FCC SAR Test Report

APPLICANT	**:**	**Zebra Technologies Corporation**
EQUIPMENT	**:**	**Touch computer**
BRAND NAME	**:**	**Zebra**
MODEL NAME	**:**	**TC510K**
FCC ID	**:**	**UZ7TC510K**
STANDARD	**:**	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2013**

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Eric Huang

Reviewed by: Eric Huang / Deputy Manager

Jones Tsai

Approved by: Jones Tsai / Manager

ilac-MRA

TAF Testing Laboratory 1190

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA672014	Rev. 01	Initial issue of report	Sep, 19, 2016
FA672014	Rev. 02	Added head SAR test results	Oct, 10, 2016

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Zebra Technologies Corporation, Touch computer, TC510K,** are as follows.

Equipment Class	Frequency Band	Highest SAR Summary		Highest Simultaneous Transmission 1g SAR (W/kg)
		Head (Separation 0mm)	Body-worn (Separation 10mm)	
		1g SAR (W/kg)		
DTS	2.4GHz WLAN	1.00	0.27	1.48
NII	5GHz WLAN	1.20	0.94	1.50
Date of Testing:		2016/7/12 ~ 2016/8/25		

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013 and FCC KDB publications

2. Administration Data

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Zebra Technologies Corporation
Address	1 Zebra Plaza Holtsville, NY 11742

Manufacturer	
Company Name	Wistron Corporation
Address	21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221,Taiwan R.O.C.

3. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 648474 D04 SAR Evaluation Considerations for Wireless Handsets v01r03
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Touch computer
Brand Name	Zebra
Model Name	TC510K
FCC ID	UZ7TC510K
S / N	For WLAN 2.4GHz SAR testing : 161555225E0035 For WLAN 5GHz SAR testing : 161555225E0075
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Mode	· 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 · Bluetooth BR/EDR/LE · NFC:ASK
HW Version	EV2
SW Version	91-10-03-MG-00
FW Version	FUSION_BA_2.00.0.0.008
EUT Stage	Engineering sample

Specification of Accessories				
Adapter 1 (5V/2.5A)	Brand Name	Zebra	Model Number	SAWA-65-20005A
Adapter 2 (5V/1.2A)	Brand Name	Zebra	Model Number	PS000081A01
Headset Jumper 1	Brand Name	Zebra	Part Number	CBL-TC51-HDST25-01
Headset Jumper 2	Brand Name	Zebra	Part Number	CBL-TC51-HDST35-01
Battery	Brand Name	Zebra	Part Number	BT-000314-01
2.5mm Earphone	Brand Name	Zebra	Part Number	HDST-25MM-PTVP-01
3.5mm Earphone	Brand Name	Zebra	Part Number	HDST-35MM-PTVP-01
Trigger Handle	Brand Name	Zebra	Part Number	TRG-TC51-SNP1-01
USB cable	Brand Name	Zebra	Part Number	CBL-TC51-USB1-01
Soft Holster	Brand Name	Zebra	Part Number	SG-TC51-HLSTR1-01
Exoskeleton	Brand Name	Zebra	Part Number	SG-TC51-EX01-01
Hand strap	Brand Name	Zebra	Part Number	SG-TC51-BHDSTP1-03

5. RF Exposure Limits

5.1 Uncontrolled Environment

Uncontrolled Environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

5.2 Controlled Environment

Controlled Environments are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. The exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

1. Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

6. Specific Absorption Rate (SAR)

6.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

6.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

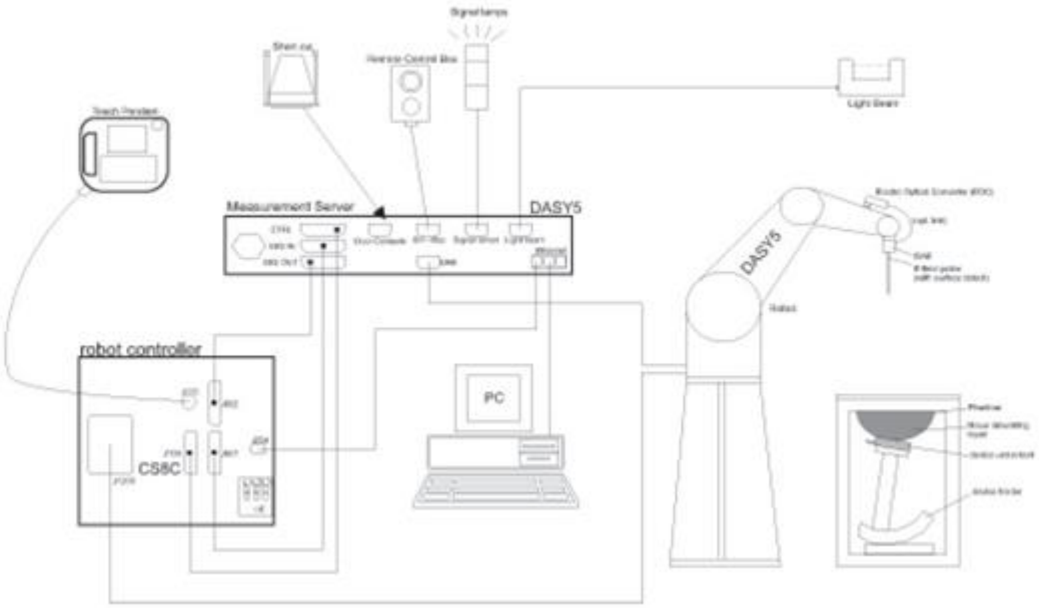
SAR is expressed in units of Watts per kilogram (W/kg)

$$\mathbf{SAR} = \frac{\boldsymbol{\sigma}|\mathbf{E}|^{2}}{\boldsymbol{\rho}}$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

7. System Description and Setup

The DASY system used 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 DASY5 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.

7.1 E-Field Probe

The SAR measurement is conducted with the dosimetric probe (manufactured by SPEAG).The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. This probe has a built in optical surface detection system to prevent from collision with phantom.

<ES3DV3 Probe>

Construction	Symmetric design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – 4 GHz; Linearity: ±0.2 dB (30 MHz – 4 GHz)
Directivity	±0.2 dB in TSL (rotation around probe axis) ±0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range	5 µW/g – >100 mW/g; Linearity: ±0.2 dB
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 3.9 mm (body: 12 mm) Distance from probe tip to dipole centers: 3.0 mm

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 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 – >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

7.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists 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 and 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.

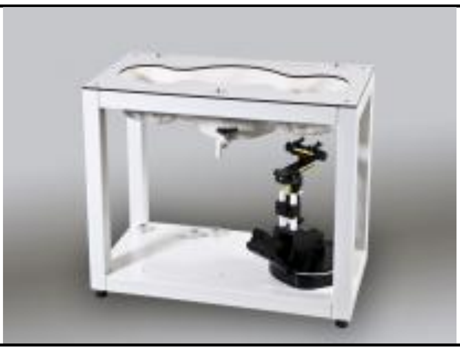
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

7.3 Phantom

<SAM Twin Phantom>

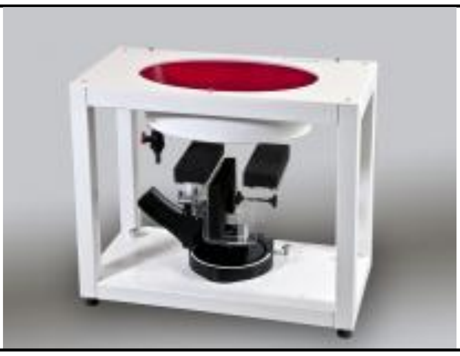
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

<ELI Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm



The ELI phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

In combination with the Twin SAM V5.0/V5.0c or ELI phantoms, the Mounting Device for Hand-Held Transmitters enables rotation of the mounted transmitter device to specified spherical coordinates. At the heads, the rotation axis is at the ear opening. Transmitter devices can be easily and accurately positioned according to IEC 62209-1, IEEE 1528, FCC, or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat). And upgrade kit to Mounting Device to enable easy mounting of wider devices like big smart-phones, e-books, small tablets, etc. It holds devices with width up to 140 mm.

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

<Mounting Device for Laptops and other Body-Worn Transmitters>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

8.1 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The DASY software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine (SEMCAD). The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

(a) Extraction of the measured data (grid and values) from the Zoom Scan
(b) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(c) Generation of a high-resolution mesh within the measured volume
(d) Interpolation of all measured values form the measurement grid to the high-resolution grid
(e) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(f) Calculation of the averaged SAR within masses of 1g and 10g

8.2 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.

8.3 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 dB0 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 D01v01r04 SAR measurement 100 MHz to 6 GHz.

	≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface	5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location	30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}	≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
	When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	

8.4 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 D01v01r04 SAR measurement 100 MHz to 6 GHz.

<table>
<tr><th colspan="3"></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\le 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

8.5 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.

8.6 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.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 20, 2015	Aug. 19, 2016
SPEAG	2450MHz System Validation Kit	D2450V2	735	Dec. 10, 2015	Dec. 09, 2016
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Oct. 06, 2015	Oct. 05, 2016
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Jul. 27, 2016	Jul. 26, 2017
SPEAG	Data Acquisition Electronics	DAE3	495	May. 27, 2016	May. 26, 2017
SPEAG	Data Acquisition Electronics	DAE4	778	May. 12, 2016	May. 11, 2017
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 26, 2016	May. 25, 2017
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 24, 2015	Nov. 23, 2016
WonDer	Thermometer	WD-5015	TM281	Oct. 16, 2015	Oct. 15, 2016
Wisewind	Thermometer	HTC-1	TM560	Oct. 16, 2015	Oct. 15, 2016
SPEAG	Device Holder	N/A	N/A	N/A	N/A
R&S	Signal Generator	MG3710A	6201502524	Dec. 18, 2015	Dec. 17, 2016
Agilent	ENA Network Analyzer	E5071C	MY46316648	Jan. 12, 2016	Jan. 11, 2017
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 23, 2016	Mar. 22, 2017
Anritsu	Power Meter	ML2495A	1419002	May. 10, 2016	May. 09, 2017
Anritsu	Power Sensor	MA2411B	1339124	May. 10, 2016	May. 09, 2017
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 21, 2016	Jun. 20, 2017
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	
AR	Power Amplifier	5S1G4M2	0328767	Note 1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note 1	

General Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.

10. System Verification

10.1 Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (εr)
For Head								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	64~78%
Mineral oil	11~18%
Emulsifiers	9~15%
Additives and Salt	2~3%

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	HSL	22.7	1.800	38.479	1.80	39.20	0.00	-1.84	±5	2016/7/22
2450	HSL	22.3	1.843	38.934	1.80	39.20	2.39	-0.68	±5	2016/8/18
2450	MSL	22.7	1.972	52.036	1.95	52.70	1.13	-1.26	±5	2016/7/22
2450	MSL	22.4	1.913	52.183	1.95	52.70	-1.90	-0.98	±5	2016/8/25
5250	MSL	22.5	5.510	46.988	5.36	48.95	2.80	-4.01	±5	2016/8/25
5300	HSL	22.4	4.543	36.519	4.76	35.90	-4.56	1.72	±5	2016/7/12
5300	MSL	22.5	5.540	47.260	5.42	48.90	2.21	-3.35	±5	2016/7/14
5600	HSL	22.4	4.833	36.138	5.07	35.50	-4.67	1.80	±5	2016/7/12
5600	MSL	22.5	5.924	46.763	5.77	48.50	2.67	-3.58	±5	2016/7/14
5600	MSL	22.5	5.965	46.372	5.77	48.50	3.38	-4.39	±5	2016/8/25
5750	MSL	22.5	6.164	46.109	5.94	48.28	3.77	-4.50	±5	2016/8/25
5800	HSL	22.4	5.030	35.904	5.27	35.30	-4.55	1.71	±5	2016/7/12
5800	MSL	22.5	6.183	46.447	6.00	48.20	3.05	-3.64	±5	2016/7/14

10.2 System Performance Check Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2016/7/22	2450	HSL	250	D2450V2-736	EX3DV4 - SN3925	DAE3 Sn495	12.70	53.40	50.80	-4.87
2016/8/18	2450	HSL	250	D2450V2-736	EX3DV4 - SN3925	DAE3 Sn495	13.00	53.40	52.00	-2.62
2016/7/22	2450	MSL	250	D2450V2-736	EX3DV4 - SN3925	DAE3 Sn495	12.10	51.90	48.40	-6.74
2016/8/25	2450	MSL	250	D2450V2-735	EX3DV4 - SN3955	DAE4 Sn778	12.00	52.10	48.00	-7.87
2016/8/25	5250	MSL	100	D5GHzV2-1128-5250	EX3DV4 - SN3955	DAE4 Sn778	7.82	74.50	78.20	4.97
2016/7/12	5300	HSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	8.62	84.50	86.20	2.01
2016/7/14	5300	MSL	100	D5GHzV2-1006-5300	EX3DV4 - SN3925	DAE3 Sn495	8.04	79.50	80.40	1.13
2016/7/12	5600	HSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.54	84.80	85.40	0.71
2016/7/14	5600	MSL	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE3 Sn495	8.61	82.30	86.10	4.62
2016/8/25	5600	MSL	100	D5GHzV2-1128-5600	EX3DV4 - SN3955	DAE4 Sn778	7.94	78.00	79.40	1.79
2016/8/25	5750	MSL	100	D5GHzV2-1128-5750	EX3DV4 - SN3955	DAE4 Sn778	7.50	76.10	75.00	-1.45
2016/7/12	5800	HSL	100	D5GHzV2-1006-5800	EX3DV4 - SN3925	DAE3 Sn495	8.42	82.00	84.20	2.68
2016/7/14	5800	MSL	100	D5GHzV2-1006-5800	EX3DV4 - SN3925	DAE3 Sn495	7.75	79.00	77.50	-1.90

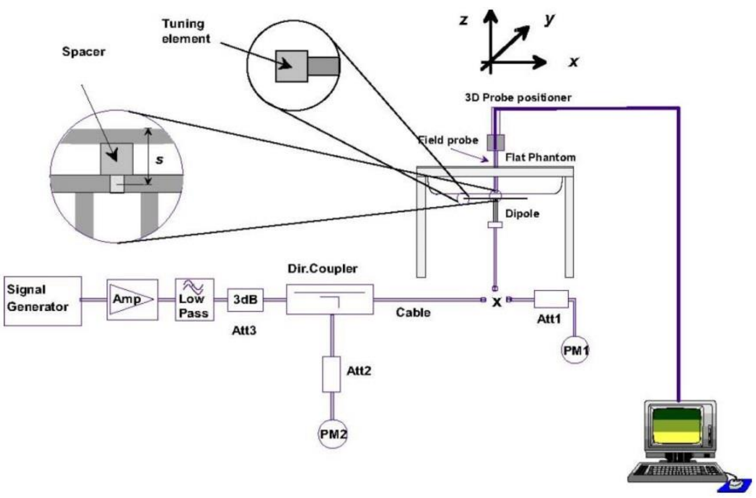


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. RF Exposure Positions

11.1 Ear and handset reference point

Figure 9.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M,” the left ear reference point (ERP) is marked “LE,” and the right ERP is marked “RE.” Each ERP is 15 mm along the B-M (back-mouth) line behind the entrance-to-ear-canal (EEC) point, as shown in Figure 9.1.2 The Reference Plane is defined as passing through the two ear reference points and point M. The line N-F (neck-front), also called the reference pivoting line, is normal to the Reference Plane and perpendicular to both a line passing through RE and LE and the B-M line (see Figure 9.1.3). Both N-F and B-M lines should be marked on the exterior of the phantom shell to facilitate handset positioning. Posterior to the N-F line the ear shape is a flat surface with 6 mm thickness at each ERP, and forward of the N-F line the ear is truncated, as illustrated in Figure 9.1.2. The ear truncation is introduced to preclude the ear lobe from interfering with handset tilt, which could lead to unstable positioning at the cheek.

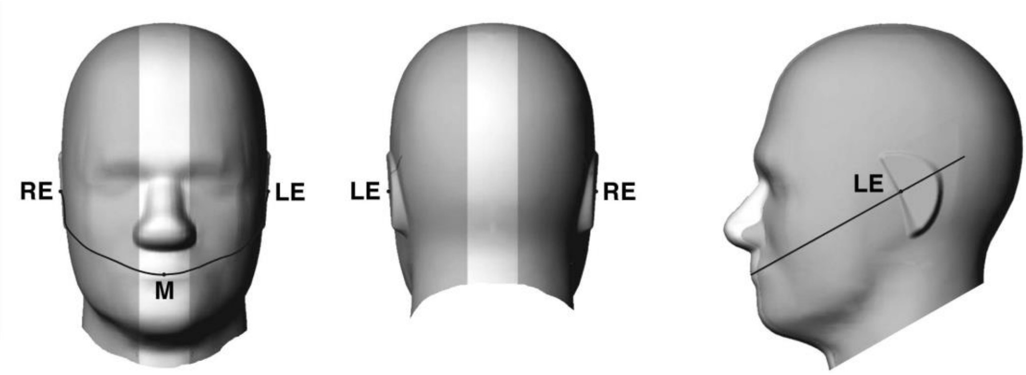


Fig 9.1.1 Front, back, and side views of SAM twin phantom

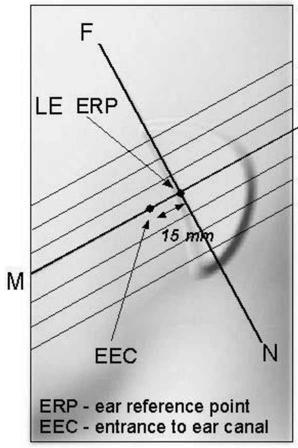


Fig 9.1.2 Close-up side view of phantom showing the ear region.

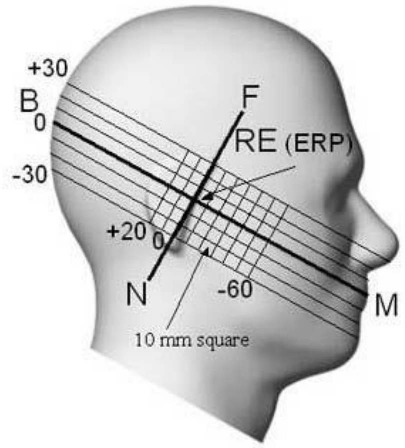


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

11.2 Definition of the cheek position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. Define two imaginary lines on the handset—the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset—the midpoint of the width wt of the handset at the level of the acoustic output (point A in Figure 9.2.1 and Figure 9.2.2), and the midpoint of the width wb of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 9.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 9.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
3. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 9.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
4. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP.
5. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
6. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the N-F line.
7. While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 9.2.3. The actual rotation angles should be documented in the test report.

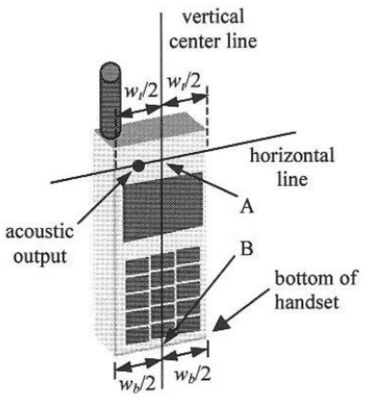


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

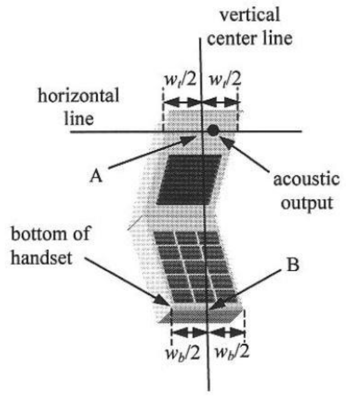


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

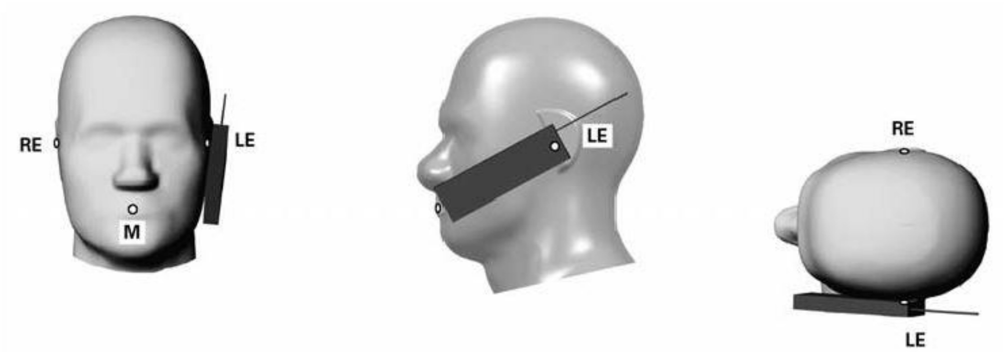


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

11.3 Definition of the tilt position

1. Ready the handset for talk operation, if necessary. For example, for handsets with a cover piece (flip cover), open the cover. If the handset can transmit with the cover closed, both configurations must be tested.
2. While maintaining the orientation of the handset, move the handset away from the pinna along the line passing through RE and LE far enough to allow a rotation of the handset away from the cheek by 15°.
3. Rotate the handset around the horizontal line by 15°.
4. While maintaining the orientation of the handset, move the handset towards the phantom on the line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact point is on the pinna. See Figure 9.3.1. If contact occurs at any location other than the pinna, e.g., the antenna at the back of the phantom head, the angle of the handset should be reduced. In this case, the tilt position is obtained if any point on the handset is in contact with the pinna and a second point

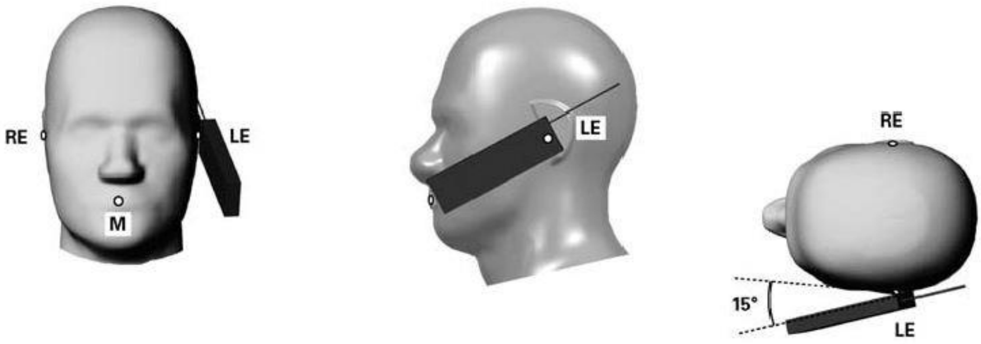


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

11.4 Body Worn Accessory

Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 9.4). Per KDB648474 D04v01r03, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01v06 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.

Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

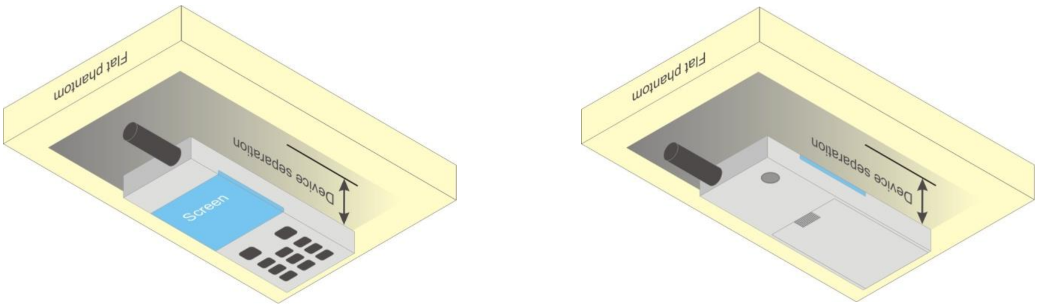


Fig 9.4 Body Worn Position

12. Conducted RF Output Power (Unit: dBm)

<WLAN Conducted Power>

General Note:

1. For each antenna, transmit power in SISO operation is larger than (or equal to) the power in MIMO operation, RF exposure compliance of MIMO mode can be deduced from the compliance simultaneous transmission of antennas operating in SISO mode.
2. Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio ≤ 0.04, no additional SAR measurements for MIMO.
3. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
4. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
5. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
6. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of 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 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode 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 report SAR is ≤ 0.8 W/kg or all required test position are tested.
   c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz WLAN ANT 1>

WLAN 2.4GHz_802.11b_Average Power (dBm)								
Power vs. Channel					Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate (bps) 1M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 2M	5.5M	11M
CH 01	2412	18.48	18.80	98.62	CH 11	18.73	18.76	18.76
CH 02	2417	18.58	18.80					
CH 06	2437	18.73	18.80					
CH 10	2457	18.72	18.80					
CH 11	2462	18.78	18.80					

WLAN 2.4GHz_802.11g_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate (bps) 6M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 9M	12M	18M	24M	36M	48M	54M
CH 01	2412	15.77	16.0	92.86	CH 06	17.74	17.71	17.72	17.74	17.75	17.74	17.70
CH 02	2417	17.42	17.8									
CH 06	2437	17.76	17.8									
CH 10	2457	17.54	17.8									
CH 11	2462	17.75	17.8									

WLAN 2.4GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	12.80	14.0	92.41	CH 06	17.42	17.25	17.50	17.51	17.49	17.44	17.49
CH 02	2417	17.52	17.8									
CH 06	2437	17.54	17.8									
CH 10	2457	16.23	16.5									
CH 11	2462	15.08	15.5									

WLAN 2.4GHz_802.11n HT40_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	11.10	12.0	97.52	CH 06	14.30	14.31	14.47	14.43	14.30	14.46	14.41
CH 04	2427	10.93	12.0									
CH 06	2437	14.50	15.0									
CH 08	2447	13.59	14.5									
CH 09	2452	13.90	14.5									

WLAN 2.4GHz_802.11ac VHT20_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 01	2412	12.90	14.0	93.10	CH 06	17.56	17.45	17.51	17.56	17.57	17.54	17.53	17.54
CH 02	2417	17.56	17.8										
CH 06	2437	17.58	17.8										
CH 10	2457	16.26	16.5										
CH 11	2462	15.07	15.5										

WLAN 2.4GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 03	2422	11.13	12.0	97.55	CH 06	14.42	14.40	14.42	14.43	14.48	14.38	14.45	14.39	14.40
CH 04	2427	10.66	12.0											
CH 06	2437	14.50	15.0											
CH 08	2447	13.80	14.5											
CH 09	2452	14.03	14.5											

<2.4GHz WLAN ANT 2>

WLAN 2.4GHz_802.11b_Average Power (dBm)								
Power vs. Channel					Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate (bps) 1M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 2M	5.5M	11M
CH 01	2412	18.96	19.0	98.62	CH 06	18.97	18.97	18.97
CH 02	2417	18.94	19.0					
CH 06	2437	18.98	19.0					
CH 10	2457	18.89	19.0					
CH 11	2462	18.67	19.0					

WLAN 2.4GHz_802.11g_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate (bps) 6M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 9M	12M	18M	24M	36M	48M	54M
CH 01	2412	15.34	16.0	92.86	CH 06	17.85	17.92	17.92	17.88	17.93	17.93	17.92
CH 02	2417	17.82	18.0									
CH 06	2437	17.94	18.0									
CH 10	2457	17.91	18.0									
CH 11	2462	16.71	18.0									

WLAN 2.4GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	13.19	14.0	92.41	CH 06	17.58	17.56	17.51	17.56	17.51	17.44	17.50
CH 02	2417	17.58	18.0									
CH 06	2437	17.59	18.0									
CH 10	2457	16.29	16.5									
CH 11	2462	14.89	15.5									

WLAN 2.4GHz_802.11n HT40_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	11.42	12.0	97.52	CH 06	14.66	14.67	14.72	14.69	14.69	14.71	14.71
CH 04	2427	11.43	12.0									
CH 06	2437	14.73	15.0									
CH 08	2447	13.93	14.5									
CH 09	2452	13.93	14.5									

WLAN 2.4GHz_802.11ac VHT20_Average Power (dBm)													
Power vs. Channel					Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 01	2412	13.62	14.0	92.47	CH 06	17.63	17.51	17.63	17.60	17.61	17.61	17.64	17.64
CH 02	2417	17.65	18.0										
CH 06	2437	17.71	18.0										
CH 10	2457	16.27	16.5										
CH 11	2462	15.16	15.5										

WLAN 2.4GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS 9
CH 03	2422	11.70	12.0	98.15	CH 06	14.88	14.89	14.85	14.88	14.89	14.87	14.82	14.87	14.88
CH 04	2427	11.37	12.0											
CH 06	2437	14.90	15.0											
CH 08	2447	14.19	14.5											
CH 09	2452	14.03	14.5											

<2.4GHz WLAN ANT 1+2>

WLAN 2.4GHz_802.11b_Average Power (dBm)								
Power vs. Channel					Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate (bps) 1M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 2M	5.5M	11M
CH 01	2412	21.72	21.9	99.08	CH 06	21.75	21.74	21.74
CH 02	2417	21.65	21.9					
CH 06	2437	21.78	21.9					
CH 10	2457	21.75	21.9					
CH 11	2462	21.76	21.9					

WLAN 2.4GHz_802.11g_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate (bps) 6M	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps) 9M	12M	18M	24M	36M	48M	54M
CH 01	2412	16.98	17.0	93.46	CH 06	20.77	20.76	20.77	20.78	20.72	20.74	20.74
CH 02	2417	20.45	20.9									
CH 06	2437	20.79	20.9									
CH 10	2457	19.74	20.9									
CH 11	2462	19.14	20.9									

WLAN 2.4GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	16.18	16.5	92.39	CH 06	20.77	20.77	20.79	21.79	20.75	21.75	20.76
CH 02	2417	20.81	20.9									
CH 06	2437	20.82	20.9									
CH 10	2457	19.31	20.9									
CH 11	2462	18.12	19.2									

WLAN 2.4GHz_802.11n HT40_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	14.45	15.0	97.52	CH 06	17.76	17.70	17.72	17.73	17.75	17.75	17.80
CH 04	2427	14.28	20.5									
CH 06	2437	17.82	20.5									
CH 08	2447	16.85	18.6									
CH 09	2452	17.15	18.6									

WLAN 2.4GHz_802.11ac VHT20_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	
CH 01	2412	16.36	16.5	92.47	CH 06	20.80	20.69	20.73	20.81	20.79	20.70	20.70	20.71	
CH 02	2417	20.82	20.9											
CH 06	2437	20.83	20.9											
CH 10	2457	19.47	20.9											
CH 11	2462	18.17	19.2											

WLAN 2.4GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 03	2422	14.61	15.0	97.53	CH 06	17.87	17.84	17.85	17.87	17.85	17.87	17.84	17.87	17.86
CH 04	2427	14.47	20.5											
CH 06	2437	17.88	20.5											
CH 08	2447	17.04	18.6											
CH 09	2452	17.21	18.6											

<TXBF Mode 2.4GHz WLAN ANT 1+2>

WLAN 2.4GHz_802.11n HT20_Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	18.11	18.3	CH 06	20.51	20.51	20.51	20.41	20.51	20.51	20.51
CH 02	2417	20.61	20.9								
CH 06	2437	20.61	20.9								
CH 10	2457	20.56	20.9								
CH 11	2462	19.06	19.2								

WLAN 2.4GHz_802.11n HT40_Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	18.71	18.8	CH 06	20.36	20.31	20.31	20.21	20.31	20.31	20.31
CH 04	2427	19.86	20.5								
CH 06	2437	20.46	20.5								
CH 08	2447	17.41	18.6								
CH 09	2452	18.37	18.6								

WLAN 2.4GHz_802.11ac VHT20_Average Power (dBm)												
Power vs. Channel				Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 01	2412	18.26	18.3	CH 06	20.80	20.69	20.73	20.81	20.79	20.70	20.70	20.71
CH 02	2417	20.76	20.9									
CH 06	2437	20.81	20.9									
CH 10	2457	20.71	20.9									
CH 11	2462	19.16	19.2									

WLAN 2.4GHz_802.11ac VHT40_Average Power (dBm)													
Power vs. Channel				Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 03	2422	18.76	18.8	CH 06	20.41	20.41	20.41	20.41	20.31	20.41	20.41	20.41	20.41
CH 04	2427	19.91	20.5										
CH 06	2437	20.51	20.5										
CH 08	2447	17.46	18.6										
CH 09	2452	18.52	18.6										

<5GHz WLAN ANT1>

WLAN 5GHz_802.11a_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	Data Rate (bps)	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps)						
	(MHz)	6M				9M	12M	18M	24M	36M	48M	54M
CH 36	5180	15.84	16.0	93.49	CH 48	16.30	16.28	16.40	16.47	16.54	16.54	16.49
CH 40	5200	16.37	16.7									
CH 44	5220	16.52	16.7									
CH 48	5240	16.54	16.7									
CH 52	5260	16.53	16.7	93.49	CH 52	16.48	16.42	16.50	16.53	16.52	16.50	16.50
CH 56	5280	16.49	16.7									
CH 60	5300	16.52	16.7									
CH 64	5320	15.54	16.0									
CH 100	5500	16.50	16.7	93.49	CH 100	16.45	16.44	16.44	16.26	16.36	16.40	16.49
CH 116	5580	16.45	16.7									
CH 124	5620	16.38	16.7									
CH 132	5660	16.43	16.7									
CH 140	5700	14.64	15.0									
CH 144	5720	16.40	16.7									
CH 149	5745	16.60	16.7	93.49	CH 157	16.62	16.59	16.58	16.62	16.60	16.60	16.61
CH 157	5785	16.69	16.7									
CH 165	5825	16.52	16.7									

WLAN 5GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index						
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	15.40	16.0	93.06	CH 44	16.33	16.26	16.27	16.26	16.34	16.34	16.30
CH 40	5200	15.29	16.7									
CH 44	5220	16.39	16.7									
CH 48	5240	16.38	16.7									
CH 52	5260	16.02	16.7	93.06	CH 60	16.40	16.39	16.31	16.39	16.36	16.34	16.34
CH 56	5280	16.18	16.7									
CH 60	5300	16.42	16.7									
CH 64	5320	14.39	15.0									
CH 100	5500	14.47	14.5	93.06	CH 116	16.13	16.11	16.11	16.14	16.11	16.11	16.09
CH 116	5580	16.14	16.7									
CH 124	5620	15.50	16.7									
CH 132	5660	15.56	16.7									
CH 140	5700	13.17	13.5									
CH 144	5720	15.82	16.7									
CH 149	5745	16.52	16.7	93.06	CH 157	16.50	16.49	16.48	16.51	16.48	16.42	16.46
CH 157	5785	16.53	16.7									
CH 165	5825	16.38	16.7									

WLAN 5GHz_802.11n HT40_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index						
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	12.08	12.5	97.52	CH 46	15.95	15.90	15.83	15.89	15.91	15.96	15.95
CH 46	5230	15.98	16.2									
CH 54	5270	15.92	16.2	97.52	CH 54	15.89	15.85	15.83	15.89	15.90	15.89	15.91
CH 62	5310	10.75	11.0									
CH 102	5510	11.68	12.0	97.52	CH 110	15.79	15.73	15.72	15.77	15.75	15.74	15.73
CH 110	5550	15.80	16.2									
CH 126	5630	15.52	16.2									
CH 134	5670	15.43	16.2									
CH 142	5710	14.77	16.2									
CH 151	5755	15.56	16.2	97.52	CH 159	15.74	15.71	15.75	15.75	15.71	15.69	15.70
CH 159	5795	15.78	16.2									

WLAN 5GHz_802.11ac VHT20_Average Power (dBm)													
Power vs. Channel					Power vs. Data Rate								
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index							
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	15.41	16.0	93.10	CH 44	16.45	16.36	16.40	16.42	16.44	16.43	16.42	16.44
CH 40	5200	15.51	16.7										
CH 44	5220	16.47	16.7										
CH 48	5240	16.42	16.7										
CH 52	5260	16.14	16.7	93.10	CH 60	16.42	16.30	16.32	16.41	16.40	16.40	16.42	16.43
CH 56	5280	16.20	16.7										
CH 60	5300	16.45	16.7										
CH 64	5320	14.45	15.0										
CH 100	5500	14.49	14.5	93.10	CH 144	16.19	16.15	16.13	16.18	16.21	16.20	16.21	16.17
CH 116	5580	16.24	16.7										
CH 124	5620	15.62	16.7										
CH 132	5660	15.75	16.7										
CH 140	5700	13.18	13.5										
CH 144	5720	16.27	16.7										
CH 149	5745	16.53	16.7	93.10	CH 157	16.51	16.52	16.48	16.51	16.53	16.46	16.52	16.43
CH 157	5785	16.54	16.7										
CH 165	5825	16.45	16.7										

WLAN 5GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	12.23	12.5	97.53	CH 46	15.95	15.94	15.98	16.00	16.02	16.01	16.00	16.02	16.01
CH 46	5230	16.04	16.2											
CH 54	5270	16.02	16.2	97.53	CH 54	15.97	15.93	15.79	15.92	15.97	15.98	16.01	16.00	15.97
CH 62	5310	10.78	11.0											
CH 102	5510	11.74	12.0	97.53	CH 110	15.74	15.77	15.69	15.79	15.80	15.80	15.78	15.77	15.73
CH 110	5550	15.81	16.2											
CH 126	5630	15.49	16.2											
CH 134	5670	15.59	16.2											
CH 142	5710	15.53	16.2											
CH 151	5755	15.71	16.2	97.53	CH 159	15.80	15.79	15.72	15.82	15.79	15.77	15.70	15.78	15.59
CH 159	5795	15.87	16.2											

WLAN 5GHz_802.11ac VHT80_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 042	5210	11.40	12.0	95.85	CH 42	10.80	10.72	10.56	10.35	10.02	10.10	10.02	9.95	9.89
CH 058	5290	11.13	11.5	95.85	CH 58	10.27	9.92	9.70	9.40	9.05	9.15	8.99	8.94	9.25
CH 106	5530	9.98	10.0	95.85	CH 122	14.42	14.13	13.83	13.77	13.25	13.32	13.23	13.23	13.12
CH 122	5610	15.01	15.2											
CH 138	5690	14.75	15.2											
CH 155	5775	15.18	15.2	95.85	CH 155	15.16	15.09	15.08	15.13	15.11	15.10	15.06	15.12	15.15

<5GHz WLAN ANT2>

WLAN 5GHz_802.11a_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	Data Rate (bps)	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps)						
	(MHz)	6M				9M	12M	18M	24M	36M	48M	54M
CH 36	5180	16.22	16.4	92.86	CH 44	16.28	16.30	16.27	16.30	16.31	16.28	16.23
CH 40	5200	16.15	16.4									
CH 44	5220	16.34	16.4									
CH 48	5240	16.25	16.4									
CH 52	5260	16.31	16.4	92.86	CH 56	16.33	16.32	16.29	16.26	16.25	16.25	16.26
CH 56	5280	16.37	16.4									
CH 60	5300	16.33	16.4									
CH 64	5320	15.67	16.0									
CH 100	5500	15.23	15.5	92.86	CH 116	16.29	16.29	16.29	16.32	16.37	16.31	16.36
CH 116	5580	16.39	16.4									
CH 124	5620	16.04	16.4									
CH 132	5660	16.37	16.4									
CH 140	5700	13.72	14.0									
CH 144	5720	16.38	16.4									
CH 149	5745	16.37	16.4	92.86	CH 149	16.35	16.33	16.30	16.34	16.34	16.34	16.36
CH 157	5785	16.26	16.4									
CH 165	5825	16.30	16.4									

WLAN 5GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index						
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	15.12	15.5	92.71	CH 44	16.24	16.23	16.23	16.26	16.26	16.25	16.24
CH 40	5200	15.09	16.4									
CH 44	5220	16.27	16.4									
CH 48	5240	16.22	16.4									
CH 52	5260	16.08	16.4	92.71	CH 60	16.13	16.09	16.05	16.09	16.11	16.08	16.09
CH 56	5280	15.85	16.4									
CH 60	5300	16.14	16.4									
CH 64	5320	14.21	14.5									
CH 100	5500	14.16	14.5	92.71	CH 116	15.90	15.87	15.87	15.88	15.90	15.88	15.89
CH 116	5580	15.92	16.4									
CH 124	5620	15.49	16.4									
CH 132	5660	15.53	16.4									
CH 140	5700	12.14	12.5									
CH 144	5720	15.47	16.4									
CH 149	5745	16.37	16.4	92.71	CH 149	16.32	16.29	16.22	16.29	16.30	16.28	16.24
CH 157	5785	16.16	16.4									
CH 165	5825	16.34	16.4									

WLAN 5GHz_802.11n HT40_Average Power (dBm)													
Power vs. Channel					Power vs. Data Rate								
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index							
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
CH 38	5190	11.51	12.0	97.52	CH 46	15.32	15.30	15.31	15.26	15.32	15.30	15.27	
CH 46	5230	15.35	15.9										
CH 54	5270	15.69	15.9	97.52	CH 54	15.64	15.61	15.60	15.59	15.66	15.65	15.65	
CH 62	5310	10.59	11.0										
CH 102	5510	11.47	12.0	97.52	CH 110	15.36	15.31	15.33	15.33	15.37	15.34	15.31	
CH 110	5550	15.39	15.9										
CH 126	5630	15.19	15.9										
CH 134	5670	14.84	15.9										
CH 142	5710	14.76	15.9										
CH 151	5755	15.54	15.9	97.52	CH 151	15.50	15.47	15.49	15.46	15.51	15.51	15.52	
CH 159	5795	15.51	15.9										

WLAN 5GHz_802.11ac VHT20_Average Power (dBm)													
Power vs. Channel					Power vs. Data Rate								
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index							
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	15.13	15.5	93.10	CH 48	16.25	16.19	16.16	16.20	16.24	16.22	16.21	16.25
CH 40	5200	15.16	16.4										
CH 44	5220	16.28	16.4										
CH 48	5240	16.30	16.4										
CH 52	5260	16.09	16.4	93.10	CH 60	16.04	16.02	16.05	16.06	16.12	16.10	16.14	16.13
CH 56	5280	15.88	16.4										
CH 60	5300	16.15	16.4										
CH 64	5320	14.24	14.5										
CH 100	5500	14.18	14.5	93.10	CH 116	15.97	16.02	16.09	16.09	16.11	16.08	16.07	16.11
CH 116	5580	16.14	16.4										
CH 124	5620	15.57	16.4										
CH 132	5660	15.67	16.4										
CH 140	5700	12.35	12.5										
CH 144	5720	16.02	16.4										
CH 149	5745	16.38	16.4	93.10	CH 149	16.34	16.30	16.25	16.35	16.21	16.26	16.17	16.29
CH 157	5785	16.13	16.4										
CH 165	5825	16.36	16.4										

WLAN 5GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	11.58	12.0	97.53	CH 46	15.39	15.36	15.31	15.37	15.31	15.38	15.34	15.31	15.36
CH 46	5230	15.42	15.9											
CH 54	5270	15.78	15.9	97.53	CH 54	15.69	15.66	15.62	15.64	15.67	15.73	15.66	15.68	15.66
CH 62	5310	10.63	11.0											
CH 102	5510	11.76	12.0	97.53	CH 110	15.33	15.35	15.36	15.40	15.33	15.32	15.22	15.40	15.38
CH 110	5550	15.41	15.9											
CH 126	5630	15.28	15.9											
CH 134	5670	15.20	15.9											
CH 142	5710	15.24	15.9											
CH 151	5755	15.60	15.9	97.53	CH 151	15.59	15.54	15.52	15.56	15.55	15.50	15.51	15.42	15.50
CH 159	5795	15.48	15.9											

WLAN 5GHz_802.11ac VHT80_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 042	5210	10.90	11.0	95.00	CH 42	10.40	10.32	10.14	9.88	9.55	9.51	9.55	9.45	9.31
CH 058	5290	10.76	11.5	95.00	CH 58	10.17	10.17	10.11	9.95	9.72	9.68	9.67	9.49	9.35
CH 106	5530	9.46	10.0	95.00	CH 138	13.71	13.68	13.51	13.25	12.95	12.93	13.00	12.89	12.76
CH 122	5610	14.50	14.9											
CH 138	5690	14.53	15.2											
CH 155	5775	14.89	14.9	95.00	CH 155	14.88	14.84	14.76	14.76	14.81	14.83	14.87	14.83	14.82

<5GHz WLAN ANT1+2>

WLAN 5GHz_802.11a_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	Data Rate (bps)	Tune-Up Limit	Duty Cycle %	Channel	Data Rate (bps)						
	(MHz)	6M				9M	12M	18M	24M	36M	48M	54M
CH 36	5180	18.40	19.2	92.86	CH 48	19.49	19.40	19.33	19.39	19.48	19.49	19.49
CH 40	5200	19.37	19.6									
CH 44	5220	19.48	19.6									
CH 48	5240	19.49	19.6									
CH 52	5260	19.49	19.6	92.86	CH 52	19.48	19.44	19.46	19.48	19.48	19.47	19.42
CH 56	5280	19.49	19.6									
CH 60	5300	19.25	19.6									
CH 64	5320	17.76	19.0									
CH 100	5500	18.14	19.2	92.86	CH 144	19.18	19.17	19.16	19.14	19.13	19.11	19.11
CH 116	5580	19.17	19.6									
CH 124	5620	18.79	19.6									
CH 132	5660	18.85	19.6									
CH 140	5700	16.30	17.5									
CH 144	5720	19.20	19.6									
CH 149	5745	19.46	19.6	92.86	CH 165	19.48	19.48	19.48	19.42	19.46	19.49	19.47
CH 157	5785	19.41	19.6									
CH 165	5825	19.49	19.6									

WLAN 5GHz_802.11n HT20_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index						
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	18.38	18.8	92.41	CH 44	19.46	19.43	19.33	19.45	19.43	19.35	19.23
CH 40	5200	19.33	19.6									
CH 44	5220	19.47	19.6									
CH 48	5240	19.45	19.6									
CH 52	5260	19.15	19.6	92.41	CH 60	19.44	19.42	19.41	19.38	19.43	19.36	19.35
CH 56	5280	19.25	19.6									
CH 60	5300	19.45	19.6									
CH 64	5320	17.50	17.8									
CH 100	5500	17.47	18.8	92.41	CH 116	19.17	19.11	19.07	19.11	19.17	19.08	19.08
CH 116	5580	19.18	19.6									
CH 124	5620	18.51	19.6									
CH 132	5660	18.75	19.6									
CH 140	5700	15.89	17.5									
CH 144	5720	19.03	19.6									
CH 149	5745	19.48	19.6	92.41	CH 149	19.48	19.47	19.47	19.48	19.47	19.46	19.47
CH 157	5785	19.41	19.6									
CH 165	5825	19.47	19.6									

WLAN 5GHz_802.11n HT40_Average Power (dBm)												
Power vs. Channel					Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	15.09	15.9	97.52	CH 46	18.91	18.87	18.84	18.90	18.92	18.93	18.89
CH 46	5230	18.97	19.1									
CH 54	5270	18.93	19.1	97.52	CH 54	18.85	18.82	18.83	18.87	18.90	18.91	18.85
CH 62	5310	13.77	14.0									
CH 102	5510	14.71	16.5	97.52	CH 110	18.64	18.61	18.53	18.53	18.53	18.50	18.67
CH 110	5550	18.70	19.1									
CH 126	5630	18.58	19.1									
CH 134	5670	18.44	19.1									
CH 142	5710	18.19	19.1									
CH 151	5755	18.67	19.1	97.52	CH 159	18.71	18.68	18.69	18.72	18.70	18.72	18.72
CH 159	5795	18.74	19.1									

WLAN 5GHz_802.11ac VHT20_Average Power (dBm)													
Power vs. Channel					Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Duty Cycle %	Channel	MCS Index MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	18.42	18.8	92.41	CH 44	19.48	19.47	19.46	19.39	19.47	19.47	19.47	19.48
CH 40	5200	19.29	19.6										
CH 44	5220	19.49	19.6										
CH 48	5240	19.48	19.6										
CH 52	5260	19.16	19.6	92.41	CH 60	19.45	19.33	19.22	19.45	19.44	19.44	19.44	19.41
CH 56	5280	19.32	19.6										
CH 60	5300	19.47	19.6										
CH 64	5320	17.53	17.8										
CH 100	5500	17.50	18.8	92.41	CH 144	19.49	19.48	19.45	19.47	19.47	19.43	19.41	19.40
CH 116	5580	19.25	19.6										
CH 124	5620	18.68	19.6										
CH 132	5660	18.77	19.6										
CH 140	5700	15.91	17.5										
CH 144	5720	19.53	19.6										
CH 149	5745	19.49	19.6	92.41	CH 149	19.48	19.48	19.47	19.47	19.47	19.48	19.48	19.48
CH 157	5785	19.46	19.6										
CH 165	5825	19.48	19.6										

WLAN 5GHz_802.11ac VHT40_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	15.19	15.9	97.53	CH 46	18.88	18.88	18.98	18.98	18.93	18.94	18.91	18.98	18.96
CH 46	5230	18.99	19.1											
CH 54	5270	18.98	19.1	97.53	CH 54	18.90	18.93	18.89	18.89	18.87	18.82	18.94	18.96	18.96
CH 62	5310	13.87	14.0											
CH 102	5510	14.89	16.5	97.53	CH 110	18.80	18.81	18.80	18.79	18.75	18.74	18.71	18.77	18.81
CH 110	5550	18.82	19.1											
CH 126	5630	18.65	19.1											
CH 134	5670	18.60	19.1											
CH 142	5710	18.68	19.1											
CH 151	5755	18.83	19.1	97.53	CH 151	18.80	18.81	18.79	18.81	18.79	18.76	18.77	18.81	18.79
CH 159	5795	18.76	19.1											

WLAN 5GHz_802.11ac VHT80_Average Power (dBm)														
Power vs. Channel					Power vs. Data Rate									
Channel	Frequency	MCS Index	Tune-Up Limit	Duty Cycle %	Channel	MCS Index								
	(MHz)	MCS0				MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 042	5210	14.41	14.5	95.83	CH 042	14.40	14.37	14.38	14.37	14.40	14.38	14.40	14.36	14.35
CH 058	5290	14.19	14.5	95.83	CH 058	14.14	14.13	14.15	14.19	14.15	14.12	14.12	14.11	14.07
CH 106	5530	13.00	14.8	95.83	CH 122	17.88	17.90	17.91	17.95	17.87	17.89	17.80	17.82	17.82
CH 122	5610	17.97	18.1											
CH 138	5690	17.80	18.2											
CH 155	5775	18.03	18.1	95.83	CH 155	18.00	17.95	17.82	17.87	17.82	17.80	17.81	17.96	18.02

<TXBF Mode 5GHz WLAN ANT1+2>

WLAN 5GHz_802.11n HT20_Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up	Channel	MCS Index						
	(MHz)	MCS0	Limit		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	18.56	18.8	CH 48	19.17	19.17	19.12	19.17	19.13	19.12	19.13
CH 40	5200	19.03	19.6								
CH 44	5220	19.12	19.6								
CH 48	5240	19.22	19.6								
CH 52	5260	18.86	19.6	CH 52	18.81	18.76	18.81	18.81	18.76	18.81	18.76
CH 56	5280	18.82	19.6								
CH 60	5300	18.77	19.6								
CH 64	5320	17.61	17.8								
CH 100	5500	18.67	18.8	CH 144	19.32	19.34	19.31	19.28	19.25	19.28	19.24
CH 116	5580	19.01	19.6								
CH 124	5620	18.51	19.6								
CH 132	5660	18.75	19.6								
CH 140	5700	17.37	17.5								
CH 144	5720	19.44	19.6								
CH 149	5745	19.36	19.6	CH 165	19.37	19.36	19.36	19.32	19.37	19.36	19.31
CH 157	5785	19.27	19.6								
CH 165	5825	19.41	19.6								

WLAN 5GHz_802.11n HT40_Average Power (dBm)											
Power vs. Channel				Power vs. Data Rate							
Channel	Frequency	MCS Index	Tune-Up	Channel	MCS Index						
	(MHz)	MCS0	Limit		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	15.66	15.9	CH 46	18.57	18.56	18.56	18.57	18.52	18.56	18.57
CH 46	5230	18.61	19.1								
CH 54	5270	18.66	19.1	CH 54	18.61	18.61	18.56	18.56	18.57	18.61	18.57
CH 62	5310	13.57	14.0								
CH 102	5510	16.37	16.5	CH 142	18.81	18.83	18.78	18.76	18.77	18.79	18.78
CH 110	5550	18.81	19.1								
CH 126	5630	18.58	19.1								
CH 134	5670	18.34	19.1								
CH 142	5710	18.92	19.1								
CH 151	5755	18.66	19.1	CH 159	18.86	18.86	18.81	18.81	18.76	18.81	18.86
CH 159	5795	18.91	19.1								

WLAN 5GHz_802.11ac VHT20_Average Power (dBm)												
Power vs. Channel				Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	18.76	18.8	CH 48	19.28	19.28	19.23	19.23	19.18	19.23	19.28	19.23
CH 40	5200	19.29	19.6									
CH 44	5220	19.33	19.6									
CH 48	5240	19.37	19.6									
CH 52	5260	19.21	19.6	CH 56	19.23	19.17	19.23	19.22	19.23	19.22	19.22	19.23
CH 56	5280	19.32	19.6									
CH 60	5300	19.27	19.6									
CH 64	5320	17.71	17.8									
CH 100	5500	18.77	18.8	CH 144	19.47	19.47	19.46	19.46	19.47	19.41	19.46	19.41
CH 116	5580	19.51	19.6									
CH 124	5620	18.68	19.6									
CH 132	5660	18.77	19.6									
CH 140	5700	17.47	17.5									
CH 144	5720	19.55	19.6									
CH 149	5745	19.46	19.6	CH 165	19.47	19.41	19.37	19.37	19.36	19.32	19.36	19.41
CH 157	5785	19.41	19.6									
CH 165	5825	19.51	19.6									

WLAN 5GHz_802.11ac VHT40_Average Power (dBm)													
Power vs. Channel				Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	15.81	15.9	CH 46	18.97	18.97	18.92	18.97	18.93	18.92	18.93	18.92	18.87
CH 46	5230	19.02	19.1										
CH 54	5270	18.91	19.1	CH 54	18.86	18.81	18.76	18.86	18.86	18.81	18.86	18.76	18.81
CH 62	5310	13.66	14.0										
CH 102	5510	16.46	16.5	CH 142	18.94	18.93	18.92	18.9	18.91	18.93	18.85	18.91	18.88
CH 110	5550	18.97	19.1										
CH 126	5630	18.65	19.1										
CH 134	5670	18.76	19.1										
CH 142	5710	19.04	19.1										
CH 151	5755	18.81	19.1	CH 159	19.01	18.96	18.96	18.96	18.97	18.91	18.96	18.86	18.81
CH 159	5795	19.06	19.1										

WLAN 5GHz_802.11ac VHT80_Average Power (dBm)													
Power vs. Channel				Power vs. Data Rate									
Channel	Frequency (MHz)	MCS Index MCS0	Tune-Up Limit	Channel	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 042	5210	14.41	14.5	CH 042	14.37	14.36	14.36	14.37	14.36	14.36	14.31	14.37	14.36
CH 058	5290	14.06	14.5	CH 058	14.01	14.01	14.01	13.96	13.96	13.96	13.91	13.91	13.96
CH 106	5530	14.72	14.8	CH 122	17.97	17.96	17.96	17.92	17.96	17.92	17.91	17.91	17.92
CH 122	5610	18.01	18.1										
CH 138	5690	17.98	18.2										
CH 155	5775	17.56	18.1	CH 155	17.51	17.46	17.46	17.41	17.41	17.46	17.51	17.46	17.41

13. Bluetooth Exclusions Applied

Mode	Average power (dBm)			
	BR/EDR			LE
	1Mbps	2Mbps	3Mbps	
Bluetooth	3.47	-0.21	-0.18	3.51
Tune-up Limit	3.6			3.6

Note:

1. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

<For Head, Body worn (with soft holster) and Body worn (with soft holster + exoskeleton + trigger handle)>

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
3.6	< 5	2.48	0.63

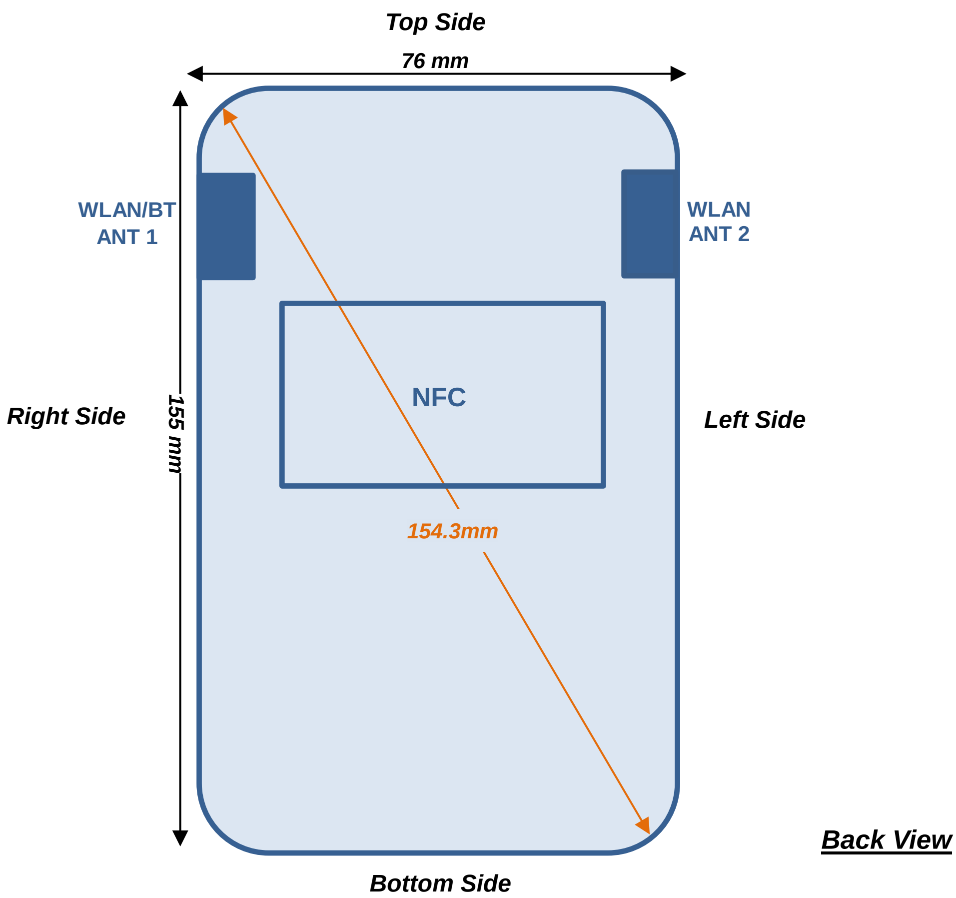
Note:
Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 0.63 which is <= 3, SAR testing is not required.

<For Body worn (without holster)>

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
3.6	10	2.48	0.31

Note:
Per KDB 447498 D01v06, when the minimum test separation distance is 10 mm, The test exclusion threshold is 0.31 which is <= 3, SAR testing is not required.

14. Antenna Location



15. SAR Test Results

General Note:

1. Per KDB 447498 D01v06, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. Per KDB 648474 D04v01r03, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, SAR testing with a headset connected to the handset is not required.
5. When EUT is placed into the holster, only front face of EUT will toward to the human body.

WLAN Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required 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.
2. Per KDB 248227 D01v02r02, for U-NII-1 Head and Body-worn SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode 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 report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. For WLAN SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
6. Per KDB 248227 D01v02r02, the simultaneous SAR provisions in KDB publication 447498 should be applied to determine simultaneous transmission SAR test exclusion for WiFi MIMO. If the sum of 1g single transmission chain SAR measurements is < 1.6W/kg and SAR peak to location ratio ≤ 0.04, no additional SAR measurements for MIMO.
7. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

15.1 Head SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	-0.12	0.459	0.468
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	-0.13	0.345	0.351
01	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	0.01	0.977	0.995
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 1	6	2437	18.73	18.80	1.016	98.62	1.014	0.08	0.876	0.903
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	-0.01	0.404	0.412
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 2	6	2437	18.98	19.00	1.005	98.62	1.014	0.18	0.937	0.955
	WLAN2.4GHz	802.11b 1Mbps	Right Cheek	0mm	Ant 2	1	2412	18.96	19.00	1.009	98.62	1.014	0.04	0.824	0.843
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Ant 2	6	2437	18.98	19.00	1.005	98.62	1.014	-0.11	0.603	0.614
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 2	6	2437	18.98	19.00	1.005	98.62	1.014	0.09	0.475	0.484
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Ant 2	6	2437	18.98	19.00	1.005	98.62	1.014	-0.05	0.299	0.305
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 1	52	5260	16.53	16.70	1.039	93.49	1.070	0.01	0.101	0.112
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 1	52	5260	16.53	16.70	1.039	93.49	1.070	0.16	0.084	0.093
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 1	52	5260	16.53	16.70	1.039	93.49	1.070	-0.19	0.247	0.275
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 1	52	5260	16.53	16.70	1.039	93.49	1.070	0.07	0.121	0.135
02	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.13	1.100	1.193
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	60	5300	16.33	16.40	1.016	92.86	1.077	-0.14	1.080	1.182
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.16	0.299	0.324
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.07	0.344	0.373
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.12	0.255	0.277
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 1	100	5500	16.50	16.70	1.047	93.49	1.070	-0.07	0.197	0.221
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 1	100	5500	16.50	16.70	1.047	93.49	1.070	-0.12	0.182	0.204
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 1	100	5500	16.50	16.70	1.047	93.49	1.070	0.01	0.358	0.401
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 1	100	5500	16.50	16.70	1.047	93.49	1.070	-0.01	0.213	0.239
03	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	-0.12	1.110	1.198
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	132	5660	16.37	16.40	1.007	92.86	1.077	0.19	1.090	1.182
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	-0.13	0.305	0.329
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	-0.07	0.342	0.369
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	-0.18	0.235	0.254
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 1	157	5785	16.69	16.70	1.002	93.49	1.070	-0.15	0.203	0.218
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 1	157	5785	16.69	16.70	1.002	93.49	1.070	-0.03	0.177	0.190
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 1	157	5785	16.69	16.70	1.002	93.49	1.070	-0.12	0.428	0.459
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 1	157	5785	16.69	16.70	1.002	93.49	1.070	0.07	0.220	0.236
04	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.14	1.100	1.192
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	165	5825	16.30	16.40	1.023	92.86	1.077	-0.19	1.070	1.179
	WLAN5GHz	802.11a 6Mbps	Right Tilted	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.19	0.416	0.451
	WLAN5GHz	802.11a 6Mbps	Left Cheek	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.15	0.327	0.354
	WLAN5GHz	802.11a 6Mbps	Left Tilted	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.16	0.403	0.437

15.2 Body Worn Accessory SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Accessories	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Ant 1	-	11	2462	18.78	18.80	1.005	98.62	1.014	0.17	0.143	0.146
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Ant 1	-	11	2462	18.78	18.80	1.005	98.62	1.014	-0.08	0.081	0.083
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Ant 1	Soft holster	11	2462	18.78	18.80	1.005	98.62	1.014	0.07	0.048	0.049
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Ant 1	Soft holster+ Exoskeleton +Trigger Handle	11	2462	18.78	18.80	1.005	98.62	1.014	0.05	0.054	0.055
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	Ant 2	-	6	2437	18.98	19.00	1.005	98.62	1.014	0.03	0.220	0.224
05	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	Ant 2	-	6	2437	18.98	19.00	1.005	98.62	1.014	0.03	0.264	0.269
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Ant 2	Soft holster	6	2437	18.98	19.00	1.005	98.62	1.014	0.06	0.052	0.053
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Ant 2	Soft holster+ Exoskeleton +Trigger Handle	6	2437	18.98	19.00	1.005	98.62	1.014	0.04	0.057	0.058
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 1	-	52	5260	16.53	16.70	1.039	93.49	1.070	-0.16	0.084	0.093
06	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 1	-	52	5260	16.53	16.70	1.039	93.49	1.070	0.07	0.622	0.692
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster	52	5260	16.53	16.70	1.039	93.49	1.070	-0.19	0.048	0.053
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster+ Exoskeleton +Trigger Handle	52	5260	16.53	16.70	1.039	93.49	1.070	0.17	0.059	0.066
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 2	-	56	5280	16.37	16.40	1.007	92.86	1.077	-0.05	0.145	0.157
	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 2	-	56	5280	16.37	16.40	1.007	92.86	1.077	-0.02	0.354	0.384
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster	56	5280	16.37	16.40	1.007	92.86	1.077	-0.12	0.130	0.141
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster+ Exoskeleton +Trigger Handle	56	5280	16.37	16.40	1.007	92.86	1.077	0.17	0.095	0.103
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 1	-	100	5500	16.50	16.70	1.047	93.49	1.070	0.05	0.155	0.174
	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 1	-	100	5500	16.50	16.70	1.047	93.49	1.070	-0.18	0.782	0.876
07	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 1	-	116	5580	16.45	16.70	1.059	93.49	1.070	-0.16	0.826	0.936
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster	100	5500	16.50	16.70	1.047	93.49	1.070	-0.14	0.059	0.066
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster+ Exoskeleton +Trigger Handle	100	5500	16.50	16.70	1.047	93.49	1.070	0.04	0.071	0.080
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 2	-	116	5580	16.39	16.40	1.002	92.86	1.077	-0.11	0.167	0.180
	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 2	-	116	5580	16.39	16.40	1.002	92.86	1.077	-0.08	0.458	0.494
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster	116	5580	16.39	16.40	1.002	92.86	1.077	-0.1	0.078	0.084
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster+ Exoskeleton +Trigger Handle	116	5580	16.39	16.40	1.002	92.86	1.077	-0.06	0.118	0.127
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 1	-	157	5785	16.69	16.70	1.002	93.49	1.070	0.06	0.134	0.144
	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 1	-	157	5785	16.69	16.70	1.002	93.49	1.070	-0.1	0.823	0.882
08	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 1	-	149	5745	16.60	16.70	1.023	93.49	1.070	0.17	0.843	0.922
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster	157	5785	16.69	16.70	1.002	93.49	1.070	-0.14	0.064	0.069
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 1	Soft holster+ Exoskeleton + Trigger Handle	157	5785	16.69	16.70	1.002	93.49	1.070	-0.1	0.061	0.065
	WLAN5GHz	802.11a 6Mbps	Front	10mm	Ant 2	-	149	5745	16.37	16.40	1.007	92.86	1.077	0	0.153	0.166
	WLAN5GHz	802.11a 6Mbps	Back	10mm	Ant 2	-	149	5745	16.37	16.40	1.007	92.86	1.077	-0.16	0.522	0.566
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster	149	5745	16.37	16.40	1.007	92.86	1.077	-0.16	0.041	0.044
	WLAN5GHz	802.11a 6Mbps	Front	0mm	Ant 2	Soft holster+ Exoskeleton +Trigger Handle	149	5745	16.37	16.40	1.007	92.86	1.077	-0.15	0.087	0.094

15.3 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	0.01	0.977	-	0.995
2nd	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Ant 1	11	2462	18.78	18.80	1.005	98.62	1.014	0.04	0.943	1.04	0.961
1st	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.13	1.100	-	1.193
2nd	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	56	5280	16.37	16.40	1.007	92.86	1.077	-0.03	1.050	1.05	1.139
1st	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	-0.12	1.110	-	1.198
2nd	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	116	5580	16.39	16.40	1.002	92.86	1.077	0.03	1.020	1.09	1.101
1st	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.14	1.100	-	1.192
2nd	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Ant 2	149	5745	16.37	16.40	1.007	92.86	1.077	-0.05	1.000	1.1	1.084

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Head	Body-worn
1.	WLAN ANT 1 + WLAN ANT 2	Yes	Yes
2.	Bluetooth ANT 1 + WLAN ANT 2	Yes	Yes

General Note:

1. WLAN RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode. Therefore SPLSR calculation was choose worst case with SAR test results of each antenna in SISO mode perform evaluation.
2. For SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
3. WLAN and Bluetooth share the same Antenna1, and cannot transmit simultaneously.
4. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
5. The Scaled SAR summation is calculated based on the same configuration and test position.
6. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   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.
   iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.
7. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Bluetooth Max Power	Exposure Position	Head	Body-worn (with soft holster)	Body-worn (with soft holster + exoskeleton + trigger handle)	Body-worn
	Test separation	5 mm	5 mm	5 mm	10 mm
3.6 dBm	Estimated SAR (W/kg)	0.084 W/kg	0.084 W/kg	0.084 W/kg	0.042 W/kg

16.1 Head Exposure Conditions

Exposure Position	1	2	3	4	5	1+2 Summed 1g SAR (W/kg)	3+4 Summed 1g SAR (W/kg)	2+5 Summed 1g SAR (W/kg)	4+5 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2	5GHz WLAN Ant 1	5GHz WLAN Ant 2	Bluetooth Ant 1				
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)				
Right Cheek	0.468	0.955	0.221	1.198	0.084	**1.423**	**1.419**	**1.039**	**1.282**
Right Tilted	0.351	0.614	0.204	0.451	0.084	**0.965**	**0.655**	**0.698**	**0.535**
Left Cheek	0.995	0.484	0.459	0.373	0.084	**1.479**	**0.832**	**0.568**	**0.457**
Left Tilted	0.412	0.305	0.239	0.437	0.084	**0.717**	**0.676**	**0.389**	**0.521**

16.2 Body-Worn Accessory Exposure Conditions

Exposure Position	1	2	3	4	5	1+2 Summed 1g SAR (W/kg)	3+4 Summed 1g SAR (W/kg)	2+5 Summed 1g SAR (W/kg)	4+5 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2	5GHz WLAN Ant 1	5GHz WLAN Ant 2	Bluetooth Ant 1				
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	Estimated 1g SAR (W/kg)				
Front	0.146	0.224	0.174	0.180	0.042	**0.370**	**0.354**	**0.266**	**0.222**
Back	0.083	0.269	0.936	0.566	0.042	**0.352**	**1.502**	**0.311**	**0.608**
Front with Soft holster	0.049	0.053	0.069	0.141	0.084	**0.102**	**0.210**	**0.137**	**0.225**
Front with Soft holster+ Exoskeleton +Trigger Handle	0.055	0.058	0.080	0.127	0.084	**0.113**	**0.207**	**0.142**	**0.211**

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17. Uncertainty Assessment

The component of uncertainly may generally be categorized according to the methods used to evaluate them. The evaluation of uncertainly by the statistical analysis of a series of observations is termed a Type An evaluation of uncertainty. The evaluation of uncertainty by means other than the statistical analysis of a series of observation is termed a Type B evaluation of uncertainty. Each component of uncertainty, however evaluated, is represented by an estimated standard deviation, termed standard uncertainty, which is determined by the positive square root of the estimated variance.

A Type A evaluation of standard uncertainty may be based on any valid statistical method for treating data. This includes calculating the standard deviation of the mean of a series of independent observations; using the method of least squares to fit a curve to the data in order to estimate the parameter of the curve and their standard deviations; or carrying out an analysis of variance in order to identify and quantify random effects in certain kinds of measurement.

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in table below.

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor(a)	1/k(b)	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

(a) standard uncertainty is determined as the product of the multiplying factor and the estimated range of variations in the measured quantity

(b) κ is the coverage factor

Table 17.1. Standard Uncertainty for Assumed Distribution

The combined standard uncertainty of the measurement result represents the estimated standard deviation of the result. It is obtained by combining the individual standard uncertainties of both Type A and Type B evaluation using the usual "root-sum-squares" (RSS) methods of combining standard deviations by taking the positive square root of the estimated variances.

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.0	N	1	1	1	6.0	6.0
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.0	R	1.732	1	1	0.6	0.6
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	2.9	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.0	R	1.732	1	1	1.2	1.2
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.1	R	1.732	1	1	3.5	3.5
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						11.4%	11.4%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						22.9%	22.7%

Table 17.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	7.0	N	1	1	1	7.0	7.0
Axial Isotropy	4.7	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.6	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	2.0	R	1.732	1	1	1.2	1.2
Linearity	4.7	R	1.732	1	1	2.7	2.7
System Detection Limits	1.0	R	1.732	1	1	0.6	0.6
Modulation Response	3.2	R	1.732	1	1	1.8	1.8
Readout Electronics	0.3	N	1	1	1	0.3	0.3
Response Time	0.0	R	1.732	1	1	0.0	0.0
Integration Time	2.6	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.0	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.0	R	1.732	1	1	1.7	1.7
Probe Positioner	0.4	R	1.732	1	1	0.2	0.2
Probe Positioning	6.7	R	1.732	1	1	3.9	3.9
Max. SAR Eval.	4.0	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Positioning	3.0	N	1	1	1	3.0	3.0
Device Holder	3.6	N	1	1	1	3.6	3.6
Power Drift	5.0	R	1.732	1	1	2.9	2.9
Power Scaling	0.0	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.6	R	1.732	1	1	3.8	3.8
SAR correction	0.0	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.2	N	1	0.78	0.71	0.1	0.1
Liquid Conductivity (target)	5.0	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.5	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.4	R	1.732	0.78	0.71	1.5	1.4
Liquid Permittivity Repeatability	0.15	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.0	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.5	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.83	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						12.8%	12.7%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.5%	25.4%

Table 17.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

18. References

[1] FCC 47 CFR Part 2 “Frequency Allocations and Radio Treaty Matters; General Rules and Regulations”

[2] ANSI/IEEE Std. C95.1-1992, “IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz”, September 1992

[3] IEEE Std. 1528-2013, “IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, Sep 2013

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

[6] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[7] FCC KDB 648474 D04 v01r03, “SAR Evaluation Considerations for Wireless Handsets”, Oct 2015.

[8] .

[9] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

[10] FCC KDB 865664 D02 v01r02, “RF Exposure Compliance Reporting and Documentation Considerations” Oct 2015.