FCC SAR TEST REPORT

FCC ID	**: UZ7TC520L**
Equipment	**: Touch Computer**
Brand Name	**: Zebra**
Model Name	**: TC520L**
Applicant	**: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Manufacturer	**: Zebra Technologies Corporation 1 Zebra Plaza, Holtsville, NY 11742**
Standard	**: FCC 47 CFR Part 2 (2.1093)**

The product was received on Mar. 29, 2021 and testing was started from Apr. 22, 2021 and completed on May 17, 2021. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample provide by manufacturer and the test data has been evaluated in accordance with the test procedures given in 47 CFR Part 2.1093 and FCC KDB and has been pass the FCC requirement.

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

Approved by: Cona Huang / Deputy Manager

Testing Laboratory 1190

Sporton International Inc. EMC & Wireless Communications Laboratory
No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan

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History of this test report

Report No.	Version	Description	Issued Date
FA122002	01	Initial issue of report	May 27, 2021

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Zebra Technologies Corporation, Touch Computer, TC520L, are as follows.

Equipment Class	Frequency Band		Highest SAR Summary Head 1g SAR (W/kg)	Highest SAR Summary Body-worn 1g SAR (W/kg)	Highest SAR Summary Extremity 10g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
DTS	WLAN	2.4GHz WLAN	0.93	0.36	0.15	0.94	0.15
NII	WLAN	5GHz WLAN	1.28	0.96	0.44	1.28	0.44
DSS	2.4GHz Band	Bluetooth	< 0.01	< 0.01	< 0.01	1.28	0.44
Date of Testing:			2021/4/22 ~ 2021/5/17				

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No.TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR, 4.0 W/kg for Extremity 10g SAR) 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.

Reviewed by: Jason Wang
Report Producer: Paula Chen

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards, the below KDB standard may not including in the TAF code without accreditation.

- 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 248227 D01 802.11 Wi-Fi SAR v02r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Touch Computer
Brand Name	Zebra
Model Name	TC520L
FCC ID	UZ7TC520L
S / N	210345225E0085
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2400 MHz ~ 2483.5 MHz WLAN U-NII 1: 5150 MHz ~ 5250 MHz WLAN U-NII 2: 5250 MHz ~ 5350 MHz WLAN U-NII 3: 5470 MHz ~ 5725 MHz WLAN U-NII 4: 5725 MHz ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 Bluetooth BR/EDR/LE NFC:ASK
HW Version	DV
SW Version	11-09-22.00-RG-U00-PRD-HEL-04
FW Version	FUSION_SA_2_1.1.0.012_R
MFD	07APR21
EUT Stage	Identical Prototype

Remark:
1. There are two battery options, the RF exposure is using battery 1 as main tested, battery 2 spot check 2.4GHz/5GHz WLAN and Bluetooth each exposure condition.
2. The device is attach accessory of exoskeleton consider extremity SAR testing on back side. Due to when the trigger handle must be paired with accessory of exoskeleton to be used and the back side will close to the hand, in this situation that we remove the trigger handle to tested extremity SAR to show compliance.
3. When the device attach the accessory of hand strap extremity SAR unnecessary, due to the hand will hold the device back side, and the back side has consider extremity SAR.

Specification of Accessories				
Adapter	Brand Name	Zebra	Model	SAWA-65-20005A
			Part Number	PWR-WUA5V12W0US
Battery 1	Brand Name	Zebra	Model	BT-000314
			Part Number	BT-000314-01
Battery 2	Brand Name	Zebra	Model	BT-000314A
			Part Number	BT-000314-50
Rugged Charge/USB cable	Brand Name	Zebra	Part Number	CBL-TC51-USB1-01
Headset Jumper 1	Brand Name	Zebra	Part Number	CBL-TC51-HDST25-01
Headset Jumper 2	Brand Name	Zebra	Part Number	CBL-TC51-HDST35-01
2.5mm Earphone	Brand Name	Zebra	Part Number	HDST-25MM-PTVP-01
3.5mm Earphone	Brand Name	Zebra	Part Number	HDST-35MM-PTVP-01
Exoskeleton	Brand Name	Zebra	Part Number	SG-TC51-EX01-01
Trigger Handle 1	Brand Name	Zebra	Part Number	TRG-TC51-SNP1-01
Soft Holster	Brand Name	Zebra	Part Number	SG-TC51-HLSTR1-01
Hand strap	Brand Name	Zebra	Part Number	SG-TC51-BHDSTP1-03
USB-C Adaptor	Brand Name	Zebra	Part Number	ADPTR-TC56-USBC-01
USB Type C cable	Brand Name	Zebra	Part Number	N/A

4. RF Exposure Limits

4.1 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.

4.2 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.

5. Specific Absorption Rate (SAR)

5.1 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.

5.2 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:

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

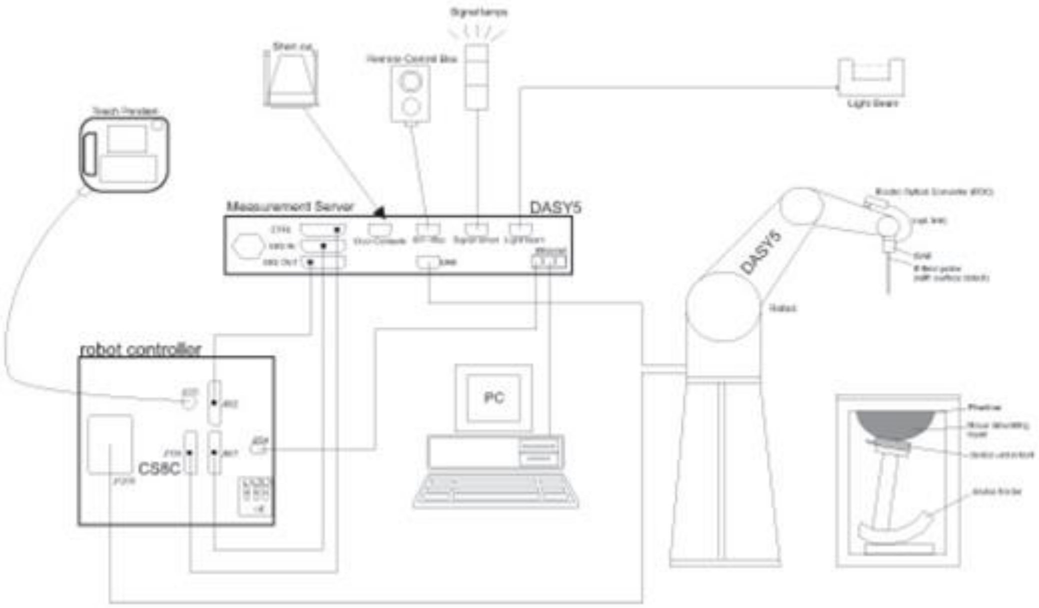
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

6. 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.

6.1 Test Site Location

The SAR measurement facilities used to collect data are within both Sporton Lab list below test site location are accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190 and 3786) and the FCC designation No.TW1190 and TW3786 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC test.

Test Site	EMC & Wireless Communications Laboratory		Wensan Laboratory		
Test Site Location	TW1190 No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan		TW3786 No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan		
Test Site No.	SAR01-HY	SAR03-HY	SAR08-HY	SAR09-HY	SAR15-HY
	SAR04-HY	SAR05-HY	SAR11-HY	SAR12-HY	
	SAR06-HY	SAR10-HY	SAR13-HY	SAR14-HY	

6.2 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

6.3 Data Acquisition Electronics (DAE)

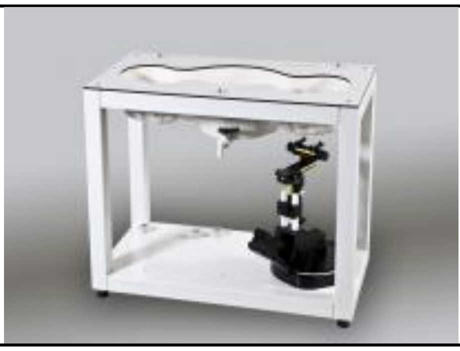
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an 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

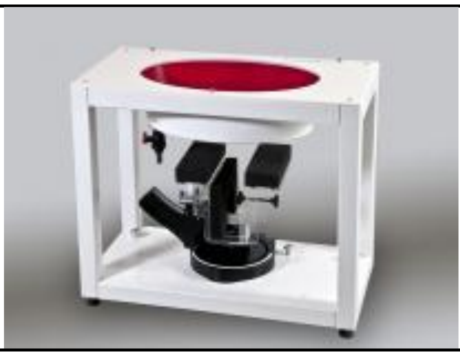
6.4 Phantom

<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.

6.5 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

7. 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

7.1 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

7.2 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.

7.3 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.	

7.4 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><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></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">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</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 <u>reported</u> 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>

7.5 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.

7.6 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.

8. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit(2)	D2450V2	736	Aug. 31, 2018	Aug. 28, 2021
SPEAG	5GHz System Validation Kit(2)	D5GHzV2	1006	Sep. 27, 2018	Sep. 24, 2021
SPEAG	Data Acquisition Electronics	DAE4	699	Feb. 16, 2021	Feb. 15, 2022
SPEAG	Dosimetric E-Field Probe	EX3DV4	7306	Jul. 24, 2020	Jul. 23, 2021
RCPTWN	Thermometer	HTC-1	TM560-2	Nov. 10, 2020	Nov. 09, 2021
R&S	BT Base Station	CBT32	100519	Jun. 04, 2020	Jun. 03, 2021
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Nov. 11, 2020	Nov. 10, 2021
Keysight	ENA Network Analyzer	E5071C	MY46101588	Jun. 10, 2020	Jun. 09, 2021
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 16, 2020	Sep. 15, 2021
LINE SEIKI	Digital Thermometer	DTM3000-spezial	2942	Nov. 06, 2020	Nov. 05, 2021
Anritsu	Power Meter	ML2495A	1419002	Aug. 19, 2020	Aug. 18, 2021
Anritsu	Power Sensor	MA2411B	1911176	Aug. 18, 2020	Aug. 17, 2021
Anritsu	Power Meter	ML2495A	1804003	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Power Sensor	MA2411B	1726150	Oct. 21, 2020	Oct. 20, 2021
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 30, 2020	Jun. 29, 2021
Anritsu	Spectrum Analyzer	N9010A	MY53470118	Jan. 15, 2021	Jan. 14, 2022
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 21, 2020	Oct. 20, 2021
Mini-Circuits	Power Amplifier	ZVE-8G+	479102029	Aug. 26, 2020	Aug. 25, 2021
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	

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.
2. The dipole calibration interval can be extended to 3 years with justification according to KDB 865664 D01. The dipoles are also not physically damaged, or repaired during the interval. The justification data in appendix C can be found which the return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration for each dipole.

9. System Verification

9.1 Tissue Verification

The tissue dielectric parameters of tissue-equivalent media used for SAR measurements must be characterized within a temperature range of 18℃ to 25℃, measured with calibrated instruments and apparatuses, such as network analyzers and temperature probes. The temperature of the tissue-equivalent medium during SAR measurement must also be within 18℃ to 25℃ and within ± 2℃ of the temperature when the tissue parameters are characterized. The tissue dielectric measurement system must be calibrated before use. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements.
The liquid tissue depth was at least 15cm in the phantom for all SAR testing

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	22.5	1.839	39.495	1.80	39.20	2.17	0.75	±5	2021/4/23
2450	22.5	1.794	39.766	1.80	39.20	-0.33	1.44	±5	2021/4/27
5250	22.5	4.659	36.412	4.71	35.95	-1.08	1.29	±5	2021/4/22
5600	22.5	5.014	35.959	5.07	35.50	-1.10	1.29	±5	2021/4/22
5750	22.5	5.176	35.735	5.22	35.35	-0.84	1.09	±5	2021/4/22
5750	22.4	5.175	34.687	5.22	35.35	-0.86	-1.88	±5	2021/5/17

9.2 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.

Test Site	Date	Frequency (MHz)	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 (%)
SAR05	2021/4/23	2450	250	D2450V2-736	EX3DV4 - SN7306	DAE4 Sn699	14.20	52.70	56.8	7.78
SAR05	2021/4/27	2450	250	D2450V2-736	EX3DV4 - SN7306	DAE4 Sn699	13.90	52.70	55.6	5.50
SAR05	2021/4/22	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7306	DAE4 Sn699	7.76	80.70	77.6	-3.84
SAR05	2021/4/22	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7306	DAE4 Sn699	8.30	83.30	83	-0.36
SAR05	2021/4/22	5750	50	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE4 Sn699	4.40	80.40	88	9.45
SAR05	2021/5/17	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE4 Sn699	7.82	80.40	78.2	-2.74

Test Site	Date	Frequency (MHz)	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 10g SAR (W/kg)	Targeted 10g SAR (W/kg)	Normalized 10g SAR (W/kg)	Deviation (%)
SAR05	2021/4/23	2450	250	D2450V2-736	EX3DV4 - SN7306	DAE4 Sn699	6.54	24.60	26.16	6.34
SAR05	2021/4/27	2450	250	D2450V2-736	EX3DV4 - SN7306	DAE4 Sn699	6.38	24.60	25.52	3.74
SAR05	2021/4/22	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN7306	DAE4 Sn699	2.21	23.20	22.1	-4.74
SAR05	2021/4/22	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN7306	DAE4 Sn699	2.35	23.80	23.5	-1.26
SAR05	2021/4/22	5750	50	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE4 Sn699	1.20	22.90	24	4.80
SAR05	2021/5/17	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN7306	DAE4 Sn699	2.23	22.90	22.3	-2.62

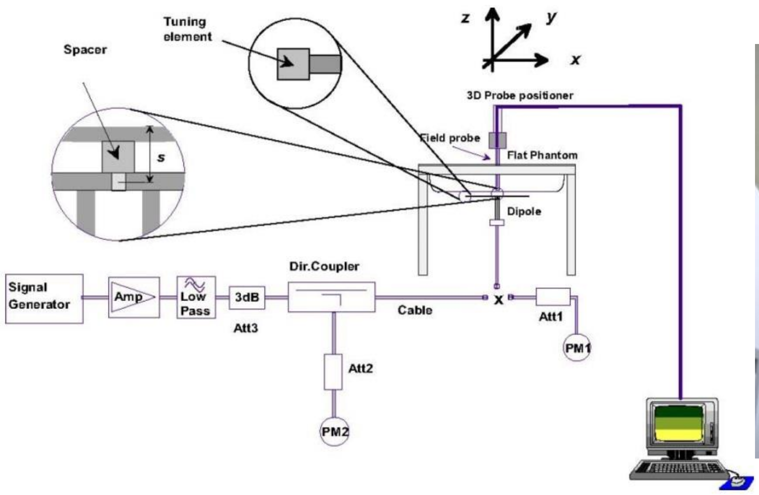


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. RF Exposure Positions

10.1 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.

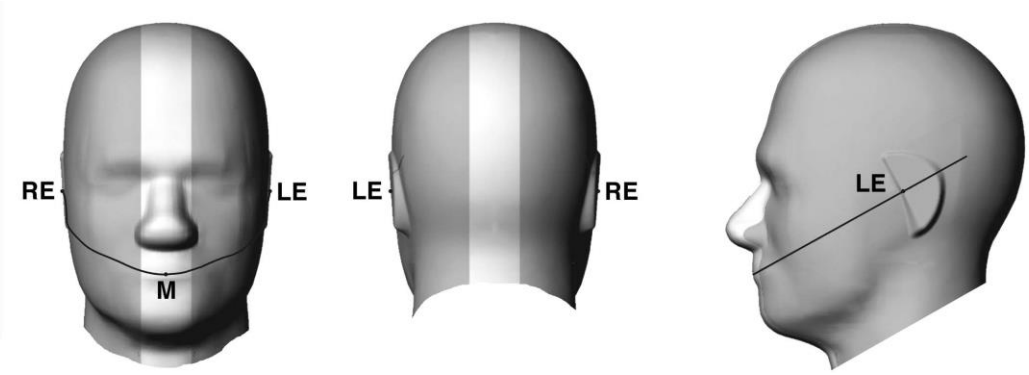


Fig 9.1.1 Front, back, and side views of SAM twin phantom

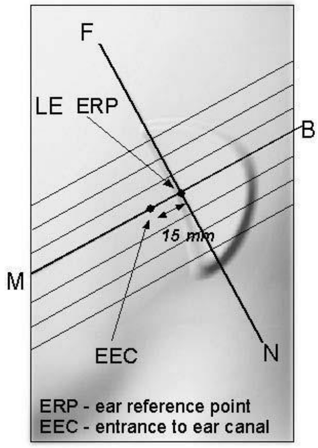


Fig 9.1.2 Close-up side view of phantom showing the ear region.

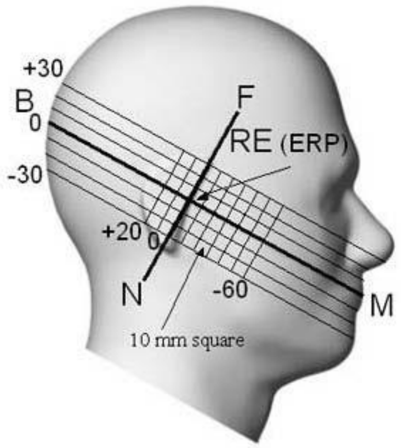


Fig 9.1.3 Side view of the phantom showing relevant markings and seven cross-sectional plane locations

10.2 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.

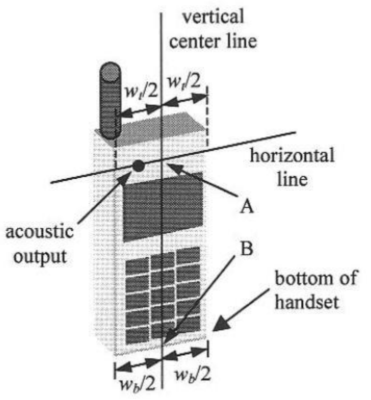


Fig 9.2.1 Handset vertical and horizontal reference lines—"fixed case

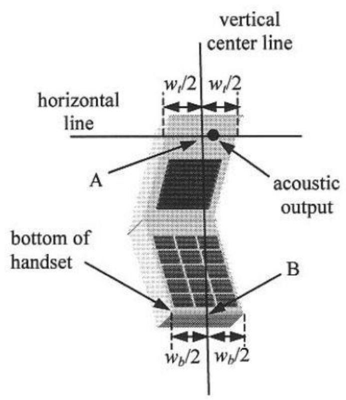


Fig 9.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

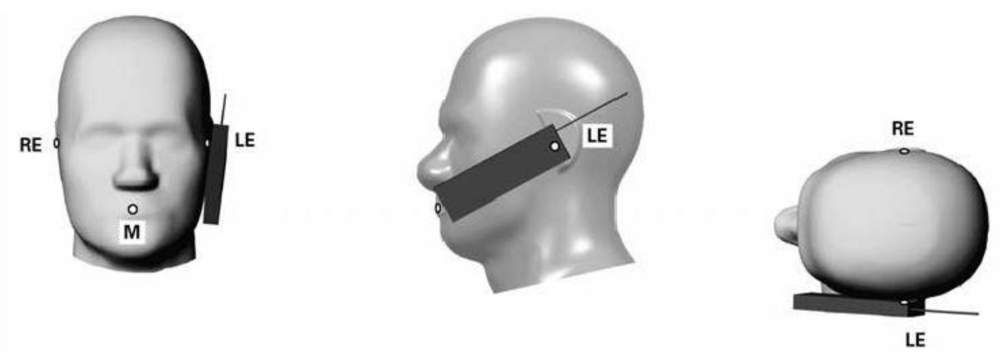


Fig 9.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

10.3 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

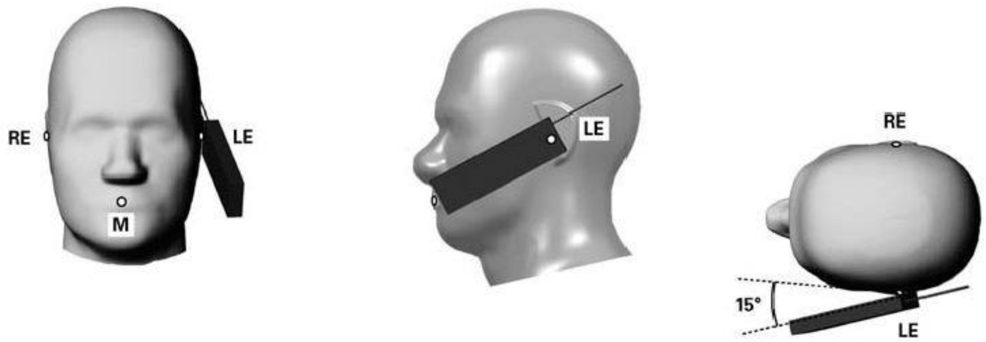


Fig 9.3.1 Tilt position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which define the Reference Plane for handset positioning, are indicated.

10.4 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.

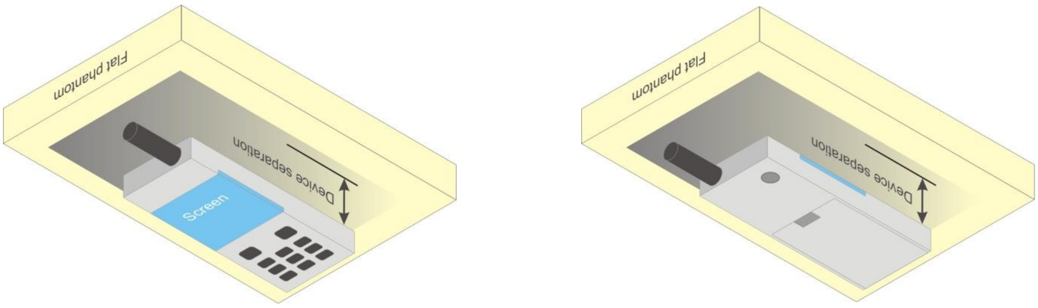


Fig 9.4 Body Worn Position

11. WiFi/Bluetooth Output Power (Unit: dBm)

General Note:

1. For each antenna, transmit power in SISO operation is equal the power in MIMO operation, for RF exposure compliance is choose MIMO to be tested and show compliance.
2. The maximum output power specified for production units are determined for all applicable 802.11 transmission modes in each standalone and aggregated frequency band. Maximum output power is measured for the highest maximum output power configuration(s) in each frequency band according to the default power measurement procedures. For "Not required", SAR Test reduction was applied from KDB 248227 guidance, Sec. 2.1, b), 1) 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 in the initial test configuration, for each frequency band or when MIMO mode was not performed, due to 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. Additional output power measurements were not necessary.
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.
7. Per 201904 TCBC workshops, General principles of FCC KDB Publication 248227 D01 can be applied to determine the SAR Initial Test Configurations and test reduction for 802.11ax SAR testing. For the table below the 802.11ax maximum power is SU (non-OFDMA), and the SU maximum power also higher than RU (OFDMA)
8. In applying the test guidance, the IEEE 802.11 mode with the maximum output power (out of all modes) should be considered for testing
9. For modes with the same maximum output power, the guidance from section 5.3.2 a) of FCC KDB Publication 248227 D01 should be applied, with 802.11ax being considered as the highest 802.11 mode for the appropriate frequency bands
10. When SAR testing for 802.11ax is required
    a. If the maximum output power is highest for OFDMA scenarios, choose the tone size with the maximum number of tones and the highest maximum output power
    b. Otherwise, consider the fully allocated channel for SAR testing
    c. When SAR testing is required on RU sizes less than the fully allocated channel, use the RU number closest to the middle of the channel, choosing the higher RU number when two RUs are equidistant to the middle of the channel

<Non-Beamforming>

2.4GHz WLAN				Ant 1+2(1)			Ant 1+2(2)			Ant 1+2		
2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11b 1Mbps	1	2412	18.90	19.00	100.00	18.80	19.00	100.00	21.86	22.00	100.00
		6	2437	18.30	19.00		18.80	19.00		21.57	22.00	
		11	2462	15.90	17.00		15.50	17.00		18.71	20.00	
	802.11g 6Mbps	1	2412	16.60	17.00	99.57	16.90	17.00	99.29	19.76	20.00	99.57
		6	2437	19.40	20.00		19.80	20.00		22.61	23.00	
		11	2462	14.00	15.00		14.20	15.00		17.11	18.00	
	802.11n-HT20 MCS0	1	2412	15.90	17.00	99.23	15.70	17.00	99.23	18.81	20.00	99.23
		6	2437	18.70	19.00		19.00	19.00		21.86	22.00	
		11	2462	14.00	15.00		13.90	15.00		16.96	18.00	
	802.11ac-VHT20 MCS0	1	2412	16.00	16.00	99.06	15.80	16.00	99.25	18.91	19.00	99.25
		6	2437	18.90	19.00		19.00	19.00		21.96	22.00	
		11	2462	14.10	14.50		14.00	14.50		17.06	17.50	
	802.11ax-HE20 MCS0	1	2412	15.40	16.00	98.61	15.40	16.00	99.24	18.41	19.00	99.24
		6	2437	18.80	19.00		18.90	19.00		21.86	22.00	
		11	2462	14.00	14.00		13.90	14.00		16.96	17.00	

5.2GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11a 6Mbps	36	5180	17.90	18.50	99.29	17.30	18.50	99.29	20.62	21.50	99.29
		40	5200	18.60	19.50		18.70	19.50		21.37	22.50	
		44	5220	18.60	19.50		18.20	19.50		21.41	22.50	
		48	5240	18.60	19.50		18.20	19.50		21.41	22.50	
	802.11n-HT20 MCS0	36	5180	17.50	18.50	100.00	17.20	18.50	100.00	20.36	21.50	100.00
		40	5200	18.40	19.50		18.10	19.50		21.26	22.50	
		44	5220	18.40	19.50		18.20	19.50		21.31	22.50	
		48	5240	18.40	19.50		18.10	19.50		21.26	22.50	
	802.11n-HT40 MCS0	38	5190	15.40	16.00	99.28	14.80	16.00	99.00	18.12	19.00	99.00
		46	5230	18.80	19.50		18.30	19.50		21.57	22.50	
	802.11ac-VHT20 MCS0	36	5180	17.50	18.50	100.00	17.20	18.50	100.00	20.36	21.50	100.00
		40	5200	18.40	19.50		18.10	19.50		21.26	22.50	
		44	5220	18.40	19.50		18.20	19.50		21.31	22.50	
		48	5240	18.40	19.50		18.10	19.50		21.26	22.50	
	802.11ac-VHT40 MCS0	38	5190	15.40	16.00	98.83	14.80	16.00	98.83	18.12	19.00	98.83
		46	5230	18.80	19.50		18.30	19.50		21.57	22.50	
	802.11ac-VHT80 MCS0	42	5210	15.20	15.50	97.45	14.80	15.50	97.46	18.01	18.50	97.45
	802.11ax-HE20 MCS0	36	5180	17.80	18.50	99.00	17.20	18.50	99.00	20.52	21.50	99.00
		40	5200	18.60	19.50		18.20	19.50		21.41	22.50	
		44	5220	18.60	19.50		18.30	19.50		21.46	22.50	
		48	5240	18.60	19.50		18.30	19.50		21.46	22.50	
	802.11ax-HE40 MCS0	38	5190	15.70	16.00	98.56	15.20	16.00	98.56	18.47	19.00	98.56
		46	5230	19.10	19.50		18.70	19.50		21.91	22.50	
	802.11ax-HE80 MCS0	42	5210	15.50	15.50	98.49	15.10	15.50	98.49	18.31	18.50	98.49

5.3GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	18.50	18.50	99.29	18.10	18.50	99.29	21.31	21.50	99.29
		56	5280	18.30	18.50		18.10	18.50		21.21	21.50	
		60	5300	18.60	19.00		18.10	19.00		21.37	22.00	
		64	5320	18.10	18.50		17.90	18.50		21.01	21.50	
	802.11n-HT20 MCS0	52	5260	18.20	18.50	100.00	18.10	18.50	100.00	21.16	21.50	100.00
		56	5280	18.30	18.50		18.10	18.50		21.21	21.50	
		60	5300	18.30	18.50		18.20	18.50		21.26	21.50	
		64	5320	17.90	18.50		17.80	18.50		20.86	21.50	
	802.11n-HT40 MCS0	54	5270	19.00	19.50	99.28	18.80	19.50	99.00	21.91	22.50	99.00
		62	5310	15.50	16.00		15.40	16.00		18.46	19.00	
	802.11ac-VHT20 MCS0	52	5260	18.20	18.50	100.00	18.10	18.50	100.00	21.16	21.50	100.00
		56	5280	18.30	18.50		18.10	18.50		21.21	21.50	
		60	5300	18.30	18.50		18.20	18.50		21.26	21.50	
		64	5320	17.90	18.50		17.80	18.50		20.86	21.50	
	802.11ac-VHT40 MCS0	54	5270	19.00	19.50	98.83	18.80	19.50	98.83	21.91	22.50	98.83
		62	5310	15.50	16.00		15.40	16.00		18.46	19.00	
	802.11ac-VHT80 MCS0	58	5290	14.80	15.50	97.45	15.00	15.50	97.46	17.91	18.50	97.45
	802.11ax-HE20 MCS0	52	5260	18.50	18.50	99.00	18.20	18.50	99.00	21.36	21.50	99.00
		56	5280	18.40	18.50		18.20	18.50		21.31	21.50	
		60	5300	18.50	18.50		18.30	18.50		21.41	21.50	
		64	5320	18.10	18.50		17.80	18.50		20.96	21.50	
	802.11ax-HE40 MCS0	54	5270	19.20	19.50	98.56	18.90	19.50	98.56	22.06	22.50	98.56
		62	5310	15.90	16.00		15.70	16.00		18.81	19.00	
	802.11ax-HE80 MCS0	58	5290	15.20	15.50	98.49	15.20	15.50	98.49	18.21	18.50	98.49

5.5GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	18.50	19.00	99.29	17.70	19.00	99.29	21.13	22.00	99.29
		116	5580	18.60	19.00		17.90	19.00		21.27	22.00	
		124	5620	18.30	19.00		17.50	19.00		20.93	22.00	
		132	5660	18.30	19.00		17.80	19.00		21.07	22.00	
		144	5720	18.30	19.00		17.30	19.00		20.84	22.00	
	802.11n-HT20 MCS0	100	5500	18.50	19.00	100.00	17.80	19.00	100.00	21.17	22.00	100.00
		116	5580	18.60	19.00		17.90	19.00		21.27	22.00	
		124	5620	18.50	19.00		17.80	19.00		21.17	22.00	
		132	5660	18.50	19.00		17.80	19.00		21.17	22.00	
		144	5720	18.90	19.00		18.10	19.00		21.53	22.00	
	802.11n-HT40 MCS0	102	5510	15.90	16.50	99.28	15.60	16.50	99.00	18.76	19.50	99.00
		110	5550	16.00	16.50		15.30	16.50		18.67	19.50	
		126	5630	18.90	19.00		18.60	19.00		21.76	22.00	
		134	5670	18.70	19.50		18.50	19.50		21.61	22.50	
		142	5710	19.00	19.50		18.60	19.50		21.81	22.50	
	802.11ac-VHT20 MCS0	100	5500	18.50	19.00	100.00	17.80	19.00	100.00	21.17	22.00	100.00
		116	5580	18.60	19.00		17.90	19.00		21.27	22.00	
		124	5620	18.50	19.00		17.80	19.00		21.17	22.00	
		132	5660	18.50	19.00		17.80	19.00		21.17	22.00	
		144	5720	18.90	19.00		18.10	19.00		21.53	22.00	
	802.11ac-VHT40 MCS0	102	5510	15.90	16.50	98.83	15.60	16.50	98.83	18.76	19.50	98.83
		110	5550	16.00	16.50		15.30	16.50		18.67	19.50	
		126	5630	18.90	19.00		18.60	19.00		21.76	22.00	
		134	5670	18.70	19.50		18.50	19.50		21.61	22.50	
		142	5710	19.00	19.50		18.60	19.50		21.81	22.50	
	802.11ac-VHT80 MCS0	106	5530	15.80	16.00	97.45	15.10	16.00	97.46	18.47	19.00	97.45
		122	5610	18.90	19.50		18.50	19.50		21.71	22.50	
		138	5690	19.10	19.50		18.40	19.50		21.77	22.50	
	802.11ax-HE20 MCS0	100	5500	18.60	19.00	99.00	18.00	19.00	99.00	21.32	22.00	99.00
		116	5580	18.70	19.00		18.00	19.00		21.37	22.00	
		124	5620	18.60	19.00		17.80	19.00		21.23	22.00	
		132	5660	18.60	19.00		18.00	19.00		21.32	22.00	
		144	5720	18.90	19.00		18.20	19.00		21.57	22.00	
	802.11ax-HE40 MCS0	102	5510	16.10	16.50	98.56	15.50	16.50	98.56	18.82	19.50	98.56
		110	5550	16.30	16.50		15.80	16.50		19.07	19.50	
		126	5630	19.00	19.00		18.80	19.00		21.91	22.00	
		134	5670	19.10	19.50		18.80	19.50		21.96	22.50	
		142	5710	19.10	19.50		18.80	19.50		21.96	22.50	
	802.11ax-HE80 MCS0	106	5530	15.90	16.00	98.49	15.30	16.00	98.49	18.62	19.00	98.49
		122	5610	19.10	19.50		18.60	19.50		21.87	22.50	
		138	5690	19.20	19.50		18.60	19.50		21.92	22.50	

5.8GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	18.30	18.50	99.29	18.40	18.50	99.29	21.36	21.50	99.29
		157	5785	18.40	18.50		18.20	18.50		21.31	21.50	
		165	5825	18.30	18.50		18.10	18.50		21.21	21.50	
	802.11n-HT20 MCS0	149	5745	18.10	18.50	100.00	18.30	18.50	100.00	21.21	21.50	100.00
		157	5785	18.20	18.50		18.00	18.50		21.11	21.50	
		165	5825	18.10	18.50		18.10	18.50		21.11	21.50	
	802.11n-HT40 MCS0	151	5755	17.90	18.50	99.40	18.08	18.50	99.40	21.00	21.50	99.40
		159	5795	17.70	18.50		18.00	18.50		20.86	21.50	
	802.11ac-VHT20 MCS0	149	5745	18.10	18.50	100.00	18.30	18.50	100.00	21.21	21.50	100.00
		157	5785	18.30	18.50		18.00	18.50		21.16	21.50	
		165	5825	18.10	18.50		18.00	18.50		21.06	21.50	
	802.11ac-VHT40 MCS0	151	5755	17.70	18.50	98.83	18.10	18.50	98.83	20.91	21.50	98.83
		159	5795	18.00	18.50		18.20	18.50		21.11	21.50	
	802.11ac-VHT80 MCS0	155	5775	18.30	18.50	97.50	18.50	18.50	97.50	21.46	21.50	97.50
	802.11ax-HE20 MCS0	149	5745	18.30	18.50	99.00	18.40	18.50	99.00	21.36	21.50	99.00
		157	5785	18.40	18.50		18.10	18.50		21.26	21.50	
		165	5825	18.30	18.50		18.20	18.50		21.26	21.50	
	802.11ax-HE40 MCS0	151	5755	17.90	18.50	98.56	18.20	18.50	98.56	21.06	21.50	98.56
		159	5795	18.10	18.50		18.20	18.50		21.16	21.50	
	802.11ax-HE80 MCS0	155	5775	18.40	18.50	98.49	18.50	18.50	98.49	21.46	21.50	98.49

<Beamforming>

2.4GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11ac-VHT20 MCS0	1	2412	17.10	17.50	99.06	17.10	17.50	99.25	20.11	20.50	99.25
		6	2437	18.00	18.50		18.00	18.50		21.01	21.50	
		11	2462	12.00	12.50		11.80	12.50		14.91	15.50	

5.2GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11ax-HE20 MCS0	36	5180	16.60	17.00	99.00	16.10	17.00	99.00	19.37	20.00	99.00
		40	5200	16.50	17.00		16.50	17.00		19.50	20.00	
		44	5220	16.40	17.00		16.20	17.00		19.31	20.00	
		48	5240	17.50	18.00		17.20	18.00		20.36	21.00	
	802.11ax-HE40 MCS0	38	5190	15.70	16.00	98.56	14.90	16.00	98.56	18.33	19.00	98.56
		46	5230	18.00	18.00		17.30	18.00		20.67	21.00	
	802.11ax-HE80 MCS0	42	5210	10.50	11.00	98.49	10.30	11.00	98.49	13.41	14.00	98.49

5.3GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
5.3GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11ax-HE20 MCS0	52	5260	17.40	18.50	99.00	17.20	18.50	99.00	20.31	21.50	99.00
		56	5280	17.00	17.00		17.00	17.00		20.00	20.00	
		60	5300	16.60	18.00		16.40	18.00		19.51	21.00	
		64	5320	15.90	17.00		15.60	17.00		18.76	20.00	
	802.11ax-HE40 MCS0	54	5270	17.00	17.00	98.56	16.40	17.00	98.56	19.72	20.00	98.56
		62	5310	15.10	15.50		14.80	15.50		17.96	18.50	
	802.11ax-HE80 MCS0	58	5290	11.30	11.50	98.49	9.90	11.50	98.49	13.67	14.50	98.49

5.5GHz WLAN				ANT 1+2(1)			ANT 1+2(2)			Ant 1+2		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11ax-HE20 MCS0	100	5500	17.40	18.00	99.00	16.70	18.00	99.00	20.07	21.00	99.00
		116	5580	17.70	18.00		17.20	18.00		20.47	21.00	
		124	5620	17.50	18.00		17.50	18.00		20.50	21.00	
		132	5660	17.50	18.00		17.50	18.00		20.50	21.00	
		144	5720	17.10	18.00		16.40	18.00		19.77	21.00	
	802.11ax-HE40 MCS0	102	5510	13.20	13.50	98.56	12.90	13.50	98.56	16.06	16.50	98.56
		110	5550	14.60	15.00		14.30	15.00		17.46	18.00	
		126	5630	14.50	14.50		14.50	14.50		17.50	17.50	
		134	5670	13.90	14.00		13.70	14.00		16.81	17.00	
		142	5710	18.40	18.50		17.80	18.50		21.12	21.50	
	802.11ax-HE80 MCS0	106	5530	12.60	13.00	98.49	12.20	13.00	98.49	15.41	16.00	98.49
		122	5610	13.20	13.50		12.70	13.50		15.97	16.50	
		138	5690	16.80	17.00		16.30	17.00		19.57	20.00	

5.8GHz WLAN				ANT 1+2(1)			Ant 2(2)			Ant 1+2		
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11ax-HE20 MCS0	149	5745	17.70	18.50	99.00	18.10	18.50	99.00	20.91	21.50	99.00
		157	5785	18.10	18.50		17.60	18.50		20.87	21.50	
		165	5825	18.10	18.50		18.30	18.50		21.21	21.50	
	802.11ax-HE40 MCS0	151	5755	17.80	18.50	98.56	18.20	18.50	98.56	21.01	21.50	98.56
		159	5795	18.10	18.50		18.10	18.50		21.11	21.50	
	802.11ax-HE80 MCS0	155	5775	16.10	16.50	98.49	16.00	16.50	98.49	19.06	19.50	98.49

<2.4GHz Bluetooth>

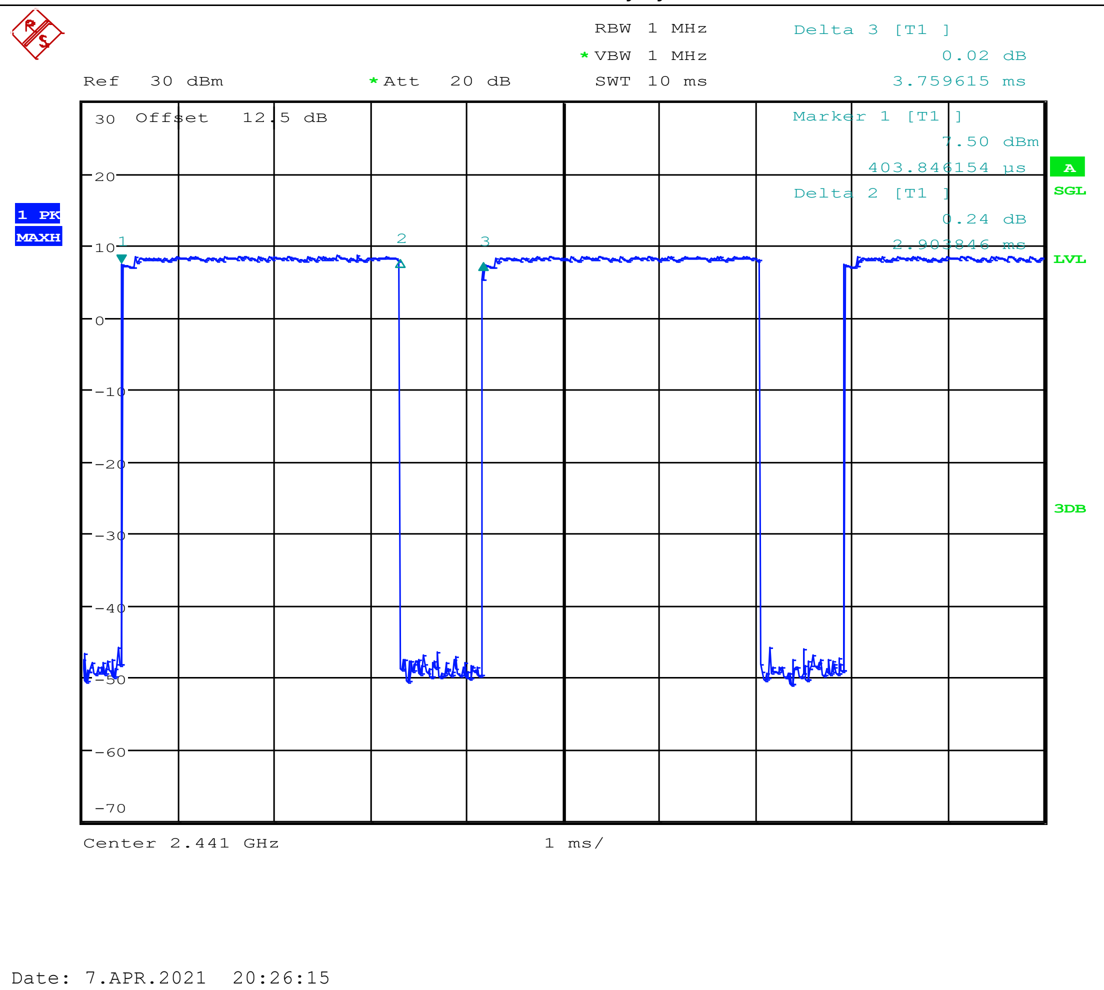
Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	7.24	6.57	6.59
	CH 39	2441	7.27	7.37	7.37
	CH 78	2480	6.99	7.10	7.09
Tune-up Limit			7.5	7.5	7.5

Mode	Channel	Frequency (MHz)	Average power (dBm)	
			1Mbps	2Mbps
LE	CH 00	2402	7.50	7.30
	CH 19	2440	7.30	7.20
	CH 39	2480	7.20	7.10
Tune-up Limit			7.5	7.5

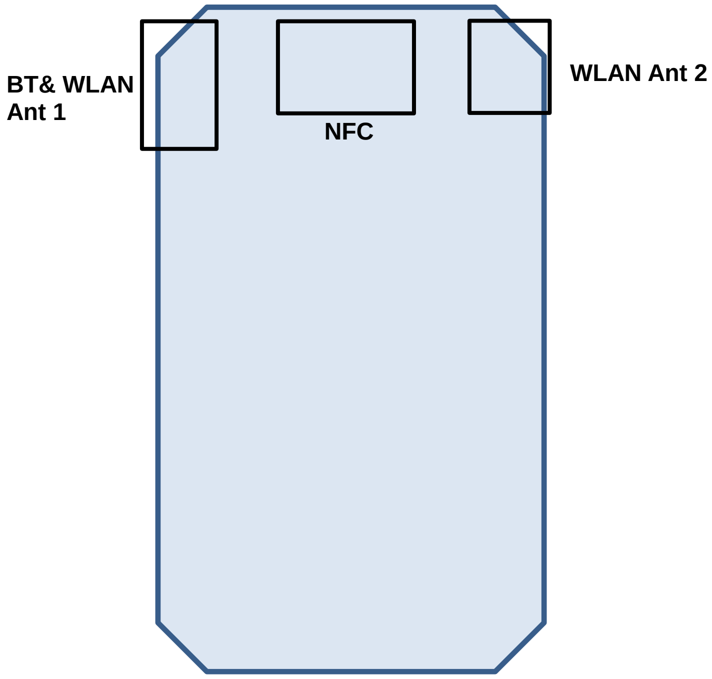
General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps due to its highest average power and duty cycle is 77.24% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

BT Duty cycle



12. Antenna Location



Back View

13. 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/Bluetooth: 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

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, U-NII-1 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 each antenna, transmit power in SISO operation is equal the power in MIMO operation, for RF exposure compliance is choose MIMO to be tested and show compliance.
6. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

13.1 Head SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	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	Battery 1	Ant 1+2	1	2412	21.86	22.00	1.033	100	1.000	0.15	0.555	0.573
	WLAN2.4GHz	802.11b 1Mbps	Right Tilted	0mm	Battery 1	Ant 1+2	1	2412	21.86	22.00	1.033	100	1.000	0.1	0.374	0.386
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Battery 1	Ant 1+2	1	2412	21.86	22.00	1.033	100	1.000	0.13	0.745	0.769
01	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Battery 1	Ant 1+2	6	2437	21.57	22.00	1.104	100	1.000	0.11	0.843	0.931
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Battery 2	Ant 1+2	6	2437	21.57	22.00	1.104	100	1.000	0.05	0.824	0.910
	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Battery 1	Ant 1+2	11	2462	18.71	20.00	1.346	100	1.000	0.1	0.578	0.778
	WLAN2.4GHz	802.11b 1Mbps	Left Tilted	0mm	Battery 1	Ant 1+2	1	2412	21.86	22.00	1.033	100	1.000	-0.1	0.480	0.496
02	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.50	1.145	99	1.010	0.16	0.916	1.059
	WLAN5GHz	802.11a 6Mbps	Right Cheek	0mm	Battery 1	Ant 1+2	60	5300	21.37	22.00	1.156	99.29	1.007	-0.09	0.852	0.992
	WLAN5GHz	802.11n-HT40 MCS0	Right Tilted	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.50	1.145	99	1.010	0.05	0.428	0.495
	WLAN5GHz	802.11n-HT40 MCS0	Left Cheek	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.50	1.145	99	1.010	-0.04	0.570	0.659
	WLAN5GHz	802.11n-HT40 MCS0	Left Tilted	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.50	1.145	99	1.010	0.14	0.214	0.248
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	138	5690	21.77	22.50	1.183	97.45	1.026	0.13	0.814	0.988
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	106	5530	18.47	19.00	1.129	97.45	1.026	-0.11	0.482	0.558
03	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	122	5610	21.71	22.50	1.198	97.45	1.026	0.07	0.974	1.197
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Battery 1	Ant 1+2	138	5690	21.77	22.50	1.183	97.45	1.026	0.15	0.470	0.570
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Battery 1	Ant 1+2	138	5690	21.77	22.50	1.183	97.45	1.026	0.18	0.549	0.666
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Battery 1	Ant 1+2	138	5690	21.77	22.50	1.183	97.45	1.026	-0.15	0.299	0.363
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	155	5775	21.46	21.50	1.009	97.50	1.026	0.01	1.090	1.129
04	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	159	5795	20.86	21.50	1.158	99.40	1.006	0.03	1.100	1.281
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 2	Ant 1+2	159	5795	20.86	21.50	1.158	99.40	1.006	0.09	1.040	1.212
	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	151	5755	21.00	21.50	1.122	99.40	1.006	0.1	1.050	1.185
	WLAN5GHz	802.11ac-VHT80 MCS0	Right Tilted	0mm	Battery 1	Ant 1+2	155	5775	21.46	21.50	1.009	97.50	1.026	0.12	0.522	0.541
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Cheek	0mm	Battery 1	Ant 1+2	155	5775	21.46	21.50	1.009	97.50	1.026	-0.11	0.722	0.748
	WLAN5GHz	802.11ac-VHT80 MCS0	Left Tilted	0mm	Battery 1	Ant 1+2	155	5775	21.46	21.50	1.009	97.50	1.026	0.06	0.522	0.541

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	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)
	Bluetooth	1Mbps	Right Cheek	0mm	Battery1	Ant 2	39	2441	7.27	7.50	1.054	77.24	1.078	-0.15	0.001	0.001
	Bluetooth	1Mbps	Right Tilted	0mm	Battery1	Ant 2	39	2441	7.27	7.50	1.054	77.24	1.078	0.18	0.001	0.001
05	Bluetooth	1Mbps	Left Cheek	0mm	Battery1	Ant 2	39	2441	7.27	7.50	1.054	77.24	1.078	-0.12	0.004	0.004
	Bluetooth	1Mbps	Left Cheek	0mm	Battery2	Ant 2	39	2441	7.27	7.50	1.054	77.24	1.078	-0.07	0.003	0.003
	Bluetooth	1Mbps	Left Cheek	0mm	Battery1	Ant 2	00	2402	7.24	7.50	1.062	77.24	1.078	-0.01	0.003	0.003
	Bluetooth	1Mbps	Left Cheek	0mm	Battery1	Ant 2	78	2480	6.99	7.50	1.125	77.24	1.078	-0.03	0.001	0.001
	Bluetooth	1Mbps	Left Tilted	0mm	Battery1	Ant 2	39	2480	7.27	7.50	1.054	77.24	1.078	-0.15	0.001	0.001

13.2 Body -Worn Accessory SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	Antenna	Accessory	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	15mm	Battery 1	Ant 1+2	-	1	2412	21.86	22.00	1.033	100	1.000	0.19	0.271	0.280
	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Battery 1	Ant 1+2	-	1	2412	21.86	22.00	1.033	100	1.000	-0.07	0.284	0.293
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Battery 1	Ant 1+2	Soft holster	1	2412	21.86	22.00	1.033	100	1.000	-0.06	0.137	0.141
	WLAN2.4GHz	802.11b 1Mbps	Front	0mm	Battery 1	Ant 1+2	Soft holster + Exoskeleton + Trigger Handle1	1	2412	21.86	22.00	1.033	100	1.000	0.03	0.118	0.122
06	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Battery 1	Ant 1+2	-	6	2437	21.57	22.00	1.104	100	1.000	-0.15	0.322	0.356
	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Battery 2	Ant 1+2	-	6	2437	21.57	22.00	1.104	100	1.000	0.08	0.317	0.350
	WLAN2.4GHz	802.11b 1Mbps	Back	15mm	Battery 1	Ant 1+2	-	11	2462	18.71	20.00	1.346	100	1.000	-0.07	0.184	0.248
	WLAN5GHz	802.11n-HT40 MCS0	Front	15mm	Battery 1	Ant 1+2	-	54	5270	21.91	22.50	1.145	99	1.010	0.06	0.123	0.142
07	WLAN5GHz	802.11n-HT40 MCS0	Back	15mm	Battery 1	Ant 1+2	-	54	5270	21.91	22.50	1.145	99	1.010	0.13	0.563	0.651
	WLAN5GHz	802.11n-HT40 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster	54	5270	21.91	22.50	1.145	99	1.010	-0.13	0.112	0.130
	WLAN5GHz	802.11n-HT40 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster + Exoskeleton + Trigger Handle1	54	5270	21.91	22.50	1.145	99	1.010	0.02	0.104	0.120
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	15mm	Battery 1	Ant 1+2	-	138	5690	21.77	22.50	1.183	97.45	1.026	0.1	0.183	0.222
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	15mm	Battery 1	Ant 1+2	-	138	5690	21.77	22.50	1.183	97.45	1.026	0.06	0.772	0.937
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster	138	5690	21.77	22.50	1.183	97.45	1.026	-0.18	0.157	0.191
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster + Exoskeleton + Trigger Handle1	138	5690	21.77	22.50	1.183	97.45	1.026	-0.07	0.136	0.165
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	15mm	Battery 1	Ant 1+2	-	106	5530	18.47	19.00	1.129	97.45	1.026	-0.15	0.470	0.544
08	WLAN5GHz	802.11ac-VHT80 MCS0	Back	15mm	Battery 1	Ant 1+2	-	122	5610	21.71	22.50	1.198	97.45	1.026	-0.12	0.784	0.964
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	15mm	Battery 2	Ant 1+2	-	122	5610	21.71	22.50	1.198	97.45	1.026	0.06	0.761	0.935
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	15mm	Battery 1	Ant 1+2	-	155	5775	21.46	21.50	1.009	97.50	1.026	-0.12	0.192	0.199
09	WLAN5GHz	802.11ac-VHT80 MCS0	Back	15mm	Battery 1	Ant 1+2	-	155	5775	21.46	21.50	1.009	97.50	1.026	-0.02	0.708	0.733
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster	155	5775	21.46	21.50	1.009	97.50	1.026	0.06	0.172	0.178
	WLAN5GHz	802.11ac-VHT80 MCS0	Front	0mm	Battery 1	Ant 1+2	Soft holster + Exoskeleton + Trigger Handle1	155	5775	21.46	21.50	1.009	97.50	1.026	0.15	0.151	0.156

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	Antenna	Accessory	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)
	Bluetooth	1Mbps	Front	15mm	Battery1	Ant 2	-	39	2441	7.27	7.50	1.054	77.24	1.078	0	0.001	0.001
10	Bluetooth	1Mbps	Back	15mm	Battery1	Ant 2	-	39	2441	7.27	7.50	1.054	77.24	1.078	-0.14	0.001	0.001
	Bluetooth	1Mbps	Back	15mm	Battery2	Ant 2	-	39	2441	7.27	7.50	1.054	77.24	1.078	0.07	0.001	0.001
	Bluetooth	1Mbps	Front	0mm	Battery1	Ant 2	Soft holster	39	2480	7.27	7.50	1.054	77.24	1.078	-0.18	0.001	0.001
	Bluetooth	1Mbps	Front	0mm	Battery1	Ant 2	Soft holster + Exoskeleton + Trigger Handle1	39	2480	7.27	7.50	1.054	77.24	1.078	0.12	0.001	0.001
	Bluetooth	1Mbps	Back	15mm	Battery1	Ant 2	-	00	2402	7.24	7.50	1.062	77.24	1.078	0.11	0.001	0.001
	Bluetooth	1Mbps	Back	15mm	Battery1	Ant 2	-	78	2480	6.99	7.50	1.125	77.24	1.078	-0.02	0.001	0.001

13.3 Extremity SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	Antenna	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	1	2412	21.86	22.00	1.033	100	1.000	-0.13	0.124	0.128
11	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	6	2437	21.57	22.00	1.104	100	1.000	-0.17	0.136	0.150
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Battery 2	Ant 1+2	Exoskeleton	6	2437	21.57	22.00	1.104	100	1.000	0.09	0.133	0.147
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	11	2462	18.71	20.00	1.346	100	1.000	0.07	0.093	0.125
12	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	54	5270	21.91	22.50	1.145	99	1.010	-0.04	0.255	0.295
	WLAN5GHz	802.11n-HT40 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	62	5310	18.46	19.00	1.132	99	1.010	-0.15	0.139	0.159
13	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	138	5690	21.77	22.50	1.183	97.45	1.026	-0.14	0.358	0.435
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Battery 2	Ant 1+2	Exoskeleton	138	5690	21.77	22.50	1.183	97.45	1.026	0.09	0.342	0.415
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	106	5530	18.47	19.00	1.129	97.45	1.026	-0.19	0.179	0.207
	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	122	5610	21.71	22.50	1.198	97.45	1.026	-0.04	0.341	0.419
14	WLAN5GHz	802.11ac-VHT80 MCS0	Back	0mm	Battery 1	Ant 1+2	Exoskeleton	155	5775	21.46	21.50	1.009	97.5	1.026	-0.18	0.327	0.339

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Battery	Antenna	Accessory	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 10g SAR (W/kg)	Reported 10g SAR (W/kg)
15	Bluetooth	1Mbps	Back	0mm	Battery 1	Ant 2	Exoskeleton	39	2441	7.27	7.50	1.054	77.24	1.078	0	0.001	0.001
	Bluetooth	1Mbps	Back	0mm	Battery 2	Ant 2	Exoskeleton	39	2441	7.27	7.50	1.054	77.24	1.078	0	0.001	0.001
	Bluetooth	1Mbps	Back	0mm	Battery 1	Ant 2	Exoskeleton	00	2402	7.24	7.50	1.062	77.24	1.078	0.18	0.001	0.001
	Bluetooth	1Mbps	Back	0mm	Battery 1	Ant 2	Exoskeleton	78	2480	6.99	7.50	1.125	77.24	1.078	-0.17	0.001	0.001

13.4 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (mm)	Battery	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	Battery 1	Ant 1+2	6	2437	21.57	22	1.104	100	1	0.11	0.843	-	0.931
2nd	WLAN2.4GHz	802.11b 1Mbps	Left Cheek	0mm	Battery 1	Ant 1+2	6	2437	21.57	22	1.104	100	1	0.04	0.792	1.064	0.874
1st	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.5	1.145	99	1.01	0.16	0.916	-	1.059
2nd	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	54	5270	21.91	22.5	1.145	99	1.01	0.16	0.88	1.041	1.018
1st	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	122	5610	21.71	22.5	1.198	97.45	1.026	0.07	0.974	-	1.197
2nd	WLAN5GHz	802.11ac-VHT80 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	122	5610	21.71	22.5	1.198	97.45	1.026	0.07	0.942	1.034	1.158
1st	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	159	5795	20.86	21.5	1.158	99.4	1.006	0.03	1.1	-	1.281
2nd	WLAN5GHz	802.11n-HT40 MCS0	Right Cheek	0mm	Battery 1	Ant 1+2	159	5795	20.86	21.5	1.158	99.4	1.006	-0.12	1.05	1.048	1.223

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.

14. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Head	Body-worn
1.	2.4GHz WLAN Ant 1+2 + Bluetooth Ant 2	Yes	Yes
2.	5GHz WLAN Ant 1+2 + Bluetooth Ant 2	Yes	Yes

General Note:

1. 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.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. 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.

14.1 Head Exposure Conditions

Exposure Position	1	2	3	1+3 Summed 1g SAR (W/kg)	2+3 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant 1+2	5GHz WLAN Ant 1+2	Bluetooth Ant 2		
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
Right Cheek	0.573	1.281	0.001	**0.574**	**1.282**
Right Tilted	0.386	0.570	0.001	**0.387**	**0.571**
Left Cheek	0.931	0.748	0.004	**0.935**	**0.752**
Left Tilted	0.496	0.541	0.001	**0.497**	**0.542**

14.2 Body-Worn Accessory Exposure Conditions

Exposure Position	1	2	3	1+3 Summed 1g SAR (W/kg)	2+3 Summed 1g SAR (W/kg)
	2.4GHz WLAN Ant 1+2	5GHz WLAN Ant 1+2	Bluetooth Ant 2		
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
Front	0.280	0.222	0.001	**0.281**	**0.223**
Back	0.356	0.964	0.001	**0.357**	**0.965**

14.3 Extremity Exposure Conditions

Exposure Position	1	2	3	1+3 Summed 10g SAR (W/kg)	2+3 Summed 10g SAR (W/kg)
	2.4GHz WLAN Ant 1+2	5GHz WLAN Ant 1+2	Bluetooth Ant 2		
	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
Back	0.150	0.435	0.001	**0.151**	**0.436**

Test Engineer： Randy Lin and Carter Jhuang

15. Uncertainty Assessment

Per KDB 865664 D01 SAR measurement 100MHz to 6GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of k = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

Declaration of Conformity:
The test results with all measurement uncertainty excluded is presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

16. 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 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
[8] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.