







# TEST REPORT

Report No. .... : **CHTEW19110080** Report verification:   
 Project No..... : **WHT1909058409EW**  
 FCC ID..... : **GVQS018**  
 Applicant's name..... : **Skyroam Technology Co., Ltd.**  
 Address..... : Block F,Room 1001,Xihaimingzhu Building,No.1 Taoyuan Road,Nanshan District,Shenzhen  
 Manufacturer..... : Skyroam Technology Co., Ltd.  
 Address..... : Block F,Room 1001,Xihaimingzhu Building,No.1 Taoyuan Road,Nanshan District,Shenzhen  
 Test item description ..... : **SOLIS X**  
 Trade Mark ..... : SKYROAM  
 Model/Type reference..... : S018  
 Listed Model(s) ..... : -  
 Standard ..... : **FCC 47 CFR Part2.1093**  
**IEEE Std C95.1, 1999 Edition**  
**IEEE 1528: 2013**  
 Date of receipt of test sample..... : Oct. 25, 2019  
 Date of testing..... : Oct. 28, 2019- Nov. 08, 2019  
 Date of issue..... : Nov. 11, 2019  
 Result..... : **PASS**

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*The test report merely correspond to the test sample.*

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## 1 . Test Standards and Report version

### 1.1. Test Standards

The tests were performed according to following standards:

[FCC 47 Part 2.1093](#): Radiofrequency radiation exposure evaluation: portable devices.

[IEEE Std C95.1, 1999 Edition](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz

[IEEE Std 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.

FCC published RF exposure KDB procedures:

[865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04](#): SAR Measurement Requirements for 100 MHz to 6 GHz

[865664 D02 RF Exposure Reporting v01r02](#): RF Exposure Compliance Reporting and Documentation Considerations

[447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

[248227 D01 802.11 Wi-Fi SAR v02r02](#): SAR Measurement Procedures for 802.11 a/b/g Transmitters

[941225 D01 3G SAR Procedures v03r01](#): SAR Measurement Procedures for 3G Devices

[941225 D05 SAR for LTE Devices v02r05](#): SAR Evaluation Considerations for LTE Devices

[941225 D06 Hotspot Mode v02r01](#): SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities

[TCB workshop](#) April, 2019; Page 19, Tissue Simulating Liquids (TSL)

### 1.2. Report version

Revision No.	Date of issue	Description
N/A	2019-11-11	Change the battery, applicant's address, manufacturer address do the difference test.

## 2. Summary

### 2.1. Client Information

Applicant:	Skyroam Technology Co., Ltd.
Address:	Block F,Room 1001,Xihaimingzhu Building,No.1 Taoyuan Road,Nanshan District,Shenzhen
Manufacturer:	Skyroam Technology Co., Ltd.
Address:	Block F,Room 1001,Xihaimingzhu Building,No.1 Taoyuan Road,Nanshan District,Shenzhen

### 2.2. Product Description

Name of EUT:	SOLIS X			
Trade Mark:	SKYROAM			
Model No.:	S018			
Listed Model(s):	-			
Power supply:	DC 3.7V			
Device Category:	Portable			
Product stage:	Production unit			
RF Exposure Environment:	General Population/Uncontrolled			
Hardware version:	Y3919A-V1.1			
Software version:	6.4.16			
Device Dimension:	Overall (Diameter): 88mm Overall (Thickness): 23.5mm			
<b>Maximum SAR Value</b>				
Separation Distance:	Body-worn:	5mm		
Max Report SAR Value(1g):	Test location:	PCT	DTS	U-NII
	<b>Body-worn:</b>	0.587 W/kg	0.082 W/kg	0.131 W/kg
<b>WCDMA</b>				
Operation Band:	FDD Band II FDD Band IV FDD Band V			
Power Class:	Class 3			
Operating Mode:	UMTS Rel. 99 (Data) HSDPA HSUPA			
Antenna Type:	Integral permanent antenna			

<b>LTE</b>	
Operation Band:	FDD Band 2 FDD Band 4 FDD Band 5 FDD Band 7 FDD Band 12 FDD Band 17 FDD Band 25 FDD Band 26 FDD Band 71 TDD Band 38 TDD Band 41
Power Class:	Class 3
Operating Mode:	QPSK 16QAM
Antenna Type:	Integral permanent antenna
<b>WiFi 2.4G</b>	
Operating Mode:	802.11b 802.11g 802.11n(HT20) 802.11n(HT40)
Antenna Type:	Integral permanent antenna
<b>WiFi 5G</b>	
Operation Band:	U-NII-1 U-NII-3
Operating Mode:	802.11a 802.11n(HT20) 802.11n(HT40)
Antenna Type:	Integral permanent antenna
<b>Bluetooth</b>	
Version:	BT4.2+EDR
Operating Mode:	GFSK $\pi$ /4DQPSK 8DPSK
Antenna Type:	Integral permanent antenna
<b>Bluetooth</b>	
Version:	BT4.2+BLE
Operating Mode:	GFSK
Antenna Type:	Integral permanent antenna
<i>Remark:</i>	
1. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power.	

### 3. Test Environment

#### 3.1. Test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

#### 3.2. Test Facility

##### **CNAS-Lab Code: L1225**

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

##### **A2LA-Lab Cert. No.: 3902.01**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

##### **FCC-Registration No.: 762235**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 762235.

##### **IC-Registration No.: 5377A**

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A.

##### **ACA**

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

#### 3.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Ambient temperature	18 °C to 25 °C
Ambient humidity	30%RH to 70%RH
Air Pressure	950-1050mbar

#### 4. Equipments Used during the Test

Used	Test Equipment	Manufacturer	Model No.	Serial No.	Cal. date (YY-MM-DD)	Due date (YY-MM-DD)
●	Data Acquisition Electronics DAEx	SPEAG	DAE4	1549	2019/03/19	2020/03/18
●	E-field Probe	SPEAG	EX3DV4	7494	2019/03/25	2020/03/24
●	Universal Radio Communication Tester	R&S	CMW500	137681	2019/06/27	2020/06/26
<b>● Tissue-equivalent liquids Validation</b>						
●	Dielectric Assessment Kit	SPEAG	DAK-3.5	1267	N/A	N/A
○	Dielectric Assessment Kit	SPEAG	DAK-12	1130	N/A	N/A
●	Network analyzer	Keysight	E5071C	MY46733048	2019/10/19	2020/10/18
<b>● System Validation</b>						
○	System Validation Antenna	SPEAG	CLA-150	4024	2018/02/21	2021/02/20
○	System Validation Dipole	SPEAG	D450V3	1102	2018/02/23	2021/02/22
●	System Validation Dipole	SPEAG	D750V3	1180	2018/02/07	2021/02/06
●	System Validation Dipole	SPEAG	D835V2	4d238	2018/02/19	2021/02/18
●	System Validation Dipole	SPEAG	D1750V2	1164	2018/02/06	2021/02/05
●	System Validation Dipole	SPEAG	D1900V2	5d226	2018/02/22	2021/02/21
●	System Validation Dipole	SPEAG	D2450V2	1009	2018/02/05	2021/02/04
●	System Validation Dipole	SPEAG	D2600V2	1150	2018/02/05	2021/02/04
●	System Validation Dipole	SPEAG	D5GHzV2	1273	2018/02/21	2021/02/20
●	Signal Generator	R&S	SMB100A	114360	2019/08/15	2020/08/14
●	Power Viewer for Windows	R&S	N/A	N/A	N/A	N/A
●	Power sensor	R&S	NRP18A	101010	2019/08/15	2020/08/14
●	Power sensor	R&S	NRP18A	101011	2019/08/15	2020/08/14
●	Power Amplifier	BONN	BLWA 0160-2M	1811887	2018/11/15	2019/11/14
●	Dual Directional Coupler	Mini-Circuits	ZHDC-10-62-S+	F975001814	2018/11/15	2019/11/14
●	Attenuator	Mini-Circuits	VAT-3W2+	1819	2018/11/15	2019/11/14
●	Attenuator	Mini-Circuits	VAT-10W2+	1741	2018/11/15	2019/11/14

**Note:**

1. The Probe, Dipole and DAE calibration reference to the Appendix B and C.
2. Referring to KDB865664 D01, the dipole calibration interval can be extended to 3 years with justification. The dipole are also not physically damaged or repaired during the interval.

## **5. Measurement Uncertainty**

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is  $< 1.5$  W/kg and the measured 10-g SAR within a frequency band is  $< 3.75$  W/kg. The expanded SAR measurement uncertainty must be  $\leq 30\%$ , for a confidence interval of  $k = 2$ . If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.



## 6. SAR Measurements System Configuration

### 6.1. SAR Measurement Set-up

The DASY5 system for performing compliance tests consists of the following items:

A standard high precision 6-axis robot (Stäubli RX family) with controller and software. An arm extension for accommodating the data acquisition electronics (DAE).

A dosimetric probe, i.e. an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.

A data acquisition electronic (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

A unit to operate the optical surface detector which is connected to the EOC.

The Electro-Optical Coupler (EOC) performs the conversion from the optical into a digital electric signal of the DAE. The EOC is connected to the DASY5 measurement server.

The DASY5 measurement server, which performs all real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operation. A computer operating Windows 2003.

DASY5 software and SEMCAD data evaluation software.

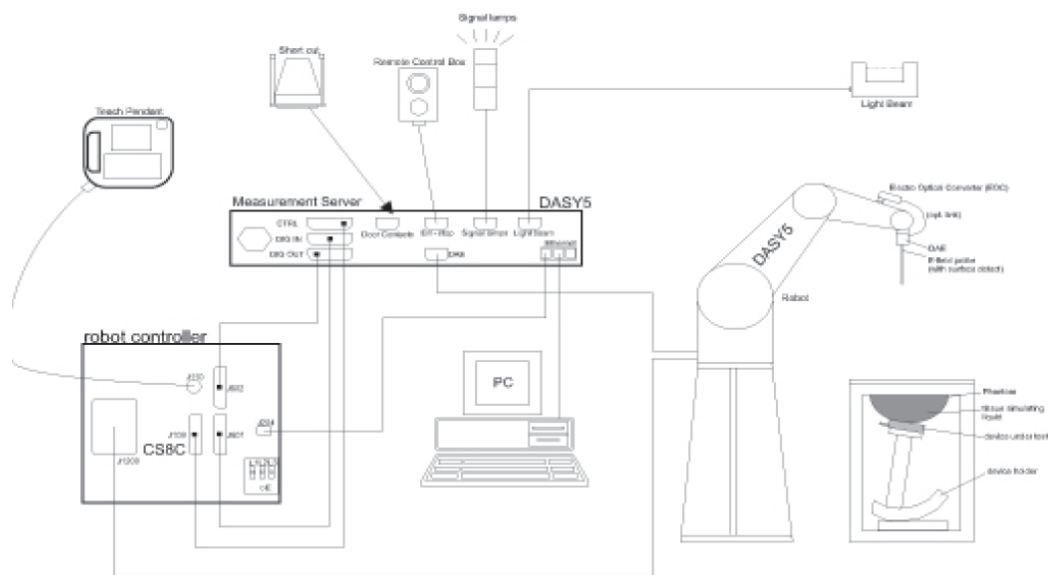
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

The generic twin phantom enabling the testing of left-hand and right-hand usage.

The device holder for handheld Mobile Phones.

Tissue simulating liquid mixed according to the given recipes.

System validation dipoles allowing to validate the proper functioning of the system.



## 6.2. DASY5 E-field Probe System

The SAR measurements were conducted with the dosimetric probe EX3DV4 (manufactured by SPEAG), designed in the classical triangular configuration and optimized for dosimetric evaluation.

### ● Probe Specification

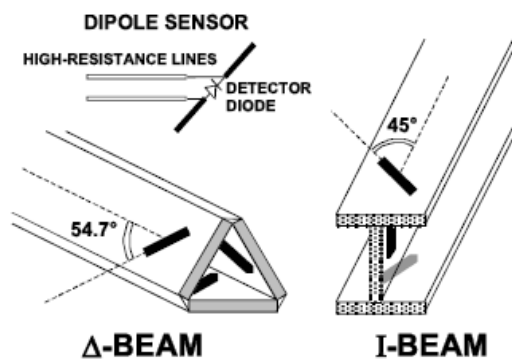
Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	ISO/IEC 17025 calibration service available.
Frequency	4 MHz to 10 GHz; Linearity: $\pm 0.2$ dB (30 MHz to 6 GHz)
Directivity	$\pm 0.3$ dB in HSL (rotation around probe axis) $\pm 0.5$ dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 $\mu$ W/g to > 100 W/kg; Linearity: $\pm 0.2$ dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Dosimetry in strong gradient fields Compliance tests of Mobile Phones
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI



### ◆ Isotropic E-Field Probe

The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

The E-Field probe utilizes a triangular sensor arrangement as detailed in the diagram below:



### 6.3. Phantoms

The phantom used for all tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG. The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region, where shell thickness increases to 6mm).

System checking was performed using the flat section, whilst Head SAR tests used the left and right head profile sections. Body SAR testing also used the flat section between the head profiles.

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with standard and all known tissuesimulating liquids. ELI has been optimized regarding its performance and can beintegrated into our standard phantom tables. A cover prevents evaporation ofthe liquid. Reference markings on the phantom allow installation of thecomplete setup, including all predefined phantom positions and measurementgrids, by teaching three points. The phantom is compatible with all SPEAGdosimetric probes and dipoles.



SAM-Twin Phantom



ELI Phantom

### 6.4. Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the DASY system.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation centers for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.



Device holder supplied by SPEAG

## 7. SAR Test Procedure

### 7.1. Scanning Procedure

The DASY5 installation includes predefined files with recommended procedures for measurements and validation. They are read-only document files and destined as fully defined but unmeasured masks. All test positions (head or body-worn) are tested with the same configuration of test steps differing only in the grid definition for the different test positions.

The “reference” and “drift” measurements are located at the beginning and end of the batch process. They measure the field drift at one single point in the liquid over the complete procedure. The indicated drift is mainly the variation of the DUT’s output power and should vary max.  $\pm 5\%$ .

The “surface check” measurement tests the optical surface detection system of the DASY5 system by repeatedly detecting the surface with the optical and mechanical surface detector and comparing the results. The output gives the detecting heights of both systems, the difference between the two systems and the standard deviation of the detection repeatability. Air bubbles or refraction in the liquid due to separation of the sugar-water mixture gives poor repeatability (above  $\pm 0.1\text{mm}$ ). To prevent wrong results tests are only executed when the liquid is free of air bubbles. The difference between the optical surface detection and the actual surface depends on the probe and is specified with each probe (It does not depend on the surface reflectivity or the probe angle to the surface within  $\pm 30^\circ$ .)

#### **Area Scan**

The Area Scan is used as a fast scan in two dimensions to find the area of high field values before running a detailed measurement around the hot spot. Before starting the area scan a grid spacing of 15 mm x 15 mm is set. During the scan the distance of the probe to the phantom remains unchanged. After finishing area scan, the field maxima within a range of 2 dB will be ascertained.

#### **Zoom Scan**

After the maximum interpolated values were calculated between the points in the cube, the SAR was averaged over the spatial volume (1g or 10g) using a 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions). The volume was then integrated with the trapezoidal algorithm.

#### **Spatial Peak Detection**

The procedure for spatial peak SAR evaluation has been implemented and can determine values of masses of 1g and 10g, as well as for user-specific masses. The DASY5 system allows evaluations that combine measured data and robot positions, such as:

- maximum search
- extrapolation
- boundary correction
- peak search for averaged SAR

During a maximum search, global and local maxima searches are automatically performed in 2-D after each Area Scan measurement with at least 6 measurement points. It is based on the evaluation of the local SAR gradient calculated by the Quadratic Shepard’s method. The algorithm will find the global maximum and all local maxima within -2 dB of the global maxima for all SAR distributions.

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. Several measurements at different distances are necessary for the extrapolation. Extrapolation routines require at least 10 measurement points in 3-D space.

They are used in the Zoom Scan to obtain SAR values between the lowest measurement points and the inner phantom surface. The routine uses the modified Quadratic Shepard’s method for extrapolation.

A Z-axis scan measures the total SAR value at the x-and y-position of the maximum SAR value found during the cube scan. The probe is moved away in z-direction from the bottom of the SAM phantom in 5mm steps.

**Table 1: Area and Zoom Scan Resolutions per FCC KDB Publication 865664 D01v04**

		$\leq 3$ GHz	$> 3$ GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		5 mm $\pm$ 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm $\pm$ 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location		30° $\pm$ 1°	20° $\pm$ 1°
Maximum area scan spatial resolution: $\Delta x_{Area}$ , $\Delta y_{Area}$		$\leq 2$ GHz: $\leq 15$ mm 2 – 3 GHz: $\leq 12$ mm	3 – 4 GHz: $\leq 12$ mm 4 – 6 GHz: $\leq 10$ mm
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$		$\leq 2$ GHz: $\leq 8$ mm 2 – 3 GHz: $\leq 5$ mm*	3 – 4 GHz: $\leq 5$ mm* 4 – 6 GHz: $\leq 4$ mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$	$\leq 5$ mm	3 – 4 GHz: $\leq 4$ mm 4 – 5 GHz: $\leq 3$ mm 5 – 6 GHz: $\leq 2$ mm
	graded grid	$\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4$ mm
		$\Delta z_{Zoom}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm
Minimum zoom scan volume	x, y, z	$\geq 30$ mm	3 – 4 GHz: $\geq 28$ mm 4 – 5 GHz: $\geq 25$ mm 5 – 6 GHz: $\geq 22$ mm
<p>Note: <math>\delta</math> is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.</p> <p>* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB Publication 447498 is <math>\leq 1.4</math> W/kg, <math>\leq 8</math> mm, <math>\leq 7</math> mm and <math>\leq 5</math> mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</p>			

## 7.2. Data Storage and Evaluation

### Data Storage

The DASY5 software stores the acquired data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors),s together with all necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files with the extension “.DA4”. The software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of incorrect parameter settings. For example, if a measurement has been performed with a wrong crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be re-evaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type ([V/m], [A/m], [°C], [W/kg], [mW/cm<sup>2</sup>], [dBrel], etc.). Some of these units are not available in certain situations or show meaningless results, e.g., a SAR output in a lossless media will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

### Data Evaluation

The SEMCAD software 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:	Normi, ai0, ai1, ai2
	Conversion factor:	ConvFi
	Diode compression point:	Dcpi
Device parameters:	Frequency:	f
	Crest factor:	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 DASY5 components. In the direct measuring mode of the multimeter 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:

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

Vi:	compensated signal of channel ( i = x, y, z )
Ui:	input signal of channel ( i = x, y, z )
cf:	crest factor of exciting field (DASY parameter)
dcp <sub>i</sub> :	diode compression point (DASY parameter)

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

$$E - \text{fieldprobes} : \quad E_i = \sqrt{\frac{V_i}{\text{Norm}_i \cdot \text{ConvF}}}$$

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

Vi:	compensated signal of channel ( i = x, y, z )
Norm <sub>i</sub> :	sensor sensitivity of channel ( i = x, y, z ), [mV/(V/m) <sup>2</sup> ] for E-field Probes
ConvF:	sensitivity enhancement in solution
a <sub>ij</sub> :	sensor sensitivity factors for H-field probes
f:	carrier frequency [GHz]
E <sub>i</sub> :	electric field strength of channel i in V/m
H <sub>i</sub> :	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.

$$SAR = E_{tot}^2 \cdot \frac{\sigma}{\rho \cdot 1'000}$$

SAR: local specific absorption rate in W/kg  
Etot: total field strength in V/m  
 $\sigma$ : conductivity in [mho/m] or [Siemens/m]  
 $\rho$ : equivalent tissue density in g/cm<sup>3</sup>

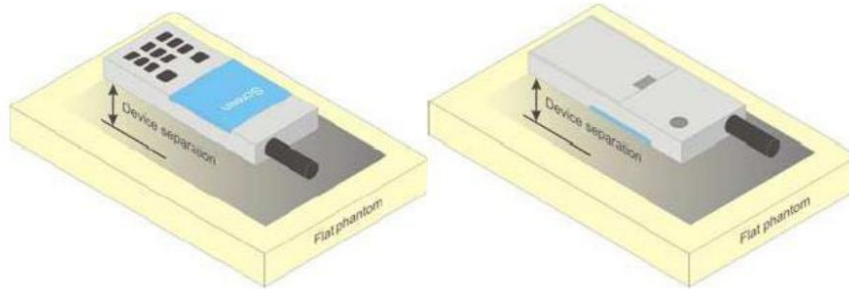
Note that the density is normally set to 1 (or 1.06), to account for actual brain density rather than the density of the simulation liquid.

## 8. Position of the wireless device in relation to the phantom

### 8.1. Body Position

Devices that support transmission while used with body-worn accessories must be tested for body-worn accessory SAR compliance, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics.

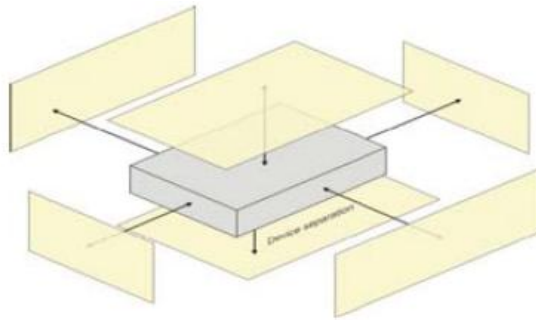
Devices that are designed to operate on the body of users using lanyards and straps or without requiring additional body-worn accessories must be tested for SAR compliance using a conservative minimum test separation distance  $\leq 5\text{mm}$  to support compliance.



Picture 4 Test positions for body-worn devices

### 8.2. Hotspot Mode Exposure conditions

The hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. This typically applies to the back and front surfaces of a handset when SAR is required for both hotspot mode and body-worn accessory exposure conditions. Depending on the form factor and dimensions of a device, the test separation distance used for hotspot mode SAR measurement is either 10 mm or that used in the body-worn accessory configuration, whichever is less for devices with dimension  $> 9\text{ cm} \times 5\text{ cm}$ . For smaller devices with dimensions  $\leq 9\text{ cm} \times 5\text{ cm}$  because of a greater potential for next to body use a test separation of  $\leq 5\text{ mm}$  must be used.



Picture 5 Test positions for Hotspot Mode



## 9. Dielectric Property Measurements & System Check

### 9.1. Tissue Dielectric Parameters

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within  $\pm 2^\circ\text{C}$  of the temperature when the tissue parameters are characterized.

The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3-4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.

The dielectric constant ( $\epsilon_r$ ) and conductivity ( $\sigma$ ) of typical tissue-equivalent media recipes are expected to be within  $\pm 5\%$  of the required target values; but for SAR measurement systems that have implemented the SAR error compensation algorithms documented in IEEE Std 1528-2013, to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters, the tolerance for  $\epsilon_r$  and  $\sigma$  may be relaxed to  $\pm 10\%$ . This is limited to frequencies  $\leq 3$  GHz.

#### Tissue Dielectric Parameters

FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz

Tissue dielectric parameters for Head and Body				
Target Frequency (MHz)	Head		Body	
	$\epsilon_r$	$\sigma(\text{S/m})$	$\epsilon_r$	$\sigma(\text{S/m})$
750	41.9	0.89	55.5	0.96
835	41.5	0.90	55.2	0.97
1750	40.1	1.37	53.4	1.49
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
2600	39.0	1.96	52.5	2.16
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5800	35.3	5.27	48.2	6.00

#### IEEE Std 1528-2013

Refer to Table 3 within the IEEE Std 1528-2013

**Dielectric Property Measurements Results:**

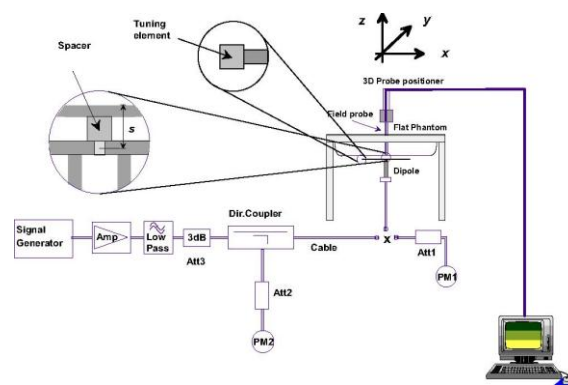
<b>Dielectric performance of Head tissue simulating liquid</b>									
Frequency (MHz)	$\epsilon_r$		$\sigma(\text{S/m})$		Delta ( $\epsilon_r$ )	Delta ( $\sigma$ )	Limit	Temp ( $^{\circ}\text{C}$ )	Date
	Target	Measured	Target	Measured					
750	41.90	43.77	0.890	0.884	4.46%	-0.67%	$\pm 5\%$	22.5	2019-10-30
835	41.50	43.49	0.900	0.916	4.80%	1.78%	$\pm 5\%$	22.5	2019-10-30
1750	40.10	41.69	1.370	1.362	3.97%	-0.58%	$\pm 5\%$	22.5	2019-10-31
1900	40.00	41.48	1.400	1.453	3.70%	3.79%	$\pm 5\%$	22.5	2019-10-31
2450	39.20	40.71	1.800	1.857	3.85%	3.17%	$\pm 5\%$	22.5	2019-11-01
2600	39.00	40.43	1.960	1.984	3.67%	1.22%	$\pm 5\%$	22.5	2019-11-01
5200	36.00	35.69	4.660	4.618	-0.87%	-0.90%	$\pm 5\%$	22.5	2019-11-02
5300	35.90	35.49	4.760	4.729	-1.13%	-0.65%	$\pm 5\%$	22.5	2019-11-02
5800	35.30	34.55	5.270	5.306	-2.13%	0.68%	$\pm 5\%$	22.5	2019-11-02

## 9.2. System Check

SAR system verification is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are re-measured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

### System Performance Check Measurement Conditions:

- ◆ The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness:  $2.0 \pm 0.2$  mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- ◆ The depth of tissue-equivalent liquid in a phantom must be  $\geq 15.0$  cm for SAR measurements  $\leq 3$  GHz and  $\geq 10.0$  cm for measurements  $> 3$  GHz.
- ◆ The DASY system with an E-Field Probe was used for the measurements.
- ◆ The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- ◆ The coarse grid with a grid spacing of 15 mm was aligned with the dipole.  
For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- ◆ Special 7x7x7 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the cube.
- ◆ The results are normalized to 1 W input power.



System Performance Check Setup



Photo of Dipole Setup

**System Check Result:**

The 1-g and 10-g SAR measured with a reference dipole, using the required tissue-equivalent medium at the test frequency, must be within  $\pm 10\%$  of the manufacturer calibrated dipole SAR target.

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (°C)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
750	8.22	8.48	2.12	5.39	5.56	1.39	3.16%	3.15%	$\pm 10\%$	22.5	2019-10-30
835	9.51	9.80	2.45	6.15	6.36	1.59	3.05%	3.41%	$\pm 10\%$	22.5	2019-10-30
1750	36.60	36.72	9.18	19.40	19.64	4.91	0.33%	1.24%	$\pm 10\%$	22.5	2019-10-31
1900	40.30	41.60	10.40	21.10	21.40	5.35	3.23%	1.42%	$\pm 10\%$	22.5	2019-10-31
2450	51.50	52.80	13.20	24.10	24.72	6.18	2.52%	2.57%	$\pm 10\%$	22.5	2019-11-01
2600	55.60	57.20	14.30	25.00	25.80	6.45	2.88%	3.20%	$\pm 10\%$	22.5	2019-11-01

Head											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (°C)	Date
	Target 1W	Normalize to 1W	Measured 100mW	Target 1W	Normalize to 1W	Measured 100mW					
5200	79.90	78.20	7.82	22.80	22.70	2.27	-2.13%	-0.44%	$\pm 10\%$	22.5	2019-11-02
5300	81.40	78.80	7.88	23.40	23.20	2.32	-3.19%	-0.85%	$\pm 10\%$	22.5	2019-11-02
5800	79.40	77.50	7.75	22.50	22.10	2.21	-2.39%	-1.78%	$\pm 10\%$	22.5	2019-11-02

### Plots of System Performance Check

#### System Performance Check-Head 750MHz

DUT: D750V3; Type: D750V3; Serial: 1180

Date: 2019-10-30

Communication System: UID 0, CW (0); Frequency: 750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 750 MHz;  $\sigma = 0.884$  S/m;  $\epsilon_r = 43.773$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature:22.2°C;Liquid Temperature:21.9°C;

#### DASY5 Configuration:

- Probe: EX3DV4 - SN7494; ConvF(10.74, 10.74, 10.74) @ 750 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=15mm, Pin=250mW/Area Scan (41x111x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.87 W/kg

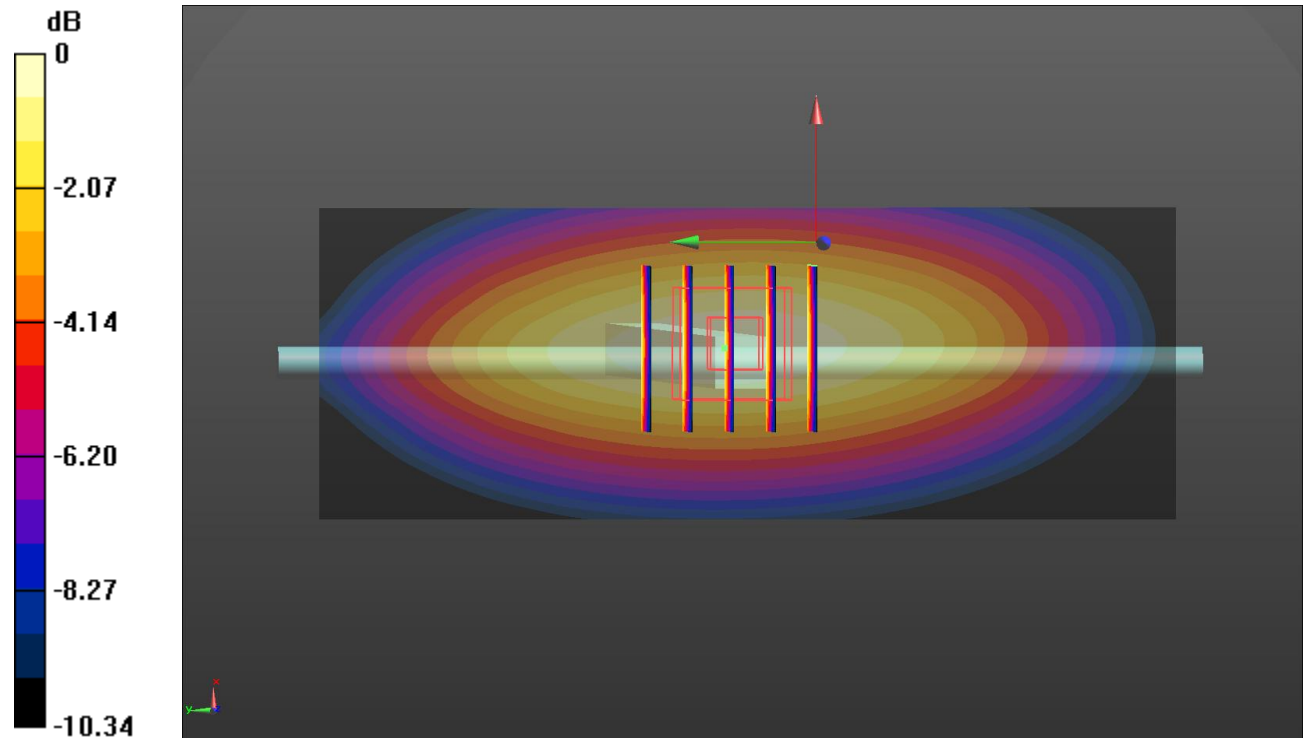
**Head/d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0:** Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 57.86 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 3.36 W/kg

**SAR(1 g) = 2.12 W/kg; SAR(10 g) = 1.39 W/kg**

Maximum value of SAR (measured) = 2.89 W/kg



0 dB = 2.89 W/kg = 4.61 dBW/kg

**System Performance Check-Head 835MHz**

DUT: D835V2; Type: D835V2; Serial: 4d238

Date: 2019-10-30

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 835 \text{ MHz}$ ;  $\sigma = 0.916 \text{ S/m}$ ;  $\epsilon_r = 43.488$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Ambient Temperature:22.1°C;Liquid Temperature:21.9°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(10.41, 10.41, 10.41) @ 835 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=15mm, Pin=250mW/Area Scan (51x101x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 3.33 W/kg

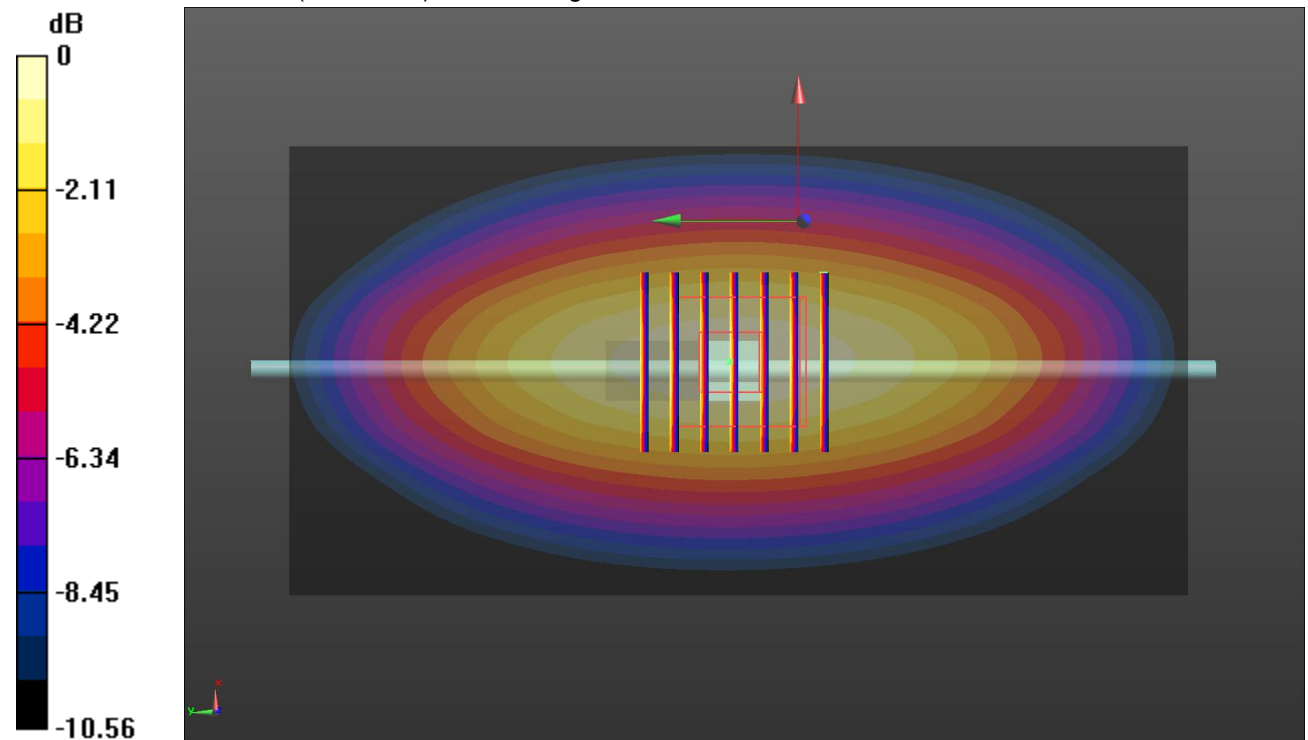
**Head/d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 61.58 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.96 W/kg

**SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg**

Maximum value of SAR (measured) = 3.38 W/kg



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

**System Performance Check-Head 1750MHz**

DUT: D1750V2; Type: D1750V2; Serial: 1164

Date: 2019-10-31

Communication System: UID 0, CW (0); Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1750$  MHz;  $\sigma = 1.362$  S/m;  $\epsilon_r = 41.694$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature: 22.2°C; Liquid Temperature: 22.0°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(8.91, 8.91, 8.91) @ 1750 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm, Pin=250mW/Area Scan (51x51x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 14.8 W/kg

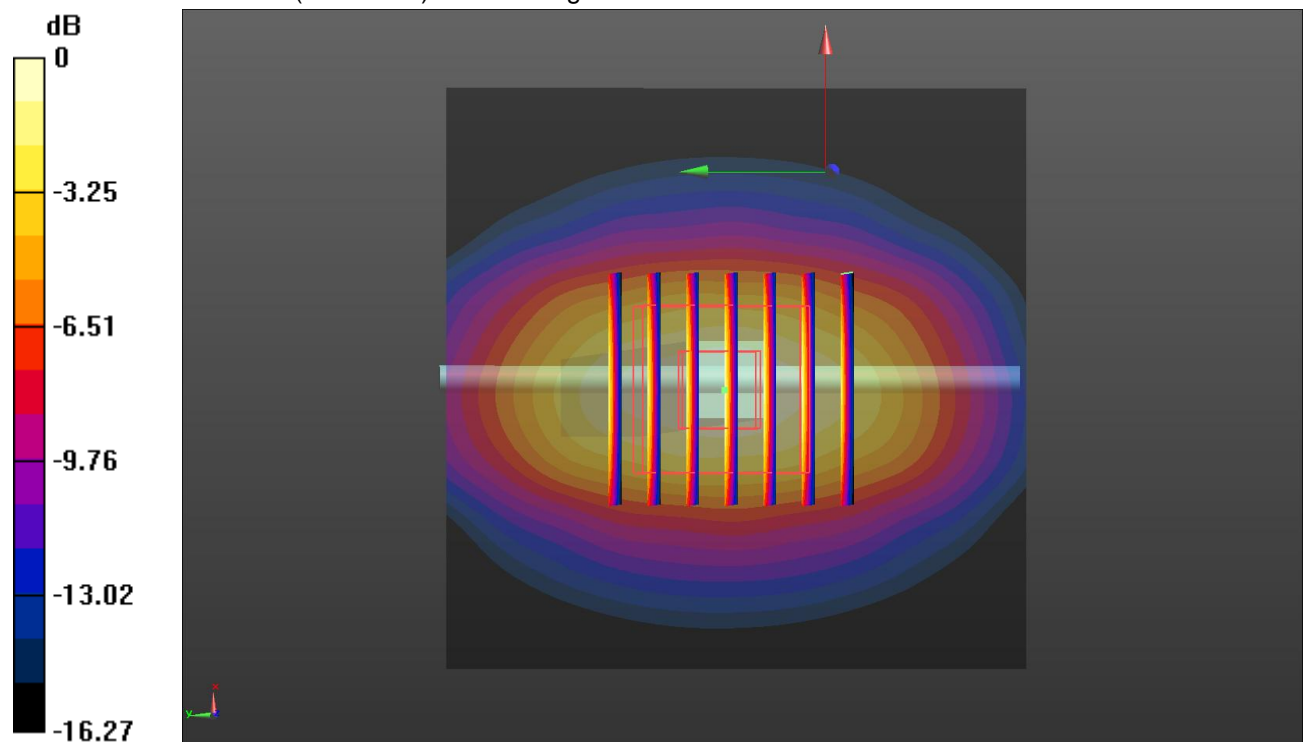
**Head/d=10mm, Pin=250mW/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 103.1 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 17.2 W/kg

**SAR(1 g) = 9.18 W/kg; SAR(10 g) = 4.91 W/kg**

Maximum value of SAR (measured) = 14.3 W/kg



0 dB = 14.3 W/kg = 11.55 dBW/kg

**System Performance Check-Head 1900MHz**

DUT: D1900V2; Type: D1900V2; Serial: 5d226  
Date:2019-10-31

Communication System: UID 0, CW (0); Frequency: 1900 MHz;Duty Cycle: 1:1  
Medium parameters used: f = 1900 MHz;  $\sigma = 1.453$  S/m;  $\epsilon_r = 41.481$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
Phantom section: Flat Section  
Ambient Temperature:22.3°C;Liquid Temperature:22.1°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(8.57, 8.57, 8.57) @ 1900 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm,Pin=250mW/Area Scan (51x51x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 17.3 W/kg

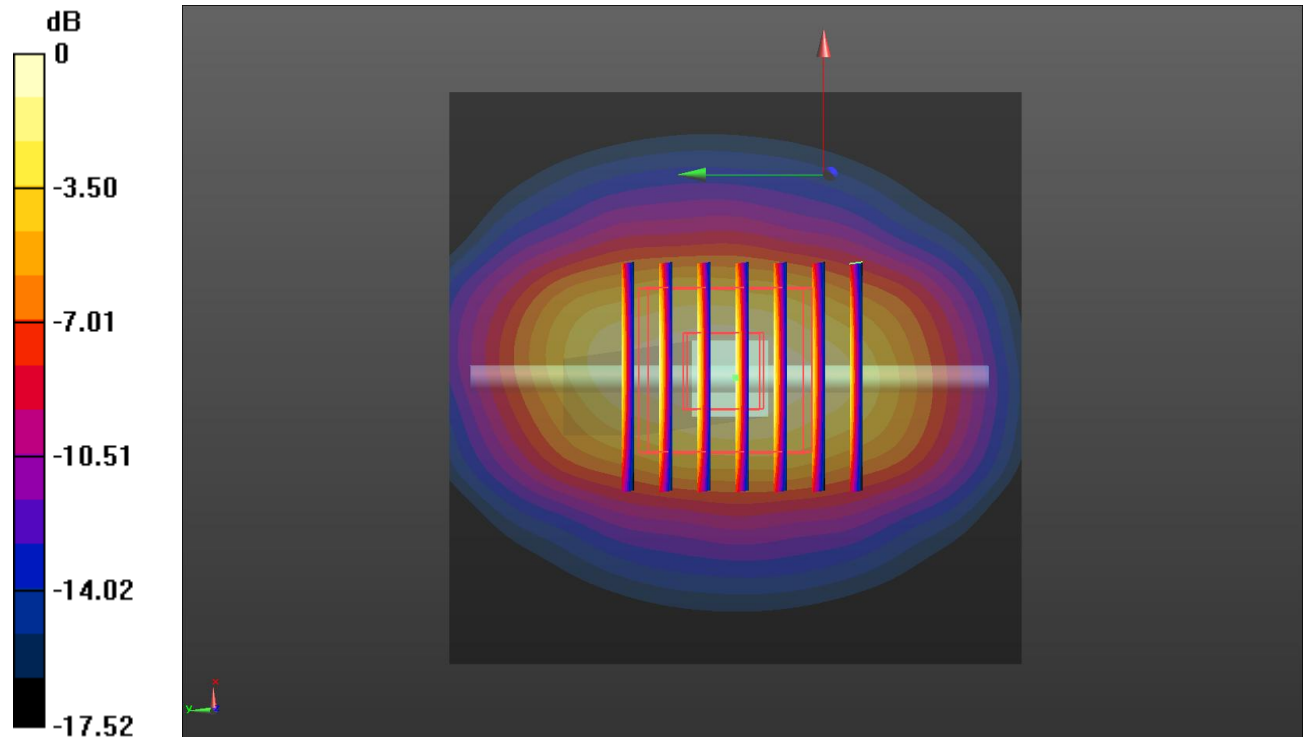
**Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7) /Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.8 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 19.8 W/kg

**SAR(1 g) = 10.4 W/kg; SAR(10 g) = 5.35 W/kg**

Maximum value of SAR (measured) = 16.2 W/kg



0 dB = 16.2 W/kg = 12.10 dBW/kg



**SystemPerformanceCheck-Head 2450MHz**

DUT: D2450V2; Type: D2450V2; Serial: 1009  
 Date:2019-11-01

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 2450$  MHz;  $\sigma = 1.857$  S/m;  $\epsilon_r = 40.706$ ;  $\rho = 1000$  kg/m<sup>3</sup>  
 Phantom section: Flat Section

Ambient Temperature:22.3°C;Liquid Temperature:22.0°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(7.9, 7.9, 7.9) @ 2450 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm,Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 22.2 W/kg

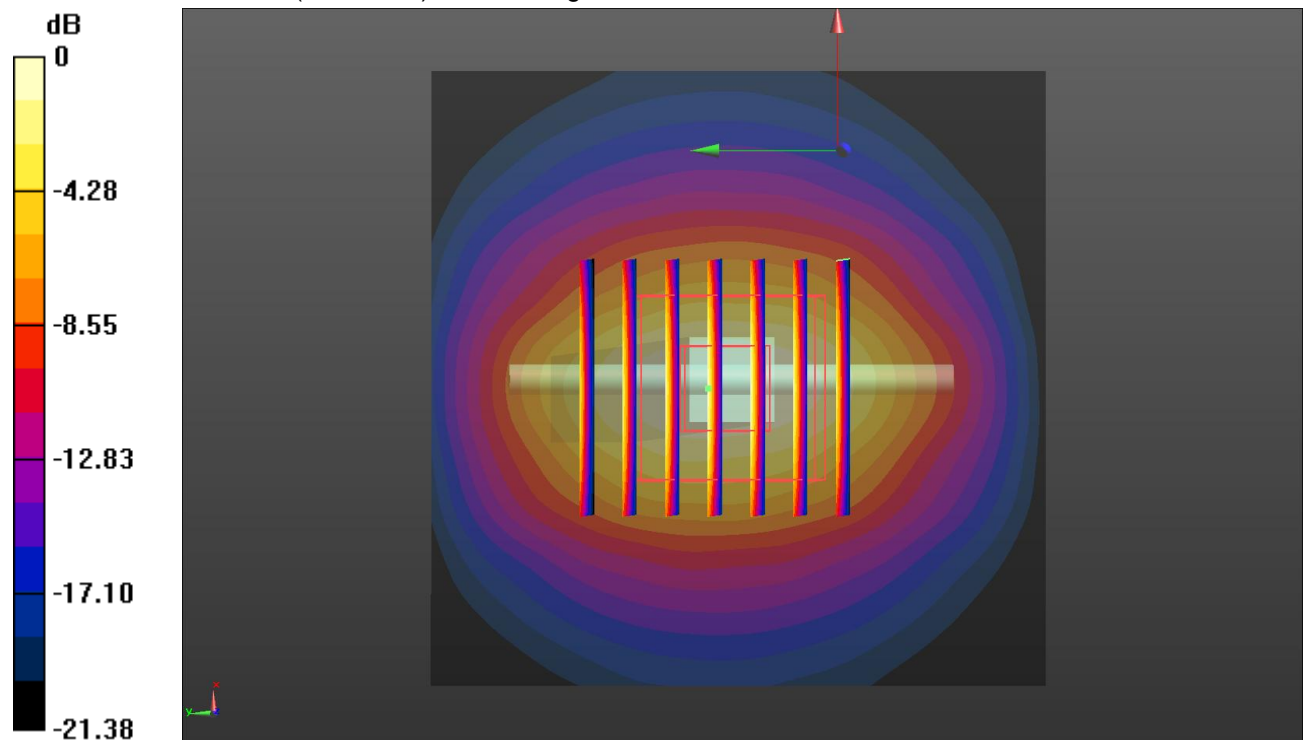
**Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 111.6 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 27.1 W/kg

**SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.18 W/kg**

Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

**SystemPerformanceCheck-Head 2600MHz**

DUT: D2600V2; Type: D2600V2; Serial: 1150

Date: 2019-11-01

Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 2600$  MHz;  $\sigma = 1.984$  S/m;  $\epsilon_r = 40.425$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature:22.5°C;Liquid Temperature:22.2°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(7.69, 7.69, 7.69) @ 2600 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm,Pin=250mW/Area Scan (61x61x1):** Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 24.9 W/kg

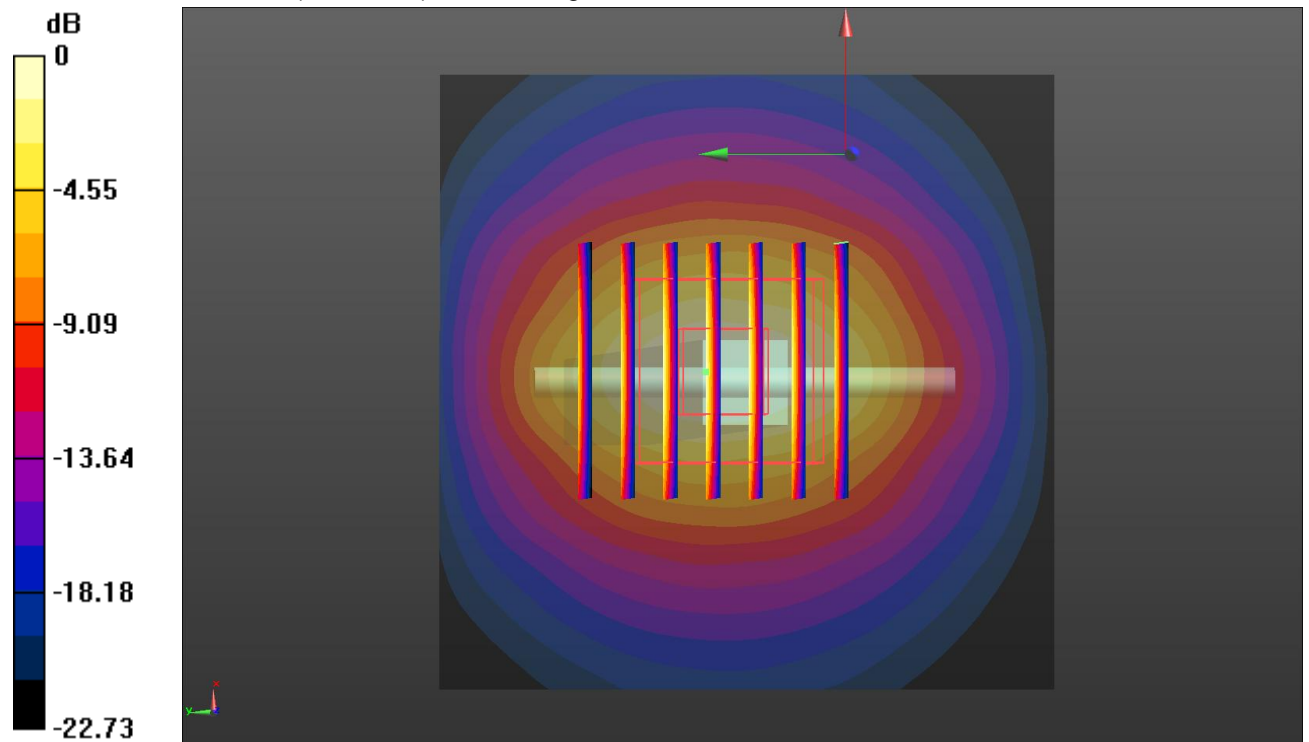
**Head/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 112.7 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 30.9 W/kg

**SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.45 W/kg**

Maximum value of SAR (measured) = 24.4 W/kg



0 dB = 24.4 W/kg = 13.87 dBW/kg

**SystemPerformanceCheck-Head 5200MHz**

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273

Date: 2019-11-02

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5200 MHz;  $\sigma = 4.618 \text{ S/m}$ ;  $\epsilon_r = 35.687$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Ambient Temperature:22.5°C;Liquid Temperature:22.2°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(5.56, 5.56, 5.56) @ 5200 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm,Pin=100mW/Area Scan (31x31x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.8 W/kg

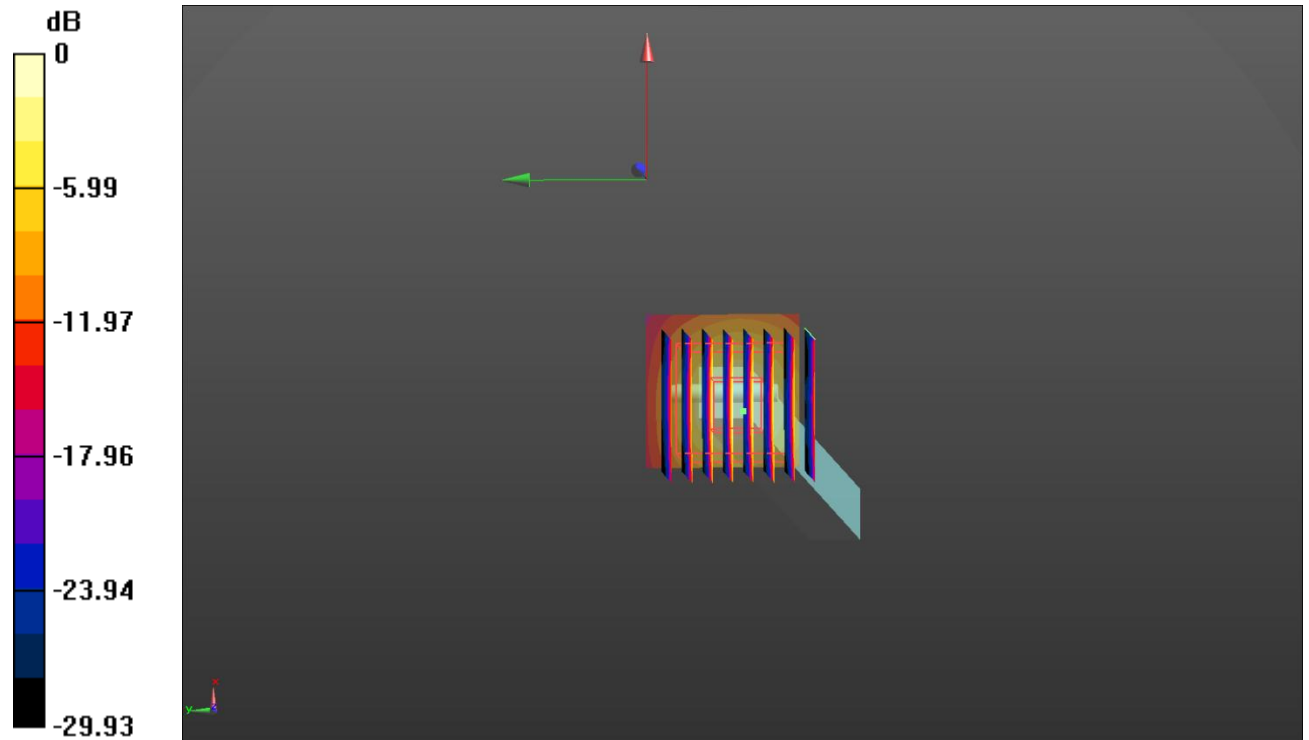
**Head/d=10mm,Pin=100mW/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 62.37 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 31.5 W/kg

**SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.27 W/kg**

Maximum value of SAR (measured) = 18.8 W/kg



0 dB = 18.8 W/kg = 12.74 dBW/kg

**SystemPerformanceCheck-Head 5300MHz**

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273

Date: 2019-11-02

Communication System: UID 0, A-CW (0); Frequency: 5300 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 5300$  MHz;  $\sigma = 4.729$  S/m;  $\epsilon_r = 35.494$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature: 22.3°C; Liquid Temperature: 22.1°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(5.37, 5.37, 5.37) @ 5300 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm, Pin=100mW/Area Scan (91x91x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 19.2 W/kg

**Head/d=10mm, Pin=100mW/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

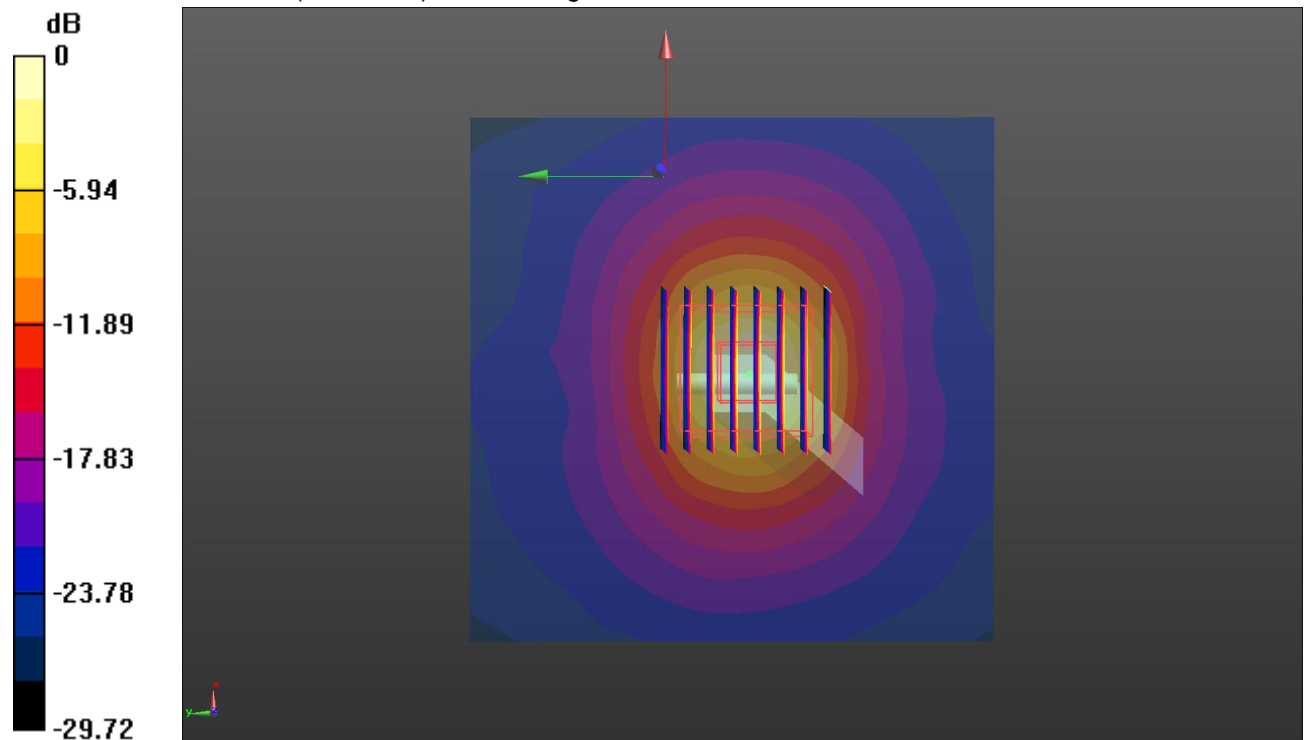
Reference Value = 66.58 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 33.5 W/kg

**SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.32 W/kg**

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

**SystemPerformanceCheck-Head 5800MHz**

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273

Date: 2019-11-02

Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1

Medium parameters used:  $f = 5800$  MHz;  $\sigma = 5.306$  S/m;  $\epsilon_r = 34.549$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Ambient Temperature:22.6°C;Liquid Temperature:22.3°C;

**DASY5 Configuration:**

- Probe: EX3DV4 - SN7494; ConvF(4.85, 4.85, 4.85) @ 5800 MHz; Calibrated: 3/25/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1549; Calibrated: 3/19/2019
- Phantom: Twin-SAM V8.0 ; Type: QD 000 P41 AA; Serial: 1974
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

**Head/d=10mm,Pin=100mW/Area Scan (41x41x1):** Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 21.5 W/kg

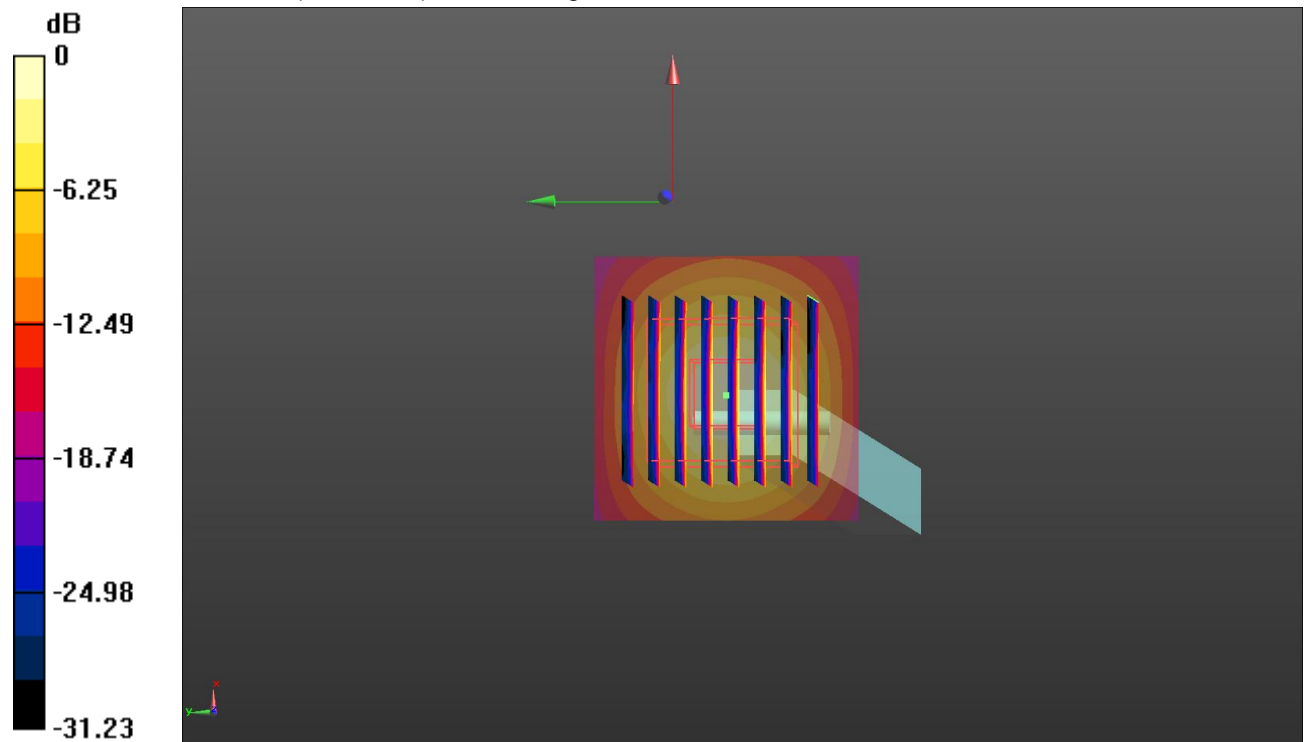
**Head/d=10mm,Pin=100mW/Zoom Scan (8x8x7)/Cube 0:** Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 55.92 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 36.5 W/kg

**SAR(1 g) = 7.75 W/kg; SAR(10 g) = 2.21 W/kg**

Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

## 10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

Type Exposure	Limit (W/kg)	
	General Population/ Uncontrolled Exposure Environment	Occupational/ Controlled Exposure Environment
Spatial Average SAR (whole body)	0.08	0.4
Spatial Peak SAR (1g cube tissue for head and trunk)	1.6	8.0
Spatial Peak SAR (10g for limb)	4.0	20.0

Population/Uncontrolled Environments: are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

Occupational/Controlled 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).

## 11. Conducted Power Measurement Results

### 11.1. WCDMA

1. The following tests were conducted according to the test requirements outlines in 3GPP TS34.121 specification.
2. The procedures in KDB 941225 D01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode to determine SAR test exclusion

A summary of these settings are illustrated below:

#### HSDPA Setup Configuration:

- a) The EUT was connected to base station RS CMU200 referred to the setup configuration
- b) The RF path losses were compensated into the measurements
- c) A call was established between EUT and base station with following setting:
  - i. Set Gain Factors ( $\beta_c$  and  $\beta_d$ ) and parameters were set according to each specific sub-test in the following table, C10.1.4, Quoted from the TS 34.121
  - ii. Set RMC 12.2Kbps + HSDPA mode
  - iii. Set Cell Power=-86dBm
  - iv. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
  - v. Select HSDPA uplink parameters
  - vi. Set Delta ACK, Delta NACK and Delta CQI=8
  - vii. Set Ack-Nack repetition Factor to 3
  - viii. Set CQI Feedback Cycle (K) to 4ms
  - ix. Set CQI repetition factor to 2
  - x. Power ctrl mode= all up bits
- d) The transmitter maximum output power was recorded.

**Table C.10.1.4:  $\beta$  values for transmitter characteristics tests with HS-DPCCH**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1:  $\Delta_{ACK}$ ,  $\Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA,  $\Delta_{ACK}$  and  $\Delta_{NACK} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ , and  $\Delta_{CQI} = 24/15$  with  $\beta_{HS} = 24/15 * \beta_c$ .

Note 3: CM = 1 for  $\beta_c/\beta_d = 12/15$ ,  $\beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the  $\beta_c/\beta_d$  ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 11/15$  and  $\beta_d = 15/15$ .

#### Setup Configuration

#### HSUPA Setup Configuration:

- a) The EUT was connected to base station RS CMU200 referred to the setup configuration
- b) The RF path losses were compensated into the measurements
- c) A call was established between EUT and base station with following setting:
  - i. Call configs = 5.2b, 5.9b, 5.10b, and 5.13.2B with QPSK
  - ii. Set Gain Factors ( $\beta_c$  and  $\beta_d$ ) and parameters (AG index) were set according to each specific sub-test in the following table, C11.1.3, Quoted from the TS 34.121
  - iii. Set Cell Power=-86dBm
  - iv. Set channel type= 12.2Kbps + HSPA mode
  - v. Set UE Target power
  - vi. Set Ctrl mode=Alternating bits
  - vii. Set and observe the E-TFCI
  - viii. Confirm that E-TFCI is equal the target E-TFCI of 75 for Sub-test 1, and other subtest's E-TFCI
- d) The transmitter maximum output power was recorded.

**Table C.11.1.3:  $\beta$  values for transmitter characteristics tests with HS-DPCCH and E-DCH**

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (Note 1)	$\beta_{ec}$	$\beta_{ed}$ (Note 5) (Note 6)	$\beta_{ed}$ (SF)	$\beta_{ed}$ (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/25	1309/225	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	$\beta_{ed1}$ : 47/15 $\beta_{ed2}$ : 47/15	4 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 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1:  $\Delta_{ACK}, \Delta_{NACK}$  and  $\Delta_{CQI} = 30/15$  with  $\beta_{HS} = 30/15 * \beta_c$ .

Note 2: CM = 1 for  $\beta_c/\beta_d = 12/15, \beta_{HS}/\beta_c = 24/15$ . For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

Note 3: For subtest 1 the  $\beta_c/\beta_d$  ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 10/15$  and  $\beta_d = 15/15$ .

Note 4: For subtest 5 the  $\beta_c/\beta_d$  ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to  $\beta_c = 14/15$  and  $\beta_d = 15/15$ .

Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.

Note 6:  $\beta_{ed}$  can not be set directly, it is set by Absolute Grant Value.

**Setup Configuration**

**General Note:**

- Per KDB 941225 D01, SAR for Head / Hotspot / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit configured to all 1s
- Per KDB 941225 D01 RMC12.2Kbps setting is used to evaluate SAR. If the maximum output power and Tune-up tolerance specified for production units in HSDPA/HSUPA is  $\leq 1/4$ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for HSDPA / HSUPA.

Mode	WCDMA Band II			WCDMA Band IV		
	Conducted Power (dBm)			Conducted Power (dBm)		
	CH9262	CH9400	CH9538	CH1312	CH1413	CH1513
	1852.4MHz	1880MHz	1907.6MHz	1712.4MHz	1732.6MHz	1752.6MHz
AMR 12.2K	20.92	21.46	21.54	21.17	21.40	21.37
RMC 12.2K	20.95	21.49	21.57	21.20	21.43	21.40
HSDPA	Subtest-1	19.93	20.47	20.59	20.20	20.45
	Subtest-2	19.41	19.91	20.01	19.67	19.89
	Subtest-3	19.40	19.90	20.02	19.67	19.90
	Subtest-4	19.40	19.92	19.99	19.70	19.93
HSUPA	Subtest-1	17.41	18.33	18.44	17.70	18.42
	Subtest-2	18.36	18.87	18.90	18.70	18.83
	Subtest-3	18.89	19.40	19.45	19.18	19.35
	Subtest-4	17.83	18.31	18.45	18.19	18.41
	Subtest-5	19.87	20.39	20.46	20.17	20.37



Mode		WCDMA Band V		
		Conducted Power (dBm)		
		CH4132	CH4183	CH4233
		826.4MHz	836.6MHz	846.6MHz
AMR 12.2K		22.58	22.43	22.25
RMC 12.2K		22.61	22.46	22.28
HSDPA	Subtest-1	21.61	21.58	21.32
	Subtest-2	21.07	21.06	20.81
	Subtest-3	21.12	21.09	20.85
	Subtest-4	21.09	21.04	20.83
HSUPA	Subtest-1	19.57	19.52	19.28
	Subtest-2	19.97	19.96	19.70
	Subtest-3	20.51	20.46	20.21
	Subtest-4	19.56	19.51	19.28
	Subtest-5	21.58	21.54	21.30

## 11.2. LTE

### General Note:

1. CMW500 base station simulator was used to setup the connection with EUT; the frequency band, channel, bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r03, 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 for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r03, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r03, 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 are  $\leq 0.8$  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.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, smaller bandwidth output power for each RB allocation configuration is  $>$  not  $\frac{1}{2}$  dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is  $\leq 1.45$  W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands as follows:

- a) The maximum output power, including tolerance, for the smaller band must be  $\leq$  the larger band to qualify for the SAR test exclusion.
- b) The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
  - LTE Band 2 (1850-1910 MHz) is covered by LTE Band 25 (1850-1915 MHz)
  - LTE Band 4 (1710-1755 MHz) is covered by LTE Band 66 (1710-1780 MHz)
  - LTE Band 5 (824-849 MHz) is covered by LTE Band 26 (814-849 MHz)
  - LTE Band 17 (704-716 MHz) is covered by LTE Band 12 (699-716 MHz)

LTE-FDD Band 2				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	18607	18900	19193
				1850.7MHz	1880MHz	1909.3MHz
1.4MHz	QPSK	1	0	22.08	22.36	22.01
			2	22.24	22.47	22.16
			5	22.03	22.34	22.33
		3	0	22.18	22.43	22.16
			1	22.17	22.41	22.17
			3	22.20	22.47	22.20
	6	0	21.09	21.35	21.19	
	16QAM	1	0	21.92	21.47	21.18
			2	21.12	21.65	21.36
			5	21.90	21.46	21.21
		3	0	21.01	21.33	21.36
			1	21.00	21.37	21.65
			3	20.99	21.32	21.34
	6	0	20.83	20.44	21.11	
Band-width	Modulation	RB allocation	RB offset	18615	18900	19185
				1851.5MHz	1880MHz	1908.5MHz
3MHz	QPSK	1	0	22.11	22.43	22.35
			8	22.07	22.42	22.34
			14	22.02	22.46	22.17
		8	0	21.02	21.42	21.34
			4	21.08	21.40	21.15
			7	21.07	21.40	21.32
	15	0	21.09	21.37	21.17	
	16QAM	1	0	21.29	21.28	21.28
			8	21.20	21.32	21.28
			14	21.18	21.33	21.25
		8	0	20.81	20.45	21.25
			4	20.91	20.43	21.21
			7	21.28	20.45	21.25
	15	0	21.00	20.35	21.20	

LTE-FDD Band 2				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	18625	18900	19175
				1852.5MHz	1880MHz	1907.5MHz
5MHz	QPSK	1	0	22.04	22.36	22.34
			12	22.06	22.53	22.20
			24	21.97	22.44	22.23
		12	0	21.00	21.32	21.34
			7	21.03	21.32	21.35
			13	21.01	21.36	21.02
	25	0	21.07	21.38	21.25	
	16QAM	1	0	21.23	21.31	21.85
			12	21.30	21.45	21.35
			24	21.17	21.42	22.11
		12	0	20.62	20.46	21.16
			7	20.93	20.42	21.14
			13	20.81	20.44	21.22
		25	0	20.93	20.47	21.23
Band-width		Modulation	RB allocation	RB offset	18650	18900
	1855MHz				1880MHz	1905MHz
10MHz	QPSK	1	0	22.02	22.28	22.32
			24	22.06	22.53	22.47
			49	21.92	22.46	22.24
		25	0	21.01	21.38	21.15
			24	21.02	21.36	21.18
			49	21.09	21.44	21.15
	50	0	21.06	21.38	21.16	
	16QAM	1	0	21.24	21.13	22.04
			24	21.24	21.38	21.30
			49	21.12	21.35	21.22
		25	0	20.86	20.49	21.21
			24	20.94	20.48	21.21
			49	20.75	20.53	21.25
		50	0	20.90	20.42	21.22

LTE-FDD Band 2				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	18675	18900	19125
				1857.5MHz	1880MHz	1902.5MHz
15MHz	QPSK	1	0	22.80	22.09	22.66
			38	22.98	22.41	22.96
			74	22.34	22.41	23.00
		38	0	21.21	20.97	21.78
			18	21.18	21.23	21.17
			37	21.09	21.26	21.35
	75	0	21.00	21.35	21.99	
	16QAM	1	0	21.18	21.00	21.76
			38	21.23	21.27	21.34
			74	21.09	21.26	21.16
		38	0	21.22	20.99	21.79
			18	21.20	21.26	21.34
			37	21.10	21.29	21.20
		75	0	21.28	20.41	20.99
Band-width		Modulation	RB allocation	RB offset	18700	18900
	1860MHz				1880MHz	1900MHz
20MHz	QPSK	1	0	22.30	22.81	22.44
			49	22.08	22.37	22.03
			99	22.74	22.20	22.95
		50	0	20.91	21.41	21.73
			25	20.89	21.40	21.72
			50	20.99	21.49	21.79
	100	0	20.92	21.43	21.78	
	16QAM	1	0	21.00	21.88	21.39
			49	21.15	21.46	21.10
			99	20.95	21.27	21.88
		50	0	20.92	20.48	20.74
			25	21.22	20.50	20.75
			50	20.92	20.56	20.81
		100	0	21.07	20.48	20.77

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	19957	20175	20393
				1710.7MHz	1732.5MHz	1754.3MHz
1.4MHz	QPSK	1	0	21.86	21.94	21.84
			2	21.84	21.98	21.96
			5	21.74	21.83	21.89
		3	0	21.86	21.02	21.34
			1	21.88	21.04	21.33
			3	21.89	21.01	21.36
	6	0	21.81	21.63	21.07	
	16QAM	1	0	21.96	21.92	21.69
			2	21.98	21.98	21.74
			5	21.87	21.91	21.83
		3	0	21.34	21.99	21.06
			1	21.52	21.01	21.87
			3	21.74	21.98	21.34
	6	0	21.68	21.88	21.75	
Band-width	Modulation	RB allocation	RB offset	19965	20175	20385
				1711.5MHz	1732.5MHz	1753.5MHz
3MHz	QPSK	1	0	22.94	22.52	22.84
			8	22.35	22.54	22.57
			14	22.64	22.63	22.51
		8	0	20.52	20.68	20.81
			4	20.41	20.77	20.98
			7	20.40	20.81	20.96
	15	0	20.74	20.82	20.90	
	16QAM	1	0	21.44	21.41	21.81
			8	21.52	21.71	21.97
			14	21.85	21.88	21.79
		8	0	21.86	21.54	21.20
			4	21.85	21.77	21.52
			7	21.72	21.23	20.92
	15	0	21.70	21.05	21.52	

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	19975	20175	20375
				1712.5MHz	1732.5MHz	1752.5MHz
5MHz	QPSK	1	0	22.00	21.36	21.41
			12	21.74	21.52	21.66
			24	21.39	21.21	21.21
		12	0	21.75	21.54	21.21
			7	21.77	21.34	21.41
			13	21.54	21.94	21.24
	25	0	21.71	21.14	21.87	
	16QAM	1	0	22.15	22.12	22.13
			12	22.99	22.62	22.54
			24	22.64	22.94	22.58
		12	0	21.80	21.80	21.65
			7	21.81	21.35	21.74
			13	21.66	21.52	20.99
		25	0	21.72	20.90	20.89
Band-width		Modulation	RB allocation	RB offset	20000	20175
	1715MHz				1732.5MHz	1750MHz
10MHz	QPSK	1	0	22.31	22.88	22.42
			24	22.34	22.34	22.52
			49	22.89	22.34	22.36
		25	0	20.52	20.66	20.57
			24	20.49	20.66	20.58
			49	20.63	20.92	20.85
	50	0	20.45	20.34	20.82	
	16QAM	1	0	20.56	20.66	20.67
			24	20.52	20.63	20.99
			49	20.84	20.65	20.74
		25	0	20.96	20.70	20.61
			24	20.58	20.70	20.60
			49	21.29	20.99	20.62
		50	0	20.49	20.32	20.82

LTE-FDD Band 4				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20025	20175	20325
				1717.5MHz	1732.5MHz	1747.5MHz
15MHz	QPSK	1	0	21.84	21.94	21.49
			38	21.20	21.13	21.41
			74	21.20	21.65	21.48
		38	0	20.47	20.89	20.60
			18	20.45	20.89	20.80
			37	21.39	20.64	20.74
	75	0	20.32	20.48	20.82	
	16QAM	1	0	20.36	20.86	20.69
			38	20.96	20.89	20.76
			74	20.52	20.41	20.83
		38	0	20.96	20.90	20.59
			18	20.34	20.85	20.79
			37	20.52	20.67	20.97
		75	0	21.08	20.72	20.69
Band-width		Modulation	RB allocation	RB offset	20050	20175
	1720MHz				1732.5MHz	1745MHz
20MHz	QPSK	1	0	22.52	22.99	22.54
			49	22.52	22.63	22.66
			99	22.63	22.70	22.75
		50	0	22.22	22.37	22.52
			25	22.23	22.30	22.52
			50	22.98	22.34	22.31
	100	0	21.70	20.75	20.86	
	16QAM	1	0	21.23	21.10	21.62
			49	22.09	21.36	21.76
			99	21.25	21.88	21.83
		50	0	21.23	20.97	21.74
			25	21.23	20.87	20.94
			50	20.86	21.76	21.01
		100	0	21.72	21.64	21.88



LTE-FDD Band 5				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20407	20525	20643
				8.4.7MHz	836.5MHz	848.3MHz
1.4MHz	QPSK	1	0	24.17	24.02	23.95
			2	24.19	24.14	23.64
			5	24.16	24.02	23.51
		3	0	24.22	24.11	23.59
			1	24.29	23.80	23.57
			3	24.31	23.66	23.58
	6	0	22.89	22.56	22.58	
	16QAM	1	0	23.26	23.11	22.57
			2	23.42	23.30	22.80
			5	23.29	23.10	22.61
		3	0	23.16	22.91	22.49
			1	23.22	22.47	22.48
			3	23.04	22.53	22.49
		6	0	21.64	21.48	21.65
Band-width		Modulation	RB allocation	RB offset	20415	20525
	825.5MHz				836.5MHz	847.5MHz
3MHz	QPSK	1	0	24.53	24.37	24.21
			8	24.54	24.39	24.25
			14	24.45	24.35	24.23
		8	0	23.57	23.35	23.26
			4	23.59	23.34	23.27
			7	23.51	23.36	23.25
	15	0	23.51	23.28	23.25	
	16QAM	1	0	23.69	23.24	23.42
			8	23.64	23.28	23.42
			14	23.55	23.22	23.37
		8	0	22.60	22.39	22.35
			4	22.60	22.39	22.35
			7	22.55	22.37	22.30
		15	0	22.49	22.25	22.30

LTE-FDD Band 5				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20425	20525	20625
				826.5MHz	836.5MHz	846.5MHz
5MHz	QPSK	1	0	24.91	24.28	24.15
			12	24.98	24.36	24.28
			24	24.85	24.22	24.17
		12	0	23.97	23.19	23.16
			7	23.55	23.15	23.17
			13	23.37	23.25	23.15
	25	0	23.47	23.30	23.18	
	16QAM	1	0	23.88	23.45	23.16
			12	23.91	23.54	23.25
			24	23.78	23.38	23.16
		12	0	22.97	22.25	22.20
			7	22.55	22.27	22.20
			13	22.44	22.38	22.18
		25	0	22.52	22.28	22.20
Band-width		Modulation	RB allocation	RB offset	20450	20525
	829MHz				836.5MHz	844MHz
10MHz	QPSK	1	0	24.45	24.31	24.29
			24	24.44	24.38	24.35
			49	24.37	24.23	24.26
		25	0	23.48	23.18	23.41
			24	23.50	23.15	23.45
			49	23.63	23.30	23.29
	50	0	23.55	23.20	23.37	
	16QAM	1	0	23.30	23.45	23.46
			24	23.44	23.60	23.52
			49	23.23	23.42	23.42
		25	0	22.59	22.18	22.47
			24	22.60	22.18	22.45
			49	22.69	22.32	22.31
		50	0	22.62	22.21	22.38

LTE-FDD Band 7				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20775	21100	21425
				2502.5MHz	2535MHz	2567.5MHz
5MHz	QPSK	1	0	23.38	23.43	22.96
			12	23.54	23.51	23.07
			24	23.46	23.41	22.94
		12	0	22.44	22.39	22.04
			7	22.41	22.42	22.08
			13	22.48	22.42	22.00
	25	0	22.50	22.44	22.08	
	16QAM	1	0	22.47	22.37	21.94
			12	22.65	22.51	22.04
			24	22.59	22.39	21.93
		12	0	21.50	21.51	21.12
			7	21.49	21.52	21.11
			13	21.55	21.57	21.14
		25	0	21.50	21.55	21.19
Band-width		Modulation	RB allocation	RB offset	20800	21100
	2505MHz				2535MHz	2565MHz
10MHz	QPSK	1	0	23.38	23.42	23.03
			24	23.67	23.47	23.04
			49	23.48	23.40	22.94
		25	0	22.52	22.53	22.16
			24	22.51	22.51	22.16
			49	22.64	22.49	22.16
	50	0	22.59	22.51	22.16	
	16QAM	1	0	22.50	22.31	22.21
			24	22.68	22.47	22.27
			49	22.62	22.32	22.09
		25	0	21.52	21.60	21.23
			24	21.53	21.62	21.23
			49	21.66	21.58	21.18
		50	0	21.60	21.57	21.22

LTE-FDD Band 7				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	20825	21100	21375
				2507.5MHz	2535MHz	2562.5MHz
15MHz	QPSK	1	0	23.35	23.36	23.04
			38	23.58	23.44	23.04
			74	23.41	23.30	22.85
		38	0	22.55	22.21	22.18
			18	22.76	22.34	22.17
			37	22.63	22.11	21.99
	75	0	22.64	22.49	22.18	
	16QAM	1	0	22.52	22.25	22.18
			38	22.75	22.34	22.19
			74	22.62	22.15	21.97
		38	0	22.55	22.25	22.19
			18	22.75	22.34	22.19
			37	22.63	22.12	22.02
		75	0	21.58	21.55	21.20
Band-width		Modulation	RB allocation	RB offset	20850	21100
	2510MHz				2535MHz	2560MHz
20MHz	QPSK	1	0	23.21	23.09	23.11
			49	23.72	23.45	23.36
			99	23.31	22.99	22.86
		50	0	22.39	22.45	22.23
			25	22.41	22.42	22.25
			50	22.55	22.40	21.94
	100	0	22.46	22.40	22.04	
	16QAM	1	0	22.23	22.17	22.04
			49	22.78	22.47	22.29
			99	22.41	22.08	21.80
		50	0	21.41	21.57	21.33
			25	21.39	21.58	21.30
			50	21.55	21.54	21.01
		100	0	21.46	21.49	21.11

LTE-FDD Band 12				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	23017	23095	23173
				699.7MHz	707.5MHz	715.3MHz
1.4MHz	QPSK	1	0	24.30	24.32	24.32
			2	24.44	24.45	24.33
			5	24.36	24.30	24.22
		3	0	24.31	24.26	24.25
			1	24.31	24.26	24.22
			3	24.36	24.30	24.23
	6	0	23.41	23.40	23.30	
	16QAM	1	0	23.26	23.24	23.19
			2	23.47	23.39	23.35
			5	23.36	23.22	23.15
		3	0	23.18	23.11	23.13
			1	23.18	23.10	23.10
			3	23.16	23.12	23.08
	6	0	22.35	22.15	22.11	
Band-width	Modulation	RB allocation	RB offset	23025	23095	23165
				700.5MHz	707.5MHz	714.5MHz
3MHz	QPSK	1	0	24.72	24.73	24.60
			8	24.76	24.70	24.14
			14	24.76	24.70	24.16
		8	0	23.82	23.76	23.22
			4	23.84	23.78	23.22
			7	23.80	23.64	23.25
	15	0	23.80	23.46	23.15	
	16QAM	1	0	23.88	23.61	23.37
			8	23.90	23.64	23.26
			14	23.90	23.62	23.23
		8	0	22.79	22.72	22.25
			4	22.77	22.65	22.25
			7	22.77	22.53	22.24
	15	0	22.69	22.16	22.15	

LTE-FDD Band 12				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	23035	23095	23155
				701.5MHz	707.5MHz	713.5MHz
5MHz	QPSK	1	0	24.31	24.33	24.21
			12	24.43	24.46	24.31
			24	24.32	24.24	24.18
		12	0	23.45	23.14	23.39
			7	23.45	23.14	23.40
			13	23.37	23.28	23.21
	25	0	23.42	23.27	23.30	
	16QAM	1	0	23.46	23.26	23.16
			12	23.60	23.34	23.25
			24	23.46	23.22	23.13
		12	0	22.45	22.13	22.30
			7	22.46	22.16	22.36
			13	22.37	22.29	22.17
		25	0	22.33	22.25	22.28
Band-width		Modulation	RB allocation	RB offset	23060	23095
	704MHz				707.5MHz	711MHz
10MHz	QPSK	1	0	24.26	24.29	24.27
			24	24.47	24.41	24.38
			49	24.23	24.20	24.22
		25	0	23.47	23.17	23.24
			24	23.49	23.17	23.21
			49	23.56	23.24	23.14
	50	0	23.50	23.20	23.17	
	16QAM	1	0	23.38	23.42	23.10
			24	23.51	23.41	23.18
			49	23.31	23.33	23.12
		25	0	22.43	22.12	22.21
			24	22.40	22.13	22.20
			49	22.49	22.23	22.13
		50	0	22.41	22.18	22.10

LTE-FDD Band 17				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	23755	23790	23825
				706.5MHz	710MHz	713.5MHz
5MHz	QPSK	1	0	24.29	24.27	24.18
			12	24.38	24.31	24.36
			24	24.22	24.24	24.22
		12	0	23.21	23.17	23.34
			7	23.19	23.18	23.38
			13	23.36	23.12	23.16
	25	0	23.33	23.14	23.29	
	16QAM	1	0	23.42	23.16	23.17
			12	23.44	23.24	23.35
			24	23.34	23.20	23.13
		12	0	22.20	22.20	22.32
			7	22.20	22.17	22.31
			13	22.34	22.08	22.17
		25	0	22.21	22.16	22.25
Band-width		Modulation	RB allocation	RB offset	23780	23790
	709MHz				710MHz	711MHz
10MHz	QPSK	1	0	24.28	24.29	24.28
			24	24.26	24.36	24.42
			49	24.22	24.26	24.26
		25	0	23.12	23.15	23.21
			24	23.09	23.14	23.23
			49	23.10	23.10	23.16
	50	0	23.14	23.12	23.20	
	16QAM	1	0	23.38	23.34	23.13
			24	23.39	23.39	23.23
			49	23.37	23.33	23.12
		25	0	22.01	22.10	22.18
			24	22.05	22.09	22.18
			49	22.02	22.09	22.19
		50	0	22.06	22.07	22.15

LTE-FDD Band 25				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	26047	26365	26683
				1850.7MHz	1882.5MHz	1914.3MHz
1.4MHz	QPSK	1	0	23.59	23.05	23.54
			2	23.61	23.12	23.70
			5	23.51	23.04	23.57
		3	0	23.58	23.12	23.65
			1	23.59	23.14	23.63
			3	23.61	23.19	23.68
	6	0	22.56	22.07	22.57	
	16QAM	1	0	22.70	22.70	22.14
			2	22.34	22.75	22.35
			5	22.65	22.64	22.19
		3	0	22.72	22.55	22.05
			1	22.70	22.50	22.02
			3	22.72	22.54	22.06
	6	0	21.74	21.48	21.00	
Band-width	Modulation	RB allocation	RB offset	26055	26365	26675
				1851.5MHz	1882.5MHz	1913.5MHz
3MHz	QPSK	1	0	22.44	22.69	22.41
			8	22.54	22.93	22.24
			14	22.41	22.72	23.08
		8	0	22.49	22.56	22.17
			4	22.48	22.57	22.18
			7	22.46	22.58	22.11
	15	0	21.60	21.73	22.09	
	16QAM	1	0	22.15	22.65	22.77
			8	22.10	22.58	22.72
			14	22.66	22.72	22.61
		8	0	23.68	23.74	23.67
			4	23.65	23.74	23.32
			7	23.63	23.81	23.14
	15	0	22.62	22.80	22.29	



LTE-FDD Band 25				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	26065	26365	26665
				1852.5MHz	1882.5MHz	1912.5MHz
5MHz	QPSK	1	0	21.18	21.68	21.81
			12	21.18	21.67	21.78
			24	21.21	21.71	21.78
		12	0	22.13	22.34	22.34
			7	22.54	22.82	22.14
			13	22.52	22.81	22.31
	25	0	22.53	22.84	23.16	
	16QAM	1	0	22.11	22.61	22.65
			12	22.13	22.61	22.62
			24	22.22	22.58	22.66
		12	0	22.20	22.66	22.67
			7	22.63	22.68	22.27
			13	22.34	22.82	22.44
		25	0	23.61	23.71	23.36
Band-width		Modulation	RB allocation	RB offset	26090	26365
	1855MHz				1882.5MHz	1910MHz
10MHz	QPSK	1	0	21.20	21.70	21.69
			24	21.19	21.71	21.65
			49	21.28	21.65	21.66
		25	0	22.37	22.34	22.54
			24	22.61	22.62	22.30
			49	22.76	22.74	22.32
	50	0	22.61	22.68	23.22	
	16QAM	1	0	22.13	22.70	22.73
			24	22.16	22.71	22.72
			49	22.32	22.70	22.83
		25	0	22.19	22.71	22.77
			24	22.34	22.31	22.25
			49	22.52	22.24	22.47
		50	0	23.58	23.63	23.62

LTE-FDD Band 25				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	26115	26365	26615
				1857.5MHz	1882.5MHz	1907.5MHz
15MHz	QPSK	1	0	21.24	21.76	21.74
			38	21.24	21.78	21.76
			74	21.37	21.79	21.80
		38	0	22.37	22.52	22.57
			18	22.44	22.79	22.24
			37	22.56	22.85	22.31
	75	0	22.47	22.77	23.28	
	16QAM	1	0	22.29	22.33	22.72
			38	22.49	22.54	22.89
			74	22.46	22.44	22.68
		38	0	23.35	23.36	23.25
			18	23.50	23.55	23.40
			37	23.67	23.73	23.37
		75	0	23.53	23.57	23.10
Band-width		Modulation	RB allocation	RB offset	26140	26365
	1860MHz				1882.5MHz	1905MHz
20MHz	QPSK	1	0	22.31	22.38	22.71
			49	22.45	22.56	22.87
			99	22.53	22.40	22.68
		50	0	22.34	22.37	22.85
			25	22.32	22.70	22.82
			50	22.52	22.86	22.31
	100	0	22.43	22.69	23.09	
	16QAM	1	0	22.03	22.68	22.92
			49	22.03	22.65	22.93
			99	22.31	22.73	22.87
		50	0	22.14	22.67	22.87
			25	22.07	22.36	22.03
			50	22.31	22.50	22.43
		100	0	23.23	23.45	23.37

LTE-FDD Band 26				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	26697	26865	27033
				814.7MHz	831.5MHz	848.3MHz
1.4MHz	QPSK	1	0	23.63	23.56	23.01
			2	23.77	23.69	23.01
			5	23.58	23.59	22.92
		3	0	23.72	23.53	23.31
			1	23.73	23.39	23.08
			3	23.74	23.12	23.05
	6	0	22.67	21.98	21.95	
	16QAM	1	0	22.76	22.66	22.06
			2	22.94	22.75	22.23
			5	22.72	22.63	21.99
		3	0	22.66	22.46	21.91
			1	22.64	21.99	21.99
			3	22.60	21.99	21.97
		6	0	21.71	20.86	21.06
Band-width	Modulation	RB allocation	RB offset	26705	26865	27025
				815.5MHz	831.5MHz	847.5MHz
3MHz	QPSK	1	0	23.13	22.68	23.11
			8	22.74	22.60	23.10
			14	22.87	22.53	23.10
		8	0	22.16	22.09	22.14
			4	22.26	22.14	22.16
			7	22.23	22.18	22.14
	15	0	22.17	22.09	22.04	
	16QAM	1	0	21.39	21.54	21.52
			8	21.85	21.46	21.37
			14	21.96	21.26	21.82
		8	0	21.28	21.18	21.23
			4	21.29	21.18	21.24
			7	21.24	21.20	21.18
		15	0	21.14	21.11	21.17

LTE-FDD Band 26				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	26715	26865	27015
				816.5MHz	831.5MHz	846.5MHz
5MHz	QPSK	1	0	23.25	23.19	23.08
			12	23.36	23.30	23.15
			24	23.18	23.12	23.06
		12	0	22.28	22.00	22.06
			7	22.27	22.00	22.04
			13	22.19	22.04	21.92
	25	0	22.26	22.08	22.01	
	16QAM	1	0	22.48	22.17	22.04
			12	22.49	22.24	22.12
			24	22.33	22.08	22.07
		12	0	21.38	21.03	21.10
			7	21.37	21.10	21.10
			13	21.31	21.16	20.98
		25	0	21.29	21.15	21.08
Band-width		Modulation	RB allocation	RB offset	26750	26865
	820MHz				831.5MHz	844MHz
10MHz	QPSK	1	0	23.25	23.12	23.02
			24	23.30	23.17	23.11
			49	23.17	22.99	22.99
		25	0	22.38	21.90	22.25
			24	22.37	21.90	22.22
			49	22.50	22.00	22.01
	50	0	22.40	21.94	22.09	
	16QAM	1	0	22.42	22.25	22.14
			24	22.46	22.35	22.31
			49	22.32	22.18	22.17
		25	0	21.39	20.96	21.29
			24	21.39	20.96	21.25
			49	21.48	21.08	21.03
		50	0	21.41	21.01	21.09

LTE-FDD Band 26				Conducted Power(dBm)			
Band-width	Modulation	RB allocation	RB offset	26775	26865	26965	
				822.5MHz	831.5MHz	841.5MHz	
15MHz	QPSK	1	0	23.13	23.06	22.98	
			38	23.22	23.16	23.04	
			74	23.00	22.98	22.87	
		38	0	22.43	21.98	22.12	
			18	22.43	22.02	22.16	
			37	22.26	21.88	22.04	
		75	0	22.28	21.88	22.01	
		16QAM	1	0	22.47	21.99	22.18
				38	22.46	22.04	22.21
	74			22.27	21.88	22.03	
	38		0	22.41	21.97	22.07	
			18	22.47	22.05	22.19	
			37	22.31	21.85	22.04	
	75	0	21.32	20.95	20.99		

LTE-FDD Band 71				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	133147	133297	133447
				665.5MHz	680.5MHz	695.5MHz
5MHz	QPSK	1	0	22.97	22.90	22.87
			12	23.04	23.00	22.98
			24	22.94	22.92	22.85
		12	0	21.98	21.90	21.79
			7	21.97	21.90	21.81
			13	22.00	21.95	21.88
	25	0	22.01	21.95	21.88	
	16QAM	1	0	21.79	22.01	21.76
			12	21.89	22.11	21.86
			24	21.94	22.01	21.80
		12	0	20.91	20.88	20.81
			7	20.92	20.89	20.79
			13	20.92	20.96	20.82
		25	0	20.93	20.84	20.86
Band-width		Modulation	RB allocation	RB offset	133172	133297
	668MHz				680.5MHz	693MHz
10MHz	QPSK	1	0	22.94	22.86	22.85
			24	23.08	22.99	23.01
			49	22.98	22.89	22.88
		25	0	22.02	22.03	21.90
			24	22.03	22.00	21.89
			49	22.15	21.98	21.92
	50	0	22.07	22.00	21.88	
	16QAM	1	0	21.78	21.99	21.91
			24	21.94	22.14	22.05
			49	21.86	21.99	21.91
		25	0	21.01	20.95	20.84
			24	21.02	20.92	20.85
			49	21.09	20.91	20.88
		50	0	21.01	20.89	20.82

LTE-FDD Band 71				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	133197	133297	133397
				670.5MHz	680.5MHz	690.5MHz
15MHz	QPSK	1	0	22.83	22.90	22.89
			38	22.92	22.99	22.94
			74	22.84	22.87	22.83
		38	0	21.86	22.03	21.77
			18	22.08	22.19	21.76
			37	21.95	22.09	21.71
	75	0	22.15	22.10	21.99	
	16QAM	1	0	21.85	22.04	21.73
			38	22.04	22.18	21.80
			74	21.98	22.07	21.67
		38	0	21.89	22.04	21.75
			18	22.08	22.19	21.81
			37	21.96	22.11	21.72
		75	0	20.96	20.99	20.94
Band-width		Modulation	RB allocation	RB offset	133222	133322
	673MHz				683MHz	688MHz
20MHz	QPSK	1	0	22.76	22.70	22.52
			49	23.07	23.11	22.83
			99	22.78	22.69	22.53
		50	0	21.76	21.93	21.81
			25	21.77	21.91	21.83
			50	21.86	22.00	21.84
	100	0	21.79	21.94	21.83	
	16QAM	1	0	21.62	21.72	21.59
			49	22.04	22.10	21.95
			99	21.72	21.73	21.59
		50	0	20.68	20.89	20.80
			25	20.72	20.87	20.80
			50	20.76	20.90	20.81
		100	0	20.72	20.87	20.76

**LTE (TDD) Considerations**

According to KDB 941225 D05 SAR for LTE Devices, for Time-Division Duplex (TDD) systems, SAR must be tested using a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by the defined 3GPP LTE TDD configurations.

SAR was tested with the highest transmission duty factor (63.33%) using Uplink-downlink configuration 0 and Special subframe configuration 7.

LTE TDD Bands support 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplinkdownlink configurations and Table 4.2-1 for Special subframe configurations.

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

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$	$7680 \cdot T_s$	$(1+X) \cdot 2192 \cdot T_s$	$(1+X) \cdot 2560 \cdot T_s$
1	$19760 \cdot T_s$			$20480 \cdot T_s$		
2	$21952 \cdot T_s$			$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$	$20480 \cdot T_s$	$(2+X) \cdot 2192 \cdot T_s$	$(2+X) \cdot 2560 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$			$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-		
9	$13168 \cdot T_s$			-		
10	$13168 \cdot T_s$	$13152 \cdot T_s$	$12800 \cdot T_s$	-	-	-

**Table 4.2-2: Uplink-downlink configurations**

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

Calculated Duty Cycle = Extended cyclic prefix in uplink x (Ts) x # of S + # of U

Example for Calculated Duty Cycle for Uplink-Downlink Configuration 0:

Calculated Duty Cycle =  $5120 \times [1/(15000 \times 2048)] \times 2 + 6 \text{ ms} = 63.33\%$

where

$T_s = 1/(15000 \times 2048)$  seconds

This device supports uplink-downlink configurations 0-6. The configuration with highest duty cycle was used-configuration 0 at 63.3% duty cycle.



LTE-TDD Band 38				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	37775	38000	38225
				2572.5MHz	2595MHz	2617.5MHz
5MHz	QPSK	1	0	22.62	22.72	23.07
			12	22.73	22.84	23.23
			24	22.63	22.78	23.12
		12	0	21.60	21.74	21.99
			7	21.60	21.72	21.97
			13	21.53	21.77	21.87
	25	0	21.58	21.78	21.97	
	16QAM	1	0	21.51	21.85	21.90
			12	21.63	21.95	22.03
			24	21.53	21.91	21.91
		12	0	20.51	20.76	20.93
			7	20.50	20.74	20.83
			13	20.50	20.78	20.94
		25	0	20.54	20.71	20.90
Band-width		Modulation	RB allocation	RB offset	37800	38000
	2575MHz				2595MHz	2615MHz
10MHz	QPSK	1	0	22.73	22.73	22.94
			24	23.05	23.11	23.32
			49	22.73	22.85	23.09
		25	0	21.58	21.79	21.96
			24	21.60	21.79	21.93
			49	21.65	21.83	22.02
	50	0	21.59	21.81	21.98	
	16QAM	1	0	21.61	21.58	21.99
			24	21.91	21.92	22.32
			49	21.67	21.71	22.06
		25	0	20.50	20.77	20.85
			24	20.49	20.77	20.87
			49	20.61	20.79	20.91
		50	0	20.53	20.77	20.87

LTE-TDD Band 38				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	37825	38000	38175
				2577.5MHz	2595MHz	2612.5MHz
15MHz	QPSK	1	0	22.66	22.65	22.81
			38	22.75	22.81	23.01
			74	22.61	22.78	22.98
		38	0	21.69	21.49	21.94
			18	21.81	21.65	22.02
			37	21.74	21.60	21.96
	75	0	21.73	21.87	22.07	
	16QAM	1	0	21.68	21.50	21.90
			38	21.80	21.64	22.04
			74	21.73	21.59	21.97
		38	0	21.69	21.49	21.92
			18	21.80	21.63	22.03
			37	21.71	21.58	21.95
		75	0	20.61	20.76	20.91
Band-width		Modulation	RB allocation	RB offset	37850	38000
	2580MHz				2595MHz	2610MHz
20MHz	QPSK	1	0	22.45	22.58	22.61
			49	22.94	23.11	23.21
			99	22.48	22.74	22.86
		50	0	21.57	21.73	21.90
			25	21.56	21.72	21.89
			50	21.62	21.75	21.93
	100	0	21.59	21.73	21.91	
	16QAM	1	0	21.38	21.68	21.49
			49	21.88	22.23	22.07
			99	21.48	21.89	21.66
		50	0	20.47	20.70	20.85
			25	20.46	20.70	20.84
			50	20.57	20.71	20.86
		100	0	20.50	20.70	20.83

LTE-TDD Band 41				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	40265	40740	41215
				2557.5MHz	2605MHz	2652.5MHz
5MHz	QPSK	1	0	22.63	22.23	22.90
			12	22.75	22.33	23.00
			24	22.57	22.20	22.93
		12	0	21.52	21.27	21.89
			7	21.52	21.25	21.88
			13	21.55	21.21	21.85
	25	0	21.53	21.25	21.88	
	16QAM	1	0	21.58	21.14	21.98
			12	21.71	21.27	22.13
			24	21.58	21.16	22.04
		12	0	20.44	20.92	20.85
			7	20.45	20.93	20.86
			13	20.49	20.77	20.87
		25	0	20.41	21.23	20.82
Band-width		Modulation	RB allocation	RB offset	40290	40740
	2560MHz				2605MHz	2650MHz
10MHz	QPSK	1	0	22.36	22.30	22.84
			24	22.94	22.59	22.31
			49	22.63	22.30	22.94
		25	0	21.48	21.24	21.94
			24	21.49	21.25	21.93
			49	21.56	21.25	21.89
	50	0	21.51	21.21	21.91	
	16QAM	1	0	21.54	21.13	21.93
			24	21.74	21.43	21.36
			49	21.47	21.16	21.30
		25	0	20.40	21.25	20.87
			24	20.37	21.24	20.72
			49	20.48	21.23	20.81
		50	0	20.40	21.17	20.83

LTE-TDD Band 41				Conducted Power(dBm)		
Band-width	Modulation	RB allocation	RB offset	40315	40740	41165
				2562.5MHz	2605MHz	2647.5MHz
15MHz	QPSK	1	0	22.63	22.24	22.65
			38	22.67	22.34	22.90
			74	22.46	22.23	22.83
		38	0	21.61	21.09	21.78
			18	21.64	21.20	21.99
			37	21.48	21.06	21.95
	75	0	21.66	21.33	22.05	
	16QAM	1	0	21.59	21.10	21.78
			38	21.61	21.19	21.98
			74	21.48	21.09	21.96
		38	0	21.62	21.08	21.79
			18	21.65	21.20	21.99
			37	21.47	21.09	21.96
		75	0	20.49	21.24	20.91
Band-width		Modulation	RB allocation	RB offset	40340	40740
	2565MHz				2605MHz	2645MHz
20MHz	QPSK	1	0	22.64	21.96	22.57
			49	22.75	22.49	22.15
			99	22.18	22.01	22.68
		50	0	21.24	21.26	21.68
			25	21.23	21.25	21.73
			50	21.45	21.17	21.74
	100	0	21.37	21.19	21.74	
	16QAM	1	0	21.42	21.63	21.38
			49	21.77	21.39	21.63
			99	21.27	20.92	21.65
		50	0	20.95	21.22	20.60
			25	21.15	21.25	20.61
			50	20.87	21.17	20.69
		100	0	21.27	20.94	20.65

### 11.3. WiFi

For 2.4GHz WiFi SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation.

The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures.

SAR testing is not required for OFDM mode(s) 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  $\leq 1.2$  W/kg.

WiFi 2.4G				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
802.11b	1	2412	12.79	10.35
	6	2437	11.07	8.56
	11	2462	12.55	10.00
802.11g	1	2412	16.21	13.33
	6	2437	14.92	11.94
	11	2462	15.75	12.51
802.11n (HT20)	1	2412	16.39	13.52
	6	2437	15.02	11.98
	11	2462	15.57	12.36
802.11n (HT40)	3	2422	15.97	12.51
	6	2437	15.36	12.28
	9	2452	15.71	12.56

WiFi 5G U-NII-1			
Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)
802.11n (HT20)	36	5180	7.78
	44	5220	6.68
	48	5240	7.18
802.11a	36	5180	8.23
	44	5220	6.72
	48	5240	7.47
802.11n (HT40)	38	5190	8.34
	46	5230	7.54

WiFi 5G U-NII-3			
Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)
802.11n (HT20)	149	5745	8.35
	157	5785	6.87
	165	5825	6.45
802.11a	149	5745	8.83
	157	5785	7.24
	165	5825	6.85
802.11n (HT40)	151	5755	8.74
	159	5795	7.63

#### 11.4. Bluetooth

Bluetooth				
Mode	Channel	Frequency (MHz)	Conducted Peak Power (dBm)	Conducted Average Power (dBm)
GFSK	0	2402	4.99	4.85
	39	2441	4.34	4.25
	78	2480	3.74	3.68
$\pi/4$ QPSK	0	2402	4.35	3.39
	39	2441	3.72	2.83
	78	2480	3.13	2.39
8DPSK	0	2402	4.48	3.42
	39	2441	3.87	3.19
	78	2480	3.27	2.22
GFSK(BLE)	0	2402	-2.51	-2.55
	19	2440	-2.84	-2.85
	39	2480	-3.74	-3.78

## 12. Maximum Tune-up Limit

WCDMA			
Mode	Maximum Tune-up (dBm)		
	FDD Band II	FDD Band IV	FDD Band V
AMR 12.2Kbps	22.00	21.50	23.00
RMC 12.2Kbps	22.00	21.50	23.00
HSDPA Subtest-1	21.00	20.50	22.00
HSDPA Subtest-2	20.50	20.00	21.50
HSDPA Subtest-3	20.50	20.00	21.50
HSDPA Subtest-4	20.00	20.00	21.50
HSUPA Subtest-1	18.50	18.50	20.00
HSUPA Subtest-2	19.00	19.00	20.00
HSUPA Subtest-3	19.50	19.50	21.00
HSUPA Subtest-4	18.50	18.50	20.00
HSUPA Subtest-5	20.50	20.50	22.00

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 2	1.4	QPSK	1	22.50
			3	22.50
			6	21.50
		16QAM	1	22.00
			3	22.00
			6	21.50
	3	QPSK	1	22.50
			8	21.50
			15	21.50
		16QAM	1	21.50
			8	21.50
			15	21.50
	5	QPSK	1	23.00
			12	21.50
			25	21.50
		16QAM	1	22.50
			12	21.50
			25	21.50
	10	QPSK	1	23.00
			25	21.50
			50	21.50
		16QAM	1	22.50
			25	21.50
			50	21.50
	15	QPSK	1	23.50
			38	22.00
			75	22.00
		16QAM	1	22.00
			38	22.00
			75	21.50
20	QPSK	1	23.00	
		50	22.00	
		100	22.00	
	16QAM	1	22.00	
		50	21.50	
		100	21.50	



LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 4	1.4	QPSK	1	22.00
			3	22.00
			6	22.00
		16QAM	1	22.00
			3	22.00
			6	22.00
	3	QPSK	1	23.00
			8	21.00
			15	21.00
		16QAM	1	22.00
			8	22.00
			15	22.00
	5	QPSK	1	22.50
			12	22.00
			25	22.00
		16QAM	1	23.00
			12	22.00
			25	22.00
	10	QPSK	1	23.00
			25	21.00
			50	21.00
		16QAM	1	21.00
			25	21.50
			50	21.00
15	QPSK	1	22.00	
		38	21.50	
		75	21.00	
	16QAM	1	21.00	
		38	21.00	
		75	21.50	
20	QPSK	1	23.00	
		50	23.00	
		100	22.00	
	16QAM	1	22.50	
		50	22.00	
		100	22.00	

LTE				
Frequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 5	1.4	QPSK	1	24.50
			3	24.50
			6	23.00
		16QAM	1	23.50
			3	23.50
			6	22.00
	3	QPSK	1	25.00
			8	24.00
			15	24.00
		16QAM	1	24.00
			8	23.00
			15	22.50
	5	QPSK	1	25.00
			12	24.00
			25	23.50
		16QAM	1	24.00
			12	23.00
			25	23.00
	10	QPSK	1	24.50
			25	24.00
			50	24.00
16QAM		1	24.00	
		25	23.00	
		50	23.00	

LTE				
Frequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 7	5	QPSK	1	24.00
			12	22.50
			25	23.00
		16QAM	1	23.00
			12	22.00
			25	22.00
	10	QPSK	1	24.00
			25	23.00
			50	23.00
		16QAM	1	23.00
			25	22.00
			50	22.00
	15	QPSK	1	24.00
			38	23.00
			75	23.00
		16QAM	1	23.00
			38	23.00
			75	22.00
	20	QPSK	1	24.00
			50	23.00
			100	22.50
16QAM		1	23.00	
		50	22.00	
		100	21.50	

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 12	1.4	QPSK	1	24.50
			3	24.50
			6	23.50
		16QAM	1	23.50
			3	23.50
			6	22.50
	3	QPSK	1	25.00
			8	24.00
			15	24.00
		16QAM	1	24.00
			8	23.00
			15	23.00
	5	QPSK	1	24.50
			12	23.50
			25	23.50
		16QAM	1	24.00
			12	22.50
			25	22.50
	10	QPSK	1	24.50
			25	24.00
			50	24.00
16QAM		1	24.00	
		25	22.50	
		50	22.50	

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 17	5	QPSK	1	24.50
			12	23.50
			25	23.50
		16QAM	1	23.50
			12	22.50
			25	22.50
	10	QPSK	1	24.50
			25	23.50
			50	23.50
		16QAM	1	23.50
			25	22.50
			50	22.50

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 25	1.4	QPSK	1	24.00
			3	24.00
			6	23.00
		16QAM	1	23.00
			3	23.00
			6	22.00
	3	QPSK	1	23.50
			8	23.00
			15	22.50
		16QAM	1	23.00
			8	24.00
			15	23.00
	5	QPSK	1	22.00
			12	23.00
			25	23.50
		16QAM	1	23.00
			12	23.00
			25	24.00
	10	QPSK	1	22.00
			25	23.00
			50	23.50
		16QAM	1	23.00
			25	23.00
			50	24.00
15	QPSK	1	22.00	
		38	23.00	
		75	23.50	
	16QAM	1	23.00	
		38	24.00	
		75	24.00	
20	QPSK	1	23.00	
		50	23.00	
		100	23.50	
	16QAM	1	23.00	
		50	23.00	
		100	23.50	

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 26	1.4	QPSK	1	24.00
			3	24.00
			6	23.00
		16QAM	1	23.00
			3	23.00
			6	22.00
	3	QPSK	1	23.50
			8	22.50
			15	22.50
		16QAM	1	22.00
			8	21.50
			15	21.50
	5	QPSK	1	23.50
			12	22.50
			25	22.50
		16QAM	1	22.50
			12	21.50
			25	21.50
	10	QPSK	1	23.50
			25	23.00
			50	22.50
		16QAM	1	22.50
			25	21.50
			50	21.50
15	QPSK	1	23.50	
		38	22.50	
		75	22.50	
	16QAM	1	22.50	
		38	22.50	
		75	21.50	

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
FDD Band 71	5	QPSK	1	23.50
			12	22.50
			25	22.50
		16QAM	1	22.50
			12	21.00
			25	21.00
	10	QPSK	1	23.50
			25	22.50
			50	22.50
		16QAM	1	22.50
			25	21.50
			50	21.50
	15	QPSK	1	23.00
			38	22.50
			75	22.50
		16QAM	1	22.50
			38	22.50
			75	21.50
	20	QPSK	1	23.50
			50	22.50
			100	22.00
16QAM		1	22.50	
		50	21.00	
		100	21.00	



LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
TDD Band 38	5	QPSK	1	23.50
			12	22.00
			25	22.00
		16QAM	1	22.50
			12	21.00
			25	21.50
	10	QPSK	1	23.00
			25	22.00
			50	22.00
		16QAM	1	22.00
			25	21.50
			50	21.50
	15	QPSK	1	23.00
			38	22.00
			75	22.50
		16QAM	1	22.00
			38	22.00
			75	21.50
	20	QPSK	1	23.00
			50	22.00
			100	22.00
16QAM		1	22.00	
		50	21.50	
		100	21.50	

LTE				
Frequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
TDD Band 41	5	QPSK	1	23.50
			12	22.00
			25	22.00
		16QAM	1	22.50
			12	21.00
			25	21.50
	10	QPSK	1	23.00
			25	22.00
			50	22.00
		16QAM	1	22.00
			25	21.50
			50	21.50
	15	QPSK	1	23.00
			38	22.00
			75	22.50
		16QAM	1	22.00
			38	22.00
			75	21.50
	20	QPSK	1	23.00
			50	22.00
			100	22.00
16QAM		1	22.00	
		50	21.50	
		100	21.50	

The allowed Maximum Power Reduction (MPR) for the maximum output power in Table 6.2.2-1 due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3**

Modulation	Channel bandwidth / Transmission bandwidth ( $N_{RB}$ )						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≤ 1						≤ 5

WiFi 2.4G	
Mode	Maximum Tune-up (dBm) Conducted Average Power
802.11b	10.50
802.11g	13.50
802.11n(HT20)	13.60
802.11n(HT40)	13.00

WiFi 5G U-NII-1	
Mode	Maximum Tune-up (dBm) Conducted Average Power
802.11n(HT20)	8.00
802.11a	8.50
802.11n(HT40)	8.50

WiFi 5G U-NII-3	
Mode	Maximum Tune-up (dBm) Conducted Average Power
802.11n(HT20)	8.50
802.11a	9.00
802.11n(HT40)	9.00

Bluetooth	
Mode	Maximum Tune-up (dBm) Conducted Average Power
GFSK	5.00
$\pi/4$ QPSK	3.50
8DPSK	3.50
GFSK(BLE)	-2.50

Per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100MHz to 6GHz at test separation distances  $\leq 50$ mm are determined by:

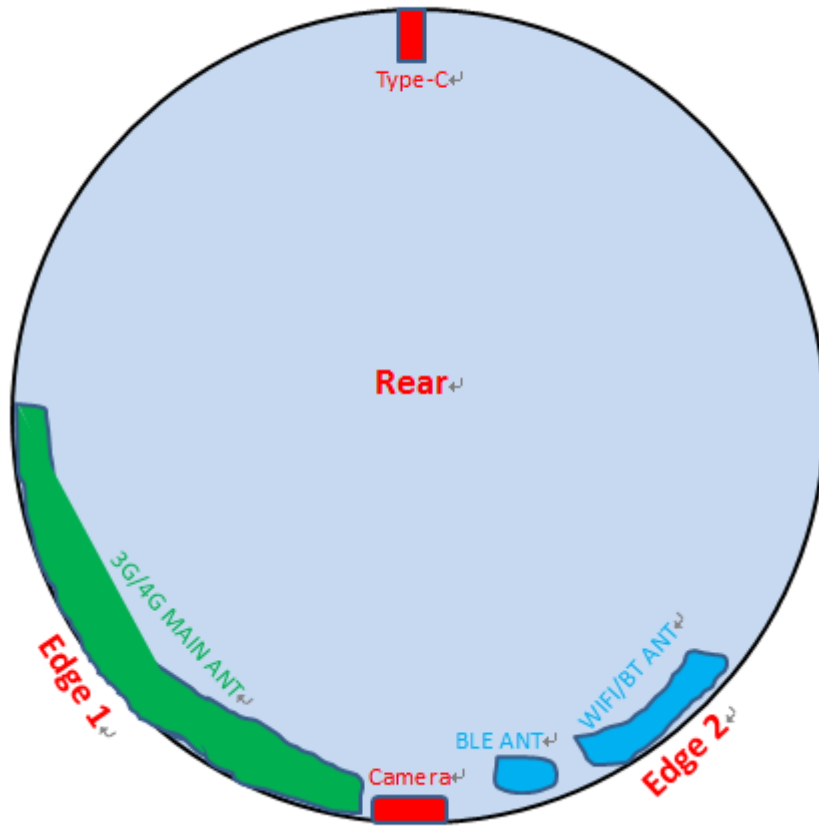
$$[(\text{max. Power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR}$$

Band/Mode	F(GHz)	Position	Separation Distance (mm)	Exclusion Thresholds	SAR test exclusion
Bluetooth	2.45	Body	5	1.0	Yes

Per KDB 447498 D01, when the minimum test separation distance is <5mm, a distance of 5mm is applied to determine SAR test exclusion.

The test exclusion threshold is  $\leq 3$ , SAR testing is not required.

### 13. Antenna Location



## **14. Measured and Reported SAR Results**

### **SAR Test Reduction criteria are as follows:**

- Reported SAR(W/kg) for WWAN = Measured SAR \*Tune-up Scaling Factor
- Reported SAR(W/kg) for Wi-Fi and Bluetooth = Measured SAR \* Tune-up scaling factor \* Duty Cycle scaling factor
- Duty Cycle scaling factor = 1 / Duty cycle (%)

### **KDB 447498 D01 General RF Exposure Guidance:**

Testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- $\leq 0.8$  W/kg or  $2.0$  W/kg, for 1-g or 10-g respectively, when the transmission band is  $\leq 100$  MHz
- $\leq 0.6$  W/kg or  $1.5$  W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- $\leq 0.4$  W/kg or  $1.0$  W/kg, for 1-g or 10-g respectively, when the transmission band is  $\geq 200$  MHz

### **KDB 941225 D01 SAR test for 3G SAR Test Reduction Procedure:**

When the maximum output power and tune-up tolerance specified for production units in a secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode or when the highest reported SAR of the primary mode is scaled by the ratio of specified maximum output power and tune-up tolerance of secondary to primary mode and the adjusted SAR is  $\leq 1.2$  W/kg, SAR measurement is not required for the secondary mode.

### **W-CDMA Guidance**

SAR for next to the ear head exposure is measured using a 12.2 kbps RMC with TPC bits configured to all "1's". The 3G SAR test reduction procedure is applied to AMR configurations with 12.2 kbps RMC (Head) and other spreading codes and multiple DPDCHn configurations supported by the handset with 12.2 kbps RMC (Body-Worn Accessory) as the primary mode.

SAR measurement is not required for the HSDPA, HSUPA, DC-HSDPA and HSPA+. When primary mode and the adjusted SAR is  $\leq 1.2$  W/kg and secondary mode is  $\leq \frac{1}{4}$  dB higher than the primary mode

### **KDB 941225 D05 SAR for LTE Devices:**

SAR test reduction is applied using the following criteria:

- Start with the largest channel bandwidth and measure SAR for QPSK with 1 RB, and 50% RB allocation, using the RB offset and required test channel combination with the highest maximum output power among RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is  $> 0.8$  W/kg, testing for other Channels is performed at the highest output power level for 1RB, and 50% RB configuration for that channel.
- Testing for 100% RB configuration is performed at the highest output power level for 100% RB configuration across the Low, Mid and High Channel when the highest reported SAR for 1 RB and 50% RB are  $> 0.8$  W/kg. Testing for the remaining required channels is not needed because the reported SAR for 100% RB Allocation  $< 1.45$  W/kg.
- Testing for 16-QAM and 64-QAM modulation is not required because the reported SAR for QPSK is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of QPSK.
- Testing for the other channel bandwidths is not required because the reported SAR for the highest channel bandwidth is  $< 1.45$  W/Kg and its output power is not more than 0.5 dB higher than that of the highest channel bandwidth.

### **KDB 248227 D01 SAR meas for 802.11:**

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

SAR test reduction for 802.11 Wi-Fi transmission mode configurations are considered separately for DSSS and OFDM. An initial test position is determined to reduce the number of tests required for certain exposure configurations with multiple test positions. An initial test configuration is determined for each frequency band and aggregated band according to maximum output power, channel bandwidth, wireless mode configurations and other operating parameters to streamline the measurement requirements. For 2.4 GHz DSSS, either the initial test position or DSSS procedure is applied to reduce the number of SAR tests; these are mutually exclusive. For OFDM, an initial test position is only applicable to next to the ear, UMPC mini-tablet and hotspot mode configurations, which is tested using the initial test configuration to facilitate test reduction. For

other exposure conditions with a fixed test position, SAR test reduction is determined using only the initial test configuration.

The multiple test positions require SAR measurements in head, hotspot mode or UMPC mini-tablet configurations may be reduced according to the highest reported SAR determined using the initial test position(s) by applying the DSSS or OFDM SAR measurement procedures in the required wireless mode test configuration(s). The initial test position(s) is measured using the highest measured maximum output power channel in the required wireless mode test configuration(s). When the reported SAR for the initial test position is:

- $\leq 0.4$  W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- $> 0.4$  W/kg, SAR is repeated using the same wireless mode test configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position, on the highest maximum output power channel, until the reported SAR is  $\leq 0.8$  W/kg or all required test positions are tested.
  - For subsequent test positions with equivalent test separation distance or when exposure is dominated by coupling conditions, the position for maximum coupling condition should be tested.
  - When it is unclear, all equivalent conditions must be tested.
- For all positions/configurations tested using the initial test position and subsequent test positions, when the reported SAR is  $> 0.8$  W/kg, measure the SAR for these positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is  $\leq 1.2$  W/kg or all required test channels are considered.
  - The additional power measurements required for this step should be limited to those necessary for identifying subsequent highest output power channels to apply the test reduction.
- When the specified maximum output power is the same for both UNII 1 and UNII 2A, begin SAR measurements in UNII 2A with the channel with the highest measured output power. If the reported SAR for UNII 2A is  $\leq 1.2$  W/kg, SAR is not required for UNII 1; otherwise treat the remaining bands separately and test them independently for SAR.
- When the specified maximum output power is different between UNII 1 and UNII 2A, begin SAR with the band that has the higher specified maximum output. If the highest reported SAR for the band with the highest specified power is  $\leq 1.2$  W/kg, testing for the band with the lower specified output power is not required; otherwise test the remaining bands independently for SAR.

To determine the initial test position, Area Scans were performed to determine the position with the Maximum Value of SAR (measured). The position that produced the highest Maximum Value of SAR is considered the worst case position; thus used as the initial test position.

WCDMA Band II										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2K	Front	9262	1852.4	20.95	22.00	1.274	-	-	-	-
		9400	1880	21.49	22.00	1.125	-	-	-	-
		9538	1907.6	21.57	22.00	1.104	0.03	0.516	0.570	1

WCDMA Band IV										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2K	Front	1312	1712.4	21.20	21.50	1.072	-	-	-	-
		1413	1732.6	21.43	21.50	1.016	-0.09	0.218	0.222	2
		1513	1752.6	21.40	21.50	1.023	-	-	-	-

WCDMA Band V										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
RMC 12.2K	Front	4132	826.4	22.61	23.00	1.094	0.00	0.537	0.587	3
		4183	836.6	22.46	23.00	1.132	-	-	-	-
		4233	846.6	22.28	23.00	1.180	-	-	-	-

LTE Band 2										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Edge 1	18700	1860	22.30	23.00	1.175	-	-	-	-
		18900	1880	22.81	23.00	1.045	-0.18	0.023	0.024	4
		19100	1900	22.44	23.00	1.138	-	-	-	-

LTE Band 4										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	20050	1720	22.52	23.00	1.117	0.00	0.224	0.250	5
		20175	1732.5	22.99	23.00	1.002	-	-	-	-
		20300	1745	22.54	23.00	1.112	-	-	-	-

LTE Band 5										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
10M QPSK 1RB	Front	20450	829	24.45	24.50	1.012	-0.18	0.015	0.015	6
		20525	836.5	24.31	24.50	1.045	-	-	-	-
		20600	844	24.29	24.50	1.050	-	-	-	-

LTE Band 7										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Left Cheek	20850	2510	23.72	24.00	1.067	-0.07	0.289	0.308	7
		21100	2535	23.45	24.00	1.135	-	-	-	-
		21350	2560	23.36	24.00	1.159	-	-	-	-

LTE Band 12										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
10M QPSK 1RB	Front	23060	704	24.47	24.50	1.007	0.05	0.073	0.074	8
		23095	707.5	24.41	24.50	1.021	-	-	-	-
		23130	711	24.38	24.50	1.028	-	-	-	-

LTE Band 17										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
10M QPSK 1RB	Front	23780	709	24.26	24.50	1.057	-	-	-	-
		23790	710	24.36	24.50	1.033	-	-	-	-
		23800	711	24.42	24.50	1.019	0.19	0.030	0.031	9

LTE Band 25										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	26140	1860	21.74	22.00	1.062	-0.18	0.124	0.132	10
		26365	1882.5	21.43	22.00	1.140	-	-	-	-
		26590	1905	21.36	22.00	1.159	-	-	-	-

LTE Band 26										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
15M QPSK 1RB	Front	26865	831.5	22.75	23.00	1.059	0.12	0.058	0.061	11
		26915	836.5	22.49	23.00	1.125	-	-	-	-
		26965	841.5	22.15	23.00	1.216	-	-	-	-



LTE Band 71										
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz							
20M QPSK 1RB	Front	133222	673	23.07	23.50	1.104	-	-	-	-
		133322	683	23.11	23.50	1.094	0.09	0.020	0.022	12
		133372	688	22.83	23.50	1.167	-	-	-	-

LTE Band 38											
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Duty Cycle Scaling Factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz								
20M QPSK 1RB	Front	37850	2580	22.94	23.50	1.14	1.006	-	-	-	-
		38000	2595	23.11	23.50	1.09	1.006	-	-	-	-
		38150	2610	23.21	23.50	1.07	1.006	0.12	0.058	0.062	13

LTE Band 41											
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune up limit (dBm)	Tune up scaling factor	Duty Cycle Scaling Factor	Power Drift(dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz								
20M QPSK 1RB	Front	40340	2565	22.75	23.00	1.06	1.006	-0.19	0.049	0.052	14
		40740	2605	22.49	23.00	1.12	1.006	-	-	-	-
		41140	2645	22.15	23.00	1.22	1.006	-	-	-	-

**Note:**

For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9%) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix  $63.3\%/62.9\% = 1.006$  is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)\* Tune-up Scaling Factor\* scaling factor for extended cyclic prefix.

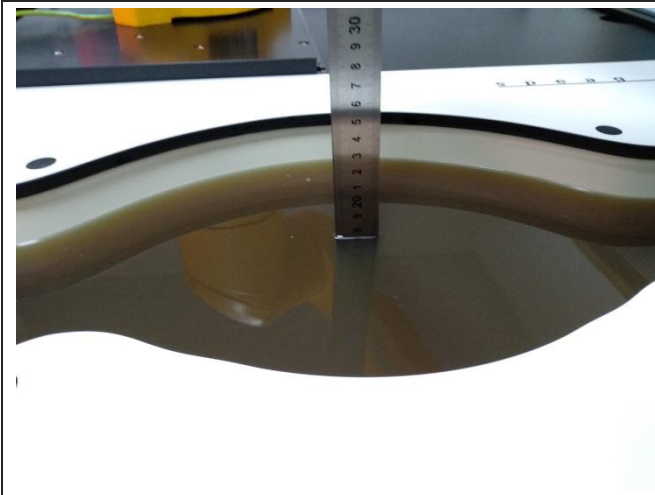
WiFi 2.4G												
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz									
802.11b	Edge 2	1	2412	10.35	10.50	1.035	100.00%	1.00	-0.11	0.079	0.082	15
		6	2437	8.56	10.50	1.563	100.00%	1.00	-	-	-	-
		11	2462	10.00	10.50	1.122	100.00%	1.00	-	-	-	-

WiFi 5G U-NII-1												
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz									
802.11n (HT40)	Edge 2	38	5190	8.34	8.50	1.04	100.00%	1.00	0.02	0.038	0.039	16
		46	5230	7.54	8.50	1.25	100.00%	1.00	-	-	-	-

WiFi 5G U-NII-3												
Mode	Test Position	Frequency		Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift (dB)	Measured SAR(1g) (W/kg)	Report SAR(1g) (W/kg)	Plot No.
		CH	MHz									
802.11n (HT40)	Edge 2	151	5755	8.74	9.00	1.06	100.00%	1.00	-0.14	0.123	0.131	17
		159	5795	7.63	9.00	1.37	100.00%	1.00	-	-	-	-

SAR Test Data Plots to the Appendix A.

### 15. TestSetup Photos



Liquid depth in the Body phantom



Front(5mm)



Edge 2(5mm)



Edge 1(5mm)

### 16. External and Internal Photos of the EUT

Please reference to the report No.: CHTEW19070094

**-----End of Report-----**