FCC SAR REPORT

Applicant: SKY PHONE LLC

Address of Applicant: 1348 Washington Av. Suite 350, Miami Beach, FL 33139

Equipment Under Test (EUT)

Product Name: 4G Smart Phone

Model No.: Sky Black2

Trade mark SKY DEVICES

FCC ID: 2ABOSSKYBLACK2

Applicable standards: FCC 47 CFR Part 2.1093

Date of Test: 30 May., 2021 ~ 11 Jun., 2021

Test Result: Maximum Reported 1-g SAR (W/kg)
Head: 0.514 Body: 0.585 Hotspot: 1.226

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*15 Jun., 2021*	*Original*

Tested by:	Carl Wei	***Date:***	*15 Jun., 2021*
	Test Engineer		
Reviewed by:	Janet Wei	***Date:***	*15 Jun., 2021*
	Project Engineer		

3 Contents

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	0.350	PCE	0.514
	GSM 1900	0.248		
	WCDMA Band V	0.272		
	WCDMA Band II	0.326		
	LTE Band 4	0.514		
	LTE Band 5	0.263		
	LTE Band 7	0.325		
	WLAN 2.4 GHz	0.383	DTS	
Body (10 mm Gap)	GSM 850	0.525	PCE	0.585
	GSM 1900	0.465		
	WCDMA Band V	0.373		
	WCDMA Band II	0.541		
	LTE Band 4	0.410		
	LTE Band 5	0.348		
	LTE Band 7	0.585		
	WLAN 2.4GHz	0.163	DTS	
Hotspot (10 mm Gap)	GSM 850	0.711	PCE	1.226
	GSM 1900	0.511		
	WCDMA Band V	0.373		
	WCDMA Band II	0.541		
	LTE Band 4	0.538		
	LTE Band 5	0.348		
	LTE Band 7	1.226		
	WLAN 2.4 GHz	0.163	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)
Bottom	LTE Band 7	1.226	PCE	1.226
	WLAN 2.4 GHz	/	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.

5 General Information

5.1 Client Information

Applicant:	SKY PHONE LLC
Address of Applicant:	1348 Washington Av. Suite 350, Miami Beach, FL 33139
Manufacturer:	SKY PHONE LLC
Address of Manufacturer:	1348 Washington Av. Suite 350, Miami Beach, FL 33139

5.2 General Description of EUT

<table>
<tr><td>Product Name:</td><td colspan="4">4G Smart Phone</td></tr>
<tr><td>Model No.:</td><td colspan="4">Sky Black2</td></tr>
<tr><td>Category of device</td><td colspan="4">Portable device</td></tr>
<tr><td rowspan="6">Operation Frequency:</td><td>2G :</td><td>GSM850: 824.2~848.8 MHz</td><td colspan="2">PCS 1900: 1850.2~1909.8 MHz</td></tr>
<tr><td>3G :</td><td>Band II: 1852.4~1907.6 MHz</td><td colspan="2">Band V: 826.4~846.6 MHz</td></tr>
<tr><td rowspan="2">4G :</td><td>Band 4 :1710MHz~1755MHz</td><td colspan="2">Band 5 :824MHz~849MHz</td></tr>
<tr><td>Band 7: 2500MHz~2570MHz</td><td colspan="2"></td></tr>
<tr><td>Wi-Fi:</td><td colspan="3">2412MHz~2472MHz</td></tr>
<tr><td colspan="4">Bluetooth: 2402 MHz ~ 2480 MHz</td></tr>
<tr><td rowspan="5">Modulation technology:</td><td>2G:</td><td>☒Voice(GMSK)</td><td>☒GPRS(GMSK)</td><td>☒EGPRS(GMSK, 8PSK)</td></tr>
<tr><td>3G:</td><td>☒RCM(QPSK)</td><td>☒HSUPA(QPSK)</td><td>☒HSDPA(QPSK,16QAM)</td></tr>
<tr><td>4G:</td><td>☒QPSK</td><td>☒16QAM</td><td>☒64QAM</td></tr>
<tr><td>Wi-Fi:</td><td>☒802.11b(DSSS)</td><td colspan="2">☒802.11g/n (OFDM)</td></tr>
<tr><td>Bluetooth:</td><td>☒BDR(GFSK)</td><td>☒EDR(π/4-DQPSK, 8DPSK)</td><td>☒LE(GFSK)</td></tr>
<tr><td>Antenna Type:</td><td colspan="4">Internal Antenna</td></tr>
<tr><td>Antenna Gain:</td><td colspan="4">GSM 850: -2.00 dBi; PCS 1900: -1.20 dBi
WCDMA Band V: -2.00 dBi;WCDMA Band II: -1.20 dBi;
LTE Band 4: -1.00 dBi; LTE Band 5: -2.00 dBi
LTE Band 7: -1.50 dBi;
Bluetooth: 0.50 dBi; 2.4G Wi-Fi: 0.50 dBi;</td></tr>
<tr><td>(E)GPRS Class:</td><td colspan="4">(E)GPRS Class: 12</td></tr>
<tr><td>Dimensions (L*W*H):</td><td colspan="4">125 mm (L)× 65 mm (W)× 10 mm (H)</td></tr>
<tr><td rowspan="2">Accessories information:</td><td colspan="3" rowspan="2">Adapter:
Model: TPA-97050050UU
Input: AC100-240V, 50/60Hz, 0.15A
Output: DC 5.0V, 0.5A</td><td>Battery:
Rechargeable Li-ion Battery 3.7V/1400mAh</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)	32.91	30.06
GPRS (1 TX Slot)	32.88	30.05
GPRS (2 TX Slots)	30.84	27.72
GPRS (3 TX Slots)	28.91	26.11
GPRS (4 TX Slots)	26.70	24.05
EGPRS (1 TX Slot)	25.93	26.17
EGPRS (2 TX Slots)	25.83	26.19
EGPRS (3 TX Slots)	24.68	24.63
EGPRS (4 TX Slots)	22.37	22.43

Mode	Average Power (dBm)	
	WCDMA Band V	WCDMA Band II
AMR 12.2 kbps	22.82	22.75
RMC 12.2 kbps	22.86	22.81
HSDPA Sub-test 1	22.36	22.72
HSDPA Sub-test 2	22.17	22.34
HSDPA Sub-test 3	21.66	22.00
HSDPA Sub-test 4	21.62	22.08
HSUPA Sub-test 1	20.74	20.30
HSUPA Sub-test 2	20.90	20.71
HSUPA Sub-test 3	20.40	20.19
HSUPA Sub-test 4	20.28	20.52
HSUPA Sub-test 5	22.14	22.59

Mode	Average Power (dBm)		
	LTE Band 4	LTE Band 5	LTE Band 7
BW/1.4 MHz	23.09	22.82	/
BW/3.0 MHz	23.06	22.77	/
BW/5.0 MHz	23.08	22.83	21.81
BW/10 MHz	23.10	22.80	21.75
BW/15 MHz	23.17	/	21.78
BW/20 MHz	23.23	/	21.89

WLAN 2.4 GHz Band Average Power (dBm)			
Mode/Band	b	g	n (HT-20)
WLAN 2.4GHz	13.92	11.45	10.77

Bluetooth Average Power (dBm)				
Mode/Band	1 Mbps(GFSK)	2 Mbps(π/4DQPSK)	3 Mbps (8DPSK)	LE (BT 4.0)
Bluetooth	3.23	4.86	5.43	-4.91

5.4 Environment of Test Site

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

5.5 Test Sample Plan

Sample Number	Used for Test Items
10#	SAR
***Remark**: JianYan Testing Group Shenzhen Co., Ltd. is only responsible for the test project data of the above samples, and will keep the above samples for a month.*	

5.6 Test Location

JianYan Testing Group Shenzhen Co., Ltd.
No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community,Xinqiao Street, Bao'an District, Shenzhen, Guangdong,People's Republic of China.
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info-JYTee@lets.com, Website: http://www.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

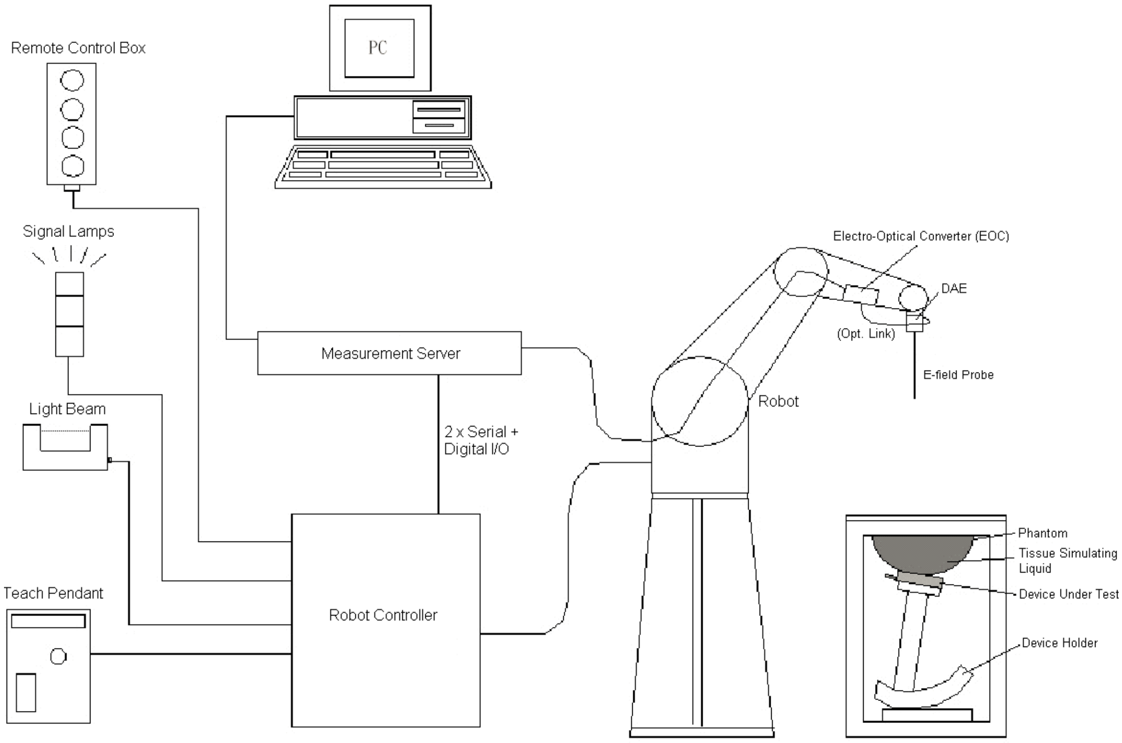

Fig. 8.1 SPEAG DASY System Configurations

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: TX60L) 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; nobelt 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 than0.1 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

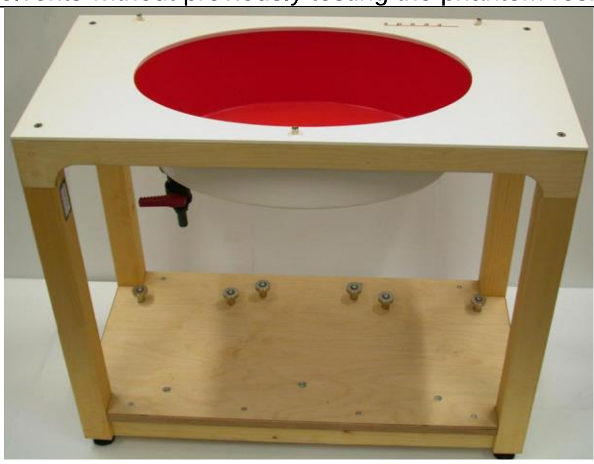

Fig.8.8 Photo of ELI4 Phantom

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	835MHz System Validation Kit	D835V2	4d154	06.11.2019	06.10.2022
SPEAG	1750MHz System Validation Kit	D1750V2	1177	02.10.2021	02.09.2024
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	07.27.2020	07.26.2021
SPEAG	Dosimetric E-Field Probe	EX3DV4	3924	09.23.2020	09.22.2021
SPEAG	DASY 52 Measurement Software	DASY 52	Version 52.10.4.1527	N.C.R	N.C.R
SPEAG	DASY 52 File Conversion Software	SEMCAD X	Version 14.6.14 (7483)	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	03.03.2021	03.02.2022
R&S	Universal Radio Communication Tester	CMU200	113097	06.18.2020	06.17.2021
HP	Network Analyzer	8753D	3410A06291	06.18.2020	06.17.2021
KEYSIGHT	EPM Series Power Meter	N1914A	MY60400002	12.12.2020	12.11.2021
KEYSIGHT	E-Series Power Sensor	E9300H	MY60310002	07.31.2020	07.30.2021
KEYSIGHT	E-Series Power Sensor	E9300H	MY60340003	08.21.2020	08.20.2021
R&S	Signal Generator	N5182A	MY49060014	11.16.2020	11.15.2021
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.

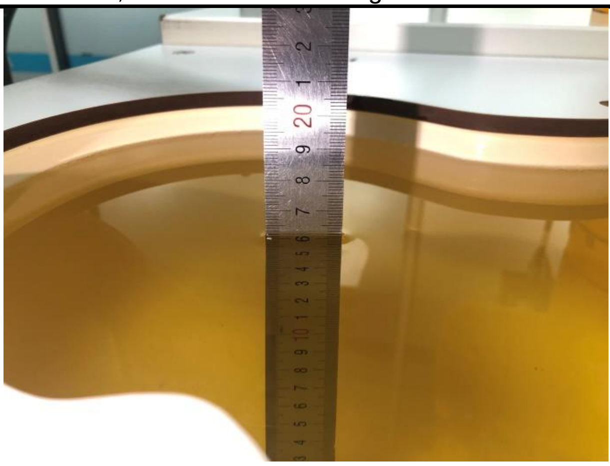

Fig. 9.1 Photo of Liquid Height for Head SAR (700MHz~1000MHz)(depth>15cm)

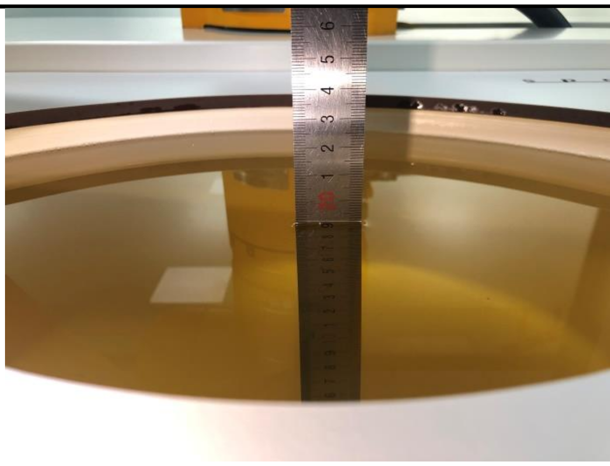

Fig. 9.2 Photo of Liquid Height for Body SAR (700MHz~1000MHz)(depth>15cm)

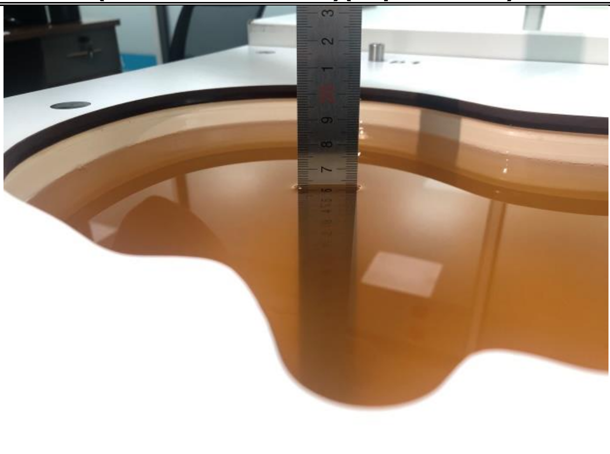

Fig. 9.3 Photo of Liquid Height for Head SAR (1700MHz~2000MHz)(depth>15cm)

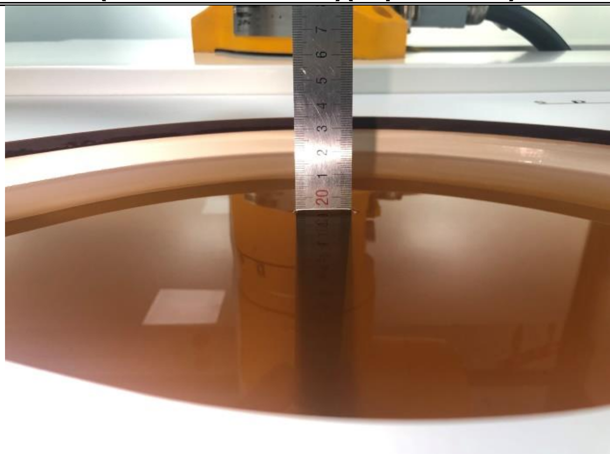

Fig. 9.4 Photo of Liquid Height for Body SAR (1700MHz~2000MHz) (depth>15cm)

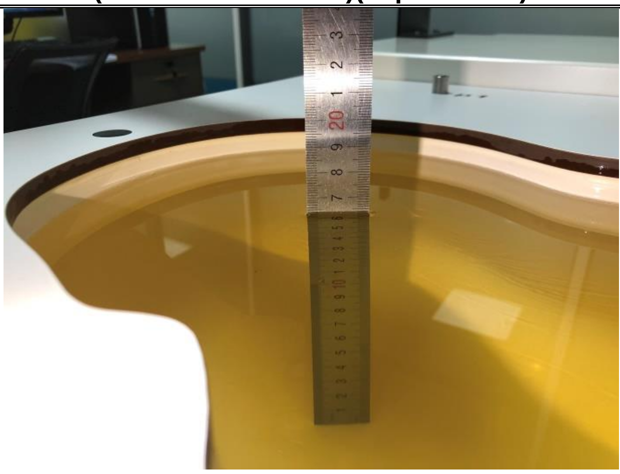

Fig. 9.5 Photo of Liquid Height for Head SAR (2000MHz~2600MHz)(depth>15cm)

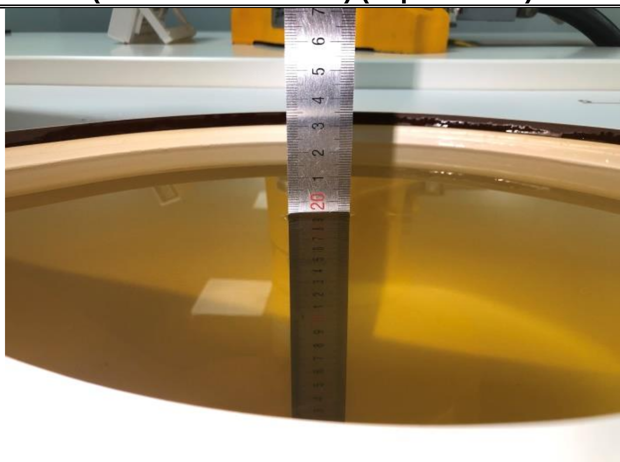

Fig. 9.6 Photo of Liquid Height for Body SAR (2000MHz~2600MHz)(depth>15cm)

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 (MHz)	εr	σ(S/m)
150	52.3	0.76
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
915	41.5	0.98
1450	40.5	1.20
1610	40.3	1.29
1800-2000	40.0	1.40
2450	39.2	1.80
3000	38.5	2.40
5800	35.3	5.27

(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 Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target(σ)	Permittivity Target(εr)	Delta (σ)%	Delta (εr)%	Limit (%)	Date (mm/dd/yy)
835	23.4	0.92	41.96	0.90	41.5	2.22	1.11	±5	05.30.2021
1750	23.5	1.35	40.48	1.37	40.1	-1.46	0.95	±5	06.03.2021
1900	23.2	1.43	39.37	1.40	40.0	2.14	-1.58	±5	06.04.2021
2450	22.9	1.82	38.42	1.80	39.2	1.11	-1.99	±5	06.02.2021
2600	21.0	2.01	38.95	1.96	39.0	2.55	-0.13	±5	06.10.2021

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:

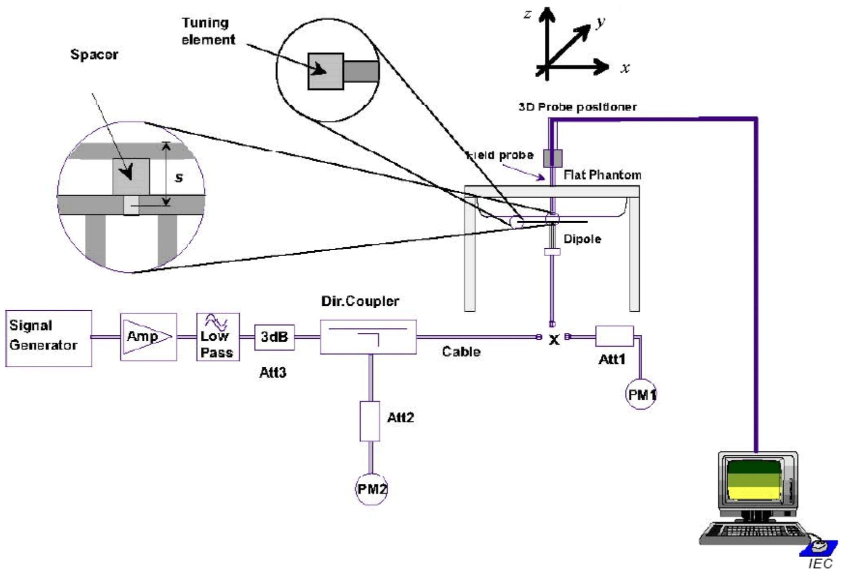

Fig.10.1 System Verification Setup Diagram

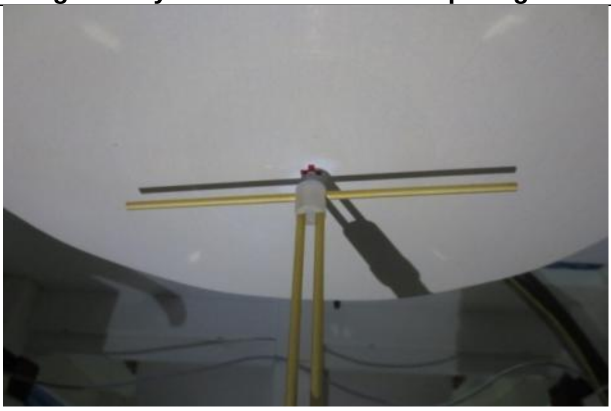

Fig.10.2 Photo of Dipole setup

-

➢ **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)	Power fed onto dipole (mW)	Measured 1g SAR (W/kg)	Normalized to 1W 1g SAR (W/kg)	1W Target 1g SAR (W/kg)	Deviation (%)
05.30.2021	835	80	0.742	9.28	9.49	-2.21
06.03.2021	1750	40	1.44	36.00	36.4	-1.10
06.04.2021	1900	40	1.67	41.75	39.4	5.96
06.02.2021	2450	40	2.19	54.75	52.6	4.09
06.10.2021	2600	40	2.34	58.5	56.3	3.91

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/Left Side /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

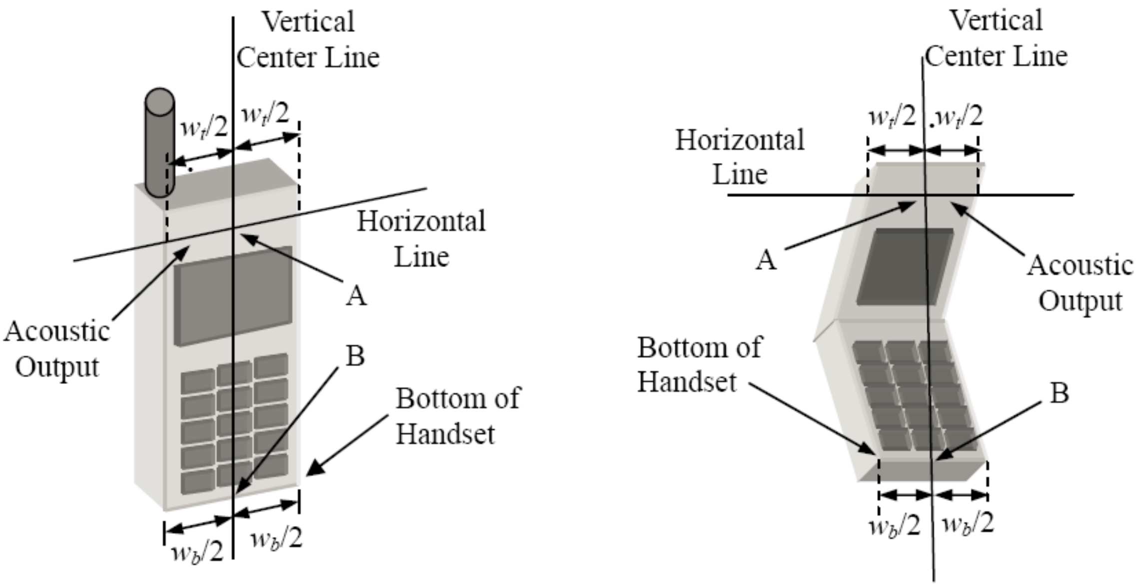

Fig. 11.2 Illustration for Handset Vertical and Horizontal Reference Lines

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.

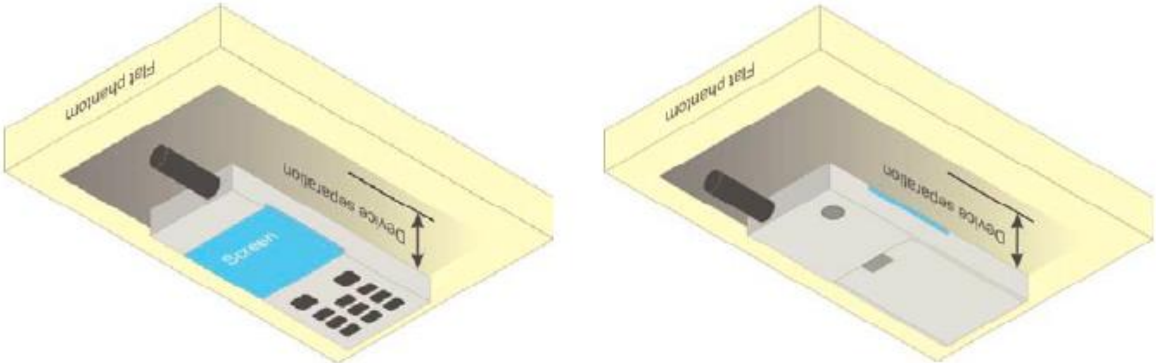

Fig.11.5 Illustration for Body Worn Position

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.

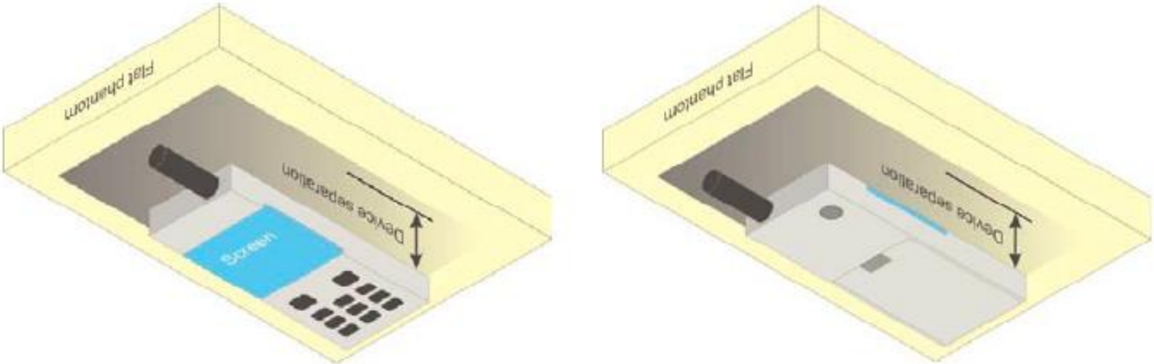

Fig.11.6 Illustration for Hotspot Position

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.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 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}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 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 ≤ 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}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 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		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 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 *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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)	**32.91**	32.61	32.74	23.88	23.58	23.71
GPRS (GMSK, 1 TX slot)	32.88	32.60	32.70	23.85	23.57	23.67
GPRS (GMSK, 2 TX slots)	**30.84**	30.53	30.49	**24.82**	24.51	24.47
GPRS (GMSK, 3 TX slots)	28.91	28.63	28.57	24.65	24.37	24.31
GPRS (GMSK, 4 TX slots)	26.70	26.46	26.41	23.69	23.45	23.40
EGPRS (8PSK, 1 TX slot)	25.93	25.68	25.39	16.90	16.65	16.36
EGPRS (8PSK, 2 TX slots)	25.83	25.75	25.50	19.81	19.73	19.48
EGPRS (8PSK, 3 TX slots)	24.68	24.57	24.27	20.42	20.31	20.01
EGPRS (8PSK, 4 TX slots)	22.37	22.29	21.95	19.36	19.28	18.94

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 2 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)	**30.06**	29.80	29.62	21.03	20.77	20.59
GPRS (GMSK, 1 TX slot)	30.05	29.78	29.61	21.02	20.75	20.58
GPRS (GMSK, 2 TX slots)	27.72	27.41	27.15	21.70	21.39	21.13
GPRS (GMSK, 3 TX slots)	**26.11**	25.81	25.57	**21.85**	21.55	21.31
GPRS (GMSK, 4 TX slots)	24.05	23.74	23.52	21.04	20.73	20.51
EGPRS (8PSK, 1 TX slot)	24.89	26.17	24.91	15.86	17.14	15.88
EGPRS (8PSK, 2 TX slots)	24.72	26.19	25.01	18.70	20.17	18.99
EGPRS (8PSK, 3 TX slots)	23.58	24.63	23.17	19.32	20.37	18.91
EGPRS (8PSK, 4 TX slots)	21.31	22.43	20.58	18.30	19.42	17.57

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 3 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 $\Delta_{CQI} = 8 \Leftrightarrow A_{hs} = \beta_{hs}/\beta_c = 30/15 \Leftrightarrow \beta_{hs} = 30/15 * \beta_c$

Note 2: CM = 1 for $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$.

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 $\beta_c = 11/15$ and $\beta_d = 15/15$.

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 $\beta_c/\beta_d = 12/15$, $\beta_{hs}/\beta_c = 24/15$. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 10/15$ and $\beta_d = 15/15$.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signaled gain factors for the reference TFC (TF1, TF1) to $\beta_c = 14/15$ and $\beta_d = 15/15$.
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	22.43	22.64	22.82
RMC 12.2 kbps	22.46	22.67	**22.86**
HSDPA Sub-test 1	22.30	21.62	22.36
HSDPA Sub-test 2	21.92	21.52	22.17
HSDPA Sub-test 3	21.66	20.84	21.58
HSDPA Sub-test 4	21.59	20.84	21.62
HSUPA Sub-test 1	20.74	19.96	20.74
HSUPA Sub-test 2	20.81	20.17	20.90
HSUPA Sub-test 3	20.38	19.66	20.40
HSUPA Sub-test 4	20.27	19.43	20.28
HSUPA Sub-test 5	22.10	21.42	22.14

WCDMA Average power (dBm)			
Band	WCDMA Band II		
Channel	9262	9400	9538
Frequency (MHz)	1852.4	1880.0	1907.6
AMR 12.2 kbps	22.69	22.75	22.47
RMC 12.2 kbps	22.78	**22.81**	22.52
HSDPA Sub-test 1	22.65	22.72	22.13
HSDPA Sub-test 2	22.34	22.32	21.77
HSDPA Sub-test 3	22.00	21.98	21.45
HSDPA Sub-test 4	22.06	22.08	21.56
HSUPA Sub-test 1	20.30	20.12	19.60
HSUPA Sub-test 2	20.71	20.61	20.09
HSUPA Sub-test 3	20.19	20.10	19.61
HSUPA Sub-test 4	20.52	20.39	19.88
HSUPA Sub-test 5	22.59	22.47	22.03

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.

LTE Band 4 part

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19957	20175	20393
					1710.7MHz	1732.5MHz	1754.3MHz
Band 4	1.4	QPSK	1	0	22.85	22.86	23.06
			1	2	22.80	22.95	23.04
			1	5	22.75	22.89	23.09
			3	0	22.23	22.15	22.09
			3	1	22.20	22.23	22.12
			3	2	22.13	22.20	22.07
			6	0	22.09	22.11	21.98
		16QAM	1	0	22.21	22.41	22.23
			1	2	22.35	22.46	22.29
			1	5	22.30	22.37	22.32
			3	0	21.42	21.64	21.59
			3	1	21.41	21.63	21.55
			3	2	21.45	21.57	21.60
			6	0	21.34	21.44	21.53

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19965	20175	20385
					1711.5MHz	1732.5MHz	1753.5MHz
Band 4	3	QPSK	1	0	22.82	22.98	22.98
			1	7	22.82	23.02	23.00
			1	14	22.77	23.06	23.01
			8	0	22.17	22.21	22.35
			8	4	22.24	22.33	22.25
			8	7	22.18	22.32	22.28
			15	0	22.03	22.18	22.21
		16QAM	1	0	22.33	22.34	22.47
			1	7	22.28	22.49	22.33
			1	14	22.37	22.43	22.41
			8	0	21.42	21.55	21.48
			8	4	21.41	21.59	21.56
			8	7	21.51	21.61	21.61
			15	0	21.32	21.52	21.42

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					19975	20175	20375
					1712.5MHz	1732.5MHz	1752.5MHz
Band 4	5	QPSK	1	0	22.82	22.98	22.86
			1	12	22.73	23.06	23.00
			1	24	22.74	23.08	22.96
			12	0	22.22	22.34	22.38
			12	6	22.25	22.25	22.39
			12	11	22.16	22.36	22.31
			25	0	22.06	22.08	22.21
		16QAM	1	0	22.46	22.37	22.48
			1	12	22.31	22.41	22.58
			1	24	22.43	22.35	22.49
			12	0	21.42	21.59	21.42
			12	6	21.43	21.60	21.50
			12	11	21.43	21.61	21.53
			25	0	21.29	21.56	21.46

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20000	20175	20350
					1715.0MHz	1732.5MHz	1750.0MHz
Band 4	10	QPSK	1	0	22.86	22.96	23.11
			1	24	22.68	23.02	23.08
			1	49	22.84	23.06	23.10
			25	0	22.19	22.20	22.36
			25	12	22.21	22.16	22.29
			25	24	22.22	22.17	22.17
			50	0	22.15	22.15	22.08
		16QAM	1	0	22.39	22.29	22.37
			1	24	22.28	22.41	22.37
			1	49	22.40	22.43	22.35
			25	0	21.39	21.48	21.53
			25	12	21.45	21.37	21.48
			25	24	21.45	21.38	21.44
			50	0	21.36	21.20	21.29

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20025	20175	20325
					1717.5MHz	1732.5MHz	1747.5MHz
Band 4	15	QPSK	1	0	22.93	22.92	23.13
			1	37	22.87	23.00	23.17
			1	74	22.96	23.10	23.15
			36	0	22.19	22.26	22.22
			36	16	22.20	22.31	22.26
			36	35	22.20	22.27	22.27
			75	0	22.18	22.15	22.14
		16QAM	1	0	22.35	22.39	22.52
			1	37	22.30	22.48	22.51
			1	74	22.42	22.45	22.46
			36	0	21.42	21.42	21.45
			36	16	21.43	21.51	21.43
			36	35	21.38	21.47	21.54
			75	0	21.22	21.44	21.35

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20050	20175	20300
					1720.0MHz	1732.5MHz	1745.0MHz
Band 4	20	QPSK	1	0	22.86	22.96	23.10
			1	49	22.77	23.23	23.03
			1	99	23.11	23.21	23.05
			50	0	22.22	22.31	22.36
			50	24	22.28	22.31	22.31
			50	49	22.24	22.30	22.42
			100	0	22.19	22.22	22.03
		16QAM	1	0	22.32	22.34	22.56
			1	49	22.36	22.44	22.46
			1	99	22.40	22.53	22.55
			50	0	21.44	21.51	21.47
			50	24	21.39	21.37	21.59
			50	49	21.33	21.45	21.46
			100	0	21.39	21.31	21.30

LTE Band 5 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20407	20525	20643
					824.7MHz	836.5MHz	848.3MHz
Band 5	1.4	QPSK	1	0	22.62	22.45	22.73
			1	2	22.46	22.57	22.82
			1	5	22.50	22.59	22.77
			3	0	22.17	22.15	22.16
			3	1	22.14	22.21	22.21
			3	2	22.23	22.18	22.24
			6	0	22.06	22.04	22.08
		16QAM	1	0	22.11	22.02	22.05
			1	2	22.05	21.95	22.07
			1	5	22.09	22.04	22.12
			3	0	21.18	21.16	21.15
			3	1	21.27	21.12	21.22
			3	2	21.25	21.12	21.20
			6	0	21.11	21.06	21.02

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20415	20525	20635
					825.5MHz	836.5MHz	847.5MHz
Band 5	3	QPSK	1	0	22.56	22.70	22.74
			1	7	22.59	22.64	22.76
			1	14	22.53	22.66	22.77
			8	0	21.97	22.09	22.17
			8	4	22.07	22.12	22.14
			8	7	22.12	22.08	22.27
			15	0	21.93	22.01	22.07
		16QAM	1	0	22.13	22.20	22.16
			1	7	22.14	22.13	22.17
			1	14	22.08	22.08	22.13
			8	0	21.15	21.15	21.02
			8	4	21.08	21.10	21.11
			8	7	21.20	21.17	21.25
			15	0	20.95	21.03	21.01

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20425	20525	20625
					826.5MHz	836.5MHz	846.5MHz
Band 5	5	QPSK	1	0	22.71	22.61	22.83
			1	12	22.61	22.68	22.72
			1	24	22.65	22.74	22.81
			12	0	22.08	22.17	22.02
			12	6	21.99	22.19	22.04
			12	11	22.00	22.19	22.11
			25	0	21.91	22.05	21.98
		16QAM	1	0	22.07	22.12	22.02
			1	12	22.07	22.00	22.05
			1	24	22.10	22.07	22.07
			12	0	21.28	21.25	21.27
			12	6	21.19	21.23	21.21
			12	11	21.13	21.36	21.48
			25	0	21.10	21.07	21.13

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20450	20525	20600
					829MHz	836.5MHz	844MHz
Band 5	10	QPSK	1	0	22.58	22.63	22.59
			1	24	22.55	22.68	22.80
			1	49	22.60	22.76	22.73
			25	0	22.09	22.17	22.10
			25	12	22.05	22.06	22.13
			25	24	22.03	22.09	22.21
			50	0	22.01	22.02	22.11
		16QAM	1	0	22.10	22.07	22.01
			1	24	22.04	22.11	22.05
			1	49	22.19	22.04	22.02
			25	0	21.21	21.22	21.26
			25	12	21.18	21.17	21.28
			25	24	21.23	21.21	21.27
			50	0	21.19	21.15	21.17

LTE Band 7 part:

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20775	21100	21425
					2502.5MHz	2535.0MHz	2567.5MHz
Band 7	5	QPSK	1	0	21.80	21.77	21.67
			1	12	21.81	21.73	21.76
			1	24	21.78	21.71	21.68
			12	0	21.18	21.08	21.05
			12	6	21.15	21.17	20.98
			12	11	21.13	21.11	21.12
			25	0	21.04	20.99	20.91
		16QAM	1	0	21.38	21.35	21.42
			1	12	21.44	21.48	21.38
			1	24	21.52	21.47	21.56
			12	0	20.72	20.63	20.68
			12	6	20.71	20.63	20.65
			12	11	20.69	20.64	20.63
			25	0	20.61	20.52	20.54

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20800	21100	21400
					2505.0MHz	2535.0MHz	2565.0MHz
Band 7	10	QPSK	1	0	21.75	21.67	21.74
			1	24	21.62	21.58	21.53
			1	49	21.59	21.51	21.47
			25	0	21.01	20.98	20.87
			25	12	21.03	21.01	21.03
			25	24	20.96	20.94	20.94
			50	0	20.97	20.90	20.88
		16QAM	1	0	21.07	20.94	20.99
			1	24	21.02	21.08	21.04
			1	49	20.91	20.99	21.12
			25	0	20.46	20.29	20.13
			25	12	20.46	20.18	20.09
			25	24	20.45	20.27	20.00
			50	0	20.35	20.14	20.05

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20825 2507.5MHz	21100 2535.0MHz	21375 2562.5MHz
Band 7	15	QPSK	1	0	21.61	21.68	21.68
			1	37	21.51	21.76	21.76
			1	74	21.69	21.75	21.78
			36	0	20.82	20.96	21.00
			36	16	20.95	20.87	20.99
			36	35	20.90	20.82	20.87
			75	0	20.82	20.71	20.92
		16QAM	1	0	21.09	20.97	21.09
			1	37	20.98	21.06	21.15
			1	74	21.03	21.01	21.08
			36	0	20.35	20.37	20.33
			36	16	20.35	20.32	20.19
			36	35	20.35	20.27	20.22
			75	0	20.20	20.29	20.17

LTE Band	Bandwidth (MHz)	Modulation	RB Size	RB Offset	Average Power (dBm)		
					20850 2510.0MHz	21100 2535.0MHz	21350 2560.0MHz
Band 7	20	QPSK	1	0	21.86	21.83	21.59
			1	49	21.74	21.89	21.64
			1	99	21.74	21.87	21.76
			50	0	20.96	20.88	20.84
			50	24	20.84	20.89	20.86
			50	49	20.85	20.96	20.97
			100	0	20.78	20.88	20.81
		16QAM	1	0	21.17	21.08	21.08
			1	49	21.25	21.19	21.03
			1	99	21.10	21.02	21.12
			50	0	20.26	20.38	20.14
			50	24	20.24	20.30	20.15
			50	49	20.22	20.37	20.13
			100	0	20.25	20.14	20.18

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	12.12	9.91	9.41
CH 06	2437	**13.92**	**11.45**	10.77
CH 11	2462	12.87	10.99	10.43

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 11	2.437	14.0	25.12	5	7.84	3.0
g/CH 06	2.437	11.5	14.13	5	4.41	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 99.81%, so the duty cycle factor is 1.01

13.5 Bluetooth Conducted Power

Average Power (dBm) (Bluetooth)				
Channel	Frequency (MHz)	GFSK	π/4-DQPSK	8DPSK
CH 00	2402	-0.18	1.85	2.39
CH 39	2441	2.52	4.34	4.37
CH 78	2480	3.23	4.86	**5.43**

Average Power (dBm)		
Channel	Frequency (MHz)	BLE
CH 00	2402	-5.84
CH 20	2442	-5.43
CH 39	2480	-4.91

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 78	2.480	5.5	3.55	5	1.14	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

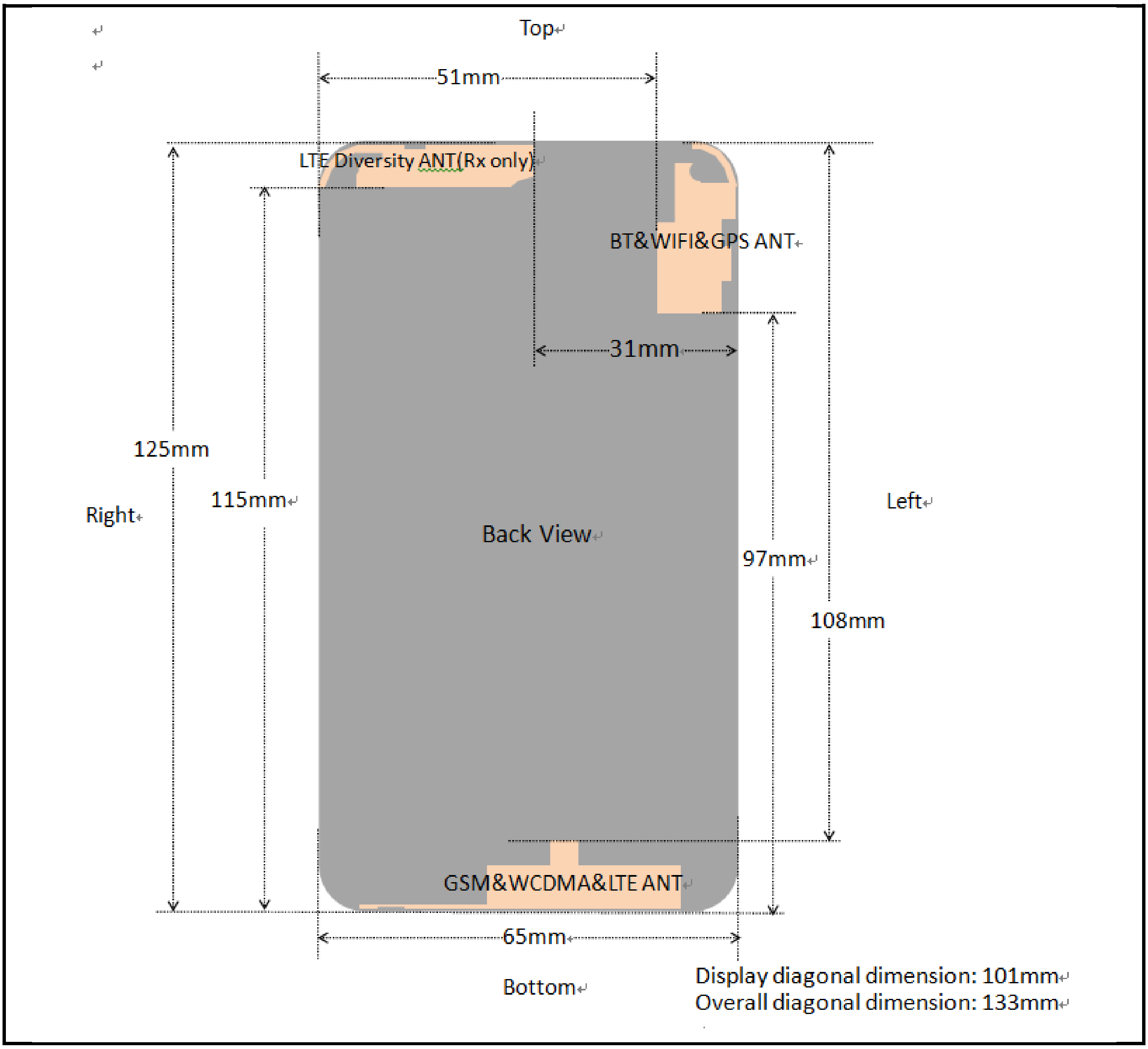

Fig.14.1 EUT Antenna Locations

Note: This antenna diagram is only used as a reference for the distance from the antenna to each edge. For the specific shape of the antenna, please refer to the physical photo.

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	108mm	<25mm	<25mm	<25mm
WLAN & Bluetooth	<25mm	<25mm	<25mm	97mm	51mm	<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	128	824.2	32.91	0.13	33.0	0.310	1.021	0.317
	GSM850/Voice	Right Tilted	128	824.2	32.91	-0.14	33.0	0.142	1.021	0.145
1	GSM850/Voice	Left Cheek	128	824.2	32.91	-0.04	33.0	**0.343**	1.021	0.350
	GSM850/Voice	Left Tilted	128	824.2	32.91	0.11	33.0	0.159	1.021	0.162
2	GSM1900/Voice	Right Cheek	512	1850.2	30.06	-0.04	30.5	**0.224**	1.107	0.248
	GSM1900/Voice	Right Tilted	512	1850.2	30.06	-0.18	30.5	0.104	1.107	0.115
	GSM1900/Voice	Left Cheek	512	1850.2	30.06	0.01	30.5	0.152	1.107	0.168
	GSM1900/Voice	Left Tilted	512	1850.2	30.06	0.05	30.5	0.072	1.107	0.080
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	22.86	0.05	23.0	0.241	1.033	0.249
	Band V/RMC	Right Tilted	4233	846.6	22.86	0.02	23.0	0.111	1.033	0.115
3	Band V/RMC	Left Cheek	4233	846.6	22.86	-0.13	23.0	**0.263**	1.033	0.272
	Band V/RMC	Left Tilted	4233	846.6	22.86	0.16	23.0	0.123	1.033	0.127
4	Band II/RMC	Right Cheek	9400	1880.0	22.81	0.15	23.0	**0.312**	1.045	0.326
	Band II/RMC	Right Tilted	9400	1880.0	22.81	0.10	23.0	0.151	1.045	0.158
	Band II/RMC	Left Cheek	9400	1880.0	22.81	-0.14	23.0	0.267	1.045	0.279
	Band II/RMC	Left Tilted	9400	1880.0	22.81	0.02	23.0	0.126	1.045	0.132
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)
5	Band4/RB#49	Right Cheek	20175	1732.5	23.23	0.06	23.5	**0.483**	1.064	0.514
	Band4/RB#49	Right Tilted	20175	1732.5	23.23	-0.16	23.5	0.232	1.064	0.247
	Band4/RB#49	Left Cheek	20175	1732.5	23.23	0.07	23.5	0.404	1.064	0.430
	Band4/RB#49	Left Tilted	20175	1732.5	23.23	0.02	23.5	0.197	1.064	0.210
	Band7/RB#49	Right Cheek	21100	2535.0	21.89	-0.06	22.0	0.186	1.026	0.191
	Band7/RB#49	Right Tilted	21100	2535.0	21.89	0.01	22.0	0.088	1.026	0.090
6	Band7/RB#49	Left Cheek	21100	2535.0	21.89	-0.03	22.0	**0.317**	1.026	0.325
	Band7/RB#49	Left Tilted	21100	2535.0	21.89	0.05	22.0	0.152	1.026	0.156
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)
	Band5/RB#24	Right Cheek	20600	844.0	22.80	-0.10	23.0	0.226	1.047	0.237
	Band5/RB#24	Right Tilted	20600	844.0	22.80	0.03	23.0	0.104	1.047	0.109
7	Band5/RB#24	Left Cheek	20600	844.0	22.80	0.20	23.0	**0.251**	1.047	0.263
	Band5/RB#24	Left Tilted	20600	844.0	22.80	-0.09	23.0	0.119	1.047	0.125
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak					**1.6 W/kg (mW/g) Averaged over 1g**					

Uncontrolled Exposure/General Population	

➢ 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)
8	Band4/RB#49	Right Cheek	20300	1745.0	22.42	0.03	22.5	**0.430**	1.019	0.438
	Band4/RB#49	Right Tilted	20300	1745.0	22.42	0.15	22.5	0.202	1.019	0.206
	Band4/RB#49	Left Cheek	20300	1745.0	22.42	-0.07	22.5	0.352	1.019	0.359
	Band4/RB#49	Left Tilted	20300	1745.0	22.42	-0.18	22.5	0.159	1.019	0.162
	Band7/RB#49	Right Cheek	21350	2560.0	20.97	-0.10	21.0	0.135	1.007	0.136
	Band7/RB#49	Right Tilted	21350	2560.0	20.97	-0.06	21.0	0.061	1.007	0.061
9	Band7/RB#49	Left Cheek	21350	2560.0	20.97	0.06	21.0	**0.259**	1.007	0.261
	Band7/RB#49	Left Tilted	21350	2560.0	20.97	0.10	21.0	0.108	1.007	0.109
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)
	Band5/RB#24	Right Cheek	20600	844.0	22.21	-0.07	22.5	0.201	1.069	0.215
	Band5/RB#24	Right Tilted	20600	844.0	22.21	0.05	22.5	0.092	1.069	0.098
10	Band5/RB#24	Left Cheek	20600	844.0	22.21	-0.12	22.5	**0.232**	1.069	0.248
	Band5/RB#24	Left Tilted	20600	844.0	22.21	-0.09	22.5	0.108	1.069	0.115
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)
11	2.4GHz/802.11b	Right Cheek	06	2437.0	13.92	-0.07	14.0	**0.372**	1.019	1.01	0.383
	2.4GHz/802.11b	Right Tilted	06	2437.0	13.92	0.01	14.0	0.204	1.019	1.01	0.210
	2.4GHz/802.11b	Left Cheek	06	2437.0	13.92	0.11	14.0	0.243	1.019	1.01	0.250
	2.4GHz/802.11b	Left Tilted	06	2437.0	13.92	-0.02	14.0	0.144	1.019	1.01	0.148
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 14.13mW(11.5dBm) and 25.12mW(14.0dBm), the scaled SAR would be 0.383×(14.13/25.12)=0.215W/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	128	824.2	32.91	0.02	33.0	0.437	1.021	0.446
12	GSM850/Voice	Back	128	824.2	32.91	-0.19	33.0	**0.514**	1.021	0.525
	GSM1900/Voice	Front	512	1850.2	30.06	0.01	30.5	0.292	1.107	0.323
13	GSM1900/Voice	Back	512	1850.2	30.06	0.14	30.5	**0.420**	1.107	0.465
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	22.86	0.00	23.0	0.323	1.033	0.334
14	Band V/RMC	Back	4233	846.6	22.86	-0.04	23.0	**0.361**	1.033	0.373
	Band II/RMC	Front	9400	1880.0	22.81	-0.02	23.0	0.304	1.045	0.318
15	Band II/RMC	Back	9400	1880.0	22.81	0.06	23.0	**0.518**	1.045	0.541
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)
16	Band4/RB#49	Front	20175	1732.5	23.23	0.11	23.5	**0.385**	1.064	0.410
	Band4/RB#49	Back	20175	1732.5	23.23	0.02	23.5	0.273	1.064	0.290
17	Band7/RB#49	Front	21100	2535.0	21.89	-0.15	22.0	**0.570**	1.026	0.585
	Band7/RB#49	Back	21100	2535.0	21.89	0.00	22.0	0.479	1.026	0.491
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 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)
18	Band5/RB#24	Front	20600	844.0	22.80	-0.14	23.0	**0.332**	1.047	0.348
	Band5/RB#24	Back	20600	844.0	22.80	-0.15	23.0	0.321	1.047	0.336
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)
19	Band4/RB#49	Front	20300	1745.0	22.42	0.17	22.5	**0.349**	1.019	0.356
	Band4/RB#49	Back	20300	1745.0	22.42	-0.05	22.5	0.255	1.019	0.260
20	Band7/RB#49	Front	21350	2560.0	20.97	-0.03	21.0	**0.537**	1.007	0.541
	Band7/RB#49	Back	21350	2560.0	20.97	-0.03	21.0	0.431	1.007	0.434
ANSI / IEEE C95.1 – SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					**1.6 W/kg (mW/g) Averaged over 1g**					