TEST REPORT

Report No. .... :	**CHTEW19030122**	Report verificaiton:
Project No....................................... :	**SHT1903025601EW**	
FCC ID.. :	**2ASJLTEMIS1**	
Applicant's name .... :	**Roboteam Home Technology (Shenzhen) Co., Ltd**	
Address..:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA	
Manufacturer.......................................:	Roboteam Home Technology (Shenzhen) Co., Ltd	
Address..:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA	
Test item description .... :	**Temi Personal Computer Robot**	
Trade Mark ....:	temi	
Model/Type reference.......................:	TEMI S1	
Listed Model(s) ....:	-	
Standard .... :	**FCC 47 CFR Part2.1093** **IEEE Std C95.1, 1999 Edition** **IEEE 1528: 2013**	
Date of receipt of test sample……….:	Mar. 11, 2019	
Date of testing………………………...:	Mar. 12, 2019- Mar. 18, 2019	
Date of issue………………………….:	Mar. 20, 2019	
Result.................. ……………………..:	**PASS**	

Compiled by (position+printedname+signature)...:	File administrators:Xiaodong Zhao	Xiaodong Zhao
Supervised by (position+printedname+signature)...:	Test Engineer: Xiaodong Zhao	Xiaodong Zhao
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 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 Proceduresfor802.11 a/b/g Transmitters

1.2. Report version

Revision No.	Date of issue	Description
N/A	2019-03-20	Original

2. Summary

2.1. Client Information

Applicant:	Roboteam Home Technology (Shenzhen) Co., Ltd
Address:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA
Manufacturer:	Roboteam Home Technology (Shenzhen) Co., Ltd
Address:	22F, CHANGFU JINMAO BUILDING NO.5 SHIHUA ROAD, FUTIAN DISTRICT, SHENZHEN, CHINA

2.2. Product Description

Name of EUT:	Temi Personal Computer Robot	
Trade Mark:	temi	
Model No.:	TEMI S1	
Listed Model(s):	-	
Power supply:	Supplied by 14.4Vdc, 15.6Ah Li-ion Battery; 19Vdc, 5.0A Charged by an external adapter	
Device Category:	Portable	
Product stage:	Production unit	
RF Exposure Environment:	General Population/Uncontrolled	
Device Dimension:	Overall (Length x Width x Thickness):270 x 197 x 28mm	
Maximum SAR Value		
Separation Distance:	Limbs:	0mm
Max Report SAR Value (10g):	**Limbs:**	1.338 W/kg
WIFI 2.4G		
Supported Type:	802.11b/802.11g/802.11n(HT20)	
Modulation Type:	DSSS for 802.11b OFDM for 802.11g/802.11n(HT20)	
Operation Frequency:	2412MHz~2462MHz	
Channel Number:	11	
Channel Separation:	5MHz	
Antenna Type:	Integral	

WIFI 5G	
Supported Type:	802.11a/802.11n(HT20)/802.11n(HT40)/802.11ac(VHT20)/802.11ac(VHT40)/ 802.11ac(VHT80)
Modulation Type:	BPSK,QPSK,16QAM,64QAM,256QAM
Operation Frequency:	U-NII-1:5150MHz~5250MHz U-NII-2A:5250MHz~5350MHz U-NII-2C:5470MHz~5725MHz U-NII-3:5725MHz~5850MHz
Antenna Type:	Integral
Bluetooth	
Version:	BT4.1+EDR
Modulation Type:	GFSK,π/4DQPSK,8DPSK
Operation Frequency:	2402MHz~2480MHz
Channel Number:	79
Channel Separation:	1MHz
Antenna Type:	Integral

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.: 5377B-1

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-1.

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	1315	2018/04/18	2019/04/17
●	E-field Probe	SPEAG	EX3DV4	7375	2018/12/13	2019/12/12
●	Universal Radio Communication Tester	R&S	CMW500	137681	2018/07/11	2019/07/10
● Tissue-equivalent liquids Validation						
●	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	2018/09/19	2019/09/18
● System Validation						
○	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	2018/08/21	2019/08/20
●	Power Viewer for Windows	R&S	N/A	N/A	N/A	N/A
●	Power sensor	R&S	NRP18A	101010	2018/08/21	2019/08/20
●	Power sensor	R&S	NRP18A	101011	2018/08/21	2019/08/20
●	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 justifcatio. 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. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions.The expanded SAR measurement uncertainty must be ≤ 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.

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.

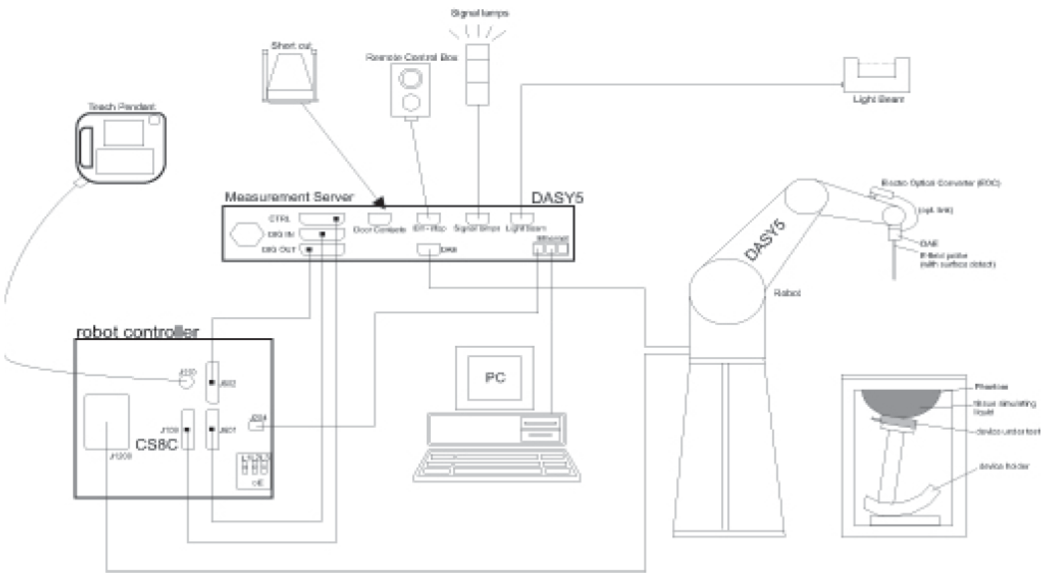
Remote control with teach panel and additional circuitry for robot safety such as warning lamps, etc.

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.

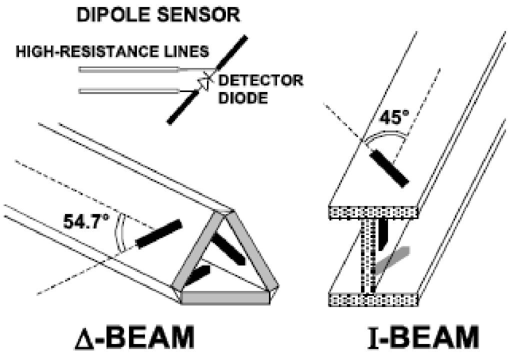
- **Probe Specification**

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: ± 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.

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. ± 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

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

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:

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

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

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. Dielectric Property Measurements & System Check

8.1. 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 Head and Body				
Target Frequency	Head		Body	
(MHz)	εr	σ(s/m)	εr	σ(s/m)
2450	39.20	1.80	52.70	1.95
5200	36.00	4.66	49.01	5.30
5300	35.90	4.76	48.90	5.42
5500	35.64	4.96	48.61	5.65
5600	35.50	5.07	48.47	5.77
5800	35.30	5.27	48.20	6.00

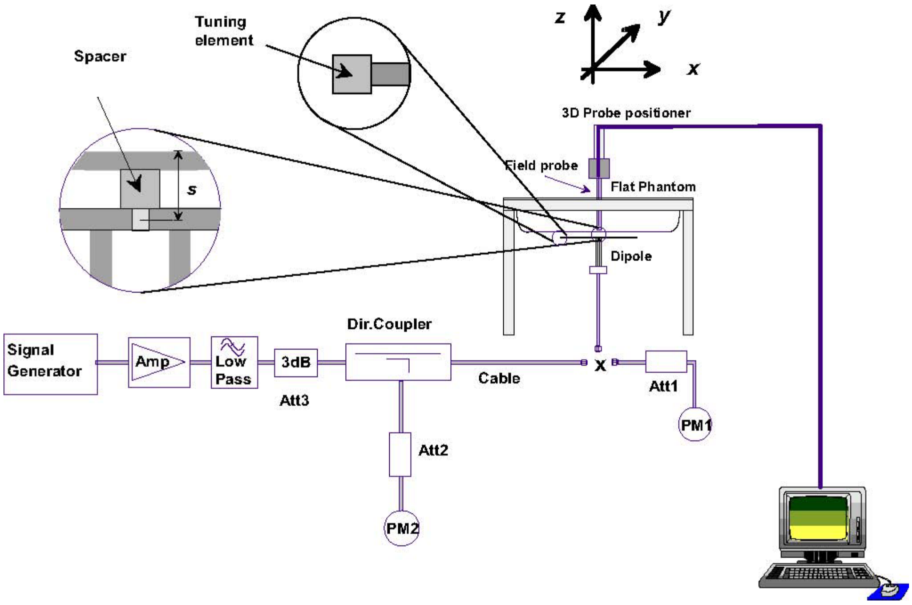
Check Result:

Dielectric performance of Body tissue simulating liquid									
Frequency (MHz)	εr		σ(s/m)		Delta (εr)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
2450	52.70	53.03	1.95	2.00	0.63%	2.56%	±5%	22	2019-03-12
5200	49.01	48.15	5.30	5.38	-1.75%	1.53%	±5%	22	2019-03-12
5300	48.90	47.94	5.42	5.52	-1.97%	1.75%	±5%	22	2019-03-12
5500	48.61	47.52	5.65	5.83	-2.25%	3.10%	±5%	22	2019-03-13
5600	48.47	47.35	5.77	5.96	-2.32%	3.42%	±5%	22	2019-03-13
5800	48.20	46.94	6.00	6.27	-2.61%	4.50%	±5%	22	2019-03-13

8.2. 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.



System Performance Check Setup

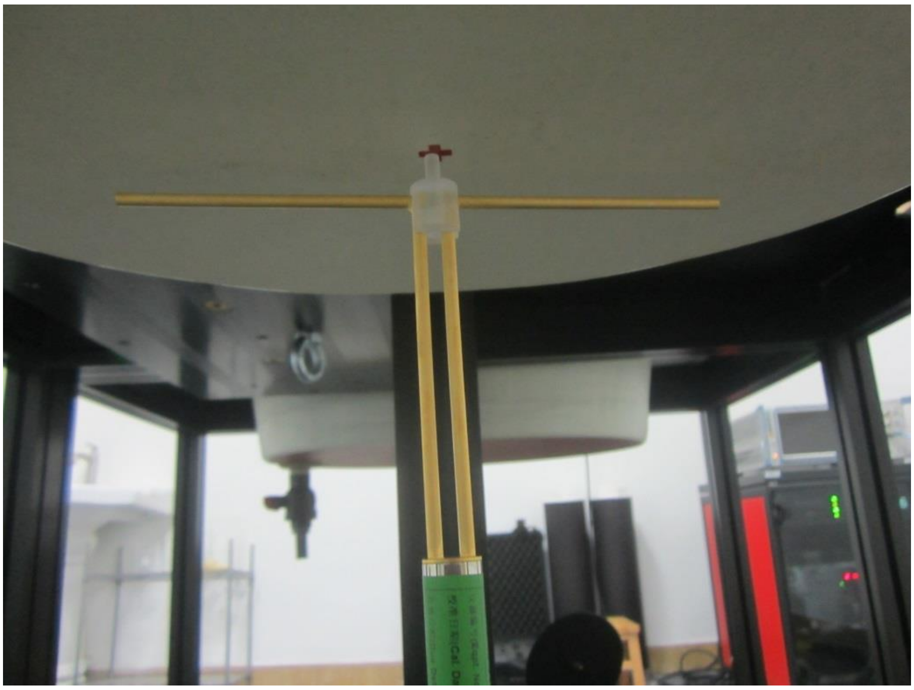


Photo of Dipole Setup

Check Result:

Body											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 250mW	Target 1W	Normalize to 1W	Measured 250mW					
2450	49.40	50.00	12.50	23.30	23.32	5.83	1.21%	0.09%	±10%	22	2019-03-12

Body											
Frequency (MHz)	1g SAR			10g SAR			Delta (1g)	Delta (10g)	Limit	Temp (℃)	Date
	Target 1W	Normalize to 1W	Measured 100mW	Target 1W	Normalize to 1W	Measured 100mW					
5200	73.60	70.70	7.07	20.40	20.00	2.00	-3.94%	-1.96%	±10%	22	2019-03-12
5300	75.60	73.70	7.37	21.10	20.70	2.07	-2.51%	-1.90%	±10%	22	2019-03-12
5600	79.40	78.00	7.80	22.10	21.60	2.16	-1.76%	-2.26%	±10%	22	2019-03-13
5800	76.50	72.80	7.28	21.10	20.20	2.02	-4.84%	-4.27%	±10%	22	2019-03-13

Plots of System Performance Check

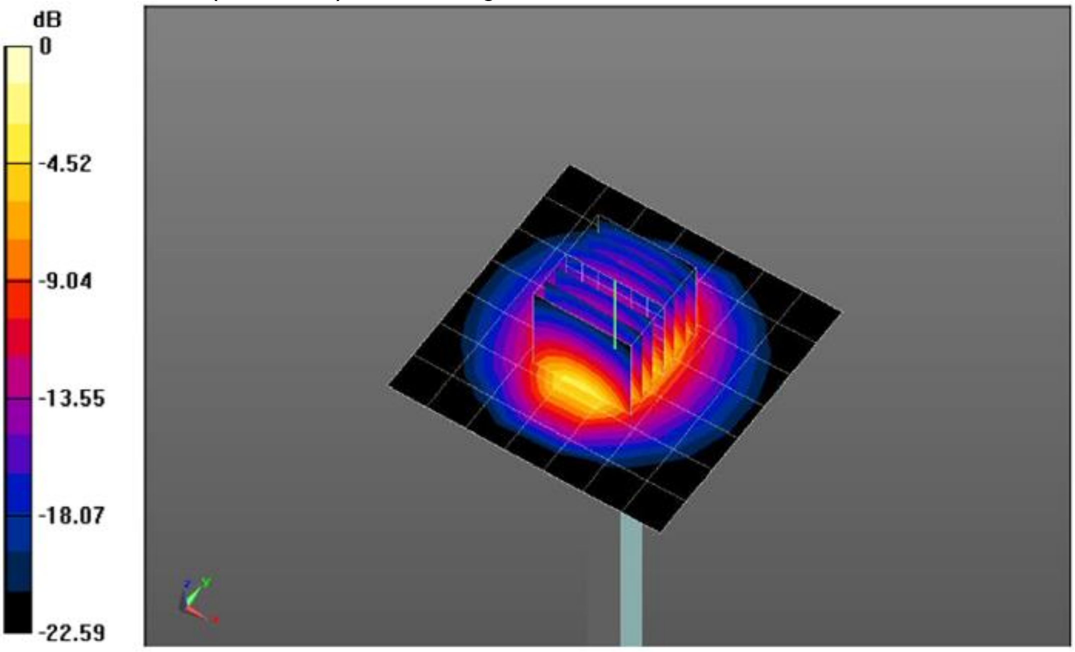
SystemPerformanceCheck-Body 2450MHz

DUT: D2450V2; Type: D2450V2; Serial: 1009
Date:2019-03-12
Communication System: UID 0, CW (0); Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.001 S/m; ε_r = 53.03; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(7.81, 7.81, 7.81); Calibrated: 12/13/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 31.0
- Electronics: DAE4 Sn1315; Calibrated: 4/18/2018
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Body/d=10mm,Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 21.1 W/kg
Body/d=10mm,Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 105.6 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 25.7 W/kg
SAR(1 g) = 12.5 W/kg; SAR(10 g) = 5.83 W/kg
Maximum value of SAR (measured) = 20.7 W/kg



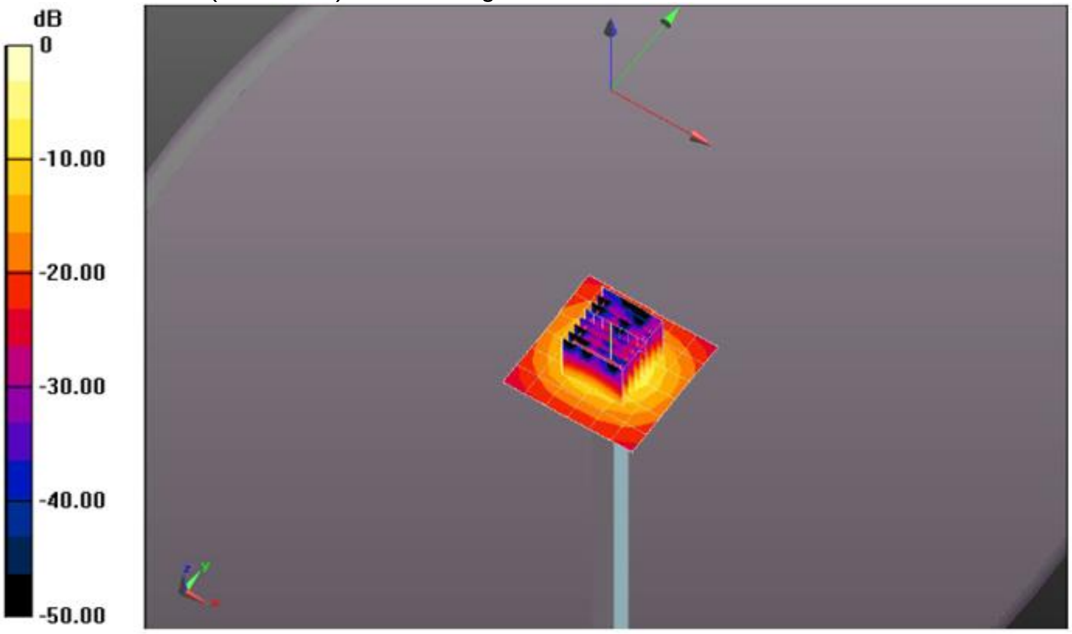
SystemPerformanceCheck-Body 5200MHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273
Date:2019-03-12
Communication System: UID 0, A-CW (0); Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.381 S/m; ε_r = 48.152; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.65, 4.65, 4.65); Calibrated: 12/13/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1315; Calibrated: 4/18/2018
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- DASY52 52.10.0(1446); SEMCAD X 14.6.11(7437)

Body/d=10mm,Pin=100mW/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.4 W/kg
Body/d=10mm,Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.23 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 30.3 W/kg
SAR(1 g) = 7.07 W/kg; SAR(10 g) = 2 W/kg
Maximum value of SAR (measured) = 16.6 W/kg



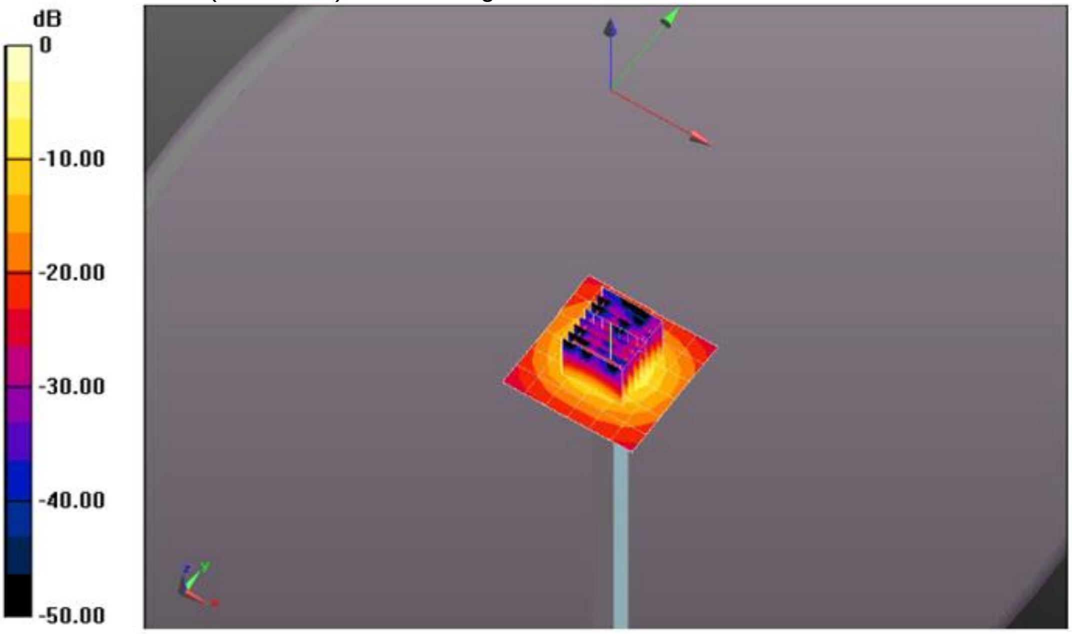
SystemPerformanceCheck-Body 5300MHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273
Date:2019-03-12
Communication System: UID 0, A-CW (0); Frequency: 5300 MHz
Medium parameters used: f = 5300 MHz; σ = 5.515 S/m; $ε_r$ = 47.936; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.65, 4.65, 4.65); Calibrated: 12/13/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1315; Calibrated: 4/18/2018
- Phantom: Twin-SAM V8.0; Type: QD 000 P41 AA; Serial: 1947
- DASY52 52.10.0(1446); SEMCAD X 14.6.11(7437)

Body/d=10mm,Pin=100mW/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.3 W/kg
Body/d=10mm,Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.13 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 31.6 W/kg
SAR(1 g) = 7.37 W/kg; SAR(10 g) = 2.07 W/kg
Maximum value of SAR (measured) = 17.8 W/kg



SystemPerformanceCheck-Body 5600MHz

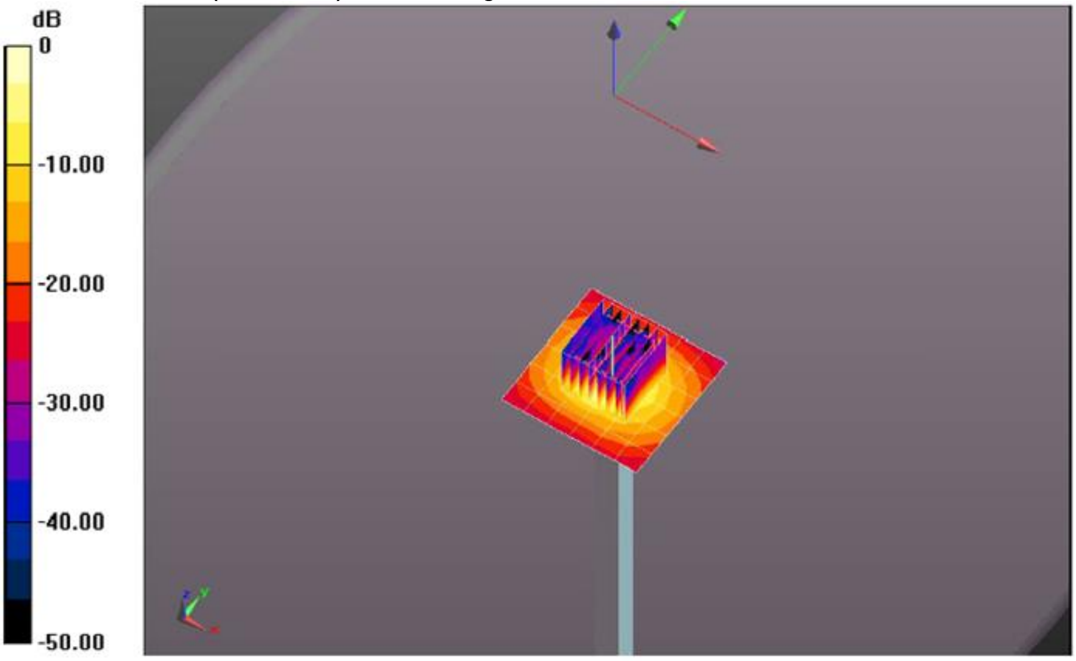
DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273
Date:2019-03-13
Communication System: UID 0, A-CW (0); Frequency: 5600 MHz
Medium parameters used: f = 5600 MHz; σ = 5.963 S/m; ε_r = 47.347; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.00, 4.00, 4.00); Calibrated: 12/13/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 29.0
- Electronics: DAE4 Sn1315; Calibrated: 4/18/2018
- Phantom: Twin-SAM V8.0; Type: QD 000 P41 AA; Serial: 1947
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

Head/d=10mm,Pin=100mW/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 19.4 W/kg

Head/d=10mm,Pin=100mW/Zoom Scan(8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.10 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 36.9 W/kg
SAR(1 g) = 7.8 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 19.7 W/kg



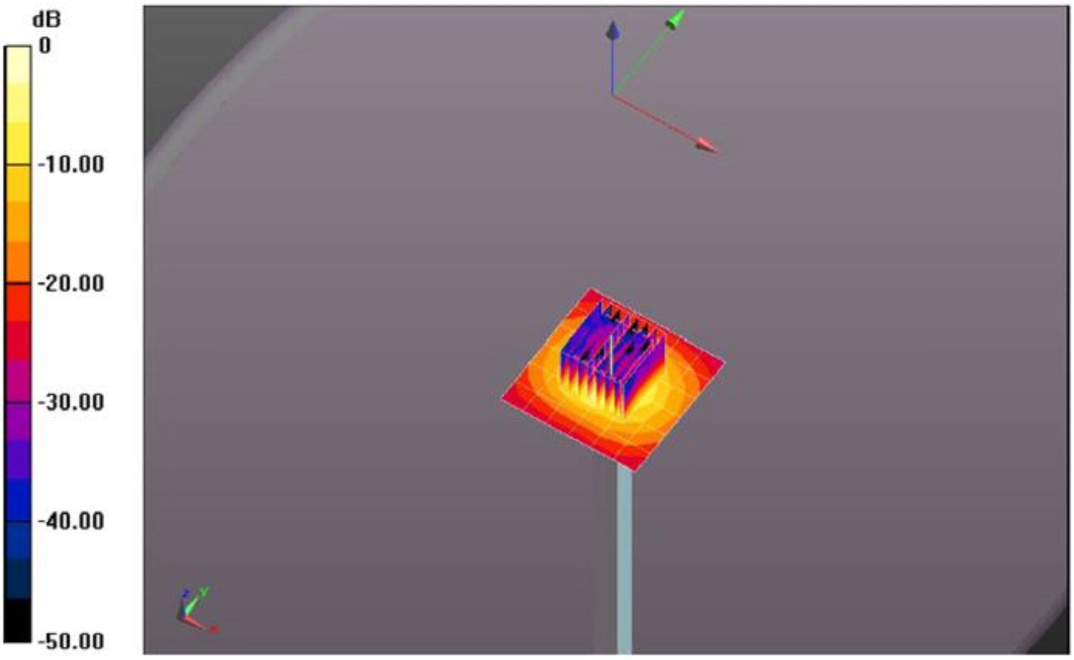
SystemPerformanceCheck-Body 5800MHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1273
Date:2019-03-13
Communication System: UID 0, A-CW (0); Frequency: 5800 MHz
Medium parameters used: f = 5800 MHz; σ = 6.27 S/m; ε_r = 46.943; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7375; ConvF(4.27, 4.27, 4.27); Calibrated: 12/13/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 1.0, 25.0
- Electronics: DAE4 Sn1315; Calibrated: 4/18/2018
- Phantom: ELI V8.0 ; Type: QD OVA 004 AA ; Serial: 2078
- DASY52 52.10.0(1446); SEMCAD X 14.6.11(7437)

Body/d=10mm,Pin=100mW/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 17.9 W/kg
Body/d=10mm,Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.07 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 36.2 W/kg
SAR(1 g) = 7.28 W/kg; SAR(10 g) = 2.02 W/kg
Maximum value of SAR (measured) = 18.8 W/kg



9. SAR Exposure Limits

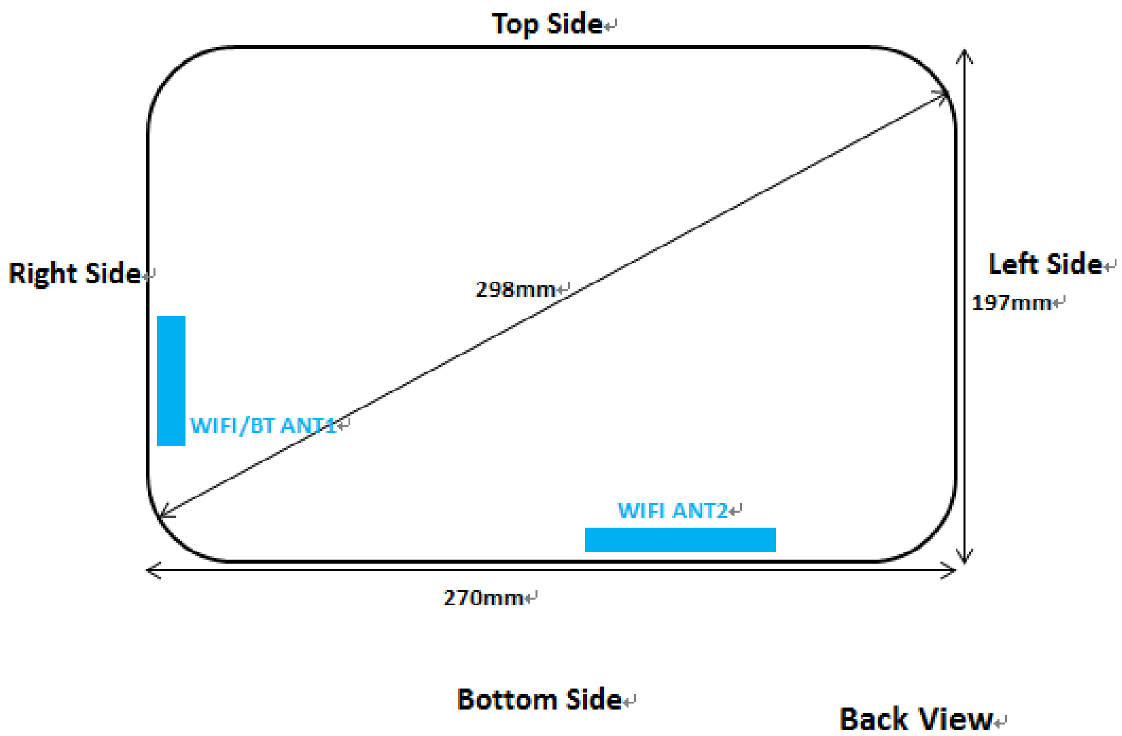
SAR assessments have been made in line with the requirements of FCC 47 CFR § 2.1093.

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).

10. Antenna Location



Distance of the Antenna to the EUT surface/edge(mm)						
Antenna	Rear	Front	Top side	Bottom side	Left side	Right side
WIFI/BT(ANT1)	-	≤25mm	>25mm	>25mm	>25mm	≤25mm
WIFI(ANT2)	-	≤25mm	>25mm	≤25mm	>25mm	>25mm

Positions for SAR test						
Antenna	Rear	Front	Top side	Bottom side	Left side	Right side
WIFI/BT(ANT1)	No	Yes	No	No	No	Yes
WIFI(ANT2)	No	Yes	No	Yes	No	No

11. Conducted Power Measurement Results

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.

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.

WIFI 2.4G						
Mode	Channel	Frequency (MHz)	Conducted Average Power(dBm)			Duty Cycle
			ANT1	ANT2	MIMO	
802.11b	1	2412	13.92	14.11	-	98.03%
	6	2437	14.23	14.83	-	
	11	2462	14.32	14.32	-	
802.11g	1	2412	13.90	14.92	-	94.32%
	6	2437	14.63	14.83	-	
	11	2462	14.77	15.62	-	
802.11n (HT20)	1	2412	13.82	14.88	17.72	92.13%
	6	2437	14.03	15.82	18.01	
	11	2462	14.93	14.99	18.55	

WIFI 5G U-NII-1						
Mode	Channel	Frequency (MHz)	Conducted Average Power(dBm)			Duty Cycle
			ANT1	ANT2	MIMO	
802.11a	36	5180	16.20	13.90	-	97.02%
	40	5200	15.20	13.70	-	
	48	5240	15.20	13.20	-	
802.11n (HT20)	36	5180	16.20	13.90	17.94	96.92%
	40	5200	15.60	14.00	17.33	
	48	5240	15.70	14.20	17.82	
802.11ac (VHT20)	36	5180	15.80	14.00	17.73	96.94%
	40	5200	15.20	14.01	17.04	
	48	5240	15.30	14.23	17.92	
802.11n (HT40)	38	5190	14.50	12.20	16.90	93.97%
	46	5230	15.00	13.01	16.92	
802.11ac (VHT40)	38	5190	14.30	12.90	17.03	94.02%
	46	5230	15.30	12.99	16.84	
802.11ac (VHT80)	42	5210	15.30	12.01	15.87	88.58%

WIFI 5G U-NII-2A						
Mode	Channel	Frequency (MHz)	Conducted Average Power(dBm)			Duty Cycle
			ANT1	ANT2	MIMO	
802.11a	52	5260	14.93	13.82	-	97.02%
	60	5300	14.82	12.20	-	
	64	5320	14.02	12.00	-	
802.11n (HT20)	52	5260	15.77	13.39	17.02	96.92%
	60	5300	15.03	12.56	15.67	
	64	5320	14.33	11.90	15.42	
802.11ac (VHT20)	52	5260	15.67	14.00	16.74	96.94%
	60	5300	14.24	12.55	15.80	
	64	5320	14.20	12.04	15.90	
802.11n (HT40)	54	5270	15.90	13.88	17.23	93.97%
	62	5310	15.00	12.29	16.60	
802.11ac (VHT40)	54	5270	15.80	13.39	17.03	94.02%
	62	5310	15.21	13.02	16.37	
802.11ac (VHT80)	58	5290	14.88	12.75	16.28	88.58%

WIFI 5G U-NII-2C						
Mode	Channel	Frequency (MHz)	Conducted Average Power(dBm)			Duty Cycle
			ANT1	ANT2	MIMO	
802.11a	100	5500	13.02	12.82	-	97.02%
	120	5600	13.02	13.02	-	
	140	5700	13.55	13.90	-	
	144	5720	12.89	14.00	-	
802.11n (HT20)	100	5500	12.10	12.80	14.50	96.92%
	120	5600	11.20	13.33	15.30	
	140	5700	11.03	14.37	15.90	
	144	5720	11.01	14.29	14.80	
802.11ac (VHT20)	100	5500	11.90	12.38	14.50	96.94%
	120	5600	10.22	12.80	15.80	
	140	5700	10.03	13.20	15.90	
	144	5720	10.82	13.90	15.70	
802.11n (HT40)	102	5510	11.80	12.80	15.60	93.97%
	110	5550	11.70	13.77	16.20	
	134	5670	11.20	14.04	16.90	
	142	5720	11.20	14.22	16.80	
802.11ac (VHT40)	102	5510	12.00	12.90	15.50	94.02%
	110	5550	11.90	13.32	15.90	
	134	5670	11.30	14.50	16.00	
	142	5720	11.70	14.30	16.30	
802.11ac (VHT80)	106	5530	10.82	12.70	15.10	88.58%
	122	5610	10.03	13.50	15.50	
	138	5690	10.11	14.20	15.90	

WIFI 5G U-NII-3						
Mode	Channel	Frequency (MHz)	Conducted Average Power(dBm)			Duty Cycle
			ANT1	ANT2	MIMO	
802.11a	149	5745	13.30	13.80	-	97.02%
	157	5785	15.00	13.70	-	
	165	5825	14.30	13.40	-	
802.11n (HT20)	149	5745	11.76	13.80	16.00	96.92%
	157	5785	11.80	13.40	15.60	
	165	5825	11.90	13.50	16.00	
802.11ac (VHT20)	149	5745	11.20	14.00	16.00	96.94%
	157	5785	11.80	14.10	15.60	
	165	5825	11.70	13.90	16.00	
802.11n (HT40)	151	5755	11.50	13.90	16.50	93.97%
	159	5795	11.50	14.40	16.60	
802.11ac (VHT40)	151	5755	11.50	14.50	16.70	94.02%
	159	5795	11.60	14.40	16.80	
802.11ac (VHT80)	155	5775	11.00	13.70	16.00	88.58%

Bluetooth Conducted Power

Bluetooth			
Mode	Channel	Frequency (MHz)	Conducted Average Power (dBm)
GFSK	0	2402	4.82
	39	2441	6.47
	78	2480	5.94
π/4QPSK	0	2402	3.16
	39	2441	4.81
	78	2480	4.89
8DPSK	0	2402	4.25
	39	2441	4.98
	78	2480	5.26

12. Maximum Tune-up Limit

WIFI 2.4G			
Mode	Maximum Tune-up (dBm)		
	ANT1	ANT2	MIMO
802.11b	14.50	15.00	-
802.11g	15.00	16.00	-
802.11n(HT20)	15.00	16.00	19.00

WIFI 5G U-NII-1			
Mode	Maximum Tune-up (dBm)		
	ANT1	ANT2	MIMO
802.11a	16.50	14.00	-
802.11n(HT20)	16.00	14.50	18.00
802.11ac(VHT20)	16.00	14.50	18.00
802.11n(HT40)	15.00	13.50	17.00
802.11ac(VHT40)	15.50	13.00	17.50
802.11ac(VHT80)	15.50	12.50	16.00

WIFI 5G U-NII-2A			
Mode	Maximum Tune-up (dBm)		
	ANT1	ANT2	MIMO
802.11a	15.00	14.00	-
802.11n(HT20)	16.00	13.50	17.50
802.11ac(VHT20)	16.00	14.00	17.00
802.11n(HT40)	16.00	14.00	17.50
802.11ac(VHT40)	16.00	13.50	17.50
802.11ac(VHT80)	15.00	13.00	16.50

WIFI 5G U-NII-2C			
Mode	Maximum Tune-up (dBm)		
	ANT1	ANT2	MIMO
802.11a	14.00	14.00	-
802.11n(HT20)	12.50	14.50	16.00
802.11ac(VHT20)	12.00	14.00	16.00
802.11n(HT40)	12.00	14.50	17.00
802.11ac(VHT40)	12.00	14.50	16.50
802.11ac(VHT80)	11.00	14.50	16.00

WIFI 5G U-NII-3			
Mode	Maximum Tune-up (dBm)		
	ANT1	ANT2	MIMO
802.11a	15.00	14.00	-
802.11n(HT20)	12.00	14.00	16.00
802.11ac(VHT20)	12.00	14.50	16.00
802.11n(HT40)	11.50	14.50	17.00
802.11ac(VHT40)	12.00	14.50	17.00
802.11ac(VHT80)	11.00	14.00	16.00

Bluetooth	
Mode	Maximum Tune-up (dBm)
GFSK	6.50
π/4QPSK	5.00
8DPSK	5.50

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

[(max. Power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] * [√f(GHz)] ≦3.0 for 1-g SAR, and ≦7.5 for 10-g extremity SAR

Band/Mode	F(GHz)	Position	Separation Distance (mm)	Exclusion Thresholds	SAR test exclusion
Bluetooth	2.45	Extremity	0	1.4	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 thereshold is ≦7.5, SAR testing is not required.

13. SAR Measurement Results

GENERAL:

Reference from 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:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 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
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

WIRELESS TECHNOLOGY:

Reference from KDB 248227 D01 SAR meas for 802.11:

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:

- ≤ 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 ≤ 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 ≤ 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 ≤ 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 ≤ 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.

WIFI 2.4G

Mode	Test Position	Frequency CH	Frequency MHz	Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift(dB)	Measured SAR(10g) (W/kg)	Report SAR(10g) (W/kg)	Plot No.
ANT1 802.11b	Front	11	2462	14.32	14.50	1.04	98.03%	1.02	0.00	0.461	0.490	-
	Right side	11	2462	14.32	14.50	1.04	98.03%	1.02	-0.18	0.118	0.125	-
ANT2 802.11b	Front	6	2437	14.83	15.00	1.04	98.03%	1.02	0.00	0.219	0.232	-
	Bottom side	6	2437	14.83	15.00	1.04	98.03%	1.02	0.15	0.099	0.105	-
MIMO 802.11n (HT20)	Front	11	2462	18.55	19.00	1.11	92.13%	1.09	0.09	0.498	0.600	1
	Right side	11	2462	18.55	19.00	1.11	92.13%	1.09	0.13	0.118	0.142	-
	Bottom side	11	2462	18.55	19.00	1.11	92.13%	1.09	-0.06	0.104	0.125	-

WIFI 5G U-NII-1

Mode	Test Position	Frequency CH	Frequency MHz	Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift(dB)	Measured SAR(10g) (W/kg)	Report SAR(10g) (W/kg)	Plot No.
ANT1 802.11a	Front	36	5180	16.20	16.50	1.07	97.02%	1.03	0.00	0.796	0.879	-
	Right side	36	5180	16.20	16.50	1.07	97.02%	1.03	0.13	0.191	0.211	-
ANT2 802.11n (HT20)	Front	36	5180	13.90	14.50	1.15	96.92%	1.03	0.07	1.030	1.220	-
		40	5200	14.00	14.50	1.12	96.92%	1.03	0.15	1.090	1.262	-
		48	5240	14.20	14.50	1.07	96.92%	1.03	0.00	1.210	1.338	2
	Bottom side	48	5240	14.20	14.50	1.07	96.92%	1.03	0.16	0.246	0.272	-
MIMO 802.11n (HT20)	Front	36	5180	17.94	18.00	1.01	96.92%	1.03	0.00	1.150	1.203	-
	Right side	36	5180	17.94	18.00	1.01	96.92%	1.03	-0.15	0.155	0.162	-
	Bottom side	36	5180	17.94	18.00	1.01	96.92%	1.03	0.11	0.241	0.252	-

WIFI 5G U-NII-2A

Mode	Test Position	Frequency CH	Frequency MHz	Conducted Power (dBm)	Tune-up limit (dBm)	Tune-up scaling factor	Duty Cycle	Duty Cycle Scaling Factor	Power Drift(dB)	Measured SAR(10g) (W/kg)	Report SAR(10g) (W/kg)	Plot No.
ANT1 802.11n (HT40)	Front	54	5270	15.90	16.00	1.02	93.97%	1.06	0.17	0.850	0.926	-
	Right side	54	5270	15.90	16.00	1.02	93.97%	1.06	0.07	0.218	0.237	-
ANT2 802.11n (HT40)	Front	54	5270	13.88	14.00	1.03	93.97%	1.06	0.18	0.219	0.240	-
	Bottom side	54	5270	13.88	14.00	1.03	93.97%	1.06	-0.16	0.226	0.247	-
MIMO 802.11n (HT40)	Front	54	5270	17.23	17.50	1.06	93.97%	1.06	0.00	1.090	1.234	3
	Right side	54	5270	17.23	17.50	1.06	93.97%	1.06	-0.02	0.207	0.234	-
	Bottom side	54	5270	17.23	17.50	1.06	93.97%	1.06	0.18	0.219	0.248	-

WIFI 5G U-NII-2C													
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(10g) (W/kg)	Report SAR(10g) (W/kg)	Plot No.
		CH	MHz									
ANT1 802.11a	Front	140	5700	13.55	14.00	1.11	97.02%	1.03	0.00	0.600	0.686	-
	Right side	140	5700	13.55	14.00	1.11	97.02%	1.03	0.00	0.241	0.276	-
ANT2 802.11ac (VHT80)	Front	138	5690	14.20	14.50	1.07	88.58%	1.13	0.00	0.540	0.653	-
	Bottom side	138	5690	14.20	14.50	1.07	88.58%	1.13	0.19	0.258	0.312	-
MIMO 802.11n (HT40)	Front	134	5670	16.90	17.00	1.02	93.97%	1.06	0.00	0.803	0.874	4
	Right side	134	5670	16.90	17.00	1.02	93.97%	1.06	0.12	0.279	0.304	-
	Bottom side	134	5670	16.90	17.00	1.02	93.97%	1.06	0.19	0.266	0.290	-

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(10g) (W/kg)	Report SAR(10g) (W/kg)	Plot No.
		CH	MHz									
ANT1 802.11a	Front	157	5785	15.00	15.00	1.00	97.02%	1.03	0.00	0.547	0.564	-
	Right side	157	5785	15.00	15.00	1.00	97.02%	1.03	0.13	0.205	0.211	-
ANT2 802.11n (HT40)	Front	159	5795	14.40	14.50	1.02	93.97%	1.06	0.00	0.652	0.710	5
	Bottom side	159	5795	14.40	14.50	1.02	93.97%	1.06	-0.12	0.225	0.245	-
MIMO 802.11n (HT40)	Front	159	5795	16.60	17.00	1.10	93.97%	1.06	0.00	0.598	0.698	-
	Right side	159	5795	16.60	17.00	1.10	93.97%	1.06	-0.11	0.260	0.303	-
	Bottom side	159	5795	16.60	17.00	1.10	93.97%	1.06	0.14	0.241	0.281	-

SAR Test Data Plots to the Appendix A.

14. Simultaneous Transmission analysis

No.	Simultaneous Transmission Configurations	Extremity	Note
9	WIFI 2.4G(ANT2) + Bluetooth	Yes	
10	WIFI 5G(ANT2) + Bluetooth	Yes	

General note:

1. The reported SAR summation is calculated based on the same configuration and test position.
2. 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.

Bluetooth Max power	Exposure position	Extremity
	Test separation	0mm
6.50 dBm	Estimated SAR (W/kg)	0.075

Maximum reported SAR value for Extremity

WLAN + Bluetooth				
WLAN Band	Exposure Position	Max SAR (W/kg)		Summed SAR
		WLAN	Bluetooth	(W/kg)
WIFI 2.4G	Front	0.232	0.075	0.307
	Bottom	0.105	-	0.105
WIFI 5G U-NII-1	Front	1.338	0.075	**1.413**
	Bottom	0.272	-	0.272
WIFI 5G U-NII-2A	Front	0.240	0.075	0.315
	Bottom	0.247	-	0.247
WIFI 5G U-NII-2C	Front	0.653	0.075	0.728
	Bottom	0.312	-	0.312
WIFI 5G U-NII-3	Front	0.710	0.075	0.785
	Bottom	0.245	-	0.245

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