FCC SAR Test Report

APPLICANT	:	**Research In Motion Limited**
EQUIPMENT NAME	:	**LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC**
BRAND NAME	:	**RIM**
MODEL NAME	:	**REF31LW**
FCC ID	:	**L6AREF30LW**
STANDARD	:	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2003** **FCC OET Bulletin 65 Supplement C (Edition 01-01)**

The product was received on Oct. 28, 2011 and completely tested on Dec. 26, 2011. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Jones Tsai

Jones Tsai / Manager

ilac-MRA

TAF Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA1O2838	Rev. 01	Initial issue of report	Apr. 27, 2012
FA1O2838	Rev. 02	1. Add scaling SAR evaluation for simultaneous transmission. 2. Update channel power in WiFi SAR results table for WiFi 5.3G and 5.5G band in page 39. 3. Update power reduction target in page 8 and page 32. 4. Update supported WiFi 5.3G & 5.5G band frequecy range in page 7.	May. 10, 2012

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for Research In Motion Limited, LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC, RIM REF31LW are as follows.

Highest 1-g SAR Summary

Technology	Test configuration	SAR_{1g} (W/kg)
CDMA2000 BC0 With Power back-off	Body (Bottom-Face_0mm Gap)	1.17
CDMA2000 BC1 With Power back-off	Body (Bottom-Face_0mm Gap)	1.47
LTE Band 13 With Power back-off	Body (Bottom-Face_0mm Gap)	1.32
WiFi 2.4G	Body (Bottom-Face_0mm Gap)	1.12
WiFi 5G	Body (Primary-Portrait_0mm Gap)	1.4

Verification of SAR compliance

Band	Position	SAR_{1g} (W/kg)
CDMA2000 BC0	Body (Bottom-Face_10mm Gap)	0.664
CDMA2000 BC1	Body (Bottom-Face_10mm Gap)	1.37
LTE Band 13	Body (Bottom-Face_10mm Gap)	0.656

Note: The test records with distance 10mm and 7.5mm to the phantom are provided for verifying the SAR compliance when user is away from DUT and proximity sensor deactivated. 10mm and 7.5mm test results are for confirming operation of the power reduction scheme, and are not applicable for compliance demonstration for the FCC tablet PC SAR test procedures.

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003 and FCC OET Bulletin 65 Supplement C (Edition 01-01).

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

2.2 Applicant

Company Name	Research In Motion Limited
Address	295 Phillip Street, Waterloo, Ontario, Canada

2.3 Manufacturer

Company Name	Quanta Computer Inc.
Address	No. 188, Wen Hwa 2nd Road, Kuei Shan Hsiang Tao Yuan Shien, 333 Taiwan

2.4 Application Details

Date of Receipt of Application	Oct. 28, 2011
Date of Start during the Test	Oct. 29, 2011
Date of End during the Test	Dec. 26, 2011

3. General Information

3.1 Description of Device Under Test (DUT)

Product Feature & Specification	
Equipment Name	LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC
Brand Name	RIM
Model Name	REF31LW
Marketing Name	P150-32*** The stars "*" in model name can be 0 to 9, A to Z or blank, for marking purpose.
FCC ID	L6AREF30LW
Tx Frequency	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 13: 779.5 ~ 784.5 MHz 802.11b/g/n : 2412 MHz ~ 2462 MHz 802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Rx Frequency	CDMA2000 BC0: 869.70 MHz ~ 893.31 MHz CDMA2000 BC1: 1931.25 MHz ~ 1988.75 MHz LTE Band 13: 748.5 ~ 753.5 MHz 802.11b/g/n: 2412 MHz ~ 2462 MHz 802.11a/n: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz; 5500 MHz ~ 5700MHz; 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Maximum Average Output Power to Antenna	CDMA2000 BC0: 23.56 dBm CDMA2000 BC1: 23.51 dBm LTE Band 13: 23.06 dBm 802.11b: 17.49 dBm 802.11g: 15.53 dBm 802.11n (2.4GHz): 13.94 dBm (BW 20MHz) 802.11a: 14.11 dBm 802.11n (5GHz): 13.91 dBm (BW 20MHz) Bluetooth: 8.70 dBm
Antenna Type	Fixed Internal Antenna
Type of Modulation	CDMA2000: QPSK LTE: QPSK / 16QAM (uplink) 802.11b: DSSS (BPSK / QPSK / CCK) 802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK NFC : ASK
DUT Stage	Identical Prototype
Remark: 1. The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. Voice call is not supported.	

The table below summarized necessary items addressed in KDB 941225 D05 v01.

<table>
<tr><td colspan="3">FCC ID</td><td colspan="3">L6AREF30LW</td></tr>
<tr><td colspan="3">DUT Type</td><td colspan="3">LTE band 13 / CDMA2000 BC0 & BC1 Tablet PC</td></tr>
<tr><td colspan="3">Operating Frequency Range of each LTE transmission band</td><td colspan="3">Band 13: TX: 779.5 MHz ~ 784.5 MHz, RX: 748.5 MHz ~ 753.5 MHz</td></tr>
<tr><td colspan="3">Channel Bandwidth</td><td colspan="3">5MHz, 10MHz</td></tr>
<tr><td colspan="6">Transmission (H, M, L) channel numbers and frequencies in each LTE band</td></tr>
<tr><td colspan="6">Band 13</td></tr>
<tr><td rowspan="2"></td><td colspan="2">Bandwidth 5 MHz</td><td colspan="3">Bandwidth 10 MHz</td></tr>
<tr><td>Channel #</td><td>Frequency (MHz)</td><td>Channel #</td><td colspan="2">Frequency (MHz)</td></tr>
<tr><td>L</td><td>23205</td><td>779.5</td><td rowspan="3">23230</td><td colspan="2" rowspan="3">782</td></tr>
<tr><td>M</td><td>23230</td><td>782</td></tr>
<tr><td>H</td><td>23255</td><td>784.5</td></tr>
<tr><td colspan="3">UE category, uplink modulations used</td><td colspan="3">Category 3, QPSK, and 16QAM</td></tr>
<tr><td colspan="3">LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)</td><td colspan="3">Main Antenna: LTE share the antenna with CDMA2000.</td></tr>
<tr><td colspan="3">LTE Voice / Data requirements</td><td colspan="3">Data only</td></tr>
<tr><td colspan="3">LTE MPR permanently built-in by design</td><td colspan="3">Yes</td></tr>
<tr><td colspan="3">LTE A-MPR</td><td colspan="3">Disabled during SAR testing. With CMW500, set NS value to NS_01 to disable A-MPR.</td></tr>
<tr><td colspan="3">LTE maximum averaged conducted output power</td><td colspan="3">LTE Band 13 : 23.06 dBm</td></tr>
<tr><td colspan="3" rowspan="4">Other U.S. wireless operating modes / bands</td><td>CDMA2000
1xRTT / 1xEV-DO</td><td colspan="2">BC0: UL: 824.7MH~848.31MHz / DL: 869.7~893.31MHz
BC1: UL: 1851.25MH~1908.75MHz / DL: 1931.25~1988.75MHz</td></tr>
<tr><td>WIFI</td><td colspan="2">2.4G: 2412 MHz ~ 2462 MHz
5G: 5180 MHz ~ 5240 MHz; 5260 MHz ~ 5320 MHz;
5500 MHz ~ 5700 MHz; 5745 MHz ~ 5825 MHz.</td></tr>
<tr><td>Bluetooth</td><td colspan="2">2402 MHz ~ 2480 MHz</td></tr>
<tr><td>NFC</td><td colspan="2">13.56 MHz</td></tr>
<tr><td colspan="3">Simultaneous transmission configurations</td><td colspan="3">In Section 12.2</td></tr>
<tr><td colspan="3">Power reduction applied to satisfy SAR compliance</td><td colspan="3">Yes, Proximity sensor.</td></tr>
</table>

3.2 Product Photos

Please refer to Appendix D

3.3 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v04
- FCC KDB 616217 D03 v01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D05 v01
- FCC KDB 248227 D01 v01r02

3.4 Device Category and SAR Limits

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

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

For WWAN SAR testing, the device was controlled by using a base station emulator. Communication between the device and the emulator was established by air link. The distance between the DUT and the antenna of the emulator is larger than 50 cm and the output power radiated from the emulator antenna is at least 30 dB smaller than the output power of DUT. The DUT was set from the emulator to radiate maximum output power during all tests.

For WLAN SAR testing, WLAN engineering testing software installed on the DUT can provide continuous transmitting RF signal. This RF signal utilized in SAR measurement has over 99% duty cycle and is treated as 1.

The DUT implements power reduction scheme for SAR compliance, for specific device configuration and orientations, as described below. The complete description of the implementation and functionality is provided in the "Technical Description" exhibit.

Power reduction applied for each wireless mode and orientation

Exposure Position / wireless mode	1xRTT 850	1xRTT 1900	1xEV-DO 850	1xEV-DO 1900	LTE Band13
Bottom Face	#	#	#	#	#
Primary Landscape	##	##	##	##	##
Secondary Landscape	#	#	#	#	#
Primary Portrait	##	##	##	##	##
Secondary Portrait	##	##	##	##	##

#: Reduced maximum limit applied by activation of proximity sensor.
##: Normal Output power without reduction.

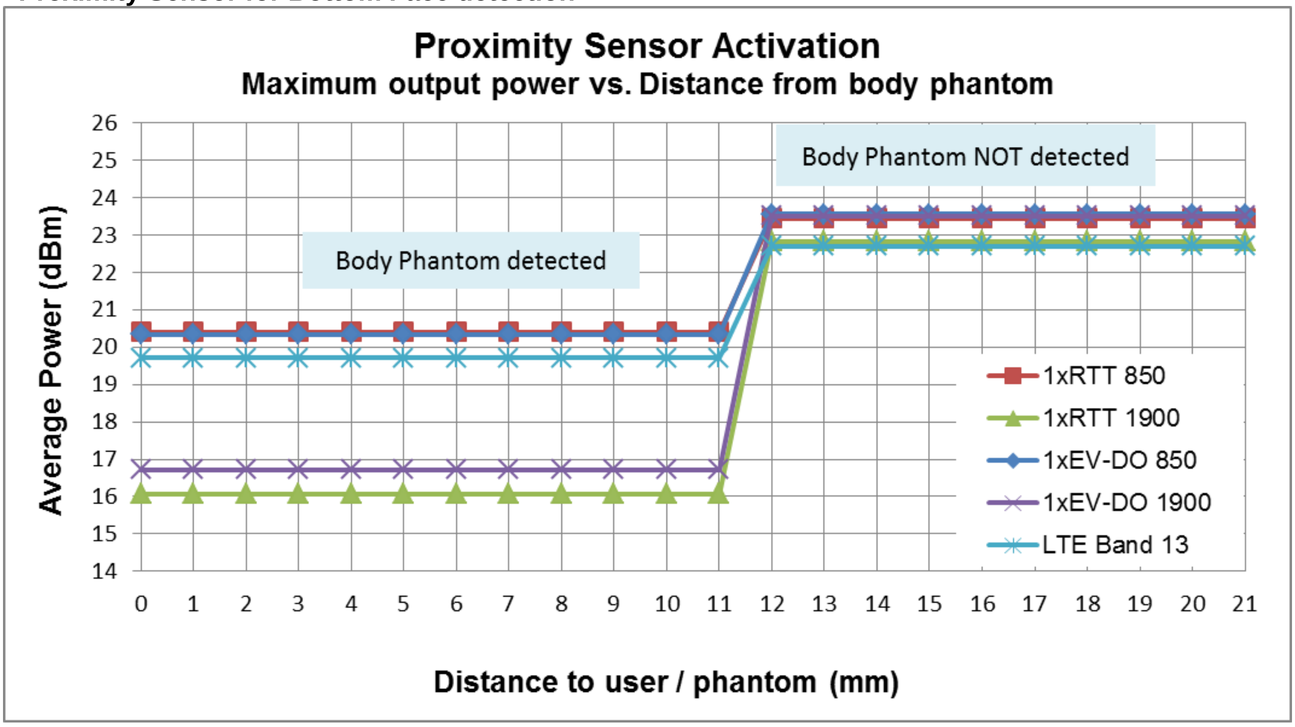
Note: WiFi, BT output power is not reduced for SAR compliance.

Target Power reduction specifications:

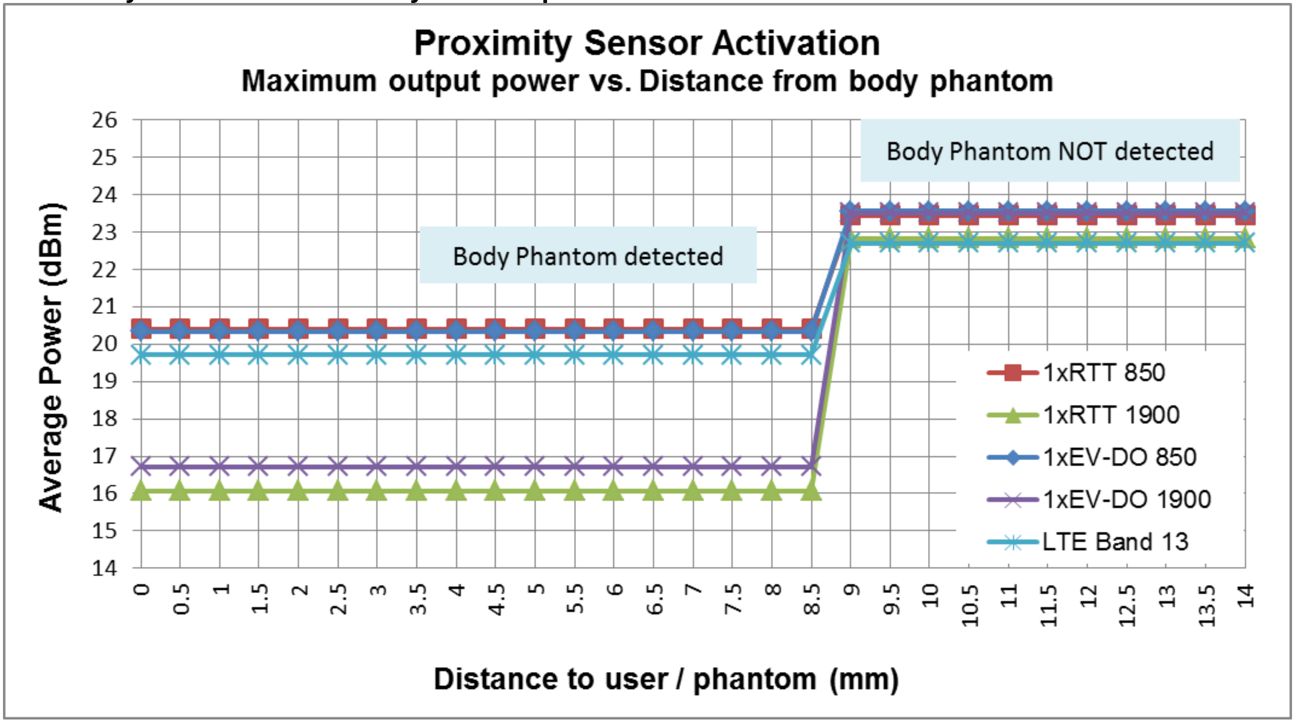
Mode(s)	1xRTT 850	1xRTT 1900	1xEV-DO 850	1xEV-DO 1900	LTE Band 13
Reduction levels	3dB	6.6dB	3dB	6.6dB	3.5dB

Remark: The deviation from the specification is due to the tolerance in the measurement.

<Proximity Sensor for Bottom Face detection>



<Proximity Sensor for Secondary-Landscape detection>



Remark:

1. 1xRTT 850, CH777. Full power: 23.45 dBm, Reduced power: 20.40 dBm. The power reduction level is 3.05 dB.
2. 1xRTT 1900, CH1175. Full power: 22.83 dBm, Reduced power: 16.08 dBm. The power reduction level is 6.75 dB.
3. 1xEVDO 850, CH777. Full power: 23.56 dBm, Reduced power: 20.34 dBm. The power reduction level is 3.22 dB.
4. 1xEVDO 1900, CH1175. Full power: 23.51 dBm, Reduced power: 16.72 dBm. The power reduction level is 6.79 dB.
5. LTE Band 13, 10M, CH23230. Full power: 22.70 dBm, Reduced power: 19.71 dBm. The power reduction level is 2.99 dB.

4. Specific Absorption Rate (SAR)

4.1 Introduction

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

4.2 SAR Definition

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

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

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

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

5. SAR Measurement System

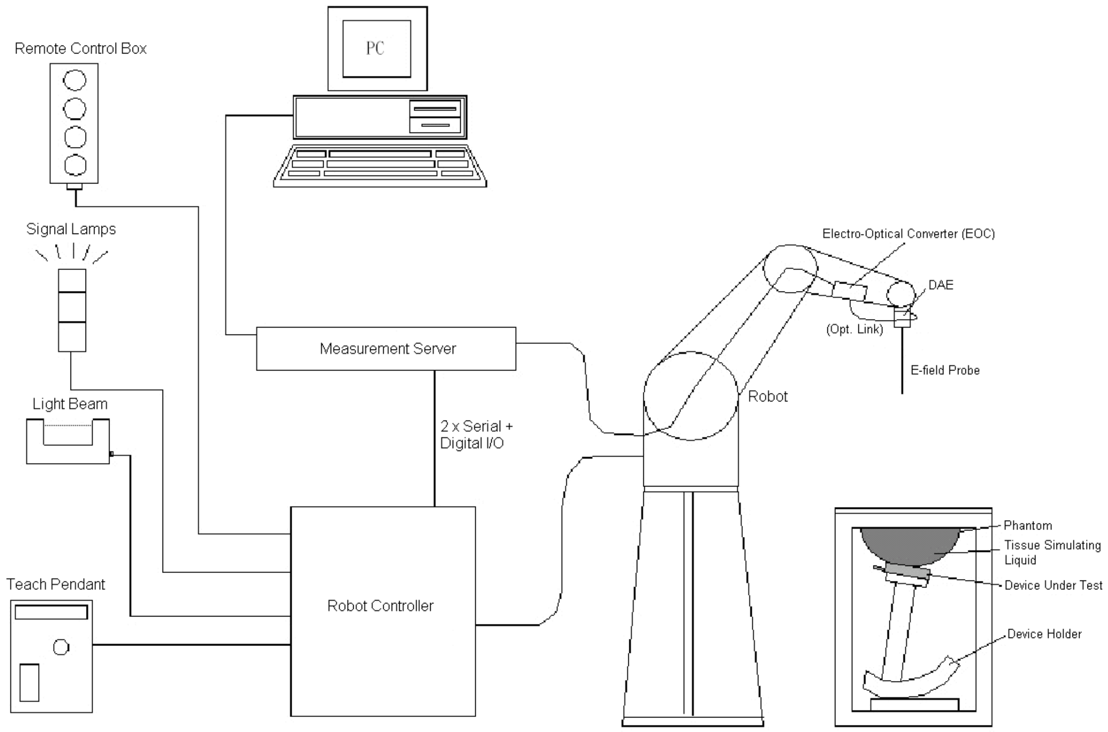


Fig 5.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (ECO) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

Some of the components are described in details in the following sub-sections.

5.1 E-Field Probe

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

5.1.1 E-Field Probe Specification

<ET3DV6 Probe >

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 3 GHz; Linearity: ± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 µW/g to 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm (Tip: 16 mm) Tip diameter: 6.8 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.7 mm

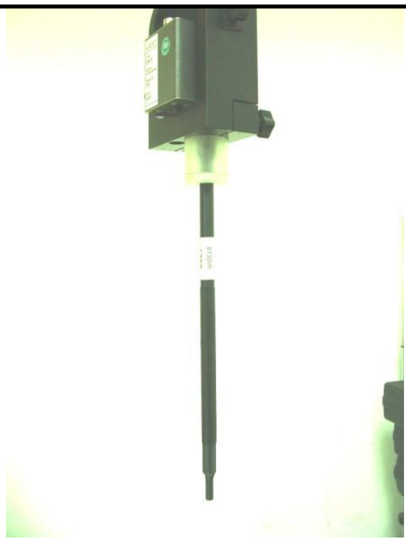


Fig 5.2 Photo of ET3DV6

<EX3DV4 Probe>

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

Fig 5.3 Photo of EX3DV4

5.1.2 E-Field Probe Calibration

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

5.2 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 5.4 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

Fig 5.1 Photo of DASY4

Fig 5.2 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.

Fig 5.1 Photo of Server for DASY4

Fig 5.2 Photo of Server for DASY5

5.5 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

Fig 5.3 Photo of SAM 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.

<ELI4 Phantom>

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

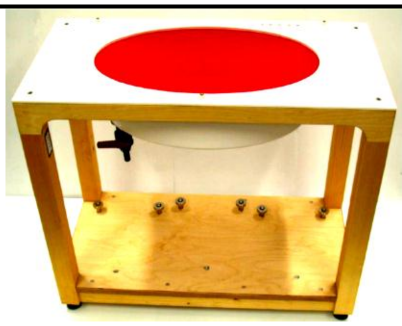


Fig 5.4 Photo of ELI4 Phantom

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

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity $\varepsilon = 3$ and loss tangent $\delta = 0.02$. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

Fig 5.5 Device Holder

<Laptop Extension Kit>

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.

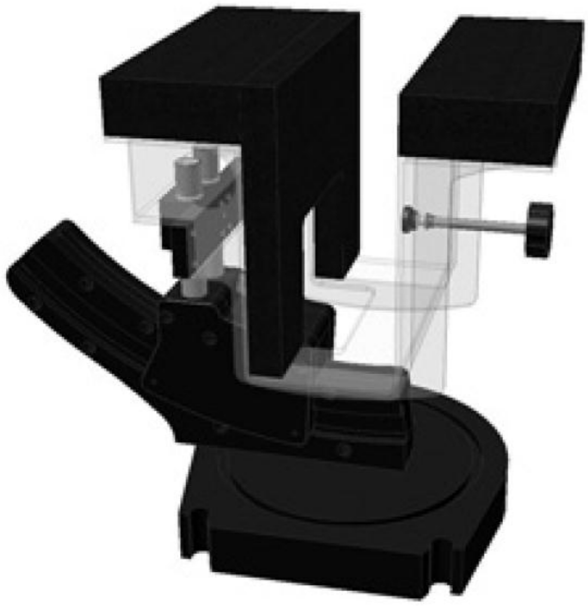


Fig 5.6 Laptop Extension Kit

5.7 Data Storage and Evaluation

5.7.1 Data Storage

The DASY software stores the assessed data from the data acquisition electronics as raw data (in microvolt readings from the probe sensors), together with all the necessary software parameters for the data evaluation (probe calibration data, liquid parameters and device frequency and modulation data) in measurement files. The post-processing software evaluates the desired unit and format for output each time the data is visualized or exported. This allows verification of the complete software setup even after the measurement and allows correction of erroneous parameter settings. For example, if a measurement has been performed with an incorrect crest factor parameter in the device setup, the parameter can be corrected afterwards and the data can be reevaluated.

The measured data can be visualized or exported in different units or formats, depending on the selected probe type (e.g., [V/m], [A/m], [mW/g]). Some of these units are not available in certain situations or give meaningless results, e.g., a SAR-output in a non-lose media, will always be zero. Raw data can also be exported to perform the evaluation with other software packages.

5.7.2 Data Evaluation

The DASY post-processing software (SEMCAD) automatically executes the following procedures to calculate the field units from the microvolt readings at the probe connector. The parameters used in the evaluation are stored in the configuration modules of the software：

Probe parameters：	- Sensitivity	$Norm_i$, a_{i0}, a_{i1}, a_{i2}
	- Conversion factor	$ConvF_i$
	- Diode compression point	dcp_i
Device parameters：	- Frequency	f
	- Crest factor	cf
Media parameters：	- Conductivity	σ
	- Density	ρ

These parameters must be set correctly in the software. They can be found in the component documents or they can be imported into the software from the configuration files issued for the DASY components. In the direct measuring mode of the multi-meter option, the parameters of the actual system setup are used. In the scan visualization and export modes, the parameters stored in the corresponding document files are used.

The first step of the evaluation is a linearization of the filtered input signal to account for the compression characteristics of the detector diode. The compensation depends on the input signal, the diode type and the DC-transmission factor from the diode to the evaluation electronics. If the exciting field is pulsed, the crest factor of the signal must be known to correctly compensate for peak power.

The formula for each channel can be given as：

$$\mathbf{V_i} = \mathbf{U_i} + \mathbf{U_i^2} \cdot \frac{\mathbf{cf}}{\mathbf{dcp_i}}$$

with V_i = compensated signal of channel i, (i = x, y, z)
U_i = input signal of channel i, (i = x, y, z)
cf = crest factor of exciting field (DASY parameter)
dcp_i = diode compression point (DASY parameter)

From the compensated input signals, the primary field data for each channel can be evaluated：

E-field Probes： $\mathbf{E_i} = \sqrt{\frac{\mathbf{V_i}}{\mathbf{Norm_i \cdot ConvF}}}$

H-field Probes： $\mathbf{H_i} = \sqrt{\mathbf{V_i}} \cdot \frac{\mathbf{a_{i0} + a_{i1} f + a_{i2} f^2}}{\mathbf{f}}$

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), μV/(V/m)^2 for E-field Probes
ConvF = sensitivity enhancement in solution
a_{ij} = sensor sensitivity factors for H-field probes
f = carrier frequency [GHz]
E_i = electric field strength of channel i in V/m
H_i = magnetic field strength of channel i in A/m

The RSS value of the field components gives the total field strength (Hermitian magnitude)：

$$\mathbf{E_{tot}} = \sqrt{\mathbf{E_x^2} + \mathbf{E_y^2} + \mathbf{E_z^2}}$$

The primary field data are used to calculate the derived field units.

$$\mathbf{SAR} = \mathbf{E_{tot}^2} \cdot \frac{\boldsymbol{\sigma}}{\boldsymbol{\rho} \cdot \mathbf{1000}}$$

with SAR = local specific absorption rate in mW/g
E_{tot} = total field strength in V/m
σ = conductivity in [mho/m] or [Siemens/m]
ρ = equivalent tissue density in g/cm^3

Note that the density is set to 1, to account for actual head tissue density rather than the density of the tissue simulating liquid.

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	750MHz System Validation Kit	D750V3	1012	Jun. 11, 2010	Jun. 10, 2012
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 22, 2010	Mar. 21, 2012
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 23, 2010	Mar. 22, 2012
SPEAG	2450MHz System Validation Kit	D2450V2	736	Jul. 25, 2011	Jul. 24, 2012
SPEAG	5GHz System Validation Kit	D5GHzV2	1040	Jun. 21, 2011	Jun. 20, 2012
SPEAG	Data Acquisition Electronics	DAE3	577	Jun. 20, 2011	Jun. 19, 2012
SPEAG	Data Acquisition Electronics	DAE4	778	Nov. 22, 2011	Nov. 21, 2012
SPEAG	Data Acquisition Electronics	DAE4	1279	Jun. 17, 2011	Jun. 16, 2012
SPEAG	Dosimetric E-Field Probe	ET3DV6	1787	May. 20, 2011	May. 19, 2012
SPEAG	Dosimetric E-Field Probe	ET3DV6	1788	Sep. 28, 2011	Sep. 27, 2012
SPEAG	Dosimetric E-Filed Probe	EX3DV4	3792	Jun. 20, 2011	Jun. 19, 2012
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1303	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1383	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1446	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 C	TP-1478	NCR	NCR
SPEAG	SAM Phantom	QD 000 P41 C	TP-1150	NCR	NCR
SPEAG	SAM Phantom	QD 000 P40 CD	TP-1644	NCR	NCR
SPEAG	SAM Phantom	SM 000 T01 DA	TP-1542	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1026	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BA	1029	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1127	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1131	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46100746	Jun. 10, 2011	Jun. 09, 2012
Anritsu	Radio Communication Analyzer	MT8820C	6201026480	Aug. 12 ,2011	Aug. 11 ,2012
Agilent	ESG Vector Series Signal Generator	E4438C	MY49070755	Oct. 17, 2011	Oct. 16, 2012
Anritsu	Power Meter	ML2495A	932001	Sep. 21, 2011	Sep. 20, 2012
Agilent	Wireless Communication Test Set	E5515C	MY50260107	Jul. 16, 2010	Jul. 15, 2012
Agilent	Wireless Communication Test Set	E5515C	GB46311322	Mar. 23, 2011	Mar. 22, 2013
Agilent	Wireless Communication Test Set	E5515C	MY50264370	Apr. 19, 2011	Apr. 18, 2013
Agilent	Wireless Communication Test Set	E5515C	MY50266977	Nov. 13, 2011	Nov. 12, 2013
Agilent	RF Vector Network Analyzer	E8358A	US40260131	May. 17, 2011	May. 16, 2012
R&S	Universal Radio Communication Tester	CMU200	114256	Feb. 08, 2010	Feb. 07, 2012
R&S	Spectrum Analyzer	FSP7	101131	Jul. 29, 2011	Jul. 28, 2012
R&S	Spectrum Analyzer	FSP30	101329	May. 03, 2011	May. 02, 2012

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB450824 D02, 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 D750V3: SN 1012, D835V2: SN 499, D1900V2: SN 5d041 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.

6. Tissue Simulating Liquids

For the measurement of the field distribution inside the SAM phantom with DASY, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.1. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm, which is shown in Fig. 6.2.

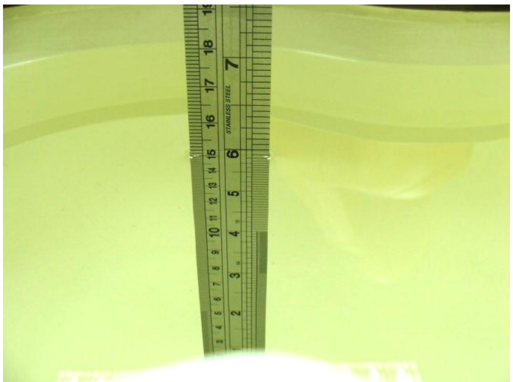


Fig 6.1 Photo of Liquid Height for Head SAR

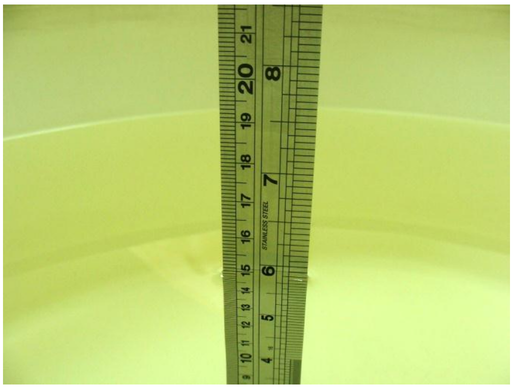


Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

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

Table 6.1 Recipes of Tissue Simulating Liquid

Simulating Liquid for 5G, Manufactured by SPEAG

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

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an Agilent 85070D Dielectric Probe Kit and an Agilent Network Analyzer.

The following table shows the measuring results for simulating liquid.

Freq. (MHz)	Liquid Type	Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
750	Body	21.5	0.964	54.3	0.96	55.5	0.42	-2.16	±5	Nov. 16, 2011
750	Body	21.6	0.961	53.9	0.96	55.5	0.10	-2.88	±5	Nov. 17, 2011
750	Body	21.5	0.922	56.1	0.96	55.5	-3.96	1.08	±5	Dec. 07, 2011
835	Body	21.4	0.962	54.6	0.97	55.2	-0.82	-1.09	±5	Nov. 07, 2011
835	Body	21.5	0.963	54.5	0.97	55.2	-0.72	-1.27	±5	Nov. 12, 2011
1900	Body	21.3	1.55	53	1.52	53.3	1.97	-0.56	±5	Nov. 11, 2011
2450	Body	21.6	2.01	53.8	1.95	52.7	3.08	2.09	±5	Dec. 26, 2011
5200	Body	21.4	5.16	48.5	5.3	49	-2.64	-1.02	±5	Nov. 22, 2011
5500	Body	21.4	5.74	48.6	5.65	48.6	1.59	0.00	±5	Nov. 22, 2011
5800	Body	21.4	6.13	47.8	6.0	48.2	2.17	-0.83	±5	Nov. 22, 2011

Table 6.2 Measuring Results for Simulating Liquid

Freq. (MHz)	Liquid Type	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
782	Body	0.99	53.6	0.96	55.4	2.72	-3.23	±5	Nov. 16, 2011
782	Body	0.986	53.2	0.98	55.4	0.61	-3.95	±5	Nov. 17, 2011
782	Body	0.99	53.6	0.96	55.4	2.72	-3.23	±5	Dec. 07, 2011
824.7	Body	0.953	54.7	0.97	55.2	-1.65	-0.96	±5	Nov. 07, 2011
836.52	Body	0.964	54.5	0.97	55.2	-0.81	-1.26	±5	Nov. 07, 2011
848.31	Body	0.975	54.4	0.99	55.2	-1.15	-1.38	±5	Nov. 07, 2011
824.7	Body	0.953	54.6	0.97	55.2	-1.65	-1.14	±5	Nov. 12, 2011
836.52	Body	0.965	54.5	0.97	55.2	-0.71	-1.26	±5	Nov. 12, 2011
848.31	Body	0.975	54.4	0.99	55.2	-1.15	-1.38	±5	Nov. 12, 2011
1851.25	Body	1.51	54.6	1.50	53.4	0.52	2.17	±5	Nov. 11, 2011
1880	Body	1.54	54.4	1.51	53.5	2.28	1.77	±5	Nov. 11, 2011
1908.75	Body	1.58	54.3	1.51	53.5	4.70	1.56	±5	Nov. 11, 2011
2412	Body	1.95	53.9	1.90	52.7	2.84	2.18	±5	Dec. 26, 2011
2437	Body	1.99	53.8	1.93	52.7	3.03	2.06	±5	Dec. 26, 2011
2462	Body	2.03	53.8	1.97	52.7	3.20	2.12	±5	Dec. 26, 2011
5180	Body	5.26	49.23	5.28	49.0	-0.28	0.38	±5	Nov. 22, 2011
5200	Body	5.29	49.18	5.30	49.0	-0.17	0.35	±5	Nov. 22, 2011
5220	Body	5.32	49.16	5.32	49.0	0.00	0.35	±5	Nov. 22, 2011
5240	Body	5.36	49.13	5.35	49.0	0.17	0.35	±5	Nov. 22, 2011
5260	Body	5.38	49.09	5.37	48.9	0.26	0.32	±5	Nov. 22, 2011
5280	Body	5.41	49.04	5.39	48.9	0.27	0.28	±5	Nov. 22, 2011
5300	Body	5.43	48.99	5.42	48.9	0.28	0.23	±5	Nov. 22, 2011
5320	Body	5.46	48.93	5.44	48.9	0.47	0.16	±5	Nov. 22, 2011
5500	Body	5.73	48.60	5.65	48.6	1.43	-0.02	±5	Nov. 22, 2011
5520	Body	5.75	48.52	5.67	48.6	1.43	-0.12	±5	Nov. 22, 2011
5540	Body	5.78	48.44	5.70	48.6	1.43	-0.23	±5	Nov. 22, 2011
5560	Body	5.80	48.38	5.72	48.5	1.49	-0.29	±5	Nov. 22, 2011
5580	Body	5.83	48.34	5.74	48.5	1.59	-0.32	±5	Nov. 22, 2011
5600	Body	5.86	48.31	5.77	48.5	1.70	-0.34	±5	Nov. 22, 2011
5620	Body	5.89	48.25	5.79	48.4	1.78	-0.40	±5	Nov. 22, 2011
5640	Body	5.92	48.20	5.81	48.4	1.87	-0.45	±5	Nov. 22, 2011
5660	Body	5.95	48.16	5.84	48.4	1.97	-0.48	±5	Nov. 22, 2011
5680	Body	5.98	48.13	5.86	48.4	2.10	-0.49	±5	Nov. 22, 2011
5700	Body	6.01	48.10	5.88	48.3	2.23	-0.49	±5	Nov. 22, 2011
5745	Body	6.06	48.00	5.94	48.3	2.04	-0.58	±5	Nov. 22, 2011
5765	Body	6.08	47.92	5.96	48.2	2.00	-0.67	±5	Nov. 22, 2011
5785	Body	6.10	47.84	5.98	48.2	1.98	-0.78	±5	Nov. 22, 2011
5805	Body	6.13	47.76	6.01	48.2	2.00	-0.89	±5	Nov. 22, 2011
5825	Body	6.16	47.68	6.03	48.2	2.13	-1.01	±5	Nov. 22, 2011

Table 6.3 Low/Middle/High Channel for Liquid Validation

7. Uncertainty Assessment

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

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

A type B evaluation of standard uncertainty is typically based on scientific judgment using all of the relevant information available. These may include previous measurement data, experience and knowledge of the behavior and properties of relevant materials and instruments, manufacture's specification, data provided in calibration reports and uncertainties assigned to reference data taken from handbooks. Broadly speaking, the uncertainty is either obtained from an outdoor source or obtained from an assumed distribution, such as the normal distribution, rectangular or triangular distributions indicated in Table 7.1

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

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

(b) κ is the coverage factor

Table 7.1 Standard Uncertainty for Assumed Distribution

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

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is showed in Table 7.2.

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

Table 7.2 Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Ci (10g)	Standard Uncertainty (1g)	Standard Uncertainty (10g)
Measurement System							
Probe Calibration	6.55	Normal	1	1	1	± 6.6 %	± 6.6 %
Axial Isotropy	4.7	Rectangular	√3	0.7	0.7	± 1.9 %	± 1.9 %
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	0.7	± 3.9 %	± 3.9 %
Boundary Effects	2.0	Rectangular	√3	1	1	± 1.2 %	± 1.2 %
Linearity	4.7	Rectangular	√3	1	1	± 2.7 %	± 2.7 %
System Detection Limits	1.0	Rectangular	√3	1	1	± 0.6 %	± 0.6 %
Readout Electronics	0.3	Normal	1	1	1	± 0.3 %	± 0.3 %
Response Time	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Integration Time	2.6	Rectangular	√3	1	1	± 1.5 %	± 1.5 %
RF Ambient Noise	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
RF Ambient Reflections	3.0	Rectangular	√3	1	1	± 1.7 %	± 1.7 %
Probe Positioner	0.8	Rectangular	√3	1	1	± 0.5 %	± 0.5 %
Probe Positioning	9.9	Rectangular	√3	1	1	± 5.7 %	± 5.7 %
Max. SAR Eval.	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Test Sample Related							
Device Positioning	2.9	Normal	1	1	1	± 2.9 %	± 2.9 %
Device Holder	3.6	Normal	1	1	1	± 3.6 %	± 3.6 %
Power Drift	5.0	Rectangular	√3	1	1	± 2.9 %	± 2.9 %
Phantom and Setup							
Phantom Uncertainty	4.0	Rectangular	√3	1	1	± 2.3 %	± 2.3 %
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	0.43	± 1.8 %	± 1.2 %
Liquid Conductivity (Meas.)	2.5	Normal	1	0.64	0.43	± 1.6 %	± 1.1 %
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	0.49	± 1.7 %	± 1.4 %
Liquid Permittivity (Meas.)	2.5	Normal	1	0.6	0.49	± 1.5 %	± 1.2 %
Combined Standard Uncertainty						± 12.8 %	± 12.6 %
Coverage Factor for 95 %						K=2	
Expanded Uncertainty						**± 25.6 %**	**± 25.2 %**

Table 7.3 Uncertainty Budget of DASY for frequency range 3 GHz to 6 GHz

8. SAR Measurement Evaluation

Each DASY system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system performance check and system validation. System validation kit includes a dipole, tripod holder to fix it underneath the flat phantom and a corresponding distance holder.

8.1 Purpose of System Performance check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

8.2 System Setup

In the simplified setup for system evaluation, the DUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave that comes from a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The equipment setup is shown below:

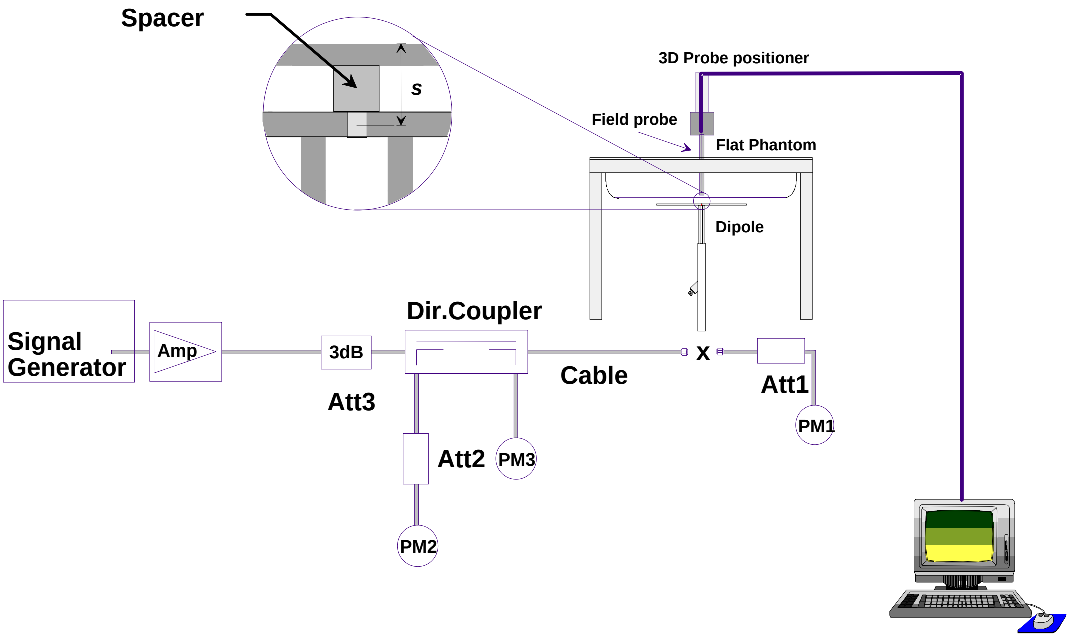


Fig 8.1 System Setup for System Evaluation

1. Signal Generator
2. Amplifier
3. Directional Coupler
4. Power Meter
5. Calibrated Dipole

The output power on dipole port must be calibrated to 24 dBm (250 mW) before dipole is connected.

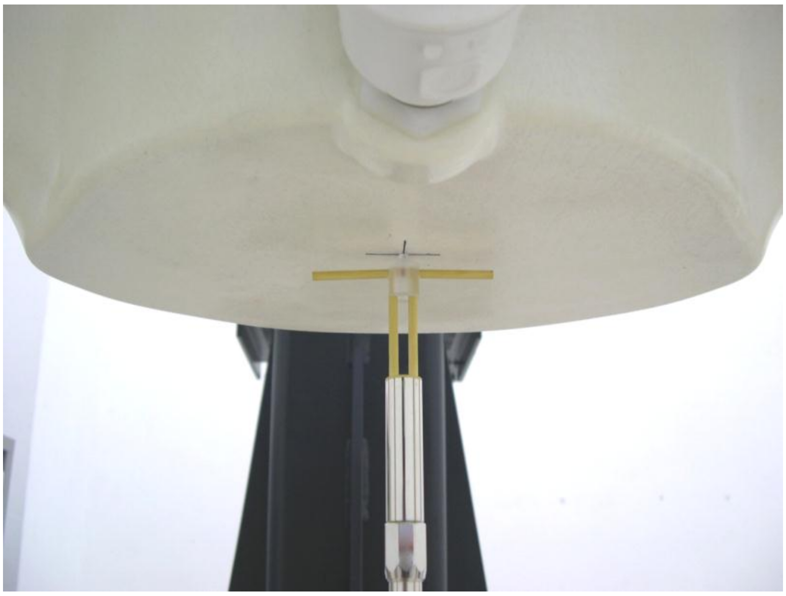


Fig 8.2 Photo of Dipole Setup

8.3 Validation Results

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 8.1 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.

Measurement Date	Frequency (MHz)	Liquid Type	Targeted SAR_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	Normalized SAR_{1g} (W/kg)	Deviation (%)
Nov. 16, 2011	750	Body	8.86	2.26	9.04	2.03
Nov. 17, 2011	750	Body	8.86	2.2	8.80	-0.68
Dec. 07, 2011	750	Body	8.86	2.09	8.36	-5.64
Nov. 07, 2011	835	Body	9.82	2.42	9.68	-1.43
Nov. 12, 2011	835	Body	9.82	2.42	9.68	-1.43
Nov. 11, 2011	1900	Body	40.0	9.57	38.28	-4.30
Dec. 26, 2011	2450	Body	52.3	13.8	55.20	5.54
Nov. 22, 2011	5200	Body	76.0	18.5	74.00	-2.63
Nov. 22, 2011	5500	Body	81.7	19.6	78.40	-4.04
Nov. 22, 2011	5800	Body	75.4	18.6	74.40	-1.33

Table 8.1 Target and Measurement SAR after Normalized

9. DUT Testing Position

Please refer to Appendix E for the test setup photos.

10. Measurement Procedures

The measurement procedures are as follows:

(a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
(b) Keep DUT to radiate maximum output power or 100% duty factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the DUT in the positions as Appendix E demonstrates.
(e) Set scan area, grid size and other setting on the DASY software.
(f) Measure SAR results for the highest power channel on each testing position.
(g) Find out the largest SAR result on these testing positions of each band
(h) Measure SAR results for other channels in worst SAR testing position if the 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

10.1 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

10.2 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

10.3 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 DUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

10.4 SAR Averaged Methods

In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5 mm.

10.5 Power Drift Monitoring

All SAR testing is under the DUT 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 DUT 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 drift more than 5%, the SAR will be retested.

11. SAR Test Configurations

11.1 Conducted Power (Unit: dBm)

CDMA2000 without Power Reduction						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
1xRTT RC3+SO32 (FCH)	23.32	23.44	23.34	23.06	23.10	22.80
1xRTT RC3+SO32 (FCH+SCH)	23.44	23.42	23.45	23.07	23.10	22.83
1xEVDO RTAP 153.6	23.44	23.53	**23.56**	23.31	23.18	**23.51**
1xEVDO RETAP 4096	23.48	23.40	23.43	23.09	23.12	23.49

CDMA2000 with Power Reduction						
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.70	836.52	848.31	1851.25	1880.00	1908.75
1xRTT RC3+SO32 (FCH)	20.21	20.36	20.29	16.33	16.30	16.25
1xRTT RC3+SO32 (FCH+SCH)	20.35	20.38	20.40	16.41	16.36	16.08
1xEVDO RTAP 153.6	20.37	20.40	20.34	16.85	16.89	16.72
1xEVDO RETAP 4096	20.39	20.41	20.44	16.80	16.76	16.62

Note: Referring to KDB 941225 D01, DUT is treated as data device and SAR is tested with RTAP 153.6 kbps (Ev-Do). If RC3+SO32 power is less than 1/4dB higher than Ev-Do, SAR tests with RC3+SO32 setting are not necessary.

Power Reduction Delta Level – Full power and reduction power level

Band	CDMA2000 BC0				CDMA2000 BC1			
Channel	1013	384	777	Target Reduction (dB)	25	600	1175	Target Reduction (dB)
Frequency (MHz)	824.70	836.52	848.31		1851.25	1880.00	1908.75	
1xRTT RC3+SO32(FCH)	3.11	3.08	3.05	3	6.73	6.80	6.55	6.6
1xRTT RC3+SO32(FCH+SCH)	3.09	3.04	3.05	3	6.66	6.74	6.75	6.6
1xEVDO RTAP 153.6	3.07	3.13	3.22	3	6.46	6.29	6.79	6.6
1xEVDO RETAP 4096	3.09	2.99	2.99	3	6.29	6.36	6.87	6.6

Note: The target power reduction value is listed in sec. 3.5.2. The deviation from the specification is due to the tolerance in the measurement.

<Without Power Reduction: LTE band 13>

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power (dBm)	MPR Target (dB)	MPR Result (dB)
779.5	23205	5	1	0	QPSK	22.60	0.00	0.00
779.5	23205	5	1	24	QPSK	22.58	0.00	0.02
779.5	23205	5	12	6	QPSK	21.54	1.00	1.06
779.5	23205	5	25	0	QPSK	21.59	1.00	1.01
779.5	23205	5	1	0	16-QAM	21.39	1.00	1.21
779.5	23205	5	1	24	16-QAM	21.60	1.00	1.00
779.5	23205	5	12	6	16-QAM	20.38	2.00	2.22
779.5	23205	5	25	0	16-QAM	20.90	2.00	1.70
782	23230	5	1	0	QPSK	23.06	0.00	0.00
782	23230	5	1	24	QPSK	23.01	0.00	0.05
782	23230	5	12	6	QPSK	22.01	1.00	1.05
782	23230	5	25	0	QPSK	22.04	1.00	1.02
782	23230	5	1	0	16-QAM	22.33	1.00	0.73
782	23230	5	1	24	16-QAM	22.07	1.00	0.99
782	23230	5	12	6	16-QAM	21.06	2.00	2.00
782	23230	5	25	0	16-QAM	21.34	2.00	1.72
784.5	23255	5	1	0	QPSK	23.02	0.00	0.00
784.5	23255	5	1	24	QPSK	22.85	0.00	0.17
784.5	23255	5	12	6	QPSK	21.98	1.00	1.04
784.5	23255	5	25	0	QPSK	21.88	1.00	1.14
784.5	23255	5	1	0	16-QAM	22.05	1.00	0.97
784.5	23255	5	1	24	16-QAM	22.00	1.00	1.02
784.5	23255	5	12	6	16-QAM	20.84	2.00	2.18
784.5	23255	5	25	0	16-QAM	21.11	2.00	1.91
782	23230	10	1	0	QPSK	22.70	0.00	0.00
782	23230	10	1	49	QPSK	22.64	0.00	0.06
782	23230	10	25	13	QPSK	21.46	1.00	1.24
782	23230	10	50	0	QPSK	21.42	1.00	1.28
782	23230	10	1	0	16-QAM	21.60	1.00	1.10
782	23230	10	1	49	16-QAM	21.74	1.00	0.96
782	23230	10	25	13	16-QAM	21.15	2.00	1.55
782	23230	10	50	0	16-QAM	20.75	2.00	1.95

<With Power Reduction: LTE band 13>

Frequency [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power (dBm)	Power Reduction by Proximity Sensor (dB)
779.5	23205	5	1	0	QPSK	19.76	2.84
779.5	23205	5	1	24	QPSK	19.75	2.85
779.5	23205	5	12	6	QPSK	19.60	3.00
779.5	23205	5	25	0	QPSK	19.54	3.06
779.5	23205	5	1	0	16-QAM	19.55	3.05
779.5	23205	5	1	24	16-QAM	19.75	2.85
779.5	23205	5	12	6	16-QAM	19.55	3.05
779.5	23205	5	25	0	16-QAM	19.65	2.95
782	23230	5	1	0	QPSK	19.99	3.07
782	23230	5	1	24	QPSK	19.56	3.50
782	23230	5	12	6	QPSK	19.53	3.53
782	23230	5	25	0	QPSK	19.65	3.41
782	23230	5	1	0	16-QAM	19.88	3.18
782	23230	5	1	24	16-QAM	19.72	3.34
782	23230	5	12	6	16-QAM	19.44	3.62
782	23230	5	25	0	16-QAM	19.98	3.08
784.5	23255	5	1	0	QPSK	19.81	3.21
784.5	23255	5	1	24	QPSK	19.64	3.38
784.5	23255	5	12	6	QPSK	19.37	3.65
784.5	23255	5	25	0	QPSK	19.40	3.62
784.5	23255	5	1	0	16-QAM	19.80	3.22
784.5	23255	5	1	24	16-QAM	19.57	3.45
784.5	23255	5	12	6	16-QAM	19.34	3.68
784.5	23255	5	25	0	16-QAM	19.75	3.27
782	23230	10	1	0	QPSK	19.71	2.99
782	23230	10	1	49	QPSK	19.57	3.13
782	23230	10	25	13	QPSK	19.64	3.06
782	23230	10	50	0	QPSK	19.58	3.12
782	23230	10	1	0	16-QAM	19.68	3.02
782	23230	10	1	49	16-QAM	19.67	3.03
782	23230	10	25	13	16-QAM	19.68	3.02
782	23230	10	50	0	16-QAM	19.65	3.05

Note:

1. Choose the widest bandwidth configuration (i.e., 10MHz) to test SAR and determine further SAR exclusion.
2. Per KDB 941225, if the output power variation across the band < 0.5dB, test middle channel SAR first and determine further test reduction based on the SAR results.
3. The proximity sensor power reduction for LTE are excluded the MPR. During proximity sensor activated and power reduction enabled, the LTE output is reduced to certain level, while MPR for different RB configurations is disabled. The power reduction is based on the normal maximum output power.
4. The target power reduction value is listed in sec. 3.5.2. The deviation from the specification is due to the tolerance in the measurement.

LTE Target MPR level

The device implements maximum power reduction per 3GPP 36.101 requirements where the MPR target is as below table. The MPR settings are implemented configured into firmware and cannot be disabled by the end user or LTE carrier network.

Modulation	Channel bandwidth / Transmission bandwidth configuration [RB]		MPR Target (dB)		3GPP MPR (dB)
	5 MHz	10 MHz	5 MHz	10 MHz	
QPSK	> 8	> 12	1	1	≤ 1
16 QAM	≤ 8	≤ 12	1	1	≤ 1
16 QAM	> 8	> 12	2	2	≤ 2

<WLAN 2.4G - Without Power Reduction>

Mode	Channel	Frequency (MHz)	Average power (dBm)			
			Data Rate (bps)			
			1M	2M	5.5M	11M
802.11b	CH 01	2412 MHz	16.87	16.83	16.82	16.80
	CH 06	2437 MHz	17.23	17.22	17.15	17.13
	CH 11	2462 MHz	**17.49**	17.47	17.40	17.36

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate (bps)							
			6M	9M	12M	18M	24M	36M	48M	54M
802.11g	CH 01	2412 MHz	15.13	15.46	14.91	14.64	12.6	12.47	10.97	10.71
	CH 06	2437 MHz	15.48	16.05	15.29	14.74	12.63	12.56	10.99	10.89
	CH 11	2462 MHz	**15.53**	14.98	15.04	14.94	12.74	12.66	11.11	11.04

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate (bps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n 20M	CH 01	2412 MHz	13.65	14.84	14.72	12.33	12.25	10.58	10.60	9.71
	CH 06	2437 MHz	**13.94**	15.07	15.02	12.78	12.63	11.09	11.04	10.14
	CH 11	2462 MHz	13.80	14.20	14.96	12.63	12.57	10.92	10.90	9.98

Note:

1. Per KDB 248227, choose the highest output power channel to test SAR and determine further SAR exclusion
2. Per KDB 248227, 11g and 11n output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.

<WLAN 5G - Without Power Reduction>

Mode	Channel	Frequency (MHz)	Average Power (dBm)							
			Data Rate (bps)							
			6M	9M	12M	18M	24M	36M	48M	54M
802.11a	CH 036	5180 MHz	13.67	13.46	13.45	13.45	13.46	13.45	13.45	13.42
	CH 040	5200 MHZ	13.48	13.35	13.32	13.46	13.46	13.43	13.45	13.33
	CH 044	5220 MHz	13.51	13.31	13.20	13.33	13.27	13.33	13.32	13.28
	CH 048	5240 MHz	**13.70**	13.39	13.40	13.51	13.49	13.50	13.51	13.50
	CH 052	5260 MHz	13.57	13.53	13.52	13.56	13.49	13.46	13.55	13.50
	CH 056	5280 MHz	13.43	13.42	13.34	13.37	13.37	13.38	13.42	13.38
	CH 060	5300 MHz	13.83	13.81	13.80	13.81	13.76	13.74	13.82	13.80
	CH 064	5320 MHz	**14.11**	14.10	14.02	14.10	14.04	14.09	14.00	13.96
	CH 100	5500 MHz	13.74	13.67	13.63	13.65	13.65	13.68	13.39	13.47
	CH 104	5520 MHz	**13.76**	13.75	13.58	13.74	13.53	13.73	13.43	13.24
	CH 108	5540 MHz	13.52	13.34	13.39	13.50	13.45	13.40	13.43	13.25
	CH 112	5560 MHz	13.71	13.50	13.68	13.65	13.62	13.41	13.25	13.37
	CH 116	5580 MHz	13.40	13.26	13.36	13.28	13.29	13.17	13.28	13.26
	CH 120	5600 MHz	13.71	13.60	13.37	13.69	13.16	13.33	13.20	13.14
	CH 124	5620 MHz	13.51	13.29	13.43	13.49	13.46	13.37	13.46	13.49
	CH 128	5640 MHz	13.62	13.56	13.54	13.59	13.58	13.60	13.48	13.49
	CH 132	5660 MHz	13.45	13.40	13.36	13.35	13.43	13.43	13.36	13.40
	CH 136	5680 MHz	13.36	13.34	13.22	13.25	13.28	13.30	13.23	13.18
	CH 140	5700 MHz	13.39	13.13	13.21	13.31	13.24	13.22	13.31	13.30
	CH 149	5745 MHz	**12.81**	12.64	12.53	12.45	12.25	12.19	12.04	11.96
	CH 153	5765 MHz	12.35	12.80	12.79	12.77	12.69	12.79	12.48	12.42
	CH 157	5785 MHz	12.48	12.71	12.73	12.65	12.55	12.46	12.31	12.26
	CH 161	5805 MHz	12.12	12.03	12.05	11.98	11.83	11.67	11.65	11.60
	CH 165	5825 MHz	11.95	11.79	11.85	11.79	11.56	11.54	11.44	11.36

Mode	Channel	Frequency (MHz)	Average Power (dBm)							
			Data Rate (bps)							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n 20M	CH 036	5180 MHz	13.61	13.47	13.53	13.55	13.60	13.60	13.58	13.41
	CH 040	5200 MHZ	13.76	13.72	13.65	13.67	13.58	13.63	13.70	13.28
	CH 044	5220 MHz	**13.91**	13.72	13.71	13.72	13.55	13.66	13.60	13.34
	CH 048	5240 MHz	13.59	13.17	13.12	13.34	13.33	13.28	13.28	13.19
	CH 052	5260 MHz	13.42	13.16	13.11	13.23	13.25	13.36	13.35	13.18
	CH 056	5280 MHz	13.42	13.40	13.41	13.36	13.31	13.37	13.40	13.14
	CH 060	5300 MHz	13.64	13.35	13.47	13.62	13.63	13.62	13.63	13.04
	CH 064	5320 MHz	**13.82**	13.60	13.68	13.67	13.71	13.67	13.60	13.14
	CH 100	5500 MHz	13.50	13.14	13.17	13.32	13.38	13.12	13.05	12.75
	CH 104	5520 MHz	**13.66**	13.35	13.35	13.52	13.56	13.48	13.42	12.71
	CH 108	5540 MHz	13.61	13.53	13.57	13.53	13.58	13.52	13.32	12.75
	CH 112	5560 MHz	13.47	13.40	13.41	13.36	13.42	13.20	13.44	12.76
	CH 116	5580 MHz	13.43	13.41	13.35	13.42	13.42	13.22	13.21	12.67
	CH 120	5600 MHz	13.47	12.96	13.18	13.30	13.12	13.04	13.21	12.76
	CH 124	5620 MHz	13.52	13.39	13.44	13.47	13.38	13.45	13.43	12.87
	CH 128	5640 MHz	13.63	13.43	13.61	13.56	13.53	13.47	13.46	12.90
	CH 132	5660 MHz	13.35	13.13	13.31	13.28	13.25	13.25	13.30	12.94
	CH 136	5680 MHz	13.30	13.05	13.26	13.27	13.18	13.25	13.29	12.94
	CH 140	5700 MHz	13.15	12.70	12.84	12.89	12.95	12.90	12.94	12.98
	CH 149	5745 MHz	**12.54**	12.52	12.50	12.47	12.43	12.12	12.07	11.12
	CH 153	5765 MHz	12.31	12.52	12.50	12.53	12.47	12.24	12.30	11.51
	CH 157	5785 MHz	12.43	12.22	12.16	12.14	12.09	11.96	11.91	11.12
	CH 161	5805 MHz	12.08	11.99	11.98	11.93	11.95	11.66	11.60	11.21
	CH 165	5825 MHz	12.03	11.72	11.65	11.59	11.63	11.43	11.47	11.07

Note:

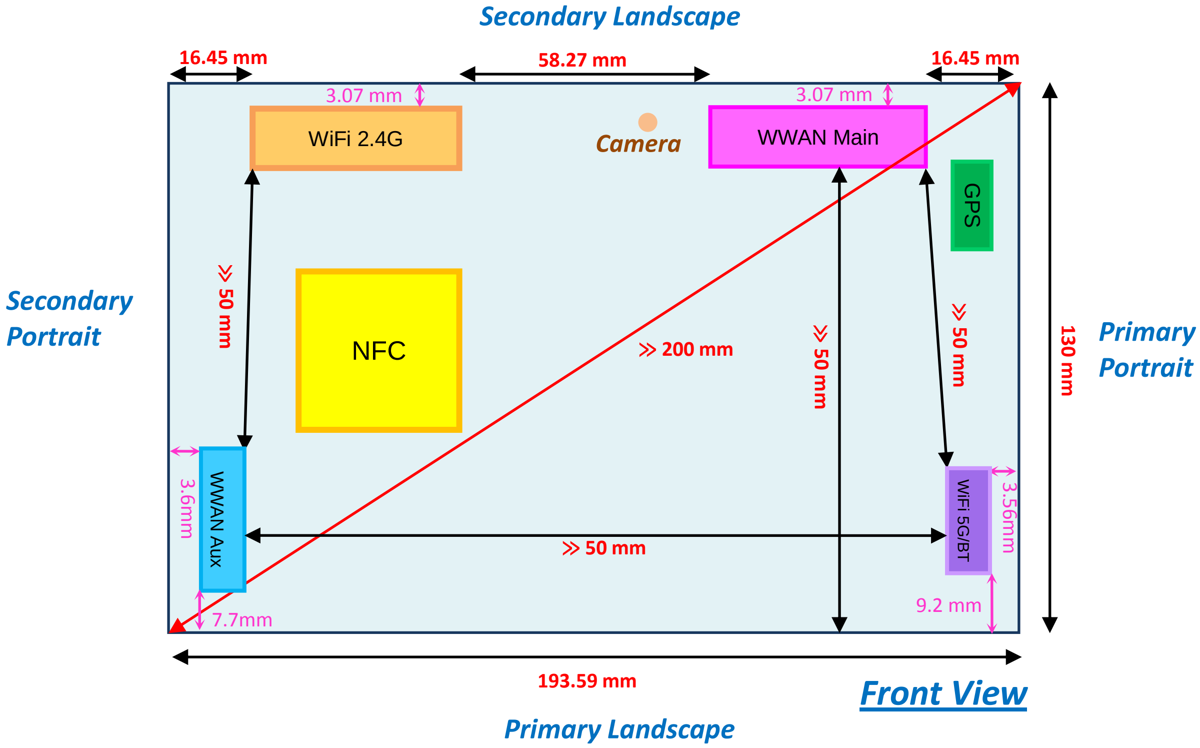
1. Per KDB 248227, choose the highest output power channel to test SAR and determine further SAR exclusion
2. Per KDB 248227, 11n output power is less than 1/4 dB higher than 11a mode, thus the SAR can be excluded.

<Bluetooth - Without Power Reduction>

Band	Bluetooth		
Channel	0	39	78
Frequency	2402	2441	2480
Average Power	8.38	**8.70**	8.50

Note: Bluetooth standalone SAR is not required due to output power ≤ 60/f(GHz) mW.

11.2 Exposure Positions Consideration



Antenna	Mode
WWAN Main (Tx/Rx)	LTE band 13 CDMA2000 BC0 CDMA2000 BC1
WWAN Aux (Rx)	LTE band 13 CDMA2000 BC0 CDMA2000 BC1
WiFi 2.4G (Tx/Rx)	802.11 b/g/n
WiFi 5G/BT (Tx/Rx)	802.11 a/n Bluetooth

Sides for stand-alone SAR tests; Tablet mode							
Antenna	Mode	Bottom Face	Front Face	Secondary Landscape	Primary Landscape	Secondary Portrait	Primary Portrait
WWAN Main Ant.	CDMA	✓(0, 10mm)	X	✓(0, 7.5mm)	X	X	✓(0mm)
	LTE						
WiFi 2.4G	WiFi 2.4G	✓(0mm)	X	✓(0mm)	X	✓(0mm)	X
WiFi 5G	WiFi 5G	✓(0mm)	X	X	✓(0mm)	X	✓(0mm)
	Bluetooth						

Note:

1. Per KDB 941225 D07, the DUT diagonal > 20 cm and Mini-Tablet procedure is not applied. Therefore, SAR tests follow the Tablet Mode in KDB 447498.
2. There is no screen orientation limitation in DUT; that is 4 orientations are supported. The power reduction for SAR compliance is not triggered by the screen orientation, but triggered by proximity sensor when the user is 11 mm or closer to the DUT from bottom face and 8.5 mm or closer to the DUT from secondary-landscape. Therefore, SAR test setup and test result is conservative for real life usage.
3. As in (1), the test distance is 0 mm to the flat phantom; SAR evaluation is required for Bottom Face and each applicable Edge with the antenna within 5 cm to the user.
4. The test distance 10 mm at Bottom Face and 7.5 mm at Secondary-Landscape are for verifying the conservative condition, whichever DUT proximity sensor maximum activated distance are 11 mm and 8.5 mm respectively. The DUT is set in full-power mode at 10 mm test distance to the phantom for bottom face and 7.5 mm test distance to the phantom for secondary landscape.
5. The proximity sensor is designed to be triggered for Bottom Face and Secondary-Landscape exposure positions. During SAR tests for DUT other edges, the sensor is disabled via software setting.
6. Per KDB 447498 D01, the distance from WWAN main antenna to the Secondary-Portrait / Primary-Landscape edge > 5 cm, therefore the stand-alone SAR in these configurations are not required.
7. Per KDB 447498 D01, the distance from WiFi 2.4G antenna to the Primary-Portrait / Primary-Landscape edge > 5 cm, therefore the stand-alone SAR in these configurations is not required.
8. Per KDB 447498 D01, the distance from WiFi 5G antenna to the Secondary-Portrait / Secondary-Landscape edge > 5 cm, therefore the stand-alone SAR test in these configurations are not required.
9. Per KDB 447498 D01, Bluetooth output power ≤ 60/f(GHz) mW thus standalone SAR tests are not required.

12. SAR Test Results

12.1 Test Records for Body Stand-alone SAR

<CDMA2000 SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Power Back-off	Ear-phone	Power Drift (dB)	SAR_{1g} (W/kg)	SAR_{10g} (W/kg)
4	CDMA2000 BC0	RTAP153.6	Bottom Face	0	777	848.31	20.34	v	v	0.050	**1.17**	0.625
5	CDMA2000 BC0	RTAP153.6	Secondary Landscape	0	777	848.31	20.34	v	-	0.145	0.749	0.365
6	CDMA2000 BC0	RTAP153.6	Primary Portrait	0	777	848.31	23.56	-	v	0.048	0.036	0.024
7	CDMA2000 BC0	RTAP153.6	Bottom Face	1	777	848.31	23.56	-	v	-0.126	0.664	0.41
8	CDMA2000 BC0	RTAP153.6	Secondary Landscape	0.75	777	848.31	23.56	-	-	0.096	0.406	0.239
20	CDMA2000 BC0	RTAP153.6	Bottom Face	0	1013	824.7	20.37	v	v	-0.194	0.937	0.506
21	CDMA2000 BC0	RTAP153.6	Bottom Face	0	384	836.52	20.40	v	v	-0.112	1.13	0.607
9	CDMA2000 BC1	RTAP153.6	Bottom Face	0	1175	1908.75	16.72	v	v	-0.178	1.24	0.618
10	CDMA2000 BC1	RTAP153.6	Secondary Landscape	0	1175	1908.75	16.72	v	-	0.138	0.736	0.35
11	CDMA2000 BC1	RTAP153.6	Primary Portrait	0	1175	1908.75	23.51	-	v	-0.109	0.163	0.088
12	CDMA2000 BC1	RTAP153.6	Bottom Face	1	1175	1908.75	23.51	-	v	-0.112	1.37	0.755
13	CDMA2000 BC1	RTAP153.6	Secondary Landscape	0.75	1175	1908.75	23.51	-	-	0.164	1.31	0.741
18	CDMA2000 BC1	RTAP153.6	Bottom Face	0	25	1851.25	16.85	v	v	-0.141	1.44	0.705
19	CDMA2000 BC1	RTAP153.6	Bottom Face	0	600	1880	16.85	v	v	0.182	**1.47**	0.715
14	CDMA2000 BC1	RTAP153.6	Bottom Face	1	25	1851.25	23.31	-	v	-0.187	0.926	0.526
15	CDMA2000 BC1	RTAP153.6	Bottom Face	1	600	1880	23.18	-	v	-0.158	0.879	0.488
16	CDMA2000 BC1	RTAP153.6	Secondary Landscape	0.75	25	1851.25	23.31	-	-	0.077	1.29	0.715
17	CDMA2000 BC1	RTAP153.6	Secondary Landscape	0.75	600	1880	23.18	-	-	0.136	1.27	0.691

Note:

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. 1 cm and 0.75 cm test results are for confirming operation of the power reduction scheme, and are not applicable for compliance demonstration for the FCC tablet PC SAR test procedures.
3. “V” in the earphone column means the earphone is plugged during SAR testing.

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Power Back-off	Ear-phone	Power Drift (dB)	SAR_{1g} (W/kg)	SAR_{10g} (W/kg)
22	LTE Band 13	QPSK	10	25	13	Bottom Face	0	23230	782	19.64	v	v	-0.075	1.27	0.658
23	LTE Band 13	QPSK	10	1	0	Bottom Face	0	23230	782	19.71	v	v	-0.093	1.15	0.599
24	LTE Band 13	QPSK	10	1	49	Bottom Face	0	23230	782	19.57	v	v	0.033	1.06	0.561
25	LTE Band 13	QPSK	10	25	13	Secondary Landscape	0	23230	782	19.64	v	-	-0.150	0.560	0.285
26	LTE Band 13	QPSK	10	1	0	Secondary Landscape	0	23230	782	19.71	v	-	0.192	0.541	0.278
27	LTE Band 13	QPSK	10	1	49	Secondary Landscape	0	23230	782	19.57	v	-	0.059	0.551	0.283
31	LTE Band 13	16QAM	10	25	13	Bottom Face	0	23230	782	19.68	v	v	-0.016	**1.32**	0.687
32	LTE Band 13	16QAM	10	1	0	Bottom Face	0	23230	782	19.68	v	v	0.080	1.05	0.561
33	LTE Band 13	16QAM	10	1	49	Bottom Face	0	23230	782	19.67	v	v	0.030	1.09	0.572
34	LTE Band 13	16QAM	10	25	13	Secondary Landscape	0	23230	782	19.68	v	-	0.059	0.661	0.34
35	LTE Band 13	16QAM	10	1	0	Secondary Landscape	0	23230	782	19.68	v	-	0.108	0.619	0.32
36	LTE Band 13	16QAM	10	1	49	Secondary Landscape	0	23230	782	19.67	v	-	0.158	0.612	0.314
37	LTE Band 13	QPSK	10	25	13	Bottom Face	1	23230	782	21.46	-	v	0.121	0.535	0.329
38	LTE Band 13	QPSK	10	1	0	Bottom Face	1	23230	782	22.70	-	v	0.031	0.656	0.401
39	LTE Band 13	QPSK	10	1	49	Bottom Face	1	23230	782	22..64	-	v	0.088	0.532	0.331
40	LTE Band 13	QPSK	10	25	13	Secondary Landscape	0.75	23230	782	21.46	-	-	0.019	0.318	0.194
41	LTE Band 13	QPSK	10	1	0	Secondary Landscape	0.75	23230	782	22.70	-	-	-0.017	0.407	0.246
42	LTE Band 13	QPSK	10	1	49	Secondary Landscape	0.75	23230	782	22.64	-	-	0.132	0.388	0.236
28	LTE Band 13	QPSK	10	25	13	Primary Portrait	0	23230	782	21.46	-	v	0.101	0.048	0.031
29	LTE Band 13	QPSK	10	1	0	Primary Portrait	0	23230	782	22.70	-	v	0.153	0.034	0.022
30	LTE Band 13	QPSK	10	1	49	Primary Portrait	0	23230	782	22.64	-	v	0.135	0.040	0.026
43	LTE Band 13	16QAM	10	25	13	Bottom Face	1	23230	782	21.15	-	v	-0.163	0.383	0.239
44	LTE Band 13	16QAM	10	1	0	Bottom Face	1	23230	782	21.60	-	v	-0.011	0.496	0.308
45	LTE Band 13	16QAM	10	1	49	Bottom Face	1	23230	782	21.74	-	v	-0.060	0.419	0.263
46	LTE Band 13	16QAM	10	25	13	Secondary Landscape	0.75	23230	782	21.15	-	-	0.026	0.277	0.168
47	LTE Band 13	16QAM	10	1	0	Secondary Landscape	0.75	23230	782	21.60	-	-	0.033	0.344	0.208
48	LTE Band 13	16QAM	10	1	49	Secondary Landscape	0.75	23230	782	21.74	-	-	0.070	0.33	0.201
49	LTE Band 13	16QAM	10	25	13	Primary Portrait	0	23230	782	21.15	-	v	-0.138	0.065	0.044
50	LTE Band 13	16QAM	10	1	0	Primary Portrait	0	23230	782	21.60	-	v	0.173	0.062	0.042
51	LTE Band 13	16QAM	10	1	49	Primary Portrait	0	23230	782	21.74	-	v	0.069	0.069	0.046

Note:

1. Per KDB 941225 D05, for LTE, if the smaller bandwidth output power is within +/- 0.5dB of the largest bandwidth, and the maximum SAR of the largest bandwidth is < 1.45 W/kg, SAR for smaller bandwidth can be excluded. Therefore LTE 5MHz bandwidth SAR tests are excluded.
2. Per KDB 941225 D05, for LTE, if 50%-RB QPSK/16QAM SAR < 1.45 W/kg, 100%-RB SAR can be excluded.
3. During proximity sensor activated and power reduction enabled, the LTE output is reduced to certain level, while MPR for different RB configurations is disabled. Therefore the MPR levels are not applicable.
4. If the highest output channel SAR for each exposure position is ≤ 0.8 W/kg, other channels SAR tests are not necessary referring to KDB 941225 D05.
5. 1 cm and 0.75 cm test results are for confirming operation of the power reduction scheme, and are not applicable for compliance demonstration for the FCC tablet PC SAR test procedures.
6. “V” in the earphone column means the earphone is plugged during SAR testing.

<WiFi SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Power Back-off	Ear-phone	Power Drift (dB)	SAR_{1g} (W/kg)	SAR_{10g} (W/kg)
101	WiFi 2.4G	802.11b	Bottom Face	0	11	2462	17.49	N/A	v	0.12	1.03	0.512
102	WiFi 2.4G	802.11b	Secondary Landscape	0	11	2462	17.49	N/A	-	0.019	0.659	0.304
103	WiFi 2.4G	802.11b	Secondary Portrait	0	11	2462	17.49	N/A	v	0.074	0.112	0.046
104	WiFi 2.4G	802.11b	Bottom Face	0	1	2412	16.87	N/A	v	0.117	1.03	0.506
105	WiFi 2.4G	802.11b	Bottom Face	0	6	2437	17.23	N/A	v	0.134	**1.12**	0.548
106	WiFi 2.4G	802.11b	Secondary Landscape	0.75	11	2462	17.49	N/A	-	0.003	0.219	0.116
107	WiFi 5.2G	802.11a	Bottom Face	0	48	5240	13.70	N/A	v	0.11	0.57	0.158
108	WiFi 5.2G	802.11a	Primary Portrait	0	48	5240	13.70	N/A	v	-0.148	**0.775**	0.179
109	WiFi 5.2G	802.11a	Primary Landscape	0	48	5240	13.70	N/A	v	-0.12	0.096	0.028
147	WiFi 5.3G	802.11a	Bottom Face	0	64	5320	14.11	N/A	v	-0.10	0.844	0.235
148	WiFi 5.3G	802.11a	Primary Portrait	0	64	5320	14.11	N/A	v	0.157	1.29	0.309
149	WiFi 5.3G	802.11a	Primary Landscape	0	64	5320	14.11	N/A	v	-0.141	0.252	0.076
150	WiFi 5.3G	802.11a	Bottom Face	0	52	5260	13.57	N/A	v	0.000	0.958	0.292
151	WiFi 5.3G	802.11a	Primary Portrait	0	52	5260	13.57	N/A	v	0.105	**1.4**	0.332
152	WiFi 5.5G	802.11a	Bottom Face	0	104	5520	13.76	N/A	v	0.000	0.528	0.154
153	WiFi 5.5G	802.11a	Primary Portrait	0	104	5520	13.76	N/A	v	-0.114	**0.835**	0.191
154	WiFi 5.5G	802.11a	Primary Landscape	0	104	5520	13.76	N/A	v	0.011	0.18	0.052
155	WiFi 5.5G	802.11a	Primary Portrait	0	116	5580	13.40	N/A	v	0.178	0.766	0.177
157	WiFi 5.5G	802.11a	Primary Portrait	0	136	5680	13.36	N/A	v	-0.162	0.665	0.15
110	WiFi 5.8G	802.11a	Bottom Face	0	149	5745	12.81	N/A	v	0.012	0.467	0.158
111	WiFi 5.8G	802.11a	Primary Portrait	0	149	5745	12.81	N/A	v	0.051	**0.651**	0.148
112	WiFi 5.8G	802.11a	Primary Landscape	0	149	5745	12.81	N/A	v	0.11	0.191	0.055

Note:

1. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.
2. “V” in the earphone column means the earphone is plugged during SAR testing.

12.2 Simultaneous Transmission SAR Analysis

No.	Applicable Simultaneous Transmission Combination
1	CDMA2000 + BT
2	LTE + BT
3	CDMA2000 + WiFi 2.4G + BT
4	LTE + WiFi2.4G + BT
5	CDMA2000 + WiFi 5G
6	LTE + WiFi 5G
7	WiFi 2.4G + BT

Note:
1. The LTE and CDMA2000 share the same WWAN transmitting antenna, and LTE will not transmit simultaneously with CDMA2000.
2. The WiFi 5G and Bluetooth share the same WiFi 5G/BT transmitting antenna.
3. DUT will choose either WiFi 2.4G or WiFi 5G according to the network signal condition, therefore, WiFi 2.4G will not transmit simultaneously with WiFi 5G.
4. Bluetooth stand-alone SAR tests are not required and are considered zero in the 1-g SAR summation.
5. When stand-alone 1-g SAR is not required for a transmitter or antenna, its SAR is considered zero in the 1-g SAR summing process to determine simultaneous transmission SAR evaluation requirements.

Refer to Exposure Positions Consideration in section 11.2

Sides for stand-alone SAR tests; Tablet mode							
Antenna	Mode	Bottom Face	Front Face	Secondary Landscape	Primary Landscape	Secondary Portrait	Primary Portrait
WWAN Main Ant.	CDMA	✓(0, 10mm)	X	✓(0, 7.5mm)	X	X	✓(0mm)
	LTE						
WiFi 2.4G	WiFi 2.4G	✓(0mm)	X	✓(0mm)	X	✓(0mm)	X
WiFi 5G	WiFi 5G	✓(0mm)	X	X	✓(0mm)	X	✓(0mm)
	Bluetooth						

<Test distance 0 mm to the phantom>
Summation table of the measured SAR

Position	WWAN (W/kg)		WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Bottom Face	LTE Band 13	1.32	1.12		**2.44**
	CDMA BC0	1.17	1.12		**2.29**
	CDMA BC1	1.47	1.12		**2.59**
	LTE Band 13	1.32		0.958	**2.28**
	CDMA BC0	1.17		0.958	**2.13**
	CDMA BC1	1.47		0.958	**2.43**
Secondary Landscape	LTE Band 13	0.661	0.659		**1.32**
	CDMA BC0	0.749	0.659		**1.41**
	CDMA BC1	0.736	0.659		**1.4**
	LTE Band 13	0.661		0	**0.66**
	CDMA BC0	0.749		0	**0.75**
	CDMA BC1	0.736		0	**0.74**
Primary Portrait	LTE Band 13	0.069	0		**0.07**
	CDMA BC0	0.036	0		**0.04**
	CDMA BC1	0.163	0		**0.16**
	LTE Band 13	0.069		1.4	**1.47**
	CDMA BC0	0.036		1.4	**1.44**
	CDMA BC1	0.163		1.4	**1.56**
Primary Landscape	LTE Band 13	0		0.252	**0.25**
	CDMA BC0	0		0.252	**0.25**
	CDMA BC1	0		0.252	**0.25**
Secondary Portrait	LTE Band 13	0	0.112		**0.11**
	CDMA BC0	0	0.112		**0.11**
	CDMA BC1	0	0.112		**0.11**

<Test distance 0 mm to the phantom>
Summation of the scaled SAR

Position	WWAN (W/kg)		Output Power (dBm)	Max. Tolerance Power (dBm)	WWAN Scaling Factor	Scaled WWAN (W/kg)	WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Bottom Face	LTE Band 13	1.32	19.68	20.00	1.076	1.421	1.12		**2.54**
	CDMA BC0	1.17	20.34	21.00	1.164	1.362	1.12		**2.48**
	CDMA BC1	1.47	16.85	17.00	1.035	1.522	1.12		**2.64**
	LTE Band 13	1.32	19.68	20.00	1.076	1.421		0.958	**2.38**
	CDMA BC0	1.17	20.34	21.00	1.164	1.362		0.958	**2.32**
	CDMA BC1	1.47	16.85	17.00	1.035	1.522		0.958	**2.48**
Secondary Landscape	LTE Band 13	0.661	19.68	20.00	1.076	0.712	0.659		**1.37**
	CDMA BC0	0.749	20.34	21.00	1.164	0.872	0.659		**1.53**
	CDMA BC1	0.736	16.72	17.00	1.067	0.785	0.659		**1.44**
	LTE Band 13	0.661	19.68	20.00	1.076	0.712		0	**0.71**
	CDMA BC0	0.749	20.34	21.00	1.164	0.872		0	**0.87**
	CDMA BC1	0.736	16.72	17.00	1.067	0.785		0	**0.79**
Primary Portrait	LTE Band 13	0.069	21.74	22.50	1.191	0.082	0		**0.08**
	CDMA BC0	0.036	23.56	24.00	1.107	0.040	0		**0.04**
	CDMA BC1	0.163	23.51	23.60	1.021	0.166	0		**0.17**
	LTE Band 13	0.069	21.74	22.50	1.191	0.082		1.4	**1.48**
	CDMA BC0	0.036	23.56	24.00	1.107	0.040		1.4	**1.44**
	CDMA BC1	0.163	23.51	23.60	1.021	0.166		1.4	**1.57**
Primary Landscape	LTE Band 13	0	-	-	-	-		0.252	**0.25**
	CDMA BC0	0	-	-	-	-		0.252	**0.25**
	CDMA BC1	0	-	-	-	-		0.252	**0.25**
Secondary Portrait	LTE Band 13	0	-	-	-	-	0.112		**0.11**
	CDMA BC0	0	-	-	-	-	0.112		**0.11**
	CDMA BC1	0	-	-	-	-	0.112		**0.11**

Note: The WWAN scaling factor is calculated according to the difference between measured output power and maximum tolerance power on this device.

<Test distance 10 mm to the phantom>
Summation table of the measured SAR

Position	WWAN (W/kg)		WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Bottom Face	LTE Band 13	0.656	1.12		1.78
	CDMA BC0	0.664	1.12		1.78
	CDMA BC1	1.37	1.12		2.49
	LTE Band 13	0.656		0.958	1.61
	CDMA BC0	0.664		0.958	1.62
	CDMA BC1	1.37		0.958	2.33

Summation of the scaled SAR

Position	WWAN (W/kg)		Output Power (dBm)	Max. Tolerance Power (dBm)	WWAN Scaling Factor	Scaled WWAN (W/kg)	WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Bottom Face	LTE Band 13	0.656	22.70	23.50	1.202	0.789	1.12		1.91
	CDMA BC0	0.664	23.56	24.00	1.107	0.735	1.12		1.85
	CDMA BC1	1.37	23.51	23.60	1.021	1.399	1.12		2.52
	LTE Band 13	0.656	22.70	23.50	1.202	0.789		0.958	1.75
	CDMA BC0	0.664	23.56	24.00	1.107	0.735		0.958	1.69
	CDMA BC1	1.37	23.51	23.60	1.021	1.399		0.958	2.36

Note:
1. WLAN SAR data at 0mm is applied here, and it will represent more conservative situation than WLAN SAR data at 7.5mm and 10mm.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement is not necessary.
3. If 1g-SAR summation >1.6W/kg, SPLSR calculation is necessary.
4. The WWAN scaling factor is calculated according to the difference between measured output power and maximum tolerance power on this device.

<Test distance 7.5 mm to the phantom>

Summation table of the measured SAR

Position	WWAN (W/kg)		WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Secondary Landscape	LTE Band 13	0.407	0.219		**0.63**
	CDMA BC0	0.406	0.219		**0.63**
	CDMA BC1	1.31	0.219		**1.53**
	LTE Band 13	0.407		0	**0.41**
	CDMA BC0	0.406		0	**0.41**
	CDMA BC1	1.31		0	**1.31**

Summation of the scaled SAR

Position	WWAN (W/kg)		Output Power (dBm)	Max. Tolerance Power (dBm)	WWAN Scaling Factor	Scaled WWAN (W/kg)	WiFi 2.4G (W/kg)	WiFi 5G (W/kg)	Max. SAR Summation (W/kg)
Secondary Landscape	LTE Band 13	0.407	22.70	23.50	1.202	0.489	0.219		**0.71**
	CDMA BC0	0.406	23.56	24.00	1.107	0.449	0.219		**0.67**
	CDMA BC1	1.31	23.51	23.60	1.021	1.337	0.219		**1.56**
	LTE Band 13	0.407	22.70	23.50	1.202	0.489		0	**0.49**
	CDMA BC0	0.406	23.56	24.00	1.107	0.449		0	**0.45**
	CDMA BC1	1.31	23.51	23.60	1.021	1.337		0	**1.34**

Note:

1. WLAN SAR data at 7.5mm is applied here.
2. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement is not necessary.
3. If 1g-SAR summation >1.6W/kg, SPLSR calculation is necessary.
4. The WWAN scaling factor is calculated according to the difference between measured output power and maximum tolerance power on this device.

12.3 Simultaneous analysis - SPLSR calculation

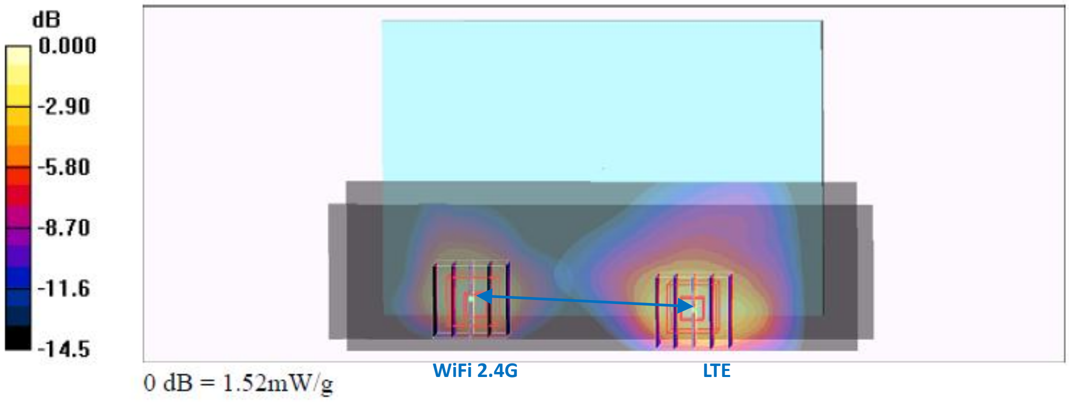
Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (cm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
					X	Y	Z				
31	LTE Band 13	Bottom Face	1.421	0	0.061	0.042	-0.179	9.8	2.54	0.26	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
04	CDMA BC0	Bottom Face	1.362	0	0.057	0.039	-0.173	9.5	2.48	0.26	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
19	CDMA BC1	Bottom Face	1.522	0	0.051	0.043	-0.172	9.9	2.64	0.27	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
31	LTE Band 13	Bottom Face	1.421	0	0.061	0.042	-0.179	11.8	2.38	0.20	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				
04	CDMA BC0	Bottom Face	1.362	0	0.057	0.039	-0.173	11.6	2.32	0.20	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				
19	CDMA BC1	Bottom Face	1.522	0	0.051	0.043	-0.172	10.8	2.48	0.23	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				
38	LTE Band 13	Bottom Face	0.789	1	0.0625	0.054	-0.176	11.0	1.91	0.17	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
07	CDMA BC0	Bottom Face	0.735	1	0.065	0.049	-0.173	10.5	1.85	0.18	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
12	CDMA BC1	Bottom Face	1.399	1	0.053	0.047	-0.173	10.3	2.52	0.24	Not required
105	WiFi 2.4G		1.120	0	0.0561	-0.056	-0.175				
38	LTE Band 13	Bottom Face	0.789	1	0.0625	0.054	-0.176	11.5	1.75	0.15	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				
07	CDMA BC0	Bottom Face	0.735	1	0.065	0.049	-0.173	11.9	1.69	0.14	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				
12	CDMA BC1	Bottom Face	1.399	1	0.053	0.047	-0.173	10.9	2.36	0.22	Not required
150	WiFi 5G		0.958	0	-0.047	0.089	-0.178				

Note:

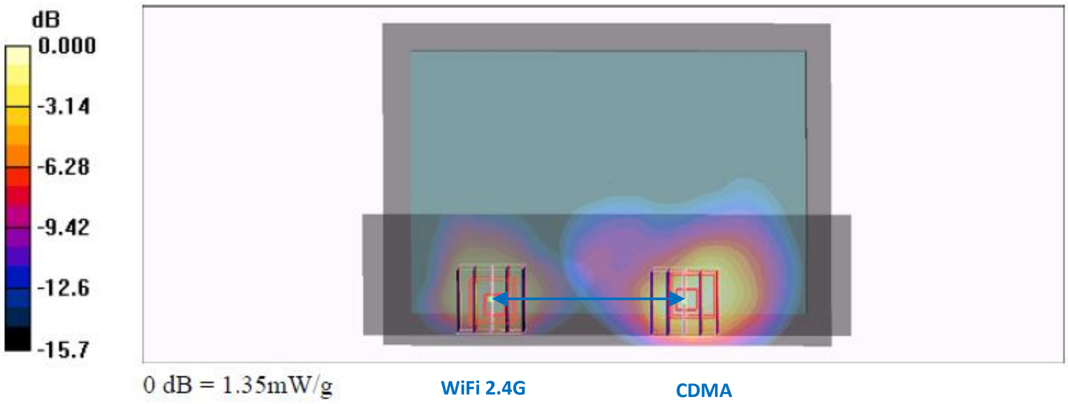
1. WLAN SAR data at 0mm is applied here, and it will represent more conservative situation than WLAN SAR data at 7.5mm and 10mm.
2. Per KDB 447498, if SPLSR < 0.3, volume scan is not necessary.

<The peak location is shown in the overlapped SAR plots>

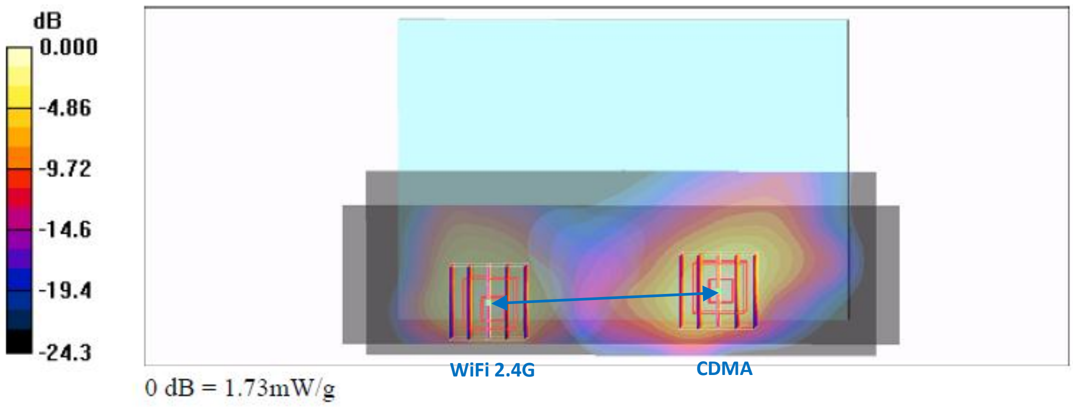
Body – Bottom Face: #31 LTE Band 13 10M CH23230, 0cm + #105 WiFi 2.4G CH6, 0cm

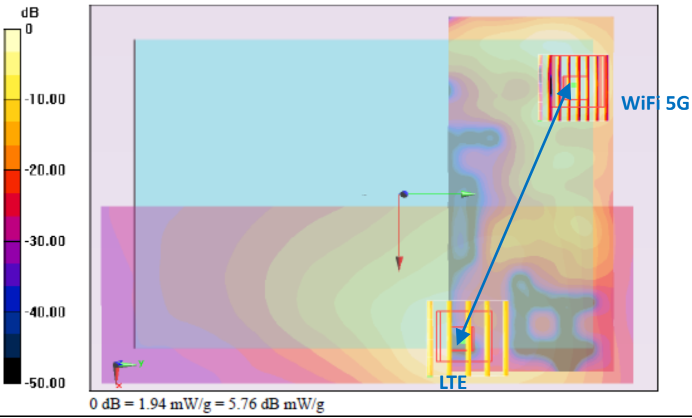
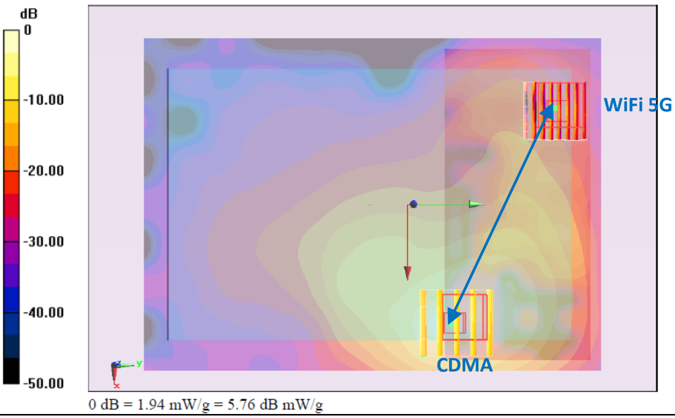


Body – Bottom Face: #04 CDMA BC0 CH777, 0cm + #105 WiFi 2.4G CH6, 0cm



Body – Bottom Face: #19 CDMA BC1 CH600, 0cm + #105 WiFi 2.4G CH6, 0cm



Body – Bottom Face: #31 LTE Band 13 10M CH23230, 0cm + #150 WiFi 5G CH52, 0cm

Body – Bottom Face: #04 CDMA BC0 CH777, 0cm + #150 WiFi 5G CH52, 0cm

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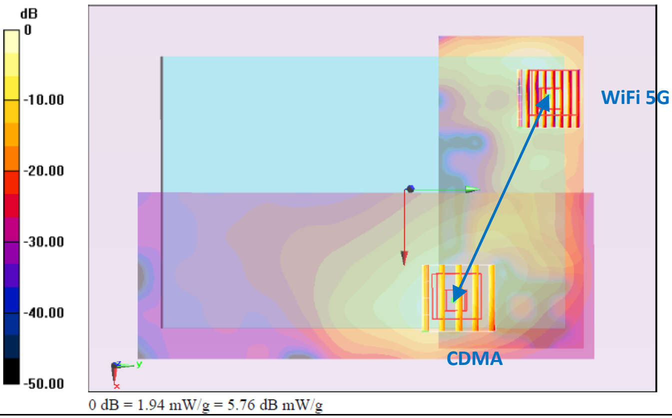
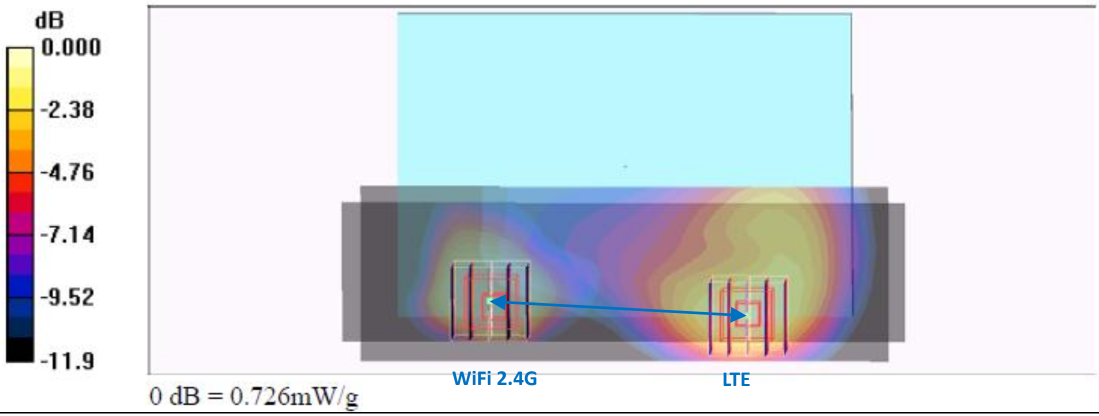
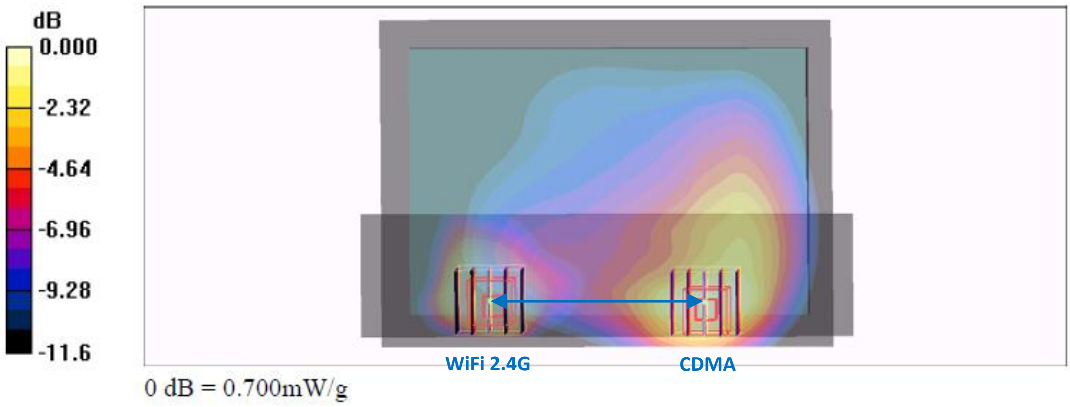
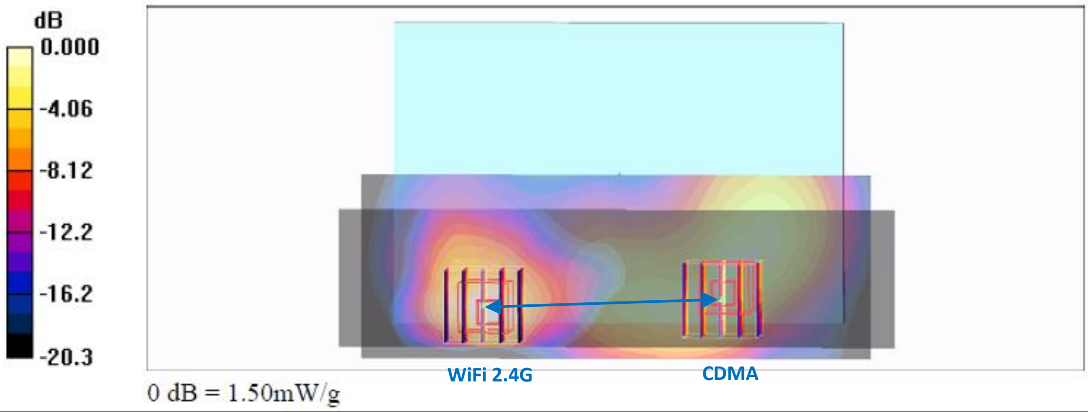
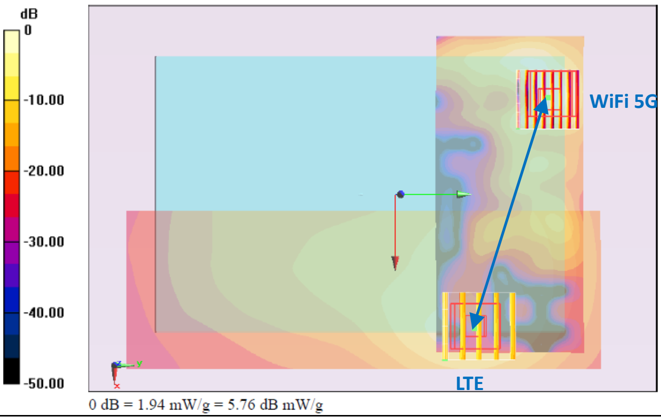
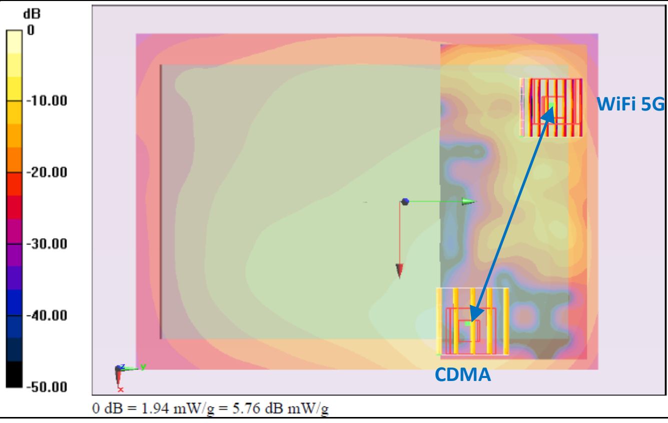
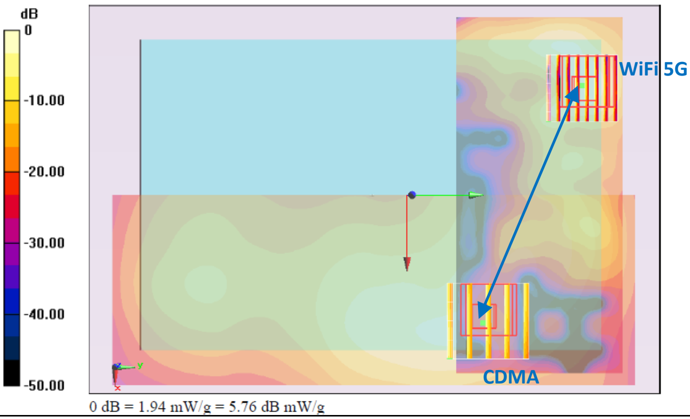


Body – Bottom Face: #38 LTE Band 13 10M CH23230, 1cm + #105 WiFi 2.4G CH6, 0cm

Body – Bottom Face: #07 CDMA BC0 CH777, 1cm + #105 WiFi 2.4G CH6, 0cm

Body – Bottom Face: #12 CDMA BC1 CH1175, 1cm + #105 WiFi 2.4G CH6, 0cm


Body – Bottom Face: #38 LTE Band 13 10M CH23230, 1cm + #150 WiFi 5G CH52, 0cm

Body – Bottom Face: #07 CDMA BC0 CH777, 1cm + #150 WiFi 5G CH52, 0cm

Body – Bottom Face: #12 CDMA BC1 CH1175, 1cm + #150 WiFi 5G CH52, 0cm


13. References

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Appendix A. Plots of System Performance Check

The plots are shown as follows.

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows.