FCC SAR Test Report

Equipment	:	**Personal Computer**
Brand Name	:	**VAIO**
Model No.	:	**VJZ12AD11L**
FCC ID	:	**VUIVJZ12AD11L**
Standard	:	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2003**
Applicant **Manufacturer**	:	**PEGATRON CORPORATION** 5F No. 76, Ligong St.,Beitou District, Taipei City 112 Taiwan **Maintek Computer (Suzhou) Co., Ltd** 233,Jin Feng Road,Suzhu New District,Jiangsu 215011,China

The product sample received on Jul. 13, 2015 and completely tested on Aug. 07, 2015. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Kevin Liang / Assistant Manager

Testing Laboratory
1190

Table of Contents

Revision History

Report No.	Version	Description	Issued Date
FA512732-02	Rev. 02	Initial issue of report	Aug. 07, 2015

1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing as follows.

Exposure Position	Frequency Band	Reported 1g SAR (W/kg)	Equipment Class
Body	WLAN5.2GHz Band	0.684	NII
	WLAN5.3GHz Band	0.606	
	WLAN5.6GHz Band	0.675	
	WLAN5.8GHz Band	0.794	DTS
	WLAN2.4GHz Band	0.558	

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

1.1 Guidance Standard

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 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 248227 D01 For IEEE802.11(Wi-Fi)Transmitters v02r01

1.2 Testing Location Information

Testing Location		
HWA YA	ADD	: No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.
	TEL	: 886-3-327-3456 FAX : 886-3-327-0973

1.3 Device Category and SAR Limits

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6W/kg as averaged over any 1 gram of tissue.

1.3.1 Test Conditions

Ambient Temperature	20 to 24 ℃
Humidity	< 60%

1.3.2 Test Configuration

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting Duty factor observed as below:

- 802.11b, 1Mbps: 100%
- 802.11g, 6Mbps: 100%
- 802.11n, MCS0: 100%
- 802.11a, 6Mbs: 100%
- 802.11an, MCS0:100%
- 802.11ac, MCS0-NSS1:100%

For WLAN SAR testing, WLAN engineering testing software installed on the Support Notebook can provide continuous transmitting RF signal.

2 Equipment Under Test (EUT)

2.1 General Information

Product Feature & Specification	
Equipment Name	Personal Computer
Brand Name	VAIO
Model Name	VJZ12AD11L
FCC ID	VUIVJZ12AD11L
Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band : 5150 MHz ~5350 MHz WLAN 5.3GHz Band : 5350 MHz ~5470 MHz WLAN 5.6GHz Band : 5470 MHz ~5725 MHz WLAN 5.8GHz Band : 5725 MHz ~5850 MHz Bluetooth: 2402 MHz ~ 2480 MHz
EUT Stage	Production Unit

Specification of Accessory					
Accessories or 2nd Source or Key Part	US Adapter 1	Brand Name	VAIO	Model Name	VJ8AC19V78
		Power Rating	I/P:100-240Vac, 1.5A, O/P: 19.5dc, 3.3 A		
		Power Cord	meter, non-shielded cable, w/o ferrite core		
	Battery 1	Brand Name	VAIO	Model Name	VJ8BPS47
		Power Rating	15.2Vdc, 4140mAh / 60Wh	Type	Li-ion

2.2 Simultaneous Transmission Condition

NO.	Simultaneous Transmission configurations	Tablet
1.	11b+Bluetooth	Yes
2.	11g+Bluetooth	Yes
3.	11n+Bluetooth	Yes
4.	11a+Bluetooth	Yes
5.	11an+Bluetooth	Yes
6.	11ac+Bluetooth	Yes
7.	11b+11b	Yes
8.	11g+11g	Yes
9.	11n+11n	Yes
10.	11a+11a	Yes
11.	11an+11an	Yes
12.	11ac+11ac	Yes

Note:

Bluetooth operation was not evaluated as the power level of the BT transmitter was 2mW which is excluded per KDB 447498 D01 V05r02 Section 4.3.1 page 11. The Bluetooth transmitter does simultaneously transmit with the WiFi transmitter. When BT and WiFi are transmitting simultaneously ,WiFi will transmit on Chain A an BT will transmit on Chain B. The installation guide has instructions to the installer to set the two antennas with a minimum of 50mm separation. Simultaneous transmission is evaluated on page 50.

3 RF Exposure Limits

3.1 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.

3.2 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

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.

4 Specific Absorption Rate (SAR)

4.1 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.

4.2 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:

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

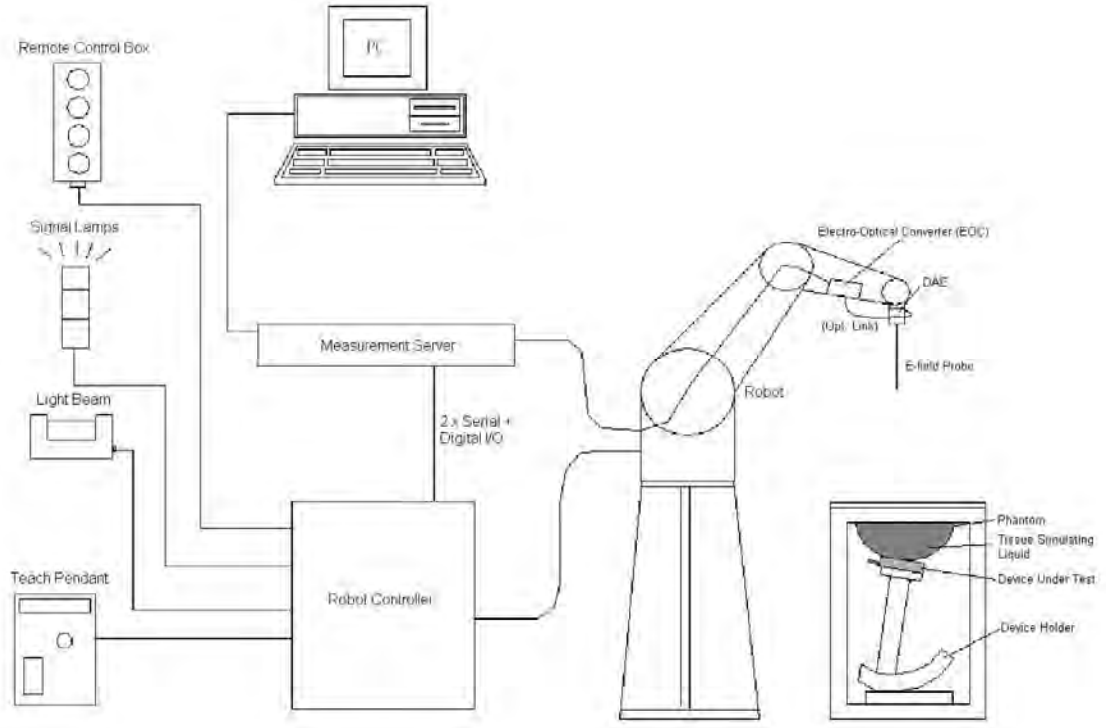
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

5 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.

5.1 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.

5.2 E-Field Probe Specification

<EX3DV4 Probe>

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 6 GHz; Linearity: ± 0.2 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
	

5.3 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. The sensitivity parameters (NormX, NormY, and NormZ), the diode compression parameter (DCP) and the conversion factor (ConvF) of the probe are tested. The calibration data can be referred to appendix C of this report.

5.4 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.

5.5 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). The Stäubli robot series have many features that are important for our application:

- High precision (repeatability ±0.035 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

5.6 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chipdisk (DASY5: 128 MB), RAM (DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board. The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

5.7 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 ELI4 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 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) Area scan
(b) Power reference measurement
(c) Zoom scan
(d) Power drift measurement

6.1 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
(g) Calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
(b) Generation of a high-resolution mesh within the measured volume
(c) Interpolation of all measured values form the measurement grid to the high-resolution grid
(d) Extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
(e) Calculation of the averaged SAR within masses of 1g and 10g

6.2 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.

6.3 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 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.	

6.4 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 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	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
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.

6.5 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.

6.6 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.

7 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	Data Acquisition Electronics	DAE4	1424	2015/2/20	2016/2/19
SPEAG	Dosimetric E-Field Probe	EX3DV4	3976	2015/2/26	2016/2/25
SPEAG	2450MHz System Validation Kit	D2450V2	929	2015/2/25	2016/2/24
SPEAG	5000MHz System Validation Kit	D5GHzV2	1171	2015/2/26	2016/2/25
SPEAG	Device Holder	N/A	N/A	NCR	NCR
Mini-Circuits	Power Amplifier	ZHL-42W+	15542	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46419201	2015/1/21	2016/1/20
Agilent	EXA Signal Analyzer	N9010A	MY54200432	2014/8/16	2015/8/15
Agilent	MXG-B RF Vector Signal Generator	N5182B	MY53050081	2015/3/30	2016/3/28
SPEAG	Dielectric Probe Kit	SM DAK 040CA	1146	NCR	NCR
Anritsu	Power Meter	ML2495A	1124009	2015/1/29	2016/1/28
Anritsu	Power sensor	MA2411B	1027452	2015/1/29	2016/1/28
SPEAG	Flat Phantom ELI5.0	QD OVA 002 AA	1238	NCR	NCR
Wisewind	Themometer	HTC1	HTC1	2014/12/25	2015/12/24
Wisewind	Themometer	YF-160A	130504609	2014/12/25	2015/12/24

General Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
3. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
4. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.
5. NCR: No calibration request.

8 System Verification

8.1 Tissue Simulating Liquids

For the measurement of the field distribution inside the phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For body SAR testing ≤ 3 GHz, 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. 8.1.

For body SAR testing >3GHz, the liquid height from the center of the flat phantom to the liquid top surface is larger than 10 cm which is shown in Fig. 8.2

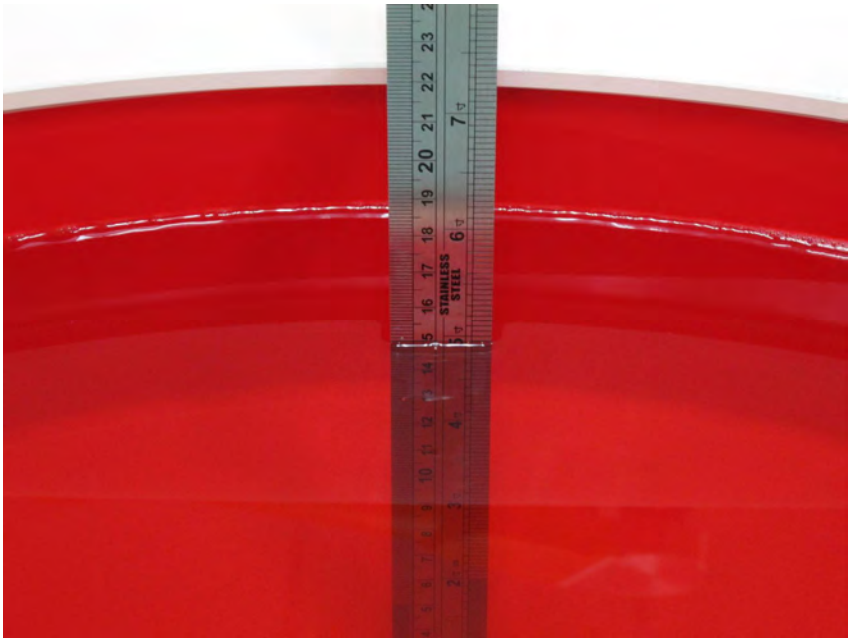


Fig 8.1 Photo of Liquid Height for Body SAR ≤ 3 GHz

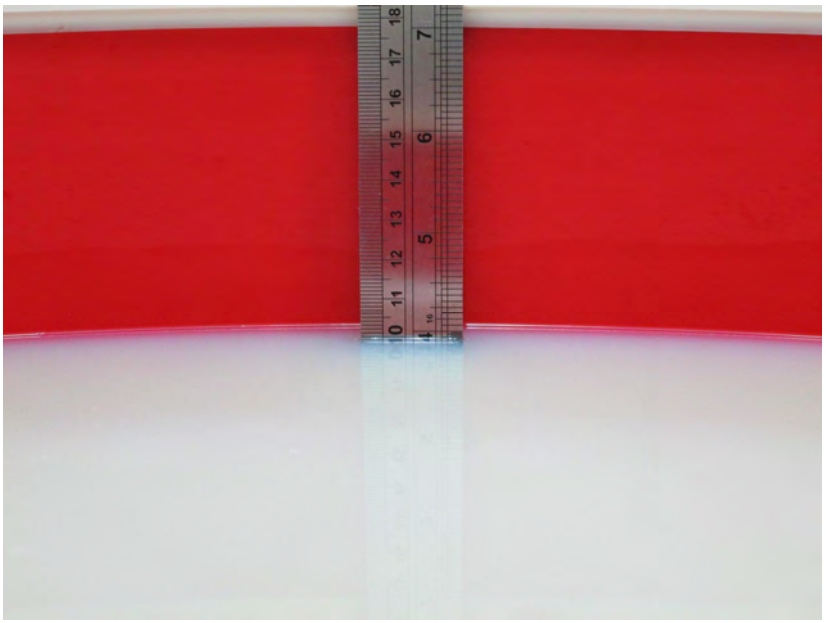


Fig 8.2 Photo of Liquid Height for Body SAR > 3GHz

8.2 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)
For Head								
2450	55.0	0	0	0	0	45.0	1.80	39.2

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>

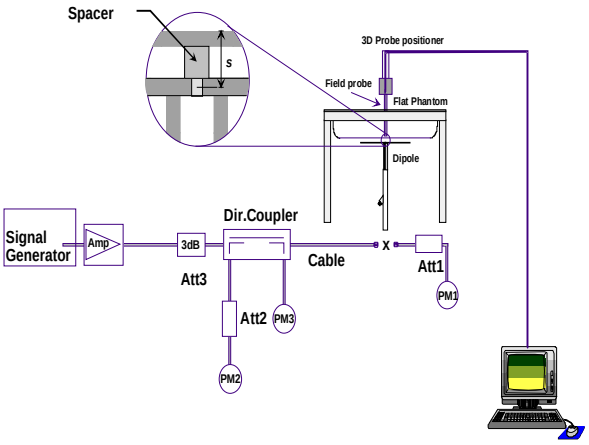
Frequency (MHz)	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
B2450	22.3	2.004	51.279	1.95	52.7	2.77	-2.70	±5	2015/7/18
B2450	22.6	2.002	51.299	1.95	52.7	2.67	-2.66	±5	2015/7/20
B5G	22.6	5.21	47.773	5.3	49	-1.70	-2.50	±5	2015/7/17
B5G	22.5	5.364	48.731	5.3	49	1.21	-0.55	±5	2015/7/20
B5G	22.6	5.339	47.636	5.42	48.9	-1.49	-2.58	±5	2015/7/17
B5G	22.5	5.495	48.561	5.42	48.9	1.38	-0.69	±5	2015/7/20
B5G	22.6	5.736	47.176	5.77	48.5	-0.59	-2.73	±5	2015/7/17
B5G	22.4	5.899	48.05	5.77	48.5	2.24	-0.93	±5	2015/7/21
B5G	22.6	5.993	46.842	6	48.2	-0.12	-2.82	±5	2015/7/17
B5G	22.4	6.174	47.733	6	48.2	2.90	-0.97	±5	2015/7/21

1. The dielectric properties of the tissue is within ±5% of the target values.
2. Liquid temperature during dielectric property measurement by more than ±2 °C
3. The dielectric properties of the tissue-equivalent liquids shall be measured within 24 h before the SAR measurements.

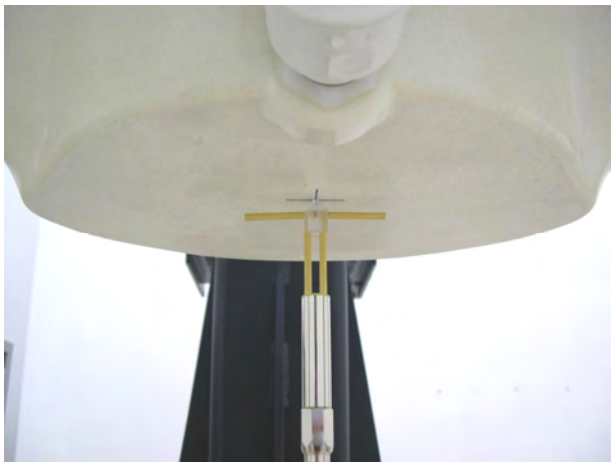
8.3 System Performance Check Results

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 SAR (W/kg)	Targeted SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2015/7/18	2450	250mW	929	3976	1424	12.6	51.1	50.40	-1.370
2015/7/20	2450	250mW	929	3976	1424	12.7	51.1	50.80	-0.587
2015/7/17	5200	100mW	1171	3976	1424	6.96	71.4	69.60	-2.521
2015/7/20	5200	100mW	1171	3976	1424	7.06	71.4	70.60	-1.120
2015/7/17	5300	100mW	1171	3976	1424	7.29	72.5	72.90	0.552
2015/7/20	5300	100mW	1171	3976	1424	7.5	72.5	75.00	3.448
2015/7/17	5600	100mW	1171	3976	1424	7.52	76	75.20	-1.053
2015/7/21	5600	100mW	1171	3976	1424	7.73	76	77.30	1.711
2015/7/17	5800	100mW	1171	3976	1424	7.42	73.1	74.20	1.505
2015/7/21	5800	100mW	1171	3976	1424	7.65	73.1	76.50	4.651



System Performance Check Setup



Setup Photo

9 Conducted RF Output Power & Maximum Tune-up Limit(dBm)

<Bluetooth Conducted Power>

Bluetooth Average Power (dBm)		Tune up Limit (dBm)
Channel / Mode	Power vs. Channel	
	v4.0-LE	
	LE-1Mbps	
CH78	3.69	4.00

<WLAN Conducted Power>

General Note:

Per FCC KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion.

< WLAN Antenna>

<Antenna MAIN>

WLAN 2.4GHz 802.11b Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		1Mbps	
CH 1	2412	14.85	15.00
CH 6	2437	14.96	15.00
CH 11	2462	14.64	15.00

WLAN 2.4GHz 802.11g Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 1	2412	13.83	14.00
CH 6	2437	14.76	15.00
CH 11	2462	12.17	12.50

WLAN 2.4GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 1	2412	13.65	14.00
CH 6	2437	14.64	15.00
CH 11	2462	12.25	12.50

WLAN 2.4GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 3	2422	13.20	13.50
CH 6	2437	14.95	15.00
CH 9	2452	12.27	12.50

WLAN 5.2GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 36	5180	13.30	13.50
CH 40	5200	13.20	13.50
CH 44	5220	13.22	13.50
CH 48	5240	13.49	13.50

WLAN 5.2GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 36	5180	13.26	13.50
CH 40	5200	13.48	13.50
CH 44	5220	13.24	13.50
CH 48	5240	13.27	13.50

WLAN 5.2GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 38	5190	11.97	12.00
CH 46	5230	13.16	13.50

WLAN 5.2GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 36	5180	13.17	13.50
CH 40	5200	13.13	13.50
CH 44	5220	13.09	13.50
CH 48	5240	13.39	13.50

WLAN 5.2GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 38	5190	11.64	12.00
CH 46	5230	13.37	13.50

WLAN 5.2GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 42	5210	13.29	13.50

WLAN 5.3GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 52	5260	13.30	13.50
CH 56	5280	13.37	13.50
CH 60	5300	13.37	13.50
CH 64	5320	13.45	13.50

WLAN 5.3GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 52	5260	13.25	13.50
CH 56	5280	13.21	13.50
CH 60	5300	13.21	13.50
CH 64	5320	13.34	13.50

WLAN 5.3GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 54	5270	13.15	13.50
CH 62	5310	13.22	13.50

WLAN 5.3GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 52	5260	13.21	13.50
CH 56	5280	13.29	13.50
CH 60	5300	13.24	13.50
CH 64	5320	13.36	13.50

WLAN 5.3GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 54	5270	13.41	13.50
CH 62	5310	13.10	13.50

WLAN 5.3GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 58	5290	13.26	13.50

WLAN 5.6GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 100	5500	13.20	13.50
CH 104	5520	13.15	13.50
CH 108	5540	13.12	13.50
CH 112	5560	13.49	13.50
CH 116	5580	13.23	13.50
CH 120	5600	13.31	13.50
CH 124	5620	13.18	13.50
CH 128	5640	13.22	13.50
CH 132	5660	13.45	13.50
CH 136	5680	13.24	13.50
CH 140	5700	12.68	13.00
CH 144	5720	13.20	13.50

WLAN 5.6GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 100	5500	13.42	13.50
CH 104	5520	13.39	13.50
CH 108	5540	13.35	13.50
CH 112	5560	13.45	13.50
CH 116	5580	13.42	13.50
CH 120	5600	13.06	13.50
CH 124	5620	13.43	13.50
CH 128	5640	13.46	13.50
CH 132	5660	13.44	13.50
CH 136	5680	13.36	13.50
CH 140	5700	12.93	13.00
CH 144	5720	13.44	13.50

WLAN 5.6GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 102	5510	13.35	13.50
CH 110	5550	13.24	13.50
CH 118	5590	13.46	13.50
CH 126	5630	13.38	13.50
CH 134	5670	13.37	13.50
CH 142	5710	13.38	13.50

WLAN 5.6GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 100	5500	13.46	13.50
CH 104	5520	13.46	13.50
CH 108	5540	13.38	13.50
CH 112	5560	13.39	13.50
CH 116	5580	13.16	13.50
CH 120	5600	13.15	13.50
CH 124	5620	13.47	13.50
CH 128	5640	13.45	13.50
CH 132	5660	13.47	13.50
CH 136	5680	13.46	13.50
CH 140	5700	12.94	13.00
CH 144	5720	13.47	13.50

WLAN 5.6GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 102	5510	13.25	13.50
CH 110	5550	13.18	13.50
CH 118	5590	13.41	13.50
CH 126	5630	13.31	13.50
CH 134	5670	13.34	13.50
CH 142	5710	13.42	13.50

WLAN 5.6GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 106	5530	13.41	13.50
CH 122	5610	13.25	13.50
CH 138	5690	13.27	13.50

WLAN 5.8GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 149	5745	13.31	13.50
CH 153	5765	13.32	13.50
CH 157	5785	13.46	13.50
CH 161	5805	13.43	13.50
CH 165	5825	13.49	13.50

WLAN 5.8GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 149	5745	13.23	13.50
CH 153	5765	13.35	13.50
CH 157	5785	13.25	13.50
CH 161	5805	13.20	13.50
CH 165	5825	13.32	13.50

WLAN 5.8GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 151	5755	13.41	13.50
CH 159	5795	13.12	13.50

WLAN 5.8GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 149	5745	13.20	13.50
CH 153	5765	13.37	13.50
CH 157	5785	13.29	13.50
CH 161	5805	13.16	13.50
CH 165	5825	13.46	13.50

WLAN 5.8GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 151	5755	13.43	13.50
CH 159	5795	13.12	13.50

WLAN 5.8GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 155	5775	13.30	13.50

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WLAN 2.4GHz 802.11b Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		1Mbps	
CH 1	2412	14.75	15.00
CH 6	2437	14.69	15.00
CH 11	2462	14.94	15.00

WLAN 2.4GHz 802.11g Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 1	2412	14.25	15.00
CH 6	2437	14.85	15.00
CH 11	2462	12.30	12.50

WLAN 2.4GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 1	2412	13.23	13.50
CH 6	2437	14.91	15.00
CH 11	2462	12.34	12.50

WLAN 2.4GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 3	2422	13.24	13.50
CH 6	2437	14.91	15.00
CH 9	2452	11.15	11.50

WLAN 5.2GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 36	5180	13.49	13.50
CH 40	5200	13.40	13.50
CH 44	5220	13.46	13.50
CH 48	5240	13.38	13.50

WLAN 5.2GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 36	5180	13.46	13.50
CH 40	5200	13.35	13.50
CH 44	5220	13.40	13.50
CH 48	5240	13.39	13.50

WLAN 5.2GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 38	5190	13.45	13.50
CH 46	5230	13.36	13.50

WLAN 5.2GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 36	5180	13.17	13.50
CH 40	5200	13.24	13.50
CH 44	5220	13.33	13.50
CH 48	5240	13.39	13.50

WLAN 5.2GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 38	5190	13.44	13.50
CH 46	5230	13.40	13.50

WLAN 5.2GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 42	5210	13.41	13.50

WLAN 5.3GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 52	5260	13.26	13.50
CH 56	5280	13.12	13.50
CH 60	5300	13.11	13.50
CH 64	5320	13.49	13.50

WLAN 5.3GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 52	5260	13.38	13.50
CH 56	5280	13.13	13.50
CH 60	5300	13.46	13.50
CH 64	5320	13.27	13.50

WLAN 5.3GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 54	5270	13.14	13.50
CH 62	5310	13.34	13.50

WLAN 5.3GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 52	5260	13.25	13.50
CH 56	5280	13.12	13.50
CH 60	5300	13.42	13.50
CH 64	5320	13.37	13.50

WLAN 5.3GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 54	5270	13.11	13.50
CH 62	5310	13.32	13.50

WLAN 5.3GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 58	5290	13.42	13.50

WLAN 5.6GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 100	5500	13.44	13.50
CH 104	5520	13.23	13.50
CH 108	5540	13.28	13.50
CH 112	5560	13.36	13.50
CH 116	5580	13.27	13.50
CH 120	5600	13.15	13.50
CH 124	5620	13.44	13.50
CH 128	5640	13.37	13.50
CH 132	5660	13.47	13.50
CH 136	5680	13.24	13.50
CH 140	5700	12.61	13.00
CH 144	5720	13.42	13.50

WLAN 5.6GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 100	5500	13.25	13.50
CH 104	5520	13.18	13.50
CH 108	5540	13.16	13.50
CH 112	5560	13.10	13.50
CH 116	5580	13.41	13.50
CH 120	5600	13.36	13.50
CH 124	5620	13.39	13.50
CH 128	5640	13.16	13.50
CH 132	5660	13.47	13.50
CH 136	5680	13.43	13.50
CH 140	5700	12.81	13.00
CH 144	5720	13.35	13.50

WLAN 5.6GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 102	5510	13.16	13.50
CH 110	5550	13.06	13.50
CH 118	5590	13.39	13.50
CH 126	5630	13.13	13.50
CH 134	5670	13.46	13.50
CH 142	5710	13.14	13.50

WLAN 5.6GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 100	5500	13.34	13.50
CH 104	5520	13.21	13.50
CH 108	5540	13.13	13.50
CH 112	5560	13.19	13.50
CH 116	5580	13.11	13.50
CH 120	5600	13.42	13.50
CH 124	5620	13.30	13.50
CH 128	5640	13.18	13.50
CH 132	5660	13.25	13.50
CH 136	5680	13.47	13.50
CH 140	5700	12.60	13.00
CH 144	5720	13.41	13.50

WLAN 5.6GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 102	5510	13.15	13.50
CH 110	5550	13.42	13.50
CH 118	5590	13.33	13.50
CH 126	5630	13.10	13.50
CH 134	5670	13.41	13.50
CH 142	5710	13.12	13.50

WLAN 5.6GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 106	5530	13.45	13.50
CH 122	5610	13.29	13.50
CH 138	5690	13.47	13.50

WLAN 5.8GHz 802.11a Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		6Mbps	
CH 149	5745	13.47	13.50
CH 153	5765	13.31	13.50
CH 157	5785	13.37	13.50
CH 161	5805	13.24	13.50
CH 165	5825	13.10	13.50

WLAN 5.8GHz 802.11n_HT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 149	5745	13.18	13.50
CH 153	5765	13.09	13.50
CH 157	5785	13.20	13.50
CH 161	5805	13.32	13.50
CH 165	5825	13.30	13.50

WLAN 5.8GHz 802.11n_HT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0	
CH 151	5755	13.14	13.50
CH 159	5795	13.18	13.50

WLAN 5.8GHz 802.11ac_VHT20 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 149	5745	13.38	13.50
CH 153	5765	13.20	13.50
CH 157	5785	13.39	13.50
CH 161	5805	13.29	13.50
CH 165	5825	13.17	13.50

WLAN 5.8GHz 802.11ac_VHT40 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 151	5755	13.11	13.50
CH 159	5795	13.13	13.50

WLAN 5.8GHz 802.11ac_VHT80 Average Power (dBm)			Tune up Limit (dBm)
Power vs. Channel			
Channel	Frequency (MHz)	Data Rate	
		MCS0-NSS1	
CH 155	5775	13.41	13.50

<Antenna MAIN+AUX>

WLAN 2.4GHz 802.11g Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		6Mbps	6Mbps		
CH 1	2412	8.57	8.82	11.71	12.00
CH 6	2437	11.71	11.85	14.79	15.00
CH 11	2462	8.82	8.90	11.87	12.00

WLAN 2.4GHz 802.11n_HT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 1	2412	8.49	8.78	11.65	12.00
CH 6	2437	11.79	11.60	14.71	15.00
CH 11	2462	8.49	9.26	11.90	12.00

WLAN 2.4GHz 802.11n_HT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 3	2422	5.77	6.46	9.14	9.50
CH 6	2437	6.18	6.75	9.48	9.50
CH 9	2452	6.83	6.88	9.87	10.00

WLAN 5.2GHz 802.11a Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 36	5180	7.53	8.87	11.26	11.50
CH 40	5200	7.73	9.08	11.47	11.50
CH 44	5220	7.31	9.31	11.43	11.50
CH 48	5240	7.59	8.75	11.22	11.50

WLAN 5.2GHz 802.11n_HT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 36	5180	7.55	9.07	11.39	11.50
CH 40	5200	7.46	9.02	11.32	11.50
CH 44	5220	7.44	9.25	11.45	11.50
CH 48	5240	7.55	9.00	11.35	11.50

WLAN 5.2GHz 802.11n_HT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 38	5190	5.59	7.40	9.60	10.00
CH 46	5230	9.42	11.26	13.45	13.50

WLAN 5.2GHz 802.11n_VHT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 36	5180	7.34	8.61	11.03	11.50
CH 40	5200	7.31	9.09	11.30	11.50
CH 44	5220	6.82	9.31	11.25	11.50
CH 48	5240	6.80	8.93	11.00	11.50

WLAN 5.2GHz 802.11n_VHT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 38	5190	6.17	7.58	9.94	10.00
CH 46	5230	8.61	11.05	13.01	13.50

WLAN 5.2GHz 802.11n_VHT80 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 42	5210	7.43	8.81	11.19	11.50

WLAN 5.3GHz 802.11a Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 52	5260	9.73	11.11	13.49	13.50
CH 56	5280	9.37	10.64	13.06	13.50
CH 60	5300	9.97	10.86	13.45	13.50
CH 64	5320	8.27	8.67	11.49	11.50

WLAN 5.3GHz 802.11n_HT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 52	5260	9.37	10.94	13.24	13.50
CH 56	5280	9.41	10.81	13.18	13.50
CH 60	5300	9.37	10.64	13.06	13.50
CH 64	5320	7.87	8.77	11.35	11.50

WLAN 5.3GHz 802.11n_HT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 54	5270	10.32	10.50	13.42	13.50
CH 62	5310	7.50	8.63	11.11	11.50

WLAN 5.3GHz 802.11n_VHT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 52	5260	9.87	10.68	13.30	13.50
CH 56	5280	9.48	10.63	13.10	13.50
CH 60	5300	10.16	10.57	13.38	13.50
CH 64	5320	7.67	8.65	11.20	11.50

WLAN 5.3GHz 802.11n_VHT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 54	5270	9.75	11.06	13.46	13.50
CH 62	5310	7.44	8.59	11.06	11.50

WLAN 5.3GHz 802.11n_VHT80 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 58	5290	7.23	8.93	11.17	11.50

WLAN 5.6GHz 802.11a Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 100	5500	7.17	7.77	10.49	10.50
CH 104	5520	10.17	10.39	13.29	13.50
CH 108	5540	10.32	10.41	13.38	13.50
CH 112	5560	10.20	10.50	13.36	13.50
CH 116	5580	10.27	10.52	13.41	13.50
CH 120	5600	10.29	10.51	13.41	13.50
CH 124	5620	9.72	10.73	13.26	13.50
CH 128	5640	9.97	10.85	13.44	13.50
CH 132	5660	10.00	10.57	13.30	13.50
CH 136	5680	9.72	10.38	13.07	13.50
CH 140	5700	7.57	8.08	10.84	11.00
CH 144	5720	9.73	10.51	13.15	13.50

WLAN 5.6GHz 802.11n_HT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 100	5500	6.84	7.49	10.19	10.50
CH 104	5520	9.79	10.92	13.40	13.50
CH 108	5540	9.50	10.77	13.19	13.50
CH 112	5560	9.99	10.74	13.39	13.50
CH 116	5580	9.73	10.57	13.18	13.50
CH 120	5600	9.90	10.79	13.38	13.50
CH 124	5620	9.56	10.54	13.09	13.50
CH 128	5640	9.73	10.72	13.26	13.50
CH 132	5660	10.07	10.67	13.39	13.50
CH 136	5680	9.89	10.73	13.34	13.50
CH 140	5700	7.04	8.23	10.69	11.00
CH 144	5720	9.61	10.75	13.23	13.50

WLAN 5.6GHz 802.11n_HT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 102	5510	7.92	8.39	11.17	11.50
CH 110	5550	9.84	10.50	13.19	13.50
CH 118	5590	10.00	10.32	13.17	13.50
CH 126	5630	9.84	10.91	13.42	13.50
CH 134	5670	10.02	10.65	13.36	13.50
CH 142	5710	10.26	10.10	13.19	13.50

WLAN 5.6GHz 802.11ac_VHT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 100	5500	7.24	7.27	10.27	10.50
CH 104	5520	9.78	10.75	13.30	13.50
CH 108	5540	9.48	10.63	13.10	13.50
CH 112	5560	9.98	10.36	13.18	13.50
CH 116	5580	10.19	10.28	13.25	13.50
CH 120	5600	10.14	10.47	13.32	13.50
CH 124	5620	9.90	10.13	13.03	13.50
CH 128	5640	10.04	10.15	13.11	13.50
CH 132	5660	10.55	10.27	13.42	13.50
CH 136	5680	10.28	10.09	13.20	13.50
CH 140	5700	7.29	8.43	10.91	11.00
CH 144	5720	9.93	10.06	13.01	13.50

WLAN 5.6GHz 802.11ac_VHT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 102	5510	7.96	8.43	11.21	11.50
CH 110	5550	9.88	10.59	13.26	13.50
CH 118	5590	9.92	10.42	13.19	13.50
CH 126	5630	9.88	10.89	13.42	13.50
CH 134	5670	9.85	10.51	13.20	13.50
CH 142	5710	9.73	10.86	13.34	13.50

WLAN 5.6GHz 802.11ac_VHT80 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 106	5530	7.33	8.82	11.15	11.50
CH 122	5610	9.84	11.00	13.47	13.50
CH 138	5690	9.65	10.92	13.34	13.50

WLAN 5.8GHz 802.11a Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 149	5745	9.56	10.57	13.10	13.50
CH 153	5765	9.69	11.01	13.41	13.50
CH 157	5785	9.58	11.02	13.37	13.50
CH 161	5805	9.36	11.09	13.32	13.50
CH 165	5825	8.86	11.02	13.08	13.50

WLAN 5.8GHz 802.11n_HT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 149	5745	9.52	10.74	13.18	13.50
CH 153	5765	9.52	11.10	13.39	13.50
CH 157	5785	9.42	11.08	13.34	13.50
CH 161	5805	9.06	10.86	13.06	13.50
CH 165	5825	8.88	11.17	13.18	13.50

WLAN 5.8GHz 802.11n_HT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0	MCS0		
CH 151	5755	9.56	11.00	13.35	13.50
CH 159	5795	9.47	11.12	13.38	13.50

WLAN 5.8GHz 802.11ac_VHT20 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 149	5745	9.43	10.54	13.03	13.50
CH 153	5765	9.88	10.51	13.22	13.50
CH 157	5785	9.40	10.99	13.28	13.50
CH 161	5805	9.10	10.76	13.02	13.50
CH 165	5825	8.94	11.15	13.19	13.50

WLAN 5.8GHz 802.11ac_VHT40 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 151	5755	9.58	10.90	13.30	13.50
CH 159	5795	9.40	11.14	13.37	13.50

WLAN 5.8GHz 802.11ac_VHT80 Average Power (dBm)					Tune up Limit (dBm)
Power vs. Channel					
Channel	Frequency (MHz)	Antenna A	Antenna B	Antenna A+B	
		Data Rate	Data Rate		
		MCS0-NSS1	MCS0-NSS1		
CH 155	5775	9.53	11.16	13.43	13.50

10 SAR Exclusion Calculations

The 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm
[(max. pwr. of channel including tune-up tolerance, mW)/(min. test separation distance, mm)]
[√f(GHz)] ≤ 3.0 for 1-g SAR,
Where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

10.1 Standalone SAR Test Exclusion Considerations

The standalone SAR test exclusion procedure in KDB 447498) 4.3.1) is applied to determine the minimum test separation distance:

- The separation distance from the antenna to adjacent edge is ≦ 5mm, distance of 5mm is applied to determine SAR test exclusion.
- The Separation distance from the antenna to adjacent edge is > 5mm, the actual antenna to edge separation distance is applied to determine SAR test exclusion.

10.2 SAR Test Exclusion Calculations for WLAN& Bluetooth

< WIFI_MAIN_ANT >

Radio	Frq. (MHz)	Tune-upPower		Separation distances (mm)					Calculated Threshold(mW)				
		dBm	mW	Rear Face	Edge 1	Edge 2	Edg e3	Edge 4	Rear Face	Edge 1	Edge 2	Edge 3	Edge 4
802.11b	2437	14.96	31	5	35.8	225.2	3.3	199.9	10	69	433	6	384
802.11g	2437	14.76	30	5	35.8	225.2	3.3	199.9	10	69	433	6	384
802.11n_HT20	2437	14.64	29	5	35.8	225.2	3.3	199.9	10	69	433	6	384
802.11n_HT40	2437	14.95	31	5	35.8	225.2	3.3	199.9	10	69	433	6	384
802.11a	5240	13.49	22	5	35.8	225.2	3.3	199.9	7	47	295	4	262
802.11n_HT20	5200	13.48	22	5	35.8	225.2	3.3	199.9	7	47	296	4	263
802.11n_HT40	5230	13.16	21	5	35.8	225.2	3.3	199.9	7	47	295	4	262
802.11ac_VHT20	5240	13.39	22	5	35.8	225.2	3.3	199.9	7	47	295	4	262
802.11ac_VHT40	5230	13.37	22	5	35.8	225.2	3.3	199.9	7	47	295	4	262
802.11ac_VHT80	5210	13.29	21	5	35.8	225.2	3.3	199.9	7	47	296	4	263
802.11a	5320	13.45	22	5	35.8	225.2	3.3	199.9	7	47	293	4	260
802.11n_HT20	5320	13.34	22	5	35.8	225.2	3.3	199.9	7	47	293	4	260
802.11n_HT40	5310	13.22	21	5	35.8	225.2	3.3	199.9	7	47	293	4	260
802.11ac_VHT20	5320	13.36	22	5	35.8	225.2	3.3	199.9	7	47	293	4	260
802.11ac_VHT40	5270	13.41	22	5	35.8	225.2	3.3	199.9	7	47	294	4	261
802.11ac_VHT80	5290	13.26	21	5	35.8	225.2	3.3	199.9	7	47	294	4	261
802.11a	5560	13.49	22	5	35.8	225.2	3.3	199.9	6	46	287	4	254
802.11n_HT20	5640	13.46	22	5	35.8	225.2	3.3	199.9	6	45	284	4	253
802.11n_HT40	5590	13.46	22	5	35.8	225.2	3.3	199.9	6	45	286	4	254
802.11ac_VHT20	5620	13.47	22	5	35.8	225.2	3.3	199.9	6	45	285	4	253
802.11ac_VHT20	5660	13.47	22	5	35.8	225.2	3.3	199.9	6	45	284	4	252
802.11ac_VHT20	5720	13.47	22	5	35.8	225.2	3.3	199.9	6	45	282	4	251
802.11ac_VHT40	5710	13.42	22	5	35.8	225.2	3.3	199.9	6	45	283	4	251
802.11ac_VHT80	5530	13.41	22	5	35.8	225.2	3.3	199.9	6	46	287	4	255
802.11a	5825	13.49	22	5	35.8	225.2	3.3	199.9	6	44	280	4	248
802.11n_HT20	5765	13.35	22	5	35.8	225.2	3.3	199.9	6	45	281	4	250
802.11n_HT40	5755	13.41	22	5	35.8	225.2	3.3	199.9	6	45	282	4	250
802.11ac_VHT20	5825	13.46	22	5	35.8	225.2	3.3	199.9	6	44	280	4	248
802.11ac_VHT40	5755	13.43	22	5	35.8	225.2	3.3	199.9	6	45	282	4	250
802.11ac_VHT80	5775	13.30	21	5	35.8	225.2	3.3	199.9	6	45	281	4	250

10.3 Required Test Configurations

Test Configurations	Rear Face	Edge1	Edge2	Edge3	Edge4
802.11b	Yes	No	No	Yes	No
802.11g	Yes	No	No	Yes	No
802.11n_HT20	Yes	No	No	Yes	No
802.11n_HT40	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No

Note:
1. Yes= SAR is required.
2. No= SAR is not required.

< WIFI+ Bluetooth_AUX_ANT>

Radio	Frq. (MHz)	Tune-upPower		Separation distances (mm)					Calculated Threshold(mW)				
		dBm	mW	Rear Face	Edge 1	Edge 2	Edge 3	Edge 4	Rear Face	Edge 1	Edge 2	Edge 3	Edge 4
Bluetooth_v4.0	2480	3.69	2	5	209.7	51.3	3.2	199.8	10	399	98	6	381
802.11b	2462	14.94	31	5	209.7	51.3	3.2	199.8	10	401	98	6	382
802.11g	2437	14.93	31	5	209.7	51.3	3.2	199.8	10	403	99	6	384
802.11n_HT20	2437	14.91	31	5	209.7	51.3	3.2	199.8	10	403	99	6	384
802.11n_HT40	2437	14.91	31	5	209.7	51.3	3.2	199.8	10	403	99	6	384
802.11a	5180	13.49	22	5	209.7	51.3	3.2	199.8	7	276	68	4	263
802.11n_HT20	5180	13.46	22	5	209.7	51.3	3.2	199.8	7	276	68	4	263
802.11n_HT40	5190	13.45	22	5	209.7	51.3	3.2	199.8	7	276	68	4	263
802.11ac_VHT20	5240	13.39	22	5	209.7	51.3	3.2	199.8	7	275	67	4	262
802.11ac_VHT40	5190	13.44	22	5	209.7	51.3	3.2	199.8	7	276	68	4	263
802.11ac_VHT80	5210	13.41	22	5	209.7	51.3	3.2	199.8	7	276	67	4	263
802.11a	5320	13.49	22	5	209.7	51.3	3.2	199.8	7	273	67	4	260
802.11n_HT20	5300	13.46	22	5	209.7	51.3	3.2	199.8	7	273	67	4	260
802.11n_HT40	5310	13.34	22	5	209.7	51.3	3.2	199.8	7	273	67	4	260
802.11ac_VHT20	5300	13.42	22	5	209.7	51.3	3.2	199.8	7	273	67	4	260
802.11ac_VHT40	5310	13.32	21	5	209.7	51.3	3.2	199.8	7	273	67	4	260
802.11ac_VHT80	5290	13.42	22	5	209.7	51.3	3.2	199.8	7	274	67	4	261
802.11a	5660	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11n_HT20	5680	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11n_HT20	5670	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11n_HT20	5690	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	251
802.11n_HT40	5670	13.46	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11ac_VHT20	5680	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11ac_VHT40	5670	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	252
802.11ac_VHT80	5690	13.47	22	5	209.7	51.3	3.2	199.8	6	264	65	4	251
802.11a	5745	13.47	22	5	209.7	51.3	3.2	199.8	6	262	64	4	250
802.11n_HT20	5805	13.32	21	5	209.7	51.3	3.2	199.8	6	261	64	4	249
802.11n_HT40	5795	13.18	21	5	209.7	51.3	3.2	199.8	6	261	64	4	249
802.11ac_VHT20	5785	13.39	22	5	209.7	51.3	3.2	199.8	6	262	64	4	249
802.11ac_VHT40	5795	13.13	21	5	209.7	51.3	3.2	199.8	6	261	64	4	249
802.11ac_VHT80	5775	13.41	22	5	209.7	51.3	3.2	199.8	6	262	64	4	249

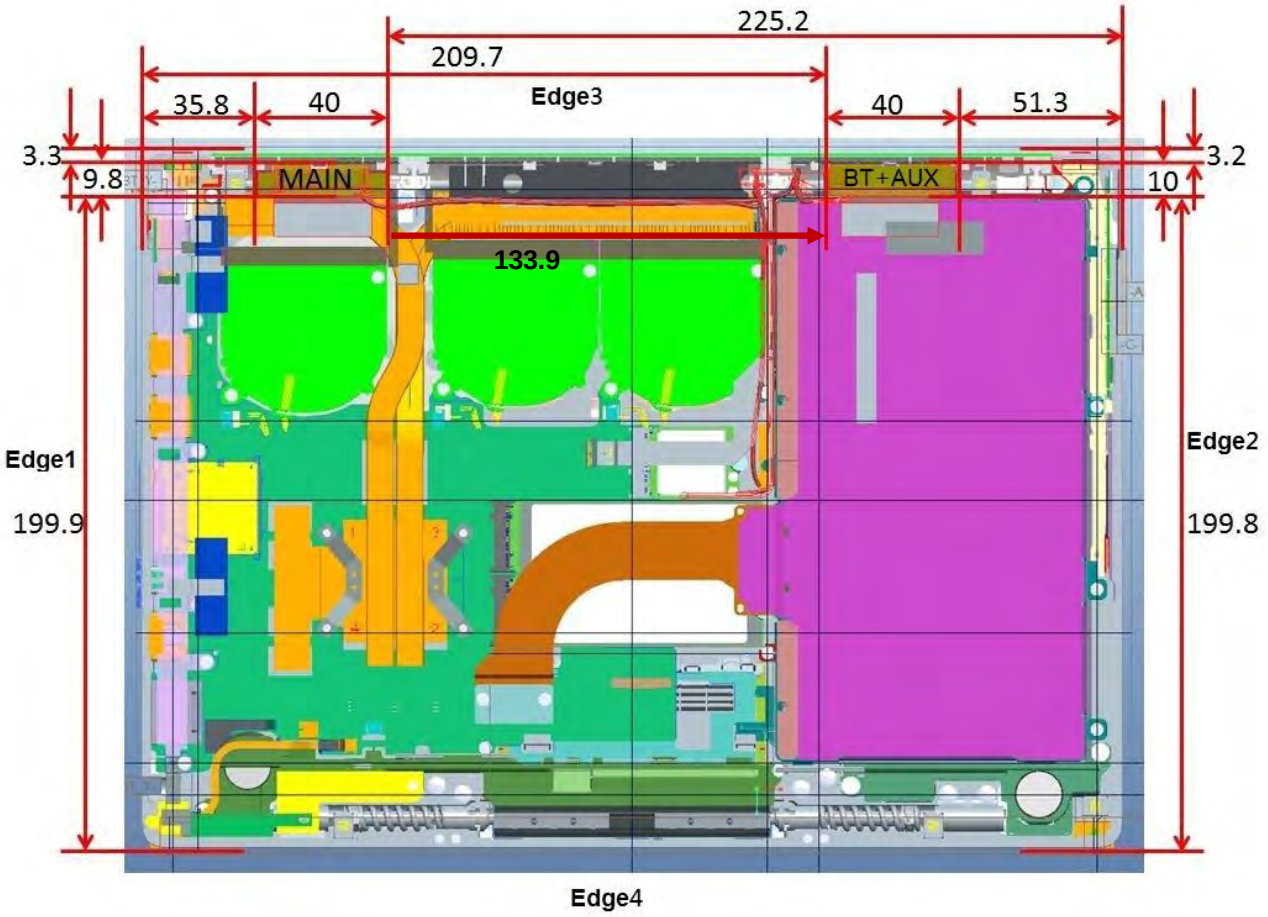
10.4 Required Test Configurations

Test Configurations	Rear Face	Edge1	Edge2	Edge3	Edge4
Bluetooth_v4.0	No	No	No	No	No
802.11b	Yes	No	No	Yes	No
802.11g	Yes	No	No	Yes	No
802.11n_HT20	Yes	No	No	Yes	No
802.11n_HT40	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No
802.11a	Yes	No	No	Yes	No
802.11an_HT20	Yes	No	No	Yes	No
802.11an_HT40	Yes	No	No	Yes	No
802.11an_VHT20	Yes	No	No	Yes	No
802.11an_VHT40	Yes	No	No	Yes	No
802.11an_VHT80	Yes	No	No	Yes	No

Note:

3. Yes= SAR is required.
4. No= SAR is not required.

11 Antenna Location



<EUT Rear View>

Antenna	Edge1 (mm)	Edge2 (mm)	Edge3 (mm)	Edge4 (mm)
WIFI_MAIN _ANT	35.8	225.2	3.3	199.9
WIFI+BT_AUX _ANT	209.7	51.3	3.2	199.8

12 SAR Test Results

General Note:

1. Per KDB 447498, 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. Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor

2. Per KDB 447498 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 616217, the additional separation introduced by the contour against a flat phantom is < 5 mm and reported SAR is < 1.2 W/kg, a curved or contoured back surface or edge SAR is not required, more detail information please refer to the setup photo.

4. Per KDB 248227D01 v02r01, the Wi-Fi transmission modes include all channel bandwidth, modulation and data rate
   combinations for the 802.11a/g/n/ac OFDM configurations in a standalone or aggregated frequency band. For 2.4 GHz, 802.11b DSSS and 802.11g/n OFDM configurations are considered separately.

5. Per KDB 248227D01 v02r01 5.1.1 Initial Test Position SAR Test Reduction Procedure.

6. When the WLAN transmission was verified using a spectrum analyzer.

12.1 Body SAR

<DTS WLAN 2.4G SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Antenna	DUT Status	Data Rate	Tune-Up Limit (dBm)	Average Power (dBm)	Tune-up Scaling Factor	Fast SAR 1g (W/kg)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
1	802.11b	-	Rear Face	0	6	2437	A	ACON	1Mbps	15	14.96	1.01	0.289	0.295	0.298
2	802.11b	-	Edge3	0	6	2437	A	ACON	1Mbps	15	14.96	1.01	0.528	0.553	0.558
3	802.11b	-	Rear Face	0	6	2437	A	Inpaq	1Mbps	15	14.94	1.01	0.409	0.412	0.418
4	802.11b	-	Edge3	0	6	2437	A	Inpaq	1Mbps	15	14.94	1.01	0.238	0.348	0.353
5	802.11b	-	Rear Face	0	11	2462	B	ACON	1Mbps	15	14.96	1.01	0.177	0.184	0.186
6	802.11b	-	Edge3	0	11	2462	B	ACON	1Mbps	15	14.96	1.01	0.189	0.209	0.211
7	802.11b	-	Rear Face	0	11	2462	B	Inpaq	1Mbps	15	14.94	1.01	0.272	0.329	0.334
8	802.11b	-	Edge3	0	11	2462	B	Inpaq	1Mbps	15	14.94	1.01	0.242	0.341	0.346

Note:

1. according KDB 248227 D01 802.11 Wi-Fi SAR v02r01 5.2.2 2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

<NII WLAN 5G SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Antenna	DUT Status	Data Rate	Tune-Up Limit (dBm)	Average Power (dBm)	Tune-up Scaling Factor	Fast SAR 1g (W/kg)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
9	802.11a	-	Rear Face	0	48	5240	A	ACON	6Mbps	13.5	13.49	1.00	0.217	0.252	0.253
10	802.11a	-	Edge3	0	48	5240	A	ACON	6Mbps	13.5	13.49	1.00	0.267	0.268	0.269
11	802.11a	-	Rear Face	0	48	5240	A	Inpaq	6Mbps	13.5	13.49	1.00	0.37	0.378	0.379
12	802.11a	-	Edge3	0	48	5240	A	Inpaq	6Mbps	13.5	13.49	1.00	0.724	0.682	0.684
13	802.11a	-	Rear Face	0	36	5180	B	ACON	6Mbps	13.5	13.49	1.00	0.163	0.172	0.172
14	802.11a	-	Edge3	0	36	5180	B	ACON	6Mbps	13.5	13.49	1.00	0.332	0.402	0.403
15	802.11a	-	Rear Face	0	36	5180	B	Inpaq	6Mbps	13.5	13.49	1.00	0.23	0.267	0.268
16	802.11a	-	Edge3	0	36	5180	B	Inpaq	6Mbps	13.5	13.49	1.00	0.311	0.648	0.649
17	802.11a	-	Rear Face	0	64	5320	A	ACON	6Mbps	13.5	13.45	1.01	0.196	0.233	0.236
18	802.11a	-	Edge3	0	64	5320	A	ACON	6Mbps	13.5	13.45	1.01	0.245	0.227	0.230
19	802.11a	-	Rear Face	0	64	5320	A	Inpaq	6Mbps	13.5	13.45	1.01	0.279	0.28	0.283
20	802.11a	-	Edge3	0	64	5320	A	Inpaq	6Mbps	13.5	13.45	1.01	0.669	0.599	0.606
21	802.11a	-	Rear Face	0	64	5320	B	ACON	6Mbps	13.5	13.49	1.00	0.166	0.18	0.18
22	802.11a	-	Edge3	0	64	5320	B	ACON	6Mbps	13.5	13.49	1.00	0.341	0.404	0.405
23	802.11a	-	Rear Face	0	64	5320	B	Inpaq	6Mbps	13.5	13.49	1.00	0.194	0.289	0.290
24	802.11a	-	Edge3	0	64	5320	B	Inpaq	6Mbps	13.5	13.49	1.00	0.272	0.538	0.539
25	802.11a	-	Rear Face	0	112	5560	A	ACON	6Mbps	13.5	13.49	1.00	0.24	0.277	0.278
26	802.11a	-	Edge3	0	112	5560	A	ACON	6Mbps	13.5	13.49	1.00	0.367	0.356	0.357
27	802.11a	-	Rear Face	0	112	5560	A	Inpaq	6Mbps	13.5	13.49	1.00	0.288	0.304	0.305
28	802.11a	-	Edge3	0	112	5560	A	Inpaq	6Mbps	13.5	13.49	1.00	0.752	0.653	0.655
29	802.11a	-	Rear Face	0	132	5660	B	ACON	6Mbps	13.5	13.47	1.01	0.186	0.225	0.227
30	802.11a	-	Edge3	0	132	5660	B	ACON	6Mbps	13.5	13.47	1.01	0.273	0.303	0.305
31	802.11a	-	Rear Face	0	132	5660	B	Inpaq	6Mbps	13.5	13.47	1.01	0.262	0.36	0.362
32	802.11a	-	Edge3	0	132	5660	B	Inpaq	6Mbps	13.5	13.47	1.01	0.399	0.67	0.675

<DTS WLAN 5G SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Antenna	DUT Status	Data Rate	Tune-Up Limit (dBm)	Average Power (dBm)	Tune-up Scaling Factor	Fast SAR 1g (W/kg)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
33	802.11a	-	Rear Face	0	165	5825	A	ACON	6Mbps	13.5	13.49	1.00	0.268	0.285	0.286
34	802.11a	-	Edge3	0	165	5825	A	ACON	6Mbps	13.5	13.49	1.00	0.406	0.59	0.591
35	802.11a	-	Rear Face	0	165	5825	A	Inpaq	6Mbps	13.5	13.49	1.00	0.341	0.385	0.386
36	802.11a	-	Edge3	0	165	5825	A	Inpaq	6Mbps	13.5	13.49	1.00	0.582	0.591	0.592
37	802.11a	-	Rear Face	0	149	5745	B	ACON	6Mbps	13.5	13.47	1.01	0.212	0.257	0.259
38	802.11a	-	Edge3	0	149	5745	B	ACON	6Mbps	13.5	13.47	1.01	0.256	0.27	0.272
39	802.11a	-	Rear Face	0	149	5745	B	Inpaq	6Mbps	13.5	13.47	1.01	0.363	0.424	0.427
40	802.11a	-	Edge3	0	149	5745	B	Inpaq	6Mbps	13.5	13.47	1.01	0.451	0.789	0.794

13 SPLSR Evaluation and Analysis

1. According to KDB447498D01 v05r02 4.3.2, When the maximum output power used for standalone operations is reduced in an operating mode or exposure condition during simultaneous transmission, often due to SAR or other implementation requirements, the standalone SAR tested at the higher output power may be applied to determine simultaneous transmission SAR test exclusion.
2. Per KDB 447498 D01 V05r02 section 4.3.2 2) follows:

   (max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]·[√f(GHz)/x] where x = 7.5 for 1-g SAR.
3. SPLSR= (SAR1 + SAR2)1.5/(min. separation distance, mm). If SPLSR≦0.04,simultaneously an mission SAR measurement is not necessary.
4. SPLSR= (SAR1 + SAR2)1.5/(min. separation distance, mm),and the peak separation distance is determined from 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 area scans or extrapolated peak SAR locations in the zoom scans.

<ACON>

Case1	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11b	Edge3	0.55	0	0.76	0.013	Not required
	802.11b		0.21	0			

Case2	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11b	Edge3	0.55	0	0.634	0.012	Not required
	Bluetooth		0.084	0			

Case3	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.27	0	0.67	0.005	Not required
	802.11a		0.4	0			

Case4	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.27	0	0.354	0.006	Not required
	Bluetooth		0.084	0			

Case5	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.23	0	0.63	0.005	Not required
	802.11a		0.4	0			

Case6	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.23	0	0.314	0.005	Not required
	Bluetooth		0.084	0			

Case7	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.36	0	0.66	0.005	Not required
	802.11a		0.3	0			

Case8	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.36	0	0.444	0.008	Not required
	Bluetooth		0.084	0			

Case9	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.59	0	0.86	0.007	Not required
	802.11a		0.27	0			

Case10	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.59	0	0.674	0.012	Not required
	Bluetooth		0.084	0			

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Case1	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11b	Rear Face	0.41	0	0.74	0.0039	Not required
	802.11b		0.33	0			

Case2	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11b	Rear Face	0.41	0	0.494	0.009	Not required
	Bluetooth		0.084	0			

Case3	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.68	0	1.33	0.0088	Not required
	802.11a		0.65	0			

Case4	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.68	0	0.764	0.014	Not required
	Bluetooth		0.084	0			

Case5	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.6	0	1.14	0.007	Not required
	802.11a		0.54	0			

Case6	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.6	0	0.684	0.012	Not required
	Bluetooth		0.084	0			

Case7	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.65	0	1.32	0.0098	Not required
	802.11a		0.67	0			

Case8	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.65	0	0.698	0.013	Not required
	Bluetooth		0.084	0			

Case9	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.59	0	1.37	0.0105	Not required
	802.11a		0.78	0			

Case10	Band	position	SAR(W/Kg)	Gap (Cm)	Summed SAR(W/kg)	SPLSR Results	Simultaneous SAR
	802.11a	Edge3	0.59	0	0.674	0.012	Not required
	Bluetooth		0.084	0			

14 Uncertainty Assessment

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

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

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience, and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 14.1

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

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

(b) κ is the coverage factor

Standard Uncertainty for Assumed Distribution

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

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

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (±%) (1g)
Measurement System					
Probe Calibration	6.0	Normal	1.0	1.0	6.0
Axial Isotropy	4.7	Rectangular	√3	0.7	1.9
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	3.9
Boundary effects	1.0	Rectangular	√3	1.0	0.6
Linearity	4.7	Rectangular	√3	1.0	2.7
System Detection Limits	1.0	Rectangular	√3	1.0	0.6
Modulation Response	2.4	Rectangular	√3	1.0	1.4
Readout Electronics	0.3	Normal	1.0	1.0	0.3
Response Time	0.8	Rectangular	√3	1.0	0.5
Integration Time	2.6	Rectangular	√3	1.0	1.5
RF Ambient Noise	3.0	Rectangular	√3	1.0	1.7
RF Ambient Reflections	3.0	Rectangular	√3	1.0	1.7
Probe Positioner	0.4	Rectangular	√3	1.0	0.2
Probe Positioning	2.9	Rectangular	√3	1.0	1.7
Max. SAR Eval.	2.0	Rectangular	√3	1.0	1.2
Dipole Related					
Device Positioning	2.9	Normal	1.0	1.0	2.9
Device Holder	3.6	Normal	1.0	1.0	3.6
Power Drift	5.0	Rectangular	√3	1.0	2.9
Power Scaling	0.0	Rectangular	√3	1.0	0.0
Phantom and Tissue parameters					
Phantom Uncertainty	6.1	Rectangular	√3	1.0	3.5
SAR correction	1.9	Normal	1.0	1.0	1.9
Liquid Conductivity (measurement)	2.0	Normal	1.0	0.8	1.6
Liquid Permittivity (measurement)	2.1	Normal	1.0	0.3	0.5
Temp. unc. - Conduct	3.4	Rectangular	√3	0.8	1.5
Temp. unc. - Permittivity	0.4	Rectangular	√3	0.2	0.1
Combined Standard Uncertainty					11.2
Coverage Factor for 95 %					Kp=2
Expanded Uncertainty					22.4

Uncertainty Budget for frequency range 30 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (±%) (1g)
Measurement System					
Probe Calibration	6.6	Normal	1.0	1.0	6.6
Axial Isotropy	4.7	Rectangular	√3	0.7	1.9
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	3.9
Boundary effects	2.0	Rectangular	√3	1.0	1.2
Linearity	4.7	Rectangular	√3	1.0	2.7
System Detection Limits	1.0	Rectangular	√3	1.0	0.6
Modulation Response	2.4	Rectangular	√3	1.0	1.4
Readout Electronics	0.3	Normal	1.0	1.0	0.3
Response Time	0.8	Rectangular	√3	1.0	0.5
Integration Time	2.6	Rectangular	√3	1.0	1.5
RF Ambient Noise	3.0	Rectangular	√3	1.0	1.7
RF Ambient Reflections	3.0	Rectangular	√3	1.0	1.7
Probe Positioner	0.8	Rectangular	√3	1.0	0.5
Probe Positioning	6.7	Rectangular	√3	1.0	3.9
Max. SAR Eval.	4.0	Rectangular	√3	1.0	2.3
Dipole Related					
Device Positioning	2.9	Normal	1.0	1.0	2.9
Device Holder	3.6	Normal	1.0	1.0	3.6
Power Drift	5.0	Rectangular	√3	1.0	2.9
Power Scaling	0.0	Rectangular	√3	1.0	0.0
Phantom and Tissue parameters					
Phantom Uncertainty	6.6	Rectangular	√3	1.0	3.8
SAR corrction	1.9	Normal	1.0	1.0	1.9
Liquid Conductivity (measurement)	2.0	Normal	1.0	0.8	1.6
Liquid Permittivity (measurement)	2.1	Normal	1.0	0.3	0.5
Temp. unc. - Conduct	3.4	Rectangular	√3	0.8	1.5
Temp. unc. - Permittivity	0.4	Rectangular	√3	0.2	0.1
Combined Standard Uncertainty					12.3
Coverage Factor for 95 %					Kp=2
Expanded Uncertainty					24.7

Uncertainty Budget for frequency range 3 GHz to 6 GHz

15 References

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