SAR TEST REPORT

Applicant	Huawei Technologies Co., Ltd.
FCC ID	QISBAH2-W19
Product	Tablet
Model	BAH2-W19
Report No.	R1806H0070-S1V1
Issue Date	July 23, 2018

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **IEEE 1528- 2013, ANSI C95.1: 1992/IEEE C95.1: 1991.** The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Performed by: Jiangpeng Lan *Approved by: Kai Xu*

TA Technology (Shanghai) Co., Ltd.

No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China

TEL: +86-021-50791141/2/3

FAX: +86-021-50791141/2/3-8000

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.**The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test facility

CNAS (accreditation number:L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-10766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.

1.3 Testing Location

Company:	TA Technology (Shanghai) Co., Ltd.
Address:	No.145, Jintang Rd, Tangzhen Industry Park, Pudong Shanghai, China
City:	Shanghai
Post code:	201201
Country:	P. R. China
Contact:	Xu Kai
Telephone:	+86-021-50791141/2/3
Fax:	+86-021-50791141/2/3-8000
Website:	http://www.ta-shanghai.com
E-mail:	xukai@ta-shanghai.com

1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for the EUT are as follows:

Table 2.1: Highest Reported SAR

Mode	Highest Reported SAR (W/kg)
	1g Body SAR
Wi-Fi (2.4G)	0.36
Wi-Fi (5G)	0.55
Bluetooth	0.18
Date of Testing:	June 29, 2018~ June 30, 2018
Note: The device is in compliance with SAR for Uncontrolled Environment /General Population exposure limits (1.6 W/kg) specified in ANSI C95.1: 1992/IEEE C95.1: 1991, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.	

Note: 1) The highest Reported SAR for body-worn and simultaneous transmission exposure conditions are 0.55 W/kg and 0.55 W/kg.

3 Description of Equipment under Test

Client Information

Applicant	Huawei Technologies Co., Ltd.
Applicant address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.
Manufacturer	Huawei Technologies Co., Ltd.
Manufacturer address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.China.

General Technologies

Application Purpose:	Original Grant
EUT Stage	Identical Prototype
Model:	BAH2-W19
SN:	18052675749
Hardware Version:	SH0BAH2LM
Software Version:	BAH2-W19 8.0.0.10(C605)
Antenna Type:	Internal Antenna
Wi-Fi Hotspot	Wi-Fi 2.4G Wi-Fi 5G U-NII-1&U-NII-3
EUT Accessory	
Adapter 1	Manufacturer: Salcomp (Shenzhen) Co., Ltd. Model: HW-059200UHQ
Adapter 2	Manufacturer: HUIZHOU BYD ELECTRONIC CO.,LTD. Model: HW-059200UHQ
Adapter 3	Manufacturer: Salcomp (Shenzhen) Co., Ltd. Model: HW-090200UH0
Adapter 4	Manufacturer: Shenzhen Kuntkey Electric Co., Ltd. Model: HW-090200UH0
Battery 1	Manufacturer: SCUD (Fujian) Electronics Co., Ltd. Model: HB2994I8ECW
Battery 2	Manufacturer: SUNWODA Electronic Co., Ltd Model: HB2994I8ECW
Battery 3	Manufacturer: Huizhou Desay Battery Co., Ltd Model: HB2994I8ECW
USB Cable 1	100cm Cable, Shielded
USB Cable 2	100cm Cable, Shielded

Wireless Technology and Frequency Range

<table>
<tr><th colspan="2">Wireless Technology</th><th>Modulation</th><th>Operating mode</th><th>Tx (MHz)</th></tr>
<tr><td>BT</td><td>2.4G</td><td colspan="2">Version 4.2 LE</td><td>2402 ~2480</td></tr>
<tr><td rowspan="4">Wi-Fi</td><td rowspan="2">2.4G</td><td>DSSS,OFDM</td><td>802.11b/g/n HT20</td><td>2412 ~ 2462</td></tr>
<tr><td>OFDM</td><td>802.11n HT40</td><td>2422 ~ 2452</td></tr>
<tr><td>5G</td><td>OFDM</td><td>802.11a/n HT20/ HT40/
ac VHT20/ VHT40/ VHT80</td><td>5150 ~ 5350
5470 ~ 5850</td></tr>
<tr><td colspan="4">Does this device support MIMO ☐Yes ☒No</td></tr>
</table>

BAH2-W19 has two storage scenarios, with different memory. EMCP Storage Capacity is 3GB+32GB, LPDDR3+EMMC separation Scheme storage capacity is 4GB+64GB.The two storage mode of peripheral circuit has slight change, but does not affect product performance.

The differences about storage scenarios are showed in the following table. Other parts of the Tablet are the same, including the appearance, the antenna, Chipset, Bluetooth mode, Wifi mode, Adapter, Battery, Mainboard,Software and so on.

Configuration	Conf. 1	Conf. 2
Model	BAH2-W19	
Storage Scenarios	EMCP	LPDDR3+eMMC
Storage capacity	3GB+32GB	4GB+64GB

4 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1093, IEEE 1528- 2013, ANSI C95.1: 1992/IEEE C95.1: 1991, the following FCC Published RF exposure KDB procedures:

248227 D01 802.11 Wi-Fi SAR v02r02
447498 D01 General RF Exposure Guidance v06
648474 D04 Handset SAR v01r03
865664 D01 SAR measurement 100 MHz to 6 GHz v01r04
865664 D02 RF Exposure Reporting v01r02
690783 D01 SAR Listings on Grants v01r03
616217 D04 SAR for laptop and tablets v01r02

5 Operational Conditions during Test

5.1 Test Positions

According to KDB 616217 D04, SAR evaluation is required for back surface and edges of the devices. The back surface and edges of the tablet are tested with the tablet touching the phantom. Exposures from antennas through the front surface of the display section of a tablet are generally limited to the user's hands. Exposures to hands for typical consumer transmitters used in tablets are not expected to exceed the extremity SAR limit; therefore, SAR evaluation for the front surface of tablet display screens are generally not necessary. When voice mode is supported on a tablet and it is limited to speaker mode or headset operations only, additional SAR testing for this type of voice use is not required.

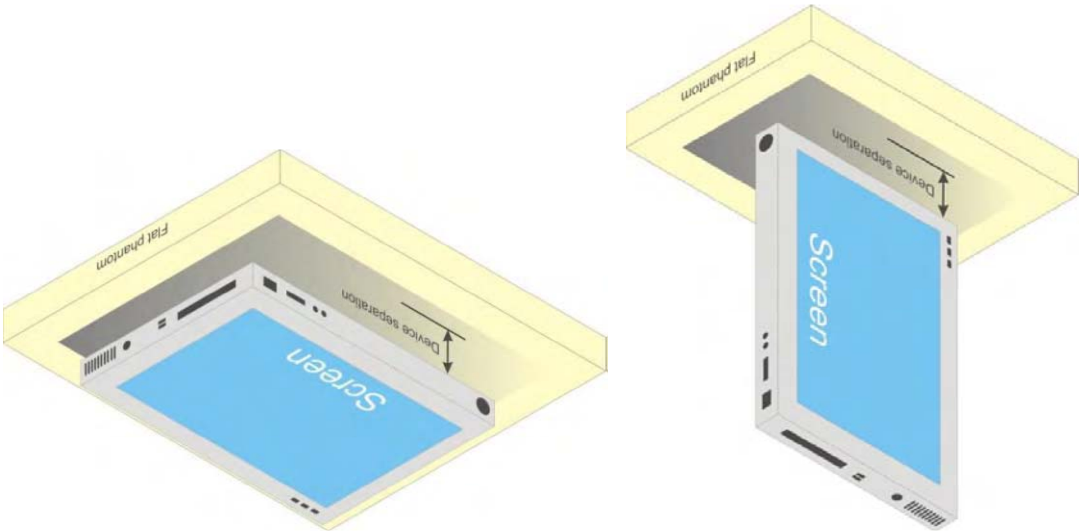


Fig-4.1 Illustration for Tablet Setup

According to KDB 447498 D01, the SAR test exclusion condition is based on source-based time-averaged maximum conducted output power, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The SAR exclusion threshold is determined by the following formula.

(1) The SAR exclusion threshold for distances ≤50mm is defined by the following equation:

$$\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} * \sqrt{\text{Frequency (GHz)}} \leq 3.0$$

(2) The SAR exclusion threshold for distances >50mm is defined by the following equation, as illustrated in KDB 447498 D01 Appendix B:

a) at 100 MHz to 1500 MHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · ($f_{(MHz)}$/150)] mW

b) at > 1500 MHz and ≤ 6 GHz

[Power allowed at numeric Threshold at 50 mm in step 1) + (test separation distance - 50 mm) ·10] mW

The Detailed Antenna Locations refer to *SAR Test Setup and Antenna Locations.*

Band	Frequency (MHz)	Sensor	Max. Tune-up Power (dBm)	Back Side			Left Edge			Right Edge			Top Edge			Bottom Edge		
				Test Distance (mm)	Evaluation	Conclusion	Test Distance (mm)	Evaluation	Conclusion	Test Distance (mm)	Evaluation	Conclusion	Test Distance (mm)	Evaluation	Conclusion	Test Distance (mm)	Evaluation	Conclusion
Wi-Fi 2.4G	2462	on	10.00	<5	3.14	Yes	Not Applicable			Not Applicable			<5	3.14	Yes	Not Applicable		
Wi-Fi 5G	5825	on	10.00	<5	4.83	Yes	Not Applicable			Not Applicable			<5	4.83	Yes	Not Applicable		
BT	2480	off	10.00	<5	3.15	Yes	55.4	54.31	No	157.8	1078.31	No	<5	3.15	Yes	154	1040.31	No
Wi-Fi 2.4G	2462	off	17.50	13	6.79	Yes	55.4	55.76	Yes	157.8	1079.76	No	14	6.30	Yes	154	1041.76	No
Wi-Fi 5G	5825	off	18.00	13	11.71	Yes	55.4	57.05	Yes	157.8	1081.05	No	14	10.88	Yes	154	1043.05	No

5.2 Measurement Variability

Per FCC KDB Publication 865664 D01, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:
1) When the original highest measured SAR is ≥ 0.80 W/kg, the measurement was repeated once.
2) A second repeated measurement was preformed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
3) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.
4) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg

The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.

5.3 Test Configuration

5.3.1 Wi-Fi Test Configuration

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:

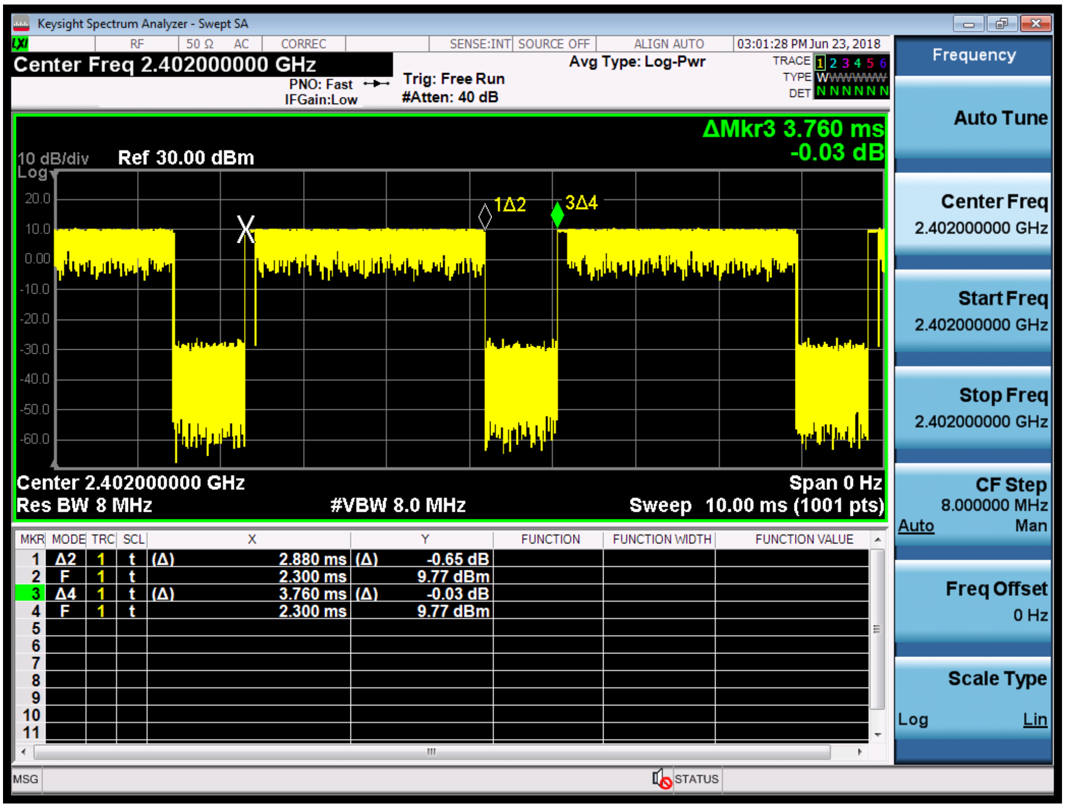
- ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and wireless mode combination within the frequency band or aggregated band. DSSS and OFDM configurations are considered separately according to the required SAR procedures.
- 0.4 W/kg, SAR 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.

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.

A Wi-Fi device must be configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools for SAR measurement.

5.3.2 BT Test Configuration

For BT SAR testing, BT engineering testing software installed on the EUT can provide continuous transmitting RF signal with maximum output power, and the CBT control the EUT operating with hoping off and data rate set for 2DH5. The SAR measurement takes full account of the BT duty cycle and is reflected in the report, and the duty factor of the device is as follow:

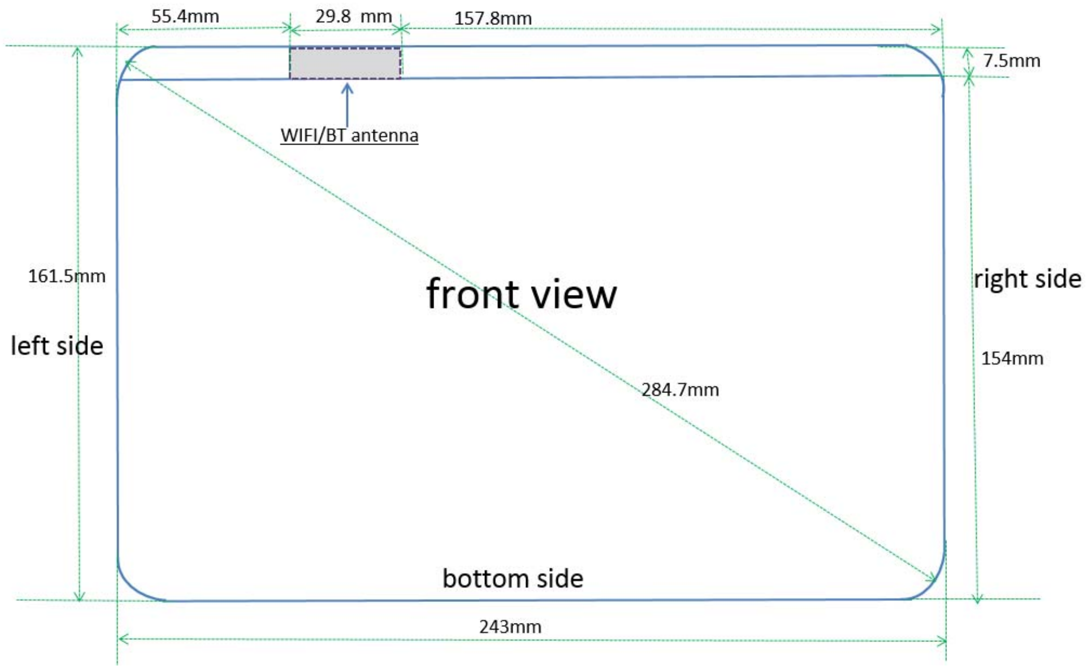


Note: Duty factor= Ton (ms)/ T(on+off) (ms)=2.880/3.760=76.6%

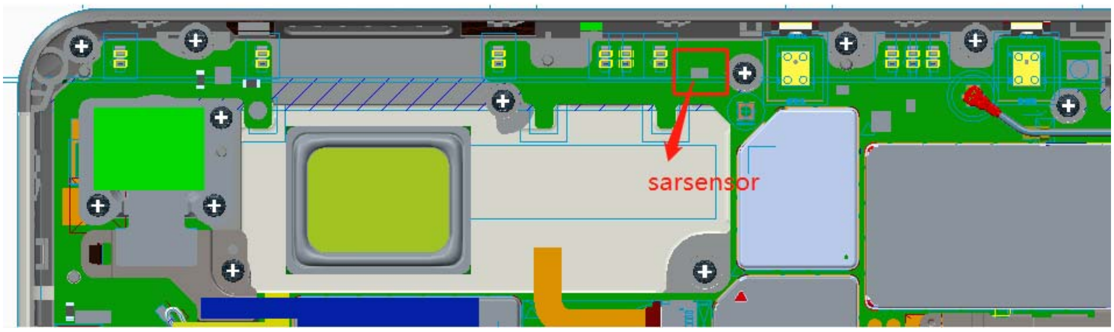
5.3.3 Proximity sensor Power reduction description

This device uses a proximity sensor that share the same metallic electrode as the transmitting antenna to facilitate triggering in typical user interactivity with the device. Due to the operating configurations and exposure conditions required by the device, the proximity sensor is used to indicate when the tablet is held close to a user's body exposure condition. It utilizes the proximity sensor to reduce the output power in specific wireless and operating modes to ensure SAR compliance for the following scenarios: To reduce the output power of main antennas during body operating configurations.

1) Antennas and sensor placement details



Figue1: The location of the antennas and the proximity sensor



Figue2: The picture of the SAR sensor

Note: The proximity sensor and Wi-Fi/BT antenna use same metallic electrode, so the location is same.

	Antenna/Sensor-to- DUT sides separation distances					
Tx ANT	Front side	Back side	Left side	Right side	Top side	Bottom side
Wi-Fi ANT	1.89mm	2mm	55.4mm	157.8mm	0	154mm
Sensor pad	1.89mm	2mm	55.4mm	157.8mm	0	154mm

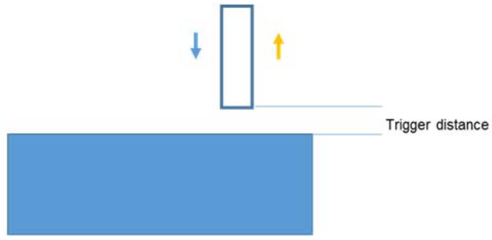
2) Power Reduction operation table

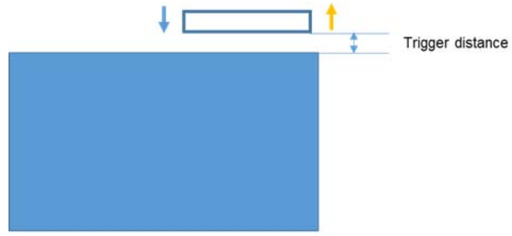
	Wi-Fi ANT power(dBm)									
Sensor	Wi-Fi2.4G-b	Wi-Fi2.4G-g	Wi-Fi2.4G-n20	Wi-Fi2.4G-n40	Wi-Fi5G-a	Wi-Fi5G-n20	Wi-Fi5G-n40	Wi-Fi5G-ac20	Wi-Fi5G-ac40	Wi-Fi5G-ac80
off	17.50	11.00	11.00	8.00	18.00	18.00	18.00	18.00	18.00	18.00
on	10.00	10.00	10.00	8.00	10.00	10.00	10.00	10.00	10.00	10.00
Power reduction	7.50	1.00	1.00	0.00	8.00	8.00	8.00	8.00	8.00	8.00

3) proximity sensor coverage, distance and angle

3.1) Procedures for determining proximity sensor triggering distances (Per KDB616217§6.2)

The proximity sensor triggering distance measurement method as below:





Top side Back side

Band(MHz)	Trigger distance-Top Side		Trigger distance-Back Side	
	Moving toward phantom	Moving away from phantom	Moving toward phantom	Moving away from phantom
Sensor pad	15	15	14	14

Table: Summary of Trigger Distances

The detailed conducted power measurement data to determine the triggering distances is as below:

3.1a) The DUT (Top side, Back side) is moved towards the flat phantom:

Conducted power(dBm) for Top side									
Distance(mm)	Wi-Fi2.4G-b	Wi-Fi2.4G-g	Wi-Fi2.4G-n20	Wi-Fi5G-a	Wi-Fi5G-n20	Wi-Fi5G-n40	Wi-Fi5G-ac20	Wi-Fi5G-ac40	Wi-Fi5G-ac80
26	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
21	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
18	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
17	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
16	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
15	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
14	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
13	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
10	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
5	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08

Conducted power(dBm) for Back side									
Distance(mm)	Wi-Fi2.4G-b	Wi-Fi2.4G-g	Wi-Fi2.4G-n20	Wi-Fi5G-a	Wi-Fi5G-n20	Wi-Fi5G-n40	Wi-Fi5G-ac20	Wi-Fi5G-ac40	Wi-Fi5G-ac80
25	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
20	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
17	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
16	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
15	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
14	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
13	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
12	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
9	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
4	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08

3.1b) The DUT (Top side, Back side) is moved away from the flat phantom:

Conducted power(dBm) for Top side									
Distance(mm)	Wi-Fi2.4G-b	Wi-Fi2.4G-g	Wi-Fi2.4G-n20	Wi-Fi5G-a	Wi-Fi5G-n20	Wi-Fi5G-n40	Wi-Fi5G-ac20	Wi-Fi5G-ac40	Wi-Fi5G-ac80
0	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
5	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
10	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
13	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
14	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
15	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
16	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
17	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
18	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
21	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
26	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18

Conducted power(dBm) for Back side									
Distance(mm)	Wi-Fi2.4G-b	Wi-Fi2.4G-g	Wi-Fi2.4G-n20	Wi-Fi5G-a	Wi-Fi5G-n20	Wi-Fi5G-n40	Wi-Fi5G-ac20	Wi-Fi5G-ac40	Wi-Fi5G-ac80
0	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
5	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
10	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
13	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
14	8.39	7.08	7.03	8.57	8.70	7.51	8.62	7.44	9.08
15	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
16	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
17	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
20	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18
25	15.54	8.44	8.03	16.22	16.53	15.95	16.45	15.88	17.18

3.2) Procedures for determining antenna and proximity sensor coverage (Per KDB616217 §6.3)

There is no spatial offset between the Wi-Fi antenna and the proximity sensor element, so procedures for determining the proximity sensor coverage does not need to be assessed.

3.3) Procedures for determining device tilt angle influences to proximity sensor triggering (Per KDB616217 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Top side parallel to the base of the flat phantom for each band.

The DUT was rotated about Top side for angles up to +/- 45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up to +/- 45°.

The proximity sensor triggering tilt angle measurement method as below:

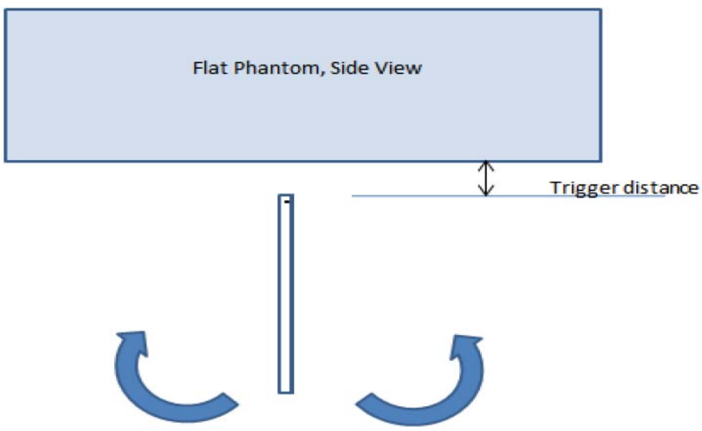


Table: Summary of Tablet Tilt Angle Influence to Proximity Sensor Triggering (Top side)

Wi-Fi Antenna	Power Reduction Status for Top side (Distance=15mm)										
	-45°	-35°	-25°	-15°	-5°	0°	5°	15°	25°	35°	45°
Wi-Fi2.4G-b	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi2.4G-g	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi2.4G-n20	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi2.4G-n40	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-a	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-n20	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-n40	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-ac20	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-ac40	on	on	on	on	on	on	on	on	on	on	on
Wi-Fi5G-ac80	on	on	on	on	on	on	on	on	on	on	on

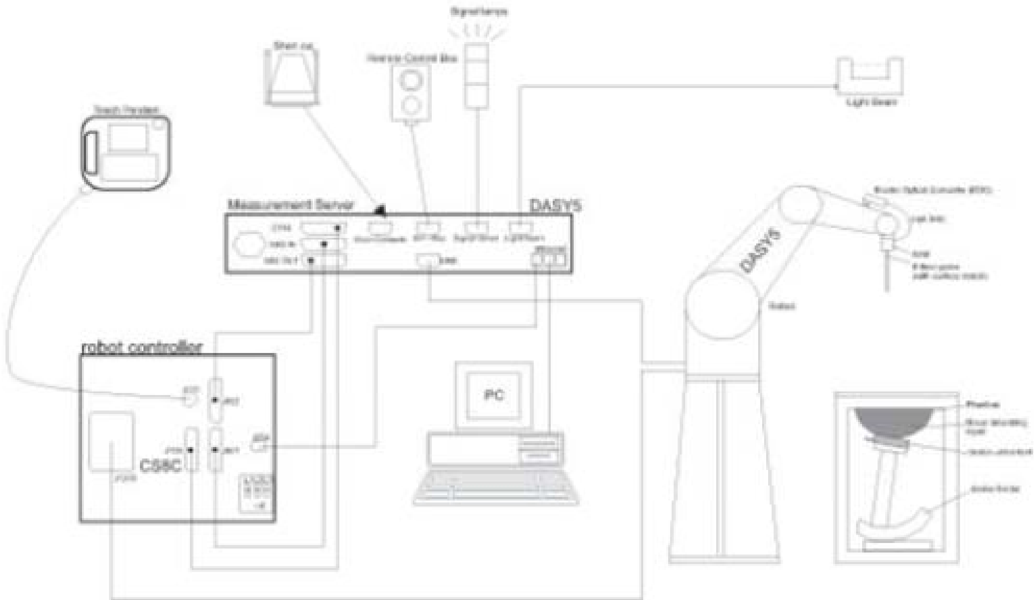
4) Summary SAR test Plan for Proximity sensor power reduction

The proximity sensor is used to indicate when the device is held close to a user's body exposure condition. SAR tests with proximity sensor power reduction are required for Top side, Back side of Wi-Fi Antenna. For the other side of the device, SAR is still tested at the maximum power level with sensor off. Moreover, since the capacitive proximity sensor triggering distance is n mm, a conservative distance of (n-1) mm was required for additional SAR test at maximum power level with sensor off.

6 SAR Measurements System Configuration

6.1 SAR Measurement Set-up

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (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.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

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.

EX3DV4 Probe Specification

Construction	Symmetrical design with triangular core 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 mW/g Linearity: ± 0.2dB (noise: typically < 1 μW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application	High precision dosimetric measurements in any exposure Scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.

E-field Probe Calibration

Each probe is calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy was evaluated and found to be better than ± 0.25dB. The sensitivity parameters (NormX, NormY, NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested.

The free space E-field from amplified probe outputs is determined in a test chamber. This is performed in a TEM cell for frequencies bellow 1 GHz, and in a wave guide above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is then rotated 360 degrees.

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The measured free space E-field in the medium correlates to temperature rise in a dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

$$SAR=C\Delta T/\Delta t$$

Where: Δt = Exposure time (30 seconds),

C = Heat capacity of tissue (brain or muscle),

ΔT = Temperature increase due to RF exposure.

Or

$$SAR=|E|^2\sigma/\rho$$

Where: σ = Simulated tissue conductivity,

ρ = Tissue density (kg/m^3).

6.3 SAR Measurement Procedure

Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.
Area scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><td></td><td>≤3 GHz</td><td>> 3 GHz</td></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td>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 rowspan="2">Maximum area scan spatial resolution: ΔxArea, ΔyArea</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 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 ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
</table>

Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><td colspan="3"></td><td>≤3GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: $\triangle x_{zoom}$ $\triangle y_{zoom}$</td><td>≤2GHz: ≤8mm
2 – 3GHz: ≤5mm*</td><td>3 – 4GHz: ≤5mm*
4 – 6GHz: ≤4mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">Uniform grid: $\triangle z_{zoom}(n)$</td><td>≤5mm</td><td>3 – 4GHz: ≤4mm
4 – 5GHz: ≤3mm
5 – 6GHz: ≤2mm</td></tr>
<tr><td rowspan="2">Graded grid</td><td>$\triangle z_{zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤4mm</td><td>3 – 4GHz: ≤3mm
4 – 5GHz: ≤2.5mm
5 – 6GHz: ≤2mm</td></tr>
<tr><td>$\triangle z_{zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \triangle z_{zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">X, y, z</td><td>≥30mm</td><td>3 – 4GHz: ≥28mm
4 – 5GHz: ≥25mm
5 – 6GHz: ≥22mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 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 447498 is ≤ 1.4W/kg, ≤8mm, ≤7mm and ≤5mm zoom scan resolution may be applied, respectively, for 2GHz to 3GHz, 3GHz to 4GHz and 4GHz to 6GHz.</td></tr>
</table>

Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

7 Main Test Equipment

Name of Equipment	Manufacturer	Type/Model	Serial Number	Last Cal.	Cal. Due Date
Network analyzer	Agilent	E5071B	MY42404014	2018-05-20	2019-05-19
Dielectric Probe Kit	HP	85070E	US44020115	2018-05-20	2019-05-19
Power meter	Agilent	E4417A	GB41291714	2018-05-21	2019-05-20
Power sensor	Agilent	N8481H	MY50350004	2018-05-21	2019-05-20
Power sensor	Agilent	E9327A	US40441622	2018-05-20	2019-05-19
Dual directional coupler	Agilent	778D-012	50519	2018-05-21	2019-05-20
Dual directional coupler	Agilent	777D	50146	2018-05-20	2019-05-19
Amplifier	INDEXSAR	IXA-020	0401	2018-05-20	2019-05-19
Wideband radio communication tester	R&S	CMW 500	113645	2018-05-20	2019-05-19
BT Base Station Simulator	R&S	CBT	100271	2018-05-14	2019-05-13
E-field Probe	SPEAG	EX3DV4	3677	2018-05-29	2019-05-28
DAE	SPEAG	DAE4	1317	2018-03-23	2019-03-22
Validation Kit 2450MHz	SPEAG	D2450V2	786	2017-08-29	2020-08-28
Validation Kit 5GHz	SPEAG	D5GHzV2	1151	2017-01-05	2020-01-04
Temperature Probe	Tianjin jinming	JM222	AA1009129	2018-05-17	2019-05-16
Hygrothermograph	Anymetr	NT-311	20150731	2018-05-17	2019-05-16
Software for Test	Speag	DASY5	52.8.8.1222	/	/
Software for Tissue	Agilent	85070	E06.01.36	/	/

8 Tissue Dielectric Parameter Measurements & System Verification

8.1 Tissue Verification

The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within ± 2°C of the temperature when the tissue parameters are characterized. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance.

Target values

Frequency (MHz)		Water (%)	Salt (%)	Sugar (%)	Glycol (%)	Preventol (%)	Cellulose (%)	ε_r	σ(s/m)
Body	2450	73.2	0.1	0	26.7	0	0	52.7	1.95
Frequency (MHz)		**Water (%)**	**Diethylenglycol monohexylether**			**Triton X-100**		**ε_r**	**σ(s/m)**
Body	5250	72.52	13.74			13.74		48.9	5.36
	5600	72.52	13.74			13.74		48.5	5.77
	5750	72.52	13.74			13.74		48.3	5.94

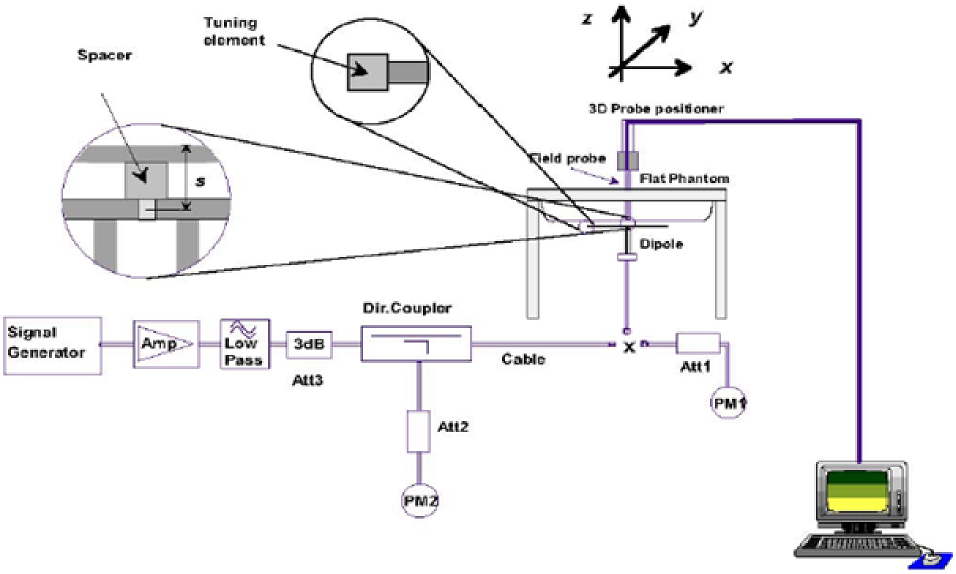
Measurements results

Frequency (MHz)		Test Date	Temp ℃	Measured Dielectric Parameters		Target Dielectric Parameters		Limit (Within ±5%)	
				ε_r	σ(s/m)	ε_r	σ(s/m)	Dev ε_r(%)	Dev σ(%)
2450	Body	6/29/2018	21.5	51.8	1.93	52.7	1.95	-1.71	-1.03
5250	Body	6/30/2018	21.5	46.7	5.42	48.9	5.36	-4.50	1.12
5600	Body	6/29/2018	21.5	47.3	6.00	48.5	5.77	-2.47	3.99
5750	Body	6/30/2018	21.5	47.7	6.07	48.3	5.94	-1.24	2.19
Note: The depth of tissue-equivalent liquid in a phantom must be ≥ 15.0 cm for SAR measurements ≤ 3 GHz and ≥ 10.0 cm for measurements > 3 GHz.									

8.2 System Performance Check

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulates were measured using the dielectric probe kit and the network analyzer. A system check measurement for every day was made following the determination of the dielectric parameters of the Tissue simulates, using the dipole validation kit. The dipole antenna was placed under the flat section of the twin SAM phantom.

System check is performed regularly on all frequency bands where tests are performed with the DASY system.



Picture 1 System Performance Check setup

Picture 2 Setup Photo

Justification for Extended SAR Dipole Calibrations

Usage of SAR dipoles calibrated less than 3 years ago but more than 1 year ago were confirmed in maintaining return loss (< - 20 dB, within 20% of prior calibration) and impedance (within 5 ohm from prior calibration) requirements per extended calibrations in KDB 865664 D01:

Dipole		Date of Measurement	Return Loss(dB)	Δ %	Impedance (Ω)	ΔΩ
Dipole D5GHzV2 SN: 1151 (5250MHz)	Body Liquid	1/5/2017	-24.7	/	50.4	/
		1/4/2018	-24.4	1.2%	49.9	-0.5Ω
Dipole D5GHzV2 SN: 1151 (5600MHz)	Body Liquid	1/5/2017	-23.3	/	57.2	/
		1/4/2018	-23.4	-0.4%	56.8	-0.4Ω
Dipole D5GHzV2 SN: 1151 (5750MHz)	Body Liquid	1/5/2017	-24.9	/	56.0	/
		1/4/2018	-25.2	-1.2%	56.4	0.4Ω

System Check results

Frequency (MHz)		Test Date	Temp ℃	250mW/ 100mW Measured SAR_{1g} (W/kg)	1W Normalized SAR_{1g} (W/kg)	1W Target SAR_{1g} (W/kg)	Δ % (Limit ±10%)	Plot No.
2450	Body	6/29/2018	21.5	12.50	50.00	50.80	-1.57	1
5250	Body	6/30/2018	21.5	7.46	74.60	75.60	-1.32	2
5600	Body	6/29/2018	21.5	8.10	81.00	80.20	1.00	3
5750	Body	6/30/2018	21.5	7.15	71.50	74.60	-4.16	4
Note：Target Values used derive from the calibration certificate Data Storage and Evaluation.								

9 Normal and Maximum Output Power

KDB 447498 D01 at the maximum rated output power and within the tune-up tolerance range specified for the product, but not more than 2 dB lower than the maximum tune-up tolerance limit.

9.1 WLAN Mode

Wi-Fi 2.4G (Sensor off) Mode	Channel	Frequency (MHz)	Data Rates (bps)	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11b	1	2412	1M	16.03	17.5	15.50
	6	2437	1M	15.67	17.5	15.50
	11	2462	1M	15.54	17.5	15.50
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11g	1	2412	6M	8.32	11.0	9.00
	6	2437	6M	8.44	11.0	9.00
	11	2462	6M	8.16	11.0	9.00
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT20)	1	2412	6.5M	8.03	11.0	9.00
	6	2437	6.5M	8.15	11.0	9.00
	11	2462	6.5M	7.94	11.0	9.00
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT40)	3	2422	13.5M	5.11	8.0	6.00
	6	2437	13.5M	5.89	8.0	6.00
	9	2452	13.5M	5.22	8.0	6.00
Note: Initial test configuration is 802.11b mode, since the highest maximum output power.						

Wi-Fi 2.4G (Sensor on) Mode	Channel	Frequency (MHz)	Data Rates (bps)	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11b	1	2412	1M	7.27	10.0	8.00
	6	2437	1M	7.06	10.0	8.00
	11	2462	1M	8.39	10.0	8.00
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11g	1	2412	6M	7.31	10.0	8.00
	6	2437	6M	7.08	10.0	8.00
	11	2462	6M	8.40	10.0	8.00
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT20)	1	2412	6.5M	7.03	10.0	8.00
	6	2437	6.5M	6.53	10.0	8.00
	11	2462	6.5M	7.46	10.0	8.00
Mode	Channel	Frequency (MHz)	/	Average Conducted Power Measured (dBm)	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT40)	3	2422	13.5M	4.80	8.0	6.00
	6	2437	13.5M	5.56	8.0	6.00
	9	2452	13.5M	6.09	8.0	6.00
Note: Initial test configuration is 802.11b mode, since the highest maximum output power.						

Wi-Fi 5G (Sensor off)	Band	Channel	Frequency (MHz)	Average Conducted Power (dBm)	Tune-up Limit (dBm)	TX Power Setting level
Mode				6M		
802.11a	U-NII-1	36	5180	15.77	18.0	16.00
		40	5200	15.62	18.0	16.00
		44	5220	15.29	18.0	16.00
		48	5240	15.44	18.0	16.00
	U-NII-2A	52	5260	15.15	18.0	16.00
		56	5280	15.15	18.0	16.00
		60	5300	15.35	18.0	16.00
		64	5320	15.31	18.0	16.00
	U-NII-2C	100	5500	16.22	18.0	16.00
		116	5580	15.45	18.0	16.00
		132	5660	15.66	18.0	16.00
		140	5700	15.49	18.0	16.00
	U-NII-3	149	5745	15.94	18.0	16.00
		157	5785	15.77	18.0	16.00
		165	5825	15.33	18.0	16.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT20)	U-NII-1	36	5180	15.99	18.0	16.00
		40	5200	15.88	18.0	16.00
		44	5220	15.93	18.0	16.00
		48	5240	15.67	18.0	16.00
	U-NII-2A	52	5260	15.48	18.0	16.00
		56	5280	15.43	18.0	16.00
		60	5300	15.67	18.0	16.00
		64	5320	15.64	18.0	16.00
	U-NII-2C	100	5500	16.53	18.0	16.00
		116	5580	15.77	18.0	16.00
		132	5660	15.89	18.0	16.00
		140	5700	15.81	18.0	16.00
	U-NII-3	149	5745	16.28	18.0	16.00
		157	5785	16.03	18.0	16.00
		165	5825	15.65	18.0	16.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT40)	U-NII-1	38	5190	15.42	18.0	16.00
		46	5230	15.26	18.0	16.00
	U-NII-2A	54	5270	15.03	18.0	16.00

		62	5310	15.18	18.0	16.00
	U-NII-2C	102	5510	15.95	18.0	16.00
		110	5550	15.89	18.0	16.00
		118	5590	15.38	18.0	16.00
		134	5670	15.43	18.0	16.00
	U-NII-3	151	5755	15.64	18.0	16.00
		159	5795	15.48	18.0	16.00
Mode	Band	Channel	Frequency (MHz)	6M	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT20)	U-NII-1	36	5180	15.94	18.0	16.00
		40	5200	15.88	18.0	16.00
		44	5220	15.78	18.0	16.00
		48	5240	15.69	18.0	16.00
	U-NII-2A	52	5260	15.42	18.0	16.00
		56	5280	15.35	18.0	16.00
		60	5300	15.74	18.0	16.00
		64	5320	15.66	18.0	16.00
	U-NII-2C	100	5500	16.45	18.0	16.00
		116	5580	15.76	18.0	16.00
		132	5660	15.93	18.0	16.00
		140	5700	15.63	18.0	16.00
	U-NII-3	149	5745	16.22	18.0	16.00
		157	5785	16.15	18.0	16.00
		165	5825	15.55	18.0	16.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT40)	U-NII-1	38	5190	15.33	18.0	16.00
		46	5230	15.21	18.0	16.00
	U-NII-2A	54	5270	14.92	18.0	16.00
		62	5310	14.99	18.0	16.00
	U-NII-2C	102	5510	15.88	18.0	16.00
		110	5550	15.84	18.0	16.00
		118	5590	15.36	18.0	16.00
		134	5670	15.33	18.0	16.00
	U-NII-3	151	5755	15.69	18.0	16.00
		159	5795	15.48	18.0	16.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT80)	U-NII-1	42	5210	16.49	18.0	16.00
	U-NII-2A	58	5290	16.13	18.0	16.00

	U-NII-2C	106	5530	17.18	18.0	16.00
		122	5610	16.27	18.0	16.00
	U-NII-3	155	5775	16.63	18.0	16.00

Sensor on

Wi-Fi 5G (Sensor on)	Band	Channel	Frequency (MHz)	Average Conducted Power (dBm)	Tune-up Limit (dBm)	TX Power Setting level
Mode				6M		
802.11a	U-NII-1	36	5180	7.61	10.0	8.00
		40	5200	7.63	10.0	8.00
		44	5220	6.85	10.0	8.00
		48	5240	7.17	10.0	8.00
	U-NII-2A	52	5260	7.32	10.0	8.00
		56	5280	6.88	10.0	8.00
		60	5300	7.41	10.0	8.00
		64	5320	7.48	10.0	8.00
	U-NII-2C	100	5500	8.57	10.0	8.00
		116	5580	7.60	10.0	8.00
		132	5660	7.85	10.0	8.00
		140	5700	6.77	10.0	8.00
	U-NII-3	149	5745	7.78	10.0	8.00
		157	5785	8.12	10.0	8.00
		165	5825	7.48	10.0	8.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT20)	U-NII-1	36	5180	7.27	10.0	8.00
		40	5200	7.72	10.0	8.00
		44	5220	7.21	10.0	8.00
		48	5240	7.72	10.0	8.00
	U-NII-2A	52	5260	7.32	10.0	8.00
		56	5280	7.44	10.0	8.00
		60	5300	7.23	10.0	8.00
		64	5320	7.37	10.0	8.00
	U-NII-2C	100	5500	8.70	10.0	8.00
		116	5580	7.50	10.0	8.00
		132	5660	7.77	10.0	8.00
		140	5700	8.02	10.0	8.00
	U-NII-3	149	5745	8.34	10.0	8.00
		157	5785	8.38	10.0	8.00

		165	5825	8.04	10.0	8.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11n (HT40)	U-NII-1	38	5190	7.61	10.0	8.00
		46	5230	6.54	10.0	8.00
	U-NII-2A	54	5270	6.87	10.0	8.00
		62	5310	7.19	10.0	8.00
	U-NII-2C	102	5510	7.51	10.0	8.00
		110	5550	7.62	10.0	8.00
		118	5590	7.55	10.0	8.00
		134	5670	7.16	10.0	8.00
	U-NII-3	151	5755	7.52	10.0	8.00
		159	5795	7.69	10.0	8.00
Mode	Band	Channel	Frequency (MHz)	6M	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT20)	U-NII-1	36	5180	8.29	10.0	8.00
		40	5200	8.23	10.0	8.00
		44	5220	7.93	10.0	8.00
		48	5240	7.88	10.0	8.00
	U-NII-2A	52	5260	6.70	10.0	8.00
		56	5280	7.19	10.0	8.00
		60	5300	7.75	10.0	8.00
		64	5320	7.22	10.0	8.00
	U-NII-2C	100	5500	8.62	10.0	8.00
		116	5580	7.49	10.0	8.00
		132	5660	7.81	10.0	8.00
		140	5700	7.84	10.0	8.00
	U-NII-3	149	5745	8.41	10.0	8.00
		157	5785	8.50	10.0	8.00
		165	5825	7.90	10.0	8.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT40)	U-NII-1	38	5190	7.52	10.0	8.00
		46	5230	6.49	10.0	8.00
	U-NII-2A	54	5270	6.76	10.0	8.00
		62	5310	7.08	10.0	8.00
	U-NII-2C	102	5510	7.44	10.0	8.00
		110	5550	8.01	10.0	8.00
		118	5590	7.09	10.0	8.00
		134	5670	7.21	10.0	8.00

	U-NII-3	151	5755	7.90	10.0	8.00
		159	5795	7.63	10.0	8.00
Mode	Band	Channel	Frequency (MHz)	MCS0	Tune-up Limit (dBm)	TX Power Setting level
802.11ac (VHT80)	U-NII-1	42	5210	9.14	10.0	8.00
	U-NII-2A	58	5290	9.46	10.0	8.00
	U-NII-2C	106	5530	9.08	10.0	8.00
		122	5610	8.06	10.0	8.00
	U-NII-3	155	5775	8.61	10.0	8.00

9.2 Bluetooth Mode

BT	Conducted Power(dBm) Channel/Frequency(MHz)			Tune-up Limit (dBm)
	Ch 0/2402 MHz	Ch 39/2441 MHz	Ch 78/2480 MHz	
GFSK	9.63	9.01	8.88	10.00
π/4DQPSK	9.85	9.49	9.27	10.00
8DPSK	9.81	9.74	9.52	10.00
BLE	**Ch 0/2402 MHz**	**Ch 19/2440 MHz**	**Ch 39/2480 MHz**	**Tune-up Limit (dBm)**
GFSK	9.59	8.85	8.86	10.00

10 Measured and Reported (Scaled) SAR Results

10.1 Measured SAR Results

Table 1: Wi-Fi (2.4G)

Test Position	sensor	Distance	Channel/ Frequency (MHz)	Mode 802.11b	Duty Cycle	Tune-up limit (dBm)	Conducted Power (dBm)	Drift (dB)	Area Scan Max.SAR (W/Kg)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Plot No.
Body SAR													
Back Side	on	0mm	11/2462	DSSS	1:1	10.00	8.39	0.000	0.182	0.177	1.45	0.256	/
Top Edge	on	0mm	11/2462	DSSS	1:1	10.00	8.39	0.063	0.118	0.159	1.45	0.230	/
Back Side	off	13mm	1/2412	DSSS	1:1	17.50	16.03	0.120	0.073	0.078	1.40	0.109	/
Left Edge	off	0mm	1/2412	DSSS	1:1	17.50	16.03	0.123	0.112	0.139	1.40	0.195	/
Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge	off	14mm	1/2412	DSSS	1:1	17.50	16.03	0.040	0.109	0.128	1.40	0.180	/
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Back Side (Battery2)	on	0mm	11/2462	DSSS	1:1	10.00	8.39	0.000	0.173	0.224	1.45	0.325	/
Back Side (Battery3)	on	0mm	11/2462	DSSS	1:1	10.00	8.39	0.000	0.213	0.248	1.45	0.359	5
Back Side (Conf. 2)	on	0mm	11/2462	DSSS	1:1	10.00	8.39	0.000	0.190	0.219	1.45	0.317	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Initial test configuration is 802.11b mode, since the highest maximum output power.

3. Per KDB 248227, when the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the other band/ configuration

Table 2: Wi-Fi (5G, U-NII-2A)

Per 248227, for band U-NII-1 and U-NII-2A, when the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.

Test Position	sensor	Distance	Channel/ Frequency (MHz)	Mode 802.11 ac VHT80	Duty Cycle	Tune-up limit (dBm)	Conducted Power (dBm)	Drift (dB)	Area Scan Max.SAR (W/Kg)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Plot No.
Body SAR													
Back Side	on	0mm	58/5290	OFDM	96.23%	10.00	9.46	0.000	0.053	0.080	1.18	0.094	/
Top Edge	on	0mm	58/5290	OFDM	96.23%	10.00	9.46	0.163	0.148	0.224	1.18	0.264	/
Back Side	off	13mm	58/5290	OFDM	96.23%	18.00	16.13	0.000	0.068	0.055	1.60	0.088	/
Left Edge	off	0mm	58/5290	OFDM	96.23%	18.00	16.13	0.186	0.177	0.343	1.60	0.548	6
Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge	off	14mm	58/5290	OFDM	96.23%	18.00	16.13	-0.024	0.159	0.151	1.60	0.241	/
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Left Edge (Battery2)	off	0mm	58/5290	OFDM	96.23%	18.00	16.13	0.034	0.167	0.331	1.60	0.529	/
Left Edge (Battery3)	off	0mm	58/5290	OFDM	96.23%	18.00	16.13	0.077	0.169	0.336	1.60	0.537	/
Left Edge (Conf. 2)	off	0mm	58/5290	OFDM	96.23%	18.00	16.13	-0.020	0.161	0.319	1.60	0.510	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per KDB 248227 D01, when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth 802.11ac VHT80 mode is used for Initial test configuration.

3. Per KDB 248227 D01, when the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the other band/ configuration.

Table 3: Wi-Fi (5G, U-NII-2C)

Test Position	sensor	Distance	Channel/ Frequency (MHz)	Mode 802.11 ac VHT80	Duty Cycle	Tune-up limit (dBm)	Conducted Power (dBm)	Drift (dB)	Area Scan Max.SAR (W/Kg)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Plot No.
Body SAR													
Back Side	on	0mm	106/5530	OFDM	96.23%	10.00	9.08	0.000	0.044	0.085	1.28	0.109	/
Top Edge	on	0mm	106/5530	OFDM	96.23%	10.00	9.08	0.039	0.078	0.162	1.28	0.208	/
Back Side	off	13mm	106/5530	OFDM	96.23%	18.00	17.18	0.017	0.089	0.044	1.26	0.055	/
Left Edge	off	0mm	106/5530	OFDM	96.23%	18.00	17.18	0.065	0.168	0.258	1.26	0.324	/
Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge	off	14mm	106/5530	OFDM	96.23%	18.00	17.18	0.053	0.284	0.266	1.26	0.334	7
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge (Battery2)	off	14mm	106/5530	OFDM	96.23%	18.00	17.18	0.025	0.264	0.230	1.26	0.289	/
Top Edge (Battery3)	off	14mm	106/5530	OFDM	96.23%	18.00	17.18	0.026	0.166	0.147	1.26	0.184	/
Top Edge (Conf. 2)	off	14mm	106/5530	OFDM	96.23%	18.00	17.18	0.182	0.177	0.146	1.26	0.183	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per KDB 248227 D01, when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth 802.11ac VHT80 mode is used for Initial test configuration.

3. Per KDB 248227 D01, when the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the other band/ configuration.

Table 4: Wi-Fi (5G, U-NII-3)

Test Position	sensor	Distance	Channel/ Frequency (MHz)	Mode 802.11 ac VHT80	Duty Cycle	Tune-up limit (dBm)	Conducted Power (dBm)	Drift (dB)	Area Scan Max.SAR (W/Kg)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Plot No.
Body SAR													
Back Side	on	0mm	155/5775	OFDM	96.23%	10.00	8.61	0.089	0.202	0.210	1.43	0.301	/
Top Edge	on	0mm	155/5775	OFDM	96.23%	10.00	8.61	0.104	0.138	0.143	1.43	0.205	/
Back Side	off	13mm	155/5775	OFDM	96.23%	18.00	16.63	0.157	0.125	0.115	1.42	0.164	/
Left Edge	off	0mm	155/5775	OFDM	96.23%	18.00	16.63	0.100	0.160	0.250	1.42	0.356	/
Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge	off	14mm	155/5775	OFDM	96.23%	18.00	16.63	0.104	0.291	0.262	1.42	0.373	8
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge (Battery2)	off	14mm	155/5775	OFDM	96.23%	18.00	16.63	0.021	0.242	0.169	1.42	0.241	/
Top Edge (Battery3)	off	14mm	155/5775	OFDM	96.23%	18.00	16.63	0.027	0.226	0.173	1.42	0.246	/
Top Edge (Conf. 2)	off	14mm	155/5775	OFDM	96.23%	18.00	16.63	0.108	0.201	0.148	1.42	0.211	/

Note: 1. The value with blue color is the maximum SAR Value of each test band.

2. Per KDB 248227 D01, when the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth 802.11ac VHT80 mode is used for Initial test configuration.

3. Per KDB 248227 D01, when the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the other band/ configuration.

Table 5: BT

Test Position	Cover Type	Channel/ Frequency (MHz)	Mode	Duty Cycle	Tune-up limit (dBm)	Conducted Power (dBm)	Drift (dB)	Area Scan Max.SAR (W/Kg)	Measured SAR_{1g} (W/kg)	Scaling Factor	Reported SAR_{1g} (W/kg)	Plot No.
Body SAR (Distance 0mm)												
Back Side	Standard	0/2402	π/4DQPSK	76.6%	10.00	9.85	0.000	0.120	0.104	1.35	0.141	/
Left Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Right Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Top Edge	Standard	0/2402	π/4DQPSK	76.6%	10.00	9.85	0.156	0.047	0.056	1.35	0.075	/
Bottom Edge	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Back Side	Battery2	0/2402	π/4DQPSK	76.6%	10.00	9.85	0.000	0.082	0.116	1.35	0.157	/
Back Side	Battery3	0/2402	π/4DQPSK	76.6%	10.00	9.85	0.000	0.151	0.131	1.35	0.177	9
Back Side	Conf. 2	0/2402	π/4DQPSK	76.6%	10.00	9.85	0.000	0.102	0.125	1.35	0.169	/
Note: 1. The value with blue color is the maximum SAR Value of each test band.												

10.2 Simultaneous Transmission Analysis

Simultaneous Transmission Configurations	Body
Wi-Fi-2.4GHz(data) + Bluetooth(data)	No
Wi-Fi-5GHz(data) + Bluetooth(data)	Yes
Wi-Fi-2.4GHz(data) + Wi-Fi-5GHz(data)	No

General Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. Per KDB 447498 D01, simultaneous transmission SAR is compliant if,

   i) Scalar SAR summation < 1.6W/kg, simultaneously transmission SAR measurement is not necessary.

   ii) SPLSR = (SAR1 + SAR2)^1.5 / (min. separation distance, mm), and the peak separation distance is determined from the square root of [(x1-x2)2 + (y1-y2)2 + (z1-z2)2], where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the zoom scan.

   iii) If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary.

About BT and WIFI

SAR_{1g}(W/kg) / Test Position	BT	WIFI 5G			MAX. ΣSAR_{1g}
		U-NII-2A	U-NII-2C	U-NII-3	
Back Side	0.177	0.094	0.109	**0.301**	0.478
Left Edge	0.400	**0.548**	0.324	0.356	0.948
Right Edge	0.400	0.400	0.400	0.400	0.800
Top Edge	0.075	0.264	0.334	**0.373**	0.448
Bottom Edge	0.400	0.400	0.400	0.400	0.800

Note: 1.The value with blue color is the maximum ΣSAR_{1g} Value.

2. According to the KDB 447498 D01 section 4.3.2 b) 2), when an antenna qualifies for the standalone SAR test exclusion of 4.3.1 and also transmits simultaneously with other antennas, the standalone SAR value must be estimated to determine the simultaneous transmission SAR test exclusion criteria, and 0.4 W/kg for 1-g SAR, when the test separation distance is > 50 mm.

2. MAX. ΣSAR_{1g} =Unlicensed SAR_{MAX} +Licensed SAR_{MAX}

Conclusion:

1) MAX. ΣSAR_{1g} = 0.948 W/kg <1.6 W/kg, so the Simultaneous transimition SAR with volum scan are not required for BT and WIFI 5G.

2) According to the KDB 690783 D01 section 1) d) i), when the sum of 1-g SAR applies for simultaneous transmission SAR test exclusion, the highest sum of 1-g SAR according to the highest reported stand-alone SAR values is used, and the highest Reported SAR for simultaneous transmission exposure conditions is 0.55 W/kg.

11 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 extensive SAR measurement uncertainty analysis described in IEEE Std 1528- 2013 is not required in SAR reports submitted for equipment approval.

ANNEX A: Test Layout

Tissue Simulating Liquids

For the measurement of the field distribution inside the flat phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For Body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Picture 3.

Picture 3: Liquid depth in the flat Phantom

ANNEX B: System Check Results

Plot 1 System Performance Check at 2450 MHz Body TSL

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 786

Date: 6/29/2018

Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.93 mho/m; ε_r = 51.8; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

d=10mm, Pin=250mW/Area Scan (41x71x1): Measurement grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 16 mW/g

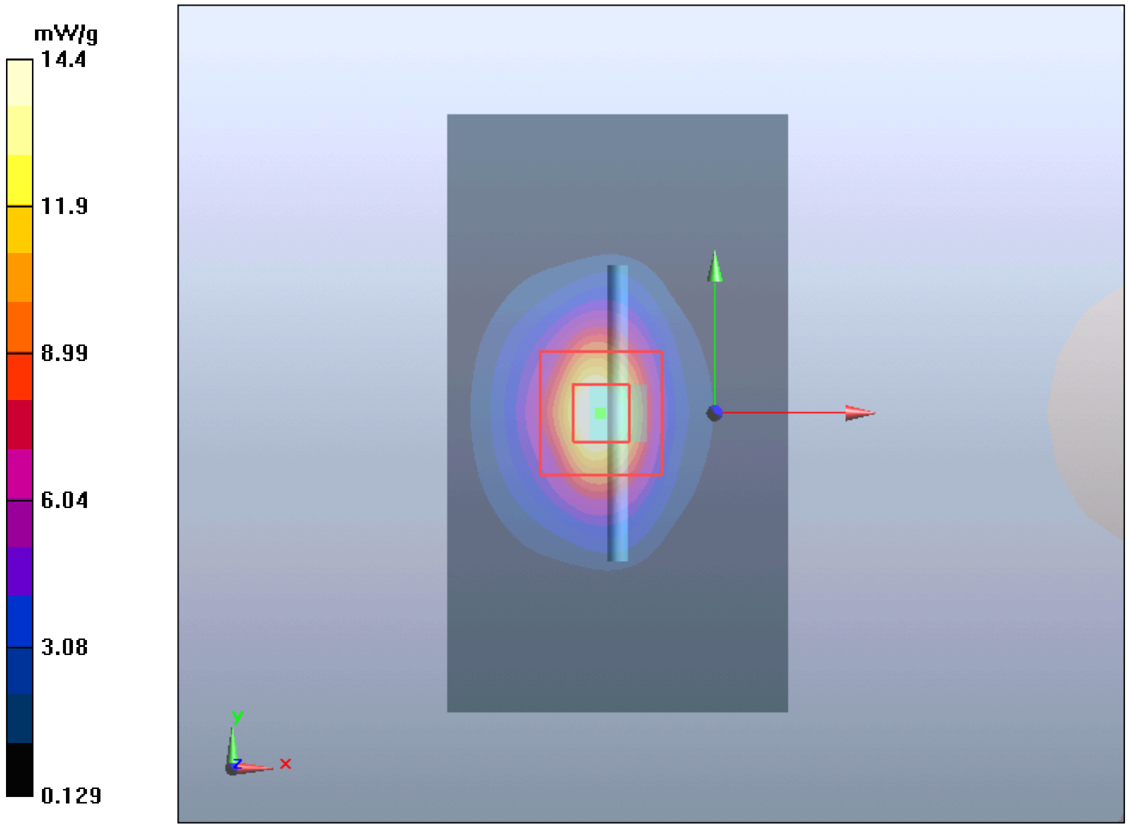
d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 81.2 V/m; Power Drift = 0.003 dB

Peak SAR (extrapolated) = 25.4 W/kg

SAR(1 g) = 12.5 mW/g; SAR(10 g) = 6.20 mW/g

Maximum value of SAR (measured) = 14.4 mW/g



Plot 2 System Performance Check at 5250 MHz Body TSL

DUT: Dipole 5250 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151

Date: 6/30/2018

Communication System: CW; Frequency: 5250 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5250 MHz; σ = 5.42 mho/m; ε_r = 46.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(5.04, 5.04, 5.04); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

d=10mm, Pin=250mW/Area Scan (61x101x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 7.69 mW/g

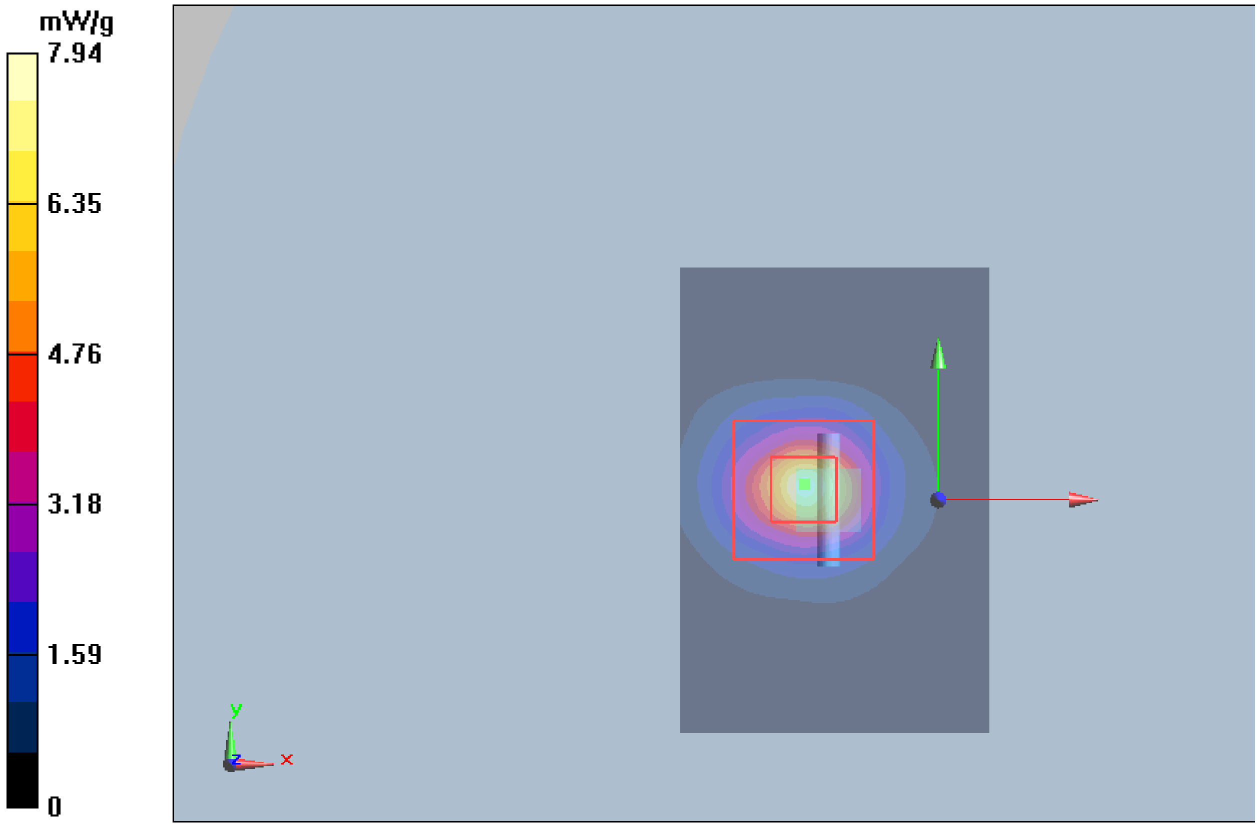
d=10mm, Pin=250mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 36.3 V/m; Power Drift = 0.0277 dB

Peak SAR (extrapolated) = 47.7 W/kg

SAR(1 g) = 7.46 mW/g; SAR(10 g) = 2.26 mW/g

Maximum value of SAR (measured) = 7.94 mW/g



Plot 3 System Performance Check at 5600 MHz Body TSL

DUT: Dipole 5600 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151

Date: 6/29/2018

Communication System: CW; Frequency: 5600 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5600 MHz; σ = 6.00 mho/m; ε_r = 47.3; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(4.27, 4.27, 4.27); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

d=10mm, Pin=250mW/Area Scan (61x101x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 7.84 mW/g

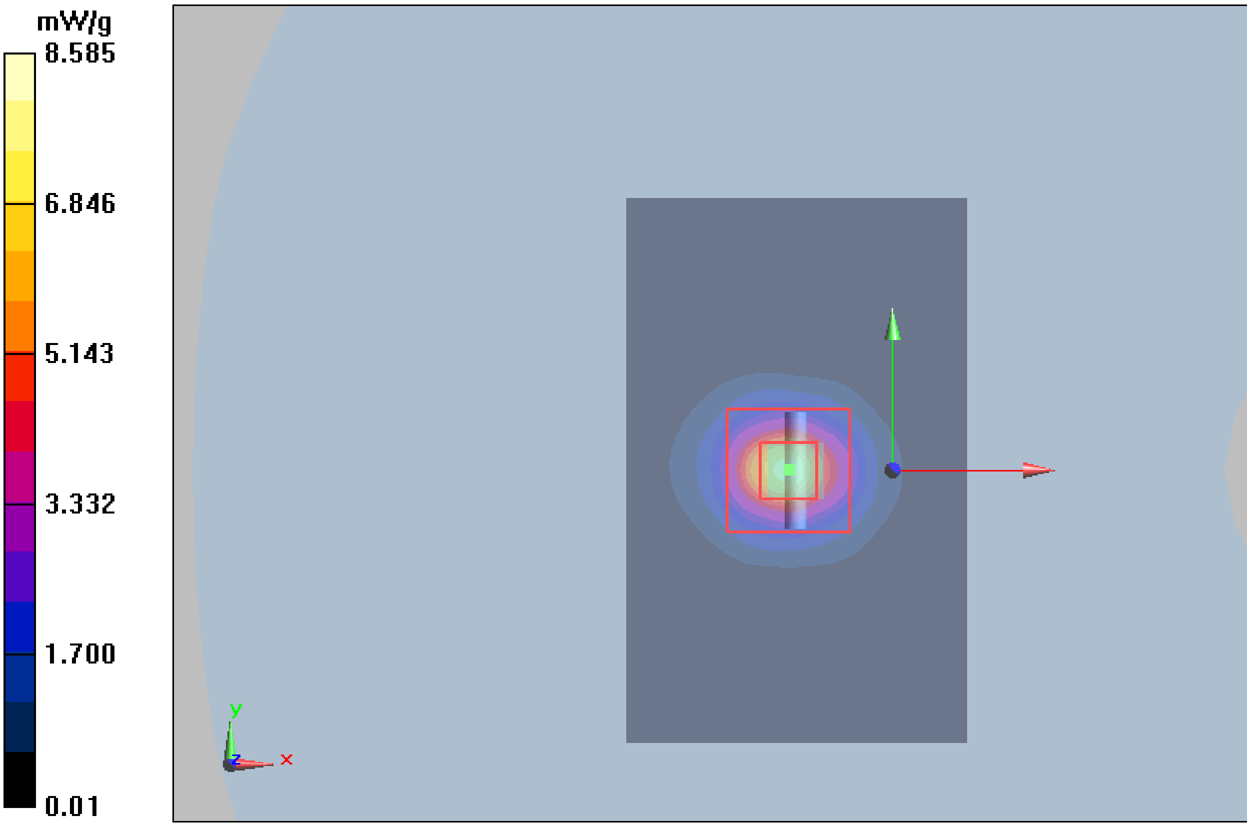
d=10mm, Pin=250mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 38 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 22.6 W/kg

SAR(1 g) = 8.10 mW/g; SAR(10 g) = 2.11 mW/g

Maximum value of SAR (measured) = 8.585 mW/g



Plot 4 System Performance Check at 5750 MHz Body TSL

DUT: Dipole 5750 MHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1151

Date: 6/30/2018

Communication System: CW; Frequency: 5750 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5750 MHz; σ = 6.07 mho/m; ε_r = 47.7; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(4.43, 4.43, 4.43); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

d=10mm, Pin=250mW/Area Scan (61x101x1): Measurement grid: dx=1.000mm, dy=1.000mm

Maximum value of SAR (interpolated) = 7.84 mW/g

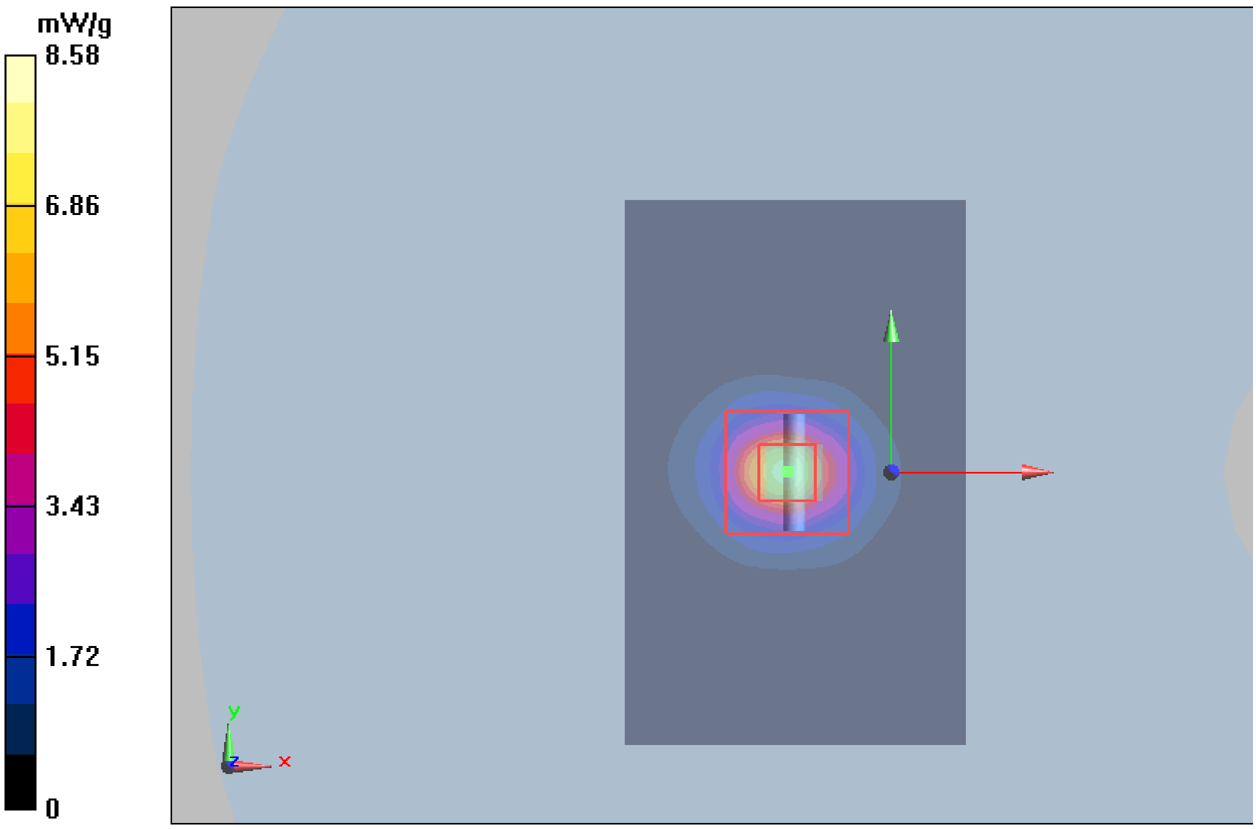
d=10mm, Pin=250mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 38 V/m; Power Drift = -0.018 dB

Peak SAR (extrapolated) = 22.6 W/kg

SAR(1 g) = 7.15 mW/g; SAR(10 g) = 1.99 mW/g

Maximum value of SAR (measured) = 8.58 mW/g



ANNEX C: Highest Graph Results

Plot 5 802.11b Back Side High (Battery 3, Distance 0mm)

Date: 6/29/2018

Communication System: UID 0, WiFi (0); Frequency: 2462 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2462 MHz; σ = 1.945 S/m; ε_r = 51.797; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side High/Area Scan (171x231x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.286 W/kg

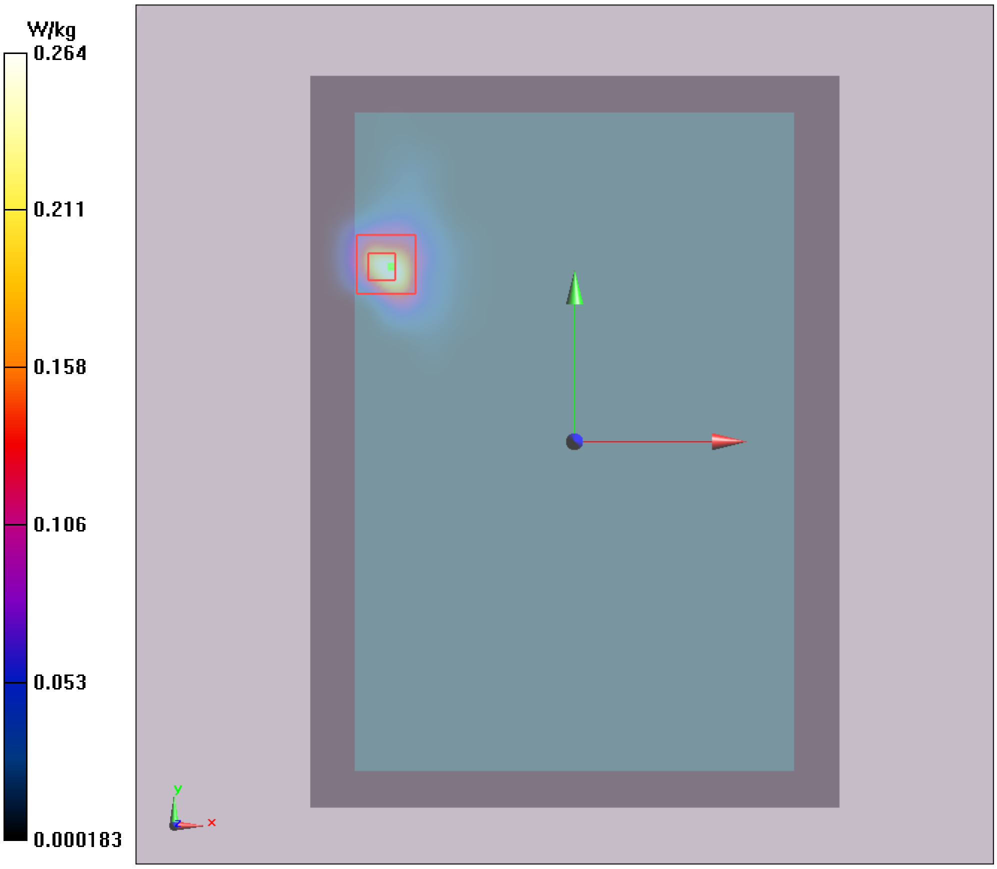
Back Side High/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.662 W/kg

SAR(1 g) = 0.248 W/kg; SAR(10 g) = 0.095 W/kg

Maximum value of SAR (measured) = 0.264 W/kg



Plot 6 802.11ac VHT80 U-NII-2A Left Edge CH58 (Distance 0mm)

Date: 6/30/2018

Communication System: UID 0, WiFi (0); Frequency: 5290 MHz;Duty Cycle: 1:1.04

Medium parameters used: f = 5290 MHz; σ = 5.479 S/m; ε_r = 46.602; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(5.04, 5.04, 5.04); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Left Edge CH58/Area Scan (51x271x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.348 W/kg

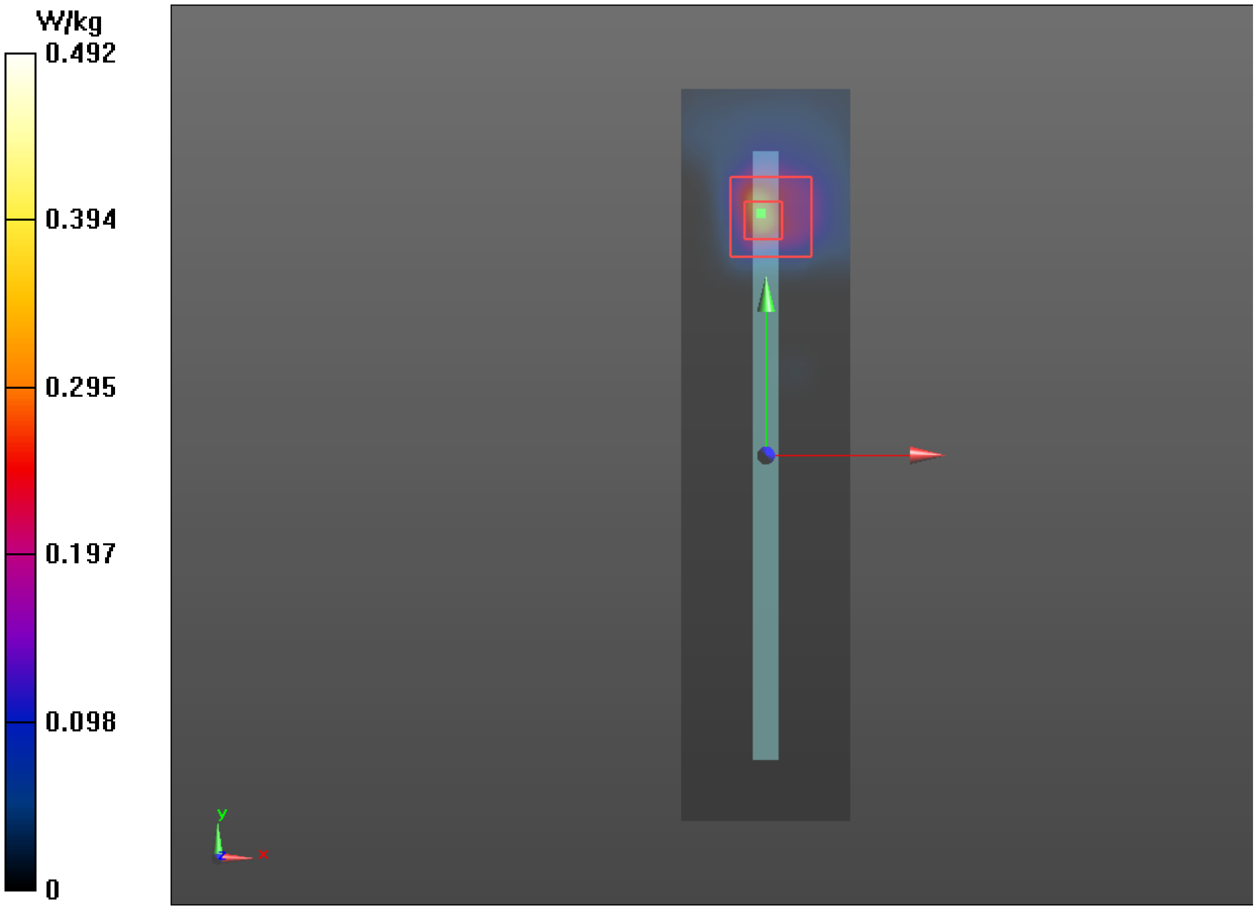
Left Edge CH58/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 2.017 V/m; Power Drift = 0.186 dB

Peak SAR (extrapolated) = 0.925 W/kg

SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.106 W/kg

Maximum value of SAR (measured) = 0.492 W/kg



Plot 7 802.11acVHT80 U-NII-2C Top Edge CH106 (Distance 14mm)

Date: 6/29/2018

Communication System: UID 0, WiFi (0); Frequency: 5530 MHz;Duty Cycle: 1:1.04

Medium parameters used: f = 5530 MHz; σ = 5.841 S/m; ε_r = 47.669; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(4.27, 4.27, 4.27); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Top Edge CH106/Area Scan (41x271x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.289 W/kg

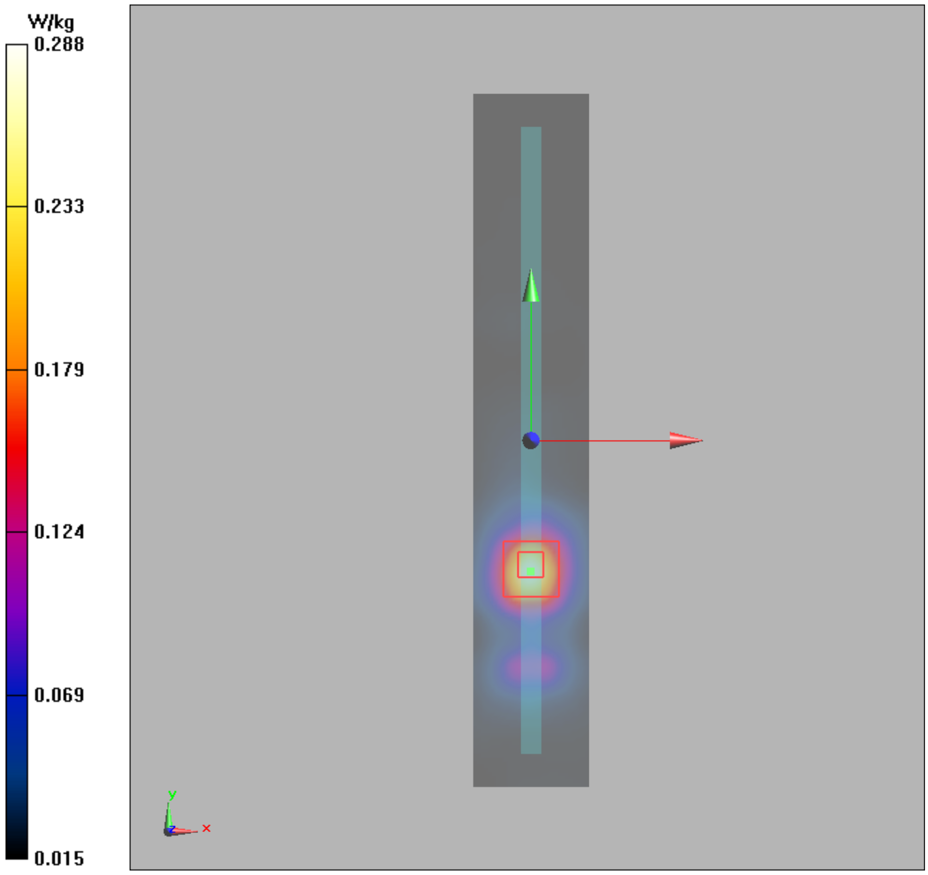
Top Edge CH106/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 4.049 V/m; Power Drift = 0.053 dB

Peak SAR (extrapolated) = 0.707 W/kg

SAR(1 g) = 0.266 W/kg; SAR(10 g) = 0.119 W/kg

Maximum value of SAR (measured) = 0.288 W/kg



Plot 8 802.11acVHT80 U-NII-3 Top Edge CH155 (Distance 14mm)

Date: 6/30/2018

Communication System: UID 0, WiFi (0); Frequency: 5775 MHz;Duty Cycle: 1:1.04

Medium parameters used: f = 5775 MHz; σ = 6.092 S/m; ε_r = 47.66; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(4.43, 4.43, 4.43); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Top Edge CH155/Area Scan (51x271x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.281 W/kg

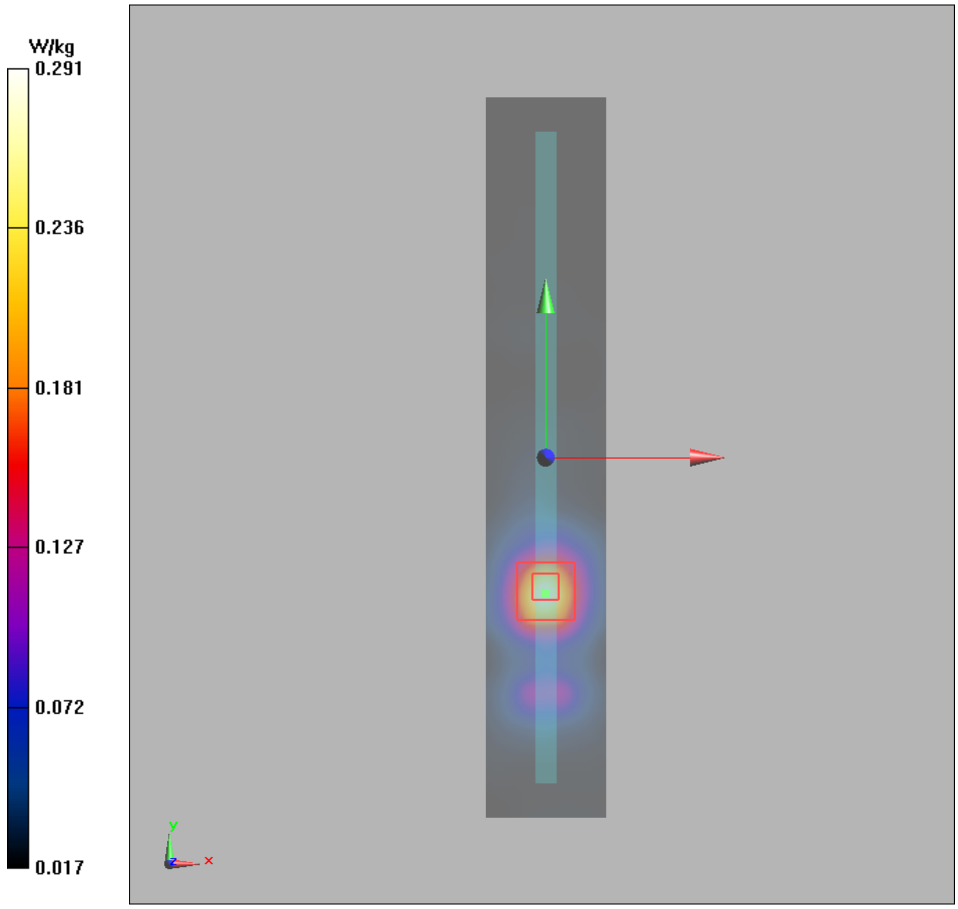
Top Edge CH155/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.654 V/m; Power Drift = 0.104 dB

Peak SAR (extrapolated) = 0.686 W/kg

SAR(1 g) = 0.262 W/kg; SAR(10 g) = 0.121 W/kg

Maximum value of SAR (measured) = 0.291 W/kg



Plot 9 Bluetooth Back Side Low (Battery 3, Distance 0mm)

Date: 6/29/2018

Communication System: UID 0, BT (0); Frequency: 2402 MHz;Duty Cycle: 1:1.3055

Medium parameters used: f = 2402 MHz; σ = 1.871 S/m; ε_r = 51.973; ρ = 1000 kg/m^3

Ambient Temperature:22.3 ℃ Liquid Temperature: 21.5℃

Phantom section: Flat Section

DASY5 Configuration:

Sensor-Surface: 4mm (Mechanical Surface Detection)

Probe: EX3DV4 - SN3677; ConvF(7.53, 7.53, 7.53); Calibrated: 5/29/2018;

Electronics: DAE4 SN1317; Calibrated: 3/23/2018

Phantom: ELI 4.0; Type: QDOVA001BA;

Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Back Side Low/Area Scan (171x231x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Maximum value of SAR (interpolated) = 0.235 W/kg

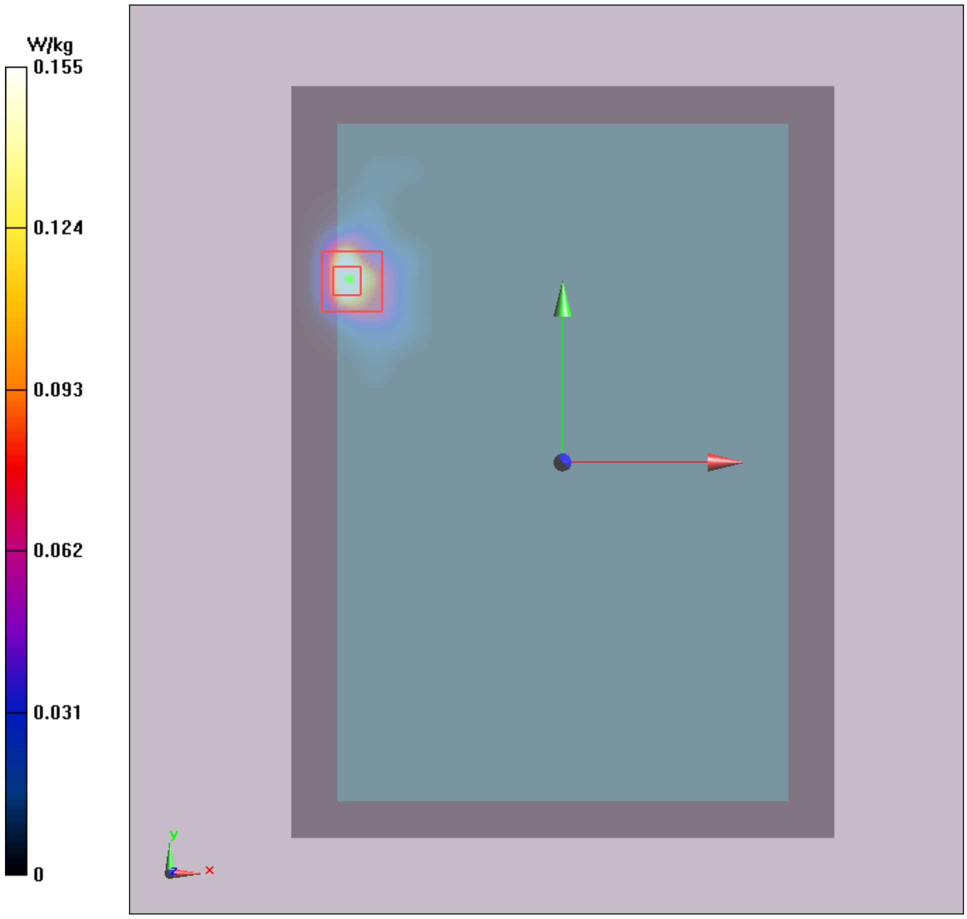
Back Side Low/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 0 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.334 W/kg

SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.051 W/kg

Maximum value of SAR (measured) = 0.155 W/kg



ANNEX D: Probe Calibration Certificate

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中国认可 国际互认 校准 CALIBRATION CNAS L0570

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Client TA(shanghai) Certificate No: Z18-60093

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3677
Calibration Procedure(s)	FF-Z11-004-01 Calibration Procedures for Dosimetric E-field Probes
Calibration date:	May 29, 2018

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	101919	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101547	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Power sensor NRP-Z91	101548	27-Jun-17 (CTTL, No.J17X05857)	Jun-18
Reference10dBAttenuator	18N50W-10dB	09-Feb-18(CTTL, No.J18X01133)	Feb-20
Reference20dBAttenuator	18N50W-20dB	09-Feb-18(CTTL, No.J18X01132)	Feb-20
Reference Probe EX3DV4	SN 3846	25-Jan-18(SPEAG,No.EX3-3846_Jan18)	Jan-19
DAE4	SN 777	15-Dec-17(SPEAG, No.DAE4-777_Dec17)	Dec -18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGeneratorMG3700A	6201052605	27-Jun-17 (CTTL, No.J17X05858)	Jun-18
Network Analyzer E5071C	MY46110673	14-Jan-18 (CTTL, No.J18X00561)	Jan -19

	Name	Function	Signature
Calibrated by:	Yu Zongying	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: May 31, 2018

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com Http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), i θ=0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016

c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010

d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization θ=0 (f≤900MHz in TEM-cell; f>1800MHz: waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not effect the E^2-field uncertainty inside TSL (see below ConvF).
- *NORM(f)x,y,z = NORMx,y,z* frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics.
- *Ax,y,z; Bx,y,z; Cx,y,z;VRx,y,z:*A,B,C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f≤800MHz) and inside waveguide using analytical field distributions based on power measurements for f >800MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from±50MHz to±100MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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Probe EX3DV4

SN: 3677

Calibrated: May 29, 2018

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: Z18-60093 Page 3 of 11

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm(μV/(V/m)^2)[A]	0.41	0.46	0.41	±10.0%
DCP(mV)[B]	99.9	102.7	102.1	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	152.4	±2.4%
		Y	0.0	0.0	1.0		161.7	
		Z	0.0	0.0	1.0		152.2	

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of Norm X, Y, Z do not affect the E^2-field uncertainty inside TSL (see Page 5 and Page 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainly is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Calibration Parameter Determined in Head Tissue Simulating Media

f [MHz][C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	41.9	0.89	9.40	9.40	9.40	0.40	0.80	±12.1%
835	41.5	0.90	9.10	9.10	9.10	0.15	1.41	±12.1%
1750	40.1	1.37	8.19	8.19	8.19	0.21	1.15	±12.1%
1900	40.0	1.40	7.96	7.96	7.96	0.25	1.01	±12.1%
2300	39.5	1.67	7.91	7.91	7.91	0.40	0.78	±12.1%
2450	39.2	1.80	7.57	7.57	7.57	0.53	0.76	±12.1%
2600	39.0	1.96	7.28	7.28	7.28	0.64	0.70	±12.1%
5250	35.9	4.71	5.60	5.60	5.60	0.40	1.15	±13.3%
5600	35.5	5.07	4.87	4.87	4.87	0.45	1.05	±13.3%
5750	35.4	5.22	4.99	4.99	4.99	0.45	1.35	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Calibration Parameter Determined in Body Tissue Simulating Media

f [MHz][C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unct. (k=2)
750	55.5	0.96	9.79	9.79	9.79	0.40	0.80	±12.1%
835	55.2	0.97	9.32	9.32	9.32	0.15	1.51	±12.1%
1750	53.4	1.49	7.91	7.91	7.91	0.23	1.09	±12.1%
1900	53.3	1.52	7.70	7.70	7.70	0.20	1.18	±12.1%
2300	52.9	1.81	7.65	7.65	7.65	0.53	0.82	±12.1%
2450	52.7	1.95	7.53	7.53	7.53	0.37	1.10	±12.1%
2600	52.5	2.16	7.16	7.16	7.16	0.55	0.80	±12.1%
5250	48.9	5.36	5.04	5.04	5.04	0.50	1.55	±13.3%
5600	48.5	5.77	4.27	4.27	4.27	0.51	1.66	±13.3%
5750	48.3	5.94	4.43	4.43	4.43	0.50	1.81	±13.3%

[C] Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequency below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ±10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ±5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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Tel: +86-10-62304633-2512 Fax: +86-10-62304633-2504
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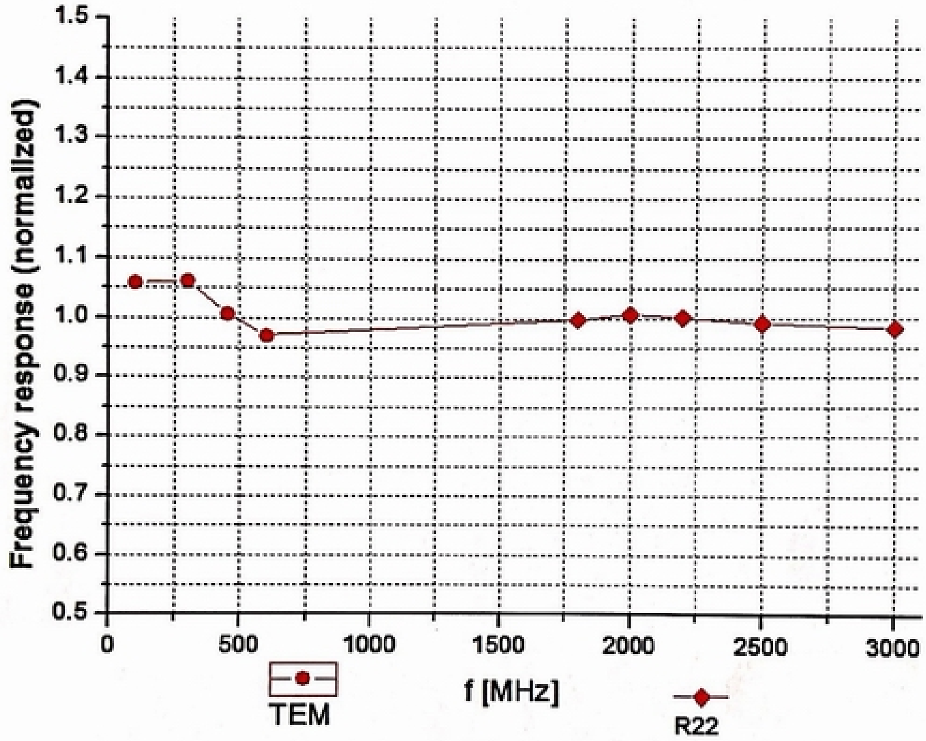
Frequency Response of E-Field
(TEM-Cell: ifi110 EXX, Waveguide: R22)



Uncertainty of Frequency Response of E-field: ±7.4% (k=2)

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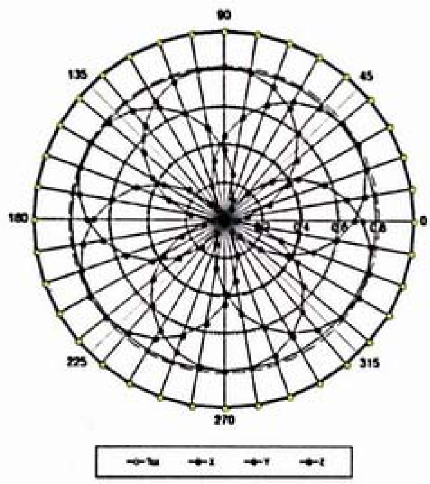
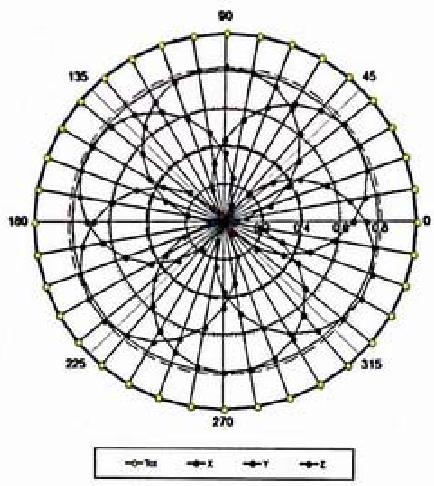
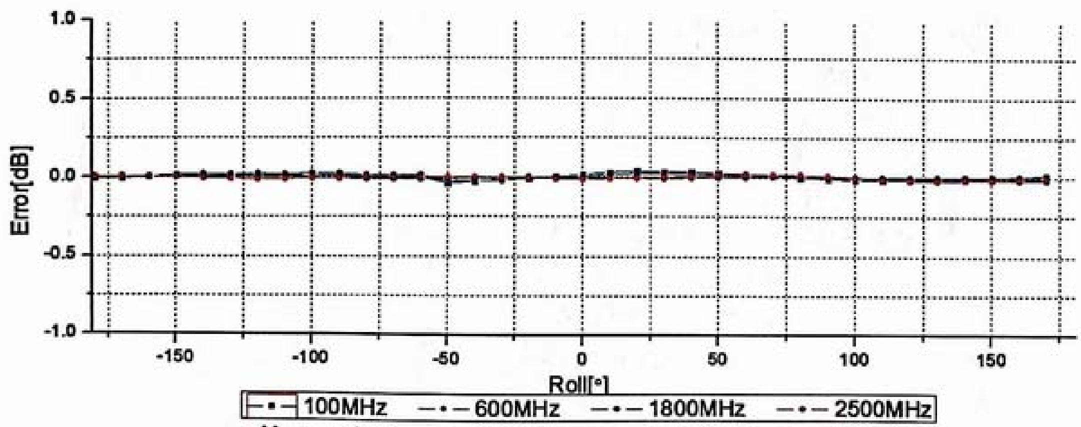
Receiving Pattern (Φ), θ=0°

f=600 MHz, TEM



f=1800 MHz, R22





Uncertainty of Axial Isotropy Assessment: ±1.2% (k=2)

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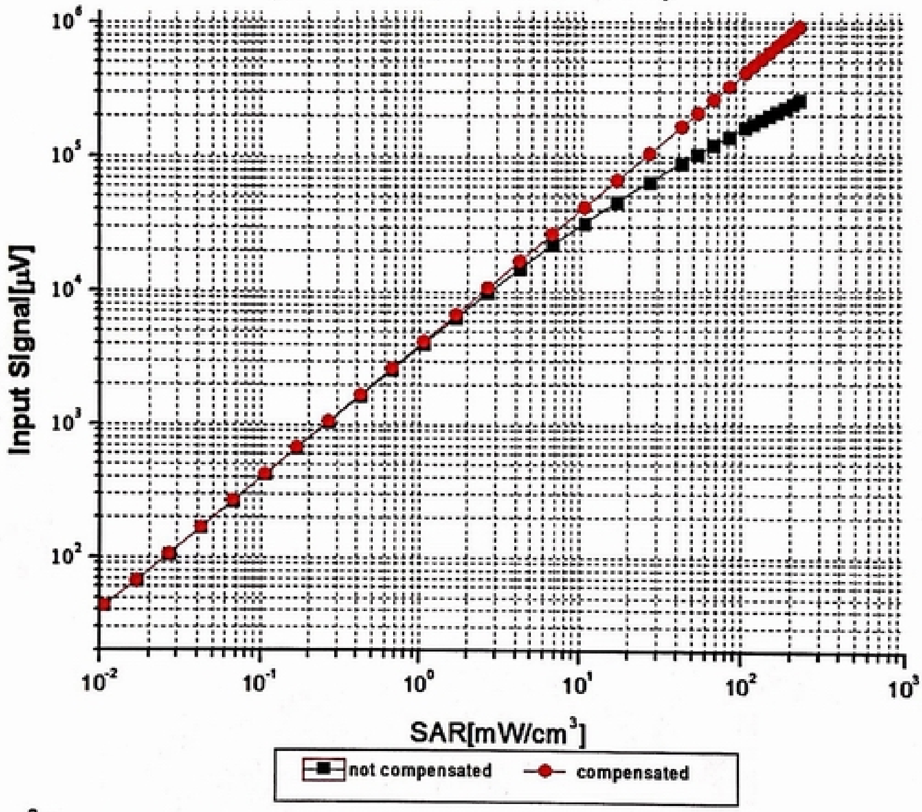
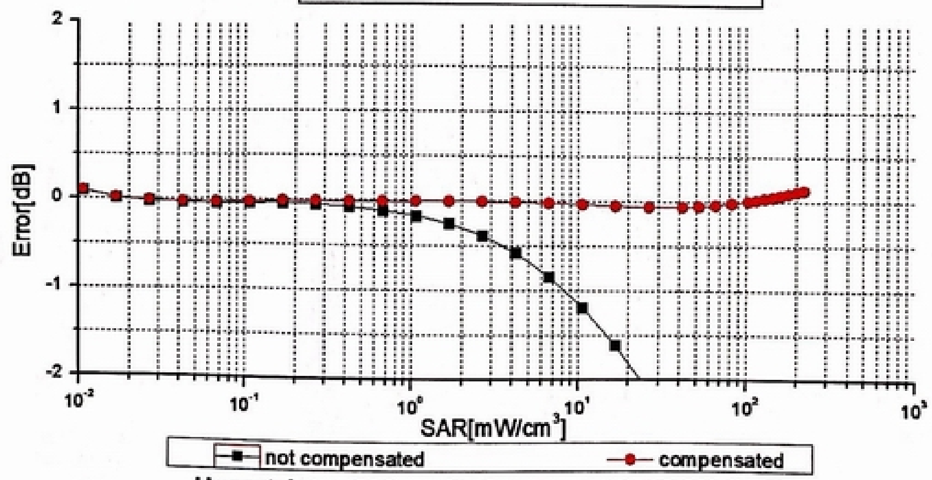
Dynamic Range f(SAR_{head})
(TEM cell, f = 900 MHz)





Uncertainty of Linearity Assessment: ±0.9% (k=2)

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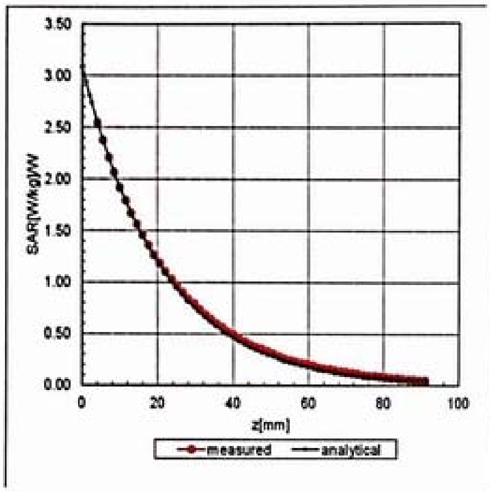
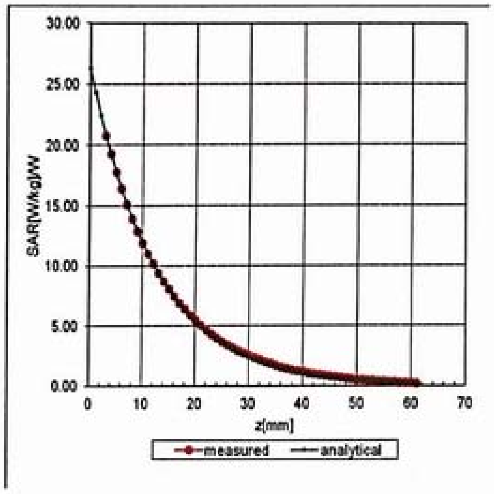
Conversion Factor Assessment

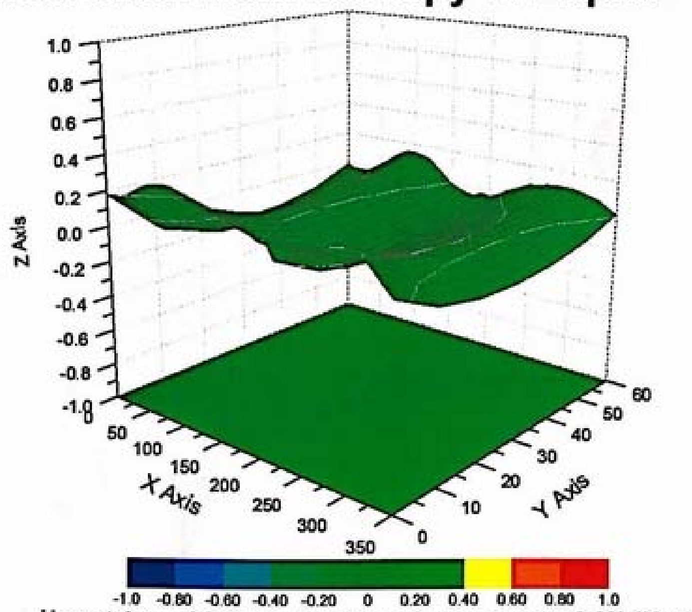
f=750 MHz, WGLS R9(H_convF)



f=1750 MHz, WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: ±3.2% (K=2)

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
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DASY/EASY – Parameters of Probe: EX3DV4 – SN: 3677

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	118.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	9mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm

ANNEX E: D2450V2 Dipole Calibration Certificate

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Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

中国认可 国际互认 校准 CALIBRATION CNAS L0570

Client TA(Shanghai) Certificate No: Z17-97116

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 786
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	August 29, 2017

This calibration Certificate documents the traceability to national standards, which realize the physical units of measurements(SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature(22±3)℃ and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102083	22-Sep-16 (CTTL, No.J16X06809)	Sep-17
Power sensor NRV-Z5	100595	22-Sep-16 (CTTL, No.J16X06809)	Sep-17
Reference Probe EX3DV4	SN 3617	23-Jan-17(SPEAG,No.EX3-3617_Jan17)	Jan-18
DAE4	SN 1331	19-Jan-17(CTTL-SPEAG,No.Z17-97015)	Jan-18
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	13-Jan-17 (CTTL, No.J17X00286)	Jan-18
Network Analyzer E5071C	MY46110673	13-Jan-17 (CTTL, No.J17X00285)	Jan-18

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 1, 2017

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Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

b) IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016

c) IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010

d) KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of Measurement multiplied by the coverage factor k=2, which for a normal distribution Corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY52	52.10.0.1446
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.7 ± 6 %	1.82 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**52.6 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.16 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 mW /g ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**50.8 mW /g ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.87 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**23.5 mW /g ± 18.7 % (k=2)**

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4Ω+ 4.29jΩ
Return Loss	- 25.5dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.0Ω+ 6.61jΩ
Return Loss	- 23.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.265 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

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