FCC SAR Test Report

APPLICANT	:	LC Future Center Limited Taiwan Branch
EQUIPMENT	:	Notebook
BRAND NAME	:	Lenovo
MODEL NAME	:	TP00086A
FCC ID	:	2AJN7-TP00086AUC
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

Equipment: AirPrime EM7455 and Intel 8260NGW tested inside of Lenovo Notebook Computer

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

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

Reviewed by: Eric Huang / Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)

Table of Contents

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA6N0822-08	Rev. 01	Initial issue of report	Jan. 24, 2017
FA6N0822-08	Rev. 02	1. Added power reduction description on page9. 2. Updated appendix D. 3. Added system validation summary in appendix F.	Feb. 2, 2017

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **LC Future Center Limited Taiwan Branch, Notebook, TP00086A**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary Body (Separation 0mm) 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	WCDMA II	1.20	1.58
	WCDMA IV	1.17	
	WCDMA V	1.15	
	LTE Band 4	1.08	
	LTE Band 7	1.19	
	LTE Band 12	1.16	
	LTE Band 13	1.20	
	LTE Band 25	1.20	
	LTE Band 26	1.13	
	LTE Band 41	1.15	
DTS	2.4GHz WLAN	0.37	1.57
NII	5GHz WLAN	0.37	1.58
DSS	Bluetooth	0.04	1.58
Date of Testing:		2016/12/20 ~ 2016/12/28	

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

2. Administration Data

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

Applicant	
Company Name	LC Future Center Limited Taiwan Branch
Address	7F., No.780, Bei'an Rd., Zhongshan Dist., Taipei City 104, Taiwan (R.O.C.)

Manufacturer	
Company Name	LC Future Center Limited Taiwan Branch
Address	7F., No.780, Bei'an Rd., Zhongshan Dist., Taipei City 104, Taiwan (R.O.C.)

3. Guidance Applied

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 248227 D01 802.11 Wi-Fi SAR v02r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02
- FCC KDB 941225 D01 3G SAR Procedures v03r01
- FCC KDB 941225 D05 SAR for LTE Devices v02r05
- FCC KDB 941225 D05A Rel.10 LTE SAR Test Guidance v01r02

3.1 Re-use of Measured Data

1. **Introduction Section**

This report referenced from the FCC ID: 2AJN7-TP00086A
(WCDMA Band 2 / 4 / 5 and LTE Band 2 / 4 / 5 / 7 / 12 / 13 / 25 / 26 / 41)

And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

2. **Difference Section**

Both original devices and modified devices that only difference is WLAN module,therefore SAR data for WWAN from the original filling was uesd for this model. Sopt checks for WWAN were performed to ensure that the SAR measurement for both device are the same,for WLAN SAR is full test in this report.

The WWAN (WCDMA Band 2 / 4 / 5 and LTE Band 4 / 7 / 12 / 13 / 25 / 26 / 41) SAR measurement results from the original report (Sporton SAR Report No. FA6N0822, FCC ID: 2AJN7-TP00086A) or appendix D. In this report, highest SAR summary and Sim-Tx analysis evaluation is select higher value of either original SAR result or spot checks SAR result.

3. **Spot Check Verification Data Section**

Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Original Model (FCC ID : 2AJN7-TP00086A)					Spot Check Mode (FCC ID : 2AJN7-TP00086AUC)					Deviation
							Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
WCDMA II	RMC 12.2Kbps	Bottom of Laptop	8mm	OFF	9262	1852.4	22.90	24.00	-	0.931	1.199	23.04	24.00	-	1.060	1.322	10.3%
WCDMA IV	RMC 12.2Kbps	Bottom of Laptop	8mm	OFF	1513	1752.6	23.09	24.00	-	0.949	1.170	22.98	24.00	-	1.020	1.290	10.3%
WCDMA V	RMC 12.2Kbps	Bottom of Laptop	8mm	OFF	4132	826.4	22.77	24.00	-	0.867	1.151	22.76	24.00	-	0.899	1.196	3.9%

Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Original Model (FCC ID : 2AJN7-TP00086A)					Spot Check Mode (FCC ID : 2AJN7-TP00086AUC)					Deviation
										Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	Average Power (dBm)	Tune-Up Limit (dBm)	Duty Cycle %	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)	
LTE Band 4	20M	QPSK	1	0	Bottom of Laptop	8mm	OFF	20175	1732.5	22.91	24.00	-	0.839	1.078	22.80	24.00	-	0.889	1.172	8.7%
LTE Band 7	20M	QPSK	50	0	Bottom of Laptop	0mm	ON	21100	2535	17.70	18.50	-	0.989	1.189	17.24	18.50	-	1.010	1.350	13.5%
LTE Band 12	10M	QPSK	1	0	Bottom of Laptop	0mm	ON	23095	707.5	20.91	21.50	-	1.010	1.157	20.60	21.50	-	0.910	1.120	-3.2%
LTE Band 13	10M	QPSK	25	0	Bottom of Laptop	0mm	ON	23230	782	19.64	20.00	-	1.100	1.195	19.47	20.00	-	1.000	1.130	-5.4%
LTE Band 25	20M	QPSK	1	0	Bottom of Laptop	8mm	OFF	26140	1860	22.98	24.00	-	0.948	1.199	22.73	24.00	-	0.895	1.199	0.0%
LTE Band 26	15M	QPSK	36	0	Bottom of Laptop	0mm	ON	26865	831.5	18.09	19.00	-	0.918	1.132	17.79	19.00	-	0.845	1.116	-1.4%
LTE Band 41	20M	QPSK	50	0	Bottom of Laptop	0mm	ON	40620	2593	19.10	19.50	62.9	1.040	1.147	18.78	19.50	62.9	1.040	1.235	7.7%

Note: In the table above, all the deviation of SAR test results are compliant with uncertainty budget.

4. **Reference detail Section:**

Equipment Class	Reference FCC ID	Folder Test/RF Exposure	Report Title/Section
PCB	2AJN7-TP00086A	RF Exposure (FA6N0822)	Sections related to WWAN test data

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	Notebook
Brand Name	Lenovo
Model Name	TP00086A
FCC ID	2AJN7-TP00086AUC
Integrated WWAN Module	Manufacturer: Sierra Wireles Brand Name: AirPrime Model Name: EM7455
Integrated WLAN Module	Brand Name: Intel Model Name: 8260NGW
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz 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 ~ 5720MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	RMC/AMR 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE/HS
EUT Stage	Production Unit

Remark:

1. For WWAN RF exposure evaluation is referred to FCC ID: 2AJN7-TP00086A, Sporton Report No.: FA6N0822 as appendix D and also used perform simultaneous transmission analysis.
2. For WLAN RF exposure evaluation is selected antenna vendor of “Speedwire” as the main tested and spot check antenna vendor of “Amphenol” to ensure both antenna vendors are compliant with the FCC limit

WWAN Antenna information				
Antenna 1	Manufacturer	Amphenol	Max. Peak gain (dBi)	2.97
	P/N	LX-7845-16-000-C	Type	PIFA
Antenna 2	Manufacturer	Speedwire	Max. Peak gain (dBi)	2.94
	P/N	F.0G.ZV-0006-001-00	Type	PIFA

WLAN Antenna Information			
Antenna 1	Manufacturer	Amphenol	
	Antenna Type	Main:PIFA Antenna	Aux:PIFA Antenna
	Part number	LX7847-16-000-C	LX7848-16-000-C
	Max. Peak Gain (dBi)	WLAN(2.4G):-6.76 WLAN(5G):-1.84	WLAN(2.4G):-6.52 BT :-6.52 WLAN(5G):0.14
Antenna 2	Manufacturer	Speedwire	
	Antenna Type	Main:PIFA Antenna	Aux:PIFA Antenna
	Part number	F.0G.ZV-0006-003-00	F.0G.ZV-0006-004-00
	Max. Peak Gain (dBi)	WLAN(2.4G):1.5 WLAN(5G):-1.97	WLAN(2.4G):1.68 BT :1.68 WLAN(5G):-0.3

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	2AJN7-TP00086AUC
Equipment Name	NOTEBOOK
Operating Frequency Range of each LTE transmission band	LTE Band 02: 1850 MHz ~ 1910 MHz LTE Band 04: 1710 MHz ~ 1755 MHz LTE Band 05: 824 MHz ~ 849 MHz LTE Band 07: 2500 MHz ~ 2570 MHz LTE Band 12: 699 MHz ~ 716 MHz LTE Band 13: 777 MHz ~ 787 MHz LTE Band 25: 1850 MHz ~ 1915 MHz LTE Band 26: 814 MHz ~ 849 MHz LTE Band 41: 2496 MHz ~ 2690 MHz
Channel Bandwidth	LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 12:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 25:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 26:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK, and 16QAM
LTE Voice / Data requirements	Data only
LTE MPR permanently built-in by design	Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)
Spectrum plots for RB configuration	A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.
Power reduction applied to satisfy SAR compliance	Yes, power reduction activated by Proximity sensor and G-sensor. Power reduction will not be activated, if either sensor is not triggered
LTE Carrier Aggregation Combinations	Inter-Band and Intra-Band possible combinations and the detail power verification please referred to Sporton SAR test Report, Report No.: FA6N0822, FCC ID: 2AJN7-TP00086A.
LTE Carrier Aggregation Additional Information	This device does not support full CA features on 3GPP Release 10. It supports a maximum of 2 carriers in the downlink only. All uplink communications are identical to the Release 8 Specifications. Uplink communications are done on the PCC. Due to carrier capability, only the combinations listed above are supported. The following LTE Release features are not supported: Relay, HetNet, Enhanced MIMO, eICI, WiFi Offloading, MDH, eMBMA, Cross-Carrier Scheduling, Enhanced SC-FDMA.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

Transmission (H, M, L) channel numbers and frequencies in each LTE band

LTE Band 2

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900

LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

LTE Band 5								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 7								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510
M	21100	2535	21100	2535	21100	2535	21100	2535
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560

LTE Band 12								
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

LTE Band 13				
	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Freq.(MHz)	Channel #	Freq.(MHz)
L	23205	779.5	23230	782
M	23230	782		
H	23255	784.5		

LTE Band 25												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855	26115	1857.5	26140	1860
M	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880	26340	1880
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910	26615	1907.5	26590	1905

LTE Band 26										
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	26697	814.7	26705	815.5	26715	816.5	26740	819	26765	821.5
M	26865	831.5	26865	831.5	26865	831.5	26865	831.5	26865	831.5
H	27033	848.3	27025	847.5	27015	846.5	26990	844	26965	841.5

LTE Band 41								
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	39675	2498.5	39700	2501	39725	2503.5	39750	2506
L M	40148	2545.8	40160	2547	40173	2548.3	40185	2549.5
M	40620	2593	40620	2593	40620	2593	40620	2593
H M	41093	2640.3	41080	2639	41068	2637.8	41055	2636.5
H	41565	2687.5	41540	2685	41515	2682.5	41490	2680

5. RF Exposure Limits

5.1 Uncontrolled Environment

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

5.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

6. Specific Absorption Rate (SAR)

6.1 Introduction

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

6.2 SAR Definition

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

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

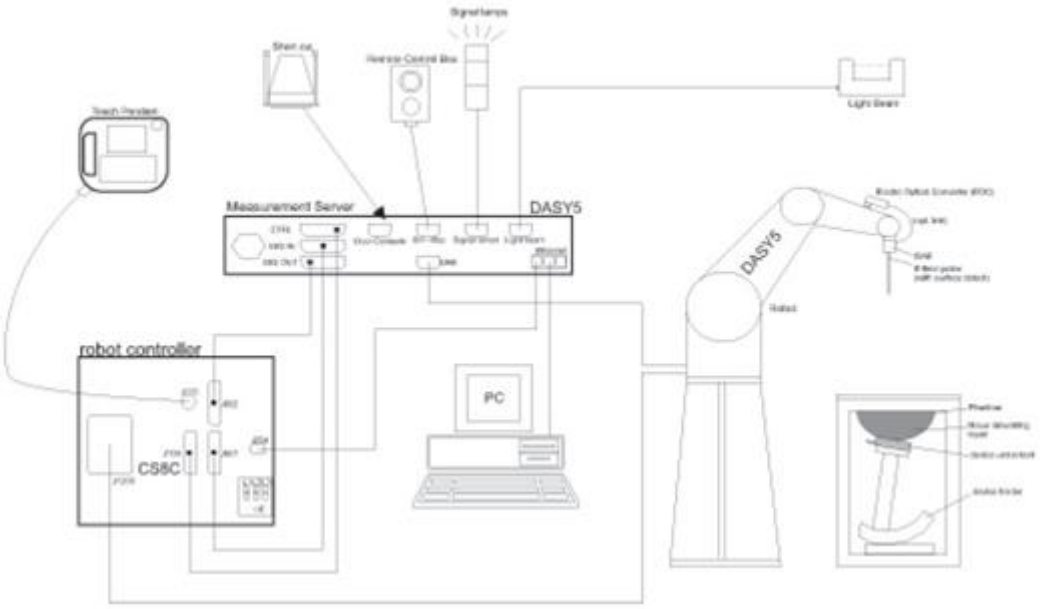
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

7. System Description and Setup

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



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

7.1 E-Field Probe

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

<ES3DV3 Probe>

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

<EX3DV4 Probe>

Construction	Symmetric design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Frequency	10 MHz – >6 GHz Linearity: ±0.2 dB (30 MHz – 6 GHz)	
Directivity	±0.3 dB in TSL (rotation around probe axis) ±0.5 dB in TSL (rotation normal to probe axis)	
Dynamic Range	10 µW/g – >100 mW/g Linearity: ±0.2 dB (noise: typically <1 µW/g)	
Dimensions	Overall length: 337 mm (tip: 20 mm) Tip diameter: 2.5 mm (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm	

7.2 Data Acquisition Electronics (DAE)

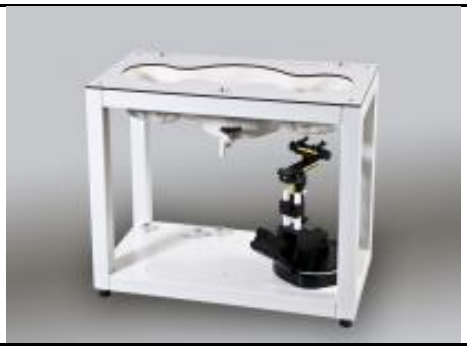
The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an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

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

Fig 5.1 Photo of DAE

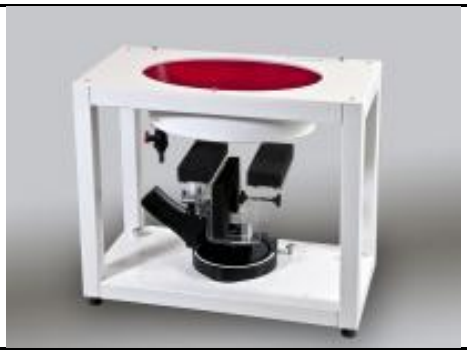
7.3 Phantom

<SAM Twin Phantom>

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

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

<ELI Phantom>

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

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

7.4 Device Holder

<Mounting Device for Hand-Held Transmitter>

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

Mounting Device for Hand-Held Transmitters

Mounting Device Adaptor for Wide-Phones

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

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

Mounting Device for Laptops

8. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

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

<SAR measurement>

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

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

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

8.1 Spatial Peak SAR Evaluation

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

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

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

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

8.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

8.3 Area Scan

The area scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum found in the scanned area, within a range of the global maximum. The range (in dB0 is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE standard 1528 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan), if only one zoom scan follows the area scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of zoom scans has to be increased accordingly.

Area scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

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

8.4 Zoom Scan

Zoom scans are used assess the peak spatial SAR values within a cubic averaging volume containing 1 gram and 10 gram of simulated tissue. The zoom scan measures points (refer to table below) within a cube shoes base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the zoom scan evaluates the averaged SAR for 1 gram and 10 gram and displays these values next to the job's label.

Zoom scan parameters extracted from FCC KDB 865664 D01v01r04 SAR measurement 100 MHz to 6 GHz.

			≤ 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.

8.5 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

8.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

9. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	2450MHz System Validation Kit	D2450V2	736	Aug. 30, 2016	Aug. 29, 2017
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 27, 2016	Sep. 26, 2017
SPEAG	Data Acquisition Electronics	DAE3	495	May. 27, 2016	May. 26, 2017
SPEAG	Data Acquisition Electronics	DAE3	577	Sep. 28, 2016	Sep. 27, 2017
SPEAG	Dosimetric E-Field Probe	EX3DV4	3925	May. 26, 2016	May. 25, 2017
SPEAG	Dosimetric E-Field Probe	EX3DV4	3931	Oct. 03, 2016	Oct. 02, 2017
WonDer	Thermometer	WD-5015	TM281	Oct. 12, 2016	Oct. 11, 2017
Wisewind	Thermometer	HTC-1	TM560	Oct. 12, 2016	Oct. 11, 2017
R&S	BT Base Station	CBT32	100519	Jun. 03, 2016	Jun. 02, 2017
SPEAG	Device Holder	N/A	N/A	N/A	N/A
Anritsu	Signal Generator	MG3710A	6201502524	Dec. 09, 2016	Dec. 10, 2017
Agilent	ENA Network Analyzer	E5071C	MY46316648	Jan. 12, 2016	Jan. 11, 2017
SPEAG	Dielectric Probe Kit	DAK-3.5	1126	Jul. 19, 2016	Jul. 18, 2017
LINE SEIKI	Digital Thermometer	LKMelectronic	DTM3000SPEZIAL	Sep. 05, 2016	Sep. 04, 2017
Anritsu	Power Meter	ML2495A	1419002	May. 10, 2016	May. 09, 2017
Anritsu	Power Sensor	MA2411B	1339124	May. 10, 2016	May. 09, 2017
Anritsu	Spectrum Analyzer	MS2830A	6201396378	Jun. 21, 2016	Jun. 20, 2017
Mini-Circuits	Power Amplifier	ZVE-8G+	D120604	Mar. 16, 2016	Mar. 15, 2017
Mini-Circuits	Power Amplifier	ZHL-42W+	QA1344002	Mar. 16, 2016	Mar. 15, 2017
ATM	Dual Directional Coupler	C122H-10	P610410z-02	Note 1	
Woken	Attenuator 1	WK0602-XX	N/A	Note 1	
PE	Attenuator 2	PE7005-10	N/A	Note 1	
PE	Attenuator 3	PE7005- 3	N/A	Note 1	

General Note:

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

10. System Verification

10.1 Tissue 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.

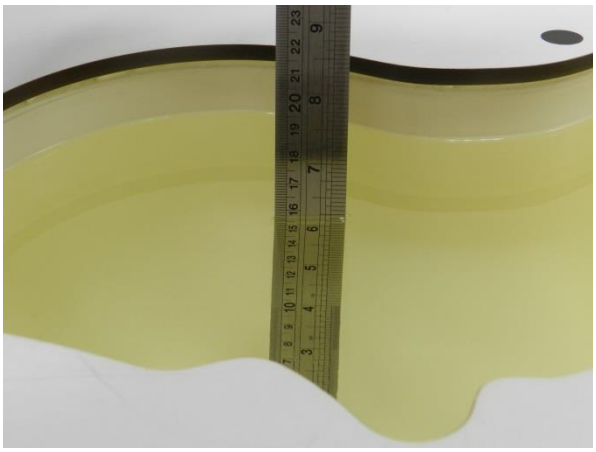


Fig 10.1Photo of Liquid Height for Head SAR

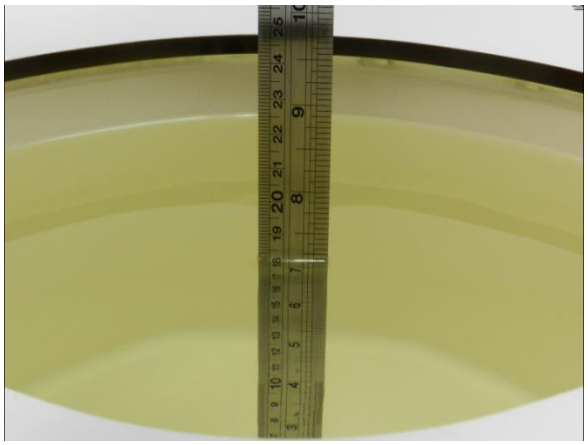


Fig 10.2 Photo of Liquid Height for Body SAR

10.2 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								
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.40	40.0
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7
2600	68.1	0	0	0.1	0	31.8	2.16	52.5

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	MSL	22.4	2.015	53.944	1.95	52.70	3.33	2.36	±5	2016/12/21
2450	MSL	22.5	1.953	52.970	1.95	52.70	0.15	0.51	±5	2016/12/28
5250	MSL	22.4	5.514	46.926	5.36	48.95	2.87	-4.13	±5	2016/12/20
5600	MSL	22.4	5.970	46.306	5.77	48.50	3.47	-4.52	±5	2016/12/20
5750	MSL	22.4	6.171	46.074	5.94	48.28	3.89	-4.57	±5	2016/12/20

10.3 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)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2016/12/21	2450	MSL	250	D2450V2-736	EX3DV4 - SN3931	DAE3 Sn577	12.50	52.10	50.00	-4.03
2016/12/28	2450	MSL	250	D2450V2-736	EX3DV4 - SN3925	DAE3 Sn495	12.40	52.10	49.60	-4.80
2016/12/20	5250	MSL	100	D5GHzV2-1006	EX3DV4 - SN3931	DAE3 Sn577	7.59	75.50	75.90	0.53
2016/12/20	5600	MSL	100	D5GHzV2-1006	EX3DV4 - SN3931	DAE3 Sn577	8.44	78.60	84.40	7.38
2016/12/20	5750	MSL	100	D5GHzV2-1006	EX3DV4 - SN3931	DAE3 Sn577	7.52	74.60	75.20	0.80

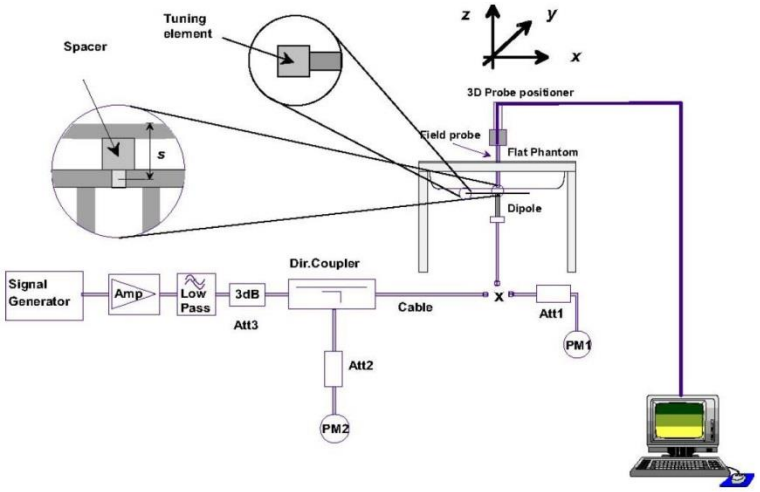


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. Conducted RF Output Power (Unit: dBm)

<WLAN Conducted Power>

General Note:

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

<2.4GHz WLAN ANT 1>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN ANT 1	802.11b	CH 1	2412	1Mbps	14.81	15.00	98.56
		CH 6	2437		14.71	15.00	
		CH 11	2462		14.88	15.00	
		CH 12	2467		14.76	15.00	
		CH 13	2472		6.59	7.00	
	802.11g	CH 1	2412	6Mbps	14.71	15.00	98.66
		CH 6	2437		14.68	15.00	
		CH 11	2462		14.79	15.00	
		CH 12	2467		14.23	15.00	
		CH 13	2472		-1.18	-1.00	
	802.11n-HT20	CH 1	2412	MCS0	14.84	15.00	97.95
		CH 6	2437		14.72	15.00	
		CH 11	2462		14.79	15.00	
		CH 12	2467		13.29	13.50	
		CH 13	2472		-2.67	-2.00	
	802.11n-HT40	CH 3	2422	MCS0	12.04	12.50	96.91
		CH 6	2437		14.78	15.00	
		CH 9	2452		14.80	15.00	
		CH 10	2457		14.98	15.00	
		CH 11	2462		-1.12	-1.00	

<2.4GHz WLAN ANT 2>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN ANT 2	802.11b	CH 1	2412	1Mbps	14.78	15.00	98.56
		CH 6	2437		14.67	15.00	
		CH 11	2462		14.84	15.00	
		CH 12	2467		13.98	14.00	
		CH 13	2472		5.13	5.50	
	802.11g	CH 1	2412	6Mbps	14.68	15.00	98.66
		CH 6	2437		14.62	15.00	
		CH 11	2462		14.74	15.00	
		CH 12	2467		13.91	14.00	
		CH 13	2472		-4.80	-4.00	
	802.11n-HT20	CH 1	2412	MCS0	14.70	15.00	98.43
		CH 6	2437		14.67	15.00	
		CH 11	2462		14.72	15.00	
		CH 12	2467		13.18	14.00	
		CH 13	2472		-2.76	-2.00	
	802.11n-HT40	CH 3	2422	MCS0	11.93	12.50	96.91
		CH 6	2437		14.75	15.00	
		CH 9	2452		14.77	15.00	
		CH 10	2457		13.78	14.00	
		CH 11	2462		-1.39	-1.00	

<2.4GHz WLAN ANT 1+2>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN ANT 1+2	802.11n-HT20	CH 1	2412	MCS0	14.87	15.00	96.08
		CH 6	2437		14.86	15.00	
		CH 11	2462		14.92	15.00	
		CH 12	2467		8.94	9.00	
		CH 13	2472		-3.83	-3.00	
	802.11n-HT40	CH 3	2422	MCS0	10.36	10.50	92.42
		CH 6	2437		14.89	15.00	
		CH 9	2452		13.95	14.00	
		CH 10	2457		12.79	13.00	
		CH 11	2462		-3.45	-2.00	

<5GHz WLAN ANT1>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN ANT 1	802.11a	CH 36	5180	6Mbps	13.40	13.50	98.46
		CH 40	5200		13.35	13.50	
		CH 44	5220		13.36	13.50	
		CH 48	5240		13.45	13.50	
	802.11n-HT20	CH 36	5180	MCS0	13.47	13.50	97.95
		CH 40	5200		13.44	13.50	
		CH 44	5220		13.44	13.50	
		CH 48	5240		13.48	13.50	
	802.11n-HT40	CH 38	5190	MCS0	13.42	13.50	96.90
		CH 46	5230		13.46	13.50	
	802.11ac-VHT20	CH 36	5180	MCS0	13.41	13.50	97.96
		CH 40	5200		13.35	13.50	
		CH 44	5220		13.39	13.50	
		CH 48	5240		13.42	13.50	
	802.11ac-VHT40	CH 38	5190	MCS0	13.38	13.50	95.92
		CH 46	5230		13.43	13.50	
	802.11ac-VHT80	CH 42	5210	MCS0	12.73	13.00	93.83

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN ANT 1	802.11a	CH 52	5260	6Mbps	13.37	13.50	98.46
		CH 56	5280		13.34	13.50	
		CH 60	5300		13.35	13.50	
		CH 64	5320		13.32	13.50	
	802.11n-HT20	CH 52	5260	MCS0	13.45	13.50	97.95
		CH 56	5280		13.35	13.50	
		CH 60	5300		13.39	13.50	
		CH 64	5320		13.42	13.50	
	802.11n-HT40	CH 54	5270	MCS0	13.41	13.50	96.90
		CH 62	5310		11.87	12.50	
	802.11ac-VHT20	CH 52	5260	MCS0	13.43	13.50	97.96
		CH 56	5280		13.40	13.50	
		CH 60	5300		13.38	13.50	
		CH 64	5320		13.41	13.50	
	802.11ac-VHT40	CH 54	5270	MCS0	13.40	13.50	95.92
		CH 62	5310		11.85	12.50	
	802.11ac-VHT80	CH 58	5290	MCS0	10.74	11.00	93.83

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN ANT 1	802.11a	CH 100	5500	6Mbps	13.35	13.50	98.46
		CH 116	5580		13.31	13.50	
		CH 124	5620		13.34	13.50	
		CH 132	5660		13.33	13.50	
		CH 144	5720		13.30	13.50	
	802.11n-HT20	CH 100	5500	MCS0	13.42	13.50	97.95
		CH 116	5580		13.47	13.50	
		CH 124	5620		13.36	13.50	
		CH 132	5660		13.35	13.50	
		CH 144	5720		13.36	13.50	
	802.11n-HT40	CH 102	5510	MCS0	12.89	13.00	96.91
		CH 110	5550		13.40	13.50	
		CH 126	5630		13.42	13.50	
		CH 134	5670		13.47	13.50	
		CH 142	5710		13.40	13.50	
	802.11ac-VHT20	CH 100	5500	MCS0	13.41	13.50	97.96
		CH 116	5580		13.44	13.50	
		CH 124	5620		13.40	13.50	
		CH 132	5660		13.39	13.50	
		CH 144	5720		13.36	13.50	
	802.11ac-VHT40	CH 102	5510	MCS0	12.83	13.00	95.92
		CH 110	5550		13.39	13.50	
		CH 126	5630		13.41	13.50	
		CH 134	5670		13.43	13.50	
		CH 142	5710		13.38	13.50	
	802.11ac-VHT80	CH 106	5530	MCS0	11.82	12.00	93.83
		CH 122	5610		13.30	13.50	
		CH 138	5690		13.38	13.50	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN ANT 1	802.11a	CH 149	5745	MCS0	13.43	13.50	98.46
		CH 157	5785		13.39	13.50	
		CH 165	5825		13.42	13.50	
	802.11n-HT20	CH 149	5745	MCS0	13.45	13.50	97.95
		CH 157	5785		13.37	13.50	
		CH 165	5825		13.42	13.50	
	802.11n-HT40	CH 151	5755	MCS0	13.46	13.50	96.91
		CH 159	5795		13.34	13.50	
	802.11ac-VHT20	CH 149	5745	MCS0	13.37	13.50	97.96
		CH 157	5785		13.34	13.50	
		CH 165	5825		13.35	13.50	
	802.11ac-VHT40	CH 151	5755	MCS0	13.36	13.50	95.92
		CH 159	5795		13.31	13.50	
	802.11ac-VHT80	CH 155	5775	MCS0	13.33	13.50	93.83

<5GHz WLAN ANT2>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN ANT 2	802.11a	CH 36	5180	6Mbps	13.33	13.50	98.09
		CH 40	5200		13.31	13.50	
		CH 44	5220		13.30	13.50	
		CH 48	5240		13.40	13.50	
	802.11n-HT20	CH 36	5180	MCS0	13.42	13.50	98.21
		CH 40	5200		13.39	13.50	
		CH 44	5220		13.38	13.50	
		CH 48	5240		13.37	13.50	
	802.11n-HT40	CH 38	5190	MCS0	13.40	13.50	95.88
		CH 46	5230		13.39	13.50	
	802.11ac-VHT20	CH 36	5180	MCS0	13.38	13.50	98.46
		CH 40	5200		13.33	13.50	
		CH 44	5220		13.37	13.50	
		CH 48	5240		13.34	13.50	
	802.11ac-VHT40	CH 38	5190	MCS0	13.36	13.50	96.45
		CH 46	5230		13.38	13.50	
	802.11ac-VHT80	CH 42	5210	MCS0	13.41	13.50	92.68

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN ANT 2	802.11a	CH 52	5260	6Mbps	13.33	13.50	98.09
		CH 56	5280		13.30	13.50	
		CH 60	5300		13.29	13.50	
		CH 64	5320		13.30	13.50	
	802.11n-HT20	CH 52	5260	MCS0	13.31	13.50	98.21
		CH 56	5280		13.32	13.50	
		CH 60	5300		13.40	13.50	
		CH 64	5320		13.43	13.50	
	802.11n-HT40	CH 54	5270	MCS0	13.40	13.50	95.88
		CH 62	5310		12.35	12.50	
	802.11ac-VHT20	CH 52	5260	MCS0	13.29	13.50	98.46
		CH 56	5280		13.35	13.50	
		CH 60	5300		13.36	13.50	
		CH 64	5320		13.40	13.50	
	802.11ac-VHT40	CH 54	5270	MCS0	13.39	13.50	96.45
		CH 62	5310		12.32	12.50	
	802.11ac-VHT80	CH 58	5290	MCS0	8.85	9.00	92.68

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN ANT 2	802.11a	CH 100	5500	6Mbps	13.27	13.50	98.09
		CH 116	5580		13.28	13.50	
		CH 124	5620		13.25	13.50	
		CH 132	5660		13.29	13.50	
		CH 144	5720		13.27	13.50	
	802.11n-HT20	CH 100	5500	MCS0	13.28	13.50	98.21
		CH 116	5580		13.30	13.50	
		CH 124	5620		13.32	13.50	
		CH 132	5660		13.30	13.50	
		CH 144	5720		13.31	13.50	
	802.11n-HT40	CH 102	5510	MCS0	13.41	13.50	95.88
		CH 110	5550		13.37	13.50	
		CH 126	5630		13.36	13.50	
		CH 134	5670		13.43	13.50	
		CH 142	5710		13.40	13.50	
	802.11ac-VHT20	CH 100	5500	MCS0	13.27	13.50	98.46
		CH 116	5580		13.29	13.50	
		CH 124	5620		13.38	13.50	
		CH 132	5660		13.35	13.50	
		CH 144	5720		13.30	13.50	
	802.11ac-VHT40	CH 102	5510	MCS0	13.38	13.50	96.45
		CH 110	5550		13.36	13.50	
		CH 126	5630		13.35	13.50	
		CH 134	5670		13.41	13.50	
		CH 142	5710		13.34	13.50	
	802.11ac-VHT80	CH 106	5530	MCS0	12.79	13.00	92.68
		CH 122	5610		13.36	13.50	
		CH 138	5690		13.49	13.50	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN ANT 2	802.11a	CH 149	5745	MCS0	13.28	13.50	98.09
		CH 157	5785		13.37	13.50	
		CH 165	5825		13.30	13.50	
	802.11n-HT20	CH 149	5745	MCS0	13.44	13.50	98.21
		CH 157	5785		13.34	13.50	
		CH 165	5825		13.33	13.50	
	802.11n-HT40	CH 151	5755	MCS0	13.45	13.50	95.88
		CH 159	5795		13.31	13.50	
	802.11ac-VHT20	CH 149	5745	MCS0	13.29	13.50	98.46
		CH 157	5785		13.32	13.50	
		CH 165	5825		13.29	13.50	
	802.11ac-VHT40	CH 151	5755	MCS0	13.34	13.50	96.45
		CH 159	5795		13.26	13.50	
	802.11ac-VHT80	CH 155	5775	MCS0	13.48	13.50	92.68

<5GHz WLAN ANT1+2>

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN ANT 1+2	802.11n-HT20	CH 36	5180	MCS0	13.37	13.50	95.12
		CH 40	5200		13.38	13.50	
		CH 44	5220		13.42	13.50	
		CH 48	5240		13.45	13.50	
	802.11n-HT40	CH 38	5190	MCS0	13.37	13.50	92.05
		CH 46	5230		13.39	13.50	
	802.11ac-VHT20	CH 36	5180	MCS0	13.34	13.50	96.12
		CH 40	5200		13.36	13.50	
		CH 44	5220		13.40	13.50	
		CH 48	5240		13.44	13.50	
	802.11ac-VHT40	CH 38	5190	MCS0	13.35	13.50	92.14
		CH 46	5230		13.38	13.50	
	802.11ac-VHT80	CH 42	5210	MCS0	13.37	13.50	86.30

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.3GHz WLAN ANT 1+2	802.11n-HT20	CH 52	5260	MCS0	13.41	13.50	95.12
		CH 56	5280		13.44	13.50	
		CH 60	5300		13.47	13.50	
		CH 64	5320		13.42	13.50	
	802.11n-HT40	CH 54	5270	MCS0	13.36	13.50	92.05
		CH 62	5310		13.42	13.50	
	802.11ac-VHT20	CH 52	5260	MCS0	13.40	13.50	96.12
		CH 56	5280		13.35	13.50	
		CH 60	5300		13.24	13.50	
		CH 64	5320		13.30	13.50	
	802.11ac-VHT40	CH 54	5270	MCS0	13.31	13.50	92.14
		CH 62	5310		13.34	13.50	
	802.11ac-VHT80	CH 58	5290	MCS0	10.73	11.00	86.30

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.5GHz WLAN ANT 1+2	802.11n-HT20	CH 100	5500	MCS0	13.44	13.50	95.12
		CH 116	5580		13.48	13.50	
		CH 124	5620		13.40	13.50	
		CH 132	5660		13.42	13.50	
		CH 144	5720		13.42	13.50	
	802.11n-HT40	CH 102	5510	MCS0	13.42	13.50	92.05
		CH 110	5550		13.41	13.50	
		CH 126	5630		13.33	13.50	
		CH 134	5670		13.48	13.50	
		CH 142	5710		13.41	13.50	
	802.11ac-VHT20	CH 100	5500	MCS0	13.38	13.50	96.12
		CH 116	5580		13.31	13.50	
		CH 124	5620		13.28	13.50	
		CH 132	5660		13.33	13.50	
		CH 144	5720		13.38	13.50	
	802.11ac-VHT40	CH 102	5510	MCS0	13.41	13.50	92.14
		CH 110	5550		13.40	13.50	
		CH 126	5630		13.35	13.50	
		CH 134	5670		13.42	13.50	
		CH 142	5710		13.39	13.50	
	802.11ac-VHT80	CH 106	5530	MCS0	13.34	13.50	86.30
		CH 122	5610		13.29	13.50	
		CH 138	5690		13.31	13.50	

	Mode	Channel	Frequency (MHz)	Data Rate	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN ANT 1+2	802.11n-HT20	CH 149	5745	MCS0	13.49	13.50	95.12
		CH 157	5785		13.46	13.50	
		CH 165	5825		13.39	13.50	
	802.11n-HT40	CH 151	5755	MCS0	13.29	13.50	92.05
		CH 159	5795		13.41	13.50	
	802.11ac-VHT20	CH 149	5745	MCS0	13.20	13.50	96.12
		CH 157	5785		13.43	13.50	
		CH 165	5825		13.38	13.50	
	802.11ac-VHT40	CH 151	5755	MCS0	13.27	13.50	92.14
		CH 159	5795		13.24	13.50	
	802.11ac-VHT80	CH 155	5775	MCS0	13.24	13.50	86.30

<2.4GHz Bluetooth>

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / DR	CH 00	2402	4.94	5.10	5.06
	CH 39	2441	5.44	5.51	5.51
	CH 78	2480	5.57	5.69	5.67
Tune-up Limit			6	6	6

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	8.58
	CH 19	2440	8.24
	CH 39	2480	7.99
Tune-up Limit			9

General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 77.13%, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the theoretical duty cycle is 83.3%, therefore the actual duty cycle will be scaled up to the theoretical value of Bluetooth reported SAR calculation

12. 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 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
3. For the body SAR measurement was used a low-loss foam block performed testing, the relative permittivity and loss tangent of the foam material is 1.0 and 10-5, respectively, therefore holder perturbation verification is not required even highest reported SAR is >1.2W/kg.

WLAN Note:

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

12.1 Body SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Sample	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 1	Speedwire	11	2462	14.88	15.00	1.028	98.56	1.015	-0.02	0.261	0.272
	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 1	Amphenol	11	2462	14.88	15.00	1.028	98.56	1.015	0.09	0.197	0.206
01	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	11	2462	14.84	15.00	1.038	98.56	1.015	-0.13	0.348	0.366
	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	1	2412	14.78	15.00	1.052	98.56	1.015	-0.08	0.263	0.281
	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	6	2437	14.67	15.00	1.079	98.56	1.015	-0.03	0.252	0.276
	WLAN2.4GHz	802.11b 1Mbps	Bottom of Laptop	0mm	Ant 2	Amphenol	11	2462	14.84	15.00	1.038	98.56	1.015	-0.06	0.268	0.282
	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Ant 1	Speedwire	54	5270	13.41	13.50	1.022	96.9	1.032	-0.1	0.226	0.238
	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Ant 1	Amphenol	54	5270	13.41	13.50	1.022	96.9	1.032	-0.07	0.188	0.198
02	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Ant 2	Speedwire	54	5270	13.40	13.50	1.023	95.88	1.043	-0.07	0.252	0.269
	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Ant 2	Speedwire	62	5320	12.35	12.50	1.034	95.88	1.043	-0.01	0.186	0.201
	WLAN5GHz	802.11n-HT40 MCS0	Bottom of Laptop	0mm	Ant 2	Amphenol	54	5270	13.40	13.50	1.023	95.88	1.043	0.18	0.204	0.218
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 1	Speedwire	138	5690	13.38	13.50	1.029	93.83	1.066	-0.1	0.262	0.287
03	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 1	Speedwire	106	5530	11.82	12.00	1.043	93.83	1.066	-0.08	0.328	0.365
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 1	Amphenol	106	5330	11.82	12.00	1.043	93.83	1.066	-0.16	0.283	0.315
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 2	Speedwire	5690	5690	13.49	13.50	1.002	92.68	1.079	0.1	0.228	0.247
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 2	Amphenol	5690	5690	13.49	13.50	1.002	92.68	1.079	-0.02	0.169	0.183
04	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 1	Speedwire	155	5775	13.33	13.50	1.040	93.83	1.066	-0.11	0.233	0.258
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 1	Amphenol	155	5775	13.33	13.50	1.040	93.83	1.066	-0.1	0.157	0.174
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 2	Speedwire	155	5775	13.48	13.50	1.005	92.68	1.079	-0.07	0.182	0.197
	WLAN5GHz	802.11ac-VHT80 MCS0	Bottom of Laptop	0mm	Ant 2	Amphenol	155	5775	13.48	13.50	1.005	92.68	1.079	0.01	0.180	0.195

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Antenna	Sample	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)
05	Bluetooth	1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	0	2402	8.58	9.00	1.102	77.13	1.297	-0.1	0.030	0.043
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	19	2440	8.24	9.00	1.191	77.13	1.297	0.12	0.020	0.031
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Ant 2	Speedwire	39	2480	7.99	9.00	1.262	77.13	1.297	-0.1	0.023	0.038
	Bluetooth	1Mbps	Back of Display Screen	25mm	Ant 2	Speedwire	0	2402	8.58	9.00	1.102	77.13	1.297	0.11	0.001	0.001
	Bluetooth	1Mbps	Bottom of Laptop	0mm	Ant 2	Amphenol	0	2402	8.58	9.00	1.102	77.13	1.297	-0.14	0.018	0.026

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Notebook
		Body
1.	WCDMA + WLAN2.4GHz	Yes
2.	LTE + WLAN2.4GHz	Yes
3.	WCDMA+ Bluetooth	Yes
4.	LTE + Bluetooth	Yes
5.	WCDMA + WLAN5GHz	Yes
6.	LTE + WLAN5GHz	Yes
7.	WCDMA + WLAN ANT 1 + Bluetooth ANT 2	Yes
8.	LTE + WLAN ANT 1 + Bluetooth ANT 2	Yes

General Note:

1. For WWAN SAR tests results are referred to Sporton SAR test report, Report No.: FA6N0822, FCC ID: 2AJN7-TP00086A and also used perform simultaneous transmission analysis
2. The worst case WLAN reported SAR for each configuration was used for SAR summation. Therefore, the following summations represent the absolute worst cases for simultaneous transmission with WLAN.
3. For SAR testing was performed on single antenna RF power in SISO mode is larger or equal to the single antenna RF power in MIMO mode, and for RF exposure assessment of MIMO mode simultaneous transmission exclusion analysis was performed with SAR test results of each antenna in SISO mode.
4. For simultaneous transmission analysis for exposure position of bottom of laptop 8mm, WLAN SAR tested at 0mm separation is worse and the test data is used for conservative SAR summation.
5. 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.
6. The Scaled SAR summation is calculated based on the same configuration and test position.
7. 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.
   v) The SPLSR calculated results please refer to section 13.2

13.1 Body Exposure Conditions

WWAN Band		Exposure Position	1	2	3	7	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+2+3 Summed 1g SAR (W/kg)	1+7 Summed 1g SAR (W/kg)	1+2+7 Summed 1g SAR (W/kg)	SPLSR	Case No
			WWAN	2.4GHz WLAN Ant 1	2.4GHz WLAN Ant 2	Bluetooth Ant 2							
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)							
WCDMA	WCDMA II	Bottom of Laptop at 0mm	1.164	0.272	0.366	0.043	1.44	1.53	1.80	1.21	1.48	0.01	Case 1
		Bottom of Laptop at 8mm	1.199	0.272	0.366	0.043	1.47	1.57	1.84	1.24	1.51	0.01	Case 2
	WCDMA IV	Bottom of Laptop at 0mm	1.028	0.272	0.366	0.043	1.30	1.39	1.67	1.07	1.34	0.01	Case 3
		Bottom of Laptop at 8mm	1.170	0.272	0.366	0.043	1.44	1.54	1.81	1.21	1.49	0.01	Case 4
	WCDMA V	Bottom of Laptop at 0mm	1.109	0.272	0.366	0.043	1.38	1.48	1.75	1.15	1.42	0.01	Case 5
		Bottom of Laptop at 8mm	1.151	0.272	0.366	0.043	1.42	1.52	1.79	1.19	1.47	0.01	Case 6
LTE	LTE Band 4	Bottom of Laptop at 0mm	1.002	0.272	0.366	0.043	1.27	1.37	1.64	1.05	1.32	0.01	Case 7
		Bottom of Laptop at 8mm	1.078	0.272	0.366	0.043	1.35	1.44	1.72	1.12	1.39	0.01	Case 8
	LTE Band 7	Bottom of Laptop at 0mm	1.189	0.272	0.366	0.043	1.46	1.56	1.83	1.23	1.50	0.01	Case 9
		Bottom of Laptop at 8mm	0.797	0.272	0.366	0.043	1.07	1.16	1.44	0.84	1.11		
	LTE Band 12	Bottom of Laptop at 0mm	1.157	0.272	0.366	0.043	1.43	1.52	1.80	1.20	1.47	0.01	Case 10
		Bottom of Laptop at 8mm	0.842	0.272	0.366	0.043	1.11	1.21	1.48	0.89	1.16		
	LTE Band 13	Bottom of Laptop at 0mm	1.195	0.272	0.366	0.043	1.47	1.56	1.83	1.24	1.51	0.01	Case 11
		Bottom of Laptop at 8mm	0.756	0.272	0.366	0.043	1.03	1.12	1.39	0.80	1.07		
	LTE Band 25	Bottom of Laptop at 0mm	1.069	0.272	0.366	0.043	1.34	1.44	1.71	1.11	1.38	0.01	Case 12
		Bottom of Laptop at 8mm	1.199	0.272	0.366	0.043	1.47	1.57	1.84	1.24	1.51	0.01	Case 13
	LTE Band 26	Bottom of Laptop at 0mm	1.132	0.272	0.366	0.043	1.40	1.50	1.77	1.18	1.45	0.01	Case 14
		Bottom of Laptop at 8mm	1.091	0.272	0.366	0.043	1.36	1.46	1.73	1.13	1.41	0.01	Case 15
	LTE Band 41	Bottom of Laptop at 0mm	1.147	0.272	0.366	0.043	1.42	1.51	1.79	1.19	1.46	0.01	Case 16
		Bottom of Laptop at 8mm	0.543	0.272	0.366	0.043	0.82	0.91	1.18	0.59	0.86		

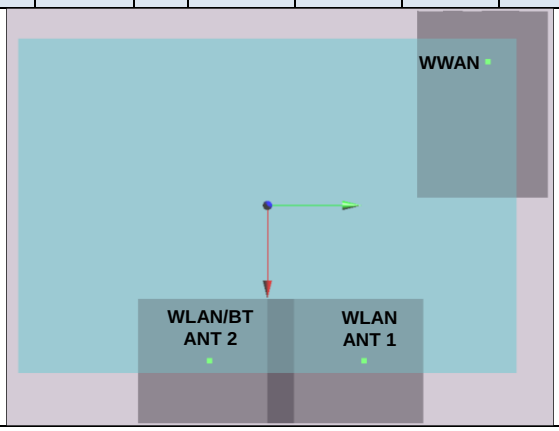
WWAN Band		Exposure Position	1	4	5	7	1+4 Summed 1g SAR (W/kg)	1+5 Summed 1g SAR (W/kg)	1+4+5 Summed 1g SAR (W/kg)	1+4+7 Summed 1g SAR (W/kg)	SPLSR	Case No
			WWAN	5GHz WLAN Ant 1	5GHz WLAN Ant 2	Bluetooth Ant 2						
			1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)	1g SAR (W/kg)						
WCDMA	WCDMA II	Bottom of Laptop at 0mm	1.164	0.365	0.269	0.043	**1.53**	**1.43**	**1.80**	**1.57**	**0.01**	**Case 17**
		Bottom of Laptop at 8mm	1.199	0.365	0.269	0.043	**1.56**	**1.47**	**1.83**	**1.61**	**0.01**	**Case 18**
	WCDMA IV	Bottom of Laptop at 0mm	1.028	0.365	0.269	0.043	**1.39**	**1.30**	**1.66**	**1.44**	**0.01**	**Case 19**
		Bottom of Laptop at 8mm	1.170	0.365	0.269	0.043	**1.54**	**1.44**	**1.80**	**1.58**	**0.01**	**Case 20**
	WCDMA V	Bottom of Laptop at 0mm	1.109	0.365	0.269	0.043	**1.47**	**1.38**	**1.74**	**1.52**	**0.01**	**Case 21**
		Bottom of Laptop at 8mm	1.151	0.365	0.269	0.043	**1.52**	**1.42**	**1.79**	**1.56**	**0.01**	**Case 22**
LTE	LTE Band 4	Bottom of Laptop at 0mm	1.002	0.365	0.269	0.043	**1.37**	**1.27**	**1.64**	**1.41**	**0.01**	**Case 23**
		Bottom of Laptop at 8mm	1.078	0.365	0.269	0.043	**1.44**	**1.35**	**1.71**	**1.49**	**0.01**	**Case 24**
	LTE Band 7	Bottom of Laptop at 0mm	1.189	0.365	0.269	0.043	**1.55**	**1.46**	**1.82**	**1.60**	**0.01**	**Case 25**
		Bottom of Laptop at 8mm	0.797	0.365	0.269	0.043	**1.16**	**1.07**	**1.43**	**1.21**		
	LTE Band 12	Bottom of Laptop at 0mm	1.157	0.365	0.269	0.043	**1.52**	**1.43**	**1.79**	**1.57**	**0.01**	**Case 26**
		Bottom of Laptop at 8mm	0.842	0.365	0.269	0.043	**1.21**	**1.11**	**1.48**	**1.25**		
	LTE Band 13	Bottom of Laptop at 0mm	1.195	0.365	0.269	0.043	**1.56**	**1.46**	**1.83**	**1.60**	**0.01**	**Case 27**
		Bottom of Laptop at 8mm	0.756	0.365	0.269	0.043	**1.12**	**1.03**	**1.39**	**1.16**		
	LTE Band 25	Bottom of Laptop at 0mm	1.069	0.365	0.269	0.043	**1.43**	**1.34**	**1.70**	**1.48**	**0.01**	**Case 28**
		Bottom of Laptop at 8mm	1.199	0.365	0.269	0.043	**1.56**	**1.47**	**1.83**	**1.61**	**0.01**	**Case 29**
	LTE Band 26	Bottom of Laptop at 0mm	1.132	0.365	0.269	0.043	**1.50**	**1.40**	**1.77**	**1.54**	**0.01**	**Case 30**
		Bottom of Laptop at 8mm	1.091	0.365	0.269	0.043	**1.46**	**1.36**	**1.73**	**1.50**	**0.01**	**Case 31**
	LTE Band 41	Bottom of Laptop at 0mm	1.147	0.365	0.269	0.043	**1.51**	**1.42**	**1.78**	**1.56**	**0.01**	**Case 32**
		Bottom of Laptop at 8mm	0.543	0.365	0.269	0.043	**0.91**	**0.81**	**1.18**	**0.95**		

13.2 SPLSR Evaluation and Analysis

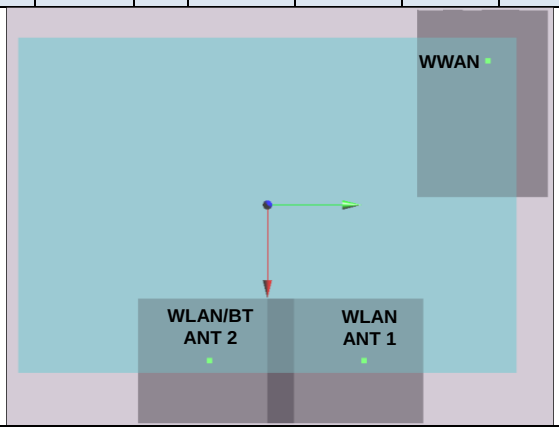
General Note:

1. SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*). If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary

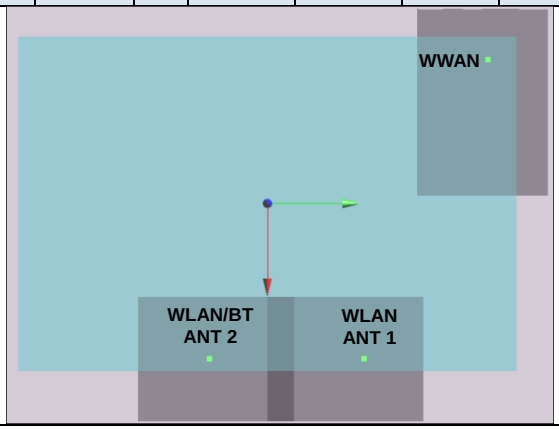
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 1	WCDMA II	Bottom of Laptop	1.164	0	-8.85	14.04	-0.11	210.6	1.44	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA II		1.164	0	-8.85	14.04	-0.11	260.8	1.53	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA II		1.164	0	-8.85	14.04	-0.11	201.1	1.21	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



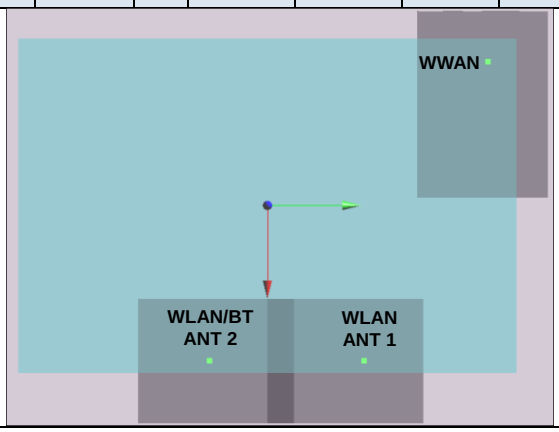
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 2	WCDMA II	Bottom of Laptop	1.199	8	-8.69	13.45	-0.26	206.5	1.47	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA II		1.199	8	-8.69	13.45	-0.26	255.5	1.57	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA II		1.199	8	-8.69	13.45	-0.26	199.6	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



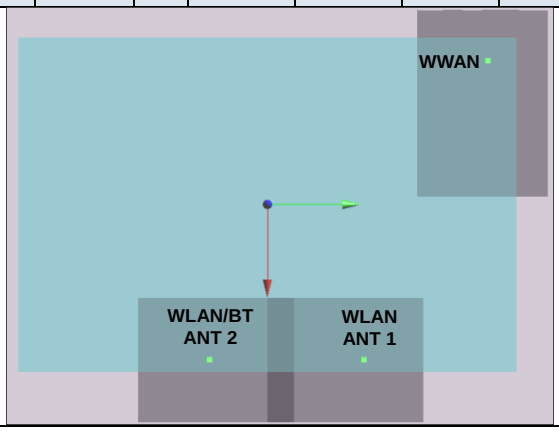
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 3	WCDMA IV	Bottom of Laptop	1.028	0	-9.46	13.75	-0.12	214.6	1.30	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA IV		1.028	0	-9.46	13.75	-0.12	263.0	1.39	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA IV		1.028	0	-9.46	13.75	-0.12	207.2	1.07	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



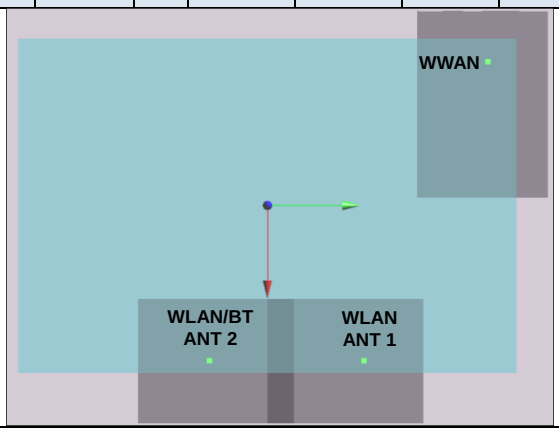
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 4	WCDMA IV	Bottom of Laptop	1.109	8	-9.3	13.14	-0.25	210.5	1.38	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA IV		1.109	8	-9.3	13.14	-0.25	257.6	1.48	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA IV		1.109	8	-9.3	13.14	-0.25	205.8	1.15	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



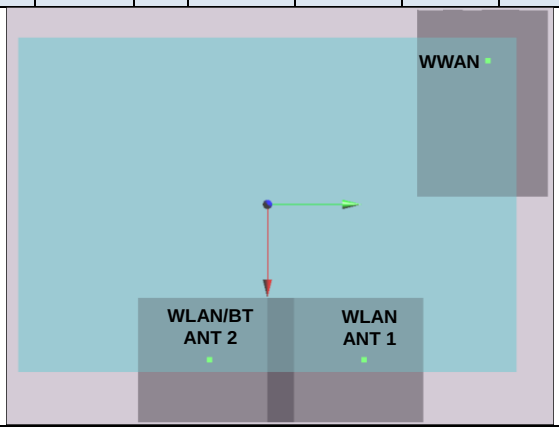
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 5	WCDMA V	Bottom of Laptop	1.109	0	-9.44	14.33	-1.16	217.6	1.38	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA V		1.109	0	-9.44	14.33	-1.16	267.3	1.48	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA V		1.109	0	-9.44	14.33	-1.16	207.3	1.15	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



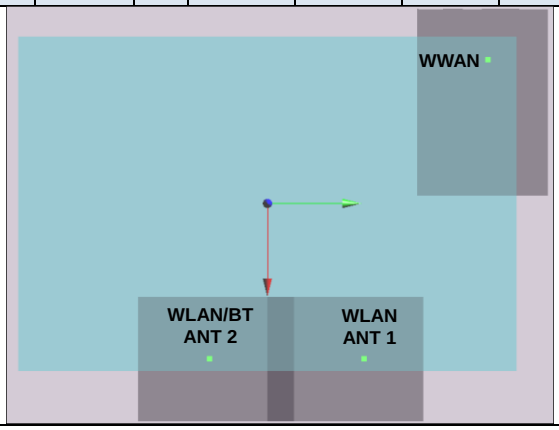
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 6	WCDMA V	Bottom of Laptop	1.151	8	-9.29	13.91	-0.25	213.9	1.42	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	WCDMA V		1.151	8	-9.29	13.91	-0.25	262.9	1.52	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	WCDMA V		1.151	8	-9.29	13.91	-0.25	205.5	1.19	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



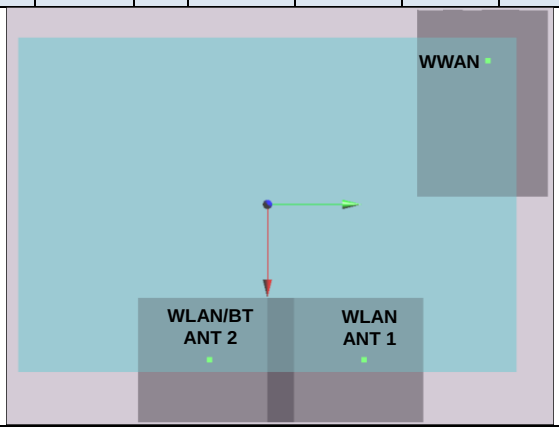
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 7	LTE B4	Bottom of Laptop	1.002	0	-9.15	14.04	-0.1	213.2	1.27	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B4		1.002	0	-9.15	14.04	-0.1	262.9	1.37	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B4		1.002	0	-9.15	14.04	-0.1	204.1	1.05	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



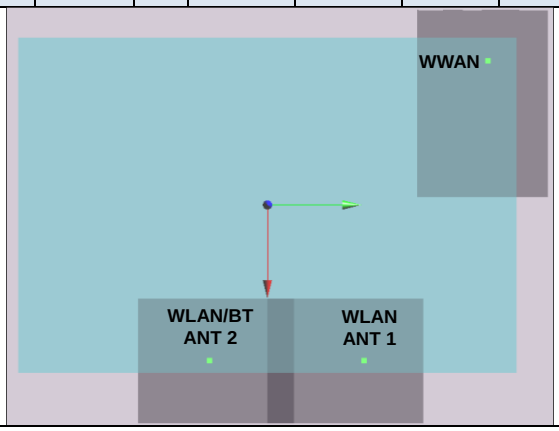
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 8	LTE B4	Bottom of Laptop	1.078	8	-8.98	13.29	-0.25	208.3	1.35	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B4		1.078	8	-8.98	13.29	-0.25	256.4	1.44	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B4		1.078	8	-8.98	13.29	-0.25	202.6	1.12	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



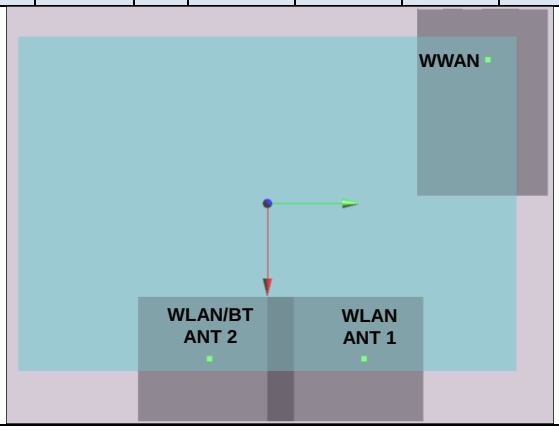
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 9	LTE B7	Bottom of Laptop	1.189	0	-9.28	14.16	-0.18	215.0	1.46	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B7		1.189	0	-9.28	14.16	-0.18	264.6	1.56	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B7		1.189	0	-9.28	14.16	-0.18	205.4	1.23	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



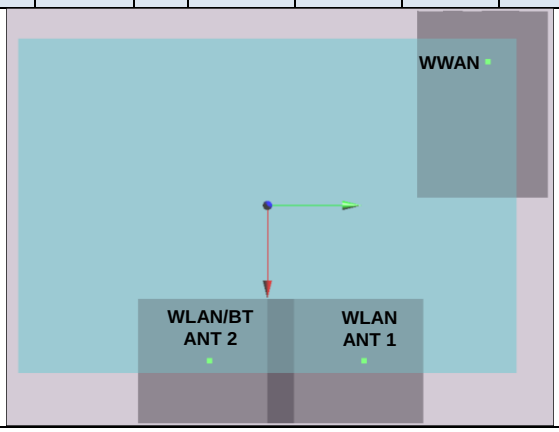
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 10	LTE B12	Bottom of Laptop	1.157	0	-7.69	15.65	-0.19	209.0	1.43	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B12		1.157	0	-7.69	15.65	-0.19	265.0	1.52	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B12		1.157	0	-7.69	15.65	-0.19	190.2	1.20	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



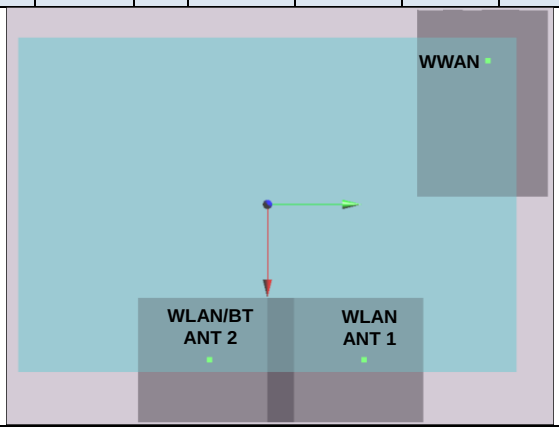
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 11	LTE B13	Bottom of Laptop	1.195	0	-9.45	14.05	-0.18	215.9	1.47	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B13		1.195	0	-9.45	14.05	-0.18	265.1	1.56	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B13		1.195	0	-9.45	14.05	-0.18	207.1	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



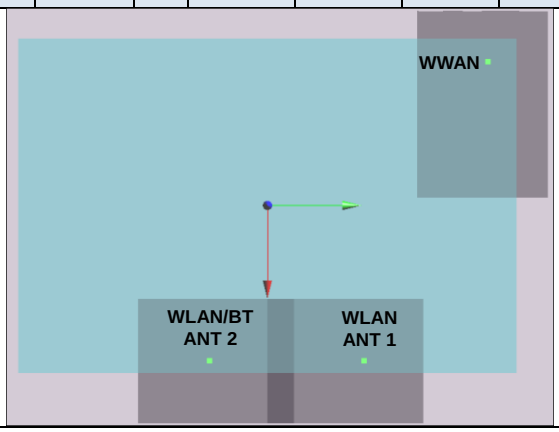
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 12	LTE B25	Bottom of Laptop	1.069	0	-9.15	14.04	-0.13	213.2	1.34	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B25		1.069	0	-9.15	14.04	-0.13	262.9	1.44	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B25		1.069	0	-9.15	14.04	-0.13	204.1	1.11	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



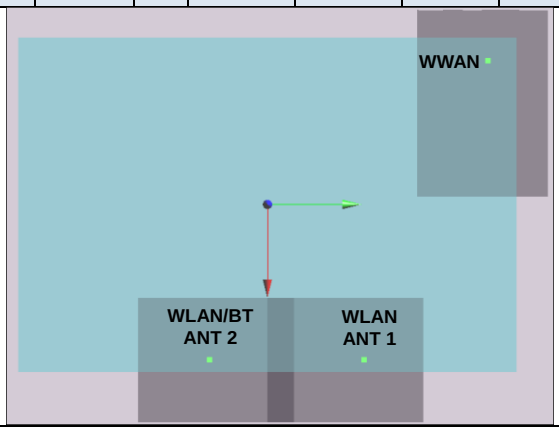
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 13	LTE B25	Bottom of Laptop	1.199	8	-9.15	13.3	-0.25	209.9	1.47	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B25		1.199	8	-9.15	13.3	-0.25	257.7	1.57	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B25		1.199	8	-9.15	13.3	-0.25	204.2	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



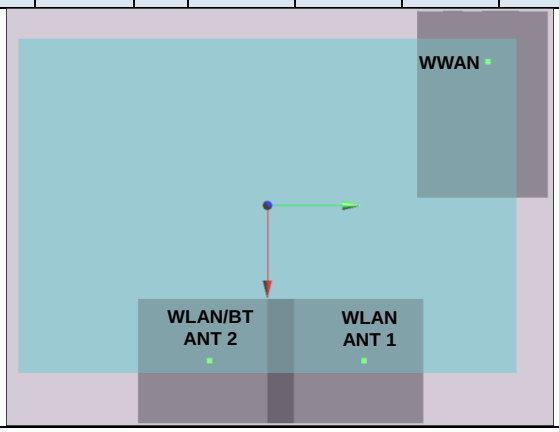
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 14	LTE B26	Bottom of Laptop	1.132	0	-9.13	14.16	-0.14	213.6	1.40	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B26		1.132	0	-9.13	14.16	-0.14	263.6	1.50	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B26		1.132	0	-9.13	14.16	-0.14	203.9	1.18	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



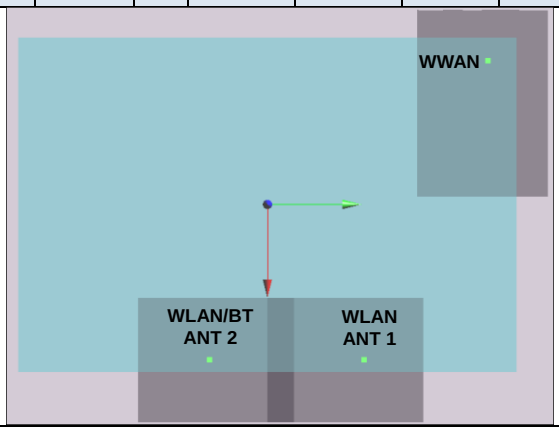
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 15	LTE B26	Bottom of Laptop	1.091	8	-8.99	13.75	-0.22	210.5	1.36	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B26		1.091	8	-8.99	13.75	-0.22	259.7	1.46	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B26		1.091	8	-8.99	13.75	-0.22	202.5	1.13	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



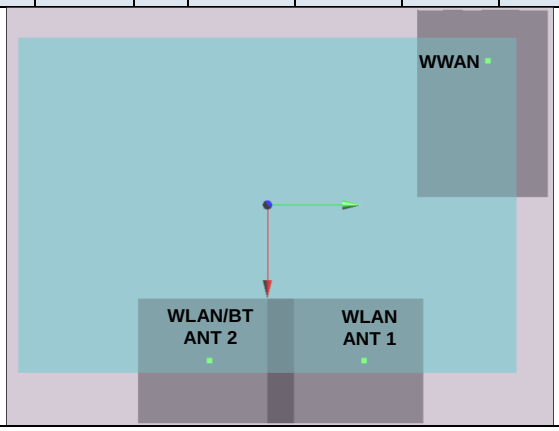
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 16	LTE B41	Bottom of Laptop	1.147	0	-9.4	14.06	-0.09	215.5	1.42	0.01	Not required
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22				
	LTE B41		1.147	0	-9.4	14.06	-0.09	264.8	1.51	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	87.1	0.64	0.01	Not required
	2.4GHz WLAN ANT 2		0.366	0	9.32	-4.66	0.24				
	LTE B41		1.147	0	-9.4	14.06	-0.09	206.6	1.19	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	2.4GHz WLAN ANT 1		0.272	0	9.68	4.04	0.22	101.5	0.32	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



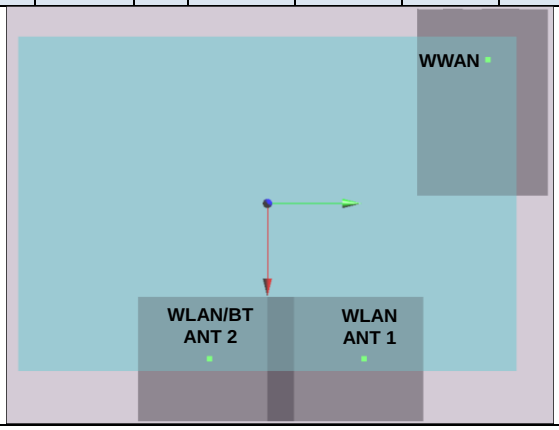
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 17	WCDMA II	Bottom of Laptop	1.164	0	-8.85	14.04	-0.11	193.6	1.53	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA II		1.164	0	-8.85	14.04	-0.11	260.1	1.43	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA II		1.164	0	-8.85	14.04	-0.11	201.1	1.21	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



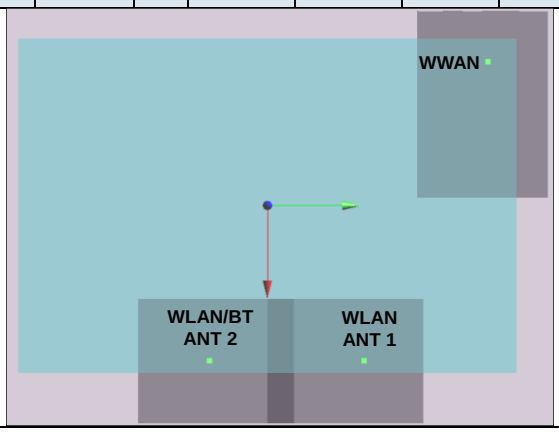
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 18	WCDMA II	Bottom of Laptop	1.199	8	-8.69	13.45	-0.26	190.0	1.56	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA II		1.199	8	-8.69	13.45	-0.26	254.9	1.47	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA II		1.199	8	-8.69	13.45	-0.26	199.6	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



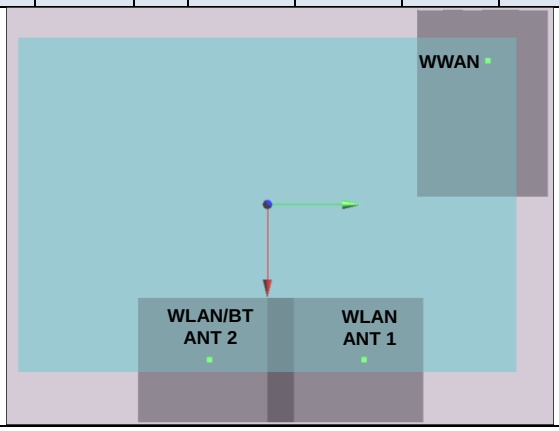
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 19	WCDMA IV	Bottom of Laptop	1.028	0	-9.46	13.75	-0.12	198.2	1.39	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA IV		1.028	0	-9.46	13.75	-0.12	262.6	1.30	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA IV		1.028	0	-9.46	13.75	-0.12	207.2	1.07	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



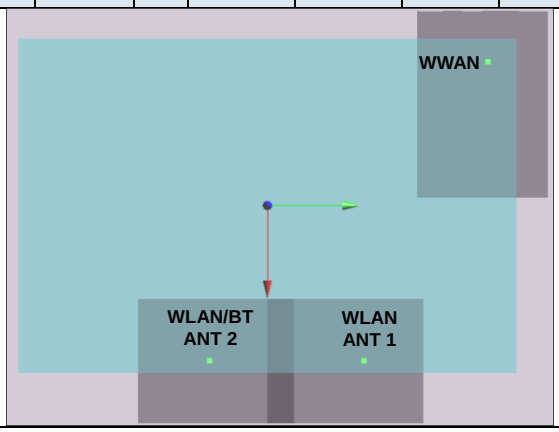
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 20	WCDMA IV	Bottom of Laptop	1.109	8	-9.3	13.14	-0.25	194.7	1.47	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA IV		1.109	8	-9.3	13.14	-0.25	257.4	1.38	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA IV		1.109	8	-9.3	13.14	-0.25	205.8	1.15	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



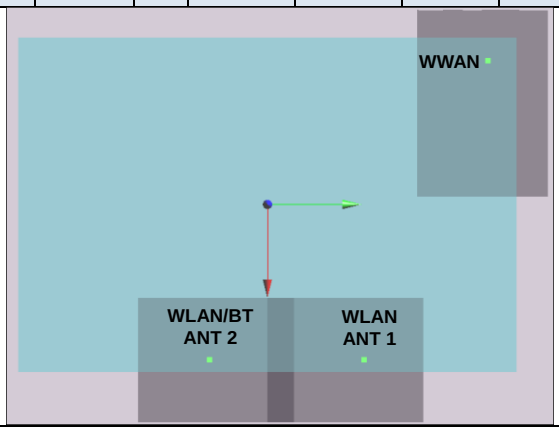
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 21	WCDMA V	Bottom of Laptop	1.109	0	-9.44	14.33	-1.16	200.6	1.47	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA V		1.109	0	-9.44	14.33	-1.16	266.7	1.38	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA V		1.109	0	-9.44	14.33	-1.16	207.3	1.15	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



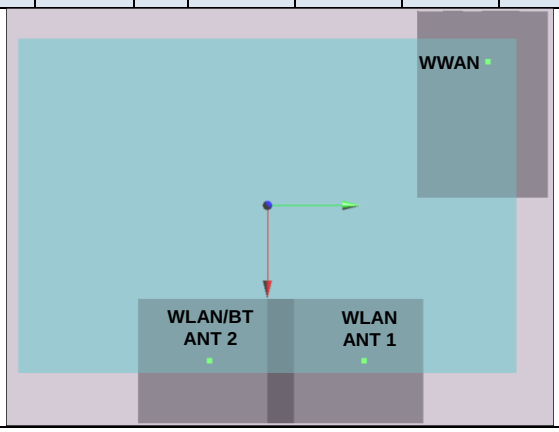
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 22	WCDMA V	Bottom of Laptop	1.151	8	-9.29	13.91	-0.25	197.2	1.52	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	WCDMA V		1.151	8	-9.29	13.91	-0.25	262.5	1.42	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	WCDMA V		1.151	8	-9.29	13.91	-0.25	205.5	1.19	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



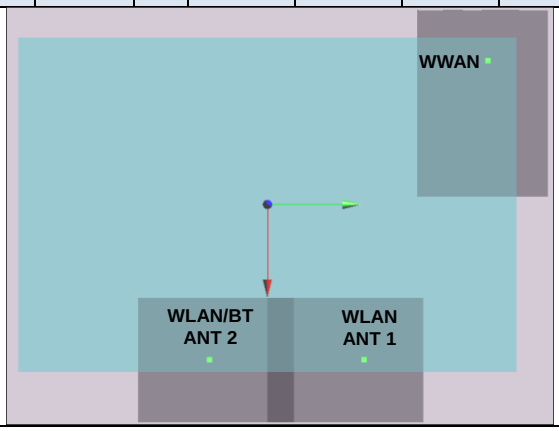
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 23	LTE B4	Bottom of Laptop	1.002	0	-9.15	14.04	-0.1	196.4	1.37	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B4		1.002	0	-9.15	14.04	-0.1	262.3	1.27	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B4		1.002	0	-9.15	14.04	-0.1	204.1	1.05	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



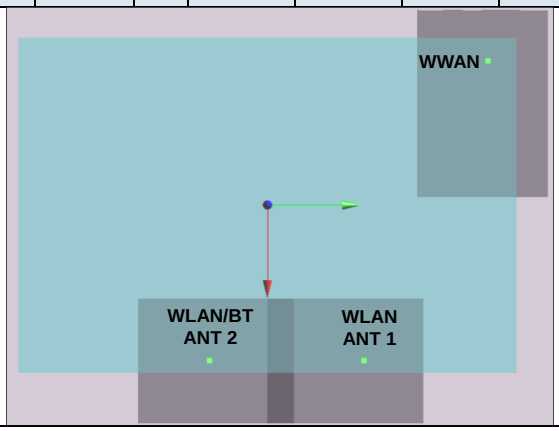
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 24	LTE B4	Bottom of Laptop	1.078	8	-8.98	13.29	-0.25	192.2	1.44	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B4		1.078	8	-8.98	13.29	-0.25	256.0	1.35	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B4		1.078	8	-8.98	13.29	-0.25	202.6	1.12	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



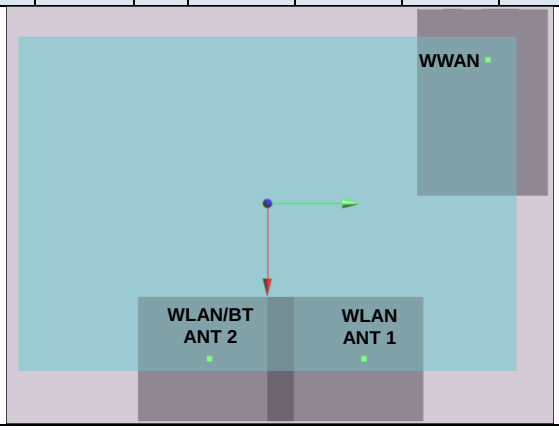
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 25	LTE B7	Bottom of Laptop	1.189	0	-9.28	14.16	-0.18	198.0	1.55	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B7		1.189	0	-9.28	14.16	-0.18	264.1	1.46	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B7		1.189	0	-9.28	14.16	-0.18	205.4	1.23	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



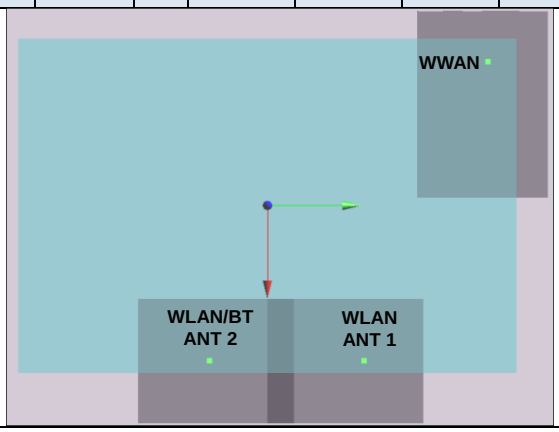
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 26	LTE B12	Bottom of Laptop	1.157	0	-7.69	15.65	-0.19	189.8	1.52	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B12		1.157	0	-7.69	15.65	-0.19	263.5	1.43	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B12		1.157	0	-7.69	15.65	-0.19	190.2	1.20	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



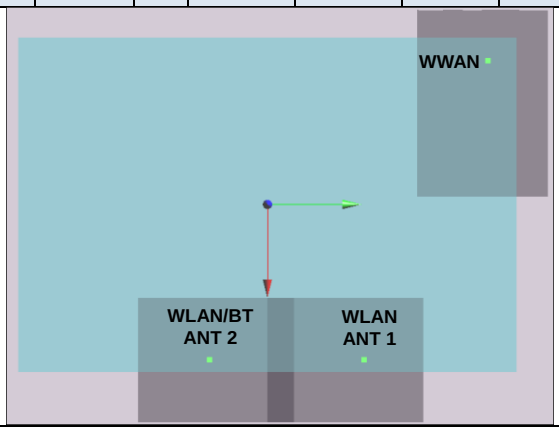
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 27	LTE B13	Bottom of Laptop	1.195	0	-9.45	14.05	-0.18	199.2	1.56	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B13		1.195	0	-9.45	14.05	-0.18	264.6	1.46	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B13		1.195	0	-9.45	14.05	-0.18	207.1	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



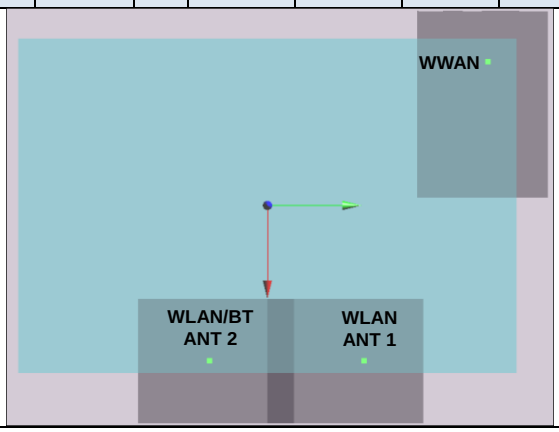
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 28	LTE B25	Bottom of Laptop	1.069	0	-9.15	14.04	-0.13	196.4	1.43	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B25		1.069	0	-9.15	14.04	-0.13	262.3	1.34	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B25		1.069	0	-9.15	14.04	-0.13	204.1	1.11	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



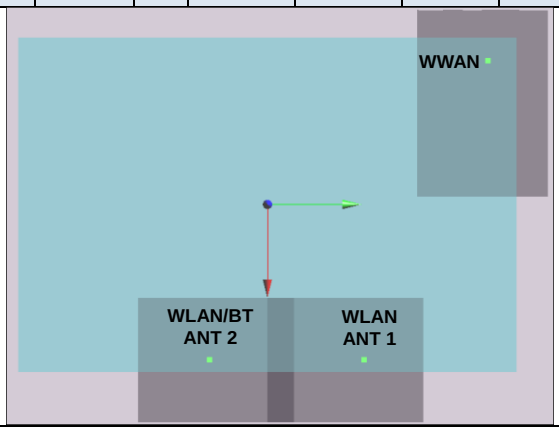
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 29	LTE B25	Bottom of Laptop	1.199	8	-9.15	13.3	-0.25	193.8	1.56	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B25		1.199	8	-9.15	13.3	-0.25	257.3	1.47	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B25		1.199	8	-9.15	13.3	-0.25	204.2	1.24	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



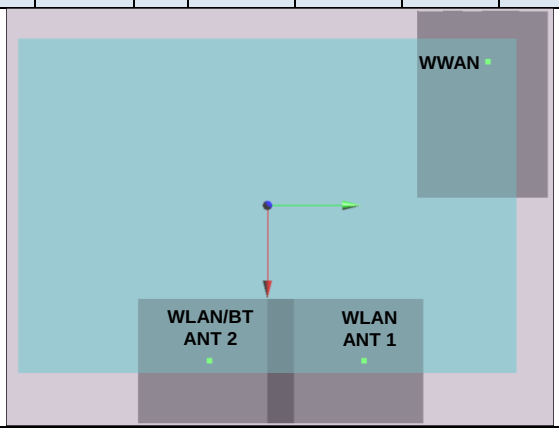
	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 30	LTE B26	Bottom of Laptop	1.132	0	-9.13	14.16	-0.14	196.6	1.50	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B26		1.132	0	-9.13	14.16	-0.14	263.0	1.40	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B26		1.132	0	-9.13	14.16	-0.14	203.9	1.18	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 31	LTE B26	Bottom of Laptop	1.091	8	-8.99	13.75	-0.22	193.8	1.46	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B26		1.091	8	-8.99	13.75	-0.22	259.2	1.36	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B26		1.091	8	-8.99	13.75	-0.22	202.5	1.13	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (cm) X	Y	Z	3D distance (mm)	Summed SAR (W/kg)	SPLSR Results	Simultaneous SAR
Case 32	LTE B41	Bottom of Laptop	1.147	0	-9.4	14.06	-0.09	198.8	1.51	0.01	Not required
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22				
	LTE B41		1.147	0	-9.4	14.06	-0.09	264.3	1.42	0.01	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	107.0	0.63	0.00	Not required
	5GHz WLAN ANT 2		0.269	0	10.02	-3.86	0.23				
	LTE B41		1.147	0	-9.4	14.06	-0.09	206.6	1.19	0.01	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				
	5GHz WLAN ANT 1		0.365	0	9.1	6.8	0.22	75.8	0.41	0.00	Not required
	BT ANT 2		0.043	0	11.26	14.06	-0.12				



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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 below.

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

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

(b) κ is the coverage factor

Table 14.1. Standard Uncertainty for Assumed Distribution

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

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

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	6.00	N	1	1	1	6.0	6.0
Axial Isotropy	4.70	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.60	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	1.00	R	1.732	1	1	0.6	0.6
Linearity	4.70	R	1.732	1	1	2.7	2.7
System Detection Limits	1.00	R	1.732	1	1	0.6	0.6
Modulation Response	4.68	R	1.732	1	1	2.7	2.7
Readout Electronics	0.30	N	1	1	1	0.3	0.3
Response Time	0.00	R	1.732	1	1	0.0	0.0
Integration Time	2.60	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.00	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.00	R	1.732	1	1	1.7	1.7
Probe Positioner	0.40	R	1.732	1	1	0.2	0.2
Probe Positioning	2.90	R	1.732	1	1	1.7	1.7
Max. SAR Eval.	2.00	R	1.732	1	1	1.2	1.2
Test Sample Related							
Device Positioning	3.03	N	1	1	1	3.0	3.0
Device Holder	3.60	N	1	1	1	3.6	3.6
Power Drift	5.00	R	1.732	1	1	2.9	2.9
Power Scaling	0.00	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.10	R	1.732	1	1	3.5	3.5
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.03	N	1	0.78	0.71	0.0	0.0
Liquid Conductivity (target)	5.00	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.50	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.68	R	1.732	0.78	0.71	1.7	1.5
Liquid Permittivity Repeatability	0.02	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.00	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.50	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.84	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						11.6%	11.6%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						23.2%	23.1%

Table 14.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability	Divisor	(Ci) 1g	(Ci) 10g	Standard Uncertainty (1g) (±%)	Standard Uncertainty (10g) (±%)
Measurement System							
Probe Calibration	7.00	N	1	1	1	7.0	7.0
Axial Isotropy	4.70	R	1.732	0.7	0.7	1.9	1.9
Hemispherical Isotropy	9.60	R	1.732	0.7	0.7	3.9	3.9
Boundary Effects	2.00	R	1.732	1	1	1.2	1.2
Linearity	4.70	R	1.732	1	1	2.7	2.7
System Detection Limits	1.00	R	1.732	1	1	0.6	0.6
Modulation Response	4.68	R	1.732	1	1	2.7	2.7
Readout Electronics	0.30	N	1	1	1	0.3	0.3
Response Time	0.00	R	1.732	1	1	0.0	0.0
Integration Time	2.60	R	1.732	1	1	1.5	1.5
RF Ambient Noise	3.00	R	1.732	1	1	1.7	1.7
RF Ambient Reflections	3.00	R	1.732	1	1	1.7	1.7
Probe Positioner	0.40	R	1.732	1	1	0.2	0.2
Probe Positioning	6.70	R	1.732	1	1	3.9	3.9
Max. SAR Eval.	4.00	R	1.732	1	1	2.3	2.3
Test Sample Related							
Device Positioning	3.03	N	1	1	1	3.0	3.0
Device Holder	3.60	N	1	1	1	3.6	3.6
Power Drift	5.00	R	1.732	1	1	2.9	2.9
Power Scaling	0.00	R	1.732	1	1	0.0	0.0
Phantom and Setup							
Phantom Uncertainty	6.60	R	1.732	1	1	3.8	3.8
SAR correction	0.00	R	1.732	1	0.84	0.0	0.0
Liquid Conductivity Repeatability	0.03	N	1	0.78	0.71	0.0	0.0
Liquid Conductivity (target)	5.00	R	1.732	0.78	0.71	2.3	2.0
Liquid Conductivity (mea.)	2.50	R	1.732	0.78	0.71	1.1	1.0
Temp. unc. - Conductivity	3.68	R	1.732	0.78	0.71	1.7	1.5
Liquid Permittivity Repeatability	0.02	N	1	0.23	0.26	0.0	0.0
Liquid Permittivity (target)	5.00	R	1.732	0.23	0.26	0.7	0.8
Liquid Permittivity (mea.)	2.50	R	1.732	0.23	0.26	0.3	0.4
Temp. unc. - Permittivity	0.84	R	1.732	0.23	0.26	0.1	0.1
Combined Std. Uncertainty						12.9%	12.9%
Coverage Factor for 95 %						K=2	K=2
Expanded STD Uncertainty						25.9%	25.8%

Table 14.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

15. 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 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

[8] FCC KDB 941225 D05 v02r05, “SAR Evaluation Considerations for LTE Devices”, Dec 2015

[9] FCC KDB 941225 D05A v01r02, “Rel. 10 LTE SAR Test Guidance and KDB Inquiries”, Oct 2015

[10] FCC KDB 616217 D04 v01r02, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, Oct 2015

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

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