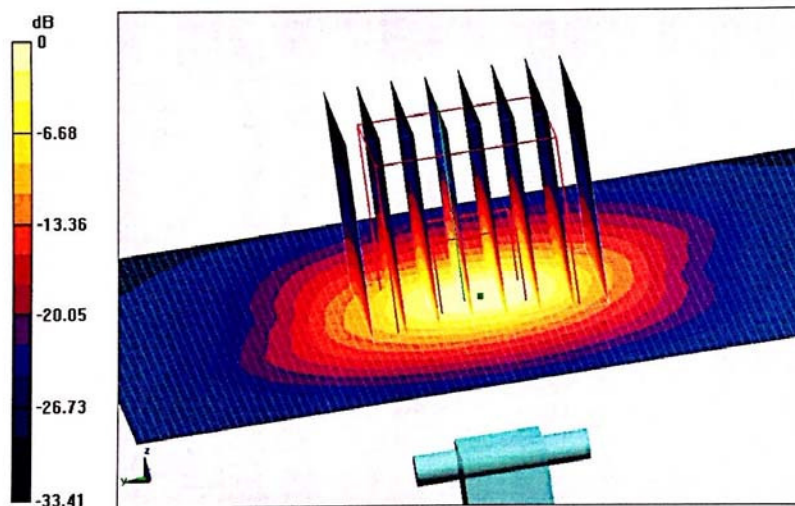
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**Dipole Calibration for Head Tissue/Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm**  
Reference Value = 69.807 V/m; Power Drift = -0.04 dB  
Peak SAR (extrapolated) = 35.3 W/kg  
**SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.29 W/kg**  
Maximum value of SAR (measured) = 19.4 W/kg

**Dipole Calibration for Head Tissue/Pin=100mW, d=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm**  
Reference Value = 67.108 V/m; Power Drift = -0.01 dB  
Peak SAR (extrapolated) = 35.5 W/kg  
**SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.22 W/kg**  
Maximum value of SAR (measured) = 18.5 W/kg



0 dB = 18.5 W/kg = 12.67 dBW/kg



# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 344 of 356



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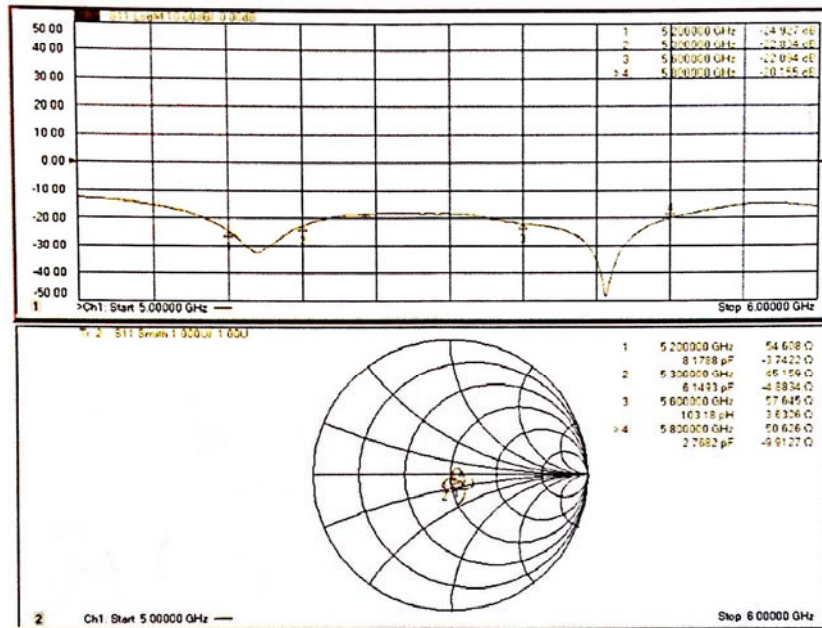
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### Impedance Measurement Plot for Head TSL



**TA Technology (Shanghai) Co., Ltd.**  
**Test Report**

Report No.: RXA1406-0060SAR

Page 345 of 356



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**DASY5 Validation Report for Body TSL**

Date: 24.12.2013

Test Laboratory: TMC, Beijing, China

**DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151**

Communication System: CW; Frequency: 5200 MHz, Frequency: 5300 MHz,  
Frequency: 5600 MHz, Frequency: 5800 MHz,  
Medium parameters used:  $f = 5200 \text{ MHz}$ ;  $\sigma = 5.38 \text{ mho/m}$ ;  $\epsilon_r = 48.56$ ;  $\rho = 1000 \text{ kg/m}^3$ ,  
Medium parameters used:  $f = 5300 \text{ MHz}$ ;  $\sigma = 5.501 \text{ mho/m}$ ;  $\epsilon_r = 48.46$ ;  $\rho = 1000$   
 $\text{kg/m}^3$ , Medium parameters used:  $f = 5600 \text{ MHz}$ ;  $\sigma = 5.851 \text{ mho/m}$ ;  $\epsilon_r = 48.09$ ;  $\rho =$   
 $1000 \text{ kg/m}^3$ , Medium parameters used:  $f = 5800 \text{ MHz}$ ;  $\sigma = 6.094 \text{ mho/m}$ ;  $\epsilon_r = 47.81$ ;  $\rho$   
 $= 1000 \text{ kg/m}^3$

Phantom section: ELI 4.0

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

**DASY5 Configuration:**

- Probe: EX3DV4 - SN3846; ConvF(4.36,4.36,4.36); Calibrated: 2013/9/3,  
ConvF(4.17,4.17,4.17); Calibrated: 2013/9/3, ConvF(3.77,3.77,3.77);  
Calibrated: 2013/9/3, ConvF(3.94,3.94,3.94); Calibrated: 2013/9/3,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn777; Calibrated: 22/2/2013
- Phantom: ELI 4.0; Type: QDOVA001BA;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

**Dipole Calibration for Body Tissue/Pin=100mW, d=10mm, f=5200**

**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm,  
dy=4mm, dz=1.4mm

Reference Value = 65.005 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 30.9 W/kg

**SAR(1 g) = 7.48 W/kg; SAR(10 g) = 2.17 W/kg**

Maximum value of SAR (measured) = 17.4 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, d=10mm, f=5300**

**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm,  
dy=4mm, dz=1.4mm

Reference Value = 65.871 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 32.8 W/kg

**SAR(1 g) = 7.7 W/kg; SAR(10 g) = 2.2 W/kg**

Maximum value of SAR (measured) = 18.3 W/kg

TA Technology (Shanghai) Co., Ltd.  
Test Report

Report No.: RXA1406-0060SAR

Page 346 of 356



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**Dipole Calibration for Body Tissue/Pin=100mW, d=10mm, f=5600**

**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.323 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 38.4 W/kg

**SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.27 W/kg**

Maximum value of SAR (measured) = 19.6 W/kg

**Dipole Calibration for Body Tissue/Pin=100mW, d=10mm, f=5800**

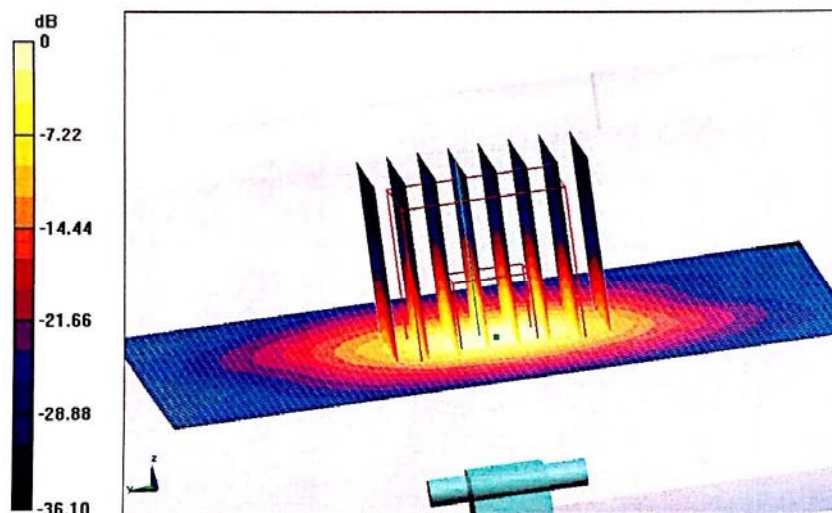
**MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.571 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 34.7 W/kg

**SAR(1 g) = 7.26 W/kg; SAR(10 g) = 2.04 W/kg**

Maximum value of SAR (measured) = 17.6 W/kg



0 dB = 17.6 W/kg = 12.46 dBW/kg



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Test Report

Report No.: RXA1406-0060SAR

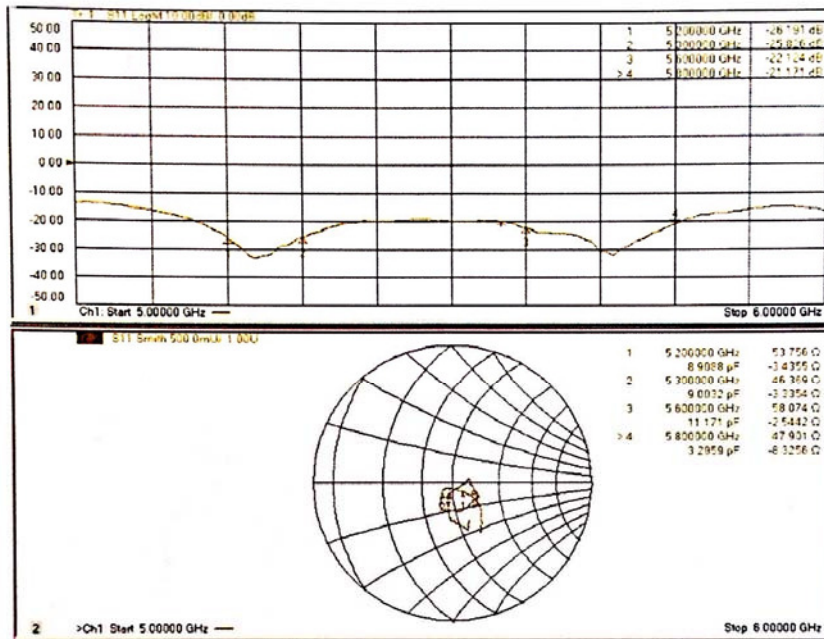
Page 347 of 356



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Impedance Measurement Plot for Body TSL



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## Test Report

Report No.: RXA1406-0060SAR

Page 348 of 356

### ANNEX M: DAE4 Calibration Certificate



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Client : **TA(Shanghai)**

Certificate No: **J14-2-0052**

#### CALIBRATION CERTIFICATE

Object: **DAE4 - SN: 1317**

Calibration Procedure(s): **TMC-OS-E-01-198**  
**Calibration Procedure for the Data Acquisition Electronics (DAEx)**

Calibration date: **January 16, 2014**

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±3)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards                  | ID #    | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|------------------------------------|---------|------------------------------------------|-----------------------|
| Documenting Process Calibrator 753 | 1971018 | 01-July-13 (TMC, No:JW13-049)            | July-14               |

|                | Name        | Function                          | Signature |
|----------------|-------------|-----------------------------------|-----------|
| Calibrated by: | Yu Zongying | SAR Test Engineer                 |           |
| Reviewed by:   | Qi Dianyuan | SAR Project Leader                |           |
| Approved by:   | Lu Bingsong | Deputy Director of the laboratory |           |

Issued: January 16, 2014

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

Certificate No: J14-2-0052

Page 1 of 3

# TA Technology (Shanghai) Co., Ltd.

## Test Report

Report No.: RXA1406-0060SAR

Page 349 of 356



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### Glossary:

DAE data acquisition electronics  
Connector angle information used in DASY system to align probe sensor X to the robot coordinate system.

### Methods Applied and Interpretation of Parameters:

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle:* The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The report provide only calibration results for DAE, it does not contain other performance test results.



TA Technology (Shanghai) Co., Ltd.  
Test Report

Report No.: RXA1406-0060SAR

Page 350 of 356



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**DC Voltage Measurement**

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 $\mu$ V, full range = -100...+300 mV  
Low Range: 1LSB = 61nV, full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

| Calibration Factors | X                         | Y                         | Z                         |
|---------------------|---------------------------|---------------------------|---------------------------|
| High Range          | 404.058 $\pm$ 0.15% (k=2) | 404.060 $\pm$ 0.15% (k=2) | 403.954 $\pm$ 0.15% (k=2) |
| Low Range           | 3.99002 $\pm$ 0.7% (k=2)  | 3.99910 $\pm$ 0.7% (k=2)  | 3.98303 $\pm$ 0.7% (k=2)  |

**Connector Angle**

|                                           |               |
|-------------------------------------------|---------------|
| Connector Angle to be used in DASY system | 119° $\pm$ 1° |
|-------------------------------------------|---------------|