TEST REPORT

Report Reference No.................... :	**TRE18030014** R/C……….: 63917
FCC ID.. :	**2AHPN-HSA-15**
Applicant's name .... :	**Harman International Industries Incorporated**
Address..:	636, Ellis St, Mountain View, CA 94043, USA
Manufacturer.....................................:	Shenzhen Neoway Technology Co., Ltd.
Address..:	4F-2#,Lianjian Science&Industry Park,Huarong Road, Dalang,Longhua new District,Shenzhen City,Guangdong Province,P.R.China
Test item description .... :	**Harman OBD II Telematics Device**
Trade Mark ....:	Harman
Model/Type reference.......................:	HSA-15
Listed Model(s) ....:	-
Standard .... :	**FCC 47 CFR Part2.1093** **ANSI/IEEE C95.1: 1999** **IEEE 1528: 2013**
Date of receipt of test sample……….:	Mar.07, 2018
Date of testing…………………………...:	Mar.08, 2018 - Mar.15, 2018
Date of issue…………………………….:	Jul.02, 2018
Result.................. ……………………...:	**PASS**

Compiled by (position+printedname+signature)...:	File administrators:	Charley Wu	Charley.Wu
Supervised by (position+printedname+signature)...:	Test Engineer:	Charley Wu	Charley.Wu
Approved by (position+printedname+signature)...:	Manager:	Hans Hu	Hans Hu

Testing Laboratory Name .... :	**Shenzhen Huatongwei International Inspection Co., Ltd**
Address..:	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

The test report merely correspond to the test sample.

Contents

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: 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.
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations
KDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies
KDB 248227 D01 802 11 Wi-Fi SAR v02r02: SAR Measurement Procedures for 802.11 a/b/g Transmitters
KDB 941225 D01 3G SAR Procedures v03r01: SAR Measurement Procedures for 3G Devices
KDB 941225 D06 Hotspot Mode v02r01: SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities
KDB 941225 D05 SAR for LTE Devices v02r05: SAR Evaluation Considerations for LTE Devices

1.2. Report version

Revision No.	Date of issue	Description
N/A	2018-07-02	Original

2. Summary

2.1. Client Information

Applicant:	Harman International Industries Incorporated
Address:	636, Ellis St, Mountain View, CA 94043, USA
Manufacturer:	Shenzhen Neoway Technology Co., Ltd.
Address:	4F-2#,Lianjian Science&Industry Park,Huarong Road, Dalang,Longhua new District,Shenzhen City,Guangdong Province,P.R.China

2.2. Product Description

Name of EUT:	Harman OBD II Telematics Device			
Trade Mark:	Harman			
Model No.:	HSA-15			
Listed Model(s):	-			
Power supply:	DC 12V			
Device Category:	Portable			
Product stage:	Production unit			
RF Exposure Environment:	General Population / Uncontrolled			
Device Class:	B			
Hardware version:	0A			
Software version:	N2860_US_OBDII_V04_20171225_signed_emmc			
Maximum SAR Value				
Separation Distance:	Body: 5mm			
Max Report SAR Value (1g):	Test location:	PCE	DTS	Simultaneous TX
	Hotspot:	**0.602 W/Kg**	**0.875 W/Kg**	**1.487 W/Kg**
WCDMA				
Operation Band:	WCDMA Band II, WCDMA Band V			
Power Class:	Power Class 3			
Modilation Type:	QPSK			
DC-HSUPA Release Version:	Not Supported			
Antenna type:	Integral Antenna			
LTE				
Operation Band:	FDD Band 2,FDD Band 4, FDD Band 5, FDD Band 12			
Modilation Type:	QPSK			
Antenna type:	Integral Antenna			

WIFI	
Supported type:	802.11b/802.11g/802.11n(HT20)
Modulation:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)
Operation frequency:	2412MHz~2462MHz
Channel number:	11
Channel separation:	5MHz
Antenna type:	Integral Antenna
Remark: *1. The EUT must be charged with a dapter,during the testing time.*	

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.

IC-Registration No.:5377B

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.: 5377B

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.

4. Equipments Used during the Test

Test Equipment	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Calibration	Calibration Interval
Data Acquisition Electronics DAEx	SPEAG	DAE4	1315	2017/08/15	1
E-field Probe	SPEAG	EX3DV4	3842	2017/08/15	1
System Validation Dipole	SPEAG	D750V3	1156	2016/02/02	3
System Validation Dipole	SPEAG	D835V2	4d134	2017/10/27	3
System Validation Dipole	SPEAG	D1750V2	1062	2017/10/26	3
System Validation Dipole	SPEAG	D1900V2	5d150	2017/10/26	3
System Validation Dipole	SPEAG	D2450V2	884	2017/10/26	3
Dielectric Assessment Kit	SPEAG	DAK-3.5	1038	2016/08/25	3
Network analyzer	Agilent	N9923A	MY51491493	2017/09/05	1
Power meter	Agilent	N1914A	MY52090010	2017/03/23	1
Power sensor	Agilent	E9304A	MY52140008	2017/03/23	1
Power sensor	Agilent	E9301H	MY54470001	2017/06/02	1
Signal Generator	ROHDE & SCHWARZ	SMBV100A	175248	2017/9/02	1
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	112012	2017/10/21	1
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMW500	155690	2017/04/17	1
Dual Directional Coupler	Agilent	772D	MY46151257	2017/03/23	1
Dual Directional Coupler	Agilent	778D	MY48220612	2017/03/23	1
Power Amplifier	Mini-Circuits	ZHL-42W	QA1202003	2017/11/27	1

Note:

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

5. Measurement Uncertainty

Measurement Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Test Sample Related										
15	Test sample positioning	A	1.86%	N	1	1	1	1.86%	1.86%	∞
16	Device holder uncertainty	A	1.70%	N	1	1	1	1.70%	1.70%	∞
17	Drift of output power	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
19	Liquid conductivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
21	Liquid permittivity (target)	B	5.00%	R	$\sqrt{3}$	0.64	0.43	1.80%	1.20%	∞
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c = \sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	9.79%	9.67%	∞
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	19.57%	19.34%	∞

System Check Uncertainty										
No.	Error Description	Type	Uncertainty Value	Probably Distribution	Div.	(Ci) 1g	(Ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	Degree of freedom
Measurement System										
1	Probe calibration	B	6.0%	N	1	1	1	6.0%	6.0%	∞
2	Axial isotropy	B	4.70%	R	$\sqrt{3}$	0.7	0.7	1.90%	1.90%	∞
3	Hemispherical isotropy	B	9.60%	R	$\sqrt{3}$	0.7	0.7	3.90%	3.90%	∞
4	Boundary Effects	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
5	Probe Linearity	B	4.70%	R	$\sqrt{3}$	1	1	2.70%	2.70%	∞
6	Detection limit	B	1.00%	R	$\sqrt{3}$	1	1	0.60%	0.60%	∞
7	RF ambient conditions-noise	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
8	RF ambient conditions-reflection	B	0.00%	R	$\sqrt{3}$	1	1	0.00%	0.00%	∞
9	Response time	B	0.80%	R	$\sqrt{3}$	1	1	0.50%	0.50%	∞
10	Integration time	B	5.00%	R	$\sqrt{3}$	1	1	2.90%	2.90%	∞
11	RF ambient	B	3.00%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
12	Probe positioned mech. restrictions	B	0.40%	R	$\sqrt{3}$	1	1	0.20%	0.20%	∞
13	Probe positioning with respect to phantom shell	B	2.90%	R	$\sqrt{3}$	1	1	1.70%	1.70%	∞
14	Max.SAR evalation	B	3.90%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
System validation source-dipole										
15	Deviation of experimental dipole from numerical dipole	A	1.58%	N	1	1	1	1.58%	1.58%	∞
16	Dipole axis to liquid distance	A	1.35%	N	1	1	1	1.35%	1.35%	∞
17	Input power and SAR drift	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
Phantom and Set-up										
18	Phantom uncertainty	B	4.00%	R	$\sqrt{3}$	1	1	2.30%	2.30%	∞
20	Liquid conductivity (meas.)	A	0.50%	N	1	0.64	0.43	0.32%	0.26%	∞
22	Liquid cpermittivity (meas.)	A	0.16%	N	1	0.64	0.43	0.10%	0.07%	∞
Combined standard uncertainty		$u_c=\sqrt{\sum_{i=1}^{22} c_i^2 u_i^2}$		/	/	/	/	8.80%	8.79%	∞
Expanded uncertainty (confidence interval of 95 %)		$u_e = 2u_c$		R	K=2	/	/	17.59%	17.58%	∞

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.

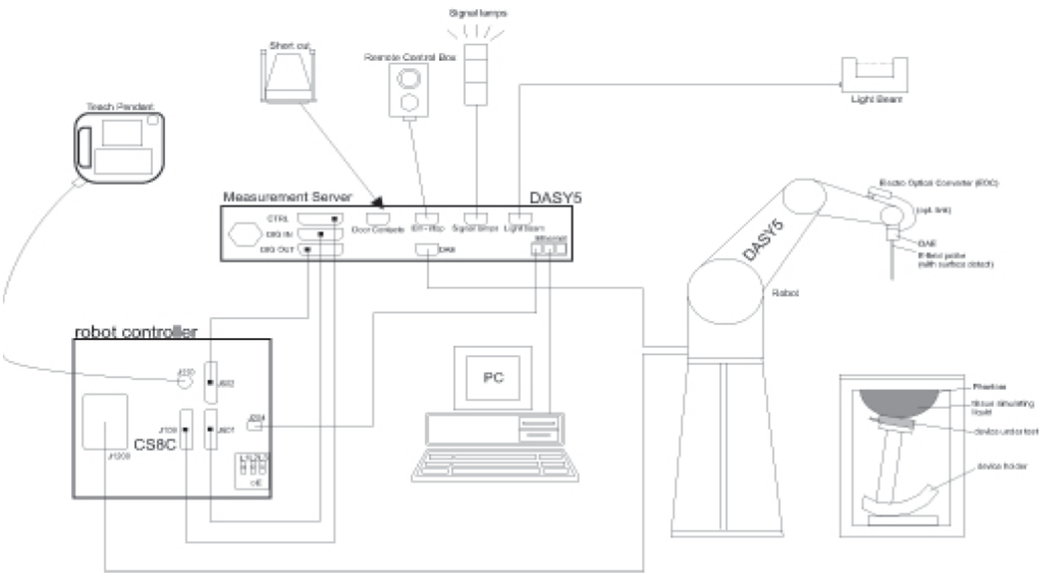
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.

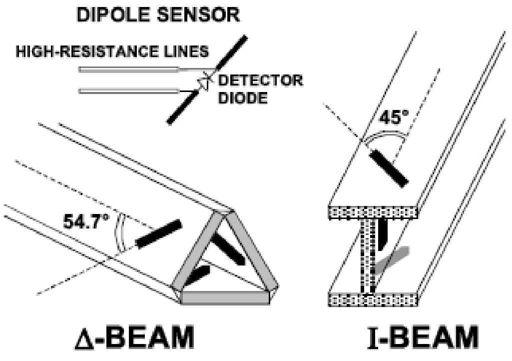
- **Probe Specification**

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	10 MHz to 6 GHz; Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 W/kg; Linearity: ± 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**

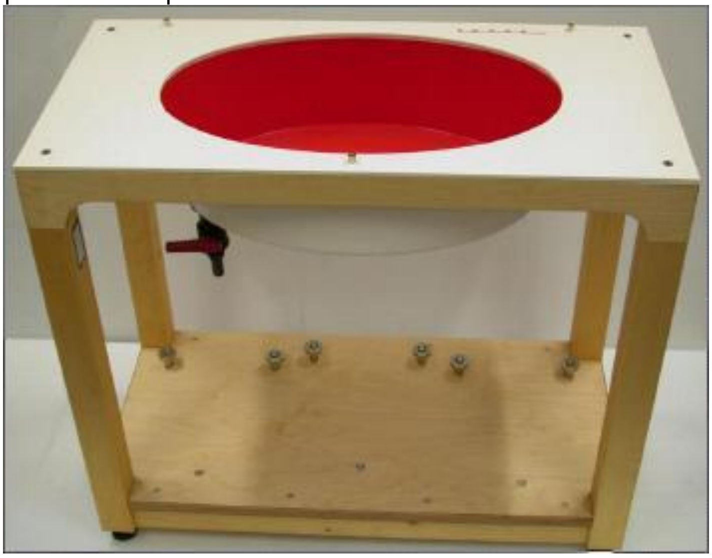
The isotropic E-Field probe has been fully calibrated and assessed for isotropicity, and boundary effect within a controlled environment. Depending on the frequency for which the probe is calibrated the method utilized for calibration will change.

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



6.3. Phantoms

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI isfully 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.



ELI4 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. ± 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 ± 0.1mm). 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 ± 30°.)

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

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 mm ± 1 mm</td><td>½·δ·ln(2) mm ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.
* When zoom scan is required and the <u>*reported*</u> SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

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/cm²], [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)
dcpi: diode compression point (DASY parameter)

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

$$\text{E} - \text{fieldprobes}: \qquad E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}$$

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

Vi: compensated signal of channel (i = x, y, z)
Normi: sensor sensitivity of channel (i = x, y, z), [mV/(V/m)2] for E-field Probes
ConvF: sensitivity enhancement in solution
aij: sensor sensitivity factors for H-field probes
f: carrier frequency [GHz]
Ei: electric field strength of channel i in V/m
Hi: magnetic field strength of channel i in A/m

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

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

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

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

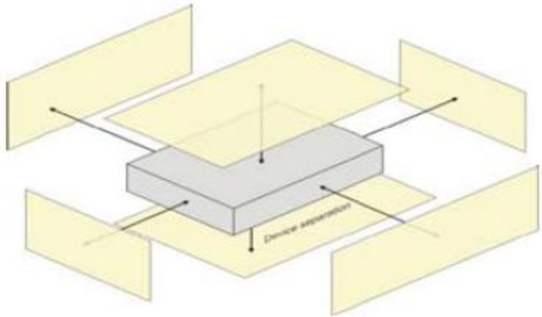
SAR:	local specific absorption rate in W/kg
Etot:	total field strength in V/m
σ:	conductivity in [mho/m] or [Siemens/m]
ρ:	equivalent tissue density in g/cm3

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. 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 cm x 5 cm. For smaller devices with dimensions ≤ 9 cm x 5 cm because of a greater potential for next to body use a test separation of ≤ 5 mm must be used.



Picture 5 Test positions for Hotspot Mode

9. System Check

9.1. Tissue Dielectric Parameters

The liquid has previously been proven to be suited for worst-case. It's satisfying the latest tissue dielectric parameters requirements proposed by the KDB865664.

Tissue dielectric parameters for body phantoms		
Target Frequency	Body	
(MHz)	εr	σ(s/m)
750	55.5	0.96
835	55.2	0.97
1750	53.4	1.49
1800-2000	53.3	1.52
2450	52.7	1.95
2600	52.5	2.16

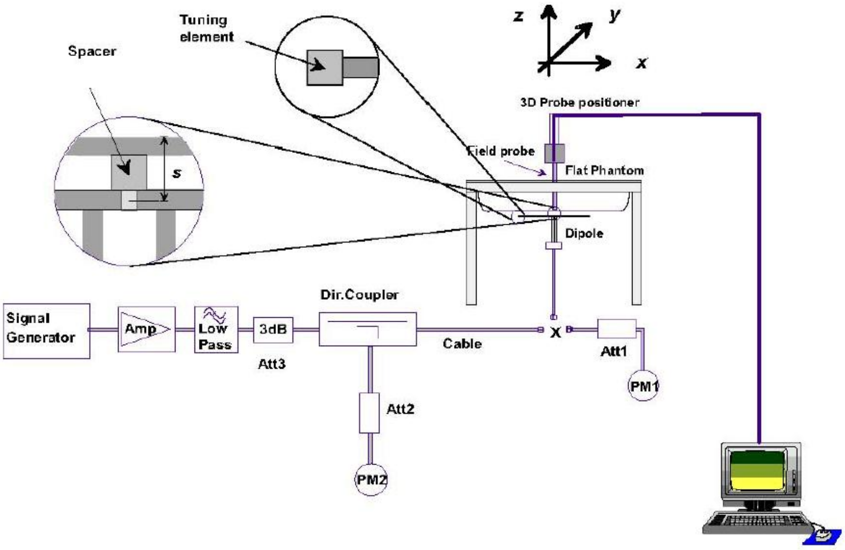
Check Result:

Dielectric performance of Body tissue simulating liquid									
Frequency (MHz)	εr		σ(s/m)		Delta (εr)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
750	55.50	55.63	0.96	0.94	0.23%	-2.60%	±5%	22	2018-03-12
835	55.20	55.15	0.97	0.96	-0.09%	-1.03%	±5%	22	2018-03-12
1750	53.40	53.52	1.49	1.44	0.22%	-3.36%	±5%	22	2018-03-13
1900	53.30	53.12	1.52	1.53	-0.34%	0.66%	±5%	22	2018-03-13
2450	52.70	52.52	1.95	1.94	-0.34%	-0.51%	±5%	22	2018-03-14

9.2. SAR System Check

The purpose of the system check is to verify that the system operates within its specifications at the decice test frequency.The system check is simple check of repeatability to make sure that the system works correctly at the time of the compliance test;

System check results have to be equal or near the values determined during dipole calibration with the relevant liquids and test system (±10%).
System check is performed regularly on all frequency bands where tests are performed with the DASY5 system.



The output power on dipole port must be calibrated to 24 dBm (250mW) before dipole is connected.

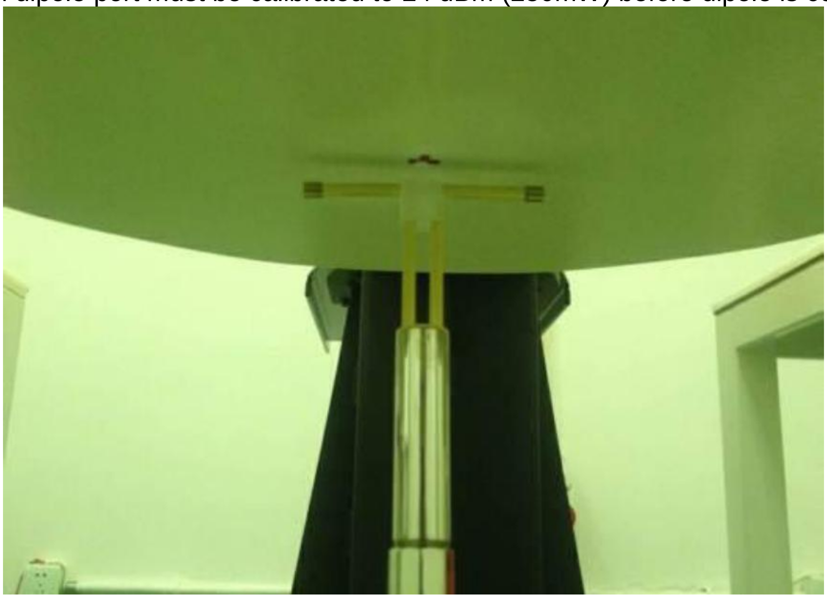


Photo of Dipole Setup

Check Result:

Body									
Frequency (MHz)	1g SAR		10g SAR		Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
750	2.21	2.10	1.45	1.40	-4.98%	-3.45%	±10%	22	2018-03-12
835	2.39	2.47	1.57	1.59	3.35%	1.27%	±10%	22	2018-03-12
1750	9.27	9.30	4.94	4.99	0.32%	1.01%	±10%	22	2018-03-13
1900	10.20	10.30	5.29	5.34	0.98%	0.95%	±10%	22	2018-03-13
2450	12.60	12.50	5.88	5.76	-0.79%	-2.04%	±10%	22	2018-03-14

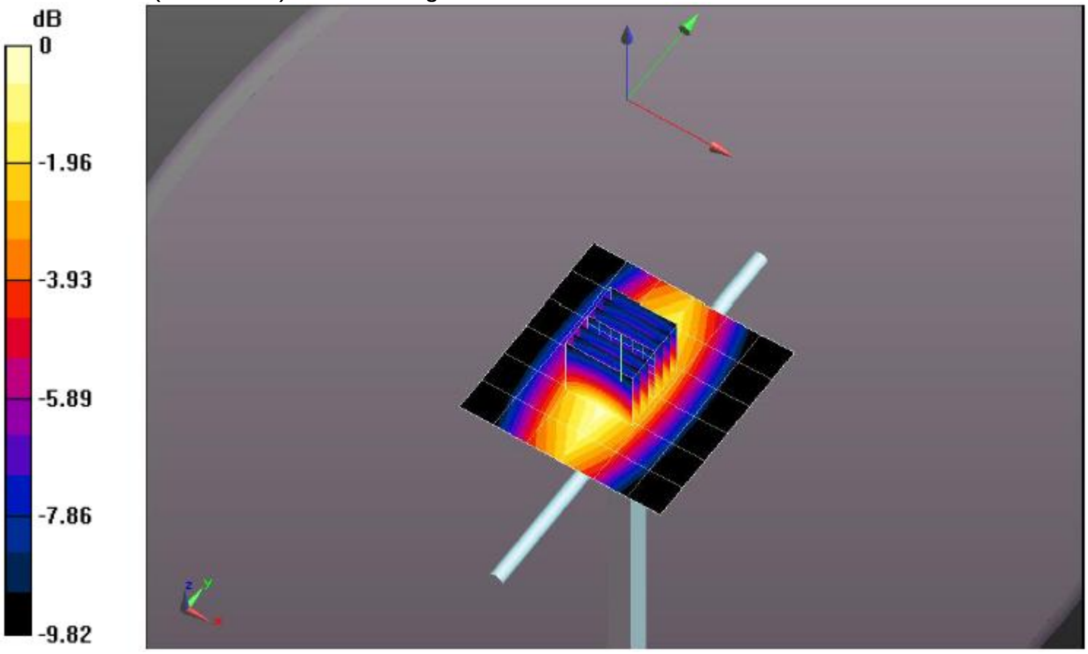
Plots of System Performance Check

System Performance Check-Body 750MHz

DUT: D750V3; Type: D750V3; Serial: 1156
Date: 2018-03-12
Communication System: UID 0, CW (0); Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.935 S/m; ε_r = 55.625; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.31, 9.31, 9.31); Calibrated: 2017/8/15;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
•Phantom: ELI v4.0; Type: QDOVA001BB;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.80 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.06 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.18 W/kg
SAR(1 g) = 2.1 W/kg; SAR(10 g) = 1.4 W/kg
Maximum value of SAR (measured) = 2.81 W/kg

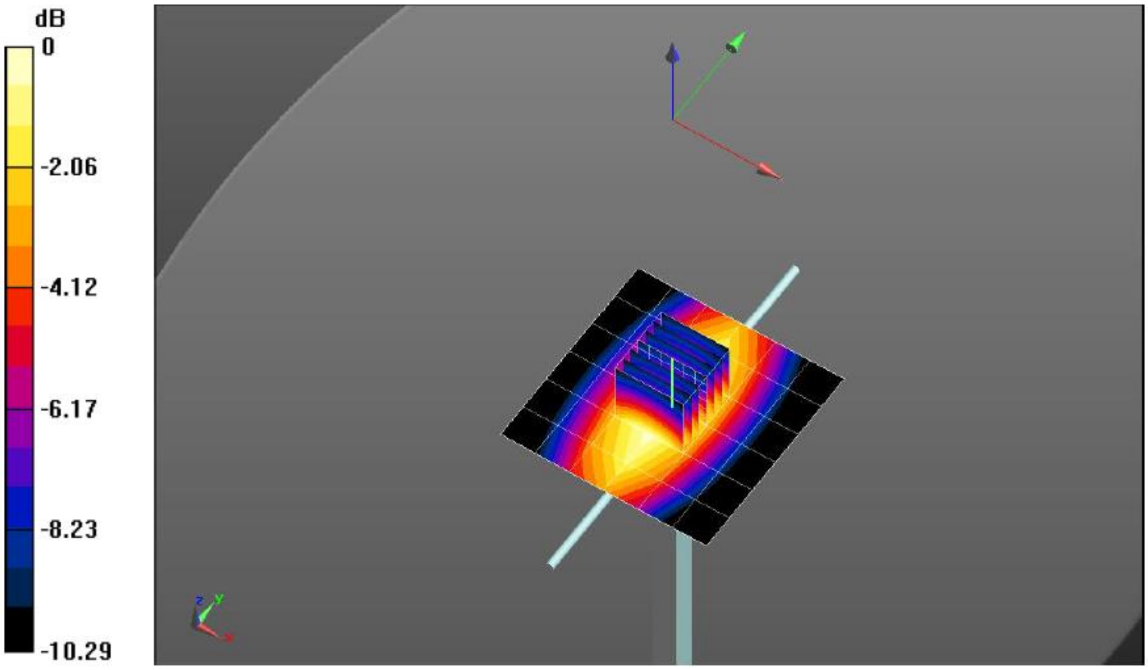


System Performance Check at 835 MHz Body

DUT: Dipole 835 MHz; Type: D835V2; Serial: 4d134
Date: 2018-03-12
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 835 MHz; σ = 0.96 S/m; ε_r = 55.15; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(9.02, 9.02, 9.02); Calibrated: 2017/8/15;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
•Phantom: ELI v4.0; Type: QDOVA001BB;
•Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (8x8x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 2.888 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 50.236 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.339 W/kg
SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.871 W/kg



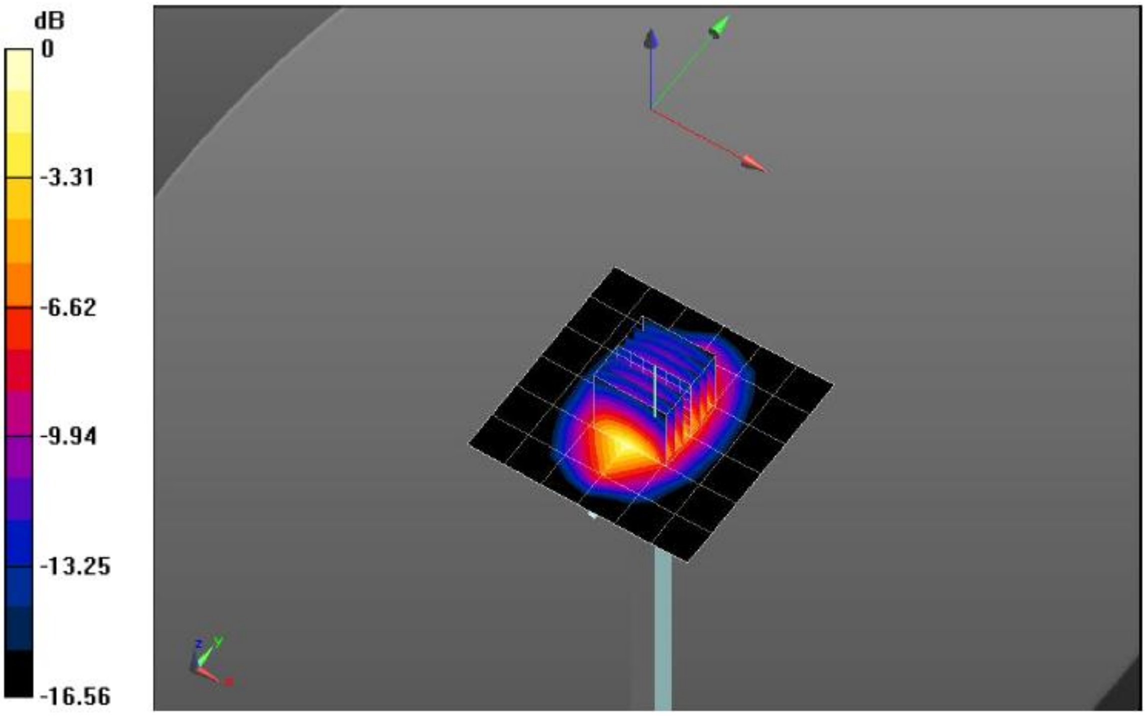
System Performance Check 835MHz Body 250mW

System Performance Check at 1750 MHz Body

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: 1062
Date: 2018-03-13
Communication System: CW; Frequency: 1750 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f =1750 MHz; σ =1.44 S/m; εr =53.52; ρ =1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.57, 7.57, 7.57); Calibrated: 2017/8/15;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
•Phantom: ELI v4.0; Type: QDOVA001BB;
•Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

AreaScan(8x8x1): Measurementgrid:dx=15mm,dy=15mm
Maximum value of SAR (interpolated) =13.354W/kg
ZoomScan(5x5x7)/Cube0: Measurementgrid:dx=8mm,dy=8mm,dz=5mm
ReferenceValue=87.582V/m;PowerDrift=-0.06dB
Peak SAR (extrapolated) = 16.752 W/kg
SAR(1 g) = 9.30 W/kg; SAR(10 g) = 4.99 W/kg
Maximum value of SAR (measured) = 13.273 W/kg



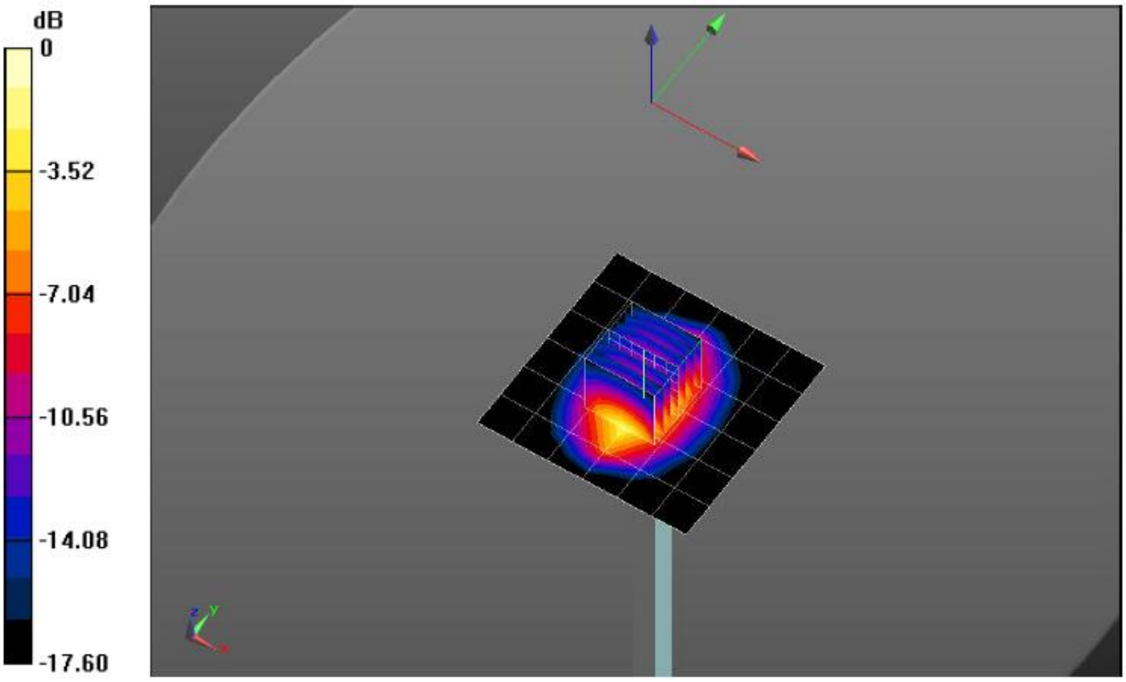
System Performance Check 1750MHz 250mW

System Performance Check at 1900 MHz Body

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: 5d150
Date: 2018-03-13
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1900 MHz; σ = 1.53S/m; εr = 53.12; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 2017/8/15;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
•Phantom: ELI v4.0; Type: QDOVA001BB;
•Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (8x8x1): Measurement grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 15.187 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 87.679 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 19.027 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.34 W/kg
Maximum value of SAR (measured) = 15.09 W/kg



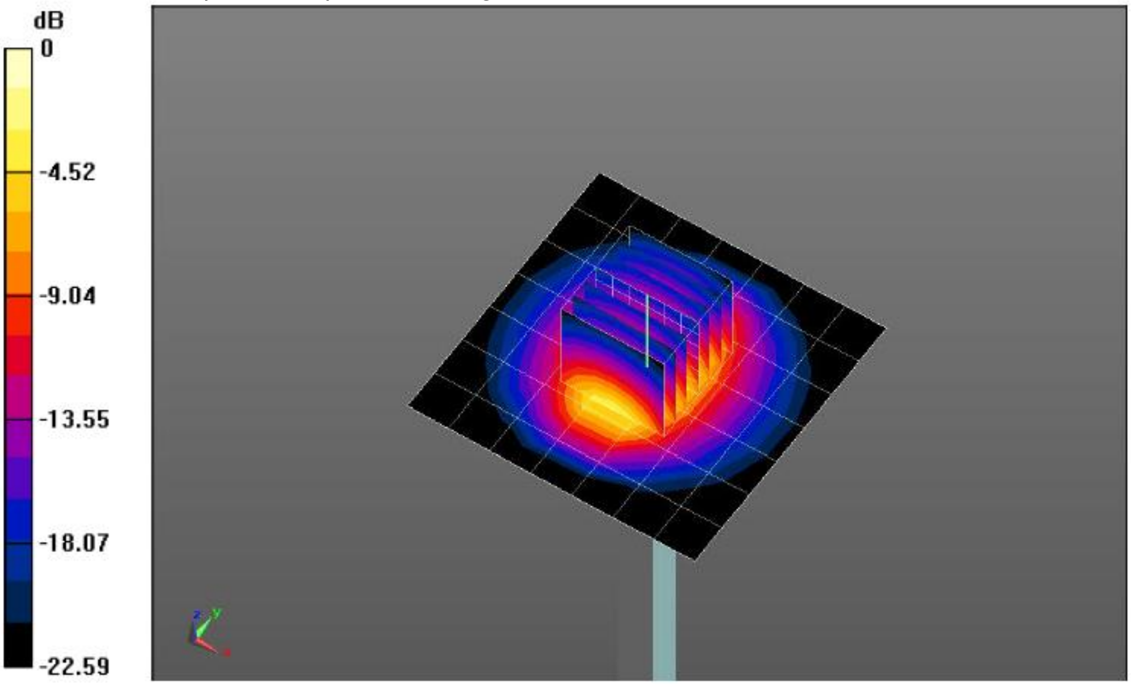
System Performance Check 1900MHz Body250mW

System Performance Check at 2450 MHz Body

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 884
Date: 2018-03-14
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.94S/m; εr = 52.52; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
•Probe: EX3DV4 - SN3842; ConvF(7.01, 7.01, 7.01); Calibrated: 2017/8/15;
•Sensor-Surface: 1.4mm (Mechanical Surface Detection)
•Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
•Phantom: ELI v4.0; Type: QDOVA001BB;
•Measurement SW: DASY52, Version 52.8 (1); SEMCAD X Version 14.6.5 (6469)

Area Scan (10x10x1): Measurement grid: dx=12.00 mm, dy=12.00 mm
Maximum value of SAR (interpolated) = 19.266 W/kg
Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.170 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 26.174 W/kg
SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.76 W/kg
Maximum value of SAR (measured) = 19.27W/kg



System Performance Check 2450MHz Body250mW

10. SAR Exposure Limits

SAR assessments have been made in line with the requirements of ANSI/IEEE C95.1-1992

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)	1.60	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

WCDMA Conducted Power

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 thest setting are illustrated belowe:

HSDPA Setup Configureation:

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 (βc and βd) 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 waw recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, 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: Δ_{ACK}, Δ_{NACK} and Δ_{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, Δ_{ACK} and Δ_{NACK} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$, and Δ_{CQI} = 24/15 with $\beta_{hs} = 24/15 * \beta_c$.

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_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 β_c/β_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 β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configureation:

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 (βc and βd) 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 waw recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{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	209/225	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	β_{ed}1: 47/15 β_{ed}2: 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: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.

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

Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_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: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

General Note:

1. Per KDB 941225 D01, SAR for Head / Hotsport / Body-worn Exposure is measured using a 12.2Kbps RMC with TPC bit ocnfigured to all 1s
2. 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 ≦1/4dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio fo specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC 12.2Kbps and the adjusted SAR is ≦1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA.

Modilation Type	WCDMA Band II			WCDMA Band V		
	Conducted Power (dBm)			Conducted Power (dBm)		
	CH9262	CH9400	CH9538	CH4132	CH4183	CH4233
	1852.4	1880.0	1907.6	826.4	836.6	846.6
QPSK	23.20	23.11	23.11	23.36	23.45	23.37

LTE Conducted Power

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 EUTtransmitting at maximum power and at different configurations which are requested to be reported to FCC, forconducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r03, when a properly configured base station simulator is used for the SAR and powermeasurements, 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 RBallocation, using the RB offset and required test channel combination with the highest maximum output power for RBoffsets 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 maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.
6. Per KDB 941225 D05v02r03, 16QAM output power for each RB allocation configuration is > not ½ dB higher than thesame configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225D05v02r03, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r03, smaller bandwidth output power for each RB allocation configuration is > not ½ dBhigher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supportedbandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r03, smaller bandwidth SAR testing is not required.

LTE-FDD Band 2				Actual output Power (dBm)		
Band-width	Modulation	RB allocation	RB offset	Low	Middle	High
1.4	QPSK	1	Low	22.16	22.41	21.89
			Middle	22.18	22.40	21.93
			High	22.06	22.33	21.86
		3	Low	22.27	22.24	22.01
			Middle	22.31	22.32	22.30
			High	22.30	22.14	21.99
		6	/	21.00	21.23	21.09
3	QPSK	1	Low	22.14	22.33	22.15
			Middle	22.15	22.21	22.12
			High	22.18	22.21	22.23
		8	Low	21.11	21.15	20.97
			Middle	21.10	21.11	21.09
			High	21.09	21.10	20.96
		15	/	21.10	21.13	21.07
5	QPSK	1	Low	22.00	22.49	22.03
			Middle	22.06	22.20	21.92
			High	22.29	22.41	22.09
		12	Low	21.11	21.24	21.21
			Middle	21.10	21.09	21.10
			High	21.17	21.10	21.10
		25	/	21.10	21.13	21.20
10	QPSK	1	Low	22.33	22.42	22.46
			Middle	22.19	22.42	22.28
			High	22.25	22.36	22.20
		25	Low	21.16	21.30	21.19
			Middle	21.20	21.31	21.21
			High	21.22	21.22	21.21
		50	/	21.22	21.26	21.18

15	QPSK	1	Low	22.34	22.39	22.35
			Middle	22.00	22.13	21.96
			High	22.24	22.30	22.28
		38	Low	21.27	21.23	21.20
			Middle	21.21	21.22	21.20
			High	21.09	21.11	21.20
		75	/	21.13	21.19	21.12
20	QPSK	1	Low	22.37	22.57	22.42
			Middle	22.24	22.47	22.16
			High	22.79	22.29	22.04
		50	Low	21.20	21.38	21.26
			Middle	21.20	21.32	21.21
			High	21.17	21.20	21.25
		100	/	21.15	21.33	21.12

LTE-FDD Band 4				Actual output Power (dBm)		
Band-width	Modulation	RB allocation	RB offset	Low	Middle	High
1.4	QPSK	1	Low	21.37	21.63	21.53
			Middle	21.47	21.61	21.87
			High	21.41	21.45	21.56
		3	Low	21.49	21.52	21.64
			Middle	21.42	21.51	21.37
			High	21.42	21.39	21.62
		6	/	20.37	20.51	20.54
3	QPSK	1	Low	21.56	21.67	21.60
			Middle	21.53	21.51	21.49
			High	21.77	21.59	21.59
		8	Low	20.52	20.58	20.52
			Middle	20.50	20.52	20.51
			High	20.55	20.49	20.47
		15	/	20.45	20.49	20.49
5	QPSK	1	Low	21.27	21.88	21.41
			Middle	21.57	21.46	21.53
			High	21.68	21.64	21.40
		12	Low	20.60	20.59	20.59
			Middle	20.58	20.57	20.26
			High	20.62	20.47	20.53
		25	/	20.58	20.57	20.53
10	QPSK	1	Low	21.68	21.65	21.74
			Middle	21.55	21.49	21.60
			High	21.50	21.57	21.55
		25	Low	20.68	20.59	20.56
			Middle	20.56	20.58	20.55
			High	20.39	20.45	20.47
		50	/	20.54	20.57	20.53

15	QPSK	1	Low	20.73	21.69	21.68
			Middle	21.41	21.42	21.38
			High	21.54	21.58	21.72
		38	Low	20.53	20.66	20.62
			Middle	20.51	20.62	20.60
			High	20.61	20.42	20.57
		75	/	20.58	20.54	20.57
20	QPSK	1	Low	22.02	21.89	21.87
			Middle	21.55	21.60	21.60
			High	21.31	21.79	21.85
		50	Low	20.62	20.61	20.59
			Middle	20.60	20.60	20.58
			High	20.57	20.47	20.61
		100	/	20.56	20.61	20.55

LTE-FDD Band 5				Actual output Power (dBm)		
Band-width	Modulation	RB allocation	RB offset	Low	Middle	High
1.4	QPSK	1	Low	22.38	22.44	22.56
			Middle	22.43	22.83	22.49
			High	22.29	22.36	22.60
		3	Low	22.36	22.30	22.40
			Middle	22.34	22.31	22.38
			High	22.35	22.40	22.29
		6	/	21.34	21.29	21.35
3	QPSK	1	Low	22.38	22.49	22.32
			Middle	22.28	22.25	22.40
			High	22.29	22.33	22.49
		8	Low	21.39	21.33	21.31
			Middle	21.20	21.24	21.19
			High	21.28	21.38	21.22
		15	/	21.34	21.27	21.36
5	QPSK	1	Low	22.09	22.54	22.18
			Middle	21.88	22.25	22.14
			High	22.14	22.39	22.32
		12	Low	21.37	21.41	21.24
			Middle	21.33	21.35	21.29
			High	21.25	21.36	21.30
		25	/	21.36	21.29	21.27
10	QPSK	1	Low	22.35	22.51	22.43
			Middle	22.45	22.63	22.19
			High	22.35	22.42	22.34
		25	Low	21.37	21.35	21.43
			Middle	21.30	21.32	21.30
			High	21.31	21.31	21.30
		50	/	21.31	21.34	21.30

LTE-FDD Band 12				Actual output Power (dBm)		
Band-width	Modulation	RB allocation	RB offset	Low	Middle	High
1.4	QPSK	1	Low	22.33	22.15	22.31
			Middle	22.45	22.36	22.40
			High	22.42	22.21	22.28
		3	Low	22.33	22.25	22.33
			Middle	22.20	22.21	22.30
			High	22.35	22.30	22.33
		6	/	21.23	21.34	21.16
3	QPSK	1	Low	22.52	22.39	22.26
			Middle	22.34	22.21	22.21
			High	22.51	22.35	22.35
		8	Low	21.38	21.27	21.29
			Middle	21.35	21.20	21.25
			High	21.40	21.32	21.22
		15	/	21.38	21.25	21.22
5	QPSK	1	Low	22.24	22.58	22.25
			Middle	22.25	22.37	22.33
			High	22.16	22.31	22.33
		12	Low	21.27	21.24	21.21
			Middle	21.25	21.22	21.23
			High	21.22	21.12	21.31
		25	/	21.28	21.15	21.29
10	QPSK	1	Low	22.25	22.25	22.42
			Middle	22.34	22.43	22.35
			High	22.35	22.31	22.52
		25	Low	21.25	21.32	21.34
			Middle	21.24	21.30	21.31
			High	21.32	21.21	21.27
		50	/	21.26	21.15	21.29

WLAN Conducted Power

For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were for SAR evaluation. 802.11g/n were not investigated since the average putput powers over all channels and data rates were not more than 0.25dB higher than the tested channel in the lowest data rate of 802.11b mode.

WIFI				
Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)	Data rate
802.11b	01	2412	11.81	1 Mbps
	06	2437	11.85	1 Mbps
	11	2462	11.49	1 Mbps
802.11g	01	2412	13.22	6 Mbps
	06	2437	13.79	6 Mbps
	11	2462	13.75	6 Mbps
802.11n(HT20)	01	2412	12.71	6.5 Mbps
	06	2437	12.17	6.5 Mbps
	11	2462	12.51	6.5 Mbps

*Note:*The output power was test all data rate and recorded worst case at recorded data rate.

12. Maximum Tune-up Limit

WCDMA		
Modilation Type	Maximum Tune-up (dBm)	
	WCDMA Band II	WCDMA Band V
QPSK	23.50	23.50

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

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
LTE Band 4	1.4	QPSK	1	22.00
			3	22.00
			6	21.00
	3	QPSK	1	22.00
			8	21.00
			15	20.50
	5	QPSK	1	22.00
			12	21.00
			25	21.00
	10	QPSK	1	22.00
			25	21.00
			50	21.00
	15	QPSK	1	22.00
			38	21.00
			75	21.00
	20	QPSK	1	22.50
			50	21.00
			100	21.00

LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
LTE Band 5	1.4	QPSK	1	23.00
			3	22.50
			6	21.50
	3	QPSK	1	22.50
			8	21.50
			15	21.50
	5	QPSK	1	22.50
			12	21.50
			25	21.50
	10	QPSK	1	23.00
			25	21.50
			50	21.50

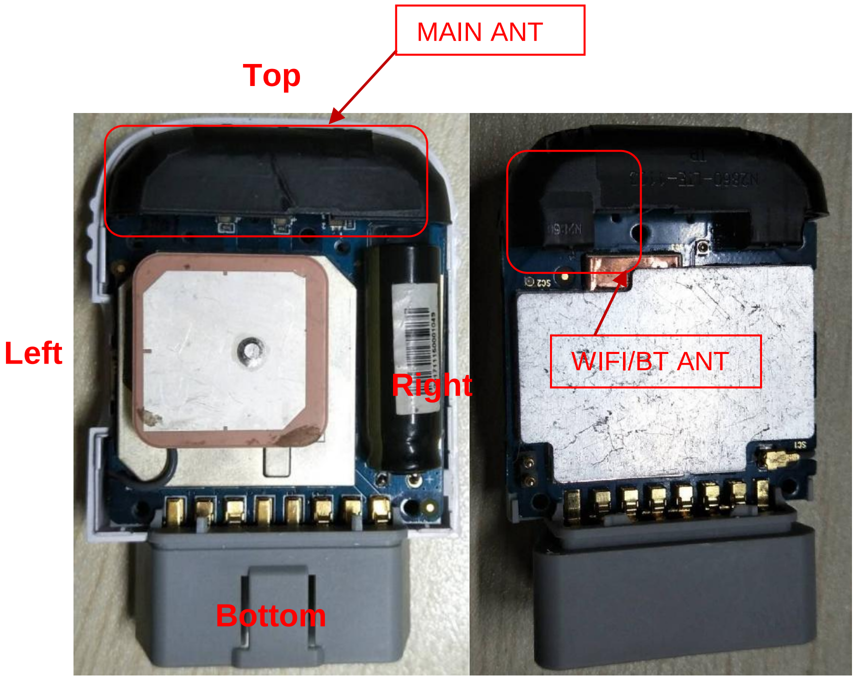
LTE				
Fequency Band	Band-width(MHz)	Modulation	RB allocation	Maximum Tune-up (dBm)
LTE Band 12	1.4	QPSK	1	22.50
			3	22.50
			6	21.50
	3	QPSK	1	23.00
			8	21.50
			15	21.50
	5	QPSK	1	22.50
			12	21.50
			25	21.50
	10	QPSK	1	23.00
			25	21.50
			50	21.50

LTE MPR will followup 3GPP setting as below:

Modulation	Channel bandwidth / Transmission bandwidth (NRB)						MPR (dB)
	1.4MHz	3.0MHz	5MHz	10MHz	15MHz	20MHz	
QPSK	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	0
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

WLAN	
Mode	Maximum Tune-up (dBm) Burst Average Power
802.11b	12.00
802.11g	14.00
802.11n(HT20)	13.00

13. Antenna Location



Positions for SAR tests; Hotspot mode						
Antenna	Back	Front	Top side	Bottom side	Right side	Left side
MAIN	Yes	Yes	Yes	No	Yes	Yes
WIFI / BT	Yes	Yes	Yes	No	Yes	Yes

General note:
Referring to KDB941225 D06, The SAR test separation distance for hotspot mode is determined according to device form factor. When the overall length and width of a device is > 9 cm x 5 cm (~3.5” x 2”), a test separation distance of 10 mm is required for hotspot mode SAR measurements. A test separation distance of 5 mm or less is required for smaller devices.

14. SAR Measurement Results

Hotspot SAR

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)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	9262	1852.4	23.20	23.50	1.07	-	-	-	-
		9400	1880.0	23.11	23.50	1.09	-0.04	0.196	0.214	-
		9538	1907.6	23.11	23.50	1.09	-	-	-	-
	Back	9262	1852.4	23.20	23.50	1.07	-	-	-	-
		9400	1880.0	23.11	23.50	1.09	-0.09	0.285	0.312	H1
		9538	1907.6	23.11	23.50	1.09	-	-	-	-
	Left	9400	1880.0	23.11	23.50	1.09	0.07	0.188	0.206	-
	Right	9400	1880.0	23.11	23.50	1.09	-0.11	0.106	0.116	-
	Top	9400	1880.0	23.11	23.50	1.09	-0.05	0.173	0.189	-

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)	Test Plot
		CH	MHz							
RMC 12.2Kbps	Front	4132	826.4	23.36	23.50	1.03	-	-	-	-
		4183	836.6	23.45	23.50	1.01	-0.02	0.162	0.164	-
		4233	846.6	23.37	23.50	1.03	-	-	-	-
	Back	4132	826.4	23.36	23.50	1.03	-	-	-	-
		4183	836.6	23.45	23.50	1.01	0.05	0.228	0.231	H2
		4233	846.6	23.37	23.50	1.03	-	-	-	-
	Left	4183	836.6	23.45	23.50	1.01	0.07	0.155	0.157	-
	Right	4183	836.6	23.45	23.50	1.01	-0.05	0.085	0.086	-
	Top	4183	836.6	23.45	23.50	1.01	-0.02	0.150	0.152	-

Note:
Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg

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)	Test Plot
		CH	MHz							
20M_1RB	Front	18700	1860.0	22.37	23.00	1.16	-	-	-	-
		18900	1880.0	22.57	23.00	1.10	-0.03	0.246	0.272	-
		19100	1900.0	22.42	23.00	1.14	-	-	-	-
	Back	18700	1860.0	22.37	23.00	1.16	-	-	-	-
		18900	1880.0	22.57	23.00	1.10	0.06	0.373	0.412	H3
		19100	1900.0	22.42	23.00	1.14	-	-	-	-
	Left	18900	1880.0	22.57	23.00	1.10	-0.03	0.286	0.316	-
	Right	18900	1880.0	22.57	23.00	1.10	0.02	0.163	0.180	-
	Top	18900	1880.0	22.57	23.00	1.10	0.07	0.271	0.299	-
20M_50RB	Front	18700	1860.0	21.20	21.50	1.07	-	-	-	-
		18900	1880.0	21.38	21.50	1.03	0.00	0.180	0.185	-
		19100	1900.0	21.26	21.50	1.06	-	-	-	-
	Back	18700	1860.0	21.20	21.50	1.07	-	-	-	-
		18900	1880.0	21.38	21.50	1.03	-0.03	0.318	0.327	-
		19100	1900.0	21.26	21.50	1.06	-	-	-	-
	Left	18900	1880.0	21.38	21.50	1.03	0.01	0.237	0.244	-
	Right	18900	1880.0	21.38	21.50	1.03	0.01	0.128	0.132	-
	Top	18900	1880.0	21.38	21.50	1.03	-0.03	0.233	0.240	-

Note:

1. Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
2. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.

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)	Test Plot
		CH	MHz							
20M_1RB	Front	20050	1720.0	22.02	22.50	1.12	-	-	-	-
		20175	1732.5	21.89	22.50	1.15	-0.02	0.139	0.160	-
		20300	1745.0	21.87	22.50	1.16	-	-	-	-
	Back	20050	1720.0	22.02	22.50	1.12	-	-	-	-
		20175	1732.5	21.89	22.50	1.15	-0.08	0.298	0.343	H4
		20300	1745.0	21.87	22.50	1.16	-	-	-	-
	Left	20175	1732.5	21.89	22.50	1.15	0.06	0.210	0.242	-
	Right	20175	1732.5	21.89	22.50	1.15	-0.01	0.122	0.140	-
	Top	20175	1732.5	21.89	22.50	1.15	-0.03	0.204	0.235	-
20M_50RB	Front	20050	1720.0	20.62	21.00	1.09	-	-	-	-
		20175	1732.5	20.61	21.00	1.09	0.01	0.108	0.118	-
		20300	1745.0	20.59	21.00	1.10	-	-	-	-
	Back	20050	1720.0	20.62	21.00	1.09	-	-	-	-
		20175	1732.5	20.61	21.00	1.09	-0.05	0.247	0.270	-
		20300	1745.0	20.59	21.00	1.10	-	-	-	-
	Left	20175	1732.5	20.61	21.00	1.09	0.03	0.168	0.184	-
	Right	20175	1732.5	20.61	21.00	1.09	-0.01	0.098	0.107	-
	Top	20175	1732.5	20.61	21.00	1.09	-0.01	0.163	0.178	-

Note:

3. Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
4. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.

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)	Test Plot
		CH	MHz							
10M_1RB	Front	20450	829.0	22.35	23.00	1.16	-	-	-	-
		20525	836.5	22.51	23.00	1.12	0.02	0.380	0.425	-
		20600	844.0	22.43	23.00	1.14	-	-	-	-
	Back	20450	829.0	22.35	23.00	1.16	-	-	-	-
		20525	836.5	22.51	23.00	1.12	-0.09	0.538	0.602	H5
		20600	844.0	22.43	23.00	1.14	-	-	-	-
	Left	20525	836.5	22.51	23.00	1.12	0.03	0.336	0.376	-
	Right	20525	836.5	22.51	23.00	1.12	-0.02	0.187	0.209	-
	Top	20525	836.5	22.51	23.00	1.12	-0.02	0.291	0.326	-
10M_25RB	Front	20450	829.0	21.37	21.50	1.03	-	-	-	-
		20525	836.5	21.35	21.50	1.04	-0.02	0.312	0.323	-
		20600	844.0	21.43	21.50	1.02	-	-	-	-
	Back	20450	829.0	21.37	21.50	1.03	-	-	-	-
		20525	836.5	21.35	21.50	1.04	0.10	0.459	0.475	-
		20600	844.0	21.43	21.50	1.02	-	-	-	-
	Left	20525	836.5	21.35	21.50	1.04	-0.03	0.264	0.273	-
	Right	20525	836.5	21.35	21.50	1.04	0.03	0.185	0.192	-
	Top	20525	836.5	21.35	21.50	1.04	0.14	0.241	0.249	-

Note:

5. Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
6. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.

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)	Test Plot
		CH	MHz							
10M_1RB	Front	23060	704.00	22.34	23.00	-	-	-	-	-
		23095	707.50	22.43	23.00	1.14	0.02	0.254	0.290	-
		23130	711.00	22.35	23.00	-	-	-	-	-
	Back	23060	704.00	22.34	23.00	-	-	-	-	-
		23095	707.50	22.43	23.00	1.14	-0.06	0.393	0.448	H6
		23130	711.00	22.35	23.00	-	-	-	-	-
	Left	23095	707.50	22.43	23.00	1.14	0.03	0.265	0.302	-
	Right	23095	707.50	22.43	23.00	1.14	-0.02	0.134	0.153	-
	Top	23095	707.50	22.43	23.00	1.14	-0.04	0.257	0.293	-
10M_25RB	Front	23060	704.00	21.25	21.50	-	-	-	-	-
		23095	707.50	21.32	21.50	1.04	-0.05	0.160	0.167	-
		23130	711.00	21.34	21.50	-	-	-	-	-
	Back	23060	704.00	21.25	21.50	-	-	-	-	-
		23095	707.50	21.32	21.50	1.04	0.07	0.344	0.359	-
		23130	711.00	21.34	21.50	-	-	-	-	-
	Left	23095	707.50	21.32	21.50	1.04	-0.05	0.208	0.217	-
	Right	23095	707.50	21.32	21.50	1.04	0.03	0.119	0.124	-
	Top	23095	707.50	21.32	21.50	1.04	0.01	0.198	0.206	-

Note:

1. Per KDB865664 D01v01r04, Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg
2. Per KDB 941225 D05v02r03, for QPSK with 100% RB allocation, SAR is not required when the highest maximumoutput power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations andthe highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highestoutput power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also betested.

WLAN										
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)	Test Plot
		CH	MHz							
802.11b 1Mbps	Front	1	2412	11.81	12.00	1.04	-	-	-	-
		6	2437	11.85	12.00	1.04	0.07	0.265	0.274	-
		11	2462	11.49	12.00	1.12	-	-	-	-
	Back	1	2412	11.81	12.00	1.04	-	-	-	-
		6	2437	11.85	12.00	1.04	-0.05	0.482	0.499	H8
		11	2462	11.49	12.00	1.12	-	-	-	-
	Left	6	2437	11.49	12.00	1.12	-0.04	0.370	0.416	-
	Right	6	2437	11.49	12.00	1.12	-0.15	0.226	0.254	-
	Top	6	2437	11.49	12.00	1.12	0.02	0.250	0.281	-

Note:

1. According to the above table, the initial test position for body is “Back”, and its reported SAR is≤ 0.4W/kg. Thus further SAR measurement is not required for the other (remaining) test positions. Because the reported SAR of the highest measured maximum output power channel for the exposureconfiguration is ≤ 0.8W/kg, no further SAR testing is required for 802.11b DSSS in that exposureconfiguration.
2. When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.
   a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.
   b) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg. the 802.11g/n is not required

WLAN- Scaled Reported SAR							
Mode	Test Position	Frequency		Actual duty factor	maximum duty factor	Reported SAR (1g)(W/kg)	Scaled reported SAR (1g)(W/kg)
		CH	MHz				
802.11b 1Mbps	Front	6	2437	57.00%	100%	0.274	0.481
	Back	6	2437	57.00%	100%	0.499	0.875
	Left	6	2437	57.00%	100%	0.416	0.730
	Right	6	2437	57.00%	100%	0.254	0.446
	Top	6	2437	57.00%	100%	0.281	0.493

Note:

1. According to the KDB248227 D01, The reported SAR must be scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit. A maximum transmission duty factor of 98.89% is achievable for WLAN in this project.

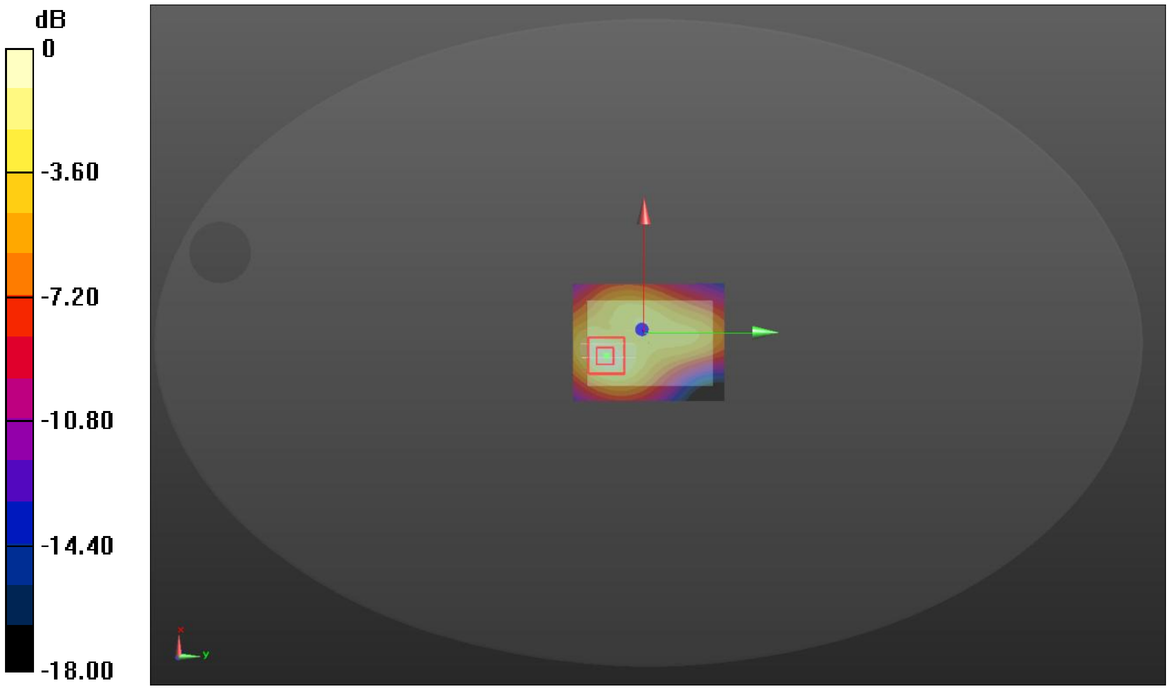
SAR Test Data Plots

Test mode:	WCDMA Band II	Test Position:	Back Side	Test Plot:	H1

Date:2018-03-13
Communication System: WCDMA; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.14; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.374 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.849 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.223 W/kg
SAR(1 g) = 0.285 W/kg; SAR(10 g) = 0.147 W/kg
Maximum value of SAR (measured) = 0.380 W/kg

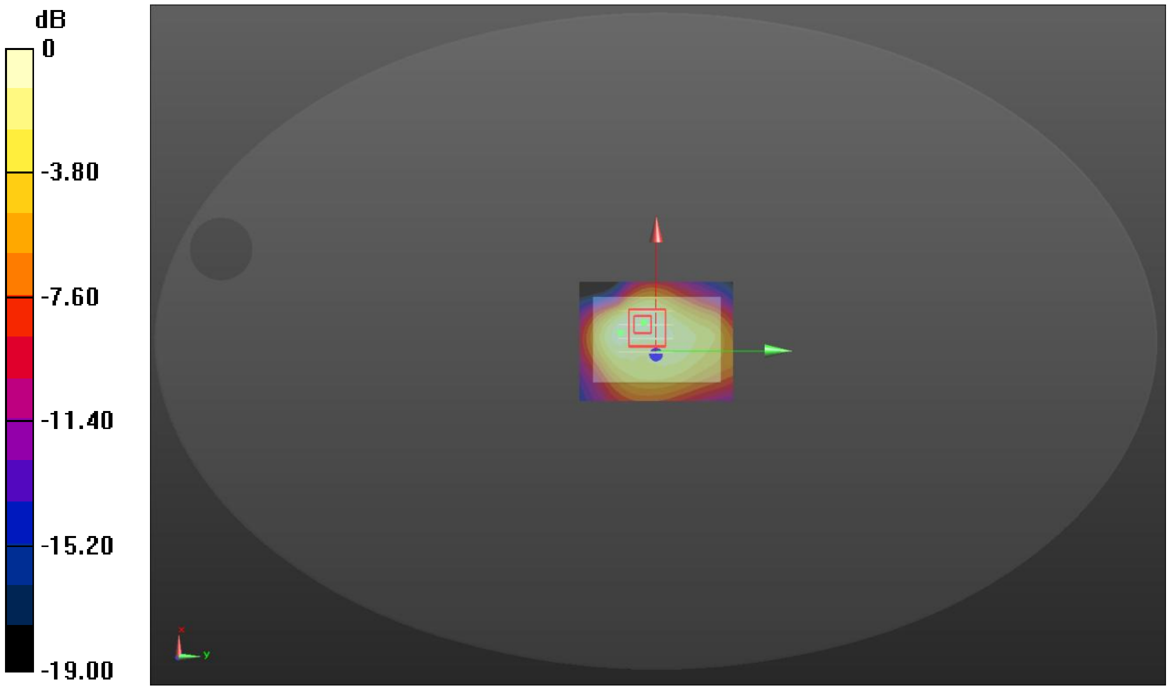


Test mode:	WCDMA Band V	Test Position:	Back Side	Test Plot:	H2

Date: 2018-03-12
Communication System: WCDMA; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.6 MHz; σ = 0.96 mho/m; ε_r = 55.858; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(9.31, 9.31, 9.31); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.283 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.424 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 0.393 W/kg
SAR(1 g) = 0.228 W/kg; SAR(10 g) = 0.191 W/kg
Maximum value of SAR (measured) = 0.294 W/kg

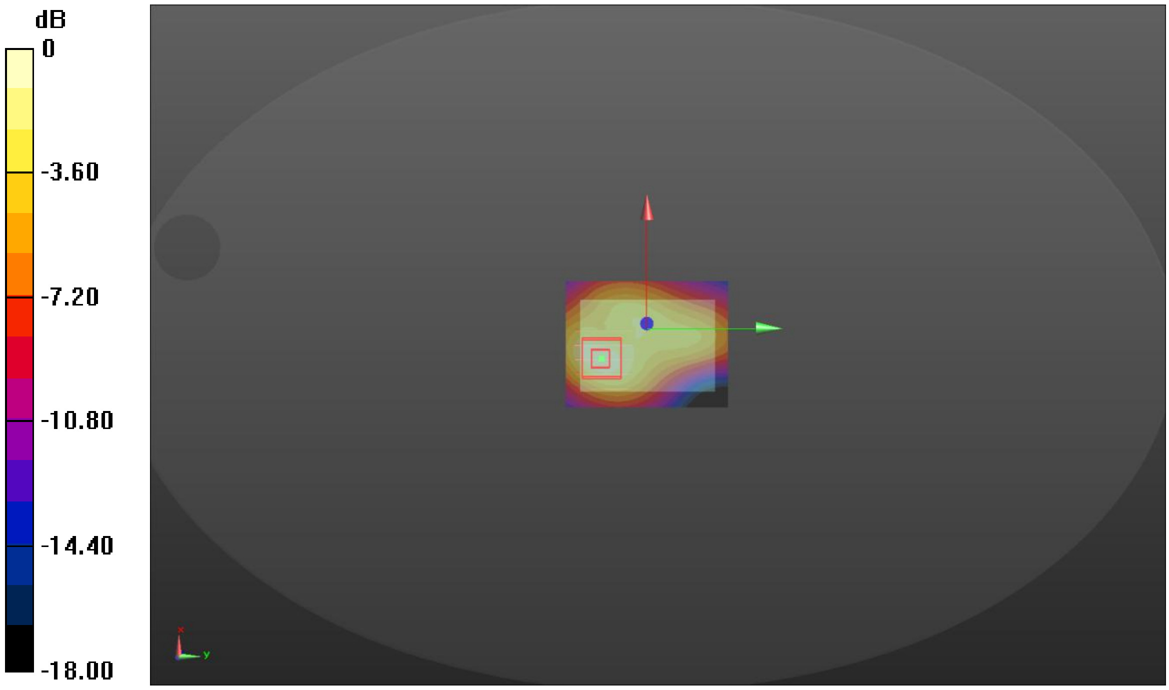


Test mode:	LTE Band 2	Test Position:	Back Side	Test Plot:	H3

Date:2018-03-13
Communication System: Generic LTE; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.14; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.32, 7.32, 7.32); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.452 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.821 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 1.130 W/kg
SAR(1 g) = 0.373 W/kg; SAR(10 g) = 0.246 W/kg
Maximum value of SAR (measured) = 0.454 W/kg

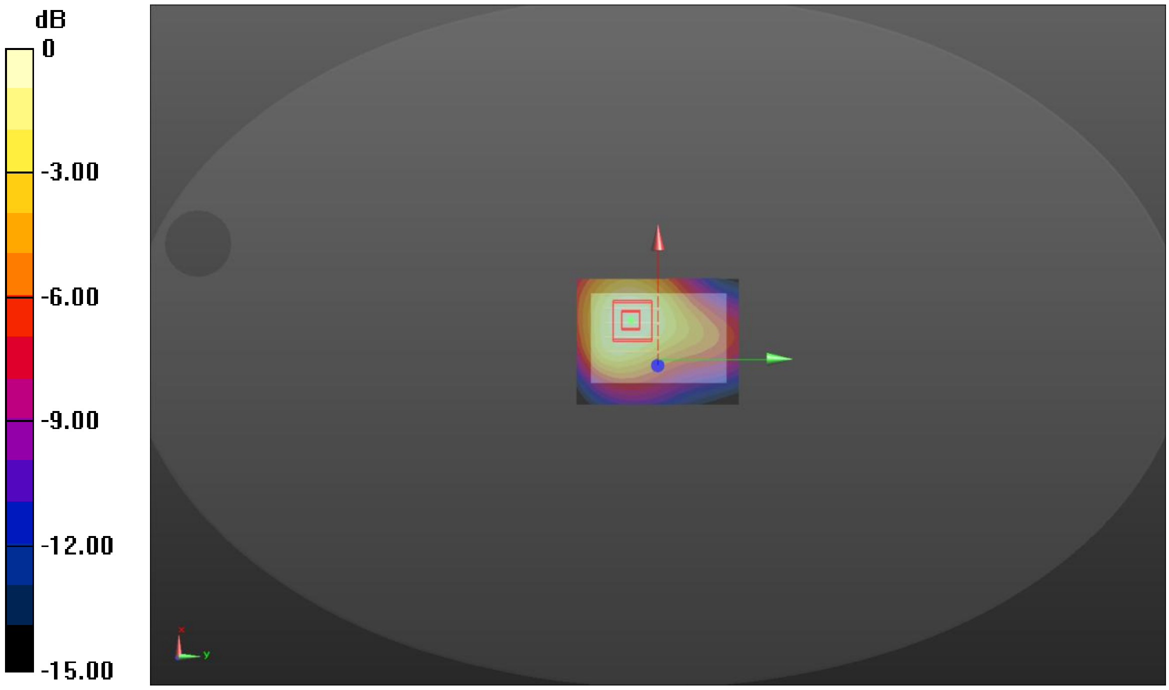


Test mode:	LTE Band 4	Test Position:	Back Side	Test Plot:	H4

Date: 2018-03-13
Communication System: Generic LTE; Frequency: 1732.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 1732.5 MHz; σ = 1.459 mho/m; ε_r = 53.239; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.57, 7.57, 7.57); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.439 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.388 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.129 W/kg
SAR(1 g) = 0.298 W/kg; SAR(10 g) = 0.180 W/kg
Maximum value of SAR (measured) = 0.434 W/kg

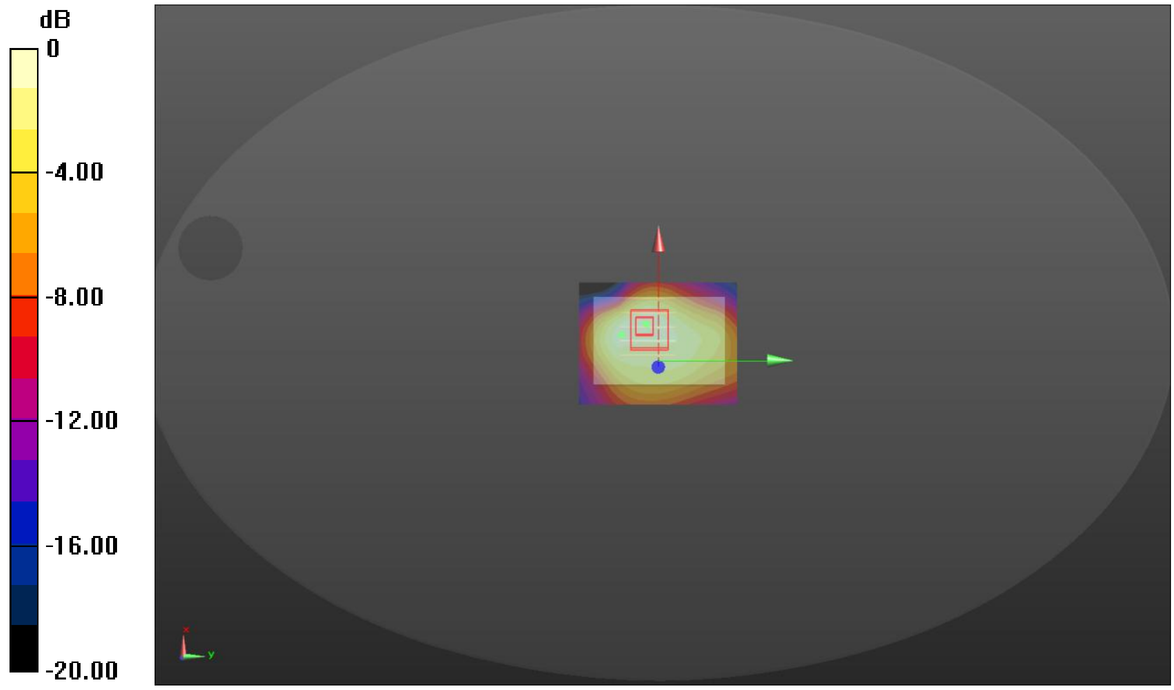


Test mode:	LTE Band 5	Test Position:	Back Side	Test Plot:	H5

Date: 2018-03-12
Communication System: Generic LTE; Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 836.5 MHz; σ = 0.96 mho/m; ε_r = 55.859; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(9.31, 9.31, 9.31); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.622 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.848 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.362 W/kg
SAR(1 g) = 0.538 W/kg; SAR(10 g) = 0.329 W/kg
Maximum value of SAR (measured) = 0.686 W/kg

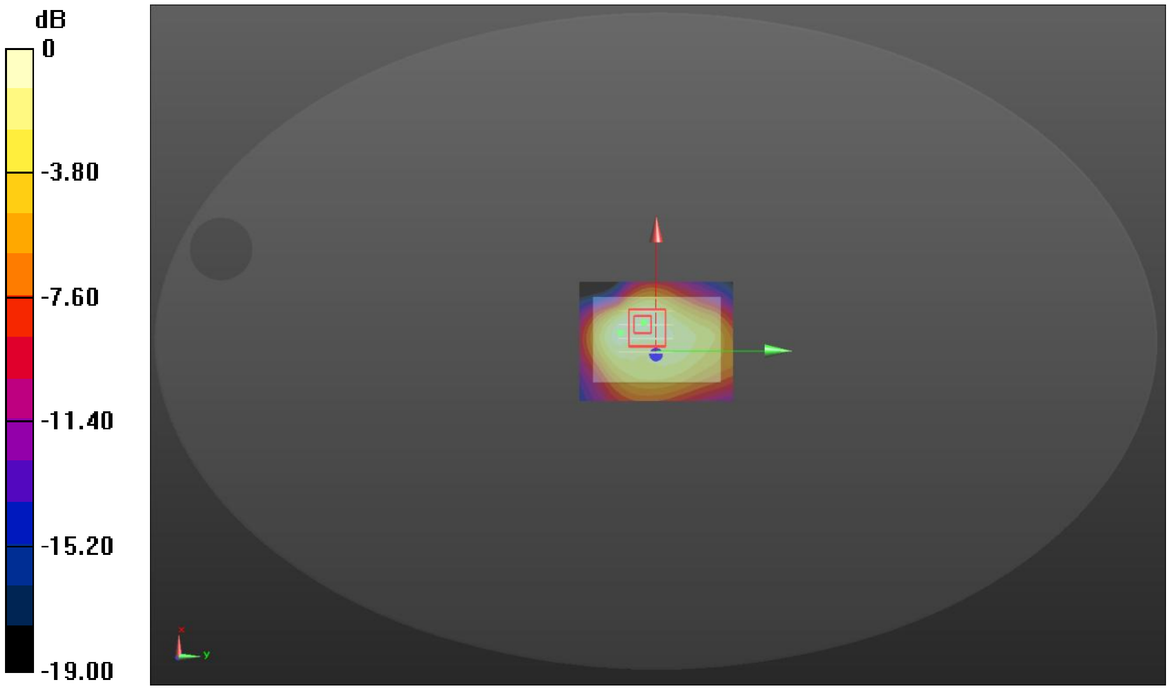


Test mode:	LTE Band 12	Test Position:	Back Side	Test Plot:	H6

Date: 2018-03-12
Communication System: Generic LTE; Frequency: 707.5 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f =707.5 MHz; σ=0.97s/m; εr=57.81; ρ = 1000 kg/m3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(9.31, 9.31, 9.31); Calibrated: 15/08/2017;
Sensor-Surface: 4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 15/08/2017
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=15.00 mm, dy=15.00 mm
Maximum value of SAR (interpolated) = 0.654 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 17.354 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.655 mW/g
SAR(1 g) = 0.393 mW/g; SAR(10 g) = 0.242 mW/g
Maximum value of SAR (measured) = 0.636 W/kg

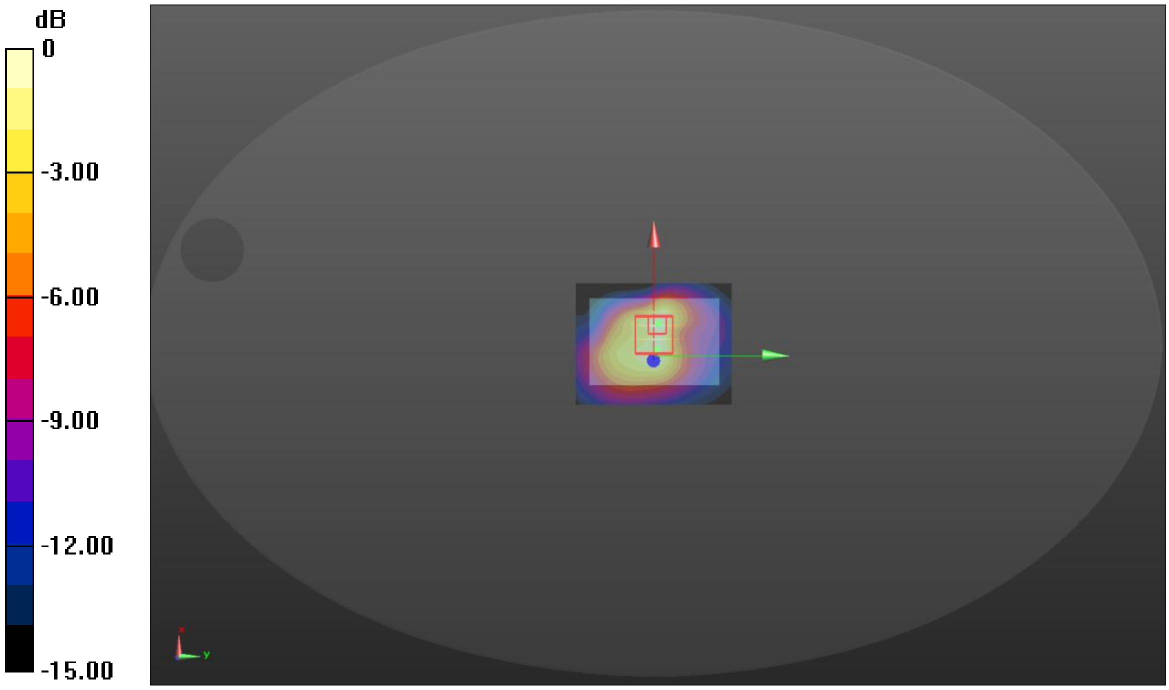


Test mode:	WLAN 802.11b	Test Position:	Back Side	Test Plot:	H8

Date:2018-03-14
Communication System: wifi; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 2.013 mho/m; ε_r = 50.739; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:
Probe: EX3DV4 - SN3842; ConvF(7.01, 7.01, 7.01); Calibrated: 2017/8/15;
Sensor-Surface: 1.4mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1315; Calibrated: 2017/8/15
Phantom: ELI v4.0; Type: QDOVA001BB;
Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6824)

Area Scan (71x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.857 W/kg
Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.993 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 1.525 mW/g
SAR(1 g) = 0.482 mW/g; SAR(10 g) = 0.217 mW/g
Maximum value of SAR (measured) = 0.866 W/kg



15. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Hotspot	Note
1	WCDMA (data) + WIFI (data)	Yes	
2	LTE + WIFI (data)	Yes	

General note:

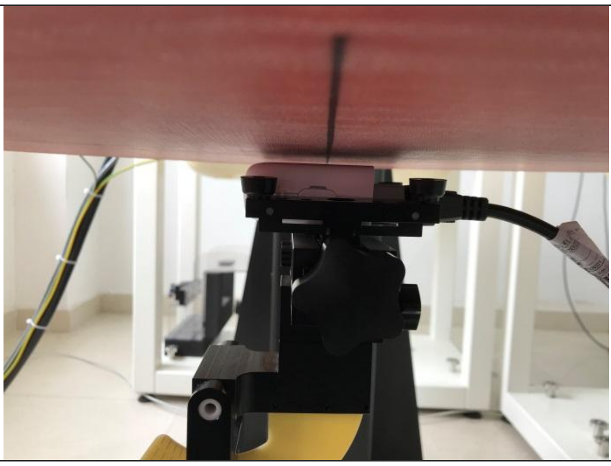
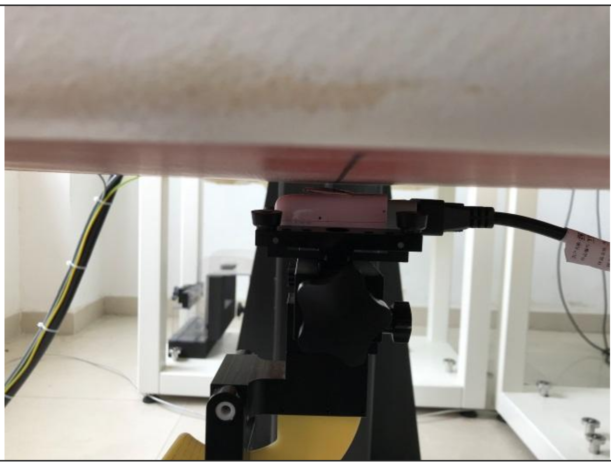
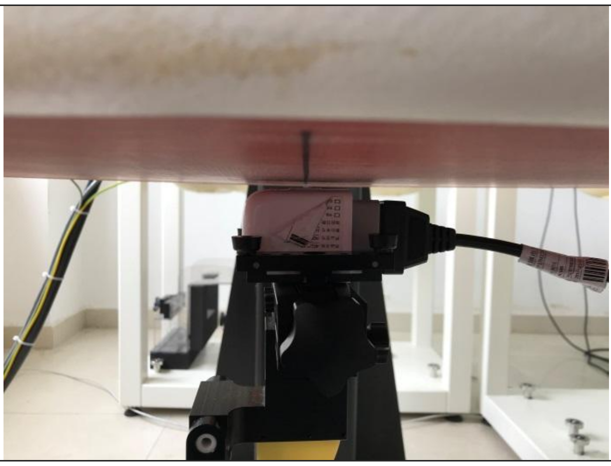
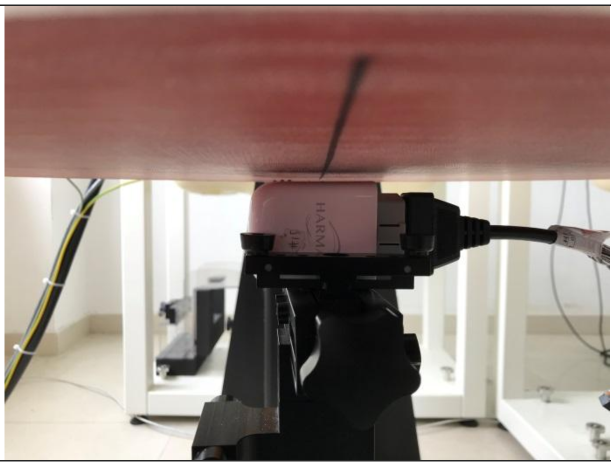
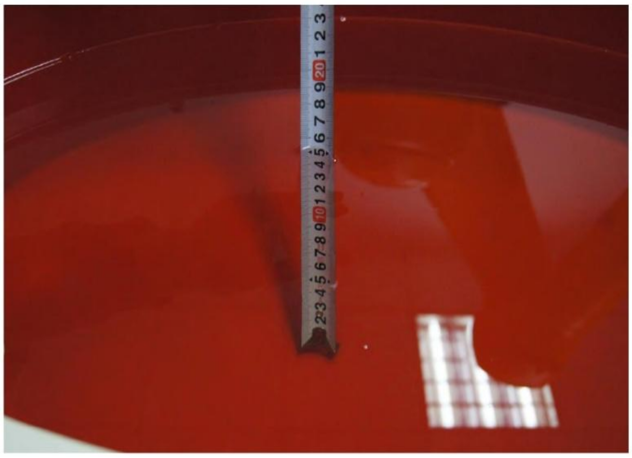
1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. The reported SAR summation is calculated based on the same configuration and test position
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01 based on the formula below
   a) [(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)/x]W/kg for test separation distances ≦50mm; whetn x=7.5 for 1-g SAR, and x=18.75 for 10-g SAR.
   b) When the minimum separation distance is <5mm, the distance is used 5mm to determine SAR test exclusion
   c) 0.4 W/kg for 1-g SAR and 1.0W/kg for 10-g SAR, when the test separation distances is >50mm.

Maximum reported SAR value for Hotspot mode

WWAN PCE + WLAN DTS					
WWAN Band		Exposure Position	Max SAR (W/kg)		Summed SAR
			WWAN PCE	WLAN DTS	(W/kg)
WCDMA	Band II	Front	0.214	0.481	0.696
		Back	0.312	0.875	1.187
		Left side	0.206	0.730	0.936
		Right side	0.116	0.446	0.562
		Top side	0.189	0.493	0.683
	Band V	Front	0.164	0.481	0.645
		Back	0.231	0.875	1.106
		Left side	0.157	0.730	0.887
		Right side	0.086	0.446	0.532
		Top side	0.152	0.493	0.645
LTE	B2 1RB	Front	0.272	0.481	0.753
		Back	0.412	0.875	1.287
		Left side	0.316	0.730	1.046
		Right side	0.180	0.446	0.626
		Top side	0.299	0.493	0.792
	B2 50RB	Front	0.185	0.481	0.666
		Back	0.327	0.875	1.202
		Left side	0.244	0.730	0.974
		Right side	0.132	0.446	0.577
		Top side	0.240	0.493	0.733
	B4 1RB	Front	0.160	0.481	0.641
		Back	0.343	0.875	1.218
		Left side	0.242	0.730	0.972
		Right side	0.140	0.446	0.586
		Top side	0.235	0.493	0.728
	B4 50RB	Front	0.118	0.481	0.599
		Back	0.270	0.875	1.146
		Left side	0.184	0.730	0.914
		Right side	0.107	0.446	0.553
		Top side	0.178	0.493	0.672

LTE	B5 1RB	Front	0.425	0.481	0.907
		Back	0.602	0.875	**1.478**
		Left side	0.376	0.730	1.106
		Right side	0.209	0.446	0.655
		Top side	0.326	0.493	0.819
	B5 25RB	Front	0.323	0.481	0.804
		Back	0.475	0.875	1.350
		Left side	0.273	0.730	1.003
		Right side	0.192	0.446	0.637
		Top side	0.249	0.493	0.743
	B12 1RB	Front	0.290	0.481	0.771
		Back	0.448	0.875	1.323
		Left side	0.302	0.730	1.032
		Right side	0.153	0.446	0.599
		Top side	0.293	0.493	0.786
	B12 25RB	Front	0.167	0.481	0.648
		Back	0.359	0.875	1.234
		Left side	0.217	0.730	0.947
		Right side	0.124	0.446	0.570
		Top side	0.206	0.493	0.699

16. TestSetup Photos

	
Front Side (5mm)	Rear Side (5mm)
	
Left Side (5mm)	Right Side (5mm)
	
Top Side (5mm)	Liquid depth in the Body phantom

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