FCC SAR Test Report

APPLICANT : ZTE CORPORATION
EQUIPMENT : LTE/CDMA HOTSPOT
BRAND NAME : ZTE
MODEL NAME : MF96U
FCC ID : SRQ-MF96U
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003

The product was completely tested on Nov. 04, 2013. We, SPORTON INTERNATIONAL (XI'AN) 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 (XI'AN) INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

ilac-MRA

TAF Testing Laboratory 2627

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3O2302	Rev. 01	Initial issue of report	Nov. 26, 2013

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION DUT: LTE/CDMA HOTSPOT, Brand Name: ZTE, Model Name: MF96U** are as follows.

<Highest SAR Summary>

Exposure Position	Frequency Band	Reported 1g-SAR (W/kg)	Equipment Class	Highest Reported 1g-SAR (W/kg)
Body (Separation 1cm)	CDMA 2000 BC0	**0.71**	PCB	**1.46**
	CDMA 2000 BC1	**1.46**		
	LTE Band 4	**1.31**		
	LTE Band 5	**0.80**		
	LTE Band 12	**0.60**		
	LTE Band 17	**0.62**		
	WLAN 2.4GHz Band	**0.10**	DTS	**0.10**

<Highest Simultaneous transmission SAR>

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
CDMA2000 BC1	PCB	Body (Separation 1cm)	**1.46**
WLAN 2.4GHz Band	DTS		

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.

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (XI'AN) INC.
Test Site Location	1F, Building A3, No. 39 Chuangye Rd., Xi'an Hi-teck Zone, Shanxi Province, P. R. C. TEL: +86-029-8860-8767 FAX: +86-029-8860-8791

2.2 Applicant

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

2.3 Manufacturer

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

2.4 Application Details

Date of Start during the Test	Oct. 30, 2013
Date of End during the Test	Nov. 04, 2013

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	LTE/CDMA HOTSPOT
Brand Name	ZTE
Model Name	MF96U
FCC ID	SRQ-MF96U
Wireless Technology and Frequency Range	CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	• CDMA2000 : 1xRTT/1xEv-Do(Rel.0)/1xEv-Do(Rev. A) • LTE: QPSK, 16QAM • 802.11b/g/n HT20
Antenna Type	WWAN: LDS Antenna WLAN: LDS Antenna
HW Version	xs5A
SW Version	USCC_MF96U_V1.0.0B01
EUT Stage	Identical Prototype

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. 802.11n- HT40 is not supported in 2.4GHz frequency band.
4. This device, WLAN 2.4GHz supports hotspot operation.

3.2 Maximum RF output power among production units

Maximum Average Power for Production Unit (dBm)		
Mode / Band	CDMA2000 BC0	CDMA2000 BC1
1xRTT RC1 SO55	24	24
1xRTT RC3 SO55	24	24
1xRTT RC3 SO32 (+ F-SCH)	24	24
1xRTT RC3 SO32 (+SCH)	24	24
1xEV-DO Rev 0 (RTAP 153.6kbps)	25	23.8
1xEV-DO Rev A (RETAP 4096bits)	24	24

Maximum Target Average Power for Production Unit (dBm)			
Mode / Band	IEEE 802.11		
	b	g	n-HT20
WLAN 2.4GHz Band	14	15	16

LTE Band 12				
average power(dBm)				
Modulation	**BW (MHz)**	**RB size**	**Target MPR**	**Target Power**
QPSK	10	≤ 12	**0**	**24**
QPSK	10	> 12	**1**	**23**
16QAM	10	≤ 12	**1**	**23**
16QAM	10	> 12	**2**	**22**
QPSK	5	≤ 8	**0**	**24**
QPSK	5	> 8	**1**	**23**
16QAM	5	≤ 8	**1**	**23**
16QAM	5	> 8	**2**	**22**
QPSK	3	≤ 4	**0**	**24**
QPSK	3	> 4	**1**	**23**
16QAM	3	≤ 4	**1**	**23**
16QAM	3	> 4	**2**	**22**
QPSK	1.4	≤ 5	**0**	**24**
QPSK	1.4	> 5	**1**	**23**
16QAM	1.4	≤ 5	**1**	**23**
16QAM	1.4	> 5	**2**	**22**

LTE Band 17				
average power(dBm)				
Modulation	**BW (MHz)**	**RB size**	**Target MPR**	**Target Power**
QPSK	10	≤ 12	**0**	**24**
QPSK	10	> 12	**1**	**23**
16QAM	10	≤ 12	**1**	**23**
16QAM	10	> 12	**2**	**22**
QPSK	5	≤ 8	**0**	**24**
QPSK	5	> 8	**1**	**23**
16QAM	5	≤ 8	**1**	**23**
16QAM	5	> 8	**2**	**22**

LTE Band 5				
average power(dBm)				
Modulation	**BW (MHz)**	**RB size**	**Target MPR**	**Target Power**
QPSK	10	≤ 12	**0**	**24.5**
QPSK	10	> 12	**1**	**23.5**
16QAM	10	≤ 12	**1**	**23.5**
16QAM	10	> 12	**2**	**22.5**
QPSK	5	≤ 8	**0**	**24.5**
QPSK	5	> 8	**1**	**23.5**
16QAM	5	≤ 8	**1**	**23.5**
16QAM	5	> 8	**2**	**22.5**
QPSK	3	≤ 4	**0**	**24.5**
QPSK	3	> 4	**1**	**23.5**
16QAM	3	≤ 4	**1**	**23.5**
16QAM	3	> 4	**2**	**22.5**
QPSK	1.4	≤ 5	**0**	**24.5**
QPSK	1.4	> 5	**1**	**23.5**
16QAM	1.4	≤ 5	**1**	**23.5**
16QAM	1.4	> 5	**2**	**22.5**

LTE Band 4				
average power(dBm)				
Modulation	**BW (MHz)**	**RB size**	**Target MPR**	**Target Power**
QPSK	20	≤ 18	**0**	**24**
QPSK	20	> 18	**1**	**23**
16QAM	20	≤ 18	**1**	**23**
16QAM	20	> 18	**2**	**22**
QPSK	15	≤ 16	**0**	**24**
QPSK	15	> 16	**1**	**23**
16QAM	15	≤ 16	**1**	**23**
16QAM	15	> 16	**2**	**22**
QPSK	10	≤ 12	**0**	**24**
QPSK	10	> 12	**1**	**23**
16QAM	10	≤ 12	**1**	**23**
16QAM	10	> 12	**2**	**22**
QPSK	5	≤ 8	**0**	**24**
QPSK	5	> 8	**1**	**23**
16QAM	5	≤ 8	**1**	**23**
16QAM	5	> 8	**2**	**22**
QPSK	3	≤ 4	**0**	**24**
QPSK	3	> 4	**1**	**23**
16QAM	3	≤ 4	**1**	**23**
16QAM	3	> 4	**2**	**22**
QPSK	1.4	≤ 5	**0**	**24**
QPSK	1.4	> 5	**1**	**23**
16QAM	1.4	≤ 5	**1**	**23**
16QAM	1.4	> 5	**2**	**22**

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
2. LTE MPR implementation is the same for normal mode and power reduction mode.

The table below summarized necessary items addressed in KDB 941225 D05 v02.

FCC ID	SRQ-MF96U
EUT	LTE/CDMA HOTSPOT
Operating Frequency Range of each LTE transmission band	LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz
Channel Bandwidth	1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz

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

LTE Band 12

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	23017	699.7	23025	700.5	23035	701.5	23060	704
M	23095	707.5	23095	707.5	23095	707.5	23095	707.5
H	23173	715.3	23165	714.5	23155	713.5	23130	711

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 5

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5
H	20643	848.3	20635	847.5	20625	846.5	20600	844

LTE Band 4

	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745

<table>
<tr><td>E category, uplink modulations used</td><td>Category 3, QPSK, and 16QAM</td></tr>
<tr><td>LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)</td><td>A primary antenna is used for LTE and other wireless interfaces (CDMA) for transmitting and receiving. LTE and other wireless interfaces (CDMA) share the same antenna, and cannot transmit simultaneously
A 2nd antenna is used for LTE and other wireless interfaces (CDMA) for receiving only</td></tr>
<tr><td>LTE Voice / Data requirements</td><td>Data only</td></tr>
<tr><td>LTE MPR permanently built-in by design</td><td>Yes, per 3GPP TS 36.101 v11.0.0
Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3
<table>
<tr><th rowspan="2">Modulation</th><th colspan="6">Channel bandwidth / Transmission bandwidth (RB)</th><th rowspan="2">MPR (dB)</th></tr>
<tr><th>1.4 MHz</th><th>3.0 MHz</th><th>5 MHz</th><th>10 MHz</th><th>15 MHz</th><th>20 MHz</th></tr>
<tr><td>QPSK</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>≤ 5</td><td>≤ 4</td><td>≤ 8</td><td>≤ 12</td><td>≤ 16</td><td>≤ 18</td><td>≤ 1</td></tr>
<tr><td>16 QAM</td><td>> 5</td><td>> 4</td><td>> 8</td><td>> 12</td><td>> 16</td><td>> 18</td><td>≤ 2</td></tr>
</table>
</td></tr>
<tr><td>LTE A-MPR</td><td>In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing.</td></tr>
<tr><td>Base station simulator used for Testing</td><td>Anritsu MT8820C</td></tr>
<tr><td>Power reduction applied to satisfy SAR compliance</td><td>No, The EUT doesn't support power reduction.</td></tr>
</table>

3.3 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 865664 D01 v01r01
- FCC KDB 865664 D02 v01r01
- FCC KDB 447498 D01 v05r01
- FCC KDB 248227 D01 v01r02
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D05 v02r02
- FCC KDB 941225 D06 v01r01

3.4 Device Category and SAR Limits

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

3.5 Test Conditions

Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

Test Configuration

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

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%

802.11g, 6Mbps: 98.36%

802.11n-HT20, MCS7: 87.22%

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

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

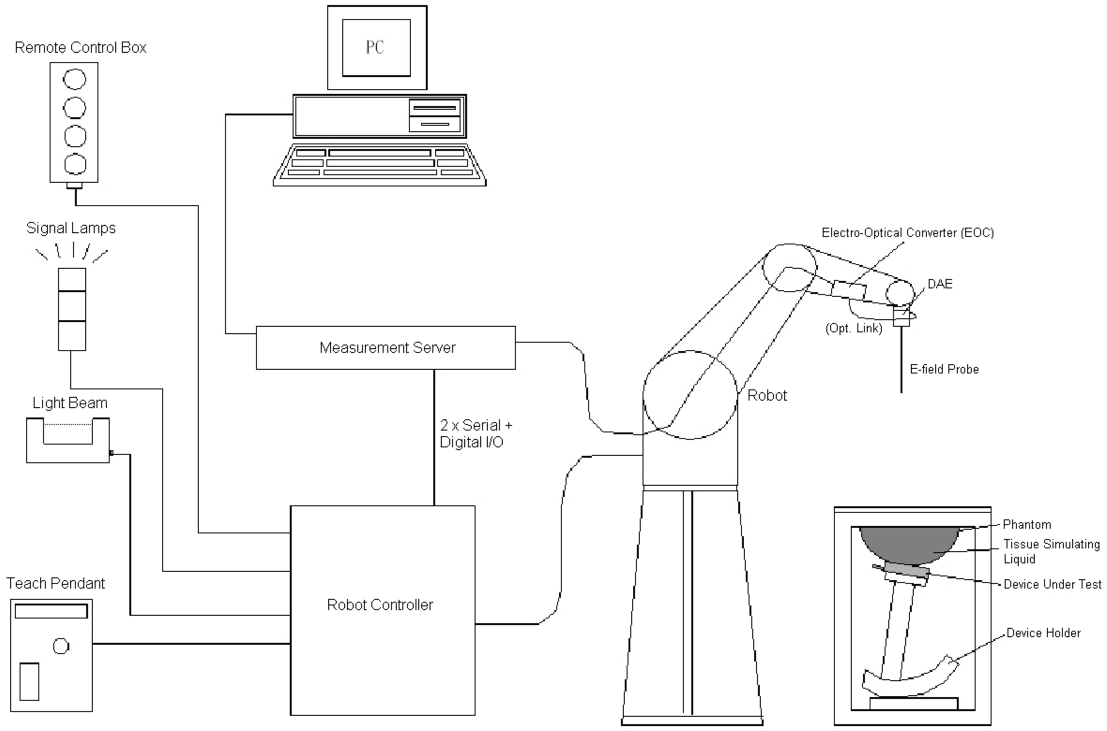


Fig 5.1 SPEAG DASY System Configurations

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

<EX3DV4 Probe>

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

Fig 5.2 Photo of EX3DV4

5.1.2 E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ± 10%. The spherical isotropy shall be evaluated and within ± 0.25dB. 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 5.3 Photo of DAE

5.3 Robot

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

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

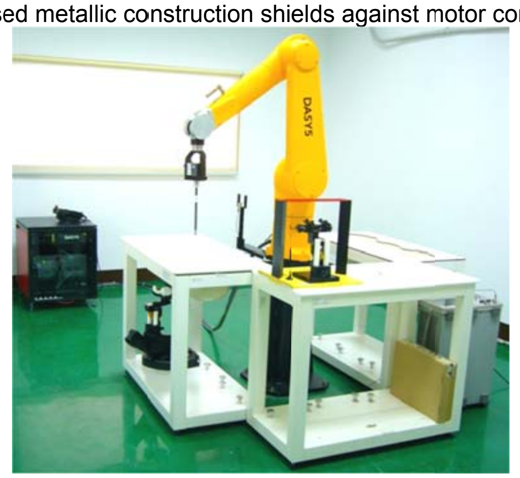


Fig 5.4 Photo of DASY5

5.4 Measurement Server

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

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

Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

Shell Thickness	2 ± 0.2 mm; Center ear point: 6 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Length: 1000 mm; Width: 500 mm; Height: adjustable feet	
Measurement Areas	Left Hand, Right Hand, Flat Phantom	**Fig 5.6 Photo of SAM Phantom**

The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

5.6 Device Holder

<Device Holder for SAM Twin Phantom>

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

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (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 5.7 Device Holder

5.7 Data Storage and Evaluation

5.7.1 Data Storage

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

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

5.7.2 Data Evaluation

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

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

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

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

The formula for each channel can be given as：

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

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

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

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

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

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

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

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

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

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

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

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

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d151	Mar. 25, 2013	Mar. 24, 2014
SPEAG	1900MHz System Validation Kit	D1900V2	5d170	Mar. 27, 2013	Mar. 26, 2014
SPEAG	1750MHz System Validation Kit	D1750V2	1090	Mar. 27, 2013	Mar. 26, 2014
SPEAG	735MHz System Validation Kit	D750V3	1087	Apr. 09, 2013	Apr. 08, 2014
SPEAG	2450MHz System Validation Kit	D2450V2	908	Mar. 26, 2013	Mar. 25, 2014
SPEAG	Data Acquisition Electronics	DAE4	1358	Apr. 08, 2013	Apr. 07, 2014
SPEAG	Dosimetric E-Field Probe	EX3DV4	3911	Apr. 11, 2013	Apr.10, 2014
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1753	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CD	TP-1754	NCR	NCR
Agilent	Dielectric Probe Kit	85070E	MY44300751	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201107506	Apr. 01, 2013	Mar. 31, 2014
Agilent	Wireless Communication Test Set	E5515C	MY52102600	Nov.17 , 2012	Nov. 16, 2013
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 22, 2013	Apr. 21, 2014
Agilent	Dual Directional Coupler	778D	50422	Note 2	
Woken	Attenuator 1	WK0602-XX	N/A	Note 2	
PE	Attenuator 2	PE7005-10	N/A	Note 2	
PE	Attenuator 3	PE7005- 3	N/A	Note 2	
AR	Power Amplifier	5S1G4M2	328767	Note 3	
R&S	Spectrum Analyzer	FSP7	101230	Jun. 13, 2013	Jun. 12, 2014

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
3. 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
4. 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 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. 6.1.

Fig 6.1 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Table 6.1 Recipes of Tissue Simulating Liquid

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

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Tissue Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Body	22.6	0.971	56.304	0.97	55.2	0.10	2.00	±5	Oct. 30, 2013
1900	Body	22.5	1.535	54.579	1.52	53.3	0.99	2.40	±5	Oct. 31, 2013
1750	Body	22.6	1.517	55.044	1.49	53.4	1.81	3.08	±5	Oct. 31, 2013
750	Body	22.5	0.97	54.642	0.96	55.5	1.04	-1.55	±5	Nov. 01, 2013
835	Body	22.4	0.973	54.082	0.97	55.2	0.31	-2.03	±5	Nov. 01, 2013
2450	Body	22.5	1.937	51.106	1.95	52.7	-0.67	-3.02	±5	Nov. 04, 2013

Table 6.2 Measuring Results for Simulating Liquid

7. System Verification Procedures

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:

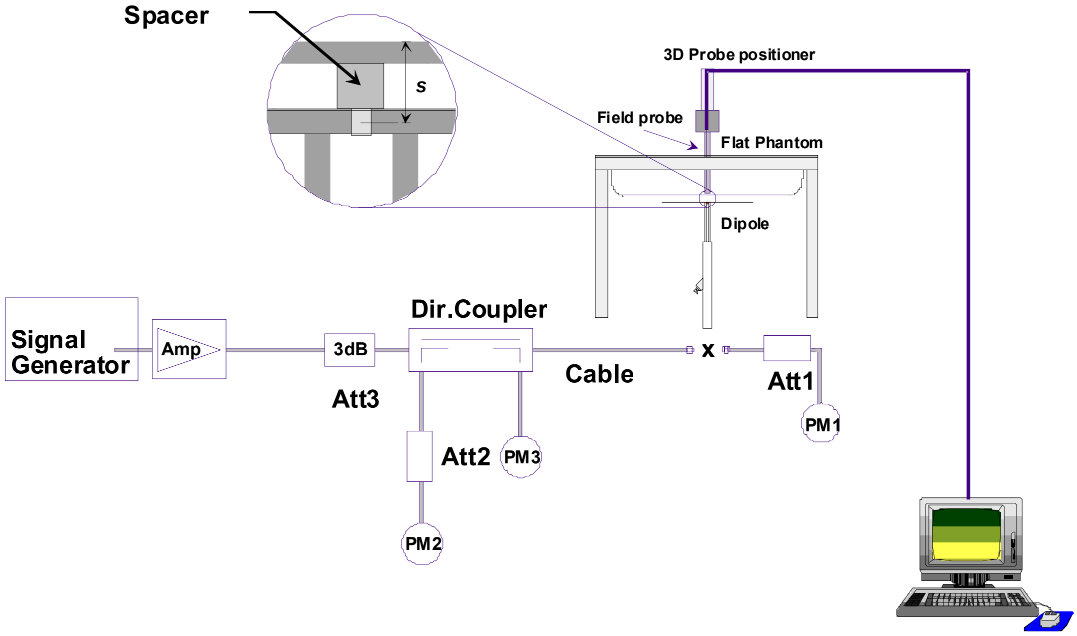


Fig 7.1 System Setup for System Evaluation

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.

Date	Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Target SAR_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	Normalized SAR_{1g} (W/kg)	Deviation (%)
Oct. 30, 2013	835	Body	250	9.43	2.37	9.48	0.53
Oct. 31, 2013	1900	Body	250	41.2	10.3	41.2	0.00
Oct. 31, 2013	1750	Body	250	38.1	9.08	36.32	-4.67
Nov. 01, 2013	750	Body	250	8.58	2.09	8.36	-2.56
Nov. 01, 2013	835	Body	250	9.43	2.44	9.76	3.50
Nov. 04, 2013	2450	Body	250	50.4	12.2	48.8	-3.17

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

This EUT was tested in six different positions. They are Front/Back/bottom Side/Right Side/Top Side/Left Side of EUT. In these positions, the surface of EUT is touching with phantom 1cm, Please refer to Appendix D for the test setup photos.

8.1 Hotspot Position

(a) To position the device parallel to the phantom surface with all sides and either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device and the flat phantom to 1.0cm.

<EUT Setup Photos>

Please refer to Appendix D for the test setup photos.

8.2 SAR Testing for Tablet

This device can be used also in full sized tablet exposure conditions, due to its size. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom. The SAR exclusion threshold in KDB 447498 D01v05r01 can be applied to determine SAR test exclusion for adjacent edge configurations. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

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 power measurement, use engineering software to configure EUT WLAN 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 output power

<SAR measurement>

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

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area & 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 D01v01r01 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.

<table>
<tr><th colspan="3"></th><th>$\leq$ 3 GHz</th><th>> 3 GHz</th></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>$30° \pm 1°$</td><td>$20° \pm 1°$</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>$\leq$ 2 GHz: $\leq$ 15 mm
2 – 3 GHz: $\leq$ 12 mm</td><td>3 – 4 GHz: $\leq$ 12 mm
4 – 6 GHz: $\leq$ 10 mm</td></tr>
<tr><td colspan="2">When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>$\leq$ 2 GHz: $\leq$ 8 mm
2 – 3 GHz: $\leq$ 5 mm*</td><td>3 – 4 GHz: $\leq$ 5 mm*
4 – 6 GHz: $\leq$ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>$\leq$ 5 mm</td><td>3 – 4 GHz: $\leq$ 4 mm
4 – 5 GHz: $\leq$ 3 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>$\leq$ 4 mm</td><td>3 – 4 GHz: $\leq$ 3 mm
4 – 5 GHz: $\leq$ 2.5 mm
5 – 6 GHz: $\leq$ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>$\geq$ 30 mm</td><td>3 – 4 GHz: $\geq$ 28 mm
4 – 5 GHz: $\geq$ 25 mm
5 – 6 GHz: $\geq$ 22 mm</td></tr>
<tr><td colspan="5">Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.
* When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB 447498 is $\leq$ 1.4 W/kg, $\leq$ 8 mm, $\leq$ 7 mm and $\leq$ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.</td></tr>
</table>

9.4 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)

<CDMA2000 Conducted Power>

Note:

1. Referring to KDB 941225 D01v02, in Hotspot mode EUT is treated as data device and SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A(RETAP 4096 bits) power is less than 1/4dB higher than Re v0, SAR tests with those settings are not necessary.

Band	CDMA2000 BC0			CDMA2000 BC1		
TX Channel	1013	384	777	25	600	1175
Frequency (MHz)	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC1 SO55	23.61	23.41	23.09	23.50	23.30	23.19
1xRTT RC3 SO55	23.67	23.43	23.11	23.52	23.33	23.23
1xRTT RC3 SO32(+ F-SCH)	23.63	23.38	23.07	23.46	23.24	23.22
1xRTT RC3 SO32(+SCH)	23.65	23.39	23.03	23.51	23.28	23.21
1xEVDO RTAP 153.6Kbps	23.66	23.42	23.10	23.50	23.31	23.21
1xEVDO RETAP 4096Bits	23.64	23.39	23.09	23.48	23.32	23.18

<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 D05v02r02, 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 D05v02r02, 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 D05v02r02, 50% RB allocation for QPSK SAR testing follows 1RB QPSK allocation procedure.
5. Per KDB 941225 D05v02r02, when reported SAR of 1RB and 50%RB allocation for QPSK ≤0.8W/kg, and 100%RB with QPSK output power is less than 1RB and 50%RB, 100%RB allocation for QPSK is not required.
6. Per KDB 941225 D05v02r02, 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.
7. 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.
8. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth, and the reported SAR for the largest supported bandwidth is ≤ 1.45 W/kg; Per KDB 941225 D05v02r02, smaller bandwidth SAR testing is not required.

<LTE Band 12 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				23060	23095	23130		
Frequency (MHz)				704	707.5	711		
10	QPSK	1	0	23.31	23.24	23.43	24	0
10	QPSK	1	24	23.61	23.49	23.44		
10	QPSK	1	49	23.25	23.41	23.36		
10	QPSK	25	0	22.15	22.17	22.05	23	1
10	QPSK	25	12	22.28	22.26	22.16		
10	QPSK	25	24	22.22	22.10	22.07		
10	QPSK	50	0	22.05	22.01	22.00		
10	16QAM	1	0	22.14	22.00	22.40	23	1
10	16QAM	1	24	22.77	22.47	22.55		
10	16QAM	1	49	22.26	22.33	22.22		
10	16QAM	25	0	21.05	21.10	21.02	22	2
10	16QAM	25	12	21.27	21.17	21.19		
10	16QAM	25	24	21.28	21.06	21.28		
10	16QAM	50	0	21.01	20.91	21.04		
Channel				23035	23095	23155	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				701.5	707.5	713.5		
5	QPSK	1	0	23.29	23.25	23.34	24	0
5	QPSK	1	12	23.51	23.33	23.47		
5	QPSK	1	24	23.50	23.22	23.52		
5	QPSK	12	0	22.26	22.41	22.41	23	1
5	QPSK	12	6	22.31	22.31	22.51		
5	QPSK	12	11	22.34	22.25	22.47		
5	QPSK	25	0	22.17	22.07	22.28		
5	16QAM	1	0	22.15	22.10	22.23	23	1
5	16QAM	1	12	22.38	22.26	22.11		
5	16QAM	1	24	22.21	22.05	22.52		
5	16QAM	12	0	21.26	21.37	21.42	22	2
5	16QAM	12	6	21.21	21.37	21.58		
5	16QAM	12	11	21.37	21.19	21.47		
5	16QAM	25	0	21.23	21.08	21.35		

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				23025	23095	23165		
Frequency (MHz)				700.5	707.5	714.5		
3	QPSK	1	0	23.33	23.54	23.45	24	0
3	QPSK	1	7	23.26	23.42	23.48		
3	QPSK	1	14	23.50	23.34	23.37		
3	QPSK	8	0	22.25	22.40	22.55	23	1
3	QPSK	8	4	22.24	22.23	22.48		
3	QPSK	8	7	22.32	22.17	22.38		
3	QPSK	15	0	22.25	22.24	22.41		
3	16QAM	1	0	22.02	22.63	22.64	23	1
3	16QAM	1	7	22.08	22.53	22.67		
3	16QAM	1	14	22.15	22.29	22.50		
3	16QAM	8	0	21.25	21.35	21.56	22	2
3	16QAM	8	4	21.14	21.32	21.41		
3	16QAM	8	7	21.27	21.23	21.50		
3	16QAM	15	0	21.20	21.29	21.44		
Channel				23017	23095	23173	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				699.7	707.5	715.3		
1.4	QPSK	1	0	23.25	23.30	23.35	24	0
1.4	QPSK	1	2	23.38	23.29	23.18		
1.4	QPSK	1	5	23.13	23.35	23.38		
1.4	QPSK	3	0	23.41	23.26	23.31		
1.4	QPSK	3	1	23.37	23.34	23.46		
1.4	QPSK	3	2	23.34	23.26	23.38		
1.4	QPSK	6	0	22.30	22.31	22.48	23	1
1.4	16QAM	1	0	22.13	21.97	22.35	23	1
1.4	16QAM	1	2	21.93	22.45	22.43		
1.4	16QAM	1	5	22.39	22.47	22.33		
1.4	16QAM	3	0	22.32	22.24	22.45		
1.4	16QAM	3	1	22.35	22.33	22.30		
1.4	16QAM	3	2	22.32	22.23	22.51		
1.4	16QAM	6	0	21.43	21.37	21.48	22	2

<LTE Band 17 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				23780	23790	23800		
Frequency (MHz)				709	710	711		
10	QPSK	1	0	23.42	23.28	23.45	24	0
10	QPSK	1	24	23.29	23.38	23.32		
10	QPSK	1	49	23.49	23.57	23.67		
10	QPSK	25	0	22.08	22.15	22.17	23	1
10	QPSK	25	12	22.13	22.16	22.18		
10	QPSK	25	24	22.33	22.30	22.36		
10	QPSK	50	0	22.01	22.02	22.09		
10	16QAM	1	0	22.02	22.65	22.25	23	1
10	16QAM	1	24	22.06	22.51	22.66		
10	16QAM	1	49	22.34	22.49	22.42		
10	16QAM	25	0	21.12	21.08	21.02	22	2
10	16QAM	25	12	21.12	21.10	21.27		
10	16QAM	25	24	21.28	21.26	21.32		
10	16QAM	50	0	21.04	21.01	21.15		
Channel				23755	23790	23825	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				706.5	710	713.5		
5	QPSK	1	0	23.55	23.29	23.29	24	0
5	QPSK	1	12	23.15	23.36	23.41		
5	QPSK	1	24	23.35	23.48	23.65		
5	QPSK	12	0	22.43	22.24	22.45	23	1
5	QPSK	12	6	22.46	22.31	22.44		
5	QPSK	12	11	22.28	22.44	22.56		
5	QPSK	25	0	22.14	22.18	22.40		
5	16QAM	1	0	22.80	22.20	22.11	23	1
5	16QAM	1	12	22.65	22.29	22.31		
5	16QAM	1	24	22.51	22.15	22.35		
5	16QAM	12	0	21.39	21.19	21.41	22	2
5	16QAM	12	6	21.45	21.37	21.58		
5	16QAM	12	11	21.25	21.49	21.65		
5	16QAM	25	0	21.11	21.17	21.32		

<LTE Band 5 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.70	23.65	23.80	24.5	0
10	QPSK	1	24	23.60	23.40	23.78		
10	QPSK	1	49	23.22	23.39	23.27		
10	QPSK	25	0	22.58	22.48	22.78	23.5	1
10	QPSK	25	12	22.37	22.38	22.62		
10	QPSK	25	24	22.12	22.25	22.20		
10	QPSK	50	0	22.16	22.12	22.25		
10	16QAM	1	0	22.39	22.82	23.16	23.5	1
10	16QAM	1	24	22.38	22.66	23.05		
10	16QAM	1	49	22.32	22.47	22.10		
10	16QAM	25	0	21.51	21.04	21.66	22.5	2
10	16QAM	25	12	21.31	21.20	21.62		
10	16QAM	25	24	21.09	21.54	21.13		
10	16QAM	50	0	21.14	21.06	21.21		
Channel				20425	20525	20625	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.70	23.58	23.51	24.5	0
5	QPSK	1	12	23.69	23.43	23.11		
5	QPSK	1	24	23.55	23.34	22.92		
5	QPSK	12	0	22.69	22.55	22.43	23.5	1
5	QPSK	12	6	22.75	22.43	22.16		
5	QPSK	12	11	22.72	22.22	22.19		
5	QPSK	25	0	22.48	22.19	22.03		
5	16QAM	1	0	23.00	22.62	22.62	23.5	1
5	16QAM	1	12	22.34	22.47	22.21		
5	16QAM	1	24	22.36	22.29	22.14		
5	16QAM	12	0	21.67	21.15	21.43	22.5	2
5	16QAM	12	6	21.75	21.38	21.32		
5	16QAM	12	11	21.68	21.55	21.26		
5	16QAM	25	0	21.42	21.32	21.00		
Channel				20415	20525	20635	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.74	23.62	23.16	24.5	0
3	QPSK	1	7	23.68	23.43	23.02		
3	QPSK	1	14	23.70	23.31	22.85		
3	QPSK	8	0	22.69	22.62	22.18	23.5	1
3	QPSK	8	4	22.70	22.50	22.10		
3	QPSK	8	7	22.71	22.35	22.00		
3	QPSK	15	0	22.68	22.27	22.10		
3	16QAM	1	0	23.02	22.72	22.12	23.5	1
3	16QAM	1	7	22.62	22.46	22.04		
3	16QAM	1	14	22.84	22.54	21.94		
3	16QAM	8	0	21.64	21.64	21.13	22.5	2
3	16QAM	8	4	21.61	21.42	21.21		
3	16QAM	8	7	21.62	21.38	20.95		
3	16QAM	15	0	21.52	21.40	21.02		

Channel				20407	20525	20643	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.71	23.58	22.92	24.5	0
1.4	QPSK	1	2	23.68	23.46	22.91		
1.4	QPSK	1	5	23.69	23.35	22.75		
1.4	QPSK	3	0	23.65	23.55	22.91		
1.4	QPSK	3	1	23.66	23.40	22.82		
1.4	QPSK	3	2	23.66	23.21	22.82		
1.4	QPSK	6	0	22.72	22.33	21.94	23.5	1
1.4	16QAM	1	0	22.93	22.46	22.39	23.5	1
1.4	16QAM	1	2	22.88	22.31	22.22		
1.4	16QAM	1	5	22.60	22.25	22.24		
1.4	16QAM	3	0	22.67	22.42	22.33		
1.4	16QAM	3	1	22.79	22.27	22.32		
1.4	16QAM	3	2	22.61	22.35	22.31		
1.4	16QAM	6	0	21.89	21.44	21.31	22.5	2

<LTE Band 4 Conducted Power>

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune up Limit (dBm)	Target MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.04	23.05	22.88	24	0
20	QPSK	1	49	22.74	23.02	22.81		
20	QPSK	1	99	22.77	22.81	22.72		
20	QPSK	50	0	21.69	21.59	21.61	23	1
20	QPSK	50	24	21.62	21.58	21.50		
20	QPSK	50	49	21.54	21.46	21.42		
20	QPSK	100	0	21.64	21.50	21.46		
20	16QAM	1	0	21.95	21.95	21.99	23	1
20	16QAM	1	49	21.85	21.69	21.37		
20	16QAM	1	99	21.79	21.88	21.57		
20	16QAM	50	0	20.72	20.54	20.50	22	2
20	16QAM	50	24	20.70	20.50	20.54		
20	16QAM	50	49	20.56	20.43	20.55		
20	16QAM	100	0	20.60	20.43	20.56		
Channel				20025	20175	20325	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.00	22.75	22.94	24	0
15	QPSK	1	37	22.91	22.59	22.89		
15	QPSK	1	74	22.72	22.74	22.70		
15	QPSK	36	0	22.84	22.72	22.74	23	1
15	QPSK	36	18	22.83	22.71	22.83		
15	QPSK	36	37	22.74	22.59	22.66		
15	QPSK	75	0	21.66	21.49	21.43		
15	16QAM	1	0	22.24	22.08	21.96	23	1
15	16QAM	1	37	21.56	21.49	21.95		
15	16QAM	1	74	21.85	21.95	21.77		
15	16QAM	36	0	21.92	21.76	21.87	22	2
15	16QAM	36	18	21.88	21.83	21.74		
15	16QAM	36	37	21.77	21.75	21.76		
15	16QAM	75	0	20.63	20.51	20.43		
Channel				20000	20175	20350	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	22.96	22.65	22.98	24	0
10	QPSK	1	24	22.88	22.61	22.87		
10	QPSK	1	49	22.65	22.57	22.75		
10	QPSK	25	0	21.81	21.68	21.57	23	1
10	QPSK	25	12	21.80	21.65	21.59		
10	QPSK	25	24	21.71	21.60	21.72		
10	QPSK	50	0	21.65	21.49	21.47		
10	16QAM	1	0	22.14	21.99	21.94	23	1
10	16QAM	1	24	22.10	21.92	21.93		
10	16QAM	1	49	21.59	21.63	21.56		
10	16QAM	25	0	20.87	20.48	20.54	22	2
10	16QAM	25	12	20.75	20.63	20.66		
10	16QAM	25	24	20.77	20.46	20.70		
10	16QAM	50	0	20.61	20.46	20.49		

Channel				19975	20175	20375	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	22.93	22.78	22.89	24	0
5	QPSK	1	12	22.92	22.76	22.81		
5	QPSK	1	24	22.85	22.74	22.73		
5	QPSK	12	0	21.85	21.67	21.79	23	1
5	QPSK	12	6	21.94	21.70	21.73		
5	QPSK	12	11	21.88	21.66	21.74		
5	QPSK	25	0	21.77	21.57	21.70		
5	16QAM	1	0	21.72	21.95	21.79	23	1
5	16QAM	1	12	21.71	21.81	21.59		
5	16QAM	1	24	21.58	21.90	21.78		
5	16QAM	12	0	20.89	20.69	20.87	22	2
5	16QAM	12	6	20.87	20.63	20.74		
5	16QAM	12	11	21.00	20.70	20.80		
5	16QAM	25	0	20.82	20.51	20.58		
Channel				19965	20175	20385	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.02	22.66	22.81	24	0
3	QPSK	1	7	22.85	22.58	22.79		
3	QPSK	1	14	23.01	22.65	22.78		
3	QPSK	8	0	21.97	21.69	21.86	23	1
3	QPSK	8	4	21.91	21.65	21.69		
3	QPSK	8	7	21.91	21.61	21.75		
3	QPSK	15	0	21.80	21.59	21.68		
3	16QAM	1	0	22.07	22.03	21.75	23	1
3	16QAM	1	7	22.01	21.93	21.68		
3	16QAM	1	14	21.63	21.01	21.53		
3	16QAM	8	0	20.91	20.65	20.89	22	2
3	16QAM	8	4	20.90	20.61	20.77		
3	16QAM	8	7	20.85	20.49	20.76		
3	16QAM	15	0	20.81	20.65	20.66		
Channel				19957	20175	20393	Tune up Limit (dBm)	Target MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	22.99	22.77	22.92	24	0
1.4	QPSK	1	2	22.96	22.72	22.85		
1.4	QPSK	1	5	22.98	22.65	22.77		
1.4	QPSK	3	0	22.94	22.68	22.74		
1.4	QPSK	3	1	22.97	22.65	22.83		
1.4	QPSK	3	2	22.95	22.67	22.79		
1.4	QPSK	6	0	22.03	21.70	21.68	23	1
1.4	16QAM	1	0	22.05	21.81	21.75	23	1
1.4	16QAM	1	2	21.99	21.52	21.48		
1.4	16QAM	1	5	21.78	21.48	21.46		
1.4	16QAM	3	0	22.04	21.74	21.59		
1.4	16QAM	3	1	22.00	21.76	21.58		
1.4	16QAM	3	2	22.03	21.69	21.65		
1.4	16QAM	6	0	21.06	20.60	20.76	22	2

<WLAN 2.4GHz mode Conducted Power>

WLAN 2.4GHz Band 802.11b Average Power (dBm)					
Channel	Frequency (MHz)	Data Rate (bps)			
		1M	2M	5.5M	11M
CH 01	2412	13.66	13.75	13.78	13.78
CH 06	2437	**13.79**	13.75	13.16	13.09
CH 11	2462	13.25	13.01	13.57	13.71

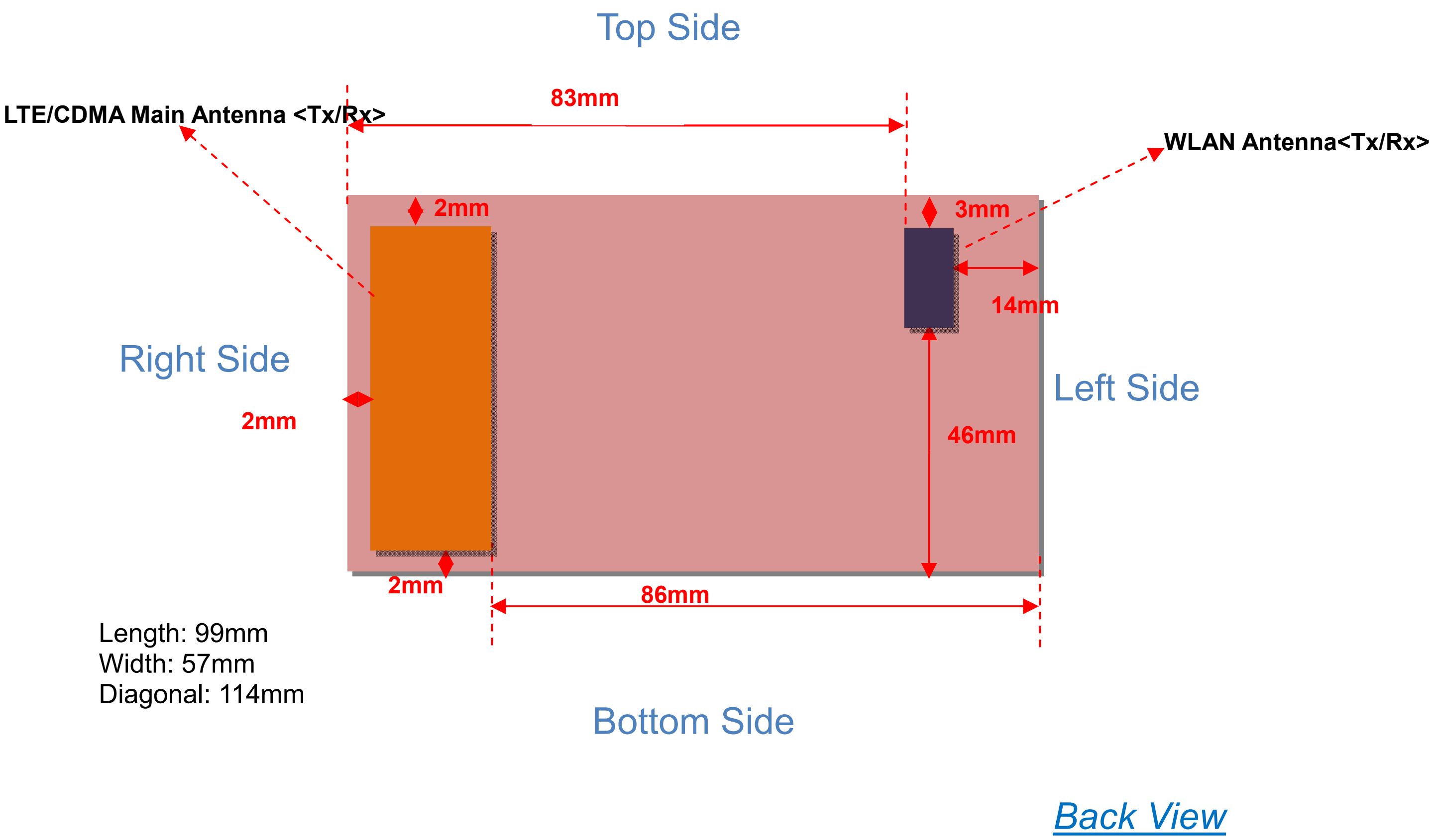
WLAN 2.4GHz Band 802.11g Average Power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		6M	9M	12M	18M	24M	36M	48M	54M
CH 01	2412	13.72	13.90	13.89	13.90	13.94	13.84	13.86	13.43
CH 06	2437	13.88	13.91	13.47	13.45	13.38	13.47	13.46	13.23
CH 11	2462	**14.30**	14.21	13.82	13.84	13.90	13.79	13.83	14.12

WLAN 2.4GHz Band 802.11n (HT 20) Average Power (dBm)									
Channel	Frequency (MHz)	MCS Index							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	12.97	13.34	12.90	13.04	14.89	14.80	14.53	**14.90**
CH 06	2437	13.34	13.21	12.91	13.01	13.81	13.81	13.44	14.84
CH 11	2462	12.84	13.62	13.38	13.84	13.94	13.78	13.55	13.55

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 average output power is higher than 1/4dB higher than 11b mode, these modes SAR will be verified at the highest RF exposure position found in 802.11b SAR testing.

11. Antenna Location



Antennas	Wireless Interface
LTE Main Antenna <Tx / Rx>	LTE Band 4 LTE Band 5 LTE Band 12 LTE Band 17
CDMA2000 1xRTT / EVDO <Tx / Rx>	CDMA2000 1xRTT and EV-DO BC0/BC1
WLAN Antenna <Tx / Rx>	WLAN 2.4GHz

Note:
1. This product has two antenna paths, one for LTE/ CDMA, and one for WLAN.
2. The LTE and CDMA share the same antenna path and cannot transmit simultaneously.

Distance of the Antenna to the EUT surface/edge						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
WWAN Main	≤ 25mm	≤ 25mm	≤ 25mm	≤ 25mm	≤ 25mm	86mm
WLAN	≤ 25mm	≤ 25mm	≤ 25mm	46mm	83mm	≤ 25mm

Positions for SAR tests; Hotspot mode Test distance: 10 mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
WWAN Main	Yes	Yes	Yes	Yes	Yes	NO
WLAN	Yes	Yes	Yes	NO	NO	Yes

Note:

1. Body mode SAR assessments are required.
2. Referring to KDB 941225 D06 v01r01, when the overall device length and width are ≥ 9cm*5cm, the test distance is 10 mm. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25mm from that surface or edge

12. SAR Test Results

Note:

1. Per KDB 447498 D01v05r01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   b. For SAR testing of WLAN signal with non-100% duty cycle, the measured SAR is scaled-up by the duty cycle scaling factor which is equal to "1/(duty cycle)"
   c. For WWAN: Reported SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
   d. For WLAN: Reported SAR(W/kg)= Measured SAR(W/kg)* Duty Cycle scaling factor * Tune-up scaling factor
2. Per KDB 447498 D01v05r01, for each exposure position, if the highest output channel reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.
3. For Hotspot SAR testing, per KDB 941225 D06v01r01, for EUT dimension ≥ 9cm*5cm, the test distance is 1cm. SAR must be measured for all surfaces and sides with a transmitting antenna located within 2.5cm from that surface or edge.
4. Per KDB 941225 D05v02r02, 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.
5. 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.
6. Smaller bandwidth output power for each RB allocation configuration is > not ½ dB higher than the same configuration in the largest supported bandwidth.
7. For QPSK with 100% RB allocation, if the reported SAR is > 1.45 W/kg, the remaining required test channels must be tested

12.1 Body SAR

<CDMA2000 SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
1	CDMA2000 BC0	RTAP 153.6	Front	1	1013	824.7	23.66	25	1.361	-0.14	0.508	0.692
2	**CDMA2000 BC0**	**RTAP 153.6**	**Back**	**1**	**1013**	**824.7**	**23.66**	**25**	**1.361**	**-0.16**	**0.524**	**0.713**
3	CDMA2000 BC0	RTAP 153.6	Right Side	1	1013	824.7	23.66	25	1.361	-0.02	0.112	0.152
4	CDMA2000 BC0	RTAP 153.6	Bottom Side	1	1013	824.7	23.66	25	1.361	-0.01	0.312	0.425
5	CDMA2000 BC0	RTAP 153.6	Top Side	1	1013	824.7	23.66	25	1.361	-0.09	0.347	0.472
6	CDMA2000 BC1	RTAP 153.6	Front	1	25	1851.25	23.5	23.8	1.072	-0.03	0.938	1.005
7	CDMA2000 BC1	RTAP 153.6	Back	1	25	1851.25	23.5	23.8	1.072	-0.08	1.31	1.404
8	**CDMA2000 BC1**	**RTAP 153.6**	**Right Side**	**1**	**25**	**1851.25**	**23.5**	**23.8**	**1.072**	**-0.05**	**1.36**	**1.457**
9	CDMA2000 BC1	RTAP 153.6	Bottom Side	1	25	1851.25	23.5	23.8	1.072	-0.01	0.52	0.557
10	CDMA2000 BC1	RTAP 153.6	Top Side	1	25	1851.25	23.5	23.8	1.072	-0.04	0.18	0.193
11	CDMA2000 BC1	RTAP 153.6	Front	1	600	1880	23.31	23.8	1.119	-0.06	0.841	0.941
12	CDMA2000 BC1	RTAP 153.6	Front	1	1175	1908.75	23.21	23.8	1.146	-0.06	0.767	0.879
13	CDMA2000 BC1	RTAP 153.6	Back	1	600	1880	23.31	23.8	1.119	-0.01	1.16	1.299
14	CDMA2000 BC1	RTAP 153.6	Back	1	1175	1908.75	23.21	23.8	1.146	-0.08	1.19	1.363
15	CDMA2000 BC1	RTAP 153.6	Right Side	1	600	1880	23.31	23.8	1.119	-0.03	1.11	1.243
16	CDMA2000 BC1	RTAP 153.6	Right Side	1	1175	1908.75	23.21	23.8	1.146	-0.01	1.18	1.352

<LTE SAR>

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
18	LTE Band 4	QPSK	20	1	0	Front	1	20175	1732.5	23.05	24	1.245	-0.03	0.352	0.438
19	LTE Band 4	QPSK	20	1	0	Back	1	20175	1732.5	23.05	24	1.245	-0.07	0.685	0.852
20	LTE Band 4	QPSK	20	1	0	Right Side	1	20175	1732.5	23.05	24	1.245	-0.05	0.763	0.950
21	LTE Band 4	QPSK	20	1	0	Bottom Side	1	20175	1732.5	23.05	24	1.245	-0.04	0.13	0.162
22	LTE Band 4	QPSK	20	1	0	Top Side	1	20175	1732.5	23.05	24	1.245	-0.07	0.175	0.218
23	LTE Band 4	QPSK	20	1	0	Back	1	20050	1720	23.04	24	1.247	-0.01	0.977	1.219
24	LTE Band 4	QPSK	20	1	0	Back	1	20300	1745	22.88	24	1.294	-0.05	0.634	0.821
25	**LTE Band 4**	**QPSK**	**20**	**1**	**0**	**Right Side**	**1**	**20050**	**1720**	**23.04**	**24**	**1.247**	**-0.09**	**1.05**	**1.310**
26	LTE Band 4	QPSK	20	1	0	Right Side	1	20300	1745	22.88	24	1.294	-0.03	0.758	0.981
27	LTE Band 4	QPSK	20	50	0	Front	1	20050	1720	21.69	23	1.352	-0.02	0.336	0.454
28	LTE Band 4	QPSK	20	50	0	Back	1	20050	1720	21.69	23	1.352	-0.06	0.653	0.883
29	LTE Band 4	QPSK	20	50	0	Right Side	1	20050	1720	21.69	23	1.352	-0.08	0.718	0.971
30	LTE Band 4	QPSK	20	50	0	Bottom Side	1	20050	1720	21.69	23	1.352	-0.17	0.115	0.155
31	LTE Band 4	QPSK	20	50	0	Top Side	1	20050	1720	21.69	23	1.352	-0.16	0.183	0.247
32	LTE Band 4	QPSK	20	50	0	Back	1	20175	1732.5	21.59	23	1.384	-0.07	0.461	0.638
33	LTE Band 4	QPSK	20	50	0	Back	1	20300	1745	21.61	23	1.377	-0.05	0.54	0.744
34	LTE Band 4	QPSK	20	50	0	Right Side	1	20175	1732.5	21.59	23	1.384	-0.03	0.56	0.775
35	LTE Band 4	QPSK	20	50	0	Right Side	1	20300	1745	21.61	23	1.377	-0.01	0.625	0.861
36	LTE Band 4	QPSK	20	100	0	Front	1	20050	1720	21.64	23	1.368	-0.05	0.269	0.368
37	LTE Band 4	QPSK	20	100	0	Back	1	20050	1720	21.64	23	1.368	-0.04	0.534	0.730
38	LTE Band 4	QPSK	20	100	0	Right Side	1	20050	1720	21.64	23	1.368	-0.02	0.615	0.841
39	LTE Band 4	QPSK	20	100	0	Bottom Side	1	20050	1720	21.64	23	1.368	-0.08	0.096	0.131
40	LTE Band 4	QPSK	20	100	0	Top Side	1	20050	1720	21.64	23	1.368	-0.02	0.139	0.190

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
62	LTE Band 5	QPSK	10	1	0	Front	1	20600	844	23.8	24.5	1.175	-0.04	0.662	0.778
63	**LTE Band 5**	**QPSK**	**10**	**1**	**0**	**Back**	**1**	**20600**	**844**	**23.8**	**24.5**	**1.175**	**-0.09**	**0.684**	**0.804**
64	LTE Band 5	QPSK	10	1	0	Right Side	1	20600	844	23.8	24.5	1.175	-0.06	0.146	0.172
65	LTE Band 5	QPSK	10	1	0	Bottom Side	1	20600	844	23.8	24.5	1.175	-0.02	0.38	0.446
66	LTE Band 5	QPSK	10	1	0	Top Side	1	20600	844	23.8	24.5	1.175	-0.01	0.442	0.519
67	LTE Band 5	QPSK	10	1	0	Back	1	20450	829	23.7	24.5	1.202	-0.03	0.501	0.602
68	LTE Band 5	QPSK	10	1	0	Back	1	20525	836.5	23.65	24.5	1.216	-0.09	0.498	0.606
69	LTE Band 5	QPSK	10	25	0	Front	1	20600	844	22.78	23.5	1.180	-0.03	0.417	0.492
70	LTE Band 5	QPSK	10	25	0	Back	1	20600	844	22.78	23.5	1.180	-0.03	0.418	0.493
71	LTE Band 5	QPSK	10	25	0	Right Side	1	20600	844	22.78	23.5	1.180	-0.05	0.103	0.122
72	LTE Band 5	QPSK	10	25	0	Bottom Side	1	20600	844	22.78	23.5	1.180	-0.09	0.248	0.293
73	LTE Band 5	QPSK	10	25	0	Top Side	1	20600	844	22.78	23.5	1.180	-0.16	0.301	0.355
74	LTE Band 5	QPSK	10	50	0	Front	1	20600	844	22.25	23.5	1.334	-0.02	0.341	0.455
75	LTE Band 5	QPSK	10	50	0	Back	1	20600	844	22.25	23.5	1.334	-0.14	0.364	0.485
76	LTE Band 5	QPSK	10	50	0	Right Side	1	20600	844	22.25	23.5	1.334	-0.09	0.089	0.119
77	LTE Band 5	QPSK	10	50	0	Bottom Side	1	20600	844	22.25	23.5	1.334	-0.06	0.192	0.256
78	LTE Band 5	QPSK	10	50	0	Top Side	1	20600	844	22.25	23.5	1.334	-0.11	0.257	0.343

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
42	LTE Band 12	QPSK	10	1	24	Front	1	23060	704	23.61	24	1.094	-0.02	0.501	0.548
43	**LTE Band 12**	**QPSK**	**10**	**1**	**24**	**Back**	**1**	**23060**	**704**	**23.61**	**24**	**1.094**	**-0.03**	**0.549**	**0.601**
44	LTE Band 12	QPSK	10	1	24	Right Side	1	23060	704	23.61	24	1.094	-0.03	0.144	0.158
45	LTE Band 12	QPSK	10	1	24	Bottom Side	1	23060	704	23.61	24	1.094	-0.03	0.202	0.221
46	LTE Band 12	QPSK	10	1	24	Top Side	1	23060	704	23.61	24	1.094	-0.07	0.257	0.281
47	LTE Band 12	QPSK	10	25	12	Front	1	23060	704	22.28	23	1.180	-0.03	0.344	0.406
48	LTE Band 12	QPSK	10	25	12	Back	1	23060	704	22.28	23	1.180	-0.16	0.369	0.436
49	LTE Band 12	QPSK	10	25	12	Right Side	1	23060	704	22.28	23	1.180	-0.07	0.102	0.120
50	LTE Band 12	QPSK	10	25	12	Bottom Side	1	23060	704	22.28	23	1.180	-0.09	0.138	0.163
51	LTE Band 12	QPSK	10	25	12	Top Side	1	23060	704	22.28	23	1.180	-0.01	0.178	0.210

Plot No.	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
52	LTE Band 17	QPSK	10	1	49	Front	1	23800	711	23.67	24	1.079	-0.02	0.569	0.614
53	**LTE Band 17**	**QPSK**	**10**	**1**	**49**	**Back**	**1**	**23800**	**711**	**23.67**	**24**	**1.079**	**-0.15**	**0.577**	**0.623**
54	LTE Band 17	QPSK	10	1	49	Right Side	1	23800	711	23.67	24	1.079	-0.04	0.126	0.136
55	LTE Band 17	QPSK	10	1	49	Bottom Side	1	23800	711	23.67	24	1.079	-0.1	0.219	0.236
56	LTE Band 17	QPSK	10	1	49	Top Side	1	23800	711	23.67	24	1.079	-0.06	0.248	0.268
57	LTE Band 17	QPSK	10	25	24	Front	1	23800	711	22.36	23	1.159	-0.02	0.446	0.517
58	LTE Band 17	QPSK	10	25	24	Back	1	23800	711	22.36	23	1.159	-0.04	0.491	0.569
59	LTE Band 17	QPSK	10	25	24	Right Side	1	23800	711	22.36	23	1.159	-0.05	0.107	0.124
60	LTE Band 17	QPSK	10	25	24	Bottom Side	1	23800	711	22.36	23	1.159	-0.03	0.183	0.212
61	LTE Band 17	QPSK	10	25	24	Top Side	1	23800	711	22.36	23	1.159	-0.02	0.217	0.251

<WLAN2.4GHz SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Data Rate (bps)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Duty Cycle Compensate Factor	Power Drift (dB)	Measured SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
79	WLAN 2.4GHz	802.11b	Front	1	6	2437	1M	13.79	14	1.050	1.000	-0.02	0.094	0.099
80	WLAN 2.4GHz	802.11b	Back	1	6	2437	1M	13.79	14	1.050	1.000	-0.04	0.046	0.048
81	WLAN 2.4GHz	802.11b	Left Side	1	6	2437	1M	13.79	14	1.050	1.000	-0.08	0.051	0.054
82	WLAN 2.4GHz	802.11b	Top Side	1	6	2437	1M	13.79	14	1.050	1.000	-0.16	0.074	0.078
83	**WLAN 2.4GHz**	**802.11g**	**Front**	**1**	**11**	**2462**	**6M**	**14.3**	**15**	**1.175**	1.017	**0.04**	**0.085**	**0.101**
84	WLAN 2.4GHz	802.11n	Front	1	1	2412	MCS7	14.9	16	1.288	1.147	-0.09	0.038	0.057

12.2 Repeated SAR Measurement

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured 1g SAR (W/kg)	Ratio	Reported 1g SAR (W/kg)
8	CDMA2000 BC1	RTAP 153.6	Right Side	1	25	1851.25	23.5	23.8	1.072	-0.05	1.36	1	1.457
17	CDMA2000 BC1	RTAP 153.6	Right Side	1	25	1851.25	23.5	23.8	1.072	-0.02	1.35	1.007	1.447
25	LTE Band4	QPSK	Right Side	1	20050	1720	23.04	24	1.247	-0.09	1.05	1	1.310
41	LTE Band4	QPSK	Right Side	1	20050	1720	23.04	24	1.247	-0.08	1.03	1.019	1.285

Note:

1. Per KDB 865664 D01v01r01, for each frequency band, repeated SAR measurement is required only when the measured SAR is ≥0.8W/kg
2. Per KDB 865664 D01v01r01, if the ratio among the repeated measurement is ≤ 1.2 and the measured SAR <1.45W/kg, only one repeated measurement is required.
3. The ratio is the largest SAR to the smallest SAR among original and repeated measurement.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

12.3 Highest SAR Plot

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.10.30

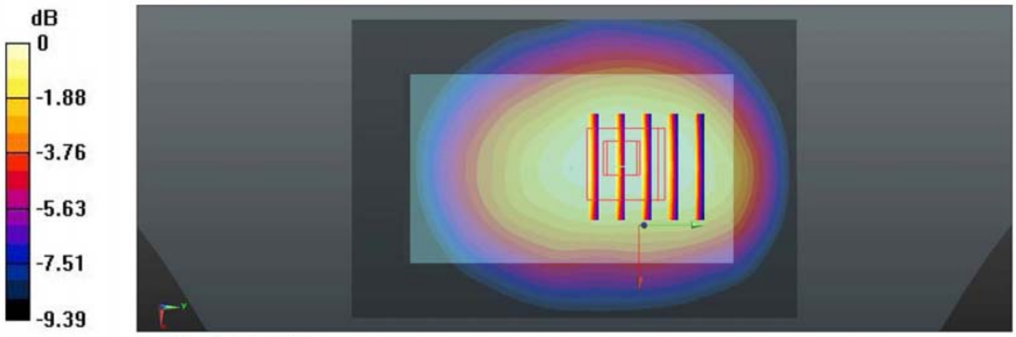
02 CDMA2000 BC0_RTAP 153.6_Back_1Cm_Ch1013

Communication System: CDMA2000;Frequency: 824.7 MHz;Duty Cycle: 1:1
Medium: MSL_835_131030 Medium parameters used: f = 825 MHz; $\sigma = 0.961$ S/m; $\varepsilon_r = 56.389$; $\rho = 1000\ kg/m^3$
Ambient Temperature： 23.5 ℃； Liquid Temperature ： 22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(9.93, 9.93, 9.93); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 2; Type: QD 000 P40 C; Serial: TP-1754
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch1013/Area Scan (91x61x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.617 W/kg

Ch1013/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.502 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.678 W/kg
SAR(1 g) = 0.524 W/kg; SAR(10 g) = 0.388 W/kg
Maximum value of SAR (measured) = 0.614 W/kg



0 dB = 0.614 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.10.31

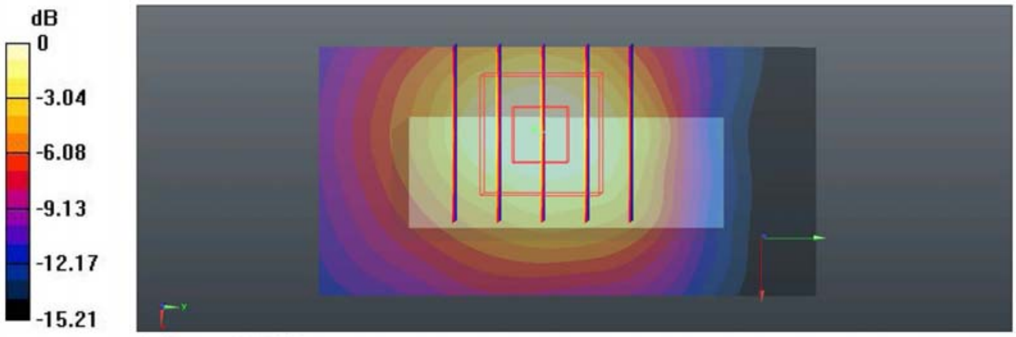
08 CDMA2000 BC1_RTAP 153.6_Right Side_1Cm_Ch25

Communication System: CDMA2000;Frequency: 1851.25 MHz;Duty Cycle: 1:1
Medium: MSL_1900_131031 Medium parameters used: f = 1851.25 MHz; σ = 1.474 S/m; ε_r = 54.678; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(7.7, 7.7, 7.7); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 1; Type: QD 000 P40 C; Serial: TP-1753
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch25/Area Scan (61x31x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.86 W/kg

Ch25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.933 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 2.08 W/kg
SAR(1 g) = 1.36 W/kg; SAR(10 g) = 0.800 W/kg
Maximum value of SAR (measured) = 1.76 W/kg



0 dB = 1.76 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.10.31

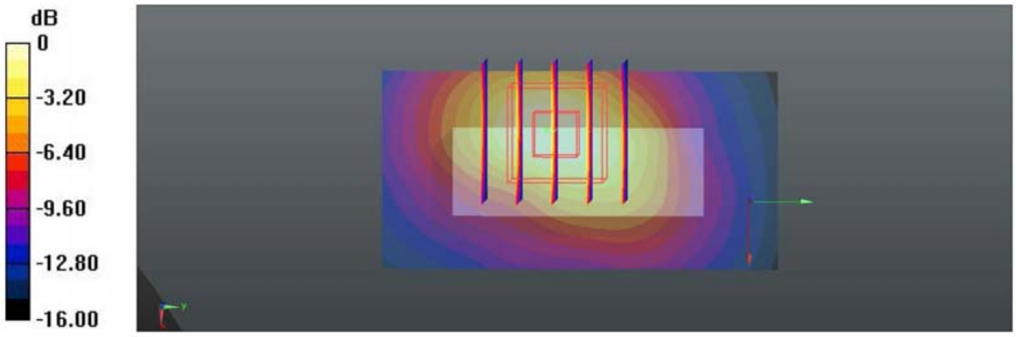
25 LTE Band 4_20M_QPSK (1,0)_Right Side_1Cm_Ch20050

Communication System: LTE;Frequency: 1720 MHz;Duty Cycle: 1:1
Medium: MSL_1750_131031 Medium parameters used: f = 1720 MHz; σ = 1.483 S/m; ε_r = 55.096; ρ = 1000 kg/m^3
Ambient Temperature： 23.5 ℃； Liquid Temperature：22.6 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(8.17, 8.17, 8.17); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 2; Type: QD 000 P40 C; Serial: TP-1754
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch20050/Area Scan (61x31x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.42 W/kg

Ch20050/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.755 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.586 W/kg
Maximum value of SAR (measured) = 1.41 W/kg



0 dB = 1.41 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.11.01

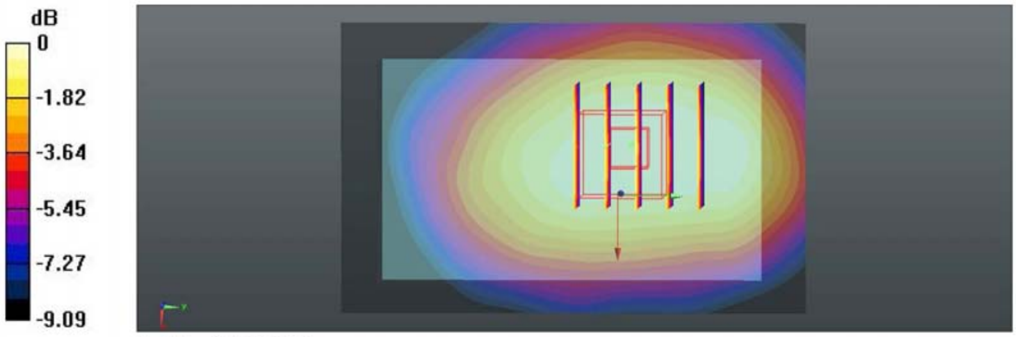
63 LTE Band 5_10M_QPSK (1,0)_Back_1Cm_Ch20600

Communication System: LTE;Frequency: 844 MHz;Duty Cycle: 1:1
Medium: MSL_835_131101 Medium parameters used: f = 844 MHz; $\sigma = 0.981$ S/m; $\varepsilon_r = 54.006$; $\rho = 1000$ kg/m^3
Ambient Temperature： 23.4 ℃; Liquid Temperature ： 22.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(9.93, 9.93, 9.93); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 2; Type: QD 000 P40 C; Serial: TP-1754
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch20600/Area Scan (81x51x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.841 W/kg

Ch20600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.057 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.865 W/kg
SAR(1 g) = 0.684 W/kg; SAR(10 g) = 0.516 W/kg
Maximum value of SAR (measured) = 0.789 W/kg



0 dB = 0.789 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.11.01

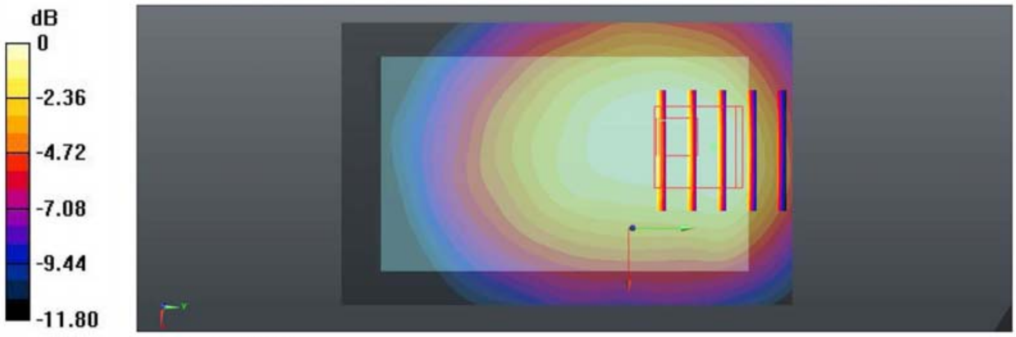
43 LTE Band 12_10M_QPSK (1,24)_Back_1Cm_Ch23060

Communication System: LTE;Frequency: 704 MHz;Duty Cycle: 1:1
Medium: MSL_750_131101 Medium parameters used: f = 704 MHz; σ = 0.936 S/m; ε_r = 55.651; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(10.21, 10.21, 10.21); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 1; Type: QD 000 P40 C; Serial: TP-1753
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch23060/Area Scan (81x51x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.687 W/kg

Ch23060/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 21.439 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 0.764 W/kg
SAR(1 g) = 0.549 W/kg; SAR(10 g) = 0.387 W/kg
Maximum value of SAR (measured) = 0.662 W/kg



0 dB = 0.662 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.11.01

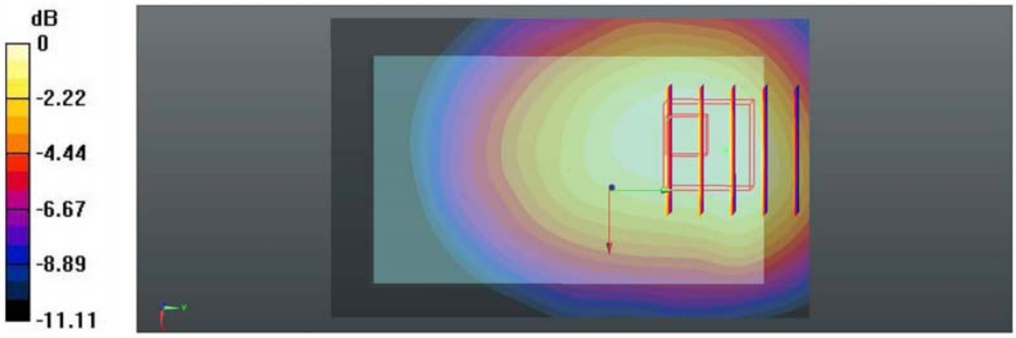
53 LTE Band 17_10M_QPSK (1,49)_Back_1Cm_Ch23800

Communication System: LTE;Frequency: 711 MHz;Duty Cycle: 1:1
Medium: MSL_750_131101 Medium parameters used: f = 711 MHz; $\sigma = 0.944$ S/m; $\varepsilon_r = 55.562$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(10.21, 10.21, 10.21); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 1; Type: QD 000 P40 C; Serial: TP-1753
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch23800/Area Scan (81x51x1): Interpolated grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.710 W/kg

Ch23800/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 20.649 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 0.773 W/kg
SAR(1 g) = 0.577 W/kg; SAR(10 g) = 0.411 W/kg
Maximum value of SAR (measured) = 0.678 W/kg



0 dB = 0.678 W/kg

TestLaboratory: Sporton International Inc. SAR/HAC TestingLab Date: 2013.11.04

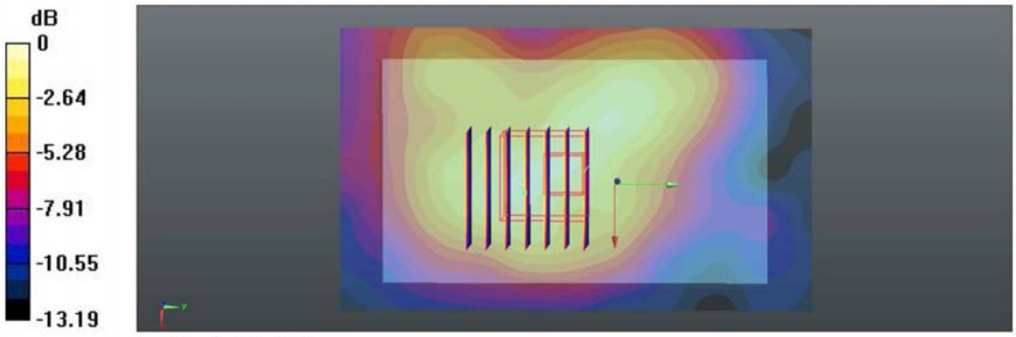
83 WLAN 2.4G_802.11g_Front_1Cm_Ch11

Communication System: 802.11g;Frequency: 2462 MHz;Duty Cycle: 1:1.017
Medium: MSL_2450_131104 Medium parameters used: f = 2462 MHz; σ = 1.954 S/m; ε_r = 51.055; ρ = 1000 kg/m^3
Ambient Temperature：23.4 ℃; Liquid Temperature：22.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3911; ConvF(7.34, 7.34, 7.34); Calibrated: 2013.04.11;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1358; Calibrated: 2013.04.08
- Phantom: SAM 2; Type: QD 000 P40 C; Serial: TP-1754
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Ch11/Area Scan (101x61x1): Interpolated grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.0994 W/kg

Ch11/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.191 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.171 W/kg
SAR(1 g) = 0.085 W/kg; SAR(10 g) = 0.048 W/kg
Maximum value of SAR (measured) = 0.117 W/kg



0 dB = 0.117 W/kg

13. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Hotspot	Note
		Hotspot	
1.	CDMA(Data) + WLAN2.4GHz(data)	Yes	2.4GHz Hotspot
2.	LTE(Data) + WLAN2.4GHz(data)	Yes	2.4GHz Hotspot

Note:

1. EUT will choose either CDMA/LTE according to the network signal condition; therefore, CDMA/LTE cannot transmit simultaneously.
2. The reported SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v05r01, 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

13.1 Hotspot Exposure Conditions

< WWAN + WLAN >

	WWAN			WLAN		WWAN+WLAN Summation SAR (W/kg)	SPLSR	Case No
Position	WWAN Band	Plot No	SAR (W/kg)	Plot No	SAR (W/kg)			
Front	CDMA2000 BC0	1	0.692	83	0.101	**0.793**		
	CDMA2000 BC1	6	1.005	83	0.101	**1.106**		
	LTE Band 4	27	0.454	83	0.101	**0.555**		
	LTE Band 5	62	0.778	83	0.101	**0.879**		
	LTE Band 12	42	0.548	83	0.101	**0.649**		
	LTE Band 17	52	0.614	83	0.101	**0.715**		
Back	CDMA2000 BC0	2	0.713	80	0.048	**0.761**		
	CDMA2000 BC1	7	1.404	80	0.048	**1.452**		
	LTE Band 4	23	1.219	80	0.048	**1.267**		
	LTE Band 5	63	0.804	80	0.048	**0.852**		
	LTE Band 12	43	0.601	80	0.048	**0.649**		
	LTE Band 17	53	0.623	80	0.048	**0.671**		
Left Side	CDMA2000 BC0			81	0.054	**0.054**		
	CDMA2000 BC1			81	0.054	**0.054**		
	LTE Band 4			81	0.054	**0.054**		
	LTE Band 5			81	0.054	**0.054**		
	LTE Band 12			81	0.054	**0.054**		
	LTE Band 17			81	0.054	**0.054**		
Right Side	CDMA2000 BC0	3	0.152			**0.152**		
	CDMA2000 BC1	8	1.457			**1.457**		
	LTE Band 4	25	1.31			**1.310**		
	LTE Band 5	64	0.172			**0.172**		
	LTE Band 12	44	0.158			**0.158**		
	LTE Band 17	54	0.136			**0.136**		
Bottom Side	CDMA2000 BC0	4	0.425			**0.425**		
	CDMA2000 BC1	9	0.557			**0.557**		
	LTE Band 4	21	0.162			**0.162**		
	LTE Band 5	65	0.446			**0.446**		
	LTE Band 12	45	0.221			**0.221**		
	LTE Band 17	55	0.236			**0.236**		
Top Side	CDMA2000 BC0	5	0.472	82	0.078	**0.550**		
	CDMA2000 BC1	10	0.193	82	0.078	**0.271**		
	LTE Band 4	31	0.247	82	0.078	**0.325**		
	LTE Band 5	66	0.519	82	0.078	**0.597**		
	LTE Band 12	46	0.281	82	0.078	**0.359**		
	LTE Band 17	56	0.268	82	0.078	**0.346**		

Test Engineer： Kat Yin

14. 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 14.1

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 14.1Standard 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 14.2Uncertainty Budget for frequency range 300 MHz to 3 GHz

15. 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] SPEAG DASY System Handbook

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

[6] FCC KDB 447498 D01 v05r01, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, May 2013

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

[8] FCC KDB 941225 D05 v02r02, “SAR Evaluation Considerations for LTE Devices”, May 2013

[9] FCC KDB 941225 D06 v01r01, "SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities", May 2013

[10] FCC KDB 865664 D01 v01r01, "SAR Measurement Requirements for 100 MHz to 6 GHz", May 2013.

[11] FCC KDB 865664 D02 v01r01, “RF Exposure Compliance Reporting and Documentation Considerations”, May 2013