# FCC SAR EVALUATION REPORT

For

## MADETRONICS SAS

Diagonal 54 Sur No. 24A - 55 Interior 24 Apto. 401 Bogota,Colombia

**Product Name:** GSM Mobile Phone

**Model No. :** mini5130

**FCC ID:** 2ACIBMINI5130

**Date of Receipt:** 21 May 2014

**Date of Test:** 21 ~25 May 2014

**Issued Date:** 25 May 2014

**Report No.:**TS201405030001

**Report Version:**V1.0

**Issue By**

Shenzhen Sunway Communication CO.,LTD Testing Center
1/F,BuildingA，SDG Info Port, KefengRoad，Hi-Tech Park, Nanshan District,
Shenzhen , Guangdong, China 518104,

## SAR Evaluation compliance

| | |
|---|---|
| Product Name: | GSM Mobile Phone |
| Brand Name: | MADETRONICS |
| Model Name: | mini5130 |
| Applicant: | MADETRONICS SAS |
| Address: | Diagonal 54 Sur No. 24A - 55 Interior 24 Apto. 401<br>Bogota,Colombia |
| Manufacturer: | Shenzhen Leed Electronic Co.,LTD |
| Address: | Room 29A1,Block A, Zhonghangbeiyuan Building,Zhenhua Road, Futian District Shenzhen China |
| Applicable Standard: | IEEE Std. 1528-2013,FCC 47 CFR§2.1093<br>KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r03<br>KDB 447498 D01 General RF Exposure Guidance v05r02 |
| Test Result: | Max. SAR Measurement<br>Body (1g): 0.630 W/kg<br>Head(1g): 0.576W/kg |
| Performed Date: | 21 ~25 May 2014 |
| Test Engineer: | Li.zhao 25tMay 2014 |
| Reviewed By | Tomy.Li 25 May 2014 |
| Performed Location: | Shenzhen Sunway Communication CO.,LTD Testing Center<br>1/F,BuildingA，SDG Info Port, KefengRoad，Hi-Tech Park, Nanshan District,Shenzhen , Guangdong, China 518104<br>Tel: +86-755- 36615880<br>Fax: +86-755- 86525532 |

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## 1. General Information:

1.1 EUT Description:

| EUT Information | |
|---|---|
| Product Name | GSM Mobile Phone |
| Brand Name | MADETRONICS |
| Model Name | mini5130 |
| Device Category | MobilePhone |
| Antenna Type | Integral Antenna |
| Headset | mini5130 |
| Battery | Type: Rechargeable lithium-ion battery 3.7V |
| Dimensions (L*W*H): | 90mm (L)× 37mm (W)×14mm (H) |
| Weight: | - |
| Power Source: | Rechargeable lithium-ion battery 3.7V |
| Normal Operation: | Head and Body-worn |

| GSM-2G | |
|---|---|
| Support Band | GSM850/PCS1900 |
| GPRS Type | N/A |
| GPRS Class | N/A |
| Frequency Bands: | GSM 850: UL: 824-850 MHz DL: 869-894 MHz<br>PCS 1900: UL: 1710-1785 MHz DL: 1805-1880 MHz |
| Release Version | R99 |
| Type of modulation | GMSK for GSM/GPRS |
| Antenna Gain | 1.2dBi for GSM 850<br>1.2dBi for DCS 1900 |

| Max. Output Power (Conducted) | |
|---|---|
| GSM850: | 32.32 dBm |
| PCS1900: | 30.51 dBm |

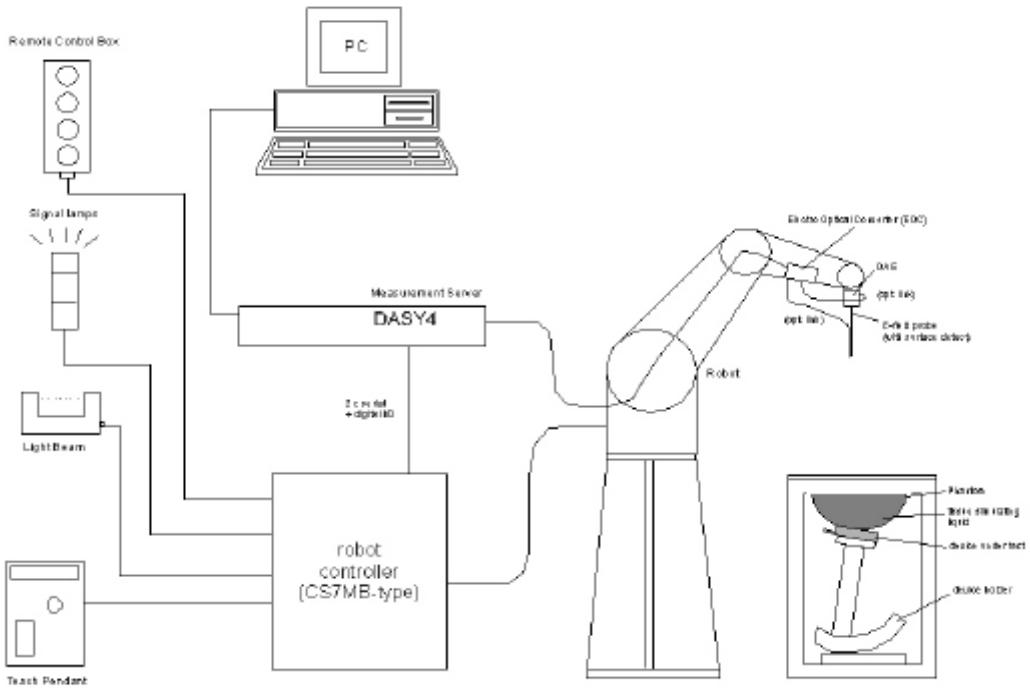
1.2 Test Environment:

Ambient conditions in the SAR laboratory:

| Items | Required | Actual |
|---|---|---|
| Temperature (℃) | 18-25 | 21~23 |
| Humidity (%RH) | 30-70 | 50~65 |

**2. SAR Measurement System:**

2.1 Dasy4 System Description:




The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.
- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

**3. System Components:**

- DAsY4 Measurement Server:


The DASY4 measurement server is based on a PC/104 CPU board with a 166MHz low-power pentium, 32MB chipdisk and 64MB RAM. The necessary circuits for communication with either the DAE4 (or DAE3) electronic box as well as the 16-bit AD-converter system for optical detection and digital I/O interface are contained on the DASY4 I/O-board, which is directly connected to the PC/104 bus of the CPU board.

Calibration: No calibration required.

- DATA Acquisition Electronics (DAE):


The data acquisition electronics consists of a highly sensitive electrometer grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.

Calibration: Recommended once a year

- Dosimetric Probes:

Model: ES3DV3,
Frequency: 10MHz to 3G, Linearity:±0.2dB,
Dynamic Range: 10 μW/g to100 mW/g
Directivity:
± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in tissue material (rotation normal to probe axis)

These probes are specially designed and calibrated for use in liquids with high permittivities. They should not be used in air, since the spherical isotropy in air is poor (±2 dB). The dosimetric probes have special calibrations in various liquids at different frequencies.

Calibration: Recommended once a year

- Light Beam unit:

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip. The repeatability of this process is better than 0.1 mm.

Calibration: No calibration required.

- SAM Twin Phantom:

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:
• Left hand
• Right hand
• Flat phantom

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

- Device Holder for SAM Twin Phantom:

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity "=3 and loss tangent _=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered

**4. Tissue Simulating Liquid**

4.1 The composition of the tissue simulating liquid:

| INGREDIENT (% Weight) | 835MHz Head | 835MHz Body | 1900MHz Head | 1900MHz Body |
|---|---|---|---|---|
| **Water** | 40.45 | 52.4 | 54.9 | 40.4 |
| **Salt** | 1.45 | 1.4 | 0.18 | 0.5 |
| **Sugar** | 57.6 | 45.0 | 0.00 | 58.0 |
| **HEC** | 0.40 | 1.0 | 0.00 | 1.0 |
| **Preventol** | 0.10 | 0.1 | 0.00 | 0.1 |
| **DGBE** | 0.00 | 0 | 44.92 | 0 |

4.2 Tissue Calibration Result:

Dielectric Probe Kit: Speag DAK 3.5mm probe -S/N:1038

Head Tissue Simulate Measurement:

| Frequency (MHz) | Description | Dielectric Parameters | | Tissue Temp. (℃) | Date |
|---|---|---|---|---|---|
| | | $\varepsilon_r$ | σ[s/m] | | |
| 835MHz | Reference | 41.50±5% (39.425~43.574) | 0.90±5% (0.9215~1.0185) | N/A | 2014.05.22 |
| | Measurement | 42.07 | 0.91 | 22.1 | |
| 1900MHz | Reference | 40±5% (38~42) | 1.40±5% (1.33~1.47) | N/A | 2014.05.22 |
| | Measurement | 39.33 | 1.42 | 21.8 | |

Body Tissue Simulate Measurement:

| Frequency (MHz) | Description | Dielectric Parameters | | Tissue Temp. (℃) | Date |
|---|---|---|---|---|---|
| | | $\varepsilon_r$ | σ[s/m] | | |
| 835MHz | Reference | 55.2±5% (52.45~57.96) | 0.97±5% (0.93~1.01) | N/A | 2014.05.23 |
| | Measurement | 53.42 | 0.98 | 22.5 | |
| 1900MHz | Reference | 53.3±5% (50.64~55.96) | 1.52±5% (1.45~1.59) | N/A | 2014.05.23 |
| | Measurement | 52.35 | 1.54 | 22.5 | |

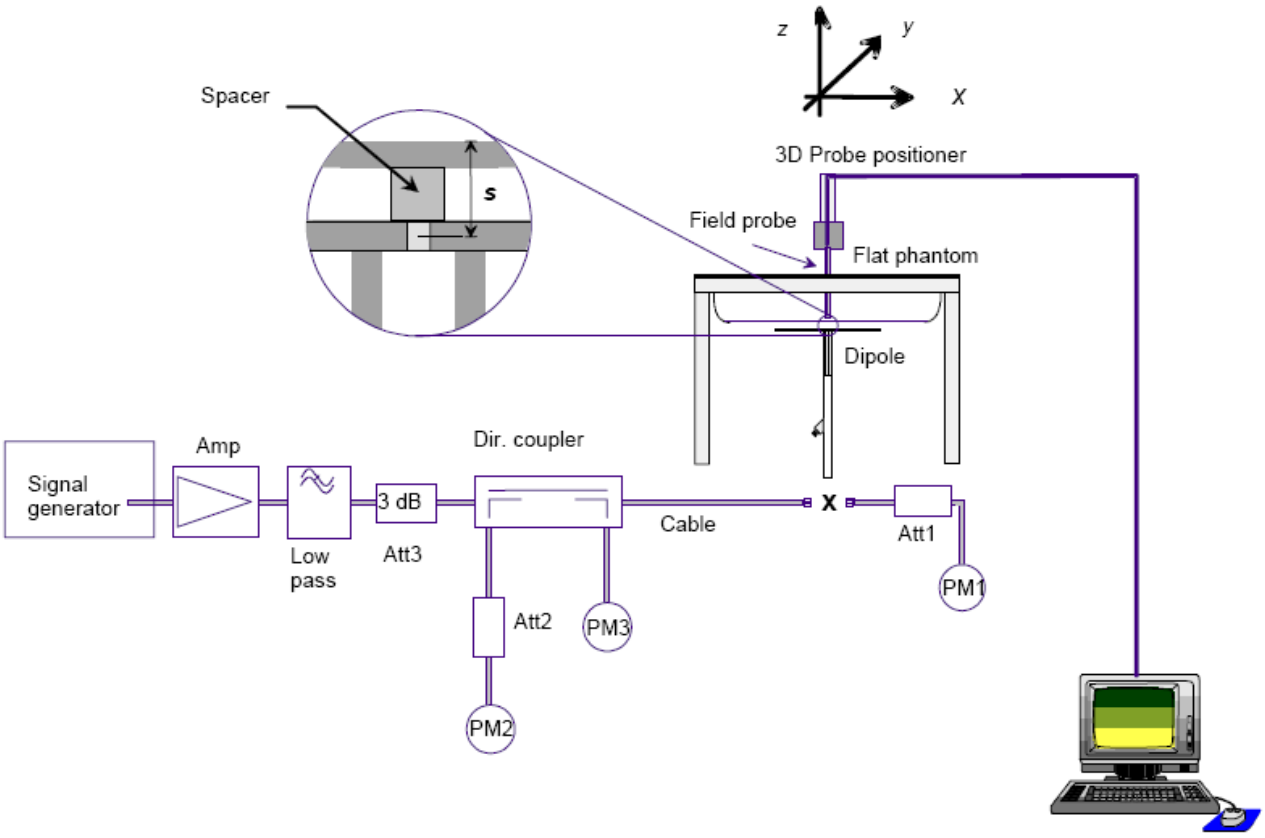
4.3 Tissue Dielectric Parameters for Head and Body Phantoms:

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table

| Target Frequency (MHz) | Head | | Body | |
|---|---|---|---|---|
| | $\varepsilon_r$ | σ[s/m] | $\varepsilon_r$ | σ[s/m] |
| 150 | 52.3 | 0.76 | 61.9 | 0.80 |
| 300 | 45.3 | 0.87 | 58.2 | 0.92 |
| 450 | 43.5 | 0.87 | 56.7 | 0.94 |
| 835 | 41.5 | 0.90 | 55.2 | 0.97 |
| 900 | 41.5 | 0.97 | 55.0 | 1.05 |
| 915 | 41.5 | 0.98 | 55.0 | 1.06 |
| 1450 | 40.5 | 1.20 | 54.0 | 1.30 |
| 1610 | 40.3 | 1.29 | 53.8 | 1.40 |
| 1800-2000 | 40.0 | 1.40 | 53.3 | 1.52 |
| 2450 | 39.2 | 1.80 | 52.7 | 1.95 |
| 3000 | 38.5 | 2.40 | 52.0 | 2.73 |
| 5800 | 35.3 | 5.27 | 48.2 | 6.00 |

## 5. SAR System Validation

5.1 Validation System:




5.2 Validation Dipoles:

The dipoles used is based on the IEEE-1528/EN62209-1 standard, and is complied with mechanical and electrical specifications in line with the requirements of both IEEE-1528/EN62209-1 and FCC Supplement C. the table below provides details for the mechanical and electrical specifications for the dipoles

| Frequency | L(mm) | H(mm) | D(mm) |
|---|---|---|---|
| 835MHz | 161 | 89.8 | 3.6 |
| 1900MHz | 68 | 39.5 | 3.6 |

5.3 Validation Result:

| System performance check for Head at 835MHz,1900MHz<br><br>Validation Dipole: D835V2-SN:4d154 | | | | | |
|---|---|---|---|---|---|
| Frequency (MHz) | Description | SAR(1g) W/Kg | SAR(10g) W/Kg | Tissue Temp. (℃) | Date |
| 835MHz | Reference | 9.51±10% (8.56~10.46) | 6.17±10% (5.56~6.78) | N/A | 2014.05.22 |
| | Validation | 10.04 | 6.56 | 22.5 | |
| Validation Dipole: D1900V2-SN: | | | | | |
| 1900MHz | Reference | 40.2±10% (36.18~44.22) | 21±10% (18.9~23.1) | N/A | 2014.05.22 |
| | Validation | 42.0 | 21.44 | 22.5 | |
| System performance check for Body at 835MHz,1900MHz<br><br>Validation Dipole: D835V2-SN:4d154 | | | | | |
| Frequency (MHz) | Description | SAR(1g) W/Kg | SAR(10g) W/Kg | Tissue Temp. (℃) | Date |
| 835MHz | Reference | 9.51±10% (8.56~10.46) | 6.23±10% (5.61~6.85) | N/A | 2014.05.22 |
| | Validation | 9.68 | 6.24 | 22.5 | |
| Validation Dipole: D1900V2-SN:5d142 | | | | | |
| 1900MHz | Reference | 40.8±10% (36.72~44.88) | 21.8±10% (19.62~23.98) | N/A | 2014.05.23 |
| | Validation | 42.40 | 21.60 | 22.5 | |
| Note: Note: All system validation SAR values are measured at 24dBm and normalized to 1W forward power. | | | | | |

**6. SAR Evaluation Procedures:**

The procedure for assessing the average SAR value consists of the following steps:

- Power Reference Measurement

  The Power Reference Measurement and Power Drift Measurement jobs are useful jobs for monitoring the power drift of the device under test in the batch process. Both jobs measure the field at a specified reference position, at a selectable distance from the phantom surface. The reference position can be either the selected section's grid reference point or a user point in this section. The reference job projects the selected point onto the phantom surface, orients the probe perpendicularly to the surface, and approaches the surface using the selected detection method.

- Area Scan

  The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. The scanning area is defined by an editable grid. This grid is anchored at the grid reference point of the selected section in the phantom. When the Area Scan's property sheet is brought-up, grid settings can be edited by a user.

- Zoom Scan

  Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The default Zoom Scan measures 7 x 7 x 7 points (5mmx5mmx5mm) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure.

- Power Drift Measurement

  The Power Drift Measurement job measures the field at the same location as the most recent power reference measurement job within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement.

## 7. SAR Exposure Limits

SAR assessments have been made in line with the requirements of IEEE-15288,FCC Supplement C ,and comply with ANSI/IEEE C95.1-1992”Uncontrolled Environments” limits.

**Limits for General Population/Uncontrolled Exposure (W/kg)**

| Type Exposure | Uncontrolled Environment Limit |
|---|---|
| Spatial Peak SAR (1g cube tissue for brain or body) | 1.60W/kg |
| Spatial Peak SAR (whole body) | 0.08W/kg |
| Spatial Peak SAR (10g for hands,feet,ankles and wrist) | 4.00W/kg |

Note: Occupational/Uncontrolled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure,(i.e. as a result of employment or occupation)

**8. Measurement Uncertainty:**

| NO | Source | Uncert. ai（%） | Prob. Dist. | Div. k | ci (1g) | ci (10g) | Stand. Uncert. ui (1g) | Stand. Uncert. ui (10g) | *Veff* |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Repeat | 0.04 | N | 1 | 1 | 1 | 0.04 | 0.04 | 9 |
| Instrument | | | | | | | | | |
| 2 | Probe calibration | 7 | N | 2 | 1 | 1 | 3.5 | 3.5 | ∞ |
| 3 | Axial isotropy | 4.7 | R | $\sqrt{3}$ | 0.7 | 0.7 | 1.9 | 1.9 | ∞ |
| 4 | Hemispherical isotropy | 9.6 | R | $\sqrt{3}$ | 0.7 | 0.7 | 3.9 | 3.9 | ∞ |
| 5 | Boundary effect | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 6 | Linearity | 4.7 | R | $\sqrt{3}$ | 1 | 1 | 2.7 | 2.7 | ∞ |
| 7 | Detection limits | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| 8 | Readout electronics | 0.3 | N | 1 | 1 | 1 | 0.3 | 0.3 | ∞ |
| 9 | Response time | 0.8 | R | $\sqrt{3}$ | 1 | 1 | 0.5 | 0.5 | ∞ |
| 10 | Integration time | 2.6 | R | $\sqrt{3}$ | 1 | 1 | 1.5 | 1.5 | ∞ |
| 11 | Ambient noise | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 | ∞ |
| 12 | Ambient reflections | 3.0 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 | ∞ |
| 13 | Probe positioner mech. restrictions | 0.4 | R | $\sqrt{3}$ | 1 | 1 | 0.2 | 0.2 | ∞ |
| 14 | Probe positioning with respect to phantom shell | 2.9 | R | $\sqrt{3}$ | 1 | 1 | 1.7 | 1.7 | ∞ |
| 15 | Max.SAR evaluation | 1.0 | R | $\sqrt{3}$ | 1 | 1 | 0.6 | 0.6 | ∞ |
| Test sample related | | | | | | | | | |
| 16 | Device positioning | 3.8 | N | 1 | 1 | 1 | 3.8 | 3.8 | 99 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 17 | Device holder | 5.1 | N | 1 | 1 | 1 | 5.1 | 5.1 | 5 |
| 18 | Drift of output power | 5.0 | R | $\sqrt{3}$ | 1 | 1 | 2.9 | 2.9 | ∞ |
| Phantom and set-up | | | | | | | | | |
| 19 | Phantom uncertainty | 4.0 | R | $\sqrt{3}$ | 1 | 1 | 2.3 | 2.3 | ∞ |
| 20 | Liquid conductivity (target) | 5.0 | R | $\sqrt{3}$ | 0.64 | 0.43 | 1.8 | 1.2 | ∞ |
| 21 | Liquid conductivity (meas) | 2.5 | N | 1 | 0.64 | 0.43 | 1.6 | 1.2 | ∞ |
| 22 | Liquid Permittivity (target) | 5.0 | R | $\sqrt{3}$ | 0.6 | 0.49 | 1.7 | 1.5 | ∞ |
| 23 | Liquid Permittivity (meas) | 2.5 | N | 1 | 0.6 | 0.49 | 1.5 | 1.2 | ∞ |
| Combined standard | | | RSS | $U_C = \sqrt{\sum_{i=1}^{n} C_i^2 U_i^2}$ | | | 12.2% | 11.9% | 236 |
| Expanded uncertainty (P=95%) | | $U = k\,U_C$ ,k=2 | | | | | 24.4% | 23.8% | |

**9. Conducted Power Measurement:**

| Band | Channel | Frequency (MHz) | Avg.Burst Power(dBm) | Duty Cycle Factor(dB) | Frame Power (dBm) |
|---|---|---|---|---|---|
| Maximum Power <SIM 1> | | | | | |
| GSM850 | CH128 | 824.20 | 32.32 | -9.03 | 23.29 |
| | CH190 | 836.60 | 32.28 | -9.03 | 23.25 |
| | CH251 | 848.80 | 32.31 | -9.03 | 23.28 |
| PCS1900 | Ch512 | 1850.20 | 30.51 | -9.03 | 21.48 |
| | CH661 | 1880.00 | 30.47 | -9.03 | 21.44 |
| | CH810 | 1909.80 | 30.49 | -9.03 | 21.46 |
| Maximum Power <SIM 2> | | | | | |
| GSM850 | CH128 | 824.20 | 32.32 | -9.03 | 23.29 |
| | CH190 | 836.60 | 32.28 | -9.03 | 23.25 |
| | CH251 | 848.80 | 32.31 | -9.03 | 23.28 |
| PCS1900 | Ch512 | 1850.20 | 30.51 | -9.03 | 21.48 |
| | CH661 | 1880.00 | 30.47 | -9.03 | 21.44 |
| | CH810 | 1909.80 | 30.49 | -9.03 | 21.46 |

| Band | Channel | Frequency (MHz) | Avg.Burst Power(dBm) | Duty Cycle Factor(dB) | Frame Power (dBm) |
|---|---|---|---|---|---|
| Maximum Power <SIM 1> | | | | | |
| GPRS850 1slot | CH128 | 824.20 | 28.62 | -9.03 | 19.59 |
| | CH190 | 836.60 | 28.73 | -9.03 | 19.70 |
| | CH251 | 848.80 | 28.65 | -9.03 | 19.62 |
| GPRS850 2slots | CH128 | 824.20 | 25.18 | -6.02 | 19.16 |
| | CH190 | 836.60 | 25.43 | -6.02 | 19.41 |
| | CH251 | 848.80 | 25.72 | -6.02 | 19.70 |
| GPRS850 3slots | CH128 | 824.20 | 24.16 | -4.26 | 19.90 |
| | CH190 | 836.60 | 24.18 | -4.26 | 19.92 |
| | CH251 | 848.80 | 24.23 | -4.26 | 19.97 |
| GPRS850 4slots | CH128 | 824.20 | 23.12 | -3.01 | 20.11 |
| | CH190 | 836.60 | 23.21 | -3.01 | 20.20 |
| | CH251 | 848.80 | 23.04 | -3.01 | 20.03 |
| GPRS1900 1slot | Ch512 | 1850.20 | 28.83 | -9.03 | 19.80 |
| | CH661 | 1880.00 | 28.71 | -9.03 | 19.68 |
| | CH810 | 1909.80 | 28.97 | -9.03 | 19.94 |
| GPRS1900 2slots | Ch512 | 1850.20 | 25.61 | -6.02 | 19.59 |
| | CH661 | 1880.00 | 25.41 | -6.02 | 19.39 |
| | CH810 | 1909.80 | 25.32 | -6.02 | 19.30 |
| GPRS1900 3slots | Ch512 | 1850.20 | 24.04 | -4.26 | 19.78 |
| | CH661 | 1880.00 | 24.31 | -4.26 | 20.05 |
| | CH810 | 1909.80 | 24.12 | -4.26 | 19.86 |
| GPRS1900 4slots | Ch512 | 1850.20 | 23.03 | -3.01 | 20.02 |
| | CH661 | 1880.00 | 22.98 | -3.01 | 19.97 |
| | CH810 | 1909.80 | 23.01 | -3.01 | 20.00 |

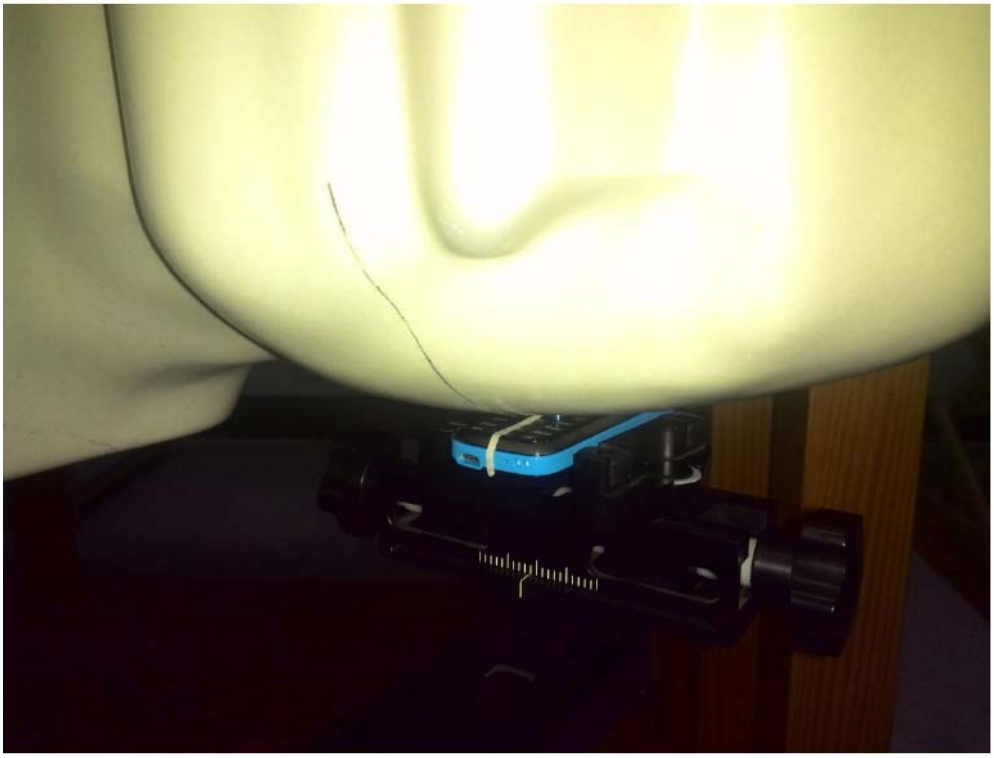
**10. Test photos and results:**

10.1 DUT photos:

Front side

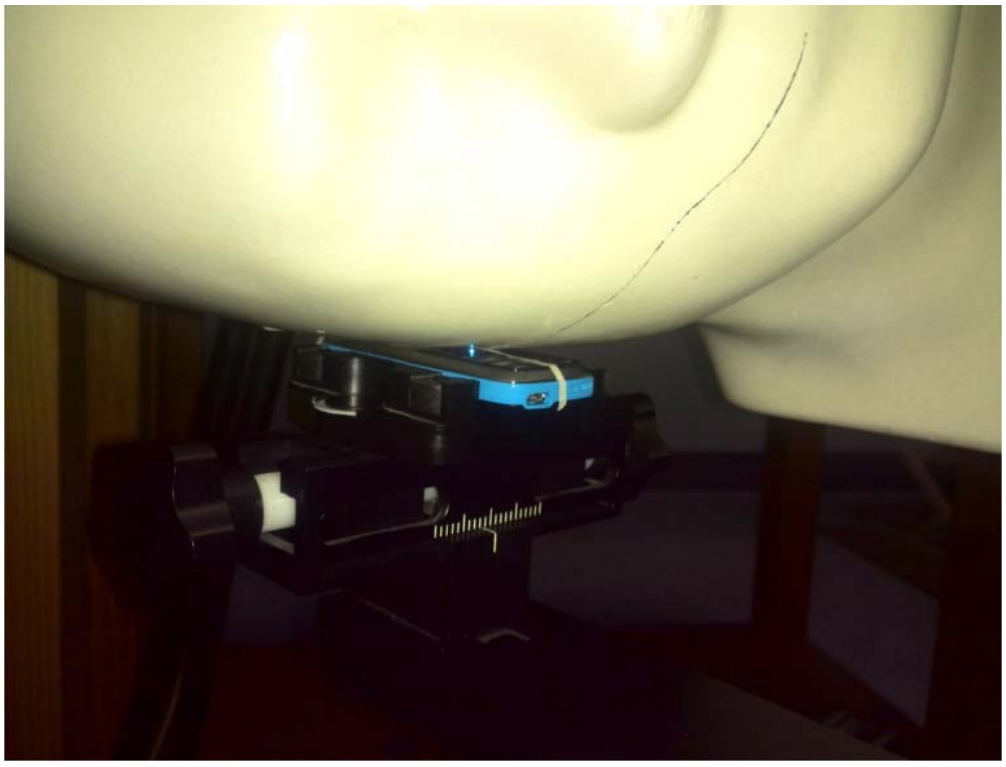
Back side

10.2 Setup photos:

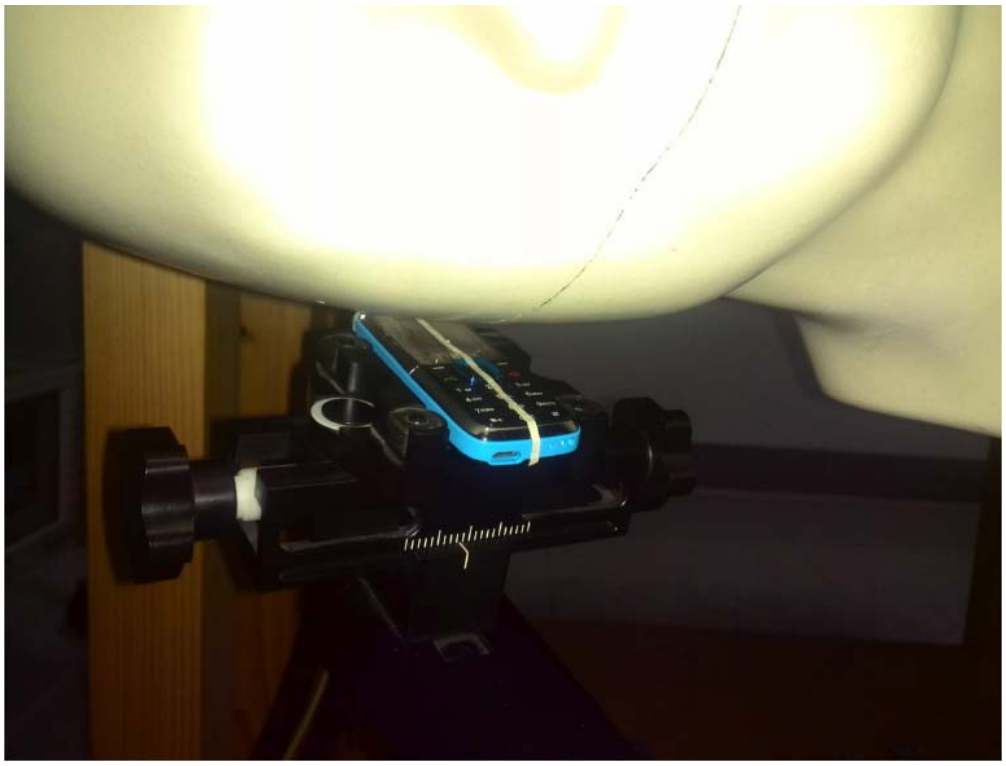


Left Touch Cheek

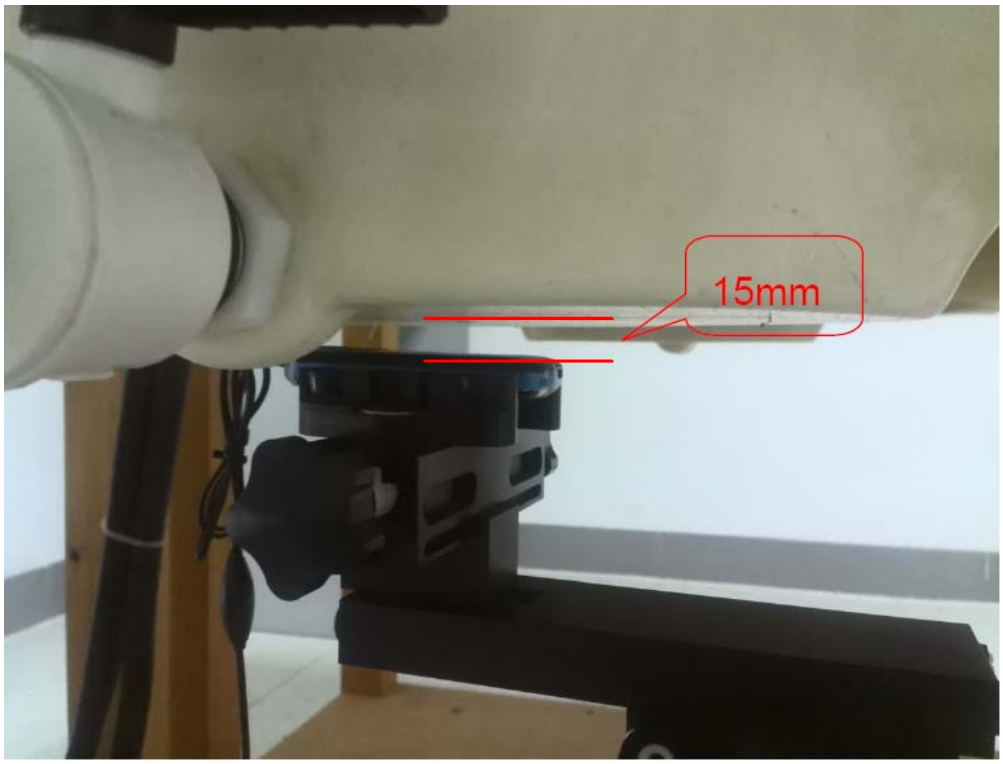
Left Tilt(15°)



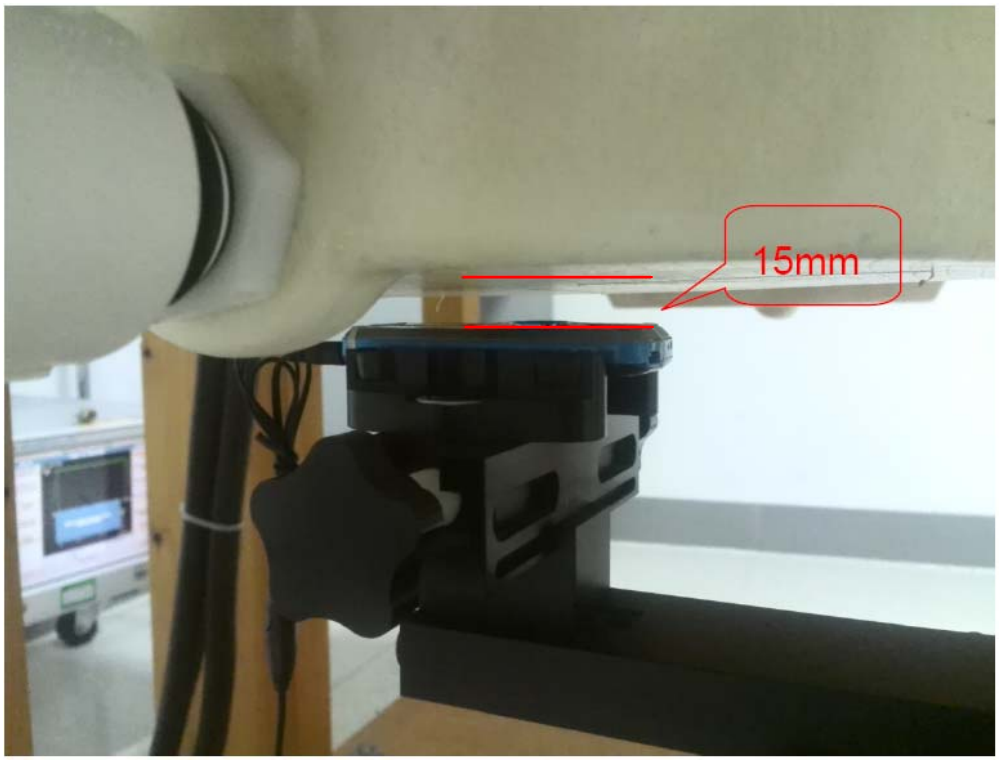
Right Touch Cheek



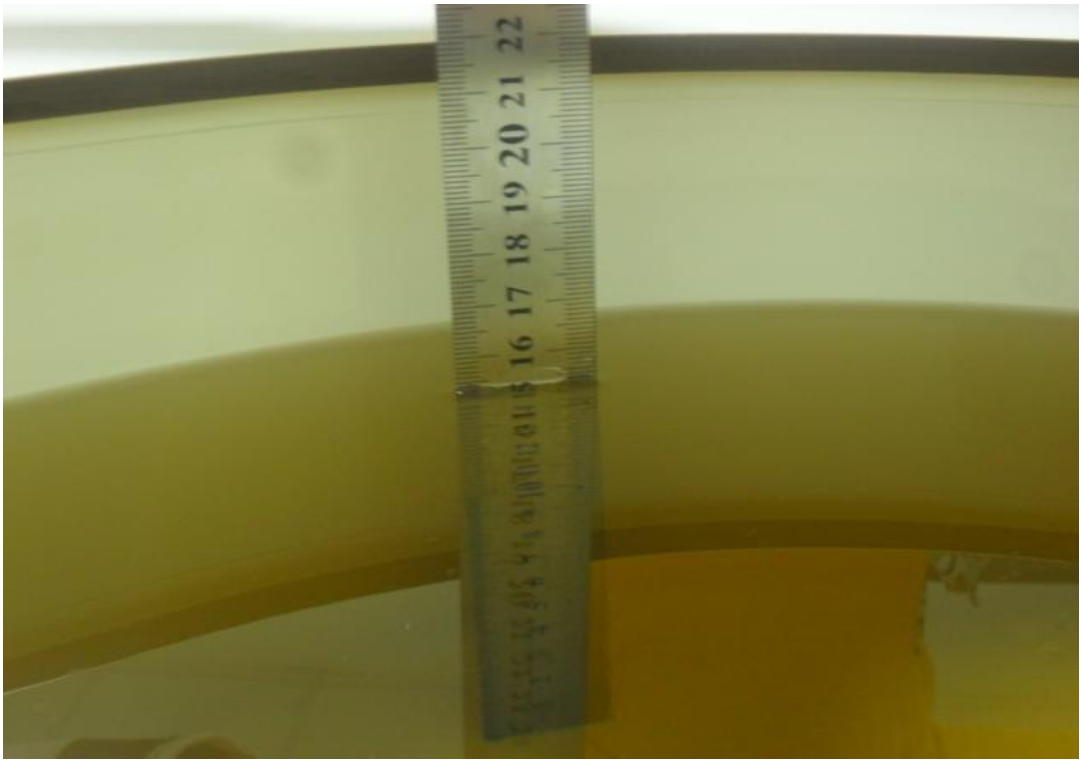
Right Tilt(15°)




Body Worn with Headset




Body Front With Headset




Liquid depth (15cm)

10.3 SAR result summary:
Scale Factor=Target Power/Measurement Power
Scale SAR=Measurement SAR*Scale Factor

Head

| Test Case of Head | | | Meas. Power (dBm) | Target Power (dBm) | Factor | Meas. SAR (W/kg) 1g Avg. | Scale SAR (W/kg) | Power Drift <±0.2 dB | Data Slot |
|---|---|---|---|---|---|---|---|---|---|
| Band | Test Position | CH | | | | | | | |
| **SIM1,Liquid: Head** | | | | | | | | | |
| GSM 850 | Right Cheek | CH190 | 32.18 | 33.0 | 1.21 | 0.476 | 0.576 | -0.108 | Plot 1 |
| | Right Tilt | CH190 | 32.18 | 33.0 | 1.21 | 0.203 | 0.246 | 0.131 | Plot 2 |
| | Left Tilt | CH190 | 32.18 | 33.0 | 1.21 | 0.220 | 0.266 | -0.136 | Plot 3 |
| | Left Cheek | CH190 | 32.18 | 33.0 | 1.21 | 0.421 | 0.509 | -0.176 | Plot 4 |
| **SIM2,Liquid: Head** | | | | | | | | | |
| GSM 850 | Right Cheek | CH190 | 32.18 | 33.0 | 1.21 | 0.473 | 0.572 | -0.180 | Plot 5 |
| **SIM1,Liquid: Head** | | | | | | | | | |
| GSM 1900 | Right Cheek | CH661 | 30.24 | 31 | 1.19 | 0.211 | 0.251 | -0.108 | Plot 6 |
| | Right Tilt | CH661 | 30.24 | 31 | 1.19 | 0.237 | 0.282 | 0.024 | Plot 7 |
| | Left Tilt | CH661 | 30.24 | 31 | 1.19 | 0.300 | 0.357 | 0.011 | Plot 8 |
| | Left Cheek | CH661 | 30.24 | 31 | 1.19 | 0.232 | 0.276 | -0.138 | Plot 9 |
| **SIM2,Liquid: Head** | | | | | | | | | |
| GSM 1900 | Left Tilt | CH661 | 30.24 | 31 | 1.19 | 0.300 | 0.357 | -0.045 | Plot 10 |

Note: When the 1g SAR is ≤0.8 W/kg，testing for low and high channel is optional.

Body (15mm between DUT and Flat Phantom)

| Test Case of Head | | | Meas. Power (dBm) | Target Power (dBm) | Factor | Meas. SAR (W/kg) 1g Avg. | Scale SAR (W/kg) | Power Drift <±0.2 dB | Data Slot |
|---|---|---|---|---|---|---|---|---|---|
| Band | Test Position | CH | | | | | | | |
| **SIM1,Liquid: Body, Separator: 15mm** | | | | | | | | | |
| GSM 850 | Worn With Headset | CH190 | 32.18 | 33.0 | 1.21 | 0.201 | 0.243 | -0.483 | Plot 11 |
| | Front With Headset | CH190 | 32.18 | 33.0 | 1.21 | 0.512 | 0.630 | -0.260 | Plot 12 |
| GSM 1900 | Worn With Headset | CH661 | 30.24 | 31 | 1.19 | 0.385 | 0.458 | -0.001 | Plot 13 |
| | Front With Headset | CH661 | 30.24 | 31 | 1.19 | 0.091 | 0.108 | -0.053 | Plot 14 |

Note: When the 1g SAR is ≤0.8 W/kg，testing for low and high channel is optional.

## 11. Equipment List:

| NO. | Instrument | Manufacture | Model | S/N | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 1 | Communication Tester | Agilent | E5515C | MY50267264 | Dec 27th 2013 | Dec 27th 2014 |
| 2 | E-field Probe | Speag | ES3DV3 | 3028 | August 5th 2013 | August 4th 2014 |
| 3 | Dielectric Probe Kit | Speag | DAK 3.5mm Probe | 1038 | N/A | N/A |
| 4 | DAE | Speag | DAE4 | 689 | July 20th 2013 | July 19th 2014 |
| 5 | SAM TWIN phantom | Speag | SAM | 1360/1432 | N/A | N/A |
| 6 | Robot | Stabuli | TX60L | N/A | N/A | N/A |
| 7 | Device Holder | Speag | SD000H01HA | N/A | N/A | N/A |
| 8 | Vector Network | Agilent | E5071C | MY46107615 | Jan 6th 2014 | Jan 7th 2015 |
| 9 | Signal Generator | Agilent | E4438C | MY49072279 | Nov 27th 2013 | Nov 27th 2014 |
| 10 | Amplifier | Mini-circult | ZHL-42W | QA098002 | N/A | N/A |
| 11 | Power Meter | Agilent | N1419A | MY50001563 | Nov 27th 2013 | Nov 27th 2014 |
| 12 | Power Sensor | Agilent | N8481H | MY51020010 | Nov 27th 2013 | Nov 27th 2014 |
| 13 | Directional Coupler | Agilent | 772D | MY46151275 | Nov 27th 2013 | Nov 27th 2014 |
| 14 | Directional Coupler | Agilent | 778D | MY48220607 | Nov 27th 2013 | Nov 27th 2014 |
| 15 | Dipole 835MHz | Speag | D835V2 | 4d154 | Jun 6th 2013 | Jun 6th 2015 |
| 16 | Dipole 1900MHz | Speag | D1900V2 | 5d142 | Jun 10th 2013 | Jun 10th 2015 |

**Appendix A. System validation plots:**

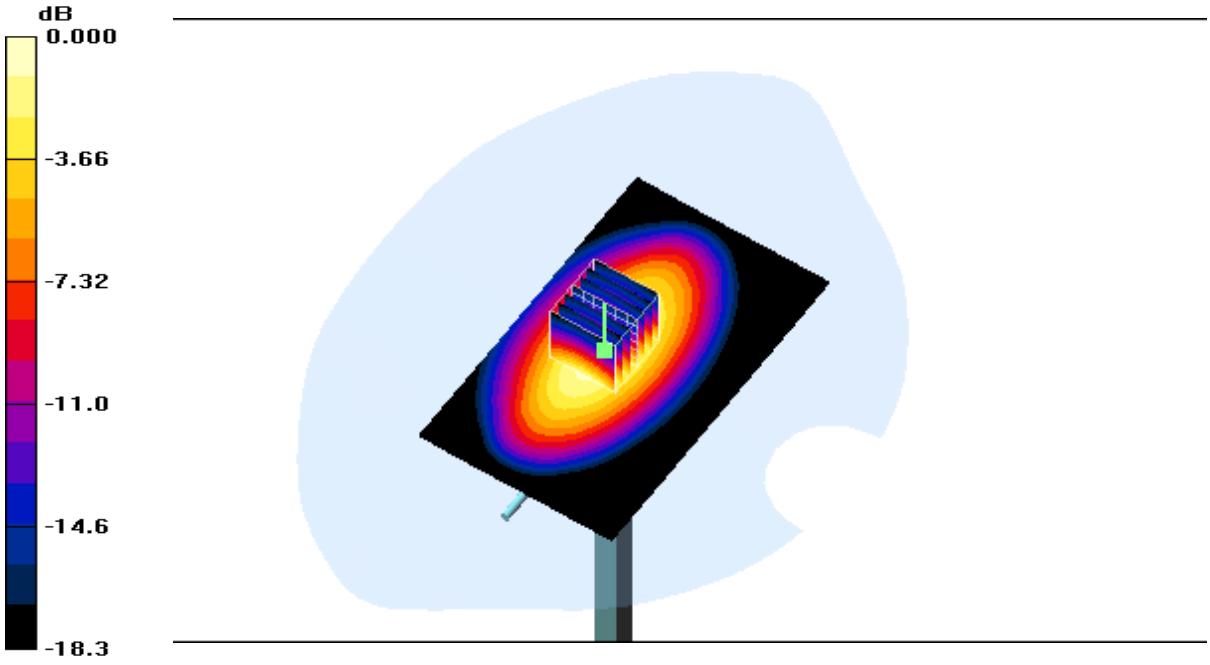
**DUT: Dipole 835MHz; Type: D835V2; Serial: D835V2 - SN:4d154**
**Program Name: System Performance Check Head at 835 MHz**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.91 mho/m; $\varepsilon_r$ = 42.27; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.08, 4.08, 4.08); Calibrated:8/5/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=10mm, Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.59 W/kg

**d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = -0.078dB
Peak SAR (extrapolated) = 3.8 W/kg
**SAR(1 g) = 2.51 W/kg; SAR(10 g) = 1.64 W/kg**
Maximum value of SAR (measured) = 2.71 W/kg




0 dB = 2.71W/kg

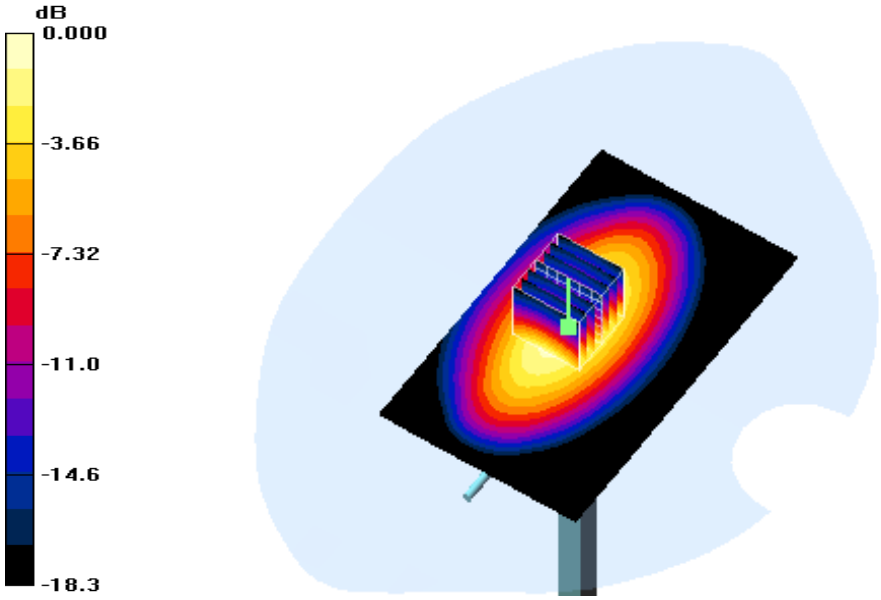
**DUT: Dipole 835MHz; Type: D835V2; Serial: D835V2 - SN:4d154**
**Program Name: System Performance Check Body at 835 MHz**

Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; $\sigma$ = 0.98 mho/m; $\varepsilon_r$ = 54.73; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.08, 4.08, 4.08); Calibrated:8/5/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=10mm, Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.49 W/kg

**d=10mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 52.1 V/m; Power Drift = -0.027dB
Peak SAR (extrapolated) = 3.68 W/kg
**SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.56 W/kg**
Maximum value of SAR (measured) = 2.61 W/kg




0 dB = 2.61W/kg

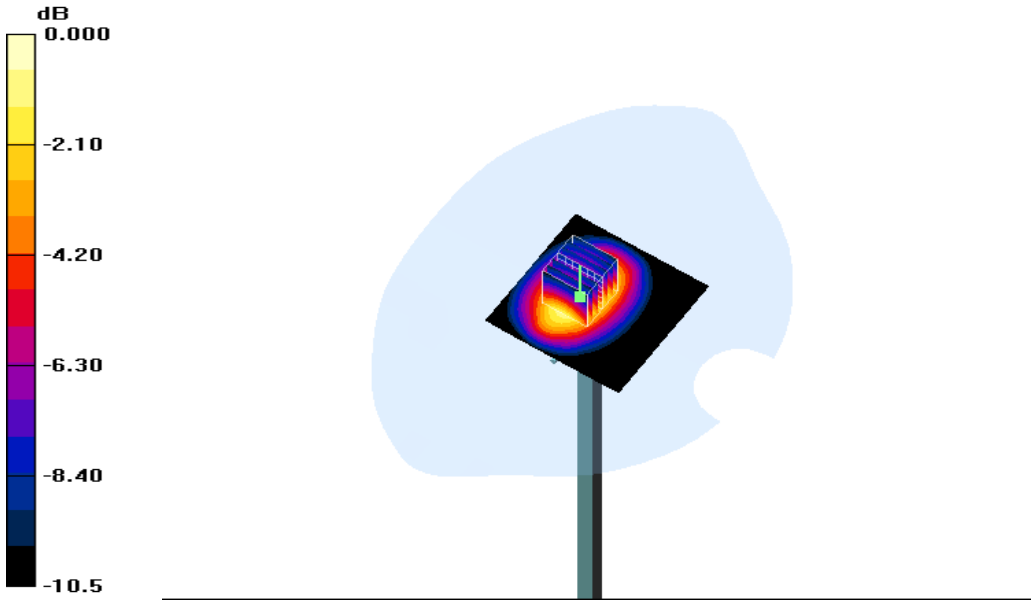
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d142**
**Program Name: System Performance Check Head at 1900 MHz**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.42 mho/m; $\varepsilon_r$ = 39.27; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.08, 4.08, 4.08); Calibrated:8/5/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=15mm, Pin=250mW/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 11.1 W/kg

**d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.8 V/m; Power Drift = -0.099dB
Peak SAR (extrapolated) = 20 W/kg
**SAR(1 g) = 10.5 W/kg; SAR(10 g) = 5.36 W/kg**
Maximum value of SAR (measured) = 12 W/kg




0 dB = 12W/kg

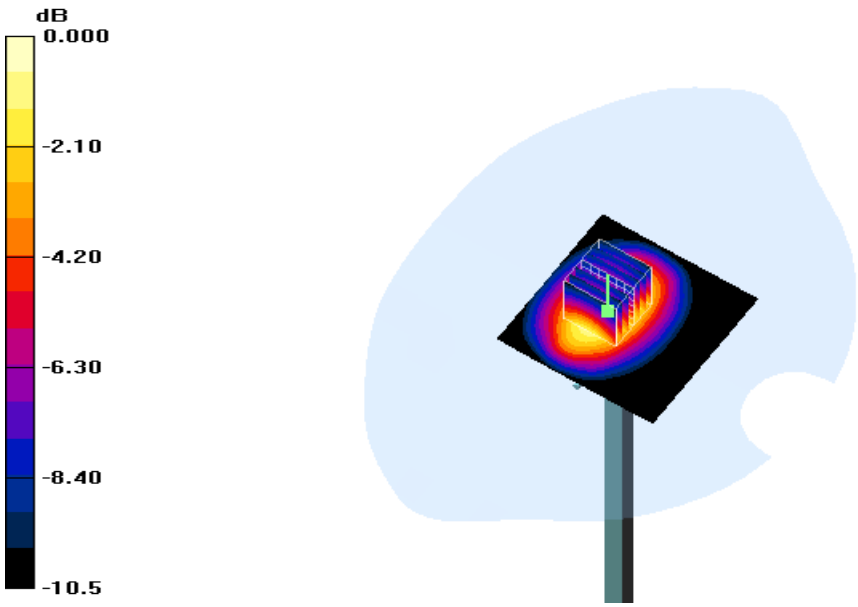
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d142**
**Program Name: System Performance Check Body at 1900 MHz**

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.54 mho/m; $\varepsilon_r$ = 52.45; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.08, 4.08, 4.08); Calibrated:8/5/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**d=15mm, Pin=250mW/Area Scan (61x101x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12 W/kg

**d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.6 V/m; Power Drift = 0.025dB
Peak SAR (extrapolated) = 19.7 W/kg
**SAR(1 g) = 10.6 W/kg; SAR(10 g) = 5.4 W/kg**
Maximum value of SAR (measured) = 12 W/kg




0 dB = 12W/kg

**Appendix B. SAR Test plots:**

Plot 1: Date/Time: 5/22/2014 8:56:22 PM

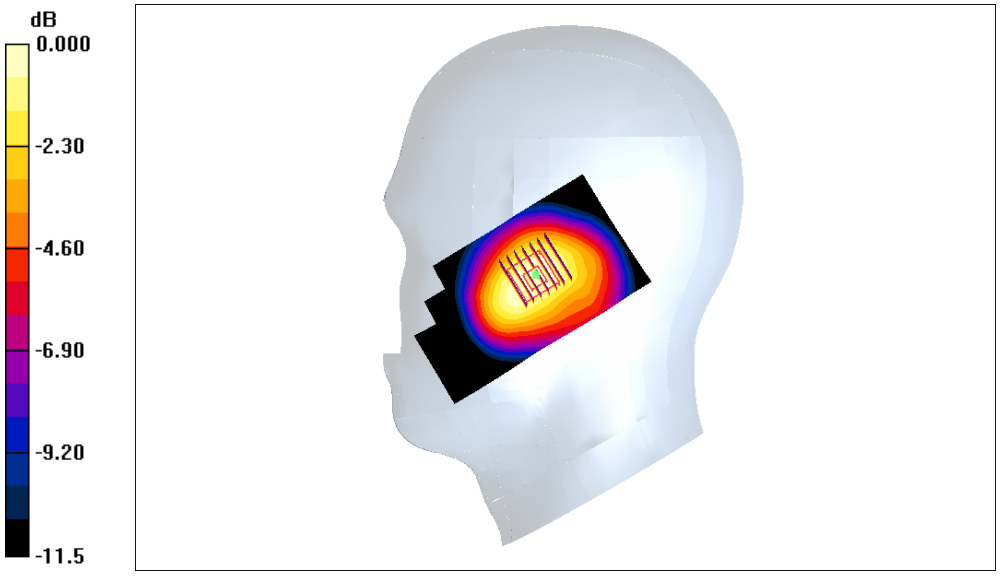
Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

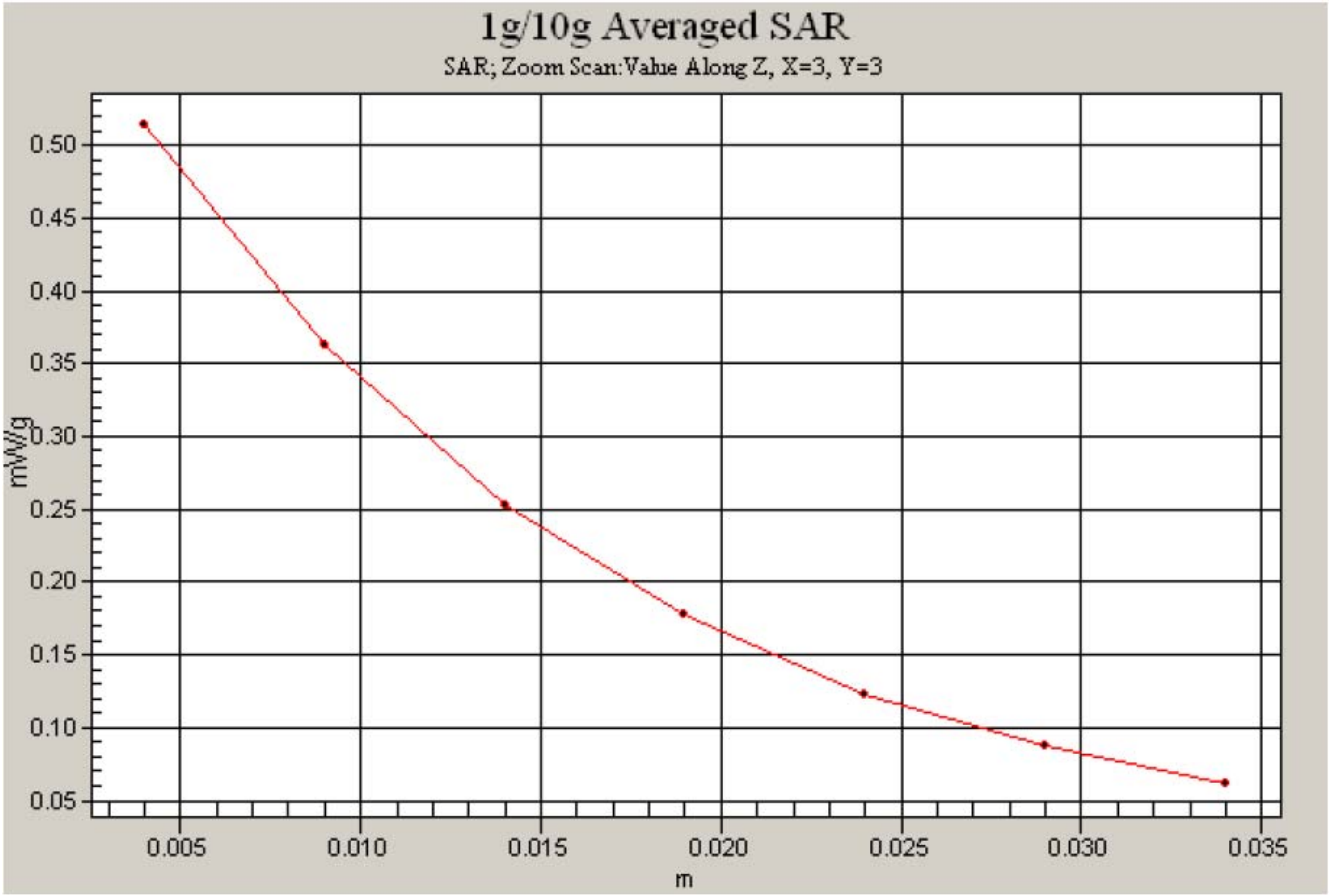
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.892 mho/m; $\varepsilon_r$ = 41.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.26, 6.26, 6.26); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Right touch/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.526 W/kg
**Right touch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.1 V/m; Power Drift = -0.108 dB
Peak SAR (extrapolated) = 0.668 W/kg
**SAR(1 g) = 0.476 W/kg; SAR(10 g) = 0.317 W/kg**
Maximum value of SAR (measured) = 0.513 W/kg




0 dB = 0.513W/kg Right touch Section, Liquid: Head


1g/10g Averaged SAR
SAR; Zoom Scan:Value Along Z, X=3, Y=3
mW/g
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Plot 2: Date/Time: 5/22/2014 9:15:58 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

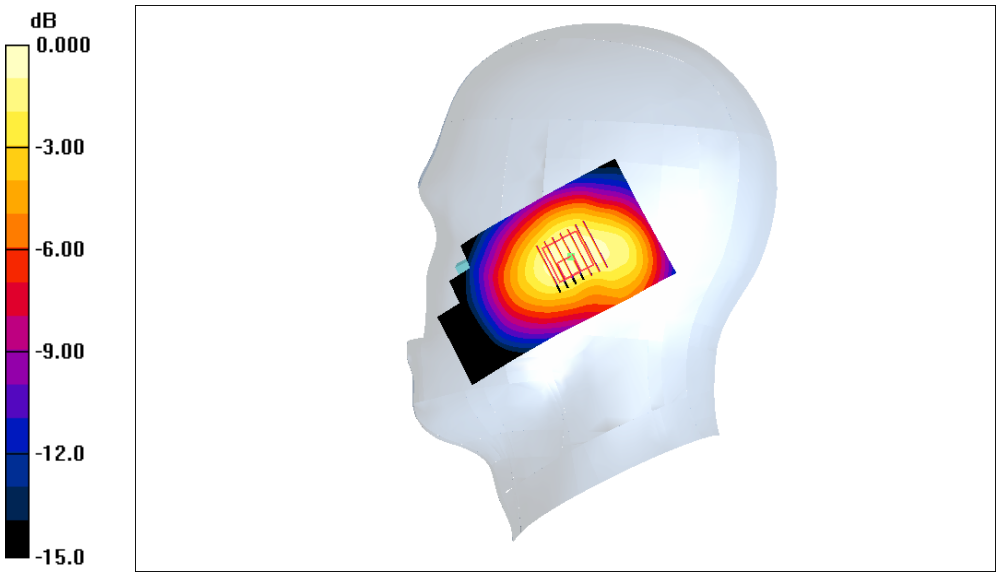
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.892 mho/m; $\varepsilon_r$ = 41.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.26, 6.26, 6.26); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Right tilt/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.220 W/kg

**Right tilt/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.5 V/m; Power Drift = 0.131 dB
Peak SAR (extrapolated) = 0.419 W/kg
**SAR(1 g) = 0.203 W/kg; SAR(10 g) = 0.130 W/kg**
Maximum value of SAR (measured) = 0.205 W/kg




0 dB = 0.205W/kg Right tilt Section Liquid: Head

Plot 3: Date/Time: 5/22/2014 10:40:35 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

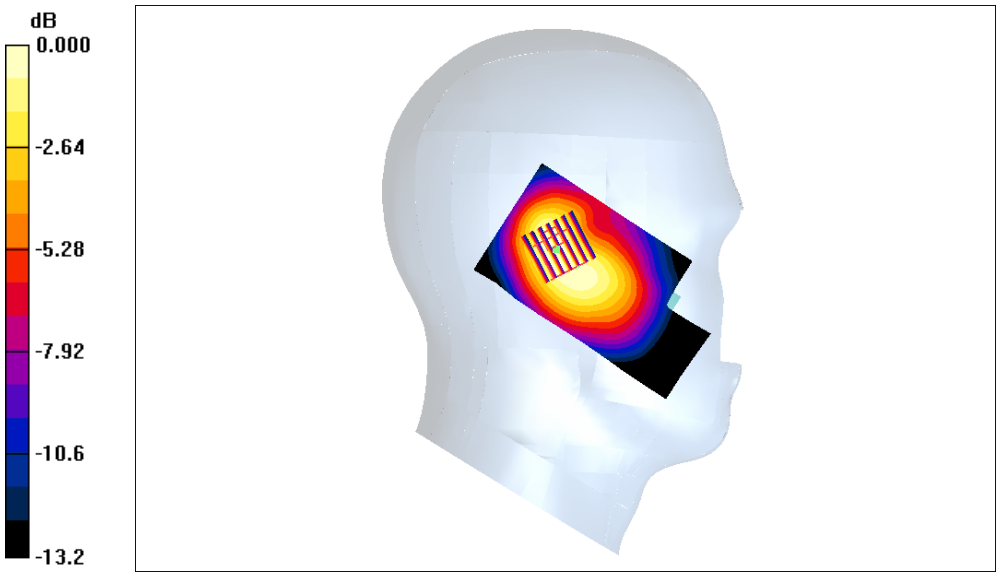
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.892 mho/m; $\varepsilon_r$ = 41.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.26, 6.26, 6.26); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Left tilt/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.252 W/kg

**Left tilt/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.2 V/m; Power Drift = -0.136 dB
Peak SAR (extrapolated) = 0.386 W/kg
**SAR(1 g) = 0.220 W/kg; SAR(10 g) = 0.138 W/kg**
Maximum value of SAR (measured) = 0.242 W/kg




0 dB = 0.242W/kg Left tilt Section Liquid: Head

Plot 4: Date/Time: 5/22/2014 10:58:50 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

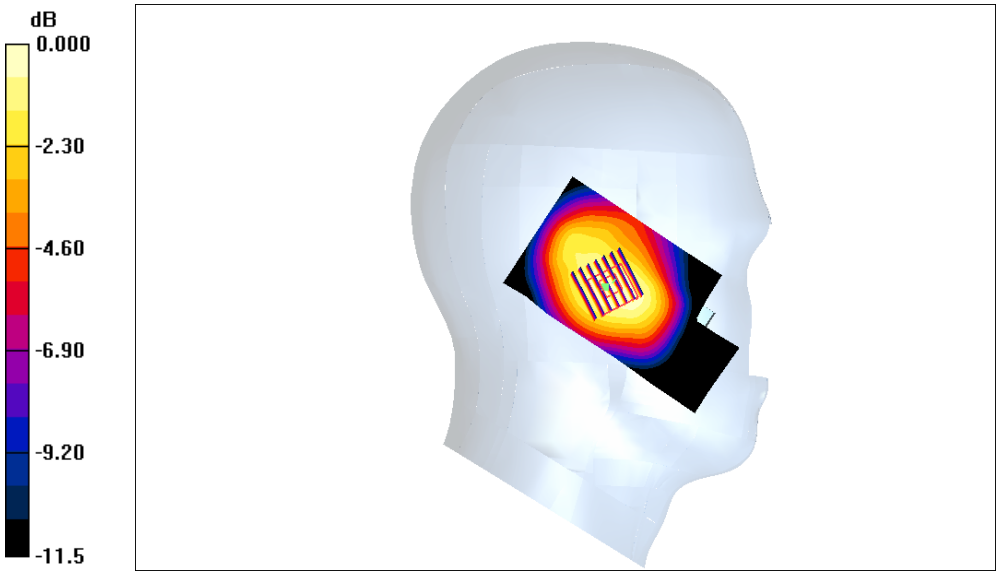
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.892 mho/m; $\varepsilon_r$ = 41.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.26, 6.26, 6.26); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Left touch/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.454 W/kg

**Left touch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 19.1 V/m; Power Drift = -0.176 dB
Peak SAR (extrapolated) = 0.647 W/kg
**SAR(1 g) = 0.421 W/kg; SAR(10 g) = 0.278 W/kg**
Maximum value of SAR (measured) = 0.452 W/kg




0 dB = 0.452W/kg Left touch Section Liquid: Head

Plot 5: Date/Time: 5/23/2014 2:45:00 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

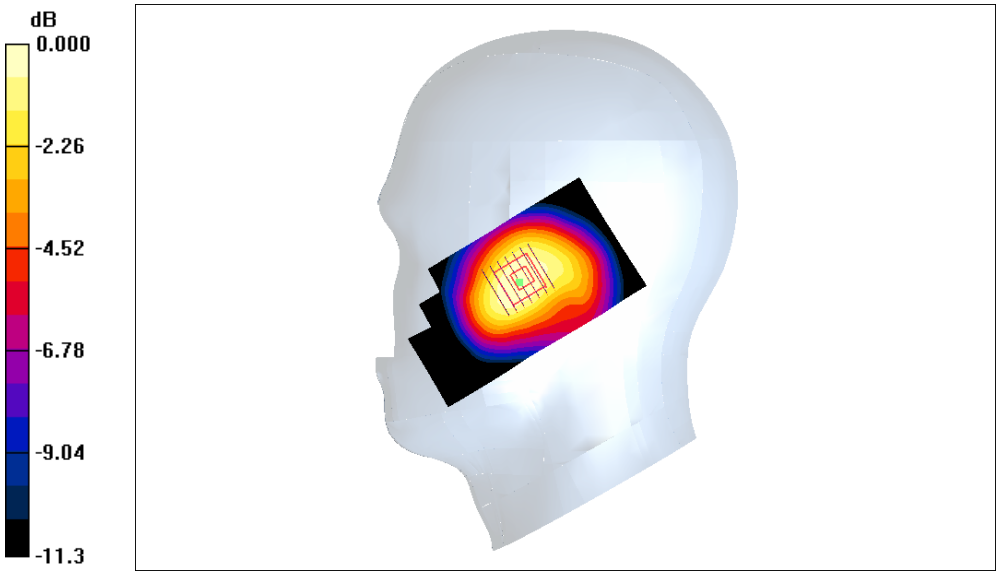
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.892 mho/m; $\varepsilon_r$ = 41.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.26, 6.26, 6.26); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Right touchSIM2/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.543 W/kg

**Right touchSIM2/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 18.2 V/m; Power Drift = -0.180 dB
Peak SAR (extrapolated) = 0.653 W/kg
**SAR(1 g) = 0.473 W/kg; SAR(10 g) = 0.317 W/kg**
Maximum value of SAR (measured) = 0.506 W/kg




0 dB = 0.506W/kg Right touch Section Liquid: Head

Plot 6: Date/Time: 5/22/2014 6:07:12 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

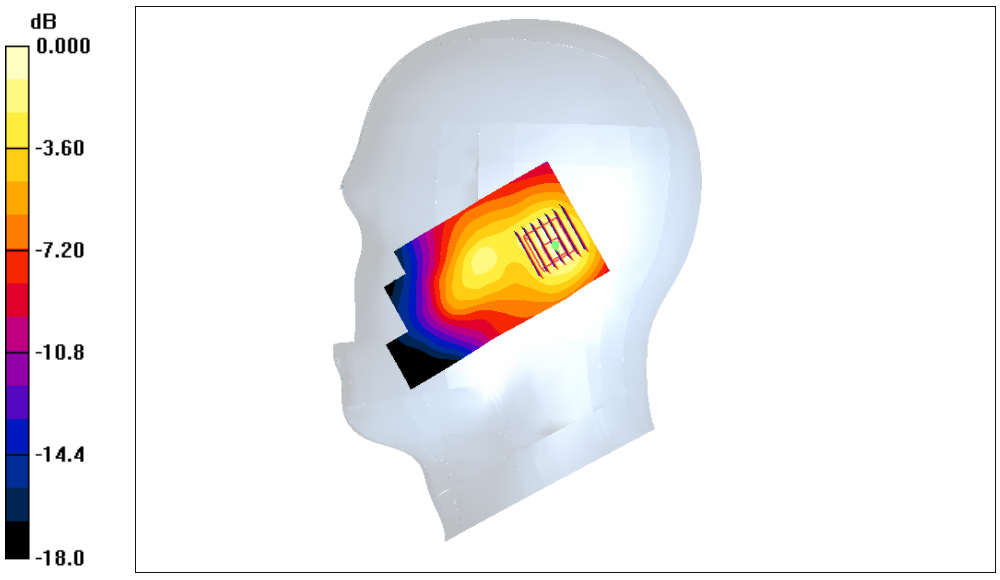
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(5.21, 5.21, 5.21); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Right touch/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.218 W/kg

**Right touch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = -0.108 dB
Peak SAR (extrapolated) = 0.420 W/kg
**SAR(1 g) = 0.211 W/kg; SAR(10 g) = 0.115 W/kg**
Maximum value of SAR (measured) = 0.233 W/kg




0 dB = 0.233W/kg Right touch Section Liquid: Head

Plot 7: Date/Time: 5/22/2014 5:41:37 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

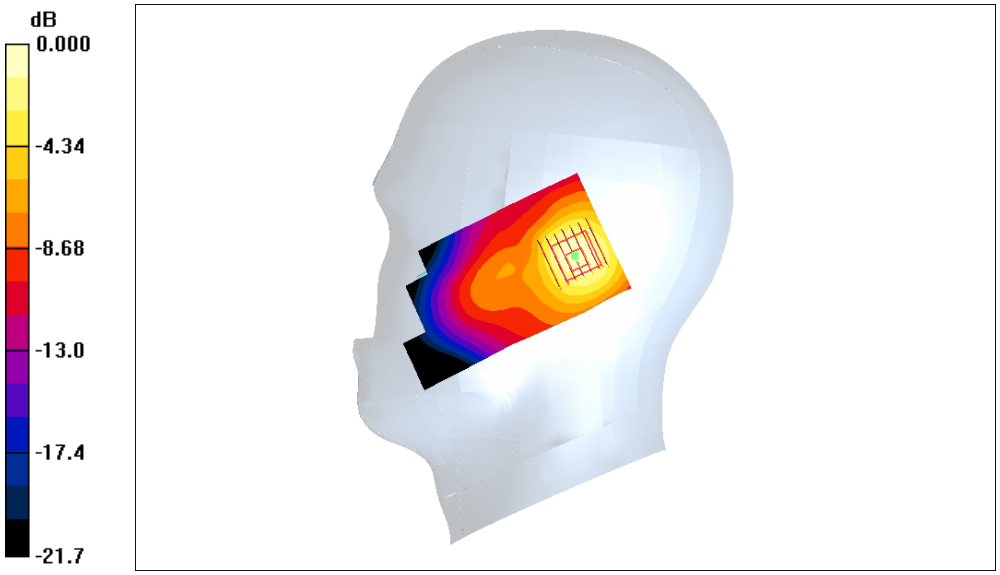
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(5.21, 5.21, 5.21); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Right tilt/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.247 W/kg

**Right tilt/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.3 V/m; Power Drift = 0.024 dB
Peak SAR (extrapolated) = 0.469 W/kg
**SAR(1 g) = 0.237 W/kg; SAR(10 g) = 0.127 W/kg**
Maximum value of SAR (measured) = 0.266 W/kg




0 dB = 0.266W/kg Right tilt Section Liquid: Head

Plot 8: Date/Time: 5/22/2014 5:21:14 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

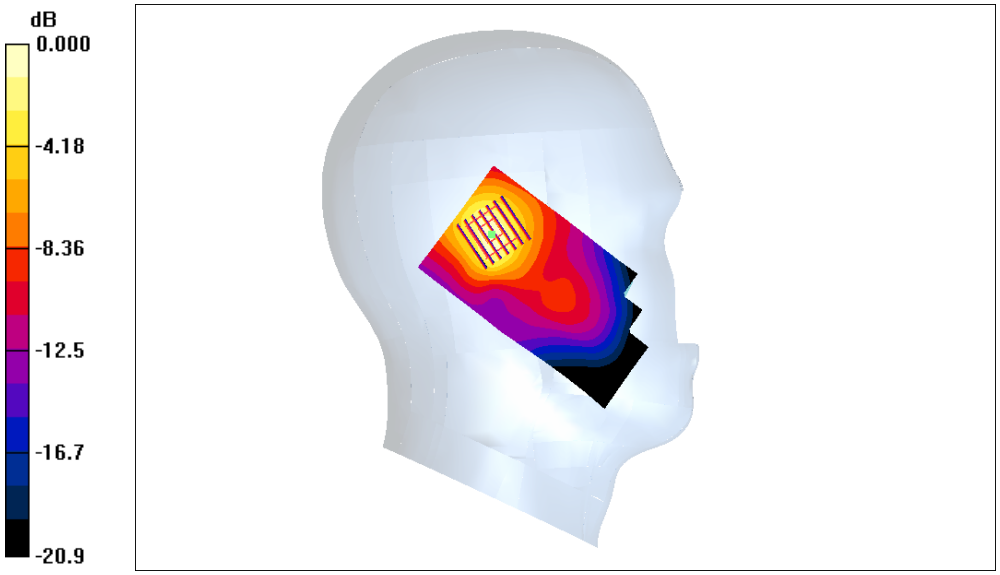
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(5.21, 5.21, 5.21); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Left tilt/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.324 W/kg

**Left tilt/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 0.597 W/kg
**SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.148 W/kg**
Maximum value of SAR (measured) = 0.341 W/kg




0 dB = 0.341W/kg Right tilt Section Liquid: Head

Plot 9: Date/Time: 5/22/2014 5:02:49 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

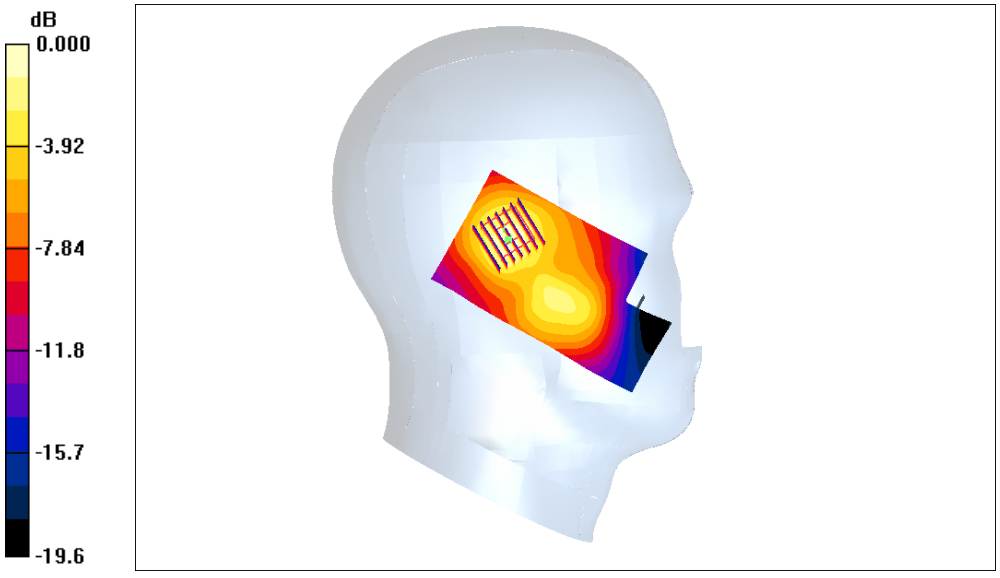
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(5.21, 5.21, 5.21); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Left touch/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.240 W/kg

**Left touch/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.138 dB
Peak SAR (extrapolated) = 0.442 W/kg
**SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.118 W/kg**
Maximum value of SAR (measured) = 0.260 W/kg




0 dB = 0.260W/kg Left touch Section Liquid: Head

Plot 10: Date/Time: 5/22/2014 8:27:23 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

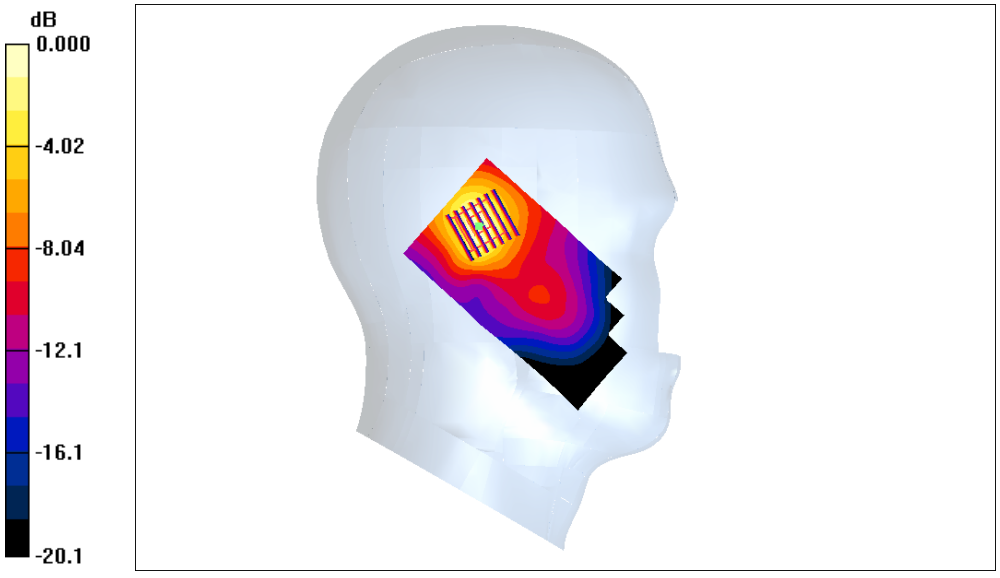
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.4 mho/m; $\varepsilon_r$ = 40.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(5.21, 5.21, 5.21); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Left tilt 2-SIM2/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.320 W/kg

**Left tilt 2-SIM2/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.7 V/m; Power Drift = -0.045 dB
Peak SAR (extrapolated) = 0.601 W/kg
**SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.147 W/kg**
Maximum value of SAR (measured) = 0.340 W/kg




0 dB = 0.340W/kg Left tilt Section Liquid: Head

Plot 11: Date/Time: 5/23/2014 4:32:20 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

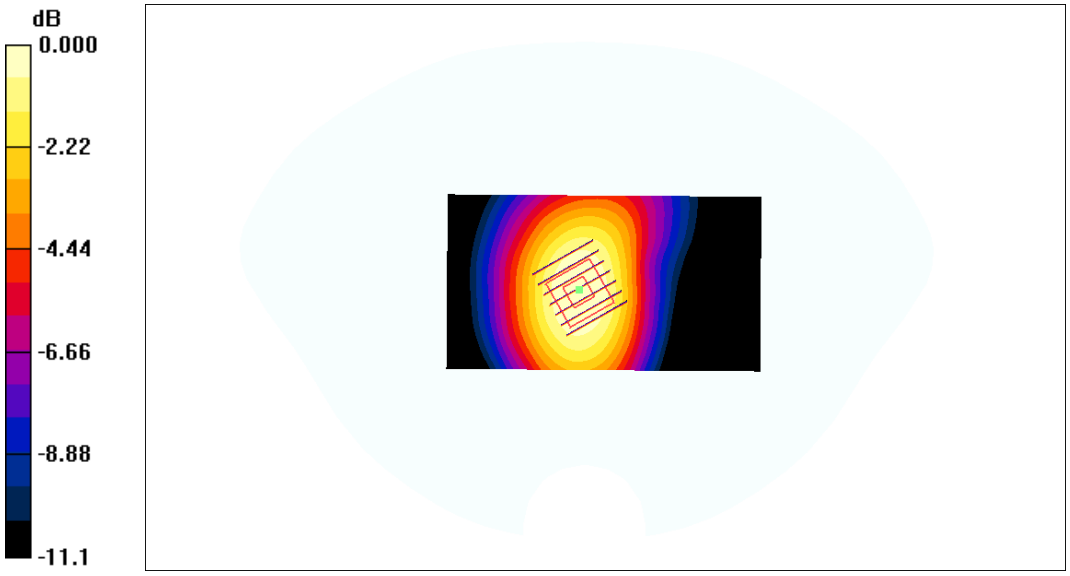
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.992 mho/m; $\varepsilon_r$ = 55.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.28, 6.28, 6.28); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Worn With HS/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.231 W/kg

**Worn With HS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.9 V/m; Power Drift = -0.483 dB
Peak SAR (extrapolated) = 0.278 W/kg
**SAR(1 g) = 0.201 W/kg; SAR(10 g) = 0.136 W/kg**
Maximum value of SAR (measured) = 0.216 W/kg




0 dB = 0.216W/kg Flat Section Liquid: Body

Plot 12: Date/Time: 5/23/2014 4:50:17 AM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

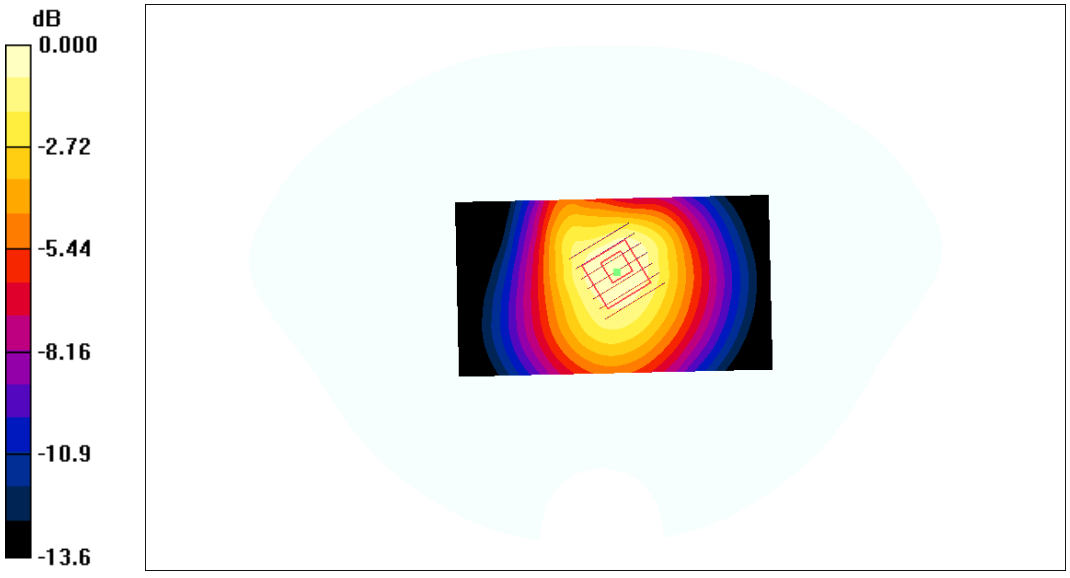
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 837 MHz; $\sigma$ = 0.992 mho/m; $\varepsilon_r$ = 55.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

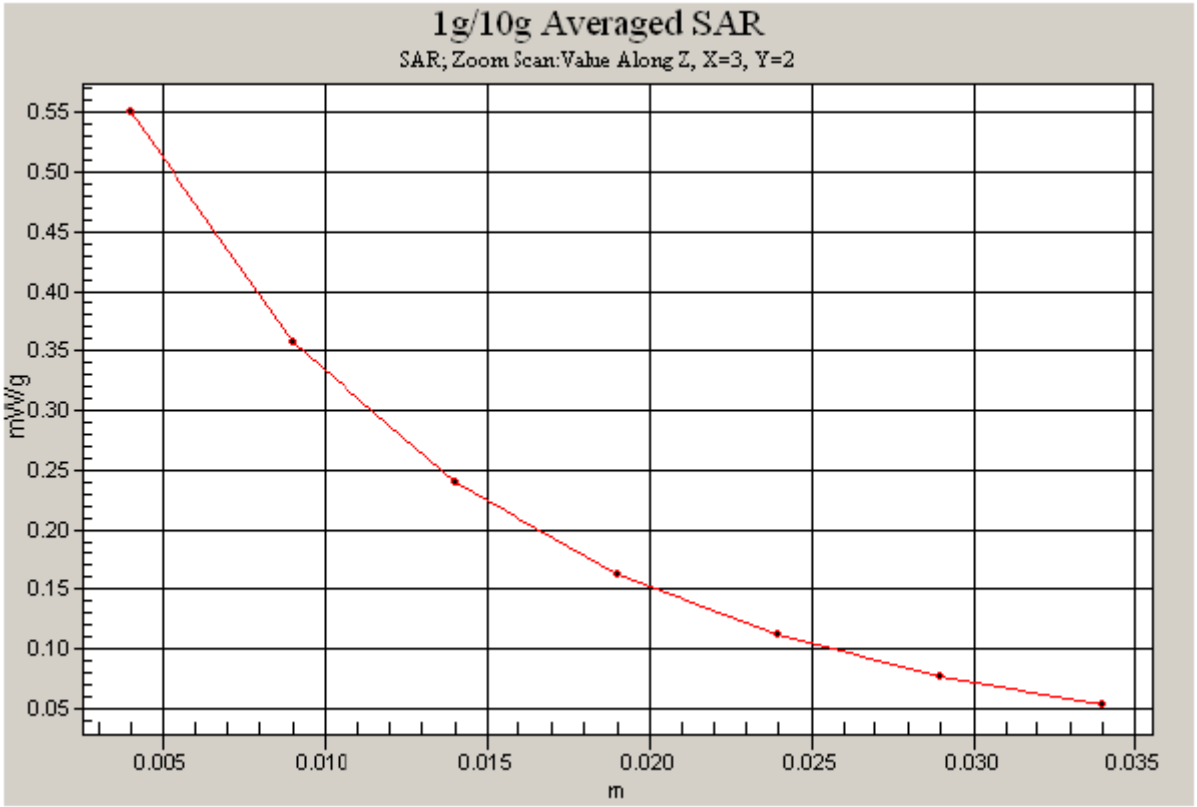
DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.28, 6.28, 6.28); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1432; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Front With HS/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.583 W/kg

**Front With HS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.3 V/m; Power Drift = -0.260 dB
Peak SAR (extrapolated) = 0.775 W/kg
**SAR(1 g) = 0.512 W/kg; SAR(10 g) = 0.335 W/kg**
Maximum value of SAR (measured) = 0.550 W/kg




0 dB = 0.550W/kg Flat Section Liquid: Body


1g/10g Averaged SAR
SAR; Zoom Scan:Value Along Z, X=3, Y=2
mW/g
0.55
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Plot 13: Date/Time: 5/23/2014 3:23:09 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

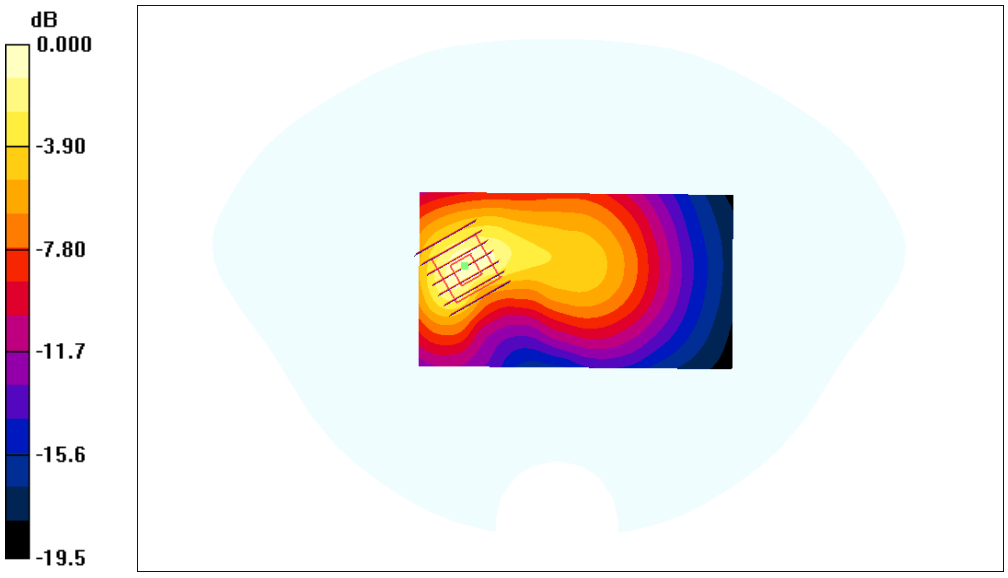
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.54 mho/m; $\varepsilon_r$ = 53.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.96, 4.96, 4.96); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Worn With HS/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.397 W/kg

**Worn With HS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.1 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 0.654 W/kg
**SAR(1 g) = 0.385 W/kg; SAR(10 g) = 0.198 W/kg**
Maximum value of SAR (measured) = 0.439 W/kg




0 dB = 0.439W/kg Flat Section Liquid: Body

Plot 14: Date/Time: 5/23/2014 2:50:17 PM

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

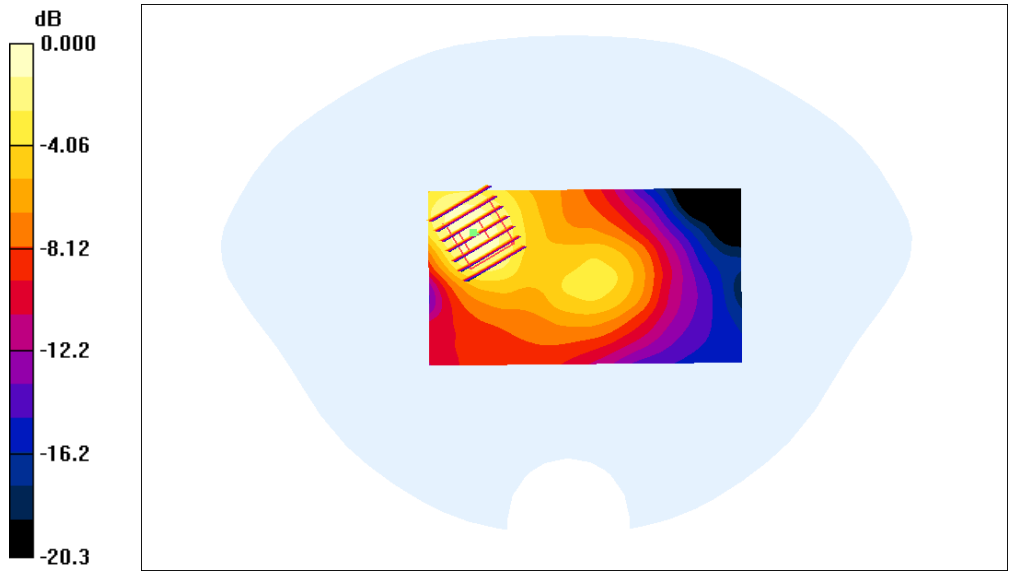
**DUT: MADETRONICS mini5130; Type: SI PIN; Serial: IMEI Number**
**Program Name: MADETRONICS mini5130**

Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; $\sigma$ = 1.54 mho/m; $\varepsilon_r$ = 53.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.96, 4.96, 4.96); Calibrated: 8/1/2013
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn689; Calibrated: 7/20/2013
- Phantom: SAM with TP1360; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

**Front With HS/Area Scan (51x91x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.101 W/kg

**Front With HS/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.74 V/m; Power Drift = -0.053 dB
Peak SAR (extrapolated) = 0.150 W/kg
**SAR(1 g) = 0.091 W/kg; SAR(10 g) = 0.051 W/kg**
Maximum value of SAR (measured) = 0.102 W/kg




0 dB = 0.102W/kg Flat Section Liquid: Body

**Appendix C. Probe Calibration Data:**

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CALIBRATION LABORATORY

Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: Info@emcite.com Http://www.emcite.com

Client **Sunway** **Certificate No: J13-2-2186**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | ES3DV3 - SN:3028 |
| Calibration Procedure(s) | TMC-OS-E-02-195<br>Calibration Procedures for Dosimetric E-field Probes |
| Calibration date: | August 5, 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)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power Meter NRP2 | 101919 | 01-Jul-13 (TMC, No.JW13-044) | Jun-14 |
| Power sensor NRP-Z91 | 101547 | 01-Jul-13 (TMC, No.JW13-044) | Jun-14 |
| Power sensor NRP-Z91 | 101548 | 01-Jul-13 (TMC, No.JW13-044) | Jun-14 |
| Reference10dBAttenuator | BT0520 | 12-Dec-12(TMC,No.JZ12-867) | Dec-14 |
| Reference20dBAttenuator | BT0267 | 12-Dec-12(TMC,No.JZ12-866) | Dec-14 |
| Reference Probe EX3DV4 | SN 3846 | 20-Dec-12(SPEAG,No.EX3-3846_Dec12) | Dec-13 |
| DAE4 | SN 777 | 22-Feb-13 (SPEAG, DAE4-777_Feb13) | Feb -14 |
| **Secondary Standards** | **ID #** | **Cal Date(Calibrated by, Certificate No.)** | **Scheduled Calibration** |
| SignalGeneratorMG3700A | 6201052605 | 01-Jul-13 (TMC, No.JW13-045) | Jun-14 |
| Network Analyzer E5071C | MY46110673 | 15-Feb-13 (TMC, No.JZ13-781) | Feb-14 |

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

Issued: August 7, 2013

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CALIBRATION LABORATORY
Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: Info@emcite.com Http://www.emcite.com

**Glossary:**

| | |
|---|---|
| TSL | tissue simulating liquid |
| NORMx,y,z | sensitivity in free space |
| ConvF | sensitivity in TSL / NORMx,y,z |
| DCP | diode compression point |
| CF | crest factor (1/duty_cycle) of the RF signal |
| A,B,C,D | modulation dependent linearization parameters |
| Polarization Φ | Φ rotation around probe axis |
| Polarization θ | θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i<br>θ=0 is normal to probe axis |

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

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

b) 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 300MHz to 3GHz)", February 2005

**Methods Applied and Interpretation of Parameters:**

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the $E^2$-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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E-mail: Info@emcite.com Http://www.emcite.com

# Probe ES3DV3

## SN: 3028

Calibrated: August 5, 2013

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

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# DASY – Parameters of Probe: ES3DV3 - SN: 3028

## Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|---|---|---|---|---|
| Norm(μV/(V/m)$^2$)[A] | 1.06 | 1.17 | 1.14 | ±10.8% |
| DCP(mV)[B] | 105.6 | 104.6 | 98.9 | |

## Modulation Calibration Parameters

| UID | Communication System Name | | A dB | B dB√μV | C | D dB | VR mV | Unc[E] (k=2) |
|---|---|---|---|---|---|---|---|---|
| 0 | CW | X | 0.0 | 0.0 | 1.0 | 0.00 | 193.3 | ±6.7% |
| | | Y | 0.0 | 0.0 | 1.0 | | 205.8 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 198.3 | |

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%.

[A] The uncertainties of Norm X, Y, Z do not affect the $E^2$-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: Info@emcite.com Http://www.emcite.com

# DASY – Parameters of Probe: ES3DV3 - SN: 3028

## Calibration Parameter Determined in Head Tissue Simulating Media

| f [MHz][C] | Relative Permittivity [F] | Conductivity (S/m) [F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 850 | 41.5 | 0.92 | 6.26 | 6.26 | 6.26 | 0.27 | 1.90 | ±12% |
| 900 | 41.5 | 0.97 | 6.28 | 6.28 | 6.28 | 0.26 | 1.88 | ±12% |
| 1750 | 40.1 | 1.37 | 5.62 | 5.62 | 5.62 | 0.27 | 3.08 | ±12% |
| 1900 | 40.0 | 1.40 | 5.21 | 5.21 | 5.21 | 0.28 | 3.03 | ±12% |
| 2000 | 40.0 | 1.40 | 5.14 | 5.14 | 5.14 | 0.27 | 2.99 | ±12% |
| 2450 | 39.2 | 1.80 | 4.84 | 4.84 | 4.84 | 0.46 | 1.72 | ±12% |

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: Info@emcite.com Http://www.emcite.com

# DASY – Parameters of Probe: ES3DV3 - SN: 3028

## Calibration Parameter Determined in Body Tissue Simulating Media

| f [MHz][C] | Relative Permittivity[F] | Conductivity (S/m)[F] | ConvF X | ConvF Y | ConvF Z | Alpha | Depth (mm) | Unct. (k=2) |
|---|---|---|---|---|---|---|---|---|
| 850 | 55.2 | 0.99 | 6.28 | 6.28 | 6.28 | 0.30 | 1.91 | ±12% |
| 900 | 55.0 | 1.05 | 6.29 | 6.29 | 6.29 | 0.37 | 1.61 | ±12% |
| 1750 | 53.4 | 1.49 | 5.15 | 5.15 | 5.15 | 0.30 | 2.92 | ±12% |
| 1900 | 53.3 | 1.52 | 4.96 | 4.96 | 4.96 | 0.29 | 2.93 | ±12% |
| 2000 | 53.3 | 1.52 | 4.99 | 4.99 | 4.99 | 0.29 | 2.86 | ±12% |
| 2450 | 52.7 | 1.95 | 4.36 | 4.36 | 4.36 | 0.52 | 1.71 | ±12% |

[C] Frequency validity of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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Add: No.52 Huayuanbei Road. Haidian District. Beijing. 100191. China
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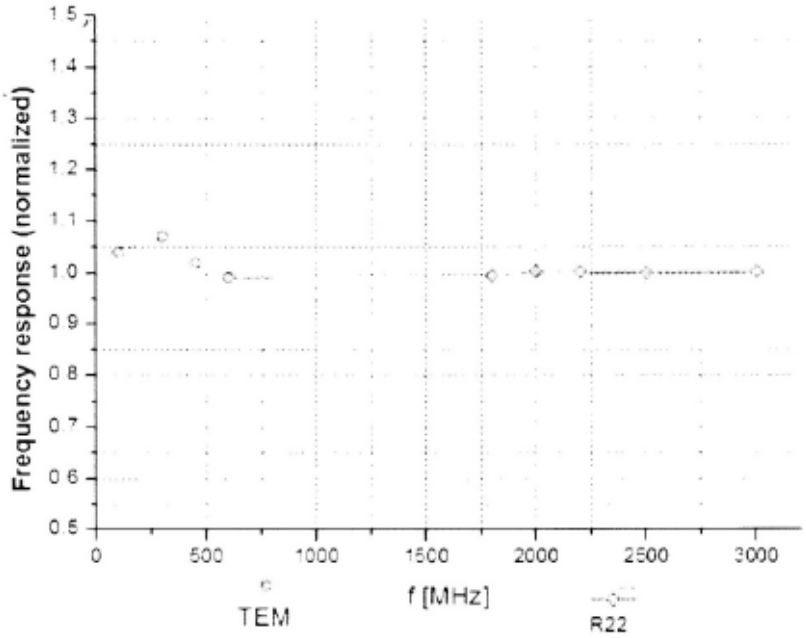
E-mail: Info@emcite.com Http://www.emcite.com

# Frequency Response of E-Field
## (TEM-Cell: ifi110 EXX, Waveguide: R22)




**Uncertainty of Frequency Response of E-field: ±7.5% (k=2)**

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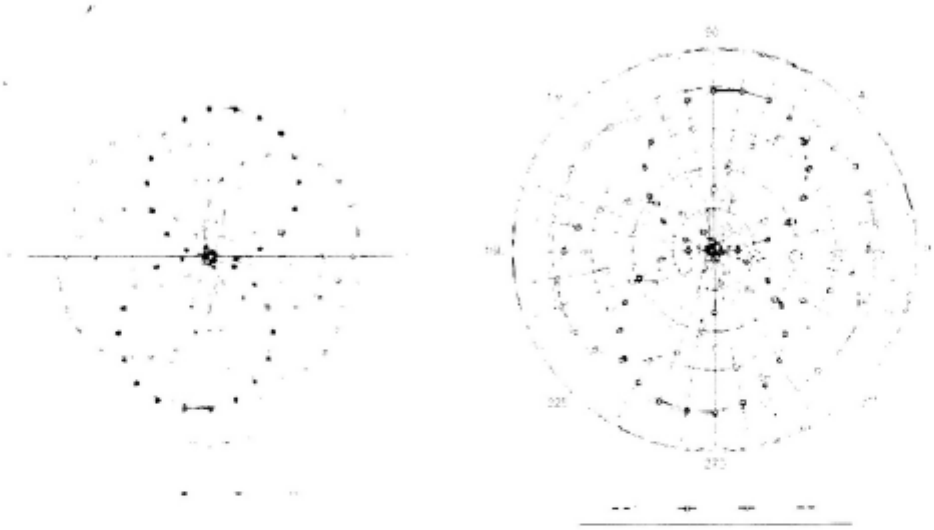
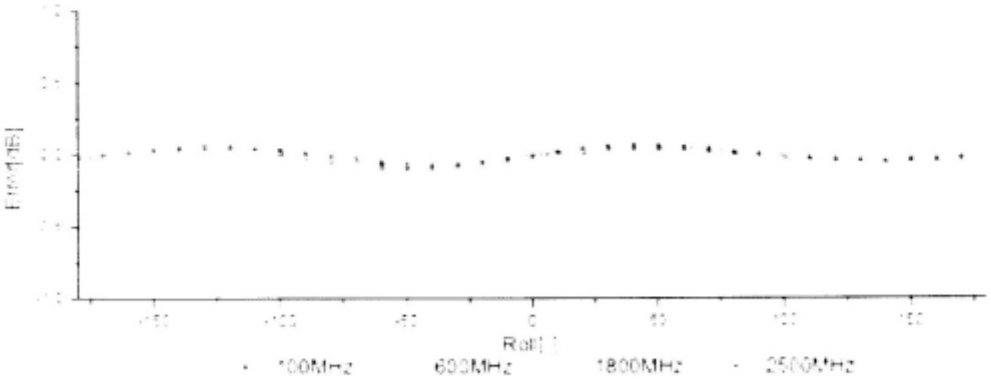
## Receiving Pattern (Φ), θ=0°

**f=600 MHz, TEM** **f=1800 MHz, R22**






**Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)**

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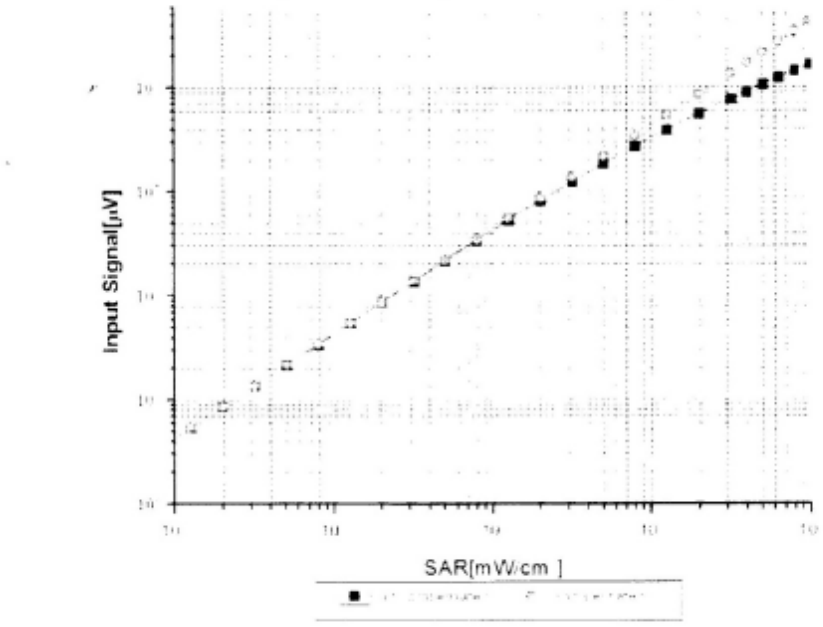
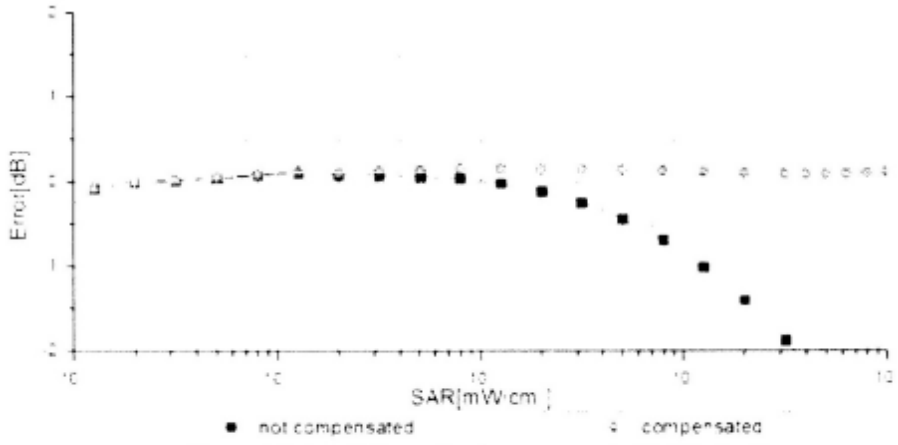
## Dynamic Range f($SAR_{head}$)
## (TEM cell, f = 900 MHz)




**Uncertainty of Linearity Assessment: ±0.9% (k=2)**

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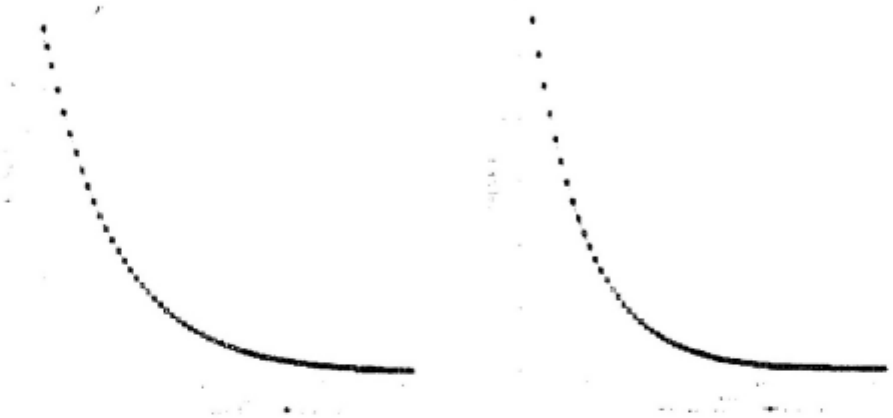
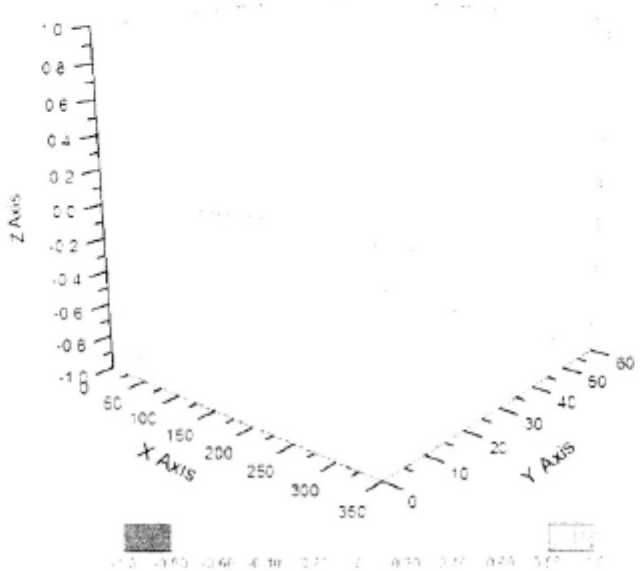
## Conversion Factor Assessment

**f=900 MHz, WGLS R9(H_convF)** **f=2450 MHz, WGLS R26(H_convF)**



## Deviation from Isotropy in Liquid




**Uncertainty of Spherical Isotropy Assessment: ±2.8% (K=2)**

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# DASY - Parameters of Probe: ES3DV3 - SN: 3028

## Other Probe Parameters

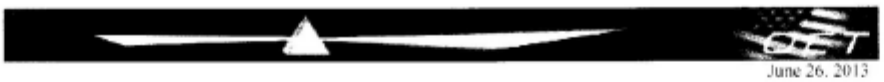
| | |
|---|---|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 54.7 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disable |
| Probe Overall Length | 337mm |
| Probe Body Diameter | 10mm |
| Tip Length | 10mm |
| Tip Diameter | 4mm |
| Probe Tip to Sensor X Calibration Point | 2mm |
| Probe Tip to Sensor Y Calibration Point | 2mm |
| Probe Tip to Sensor Z Calibration Point | 2mm |
| Recommended Measurement Distance from Surface | 3mm |

June 26, 2013

**Acceptable Conditions for SAR Measurements Using Probes and Dipoles Calibrated under the SPEAG-TMC Dual-Logo Calibration Program to Support FCC Equipment Certification**

The acceptable conditions for SAR measurements using probes, dipoles and DAEs calibrated by TMC (*Telecommunication Metrology Center of MITT in Beijing, China*), under thé Dual-Logo Calibration Certificate program and quality assurance (QA) protocols established between SPEAG (*Schmid & Partner Engineering AG, Switzerland*) and TMC, to support FCC (*U.S. Federal Communications Commission*) equipment certification are defined and described in the following.

1) The agreement established between SPEAG and TMC is only applicable to calibration services performed by TMC where its clients (companies and divisions of such companies) are headquartered in the Greater China Region, including Taiwan and Hong Kong. This agreement is subject to renewal at the end of each calendar year between SPEAG and TMC. TMC shall inform the FCC of any changes or early termination to the agreement.
2) Only a subset of the calibration services specified in the SPEAG-TMC agreement, while it remains valid, are applicable to SAR measurements performed using such equipment for supporting FCC equipment certification. These are identified in the following.
   a) Calibration of dosimetric (SAR) probes EX3DVx, ET3DVx and ES3DVx.
      i) Free-space E-field and H-field probes, including those used for HAC (hearing aid compatibility) evaluation, temperature probes, other probes or equipment not identified in this document, when calibrated by TMC, are excluded and cannot be used for measurements to support FCC equipment certification.
      ii) Signal specific and bundled probe calibrations based on PMR (probe modulation response) characteristics are handled according to the requirements of KDB 865664; that is, "Until standardized procedures are available to make such determination, the applicability of a signal specific probe calibration for testing specific wireless modes and technologies is determined on a case-by-case basis through KDB inquiries, including SAR system verification requirements."
   b) Calibration of SAR system validation dipoles, excluding HAC dipoles.
   c) Calibration of data acquisition electronics DAE3Vx, DAE4Vx and DAEasyVx.
   d) For FCC equipment certification purposes, the frequency range of SAR probe and dipole calibrations is limited to 700 MHz - 6 GHz and provided it is supported by the equipment identified in the TMC QA protocol (a separate attachment to this document).
   e) The identical system and equipment setup, measurement configurations, hardware, evaluation algorithms, calibration and QA protocols, including the format of calibration certificates and reports used by SPEAG shall be applied by TMC.
   f) The calibrated items are only applicable to SPEAG DASY 4 and DASY 5 or higher version systems.



June 26, 2013

3) The SPEAG-TMC agreement includes specific protocols identified in the following to ensure the quality of calibration services provided by TMC under this SPEAG-TMC Dual-Logo calibration agreement are equivalent to the calibration services provided by SPEAG. TMC shall, upon request, provide copies of documentation to the FCC to substantiate program implementation.
   a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the TMC QA protocol shall be performed between SPEAG and TMC at least once every 12 months. The ILCE acceptance criteria defined in the TMC QA protocol shall be satisfied for the TMC, SPEAG and FCC agreements to remain valid.
   b) Check of Calibration Certificate (CCC) shall be performed by SPEAG for all calibrations performed by TMC. Written confirmation from SPEAG is required for TMC to issue calibration certificates under the SPEAG-TMC Dual-Logo calibration program. Quarterly reports for all calibrations performed by TMC under the program are also issued by SPEAG.
   c) The calibration equipment and measurement system used by TMC shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the TMC QA protocol before each actual calibration can commence. TMC shall maintain records of the measurement and calibration system verification results for all calibrations.
   d) Quality Check of Calibration (QCC) certificates shall be performed by SPEAG at least once every 12 months. SPEAG shall visit TMC facilities to verify the laboratory, equipment, applied procedures and plausibility of randomly selected certificates.
4) A copy of this document, to be updated annually, shall be provided to TMC clients that accept calibration services according to the SPEAG-TMC Dual-Logo calibration program, which should be presented to a TCB (*Telecommunication Certification Body*), to facilitate FCC equipment approval.
5) TMC shall address any questions raised by its clients or TCBs relating to the SPEAG-TMC Dual-Logo calibration program and inform the FCC and SPEAG of any critical issues.

Change Note: Revised on June 26 to clarify the applicability of PMR and Bundled probe calibrations according to the requirements of KDB 865664.

**Appendix D. DAE Calibration Data:**

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Add: No.52 Huayuanbei Road, Haidian District, Beijing, 100191, China
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Client : **Sunway** **Certificate No: J13-2-2187**

## CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | DAE4 - SN: 689 |
| Calibration Procedure(s) | TMC-OS-E-01-198<br>Calibration Procedure for the Data Acquisition Electronics (DAEx) |
| Calibration date: | July 20, 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)℃ 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: | Zhao Jing | SAR Test Engineer | |
| Reviewed by: | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Xiao Li | Deputy Director of the laboratory | |

Issued: August 5, 2013

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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.

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## DC Voltage Measurement

A/D - Converter Resolution nominal

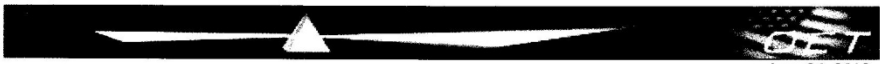
High Range: 1LSB = 6.1μV , full range = -100...+300 mV
Low Range: 1LSB = 61nV , full range = -1.....+3mV

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

| Calibration Factors | X | Y | Z |
|---|---|---|---|
| High Range | 404.270 ± 0.15% (k=2) | 404.187 ± 0.15% (k=2) | 404.856 ± 0.15% (k=2) |
| Low Range | 3.95764 ± 0.7% (k=2) | 3.97509 ± 0.7% (k=2) | 3.99031 ± 0.7% (k=2) |

## Connector Angle

| | |
|---|---|
| **Connector Angle** to be used in DASY system | 87.5° ± 1 ° |



June 26, 2013

**Acceptable Conditions for SAR Measurements Using Probes and Dipoles Calibrated under the SPEAG-TMC Dual-Logo Calibration Program to Support FCC Equipment Certification**

The acceptable conditions for SAR measurements using probes, dipoles and DAEs calibrated by TMC (*Telecommunication Metrology Center of MITT in Beijing, China*), under the Dual-Logo Calibration Certificate program and quality assurance (QA) protocols established between SPEAG (*Schmid & Partner Engineering AG, Switzerland*) and TMC, to support FCC (*U.S. Federal Communications Commission*) equipment certification are defined and described in the following.

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   a) Calibration of dosimetric (SAR) probes EX3DVx, ET3DVx and ES3DVx.
      i) Free-space E-field and H-field probes, including those used for HAC (hearing aid compatibility) evaluation, temperature probes, other probes or equipment not identified in this document, when calibrated by TMC, are excluded and cannot be used for measurements to support FCC equipment certification.
      ii) Signal specific and bundled probe calibrations based on PMR (probe modulation response) characteristics are handled according to the requirements of KDB 865664; that is, "Until standardized procedures are available to make such determination, the applicability of a signal specific probe calibration for testing specific wireless modes and technologies is determined on a case-by-case basis through KDB inquiries, including SAR system verification requirements."
   b) Calibration of SAR system validation dipoles, excluding HAC dipoles.
   c) Calibration of data acquisition electronics DAE3Vx, DAE4Vx and DAEasyVx.
   d) For FCC equipment certification purposes, the frequency range of SAR probe and dipole calibrations is limited to 700 MHz - 6 GHz and provided it is supported by the equipment identified in the TMC QA protocol (a separate attachment to this document).
   e) The identical system and equipment setup, measurement configurations, hardware, evaluation algorithms, calibration and QA protocols, including the format of calibration certificates and reports used by SPEAG shall be applied by TMC.
   f) The calibrated items are only applicable to SPEAG DASY 4 and DASY 5 or higher version systems.

June 26, 2013

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   a) The Inter-laboratory Calibration Evaluation (ILCE) stated in the TMC QA protocol shall be performed between SPEAG and TMC at least once every 12 months. The ILCE acceptance criteria defined in the TMC QA protocol shall be satisfied for the TMC, SPEAG and FCC agreements to remain valid.
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   c) The calibration equipment and measurement system used by TMC shall be verified before each calibration service according to the specific reference SAR probes, dipoles, and DAE calibrated by SPEAG. The results shall be reproducible and within the defined acceptance criteria specified in the TMC QA protocol before each actual calibration can commence. TMC shall maintain records of the measurement and calibration system verification results for all calibrations.
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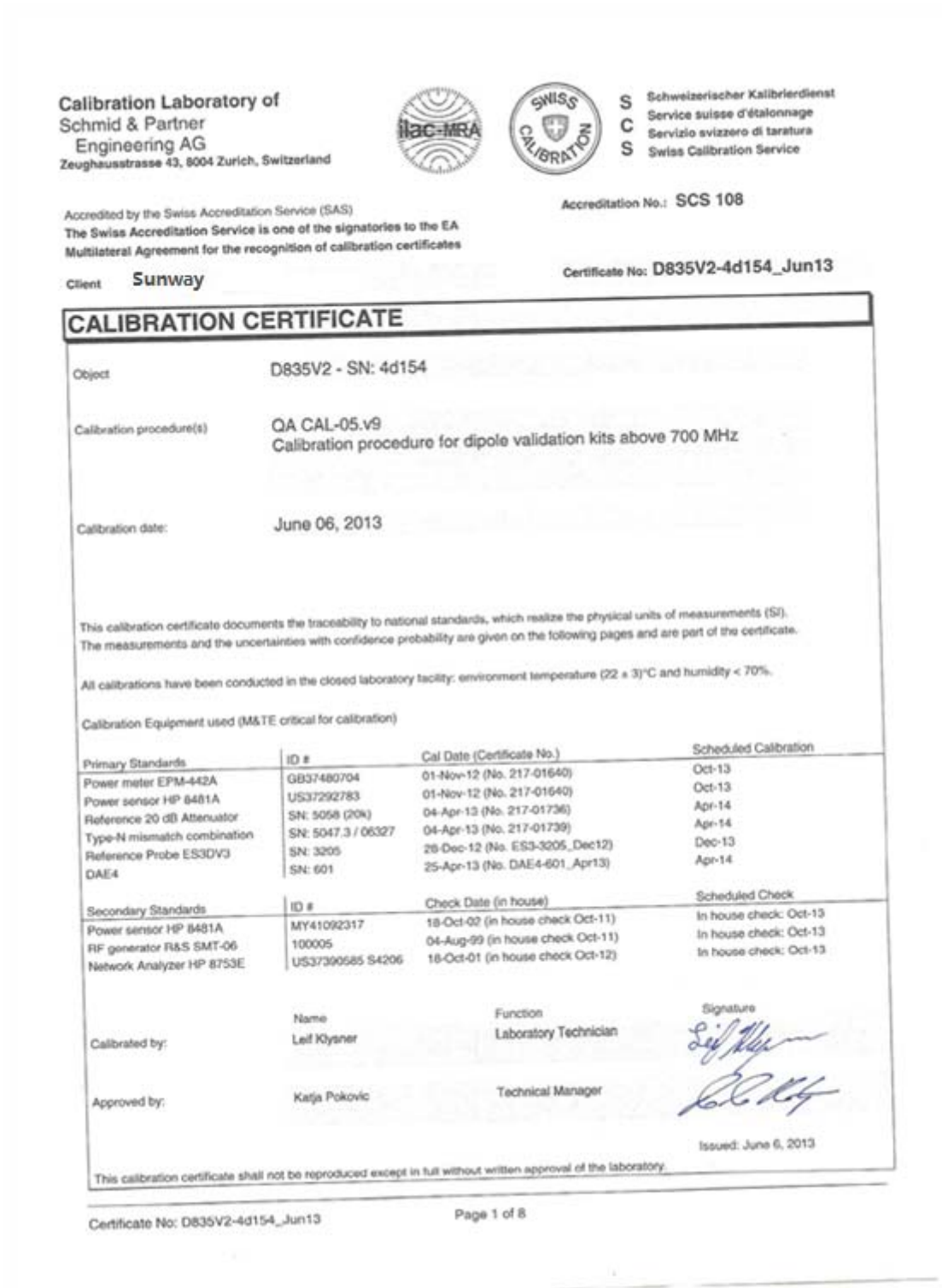
Change Note: Revised on June 26 to clarify the applicability of PMR and Bundled probe calibrations according to the requirements of KDB 865664.

**Appendix E. Dipole Calibration Data:**



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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
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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 108

Client Sunway

Certificate No: D835V2-4d154_Jun13

## CALIBRATION CERTIFICATE

Object D835V2 - SN: 4d154

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

Calibration date: June 06, 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 (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-13 (No. 217-01736) | Apr-14 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739) | Apr-14 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 601 | 25-Apr-13 (No. DAE4-601_Apr13) | Apr-14 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

| | Name | Function | Signature |
|---|---|---|---|
| Calibrated by: | Leif Klysner | Laboratory Technician | |
| Approved by: | Katja Pokovic | Technical Manager | |

Issued: June 6, 2013

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

Certificate No: D835V2-4d154_Jun13 Page 1 of 8

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

Accreditation No.: SCS 108

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

**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:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**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%.

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.6 |
| **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 ± 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 ± 0.2) °C | 40.4 ± 6 % | 0.94 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm³ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.47 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **9.51 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.59 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **6.17 W/kg ± 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 ± 0.2) °C | 54.5 ± 6 % | 1.00 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm³ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 2.44 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **9.51 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm³ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 1.59 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **6.23 W/kg ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.4 Ω - 2.8 jΩ |
| Return Loss | - 28.8 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 48.2 Ω - 4.5 jΩ |
| Return Loss | - 26.0 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.432 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 | December 28, 2012 |

**DASY5 Validation Report for Head TSL**

Date: 06.06.2013

Test Laboratory: SPEAG, Zurich, Switzerland

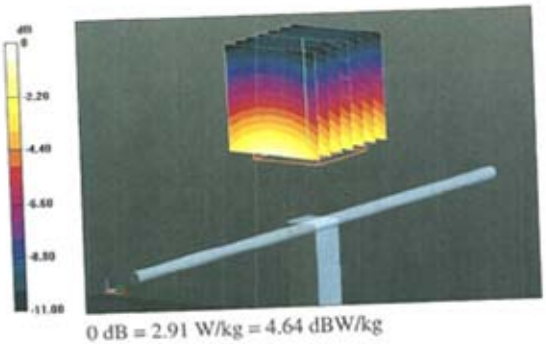
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154**

Communication System: UID 0 - CW ; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 0.94 S/m; $\varepsilon_r$ = 40.4; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

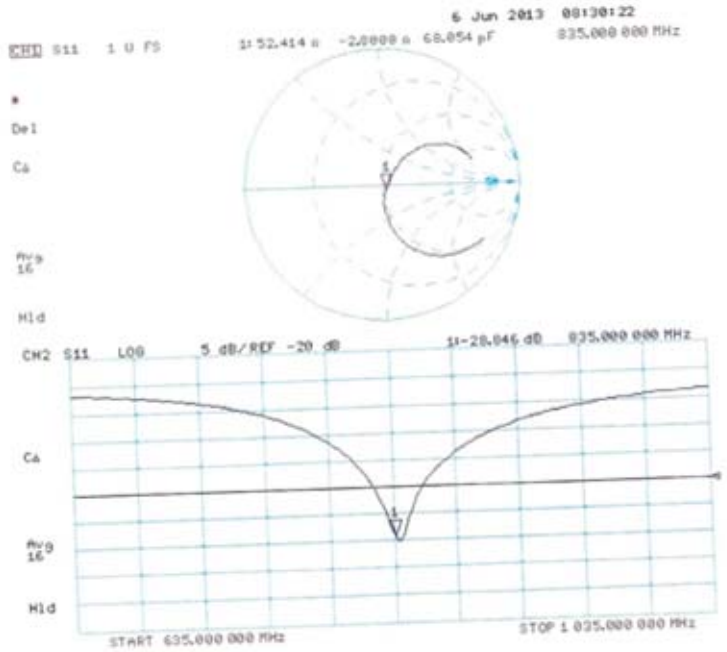
- Probe: ES3DV3 - SN3205; ConvF(6.05, 6.05, 6.05); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

**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 = 57.316 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.76 W/kg
**SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.59 W/kg**
Maximum value of SAR (measured) = 2.91 W/kg




0 dB = 2.91 W/kg = 4.64 dBW/kg

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body TSL**

Date: 05.06.2013

Test Laboratory: SPEAG, Zurich, Switzerland

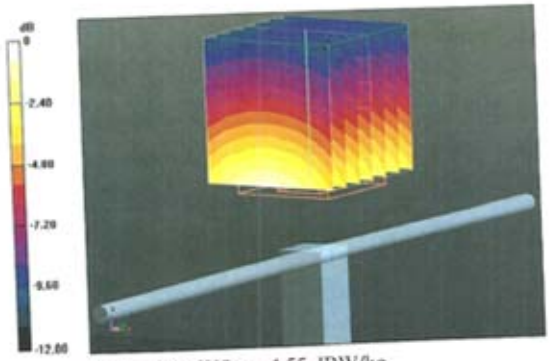
**DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d154**

Communication System: UID 0 - CW ; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; $\sigma$ = 1 S/m; $\varepsilon_r$ = 54.5; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

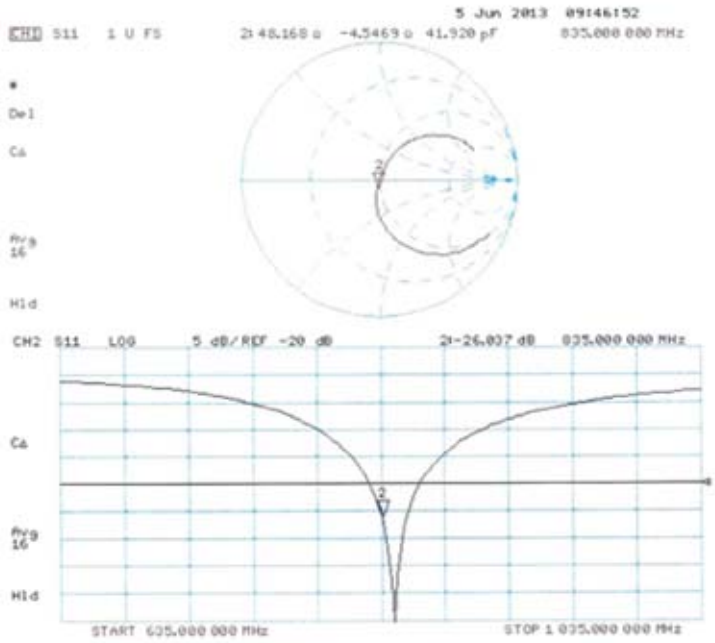
- Probe: ES3DV3 - SN3205; ConvF(6.04, 6.04, 6.04); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

**Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:**
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.428 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 3.58 W/kg
**SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.59 W/kg**
Maximum value of SAR (measured) = 2.85 W/kg




0 dB = 2.85 W/kg = 4.55 dBW/kg

**Impedance Measurement Plot for Body TSL**



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

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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 108**

**Client** Sunway

**Certificate No: D1900V2-5d142_Jun13**

# CALIBRATION CERTIFICATE

| | |
|---|---|
| Object | D1900V2 - SN: 5d142 |
| Calibration procedure(s) | QA CAL-05.v9<br>Calibration procedure for dipole validation kits above 700 MHz |
| Calibration date: | June 10, 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 (Certificate No.) | Scheduled Calibration |
|---|---|---|---|
| Power meter EPM-442A | GB37480704 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Power sensor HP 8481A | US37292783 | 01-Nov-12 (No. 217-01640) | Oct-13 |
| Reference 20 dB Attenuator | SN: 5058 (20k) | 04-Apr-13 (No. 217-01736) | Apr-14 |
| Type-N mismatch combination | SN: 5047.3 / 06327 | 04-Apr-13 (No. 217-01739) | Apr-14 |
| Reference Probe ES3DV3 | SN: 3205 | 28-Dec-12 (No. ES3-3205_Dec12) | Dec-13 |
| DAE4 | SN: 601 | 25-Apr-13 (No. DAE4-601_Apr13) | Apr-14 |

| Secondary Standards | ID # | Check Date (in house) | Scheduled Check |
|---|---|---|---|
| Power sensor HP 8481A | MY41092317 | 18-Oct-02 (in house check Oct-11) | In house check: Oct-13 |
| RF generator R&S SMT-06 | 100005 | 04-Aug-99 (in house check Oct-11) | In house check: Oct-13 |
| Network Analyzer HP 8753E | US37390585 S4206 | 18-Oct-01 (in house check Oct-12) | In house check: Oct-13 |

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

Issued: June 11, 2013

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

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**The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates**

**Accreditation No.: SCS 108**

**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:**

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) 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
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

**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%.

## Measurement Conditions

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

| | | |
|---|---|---|
| **DASY Version** | DASY5 | V52.8.7 |
| **Extrapolation** | Advanced Extrapolation | |
| **Phantom** | Modular Flat Phantom | |
| **Distance Dipole Center - TSL** | 10 mm | with Spacer |
| **Zoom Scan Resolution** | dx, dy, dz = 5 mm | |
| **Frequency** | 1900 MHz ± 1 MHz | |

## Head TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Head TSL parameters** | 22.0 °C | 40.0 | 1.40 mho/m |
| **Measured Head TSL parameters** | (22.0 ± 0.2) °C | 39.3 ± 6 % | 1.34 mho/m ± 6 % |
| **Head TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Head TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Head TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 9.83 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **40.2 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Head TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.18 W/kg |
| SAR for nominal Head TSL parameters | normalized to 1W | **21.0 W/kg ± 16.5 % (k=2)** |

## Body TSL parameters

The following parameters and calculations were applied.

| | Temperature | Permittivity | Conductivity |
|---|---|---|---|
| **Nominal Body TSL parameters** | 22.0 °C | 53.3 | 1.52 mho/m |
| **Measured Body TSL parameters** | (22.0 ± 0.2) °C | 53.7 ± 6 % | 1.50 mho/m ± 6 % |
| **Body TSL temperature change during test** | < 0.5 °C | ---- | ---- |

## SAR result with Body TSL

| **SAR averaged over 1 cm$^3$ (1 g) of Body TSL** | Condition | |
|---|---|---|
| SAR measured | 250 mW input power | 10.1 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **40.8 W/kg ± 17.0 % (k=2)** |

| **SAR averaged over 10 cm$^3$ (10 g) of Body TSL** | condition | |
|---|---|---|
| SAR measured | 250 mW input power | 5.41 W/kg |
| SAR for nominal Body TSL parameters | normalized to 1W | **21.8 W/kg ± 16.5 % (k=2)** |

## Appendix

### Antenna Parameters with Head TSL

| | |
|---|---|
| Impedance, transformed to feed point | 52.8 Ω + 5.8 jΩ |
| Return Loss | - 24.0 dB |

### Antenna Parameters with Body TSL

| | |
|---|---|
| Impedance, transformed to feed point | 48.0 Ω + 6.2 jΩ |
| Return Loss | - 23.6 dB |

### General Antenna Parameters and Design

| | |
|---|---|
| Electrical Delay (one direction) | 1.199 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 11, 2011 |

**DASY5 Validation Report for Head TSL**

Date: 10.06.2013

Test Laboratory: SPEAG, Zurich, Switzerland

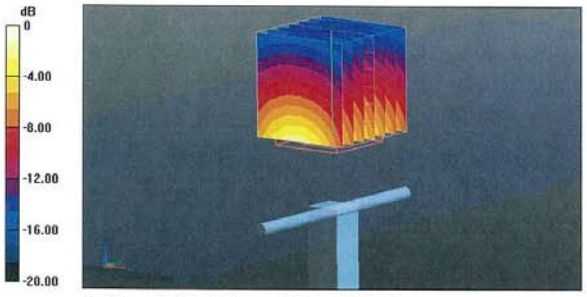
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d142**

Communication System: UID 0 - CW ; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.34 S/m; $\varepsilon_r$ = 39.3; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

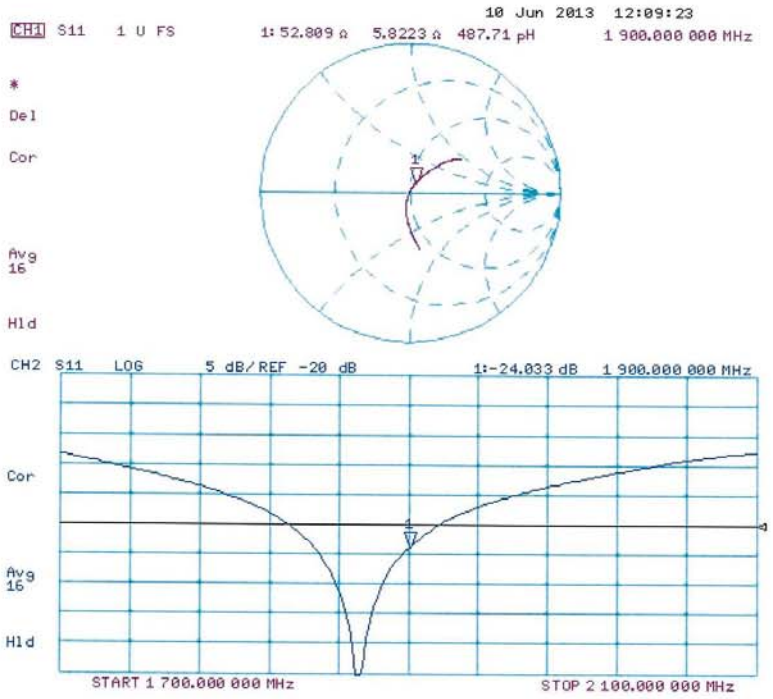
- Probe: ES3DV3 - SN3205; ConvF(4.98, 4.98, 4.98); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**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 = 95.950 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 17.8 W/kg
**SAR(1 g) = 9.83 W/kg; SAR(10 g) = 5.18 W/kg**
Maximum value of SAR (measured) = 12.3 W/kg




0 dB = 12.3 W/kg = 10.90 dBW/kg

**Impedance Measurement Plot for Head TSL**



**DASY5 Validation Report for Body TSL**

Date: 10.06.2013

Test Laboratory: SPEAG, Zurich, Switzerland

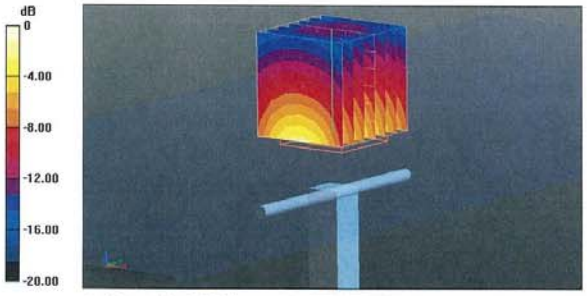
**DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d142**

Communication System: UID 0 - CW ; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; $\sigma$ = 1.5 S/m; $\varepsilon_r$ = 53.7; $\rho$ = 1000 kg/m$^3$
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

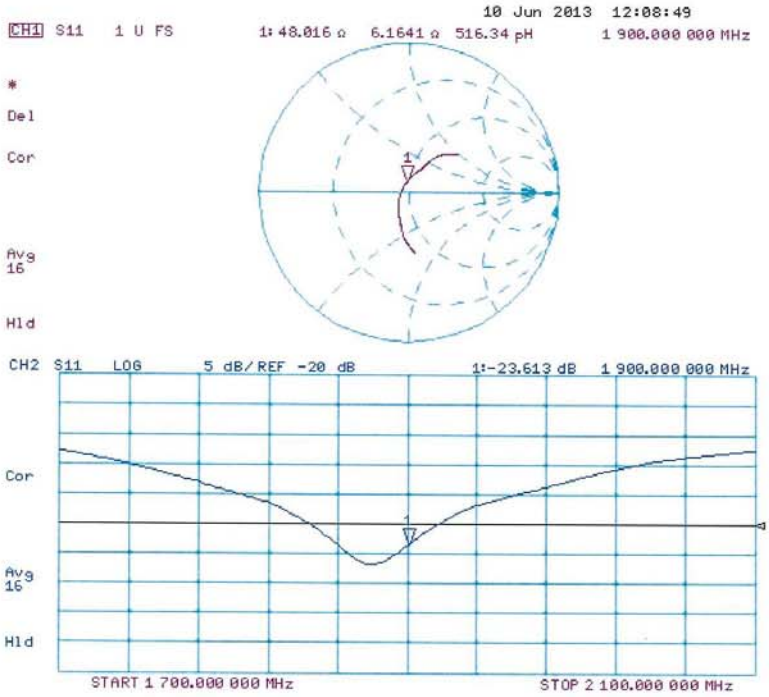
- Probe: ES3DV3 - SN3205; ConvF(4.6, 4.6, 4.6); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**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 = 95.950 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 17.4 W/kg
**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.41 W/kg**
Maximum value of SAR (measured) = 12.8 W/kg




0 dB = 12.8 W/kg = 11.07 dBW/kg

**Impedance Measurement Plot for Body TSL**



China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L6487 )

Shenzhen Sunway Communication Co., Ltd. Testing Center

1/F., Building A, SDG Info Port, Kefeng Road, Hi-Tech Park,

Nanshan District, Shenzhen, Guangdong, China

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*The scope of accreditation is detailed in the attached appendices bearing the same registration number as above. The appendices form an integral part of this certificate.*

Date of Issue: 2013-10-29

Date of Expiry: 2016-10-28

Date of Initial Accreditation: 2013-10-29

Date of Update: 2013-10-29

Signed on behalf of China National Accreditation Service for Conformity Assessment

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No.CNAS AL 2 0008227

*****END OF REPORT*****