



FCC SAR TEST REPORT

For

SHENZHEN YLWD TECHNOLOGY CO.,LTD

RM1002.A, Haisong BLD.RDTairan, FuTian District, Shenzhen, China

Product Name : Mobile Phone

Model No. : S4001

S4002, S4003, S4004, S4005, S4501, S4502,
S4503, S4504, S4505, S5001, S5002, S5003,
S5004, S5005, S5501, S5502, S5503, S5504,
S5505, S6001, S6002, S6003, S6004, S6005

FCC ID : 2AKSAMOVIC-S

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Shenzhen Sunway Communication CO.,LTD Testing Center
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Shenzhen , Guangdong, China 518104,



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1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

<Highest SAR Summary>

| Exposure Position | Frequency Band | 1g-SAR (W/kg) | Highest 1g-SAR (W/kg) |
|-------------------|------------------|---------------|-----------------------|
| Head | GSM850 | 0.218 | 0.538 |
| | GSM1900 | 0.235 | |
| | WCDMA V | 0.263 | |
| | WCDMA II | 0.538 | |
| | WLAN 2.4GHz Band | 0.195 | |
| Body (1cm Gap) | GSM850 | 0.586 | 0.586 |
| | GSM1900 | 0.566 | |
| | WCDMA V | 0.408 | |
| | WCDMA II | 0.512 | |
| | WLAN 2.4GHz Band | 0.115 | |

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.

<Highest simultaneous transmission SAR>

| | Position | Main antenna | WLAN 2.4G | Bluetooth | Max Sum |
|----------------------------|-------------|--------------|-----------|-----------|--------------|
| Highest SAR value for Head | Right Cheek | 0.538 | 0.192 | 0.132 | 0.73 |
| Highest SAR value for Body | Back | 0.586 | 0.115 | 0.066 | 0.701 |

According to the above table, the maximum sum of reported SAR values for GSM/WCDMA and BT/WIFI is 0.73W/kg (1g).



2. SAR Evaluation compliance

| | |
|-----------------------------|---|
| Product Name: | Mobile Phone |
| Brand Name: | N/A |
| Model Name: | S4001 S4002, S4003, S4004, S4005, S4501, S4502, S4503, S4504, S4505, S5001, S5002, S5003, S5004, S5005, S5501, S5502, S5503, S5504, S5505, S6001, S6002, S6003, S6004, S6005 |
| Applicant: | SHENZHEN YLWD TECHNOLOGY CO.,LTD |
| Address: | RM1002.A, Haisong BLD.RDTairan, FuTian District, Shenzhen, China |
| Manufacturer: | SHENZHEN YLWD TECHNOLOGY CO.,LTD |
| Address: | RM1002.A, Haisong BLD.RDTairan, FuTian District, Shenzhen, China |
| Applicable Standard: | FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013 FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04 FCC KDB 865664 D02 SAR Reporting v01r02 FCC KDB 447498 D01 General RF Exposure Guidance v06 FCC KDB 941225 D06 Hotspot Mode SAR v02r01 FCC KDB 648474 D04 Handset SAR v01r03 FCC KDB 248227 D01 Wi-Fi SAR v02r02 FCC KDB 941225 D01 3G SAR Procedures v03r01 |
| Performed Date: | 18 th ~20 th May. 2017 |
| Test Engineer: | <i>Li.Zhao</i> |
| Reviewed By | <i>Tonyy. Lin</i> |
| Performed Location: | Shenzhen Sunway Communication CO.,LTD Testing Center 1/F, BuildingA, SDG Info Port, KefengRoad, Hi-Tech Park, Nanshan District, Shenzhen , Guangdong, China 518104 Tel: +86-755- 36615880 Fax: +86-755- 86525532 |



3. General Information:

3.1 EUT Description:

| EUT Information | |
|----------------------------------|--|
| Product Name | Mobile Phone |
| Brand Name | N/A |
| Model Name | S4001 S4002, S4003, S4004, S4005, S4501, S4502, S4503, S4504, S4505, S5001, S5002, S5003, S5004, S5005, S5501, S5502, S5503, S5504, S5505, S6001, S6002, S6003, S6004, S6005 |
| Hardware Version | -- |
| Software Version | -- |
| Tx Frequency | GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz |
| Mode | GSM/GPRS/EGPRS RMC/AMR 12.2Kbps HSDPA HSUPA 802.11b/g/n HT20/HT40 Bluetooth v4.0 LE |
| GSM/(E)GPRS Transfer mode | Class B – EUT cannot support Packet Switched and Circuit Switched Network simultaneously but can automatically switch between Packet and Circuit Switched Network. |

**3.2 Test Environment:**

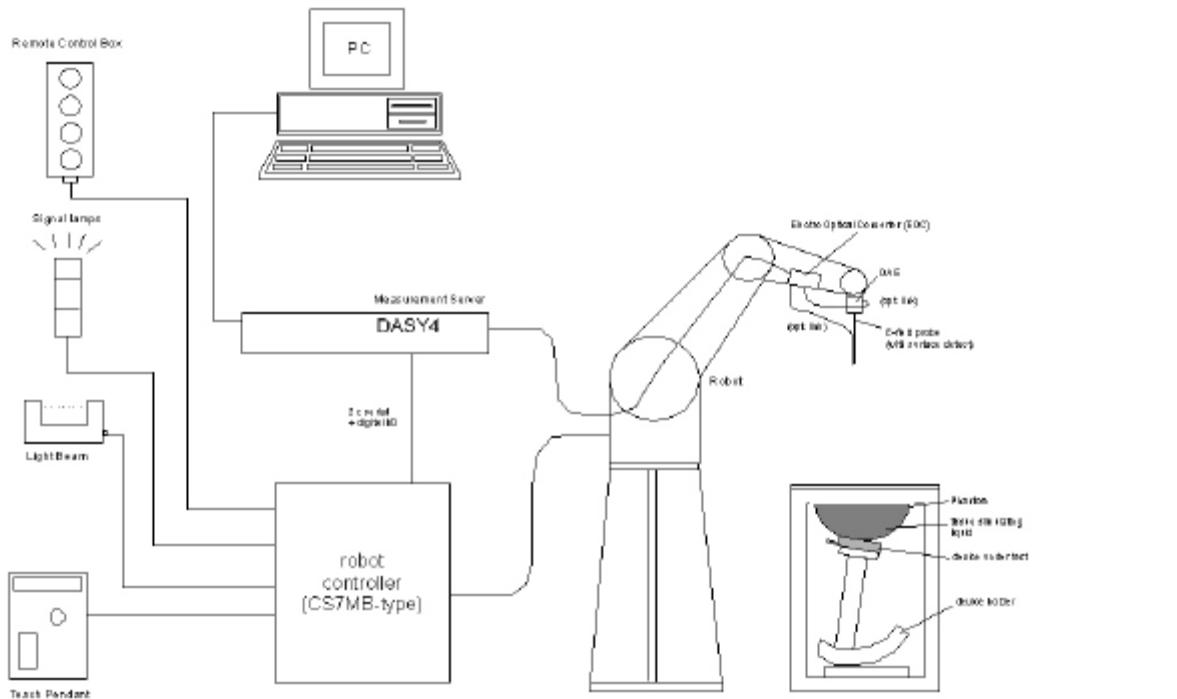
Ambient conditions in the SAR laboratory:

| Items | Required | Actual |
|-------------------------|-----------------|---------------|
| Temperature (°C) | 18-25 | 22~23 |
| Humidity (%RH) | 30-70 | 55~65 |



4. SAR Measurement System:

4.1 Dasy4 System Description:



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

- Ø A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- Ø 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.
- Ø A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc.
- Ø 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.
- Ø A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- Ø A computer operating Windows 2000 or Windows XP.
- Ø DASY4 software.
- Ø Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- Ø The SAM twin phantom enabling testing left-hand and right-hand usage.
- Ø The device holder for handheld mobile phones.
- Ø Tissue simulating liquid mixed according to the given recipes.
- Ø Validation dipole kits allowing to validate the proper functioning of the system.



5. System Components:

Ø DASY4 Measurement Server:



Calibration: No calibration required.

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.

Ø 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

Ø Dosimetric Probes:



Model: EX3DV4,
Frequency: 10MHz to 6G, Linearity: $\pm 0.2\text{dB}$,
Dynamic Range: 10 $\mu\text{W/g}$ to 100 mW/g
Directivity:
 $\pm 0.3 \text{ dB}$ in HSL (rotation around probe axis)
 $\pm 0.5 \text{ dB}$ 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 ($\pm 2 \text{ dB}$). The dosimetric probes have special calibrations in various liquids at different frequencies.

Calibration: Recommended once a year



Ø Light Beam unit:



Calibration: No calibration required.

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.

Ø 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.

Ø 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 " $\epsilon_r = 3$ " and loss tangent " $\delta = 0.02$ ". 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.



6. Tissue Simulating Liquid

6.1 The composition of the tissue simulating liquid:

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

| Frequency (MHz) | Water (%) | Sugar (%) | Cellulose (%) | Salt (%) | Preventol (%) | DGBE (%) | Conductivity (σ) | Permittivity (ϵ_r) |
|--------------------|--------------|--------------|------------------|-------------|------------------|-------------|------------------------------|----------------------------------|
| For Head | | | | | | | | |
| 900 | 40.3 | 57.9 | 0.2 | 1.4 | 0.2 | 0 | 0.97 | 41.5 |
| 1750 | 55.2 | 0 | 0 | 0.3 | 0 | 44.5 | 1.37 | 40.1 |
| 1800,1900,2000 | 55.2 | 0 | 0 | 0.3 | 0 | 44.5 | 1.40 | 40.0 |
| 2450 | 55.0 | 0 | 0 | 0 | 0 | 45.0 | 1.80 | 39.2 |
| For Body | | | | | | | | |
| 900 | 50.8 | 48.2 | 0 | 0.9 | 0.1 | 0 | 0.97 | 55.2 |
| 1750 | 70.2 | 0 | 0 | 0.4 | 0 | 29.4 | 1.49 | 53.4 |
| 1800,1900,2000 | 70.2 | 0 | 0 | 0.4 | 0 | 29.4 | 1.52 | 53.3 |
| 2450 | 68.6 | 0 | 0 | 0 | 0 | 31.4 | 1.95 | 52.7 |

6.2 Tissue Calibration Result:

| Frequency (MHz) | Description | Dielectric Parameters | | Tissue Temp. ($^{\circ}$ C) | Date |
|--------------------|-------------|------------------------------------|-----------------------------------|---------------------------------|------------|
| | | Permittivity (ϵ_r) | Conductivity (σ) | | |
| 900 (Head) | Reference | $41.50 \pm 5\%$ (39.425~43.574) | $0.97 \pm 5\%$ (0.9215~1.0185) | NA | 2017/05/18 |
| | Measurement | 42.14 | 0.98 | 22.5 | |
| 1900 (Head) | Reference | $40.00 \pm 5\%$ (38.00~42.00) | $1.40 \pm 5\%$ (1.33~1.47) | NA | 2017/05/18 |
| | Measurement | 40.3 | 1.46 | 22.7 | |
| 2450 (Head) | Reference | $39.2 \pm 5\%$ (37.24~41.16) | $1.80 \pm 5\%$ (1.71~1.89) | NA | 2017/05/18 |
| | Measurement | 38.2 | 1.84 | 22.1 | |

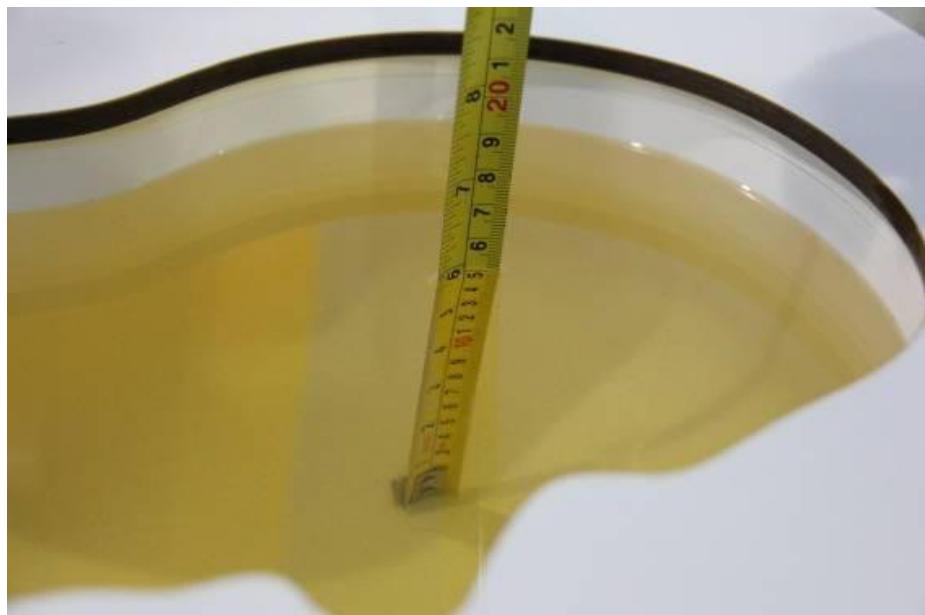


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| Frequency (MHz) | Description | Dielectric Parameters | | Tissue Temp. (°C) | Date |
|--------------------|-------------|----------------------------------|------------------------------|----------------------|------------|
| | | Permittivity (ϵ_r) | Conductivity (σ) | | |
| 900 (Body) | Reference | 55.2±5% (52.44~57.96) | 0.97±5% (0.9215~1.0185) | NA | 2017/05/19 |
| | Measurement | 54.7 | 0.96 | 22.4 | |
| 1900 (Body) | Reference | 53.3±5% (50.635~55.965) | 1.52±5% (1.444~1.596) | NA | 2017/05/19 |
| | Measurement | 53.5 | 1.51 | 22.8 | |
| 2450 (Body) | Reference | 52.7±5% (50.065~55.335) | 1.95±5% (1.8525~2.0475) | NA | 2017/05/20 |
| | Measurement | 50.6 | 1.87 | 22.6 | |



Liquid depth in the Head Phantom (900 MHz) (depth>15cm)



Liquid depth in the Flat Phantom (900 MHz) (depth>15cm)



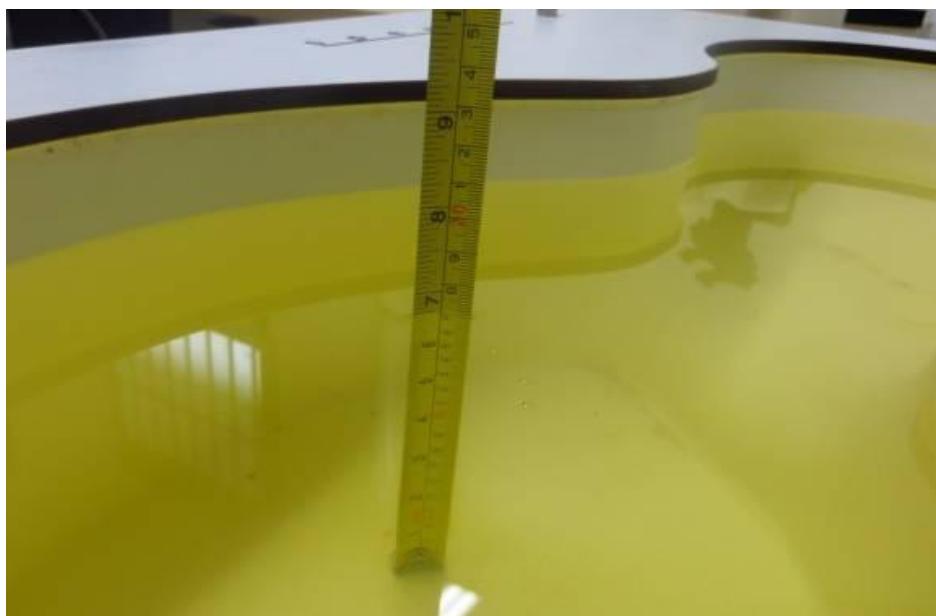
Liquid depth in the Head Phantom (1900 MHz) (depth>15cm)



Liquid depth in the Body Phantom (1900 MHz) (depth>15cm)



Liquid depth in the Head Phantom (2450 MHz) (depth>15cm)



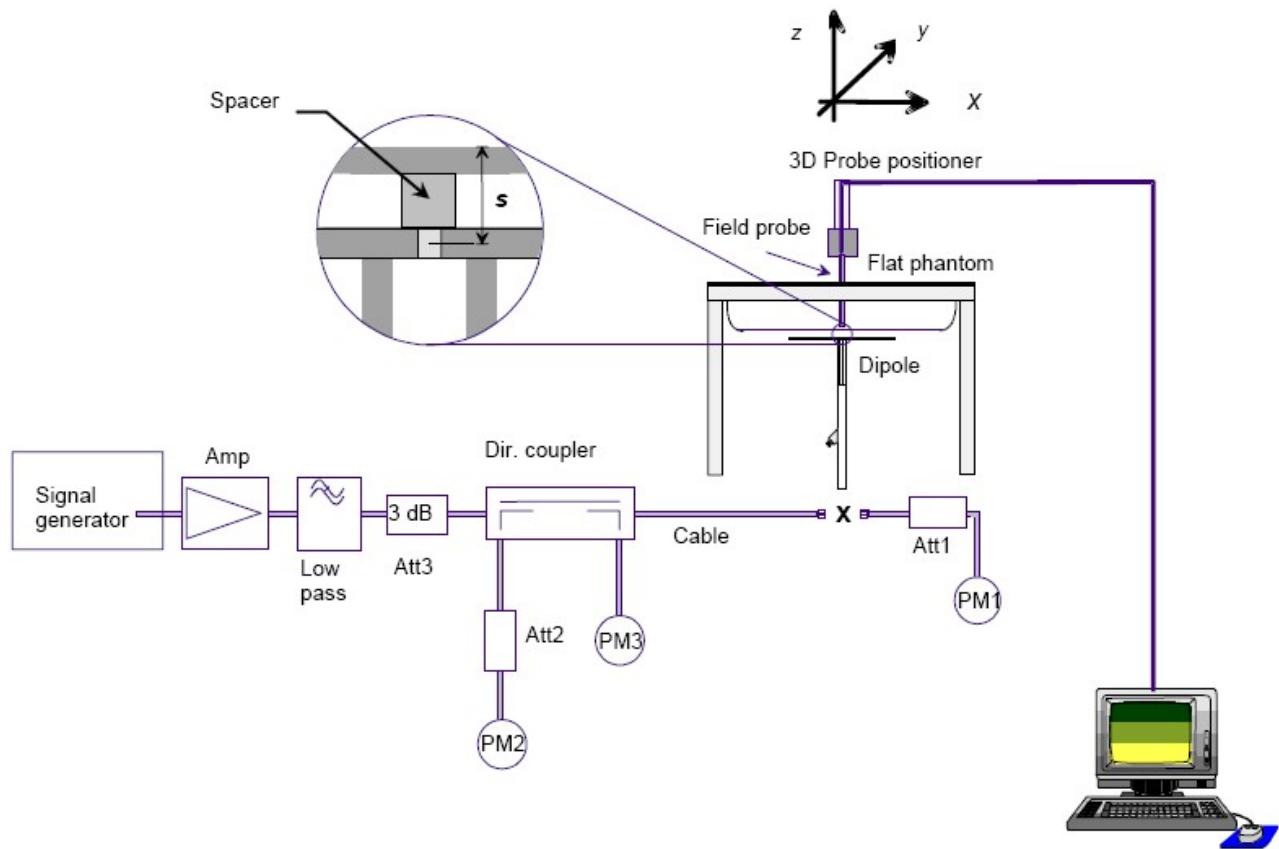
Liquid depth in the Flat Phantom (2450 MHz) (depth>15cm)



7. SAR System Validation

7.1 Validation System:

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:



7.2 Validation Dipoles:

The dipoles used are based on the IEEE-1528/EN62209-1 standard, and are compliant with mechanical and electrical specifications in line with the requirements of both IEEE-1528/EN62209-1 and FCC Supplement C.



7.3 Validation Result:

| Frequency (MHz) | Description | SAR(1g) W/Kg | SAR(10g) W/Kg | Tissue Temp. (°C) | Date |
|--------------------|-------------|---------------------------|---------------------------|----------------------|------------|
| 900 (Head) | Reference | 10.7±10% (9.63~11.77) | 6.88±10% (6.19~7.57) | NA | 2017/05/18 |
| | Measurement | 10.72 | 6.92 | 22.5 | |
| 1900 (Head) | Reference | 40.6±10% (36.54~44.66) | 21.3±10% (19.17~23.43) | NA | 2017/05/18 |
| | Measurement | 39.52 | 21.05 | 22.7 | |
| 2450 (Head) | Reference | 51.6±10% (46.44~56.76) | 23.9±10% (21.51~26.29) | NA | 2017/05/18 |
| | Measurement | 53.6 | 25.84 | 22.1 | |
| 900 (Body) | Reference | 10.9±10% (9.81~11.99) | 7.14±10% (6.43~7.85) | NA | 2017/05/19 |
| | Measurement | 10.2 | 7.04 | 22.4 | |
| 1900 (Body) | Reference | 40.1±10% (36.09~44.11) | 21.3±10% (19.17~23.43) | NA | 2017/05/19 |
| | Measurement | 41.6 | 21.72 | 22.8 | |
| 2450 (Body) | Reference | 51.8±10% (46.62~56.98) | 24.2±10% (21.78~26.62) | NA | 2017/05/20 |
| | Measurement | 54.4 | 25.4 | 22.6 | |

system Validation

| Frequency (MHz) | Liquid Type (head/body) | Target SAR1g (W/Kg) | Measured SAR1g (W/Kg) | Normalized SAR1g (W/Kg) | Deviation | Date |
|--------------------|----------------------------|---------------------------|-----------------------------|-------------------------------|-----------|------------|
| 835 | body | 9.44 | 0.0915 | 9.15 | -3.1 | 2017/05/19 |
| 1900 | body | 38.55 | 0.3654 | 36.54 | -5.3 | 2017/05/19 |



8. SAR Evaluation Procedures:

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

Ø 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.

Ø Area Scan

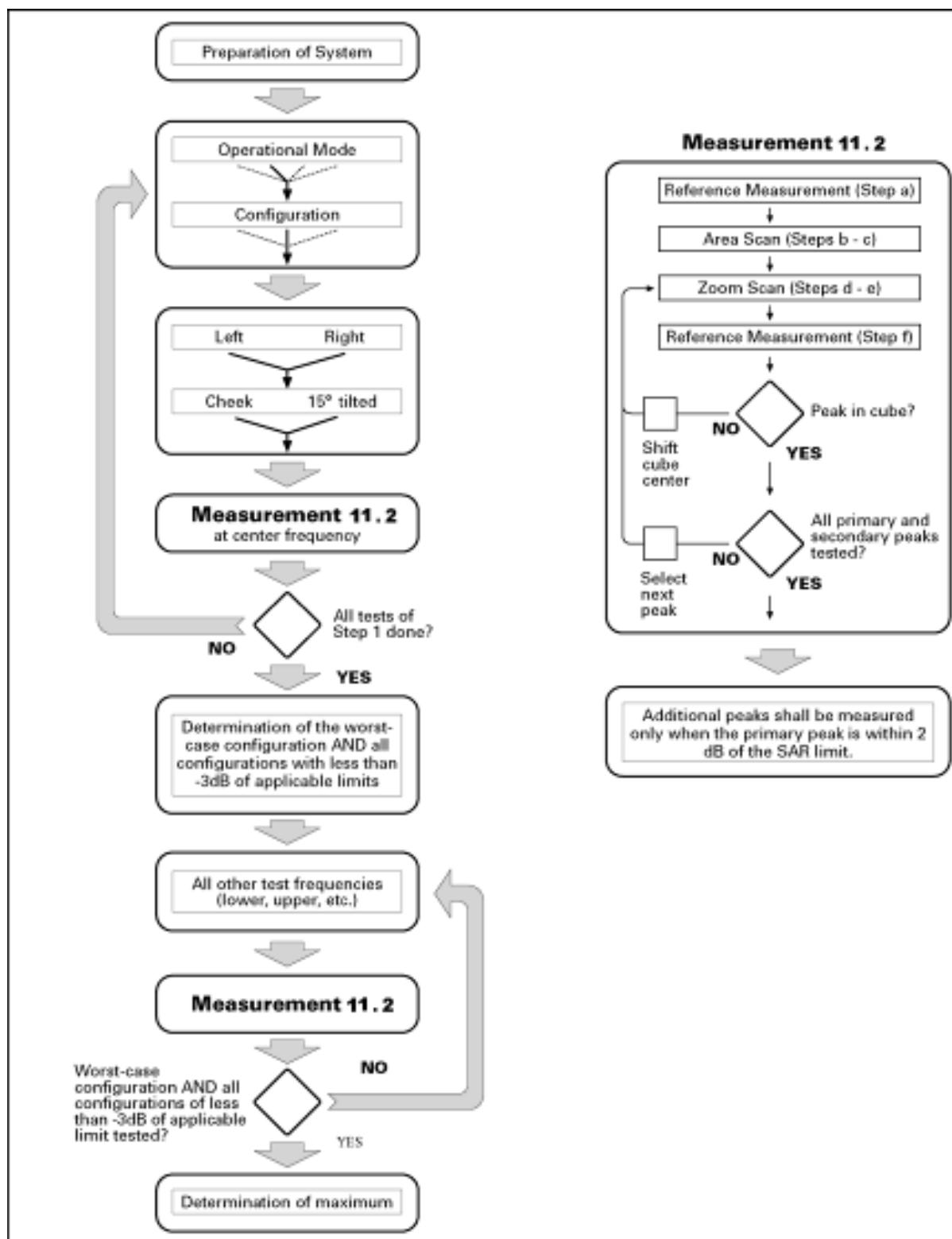
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. The scanning area 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.

Ø 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.

Ø 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.





9. SAR Exposure Limits

9.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

9.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

| Whole-Body | Partial-Body | Hands, Wrists, Feet and Ankles |
|------------|--------------|--------------------------------|
| 0.4 | 8.0 | 20.0 |

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

| Whole-Body | Partial-Body | Hands, Wrists, Feet and Ankles |
|------------|--------------|--------------------------------|
| 0.08 | 1.6 | 4.0 |

Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.



10. 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% | |



11. Conducted Power Measurement:

<GSM Conducted Power>

General Note:

- Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
- According to October 2013TCB Workshop, for GSM / GPRS, the number of time slots to test for SAR should correspond to the highest frame-average maximum output power configuration, considering the possibility of e.g. 3rd party VoIP operation for head and body-worn SAR testing, the EUT was set in GPRS (4Tx slot) for GSM850/GSM1900 band due to their highest frame-average power.
- For hotspot mode SAR testing, GPRS should be evaluated, therefore the EUT was set in GPRS 4 Tx slots for GSM850/GSM1900 band due to its highest frame-average power.

| Band GSM850 | Burst Average Power (dBm) | | | Frame-Average Power (dBm) | | |
|--------------------------------|---------------------------|-------|---------------|---------------------------|-------|---------------|
| TX Channel | 128 | 190 | 251 | 128 | 190 | 251 |
| Frequency (MHz) | 824.2 | 836.6 | 848.8 | 824.2 | 836.6 | 848.8 |
| GSM (GMSK, 1 Tx slot) | 31.52 | 31.53 | 31.54 | 22.52 | 22.53 | 22.54 |
| GPRS (GMSK, 1 Tx slot) – CS1 | 31.52 | 31.51 | 31.53 | 22.52 | 22.51 | 22.53 |
| GPRS (GMSK, 2 Tx slots) – CS1 | 30.78 | 30.78 | 30.81 | 24.78 | 24.78 | 24.81 |
| GPRS (GMSK, 3 Tx slots) – CS1 | 28.75 | 28.70 | 28.69 | 24.49 | 24.44 | 24.43 |
| GPRS (GMSK, 4 Tx slots) – CS1 | 27.59 | 27.38 | 27.38 | 24.59 | 24.38 | 24.38 |
| EGPRS (GMSK, 1 Tx slot) – CS1 | 31.51 | 31.42 | 31.44 | 22.51 | 22.42 | 22.44 |
| EGPRS (GMSK, 2 Tx slots) – CS1 | 30.13 | 30.44 | 30.73 | 24.13 | 24.44 | 24.73 |
| EGPRS (GMSK, 3 Tx slots) – CS1 | 29.07 | 29.35 | 29.56 | 24.81 | 25.09 | 25.30 |
| EGPRS (GMSK, 4 Tx slots) – CS1 | 27.15 | 27.27 | 27.49 | 24.15 | 24.27 | 24.49 |
| Band GSM1900 | Burst Average Power (dBm) | | | Frame-Average Power (dBm) | | |
| TX Channel | 512 | 661 | 810 | 512 | 661 | 810 |
| Frequency (MHz) | 1850.2 | 1880 | 1909.8 | 1850.2 | 1880 | 1909.8 |
| GSM (GMSK, 1 Tx slot) | 29.54 | 29.23 | 28.86 | 20.54 | 20.23 | 19.86 |
| GPRS (GMSK, 1 Tx slot) – CS1 | 29.51 | 29.24 | 28.88 | 20.51 | 20.24 | 19.88 |
| GPRS (GMSK, 2 Tx slots) – CS1 | 28.21 | 28.15 | 27.72 | 22.21 | 22.15 | 21.72 |
| GPRS (GMSK, 3 Tx slots) – CS1 | 26.55 | 26.04 | 25.58 | 22.29 | 21.78 | 21.32 |
| GPRS (GMSK, 4 Tx slots) – CS1 | 25.42 | 24.80 | 24.31 | 22.42 | 21.80 | 21.31 |
| EGPRS (GMSK, 1 Tx slot) – CS1 | 29.25 | 29.21 | 29.33 | 20.25 | 20.21 | 20.33 |
| EGPRS (GMSK, 2 Tx slots) – CS1 | 27.44 | 27.32 | 27.61 | 21.44 | 21.32 | 21.61 |
| EGPRS (GMSK, 3 Tx slots) – CS1 | 25.82 | 25.93 | 25.22 | 21.56 | 21.67 | 20.96 |
| EGPRS (GMSK, 4 Tx slots) – CS1 | 23.92 | 24.02 | 24.34 | 20.92 | 21.02 | 21.34 |

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.

The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

**<WCDMA Conducted Power>**

The following tests were conducted according to the test requirements outlined in 3GPP TS 34.121 specification. A summary of these settings are illustrated below:

HSDPA Setup Configuration:

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting:
 - i. Set Gain Factors (β_c and β_d) and parameters were set according to each
 - ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
 - iii. Set RMC 12.2Kbps + HSDPA mode.
 - iv. Set Cell Power = -86 dBm
 - v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
 - vi. Select HSDPA Uplink Parameters
 - vii. Set Delta ACK, Delta NACK and Delta CQI = 8
 - viii. Set Ack-Nack Repetition Factor to 3
 - ix. Set CQI Feedback Cycle (k) to 4 ms
 - x. Set CQI Repetition Factor to 2
 - xi. Power Ctrl Mode = All Up bits
- d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | β_{hs} (Note 1, Note 2) | CM (dB) (Note 3) | MPR (dB) (Note 3) |
|----------|-------------------|-------------------|-------------------|-------------------|-------------------------------------|---------------------|----------------------|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0.0 | 0.0 |
| 2 | 12/15 (Note 4) | 15/15 (Note 4) | 64 | 12/15 (Note 4) | 24/15 | 1.0 | 0.0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

Note 1: $\Delta_{ACK}, \Delta_{NACK}$ and $\Delta_{CQI} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and $\Delta_{NACK} = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$, and $\Delta_{CQI} = 24/15$ with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for $\beta_c/\beta_d = 12/15, \beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 11/15$ and $\beta_d = 15/15$.

Setup Configuration

**HSUPA Setup Configuration:**

- a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
- b. The RF path losses were compensated into the measurements.
- c. A call was established between EUT and Base Station with following setting * :
 - i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
 - ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
 - iii. Set Cell Power = -86 dBm
 - iv. Set Channel Type = 12.2k + HSPA
 - v. Set UE Target Power
 - vi. Power Ctrl Mode= Alternating bits
 - vii. Set and observe the E-TFCI
 - viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
- d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | β_{hs} (Note 1) | β_{ec} | β_{ed} (Note 5) (Note 6) | β_{ed} (SF) | β_{ed} (Codes) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 6) | E-TFCI |
|----------|----------------|----------------|----------------|-------------------|-----------------------|--------------|--|-------------------|----------------------|------------------|-------------------|-------------------|--------|
| 1 | 11/15 (Note 3) | 15/15 (Note 3) | 64 | 11/15 (Note 3) | 22/15 | 209/25 | 1309/225 | 4 | 1 | 1.0 | 0.0 | 20 | 75 |
| 2 | 6/15 | 15/15 | 64 | 6/15 | 12/15 | 12/15 | 94/75 | 4 | 1 | 3.0 | 2.0 | 12 | 67 |
| 3 | 15/15 | 9/15 | 64 | 15/9 | 30/15 | 30/15 | $\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$ | 4 4 | 2 | 2.0 | 1.0 | 15 | 92 |
| 4 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 2/15 | 56/75 | 4 | 1 | 3.0 | 2.0 | 17 | 71 |
| 5 | 15/15 (Note 4) | 15/15 (Note 4) | 64 | 15/15 (Note 4) | 30/15 | 24/15 | 134/15 | 4 | 1 | 1.0 | 0.0 | 21 | 81 |

Note 1: $\Delta ACK, \Delta NACK$ and $\Delta COI = 30/15$ with $\beta_{hs} = 30/15 * \beta_c$.

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

**General Note**

1. Per KDB 941225 D01 v02, RMC 12.2kbps setting is used to evaluate SAR. If AMR 12.2kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2kbps can be excluded.
2. By design, AMR and HSDPA/HSUPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in tune-up procedure exhibit.

| Band | WCDMA II | | |
|------------------------|-----------------|-------------|---------------|
| TX Channel | 9262 | 9400 | 9538 |
| Rx Channel | 9662 | 9800 | 9938 |
| Frequency (MHz) | 1852.4 | 1880 | 1907.6 |
| AMR 12.2Kbps | 23.92 | 22.21 | 21.16 |
| RMC 12.2Kbps | 23.95 | 22.28 | 21.25 |
| HSDPA Subtest-1 | 21.65 | 20.84 | 20.89 |
| HSDPA Subtest-2 | 21.30 | 20.42 | 20.44 |
| HSDPA Subtest-3 | 19.67 | 18.72 | 18.85 |
| HSDPA Subtest-4 | 19.65 | 18.83 | 18.83 |
| HSUPA Subtest-1 | 21.55 | 20.68 | 20.74 |
| HSUPA Subtest-2 | 21.65 | 20.74 | 20.77 |
| HSUPA Subtest-3 | 19.58 | 18.81 | 18.89 |
| HSUPA Subtest-4 | 21.72 | 20.80 | 20.86 |
| HSUPA Subtest-5 | 20.75 | 19.79 | 19.93 |

**<WLAN 2.4GHz Conducted Power>****General Note**

Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion

| Mode | Channel | Frequency (MHz) | Conducted Output Power(dBm) | Test Rate Data |
|----------------|---------|-----------------|-----------------------------|----------------|
| 802.11b | 1 | 2412 | 13.95 | 1 Mbps |
| | 6 | 2437 | 13.54 | 1 Mbps |
| | 11 | 2462 | 13.00 | 1 Mbps |
| 802.11g | 1 | 2412 | 11.46 | 6 Mbps |
| | 6 | 2437 | 11.50 | 6 Mbps |
| | 11 | 2462 | 10.55 | 6 Mbps |
| 802.11n(20MHz) | 1 | 2412 | 11.14 | 6.5 Mbps |
| | 6 | 2437 | 11.43 | 6.5 Mbps |
| | 11 | 2462 | 10.39 | 6.5 Mbps |
| 802.11n(40MHz) | 3 | 2422 | 10.76 | 13.5Mbps |
| | 6 | 2437 | 10.69 | 13.5Mbps |
| | 9 | 2452 | 10.11 | 13.5Mbps |



<Bluetooth Conducted Power>

| Mode Band | Average power(dBm) |
|------------------|--------------------|
| | Bluetooth v4.0 LE |
| 2.4GHz Bluetooth | -2.80 |

Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances \leq 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$

- ž $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- ž Power and distance are rounded to the nearest mW and mm before calculation
- ž The result is rounded to one decimal place for comparison

| Bluetooth Max Power (dBm) | Separation Distance (mm) | Frequency (GHz) | exclusion thresholds |
|---------------------------|--------------------------|-----------------|----------------------|
| -2.80 | 0 | 2.48 | 0.99 |

Per KDB 447498 D01v05r02, when the minimum test separation distance is $<$ 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.99 which is \leq 3, SAR testing is not required.



Tune up Procedure

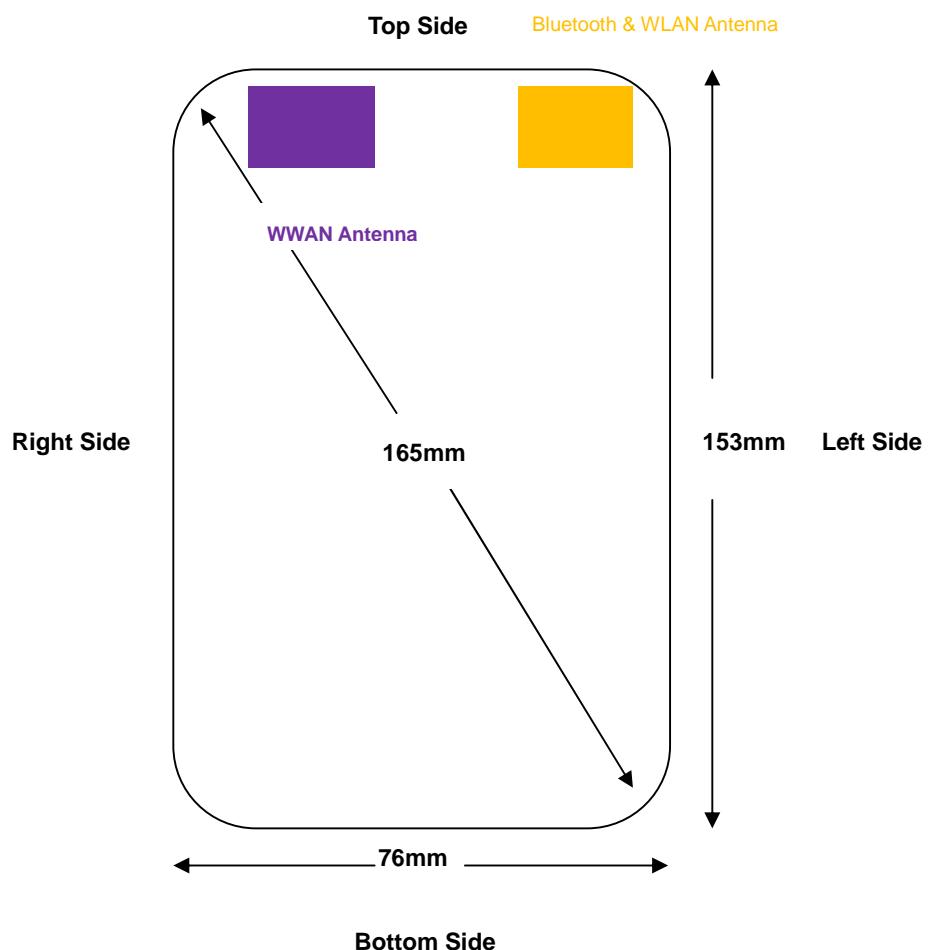
Conducted Peak power range is below:

| Mode | Maximum Target Value | Mode | Maximum Target Value |
|---------------------------|----------------------|----------------------------|----------------------|
| GSM 850 | 32.0dBm±0.5 | GSM 1900 | 29.0 dBm±1.0 |
| GPRS 850 1Txslot | 32.0dBm±0.5 | GPRS 1900 1Txslot | 29.0 dBm±1.0 |
| GPRS 850 2Txslot | 31.2 dBm±0.5 | GPRS 1900 2Txslot | 28.0 dBm±1.0 |
| GPRS 850 3Txslot | 29.0 dBm±1.0 | GPRS 1900 3Txslot | 26.0 dBm±1.0 |
| GPRS 850 4Txslot | 27.5 dBm±1.0 | GPRS 1900 4Txslot | 24.5 dBm±1.0 |
| EGPRS 850 1Txslot (GMSK) | 32.0 dBm±1.0 | EGPRS 1900 1Txslot (GMSK) | 29.0 dBm±1.0 |
| EGPRS 850 2Txslot (GMSK) | 31.0 dBm±1.0 | EGPRS 1900 2Txslot (GMSK) | 28.0 dBm±1.0 |
| EGPRS 850 3Txslot (GMSK) | 29.0 dBm±1.0 | EGPRS 1900 3Txslot (GMSK) | 26.0 dBm±1.0 |
| EGPRS 850 4Txslot (GMSK) | 27.5 dBm±1.0 | EGPRS 1900 3Txslot (GMSK) | 24.5 dBm±1.0 |
| EGPRS 850 1Txslot (8DPSK) | 26.5 dBm±1.0 | EGPRS 1900 1Txslot (8DPSK) | 25.5 dBm ±1.5 |
| EGPRS 850 2Txslot (8DPSK) | 24.2 dBm±1.5 | EGPRS 1900 2Txslot (8DPSK) | 23.5 dBm ±1.5 |
| EGPRS 850 3Txslot (8DPSK) | 22.2 dBm±1.5 | EGPRS 1900 3Txslot (8DPSK) | 21.5 dBm±1.5 |
| EGPRS 850 4Txslot (8DPSK) | 22.2 dBm±1.5 | EGPRS 1900 3Txslot (8DPSK) | 21.5 dBm±1.5 |

| WCDMA Band II | | WIFI | |
|------------------|----------------------|--------------|----------------------|
| Mode | Maximum Target Value | Mode | Maximum Target Value |
| RMC 12.2kbps | 24.0dBm ±1.0 | 802.11b | 13.0 dBm ±1.0 |
| RMC 64kbps | 24.0dBm ±1.0 | 802.11g | 11.0 dBm ±1.0 |
| RMC 144kbps | 24.0dBm ±1.0 | 802.11n(H20) | 11.0 dBm ±1.0 |
| RMC 384kbps | 24.0dBm ±1.0 | 802.11n(H40) | 10.0 dBm ±1.0 |
| HSDPA Sub-test 1 | 24.0dBm ±1.0 | | |
| HSDPA Sub-test 2 | 24.0dBm ±1.0 | Bluetooth | |
| HSDPA Sub-test 3 | 24.0dBm ±1.0 | Mode | Maximum Target Value |
| HSDPA Sub-test 4 | 24.0dBm ±1.0 | GFSK | -2.0 dBm ±1.0 |
| HSUPA Sub-test 1 | 24.0dBm ±1.0 | | |
| HSUPA Sub-test 2 | 24.0dBm ±1.0 | | |
| HSUPA Sub-test 3 | 24.0dBm ±1.0 | | |
| HSUPA Sub-test 4 | 24.0dBm ±1.0 | | |
| HSUPA Sub-test 5 | 24.0dBm ±1.0 | | |
| ARM | 24.0dBm ±1.0 | | |



12. Antenna Location



Back View

| Distance of The Antenna to the EUT surface and edge | | | | | | |
|---|-------|------|----------|-------------|-----------|------------|
| Antennas | Front | Back | Top Side | Bottom Side | Left Side | Right Side |
| WWAN | / | / | 6.5mm | / | 15mm | / |
| BT&WLAN | / | / | / | 134mm | / | 25mm |

| Positions for SAR tests; Hotspot mode | | | | | | |
|---------------------------------------|-------|------|----------|-------------|-----------|------------|
| Antennas | Front | Back | Top Side | Bottom Side | Left Side | Right Side |
| WWAN | Yes | Yes | No | Yes | Yes | Yes |
| BT&WLAN | Yes | Yes | Yes | No | Yes | No |

General Note: Referring to KDB 941225, When the overall device length and width are $\geq 9\text{cm} \times 5\text{cm}$, the test distance is 10mm, SAR must be measured for all sides and surfaces with a transmitting antenna located with 25mm from that surface or edge.



13. Results and Test photos :

13.1 SAR result summary:

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 | Plot |
|----------------------|------------------|--------|-------------------------|--------------------------|--------|--------------------------------|------------------------|----------------------------|------|
| Band | Test Position | CH | | | | | | | |
| GSM 850 | Right Cheek | Ch251 | 31.54 | 32.00 | 1.112 | 0.196 | 0.218 | 0.171 | #1 |
| | Right Tilt | Ch251 | 31.54 | 32.00 | 1.112 | 0.125 | 0.139 | 0.064 | |
| | Left Cheek | Ch251 | 31.54 | 32.00 | 1.112 | 0.171 | 0.190 | 0.177 | |
| | Left Tilt | Ch251 | 31.54 | 32.00 | 1.112 | 0.117 | 0.130 | 0.036 | |
| GSM 1900 | Right Cheek | Ch512 | 29.54 | 30.00 | 1.112 | 0.211 | 0.235 | -0.188 | #2 |
| | Right Tilt | Ch512 | 29.54 | 30.00 | 1.112 | 0.0834 | 0.093 | 0.153 | |
| | Left Cheek | Ch512 | 29.54 | 30.00 | 1.112 | 0.124 | 0.138 | 0.055 | |
| | Left Tilt | Ch512 | 29.54 | 30.00 | 1.112 | 0.086 | 0.095 | 0.097 | |
| WCDM A Band II | Right Cheek | Ch9262 | 23.95 | 24.50 | 1.135 | 0.474 | 0.538 | 0.038 | #4 |
| | Right Tilt | Ch9262 | 23.95 | 24.50 | 1.135 | 0.122 | 0.138 | -0.070 | |
| | Left Cheek | Ch9262 | 23.95 | 24.50 | 1.135 | 0.217 | 0.246 | -0.135 | |
| | Left Tilt | Ch9262 | 23.95 | 24.50 | 1.135 | 0.121 | 0.137 | 0.064 | |
| WLAN 2.4G | Right Cheek | Ch1 | 13.95 | 14.50 | 1.135 | 0.169 | 0.192 | 0.060 | |
| | Right Tilt | Ch1 | 13.95 | 14.50 | 1.135 | 0.087 | 0.099 | 0.140 | |
| | Left Cheek | Ch1 | 13.95 | 14.50 | 1.135 | 0.172 | 0.195 | -0.120 | #5 |
| | Left Tilt | Ch1 | 13.95 | 14.50 | 1.135 | 0.095 | 0.108 | 0.140 | |



Body Hotspot (10mm 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 | Plot |
|--------------------------------|---------------|--------|-------------------------|--------------------------|--------|--------------------------------|------------------------|----------------------------|------|
| Band | Test Position | CH | | | | | | | |
| GPRS 850(4 Tx slots) | Front | Ch251 | 27.38 | 28.00 | 1.153 | 0.432 | 0.498 | -0.032 | |
| | Back | Ch251 | 27.38 | 28.00 | 1.153 | 0.508 | 0.586 | 0.058 | #6 |
| | Left Side | Ch251 | 27.38 | 28.00 | 1.153 | 0.355 | 0.409 | 0.230 | |
| | Right Side | Ch251 | 27.38 | 28.00 | 1.153 | 0.141 | 0.163 | 0.310 | |
| | Bottom Side | Ch251 | 27.38 | 28.00 | 1.153 | 0.166 | 0.191 | -0.216 | |
| GPRS 1900(4 Tx slots) | Front | Ch512 | 25.42 | 26.00 | 1.143 | 0.459 | 0.525 | -0.164 | |
| | Back | Ch512 | 25.42 | 26.00 | 1.143 | 0.495 | 0.566 | 0.141 | #7 |
| | Left Side | Ch512 | 25.42 | 26.00 | 1.143 | 0.0342 | 0.039 | 0.634 | |
| | Right Side | Ch512 | 25.42 | 26.00 | 1.143 | 0.2790 | 0.319 | -0.005 | |
| | Bottom Side | Ch512 | 25.42 | 26.00 | 1.143 | 0.364 | 0.416 | 0.108 | |
| WCDM A Band II | Front | Ch9262 | 23.95 | 24.50 | 1.135 | 0.387 | 0.439 | -0.339 | |
| | Back | Ch9262 | 23.95 | 24.50 | 1.135 | 0.451 | 0.512 | 0.140 | #8 |
| | Left Side | Ch9262 | 23.95 | 24.50 | 1.135 | 0.039 | 0.044 | 0.950 | |
| | Right Side | Ch9262 | 23.95 | 24.50 | 1.135 | 0.315 | 0.358 | 0.182 | |
| | Bottom Side | Ch9262 | 23.95 | 24.50 | 1.135 | 0.406 | 0.461 | 0.011 | |
| WLAN 2.4G | Front | Ch1 | 13.95 | 14.50 | 1.135 | 0.089 | 0.101 | 0.012 | |
| | Back | Ch1 | 13.95 | 14.50 | 1.135 | 0.101 | 0.115 | 0.104 | #9 |
| | Left Side | Ch1 | 13.95 | 14.50 | 1.135 | 0.0073 | 0.008 | 0.100 | |
| | Top Side | Ch1 | 13.95 | 14.50 | 1.135 | 0.091 | 0.104 | 0.001 | |



Body Worn (10mm 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 |
|--------------------------------|---------------|--------|-------------------|--------------------|--------|-----------------------------|------------------|----------------------|
| Band | Test Position | CH | | | | | | |
| GPRS 850(4 Tx slots) | Front | Ch251 | 27.38 | 28.00 | 1.153 | 0.432 | 0.498 | -0.032 |
| | Back | Ch251 | 27.38 | 28.00 | 1.153 | 0.508 | 0.586 | 0.058 |
| GPRS 1900(4 Tx slots) | Front | Ch512 | 25.42 | 26.00 | 1.143 | 0.459 | 0.525 | -0.164 |
| | Back | Ch512 | 25.42 | 26.00 | 1.143 | 0.495 | 0.566 | 0.141 |
| WCDM A Band II | Front | Ch9262 | 23.95 | 24.50 | 1.135 | 0.387 | 0.439 | -0.339 |
| | Back | Ch9262 | 23.95 | 24.50 | 1.135 | 0.451 | 0.512 | 0.140 |
| WLAN 2.4G | Front | Ch1 | 13.95 | 14.50 | 1.135 | 0.089 | 0.101 | 0.012 |
| | Back | Ch1 | 13.95 | 14.50 | 1.135 | 0.101 | 0.115 | 0.104 |



13.2 Evaluation of Simultaneous :

BT* - Estimated SAR for Bluetooth

$(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm}) \cdot [\sqrt{f_{(\text{GHz})}}/x]$ W/kg for test separation distances ≤ 50 mm;

where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.

| Maximum Power | Exposure Position | Head | Hotspot | Body-worn |
|---------------|----------------------|-----------|-----------|-----------|
| | Test separation | 0 mm | 10 mm | 10 mm |
| 4.96dBm | Estimated SAR (W/kg) | 0.132W/kg | 0.066W/kg | 0.066W/kg |

Conclusion:

According to the above table, the sum of reported SAR values for GSM and BT < 1.6 W/kg. So the simultaneous transmission SAR is not required for BT transmitter.

<Highest simultaneous transmission SAR>

| | Position | Main antenna | WLAN 2.4G | Bluetooth | Max Sum |
|----------------------------|-------------|--------------|-----------|-----------|--------------|
| Highest SAR value for Head | Right Cheek | 0.538 | 0.192 | 0.132 | 0.73 |
| Highest SAR value for Body | Back | 0.586 | 0.115 | 0.066 | 0.701 |



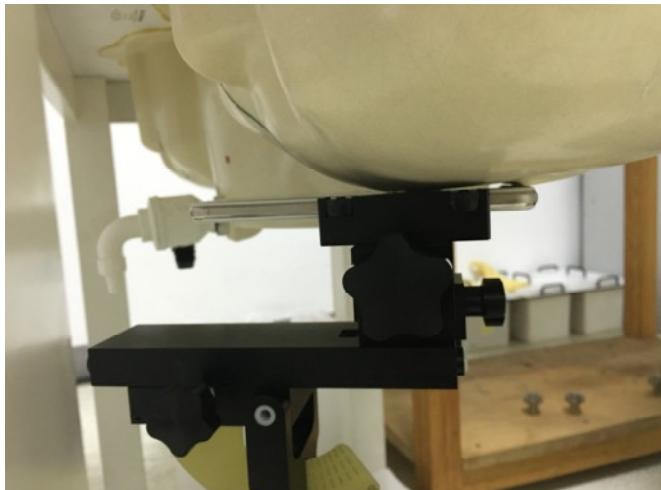
13.3 DUT and setup photos:



Front



Back



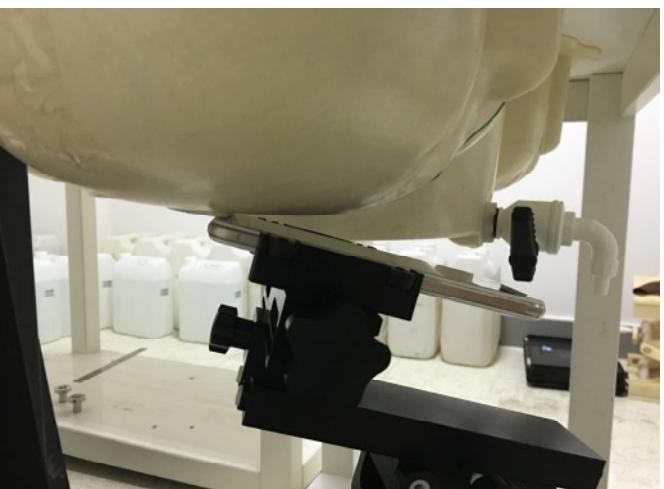
Left Cheek



Left Tilt



Right Cheek



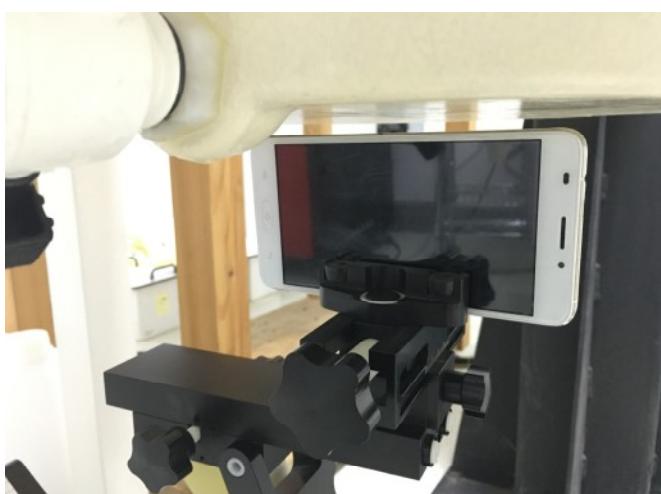
Right Tilt



Front of the EUT with 1 cm Gap



Back of the EUT with 1 cm Gap



Left of the EUT with 1 cm Gap



Right of the EUT with 1 cm Gap



Top of the EUT with 1 cm Gap



Bottom of the EUT with 1 cm Gap

**14. Equipment List:**

| NO. | Instrument | Manufacturer | Model | S/N | Cal. Date | Cal. Due Date |
|-----|----------------------|--------------|----------------|----------------|------------------------------|---------------------------|
| 1 | Communication Tester | Agilent | E5515C | MY502672 64 | Jul 7 th 2016 | Jul 6 th 2017 |
| 2 | E-field Probe | Speag | EX3DV4 | 3836 | Jul 7 th 2016 | Jul 6 th 2017 |
| 3 | Dielectric Probe Kit | Speag | DAK | 1038 | N/A | N/A |
| 4 | DAE | Speag | DAE4 | 760 | Jun 24 th 2016 | Jun 23 th 2017 |
| 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 | SD000H0 1HA | N/A | N/A | N/A |
| 8 | Vector Network | Agilent | E5071C | MY461076 15 | Jul 7 th 2016 | Jul 6 th 2017 |
| 9 | Signal Generator | Agilent | E4438C | MY490722 79 | Jul 7 th 2016 | Jul 6 th 2017 |
| 10 | Amplifier | Mini-circuit | ZHL-42W | QA098002 | N/A | N/A |
| 11 | Power Meter | Agilent | N1419A | MY500015 63 | Jul 8 th 2016 | Jul 7 th 2017 |
| 12 | Power Sensor | Agilent | N8481H | MY510200 10 | Jul 8 th 2016 | Jul 7 th 2017 |
| 13 | Directional Coupler | Agilent | 772D | MY461512 75 | Jul 7 th 2016 | Jul 6 th 2017 |
| 14 | Directional Coupler | Agilent | 778D | MY482206 07 | Jul 7 th 2016 | Jul 6 th 2017 |
| 15 | Dipole 900MHz | Speag | D900V2 | 1d086 | Jul 1 st 2016 | Jun 30 th 2019 |
| 16 | Dipole 1900MHz | Speag | D1900V2 | 5d194 | Jan 7 th 2015 | Aug 6 th 2018 |
| 18 | Dipole 2450MHz | Speag | D2450V2 | 955 | Jan 8 th 2015 | Jan 7 th 2018 |



Appendix A. System validation plots:

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO., LTD.

DUT: Dipole 900MHz; Type: D900V2; Serial: D900V2 - SN: 1d086

Program Name: System Performance Check at 900 MHz Head

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 0.98 \text{ mho/m}$; $\epsilon_r = 42.14$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(9.03, 9.03, 9.03); Calibrated: 7/7/2016;
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE4 Sn760; Calibrated: 6/24/2016
 - Phantom: SAM 2; Type: SAM; Serial: TP-1432
 - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172
- d=15mm, Pin=250mW/Area Scan (61x61x1):** Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.82 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

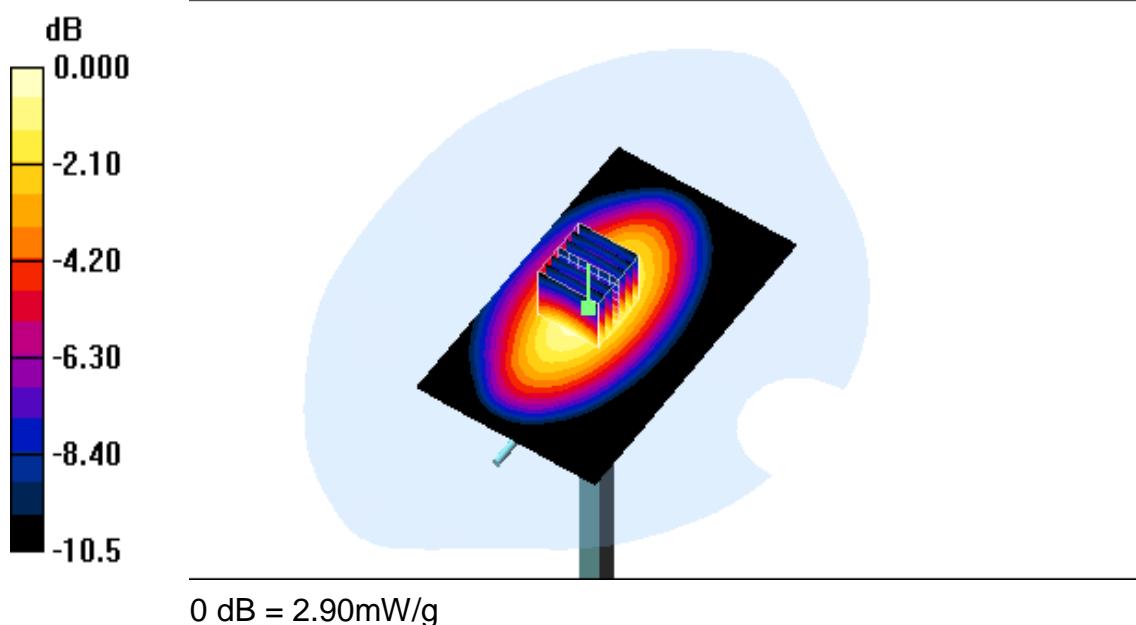
dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.523 V/m; Power Drift = -0.01dB

Peak SAR (extrapolated) = 4.068 W/kg

SAR(1 g) = 2.68 mW/g; SAR(10 g) = 1.73 mW/g

Maximum value of SAR (measured) = 2.90 mW/g





Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Dipole 1900MHz; Type: D1900V2; Serial: 5d194

Program Name: System Performance Check at 1900 MHz Head

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.60, 7.60, 7.60); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 11.3 mW/g

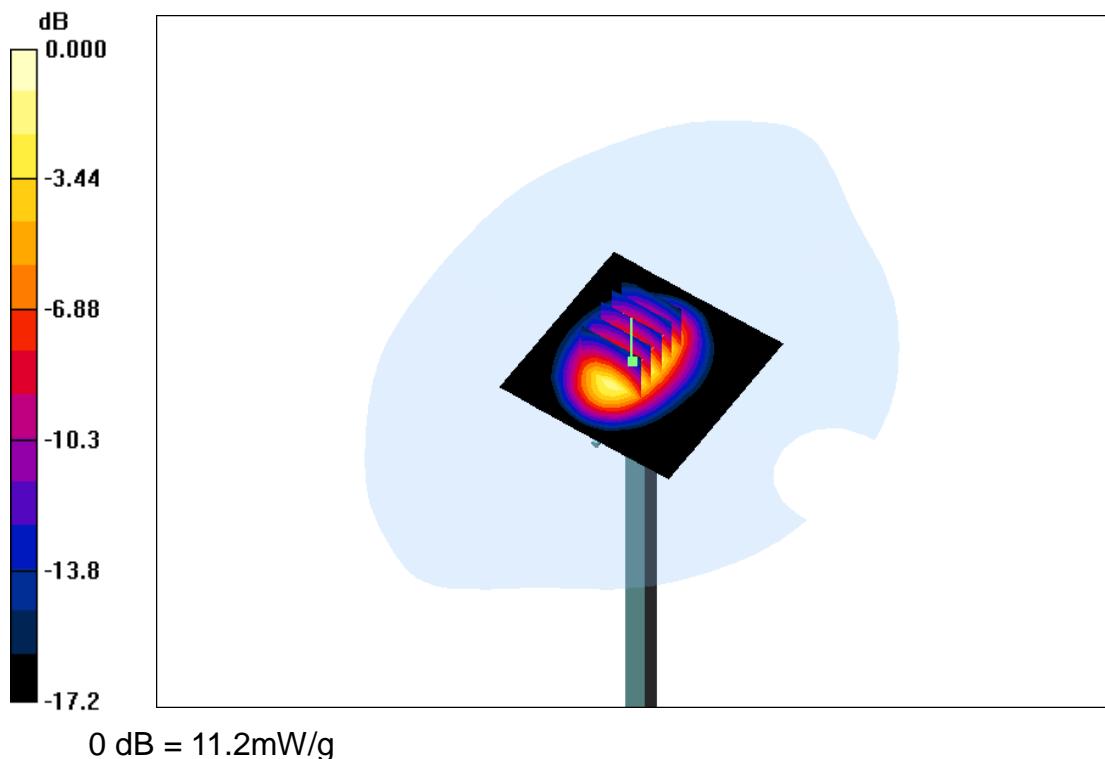
d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 80.6 V/m; Power Drift = -0.005 dB

Peak SAR (extrapolated) = 17.5 W/kg

SAR(1 g) = 9.88 mW/g; SAR(10 g) = 5.27 mW/g

Maximum value of SAR (measured) = 11.2 mW/g





Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 955

Program Name: System Performance Check at 2450 MHz Head

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.84 \text{ mho/m}$; $\epsilon_r = 38.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.07, 7.07, 7.07); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- 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) = 16.7 mW/g

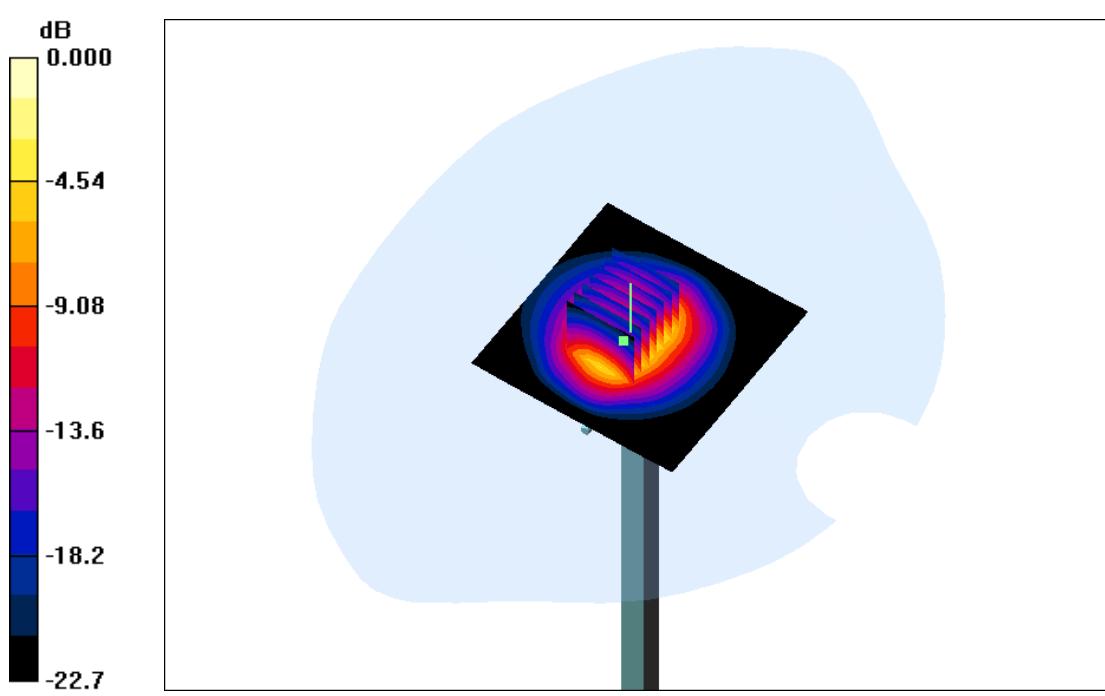
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.0 V/m; Power Drift = 0.019 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 13.4 mW/g; SAR(10 g) = 6.46 mW/g

Maximum value of SAR (measured) = 16.2 mW/g



0 dB = 16.2mW/g



Date: 5/19/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Dipole 900MHz; Type: D900V2; Serial: D900V2 - SN: 1d086

Program Name: System Performance Check at 900 MHz Body

Communication System: CW; Frequency: 900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 900 \text{ MHz}$; $\sigma = 0.96 \text{ mho/m}$; $\epsilon_r = 54.7$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(8.95, 8.95, 8.95); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=15mm, Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.72 mW/g

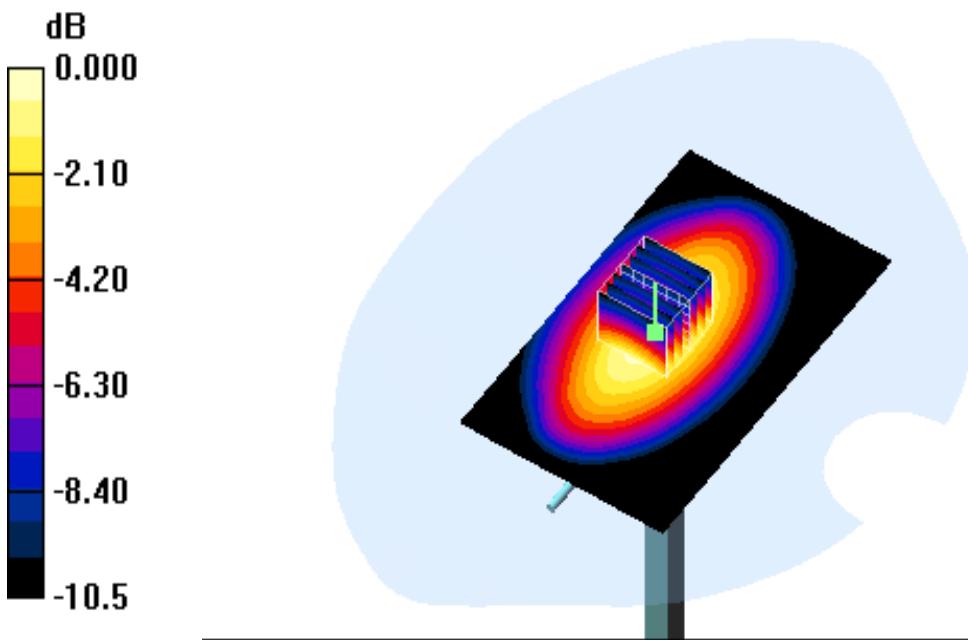
d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:
dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.523 V/m; Power Drift = -0.01dB

Peak SAR (extrapolated) = 4.068 W/kg

SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.76 mW/g

Maximum value of SAR (measured) = 2.80 mW/g



0 dB = 2.90mW/g



Date: 5/19/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Dipole 1900MHz; Type: D1900V2; Serial: 5d194

Program Name: System Performance Check at 1900 MHz Body

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900 \text{ MHz}$; $\sigma = 1.46 \text{ mho/m}$; $\epsilon_r = 40.3$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.33, 7.33, 7.33); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

d=10mm, Pin=250mW/Area Scan (91x91x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 12.8 mW/g

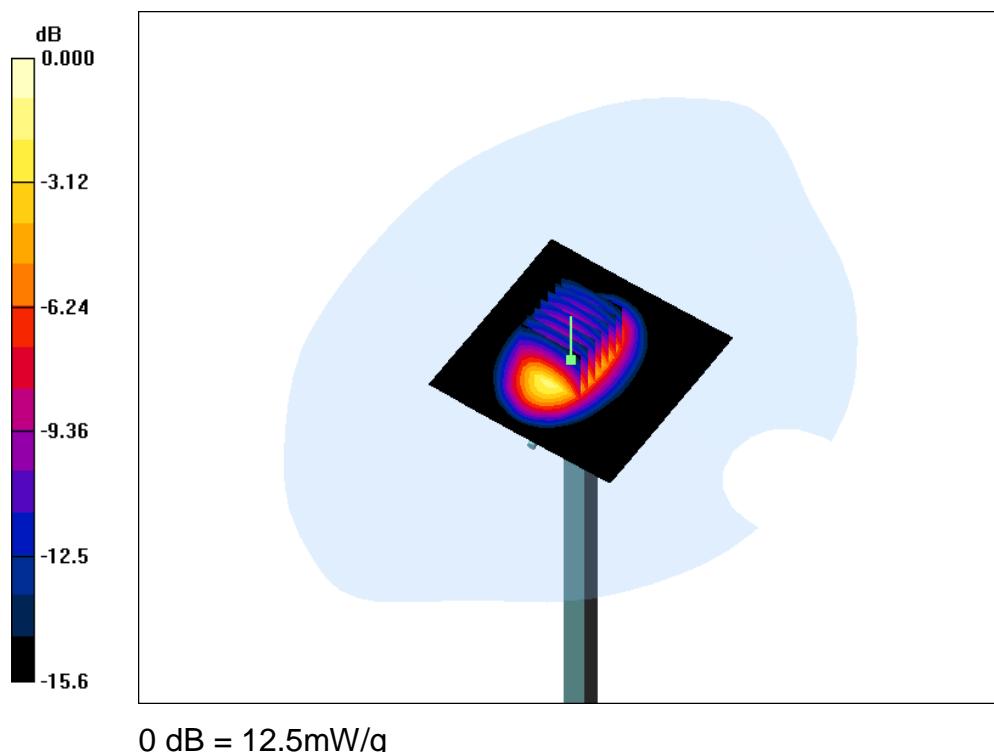
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.9 V/m; Power Drift = 0.109 dB

Peak SAR (extrapolated) = 19.7 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.43 mW/g

Maximum value of SAR (measured) = 12.5 mW/g





Date: 5/20/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 955

Program Name: System Performance Check at 2450 MHz Body

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.87 \text{ mho/m}$; $\epsilon_r = 50.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.20, 7.20, 7.20); Calibrated: 7/7/2016;
 - Sensor-Surface: 4mm (Mechanical Surface Detection)
 - Electronics: DAE4 Sn760; Calibrated: 6/24/2016
 - Phantom: SAM 1; Type: SAM; Serial: TP-1360
 - Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172
- d=10mm, Pin=250mW/Area Scan (91x91x1):** Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 16.2 mW/g

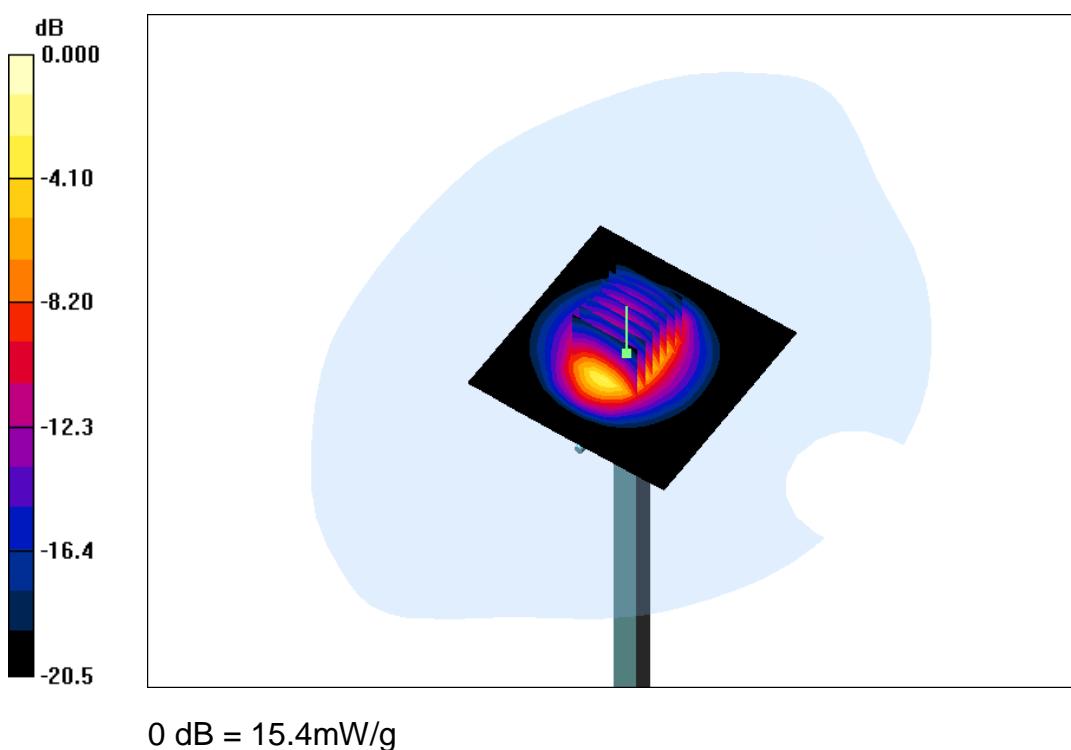
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.5 V/m; Power Drift = 0.017 dB

Peak SAR (extrapolated) = 27.0 W/kg

SAR(1 g) = 13.6 mW/g; SAR(10 g) = 6.35 mW/g

Maximum value of SAR (measured) = 15.4 mW/g





Appendix B. SAR Test plots:

#1

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number

Program Name: S4001

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 849 \text{ MHz}$; $\sigma = 0.932 \text{ mho/m}$; $\epsilon_r = 41$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(9.42, 9.42, 9.42); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Right Cheek/Area Scan (71x111x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.203 mW/g

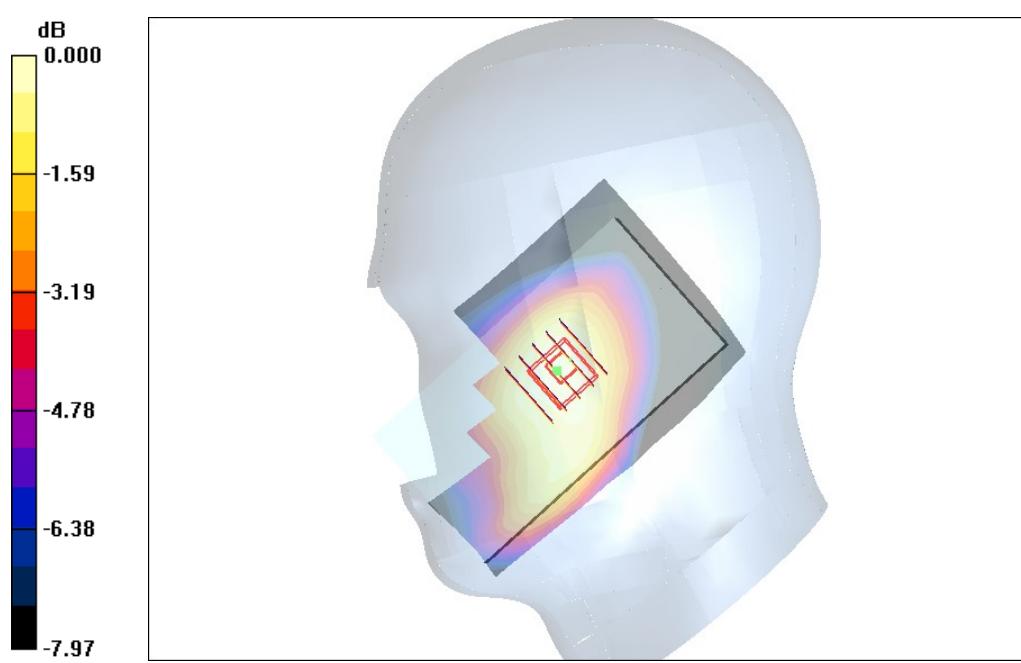
Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.61 V/m; Power Drift = 0.171 dB

Peak SAR (extrapolated) = 0.236 W/kg

SAR(1 g) = 0.196 mW/g; SAR(10 g) = 0.152 mW/g

Maximum value of SAR (measured) = 0.204 mW/g



0 dB = 0.204mW/g



#2

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: GSM 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3

Medium parameters used: $f = 1850.2$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.60, 7.60, 7.60); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Right Cheek/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.228 mW/g

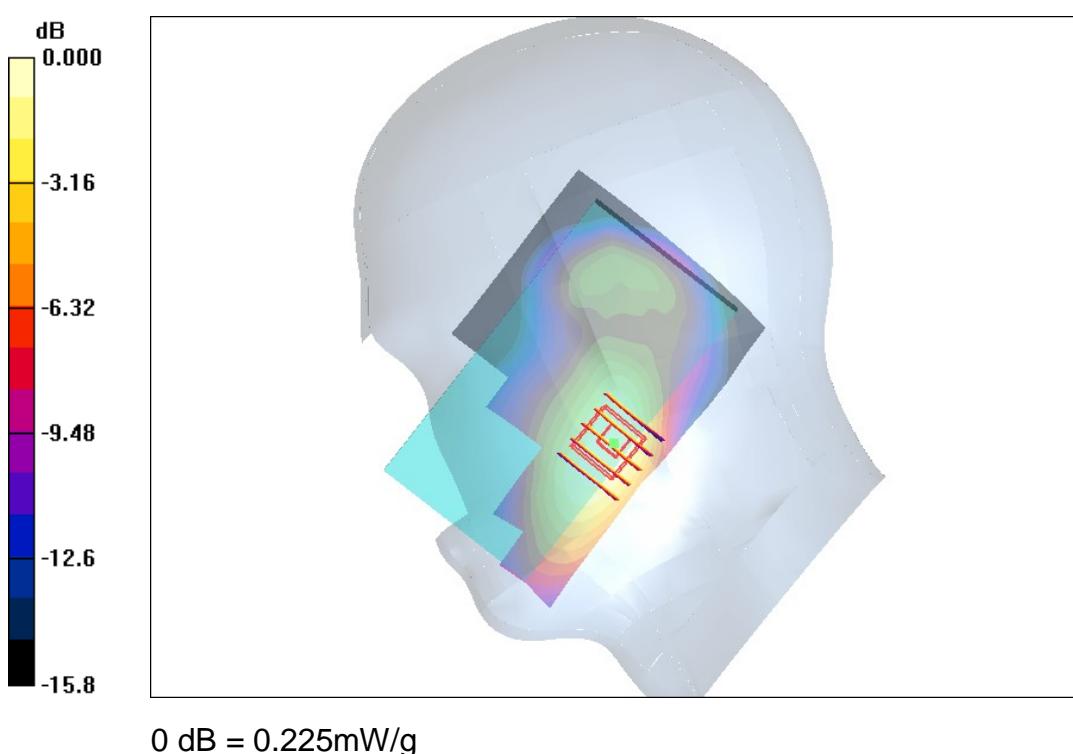
Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 6.67 V/m; Power Drift = -0.188 dB

Peak SAR (extrapolated) = 0.307 W/kg

SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.136 mW/g

Maximum value of SAR (measured) = 0.225 mW/g





#3

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: W850; Frequency: 836.6 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 837 \text{ MHz}$; $\sigma = 0.92 \text{ mho/m}$; $\epsilon_r = 41.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(9.42, 9.42, 9.42); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Left Cheek/Area Scan (71x111x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.271 mW/g

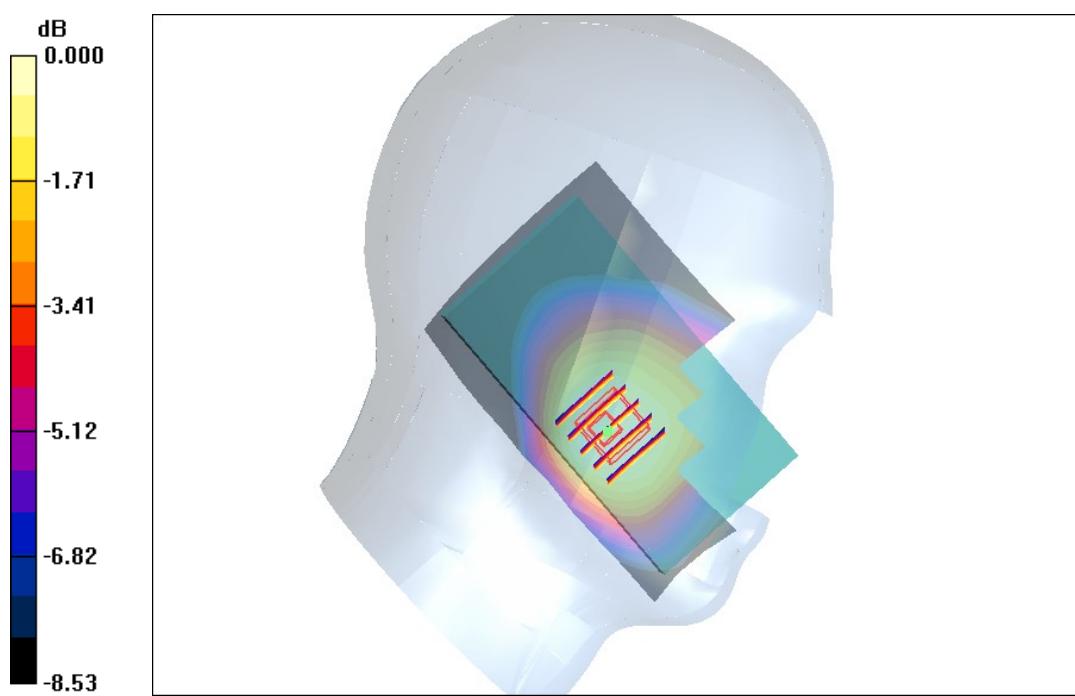
Left Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 5.01 V/m; Power Drift = 0.566 dB

Peak SAR (extrapolated) = 0.307 W/kg

SAR(1 g) = 0.251 mW/g; SAR(10 g) = 0.195 mW/g

Maximum value of SAR (measured) = 0.261 mW/g



0 dB = 0.261mW/g



#4

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: W1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.42$ mho/m; $\epsilon_r = 39.9$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.60, 7.60, 7.60); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Right Cheek/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.526 mW/g

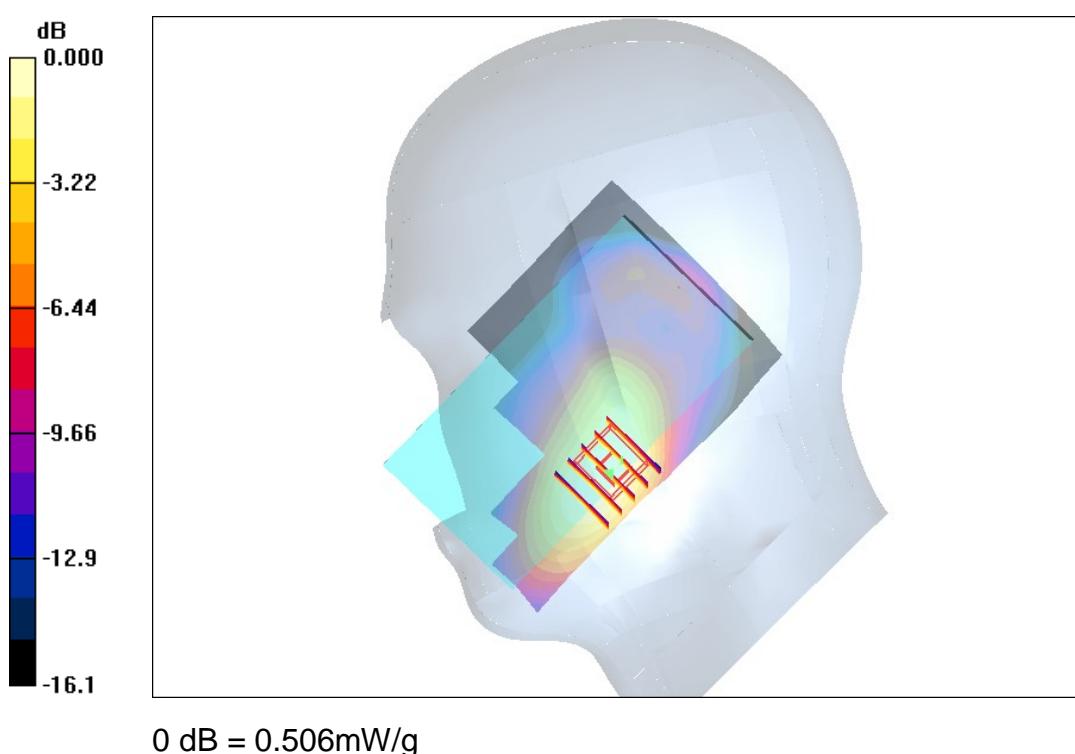
Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 7.41 V/m; Power Drift = 0.038 dB

Peak SAR (extrapolated) = 0.708 W/kg

SAR(1 g) = 0.474 mW/g; SAR(10 g) = 0.304 mW/g

Maximum value of SAR (measured) = 0.506 mW/g





#5

Date: 5/18/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: 802.11; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2412 \text{ MHz}$; $\sigma = 1.82 \text{ mho/m}$; $\epsilon_r = 38.2$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.07, 7.07, 7.07); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Left touch/Area Scan (101x181x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Maximum value of SAR (interpolated) = 0.240 mW/g

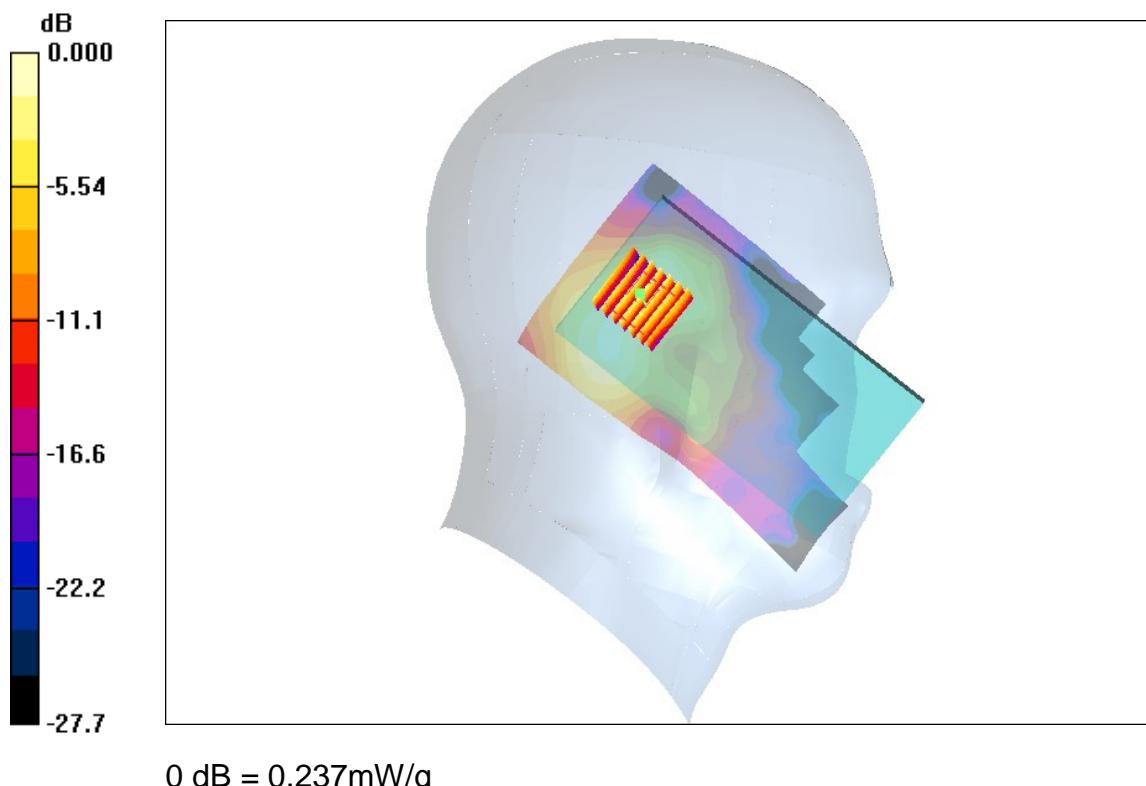
Left touch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 7.65 V/m; Power Drift = -0.120 dB

Peak SAR (extrapolated) = 0.335 W/kg

SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.064 mW/g

Maximum value of SAR (measured) = 0.237 mW/g





#6

Date: 5/19/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: GPRS850; Frequency: 848.8 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated): $f = 848.8 \text{ MHz}$; $\sigma = 0.969 \text{ mho/m}$; $\epsilon_r = 55.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(9.25, 9.25, 9.25); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Back/Area Scan (71x111x1): Measurement grid: $dx=15\text{mm}$, $dy=15\text{mm}$

Maximum value of SAR (interpolated) = 0.541 mW/g

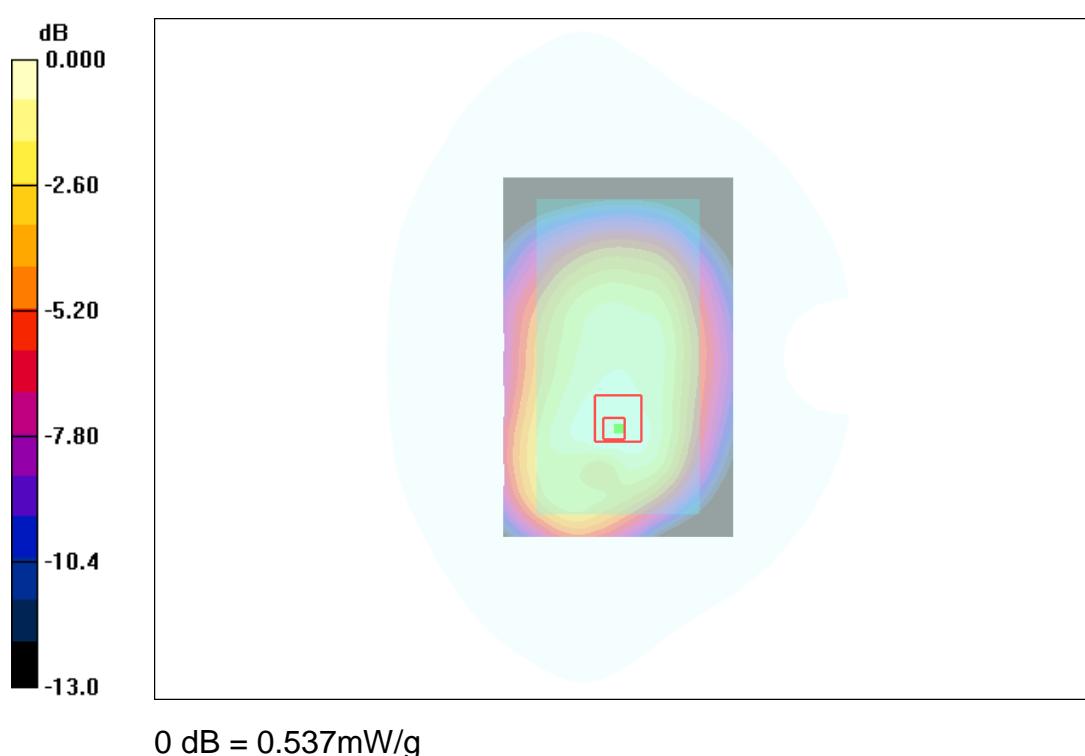
Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=8\text{mm}$, $dy=8\text{mm}$, $dz=5\text{mm}$

Reference Value = 21.1 V/m; Power Drift = 0.058 dB

Peak SAR (extrapolated) = 0.682 W/kg

SAR(1 g) = 0.508 mW/g; SAR(10 g) = 0.373 mW/g

Maximum value of SAR (measured) = 0.537 mW/g





#7

Date: 5/19/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: GPRS1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.33, 7.33, 7.33); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Back/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.538 mW/g

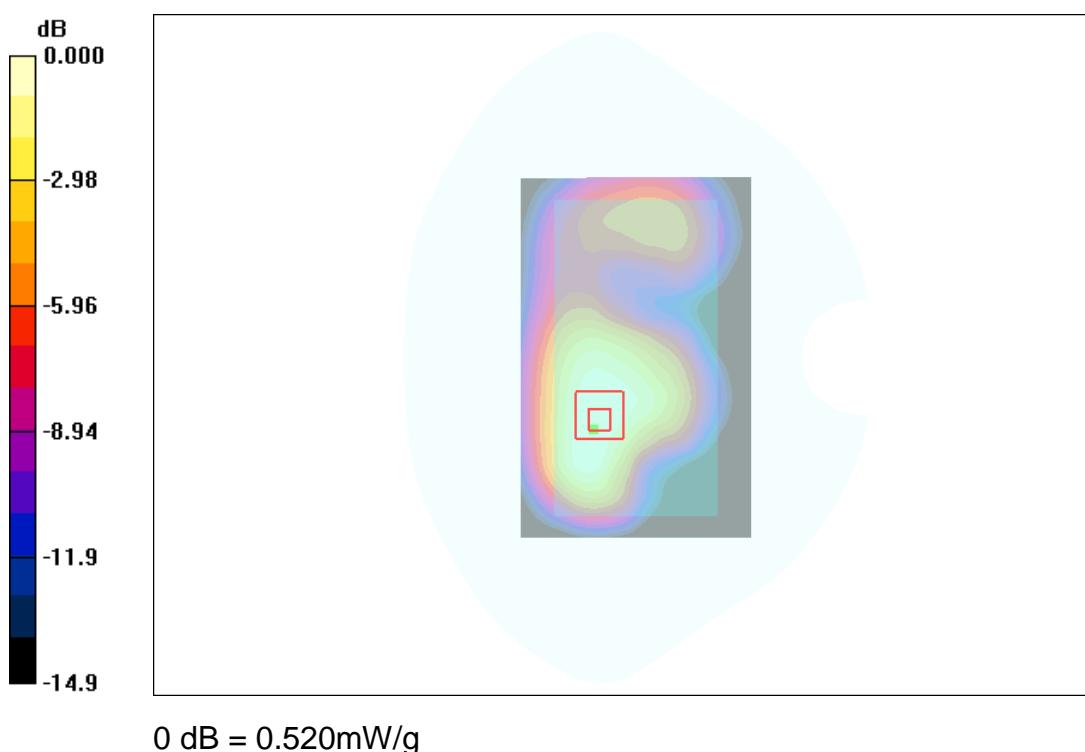
Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = 0.141 dB

Peak SAR (extrapolated) = 0.761 W/kg

SAR(1 g) = 0.495 mW/g; SAR(10 g) = 0.323 mW/g

Maximum value of SAR (measured) = 0.520 mW/g





#8

Date: 5/19/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: W1900; Frequency: 1852.4 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 1852.4$ MHz; $\sigma = 1.48$ mho/m; $\epsilon_r = 52.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.33, 7.33, 7.33); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Back/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (interpolated) = 0.487 mW/g

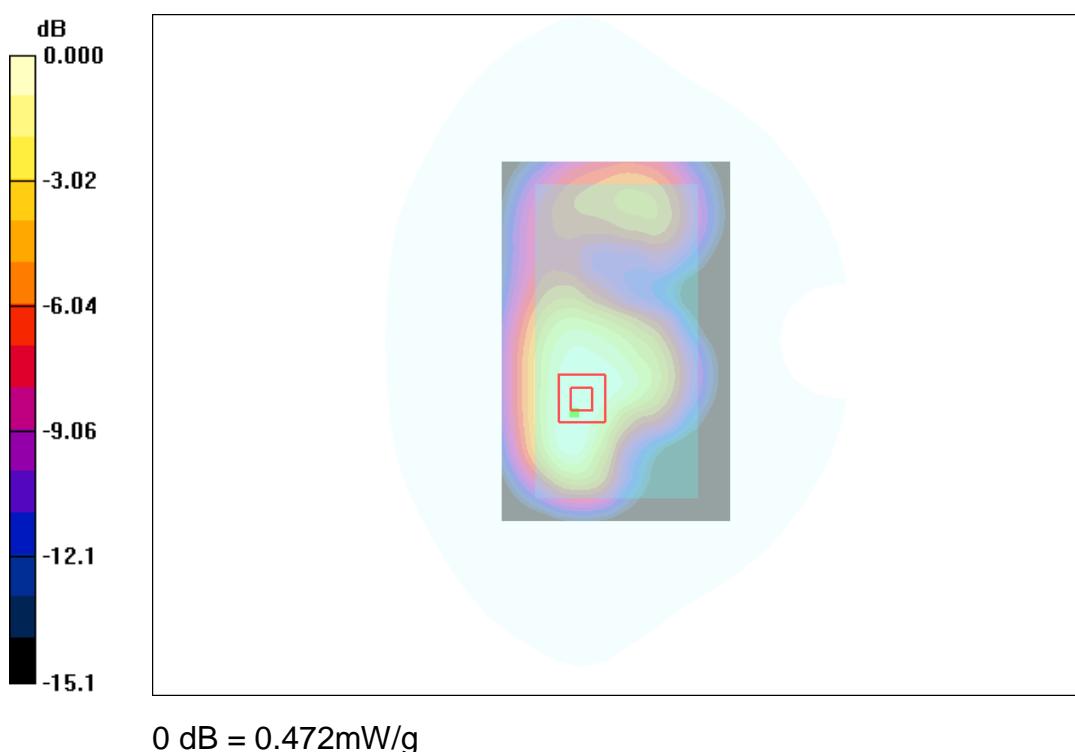
Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 13.6 V/m; Power Drift = 0.140 dB

Peak SAR (extrapolated) = 0.695 W/kg

SAR(1 g) = 0.451 mW/g; SAR(10 g) = 0.293 mW/g

Maximum value of SAR (measured) = 0.472 mW/g





#9

Date: 5/20/2017

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: S4001; Type: SI PIN; Serial: IMEI Number**Program Name: S4001**

Communication System: 802.11; Frequency: 2412 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated): $f = 2412 \text{ MHz}$; $\sigma = 1.81 \text{ mho/m}$; $\epsilon_r = 50.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3836; ConvF(7.20, 7.20, 7.20); Calibrated: 7/7/2016;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn760; Calibrated: 6/24/2016
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Back/Area Scan (101x181x1): Measurement grid: $dx=12\text{mm}$, $dy=12\text{mm}$

Maximum value of SAR (interpolated) = 0.180 mW/g

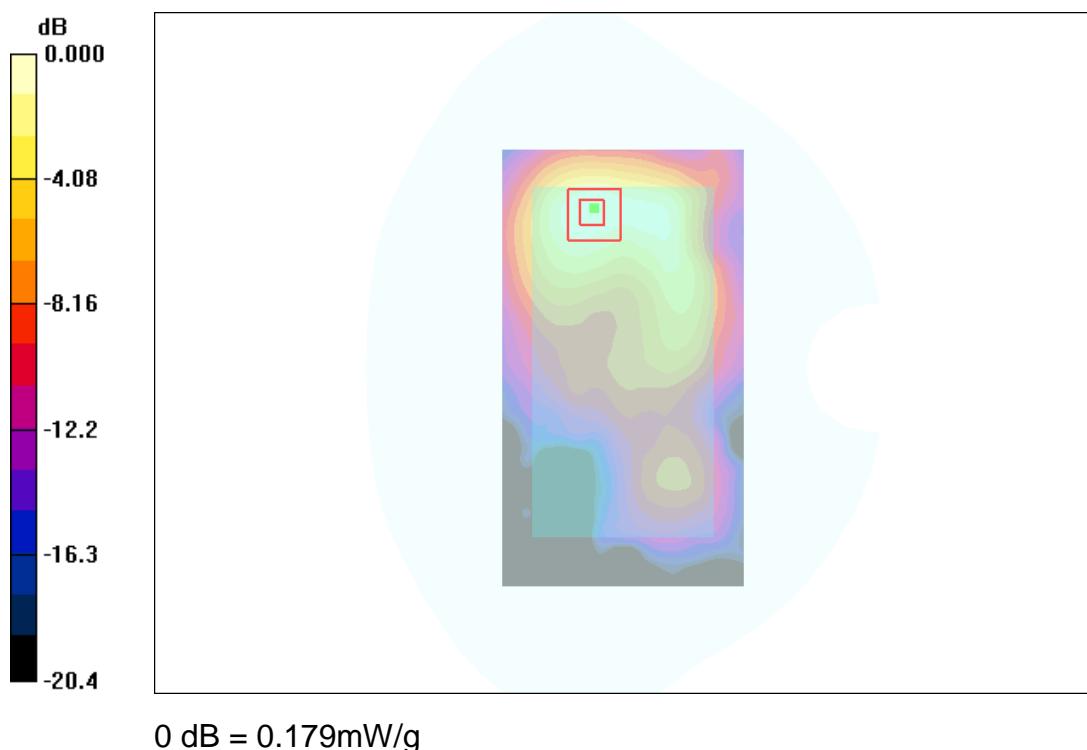
Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 2.80 V/m; Power Drift = 0.104 dB

Peak SAR (extrapolated) = 0.131 W/kg

SAR(1 g) = 0.101 mW/g; SAR(10 g) = 0.041 mW/g

Maximum value of SAR (measured) = 0.179 mW/g





Appendix C. Probe Calibration Data:

| In Collaboration with IAC-MRA 中国认可 国际互认 校准 CALIBRATION CNAS L0570 | | | |
|---|---|--|-----------------------|
| Client | Sunway | | |
| Certificate No: Z16-97101 | | | |
| CALIBRATION CERTIFICATE | | | |
| Object | EX3DV4 - SN:3836 | | |
| Calibration Procedure(s) | FD-Z11-2-004-01 Calibration Procedures for Dosimetric E-field Probes | | |
| Calibration date: | July 07, 2016 | | |
| This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. | | | |
| All calibrations have been conducted in the closed laboratory facility: environment temperature(22 ± 3)°C and humidity<70%. | | | |
| Calibration Equipment used (M&TE critical for calibration) | | | |
| Primary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
| Power Meter NRP2 | 101919 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101547 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Power sensor NRP-Z91 | 101548 | 27-Jun-16 (CTTL, No.J16X04777) | Jun-17 |
| Reference10dBAttenuator | 18N50W-10dB | 13-Mar-16(CTTL, No.J16X01547) | Mar-18 |
| Reference20dBAttenuator | 18N50W-20dB | 13-Mar-16(CTTL, No.J16X01548) | Mar-18 |
| Reference Probe EX3DV4 | SN 3617 | 26-Aug-15(SPEAG, No.EX3-3617_Aug15) | Aug-16 |
| DAE4 | SN 1331 | 21-Jan-16(SPEAG, No.DAE4-1331_Jan16) | Jan -17 |
| Secondary Standards | ID # | Cal Date(Calibrated by, Certificate No.) | Scheduled Calibration |
| SignalGeneratorMG3700A | 6201052605 | 27-Jun-16 (CTTL, No.J16X04776) | Jun-17 |
| Network Analyzer E5071C | MY46110673 | 26-Jan-16 (CTTL, No.J16X00894) | Jan -17 |
| Calibrated by: | Name | Function | Signature |
| | Yu Zongying | SAR Test Engineer | |
| Reviewed by: | Name | Function | Signature |
| | Qi Dianyuan | SAR Project Leader | |
| Approved by: | Name | Function | Signature |
| | Lu Bingsong | Deputy Director of the laboratory | |
| Issued: July 08, 2016 | | | |
| This calibration certificate shall not be reproduced except in full without written approval of the laboratory. | | | |



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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 $\theta=0$ is normal to probe axis |
| Connector Angle | information used in DASY system to align probe sensor X to the robot coordinate system |

Calibration is Performed According to the Following Standards:

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

Methods Applied and Interpretation of Parameters:

- $NORMx,y,z$: Assessed for E-field polarization $\theta=0$ ($f \leq 900\text{MHz}$ in TEM-cell; $f > 1800\text{MHz}$: 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 $f \leq 800\text{MHz}$) and inside waveguide using analytical field distributions based on power measurements for $f > 800\text{MHz}$. 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 $\pm 50\text{MHz}$ to $\pm 100\text{MHz}$.
- *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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Probe EX3DV4

SN: 3836

Calibrated: July 07, 2016

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3836

Basic Calibration Parameters

| | Sensor X | Sensor Y | Sensor Z | Unc (k=2) |
|--|----------|----------|----------|--------------|
| Norm($\mu\text{V}/(\text{V}/\text{m})^2$) ^A | 0.40 | 0.46 | 0.43 | $\pm 10.8\%$ |
| DCP(mV) ^B | 93.2 | 100.2 | 98.0 | |

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 | 167.8 | $\pm 2.0\%$ |
| | | Y | 0.0 | 0.0 | 1.0 | | 182.5 | |
| | | Z | 0.0 | 0.0 | 1.0 | | 176.7 | |

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 E²-field uncertainty inside TSL (see Page 5 and Page 6).

^B Numerical linearization parameter: uncertainty not required.

^E Uncertainty 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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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3836

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 ^G | Depth ^G (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750 | 41.9 | 0.89 | 9.43 | 9.43 | 9.43 | 0.30 | 0.80 | ± 12% |
| 835 | 41.5 | 0.90 | 9.42 | 9.42 | 9.42 | 0.15 | 1.58 | ± 12% |
| 900 | 41.5 | 0.97 | 9.03 | 9.03 | 9.03 | 0.15 | 1.46 | ± 12% |
| 1750 | 40.1 | 1.37 | 8.04 | 8.04 | 8.04 | 0.14 | 1.63 | ± 12% |
| 1900 | 40.0 | 1.40 | 7.60 | 7.60 | 7.60 | 0.16 | 1.59 | ± 12% |
| 2300 | 39.5 | 1.67 | 7.45 | 7.45 | 7.45 | 0.53 | 0.68 | ± 12% |
| 2450 | 39.2 | 1.80 | 7.07 | 7.07 | 7.07 | 0.54 | 0.71 | ± 12% |
| 2600 | 39.0 | 1.96 | 6.96 | 6.96 | 6.96 | 0.61 | 0.66 | ± 12% |
| 5200 | 36.0 | 4.66 | 5.32 | 5.32 | 5.32 | 0.40 | 1.42 | ± 13% |
| 5300 | 35.9 | 4.76 | 5.13 | 5.13 | 5.13 | 0.40 | 1.40 | ± 13% |
| 5500 | 35.6 | 4.96 | 4.85 | 4.85 | 4.85 | 0.40 | 1.35 | ± 13% |
| 5600 | 35.5 | 5.07 | 4.59 | 4.59 | 4.59 | 0.40 | 1.45 | ± 13% |
| 5800 | 35.3 | 5.27 | 4.71 | 4.71 | 4.71 | 0.40 | 1.45 | ± 13% |

^C Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

^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.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3836

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 ^G | Depth ^G (mm) | Unct. (k=2) |
|----------------------|------------------------------------|---------------------------------|---------|---------|---------|--------------------|-------------------------|-------------|
| 750 | 55.5 | 0.96 | 9.38 | 9.38 | 9.38 | 0.30 | 0.85 | ±12% |
| 835 | 55.2 | 0.97 | 9.25 | 9.25 | 9.25 | 0.17 | 1.44 | ±12% |
| 900 | 55.0 | 1.05 | 8.95 | 8.95 | 8.95 | 0.14 | 1.60 | ±12% |
| 1750 | 53.4 | 1.49 | 7.64 | 7.64 | 7.64 | 0.17 | 1.71 | ±12% |
| 1900 | 53.3 | 1.52 | 7.33 | 7.33 | 7.33 | 0.18 | 1.80 | ±12% |
| 2300 | 52.9 | 1.81 | 7.45 | 7.45 | 7.45 | 0.51 | 0.80 | ±12% |
| 2450 | 52.7 | 1.95 | 7.20 | 7.20 | 7.20 | 0.62 | 0.70 | ±12% |
| 2600 | 52.5 | 2.16 | 6.99 | 6.99 | 6.99 | 0.52 | 0.79 | ±12% |
| 5200 | 49.0 | 5.30 | 4.83 | 4.83 | 4.83 | 0.50 | 1.25 | ±13% |
| 5300 | 48.9 | 5.42 | 4.60 | 4.60 | 4.60 | 0.50 | 1.35 | ±13% |
| 5500 | 48.6 | 5.65 | 4.32 | 4.32 | 4.32 | 0.50 | 1.35 | ±13% |
| 5600 | 48.5 | 5.77 | 4.20 | 4.20 | 4.20 | 0.50 | 1.40 | ±13% |
| 5800 | 48.2 | 6.00 | 4.30 | 4.30 | 4.30 | 0.50 | 1.30 | ±13% |

^C Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

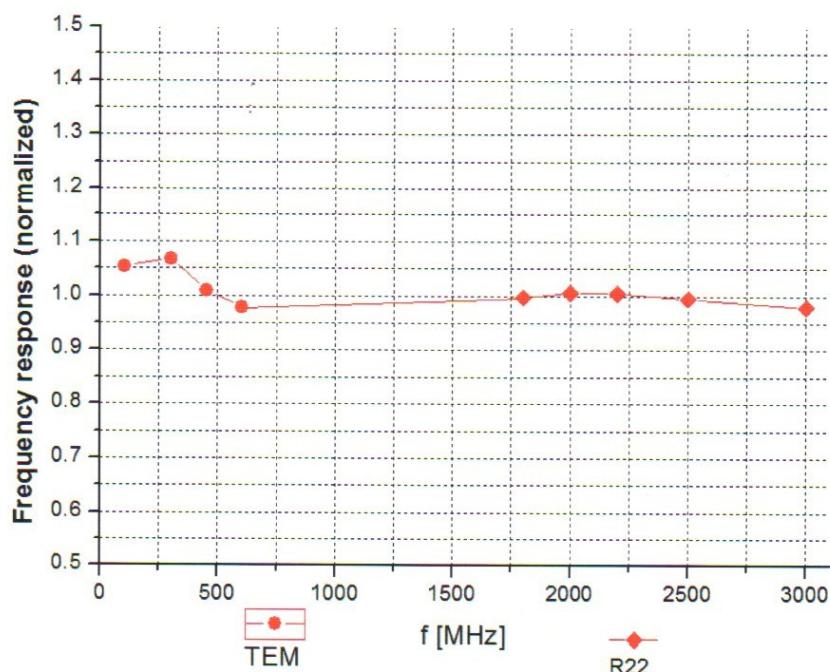
^F At frequency below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.



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



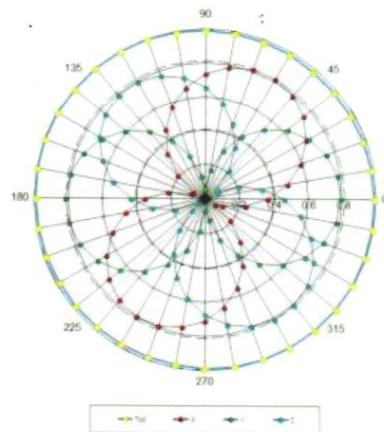
Uncertainty of Frequency Response of E-field: $\pm 7.5\%$ ($k=2$)



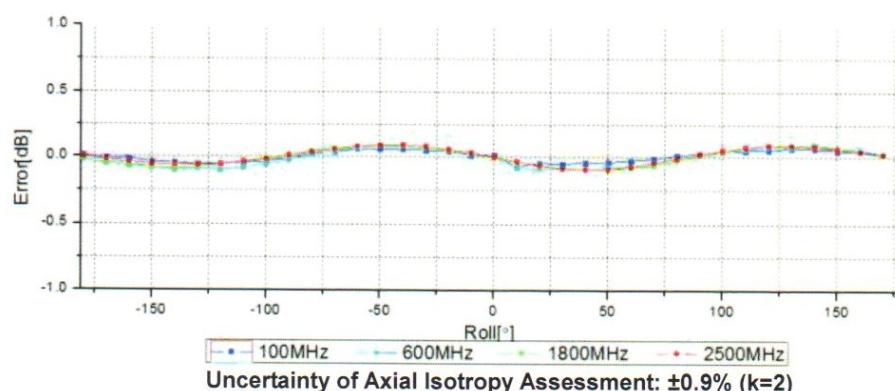
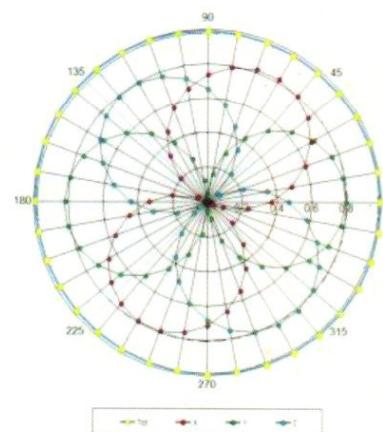
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Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM



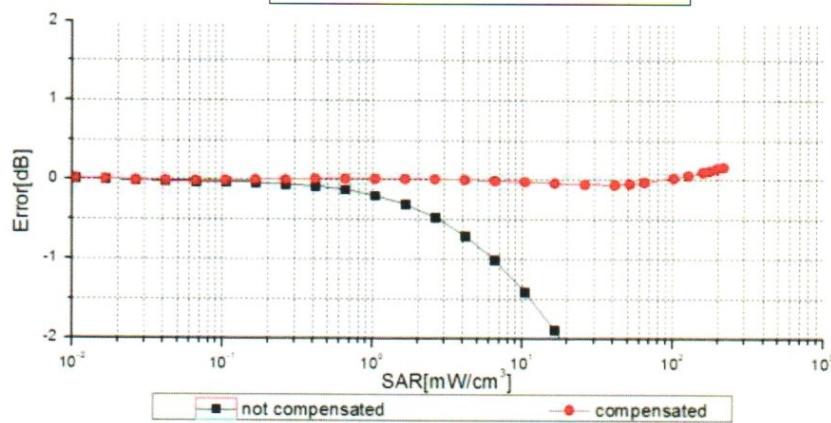
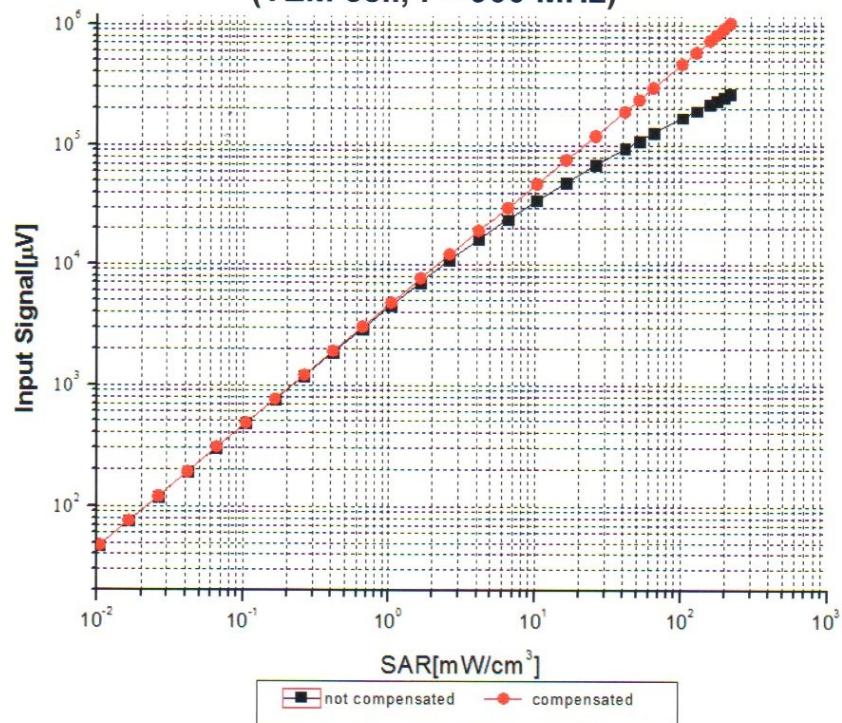
f=1800 MHz, R22





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



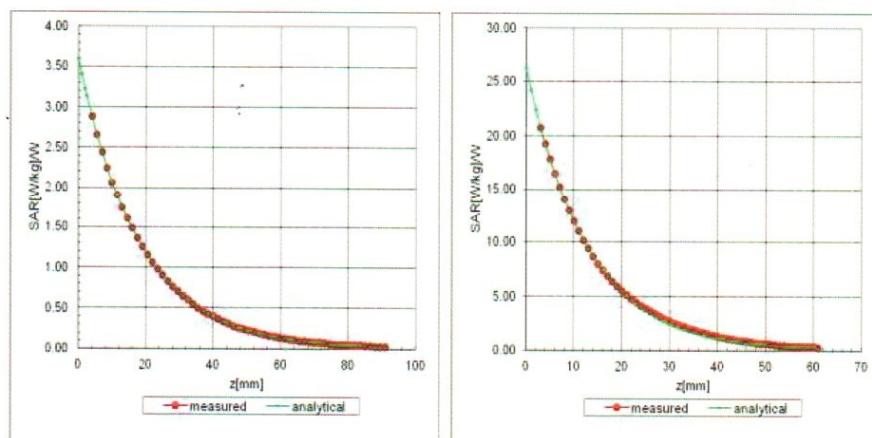
Uncertainty of Linearity Assessment: $\pm 0.9\%$ ($k=2$)



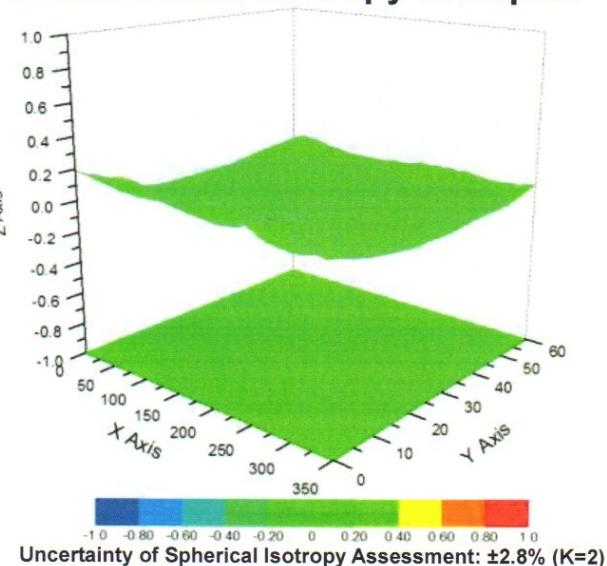
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Conversion Factor Assessment

f=900 MHz, WGLS R9(H_convF) f=1900 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid





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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3836

Other Probe Parameters

| | |
|---|------------|
| Sensor Arrangement | Triangular |
| Connector Angle (°) | 47.9 |
| Mechanical Surface Detection Mode | enabled |
| Optical Surface Detection Mode | disable |
| Probe Overall Length | 337mm |
| Probe Body Diameter | 10mm |
| Tip Length | 9mm |
| Tip Diameter | 2.5mm |
| Probe Tip to Sensor X Calibration Point | 1mm |
| Probe Tip to Sensor Y Calibration Point | 1mm |
| Probe Tip to Sensor Z Calibration Point | 1mm |
| Recommended Measurement Distance from Surface | 1.4mm |