FCC SAR Test Report

APPLICANT	:	Lenovo (Shanghai) Electronics Technology Co., Ltd.
EQUIPMENT	:	Tablet PC
BRAND NAME	:	lenovo
MODEL NAME	:	60015, 2298
FCC ID	:	O57A2107ATT3G
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 completely tested on Aug. 11, 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

ilac-MRA

TAF
Testing Laboratory
1190

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No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA262503	Rev. 01	Initial issue of report	Aug. 22, 2012

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Lenovo (Shanghai) Electronics Technology Co., Ltd., DUT: Tablet PC, Brand Name: Lenovo, Model Name: 60015, 2298** are as follows.

Highest 1-g SAR Summary

Band	Position	SAR_{1g} (W/kg)
GSM850	Body (Bottom Face with 0cm Gap)	1.07
GSM1900	Body (Primary Portrait / Right Corner at 6° with 0cm Gap)	1.01
WCDMA Band V	Body (Bottom Face with 0cm Gap)	1.08
WCDMA Band II	Body (Primary Portrait / Right Corner at 6° with 0cm Gap)	1.34
WLAN 2.4G	Body (Bottom Face with 0cm Gap)	0.508

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 (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	Lenovo (Shanghai) Electronics Technology Co., Ltd.
Address	No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ, Shanghai, China

2.3 Manufacturer

Company Name	Lenovo (Singapore) Pte Ltd.
Address	151, Lorong Chuan, #02-01, New Tech Park, 556741, Singapore

2.4 Application Details

Date of Start during the Test	Jul. 10, 2012
Date of End during the Test	Aug. 11, 2012

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	Tablet PC
Brand Name	lenovo
Model Name	60015, 2298
FCC ID	O57A2107ATT3G
IMEI	863580010410071
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WLAN2.4G: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz WLAN2.4G: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Maximum Average Output Power to Antenna	GSM850: 32.18 dBm GSM1900: 29.01 dBm WCDMA Band V: 22.82 dBm WCDMA Band II: 22.35 dBm 802.11b: 14.21 dBm 802.11g: 10.28 dBm 802.11n-HT20 (2.4GHz): 10.80 dBm Bluetooth: 5.45 dBm
Antenna Type	WWAN: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna
HW Version	A2-MB-H302-A
SW Version	A2107A_A404_000_002_120612_ATT
Uplink Modulations	GPRS: GMSK EDGE: GMSK / 8PSK WCDMA (Rel 99): QPSK HSDPA (Rel 6, Cat 8): QPSK HSUPA (Rel 6, Cat 6): QPSK 802.11b: DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth V2.1 : GFSK Bluetooth V2.1 EDR : π/4-DQPSK, 8-DPSK Bluetooth V4.0 LE : GFSK
EUT Stage	Identical Prototype
Remark: 1. The above EUT's information was declared by the manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. Voice call is not supported.	

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 D03 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 to 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 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 a continuous transmitting RF signal.

The EUT implements a 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

Exposure Position / Wireless mode	GPRS/EDGE 850	GPRS/EDGE 1900	UMTS Band 5	UMTS Band 2
Bottom Face	#	#	#	#
Primary Landscape	##	##	##	##
Secondary Landscape	##	##	##	##
Primary Portrait	#	#	#	#
Secondary Portrait	##	##	##	##

Remark:

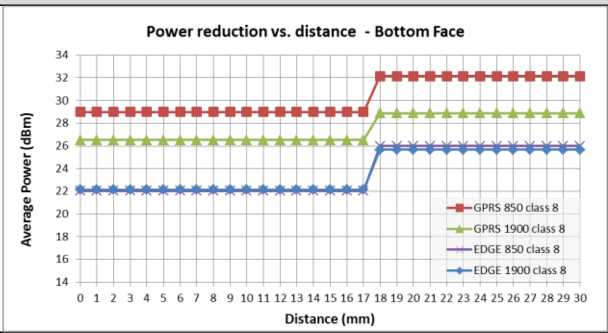
1. #: Reduced maximum limit applied by activation of the proximity sensor.
2. ##: Normal output power without reduction.
3. WLAN and Bluetooth output power are not reduced for SAR compliance.

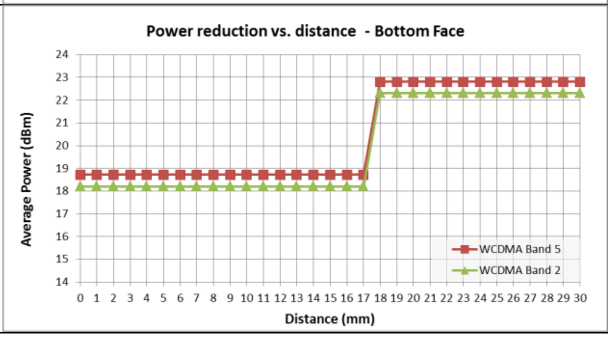
Target Power reduction specifications:

Mode(s) of Operation	GSM850 GPRS(GMSK)	GSM850 EDGE(8PSK)	GSM1900 GPRS(GMSK)	GSM1900 EDGE(8PSK)	UMTS Band 5	UMTS Band 2
Reduction levels (dB)	3	4	3	4	4	4

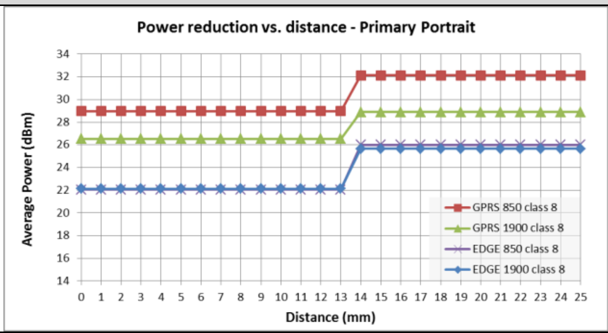
The separation distance of 9mm from Bottom Face, 7mm for Primary Portrait, was chosen to verify the full WWAN output power SAR compliance for the more conservative evaluation condition.

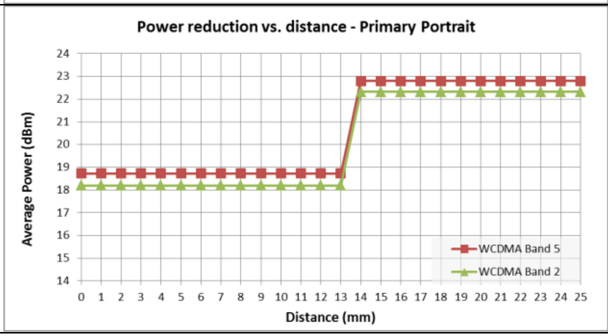
Proximity Sensor for Bottom Face detection





Proximity Sensor for Primary Portrait detection





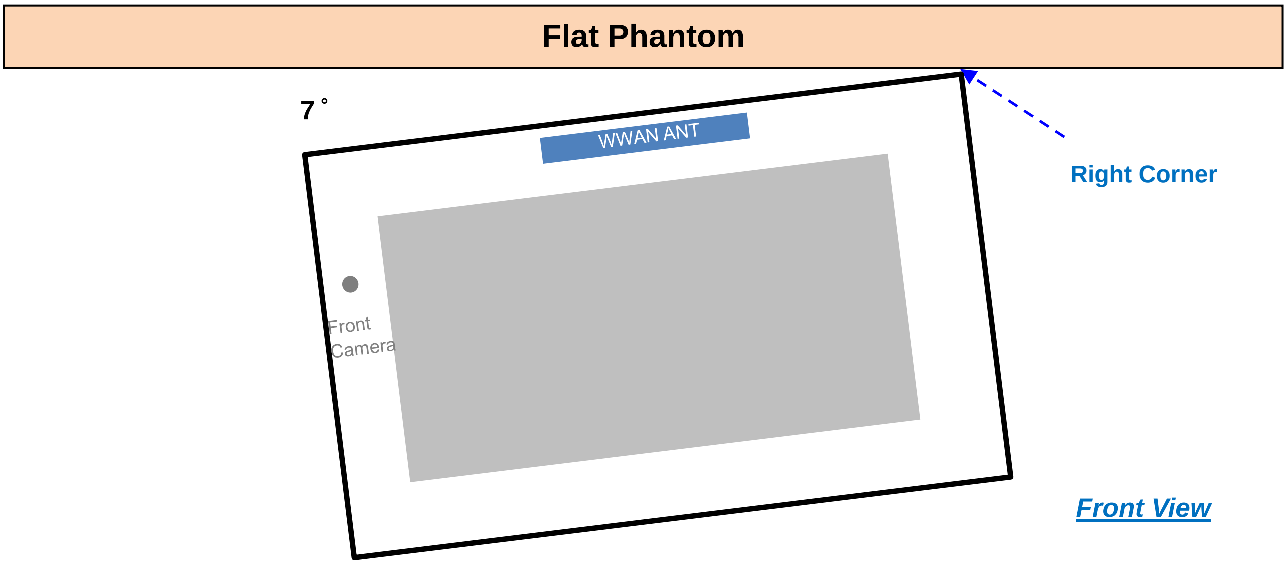
Remark:

1. For GSM 850, GPRS (GMSK) class 8, CH 189. Full power: 32.13dBm, Reduced power: 28.98dBm. The power reduction level is 3.15dB.
2. For GSM 1900, GPRS (GMSK) class 8, CH 661. Full power: 28.89dBm, Reduced power: 26.52dBm. The power reduction level is 2.37dB.
3. For GSM 850, EDGE (8PSK) class 8, CH 189. Full power: 25.99dBm, Reduced power: 22.04dBm. The power reduction level is 3.95dB.
4. For GSM 1900, EDGE (8PSK) class 8, CH 661. Full power: 25.66dBm, Reduced power: 22.13dBm. The power reduction level is 3.53dB.
5. For WCDMA Band V, RMC 12.2K, CH 4182. Full power: 22.80dBm, Reduced power: 18.72dBm. The power reduction level is 4.08dB.
6. For WCDMA Band II, RMC 12.2K, CH 9400. Full power: 22.32dBm, Reduced power: 18.20dBm. The power reduction level is 4.12dB.

Proximity Sensor Status of EUT in tilted operating condition – Primary Portrait / Right Corner

Tilt angle (degree)	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Sensor status	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF

<Proximity Sensor for Primary Portrait / Right Corner detection>



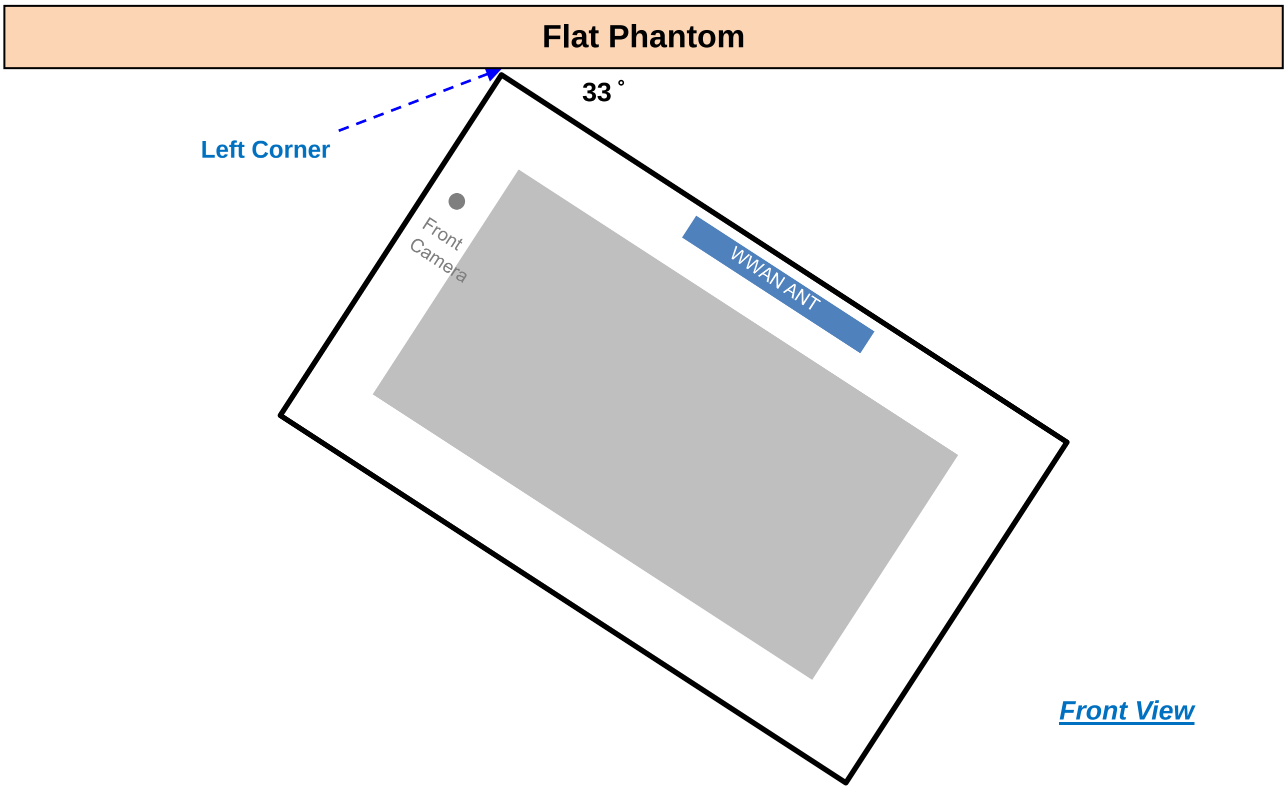
Note:

1. The angle at which proximity sensor start triggering is demonstrated as above drawing. This is the most conservative SAR peak location to user angle.
2. The proximity sensor coverage does not enclose WWAN antenna and SAR peaks, and the additional SAR testing is to ensure compliance. Detailed analysis and justification are included in "Operational Description of power reduction" exhibit.
3. WWAN SAR measurement under this usage condition is performed with full WWAN output power at 6 degrees tilt for more conservative evaluation.

Proximity Sensor Status of EUT in tilted operating condition – Primary Portrait / Left Corner

Tilt angle (degree)	0	5	10	15	20	25	30	31	32	33	34	35	36	38	40
Sensor status	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF

<Proximity Sensor for Primary Portrait / Left Corner detection>



Note:

1. The angle at which proximity sensor start triggering is demonstrated as above drawing. This is the most conservative SAR peak location to user angle.
2. The proximity sensor coverage does not enclose WWAN antenna and SAR peaks, and the additional SAR testing is to ensure compliance. Detailed analysis and justification are included in "Operational Description of power reduction" exhibit.
3. WWAN SAR measurement under this usage condition is performed with full WWAN output power at 32 degrees tilt for more conservative evaluation.

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

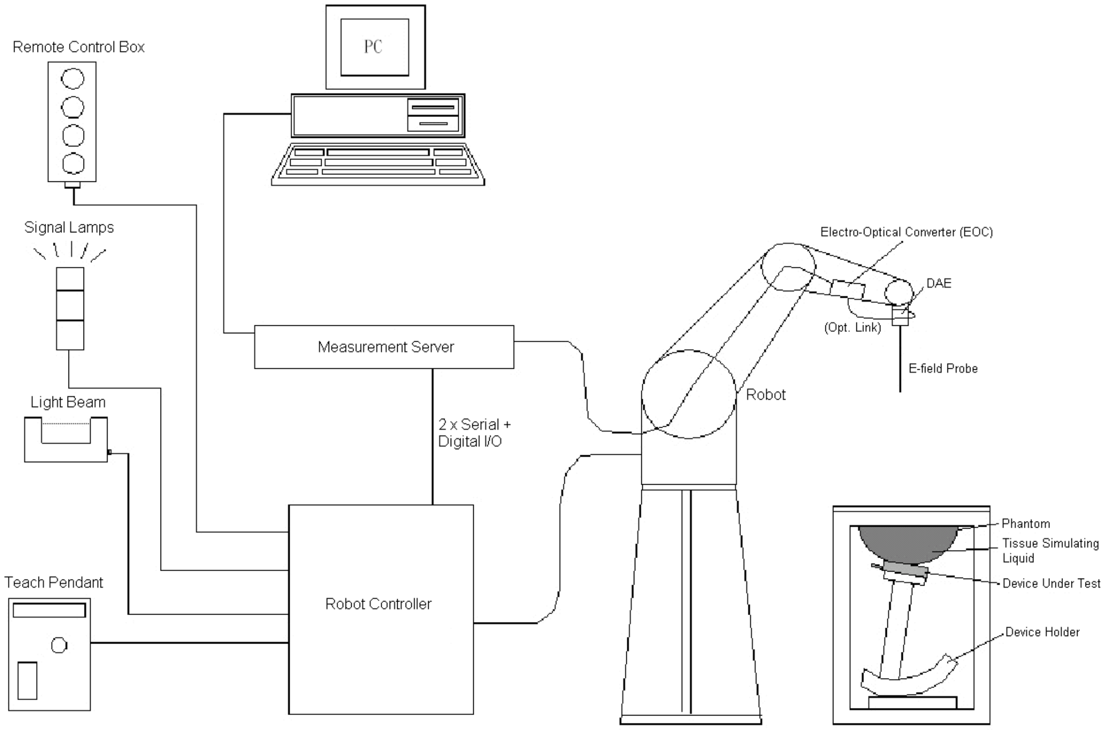


Fig 5.1 SPEAG DASY System Configurations

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 (EOC) 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

<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 pre-amplifier 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 (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 5.4 Photo of DASY5

5.4 Measurement Server

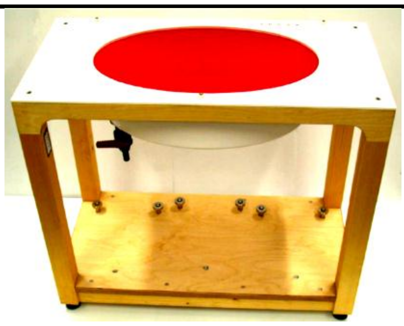
The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter 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 5.5 Photo of Server for DASY5

5.5 Phantom

<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)	 **Fig 5.6 Photo of ELI4 Phantom**
Filling Volume	Approx. 30 liters	
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm	

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.

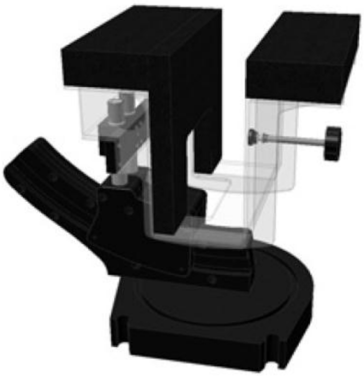


Fig 5.7 Laptop Extension Kit

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	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	736	Jul. 25, 2011	Jul. 24, 2013
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	Dosimetric E-Field Probe	EX3DV4	3857	Jun. 20, 2012	Jun. 19, 2013
SPEAG	ELI4 Phantom	QD OVA 001 BB	1079	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201074235	Nov. 30, 2011	Nov. 29, 2012
Agilent	Wireless Communication Test Set	E5515C	GB47050646	Aug. 18, 2011	Aug. 17, 2012
Agilent	Wireless Communication Test Set	E5515C	MY48367160	Oct. 26, 2011	Oct. 25, 2012
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 13, 2012	Apr. 12, 2013
R&S	Signal Generator	SMR40	100455	Dec. 30, 2011	Dec. 29, 2012
Agilent	Power Meter	E4416A	MY45101555	Aug. 23, 2011	Aug. 22, 2012
Agilent	Power Sensor	E9327A	MY44421198	Aug. 23, 2011	Aug. 22, 2012
R&S	Spectrum Analyzer	FSP30	101399	Jun. 01, 2012	May 31, 2013

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 KDB 450824 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 D2450V2, SN: 736, 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.

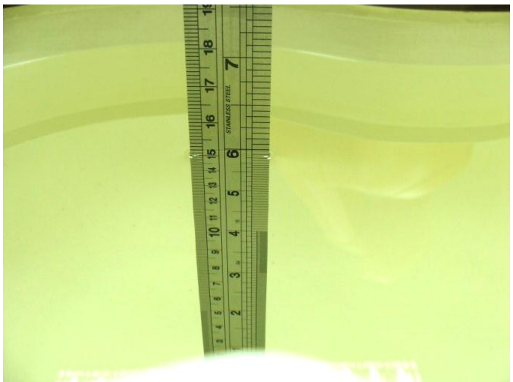


Fig 6.1 Photo of Liquid Height for Head SAR

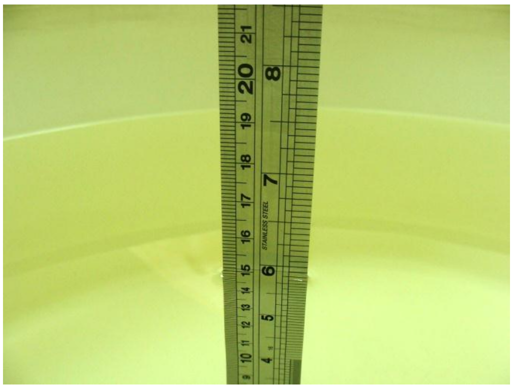


Fig 6.2 Photo of Liquid Height for Body SAR

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								
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

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 measurement 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
835	Body	21.2	0.967	55.405	0.97	55.2	-0.31	0.37	±5	Jul. 16, 2012
835	Body	21.1	0.976	54.369	0.97	55.2	0.62	-1.51	±5	Jul. 30, 2012
1900	Body	21.4	1.58	54.631	1.52	53.3	3.95	2.50	±5	Jul. 17, 2012
1900	Body	21.3	1.542	54.484	1.52	53.3	1.45	2.22	±5	Jul. 30, 2012
1900	Body	21.2	1.535	54.579	1.52	53.3	0.99	2.37	±5	Aug. 11, 2012
2450	Body	21.4	2.002	53.464	1.95	52.7	2.67	1.45	±5	Jul. 30, 2012

Table 6.2 Measuring Results for Simulating Liquid

7. 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.

7.1 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.

7.2 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:

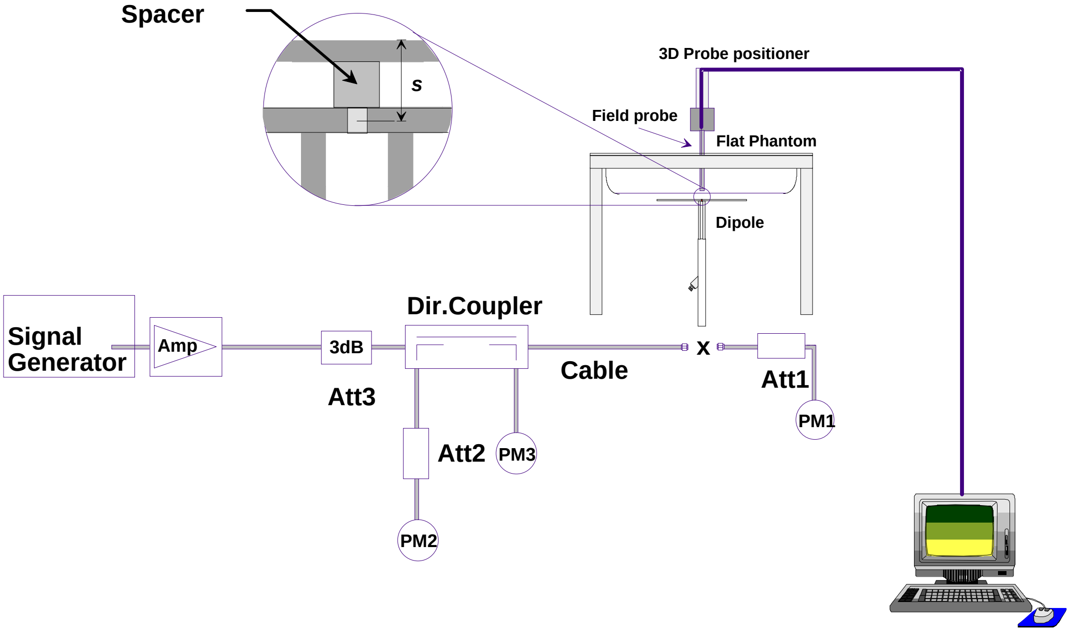


Fig 8.1 System Setup for System Evaluation

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.

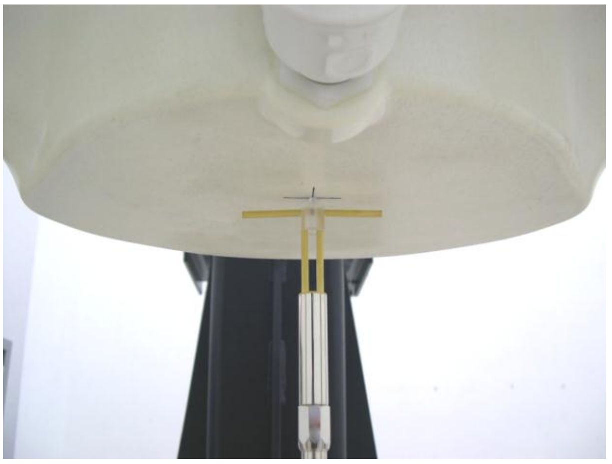


Fig 8.2 Photo of Dipole Setup

7.3 Validation Results

Comparing to the original SAR value provided by SPEAG, the validation data should be within its specification of 10 %. Table 7.1 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 (%)	Limit (%)
Jul. 16, 2012	835	Body	9.42	2.44	9.76	3.61	±10
Jul. 30, 2012	835	Body	9.42	2.34	9.36	-0.64	±10
Jul. 17, 2012	1900	Body	41.8	10.7	42.80	2.39	±10
Jul. 30, 2012	1900	Body	41.8	10.9	43.60	4.31	±10
Aug. 11, 2012	1900	Body	41.8	9.94	39.76	-4.88	±10
Jul. 30, 2012	2450	Body	52.3	13.3	53.20	1.72	±10

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Test Setup Photos

Please refer to Appendix E for the test setup photos.

9. 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 EUT to radiate maximum output power or 100% duty factor (if applicable)
(c) Measure output power through RF cable and power meter.
(d) Place the EUT 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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 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.

9.3 Volume Scan Procedures

The volume scan is used for assessing 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 up correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan using 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 for calculating the multi-band SAR.

9.4 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.

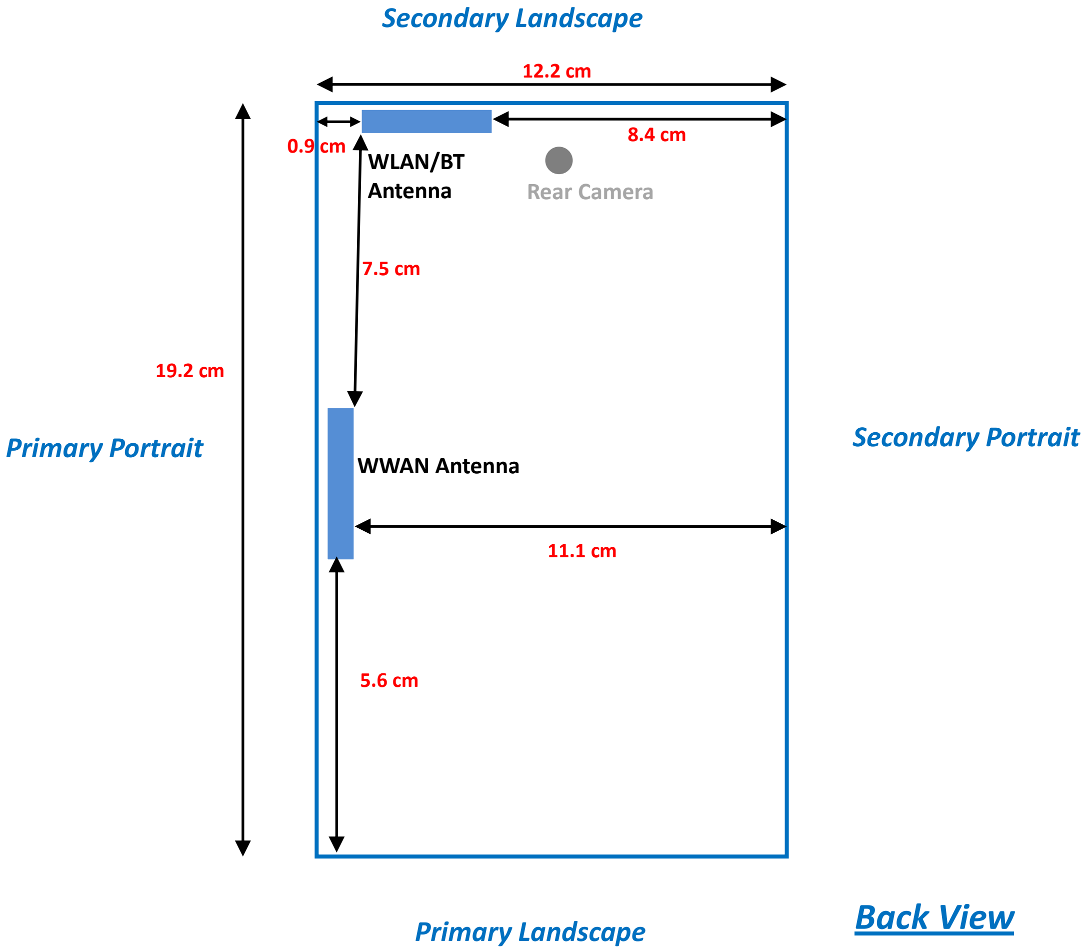
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty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

9.5 Power Drift Monitoring

All SAR testing is under the EUT installed 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 the SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

10. SAR Test Configurations

10.1 Exposure Positions Consideration



Antennas	Wireless Interface
WWAN (Tx/Rx)	GPRS/EDGE 850 GPRS/EDGE 1900 WCDMA Band II WCDMA Band V
WLAN/BT (Tx/Rx)	WiFi 2.4GHz 802.11 b/g/n Bluetooth

Sides for SAR tests; Tablet (> 20cm diagonal)							
Antenna	Technology	Bottom Face	Front Face	Primary Landscape	Secondary Landscape	Primary Portrait	Secondary Portrait
WWAN	GSM/WCDMA	0mm, 9mm	Not Required	Not Required	Not Required	0mm, 7mm, Right Corner at 6°, Left Corner at 32°	Not Required
WLAN/BT	WLAN 2.4GHz	0mm	Not Required	Not Required	0mm	0mm, Right Corner at 6°, Left Corner at 32°	Not Required

Note:

1. Per KDB 941225 D07, the EUT diagonal > 20 cm and Mini-Tablet procedure is not applied. Therefore, SAR tests follow the Tablet Mode in KDB 447498.
2. 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.
3. The power reduction for SAR compliance is triggered by the proximity sensor when the user is closer to the device
4. The proximity sensor is designed to be triggered for Bottom Face and Primary Portrait exposure positions. During SAR tests for EUT other edges, the sensor is disabled via software setting.
5. The tests under a separation of 9 mm at Bottom Face and 7 mm at Primary Portrait are for verifying the conservative condition, whichever EUT proximity sensor activated distance are 17 mm and 13 mm respectively. The EUT is set in full-power mode under these configurations during the test.
6. The test at Primary Portrait Right/Left Corner positions are for verifying the conservative condition when EUT is used under tilt conditions. The EUT is set in full-power mode during the tests.
7. EUT does not support voice call function; therefore GSM voice call SAR is not required.
8. Per KDB 447498 D01, the distance from WLAN antenna to the Secondary Portrait / Primary Landscape edge > 5 cm, therefore the stand-alone SAR in these configurations are not required.
9. Per KDB 447498 D01, the distance from WWAN antenna to the Secondary Portrait / Secondary Landscape / Primary Landscape edge > 5 cm, therefore the stand-alone in these configurations SAR are not required.

10.2 Conducted RF Output Power (Unit: dBm)

<GSM850>

Burst Average Power										
Band	GSM850									Target Reduction (dB)
Channel	128	189	251	128	189	251	128	189	251	
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8	824.2	836.4	848.8	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
GPRS 8 (1 Uplink) CS1	32.10	32.13	32.18	28.95	28.98	29.02	3.15	3.15	3.16	3
GPRS 10 (2 Uplink) CS1	29.09	29.12	29.17	26.03	26.06	26.11	3.06	3.06	3.06	3
GPRS 11 (3 Uplink) CS1	27.36	27.40	27.43	24.28	24.31	24.36	3.08	3.09	3.07	3
GPRS 12 (4 Uplink) CS1	26.09	26.13	26.19	22.99	23.03	23.12	3.10	3.10	3.07	3
EDGE 8 (GMSK, 1 Uplink) MCS1	32.08	32.13	32.17	28.94	28.98	29.02	3.14	3.15	3.15	3
EDGE 10 (GMSK, 2 Uplink) MCS1	29.08	29.12	29.16	26.03	26.05	26.11	3.05	3.07	3.05	3
EDGE 11 (GMSK, 3 Uplink) MCS1	27.35	27.39	27.42	24.28	24.32	24.36	3.07	3.07	3.06	3
EDGE 12 (GMSK, 4 Uplink) MCS1	26.08	26.13	26.10	22.99	23.04	23.08	3.09	3.09	3.02	3
EDGE 8 (8PSK, 1 Uplink) MCS9	26.32	25.99	25.70	22.41	22.04	21.84	3.91	3.95	3.86	4
EDGE 10 (8PSK, 2 Uplink) MCS9	24.76	24.46	24.18	20.84	20.63	20.35	3.92	3.83	3.83	4
EDGE 11 (8PSK, 3 Uplink) MCS9	22.23	21.96	21.69	18.39	18.20	18.03	3.84	3.76	3.66	4
EDGE 12 (8PSK, 4 Uplink) MCS9	22.08	21.80	21.61	18.32	18.18	18.02	3.76	3.62	3.59	4
Source-Based Time-Averaged Power										
Band	GSM850									Target Reduction (dB)
Channel	128	189	251	128	189	251	128	189	251	
Frequency (MHz)	824.2	836.4	848.8	824.2	836.4	848.8	824.2	836.4	848.8	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
GPRS 8 (1 Uplink) CS1	23.10	23.13	23.18	19.95	19.98	20.02	3.15	3.15	3.16	3
GPRS 10 (2 Uplink) CS1	23.09	23.12	23.17	20.03	20.06	20.11	3.06	3.06	3.06	3
GPRS 11 (3 Uplink) CS1	23.10	23.14	23.17	20.02	20.05	20.10	3.08	3.09	3.07	3
GPRS 12 (4 Uplink) CS1	23.09	23.13	23.19	19.99	20.03	20.12	3.10	3.10	3.07	3
EDGE 8 (GMSK, 1 Uplink) MCS1	23.08	23.13	23.17	19.94	19.98	20.02	3.14	3.15	3.15	3
EDGE 10 (GMSK, 2 Uplink) MCS1	23.08	23.12	23.16	20.03	20.05	20.11	3.05	3.07	3.05	3
EDGE 11 (GMSK, 3 Uplink) MCS1	23.09	23.13	23.16	20.02	20.06	20.10	3.07	3.07	3.06	3
EDGE 12 (GMSK, 4 Uplink) MCS1	23.08	23.13	23.10	19.99	20.04	20.08	3.09	3.09	3.02	3
EDGE 8 (8PSK, 1 Uplink) MCS9	17.32	16.99	16.70	13.41	13.04	12.84	3.91	3.95	3.86	4
EDGE 10 (8PSK, 2 Uplink) MCS9	18.76	18.46	18.18	14.84	14.63	14.35	3.92	3.83	3.83	4
EDGE 11 (8PSK, 3 Uplink) MCS9	17.97	17.70	17.43	14.13	13.94	13.77	3.84	3.76	3.66	4
EDGE 12 (8PSK, 4 Uplink) MCS9	19.08	18.80	18.61	15.32	15.18	15.02	3.76	3.62	3.59	4

Remark: The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method is shown as below:
Source based time averaged power = Maximum burst averaged power (1 Uplink) - 9 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) - 6 dB
Source based time averaged power = Maximum burst averaged power (3 Uplink) - 4.26 dB
Source based time averaged power = Maximum burst averaged power (4 Uplink) - 3 dB

Note:

1. Following KDB 941225 D03, for Body SAR testing, the EUT was set in GPRS 12 for full power GSM850 and set in GPRS 12 for reduction power GSM850 due to its highest source-based time-average power.
2. Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
3. EDGE tests with MCS1 setting, GMSK modulation. Burst average power with MCS9 setting 8 PSK modulations are provided voluntary for reference.

<GSM1900>

Burst Average Power										
Band	GSM1900									Target Reduction (dB)
Channel	512	661	810	512	661	810	512	661	810	
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8	1850.2	1880	1909.8	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
GPRS 8 (1 Uplink) CS1	29.01	28.89	28.77	26.63	26.52	26.40	2.38	2.37	2.37	3
GPRS 10 (2 Uplink) CS1	28.52	28.41	28.30	26.18	26.07	25.96	2.34	2.34	2.34	3
GPRS 11 (3 Uplink) CS1	25.59	25.50	25.38	22.70	22.59	22.47	2.89	2.91	2.91	3
GPRS 12 (4 Uplink) CS1	25.58	25.50	25.38	22.71	22.61	22.48	2.87	2.89	2.90	3
EDGE 8 (GMSK, 1 Uplink) MCS1	29.00	28.91	28.81	26.63	26.52	26.41	2.37	2.39	2.40	3
EDGE 10 (GMSK, 2 Uplink) MCS1	28.55	28.44	28.33	26.18	26.06	25.96	2.37	2.38	2.37	3
EDGE 11 (GMSK, 3 Uplink) MCS1	25.57	25.53	25.43	22.71	22.60	22.47	2.86	2.93	2.96	3
EDGE 12 (GMSK, 4 Uplink) MCS1	25.56	25.53	25.42	22.71	22.61	22.48	2.85	2.92	2.94	3
EDGE 8 (8PSK, 1 Uplink) MCS9	25.53	25.66	25.70	22.01	22.13	22.12	3.52	3.53	3.58	4
EDGE 10 (8PSK, 2 Uplink) MCS9	23.35	23.51	23.56	19.86	19.93	19.98	3.49	3.58	3.58	4
EDGE 11 (8PSK, 3 Uplink) MCS9	21.02	21.17	21.36	17.71	17.72	17.71	3.31	3.45	3.65	4
EDGE 12 (8PSK, 4 Uplink) MCS9	21.01	21.70	21.09	17.54	17.60	17.54	3.47	4.10	3.55	4
Source-Based Time-Averaged Power										
Band	GSM1900									Target Reduction (dB)
Channel	512	661	810	512	661	810	512	661	810	
Frequency (MHz)	1850.2	1880	1909.8	1850.2	1880	1909.8	1850.2	1880	1909.8	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
GPRS 8 (1 Uplink) CS1	20.01	19.89	19.77	17.63	17.52	17.40	2.38	2.37	2.37	3
GPRS 10 (2 Uplink) CS1	22.52	22.41	22.30	20.18	20.07	19.96	2.34	2.34	2.34	3
GPRS 11 (3 Uplink) CS1	21.33	21.24	21.12	18.44	18.33	18.21	2.89	2.91	2.91	3
GPRS 12 (4 Uplink) CS1	22.58	22.50	22.38	19.71	19.61	19.48	2.87	2.89	2.90	3
EDGE 8 (GMSK, 1 Uplink) MCS1	20.00	19.91	19.81	17.63	17.52	17.41	2.37	2.39	2.40	3
EDGE 10 (GMSK, 2 Uplink) MCS1	22.55	22.44	22.33	20.18	20.06	19.96	2.37	2.38	2.37	3
EDGE 11 (GMSK, 3 Uplink) MCS1	21.31	21.27	21.17	18.45	18.34	18.21	2.86	2.93	2.96	3
EDGE 12 (GMSK, 4 Uplink) MCS1	22.56	22.53	22.42	19.71	19.61	19.48	2.85	2.92	2.94	3
EDGE 8 (8PSK, 1 Uplink) MCS9	16.53	16.66	16.70	13.01	13.13	13.12	3.52	3.53	3.58	4
EDGE 10 (8PSK, 2 Uplink) MCS9	17.35	17.51	17.56	13.86	13.93	13.98	3.49	3.58	3.58	4
EDGE 11 (8PSK, 3 Uplink) MCS9	16.76	16.91	17.10	13.45	13.46	13.45	3.31	3.45	3.65	4
EDGE 12 (8PSK, 4 Uplink) MCS9	18.01	18.70	18.09	14.54	14.60	14.54	3.47	4.10	3.55	4

Remark: The source-based time-averaged power is linearly scaled the maximum burst averaged power based on time slots. The calculated method is shown as below:
Source based time averaged power = Maximum burst averaged power (1 Uplink) - 9 dB
Source based time averaged power = Maximum burst averaged power (2 Uplink) - 6 dB
Source based time averaged power = Maximum burst averaged power (3 Uplink) - 4.26 dB
Source based time averaged power = Maximum burst averaged power (4 Uplink) - 3 dB

Note:

1. Following KDB 941225 D03, for Body SAR testing, the EUT was set in GPRS 12 for full power GSM1900 and set in GPRS 10 for reduction power GSM1900 due to its highest source-based time-average power.
2. Per KDB 447498, the maximum output power channel is used for SAR testing and for further SAR test reduction.
3. EDGE tests with MCS1 setting, GMSK modulation. Burst average power with MCS9 setting 8 PSK modulations are provided voluntary for reference.

<WCDMA Band V>

Band	WCDMA Band V									Target Reduction (dB)
Channel	4132	4182	4233	4132	4182	4233	4132	4182	4233	
Frequency (MHz)	826.4	836.4	846.6	826.4	836.4	846.6	826.4	836.4	846.6	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
RMC 12.2K	22.82	22.80	22.67	18.73	18.72	18.63	4.09	4.08	4.04	4
HSDPA Subtest-1	22.81	22.80	22.69	18.71	18.70	18.62	4.10	4.10	4.07	4
HSDPA Subtest-2	21.78	21.76	21.64	17.72	17.71	17.63	4.06	4.05	4.01	4
HSDPA Subtest-3	21.32	21.30	21.18	17.24	17.22	17.13	4.08	4.08	4.05	4
HSDPA Subtest-4	21.28	21.28	21.14	17.23	17.21	17.12	4.05	4.07	4.02	4
HSUPA Subtest-1	21.81	21.81	21.72	17.81	17.74	17.67	4.00	4.07	4.05	4
HSUPA Subtest-2	19.88	19.86	19.81	15.79	15.75	15.76	4.09	4.11	4.05	4
HSUPA Subtest-3	20.77	20.75	20.66	16.70	16.67	16.66	4.07	4.08	4.00	4
HSUPA Subtest-4	20.92	20.85	20.76	16.83	16.76	16.67	4.09	4.09	4.09	4
HSUPA Subtest-5	21.75	21.68	21.58	17.57	17.49	17.57	4.18	4.19	4.01	4

Note:
1. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/HSUPA output power is < 1/4 dB higher than RMC and SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA and HSUPA SAR evaluation can be excluded.
2. By design, HSDPA/HSUPA RF power will not be larger than RMC12.2kbps; detailed information is included in Tune-up Procedure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in the tune-up procedure exhibit.

<WCDMA Band II>

Band	WCDMA Band II									Target Reduction (dB)
Channel	9262	9400	9538	9262	9400	9538	9262	9400	9538	
Frequency (MHz)	1852.4	1880.0	1907.6	1852.4	1880.0	1907.6	1852.4	1880.0	1907.6	
Mode	Without Power Back-off			With Power Back-off			Pwr. Reduction (dB)			
RMC 12.2K	22.27	22.32	22.35	18.07	18.20	18.25	4.20	4.12	4.10	4
HSDPA Subtest-1	22.28	22.32	22.34	18.08	18.18	18.24	4.20	4.14	4.10	4
HSDPA Subtest-2	21.23	21.38	21.37	17.14	17.26	17.32	4.09	4.12	4.05	4
HSDPA Subtest-3	20.80	20.92	20.91	16.68	16.79	16.85	4.12	4.13	4.06	4
HSDPA Subtest-4	20.75	20.88	20.89	16.65	16.79	16.84	4.10	4.09	4.05	4
HSUPA Subtest-1	21.21	21.22	21.16	17.02	17.12	17.04	4.19	4.10	4.12	4
HSUPA Subtest-2	19.33	19.40	19.46	15.16	15.25	15.38	4.17	4.15	4.08	4
HSUPA Subtest-3	20.13	20.20	20.36	16.05	16.10	16.30	4.08	4.10	4.06	4
HSUPA Subtest-4	20.38	20.43	20.43	16.28	16.25	16.34	4.10	4.18	4.09	4
HSUPA Subtest-5	21.12	21.18	21.31	17.01	17.05	17.29	4.11	4.13	4.02	4

Note:
1. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/HSUPA output power is < 1/4 dB higher than RMC and SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA and HSUPA SAR evaluation can be excluded.
2. By design, HSDPA/HSUPA RF power will not be larger than RMC12.2kbps; detailed information is included in Tune-up Procedure exhibit.
3. It is expected by the manufacturer that MPR for some HSDPA/HSUPA subtests may differ from the specification of 3GPP, according to the chipset implementation in this model. The implementation and expected deviation are detailed in the tune-up procedure exhibit.

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average power (dBm)			
			Data Rate (bps)			
			1M	2M	5.5M	11M
802.11b	CH 01	2412	13.13	13.17	13.36	13.48
	CH 06	2437	13.87	13.51	14.06	14.21
	CH 11	2462	13.27	13.01	13.48	13.55

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			Data Rate (bps)							
			6M	9M	12M	18M	24M	36M	48M	54M
802.11g	CH 01	2412	9.62	9.65	10.11	9.88	9.85	10.19	10.22	10.24
	CH 06	2437	9.88	10.06	9.98	10.07	10.15	10.16	10.23	10.28
	CH 11	2462	9.82	9.90	9.96	10.03	10.15	10.03	10.09	10.18

Mode	Channel	Frequency (MHz)	Average power (dBm)							
			MCS Index							
			MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
802.11n HT20	CH 01	2412	10.23	10.32	10.43	9.90	10.46	10.57	10.50	10.60
	CH 06	2437	10.55	10.12	10.24	10.19	10.20	10.71	10.78	10.80
	CH 11	2462	9.90	9.97	10.03	10.02	10.11	10.21	10.16	10.27

Note:

1. Per KDB 248227, choose the lowest data rate, highest output power channel to test SAR and determine further SAR exclusion; CH6 1Mbps was chosen
2. Per KDB 248227, 11g and 11n-HT20 output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.
3. Per KDB 248227, due to the 11b higher data rates average output power is more than 1/4 dB higher than the lowest data rate, thus the 11b 11M (bps) data rate was verified in the worst case that obtain from the lowest data rate SAR testing.

<Bluetooth>

Bluetooth			
Channel	0	39	78
Frequency (MHz)	2402	2441	2480
Average Power	4.49	4.86	5.45

Note: Per KDB 447498, Bluetooth SAR is excluded due to highest output power ≤ 60/f (GHz) mW, where 60/f (GHz) mW = 24mW = 13.8dBm.

11. SAR Test Results

11.1 Test Records for Body SAR Test

<GSM>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Reduction Levels (dB)	Burst Average Power (dBm)	Power Drift (dB)	SAR_{1g} (W/kg)
1	**GSM850**	**GPRS12**	**Bottom Face**	**0**	**251**	**848.8**	**3.07**	**23.12**	**0.01**	**1.07**
6	GSM850	GPRS12	Bottom Face	0	128	824.2	3.10	22.99	0.11	1.01
7	GSM850	GPRS12	Bottom Face	0	189	836.4	3.10	23.03	0.10	1.06
2	GSM850	GPRS12	Primary Portrait	0	251	848.8	3.07	23.12	-0.05	0.601
3	GSM850	GPRS12	Bottom Face	0.9	251	848.8	0	26.19	-0.07	1.01
8	GSM850	GPRS12	Bottom Face	0.9	128	824.2	0	26.09	-0.05	0.793
9	GSM850	GPRS12	Bottom Face	0.9	189	836.4	0	26.13	-0.05	0.933
4	GSM850	GPRS12	Primary Portrait	0.7	251	848.8	0	26.19	-0.07	0.835
39	GSM850	GPRS12	Primary Portrait	0.7	128	824.2	0	26.09	-0.05	0.674
40	GSM850	GPRS12	Primary Portrait	0.7	189	836.4	0	26.13	-0.06	0.803
5	GSM850	GPRS12	Primary Portrait / Right Corner at 6°	0	251	848.8	0	26.19	-0.06	0.576
45	GSM850	GPRS12	Primary Portrait / Left Corner at 32°	0	251	848.8	0	26.19	0.02	0.089
10	GSM1900	GPRS10	Bottom Face	0	512	1850.2	2.34	26.18	0.04	0.739
11	GSM1900	GPRS10	Primary Portrait	0	512	1850.2	2.34	26.18	-0.12	0.608
12	GSM1900	GPRS12	Bottom Face	0.9	512	1850.2	0	25.58	0.18	0.337
13	GSM1900	GPRS12	Primary Portrait	0.7	512	1850.2	0	25.58	0.09	0.425
14	GSM1900	GPRS12	Primary Portrait / Right Corner at 6°	0	512	1850.2	0	25.58	-0.02	0.849
15	**GSM1900**	**GPRS12**	**Primary Portrait / Right Corner at 6°**	**0**	**661**	**1880**	**0**	**25.50**	**-0.04**	**1.01**
16	GSM1900	GPRS12	Primary Portrait / Right Corner at 6°	0	810	1909.8	0	25.38	-0.08	0.997
46	GSM1900	GPRS12	Primary Portrait / Left Corner at 32°	0	512	1850.2	0	25.58	-0.14	0.088

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.

<WCDMA>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Reduction Levels (dB)	Average Power (dBm)	Power Drift (dB)	SAR_{1g} (W/kg)
19	**WCDMA V**	**RMC12.2K**	**Bottom Face**	**0**	**4132**	**826.4**	**4.09**	**18.73**	**0.15**	**1.08**
24	WCDMA V	RMC12.2K	Bottom Face	0	4182	836.4	4.08	18.72	0.12	1.06
25	WCDMA V	RMC12.2K	Bottom Face	0	4233	846.6	4.04	18.63	0.03	1.02
20	WCDMA V	RMC12.2K	Primary Portrait	0	4132	826.4	4.09	18.73	-0.01	0.753
21	WCDMA V	RMC12.2K	Bottom Face	0.9	4132	826.4	0	22.82	-0.02	0.893
26	WCDMA V	RMC12.2K	Bottom Face	0.9	4182	836.4	0	22.80	-0.03	1.02
27	WCDMA V	RMC12.2K	Bottom Face	0.9	4233	836.6	0	22.67	-0.04	1.02
22	WCDMA V	RMC12.2K	Primary Portrait	0.7	4132	826.4	0	22.82	-0.05	0.857
28	WCDMA V	RMC12.2K	Primary Portrait	0.7	4182	836.4	0	22.80	-0.04	0.942
29	WCDMA V	RMC12.2K	Primary Portrait	0.7	4233	836.6	0	22.67	-0.04	0.945
23	WCDMA V	RMC12.2K	Primary Portrait / Right Corner at 6°	0	4132	826.4	0	22.82	-0.04	0.633
47	WCDMA V	RMC12.2K	Primary Portrait / Left Corner at 32°	0	4132	826.4	0	22.82	0.0045	0.062
30	WCDMA II	RMC12.2K	Bottom Face	0	9538	1907.6	4.10	18.25	0.01	0.943
35	WCDMA II	RMC12.2K	Bottom Face	0	9262	1852.4	4.20	18.07	0.14	1.04
36	WCDMA II	RMC12.2K	Bottom Face	0	9400	1880	4.12	18.20	0.14	1.06
31	WCDMA II	RMC12.2K	Primary Portrait	0	9538	1907.6	4.10	18.25	-0.06	0.736
32	WCDMA II	RMC12.2K	Bottom Face	0.9	9538	1907.6	0	22.35	-0.03	0.573
33	WCDMA II	RMC12.2K	Primary Portrait	0.7	9538	1907.6	0	22.35	-0.02	0.712
34	WCDMA II	RMC12.2K	Primary Portrait / Right Corner at 6°	0	9538	1907.6	0	22.35	-0.02	1.22
37	WCDMA II	RMC12.2K	Primary Portrait / Right Corner at 6°	0	9262	1852.4	0	22.27	-0.03	1.29
38	**WCDMA II**	**RMC12.2K**	**Primary Portrait / Right Corner at 6°**	**0**	**9400**	1880	**0**	**22.32**	**-0.07**	**1.34**
48	WCDMA II	RMC12.2K	Primary Portrait / Left Corner at 32°	0	9538	1907.6	0	22.35	-0.09	0.043

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.

<WLAN>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Data Rate	Average Power (dBm)	Power Drift (dB)	SAR_{1g} (W/kg)
41	**WLAN2.4G**	**802.11b**	**Bottom Face**	**0**	**6**	**2437**	**1**	**13.87**	**0**	**0.508**
42	WLAN2.4G	802.11b	Primary Portrait	0	6	2437	1	13.87	0.06	0.045
43	WLAN2.4G	802.11b	Secondary Landscape	0	6	2437	1	13.87	-0.02	0.286
44	WLAN2.4G	802.11b	Primary Portrait / Right Corner at 6°	0	6	2437	1	13.87	0.01	0.016
49	WLAN2.4G	802.11b	Primary Portrait / Left Corner at 32°	0	6	2437	1	13.87	-0.08	0.043
50	WLAN2.4G	802.11b	Bottom Face	0	6	2437	11	14.21	0.009	0.468

Note:

1. Per KDB 248227, if the highest output channel SAR for each exposure position ≤ 0.8 W/kg other channels SAR tests are not necessary.

11.2 Simultaneous Transmission SAR Analysis and Measurements

No.	Applicable Simultaneous Transmission Combination
1.	WWAN (data) + BT (data)
2.	WWAN (data) + WLAN 2.4G (data)

Simultaneous Transmission SAR						
Exposure Position	Bottom Face	Front Face	Secondary Landscape	Primary Landscape	Primary Portrait	Secondary Portrait
GSM/WCDMA With power reduction enable by the P-sensor	0mm	Not Required	Not Required	Not Required	0mm	Not Required
WLAN 2.4GHz	0mm	Not Required	Not Required	Not Required	0mm	Not Required
GSM/WCDMA Without power reduction enable by the P-sensor	9mm	Not Required	Not Required	Not Required	7mm, Right Corner at 6°, Left Corner at 32°	Not Required
WLAN 2.4GHz	0mm	Not Required	Not Required	Not Required	0mm, Right Corner at 6°, Left Corner at 32°	Not Required

Note:

1. WLAN and BT share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either GSM or WCDMA according to the network signal condition, therefore, they cannot transmit simultaneously.
3. For SAR summation (WWAN Ant. + WLAN Ant.) at Bottom Face 9mm distance, WLAN SAR data at 0mm is applied, since it can represent a more conservative situation than WLAN SAR data at 9mm.
4. For SAR summation (WWAN Ant. + WLAN Ant.) at Primary Portrait, 7mm distance, WLAN SAR data at 0mm is applied, since it can represent a more conservative situation than WLAN SAR data at 7mm.
5. Per KDB 447498, since Bluetooth average power is less than 60/f (13.8 dBm), standalone SAR is excluded, and is considered zero in the 1-g SAR summation process.

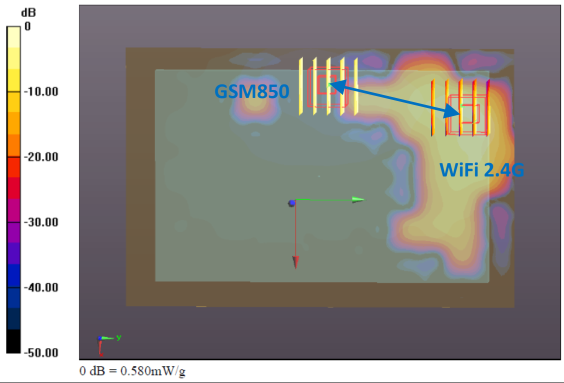
	WWAN			WLAN			Scaled WWAN				Scaled WLAN				
Position	WWAN Band	Plot No	Max. WWAN SAR (W/kg)	Plot No	Max. WLAN SAR (W/kg)	Max. SAR Sum	Average Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled WWAN (W/kg)	Average Power (dBm)	Tune-up Limit (dBm)	Scaling Factor	Scaled WLAN (W/kg)	Scaled WWAN + Scaled WLAN
Bottom Face At 0cm	GSM850	#01	1.07	#41	0.508	**1.58**	23.12	23.5	1.091	1.168	13.87	14.5	1.156	0.587	**1.76**
	GSM1900	#10	0.739	#41	0.508	**1.25**	26.18	26.5	1.076	0.796	13.87	14.5	1.156	0.587	1.38
	WCDMA V	#19	1.08	#41	0.508	**1.59**	18.73	19.5	1.194	1.290	13.87	14.5	1.156	0.587	**1.88**
	WCDMA II	#36	1.06	#41	0.508	**1.57**	18.20	18.5	1.072	1.136	13.87	14.5	1.156	0.587	**1.72**
Primary Portrait At 0cm	GSM850	#02	0.601	#42	0.045	**0.65**	23.12	23.5	1.091	0.656	13.87	14.5	1.156	0.052	0.71
	GSM1900	#11	0.608	#42	0.046	**0.65**	26.18	26.5	1.076	0.654	13.87	14.5	1.156	0.053	0.71
	WCDMA V	#20	0.753	#42	0.045	**0.80**	18.73	19.5	1.194	0.899	13.87	14.5	1.156	0.052	0.95
	WCDMA II	#31	0.736	#42	0.045	**0.78**	18.25	18.5	1.059	0.780	13.87	14.5	1.156	0.052	0.83
Bottom Face At 0.9cm	GSM850	#03	1.01	#41	0.508	**1.52**	26.19	26.5	1.074	1.085	13.87	14.5	1.156	0.587	**1.67**
	GSM1900	#12	0.337	#41	0.508	**0.85**	25.58	26.5	1.236	0.417	13.87	14.5	1.156	0.587	1.00
	WCDMA V	#27	1.02	#41	0.508	**1.53**	22.67	23.5	1.211	1.235	13.87	14.5	1.156	0.587	**1.82**
	WCDMA II	#32	0.573	#41	0.508	**1.08**	22.35	22.5	1.035	0.593	13.87	14.5	1.156	0.587	1.18
Primary Portrait At 0.7cm	GSM850	#04	0.835	#42	0.045	**0.88**	26.19	26.5	1.074	0.897	13.87	14.5	1.156	0.052	0.95
	GSM1900	#13	0.425	#42	0.046	**0.47**	25.58	26.5	1.236	0.525	13.87	14.5	1.156	0.053	0.58
	WCDMA V	#29	0.945	#42	0.045	**0.99**	22.67	23.5	1.211	1.144	13.87	14.5	1.156	0.052	1.20
	WCDMA II	#33	0.712	#42	0.045	**0.76**	22.35	22.5	1.035	0.737	13.87	14.5	1.156	0.052	0.79
Primary Portrait Right Corner at 6°	GSM850	#05	0.576	#44	0.016	**0.59**	26.19	26.5	1.074	0.619	13.87	14.5	1.156	0.018	0.64
	GSM1900	#15	1.01	#44	0.0158	**1.03**	25.50	26.5	1.259	1.272	13.87	14.5	1.156	0.018	1.29
	WCDMA V	#23	0.633	#44	0.016	**0.65**	22.82	23.5	1.169	0.740	13.87	14.5	1.156	0.018	0.76
	WCDMA II	#38	1.34	#44	0.016	**1.36**	22.32	22.5	1.042	1.397	13.87	14.5	1.156	0.018	1.42
Primary Portrait Left Corner at 32°	GSM850	#45	0.089	#49	0.043	**0.13**	26.19	26.5	1.074	0.096	13.87	14.5	1.156	0.050	0.15
	GSM1900	#46	0.088	#49	0.043	**0.13**	25.58	26.5	1.236	0.109	13.87	14.5	1.156	0.050	0.16
	WCDMA V	#47	0.062	#49	0.043	**0.09**	22.82	23.5	1.169	0.073	13.87	14.5	1.156	0.050	0.12
	WCDMA II	#48	0.043	#49	0.043	**0.09**	22.35	22.5	1.035	0.045	13.87	14.5	1.156	0.050	0.10

Note:

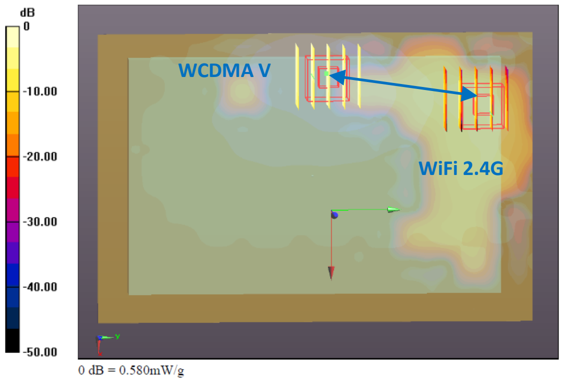
1. The maximum SAR summation is calculated based on the same configuration and test position.
2. When stand-alone 1-g SAR is not required for a transmitter or antenna, its SAR is considered zero in the 1-g SAR summation process to determine simultaneous transmission SAR evaluation requirements
3. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement is not necessary.
4. If 1g-SAR scalar summation ≥ 1.6W/kg, SPLSR calculation is necessary.
5. The maximum rated power of WWAN is listed in "Tune-Up Procedure" exhibit, and the maximum rated power of WLAN is listed in "Operational Description" exhibit; The scaling factor is calculated according to the difference between measured output power and maximum tolerance power on this device.

11.3 Simultaneous analysis - SPLSR calculation

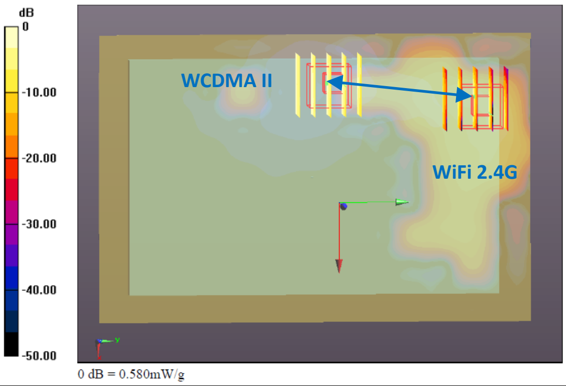
Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (cm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
					X	Y	Z				
01	GSM850	Bottom Face	1.168	0	-0.054	0.0075	-0.175	8.7	1.76	0.20	Not required
41	WLAN 2.4G		0.587	0	-0.034	0.092	-0.175				



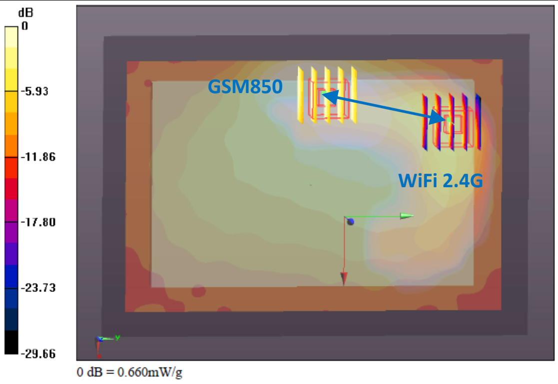
Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (cm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
					X	Y	Z				
19	WCDMA V	Bottom Face	1.290	0	-0.054	-0.0005	-0.175	9.5	1.88	0.20	Not required
41	WLAN 2.4G		0.587	0	-0.034	0.092	-0.175				



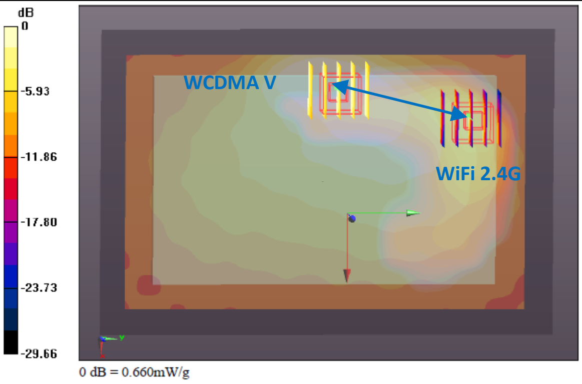
Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m)			3D distance (cm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
					X	Y	Z				
36	WCDMA II	Bottom Face	1.136	0	-0.0495	0.0155	-0.174	7.8	1.72	0.22	Not required
41	WLAN 2.4G		0.587	0	-0.034	0.092	-0.175				



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				
03	GSM850	Bottom Face	1.085	0.9	-0.0555	0.0075	-0.175	8.7	1.67	0.19	Not required
41	WLAN 2.4G		0.587	0	-0.034	0.092	-0.175				



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				
27	WCDMA V	Bottom Face	1.235	0.9	-0.0555	-0.0005	-0.175	9.5	1.82	0.19	Not required
41	WLAN 2.4G		0.587	0	-0.034	0.092	-0.175				



Note: Per KDB 447498, if SPLSR < 0.3, simultaneously transmission SAR is not necessary.

12. 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 12.1

Uncertainty Distributions	Normal	Rectangular	Triangular	U-Shape
Multiplying 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 12.1 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 purposes of this document, a coverage factor two is used, which corresponds to a confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables:

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

Table 12.2 Uncertainty Budget of DASY for frequency range 300 MHz to 3 GHz

Test Engineer： Fulu Hu

13. References

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

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

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

[4] 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 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE”, December 2008

[11] FCC KDB 941225 D04 v01, “Evaluating SAR for GSM/(E)GPRS Dual Transfer Mode”, January 27 2010

[12] FCC KDB 941225 D05 v01, “SAR Test Considerations for LTE Handsets and Data Modems”, December 2010

[13] FCC KDB 941225 D07 01, "SAR Evaluation Procedure for UMPC Mini-Tablet Devices", April 2011

[14] FCC KDB 388624 D02, "Permit But Ask List", December 2011.

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.