FCC SAR TEST REPORT

For

AZUMI S.A

Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Piso 16 of. 16-01, Marbella, Ciudad de Panamá City, Rep. Panamá

Product Name	: Mobile phone
Model No.	: Speed 5.5
FCC ID	: QRP-AZUMISPEED55
Date of Receipt	: 15th Oct. 2015
Date of Test	: 15th ~20th Oct. 2015
Issued Date	: 5th Nov. 2015
Report No.	: TS201511001
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

TABLE OF CONTENS

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	0.139	**0.244**
	GSM1900	0.060	
	WCDMA V	0.109	
	WCDMA II	0.068	
	LTE Band 2	0.046	
	LTE Band 4	0.041	
	LTE Band 7	0.031	
	WLAN 2.4GHz Band	**0.244**	
Body (1cm Gap)	GSM850	0.754	**0.785**
	GSM1900	0.778	
	WCDMA V	0.273	
	WCDMA II	**0.785**	
	LTE Band 2	0.745	
	LTE Band 4	0.189	
	LTE Band 7	0.250	
	WLAN 2.4GHz Band	0.042	

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 (W/kg)	WLAN 2.4G (W/kg)	Max Sum (W/kg)
Highest SAR value for Head	Right Cheek	0.121	0.244	**0.365**
Highest SAR value for Body	Back	0.785	0.042	**0.827**

According to the above table, the maximum sum of reported SAR values for GSM/WCDMA/LTE and WIFI is **0.827** W/kg (1g).

2. SAR Evaluation compliance

Product Name:	Mobile phone
Brand Name:	Azumi
Model Name:	Speed 5.5
Applicant:	AZUMI S.A
Address:	Avenida Aquilino de la Guardia con Calle 47, PH Ocean Plaza, Piso 16 of. 16-01, Marbella, Ciudad de Panamá City, Rep. Panamá
Manufacturer:	AZUMI (HK) LTD
Address:	518, 5F, R&D building, Tsinghua Hi-Tech Park, Hi-Tech park(North) Nanshan district, Shenzhen
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 v01r01 FCC KDB 447498 D01 General RF Exposure Guidance v05r02 FCC KDB 941225 D06 Hotspot Mode v02 FCC KDB 648474 D04 Handset SAR v01r02 FCC KDB 248227 D01 SAR meas for 802 11abg v02r01 FCC KDB 941225 D01 3G SAR Procedures v03 FCC KDB 941225 D05 SAR for LTE Devices v02r03
Test Engineer:	Li.zhao
Reviewed By	Tomy. Liu
Performed Location:	Shenzhen Sunway Communication CO.,LTD Testing Center 1/F, BuildingA，SDG Info Port, KefengRoad，Hi-Tech Park, Nanshan District, Shenzhen, Guangdong, China Tel: +86-755- 36615880 Fax: +86-755- 86525532

3. General Information:

3.1 EUT Description:

EUT Information	
Product Name	Mobile phone
Brand Name	Azumi
Model Name	Speed 5.5
Hardware Version	S5508-MB-V1.2
Software Version	/
Antenna gain:	GSM 850: 1.6 dBi PCS 1900:3.8 dBi WCDMA 850:1.7 dBi WCDMA 1900:3.8dBi LTE Band 2: 3.8 dBi LTE Band 4: 3.95 dBi LTE Band 7: 4.3 dBi WIFI: 2.9 dBi BT: 2.9 dBi
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	GSM/GPRS RMC/AMR 12.2Kbps HSDPA HSUPA LTE QPSK/16QAM 802.11b/g/n HT20/HT40 Bluetooth v3.0+EDR 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.

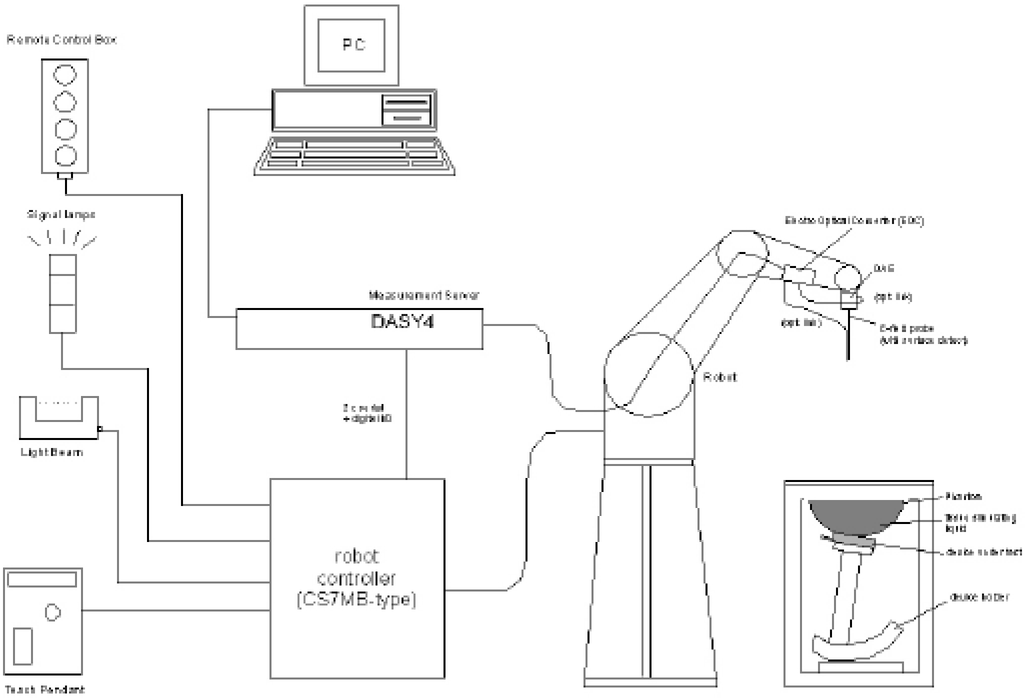
3.2 Test Environment:

Ambient conditions in the SAR laboratory:

Items	Required	Actual
Temperature (℃)	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:

- 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.

5. System Components:

➢ 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.

➢ 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:

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.

- 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 are the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

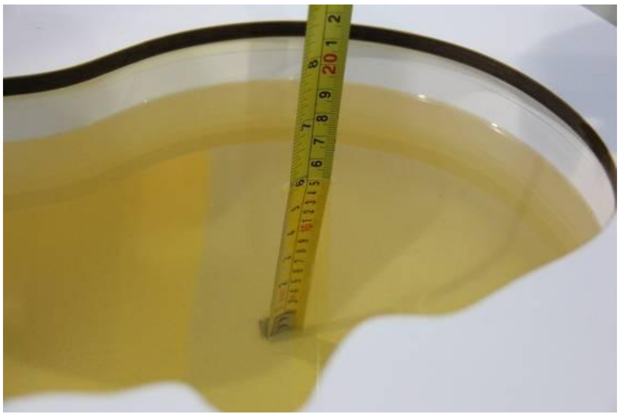
The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity "=3 and loss tangent _=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence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

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 (εr)
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
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
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
2600	68.1	0	0	0.1	0	31.8	2.16	52.5



Head (depth>15cm)

Flat (depth>15cm)

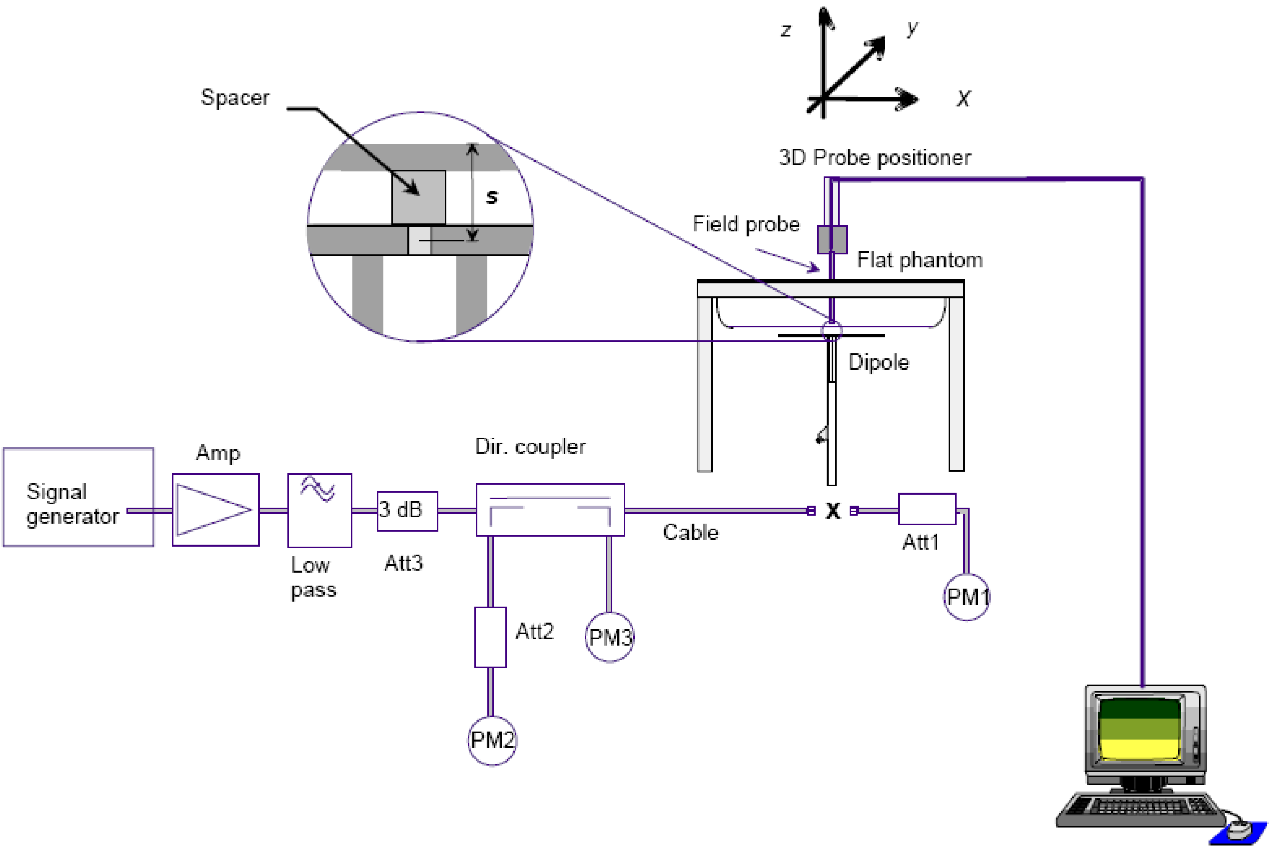
6.2 Tissue Calibration Result:

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue				Liquid Temp.	Test Data
		ε_r	σ	ε_r	Dev.	σ	Dev.		
900H	900	0.97	41.5	0.97	0%	42.09	1.5%	22.3	10/15/2015
1750H	1750	1.37	40.1	1.38	0.73%	39.79	-0.7%	22.8	10/15/2015
1900H	1900	1.40	40.0	1.41	0.71%	40.29	0.7%	22.6	10/16/2015
2450H	2450	1.80	39.2	1.83	1.7%	38.19	-2.6%	22.4	10/16/2015
2600H	2600	1.96	39.0	1.96	0%	38.09	-2.3%	22.3	10/17/2015
900B	900	1.05	55.0	1.01	-3.8%	54.69	-0.5%	22.6	10/18/2015
1750B	1750	1.49	53.4	1.53	2.7%	54.59	2.3%	22.4	10/18/2015
1900B	1900	1.52	53.3	1.54	1.3%	53.69	0.8%	22.6	10/19/2015
2450B	2450	1.95	52.7	1.9	-2.6%	50.59	-4.0%	22.7	10/19/2015
2600B	2600	2.16	52.5	2.2	1.9%	51.09	-2.7%	22.5	10/20/2015

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 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.

7.3 Validation Result:

Frequency (MHz)	Description	SAR(1g) W/Kg	SAR(10g) W/Kg	Tissue Temp. (℃)	Date
900 (Head)	Reference	10.7±10% (9.63~11.77)	6.87±10% (6.18~7.49)	NA	2015/10/15
	Measurement	10.68	6.88	22.3	
1750 (Head)	Reference	34.6±10% (31.14~38.06)	18.3±10% (16.47~20.13)	NA	2015/10/15
	Measurement	35.28	18.24	22.8	
1900 (Head)	Reference	40.6±10% (36.54~44.66)	21.3±10% (19.17~23.43)	NA	2015/10/16
	Measurement	39.48	21.04	22.6	
2450 (Head)	Reference	52.4±10% (47.16~57.64)	24.4±10% (21.96~26.84)	NA	2015/10/16
	Measurement	53.2	25.84	22.4	
2600 (Head)	Reference	57.9±10% (52.11~63.69)	26.2±10% (23.58~28.82)	NA	2015/10/17
	Measurement	57.6	25.88	22.3	
900 (Body)	Reference	10.7±10% (9.63~11.77)	6.94±10% (6.246~7.634)	NA	2015/10/18
	Measurement	9.8	6.4	22.6	
1750 (Body)	Reference	37.5±10% (33.75~41.25)	20.1±10% (18.09~22.11)	NA	2015/10/18
	Measurement	36.24	19.4	22.4	
1900 (Body)	Reference	40.1±10% (36.09~44.11)	21.3±10% (19.17~23.43)	NA	2015/10/19
	Measurement	40.4	21.68	22.6	
2450 (Body)	Reference	53.7±10% (48.33~59.07)	25±10% (22.5~27.5)	NA	2015/10/19
	Measurement	54.0	25.36	22.7	
2600 (Body)	Reference	56.8±10% (51.12~62.48)	25.3±10% (22.77~27.83)	NA	2015/10/20
	Measurement	58.4	25.92	22.5	

8. 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

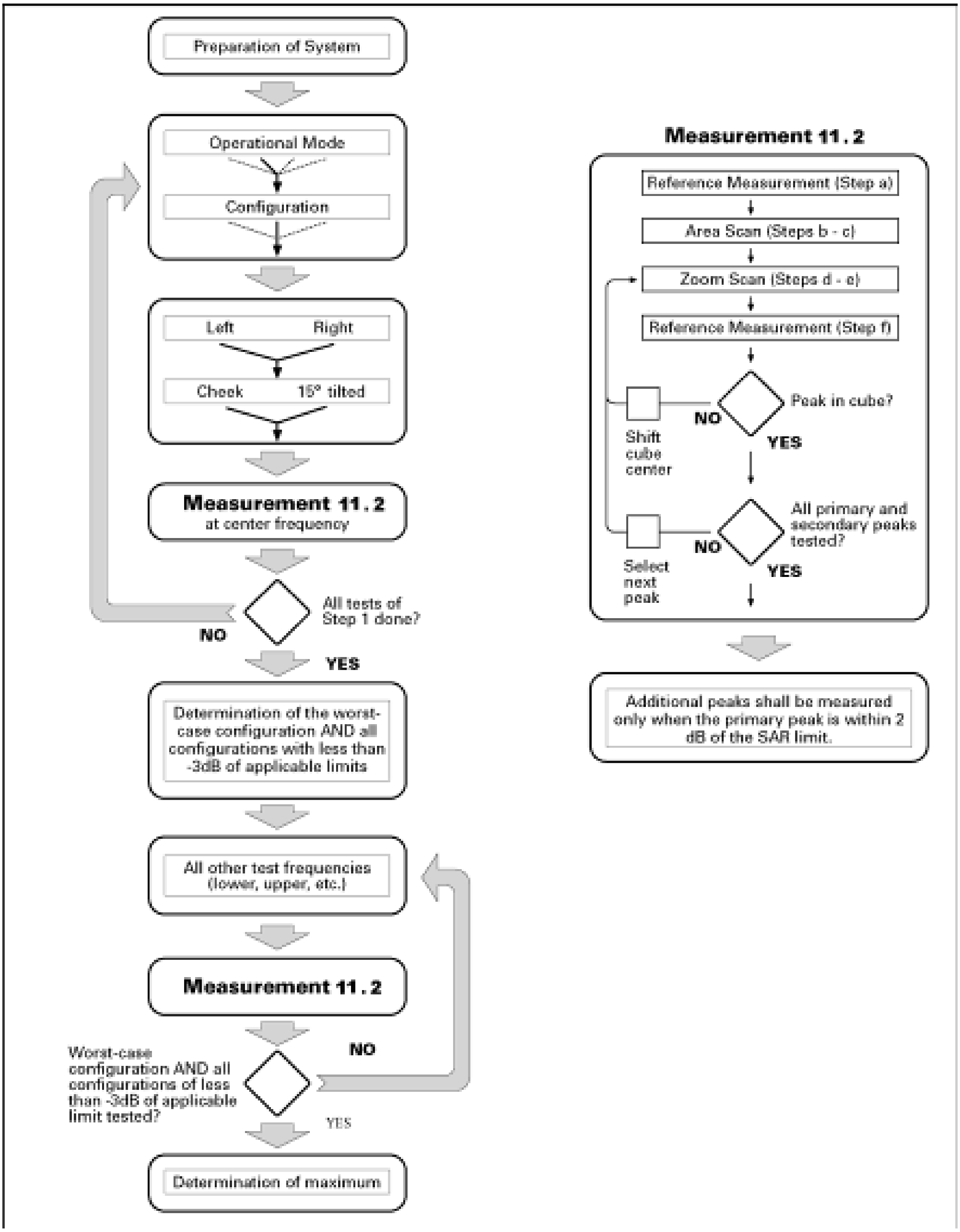
  The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a finer measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. The scanning area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



Block diagram of the tests to be performed

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:

1. Per KDB 447498 D01v05r02, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. 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.
3. 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**	**189**	**251**	**128**	**189**	**251**
Frequency (MHz)	**824.2**	**836.4**	**848.8**	**824.2**	**836.4**	**848.8**
GSM (GMSK, 1 Tx slot)	32.61	32.62	**32.69**	23.61	23.62	23.69
GPRS (GMSK, 1 Tx slot) – CS1	32.37	32.39	32.42	23.37	23.39	23.42
GPRS (GMSK, 2 Tx slots) – CS1	31.86	31.89	31.91	25.86	25.89	25.91
GPRS (GMSK, 3 Tx slots) – CS1	30.46	30.44	30.43	26.20	26.18	26.17
GPRS (GMSK, 4 Tx slots) – CS1	**29.48**	**29.44**	**29.39**	**26.48**	**26.44**	**26.39**
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)	29.30	29.45	**29.47**	20.30	20.45	20.47
GPRS (GMSK, 1 Tx slot) – CS1	28.99	29.18	29.19	19.99	20.18	20.19
GPRS (GMSK, 2 Tx slots) – CS1	28.44	28.68	28.77	22.44	22.68	22.77
GPRS (GMSK, 3 Tx slots) – CS1	26.90	27.19	17.48	22.64	22.93	13.22
GPRS (GMSK, 4 Tx slots) – CS1	**25.81**	**26.12**	**26.46**	**22.81**	**23.12**	**23.46**

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 outlines 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} (Note1, 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: Δ_{ACK}, Δ_{NACK} and Δ_{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 Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c = 11/15 and β_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} (Note1)	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	209/225	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	β_{ed}1: 47/15 β_{ed}2: 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: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c = 10/15 and β_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 β_c = 14/15 and β_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**			**WCDMA V**		
TX Channel	**9262**	**9400**	**9538**	**4132**	**4183**	**4233**
Rx Channel	**9662**	**9800**	**9938**	**4357**	**4408**	**4458**
Frequency (MHz)	**1852.4**	**1880**	**1907.6**	**826.4**	**836.6**	**846.6**
AMR 12.2Kbps	**23.01**	22.85	22.85	22.73	22.82	**22.87**
RMC 12.2Kbps	23.02	22.87	22.86	22.74	22.83	22.89
HSDPA Subtest-1	22.00	21.80	21.93	21.74	21.89	21.90
HSDPA Subtest-2	20.10	19.53	19.87	19.79	19.91	19.98
HSDPA Subtest-3	18.72	18.80	18.83	18.27	19.09	18.82
HSDPA Subtest-4	18.56	18.07	18.43	18.83	18.36	18.14
HSUPA Subtest-1	20.63	20.02	20.51	20.38	20.45	20.42
HSUPA Subtest-2	21.64	21.35	21.48	21.31	21.49	21.42
HSUPA Subtest-3	19.04	18.41	18.88	18.96	18.69	18.80
HSUPA Subtest-4	22.08	21.90	22.04	21.69	21.83	21.88
HSUPA Subtest-5	19.38	19.02	19.42	19.45	19.24	19.58

<LTE Conducted Power>

General Note:

1. Per KDB941225 D05 v02r03, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r03, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in sections 4.2.1 and 4.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r03, For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 4.2.1, 5.2.2 and 4.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.
5. Per KDB 941225 D05v02r03, For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 4.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

<LTE Band 2>

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18607	18900	19193
					1850.7MHz	1880.0MHz	1909.3MHz
2	1.4	QPSK	1	0	23.76	23.23	23.34
			1	2	23.72	23.31	23.42
			1	5	23.69	23.26	23.35
			3	0	23.81	23.45	23.51
			3	1	23.79	23.40	23.49
			3	2	23.78	23.38	23.52
			6	0	22.78	22.32	22.56
		16QAM	1	0	22.85	22.51	22.87
			1	2	22.68	22.53	22.80
			1	5	22.62	22.54	22.46
			3	0	22.83	22.81	22.49
			3	1	22.72	22.50	22.57
			3	2	22.76	22.43	22.43
			6	0	21.94	21.65	21.55

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18615	18900	19185
					1851.5MHz	1880.0MHz	1908.5MHz
2	3	QPSK	1	0	23.55	23.16	23.16
			1	7	23.62	23.38	23.38
			1	14	23.45	23.15	23.21
			8	0	22.75	22.40	22.45
			8	4	22.78	22.46	22.41
			8	7	22.71	22.38	22.46
			15	0	22.75	22.40	22.51
		16QAM	1	0	22.47	22.39	22.42
			1	7	22.86	22.45	22.45
			1	14	22.62	22.41	22.13
			8	0	21.88	21.52	21.65
			8	4	21.79	21.58	21.56
			8	7	21.89	21.74	21.60
			15	0	21.78	21.53	21.52

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18625	18900	19175
					1852.5MHz	1880.0MHz	1907.5MHz
2	5	QPSK	1	0	23.40	23.15	23.21
			1	12	23.53	23.20	23.32
			1	24	23.40	23.01	23.16
			12	0	22.69	22.38	22.40
			12	6	22.71	22.31	22.40
			12	11	22.64	22.36	22.43
			25	0	22.65	22.27	22.33
		16QAM	1	0	22.68	22.48	22.49
			1	12	22.80	22.46	22.75
			1	24	22.56	22.28	22.38
			12	0	21.81	21.50	21.56
			12	6	21.80	21.47	21.56
			12	11	21.74	21.50	21.53
			25	0	21.76	21.38	21.49

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18650	18900	19150
					1855.0MHz	1880.0MHz	1905.0MHz
2	10	QPSK	1	0	23.48	23.17	23.08
			1	24	23.50	23.18	23.25
			1	49	23.38	23.06	23.18
			25	0	22.66	22.31	22.40
			25	12	22.57	22.27	22.37
			25	24	22.56	22.26	22.34
			50	0	22.67	22.34	22.40
		16QAM	1	0	22.41	22.29	22.40
			1	24	22.62	22.70	22.43
			1	49	22.50	22.61	22.26
			25	0	21.68	21.45	21.63
			25	12	21.67	21.48	21.53
			25	24	21.62	21.37	21.39
			50	0	21.7	21.45	21.42

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18675	18900	19125
					1857.5MHz	1880.0MHz	1902.5MHz
2	15	QPSK	1	0	23.51	23.14	23.15
			1	37	23.45	23.25	23.28
			1	74	22.27	23.04	23.17
			36	0	22.71	22.38	22.46
			36	16	22.69	22.31	22.42
			36	35	22.52	22.31	22.89
			75	0	22.61	22.24	22.38
		16QAM	1	0	22.28	22.22	22.22
			1	37	22.54	22.10	22.10
			1	74	22.32	22.15	22.40
			36	0	21.85	21.44	21.28
			36	16	21.75	21.42	21.58
			36	35	21.64	21.43	21.53
			75	0	21.74	21.31	21.53
LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					18700	18900	19100
					1860.0MHz	1880.0MHz	1900.0MHz
2	20	QPSK	1	0	23.56	23.26	23.14
			1	49	23.42	23.10	23.78
			1	99	23.17	23.05	23.17
			50	0	22.89	22.37	22.31
			50	24	22.57	22.23	22.67
			50	49	22.56	22.16	22.69
			100	0	22.63	22.32	22.22
		16QAM	1	0	22.37	22.51	21.79
			1	49	22.72	22.94	22.41
			1	99	22.20	22.32	22.11
			50	0	21.84	21.48	21.06
			50	24	21.59	21.27	21.51
			50	49	21.51	21.42	21.47
			100	0	21.61	21.38	22.24

<LTE Band 4>

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19957	20175	20393
					1710.7MHz	1732.5MHz	1754.3MHz
4	1.4	QPSK	1	0	22.51	22.16	22.17
			1	2	22.57	22.27	22.21
			1	5	22.49	22.16	22.16
			3	0	22.67	22.32	22.26
			3	1	22.62	22.23	22.17
			3	2	22.65	22.27	22.23
			6	0	22.65	22.22	22.29
		16QAM	1	0	22.61	22.15	22.12
			1	2	22.65	22.31	22.14
			1	5	22.42	22.26	22.26
			3	0	22.71	22.42	22.38
			3	1	22.65	22.51	22.51
			3	2	22.50	22.34	22.13
			6	0	22.59	22.27	22.24
LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19965	20175	20385
					1711.5MHz	1732.5MHz	1753.5MHz
4	3	QPSK	1	0	22.45	22.17	22.07
			1	7	22.62	22.24	22.26
			1	14	22.40	22.09	22.08
			8	0	22.68	22.30	22.31
			8	4	22.63	22.31	22.29
			8	7	22.62	22.26	22.26
			15	0	22.68	22.27	22.25
		16QAM	1	0	22.58	22.61	22.19
			1	7	22.62	22.22	22.37
			1	14	22.56	22.26	22.24
			8	0	22.71	22.32	22.37
			8	4	22.64	22.34	22.31
			8	7	22.60	22.23	22.28
			15	0	22.62	22.19	22.18

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19975	20175	20375
					1712.5MHz	1732.5MHz	1752.5MHz
4	5	QPSK	1	0	22.56	22.16	22.19
			1	12	22.67	22.28	22.27
			1	24	22.42	22.06	22.06
			12	0	22.71	22.38	22.37
			12	6	22.68	22.31	22.31
			12	11	22.60	22.30	22.32
			25	0	22.63	22.25	22.3
		16QAM	1	0	22.41	22.2	22.71
			1	12	22.75	22.40	22.39
			1	24	22.83	22.22	22.25
			12	0	22.71	22.43	22.48
			12	6	22.62	22.30	22.28
			12	11	22.59	22.25	22.18
			25	0	22.54	22.23	22.28
LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20000	20175	20350
					1715.0MHz	1732.5MHz	1750.0MHz
4	10	QPSK	1	0	22.58	22.20	22.56
			1	24	22.51	22.14	22.49
			1	49	22.48	22.13	22.39
			25	0	22.70	22.36	22.67
			25	12	22.69	22.34	22.63
			25	24	22.60	22.25	22.59
			50	0	22.66	22.32	22.59
		16QAM	1	0	22.56	22.35	22.48
			1	24	22.47	22.34	22.63
			1	49	22.44	22.03	22.46
			25	0	22.68	22.33	22.56
			25	12	22.63	22.34	22.69
			25	24	22.62	22.19	22.59
			50	0	22.63	22.31	22.56

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20025	20175	20325
					1717.5MHz	1732.5MHz	1747.5MHz
4	15	QPSK	1	0	22.56	22.34	22.24
			1	37	22.57	22.28	22.37
			1	74	22.37	22.04	22.07
			36	0	22.72	22.40	22.38
			36	16	22.68	22.35	22.40
			36	35	22.58	22.31	22.36
			75	0	22.65	22.35	22.34
		16QAM	1	0	22.51	22.26	22.19
			1	37	22.40	22.28	22.11
			1	74	22.24	21.98	22.30
			36	0	22.69	22.41	22.35
			36	16	22.66	22.38	22.37
			36	35	22.58	22.32	22.40
			75	0	22.63	22.38	22.36
LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20050	20175	20300
					1720.0MHz	1732.5MHz	1745.0MHz
4	20	QPSK	1	0	22.60	22.38	22.21
			1	49	22.59	22.23	22.26
			1	99	22.16	22.09	22.08
			50	0	22.72	22.42	22.38
			50	24	22.60	22.35	22.38
			50	49	22.46	22.29	22.34
			100	0	22.56	22.36	22.36
		16QAM	1	0	22.85	22.13	22.16
			1	49	22.61	22.43	22.01
			1	99	21.94	22.46	22.08
			50	0	22.77	22.44	22.33
			50	24	22.66	22.35	22.34
			50	49	22.50	22.27	22.33
			100	0	22.50	22.32	22.30

<LTE Band 7>

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20775	21100	21425
					2502.5MHz	2535.0MHz	2567.5MHz
7	5	QPSK	1	0	23.01	23.06	23.03
			1	12	23.18	22.26	23.04
			1	24	23.09	23.19	22.89
			12	0	22.30	22.30	22.14
			12	6	22.31	22.36	22.14
			12	11	22.29	22.39	22.09
			25	0	22.33	22.34	22.09
		16QAM	1	0	22.07	22.47	22.03
			1	12	22.2	22.54	22.13
			1	24	21.99	21.96	21.96
			12	0	21.26	21.26	21.17
			12	6	21.38	21.27	21.15
			12	11	21.19	21.25	21.23
			25	0	21.20	21.39	21.10
LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20800	21100	21400
					2505.0MHz	2535.0MHz	2565.0MHz
7	10	QPSK	1	0	23.09	23.06	23.06
			1	24	23.15	23.15	23.04
			1	49	23.17	23.08	22.98
			25	0	22.34	22.35	22.18
			25	12	22.30	22.40	22.14
			25	24	22.29	22.49	22.12
			50	0	22.27	22.44	22.22
		16QAM	1	0	22.17	22.06	22.04
			1	24	22.13	22.21	22.12
			1	49	22.50	22.58	21.96
			25	0	21.36	21.16	21.23
			25	12	21.30	21.34	21.13
			25	24	21.28	21.37	21.06
			50	0	21.22	21.32	21.15

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20825	21100	21375
					2507.5MHz	2535.0MHz	2562.5MHz
7	15	QPSK	1	0	23.34	23.07	23.11
			1	37	23.54	23.26	22.79
			1	74	23.76	23.36	22.69
			36	0	22.53	22.34	22.10
			36	16	22.61	22.42	21.96
			36	35	22.76	22.59	21.85
			75	0	22.68	22.48	21.99
		16QAM	1	0	22.79	22.59	21.93
			1	37	22.41	22.47	21.76
			1	74	22.88	22.61	21.52
			36	0	21.53	21.27	21.14
			36	16	21.48	21.35	21.01
			36	35	21.71	21.44	20.82
			75	0	21.63	21.36	20.98
LTE Band	**Bandwidth (MHz)**	**Modulation**	**RB Size**	**RB Offset**	**Average Power (dBm)**		
					20850	**21100**	**21350**
					2510.0MHz	**2535.0MHz**	**2560.0MHz**
7	20	QPSK	1	0	23.34	23.08	23.40
			1	49	23.53	23.27	23.06
			1	99	22.76	22.36	22.59
			50	0	22.61	22.34	22.31
			50	24	22.70	22.40	22.09
			50	49	22.80	22.56	21.90
			100	0	22.72	22.48	22.11
		16QAM	1	0	22.35	22.11	22.23
			1	49	22.64	22.01	22.08
			1	99	22.48	22.37	21.94
			50	0	21.53	21.23	21.33
			50	24	21.59	21.36	21.11
			50	49	21.80	21.46	20.90
			100	0	21.68	21.42	21.13

<WLAN 2.4GHz Conducted Power>

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)	Test Rate Data
802.11b	1	2412	12.84	1 Mbps
	6	2437	**13.53**	1 Mbps
	11	2462	13.41	1 Mbps
802.11g	1	2412	9.81	6 Mbps
	6	2437	12.56	6 Mbps
	11	2462	10.78	6 Mbps
802.11n(20MHz)	1	2412	9.81	6.5 Mbps
	6	2437	12.57	6.5 Mbps
	11	2462	10.55	6.5 Mbps
802.11n(40MHz)	3	2422	8.4	13.5Mbps
	6	2437	12.35	13.5Mbps
	9	2452	8.82	13.5Mbps

Note:

1. Per KDB 447498 D01v05r02, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where
- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

Channel	Frequency (GHz)	Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
b/CH 11	2.437	14	25.12	5	7.91	3.0
g/CH 6	2.437	13	19.95	5	6.28	3.0

2. Base on the result of note1, RF exposure evaluation of 802.11 b mode is required.
3. Per KDB 248227 D01v02, choose the highest output power channel to test SAR and determine further SAR exclusion.
4. Per KDB 248227 D01v02, in the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:
   1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
   2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
5. The output power of all data rate were pre-scan, just the worst case (the lowest data rate) of all mode were shown in report.
6. Per KDB 248227 D01V02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 98.4%, so the duty cycle factor is 1.02.

<Bluetooth Conducted Power>

Mode Band	Average power (dBm)	
	Bluetooth v3.0+EDR	Bluetooth v4.0
2.4GHz Bluetooth	3.26	-3.98

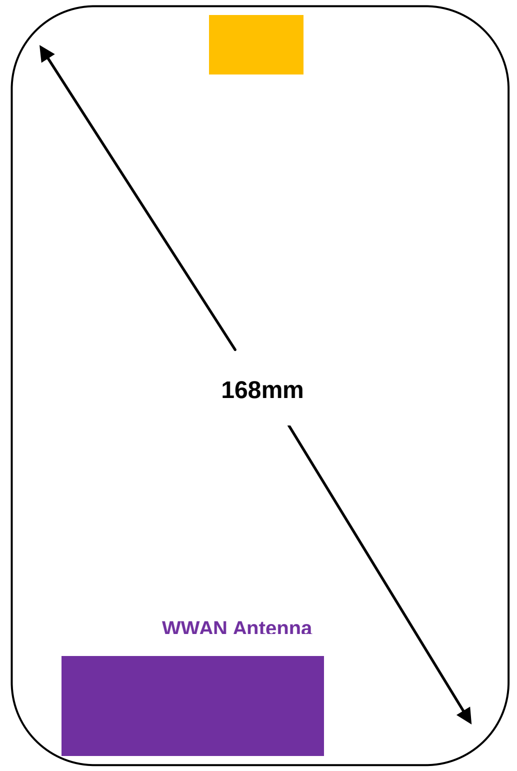
Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:
[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

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

Bluetooth Turn up Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
4	0	2.48	0.79

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 **0.79** which is <= 3, SAR testing is not required.

12. Antenna Location



Distance of The Antenna to the EUT surface and edge						
Antennas	**Front**	**Back**	**Top Side**	**Bottom Side**	**Left Side**	**Right Side**
WWAN	/	/	>25mm	/	>25mm	/
BT&WLAN	/	/	/	>25mm	>25mm	>25mm

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

General Note: Referring to KDB 941225 D06 v02, When the overall device length and width are ≥9cm*5cm, the test distance is 10mm, SAR must be measured for all sides and surfaces with a transmitting antenna located with 25 mm 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	32.69	33.00	1.074	0.113	0.121	0.064	
	Right Tilt	Ch251	32.69	33.00	1.074	0.073	0.078	0.038	
	Left Cheek	Ch251	32.69	33.00	1.074	0.129	**0.139**	-0.113	**#1**
	Left Tilt	Ch251	32.69	33.00	1.074	0.056	0.060	0.054	
GSM 1900	Right Cheek	Ch810	29.47	30.00	1.130	0.053	**0.060**	0.044	**#2**
	Right Tilt	Ch810	29.47	30.00	1.130	0.021	0.024	0.011	
	Left Cheek	Ch810	29.47	30.00	1.130	0.029	0.033	0.118	
	Left Tilt	Ch810	29.47	30.00	1.130	0.015	0.017	0.088	
WCDM A Band V	Right Cheek	Ch4233	22.89	23.50	1.151	0.078	0.090	-0.150	
	Right Tilt	Ch4233	22.89	23.50	1.151	0.053	0.061	0.149	
	Left Cheek	Ch4233	22.89	23.50	1.151	0.095	**0.109**	0.130	**#3**
	Left Tilt	Ch4233	22.89	23.50	1.151	0.041	0.047	0.063	
WCDM A Band II	Right Cheek	Ch9262	23.02	23.50	1.117	0.061	**0.068**	-0.086	**#4**
	Right Tilt	Ch9262	23.02	23.50	1.117	0.024	0.027	0.000	
	Left Cheek	Ch9262	23.02	23.50	1.117	0.051	0.057	0.192	
	Left Tilt	Ch9262	23.02	23.50	1.117	0.021	0.023	-0.134	

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							
LTE Band 2 (20M 1RB)	Right Cheek	Ch19100	23.78	24.00	1.052	0.031	0.033	0.064	
	Right Tilt	Ch19100	23.78	24.00	1.052	0.018	0.019	0.038	
	Left Cheek	Ch19100	23.78	24.00	1.052	0.044	**0.046**	-0.113	**#5**
	Left Tilt	Ch19100	23.78	24.00	1.052	0.023	0.024	0.054	
LTE Band 2 (20M 50%RB)	Right Cheek	Ch18700	22.89	23.00	1.026	0.028	0.029	0.026	
	Right Tilt	Ch18700	22.89	23.00	1.026	0.011	0.011	0.144	
	Left Cheek	Ch18700	22.89	23.00	1.026	0.039	0.040	0.086	
	Left Tilt	Ch18700	22.89	23.00	1.026	0.018	0.018	-0.020	
LTE Band 4 (20M 1RB)	Right Cheek	Ch20050	22.60	23.00	1.096	0.037	**0.041**	0.044	**#6**
	Right Tilt	Ch20050	22.60	23.00	1.096	0.011	0.012	0.011	
	Left Cheek	Ch20050	22.60	23.00	1.096	0.027	0.030	0.118	
	Left Tilt	Ch20050	22.60	23.00	1.096	0.01	0.011	0.088	
LTE Band 4 (20M 50%RB)	Right Cheek	Ch20050	22.72	23.00	1.067	0.029	0.031	-0.159	
	Right Tilt	Ch20050	22.72	23.00	1.067	0.012	0.013	0.144	
	Left Cheek	Ch20050	22.72	23.00	1.067	0.021	0.022	0.086	
	Left Tilt	Ch20050	22.72	23.00	1.067	0.011	0.012	-0.020	
LTE Band 7 (20M 1RB)	Right Cheek	Ch20850	23.53	24.00	1.114	0.028	**0.031**	-0.150	**#7**
	Right Tilt	Ch20850	23.53	24.00	1.114	0.016	0.018	0.149	
	Left Cheek	Ch20850	23.53	24.00	1.114	0.027	0.030	0.130	
	Left Tilt	Ch20850	23.53	24.00	1.114	0.014	0.016	0.063	
LTE Band 7 (20M 50%RB)	Right Cheek	Ch20850	22.80	23.00	1.047	0.024	0.025	-0.020	
	Right Tilt	Ch20850	22.80	23.00	1.047	0.013	0.014	-0.062	
	Left Cheek	Ch20850	22.80	23.00	1.047	0.021	0.022	-0.172	
	Left Tilt	Ch20850	22.80	23.00	1.047	0.01	0.010	0.151	

Test Case of Head			Meas. Power (dBm)	Target Power (dBm)	Factor	D.C Factor	Meas. SAR (W/kg) 1g	Scale SAR (W/kg)	Power Drift(dB)	Plot
Band	**Test Position**	**CH**								
WLAN2.4G	Right Cheek	Ch6	13.53	14.00	1.114	1.02	0.215	**0.244**	-0.052	**#8**
	Right Tilt	Ch6	13.53	14.00	1.114	1.02	0.104	0.118	-0.028	
	Left Cheek	Ch6	13.53	14.00	1.114	1.02	0.124	0.141	0.140	
	Left Tilt	Ch6	13.53	14.00	1.114	1.02	0.087	0.099	0.051	

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	29.39	29.50	1.026	0.659	0.676	0.130	
	Back	Ch251	29.39	29.50	1.026	0.735	**0.754**	-0.006	**#9**
	Right Side	Ch251	29.39	29.50	1.026	0.186	0.191	0.110	
	Bottom Side	Ch251	29.39	29.50	1.026	0.56	0.574	0.175	
GPRS 1900(4 Tx slots)	Front	Ch810	26.46	27.00	1.132	0.458	0.519	0.006	
	Back	Ch810	26.46	27.00	1.132	0.687	**0.778**	-0.099	**#10**
	Right Side	Ch810	26.46	27.00	1.132	0.274	0.310	0.026	
	Bottom Side	Ch810	26.46	27.00	1.132	0.471	0.533	0.144	
WCDMA Band V	Front	Ch4233	22.89	23.50	1.151	0.141	0.162	0.086	
	Back	Ch4233	22.89	23.50	1.151	0.237	**0.273**	-0.020	**#11**
	Right Side	Ch4233	22.89	23.50	1.151	0.087	0.100	-0.062	
	Bottom Side	Ch4233	22.89	23.50	1.151	0.117	0.135	-0.172	
WCDMA Band II	Front	Ch9262	23.02	23.50	1.117	0.652	0.728	0.151	
	Back	Ch9262	23.02	23.50	1.117	0.703	**0.785**	-0.094	**#12**
	Right Side	Ch9262	23.02	23.50	1.117	0.133	0.149	0.053	
	Bottom Side	Ch9262	23.02	23.50	1.117	0.661	0.738	-0.159	

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							
LTE Band 2 (20M 1RB)	Front	Ch19100	23.78	24.00	1.052	0.53	0.558	0.130	
	Back	Ch19100	23.78	24.00	1.052	0.708	**0.745**	-0.006	**#13**
	Right Side	Ch19100	23.78	24.00	1.052	0.241	0.254	0.110	
	Bottom Side	Ch19100	23.78	24.00	1.052	0.621	0.653	0.175	
LTE Band 2 (20M 50%RB)	Front	Ch18700	22.89	23.00	1.026	0.413	0.424	0.006	
	Back	Ch18700	22.89	23.00	1.026	0.640	0.656	-0.099	
	Right Side	Ch18700	22.89	23.00	1.026	0.184	0.189	0.026	
	Bottom Side	Ch18700	22.89	23.00	1.026	0.531	0.545	0.144	
LTE Band 4 (20M 1RB)	Front	Ch20050	22.60	23.00	1.096	0.17	0.186	0.086	
	Back	Ch20050	22.60	23.00	1.096	0.172	**0.189**	-0.020	**#14**
	Right Side	Ch20050	22.60	23.00	1.096	0.056	0.061	-0.062	
	Bottom Side	Ch20050	22.60	23.00	1.096	0.151	0.166	-0.172	
LTE Band 4 (20M 50%RB)	Front	Ch20050	22.72	23.00	1.067	0.151	0.161	0.151	
	Back	Ch20050	22.72	23.00	1.067	0.162	0.173	-0.094	
	Right Side	Ch20050	22.72	23.00	1.067	0.046	0.049	0.053	
	Bottom Side	Ch20050	22.72	23.00	1.067	0.137	0.146	-0.159	
LTE Band 7 (20M 1RB)	Front	Ch20850	23.53	24.00	1.114	0.207	0.231	0.144	
	Back	Ch20850	23.53	24.00	1.114	0.224	**0.250**	0.086	**#15**
	Right Side	Ch20850	23.53	24.00	1.114	0.094	0.105	-0.020	
	Bottom Side	Ch20850	23.53	24.00	1.114	0.189	0.211	-0.062	
LTE Band 7 (20M 50%RB)	Front	Ch20850	22.80	23.00	1.047	0.184	0.193	-0.172	
	Back	Ch20850	22.80	23.00	1.047	0.210	0.220	0.151	
	Right Side	Ch20850	22.80	23.00	1.047	0.082	0.086	-0.094	
	Bottom Side	Ch20850	22.80	23.00	1.047	0.173	0.181	0.053	

Test Case of Head			Meas. Power (dBm)	Target Power (dBm)	Factor	D.C Factor	Meas. SAR (W/kg) 1g	Scale SAR (W/kg)	Power Drift(dB)	Plot
Band	Test Position	CH								
WLAN 2.4G	Front	Ch6	13.53	14.00	1.114	1.02	0.036	0.041	0.094	
	Back	Ch6	13.53	14.00	1.114	1.02	0.037	**0.042**	0.114	**#16**
	Top	Ch6	13.53	14.00	1.114	1.02	0.036	0.041	0.058	

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	29.39	29.50	1.026	0.659	0.676	0.130
	Back	Ch251	29.39	29.50	1.026	0.735	**0.754**	-0.006
GPRS 1900(4 Tx slots)	Front	Ch810	26.46	27.00	1.132	0.458	0.519	0.006
	Back	Ch810	26.46	27.00	1.132	0.687	**0.778**	-0.099
WCDMA Band V	Front	Ch4233	22.89	23.50	1.151	0.141	0.162	0.086
	Back	Ch4233	22.89	23.50	1.151	0.237	**0.273**	-0.020
WCDMA Band II	Front	Ch9262	23.02	23.50	1.117	0.652	0.728	0.151
	Back	Ch9262	23.02	23.50	1.117	0.703	**0.785**	-0.094
LTE Band 2 (20M 1RB)	Front	Ch19100	23.78	24.00	1.052	0.53	0.558	0.130
	Back	Ch19100	23.78	24.00	1.052	0.708	**0.745**	-0.006
LTE Band 2 (20M 50%RB)	Front	Ch18700	22.89	23.00	1.026	0.413	0.424	0.006
	Back	Ch18700	22.89	23.00	1.026	0.640	0.656	-0.099
LTE Band 4 (20M 1RB)	Front	Ch20050	22.60	23.00	1.096	0.17	0.186	0.086
	Back	Ch20050	22.60	23.00	1.096	0.172	**0.189**	-0.020
LTE Band 4 (20M 50%RB)	Front	Ch20050	22.72	23.00	1.067	0.151	0.161	0.151
	Back	Ch20050	22.72	23.00	1.067	0.162	0.173	-0.094
LTE Band 7 (20M 1RB)	Front	Ch20850	23.53	24.00	1.114	0.207	0.231	0.144
	Back	Ch20850	23.53	24.00	1.114	0.224	**0.250**	0.086
LTE Band 7 (20M 50%RB)	Front	Ch20850	22.80	23.00	1.047	0.184	0.193	-0.172
	Back	Ch20850	22.80	23.00	1.047	0.210	0.220	0.151

13.2 Evaluation of Simultaneous:

BT* - Estimated SAR for Bluetooth

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

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

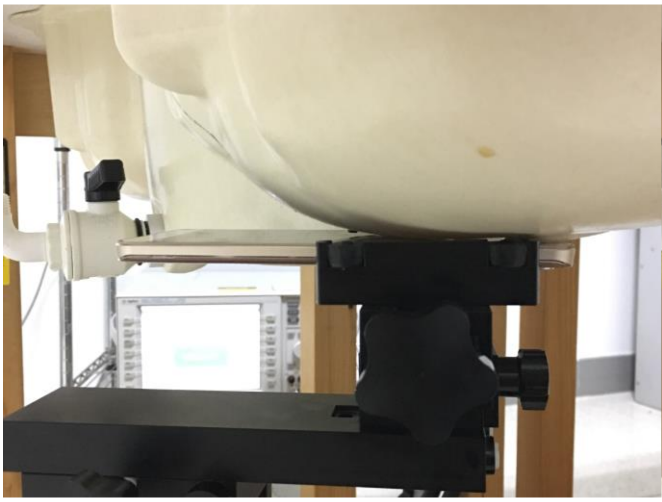
Maximum Turn up Power	**Exposure Position**	**Head**	**Hotspot**	**Body-worn**
	Test separation	**0 mm**	**10 mm**	**10 mm**
4dBm	Estimated SAR (W/kg)	0.105W/kg	0.053W/kg	0.053W/kg

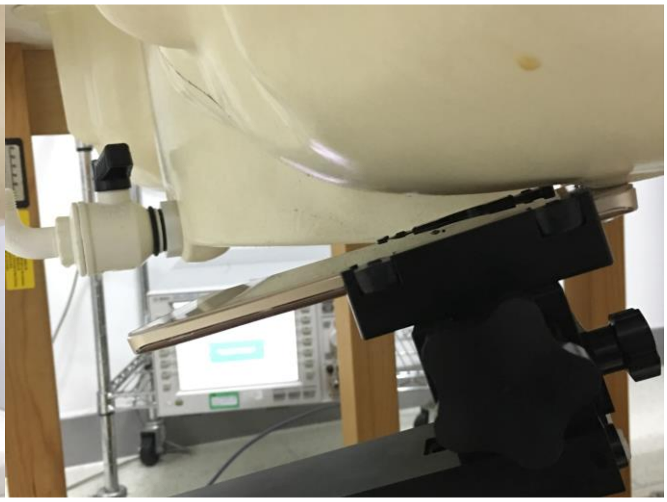
Conclusion:
According to the above table, the sum of reported SAR values for GSM/WCDMA/LTE and WIFI/BT ＜1.6W/kg. So the simultaneous transmission SAR is not required for WIFI/BT transmitter.

13.3 DUT and setup photos photos:

Front

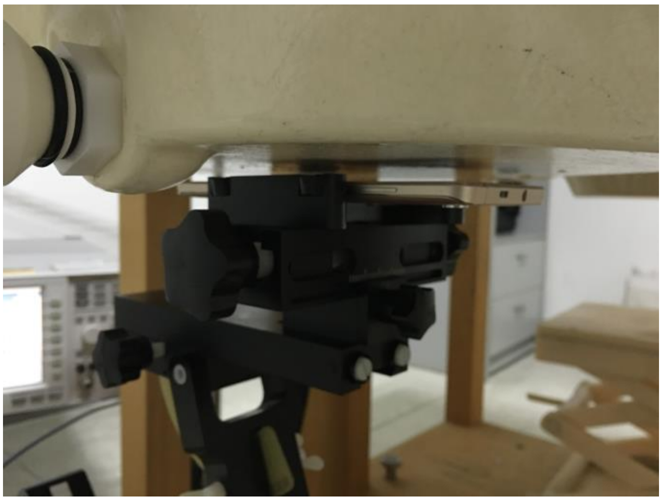
Back


Left Cheek

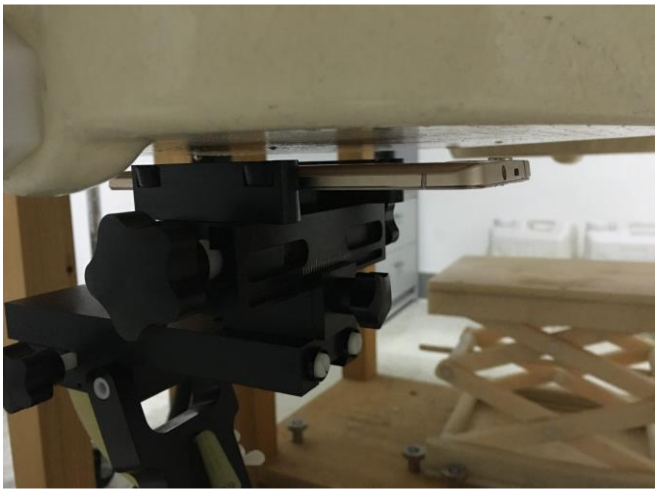

Left Tilt


Right Cheek


Right Tilt



Front of the EUT with 1 cm Gap



Back of the EUT with 1 cm Gap

Right Side 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	MY50267264	Dec 26th 2015	Dec 25th 2016
2	Communication Tester	R&S	CMW500	116581	Jul 7th 2015	Jul 6th 2016
3	E-field Probe	Speag	ES3DV3	3028	Oct 22th 2014	Oct 21th 2015
4	Dielectric Probe Kit	Speag	DAK	1038	N/A	N/A
5	DAE	Speag	DAE4	905	Jul 16th 2015	Jul 15th 2016
6	SAM TWIN phantom	Speag	SAM	1360/1432	N/A	N/A
7	Robot	Stabuli	TX60L	N/A	N/A	N/A
8	Device Holder	Speag	SD000H01HA	N/A	N/A	N/A
9	Vector Network	Agilent	E5071C	MY46107615	Jan 6th 2015	Jan 7th 2016
10	Signal Generator	Agilent	E4438C	MY49072279	Nov 27th 2014	Nov 26th 2015
11	Amplifier	Mini-circult	ZHL-42W	QA098002	N/A	N/A
12	Power Meter	Agilent	N1419A	MY50001563	Nov 27th 2014	Nov 26th 2015
13	Power Sensor	Agilent	N8481H	MY51020010	Nov 27th 2014	Nov 26th 2015
14	Directional Coupler	Agilent	772D	MY46151275	Nov 27th 2014	Nov 26th 2015
15	Directional Coupler	Agilent	778D	MY48220607	Nov 27th 2014	Nov 26th 2015
16	Dipole 900MHz	Speag	D900V2	1d086	Aug 9th 2013	Aug 8th 2016
17	Dipole 1750MHz	SPEAG	D1750V2	1021	Aug 2nd 2013	Aug 1st 2016
18	Dipole 1900MHz	Speag	D1900V2	5d194	Jan 7th 2015	Aug 6th 2018
19	Dipole 2450MHz	Speag	D2450V2	955	Jan 8th 2015	Jan 7th 2018
20	Dipole 2600MHz	SPEAG	D2600V2	1058	Jun 23th 2015	Jun 22th 2018

Appendix A. System validation plots:

Date: 10/15/2015

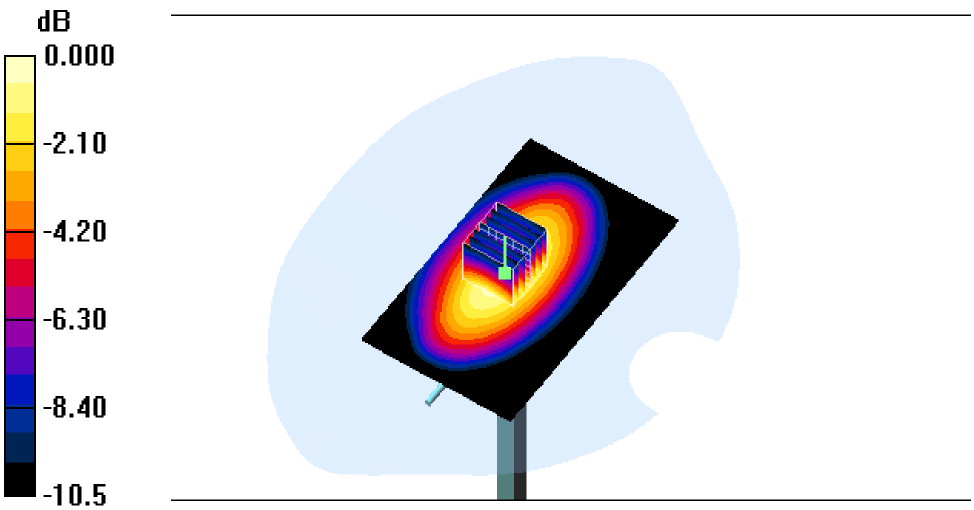
DUT: Dipole 900MHz; Type: D900V2; Serial: D900V2 - SN: 1d086
Program Name: System Performance Check Head at 900 MHz

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 0.97 mho/m; ε_r = 42.13; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.19, 6.19, 6.19); Calibrated:10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (5x5x7) (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.523 V/m; Power Drift = -0.01dB
Peak SAR (extrapolated) = 4.068 W/kg
SAR(1 g) = 2.67 mW/g; SAR(10 g) = 1.72 mW/g
Maximum value of SAR (measured) = 2.90 mW/g



0 dB = 2.90mW/g

Date: 10/18/2015

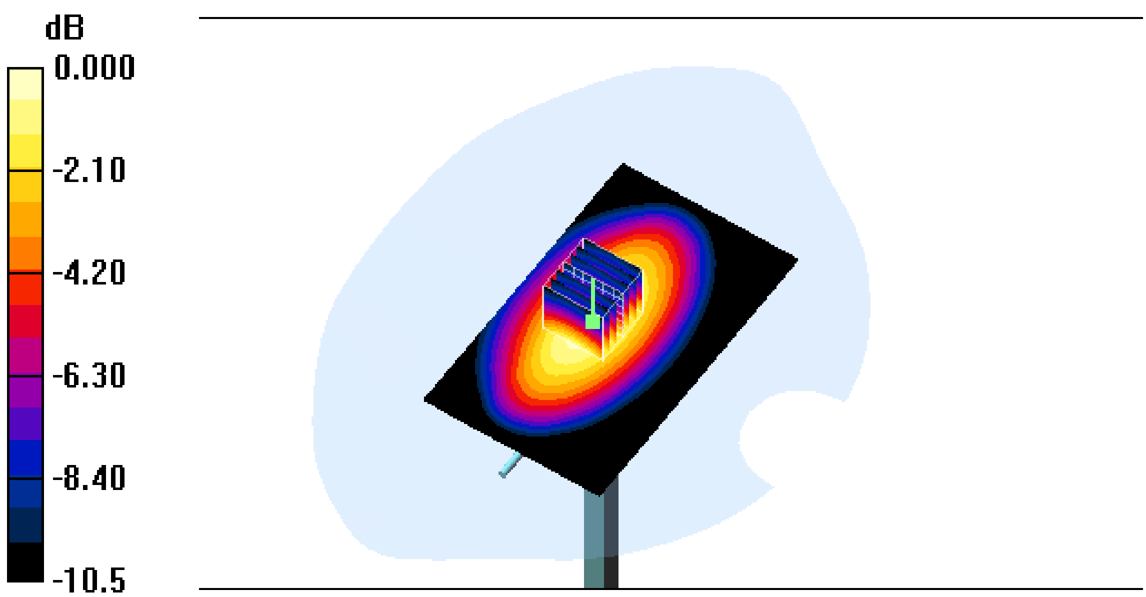
DUT: Dipole 900MHz; Type: D900V2; Serial: D900V2 - SN: 1d086
Program Name: System Performance Check at 900 MHz Body

Communication System: CW; Frequency: 900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 900 MHz; σ = 1.01 mho/m; ε_r = 54.69; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.02, 6.02, 6.02); Calibrated:10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (5x5x7) (7x7x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 54.523 V/m; Power Drift = -0.01dB
Peak SAR (extrapolated) = 4.068 W/kg
SAR(1 g) = 2.45 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.80 mW/g



0 dB = 2.90mW/g

Date: 10/15/2015

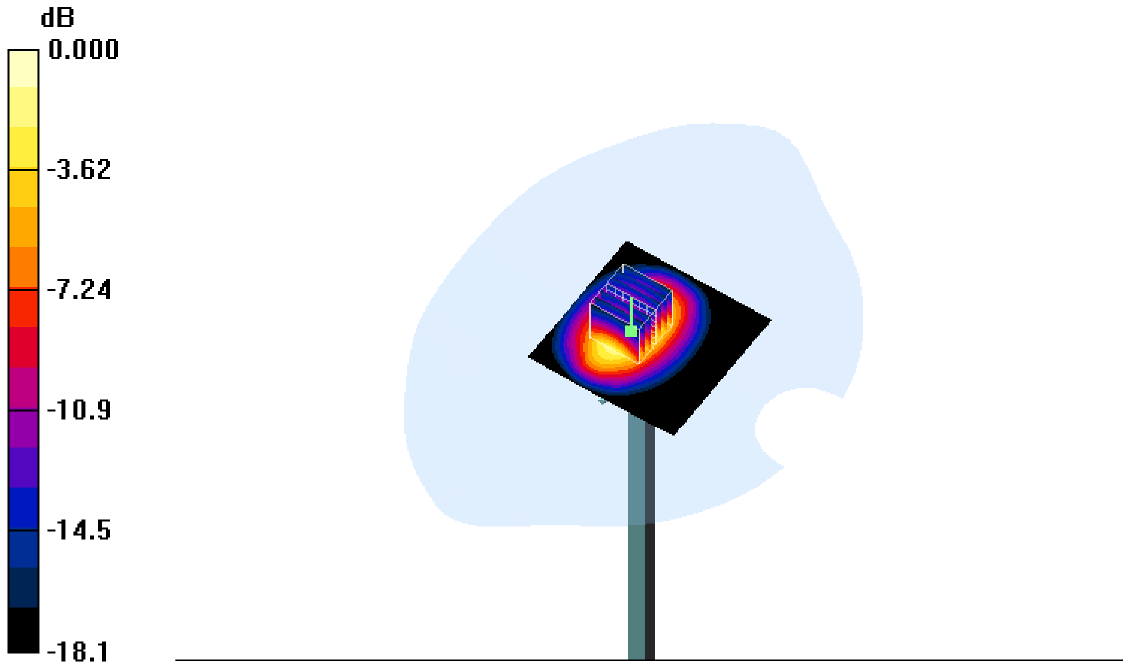
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021
Program Name: System Performance Check Head at 1750 MHz

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.38 mho/m; ε_r = 39.83; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.97, 4.97, 4.97); Calibrated:10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (61x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 8.60 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 83.712 V/m; Power Drift = 0.03dB
Peak SAR (extrapolated) = 16.718 W/kg
SAR(1 g) = 8.82 mW/g; SAR(10 g) = 4.56 mW/g
Maximum value of SAR (measured) = 9.93 mW/g



0 dB = 9.93mW/g

Date: 10/18/2015

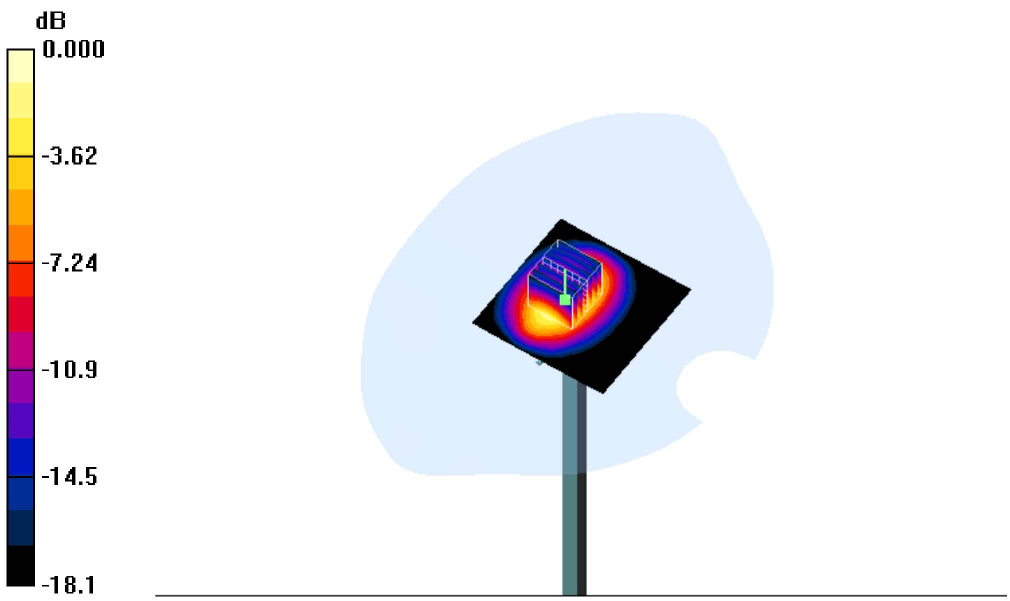
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1021
Program Name: System Performance Check Body at 1750 MHz

Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.53 mho/m; ε_r = 54.57; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.69, 4.69, 4.69); Calibrated:10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- 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) = 12.60 mW/g

d=15mm, Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 81.17 V/m; Power Drift = 0.03dB
Peak SAR (extrapolated) = 15.81 W/kg
SAR(1 g) = 9.06 mW/g; SAR(10 g) = 4.85 mW/g
Maximum value of SAR (measured) = 12.8 mW/g



0 dB = 12.8mW/g

Date: 10/16/2015

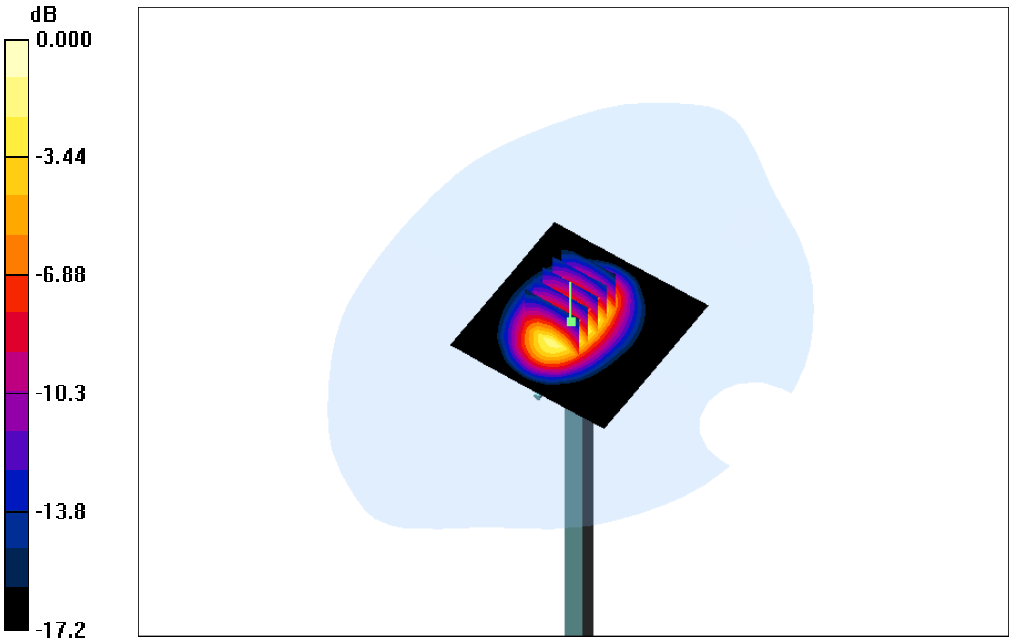
DUT: Dipole 1900MHz; Type: D1900V2; Serial: 5d194
Program Name: System Performance Check Head at 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 40.29; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.68, 4.68, 4.68); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=15mm, dy=15mm
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) = 9.87 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 11.2 mW/g



0 dB = 11.2mW/g

Date: 10/19/2015

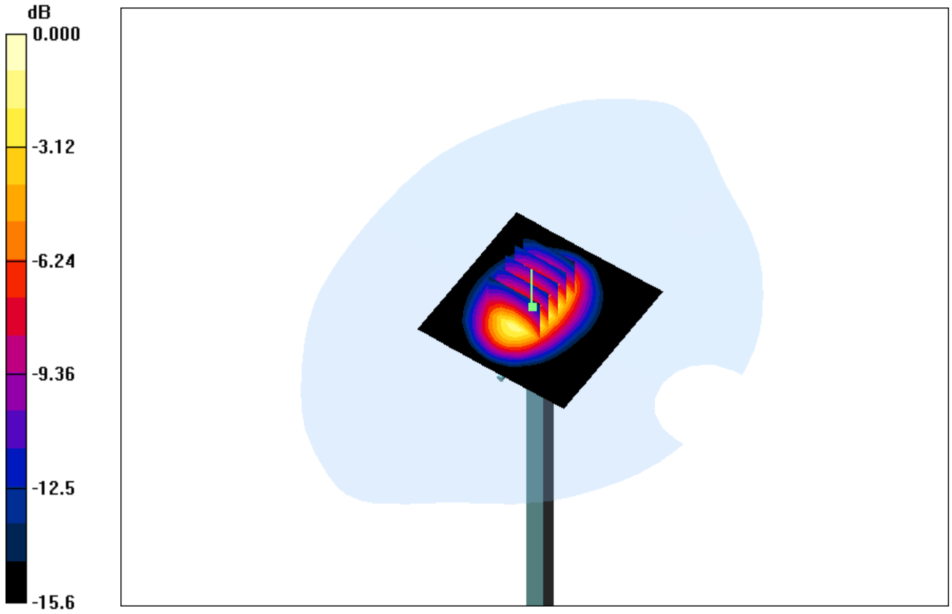
DUT: Dipole 1900MHz; Type: D1900V2; Serial: 5d194
Program Name: System Performance Check at Body 1900 MHz

Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 53.69; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.48, 4.48, 4.48); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.8 mW/g

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, 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) = 5.42 mW/g
Maximum value of SAR (measured) = 12.5 mW/g



0 dB = 12.5mW/g

Date: 10/16/2015

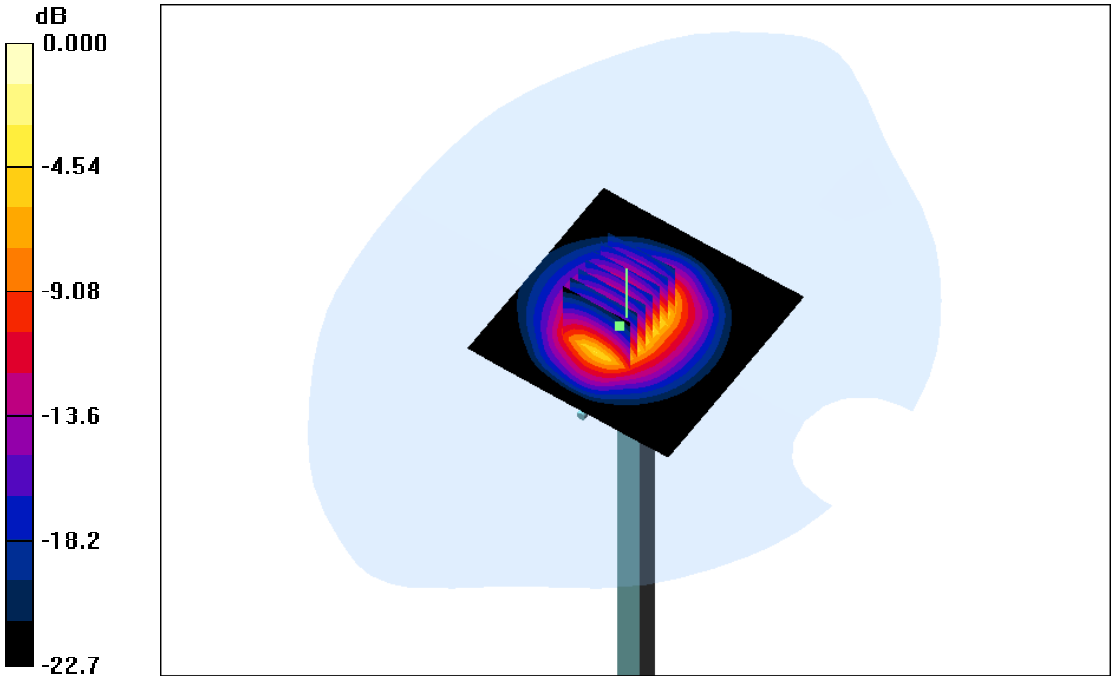
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 955
Program Name: System Performance Check Head at 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.83 mho/m; ε_r = 38.19; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.21, 4.21, 4.21); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=12mm, dy=12mm
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) = 13.3 mW/g; SAR(10 g) = 6.45 mW/g
Maximum value of SAR (measured) = 16.2 mW/g



0 dB = 16.2mW/g

Date: 10/19/2015

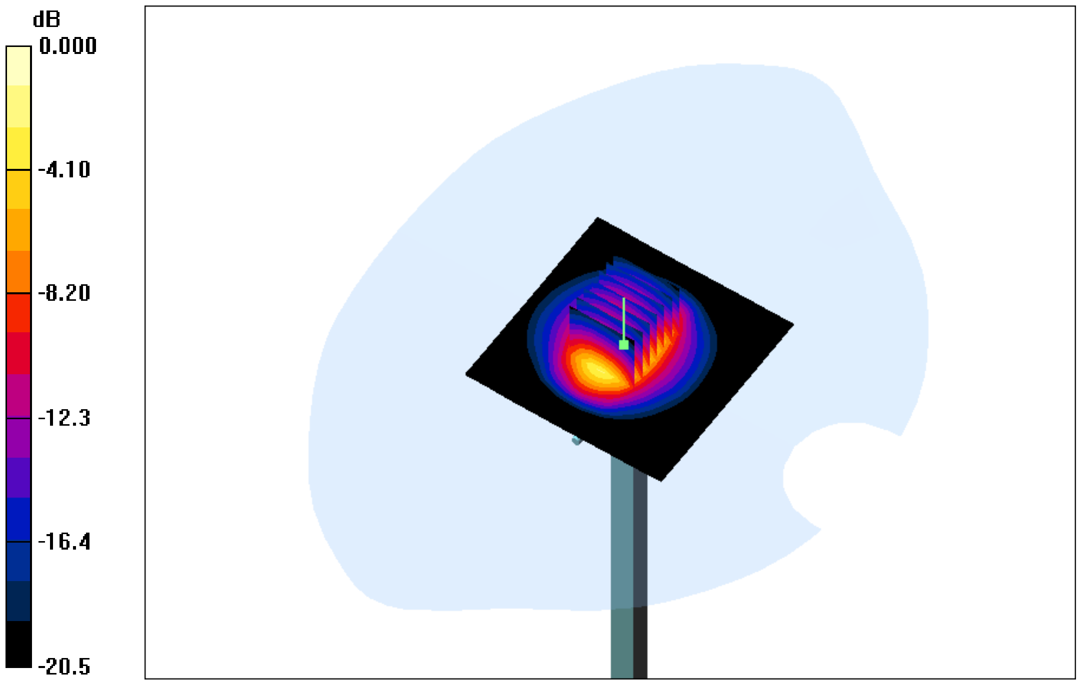
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 955
Program Name: System Performance Check Body at 2450 MHz

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.90 mho/m; ε_r = 50.59; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.14, 4.14, 4.14); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=12mm, dy=12mm
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) = 13.5 mW/g; SAR(10 g) = 6.34 mW/g
Maximum value of SAR (measured) = 15.4 mW/g



0 dB = 15.4mW/g

Date: 10/17/2015

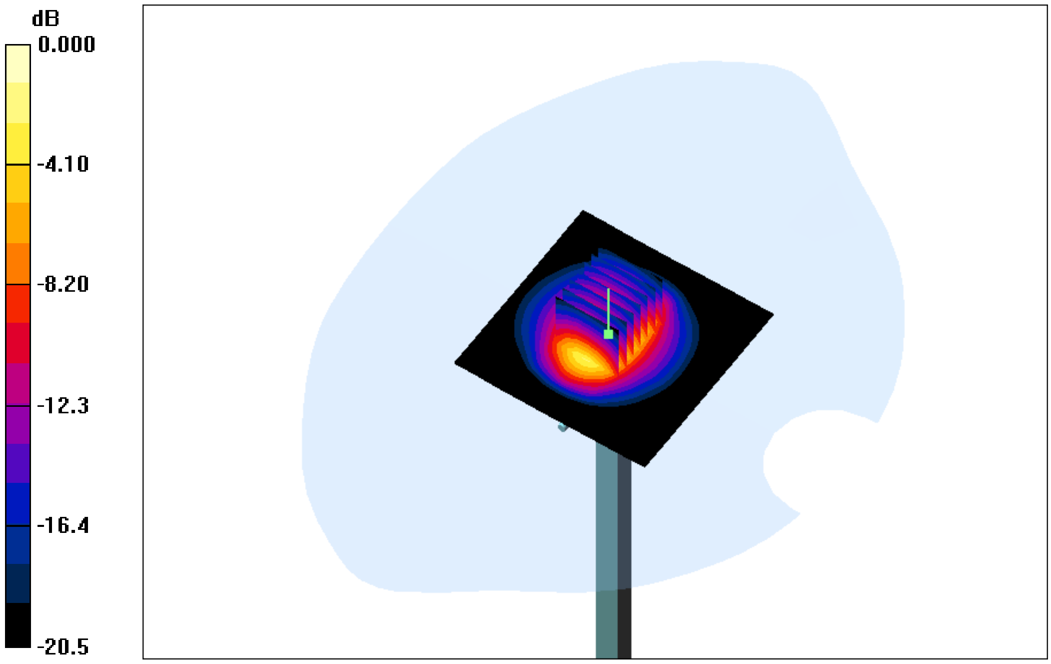
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1058
Program Name: System Performance Check Head at 2600 MHz

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ =1.96 mho/m; ε_r = 38.09; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.06, 4.06, 4.06); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=12mm, dy=12mm
Maximum value of SAR (interpolated) = 21.1 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.1 V/m; Power Drift = 0.032 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 14.4 mW/g; SAR(10 g) = 6.47 mW/g
Maximum value of SAR (measured) =19.7 mW/g



0 dB = 19.7mW/g

Date: 10/20/2015

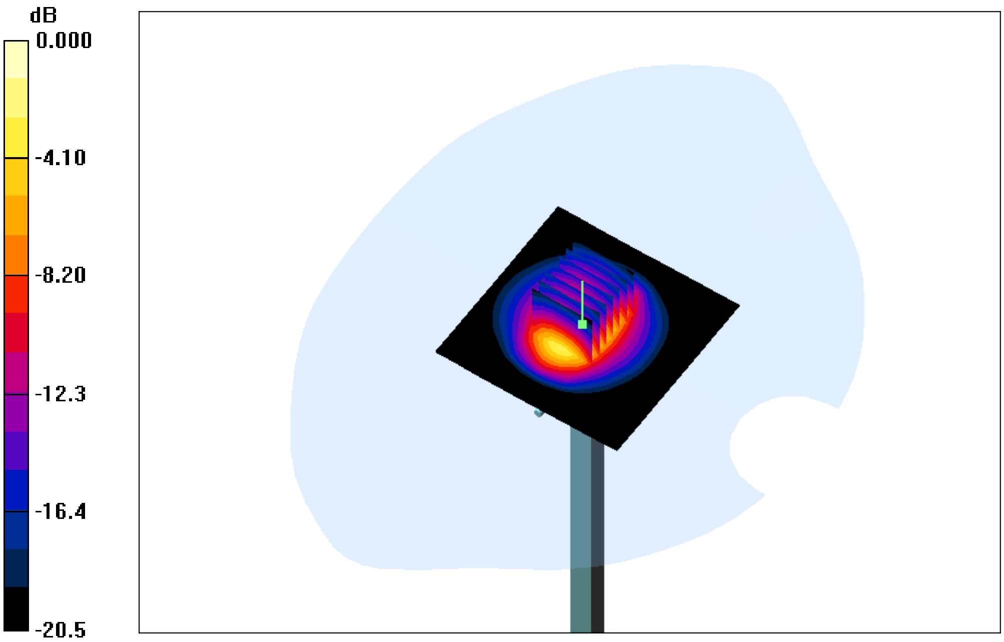
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: 1058
Program Name: System Performance Check Body at 2600 MHz

Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.20 mho/m; ε_r = 51.09; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.02, 4.02, 4.02); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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=12mm, dy=12mm
Maximum value of SAR (interpolated) = 25.1 mW/g

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.4 V/m; Power Drift = 0.018 dB
Peak SAR (extrapolated) = 34.1 W/kg
SAR(1 g) = 14.6 mW/g; SAR(10 g) = 6.48 mW/g
Maximum value of SAR (measured) = 23.2 mW/g



0 dB = 23.2mW/g

Appendix B. SAR Test plots:

#1

Date: 10/15/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

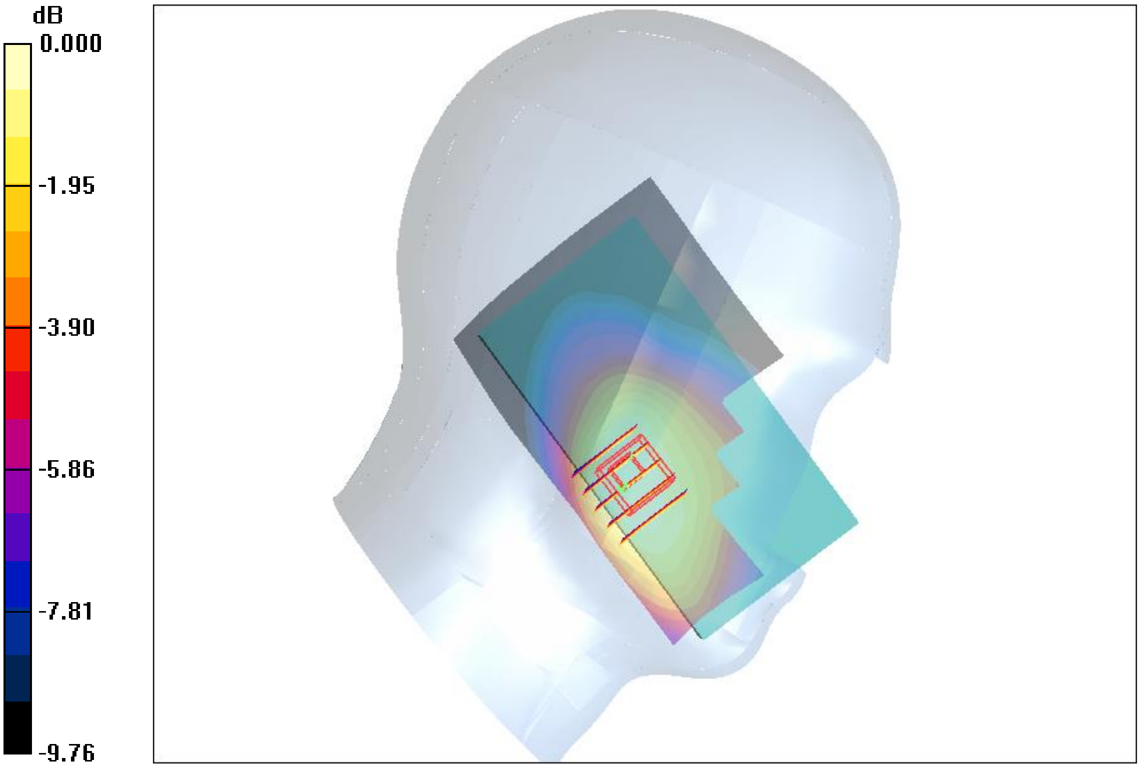
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.899 mho/m; ε_r = 41.3; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.19, 6.19, 6.19); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Left Cheek 2/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.138 mW/g

Left Cheek 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.42 V/m; Power Drift = -0.113 dB
Peak SAR (extrapolated) = 0.166 W/kg
SAR(1 g) = 0.129 mW/g; SAR(10 g) = 0.099 mW/g
Maximum value of SAR (measured) = 0.144 mW/g



0 dB = 0.144mW/g

#2

Date: 10/16/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

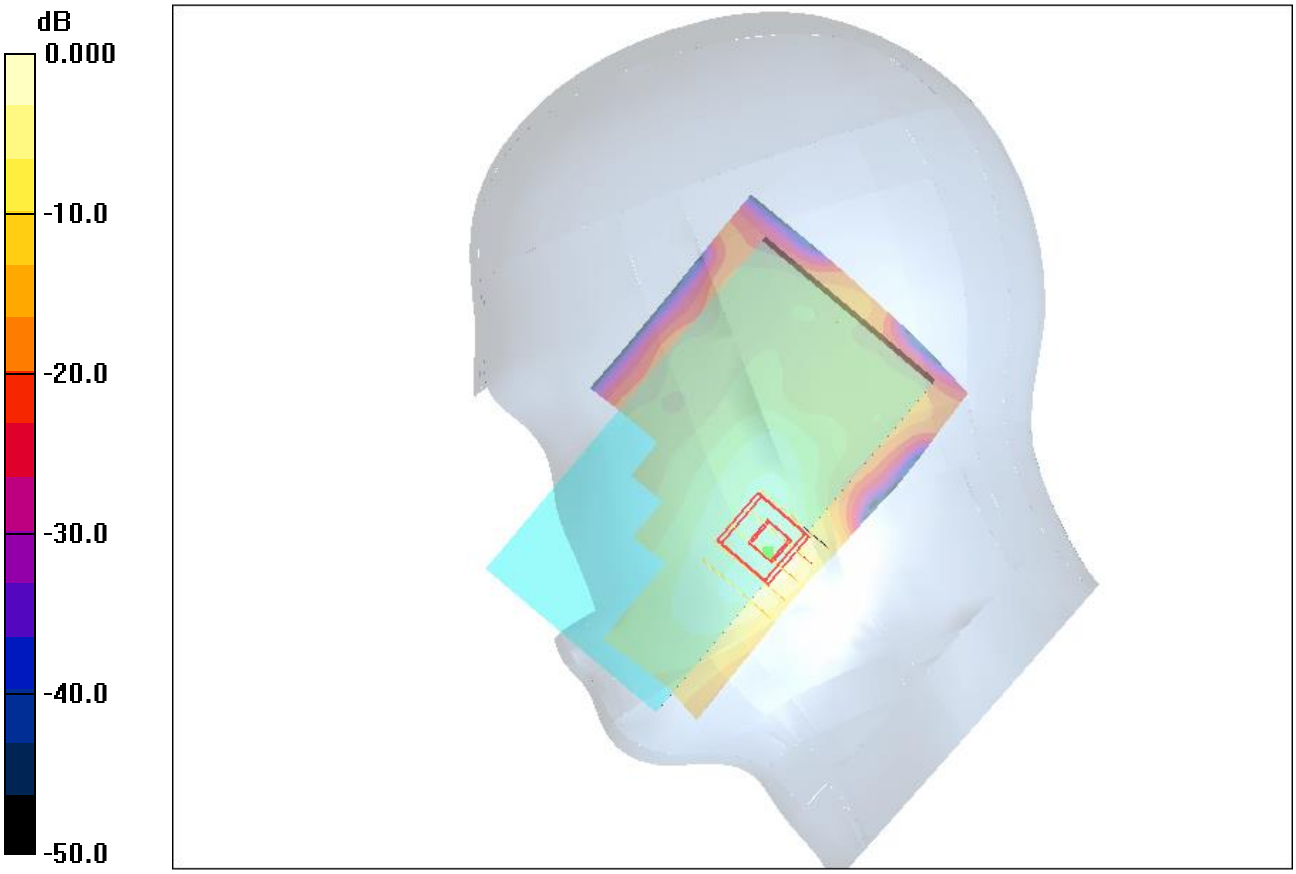
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: GSM 1900; Frequency: 1909.8 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1910 MHz; σ = 1.42 mho/m; ε_r = 39.6; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.68, 4.68, 4.68); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.056 mW/g

Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.50 V/m; Power Drift = 0.044 dB
Peak SAR (extrapolated) = 0.090 W/kg
SAR(1 g) = 0.053 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.059 mW/g



0 dB = 0.059mW/g

#3

Date: 10/15/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

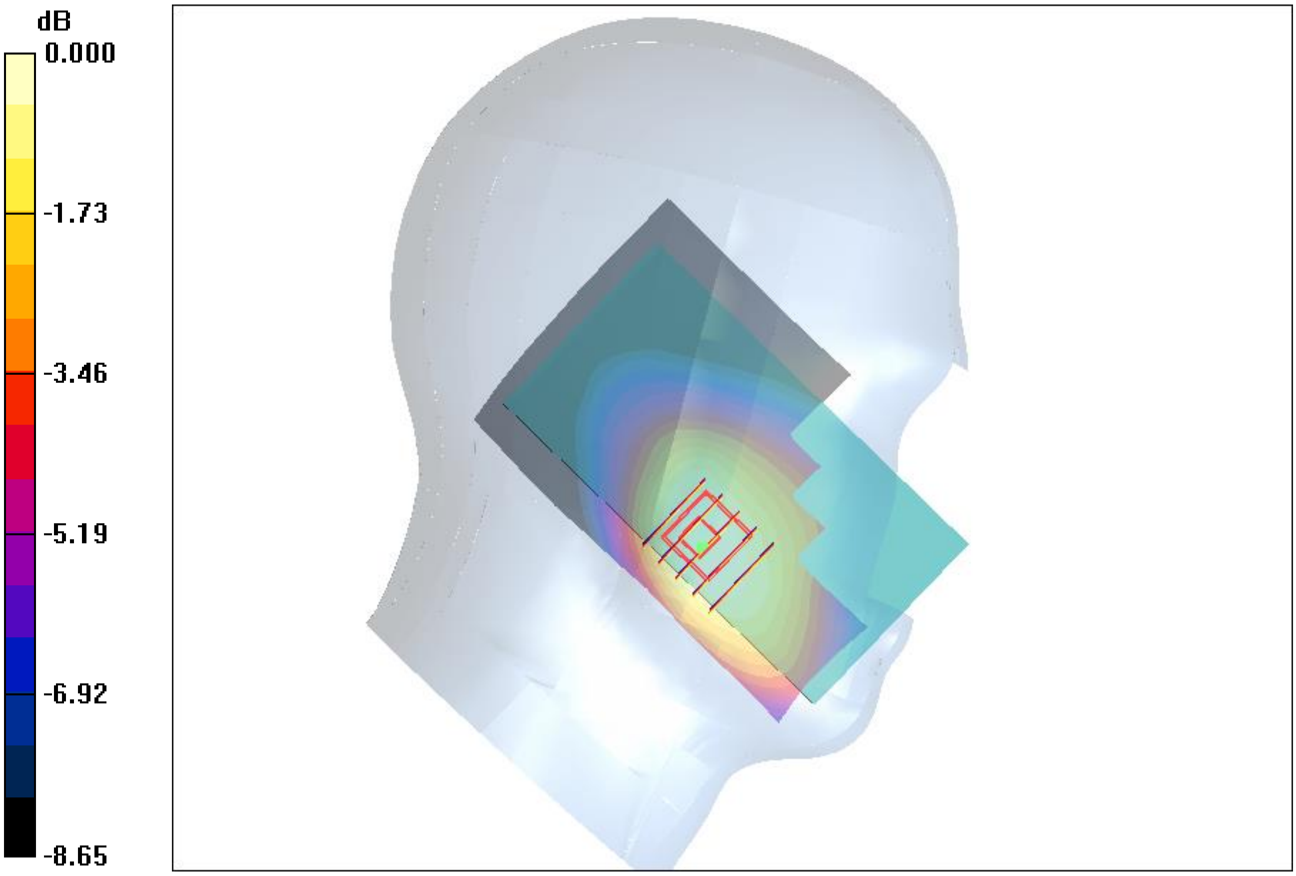
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: W850; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.898 mho/m; ε_r = 41.4; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.19, 6.19, 6.19); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Left Cheek 2/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.101 mW/g

Left Cheek 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.60 V/m; Power Drift = 0.130 dB
Peak SAR (extrapolated) = 0.117 W/kg
SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.073 mW/g
Maximum value of SAR (measured) = 0.098 mW/g



0 dB = 0.098mW/g

#4

Date: 10/16/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

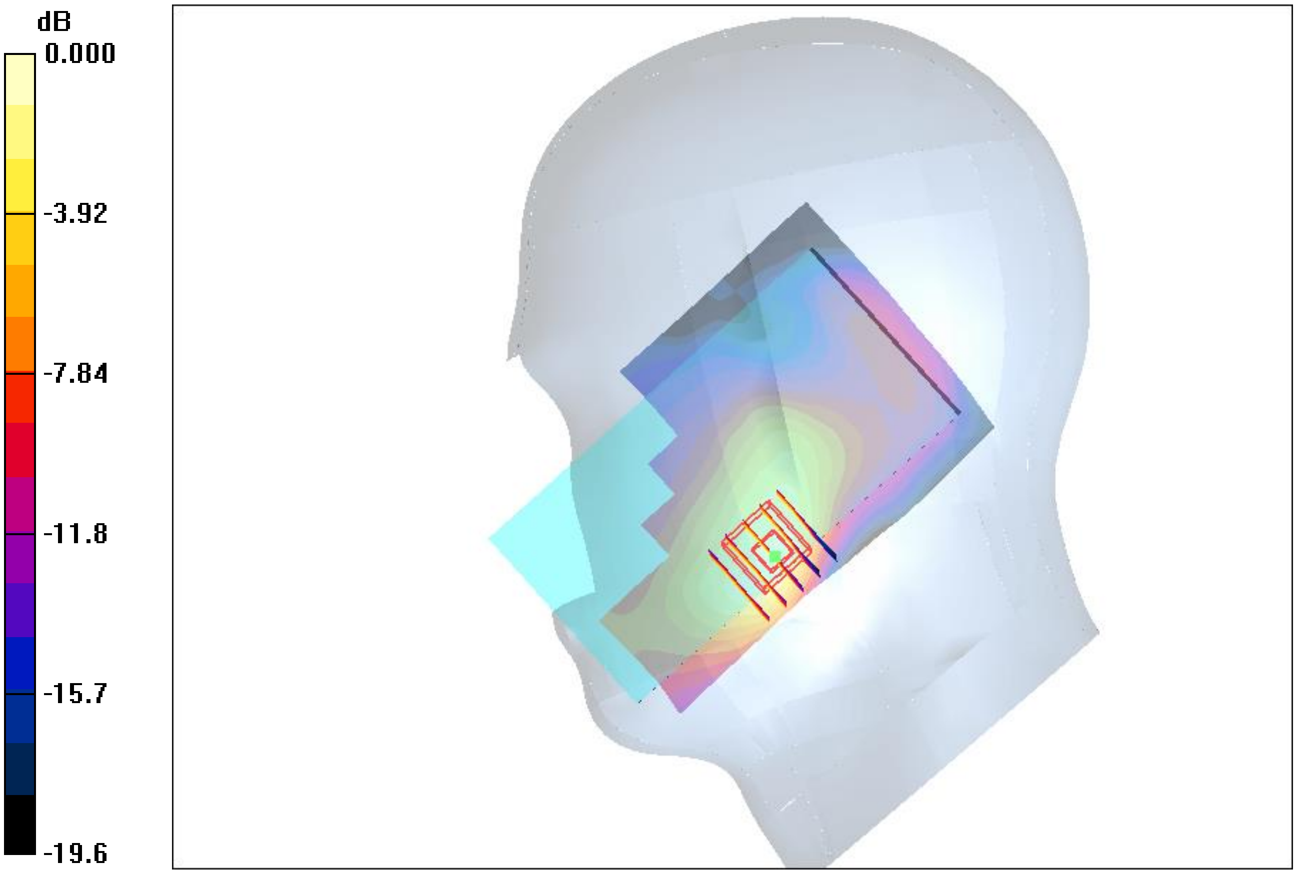
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: W1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.36 mho/m; ε_r = 39.8; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.68, 4.68, 4.68); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.074 mW/g

Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.04 V/m; Power Drift = -0.086 dB
Peak SAR (extrapolated) = 0.103 W/kg
SAR(1 g) = 0.061 mW/g; SAR(10 g) = 0.034 mW/g
Maximum value of SAR (measured) = 0.067 mW/g



0 dB = 0.067mW/g

#5

Date: 10/16/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 40.29; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.68, 4.68, 4.68); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- Phantom: SAM 1; Type: SAM; Serial: TP-1360
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Left Cheek/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.046 mW/g

Left Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.42 V/m; Power Drift = -0.113 dB
Peak SAR (extrapolated) = 0.065 W/kg
SAR(1 g) = 0.044 mW/g; SAR(10 g) = 0.029 mW/g
Maximum value of SAR (measured) = 0.047 mW/g

0 dB = 0.047mW/g

#6

Date: 10/15/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

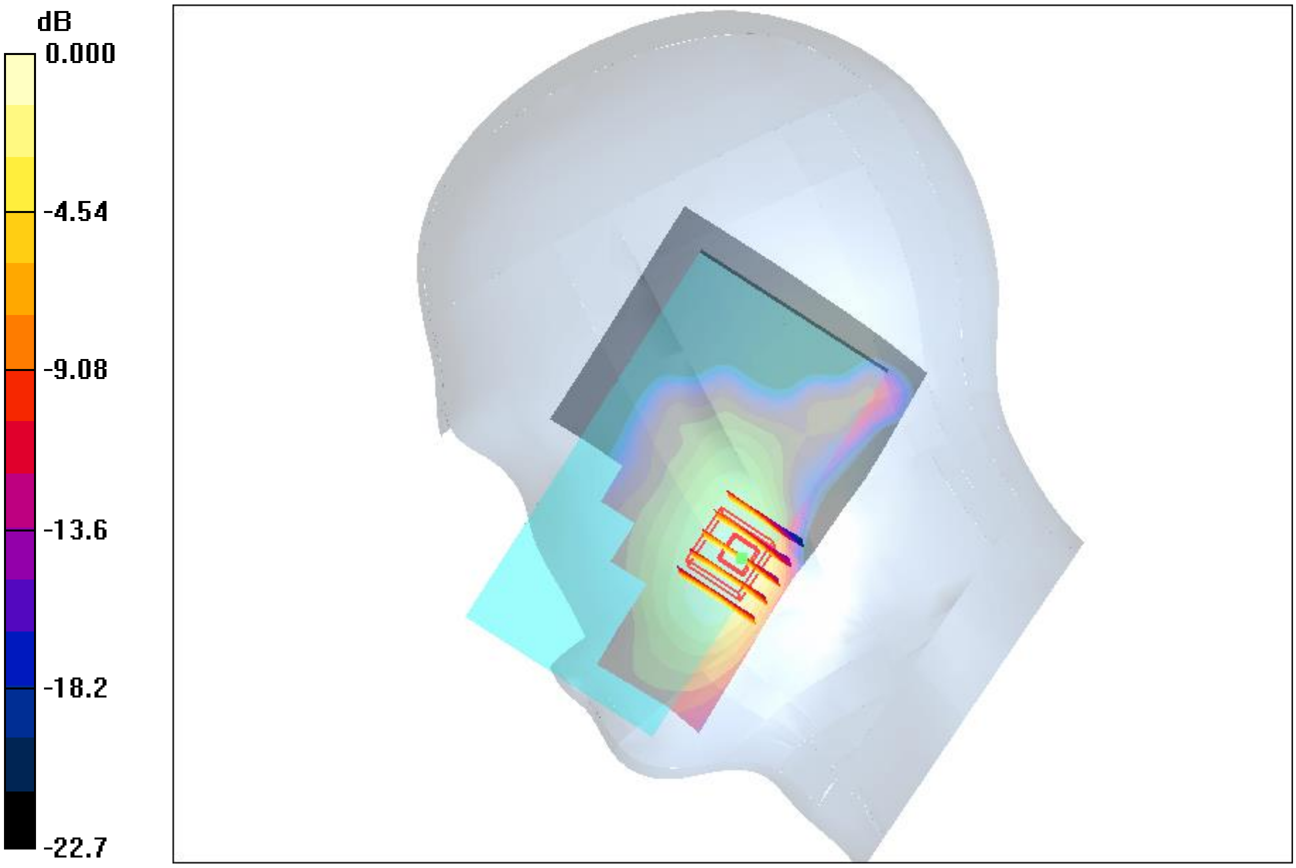
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1720 MHz; σ = 1.34 mho/m; ε_r = 41.5; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.97, 4.97, 4.97); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.044 mW/g

Right Cheek/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.9 V/m; Power Drift = 0.044 dB
Peak SAR (extrapolated) = 0.060 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.040 mW/g



0 dB = 0.040mW/g

#7

Date: 10/17/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

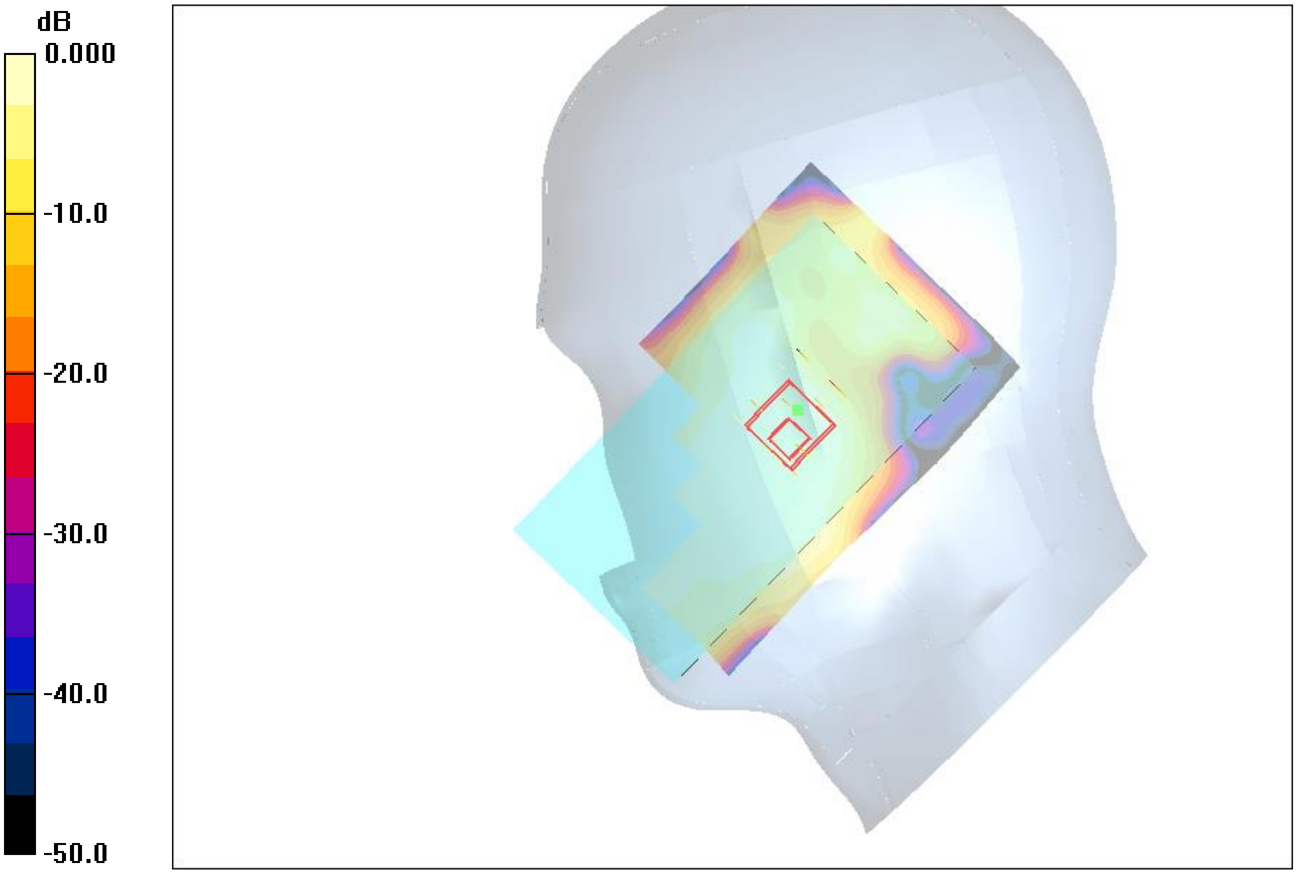
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2510 MHz; σ = 1.81 mho/m; ε_r = 38.1; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.21, 4.21, 4.21); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (81x151x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.032 mW/g

Right Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.94 V/m; Power Drift = -0.150 dB
Peak SAR (extrapolated) = 0.055 W/kg
SAR(1 g) = 0.028 mW/g; SAR(10 g) = 0.016 mW/g
Maximum value of SAR (measured) = 0.030 mW/g



0 dB = 0.030mW/g

#8

Date: 10/16/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

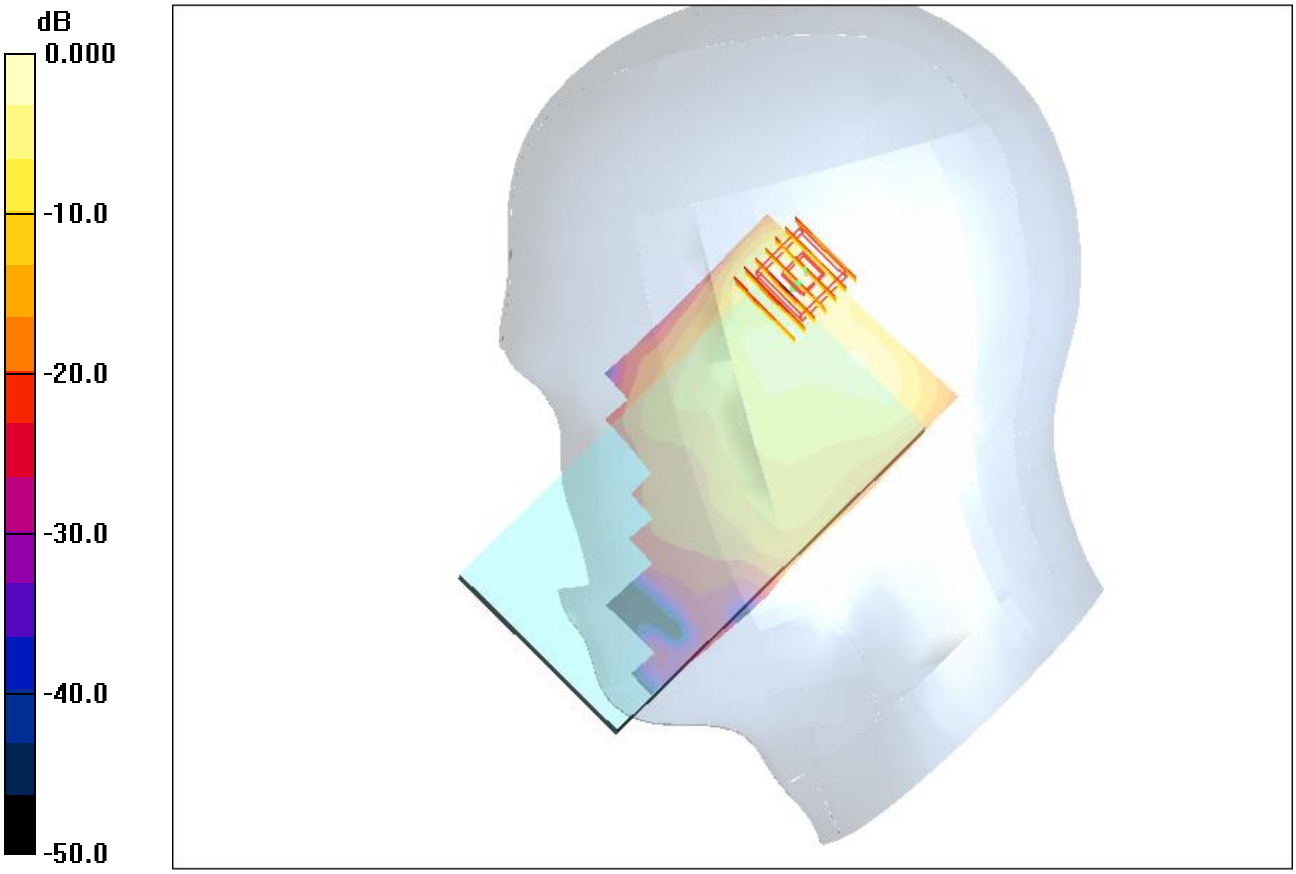
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: 802.11; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.84 mho/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.21, 4.21, 4.21); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (81x151x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.188 mW/g

Right Cheek/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.47 V/m; Power Drift = -0.052 dB
Peak SAR (extrapolated) = 0.616 W/kg
SAR(1 g) = 0.215 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.263 mW/g



0 dB = 0.263mW/g

#9

Date: 10/18/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

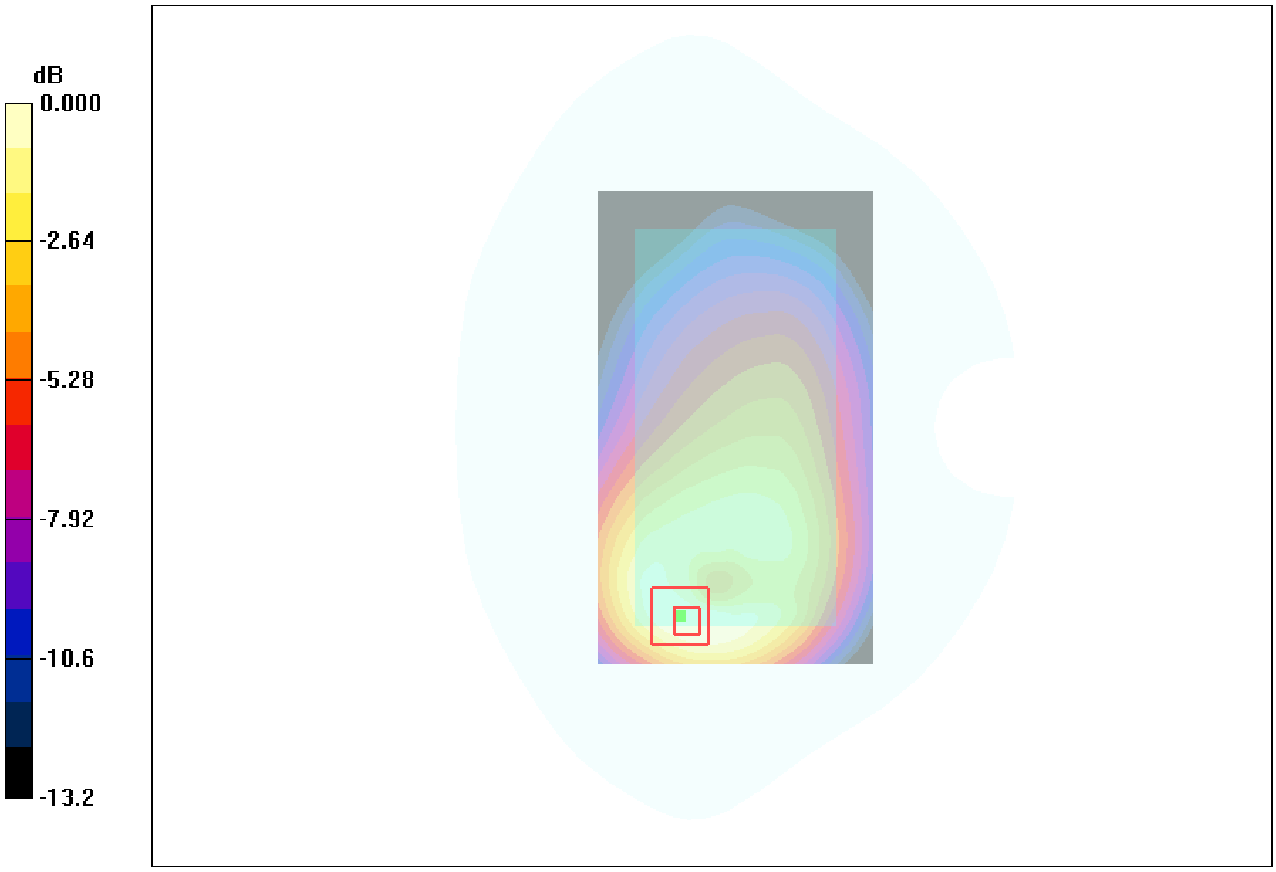
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: GPRS850; Frequency: 848.8 MHz;Duty Cycle: 1:2
Medium parameters used: f = 849 MHz; σ = 1.01 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.02, 6.02, 6.02); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.811 mW/g

Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.5 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 1.22 W/kg
SAR(1 g) = 0.735 mW/g; SAR(10 g) = 0.438 mW/g
Maximum value of SAR (measured) = 0.797 mW/g



0 dB = 0.797mW/g

#10

Date: 10/19/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

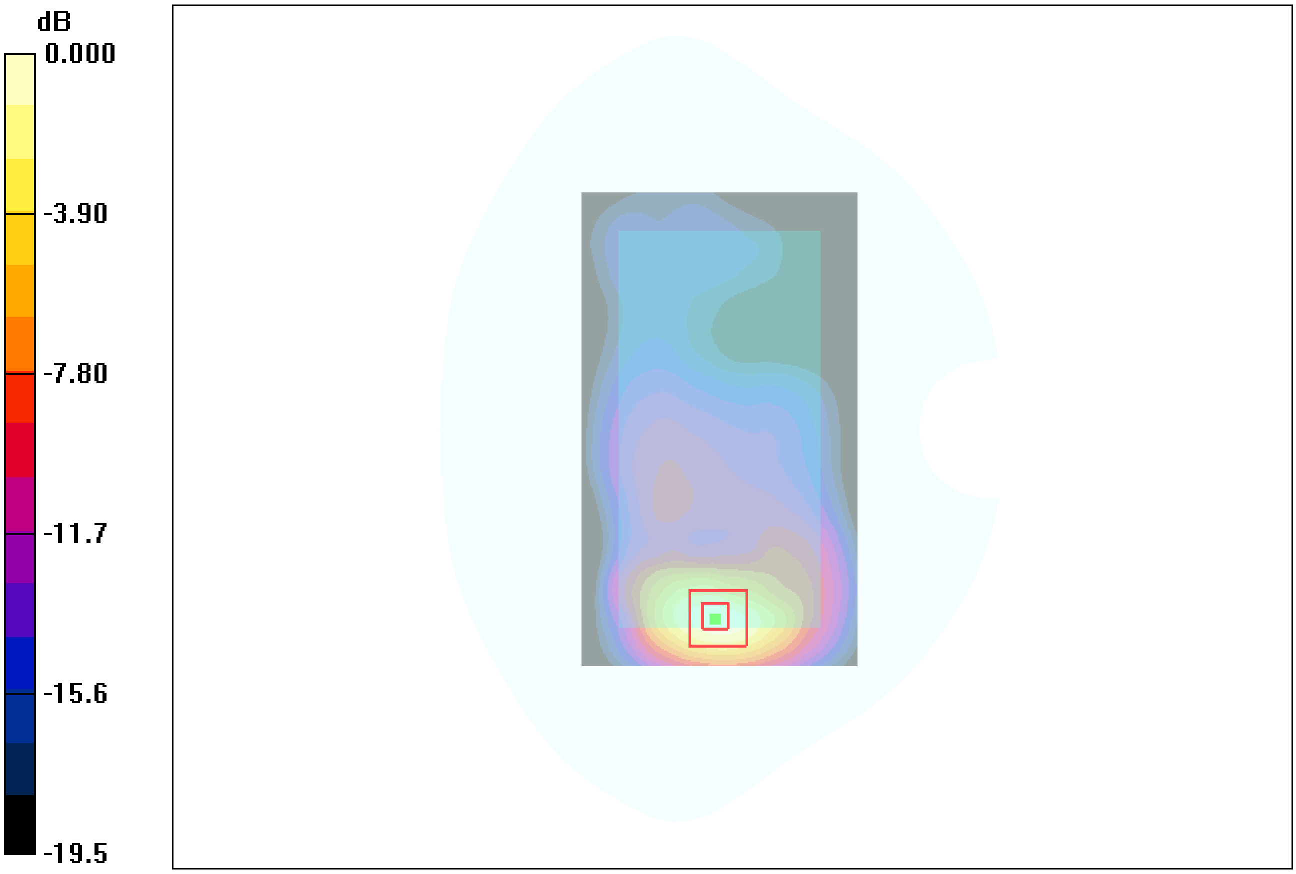
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: GPRS1900; Frequency: 1909.8 MHz;Duty Cycle: 1:2
Medium parameters used: f = 1910 MHz; σ = 1.55 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.48, 4.48, 4.48); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.720 mW/g

Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.43 V/m; Power Drift = -0.099 dB
Peak SAR (extrapolated) = 1.24 W/kg
SAR(1 g) = 0.687 mW/g; SAR(10 g) = 0.353 mW/g
Maximum value of SAR (measured) = 0.760 mW/g



0 dB = 0.760mW/g

#11

Date: 10/18/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

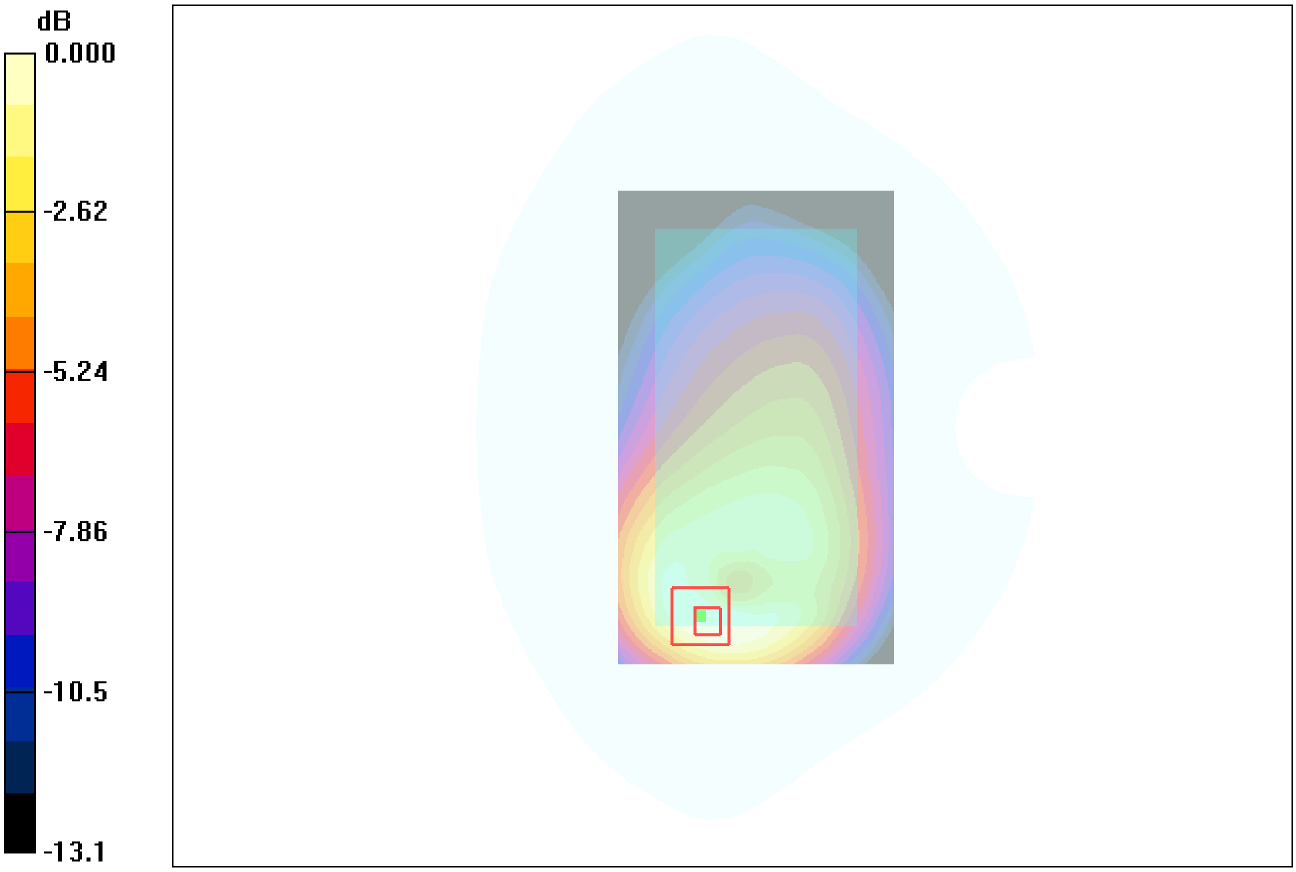
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: W850; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium parameters used: f = 847 MHz; σ = 1.01 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(6.02, 6.02, 6.02); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- Phantom: SAM 2; Type: SAM; Serial: TP-1432
- Measurement SW: DASY4, V4.7 Build 53; Postprocessing SW: SEMCAD, V1.8 Build 172

Back 2/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.265 mW/g

Back 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.4 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 0.391 W/kg
SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.142 mW/g
Maximum value of SAR (measured) = 0.260 mW/g



0 dB = 0.260mW/g

#12

Date: 10/19/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

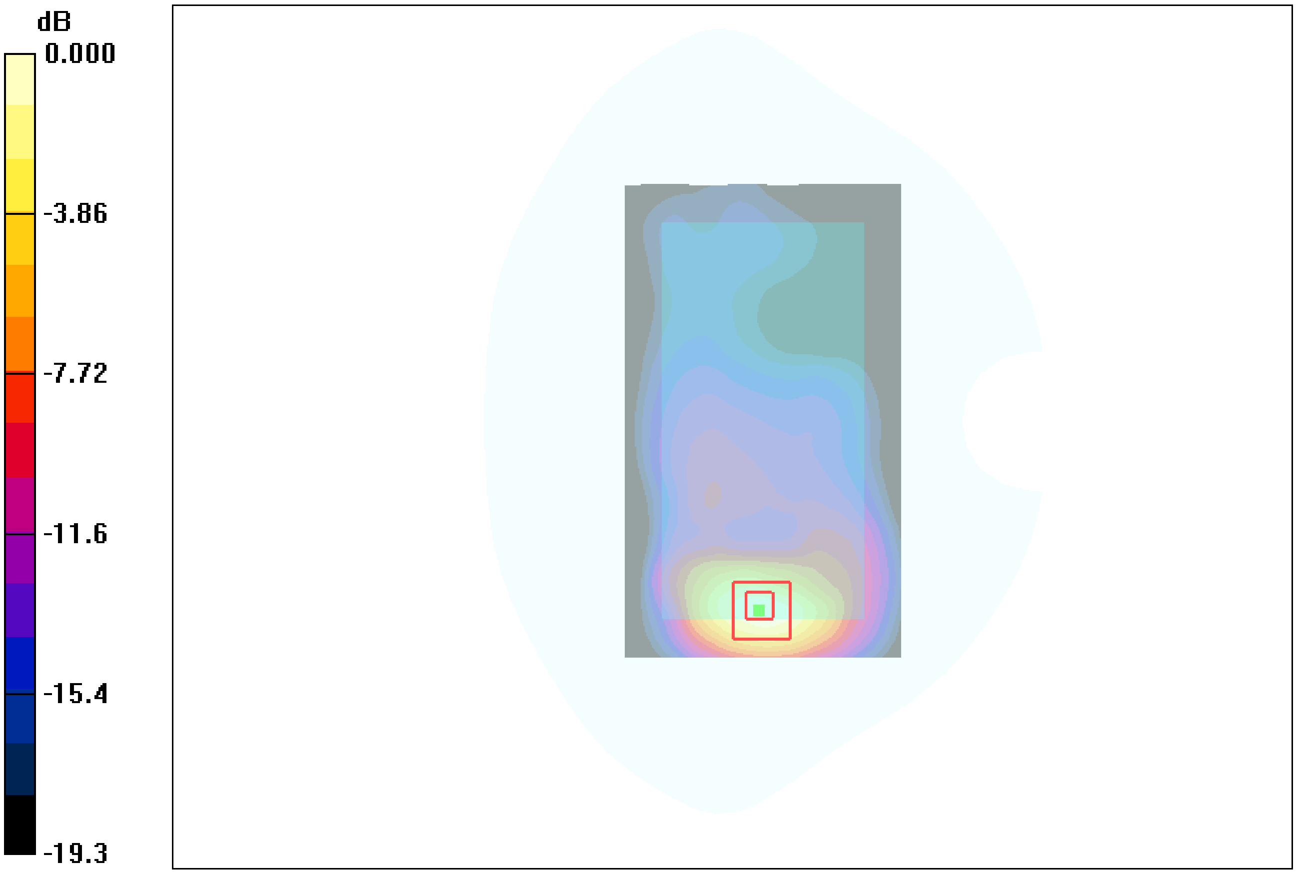
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: W1900; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.48 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.48, 4.48, 4.48); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.747 mW/g

Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.45 V/m; Power Drift = -0.094 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.703 mW/g; SAR(10 g) = 0.359 mW/g
Maximum value of SAR (measured) = 0.781 mW/g



0 dB = 0.781mW/g

#13

Date: 10/19/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

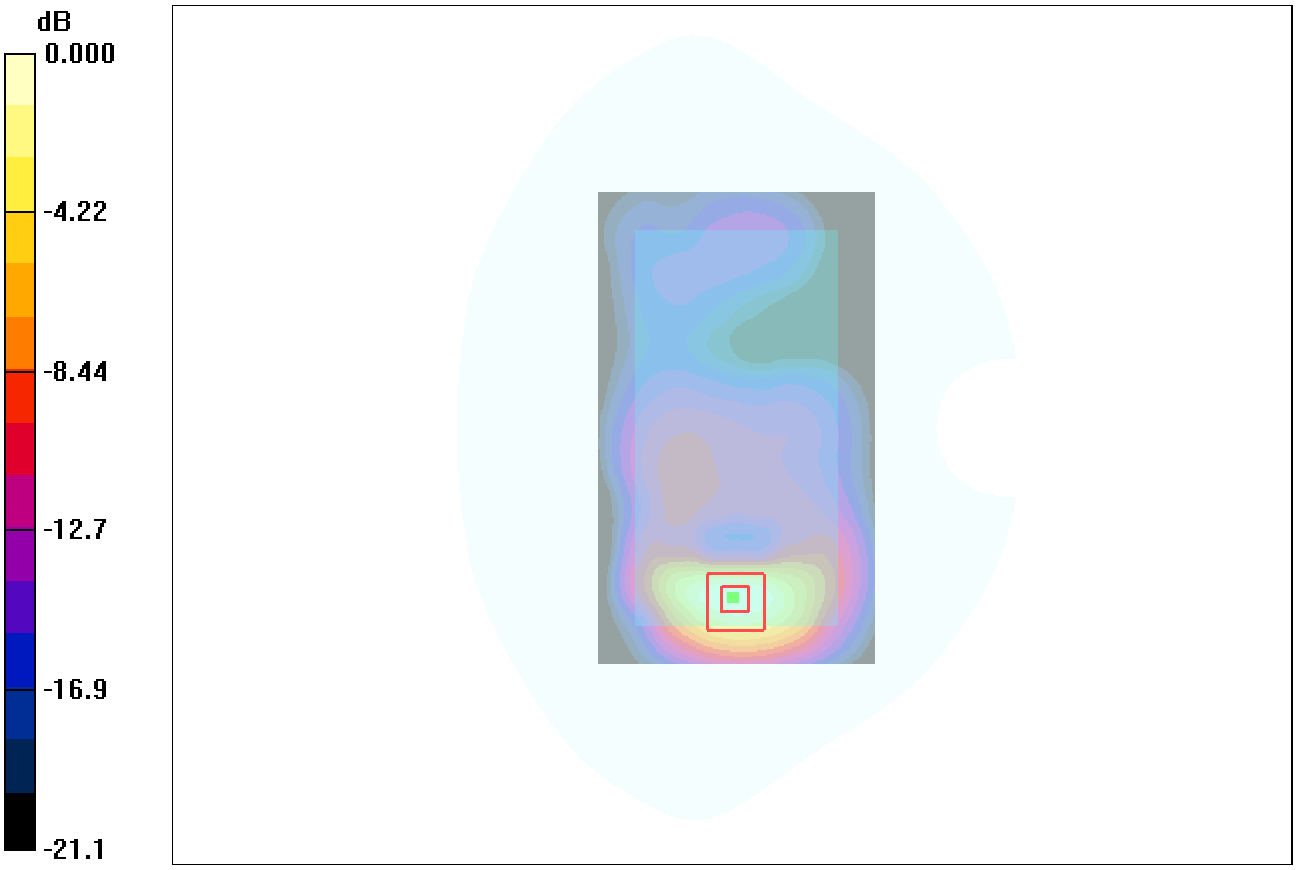
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 53.69; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.48, 4.48, 4.48); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.23 V/m; Power Drift = -0.006 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.708 mW/g; SAR(10 g) = 0.458 mW/g
Maximum value of SAR (measured) = 0.991 mW/g



0 dB = 0.991mW/g

#14

Date: 10/18/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

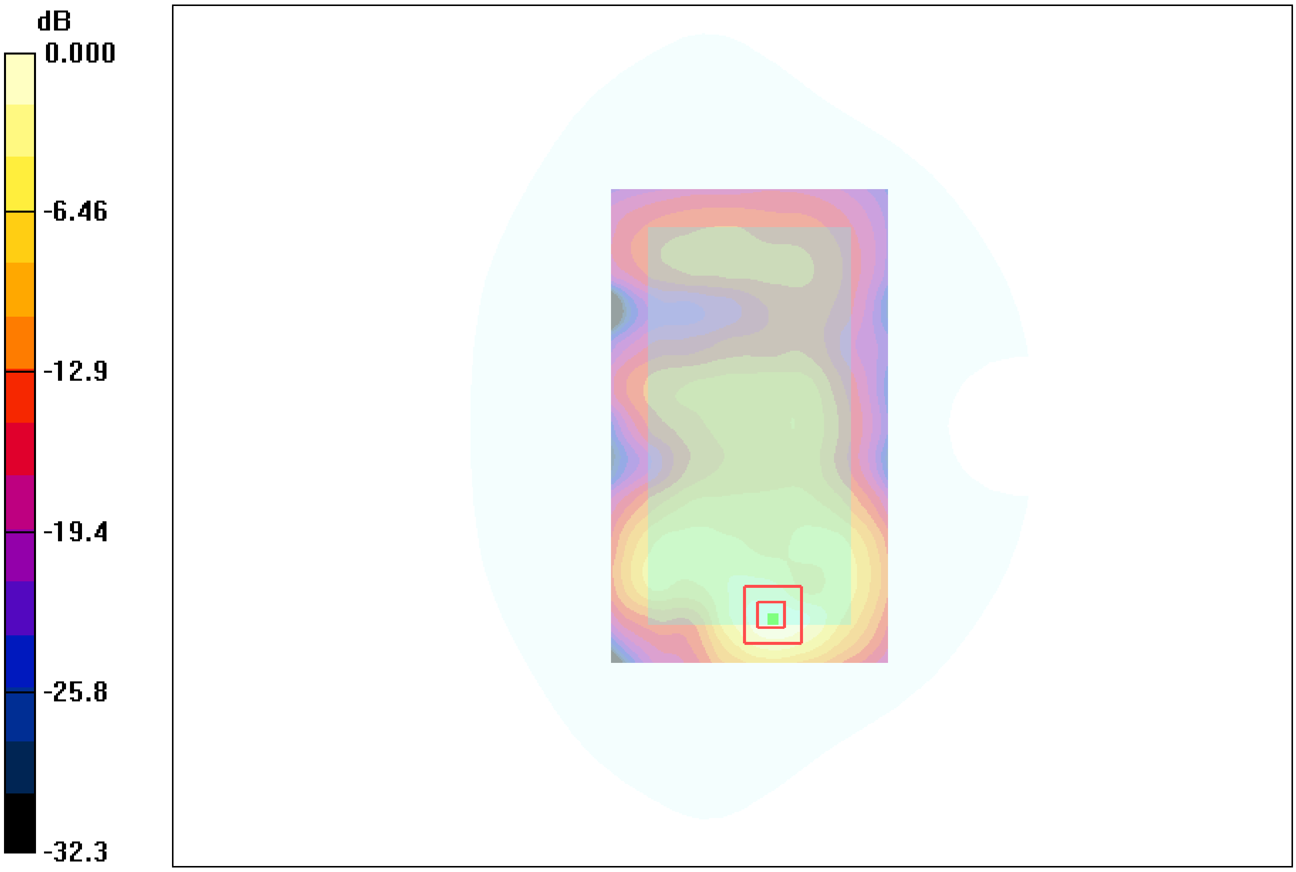
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 1720 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1720 MHz; σ = 1.49 mho/m; ε_r = 52.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.69, 4.69, 4.69); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.188 mW/g

Back/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.09 V/m; Power Drift = -0.020 dB
Peak SAR (extrapolated) = 0.382 W/kg
SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.077 mW/g
Maximum value of SAR (measured) = 0.195 mW/g



0 dB = 0.195mW/g

#15

Date: 10/20/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

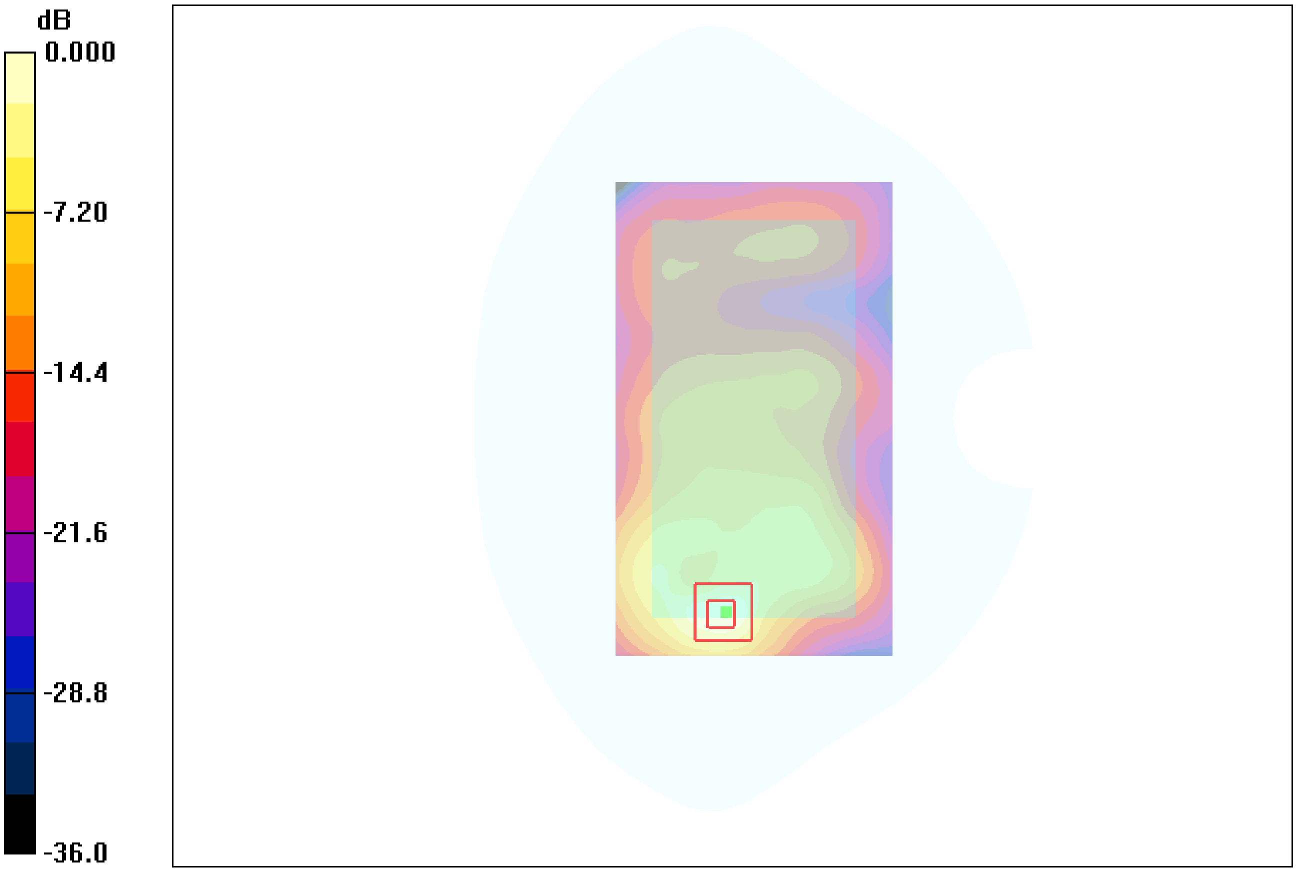
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: LTE; Frequency: 2510 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2510 MHz; σ = 1.88 mho/m; ε_r = 50.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.14, 4.14, 4.14); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (81x151x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.245 mW/g

Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.30 V/m; Power Drift = 0.086 dB
Peak SAR (extrapolated) = 0.516 W/kg
SAR(1 g) = 0.224 mW/g; SAR(10 g) = 0.097 mW/g
Maximum value of SAR (measured) = 0.247 mW/g



0 dB = 0.247mW/g

#16

Date: 10/19/2015

Test Laboratory: SUNWAY COMMUNICATION CO.,LTD.

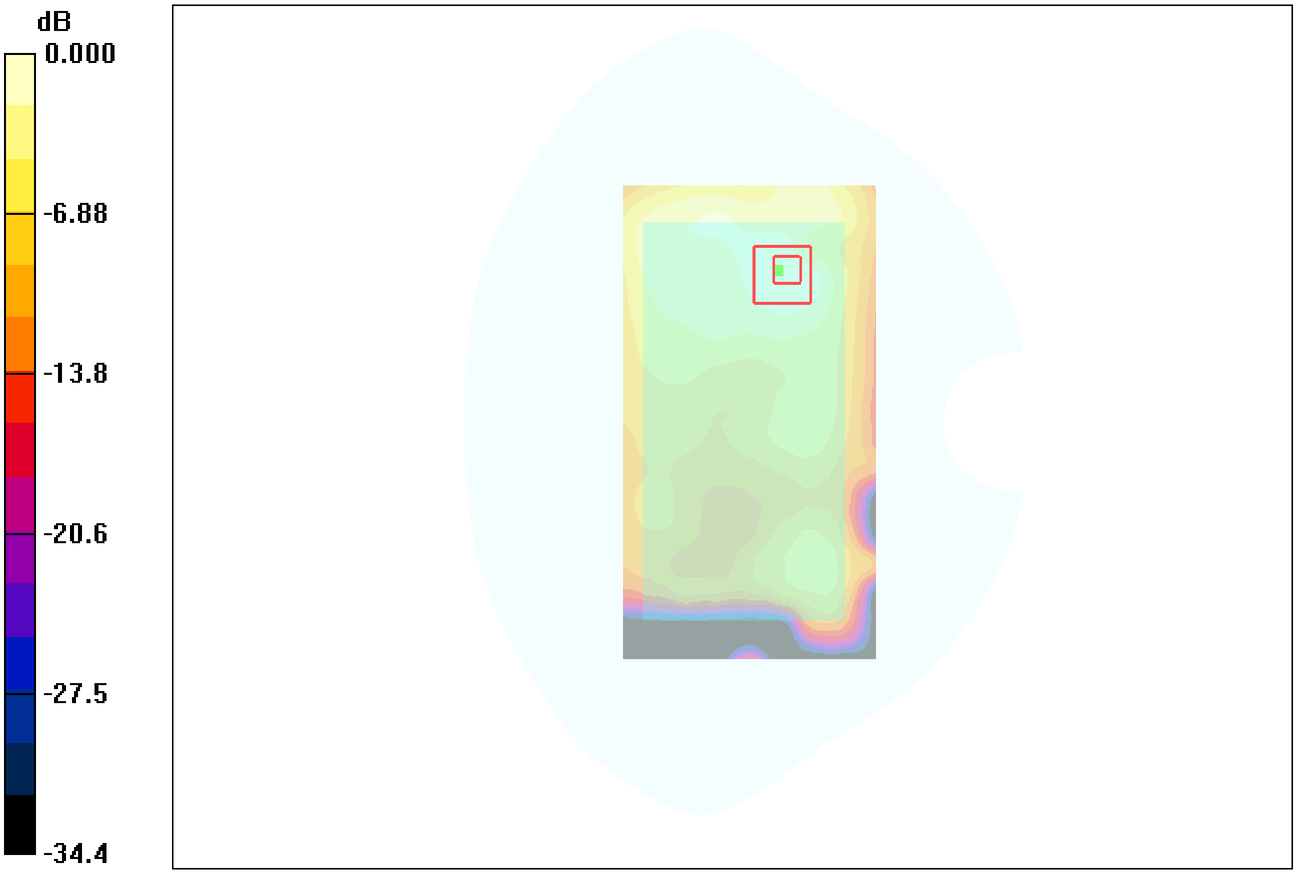
DUT: Speed 5.5; Type: SI PIN; Serial: IMEI Number
Program Name: Speed 5.5

Communication System: 802.11; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2437 MHz; σ = 1.95 mho/m; ε_r = 54.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:
- Probe: ES3DV3 - SN3028; ConvF(4.14, 4.14, 4.14); Calibrated: 10/22/2014
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn905; Calibrated: 7/16/2015
- 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 (81x151x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.037 mW/g

Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.85 V/m; Power Drift = 0.114 dB
Peak SAR (extrapolated) = 0.083 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.019 mW/g
Maximum value of SAR (measured) = 0.041 mW/g



0 dB = 0.041mW/g

Appendix C. Probe Calibration Data:

In Collaboration with s p e a g CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

CALIBRATION No. L0570

Client AUDEN Certificate No: Z14-97115

CALIBRATION CERTIFICATE

Object	ES3DV3 - SN:3028
Calibration Procedure(s)	TMC-OS-E-02-195 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	October 22, 2014

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

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ 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-14 (CTTL, No.J14X02146)	Jun-15
Power sensor NRP-Z91	101547	01-Jul-14 (CTTL, No.J14X02146)	Jun-15
Power sensor NRP-Z91	101548	01-Jul-14 (CTTL, No.J14X02146)	Jun-15
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 3617	28-Aug-14(SPEAG,No.EX3-3617_Aug14)	Aug-15
DAE4	SN 1331	23-Jan-14 (SPEAG, DAE4-1331_Jan14)	Jan -15
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	01-Jul-14 (CTTL, No.J14X02145)	Jun-15
Network Analyzer E5071C	MY46110673	15-Feb-14 (TMC, No.JZ14-781)	Feb-15

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

Issued: October 23, 2014

In Collaboration with
speag
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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 θ=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

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).

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Probe ES3DV3

SN: 3028

Calibrated: October 22, 2014

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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	1.16	1.27	1.21	±10.8%
DCP(mV)^B	105.8	103.2	103.8	

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	282.9	±2.2%
		Y	0.0	0.0	1.0		292.0	
		Z	0.0	0.0	1.0		290.3	

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.

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	6.36	6.36	6.36	0.37	1.44	±12%
835	41.5	0.90	6.19	6.19	6.19	0.39	1.42	±12%
1750	40.1	1.37	4.97	4.97	4.97	0.55	1.34	±12%
1900	40.0	1.40	4.68	4.68	4.68	0.70	1.23	±12%
2300	39.5	1.67	4.52	4.52	4.52	0.80	1.17	±12%
2450	39.2	1.80	4.21	4.21	4.21	0.98	1.04	±12%
2600	39.0	1.96	4.06	4.06	4.06	0.86	1.11	±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.
[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.

In Collaboration with
speag
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	6.02	6.02	6.02	0.33	1.68	±12%
835	55.2	0.97	6.02	6.02	6.02	0.34	1.79	±12%
1750	53.4	1.49	4.69	4.69	4.69	0.63	1.30	±12%
1900	53.3	1.52	4.48	4.48	4.48	0.60	1.34	±12%
2300	52.9	1.81	4.37	4.37	4.37	0.74	1.25	±12%
2450	52.7	1.95	4.14	4.14	4.14	0.68	1.35	±12%
2600	52.5	2.16	4.02	4.02	4.02	0.84	1.16	±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.

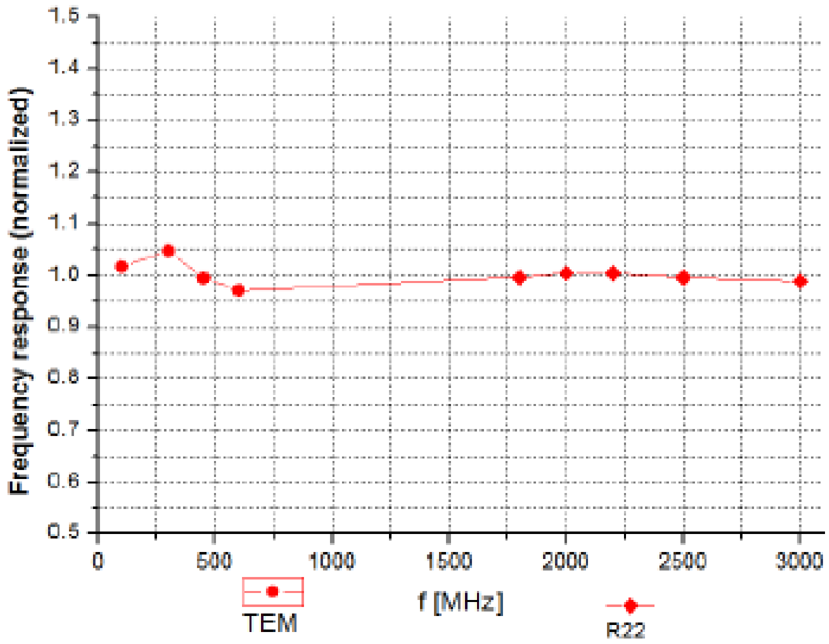
[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty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

[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.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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



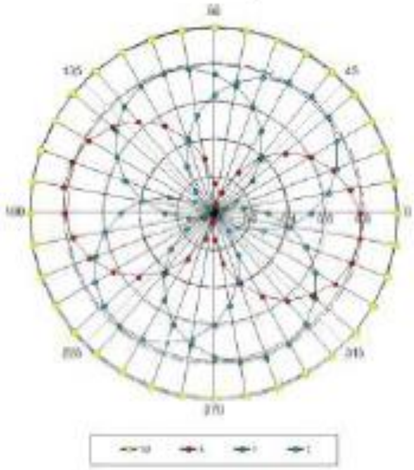
Uncertainty of Frequency Response of E-field: ±7.5% (k=2)

In Collaboration with
s p e a g
CALIBRATION LABORATORY

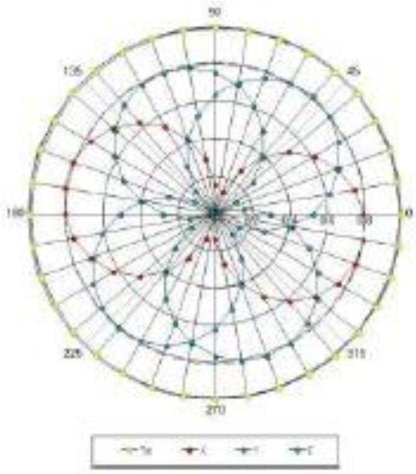
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

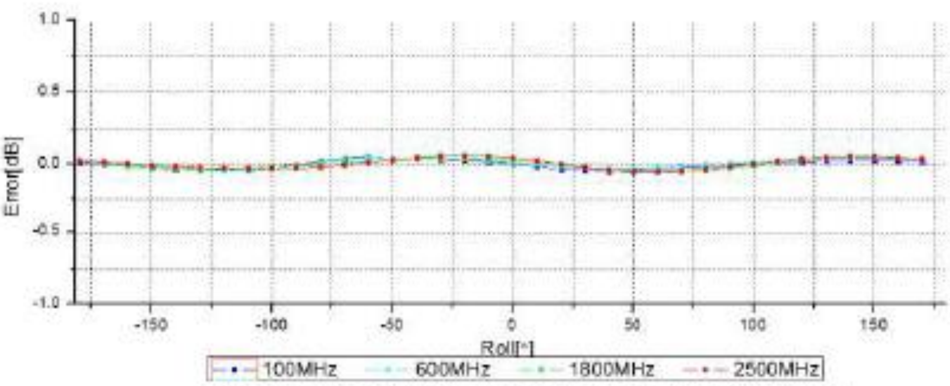
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22

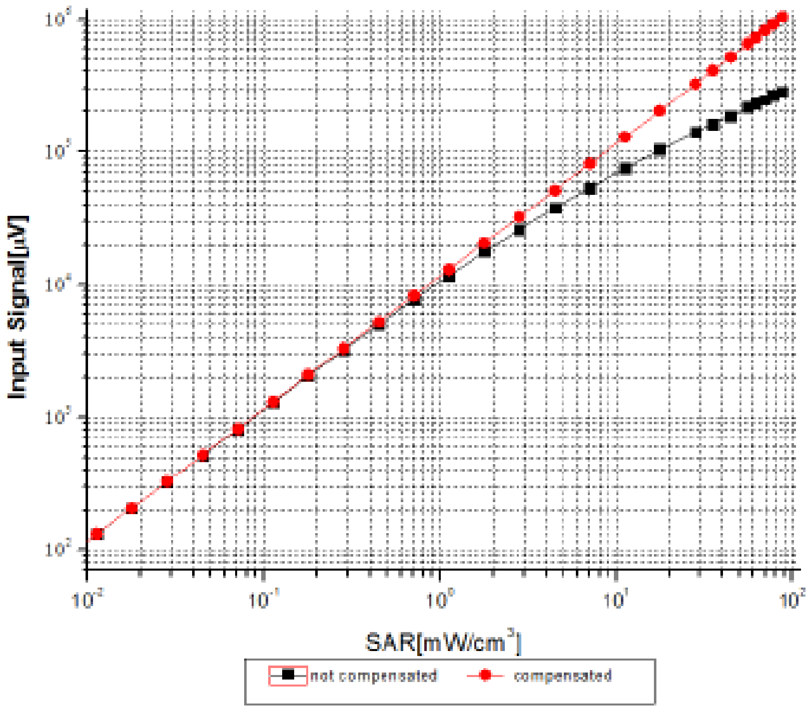


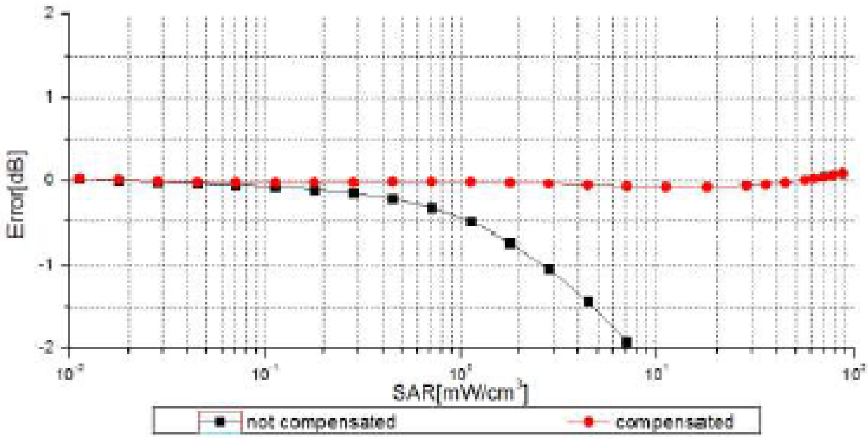


Uncertainty of Axial Isotropy Assessment: ±0.9% (k=2)

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Dynamic Range f(SAR$_{head}$)
(TEM cell, f = 900 MHz)





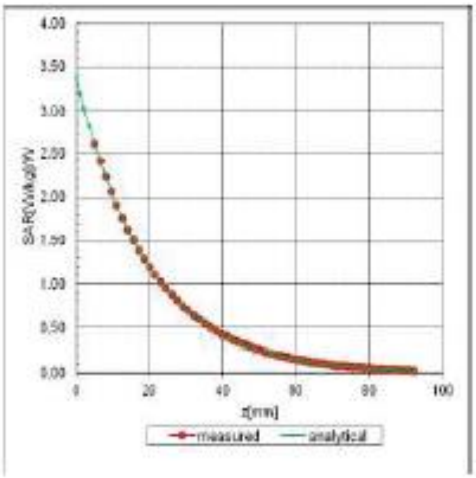
Uncertainty of Linearity Assessment: ±0.9% (k=2)

In Collaboration with
s p e a g
CALIBRATION LABORATORY

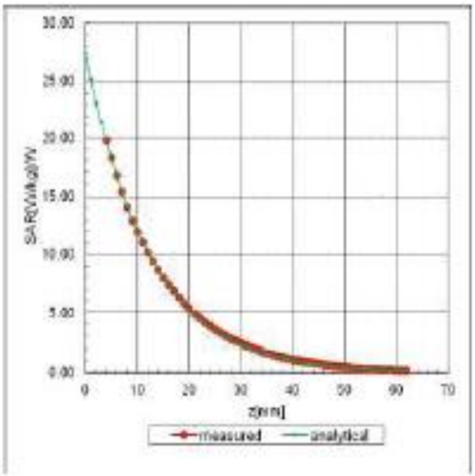
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Conversion Factor Assessment

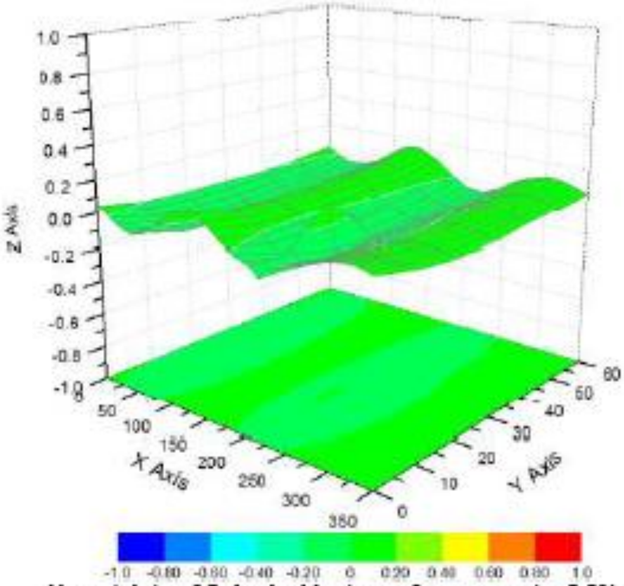
f=835 MHz, WGLS R9(H_convF)



f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



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

In Collaboration with
s p e a g
CALIBRATION LABORATORY
Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

DASY - Parameters of Probe: ES3DV3 - SN: 3208

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	54.8
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 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.

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.

Appendix D. DAE Calibration Data:

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

CALIBRATION No. L0570

Client : Auden

Certificate No: Z15-97093

CALIBRATION CERTIFICATE

Object	DAE4 - SN: 905
Calibration Procedure(s)	FD-Z11-2-002-01 Calibration Procedure for the Data Acquisition Electronics (DAEx)
Calibration date:	July 16, 2015

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

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	06-July-15 (CTTL, No:J15X04257)	July-16

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

Issued: July 17, 2015

In Collaboration with
speag
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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.

In Collaboration with
s p e a g
CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2218 Fax: +86-10-62304633-2209
E-mail: cttl@chinattl.com Http://www.chinattl.cn

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	404.672 ± 0.15% (k=2)	405.235 ± 0.15% (k=2)	404.825 ± 0.15% (k=2)
Low Range	3.98116 ± 0.7% (k=2)	4.00286 ± 0.7% (k=2)	3.99735 ± 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	269° ± 1 °

Appendix E. Dipole Calibration Data:

TMC In Collaboration with s p e a g 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

ilac-MRA CNAS 校准 CNAS L0442

Client **Sunway** **Certificate No: J13-2-2185**

CALIBRATION CERTIFICATE

Object	D900V2 - SN: 1d086
Calibration Procedure(s)	TMC-OS-E-02-194 Calibration procedure for dipole validation kits
Calibration date:	August 9, 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 NRVD	102083	11-Sep-12 (TMC, No.JZ12-443)	Sep-13
Power sensor NRV-Z5	100595	11-Sep-12 (TMC, No. JZ12-443)	Sep -13
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
Signal Generator E4438C	MY49070393	13-Nov-12 (TMC, No.JZ12-394)	Nov-13
Network Analyzer E8362B	MY43021135	19-Oct-12 (TMC, No.JZ13-278)	Oct-13

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

Issued: August 11, 2013

In Collaboration with
s p e a g
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
ConvF	sensitivity in TSL / NORMx,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 300MHz to 3GHz)", February 2005
c) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

In Collaboration with
speag
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

Measurement Conditions

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

DASY Version	DASY52	52.8.7.1137
Extrapolation	Advanced Extrapolation	
Phantom	Twin Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	900 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	0.97 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.6 ± 6 %	0.98 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	2.67 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**10.7 mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.72 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.87 mW /g ± 20.4 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.0	1.05 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.2 ± 6 %	1.02 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	2.63 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.7mW /g ± 20.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.71 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.94 mW /g ± 20.4 % (k=2)**

In Collaboration with
speag
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

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.1Ω-8.85jΩ
Return Loss	- 22.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	42.1Ω+0.52jΩ
Return Loss	- 21.3dB

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

TMC In Collaboration with s p e a g 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

DASY5 Validation Report for Head TSL Date: 02.08.2013

Test Laboratory: TMC, Beijing, China

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

Communication System: CW; Frequency: 900 MHz

Medium parameters used: f = 900 MHz; σ = 0.982 mho/m; εr = 42.66; ρ = 1000 kg/m^3

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3846; ConvF(9.01,9.01,9.01); Calibrated:20,12,2012
- Sensor-Surface: 2mm (Mechanical Surface Detection); 1.0, 31.0
- Electronics: DAE4 Sn777; Calibrated: 22/2/2013
- Phantom: Flat Phantom; Type: QD000P40CC;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

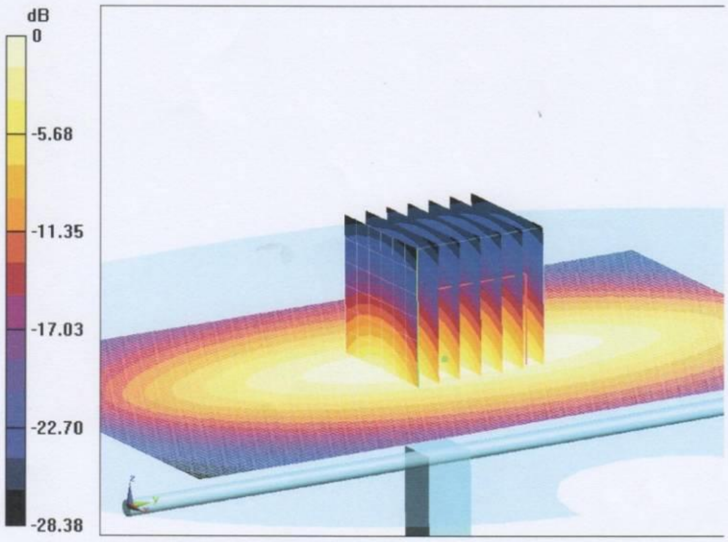
Dipole Calibration for Head Tissue/Pin=250mW, d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 59.910 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 4.11 W/kg

SAR(1 g) = 2.67 W/kg; SAR(10 g) = 1.72 W/kg

Maximum value of SAR (measured) = 3.43 W/kg

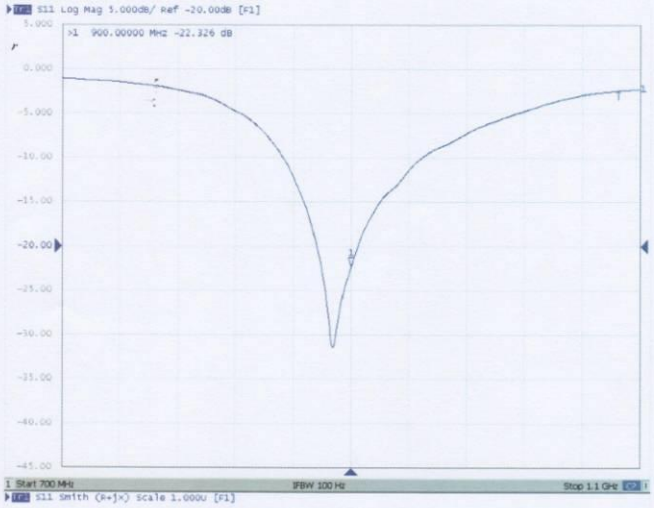


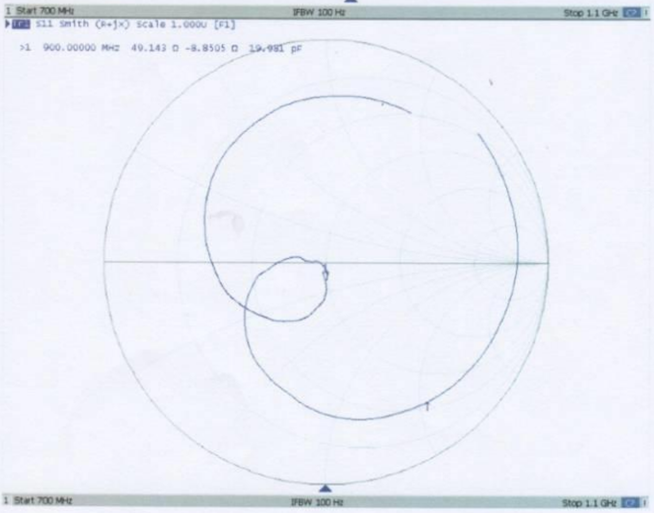
0 dB = 3.44 W/kg = 5.36 dBW/kg

In Collaboration with
speag
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

Impedance Measurement Plot for Head TSL





In Collaboration with
speag
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

DASY5 Validation Report for Body TSL Date: 02.08.2013

Test Laboratory: TMC, Beijing, China

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

Communication System: CW; Frequency: 900 MHz;

Medium parameters used: f = 900 MHz; σ = 1.023 mho/m; εr = 54.207; ρ = 1000 kg/m^3 .

Phantom section: ELI 4.0

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

DASY5 Configuration:

- Probe: EX3DV4 - SN3846; ConvF(9.01,9.01,9.01) ; Calibrated:20.12.2012
- Sensor-Surface: 2mm (Mechanical Surface Detection); 1.0, 31.0
- Electronics: DAE4 Sn777; Calibrated: 22/2/2013
- Phantom: ELI 4.0; Type: QDOVA001DB;
- DASY52 52.8.7(1137); SEMCAD X Version 14.6.10 (7164)

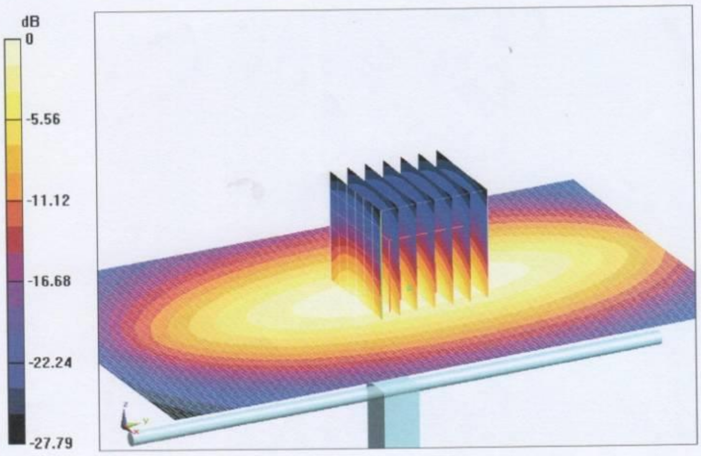
Dipole Calibration for Body Tissue/Pin=250mW, d=15mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.362 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 3.90 W/kg

SAR(1 g) = 2.63 W/kg; SAR(10 g) = 1.71 W/kg

Maximum value of SAR (measured) = 3.33 W/kg

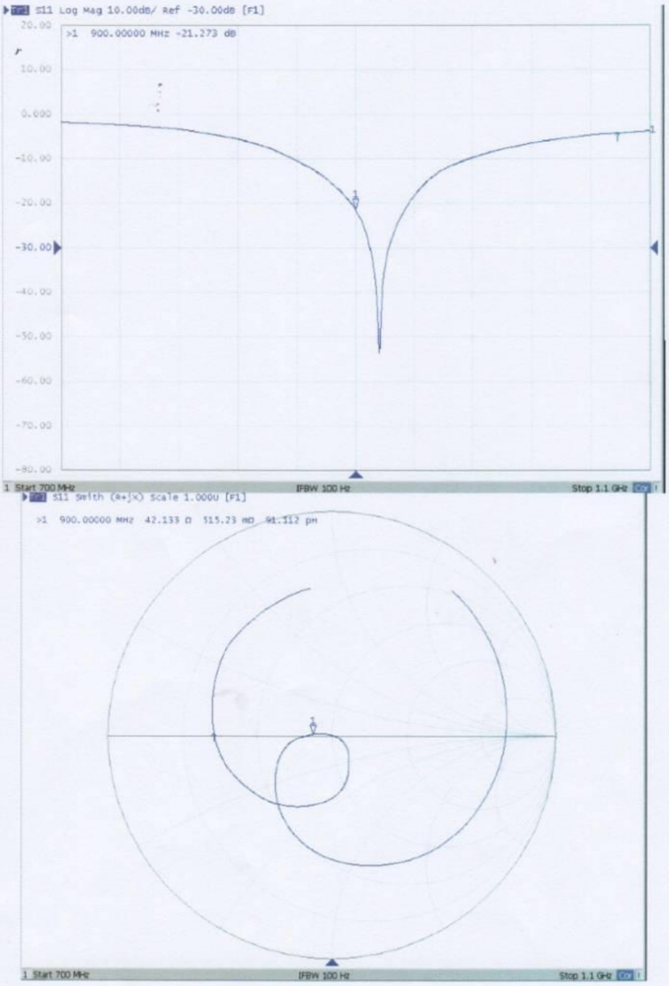


0 dB = 3.31 W/kg = 5.19 dBW/kg

TMC In Collaboration with speag 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

Impedance Measurement Plot for Body TSL



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.

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.

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.

D900V2, serial no. 1d086 Extended Dipole Calibrations

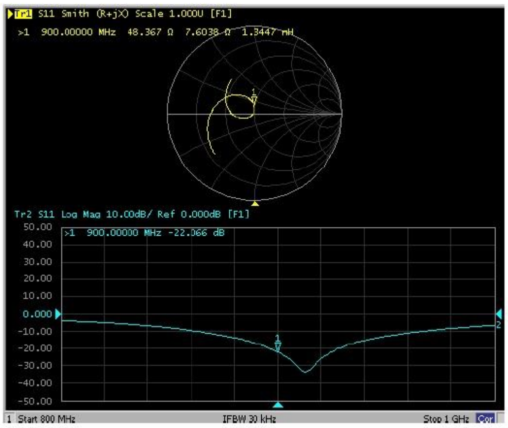
Referring to KDB 865664D01V01r03, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

D900V2, serial no. 1d086								
	900 Head				900 Body			
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)
2013-8-9	-22.3		49.2		-21.3		42.1	
2014-8-8	-22.21	0.41	49.12	-0.08	-21.1	0.94	42.25	-0.15
2015-8-4	-22.1	0.9	48.4	-0.8	-21.4	-0.5	43.1	1.0

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Dipole Verification Data>- D900V2, serial no. 1d086

900MHz Head



900MHz Body