FCC SAR Test Report

APPLICANT	:	**ZTE CORPORATION**
EUT	:	**CDMA/LTE Tablet**
BRAND NAME	:	**ZTE**
MODEL NAME	:	**V68**
FCC ID	:	**Q78-V68**
STANDARD	:	**FCC 47 CFR Part 2 (2.1093)** **IEEE C95.1-1991** **IEEE 1528-2003** **FCC OET Bulletin 65 Supplement C (Edition 01-01)**

The product was received on Sep. 08, 2011 and completely tested on Mar. 02, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory
1190

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Table of Contents

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA190807	Rev. 01	Initial issue of report	Mar. 07, 2012
FA190807	Rev. 02	1. Remove power rate column in page 42. 2. Add frequency column in SAR results table. 3. Group table rows in SAR results table for the different modes of each position together. 4. Revise Rx frequecy range in section 3.1 for WLAN and BT to channel frequecy.	May. 04, 2012

1 Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION CDMA/LTE Tablet, ZTE V68,** are as follows.

0 cm SAR test results

Band	Position	SAR 1g (W/kg)
CDMA2000 1xRTT BC0	Body (Bottom Face_0cm Gap)	0.541
CDMA2000 1xEVDO BC0	Body (Bottom Face_0cm Gap)	0.63
CDMA2000 1xRTT BC1	Body (Bottom Face_0cm Gap)	1.38
CDMA2000 1xEVDO BC1	Body (Primary Portrait_0cm Gap)	0.768
LTE Band XIII	Body (Bottom Face_0cm Gap)	0.761
WLAN 2.4GHz	Body (Bottom Face_0cm Gap)	0.503
WLAN 5GHz UNII	Body (Secondary Landscape_0cm Gap)	1.3

Verification of SAR compliance

Band	Position	SAR 1g (W/kg)
CDMA2000 1xRTT BC0	Body (Bottom Face_1.4cm Gap)	0.343
CDMA2000 1xEVDO BC0	Body (Bottom Face_0.9cm Gap)	1.3
CDMA2000 1xRTT BC1	Body (Bottom Face_1.4cm Gap)	1.51
CDMA2000 1xEVDO BC1	Body (Bottom Face_0.9cm Gap)	1.16
LTE Band XIII	Body (Bottom Face_0.9cm Gap)	1.02

The test records with distance 1.4cm and 0.9cm to the phantom are provided for verifying the SAR compliance when user is away from EUT and proximity sensor deactivated. 1.4cm and 0.9cm 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 C95.1-1991, 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 (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

2.2 Applicant

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2.3 Manufacturer

Company Name	ZTE CORPORATION
Address	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

2.4 Application Details

Date of Receipt of Application	Sep. 08, 2011
Date of Start during the Test	Feb. 25, 2012
Date of End during the Test	Mar. 02, 2012

3 General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	CDMA/LTE Tablet
Brand Name	ZTE
Model Name	V68
FCC ID	Q78-V68
Tx Frequency	CDMA2000 BC0 : 824.70 MHz ~ 848.31 MHz CDMA2000 BC1 : 1851.25 MHz ~ 1908.75 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz 802.11b/g/n : 2412 MHz ~ 2462 MHz 802.11a/n : 5180 MHz ~ 5240 MHz; 5745 MHz ~ 5805 MHz Bluetooth : 2402 MHz ~ 2480 MHz
Rx Frequency	CDMA2000 BC0 : 869.70 MHz ~ 893.31 MHz CDMA2000 BC1 : 1931.25 MHz ~ 1988.75 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz 802.11b/g/n : 2412 MHz ~ 2462 MHz 802.11a/n : 5180 MHz ~ 5240 MHz; 5745 MHz ~ 5805 MHz Bluetooth : 2402 MHz ~ 2480 MHz
Maximum Average Output Power to Antenna	**<1xRTT (Diversity Ant.)>** CDMA2000 BC0 : 24.35 dBm CDMA2000 BC1 : 24.52 dBm **<1xEV-DO & LTE (Main Ant.)>** CDMA2000 BC0 : 24.60 dBm CDMA2000 BC1 : 24.69 dBm LTE Band 13 : 23.30 dBm **<WLAN Antenna>** 802.11b : 13.48 dBm 802.11g : 13.37 dBm 802.11n (BW 20MHz) (2.4GHz) : 14.31 dBm 802.11a : 9.57 dBm 802.11n (BW 20MHz) (5GHz) : 9.22 dBm Bluetooth : 2.75 dBm
Antenna Type	CDMA2000 1xRTT: PIFA Antenna CDMA2000 1xEV-DO & LTE : PIFA Antenna WLAN/Bluetooth : PIFA Antenna
HW Version	V2.1
SW Version	V68_V1.12
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
EUT Stage	Identical Prototype

Remark:

1. Voice Call not supported
2. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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

<table>
<tr><td>FCC ID</td><td colspan="4">Q78-V68</td></tr>
<tr><td>EUT</td><td colspan="4">CDMA/LTE TABLET</td></tr>
<tr><td>Operating Frequency Range of each LTE transmission band</td><td colspan="4">Band 13: TX: 779.5 ~ 784.5 MHz, RX: 748.5~ 753.5 MHz</td></tr>
<tr><td>Channel Bandwidth</td><td colspan="4">5MHz, 10MHz</td></tr>
<tr><td rowspan="6">Transmission (H, M, L) channel numbers and frequencies in each LTE band</td><td colspan="4">Band 13:</td></tr>
<tr><td colspan="2">Bandwidth 5 MHz</td><td colspan="2">Bandwidth 10 MHz</td></tr>
<tr><td>Channel #</td><td>Frequency (MHz)</td><td>Channel #</td><td>Frequency (MHz)</td></tr>
<tr><td>23205</td><td>779.5</td><td rowspan="3">23230</td><td rowspan="3">782</td></tr>
<tr><td>23230</td><td>782</td></tr>
<tr><td>23255</td><td>784.5</td></tr>
<tr><td>UE category, uplink modulations used</td><td colspan="4">Category 3, QPSK, and 16QAM</td></tr>
<tr><td>LTE transmitter and antenna implementation (stand-alone or sharing hardware components / antennas)</td><td colspan="4">Main antenna: LTE share the antenna with CDMA2000 1xEV-DO.</td></tr>
<tr><td>LTE Voice / Data requirements</td><td colspan="4">Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td colspan="4">Yes</td></tr>
<tr><td>LTE A-MPR</td><td colspan="4">Disabled during SAR testing. With CMW500, set NS value to NS_01 to disable A-MPR.</td></tr>
<tr><td>LTE maximum averaged conducted output power</td><td colspan="4">LTE Band 13 : 23.30 dBm</td></tr>
<tr><td rowspan="4">Other U.S. wireless operating modes / bands</td><td>CDMA2000 1xRTT</td><td colspan="3">BC 0: UL: 824.7~848.31MHz / DL: 869.7~893.31MHz
BC 1: UL: 1851.25~1908.75MHz / DL: 1931.25~1988.75MHz</td></tr>
<tr><td>CDMA2000 1xEV-DO</td><td colspan="3">BC 0: UL: 824.7~848.31MHz / DL: 869.7~893.31MHz
BC 1: UL: 1851.25~1908.75MHz / DL: 1931.25~1988.75MHz</td></tr>
<tr><td>WLAN</td><td colspan="3">2.4G: 2412 MHz ~ 2462 MHz
5G: 5180 MHz ~ 5240 MHz; 5745 MHz ~ 5805 MHz</td></tr>
<tr><td>Bluetooth</td><td colspan="3">2402 MHz ~ 2480 MHz</td></tr>
<tr><td>Simultaneous transmission configurations</td><td colspan="4">In Section 12.3</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td colspan="4">Yes.</td></tr>
</table>

3.2 Product Photos

Please refer to Appendix D

3.3 Applied Standards

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)
- IEEE C95.1-1991
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 616217 D03 v01
- FCC KDB 941225 D01 v01
- FCC KDB 941225 D05 v01
- FCC KDB 447498 D01 v04
- 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 EUT is in CDMA2000 and LTE link mode. 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 EUT 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 EUT. The EUT was set from the emulator to radiate maximum output power during all tests.

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

The EUT 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 “Operational Description of power reduction” exhibit.

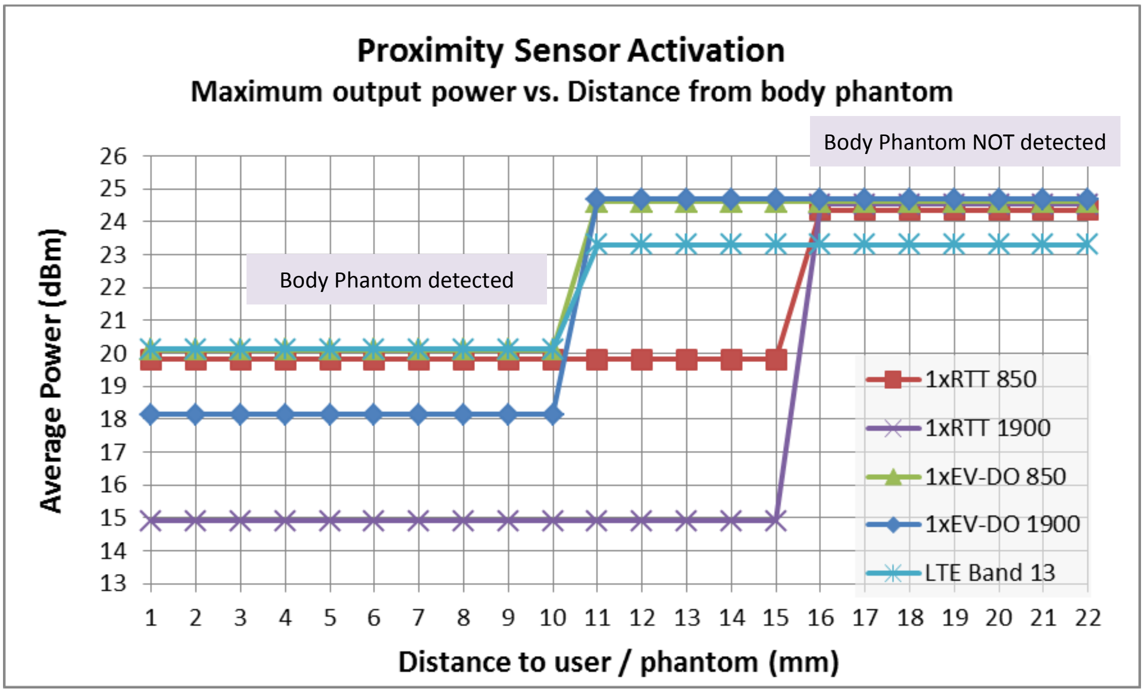
Power reduction applied for each wireless mode and orientation

Display Orientation/ wireless mode	1xRTT 850	1xRTT 1900	1xEV-DO 850	1xEV-DO 1900	LTE Band 13	WLAN	BT
Secondary Landscape	*	*	#	#	#	-	-
Primary Landscape	#	#	#	#	#	-	-
Secondary Portrait	#	#	#	#	#	-	-
Primary Portrait	#	#	*	*	*	-	-
# Reduced maximum limit applied only by activation of proximity sensor. * Reduced maximum limit applied by default.							

Remark: WLAN and Bluetooth output power are not reduced for SAR compliance

Target Power reduction specifications:

Mode(s) of Operation	1xRTT 850	1xRTT 1900	1xEV-DO 850	1xEV-DO 1900	LTE Band 13
Target Reduction Level	4.5 dB	10 dB	4.5 dB	6.5dB	3 dB



Remark:

1. EUT is Tablet not supporting voice function, and 1xRTT (data transmission) and LTE/EV-DO cannot transmit simultaneously. It is also described in "Operational Description" exhibit.
2. For CDMA BC0, 1xRTT, CH 1013, Full power: 24.35dBm, Reduced power: 19.82dBm. The power reduction level is 4.53dB.
3. For CDMA BC1, 1xRTT, CH 25, Full power: 24.52dBm, Reduced power: 14.90dBm. The power reduction level is 9.62dB.
4. For CDMA BC0, 1xEVDO, CH 1013 Full power: 24.60dBm, Reduced power: 20.10dBm. The power reduction level is 4.50dB.
5. For CDMA BC1, 1xEVDO, CH 25 Full power: 24.69dBm, Reduced power: 18.13dBm. The power reduction level is 6.56dB.

6. For LTE Band 13, CH 23230 Bandwidth 10Mz, RB-size:1, RB-offset:0, Full power: 23.30dBm, Reduced power: 20.12dBm. The power reduction level is 3.18dB.

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

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

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

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

5 SAR Measurement System

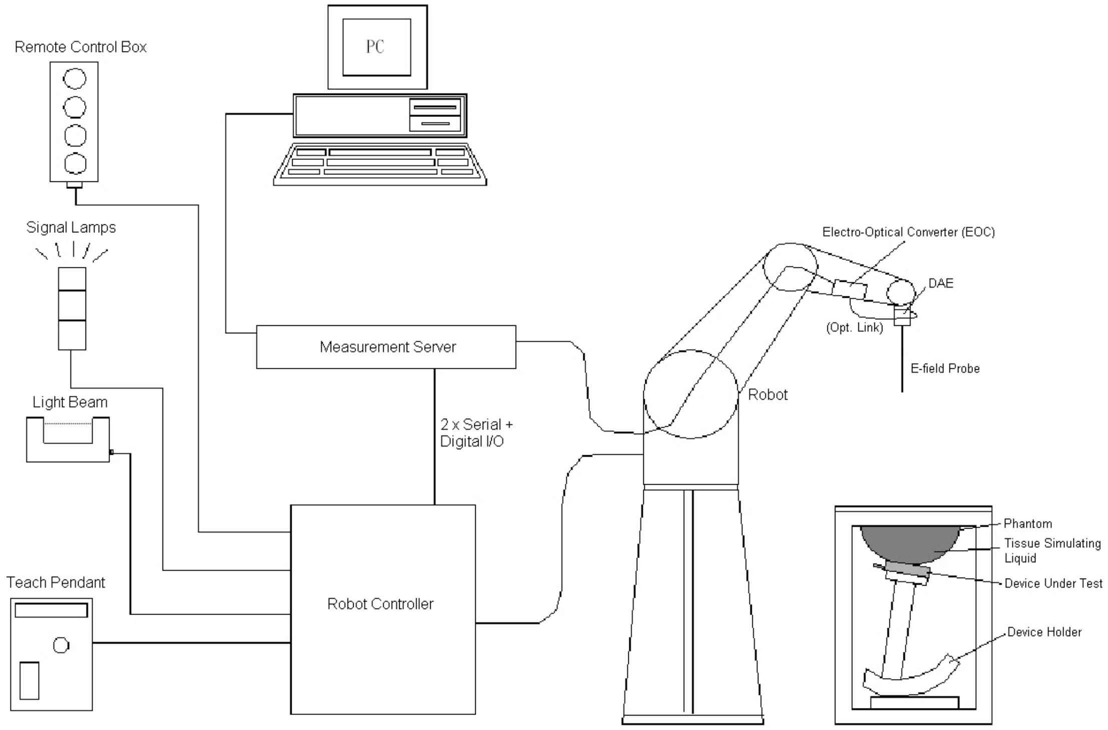


Fig 5.1 SPEAG DASY5 System Configurations

The DASY5 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
- DASY5 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

<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 5.2 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 5.3 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (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 5.4 Photo of DASY5

5.4 Measurement Server

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

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

Fig 5.5 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 5.6 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

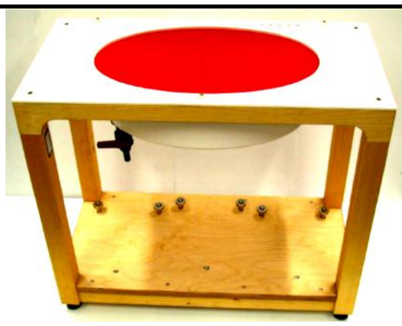


Fig 5.7 Photo of ELI4 Phantom

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

<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.

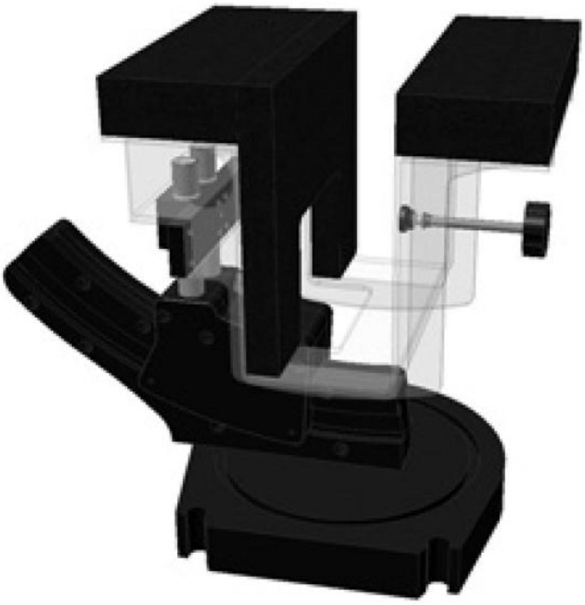


Fig 5.8 Laptop Extension Kit

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：

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

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：$\mathbf{E_i = \sqrt{\frac{V_i}{Norm_i \cdot ConvF}}}$

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

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)：

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

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

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

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	4d091	Nov. 18, 2011	Nov. 17, 2012
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	Nov. 21, 2011	Nov. 20, 2012
SPEAG	2450MHz System Validation Kit	D2450V2	840	Mar. 18, 2010	Mar. 17, 2012
SPEAG	5GHz System Validation Kit	D5GHzV2	1113	Nov.14, 2011	Nov.13, 2012
SPEAG	Data Acquisition Electronics	DAE4	1210	Nov. 18, 2011	Nov. 17, 2012
SPEAG	Dosimetric E-Field Probe	EX3DV4	3697	Sep. 02, 2011	Sep. 01, 2012
SPEAG	ELI4 Phantom	QD OVA 001 BB	1079	NCR	NCR
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 07, 2011	Apr. 06, 2012
Agilent	Wireless Communication Test Set	E5515C	MY48367160	Oct. 26, 2011	Oct. 25, 2012
Agilent	Dielectric Probe Kit	85070E	MY44300475	NCR	NCR
R&S	Signal Generator	SMR40	100455	Dec. 29, 2012	Dec. 28, 2013
R&S	Spectrum Analyzer	FSP30	101399	Jun. 02, 2011	Jun. 01, 2012
Agilent	Base Station	E5515C	GB47050646	Aug. 18, 2011	Aug. 17, 2012
AR	Amplifier	551G4	333096	NCR	NCR

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 and D2450V2, SN: 840 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.

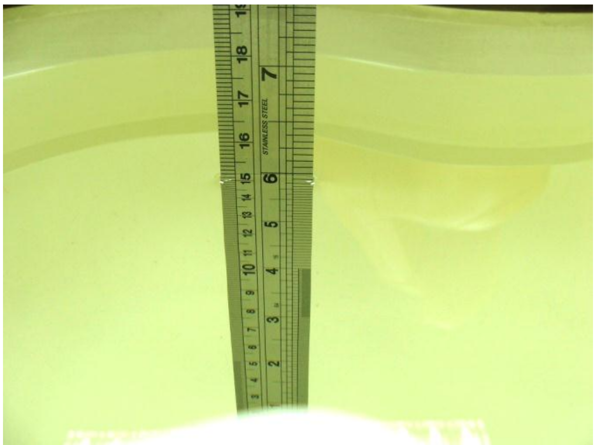


Fig 6.1 Photo of Liquid Height for Head SAR

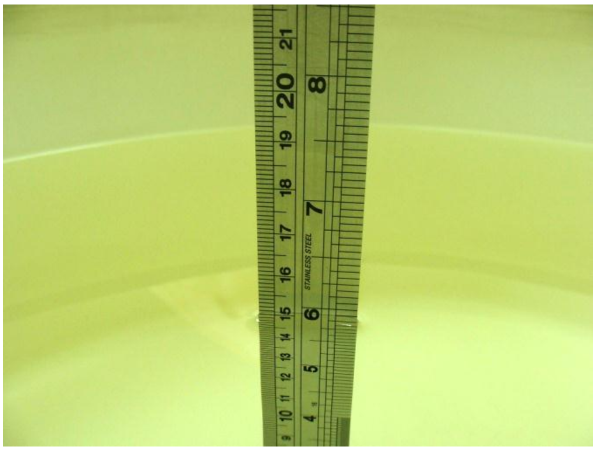


Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For 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
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	21.4	0.97	54.646	0.96	55.5	1.04	-1.54	±5	Feb. 29, 2012
835	Body	21.6	0.973	54.082	0.97	55.2	0.31	-2.03	±5	Feb. 25, 2012
835	Body	21.5	0.976	54.388	0.97	55.2	0.62	-1.47	±5	Feb. 28, 2012
1900	Body	21.2	1.535	54.579	1.52	53.3	0.99	2.40	±5	Feb. 27, 2012
1900	Body	21.3	1.525	54.504	1.52	53.3	0.33	2.26	±5	Feb. 28, 2012
2450	Body	21.6	1.992	54.311	1.95	52.7	2.15	3.06	±5	Mar. 02, 2012
5200	Body	21.4	5.297	49.185	5.30	49.0	-0.06	0.38	±5	Mar. 01, 2012
5800	Body	21.4	6.127	47.784	6.00	48.2	2.12	-0.86	±5	Mar. 01, 2012

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
824.7	Body	0.964	54.155	0.97	55.2	-0.62	-1.89	±5	Feb. 25, 2012
836.52	Body	0.9747	54.07	0.97	55.2	0.48	-2.05	±5	Feb. 28, 2012
848.31	Body	0.9848	53.97	0.99	55.2	-0.53	-2.23	±5	Feb. 28, 2012
1851.25	Body	1.474	54.678	1.50	53.4	-1.73	2.39	±5	Feb. 28, 2012
1880	Body	1.513	54.609	1.51	53.5	0.20	2.07	±5	Feb. 28, 2012
1909	Body	1.543	54.562	1.51	53.5	2.19	1.99	±5	Feb. 28, 2012
782	Body	0.996	53.986	0.96	55.4	3.75	-2.55	±5	Feb. 29, 2012
2412	Body	1.922	54.35	1.90	52.7	1.16	3.13	±5	Mar. 02, 2012
2437	Body	1.965	54.33	1.93	52.7	1.81	3.09	±5	Mar. 02, 2012
2462	Body	2.015	54.25	1.97	52.7	2.28	2.94	±5	Mar. 02, 2012
5180	Body	5.268	49.23	5.28	49.0	-0.23	0.47	±5	Mar. 01, 2012
5200	Body	5.293	49.202	5.30	49.0	-0.13	0.41	±5	Mar. 01, 2012
5220	Body	5.33	49.157	5.32	49.0	0.19	0.32	±5	Mar. 01, 2012
5240	Body	5.341	49.092	5.32	49.0	0.39	0.19	±5	Mar. 01, 2012
5745	Body	6.062	48.023	5.94	48.3	2.05	-0.57	±5	Mar. 01, 2012
5765	Body	6.088	47.926	5.94	48.2	2.49	-0.57	±5	Mar. 01, 2012
5785	Body	6.11	47.844	5.98	48.2	2.17	-0.74	±5	Mar. 01, 2012
5805	Body	6.132	47.911	6.01	48.2	2.03	-0.60	±5	Mar. 01, 2012

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

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

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

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 EUT 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:

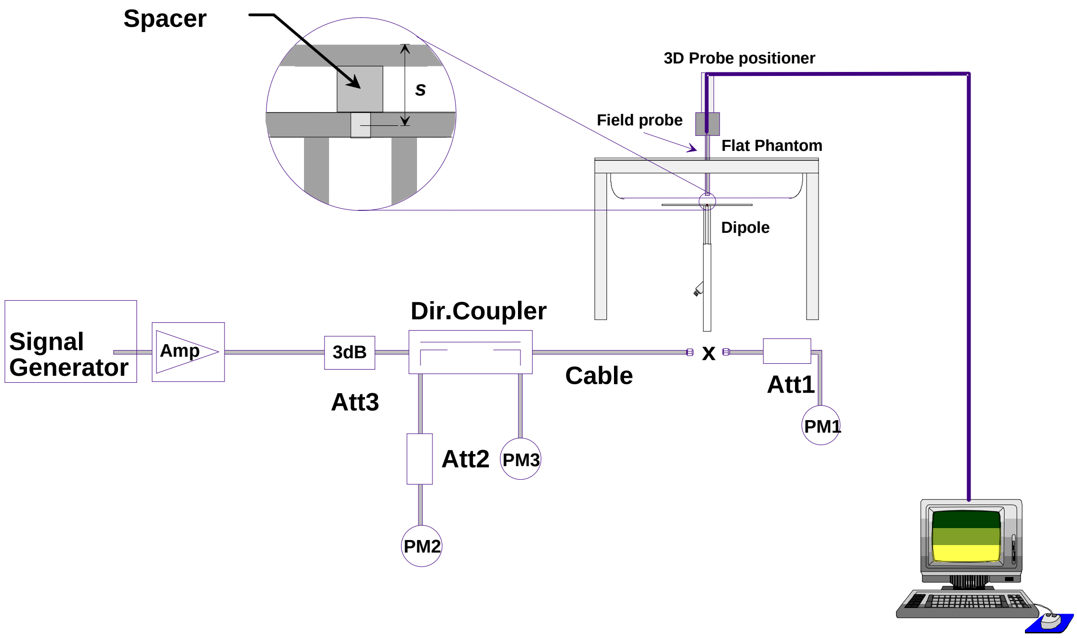


Fig 8.1 System Setup for System Evaluation

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.

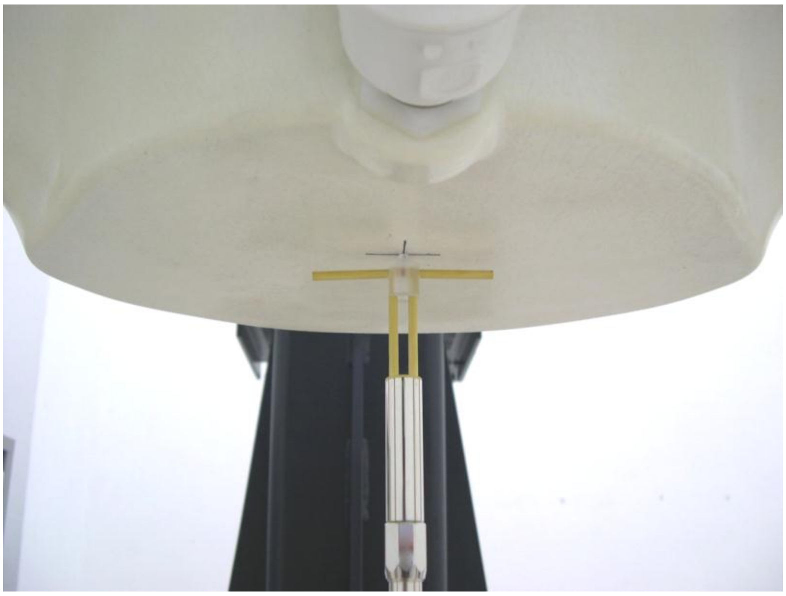


Fig 8.2 Photo of Dipole Setup

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 (%)
Feb. 29, 2012	750	Body	8.86	2.34	9.36	5.64
Feb. 25, 2012	835	Body	9.42	2.25	9.00	-4.46
Feb. 28, 2012	835	Body	9.42	2.52	10.08	7.01
Feb. 27, 2012	1900	Body	41.8	10.1	40.40	-3.35
Feb. 28, 2012	1900	Body	41.8	10.9	43.60	4.31
Mar. 02, 2012	2450	Body	52.1	13.8	55.20	5.95
Mar. 01, 2012	5200	Body	76.1	17.9	71.60	-5.91
Mar. 01, 2012	5800	Body	77.0	18.0	72.00	-6.49

Table 8.1 Target and Measurement SAR after Normalized

9 EUT Testing Position

This EUT was tested in four different positions. They are bottom face of tablet PC, Primary Portrait, Secondary Landscape, and Secondary Portrait, in these positions, the surface of EUT is touching with phantom 0 cm or 1.4 cm or 0.9 cm gap. Please refer to Appendix E for the test setup photos.

10 Measurement Procedures

The measurement procedures are as follows:

(a) For WWAN function, link EUT with base station emulator in highest power channel
(b) Set base station emulator to allow EUT to radiate maximum output power
(c) For WLAN function, using engineering software to transmit RF power continuously (continuous Tx) in the highest power channel
(d) Measure output power through RF cable and power meter
(e) Place the EUT in the positions described in the last section
(f) Set scan area, grid size and other setting on the DASY software
(g) Taking data for the testing channel on each testing position
(h) Find out the largest SAR result on these testing positions of each band
(i) 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 stand-alone 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 (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.

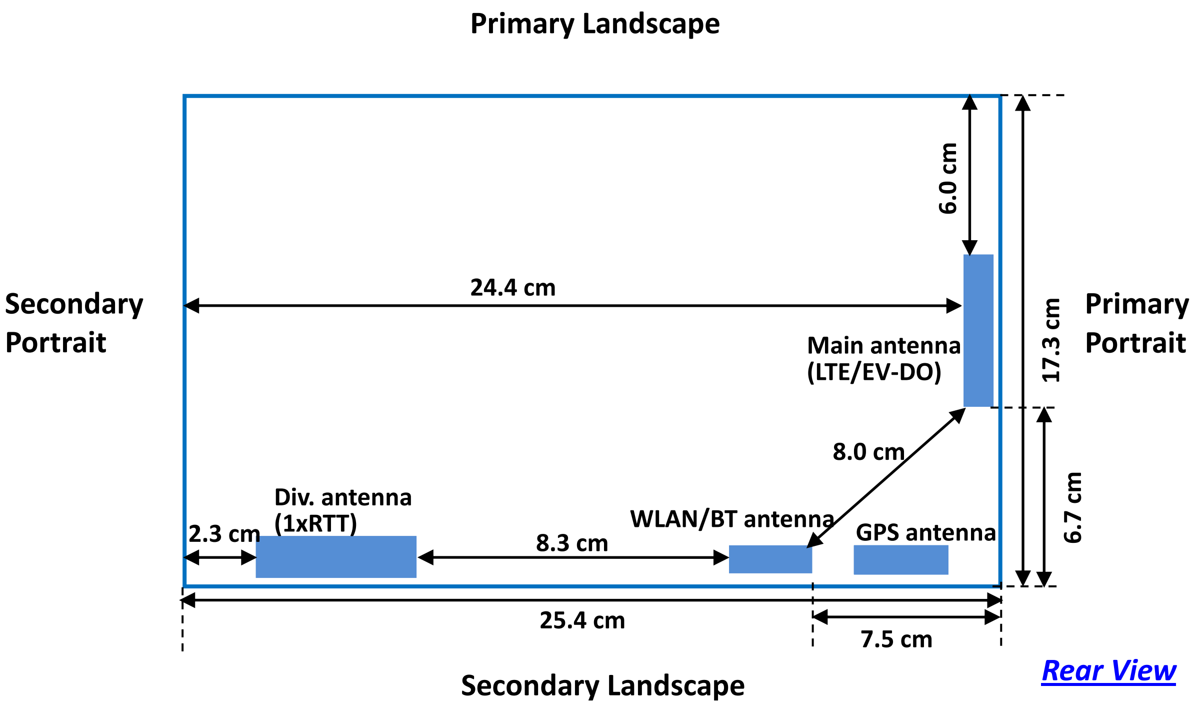
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty 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 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 drift more than 5%, the SAR will be retested.

11 SAR Test Configuration

11.1 Exposure Position Consideration



Main antenna	CDMA2000 1xEV-DO BC0 (Tx/Rx) CDMA2000 1xEV-DO BC1 (Tx/Rx) LTE band 13 (Tx/Rx)
Diversity antenna	CDMA2000 1xRTT BC0 (Tx/Rx) CDMA2000 1xRTT BC1 (Tx/Rx)
WLAN/BT antenna	WLAN 2.4G 802.11 b/g/n (Tx/Rx) WLAN 5G 802.11 a/n (Tx/Rx) Bluetooth (Tx/Rx)

Sides for SAR tests; Tablet (> 20cm diagonal)							
Antenna	Exposure Position	Bottom Face	Front Face	Primary Landscape	Secondary Landscape	Primary Portrait	Secondary Portrait
Main	CDMA 1xEV-DO	0mm, 9mm	x	x	x	0mm	x
	LTE	0mm, 9mm	x	x	x	0mm	x
Div.	CDMA 1xRTT	0mm, 14mm	x	x	0mm	x	0mm
WLAN/BT	WLAN 2.4GHz 11b/g/n	0mm	x	x	0mm	x	x
	WLAN 5GHz 11a/n	0mm	x	x	0mm	x	x

Note:

1. EUT diagonal is >20cm, per KDB 447498, Tablet SAR should be tested at separation distance 0mm.
2. Per KDB 447498, LTE and CDMA 1xEV-DO SAR should be evaluated at Bottom Face. LTE and CDMA 1xEV-DO SAR should also be evaluated at Primary Portrait positions due to the Main antenna to the user at those exposure positions is < 5cm. Per KDB 447498, Front Face, Primary Landscape, Secondary Portrait and Secondary Landscape (antenna to the user >5cm) positions SAR is excluded.
3. Per KDB 447498, CDMA 1xRTT SAR should be evaluated at Bottom Face. CDMA 1xRTT SAR should also be evaluated at Secondary-Landscape / Secondary-Portrait positions due to the Diversity antenna to the user at those exposure positions is < 5cm. Per KDB 447498, Front Face / Primary-Portrait / Primary-Landscape (antenna to the user >5cm) positions SAR is excluded.
4. Per KDB 447498, WLAN SAR should be evaluated at Bottom Face. WLAN SAR should also be evaluated at Secondary-Landscape position due to the WLAN antenna to the user at those exposure positions is < 5cm. Per KDB 447498, Front Face and Primary-Landscape / Primary-Portrait / Secondary-Portrait (antenna to the user >5cm) positions SAR is excluded.
5. Per KDB 447498, since Bluetooth average power is less than 60/f (13.8dBm), standalone SAR is excluded.

11.2 Simultaneous Transmission Consideration

	Position	Applicable Combination
Simultaneous Transmission	Body	CDMA1xRTT (data) + WLAN
		CDMA1xEV-DO (data) + WLAN
		LTE (data) + WLAN
		CDMA1xRTT (data) + BT
		CDMA1xEV-DO (data) + BT
		LTE (data) + BT

Simultaneous Transmission SAR						
Exposure Position	Bottom Face	Front Face	Secondary Landscape	Primary Landscape	Primary Portrait	Secondary Portrait
CDMA 1xRTT With power reduction enable by P-sensor at Bottom Face	0mm	x	0mm	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	0mm	x	x	x
CDMA 1xRTT With Full Power	14mm	x	x	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	x	x	x	x
CDMA 1xEV-DO With power reduction enable by P-sensor at Bottom Face	0mm	x	x	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	x	x	x	x
CDMA 1xEV-DO With Full Power	9mm	x	x	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	x	x	x	X
LTE With power reduction enable by P-sensor at Bottom Face	0mm	x	x	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	x	x	x	x
LTE With Full Power	9mm	x	x	x	x	x
WLAN 2.4GHz / 5GHz	0mm	x	x	x	x	x

Note:

1. EUT is Tablet not supporting voice function, and 1xRTT (data transmission) and LTE/EV-DO cannot transmit simultaneously. It is also described in “Operational Description” exhibit.
2. For simultaneous SAR evaluation (Main Ant. + WLAN Ant.) at Bottom Face, 9mm distance, since WLAN SAR value 0mm will be worse than 9mm data; therefore 0mm WLAN SAR data is used here.
3. For simultaneous SAR evaluation (Diversity Ant. + WLAN Ant.) at Bottom Face, 14mm distance, since WLAN SAR value 0mm will be worse than 14mm data; therefore 0mm WLAN SAR data is used here.
4. Per KDB 447498, since Bluetooth average power is less than 60/f (13.8dBm), standalone SAR is excluded, and simultaneous transmission analysis is excluded.

12 SAR Test Results

12.1 Conducted Power (Unit: dBm)

<CDMA2000 1xRTT (Diversity Ant.)>

Full Power 1xRTT (Diversity Ant.)						
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)	24.35	24.06	24.12	24.52	24.38	24.51
1xRTT RC3+SO32 (FCH+SCH)	24.33	24.05	24.12	24.40	24.42	24.48

Reduced Power 1xRTT (Diversity Ant.)												
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	
	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)
1xRTT RC3+SO32 (FCH)	19.82	4.53	19.56	4.50	19.61	4.51	14.90	9.62	14.50	9.88	14.09	10.42
1xRTT RC3+SO32 (FCH+SCH)	19.81	4.52	19.59	4.46	19.68	4.44	14.89	9.51	14.63	9.79	14.32	10.16

1xRTT (Diversity Ant.) Reduction Level								
Band	CDMA2000 BC0			Target Reduction (dB)	CDMA2000 BC1			Target Reduction (dB)
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)	4.53	4.50	4.51	4.50	9.62	9.88	10.42	10.00
1xRTT RC3+SO32 (FCH+SCH)	4.52	4.46	4.44	4.50	9.51	9.79	10.16	10.00

Note:

1. The target power reduction mechanism is listed in sec. 3.5.2. The deviation from the specification is due to the tolerance in the measurement.
2. Per KDB 941225 D01, 1xRTT (data transmission) SAR should be tested with SO32 FCH setting; (FCH+SCH) SAR can be excluded if output power is less than 1/4dB higher than FCH setting.

<CDMA2000 1xEV-DO (Main Ant.)>

Full Power 1xEV-DO (Main Ant.)						
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
1xEVDO RTAP 153.6	24.60	24.23	24.38	24.69	24.55	24.65
1xEVDO RETAP 4096	24.58	24.29	24.36	24.68	24.53	24.58

Reduced Power 1xEV-DO (Main Ant.)												
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	
	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)	Output Power (dBm)	Reduction (dB)
1xEVDO RTAP 153.6	20.10	4.50	19.75	4.48	19.83	4.55	18.13	6.56	18.05	6.50	18.12	6.53
1xEVDO RETAP 4096	20.09	4.49	19.75	4.54	19.54	4.82	18.05	6.63	18.03	6.50	18.12	6.46

1xEV-DO (Main Ant.) Reduction Level								
Band	CDMA2000 BC0			Target Reduction (dB)	CDMA2000 BC1			Target Reduction (dB)
Channel	1013	384	777		25	600	1175	
Frequency (MHz)	824.70	836.52	848.31		1851.25	1880.00	1908.75	
1xEVDO RTAP 153.6	4.50	4.48	4.55	4.50	6.56	6.50	6.53	6.00
1xEVDO RETAP 4096	4.49	4.54	4.82	4.50	6.63	6.50	6.46	6.00

Note:

1. The target power reduction mechanism is listed in sec. 3.5.2. The deviation from the specification is due to the tolerance in the measurement.
2. Per KDB 941225 D01, EV-DO SAR should be tested with RTAP 153.6kbps setting; RETAP 4096-bits SAR can be excluded if output power is not more than 1/4dB higher than RTAP 153.6kbps.

<LTE Band 13 (Main Ant.)>

Full Power LTE Band XIII (Main Ant.)								
Freq. [MHz]	**Uplink Channel Number**	**BW [MHz]**	**RB Size**	**RB Offset**	**Mod**	**Maximum Average Power [dBm]**	**Target MPR (dB)**	**MPR Result (dB)**
779.5	23205	5	1	0	QPSK	23.11	0	0.06
779.5	23205	5	1	24	QPSK	23.17	0	0.00
779.5	23205	5	12	6	QPSK	23.13	0	0.04
779.5	23205	5	25	0	QPSK	23.08	0	0.09
779.5	23205	5	1	0	16-QAM	23.25	0	-0.08
779.5	23205	5	1	24	16-QAM	23.25	0	-0.08
779.5	23205	5	12	6	16-QAM	23.15	0	0.02
779.5	23205	5	25	0	16-QAM	23.21	0	-0.04
782	23230	5	1	0	QPSK	23.17	0	0.00
782	23230	5	1	24	QPSK	23.10	0	0.07
782	23230	5	12	6	QPSK	23.07	0	0.10
782	23230	5	25	0	QPSK	23.16	0	0.01
782	23230	5	1	0	16-QAM	23.22	0	-0.05
782	23230	5	1	24	16-QAM	23.27	0	-0.10
782	23230	5	12	6	16-QAM	23.26	0	-0.09
782	23230	5	25	0	16-QAM	23.26	0	-0.09
784.5	23255	5	1	0	QPSK	23.13	0	0.00
784.5	23255	5	1	24	QPSK	23.07	0	0.06
784.5	23255	5	12	6	QPSK	23.08	0	0.05
784.5	23255	5	25	0	QPSK	23.03	0	0.10
784.5	23255	5	1	0	16-QAM	23.26	0	-0.13
784.5	23255	5	1	24	16-QAM	23.28	0	-0.15
784.5	23255	5	12	6	16-QAM	23.08	0	0.05
784.5	23255	5	25	0	16-QAM	23.14	0	-0.01
782	23230	10	1	0	QPSK	23.06	0	0.00
782	23230	10	1	49	QPSK	23.02	0	0.04
782	23230	10	25	13	QPSK	23.11	0	-0.05
782	23230	10	50	0	QPSK	23.15	0	-0.09
782	23230	10	1	0	16-QAM	**23.30**	0	-0.24
782	23230	10	1	49	16-QAM	23.25	0	-0.19
782	23230	10	25	13	16-QAM	23.30	0	-0.24
782	23230	10	50	0	16-QAM	23.06	0	0.00

<LTE Band 13 (Main Ant.)>

Reduced Power LTE Band XIII (Main Ant.)									
Freq. [MHz]	Uplink Channel Number	BW [MHz]	RB Size	RB Offset	Mod	Maximum Average Power [dBm]	Target MPR (dB)	MPR Result (dB)	Power Reduction by Proximity Sensor (dB)
779.5	23205	5	1	0	QPSK	19.92	0	0.02	3.19
779.5	23205	5	1	24	QPSK	19.94	0	0.00	3.23
779.5	23205	5	12	6	QPSK	19.95	0	-0.01	3.18
779.5	23205	5	25	0	QPSK	19.89	0	0.05	3.19
779.5	23205	5	1	0	16-QAM	20.11	0	-0.17	3.14
779.5	23205	5	1	24	16-QAM	20.13	0	-0.19	3.12
779.5	23205	5	12	6	16-QAM	19.95	0	-0.01	3.20
779.5	23205	5	25	0	16-QAM	20.15	0	-0.21	3.06
782	23230	5	1	0	QPSK	20.14	0	0.00	3.03
782	23230	5	1	24	QPSK	19.96	0	0.18	3.14
782	23230	5	12	6	QPSK	20.02	0	0.12	3.05
782	23230	5	25	0	QPSK	19.97	0	0.17	3.19
782	23230	5	1	0	16-QAM	20.14	0	0.00	3.08
782	23230	5	1	24	16-QAM	19.96	0	0.18	3.31
782	23230	5	12	6	16-QAM	19.98	0	0.16	3.28
782	23230	5	25	0	16-QAM	20.10	0	0.04	3.16
784.5	23255	5	1	0	QPSK	20.02	0	0.00	3.11
784.5	23255	5	1	24	QPSK	19.96	0	0.06	3.11
784.5	23255	5	12	6	QPSK	19.92	0	0.10	3.16
784.5	23255	5	25	0	QPSK	19.98	0	0.04	3.05
784.5	23255	5	1	0	16-QAM	20.13	0	-0.11	3.13
784.5	23255	5	1	24	16-QAM	19.96	0	0.06	3.32
784.5	23255	5	12	6	16-QAM	19.92	0	0.10	3.16
784.5	23255	5	25	0	16-QAM	20.14	0	-0.12	3.00
782	23230	10	1	0	QPSK	19.95	0	0.00	3.01
782	23230	10	1	49	QPSK	19.94	0	0.01	2.92
782	23230	10	25	13	QPSK	19.98	0	-0.03	2.95
782	23230	10	50	0	QPSK	20.04	0	-0.09	2.87
782	23230	10	1	0	16-QAM	20.12	0	-0.17	3.18
782	23230	10	1	49	16-QAM	20.08	0	-0.13	3.17
782	23230	10	25	13	16-QAM	20.16	0	-0.21	3.14
782	23230	10	50	0	16-QAM	20.06	0	-0.11	2.90

Note:

1. Choose the widest bandwidth configuration (i.e., 10MHz) to test SAR and determine further SAR exclusion.
2. The Target of LTE power reduction value is 3dB, which 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	0	0	≤ 1
16 QAM	≤ 8	≤ 12	0	0	≤ 1
16 QAM	> 8	> 12	0	0	≤ 2

Note:

1. The measurement result showed some difference from the target MPR level, due to expected 0.5dB measurement tolerance.
2. When power reduction is enabled for SAR compliance, the LTE output power, is reduced 3dB further for SAR compliance.

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average power (dBm)			
			Data Rate (bps)			
			1M	2M	5.5M	11M
802.11b	CH 01	2412 MHz	13.48	13.45	13.44	13.43
	CH 06	2437 MHz	13.38	13.34	13.32	13.30
	CH 11	2462 MHz	13.19	13.17	13.16	13.15

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate (bps)							
			6M	9M	12M	18M	24M	36M	48M	54M
802.11g	CH 01	2412 MHz	13.37	13.32	13.23	13.21	13.20	13.17	13.18	13.23
	CH 06	2437 MHz	13.20	13.16	13.13	13.09	13.07	13.05	13.04	13.08
	CH 11	2462 MHz	13.15	13.11	13.08	13.06	13.03	13.05	12.99	12.95

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	14.31	14.29	14.24	14.22	14.20	14.17	14.15	14.18
	CH 06	2437 MHz	14.19	14.16	14.13	14.12	14.10	14.07	14.02	14.04
	CH 11	2462 MHz	13.93	13.90	13.88	13.86	13.83	13.79	13.73	13.76

Note:

1. Per KDB 248227, choose the highest output power channel to test SAR and determine further SAR exclusion
2. Since 11n power is 1/4dB higher than 11b, 11n SAR will be verified.

<Bluetooth>

Channel	Frequency (MHz)	Average power (dBm)								
		Data Rate								
		DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
CH 00	2402 MHz	1.89	1.91	1.93	-0.52	-0.37	-0.22	-0.43	-0.26	-0.33
CH 39	2441 MHz	2.54	2.59	2.73	0.06	0.37	0.40	0.21	0.46	0.45
CH 78	2480 MHz	2.63	2.61	2.75	0.04	0.27	0.36	0.12	0.39	0.32

Note: Per KDB 447498, since Bluetooth average power is less than 60/f (13.8dBm), SAR is excluded.

<WLAN 5G>

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate (bps)							
			6M	9M	12M	18M	24M	36M	48M	54M
802.11a	CH 036	5180 MHz	9.18	8.48	8.79	9.04	8.87	9.15	8.63	8.87
	CH 040	5200 MHZ	9.49	8.82	8.79	9.11	9.22	8.77	8.75	8.79
	CH 044	5220 MHz	**9.57**	9.31	9.27	9.47	9.41	9.40	9.37	9.39
	CH 048	5240 MHz	9.45	9.29	9.40	9.44	9.21	9.42	9.40	9.44
	CH 149	5745 MHz	8.89	8.62	8.32	8.63	8.77	8.76	8.86	8.87
	CH 153	5765 MHz	9.15	9.07	9.06	9.08	9.07	9.10	9.13	9.14
	CH 157	5785 MHz	**9.24**	8.98	8.96	9.18	9.19	9.16	9.20	9.22
	CH 161	5805 MHz	9.18	9.12	9.01	9.02	9.06	9.06	9.15	9.08

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	9.04	8.22	8.93	8.97	8.99	8.95	8.57	8.93
	CH 040	5200 MHZ	9.00	8.56	8.93	8.80	8.98	8.96	8.88	8.90
	CH 044	5220 MHz	**9.22**	8.98	9.03	9.18	9.20	9.18	9.09	9.12
	CH 048	5240 MHz	9.12	8.91	8.96	9.05	8.98	9.04	8.93	9.01
	CH 149	5745 MHz	8.84	8.37	8.76	8.83	8.76	8.73	8.74	8.81
	CH 153	5765 MHz	8.91	8.75	8.87	8.77	8.65	8.53	8.60	8.42
	CH 157	5785 MHz	**9.00**	8.78	8.90	8.89	8.68	8.86	8.92	8.51
	CH 161	5805 MHz	8.65	8.37	8.59	8.53	8.64	8.64	8.60	8.40

Note:

1. Per KDB 248227, choose the highest output power channel to test SAR and determine further SAR exclusion. Therefore CH44 and CH157 are chosen first for SAR testing.
2. Since 5GHz 11n power is less than 1/4dB higher than 11a, 11n SAR will be excluded.

12.2 Test Records for Body SAR Test

<CDMA2000 1xRTT>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Conducted Power	Power Drift (dB)	Ear-phone	SAR_{1g} (W/kg)
1	**CDMA2000 BC0**	**RC3 SO32**	**Bottom Face**	**0**	**1013**	**824.7**	**19.82**	**-0.02**	**V**	**0.541**
3	CDMA2000 BC0	RC3 SO32	Secondary Landscape	0	1013	824.7	19.82	0.07	V	0.304
2	CDMA2000 BC0	RC3 SO32	Secondary Portrait	0	1013	824.7	24.35	-0.17	-	0.423
4	**CDMA2000 BC0**	**RC3 SO32**	**Bottom Face**	**1.4**	**1013**	**824.7**	**24.35**	**-0.07**	**V**	**0.343**
5	**CDMA2000 BC1**	**RC3 SO32**	**Bottom Face**	**0**	**25**	**1851.25**	**14.9**	**0.01**	**V**	**1.38**
8	CDMA2000 BC1	RC3 SO32	Bottom Face	0	600	1880	14.5	0.06	V	1.28
9	CDMA2000 BC1	RC3 SO32	Bottom Face	0	1175	1908.75	14.09	0.02	V	0.967
7	CDMA2000 BC1	RC3 SO32	Secondary Landscape	0	25	1851.25	14.9	0.05	V	1.34
10	CDMA2000 BC1	RC3 SO32	Secondary Landscape	0	600	1880	14.5	0.08	V	1.2
11	CDMA2000 BC1	RC3 SO32	Secondary Landscape	0	1175	1908.75	14.09	0.07	V	0.962
6	CDMA2000 BC1	RC3 SO32	Secondary Portrait	0	25	1851.25	24.52	0.07	-	0.23
12	**CDMA2000 BC1**	**RC3 SO32**	**Bottom Face**	**1.4**	**25**	**1851.25**	**24.52**	**-0.04**	**V**	**1.51**
13	CDMA2000 BC1	RC3 SO32	Bottom Face	1.4	600	1880	24.38	0.07	V	1.34
14	CDMA2000 BC1	RC3 SO32	Bottom Face	1.4	1175	1908.75	24.51	0.06	V	1.13

Note:

1. “V” in the earphone column means the earphone is plugged during SAR testing.
2. 1.4cm 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. The specific SW utility is used to disable the proximity sensor for 1.4cm SAR testing. The SW is not available for end users.
3. During SAR testing for positions other than Bottom Face, proximity sensor power reduction is disabled to avoid any unexpected trigger.
4. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

<CDMA2000 1xEV-DO>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Conducted Power	Power Drift (dB)	Ear-phone	SAR_{1g} (W/kg)
20	**CDMA2000 BC0**	**RTAP153.6**	**Bottom Face**	**0**	**1013**	**824.7**	**20.1**	**-0.05**	**V**	**0.63**
21	CDMA2000 BC0	RTAP153.6	Primary Portrait	0	1013	824.7	20.1	0.06	V	0.406
22	**CDMA2000 BC0**	**RTAP153.6**	**Bottom Face**	**0.9**	**1013**	**824.7**	**24.6**	**-0.09**	**V**	**1.3**
23	CDMA2000 BC0	RTAP153.6	Bottom Face	0.9	384	836.52	24.23	-0.02	V	0.938
24	CDMA2000 BC0	RTAP153.6	Bottom Face	0.9	777	848.31	24.38	-0.03	V	0.949
15	CDMA2000 BC1	RTAP153.6	Bottom Face	0	25	1851.25	18.13	-0.08	V	0.576
16	**CDMA2000 BC1**	**RTAP153.6**	**Primary Portrait**	**0**	**25**	**1851.25**	**18.13**	**-0.05**	**V**	**0.768**
17	CDMA2000 BC1	RTAP153.6	Bottom Face	0.9	25	1851.25	24.69	-0.08	V	0.965
18	CDMA2000 BC1	RTAP153.6	Bottom Face	0.9	600	1880	24.55	-0.02	V	0.995
19	**CDMA2000 BC1**	**RTAP153.6**	**Bottom Face**	**0.9**	**1175**	**1908.75**	**24.65**	**-0.09**	**V**	**1.16**

Note:

1. “V” in the earphone column means the earphone is plugged during SAR testing.
2. 0.9cm 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. The specific SW utility is used to disable the proximity sensor for 0.9cm SAR testing. The SW is not available for end users.
3. During SAR testing for positions other than Bottom Face, proximity sensor power reduction is disabled to avoid any unexpected trigger.
4. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

<LTE Band XIII>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Conducted Power	Power Drift (dB)	Ear-phone	SAR_{1g} (W/kg)
25	LTE BAND XIII	QPSK	10	25	13	Bottom Face	0	23230	782	19.98	0.06	V	0.585
28	LTE BAND XIII	QPSK	10	1	0	Bottom Face	0	23230	782	19.95	0.09	V	0.712
31	LTE BAND XIII	QPSK	10	1	49	Bottom Face	0	23230	782	19.94	0.03	V	0.561
34	LTE BAND XIII	16-QAM	10	25	13	Bottom Face	0	23230	782	20.16	0.05	V	0.611
37	**LTE BAND XIII**	**16-QAM**	**10**	**1**	**0**	**Bottom Face**	**0**	**23230**	**782**	**20.12**	**0.02**	**V**	**0.761**
40	LTE BAND XIII	16-QAM	10	1	49	Bottom Face	0	23230	782	20.08	0.04	V	0.575
26	LTE BAND XIII	QPSK	10	25	13	Primary Portrait	0	23230	782	19.98	0.001	V	0.567
29	LTE BAND XIII	QPSK	10	1	0	Primary Portrait	0	23230	782	19.95	-0.005	V	0.628
32	LTE BAND XIII	QPSK	10	1	49	Primary Portrait	0	23230	782	19.94	0.02	V	0.52
35	LTE BAND XIII	16-QAM	10	25	13	Primary Portrait	0	23230	782	20.16	0.03	V	0.599
38	LTE BAND XIII	16-QAM	10	1	0	Primary Portrait	0	23230	782	20.12	0.07	V	0.719
41	LTE BAND XIII	16-QAM	10	1	49	Primary Portrait	0	23230	782	20.08	0.01	V	0.576
27	LTE BAND XIII	QPSK	10	25	13	Bottom Face	0.9	23230	782	23.11	0.004	V	1.01
30	LTE BAND XIII	QPSK	10	1	0	Bottom Face	0.9	23230	782	23.06	0.03	V	0.916
33	LTE BAND XIII	QPSK	10	1	49	Bottom Face	0.9	23230	782	23.02	0.02	V	0.832
36	**LTE BAND XIII**	**16-QAM**	**10**	**25**	**13**	**Bottom Face**	**0.9**	**23230**	**782**	**23.3**	**-0.06**	**V**	**1.02**
39	LTE BAND XIII	16-QAM	10	1	0	Bottom Face	0.9	23230	782	23.3	-0.05	V	0.966
42	LTE BAND XIII	16-QAM	10	1	49	Bottom Face	0.9	23230	782	23.25	0.01	V	0.858

Note:

1. “V” in the earphone column means the earphone is plugged during SAR testing.
2. 0.9cm 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. The specific SW utility is used to disable the proximity sensor for 0.9cm SAR testing. The SW is not available for end users.
3. During SAR testing for positions other than Bottom Face, proximity sensor power reduction is disabled to avoid any unexpected trigger.
4. Per KDB 941225 D05, for LTE, if the smaller bandwidth output power is within +/- ½dB of the largest bandwidth, and the maximum SAR of the largest bandwidth is ≤ 1.45 W/kg, SAR for smaller bandwidth can be excluded.
5. Per KDB 941225 D05, for LTE, if 50%-RB QPSK SAR ≤ 1.45 W/kg, 100%-RB QPSK SAR can be excluded; if 50%-RB 16QAM SAR ≤ 1.45 W/kg, 100%-RB 16QAM SAR can be excluded.
6. Per KDB 447498, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

<WLAN>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Conducted Power	Power Drift (dB)	Earphone	Data Rate	SAR_{1g} (W/kg)
43	802.11b	-	Bottom Face	0	1	2412	13.48	0.03	V	1M	0.49
45	**802.11n**	**-**	**Bottom Face**	**0**	**1**	**2412**	**14.31**	**0.05**	**V**	**MCS0**	**0.503**
44	802.11b	-	Secondary Landscape	0	1	2412	13.48	-0.09	V	1M	0.27
46	802.11a	-	Bottom Face	0	44	5220	9.57	0	V	6M	0.517
49	802.11a	-	Bottom Face	0	157	5785	9.24	0.09	V	6M	0.239
47	**802.11a**	**-**	**Secondary Landscape**	**0**	**44**	**5220**	**9.57**	**0.12**	**V**	**6M**	**1.3**
48	802.11a	-	Secondary Landscape	0	36	5180	9.18	0.04	V	6M	1.24
50	802.11a	-	Secondary Landscape	0	157	5785	9.24	0.02	V	6M	0.794

Note:

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

12.3 Simultaneous Transmission Analysis

	Position	Applicable Combination
Simultaneous Transmission	Body	CDMA1xRTT (data) + WLAN
		CDMA1xEV-DO (data) + WLAN
		LTE (data) + WLAN
		CDMA1xRTT (data) + BT
		CDMA1xEV-DO (data) + BT
		LTE (data) + BT

<Diversity Ant + WLAN with 0cm separation gap>

Position	1xRTT BC0	1xRTT BC1	802.11b/g/n	802.11a/n	Max. SAR Summation	SPSLR	Volume Scan
Bottom Face	0.541	**1.38**	0.503	**0.517**	1.90	**0.14**	No
Secondary Landscape	0.304	**1.34**	0.27	**1.3**	2.64	**0.20**	No
Secondary Portrait	**0.423**	0.23	0	0	0.42	N/A	No
Primary Landscape	0	0	0	0	0	N/A	No
Primary Portrait	0	0	0	0	0	N/A	No

<Main Ant + WLAN with 0cm separation gap>

Position	1xEV-DO BC0	1xEV-DO BC1	LTE	802.11b/g/n	802.11a/n	Max. SAR Summation	SPSLR	Volume Scan
Bottom Face	0.63	0.576	**0.761**	0.503	**0.517**	1.28	N/A	No
Secondary Landscape	0	0	0	0.27	**1.3**	1.3	N/A	No
Secondary Portrait	0	0	0	0	0	0	N/A	No
Primary Landscape	0	0	0	0	0	0	N/A	No
Primary Portrait	0.406	**0.768**	0719	0	0	0.77	N/A	No

<Diversity Ant with 1.4cm separation gap + WLAN with 0cm separation gap>

Position	1xRTT BC0	1xRTT BC1	802.11b/g/n	802.11a/n	Max. SAR Summation	SPSLR	Volume Scan
Bottom Face	0.343	**1.51**	0.503	**0.517**	2.03	**0.15**	No

<Main Ant 0.9cm separation gap + WLAN with 0cm separation gap>

Position	1xEV-DO BC0	1xEV-DO BC1	LTE	802.11b/g/n	802.11a/n	Max. SAR Summation	SPSLR	Volume Scan
Bottom Face	**1.3**	1.16	1.02	0.503	**0.517**	1.82	**0.17**	No

Note:

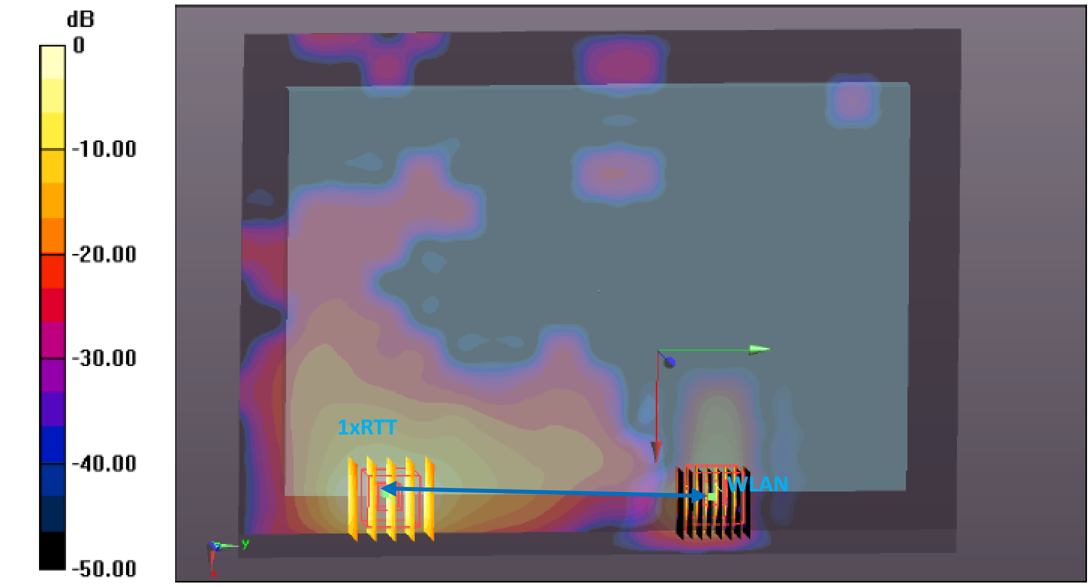
1. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement is not necessary.
2. SPLSR < 0.3, therefore volume scan is not necessary; referring to KDB 447498.
3. 1.4cm and 0.9cm test results are for confirming operation of the power reduction scheme, and are not applicable for compliance demonstration for the FCC tablet PC SAR test procedures.
4. WLAN SAR data at 0mm is applied here, and it will represent more conservative situation than WLAN SAR data at 1.4cm/0.9cm.

Body	Plot	Band	Gap	SAR (W/kg)	SAR peak location (m)			Ant Pair	Peak Distance (cm)	Pair SAR Sum (W/kg)	SPLSR
			cm		X	Y	Z				
Bottom Face	46	802.11a, CH 44	0 cm	0.517	0.081	0.049	-0.177	WLAN	13.8	1.90	0.14
	5	1xRTT BC1 Channel 25	0 cm	1.38	0.0835	-0.0885	-0.175	Div.			
Secondary Landscape	47	802.11a, CH 44	0 cm	1.3	-0.003	0.045	-0.178	WLAN	13.3	2.64	0.20
	7	1xRTT BC1 Channel 25	0 cm	1.34	-0.001	-0.0875	-0.176	Div.			
Bottom Face	46	802.11a, CH 44	0 cm	0.517	0.081	0.049	-0.177	WLAN	13.2	2.03	0.15
	12	1xRTT BC1 Channel 25	1.4 cm	1.51	0.0865	-0.0825	-0.175	Div.			
Bottom Face	46	802.11a, CH 44	0 cm	0.517	0.081	0.049	-0.177	WLAN	10.5	1.82	0.17
	22	1xEV-DO BC0 Channel 1013	0.9 cm	1.3	0.013	0.129	-0.176	Main			

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

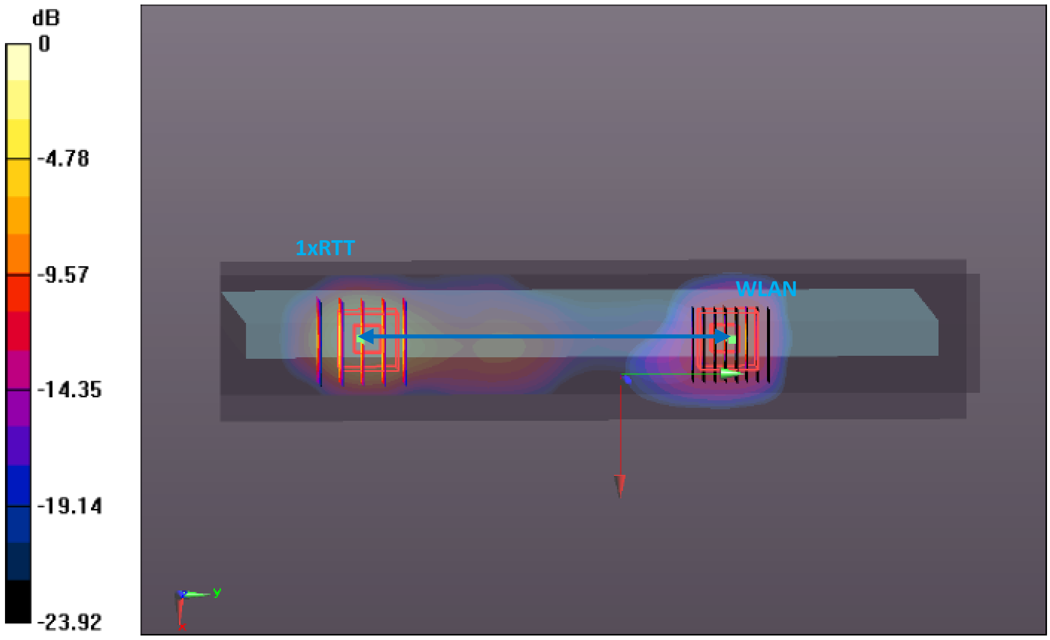
Body – Bottom Face

#46 802.11a, CH 44, 0cm + #05 1xRTT BC1 CH 25, 0cm



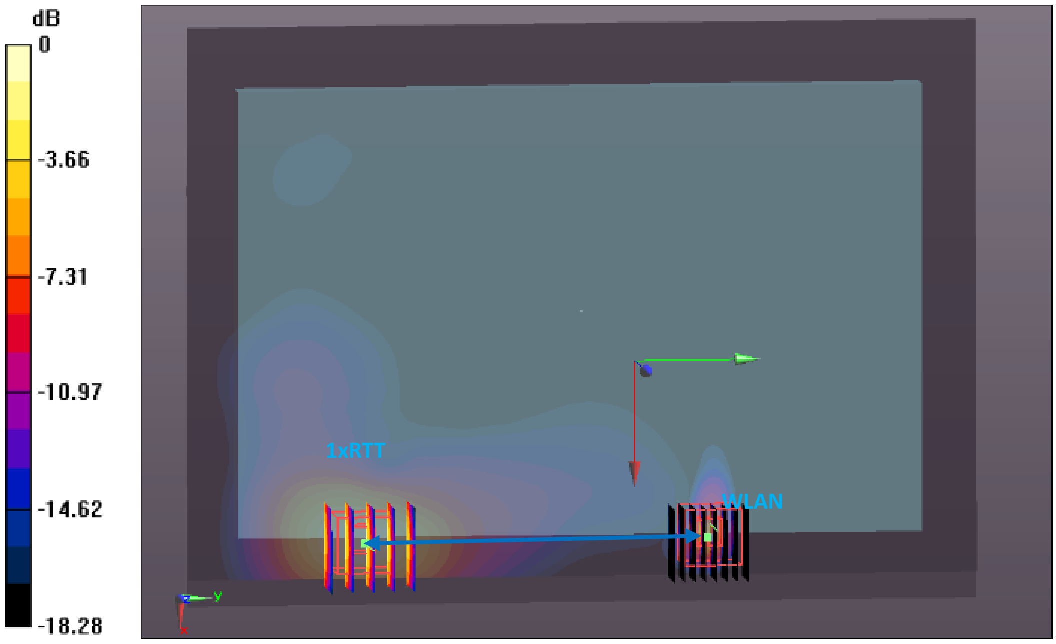
0 dB = 1.150mW/g

Body – Secondary Landscape
#47 802.11a, CH 44, 0cm + #07 1xRTT BC1 CH 25, 0cm



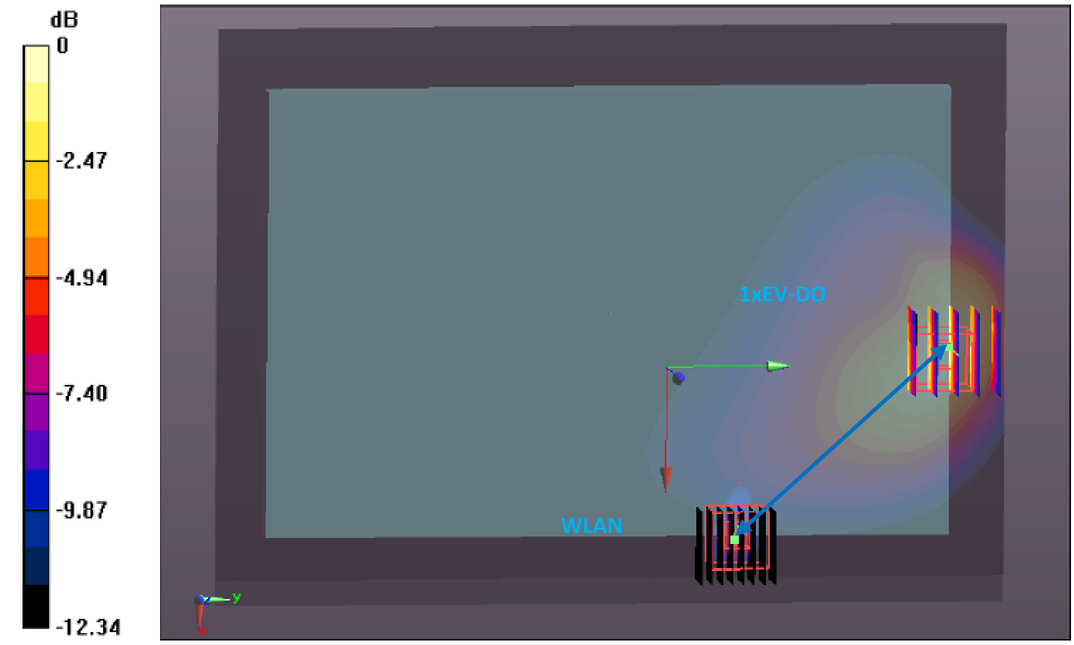
0 dB = 1.560mW/g

Body – Bottom Face
#46 802.11a, CH 44, 0cm + #12 1xRTT BC1 CH 25, 1.4cm



0 dB = 1.640mW/g

Body – Bottom Face
#46 802.11a, CH 44, 0cm + #22 1xEV-DO BC0 CH 1013, 0.9cm



0 dB = 1.420mW/g

Note:

1. SPLSR < 0.3, so volume scan is not necessary; referring to KDB 447498

Test Engineer：Mark Qu

13 References

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

[2] IEEE Std. C95.1-1991, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", 1991

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

[4] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", June 2001

[5] SPEAG DASY System Handbook

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

[7] FCC KDB 447498 D01 v04, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", November 2009

[8] FCC KDB 616217 D03 v01, "SAR Evaluation Considerations for Laptop/Notebook/Netbook and Tablet Computers", November 2009

[9] FCC KDB 941225 D01 v02, "SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA", October 2007

[10] FCC KDB 941225 D05 v01, "SAR Test Considerations for LTE Handsets and Data Modems", December 2010

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.