TEST REPORT

APPLICANT	:	GREAT TALENT TECHNOLOGY LIMITED
PRODUCT NAME	:	Android Tablet
MODEL NAME	:	TEL-TE-U5
BRAND NAME	:	UMX
FCC ID	:	2ALZM-TEL-TE-U5
STANDARD(S)	:	47CFR 2.1093 IEEE 1528-2013
RECEIPT DATE	:	2019-05-08
TEST DATE	:	2019-05-25 to 2019-05-28
ISSUE DATE	:	2019-05-30

Edited by: Su Jinhai
Su Jinhai (Rapporteur)

Approved by: Peng Huarui
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DIRECTORY

Change History		
Version	**Date**	**Description**
1.0	2019-05-30	Original

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))
		Body
		Separation (0mm)
WLAN	2.4GHz WLAN	**1.399**
	5G WLAN	1.183
2.4GHz Band	Bluetooth	0.036

Note: 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.

2 Technical Information

Note: Provide by manufacturer.

2.1 Applicant and Manufacturer Information

Applicant:	GREAT TALENT TECHNOLOGY LIMITED
Applicant Address:	RM602,T3 Software Park,Nanshan,Shenzhen,China
Manufacturer:	SHENZHEN GIEC DIGITAL CO., LTD
Manufacturer Address:	1st&3rd Building,No.26 Puzai Road,Pingdi,Longgang District, Shenzhen, China

2.2 Equipment Under Test (EUT) Description

EUT Type:	Android Tablet
Hardware Version:	MQ_MPEG_J10F_02G_V1.0
Software Version:	GK_MJQ1020-user.20190527
Frequency Bands:	WLAN 2.4GHz: 2412 MHz ~ 2462 MHz WLAN 5.2GHz: 5180 MHz ~ 5240 MHz WLAN 5.3GHz: 5260 MHz ~ 5320 MHz WLAN 5.5GHz: 5500 MHz ~ 5720 MHz WLAN 5.8GHz: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Modulation Mode:	802.11b: DSSS 802.11a/g/n-HT20/HT40 Bluetooth BR+EDR: GFSK, π/4-DQPSK, 8-DPSK Bluetooth LE: GFSK
Hotspot Mode:	Support
Antenna Type:	FPC Antenna

Note: .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

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.

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

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

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.

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Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Tel: 86-755-36698555 Fax: 86-755-36698525
Http://www.morlab.cn E-mail: service@morlab.cn

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 248227 D01v02r02	SAR Measurement Procedures for 802.11 Transmitters
5	KDB 865664 D01v01r04	SAR Measurement 100 MHz to 6 GHz
6	KDB 865664 D02v01r02	RF Exposure Reporting
7	KDB 941225 D06v02r01	SAR Evaluation Procedures For Portable Devices With Wireless Router Capabilities

6 SAR Measurement System

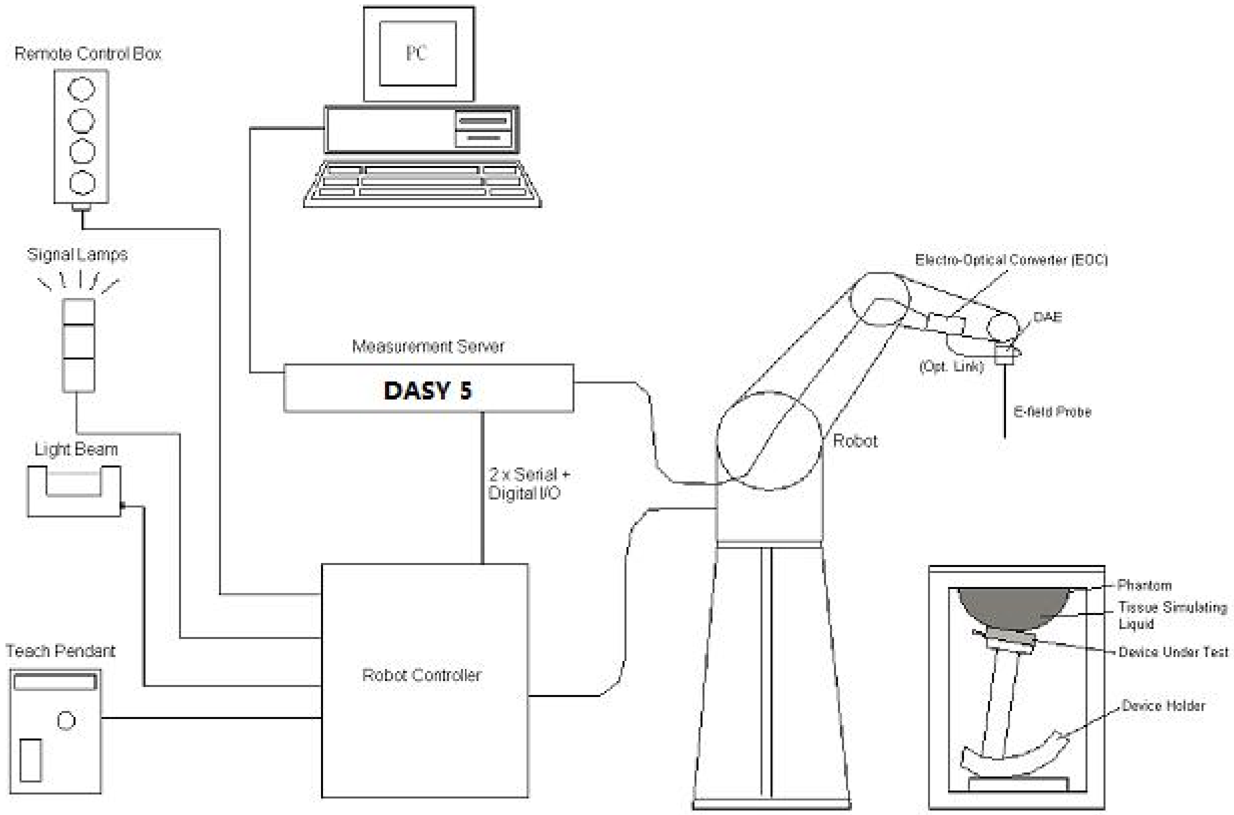


Fig.6.1 SPEAG DASY System Configurations

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

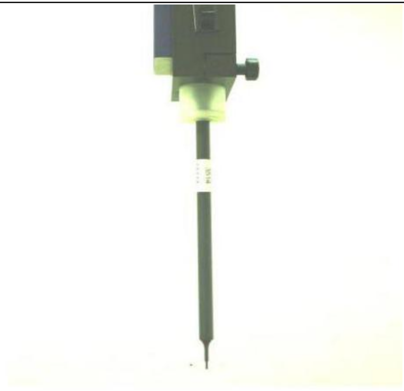
Component details are described in the following sub-sections.

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	 **Fig. 6.6Photo of SAM Phantom**
Filling Volume Dimensions	Approx. 25 liters Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Head, Right Head, Flat phantom	

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

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.

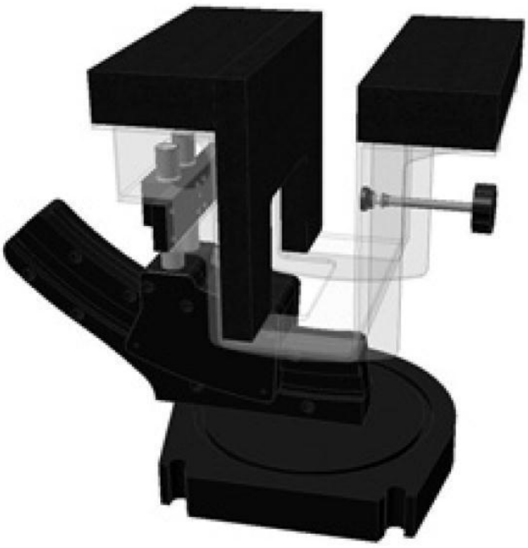
The DASY device holder is constructed of low-low POM material having the following dielectric parameters: relative permittivity ε = 3 and loss tangent δ = 0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence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

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

WithV_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: $H_i = \sqrt{V_i} \cdot \frac{a_{i0} + a_{i1} f + a_{i2} f^2}{f}$

WithV_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	2450MHz System Validation Kit	D2450V2	997	2018.06.26	2019.06.25
SPEAG	5000MHz System Validation Kit	D5GHzV2	1176	2018.11.06	2019.11.05
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 2	QD 000 P40 CB	TP-1464	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Agilent	Network Analyzer	E5071B	MY42404762	2019.04.15	2020.04.14
mini-circuits	Amplifier	ZHL-42W+	608501717	NCR	NCR
mini-circuits	Amplifier	ZVE-8G+	754401735	NCR	NCR
Agilent	Signal Generator	N5182B	MY53050509	2019.04.17	2020.04.16
Agilent	Power Senor	N8482A	MY41090849	2018.11.23	2019.11.22
Agilent	Power Meter	E4416A	MY45102093	2018.11.23	2019.11.22
R&S	Power Meter	NRVD	101066	2018.11.23	2019.11.22
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	MSL2300-2600MHz MSL5000-6000MHz	N/A	24H	

Note:

1. The calibration certificate of DASY can be referred to appendix E 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.

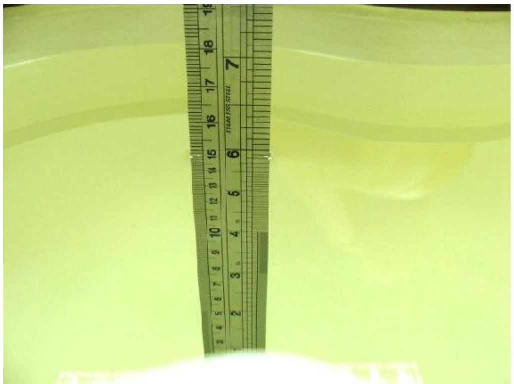


Fig 6.10 Photo of Liquid Height for Head SAR

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
2450	MSL	22.3	1.865	1.95	-4.36	±5	2019.05.25
5250	MSL	22.2	5.432	5.36	1.34	±5	2019.05.28
5600	MSL	22.2	5.822	5.77	0.90	±5	2019.05.28
5750	MSL	22.2	6.035	5.94	1.60	±5	2019.05.28

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Permittivity (εr)	Permittivity Target (εr)	Delta (εr) (%)	Limit (%)	Date
2450	MSL	22.3	53.048	52.70	0.66	±5	2019.05.25
5250	MSL	22.2	47.905	48.90	-2.03	±5	2019.05.28
5600	MSL	22.2	47.375	48.50	-2.32	±5	2019.05.28
5750	MSL	22.2	47.061	48.30	-2.57	±5	2019.05.28

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:

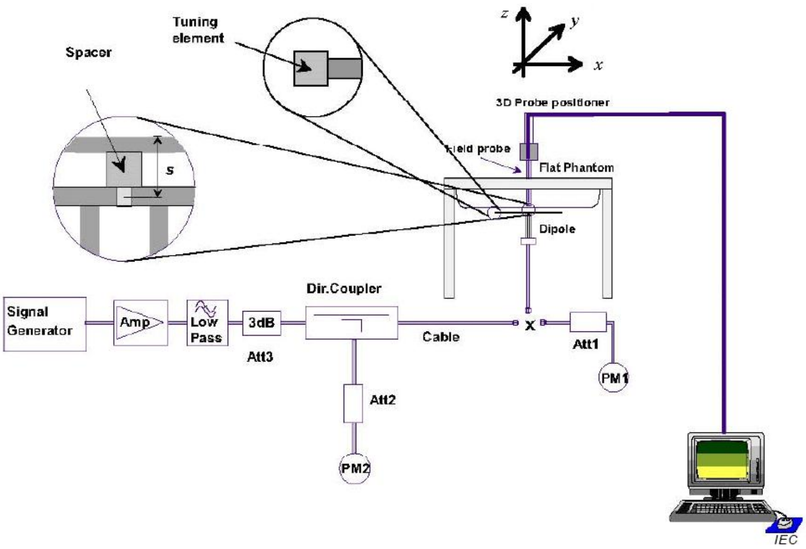


Fig.7.1 System Verification Setup Diagram

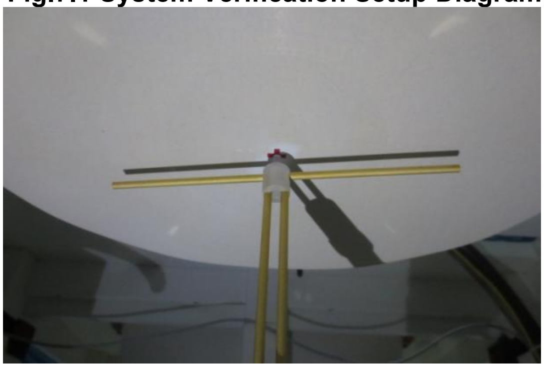


Fig.7.2 Photo of Dipole setup

- **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**
D2450V2-997	3823	480
D5GHzV2-1176	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 (%)**
2019.05.25	2450	MSL	250	12.1	51.50	48.4	6.40
2019.05.28	5250	MSL	100	7.52	72.70	75.2	-3.32
2019.05.28	5600	MSL	100	8.12	77.30	81.2	-4.80
2019.05.28	5750	MSL	100	8.04	75.30	80.4	-6.34

<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 (%)**
2019.05.25	2450	MSL	250	5.61	23.80	22.44	6.06
2019.05.28	5250	MSL	100	2.14	20.60	21.4	-3.74
2019.05.28	5600	MSL	100	2.13	21.80	21.3	2.35
2019.05.28	5750	MSL	100	2.16	21.10	21.6	-2.31

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 Body-Supported Device Configurations

According to KDB 616217 section 4.3, SAR should be separately assessed with each surface and separation distance positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. The antennas in tablets are typically located near the back (bottom) surface and/or along the edges of the devices; therefore, SAR evaluation is required for these configurations. Exposures from antennas through the front (top) surface of the display section of a full-size tablet, away from the edges, are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary, except for tablets that are designed to require continuous operations with the hand(s) next to the antenna(s).

- 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 0 mm.
- When each surface is measurement, the SAR Test Exclusion Threshold in KDB 447498 should be applied.

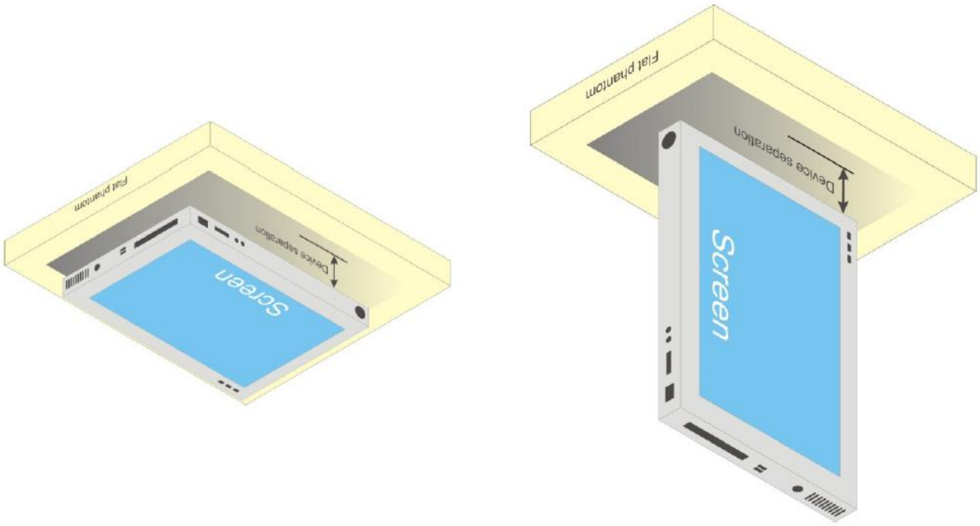


Fig.8.1 Illustration for Body Position

8.2 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).

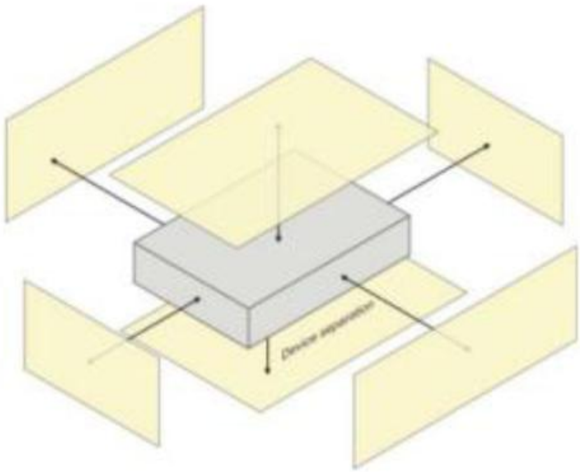


Fig 8.2 Illustration for Hotspot Position

9 Measurement Procedures

The measurement procedures are as bellows:

<Conducted power measurement>

- 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 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 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	**16.16**	**16.50**	16.00	100.00
		CH 6	2437	16.06	16.50	16.00	
		CH 7	2442	15.99	16.00	16.00	
		CH 11	2462	16.06	16.50	16.00	
		CH 12	2467	16.07	16.50	16.00	
		CH 13	2472	16.08	16.50	16.00	
	802.11g 6Mbps	CH 1	2412	13.98	14.00	14.00	97.55
		CH 6	2437	**14.02**	**14.50**	14.00	
		CH 7	2442	13.93	14.00	14.00	
		CH 11	2462	13.90	14.00	14.00	
		CH 12	2467	13.93	14.00	14.00	
		CH 13	2472	13.99	14.00	14.00	
	802.11n-HT20 MCS0	CH 1	2412	13.95	14.00	14.00	97.38
		CH 6	2437	13.98	14.00	14.00	
		CH 7	2442	13.97	14.00	14.00	
		CH 11	2462	13.95	14.00	14.00	
		CH 12	2467	13.99	14.00	14.00	
		CH 13	2472	13.99	14.00	14.00	
	802.11n-HT40 MCS0	CH 3	2422	13.46	13.50	13.50	95.15
		CH 6	2437	13.42	13.50	13.50	
		CH 7	2442	13.43	13.50	13.50	
		CH 9	2452	13.42	13.50	13.50	
		CH 10	2457	13.29	13.50	13.50	
		CH 11	2462	13.40	13.50	13.50	

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 01	2.412	16.50	44.67	5	13.85	3.0
g/CH 06	2.437	14.50	28.18	5	8.79	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.

10.2 WLAN 5GHz Band Conducted Power

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	CH 36	5180	**12.74**	**13.00**	13.50	97.54
		CH 44	5220	12.72	13.00	13.50	
		CH 48	5240	12.59	13.00	13.50	
	802.11n-HT20 MCS0	CH 36	5180	12.80	13.00	13.50	97.38
		CH 44	5220	12.70	13.00	13.50	
		CH 48	5240	12.56	13.00	13.50	
	802.11n-HT40 MCS0	CH 38	5190	11.71	12.00	13.00	94.74
		CH 46	5230	11.35	11.50	13.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	CH 52	5260	**12.40**	**12.50**	13.50	97.54
		CH 60	5300	12.17	12.50	13.50	
		CH 64	5320	12.03	12.50	13.50	
	802.11n-HT20 MCS0	CH 52	5260	12.35	12.50	13.50	97.38
		CH 60	5300	12.14	12.50	13.50	
		CH 64	5320	11.46	11.50	13.50	
	802.11n-HT40 MCS0	CH 54	5270	11.55	12.00	13.00	94.74
		CH 62	5310	11.03	11.50	13.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	CH 100	5500	**11.73**	**12.00**	13.50	97.54
		CH 116	5580	11.53	12.00	13.50	
		CH 124	5620	11.64	12.00	13.50	
		CH 132	5660	11.65	12.00	13.50	
		CH 140	5700	11.35	11.50	13.50	
		CH 144	5720	11.39	11.50	13.50	
	802.11n-HT20	CH 100	5500	11.71	12.00	13.50	97.38

	MCS0	CH 116	5580	11.45	11.50	13.50	
		CH 124	5620	11.62	12.00	13.50	
		CH 132	5660	11.52	12.00	13.50	
		CH 140	5700	11.46	11.50	13.50	
		CH 144	5720	11.36	11.50	13.50	
	802.11n-HT40 MCS0	CH 102	5510	11.12	11.50	13.00	94.74
		CH 110	5550	10.86	11.00	13.00	
		CH 126	5630	10.97	11.00	13.00	
		CH 134	5670	10.52	11.00	13.00	
		CH 142	5710	10.35	10.50	13.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting	Duty Cycle %
5.8GHz WLAN	802.11a MCS0	CH 149	5745	12.23	12.50	15.00	97.54
		CH 157	5785	12.18	12.50	15.00	
		CH 165	5825	12.05	12.50	15.00	
	802.11n-HT20 MCS0	CH 149	5745	12.19	12.50	15.00	97.38
		CH 157	5785	12.12	12.50	15.00	
		CH 165	5825	11.98	12.00	15.00	
	802.11n-HT40 MCS0	CH 151	5755	**12.52**	**13.00**	15.00	94.74
		CH 159	5795	12.30	12.50	15.00	

Note:

6. 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
a/CH 36	5.180	13.00	19.95	5	9.10	3.0
a/CH 52	5.260	12.50	17.78	5	8.14	3.0
a/CH 100	5.500	12.00	15.85	5	7.45	3.0
n-HT40/CH 151	5.755	13.00	19.95	5	9.58	3.0

7. Base on the result of note1, RF exposure evaluation of 802.11 a and n-HT40 mode is required.
8. Per KDB 248227 D01v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.
9. 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.

10.3 Bluetooth Conducted Power

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	8.271	5.226	1.832
	CH 39	2441	8.631	5.497	2.118
	CH 78	2480	**8.689**	5.495	2.142
Tune-up Limit (dBm)			9.00	6.00	2.50

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	6.428
	CH 19	2440	6.692
	CH 39	2480	6.644
Tune-up Limit			7.00

Note:

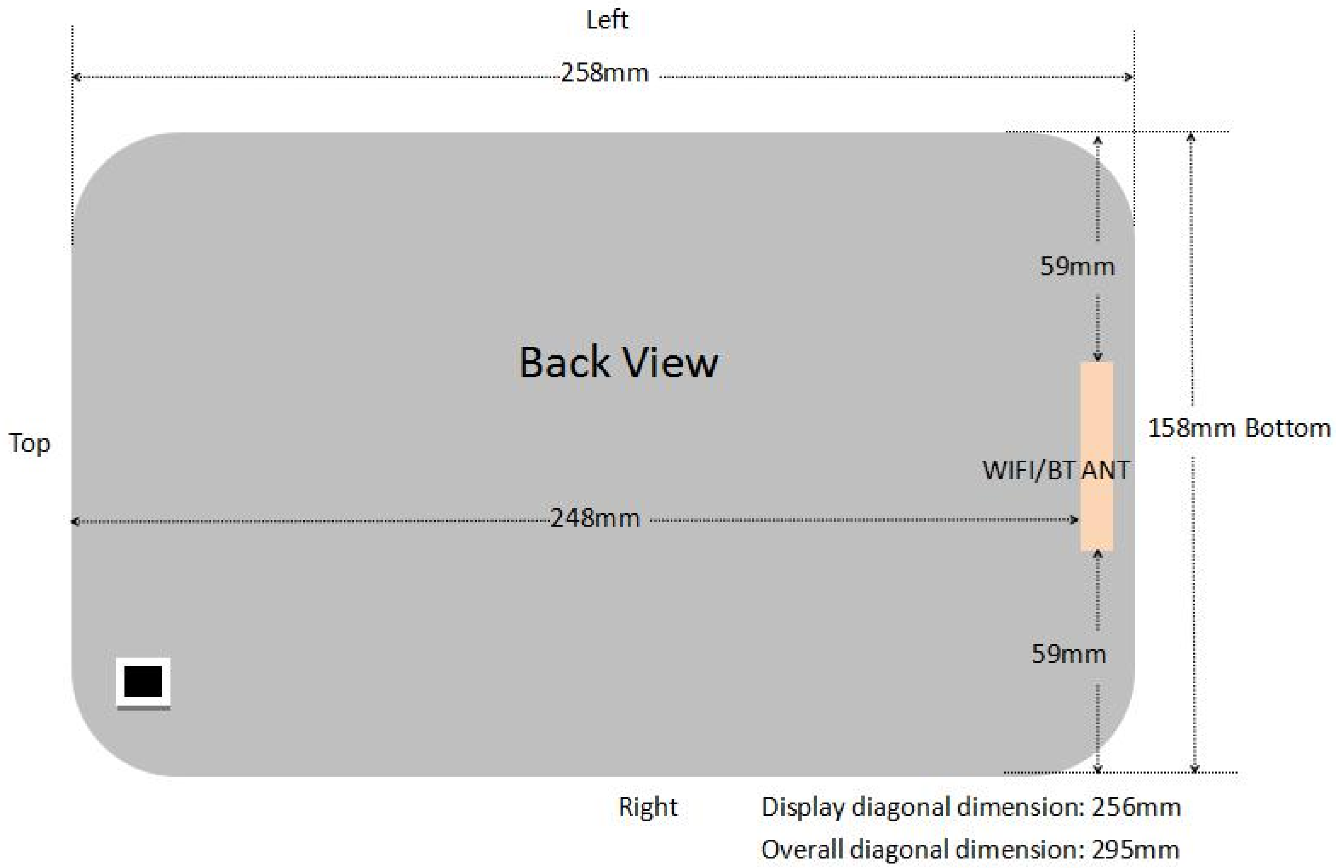
1. Per KDB 447498 D01v06, the 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, where
   - f(GHz) is the 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 78	2.480	9.00	7.94	5	2.49	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



11.2 Test Positions Consideration

SAR exclusion calculations for antenna < 50mm from the user													
Antennas	Freq. (MHz)	Max. tune-up Power		Distance of Antennas to EUT edge/surface (mm)					Calculated Threshold Value (≦3.0 SAR is not required)				
		dBm	mW	Back	Top	Bott.	Right	Left	Back	Top	Bott.	Right	Left
802.11b	2412	16.50	44.67	3	248	5	59	59	23.08	>50mm	13.85	>50mm	>50mm
802.11g	2437	14.50	28.18	3	248	5	59	59	14.65	>50mm	8.79	>50mm	>50mm
802.11a	5180	13.00	19.95	3	248	5	59	59	15.16	>50mm	9.10	>50mm	>50mm
802.11a	5260	12.50	17.78	3	248	5	59	59	13.57	>50mm	8.14	>50mm	>50mm
802.11a	5500	12.00	15.85	3	248	5	59	59	12.42	>50mm	7.45	>50mm	>50mm
802.11n-HT40	5755	13.00	19.95	3	248	5	59	59	15.96	>50mm	9.58	>50mm	>50mm
Bluetooth	2480	9.00	7.94	3	248	5	59	59	4.16	>50mm	2.49	>50mm	>50mm

SAR exclusion calculations for antenna > 50mm from the user													
Antennas	Freq. (MHz)	Max. tune-up Power		Distance of Antennas to EUT edge/surface (mm)					Calculated Threshold Value (SAR test exclusion power,mW)				
		dBm	mW	Back	Top	Bott.	Right	Left	Back	Top	Bott.	Right	Left
802.11b	2412	16.50	44.67	3	248	5	59	59	/	2076	/	186	186
802.11g	2437	14.50	28.18	3	248	5	59	59	/	2076	/	186	186
802.11a	5180	13.00	19.95	3	248	5	59	59	/	2046	/	156	156
802.11a	5260	12.50	17.78	3	248	5	59	59	/	2046	/	156	156
802.11a	5500	12.00	15.85	3	248	5	59	59	/	2046	/	156	156
802.11n-HT40	5755	13.00	19.95	3	248	5	59	59	/	2046	/	156	156
Bluetooth	2480	9.00	7.94	3	248	5	59	59	/	2076	/	186	186

Test Positions					
Antennas	Back Side	Top Side	Bottom Side	Right Side	Left Side
802.11b	Yes	No	Yes	No	No
802.11g	Yes	No	Yes	No	No
802.11a	Yes	No	Yes	No	No
802.11a	Yes	No	Yes	No	No
802.11a	Yes	No	Yes	No	No
802.11n-HT40	Yes	No	Yes	No	No
Bluetooth	Yes	No	No	No	No

Note:

1. Referring to KDB 616217 D04v01r02, when the overall diagonal dimension of display is > 20 cm, the test distance is 0 mm;the SAR Test Exclusion Threshold in KDB 447498 section 4.3.1 can be applied to determine SAR test exclusion for adjacent edge configurations.
2. Per KDB 616217 D04v01r02, SAR evaluation for the front surface of tablet display screens is generally not necessary.

12 Block diagram of the tests to be performed

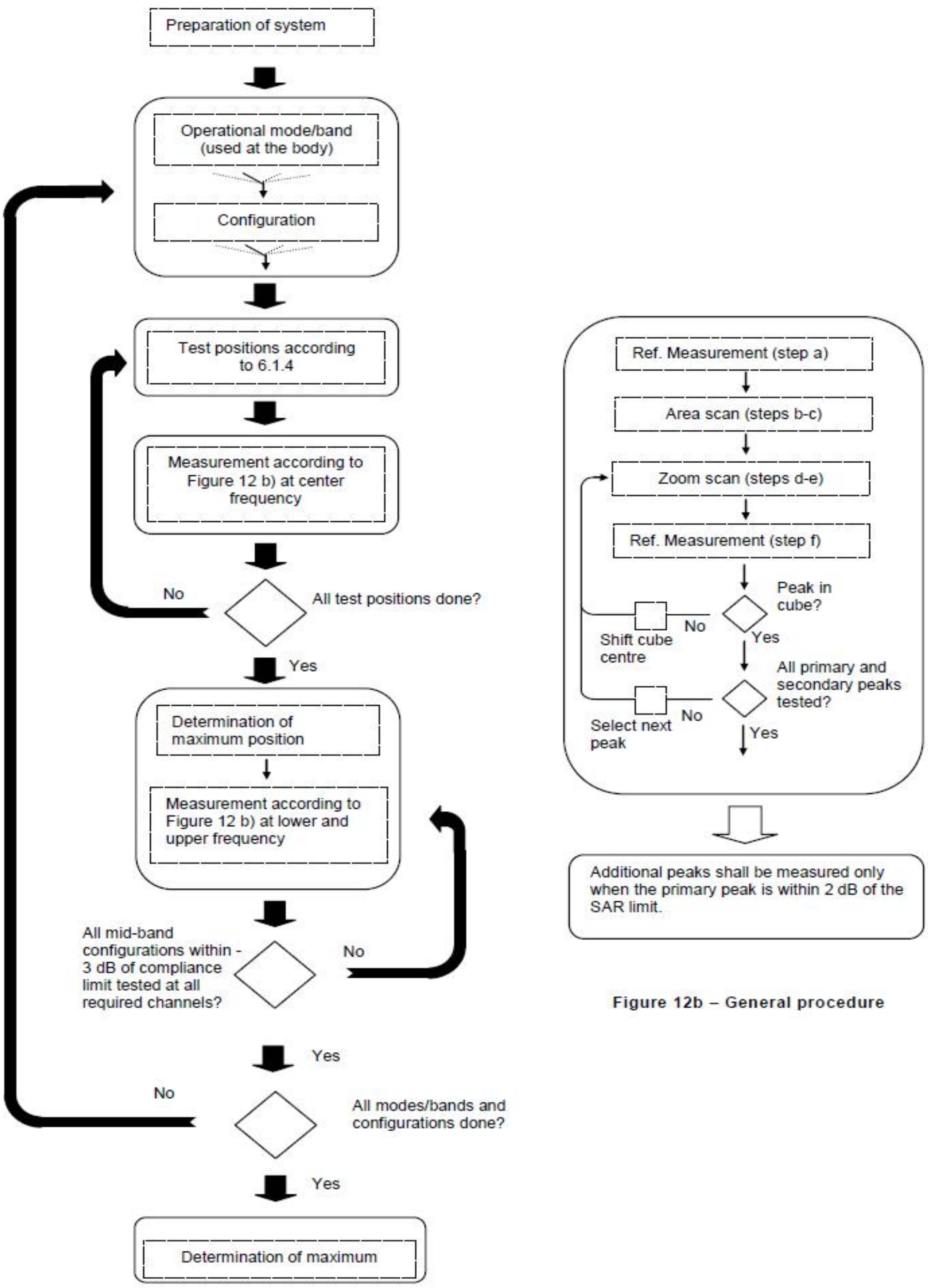


Figure 12b – General procedure

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.
   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 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 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.

14 SAR Test Results Summary

14.1 Standalone Body SAR

➢ WLAN 2.4 GHz Body SAR

Plot No.	Band/Mode	Test Position	Gap.	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	Back Side	0mm	1	16.16	16.50	1.081	1.040	1.125
	2.4GHz/802.11b	Bottom Side	0mm	1	16.16	16.50	1.081	0.057	0.062
	2.4GHz/802.11b	Back Side	0mm	7	15.99	16.00	1.002	1.240	1.243
1#	2.4GHz/802.11b	Back Side	0mm	13	16.08	16.50	1.102	1.270	**1.399**
(Headset)	2.4GHz/802.11b	Back Side	0mm	13	16.08	16.50	1.102	1.190	1.311
	2.4GHz/802.11b	**Back Side**	**0mm**	**13**	**16.08**	**16.50**	**1.102**	**1.270**	**1.399**

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.
3. Per KDB248227 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 25.23mW(14.02dBm) and 44.67mW(16.16dBm), the scaled SAR would be 1.399×(25.23/44.67)=0.79W/Kg < 1.2W/kg, therefore, SAR is not required for OFDM.
4. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
5. The WLAN Reported has been calculated together with the duty cycle scaling factor.
6. Highlight part of test data means repeated test.

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➢ WLAN 5GHz Body SAR

Plot No.	Band/Mode	Test Position	Gap.	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
				Band 1					
	5GHz/802.11a	Back Side	0mm	36	12.74	13.00	1.062	0.813	0.885
	5GHz/802.11a	Bottom Side	0mm	36	12.74	13.00	1.062	0.139	0.151
	5GHz/802.11a	Back Side	0mm	44	12.72	13.00	1.067	1.050	1.148
2#	5GHz/802.11a	Back Side	0mm	48	12.59	13.00	1.099	1.050	**1.183**
	5GHz/802.11a	**Back Side**	**0mm**	**48**	**12.59**	**13.00**	**1.099**	**1.045**	**1.177**
				Band 2					
	5GHz/802.11a	Back Side	0mm	52	12.40	12.50	1.023	0.951	0.997
	5GHz/802.11a	Bottom Side	0mm	52	12.40	12.50	1.023	0.123	0.129
	5GHz/802.11a	Back Side	0mm	60	12.17	12.50	1.079	1.030	1.139
3#	5GHz/802.11a	Back Side	0mm	64	12.03	12.50	1.114	1.020	**1.165**
	5GHz/802.11a	**Back Side**	**0mm**	**60**	**12.17**	**12.50**	**1.079**	**1.021**	**1.129**
				Band 3					
4#	5GHz/802.11a	Back Side	0mm	100	11.73	12.00	1.064	0.825	**0.900**
	5GHz/802.11a	Bottom Side	0mm	100	11.73	12.00	1.064	0.163	0.178
	5GHz/802.11a	Back Side	0mm	132	11.65	12.00	1.084	0.719	0.799
	5GHz/802.11a	Back Side	0mm	144	11.39	11.50	1.026	0.811	0.853
	5GHz/802.11a	**Back Side**	**0mm**	**100**	**11.73**	**12.00**	**1.064**	**0.819**	**0.893**
				Band 4					
5#	5GHz/802.11n-HT40	Back Side	0mm	151	12.52	13.00	1.117	0.959	**1.131**
	5GHz/802.11n-HT40	Bottom Side	0mm	151	12.52	13.00	1.117	0.145	0.171
	5GHz/802.11n-HT40	Back Side	0mm	159	12.30	12.50	1.047	0.786	0.869
	5GHz/802.11n-HT40	**Back Side**	**0mm**	**151**	**12.52**	**13.00**	**1.117**	**0.942**	**1.111**

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 865664 D01v01r04, for each frequency band, repeated SAR measurement is required when the measured SAR is ≥0.8W/kg.
9. According to KDB 865664 D02v01r02, SAR plot is required for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
10. The WLAN Reported has been calculated together with the duty cycle scaling factor.
11. Highlight part of test data means repeated test.

➢ Bluetooth Body SAR

Plot No.	Band/Mode	Test Position	Gap.	CH.	Ave. Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Meas. SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
6#	Bluetooth/DH5	Back Side	0mm	78	8.689	9.00	1.074	0.034	0.036

14.2 Repeated SAR measurement

Band/ Mode	Test Position	CH.	Freq. (MHz)	Measured SAR (W/kg)				
				Original	1st Repeated		2nd Repeated	
					Value	Ratio	Value	Ratio
2.4GHz/802.11b	Back Side	13	2472	1.399	1.399	1.00	/	/
5GHz/802.11a	Back Side	48	5240	1.183	1.177	1.01	/	/
5GHz/802.11a	Back Side	60	5300	1.165	1.129	1.03	/	/
5GHz/802.11a	Back Side	100	5500	0.900	0.893	1.01	/	/
5GHz/802.11a	Back Side	151	5755	1.131	1.111	1.02	/	/

Note:

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

15 SAR Simultaneous Transmission Analysis

The DUT WLAN 2.4GHz Band,WLAN 5GHz Band and Bluetooth share the same antenna, and cannot transmit simultaneously.

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