TESTING LABORATORY
CERTIFICATE # 4821.01

Bay Area Compliance Labs Corp.

SAR EVALUATION REPORT

For

Shenzhen Jingwah Information Technology Co., Ltd.

4F, Bldg 4, Jinghua Square, No.1 Huafa North Road,Shenzhen, China

FCC ID: RBD-M11550

Report Type:	**Product Type:**
Original Report	Tablet PC

Report Number: RGMA190225001-20A

Report Date: 2019-03-13

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<tr><td>Serial Number</td><td colspan="2">19022500103</td></tr>
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<tr><td colspan="2">MODE</td><td>Max. SAR Level(s) Reported(W/kg)</td><td>Limit (W/kg)</td></tr>
<tr><td>Bluetooth</td><td>1g Body SAR</td><td>0.26</td><td rowspan="5">1.6</td></tr>
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<tr><td rowspan="4">Applicable Standards</td><td>FCC 47 CFR part 2.1093
Radiofrequency radiation exposure evaluation: portable devices</td></tr>
<tr><td>IEEE1528:2013
IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques</td></tr>
<tr><td>IEC 62209-2:2010
Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices-Human models, instrumentation, and procedures-Part 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)</td></tr>
<tr><td>KDB procedures
KDB 447498 D01 General RF Exposure Guidance v06
KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
KDB 865664 D02 RF Exposure Reporting v01r02
KDB 941225 D05 SAR for LTE Devices v02r05
KDB 616217 D04 SAR for laptop and tablets v01r02
KDB 248227 D01 802.11 Wi-Fi SAR v02r02</td></tr>
<tr><td colspan="2">Note: This wireless device has been shown to be capable of compliance for localized specific absorption rate (SAR) for General Population/Uncontrolled Exposure limits specified in FCC 47 CFR part 2.1093 and has been tested in accordance with the measurement procedures specified in IEEE 1528-2013 and RF exposure KDB procedures.
The results and statements contained in this report pertain only to the device(s) evaluated.</td></tr>
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
1.0	RGMA190225001-20A	Original Report	2019-03-13

EUT DESCRIPTION

This report has been prepared on behalf of ***Shenzhen Jingwah Information Technology Co., Ltd.*** and their product ***Tablet PC***, Model: ***M11550***, FCC ID: ***RBD-M11550*** or the EUT (Equipment under Test) as referred to in the rest of this report.

Notes: This series products model: ST11550 and M11550 are electrically identical, the differences between them is the model number. Model M11550 was selected for fully testing, the detailed information can be referred to the declaration which was stated and guaranteed by the applicant.

**All measurement and test data in this report was gathered from production sample serial number: 19022500103 (Assigned by BACL, Shenzhen).The EUT supplied by the applicant was received on 2019-02-25.*

Technical Specification

Device Type:	Portable
Exposure Category:	Population / Uncontrolled
Antenna Type(s):	Internal Antenna
Proximity sensor for SAR reduction:	None
Body-Worn Accessories:	Headset
Face-Head Accessories:	None
Operation Mode :	WLAN, Bluetooth
Frequency Band:	Bluetooth : 2402 MHz-2480 MHz 2.4G Wi-Fi: 2412-2472MHz(TX & RX)/2422-2462MHz(TX & RX) Wi-Fi(U-NII-1 Band): 5150-5250MHz(TX & RX) Wi-Fi(U-NII-2A Band): 5250-5350MHz(TX & RX) Wi-Fi(U-NII-2C Band): 5470-5725MHz(TX & RX) Wi-Fi(U-NII-3 Band): 5725-5850MHz(TX & RX)
Conducted RF Power:	Bluetooth : 2402 MHz-2480 MHz 2.4G Wi-Fi: 2412-2472MHz(TX & RX) Wi-Fi(U-NII-1 Band): 5150-5250MHz(TX & RX) Wi-Fi(U-NII-2A Band): 5250-5350MHz(TX & RX) Wi-Fi(U-NII-2C Band): 5470-5725MHz(TX & RX) Wi-Fi(U-NII-3 Band): 5725-5850MHz(TX & RX)
Power Source:	3.7 V_{DC} Rechargeable Battery
Normal Operation:	Body Supported

REFERENCE, STANDARDS, AND GUIDELINES

FCC:

The Report and Order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 1.6 mW/g as recommended by the ANSI/IEEE standard C95.1-1992 [6] for an uncontrolled environment (Paragraph 65). According to the Supplement C of OET Bulletin 65 "Evaluating Compliance with FCC Guide-lines for Human Exposure to Radio frequency Electromagnetic Fields", released on Jun 29, 2001 by the FCC, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in North America is 1.6 mW/g average over 1 gram of tissue mass.

CE:

The order requires routine SAR evaluation prior to equipment authorization of portable transmitter devices, including portable telephones. For consumer products, the applicable limit is 2 mW/g as recommended by EN62209-1 for an uncontrolled environment. According to the Standard, the device should be evaluated at maximum output power (radiated from the antenna) under "worst-case" conditions for normal or intended use, incorporating normal antenna operating positions, device peak performance frequencies and positions for maximum RF energy coupling.

This report describes the methodology and results of experiments performed on wireless data terminal. The objective was to determine if there is RF radiation and if radiation is found, what is the extent of radiation with respect to safety limits. SAR (Specific Absorption Rate) is the measure of RF exposure determined by the amount of RF energy absorbed by human body (or its parts) – to determine how the RF energy couples to the body or head which is a primary health concern for body worn devices. The limit below which the exposure to RF is considered safe by regulatory bodies in Europe is 2 mW/g average over 10 gram of tissue mass.

The test configurations were laid out on a specially designed test fixture to ensure the reproducibility of measurements. Each configuration was scanned for SAR. Analysis of each scan was carried out to characterize the above effects in the device.

SAR Limits

FCC Limit

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1 g of tissue)	**1.60**	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	4.0	20.0

CE Limit

EXPOSURE LIMITS	SAR (W/kg)	
	(General Population / Uncontrolled Exposure Environment)	(Occupational / Controlled Exposure Environment)
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 10 g of tissue)	2.0	10
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)	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).

General Population/Uncontrolled environments Spatial Peak limit 1.6W/kg (FCC) & 2 W/kg (CE) applied to the EUT.

FACILITIES

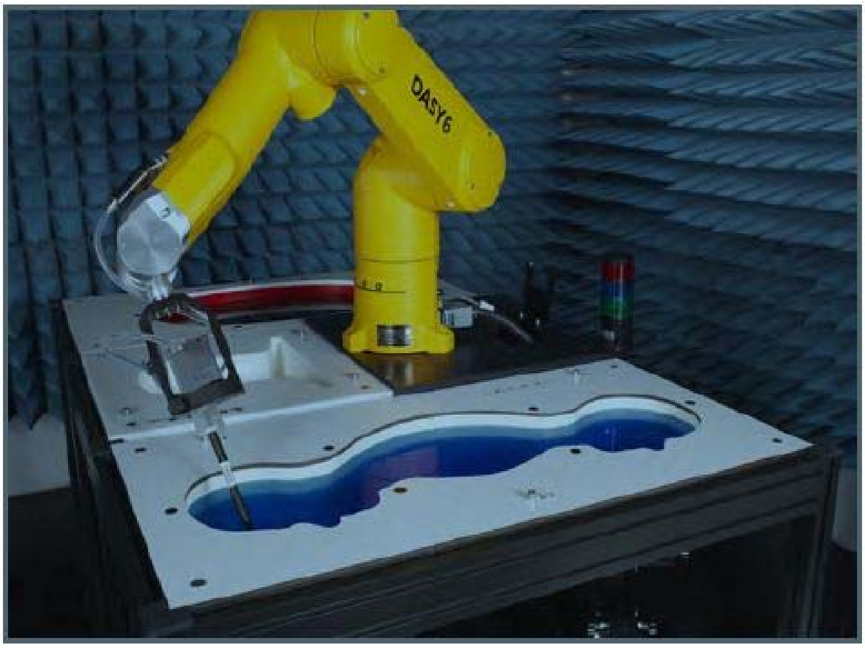
The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect data is located at 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

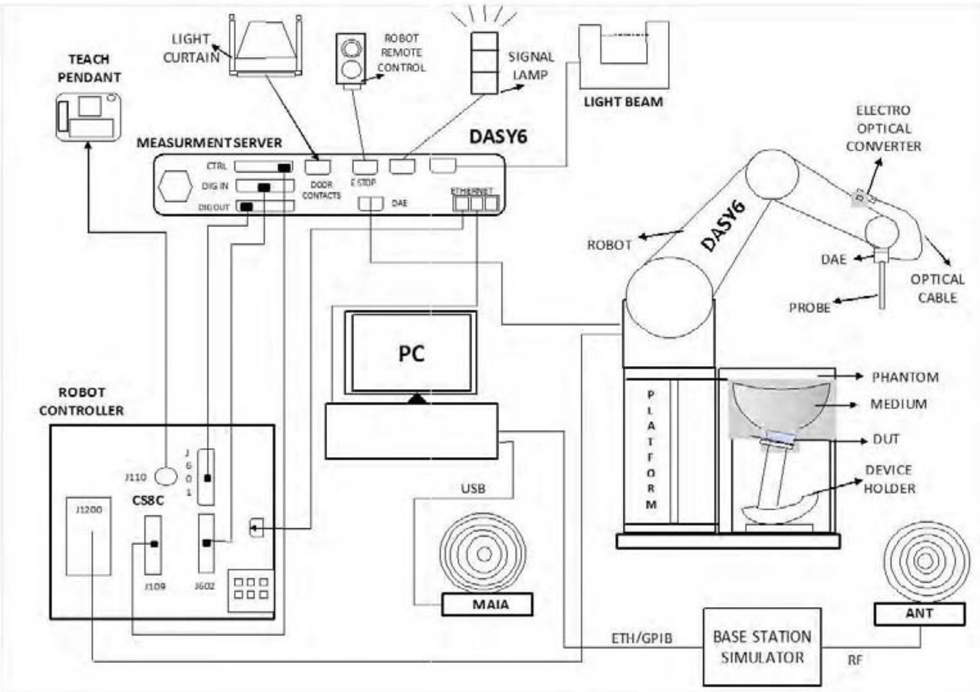
DESCRIPTION OF TEST SYSTEM

These measurements were performed with the automated near-field scanning system DASY6 from Schmid & Partner Engineering AG (SPEAG) which is the Fifth generation of the system shown in the figure hereinafter:



DASY6 System Description

The DASY6 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot (Staubli TX=RX family) 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 application, 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 Win7 professional operating system and the DASY52 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.

DASY6 Measurement Server

The DASY6 measurement server is based on a PC/104 CPU board with a 400 MHz Intel ULV Celeron, 128 MB chip-disk and 128 MB RAM. The necessary circuits for communication with the DAE4 (or DAE3) electronics box, as well as the 16-bit AD converter system for optical detection and digital I/O interface are contained on the DASY6 I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all real-time data evaluations of field measurements and surface detection, controls robot movements, and handles safety operations. The PC operating system cannot interfere with these time-critical processes. All connections are supervised by a watchdog, and disconnection of any of the cables to the measurement server will automatically disarm the robot and disable all program- controlled robot movements. Furthermore, the measurement server is equipped with an expansion port, which is reserved for future applications. Please note that this expansion port does not have a standardized pinout, and therefore only devices provided by SPEAG can be connected. Connection of devices from any other supplier could seriously damage the measurement server.

Data Acquisition Electronics

The data acquisition electronics (DAE4) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

The input impedance of both the DAE4 as well as of the DAE3 box is 200MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

EX3DV4 E-Field Probes

Frequency	10 MHz to > 6 GHz Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in TSL (rotation around probe axis) ± 0.5 dB in TSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 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); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better 30%.
Compatibility	DASY3, DASY4, DASY52 SAR and higher, EASY4/MRI

SAM Twin Phantom

The SAM Twin Phantom (shown in front of DASY6) is a fiberglass shell phantom with shell thickness 2 mm, except in the ear region where the thickness is increased to 6 mm. The phantom has three measurement areas: 1) Left Head, 2) Right Head, and 3) Flat Section. For larger devices, the use of the ELI-Phantom (shown behind DASY6) is required. For devices such as glasses with a wireless link, the Face Down Phantom is the most suitable (between the SAM Twin and ELI phantoms).

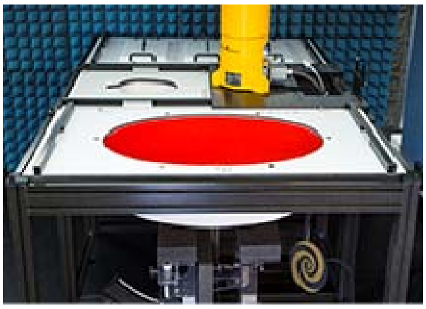
When the phantom is mounted inside allocated slot of the DASY6 platform, phantom reference points can be taught directly in the DASY5 V5.2 software. When the DASY6 platform is used to mount the

Phantom, some of the phantom teaching points cannot be reached by the robot in DASY5 V5.2. A special tool called P1a-P2aX-Former is provided to transform two of the three points, P1 and P2, to reachable locations. To use these new teaching points, a revised phantom configuration file is required.
In addition to our standard broadband liquids, the phantom can be used with the following tissue simulating liquids:

Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.
DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).

Do not use other organic solvents without previously testing the solvent resistivity of the phantom.
Approximately 25 liters of liquid is required to fill the SAM Twin phantom.

ELI Phantom



The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30MHz to 6 GHz. ELI is fully compatible with the latest draft of the standard IEC 62209-2 and the use of all known tissue simulating liquids. ELI has been optimized for performance and can be integrated into a SPEAG standard phantom table. A cover is provided to prevent evaporation of water and changes in liquid parameters. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points.

The phantom can be used with the following tissue simulating liquids:

- Sugar-water-based liquids can be left permanently in the phantom. Always cover the liquid when the system is not in use to prevent changes in liquid parameters due to water evaporation.
- DGBE-based liquids should be used with care. As DGBE is a softener for most plastics, the liquid should be taken out of the phantom, and the phantom should be dried when the system is not in use (desirable at least once a week).
- Do not use other organic solvents without previously testing the solvent resistivity of the phantom.

Approximately 25 liters of liquid is required to _fill the ELI phantom.

Robots

The DASY6 system uses the high-precision industrial robots TX60L, TX90XL, and RX160L from St aubli SA (France). The TX robot family - the successor of the well-known RX robot family - continues to offer the features important for DASY6 applications:

- High precision (repeatability 0.02mm)
- High reliability (industrial design)
- Low maintenance costs (virtually maintenance free due to direct drive gears; no belt drives)
- Jerk-free straight movements (brushless synchrony motors; no stepper motors)
- Low ELF interference (motor control fields shielded via the closed metallic construction shields)

The robots are controlled by the Staubli CS8c robot controllers. All information regarding the use and maintenance of the robot arm and the robot controller is provided

Calibration Frequency Points for EX3DV4 E-Field Probes SN: 7522 Calibrated: 2018/11/02

Calibration Frequency Point(MHz)	Frequency Range(MHz)		Conversion Factor		
	From	To	X	Y	Z
750 Head	650	800	9.78	9.78	9.78
750 Body	650	800	9.8	9.8	9.8
850 Head	800	950	9.46	9.46	9.46
850 Body	800	950	9.54	9.54	9.54
1750 Head	1650	1810	8.2	8.2	8.2
1750 Body	1650	1810	7.88	7.88	7.88
1900 Head	1810	1920	7.91	7.91	7.91
1900 Body	1810	1920	7.48	7.48	7.48
2000 Head	1920	2100	7.78	7.78	7.78
2000 Body	1920	2100	7.36	7.36	7.36
2300 Head	2200	2399	7.35	7.35	7.35
2300 Body	2200	2399	7.27	7.27	7.27
2450 Head	2399	2500	6.97	6.97	6.97
2450 Body	2399	2500	7.05	7.05	7.05
2600 Head	2500	2700	6.79	6.79	6.79
2600 Body	2500	2700	6.95	6.95	6.95
5250 Head	5140	5360	5.05	5.05	5.05
5250 Body	5140	5360	4.77	4.77	4.77
5600 Head	5490	5700	4.48	4.48	4.48
5600 Body	5490	5700	4.27	4.27	4.27
5800 Head	5700	5910	4.76	4.76	4.76
5800 Body	5700	5910	4.31	4.31	4.31

Area Scans

Area scans are defined prior to the measurement process being executed with a user defined variable spacing between each measurement point (integral) allowing low uncertainty measurements to be conducted. Scans defined for FCC applications utilize a 15mm 2 step integral, with 1.5mm interpolation used to locate the peak SAR area used for zoom scan assessments.

Where the system identifies multiple SAR peaks (which are within 25% of peak value) the system will provide the user with the option of assessing each peak location individually for zoom scan averaging.

Zoom Scan (Cube Scan Averaging)

The averaging zoom scan volume utilized in the DASY5 software is in the shape of a cube and the side dimension of a 1 g or 10 g mass is dependent on the density of the liquid representing the simulated tissue. A density of 1000 kg/m^3 is used to represent the head and body tissue density and not the phantom liquid density, in order to be consistent with the definition of the liquid dielectric properties, i.e. the side length of the 1g cube is 10mm,with the side length of the 10g cube is 21.5mm.

When the cube intersects with the surface of the phantom, it is oriented so that 3 vertices touch the surface of the shell or the center of a face is tangent to the surface. The face of the cube closest to the surface is modified in order to conform to the tangent surface.

The zoom scan integer steps can be user defined so as to reduce uncertainty, but normal practice for typical test applications (including FCC) utilize a physical step of 7 x7 x 7 (5mmx5mmx5mm) providing a volume of 30 mm in the X & Y & Z axis.

Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Recommended Tissue Dielectric Parameters for Head and Body

Frequency (MHz)	Head Tissue		Body Tissue	
	εr	Ơ (S/m)	εr	Ơ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800-2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

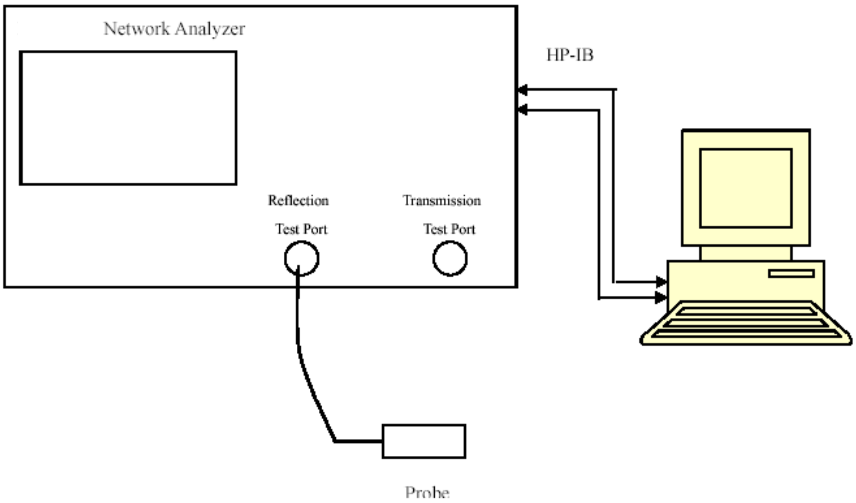
EQUIPMENT LIST AND CALIBRATION

Equipments List & Calibration Information

Equipment	Model	S/N	Calibration Date	Calibration Due Date
DASY5 Test Software	DASY52 52.10.2	N/A	NCR	NCR
DASY6 Measurement Server	DASY6 6.0.31	N/A	NCR	NCR
Data Acquisition Electronics	DAE4	1562	2018/11/6	2019/11/6
E-Field Probe	EX3DV4	7522	2018/11/2	2019/11/2
Mounting Device	MD4HHTV5	SD 000 H01 KA	NCR	NCR
ELI Phantom	ELI V8.0	2092	NCR	NCR
Dipole, 2450MHz	D2450V2	751	2017/10/12	2020/10/12
Dipole, 5200MHz	ALS-D-5200-S-2	230-00805	2016/10/05	2019/10/05
Dipole, 5600MHz	ALS-D-5600-S-2	234-00703	2016/10/05	2019/10/05
Dipole, 5800MHz	ALS-D-5800-S-2	240-00855	2016/10/05	2019/10/05
Simulated Tissue Liquid Body	MBBL600-6000V6	180611-1	Each Time	
Network Analyzer	8753D	3410A08288	2018/04/25	2019/04/25
Dielectric Assessment Kit	DAK-3.5	1248	NCR	NCR
Anritsu Signal Generator	68369B	4114	2018/12/29	2019/12/29
Power Meter	E4419B	GB39511341	2018/06/23	2019/06/23
Power Amplifier	5S1G4	71377	NCR	NCR
Directional Coupler	4242-10	3307	NCR	NCR
Attenuator	3dB	5402	NCR	NCR
Attenuator	10dB	AU 3842	NCR	NCR
R&S, universal Radio Communication Tester	CMU200	115500	2018/06/23	2019/06/23
WIDEBAND RADIO COMMUNICATION TESTER	CMW500	1201.002K50-146520-wh	2018/04/24	2019/04/24
Wireless communication tester	8960	MY50266471	2018/04/25	2019/04/25

SAR MEASUREMENT SYSTEM VERIFICATION

Liquid Verification



Liquid Verification Setup Block Diagram

Liquid Verification Results

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
2402	Simulated Tissue Liquid Body	52.809	1.911	52.76	1.90	0.09	0.58	±5
2412	Simulated Tissue Liquid Body	52.454	1.923	52.75	1.91	-0.56	0.68	±5
2441	Simulated Tissue Liquid Body	52.577	1.942	52.71	1.94	-0.25	0.1	±5
2442	Simulated Tissue Liquid Body	52.588	1.941	52.71	1.94	-0.23	0.05	±5
2450	Simulated Tissue Liquid Body	52.271	1.956	52.70	1.95	-0.81	0.31	±5
2472	Simulated Tissue Liquid Body	52.43	1.998	52.67	1.98	-0.46	0.91	±5
2480	Simulated Tissue Liquid Body	52.317	1.991	52.66	1.99	-0.65	0.05	±5

Liquid Verification above was performed on 2019/03/04.

Frequency (MHz)	Liquid Type	Liquid Parameter		Target Value		Delta (%)		Tolerance (%)
		ε_r	σ (S/m)	ε_r	σ (S/m)	$\Delta\varepsilon_r$	Δσ	
5200	Simulated Tissue Liquid Body	49.357	5.420	49.01	5.30	0.71	2.26	±5
5290	Simulated Tissue Liquid Body	49.181	5.492	48.89	5.40	0.6	1.7	±5
5500	Simulated Tissue Liquid Body	48.896	5.733	48.61	5.65	0.59	1.47	±5
5600	Simulated Tissue Liquid Body	48.777	5.862	48.47	5.77	0.63	1.59	±5
5700	Simulated Tissue Liquid Body	48.536	5.937	48.34	5.88	0.41	0.97	±5
5775	Simulated Tissue Liquid Body	48.369	6.031	48.23	5.97	0.29	1.02	±5
5800	Simulated Tissue Liquid Body	48.335	6.065	48.20	6.00	0.28	1.08	±5

Liquid Verification above was performed on 2019/03/04.

System Accuracy Verification

Prior to the assessment, the system validation kit was used to test whether the system was operating within its specifications of ±10%. The validation results are tabulated below. And also the corresponding SAR plot is attached as well in the SAR plots files.

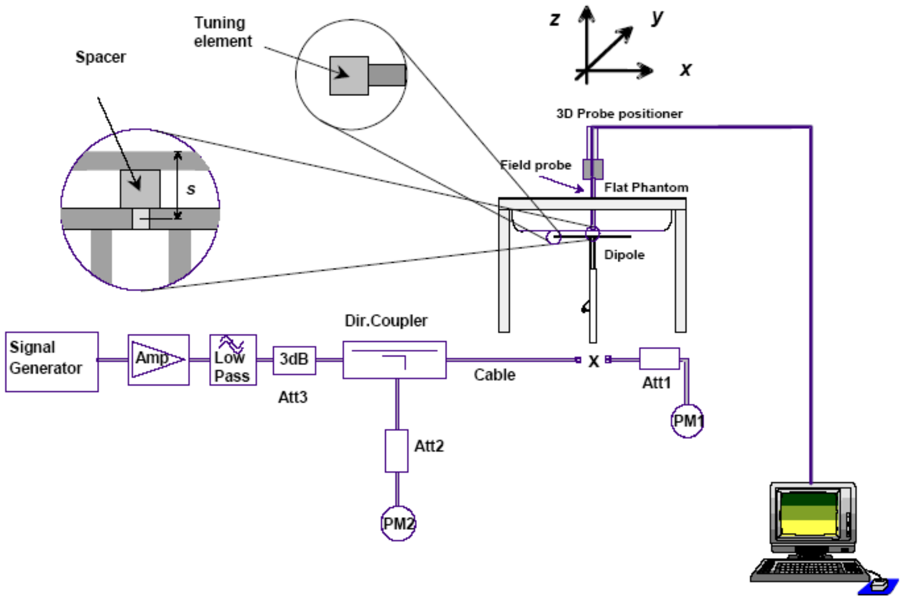
The spacing distances in the **System Verification Setup Block Diagram** is given by the following:

a) s = 15 mm ± 0,2 mm for 300 MHz ≤ f ≤ 1 000 MHz;

b) s = 10 mm ± 0,2 mm for 1 000 MHz < f ≤ 3 000 MHz;

c) s = 10 mm ± 0,2 mm for 3 000 MHz < f ≤ 6 000 MHz.

System Verification Setup Block Diagram



System Accuracy Check Results

Date	Frequency Band (MHz)	Liquid Type	Input Power (mW)	Measured SAR (W/kg)		Normalized to 1W (W/kg)	Target Value (W/Kg)	Delta (%)	Tolerance (%)
2019/03/04	2450	Body	100	1g	5.07	50.7	51.7	-1.934	±10
2019/03/04	5200	Body	100	1g	7.71	77.1	75.12	2.636	±10
2019/03/04	5600	Body	100	1g	8.57	85.7	82.22	4.233	±10
2019/03/04	5800	Body	100	1g	7.97	79.7	77.17	3.278	±10

*The SAR values above are normalized to 1 Watt forward power.

SAR SYSTEM VALIDATION DATA

System Performance 2450 MHz Body

DUT: Dipole 2450MHz; Type: D2450V2; Serial: 751

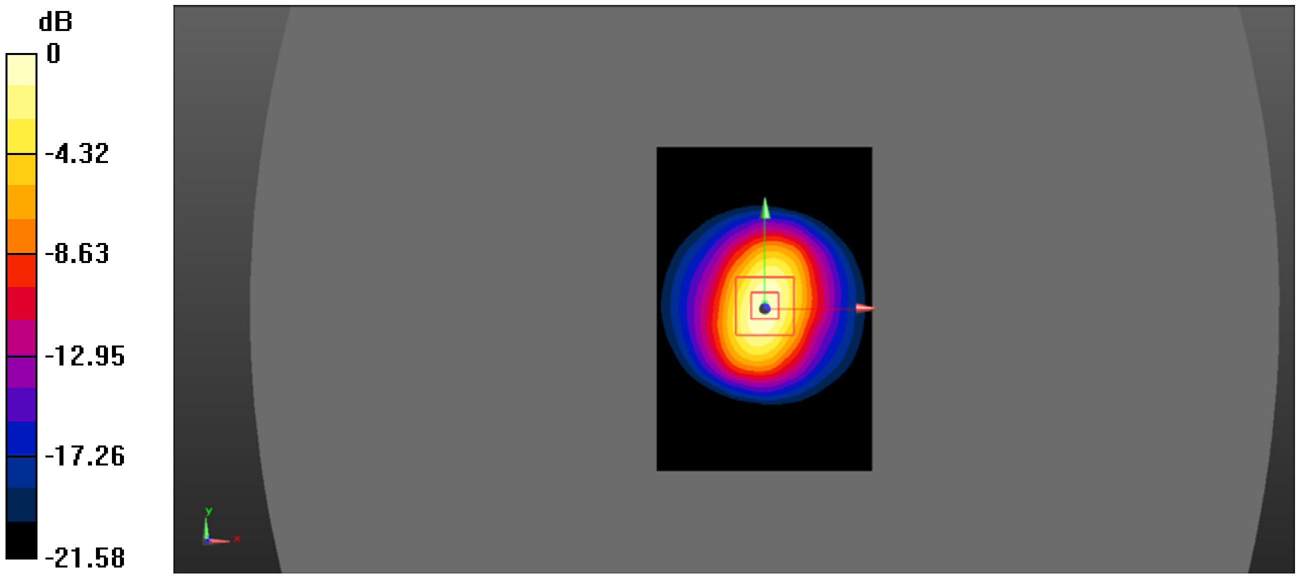
Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.956 S/m; ε_r = 52.271; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN7522; ConvF(7.05, 7.05, 7.05) @ 2450 MHz;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1562; Calibrated: 11/6/2018
- Phantom: ELI V8.0 P1aP2a; Type: QD OVA 004 AA; Serial: 2092
- DASY52 52.10.2(1495); SEMCAD X 14.6.12(7450)

Body 2450MHz Pin=100mW/Area Scan (81x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 5.66 W/kg

Body 2450MHz Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.98 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 10.9 W/kg
SAR(1 g) = 5.07 W/kg; SAR(10 g) = 2.50 W/kg
Maximum value of SAR (measured) = 5.77 W/kg



0 dB = 5.77 W/kg = 7.61 dBW/kg

System Performance 5200 MHz Body

DUT: Dipole 5200MHz; Type: ALS-D-5200-S-2; Serial: 230-00805

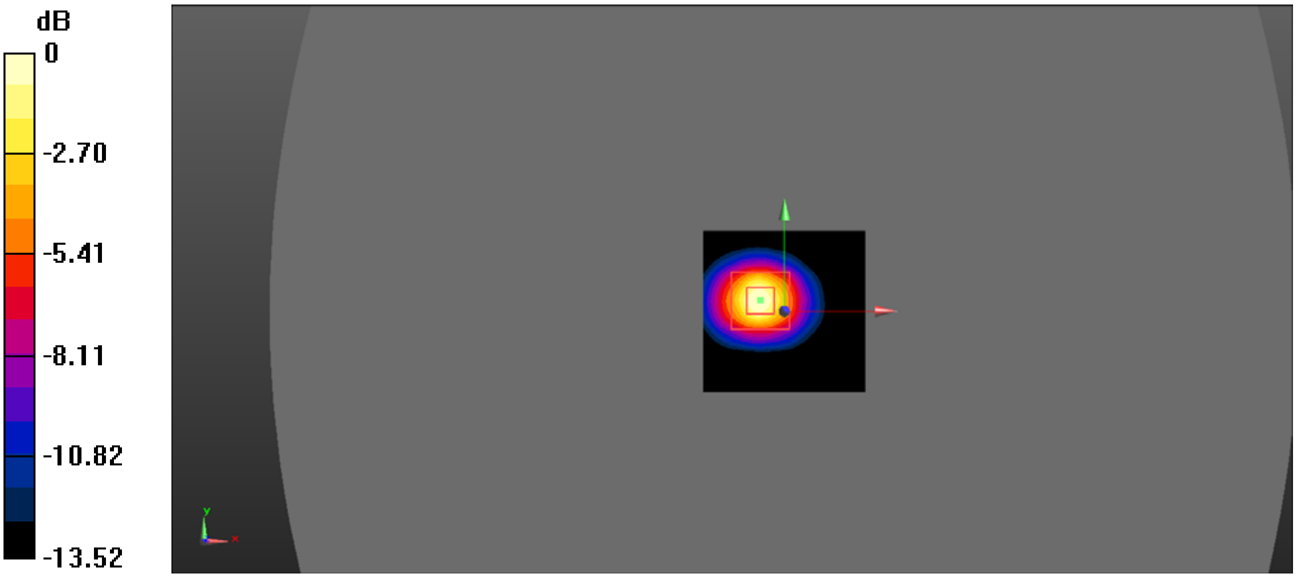
Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.42 S/m; ε_r = 49.357; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(4.77, 4.77, 4.77) @ 5200 MHz;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1562; Calibrated: 11/6/2018
- Phantom: ELI V8.0 P1aP2a; Type: QD OVA 004 AA; Serial: 2092
- Measurement SW: DASY52, Version 52.10 (2);

Body 5200MHz Pin=100mW/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 14.9 W/kg

Body 5200MHz Pin=100mW/Zoom Scan (8x8x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 35.86 V/m; Power Drift = -0.022 dB
Peak SAR (extrapolated) = 30.5 W/kg
SAR(1 g) = 7.71 W/kg; SAR(10 g) = 2.58 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dBW/kg

System Performance 5600 MHz Body

DUT: Dipole 5600MHz; Type: ALS-D-5600-S-2; Serial: 234-00703

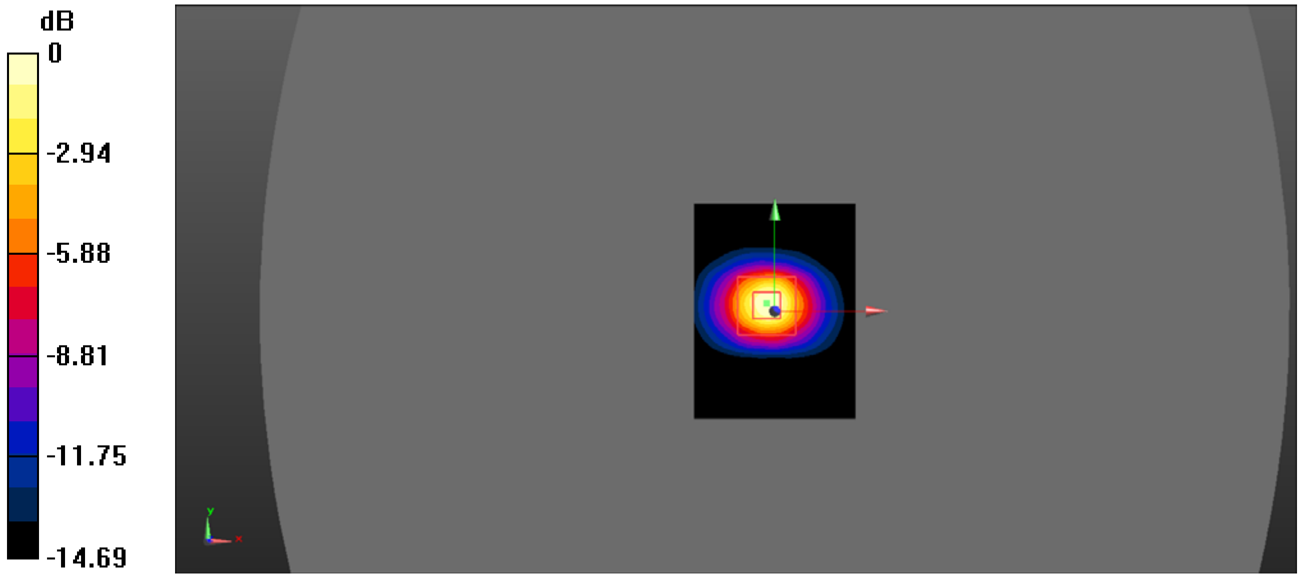
Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.862 S/m; ε_r = 48.777; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(4.27, 4.27, 4.27) @ 5600 MHz;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1562; Calibrated: 11/6/2018
- Phantom: ELI V8.0 P1aP2a; Type: QD OVA 004 AA; Serial: 2092
- Measurement SW: DASY52, Version 52.10 (2);

Body 5600MHz Pin=100mW/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.7 W/kg

Body 5600MHz Pin=100mW/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 36.91 V/m; Power Drift = 0.129 dB
Peak SAR (extrapolated) = 36.1 W/kg
SAR(1 g) = 8.57 W/kg; SAR(10 g) = 2.59 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 17.2 W/kg



0 dB = 17.2 W/kg = 12.36 dBW/kg

System Performance 5800 MHz Body

DUT: Dipole 5800MHz; Type: ALS-D-5800-S-2; Serial: 240-00855

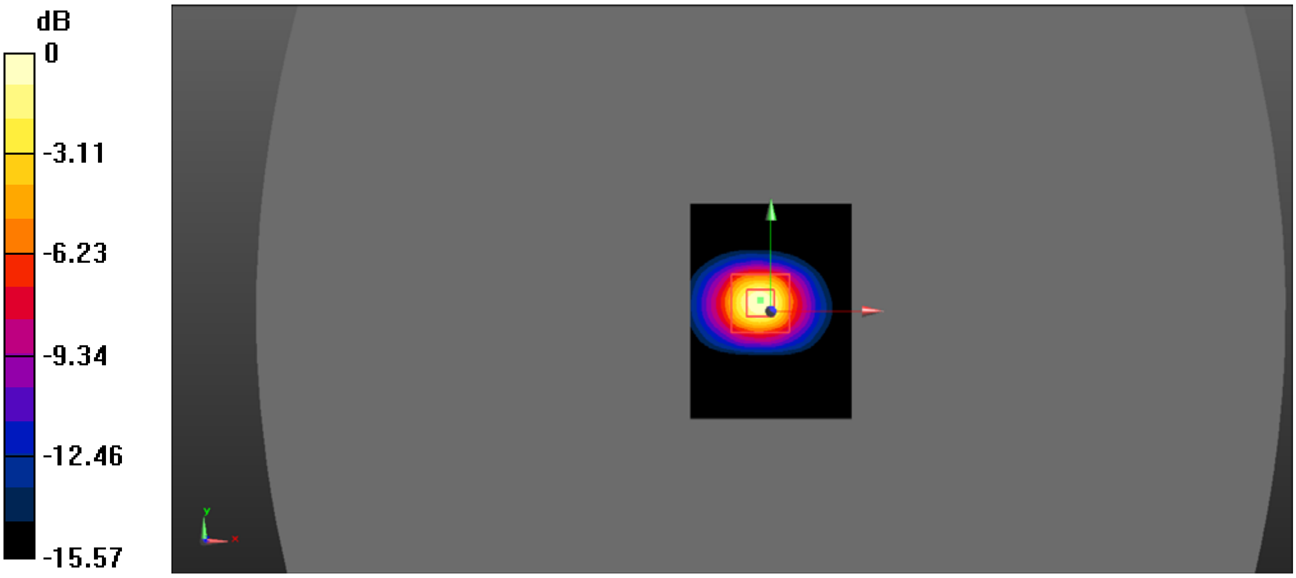
Communication System: UID 0, CW (0); Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.065 S/m; ε_r = 48.335; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7522; ConvF(4.31, 4.31, 4.31) @ 5800 MHz;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1562; Calibrated: 11/6/2018
- Phantom: ELI V8.0 P1aP2a; Type: QD OVA 004 AA; Serial: 2092
- Measurement SW: DASY52, Version 52.10 (2);

Body 5800MHz Pin=100mW/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.1 W/kg

Body 5800MHz Pin=100mW/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 30.66 V/m; Power Drift = 0.071 dB
Peak SAR (extrapolated) = 38.3 W/kg
SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.41 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

EUT TEST STRATEGY AND METHODOLOGY

Test positions for body-worn and other configurations

Body-worn operating configurations should be tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in normal use configurations. Devices with a headset output should be tested with a headset connected to the device. When multiple accessories that do not contain metallic components are supplied with the device, the device may be tested with only the accessory that dictates the closest spacing to the body. When multiple accessories that contain metallic components are supplied with the device, the device must be tested with each accessory that contains a unique metallic component. If multiple accessories share an identical metallic component (e.g., the same metallic belt-clip used with different holsters with no other metallic components), only the accessory that dictates the closest spacing to the body must be tested.

Body-worn accessories may not always be supplied or available as options for some devices that are intended to be authorized for body-worn use. A separation distance of 1.5 cm between the back of the device and a flat phantom is recommended for testing body-worn SAR compliance under such circumstances. Other separation distances may be used, but they should not exceed 2.5 cm. In these cases, the device may use body-worn accessories that provide a separation distance greater than that tested for the device provided however that the accessory contains no metallic components.

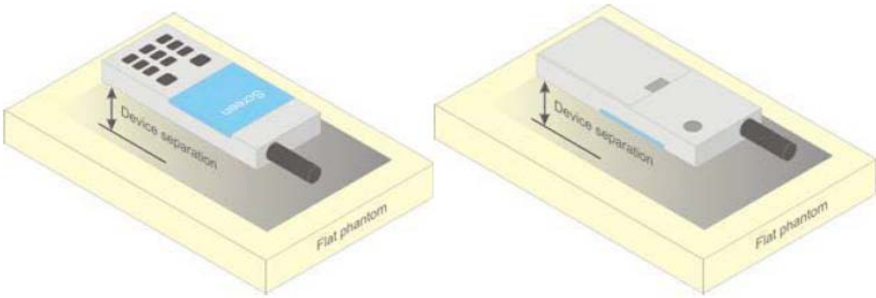


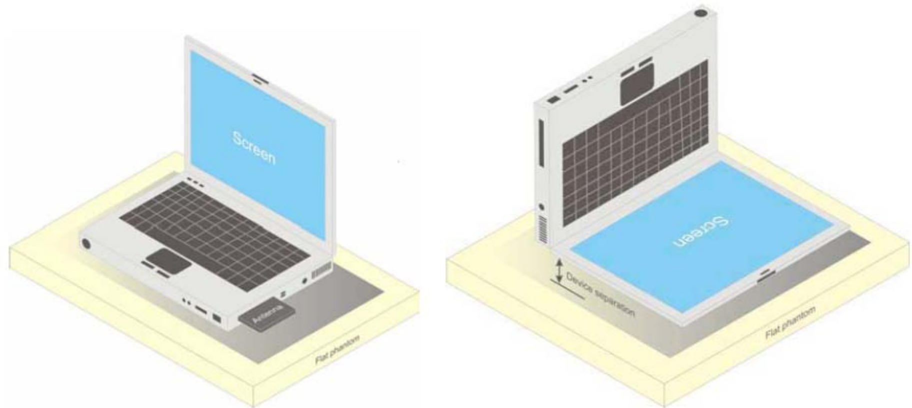
Figure 5 – Test positions for body-worn devices

Test positions for Body-supported device

A typical example of a body supported device is a wireless enabled laptop device that among other orientations may be supported on the thighs of a sitting user. To represent this orientation, the device shall be positioned with its base against the flat phantom. Other orientations may be specified by the manufacturer in the user instructions. If the intended use is not specified, the device shall be tested directly against the flat phantom in all usable orientations.

The screen portion of the device shall be in an open position at a 90° angle as seen in Figure below (left side), or at an operating angle specified for intended use by the manufacturer in the operating instructions. Where a body supported device has an integral screen required for normal operation, then the screen-side will not need to be tested if it ordinarily remains 200 mm from the body. Where a screen mounted antenna is present, this position shall be repeated with the screen against the flat phantom as shown in Figure below (right side), if this is consistent with the intended use.

Other devices that fall into this category include tablet type portable computers and credit card transaction authorisation terminals, point-of-sale and/or inventory terminals. Where these devices may be torso or limb-supported, the same principles for body-supported devices are applied.



a) Portable computer with external antenna plug-in-radio-card (left side) or with internal antenna located in screen section (right side)

Test Distance for SAR Evaluation

For this case the EUT(Equipment Under Test) is set 0mm away from the phantom, the test distance is 0mm.

SAR Evaluation Procedure

The evaluation was performed with the following procedure:

Step 1: Measurement of the SAR value at a fixed location above the ear point or central position was used as a reference value for assessing the power drop. The SAR at this point is measured at the start of the test and then again at the end of the testing.

Step 2: The SAR distribution at the exposed side of the head was measured at a distance of 4 mm from the inner surface of the shell. The area covered the entire dimension of the head or radiating structures of the EUT, the horizontal grid spacing was 15 mm x 15 mm, and the SAR distribution was determined by integrated grid of 1.5mm x 1.5mm. Based on these data, the area of the maximum absorption was determined by spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.

Step 3: Around this point, a volume of 30 mm x 30 mm x 30 mm was assessed by measuring 7x 7 x 7 points. On the basis of this data set, the spatial peak SAR value was evaluated under the following procedure:

1) The data at the surface were extrapolated, since the center of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation was based on a least square algorithm. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.

2) The maximum interpolated value was searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g or 10 g) were computed by the 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 integrated with the trapezoidal-algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the averages.

All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.

Step 4: Re-measurement of the SAR value at the same location as in Step 1. If the value changed by more than 5%, the evaluation was repeated.

CONDUCTED OUTPUT POWER MEASUREMENT

Description of Test Configuration

For 802.11b, 802.11g and 802.11n-HT20 mode, 13 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	/	/

For 802.11b, 802.11g, 802.11n-HT20 mode, EUT was tested with Channel 1, 7 and 13

For 802.11n-HT40 mode, 9 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2422	6	2447
2	2427	7	2452
3	2432	8	2457
4	2437	9	2462
5	2442	/	/

EUT was tested with Channel 1, 5 and 9.

BLE & Wi-Fi test in the engineer mode.

The device was tested with the worst case was performed as below:

Mode	Data rate	Power level		
		Low channel	Middle channel	High channel
802.11b	1 Mbps	4	4	5
802.11g	6 Mbps	4	4	4
802.11n-HT20	MCS0	4	4	4
802.11n-HT40	MCS0	4	4	4
BLE	/	Default	Default	Default

5G Wi-Fi Test Configurations

The system was configured for testing in an engineering mode, which was provided by manufacturer.

The device support 802.11a/n20/n40/ac20/ac40/ac80 modes.

For 5150-5250MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
38	5190	46	5230
40	5200	48	5240
42	5210	/	/

For 5250-5350MHz Band, 7 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
54	5270	62	5310
56	5280	64	5320
58	5290	/	/

For 5470-5725MHz Band, 18 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	124	5620
102	5510	126	5630
104	5520	128	5640
106	5530	132	5660
108	5540	134	5670
110	5550	136	5680
112	5560	140	5700
116	5580	/	/
118	5590	/	/
120	5600	/	/
122	5610	/	/

For 5725-5850MHz Band, 8 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	157	5785
151	5755	159	5795
153	5765	161	5805
155	5775	165	5825

The system was configured for testing in an engineering mode.Test frequencies and power level were configured as below:

U-NII	Mode	Channel Number	Frequency (MHz)	Rate (Mbps)	Power Level
5150 – 5250MHz	802.11 a	CH36	5180	6	15
		CH40	5200	6	15
		CH48	5240	6	15
	802.11 n20	CH36	5180	MCS0	15
		CH40	5200	MCS0	15
		CH48	5240	MCS0	15
	802.11 n40	CH38	5190	MCS0	15
		CH46	5230	MCS0	15
	802.11 ac20	CH36	5180	MCS0	15
		CH40	5200	MCS0	15
		CH48	5240	MCS0	15
	802.11 ac40	CH38	5190	MCS0	15
		CH46	5230	MCS0	15
	802.11 ac80	CH42	5210	MCS0	15
5250 – 5350MHz	802.11 a	CH52	5260	6	15
		CH56	5280	6	15
		CH64	5320	6	15
	802.11 n20	CH52	5260	MCS0	17
		CH56	5280	MCS0	17
		CH64	5320	MCS0	17
	802.11 n40	CH54	5270	MCS0	17
		CH62	5310	MCS0	17
	802.11 ac20	CH52	5260	MCS0	17
		CH56	5280	MCS0	17
		CH64	5320	MCS0	17
	802.11 ac40	CH54	5270	MCS0	17
		CH62	5310	MCS0	17
	802.11 ac80	CH58	5290	MCS0	17

U-NII	Mode	Channel Number	Frequency (MHz)	Rate (Mbps)	Power Level
5470 – 5725MHz	802.11 a	CH100	5500	6	15
		CH120	5600	6	15
		CH140	5700	6	15
	802.11 n20	CH100	5500	MCS0	12
		CH120	5600	MCS0	12
		CH140	5700	MCS0	12
	802.11 n40	CH102	5510	MCS0	10
		CH118	5590	MCS0	10
	802.11 ac20	CH100	5500	MCS0	12
		CH120	5600	MCS0	12
		CH140	5700	MCS0	12
	802.11 ac40	CH102	5510	MCS0	10
		CH118	5590	MCS0	10
		CH134	5670	MCS0	10
	802.11 ac80	CH106	5530	MCS0	12
		CH122	5610	MCS0	12
5725 – 5850MHz	802.11 a	CH149	5745	6	15
		CH157	5785	6	15
		CH165	5825	6	15
	802.11 n20	CH149	5745	MCS0	12
		CH157	5785	MCS0	12
		CH165	5825	MCS0	12
	802.11 n40	CH151	5755	MCS0	12
		CH159	5795	MCS0	12
	802.11 ac20	CH149	5745	MCS0	12
		CH157	5785	MCS0	12
		CH165	5825	MCS0	12
	802.11 ac40	CH151	5755	MCS0	12
		CH159	5795	MCS0	12
	802.11 ac80	CH155	5775	MCS0	12

Maximum Target Output Power

Max Target Power(dBm)				
Mode/Band		Channel		
		Low	Middle	High
Bluetooth	(GFSK)	6.5	7.5	8.5
	π/4-DQPSK	5.5	6.0	7.5
	8-DPSK	6.0	6.5	8.0
	LE	5.0	6.5	8.5
WLAN 2.4G	802.11b	10.0	10.0	10.0
	802.11g	9.5	9.5	9.5
	802.11n HT20	9.0	9.0	9.0
	802.11n HT40	9.0	9.0	9.0
WLAN U-NII-1 Band	802.11a	7.5	7.5	7.5
	802.11n HT20	7.5	7.5	7.5
	802.11n HT40	7.5	7.5	7.5
	802.11ac20	7.5	7.5	7.5
	802.11ac40	7.0	7.0	7.0
	802.11ac80	7.0	7.0	7.0
WLAN U-NII-2A Band	802.11a	7.5	7.5	7.5
	802.11n HT20	8.0	8.0	8.0
	802.11n HT40	7.5	7.5	7.5
	802.11ac20	8.0	8.0	8.0
	802.11ac40	7.5	7.5	7.5
	802.11ac80	8.0	8.0	8.0
WLAN U-NII-2C Band	802.11a	10.5	10.5	10.5
	802.11n HT20	10.5	10.5	10.5
	802.11n HT40	9.5	9.5	9.5
	802.11ac20	10.0	10.0	10.0
	802.11ac40	9.5	9.5	9.5
	802.11ac80	10.0	10.0	10.0
WLAN U-NII-3 Band	802.11a	13.5	13.5	13.5
	802.11n HT20	12.5	12.5	12.5
	802.11n HT40	13.0	13.0	13.0
	802.11ac20	13.5	13.5	13.5
	802.11ac40	13.0	13.0	13.0
	802.11ac80	13.5	13.5	13.5

Test Results:

Bluetooth:

Mode	Channel frequency (MHz)	RF Output Power (dBm)
BDR(GFSK)	2402	6.39
	2441	7.15
	2480	**8.25**
EDR(π/4-DQPSK)	2402	5.16
	2441	5.70
	2480	7.28
EDR(8-DPSK)	2402	5.62
	2441	6.23
	2480	7.65
Bluetooth LE	2402	4.75
	2440	6.41
	2480	8.12

WLAN 2.4G:

Mode	Channel frequency (MHz)	Data Rate	RF Output Power(dBm)
802.11b	2412	1Mbps	**9.63**
	2442		8.96
	2472		8.17
802.11g	2412	6Mbps	8.38
	2442		8.54
	2472		9.04
802.11n HT20	2412	MCS0	8.43
	2442		8.51
	2472		8.73
802.11n HT40	2422	MCS0	8.77
	2442		8.47
	2462		8.84

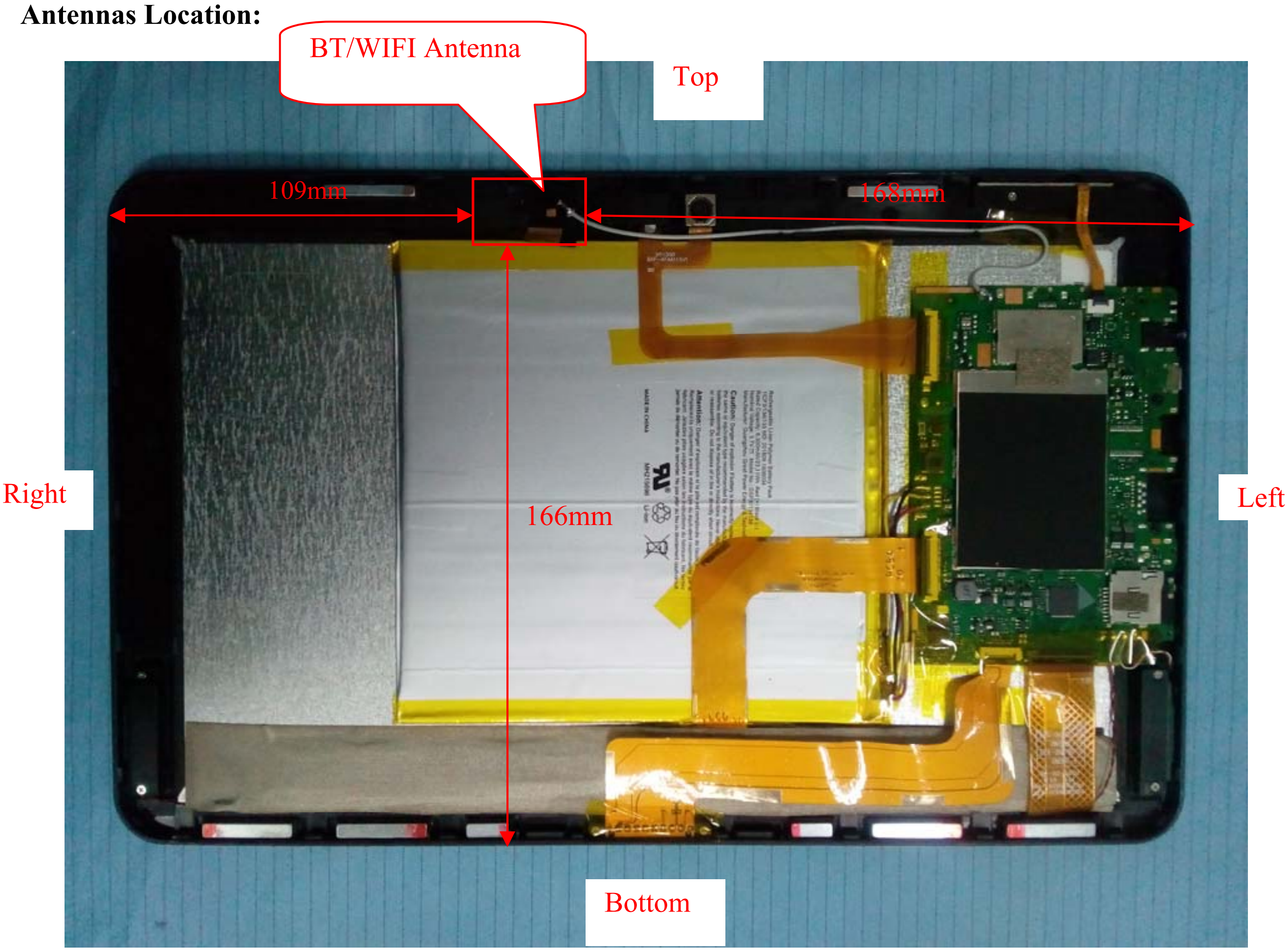
WLAN 5G:

Band	Mode	Channel frequency (MHz) (MHz)	Data Rate	RF Output Power(dBm) (dBm)
U-NII-1 Band	802.11a	5180	6Mbps	7.25
		5200		6.99
		5240		7.17
	802.11n HT20	5180	MCS0	**7.40**
		5200		7.19
		5240		7.26
	802.11n HT40	5190	MCS0	6.82
		5230		7.01
	802.11ac20	5180	MCS0	7.38
		5200		7.32
		5240		7.26
	802.11ac40	5190	MCS0	6.95
		5230		6.95
	802.11ac80	5210	MCS0	6.94
U-NII-2A Band	802.11a	5260	6Mbps	7.26
		5280		7.36
		5320		7.43
	802.11n HT20	5260	MCS0	7.58
		5280		**7.67**
		5320		7.47
	802.11n HT40	5270	MCS0	7.06
		5310		7.25
	802.11ac20	5260	MCS0	7.46
		5280		7.60
		5320		7.59
	802.11ac40	5270	MCS0	7.07
		5310		7.16
	802.11ac80	5290	MCS0	7.35

Band	Mode	Channel frequency (MHz) (MHz)	Data Rate	RF Output Power(dBm) (dBm)
U-NII-2C Band	802.11a	5500	6Mbps	9.93
		5600		**10.27**
		5700		10.08
	802.11n HT20	5500	MCS0	9.34
		5600		9.92
		5700		10.21
	802.11n HT40	5510	MCS0	8.87
		5590		9.00
		5670		8.81
	802.11ac20	5500	MCS0	9.92
		5600		9.95
		5700		9.92
	802.11ac40	5510	MCS0	9.01
		5590		8.79
		5670		9.01
	802.11ac80	5530	MCS0	9.52
		5610		9.63
U-NII-3 Band	802.11a	5745	6Mbps	12.70
		5785		**13.13**
		5825		12.89
	802.11n HT20	5745	MCS0	11.63
		5785		12.25
		5825		11.95
	802.11n HT40	5755	MCS0	12.62
		5795		12.83
	802.11ac20	5745	MCS0	12.54
		5785		13.12
		5825		12.74
	802.11ac40	5755	MCS0	12.58
		5795		12.50
	802.11ac80	5775	MCS0	12.92

Standalone SAR test exclusion considerations

Antennas Location:



Antenna Distance To Edge

Antenna Distance To Edge(mm)					
Antenna	**Back**	**Left**	**Right**	**Top**	**Bottom**
WLAN/BT Antenna	< 5	168	109	< 5	166

Standalone SAR test exclusion considerations

Distance> 50mm

Mode	Frequency (MHz)	P_{avg} (dBm)	P_{avg} (mW)	Position	Distance (mm)	Test exclusion Threshold (mW)	SAR Test Exclusion
Bluetooth	2480	8.5	7.08	Left	168	1275.25	YES
	2480	8.5	7.08	Right	109	685.25	YES
	2480	8.5	7.08	Bottom	166	1255.25	YES
WLAN 2.4G	2472	10.0	10.00	Left	168	1275.40	YES
	2472	10.0	10.00	Right	109	685.40	YES
	2472	10.0	10.00	Bottom	166	1255.40	YES
WLAN U-NII-1 Band	5240	7.5	5.62	Left	168	1245.53	YES
	5240	7.5	5.62	Right	109	655.53	YES
	5240	7.5	5.62	Bottom	166	1225.53	YES
WLAN U-NII-2A Band	5320	8.0	6.31	Left	168	1245.03	YES
	5320	8.0	6.31	Right	109	655.03	YES
	5320	8.0	6.31	Bottom	166	1225.03	YES
WLAN U-NII-2C Band	5700	10.5	11.22	Left	168	1242.83	YES
	5700	10.5	11.22	Right	109	652.83	YES
	5700	10.5	11.22	Bottom	166	1222.83	YES
WLAN U-NII-3 Band	5825	13.5	22.39	Left	168	1242.15	YES
	5825	13.5	22.39	Right	109	652.15	YES
	5825	13.5	22.39	Bottom	166	1222.15	YES

At 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following:

a) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz

b) [Power allowed at numeric threshold for 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

SAR MEASUREMENT RESULTS

This page summarizes the results of the performed dosimetric evaluation.

SAR Test Data

Environmental Conditions

Temperature:	22.1-23.2 ℃
Relative Humidity:	62 %
ATM Pressure:	101.7 kPa
Test Date:	2019/03/04

Testing was performed by Huan Li and Gavin Guo.

Bluetooth:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
					Scaled Factor	Meas. SAR	Scaled SAR	Plot
Body Back (0mm)	2402	GFSK	6.39	6.5	1.026	0.081	0.08	1#
	2441	GFSK	7.15	7.5	1.084	0.243	**0.26**	2#
	2480	GFSK	8.25	8.5	1.059	0.179	0.19	3#
Body Top (0mm)	2402	GFSK	/	/	/	/	/	/
	2441	GFSK	/	/	/	/	/	/
	2480	GFSK	8.25	8.5	1.059	0.036	0.04	4#

Note:
1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. Since BDR(GFSK) mode power is the largest mode of Bluetooth, BDR(GFSK) mode is selected to test.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

WLAN 2.4G:

EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/Kg)			
					Scaled Factor	Meas. SAR	Scaled SAR	Plot
Body Back (0mm)	2412	802.11b	9.63	10.0	1.089	0.629	0.68	5#
	2442	802.11b	8.96	10.0	1.271	0.598	**0.76**	6#
	2472	802.11b	8.17	10.0	1.524	0.436	0.66	7#
Body Top (0mm)	2412	802.11b	9.63	10.0	1.089	0.084	0.09	8#
	2442	802.11b	/	/	/	/	/	/
	2472	802.11b	/	/	/	/	/	/

Note:
1. When the 1-g SAR is≤ 0.8W/Kg, testing for other channels are optional.
2. When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, OFDM SAR is not required.
3. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Consideration:

Modulation Mode	Pavg (dBm)	Pavg (mW)	Reported SAR(W/kg)	Adjusted SAR(W/kg)	Limit(W/kg)	SAR Test Exclusion
802.11b(DSSS)	10.0	10.00	0.73	/	/	/
802.11g(OFDM)	9.5	8.91	/	0.65	1.2	Yes
802.11n HT20(OFDM)	9.0	7.94	/	0.58	1.2	Yes
802.11n HT40(OFDM)	9.0	7.94	/	0.58	1.2	Yes

Note:

KDB 248227 D01-When SAR measurement is required for 2.4 GHz 802.11g/n OFDM configurations, the measurement and test reduction procedures for OFDM are applied. SAR is not required for the following 2.4 GHz OFDM conditions.

a) When KDB Publication 447498 D01 SAR test exclusion applies to the OFDM configuration.

b) When the highest *reported* SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

WLAN (U-NII Band):

Band	EUT Position	Frequency (MHz)	Test Mode	Max. Meas. Power (dBm)	Max. Rated Power (dBm)	1g SAR (W/kg)			
						Scaled Factor	Meas. SAR	Scaled SAR	Plot
U-NII-2A Band	Body Back (0mm)	5290	802.11ac80	7.35	8.0	1.161	0.645	**0.75**	9#
	Body Top (0mm)	5290	802.11ac80	7.35	8.0	1.161	0.399	0.46	10#
U-NII-2C Band	Body Back (0mm)	5500	802.11a	9.93	10.5	1.140	0.810	**0.92**	11#
		5600	802.11a	10.27	10.5	1.054	0.717	0.76	12#
		5700	802.11a	10.08	10.5	1.102	0.493	0.54	13#
	Body Top (0mm)	5500	802.11a	/	/	/	/	/	/
		5600	802.11a	10.27	10.5	1.054	0.370	0.39	14#
		5700	802.11a	/	/	/	/	/	/
U-NII-3 Band	Body Back (0mm)	5775	802.11ac80	12.92	13.5	1.143	0.745	**0.85**	15#
	Body Top (0mm)	5775	802.11ac80	12.92	13.5	1.143	0.322	0.37	16#

Note:

1. When the 1-g SAR is≤ 0.8W/kg, testing for other channels are optional.
2. The EUT transmit and receive through the same antenna while testing SAR.
3. KDB 248227 D01-For devices that operate in only one of the U-NII-1 and U-NII-2A bands:
   a. 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.
   b. When different maximum output power is specified for the bands, begin SAR measurement in the band with higher specified maximum output power. The highest reported SAR for the tested configuration is adjusted by the ratio of lower to higher specified maximum output power for the two bands. When the adjusted SAR is ≤ 1.2 W/kg, SAR is not required for the band with lower maximum output power in that test configuration; otherwise, each band is tested independently for SAR.
4. KDB 248227 D01-The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance. SAR for the initial test configuration is measured using the highest maximum output power channel
5. KDB 248227 D01- When multiple channel bandwidth configurations in a frequency band have the same specified maximum output power, the initial test configuration is determined by applying the following steps sequentially.
   a. The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same specified maximum output power.
   b. If multiple configurations have the same specified maximum output power and largest channel bandwidth, the lowest order modulation among the largest channel bandwidth configurations is selected.
   c. If multiple configurations have the same specified maximum output power, largest channel bandwidth and lowest order modulation, the lowest data rate configuration among these configurations is selected.
   d. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n.
6. When SAR or MPE is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance.

SAR Measurement Variability

In accordance with published RF Exposure KDB procedure 865664 D01 SAR measurement 100 MHz to 6 GHz v01. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results

1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).
4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

Note: 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.

The Highest Measured SAR Configuration in Each Frequency Band

Head

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
/	/	/	/	/	/	/

Body

SAR probe calibration point	Frequency Band	Freq.(MHz)	EUT Position	Meas. SAR (W/kg)		Largest to Smallest SAR Ratio
				Original	Repeated	
5600MHz (5490-5700)	WLAN U-NII-2C Band	5500	Body Back	0.810	0.772	1.05

Note:

1. Second Repeated Measurement is not required since the ratio of the largest to smallest SAR for the original and first repeated measurement is not > 1.20.
2. The measured SAR results **do not** have to be scaled to the maximum tune-up tolerance to determine if repeated measurements are required.
3. SAR measurement variability must be assessed for each frequency band, which is determined by the **SAR probe calibration point and tissue-equivalent medium** used for the device measurements..

SAR SIMULTANEOUS TRANSMISSION DESCRIPTION

Simultaneous Transmission:

Description of Simultaneous Transmit Capabilities		
Transmitter Combination	**Simultaneous?**	**Hotspot?**
WLAN + Bluetooth	×	×

1. WLAN and Bluetooth transmite with a same antenna

Conclusion:

Sum of SAR: **Σ SAR ≤ 1.6 W/kg** therefore simultaneous transmission SAR with Volume Scans is **not required**.

SAR Plots

Please Refer to the Attachment.

APPENDIX A MEASUREMENT UNCERTAINTY

The uncertainty budget has been determined for the measurement system and is given in the following Table.

Measurement uncertainty evaluation for IEEE1528-2013 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Linearity	4.7	R	√3	1	1	2.7	2.7
Detection limits	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Device holder uncertainty	6.3	N	1	1	1	6.3	6.3
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Liquid conductivity target)	5.0	R	√3	0.64	0.43	1.8	1.2
Liquid conductivity meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity target)	5.0	R	√3	0.6	0.49	1.7	1.4
Liquid permittivity meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Combined standard uncertainty		RSS				12.2	12.0
Expanded uncertainty 95 % confidence interval)						24.3	23.9

Measurement uncertainty evaluation for IEC62209-2 SAR test

Source of uncertainty	Tolerance/ uncertainty ± %	Probability distribution	Divisor	ci (1 g)	ci (10 g)	Standard uncertainty ± %, (1 g)	Standard uncertainty ± %, (10 g)
Measurement system							
Probe calibration	6.55	N	1	1	1	6.6	6.6
Axial Isotropy	4.7	R	√3	1	1	2.7	2.7
Hemispherical Isotropy	9.6	R	√3	0	0	0.0	0.0
Linearity	4.7	R	√3	1	1	2.7	2.7
Modulation Response	0.0	R	√3	1	1	0.0	0.0
Detection limits	1.0	R	√3	1	1	0.6	0.6
Boundary effect	1.0	R	√3	1	1	0.6	0.6
Readout electronics	0.3	N	1	1	1	0.3	0.3
Response time	0.0	R	√3	1	1	0.0	0.0
Integration time	0.0	R	√3	1	1	0.0	0.0
RF ambient conditions – noise	1.0	R	√3	1	1	0.6	0.6
RF ambient conditions–reflections	1.0	R	√3	1	1	0.6	0.6
Probe positioner mech. Restrictions	0.8	R	√3	1	1	0.5	0.5
Probe positioning with respect to phantom shell	6.7	R	√3	1	1	3.9	3.9
Post-processing	2.0	R	√3	1	1	1.2	1.2
Test sample related							
Device holder Uncertainty	6.3	N	1	1	1	6.3	6.3
Test sample positioning	2.8	N	1	1	1	2.8	2.8
Power scaling	4.5	R	√3	1	1	2.6	2.6
Drift of output power	5.0	R	√3	1	1	2.9	2.9
Phantom and set-up							
Phantom uncertainty (shape and thickness tolerances)	4.0	R	√3	1	1	2.3	2.3
Algorithm for correcting SAR for deviations in permittivity and conductivity	1.9	N	1	1	0.84	1.1	0.9
Liquid conductivity (meas.)	2.5	N	1	0.64	0.43	1.6	1.1
Liquid permittivity (meas.)	2.5	N	1	0.6	0.49	1.5	1.2
Temp. unc. - Conductivity	1.7	R	√3	0.78	0.71	0.8	0.7
Temp. unc. - Permittivity	0.3	R	√3	0.23	0.26	0.0	0.0
Combined standard uncertainty		RSS				12.2	12.1
Expanded uncertainty 95 % confidence interval)						24.5	24.2

APPENDIX B EUT TEST POSITION PHOTOS

Please Refer to the Attachment.

APPENDIX C PROBE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

APPENDIX D DIPOLE CALIBRATION CERTIFICATES

Please Refer to the Attachment.

******* END OF REPORT *******