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SAR TEST REPORT

Applicant Name: **SAMSUNG Electronics Co., Ltd.** 129, Samsung-ro, Yeongtong-gu, Suwon-Si, Gyeonggi-do, 16677 Rep. of Korea	**Date of Issue: 12. 23, 2015** **Test Report No.: HCT-A-1512-F006-1** **Test Site: HCT CO., LTD.**

FCC ID: A3LSMA7108

Equipment Type:	**Mobile Phone**
Model Name:	**SM-A7108**
Testing has been carried out in accordance with:	**47CFR §2.1093** **ANSI/ IEEE C95.1 - 2005** **IEEE 1528-2013**
Date of Test:	**11/27/ 2015 ~ 12/16/ 2015**

This device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in FCC KDB procedures and had been tested in accordance with the measurement procedures specified in FCC KDB procedures.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested By	**Reviewed By**
Yun-Jeang Heo **Test Engineer / SAR Team** **Certification Division**	**Dong-Seob Kim** **Technical Manager / SAR Team** **Certification Division**

Version

Rev.	DATE	DESCRIPTION
HCT-A-1512-F006	12. 21, 2015	First Approval Report
HCT-A-1512-F006-1	12. 23, 2015	• Removed LTE Band 41 Carrier Aggregation description. Revised sec. 2.3, 9.3 and 11.4 LTE note. • Revised 802.11 Target Power. Revised Sec. 2.5.1

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1. Attestation of Test Result of Device Under Test

Attestation of SAR test result						
Applicant Name:	SAMSUNG Electronics Co., Ltd.					
FCC ID:	A3LSMA7108					
Model:	SM-A7108					
EUT Type:	Mobile Phone					
Application Type:	Certification					
The Highest Reported SAR						
Band	Tx. Frequency	Equipment Class	Reported 1g SAR			Reported 10g SAR
			Head	Body-Worn	Hotspot	Hand SAR for Phablet
	(MHz)		(W/Kg)	(W/Kg)	(W/Kg)	(W/Kg)
GSM/GPRS/ EDGE 850	824.2 - 848.8	PCE	0.08	0.16	0.27	
GSM/GPRS/ EDGE 1900	1 850.2 -1 909.8	PCE	0.08	0.40	0.63	
UMTS 850	826.4 - 846.6	PCE	0.09	0.19	0.19	
UMTS 1900	1 852.4 - 1 907.6	PCE	0.12	0.51	0.55	
LTE 41	2 555 ~ 2 655	PCE	0.07	0.37	0.97	
802.11b	2 412 - 2 462	DTS	0.18	0.16	0.16	
U-NII-1	5 180 - 5 240	NII				
U-NII-2A	5 260 - 5 320	NII	0.28	0.04		0.20
U-NII-2C<5.65GHz	5 500 - 5 580	NII	0.24	0.03		0.15
U-NII-2C>5.65GHz +U-NII-3	5660 - 5 825	NII	0.16	0.03	0.08	
Bluetooth	2 402 - 2 480	DSS/DTS		0.13 *		
Simultaneous SAR per KDB 690783 D01v01r03			0.39	1.12		
Date(s) of Tests:	11/27/2015 ~ 12/16/2015					

SAR Test Note :

* BT Body-worn SAR value is estimated SAR value that should not be reported standalone SAR on grants of equipment approval.

* The device, SM-A7108 (FCC ID: A3LSMA7108) is electrically identical compare to SM-A710FD (FCC ID: A3LSMA710FD), with spot-checks test done to confirm. WiFi SAR test data (DTS and NII) of this model were reused from SM-A710FD (FCC ID: A3LSM710FD).

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2. Device Under Test Description

2.1 DUT specification

Device Wireless specification overview		
Band & Mode	**Operating Mode**	**Tx Frequency**
GSM/GPRS/EDGE 850	Voice / Data	824.2 – 848.8 MHz
GSM/GPRS/EDGE 1900	Voice / Data	1 850.0 – 1 909.8 MHz
UMTS 850	Voice / Data	826.4 – 846.6 MHz
UMTS 1900	Voice / Data	1 852.4 – 1 907.6 MHz
LTE TDD Band 41	Data	2 555 – 2 655 MHz
2.4 GHz WLAN	Data	2 412 – 2 462 MHz
U-NII-1	Data	5 180 – 5 240 MHz
U-NII-2A	Data	5 260 – 5 320 MHz
U-NII-2C	Data	5 500 – 5 720 MHz
U-NII-3	Data	5 745 – 5 825 MHz
Bluetooth	Data	2 402 – 2 480 MHz
NFC	Data	13.56 MHz
ANT+	Data	2402 – 2480 MHz

Device Description		
Device Dimension:	Overall (Length x Width) : 149 mm x 72 mm Overall Diagonal : 162.4 mm Display Diagonal : 140 mm	
Back Cover:	Normal Battery cover	
Battery Options:	Standard	
Hardware Version:	REV0.1	
Software Version :	A7108.001	
Device Serial Numbers	Mode	Serial Number
	GSM 850,1900 UMTS 850, 1900 LTE 41	R38GC0B865D R38GA0PHC3Z
	WiFi	R38GB0WKDOJ
	Several samples with identical hardware were used to SAR testing. The manufacturer has confirmed that the devices tested have the same physical, mechanical and thermal characteristics are within operational tolerances expected for production units.	

2.2 DUT Wireless mode

Wireless Modulation	Band	Operating Mode		Duty Cycle
GSM	850 1900	Voice(GMSK) GPRS (GMSK) EGPRS (8PSK)	GPRS/ EDGE Multi-Slot Class: Class 33 – 4 Up, 5 Down Mode class B	GSM Voice: 12.5% GPRS 1 Slot: 12.5% 2 Slots : 25% 3 Slots : 37.5% 4 Slots : 50%
WCDMA (UMTS)	Band 5 Band 2	UMTS Rel.99 (Voice / DATA) HSDPA (Rel. 5) HSUPA (Rel. 6) HSPA+ (Rel. 7) (Uplink QPSK Only) DC- HSDPA (Rel. 8)		100 %
LTE Band	41	Data (QPSK, 16QAM)		63.3 % (TDD)
2.4 GHz WLAN		Data	802.11 b, 802.11 g, 802.11 n (HT20)	98.97 %
5 GHz WLAN		Data	802.11 a, 802.11 n (HT20/HT40)	93.14 %
Bluetooth		Data	4.1 LE	N/A
Others		This EUT support dual SIM cards. SIM path is using same RF path. This device was tested with SIM 1. This device supports Mobile Hotspot.		

2.3 LTE information

Item.	Description
Frequency Range:	Band 41: 2 555 MHz – 2 655 MHz
Channel Bandwidths	Band 41: 5 MHz, 10 MHz, 15 MHz, 20 MHz

Channel Number s& Frequencies(MHz):

Band 41							
5 MHz		10 MHz		15 MHz		20 MHz	
Ch.	Freq. (MHz)	Ch.	Freq. (MHz)	Ch.	Freq. (MHz)	Ch.	Freq. (MHz)
40265	2557.5	40290	2560.0	40315	2562.5	40340	2565.0
40620	2593.0	40620	2593.0	40620	2593.0	40620	2593.0
41215	2652.5	41190	2650.0	41165	2647.5	41140	2645.0

Item.	Description
UE Category	UE Category 4
Modulations Supported in UL	QPSK, 16QAM
LTE voice/data requirements	Data Only,
	LTE voice is available via VoIP. Considering the users may install 3rd party software to enable VoIP, LTE Head SAR is also evaluated.
LTE MPR options	The EUT incorporates MPR as per 3GPP TS 36.101 sec. 6.2.3 ~ 6.2.5 (Manufacturer attestation to be provided)
	The MPR is permanently built-in by design as a mandatory.
	A-MPR is not implemented in the DUT.
Description of the LTE Transmitter & antenna	This model has two Tx. paths.
	One is for GSM and WCDMA and LTE. It can not transmit simultaneously.
	The other is for BT & WLAN. It can not transmit simultaneously.
LTE Release 10 Additional Information	This device does not support full CA features on 3GPP Release 10 in the US. The following LTE Release 10 Features are not supported: Carrier Aggregation,. Relay, HetNet, Enhanced MIMO, eICI, WiFi offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.
Description of the test equipment, software, etc.	LTE SAR Testing was performed using a CMW500. UE transmits with maximum output power during SAR testing.

2.4 TEST METHODOLOGY and Procedures

The tests documented in this report were performed in accordance with IEEE Standard 1528-2013 & IEEE 1528-2005 and the following published KDB procedures.

- FCC KDB Publication 941225 D01 3G SAR Procedures v03r01
- FCC KDB Publication 941225 D06 Hot Spot SAR v02r01
- FCC KDB Publication 941225 D05 SAR for LTE Devices v02r04
- FCC KDB Publication 941225 D05A LTE Rel.10 KDB Inquiry sheet v01r02
- FCC KDB Publication 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB Publication 447498 D01 General SAR Guidance v06
- FCC KDB Publication 648474 D04 Handset SAR v01r03
- FCC KDB Publication 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
- FCC KDB Publication 865664 D02 SAR Reporting v01r02
- October 2013 TCB Workshop Notes (GPRS testing criteria)
- April 2015 TCB Workshop Notes (Simultaneous transmission summation clarified)

2.5 Nominal and Maximum Output Power Specifications

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

2.5.1 Maximum Output Power

Mode / Band		Voice (dBm)	Burst Average GMSK (dBm)				Burst Average 8-PSK (dBm)			
		1 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot	1 Tx Slot	2 Tx Slot	3 Tx Slot	4 Tx Slot
GSM/GPRS/EDGE 850	Maximum	33.5	33.5	31.5	30.0	29.0	27.5	25.5	24.0	23.0
	Nominal	33.0	33.0	31.0	29.5	28.5	27.0	25.0	23.5	22.5
GSM/GPRS/EDGE 1900	Maximum	30.0	30.0	28.5	26.5	25.5	26.5	25.0	23.5	22.0
	Nominal	29.5	29.5	28.0	26.0	25.0	26.0	24.5	23.0	21.5

Mode / Band		3GPP WCDMA (dBm)	3GPP HSDPA (dBm)	3GPP HSUPA (dBm)	DC-HSDPA (dBm)
UMTS Band 5 (850 MHz)	Maximum	23.5	23.5	22.5	23.5
	Nominal	23.0	23.0	22.0	23.0
UMTS Band 2 (1900 MHz)	Maximum	22.0	22.0	20.5	21.0
	Nominal	21.5	21.5	20.0	20.5

Mode / Band		Modulated Average (dBm)
LTE Band 41	Maximum	23.7
	Nominal	23.2

Mode / Band		Modulated Average (dBm)	
		Nominal	Maximum
802.11b (2.4 GHz)	1,2,3,10,11 CH	17.0	17.5
	4~9 CH	17.0	17.5
	12,13 CH	7.5	8.0
802.11g (2.4 GHz)	1,2,3,10,11 CH	14.0	14.5
	4~9 CH	14.0	14.5
	12,13 CH	7.5	8.0
802.11n (2.4 GHz)	1,2,3,10,11 CH	13.0	13.5
	4~9 CH	13.0	13.5
	12,13 CH	7.5	8.0
802.11 a (5 GHz)		13.0	13.5
802.11 n HT20 (5 GHz)		13.0	13.5
802.11 n HT40 (5 GHz)		12.0	12.5
Bluetooth (DH5)		9.0	9.5
Bluetooth LE		8.0	8.5

2.6 DUT Antenna Locations

Device Edges / Sides for SAR Testing						
Mode	**Rear**	**Front**	**Left**	**Right**	**Bottom**	**Top**
GSM/GPRS 850	Yes	Yes	Yes	No	Yes	No
GSM/GPRS 1900	Yes	Yes	Yes	No	Yes	No
UMTS 850	Yes	Yes	Yes	No	Yes	No
UMTS 1900	Yes	Yes	Yes	No	Yes	No
LTE Band 41	Yes	Yes	Yes	No	Yes	No
2.4 GHz WLAN	Yes	Yes	Yes	No	No	Yes
5 GHz WLAN	Yes	Yes	Yes	No	No	Yes

Particular EUT edges were not required to be evaluated for Wireless Router SAR if the edges were > 25 mm from the transmitting antenna according to FCC KDB 941225 D06v02r01 on page 2. The distance between the transmit antennas and the edges of the device are included in the filing. The overall dimensions of this device are > 9 X 5 cm. A diagram showing device antenna can be found in SAR_setup_photos. Since the diagonal dimension of this device is > 160 mm and < 200 mm, it is considered a "phablet".

Note; All test configurations are based on front view.

2.7 SAR Summation Scenario

According to FCC KDB 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds. Possible transmission paths for the EUT are shown below paths and are mode in same rectangle to indicate communication modes which share the same path. Modes which share the same transmission path cannot transmit simultaneously with one another.

Path 1	Path 2
GSM/GPRS **UMTS** **LTE**	**BT/WiFi**

Simultaneous transmission paths

This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB 447498 D01v06.

Simultaneous Transmission Scenarios			
Applicable Combination	Head	Body-Worn	Hotspot
GSM Voice + 2.4 GHz WiFi	Yes	Yes	N/A
GSM Voice + 5 GHz WiFi	Yes	Yes	N/A
GSM Voice + 2.4 GHz Bluetooth	N/A	Yes	N/A
GPRS + 2.4 GHz WiFi	N/A	N/A	Yes
GPRS + 5 GHz WiFi	N/A	N/A	Yes
UMTS + 2.4 GHz WiFi	Yes	Yes	Yes
UMTS + 5 GHz WiFi	Yes	Yes	Yes
UMTS + 2.4 GHz Bluetooth	N/A	Yes	N/A
LTE+ 2.4 GHz WiFi	Yes	Yes	Yes
LTE+ 5 GHz WiFi	Yes	Yes	Yes
LTE+ 2.4 GHz Bluetooth	N/A	Yes	N/A

1. 2.4 GHz WLAN and 2.4 GHz Bluetooth share antenna path and cannot transmit simultaneously
2. All licensed modes share the same antenna path and cannot transmit simultaneously.
3. UMTS +WLAN scenario also represents the UMTS Voice/DATA + WLAN hotspot scenario.
4. Per the manufacturer, GPRS does not support VOIP service.
5. LTE is considered pre-installed VOIP applications.
6. The highest reported SAR for each exposure condition is used for SAR summation purpose.

2.8 SAR Test Exclusions Applied

(A) BT & BT LE

Per FCC KDB 447498 D01v06, The SAR exclusion threshold for distance < 50mm is defined by the following equation:

$$\frac{Max\ Power\ of\ Channel(mW)}{Test\ \ Separation\ Distance\ (mm)} * \sqrt{Frequency(GHz)} \leq 3.0$$

Mode	Frequency [MHz]	Maximum Allowed Power [mW]	Separation Distance [mm]	≤ 3.0
Bluetooth	2 480	9	15	0.94
Bluetooth LE	2 480	7	15	0.73

Based on the maximum conducted power of Bluetooth and antenna to use separation distance, Bluetooth SAR was not required [(9/15)*√2.480] = 0.94 < 3.0.
Based on the maximum conducted power of Bluetooth LE and antenna to use separation distance, Bluetooth LE SAR was not required [(7/15)*√2.480] = 0.73 < 3.0.

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06 IV.C.1iii, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is ≤ 1.6W/kg. When standalone SAR is not required to be measured per FCC KDB 447498 D01v06 4.3.22, the following equation must be used to estimate the standalone 1-g SAR for simultaneous transmission assessment involving that transmitter.

$$Estimated\ SAR = \frac{\sqrt{f(GHZ)}}{7.5} * \frac{(Max\ Power\ of\ channel\ mW)}{Min\ Seperation\ Distance}.$$

Mode	Frequency	Maximum Allowed Power	Separation Distance (Body)	Estimated SAR (Body)
	[MHz]	[mW]	[mm]	[W/kg]
Bluetooth	2 480	9	15	0.13
Bluetooth LE	2 480	7	15	0.10

Note :
1) Held-to ear configurations are not applicable to Bluetooth and Bluetooth LE operations and therefore were not considered for simultaneous transmission. The Estimated SAR results were determined according to FCC KDB447498 D01v06.
.
2) The frequency of Bluetooth and Bluetooth LE using for estimated SAR was selected highest channel of Bluetooth LE for highest estimated SAR.

(B) Licensed Transmitter(s)

GSM/GPRS/EDGE is not supported for US bands. Therefore, the GSM Voice modes in this report do not transmit simultaneously with GPRS/EDGE Data.

This device is only capable of QPSK HSUPA in the uplink. Therefore, no additional SAR tests are required beyond that described for devices with HSUPA in KDB 941225 D01v03r01.

LTE SAR for the higher modulations and lower bandwidths were not tested since the maximum average output power of all required channels and configurations was not more than 0.5 dB higher than the highest bandwidth; and the reported LTE SAR for the highest bandwidth was less than 1.45 W/kg for all configurations according to FCC KDB 941225 D05v02r04.

Per FCC KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is greater than 160 mm and less than 200 mm. Therefore, extremity SAR tests are required when wireless router mode does not apply or if wireless router 1g SAR >1.2 W/kg. When hotspot mode applies, 10g SAR required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1g SAR > 1.2 W/kg.

Per FCC KDB 941225 D01v03r01, 12.2 kbps RMC is the primary mode and HSPA (HSUPA/HSDPA with RMC) is the secondary mode.

Per KDB 941225 D01v03r01, The SAR test exclusion is applied to the secondary mode by the following equation.

$$\text{Adjusted SAR} = \text{Highest Reported SAR} * \frac{Secondary\ Max\ tune - up\ (mW)}{Primary\ Max\ tune\ tune - up(mW)} \leq 1.2\ \text{W/kg.}$$

Based on the highest Reported SAR, the secondary mode is not required.

[0.548 * (158/158)] = 0.548 W/kg ≤ 1.2 W/kg

And the maximum output power and tune-up tolerance in secondary mode is ≤ 0.25 dB higher than the primary mode.

3. INTRODUCTION

The FCC has adopted the guidelines for evaluating the environmental effects of radio frequency radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-2005 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz. 1992 by the Institute of Electrical and Electronics Engineers, Inc., Ne York, New York 10017. The measurement procedure described in IEEE/ANSI C95.3-1992 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave is used for guidance in measuring SAR due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86 NCRP, 1986, Bethesda, MD 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

SAR Definition

Specific Absorption Rate (SAR) is defined as the time derivative of the incremental electromagnetic energy (d*W*) absorbed by (dissipated in) an incremental mass (d*m*) contained in a volume element (d*V*) of a given density (*r*). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body.

$$SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho\, dv}\right)$$

Figure 1. SAR Mathematical Equation

SAR is expressed in units of Watts per Kilogram (W/kg)

$$SAR = \sigma E^2 / \rho$$

Where:

σ = conductivity of the tissue-simulant material (S/m)

ρ = mass density of the tissue-simulant material (kg/㎥)

E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relations to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.

4. DESCRIPTION OF TEST EQUIPMENT

4.1 SAR MEASUREMENT SETUP

These measurements are performed using the DASY4 automated dosimetric assessment system. It is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland. It consists of high precision robotics system (Staubli), robot controller, Pentium III computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure.2).

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and remote control, is used to drive the robot motors. The PC with Windows XP or Windows 7 is working with SAR Measurement system DASY4 & DASY5, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

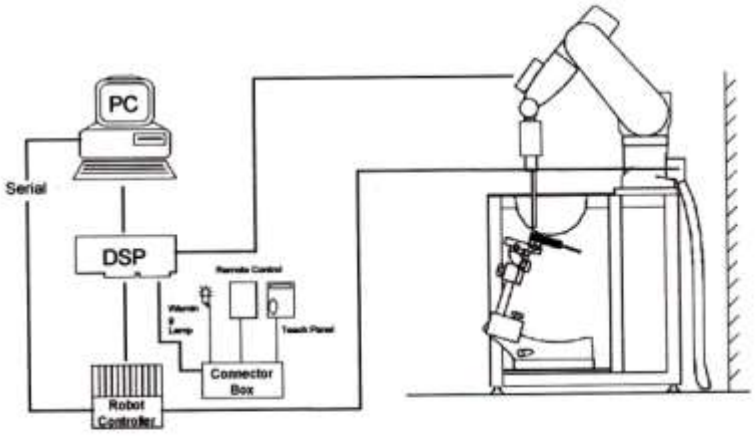


Figure 2. HCT SAR Lab. Test Measurement Set-up

The DAE 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 PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in.

4.2 DASY E-FIELD PROBE SYSTEM

Isotropic SAR Probe			
Probe type	ET3DV6	ES3DV3	EX3DV4
Appearance			
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)		
Calibration	IEEE 1528-2013, IEC 62209-1, IEC 62209-2, KDB 865664		
Frequency	10 MHz to 2.3 GHz Linearity: ± 0.2 dB (30 MHz to 2.3 GHz)	10 MHz to 4 GHz Linearity: ± 0.2 dB (30 MHz to 4 GHz)	10 MHz to 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.2 dB in TSL (rotation around probe axis) ± 0.4 dB in TSL (rotation normal to probe axis)	± 0.2 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB	5 µW/g to > 100 mW/g; Linearity: ± 0.2 dB	10 µW/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 2.3 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones	General dosimetry up to 4 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of mobile phones

The SAR measurements were conducted with the dosimetric probe ET3DV6, ES3DV3 and EX3DV4(depending on the frequency), designed in the classical triangular configuration and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multitier line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches a maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY 4 & 5 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting. The approach is stopped at reaching the maximum.

4.3 SAM Phantom

<table>
<tr><th colspan="4">SAR PHANTOMS</th></tr>
<tr><td rowspan="7">TWIN SAM</td><td>Name</td><td>Twin SAM</td><td rowspan="7">The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand Phone usage as well as body-mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.</td></tr>
<tr><td>Appearance</td><td></td></tr>
<tr><td>Material</td><td>Vinyl ester, Fiberglass reinforced (VE-GF)</td></tr>
<tr><td>Liquid Compatibility</td><td>Compatible with all DGBE Type liquid</td></tr>
<tr><td>Shell Thickness</td><td>2±0.2 mm (6±0.2 mm at ear point)</td></tr>
<tr><td>Dimensions</td><td>Length : 1000 mm
Width : 500 mm
Height : adjustable feet</td></tr>
<tr><td>Filling Volume</td><td>Approx. 25 liters</td></tr>
<tr><td rowspan="7">MFP</td><td>Name</td><td>MFP – Triple Modular Phantom</td><td rowspan="7">Triple Modular Phantom consists of three identical modules which can be installed and removed separately without emptying the liquid. It includes three reference points for phantom installation. Covers prevent evaporation of the liquid. Phantom material is resistant to DGBE-based tissue simulating liquids.

Applicable for system performance check from 700 MHz – 6 GHz as well as dosimetric evaluations of body-worn devices.</td></tr>
<tr><td>Appearance</td><td></td></tr>
<tr><td>Material</td><td>Vinyl ester, Fiberglass reinforced (VE-GF)</td></tr>
<tr><td>Liquid Compatibility</td><td>Compatible with all DGBE Type liquid</td></tr>
<tr><td>Shell Thickness</td><td>2±0.2 mm</td></tr>
<tr><td>Dimensions</td><td>Length : 292 mm
Width : 178 mm
Height : 178 mm
Useable area : 280 x 175 mm</td></tr>
<tr><td>Filling Volume</td><td>Approx. 8.1 liters
(filing height 155 mm)</td></tr>
</table>

4.4 Device Holder for Transmitters

Device Holder – Mounting Device	
In combination with the SAM Phantom, the Mounting Device enables the rotation of the mounted transmitter in spherical coordinates whereby the rotation points is the ear opening. The devices can be easily, accurately, and repeatable positioned according to the EN 50360:2001/A:2001 and FCC KDB specifications. The device holder can be locked at different phantom locations (left head, right head, flat phantom). Note: A simulating human hand is not used due to the complex anatomical and geometrical structure of the hand that may produced infinite number of configurations. To produce the Worst-case condition (the hand absorbs antenna output power), the hand is omitted during the tests.	

4.5 Validation Dipole

The reference dipole should have a return loss better than -20 dB (measured in the setup) at the resonant frequency to reduce the uncertainty in the power measurement.

System Validation Dipole		
Description	Symmetrical dipole with λ/4 balun. Enables measurement of feedpoint impedance with network analyzer (NWA). Matched for use near flat phantoms filled with tissue simulating liquids.	
Frequency	750,835,1900, 2000, 2300, 2450, 2600, 5000 MHz	
Return Loss	> 20 dB at specified validation position	
Power Capability	> 100 W (f < 1GHz), >40 W (f > 1 GHz)	
Dimension	D750V3: dipole length : 179.0 mm ; overall height : 330.0 mm D835V2: dipole length : 158.0 mm ; overall height : 340.0 mm D1900V2: dipole length : 67.7 mm ; overall height : 300.0 mm D2300V2: dipole length : 56.3 mm ; overall height : 290.0 mm D2450V2: dipole length : 52.0 mm ; overall height : 290.0 mm D2600V1: dipole length : 49.2 mm ; overall height : 290.0 mm D5GHzV2: dipole length : 20.6 mm ; overall height : 300.0 mm	

5. SAR MEASUREMENT PROCEDURE

The evaluation was performed with the following procedure:

1. The SAR distribution at the exposed side of the head or body was measured at a distance no more than 5.0 mm from the inner surface of the shell. The area covered the entire dimension of the DUT's head and body area and the horizontal grid resolution was depending on the FCC KDB 865664 D01v01r04 table 4-1 & IEEE 1528-2013.

2. Based on step, the area of the maximum absorption was determined by sophisticated interpolations routines implemented in DASY software. When an Area Scan has measured all reachable point. DASY system computes the field maximal found in the scanned are, within a range of the maximum. SAR at this fixed point was measured and used as a reference value.

3. Around this point, a volume was assessed according to the measurement resolution and volume size requirements of FCC KDB 865664 D01v01r04 table 4-1 and IEEE 1528-2013. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure (reference from the DASY manual.)

   a. The data at the surface were extrapolated, since the center of the dipoles is no more than 2.7 mm away from the tip of the probe (it is different from the probe type) and the distance between the surface and the lowest measuring point is 1.2 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the "Not a knot" condition (in x, y, and z directions. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.

   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

4. The SAR reference value, at the same location as step 2, was re-measured after the zoom scan. If the value changed by more than 5 %, the SAR evaluation and drift measurements were repeated.

Area scan and zoom scan resolution setting follow KDB 865664 D01v01r04 quoted below.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5±1 mm</td><td>$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30°±1°</td><td>20°±1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan Spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤15 mm
2-3 GHz: ≤12 mm</td><td>3-4 GHz: ≤12 mm
4-6 GHz: ≤10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan Spatial resolution: Δx_{zoom}, Δy_{zoom}</td><td>≤ 2 GHz: ≤8mm
2-3 GHz: ≤5mm*</td><td>3-4 GHz: ≤5 mm*
4-6 GHz: ≤4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan Spatial resolution normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{zoom}(n)$</td><td>≤ 5 mm</td><td>3-4 GHz: ≤4 mm
4-5 GHz: ≤3 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{zoom}(1)$: between 1st two Points closest to phantom surface</td><td>≤ 4 mm</td><td>3-4 GHz: ≤3 mm
4-5 GHz: ≤2.5 mm
5-6 GHz: ≤2 mm</td></tr>
<tr><td>$\Delta z_{zoom}(n>1)$: between subsequent Points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3-4 GHz: ≥28 mm
4-5 GHz: ≥25 mm
5-6 GHz: ≥22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

6. DESCRIPTION OF TEST POSITION

6.1 EAR REFERENCE POINT

Figure 6-2 shows the front, back and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE.” Each ERP is on the B-M (back-mouth) line located 15 mm behind the entrance-to-ear-canal (EEC) point, as shown in Figure 6-1. The Reference Plane is defined as passing through the two ear reference point and point M. The line N-F (Neck-Front), also called the Reference Pivoting Line, is not perpendicular to the reference plane (See Figure 5-1), Line B-M is perpendicular to the N-F line. Both N-F and B-M lines are marked on the external phantom shell to facilitate handset positioning.

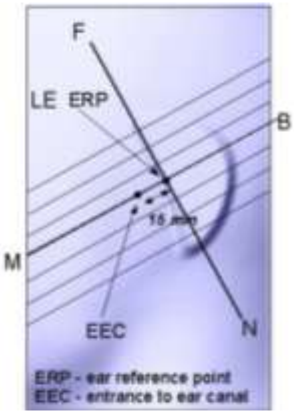


Figure 6-1
Close-up side view of ERP

6.2 HEAD POSITION

Two imaginary lines on the handset were established: the vertical centerline and the horizontal line. The device under test was placed in a normal operating position with the acoustic output located along the “vertical centerline” on the front of the device aligned to the “ear reference point”(see Figure 6-3). The acoustic output was than located at the same level as the center of the ear reference point. The device under test was positioned so that the “vertical centerline” was bisecting the front surface of the handset at its top and bottom edges, positioning the “ear reference point” on the outer surface of the both the left and right head phantoms on the ear reference point.

Figure 6-2
Front, back and side views of SAM Twin Phantom

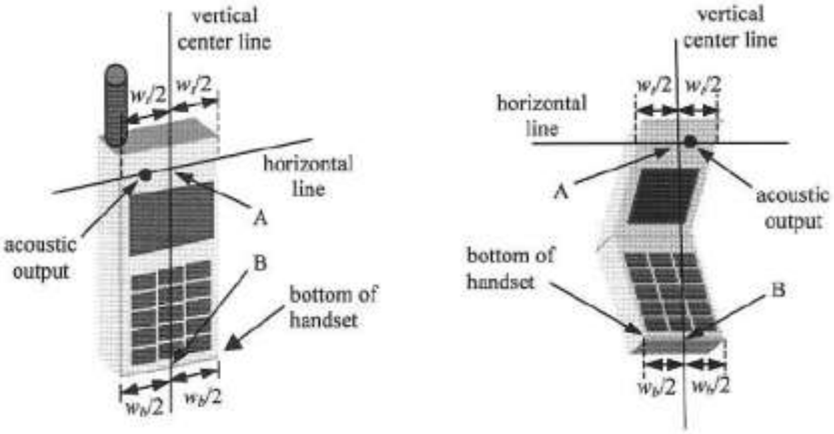


Figure 6-3. Handset vertical and horizontal reference lines

6.3 Body Holster/Belt Clip Configurations

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration. A device with a headset output is tested with a headset connected to the device. Body dielectric parameters are used.

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with each accessory. If multiple accessory share an identical metallic component (i.e. the same metallic belt-clip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some Devices intended to be authorized for body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used.

Since this EUT does not supply any body worn accessory to the end user a distance of 1.0 cm from the EUT back surface to the liquid interface is configured for the generic test.

"See the Test SET-UP Photo"

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters, SAR compliance is tested with the accessory(ies), Including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

In all cases SAR measurements are performed to investigate the worst-case positioning. Worst case positioning is then documented and used to perform Body SAR testing.

6.4 Body-Worn Accessory Configurations

Body-worn operating configurations are tested with the belt-dips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6-4). Per FCC KDB Publication 648474 D04v01r03 Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in Body-worn accessories. The Body-worn accessory procedures in FCC KDB Publication 447498 D01v06 should be used to test for Body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the Body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for a body- worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body- worn accessory with a headset attached to the handset.

Figure 6-4
Sample Body-Worn Diagram

Accessories for Body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are tested with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-dip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

Body-worn accessories may not always be supplied or available as options for some devices intended to be authorized for Body-worn use. In this case, a test configuration with a separation distance between the back of the device and the flat phantom is used. Test position spacing was documented.

Transmitters that are designed to operate in front of a person's face, as in push-to-talk configurations, are tested for SAR compliance with the front of the device positioned to face the flat phantom in head fluid. For devices that are carried next to the body such as a shoulder, waist or chest-worn transmitters. SAR compliance is tested with the accessories, including headsets and microphones, attached to the device and positioned against a flat phantom in a normal use configuration.

6.5 Extremity Exposure Configurations

Devices that are designed or intended for use on extremities or mainly operated in extremity only exposure conditions: i.e., hands, wrists, feet and ankles, may require extremity SAR evaluation. When the device also operates in close proximity to the user's body, SAR compliance for the body is also required. The 1-g body and 10-g extremity SAR Exclusion Thresholds found in KDB Publication 447498 D01v06 should be applied to determine SAR test requirements.

For smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear. the phablets procedures outlined in KDB Publication 648474 D04 v01r03 should be applied to evaluate SAR compliance. A device marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance. In addition to the normally required head and body-worm accessory SAR test procedures required for handsets, the UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna ≤25 mm from that surface or edge, in direct contact with the phantom, for 10-g SAR. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (including tolerance) is 1-g SAR > 1.2 W/kg.

6.6 Wireless Router Configurations

Some battery-operated handsets have the capability to transmit and receive user data through simultaneous transmission of WIFI simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06v02r01 where SAR test considerations for handsets (LxW≥9cmx5 cm) are based on *a* composite test separation distance of 10 mm from the front back and edges of the device containing transmitting antennas within 2.5 cm of their edges, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the Body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some Body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset actual operations include simultaneous transmission of both the WIFI transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WIFI transmitter according to FCC KDB Publication 447498 D01v06 publication procedures. The "Portable Hotspot* feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7. ANSI/ IEEE C95.1 - 2005 RF EXPOSURE LIMITS

HUMAN EXPOSURE	UNCONTROLLED ENVIRONMENT General Population	CONTROLLED ENVIRONMENT Occupational
	(W/kg) or (mW/g)	(W/kg) or (mW/g)
SPATIAL PEAK SAR * (Brain)	1.60	8.00
SPATIAL AVERAGE SAR ** (Whole Body)	0.08	0.40
SPATIAL PEAK SAR *** (Hands / Feet / Ankle / Wrist)	4.00	20.00

Table 8.1 Safety Limits for Partial Body Exposure

NOTES:

* The Spatial Peak value of the SAR averaged over any 1 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

** The Spatial Average value of the SAR averaged over the whole-body.

******* The Spatial Peak value of the SAR averaged over any 10 g of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

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 mad 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.

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. This 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.

8. FCC SAR GENERAL MEASUREMENT PROCEDURES

8.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, when SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as Reported SAR. The highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

8.2 3G SAR Test Reduction Procedure

8.2.1 GSM, GPRS AND EDGE

The following procedures may be considered for each frequency band to determine SAR test reduction for devices operating in GSM/GPRS/EDGE modes to demonstrate RF exposure compliance. GSM voice mode transmits with 1 time slot. GPRS and EDGE may transmit up to 4 time slots in the 8 time-slot frame according to the multi-slot class implemented in a device.

8.2.2 SAR Test Reduction

In FCC KDB 941225 D01v03r01, certain transmission modes within a frequency band and wireless mode evaluated for SAR are defined as primary modes. The equivalent modes considered for SAR test reduction are denoted as secondary modes. When the maximum output power including tune-up tolerance specified for production units in a secondary mode is ≤ 0.25 dB higher than the primary mode or when the highest reported SAR of the primary mode, scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode, is ≤ 1.2 W/kg, SAR measurements are not required for the secondary mode. These criteria are referred to as the 3G SAR test reduction procedure. When the 3G SAR test reduction procedure is not satisfied, SAR measurements are additionally required for the secondary mode.

SAR test reduction for GPRS and EDGE modes is determined by the source-based time-averaged output power specified for production units, including tune-up tolerance. The data mode with highest specified time-averaged output power should be tested for SAR compliance in the applicable exposure conditions. For modes with the same specified maximum output power and tolerance, the higher number time-slot configuration should be tested

8.3 Procedures Used to Establish RF Signal for SAR

The following procedures are according to FCC KDB 941225 D01v03r01 - 3G SAR Measurement Procedures The handset was placed into a simulated call using a base station simulator in a shielded chamber. Such test signals offer a consistent means for testing SAR and are recommended for evaluation SAR measurements were taken with a fully charged battery. In order to verify that the device was tested and maintained at full power, this was configured with the base station simulator. The SAR measurement Software calculates a reference point at the start and end of the test to Cheek for power drifts. If conducted Power deviations of more than 5 % occurred, the tests were repeated.

8.4 SAR Measurement Conditions for UMTS

8.4.1 Output Power Verification

Maximum output power is verified on the High, Middle and Low channels according to the general descriptions in sec. 5.2 of 3GPP TS 34.121, using the appropriate RMC with TPC (transmit power control) set to all "1s" or applying the required inner loop power control procedures to maintain maximum output power while HSUPA is active. Results for all applicable physical channel configurations (DPCCH, DPDCHn and spreading codes, HS-DPCCH etc) are tabulated in this test report. All configurations that are not supported by the DUT or cannot be measured due to technical or equipment limitations are identified.

8.4.2 Head SAR Measurements

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured for 12.2 kbps AMR in 3.4 kbps SRB (signaling radio bearer) using the highest reported SAR configuration in 12.2 kbps RMC for head exposure.

8.4.3 Body SAR measurements

SAR for body exposure configurations is measured using the 12.2kbps RMC with the TPC bits all "1s". the 3G SAR test reduction procedure is applied to other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC as the primary mode. Otherwise, SAR is measured using and applicable RMC configuration with the corresponding spreading code or DPDCHn, for the highest reported SAR configuration in 12.2kbps RMC.

8.4.4 SAR Measurements with Rel. 5 HSDPA

The 3G SAR test reduction procedure is applied to HSDPA body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSDPA is measured using and FRC with H-SET 1 in Sub-test and a 12.2 kbps RMC without HSDPA. Handsets with both HSDPA and HSUPA are tested according to release 6 HSPA test procedures. 8.4.5 SAR Measurement with Rel 6 HSUPA The 3G SAR test Reduction Procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, Using H-Set 1 and QPSK for FRC and a 12.2kbps RMC configured in Test Loop Mode 1 and Power Control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA. When VOIP applies to head exposure, the 3G SAR test reduction procedure is applied with 12.2 kbps RMC as the primary mode; otherwise, the same HSPA configuration used for body SAR measurements are applied to head exposure testing.

8.4.5 SAR Measurements with Rel. 6 HSUPA

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) body configurations with 12.2 kbps RMC as the primary mode. Otherwise, Body SAR for HSPA is measured with E-DCH Sub-test 5, using H-Set1 and QPSK for FRC and a 12.2 kbps RMC configured in Test Loop Mode 1 and power control algorithm 2, according to the highest reported body SAR configuration in 12.2 kbps RMC without HSPA.

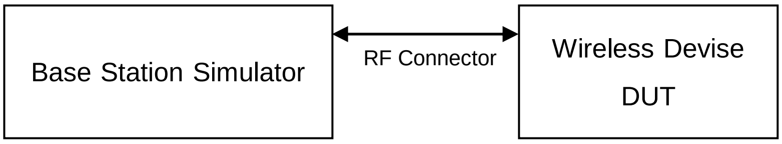
8.4.5 DC-HSDPA

UMTS SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03r01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

DC-HSDPA Considerations:

- 3GPP Specification 34.121-1 Release 8 Ver 8.10.0 was used for DC-HSDPA guidance
- H-Set 12(QPSK) was confirmed to be used during DC-HSDPA measurements
- Measured maximum output powers for DC-HSDPA were not greater than 1/4 dB higher than the WCDMA 12.2 kbps RMC maximum output and as a result, SAR is not required for DC-HSDPA
- The DUT supports UE category 24 for HSDPA.

It is expected by the manufacturer that MPR for some HSUPA subtests may be up to 1 dB more than specified by 3GPP, but also as low as 0 dB according to the chipset implementation in this model.



8.5 SAR Measurement Conditions for LTE

LTE modes are tested according to FCC KDB 941225 D05v02r04 publication. Establishing connections with base station simulators ensure a consistent means for testing SAR and are recommended for evaluation SAR [4]. The R&S CMW500 or Anritsu MT8820C simulators are used for LTE output power measurements and SAR testing. Closed loop power control was used so the UE transmits with maximum output power during SAR testing. SAR tests were performed with the same number of RB and RB offsets transmitting on all TTI frames (maximum TTI).

8.5.1 Spectrum Plots for RB Configurations

A properly configured base station simulator was used for SAR tests and power measurements. Therefore, spectrum plots for RB configurations were not required to be included in this report.

8.5.2 MPR

MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to 3GPP TS36. 101 Section 6.2.3 – 6.2.5 under Table 6.2.3-1.

8.5.3 A-MPR

A-MPR(Additional MPR) has been disabled for all SAR tests by setting NS=01 on the base station simulator.

8.5.4 Required RB Size and RB offsets for SAR testing

According to FCC KDB 941225 D05v02r04

a. Per sec 4.2.1, SAR is required for QPSK 1 RB Allocation for the largest bandwidth
   i. The required channel and offset combination with the highest maximum output power is required for SAR.
   ii. When the reported SAR is ≤ 0.8 W/Kg, testing of the remaining RB offset configurations and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the RB offset configuration with highest output power for that channel.
   iii. When the reported SAR for a required test channel is > 1.45 W/kg, SAR is required for all RB offset configurations for that channel.
b. Per Sec 4.2.2, SAR is required for 50% RB allocation using the largest bandwidth following the same procedures outlined in Sec 4.2.1.
c. Per Sec. 4.2.3, QPSK SAR is not required for the 100% all0cation when the highest maximum output power for the 100% allocation is less than the highest maximum output power of the 1 RB and 50% RB allocations and the reported SAR for the 1 RB and 50% RB allocations is < 0.8 W/kg.
d. Per Sec. 4.2.4 and 4.3, SAR test for higher order modulations and lower bandwidths configurations are not required when the conducted power of the required test configurations determined by Sec. 4.2.1 through 4.2.3 is less than or equal to 1/2 dB higher than the equivalent configuration using QPSK modulation and when the QPSK SAR for those configurations is < 1.45 W/Kg.

SAR testing was performed according to the FCC KDB 941225 D05v02r03 publication.
This DUT is developed base on MPR. The MPR is mandatory.
The device will not operate with any other MPR setting than that stated in the table as indicated.
SAR Testing was performed using a CMW500. UE transmits with Maximum output power during SAR testing.
A-MPR has been disabled for all SAR tests by setting NS=01 on the R&S CMW500.

8.5.5 LTE(TDD) Considerations

According to KDB 941225 D05v02r03, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33 %) using Uplink-downlink configuration 0 and Special subframe configuration 6.

LTE TDD Band 41 supports 3GPP TS 36.211 section 4.2 for Type 2 Frame and Table 4.2-2 for uplink-downlink configurations and Table 4.2-1 for Special subframe configurations.

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS)

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$			$7680 \cdot T_s$		
1	$19760 \cdot T_s$			$20480 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
2	$21952 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$			$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

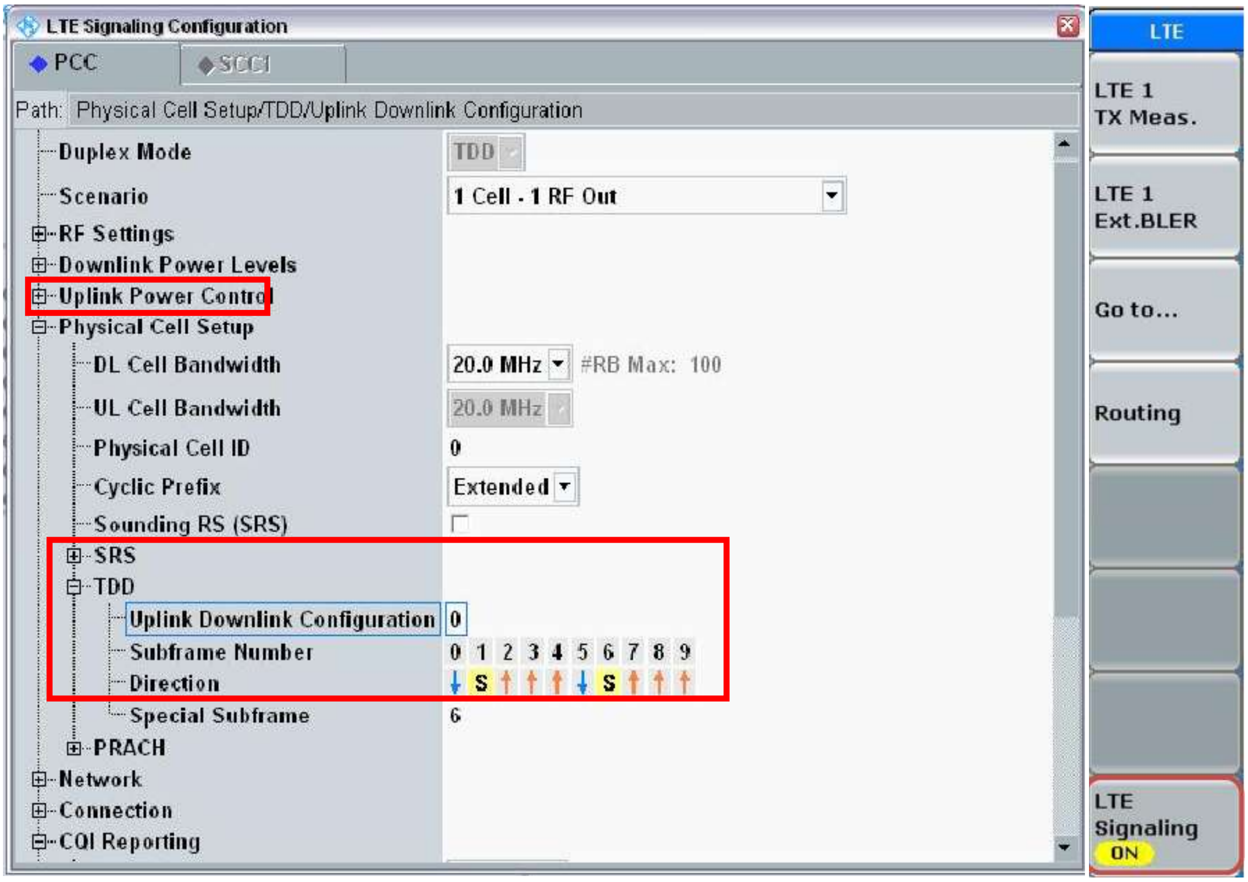
Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Calculated Duty Cycle – Extended cyclic prefix in uplink x (T_s) x # of S + # of U
Example for calculated Duty Cycle for Uplink-Downlink Configuration 0:
Calculated Duty Cycle = 5120 x [1/(15000 x 2048)] x 2 + 6 ms = 63.33 %
Where
T_s = 1/(15000 x 2048) seconds

LTE Band 41
Conducted Power Measured Results
LTE TDD Band 41 setup method (CMW-500).

- Physical Cell Setup Menu
- Sub-menu "TDD" and set "Uplink Downlink Configuration" to "0"
- Turn the cell on using "ON : OFF" Key



8.6 SAR Testing with 802.11 Transmitters

The normal network operating configurations of 802.11 transmitters are not suitable for SAR measurements. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable. See KDB Publication 248227 D01v02r02 for more details.

8.6.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters.

A periodic duty factor is required for current generation SAR system to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92-96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

8.6.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR. When different maximum output powers are specified for the bands, SAR measurement for the U-NII band with the lower maximum output power is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg for 1g SAR or > 3.0 W/kg for 10g SAR.

8.6.3 U-NII-C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380MHz (5.47 – 5.85 GHz), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 -5.65 GHz in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification.
Unless band gap channels are permanently disabled, SAR must be considered for these channels.

8.6.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating nest to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test position is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test positions are measured.

8.6.5 2.4 GHz SAR test Requirements

SAR is measured for 2.4 GHz 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following:

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS is that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

2.4 GHz 802.11 g/n OFDM are additionally evaluated for SAR if the highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 GHz band, the Initial Test Configuration Procedures should be followed.

8.6.6 OFDM Transmission Mode and SAR Test channel Selection

For the 2.4 GHz and 5 GHz bands, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate and lowest order 802.11 a/g/n/ac mode. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11 ac or 802.11g and 802.11n with the same channel bandwidth, modulation and data rate etc., the lower order 802.11 mode i.2., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When the maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

8.6.7 Initial Test configuration Procedure

For OFDM, in both 2.4 GHZ and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements.

8.6.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position on procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg for 1g SAR and ≤ 3.0 W/kg for 10g SAR, no additional SAR tests for the subsequent test configurations are required.

9. Output Power Specifications

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB publication 447498 D01v06.

9.1 GSM

GSM Conducted output powers (Burst-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	33.01	33.01	30.74	29.23	27.84	26.98	24.38	23.08	21.84
	190	33.19	33.18	30.92	29.27	28.00	27.11	24.69	23.14	21.90
	251	33.06	33.09	30.66	29.14	27.93	27.12	24.51	23.06	21.62
GSM 1900	512	29.64	29.62	26.77	25.41	23.91	25.93	23.48	22.16	21.06
	661	29.61	29.58	26.85	25.35	23.78	25.94	23.57	22.34	21.05
	810	29.55	29.59	26.92	25.65	24.08	26.13	23.64	22.41	21.31

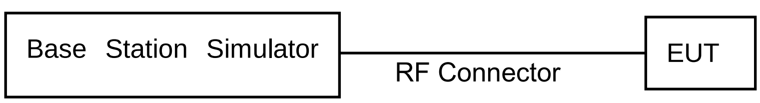
GSM Conducted output powers (Frame-Average)

Band	Channel	Voice	GPRS(GMSK) Data – CS1				EDGE Data			
		GSM (dBm)	GPRS 1 TX Slot (dBm)	GPRS 2 TX Slot (dBm)	GPRS 3 TX Slot (dBm)	GPRS 4 TX Slot (dBm)	EDGE 1 TX Slot (dBm)	EDGE 2 TX Slot (dBm)	EDGE 3 TX Slot (dBm)	EDGE 4 TX Slot (dBm)
GSM 850	128	23.98	23.98	24.72	24.97	24.83	17.95	18.36	18.82	18.83
	190	24.16	24.15	24.90	25.01	24.99	18.08	18.67	18.88	18.89
	251	24.03	24.06	24.64	24.88	24.92	18.09	18.49	18.80	18.61
GSM 1900	512	20.61	20.59	20.75	21.15	20.90	16.90	17.46	17.90	18.05
	661	20.58	20.55	20.83	21.09	20.77	16.91	17.55	18.08	18.04
	810	20.52	20.56	20.90	21.39	21.07	17.10	17.62	18.15	18.30

Note:

Time slot average factor is as follows:
1 Tx slot = 9.03 dB, Frame-Average output power = Burst-Average output power – 9.03 dB
2 Tx slot = 6.02 dB, Frame-Average output power = Burst-Average output power – 6.02 dB
3 Tx slot = 4.26 dB, Frame-Average output power = Burst-Average output power – 4.26 dB
4 Tx slot = 3.01 dB, Frame-Average output power = Burst-Average output power – 3.01 dB

GSM Class : B
GSM voice/GPRS VOIP: Head SAR , Body worn SAR
GPRS/EDGE Multi-slots 33 : Hotspot SAR with GPRS/EDGE
Multi-slot Class 33 with CS 1 (GMSK)



9.2 UMTS

Release 99 Setup Procedures used to establish the test signals

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The DUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7)

Mode	Subtest	Rel99
WCDMA General Settings	Loopback Mode	Test Mode 2
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc/βd	8/15

HSDPA Setup Procedures used to establish the test signals

The following 4 Sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSDPA			
	Subtest	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set 1			
	Power Control Algorithm	Algorithm 2			
	βc	2/15	11/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	Bd (SF)	64			
	βc/βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR (dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback (Table 5.2B.4)	4ms			
	CQI Repetition Factor (Table 5.2B.4)	2			
	Ahs=βhs/βc	30/15			

HSPA (HSDPA & HSUPA) Setup Procedures used to establish the test signals

The following 5 Sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS34.121. A summary of these settings are illustrated below:

	Mode	HSPA				
	Subtest	1	2	3	4	5
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2 kbps RMC				
	HSDPA FRC	H-Set 1				
	HSUPA Test	HSPA				
	Power Control Algorithm	Algorithm 2				Algorithm 1
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/βd	11/15	6/15	15/9	2/15	15/1
	βhs	22/15	12/15	30/15	4/15	5/15
	βed	1309/225	94/75	47/15	56/75	47/15
	CM (dB)	1	3	2	3	1
	MPR (dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				0
	DNAK	8				0
	DCQI	8				0
	Ack-Nack repetition factor	3				
	CQI Feedback (Table 5.2B.4)	4ms				
	CQI Repetition Factor (Table 5.2B.4)	2				
	Ahs = βhs/βc	30/15				
HSUPA Specific Settings	E-DPDCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI (from 34.121 Table C.11.1.3)	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E-TFCIs	5	5	2	5	1
	Reference E-TFCI	11	11	11	11	67
	Reference E-TFCI PO	4	4	4	4	18
	Reference E-TFCI	67	67	92	67	67
	Reference E-TFCI PO	18	18	18	18	18
	Reference E-TFCI	71	71	71	71	71
	Reference E-TFCI PO	23	23	23	23	23
	Reference E-TFCI	75	75	75	75	75
	Reference E-TFCI PO	26	26	26	26	26
	Reference E-TFCI	81	81	81	81	81
	Reference E-TFCI PO	27	27	27	27	27
	Maximum Channelization Codes	2xSF2				SF4

HSPA+

This DUT is only capable of QPSK HSPA+ in uplink. Therefore, the RF conducted power is not measured according to 941225 D01 3G SAR.

WCDMA850

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 5 [dBm]		
		Subtest	UL 4132 DL 4357	UL 4183 DL 4408	UL 4233 DL 4458
99	WCDMA	12.2 kbps RMC	23.13	23.01	23.23
99	WCDMA	12.2 kbps AMR	23.13	22.05	23.23
5	HSDPA	Subtest 1	23.00	22.93	23.13
5		Subtest 2	23.04	22.98	23.19
5		Subtest 3	23.09	22.99	23.22
5		Subtest 4	22.11	21.99	22.22
6	HSUPA	Subtest 1	21.05	20.97	21.04
6		Subtest 2	19.03	18.88	19.19
6		Subtest 3	20.10	20.02	20.21
6		Subtest 4	18.99	18.87	19.02
6		Subtest 5	22.04	21.95	22.14
8	DC-HSDPA	Subtest 1	22.98	22.82	22.83
8		Subtest 2	23.04	22.87	22.87
8		Subtest 3	22.07	21.89	21.91
8		Subtest 4	22.06	21.90	21.90

WCDMA Average Conducted output powers

WCDMA1900

3GPP Release Version	Mode	3GPP 34.121	WCDMA Band 2 [dBm]		
		Subtest	UL 9262 DL 9662	UL 9400 DL 9800	UL 9538 DL 9938
99	WCDMA	12.2 kbps RMC	21.02	20.92	21.20
99	WCDMA	12.2 kbps AMR	21.61	19.97	21.19
5	HSDPA	Subtest 1	21.05	20.97	21.25
5		Subtest 2	21.11	21.04	21.31
5		Subtest 3	21.14	21.05	21.35
5		Subtest 4	21.13	21.08	21.31
6	HSUPA	Subtest 1	20.01	20.02	20.32
6		Subtest 2	18.10	18.00	18.29
6		Subtest 3	19.09	19.05	19.33
6		Subtest 4	18.05	18.02	18.20
6		Subtest 5	20.00	20.00	20.29
8	DC-HSDPA	Subtest 1	20.59	20.29	20.71
8		Subtest 2	20.66	20.39	20.81
8		Subtest 3	20.68	20.42	20.85
8		Subtest 4	20.71	20.42	20.83

WCDMA Average Conducted output powers

9.3 LTE

- LTE TDD Band 41

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40265	40740	41215	[dB]	[dB]
				2557.5 MHz	2605 MHz	2652.5 MHz		
5 MHz	QPSK	1	0	23.45	23.23	22.94	0	0
		1	12	23.43	23.16	22.91	0	0
		1	24	23.47	23.21	22.96	0	0
		12	0	22.54	22.31	21.93	0-1	1
		12	6	22.59	22.27	21.95	0-1	1
		12	11	22.58	22.24	21.91	0-1	1
		25	0	22.56	22.33	21.91	0-1	1
	16QAM	1	0	22.42	22.36	21.86	0-1	1
		1	12	22.42	22.24	21.81	0-1	1
		1	24	22.4	22.34	21.85	0-1	1
		12	0	21.47	21.39	20.76	0-2	2
		12	6	21.48	21.34	20.79	0-2	2
		12	11	21.44	21.31	20.76	0-2	2
		25	0	21.49	21.28	20.97	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40290	40740	41190	[dB]	[dB]
				2560 MHz	2605 MHz	2650 MHz		
10 MHz	QPSK	1	0	23.69	23.31	23.06	0	0
		1	24	23.68	23.20	23.02	0	0
		1	49	23.68	23.23	22.95	0	0
		25	0	22.69	22.28	22.09	0-1	1
		25	12	22.82	22.28	22.11	0-1	1
		25	24	22.64	22.25	22.01	0-1	1
		50	0	22.64	22.28	22.06	0-1	1
	16QAM	1	0	22.47	22.12	21.79	0-1	1
		1	24	22.37	22.14	21.74	0-1	1
		1	49	22.36	22.11	21.66	0-1	1
		25	0	21.64	21.24	21.16	0-2	2
		25	12	21.66	21.33	21.05	0-2	2
		25	24	21.59	21.22	21.07	0-2	2
		50	0	21.67	21.28	20.98	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40315	40620	41165	[dB]	[dB]
				2562.5 MHz	2593 MHz	2647.5 MHz		
15 MHz	QPSK	1	0	23.66	23.44	23.32	0	0
		1	36	23.69	23.40	23.14	0	0
		1	74	23.51	23.35	23.06	0	0
		36	0	22.67	22.59	22.11	0-1	1
		36	18	22.62	22.60	22.15	0-1	1
		36	39	22.62	22.46	22.10	0-1	1
		75	0	22.70	22.47	22.09	0-1	1
	16QAM	1	0	22.28	22.29	22.00	0-1	1
		1	36	22.26	22.35	22.13	0-1	1
		1	74	22.37	22.18	22.02	0-1	1
		36	0	21.65	21.56	21.01	0-2	2
		36	18	21.62	21.53	21.04	0-2	2
		36	39	21.63	21.51	20.99	0-2	2
		75	0	21.60	21.46	21.10	0-2	2

Bandwidth	Modulation	RB Size	RB Offset	Max.Average Power (dBm)			MPR Allowed Per 3GPP	MPR
				40340	40740	41140	[dB]	[dB]
				2565 MHz	2605 MHz	2645 MHz		
20 MHz	QPSK	1	0	23.59	23.51	23.03	0	0
		1	49	23.54	23.46	22.78	0	0
		1	99	23.42	23.30	22.80	0	0
		50	0	22.58	22.41	21.94	0-1	1
		50	25	22.56	22.33	22.00	0-1	1
		50	49	22.46	22.28	21.92	0-1	1
		100	0	22.48	22.36	21.94	0-1	1
	16QAM	1	0	22.05	22.30	21.47	0-1	1
		1	49	22.05	22.18	21.13	0-1	1
		1	99	21.92	22.03	21.38	0-1	1
		50	0	21.58	21.36	20.97	0-2	2
		50	25	21.53	21.36	20.96	0-2	2
		50	49	21.47	21.26	20.93	0-2	2
		100	0	21.44	21.31	20.91	0-2	2

Note;

The EUT enables maximum power reduction in accordance with 3GPP 36.101. The MPR settings are configured during the manufacture process and are not configurable by the network, carrier, or end user.

9.4 WiFi

IEEE 802.11 Average RF Power– 20 MHz Bandwidth

Mode	Freq. [MHz]	Channel	IEEE 802.11 (2.4 GHz) Conducted Power [dBm]
802.11b	2 412	1	15.79
	2 437	6	16.13
	2 462	11	15.52
	2 467	12	6.93
	2 472	13	6.73
802.11g	2 412	1	14.00
	2 437	6	14.30
	2 462	11	13.75
	2 467	12	7.68
	2 472	13	7.54
802.11n	2 412	1	12.63
	2 437	6	12.91
	2 462	11	12.53
	2 467	12	7.41
	2 472	13	7.19

IEEE 802.11a Average RF Power– 20 MHz Bandwidth

Mode	Freq. [MHz]	Channel	IEEE 802.11 (5 GHz) Conducted Power [dBm]
802.11a	5 180	36	11.74
	5 200	40	11.61
	5 220	44	11.84
	5 240	48	11.76
	5 260	52	11.35
	5 280	56	11.40
	5 300	60	11.46
	5 320	64	11.59
	5 500	100	12.52
	5 580	116	12.73
	5 620	124	12.68
	5 720	144	12.80
	5 745	149	13.28
	5 785	157	13.25
	5 825	165	12.98

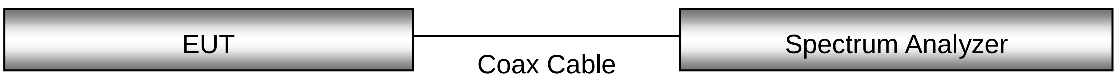
IEEE 802.11n Average RF Power– 20 MHz Bandwidth

Mode	Freq. [MHz]	Channel	IEEE 802.11 (5 GHz) Conducted Power [dBm]
802.11n	5180	36	10.21
	5200	40	10.25
	5220	44	10.23
	5240	48	10.31
	5260	52	10.05
	5280	56	10.08
	5300	60	10.14
	5320	64	10.15
	5500	100	11.22
	5580	116	11.44
	5620	124	11.30
	5720	144	11.32
	5745	149	11.89
	5785	157	11.69
	5825	165	11.67

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission mode with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.
- Output power and SAR measurement is not required for 802.11n HT40 channels when the specified tune-up tolerances for 802.11n HT40 are lower than 802.11a by more than 1/2dB and the measured SAR is $\leq$ 1.2 W/kg

Test Configuration



10. SYSTEM VERIFICATION

10.1 Tissue Verification

The Head /body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity.

Table for Head Tissue Verification

Date of Tests	Tissue Temp	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
12/16/2015	19.8	835H	820	0.860	42.400	0.899	41.578	-4.34%	1.98%
			835	0.878	42.209	0.900	41.500	-2.44%	1.71%
			850	0.890	42.030	0.916	41.500	-2.84%	1.28%
12/08/2015	20.4	1900H	1 850	1.350	39.500	1.400	40.000	-3.57%	-1.25%
			1 900	1.400	39.300	1.400	40.000	0.00%	-1.75%
			1 910	1.410	39.300	1.400	40.000	0.71%	-1.75%
12/08/2015	21.3	2450H	2 400	1.780	38.600	1.756	39.290	1.37%	-1.76%
			2 450	1.840	38.400	1.800	39.200	2.22%	-2.04%
			2 500	1.890	38.200	1.855	39.140	1.89%	-2.40%
11/27/2015	20.5	2600H	2 500	1.911	39.260	1.855	39.140	3.02%	0.31%
			2 600	2.030	38.900	1.964	39.010	3.36%	-0.28%
			2 700	2.140	38.600	2.073	38.880	3.23%	-0.72%
12/11/2015	20.2	5200H-5800H	5 180	4.516	36.198	4.641	36.010	-2.69%	0.52%
			5 300	4.669	35.905	4.758	35.870	-1.87%	0.10%
			5 600	5.010	35.162	5.065	35.530	-1.09%	-1.04%
			5 800	5.292	34.559	5.270	35.300	0.42%	-2.10%
			5 825	5.355	34.475	5.303	35.270	0.98%	-2.25%

Table for Body Tissue Verification

Date of Tests	Tissue Temp	Tissue Type	Freq. (MHz)	Measured Conductivity σ (S/m)	Measured Dielectric Constant, ε	Target Conductivity σ (S/m)	Target Dielectric Constant, ε	% dev σ	% dev ε
12/16/2015	20.1	835B	820	0.945	56.870	0.969	55.258	-2.48%	2.92%
			835	0.958	56.600	0.970	55.200	-1.24%	2.54%
			850	0.977	56.450	0.988	55.154	-1.11%	2.35%
12/08/2015	20.4	1900B	1 850	1.490	55.100	1.520	53.300	-1.97%	3.38%
			1 900	1.540	55.000	1.520	53.300	1.32%	3.19%
			1 910	1.550	55.000	1.520	53.300	1.97%	3.19%
12/10/2015	21.0	2450B	2 400	1.890	52.000	1.902	52.770	-0.63%	-1.46%
			2 450	1.960	51.700	1.950	52.700	0.51%	-1.90%
			2 500	2.040	51.600	2.021	52.640	0.94%	-1.98%
12/02/2015	23.4	2600B	2 500	2.024	53.660	2.021	52.640	0.15%	1.94%
			2 600	2.170	53.300	2.163	52.510	0.32%	1.50%
			2 700	2.320	53.00	2.305	52.380	0.65%	1.18%
12/11/2015	20.7	5200B-5800B	5 180	5.260	47.600	5.283	49.038	-0.44%	-2.93%
			5 300	5.410	47.000	5.416	48.880	-0.11%	-3.85%
			5 600	5.850	46.400	5.766	48.470	1.46%	-4.27%
			5 800	6.250	46.100	6.000	48.200	4.17%	-4.36%
			5 825	6.180	46.000	6.037	48.165	2.37%	-4.49%

10.2 System Verification

Prior to assessment, the system is verified to the ± 10 % of the specifications at 835 MHz / 1 900 MHz / 2 450 MHz / 2 600 MHz / 5 300 MHz / 5 800 MHz by using the system Verification kit. (Graphic Plots Attached)

System Verification Results

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR_{1g} (SPEAG) [W/kg]	Measured SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Limit [%]
835	12/16/2015	1631	441	Head	20.0	19.8	9.21	0.896	8.96	- 2.71	± 10
835	12/16/2015	1609		Body	20.4	20.1	9.34	0.937	9.37	+ 0.32	± 10
1 900	12/08/2015	1609	5d032	Head	20.7	20.4	41.1	4	40	- 2.68	± 10
1 900	12/08/2015	1609		Body	20.7	20.4	40.9	3.94	39.4	- 3.67	± 10
2 450	12/08/2015	7370	743	Head	21.5	21.3	53.4	5.45	54.5	+ 2.06	± 10
2 450	12/10/2015	7370		Body	21.4	21.0	52.1	5.25	52.5	+ 0.77	± 10
2 600	11/27/2015	3903	1015	Head	20.8	20.5	56.5	5.74	57.4	+ 1.59	± 10
2 600	12/02/2015	3903		Body	23.7	23.4	55.4	5.57	55.7	+ 0.54	± 10
5 300	12/11/2015	3797	1107	Head	20.4	20.2	80.8	8.25	82.5	+ 2.10	± 10
5 300	12/11/2015	7370		Body	21.0	20.7	73.5	7.24	72.4	- 1.50	± 10
5 800	12/11/2015	3797		Head	20.4	20.2	77.8	7.7	77	- 1.03	± 10
5 800	12/11/2015	7370		Body	21.0	20.7	75.3	7.46	74.6	- 0.93	± 10

System Verification Results – Extremity SAR

Freq. [MHz]	Date	Probe (S/N)	Dipole (S/N)	Liquid	Amb. Temp. [°C]	Liquid Temp. [°C]	1 W Target SAR $_{10g}$ (SPEAG) [W/kg]	Measured SAR_{10g} [W/kg]	1 W Normalized SAR_{10g} [W/kg]	Deviation [%]	Limit [%]
2 450	12/10/2015	7370	743	Body	21.4	21.0	24.4	2.48	24.8	+ 1.64	± 10
5 300	12/11/2015	7370	1107	Body	21.0	20.7	20.6	2.06	20.6	+ 0.00	± 10
5 800	12/11/2015	7370	1107	Body	21.0	20.7	20.7	2.09	20.9	+ 0.97	± 10

10.3 System Verification Procedure

SAR measurement was prior to assessment, the system is verified to the ± 10 % of the specifications at each frequency band by using the system Verification kit. (Graphic Plots Attached)

- Cabling the system, using the Verification kit equipments.
- Generate about 100 mW Input Level from the Signal generator to the Dipole Antenna.
- Dipole Antenna was placed below the Flat phantom.
- The measured one-gram SAR at the surface of the phantom above the dipole feed-point should be within 10 % of the target reference value.
- The results are normalized to 1 W input power.

NOTE;
SAR Verification was performed according to the FCC KDB 865664 D01v01r04.

11. SAR TEST DATA SUMMARY

11.1 HEAD SAR Measurement Results

GSM 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	190	Voice	33.5	33.19	-0.18	Left Cheek	1:8.3	0.053	1.074	0.057	-
836.6	190	Voice	33.5	33.19	-0.15	Left Tilt	1:8.3	0.052	1.074	0.056	-
836.6	190	Voice	33.5	33.19	-0.16	Right Cheek	1:8.3	0.071	1.074	**0.076**	1
836.6	190	Voice	33.5	33.19	-0.05	Right Tilt	1:8.3	0.039	1.074	0.042	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

GSM 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 880.0	661	Voice	30.0	29.61	-0.009	Left Cheek	1:8.3	0.041	1.094	0.045	-
1 880.0	661	Voice	30.0	29.61	0.033	Left Tilt	1:8.3	0.019	1.094	0.021	-
1 880.0	661	Voice	30.0	29.61	0.106	Right Cheek	1:8.3	0.077	1.094	**0.084**	2
1 880.0	661	Voice	30.0	29.61	-0.147	Right Tilt	1:8.3	0.042	1.094	0.046	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

UMTS 850 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
836.6	4183	RMC	23.5	23.01	-0.10	Left Cheek	1:1	0.057	1.119	0.064	-
836.6	4183	RMC	23.5	23.01	-0.13	Left Tilt	1:1	0.046	1.119	0.051	-
836.6	4183	RMC	23.5	23.01	-0.08	Right Cheek	1:1	0.076	1.119	**0.085**	3
836.6	4183	RMC	23.5	23.01	-0.19	Right Tilt	1:1	0.036	1.119	0.040	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

UMTS 1900 Head SAR											
Frequency		Mode	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(dB)	(dB)	(dB)			(W/kg)		(W/kg)	
1 880.0	9400	RMC	22.0	20.92	-0.103	Left Cheek	1:1	0.057	1.282	0.073	-
1 880.0	9400	RMC	22.0	20.92	-0.086	Left Tilt	1:1	0.026	1.282	0.033	-
1 880.0	9400	RMC	22.0	20.92	-0.156	Right Cheek	1:1	0.090	1.282	**0.115**	4
1 880.0	9400	RMC	22.0	20.92	0.134	Right Tilt	1:1	0.052	1.282	0.067	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Head 1.6 W/kg (mW/g) Averaged over 1 gram					

LTE Band 41 Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	RB Size	RB offset	Duty Cycle	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
2 565	40340	QPSK	20	23.7	23.59	0.145	Left Cheek	1	0	1:1.58	0.067	1.026	**0.069**	5
2 565	40340	QPSK	20	22.7	22.58	0.170	Left Cheek	50	0	1:1.58	0.031	1.028	0.032	-
2 565	40340	QPSK	20	23.7	23.59	0.110	Left Tilt	1	0	1:1.58	0.017	1.026	0.017	-
2 565	40340	QPSK	20	22.7	22.58	0.100	Left Tilt	50	0	1:1.58	0.013	1.028	0.013	-
2 565	40340	QPSK	20	23.7	23.59	0.110	Right Cheek	1	0	1:1.58	0.062	1.026	0.064	-
2 565	40340	QPSK	20	22.7	22.58	0.100	Right Cheek	50	0	1:1.58	0.046	1.028	0.047	-
2 565	40340	QPSK	20	23.7	23.59	0.190	Right Tilt	1	0	1:1.58	0.047	1.026	0.048	-
2 565	40340	QPSK	20	22.7	22.58	0.100	Right Tilt	50	0	1:1.58	0.038	1.028	0.039	-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Head 1.6 W/kg (mW/g) Averaged over 1 gram							

DTS Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
2 437	6	802.11b	22	1	17.5	16.13		Left Cheek	98.97	0.0955		1.371	1.010		-
2 437	6	802.11b	22	1	17.5	16.13		Left Tilt	98.97	0.0816		1.371	1.010		-
2 437	6	802.11b	22	1	17.5	16.13		Right Cheek	98.97	0.266		1.371	1.010		-
2 437	6	802.11b	22	1	17.5	16.13	0.108	Right Tilt	98.97	0.286	0.132	1.371	1.010	**0.183**	6
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg (mW/g) Averaged over 1 gram							

NII Head SAR

Frequency MHz	Frequency Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
5 320	64	802.11a	20	6Mbps	13.5	11.59		Left Cheek	93.14	0.219		1.552	1.074		-
5 320	64	802.11a	20	6Mbps	13.5	11.59		Left Tilt	93.14	0.148		1.552	1.074		-
5 320	64	802.11a	20	6Mbps	13.5	11.59		Right Cheek	93.14	0.419		1.552	1.074		-
5 320	64	802.11a	20	6Mbps	13.5	11.59	-0.11	Right Tilt	93.14	0.673	0.165	1.552	1.074	**0.275**	-
5 720	144	802.11a	20	6Mbps	13.5	12.80		Left Cheek	93.14	0.178		1.175	1.074		-
5 720	144	802.11a	20	6Mbps	13.5	12.80		Left Tilt	93.14	0.158		1.175	1.074		-
5 720	144	802.11a	20	6Mbps	13.5	12.80	-0.06	Right Cheek	93.14	0.576	0.187	1.175	1.074	0.236	7
5 720	144	802.11a	20	6Mbps	13.5	12.80		Right Tilt	93.14	0.474		1.175	1.074		-
5 745	149	802.11a	20	6Mbps	13.5	13.28		Left Cheek	93.14	0.250		1.052	1.074		-
5 745	149	802.11a	20	6Mbps	13.5	13.28		Left Tilt	93.14	0.187		1.052	1.074		-
5 745	149	802.11a	20	6Mbps	13.5	13.28	-0.16	Right Cheek	93.14	0.416	0.140	1.052	1.074	0.158	-
5 745	149	802.11a	20	6Mbps	13.5	13.28		Right Tilt	93.14	0.352		1.052	1.074		-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Head 1.6 W/kg (mW/g) Averaged over 1 gram							

11.2 Body-worn SAR Measurement Results

GSM/UMTS Body-Worn SAR

Frequency MHz	Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.6	190	Voice	33.5	33.19	-0.071	Rear	1:8.3	10	0.151	1.074	**0.162**	8
836.6	190	Voice	33.5	33.19	-0.132	Front	1:8.3	10	0.117	1.074	0.126	-
1880.0	661	Voice	30.0	29.61	-0.192	Rear	1:8.3	10	0.354	1.094	0.387	-
1880.0	661	Voice	30.0	29.61	-0.038	Front	1:8.3	10	0.363	1.094	**0.397**	9
836.6	4183	RMC	23.5	23.01	-0.035	Rear	1:1	10	0.171	1.119	**0.191**	10
836.6	4183	RMC	23.5	23.01	-0.011	Front	1:1	10	0.134	1.119	0.150	-
1880.0	9400	RMC	22.0	20.92	-0.015	Rear	1:1	10	0.396	1.282	**0.508**	11
1880.0	9400	RMC	22.0	20.92	0.169	Front	1:1	10	0.378	1.282	0.485	-

ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population	Body 1.6 W/kg (mW/g) Averaged over 1 gram

LTE Body-Worn SAR

Frequency MHz	Ch.	Mode	Band width (MHz)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	RB Size	RB offset	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
2 565	40340	QPSK	20	23.7	23.59	-0.160	Rear	1	0	1:1.58	10	0.362	1.026	**0.371**	12
2 565	40340	QPSK	20	22.7	22.58	-0.112	Rear	50	0	1:1.58	10	0.281	1.028	0.289	-
2 565	40340	QPSK	20	23.7	23.59	-0.035	Front	1	0	1:1.58	10	0.343	1.026	0.352	-
2 565	40340	QPSK	20	22.7	22.58	0.101	Front	50	0	1:1.58	10	0.258	1.028	0.265	-

ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population	Body 1.6 W/kg (mW/g) Averaged over 1 gram

DTS Body-Worn SAR

Frequency MHz	Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
2 437	6	802.11b	22	1	17.5	16.13	0.030	Rear	98.97	10	0.156	0.114	1.371	1.010	**0.158**	13
2 437	6	802.11b	22	1	17.5	16.13	-0.140	Front	98.97	10	0.127	0.090	1.371	1.010	0.125	-

ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population	Body 1.6 W/kg (mW/g) Averaged over 1 gram

NII Body-Worn SAR

Frequency MHz	Ch.	Mode	Band width (MHz)	Data Rate (Mbps)	Tune-Up Limit (dBm)	Meas. Power (dBm)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Area Scan Peak SAR (W/kg)	Meas. SAR (W/kg)	Scaling Factor	Scaling Factor (Duty)	Scaled SAR (W/kg)	Plot No.
5 320	64	802.11a	20	6Mbps	13.5	11.59	0.000	Rear	93.14	10	0.181	0.024	1.552	1.074	**0.040**	-
5 320	64	802.11a	20	6Mbps	13.5	11.59	0.100	Front	93.14	10	0.099	0.022	1.552	1.074	0.037	-
5 720	144	802.11a	20	6Mbps	13.5	12.80	0.000	Rear	93.14	10	0.127	0.027	1.175	1.074	0.034	14
5 720	144	802.11a	20	6Mbps	13.5	12.80	-	Front	93.14	10	0.0266	-	1.175	1.074		-
5 745	149	802.11a	20	6Mbps	13.5	13.28	0.000	Rear	93.14	10	0.149	0.023	1.052	1.074	0.026	-
5 745	149	802.11a	20	6Mbps	13.5	13.28	-	Front	93.14	10	0.051	-	1.052	1.074		-

ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population	Body 1.6 W/kg (mW/g) Averaged over 1 gram

11.3 Hotspot SAR Measurement Results

GSM 850 Hotspot SAR

Frequency MHz	Frequency Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.6	190	GPRS 4Tx	29.0	28.00	0.103	Rear	1:2.075	10	0.218	1.259	**0.274**	15
836.6	190	GPRS 4Tx	29.0	28.00	0.184	Front	1:2.075	10	0.168	1.259	0.211	-
836.6	190	GPRS 4Tx	29.0	28.00	0.008	Left	1:2.075	10	0.039	1.259	0.049	-
836.6	190	GPRS 4Tx	29.0	28.00	-0.015	Bottom	1:2.075	10	0.046	1.259	0.058	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

GSM 1900 Hotspot SAR

Frequency MHz	Frequency Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
1 880.0	661	GPRS 4Tx	25.5	23.78	-0.004	Rear	1:2.075	10	0.354	1.486	0.526	-
1 880.0	661	GPRS 4Tx	25.5	23.78	0.025	Front	1:2.075	10	0.337	1.486	0.501	-
1 880.0	661	GPRS 4Tx	25.5	23.78	0.094	Left	1:2.075	10	0.090	1.486	0.134	-
1 880.0	661	GPRS 4Tx	25.5	23.78	-0.035	Bottom	1:2.075	10	0.423	1.486	**0.629**	16
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

UMTS 850 Hotspot SAR

Frequency MHz	Frequency Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
836.6	4183	RMC	23.5	23.01	-0.035	Rear	1:1	10	0.171	1.119	**0.191**	10
836.6	4183	RMC	23.5	23.01	-0.011	Front	1:1	10	0.134	1.119	0.150	-
836.6	4183	RMC	23.5	23.01	-0.036	Left	1:1	10	0.032	1.119	0.036	-
836.6	4183	RMC	23.5	23.01	0.001	Bottom	1:1	10	0.038	1.119	0.043	-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

UMTS 1900 Hotspot SAR

Frequency MHz	Frequency Ch.	Mode	Tune-Up Limit (dB)	Meas. Power (dB)	Power Drift (dB)	Test Position	Duty Cycle	Distance (mm)	Meas. SAR (W/kg)	Scaling Factor	Scaled SAR (W/kg)	Plot No.
1 880.0	9400	RMC	22.0	20.92	-0.015	Rear	1:1	10	0.396	1.282	0.508	11
1 880.0	9400	RMC	22.0	20.92	0.169	Front	1:1	10	0.378	1.282	0.485	-
1 880.0	9400	RMC	22.0	20.92	-0.048	Left	1:1	10	0.092	1.282	0.118	-
1 880.0	9400	RMC	22.0	20.92	0.086	Bottom	1:1	10	0.427	1.282	**0.548**	17
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population						Body 1.6 W/kg (mW/g) Averaged over 1 gram						

LTE Band 41 Hotspot SAR

Frequency		Mode	Band width	Tune-Up Limit	Meas. Power	Power Drift	Test Position	RB Size	RB offset	Duty Cycle	Distance	Meas. SAR	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(dBm)	(dBm)	(dB)					(mm)	(W/kg)		(W/kg)	
2 565	40340	QPSK	20	23.7	23.59	-0.160	Rear	1	0	1:1.58	10	0.362	1.026	0.371	12
2 565	40340	QPSK	20	22.7	22.58	-0.112	Rear	50	0	1:1.58	10	0.281	1.028	0.289	-
2 565	40340	QPSK	20	23.7	23.59	-0.035	Front	1	0	1:1.58	10	0.343	1.026	0.352	-
2 565	40340	QPSK	20	22.7	22.58	0.101	Front	50	0	1:1.58	10	0.258	1.028	0.265	-
2 565	40340	QPSK	20	23.7	23.59	0.149	Left	1	0	1:1.58	10	0.108	1.026	0.111	-
2 565	40340	QPSK	20	22.7	22.58	0.183	Left	50	0	1:1.58	10	0.080	1.028	0.082	-
2 565	40340	QPSK	20	23.7	23.59	0.049	Bottom	1	0	1:1.58	10	0.941	1.026	**0.965**	18
2 605	40740	QPSK	20	23.7	23.51	-0.043	Bottom	1	0	1:1.58	10	0.834	1.045	0.871	-
2 645	41140	QPSK	20	23.7	23.03	-0.063	Bottom	1	0	1:1.58	10	0.700	1.167	0.817	
2 565	40340	QPSK	20	22.7	22.58	0.034	Bottom	50	0	1:1.58	10	0.700	1.028	0.720	
2 565	40340	QPSK	20	22.7	22.48	-0.046	Bottom	100	0	1:1.58	10	0.676	1.052	0.711	
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population							Body 1.6 W/kg (mW/g) Averaged over 1 gram								

DTS Hotspot SAR

Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
2 437	6	802.11b	22	1	17.5	16.13	0.030	Rear	98.97	10	0.156	0.114	1.371	1.010	**0.158**	13
2 437	6	802.11b	22	1	17.5	16.13	-0.140	Front	98.97	10	0.127	0.090	1.371	1.010	0.125	-
2 437	6	802.11b	22	1	17.5	16.13		Left	98.97	10	0.0977		1.371	1.010		
2 437	6	802.11b	22	1	17.5	16.13		Top	98.97	10	0.144		1.371	1.010		-
ANSI/ IEEE C95.1 - 2005 – Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

5GHz WLAN Hotspot SAR

Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 745	149	802.11a	20	6Mbps	13.5	13.28	0.000	Rear	93.14	10	0.149	0.023	1.052	1.074	0.026	-
5 745	149	802.11a	20	6Mbps	13.5	13.28	-	Front	93.14	10	0.051	-	1.052	1.074		-
5 745	149	802.11a	20	6Mbps	13.5	13.28	0.082	Left	93.14	10	0.153	0.065	1.052	1.074	**0.073**	19
5 745	149	802.11a	20	6Mbps	13.5	13.28		Top	93.14	10	0.039		1.052	1.074		-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 1.6 W/kg (mW/g) Averaged over 1 gram								

NII Hand SAR																
Frequency		Mode	Band width	Data Rate	Tune-Up Limit	Meas. Power	Power Drift	Test Position	Duty Cycle	Distance	Area Scan Peak SAR	Meas. SAR	Scaling Factor	Scaling Factor	Scaled SAR	Plot No.
MHz	Ch.		(MHz)	(Mbps)	(dBm)	(dBm)	(dB)			(mm)	(W/kg)	(W/kg)		(Duty)	(W/kg)	
5 320	64	802.11a	20	6Mbps	13.5	11.59	0.000	Rear	93.14	0	1.60	0.122	1.552	1.074	**0.203**	20
5 320	64	802.11a	20	6Mbps	13.5	11.59		Front	93.14	0	0.908		1.552	1.074		-
5 320	64	802.11a	20	6Mbps	13.5	11.59		Left	93.14	0	0.268		1.552	1.074		-
5 320	64	802.11a	20	6Mbps	13.5	11.59		Top	93.14	0	0.628		1.552	1.074		-
5 720	144	802.11a	20	6Mbps	13.5	12.80	0.000	Rear	93.14	0	2.25	0.122	1.175	1.074	0.154	-
5 720	144	802.11a	20	6Mbps	13.5	12.80		Front	93.14	0	0.903		1.175	1.074		-
5 720	144	802.11a	20	6Mbps	13.5	12.80		Left	93.14	0	0.227		1.175	1.074		-
5 720	144	802.11a	20	6Mbps	13.5	12.80		Top	93.14	0	0.617		1.175	1.074		-
ANSI/ IEEE C95.1 - 2005– Safety Limit Spatial Peak Uncontrolled Exposure/ General Population								Body 2.0 W/kg (mW/g) Averaged over 10 gram								

11.4 SAR Test Notes

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013, FCC KDB Procedure.
2. Batteries are fully charged at the beginning of the SAR measurements. A standard battery was used for all SAR measurements.
3. Liquid tissue depth was at least 15.0 cm for all frequencies.
4. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
5. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB 447498 D01v06.
6. Device was tested using a fixed spacing for body-worn accessory testing. A separation distance of 15 mm was considered because the manufacturer has determined that there will be body-worn accessories available in the marketplace for users to support this separation distance. SAR test separation distance was used 10 mm as more conservative to cover both Body-worn and Hot-spot SAR conditions.
7. Per FCC KDB 648474 D04v01r03, SAR was evaluated without a headset connected to the device. Since the standalone reported SAR was ≤ 1.2 W/kg, no additional SAR evaluation using a headset cable were required.
8. Per KDB 648474 D04v01r03, this device is considered a “Phablet” since the diagonal dimension is > 160 mm and < 200 mm. When hotspot mode applies, extremity SAR is required only for the surfaces and edges with hotspot mode scaled to the maximum output power (with tolerance) is 1 g SAR > 1.2 W/kg.

GSM/GPRS Test Notes:

1. This EUT’S GSM and GPRS device class is B.
2. Body-Worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.
3. Justification for reduced test configurations per KDB 941225 D01v03r01: The source-based time-averaged output power was evaluated for all multi-slot operations. The multi-slot configuration with the highest frame averaged output power including tolerance was evaluated for SAR.
4. Per FCC KDB 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the required test channels is 1/2 dB, instead of the middle channel, the highest output power channel must be used.
5. Justification for reduced test configurations per KDB Publication 941225 D01v03r01 and October 2013 TCB Workshop Notes: The source-based frame-averaged output power was evaluated for all GPRS/EDGE slot configurations. The configuration with the highest target frame averaged output power was evaluated for hotspot SAR. When the maximum frame-averaged powers are equivalent across two or more slots (within 0.25 dB), the configuration with the most number of time slots was tested.

UMTS Notes:

1. The 12.2 kbps RMC mode is the primary mode per KDB 941225 D01v03r01.
2. UMTS mode in Body SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB 941225 D01v03r01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and Adjusted SAR value was less than 1.2 W/kg.
3. Per FCC KDB 447498 D01v06, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is ≤ 0.8 W/kg then testing at the other channels is not required for such test configuration(s). When the maximum output power variation across the channel highest output power channel was used.
4. UMTS SAR was tested under RMC 12.2 kbps with HSPA inactive per KDB publication 941225 D01v03r01. HSPA SAR was not required since the average output power of the HSPA subtests was not more than 0.25 dB higher than the RMC level and SAR was less than 1.2 W/kg.

LTE Notes:

1. LTE Considerations: LTE test configurations are determined according to SAR Evaluation Consideration for LTE Devices in FCC KDB 941225 D05v02r04.
2. According to FCC KDB 941225 D05v02r04:
   When the reported SAR is ≤ 0.8 W/kg, testing of the 100%RB allocation and required test channels is not required. Otherwise, SAR is required for the remaining required test channels using the 1RB, 50%RB and 100%RB allocation with highest output power for that channel.
   Only one channel, and as reported SAR values for 1RB allocation and 50%RB allocation were less than 1.45W/Kg only the highest power RB offset for each allocation was required.
3. MPR is permanently implemented for this device by the manufacturer. The specific manufacturer target MPR is indicated alongside the SAR results. MPR is enabled for this device, according to target MPR is indicated alongside the SAR results.
4. A-MPR was dialed for all SAR tests by setting NS=01 on the base station simulator.
5. Pre-installed VOIP applications are considered.
6. SAR test reduction is applied using the following criteria:
7. Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel. When the reported SAR is >0.8 W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel. Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are >0.8 W/kg, Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation <1.45 W/kg. Testing for 16-QAM modulation is not required because the reported SAR for QPSK is <1.45 W/kg and its output power is not more than 0.5 dB higher than that a QPSK. Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is <1.45 W/kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

WLAN Notes:

1. For held-to-ear and hotspot operations, the initial test position procedures were applied. For initial test position, the highest extrapolated peak SAR will be used. When reported SAR for the initial test position is ≤ 0.4 W/kg for 1g SAR and ≤ 1.0 W/kg for 10g SAR, no additional testing for the remaining test positions was required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR results is ≤ 0.8 W/kg for 1g SAR and ≤ 2.0 W/kg for 10g SAR or all test position are measured.
2. Per KDB 2482227 D01v02r02 justification for test configurations of 2.4 GHz WiFi Single transmission chain operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement. SAR for OFDM modes (2.4 GHz 802.11 g/n) was not required due to the maximum allowed powers and the highest reported DSSS SAR.
3. Per KDB 2482227 D01v02r02 justification for test configurations of 5 GHz WiFi Single transmission chain operations, the initial test configuration was selected according to the transmission mode with the highest maximum allowed powers. Other transmission mode were not investigated since the highest reported SAR for initial test configuration adjusted by the ration of maximum output powers is less than 1.2 W/kg for 1g SAR and less than 3.0 W/kg for 10 g SAR.
4. When the maximum reported 1g averaged SAR is ≤ 0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg or all test channels were measured.
5. The device was configured to transmit continuously at the required data rated, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance. Procedures used to measure the duty factor are identical to that in the associated WLAN test reports.
6. Only channels in the U-NII-2C (> 5.65 GHz WIFI) & U-NII-3 aggregate band that support wireless router were considered for hotspot SAR tests.

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12. Simultaneous SAR Analysis

12.1 Simultaneous Transmission Summation for Head

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.076	0.183	0.259
	GSM 1900	0.084	0.183	0.267
	UMTS 850	0.085	0.183	0.268
	UTMS 1900	0.115	0.183	0.298
	LTE Band 41	0.069	0.183	0.252

Simultaneous Transmission Summation Scenario with 5 GHz WLAN				
Exposure condition	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Head SAR	GSM 850	0.076	0.275	0.351
	GSM 1900	0.084	0.275	0.359
	UMTS 850	0.085	0.275	0.360
	UTMS 1900	0.115	0.275	**0.390**
	LTE Band 41	0.069	0.275	0.344

12.2 Simultaneous Transmission Summation for Body-Worn

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance	Band	WWAN SAR	2.4 GHz WLAN SAR	∑ 1-g SAR
	(mm)		(W/kg)	(W/kg)	(W/kg)
Body-worn	15	GSM 850	0.162	0.158	0.320
		GSM 1900	0.397	0.158	0.555
		UMTS 850	0.191	0.158	0.349
		UTMS 1900	0.508	0.158	0.666
		LTE Band 41	0.371	0.158	0.529

Simultaneous Transmission Summation Scenario with 5 GHz WLAN					
Exposure condition	Distance	Band	WWAN SAR	5 GHz WLAN SAR	∑ 1-g SAR
	(mm)		(W/kg)	(W/kg)	(W/kg)
Body-worn	15	GSM 850	<0.162	<0.040	<0.202
		GSM 1900	<0.397	<0.040	<0.437
		UMTS 850	<0.191	<0.040	<0.231
		UTMS 1900	<0.508	<0.040	<0.548
		LTE Band 41	<0.371	<0.040	<0.411

Simultaneous Transmission Summation Scenario with Bluetooth					
Exposure condition	Distance	Band	WWAN SAR	Bluetooth Estimated SAR	∑ 1-g SAR
	(mm)		(W/kg)	(W/kg)	(W/kg)
Body-worn	15	GSM 850	<0.162	0.13	<0.292
		GSM 1900	<0.397	0.13	<0.527
		UMTS 850	<0.191	0.13	<0.321
		UTMS 1900	<0.508	0.13	<0.638
		LTE Band 41	<0.371	0.13	<0.501

Note:
1. For SAR summation for body-worn back side at 15mm, the SAR values at 10 mm for some transmission mode were used since the 10mm test distance was more conservative. "<" denotes that the 10mm SAR values were used for summation purposes.

2. Bluetooth SAR was not required to be measured per FCC KDB 447498 D01v06. Estimated SAR results were used for SAR summation for body-worn back side at 15 mm to determine simultaneous transmission SAR test exclusion.

12.3 Simultaneous Transmission Summation for Hotspot

Simultaneous Transmission Summation Scenario with 2.4 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	2.4 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	0.274	0.158	0.432
		GSM 1900	0.629	0.158	0.787
		UMTS 850	0.191	0.158	0.349
		UTMS 1900	0.548	0.158	0.706
		LTE Band 41	0.965	0.158	**1.123**

Simultaneous Transmission Summation Scenario with 5 GHz WLAN					
Exposure condition	Distance (mm)	Band	WWAN SAR (W/kg)	5 GHz WLAN SAR (W/kg)	∑ 1-g SAR (W/kg)
Hotspot	10	GSM 850	0.274	0.073	0.347
		GSM 1900	0.629	0.073	0.702
		UMTS 850	0.191	0.073	0.264
		UTMS 1900	0.548	0.073	0.621
		LTE Band 41	0.965	0.073	1.038

12.4 Simultaneous Transmission Conclusion

The above numerical summed SAR results for all the worst-case simultaneous transmission conditions were below the SAR limit. Therefore, the above analysis is sufficient to determine that simultaneous transmission cases will not exceed the SAR limit. And therefore no measured volumetric simultaneous SAR summation is required per FCC KDB Publication 447498 D01v06 and IEEE 1528-2013.

13. SAR Measurement Variability and Uncertainty

In accordance with KDB procedure 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz, SAR additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement variability was assessed using the following procedures for each frequency band:

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg for 1g SAR or < 2.0 W/kg for 10g SAR ; steps 2) through 4) do not apply.

2) When the original highest measured 1g SAR is ≥ 0.80 W/kg or 10g SAR ≥ 2.0W/kg, repeat that measurement once.

3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg for 1g SAR or ≥ 3.625 W/kg for 10g SAR (~ 10% from the 1-g SAR limit).

4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg for 1g SAR or ≥3.75 W/kg for 10g SAR and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Frequency		Modulation	Battery	Configuration	Original SAR	Repeated SAR	Largest to Smallest SAR Ratio	Plot No.
MHz	Channel				(W/kg)	(W/kg)		
2 565	40340	LTE 41	Standard	Bottom (1RB, 0offset)	0.941	0.933	1.01	21

14. MEASUREMENT UNCERTAINTY

Uncertainty 1g(700 MHz ~ 5000 MHz)						
Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}
1. Measurement System						
Probe Calibration	6.55	N	1	1	6.55	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2.Test Sample Related						
Device Positioning	2.25	N	1.00	1	2.25	9
Device Holder	3.60	N	1.00	1	3.60	∞
Power Drift	5.00	R	1.73	1	2.89	∞
3.Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.64	1.85	∞
Liquid Conductivity(meas.)	3.00	N	1	0.64	1.73	∞
Liquid Permitivity(target)	5.00	R	1.73	0.6	1.73	∞
Liquid Permitivity(meas.)	2.30	N	1	0.6	1.14	∞
Combind Standard Uncertainty					10.99	
Coverage Factor for 95 %					k=2	
Expanded STD Uncertainty					21.98	

Uncertainty 10g (5000 MHz ~ 6000 MHz)						
Error Description	Tol (± %)	Prob. dist.	Div.	c_i	Standard Uncertainty (± %)	v_{eff}
1. Measurement System						
Probe Calibration	6.55	N	1	1	6.55	∞
Axial Isotropy	4.70	R	1.73	0.7	1.90	∞
Hemispherical Isotropy	9.60	R	1.73	0.7	3.88	∞
Boundary Effects	1.00	R	1.73	1	0.58	∞
Linearity	4.70	R	1.73	1	2.71	∞
System Detection Limits	1.00	R	1.73	1	0.58	∞
Readout Electronics	0.30	N	1.00	1	0.30	∞
Response Time	0.8	R	1.73	1	0.46	∞
Integration Time	2.6	R	1.73	1	1.50	∞
RF Ambient Conditions	3.00	R	1.73	1	1.73	∞
Probe Positioner	0.40	R	1.73	1	0.23	∞
Probe Positioning	2.90	R	1.73	1	1.67	∞
Max SAR Eval	1.00	R	1.73	1	0.58	∞
2.Test Sample Related						
Device Positioning	2.25	N	1.00	1	2.25	9
Device Holder	3.60	N	1.00	1	3.60	∞
Power Drift	5.00	R	1.73	1	2.89	∞
3.Phantom and Setup						
Phantom Uncertainty	4.00	R	1.73	1	2.31	∞
Liquid Conductivity(target)	5.00	R	1.73	0.43	1.24	∞
Liquid Conductivity(meas.)	2.70	N	1	0.43	1.16	∞
Liquid Permitivity(target)	5.00	R	1.73	0.49	1.42	∞
Liquid Permitivity(meas.)	1.90	N	1	0.49	0.93	∞
Combind Standard Uncertainty					10.76	
Coverage Factor for 95 %					k=2	
Expanded STD Uncertainty					21.53	

15. SAR TEST EQUIPMENT

Manufacturer	Type / Model	S/N	Calib. Date	Calib.Interval	Calib.Due
SPEAG	SAM Phantom	-	N/A	N/A	N/A
SPEAG	Triple Modular Phantom	-	N/A	N/A	N/A
HP	SAR System Control PC	-	N/A	N/A	N/A
Staubli	Robot TX90 XLspeag	F13/5R4XF1/A/01	N/A	N/A	N/A
Staubli	Robot RX90B L	F01/5K09A1/A/01	N/A	N/A	N/A
Staubli	CS8Cspeag-TX90	F13/5R4XF1/C/01	N/A	N/A	N/A
Staubli	Robot ControllerCS7MB	F01/5K09A1/C/01	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	273	N/A	N/A	N/A
SPEAG	Light Alignment Sensor	265	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D21142605	N/A	N/A	N/A
Staubli	Teach Pendant (Joystick)	D221340.01	N/A	N/A	N/A
SPEAG	DAE4	648	04/28/2015	Annual	04/28/2016
SPEAG	DAE4	652	03/18/2015	Annual	03/18/2016
SPEAG	DAE4	869	10/07/2015	Annual	10/07/2016
SPEAG	DAE4	1417	01/27/2015	Annual	01/27/2016
SPEAG	E-Field Probe ET3DV6	1631	01/28/2015	Annual	01/28/2016
SPEAG	E-Field Probe ET3DV6	1609	01/27/2015	Annual	01/27/2016
SPEAG	E-Field Probe EX3DV4	7370	09/01/2015	Annual	09/01/2016
SPEAG	E-Field Probe EX3DV4	3903	09/28/2015	Annual	09/28/2016
SPEAG	E-Field Probe EX3DV4	3797	11/24/2015	Annual	11/24/2016
SPEAG	Dipole D835V2	441	01/23/2015	Annual	01/23/2016
SPEAG	Dipole D1900V2	5d032	05/20/2015	Annual	05/20/2016
SPEAG	Dipole D2450V2	743	05/19/2015	Annual	05/19/2016
SPEAG	Dipole D2600V2	1015	03/25/2015	Annual	03/25/2016
SPEAG	Dipole D5GHzV2	1107	01/28/2015	Annual	01/28/2016
Agilent	Power Meter N1991A	MY45101406	10/03/2015	Annual	10/03/2016
Agilent	Power Sensor N1921A	MY55220026	08/19/2015	Annual	08/19/2016
SPEAG	DAKS 3.5	1038	05/26/2015	Annual	05/26/2016
HP	Dirextional Bridge	86205A	05/20/2015	Annual	05/20/2016
Agilent	Base Station E5515C	GB44400269	02/09/2015	Annual	02/09/2016
HP	Signal Generator N5182A	MY4770230	05/13/2015	Annual	05/13/2016
Agilent	MXA Signal Analyzer N9020A	MY50510407	03/23/2015	Annual	03/23/2016
HP	Network Analyzer 8753ES	JP39240221	03/23/2015	Annual	03/23/2016
R&S	Wideband Radio Communication Tester CMW500	115733	09/18/2015	Annual	09/18/2016
Hewlett Packard	11636B/Power Divider	58698	03/02/2015	Annual	03/02/2016

NOTE:
1. The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Verification measurement is performed by HCT Lab. before each test. The brain/body simulating material is calibrated by HCT using the DAKS 3.5 to determine the conductivity and permittivity (dielectric constant) of the brain/body-equivalent material.

16. CONCLUSION

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the ANSI/ IEEE C95.1- 2005.

These measurements are taken to simulate the RF effects exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests.

The SAR measurement indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

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Attachment 1. – SAR Test Plots

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 12/16/2015
Plot No.: 1

DUT: SM-A7108; Type: Bar

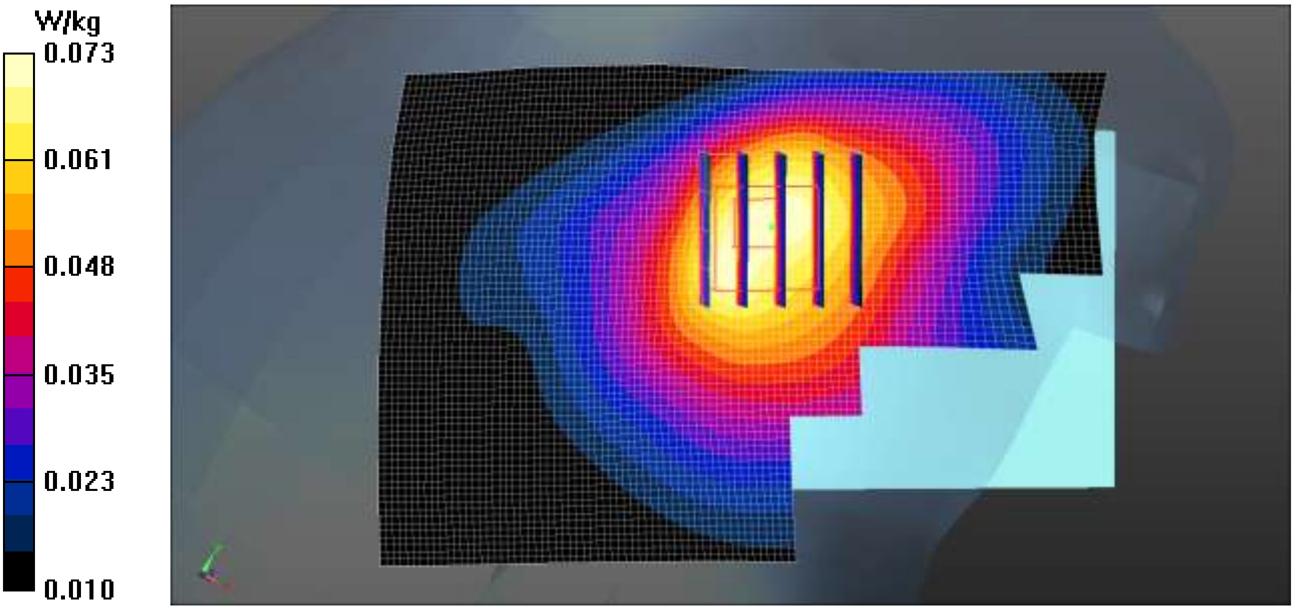
Communication System: UID 0, GSM 850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.88 S/m; ε_r = 42.19; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY5 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(6.37, 6.37, 6.37); Calibrated: 2015-01-28;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

SM-A7108/GSM850 Head Right Touch 190ch/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0734 W/kg

SM-A7108/GSM850 Head Right Touch 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.049 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.0880 W/kg
SAR(1 g) = 0.071 W/kg; SAR(10 g) = 0.054 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.0734 W/kg



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 2

DUT: SM-A7108; Type: Bar

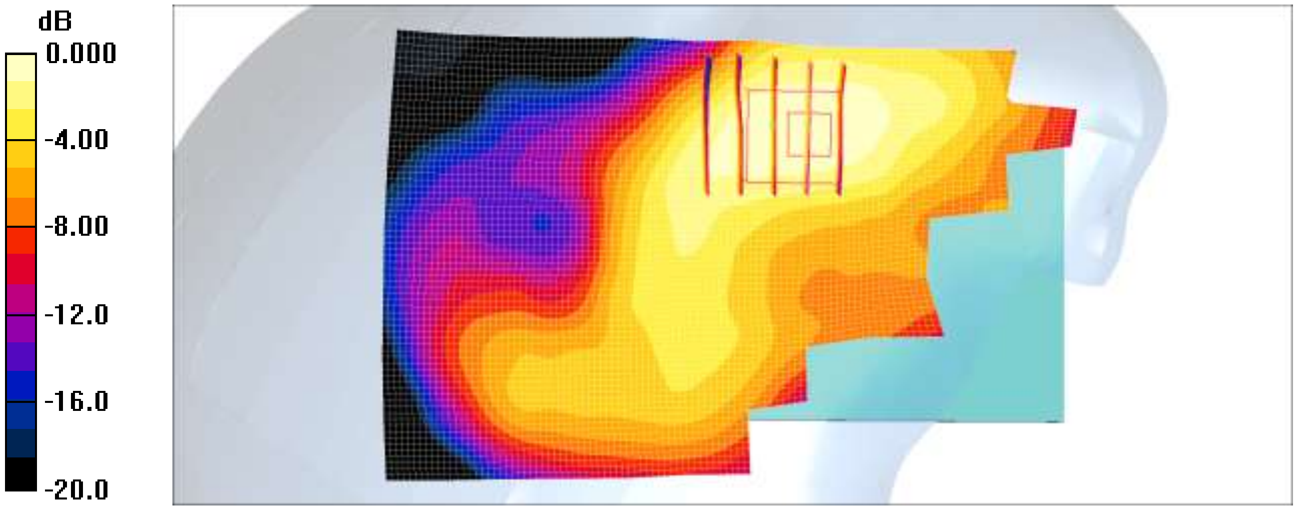
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(5.18, 5.18, 5.18); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

GSM1900 Head Right touch 661ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.085 mW/g

GSM1900 Head Right touch 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.52 V/m; Power Drift = 0.106 dB
Peak SAR (extrapolated) = 0.107 W/kg
SAR(1 g) = 0.077 mW/g; SAR(10 g) = 0.049 mW/g
Maximum value of SAR (measured) = 0.084 mW/g



0 dB = 0.084mW/g

]

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 19.8 ℃
Ambient Temperature: 20.0 ℃
Test Date: 12/16/2015
Plot No.: 3

DUT: SM-A7108; Type: Bar

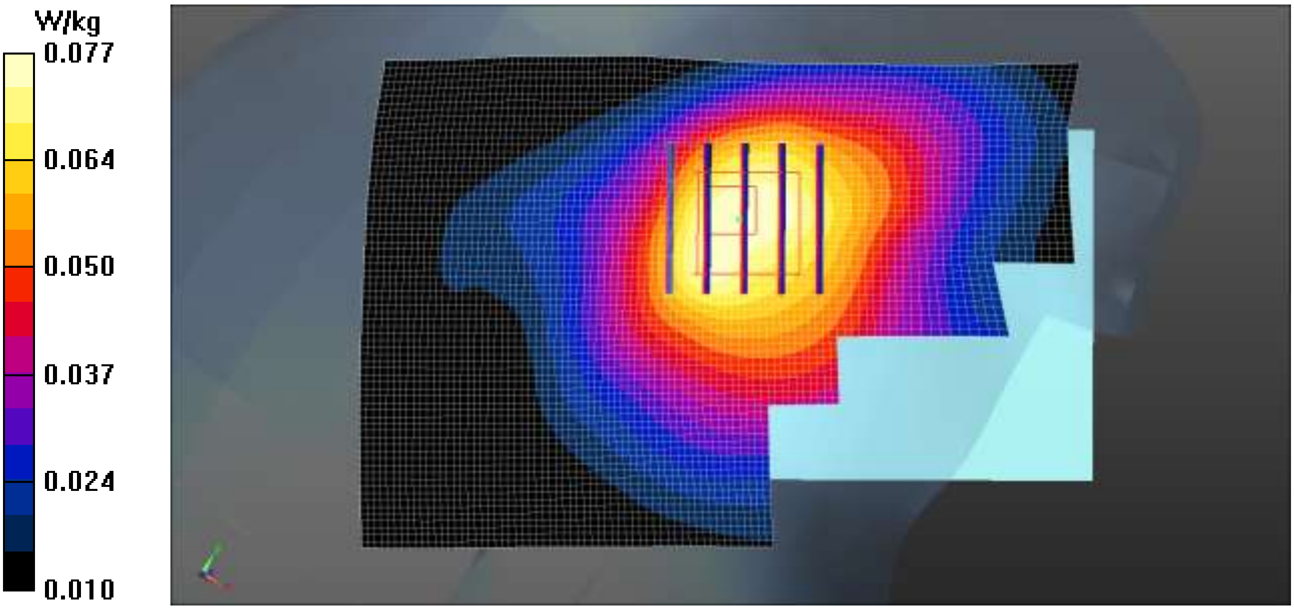
Communication System: UID 0, WCDMA850 (0); Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.88 S/m; ε_r = 42.19; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY5 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(6.37, 6.37, 6.37); Calibrated: 2015-01-28;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

SM-A7108/WCDMA850 Head Right Touch 4183ch/Area Scan (71x111x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0784 W/kg

SM-A7108/WCDMA850 Head Right Touch 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.522 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.0950 W/kg
SAR(1 g) = 0.076 W/kg; SAR(10 g) = 0.058 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.0773 W/kg



Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 4

DUT: SM-A7108; Type: Bar

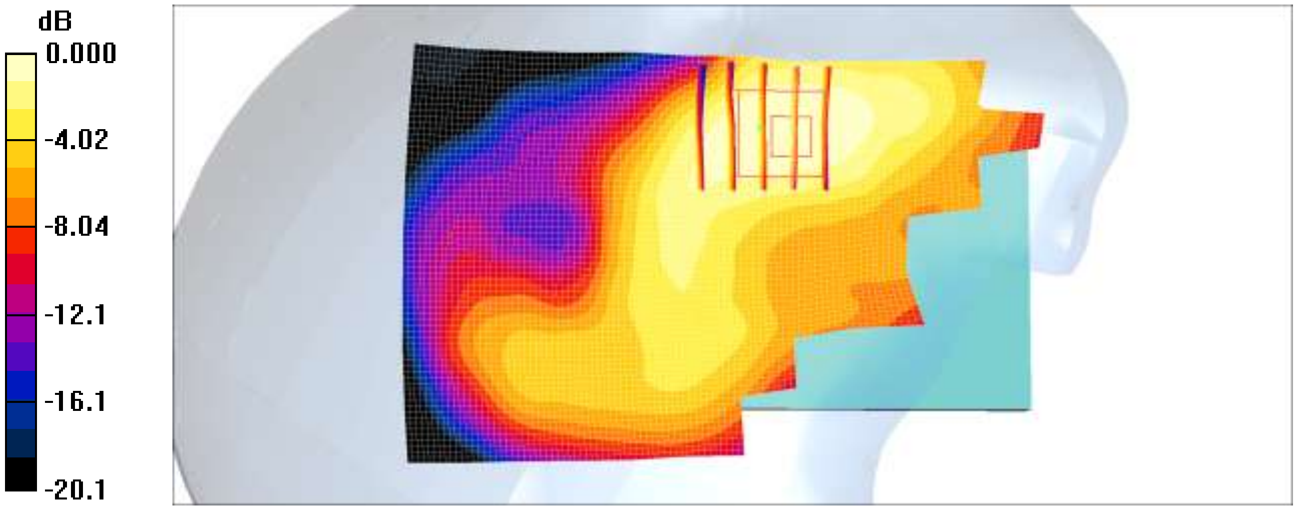
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.38 mho/m; ε_r = 39.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(5.18, 5.18, 5.18); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA1900 Head Right touch 9400ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.104 mW/g

WCDMA1900 Head Right touch 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.95 V/m; Power Drift = -0.156 dB
Peak SAR (extrapolated) = 0.122 W/kg
SAR(1 g) = 0.090 mW/g; SAR(10 g) = 0.060 mW/g
Maximum value of SAR (measured) = 0.097 mW/g



0 dB = 0.097mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.5 ℃
Ambient Temperature: 20.8 ℃
Test Date: 11/27/2015
Plot No.: 5

DUT: SM-A7108; Type: Bar

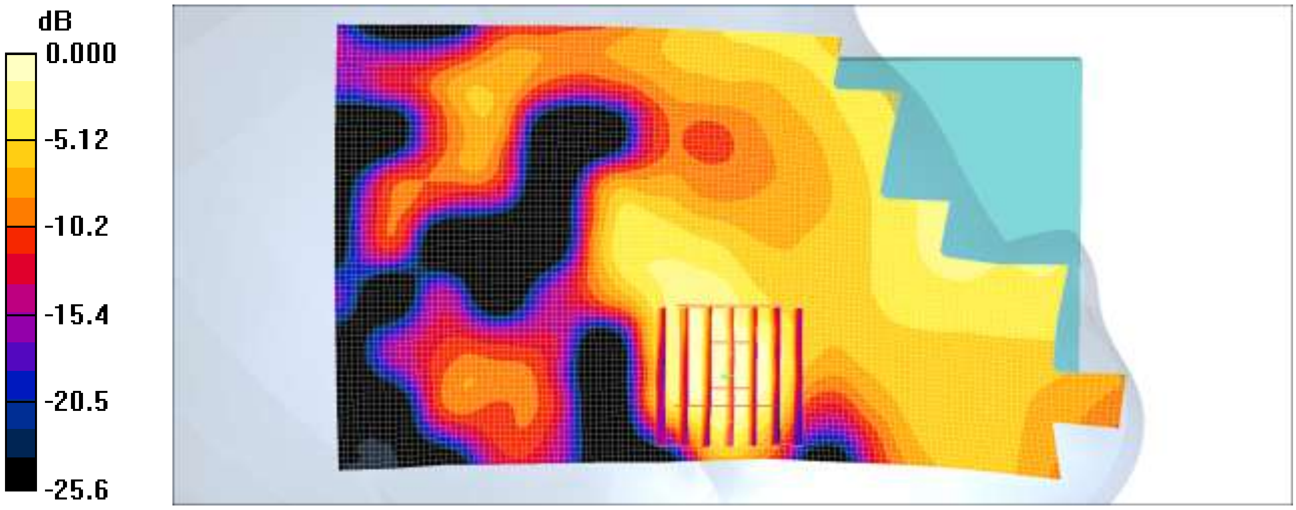
Communication System: LTE Band 41 (FCC); Frequency: 2565 MHz;Duty Cycle: 1:1.58
Medium parameters used (interpolated): f = 2565 MHz; σ = 1.99 mho/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.09, 7.09, 7.09); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

LTE41 Head Left Touch QPSK 20MHz 1RB 0offset 40340ch/Area Scan (81x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.116 mW/g

LTE41 Head Left Touch QPSK 20MHz 1RB 0offset 40340ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.52 V/m; Power Drift = 0.145 dB
Peak SAR (extrapolated) = 0.138 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.035 mW/g
Maximum value of SAR (measured) = 0.097 mW/g



0 dB = 0.097mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.3 ℃
Ambient Temperature: 21.5 ℃
Test Date: 12/08/2015
Plot No.: 6

DUT: SM-A710F; Type: Bar

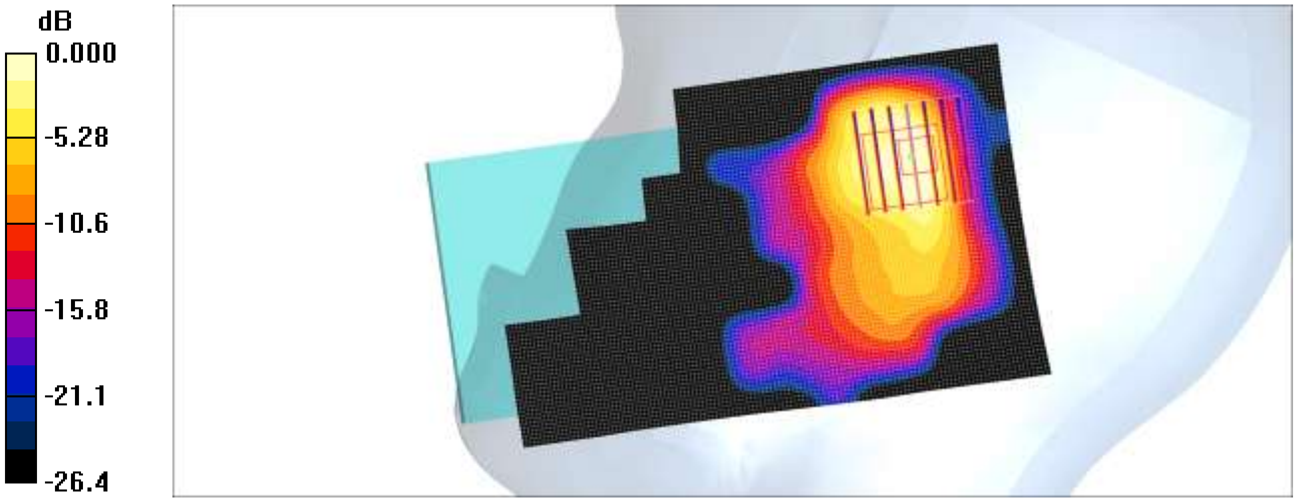
Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.82 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(6.94, 6.94, 6.94); Calibrated: 2015-09-01
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: SAM Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Right tilt 6ch/Area Scan (81x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.286 mW/g

Right tilt 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.83 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.337 W/kg
SAR(1 g) = 0.132 mW/g; SAR(10 g) = 0.060 mW/g
Maximum value of SAR (measured) = 0.211 mW/g



0 dB = 0.211mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.0 ℃
Ambient Temperature: 20.1 ℃
Test Date: 12/17/2015
Plot No.: 7

DUT: SM-A710FD; Type: Bar

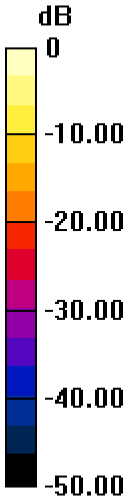
Communication System: UID 0, WIFI 5GHz (0); Frequency: 5720 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5720 MHz; σ = 5.194 S/m; ε_r = 34.781; ρ = 1000 kg/m^3
Phantom section: Right Section

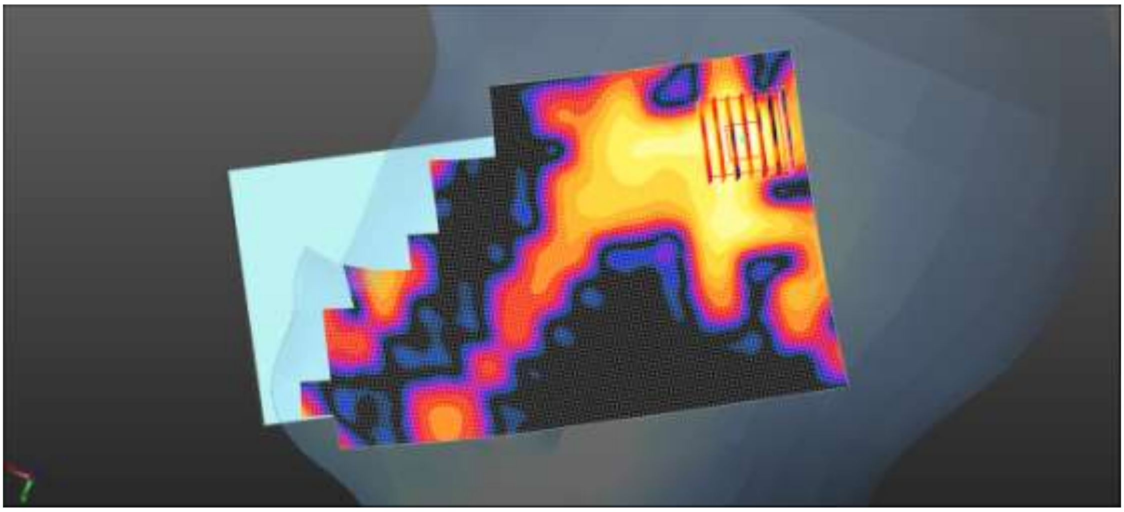
DASY5 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(4.2, 4.2, 4.2); Calibrated: 2015-11-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM with CRP v5.0_R
- Measurement SW: DASY52, Version 52.8 (8);

SM-A710FD/802.11a Head Right Touch 6Mbps 144ch/Area Scan (101x171x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.576 W/kg

SM-A710FD/802.11a Head Right Touch 6Mbps 144ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 5.806 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.27 W/kg
SAR(1 g) = 0.187 W/kg; SAR(10 g) = 0.048 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 0.431 W/kg





0 dB = 0.576 W/kg = -2.39 dBW/kg

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.1 ℃
Ambient Temperature: 20.4 ℃
Test Date: 12/16/2015
Plot No.: 8

DUT: SM-A7108; Type: bar

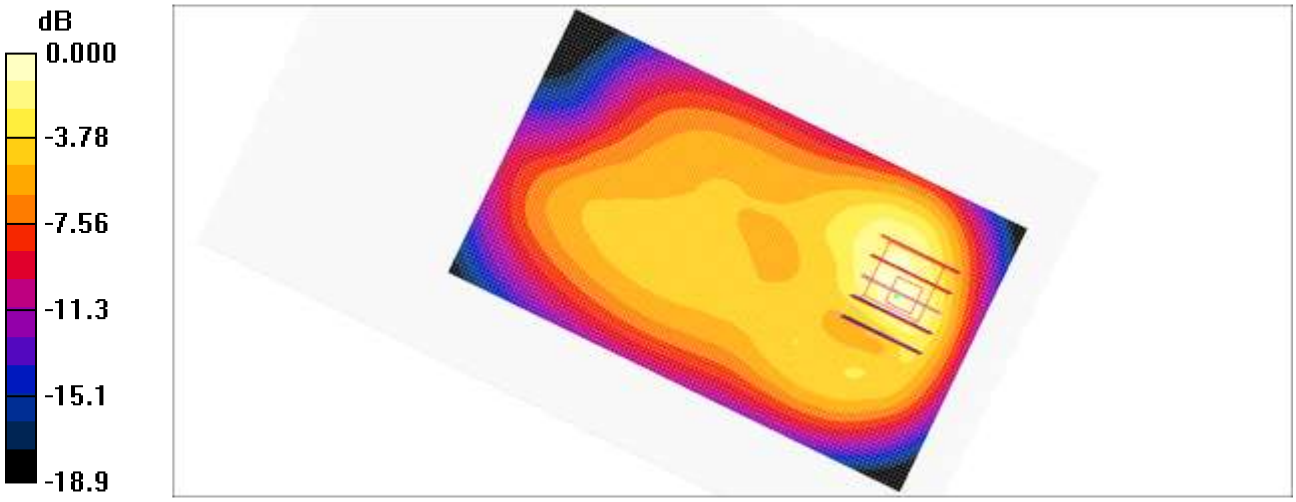
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.35, 6.35, 6.35); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850 Body Rear GPRS Body Worn 190ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.166 mW/g

GSM850 Body Rear GPRS Body Worn 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.94 V/m; Power Drift = -0.071 dB
Peak SAR (extrapolated) = 0.295 W/kg
SAR(1 g) = 0.151 mW/g; SAR(10 g) = 0.082 mW/g
Maximum value of SAR (measured) = 0.167 mW/g



0 dB = 0.167mW/g

Test Laboratory: HCT CO., LTD

EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 9

DUT: SM-A7108; Type: Bar

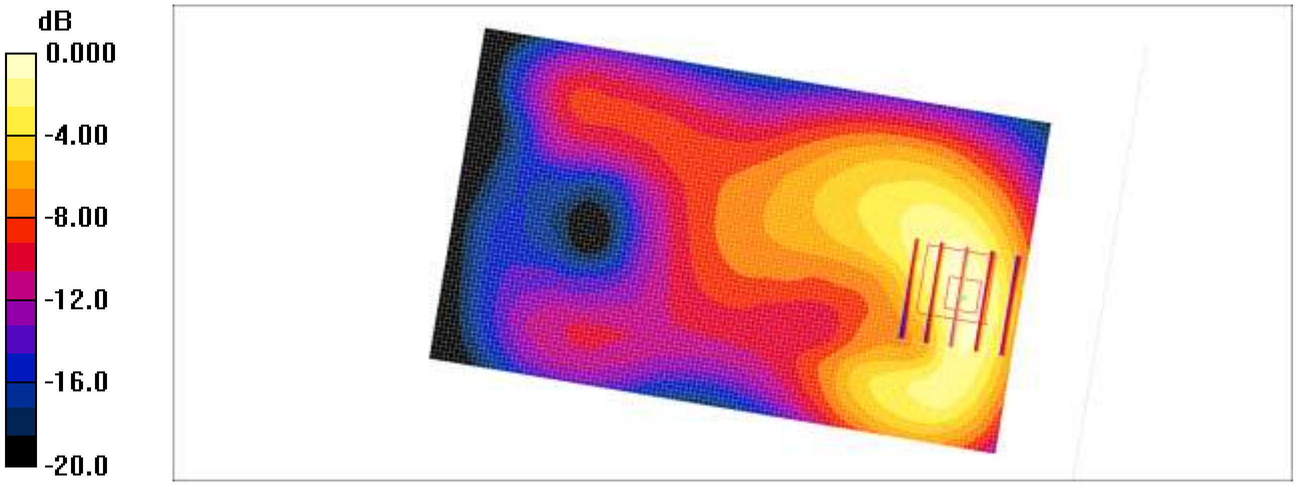
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.74, 4.74, 4.74); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

GSM1900 Body front body-worn voice 661ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.407 mW/g

GSM1900 Body front body-worn voice 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.79 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 0.589 W/kg
SAR(1 g) = 0.363 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 0.408 mW/g



0 dB = 0.408mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.1 ℃
Ambient Temperature: 20.4 ℃
Test Date: 12/16/2015
Plot No.: 10

DUT: SM-A7108; Type: bar

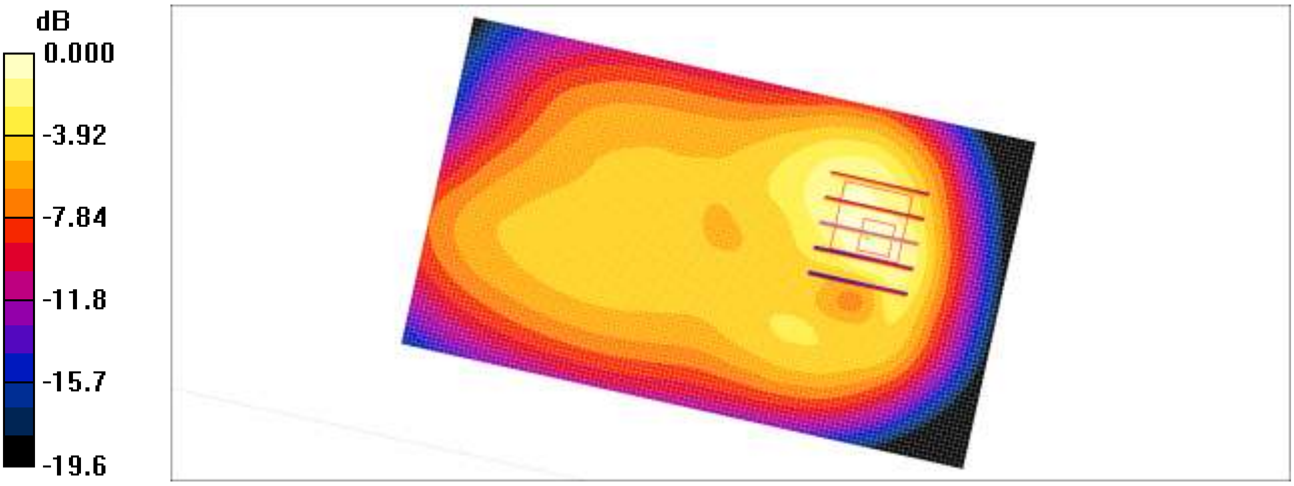
Communication System: WCDMA850; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.35, 6.35, 6.35); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA850 Body Rear 4183ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.186 mW/g

WCDMA850 Body Rear 4183ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.47 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.332 W/kg
SAR(1 g) = 0.171 mW/g; SAR(10 g) = 0.093 mW/g
Maximum value of SAR (measured) = 0.187 mW/g



0 dB = 0.187mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 11

DUT: SM-A7108; Type: Bar

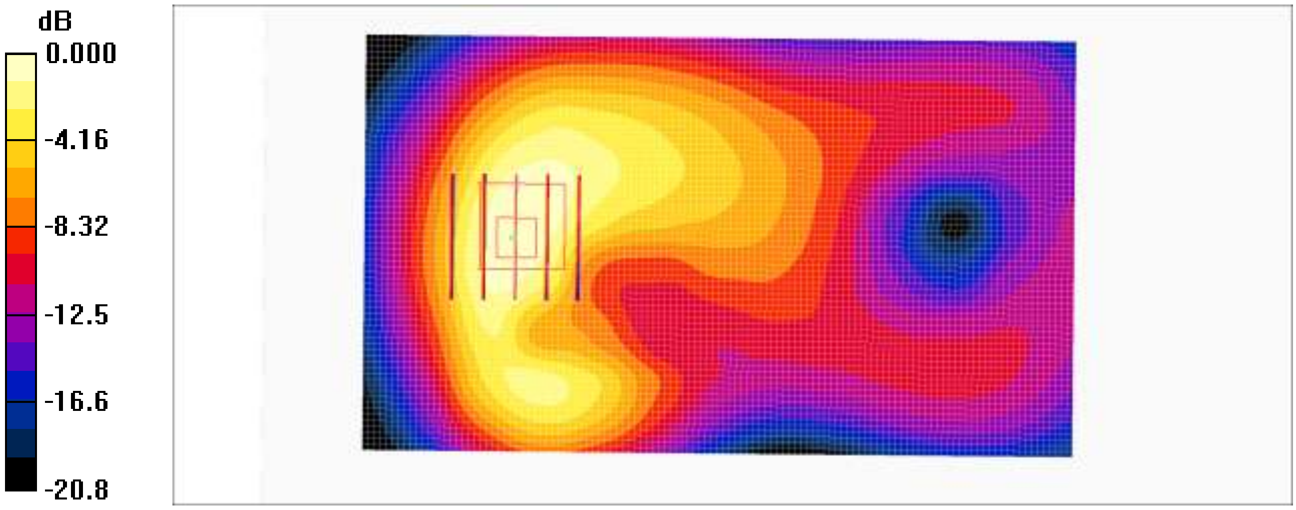
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.74, 4.74, 4.74); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA1900 Body rear 9400ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.450 mW/g

WCDMA1900 Body rear 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.65 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 0.637 W/kg
SAR(1 g) = 0.396 mW/g; SAR(10 g) = 0.227 mW/g
Maximum value of SAR (measured) = 0.438 mW/g



0 dB = 0.438mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.4 ℃
Ambient Temperature: 23.7 ℃
Test Date: 12/02/2015
Plot No.: 12

DUT: SM-A7108; Type: Bar

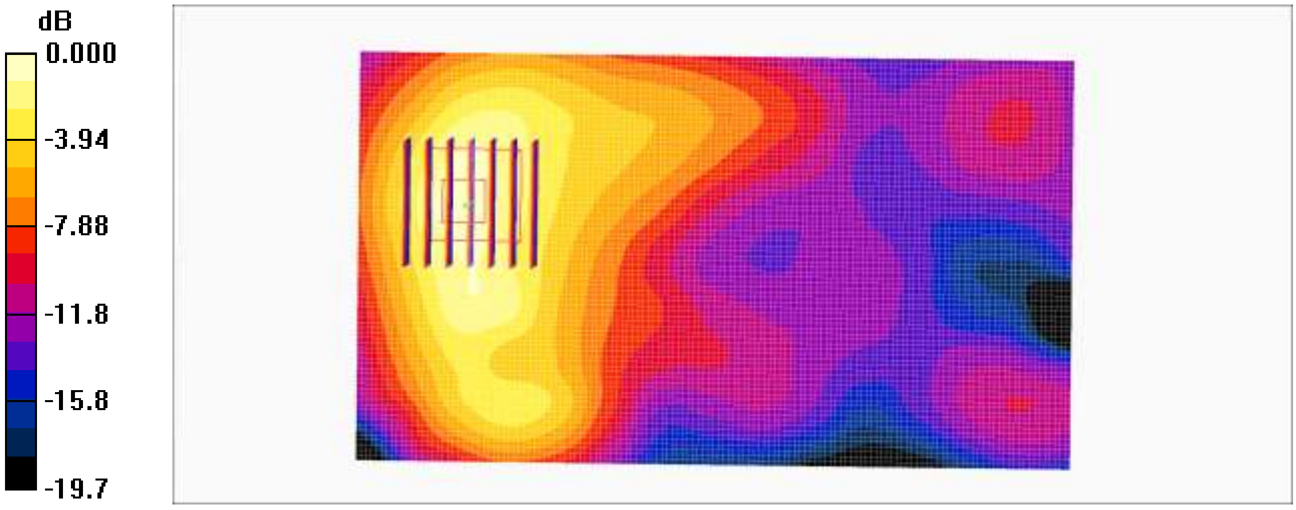
Communication System: LTE Band 41 (FCC); Frequency: 2565 MHz;Duty Cycle: 1:1.58
Medium parameters used (interpolated): f = 2565 MHz; σ = 2.13 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.22, 7.22, 7.22); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

LTE41 Body Rear QPSK 20MHz 1RB 0offset 40340ch/Area Scan (81x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.525 mW/g

LTE41 Body Rear QPSK 20MHz 1RB 0offset 40340ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.40 V/m; Power Drift = -0.160 dB
Peak SAR (extrapolated) = 0.705 W/kg
SAR(1 g) = 0.362 mW/g; SAR(10 g) = 0.189 mW/g
Maximum value of SAR (measured) = 0.525 mW/g



0 dB = 0.525mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 21.0 ℃
Ambient Temperature: 21.4 ℃
Test Date: 12/10/2015
Plot No.: 13

DUT: SM-A700F/D; Type: Bar

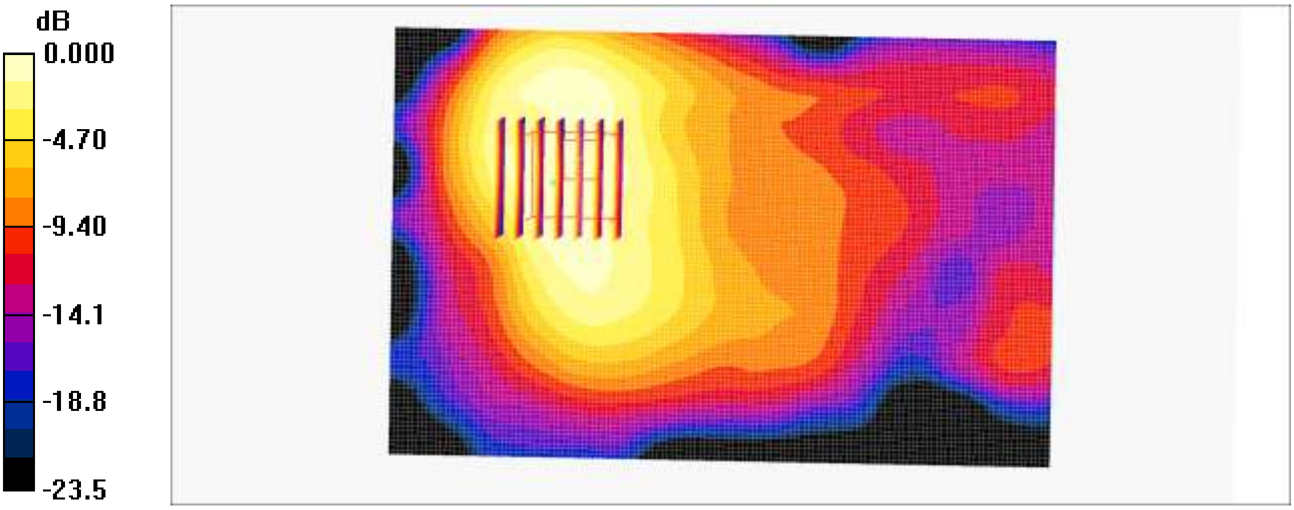
Communication System: 2450MHz FCC; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.94 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.16, 7.16, 7.16); Calibrated: 2015-09-01
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b Body Rear 1Mbps 6ch/Area Scan (91x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.156 mW/g

802.11b Body Rear 1Mbps 6ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.14 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 0.203 W/kg
SAR(1 g) = 0.114 mW/g; SAR(10 g) = 0.065 mW/g
Maximum value of SAR (measured) = 0.158 mW/g



0 dB = 0.158mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.7 ℃
Ambient Temperature: 21.0 ℃
Test Date: 12/11/2015
Plot No.: 14

DUT: SM-A710F/D; Type: Bar

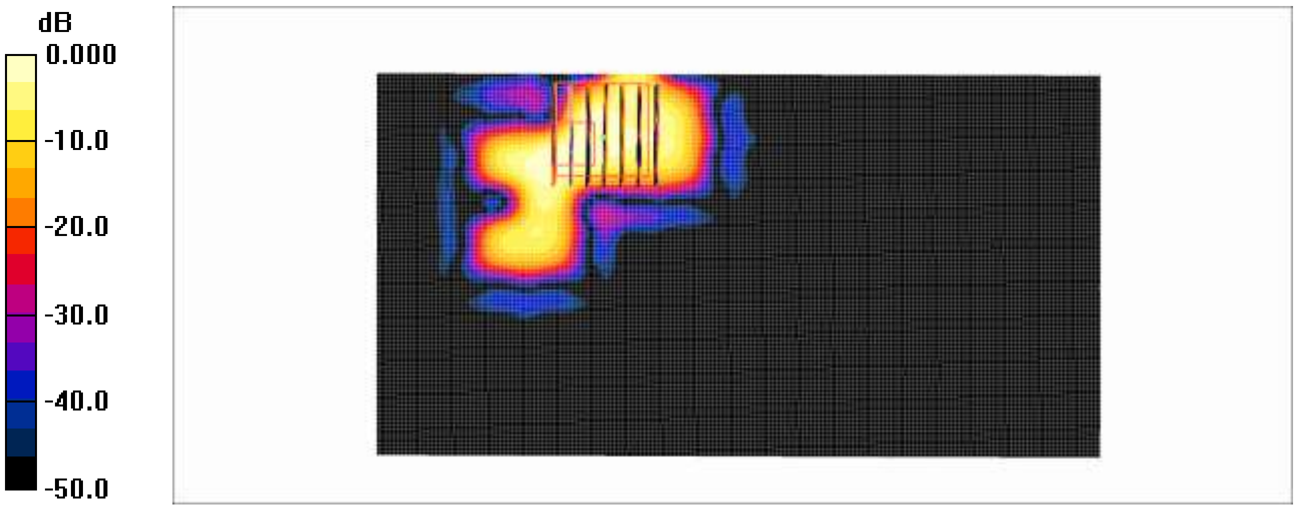
Communication System: WIFI 5GHz; Frequency: 5720 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5720 MHz; σ = 6.15 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.03, 4.03, 4.03); Calibrated: 2015-09-01
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a UNII-2C Body Rear 6Mbps 144ch/Area Scan (91x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.127 mW/g

802.11a UNII-2C Body Rear 6Mbps 144ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.000 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.254 W/kg
SAR(1 g) = 0.027 mW/g; SAR(10 g) = 0.00659 mW/g
Maximum value of SAR (measured) = 0.092 mW/g



0 dB = 0.092mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.1 ℃
Ambient Temperature: 20.4 ℃
Test Date: 12/16/2015
Plot No.: 15

DUT: SM-A7108; Type: bar

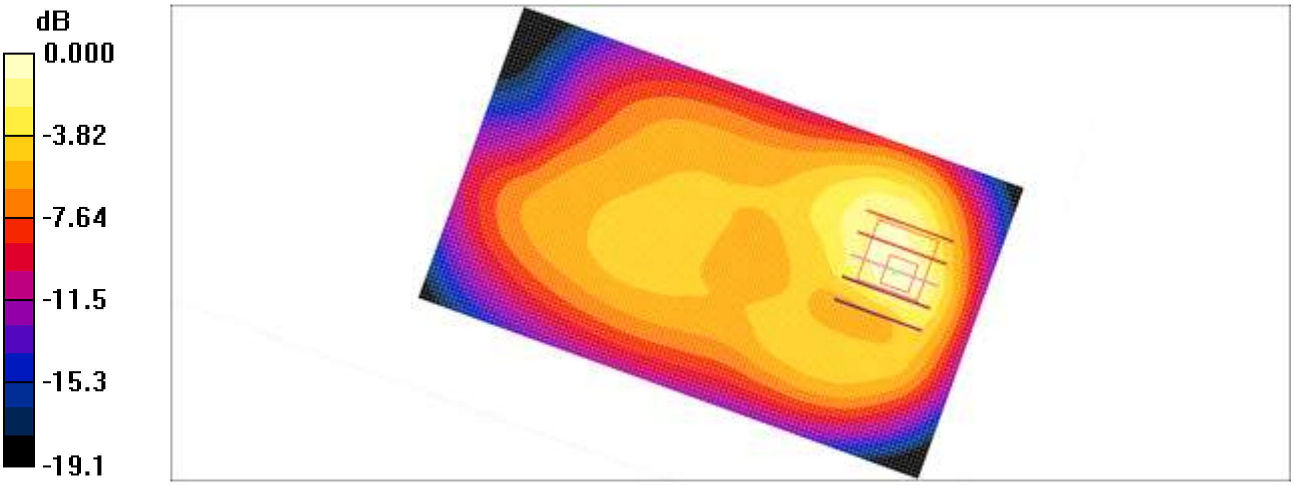
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.075
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.35, 6.35, 6.35); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

GSM850 Body Rear GPRS 4Tx 190ch/Area Scan (71x121x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.247 mW/g

GSM850 Body Rear GPRS 4Tx 190ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.16 V/m; Power Drift = 0.103 dB
Peak SAR (extrapolated) = 0.418 W/kg
SAR(1 g) = 0.218 mW/g; SAR(10 g) = 0.119 mW/g
Maximum value of SAR (measured) = 0.244 mW/g



0 dB = 0.244mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 16

DUT: SM-A7108; Type: Bar

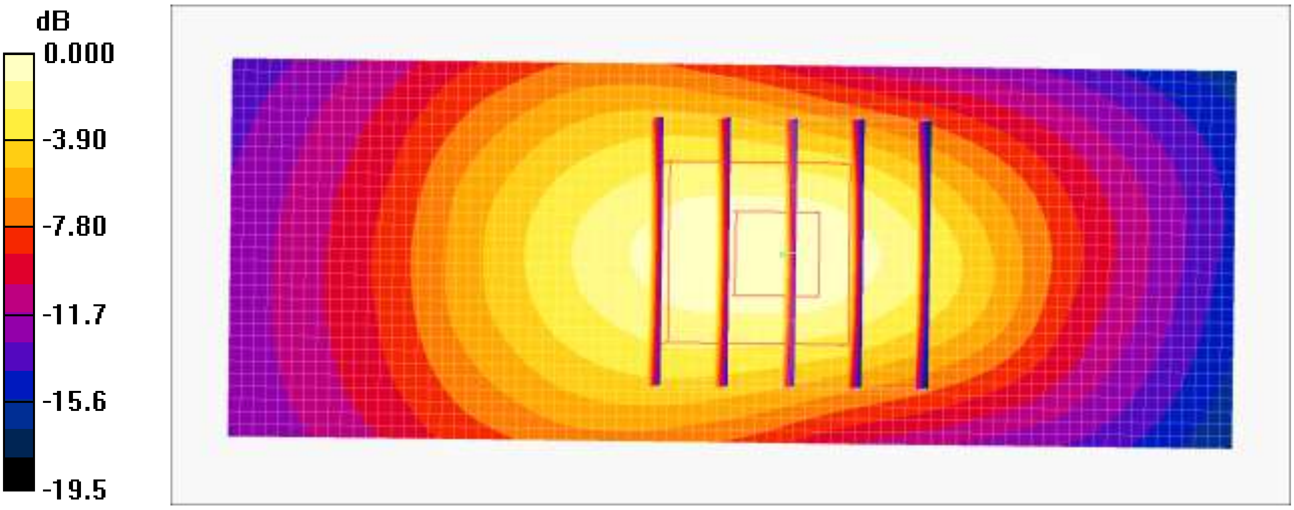
Communication System: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.075
Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.74, 4.74, 4.74); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

GSM1900 Body bottom 4Tx 661ch/Area Scan (31x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.489 mW/g

GSM1900 Body bottom 4Tx 661ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.9 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 0.681 W/kg
SAR(1 g) = 0.423 mW/g; SAR(10 g) = 0.235 mW/g
Maximum value of SAR (measured) = 0.480 mW/g



0 dB = 0.480mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.4 ℃
Ambient Temperature: 20.7 ℃
Test Date: 12/08/2015
Plot No.: 17

DUT: SM-A7108; Type: Bar

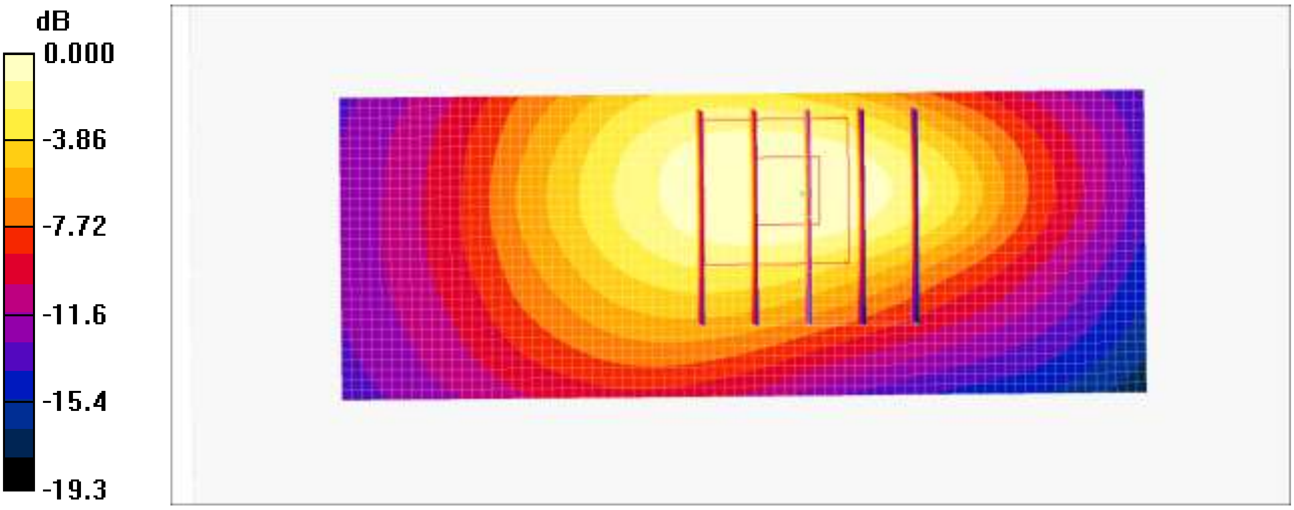
Communication System: WCDMA1900; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.52 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.74, 4.74, 4.74); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

WCDMA1900 Body bottom 9400ch/Area Scan (31x81x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.500 mW/g

WCDMA1900 Body bottom 9400ch/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 16.5 V/m; Power Drift = 0.086 dB
Peak SAR (extrapolated) = 0.683 W/kg
SAR(1 g) = 0.427 mW/g; SAR(10 g) = 0.240 mW/g
Maximum value of SAR (measured) = 0.448 mW/g



0 dB = 0.448mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.4 ℃
Ambient Temperature: 23.7 ℃
Test Date: 12/02/2015
Plot No.: 18

DUT: SM-A7108; Type: Bar

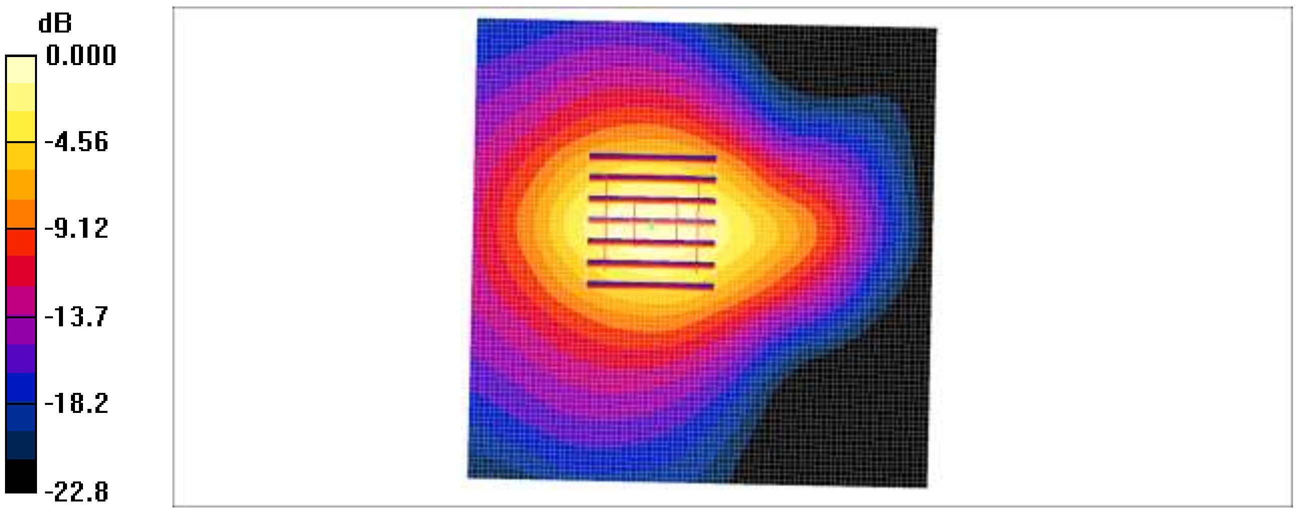
Communication System: LTE Band 41 (FCC); Frequency: 2565 MHz;Duty Cycle: 1:1.58
Medium parameters used (interpolated): f = 2565 MHz; σ = 2.13 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.22, 7.22, 7.22); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

LTE41 Body Bottom QPSK 20MHz 1RB 0offset 40340ch/Area Scan (91x91x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.39 mW/g

LTE41 Body Bottom QPSK 20MHz 1RB 0offset 40340ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = 0.049 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 0.941 mW/g; SAR(10 g) = 0.457 mW/g
Maximum value of SAR (measured) = 1.40 mW/g



0 dB = 1.40mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.7 ℃
Ambient Temperature: 21.0 ℃
Test Date: 12/11/2015
Plot No.: 19

DUT: SM-A710F/D; Type: Bar

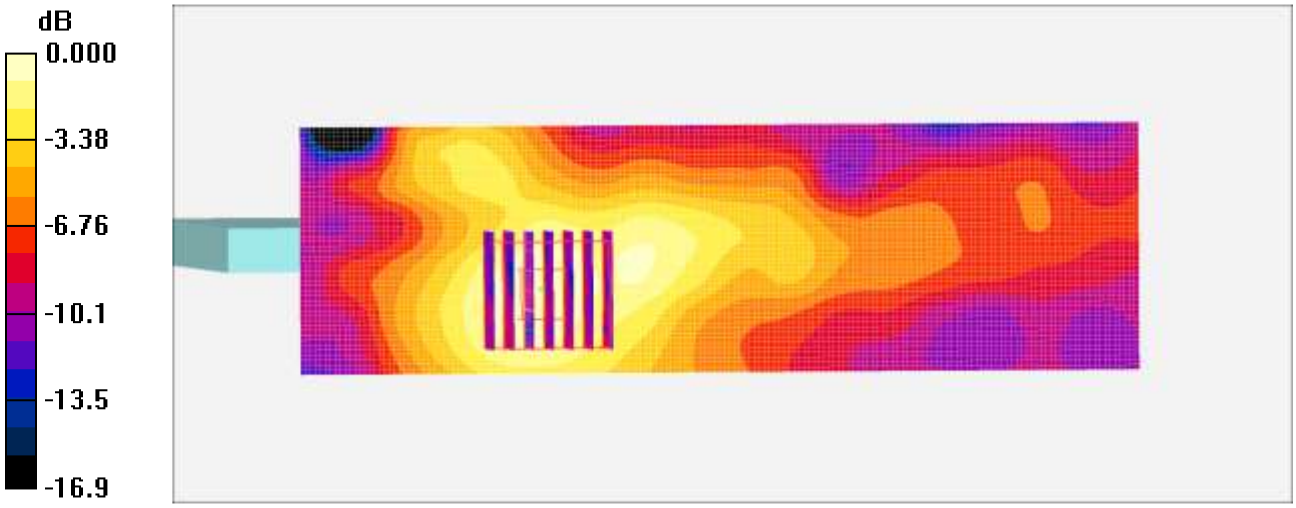
Communication System: WIFI 5GHz; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5745 MHz; σ = 6.06 mho/m; ε_r = 46; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.03, 4.03, 4.03); Calibrated: 2015-09-01
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a UNII-3 Body Left side 6Mbps 149ch/Area Scan (51x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.153 mW/g

802.11a UNII-3 Body Left side 6Mbps 149ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 4.80 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 0.267 W/kg
SAR(1 g) = 0.065 mW/g; SAR(10 g) = 0.030 mW/g
Maximum value of SAR (measured) = 0.140 mW/g



0 dB = 0.140mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 20.7 ℃
Ambient Temperature: 21.0 ℃
Test Date: 12/11/2015
Plot No.: 20

DUT: SM-A710F/D; Type: Bar

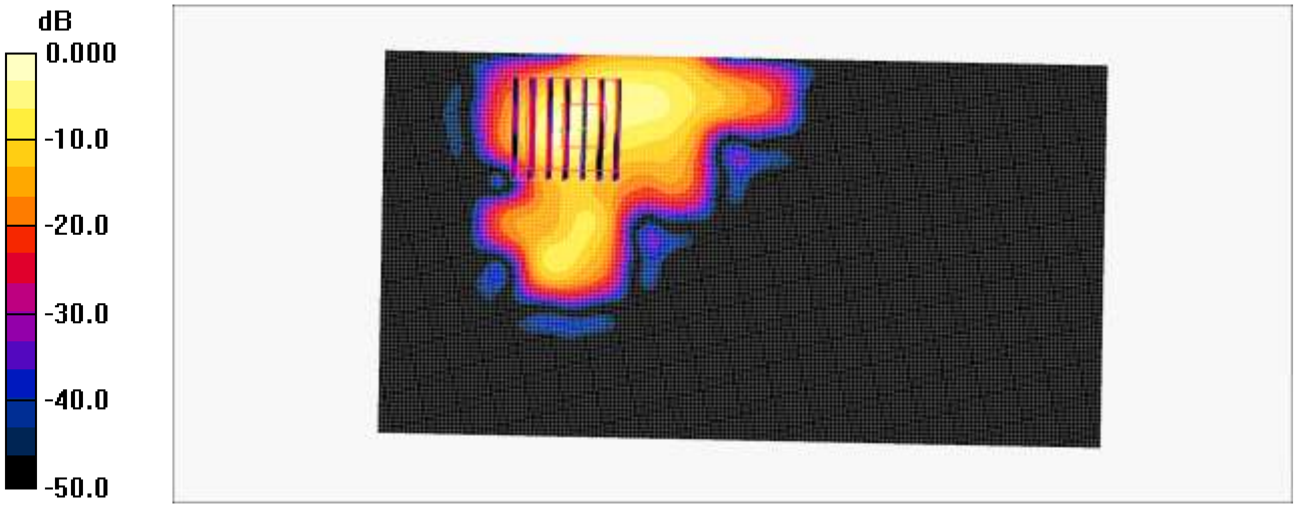
Communication System: WIFI 5GHz; Frequency: 5320 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5320 MHz; σ = 5.44 mho/m; ε_r = 47.1; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.46, 4.46, 4.46); Calibrated: 2015-09-01
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a UNII-2A Body Rear Extremity 6Mbps 64ch/Area Scan (91x171x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.60 mW/g

802.11a UNII-2A Body Rear Extremity 6Mbps 64ch/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.000 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 4.02 W/kg
SAR(1 g) = 0.629 mW/g; SAR(10 g) = 0.122 mW/g
Maximum value of SAR (measured) = 2.29 mW/g



0 dB = 2.29mW/g

Test Laboratory: HCT CO., LTD
EUT Type: Mobile Phone
Liquid Temperature: 23.4 ℃
Ambient Temperature: 23.7 ℃
Test Date: 12/02/2015
Plot No.: 21

DUT: SM-A7108; Type: Bar

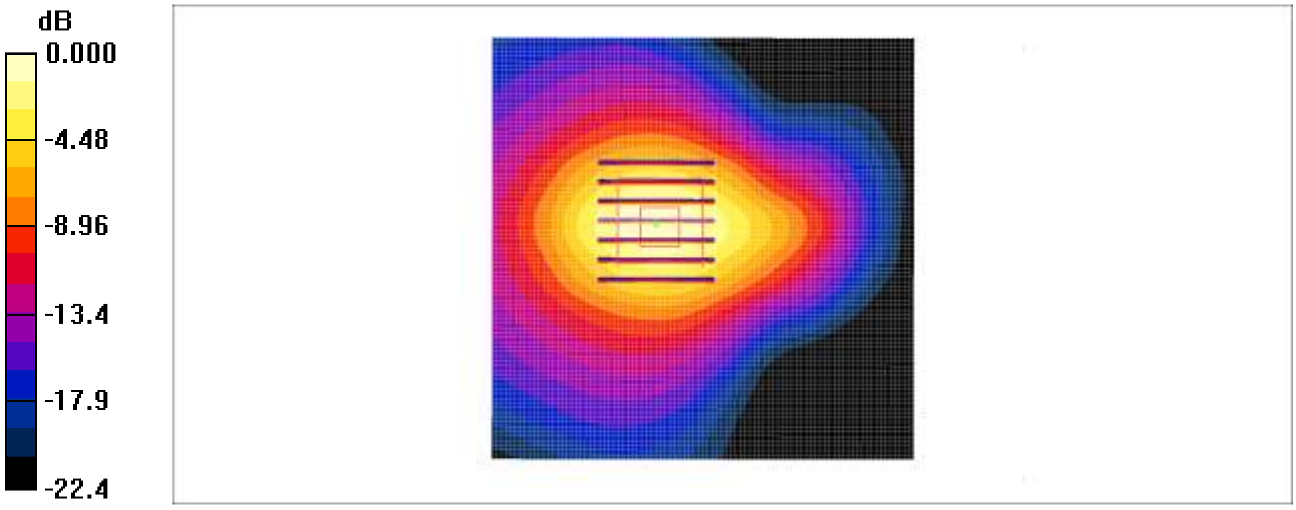
Communication System: LTE Band 41 (FCC); Frequency: 2565 MHz;Duty Cycle: 1:1.58
Medium parameters used (interpolated): f = 2565 MHz; σ = 2.13 mho/m; ε_r = 53.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.22, 7.22, 7.22); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

LTE41 Body Bottom QPSK 20MHz 1RB 0offset 40340ch Repeat/Area Scan (91x91x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.38 mW/g

LTE41 Body Bottom QPSK 20MHz 1RB 0offset 40340ch Repeat/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.3 V/m; Power Drift = 0.076 dB
Peak SAR (extrapolated) = 1.88 W/kg
SAR(1 g) = 0.933 mW/g; SAR(10 g) = 0.453 mW/g
Maximum value of SAR (measured) = 1.40 mW/g



0 dB = 1.40mW/g

Attachment 2. – Dipole Verification Plots

■ Verification Data (835 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 19.8 ℃
Test Date: 12/16/2015

DUT: Dipole 835 MHz D835V2; Type: D835V2

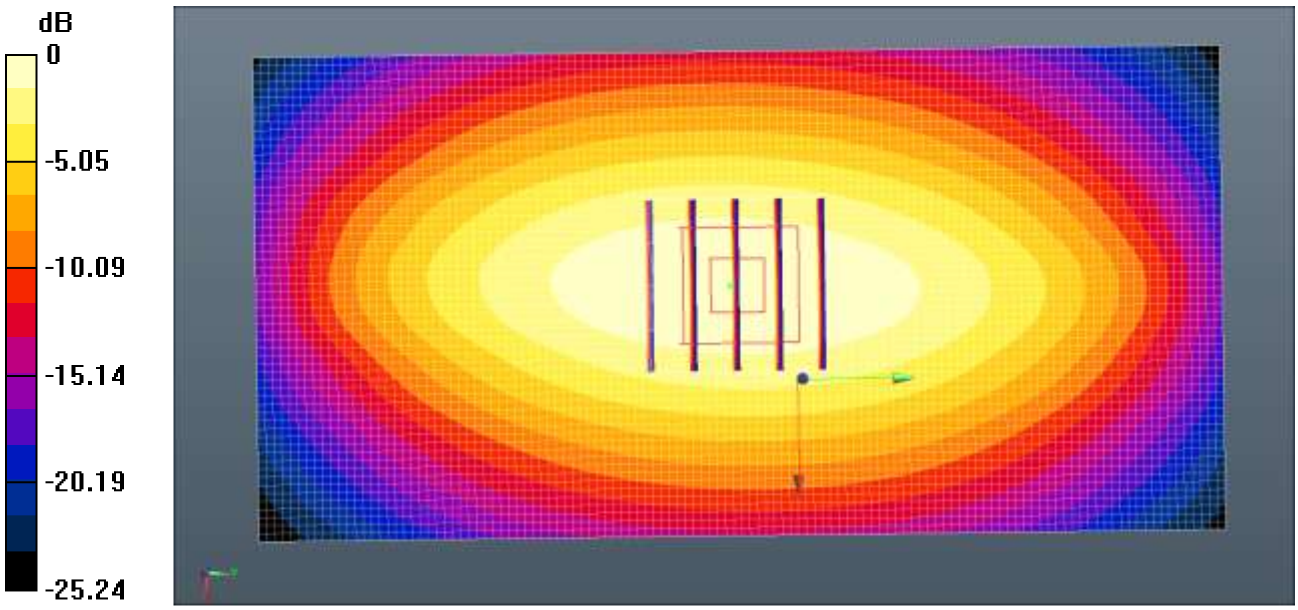
Communication System: UID 0, CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.878 S/m; ε_r = 42.209; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: ET3DV6 - SN1631; ConvF(6.37, 6.37, 6.37); Calibrated: 2015-01-28;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

835MHz SAR Verification Area Scan (61x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.968 W/kg

835MHz SAR Verification Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.54 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.29 W/kg
SAR(1 g) = 0.896 W/kg; SAR(10 g) = 0.591 W/kg
Maximum value of SAR (measured) = 0.966 W/kg



0 dB = 0.968 W/kg = -0.14 dBW/kg

■ Verification Data (835 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.1 ℃
Test Date: 12/16/2015

DUT: Dipole 835 MHz; Type: D835V2

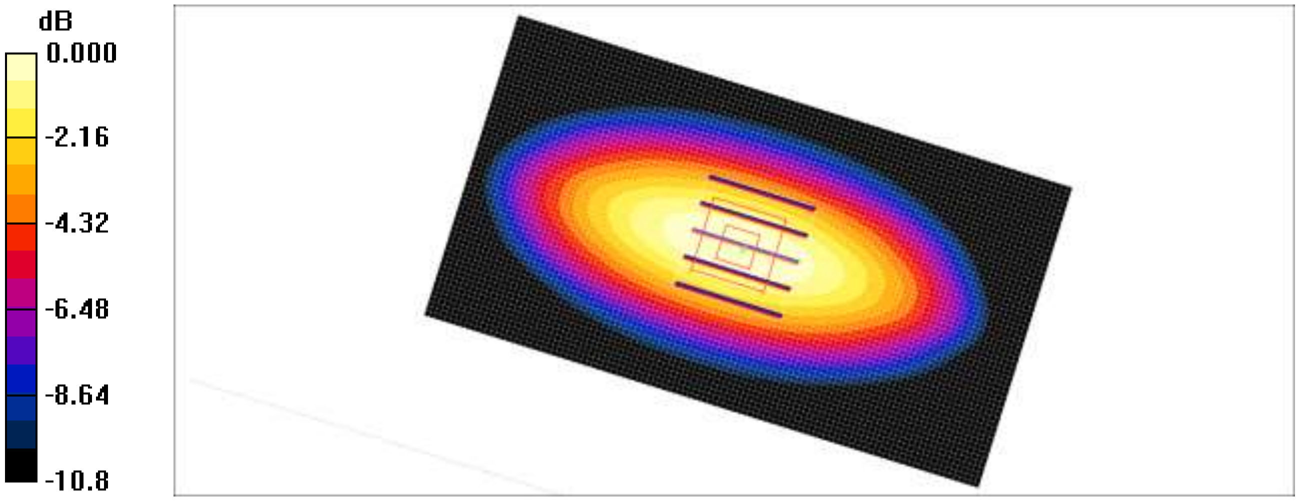
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.958 mho/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(6.35, 6.35, 6.35); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

835 MHz Body Verification/Area Scan (111x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.01 mW/g

835 MHz Body Verification/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.7 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 1.40 W/kg
SAR(1 g) = 0.937 mW/g; SAR(10 g) = 0.605 mW/g
Maximum value of SAR (measured) = 1.01 mW/g



0 dB = 1.01mW/g

■ Verification Data (1 900 MHz Head)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.4 ℃
Test Date: 12/08/2015

DUT: Dipole 1900 MHz; Type: D1900V2

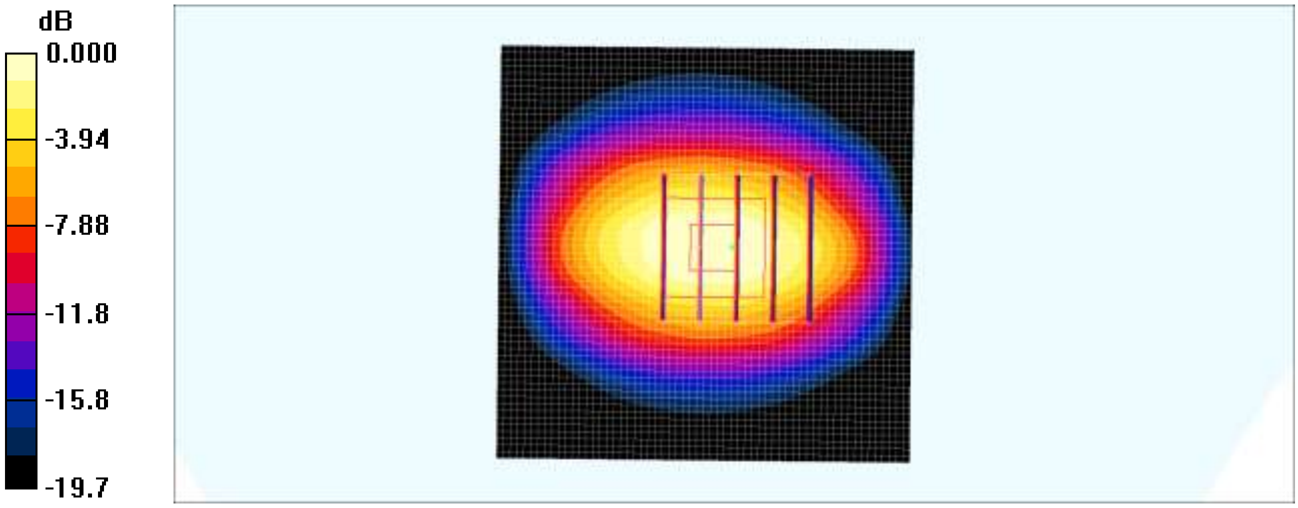
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.4 mho/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(5.18, 5.18, 5.18); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Verification 1900MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.75 mW/g

Verification 1900MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 60.6 V/m; Power Drift = 0.001 dB
Peak SAR (extrapolated) = 6.92 W/kg
SAR(1 g) = 4 mW/g; SAR(10 g) = 2.09 mW/g
Maximum value of SAR (measured) = 4.47 mW/g



0 dB = 4.47mW/g

■ Verification Data (1 900 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 20.4 ℃

Test Date: 12/08/2015

DUT: Dipole 1900 MHz; Type: D1900V2

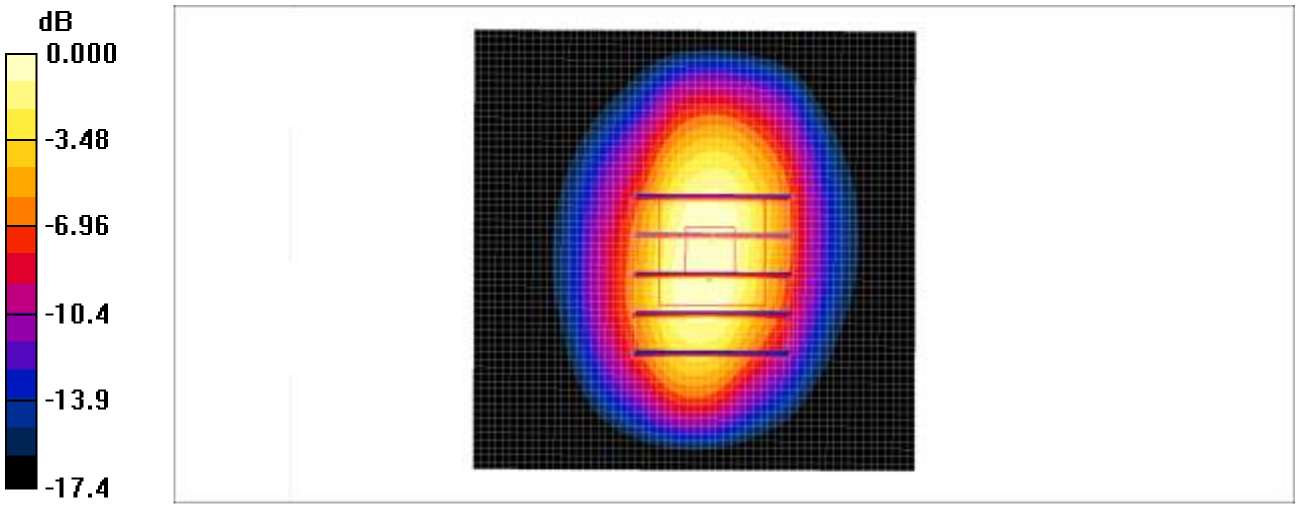
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: ET3DV6 - SN1609; ConvF(4.74, 4.74, 4.74); Calibrated: 2015-01-27
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1417; Calibrated: 2015-01-27
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Verification 1900 MHz/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 4.67 mW/g

Verification 1900 MHz/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 56.7 V/m; Power Drift = -0.008 dB
Peak SAR (extrapolated) = 6.49 W/kg
SAR(1 g) = 3.94 mW/g; SAR(10 g) = 2.14 mW/g
Maximum value of SAR (measured) = 4.41 mW/g



0 dB = 4.41mW/g

Verification Data (2 450 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.3 ℃

Test Date: 12/08/2015

DUT: Dipole 2450 MHz; Type: D2450V2

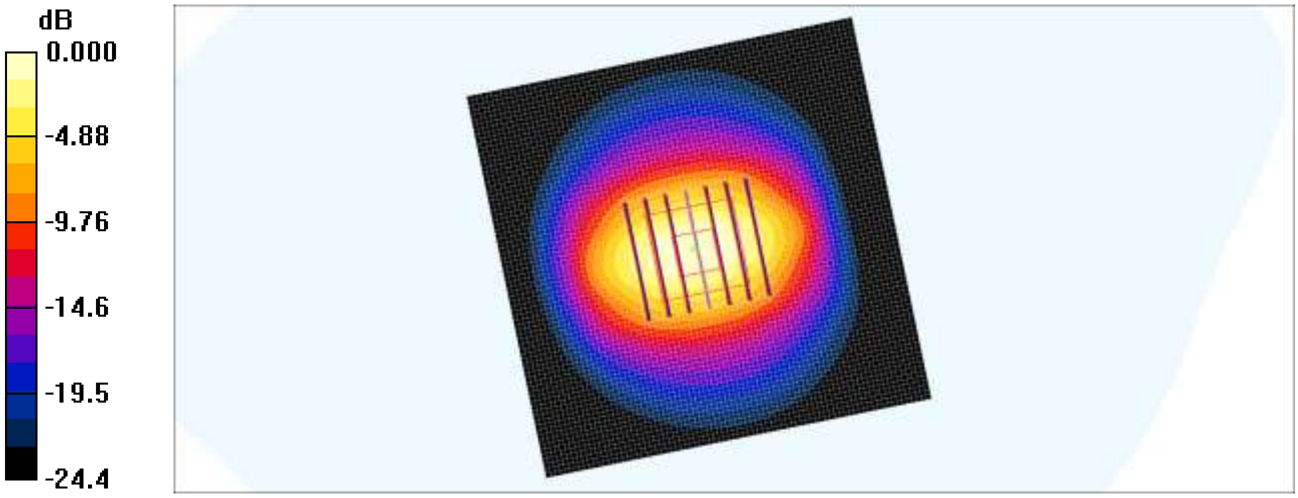
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.84 mho/m; ε_r = 38.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(6.94, 6.94, 6.94); Calibrated: 2015-09-01
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: 835/900 Phamtom ; Type: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Verification 2450MHz Head/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.77 mW/g

Verification 2450MHz Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.9 V/m; Power Drift = -0.124 dB
Peak SAR (extrapolated) = 12.3 W/kg
SAR(1 g) = 5.45 mW/g; SAR(10 g) = 2.42 mW/g
Maximum value of SAR (measured) = 8.67 mW/g



0 dB = 8.67mW/g

Verification Data (2 450 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 21.0 ℃

Test Date: 12/10/2015

DUT: Dipole 2450 MHz; Type: D2450V2

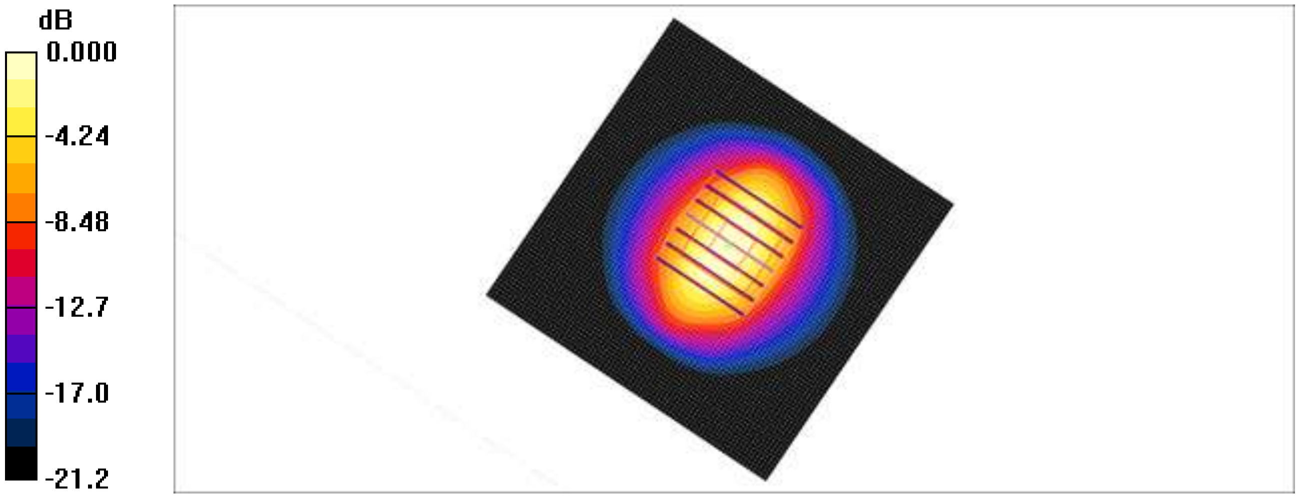
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.96 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(7.16, 7.16, 7.16); Calibrated: 2015-09-01
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

2450MHz Body Verification/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 7.85 mW/g

2450MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.8 V/m; Power Drift = -0.073 dB
Peak SAR (extrapolated) = 10.6 W/kg
SAR(1 g) = 5.25 mW/g; SAR(10 g) = 2.48 mW/g
Maximum value of SAR (measured) = 7.89 mW/g



0 dB = 7.89mW/g

Verification Data (2 600 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 20.5 ℃

Test Date: 11/27/2015

DUT: Dipole 2600 MHz; Type: D2600V2

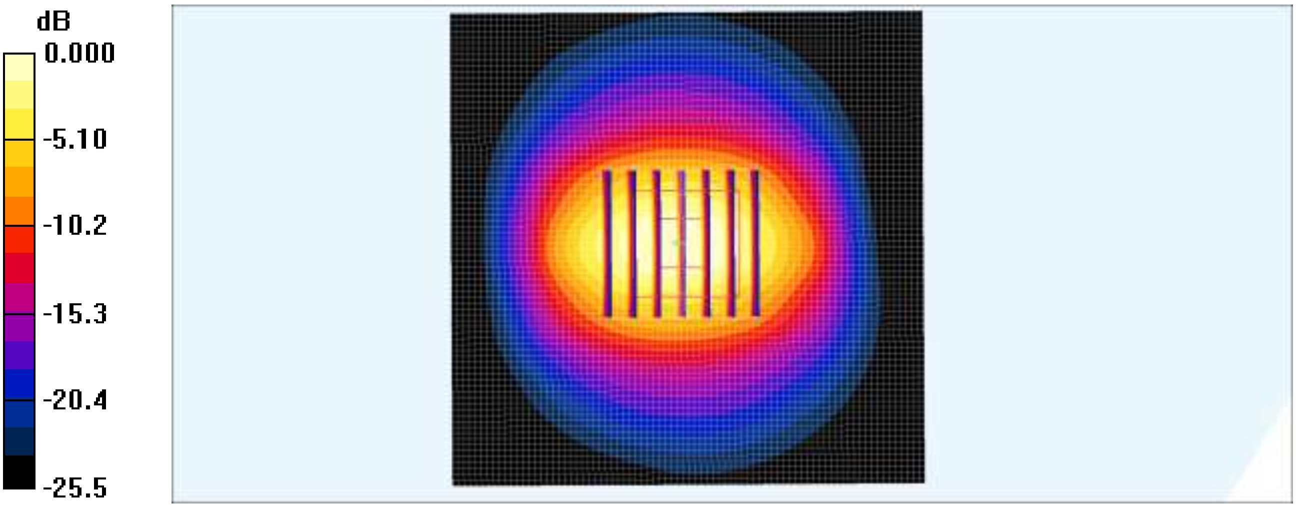
Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.03 mho/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.09, 7.09, 7.09); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: SAM
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

2600MHz Head Verification/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 9.21 mW/g

2600MHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.8 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 12.9 W/kg
SAR(1 g) = 5.74 mW/g; SAR(10 g) = 2.53 mW/g
Maximum value of SAR (measured) = 9.16 mW/g



0 dB = 9.16mW/g

Verification Data (2 600 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 23.4℃

Test Date: 12/02/2015

DUT: Dipole 2600MHz; Type: D2600V2

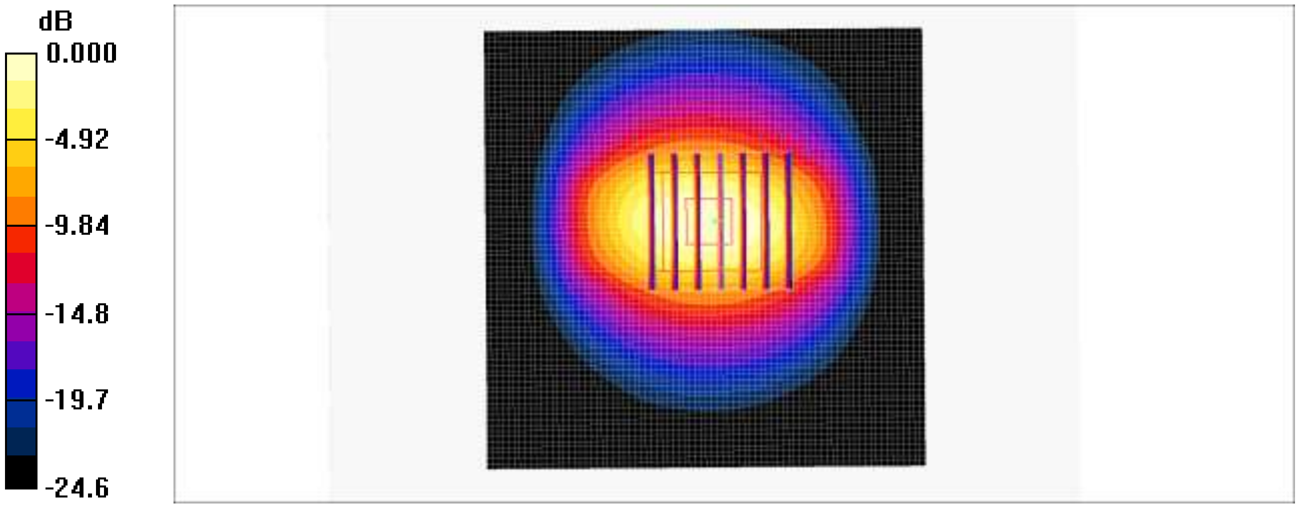
Communication System: CW; Frequency: 2600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.17 mho/m; ε_r = 53.3; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3903; ConvF(7.22, 7.22, 7.22); Calibrated: 2015-09-28
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn652; Calibrated: 2015-03-18
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

2600MHz Body Verification/Area Scan (81x81x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 8.90 mW/g

2600MHz Body Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 46.8 V/m; Power Drift = -0.050 dB
Peak SAR (extrapolated) = 12.2 W/kg
SAR(1 g) = 5.57 mW/g; SAR(10 g) = 2.49 mW/g
Maximum value of SAR (measured) = 8.71 mW/g



0 dB = 8.71mW/g

■ Verification Data (5 300 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 20.2 ℃

Test Date: 12/11/2015

DUT: Dipole D5GHzV2; Type: D5GHzV2

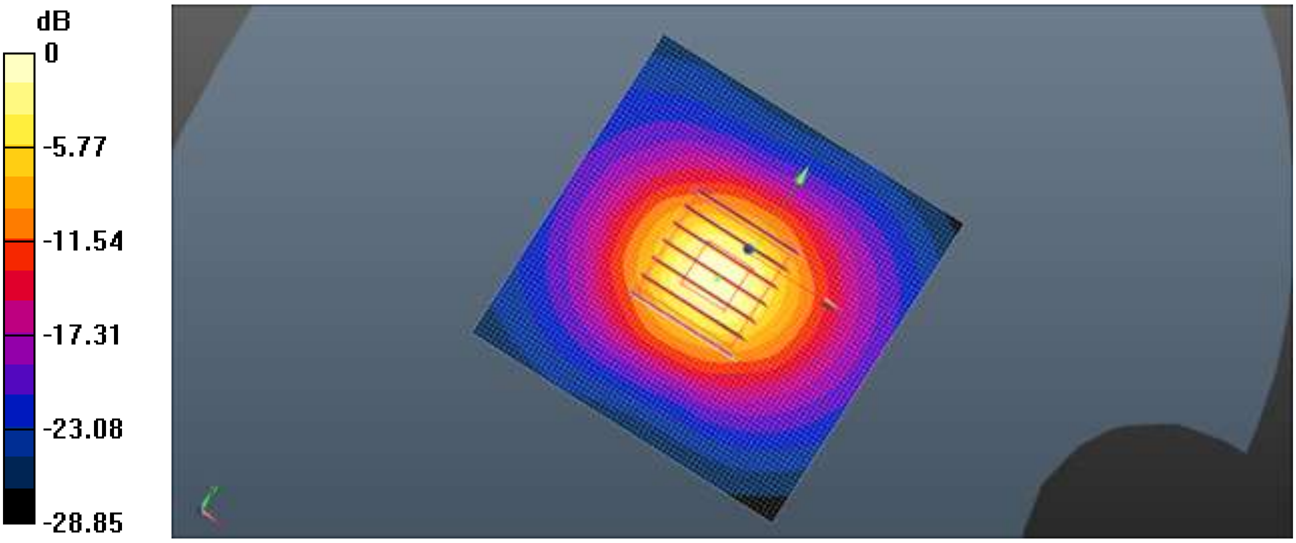
Communication System: UID 0, CW (0); Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 4.669 S/m; ε_r = 35.905; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(4.59, 4.59, 4.59); Calibrated: 2015-11-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

5.3GHz Head Verification/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.3 W/kg

5.3GHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.01 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 34.8 W/kg
SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.35 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 21.1 W/kg



0 dB = 20.3 W/kg = 13.07 dBW/kg

■ Verification Data (5 300 MHz Body)

Test Laboratory: HCT CO., LTD
Input Power 100 mW (20 dBm)
Liquid Temp: 20.7 ℃
Test Date: 12/11/2015

DUT: Dipole 5GHz; Type: D5000V2

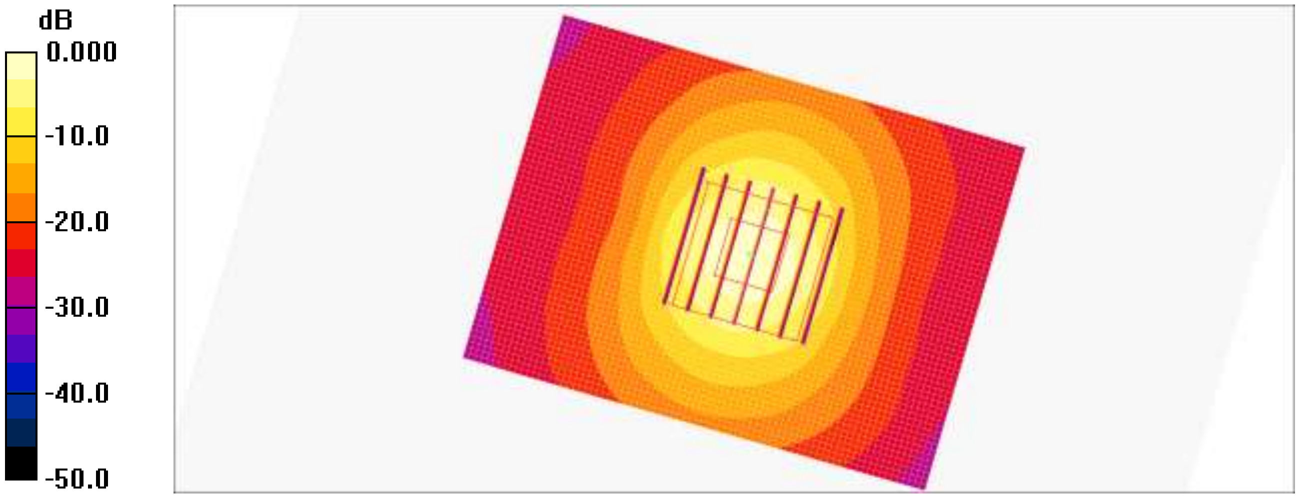
Communication System: CW; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.41 mho/m; ε_r = 47; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.46, 4.46, 4.46); Calibrated: 2015-09-01
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Verification 5300MHz Body/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 18.6 mW/g

Verification 5300MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.4 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 7.24 mW/g; SAR(10 g) = 2.06 mW/g
Maximum value of SAR (measured) = 18.5 mW/g



0 dB = 18.5mW/g

■ Verification Data (5 800 MHz Head)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 20.2 ℃

Test Date: 12/11/2015

DUT: Dipole D5GHzV2; Type: D5GHzV2

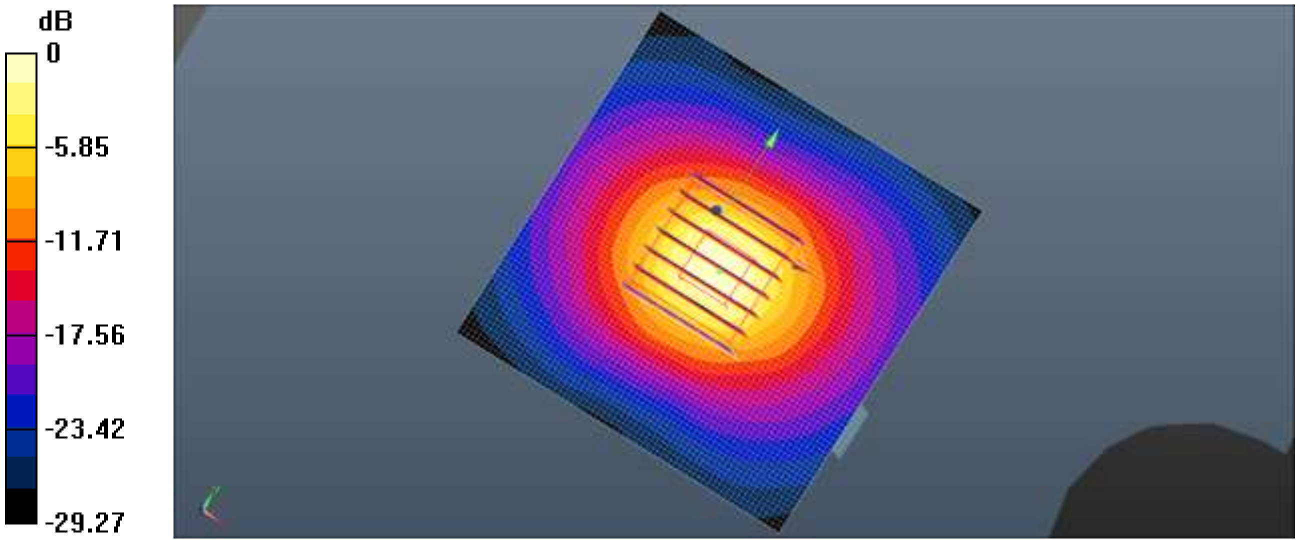
Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.292 S/m; ε_r = 34.559; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3797; ConvF(4.2, 4.2, 4.2); Calibrated: 2015-11-24;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn648; Calibrated: 2015-04-28
- Phantom: SAM
- Measurement SW: DASY52, Version 52.8 (8);

5.8GHz Head Verification/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 19.4 W/kg

5.8GHz Head Verification/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.50 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 33.1 W/kg
SAR(1 g) = 7.7 W/kg; SAR(10 g) = 2.19 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 20.2 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

■ Verification Data (5 800 MHz Body)

Test Laboratory: HCT CO., LTD

Input Power 100 mW (20 dBm)

Liquid Temp: 20.7 ℃

Test Date: 12/11/2015

DUT: Dipole 5GHz; Type: D5000V2

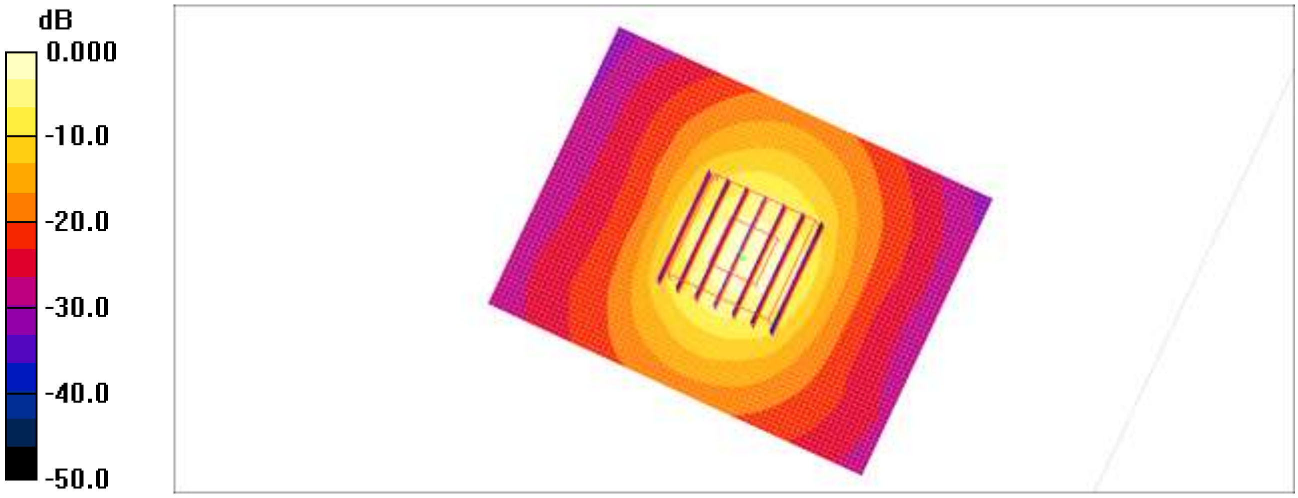
Communication System: CW; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.25 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY4 Configuration:

- Probe: EX3DV4 - SN7370; ConvF(4.03, 4.03, 4.03); Calibrated: 2015-09-01
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn869; Calibrated: 2015-10-07
- Phantom: Triple Flat Phantom
- Measurement SW: DASY4, V4.7 Build 80
- Postprocessing SW: SEMCAD, V1.8 Build 186

Verification 5800MHz Body/Area Scan (61x81x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 21.0 mW/g

Verification 5800MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 66.5 V/m; Power Drift = -0.025 dB
Peak SAR (extrapolated) = 34.8 W/kg
SAR(1 g) = 7.46 mW/g; SAR(10 g) = 2.09 mW/g
Maximum value of SAR (measured) = 19.9 mW/g



0 dB = 19.9mW/g