REPORT No. : SZ19020019S01

TEST REPORT

APPLICANT	:	BLU Products, Inc.
PRODUCT NAME	:	Mobile phone
MODEL NAME	:	G5,V5,D701,STUDIO MINI
BRAND NAME	:	BLU
FCC ID	:	YHLBLUG5
STANDARD(S)	:	47CFR 2.1093 IEEE 1528-2013
RECEIPT DATE	:	2019-03-18
TEST DATE	:	2019-03-23 to 2019-03-29
ISSUE DATE	:	2019-05-21

Edited by: Su Jinhai

Su Jinhai (Rapporteur)

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DIRECTORY

Annex E DASY Calibration Certificate

Change History		
Version	**Date**	**Description**
1.0	2019-04-18	Original
2.0	2019-05-21	Update the model name

1 SAR Results Summary

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

<Highest Reported standalone SAR Summary>

Frequency Band		Highest SAR Summary (1g SAR (W/kg))		
		Head	Body-worn	Hotspot
		Separation (0mm)	Separation (10mm)	Separation (10mm)
GSM	GSM 850	**0.440**	**0.765**	**0.765**
	GSM 1900	0.083	0.098	0.126
WCDMA	Band II	0.163	0.201	0.205
	Band IV	0.100	0.136	0.141
	Band V	0.138	0.228	0.228
LTE	Band 2	0.169	0.235	0.245
	Band 4	0.087	0.146	0.168
	Band 5	0.291	0.347	0.379
	Band 12	0.047	0.058	0.058
WLAN	2.4GHz WLAN	0.187	0.087	0.087
2.4GHz Band	Bluetooth	N/A	N/A	N/A
Highest Simultaneous Transmission 1g SAR (W/kg)		Head	Body-worn	Hotspot
WWAN+WLAN 2.4GHz		0.627	0.852	0.852
WWAN+BT		N/A	0.858	0.858

Max Scaled SAR_{1g} (W/Kg):	Head	0.440W/kg	Limit(W/kg): 1.6 W/kg
	Body-worn	0.765W/kg	
	Hotspot	0.765W/kg	

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 17 is full covered by FDD-LTE Band 12, so only FDD-LTE Band 12 was tested.

2 Technical Information

Note: Provide by manufacturer.

2.1 Applicant and Manufacturer Information

Applicant:	BLU Products,Inc.
Applicant Address:	10814 NW 33rd St # 100 Doral, FL 33172, Doral, Florida, United States
Manufacturer:	BLU Products, Inc.
Manufacturer Address:	10814 NW 33rd St # 100 Doral, FL 33172, Doral, Florida, United States

2.2 Equipment Under Test (EUT) Description

EUT Type:	Mobile phone
Hardware Version:	FS171-MB-V0.1
Software Version:	BLU_G0090_V9.0.01.00
Frequency Bands:	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band II: 1850 MHz ~1910 MHz WCDMA Band IV: 1712.4MHz ~ 1752.6MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850MHz ~ 1910MHz LTE Band 4: 1710MHz ~ 1755MHz LTE Band 5: 824MHz ~ 849MHz LTE Band 12: 699MHz ~ 716MHz LTE Band 17: 704MHz ~ 716MHz WLAN: 802.11b/g/n-HT20:2412 MHz ~2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Modulation Mode:	GSM/GPRS: GMSK, EDGE: 8PSK WCDMA: QPSK LTE: QPSK/16QAM/64QAM 802.11b: DSSS 802.11g/n HT20: OFDM Bluetooth: GFSK, π/4-DQPSK, 8-DPSK BLE:GFSK
Multi-slot Class:	Multi-Slot Class 12
Operation Class	Class B
Hotspot Mode:	Support
Antenna Type:	PIFA Antenna
SIM cards description:	For dual SIM card version, SIM1(GSM/WCDMA/LTE)and SIM2(GSM) select SIM1 for full testing.

Note:

1.According to the certificate holder, the model G5,V5,D701 and STUDIO MINI are accordant in both hardware and software ,the application information of G5,V5,D701 and STUDIO MINI are identical,these four models only differ in model number.

2.For a more detailed description, please refer to specification or user's manual supplied by the applicant and/or manufacturer.

2.3 Environment of Test Site

Temperature:	20 ... 25 ° C
Humidity:	30 ... 75 %
Atmospheric Pressure:	980 ... 1020 hPa

Test frequency:	GSM 850MHz/1900MHz; WCDMA Band II/IV/V; FDD-LTE Band 2/4/5/12/17; WLAN; Bluetooth;
Operation mode:	Call established
Power Level:	GSM 850MHz Maximum output power(level 5); GSM 1900MHz Maximum output power(level 0); WCDMA Band II/IV/V (All Up Bits); FDD-LTE Band 2/4/5/12/17 (Maximum output power); WLAN; Bluetooth;

During SAR test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition. A communication link is set up with a System Simulator (SS) by air link, and a call is established.

The EUT shall use its internal transmitter. The antenna(s), battery and accessories shall be those specified by the Factory. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power output. If a wireless link is used, the antenna connected to the output of the base station simulator shall be placed at least 50 cm away from the handset.

The signal transmitted by the simulator to the antenna feeding point shall be lower than the output power level of the handset by at least 35 dB.

For SAR testing, EUT is in GPRS mode. In GPRS link mode, its crest factor is 2, because EUT is set in GPRS multi-slot class 12 with 4 uplink slots. In WCDMA mode, its crest factor is 1.

3 Introduction

3.1 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.

3.2 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:

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

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

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

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

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

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.

4 RF Exposure Limits

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

Type Exposure	Uncontrolled Environment Limit
Spatial Peak SAR (1g cube tissue for head and trunk)	1.60W/kg
Spatial Peak SAR (10g cube tissue for limbs)	4.00W/kg
Spatial Peak SAR (1g cube tissue for whole body)	0.08W/kg

Note:
1. This limit is according to recommendation1999/519/EC, Annex II (Basic Restrictions)
2. Occupational/Uncontrolled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure,(i.e. as a result of employment or occupation)

5 Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	47 CFR§2.1093	Radio Frequency Radiation Exposure Evaluation: Portable Devices
2	IEEE 1528-2013	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices:Measurement Techniques
3	KDB 447498 D01v06	General RF Exposure Guidance
4	KDB 865664 D01v01r04	SAR Measurement 100 MHz to 6 GHz
5	KDB 865664 D02v01r02	RF Exposure Reporting
6	KDB 648474 D04v01r03	Handset SAR
7	KDB 941225 D01v03r01	3G SAR Measurement Procedures

6 SAR Measurement System

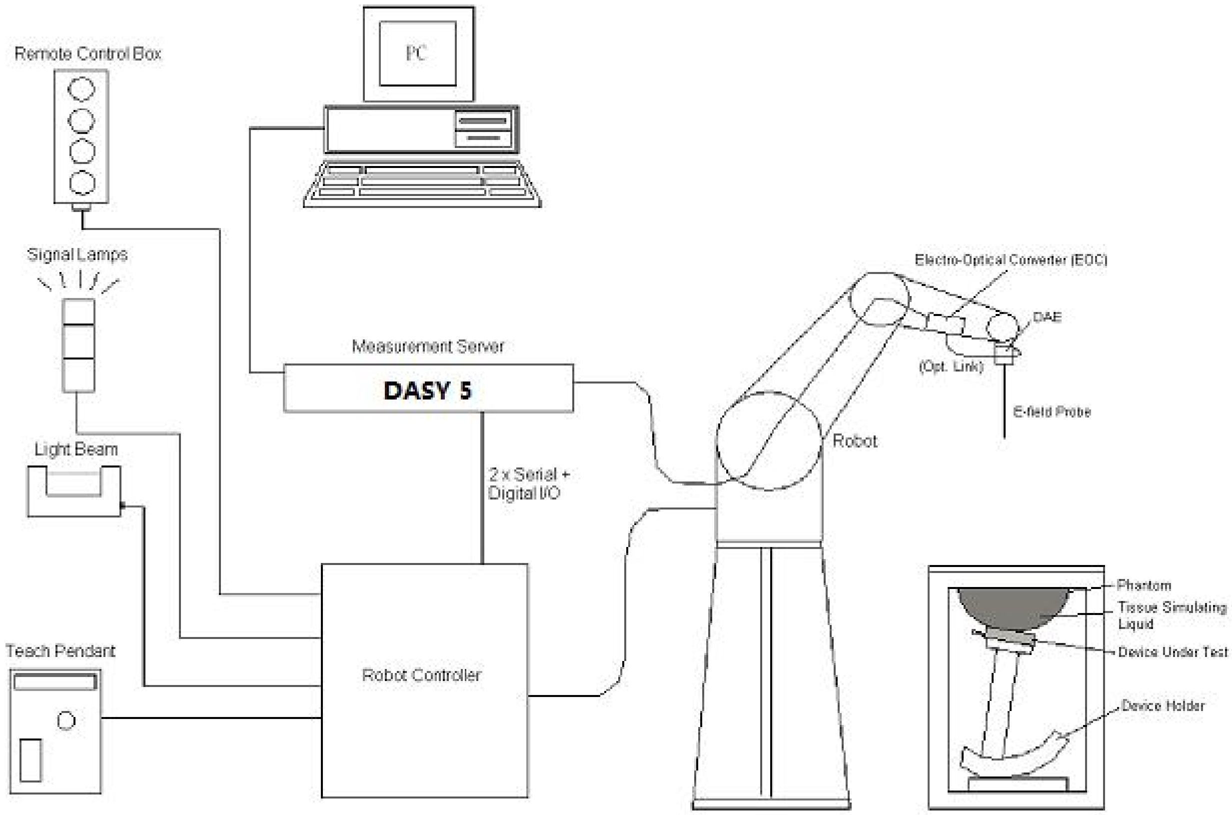


Fig.6.1 SPEAG DASY System Configurations

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 operationand 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

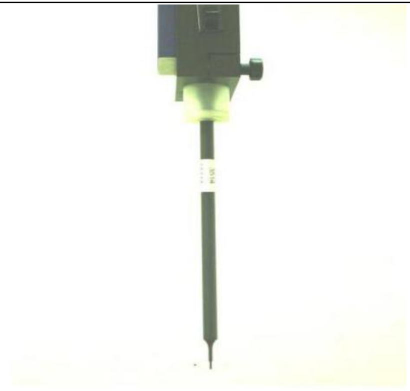
Component details are described in the following sub-sections.

6.1 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	10 MHz to 6 GHz; Linearity: ± 0.2 dB	
Directivity	± 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	
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

- **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.

6.2 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.

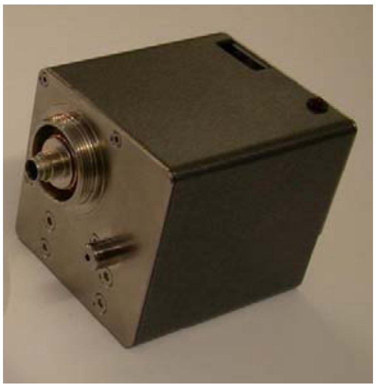


Fig. 6.2 Photo of DAE

6.3 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 Stäubliis used. The Stäublirobot series have many features that are important for our application:

- High precision (repeat ability 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. 6.3 Photo of Robot

6.4 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. 6.4 Photo of Server for DASY5

6.5 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 repeat ability 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. 6.5 Photo of Light Beam

6.6 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%) Center ear point: 6 ± 0.2 mm	
Filling Volume Dimensions	Approx. 25 liters Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Head, Right Head, Flat phantom	**Fig. 6.6Photo of SAM 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.

6.7 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.

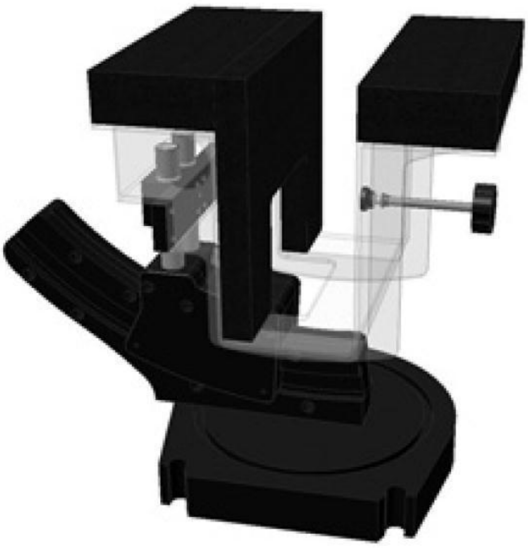
The DASY device holder is constructed of low-low POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence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

Fig. 6.7Photo of Device Holder

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Fig 6.8 Laptop Extension Kit



6.8 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.

6.9 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1173	2018.06.21	2019.06.20
SPEAG	835MHz System Validation Kit	D835V2	4d227	2018.06.22	2019.06.21
SPEAG	1750MHz System Validation Kit	D1750V2	1160	2018.06.25	2019.06.24
SPEAG	1900MHz System Validation Kit	D1900V2	5d221	2018.06.22	2019.06.21
SPEAG	2450MHz System Validation Kit	D2450V2	997	2018.06.26	2019.06.25
SPEAG	Dosimetric E-Field Probe	EX3DV4	7445	2018.09.04	2019.09.03
SPEAG	Dosimetric E-Field Probe	EX3DV4	3823	2018.11.12	2019.11.11
SPEAG	Data Acquisition Electronics	DAE4	480	2018.10.29	2019.10.28
SPEAG	Dielectric Assessment KIT	DAK-3.5	1279	2018.11.03	2019.11.02
SPEAG	SAM Twin Phantom 1	QD 000 P40 CB	TP-1471	NCR	NCR
SPEAG	SAM Twin Phantom 2	QD 000 P40 CB	TP-1464	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
R&S	Network Emulator	CMW500	124534	2018.04.17	2019.04.16
Agilent	Network Analyzer	E5071B	MY42404762	2018.04.17	2019.04.16
mini-circuits	Amplifier	ZHL-42W+	608501717	NCR	NCR
Agilent	Signal Generator	SMP_02	N/A	2018.04.17	2019.04.16
Agilent	Signal Generator	N5182B	MY53050509	2018.04.17	2019.04.16
Agilent	Power Senor	N8482A	MY41091706	2018.04.17	2019.04.16
Agilent	Power Meter	E4416A	MY45102093	2018.04.17	2019.04.16
Anritsu	Power Sensor	MA2411B	N/A	2018.04.17	2019.04.16
R&S	Power Meter	NRVD	101066	2018.04.17	2019.04.16
MCL	Attenuation1	351-218-010	N/A	NA	NA
THERMOMETER	Thermo meter	DC-803	N/A	2018.11.22	2019.11.21
N/A	Tissue Simulating Liquids	HSL700-2600MHz MSL700-2600MHz	N/A	24H	

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
3. 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.
4. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of1W 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 power meter is critical and we do have calibration for it

5. Attenuator insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
6. N.C.R means No Calibration Requirement.

6.10 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. 6.11, 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. 6.12.

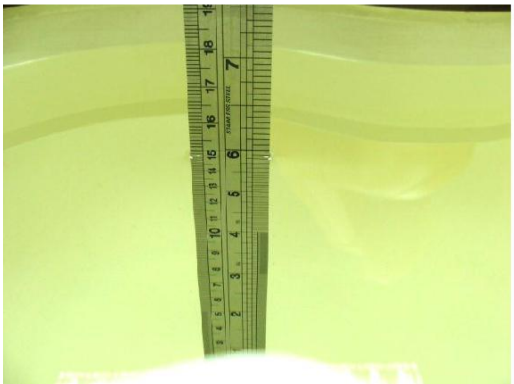


Fig 6.10 Photo of Liquid Height for Head SAR

Fig 6.11 Photo of Liquid Height for Body SAR

Thefollowingtablegivestherecipesfortissuesimulatingliquids

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.96	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

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 65supplement 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)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Conductivity Target (σ)	Delta (σ) (%)	Limit (%)	Date
750	HSL	22.5	0.885	0.89	-0.56	±5	2019.03.26
835	HSL	22.5	0.902	0.90	0.22	±5	2019.03.26
1750	HSL	22.2	1.391	1.37	1.53	±5	2019.03.27
1900	HSL	22.2	1.452	1.40	3.71	±5	2019.03.27
2450	HSL	22.3	1.731	1.80	-3.83	±5	2019.03.29
750	MSL	22.1	0.965	0.96	0.52	±5	2019.03.24
835	MSL	22.1	0.981	0.97	1.13	±5	2019.03.24
1750	MSL	22.4	1.446	1.49	-2.95	±5	2019.03.23
1900	MSL	22.4	1.520	1.52	0.00	±5	2019.03.23
2450	MSL	22.50	1.924	1.95	-1.33	±5	2019.03.26

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Permittivity (εr)	Permittivity Target (εr)	Delta (εr) (%)	Limit (%)	Date
750	HSL	22.5	40.809	41.90	-2.60	±5	2019.03.26
835	HSL	22.5	40.935	41.50	-1.36	±5	2019.03.26
1750	HSL	22.2	40.358	40.10	0.64	±5	2019.03.27
1900	HSL	22.2	40.908	40.00	2.27	±5	2019.03.27
2450	HSL	22.3	37.302	39.20	-4.84	±5	2019.03.29
750	MSL	22.1	54.221	55.50	-2.30	±5	2019.03.24
835	MSL	22.1	54.351	55.20	-1.54	±5	2019.03.24
1750	MSL	22.4	54.718	53.40	2.47	±5	2019.03.23
1900	MSL	22.4	53.565	53.30	0.50	±5	2019.03.23
2450	MSL	22.50	50.987	52.70	-3.25	±5	2019.03.26

7 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:

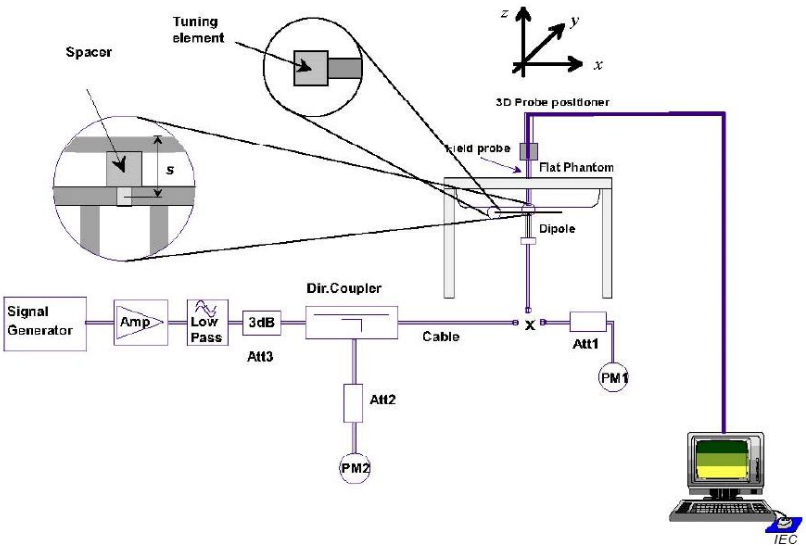


Fig.7.1 System Verification Setup Diagram

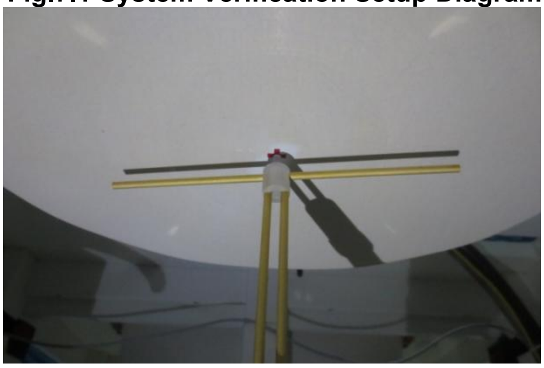


Fig.7.2 Photo of Dipole setup

- **System Verification Results**

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10%. Below table shows the target SAR and measured SAR after normalized to 1W input power. 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.

Dipole S/N	Probe S/N	DAE S/N
D750V3-1173	7445	480
D835V2-4d227	3823	480
D1750V2-1160	3823	480
D1900V2_5d221	3823	480
D2450V2-997	3823	480

<1g SAR>

Date	Freq. (MHz)	Tissue Type	Input Power (mW)	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2019.03.26	750	HSL	250	2.12	8.26	8.48	-2.59
2019.03.26	835	HSL	250	2.28	9.34	9.12	2.41
2019.03.27	1750	HSL	250	9.24	37.10	36.96	0.38
2019.03.27	1900	HSL	250	9.98	39.50	39.92	-1.05
2019.03.29	2450	HSL	250	12.72	52.90	50.88	3.97
2019.03.24	750	MSL	250	2.22	8.65	8.88	-2.59
2019.03.24	835	MSL	250	2.51	9.61	10.04	-4.28
2019.03.23	1750	MSL	250	9.36	37.40	37.44	-0.11
2019.03.23	1900	MSL	250	9.84	39.90	39.36	1.37
2019.03.26	2450	MSL	250	12.72	51.50	50.88	1.22

<10g SAR>

Date	Freq. (MHz)	Tissue Type	Input Power (mW)	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
2019.03.26	750	HSL	250	1.45	5.71	5.80	-1.55
2019.03.26	835	HSL	250	1.50	6.07	6.00	1.17
2019.03.27	1750	HSL	250	4.92	20.00	19.68	1.63
2019.03.27	1900	HSL	250	5.32	20.60	21.28	-3.20
2019.03.29	2450	HSL	250	6.01	24.90	24.04	3.58
2019.03.24	750	MSL	250	1.41	5.45	5.64	-3.37
2019.03.24	835	MSL	250	1.60	6.31	6.40	-1.41
2019.03.23	1750	MSL	250	4.93	19.90	19.72	0.91
2019.03.23	1900	MSL	250	5.12	20.70	20.48	1.07
2019.03.26	2450	MSL	250	5.81	23.80	23.24	2.41

Note: System checks the specific test data please see Annex C

8 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.

8.1 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.8.1 Illustration for Front, Back and Side of SAM Phantom

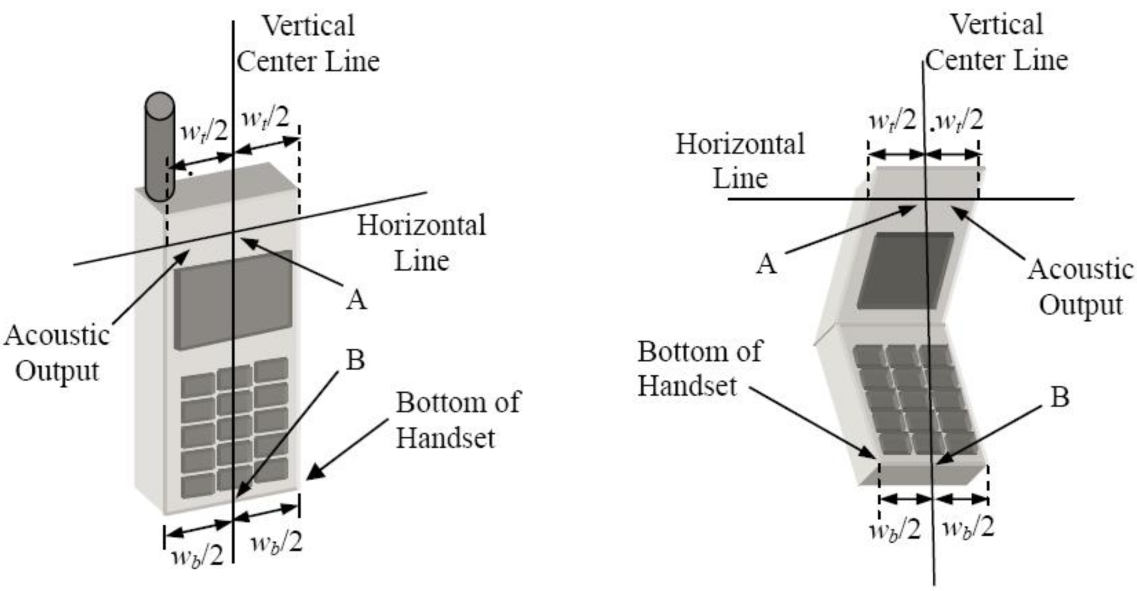


Fig. 8.2Illustration for Handset Vertical and Horizontal Reference Lines

8.2 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. 8.3 Illustration for Cheek Position

8.3 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.8.4 Illustration for Tilted Position

8.4 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.

8.5 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.

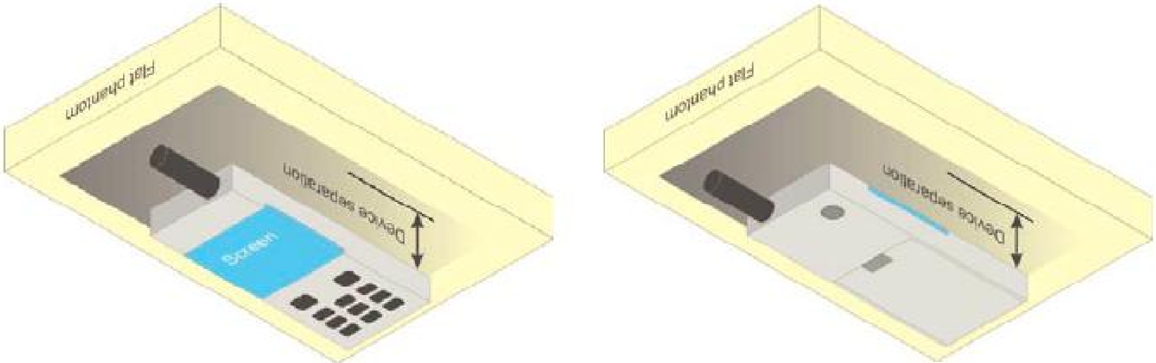


Fig.8.5 Illustration for Body Worn Position

8.6 Hotspot Mode Exposure Position Conditions

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing functions, the relevant hand and body exposure conditions are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge. When the form factor of a handset is smaller than 9 cm x 5 cm, a test separation distance of 5 mm (instead of 10 mm) is required for testing hotspot mode. When the separation distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).

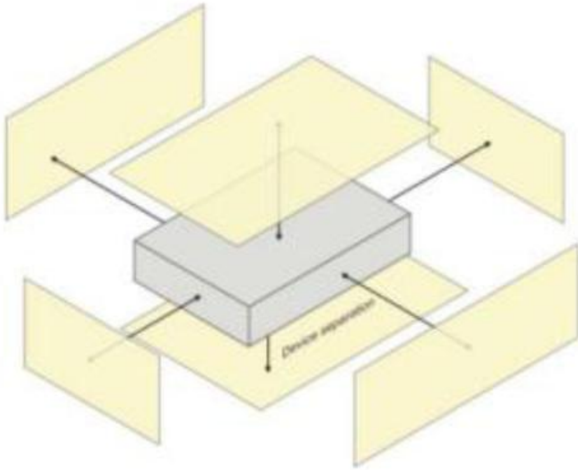


Fig 8.6 Illustration for Hotspot Position

9 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

9.1 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.

9.2 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.

9.3 Area Scan Procedures

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a10mm^2 step integral, with 1mm interpolation used to locate the peak SAR area used for zoom scan assessments.
When an Area Scan has measured all reachable points, it computes the field maxima found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE1528-2003, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan).

9.4 Zoom Scan Procedures

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm, with the side length of the 10 g cube 21,5mm.The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications utilize a physical step of 5x5x7 (8mmx8mmx5mm)providing a volume of 32mm in the X & Y axis, and 30mm in the Z axis.

9.5 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Sheppard'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.

9.6 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.

10 Conducted RF Output Power

10.1 GSM Conducted Power

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GSM	32.78	32.61	32.68	33.00	23.78	23.61	23.68	24.00
GPRS 1Tx slots	32.76	32.60	32.71	33.00	23.76	23.60	23.71	24.00
GPRS 2Tx slots	**30.61**	30.55	30.60	31.00	24.61	24.55	24.60	**25.00**
GPRS 3Tx slots	28.82	28.77	28.84	29.00	24.56	24.51	24.58	24.74
GPRS 4Tx slots	26.74	26.74	26.80	27.00	23.74	23.74	23.80	24.00
EDGE 1Tx slots	25.90	26.08	25.91	26.50	16.90	17.08	16.91	17.50
EDGE 2Tx slots	24.85	25.00	24.86	25.50	18.85	19.00	18.86	19.50
EDGE 3Tx slots	22.34	22.41	22.15	22.50	18.08	18.15	17.89	18.24
EDGE 4Tx slots	18.86	19.07	18.95	19.50	15.86	16.07	15.95	16.50

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM	29.76	29.75	29.60	30.00	20.76	20.75	20.60	21.00
GPRS 1Tx slots	29.72	29.73	29.58	30.00	20.72	20.73	20.58	21.00
GPRS 2Tx slots	27.69	27.71	27.44	28.00	21.69	21.71	21.44	22.00
GPRS 3Tx slots	26.16	**26.17**	25.89	26.50	21.90	21.91	21.63	**22.24**
GPRS 4Tx slots	24.16	24.19	23.93	24.50	21.16	21.19	20.93	21.50
EDGE 1Tx slots	25.48	25.82	25.78	26.00	16.48	16.82	16.78	17.00
EDGE 2Tx slots	24.16	24.48	24.38	24.50	18.16	18.48	18.38	18.50
EDGE 3Tx slots	22.78	22.91	22.70	23.00	18.52	18.65	18.44	18.74
EDGE 4Tx slots	20.37	20.66	20.47	21.00	17.37	17.66	17.47	18.00

Timeslot consignations:

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).

No. of Slots:	Slot 1	Slot 2	Slot 3	Slot 4

Slot Consignation:	1Up4Down	2Up3Down	3Up2Down	4Up1Down
Duty Cycle:	1:8.3	1:4.15	1:2.77	1:2.08
Correct Factor:	-9.03dB	-6.02dB	-4.26dB	-3.01dB

10.2 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 CMW500 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 (βc and βd) 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 CMW500 referred to the SetupConfiguration.
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 (βc and βd) and parameters (AG Index) were set according to each specific sub-test inthe 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 Δ_{CQI} = 8 ⇔ $A_{hs} = \beta_{hs}/\beta_c = 30/15$ ⇔ $\beta_{hs} = 30/15 * \beta_c$.
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

Band		WCDMA II			Tune-up Limit (dBm)
TX Channel		9262	9400	9538	
Rx Channel		9662	9800	9938	
Frequency (MHz)		1852.4	1880	1907.6	
3GPP Rel 99	AMR 12.2Kbps	22.28	22.37	22.38	22.50
3GPP Rel 99	RMC 12.2Kbps	22.23	22.38	**22.39**	22.50
3GPP Rel 6	HSDPA Subtest-1	21.87	22.21	22.04	22.50
3GPP Rel 6	HSDPA Subtest-2	21.85	22.14	22.04	22.50
3GPP Rel 6	HSDPA Subtest-3	21.34	21.63	21.53	22.00
3GPP Rel 6	HSDPA Subtest-4	21.31	21.66	21.54	22.00
3GPP Rel 6	HSUPA Subtest-1	21.48	21.84	21.72	22.50
3GPP Rel 6	HSUPA Subtest-2	19.46	19.81	19.75	20.50
3GPP Rel 6	HSUPA Subtest-3	20.51	20.85	20.72	21.50
3GPP Rel 6	HSUPA Subtest-4	19.49	19.83	19.71	20.50
3GPP Rel 6	HSUPA Subtest-5	21.48	21.82	21.71	22.50

Band		WCDMA IV			Tune-up Limit (dBm)
TX Channel		1312	1413	1513	
Rx Channel		1537	1638	1738	
Frequency (MHz)		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	22.14	22.10	22.03	22.50
3GPP Rel 99	RMC 12.2Kbps	22.12	**22.16**	22.05	22.50
3GPP Rel 6	HSDPA Subtest-1	21.87	22.21	22.04	22.50
3GPP Rel 6	HSDPA Subtest-2	21.85	22.14	22.04	22.50
3GPP Rel 6	HSDPA Subtest-3	21.34	21.63	21.53	22.00
3GPP Rel 6	HSDPA Subtest-4	21.31	21.66	21.54	22.00
3GPP Rel 6	HSUPA Subtest-1	21.48	21.84	21.72	22.50
3GPP Rel 6	HSUPA Subtest-2	19.46	19.81	19.75	20.50
3GPP Rel 6	HSUPA Subtest-3	20.51	20.85	20.72	21.50
3GPP Rel 6	HSUPA Subtest-4	19.49	19.83	19.71	20.50
3GPP Rel 6	HSUPA Subtest-5	21.48	21.82	21.71	22.50

Band		WCDMA V			Tune-up Limit (dBm)
TX Channel		4132	4183	4233	
Rx Channel		4357	4408	4458	
Frequency (MHz)		826.4	836.6	846.6	
3GPP Rel 99	AMR 12.2Kbps	22.38	22.33	22.37	22.50
3GPP Rel 99	RMC 12.2Kbps	22.34	22.35	**22.39**	22.50
3GPP Rel 6	HSDPA Subtest-1	21.21	21.17	21.18	22.50
3GPP Rel 6	HSDPA Subtest-2	21.14	21.15	21.19	22.50
3GPP Rel 6	HSDPA Subtest-3	20.71	20.91	20.66	22.00
3GPP Rel 6	HSDPA Subtest-4	20.74	20.88	20.67	22.00
3GPP Rel 6	HSUPA Subtest-1	21.32	21.35	21.34	22.50
3GPP Rel 6	HSUPA Subtest-2	19.42	19.55	19.34	20.50
3GPP Rel 6	HSUPA Subtest-3	20.41	20.57	20.33	21.50
3GPP Rel 6	HSUPA Subtest-4	19.43	19.57	19.32	20.50
3GPP Rel 6	HSUPA Subtest-5	21.32	21.36	21.33	22.50

10.3 LTE Conducted Power

10.3.1 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.

10.3.2 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.

<FDD LTE Band 2>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				18700	18900	19100	
Frequency (MHz)				1860	1880	1900	
20	QPSK	1	0	22.65	22.75	22.72	23.00
20	QPSK	1	49	22.53	22.53	22.66	
20	QPSK	1	99	22.48	22.58	**22.79**	
20	QPSK	50	0	21.73	21.66	**21.91**	22.00
20	QPSK	50	24	21.75	21.84	21.64	
20	QPSK	50	50	21.49	21.73	21.91	
20	QPSK	100	0	21.69	21.64	21.68	
20	16QAM	1	0	22.51	21.73	22.54	23.00
20	16QAM	1	49	22.15	21.83	22.45	
20	16QAM	1	99	22.33	21.78	22.18	
20	16QAM	50	0	20.73	20.89	20.92	21.00
20	16QAM	50	24	20.77	20.81	20.89	
20	16QAM	50	50	20.69	20.82	20.96	
20	16QAM	100	0	20.76	20.96	20.94	
20	64QAM	1	0	21.66	21.52	21.77	22.00
20	64QAM	1	49	21.28	21.53	21.55	
20	64QAM	1	99	21.85	21.65	21.94	
20	64QAM	50	0	20.87	20.83	20.9	21.00
20	64QAM	50	24	20.85	20.87	20.69	
20	64QAM	50	50	20.85	20.85	20.96	
20	64QAM	100	0	20.74	20.81	20.93	
Channel				18675	18900	19125	Tune-up limit (dBm)
Frequency (MHz)				1857.5	1880	1902.5	
15	QPSK	1	0	22.5	22.5	22.59	23.00
15	QPSK	1	37	22.58	22.6	22.69	
15	QPSK	1	74	22.48	22.69	22.66	
15	QPSK	36	0	21.67	21.66	21.78	22.00
15	QPSK	36	20	21.71	21.84	21.87	
15	QPSK	36	39	21.56	21.82	21.72	
15	QPSK	75	0	21.59	21.92	21.89	
15	16QAM	1	0	22.18	22.3	22.45	23.00
15	16QAM	1	37	22.03	22.54	22.32	
15	16QAM	1	74	22.53	22.24	22.61	
15	16QAM	36	0	20.76	20.84	20.83	21.00
15	16QAM	36	20	20.66	20.82	20.84	

15	16QAM	36	39	20.65	20.74	20.89	
15	16QAM	75	0	20.81	20.88	20.87	
15	64QAM	1	0	21.95	21.57	21.81	22.00
15	64QAM	1	37	21.82	21.8	21.8	
15	64QAM	1	74	21.52	21.46	21.72	
15	64QAM	36	0	20.89	20.79	20.96	21.00
15	64QAM	36	20	20.94	20.74	20.76	
15	64QAM	36	39	20.79	20.82	20.95	
15	64QAM	75	0	20.85	20.75	20.92	
Channel				18650	18900	19150	Tune-up limit (dBm)
Frequency (MHz)				1855	1880	1905	
10	QPSK	1	0	22.51	22.58	22.56	23.00
10	QPSK	1	25	22.53	22.53	22.57	
10	QPSK	1	49	22.45	22.74	22.61	
10	QPSK	25	0	21.55	21.73	21.79	22.00
10	QPSK	25	12	21.52	21.66	21.72	
10	QPSK	25	25	21.83	21.75	21.86	
10	QPSK	50	0	21.71	21.65	21.72	
10	16QAM	1	0	21.84	22.21	22.33	22.50
10	16QAM	1	25	22.16	22.5	21.92	
10	16QAM	1	49	22	22.55	22.03	
10	16QAM	25	0	20.64	20.8	20.98	21.00
10	16QAM	25	12	20.68	20.74	20.98	
10	16QAM	25	25	20.67	20.82	20.89	
10	16QAM	50	0	20.69	20.68	20.86	
10	64QAM	1	0	21.72	21.57	21.58	22.00
10	64QAM	1	25	21.51	21.85	21.93	
10	64QAM	1	49	21.94	21.93	21.56	
10	64QAM	25	0	20.74	20.79	20.75	21.00
10	64QAM	25	12	20.72	20.75	20.98	
10	64QAM	25	25	20.75	20.81	20.86	
10	64QAM	50	0	20.85	20.83	20.93	
Channel				18625	18900	19175	Tune-up limit (dBm)
Frequency (MHz)				1852.5	1880	1907.5	
5	QPSK	1	0	22.71	22.7	22.69	23.00
5	QPSK	1	12	22.72	22.76	22.63	
5	QPSK	1	24	22.67	22.58	22.7	
5	QPSK	12	0	21.68	21.8	21.85	22.00
5	QPSK	12	7	21.65	21.73	21.83	
5	QPSK	12	13	21.7	21.66	21.78	

5	QPSK	25	0	21.65	21.63	21.81	
5	16QAM	1	0	22.23	21.96	22.03	22.50
5	16QAM	1	12	22.38	22.33	21.99	
5	16QAM	1	24	22.32	22.46	21.95	
5	16QAM	12	0	20.84	20.83	20.84	21.00
5	16QAM	12	7	20.9	20.84	20.79	
5	16QAM	12	13	20.9	20.95	20.87	
5	16QAM	25	0	20.77	20.89	20.98	
5	64QAM	1	0	21.72	21.68	21.85	22.00
5	64QAM	1	12	21.75	21.92	21.88	
5	64QAM	1	24	21.76	21.75	21.83	
5	64QAM	12	0	20.58	20.94	20.92	21.00
5	64QAM	12	7	20.65	20.97	20.95	
5	64QAM	12	13	20.55	20.96	20.87	
5	64QAM	25	0	20.79	20.89	20.89	
Channel				18615	18900	19185	Tune-up limit (dBm)
Frequency (MHz)				1851.5	1880	1908.5	
3	QPSK	1	0	22.49	22.66	22.66	23.00
3	QPSK	1	8	22.56	22.78	22.66	
3	QPSK	1	14	22.46	22.7	22.7	
3	QPSK	8	0	21.69	21.79	21.79	22.00
3	QPSK	8	4	21.69	21.78	21.78	
3	QPSK	8	7	21.7	21.89	21.78	
3	QPSK	15	0	21.67	21.75	21.72	
3	16QAM	1	0	21.91	21.92	22.58	23.00
3	16QAM	1	8	22.47	21.94	22.59	
3	16QAM	1	14	21.99	21.85	22.49	
3	16QAM	8	0	20.74	20.78	20.87	21.00
3	16QAM	8	4	20.76	20.84	20.97	
3	16QAM	8	7	20.9	20.66	20.97	
3	16QAM	15	0	20.74	20.95	20.97	
3	64QAM	1	0	21.81	21.34	21.92	22.00
3	64QAM	1	8	21.67	21.71	21.94	
3	64QAM	1	14	21.65	21.62	21.85	
3	64QAM	8	0	20.84	20.85	20.84	21.00
3	64QAM	8	4	20.65	20.73	20.72	
3	64QAM	8	7	20.65	20.85	20.89	
3	64QAM	15	0	20.82	20.92	20.95	
Channel				18607	18900	19193	Tune-up limit (dBm)
Frequency (MHz)				1850.7	1880	1909.3	

1.4	QPSK	1	0	22.45	22.61	22.65	23.00
1.4	QPSK	1	3	22.46	22.67	22.67	
1.4	QPSK	1	5	22.48	22.45	22.65	
1.4	QPSK	3	0	22.58	22.45	22.67	
1.4	QPSK	3	1	22.62	22.76	22.71	
1.4	QPSK	3	3	22.71	22.59	22.67	
1.4	QPSK	6	0	21.59	21.78	21.69	22.00
1.4	16QAM	1	0	22.02	21.83	22.33	22.50
1.4	16QAM	1	3	22.15	21.85	22.48	
1.4	16QAM	1	5	21.85	21.86	22.24	
1.4	16QAM	3	0	21.93	21.67	21.94	
1.4	16QAM	3	1	21.96	21.73	22.13	
1.4	16QAM	3	3	22.07	21.63	22.08	
1.4	16QAM	6	0	20.58	20.8	20.79	21.00
1.4	64QAM	1	0	21.99	21.64	22.01	22.50
1.4	64QAM	1	3	21.88	21.32	21.67	
1.4	64QAM	1	5	21.63	21.23	21.84	
1.4	64QAM	3	0	21.81	21.7	21.73	
1.4	64QAM	3	1	22.03	21.9	21.58	
1.4	64QAM	3	3	21.89	21.93	21.75	
1.4	64QAM	6	0	20.76	20.69	20.81	21.00

<FDD LTE Band 4>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20050	20175	20300	
Frequency (MHz)				1720	1732.5	1745	
20	QPSK	1	0	22.92	**22.95**	22.58	23.00
20	QPSK	1	49	22.82	22.91	22.61	
20	QPSK	1	99	22.8	22.78	22.66	
20	QPSK	50	0	**22.92**	22.89	22.86	23.00
20	QPSK	50	24	22.85	22.85	22.73	
20	QPSK	50	50	21.98	21.96	21.91	
20	QPSK	100	0	21.86	21.91	21.95	
20	16QAM	1	0	22.64	22.53	22.33	23.00
20	16QAM	1	49	22.23	22.55	22.63	
20	16QAM	1	99	21.86	22.07	22.67	
20	16QAM	50	0	20.87	20.99	20.8	21.00
20	16QAM	50	24	20.83	20.93	20.95	
20	16QAM	50	50	20.93	20.89	20.77	
20	16QAM	100	0	20.87	20.96	20.9	

20	64QAM	1	0	22.25	21.7	22.39	22.50
20	64QAM	1	49	21.92	21.96	22.44	
20	64QAM	1	99	22.04	21.9	22.23	
20	64QAM	50	0	21.04	21.11	20.96	21.50
20	64QAM	50	24	20.98	21	20.89	
20	64QAM	50	50	21.01	20.86	20.79	
20	64QAM	100	0	20.99	20.99	20.88	
Channel				20025	20175	20325	Tune-up limit (dBm)
Frequency (MHz)				1717.5	1732.5	1747.5	
15	QPSK	1	0	22.76	22.76	22.83	23.00
15	QPSK	1	37	22.74	22.83	22.87	
15	QPSK	1	74	22.7	22.74	22.86	
15	QPSK	36	0	21.87	21.93	21.83	22.00
15	QPSK	36	20	21.78	21.81	21.89	
15	QPSK	36	39	21.91	21.76	21.75	
15	QPSK	75	0	21.81	21.99	21.72	
15	16QAM	1	0	22.28	22.08	22.23	22.50
15	16QAM	1	37	21.94	22.2	21.89	
15	16QAM	1	74	22.21	22.47	22.46	
15	16QAM	36	0	20.61	20.82	20.85	21.00
15	16QAM	36	20	20.79	20.99	20.94	
15	16QAM	36	39	20.84	20.9	20.8	
15	16QAM	75	0	20.86	20.86	20.75	
15	64QAM	1	0	22.12	22.17	21.87	22.50
15	64QAM	1	37	22.03	21.66	21.82	
15	64QAM	1	74	21.5	21.52	21.54	
15	64QAM	36	0	21.11	20.95	20.95	21.50
15	64QAM	36	20	21.04	21.07	21.07	
15	64QAM	36	39	20.99	21.01	21.03	
15	64QAM	75	0	20.85	21.00	20.98	
Channel				20000	20175	20350	Tune-up limit (dBm)
Frequency (MHz)				1715	1732.5	1750	
10	QPSK	1	0	22.81	22.81	22.71	23.00
10	QPSK	1	25	22.74	22.91	22.74	
10	QPSK	1	49	22.78	22.75	22.72	
10	QPSK	25	0	21.88	21.87	21.82	22.00
10	QPSK	25	12	21.76	21.8	21.8	
10	QPSK	25	25	21.81	21.73	21.89	
10	QPSK	50	0	21.87	21.79	21.84	
10	16QAM	1	0	22.21	22.38	22.08	22.50

10	16QAM	1	25	22.54	22.16	22.14	
10	16QAM	1	49	22.24	22.26	22.26	
10	16QAM	25	0	20.96	20.96	20.93	21.00
10	16QAM	25	12	20.99	20.92	20.85	
10	16QAM	25	25	20.86	20.89	20.96	
10	16QAM	50	0	20.75	20.87	20.8	
10	64QAM	1	0	22.11	21.97	21.9	22.50
10	64QAM	1	25	22.05	21.92	22.18	
10	64QAM	1	49	22.08	22.21	21.92	
10	64QAM	25	0	21.14	20.93	20.9	21.50
10	64QAM	25	12	21.05	21.04	20.86	
10	64QAM	25	25	21.01	20.97	20.99	
10	64QAM	50	0	21.03	21.11	20.92	
Channel				19975	20175	20375	Tune-up limit (dBm)
Frequency (MHz)				1712.5	1732.5	1752.5	
5	QPSK	1	0	22.75	22.92	22.85	23.00
5	QPSK	1	12	22.75	22.57	22.78	
5	QPSK	1	24	22.91	22.75	22.58	
5	QPSK	12	0	21.95	21.88	21.86	22.00
5	QPSK	12	7	21.91	21.93	21.84	
5	QPSK	12	13	21.96	21.86	21.78	
5	QPSK	25	0	21.85	21.79	21.95	
5	16QAM	1	0	22.42	22.54	21.65	22.50
5	16QAM	1	12	21.98	22.16	22.21	
5	16QAM	1	24	22.37	22.53	22.04	
5	16QAM	12	0	20.95	20.97	20.89	21.50
5	16QAM	12	7	20.98	20.96	20.74	
5	16QAM	12	13	20.81	20.75	20.63	
5	16QAM	25	0	20.86	20.83	20.82	
5	64QAM	1	0	21.91	22.14	21.97	22.50
5	64QAM	1	12	22.01	22.46	22.05	
5	64QAM	1	24	22	21.9	21.9	
5	64QAM	12	0	20.74	21.05	20.84	21.50
5	64QAM	12	7	20.88	21.03	20.99	
5	64QAM	12	13	20.92	21.05	21.09	
5	64QAM	25	0	21.04	21.16	21.26	
Channel				19965	20175	20385	Tune-up limit (dBm)
Frequency (MHz)				1711.5	1732.5	1753.5	
3	QPSK	1	0	22.63	22.77	22.59	23.00
3	QPSK	1	8	22.77	22.7	22.64	

3	QPSK	1	14	22.75	22.85	22.73	
3	QPSK	8	0	21.76	21.88	21.74	22.00
3	QPSK	8	4	21.86	21.89	21.75	
3	QPSK	8	7	21.97	21.9	21.68	
3	QPSK	15	0	21.89	21.83	21.84	
3	16QAM	1	0	22.69	22.57	22.18	23.00
3	16QAM	1	8	22.55	22.55	22.48	
3	16QAM	1	14	22.27	22.13	22.25	
3	16QAM	8	0	20.97	20.98	20.94	21.00
3	16QAM	8	4	20.89	20.91	20.96	
3	16QAM	8	7	20.92	20.85	20.93	
3	16QAM	15	0	20.85	20.96	20.99	
3	64QAM	1	0	21.89	22.34	22.19	22.50
3	64QAM	1	8	22.41	21.91	21.93	
3	64QAM	1	14	21.76	21.59	21.85	
3	64QAM	8	0	20.87	20.86	20.84	21.50
3	64QAM	8	4	20.94	20.89	20.78	
3	64QAM	8	7	20.98	20.98	20.75	
3	64QAM	15	0	20.91	21	20.89	
Channel				19957	20175	20393	Tune-up limit (dBm)
Frequency (MHz)				1710.7	1732.5	1754.3	
1.4	QPSK	1	0	22.7	22.68	22.58	23.00
1.4	QPSK	1	3	22.82	22.91	22.61	
1.4	QPSK	1	5	22.8	22.78	22.66	
1.4	QPSK	3	0	22.92	22.89	22.86	
1.4	QPSK	3	1	22.85	22.85	22.73	
1.4	QPSK	3	3	22.91	22.94	22.8	
1.4	QPSK	6	0	21.82	21.82	21.74	22.00
1.4	16QAM	1	0	22.15	22.11	22.22	23.00
1.4	16QAM	1	3	22.34	21.95	22.69	
1.4	16QAM	1	5	22.41	21.89	22.55	
1.4	16QAM	3	0	22.18	22.05	21.95	
1.4	16QAM	3	1	22.21	22.09	22.01	
1.4	16QAM	3	3	22.17	22.13	22.08	
1.4	16QAM	6	0	20.9	20.81	20.34	21.00
1.4	64QAM	1	0	22.07	22.29	22.08	22.50
1.4	64QAM	1	3	22.1	21.77	22.01	
1.4	64QAM	1	5	22.03	22.15	22.12	
1.4	64QAM	3	0	22.04	21.96	21.66	
1.4	64QAM	3	1	22.11	22.11	21.86	

1.4	64QAM	3	3	22.13	22.21	21.8	
1.4	64QAM	6	0	20.89	21.02	20.86	21.50

<FDD LTE Band 5>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				20450	20525	20600	
Frequency (MHz)				829	836.5	844	
10	QPSK	1	0	22.76	22.65	22.62	23.50
10	QPSK	1	25	22.67	22.83	22.82	
10	QPSK	1	49	**23.13**	22.73	22.87	
10	QPSK	25	0	21.70	21.65	21.75	22.00
10	QPSK	25	12	21.66	**21.87**	21.86	
10	QPSK	25	25	21.66	21.84	21.72	
10	QPSK	50	0	21.7	21.87	21.76	
10	16QAM	1	0	22.27	22.25	22.58	23.00
10	16QAM	1	25	22.52	21.98	21.98	
10	16QAM	1	49	22.26	22.58	22.55	
10	16QAM	25	0	20.72	20.83	21.03	21.50
10	16QAM	25	12	20.79	20.91	20.75	
10	16QAM	25	25	20.68	20.76	20.81	
10	16QAM	50	0	20.72	21	20.81	
10	64QAM	1	0	21.93	22.09	21.86	22.50
10	64QAM	1	25	21.56	21.51	21.58	
10	64QAM	1	49	22.09	22.03	21.63	
10	64QAM	25	0	20.74	20.98	20.99	21.00
10	64QAM	25	12	20.84	20.88	20.83	
10	64QAM	25	25	20.87	20.85	20.9	
10	64QAM	50	0	20.71	20.98	20.99	
Channel				20425	20525	20625	Tune-up limit (dBm)
Frequency (MHz)				826.5	836.5	846.5	
5	QPSK	1	0	22.75	22.79	22.87	23.50
5	QPSK	1	12	22.62	22.71	22.89	
5	QPSK	1	24	22.73	22.96	22.89	
5	QPSK	12	0	21.78	21.69	21.85	22.50
5	QPSK	12	7	21.72	21.84	21.85	
5	QPSK	12	13	21.86	21.68	21.75	
5	QPSK	25	0	21.72	21.81	21.7	
5	16QAM	1	0	22.15	21.96	21.82	22.50
5	16QAM	1	12	22.04	22.29	22.19	

5	16QAM	1	24	22.32	22.29	22.04	
5	16QAM	12	0	21.03	21.06	21.04	21.50
5	16QAM	12	7	20.75	21.08	20.98	
5	16QAM	12	13	20.77	20.94	20.86	
5	16QAM	25	0	21.02	21.25	20.96	
5	64QAM	1	0	21.72	21.91	21.95	22.00
5	64QAM	1	12	21.71	21.85	21.76	
5	64QAM	1	24	21.9	21.68	21.74	
5	64QAM	12	0	20.89	20.87	20.98	21.00
5	64QAM	12	7	20.72	20.68	20.87	
5	64QAM	12	13	20.67	20.63	20.84	
5	64QAM	25	0	20.74	20.96	20.91	
Channel				20415	20525	20635	Tune-up limit (dBm)
Frequency (MHz)				825.5	836.5	847.5	
3	QPSK	1	0	22.54	22.6	22.68	23.00
3	QPSK	1	8	22.51	22.56	22.73	
3	QPSK	1	14	22.45	22.6	22.7	
3	QPSK	8	0	21.82	21.58	21.82	22.00
3	QPSK	8	4	21.79	21.75	21.74	
3	QPSK	8	7	21.58	21.75	21.86	
3	QPSK	15	0	21.7	21.8	21.84	
3	16QAM	1	0	21.92	21.89	22.4	22.50
3	16QAM	1	8	22.15	22.29	22.47	
3	16QAM	1	14	21.85	22.02	22.34	
3	16QAM	8	0	21.15	21.07	21.04	21.00
3	16QAM	8	4	21.05	21.04	20.88	
3	16QAM	8	7	20.93	21.09	21.14	
3	16QAM	15	0	21.06	20.96	20.95	
3	64QAM	1	0	21.85	21.66	21.79	22.00
3	64QAM	1	8	21.77	21.83	21.85	
3	64QAM	1	14	21.88	21.75	21.83	
3	64QAM	8	0	20.83	20.67	20.68	20.00
3	64QAM	8	4	20.93	20.88	20.58	
3	64QAM	8	7	20.66	20.71	20.95	
3	64QAM	15	0	20.98	20.97	20.89	
Channel				20407	20525	20643	Tune-up limit (dBm)
Frequency (MHz)				824.7	836.5	848.3	
1.4	QPSK	1	0	22.55	22.55	22.76	23.00
1.4	QPSK	1	3	22.52	22.61	22.73	
1.4	QPSK	1	5	22.58	22.53	22.68	

1.4	QPSK	3	0	22.9	22.81	22.85	
1.4	QPSK	3	1	22.79	22.88	22.9	
1.4	QPSK	3	3	22.8	22.79	22.81	
1.4	QPSK	6	0	21.63	21.73	21.92	22.00
1.4	16QAM	1	0	21.84	22.32	22.25	22.50
1.4	16QAM	1	3	22.13	22.34	22.26	
1.4	16QAM	1	5	22.17	22.31	22.23	
1.4	16QAM	3	0	22.19	22.02	21.96	
1.4	16QAM	3	1	22.09	22.07	22.04	
1.4	16QAM	3	3	21.97	21.99	21.92	
1.4	16QAM	6	0	20.59	20.67	20.87	21.00
1.4	64QAM	1	0	21.79	21.65	21.75	22.00
1.4	64QAM	1	3	21.84	21.79	21.75	
1.4	64QAM	1	5	21.61	21.65	21.72	
1.4	64QAM	3	0	21.85	21.75	21.92	
1.4	64QAM	3	1	21.5	21.69	21.96	
1.4	64QAM	3	3	21.85	21.92	21.91	
1.4	64QAM	6	0	20.84	20.86	21.06	21.50

<FDD LTE Band 12>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23060	23095	23130	
Frequency (MHz)				704	707.5	711	
10	QPSK	1	0	22.42	**22.78**	22.54	23.00
10	QPSK	1	25	22.6	22.73	22.6	
10	QPSK	1	49	22.59	22.26	22.54	
10	QPSK	25	0	21.56	21.47	21.49	22.00
10	QPSK	25	12	21.53	**21.65**	21.36	
10	QPSK	25	25	21.49	21.39	21.52	
10	QPSK	50	0	21.53	21.78	21.39	
10	16QAM	1	0	22.16	21.8	22.46	23.00
10	16QAM	1	25	21.72	21.6	22.13	
10	16QAM	1	49	22.18	21.97	21.73	
10	16QAM	25	0	21.05	20.95	20.73	21.50
10	16QAM	25	12	20.99	20.74	20.69	
10	16QAM	25	25	21.18	20.78	20.97	
10	16QAM	50	0	20.96	20.67	20.59	
10	64QAM	1	0	21.19	21.69	21.71	22.00
10	64QAM	1	25	21.85	21.88	21.9	
10	64QAM	1	49	21.99	21.85	21.78	

10	64QAM	25	0	20.93	20.95	20.73	21.00
10	64QAM	25	12	20.92	20.74	20.63	
10	64QAM	25	25	20.87	20.7	20.87	
10	64QAM	50	0	20.93	20.64	20.72	
Channel				23035	23095	23155	Tune-up limit (dBm)
Frequency (MHz)				701.5	707.5	713.5	
5	QPSK	1	0	22.49	22.59	22.65	23.00
5	QPSK	1	12	22.55	22.71	22.5	
5	QPSK	1	24	22.54	22.75	22.58	
5	QPSK	12	0	21.47	21.53	21.37	22.00
5	QPSK	12	7	21.5	21.45	21.55	
5	QPSK	12	13	21.62	21.41	21.39	
5	QPSK	25	0	21.54	21.75	21.64	
5	16QAM	1	0	21.36	22.07	22.14	22.50
5	16QAM	1	12	21.45	22.14	21.95	
5	16QAM	1	24	21.67	21.51	21.74	
5	16QAM	12	0	20.85	20.95	20.71	21.00
5	16QAM	12	7	20.82	20.72	20.74	
5	16QAM	12	13	20.87	20.68	20.86	
5	16QAM	25	0	20.86	20.8	20.75	
5	64QAM	1	0	21.8	21.8	21.46	22.00
5	64QAM	1	12	21.27	21.59	21.57	
5	64QAM	1	24	21.88	21.83	21.86	
5	64QAM	12	0	20.52	20.86	20.9	21.00
5	64QAM	12	7	20.87	20.74	20.45	
5	64QAM	12	13	20.78	20.9	20.93	
5	64QAM	25	0	20.85	20.72	20.86	
Channel				23025	23095	23165	Tune-up limit (dBm)
Frequency (MHz)				700.5	707.5	714.5	
3	QPSK	1	0	22.28	22.48	22.45	23.00
3	QPSK	1	8	22.44	22.62	22.38	
3	QPSK	1	14	22.57	22.46	22.47	
3	QPSK	8	0	21.49	21.49	21.59	22.00
3	QPSK	8	4	21.39	21.44	21.55	
3	QPSK	8	7	21.57	21.39	21.73	
3	QPSK	15	0	21.43	21.49	21.52	
3	16QAM	1	0	21.38	22.1	21.94	22.50
3	16QAM	1	8	22.06	21.9	21.57	
3	16QAM	1	14	22.2	22.05	22.06	
3	16QAM	8	0	20.91	20.97	20.85	21.00

3	16QAM	8	4	20.89	20.72	20.86	
3	16QAM	8	7	20.92	20.79	20.59	
3	16QAM	15	0	20.86	20.53	20.63	
3	64QAM	1	0	21.54	21.59	21.58	22.00
3	64QAM	1	8	21.54	21.74	21.72	
3	64QAM	1	14	21.94	21.63	21.62	
3	64QAM	8	0	20.68	20.81	20.75	21.00
3	64QAM	8	4	20.88	20.67	20.8	
3	64QAM	8	7	20.64	20.56	20.64	
3	64QAM	15	0	20.87	20.85	20.86	
Channel				23017	23095	23173	Tune-up limit (dBm)
Frequency (MHz)				699.7	707.5	715.3	
1.4	QPSK	1	0	22.44	22.31	22.41	23.00
1.4	QPSK	1	3	22.39	22.52	22.51	
1.4	QPSK	1	5	22.42	22.4	22.4	
1.4	QPSK	3	0	22.58	22.72	22.4	
1.4	QPSK	3	1	22.64	22.62	22.42	
1.4	QPSK	3	3	22.61	22.56	22.48	
1.4	QPSK	6	0	21.47	21.61	21.49	22.00
1.4	16QAM	1	0	21.34	22.24	21.69	22.50
1.4	16QAM	1	3	21.25	22.23	21.72	
1.4	16QAM	1	5	21.15	21.75	21.58	
1.4	16QAM	3	0	21.6	21.76	21.6	
1.4	16QAM	3	1	21.58	21.71	21.81	
1.4	16QAM	3	3	21.56	21.86	21.87	
1.4	16QAM	6	0	20.63	20.5	20.34	21.00
1.4	64QAM	1	0	21.23	21.5	21.47	22.00
1.4	64QAM	1	3	21.48	21.45	21.31	
1.4	64QAM	1	5	21.47	21.45	21.46	
1.4	64QAM	3	0	21.83	21.49	21.67	
1.4	64QAM	3	1	21.5	21.48	21.7	
1.4	64QAM	3	3	21.7	21.61	21.59	
1.4	64QAM	6	0	20.87	20.75	20.66	21.00

<FDD LTE Band 17>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)
Channel				23780	23790	23800	
Frequency (MHz)				709	710	711	
10	QPSK	1	0	22.37	22.45	22.22	23.00
10	QPSK	1	25	22.5	22.23	22.43	
10	QPSK	1	49	22.52	**22.62**	22.32	
10	QPSK	25	0	21.43	21.38	**21.63**	22.00
10	QPSK	25	12	21.57	21.3	21.63	
10	QPSK	25	25	21.33	21.38	21.48	
10	QPSK	50	0	21.37	21.4	21.66	
10	16QAM	1	0	22.08	21.66	21.6	22.50
10	16QAM	1	25	22.37	22.16	22.14	
10	16QAM	1	49	22.05	21.75	22.15	
10	16QAM	25	0	21.06	20.52	20.61	21.50
10	16QAM	25	12	20.68	20.32	20.45	
10	16QAM	25	25	21.28	20.76	20.79	
10	16QAM	50	0	20.6	20.62	20.59	
10	64QAM	1	0	21.45	21.26	21.5	22.00
10	64QAM	1	25	21.46	21.59	21.53	
10	64QAM	1	49	21.63	21.13	21.5	
10	64QAM	25	0	20.83	20.75	20.69	21.00
10	64QAM	25	12	20.55	20.48	20.35	
10	64QAM	25	25	20.86	20.74	20.83	
10	64QAM	50	0	20.61	20.68	20.68	
Channel				23755	23790	23825	Tune-up limit (dBm)
Frequency (MHz)				706.5	710	713.5	
5	QPSK	1	0	22.47	22.53	22.46	23.00
5	QPSK	1	12	22.43	22.51	22.42	
5	QPSK	1	24	22.47	22.6	22.5	
5	QPSK	12	0	21.53	21.62	21.39	22.00
5	QPSK	12	7	21.5	21.68	21.56	
5	QPSK	12	13	21.54	21.38	21.43	
5	QPSK	25	0	21.52	21.56	21.35	
5	16QAM	1	0	22.23	22.4	22.04	22.50
5	16QAM	1	12	22.31	21.53	22.1	
5	16QAM	1	24	22.31	21.7	21.43	
5	16QAM	12	0	20.82	20.74	20.78	21.00

5	16QAM	12	7	20.96	20.6	20.76	
5	16QAM	12	13	20.86	20.95	20.9	
5	16QAM	25	0	20.99	20.7	20.99	
5	64QAM	1	0	21.8	21.78	21.48	22.00
5	64QAM	1	12	21.59	21.48	21.6	
5	64QAM	1	24	21.87	21.63	21.57	
5	64QAM	12	0	20.76	20.65	20.89	21.00
5	64QAM	12	7	20.45	20.57	20.79	
5	64QAM	12	13	20.65	20.53	20.98	
5	64QAM	25	0	20.49	20.67	20.9	

10.4 WLAN 2.4 GHz Band Conducted Power

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	CH 1	2412	14.73	15.00	15.00	100.00
		CH 6	2437	**15.96**	**16.50**	15.00	
		CH 11	2462	15.19	15.50	15.00	
	802.11g 6Mbps	CH 1	2412	12.37	12.50	15.00	97.54
		CH 6	2437	**13.67**	**14.00**	15.00	
		CH 11	2462	12.73	13.00	15.00	
	802.11n-HT20 MCS0	CH 1	2412	11.17	11.50	15.00	96.65
		CH 6	2437	12.62	13.00	15.00	
		CH 11	2462	11.62	12.00	15.00	

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	16.50	44.67	5	13.94	3.0
g/CH 06	2.437	14.00	25.12	5	7.84	3.0

2. Base on the result of note1, RF exposure evaluation of 802.11 b and g 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.

10.5 Bluetooth Conducted Power

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	5.94	5.25	5.32
	CH 39	2441	**6.37**	5.79	5.81
	CH 78	2480	5.67	5.10	5.14
Tune-up Limit (dBm)			6.50	6.00	6.00

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	-5.25
	CH 19	2440	-2.60
	CH 39	2480	-3.44
Tune-up Limit			-2.00

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 39	2.441	6.50	4.47	5	1.39	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.

11 Exposure Positions Consideration

11.1 EUT Antenna Location

Note: Please see Annex B

11.2 Test Positions Consideration

Distance of Antennas to EUT edge/surface Test distance: 10mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
GSM/WCDMA/LTE	<25mm	<25mm	130mm	<25mm	<25mm	<25mm
WLAN/Bluetooth	<25mm	<25mm	<25mm	122mm	58mm	<25mm

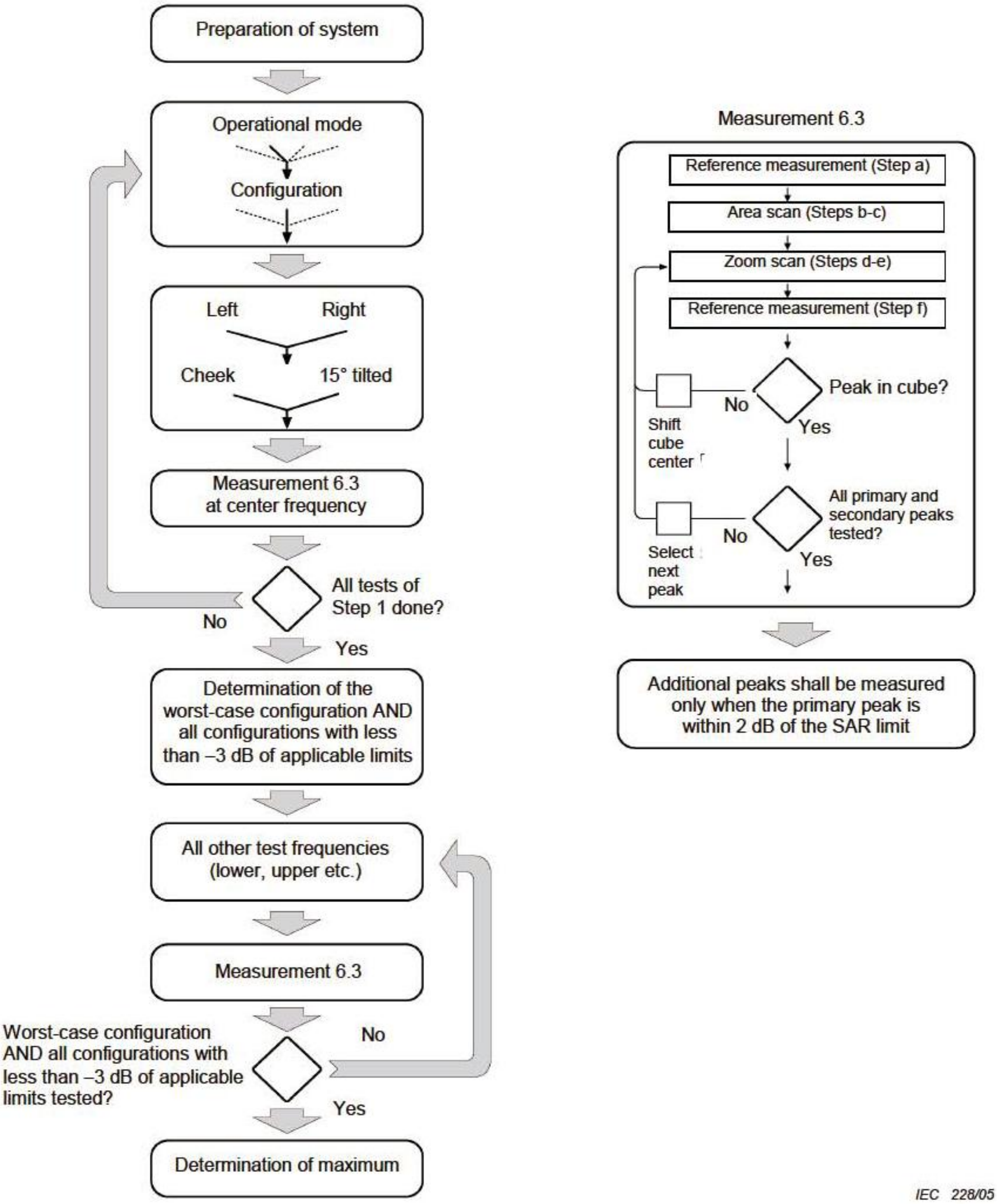
Test Positions Test distance: 10mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
GSM/WCDMA/LTE	Yes	Yes	No	Yes	Yes	Yes
WLAN/Bluetooth	Yes	Yes	Yes	No	No	Yes

Note:

1. Head/Body-worn/hotspot mode SAR assessments are required.
2. 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 and 10 mm for body-worn and hotspot SAR.

12 Block diagram of the tests to be performed

12.1 Head



12.2 Body

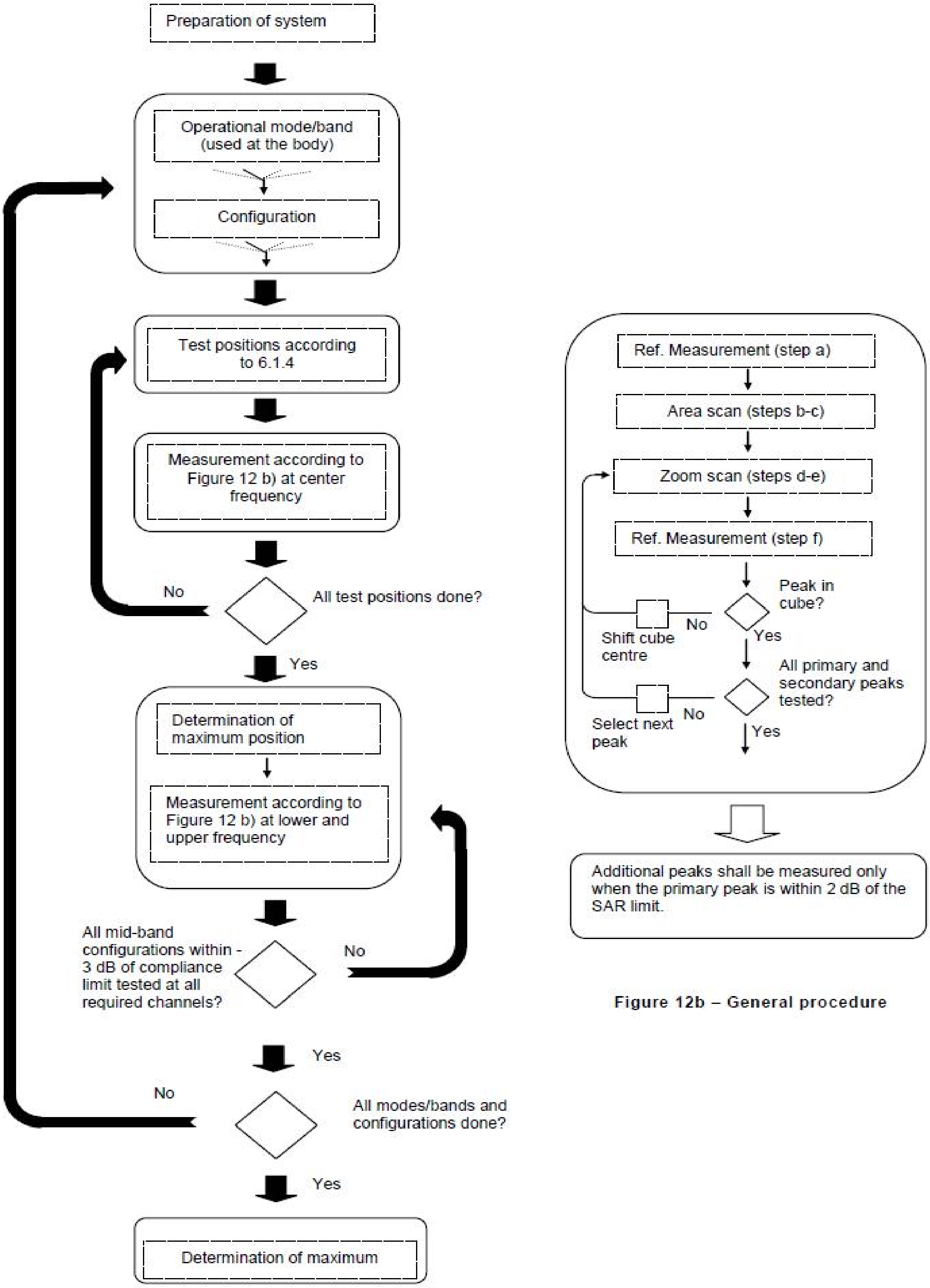


Figure 12b – General procedure

13 Test Results List

Test Guidance:

1. The reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. 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.
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ⩾ 0.8W/kg.
4. 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.
5. 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.
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 not required.
7. LTE band 17 SAR test was covered by Band 12; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ⩽ the larger band to qualify for the SAR test exclusion.
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band.

14 SAR Test Results Summary

14.1 Standalone Head SAR

➢ **GSM Head SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
1#	GSM850/2Tx slots	Right Cheek	128	30.61	31.00	1.094	0.402	**0.440**
	GSM850/2Tx slots	Right Tilt	128	30.61	31.00	1.094	0.310	0.339
	GSM850/2Tx slots	Left Cheek	128	30.61	31.00	1.094	0.376	0.411
	GSM850/2Tx slots	Left Tilt	128	30.61	31.00	1.094	0.242	0.265
2#	GSM1900/3Tx slots	Right Cheek	661	26.17	26.50	1.079	0.077	**0.083**
	GSM1900/3Tx slots	Right Tilt	661	26.17	26.50	1.079	0.045	0.049
	GSM1900/3Tx slots	Left Cheek	661	26.17	26.50	1.079	0.058	0.062
	GSM1900/3Tx slots	Left Tilt	661	26.17	26.50	1.079	0.026	0.028

➢ **WCDMA Head SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
3#	Band II/RMC	Right Cheek	9538	22.39	22.50	1.026	0.159	**0.163**
	Band II/RMC	Right Tilt	9538	22.39	22.50	1.026	0.090	0.093
	Band II/RMC	Left Cheek	9538	22.39	22.50	1.026	0.102	0.105
	Band II/RMC	Left Tilt	9538	22.39	22.50	1.026	0.079	0.081
4#	Band IV/RMC	Right Cheek	1413	22.16	22.50	1.081	0.092	**0.100**
	Band IV/RMC	Right Tilt	1413	22.16	22.50	1.081	0.045	0.048
	Band IV/RMC	Left Cheek	1413	22.16	22.50	1.081	0.054	0.058
	Band IV/RMC	Left Tilt	1413	22.16	22.50	1.081	0.031	0.034
5#	Band V/RMC	Right Cheek	4233	22.39	22.50	1.026	0.135	**0.138**
	Band V/RMC	Right Tilt	4233	22.39	22.50	1.026	0.054	0.055
	Band V/RMC	Left Cheek	4233	22.39	22.50	1.026	0.130	0.133
	Band V/RMC	Left Tilt	4233	22.39	22.50	1.026	0.042	0.043

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. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥ 0.8W/kg.

➢ **LTE 20MHz QPSK Head SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
6#	Band 2/1RB#99	Right Cheek	19100	22.79	23.00	1.050	0.161	**0.169**
	Band 2/1RB#99	Right Tilt	19100	22.79	23.00	1.050	0.087	0.091
	Band 2/1RB#99	Left Cheek	19100	22.79	23.00	1.050	0.119	0.125
	Band 2/1RB#99	Left Tilt	19100	22.79	23.00	1.050	0.066	0.069
	Band 2/50RB#0	Right Cheek	19100	21.91	22.00	1.021	0.117	0.119
	Band 2/50RB#0	Right Tilt	19100	21.91	22.00	1.021	0.061	0.062
	Band 2/50RB#0	Left Cheek	19100	21.91	22.00	1.021	0.087	0.089
	Band 2/50RB#0	Left Tilt	19100	21.91	22.00	1.021	0.054	0.055
7#	Band 4/1RB#0	Right Cheek	20175	22.95	23.00	1.012	0.086	**0.087**
	Band 4/1RB#0	Right Tilt	20175	22.95	23.00	1.012	0.057	0.058
	Band 4/1RB#0	Left Cheek	20175	22.95	23.00	1.012	0.059	0.059
	Band 4/1RB#0	Left Tilt	20175	22.95	23.00	1.012	0.048	0.049
	Band 4/50RB#0	Right Cheek	20050	22.92	23.00	1.019	0.070	0.071
	Band 4/50RB#0	Right Tilt	20050	22.92	23.00	1.019	0.051	0.052
	Band 4/50RB#0	Left Cheek	20050	22.92	23.00	1.019	0.046	0.047
	Band 4/50RB#0	Left Tilt	20050	22.92	23.00	1.019	0.022	0.022

➢ **LTE 10MHz QPSK Head SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
8#	Band 5/1RB#49	Right Cheek	20450	23.13	23.50	1.089	0.267	**0.291**
	Band 5/1RB#49	Right Tilt	20450	23.13	23.50	1.089	0.187	0.204
	Band 5/1RB#49	Left Cheek	20450	23.13	23.50	1.089	0.263	0.286
	Band 5/1RB#49	Left Tilt	20450	23.13	23.50	1.089	0.172	0.187
	Band 5/25RB#12	Right Cheek	20525	21.87	22.00	1.030	0.175	0.180
	Band 5/25RB#12	Right Tilt	20525	21.87	22.00	1.030	0.125	0.129
	Band 5/25RB#12	Left Cheek	20525	21.87	22.00	1.030	0.227	0.234
	Band 5/25RB#12	Left Tilt	20525	21.87	22.00	1.030	0.153	0.158
9#	Band 12/1RB#0	Right Cheek	23095	22.78	23.00	1.052	0.045	**0.047**
	Band 12/1RB#0	Right Tilt	23095	22.78	23.00	1.052	0.027	0.028
	Band 12/1RB#0	Left Cheek	23095	22.78	23.00	1.052	0.038	0.039
	Band 12/1RB#0	Left Tilt	23095	22.78	23.00	1.052	0.021	0.022
	Band 12/25RB#12	Right Cheek	23095	21.65	22.00	1.084	0.038	0.041
	Band 12/25RB#12	Right Tilt	23095	21.65	22.00	1.084	0.025	0.027
	Band 12/25RB#12	Left Cheek	23095	21.65	22.00	1.084	0.032	0.034
	Band 12/25RB#12	Left Tilt	23095	21.65	22.00	1.084	0.019	0.021

➢ **WLAN 2.4 GHz Head SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
10#	2.4GHz/802.11b	Right Cheek	6	15.96	16.50	1.132	0.165	**0.187**
	2.4GHz/802.11b	Right Tilt	6	15.96	16.50	1.132	0.112	0.127
	2.4GHz/802.11b	Left Cheek	6	15.96	16.50	1.132	0.091	0.103
	2.4GHz/802.11b	Left Tilt	6	15.96	16.50	1.132	0.058	0.066

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 23.88mW(13.78dBm) and 39.45mW(15.96dBm), the scaled SAR would be 0.187×(23.88/39.45)=0.113W/Kg<1.2W/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.

14.2 Standalone Hotspot SAR

➢ **GSM Hotspot SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	GPRS850/2TX Slots	Front Side	128	30.61	31.00	1.094	0.609	0.666
11#	GPRS850/2TX Slots	Back Side	128	30.61	31.00	1.094	0.699	**0.765**
	GPRS850/2TX Slots	Left Side	128	30.61	31.00	1.094	0.507	0.555
	GPRS850/2TX Slots	Right Side	128	30.61	31.00	1.094	0.591	0.647
	GPRS850/2TX Slots	Bottom Side	128	30.61	31.00	1.094	0.366	0.400
	GPRS1900/3TX Slots	Front Side	661	26.17	26.50	1.079	0.079	0.085
	GPRS1900/3TX Slots	Back Side	661	26.17	26.50	1.079	0.090	0.098
	GPRS1900/3TX Slots	Left Side	661	26.17	26.50	1.079	0.039	0.042
	GPRS1900/3TX Slots	Right Side	661	26.17	26.50	1.079	0.044	0.047
12#	GPRS1900/3TX Slots	Bottom Side	661	26.17	26.50	1.079	0.117	**0.126**

➢ **WCDMA Hotspot SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	Band II/RMC	Front Side	9538	22.39	22.50	1.026	0.167	0.171
	Band II/RMC	Back Side	9538	22.39	22.50	1.026	0.196	0.201
	Band II/RMC	Left Side	9538	22.39	22.50	1.026	0.033	0.034
	Band II/RMC	Right Side	9538	22.39	22.50	1.026	0.090	0.092
13#	Band II/RMC	Bottom Side	9538	22.39	22.50	1.026	0.200	**0.205**
	Band IV/RMC	Front Side	1413	22.16	22.50	1.081	0.100	0.108
	Band IV/RMC	Back Side	1413	22.16	22.50	1.081	0.126	0.136
	Band IV/RMC	Left Side	1413	22.16	22.50	1.081	0.012	0.013
	Band IV/RMC	Right Side	1413	22.16	22.50	1.081	0.048	0.052
14#	Band IV/RMC	Bottom Side	1413	22.16	22.50	1.081	0.130	**0.141**
	Band V/RMC	Front Side	4233	22.39	22.50	1.026	0.192	0.197
15#	Band V/RMC	Back Side	4233	22.39	22.50	1.026	0.222	**0.228**
	Band V/RMC	Left Side	4233	22.39	22.50	1.026	0.182	0.187
	Band V/RMC	Right Side	4233	22.39	22.50	1.026	0.217	0.223
	Band V/RMC	Bottom Side	4233	22.39	22.50	1.026	0.125	0.128

➢ **LTE 20MHz QPSK Hotspot SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-Up Limit (dBm)	Tune-Up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	Band 2/1RB#99	Front Side	19100	22.79	23.00	1.050	0.192	0.202
	Band 2/1RB#99	Back Side	19100	22.79	23.00	1.050	0.224	0.235
	Band 2/1RB#99	Left Side	19100	22.79	23.00	1.050	0.039	0.041
	Band 2/1RB#99	Right Side	19100	22.79	23.00	1.050	0.206	0.216
16#	Band 2/1RB#99	Bottom Side	19100	22.79	23.00	1.050	0.233	**0.245**
	Band 2/50RB#0	Front Side	19100	21.91	22.00	1.021	0.141	0.144
	Band 2/50RB#0	Back Side	19100	21.91	22.00	1.021	0.165	0.168
	Band 2/50RB#0	Left Side	19100	21.91	22.00	1.021	0.022	0.022
	Band 2/50RB#0	Right Side	19100	21.91	22.00	1.021	0.074	0.076
	Band 2/50RB#0	Bottom Side	19100	21.91	22.00	1.021	0.189	0.193
	Band 4/1RB#0	Front Side	20175	22.95	23.00	1.012	0.116	0.117
	Band 4/1RB#0	Back Side	20175	22.95	23.00	1.012	0.144	0.146
	Band 4/1RB#0	Left Side	20175	22.95	23.00	1.012	0.024	0.024
	Band 4/1RB#0	Right Side	20175	22.95	23.00	1.012	0.055	0.056
17#	Band 4/1RB#0	Bottom Side	20175	22.95	23.00	1.012	0.166	**0.168**
	Band 4/50RB#0	Front Side	20050	22.92	23.00	1.019	0.091	0.093
	Band 4/50RB#0	Back Side	20050	22.92	23.00	1.019	0.113	0.115
	Band 4/50RB#0	Left Side	20050	22.92	23.00	1.019	0.011	0.011
	Band 4/50RB#0	Right Side	20050	22.92	23.00	1.019	0.043	0.044
	Band 4/50RB#0	Bottom Side	20050	22.92	23.00	1.019	0.132	0.134

➢ **LTE 10MHz QPSK Hotspot SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-Up Limit (dBm)	Tune-Up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	Band 5/1RB#49	Front Side	20450	23.13	23.50	1.089	0.283	0.308
	Band 5/1RB#49	Back Side	20450	23.13	23.50	1.089	0.319	0.347
	Band 5/1RB#49	Left Side	20450	23.13	23.50	1.089	0.265	0.289
18#	Band 5/1RB#49	Right Side	20450	23.13	23.50	1.089	0.348	**0.379**
	Band 5/1RB#49	Bottom Side	20450	23.13	23.50	1.089	0.163	0.177
	Band 5/25RB#12	Front Side	20525	21.87	22.00	1.030	0.235	0.242
	Band 5/25RB#12	Back Side	20525	21.87	22.00	1.030	0.276	0.284
	Band 5/25RB#12	Left Side	20525	21.87	22.00	1.030	0.227	0.234
	Band 5/25RB#12	Right Side	20525	21.87	22.00	1.030	0.291	0.300
	Band 5/25RB#12	Bottom Side	20525	21.87	22.00	1.030	0.138	0.142
	Band 12/1RB#0	Front Side	23095	22.78	23.00	1.052	0.035	0.037
19#	Band 12/1RB#0	Back Side	23095	22.78	23.00	1.052	0.056	**0.058**
	Band 12/1RB#0	Left Side	23095	22.78	23.00	1.052	0.024	0.025
	Band 12/1RB#0	Right Side	23095	22.78	23.00	1.052	0.051	0.054
	Band 12/1RB#0	Bottom Side	23095	22.78	23.00	1.052	0.022	0.023
	Band 12/25RB#12	Front Side	23095	21.65	22.00	1.084	0.034	0.037
	Band 12/25RB#12	Back Side	23095	21.65	22.00	1.084	0.049	0.053
	Band 12/25RB#12	Left Side	23095	21.65	22.00	1.084	0.014	0.016
	Band 12/25RB#12	Right Side	23095	21.65	22.00	1.084	0.045	0.048
	Band 12/25RB#12	Bottom Side	23095	21.65	22.00	1.084	0.020	0.022

➢ **WLAN 2.4GHz Hotspot SAR**

Plot No.	Band/Mode	Test Position	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
	2.4GHz/802.11b	Front Side	6	15.96	16.50	1.132	0.064	0.072
20#	2.4GHz/802.11b	Back Side	6	15.96	16.50	1.132	0.077	**0.087**
	2.4GHz/802.11b	Left Side	6	15.96	16.50	1.132	0.072	0.081
	2.4GHz/802.11b	Top Side	6	15.96	16.50	1.132	0.037	0.041

Note:

7. 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.
8. 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.
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.

14.3 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.

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 ina 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
		Test Distance (mm)	0	10
Bluetooth	6.5	Estimated SAR (W/kg)	0.186	0.093

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	2G/3G/4G+WLAN 2.4GHz
	Body	2G/3G/4G+WLAN 2.4GHz
		2G/3G/4G+Bluetooth
	Hotspot	2G/3G/4G+WLAN 2.4GHz
		2G/3G/4G+Bluetooth

Note:

1. GSM/WCDMA/LTE shares the same antenna, and cannot transmit simultaneously.
2. WLAN/Bluetooth 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 < 1.6W/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 < 1.6W/kg

15 SAR Simultaneous Transmission Analysis

➢ **Head Simultaneous Transmission**

WWAN Band		Exposure Position	WWAN 1g SAR (W/kg)	2.4GHz WLAN 1g SAR (W/kg)	Summed 1g SAR (W/kg)
GSM	GSM850	Right Cheek	0.440	0.187	**0.627**
		Right Tilt	0.339	0.127	0.466
		Left Cheek	0.411	0.103	0.514
		Left Tilt	0.265	0.066	0.331
	GSM1900	Right Cheek	0.083	0.187	0.270
		Right Tilt	0.049	0.127	0.176
		Left Cheek	0.062	0.103	0.165
		Left Tilt	0.028	0.066	0.094
WCDMA	WCDMA Band II	Right Cheek	0.163	0.187	0.350
		Right Tilt	0.093	0.127	0.220
		Left Cheek	0.105	0.103	0.208
		Left Tilt	0.081	0.066	0.147
	WCDMA Band IV	Right Cheek	0.100	0.187	0.287
		Right Tilt	0.048	0.127	0.175
		Left Cheek	0.058	0.103	0.161
		Left Tilt	0.034	0.066	0.100
	WCDMA Band V	Right Cheek	0.138	0.187	0.325
		Right Tilt	0.055	0.127	0.182
		Left Cheek	0.133	0.103	0.236
		Left Tilt	0.043	0.066	0.109
LTE	LTE Band 2	Right Cheek	0.169	0.187	0.356
		Right Tilt	0.091	0.127	0.218
		Left Cheek	0.125	0.103	0.228
		Left Tilt	0.069	0.066	0.135
	LTE Band 4	Right Cheek	0.087	0.187	0.274
		Right Tilt	0.058	0.127	0.185
		Left Cheek	0.059	0.103	0.162
		Left Tilt	0.049	0.066	0.115
	LTE Band 5	Right Cheek	0.291	0.187	0.478
		Right Tilt	0.204	0.127	0.331
		Left Cheek	0.286	0.103	0.389
		Left Tilt	0.187	0.066	0.253

	LTE Band 12	Right Cheek	0.047	0.187	0.234
		Right Tilt	0.028	0.127	0.155
		Left Cheek	0.039	0.103	0.142
		Left Tilt	0.022	0.066	0.088

➢ **Body worn Simultaneous Transmission**

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
GSM	GSM850	Front side	0.666	0.072	0.093	0.738	0.759
		Back side	0.765	0.087	0.093	**0.852**	**0.858**
	GSM1900	Front side	0.085	0.072	0.093	0.157	0.178
		Back side	0.098	0.087	0.093	0.185	0.191
WCDMA	WCDMA Band II	Front side	0.171	0.072	0.093	0.243	0.264
		Back side	0.201	0.087	0.093	0.288	0.294
	WCDMA Band IV	Front side	0.108	0.072	0.093	0.180	0.201
		Back side	0.136	0.087	0.093	0.223	0.229
	WCDMA Band V	Front side	0.197	0.072	0.093	0.269	0.290
		Back side	0.228	0.087	0.093	0.315	0.321
LTE	LTE Band 2	Front side	0.202	0.072	0.093	0.274	0.295
		Back side	0.235	0.087	0.093	0.322	0.328
	LTE Band 4	Front side	0.117	0.072	0.093	0.189	0.210
		Back side	0.146	0.087	0.093	0.233	0.239
	LTE Band 5	Front side	0.308	0.072	0.093	0.380	0.401
		Back side	0.347	0.087	0.093	0.434	0.440
	LTE Band 12	Front side	0.037	0.072	0.093	0.109	0.130
		Back side	0.058	0.087	0.093	0.145	0.151

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➢ **Hotspot Simultaneous Transmission**

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 Bluetooth Estimated 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
GSM	GSM850	Front side	0.666	0.072	0.093	0.738	0.759
		Back side	0.765	0.087	0.093	**0.852**	**0.858**
		Left side	0.555	0.081	0.093	0.636	0.648
		Right side	0.647	/	/	0.647	0.647
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.400	/	/	0.400	0.400
	GSM1900	Front side	0.085	0.072	0.093	0.157	0.178
		Back side	0.098	0.087	0.093	0.185	0.191
		Left side	0.042	0.081	0.093	0.123	0.135
		Right side	0.047	/	/	0.047	0.047
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.126	/	/	0.126	0.126
WCDMA	WCDMA Band II	Front side	0.171	0.072	0.093	0.243	0.264
		Back side	0.201	0.087	0.093	0.288	0.294
		Left side	0.034	0.081	0.093	0.115	0.127
		Right side	0.092	/	/	0.092	0.092
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.205	/	/	0.205	0.205
	WCDMA Band IV	Front side	0.108	0.072	0.093	0.180	0.201
		Back side	0.136	0.087	0.093	0.223	0.229
		Left side	0.013	0.081	0.093	0.094	0.106
		Right side	0.052	/	/	0.052	0.052
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.141	/	/	0.141	0.141
	WCDMA Band V	Front side	0.197	0.072	0.093	0.269	0.290
		Back side	0.228	0.087	0.093	0.315	0.321
		Left side	0.187	0.081	0.093	0.268	0.280
		Right side	0.223	/	/	0.223	0.223
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.128	/	/	0.128	0.128
LTE	LTE Band 2	Front side	0.202	0.072	0.093	0.274	0.295
		Back side	0.235	0.087	0.093	0.322	0.328

		Left side	0.041	0.081	0.093	0.122	0.134
		Right side	0.216	/	/	0.216	0.216
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.245	/	/	0.245	0.245
	LTE Band 4	Front side	0.117	0.072	0.093	0.189	0.210
		Back side	0.146	0.087	0.093	0.233	0.239
		Left side	0.024	0.081	0.093	0.105	0.117
		Right side	0.056	/	/	0.056	0.056
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.168	/	/	0.168	0.168
	LTE Band 5	Front side	0.308	0.072	0.093	0.380	0.401
		Back side	0.347	0.087	0.093	0.434	0.440
		Left side	0.289	0.081	0.093	0.370	0.382
		Right side	0.379	/	/	0.379	0.379
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.177	/	/	0.177	0.177
	LTE Band 12	Front side	0.037	0.072	0.093	0.109	0.130
		Back side	0.058	0.087	0.093	0.145	0.151
		Left side	0.025	0.081	0.093	0.106	0.118
		Right side	0.054	/	/	0.054	0.054
		Top side	/	0.041	0.093	0.041	0.093
		Bottom side	0.023	/	/	0.023	0.023

16 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.

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a	b	c	d	e= f(d,k)	f	g	h= c*f/e	i= c*g/e	k
Uncertainty Component	Sec.	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+-%)	10g Ui (+-%)	Vi
Measurement System									
Probe calibration	E.2.1	5.83	N	1	1	1	5.83	5.83	∞
Axial Isotropy	E.2.2	3.5	R	$\sqrt{3}$	1	1	2.02	2.02	∞
Hemispherical Isotropy	E.2.2	5.9	R	$\sqrt{3}$	1	1	3.41	3.41	∞
Boundary effect	E.2.3	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Linearity	E.2.4	4.7	R	$\sqrt{3}$	1	1	2.71	2.71	∞
System detection limits	E.2.5	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	∞
Readout Electronics	E.2.6	0.5	N	1	1	1	0.5	0.5	∞
Reponse Time	E.2.7	3.0	R	$\sqrt{3}$	1	1	3.0	3.0	∞
Integration Time	E.2.8	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
RF ambient Conditions	E.6.1	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	E.6.2	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	E.6.3	1.4	R	$\sqrt{3}$	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algoritms for Max. SAR Evaluation	E.5.2	2.3	R	$\sqrt{3}$	1	1	1.33	1.33	∞
Test sample Related									
Test sample positioning	E.4.2.1	2.6	N	1	1	1	2.6	2.6	N-1
Device Holder Uncertainty	E.4.1.1	3.0	N	1	1	1	5.11	5.11	∞
Output power Power drift - SAR drift measurement	6.6.2	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	∞
Phantom and Tissue Parameters									
Phantom Uncertainty (Shape and thickness tolerances)	E.3.1	4.0	R	$\sqrt{3}$	1	1	2.31	2.31	∞
Liquid conductivity - deviation from target value	E.3.2	2.0	R	$\sqrt{3}$	0.64	0.43	1.69	1.13	∞
Liquid conductivity - measurement uncertainty	E.3.3	2.5	N	1	0.64	0.43	3.20	2.15	M
Liquid permittivity - deviation from target value	E.3.2	2.5	R	$\sqrt{3}$	0.6	0.49	1.28	1.04	∞
Liquid permittivity - measurement uncertainty	E.3.3	5.0	N	1	0.6	0.49	6.00	4.90	M
Liquid conductivity – temperature uncertainty	E.3.4		R	$\sqrt{3}$	0.78	0.41			∞
Liquid permittivity – temperature uncertainty	E.3.4		R	$\sqrt{3}$	0.23	0.26			∞
Combined Standard Uncertainty			RSS				11.55	12.07	

Expanded Uncertainty (95% Confidence interval)			K=2				±23.20	±24.17	

17 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the India, 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.

END OF REPORT