FCC SAR Test Report

APPLICANT	:	DELL
EQUIPMENT	:	Tablet PC
BRAND NAME	:	Dell
MODEL NAME	:	J42A
FCC ID	:	E2KJ42AW
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 Jan. 18, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA311130	Rev. 01	Initial issue of report	Jan. 24, 2013

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing are as follows.

<Highest Reported standalone SAR Summary>

Exposure Position	Frequency Band	Highest Reported 1g-SAR (W/kg)	Equipment Class	Highest Reported 1g-SAR (W/kg)
Body (0 cm Gap)	WCDMA Band V	**1.45**	PCB	**1.45**
	WCDMA Band II	**1.20**		
	LTE Band 17	**1.39**		
	LTE Band 4	**1.17**		
	WLAN 5.2GHz Band	**0.37**	NII	**0.77**
	WLAN 5.3GHz Band	**0.59**		
	WLAN 5.5GHz Band	**0.77**		
	WLAN 5.8GHz Band	**0.41**	DTS	**1.13**
	WLAN 2.4GHz Band	**1.13**		

<Highest Simultaneous transmission SAR>

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
LTE Band 17	**PCB**	**Bottom Face (0cm Gap)**	**1.55**
Bluetooth 2.4GHz	**DSS**		

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
WCDMA II	**PCB**	**Bottom Face (0cm Gap)**	**1.58**
WLAN 5.8GHz	**DTS**		

Remark:

1. The highest simultaneous transmission reported SAR is scalar SAR summation per FCC KDB 690873 D01 v01r02. Simultaneous transmission SAR measurement is exempted according to the SPLSR analysis per KDB 447498 D01v05.

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

2. Administration Data

2.1 Testing Laboratory

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

2.2 Applicant

Company Name	DELL
Address	One Dell Way, Round Rock, TX 78682 U.S.A

2.3 Manufacturer

Company Name	Dell
Address	One Dell Way, Round Rock, TX 78682 U.S.A.

2.4 Application Details

Date of Start during the Test	Dec. 19, 2012
Date of End during the Test	Jan. 18, 2013

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	Tablet PC
Brand Name	Dell
Model Name	J42A
FCC ID	E2KJ42AW
IMEI Code	013232000047351
TX Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band:5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Antenna Type	WWAN: Fixed Internal Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna
HW Version	LA8763P
SW Version	1146.23
Uplink Modulations	WCDMA (Rel 99): QPSK HSDPA (Rel 6): QPSK HSUPA (Rel 6): QPSK LTE: QPSK, 16QAM 802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth : GFSK Bluetooth EDR : π/4-DQPSK, 8-DPSK
Remark: 1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description. 2. Voice call is not supported. 3. 5600 MHz ~ 5650 MHz is notched. 4. This device, WLAN 2.4GHz and 5.8GHz supports hotspot/ Ad-hoc/ WiFi Direct operation; WLAN 5.2/ 5.3/ 5.5 GHz does not support those operations	

3.2 Maximum RF output power among production units

Band	Average power (dBm)			
	WCDMA Band V		WCDMA Band II	
Output Power Status	Normal mode	Reduced power mode	Normal mode	Reduced power mode
RMC 12.2Kbps	24	21	24	20
HSDPA Subtest-1	24	21	24	20
HSUPA Subtest-5	24	21	24	20

LTE Band 17				
Average power (dBm)				
Modulation	BW (MHz)	RB size	Normal mode	Reduced power mode
QPSK	10	≤ 12	24	21
QPSK	10	> 12	23	21
16QAM	10	≤ 12	23	21
16QAM	10	> 12	22	21
QPSK	5	≤ 8	24	21
QPSK	5	> 8	23	21
16QAM	5	≤ 8	23	21
16QAM	5	> 8	22	21

LTE Band 14				
Average power (dBm)				
Modulation	BW (MHz)	RB size	Normal mode	Reduced power mode
QPSK	10	≤ 12	24	19
QPSK	10	> 12	23	19
16QAM	10	≤ 12	23	19
16QAM	10	> 12	22	19
QPSK	5	≤ 8	24	19
QPSK	5	> 8	23	19
16QAM	5	≤ 8	23	19
16QAM	5	> 8	22	19

Remark:

1. By design, maximum LTE RF power of smaller supported bandwidth does not exceed the RF power of largest supported bandwidth; the information is included in “tune-up procedure” exhibit

IEEE 802.11 Average Power (dBm)				
Mode/Band	a	b	g	n
WLAN 2.4 GHz Band		18	15	14
WLAN 5.2 GHz Band	13.5			13
WLAN 5.3 GHz Band	13.5			13
WLAN 5.5 GHz Band	13.5			13
WLAN 5.8 GHz Band	13.5			13

Mode / Band	Bluetooth Average power(dBm)		
	1Mbps (GFSK)	2Mbps (π/4-DQPSK)	3Mbps (8-DPSK)
2.4 GHz Bluetooth	7.5	6	6

Summary of necessary items addressed in KDB 941225 D05 v02.

FCC ID	E2KJ42AW
EUT	Tablet PC
Operating Frequency Range of each LTE transmission band	LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
Channel Bandwidth	LTE Band 17: 5MHz, 10MHz LTE Band 4: 5MHz, 10MHz

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

Band 17

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Channel #	Frequency (MHz)	Channel #	Frequency (MHz)
L	23755	706.5	23780	709
M	23790	710	23790	710
H	23825	713.5	23800	711

LTE Band 4

	Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19975	1712.5	20000	1715
M	20175	1732.5	20175	1732.5
H	20375	1752.5	20350	1750

LTE category, uplink modulations used	Category 3, QPSK, and 16QAM
LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)	A primary antenna is used for LTE and WCDMA, for transmitting and receiving. LTE and WCDMA share the same antenna, and cannot transmit simultaneously A 2nd antenna is used for LTE and WCDMA , for receiving only
LTE Voice / Data requirements	1. Data only
LTE MPR permanently built-in by design	Yes, per 3GPP TS 36.101 v11.0.0 **Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**
LTE A-MPR	In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing.
Base station simulator used for Testing	Anritsu MT8820C
Power reduction applied to satisfy SAR compliance	Yes, proximity sensor.

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

3.3 Product Photos

Please refer to Appendix D.

3.4 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 v05
- FCC KDB 648474 D04 v01
- FCC KDB 248227 D01 v01r02
- FCC KDB 616217 D04 v01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D05 v02
- FCC KDB 865664 D01 v01

3.5 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.

3.6 Test Conditions

3.6.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.6.2 Test Configuration

1. 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
2. During WLAN SAR testing EUT is configured with the WLAN continuous TX tool, and the transmission duty factor was monitored on the spectrum analyzer with zero-span setting

   Duty factor observed as below:

   802.11b, 1Mbps: 100%

   802.11a, 6Mbps: 93.17%

   For WLAN SAR testing, WLAN engineering testing software installed on the EUT can provide continuous transmitting RF signal.

Target Power reduction applied for each wireless mode and orientation

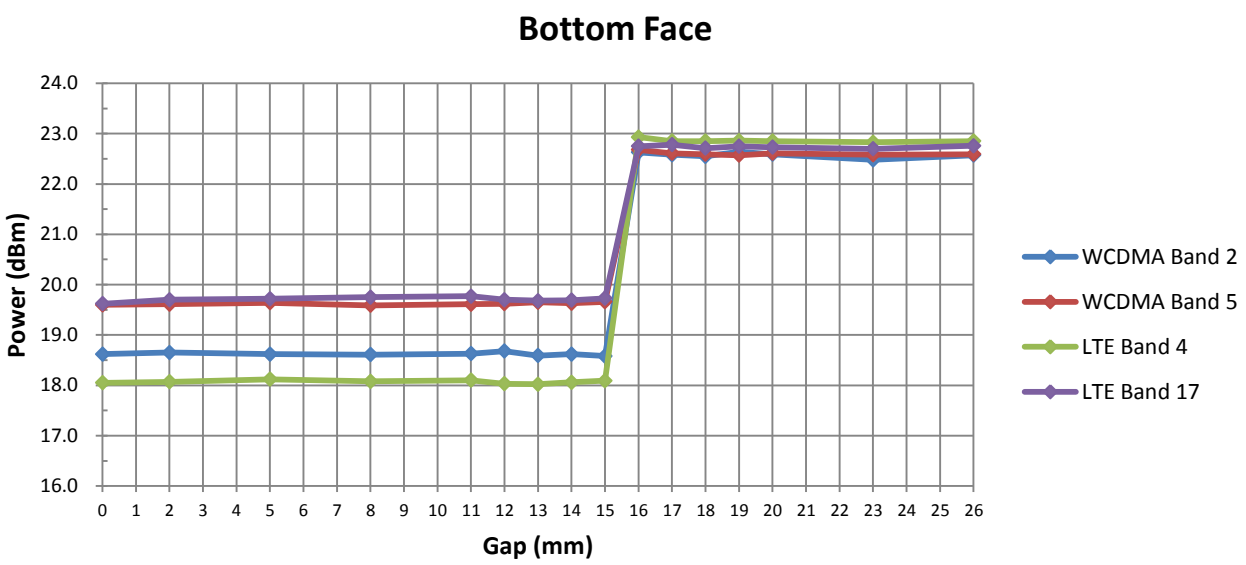
Exposure Position / wireless mode	Bottom Face(1)	Edge 1	Edge 2(1)	Edge 3	Edge 4
WCDMA Band V	3 dB	0 dB	3 dB	0 dB	0 dB
WCDMA Band II	4 dB	0 dB	4 dB	0 dB	0 dB
LTE Band 17	3 dB	0 dB	3 dB	0 dB	0 dB
LTE Band 4	5 dB	0 dB	5 dB	0 dB	0 dB

Remark:
1. (1): Reduced maximum limit applied by activation of proximity sensor.
2. Power reduction is not applicable for WLAN and Bluetooth.

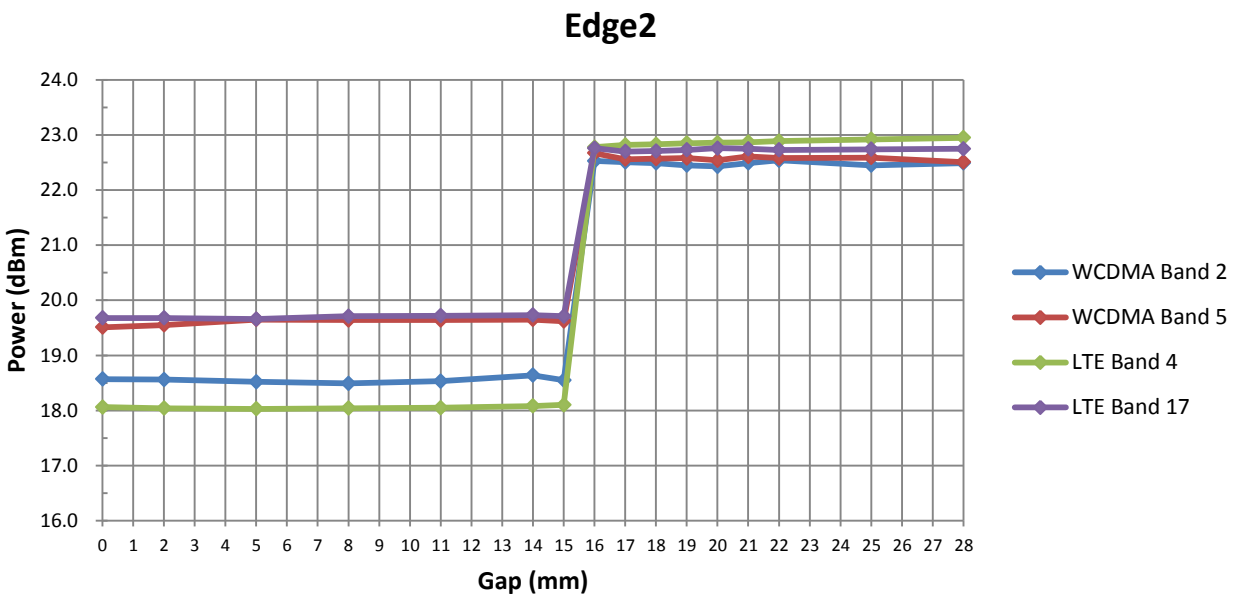
Measurement on EUT:

Band/Mode	Ch #	Measured power reduction (dBm)		Measured Reduction Level
		w/o power back-off	w/ power back-off	(dB)
WCDMA Band V (RMC 12.2Kbps)	4182	22.53	19.42	3.11
WCDMA Band II (RMC 12.2Kbps)	9800	22.46	19.13	3.33
LTE Band 17 (QPSK 1RB 0 offset)	23790	22.98	20.12	2.86
LTE Band 4 (QPSK 1RB 0 offset)	20175	22.93	18.83	4.10

Proximity Sensor for Bottom Face detection



Proximity Sensor for Edge2 detection



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

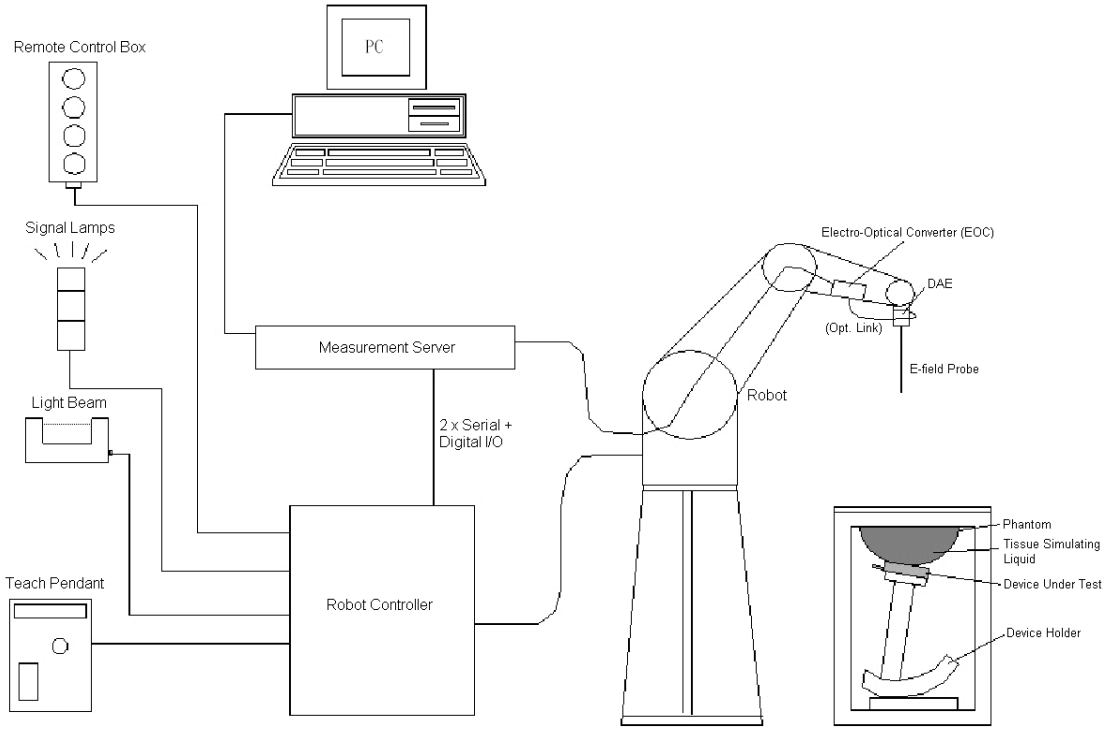


Fig 5.1 SPEAG DASY System Configurations

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

Component details are described in in the following sub-sections.

5.1 E-Field Probe

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

5.1.1 E-Field Probe Specification

<ET3DV6 / ET3DV6R Probe >

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

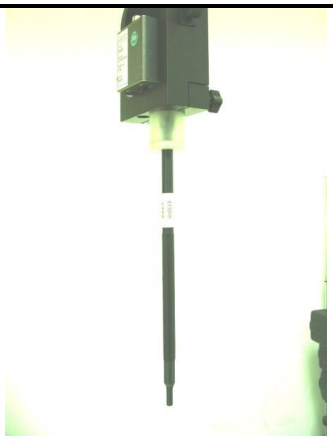


Fig 5.2 Photo of ET3DV6/ET3DV6

<ES3DV3 Probe >

Construction	Symmetrical design with triangular core Built-in optical fiber for surface detection system. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Frequency	10 MHz to 3 GHz; Linearity: ± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.4 dB in HSL (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 10 mm) Tip diameter: 4 mm (Body: 10 mm) Distance from probe tip to dipole centers: 3 mm

Fig 5.3 Photo of ES3DV3

<EX3DV4 / ES3DV4 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 5.4 Photo of EX3DV4/ES3DV4

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 ± 0.25dB. 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 5.5 Photo of DAE

5.4 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)

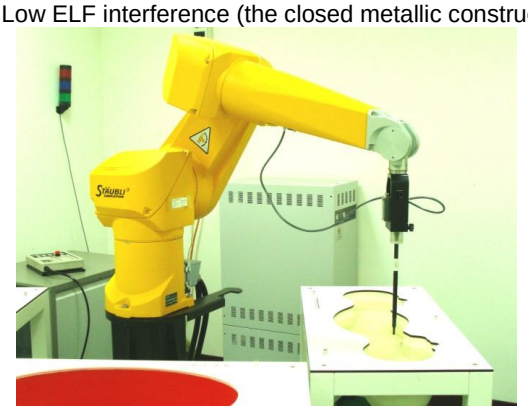


Fig 5.6 Photo of DASY4

Fig 5.7 Photo of DASY5

5.5 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 5.8 Photo of Server for DASY4

Fig 5.9 Photo of Server for DASY5

5.6 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 5.10 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

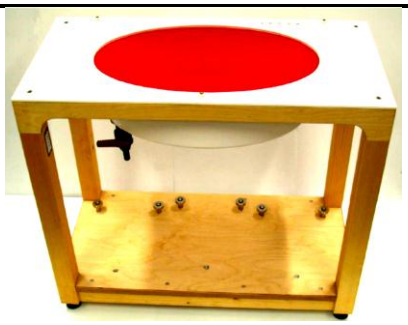


Fig 5.11 Photo of ELI4 Phantom

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.

5.7 Device Holder

<Device Holder for SAM Twin Phantom>

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

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

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

Fig 5.12 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.

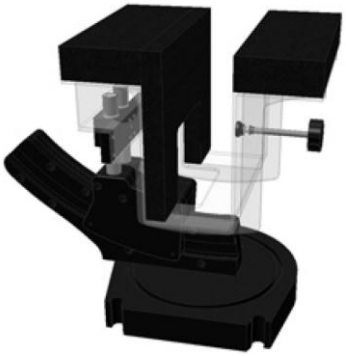


Fig 5.13 Laptop Extension Kit

5.8 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.

5.9 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, 2013
SPEAG	835MHz System Validation Kit	D835V2	499	Mar. 22, 2010	Mar. 21, 2013
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Jun. 20, 2012	Jun. 19, 2013
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 23, 2010	Mar. 22, 2013
SPEAG	2450MHz System Validation Kit	D2450V2	736	Jul. 25, 2011	Jul. 24, 2013
SPEAG	5GHz System Validation Kit	D5GHzV2	1128	Jun. 19, 2012	Jun. 18, 2013
SPEAG	Data Acquisition Electronics	DAE4	778	Aug. 27, 2012	Aug. 26, 2013
SPEAG	Data Acquisition Electronics	DAE3	495	Apr. 23, 2012	Apr. 22, 2013
SPEAG	Data Acquisition Electronics	DAE4	1338	Jun. 12, 2012	Jun. 11, 2013
SPEAG	Dosimetric E-Field Probe	ET3DV6	1787	May. 29, 2012	May. 28, 2013
SPEAG	Dosimetric E-Field Probe	EX3DV4	3792	Jun. 21, 2012	Jun. 20, 2013
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 28, 2012	Sep. 27, 2013
Wisewind	Thermometer	ETP-101	TM560	Nov. 13, 2012	Nov. 12, 2013
Wisewind	Thermometer	ETP-101	TM685	Nov. 13, 2012	Nov. 12, 2013
Wisewind	Thermometer	HTC-1	TM642	Nov. 13, 2012	Nov. 12, 2013
SPEAG	Device Holder	N/A	N/A	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1026	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 001 BA	1029	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1127	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1131	NCR	NCR
Agilent	Network Analyzer	E5071C	MY46101588	May. 11, 2012	May. 10, 2013
Agilent	ESG Vector Series Signal Generator	E4438C	MY49070755	Oct. 02, 2012	Oct. 01, 2013
Anritsu	Power Meter	ML2495A	1132003	Aug. 14, 2012	Aug. 13, 2013
Anritsu	Radio Communication Analyzer	MT8820C	6201074414	Dec. 11, 2012	Dec. 10, 2014
Agilent	Wireless Communication Test Set	E5515C	MY48360820	Jan. 05, 2012	Jan. 04, 2014
Agilent	Dual Directional Coupler	778D	50422	Note 4	
Woken	Attenuator 1	WK0602-XX	N/A	Note 4	
PE	Attenuator 2	PE7005-10	N/A	Note 4	
PE	Attenuator 3	PE7005- 3	N/A	Note 4	
Agilent	Dielectric Probe Kit	85070D	US01440205	Note 5	
AR	Power Amplifier	5S1G4M2	328767	Note 6	
R&S	Spectrum Analyzer	FSP	101131	Jul. 23, 2012	Jul. 22, 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 865664 D01v01, 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 D750V2, SN: 1012, D835V2, SN: 499, D1900V2, SN: 5d041, 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.
4. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
5. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
6. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
7. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

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

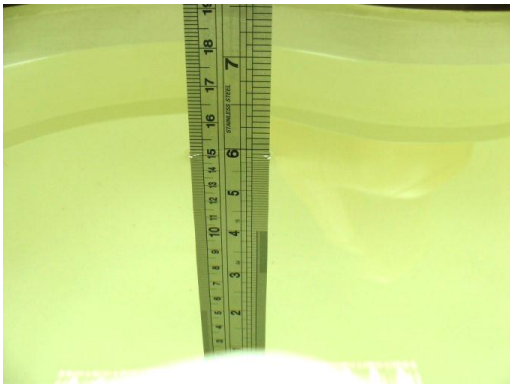


Fig 6.1 Photo of Liquid Height for Head SAR

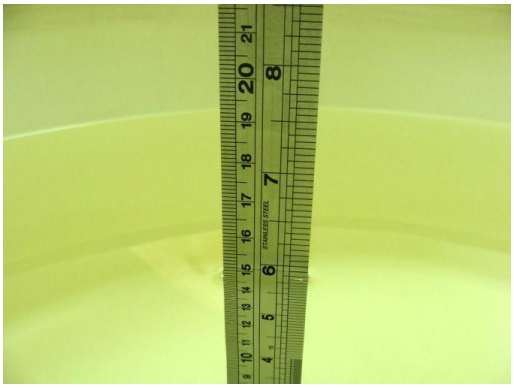


Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

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

Table 6.1 Recipes of Tissue Simulating Liquid

Simulating Liquid for 5G, Manufactured by SPEAG

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

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

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
750	Body	21.2	0.961	53.917	0.96	55.5	0.10	-2.85	±5	2012/12/21
750	Body	21.4	0.963	54.245	0.96	55.5	0.31	-2.26	±5	2013/1/3
835	Body	21.7	0.997	55.961	0.97	55.2	2.78	1.38	±5	2012/12/19
835	Body	21.5	0.994	54.715	0.97	55.2	2.47	-0.88	±5	2013/1/3
1750	Body	21.5	1.546	51.518	1.52	53.3	1.71	-3.34	±5	2013/1/12
1900	Body	21.3	1.545	51.942	1.52	53.3	1.64	-2.55	±5	2013/1/11
2450	Body	21.4	1.904	51.836	1.95	52.7	-2.36	-1.64	±5	2012/12/20
2450	Body	21.7	1.931	53.552	1.95	52.7	-2.36	-1.64	±5	2013/1/13
5200	Body	21.6	5.244	47.499	5.30	49.0	-1.06	-3.06	±5	2012/12/21
5300	Body	21.6	5.38	47.244	5.30	49.0	1.51	-3.58	±5	2012/12/21
5600	Body	21.6	5.773	46.756	5.65	48.6	2.18	-3.79	±5	2012/12/21
5600	Body	21.3	5.881	46.699	5.65	48.6	4.09	-3.91	±5	2013/1/18
5800	Body	21.6	6.127	46.464	6.00	48.2	2.12	-3.60	±5	2012/12/21

Table 6.2 Measuring Results for Simulating Liquid

7. SAR System Validation

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:

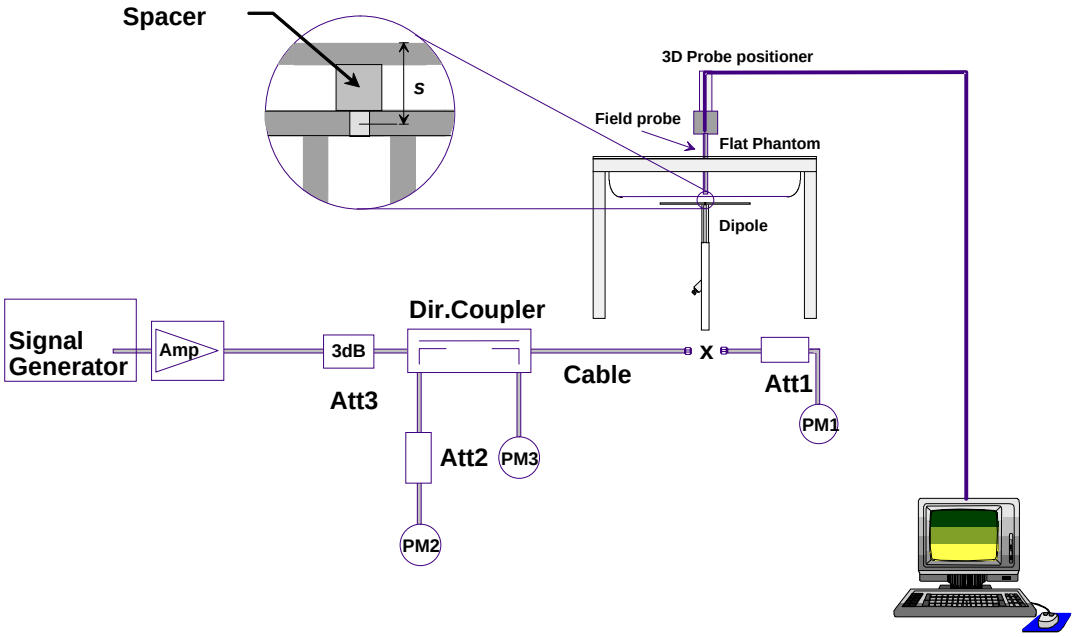


Fig 7.1 System Setup for System Evaluation

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

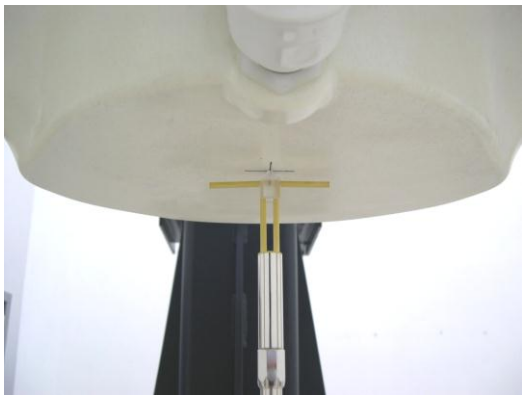


Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification 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.

For 5300MHz and 5600MHz measurement, the probe is calibrated at 5200MHz and 5500MHz; per KDB 865664D01v01, 5200MHz and 5600MHz system verification was performed and the result is compared to 5200MHz and 5500MHz target SAR and the deviation is within 15%

Date	Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2012/12/21	750	Body	250	8.86	2.23	8.92	0.68
2013/1/3	750	Body	250	8.86	2.16	8.64	-2.48
2012/12/19	835	Body	250	9.82	2.49	9.96	1.43
2013/1/3	835	Body	250	9.82	2.41	9.64	-1.83
2013/1/12	1750	Body	250	36.8	9.29	37.16	0.98
2013/1/11	1900	Body	250	40	10.3	41.20	3.00
2012/12/20	2450	Body	250	52.3	13.1	52.40	0.19
2013/1/13	2450	Body	250	52.3	12.3	49.20	-5.93
2012/12/21	5200	Body	100	75.6	7.7	77.00	1.85
2012/12/21	5300	Body	100	75.6	7.68	76.80	1.59
2012/12/21	5600	Body	100	80.3	8.17	81.70	1.74
2013/1/18	5600	Body	100	76.8	8.07	80.70	5.08
2012/12/21	5800	Body	100	75.2	7.12	71.20	-5.32

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

This EUT was tested in three different positions. They are bottom-face of tablet PC, Edge1, Edge 2 and Edge3. In these positions, the surface of EUT is touching with phantom 0 cm, additional 1 cm separation for bottom-face and 0.5 cm for Edge 2. Please refer to Appendix E for the test setup photos.

9. Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
(b) Read the WWAN RF power level from the base station simulator.
(c) For WLAN/BT power measurement, use engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power in each supported wireless interface and frequency band
(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/BT output power

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/BT continuously transmission, at maximum RF power, in the highest power channel.
(b) Place the EUT in the positions as Appendix E demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

(a) Power reference measurement
(b) Area scan
(c) Zoom scan
(d) Power drift measurement

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

9.3 Area & 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 is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01 quoted below.

For any secondary peaks found in the area scan which are within 2 dB of the maximum peak and are not within this zoom scan, the zoom scan should be repeated

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the area scan based *1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

9.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing. When all volume scan were completed, the software, SEMCAD postprocessor can combine and subsequently superpose these measurement data to calculating the multiband SAR.

9.5 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.

9.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In DASY measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drifts more than 5%, the SAR will be retested.

10. Conducted RF Output Power (Unit: dBm)

<WCDMA Conducted Power>

The following tests were conducted according to the test requirements outlines in 3GPP TS 34.121 specification.

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

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

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (Note 5) (Note 6)	β_{ed} (SF)	β_{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.
Note 2: CM = 1 for β_c/β_d =12/15, β_{hs}/β_c=24/15. For all other combinations of DPDCH, DPCCH, HS- DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: For subtest 5 the β_c/β_d ratio of 15/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 14/15 and β_d = 15/15.
Note 5: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 6: β_{ed} can not be set directly, it is set by Absolute Grant Value.

Setup Configuration

<WCDMA Conducted Power>

Note:

1. Applying the subtest setup in Table C.11.1.3 of 3GPP TS 34.121-1 V9.1.0 to Rel. 6 HSPA.
2. By design, HSDPA and HSUPA RF power will not be larger than RMC 12.2kbps., detailed information is included in Tune-up Procure exhibit.

Maximum Average RF Power (Proximity Sensor Inactive)

Average power (dBm)							
Band		WCDMA Band V			WCDMA Band II		
TX Channel		4132	4182	4233	9262	9400	9538
RX Channel		4357	4407	4458	9662	9800	9938
Frequency (MHz)		826.4	836.4	846.6	1852.4	1880	1907.6
3GPP Rel 99	RMC 12.2kbps	22.72	22.53	22.66	22.67	22.46	22.58
3GPP Rel 6	HSDPA Subtest-1	22.39	22.18	22.28	22.18	21.97	22.07
3GPP Rel 6	HSDPA Subtest-2	22.36	22.12	22.26	22.15	21.94	22.01
3GPP Rel 6	HSDPA Subtest-3	21.94	21.68	21.84	21.84	21.56	21.67
3GPP Rel 6	HSDPA Subtest-4	21.88	21.63	21.80	21.81	21.51	21.59
3GPP Rel 6	HSUPA Subtest-1	22.11	22.01	22.13	22.38	22.34	22.21
3GPP Rel 6	HSUPA Subtest-2	20.88	20.61	20.78	20.94	20.96	20.99
3GPP Rel 6	HSUPA Subtest-3	21.20	21.05	21.10	21.39	21.34	21.25
3GPP Rel 6	HSUPA Subtest-4	20.89	20.76	20.85	20.95	20.98	20.96
3GPP Rel 6	HSUPA Subtest-5	22.20	22.11	22.16	22.46	22.51	22.51
MPR result (dB)							
3GPP MPR specification		WCDMA Band V			WCDMA Band II		
0	HSDPA Subtest-1	0.00	0.00	0.00	0.00	0.00	0.00
0	HSDPA Subtest-2	0.03	0.06	0.02	0.03	0.03	0.06
≦0.5	HSDPA Subtest-3	0.45	0.50	0.44	0.34	0.41	0.40
≦0.5	HSDPA Subtest-4	0.51	0.55	0.48	0.37	0.46	0.48
≦0	HSUPA Subtest-1	0.09	0.10	0.03	0.08	0.17	0.30
≦2	HSUPA Subtest-2	1.32	1.50	1.38	1.52	1.55	1.52
≦1	HSUPA Subtest-3	1.00	1.06	1.06	1.07	1.17	1.26
≦2	HSUPA Subtest-4	1.31	1.35	1.31	1.51	1.53	1.55
≦0	HSUPA Subtest-5	0.00	0.00	0.00	0.00	0.00	0.00

Reduced Average RF Power (Proximity Sensor active)

Average Power(dBm)							
Band		WCDMA Band V			WCDMA Band II		
TX Channel		4132	4182	4233	9262	9400	9538
RX Channel		4357	4407	4458	9662	9800	9938
Frequency (MHz)		826.4	836.4	846.6	1852.4	1880	1907.6
3GPP Rel 99	RMC 12.2kbps	19.71	19.42	19.60	19.38	19.13	19.30
3GPP Rel 6	HSDPA Subtest-1	19.38	19.15	19.27	18.42	18.16	18.25
3GPP Rel 6	HSDPA Subtest-2	19.34	19.08	19.23	18.35	18.09	18.13
3GPP Rel 6	HSDPA Subtest-3	18.85	18.57	18.74	17.94	17.67	17.83
3GPP Rel 6	HSDPA Subtest-4	18.82	18.54	18.71	17.86	17.63	17.78
3GPP Rel 6	HSUPA Subtest-1	18.76	18.44	19.07	18.27	18.45	18.61
3GPP Rel 6	HSUPA Subtest-2	17.75	17.57	17.56	17.03	17.09	17.39
3GPP Rel 6	HSUPA Subtest-3	18.03	18.07	18.10	17.23	17.17	17.19
3GPP Rel 6	HSUPA Subtest-4	17.71	17.68	17.77	17.09	17.05	17.10
3GPP Rel 6	HSUPA Subtest-5	19.12	19.04	19.06	18.31	18.51	18.64
MPR result (dB)							
3GPP MPR Specification		WCDMA Band V			WCDMA Band II		
0	HSDPA Subtest-1	0.00	0.00	0.00	0.00	0.00	0.00
0	HSDPA Subtest-2	0.04	0.07	0.04	0.07	0.07	0.12
≦0.5	HSDPA Subtest-3	0.53	0.58	0.53	0.48	0.49	0.42
≦0.5	HSDPA Subtest-4	0.56	0.61	0.56	0.56	0.53	0.47
≦0	HSUPA Subtest-1	0.36	0.60	-0.01	0.04	0.06	0.03
≦2	HSUPA Subtest-2	1.37	1.47	1.50	1.28	1.42	1.25
≦1	HSUPA Subtest-3	1.09	0.97	0.96	1.08	1.34	1.45
≦2	HSUPA Subtest-4	1.41	1.36	1.29	1.22	1.46	1.54
≦0	HSUPA Subtest-5	0.00	0.00	0.00	0.00	0.00	0.00

<LTE Conducted Power>

Note:

1. Anritsu MT8820C base station simulator was used to setup the connection with EUT; the frequency band, channel bandwidth, RB allocation configuration, modulation type are set in the base station simulator to configure EUT transmitting at maximum power and at different configurations which are requested to be reported to FCC, for conducted power measurement and SAR testing.
2. Per KDB 941225 D05v02, when a properly configured base station simulator is used for the SAR and power measurements, spectrum plots for each RB allocation and offset configuration is not required.
3. Per KDB 941225 D05v02, start with the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation, using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each *required test channel*.
4. Per KDB 941225 D05v02, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure
5. 16QAM output power for each RB allocation configuration is not > ½ dB higher than the same configuration in QPSK
6. Smaller bandwidth output power for each RB allocation configuration is not > ½ dB higher than the same configuration in the largest supported bandwidth

<LTE Band 17 Conducted Power >

Maximum Average RF Power (Proximity Sensor Inactive)

BW [MHz]	Mod / RB (Size - Offset)	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR	MPR Low Ch. / Freq.	MPR Middle Ch. / Freq.	MPR High Ch. / Freq.
Channel		23780	23790	23800		23780	23790	23800
Frequency (MHz)		709	710	711		709	710	711
10	QPSK 1-0	22.92	22.98	22.97	0	0.00	0.00	0.00
10	QPSK 1-24	22.89	22.77	22.80		0.03	0.21	0.17
10	QPSK 1-49	22.87	22.94	22.93		0.05	0.04	0.04
10	QPSK 25-0	22.19	22.04	22.10	1	0.73	0.94	0.87
10	QPSK 25-12	21.99	21.95	22.02		0.93	1.03	0.95
10	QPSK 25-24	22.04	22.13	22.20		0.88	0.85	0.77
10	QPSK 50-0	22.02	22.05	22.20		0.90	0.93	0.77
10	16QAM 1-0	22.05	22.46	22.51	1	0.87	0.52	0.46
10	16QAM 1-24	21.94	22.25	22.38		0.98	0.73	0.59
10	16QAM 1-49	22.15	22.58	22.57		0.77	0.40	0.40
10	16QAM 25-0	21.51	21.37	21.51	2	1.41	1.61	1.46
10	16QAM 25-12	21.24	21.30	21.46		1.68	1.68	1.51
10	16QAM 25-24	21.34	21.53	21.50		1.58	1.45	1.47
10	16QAM 50-0	21.13	21.17	21.29		1.79	1.81	1.68
Channel		23755	23790	23825		23755	23790	23825
Frequency (MHz)		706.5	710	713.5		706.5	710	713.5
5	QPSK 1-0	22.46	22.45	22.23	0	0.16	0.07	0.50
5	QPSK 1-12	22.62	22.52	22.73		0.00	0.00	0.00
5	QPSK 1-24	22.27	22.37	22.64		0.35	0.15	0.09
5	QPSK 12-0	21.69	21.68	21.80	1	0.93	0.84	0.93
5	QPSK 12-6	21.90	21.68	21.93		0.72	0.84	0.80
5	QPSK 12-11	21.79	21.75	21.86		0.83	0.77	0.87
5	QPSK 25-0	22.08	21.71	21.95		0.54	0.81	0.78
5	16QAM 1-0	21.63	21.90	21.80	1	0.99	0.62	0.93
5	16QAM 1-12	22.28	21.81	22.21		0.34	0.71	0.52
5	16QAM 1-24	21.98	22.21	22.13		0.64	0.31	0.60
5	16QAM 12-0	20.64	20.58	20.84	2	1.98	1.94	1.89
5	16QAM 12-6	20.82	20.56	20.79		1.80	1.96	1.94
5	16QAM 12-11	20.74	20.58	20.80		1.88	1.94	1.93
5	16QAM 25-0	21.22	20.98	21.29		1.40	1.54	1.44

<LTE Band 17 Conducted Power >

Reduced Average RF Power (Proximity Sensor active)

BW [MHz]	Mod / RB (Size - Offset)	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	MPR Low Ch. / Freq.	MPR Middle Ch. / Freq.	MPR High Ch. / Freq.
Channel		23780	23790	23800	23780	23790	23800
Frequency (MHz)		709	710	711	709	710	711
10	QPSK 1-0	20.08	20.12	20.22	0.00	0.00	0.00
10	QPSK 1-24	20.05	20.02	20.18	0.03	0.10	0.04
10	QPSK 1-49	20.04	20.06	20.21	0.04	0.06	0.01
10	QPSK 25-0	19.95	19.74	20.19	0.13	0.38	0.03
10	QPSK 25-12	20.05	19.84	20.13	0.03	0.28	0.09
10	QPSK 25-24	20.06	20.03	20.17	0.02	0.09	0.05
10	QPSK 50-0	19.92	19.80	20.16	0.16	0.32	0.06
10	16QAM 1-0	19.91	19.87	19.90	0.17	0.25	0.32
10	16QAM 1-24	19.84	19.76	19.88	0.24	0.36	0.34
10	16QAM 1-49	19.87	19.81	19.85	0.21	0.31	0.37
10	16QAM 25-0	19.82	19.61	19.75	0.26	0.51	0.47
10	16QAM 25-12	19.74	19.71	19.80	0.34	0.41	0.42
10	16QAM 25-24	19.68	19.77	19.84	0.40	0.35	0.38
10	16QAM 50-0	19.77	19.74	19.82	0.31	0.38	0.40
Channel		23755	23790	23825	23755	23790	23825
Frequency (MHz)		706.5	710	713.5	706.5	710	713.5
5	QPSK 1-0	19.76	19.61	19.99	0.29	0.24	0.18
5	QPSK 1-12	20.05	19.85	20.17	0.00	0.00	0.00
5	QPSK 1-24	19.99	19.79	20.16	0.06	0.06	0.01
5	QPSK 12-0	19.60	19.40	19.70	0.45	0.45	0.47
5	QPSK 12-6	19.68	19.46	19.93	0.37	0.39	0.24
5	QPSK 12-11	19.62	19.62	19.86	0.43	0.23	0.31
5	QPSK 25-0	20.03	19.77	20.14	0.02	0.08	0.03
5	16QAM 1-0	19.65	19.33	19.73	0.40	0.52	0.44
5	16QAM 1-12	19.93	19.67	20.09	0.12	0.18	0.08
5	16QAM 1-24	19.64	19.51	19.87	0.41	0.34	0.30
5	16QAM 12-0	19.76	19.52	19.91	0.29	0.33	0.26
5	16QAM 12-6	19.90	19.54	20.01	0.15	0.31	0.16
5	16QAM 12-11	19.82	19.46	19.91	0.23	0.39	0.26
5	16QAM 25-0	19.86	19.61	20.07	0.19	0.24	0.10

<LTE Band 4 Conducted Power >

Maximum Average RF Power (Proximity Sensor Inactive)

BW [MHz]	Mod / RB (Size - Offset)	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Target MPR	MPR Low Ch. / Freq.	MPR Middle Ch. / Freq.	MPR High Ch. / Freq.
Channel		20000	20175	20350		20000	20175	20350
Frequency (MHz)		1715	1732.5	1750		1715	1732.5	1750
10	QPSK 1-0	22.89	22.93	22.87	0	0.04	0.00	0.00
10	QPSK 1-24	22.78	22.75	22.57		0.15	0.18	0.30
10	QPSK 1-49	22.93	22.78	22.54		0.00	0.15	0.33
10	QPSK 25-0	22.08	21.92	21.79	1	0.85	1.01	1.08
10	QPSK 25-12	22.12	21.90	21.77		0.81	1.03	1.10
10	QPSK 25-24	22.03	21.92	21.79		0.90	1.01	1.08
10	QPSK 50-0	22.03	21.92	21.75		0.90	1.01	1.12
10	16QAM 1-0	22.06	22.24	22.01	1	0.87	0.69	0.86
10	16QAM 1-24	22.06	21.91	21.78		0.87	1.02	1.09
10	16QAM 1-49	22.07	22.09	21.81		0.86	0.84	1.06
10	16QAM 25-0	21.39	21.19	21.20	2	1.54	1.74	1.67
10	16QAM 25-12	21.35	21.12	20.97		1.58	1.81	1.90
10	16QAM 25-24	21.41	21.14	21.19		1.52	1.79	1.68
10	16QAM 50-0	21.34	20.94	20.96		1.59	1.99	1.91
Channel		19975	20175	20375		19975	20175	20375
Frequency (MHz)		1712.5	1732.5	1752.5		1712.5	1732.5	1752.5
5	QPSK 1-0	22.64	22.59	22.78	0	0.03	0.31	0.02
5	QPSK 1-12	22.67	22.70	22.80		0.00	0.20	0.00
5	QPSK 1-24	22.66	22.90	22.70		0.01	0.00	0.10
5	QPSK 12-0	21.83	21.76	21.85	1	0.84	1.14	0.95
5	QPSK 12-6	21.87	21.73	21.82		0.80	1.17	0.98
5	QPSK 12-11	21.81	21.87	21.84		0.86	1.03	0.96
5	QPSK 25-0	21.81	21.70	21.92		0.86	1.20	0.88
5	16QAM 1-0	22.08	22.01	22.40	1	0.59	0.89	0.40
5	16QAM 1-12	22.29	22.37	22.46		0.38	0.53	0.34
5	16QAM 1-24	22.23	22.12	22.42		0.44	0.78	0.38
5	16QAM 12-0	20.99	20.90	20.80	2	1.68	2.00	2.00
5	16QAM 12-6	20.92	20.71	20.66		1.75	2.19	2.14
5	16QAM 12-11	20.80	21.05	20.87		1.87	1.85	1.93
5	16QAM 25-0	21.29	21.17	21.29		1.38	1.73	1.51

<LTE Band 4 Conducted Power >

Reduced Average RF Power (Proximity Sensor active)

BW [MHz]	Mod / RB (Size - Offset)	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	MPR Low Ch. / Freq.	MPR Middle Ch. / Freq.	MPR High Ch. / Freq.
Channel		20000	20175	20350	20000	20175	20350
Frequency (MHz)		1715	1732.5	1750	1715	1732.5	1750
10	QPSK 1-0	18.67	18.83	18.77	0.00	0.00	0.00
10	QPSK 1-24	18.38	18.66	18.51	0.29	0.17	0.26
10	QPSK 1-49	18.22	18.48	18.70	0.45	0.35	0.07
10	QPSK 25-0	18.37	18.41	18.61	0.30	0.42	0.16
10	QPSK 25-12	18.42	18.43	18.52	0.25	0.40	0.25
10	QPSK 25-24	18.48	18.53	18.48	0.19	0.30	0.29
10	QPSK 50-0	18.32	18.35	18.30	0.35	0.48	0.47
10	16QAM 1-0	18.09	18.57	18.27	0.58	0.26	0.50
10	16QAM 1-24	18.16	18.42	18.30	0.51	0.41	0.47
10	16QAM 1-49	18.20	18.21	18.12	0.47	0.62	0.65
10	16QAM 25-0	18.05	18.47	18.28	0.62	0.36	0.49
10	16QAM 25-12	18.13	18.48	18.24	0.54	0.35	0.53
10	16QAM 25-24	18.03	18.50	18.17	0.64	0.33	0.60
10	16QAM 50-0	18.11	18.51	18.23	0.56	0.32	0.54
Channel		19975	20175	20375	19975	20175	20375
Frequency (MHz)		1712.5	1732.5	1752.5	1712.5	1732.5	1752.5
5	QPSK 1-0	18.69	18.80	18.61	0.05	0.08	0.19
5	QPSK 1-12	18.74	18.88	18.80	0.00	0.00	0.00
5	QPSK 1-24	18.67	18.56	18.60	0.07	0.32	0.20
5	QPSK 12-0	18.76	18.50	18.65	-0.02	0.38	0.15
5	QPSK 12-6	18.75	18.57	18.64	-0.01	0.31	0.16
5	QPSK 12-11	18.69	18.74	18.75	0.05	0.14	0.05
5	QPSK 25-0	18.72	18.77	18.78	0.02	0.11	0.02
5	16QAM 1-0	18.68	18.49	18.65	0.06	0.39	0.15
5	16QAM 1-12	18.70	18.59	18.68	0.04	0.29	0.12
5	16QAM 1-24	18.69	18.62	18.56	0.05	0.26	0.24
5	16QAM 12-0	18.65	18.50	18.64	0.09	0.38	0.16
5	16QAM 12-6	18.67	18.48	18.60	0.07	0.40	0.20
5	16QAM 12-11	18.61	18.54	18.62	0.13	0.34	0.18
5	16QAM 25-0	18.68	18.54	18.65	0.06	0.34	0.15

<WLAN 2.4GHz Conducted Power>

WLAN 2.4GHz 802.11b Average Power (dBm)						
Power vs. Channel			Power vs. Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
CH 1	2412	17.66	CH 11	17.56	17.64	17.14
CH 6	2437	17.72				
CH 11	2462	**17.78**				

WLAN 2.4GHz 802.11g Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)					
		6M		9M	12M	18M	24M	36M	48M	54M
CH 1	2412	**14.44**	CH 1	14.11	14.24	14.35	13.57	14.25	14.12	13.59
CH 6	2437	14.26								
CH 11	2462	14.26								

WLAN 2.4GHz 802.11n-HT20 Average Power (dBm)									
Power vs. Channel			Power vs. Data Rate						
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index					
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 1	2412	13.60	CH 6	13.61	13.54	13.24	12.57	12.69	13.57	13.51
CH 6	2437	**13.85**								
CH 11	2462	13.64								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate
3. Per KDB 248227 D01 v01r02, 11g and 11n-HT20 output power is less than 1/4dB higher than 11b mode, thus the SAR can be excluded.

<Bluetooth Conducted Power>

Channel	Frequency (MHz)	Average power (dBm)		
		Mode		
		GFSK	π/4-DQPSK	8-DPSK
CH 0	2402	6.86	5.45	5.46
CH 39	2441	**7.12**	5.73	5.71
CH 78	2480	6.39	5.01	5.02

<WLAN 5GHz Conducted Power>

WLAN 5GHz 802.11a Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)						
		6M		9M	12M	18M	24M	36M	48M	54M
CH 36	5180	13.17	CH 44	13.21	12.57	13.06	13.36	12.69	13.15	12.99
CH 40	5200	13.18								
CH 44	5220	13.41								
CH 48	5240	13.10								
CH 52	5260	13.29	CH 60	13.26	13.05	12.69	12.79	13.25	12.85	13.30
CH 56	5280	13.37								
CH 60	5300	13.37								
CH 64	5320	13.35								
CH 100	5500	13.37	CH 108	13.12	13.34	13.20	12.69	13.02	13.33	12.59
CH 104	5520	13.26								
CH 108	5540	13.40								
CH 112	5560	13.27								
CH 116	5580	13.41								
CH 132	5660	13.29								
CH 136	5680	13.38								
CH 140	5700	13.26								
CH 149	5745	13.25	CH 165	13.40	12.69	13.33	13.11	12.98	12.69	13.30
CH 153	5765	13.36								
CH 157	5785	13.40								
CH 161	5805	13.39								
CH 165	5825	**13.47**								

WLAN 5GHz 802.11n-HT20 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 36	5180	12.89	CH 40	12.65	12.69	12.87	12.67	12.05	12.67	12.36
CH 40	5200	12.95								
CH 44	5220	12.74								
CH 48	5240	12.68								
CH 52	5260	12.77	CH 60	12.58	12.67	12.36	12.81	12.67	12.30	12.35
CH 56	5280	12.65								
CH 60	5300	12.87								
CH 64	5320	12.85								
CH 100	5500	12.90	CH 100	12.81	12.61	12.35	12.46	12.39	12.74	12.36
CH 104	5520	12.78								
CH 108	5540	12.72								
CH 112	5560	12.69								
CH 116	5580	12.83								
CH 132	5660	12.69								
CH 136	5680	12.73								
CH 140	5700	12.75								
CH 149	5745	12.82	CH 165	12.85	12.67	12.69	12.88	12.67	12.36	12.67
CH 153	5765	12.88								
CH 157	5785	12.85								
CH 161	5805	12.85								
CH 165	5825	**12.98**								

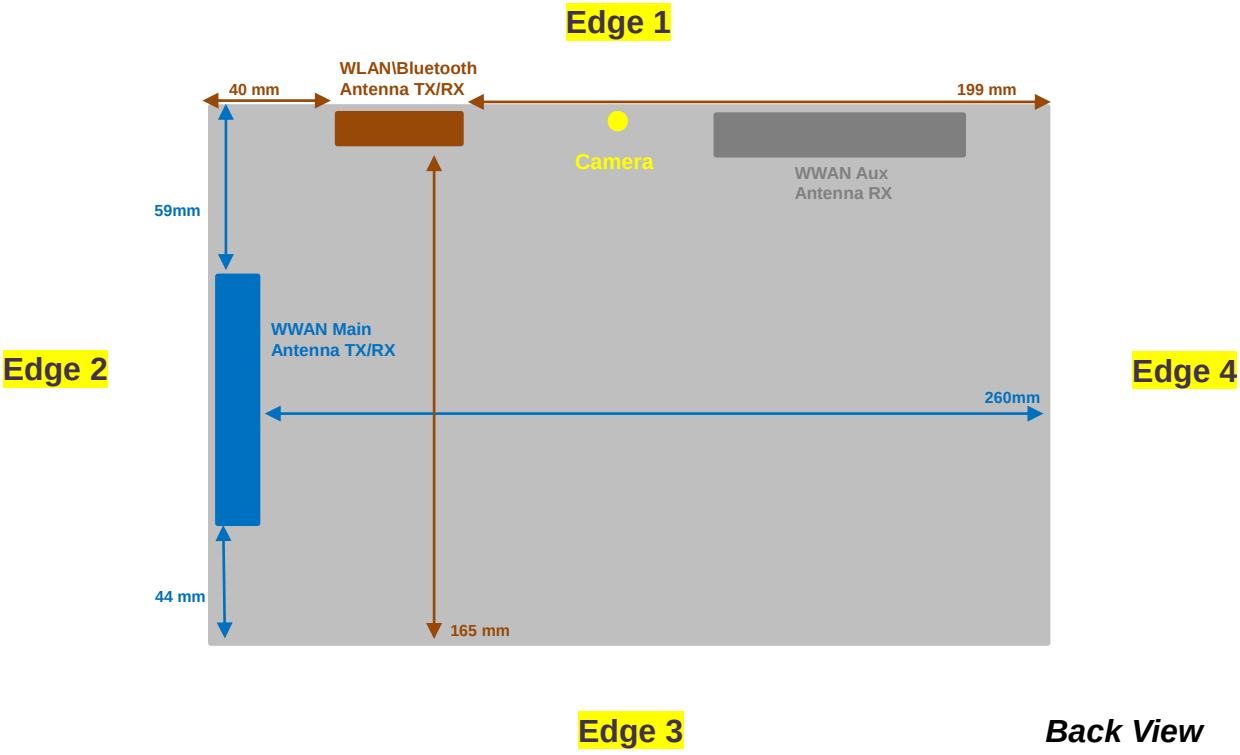
WLAN 5GHz 802.11n-HT40 Average Power (dBm)										
Power vs. Channel			Power vs. Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 38	5190	12.20	CH 46	12.11	12.30	12.04	12.25	12.06	11.67	11.98
CH 46	5230	12.32								
CH 54	5270	12.34	CH 54	11.39	12.14	12.30	11.59	12.05	12.19	12.20
CH 62	5310	12.28								
CH 102	5510	**12.40**	CH 102	11.59	12.25	12.09	12.24	11.97	12.08	11.91
CH 118	5590	12.34								
CH 134	5670	12.35								
CH 151	5755	12.29	CH 151	12.10	11.92	12.06	12.18	12.08	11.81	12.15
CH 159	5795	12.22								

Note:

1. Per KDB 248227 D01 v01r02, choose the highest output power channel to test SAR and determine further SAR exclusion
2. For each frequency band, testing at higher data rates and higher order modulations is not required when the maximum average output power for each of these configurations is less than 1/4dB higher than those measured at the lowest data rate.
3. Per KDB 248227 D01 v01r02, 11n-HT20 and 11n-HT40 output power is less than 1/4dB higher than 802.11a mode, thus the SAR can be excluded.

11. Exposure Positions Consideration

<Tablet PC>



Antennas	Wireless Interface
WWAN Main Antenna (Tx / Rx)	WCDMA Band V WCDMA Band II LTE Band 17 LTE Band 4
BT&WLAN Antenna (Tx / Rx)	WLAN 2.4GHz WLAN 5GHz Bluetooth

<Full Power>

Exposure Position	Wireless Interface	WCDMA Band V	WCDMA Band II	LTE Band 17	LTE Band 4	802.11b	802.11a	Bluetooth
	Tune-up Maximum power (dBm)	24	24	24	23.5	18	13.5	7.5
	Tune-up Maximum rated power (mW)	251.19	251.19	251.19	223.87	63.10	22.39	5.62
Bottom Face	Antenna to user (mm)	5				5	5	5
	SAR exclusion threshold (mW)	16	11	18	11	10	6	10
	SAR testing required?	YES	YES	YES	YES	YES	YES	NO
Edge 1	Antenna to user (mm)	58				5	5	5
	SAR exclusion threshold (mW)	203	179	211	183	10	6	10
	SAR testing required?	YES	YES	YES	YES	YES	YES	NO
Edge 2	Antenna to user (mm)	5				40	40	40
	SAR exclusion threshold (mW)	16	11	18	11	76	50	76
	SAR testing required?	YES	YES	YES	YES	NO	NO	NO
Edge 3	Antenna to user (mm)	44				170	170	170
	SAR exclusion threshold (mW)	144	96	156	100	1296	1262	324
	SAR testing required?	YES	YES	YES	YES	NO	NO	NO
Edge 4	Antenna to user (mm)	252				200	200	200
	SAR exclusion threshold (mW)	1302	2129	1138	2133	1596	1562	381
	SAR testing required?	NO	NO	NO	NO	NO	NO	NO

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
2. Per KDB 447498 D01v05, for larger devices, the *test separation distance* is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D01v05, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D01v05, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[$\sqrt{}$f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
5. Per KDB 447498 D01v05, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

12. SAR Test Results

Note:

1. Per KDB 447498 D01v05, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)= Measured SAR(W/kg) Scaling Factor*
2. For the exposure positions that proximity sensor power reduction is applied for SAR compliance, additional SAR testing with EUT transmitting full power in normal mode was performed; 1cm for bottom face, 0.5cm for edge2.
3. Per KDB 447498 D01v05, for each exposure position, testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid-band or highest output power channel is:
   - ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
   - ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
   - ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz
4. Considering the curvature transition from bottom face to the edge, SAR testing at the curvature was performed. The SAR test setup is included in test setup photo exhibit, and the details of the curvature is included in operation description exhibit.

12.1 Test Records for Body SAR Test

<WCDMA SAR>

Note:

1. If Reported SAR with RMC 12.2kbps setting is > 1.2W/kg, HSDPA subtest-1 and HSUPA subtest-5 SAR is additionally tested at that exposure position.
2. Per KDB 941225 D01, RMC 12.2kbps setting is used to evaluate SAR. If HSDPA/HSUPA output power is < 0.25dB higher than RMC, or reported SAR with RMC 12.2kbps setting is ≤ 1.2W/kg, HSDPA/HSUPA SAR evaluation can be excluded.

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
72	WCDMA V	RMC 12.2kbps	Bottom Face	1cm	4132	826.4	OFF	22.72	24	1.343	-0.04	0.631	0.847
73	WCDMA V	RMC 12.2kbps	Bottom Face	1cm	4182	836.4	OFF	22.53	24	1.403	-0.03	0.574	0.805
74	WCDMA V	RMC 12.2kbps	Bottom Face	1cm	4233	846.6	OFF	22.66	24	1.361	0.06	0.567	0.772
92	WCDMA V	RMC 12.2kbps	Edge1	0cm	4132	826.4	OFF	22.72	24	1.343	0.166	0.126	0.169
75	WCDMA V	RMC 12.2kbps	Edge2	0.5cm	4132	826.4	OFF	22.72	24	1.343	-0.125	1.02	1.370
76	WCDMA V	RMC 12.2kbps	Edge2	0.5cm	4182	836.4	OFF	22.53	24	1.403	-0.11	0.89	1.249
77	WCDMA V	RMC 12.2kbps	Edge2	0.5cm	4233	846.6	OFF	22.66	24	1.361	0.133	0.839	1.142
93	WCDMA V	RMC 12.2kbps	Edge3	0cm	4132	826.4	OFF	22.72	24	1.343	-0.06	0.142	0.191
1	WCDMA V	RMC 12.2kbps	Bottom Face	0cm	4132	826.4	ON	19.71	21	1.346	0	1.07	1.440
2	**WCDMA V**	**RMC 12.2kbps**	**Bottom Face**	**0cm**	**4182**	**836.4**	**ON**	**19.42**	**21**	**1.439**	**-0.04**	**1.01**	**1.453**
3	WCDMA V	RMC 12.2kbps	Bottom Face	0cm	4233	846.6	ON	19.6	21	1.380	0.08	1.05	1.449
114	WCDMA V	HSDPA Subtest-1	Bottom Face	0cm	4132	826.4	ON	19.38	21	1.452	-0.141	0.949	1.378
115	WCDMA V	HSDPA Subtest-1	Bottom Face	0cm	4182	836.4	ON	19.15	21	1.531	-0.138	0.897	1.373
116	WCDMA V	HSDPA Subtest-1	Bottom Face	0cm	4233	846.6	ON	19.27	21	1.489	-0.04	0.958	1.427
117	WCDMA V	HSUPA Subtest-5	Bottom Face	0cm	4132	826.4	ON	19.12	21	1.542	-0.125	0.914	1.409
118	WCDMA V	HSUPA Subtest-5	Bottom Face	0cm	4182	836.4	ON	19.04	21	1.570	-0.03	0.905	1.421
119	WCDMA V	HSUPA Subtest-5	Bottom Face	0cm	4233	846.6	ON	19.06	21	1.563	-0.05	0.919	1.437
5	WCDMA V	RMC 12.2kbps	Edge2	0cm	4132	826.4	ON	19.71	21	1.346	0.06	0.661	0.890
6	WCDMA V	RMC 12.2kbps	Edge2	0cm	4182	836.4	ON	19.42	21	1.439	0.04	0.596	0.858
7	WCDMA V	RMC 12.2kbps	Edge2	0cm	4233	846.6	ON	19.6	21	1.380	0.07	0.591	0.816
8	WCDMA V	RMC 12.2kbps	Curved surface of Edge2	0cm	4132	826.4	ON	19.71	21	1.346	-0.167	1.07	1.440

9	WCDMA V	RMC 12.2kbps	Curved surface of Edge2	0cm	4182	836.4	ON	19.42	21	1.439	-0.15	0.992	1.427
10	WCDMA V	RMC 12.2kbps	Curved surface of Edge2	0cm	4233	846.6	ON	19.6	21	1.380	-0.06	1.03	1.422

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
99	WCDMA II	RMC 12.2kbps	Bottom Face	1cm	9262	1852.4	OFF	22.67	24	1.358	0.114	0.53	0.720
100	WCDMA II	RMC 12.2kbps	Edge1	0cm	9262	1852.4	OFF	22.67	24	1.358	0.18	0.162	0.220
101	WCDMA II	RMC 12.2kbps	Edge 2	0.5cm	9262	1852.4	OFF	22.67	24	1.358	0.02	0.802	1.089
102	WCDMA II	RMC 12.2kbps	Edge 2	0.5cm	9400	1880	OFF	22.46	24	1.426	0.136	0.768	1.095
103	WCDMA II	RMC 12.2kbps	Edge 2	0.5cm	9538	1907.6	OFF	22.58	24	1.387	0.01	0.815	1.130
104	WCDMA II	RMC 12.2kbps	Edge 3	0cm	9262	1852.4	OFF	22.67	24	1.358	-0.01	0.083	0.113
106	WCDMA II	RMC 12.2kbps	Bottom Face	0cm	9262	1852.4	ON	19.38	20	1.153	0.126	0.926	1.068
107	WCDMA II	RMC 12.2kbps	Bottom Face	0cm	9400	1880	ON	19.13	20	1.222	-0.07	0.915	1.118
108	**WCDMA II**	**RMC 12.2kbps**	**Bottom Face**	**0cm**	**9538**	**1907.6**	ON	**19.3**	**20**	**1.175**	**-0.18**	**1.02**	**1.198**
109	WCDMA II	RMC 12.2kbps	Edge2	0cm	9262	1852.4	ON	19.38	20	1.153	-0.15	0.541	0.624
110	WCDMA II	RMC 12.2kbps	Curved surface of Edge2	0cm	9262	1852.4	ON	19.38	20	1.153	-0.079	0.891	1.028
111	WCDMA II	RMC 12.2kbps	Curved surface of Edge2	0cm	9400	1852.4	ON	19.13	20	1.222	0	0.899	1.098
112	WCDMA II	RMC 12.2kbps	Curved surface of Edge2	0cm	9538	1907.6	ON	19.3	20	1.175	0.03	0.997	1.171

<LTE SAR>

Plot No.	Band	BW (MHz)	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
79	LTE Band 17	10M	QPSK 1RB 0 offset	Bottom Face	1cm	23790	710	OFF	22.98	24	1.265	0.01	0.48	0.607
80	LTE Band 17	10M	QPSK 25RB 24 offset	Bottom Face	1cm	23800	711	OFF	22.2	23	1.202	-0.02	0.5	0.601
81	LTE Band 17	10M	QPSK 1RB 0 offset	Edge1	0cm	23790	710	OFF	22.98	24	1.265	-0.06	0.137	0.173
82	LTE Band 17	10M	QPSK 25RB 24 offset	Edge1	0cm	23800	711	OFF	22.2	23	1.202	0.05	0.112	0.135
83	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0.5cm	23790	710	OFF	22.98	24	1.265	-0.149	0.933	1.180
84	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0.5cm	23780	709	OFF	22.92	24	1.282	-0.07	0.882	1.131
85	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0.5cm	23800	711	OFF	22.97	24	1.268	-0.04	0.892	1.131
86	LTE Band 17	10M	QPSK 25RB 24 offset	Edge2	0.5cm	23800	711	OFF	22.2	23	1.202	-0.152	0.946	1.137
87	LTE Band 17	10M	QPSK 25RB 24 offset	Edge2	0.5cm	23780	709	OFF	22.04	23	1.247	0.02	0.922	1.150
88	LTE Band 17	10M	QPSK 25RB 24 offset	Edge2	0.5cm	23790	710	OFF	22.13	23	1.222	0.04	0.943	1.152
89	LTE Band 17	10M	QPSK 50RB 0 offset	Edge2	0.5cm	23800	711	OFF	22.2	23	1.202	0	0.933	1.122
90	LTE Band 17	10M	QPSK 1RB 0 offset	Edge3	0cm	23790	710	OFF	22.98	24	1.265	0.05	0.075	0.095
91	LTE Band 17	10M	QPSK 25RB 24 offset	Edge3	0cm	23800	711	OFF	22.2	23	1.202	-0.07	0.068	0.082
51	LTE Band 17	10M	QPSK 1RB 0 offset	Bottom Face	0cm	23800	711	ON	20.22	21	1.197	-0.001	1.03	1.233
52	LTE Band 17	10M	QPSK 1RB 0 offset	Bottom Face	0cm	23790	710	ON	20.12	21	1.225	-0.01	0.999	1.223
53	LTE Band 17	10M	QPSK 1RB 0 offset	Bottom Face	0cm	23780	709	ON	20.08	21	1.236	-0.01	0.868	1.073
54	LTE Band 17	10M	QPSK 25RB 0 offset	Bottom Face	0cm	23800	711	ON	20.19	21	1.205	-0.07	1.04	1.253
55	LTE Band 17	10M	QPSK 25RB 0 offset	Bottom Face	0cm	23790	710	ON	19.74	21	1.337	-0.03	0.983	1.314
56	LTE Band 17	10M	QPSK 25RB 0 offset	Bottom Face	0cm	23780	709	ON	19.95	21	1.274	0.01	0.931	1.186
57	LTE Band 17	10M	QPSK 50RB 0 offset	Bottom Face	0cm	23800	711	ON	20.16	21	1.213	-0.02	0.985	1.195
58	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0cm	23800	711	ON	20.22	21	1.197	-0.05	1.07	1.281
59	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0cm	23790	710	ON	20.12	21	1.225	-0.07	1.02	1.249
60	LTE Band 17	10M	QPSK 1RB 0 offset	Edge2	0cm	23780	709	ON	20.08	21	1.236	0.06	1.01	1.248
61	LTE Band 17	10M	QPSK 25RB 0 offset	Edge2	0cm	23800	711	ON	20.19	21	1.205	-0.04	0.921	1.110
62	LTE Band 17	10M	QPSK 25RB 0 offset	Edge2	0cm	23790	710	ON	19.74	21	1.337	-0.15	0.979	1.309
63	LTE Band 17	10M	QPSK 25RB 0 offset	Edge2	0cm	23780	709	ON	19.95	21	1.274	-0.02	1.02	1.299
64	LTE Band 17	10M	QPSK 50RB 0 offset	Edge2	0cm	23800	711	ON	20.16	21	1.213	-0.02	0.979	1.188
65	**LTE Band 17**	**10M**	**QPSK 1RB 0 offset**	**Curved surface of Edge2**	**0cm**	**23800**	**711**	**ON**	**20.22**	**21**	**1.197**	**-0.02**	**1.16**	**1.388**
66	LTE Band 17	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	23790	710	ON	20.12	21	1.225	-0.01	1.07	1.310
67	LTE Band 17	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	23780	709	ON	20.08	21	1.236	-0.141	1.03	1.273
68	LTE Band 17	10M	QPSK 25RB 0 offset	Curved surface of Edge2	0cm	23800	711	ON	20.19	21	1.205	-0.127	0.982	1.183
69	LTE Band 17	10M	QPSK 25RB 0 offset	Curved surface of Edge2	0cm	23790	710	ON	19.74	21	1.337	-0.187	0.891	1.191
70	LTE Band 17	10M	QPSK 25RB 0 offset	Curved surface of Edge2	0cm	23780	709	ON	19.95	21	1.274	-0.03	0.852	1.085
71	LTE Band 17	10M	QPSK 50RB 0 offset	Curved surface of Edge2	0cm	23800	711	ON	20.16	21	1.213	-0.03	1.11	1.347

Note:

1. Per KDB 941225 D05v02, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel.
2. 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the *reported* SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02, 16QAM SAR testing is not required.
3. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth.

Plot No.	Band	BW (MHz)	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
137	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	1cm	20175	1732.5	OFF	22.93	24	1.279	0.117	0.866	1.108
138	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	1cm	20000	1715	OFF	22.89	24	1.291	0.09	0.839	1.083
139	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	1cm	20350	1750	OFF	22.87	24	1.297	-0.09	0.845	1.096
140	LTE Band 4	10M	QPSK 25RB 12 offset	Bottom Face	1cm	20000	1715	OFF	22.12	23	1.225	0.152	0.757	0.927
141	LTE Band 4	10M	QPSK 25RB 12 offset	Bottom Face	1cm	20175	1732.5	OFF	21.9	23	1.288	0.02	0.754	0.971
142	LTE Band 4	10M	QPSK 25RB 12 offset	Bottom Face	1cm	20350	1750	OFF	21.77	23	1.327	0.04	0.74	0.982
143	LTE Band 4	10M	QPSK 50RB 0 offset	Bottom Face	1cm	20000	1715	OFF	22.03	23	1.250	-0.03	0.735	0.919
144	LTE Band 4	10M	QPSK 1RB 0 offset	Edge1	0cm	20175	1732.5	OFF	22.93	24	1.279	-0.09	0.169	0.216
145	LTE Band 4	10M	QPSK 25RB 12 offset	Edge1	0cm	20000	1715	OFF	22.12	23	1.225	-0.15	0.128	0.157
146	LTE Band 4	10M	QPSK 1RB 0 offset	Edge2	0.5cm	20175	1732.5	OFF	22.93	24	1.279	0.05	0.614	0.786
147	LTE Band 4	10M	QPSK 25RB 12 offset	Edge2	0.5cm	20000	1715	OFF	22.12	23	1.225	0.01	0.448	0.549
148	LTE Band 4	10M	QPSK 1RB 0 offset	Edge3	0cm	20175	1732.5	OFF	22.93	24	1.279	-0.16	0.105	0.134
149	LTE Band 4	10M	QPSK 25RB 12 offset	Edge3	0cm	20000	1715	OFF	22.12	23	1.225	-0.08	0.08	0.098
120	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	0cm	20175	1732.5	ON	18.83	19	1.040	0.159	1.03	1.071
121	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	0cm	20000	1715	ON	18.67	19	1.079	-0.05	1.05	1.133
122	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	0cm	20350	1750	ON	18.77	19	1.054	-0.01	0.96	1.012
123	LTE Band 4	10M	QPSK 25RB 0 offset	Bottom Face	0cm	20350	1750	ON	18.61	19	1.094	-0.02	0.968	1.059
124	LTE Band 4	10M	QPSK 25RB 0 offset	Bottom Face	0cm	20175	1732.5	ON	18.41	19	1.146	0.01	1.01	1.157
125	LTE Band 4	10M	QPSK 25RB 0 offset	Bottom Face	0cm	20000	1715	ON	18.37	19	1.156	-0.154	0.998	1.154
126	LTE Band 4	10M	QPSK 50RB 0 offset	Bottom Face	0cm	20175	1732.5	ON	18.35	19	1.161	-0.146	0.99	1.150
127	LTE Band 4	10M	QPSK 1RB 0 offset	Edge2	0cm	20175	1732.5	ON	18.83	19	1.040	-0.13	0.636	0.661
128	LTE Band 4	10M	QPSK 25RB 0 offset	Edge2	0cm	20350	1750	ON	18.61	19	1.094	-0.01	0.605	0.662
129	LTE Band 4	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	20175	1732.5	ON	18.83	19	1.040	0.136	0.916	0.953
130	LTE Band 4	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	20000	1715	ON	18.67	19	1.079	-0.02	0.996	1.075
131	LTE Band 4	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	20350	1750	ON	18.77	19	1.054	0.02	0.974	1.027
132	LTE Band 4	10M	QPSK 25RB 0 offset	Curved surface of Edge2	0cm	20350	1750	ON	18.61	19	1.094	0	0.989	1.082
133	LTE Band 4	10M	QPSK 25RB 0 offset	Curved surface of Edge2	0cm	20175	1732.5	ON	18.41	19	1.146	0.01	0.959	1.099
134	**LTE Band 4**	10M	**QPSK 25RB 0 offset**	**Curved surface of Edge2**	**0cm**	**20000**	**1715**	**ON**	**18.37**	**19**	**1.156**	**0**	**1.01**	**1.168**
135	LTE Band 4	10M	QPSK 50RB 0 offset	Curved surface of Edge2	0cm	20175	1732.5	ON	18.35	19	1.161	-0.01	1	1.161

Note:

1. Per KDB 941225 D05v02, when reported SAR of 1RB and 50%RB allocation for QPSK >0.8W/kg for any exposure position, SAR testing of 100%RB allocation for QPSK is performed at the highest power channel.
2. 16QAM output power for each RB allocation configuration is > not ½ dB higher than the same configuration in QPSK and the *reported* SAR for the QPSK configuration is ≤ 1.45 W/kg; Per KDB 941225 D05v02, 16QAM SAR testing is not required.
3. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth.

<WLAN SAR - DTS>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Duty Cycle Compensated SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
11	WLAN2.4GHz	802.11b	Bottom Face	0cm	11	2462	17.78	18	1.052	100	1.000	-0.02	1.07	1.070	1.126
12	WLAN2.4GHz	802.11b	Bottom Face	0cm	1	2412	17.66	18	1.081	100	1.000	-0.02	0.929	0.990	1.005
13	WLAN2.4GHz	802.11b	Bottom Face	0cm	6	2437	17.72	18	1.067	100	1.000	0	0.839	0.929	0.895
14	WLAN2.4GHz	802.11b	Edge1	0cm	11	2462	17.78	18	1.052	100	1.000	-0.01	0.702	0.839	0.738
25	WLAN 5.8GHz	802.11a	Bottom Face	0cm	165	5825	13.47	13.5	1.007	93.17	1.073	-0.09	0.35	0.376	0.379
26	**WLAN 5.8GHz**	**802.11a**	**Edge1**	**0cm**	**165**	**5825**	**13.47**	**13.5**	**1.007**	**93.17**	**1.073**	**0.04**	**0.378**	**0.406**	**0.409**

<WLAN SAR - NII>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle %	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Duty Cycle Compensated SAR_{1g} (W/kg)	Scaled SAR_{1g} (W/kg)
19	**WLAN 5.2GHz**	**802.11a**	**Bottom Face**	**0cm**	**44**	**5220**	**13.41**	**13.5**	**1.021**	**93.17**	**1.073**	**-0.12**	**0.338**	**0.363**	**0.371**
20	WLAN 5.2GHz	802.11a	Edge1	0cm	44	5220	13.41	13.5	1.021	93.17	1.073	0.04	0.31	0.333	0.340
21	**WLAN 5.3GHz**	**802.11a**	**Bottom Face**	**0cm**	**60**	**5300**	**13.37**	**13.5**	**1.030**	**93.17**	**1.073**	**-0.028**	**0.532**	**0.571**	**0.588**
22	WLAN 5.3GHz	802.11a	Edge1	0cm	60	5300	13.37	13.5	1.030	93.17	1.073	0.07	0.343	0.368	0.379
23	WLAN 5.5GHz	802.11a	Bottom Face	0cm	116	5580	13.41	13.5	1.021	93.17	1.073	0.02	0.41	0.440	0.449
153	**WLAN 5.5GHz**	**802.11a**	**Bottom Face**	**0cm**	**108**	**5540**	**13.4**	**13.5**	**1.023**	**93.17**	**1.073**	**-0.05**	**0.704**	**0.756**	**0.774**
154	WLAN 5.5GHz	802.11a	Bottom Face	0cm	136	5680	13.38	13.5	1.028	93.17	1.073	0.03	0.55	0.590	0.607
24	WLAN 5.5GHz	802.11a	Edge1	0cm	116	5580	13.41	13.5	1.021	93.17	1.073	0.13	0.379	0.407	0.416
155	WLAN 5.5GHz	802.11a	Edge1	0cm	108	**5540**	13.4	13.5	1.023	93.17	1.073	-0.16	0.493	0.529	0.541
156	WLAN 5.5GHz	802.11a	Edge1	0cm	136	5680	13.38	13.5	1.028	93.17	1.073	-0.14	0.597	0.641	0.659

12.2 Repeated SAR Measurement

Plot No.	Band	BW (MHz)	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Ratio	Scaled SAR_{1g} (W/kg)
1	WCDMA V	-	RMC 12.2kbps	Bottom Face	0cm	4132	826.4	ON	19.71	21	1.346	0	1.07	1	1.440
4	WCDMA V	-	RMC 12.2kbps	Bottom Face	0cm	4132	826.4	ON	19.71	21	1.346	-0.02	1.06	1.009	1.427
108	WCDMA II	-	RMC 12.2kbps	Bottom Face	0cm	9538	1907.6	ON	19.3	20	1.175	-0.18	1.02	1	1.198
113	WCDMA II	-	RMC 12.2kbps	Bottom Face	0cm	9538	1907.6	ON	19.3	20	1.175	0.18	0.928	1.099	1.090
65	LTE Band 17	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	23800	711	ON	20.22	21	1.197	-0.02	1.16	1	1.388
98	LTE Band 17	10M	QPSK 1RB 0 offset	Curved surface of Edge2	0cm	23800	711	ON	20.22	21	1.197	-0.09	1.13	1.026	1.352
121	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	0cm	20000	1715	ON	18.67	19	1.079	-0.05	1.05	1	1.133
136	LTE Band 4	10M	QPSK 1RB 0 offset	Bottom Face	0cm	20000	1715	ON	18.67	19	1.079	-0.03	0.951	1.104	1.026
11	WLAN2.4GHz	-	802.11b	Bottom Face	0cm	11	2462	-	17.78	18	1.052	-0.02	1.07	1	1.126
18	WLAN2.4GHz	-	802.11b	Bottom Face	0cm	11	2462	-	17.78	18	1.052	0.01	0.99	1.08	1.041

Note:

1. Per KDB 865664 D01v01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01, among the original measurement and the repeated measurement, if the ratio of the highest measured data to the lowest measured data is ≤1.2, and the measured SAR <1.45W/kg, only one repeated measurement is required
3. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

12.3 Highest SAR Plot

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/19

#02_WCDMA V_RMC 12.2K_Bottom Face_0cm_Ch4182

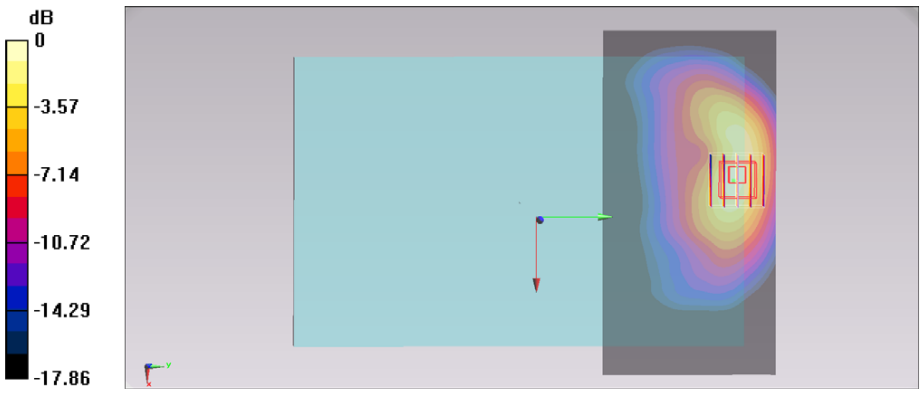
DUT: 311130

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850_121219 Medium parameters used: f = 836.4 MHz; σ = 0.999 mho/m; ε_r = 55.965; ρ = 1000 kg/m^3
Ambient Temperature：22.7 ℃; Liquid Temperature：21.7 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3270; ConvF(6.16, 6.16, 6.16); Calibrated: 2012/9/28;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2012/8/27
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

Configuration/Ch4182/Area Scan (141x71x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.13 mW/g

Configuration/Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 36.865 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 1.895 mW/g
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.553 mW/g
Maximum value of SAR (measured) = 1.29 mW/g



0 dB = 1.29 mW/g = 2.21 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/1/11

#108_WCDMA II_RMC 12.2K_Bottom Face_0cm_Ch9538

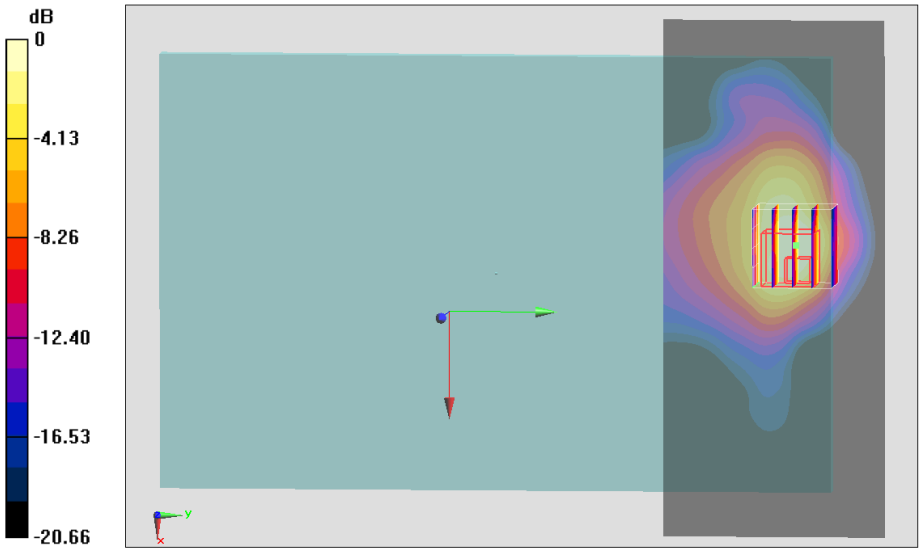
DUT: 311130

Communication System: WCDMA; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130111 Medium parameters used: f = 1908 MHz; σ = 1.553 mho/m; ε_r = 51.91; ρ = 1000 kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.58, 4.58, 4.58); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1127
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch9538/Area Scan (141x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.27 mW/g

Configuration/Ch9538/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.880 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 2.128 mW/g
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.522 mW/g
Maximum value of SAR (measured) = 1.14 mW/g



0 dB = 1.14 mW/g = 1.14 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/21

#65_LTE Band 17_10M_QPSK 1RB 0 offset_Curved surface of Edge 2_0cm_Ch23800

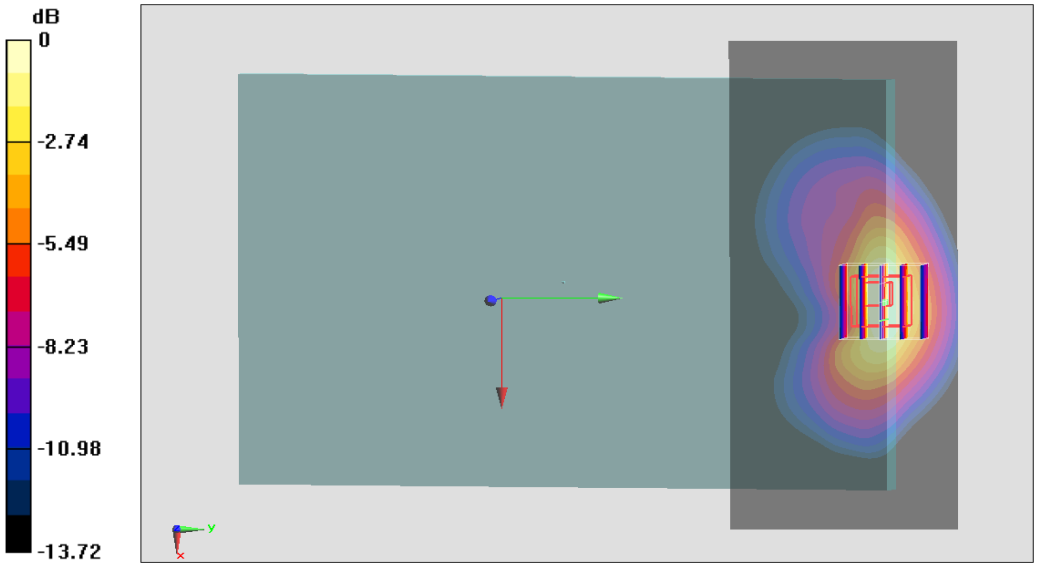
DUT: 311130

Communication System: LTE; Frequency: 711 MHz;Duty Cycle: 1:1
Medium: MSL_750_121221 Medium parameters used: f = 711 MHz; σ = 0.935 mho/m; ε_r = 54.837; ρ = 1000 kg/m^3
Ambient Temperature：22.2 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.2, 6.2, 6.2); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1127
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch23800/Area Scan (141x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.42 mW/g

Configuration/Ch23800/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 37.943 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.418 mW/g
SAR(1 g) = 1.16 mW/g; SAR(10 g) = 0.589 mW/g
Maximum value of SAR (measured) = 1.19 mW/g



0 dB = 1.19 mW/g = 1.51 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/1/12

#134_LTE Band 4_10M_QPSK 25RB 0 offset_Curved surface of Edge 2_0cm_Ch20000

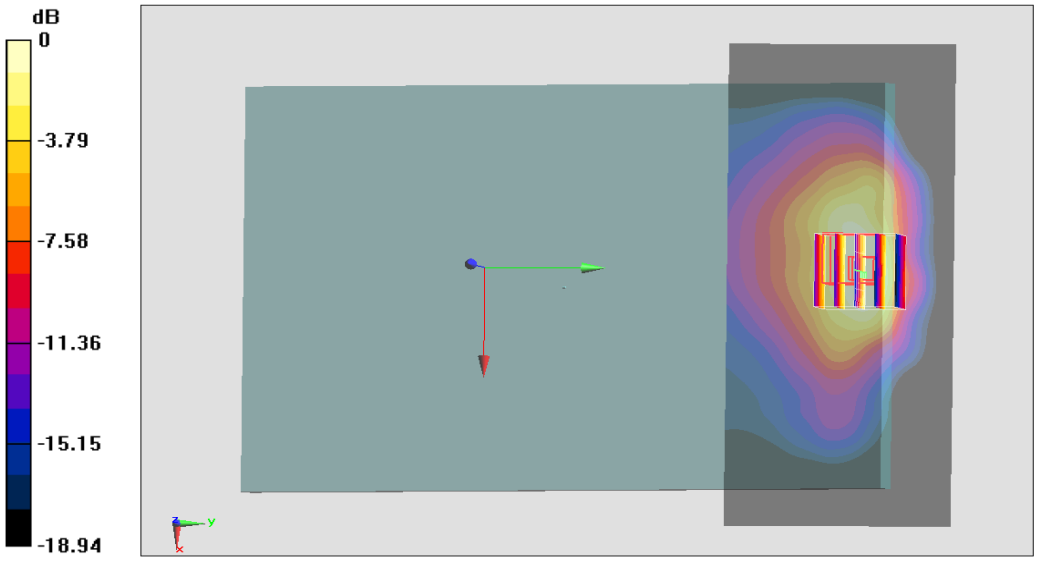
DUT: 311130

Communication System: LTE; Frequency: 1715 MHz;Duty Cycle: 1:1
Medium: MSL_1750_130112 Medium parameters used: f = 1715 MHz; σ = 1.506 mho/m; ε_r = 51.614; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(4.81, 4.81, 4.81); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v4.0; Type: QDOVA001BB; Serial: TP:1127
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch20000/Area Scan (141x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.30 mW/g

Configuration/Ch20000/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 29.377 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.921 mW/g
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.559 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



0 dB = 1.10 mW/g = 0.83 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/20

#11_WLAN2.4G_802.11b_Bottom Face_0cm_Ch11

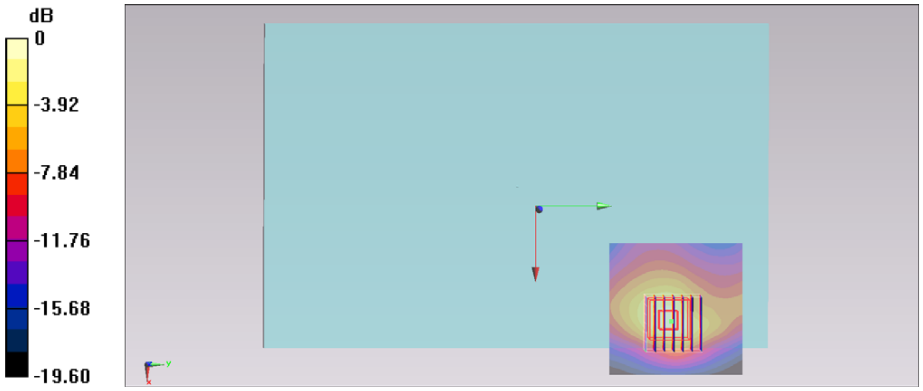
DUT: 311130

Communication System: 802.11b; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium: MSL_2450_121220 Medium parameters used: f = 2462 MHz; σ = 1.88 mho/m; ε_r = 51.791; ρ = 1000 kg/m^3
Ambient Temperature：22.4 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3270; ConvF(4.17, 4.17, 4.17); Calibrated: 2012/9/28;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2012/8/27
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

Configuration/Ch11/Area Scan (61x61x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 1.56 mW/g

Configuration/Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.935 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.537 mW/g
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.492 mW/g
Maximum value of SAR (measured) = 1.39 mW/g



0 dB = 1.39 mW/g = 2.86 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/21

#19_WLAN5G_802.11a_Bottom Face_0cm_Ch44

DUT: 311130

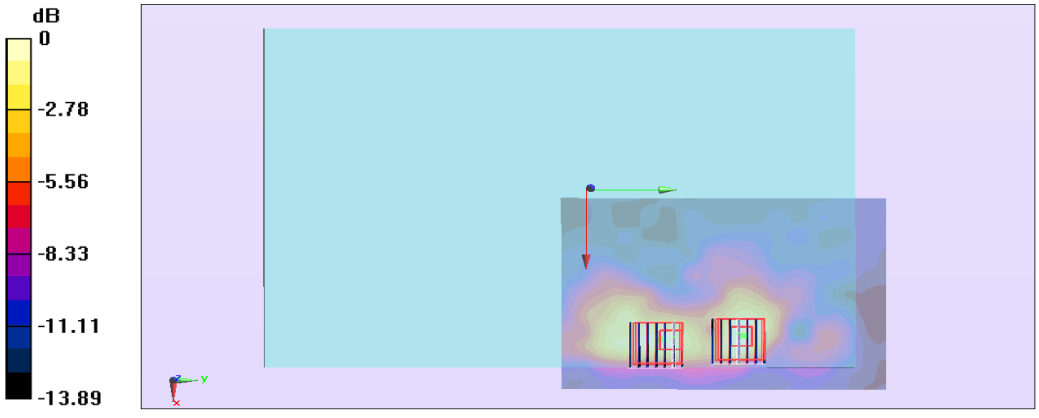
Communication System: 802.11a; Frequency: 5220 MHz;Duty Cycle: 1:1.073
Medium: MSL_5G_121221 Medium parameters used: f = 5220 MHz; σ = 5.257 mho/m; ε_r = 47.44; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.2, 4.2, 4.2); Calibrated: 2012/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1029
- Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.5 (6469)

Configuration/Ch44/Area Scan (101x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.772 mW/g

Configuration/Ch44/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 13.772 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.260 mW/g
SAR(1 g) = 0.338 mW/g; SAR(10 g) = 0.127 mW/g
Maximum value of SAR (measured) = 0.753 mW/g

Configuration/Ch44/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 13.772 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 1.028 mW/g
SAR(1 g) = 0.255 mW/g; SAR(10 g) = 0.112 mW/g
Maximum value of SAR (measured) = 0.576 mW/g



0 dB = 0.576 mW/g = -4.79 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/21

#21_WLAN5G_802.11a_Bottom Face_0cm_Ch60

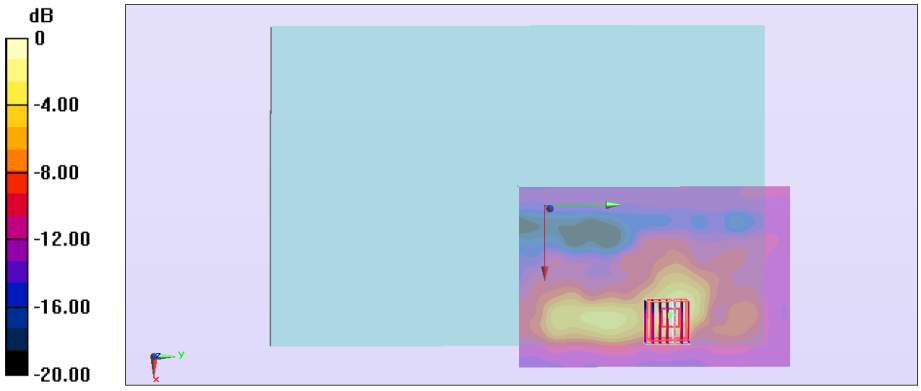
DUT: 311130

Communication System: 802.11a; Frequency: 5300 MHz;Duty Cycle: 1:1.073
Medium: MSL_5G_121221 Medium parameters used: f = 5300 MHz; σ = 5.38 mho/m; ε_r = 47.244; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(4.01, 4.01, 4.01); Calibrated: 2012/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1029
- Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.5 (6469)

Configuration/Ch60/Area Scan (101x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.22 mW/g

Configuration/Ch60/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 17.364 V/m; Power Drift = -0.028 dB
Peak SAR (extrapolated) = 1.986 mW/g
SAR(1 g) = 0.532 mW/g; SAR(10 g) = 0.195 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.17 mW/g = 1.36 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/1/18

#153_WLAN5G_802.11a_Bottom Face_0cm_Ch108

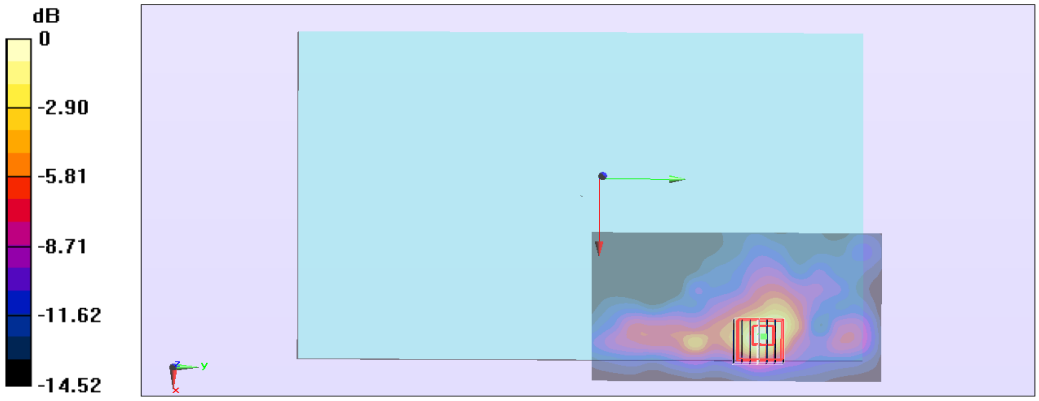
DUT: 311130

Communication System: 802.11a; Frequency: 5540 MHz;Duty Cycle: 1:1.073
Medium: MSL_5G_130118 Medium parameters used: f = 5540 MHz; σ = 5.801 mho/m; ε_r = 46.888; ρ = 1000 kg/m^3
Ambient Temperature：22.3 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.81, 3.81, 3.81); Calibrated: 2012/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1029
- Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.5 (6469)

Configuration/Ch108/Area Scan (81x141x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 1.70 mW/g

Configuration/Ch108/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 19.359 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.924 mW/g
SAR(1 g) = 0.704 mW/g; SAR(10 g) = 0.263 mW/g
Maximum value of SAR (measured) = 1.64 mW/g



0 dB = 1.64 mW/g = 4.30 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012/12/21

#26_WLAN5G_802.11a_Edge1_0cm_Ch165

DUT: 311130

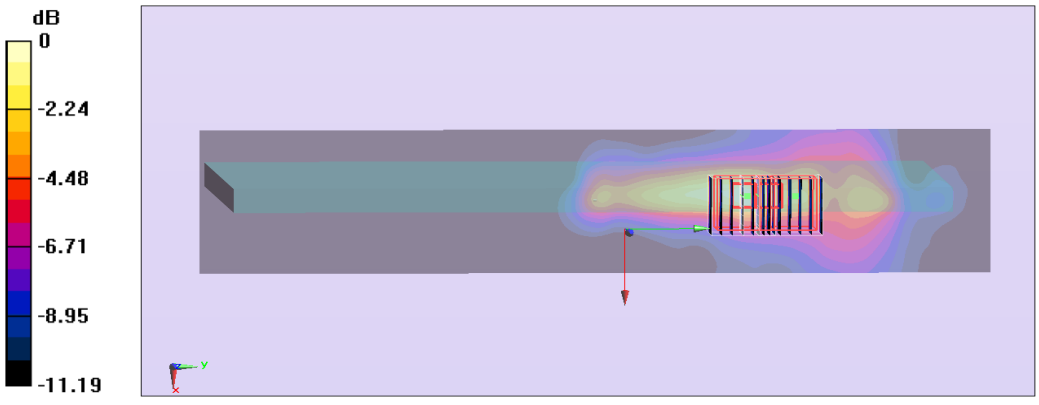
Communication System: 802.11a; Frequency: 5825 MHz;Duty Cycle: 1:1.073
Medium: MSL_5G_121221 Medium parameters used: f = 5825 MHz; σ = 6.193 mho/m; ε_r = 46.405; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3792; ConvF(3.89, 3.89, 3.89); Calibrated: 2012/6/21;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1338; Calibrated: 2012/6/12
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1029
- Measurement SW: DASY52, Version 52.8 (3);SEMCAD X Version 14.6.5 (6469)

Configuration/Ch165/Area Scan (61x301x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.739 mW/g

Configuration/Ch165/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 13.392 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.172 mW/g
SAR(1 g) = 0.378 mW/g; SAR(10 g) = 0.165 mW/g
Maximum value of SAR (measured) = 0.787 mW/g

Configuration/Ch165/Zoom Scan (7x7x7)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 13.392 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 1.098 mW/g
SAR(1 g) = 0.311 mW/g; SAR(10 g) = 0.146 mW/g
Maximum value of SAR (measured) = 0.749 mW/g



0 dB = 0.749 mW/g = -2.51 dB mW/g

12.4 Simultaneous Multi-band Transmission Analysis

No.	Applicable Simultaneous Transmission Combination
1.	WCDMA/LTE (data) + WLAN 2.4GHz (hotspot/ Ad-hoc/ WiFi Direct)
2.	WCDMA/LTE (data) + WLAN 5.8GHz (hotspot/ Ad-hoc/ WiFi Direct)
3.	WCDMA/LTE (data) + Bluetooth

Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, they will not transmit simultaneously.
3. This device, WLAN 2.4GHz and 5.8GHz supports hotspot/ Ad-hoc/ WiFi Direct operation; WLAN 5.2/ 5.3/ 5.5 GHz does not support those operations. WWAN transmitter would transmit simultaneously with WLAN 2.4GHz and 5.8GHz only.
4. The Scaled SAR summation is calculated based on the same configuration and test position.
5. Per KDB 447498 D01v05, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
   If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg

6. Per KDB 447498 D01v05, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{}$f(GHz)/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Bluetooth SAR is estimated below.

Max Power	Exposure Position	Bottom Face	Bottom Face	Edge 1	Edge 2	Edge 2	Edge 3
	Test separation	0 mm	10 mm	0 mm	0 mm	5 mm	0 mm
7.5 dBm	Antenna to user distance	5 mm	10 mm	5 mm	40 mm	45 mm	165 mm
	Estimated SAR (W/kg)	0.236W/kg	0.118W/kg	0.236 W/kg	0.03W/kg	0.026W/kg	0.4W/kg

<Tablet PC mode>

<WWAN+WLAN2.4GHz-DTS>

Position	WWAN			WLAN-DTS		2 TX SAR summation (W/kg)	SPLSR	Case No
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Plot No	Max. Reported SAR (W/kg)			
Bottom Face At 1cm	WCDMA V	72	0.847	11	1.126	**1.97**	**0.03**	**#3**
	WCDMA II	99	0.72	11	1.126	**1.85**	**0.03**	**#5**
	LTE Band 17	79	0.607	11	1.126	**1.73**	**0.03**	**#4**
	LTE Band 4	137	1.108	11	1.126	**2.23**	**0.03**	**#8**
Edge2 At 0.5cm	WCDMA V	75	1.37			1.37		
	WCDMA II	103	1.13			1.13		
	LTE Band 17	83	1.18			1.18		
	LTE Band 4	146	0.846			0.85		
Bottom Face At 0cm	WCDMA V	2	1.453	11	1.126	**2.58**	**0.04**	**#2**
	WCDMA II	108	1.198	11	1.126	**2.32**	**0.04**	**#6**
	LTE Band 17	55	1.314	11	1.126	**2.44**	**0.04**	**#1**
	LTE Band 4	124	1.157	11	1.126	**2.28**	**0.04**	**#7**
Edge1 At 0cm	WCDMA V	92	0.169	14	0.738	**0.91**		
	WCDMA II	100	0.22	14	0.738	**0.96**		
	LTE Band 17	81	0.173	14	0.738	**0.91**		
	LTE Band 4	144	0.216	14	0.738	**0.95**		
Edge2 At 0cm	WCDMA V	5	0.89			**0.89**		
	WCDMA II	109	0.624			**0.62**		
	LTE Band 17	62	1.309			**1.31**		
	LTE Band 4	127	0.661			**0.66**		
Edge3 At 0cm	WCDMA V	93	0.191			**0.19**		
	WCDMA II	104	0.113			**0.11**		
	LTE Band 17	90	0.095			**0.10**		
	LTE Band 4	148	0.134			**0.13**		

<Tablet PC mode>

<WWAN + WLAN5.8GHz - DTS>

Position	WWAN			WLAN-DTS		2 TX SAR summation (W/kg)	SPLSR	Case No
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Plot No	Max. Reported SAR (W/kg)			
Bottom Face At 1cm	WCDMA V	72	0.847	25	0.379	**1.23**		
	WCDMA II	99	0.72	25	0.379	**1.10**		
	LTE Band 17	79	0.607	25	0.379	**0.99**		
	LTE Band 4	137	1.108	25	0.379	**1.49**		
Edge2 At 0.5cm	WCDMA V	72	1.37			**1.37**		
	WCDMA II	103	1.13			**1.13**		
	LTE Band 17	83	1.18			**1.18**		
	LTE Band 4	146	0.846			**0.85**		
Bottom Face At 0cm	WCDMA V	2	1.453	25	0.379	**1.83**	**0.02**	**#9**
	WCDMA II	108	1.198	25	0.379	**1.58**		
	LTE Band 17	55	1.314	25	0.379	**1.69**	**0.02**	**#10**
	LTE Band 4	124	1.157	25	0.379	**1.54**		
Edge1 At 0cm	WCDMA V	92	0.169	26	0.409	**0.58**		
	WCDMA II	100	0.22	26	0.409	**0.63**		
	LTE Band 17	81	0.173	26	0.409	**0.58**		
	LTE Band 4	144	0.216	26	0.409	**0.63**		
Edge2 At 0cm	WCDMA V	5	0.89			**0.89**		
	WCDMA II	109	0.624			**0.62**		
	LTE Band 17	62	1.309			**1.31**		
	LTE Band 4	127	0.661			**0.66**		
Edge3 At 0cm	WCDMA V	93	0.191			**0.19**		
	WCDMA II	104	0.113			**0.11**		
	LTE Band 17	90	0.095			**0.10**		
	LTE Band 4	148	0.134			**0.13**		

<Tablet PC mode>

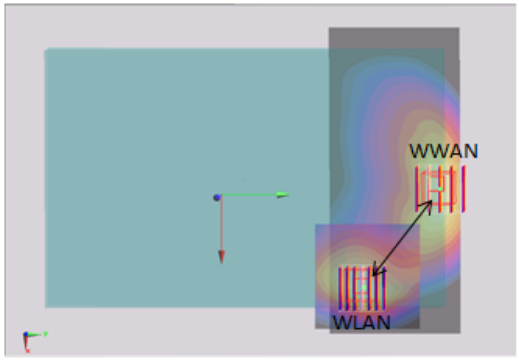
<WWAN + Bluetooth 2.4GHz>

	WWAN			Bluetooth-DSS	2 TX SAR summation (W/kg)	SPLSR	Case No
Position	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Estimated SAR (W/kg)			
Bottom Face At 1cm	WCDMA V	72	0.847	0.118	**0.97**		
	WCDMA II	99	0.72	0.118	**0.84**		
	LTE Band 17	79	0.607	0.118	**0.73**		
	LTE Band 4	137	1.108	0.118	**1.23**		
Edge2 At 0.5cm	WCDMA V	72	1.37	0.026	**1.40**		
	WCDMA II	103	1.13	0.026	**1.16**		
	LTE Band 17	83	1.18	0.026	**1.21**		
	LTE Band 4	146	0.846	0.026	**0.87**		
Bottom Face At 0cm	WCDMA V	2	1.453	0.236	**1.69**	**0.02**	**#12**
	WCDMA II	108	1.198	0.236	**1.43**		
	LTE Band 17	55	1.314	0.236	**1.55**		
	LTE Band 4	124	1.157	0.236	**1.39**		
Edge1 At 0cm	WCDMA V	92	0.169	0.236	**0.41**		
	WCDMA II	100	0.22	0.236	**0.46**		
	LTE Band 17	81	0.173	0.236	**0.41**		
	LTE Band 4	144	0.216	0.236	**0.45**		
Edge2 At 0cm	WCDMA V	5	0.89	0.03	**0.92**		
	WCDMA II	109	0.624	0.03	**0.65**		
	LTE Band 17	62	1.309	0.03	**1.34**		
	LTE Band 4	127	0.661	0.03	**0.69**		
Edge3 At 0cm	WCDMA V	93	0.191	0.4	**0.63**		
	WCDMA II	104	0.113	0.4	**0.51**		
	LTE Band 17	90	0.095	0.4	**0.5**		
	LTE Band 4	148	0.134	0.4	**0.53**		

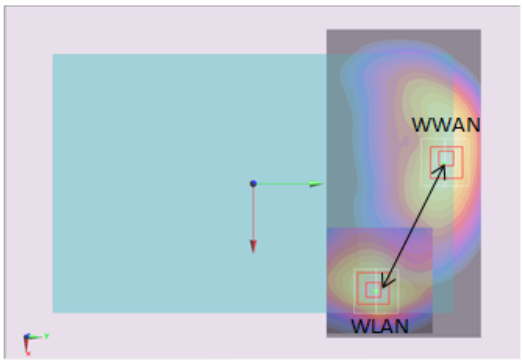
12.5 Simultaneous analysis - SPLSR calculation

<WWAN+WLAN2.4GHz>

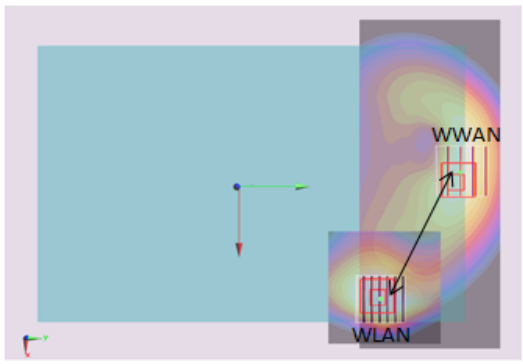
Case 01 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
55	LTE Band 17	Bottom face	1.314	0	-0.003	0.13	-0.18	89.3	2.44	0.04	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



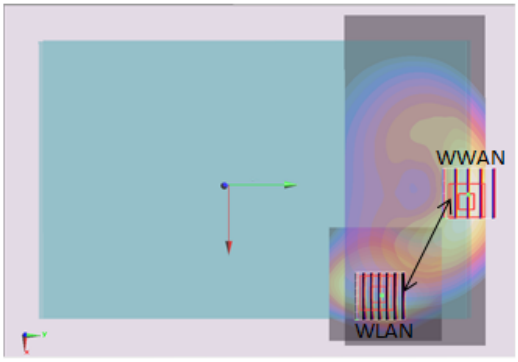
Case 02 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
2	WCDMA V	Bottom face	1.453	0	-0.0225	0.13	-0.175	106.4	2.58	0.04	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



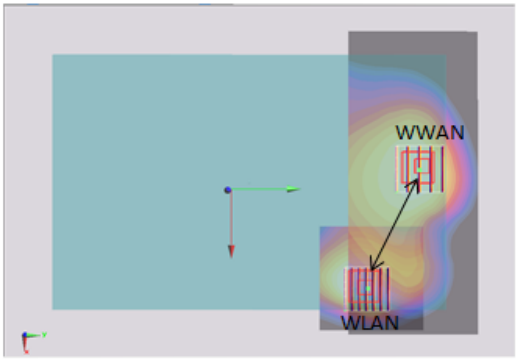
Case 03 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
72	WCDMA V	Bottom face	0.847	1	-0.0005	0.136	-0.178	90.5	1.97	0.03	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



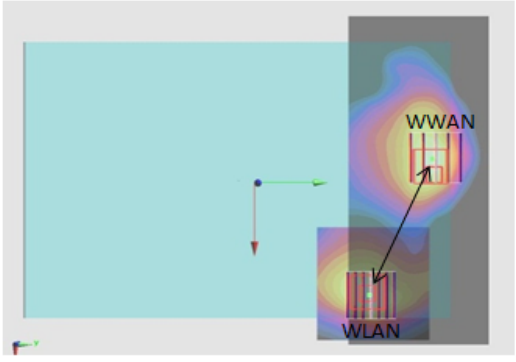
Case 04 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
79	LTE Band 17	Bottom face	0.607	1	0.016	0.141	-0.178	81.1	1.73	0.03	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



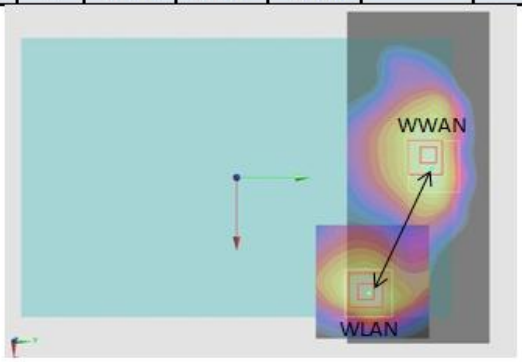
Case 05 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
99	WCDMA II	Bottom face	0.72	1	-0.01	0.121	-0.179	91.3	1.85	0.03	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



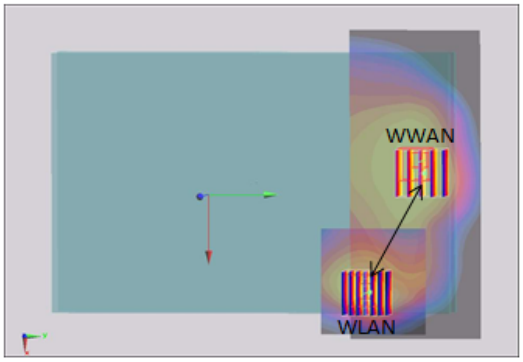
Case 06 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
108	WCDMA II	Bottom face	1.198	0	0.0015	0.125	-0.178	82.8	2.32	0.04	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				



Case 07 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
124	LTE Band 4	Bottom face	1.157	0	-0.015	0.125	-0.178	97.5	2.28	0.04	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				

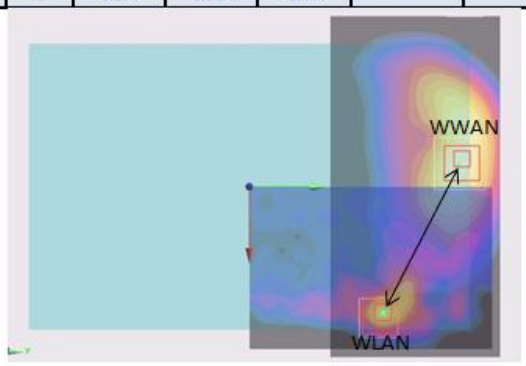


Case 8 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
137	LTE Band 4	Bottom face	1.108	1	-0.0165	0.122	-0.179	97.6	2.23	0.03	Not required
11	WLAN2.4GHz		1.126	0	0.0732	0.0836	-0.176				

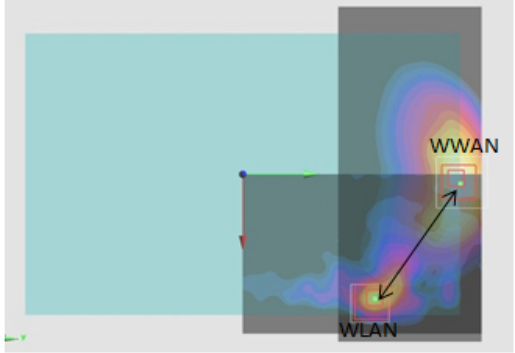


<WWAN+WLAN 5.8GHz>

Case 09 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
2	WCDMA V	Bottom face	1.453	0	-0.0225	0.13	-0.175	109.6	1.83	0.02	Not required
25	WLAN5GHz		0.379	0	0.077	0.084	-0.177				

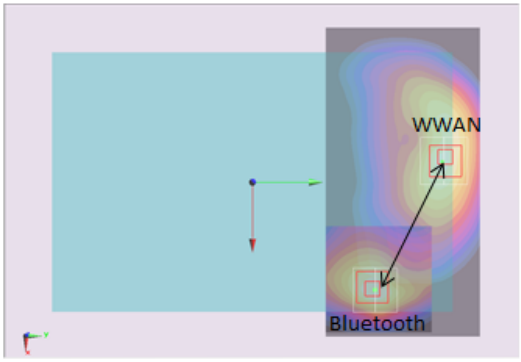


Case 10 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
55	LTE Band 17	Bottom face	1.314	0	-0.003	0.13	-0.18	92.3	1.69	0.02	Not required
25	WLAN5GHz		0.379	0	0.077	0.084	-0.177				



<WWAN + Bluetooth>

Case 12 / Plot No	Band	Position	SAR (W/kg)	Gap (cm)	SAR peak location (m) X	Y	Z	3D distance (mm)	Pair SAR sum (W/kg)	SPLSR	Simultaneous SAR
2	WCDMA V	Bottom face	1.453	0	-0.0225	0.13	-0.175	106.4	1.69	0.02	Not required
Bluetooth			0.236	0	0.0732	0.0836	-0.176				



Remark

1. For SPLSR calculation Bluetooth SAR peak position is estimated using WLAN 2.4GHz peak location, due to the WLAN and Bluetooth shares the same RF trace to the same antenna, and the operational frequency range is the same.

Test Engineer： Jack Wu, Angelo Chang, San Lin, Ken Li, Nick Yu, Ted Sun, Bevis Chang, Vic Yang, Bevis Chang, and Michael Yang

13. 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
Multi-plying Factor[(a)]	1/k[(b)]	1/√3	1/√6	1/√2

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

(b) κ is the coverage factor

Table 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 purpose of this document, a coverage factor two is used, which corresponds to confidence interval of about 95 %. The DASY uncertainty Budget is shown in the following tables.

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

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

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

Table 12.3 Uncertainty Budget of DASY for frequency range 3 GHz to 6 GHz

14. 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 v05, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, October 2012

[8] FCC KDB 865664 D01 v01, “SAR Measurement Requirements for 100MHz to 6GHz”, October 2012

[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 D02 v02 "3GPP R6 HSPA and R7 HSPA+ SAR Guidance", December 2009.

[11] FCC KDB 941225 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE”, December 2008

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

[13] FCC KDB 941225 D05 v02, “SAR Test Considerations for LTE Handsets and Data Modems”, October 24 2012

[14] FCC KDB 941225 D06 v01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", April 2011

[15] FCC KDB 616217 D04 v01, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, October 2012.

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.