FCC SAR REPORT

Applicant:	Xwireless LLC
Address of Applicant:	11565 Old Georgetown Road, Rockville, MD 20852United States
Equipment Under Test (EUT)	
Product Name:	LTE smartphone
Model No.:	MUV
Trade mark	Vortex
FCC ID:	2ADLJMUV
Applicable standards:	FCC 47 CFR Part 2.1093
Date of Test:	21 Aug., 2019 ~ 29 Aug., 2019
Test Result:	Maximum Reported 1-g SAR (W/kg) Head: 0.384 Body: 1.361 Hotspot: 1.361

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*27 Sep., 2019*	*Original*

Tested by:	Huheng Cai ***Report Clerk***	***Date:***	*27 Sep., 2019*
Reviewed by:	Janet Wei ***Project Engineer***	***Date:***	*27 Sep., 2019*

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4 SAR Results Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:

<Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported 1-g SAR (W/kg)
Head	GSM 850	0.257	PCE	0.384
	GSM 1900	0.074		
	WCDMA Band V	0.203		
	WCDMA Band IV	0.196		
	WCDMA Band II	0.139		
	LTE Band 12	0.168		
	LTE Band 25	0.035		
	LTE Band 26	0.154		
	LTE Band 66	0.053		
	LTE Band 71	0.081		
	LTE Band 41	0.045		
	WLAN 2.4 GHz	0.384	DTS	
Body (10 mm Gap)	GSM 850	0.346	PCE	1.361
	GSM 1900	0.641		
	WCDMA Band V	0.365		
	WCDMA Band IV	1.111		
	WCDMA Band II	1.361		
	LTE Band 12	0.359		
	LTE Band 25	0.270		
	LTE Band 26	0.285		
	LTE Band 66	0.224		
	LTE Band 71	0.184		
	LTE Band 41	0.180		
	WLAN 2.4GHz	0.123	DTS	
Hotspot (10 mm Gap)	GSM 850	0.481	PCE	1.361
	GSM 1900	1.134		
	WCDMA Band V	0.365		
	WCDMA Band IV	1.111		
	WCDMA Band II	1.361		
	LTE Band 12	0.359		
	LTE Band 25	0.270		
	LTE Band 26	0.285		
	LTE Band 66	0.224		
	LTE Band 71	0.184		
	LTE Band 41	0.180		
	WLAN 2.4 GHz	0.123	DTS	

<Highest Reported simultaneous SAR Summary>

Exposure Position	Frequency Band	Reported 1-g SAR (W/kg)	Equipment Class	Highest Reported Simultaneous Transmission

				1-g SAR (W/kg)
Back	WCDMA Band II	1.361	PCE	1.484
	WLAN 2.4 GHz	0.123	DTS	

Note:

1. The highest simultaneous transmission is scalar summation of Reported standalone SAR per FCC KDB 690783 D01 v01r03, and scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.
2. This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2005, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.
3. For FDD-LTE Band 2 is full covered by FDD-LTE Band 25, so only FDD-LTE Band 25 was tested.
4. For FDD-LTE Band 4 is full covered by FDD-LTE Band 66, so only FDD-LTE Band 66 was tested.
5. For FDD-LTE Band 5 is full covered by FDD-LTE Band 26, so only FDD-LTE Band 26 was tested.

5 General Information

5.1 Client Information

Applicant:	Xwireless LLC
Address of Applicant:	11565 Old Georgetown Road, Rockville, MD 20852United States
Manufacturer:	Xwireless LLC
Address of Manufacturer:	11565 Old Georgetown Road, Rockville, MD 20852United States

5.2 General Description of EUT

Product Name:	LTE smartphone
Model No.:	MUV
Category of device	Portable device
Operation Frequency:	GSM850: 824.2 ~ 848.8 MHz PCS 1900: 1850.2 ~ 1909.8 MHz WCDMA Band V: 826.4 ~ 846.6 MHz WCDMA Band IV: 1712.4 ~ 1752.6 MHz WCDMA Band II: 1852.4 ~ 1907.6 MHz FDD LTE Band 25 : 1850MHz-1915MHz FDD LTE Band 2 :1850MHz~1910MHz FDD LTE Band 4 :1710MHz~1755MHz FDD LTE Band 5 :824MHz~849MHz FDD LTE Band 26 :814MHz~849MHz FDD LTE Band 12: 698MHz~716MHz FDD LTE Band 66: 1710MHz-1780MHz FDD LTE Band 71: 663MHz-698MHz TDD LTE Band 41: 2555MHz~2655MHz Bluetooth: 2402 MHz ~ 2480 MHz Wi-Fi: 802.11b/g/n-HT20: 2412MHz ~ 2462 MHz 802.11n-HT40 :2422MHz~2452MHz
Modulation technology:	GSM/GPRS:GMSK, EGPRS: 8PSK, WCDMA/HSDPA/HSUPA: BPSK/QPSK LTE:QPSK/16QAM Bluetooth: GFSK/π/4DQPSK/8DPSK Wi-Fi: 802.11b: DSSS, 802.11g/n: OFDM
Antenna Type:	Internal Antenna
Antenna Gain:	GSM 850: 2.2 dBi; PCS 1900: 2.2dBi WCDMA Band V: 2.7 dBi; WCDMA Band II: 2.1 dBi WCDMA Band IV: 2.8 dBi LTE Band 2: 3.1dBi; LTE Band 4: 2.9dBi; LTE Band 5: 2.2dBi; LTE Band 12: 2.5dBi; LTE Band 25: 2.2dBi; LTE Band 26: 2.3dBi; LTE Band 41: 2.2dBi; LTE Band 66: 2.5dBi; LTE Band 71: 1.89dBi Wi-Fi: -0.38 dBi; Bluetooth: -0.38 dBi
(E)GPRS Class:	(E)GPRS Class: 12
Dimensions (L*W*H):	145 mm (L)× 72 mm (W)× 10 mm (H)

<table>
<tr><td rowspan="2">Accessories information:</td><td rowspan="2">Adapter:
Model: MUV
Input: AC100-240V, 50/60Hz, 0.2A
Output: DC 5.0V, 800mA</td><td>Battery:
Rechargeable Li-ion Battery 3.7V/2000mAh</td></tr>
<tr><td>Headset:
Support headset</td></tr>
</table>

5.3 Maximum RF Output Power

Mode	Average Power (dBm)	
	GSM 850	GSM 1900
GSM (Voice)	32.55	30.99
GPRS (1 TX Slot)	32.53	30.98
GPRS (2 TX Slots)	31.80	30.22
GPRS (3 TX Slots)	30.13	28.37
GPRS (4 TX Slots)	28.93	27.42
EGPRS (1 TX Slot)	27.15	28.04
EGPRS (2 TX Slots)	26.15	26.51
EGPRS (3 TX Slots)	24.44	24.74
EGPRS (4 TX Slots)	23.28	23.63

Mode	Average Power (dBm)		
	WCDMA Band V	WCDMA Band IV	WCDMA Band II
AMR 12.2 kbps	22.91	23.30	23.92
RMC 12.2 kbps	23.00	23.38	23.97
HSDPA Sub-test 1	22.18	22.43	23.09
HSDPA Sub-test 2	21.61	22.01	22.73
HSDPA Sub-test 3	20.07	20.59	21.14
HSDPA Sub-test 4	20.10	20.48	21.13
HSUPA Sub-test 1	21.52	21.91	22.62
HSUPA Sub-test 2	21.99	22.34	23.07
HSUPA Sub-test 3	19.62	20.05	20.78
HSUPA Sub-test 4	22.08	22.44	23.10
HSUPA Sub-test 5	20.53	20.98	21.72

Mode	Average Power (dBm)					
	LTE Band 12	LTE Band 25	LTE Band 26	LTE Band 66	LTE Band 71	LTE Band 41
BW/1.4 MHz	22.98	23.00	22.74	22.92	/	/
BW/3.0 MHz	22.62	22.89	22.70	22.83	/	/
BW/5.0 MHz	22.62	22.92	22.63	22.84	22.85	23.73
BW/10 MHz	22.78	22.95	22.67	22.99	22.92	23.80
BW/15 MHz	/	22.93	23.05	22.86	22.91	23.64
BW/20 MHz	/	23.06	/	23.03	22.82	23.73

WLAN 2.4 GHz Band Average Power (dBm)				
Mode/Band	b	g	n (HT-20)	n (HT-40)
WLAN 2.4GHz	15.13	14.14	13.09	11.28

Bluetooth Average Power (dBm)				
Mode/Band	1 Mbps(GFSK)	2 Mbps(π/4DQPSK)	3 Mbps (8DPSK)	LE (BT 4.0)
Bluetooth 2.4 GHz	1.40	0.90	1.39	2.18

5.4 Environment of Test Site

Temperature:	18°C ~25 °C
Humidity:	35%~75% RH
Atmospheric Pressure:	1010 mbar

5.5 Test Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd. Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755-23118282, Fax: +86-755-23116366 E-mail: info@ccis-cb.com

6 Introduction

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = C\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$SAR = \frac{\sigma \cdot E^2}{\rho}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

7 RF Exposure Limits

7.1 Uncontrolled Environment

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

7.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. 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.

7.3 RF Exposure Limits

SAR Human Exposure Specified in ANSI/IEEE C95.1-1992 and Health Canada Safety Code 6

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

Note:

1. The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2. The Spatial Average value of the SAR averaged over the whole body.
3. The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

8 SAR Measurement System

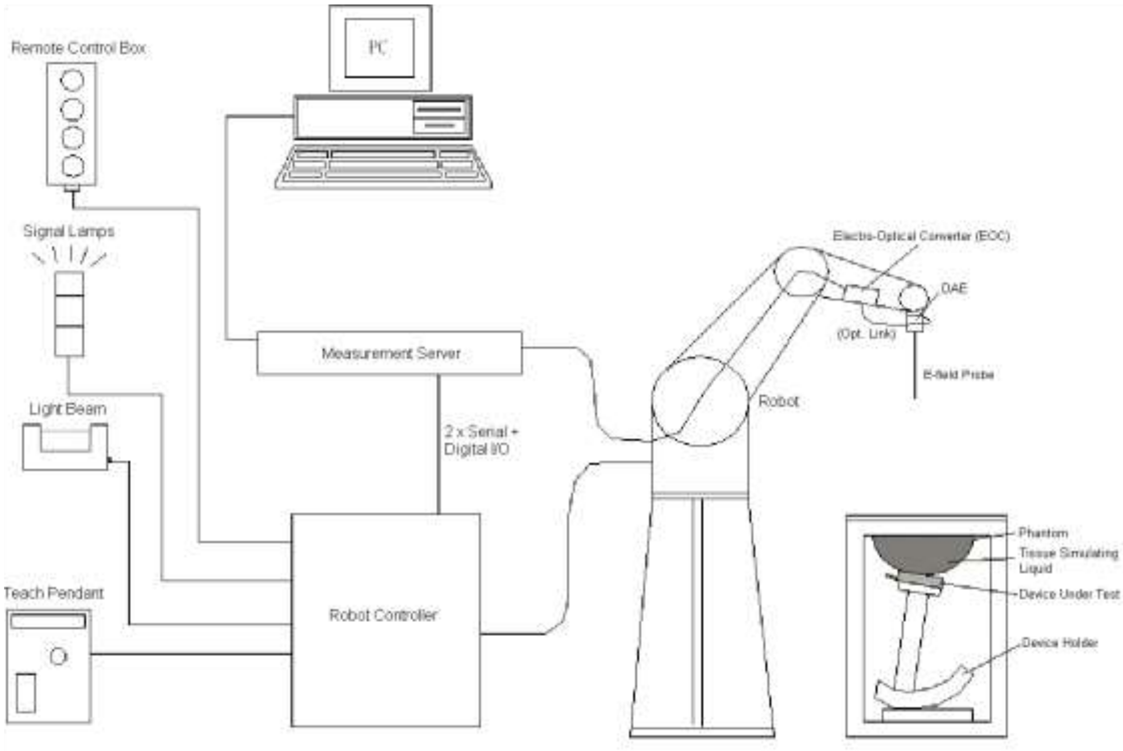


Fig. 8.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Component details are described in the following sub-sections.

8.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG). The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

- **E-Field Probe Specification**
  <EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency Directivity	10 MHz to 6 GHz; Linearity: ± 0.2 dB ± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 330 mm (Tip: 20mm) Tip diameter: 2.5 mm (Body: 12mm) Typical distance from probe tip to dipole centers: 1 mm

Fig. 8.2 Photo of E-Field Probe

- **E-Field Probe Calibration**
  Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (Norm X, Norm Y and Norm Z), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix E of this report.

8.2 Data Acquisition Electronics (DAE)

The Data acquisition electronics (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 measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock. The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig. 8.3 Photo of DAE

8.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX60XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

- High precision (repeatability 0.02 mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

Fig. 8.4 Photo of Robot

8.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY 5: 400MHz, Intel Celeron), chip-disk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.
The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

Fig. 8.5 Photo of Server for DASY5

8.5 Light Beam Unit

The light beam switch allows automatic "tooling" of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.
The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned probe, the same position will be reached with another aligned probe within 0.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position.

Fig. 8.6 Photo of Light Beam

8.6 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume Dimensions	Approx. 25 liters Length: 1000mm; Width: 500mm; Height: adjustable feet
Measurement Areas	Left Head, Right Head, Flat phantom

Fig. 8.7 Photo of SAM Twin Phantom

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

<ELI4 Phantom >

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI4 is fully compatible with the latest draft of the standard IEC 62209-2 and all known tissue simulating liquids.

ELI4 has been optimized regarding its performance and can be integrated into a SPEAG standard phantom table. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points

The phantom can be used with the following tissue simulating liquids:

- Water-sugar based liquids can be left permanently in the phantom. Always cover the liquid if the system is not in use; otherwise the parameters will change due to water evaporation.
- DGBE based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom and the phantom should be dried when the system is not in use (desirable at least once a week).
- Do not use other organic solvents without previously testing the phantom resistiveness.

Fig.8.8 Photo of ELI4 Phantom

8.7 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP).

Thus the device needs no repositioning when changing the angles.

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

Fig. 8.9 Photo of Device Holder

8.8 Data storage and Evaluation

- **Data Storage**

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verifications of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

- **Data Evaluation**

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software:

Probe Parameters:	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion	$ConvF_i$
	- Diode compression point	dcp_i
Device Parameters:	- Frequency	f
	- Crest	cf
Media Parameters:	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as:

$$V_i = U_i + U_i^2 \cdot \frac{cf}{dcp_i}$$

With V_i = compensated signal of channel i, (i = x, y, z)
U_i = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp^i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated:

E- Field Probes: $E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$

H-Field Probes: $H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$

With V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = senor sensitivity of channel i, (i = x, y, z), μV/ (V/m) ^{2}
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency (GHz)
E_i = electric field strength of channel i in V/m
Hi = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude):

$$E_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

The primary field data are used to calculate the derived field units.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1000}$$

With SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in (mho/m) or (Siemens/m)
ρ = equipment tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

8.9 Test Equipment List

Manufacturer	Equipment Description	Model	S/N	Cal. Information	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1118	06.08.2017	06.07.2020
SPEAG	835MHz System Validation Kit	D835V2	4d154	06.11.2019	06.10.2022
MVG	COMOSAR 1800 MHz REFERENCE DIPOLE	SID1800	SN 09/15 DIP 1G800-360	02.28.2018	02.27.2021
SPEAG	1900MHz System Validation Kit	D1900V2	5d175	06.11.2019	06.10.2022
SPEAG	2450MHz System Validation Kit	D2450V2	910	06.10.2019	06.09.2022
SPEAG	2600MHz System Validation Kit	D2600V2	1114	11.05.2018	11.04.2021
SPEAG	Data Acquisition Electronics	DAE4	1373	08.09.2019	08.08.2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	3748	06.19.2019	06.18.2020
SPEAG	DASY 52 Measurement Software	DASY 52	Version: 52.8.8.1222	N.C.R	N.C.R
SPEAG	DASY 52 File Conversion Software	SEMCAD X	Version: 14.6.10 (7331)	N.C.R	N.C.R
SPEAG	Phantom	Twin Phantom	1765	N.C.R	N.C.R
SPEAG	Phantom	ELI V5.0	1208	N.C.R	N.C.R
SPEAG	Phone Positioner	N/A	N/A	N.C.R	N.C.R
Stäubli	Robot	TX60L	F13/5P6VB1/A/01	N.C.R	N.C.R
Anritsu	Universal Radio Communication Analyzer	MT8820C	6201060814	03.18.2019	03.17.2020
R&S	Universal Radio Communication Tester	CMU200	113097	03.18.2019	03.17.2020
HP	Network Analyzer	8753D	3410A06291	07.22.2019	07.21.2020
Agilent	Spectrum Analyzer	ESRP7	101070	03.18.2019	03.17.2020
R&S	Spectrum Analyzer	FSP30	101454	03.18.2019	03.17.2020
R&S	Signal Generator	N5182A	MY49060014	11.07.2018	11.06.2019
Huber Suhner	RF Cable	SUCOFLEX	12341	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	17268	See Note 3	
Huber Suhner	RF Cable	SUCOFLEX	2080	See Note 3	
Weinschel	Attenuator	23-3-34	BL5513	See Note 3	
Anritsu	Directional Coupler	MP654A	100217491	See Note 3	
SPEAG	Dielectric Assessment Kit	3.5 Probe	1119	See Note 4	
SPEAG	DAK Measurement Software	DAK	Version: DAK 3.5	N.C.R	
Mini-circuits	Low Noise Amplifier	Power amplifier	LNA-00500200-2515	See Note 5	

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
4. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Speag.
5. In system check we need to monitor the level on the spectrum analyzer, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1 W input power according to the ratio of 1 W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the spectrum analyzer is critical and we do have calibration for it
6. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
7. N.C.R means No Calibration Requirement.

9 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 9.1, for body SAR testing, the liquid height from the center of the flat phantom to liquid top surface is larger than 15 cm, which is shown in Fig. 9.2.

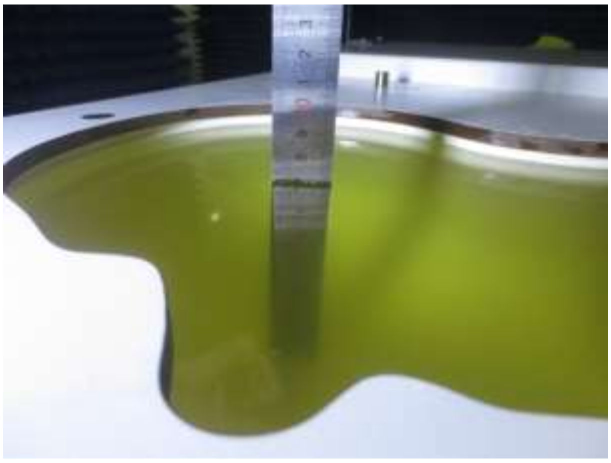


Fig. 9.1 Photo of Liquid Height for Head SAR (650MHz~950MHz) (depth>15cm)

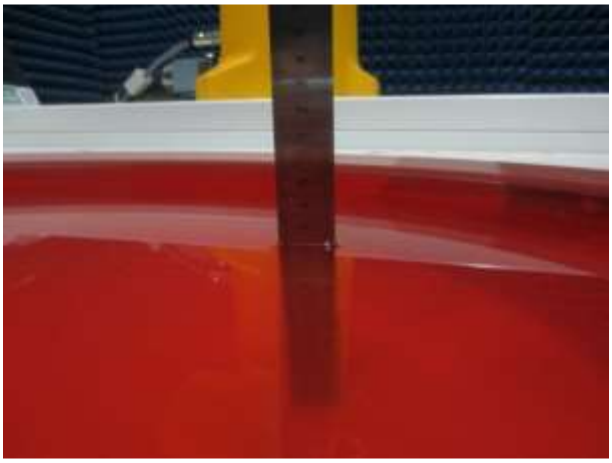


Fig. 9.2 Photo of Liquid Height for Body SAR of (650MHz~950MHz) (depth>15cm)

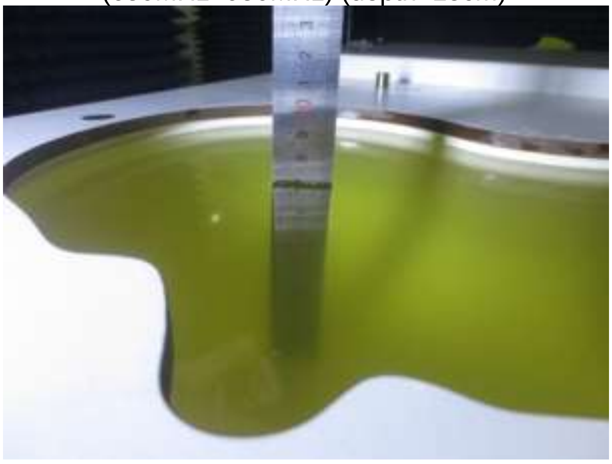


Fig. 9.3 Photo of Liquid Height for Head SAR (1710MHz~1910MHz) (depth>15cm)

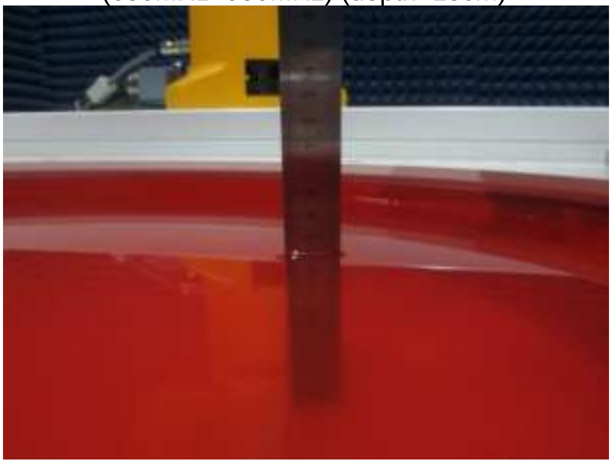


Fig. 9.4 Photo of Liquid Height for Body SAR of ELI V5.0 (1710MHz~1910MHz) (depth>15cm)

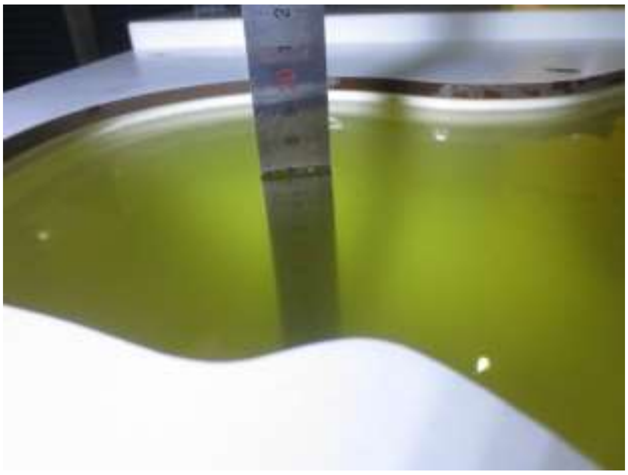


Fig. 9.5 Photo of Liquid Height for Head SAR (2000MHz~2600MHz) (depth>15cm)

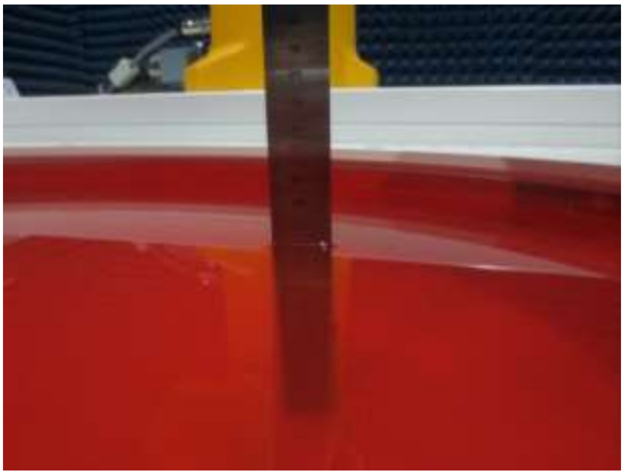


Fig. 9.6 Photo of Liquid Height for Body SAR of Twin Phantom (2000MHz~2600MHz) (depth>15cm)

The relative permittivity and conductivity of the tissue material should be within ±5% of the values given in the table below recommended by the FCC OET 65 supplement C and RSS 102 Issue 5.

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

(εr = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

The dielectric parameters of liquids were verified prior to the SAR evaluation using a Speag Dielectric Probe Kit and an Agilent Network Analyzer.
The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target(σ)	Permittivity Target(εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Date (mm/dd/yy)
750	Head	22.3	0.86	41.59	0.89	41.9	-3.37	-0.74	±5	08.23.2019
835	Head	22.3	0.89	41.07	0.9	41.5	-1.11	-1.04	±5	08.23.2019
1800	Head	22.4	1.38	40.72	1.4	40.0	-1.43	1.8	±5	08.29.2019
1900	Head	22.4	1.42	40.26	1.4	40.0	1.43	0.65	±5	08.29.2019
2450	Head	22.8	1.82	39.86	1.8	39.2	1.11	1.68	±5	08.25.2019
2600	Head	22.8	2.01	38.90	1.96	39.0	2.55	-0.26	±5	08.25.2019
750	Body	22.4	0.95	55.82	0.96	55.5	-1.04	0.58	±5	08.27.2019
835	Body	22.4	0.98	55.21	0.97	55.2	1.03	0.02	±5	08.27.2019
1800	Body	22.3	1.52	52.68	1.52	53.3	0	-1.16	±5	08.21.2019
1900	Body	22.3	1.55	52.32	1.52	53.3	1.97	-1.84	±5	08.21.2019
2450	Body	22.7	1.98	53.63	1.95	52.7	1.54	1.76	±5	08.26.2019
2600	Body	22.7	2.20	52.47	2.16	52.5	1.85	-0.06	±5	08.26.2019

10 SAR System Verification

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

- **Purpose of System Performance check**
  The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

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

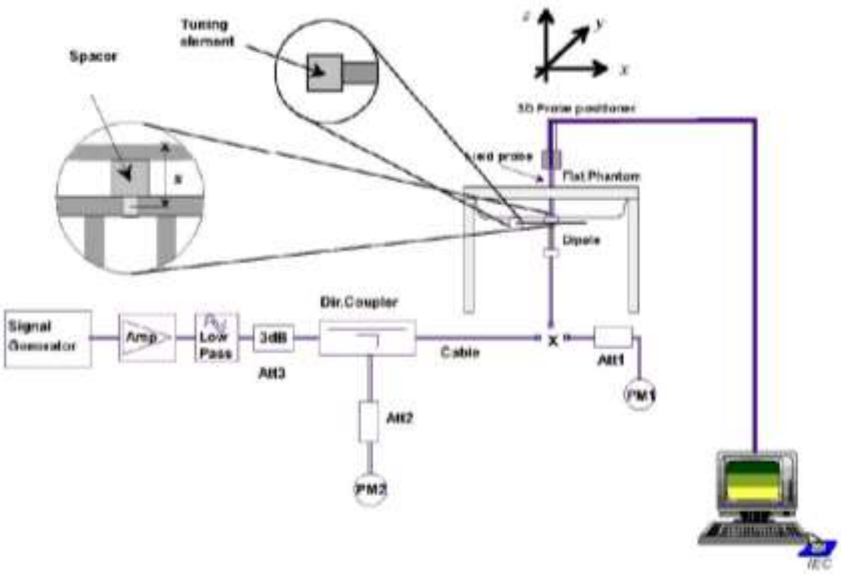


Fig.10.1 System Verification Setup Diagram

Fig.10.2 Photo of Dipole setup

- **System Verification Results**
  Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. The table as below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix C of this report.

Date (mm/dd/yy)	Frequency (MHz)	Liquid Type	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
08.23.2019	750	Head	80	0.675	8.44	8.31	1.56
08.23.2019	835	Head	80	0.776	9.70	9.49	2.21
08.29.2019	1800	Head	40	1.57	39.25	38.76	1.26
08.29.2019	1900	Head	40	1.63	40.75	39.4	3.43
08.25.2019	2450	Head	40	2.12	53.0	52.6	0.76
08.25.2019	2600	Head	40	2.24	56.0	56.3	-0.53
08.27.2019	750	Body	80	0.714	8.93	8.76	1.94
08.27.2019	835	Body	80	0.785	9.81	9.57	2.51
08.21.2019	1800	Body	40	1.60	40.0	38.90	2.83
08.21.2019	1900	Body	40	1.65	41.25	40.5	1.85
08.26.2019	2450	Body	40	2.06	51.5	50.9	1.18
08.26.2019	2600	Body	40	2.19	54.75	53.1	3.11

11 EUT Testing Position

This EUT was tested in ten different positions. They are right cheek/right tilted/left cheek/left tilted for head, Front/Back/Right Side/Top Side/Bottom Side of the EUT with phantom 10 mm gap, as illustrated below, please refer to Appendix B for the test setup photos.

11.1 Handset Reference Points

- The vertical centreline passes through two points on the front side of the handset – the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.
- The horizontal line is perpendicular to the vertical centreline and passes the center of the acoustic output. The horizontal line is also tangential to the handset at point A.
- The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

Fig.11.1 Illustration for Front, Back and Side of SAM Phantom

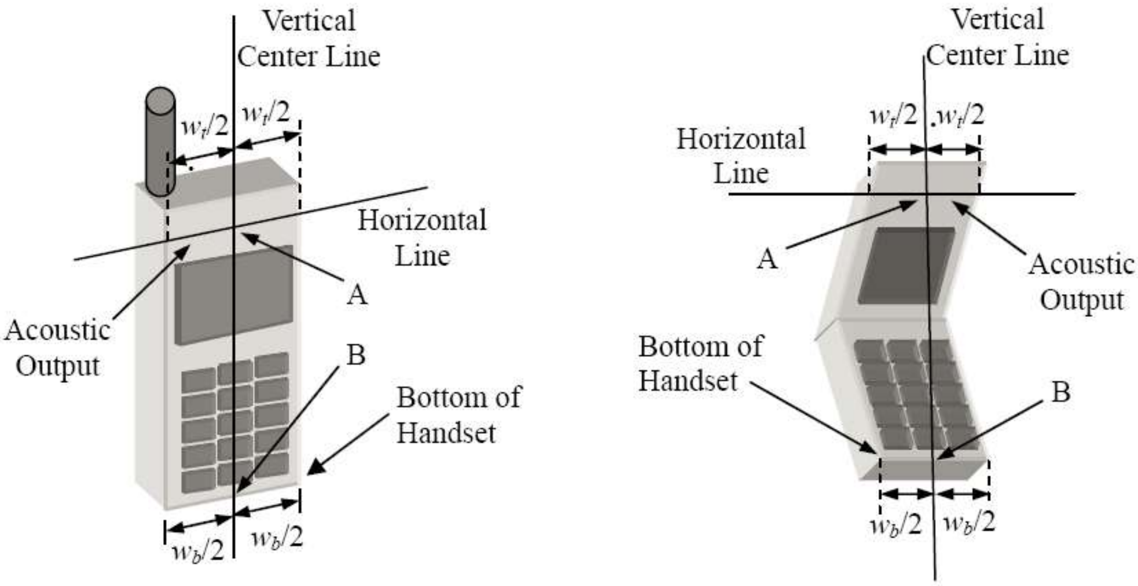


Fig. 11.2 Illustration for Handset Vertical and Horizontal Reference Lines

11.2 Positioning for Cheek / Touch

- To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear and LE: Left Ear) and align the center of the ear piece with the line RE-LE.
- To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see below figure)

Fig. 11.3 Illustration for Cheek Position

11.3 Positioning for Ear / 15º Tilt

- To position the device in the “cheek” position described above.
- While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see figure below).

Fig.11.4 Illustration for Tilted Position

11.4 SAR Evaluations near the Mouth/Jaw Regions of the SAM Phantom

Antennas located near the bottom of a phone may require SAR measurements around the mouth and jaw regions of the SAM head phantom. This typically applies to clam-shell style phones that are generally longer in the unfolded normal use positions or to certain older style long rectangular phones.

Under these circumstances, the following procedures apply, adopted from the FCC guidance on SAR handsets document FCC KDB Publication 648474 D04v01r03. The SAR required in these regions of SAM should be measured using a flat phantom. The phone should be positioned with a separation distance of 4 mm between the ear reference point (ERP) and the outer surface of the flat phantom shell. While maintaining this distance at the ERP location, the low (bottom) edge of the phone should be lowered from the phantom to establish the same separation distance between the peak SAR locations identified by the truncated partial SAR distribution measured with the SAM phantom. The distance from the peak SAR location to the phone is determined by the straight line passing perpendicularly through the phantom surface. When it is not feasible to maintain 4 mm separation at the ERP while also establishing the required separation at the peak SAR location, the top edge of the phone will be allowed to touch the phantom with a separation < 4 mm at the ERP. The phone should not be tilted to the left or right while placed in this inclined position to the flat phantom.

11.5 Body Worn Accessory Configurations

- To position the device parallel to the phantom surface with either keypad up or down.
- To adjust the device parallel to the flat phantom.
- To adjust the distance between the device surface and the flat phantom to 10 mm or holster surface and the flat phantom to 0 mm.

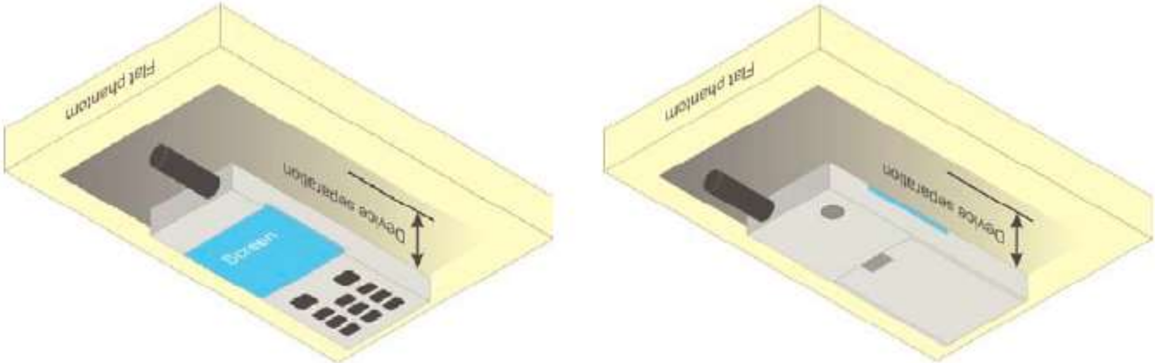


Fig.11.5 Illustration for Body Worn Position

11.6 Wireless Router (Hotspot) Configurations

Some battery-operated handsets have the capability to transmit and receive internet connectivity through simultaneous transmission of WIFI in conjunction with a separate licensed transmitter. The FCC has provided guidance in KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥
9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, 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. Therefore, SAR must be evaluated for each frequency transmission and mode separately and summed with the WIFI transmitter according to KDB 648474 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

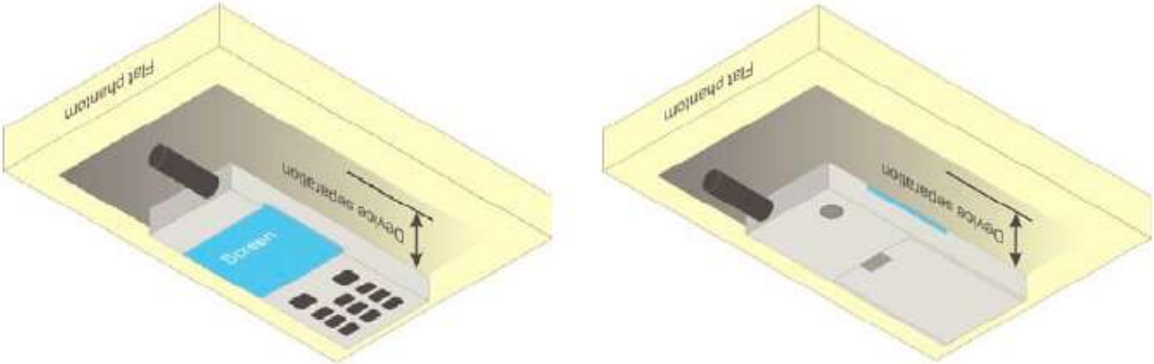


Fig.11.6 Illustration for Hotspot Position

12 Measurement Procedures

The measurement procedures are as bellows:

<Conducted power measurement>
- For WWAN power measurement, use base station simulator to configure EUT WWAN transition in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- Read the WWAN RF power level from the base station simulator.
- For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- Connect EUT RF port through RF cable to the power meter or spectrum analyzer, and measure WLAN/BT output power.

<Conducted power measurement>
- Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
- Place the EUT in positions as Appendix B demonstrates.
- Set scan area, grid size and other setting on the DASY software.
- Measure SAR results for the highest power channel on each testing position.
- Find out the largest SAR result on these testing positions of each band.
- Measure SAR results for other channels in worst SAR testing position if the Reported SAR or highest power channel is larger than 0.8 W/kg.

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- Power reference measurement
- Area scan
- Zoom scan
- Power drift measurement

12.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a “cube” measurement. The measured volume must include the 1g and 10 g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:
- Extraction of the measured data (grid and values) from the Zoom Scan.
- Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters).
- Generation of a high-resolution mesh within the measured volume.
- Interpolation of all measured values form the measurement grid to the high-resolution grid
- Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
- Calculation of the averaged SAR within masses of 1g and 10g.

12.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

12.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01r04 quoted below.

			$\leq$ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			$\leq$ 2 GHz: $\leq$ 15 mm 2 – 3 GHz: $\leq$ 12 mm	3 – 4 GHz: $\leq$ 12 mm 4 – 6 GHz: $\leq$ 10 mm
			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 $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			$\leq$ 2 GHz: $\leq$ 8 mm 2 – 3 GHz: $\leq$ 5 mm*	3 – 4 GHz: $\leq$ 5 mm* 4 – 6 GHz: $\leq$ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		$\leq$ 5 mm	3 – 4 GHz: $\leq$ 4 mm 4 – 5 GHz: $\leq$ 3 mm 5 – 6 GHz: $\leq$ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	$\leq$ 4 mm	3 – 4 GHz: $\leq$ 3 mm 4 – 5 GHz: $\leq$ 2.5 mm 5 – 6 GHz: $\leq$ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq$ 30 mm	3 – 4 GHz: $\geq$ 28 mm 4 – 5 GHz: $\geq$ 25 mm 5 – 6 GHz: $\geq$ 22 mm

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 <u>*reported*</u> SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 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.

12.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD post-processor scan combine and subsequently superpose these measurement data to calculating the multiband SAR.

12.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1g and 10g cubes, the extrapolation distance should not be larger than 5 mm.

12.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

13 Conducted RF Output Power

13.1 GSM Conducted Power

Band: GSM 850	Burst Average Power (dBm)			Frame-Average Power(dBm)		
Channel	128	190	251	128	190	251
Frequency (MHz)	824.2	836.6	848.8	824.2	836.6	848.8
GSM (GMSK, Voice)	32.49	32.50	**32.55**	23.46	23.47	23.52
GPRS (GMSK, 1 TX slot)	32.46	32.48	32.53	23.43	23.45	23.50
GPRS (GMSK, 2 TX slots)	31.62	31.69	31.80	25.60	25.67	25.78
GPRS (GMSK, 3 TX slots)	29.96	30.01	30.13	25.70	25.75	25.87
GPRS (GMSK, 4 TX slots)	28.75	28.82	**28.96**	25.74	25.81	**25.95**
EGPRS (8PSK, 1 TX slot)	27.10	27.15	27.11	18.07	18.12	18.08
EGPRS (8PSK, 2 TX slots)	26.15	26.14	26.13	20.13	20.12	20.11
EGPRS (8PSK, 3 TX slots)	24.44	24.43	24.35	20.18	20.17	20.09
EGPRS (8PSK, 4 TX slots)	23.28	23.25	23.20	20.27	20.24	20.19

Remark:

1. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:
   The duty cycle "x" of different time slots as below:
   1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8
   Based on the calculation formula:
   Frame-averaged power = Burst averaged power + 10 1og (x)
   So,
   Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03
   Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02
   Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26
   Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
2. CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

Note:

1. For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 850 Voice mode.
2. For Body worn SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 850 Voice mode.
3. For Hotspot mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 4 TX slots mode due to the highest frame-averaged power.
4. Per KDB447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
5. The EUT do not support DTM and VoIP function.

Band: PCS 1900	Burst Average Power (dBm)			Frame-Average Power(dBm)		
Channel	512	661	810	512	661	810
Frequency (MHz)	1850.2	1880.0	1909.8	1850.2	1880.0	1909.8
GSM (GMSK, Voice)	30.89	**30.99**	30.97	21.86	21.96	21.94
GPRS (GMSK, 1 TX slot)	30.88	30.98	30.96	21.85	21.95	21.93
GPRS (GMSK, 2 TX slots)	30.15	30.22	30.19	24.13	24.20	24.17
GPRS (GMSK, 3 TX slots)	28.29	28.33	28.37	24.03	24.07	24.11
GPRS (GMSK, 4 TX slots)	27.26	27.33	**27.42**	24.25	24.32	**24.41**
EGPRS (8PSK, 1 TX slot)	27.60	27.82	28.04	18.57	18.79	19.01
EGPRS (8PSK, 2 TX slots)	26.23	26.48	26.51	20.21	20.46	20.49
EGPRS (8PSK, 3 TX slots)	24.39	24.64	24.74	20.13	20.38	20.48
EGPRS (8PSK, 4 TX slots)	23.13	23.32	23.63	20.12	20.31	20.62

Remark:

3. The frame-averaged power is linearly reported the maximum burst averaged power over 8 time slots. The calculated method are shown as below:
   The duty cycle "x" of different time slots as below:
   1 TX slot is 1/8, 2 TX slots is 2/8, 3 TX slots is 3/8 and 4 TX slots is 4/8
   Based on the calculation formula:
   Frame-averaged power = Burst averaged power + 10 1og (x)
   So,
   Frame-averaged power (1 TX slot) = Burst averaged power (1 TX slot)– 9.03
   Frame-averaged power (2 TX slots) = Burst averaged power (2 TX slots)– 6.02
   Frame-averaged power (3 TX slots) = Burst averaged power (3 TX slots)– 4.26
   Frame-averaged power (4 TX slots) = Burst averaged power (4 TX slots) – 3.01
4. CS1 coding scheme was used in GPRS conducted power measurements and SAR testing, MCS5 coding scheme was used in EGPRS conducted power measurements and SAR testing (if necessary).

Note:

1. For Head SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM 1900 Voice mode.
2. For Body worn SAR testing, GSM Voice mode should be evaluated, therefore the EUT was set in GSM Voice 1900 mode.
3. For Hotspot mode SAR testing, GPRS and EGPRS mode should be evaluated, therefore the EUT was set in GPRS 4 TX slots mode due to the highest frame-averaged power.
4. Per KDB447498 D01v06, the maximum output power channel is used for SAR testing and for further SAR test reduction.
5. The EUT do not support DTM and VoIP function.

13.2 WCDMA Conducted Power

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

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Rohde & Schwarz CMU200 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table 1

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 8 $\Leftrightarrow$ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ $\Leftrightarrow$ $\beta_{hs} = 30/15 * \beta_c$
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15.
Note 3: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

HSDPA Sub-test setup configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Rohde & Schwarz CMU200 referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table 2

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{hs} (1)	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (codes)	CM (2) (dB)	MPR (dB)	AG (4) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1039/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1}: 47/15 β_{ed2}: 47/15	4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (4)	15/15 (4)	64	15/15 (4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: Testing UE using E-DPDCH Physical Layer category 1 Sub-test 3 is not required according to TS 25.306 Table 5.1g.
Note 6: β_{ed} cannot be set directly; it is set by Absolute Grant Value.

HSUPA Sub-test setup configuration

WCDMA Conducted Power:

WCDMA Average power (dBm)			
Band	WCDMA Band V		
Channel	4132	4183	4233
Frequency (MHz)	826.4	836.6	846.6
AMR 12.2 kbps	21.87	22.83	22.91
RMC 12.2 kbps	22.01	22.87	**23.00**
HSDPA Sub-test 1	21.02	21.98	22.18
HSDPA Sub-test 2	20.68	21.60	21.61
HSDPA Sub-test 3	19.23	20.03	20.07
HSDPA Sub-test 4	19.13	20.00	20.10
HSUPA Sub-test 1	20.45	21.42	21.52
HSUPA Sub-test 2	20.96	21.90	21.99
HSUPA Sub-test 3	18.61	19.59	19.62
HSUPA Sub-test 4	21.04	21.94	22.08
HSUPA Sub-test 5	19.52	20.50	20.53

WCDMA Average power (dBm)			
Band	WCDMA Band IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
AMR 12.2 kbps	23.22	23.28	23.30
RMC 12.2 kbps	23.34	23.34	**23.38**
HSDPA Sub-test 1	22.33	22.40	22.43
HSDPA Sub-test 2	21.98	22.01	22.00
HSDPA Sub-test 3	20.45	20.46	20.59
HSDPA Sub-test 4	20.42	20.48	20.46
HSUPA Sub-test 1	21.81	21.83	21.91
HSUPA Sub-test 2	22.24	22.32	22.34
HSUPA Sub-test 3	19.94	20.05	20.03
HSUPA Sub-test 4	22.33	22.42	22.44
HSUPA Sub-test 5	20.85	20.91	20.98

WCDMA Average power (dBm)			
Band	WCDMA Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
AMR 12.2 kbps	22.72	23.86	23.92
RMC 12.2 kbps	22.78	23.93	**23.97**
HSDPA Sub-test 1	21.80	21.98	23.09
HSDPA Sub-test 2	21.44	22.65	22.73
HSDPA Sub-test 3	19.98	21.06	21.14
HSDPA Sub-test 4	19.95	21.06	21.13
HSUPA Sub-test 1	21.41	22.54	22.62
HSUPA Sub-test 2	21.82	22.92	23.07
HSUPA Sub-test 3	19.50	20.61	20.78
HSUPA Sub-test 4	21.82	22.98	23.10
HSUPA Sub-test 5	20.43	21.62	21.72

Note:

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1
2. Per KDB 941225 D01, RMC 12.2kbps mode is used to evaluate SAR due the highest output power. If AMR 12.2 kbps power is < 0.25dB higher than RMC 12.2kbps, SAR tests with AMR 12.2 kbps can be excluded.
3. AMR, HSDPA RF power will not be larger than RMC 12.2kbps, detailed information is included in Tune-up Procure exhibit.

13.3 LTE Conducted Power

13.3.1 Largest channel bandwidth standalone SAR test requirements

QPSK with 1 RB allocation

Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power 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 of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.8 When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

QPSK with 50% RB allocation

The procedures required for 1 RB allocation in section 4.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.9

QPSK with 100% RB allocation

For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in sections 4.2.1 and 4.2.2 are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

Higher order modulations

For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 4.2.1, 5.2.2 and 4.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

13.3.2 Other channel bandwidth standalone SAR test requirements

For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 4.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth. For example, 50 RB in 10 MHz channel bandwidth does not apply to 5 MHz channel bandwidth; therefore, this cannot be tested in the smaller channel bandwidth. However, 50% RB allocation in 10 MHz channel bandwidth is equivalent to 100% RB allocation in 5 MHz channel bandwidth; therefore, these are the equivalent configurations to be compared to determine the specific channel and configuration in the smaller channel bandwidth that need SAR testing.

13.3.3 TDD LTE configuration setup for SAR measurement

According to KDB 941225 D05v02r03 and April 2013 TCB workshop slides, SAR must be tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

- see 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
- “special subframe S” contains both uplink and downlink transmissions and must be taken into consideration to determine the transmission duty factor
  – according to the worst case uplink and downlink cyclic prefix requirements for UpPTS to determine the highest SAR test duty factor

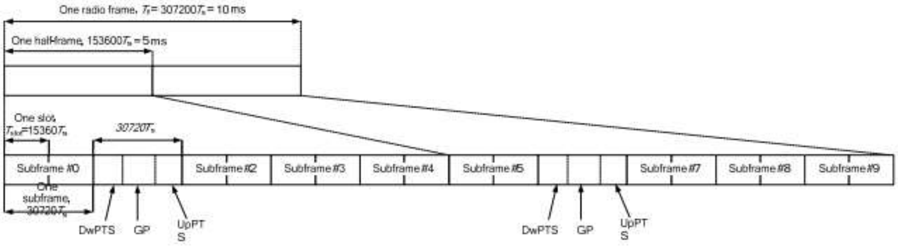


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity)

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	$6592 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$7680 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
5	$6592 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$20480 \cdot T_s$		
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Per 3GPP 36.211 section 4.2, each radio frame of length T_f=37200·Ts = 10 ms consists of two half-frames of length 153600·Ts = 5ms each. Each half-frame consists of five subframes of length 30720 ·Ts = 1ms. So, the uplink duty factor in special subframe as below:

Special Subframe configuration	Normal cyclic prefix in downlink		Extended cyclic prefix in downlink	
	Duty factor of Uplink		Duty factor of Uplink	
	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink	Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	7.14%	8.33%	7.14%	8.33%
1	7.14%	8.33%	7.14%	8.33%
2	7.14%	8.33%	7.14%	8.33%
3	7.14%	8.33%	7.14%	8.33%
4	7.14%	8.33%	14.27%	16.67%
5	14.27%	16.67%	14.27%	16.67%
6	14.27%	16.67%	14.27%	16.67%
7	14.27%	16.67%	14.27%	16.67%
8	14.27%	16.67%	/	/
9	14.27%	16.67%	/	/

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

According to above table:

1. The highest duty factor is configuration 0;
2. The duty factor of uplink in one half-frame with normal cyclic prefix is: (3ms + 0.143ms)/5ms=62.86%;
3. The duty factor of uplink in one half-frame with extended cyclic prefix is: (3ms + 0.167ms)/5ms=63.34%;
4. For purpose to get the worst case SAR test duty factor, the duty factor of normal cyclic prefix in uplink scaled-up to the extended cyclic prefix in uplink, the scaling factor is 63.34%/62.86%=1.008, and the scaling factor will be taken into the final measured SAR.

LTE Band 12 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23017	23095	23175
					699.7MHz	707.5MHz	715.3MHz
Band 12	1.4	QPSK	1	0	22.67	22.98	22.25
			1	2	22.91	22.96	22.55
			1	5	22.76	22.94	22.30
			3	0	21.80	21.90	21.50
			3	1	21.92	21.92	21.65
			3	2	21.97	21.91	21.52
			6	0	22.10	22.22	21.68
		16QAM	1	0	22.28	22.02	21.77
			1	2	22.22	22.28	21.80
			1	5	22.01	22.01	21.42
			3	0	21.19	21.14	20.53
			3	1	21.22	21.19	20.62
			3	2	21.11	21.03	20.55
			6	0	21.20	21.06	20.64

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23025	23095	23165
					700.5MHz	707.5MHz	714.5MHz
Band 12	3	QPSK	1	0	22.36	22.36	22.52
			1	7	22.62	22.61	22.51
			1	14	22.48	22.43	22.34
			8	0	21.63	21.67	21.65
			8	4	21.67	21.65	21.69
			8	7	21.61	21.55	21.74
			15	0	21.64	21.65	21.68
		16QAM	1	0	21.89	21.62	21.91
			1	7	21.66	21.94	21.68
			1	14	21.65	21.62	21.60
			8	0	20.51	20.67	20.81
			8	4	20.61	20.74	20.69
			8	7	20.60	20.70	20.51
			15	0	20.54	20.63	20.68

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23035	23095	23155
					701.5MHz	707.5MHz	713.5MHz
Band 12	5	QPSK	1	0	22.31	22.39	22.27
			1	12	22.62	22.60	22.57
			1	24	22.28	22.28	22.37
			12	0	21.63	21.62	21.62
			12	6	21.73	21.63	21.59
			12	11	21.64	21.55	21.70
			25	0	21.65	21.71	21.73
		16QAM	1	0	21.52	21.40	21.47
			1	12	22.10	21.69	21.76
			1	24	21.63	21.34	21.62
			12	0	20.56	20.65	20.56
			12	6	20.70	20.72	20.64
			12	11	20.59	20.56	20.49
			25	0	20.61	20.65	20.65

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					23060	23095	23130
					704MHz	707.5MHz	711MHz
Band 12	10	QPSK	1	0	22.28	22.31	22.43
			1	24	22.67	22.78	22.60
			1	49	22.35	22.43	22.52
			25	0	21.61	21.74	21.72
			25	12	21.67	21.64	21.69
			25	24	21.63	21.65	21.80
			50	0	21.71	21.67	21.77
		16QAM	1	0	21.27	21.54	21.61
			1	24	22.06	21.80	21.68
			1	49	21.86	21.36	21.48
			25	0	20.56	20.55	20.63
			25	12	20.64	20.69	20.68
			25	24	20.68	20.65	20.77
			50	0	20.55	20.61	20.67

LTE Band 25 part

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26047	26365	26683
					1850.70MHz	1882.5MHz	1914.3MHz
Band 25	1.4	QPSK	1	0	22.65	22.75	22.70
			1	2	22.97	23.00	22.91
			1	5	22.69	22.84	22.78
			3	0	22.35	22.28	22.35
			3	1	22.30	22.37	22.32
			3	2	22.39	22.27	22.38
			6	0	22.07	22.05	22.23
		16QAM	1	0	22.32	22.21	22.02
			1	2	22.12	22.22	22.00
			1	5	22.19	22.31	22.09
			3	0	21.23	21.21	21.24
			3	1	21.41	21.32	21.29
			3	2	21.20	21.20	21.25
			6	0	21.05	21.01	21.02

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26055	26365	26675
					1851.50MHz	1882.5MHz	1913.5MHz
Band 25	3	QPSK	1	0	22.57	22.80	22.77
			1	7	22.73	22.88	22.89
			1	14	22.74	22.76	22.96
			8	0	21.97	22.07	22.12
			8	4	21.94	22.05	22.02
			8	7	21.95	22.03	22.03
			15	0	21.87	22.02	22.09
		16QAM	1	0	22.21	22.26	22.16
			1	7	22.22	22.12	22.22
			1	14	22.26	22.05	22.20
			8	0	21.11	21.15	21.12
			8	4	21.06	21.10	21.04
			8	7	21.02	21.06	21.06
			15	0	20.90	21.02	21.10

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26065	26365	26665
					1852.5MHz	1882.5MHz	1912.5MHz
Band 25	5	QPSK	1	0	22.65	22.62	22.63
			1	12	22.79	22.82	22.92
			1	24	22.59	22.57	22.62
			12	0	21.92	22.02	22.04
			12	6	21.98	22.10	22.12
			12	11	21.90	21.96	22.06
			25	0	21.92	22.02	22.14
		16QAM	1	0	22.17	21.65	21.86
			1	12	22.08	22.05	22.03
			1	24	22.12	22.67	21.81
			12	0	20.88	21.04	21.11
			12	6	21.01	21.03	21.06
			12	11	20.94	21.00	21.05
			25	0	20.97	21.08	21.10

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26090	26365	26640
					1855.00MHz	1882.5MHz	1910.0MHz
Band 25	10	QPSK	1	0	22.64	22.69	22.95
			1	24	22.89	22.89	22.92
			1	49	22.58	22.74	22.73
			25	0	22.03	22.13	22.22
			25	12	22.06	22.05	22.24
			25	24	22.07	22.10	22.09
			50	0	22.09	22.11	22.29
		16QAM	1	0	22.28	22.30	22.35
			1	24	22.42	22.11	22.15
			1	49	22.27	22.29	22.23
			25	0	21.10	21.12	21.16
			25	12	21.03	21.16	21.11
			25	24	21.02	21.14	21.10
			50	0	21.04	21.07	21.14

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26115	26365	26615
					1857.50MHz	1882.5MHz	1907.5MHz
Band 25	15	QPSK	1	0	22.59	22.73	22.66
			1	37	22.92	22.92	22.93
			1	74	22.63	22.76	22.87
			36	0	22.00	22.05	22.13
			36	16	22.08	22.03	22.15
			36	35	22.04	22.05	22.08
			75	0	22.06	22.11	22.23
		16QAM	1	0	22.41	22.01	22.40
			1	37	22.54	22.28	22.23
			1	74	22.38	22.50	22.25
			36	0	21.10	21.13	21.15
			36	16	21.11	21.07	21.21
			36	35	21.03	21.08	21.09
			75	0	21.06	21.02	21.11

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26140	26365	26590
					1860.00MHz	1882.50MHz	1905.00MHz
Band 25	20	QPSK	1	0	22.44	22.44	22.53
			1	49	22.97	22.90	23.06
			1	99	22.31	22.49	22.50
			50	0	22.09	22.15	22.10
			50	24	22.08	22.12	22.25
			50	49	22.05	22.06	22.15
			100	0	22.02	22.01	22.22
		16QAM	1	0	22.21	22.22	22.27
			1	49	22.32	22.61	22.33
			1	99	22.20	22.31	22.05
			50	0	21.00	21.02	21.19
			50	24	21.01	21.10	21.11
			50	49	21.07	21.00	21.04
			100	0	21.05	21.03	21.08

LTE Band 26 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26697	26865	27033
					814.7 MHz	831.5 MHz	848.3MHz
Band 26	1.4	QPSK	1	0	22.54	22.67	22.57
			1	2	22.74	22.52	22.55
			1	5	22.56	22.26	22.33
			3	0	21.72	21.62	21.57
			3	1	21.67	21.75	21.55
			3	2	21.67	21.84	21.59
			6	0	21.88	21.68	21.63
		16QAM	1	0	21.65	21.76	21.83
			1	2	22.11	22.17	21.92
			1	5	21.90	21.76	21.68
			3	0	20.86	20.87	20.60
			3	1	20.70	20.79	20.65
			3	2	20.74	20.96	20.55
			6	0	20.82	20.58	20.72

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26705	26865	27025
					815.5MHz	831.5 MHz	847.50MHz
Band 26	3	QPSK	1	0	22.55	22.67	22.55
			1	7	22.70	22.52	22.64
			1	14	22.68	22.26	22.59
			8	0	21.74	21.62	21.62
			8	4	21.73	21.75	21.68
			8	7	21.68	21.84	21.67
			15	0	21.75	21.68	21.63
		16QAM	1	0	22.05	21.76	21.53
			1	7	22.09	22.17	21.69
			1	14	22.00	21.76	21.85
			8	0	20.86	20.87	20.67
			8	4	20.79	20.79	20.68
			8	7	20.82	20.96	20.72
			15	0	20.72	20.58	20.73

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26715	26865	27015
					816.5MHz	831.5 MHz	846.5MHz
Band 26	5	QPSK	1	0	22.50	22.57	22.32
			1	12	22.63	22.60	22.55
			1	24	22.45	22.16	22.37
			12	0	21.67	21.52	21.65
			12	6	21.75	21.55	21.71
			12	11	21.63	21.64	21.58
			25	0	21.68	21.58	21.68
		16QAM	1	0	21.61	21.86	21.38
			1	12	21.81	22.07	21.64
			1	24	21.57	21.96	21.40
			12	0	20.76	20.77	20.73
			12	6	20.77	20.69	20.67
			12	11	20.79	20.76	20.60
			25	0	20.72	20.58	20.76

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26740	26865	26990
					819.0 MHz	831.5 MHz	844.0MHz
Band 26	10	QPSK	1	0	22.56	22.37	22.54
			1	24	22.67	22.50	22.63
			1	49	22.48	22.26	22.44
			25	0	21.64	21.52	21.77
			25	12	21.72	21.55	21.72
			25	24	21.78	21.64	21.58
			50	0	21.63	21.58	21.63
		16QAM	1	0	21.66	21.86	21.59
			1	24	22.13	22.07	21.88
			1	49	21.89	21.96	21.47
			25	0	20.71	20.87	20.56
			25	12	21.72	20.79	20.77
			25	24	20.79	20.76	20.61
			50	0	20.79	20.68	20.71

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					26765	26865	26965
					821.5MHz	831.5	841.5MHz
Band 26	15	QPSK	1	0	23.05	22.47	22.48
			1	37	22.56	22.60	22.51
			1	74	22.38	22.36	22.50
			36	0	21.62	21.72	21.60
			36	16	21.66	21.65	21.62
			36	35	21.64	21.74	21.67
			75	0	21.66	21.73	21.60
		16QAM	1	0	21.88	22.06	22.02
			1	37	21.94	22.25	22.09
			1	74	22.07	21.96	21.84
			36	0	20.61	20.87	20.67
			36	16	20.74	20.79	20.75
			36	35	20.73	20.76	20.66
			75	0	20.70	20.68	20.70

LTE Band 66 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131979	132322	132665
					1710.7MHz	1745.0MHz	1779.3MHz
Band 66	1.4	QPSK	1	0	22.67	22.71	22.74
			1	2	22.85	22.88	22.92
			1	5	22.68	22.70	22.76
			3	0	21.80	21.85	21.84
			3	1	21.98	21.98	21.97
			3	2	21.79	21.81	21.82
			6	0	21.83	21.83	21.91
		16QAM	1	0	21.80	21.87	21.95
			1	2	21.97	21.99	22.11
			1	5	21.78	21.86	21.92
			3	0	21.09	21.16	20.87
			3	1	21.32	21.34	21.12
			3	2	21.12	21.17	20.89
			6	0	20.84	20.90	20.92

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131987	132322	132657
					1711.5MHz	1745.0MHz	1778.5MHz
Band 66	3	QPSK	1	0	22.77	22.83	22.83.
			1	7	22.72	22.75	22.81
			1	14	22.76	22.77	22.82
			8	0	21.88	21.94	21.94
			8	4	21.86	21.95	21.93
			8	7	21.85	21.93	21.92
			15	0	21.84	21.94	21.93
		16QAM	1	0	21.92	22.48	22.02
			1	7	21.85	22.43	22.01
			1	14	21.84	22.42	22.00
			8	0	20.93	21.11	20.90
			8	4	20.92	21.12	20.88
			8	7	20.90	21.09	20.87
			15	0	20.91	21.02	20.88

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					131997	132322	132647
					1712.5MHz	1745.0MHz	1777.5MHz
Band 66	5	QPSK	1	0	22.62	22.73	22.70
			1	12	22.74	22.84	22.79
			1	24	22.66	22.76	22.69
			12	0	21.82	21.90	21.88
			12	6	21.97	21.98	21.95
			12	11	21.86	21.92	21.87
			25	0	21.83	21.93	21.88
		16QAM	1	0	21.63	22.16	21.85
			1	12	21.74	22.24	21.93
			1	24	21.66	22.14	21.81
			12	0	20.86	20.97	20.86
			12	6	20.98	21.03	20.95
			12	11	20.88	20.98	20.88
			25	0	20.91	20.95	20.90

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132022	132322	132622
					1715.0MHz	1745.0MHz	1775.0MHz
Band 66	10	QPSK	1	0	22.75	22.80	22.84
			1	24	22.93	22.99	22.99
			1	49	22.77	22.81	22.82
			25	0	21.93	22.05	22.03
			25	12	22.12	22.18	22.15
			25	24	21.98	22.04	22.00
			50	0	22.02	22.05	22.01
		16QAM	1	0	21.87	22.51	22.04
			1	24	22.04	22.63	22.20
			1	49	21.89	22.50	22.00
			25	0	21.04	21.08	21.03
			25	12	21.16	21.17	21.18
			25	24	21.08	21.07	21.02
			50	0	21.05	21.06	21.01

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132047	132322	132597
					1717.5MHz	1745.0MHz	1772.5MHz
Band 66	15	QPSK	1	0	22.71	22.73	22.76
			1	12	22.85	22.84	22.86
			1	24	22.72	22.72	22.72
			12	0	21.92	22.00	22.05
			12	6	22.08	22.11	22.14
			12	11	21.95	21.99	22.03
			25	0	21.99	22.01	22.04
		16QAM	1	0	22.23	22.43	21.98
			1	12	22.33	22.54	22.08
			1	24	22.24	22.41	21.93
			12	0	20.91	21.01	21.04
			12	6	21.04	21.10	21.12
			12	11	20.95	21.00	21.01
			25	0	20.94	21.01	21.02

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					132072	132322	132572
					1720.0MHz	1745.0MHz	1770.0MHz
Band 66	20	QPSK	1	0	22.52	22.62	22.61
			1	12	22.93	23.03	23.02
			1	24	22.52	22.58	22.60
			12	0	21.87	21.99	21.96
			12	6	22.24	22.32	22.34
			12	11	21.93	21.98	21.90
			25	0	21.86	21.97	21.94
		16QAM	1	0	22.23	22.04	21.90
			1	12	22.61	22.42	22.28
			1	24	22.22	22.01	21.82
			12	0	20.87	20.98	20.96
			12	6	21.26	21.33	21.30
			12	11	20.91	20.99	20.88
			25	0	20.88	21.00	20.93

LTE Band 71 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133147	133297	133447
					665.5MHz	680.5MHz	695.5MHz
Band 71	5	QPSK	1	0	22.73	22.58	22.51
			1	2	22.85	22.67	22.66
			1	5	22.66	22.55	22.56
			3	0	21.79	21.71	21.66
			3	1	21.92	21.79	21.74
			3	2	21.80	21.69	21.72
			6	0	21.79	21.70	21.71
		16QAM	1	0	21.98	21.50	21.61
			1	2	22.02	21.60	21.80
			1	5	21.97	21.47	21.63
			3	0	20.78	20.67	20.60
			3	1	20.88	20.72	20.76
			3	2	20.80	20.63	20.66
			6	0	20.77	20.75	20.70

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133172	133297	133422
					668.0MHz	680.5MHz	693.0MHz
Band 71	10	QPSK	1	0	22.86	22.68	22.57
			1	7	22.92	22.85	22.75
			1	14	22.72	22.71	22.62
			8	0	21.82	21.83	21.73
			8	4	21.96	21.98	21.87
			8	7	21.86	21.74	21.78
			15	0	21.84	21.72	21.80
		16QAM	1	0	21.78	21.72	21.82
			1	7	21.93	21.88	21.96
			1	14	21.75	21.75	21.83
			8	0	20.89	20.91	20.74
			8	4	21.10	21.18	21.05
			8	7	20.93	20.78	20.84
			15	0	20.83	20.78	20.76

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133197	133297	133397
					670.5MHz	680.5MHz	690.5MHz
Band 71	15	QPSK	1	0	22.78	22.82	22.54
			1	12	22.79	22.91	22.68
			1	24	22.61	22.83	22.59
			12	0	21.93	22.08	21.78
			12	6	21.95	22.15	21.98
			12	11	21.92	22.06	21.89
			25	0	21.96	22.08	21.86
		16QAM	1	0	22.02	22.13	22.14
			1	12	22.20	22.23	22.24
			1	24	22.03	22.16	22.16
			12	0	20.81	20.75	20.74
			12	6	20.97	20.84	20.94
			12	11	20.85	20.70	20.83
			25	0	20.86	20.72	20.77

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					133222	133297	133372
					673.0MHz	680.5MHz	688.0MHz
Band 71	20	QPSK	1	0	22.46	22.39	22.36
			1	24	22.80	22.77	22.82
			1	49	22.33	22.44	22.44
			25	0	21.72	21.64	21.68
			25	12	21.98	21.86	22.05
			25	24	21.70	21.72	21.81
			50	0	21.72	21.71	21.82
		16QAM	1	0	22.00	21.76	21.56
			1	24	22.40	22.05	22.08
			1	49	22.01	21.82	21.66
			25	0	20.72	20.60	20.70
			25	12	22.95	20.84	20.97
			25	24	20.69	20.72	20.77
			50	0	20.70	20.68	20.74

LTE Band 41 part:

LTE Band	Band width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40265	40505	40740	40980	41215
					2557.5MHz	2581.5MHz	2605.0MHz	2629.5MHz	2652.5MHz
Band 41	5	QPSK	1	0	23.46	23.26	23.40	23.21	23.31
			1	12	23.73	23.53	23.65	23.42	23.52
			1	24	23.51	23.41	23.45	23.26	23.27
			12	0	22.90	22.80	22.93	22.72	22.78
			12	6	22.95	22.75	22.89	22.62	22.82
			12	11	22.89	22.82	22.86	22.51	22.71
			25	0	22.91	22.98	22.84	22.66	22.76
		16QAM	1	0	22.72	22.62	22.69	22.68	22.65
			1	12	22.94	22.91	22.90	22.78	22.70
			1	24	22.73	22.76	22.66	22.52	22.53
			12	0	21.77	21.57	21.85	21.71	21.79
			12	6	21.91	21.81	21.87	21.98	21.78
			12	11	21.92	21.95	21.84	21.62	21.72
			25	0	21.94	21.84	21.89	21.76	21.83

LTE Band	Band width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40290	40515	40740	40965	41190
					2560.0MHz	2582.5MHz	2605.0MHz	2627.5MHz	2650.0MHz
Band 41	10	QPSK	1	0	23.51	23.42	23.52	23.41	23.40
			1	24	23.80	23.71	23.71	23.50	23.60
			1	49	23.59	23.38	23.47	23.79	23.32
			25	0	22.92	22.75	22.95	22.82	22.87
			25	12	23.02	22.88	22.98	22.92	22.83
			25	24	23.01	22.91	22.96	22.91	22.77
			50	0	23.00	22.98	23.01	22.90	22.86
		16QAM	1	0	22.78	22.67	22.77	22.68	22.60
			1	24	23.00	22.92	22.92	22.90	22.80
			1	49	22.81	22.73	22.73	22.71	22.76
			25	0	21.94	21.78	21.88	21.84	21.79
			25	12	21.95	21.84	21.94	21.65	21.86
			25	24	21.98	21.81	21.91	21.88	21.78
			50	0	21.97	21.98	21.88	21.92	21.82

LTE Band	Band width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40315	40530	40740	40955	41165
					2562.5MHz	2584.0MHz	2605.0MHz	2626.5MHz	2647.5MHz
Band 41	15	QPSK	1	0	23.41	23.17	23.32	23.32	23.35
			1	37	23.64	23.55	23.62	23.52	23.55
			1	74	23.50	23.07	23.44	23.24	23.30
			36	0	22.92	22.84	22.95	22.95	22.82
			36	16	22.94	22.75	22.90	22.80	22.84
			36	35	22.99	22.83	22.88	22.88	22.80
			75	0	22.95	22.78	22.93	22.73	22.79
		16QAM	1	0	22.78	22.52	22.71	22.71	22.65
			1	37	22.96	22.81	22.90	22.90	22.82
			1	74	22.77	22.45	22.73	22.73	22.53
			36	0	21.88	21.75	21.95	21.95	21.82
			36	16	21.86	21.83	21.98	21.78	21.87
			36	35	21.97	21.85	21.87	21.82	21.81
			75	0	21.91	21.87	21.94	21.92	21.79

LTE Band	Band width (MHz)	Modu-lation	RB Size	RB Offset	Average Power (dBm)				
					40340	40540	40740	40940	41140
					2565.0MHz	2585.0MHz	2605.0MHz	2625.0MHz	2645.0MHz
Band 41	20	QPSK	1	0	23.27	23.38	23.22	23.42	23.17
			1	49	23.73	23.58	23.65	23.56	23.55
			1	99	23.29	23.32	23.23	23.21	23.07
			50	0	22.85	22.68	22.92	22.72	22.84
			50	24	22.97	22.87	22.95	22.85	22.85
			50	49	23.02	22.82	22.80	22.60	22.83
			100	0	22.99	22.79	23.00	22.91	22.88
		16QAM	1	0	22.63	22.67	22.44	22.54	22.44
			1	49	23.04	22.85	22.96	22.76	22.84
			1	99	22.65	22.55	22.51	22.41	22.45
			50	0	21.77	21.81	21.91	21.81	21.85
			50	24	21.96	21.80	21.92	21.62	21.83
			50	49	21.99	21.88	21.85	21.85	21.80
			100	0	22.01	21.72	21.96	21.93	21.84

Note:

1. Per KDB 447498 D01v05r02 section 4.1, 6), the required test channels number is 5 for LTE Band 41.

13.4 WLAN 2.4 GHz Band Conducted Power

Average Power (dBm)				
Channel	Frequency (MHz)	802.11 b	802.11 g	802.11n (HT20)
CH 01	2412	15.03	14.08	13.07
CH 06	2437	**15.13**	14.06	13.09
CH 11	2462	15.05	**14.14**	13.09

Average Power (dBm)		
Channel	Frequency (MHz)	802.11n (HT40)
CH 03	2422	11.17
CH 06	2437	11.28
CH 09	2452	11.06

Note:

1. Per KDB 447498 D01v06, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

Channel	Frequency (GHz)	Max. Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
b/CH 06	2.437	15.5	35.48	5	11.1	3.0
g/CH 11	2.462	14.5	28.18	5	8.85	3.0

2. Base on the result of note1, RF exposure evaluation of 802.11 b mode is required.
3. Per KDB 248227 D01v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
4. Per KDB 248227 D01v02r02, In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. SAR is not required for the following 2.4 GHz OFDM conditions:
   1) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.
   2) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
5. The output power of all data rate were pre-scan, just the worst case (the lowest data rate) of all mode were shown in report.
6. Per KDB 248227 D01V02r02 section 2.2, when the EUT in continuously transmitting mode, the actual duty cycle is 97.1%, so the duty cycle factor is 1.03.

13.5 Bluetooth Conducted Power

Average Power (dBm) (Bluetooth)				
Channel	Frequency (MHz)	GFSK	π/4-DQPSK	8DPSK
CH 01	2402	1.40	0.90	1.39
CH 39	2441	1.17	0.72	1.18
CH 78	2480	0.61	0.20	0.63

Average Power (dBm)		
Channel	Frequency (MHz)	BLE
CH 00	2402	**2.18**
CH 20	2442	2.01
CH 39	2480	1.42

Note:

1. Per KDB 447498 D01v06, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

Channel	Frequency (GHz)	Max. tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Result	exclusion thresholds for 1-g SAR
CH 00	2.402	2.5	1.78	5	0.55	3.0

2. The max. tune-up power was provided by manufacturer, base on the result of note 1, RF exposure evaluation is not required.
3. The output power of all data rate were pre-scan, just the worst case of all mode were shown in report.
4. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according is applied to determine SAR test exclusion.

14 Exposure Positions Consideration

14.1 EUT Antenna Locations

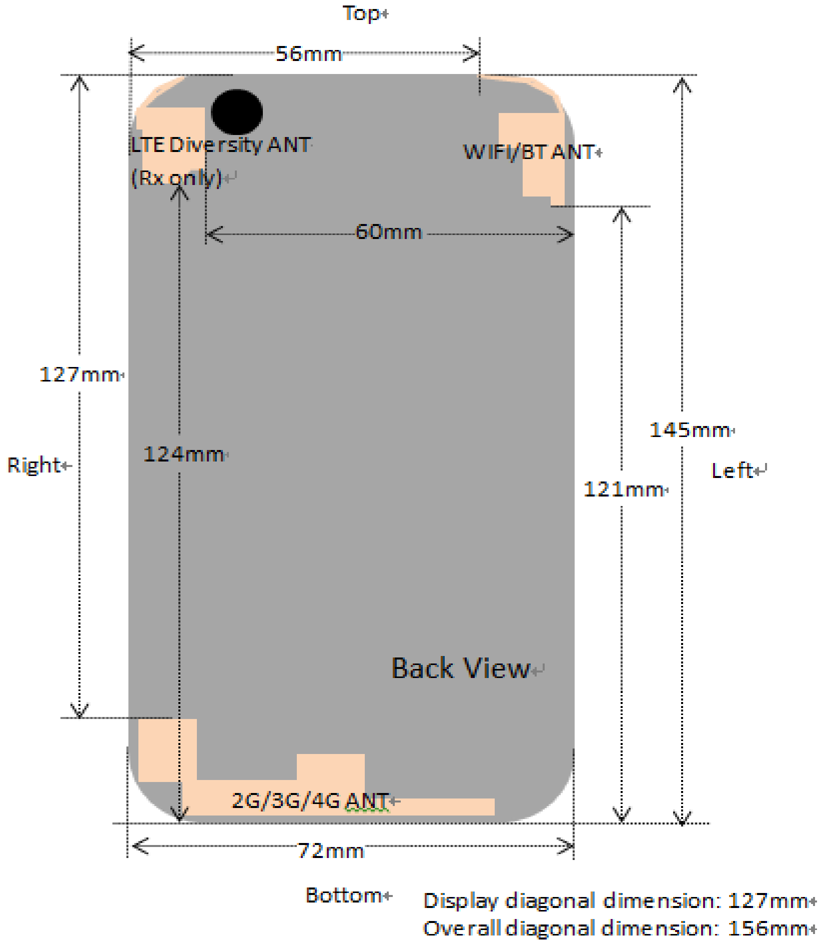


Fig.14.1 EUT Antenna Locations

14.2 Test Positions Consideration

Distance of Antennas to EUT edge/surface Test distance: 10mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
2G/3G/4G	<25mm	<25mm	127mm	<25mm	<25mm	<25mm
WLAN & Bluetooth	<25mm	<25mm	<25mm	121mm	56mm	<25mm

Test Positions Test distance: 10mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
2G/3G/4G	Yes	Yes	No	Yes	Yes	Yes
WLAN & Bluetooth	Yes	Yes	Yes	No	No	Yes

Note:

1. Head/Body-worn/Hotspot mode SAR assessments are required.
2. Referring to KDB 941225 D06 v02r01, when the overall device length and width are ≥ 9cm * 5cm, the test distance is 10mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge.
3. Per KDB 447498 D01v06, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user, which is 0 mm for head SAR, 10 mm for hotspot SAR, and 10 mm for body-worn SAR.

15 SAR Test Results Summary

15.1 Standalone Head SAR Data

➢ GSM Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	GSM850/Voice	Right Cheek	251	848.8	32.55	0.10	33.0	0.189	1.109	0.210
	GSM850/Voice	Right Tilted	251	848.8	32.55	-0.06	33.0	0.092	1.109	0.102
1	GSM850/Voice	Left Cheek	251	848.8	32.55	0.27	33.0	**0.232**	1.109	0.257
	GSM850/Voice	Left Tilted	251	848.8	32.55	0.15	33.0	0.109	1.109	0.121
2	GSM1900/Voice	Right Cheek	661	1880.0	30.99	-0.09	31.0	**0.074**	1.002	0.074
	GSM1900/Voice	Right Tilted	661	1880.0	30.99	-0.13	31.0	0.033	1.002	0.033
	GSM1900/Voice	Left Cheek	661	1880.0	30.99	-0.25	31.0	0.038	1.002	0.038
	GSM1900/Voice	Left Tilted	661	1880.0	30.99	0.08	31.0	0.021	1.002	0.021
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ WCDMA Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band V/RMC	Right Cheek	4233	846.6	23.00	-0.12	23.5	0.140	1.122	0.157
	Band V/RMC	Right Tilted	4233	846.6	23.00	-0.09	23.5	0.056	1.122	0.063
3	Band V/RMC	Left Cheek	4233	846.6	23.00	-0.14	23.5	**0.181**	1.122	0.203
	Band V/RMC	Left Tilted	4233	846.6	23.00	0.13	23.5	0.098	1.122	0.110
4	Band IV/RMC	Right Cheek	1513	1752.6	23.38	-0.17	23.5	**0.191**	1.028	0.196
	Band IV/RMC	Right Tilted	1513	1752.6	23.38	0.06	23.5	0.102	1.028	0.105
	Band IV/RMC	Left Cheek	1513	1752.6	23.38	0.30	23.5	0.165	1.028	0.170
	Band IV/RMC	Left Tilted	1513	1752.6	23.38	0.21	23.5	0.086	1.028	0.088
5	Band II/RMC	Right Cheek	9538	1907.6	23.97	0.25	24.0	**0.138**	1.007	0.139
	Band II/RMC	Right Tilted	9538	1907.6	23.97	0.17	24.0	0.065	1.007	0.065
	Band II/RMC	Left Cheek	9538	1907.6	23.97	-0.23	24.0	0.071	1.007	0.071
	Band II/RMC	Left Tilted	9538	1907.6	23.97	0.08	24.0	0.042	1.007	0.042
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 20MHz QPSK 1RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band25/RB#49	Right Cheek	26590	1905.0	23.06	-0.19	23.5	0.027	1.107	0.030
	Band25/RB#49	Right Tilted	26590	1905.0	23.06	-0.12	23.5	0.012	1.107	0.013
6	Band25/RB#49	Left Cheek	26590	1905.0	23.06	0.00	23.5	**0.032**	1.107	0.035
	Band25/RB#49	Left Tilted	26590	1905.0	23.06	0.03	23.5	0.015	1.107	0.017
	Band66/RB#49	Right Cheek	132322	1745.0	23.03	-0.19	23.5	0.042	1.114	0.047
	Band66/RB#49	Right Tilted	132322	1745.0	23.03	0.11	23.5	0.018	1.114	0.020
7	Band66/RB#49	Left Cheek	132322	1745.0	23.03	-0.15	23.5	**0.048**	1.114	0.053
	Band66/RB#49	Left Tilted	132322	1745.0	23.03	0.08	23.5	0.021	1.114	0.023
8	Band71/RB#49	Right Cheek	133372	688.0	22.82	-0.17	23.0	**0.078**	1.042	0.081
	Band71/RB#49	Right Tilted	133372	688.0	22.82	-0.15	23.0	0.034	1.042	0.035
	Band71/RB#49	Left Cheek	133372	688.0	22.82	-0.29	23.0	0.074	1.042	0.077
	Band71/RB#49	Left Tilted	133372	688.0	22.82	-0.21	23.0	0.030	1.042	0.031
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 1RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Right Cheek	26765	821.5	23.05	0.21	23.5	0.097	1.109	0.108
	Band26/RB#0	Right Tilted	26765	821.5	23.05	0.13	23.5	0.046	1.109	0.051
9	Band26/RB#0	Left Cheek	26765	821.5	23.05	-0.28	23.5	**0.139**	1.109	0.154
	Band26/RB#0	Left Tilted	26765	821.5	23.05	-0.17	23.5	0.062	1.109	0.069
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 1RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
10	Band12/RB#24	Right Cheek	23095	707.5	22.78	-0.18	23.0	**0.160**	1.052	0.168
	Band12/RB#24	Right Tilted	23095	707.5	22.78	-0.21	23.0	0.084	1.052	0.088
	Band12/RB#24	Left Cheek	23095	707.5	22.78	0.04	23.0	0.156	1.052	0.164
	Band12/RB#24	Left Tilted	23095	707.5	22.78	0.17	23.0	0.083	1.052	0.087
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 1RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
11	Band41/RB#49	Right Cheek	40340	2565.0	23.73	0.16	24.0	**0.042**	1.064	1.008	0.045
	Band41/RB#49	Right Tilted	40340	2565.0	23.73	-0.00	24.0	0.018	1.064	1.008	0.019
	Band41/RB#49	Left Cheek	40340	2565.0	23.73	0.00	24.0	0.010	1.064	1.008	0.011
	Band41/RB#49	Left Tilted	40340	2565.0	23.73	-0.32	24.0	0.006	1.064	1.008	0.006
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ LTE 20MHz QPSK 50%RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
12	Band25/RB#24	Right Cheek	26590	1905.0	22.25	0.00	22.5	**0.020**	1.059	0.021
	Band25/RB#24	Right Tilted	26590	1905.0	22.25	-0.02	22.5	0.008	1.059	0.008
	Band25/RB#24	Left Cheek	26590	1905.0	22.25	0.00	22.5	0.014	1.059	0.015
	Band25/RB#24	Left Tilted	26590	1905.0	22.25	-0.15	22.5	0.005	1.059	0.005
13	Band66/RB#24	Right Cheek	132572	1770.0	22.34	0.20	22.5	**0.035**	1.038	0.036
	Band66/RB#24	Right Tilted	132572	1770.0	22.34	0.13	22.5	0.016	1.038	0.017
	Band66/RB#24	Left Cheek	132572	1770.0	22.34	-0.23	22.5	0.034	1.038	0.035
	Band66/RB#24	Left Tilted	132572	1770.0	22.34	0.11	22.5	0.017	1.038	0.018
	Band71/RB#24	Right Cheek	133372	688.0	22.05	-0.27	22.5	0.065	1.109	0.072
	Band71/RB#24	Right Tilted	133372	688.0	22.05	-0.19	22.5	0.031	1.109	0.034
14	Band71/RB#24	Left Cheek	133372	688.0	22.05	0.23	22.5	**0.072**	1.109	0.08
	Band71/RB#24	Left Tilted	133372	688.0	22.05	-0.08	22.5	0.038	1.109	0.042
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 50%RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Right Cheek	26865	831.5	21.72	-0.05	22.0	0.075	1.067	0.080

	Band26/RB#0	Right Tilted	26865	831.5	21.72	0.23	22.0	0.034	1.067	0.036
15	Band26/RB#0	Left Cheek	26865	831.5	21.72	0.10	22.0	**0.108**	1.067	0.115
	Band26/RB#0	Left Tilted	26865	831.5	21.72	-0.12	22.0	0.051	1.067	0.054
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 50%RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band12/RB#24	Right Cheek	23130	711.0	21.80	-0.21	22.0	0.132	1.047	0.138
	Band12/RB#24	Right Tilted	23130	711.0	21.80	-0.08	22.0	0.063	1.047	0.066
16	Band12/RB#24	Left Cheek	23130	711.0	21.80	-0.24	22.0	**0.147**	1.047	0.154
	Band12/RB#24	Left Tilted	23130	711.0	21.80	-0.15	22.0	0.069	1.047	0.072
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 50%RB Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
17	Band41/RB#49	Right Cheek	40340	2565.0	23.02	-0.29	23.5	**0.032**	1.117	1.008	0.036
	Band41/RB#49	Right Tilted	40340	2565.0	23.02	-0.00	23.5	0.015	1.117	1.008	0.017
	Band41/RB#49	Left Cheek	40340	2565.0	23.02	-0.21	23.5	0.008	1.117	1.008	0.009
	Band41/RB#49	Left Tilted	40340	2565.0	23.02	0.34	23.5	0.005	1.117	1.008	0.006
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ WLAN 2.4 GHz Head SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
18	2.4GHz/802.11b	Right Cheek	06	2437	15.13	0.12	15.5	**0.342**	1.089	1.03	0.384
	2.4GHz/802.11b	Right Tilted	06	2437	15.13	0.05	15.5	0.317	1.089	1.03	0.356
	2.4GHz/802.11b	Left Cheek	06	2437	15.13	0.30	15.5	0.234	1.089	1.03	0.262
	2.4GHz/802.11b	Left Tilted	06	2437	15.13	-0.09	15.5	0.242	1.089	1.03	0.271
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

Note:

1. Per KDB 447498 D01v06, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
2. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.
3. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
4. Per KDB 248227 D01v02r02, for 802.11b DSSS , 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 in that exposure configuration.
5. Per KDB 248227 D01v02r02, OFDM SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. Cuz the maximum output power specified for OFDM and DSSS are 28.18mW(14.5dBm) and 35.48mW(15.5dBm), the scaled SAR would be 0.384×(28.18/35.48)=0.305W/Kg<1.2 W/kg, therefore, SAR is not required for OFDM.
6. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.

15.2 Standalone Body SAR

➢ GSM Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	GSM850/Voice	Front	251	848.8	32.55	0.36	33.0	0.221	1.109	0.245
19	GSM850/Voice	Back	251	848.8	32.55	0.12	33.0	**0.312**	1.109	0.346
	GSM1900/Voice	Front	661	1880.0	30.99	-0.04	31.0	0.250	1.002	0.251
20	GSM1900/Voice	Back	661	1880.0	30.99	-0.05	31.0	**0.640**	1.002	0.641
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ WCDMA Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band V/RMC	Front	4233	846.6	23.00	0.33	23.5	0.233	1.122	0.261
21	Band V/RMC	Back	4233	846.6	23.00	-0.02	23.5	**0.325**	1.122	0.365
	Band IV/RMC	Front	1513	1752.6	23.38	0.01	23.5	0.504	1.028	0.518
	Band IV/RMC	Back	1513	1752.6	23.38	-0.07	23.5	0.942	1.028	0.968
	Band IV/RMC	Back	1312	1712.4	23.34	-0.19	23.5	0.873	1.038	0.906
22	Band IV/RMC	Back	1413	1732.6	23.34	0.10	23.5	**1.070**	1.038	1.111
	Band IV/RMC	**Back**	**1413**	**1732.6**	**23.34**	**-0.13**	**23.5**	**1.040**	**1.038**	**1.080**
	Band II/RMC	Front	9538	1907.6	23.97	0.19	24.0	0.396	1.007	0.399
	Band II/RMC	Back	9538	1907.6	23.97	0.04	24.0	1.150	1.007	1.158
	Band II/RMC	Back	9262	1852.4	22.78	-0.00	24.0	0.997	1.324	1.320
23	Band II/RMC	Back	9400	1880.0	23.93	-0.01	24.0	**1.340**	1.016	1.361
	Band II/RMC	**Back**	**9400**	**1880.0**	**23.93**	**0.10**	**24.0**	**1.320**	**1.016**	**1.341**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 20MHz QPSK 1RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band25/RB#49	Front	26590	1905.0	23.06	-0.19	23.5	0.087	1.107	0.096
24	Band25/RB#49	Back	26590	1905.0	23.06	-0.04	23.5	**0.244**	1.107	0.270
	Band66/RB#49	Front	132322	1745.0	23.03	0.11	23.5	0.112	1.114	0.125
25	Band66/RB#49	Back	132322	1745.0	23.03	0.14	23.5	**0.201**	1.114	0.224
	Band71/RB#49	Front	133372	688.0	22.82	0.32	23.0	0.099	1.042	0.103
26	Band71/RB#49	Back	133372	688.0	22.82	-0.33	23.0	**0.175**	1.042	0.182
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 1RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Front	26765	821.5	23.05	0.08	23.5	0.175	1.109	0.194
27	Band26/RB#0	Back	26765	821.5	23.05	-0.02	23.5	**0.257**	1.109	0.285
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 1RB Body SAR

Plot	Band/Mode	Test	CH.	Freq.	Ave.	Power	Tune-Up	Meas.	Scaling	Reported

No.		Position		(MHz)	Power (dBm)	Drift (dB)	Limit (dBm)	SAR_{1g} (W/kg)	Factor	SAR_{1g} (W/kg)
	Band12/RB#24	Front	23095	707.5	22.78	-0.05	23.0	0.231	1.052	0.243
28	Band12/RB#24	Back	23095	707.5	22.78	-0.31	23.0	**0.341**	1.052	0.359
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 1RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band41/RB#49	Front	40340	2565.0	23.73	-0.09	24.0	0.035	1.064	1.008	0.038
29	Band41/RB#49	Back	40340	2565.0	23.73	0.16	24.0	**0.168**	1.064	1.008	0.180
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ LTE 20MHz QPSK 50%RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band25/RB#24	Front	26590	1905.0	22.25	-0.14	22.5	0.065	1.059	0.069
30	Band25/RB#24	Back	26590	1905.0	22.25	-0.08	22.5	**0.193**	1.059	0.204
	Band66/RB#24	Front	132572	1770.0	22.34	0.14	22.5	0.091	1.038	0.094
31	Band66/RB#24	Back	132572	1770.0	22.34	-0.02	22.5	**0.169**	1.038	0.175
	Band71/RB#24	Front	133372	688.0	22.05	-0.09	22.5	0.096	1.109	0.106
32	Band71/RB#24	Back	133372	688.0	22.05	-0.28	22.5	**0.166**	1.109	0.184
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 50%RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Front	26865	831.5	21.72	0.01	22.0	0.133	1.067	0.142
33	Band26/RB#0	Back	26865	831.5	21.72	-0.01	22.0	**0.190**	1.067	0.203
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 50%RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band12/RB#24	Front	23130	711.0	21.80	-0.09	22.0	0.199	1.047	0.208
34	Band12/RB#24	Back	23130	711.0	21.80	0.21	22.0	**0.233**	1.047	0.244
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 50%RB Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band41/RB#49	Front	40340	2565.0	23.02	-0.04	23.5	0.027	1.117	1.008	0.030
35	Band41/RB#49	Back	40340	2565.0	23.02	0.07	23.5	**0.122**	1.117	1.008	0.137
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak					**1.6 W/kg (mW/g) Averaged over 1g**						

Uncontrolled Exposure/General Population	

➢ WLAN 2.4 GHz Body SAR

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	2.4GHz/802.11b	Front	06	2437	15.13	-0.17	15.5	0.084	1.089	1.03	0.094
36	2.4GHz/802.11b	Back	06	2437	15.13	-0.01	15.5	**0.110**	1.089	1.03	0.123
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ WCDMA Body SAR With Headset

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band II/RMC	Back	9538	1907.6	23.97	-0.03	24.0	1.080	1.007	1.088
	Band II/RMC	Back	9262	1852.4	22.78	0.11	24.0	0.825	1.324	1.092
37	Band II/RMC	Back	9400	1880.0	23.93	0.19	24.0	**1.260**	1.016	1.280
	Band II/RMC	**Back**	**9400**	**1880.0**	**23.93**	**0.10**	**24.0**	**1.230**	**1.016**	**1.250**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

Note:

1. Body-worn SAR testing was performed at 10mm separation, and this distance is determined by the handset manufacturer that there will be body-worn accessories that users may acquire at the time of equipment certification, to enable users to purchase aftermarket body-worn accessories with the required minimum separation.
2. Per KDB 941225 D06v02r01, when the same wireless modes and device transmission configurations are required for testing body-worn accessories and hotspot mode, it is not necessary to test body-worn accessory SAR for the same device orientation if the test separation distance for hotspot mode is more conservative than that used for body-worn accessories.
3. Body-worn exposure conditions are intended to voice call operations, therefore GSM voice call is selected to be tested.
4. Per KDB 648474 D04v01r03, when the *Reported* SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
5. The WLAN SAR perform the front and back position, due considered the simultaneous SAR for body-worn.
6. Per KDB 447498 D01v06, for each exposure position, if the highest output channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
7. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
8. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg.
9. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
10. Highlight part of test data means repeated test.

15.3 Body SAR in Hotspot Mode

➢ GSM Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	GPRS850/4 slots	Front	251	848.8	28.96	0.02	29.0	0.332	1.009	0.335
38	GPRS850/4 slots	Back	251	848.8	28.96	-0.28	29.0	**0.477**	1.009	0.481
	GPRS850/4 slots	Left	251	848.8	28.96	0.31	29.0	0.059	1.009	0.060
	GPRS850/4 slots	Right	251	848.8	28.96	-0.15	29.0	0.084	1.009	0.085
	GPRS850/4 slots	Bottom	251	848.8	28.96	0.23	29.0	0.103	1.009	0.104
	GPRS1900/4 slots	Front	810	1909.8	27.42	-0.10	27.5	0.375	1.019	0.382
	GPRS1900/4 slots	Back	810	1909.8	27.42	-0.14	27.5	0.968	1.019	0.986
	GPRS1900/4 slots	Back	512	1850.2	27.26	0.03	27.5	1.020	1.057	1.078
39	GPRS1900/4 slots	Back	661	1880.0	27.33	0.03	27.5	**1.090**	1.040	1.134
	GPRS1900/4 slots	**Back**	**661**	**1880.0**	**27.33**	**0.11**	**27.5**	**1.070**	**1.040**	**1.113**
	GPRS1900/4 slots	Left	810	1909.8	27.42	0.25	27.5	0.214	1.019	0.218
	GPRS1900/4 slots	Right	810	1909.8	27.42	-0.19	27.5	0.359	1.019	0.366
	GPRS1900/4 slots	Bottom	810	1909.8	27.42	-0.13	27.5	0.952	1.019	0.970
	GPRS1900/4 slots	Bottom	512	1850.2	27.26	-0.22	27.5	0.977	1.057	1.033
	GPRS1900/4 slots	Bottom	661	1880.0	27.33	-0.23	27.5	1.030	1.040	1.071
	GPRS1900/4 slots	**Bottom**	**661**	**1880.0**	**27.33**	**-0.18**	**27.5**	**1.020**	**1.040**	**1.061**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ WCDMA Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band V/RMC	Front	4233	846.6	23.00	0.33	23.5	0.233	1.122	0.261
	Band V/RMC	Back	4233	846.6	23.00	-0.02	23.5	**0.325**	1.122	0.365
	Band V/RMC	Left	4233	846.6	23.00	0.23	23.5	0.042	1.122	0.047
	Band V/RMC	Right	4233	846.6	23.00	-0.10	23.5	0.096	1.122	0.108
	Band V/RMC	Bottom	4233	846.6	23.00	0.19	23.5	0.074	1.122	0.083
	Band IV/RMC	Front	1513	1752.6	23.38	0.01	23.5	0.504	1.028	0.518
	Band IV/RMC	Back	1513	1752.6	23.38	-0.07	23.5	0.942	1.028	0.968
	Band IV/RMC	Back	1312	1712.4	23.34	-0.19	23.5	0.873	1.038	0.906
	Band IV/RMC	Back	1413	1732.6	23.34	0.10	23.5	**1.070**	1.038	1.111
	Band IV/RMC	**Back**	**1413**	**1732.6**	**23.34**	**-0.13**	**23.5**	**1.040**	**1.038**	**1.080**
	Band IV/RMC	Left	1513	1752.6	23.38	-0.16	23.5	0.160	1.028	0.164
	Band IV/RMC	Right	1513	1752.6	23.38	-0.11	23.5	0.253	1.028	0.260
	Band IV/RMC	Bottom	1513	1752.6	23.38	-0.24	23.5	0.761	1.028	0.782
	Band II/RMC	Front	9538	1907.6	23.97	0.19	24.0	0.396	1.007	0.399
	Band II/RMC	Back	9538	1907.6	23.97	0.04	24.0	1.150	1.007	1.158
	Band II/RMC	Back	9262	1852.4	22.78	-0.00	24.0	0.997	1.324	1.320
	Band II/RMC	Back	9400	1880.0	23.93	-0.01	24.0	**1.340**	1.016	1.361
	Band II/RMC	**Back**	**9400**	**1880.0**	**23.93**	**0.10**	**24.0**	**1.320**	**1.016**	**1.341**
	Band II/RMC	Left	9538	1907.6	23.97	-0.23	24.0	0.254	1.007	0.256
	Band II/RMC	Right	9538	1907.6	23.97	0.19	24.0	0.417	1.007	0.42
	Band II/RMC	Bottom	9538	1907.6	23.97	-0.24	24.0	1.040	1.007	1.047
	Band II/RMC	Bottom	9262	1852.4	22.78	-0.10	24.0	0.812	1.324	1.075
	Band II/RMC	Bottom	9400	1880.0	23.93	-0.21	24.0	1.170	1.016	1.189
	Band II/RMC	**Bottom**	**9400**	**1880.0**	**23.93**	**0.17**	**24.0**	**1.140**	**1.016**	**1.158**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 20MHz QPSK 1RB Body SAR in Hotspot mode

Plot	Band/Mode	Test	CH.	Freq.	Ave.	Power	Tune-Up	Meas.	Scaling	Reported

No.		Position		(MHz)	Power (dBm)	Drift (dB)	Limit (dBm)	SAR_{1g} (W/kg)	Factor	SAR_{1g} (W/kg)
	Band25/RB#49	Front	26590	1905.0	23.06	-0.19	23.5	0.087	1.107	0.096
	Band25/RB#49	Back	26590	1905.0	23.06	-0.04	23.5	**0.244**	1.107	0.270
	Band25/RB#49	Left	26590	1905.0	23.06	-0.22	23.5	0.049	1.107	0.054
	Band25/RB#49	Right	26590	1905.0	23.06	0.19	23.5	0.072	1.107	0.080
	Band25/RB#49	Bottom	26590	1905.0	23.06	-0.11	23.5	0.186	1.107	0.206
	Band66/RB#49	Front	132322	1745.0	23.03	0.11	23.5	0.112	1.114	0.125
	Band66/RB#49	Back	132322	1745.0	23.03	0.14	23.5	**0.201**	1.114	0.224
	Band66/RB#49	Left	132322	1745.0	23.03	-0.18	23.5	0.065	1.114	0.072
	Band66/RB#49	Right	132322	1745.0	23.03	0.21	23.5	0.094	1.114	0.105
	Band66/RB#49	Bottom	132322	1745.0	23.03	-0.25	23.5	0.168	1.114	0.187
	Band71/RB#49	Front	133372	688.0	22.82	0.32	23.0	0.099	1.042	0.103
	Band71/RB#49	Back	133372	688.0	22.82	-0.33	23.0	**0.175**	1.042	0.182
	Band71/RB#49	Left	133372	688.0	22.82	-0.23	23.0	0.053	1.042	0.055
	Band71/RB#49	Right	133372	688.0	22.82	-0.28	23.0	0.078	1.042	0.081
	Band71/RB#49	Bottom	133372	688.0	22.82	-0.21	23.0	0.021	1.042	0.022
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 1RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Front	26765	821.5	23.05	0.08	23.5	0.175	1.109	0.194
	Band26/RB#0	Back	26765	821.5	23.05	-0.02	23.5	**0.257**	1.109	0.285
	Band26/RB#0	Left	26765	821.5	23.05	-0.16	23.5	0.032	1.109	0.035
	Band26/RB#0	Right	26765	821.5	23.05	-0.30	23.5	0.056	1.109	0.062
	Band26/RB#0	Bottom	26765	821.5	23.05	0.25	23.5	0.039	1.109	0.043
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 1RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band12/RB#24	Front	23095	707.5	22.78	-0.05	23.0	0.231	1.052	0.243
	Band12/RB#24	Back	23095	707.5	22.78	-0.31	23.0	**0.341**	1.052	0.359
	Band12/RB#24	Left	23095	707.5	22.78	0.13	23.0	0.086	1.052	0.090
	Band12/RB#24	Right	23095	707.5	22.78	-0.20	23.0	0.124	1.052	0.130
	Band12/RB#24	Bottom	23095	707.5	22.78	0.26	23.0	0.031	1.052	0.033
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 1RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band41/RB#49	Front	40340	2565.0	23.73	-0.09	24.0	0.035	1.064	1.008	0.038
	Band41/RB#49	Back	40340	2565.0	23.73	0.16	24.0	**0.168**	1.064	1.008	0.180
	Band41/RB#49	Left	40340	2565.0	23.73	-0.21	24.0	0.010	1.064	1.008	0.011
	Band41/RB#49	Right	40340	2565.0	23.73	0.02	24.0	0.041	1.064	1.008	0.044
	Band41/RB#49	Bottom	40340	2565.0	23.73	-0.28	24.0	0.099	1.064	1.008	0.106
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ LTE 20MHz QPSK 50%RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band25/RB#24	Front	26590	1905.0	22.25	-0.14	22.5	0.065	1.059	0.069
	Band25/RB#24	Back	26590	1905.0	22.25	-0.08	22.5	**0.193**	1.059	0.204
	Band25/RB#24	Left	26590	1905.0	22.25	-0.24	22.5	0.037	1.059	0.039
	Band25/RB#24	Right	26590	1905.0	22.25	0.21	22.5	0.063	1.059	0.067
	Band25/RB#24	Bottom	26590	1905.0	22.25	-0.20	22.5	0.147	1.059	0.156
	Band66/RB#24	Front	132572	1770.0	22.34	0.14	22.5	0.091	1.038	0.094
	Band66/RB#24	Back	132572	1770.0	22.34	-0.02	22.5	**0.169**	1.038	0.175
	Band66/RB#24	Left	132572	1770.0	22.34	0.21	22.5	0.051	1.038	0.053
	Band66/RB#24	Right	132572	1770.0	22.34	0.19	22.5	0.076	1.038	0.079
	Band66/RB#24	Bottom	132572	1770.0	22.34	-0.20	22.5	0.143	1.038	0.148
	Band71/RB#24	Front	133372	688.0	22.05	-0.09	22.5	0.096	1.109	0.106
	Band71/RB#24	Back	133372	688.0	22.05	-0.28	22.5	**0.166**	1.109	0.184
	Band71/RB#24	Left	133372	688.0	22.05	-0.31	22.5	0.042	1.109	0.047
	Band71/RB#24	Right	133372	688.0	22.05	-0.25	22.5	0.069	1.109	0.077
	Band71/RB#24	Bottom	133372	688.0	22.05	-0.24	22.5	0.016	1.109	0.018
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 15MHz QPSK 50%RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band26/RB#0	Front	26865	831.5	21.72	0.01	22.0	0.133	1.067	0.142
	Band26/RB#0	Back	26865	831.5	21.72	-0.01	22.0	**0.190**	1.067	0.203
	Band26/RB#0	Left	26865	831.5	21.72	-0.18	22.0	0.021	1.067	0.022
	Band26/RB#0	Right	26865	831.5	21.72	0.13	22.0	0.045	1.067	0.048
	Band26/RB#0	Bottom	26865	831.5	21.72	0.24	22.0	0.032	1.067	0.034
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ LTE 10MHz QPSK 50%RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band12/RB#24	Front	23130	711.0	21.80	-0.09	22.0	0.199	1.047	0.208
	Band12/RB#24	Back	23130	711.0	21.80	0.21	22.0	**0.233**	1.047	0.244
	Band12/RB#24	Left	23130	711.0	21.80	-0.25	22.0	0.065	1.047	0.068
	Band12/RB#24	Right	23130	711.0	21.80	0.27	22.0	0.097	1.047	0.102
	Band12/RB#24	Bottom	23130	711.0	21.80	0.32	22.0	0.025	1.047	0.026
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

➢ TDD-LTE 20MHz QPSK 50%RB Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	Band41/RB#49	Front	40340	2565.0	23.02	-0.04	23.5	0.027	1.117	1.008	0.030
	Band41/RB#49	Back	40340	2565.0	23.02	0.07	23.5	**0.122**	1.117	1.008	0.137
	Band41/RB#49	Left	40340	2565.0	23.02	-0.19	23.5	0.007	1.117	1.008	0.008
	Band41/RB#49	Right	40340	2565.0	23.02	-0.18	23.5	0.034	1.117	1.008	0.038
	Band41/RB#49	Bottom	40340	2565.0	23.02	-0.25	23.5	0.078	1.117	1.008	0.088

ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population	1.6 W/kg (mW/g) Averaged over 1g

➢ WLAN 2.4GHz Body SAR in Hotspot mode

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	D.C Factor	Reported SAR_{1g} (W/kg)
	2.4GHz/802.11b	Front	06	2437	15.13	-0.17	15.5	0.084	1.089	1.03	0.094
	2.4GHz/802.11b	Back	06	2437	15.13	-0.01	15.5	**0.110**	1.089	1.03	0.123
	2.4GHz/802.11b	Left	06	2437	15.13	-0.22	15.5	0.075	1.089	1.03	0.084
	2.4GHz/802.11b	Top	06	2437	15.13	0.31	15.5	0.038	1.089	1.03	0.043
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**						

➢ WCDMA Body SAR in Hotspot mode With Headset

Plot No.	Band/Mode	Test Position	CH.	Freq. (MHz)	Ave. Power (dBm)	Power Drift (dB)	Tune-Up Limit (dBm)	Meas. SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)
	Band II/RMC	Back	9538	1907.6	23.97	-0.03	24.0	1.080	1.007	1.088
	Band II/RMC	Back	9262	1852.4	22.78	0.11	24.0	0.825	1.324	1.092
37	Band II/RMC	Back	9400	1880.0	23.93	0.19	24.0	**1.260**	1.016	1.280
	Band II/RMC	**Back**	**9400**	**1880.0**	**23.93**	**0.10**	**24.0**	**1.230**	**1.016**	**1.250**
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					

Note:

1. Per KDB 447498 D01v06, for each exposure position, if the highest output channel Reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
2. Additional WLAN SAR testing was performed for simultaneous transmission analysis.
3. For Hotspot SAR testing, per KDB 941225 D06v02r01, for EUT dimension ≥ 9cm*5cm, the test distance is 10mm. SAR must be measured for all surfaces and sides with a transmitting antenna located within 2.5cm from that surface or edge.
4. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA output power is < 0.25dB higher than RMC 12.2kbps, or Reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA SAR evaluation can be excluded.
5. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
6. Per KDB 648474 D04v01r03, when the Reported SAR for a body-worn accessory measured without a headset connected to the handset is ＞ 1.2 W/kg, SAR testing with a headset connected to the handset is required.
7. Per KDB 941225 D05v02r05, 100% RB allocation SAR measurement is not required when the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel.
8. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
9. Highlight part of test data means repeated test.

15.4 Repeated SAR measurement

Band/ Mode	Test Position	CH.	Freq. (MHz)	Measured SAR (W/kg)				
				Original	1st Repeated		2nd Repeated	
					Value	Ratio	Value	Ratio
GPRS1900/4 slots	Back	661	1880.0	1.09	1.07	1.02	/	/
GPRS1900/4 slots	Bottom	661	1880.0	1.03	1.02	1.01	/	/
Band IV/RMC	Back	1413	1732.6	1.07	1.04	1.03	/	/
Band II/RMC	Back	9400	1880.0	1.34	1.32	1.02	/	/
Band II/RMC	Bottom	9400	1880.0	1.17	1.14	1.03	/	/
Band II/RMC With Headset	Back	9400	1880.0	1.26	1.23	1.02	/	/
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population				**1.6 W/kg (mW/g) Averaged over 1g**				

Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8 W/kg
2. Per KDB 865664 D01v01r04, if the ratio of *original* and *repeated* is ≤ 1.2 and the measured SAR <1.45 W/kg, only one repeated measurement is required.

15.5 Multi-Band Simultaneous Transmission Considerations

➢ **Simultaneous Transmission Capabilities**

According to FCC KDB Publication 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 in below Figure and are color-coded 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/WCDMA/LTE	Bluetooth/WLAN

Fig.15.1 Simultaneous Transmission Paths

➢ **Simultaneous Transmission Procedures**

This device contains transmitters that may operate simultaneously. Therefore simultaneous transmission analysis is required. Per FCC KDB 447498 D01v06, 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 ≤ 1.6 W/kg. When standalone SAR is not required to be measured, per FCC KDB 447498 D01v06 4.3.2), the following equation must be used to estimate the standalone 1g SAR for simultaneous transmission assessment involving that transmitter.

$$\text{Estimated SAR} = \frac{\sqrt{f(GHz)}}{7.5} \cdot \frac{\text{Max. power of channel, mW}}{\text{Min. Separation Distance, mm}}$$

Mode	Max. tune-up Power (dBm)	Exposure Position	Head	Body	Hotspot
		Test Distance (mm)	0	10	10
Bluetooth	2.5	Estimated SAR (W/kg)	0.074	0.037	0.037

Note:

1. When the minimum *test separation distance* is < 5 mm, a distance of 5 mm according is applied to determine estimated SAR.

➢ **Multi-Band simultaneous Transmission Consideration**

	Position	Applicable Combination
Simultaneous Transmission Consideration	Head	WWAN (Voice) + WLAN 2.4 GHz
		WWAN (Voice) + Bluetooth
	Body	WWAN (Voice) + WLAN 2.4 GHz
		WWAN (Voice) + Bluetooth
	Hotspot	WWAN (Data) + WLAN 2.4 GHz
		WWAN (Data) + Bluetooth

Note:

1. WLAN 2.4GHz Band and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. GSM/WCDMA/LTE shares the same antenna, and cannot transmit simultaneously.
3. The Report SAR summation is calculated based on the same configuration and test position.
4. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i. Scalar SAR summation < 1.6 W/kg.
   ii. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii. Simultaneously transmission SAR measurement, and the Reported multi-band SAR < 1.6 W/kg

15.6 SAR Simultaneous Transmission Analysis

➢ **Head Simultaneous Transmission**

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM850	Right Cheek	0.210	0.384	0.594		GSM850	Right Cheek	0.210	0.074	0.284
	Right Tilted	0.102	0.356	0.458			Right Tilted	0.102	0.074	0.176
	Left Cheek	0.257	0.262	0.519			Left Cheek	0.257	0.074	0.331
	Left Tilted	0.121	0.271	0.392			Left Tilted	0.121	0.074	0.195

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM 1900	Right Cheek	0.074	0.384	0.458		GSM 1900	Right Cheek	0.074	0.074	0.148
	Right Tilted	0.033	0.356	0.389			Right Tilted	0.033	0.074	0.107
	Left Cheek	0.038	0.262	0.300			Left Cheek	0.038	0.074	0.112
	Left Tilted	0.021	0.271	0.292			Left Tilted	0.021	0.074	0.095

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band V	Right Cheek	0.157	0.384	0.541		WCDMA Band V	Right Cheek	0.157	0.074	0.231
	Right Tilted	0.063	0.356	0.419			Right Tilted	0.063	0.074	0.137
	Left Cheek	0.203	0.262	0.465			Left Cheek	0.203	0.074	0.277
	Left Tilted	0.110	0.271	0.381			Left Tilted	0.110	0.074	0.184

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band IV	Right Cheek	0.196	0.384	0.580		WCDMA Band IV	Right Cheek	0.196	0.074	0.270
	Right Tilted	0.105	0.356	0.461			Right Tilted	0.105	0.074	0.179
	Left Cheek	0.170	0.262	0.432			Left Cheek	0.170	0.074	0.244
	Left Tilted	0.088	0.271	0.359			Left Tilted	0.088	0.074	0.162

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band II	Right Cheek	0.139	0.384	0.523		WCDMA Band II	Right Cheek	0.139	0.074	0.213
	Right Tilted	0.065	0.356	0.421			Right Tilted	0.065	0.074	0.139
	Left Cheek	0.071	0.262	0.333			Left Cheek	0.071	0.074	0.145
	Left Tilted	0.042	0.271	0.313			Left Tilted	0.042	0.074	0.116

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 12	Right Cheek	0.168	0.384	0.552		LTE Band 12	Right Cheek	0.168	0.074	0.242
	Right Tilted	0.088	0.356	0.444			Right Tilted	0.088	0.074	0.162
	Left Cheek	0.164	0.262	0.426			Left Cheek	0.164	0.074	0.238
	Left Tilted	0.087	0.271	0.358			Left Tilted	0.087	0.074	0.161

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 25	Right Cheek	0.030	0.384	0.414		LTE Band 25	Right Cheek	0.030	0.074	0.104
	Right Tilted	0.013	0.356	0.369			Right Tilted	0.013	0.074	0.087
	Left Cheek	0.035	0.262	0.297			Left Cheek	0.035	0.074	0.109
	Left Tilted	0.017	0.271	0.288			Left Tilted	0.017	0.074	0.091

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 26	Right Cheek	0.108	0.384	0.492		LTE Band 26	Right Cheek	0.108	0.074	0.182
	Right Tilted	0.051	0.356	0.407			Right Tilted	0.051	0.074	0.125
	Left Cheek	0.154	0.262	0.416			Left Cheek	0.154	0.074	0.228
	Left Tilted	0.069	0.271	0.340			Left Tilted	0.069	0.074	0.143

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 66	Right Cheek	0.047	0.384	0.431		LTE Band 66	Right Cheek	0.047	0.074	0.121
	Right Tilted	0.020	0.356	0.376			Right Tilted	0.020	0.074	0.094
	Left Cheek	0.053	0.262	0.315			Left Cheek	0.053	0.074	0.127
	Left Tilted	0.023	0.271	0.294			Left Tilted	0.023	0.074	0.097

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 71	Right Cheek	0.081	0.384	0.465		LTE Band 71	Right Cheek	0.081	0.074	0.155
	Right Tilted	0.035	0.356	0.391			Right Tilted	0.035	0.074	0.109
	Left Cheek	0.077	0.262	0.339			Left Cheek	0.077	0.074	0.151
	Left Tilted	0.031	0.271	0.302			Left Tilted	0.031	0.074	0.105

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 41	Right Cheek	0.045	0.384	0.429		LTE Band 41	Right Cheek	0.045	0.074	0.119
	Right Tilted	0.019	0.356	0.375			Right Tilted	0.019	0.074	0.093
	Left Cheek	0.011	0.262	0.273			Left Cheek	0.011	0.074	0.085
	Left Tilted	0.006	0.271	0.277			Left Tilted	0.006	0.074	0.080

➢ **Body worn Simultaneous Transmission**

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM850	Front	0.245	0.094	0.339		GSM850	Front	0.245	0.037	0.282
	Back	0.346	0.123	0.469			Back	0.346	0.037	0.383

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM 1900	Front	0.251	0.094	0.345		GSM 1900	Front	0.251	0.037	0.288
	Back	0.641	0.123	0.764			Back	0.641	0.037	0.678

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band V	Front	0.261	0.094	0.355		WCDMA Band V	Front	0.261	0.037	0.298
	Back	0.365	0.123	0.488			Back	0.365	0.037	0.402

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band IV	Front	0.518	0.094	0.612		WCDMA Band IV	Front	0.518	0.037	0.555
	Back	1.111	0.123	1.234			Back	1.111	0.037	1.148

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band II	Front	0.399	0.094	0.493		WCDMA Band II	Front	0.399	0.037	0.436
	Back	1.361	0.123	1.484			Back	1.361	0.037	1.398

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 12	Front	0.243	0.094	0.337		LTE Band 12	Front	0.243	0.037	0.280
	Back	0.359	0.123	0.482			Back	0.359	0.037	0.396

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 25	Front	0.096	0.094	0.190		LTE Band 25	Front	0.096	0.037	0.133
	Back	0.270	0.123	0.393			Back	0.270	0.037	0.307

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 26	Front	0.194	0.094	0.288		LTE Band 26	Front	0.194	0.037	0.231
	Back	0.285	0.123	0.408			Back	0.285	0.037	0.322

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 66	Front	0.125	0.094	0.219		LTE Band 66	Front	0.125	0.037	0.162
	Back	0.224	0.123	0.347			Back	0.224	0.037	0.261

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 71	Front	0.103	0.094	0.197		LTE Band 71	Front	0.103	0.037	0.140
	Back	0.184	0.123	0.307			Back	0.184	0.037	0.221

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 41	Front	0.038	0.094	0.132		LTE Band 41	Front	0.038	0.037	0.075
	Back	0.180	0.123	0.303			Back	0.180	0.037	0.217

➢ **Hotspot mode Simultaneous Transmission**

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM850	Front	0.335	0.094	0.429		GSM850	Front	0.335	0.037	0.372
	Back	0.481	0.123	0.604			Back	0.481	0.037	0.518
	Left	0.060	0.084	0.144			Left	0.060	0.037	0.097
	Right	0.085	/	0.085			Right	0.085	/	0.085
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.104	/	0.104			Bottom	0.104	/	0.104

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
GSM 1900	Front	0.382	0.094	0.476		GSM 1900	Front	0.382	0.037	0.419
	Back	1.134	0.123	1.257			Back	1.134	0.037	1.171
	Left	0.218	0.084	0.302			Left	0.218	0.037	0.255
	Right	0.366	/	0.366			Right	0.366	/	0.366
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	1.071	/	1.071			Bottom	1.071	/	1.071

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band V	Front	0.261	0.094	0.355		WCDMA Band V	Front	0.261	0.037	0.298
	Back	0.365	0.123	0.488			Back	0.365	0.037	0.402
	Left	0.047	0.084	0.131			Left	0.047	0.037	0.084
	Right	0.108	/	0.108			Right	0.108	/	0.108
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.083	/	0.083			Bottom	0.083	/	0.083

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band IV	Front	0.518	0.094	0.612		WCDMA Band IV	Front	0.518	0.037	0.555
	Back	1.111	0.123	1.234			Back	1.111	0.037	1.148
	Left	0.164	0.084	0.248			Left	0.164	0.037	0.201
	Right	0.260	/	0.260			Right	0.260	/	0.260
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.782	/	0.782			Bottom	0.782	/	0.782

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
WCDMA Band II	Front	0.399	0.094	0.493		WCDMA Band II	Front	0.399	0.037	0.436
	Back	1.361	0.123	1.484			Back	1.361	0.037	1.398
	Left	0.256	0.084	0.34			Left	0.256	0.037	0.293

	Right	0.420	/	0.420			Right	0.420	/	0.420
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	1.189	/	1.189			Bottom	1.189	/	1.189

WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	WLAN SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	Bluetooth Estimated SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)
LTE Band 12	Front	0.243	0.094	0.337		LTE Band 12	Front	0.243	0.037	0.28
	Back	0.359	0.123	0.482			Back	0.359	0.037	0.396
	Left	0.090	0.084	0.174			Left	0.090	0.037	0.127
	Right	0.130	/	0.130			Right	0.130	/	0.130
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.033	/	0.033			Bottom	0.033	/	0.033

WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	WLAN SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	Bluetooth Estimated SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)
LTE Band 25	Front	0.096	0.094	0.19		LTE Band 25	Front	0.096	0.037	0.133
	Back	0.270	0.123	0.393			Back	0.270	0.037	0.307
	Left	0.054	0.084	0.138			Left	0.054	0.037	0.091
	Right	0.080	/	0.080			Right	0.080	/	0.080
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.206	/	0.206			Bottom	0.206	/	0.206

WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	WLAN SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	Bluetooth Estimated SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)
LTE Band 26	Front	0.194	0.094	0.288		LTE Band 26	Front	0.194	0.037	0.231
	Back	0.285	0.123	0.408			Back	0.285	0.037	0.322
	Left	0.035	0.084	0.119			Left	0.035	0.037	0.072
	Right	0.062	/	0.062			Right	0.062	/	0.062
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.043	/	0.043			Bottom	0.043	/	0.043

WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	WLAN SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR$_{1g}$ (W/kg)	Bluetooth Estimated SAR$_{1g}$ (W/kg)	Σ SAR (W/kg)
LTE Band66	Front	0.125	0.094	0.219		LTE Band 66	Front	0.125	0.037	0.162
	Back	0.224	0.123	0.347			Back	0.224	0.037	0.261
	Left	0.072	0.084	0.156			Left	0.072	0.037	0.109
	Right	0.105	/	0.105			Right	0.105	/	0.105
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.187	/	0.187			Bottom	0.187	/	0.187

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 71	Front	0.103	0.094	0.197		LTE Band 71	Front	0.103	0.037	0.140
	Back	0.184	0.123	0.307			Back	0.184	0.037	0.221
	Left	0.055	0.084	0.139			Left	0.055	0.037	0.092
	Right	0.081	/	0.081			Right	0.081	/	0.081
	Top	/	0.043	0.043			Top	/	0.037	0.037
	Bottom	0.022	/	0.022			Bottom	0.022	/	0.022

WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	WLAN SAR_{1g} (W/kg)	Σ SAR (W/kg)		WWAN Mode	Position	WWAN SAR_{1g} (W/kg)	Bluetooth Estimated SAR_{1g} (W/kg)	Σ SAR (W/kg)
LTE Band 41	Front	0.038	0.094	0.303		LTE Band 41	Front	0.038	0.037	0.075
	Back	0.180	0.123	0.095			Back	0.180	0.037	0.217
	Left	0.011	0.084	0.044			Left	0.011	0.037	0.048
	Right	0.044	/	0.043			Right	0.044	/	0.044
	Top	/	0.043	0.106			Top	/	0.037	0.037
	Bottom	0.106	/	0.303			Bottom	0.106	/	0.106

➢ **Simultaneous Transmission Conclusion**

The above numerical summed SAR results for all the 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.

15.7 DUT holder perturbation uncertainty evaluation

1. According to TCB workshop, Oct 2016:
   When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.
2. When the highest reported SAR of an antenna is > 1.2 W/kg, holder perturbation verification is required for each antenna, using the highest SAR configuration among all applicable frequency bands.
3. According to IEEE 1528-2013 section E.4.1, When it is unknown if a device holder perturbs the fields of a test device, the SAR uncertainty shall be assessed with a flat phantom (see Clause 5) by comparing the SAR with and without the device holder according to the following tests:

a) With device holder: 1 g or 10 g peak spatial-average SAR is measured with the handset fixed in the holder in a manner similar to the way it was held when tested for the head SAR position. The handset horizontal and vertical centerlines (see Clause 6) are aligned parallel to the bottom of the flat phantom and the device is in direct contact with the phantom. The test shall be performed with the antenna position and device operational configuration corresponding to that where the highest head SAR was previously measured for each frequency band.

b) Without device holder: 1 g or 10 g peak spatial-average SAR is measured with the handset placed on a low-loss foam block or support in the position identical to that tested with the device holder. The relative permittivity and loss tangent of the foam material shall be less than 1.2 and 10–5, respectively.

Test result:

Plot	Band/ Mode	Test Position	CH.	Freq. (MHz)	Test configuration	Measured SAR (W/kg) Averaged over 1g
1	Band II/RMC	Body Back	9400	1880.0	With device holder	7.35
2	Band II/RMC	Body Back	9400	1880.0	Without device holder	7.07

Note:

1. The plots of test result please check Appendix C(page 136).

The following equation is used to computed the SAR tolerance,

$$SAR_{\text{tolerance}}[\%] = 100 \times \left(\frac{SAR_{\text{w/ holder}} - SAR_{\text{w/o holder}}}{SAR_{\text{w/o holder}}} \right)$$

Therefore, the $SAR_{\text{tolerance}}$=100×[(7.35-7.07)/ 7.07]= 3.96%.

15.8 Measurement Uncertainty

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type A evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A Type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in below Table.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor	1/k(b)	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

Uncertainty Component	Section	Uncert. Value	Prob. Dist.	Div.	(C_i) (1 g)	(C_i) (10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)	V_i
Measurement System									
Probe Calibration	E.2.1	±7.4%	N	1	1	1	±7.4%	±7.4%	∞
Axial Isotropy	E.2.2	±1.2%	R	$\sqrt{3}$	0.7	0.7	±0.49%	±0.49%	∞
Hemispherical Isotropy	E.2.2	±3.2%	R	$\sqrt{3}$	0.7	0.7	±1.29%	±1.29%	∞
Boundary Effects	E.2.3	±1.0%	R	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
Linearity	E.2.4	±0.9%	R	$\sqrt{3}$	1	1	±0.52%	±0.52%	∞
System Detection Limits	E.2.5	±0.25%	R	$\sqrt{3}$	1	1	±0.14%	±0.14%	∞
Readout Electronics	E.2.6	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	E.2.7	±0.8%	R	$\sqrt{3}$	1	1	±0.46%	±0.46%	∞
Integration Time	E.2.8	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	E.6.1	±3.0%	R	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
RF Ambient Reflections	E.6.1	±3.0%	R	$\sqrt{3}$	1	1	±1.73%	±1.73%	∞
Probe positioner mechanical tolerances	E.6.2	±0.4%	R	$\sqrt{3}$	1	1	±0.23%	±0.23%	∞
Probe positioning tolerance with respect to the phantom shell surface	E.6.3	±2.9%	R	$\sqrt{3}$	1	1	±1.67%	±1.67%	∞
Interpolation, extrapolation, and integration algorithm For max. SAR Evaluation.	E.5	±1.0%	R	$\sqrt{3}$	1	1	±0.58%	±0.58%	∞
Test Sample Related									
Device Positioning	E.4.2	±4.6%	N	1	1	1	±4.6%	±4.6%	M-1
Device Holder	E.4.1	±5.2%	N	1	1	1	3.96%	3.96%	∞
Power Drift	6.6.2	±5.0%	R	$\sqrt{3}$	1	1	±2.89%	±2.89%	∞
Phantom and Setup									
Phantom Uncertainty	E.3.1	±4.0%	R	$\sqrt{3}$	1	1	±2.31%	±2.31%	∞
Liquid conductivity (measured value)	E.3.3	±3.51%	N	1	0.78	0.71	±2.74%	±2.49%	M
Liquid dielectric constant (measured value)	E.3.3	±3.4%	N	1	0.23	0.26	±0.78%	±0.88%	M
Liquid Conductivity - Temperature Uncertainty	E.3.4	±1.6%	R	$\sqrt{3}$	0.78	0.71	±0.72%	±0.66%	∞
Liquid Dielectric Constant - Temperature Uncertainty	E.3.4	±0.9%	R	$\sqrt{3}$	0.23	0.26	±0.12%	±0.14%	∞
Combined Standard Uncertainty (RSS)							±11.61%	±11.55%	
Expanded Uncertainty (95% Confidence Level, k = 2)							±23.23%	±23.10%	

Uncertainty Budget for frequency range 300 MHz to 3 GHz according to IEEE1528-2013

15.9 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. 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. Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables.

16 Reference

[1]. FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2]. ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3]. IEEE Std. 1528-2013, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, September2013

[4]. SPEAG DASY52 System Handbook

[5]. FCC KDB 248227 D01 v02r02, “SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS”, October 2015

[6]. FCC KDB 447498 D01 v06, “RF EXPOSURE PROCEDURES AND EQUIPMENT AUTHORIZATION POLICIES FOR MOBILE AND PORTABLE DEVICES”, October 2015

[7]. FCC KDB 648474 D04 v01r03, “SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS”, October 2015

[8]. FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, October 2015

[9]. FCC KDB 941225 D05 v02r05, “SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES”, Dec 2015

[10]. FCC KDB 941225 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE”, December 2008

[11]. FCC KDB 941225 D06 v02r01, " SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES", October 2015

[12]. FCC KDB 865664 D01 v01r04, “SAR MEASUREMENT REQUIREMENTS FOR 100 MHz TO 6 GHz”, August 2015

Appendix A: Plots of SAR System Check

Test Laboratory: CCIS Date/Time: 08.23.2019 08:27:35

DUT: Dipole 750 MHz; Type: D750V3; Serial: SN:1118

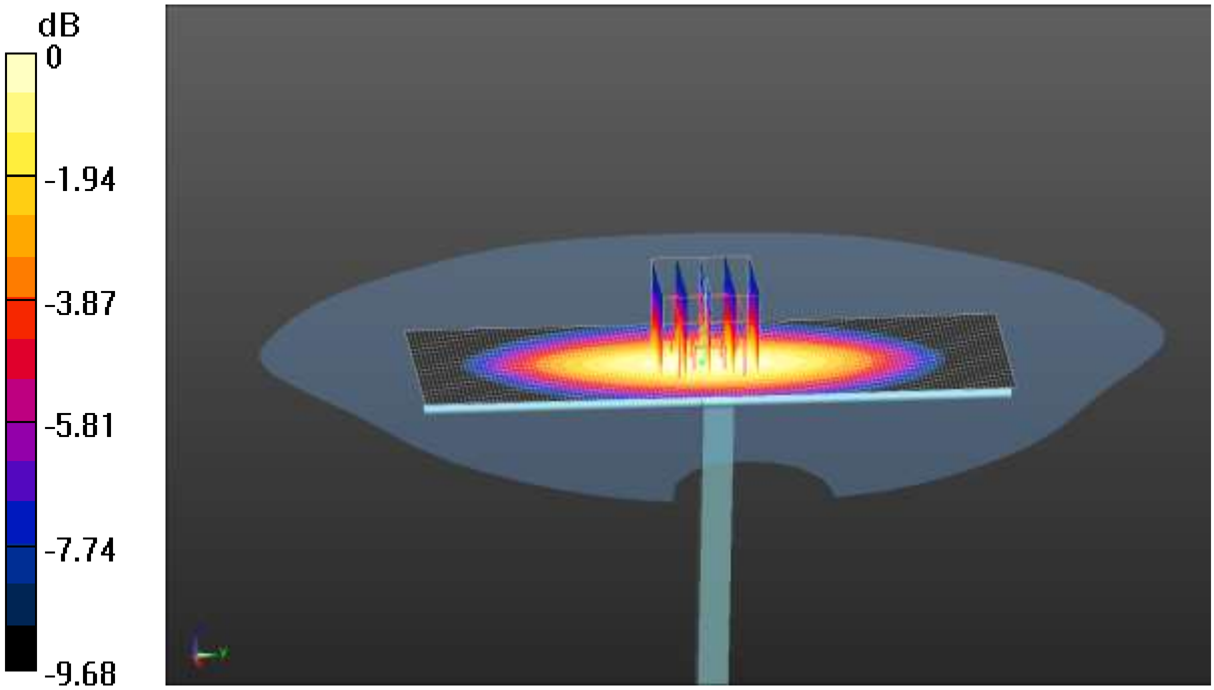
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.861 S/m; ε_r = 41.594; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(9.14, 9.14, 9.14); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.94 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.985 W/kg
SAR(1 g) = 0.675 W/kg; SAR(10 g) = 0.452 W/kg
Maximum value of SAR (measured) = 0.853 W/kg

System Performance Check at Frequency 750 MHz Head Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Area Scan (41x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.826 W/kg



0 dB = 0.826 W/kg = -0.83 dBW/kg

Test Laboratory: CCIS Date/Time: 08.23.2019 08:04:59

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

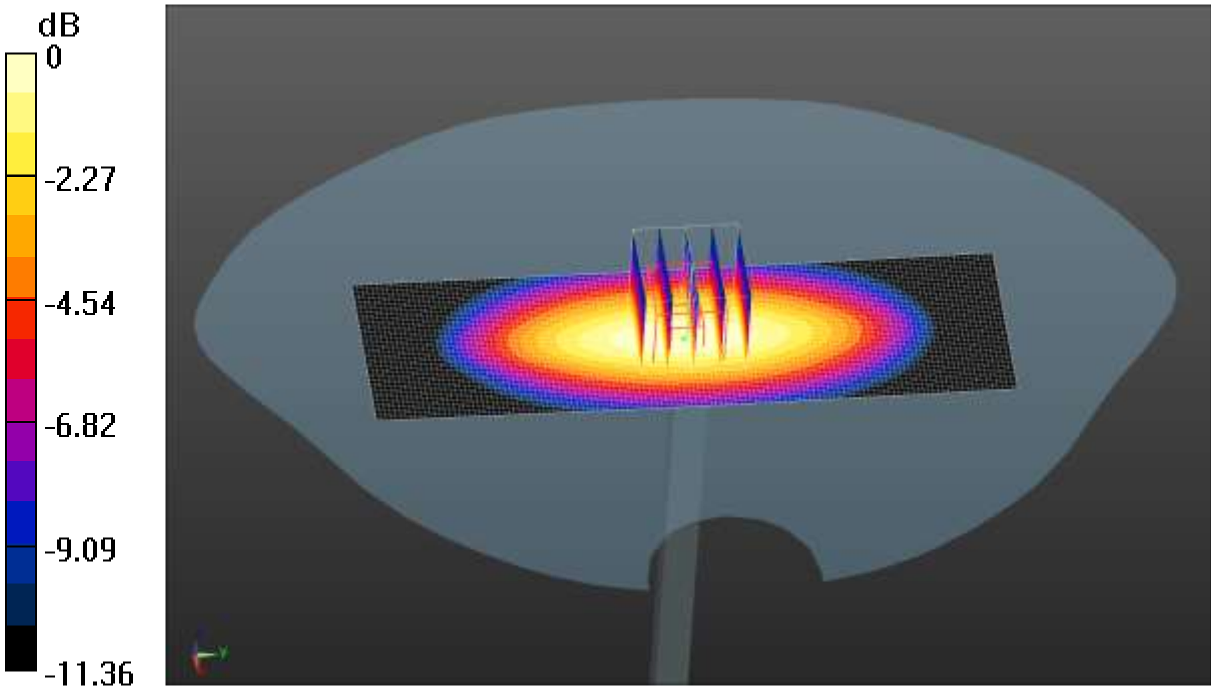
Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.892 S/m; ε_r = 41.074; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(8.76, 8.76, 8.76); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Area Scan (41x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.04 W/kg

System Performance Check at Frequency 835 MHz Head Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.42 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.776 W/kg; SAR(10 g) = 0.502 W/kg
Maximum value of SAR (measured) = 0.986 W/kg



0 dB = 0.986W/kg = -0.06 dBW/kg

Test Laboratory: CCIS　　　　　　　　　　　　Date/Time: 08.29.2019 08:25:01

DUT: Dipole 1800 MHz; Type: SID1800; Serial: SN:09/15 DIP IG800-360

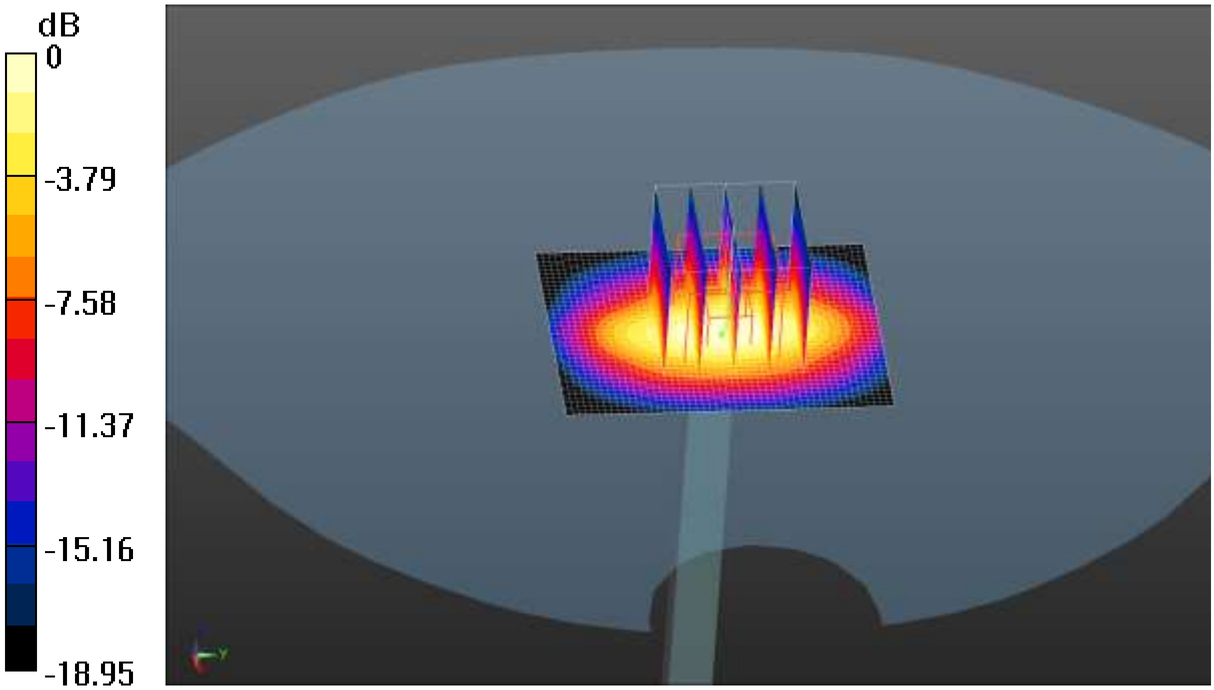
Communication System: UID 0, CW (0); Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.382 S/m; ε_r = 40.715; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.6, 7.6, 7.6); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 1800MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 41.72 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.16 W/kg
SAR(1 g) = 1.57 W/kg; SAR(10 g) = 0.808 W/kg
Maximum value of SAR (measured) = 2.45 W/kg

System Performance Check at Frequency 1800MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (41x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.62 W/kg



0 dB = 2.62 W/kg = 4.18 dBW/kg

Test Laboratory: CCIS Date/Time: 08.29.2019 08:07:22

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d175

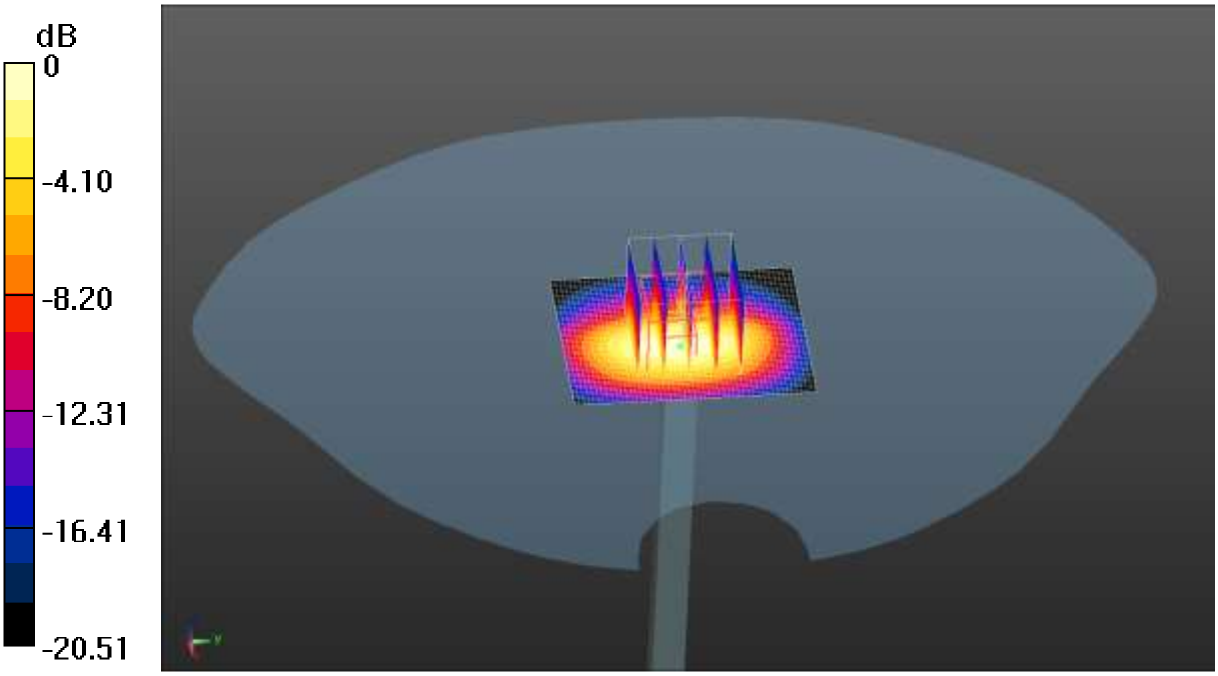
Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.416 S/m; ε_r = 40.257; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.31, 7.31, 7.31); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 1900MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (41x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.73 W/kg

System Performance Check at Frequency 1900MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 42.64 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.37 W/kg
SAR(1 g) = 1.63 W/kg; SAR(10 g) = 0.832 W/kg
Maximum value of SAR (measured) = 2.54 W/kg



0 dB = 2.54 W/kg = 4.05 dBW/kg

Test Laboratory: CCIS Date/Time: 08.25.2019 08:02:56

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: SN:910

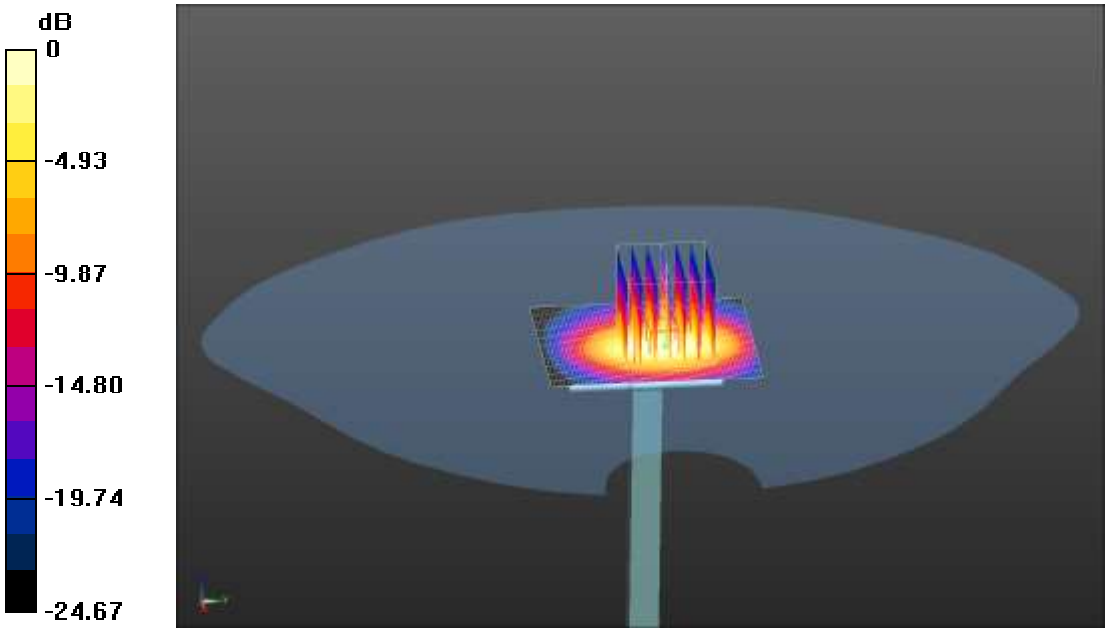
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.815 S/m; ε_r = 39.864; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(6.98, 6.98, 6.98); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 2450MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (51x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 3.61 W/kg

System Performance Check at Frequency 2450MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.94 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 4.38 W/kg
SAR(1 g) = 2.12 W/kg; SAR(10 g) = 0.957 W/kg
Maximum value of SAR (measured) = 3.27 W/kg



0 dB = 3.27 W/kg = 5.15 dBW/kg

Test Laboratory: CCIS Date/Time: 08.25.2019 08:28:53

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: SN:1114

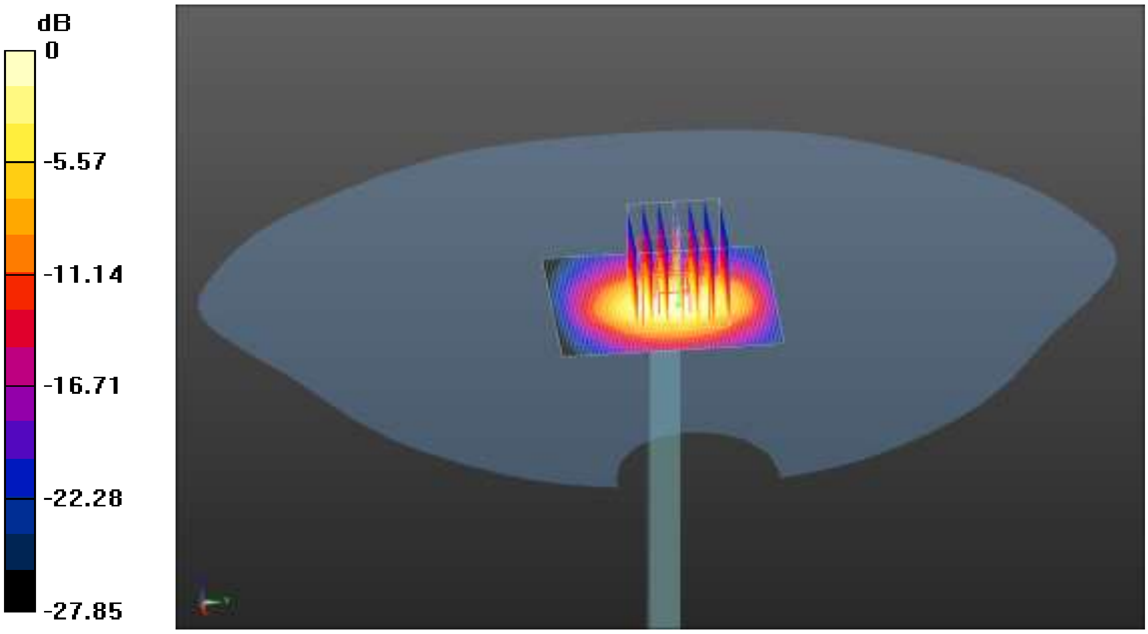
Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.013 S/m; ε_r = 38.904; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(6.7, 6.7, 6.7); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 2600MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan(7X7X7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 43.22 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 4.94 W/kg
SAR(1 g) = 2.24 W/kg; SAR(10 g) = 0.986 W/kg
Maximum value of SAR (measured) = 3.81 W/kg

System Performance Check at Frequency 2600MHz Head Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (51x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 4.15 W/kg



0 dB = 4.15 W/kg = 6.18 dBW/kg

Test Laboratory: CCIS Date/Time: 08.27.2019 08:03:59

DUT: Dipole 750 MHz; Type: D750V3; Serial: SN:1118

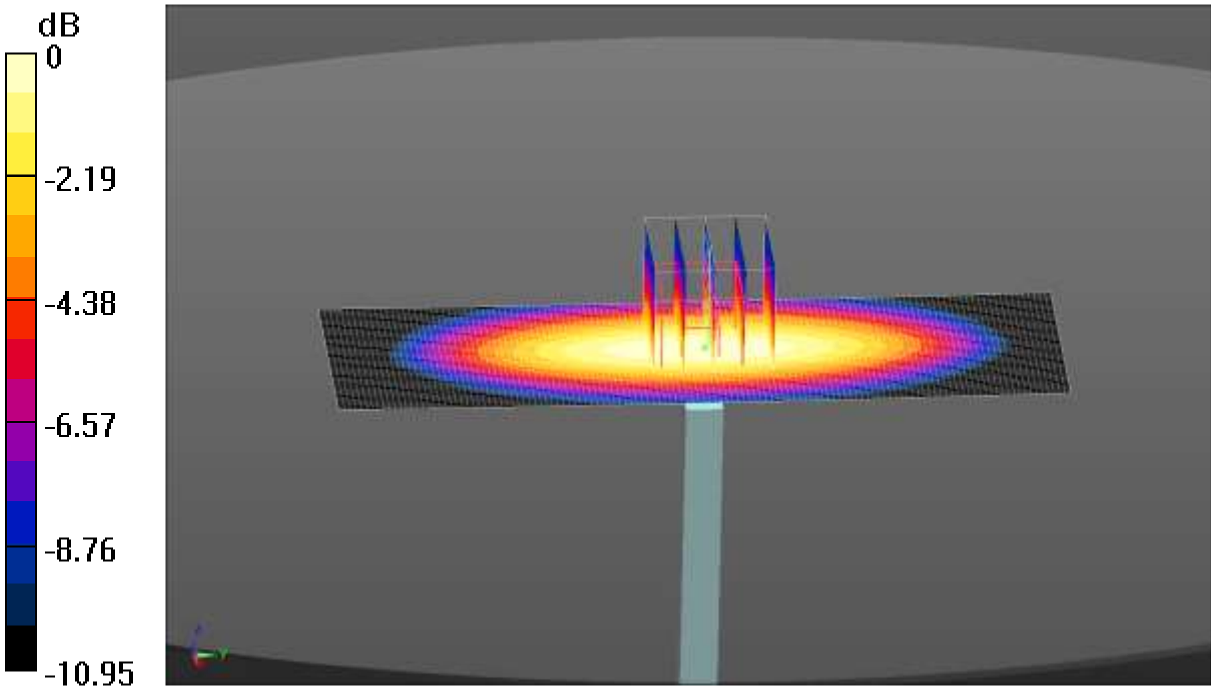
Communication System: UID 0, CW (0); Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.952 S/m; ε_r = 55.876; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(9.1, 9.1, 9.1); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 750 MHz Body Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.78 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.714 W/kg; SAR(10 g) = 0.483 W/kg
Maximum value of SAR (measured) = 0.976 W/kg

System Performance Check at Frequency 750 MHz Body Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Area Scan (41x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.03 W/kg



0 dB = 1.03 W/kg = 0.13 dBW/kg

Test Laboratory: CCIS Date/Time: 08.27.2019 08:22:34

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

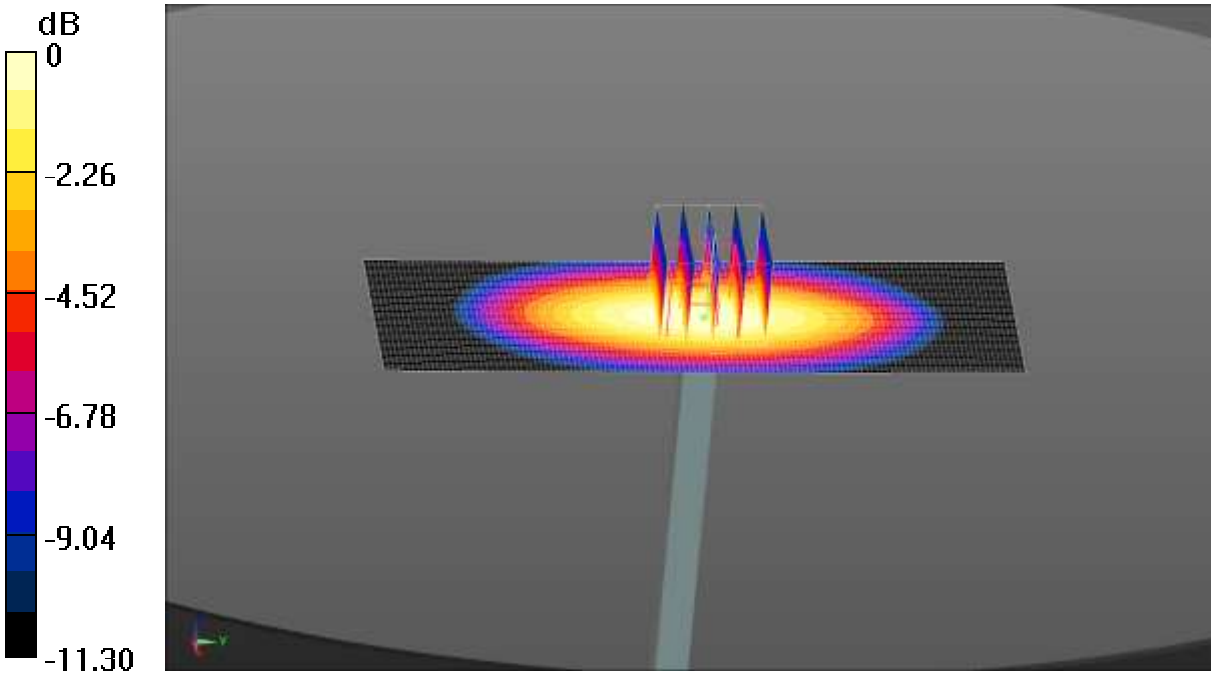
Communication System: UID 0, CW (0); Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.978 S/m; ε_r = 55.206; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(8.78, 8.78, 8.78); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 835 MHz Body Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Area Scan (41x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.12 W/kg

System Performance Check at Frequency 835 MHz Body Tissue/d=15mm, Pin=80 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.94 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 1.18 W/kg
SAR(1 g) = 0.785 W/kg; SAR(10 g) = 0.514 W/kg
Maximum value of SAR (measured) = 1.08 W/kg



0 dB = 1.08 W/kg = 0.33 dBW/kg

Test Laboratory: CCIS　　　　　Date/Time: 08.21.2019 08:05:32

DUT: Dipole 1800 MHz; Type: SID 1800; Serial: SN:09/15 DIP IG800-360

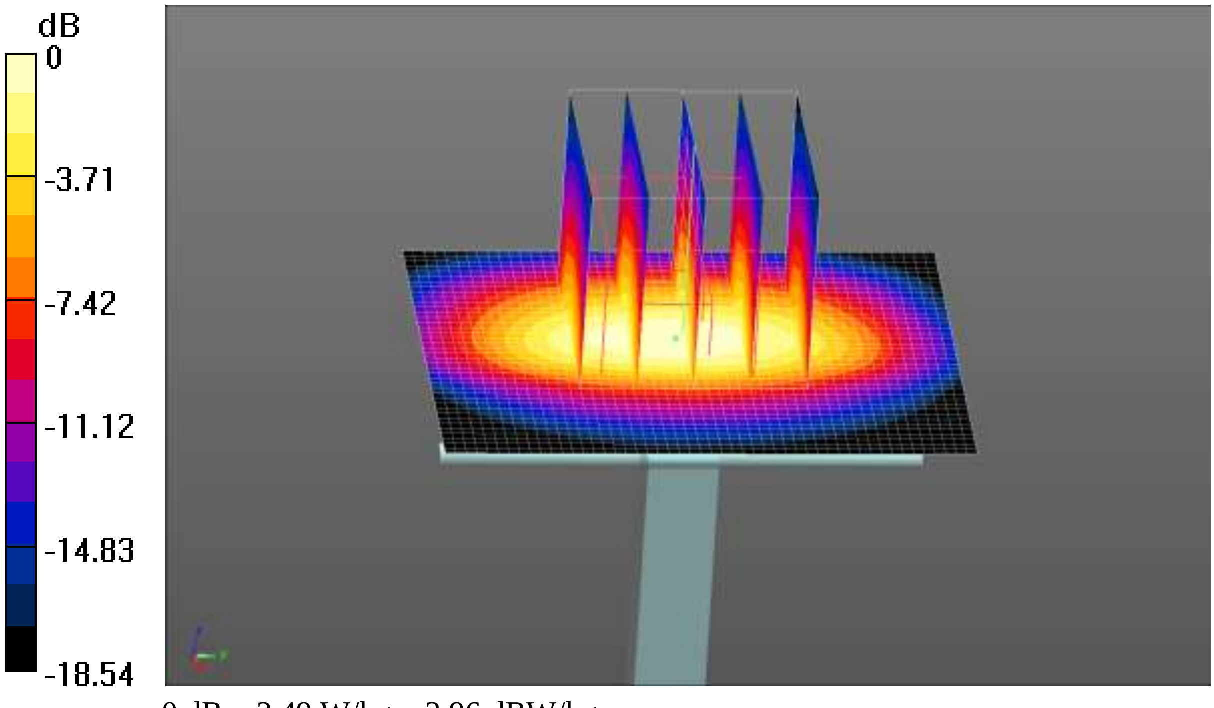
Communication System: UID 0, CW (0); Frequency: 1800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1800 MHz; σ = 1.517 S/m; ε_r = 52.683; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.28, 7.28, 7.28); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 1800MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 38.64 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 3.27 W/kg
SAR(1 g) = 1.6 W/kg; SAR(10 g) = 0.845 W/kg
Maximum value of SAR (measured) = 2.35 W/kg

System Performance Check at Frequency 1800MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (41x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.49 W/kg



0 dB = 2.49 W/kg = 3.96 dBW/kg

Test Laboratory: CCIS Date/Time: 08.21.2019 08:24:16

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d175

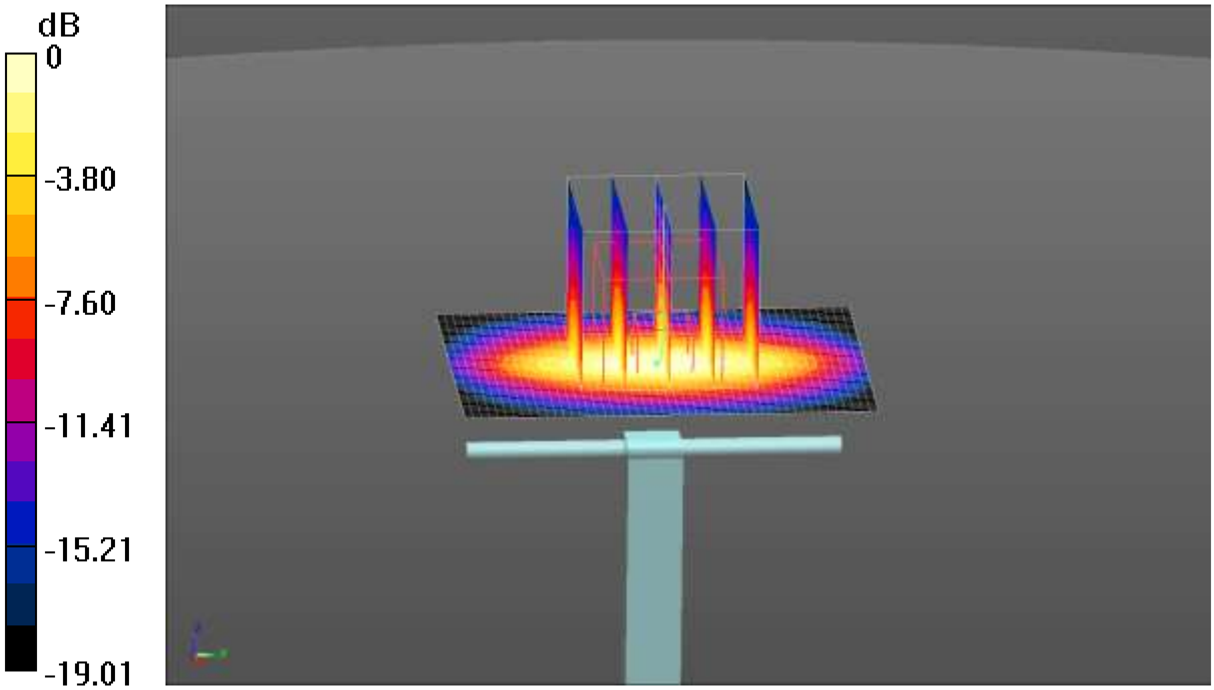
Communication System: UID 0, CW (0); Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.545 S/m; ε_r = 52.318; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.03, 7.03, 7.03); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 1900MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (41x51x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.84 W/kg

System Performance Check at Frequency 1900MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 42.78 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.41 W/kg
SAR(1 g) = 1.65 W/kg; SAR(10 g) = 0.837 W/kg
Maximum value of SAR (measured) = 2.58 W/kg



0 dB = 2.58 W/kg = 4.12 dBW/kg

Test Laboratory: CCIS Date/Time: 08.26.2019 16:41:51

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: SN:910

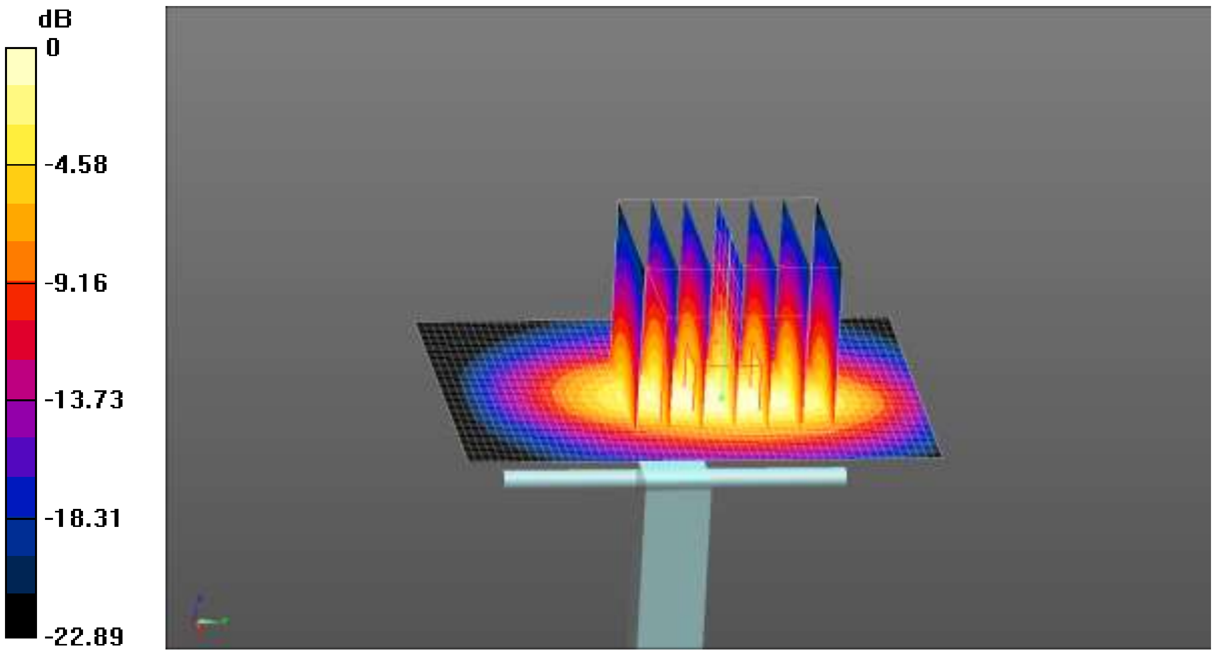
Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.983 S/m; ε_r = 53.627; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.14, 7.14, 7.14); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 2450MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 39.42 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 4.18 W/kg
SAR(1 g) = 2.06 W/kg; SAR(10 g) = 0.932 W/kg
Maximum value of SAR (measured) = 3.06 W/kg

System Performance Check at Frequency 2450MHz Body Tissue/d=10mm, Pin=40 mW, dist=2.0mm (EX-Probe)/Area Scan (51x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 3.38 W/kg



0 dB = 3.38 W/kg = 5.29 dBW/kg

Test Laboratory: CCIS　　　　　　　　Date/Time: 08.26.2019 17:06:28

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: SN:1114

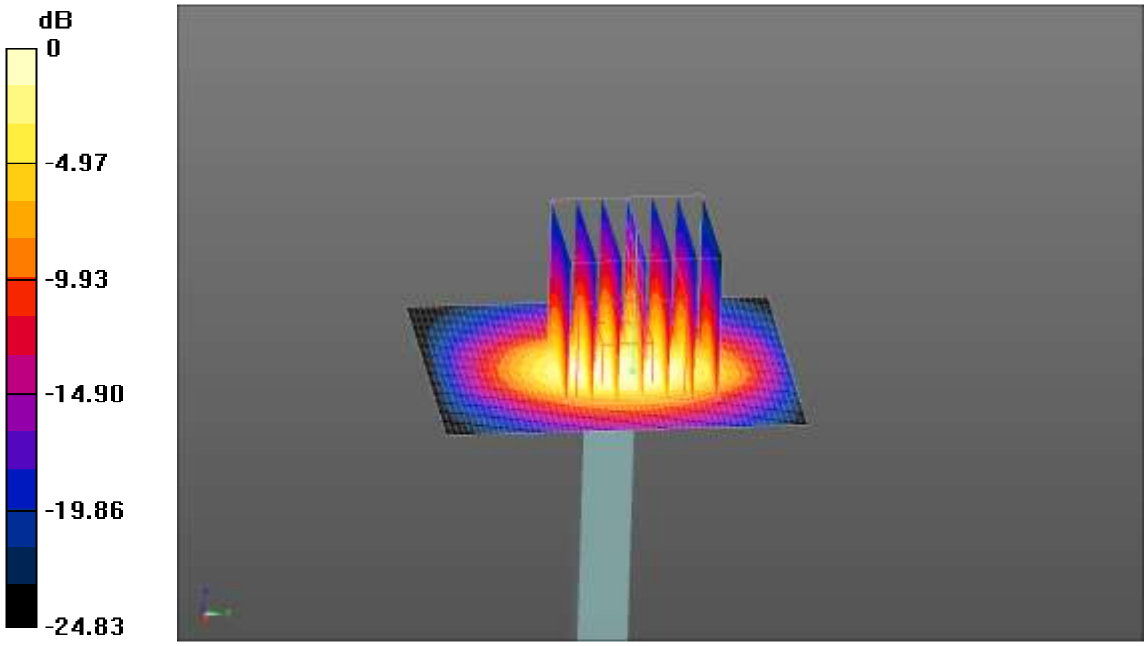
Communication System: UID 0, CW (0); Frequency: 2600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2600 MHz; σ = 2.198 S/m; ε_r = 52.472; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(6.85, 6.85, 6.85); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1208
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

System Performance Check at Frequency 2600MHz Body Tissue/d=10mm, Pin=40mW, dist=2.0mm(EX-Probe)/Area Scan (51x61x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 3.69 W/kg

System Performance Check at Frequency 2600MHz Body Tissue/d=10mm, Pin=40mW, dist=2.0mm(EX-Probe)/Zoom Scan(7X7X7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 38.14 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 4.59 W/kg
SAR(1 g) = 2.19 W/kg; SAR(10 g) = 0.952 W/kg
Maximum value of SAR (measured) = 3.53 W/kg



0 dB = 3.53 W/kg = 5.48 dBW/kg

Appendix B: Plots of SAR Test Data

Test Laboratory: CCIS Date/Time: 08.23.2019 11:13:42

DUT: LTE smartphone; Type: MUV; Serial: 1#

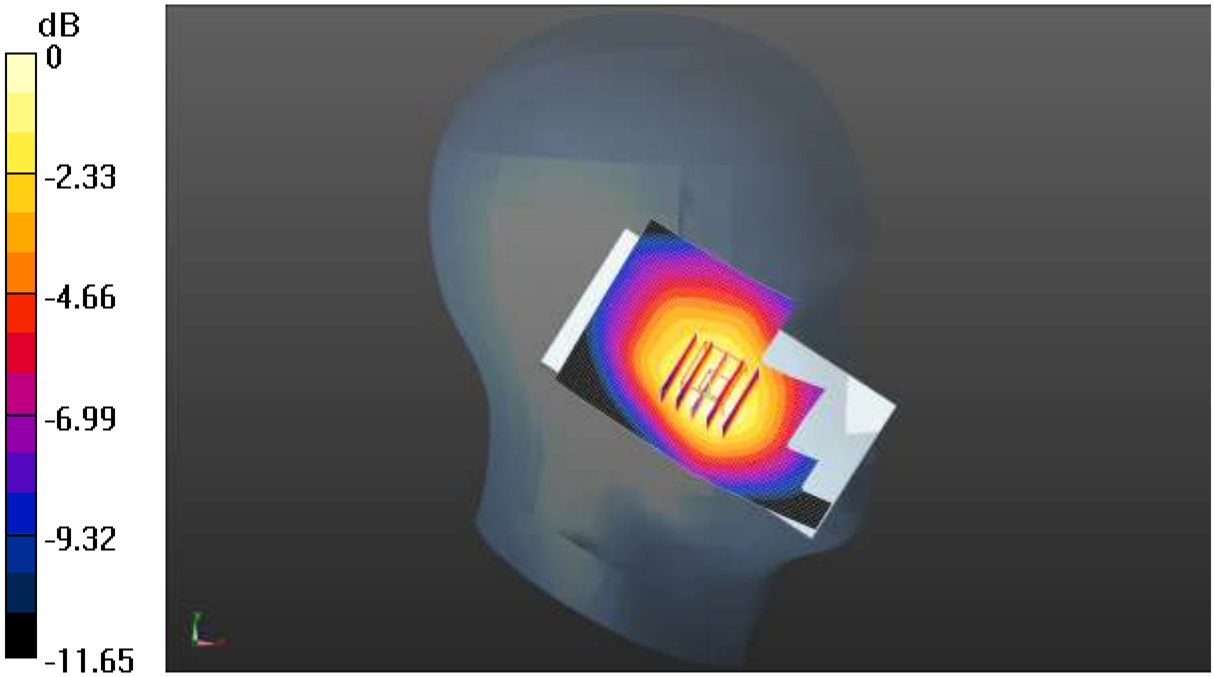
Communication System: UID 0, GSM (0); Frequency: 848.8 MHz; Duty Cycle: 1:8.30042
Medium parameters used (interpolated): f = 848.8 MHz; σ = 0.907 S/m; ε_r = 40.928; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(8.76, 8.76, 8.76); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

GSM 850 Left Cheek/High Channel/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.049 V/m; Power Drift = 0.27 dB
Peak SAR (extrapolated) = 0.319 W/kg
SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.170 W/kg
Maximum value of SAR (measured) = 0.286 W/kg

GSM 850 Left Cheek/High Channel/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.298 W/kg



0 dB = 0.298 W/kg = -5.26 dBW/kg

Test Laboratory: CCIS Date/Time: 08.29.2019 09:17:33

DUT: LTE smartphone; Type: MUV; Serial: 1#

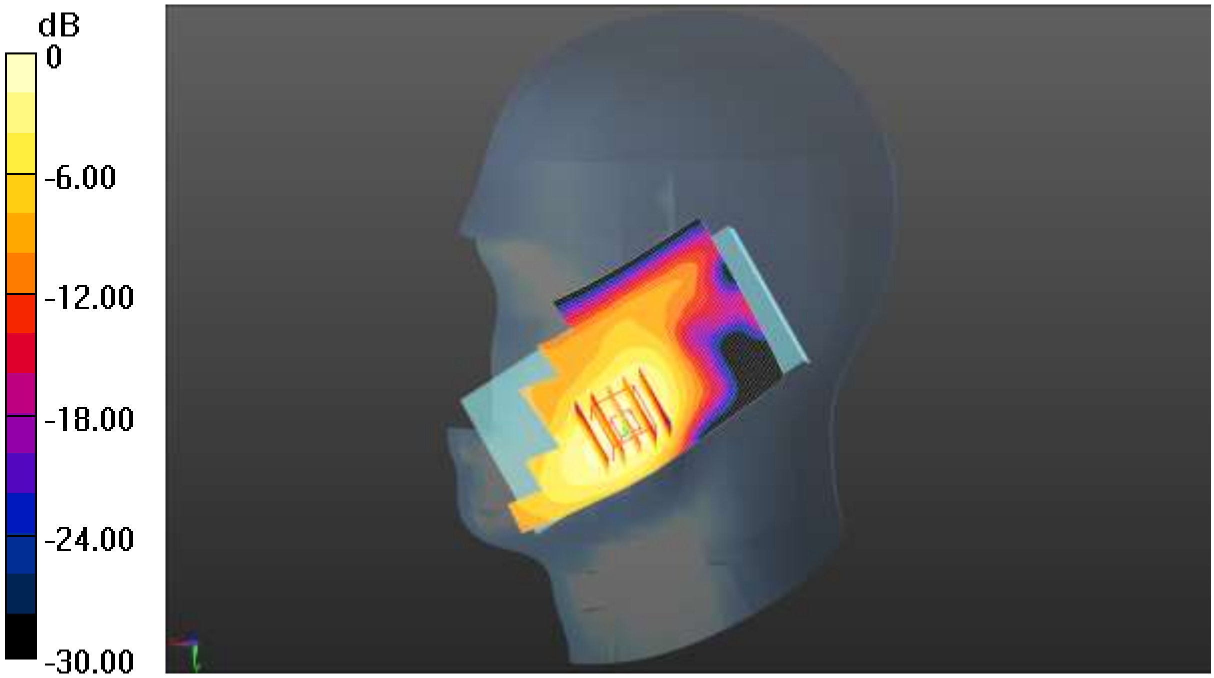
Communication System: UID 0, GSM (0); Frequency: 1880 MHz; Duty Cycle: 1:8.30042
Medium parameters used: f = 1880 MHz; $\sigma = 1.406$ S/m; $\varepsilon_r = 40.348$; $\rho = 1000$ kg/m^3
Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.31, 7.31, 7.31); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

GSM 1900 Right Cheek/Middle Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.400 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.122 W/kg
SAR(1 g) = 0.074 W/kg; SAR(10 g) = 0.044 W/kg
Maximum value of SAR (measured) = 0.104 W/kg

GSM 1900 Right Cheek/Middle Channel/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.108 W/kg



0 dB = 0.108 W/kg = -9.67 dBW/kg

Test Laboratory: CCIS Date/Time: 08.23.2019 12:05:21

DUT: LTE smartphone; Type: MUV; Serial: 1#

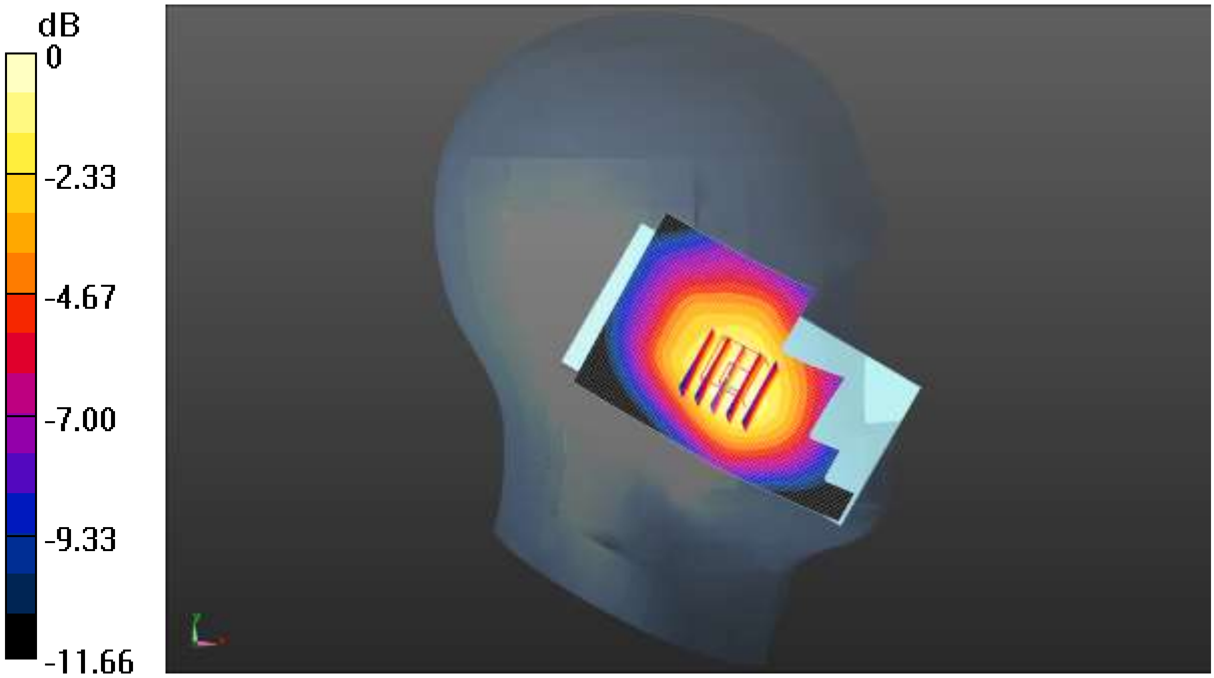
Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 846.6 MHz; σ = 0.907 S/m; ε_r = 40.928; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(8.76, 8.76, 8.76); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

WCDMA 850 Left Cheek/High Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.596 V/m; Power Drift = -0.54 dB
Peak SAR (extrapolated) = 0.250 W/kg
SAR(1 g) = 0.181 W/kg; SAR(10 g) = 0.132 W/kg
Maximum value of SAR (measured) = 0.223 W/kg

WCDMA 850 Left Cheek/High Channel/Area Scan (61x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.236 W/kg



0 dB = 0.236 W/kg = -6.27 dBW/kg

Test Laboratory: CCIS Date/Time: 08.29.2019 11:13:42

DUT: LTE smartphone; Type: MUV; Serial: 1#

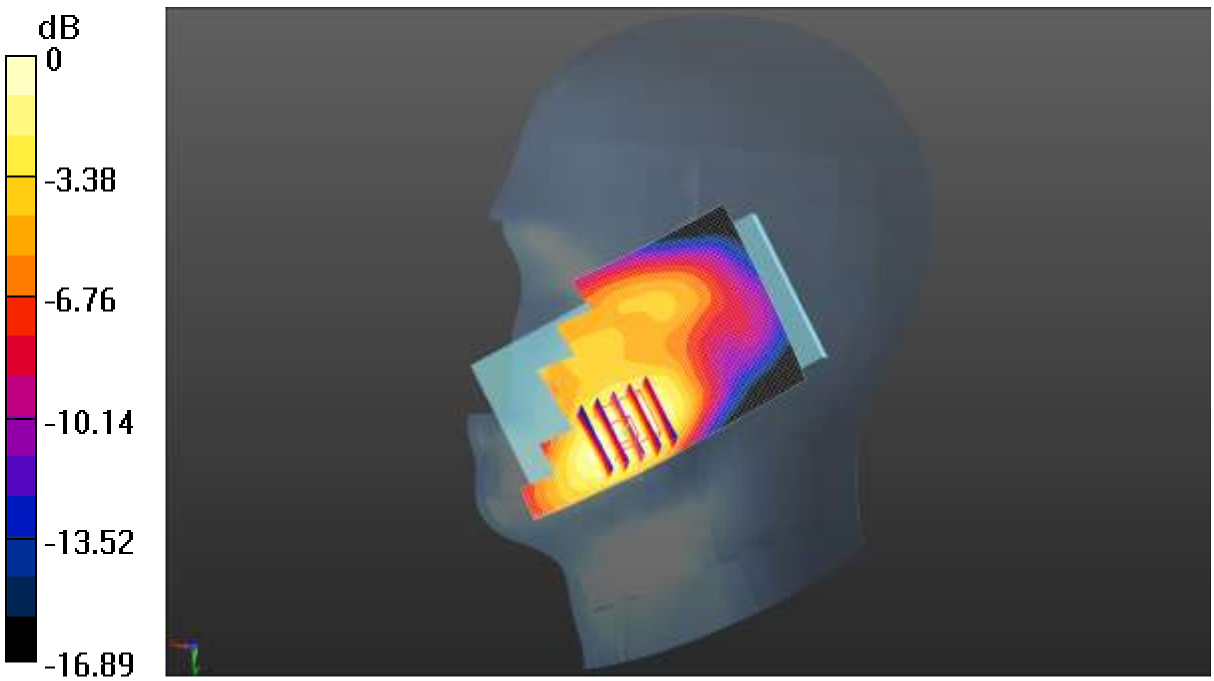
Communication System: UID 0, UMTS-FDD(WCDMA) (0); Frequency: 1752.6 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1752.6 MHz; σ = 1.354 S/m; ε_r = 40.627; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3748; ConvF(7.6, 7.6, 7.6); Calibrated: 06.19.2019;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1373; Calibrated: 08.09.2019
- Phantom: SAM 5.0; Type: QD000P40CD; Serial: TP:1765
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

WCDMA 1700 Right Cheek/High Channel/Area Scan (61x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.293 W/kg

WCDMA 1700 Right Cheek/High Channel/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.440 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 0.311 W/kg
SAR(1 g) = 0.191 W/kg; SAR(10 g) = 0.118 W/kg
Maximum value of SAR (measured) = 0.270 W/kg



0 dB = 0.270 W/kg = -5.69 dBW/kg