FCC SAR TEST REPORT

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	dtab Compact
BRAND NAME	:	NTT docomo
Model Name	:	ELF-8605L
FCC ID	:	O57ELF8605L
STANDARD	:	FCC 47 CFR Part 2 (2.1093) ANSI/IEEE C95.1-1992 IEEE 1528-2013

The product was received on May 09, 2020 and testing was started from Jul. 20, 2020 and completed on Jul. 26, 2020. We, Sporton International (Kunshan) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.

Rose Wang

Reviewed by: Rose Wang / Supervisor

Kat Yin

Approved by: Kat Yin / Manager

ilac-MRA

ACCREDITED Cert #5145.02

Sporton International (Kunshan) Inc.
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China

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History of this test report

Report No.	Version	Description	Issued Date
FA050909	Rev. 01	Initial issue of report	Aug. 25, 2020

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Lenovo (Shanghai) Electronics Technology Co., Ltd., Portable Tablet Computer, ELF-8605L,** are as follows.

Highest Standalone 1g SAR Summary				
Equipment Class	Frequency Band		Body 1g SAR (W/kg)	Highest Simultaneous Transmission 1g SAR (W/kg)
Licensed	WCDMA	Band V	0.69	1.58
	LTE	Band 5	0.88	
		Band 41/Band 38	**1.11**	
DTS	WLAN	2.4GHz WLAN	0.34	1.23
NII		5GHz WLAN	0.38	1.24
DSS	Bluetooth	Bluetooth	0.64	1.58
Date of Testing:		2020/7/20~2020/7/26		

Remark: This device supports both LTE B38 and B41. Since the supported frequency span for LTE B38 falls completely within the supports frequency span for LTE B41, both LTE bands have the same target power, and both LTE bands share the same transmission path; therefore, SAR was only assessed for LTE B41.

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

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg for Partial-Body 1g SAR) 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

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address	Section 304-305, Building No. 4, # 222, Meiyue Road, China (Shanghai) Pilot Free Trade Zone

Manufacturer	
Company Name	Lenovo PC HK Limited
Address	23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong, P.R.China

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

4. Equipment Under Test (EUT) Information

4.1 General Information

Product Feature & Specification	
Equipment Name	dtab Compact
Brand Name	NTT docomo
Model Name	ELF-8605L
FCC ID	O57ELF8605L
SN Code	HA1567EC
Wireless Technology and Frequency Range	WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 41: 2537.5 MHz ~ 2652.5 MHz 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 ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA LTE: QPSK, 16QAM, 64QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	Tablet ELF-8605L
SW Version	ELF8605L_RF04_20200813
EUT Stage	Identical Prototype

Remark:
1. This device has voice function.
2. The device employs proximity sensors that detect the presence of the user’s body also a finger or hand near the bottom face, edge 1 or edge 2 of the device, reduced power will be active for all WWAN bands. (P-sensor can’t work at detecting presence of the user’s body at other edges of the device.)
3. For WLAN, the device employs proximity sensors that detect the presence of the user’s body also a finger or hand near the bottom face or edge 1 or edge 4 of the device, reduced power will be active for all WLAN bands. (P-sensor can’t work at detecting presence of the user’s body at other edges of the device.)
4. There are two types of EUT. The difference can refer to the product equality declaration. According to the difference, we only choose the sample 1 to perform full SAR testing.

4.2 General LTE SAR Test and Reporting Considerations

Summarized necessary items addressed in KDB 941225 D05 v02r05	
FCC ID	O57ELF8605L
Equipment Name	Portable Tablet Computer
Operating Frequency Range of each LTE transmission band	LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 38: 2572.5 MHz ~ 2617.5 MHz LTE Band 41: 2537.5 MHz ~ 2652.5 MHz
Channel Bandwidth	LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 38: 5MHz, 10MHz, 15MHz, 20MHz LTE Band 41: 5MHz, 10MHz, 15MHz, 20MHz
uplink modulations used	QPSK / 16QAM / 64QAM
LTE release	R12, Cat 13
CA support	No.
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 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{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
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

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, Proximity Sensor. Power reduction will be active at bottom face, edge 1 or edge 2 for all WWAN bands.

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

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 38

	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	37775	2572.5	37800	2575	37825	2577.5	37850	2580
M	38000	2595	38000	2595	38000	2595	38000	2595
H	38225	2617.5	38200	2615	38175	2612.5	38150	2610

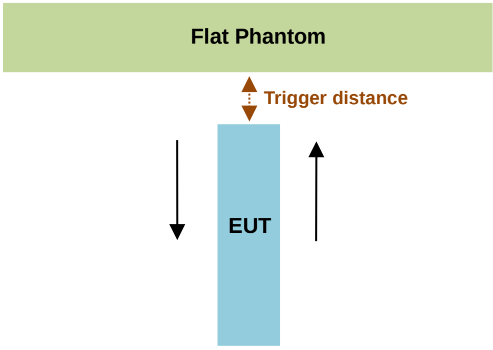
LTE Band 41

	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	40065	2537.5	40090	2540	40115	2542.5	40140	2545
LM	40385	2569.5	40390	2570	40395	2570.5	40400	2571
HM	40705	2601.5	40690	2600	40685	2599.5	40670	2598
H	41215	2652.5	41190	2650	41165	2647.5	41140	2645

5. Proximity Sensor Triggering Test

<Proximity Sensor Triggering Distance (KDB 616217 D04 section 6.2)>:

1. Proximity sensor triggering distance testing was performed according to the procedures outlined in KDB 616217 D04 section 6.2, and EUT moving further away from the flat phantom and EUT moving toward the flat phantom were both assessed and the tissue-equivalent medium for highest frequency 5825MHz and lowest 850MHz frequency was used for proximity sensor triggering testing.
2. Capacitive proximity sensor placed coincident with antenna elements at WWAN antenna and WLAN antenna. There is no need to do sensor coverage testing for the proximity sensor is designed to support sufficient detection range and sensitivity to cover regions of the sensors in all applicable directions since the proximity sensor entirely covers the antenna.
3. When the sensor is active, all WWAN/WLAN bands reduced power will be active.
4. The sensors used to detect the proximity of the user's body at the Bottom Face or Edge 1 or Edge 2 side for WWAN, Bottom Face or Edge 1 or Edge 4 side for WLAN of the device use a detection threshold distance. The data shown in the sections below shows the distance(s).



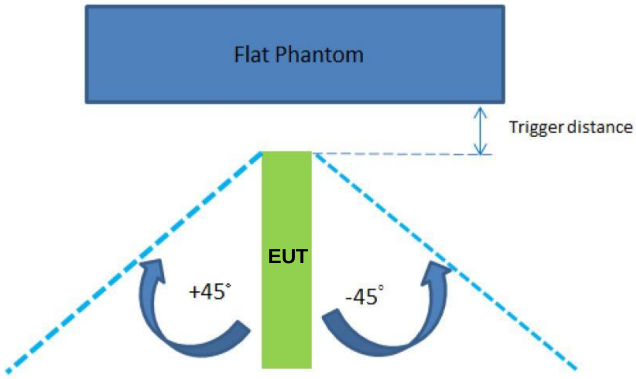
Proximity Sensor Triggering Distance (mm)								
Position	Bottom Face		Edge 1		Edge 2		Edge 4	
	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away	Moving towards	Moving away
Minimum	16	16	16	16	6	6	11	11

<Proximity Sensor Triggering Coverage (KDB 616217 D04 section 6.3)>:

If a sensor is spatially offset from the antenna(s), it is necessary to verify sensor triggering for conditions where the antenna is next to the user but the sensor is laterally further away to ensure sensor coverage is sufficient for reducing the power to maintain compliance. For p-sensor coverage testing, the device is moved and "along the direction of maximum antenna and sensor offset".
Illustrated in the internal photo exhibit, although the senor is spatially offset, there is no trigger condition where the antenna is next to the user but the sensor is laterally further away, therefore proximity sensor coverage testing is not required.
This procedure is not required because antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

<Tablet Tilt angle influences to proximity sensor triggering (KDB 616217 D04 section 6.4)>:

The influence of table tilt angles to proximity sensor triggering was determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at 16 mm at Edge 1, 6 mm at Edge 2, 11 mm at Edge 4.
Rotating the tablet around the edge next to the phantom in ≤ 10° increments until the tablet is ± 45° from the vertical position at 0°, and the maximum output power remains in the reduced mode.



The Sensor Trigger Distance (mm)			
Position	Edge 1	Edge 2	Edge 4
Minimum	16	6	11

Proximity sensor power reduction

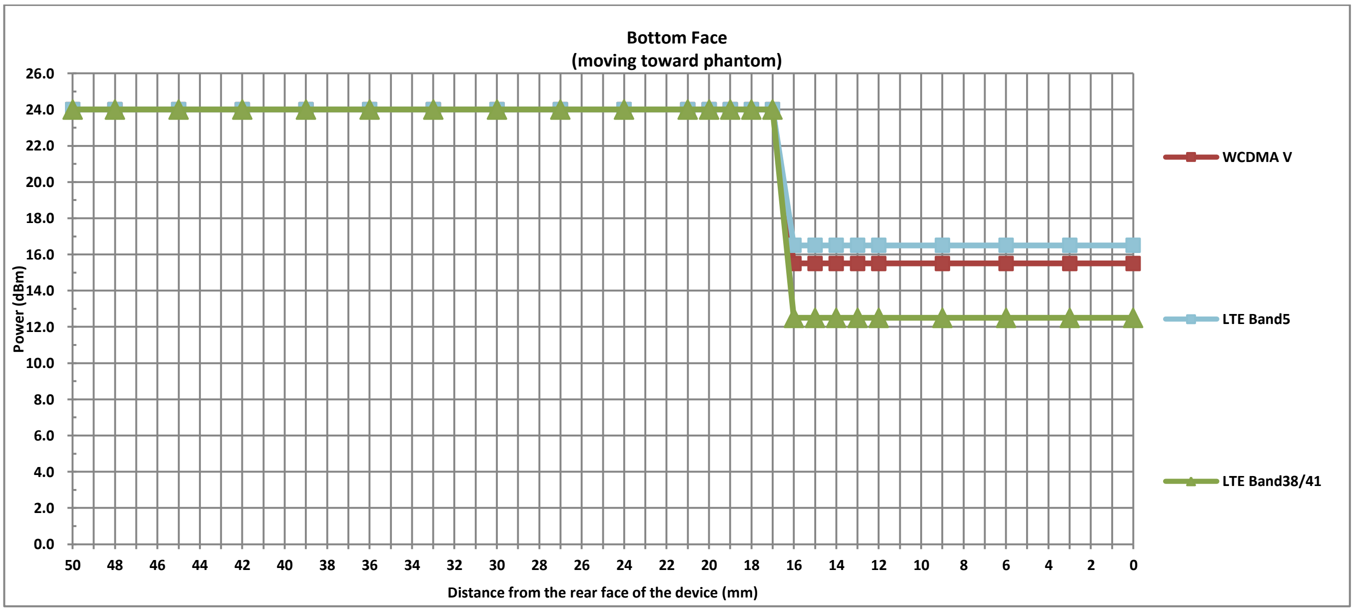
Exposure Position / wireless mode	Bottom Face[(1)]	Edge 1[(1)]	Edge 2[(1)]	Edge 3	Edge 4[(1)]
WCDMA Band V	8.5 dB	8.5 dB	8.5 dB	0 dB	0 dB
LTE Band 5	7.5 dB	7.5 dB	7.5 dB	0 dB	0 dB
LTE Band 41/38	11.5 dB	11.5 dB	11.5 dB	0 dB	0 dB
WLAN 2.4GHz	8.0 dB	8.0 dB	0 dB	0 dB	8.0 dB
WLAN 5.2GHz	8.5 dB	8.5 dB	0 dB	0 dB	8.5 dB
WLAN 5.3GHz	7.0 dB	7.0 dB	0 dB	0 dB	7.0 dB
WLAN 5.5GHz	8.0 dB	8.0 dB	0 dB	0 dB	8.0 dB
WLAN 5.8GHz	9.5 dB	9.5 dB	0 dB	0 dB	9.5 dB

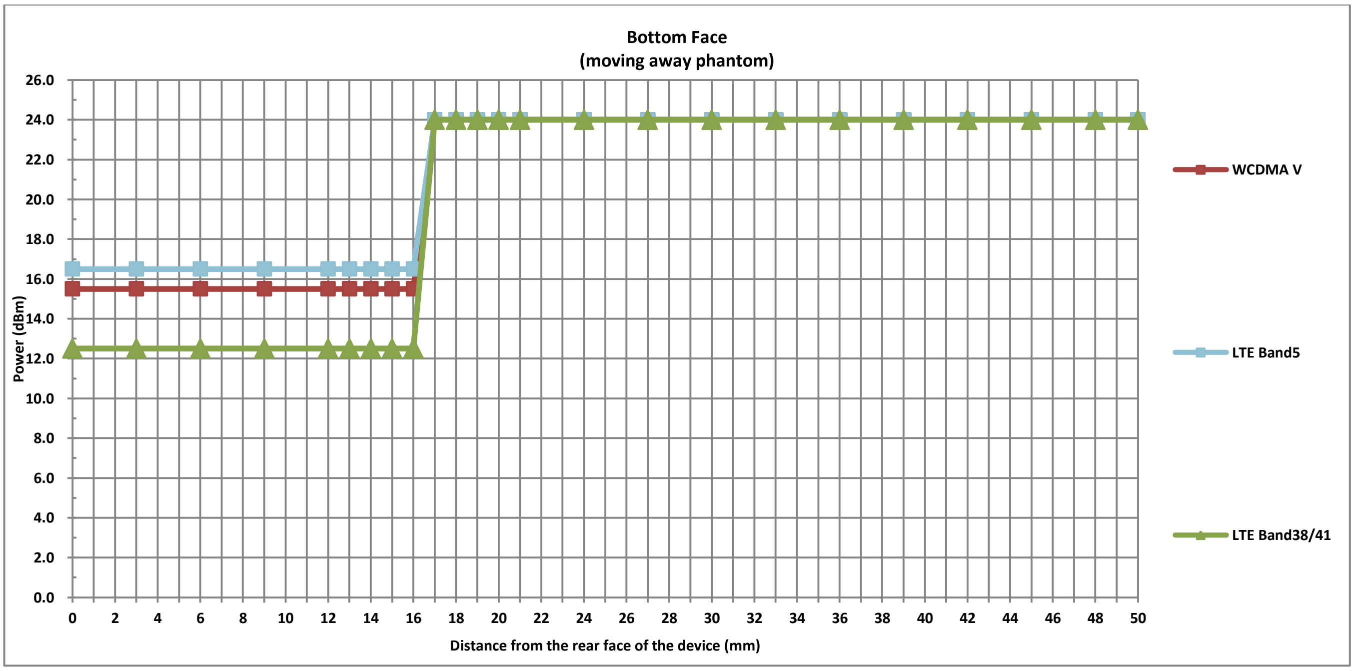
Remark:

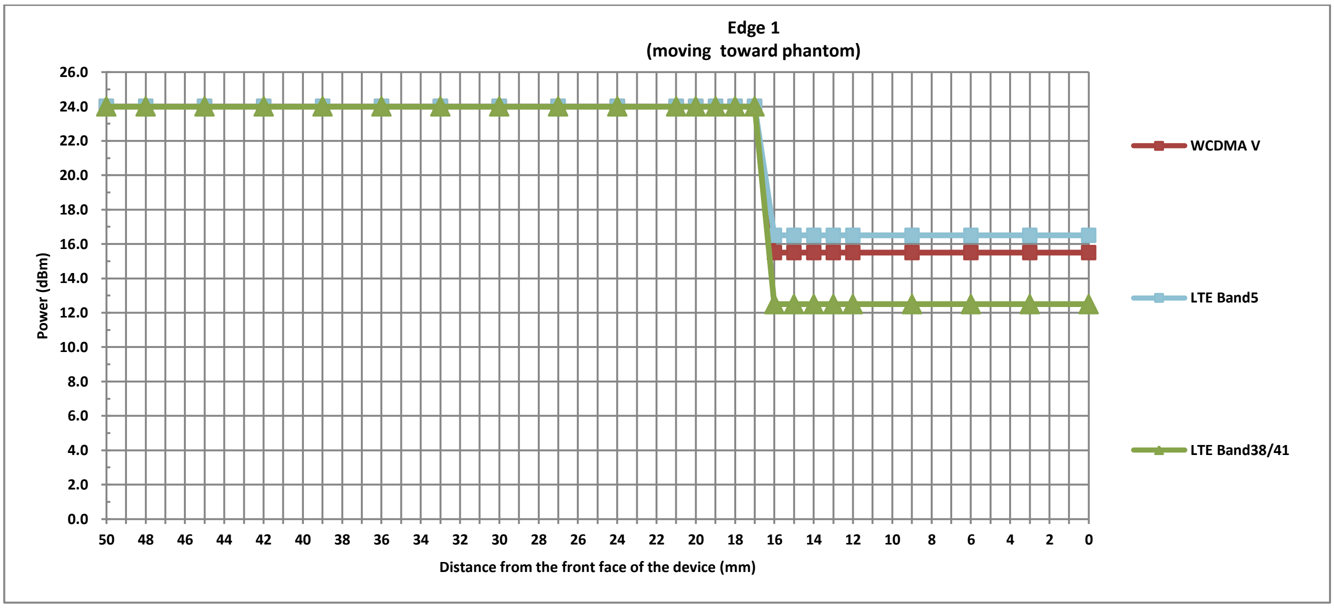
1. [(1)]: Reduced maximum limit applied by activation of proximity sensor.
2. Power reduction is not applicable for Bluetooth.
3. Tests were performed in accordance with KDB 616217 D04 section 6.1, 6.2, 6.3, 6.4 and 6.5 and compliant results are shown and described in exhibit "P-Sensor operational description
4. For verification of compliance of power reduction scheme, additional SAR testing with EUT transmitting at full RF power at a conservative trigger distance was performed:
   - Bottom Face: 15 mm
   - Edge 1: 15 mm
   - Edge 2: 5 mm
   - Edge 4: 10 mm

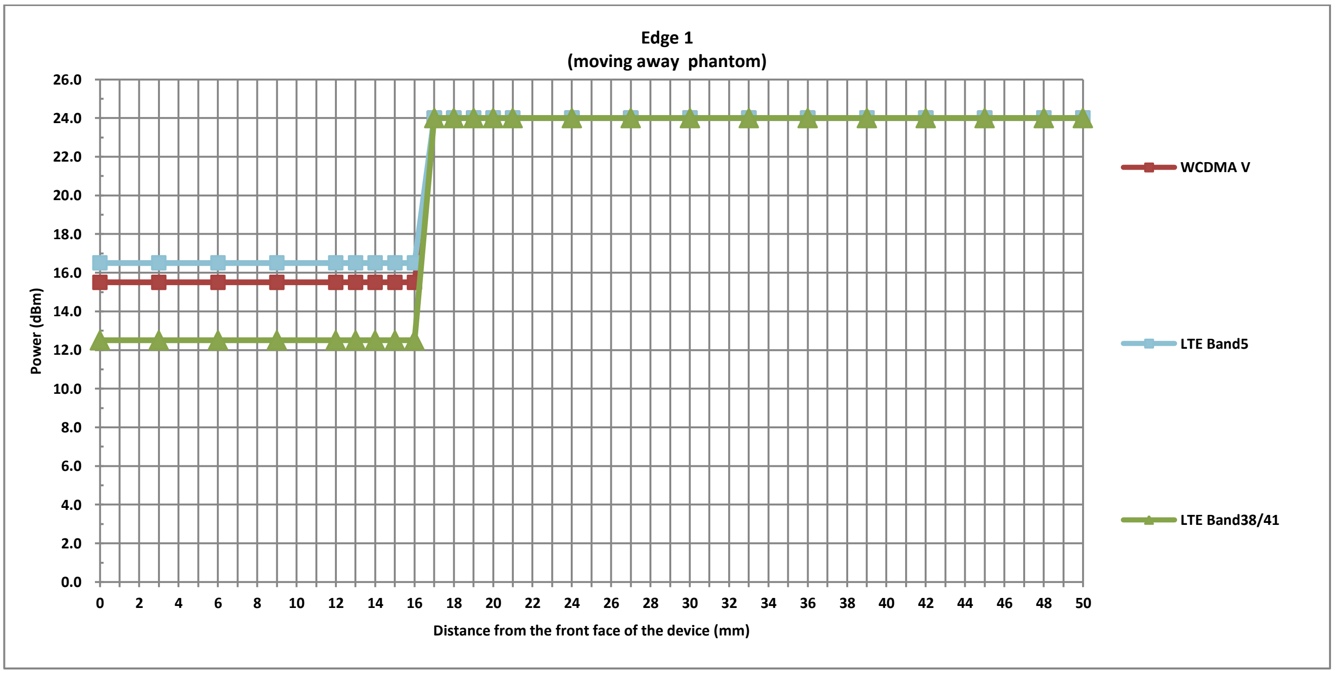
Power Measurement during Sensor Trigger distance testing

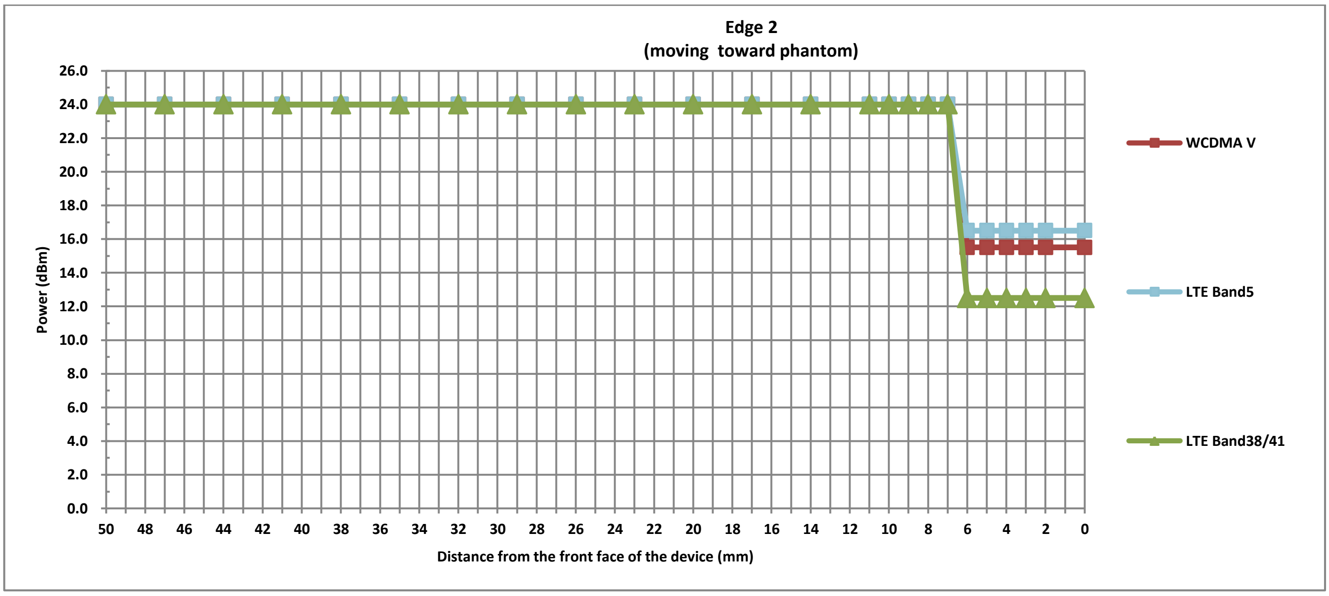
Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
WCDMA Band V	4182	23.04	14.72	8.32
LTE Band 5	20525	23.07	15.72	7.35
LTE Band 41/38	40670	23.65	11.94	11.71

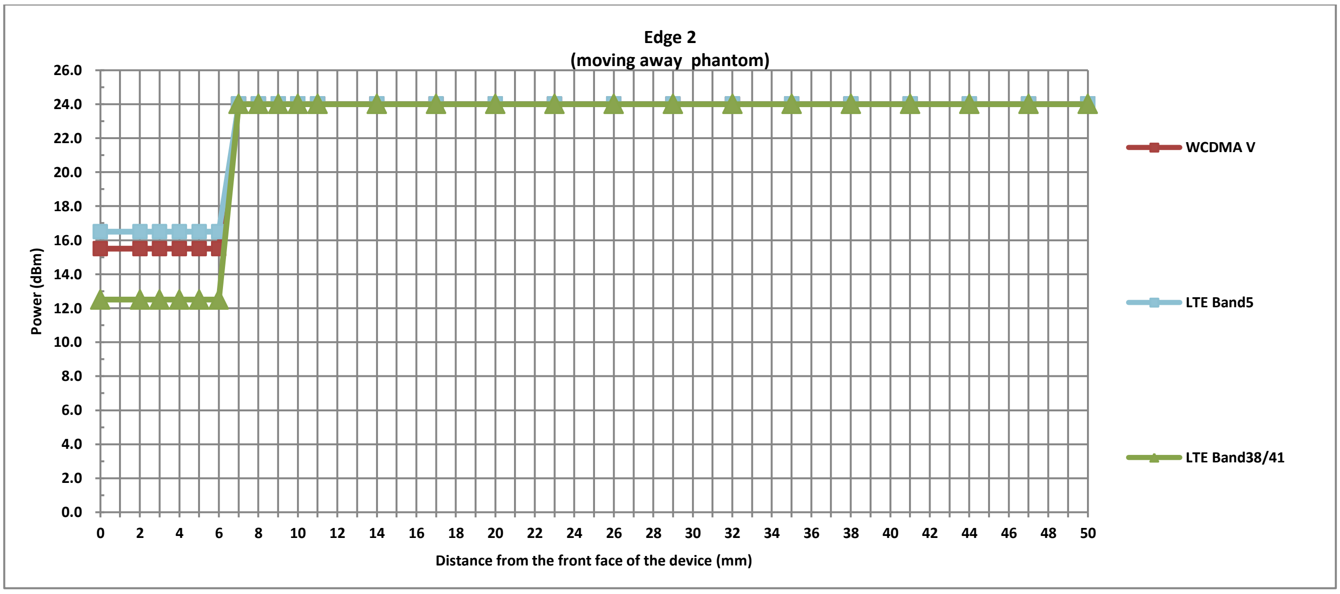





Edge 1
(moving toward phantom)
Power (dBm)
Distance from the front face of the device (mm)
WCDMA V
LTE Band5
LTE Band38/41

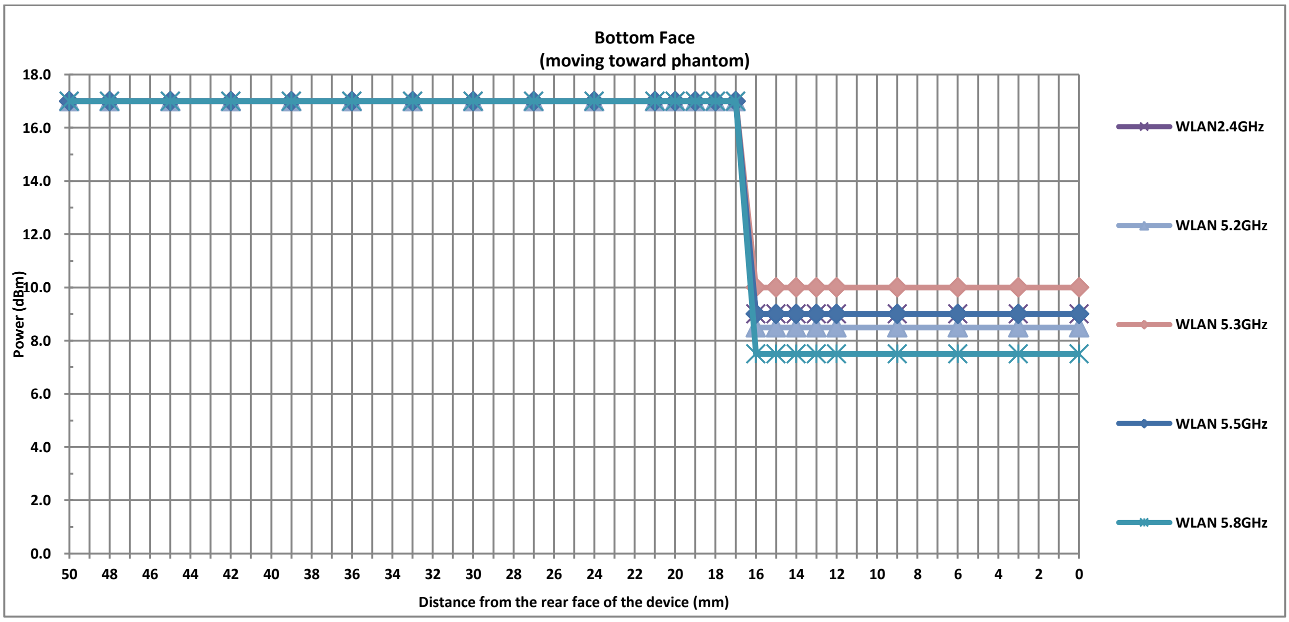

Edge 1
(moving away phantom)
Power (dBm)
Distance from the front face of the device (mm)
WCDMA V
LTE Band5
LTE Band38/41

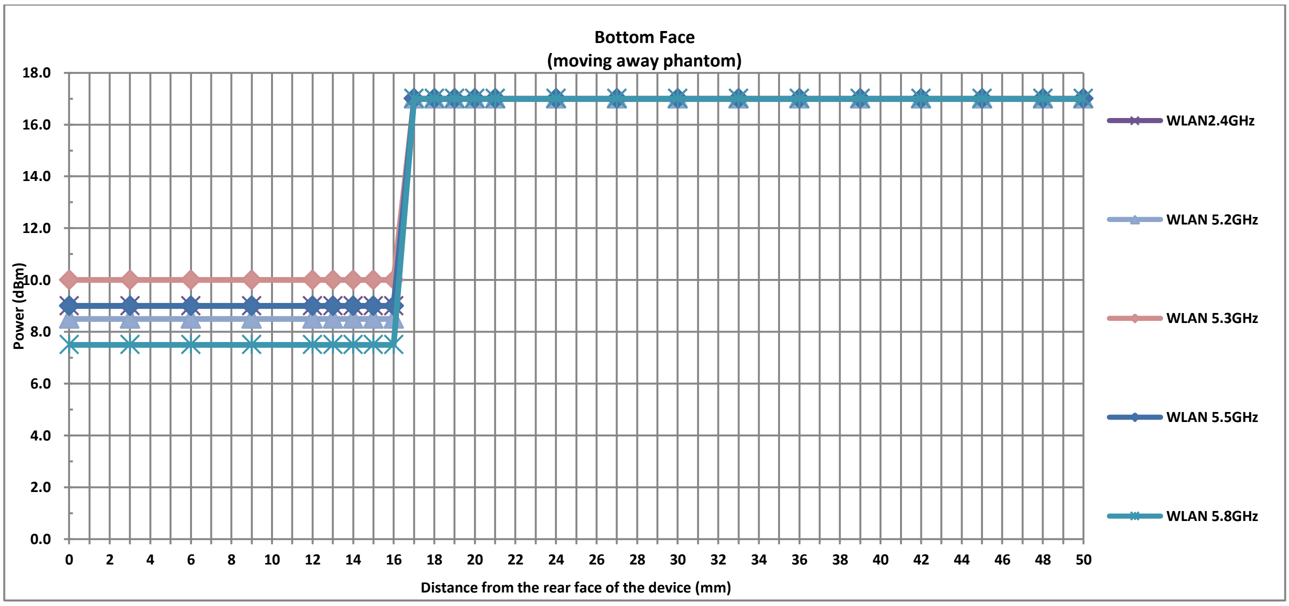

Edge 2
(moving toward phantom)
Power (dBm)
Distance from the front face of the device (mm)
WCDMA V
LTE Band5
LTE Band38/41

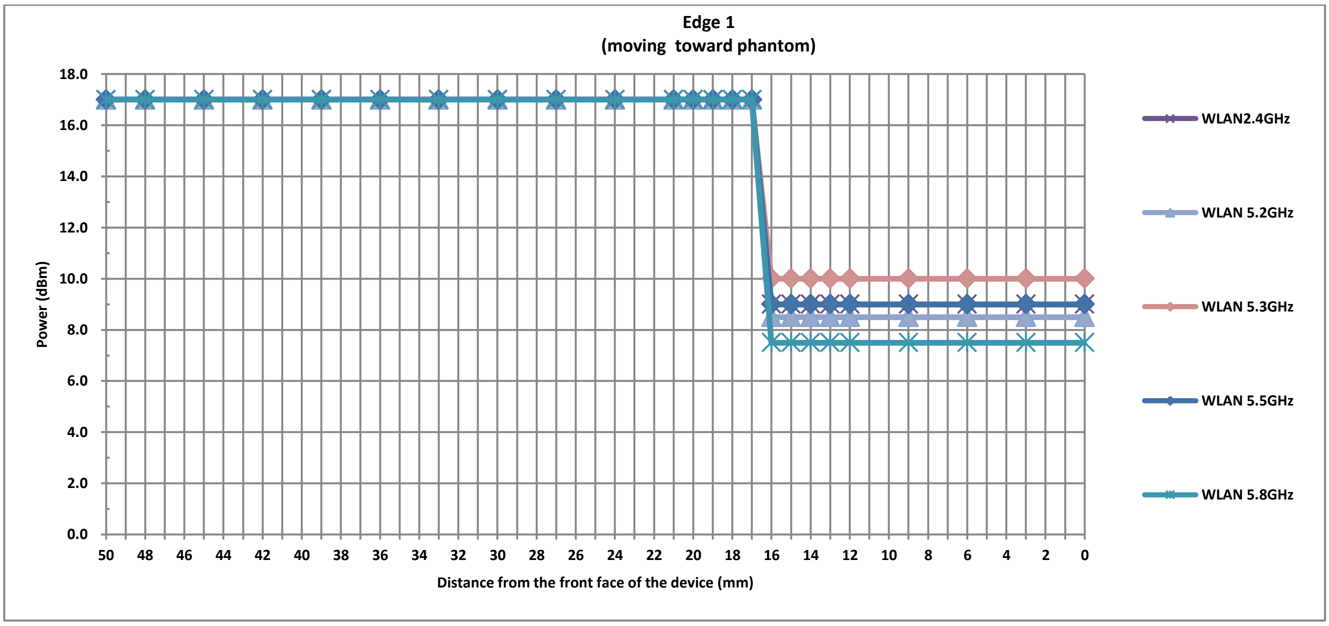

Edge 2
(moving away phantom)
Power (dBm)
Distance from the front face of the device (mm)
WCDMA V
LTE Band5
LTE Band38/41

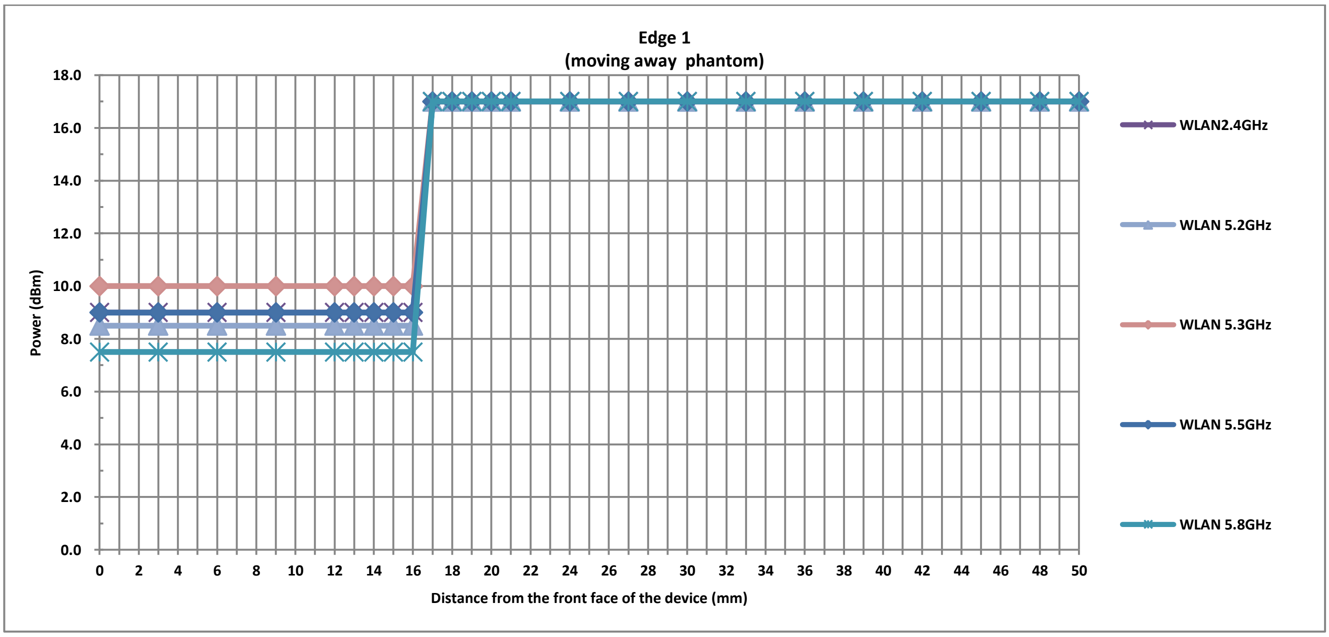
Power Measurement during Sensor Trigger distance testing

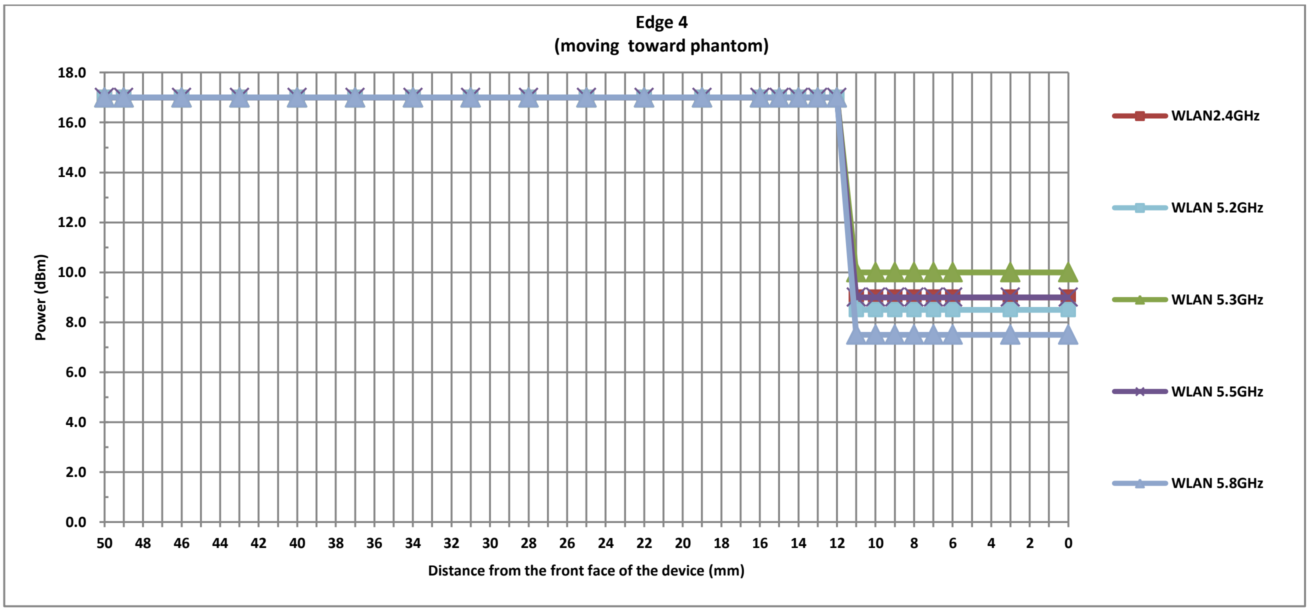
Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
WLAN 2.4GHz	6	16.86	8.33	8.53
WLAN 5.2GHz	40	16.04	8.11	7.93
WLAN 5.3GHz	60	15.93	9.76	6.17
WLAN 5.5GHz	124	16.27	8.61	7.66
WLAN 5.8GHz	165	15.97	7.31	8.66

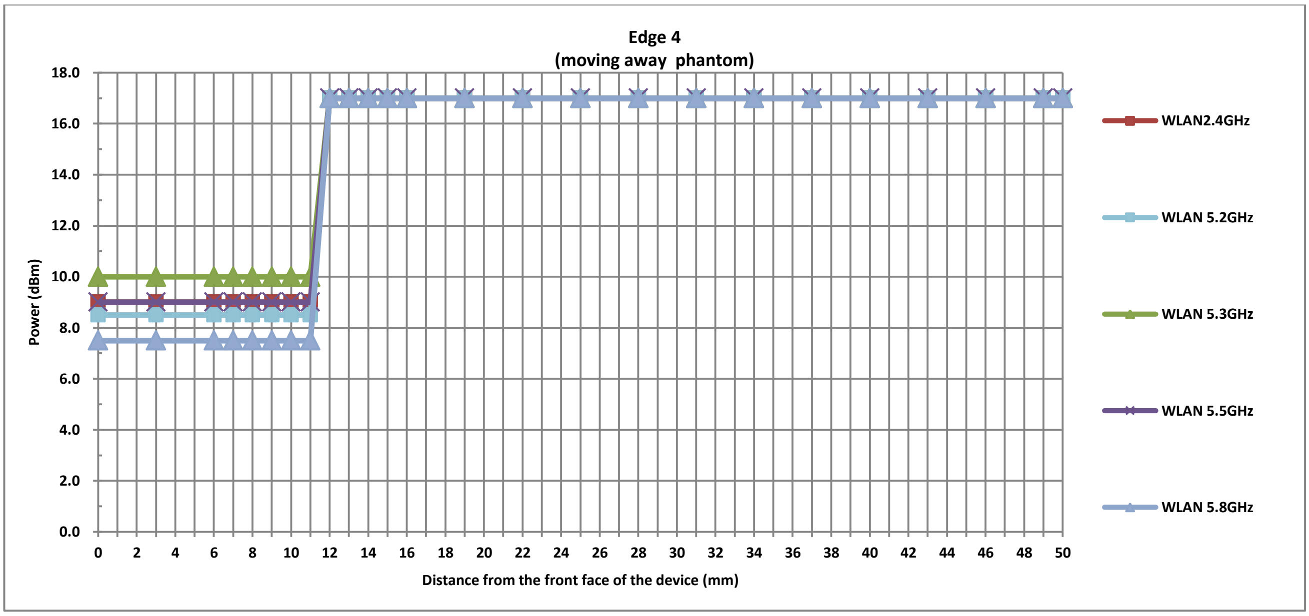





Edge 1
(moving toward phantom)
Power (dBm)
Distance from the front face of the device (mm)
WLAN2.4GHz
WLAN 5.2GHz
WLAN 5.3GHz
WLAN 5.5GHz
WLAN 5.8GHz


Edge 1
(moving away phantom)
Power (dBm)
Distance from the front face of the device (mm)
WLAN2.4GHz
WLAN 5.2GHz
WLAN 5.3GHz
WLAN 5.5GHz
WLAN 5.8GHz


Edge 4
(moving toward phantom)
Power (dBm)
Distance from the front face of the device (mm)
WLAN2.4GHz
WLAN 5.2GHz
WLAN 5.3GHz
WLAN 5.5GHz
WLAN 5.8GHz


Edge 4
(moving away phantom)
Power (dBm)
Distance from the front face of the device (mm)
WLAN2.4GHz
WLAN 5.2GHz
WLAN 5.3GHz
WLAN 5.5GHz
WLAN 5.8GHz

6. RF Exposure Limits

6.1 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.

6.2 Controlled Environment

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

Limits for Occupational/Controlled Exposure (W/kg)

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

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

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

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

7. Specific Absorption Rate (SAR)

7.1 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.

7.2 SAR Definition

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

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

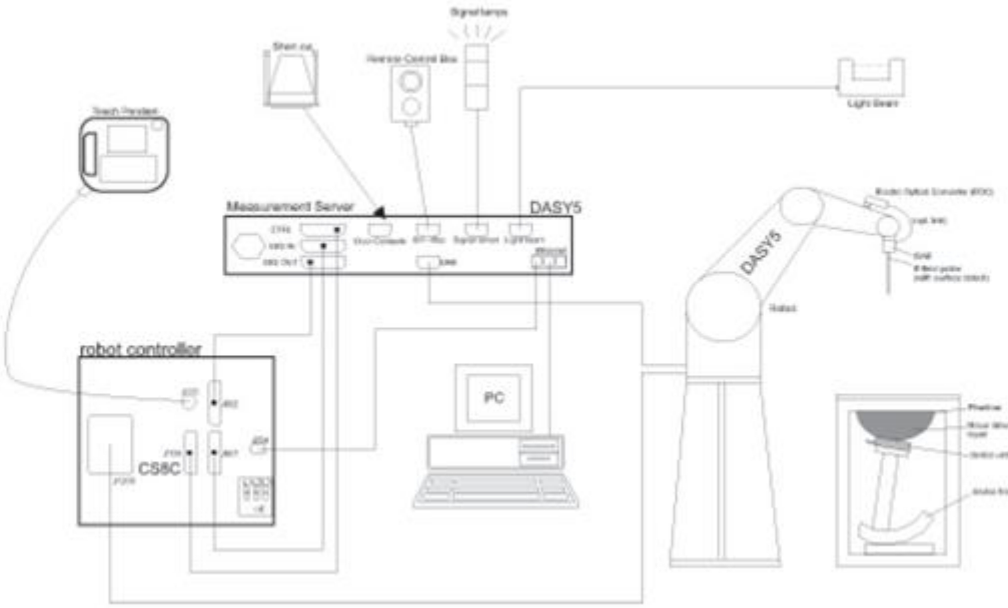
SAR is expressed in units of Watts per kilogram (W/kg)

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

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

8. 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.

8.1 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.

<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

8.2 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.

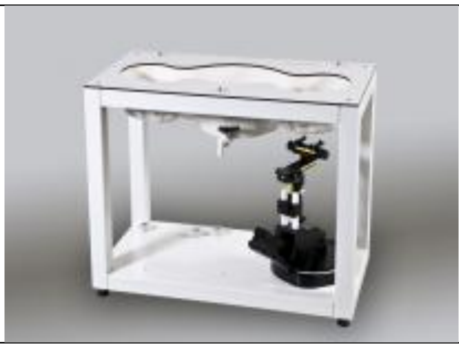
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.1 Photo of DAE

8.3 Phantom

<SAM Twin Phantom>

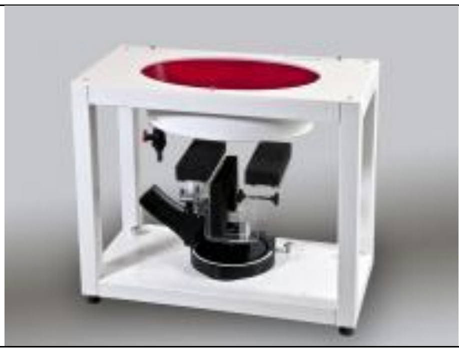
Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet
Measurement Areas	Left Hand, Right Hand, Flat Phantom



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.

8.4 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

9. 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

9.1 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

9.2 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.

9.3 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.

<table>
<tr><th></th><th>≤ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td>Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td>Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
</table>

9.4 Zoom Scan

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

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

<table>
<tr><td colspan="3"></td><td>$\leq$ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the <u>reported</u> SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.5 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.

9.6 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.

10. Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d162	2018/12/5	2021/12/4
SPEAG	2450MHz System Validation Kit	D2450V2	908	2019/3/25	2022/3/24
SPEAG	2600MHz System Validation Kit	D2600V2	1070	2018/12/7	2021/12/6
SPEAG	5000MHz System Validation Kit	D5GHzV2	1113	2019/9/24	2020/9/23
SPEAG	Data Acquisition Electronics	DAE4	799	2020/2/10	2021/2/9
SPEAG	Data Acquisition Electronics	DAE4	1356	2020/5/19	2021/5/18
SPEAG	Dosimetric E-Field Probe	EX3DV4	3843	2019/9/26	2020/9/25
SPEAG	Dosimetric E-Field Probe	EX3DV4	3826	2020/5/20	2021/5/19
SPEAG	ELI4 Phantom	QD 0VA 001 BB	TP-1201	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	TP-1149	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio Communication Analyzer	MT8821C	6201432831	2020/4/16	2021/4/15
Agilent	Wireless Communication Test Set	E5515C	MY52102706	2020/4/16	2021/4/15
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	2020/4/16	2021/4/15
SPEAG	Dielectric Probe Kit	DAK-3.5	1071	2019/10/28	2020/10/27
Anritsu	Vector Signal Generator	MG3710A	6201682672	2020/1/8	2021/1/7
Rohde & Schwarz	Power Meter	NRVD	102081	2019/8/15	2020/8/14
Rohde & Schwarz	Power Sensor	NRV-Z5	100538	2019/8/14	2020/8/13
Rohde & Schwarz	Power Sensor	NRV-Z5	100539	2019/8/14	2020/8/13
R&S	CBT BLUETOOTH TESTER	CBT	101641	2020/1/8	2021/1/7
EXA	Spectrum Analyzer	FSV7	101631	2020/1/8	2021/1/7
Testo	Hygrometer	608-H1	1241332088	2020/1/8	2021/1/7
FLUKE	DIGITAC THERMOMETER	51II	97240029	2019/8/15	2020/8/14
BONN	POWER AMPLIFIER	BLMA 0830-3	087193A	Note 1	
BONN	POWER AMPLIFIER	BLMA 2060-2	087193B	Note 1	
ARRA	Power Divider	A3200-2	N/A	Note 1	
MCL	Attenuation1	BW-S10W5+	N/A	Note 1	
MCL	Attenuation2	BW-S10W5+	N/A	Note 1	
MCL	Attenuation3	BW-S10W5+	N/A	Note 1	
Agilent	Dual Directional Coupler	778D	20500	Note 1	
Agilent	Dual Directional Coupler	11691D	MY48151020	Note 1	

Note:

1. Prior to system verification and validation, the path loss from the signal generator to the system check source and the power meter, which includes the amplifier, cable, attenuator and directional coupler, was measured by the network analyzer. The reading of the power meter was offset by the path loss difference between the path to the power meter and the path to the system check source to monitor the actual power level fed to the system check source.
2. Referring to KDB 865664 D01v01r04, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.

11. System Verification

11.1 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 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. 11.1.

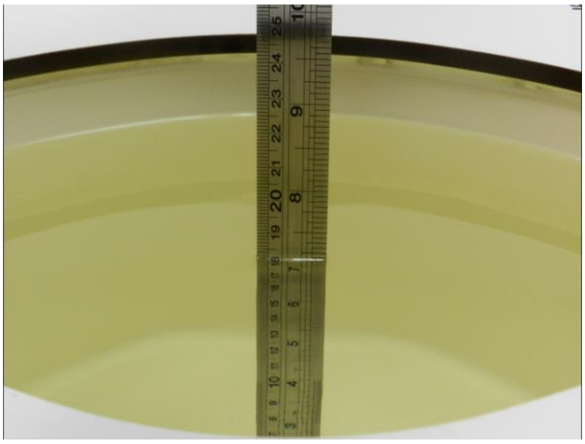


Fig 11.1 Photo of Liquid Height for Body SAR

11.2 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								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
2450	55.0	0	0	0	0	45.0	1.80	39.2
2600	54.8	0	0	0.1	0	45.1	1.96	39.0

Simulating Liquid for 5GHz, Manufactured by SPEAG

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

<Tissue Dielectric Parameter Check Results>

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	22.4	0.910	42.910	0.90	41.50	1.11	3.40	±5	2020/7/23
2450	Head	22.8	1.782	40.615	1.80	39.20	-1.00	3.61	±5	2020/7/20
2600	Head	22.5	2.054	38.328	1.96	39.00	4.80	-1.72	±5	2020/7/26
5250	Head	22.7	4.553	36.804	4.71	35.90	-3.33	2.52	±5	2020/7/20
5600	Head	22.6	4.946	36.230	5.07	35.50	-2.45	2.06	±5	2020/7/21
5750	Head	22.9	5.124	35.989	5.22	35.40	-1.84	1.66	±5	2020/7/21

11.3 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 (%)
2020/7/23	835	Head	250	4d162	3826	1356	2.46	9.61	9.84	2.39
2020/7/20	2450	Head	250	908	3843	799	12.90	52.80	51.6	-2.27
2020/7/26	2600	Head	250	1070	3826	1356	15.70	58.10	62.8	8.09
2020/7/20	5250	Head	100	1113	3843	799	7.92	80.50	79.2	-1.61
2020/7/21	5600	Head	100	1113	3843	799	8.01	83.40	80.1	-3.96
2020/7/21	5750	Head	100	1113	3843	799	7.57	80.00	75.7	-5.38

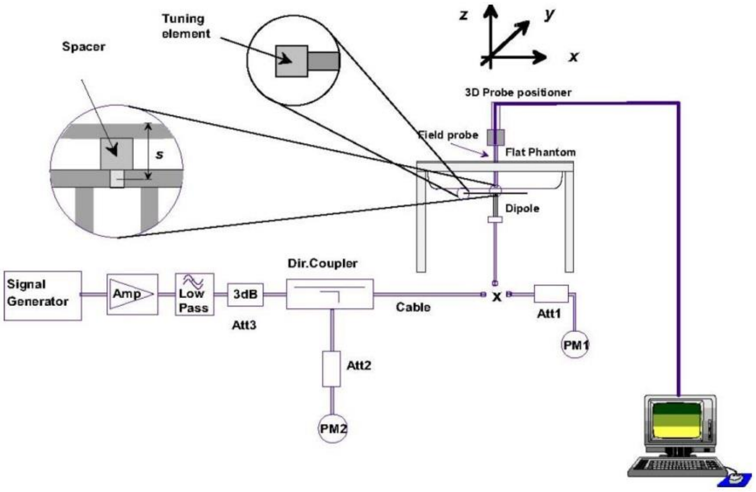


Fig 8.3.1 System Performance Check Setup

Fig 8.3.2 Setup Photo

12. RF Exposure Positions

12.1 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 D01v06 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.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

13. GSM/UMTS/CDMA/LTE Output Power (Unit: dBm)

The detailed conducted power table can refer to Appendix E.

<WCDMA Conducted Power>

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.
2. The procedures in KDB 941225 D01v03r01 are applied for 3GPP Rel. 6 HSPA to configure the device in the required sub-test mode(s) to determine SAR test exclusion.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting:
   i. Set Gain Factors (β_c and β_d) and parameters were set according to each
   ii. Specific sub-test in the following table, C10.1.4, quoted from the TS 34.121
   iii. Set RMC 12.2Kbps + HSDPA mode.
   iv. Set Cell Power = -86 dBm
   v. Set HS-DSCH Configuration Type to FRC (H-set 1, QPSK)
   vi. Select HSDPA Uplink Parameters
   vii. Set Delta ACK, Delta NACK and Delta CQI = 8
   viii. Set Ack-Nack Repetition Factor to 3
   ix. Set CQI Feedback Cycle (k) to 4 ms
   x. Set CQI Repetition Factor to 2
   xi. Power Ctrl Mode = All Up bits
d. The transmitted maximum output power was recorded.

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c .

Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{hs} = 30/15 * β_c , and Δ_{CQI} = 24/15 with β_{hs} = 24/15 * β_c .

Note 3: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.

Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

Setup Configuration

HSUPA Setup Configuration:

a. The EUT was connected to Base Station Agilent E5515C referred to the Setup Configuration.
b. The RF path losses were compensated into the measurements.
c. A call was established between EUT and Base Station with following setting * :
   i. Call Configs = 5.2B, 5.9B, 5.10B, and 5.13.2B with QPSK
   ii. Set the Gain Factors (β_c and β_d) and parameters (AG Index) were set according to each specific sub-test in the following table, C11.1.3, quoted from the TS 34.121
   iii. Set Cell Power = -86 dBm
   iv. Set Channel Type = 12.2k + HSPA
   v. Set UE Target Power
   vi. Power Ctrl Mode= Alternating bits
   vii. Set and observe the E-TFCI
   viii. Confirm that E-TFCI is equal to the target E-TFCI of 75 for sub-test 1, and other subtest's E-TFCI
d. The transmitted maximum output power was recorded.

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 4) (Note 5)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2) (Note 6)	AG Index (Note 5)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with $\beta_{hs} = 5/15 * \beta_c$.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

Setup Configuration

<WCDMA Conducted Power>

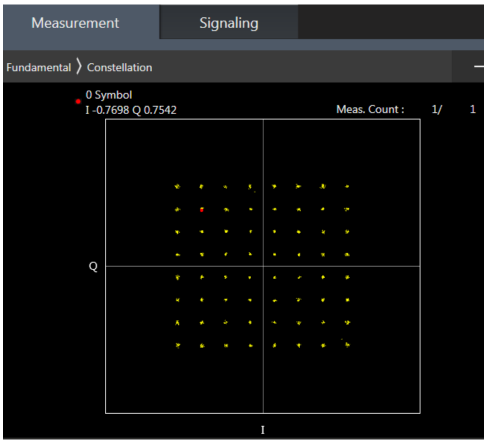
General Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA, and according to the following RF output power, the output power results of the secondary modes (HSDPA / HSUPA) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA.

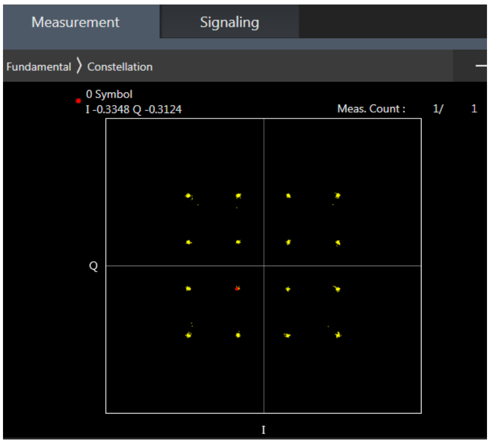
<LTE Conducted Power>

General Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02r05, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
4. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
6. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
7. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
8. For LTE B5 / B38 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
9. LTE band 38 SAR test was covered by Band 41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band
10. According to 2017 TCB workshop, for 64 QAM and 16 QAM should be verified by checking the signal constellation with a call box to avoid incorrect maximum power levels due to MPR and other requirements associated with signal modulation, and the following figure is taken from the "Fundamental Measurement >> Modulation Analysis >> constellation" mode of the device connect to the MT8821C base station, therefore, the device 64QAM and 16QAM signal modulation are correct.



64QAM



16QAM

<TDD LTE SAR Measurement>

TDD LTE configuration setup for SAR measurement

SAR was tested with a fixed periodic duty factor according to the highest transmission duty factor implemented for the device and supported by 3GPP.

a. 3GPP TS 36.211 section 4.2 for Type 2 Frame Structure and Table 4.2-2 for uplink-downlink configurations
b. “special subframe S” contains both uplink and downlink transmissions, it has been taken into consideration to determine the transmission duty factor according to the worst case uplink and downlink cyclic prefix requirements for UpPTS
c. Establishing connections with base station simulators ensure a consistent means for testing SAR and recommended for evaluating SAR. The Anritsu MT8820C (firmware: #22.52#004) was used for LTE output power measurements and SAR testing.

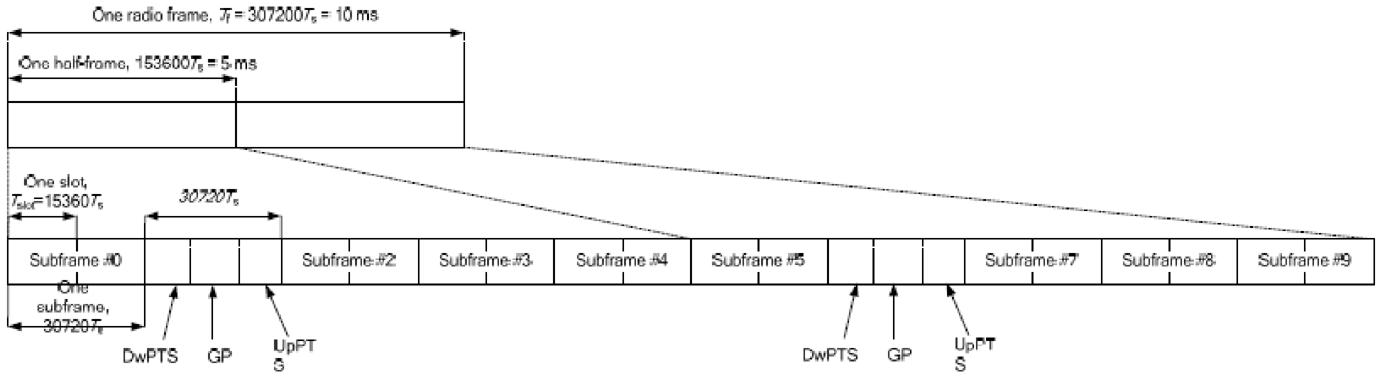


Figure 4.2-1: Frame structure type 2 (for 5 ms switch-point periodicity).

Table 4.2-2: Uplink-downlink configurations.

Uplink-downlink configuration	Downlink-to-Uplink Switch-point periodicity	Subframe number									
		0	1	2	3	4	5	6	7	8	9
0	5 ms	D	S	U	U	U	D	S	U	U	U
1	5 ms	D	S	U	U	D	D	S	U	U	D
2	5 ms	D	S	U	D	D	D	S	U	D	D
3	10 ms	D	S	U	U	U	D	D	D	D	D
4	10 ms	D	S	U	U	D	D	D	D	D	D
5	10 ms	D	S	U	D	D	D	D	D	D	D
6	5 ms	D	S	U	U	U	D	S	U	U	D

Table 4.2-1: Configuration of special subframe (lengths of DwPTS/GP/UpPTS).

Special subframe configuration	Normal cyclic prefix in downlink			Extended cyclic prefix in downlink		
	DwPTS	UpPTS		DwPTS	UpPTS	
		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink		Normal cyclic prefix in uplink	Extended cyclic prefix in uplink
0	$6592 \cdot T_s$			$7680 \cdot T_s$		
1	$19760 \cdot T_s$			$20480 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$
2	$21952 \cdot T_s$	$2192 \cdot T_s$	$2560 \cdot T_s$	$23040 \cdot T_s$		
3	$24144 \cdot T_s$			$25600 \cdot T_s$		
4	$26336 \cdot T_s$			$7680 \cdot T_s$		
5	$6592 \cdot T_s$			$20480 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$
6	$19760 \cdot T_s$			$23040 \cdot T_s$		
7	$21952 \cdot T_s$	$4384 \cdot T_s$	$5120 \cdot T_s$	$12800 \cdot T_s$		
8	$24144 \cdot T_s$			-	-	-
9	$13168 \cdot T_s$			-	-	-

Special subframe (30720·T_s): Normal cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~4**	7.13%	8.33%
	5~9	14.3%	16.7%

Special subframe(30720·T_s): Extended cyclic prefix in downlink (UpPTS)			
	Special subframe configuration	**Normal cyclic prefix in uplink**	**Extended cyclic prefix in uplink**
Uplink duty factor in one special subframe	**0~3**	7.13%	8.33%
	4~7	14.3%	16.7%

The highest duty factor is resulted from:

i. Uplink-downlink configuration: 0. In a half-frame consisted of 5 subfames, uplink operation is in 3 uplink subframes and 1 special subframe.

ii. special subframe configuration: 5-9 for normal cyclic prefix in downlink, 4-7 for extended cyclic prefix in downlink

iii. for special subframe with extended cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.167)/5 = 63.3%

iv. for special subframe with normal cyclic prefix in uplink, the total uplink duty factor in one half-frame is: (3+0.143)/5 = 62.9%

v. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The scaled TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.

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

General Note:

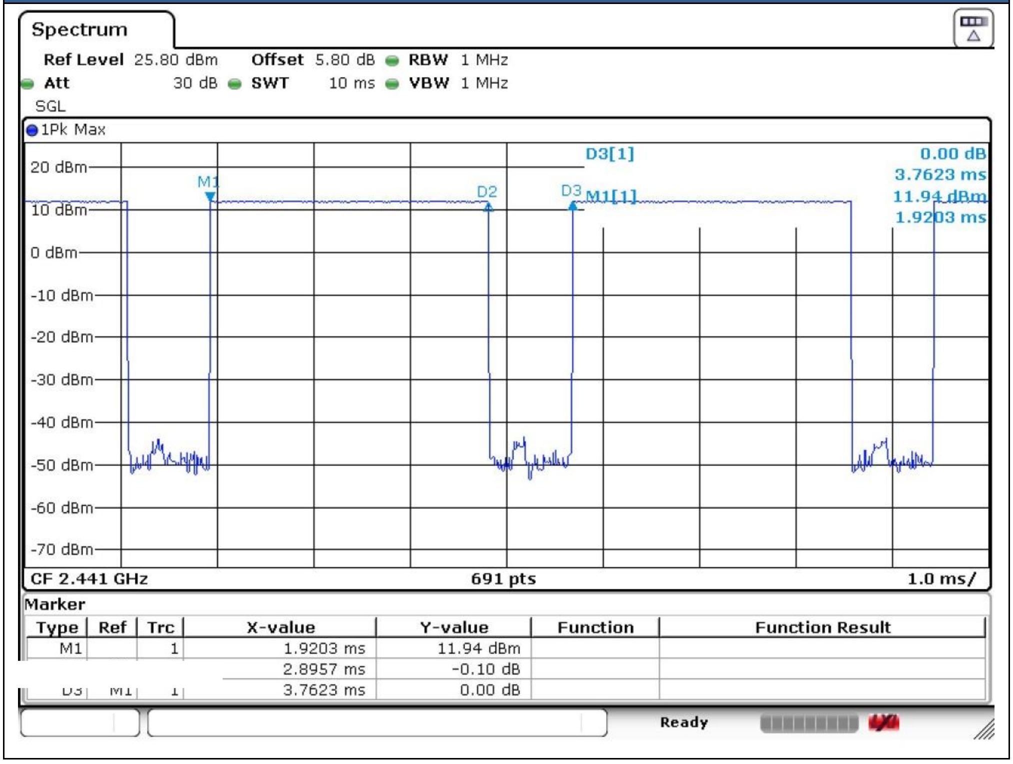
1. Per KDB 248227 D01v02r02, SAR test reduction is determined according to 802.11 transmission mode configurations and certain exposure conditions with multiple test positions. In the 2.4 GHz band, separate SAR procedures are applied to DSSS and OFDM configurations to simplify DSSS test requirements. For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration must be determined for each standalone and aggregated frequency band, according to the transmission mode configuration with the highest maximum output power specified for production units to perform SAR measurements. If the same highest maximum output power applies to different combinations of channel bandwidths, modulations and data rates, additional procedures are applied to determine which test configurations require SAR measurement. When applicable, an initial test position may be applied to reduce the number of SAR measurements required for next to the ear, UMPC mini-tablet or hotspot mode configurations with multiple test positions.
2. For 2.4 GHz 802.11b DSSS, either the initial test position procedure for multiple exposure test positions or the DSSS procedure for fixed exposure position is applied; these are mutually exclusive. For 2.4 GHz and 5 GHz OFDM configurations, the initial test configuration is applied to measure SAR using either the initial test position procedure for multiple exposure test position configurations or the initial test configuration procedures for fixed exposure test conditions. Based on the reported SAR of the measured configurations and maximum output power of the transmission mode configurations that are not included in the initial test configuration, the subsequent test configuration and initial test position procedures are applied to determine if SAR measurements are required for the remaining OFDM transmission configurations. In general, the number of test channels that require SAR measurement is minimized based on maximum output power measured for the test sample(s).
3. For OFDM transmission configurations in the 2.4 GHz and 5 GHz bands, When the same maximum power is specified for multiple transmission modes in a frequency band, the largest channel bandwidth, lowest order modulation, lowest data rate and lowest order 802.11a/g/n/ac mode is used for SAR measurement, on the highest measured output power channel for each frequency band.
4. DSSS and OFDM configurations are considered separately according to the required SAR procedures. SAR is measured in the initial test position using the 802.11 transmission mode configuration required by the DSSS procedure or initial test configuration and subsequent test configuration(s) according to the OFDM procedures.18 The initial test position procedure is described in the following:
   a. When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other test positions in that exposure configuration and 802.11 transmission mode combinations within the frequency band or aggregated band.
   b. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
   c. For all positions/configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions/configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.

<2.4GHz Bluetooth>

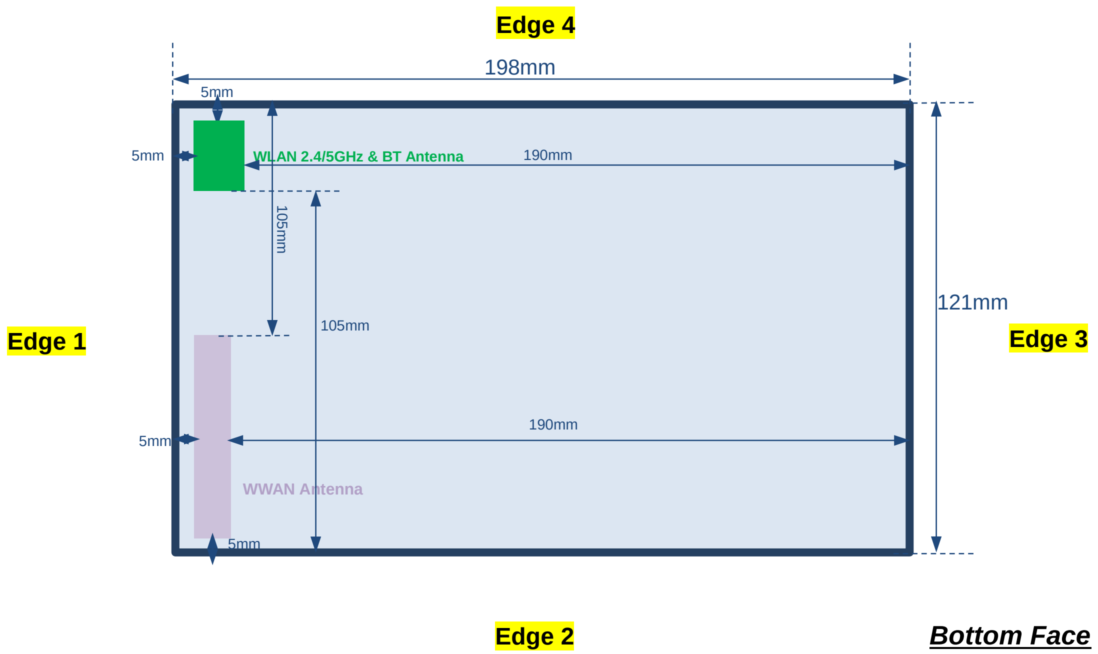
General Note:

1. For 2.4GHz Bluetooth SAR testing was selected 1Mbps, due to its highest average power.
2. The Bluetooth duty cycle is 76.97 % as following figure, 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

Bluetooth time-domain plot



15. Antenna Location



Diagonal Dimension: 227mm

<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 D01v06, 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 D01v06, 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 D01v06, 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 D01v06, 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	WCDMA Band V	LTE Band 5	LTE Band 38	LTE Band 41	BT	2.4GHz WLAN	5GHz WLAN
	Calculated Frequency	846MHz	848MHz	2617MHz	2687MHz	2480MHz	2462MHz	5825MHz
	Maximum power (dBm)	24.00	24	24	24	12.5	17	17
	Maximum rated power(mW)	251.0	251.0	251.0	251.0	18.0	50.0	50.0
Bottom Face	Separation distance(mm)	5.0				5.0	5.0	5.0
	exclusion threshold	46.2	46.2	81.2	82.3	5.7	15.7	24.1
	Testing required?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Edge 1	Separation distance(mm)	5.0				5.0	5.0	5.0
	exclusion threshold	46.2	46.2	81.2	82.3	5.7	15.7	24.1
	Testing required?	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Edge 2	Separation distance(mm)	5.0				105.0	105.0	105.0
	exclusion threshold	46.2	46.2	81.2	82.3	645.0	646.0	612.0
	Testing required?	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**No**	**No**
Edge 3	Separation distance(mm)	190.0				190.0	190.0	190.0
	exclusion threshold	953.0	954.0	1493.0	1492.0	1495.0	1496.0	1462.0
	Testing required?	**No**	**No**	**No**	**No**	**No**	**No**	**No**
Edge 4	Separation distance(mm)	105.0				5.0	5.0	5.0
	exclusion threshold	473.0	474.0	643.0	642.0	5.7	15.7	24.1
	Testing required?	**No**	**No**	**No**	**No**	**Yes**	**Yes**	**Yes**

16. 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 WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN/Bluetooth: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
   e. For TDD LTE SAR measurement, the duty cycle 1:1.59 (62.9 %) was used perform testing and considering the theoretical duty cycle of 63.3% for extended cyclic prefix in the uplink, and the theoretical duty cycle of 62.9% for normal cyclic prefix in uplink, a scaling factor of extended cyclic prefix 63.3%/62.9% = 1.006 is applied to scale-up the measured SAR result. The Reported TDD LTE SAR = measured SAR (W/kg)* Tune-up Scaling Factor* scaling factor for extended cyclic prefix.
2. Per KDB 447498 D01v06, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
3. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
4. The device employs proximity sensors that detect the presence of the user's body also a finger or hand near the bottom face, edge 1 or edge 2 of the device, reduced power will be active for all WWAN bands.
5. For WLAN, the device employs proximity sensors that detect the presence of the user's body also a finger or hand near the bottom face or edge 1 or edge 4 of the device, reduced power will be active for all WLAN bands.
6. The following table "n/a" means the measured SAR is too small to find the 1g cube SAR.

UMTS Note:

1. Per KDB 941225 D01v03r01, for SAR testing is measured using a 12.2 kbps RMC with TPC bits configured to all "1's".
2. Per KDB 941225 D01v03r01, RMC 12.2kbps setting is used to evaluate SAR. The maximum output power and tune-up tolerance specified for production units in HSDPA / HSUPA / HSPA+. is ≤ ¼ dB higher than RMC 12.2Kbps or when the highest reported SAR of the RMC12.2Kbps is scaled by the ratio of specified maximum output power and tune-up tolerance of HSDPA / HSUPA / HSPA+. to RMC12.2Kbps and the adjusted SAR is ≤ 1.2 W/kg, SAR measurement is not required for HSDPA / HSUPA / HSPA+.A, and according to the following RF output power, the output power results of the secondary modes (HSUPA, HSDPA / HSPA+.) are less than ¼ dB higher than the primary modes; therefore, SAR measurement is not required for HSDPA / HSUPA / HSPA+.

LTE Note:

1. Per KDB 941225 D05v02r05, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
2. Per KDB 941225 D05v02r05, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
3. Per KDB 941225 D05v02r05, For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation are ≤ 0.8 W/kg. Otherwise, SAR is measured for the highest output power channel; and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.
4. Per KDB 941225 D05v02r05, 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the reported SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, 16QAM SAR testing is not required.
5. Per KDB 941225 D05v02r05, Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r05, smaller bandwidth SAR testing is not required.
6. For LTE B5 / B38 the maximum bandwidth does not support three non-overlapping channels, per KDB 941225 D05v02r05, when a device supports overlapping channel assignment in a channel bandwidth configuration, the middle channel of the group of overlapping channels should be selected for testing.
7. LTE band 38 SAR test was covered by Band 41; according to April 2015 TCB workshop, SAR test for overlapping LTE bands can be reduced if
   a. the maximum output power, including tolerance, for the smaller band is ≤ the larger band to qualify for the SAR test exclusion
   b. the channel bandwidth and other operating parameters for the smaller band are fully supported by the larger band

WLAN Note:

1. Per KDB 248227 D01v02r02, for 2.4GHz 802.11g/n SAR testing is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. Per KDB 248227 D01v02r02, U-NII-1 SAR testing is not required when the U-NII-2A band highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band.
3. When the reported SAR of the test position is > 0.4 W/kg, SAR is repeated for the 802.11 transmission mode configuration tested in the initial test position to measure the subsequent next closet/smallest test separation distance and maximum coupling test position on the highest maximum output power channel, until the report SAR is ≤ 0.8 W/kg or all required test position are tested.
4. For all positions / configurations, when the reported SAR is > 0.8 W/kg, SAR is measured for these test positions / configurations on the subsequent next highest measured output power channel(s) until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
5. During SAR testing the WLAN transmission was verified using a spectrum analyzer.

16.1 Body SAR

<WCDMA SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	WCDMA V	RMC 12.2Kbps	Edge 1	0mm	Reduced	4182	836.4	14.72	15.5	1.197	0.06	0.283	0.339
	WCDMA V	RMC 12.2Kbps	Edge 2	0mm	Reduced	4182	836.4	14.72	15.5	1.197	0.13	0.085	0.102
	WCDMA V	RMC 12.2Kbps	Edge 3	0mm	Full power	4182	836.4	23.04	24	1.247	-	n/a	n/a
	WCDMA V	RMC 12.2Kbps	Edge 4	0mm	Full power	4182	836.4	23.04	24	1.247	-	n/a	n/a
	WCDMA V	RMC 12.2Kbps	Bottom face	0mm	Reduced	4182	836.4	14.72	15.5	1.197	-0.05	0.418	0.500
	WCDMA V	RMC 12.2Kbps	Edge 1	15 mm	Full power	4182	836.4	23.04	24	1.247	0.08	0.372	0.464
	WCDMA V	RMC 12.2Kbps	Edge 2	5mm	Full power	4182	836.4	23.04	24	1.247	0.01	0.330	0.412
01	WCDMA V	RMC 12.2Kbps	Bottom face	15 mm	Full power	4182	836.4	23.04	24	1.247	0.02	0.551	**0.687**

<FDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	LTE Band 5	10M	QPSK	1	49	Edge 1	0mm	Reduced	20525	836.5	15.72	16.5	1.197	0.08	0.412	0.493
	LTE Band 5	10M	QPSK	1	49	Edge 2	0mm	Reduced	20525	836.5	15.72	16.5	1.197	0.06	0.114	0.136
	LTE Band 5	10M	QPSK	1	49	Edge 3	0mm	Full power	20525	836.5	23.07	24	1.239	-	n/a	n/a
	LTE Band 5	10M	QPSK	1	49	Edge 4	0mm	Full power	20525	836.5	23.07	24	1.239	-	n/a	n/a
	LTE Band 5	10M	QPSK	1	49	Bottom face	0mm	Reduced	20525	836.5	15.72	16.5	1.197	0.03	0.558	0.668
	LTE Band 5	10M	QPSK	1	49	Edge 1	15 mm	Full power	20525	836.5	23.07	24	1.239	-0.06	0.456	0.565
	LTE Band 5	10M	QPSK	1	49	Edge 2	5mm	Full power	20525	836.5	23.07	24	1.239	-0.15	0.323	0.400
02	LTE Band 5	10M	QPSK	1	49	Bottom face	15 mm	Full power	20525	836.5	23.07	24	1.239	0.02	0.706	**0.875**
	LTE Band 5	10M	QPSK	25	0	Edge 1	0mm	Reduced	20525	836.5	15.6	16.5	1.230	0.04	0.293	0.360
	LTE Band 5	10M	QPSK	25	0	Edge 2	0mm	Reduced	20525	836.5	15.6	16.5	1.230	0.07	0.092	0.113
	LTE Band 5	10M	QPSK	25	0	Edge 3	0mm	Full power	20525	836.5	21.6	23	1.380	-	n/a	n/a
	LTE Band 5	10M	QPSK	25	0	Edge 4	0mm	Full power	20525	836.5	21.6	23	1.380	-	n/a	n/a
	LTE Band 5	10M	QPSK	25	0	Bottom face	0mm	Reduced	20525	836.5	15.6	16.5	1.230	-0.16	0.460	0.566
	LTE Band 5	10M	QPSK	25	0	Edge 1	15 mm	Full power	20525	836.5	21.6	23	1.380	0.07	0.231	0.319
	LTE Band 5	10M	QPSK	25	0	Edge 2	5mm	Full power	20525	836.5	21.6	23	1.380	-0.15	0.166	0.229
	LTE Band 5	10M	QPSK	25	0	Bottom face	15 mm	Full power	20525	836.5	21.6	23	1.380	-0.02	0.350	0.483
	LTE Band 5	10M	QPSK	50	0	Bottom face	15 mm	Full power	20525	836.5	21.7	23	1.349	0.04	0.411	0.554

<TDD LTE SAR>

Plot No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	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)
	LTE Band 41	20M	QPSK	1	99	Edge 1	0mm	Reduced	40670	2598	11.94	12.5	1.138	62.9	1.006	0.07	0.537	0.615
	LTE Band 41	20M	QPSK	1	99	Edge 2	0mm	Reduced	40670	2598	11.94	12.5	1.138	62.9	1.006	0.06	0.059	0.067
	LTE Band 41	20M	QPSK	1	99	Edge 3	0mm	Full power	40670	2598	23.65	24	1.084	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	99	Edge 4	0mm	Full power	40670	2598	23.65	24	1.084	62.9	1.006	-	n/a	n/a
	LTE Band 41	20M	QPSK	1	99	Bottom face	0mm	Reduced	40670	2598	11.94	12.5	1.138	62.9	1.006	0.09	0.678	0.776
	LTE Band 41	20M	QPSK	1	99	Bottom face	0mm	Reduced	40140	2545	11.61	12.5	1.227	62.9	1.006	0.04	0.707	0.873
	LTE Band 41	20M	QPSK	1	99	Bottom face	0mm	Reduced	40400	2571	11.62	12.5	1.225	62.9	1.006	0.05	0.666	0.820
	LTE Band 41	20M	QPSK	1	99	Bottom face	0mm	Reduced	41140	2645	11.55	12.5	1.245	62.9	1.006	0.11	0.685	0.858
	LTE Band 41	20M	QPSK	1	99	Edge 1	0mm	Reduced	40140	2545	11.61	12.5	1.227	62.9	1.006	0.02	0.645	0.796
	LTE Band 41	20M	QPSK	1	99	Edge 1	0mm	Reduced	40400	2571	11.62	12.5	1.225	62.9	1.006	0.03	0.582	0.717
	LTE Band 41	20M	QPSK	1	99	Edge 1	0mm	Reduced	41140	2645	11.55	12.5	1.245	62.9	1.006	-0.03	0.482	0.603
03	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	40140	2545	23.09	24	1.233	62.9	1.006	0.07	0.894	1.109
	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	40400	2571	23.48	24	1.127	62.9	1.006	0.05	0.792	0.898
	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	40670	2598	23.65	24	1.084	62.9	1.006	0.05	0.811	0.884
	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	41140	2645	23.11	24	1.227	62.9	1.006	0.07	0.473	0.584
	LTE Band 41	20M	QPSK	1	99	Edge 2	5mm	Full power	40670	2598	23.65	24	1.084	62.9	1.006	0.04	0.531	0.579
	LTE Band 41	20M	QPSK	1	99	Edge 2	5mm	Full power	40140	2545	23.09	24	1.233	62.9	1.006	0.01	0.601	0.746
	LTE Band 41	20M	QPSK	1	99	Edge 2	5mm	Full power	40400	2571	23.48	24	1.127	62.9	1.006	0.17	0.490	0.556
	LTE Band 41	20M	QPSK	1	99	Edge 2	5mm	Full power	41140	2645	23.11	24	1.227	62.9	1.006	0.06	0.294	0.363
	LTE Band 41	20M	QPSK	1	99	Bottom face	15 mm	Full power	40140	2545	23.09	24	1.233	62.9	1.006	0.02	0.726	0.901
	LTE Band 41	20M	QPSK	1	99	Bottom face	15 mm	Full power	40400	2571	23.48	24	1.127	62.9	1.006	-0.02	0.683	0.774
	LTE Band 41	20M	QPSK	1	99	Bottom face	15 mm	Full power	40670	2598	23.65	24	1.084	62.9	1.006	0.05	0.821	0.895
	LTE Band 41	20M	QPSK	1	99	Bottom face	15 mm	Full power	41140	2645	23.11	24	1.227	62.9	1.006	0.02	0.453	0.559
	LTE Band 41	20M	QPSK	50	0	Edge 1	0mm	Reduced	40670	2598	11.85	12.5	1.161	62.9	1.006	0.07	0.562	0.657
	LTE Band 41	20M	QPSK	50	0	Edge 2	0mm	Reduced	40670	2598	11.85	12.5	1.161	62.9	1.006	0.05	0.054	0.063
	LTE Band 41	20M	QPSK	50	0	Edge 3	0mm	Full power	40670	2598	22.81	23	1.045	62.9	1.006	0.12	0.059	0.062
	LTE Band 41	20M	QPSK	50	0	Edge 4	0mm	Full power	40670	2598	22.81	23	1.045	62.9	1.006	0.02	0.038	0.040
	LTE Band 41	20M	QPSK	50	0	Bottom face	0mm	Reduced	40670	2598	11.85	12.5	1.161	62.9	1.006	-0.09	0.678	0.792
	LTE Band 41	20M	QPSK	50	0	Bottom face	0mm	Reduced	40140	2545	11.56	12.5	1.242	62.9	1.006	0.03	0.697	0.871
	LTE Band 41	20M	QPSK	50	0	Bottom face	0mm	Reduced	40400	2571	11.6	12.5	1.230	62.9	1.006	0.02	0.687	0.850
	LTE Band 41	20M	QPSK	50	0	Bottom face	0mm	Reduced	41140	2645	11.5	12.5	1.259	62.9	1.006	0.12	0.702	0.889
	LTE Band 41	20M	QPSK	50	0	Edge 1	0mm	Reduced	40140	2545	11.56	12.5	1.242	62.9	1.006	0.03	0.671	0.838
	LTE Band 41	20M	QPSK	50	0	Edge 1	0mm	Reduced	40400	2571	11.6	12.5	1.230	62.9	1.006	0.01	0.629	0.778
	LTE Band 41	20M	QPSK	50	0	Edge 1	0mm	Reduced	41140	2645	11.5	12.5	1.259	62.9	1.006	0.14	0.505	0.640
	LTE Band 41	20M	QPSK	50	0	Edge 1	15 mm	Full power	40140	2545	22.46	23	1.132	62.9	1.006	0.01	0.697	0.794
	LTE Band 41	20M	QPSK	50	0	Edge 1	15 mm	Full power	40670	2598	22.81	23	1.045	62.9	1.006	0.04	0.638	0.671
	LTE Band 41	20M	QPSK	50	0	Edge 1	15 mm	Full power	41140	2645	22.55	23	1.109	62.9	1.006	0.01	0.637	0.711
	LTE Band 41	20M	QPSK	50	0	Edge 1	15 mm	Full power	40400	2571	22.57	23	1.104	62.9	1.006	0.04	0.634	0.704
	LTE Band 41	20M	QPSK	50	0	Edge 2	5mm	Full power	40140	2545	22.46	23	1.132	62.9	1.006	0.05	0.629	0.717
	LTE Band 41	20M	QPSK	50	0	Edge 2	5mm	Full power	40670	2598	22.81	23	1.045	62.9	1.006	0.16	0.410	0.431
	LTE Band 41	20M	QPSK	50	0	Edge 2	5mm	Full power	41140	2645	22.55	23	1.109	62.9	1.006	0.02	0.408	0.455
	LTE Band 41	20M	QPSK	50	0	Edge 2	5mm	Full power	40400	2571	22.57	23	1.104	62.9	1.006	-0.02	0.442	0.491
	LTE Band 41	20M	QPSK	50	0	Bottom face	15 mm	Full power	40140	2545	22.46	23	1.132	62.9	1.006	0.02	0.501	0.571
	LTE Band 41	20M	QPSK	100	0	Edge 1	0mm	Reduced	40670	2598	11.78	12.5	1.180	62.9	1.006	0.04	0.499	0.593
	LTE Band 41	20M	QPSK	100	0	Bottom face	0mm	Reduced	40670	2598	11.78	12.5	1.180	62.9	1.006	-0.04	0.551	0.654
	LTE Band 41	20M	QPSK	100	0	Bottom face	0mm	Reduced	40140	2545	11.53	12.5	1.250	62.9	1.006	0.03	0.602	0.757
	LTE Band 41	20M	QPSK	100	0	Bottom face	0mm	Reduced	40400	2571	11.56	12.5	1.242	62.9	1.006	0.01	0.541	0.676
	LTE Band 41	20M	QPSK	100	0	Bottom face	0mm	Reduced	41140	2645	11.47	12.5	1.268	62.9	1.006	0.09	0.588	0.750
	LTE Band 41	20M	QPSK	100	0	Edge 1	15 mm	Full power	40140	2545	22.51	23	1.119	62.9	1.006	-0.01	0.700	0.788
	LTE Band 41	20M	QPSK	100	0	Edge 1	15 mm	Full power	40670	2598	22.8	23	1.047	62.9	1.006	0.04	0.591	0.623
	LTE Band 41	20M	QPSK	100	0	Edge 1	15 mm	Full power	41140	2645	22.27	23	1.183	62.9	1.006	-0.01	0.621	0.739

	LTE Band 41	20M	QPSK	100	0	Edge 1	15 mm	Full power	40400	2571	22.64	23	1.086	62.9	1.006	-0.05	0.556	0.608
	LTE Band 41	20M	QPSK	100	0	Edge 2	5mm	Full power	40140	2545	22.51	23	1.119	62.9	1.006	0.16	0.572	0.644
	LTE Band 41	20M	QPSK	100	0	Edge 2	5mm	Full power	40670	2598	22.8	23	1.047	62.9	1.006	0.02	0.611	0.644
	LTE Band 41	20M	QPSK	100	0	Edge 2	5mm	Full power	41140	2645	22.27	23	1.183	62.9	1.006	0.05	0.641	0.763
	LTE Band 41	20M	QPSK	100	0	Edge 2	5mm	Full power	40400	2571	22.64	23	1.086	62.9	1.006	-0.16	0.597	0.652
	LTE Band 41	20M	QPSK	100	0	Bottom face	15 mm	Full power	40140	2545	22.51	23	1.119	62.9	1.006	0.04	0.500	0.563

<WLAN 2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	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	Edge 1	0mm	Reduced	6	2437	8.33	9	1.167	100	1.000	0.12	0.150	0.175
	WLAN2.4GHz	802.11b 1Mbps	Edge 2	0mm	Full Power	6	2437	16.86	17	1.033	100	1.000	0.01	0.005	0.005
	WLAN2.4GHz	802.11b 1Mbps	Edge 3	0mm	Full Power	6	2437	16.86	17	1.033	100	1.000	-	n/a	n/a
	WLAN2.4GHz	802.11b 1Mbps	Edge 4	0mm	Reduced	6	2437	8.33	9	1.167	100	1.000	-0.01	0.040	0.047
04	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	0mm	Reduced	6	2437	8.33	9	1.167	100	1.000	0.15	0.291	0.340
	WLAN2.4GHz	802.11b 1Mbps	Edge 1	15 mm	Full Power	6	2437	16.86	17	1.033	100	1.000	0.01	0.041	0.042
	WLAN2.4GHz	802.11b 1Mbps	Bottom Face	15 mm	Full Power	6	2437	16.86	17	1.033	100	1.000	0.04	0.020	0.021
	WLAN2.4GHz	802.11b 1Mbps	Edge 4	10 mm	Full Power	6	2437	16.86	17	1.033	100	1.000	0.04	0.102	0.105

<WLAN5G SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	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)
	WLAN5.3GHz	802.11a 6Mbps	Edge 1	0mm	Reduced	60	5300	9.76	10	1.057	98.28	1.018	0.03	0.114	0.123
	WLAN5.3GHz	802.11a 6Mbps	Edge 2	0mm	Full Power	60	5300	15.93	17	1.279	98.28	1.018	0.05	0.009	0.012
	WLAN5.3GHz	802.11a 6Mbps	Edge 3	0mm	Full Power	60	5300	15.93	17	1.279	98.28	1.018	0.08	0.020	0.026
	WLAN5.3GHz	802.11a 6Mbps	Edge 4	0mm	Reduced	60	5300	9.76	10	1.057	98.28	1.018	0.01	0.073	0.079
05	WLAN5.3GHz	802.11a 6Mbps	Bottom Face	0mm	Reduced	60	5300	9.76	10	1.057	98.28	1.018	0.01	0.314	0.338
	WLAN5.3GHz	802.11a 6Mbps	Edge 1	15 mm	Full Power	60	5300	15.93	17	1.279	98.28	1.018	0.12	0.089	0.116
	WLAN5.3GHz	802.11a 6Mbps	Bottom Face	15 mm	Full Power	60	5300	15.93	17	1.279	98.28	1.018	-0.04	0.058	0.076
	WLAN5.3GHz	802.11a 6Mbps	Edge 4	10 mm	Full Power	60	5300	15.93	17	1.279	98.28	1.018	0.04	0.100	0.130
06	WLAN5.5GHz	802.11a 6Mbps	Edge 1	0mm	Reduced	124	5620	8.61	9	1.094	98.28	1.018	0.01	0.343	0.382
	WLAN5.5GHz	802.11a 6Mbps	Edge 2	0mm	Full Power	124	5620	16.27	17	1.183	98.28	1.018	0.02	0.011	0.013
	WLAN5.5GHz	802.11a 6Mbps	Edge 3	0mm	Full Power	124	5620	16.27	17	1.183	98.28	1.018	0.04	0.015	0.018
	WLAN5.5GHz	802.11a 6Mbps	Edge 4	0mm	Reduced	124	5620	8.61	9	1.094	98.28	1.018	-0.04	0.081	0.090
	WLAN5.5GHz	802.11a 6Mbps	Bottom Face	0mm	Reduced	124	5620	8.61	9	1.094	98.28	1.018	0.01	0.240	0.267
	WLAN5.5GHz	802.11a 6Mbps	Edge 1	15 mm	Full Power	124	5620	16.27	17	1.183	98.28	1.018	0.12	0.110	0.132
	WLAN5.5GHz	802.11a 6Mbps	Bottom Face	15 mm	Full Power	124	5620	16.27	17	1.183	98.28	1.018	-0.04	0.106	0.128
	WLAN5.5GHz	802.11a 6Mbps	Edge 4	10 mm	Full Power	124	5620	16.27	17	1.183	98.28	1.018	0.05	0.118	0.142
07	WLAN5.8GHz	802.11a 6Mbps	Edge 1	0mm	Reduced	165	5825	7.31	7.5	1.045	98.28	1.018	-0.06	0.301	0.320
	WLAN5.8GHz	802.11a 6Mbps	Edge 2	0mm	Full Power	165	5825	15.97	17	1.268	98.28	1.018	0.05	0.012	0.015
	WLAN5.8GHz	802.11a 6Mbps	Edge 3	0mm	Full Power	165	5825	15.97	17	1.268	98.28	1.018	0.06	0.011	0.014
	WLAN5.8GHz	802.11a 6Mbps	Edge 4	0mm	Reduced	165	5825	7.31	7.5	1.045	98.28	1.018	-0.04	0.108	0.115
	WLAN5.8GHz	802.11a 6Mbps	Bottom Face	0mm	Reduced	165	5825	7.31	7.5	1.045	98.28	1.018	0.03	0.177	0.188
	WLAN5.8GHz	802.11a 6Mbps	Edge 1	15 mm	Full Power	165	5825	15.97	17	1.268	98.28	1.018	-0.04	0.098	0.126
	WLAN5.8GHz	802.11a 6Mbps	Bottom Face	15 mm	Full Power	165	5825	15.97	17	1.268	98.28	1.018	0.04	0.091	0.117
	WLAN5.8GHz	802.11a 6Mbps	Edge 4	10 mm	Full Power	165	5825	15.97	17	1.268	98.28	1.018	0.09	0.211	0.272

<Bluetooth SAR>

Plot No.	Band	Mode	Test Position	Gap (mm)	Power Reduction	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Reported 1g SAR (W/kg)
	Bluetooth	DH5 1Mbps	Edge 1	0mm	Full Power	39	2441	12.26	12.5	1.057	76.97	1.082	0.12	0.408	0.467
	Bluetooth	DH5 1Mbps	Edge 2	0mm	Full Power	39	2441	12.26	12.5	1.057	76.97	1.082	0.02	0.037	0.043
	Bluetooth	DH5 1Mbps	Edge 3	0mm	Full Power	39	2441	12.26	12.5	1.057	76.97	1.082	0.02	0.003	0.004
	Bluetooth	DH5 1Mbps	Edge 4	0mm	Full Power	39	2441	12.26	12.5	1.057	76.97	1.082	0.09	0.236	0.270
08	Bluetooth	DH5 1Mbps	Bottom Face	0mm	Full Power	39	2441	12.26	12.5	1.057	76.97	1.082	0.09	0.563	**0.644**

16.2 Repeated SAR Measurement

No.	Band	BW (MHz)	Modulation	RB Size	RB offset	Test Position	Gap (mm)	Power Reduction	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	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	40140	2545	23.09	24	1.233	62.9	1.006	0.07	0.894	1	1.109
2nd	LTE Band 41	20M	QPSK	1	99	Edge 1	15 mm	Full power	40140	2545	23.09	24	1.233	62.9	1.006	0.06	0.832	1.075	1.032

General Note:

1. Per KDB 865664 D01v01r04, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg.
2. Per KDB 865664 D01v01r04, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the difference in percentage between original and repeated *measured SAR*.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

17. Simultaneous Transmission Analysis

No.	Simultaneous Transmission Configurations	Body
1.	WCDMA + 2.4GHz WLAN	Yes
2.	LTE + 2.4GHz WLAN	Yes
3.	WCDMA + 5GHz WLAN	Yes
4.	LTE + 5GHz WLAN	Yes
5.	WCDMA + Bluetooth	Yes
6.	LTE + Bluetooth	Yes

General Note:

1. According to the EUT character, WLAN 5GHz and Bluetooth can't transmit simultaneously
2. EUT will choose each WCDMA and LTE according to the network signal condition; therefore, they will not operate simultaneously at any moment.
3. 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 though they have independent antenna.
4. WLAN 2.4GHz and Bluetooth share the same antenna so can't transmit simultaneously.
5. The reported SAR summation is calculated based on the same configuration and test position.
6. All licensed modes share the same antenna part and cannot transmit simultaneously.
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.

17.1 Body Exposure Conditions

WWAN Band		Exposure Position	1 WWAN 1g SAR (W/kg)	2 2.4GHz WLAN 1g SAR (W/kg)	3 5GHz WLAN 1g SAR (W/kg)	4 Bluetooth 1g SAR (W/kg)	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)	1+4 Summed 1g SAR (W/kg)
WCDMA	WCDMA V	Bottom Face at 15 mm	0.687	0.021	0.128	0.644	0.71	0.82	1.33
		Edge 1 at 15 mm	0.464	0.042	0.132	0.467	0.51	0.60	0.93
		Edge 2 at 5 mm	0.412	0.005	0.015	0.043	0.42	0.43	0.46
		Bottom Face at 0mm	0.500	0.340	0.338	0.644	0.84	0.84	1.14
		Edge 1 at 0mm	0.339	0.175	0.382	0.467	0.51	0.72	0.81
		Edge 2 at 0mm	0.102	0.005	0.015	0.043	0.11	0.12	0.15
		Edge 3 at 0mm			0.026	0.004	0.00	0.03	0.00
		Edge 4 at 0mm		0.047	0.115	0.270	0.05	0.12	0.27
		Edge 4 at 10mm		0.105	0.272	0.270	0.11	0.27	0.27
LTE	LTE Band 5	Bottom Face at 15 mm	0.875	0.021	0.128	0.644	0.90	1.00	1.52
		Edge 1 at 15 mm	0.565	0.042	0.132	0.467	0.61	0.70	1.03
		Edge 2 at 5 mm	0.400	0.005	0.015	0.043	0.41	0.42	0.44
		Bottom Face at 0mm	0.668	0.340	0.338	0.644	1.01	1.01	1.31
		Edge 1 at 0mm	0.493	0.175	0.382	0.467	0.67	0.88	0.96
		Edge 2 at 0mm	0.136	0.005	0.015	0.043	0.14	0.15	0.18
		Edge 3 at 0mm			0.026	0.004	0.00	0.03	0.00
		Edge 4 at 0mm		0.047	0.115	0.270	0.05	0.12	0.27
		Edge 4 at 10mm		0.105	0.272	0.270	0.11	0.27	0.27
	LTE Band 41	Bottom Face at 15 mm	0.901	0.021	0.128	0.644	0.92	1.03	1.55
		Edge 1 at 15 mm	1.109	0.042	0.132	0.467	1.15	1.24	1.58
		Edge 2 at 5 mm	0.763	0.005	0.015	0.043	0.77	0.78	0.81
		Bottom Face at 0mm	0.889	0.340	0.338	0.644	1.23	1.23	1.53
		Edge 1 at 0mm	0.838	0.175	0.382	0.467	1.01	1.22	1.31
		Edge 2 at 0mm	0.067	0.005	0.015	0.043	0.07	0.08	0.11
		Edge 3 at 0mm	0.062		0.026	0.004	0.06	0.09	0.07
		Edge 4 at 0mm	0.040	0.047	0.115	0.270	0.09	0.16	0.31
		Edge 4 at 10mm	0.040	0.105	0.272	0.270	0.15	0.31	0.31

Note:
1. Chose WWAN Edge 4 at 0mm as Edge 4 at 10 mm SAR to do co-located with WLAN analysis.
2. Chose WLAN Edge 2 at 0mm as Edge 2 at 5 mm SAR to do co-located with WWAN analysis.
3. Chose Bluetooth Bottom Face/ Edge 1/ Edge 2 at 0mm as Bottom Face at 15 mm, Edge 1 at 15 mm, Edge 2 at 5 mm SAR to do co-located with WWAN analysis.

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18. Uncertainty Assessment

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

19. 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 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.

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

[7] FCC KDB 447498 D01 v06, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, Oct 2015

[8] FCC KDB 248227 D01 v02r02, “SAR Guidance for IEEE 802.11 (WiFi) Transmitters”, Oct 2015.

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

[10] FCC KDB 941225 D01 v03r01, “3G SAR MEAUREMENT PROCEDURES”, Oct 2015

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

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.07.23

System Check_Head_835MHz

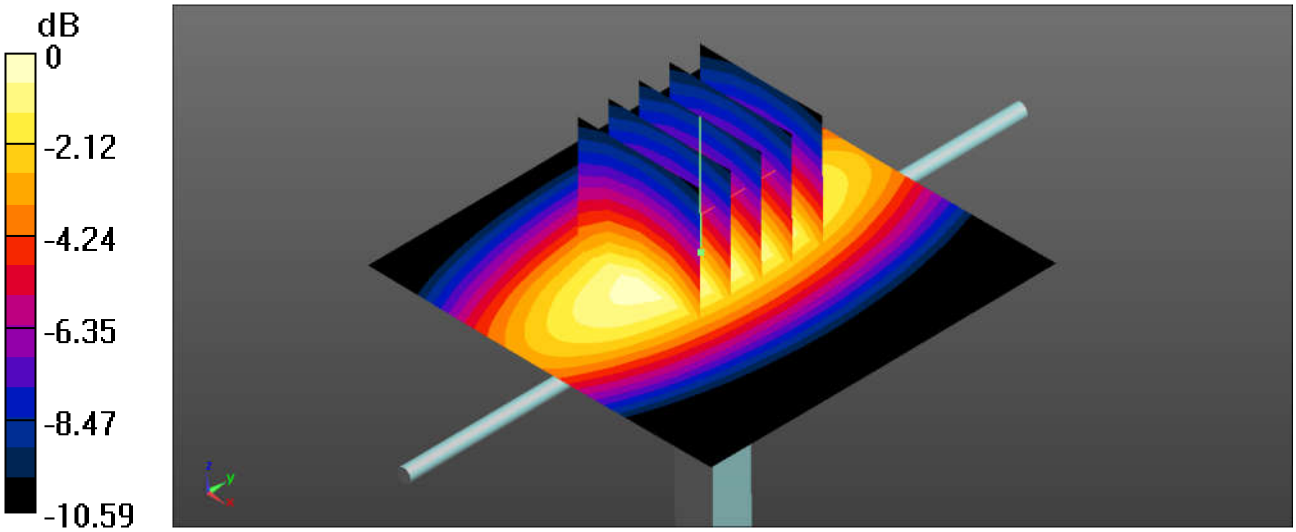
DUT: D835V2-SN:4d162

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium: HSL_835 Medium parameters used: f = 835 MHz; σ = 0.91 S/m; ε_r = 42.91; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3826; ConvF(9.12, 9.12, 9.12); Calibrated: 2020.05.20;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1356; Calibrated: 2020.05.19
- Phantom: ELI v4.0; Type: QDOVA002AA; Serial: TP:1149
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.09 W/kg

Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 57.15 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.62 W/kg
Maximum value of SAR (measured) = 3.11 W/kg



0 dB = 3.09 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.7.20

System Check_Head_2450MHz

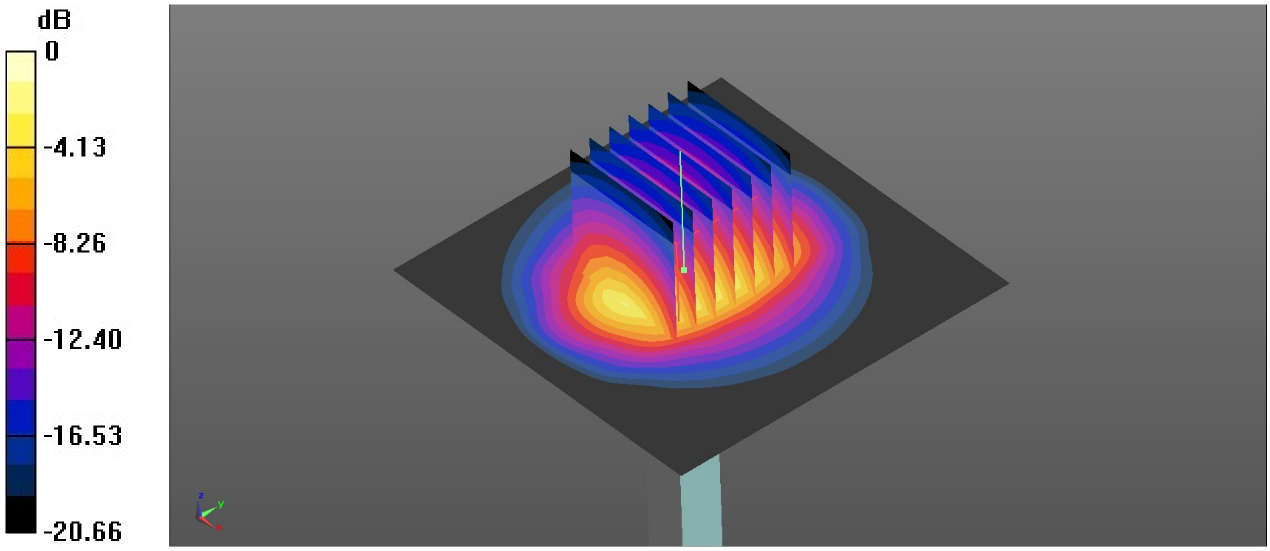
DUT: D2450V2 - SN:908

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2450 MHz; σ = 1.782 S/m; ε_r = 40.615; ρ = 1000 kg/m^3
Ambient Temperature：23.3 °C; Liquid Temperature：22.8 °C

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=250mW/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 19.9 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.74 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 25.4 W/kg
SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6.14 W/kg
Maximum value of SAR (measured) = 19.4 W/kg



0 dB = 19.4 W/kg = 12.88 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.07.26

System Check_Head_2600MHz

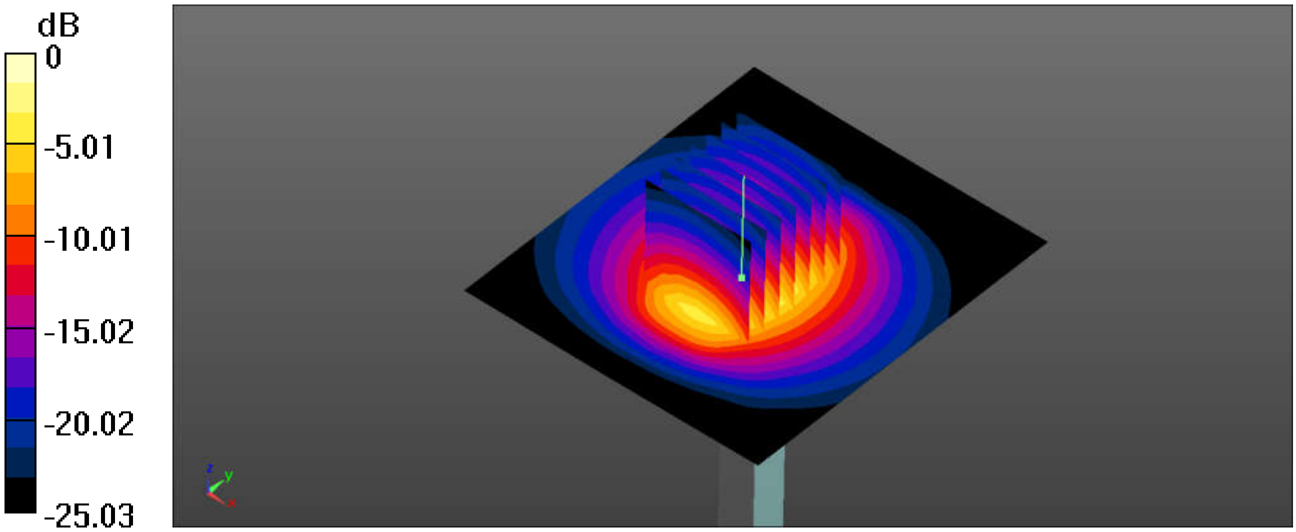
DUT: D2600V2-SN:1070

Communication System: UID 0, CW (0); Frequency: 2600 MHz;Duty Cycle: 1:1
Medium: HSL_2600 Medium parameters used: f = 2600 MHz; σ = 2.054 S/m; ε_r = 38.328; ρ= 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3826; ConvF(6.94, 6.94, 6.94); Calibrated: 2020.05.20;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1356; Calibrated: 2020.05.19
- Phantom: ELI v4.0; Type: QDOVA002AA; Serial: TP:1149
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Pin=250mW/Area Scan (71x81x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 27.0 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 111.4 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 35.1 W/kg
SAR(1 g) = 15.7 W/kg; SAR(10 g) = 6.84 W/kg
Maximum value of SAR (measured) = 24.9 W/kg



0 dB = 24.9 W/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.7.20

System Check_Head_5250MHz

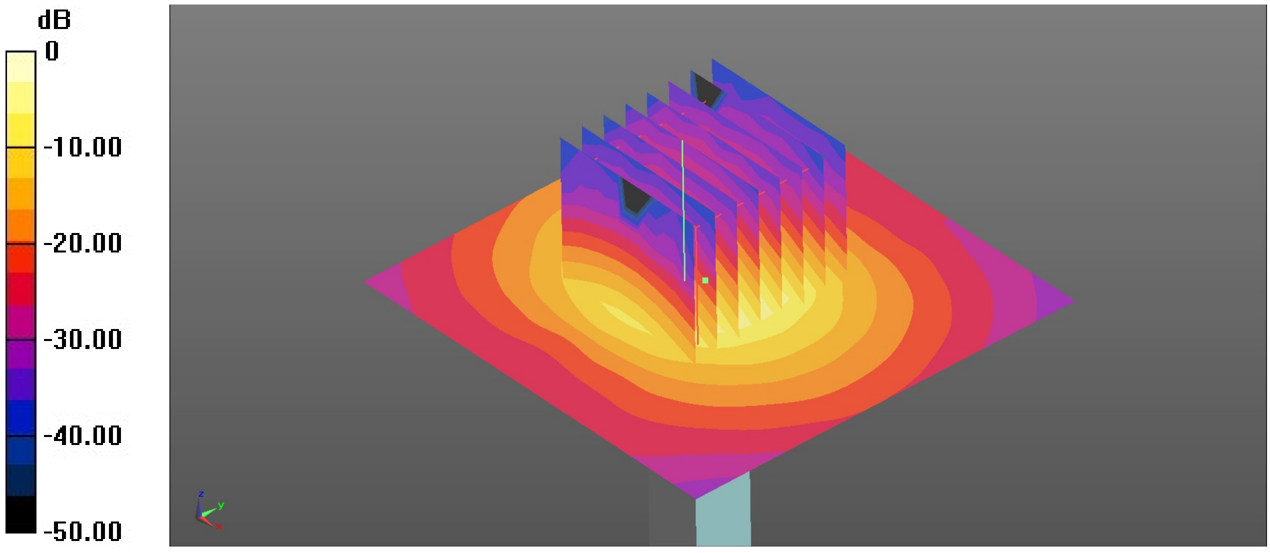
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5250 MHz; σ = 4.553 S/m; ε_r = 36.804; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.74, 4.74, 4.74); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 19.1 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.83 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 7.92 W/kg; SAR(10 g) = 2.26 W/kg
Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 18.7 W/kg = 12.72 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.7.21

System Check_Head_5600MHz

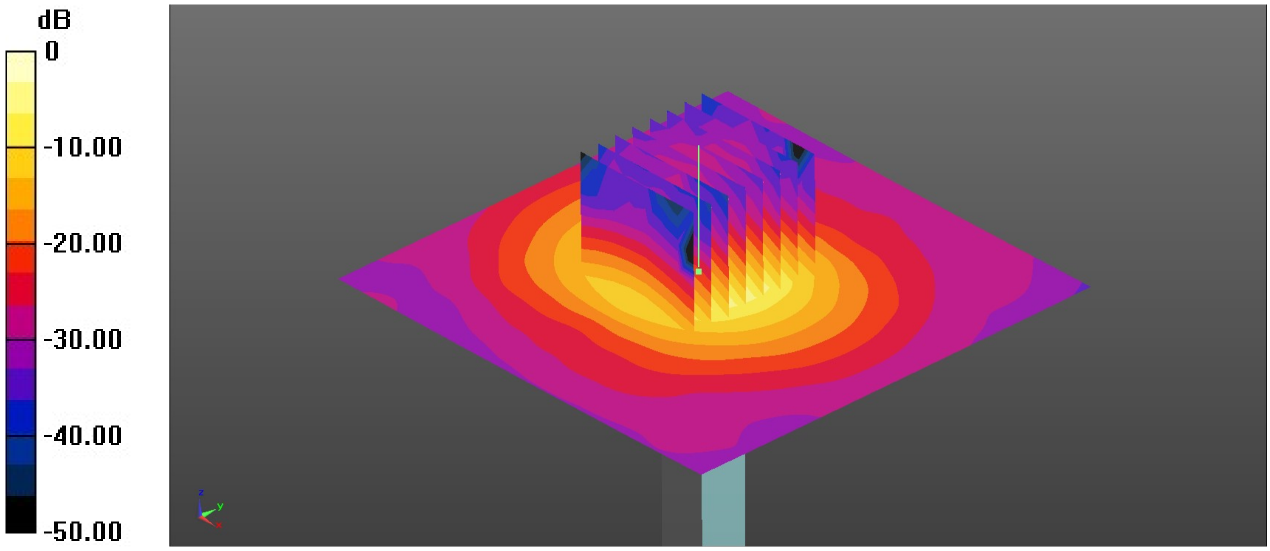
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5600 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5600 MHz; σ = 4.946 S/m; ε_r = 36.23; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.47, 4.47, 4.47); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (91x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 20.2 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 38.22 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 35.6 W/kg
SAR(1 g) = 8.01 W/kg; SAR(10 g) = 2.25 W/kg
Maximum value of SAR (measured) = 20.2 W/kg



0 dB = 20.2 W/kg = 13.05 dBW/kg

System Check_Head_5750MHz

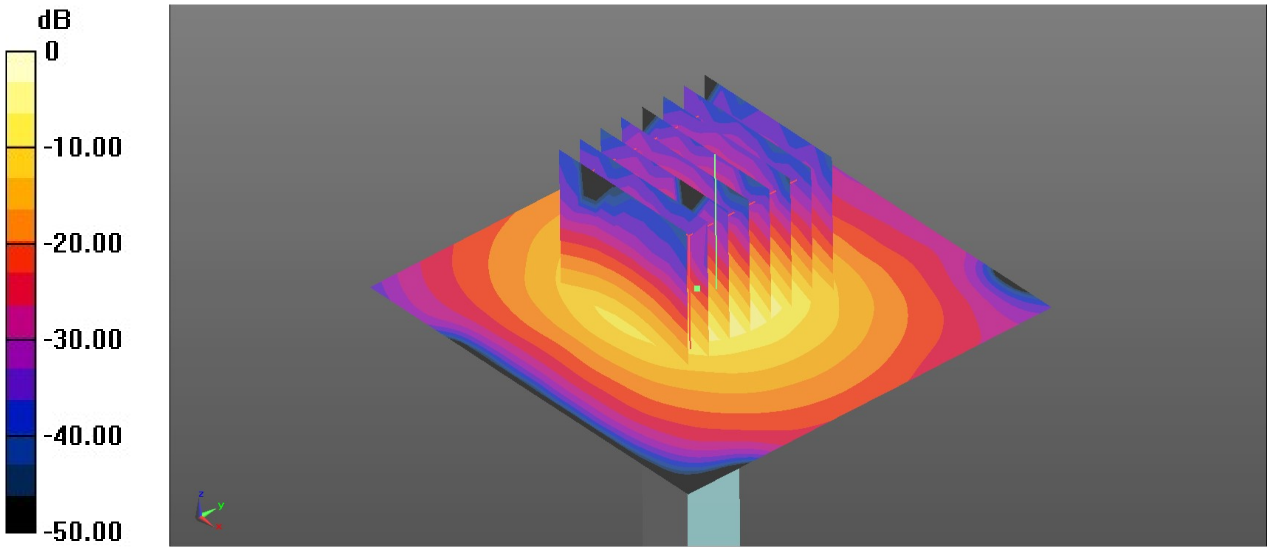
DUT: D5GHzV2 - SN:1113

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium: HSL_5000 Medium parameters used: f = 5750 MHz; σ = 5.124 S/m; ε_r = 35.989; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.9 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.44, 4.44, 4.44); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Pin=100mW/Area Scan (71x71x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 18.3 W/kg

Pin=100mW/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 39.34 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 31.6 W/kg
SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.07.23

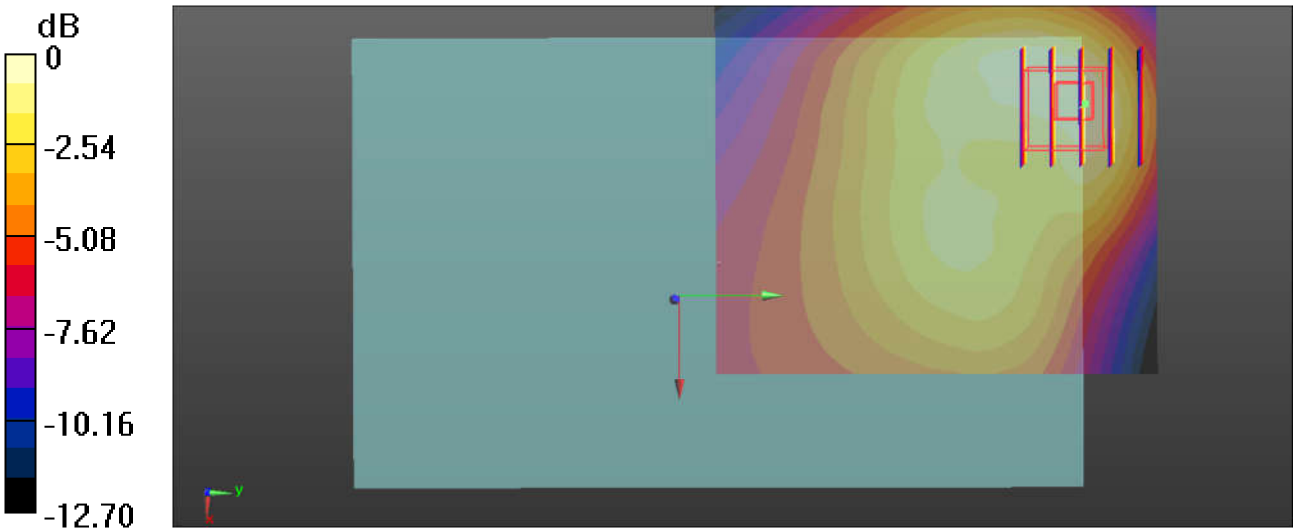
01_WCDMA V_RMC 12.2Kbps_Bottom face_15mm_Ch4182

Communication System: UID 0, UMTS (0); Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: HSL_835_200723 Medium parameters used: f = 836.4 MHz; σ = 0.912 S/m; ε_r = 42.893; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3826; ConvF(9.12, 9.12, 9.12); Calibrated: 2020.05.20;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1356; Calibrated: 2020.05.19
- Phantom: ELI v4.0; Type: QDOVA002AA; Serial: TP:1149
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch4182/Area Scan (81x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.703 W/kg

Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 13.36 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.854 W/kg
SAR(1 g) = 0.551 W/kg; SAR(10 g) = 0.360 W/kg
Maximum value of SAR (measured) = 0.707 W/kg



0 dB = 0.707 W/kg

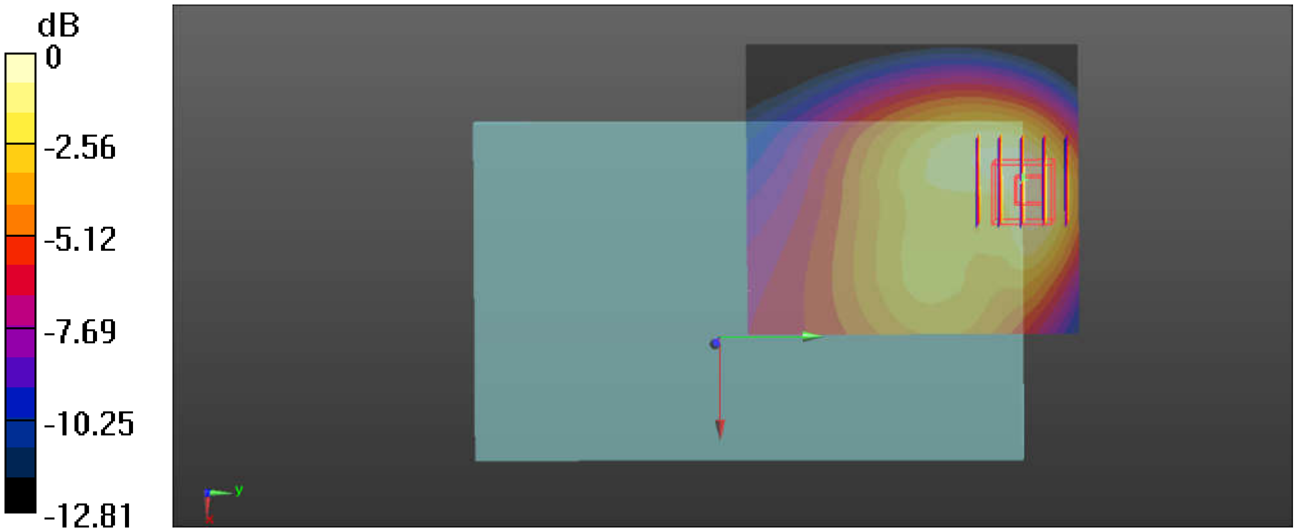
02_LTE Band 5_10M_QPSK_1RB_49Offset_Bottom face_15mm_Ch20525

Communication System: UID 0, LTE (0); Frequency: 836.5 MHz;Duty Cycle: 1:1
Medium: HSL_835_200723 Medium parameters used: f = 836.5 MHz; σ = 0.912 S/m; ε_r = 42.892; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3826; ConvF(9.12, 9.12, 9.12); Calibrated: 2020.05.20;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1356; Calibrated: 2020.05.19
- Phantom: ELI v4.0; Type: QDOVA002AA; Serial: TP:1149
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch20525/Area Scan (71x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.919 W/kg

Ch20525/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 14.17 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.706 W/kg; SAR(10 g) = 0.454 W/kg
Maximum value of SAR (measured) = 0.900 W/kg



0 dB = 0.900 W/kg

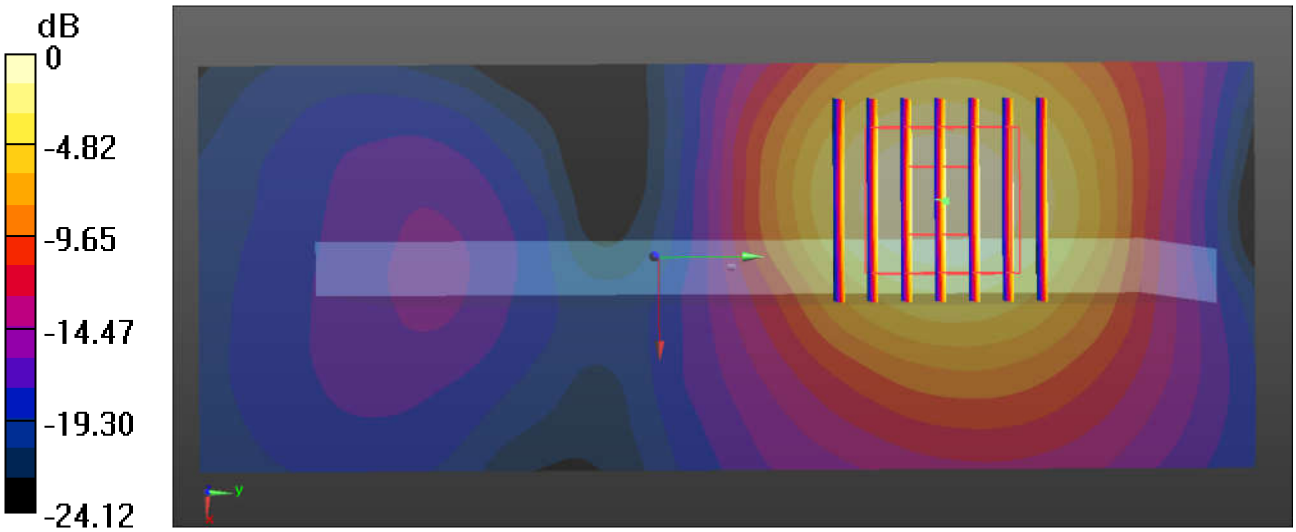
03_LTE Band 41_20M_QPSK_1RB_99Offset_Edge 1_15mm_Ch40140

Communication System: UID 0, LTE (0); Frequency: 2545 MHz;Duty Cycle: 1:1.59
Medium: HSL_2600_200726 Medium parameters used: f = 2545 MHz; σ = 1.927 S/m; ε_r = 40.638; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3826; ConvF(6.94, 6.94, 6.94); Calibrated: 2020.05.20;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1356; Calibrated: 2020.05.19
- Phantom: ELI v4.0; Type: QDOVA002AA; Serial: TP:1149
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.10 (7331)

Ch40140/Area Scan (51x131x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 1.38 W/kg

Ch40140/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.934 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.84 W/kg
SAR(1 g) = 0.894 W/kg; SAR(10 g) = 0.434 W/kg
Maximum value of SAR (measured) = 1.34 W/kg



0 dB = 1.34 W/kg

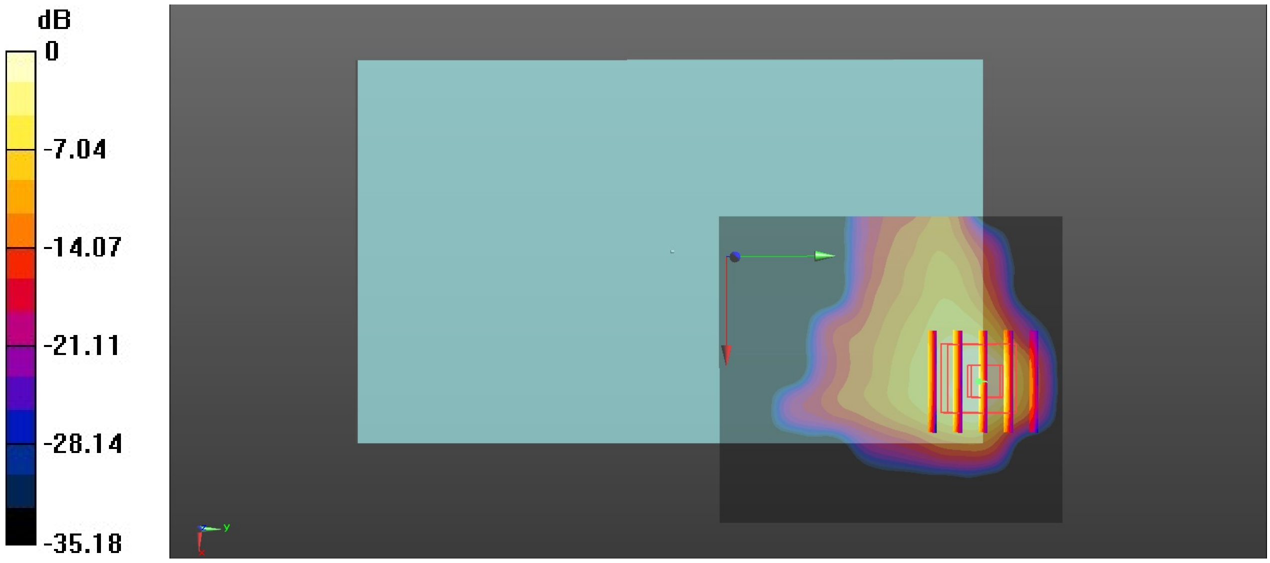
04_WLAN2.4GHz_802.11b 1Mbps_Bottom Face_0mm_Ch6

Communication System: UID 0, 802.11b (0); Frequency: 2437 MHz;Duty Cycle: 1:1
Medium: HSL_2450 Medium parameters used: f = 2437 MHz; σ = 1.764 S/m; ε_r = 40.666; ρ = 1000 kg/m^3
Ambient Temperature：23.3 °C; Liquid Temperature：22.8 °C

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(7.06, 7.06, 7.06); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (81x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.792 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.757 W/kg
SAR(1 g) = 0.291 W/kg; SAR(10 g) = 0.118 W/kg
Maximum value of SAR (measured) = 0.557 W/kg



0 dB = 0.557 W/kg = -2.54 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2020.7.20

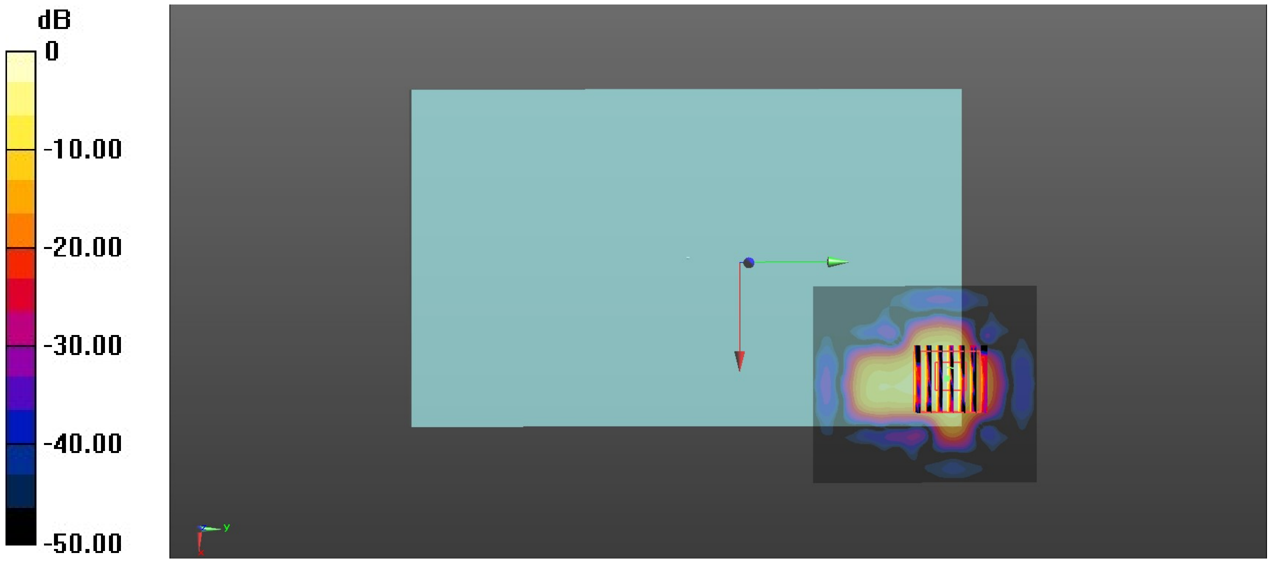
05_WLAN5GHz_802.11a 6Mbps_Bottom Face_0mm_Ch60

Communication System: UID 0, 802.11a (0); Frequency: 5300 MHz;Duty Cycle: 1:1.018
Medium: HSL_5000 Medium parameters used: f = 5300 MHz; σ = 4.794 S/m; ε_r = 36.393; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：22.7 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.74, 4.74, 4.74); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (71x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.43 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.314 W/kg; SAR(10 g) = 0.080 W/kg
Maximum value of SAR (measured) = 0.994 W/kg



0 dB = 0.994 W/kg = -0.03 dBW/kg

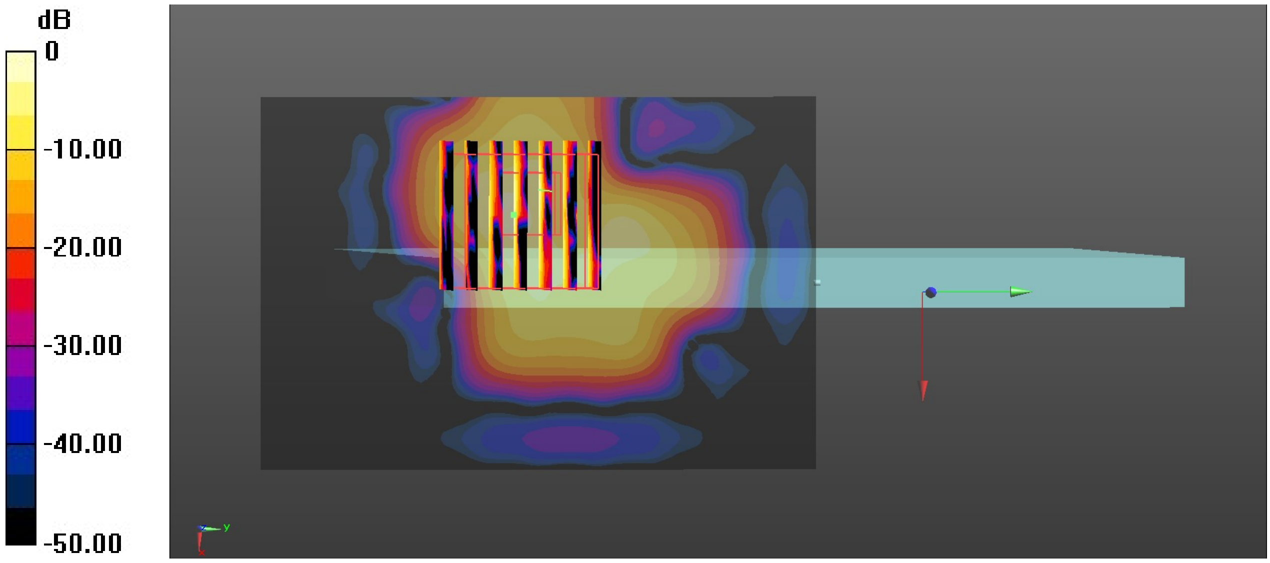
06_WLAN5GHz_802.11a 6Mbps_Edge 1_0mm_Ch124

Communication System: UID 0, 802.11a (0); Frequency: 5620 MHz;Duty Cycle: 1:1.018
Medium: HSL_5000 Medium parameters used: f = 5620 MHz; σ = 5.114 S/m; ε_r = 35.954; ρ = 1000 kg/m^3
Ambient Temperature：23.2 °C; Liquid Temperature：22.6 °C

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.47, 4.47, 4.47); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.722 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 1.418 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 2.83 W/kg
SAR(1 g) = 0.343 W/kg; SAR(10 g) = 0.073 W/kg
Maximum value of SAR (measured) = 1.17 W/kg



0 dB = 1.17 W/kg = 0.68 dBW/kg

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2020.7.21

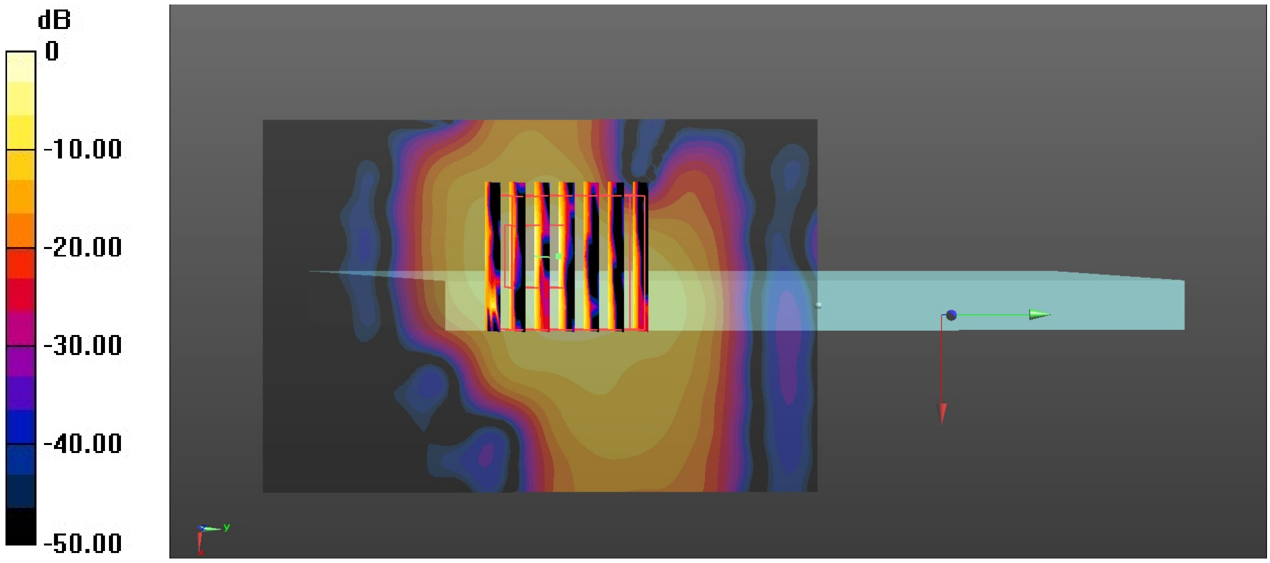
07_WLAN5GHz_802.11a 6Mbps_Edge 1_0mm_Ch165

Communication System: UID 0, 802.11a (0); Frequency: 5825 MHz;Duty Cycle: 1:1.018
Medium: HSL_5000 Medium parameters used: f = 5825 MHz; σ = 5.327 S/m; ε_r = 35.67; ρ = 1000 kg/m^3
Ambient Temperature：23.2 °C; Liquid Temperature：22.9 °C

DASY5 Configuration:
- Probe: EX3DV4 - SN3843; ConvF(4.44, 4.44, 4.44); Calibrated: 2019.9.26
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn799; Calibrated: 2020.2.10
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:1201
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (61x91x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.967 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 2.052 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 2.29 W/kg
SAR(1 g) = 0.301 W/kg; SAR(10 g) = 0.055 W/kg
Maximum value of SAR (measured) = 1.28 W/kg



0 dB = 1.28 W/kg = 1.07 dBW/kg