FCC SAR TEST REPORT

FCC ID	:	**2AJ3Y-1013**
Equipment	:	**Wireless Game Controller**
Model Name	:	**T28B69**
Applicant	:	**Zippy Hippie Twister Limited Liability Company. 2000 Town Center, Suite 1900 Southfield, MI 48075 United States**
Standard	:	**FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013**

The product was received on Dec. 10, 2019 and testing was started from Jan. 22, 2020 and completed on Feb. 06, 2020. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

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History of this test report

Report No.	Version	Description	Issued Date
FA952805-03	01	Initial issue of report	Feb. 20, 2020

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Zippy Hippie Twister Limited Liability Company, Wireless Game Controller, T28B69, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary		Highest Simultaneous Transmission 1g SAR (W/kg)	Highest Simultaneous Transmission 10g SAR (W/kg)
		Body (Separation 10mm)	Extremity (Separation 0mm)		
		1g SAR (W/kg)	10g SAR (W/kg)		
DTS	2.4GHz WLAN	0.49	0.59	0.48	0.61
NII	5GHz WLAN	0.64	0.56	0.65	0.58
DSS	Bluetooth	0.01	0.03	0.65	0.61
Date of Testing:		2020/1/22 ~ 2020/2/6			

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 Product Specific 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 publications

Reviewed by: Jason Wang
Report Producer: Wan Liu

2. 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 248227 D01 802.11 Wi-Fi SAR v02r02

3. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	Wireless Game Controller
Model Name	T28B69
FCC ID	2AJ3Y-1013
S/N	G0G159049392008C
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2472 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
Mode	WLAN: 802.11a/b/g/n/ac HT20 / VHT20 Bluetooth BR/EDR/LE

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:

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

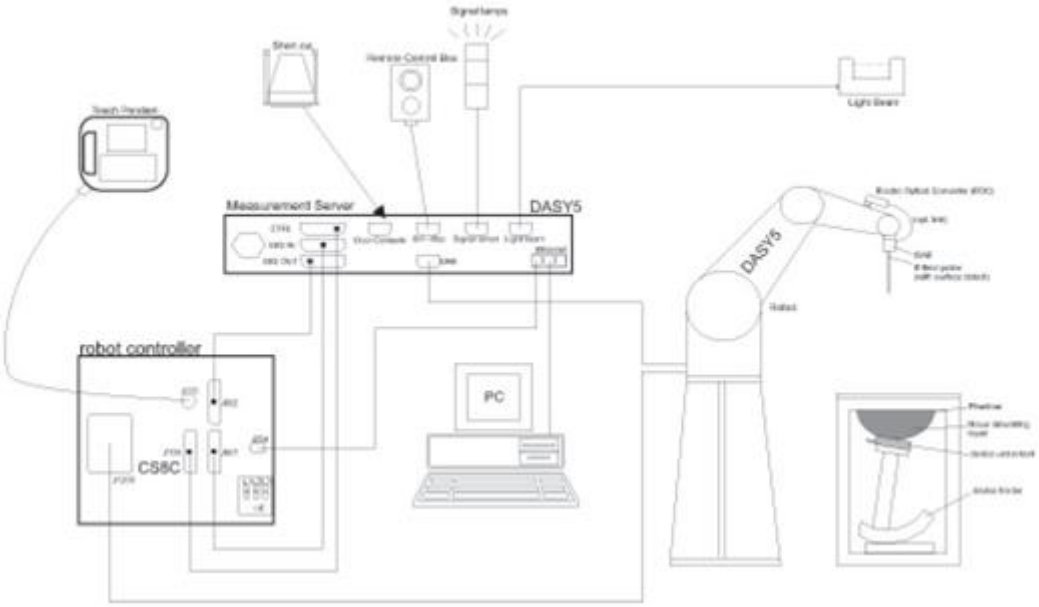
SAR is expressed in units of Watts per kilogram (W/kg)

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

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 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	

6.2 Data Acquisition Electronics (DAE)

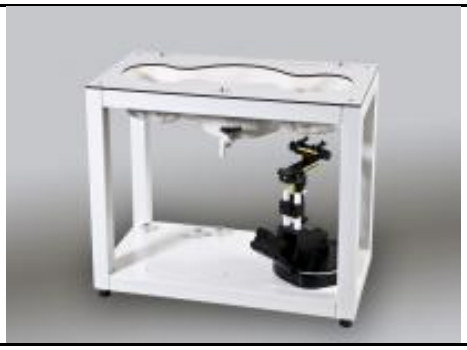
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

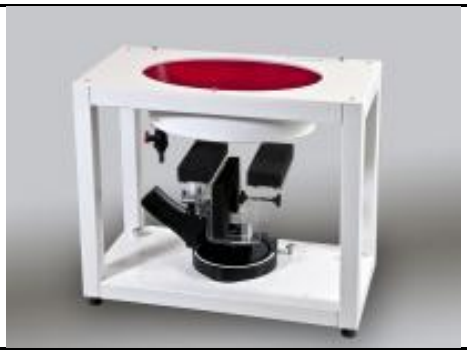
6.3 Phantom

<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.

6.4 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

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.

			≤ 3 GHz	> 3 GHz
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see 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.

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	D2450V2	736	Aug. 31, 2018	Aug. 29, 2020
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 27, 2018	Sep. 25, 2020
SPEAG	Data Acquisition Electronics	DAE4	778	May. 21, 2019	May. 20, 2020
SPEAG	Data Acquisition Electronics	DAE4	1311	Aug. 27, 2019	Aug. 26, 2020
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 25, 2019	Sep. 24, 2020
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	Sep. 20, 2019	Sep. 19, 2020
RCPTWN	Thermometer	HTC-1	TM685-1	Nov. 12, 2019	Nov. 11, 2020
RCPTWN	Thermometer	HTC-1	TM560-2	Nov. 12, 2019	Nov. 11, 2020
R&S	BT Base Station	CBT32	100522	Mar. 18, 2019	Mar. 17, 2020
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Nov. 20, 2019	Nov. 19, 2020
Agilent	ENA Network Analyzer	E5071C	MY46104758	Sep. 06, 2019	Sep. 05, 2020
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Sep. 18, 2019	Sep. 17, 2020
LINE SEIKI	Digital Thermometer	DTM3000-spezial	3169	Sep. 10, 2019	Sep. 09, 2020
Anritsu	Power Meter	ML2495A	1036004	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Sensor	MA2411B	1027253	Aug. 08, 2019	Aug. 07, 2020
Anritsu	Power Meter	ML2495A	1419002	May. 29, 2019	May. 28, 2020
Anritsu	Power Sensor	MA2411B	1339124	May. 29, 2019	May. 28, 2020
Agilent	Spectrum Analyzer	E4408B	MY44211028	Aug. 27, 2019	Aug. 26, 2020
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 27, 2019	Jun. 26, 2020
Mini-Circuits	Power Amplifier	ZVE-8G+	6418	Oct. 16, 2019	Oct. 15, 2020
Mini-Circuits	Power Amplifier	ZVE-8G+	6382	Aug. 12, 2019	Aug. 11, 2020
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. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D5GHzV2, SN: 1006, D2450V2, SN: 736 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

9. System Verification

9.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 10.2.

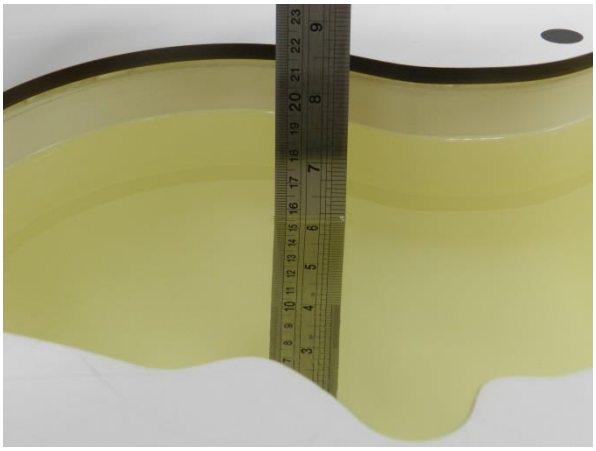


Fig 10.1Photo of Liquid Height for Head SAR

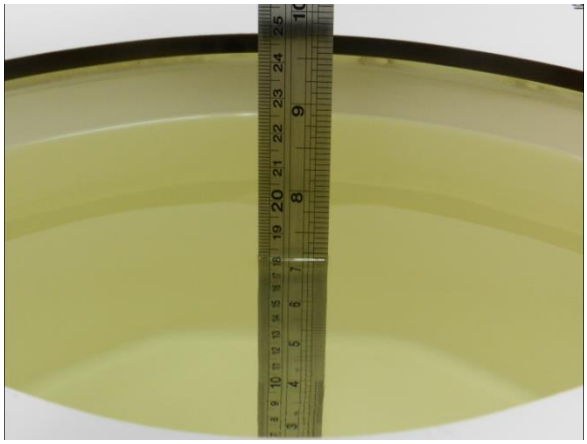


Fig 10.2 Photo of Liquid Height for Body SAR

9.2 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)
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

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)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	22.5	1.793	38.961	1.80	39.20	-0.39	-0.61	±5	2020/2/6
2450	22.7	1.795	38.811	1.80	39.20	-0.28	-0.99	±5	2020/1/22
5250	22.5	4.676	37.356	4.71	35.95	-0.72	3.91	±5	2020/1/23
5600	22.5	5.055	36.799	5.07	35.50	-0.30	3.66	±5	2020/1/23
5750	22.5	5.215	36.578	5.22	35.35	-0.10	3.47	±5	2020/1/23

9.3 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)	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 (%)
2020/2/6	2450	250	D2450V2-736	ES3DV3 - SN3270	DAE4 Sn1311	12.10	52.70	48.4	-8.16
2020/1/22	2450	250	D2450V2-736	EX3DV4 - SN3925	DAE4 Sn778	13.20	52.70	52.8	0.19
2020/1/23	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN3925	DAE4 Sn778	7.98	80.70	79.8	-1.12
2020/1/23	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE4 Sn778	8.74	83.30	87.4	4.92
2020/1/23	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN3925	DAE4 Sn778	7.93	80.40	79.3	-1.37

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 (%)
2020/2/6	2450	250	D2450V2-736	ES3DV3 - SN3270	DAE4 Sn1311	5.61	24.60	22.44	-8.78
2020/1/22	2450	250	D2450V2-736	EX3DV4 - SN3925	DAE4 Sn778	6.08	24.60	24.32	-1.14
2020/1/23	5250	100	D5GHzV2-1006-5250	EX3DV4 - SN3925	DAE4 Sn778	2.27	23.20	22.7	-2.16
2020/1/23	5600	100	D5GHzV2-1006-5600	EX3DV4 - SN3925	DAE4 Sn778	2.47	23.80	24.7	3.78
2020/1/23	5750	100	D5GHzV2-1006-5750	EX3DV4 - SN3925	DAE4 Sn778	2.24	22.90	22.4	-2.18

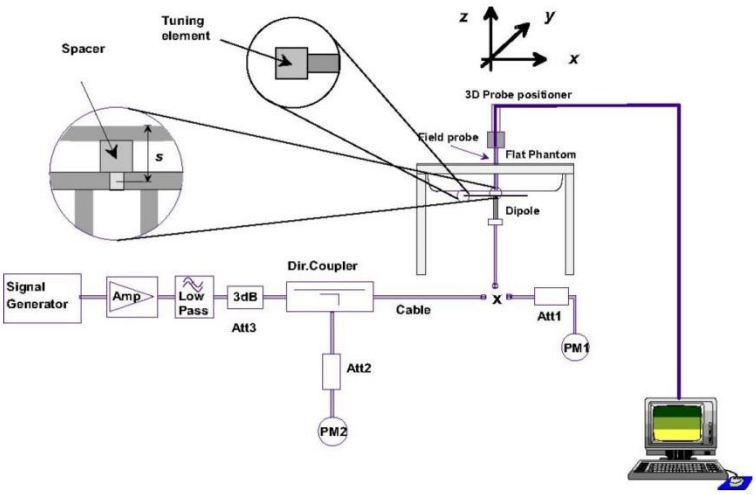


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

10. Conducted RF Output Power (Unit: dBm)

<WLAN Conducted Power>

General Note:

1. 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.
2. 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).
3. 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.
4. 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>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	12.50	13.00	100.00
		6	2437	12.70	13.00	
		11	2462	12.70	13.00	
		12	2467	12.90	13.00	
		13	2472	12.40	13.00	
	802.11g 6Mbps	1	2412	13.50	14.00	98.80
		6	2437	14.30	14.50	
		11	2462	12.50	13.00	
		12	2467	11.80	12.00	
		13	2472	7.30	7.50	
	802.11n-HT20 MCS0	1	2412	12.00	12.50	98.47
		6	2437	14.30	14.50	
		11	2462	12.30	12.50	
		12	2467	10.40	10.50	
		13	2472	6.00	6.50	

<5GHz WLAN>

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	14.80	15.00	98.56
		40	5200	16.40	16.50	
		44	5220	16.50	16.50	
		48	5240	16.40	16.50	
	802.11n-HT20 MCS0	36	5180	14.60	15.00	98.46
		40	5200	16.10	16.50	
		44	5220	16.20	16.50	
		48	5240	16.40	16.50	
	802.11ac-VHT20 MCS0	36	5180	14.50	15.00	98.47
		40	5200	16.00	16.50	
		44	5220	16.10	16.50	
		48	5240	16.30	16.50	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN	802.11a 6Mbps	52	5260	15.80	16.00	98.56
		56	5280	15.40	16.00	
		60	5300	15.50	16.00	
		64	5320	14.00	14.00	
	802.11n-HT20 MCS0	52	5260	14.00	14.00	98.46
		56	5280	15.40	15.50	
		60	5300	15.50	15.50	
		64	5320	13.60	14.00	
	802.11ac-VHT20 MCS0	52	5260	13.90	14.00	98.47
		56	5280	15.30	15.50	
		60	5300	15.40	15.50	
		64	5320	13.50	14.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN	802.11a 6Mbps	100	5500	13.80	14.00	98.56
		116	5580	15.30	15.50	
		124	5620	15.10	15.50	
		132	5660	14.90	15.00	
		144	5720	14.90	15.00	
	802.11n-HT20 MCS0	100	5500	13.60	14.00	98.46
		116	5580	15.20	15.50	
		124	5620	15.10	15.50	
		132	5660	14.90	15.00	
		144	5720	15.10	15.50	
	802.11ac-VHT20 MCS0	100	5500	13.50	14.00	98.47
		116	5580	15.10	15.50	
		124	5620	15.00	15.50	
		132	5660	14.80	15.00	
		144	5720	15.00	15.00	

	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	15.80	16.00	98.56
		157	5785	15.90	16.00	
		165	5825	16.30	16.50	
	802.11n-HT20 MCS0	149	5745	15.70	16.00	98.46
		157	5785	15.90	15.50	
		165	5825	16.20	16.50	
	802.11ac-VHT20 MCS0	149	5745	15.60	16.00	98.47
		157	5785	15.80	16.00	
		165	5825	16.10	16.50	

<2.4GHz Bluetooth>

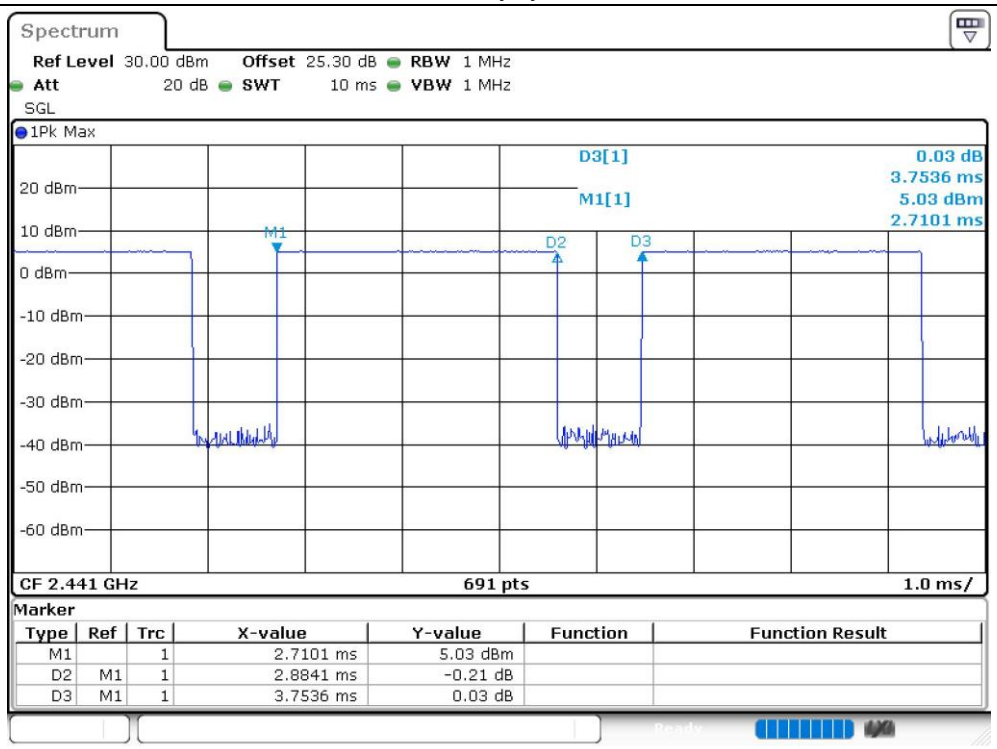
Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	4.25	2.12	2.09
	CH 39	2441	5.02	2.57	2.58
	CH 78	2480	3.84	1.35	1.39
Tune-up Limit			5.5	3	3

Mode	Channel	Frequency (MHz)	Average power (dBm)	
			1Mbps	2Mbps
LE	CH 00	2402	4.60	4.60
	CH 19	2440	5.00	5.10
	CH 39	2480	4.10	4.10
Tune-up Limit			5.0	5.5

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected BR 1Mbps due to its highest average power and duty cycle is 76.83% considered in SAR testing, and the duty cycle would be scaled to theoretical 83.3% in reported SAR calculation.

BT Duty cycle



11. 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. The test position was confirmed by FCC via a KDB inquiry.

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. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

11.1 Body SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	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)
01	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	6	2437	12.70	13.00	1.072	100	1.000	-0.03	0.442	0.474
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	1	2412	12.50	13.00	1.122	100	1.000	0.06	0.231	0.259
	WLAN2.4GHz	802.11b 1Mbps	Front	10mm	11	2462	12.70	13.00	1.072	100	1.000	-0.013	0.228	0.244
	WLAN2.4GHz	802.11b 1Mbps	Back	10mm	6	2437	12.70	13.00	1.072	100	1.000	0.01	0.052	0.056
02	WLAN5GHz	802.11a 6Mbps	Front	10mm	44	5220	16.50	16.50	1.000	98.56	1.015	-0.18	0.628	0.637
	WLAN5GHz	802.11a 6Mbps	Front	10mm	36	5180	14.80	15.00	1.047	98.56	1.015	0.03	0.446	0.474
	WLAN5GHz	802.11a 6Mbps	Front	10mm	40	5200	16.40	16.50	1.023	98.56	1.015	0.15	0.579	0.601
	WLAN5GHz	802.11a 6Mbps	Front	10mm	48	5240	16.40	16.50	1.023	98.56	1.015	0.14	0.591	0.614
	WLAN5GHz	802.11a 6Mbps	Back	10mm	44	5220	16.50	16.50	1.000	98.56	1.015	-0.11	0.107	0.109
03	WLAN5GHz	802.11a 6Mbps	Front	10mm	52	5260	15.80	16.00	1.047	98.56	1.015	-0.07	0.569	0.605
	WLAN5GHz	802.11a 6Mbps	Front	10mm	56	5280	15.40	16.00	1.148	98.56	1.015	0.03	0.507	0.591
	WLAN5GHz	802.11a 6Mbps	Front	10mm	60	5300	15.50	16.00	1.122	98.56	1.015	-0.05	0.522	0.594
	WLAN5GHz	802.11a 6Mbps	Front	10mm	64	5320	14.00	14.00	1.000	98.56	1.015	0.11	0.373	0.379
	WLAN5GHz	802.11a 6Mbps	Back	10mm	52	5260	15.80	16.00	1.047	98.56	1.015	-0.07	0.096	0.102
04	WLAN5GHz	802.11a 6Mbps	Front	10mm	116	5580	15.30	15.50	1.047	98.56	1.015	-0.1	0.326	0.346
	WLAN5GHz	802.11a 6Mbps	Front	10mm	100	5500	13.80	14.00	1.047	98.56	1.015	0.07	0.217	0.231
	WLAN5GHz	802.11a 6Mbps	Front	10mm	124	5620	15.10	15.50	1.096	98.56	1.015	-0.14	0.288	0.321
	WLAN5GHz	802.11a 6Mbps	Front	10mm	132	5660	14.90	15.00	1.023	98.56	1.015	0.19	0.264	0.274
	WLAN5GHz	802.11a 6Mbps	Front	10mm	144	5720	14.90	15.00	1.023	98.56	1.015	0.03	0.263	0.273
	WLAN5GHz	802.11a 6Mbps	Back	10mm	116	5580	15.30	15.50	1.047	98.56	1.015	-0.05	0.114	0.121
05	WLAN5GHz	802.11a 6Mbps	Front	10mm	165	5825	16.30	16.50	1.047	98.56	1.015	-0.11	0.431	0.458
	WLAN5GHz	802.11a 6Mbps	Front	10mm	149	5745	15.80	16.00	1.047	98.56	1.015	0.07	0.399	0.424
	WLAN5GHz	802.11a 6Mbps	Front	10mm	157	5825	15.90	16.00	1.023	98.56	1.015	-0.04	0.408	0.424
	WLAN5GHz	802.11a 6Mbps	Back	10mm	165	5825	16.30	16.50	1.047	98.56	1.015	0.02	0.117	0.124

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	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)
06	Bluetooth	1Mbps	Front	10mm	39	2441	5.02	5.50	1.117	76.83	1.084	0.15	0.007	0.008
	Bluetooth	1Mbps	Front	10mm	0	2402	4.25	5.50	1.334	76.83	1.084	0.09	0.005	0.007
	Bluetooth	1Mbps	Front	10mm	78	2480	3.84	5.50	1.466	76.83	1.084	0.18	0.002	0.003
	Bluetooth	1Mbps	Back	10mm	39	2441	5.02	5.50	1.117	76.83	1.084	0.14	0.001	0.001

11.2 Extremity SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	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	Front	0mm	6	2437	12.70	13.00	1.072	100	1.000	0.01	0.385	0.413
	WLAN2.4GHz	802.11b 1Mbps	Back	0mm	6	2437	12.70	13.00	1.072	100	1.000	0.11	0.095	0.102
07	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	6	2437	12.70	13.00	1.072	100	1.000	0.01	0.537	0.575
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	1	2412	12.50	13.00	1.122	100	1.000	0.07	0.299	0.335
	WLAN2.4GHz	802.11b 1Mbps	Top Side	0mm	11	2462	12.70	13.00	1.072	100	1.000	-0.07	0.302	0.324
	WLAN2.4GHz	802.11b 1Mbps	Right Side	0mm	6	2437	12.70	13.00	1.072	100	1.000	0.01	0.035	0.038
08	WLAN5GHz	802.11a 6Mbps	Front	0mm	44	5220	16.50	16.50	1.000	98.56	1.015	0.18	0.556	0.564
	WLAN5GHz	802.11a 6Mbps	Front	0mm	36	5180	14.80	15.00	1.047	98.56	1.015	0.03	0.383	0.407
	WLAN5GHz	802.11a 6Mbps	Front	0mm	40	5200	16.40	16.50	1.023	98.56	1.015	-0.03	0.527	0.547
	WLAN5GHz	802.11a 6Mbps	Front	0mm	48	5240	16.40	16.50	1.023	98.56	1.015	0.05	0.514	0.534
	WLAN5GHz	802.11a 6Mbps	Back	0mm	44	5220	16.50	16.50	1.000	98.56	1.015	0.08	0.027	0.027
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	44	5220	16.50	16.50	1.000	98.56	1.015	-0.16	0.513	0.521
	WLAN5GHz	802.11a 6Mbps	Right Side	0mm	44	5220	16.50	16.50	1.000	98.56	1.015	-0.08	0.097	0.098
09	WLAN5GHz	802.11a 6Mbps	Front	0mm	52	5260	15.80	16.00	1.047	98.56	1.015	-0.16	0.476	0.506
	WLAN5GHz	802.11a 6Mbps	Front	0mm	56	5280	15.40	16.00	1.148	98.56	1.015	0.06	0.421	0.491
	WLAN5GHz	802.11a 6Mbps	Front	0mm	60	5300	15.50	16.00	1.122	98.56	1.015	-0.01	0.417	0.475
	WLAN5GHz	802.11a 6Mbps	Front	0mm	64	5320	14.00	14.00	1.000	98.56	1.015	0.17	0.308	0.313
	WLAN5GHz	802.11a 6Mbps	Back	0mm	52	5260	15.80	16.00	1.047	98.56	1.015	0.14	0.027	0.029
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	52	5260	15.80	16.00	1.047	98.56	1.015	0.05	0.430	0.457
	WLAN5GHz	802.11a 6Mbps	Right Side	0mm	52	5260	15.80	16.00	1.047	98.56	1.015	-0.1	0.094	0.100
10	WLAN5GHz	802.11a 6Mbps	Front	0mm	116	5580	15.30	15.50	1.047	98.56	1.015	-0.04	0.321	0.341
	WLAN5GHz	802.11a 6Mbps	Front	0mm	100	5500	13.80	14.00	1.047	98.56	1.015	0.13	0.219	0.233
	WLAN5GHz	802.11a 6Mbps	Front	0mm	124	5620	15.10	15.50	1.096	98.56	1.015	-0.01	0.288	0.321
	WLAN5GHz	802.11a 6Mbps	Front	0mm	132	5660	14.90	15.00	1.023	98.56	1.015	0.02	0.276	0.287
	WLAN5GHz	802.11a 6Mbps	Front	0mm	144	5720	14.90	15.00	1.023	98.56	1.015	-0.17	0.273	0.284
	WLAN5GHz	802.11a 6Mbps	Back	0mm	116	5580	15.30	15.50	1.047	98.56	1.015	0.06	0.032	0.034
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	116	5580	15.30	15.50	1.047	98.56	1.015	-0.16	0.298	0.317
	WLAN5GHz	802.11a 6Mbps	Right Side	0mm	116	5580	15.30	15.50	1.047	98.56	1.015	-0.1	0.092	0.098
11	WLAN5GHz	802.11a 6Mbps	Front	0mm	165	5825	16.30	16.50	1.047	98.56	1.015	0.16	0.450	0.478
	WLAN5GHz	802.11a 6Mbps	Front	0mm	149	5745	15.80	16.00	1.047	98.56	1.015	0.03	0.397	0.422
	WLAN5GHz	802.11a 6Mbps	Front	0mm	157	5825	15.90	16.00	1.023	98.56	1.015	-0.14	0.388	0.403
	WLAN5GHz	802.11a 6Mbps	Back	0mm	165	5825	16.30	16.50	1.047	98.56	1.015	0.06	0.033	0.035
	WLAN5GHz	802.11a 6Mbps	Top Side	0mm	165	5825	16.30	16.50	1.047	98.56	1.015	-0.03	0.269	0.286
	WLAN5GHz	802.11a 6Mbps	Right Side	0mm	165	5825	16.30	16.50	1.047	98.56	1.015	0.15	0.121	0.129

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	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)
	Bluetooth	1Mbps	Front	0mm	39	2441	5.02	5.50	1.117	76.83	1.084	0.19	0.015	0.018
	Bluetooth	1Mbps	Back	0mm	39	2441	5.02	5.50	1.117	76.83	1.084	0.17	0.001	0.002
12	Bluetooth	1Mbps	Top Side	0mm	39	2441	5.02	5.50	1.117	76.83	1.084	0.09	0.025	0.030
	Bluetooth	1Mbps	Top Side	0mm	0	2402	4.25	5.50	1.334	76.83	1.084	-0.15	0.018	0.026
	Bluetooth	1Mbps	Top Side	0mm	78	2480	3.84	5.50	1.466	76.83	1.084	-0.08	0.018	0.029
	Bluetooth	1Mbps	Left Side	0mm	39	2441	5.02	5.50	1.117	76.83	1.084	-0.07	0.003	0.003

12. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Body	Extremity
1.	WLAN2.4GHz + BT	Yes	Yes
2.	WLAN5GHz + BT	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.

12.1 Body Exposure Conditions

Exposure Position	1	2	3	1+3 Summed 1g SAR (W/kg)	2+3 Summed 1g SAR (W/kg)
	2.4GHz WLAN	5GHz WLAN	Bluetooth		
	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)		
Front at 10 mm	0.474	0.637	0.008	**0.482**	**0.645**
Back at 10mm	0.057	0.124	0.001	**0.058**	**0.125**

12.2 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	5GHz WLAN	Bluetooth		
	10g SAR (W/kg)	10g SAR (W/kg)	10g SAR (W/kg)		
Front at 0mm	0.413	0.564	0.018	**0.431**	**0.582**
Back at 0mm	0.102	0.035	0.002	**0.104**	**0.037**
Left Side at 0mm			0.003	**0.003**	**0.003**
Right Side at 0mm	0.038	0.129		**0.038**	**0.129**
Top Side at 0mm	0.575	0.521	0.030	**0.605**	**0.551**

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13. 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.

14. 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.