FCC SAR Test Report

APPLICANT	:	Getac Technology Corporation.
EQUIPMENT	:	WLAN module
BRAND NAME	:	Intel
MODEL NAME	:	7265NGW
FCC ID	:	QYL7265NG
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2003

The product was installed into NB & Tablet (Brand Name: V110, Model Name: Getac) during test.

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 / Deputy 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
FA391715-05	Rev. 01	Initial issue of report	Feb. 04, 2015

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Getac Technology Corporation., WLAN module, 7265NGW**, are as follows.

Equipment Class	Frequency Band	Highest SAR Summary	
		Body 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
DTS	WLAN 2.4GHz Band	0.40	1.38
	WLAN 5.8GHz Band	0.62	
NII	WLAN 5.2GHz Band	0.70	0.95
	WLAN 5.3GHz Band	**0.95**	
	WLAN 5.5GHz Band	0.68	
Date of Testing:		2015/01/17~2015/01/21	

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

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	Getac Technology Corporation.
Address	5F., Building A, No. 209, Sec.1, Nangang Rd., Nangang Dist., Taipei City 11568, Taiwan, R.O.C.

Manufacturer	
Company Name	Getac Technology(Kunshan)Co., LTD.
Address	No. 269, No. 2 Avenue, Kunshan Comprehensive Free Trade Zone, Jiangsu Province, P.R.C

3. Guidance Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 248227 D01 SAR meas for 802 11abg v01r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r01

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	WLAN module
Brand Name	Intel
Model Name	7265NGW
FCC ID	QYL7265NG
S/N	REAXXV0100
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	・802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 ・Bluetooth v3.0+EDR，Bluetooth v4.0-LE
EUT Stage	Identical Prototype
Remark: 1. The WWAN module, Brand Name: Sierra, Model Name: EM7355, FCC ID: QYLEM7355V is also integrated into this host and the WWAN SAR testing results are also used perform transmission simultaneous analysis which can be referred to Sporton SAR Test Report, Report No: FA3O1142 Rev.01.	

Host Information	
Host Name	NB & Tablet
Brand Name	Getac
Model Name	V110
Integrated WWAN Module	Brand Name: Sierra Model Name: EM7355 FCC ID: QYLEM7355V
Integrated NFC Module	Brand Name: TI Model Name: TRF7960 FCC ID: QYLV110RFID

4.2 Maximum Tune-up Limit

Mode	Average Power(dBm)
Bluetooth v3.0+EDR	6
Bluetooth v4.0-LE	3

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)									
		Ant A				Ant B				Ant A+B	
		11b	11g	HT20	HT40	11b	11g	HT20	HT40	HT20	HT40
2.4GHz Band	2412	16.5	14.5	14.5		16.5	14.5	14.5		14.5	
	2422				14.0				14.0		14.0
	2437	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
	2452				13.0				13.0		13.0
	2462	17.5	13.0	13.0		17.5	13.0	13.0		13.0	

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)																			
		Antenna A						Antenna B						Antenna A+B							
		11a	HT20	HT40	VHT20	VHT40	VHT80	11a	HT20	HT40	VHT20	VHT40	VHT80	HT20	HT40	VHT20	VHT40	VHT80			
5.2GHz Band	5180	14	14		14			14	14		14			14		14					
	5190			13.5		12				13.5		12			13.5		13.5				
	5200	16	16		16			16	16		16			16		16					
	5210						13.5						13.5					13.5			
	5220	16	16		16			16	16		16			16		16					
	5230			16.5		16.5				16.5		16.5			16.5		16.5				
	5240	16	16		16			16	16		16			16		16					
5.3GHz Band	5260	16	16		16			16	16		16			16		16					
	5270			16.5		16.5				16.5		16.5			16.5		16.5				
	5280	16	16		16			16	16		16			16		16					
	5290						13.5						13.5					13.5			
	5300	16	16		16			16	16		16			16		16					
	5310			14		14				14		14			14		14				
	5320	14	14		14			14	14		14			14		14					

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)																
		Antenna A						Antenna B						Antenna A+B				
		11a	HT20	HT40	VHT20	VHT40	VHT80	11a	HT20	HT40	VHT20	VHT40	VHT80	HT20	HT40	VHT20	VHT40	VHT80
5.5GHz Band	5500	14	14		14			14	14		14			14		14		
	5510			14		14				14		14			14		14	
	5520	16	16		16			16	16		16			16		16		
	5530						14						14					14
	5540	16	16		16			16	16		16			16		16		
	5550			16.5		16.5				16.5		16.5			16.5		16.5	
	5560	16	16		16			16	16		16			16		16		
	5580	16	16		16			16	16		16			16		16		
	5600	16	16		16			16	16		16			16		16		
	5610						15						14					14.5
	5620	16	16		16			16	16		16			16		16		
	5630			16.5		16.5				16.5		16.5			16.5		16.5	
	5640	16	16		16			16	16		16			16		16		
	5660	16	16		16			16	16		16			16		16		
	5670			16.5		16.5				16.5		16.5			16.5		16.5	
	5680	16	16		16			16	16		16			16		16		
	5690						15						12					15
	5700	13	13		13			13	13		13			13		13		
	5710			16.5		16.5				16.5		16.5			16.5		16.5	
	5720	16	16		16			16	16		16			16		16		
5.8GHz Band	5745	16	16		16			16	16		16			16		16		
	5755			16.5		16.5				16.5		16.5			16.5		16.5	
	5765	16	16		16			16	16		16			16		16		
	5775						15						14					15
	5785	16	16		16			16	16		16			16		16		
	5795			16.5		16.5				16.5		16.5			16.5		16.5	
	5805	16	16		16			16	16		16			16		16		
	5825	16	16		16			16	16		16			16		16		

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:

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

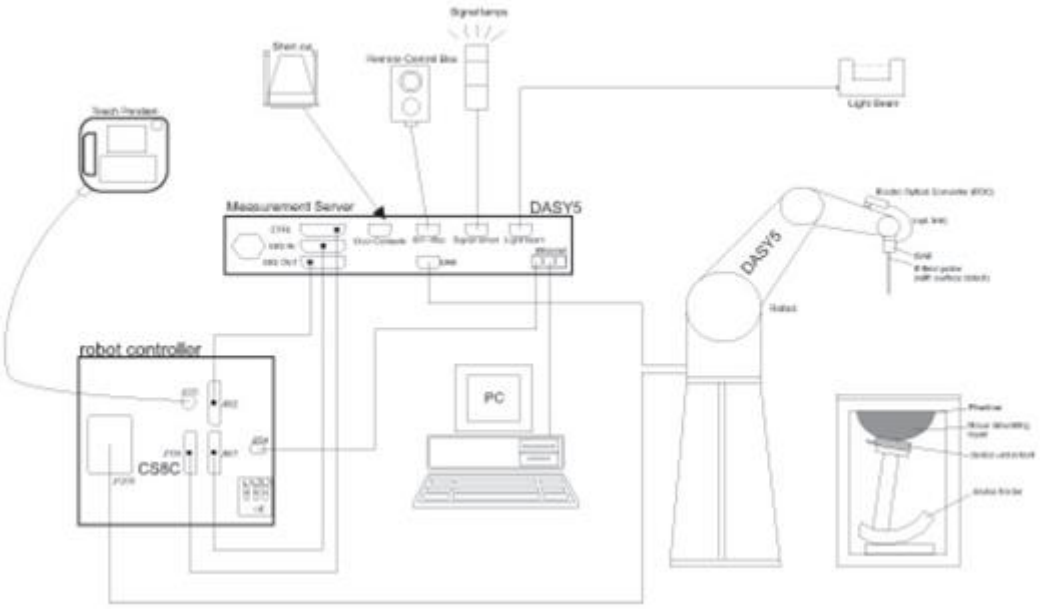
SAR is expressed in units of Watts per kilogram (W/kg)

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

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.

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 D01v01r03 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 D01v01r03 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	924	Nov. 19, 2014	Nov. 18, 2015
SPEAG	5GHz System Validation Kit	D5GHzV2	1006	Sep. 25, 2014	Sep. 24, 2015
SPEAG	Data Acquisition Electronics	DAE4	1279	Jul. 23, 2014	Jul. 22, 2015
SPEAG	Data Acquisition Electronics	DAE4	1399	Nov. 13, 2014	Nov. 12, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3954	Nov. 21, 2014	Nov. 20, 2015
SPEAG	Dosimetric E-Field Probe	EX3DV4	3955	Nov. 21, 2014	Nov. 20, 2015
H.M.IRIS	Thermometer	TH-08	TM658	Oct. 21, 2014	Oct. 20, 2015
WonDer	Thermometer	WD-5015	TM225	Oct. 21, 2014	Oct. 20, 2015
SPEAG	Device Holder	N/A	N/A	NCR	NCR
R&S	Signal Generator	SMU200A	102502	Jul. 07, 2014	Jul. 06, 2015
SPEAG	Dielectric Probe Kit	DAKS-3.5	0004	Mar. 04, 2014	Mar. 03, 2015
Agilent	ENA Network Analyzer	E5071C	MY46101588	May. 31, 2014	May. 30, 2015
Anritsu	Power Meter	ML2495A	1036004	Aug. 09, 2014	Aug. 08, 2015
Anritsu	Power Sensor	MA2411B	1027253	Aug. 11, 2014	Aug. 10, 2015
R&S	Spectrum Analyzer	FSP 7	101131	Jul. 10, 2014	Jul. 09, 2015
Agilent	Dual Directional Coupler	778D	50422	Note1	
Woken	Attenuator 1	WK0602-XX	N/A	Note1	
PE	Attenuator 2	PE7005-10	N/A	Note1	
PE	Attenuator 3	PE7005- 3	N/A	Note1	
AR	Power Amplifier	5S1G4M2	0328767	Note1	
Mini-Circuits	Power Amplifier	ZVE-3W	162601250	Note1	
Mini-Circuits	Power Amplifier	ZHL-42W+	13440021344	Note1	

General Note:

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

10. System Verification

10.1 Tissue Verification

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

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

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
2450	MSL	22.4	2.004	54.202	1.95	52.70	2.77	2.85	±5	2015/1/17
5200	MSL	22.4	5.281	47.952	5.30	49.00	-0.36	-2.14	±5	2015/1/17
5300	MSL	22.6	5.577	47.449	5.42	48.90	2.90	-2.97	±5	2015/1/19
5600	MSL	22.6	5.942	47.099	5.77	48.50	2.98	-2.89	±5	2015/1/20
5600	MSL	22.6	5.838	46.840	5.77	48.50	1.18	-3.42	±5	2015/1/21
5800	MSL	22.6	6.048	46.638	6.00	48.20	0.80	-3.24	±5	2015/1/21

10.2 System Performance Check Results

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

Date	Frequency (MHz)	Tissue Type	Input Power (mW)	Dipole S/N	Probe S/N	DAE S/N	Measured 1g SAR (W/kg)	Targeted 1g SAR (W/kg)	Normalized 1g SAR (W/kg)	Deviation (%)
2015/1/17	2450	MSL	250	D2450V2-924	EX3DV4 - SN3955	DAE4 Sn1399	12.90	51.40	51.6	0.39
2015/1/17	5200	MSL	100	D5GHzV2-1006	EX3DV4 - SN3955	DAE4 Sn1399	8.23	77.50	82.3	6.19
2015/1/19	5300	MSL	100	D5GHzV2-1006	EX3DV4 - SN3955	DAE4 Sn1399	7.67	80.00	76.7	-4.13
2015/1/20	5600	MSL	100	D5GHzV2-1006	EX3DV4 - SN3955	DAE4 Sn1399	8.77	85.20	87.7	2.93
2015/1/21	5600	MSL	100	D5GHzV2-1006	EX3DV4 - SN3954	DAE4 Sn1279	8.64	85.20	86.4	1.41
2015/1/21	5800	MSL	100	D5GHzV2-1006	EX3DV4 - SN3954	DAE4 Sn1279	8.38	78.40	83.8	6.89

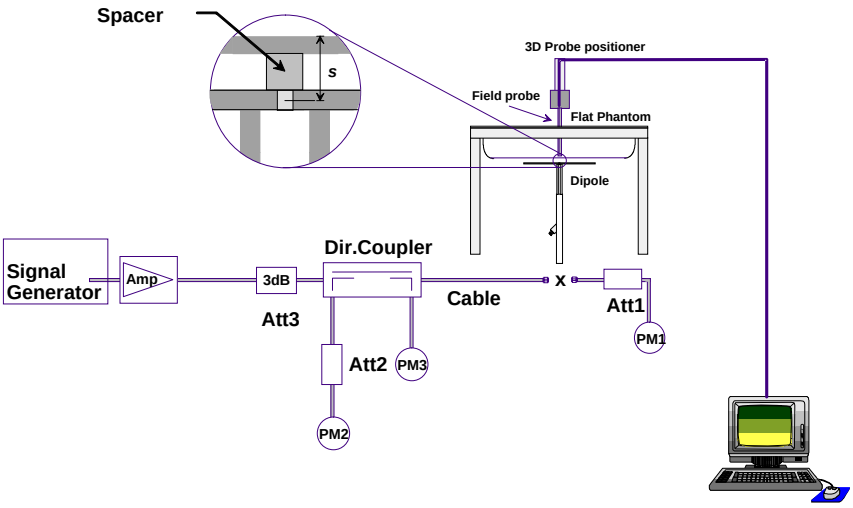


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

11. RF Exposure Positions

11.1 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v05r02 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

12. Conducted RF Output Power (Unit: dBm)

<WLAN Conducted Power>

General Note:

1. 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.
2. Per April 2013 TCB Workshop notes, full SAR tests for SISO IEEE 802.11ac configurations were not required because the average output power was not more than 0.25 dB higher than IEEE 802.11a mode. IEEE 802.11ac was evaluated for the highest IEEE 802.11a position in each 5 GHz band and exposure condition. => 802.11ac
3. For 2.4GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11b were selected for SAR evaluation. 802.11g/n HT20/HT40 were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11b mode.
4. For 5 GHz WLAN SAR testing, highest average RF output power channel for the lowest data rate for 802.11a were selected for SAR evaluation. If the 802.11n HT20/HT40/VHT20/VHT40 modes were not investigated since the average output powers over all channels and data rates were not more than 0.25 dB higher than the tested channel in the lowest data rate of 802.11a mode.
5. Following KDB 248227 D01 v01r02, if 802.11g/n HT20/HT40/VHT20/VHT40 average output power is higher than 1/4dB higher than 802.11b mode, these modes SAR will be verified at the highest RF exposure position found in 802.11a SAR testing.

<2.4GHz WLAN>

<Antenna A>

WLAN 2.4GHz 802.11b Average Power (dBm)					
Power vs. Channel			Power vs. Data Rate		
Channel	Frequency (MHz)	Data Rate	2Mbps	5.5Mbps	11Mbps
		1Mbps			
CH 1	2412	16.15	17.17	17.24	17.26
CH 6	2437	17.19			
CH 11	2462	17.39			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 1	2412	13.66	17.11	17.08	17.05	17.04	17.10	17.04	17.14
CH 6	2437	17.15							
CH 11	2462	12.11							

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 1	2412	13.65	17.05	16.99	16.98	17.05	16.79	16.84	17.03
CH 6	2437	17.07							
CH 11	2462	12.23							

WLAN 2.4GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 3	2422	13.25	17.19	16.92	17.01	17.13	17.00	16.93	16.99
CH 6	2437	17.20							
CH 9	2452	12.28							

<Antenna B>

WLAN 2.4GHz 802.11b Average Power (dBm)					
Power vs. Channel			Power vs. Data Rate		
Channel	Frequency (MHz)	Data Rate 1Mbps	2Mbps	5.5Mbps	11Mbps
CH 1	2412	16.23	17.02	17.14	17.03
CH 6	2437	17.28			
CH 11	2462	17.11			

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 1	2412	14.35	17.19	17.46	17.47	17.39	17.40	17.28	17.31
CH 6	2437	17.48							
CH 11	2462	12.38							

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 1	2412	14.28	17.19	17.25	17.03	17.19	17.29	17.32	17.21
CH 6	2437	17.33							
CH 11	2462	12.05							

WLAN 2.4GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 3	2422	13.40	17.05	17.15	17.08	16.94	17.00	16.89	17.18
CH 6	2437	17.20							
CH 9	2452	11.25							

<Antenna A+B>

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 1	2412	14.17	17.09	17.03	17.08	17.15	17.09	17.05	17.09
CH 6	2437	17.33							
CH 11	2462	12.39							

WLAN 2.4GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 3	2422	13.23	17.29	17.46	17.36	17.26	17.27	17.44	17.33
CH 6	2437	17.47							
CH 9	2452	12.14							

<5GHz WLAN>

<Antenna A>

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	13.55	15.20	15.28	15.32	15.08	15.06	15.24	15.20
CH 40	5200	15.15							
CH 44	5220	15.35							
CH 48	5240	15.25							
CH 52	5260	15.05	15.04	14.93	14.86	14.84	14.74	14.83	15.01
CH 56	5280	14.82							
CH 60	5300	15.04							
CH 64	5320	13.45							
CH 100	5500	13.33	15.17	15.30	15.21	15.14	15.05	15.08	15.11
CH 104	5520	15.35							
CH 108	5540	15.32							
CH 112	5560	15.01							
CH 116	5580	15.09							
CH 120	5600	15.05							
CH 124	5620	15.04							
CH 128	5640	15.01							
CH 132	5660	15.07							
CH 136	5680	15.05							
CH 140	5700	12.63							
CH 144	5720	15.30							
CH 149	5745	15.16	15.39	15.36	15.46	15.47	15.24	15.29	15.44
CH 153	5765	15.06							
CH 157	5785	15.49							
CH 161	5805	15.41							
CH 165	5825	15.03							

WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	13.55	15.27	15.36	15.25	15.35	15.22	15.33	15.36
CH 40	5200	15.40							
CH 44	5220	15.35							
CH 48	5240	15.40							
CH 52	5260	15.18	15.35	15.25	15.50	15.24	15.40	15.47	15.29
CH 56	5280	15.17							
CH 60	5300	15.54							
CH 64	5320	13.25							
CH 100	5500	12.96	15.28	15.14	15.33	15.16	15.23	15.35	15.22
CH 104	5520	15.12							
CH 108	5540	15.14							
CH 112	5560	15.26							
CH 116	5580	15.32							
CH 120	5600	15.28							
CH 124	5620	15.20							
CH 128	5640	15.18							
CH 132	5660	15.07							
CH 136	5680	15.35							
CH 140	5700	12.54							
CH 144	5720	15.41							
CH 149	5745	15.39	15.34	15.29	15.31	15.13	15.13	15.14	15.28
CH 153	5765	15.21							
CH 157	5785	15.05							
CH 161	5805	15.44							
CH 165	5825	15.31							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 38	5190	11.46	15.93	16.11	16.18	15.93	16.16	16.13	15.99
CH 46	5230	16.23							
CH 54	5270	16.20	15.90	15.92	15.90	16.06	15.96	15.96	16.10
CH 62	5310	13.04							
CH 102	5510	13.19	16.13	16.01	16.18	16.25	16.08	15.98	16.20
CH 110	5550	15.98							
CH 126	5630	15.95							
CH 134	5670	16.03							
CH 142	5710	16.26							
CH 151	5755	16.24	16.16	15.93	16.16	16.23	16.15	16.19	16.20
CH 159	5795	16.12							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	13.51	15.22	15.14	15.17	15.08	15.09	15.09	15.18	15.16
CH 40	5200	15.33								
CH 44	5220	15.36								
CH 48	5240	15.06								
CH 52	5260	15.16	15.33	15.36	15.41	15.34	15.41	15.24	15.19	15.40
CH 56	5280	15.09								
CH 60	5300	15.49								
CH 64	5320	13.18								
CH 100	5500	12.91	15.19	15.17	15.19	15.27	15.23	15.15	15.15	15.29
CH 104	5520	15.11								
CH 108	5540	15.13								
CH 112	5560	15.16								
CH 116	5580	15.27								
CH 120	5600	15.15								
CH 124	5620	15.06								
CH 128	5640	15.00								
CH 132	5660	15.06								
CH 136	5680	15.34								
CH 140	5700	12.48								
CH 144	5720	15.26								
CH 149	5745	15.31	15.11	15.22	15.29	15.10	15.20	15.28	15.14	15.20
CH 153	5765	15.13								
CH 157	5785	15.27								
CH 161	5805	15.18								
CH 165	5825	15.03								

WLAN 5GHz 802.11ac-VHT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	11.62	16.00	16.11	15.90	15.94	15.91	15.92	16.02	15.98	15.89
CH 46	5230	16.20									
CH 54	5270	16.15	15.98	15.91	16.00	16.08	15.98	15.98	15.85	15.94	15.90
CH 62	5310	13.00									
CH 102	5510	13.18	16.02	16.05	16.05	16.27	16.24	16.19	16.02	16.20	16.12
CH 110	5550	16.05									
CH 126	5630	15.75									
CH 134	5670	16.12									
CH 142	5710	16.28									
CH 151	5755	16.23	16.29	16.06	16.17	16.05	16.07	16.21	16.25	16.25	16.30
CH 159	5795	16.31									

WLAN 5GHz 802.11ac-VHT80 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 42	5210	13.35	13.13	13.14	13.13	13.23	13.31	13.14	13.06	13.22	13.20
CH 58	5290	13.08	12.78	12.79	12.80	12.77	12.83	13.03	12.86	12.87	12.77
CH 106	5530	13.46	14.58	14.61	14.52	14.54	14.59	14.78	14.53	14.76	14.66
CH 122	5610	14.80									
CH 138	5690	14.83									
CH 155	5775	14.76	14.49	14.66	14.68	14.54	14.51	14.53	14.50	14.65	14.55

<Antenna B>

WLAN 5GHz 802.11a Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	13.83	15.52	15.62	15.67	15.78	15.60	15.49	15.63
CH 40	5200	15.61							
CH 44	5220	15.60							
CH 48	5240	15.79							
CH 52	5260	15.52	15.72	15.70	15.72	15.56	15.56	15.68	15.64
CH 56	5280	15.57							
CH 60	5300	15.74							
CH 64	5320	13.15							
CH 100	5500	13.87	15.57	15.63	15.69	15.56	15.59	15.73	15.79
CH 104	5520	15.58							
CH 108	5540	15.59							
CH 112	5560	15.56							
CH 116	5580	15.55							
CH 120	5600	15.29							
CH 124	5620	15.23							
CH 128	5640	15.50							
CH 132	5660	15.82							
CH 136	5680	15.62							
CH 140	5700	12.59							
CH 144	5720	14.91							
CH 149	5745	15.85	15.88	15.67	15.66	15.93	15.85	15.66	15.88
CH 153	5765	15.87							
CH 157	5785	15.97							
CH 161	5805	15.92							
CH 165	5825	15.86							

WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
		6Mbps							
CH 36	5180	13.64	15.63	15.86	15.61	15.85	15.77	15.76	15.64
CH 40	5200	15.57							
CH 44	5220	15.68							
CH 48	5240	15.89							
CH 52	5260	15.78	15.56	15.72	15.69	15.60	15.48	15.61	15.69
CH 56	5280	15.58							
CH 60	5300	15.76							
CH 64	5320	13.04							
CH 100	5500	13.14	15.78	15.83	15.89	15.89	15.90	15.87	15.70
CH 104	5520	15.66							
CH 108	5540	15.63							
CH 112	5560	15.99							
CH 116	5580	15.63							
CH 120	5600	15.73							
CH 124	5620	15.54							
CH 128	5640	15.33							
CH 132	5660	15.66							
CH 136	5680	15.51							
CH 140	5700	12.71							
CH 144	5720	14.95							
CH 149	5745	15.86	15.85	15.56	15.65	15.71	15.69	15.74	15.63
CH 153	5765	15.83							
CH 157	5785	15.87							
CH 161	5805	15.80							
CH 165	5825	15.78							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
		MCS0							
CH 38	5190	12.96	15.99	16.03	15.81	15.98	15.79	15.75	15.82
CH 46	5230	16.06							
CH 54	5270	15.95	15.86	15.64	15.75	15.74	15.67	15.64	15.94
CH 62	5310	13.09							
CH 102	5510	13.65	16.25	16.15	16.36	16.27	16.23	16.40	16.40
CH 110	5550	16.16							
CH 126	5630	16.44							
CH 134	5670	16.02							
CH 142	5710	15.89							
CH 151	5755	16.20	16.12	15.94	16.08	16.04	16.02	15.98	16.19
CH 159	5795	16.10							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
		MCS0								
CH 36	5180	13.59	15.65	15.59	15.55	15.72	15.72	15.67	15.78	15.67
CH 40	5200	15.54								
CH 44	5220	15.64								
CH 48	5240	15.79								
CH 52	5260	15.75	15.61	15.45	15.73	15.54	15.48	15.66	15.73	15.50
CH 56	5280	15.49								
CH 60	5300	15.72								
CH 64	5320	12.99								
CH 100	5500	13.09	15.81	15.95	15.85	15.95	15.86	15.86	15.73	15.88
CH 104	5520	15.23								
CH 108	5540	15.90								
CH 112	5560	15.88								
CH 116	5580	15.99								
CH 120	5600	15.75								
CH 124	5620	15.55								
CH 128	5640	15.78								
CH 132	5660	15.63								
CH 136	5680	15.43								
CH 140	5700	12.68								
CH 144	5720	14.47								
CH 149	5745	15.84	15.69	15.64	15.65	15.56	15.71	15.60	15.54	15.73
CH 153	5765	15.81								
CH 157	5785	15.82								
CH 161	5805	15.72								
CH 165	5825	15.75								

WLAN 5GHz 802.11ac-VHT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
		MCS0									
CH 38	5190	13.01	15.91	16.00	15.90	15.97	15.79	16.03	15.89	16.02	15.78
CH 46	5230	16.04									
CH 54	5270	16.42	16.27	16.41	16.38	16.35	16.29	16.19	16.12	16.29	16.22
CH 62	5310	13.04									
CH 102	5510	13.51	16.25	16.27	16.10	16.21	16.33	16.38	16.28	16.38	16.29
CH 110	5550	16.11									
CH 126	5630	15.91									
CH 134	5670	16.40									
CH 142	5710	16.27									
CH 151	5755	16.33	16.29	16.08	16.23	16.33	16.23	16.10	16.37	16.16	16.38
CH 159	5795	16.39									

WLAN 5GHz 802.11ac-VHT80 Average Power (dBm)											
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 42	5210	13.29	13.21	13.02	13.07	13.24	13.23	13.20	13.24	13.23	13.17
CH 58	5290	13.12	13.05	13.03	13.02	13.07	12.88	13.03	13.03	12.84	12.87
CH 106	5530	13.45	13.17	13.28	13.34	13.29	13.26	13.28	13.14	13.16	13.33
CH 122	5610	13.43									
CH 138	5690	11.28									
CH 155	5775	13.82	13.52	13.67	13.57	13.63	13.57	13.70	13.53	13.67	13.78

< Antenna A+B>

WLAN 5GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate 6Mbps	9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 36	5180	13.97	15.81	15.78	15.85	15.84	15.81	15.92	15.88
CH 40	5200	15.81							
CH 44	5220	15.92							
CH 48	5240	15.98							
CH 52	5260	15.72	15.58	15.68	15.77	15.68	15.76	15.78	15.76
CH 56	5280	15.77							
CH 60	5300	15.81							
CH 64	5320	13.39							
CH 100	5500	13.46	15.68	15.78	15.96	15.92	15.91	15.69	15.78
CH 104	5520	15.75							
CH 108	5540	15.73							
CH 112	5560	15.62							
CH 116	5580	15.98							
CH 120	5600	15.90							
CH 124	5620	15.91							
CH 128	5640	15.75							
CH 132	5660	15.78							
CH 136	5680	15.57							
CH 140	5700	12.92							
CH 144	5720	15.01							
CH 149	5745	15.99	15.72	15.97	15.93	15.82	15.74	15.93	15.98
CH 153	5765	15.83							
CH 157	5785	15.85							
CH 161	5805	15.90							
CH 165	5825	15.98							

WLAN 5GHz 802.11n-HT40 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	13.49	16.26	16.26	16.28	16.22	16.41	16.47	16.43
CH 46	5230	16.48							
CH 54	5270	16.37	16.30	16.19	16.19	16.30	16.33	16.21	16.16
CH 62	5310	13.20							
CH 102	5510	13.95	16.03	16.11	16.09	16.08	16.22	16.14	16.09
CH 110	5550	16.23							
CH 126	5630	16.27							
CH 134	5670	16.10							
CH 142	5710	15.92							
CH 151	5755	16.32	16.08	16.20	16.14	16.34	16.15	16.18	16.17
CH 159	5795	16.36							

WLAN 5GHz 802.11ac-VHT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8
CH 36	5180	13.81	15.89	15.60	15.86	15.67	15.84	15.80	15.70	15.73
CH 40	5200	15.83								
CH 44	5220	15.91								
CH 48	5240	15.68								
CH 52	5260	15.59	16.01	16.12	16.01	15.87	16.04	15.98	16.06	15.96
CH 56	5280	16.18								
CH 60	5300	15.63								
CH 64	5320	13.36								
CH 100	5500	13.44	15.91	15.77	15.78	15.75	15.79	15.74	15.70	15.77
CH 104	5520	15.80								
CH 108	5540	15.88								
CH 112	5560	15.75								
CH 116	5580	15.76								
CH 120	5600	15.56								
CH 124	5620	15.98								
CH 128	5640	15.84								
CH 132	5660	15.86								
CH 136	5680	15.61								
CH 140	5700	12.91								
CH 144	5720	15.43								
CH 149	5745	15.89	15.83	15.66	15.67	15.78	15.66	15.60	15.58	15.70
CH 153	5765	15.63								
CH 157	5785	15.61								
CH 161	5805	15.53								
CH 165	5825	15.77								

WLAN 5GHz 802.11ac-VHT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 38	5190	13.16	16.17	16.43	16.29	16.38	16.41	16.38	16.25	16.28	16.26
CH 46	5230	16.48									
CH 54	5270	16.26	16.10	16.23	16.10	15.98	16.20	16.23	16.14	16.06	16.20
CH 62	5310	13.45									
CH 102	5510	13.77	16.01	16.09	16.03	16.29	16.24	16.18	16.01	16.30	16.30
CH 110	5550	16.32									
CH 126	5630	16.13									
CH 134	5670	16.21									
CH 142	5710	16.08									
CH 151	5755	16.08	16.26	16.11	16.35	16.28	16.12	16.27	16.17	16.37	16.23
CH 159	5795	16.38									

WLAN 5GHz 802.11ac-VHT80 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate								
Channel	Frequency (MHz)	MCS Index MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9
CH 42	5210	13.09	13.08	12.84	13.04	13.04	12.94	13.06	13.01	13.06	13.02
CH 58	5290	13.06	13.02	12.87	12.77	12.81	12.96	13.05	13.02	12.79	12.81
CH 106	5530	13.47	14.32	14.54	14.28	14.46	14.49	14.53	14.45	14.36	14.50
CH 122	5610	14.44									
CH 138	5690	14.56									
CH 155	5775	14.87	14.67	14.63	14.59	14.86	14.61	14.56	14.85	14.70	14.72

13. Bluetooth Exclusions Applied

Mode Band	Average power(dBm)	
	Bluetooth v3.0+EDR	Bluetooth v4.0+LE
2.4GHz Bluetooth	6.0	3.0

Note:

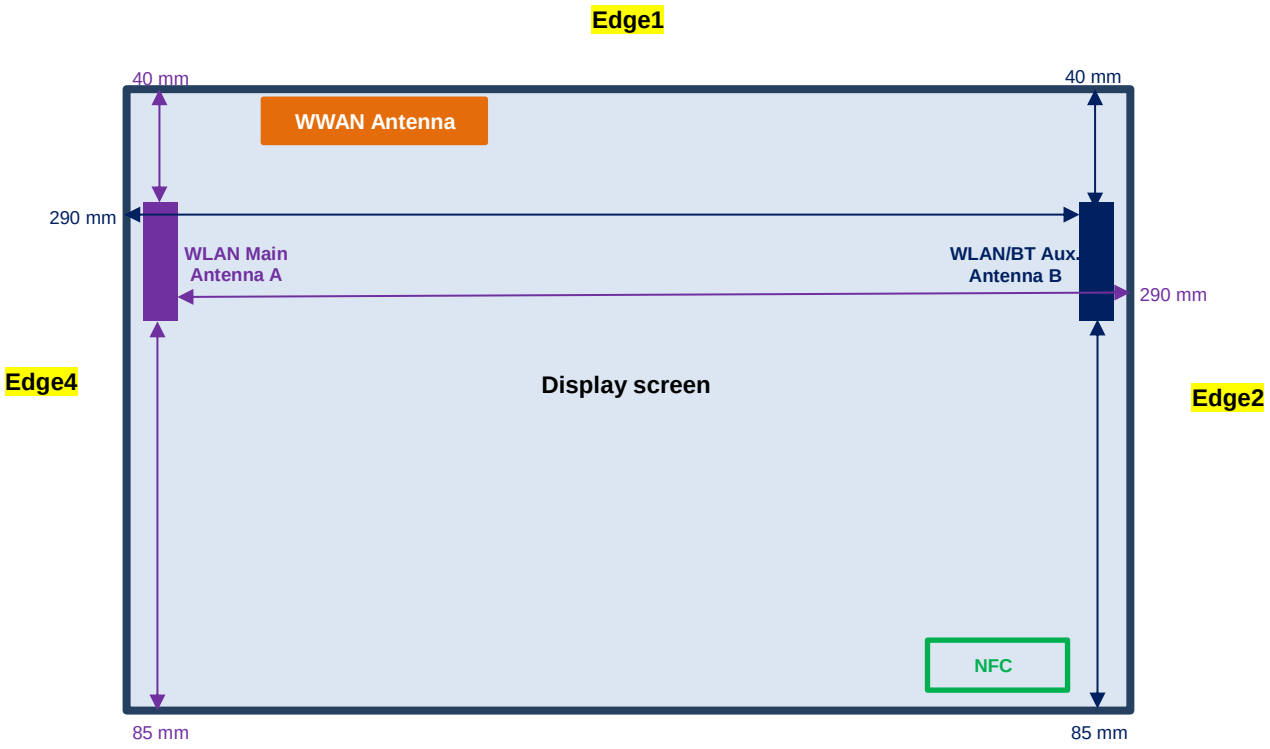
1. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison

Bluetooth Max Power (dBm)	Separation Distance (mm)	Frequency (GHz)	exclusion thresholds
6	< 5	2.48	1.26

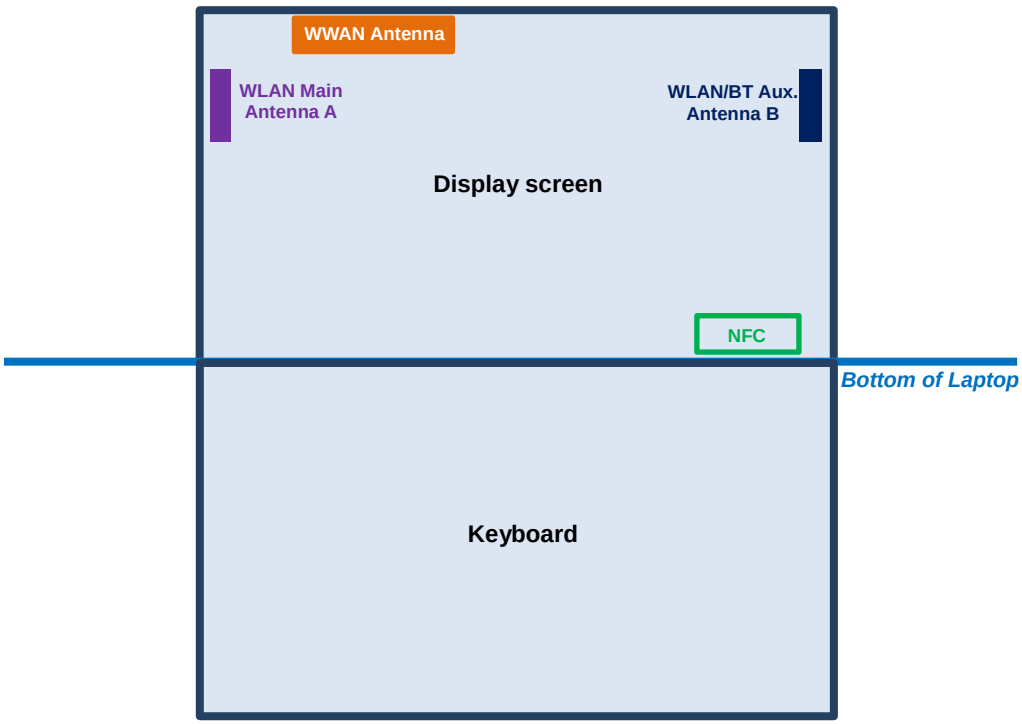
Note:

Per KDB 447498 D01v05r02, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. The test exclusion threshold is 1.26 which is <= 3, SAR testing is not required.

14. Antenna Location



Front View


WWAN Antenna
WLAN Main Antenna A
WLAN/BT Aux. Antenna B
Display screen
NFC
Bottom of Laptop
Keyboard

<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v05r02, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v05r02, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v05r02, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v05r02, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	802.11b Ant A	802.11b Ant B	802.11a Ant A	802.11a Ant B
	Calculated Frequency	2462MHz	2462MHz	5825MHz	5825MHz
	Maximum power (dBm)	17.5	17.5	16.5	16.5
	Maximum rated power(mW)	56	56	45	45
Bottom Face	Separation distance(mm)	5	5	5	5
	exclusion threshold	17.6	17.6	21.7	21.7
	Testing required?	**Yes**	**Yes**	**Yes**	**Yes**
Edge 1	Separation distance(mm)	40.00	40.00	40.00	40.00
	exclusion threshold	2.2	2.2	2.7	2.7
	Testing required?	**No**	**No**	**No**	**No**
Edge 2	Separation distance(mm)	290.00	5.00	290.00	5.00
	exclusion threshold	2496.0	17.6	2462.0	21.7
	Testing required?	**No**	**Yes**	**No**	**Yes**
Edge 3	Separation distance(mm)	85.00	85.00	85.00	85.00
	exclusion threshold	446.0	446.0	412.0	412.0
	Testing required?	**No**	**No**	**No**	**No**
Edge 4	Separation distance(mm)	5.00	290.00	5.00	290.00
	exclusion threshold	17.6	2496.0	21.7	2462.0
	Testing required?	**Yes**	**No**	**Yes**	**No**
Bottom of Laptop	Separation distance(mm)	85.00	85.00	85.00	85.00
	exclusion threshold	446.0	446.0	412.0	412.0
	Testing required?	**No**	**No**	**No**	**No**

15. SAR Test Results

General Note:

1. Per KDB 447498 D01v05r02, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r02, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

15.1 Body SAR

<WLAN SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant A	11	2462	17.39	17.50	1.026	98.7	1.013	-0.08	0.009	0.009
	WLAN2.4GHz	802.11b 1Mbps	Edge 4	0cm	Ant A	11	2462	17.39	17.50	1.026	98.7	1.013	-0.1	0.247	0.257
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0cm	Ant B	6	2437	17.28	17.50	1.053	98.7	1.013	-0.12	0.007	0.008
1	WLAN2.4GHz	802.11b 1Mbps	Edge 2	0cm	Ant B	6	2437	17.28	17.50	1.053	98.7	1.013	-0.12	0.376	**0.401**
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant A	44	5220	15.35	16.00	1.161	99.04	1.010	0.11	0.001	0.001
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant A	44	5220	15.35	16.00	1.161	99.04	1.010	0.15	0.334	0.392
	WLAN5GHz	802.11n-HT40 MCS0	Edge 4	0cm	Ant A	46	5230	16.23	16.50	1.064	97.53	1.025	0.12	0.432	0.471
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	46	5230	16.20	16.50	1.070	96.94	1.032	0.18	0.435	0.480
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 4	0cm	Ant A	42	5210	13.35	13.50	1.036	94.07	1.063	0.14	0.186	0.205
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant B	48	5240	15.79	16.00	1.050	99.04	1.010	0.08	0.012	0.013
2	WLAN5GHz	802.11a 6Mbps	Edge 2	0cm	Ant B	48	5240	15.79	16.00	1.050	99.04	1.010	-0.01	0.657	**0.696**
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	46	5230	16.06	16.50	1.107	97.53	1.025	-0.01	0.607	0.689
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	46	5230	16.04	16.50	1.112	97.96	1.021	-0.01	0.608	0.690
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0cm	Ant B	42	5210	13.29	13.50	1.051	94.07	1.063	-0.03	0.283	0.316
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant A	52	5260	15.05	16.00	1.244	99.04	1.010	-0.03	0.001	0.001
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant A	52	5260	15.05	16.00	1.244	99.04	1.010	-0.03	0.212	0.266
	WLAN5GHz	802.11n-HT40 MCS0	Edge 4	0cm	Ant A	54	5270	16.20	16.50	1.072	97.53	1.025	-0.17	0.285	0.313
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	54	5270	16.15	16.50	1.083	96.94	1.032	0.18	0.373	0.417
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 4	0cm	Ant A	58	5290	13.08	13.50	1.103	94.07	1.063	-0.14	0.119	0.139
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant B	60	5300	15.74	16.00	1.062	99.04	1.010	-0.17	0.005	0.005
	WLAN5GHz	802.11a 6Mbps	Edge 2	0cm	Ant B	60	5300	15.74	16.00	1.062	99.04	1.010	-0.11	0.589	0.632
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	54	5270	15.95	16.50	1.135	97.53	1.025	-0.02	0.814	0.947
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	62	5310	13.09	14.00	1.233	97.53	1.025	-0.01	0.421	0.532
3	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	54	5270	16.42	16.50	1.019	97.96	1.021	-0.04	0.914	**0.951**
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	62	5310	13.04	14.00	1.248	97.96	1.021	-0.01	0.424	0.540
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0cm	Ant B	58	5290	13.12	13.50	1.093	94.07	1.063	-0.05	0.370	0.430

Plot No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant A	104	5520	15.35	16.00	1.161	99.04	1.010	-	0.001	0.001
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant A	104	5520	15.35	16.00	1.161	99.04	1.010	-0.09	0.208	0.244
	WLAN5GHz	802.11n-HT40 MCS0	Edge 4	0cm	Ant A	142	5710	16.26	16.50	1.057	97.53	1.025	-0.05	0.306	0.332
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	142	5710	16.28	16.50	1.052	96.94	1.032	-0.15	0.401	0.436
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	102	5510	13.18	14.00	1.206	96.94	1.032	-0.09	0.174	0.217
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	110	5550	16.05	16.50	1.108	96.94	1.032	-0.09	0.272	0.311
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	126	5630	15.75	16.50	1.187	96.94	1.032	-0.02	0.322	0.394
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	134	5670	16.12	16.50	1.090	96.94	1.032	-0.02	0.361	0.406
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 4	0cm	Ant A	138	5690	14.83	15.00	1.040	94.07	1.063	-0.18	0.290	0.321
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant B	132	5660	15.82	16.00	1.042	99.04	1.010	-0.013	0.037	0.039
	WLAN5GHz	802.11a 6Mbps	Edge 2	0cm	Ant B	132	5660	15.82	16.00	1.042	99.04	1.010	-0.13	0.328	0.345
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	126	5630	16.44	16.50	1.014	97.53	1.025	0.07	0.417	0.434
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	110	5550	16.16	16.50	1.082	97.53	1.025	0.03	0.591	0.655
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	134	5670	16.02	16.50	1.117	97.53	1.025	0.01	0.496	0.568
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	134	5670	16.40	16.50	1.023	97.96	1.021	0.04	0.541	0.565
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	102	5510	13.51	14.00	1.120	97.96	1.021	-0.15	0.308	0.352
4	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	110	5550	16.11	16.50	1.094	97.96	1.021	0.04	0.606	**0.677**
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	126	5630	15.91	16.50	1.146	97.96	1.021	0.01	0.399	0.467
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	142	5710	16.27	16.50	1.055	97.96	1.021	0.04	0.490	0.528
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0cm	Ant B	106	5530	13.45	14.00	1.136	94.07	1.063	-0.16	0.299	0.361
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant A	157	5785	15.49	16.00	1.125	99.04	1.010	-0.13	0.013	0.015
	WLAN5GHz	802.11a 6Mbps	Edge 4	0cm	Ant A	157	5785	15.49	16.00	1.125	99.04	1.010	0.15	0.313	0.356
	WLAN5GHz	802.11n-HT40 MCS0	Edge 4	0cm	Ant A	151	5755	16.24	16.50	1.062	97.53	1.025	0.12	0.519	0.565
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 4	0cm	Ant A	159	5795	16.31	16.50	1.045	96.94	1.032	0.18	0.437	0.471
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 4	0cm	Ant A	155	5775	14.76	15.00	1.057	94.07	1.063	0.16	0.250	0.281
	WLAN5GHz	802.11a 6Mbps	Bottom Face	0cm	Ant B	157	5785	15.97	16.00	1.007	99.04	1.010	-0.03	0.025	0.025
	WLAN5GHz	802.11a 6Mbps	Edge 2	0cm	Ant B	157	5785	15.97	16.00	1.007	99.04	1.010	-0.04	0.442	0.450
5	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	151	5755	16.20	16.50	1.072	97.53	1.025	0	0.562	**0.617**
	WLAN5GHz	802.11n-HT40 MCS0	Edge 2	0cm	Ant B	159	5795	16.10	16.50	1.096	97.53	1.025	-0.01	0.427	0.480
	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	159	5795	16.39	16.50	1.026	97.96	1.021	-0.01	0.512	0.536
	WLAN5GHz	802.11ac-VHT80 MCS0	Edge 2	0cm	Ant B	155	5775	13.82	14.00	1.042	94.07	1.063	-0.09	0.319	0.353

15.2 Repeated SAR Measurement

No.	Band	Mode	Test Position	Gap (cm)	Antenna	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
1st	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	54	5270	16.42	16.50	1.019	97.96	1.021	-0.04	0.914	-	0.951
2nd	WLAN5GHz	802.11ac-VHT40 MCS0	Edge 2	0cm	Ant B	54	5270	16.42	16.50	1.019	97.96	1.021	-0.05	0.882	1.04	0.917

General Note:

1. Per KDB 865664 D01v01r03, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01r03, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

16. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Support
1.	WLAN Main Ant A + WLAN Aux. Ant B	Yes
2.	WLAN Main Ant A + Bluetooth Aux. Ant B	Yes
3.	GPRS/EDGE(Data) + WLAN2.4GHz(data)	Yes
4.	WCDMA(Data) + WLAN2.4GHz(data)	Yes
5.	CDMA(Data) + WLAN2.4GHz(data)	Yes
6.	LTE(Data) + WLAN2.4GHz(data)	Yes
7.	GPRS/EDGE(Data) + Bluetooth(data)	Yes
8.	WCDMA(Data) + Bluetooth(data)	Yes
9.	CDMA(Data) + Bluetooth(data)	Yes
10.	LTE(Data) + Bluetooth(data)	Yes
11.	GPRS/EDGE(data) + WLAN5GHz(data)	No
12.	WCDMA(data) + WLAN5GHz(data)	No
13.	CDMA(data) + WLAN5 GHz(data)	No
14.	LTE(data) + WLAN5GHz(data)	No

General Note:

1. The WWAN module, Brand Name: Sierra, Model Name: EM7355, FCC ID: QYLEM7355V is also integrated into this host and the WWAN SAR testing results are also used perform transmission simultaneous analysis which can be referred to Sporton SAR Test Report, Report No: FA3O1142 Rev.01.
2. For co-location analysis:
   i) For WWAN SAR testing was performed on bottom face, Edge1 and Edge4, according to KDB 447498 D01v05r02 exclusion thresholds which can be referred to Sporton FCC SAR Report, FCC ID: QYLEM7355V, Report No: FA3O1142 Rev.01 page54.
   ii) The WLAN SAR testing was performed on bottom face, Edge2 and Edge4, according to KDB 447498 D01v05r02 exclusion thresholds which can be referred to page30.
   iii) For co-location analysis was performed at the same exposure positions, which are bottom face and Edge4, where both WWAN standalone SAR and WLAN standalone SAR was assessed.
3. Per KDB 447498 D01v05r02, 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.
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r02 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) When the minimum separation distance is < 5mm, the distance is used 5mm to determine SAR test exclusion.
   iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.
   iv) Bluetooth estimated SAR is conservatively determined by 5mm separation, for all applicable exposure positions.

Bluetooth Max Power	Exposure Position	All Positions
6 dBm	Estimated SAR (W/kg)	0.168 W/kg

16.1 Body Exposure Conditions

Position	WLAN Band	1	2	3	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)
		WLAN Ant A	WLAN Ant B	Bluetooth Ant B		
		SAR (W/kg)	SAR (W/kg)	Estimated SAR (W/kg)		
Bottom Face At 0 cm	2.4GHz WLAN	0.009	0.008	0.168	**0.02**	**0.18**
	5.2GHz WLAN	0.001	0.013	0.168	**0.01**	**0.17**
	5.3GHz WLAN	0.001	0.005	0.168	**0.01**	**0.17**
	5.5GHz WLAN	0.001	0.039	0.168	**0.04**	**0.17**
	5.8GHz WLAN	0.015	0.025	0.168	**0.04**	**0.18**
Edge4 At 0 cm	2.4GHz WLAN	0.257		0.168	**0.26**	**0.43**
	5.2GHz WLAN	0.480		0.168	**0.48**	**0.65**
	5.3GHz WLAN	0.417		0.168	**0.42**	**0.59**
	5.5GHz WLAN	0.436		0.168	**0.44**	**0.60**
	5.8GHz WLAN	0.565		0.168	**0.57**	**0.73**
Edge2 At 0cm	2.4GHz WLAN		0.401	0.168	**0.40**	**0.17**
	5.2GHz WLAN		0.696	0.168	**0.70**	**0.17**
	5.3GHz WLAN		0.951	0.168	**0.95**	**0.17**
	5.5GHz WLAN		0.677	0.168	**0.68**	**0.17**
	5.8GHz WLAN		0.617	0.168	**0.62**	**0.17**

Position	1		2	3	4	1+2 Summed SAR (W/kg)	1+3 Summed SAR (W/kg)	1+4 Summed SAR (W/kg)
	WWAN		2.4GHz WLAN Ant A	2.4GHz WLAN Ant B	Bluetooth Ant B			
	Band	SAR (W/kg)	SAR (W/kg)	SAR (W/kg)	Estimated SAR (W/kg)			
Bottom Face	GSM850	0.025	0.009	0.008	0.168	**0.03**	**0.03**	**0.19**
	GSM1900	0.016	0.009	0.008	0.168	**0.03**	**0.02**	**0.18**
	WCDMA V	0.025	0.009	0.008	0.168	**0.03**	**0.03**	**0.19**
	WCDMA IV	0.040	0.009	0.008	0.168	**0.05**	**0.05**	**0.21**
	WCDMA II	0.029	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
	CDMA BC0	0.033	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
	CDMA BC1	0.025	0.009	0.008	0.168	**0.03**	**0.03**	**0.19**
	CDMA BC10	0.033	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
	LTE Band 2	0.026	0.009	0.008	0.168	**0.04**	**0.03**	**0.19**
	LTE Band 4	0.025	0.009	0.008	0.168	**0.03**	**0.03**	**0.19**
	LTE Band 5	0.027	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
	LTE Band 13	0.034	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
	LTE Band 17	0.022	0.009	0.008	0.168	**0.03**	**0.03**	**0.19**
	LTE Band 25	0.032	0.009	0.008	0.168	**0.04**	**0.04**	**0.20**
Edge1	GSM850	1.059			0.168	**1.06**	**1.06**	**1.23**
	GSM1900	1.126			0.168	**1.13**	**1.13**	**1.29**
	WCDMA V	1.068			0.168	**1.07**	**1.07**	**1.24**
	WCDMA IV	1.332			0.168	**1.33**	**1.33**	**1.50**
	WCDMA II	1.353			0.168	**1.35**	**1.35**	**1.52**
	CDMA BC0	1.216			0.168	**1.22**	**1.22**	**1.38**
	CDMA BC1	1.165			0.168	**1.17**	**1.17**	**1.33**
	CDMA BC10	1.160			0.168	**1.16**	**1.16**	**1.33**
	LTE Band 2	1.381			0.168	**1.38**	**1.38**	**1.55**
	LTE Band 4	1.244			0.168	**1.24**	**1.24**	**1.41**
	LTE Band 5	1.206			0.168	**1.21**	**1.21**	**1.37**
	LTE Band 13	1.372			0.168	**1.37**	**1.37**	**1.54**
	LTE Band 17	1.274			0.168	**1.27**	**1.27**	**1.44**
	LTE Band 25	1.169			0.168	**1.17**	**1.17**	**1.34**
Edge4	GSM850	0.049	0.257		0.168	**0.31**	**0.05**	**0.22**
	GSM1900	0.245	0.257		0.168	**0.50**	**0.25**	**0.41**
	WCDMA V	0.040	0.257		0.168	**0.30**	**0.04**	**0.21**
	WCDMA IV	0.331	0.257		0.168	**0.59**	**0.33**	**0.50**
	WCDMA II	0.226	0.257		0.168	**0.48**	**0.23**	**0.39**
	CDMA BC0	0.041	0.257		0.168	**0.30**	**0.04**	**0.21**
	CDMA BC1	0.233	0.257		0.168	**0.49**	**0.23**	**0.40**
	CDMA BC10	0.053	0.257		0.168	**0.31**	**0.05**	**0.22**
	LTE Band 2	0.336	0.257		0.168	**0.59**	**0.34**	**0.50**
	LTE Band 4	0.419	0.257		0.168	**0.68**	**0.42**	**0.59**
	LTE Band 5	0.042	0.257		0.168	**0.30**	**0.04**	**0.21**
	LTE Band 13	0.041	0.257		0.168	**0.30**	**0.04**	**0.21**
	LTE Band 17	0.023	0.257		0.168	**0.28**	**0.02**	**0.19**
	LTE Band 25	0.336	0.257		0.168	**0.59**	**0.34**	**0.50**

Test Engineer： Mood Huang, Bevis Chang, Angelo Chang, and Jerry Hu

17. Uncertainty Assessment

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

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

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

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multi-plying Factor[a]	1/k[b]	1/√3	1/√6	1/√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 16.1. 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 Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.0	Normal	1	1	1	± 6.0 %	± 6.0 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.4	Rectangular	√3	1	1	± 0.2 %	± 0.2 %
Probe Positioning	2.9	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Max. SAR Eval.	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 11.0 %	± 10.8 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 22.0 %**	**± 21.5 %**

Table 16.2. Uncertainty Budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.55	Normal	1	1	1	± 6.55 %	± 6.55 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Probe Positioning	9.9	Rectangular	√3	1	1	± 5.7 %	± 5.7 %
Max. SAR Eval.	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 12.8 %	± 12.6 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 25.6 %**	**± 25.2 %**

Table 16.3. Uncertainty Budget for frequency range 3 GHz to 6 GHz

18. References

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

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

[3] IEEE Std. 1528-2003, “Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques”, December 2003

[4] SPEAG DASY System Handbook

[5] FCC KDB 248227 D01 v01r02, “SAR Measurement Procedures for 802.11 a/b/g Transmitters”, May 2007

[6] FCC KDB 447498 D01 v05r02, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Feb 2014

[7] FCC KDB 616217 D04 v01r01, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, May 2013

[8] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.

[9] FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations” May 2013.