Variant FCC SAR Test Report

APPLICANT	**:**	**ZTE CORPORATION**
EQUIPMENT	**:**	**CDMA/LTE Digital Mobile Handset**
BRAND NAME	**:**	**ZTE**
MODEL NAME	**:**	**ZTE FLASH 4G LTE**
FCC ID	**:**	**Q78-ZTEN9500**
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)**

This is a variant report which was only valid together with the original report. The product was completely tested on Dec. 19, 2012. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

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ilac-MRA

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA270201-03	Rev. 01	This is a variant for ZTE FLASH 4G LTE. The product equality declaration could be referred to Appendix F. All the test cases were performed on original report which can be referred to Sporton Report Number FA270201. Based on the original test report, all the test items of WLAN were retested and all the worst cases of WWAN were verified for the differences.	Jan. 14, 2013

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **ZTE CORPORATION, DUT: CDMA/LTE Digital Mobile Handset, Brand Name: ZTE, Model Name: ZTE FLASH 4G LTE** 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)
Head	CDMA2000 BC0	0.44	PCE	0.70
	CDMA2000 BC1	0.44		
	CDMA2000 BC10	0.33		
	LTE Band 25	0.70		
	WLAN, 2412 - 2462 MHz	0.05	DTS	0.05
Hotspot (1cm Gap)	CDMA2000 BC0	0.68	PCE	0.78
	CDMA2000 BC1	0.77		
	CDMA2000 BC10	0.78		
	LTE Band 25	0.74		
	WLAN, 2412 - 2462 MHz	0.05	DTS	0.05
Body-worn (1cm Gap)	CDMA2000 BC0	0.67	PCE	1.18
	CDMA2000 BC1	0.83		
	CDMA2000 BC10	0.80		
	LTE Band 25	1.18		
	WLAN, 2412 - 2462 MHz	0.05	DTS	0.05

<Highest Simultaneous Transmission SAR>

Exposure Position	Frequency Band	Equipment Class	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Body-worn (1cm Gap)	CDMA2000 BC10	PCE	1.54
	LTE Band 25	PCE	
	WLAN, 2412 - 2462 MHz	DTS	

Exposure Position	Frequency Band	Equipment Class	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Body-worn (1cm Gap)	CDMA2000 BC1	PCE	1.44
	LTE Band 25	PCE	
	Bluetooth, 2402 - 2480 MHz	DSS	

Remark:

1. The highest simultaneous transmission SAR is reported multi-band summation of simultaneous transmission SAR measurement.
2. Scalar SAR summation of all possible simultaneous transmission scenarios are < 1.6W/kg.

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

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

2.2 Applicant

Company Name	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	Dec. 18, 2012
Date of End during the Test	Dec. 19, 2012

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	CDMA/LTE Digital Mobile Handset
Brand Name	ZTE
Model Name	ZTE FLASH 4G LTE
FCC ID	Q78-ZTEN9500
MEID	99000058110555
Tx Frequency	CDMA2000 BC0: 824.70 MHz ~ 848.31 MHz CDMA2000 BC1: 1851.25 MHz ~ 1908.75 MHz CDMA2000 BC10: 817.90 MHz ~ 823.10 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz WLAN 2.4G: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz NFC : 13.56 MHz
Antenna Type	WWAN: PIFA Antenna LTE : PIFA Antenna WLAN: PIFA Antenna Bluetooth: PIFA Antenna NFC: Internal coil Antenna (on battery cover)
HW Version	c7zB
SW Version	N9500V1.0.0B13
Uplink Modulations	CDMA2000 1xRTT: QPSK CDMA2000 1xEV-DO: 8PSK LTE: QPSK / 16QAM 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth BDR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π /4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK Bluetooth V4.0 LE : GFSK NFC : ASK
DUT Stage	Identical Prototype
Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

3.2 Maximum RF output power among production units

Maximum Burst Average Power for Production Unit			
Band	**CDMA2000 BC0 (dBm)**	**CDMA2000 BC1 (dBm)**	**CDMA2000 BC10 (dBm)**
1xRTT RC1 SO55	**25**	**24.7**	**25**
1xRTT RC3 SO55	**25**	**24.7**	**25**
1xRTT RC3 SO32(+ F-SCH)	**25**	**24.7**	**25**
1xRTT RC3 SO32(+SCH)	**25**	**24.7**	**25**
1xEV-DO Rev 0	**25**	**24.7**	**25**
1xEV-DO Rev A	**25**	**24.7**	**25**

LTE Band 25				
Modulation	**BW (MHz)**	**RB size**	**Target MPR**	**Maximum Power**
QPSK	10	≤ 12	**0**	**23.5**
QPSK	10	> 12	**1**	**22.5**
16QAM	10	≤ 12	**1**	**22.5**
16QAM	10	> 12	**2**	**21.5**
QPSK	5	≤ 8	**0**	**23.5**
QPSK	5	> 8	**1**	**22.5**
16QAM	5	≤ 8	**1**	**22.5**
16QAM	5	> 8	**2**	**21.5**
QPSK	3	≤ 4	**0**	**23.5**
QPSK	3	> 4	**1**	**22.5**
16QAM	3	≤ 4	**1**	**22.5**
16QAM	3	> 4	**2**	**21.5**
QPSK	1.4	≤ 5	**0**	**23.5**
QPSK	1.4	> 5	**1**	**22.5**
16QAM	1.4	≤ 5	**1**	**22.5**
16QAM	1.4	> 5	**2**	**21.5**

Modulation	**Channel bandwidth / Transmission bandwidth configuration [RB]**				**MPR Target (dB)**				**3GPP MPR (dB)**
	1.4 MHz	**3 MHz**	**5 MHz**	**10 MHz**	**1.4 MHz**	**3 MHz**	**5 MHz**	**10 MHz**	
QPSK	> 5	> 4	> 8	> 12	1	1	1	1	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	1	1	1	1	≤ 1
16 QAM	> 5	> 4	> 8	> 12	2	2	2	2	≤ 2

Remark:

1. By design, other RB configurations and higher-order modulation RF output power will never exceed maximum output power listed above, detailed information is included in “tune-up procedure” exhibit
2. LTE MPR implementation is the same for normal mode and power reduction mode

Maximum Target Average Power for Production Unit				
Mode / Band	IEEE 802.11 (dBm)			
	a	b	g	n-HT20
2.4 GHz WLAN		15.5	12.0	12.0

Maximum Target Average Power for Production Unit			
Mode / Band	Bluetooth (dBm)		
	1Mbps (GFSK)	2Mbps (π/4-DQPSK)	3Mbps (8-DPSK)
2.4 GHz Bluetooth	3	1	1

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

FCC ID	Q78-ZTEN9500
DUT Type	CDMA/LTE Digital Mobile Handset
Operating Frequency Range of each LTE transmission band	Band 25: TX: 1850.7 MHz ~ 1914.3 MHz, RX: 1930.7 MHz ~ 1994.3 MHz
Channel Bandwidth	Band 25: 1.4MHz, 3MHz, 5MHz, 10MHz

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

Band 25								
	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	26047	1850.7	26055	1851.5	26065	1852.5	26090	1855
M	26365	1882.5	26365	1882.5	26365	1882.5	26365	1882.5
H	26683	1914.3	26675	1913.5	26665	1912.5	26640	1910

UE category, uplink modulations used	Category 3, QPSK, and 16QAM	
LTE transmitter and antenna implementation (standalone or sharing hardware components / antennas)	LTE owns standalone transmitter and antenna.	
LTE Voice / Data requirements	Data only	
LTE MPR permanently built-in by design	Yes	
LTE A-MPR	Disabled during SAR testing. With CMW500, set NS value to NS_01 to disable A-MPR.	
LTE maximum averaged conducted output power	LTE Band 25: 23.32 dBm	
Other U.S. wireless operating modes / bands	CDMA2000 1xRTT	BC0: UL: 824.70 ~ 848.31 MHz / DL: 869.70 ~ 893.31 MHz BC1: UL: 1815.25 ~ 1908.75 MHz / DL: 1931.25 ~ 1988.75 MHz BC10: UL: 817.90 ~ 823.10 MHz / DL: 903.8 ~ 914.2 MHz
	1xEVDO	BC0: UL: 824.70 ~ 848.31 MHz / DL: 869.70 ~ 893.31 MHz BC1: UL: 1815.25 ~ 1908.75 MHz / DL: 1931.25 ~ 1988.75 MHz BC10: UL: 817.90 ~ 823.10 MHz / DL: 903.8 ~ 914.2 MHz
	WLAN	2.4G: 2412 MHz ~ 2462 MHz
	Bluetooth	2402 MHz ~ 2480 MHz
	NFC	13.56 MHz
Simultaneous transmission configurations	In Section 12.6	
Power reduction applied to satisfy SAR compliance	Yes, SVLTE power reduction.	

The SVLTE operating mode, which means CDMA 1x RTT(voice) and LTE (data) transmitting simultaneously, the power reduction is implemented on this device and cannot be changed by end users or overridden by power control command from base stations.
The power reduction implementation is defined as following table.

CDMA2000 1x voice BC0/BC10	LTE data mode Band 25
P ≥ 16.5	20.5
P < 16.5	23.5

CDMA2000 1x voice BC1	LTE data mode Band 25
P ≥ 16.5	20.5
P < 16.5	23.5

Table 3.1-A: Power Reduction Implementation (Unit: dBm)

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 941225 D01 v02
- FCC KDB 941225 D05 v02
- FCC KDB 941225 D06 v01
- FCC KDB 865664 D01 v01
- FCC KDB 248227 D01 v01r02

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

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

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

During WLAN SAR testing EUT is configured with the WLAN continuous TX tool.

The EUT was set from the emulator to radiate maximum WWAN output power during all tests.

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

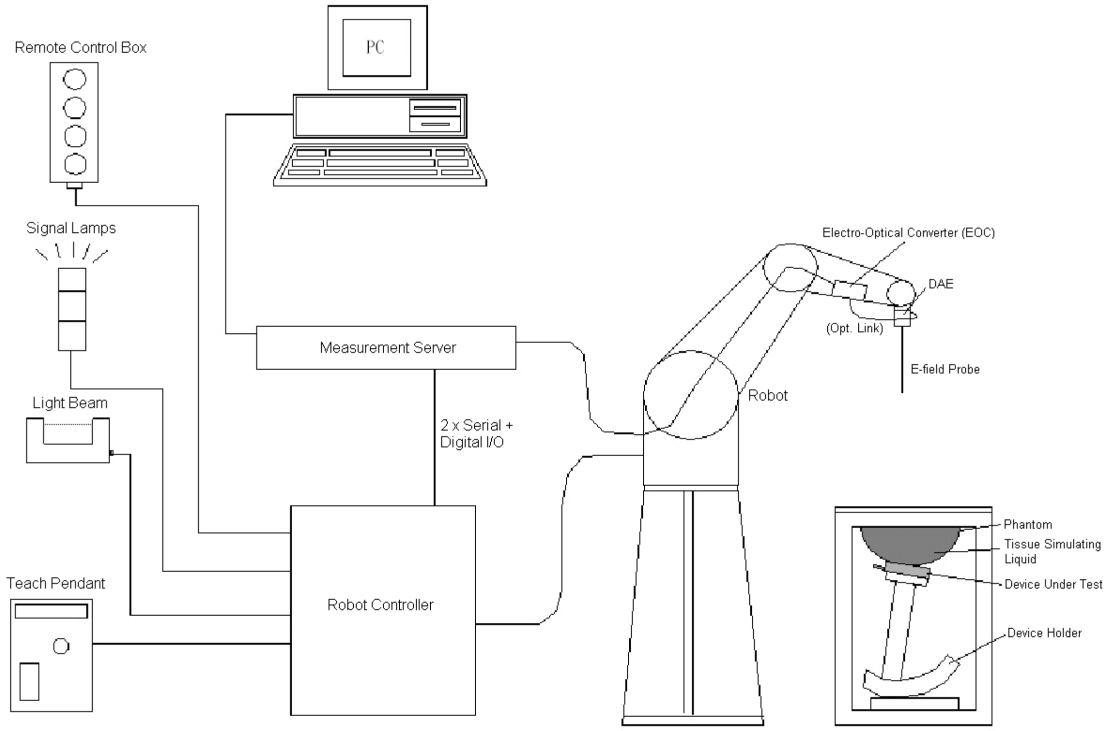


Fig 5.1 SPEAG DASY System Configurations

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)	 **Fig 5.2 Photo of EX3DV4**
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	

5.1.2 E-Field Probe Calibration

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

5.2 Data Acquisition Electronics (DAE)

The data acquisition electronics (DAE) consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information as well as an optical uplink for commands and the clock.
The input impedance of the DAE is 200 MOhm; the inputs are symmetrical and floating. Common mode rejection is above 80 dB.

Fig 5.3 Photo of DAE

5.3 Robot

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

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

Fig 5.4 Photo of DASY5

5.4 Measurement Server

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

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

Fig 5.5 Photo of Server for DASY5

5.5 Phantom

<SAM Twin Phantom>

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

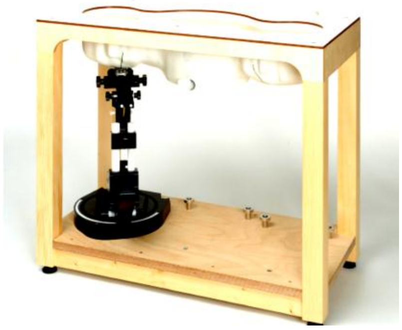


Fig 5.6 Photo of SAM Phantom

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

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：

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

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), $\mu V/(V/m)^2$ 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)：

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

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

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

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

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

5.8 Test Equipment List

Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
SPEAG	835MHz System Validation Kit	D835V2	4d091	Nov. 18, 2011	Nov. 16, 2013
SPEAG	1900MHz System Validation Kit	D1900V2	5d118	Nov. 21, 2011	Nov. 16, 2013
SPEAG	2450MHz System Validation Kit	D2450V2	736	Jul. 25, 2011	Jul. 24, 2013
SPEAG	Data Acquisition Electronics	DAE3	360	Nov. 15, 2012	Nov. 14, 2013
SPEAG	Dosimetric E-Field Probe	EX3DV4	3857	Jun. 20, 2012	Jun. 19, 2013
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1477	NCR	NCR
SPEAG	SAM Twin Phantom	QD 000 P40 CB	TP-1479	NCR	NCR
SPEAG	Phone Positioner	N/A	N/A	NCR	NCR
Anritsu	Radio communication analyzer	MT8820C	6201074235	Nov. 29, 2012	Nov. 28, 2013
Agilent	Wireless Communication Test Set	E5515C	MY48367160	Oct. 25, 2012	Oct. 24, 2013
Agilent	ENA Series Network Analyzer	E5071C	MY46111157	Apr. 13, 2012	Apr. 12, 2013
Agilent	Power Meter	E4416A	MY45101555	Aug. 22, 2012	Aug. 21, 2013
Agilent	Power Sensor	E9327A	MY44421198	Aug. 22, 2012	Aug. 21, 2013
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	0328767	Note 6	-
R&S	Spectrum Analyzer	FSP30	101400	Jun. 01, 2012	May 31, 2013

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 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 D835V2, SN: 4d091, D1900V2, SN: 5d118, 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.

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.

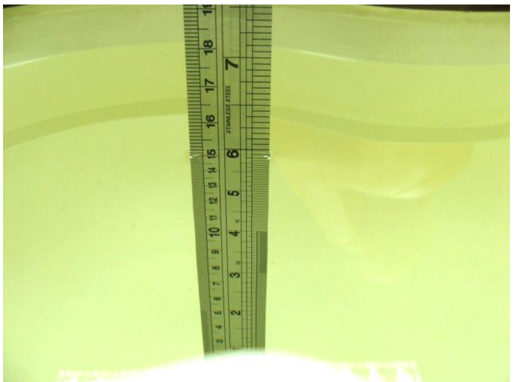


Fig 6.1 Photo of Liquid Height for Head SAR

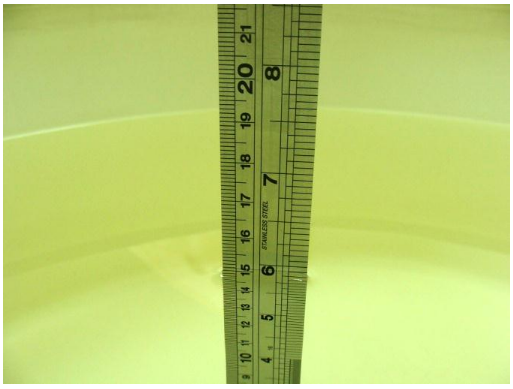


Fig 6.2 Photo of Liquid Height for Body SAR

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								
835	40.3	57.9	0.2	1.4	0.2	0	0.90	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								
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Table 6.1 Recipes of Tissue Simulating Liquid

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

The following table shows the measuring results for simulating liquid.

Freq. (MHz)	Liquid Type	Temp. (℃)	Conductivity (σ)	Permittivity (ε_r)	Conductivity Target (σ)	Permittivity Target (ε_r)	Delta (σ) (%)	Delta (ε_r) (%)	Limit (%)	Date
835	Head	21.1	0.894	41.382	0.90	41.5	-0.67	-0.28	±5	Dec. 18, 2012
1900	Head	21.3	1.423	39.015	1.40	40.0	1.64	-2.46	±5	Dec. 18, 2012
2450	Head	21.5	1.856	37.685	1.80	39.2	3.11	-3.86	±5	Dec. 18, 2012
835	Body	21.2	0.98	54.477	0.97	55.2	1.03	-1.31	±5	Dec. 19, 2012
1900	Body	21.5	1.551	53.249	1.52	53.3	2.04	-0.10	±5	Dec. 19, 2012
2450	Body	21.4	2.002	53.464	1.95	52.7	2.67	1.45	±5	Dec. 19, 2012

Table 6.2 Measuring Results for Simulating Liquid

7. SAR Measurement Evaluation

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

7.1 Purpose of System Performance check

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

7.2 System Setup

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

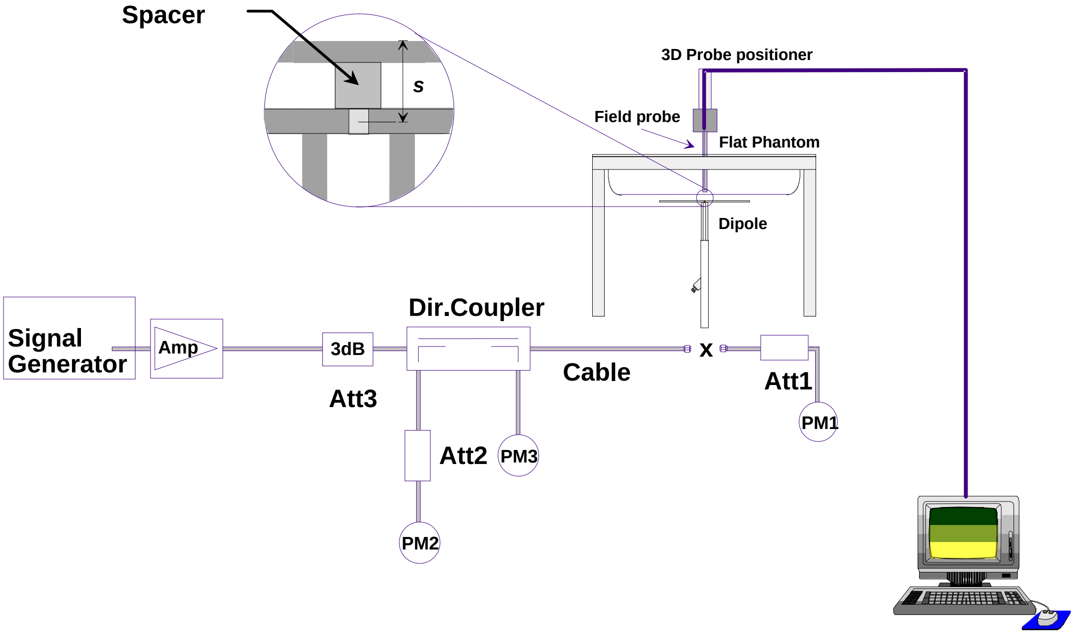


Fig 7.1 System Setup for System Evaluation

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

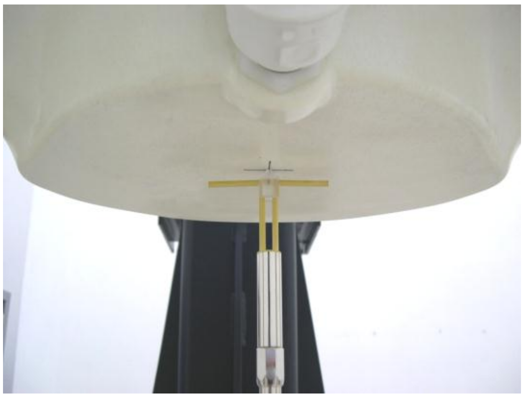


Fig 7.2 Photo of Dipole Setup

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.

Measurement Date	Frequency (MHz)	Liquid Type	Power fed onto reference dipole (mW)	Targeted SAR_{1g} (W/kg)	Measured SAR_{1g} (W/kg)	Normalized SAR_{1g} (W/kg)	Deviation (%)
Dec. 18, 2012	835	Head	250	9.40	2.29	9.16	-2.55
Dec. 18, 2012	1900	Head	250	40.3	9.96	39.84	-1.14
Dec. 18, 2012	2450	Head	250	54.8	13.7	54.80	0.00
Dec. 19, 2012	835	Body	250	9.42	2.23	8.92	-5.31
Dec. 19, 2012	1900	Body	250	41.80	10.4	41.60	-0.48
Dec. 19, 2012	2450	Body	250	52.3	13.5	54.00	3.25

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

This EUT was tested in seven different positions. They are right cheek, right tilted, left cheek, left tilted, Front of the EUT with phantom 1 cm gap, Back of the EUT with phantom 1 cm gap, and Right Side of the EUT with phantom 1 cm gap, as illustrated below:

8.1 Define two imaginary lines on the handset

(a) The vertical centerline passes through two points on the front side of the handset - the midpoint of the width w_t of the handset at the level of the acoustic output, and the midpoint of the width w_b of the bottom of the handset.

(b) The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output. The horizontal line is also tangential to the face of the handset at point A.

(c) The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset, especially for clamshell handsets, handsets with flip covers, and other irregularly shaped handsets.

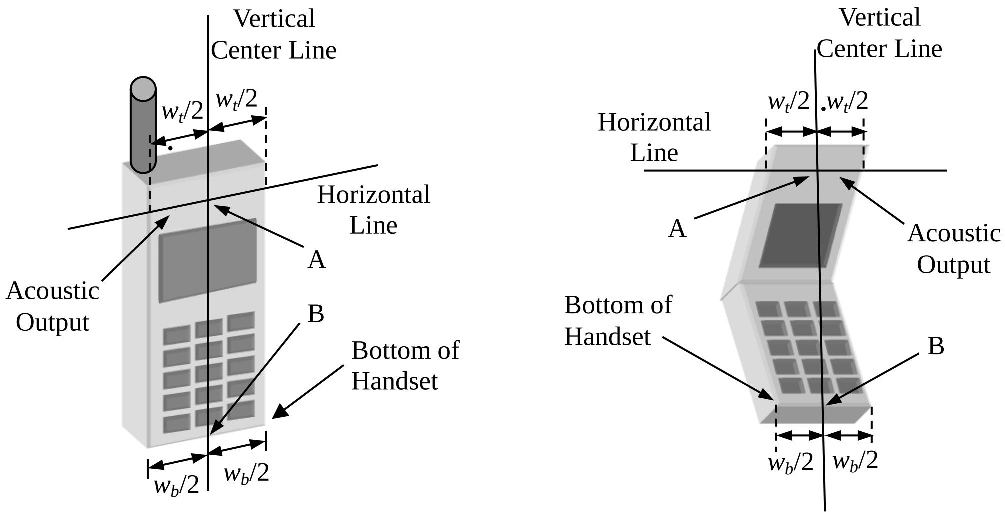


Fig 8.1 Illustration for Handset Vertical and Horizontal Reference Lines

8.2 Cheek Position

(a) To position the device with the vertical center line of the body of the device and the horizontal line crossing the center piece in a plane parallel to the sagittal plane of the phantom. While maintaining the device in this plane, align the vertical center line with the reference plane containing the three ear and mouth reference point (M: Mouth, RE: Right Ear, and LE: Left Ear) and align the center of the ear piece with the line RE-LE.

(b) To move the device towards the phantom with the ear piece aligned with the line LE-RE until the phone touched the ear. While maintaining the device in the reference plane and maintaining the phone contact with the ear, move the bottom of the phone until any point on the front side is in contact with the cheek of the phantom or until contact with the ear is lost (see Fig. 8.2).

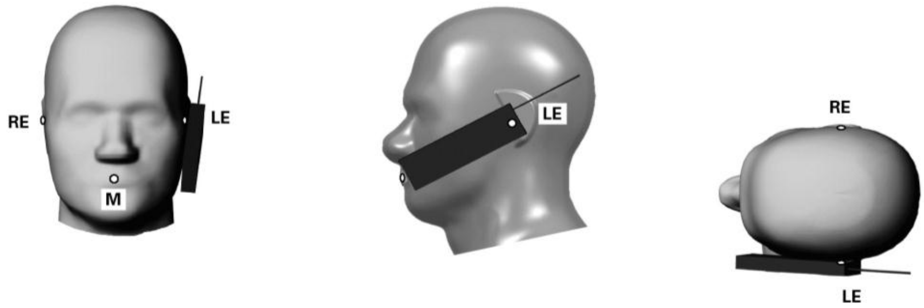


Fig 8.2 Illustration for Cheek Position

8.3 Tilted Position

(a) To position the device in the "cheek" position described above.

(b) While maintaining the device the reference plane described above and pivoting against the ear, moves it outward away from the mouth by an angle of 15 degrees or until contact with the ear is lost (see Fig. 8.3).

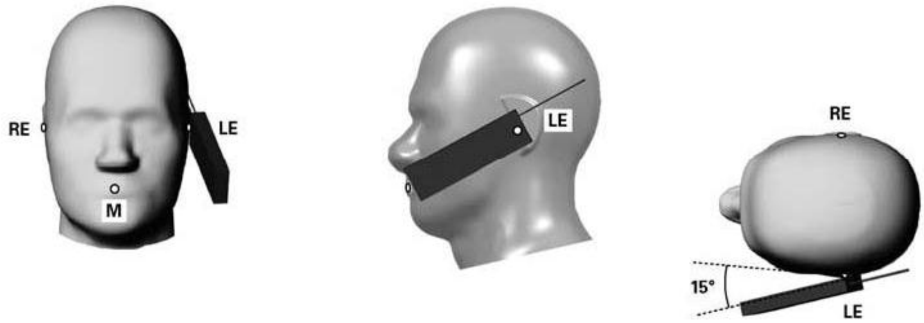


Fig 8.3 Illustration for Tilted Position

8.4 Body Worn Position

(a) To position the device parallel to the phantom surface either keypad up or down.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device surface and the flat phantom to 1 cm.

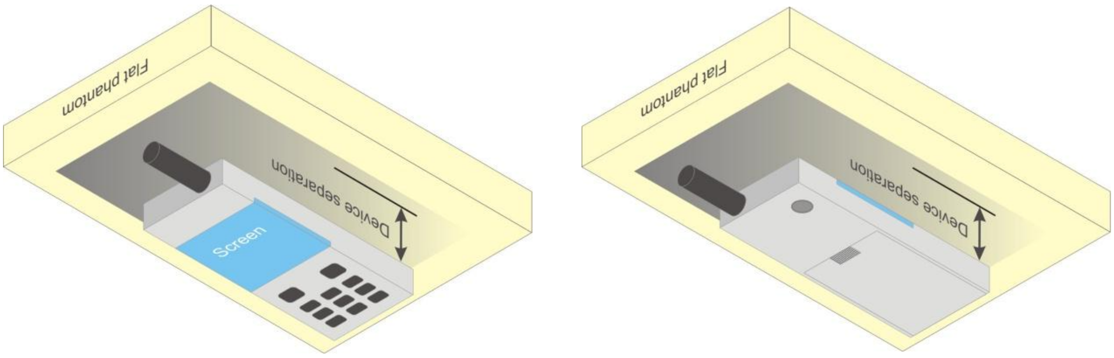


Fig 8.4 Illustration for Body Worn Position

8.5 Hotspot Position

(a) To position the device parallel to the phantom surface with all sides.
(b) To adjust the device parallel to the flat phantom.
(c) To adjust the distance between the device and the flat phantom to 1 cm.

<EUT Setup Photos>

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 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.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></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° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 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 ≤ 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>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 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>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 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>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 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>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 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 <u>reported</u> 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.</td></tr>
</table>

9.3 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the 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.

9.4 SAR Averaged Methods

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

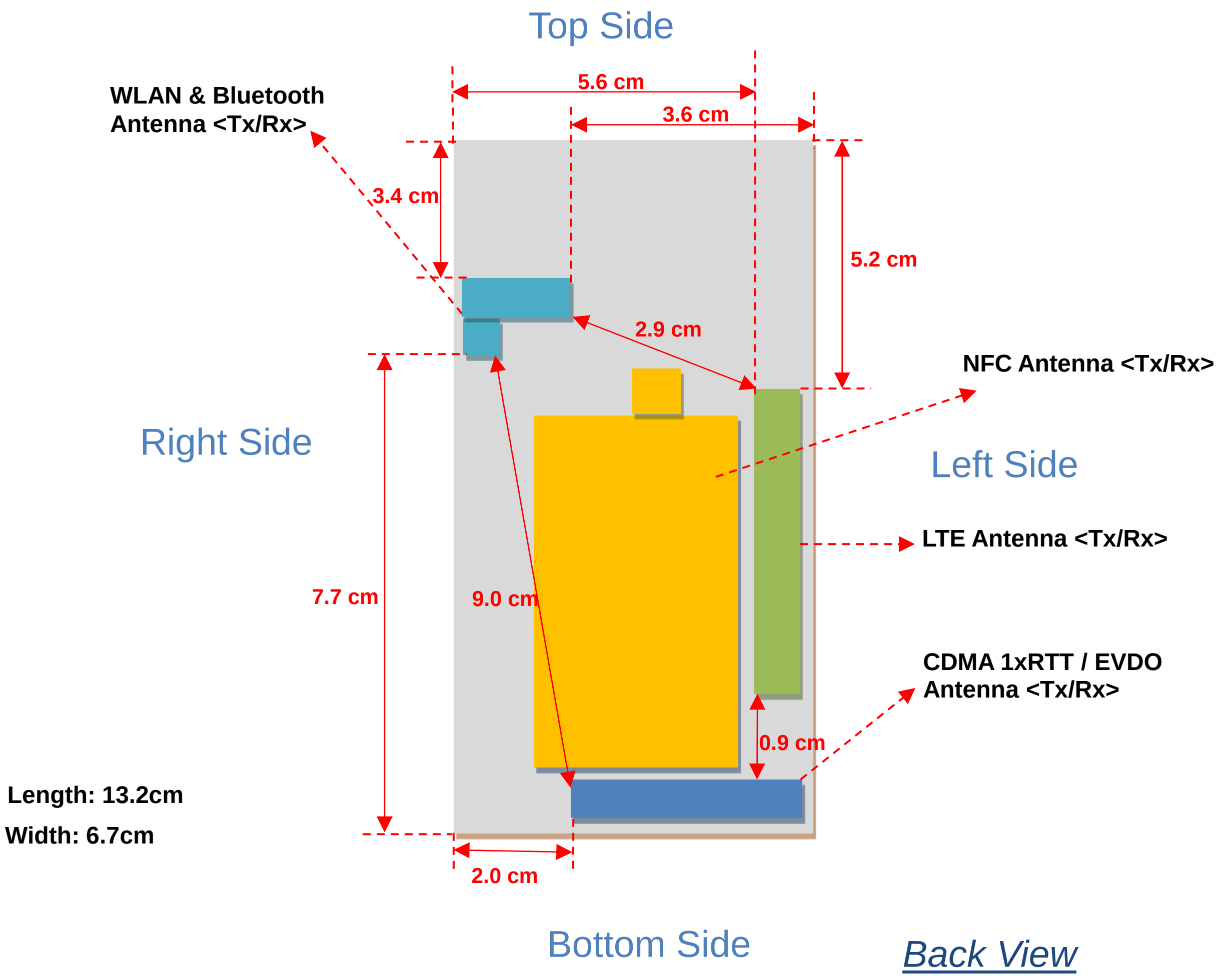
Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation distance is determined by the surface detection distance and the probe sensor offset. The uncertainty increases with the extrapolation distance. To keep the uncertainty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

9.5 Power Drift Monitoring

All SAR testing is under the EUT 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. SAR Test Configurations

10.1 Exposure Positions Consideration



Antennas	Wireless Interface
LTE Antenna (Tx / Rx)	LTE: band 25
CDMA 1xRTT / EVDO (Tx / Rx)	CDMA2000 1xRTT and EVDO BC 0/1/10
WLAN&BT Antenna (Tx / Rx)	WLAN 2.4GHz Bluetooth
NFC Antenna (Tx / Rx)	NFC

Sides for SAR tests; Hotspot mode Test distance: 10 mm						
Antennas	**Back**	**Front**	**Top Side**	**Bottom Side**	**Right Side**	**Left Side**
LTE	YES	YES	NO	YES	NO	YES
CDMA 1xRTT / EVDO	YES	YES	NO	YES	YES	YES
WLAN & Bluetooth	YES	YES	NO	NO	YES	NO

Note:

1. Head/Body-worn/Hotspot mode SAR assessments are required.
2. Referring to KDB 941225 D06, 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.
3. For LTE antenna, Top/Right sides SAR are not required since the distance between the transmitting antenna and surface of device > 25mm. However, we only test Back side that is the worst case of the original report in this report.
4. For CDMA 1xRTT and EVDO antenna, Top side SAR is not required since the distance between the transmitting antenna and surface of device > 25mm. However, we only test Back side that is the worst case of the original report in this report.
5. For WLAN & Bluetooth antenna, Top/Bottom/Left sides SAR are not required since the distance between the transmitting antenna and surface of device > 25mm.
6. Per KDB 447498 D01v05, for handsets the test separation distance is determined by the smallest distance between the outer surface of the device and the user; which is 0mm for head SAR, 10mm for hotspot SAR, and 10mm for body-worn SAR.
7. If the test separation distance (antenna-user) is < 5mm, 5mm is used for estimated SAR calculation.
8. The NFC antenna is integrated into the standard back cover of this model.
9. For minimum test separation distance ≤50mm, Bluetooth standalone SAR is excluded according to [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR.

	Wireless Interface	Bluetooth
Tune-up Maximum power (dBm)		3
Tune-up Maximum rated power (mW)		2.0
Head	Antenna to user (mm)	5
	SAR exclusion threshold (mW)	10
	SAR testing required?	**NO**
Body	Antenna to user (mm)	10
	SAR exclusion threshold (mW)	19
	SAR testing required?	**NO**

11. Conducted RF Output Power (Unit: dBm)

<1xRTT Conducted Power>

Band	CDMA2000 BC0			CDMA2000 BC1			CDMA2000 BC10		
Channel	1013	384	777	25	600	1175	476	580	684
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75	817.9	820.5	823.1
1x Voice Mode	Full Power (25dBm)			Full Power (24.7dBm)			Full Power (25dBm)		
1xRTT RC1+SO55	24.12	24.36	24.23	23.92	24.13	24.19	24.35	24.29	24.23
1xRTT RC3+SO55	23.99	24.28	24.14	23.92	24.04	24.10	24.31	24.26	24.20
1xRTT RC3+SO32(+F-SCH)	24.09	24.32	24.21	23.95	24.09	24.11	24.33	24.31	24.23
1xRTT RC3+SO32(+SCH)	24.05	24.30	24.18	23.89	24.07	24.09	24.30	24.28	24.22
1x Voice Mode	Reduced Power (16.5dBm)			Reduced Power (16.5dBm)			Reduced Power (16.5dBm)		
1xRTT RC1+SO55	16.18	16.25	16.32	16.07	16.18	16.06	16.12	16.30	16.37
1xRTT RC3+SO55	16.11	16.27	16.31	15.94	16.15	15.93	15.59	16.39	16.38
1xRTT RC3+SO32(+F-SCH)	16.03	16.19	15.65	15.93	16.05	15.88	15.82	16.28	16.35
1xRTT RC3+SO32(+SCH)	15.80	16.13	15.58	16.02	16.02	15.85	15.80	16.24	16.32

<1xEVDO Conducted Power>

Band		CDMA2000 BC0			CDMA2000 BC1			CDMA2000 BC10		
Channel		1013	384	777	25	600	1175	476	580	684
Frequency		824.7	836.52	848.31	1851.25	1880	1908.75	817.9	820.5	823.1
EVDO data mode		Full Power (25dBm)			Full Power (24.7dBm)			Full Power (25dBm)		
EVDO Rev.0	RTAP 153.6kbps	24.01	24.24	24.14	23.84	23.99	24.02	24.23	24.20	24.12
EVDO Rev.A	RETAP 4096byte	24.01	24.18	24.13	23.77	23.93	23.95	24.25	24.20	24.01

<LTE Band 25 Conducted Power>

BW [MHz]	Mod / RB (Size - Offset)	Full Power (23.5dBm) Average Power. (dBm) Low Ch	Mid Ch	High Ch	3GPP MPR	MPR Result (dB) Low Ch	Mid Ch	High Ch	Reduced Power (20.5dBm) Average Power. (dBm) Low Ch	Mid Ch	High Ch	3GPP MPR	MPR Result (dB) Low Ch	Mid Ch	High Ch
Channel		26090	26365	26640		26090	26365	26640	26090	26365	26640		26090	26365	26640
Frequency (MHz)		1855	1882.5	1910		1855	1882.5	1910	1855	1882.5	1910		1855	1882.5	1910
10	QPSK 1-0	23.27	23.30	23.26	0	0.00	0.00	0.00	19.57	**19.63**	19.47	0	0.00	0.00	0.00
10	QPSK 1-49	23.22	23.29	23.21		0.05	0.01	0.05	19.43	19.46	19.33		0.14	0.17	0.14
10	QPSK 25-13	22.05	22.12	22.13	≤ 1	1.22	1.18	1.13	18.14	18.20	18.18	≤ 1	1.43	1.43	1.29
10	QPSK 50-0	21.94	22.05	21.95		1.33	1.25	1.31	18.08	18.18	18.02		1.49	1.45	1.45
10	16QAM 1-0	22.30	22.42	22.34	≤ 1	0.97	0.88	0.92	18.57	18.68	18.06	≤ 1	1.00	0.95	1.41
10	16QAM 1-49	22.26	22.29	22.29		1.01	1.01	0.97	18.22	18.36	17.99		1.35	1.27	1.48
10	16QAM 25-13	21.19	21.06	20.98	≤ 2	2.08	2.24	2.28	18.14	17.86	17.73	≤ 2	1.43	1.77	1.74
10	16QAM 50-0	20.90	21.02	20.95		2.37	2.28	2.31	17.88	17.65	17.38		1.69	1.98	2.09
Channel		26065	26365	26665		26065	26365	26665	26065	26365	26665		26065	26365	26665
Frequency (MHz)		1852.5	1882.5	1912.5		1852.5	1882.5	1912.5	1852.5	1882.5	1912.5		1852.5	1882.5	1912.5
5	QPSK 1-0	**23.32**	**23.32**	23.30	0	0.00	0.00	0.00	19.46	19.27	19.45	0	0.00	0.00	0.00
5	QPSK 1-24	23.29	23.25	23.18		0.03	0.07	0.12	19.44	19.23	19.02		0.02	0.04	0.43
5	QPSK 12-6	22.27	22.17	22.37	≤ 1	1.05	1.15	0.93	18.43	18.22	18.12	≤ 1	1.03	1.05	1.33
5	QPSK 25-0	22.06	22.09	22.14		1.26	1.23	1.16	18.32	18.14	18.01		1.14	1.13	1.44
5	16QAM 1-0	22.40	22.42	22.40	≤ 1	0.92	0.90	0.90	18.57	18.54	18.71	≤ 1	0.89	0.73	0.74
5	16QAM 1-24	22.18	22.40	22.26		1.14	0.92	1.04	18.45	18.52	18.21		1.01	0.75	1.24
5	16QAM 12-6	21.39	21.25	21.35	≤ 2	1.93	2.07	1.95	17.93	17.95	17.48	≤ 2	1.53	1.32	1.97
5	16QAM 25-0	21.27	21.14	21.03		2.05	2.18	2.27	17.84	17.84	17.24		1.62	1.43	2.21
Channel		26055	26365	26675		26055	26365	26675	26055	26365	26675		26055	26365	26675
Frequency (MHz)		1851.5	1882.5	1913.5		1851.5	1882.5	1913.5	1851.5	1882.5	1913.5		1851.5	1882.5	1913.5
3	QPSK 1-0	23.08	23.12	23.08	0	0.00	0.00	0.00	19.35	19.32	19.32	0	0.00	0.00	0.00
3	QPSK 1-14	23.06	23.07	23.06		0.02	0.05	0.02	19.31	19.31	19.10		0.04	0.01	0.22
3	QPSK 8-4	22.36	22.27	22.49	≤ 1	0.72	0.85	0.59	18.34	18.34	17.93	≤ 1	1.01	0.98	1.39
3	QPSK 15-0	22.26	22.24	22.22		0.82	0.88	0.86	18.33	18.23	17.92		1.02	1.09	1.40
3	16QAM 1-0	22.11	22.13	22.12	≤ 1	0.97	0.99	0.96	18.80	18.42	18.62	≤ 1	0.55	0.90	0.70
3	16QAM 1-14	22.10	22.12	22.10		0.98	1.00	0.98	18.76	18.39	17.90		0.59	0.93	1.42
3	16QAM 8-4	21.28	21.28	21.29	≤ 2	1.80	1.84	1.79	17.85	17.81	17.27	≤ 2	1.50	1.51	2.05
3	16QAM 15-0	21.32	21.16	21.38		1.76	1.96	1.70	17.67	17.62	16.91		1.68	1.70	2.41
Channel		26047	26365	26683		26047	26365	26683	26047	26365	26683		26047	26365	26683
Frequency (MHz)		1850.7	1882.5	1914.3		1850.7	1882.5	1914.3	1850.7	1882.5	1914.3		1850.7	1882.5	1914.3
1.4	QPSK 1-0	23.24	23.26	23.23	0	0.00	0.00	0.02	19.31	19.34	18.97	0	0.00	0.00	0.00
1.4	QPSK 1-5	23.20	23.23	23.25		0.04	0.03	0.00	19.30	19.33	18.60		0.01	0.01	0.37
1.4	QPSK 3-2	23.18	23.22	23.22		0.06	0.04	0.03	19.26	19.31	18.58		0.05	0.03	0.39
1.4	QPSK 6-0	22.37	22.22	22.35	≤ 1	0.87	1.04	0.90	18.38	18.36	17.54	≤ 1	0.93	0.98	1.43
1.4	16QAM 1-0	22.28	22.39	22.38	≤ 1	0.96	0.87	0.87	18.55	18.66	17.98	≤ 1	0.76	0.68	0.99
1.4	16QAM 1-5	22.06	22.15	22.34		1.18	1.11	0.91	18.42	18.60	17.83		0.89	0.74	1.14
1.4	16QAM 3-2	22.19	22.28	22.35		1.05	0.98	0.90	18.37	18.54	17.73		0.94	0.80	1.24
1.4	16QAM 6-0	21.24	21.28	21.20	≤ 2	2.00	1.98	2.05	18.08	17.45	17.17	≤ 2	1.23	1.89	1.80

<WLAN 2.4GHz>

WLAN 2.4G 802.11b Average Power (dBm)					
Channel	Frequency (MHz)	Data Rate (bps)			
		1M	2M	5.5M	11M
CH 01	2412	15.28	15.21	14.80	14.98
CH 06	2437	15.22	15.06	14.75	14.96
CH 11	2462	15.14	15.23	15.27	14.97

WLAN 2.4G 802.11g Average Power (dBm)									
Channel	Frequency (MHz)	Data Rate (bps)							
		6M	9M	12M	18M	24M	36M	48M	54M
CH 01	2412	10.67	10.67	10.72	10.80	10.75	11.15	11.04	10.98
CH 06	2437	11.38	11.20	11.25	11.29	11.25	11.25	11.11	10.98
CH 11	2462	10.87	10.85	10.82	11.22	10.92	11.16	10.96	10.95

WLAN 2.4G 802.11n-HT20 Average Power (dBm)									
Channel	Frequency (MHz)	MCS Index							
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	10.90	10.99	11.14	10.84	11.17	11.14	11.24	11.14
CH 06	2437	11.33	11.45	11.49	11.52	11.19	11.29	11.30	11.41
CH 11	2462	11.58	11.33	11.19	11.24	10.99	11.54	11.55	11.54

Note:

1. Per KDB 248227, choose the highest output power channel to test SAR and determine further SAR exclusion
2. Per KDB 248227, 11g and 11n-HT20 output power is less than 1/4 dB higher than 11b mode, thus the SAR can be excluded.
3. 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 1/4 dB higher than those measured at the lowest data rate. 2.4GHz WLAN SAR was tested on CH01 of 802.11b 1Mbps.

<Bluetooth>

Bluetooth Average Power (dBm)										
Channel	Frequency (MHz)	Data Rate								
		DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5
CH 00	2402	1.94	2.18	2.23	0.83	0.90	0.94	0.82	0.86	0.85
CH 39	2441	1.17	1.43	1.39	0.03	0.10	0.13	0.06	0.12	0.13
CH 78	2480	1.31	1.58	1.57	0.14	0.16	0.26	0.19	0.28	0.26

12. SAR Test Results

General 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. Per KDB 447498 D01v05, for each exposure position, if the highest output channel reported SAR ≤0.8W/kg, other channels SAR testing is not necessary.

12.1 Test Records for Head SAR Test

<CDMA2000>

Plot No.	Antenna	Band	Mode	Test Position	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#01	**1xRTT / EVDO**	**CDMA2000 BC0**	**RC3 SO55**	**Right Cheek**	**777**	**848.31**	**24.14**	**25**	**1.219**	**0.362**	**0.441**	**0.12**	**0**
#02	1xRTT / EVDO	CDMA2000 BC0	RETAP4096	Right Cheek	777	848.31	24.13	25	1.222	0.361	0.441	0.01	0
#03	1xRTT / EVDO	CDMA2000 BC1	RC3 SO55	Left Cheek	600	1880	24.04	24.7	1.164	0.366	0.426	0.081	0
#06	**1xRTT / EVDO**	**CDMA2000 BC1**	**RETAP4096**	**Left Cheek**	**600**	**1880**	**23.93**	**24.7**	**1.194**	**0.366**	**0.437**	**0.045**	**0**
#09	1xRTT / EVDO	CDMA2000 BC10	RC3 SO55	Right Cheek	476	817.9	24.31	25	1.172	0.274	0.321	0.14	0
#10	**1xRTT / EVDO**	**CDMA2000 BC10**	**RETAP4096**	**Right Cheek**	**476**	**817.9**	**24.25**	**25**	**1.194**	**0.276**	**0.328**	**0.09**	**0**

<LTE>

Plot No.	Antenna	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#11	LTE	LTE Band 25	QPSK	10	1	49	Right Cheek	26365	1882.5	23.29	23.5	1.050	0.548	0.575	0.044	0
#12	**LTE**	**LTE Band 25**	**QPSK**	**10**	**1**	**49**	**Left Cheek**	**26365**	**1882.5**	**23.29**	**23.5**	**1.050**	**0.670**	**0.703**	**0.035**	**0**

<WLAN 2.4GHz>

Plot No.	Antenna	Band	Mode	Test Position	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#13	WLAN/BT	WLAN 2.4GHz	802.11b	Right Cheek	1	2412	15.28	15.5	1.052	0.021	0.022	0.07	0
#14	WLAN/BT	WLAN 2.4GHz	802.11b	Right Tilted	1	2412	15.28	15.5	1.052	0.012	0.013	0.02	0
#15	**WLAN/BT**	**WLAN 2.4GHz**	**802.11b**	**Left Cheek**	**1**	**2412**	**15.28**	**15.5**	**1.052**	**0.049**	**0.052**	**0.09**	**0**
#16	WLAN/BT	WLAN 2.4GHz	802.11b	Left Tilted	1	2412	15.28	15.5	1.052	0.011	0.012	0.02	0

12.2 Test Records for Hotspot SAR Test

<CDMA2000>

Plot No.	Antenna	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#21	**1xRTT / EVDO**	**CDMA2000 BC0**	**RTAP 153.6**	**Back**	**1**	**777**	**848.31**	**24.14**	**25**	**1.219**	**0.557**	**0.679**	**-0.06**	**0**
#31	**1xRTT / EVDO**	**CDMA2000 BC1**	**RTAP 153.6**	**Back**	**1**	**1175**	**1908.75**	**24.02**	**24.7**	**1.169**	**0.656**	**0.767**	**-0.07**	**0**
#36	**1xRTT / EVDO**	**CDMA2000 BC10**	**RTAP 153.6**	**Back**	**1**	**476**	**817.9**	**24.23**	**25**	**1.194**	**0.651**	**0.777**	0.0056	0

<LTE>

Plot No.	Antenna	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#40	**LTE**	**LTE Band 25**	**QPSK**	**10**	**1**	**49**	**Back**	**1**	**26365**	**1882.5**	**23.29**	**23.5**	**1.050**	**0.706**	**0.741**	**-0.03**	**0**
#52	LTE	LTE Band 25	QPSK	10	1	49	Back	1	26365	1882.5	19.46	20.5	1.271	0.452	0.574	-0.02	3

<WLAN 2.4GHz>

Plot No.	Antenna	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#47	WLAN/BT	WLAN 2.4GHz	802.11b	Front	1	1	2412	15.28	15.5	1.052	0.00355	0.004	0.03	0
#48	**WLAN/BT**	**WLAN 2.4GHz**	**802.11b**	**Back**	**1**	**1**	**2412**	**15.28**	**15.5**	**1.052**	**0.045**	**0.047**	**0.04**	**0**
#49	WLAN/BT	WLAN 2.4GHz	802.11b	Right Side	1	1	2412	15.28	15.5	1.052	0.034	0.036	0.02	0

Note: Per KDB 941225 D06, 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.

12.3 Test Records for Body-worn SAR Test

<CDMA2000>

Plot No.	Antenna	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#17	1xRTT / EVDO	CDMA2000 BC0	RC3 SO32	Back	1	777	848.31	24.21	25	1.199	0.557	0.668	0.01	0
#20	**1xRTT / EVDO**	**CDMA2000 BC0**	**RETAP4096**	**Back**	**1**	**777**	**848.31**	**24.13**	**25**	**1.222**	**0.551**	**0.673**	**0.02**	**0**
#24	**1xRTT / EVDO**	**CDMA2000 BC1**	**RC3 SO32**	**Back**	**1**	**600**	**1880**	**24.09**	**24.7**	**1.151**	**0.718**	**0.826**	**-0.01**	**0**
#51	1xRTT / EVDO	CDMA2000 BC1	RC3 SO32	Back	1	600	1880	16.05	16.5	1.109	0.147	0.163	0.27	8.2
#25	1xRTT / EVDO	CDMA2000 BC1	RC3 SO32	Back	1	25	1851.25	23.95	24.7	1.189	0.661	0.786	-0.13	0
#26	1xRTT / EVDO	CDMA2000 BC1	RC3 SO32	Back	1	1175	1908.75	24.11	24.7	1.146	0.644	0.738	-0.07	0
#27	1xRTT / EVDO	CDMA2000 BC1	RETAP4096	Back	1	1175	1908.75	23.95	24.7	1.189	0.616	0.732	-0.09	0
#34	1xRTT / EVDO	CDMA2000 BC10	RC3 SO32	Back	1	476	817.9	24.33	25	1.167	0.647	0.755	-0.07	0
#35	**1xRTT / EVDO**	**CDMA2000 BC10**	**RETAP4096**	**Back**	**1**	**476**	**817.9**	**24.25**	**25**	**1.189**	**0.670**	**0.796**	-0.01	0

<LTE>

Plot No.	Antenna	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#40	LTE	LTE Band 25	QPSK	10	1	49	Back	1	26365	1882.5	23.29	23.5	1.050	0.706	0.741	-0.03	0
#52	LTE	LTE Band 25	QPSK	10	1	49	Back	1	26365	1882.5	19.46	20.5	1.271	0.452	0.574	-0.02	3
#37	LTE	LTE Band 25	QPSK	10	1	49	Back w/ headset	1	26365	1882.5	23.29	23.5	1.050	0.978	1.026	-0.01	0
#38	**LTE**	**LTE Band 25**	**QPSK**	**10**	**1**	**49**	**Back w/ headset**	**1**	**26090**	**1855**	**23.22**	**23.5**	**1.067**	**1.110**	**1.184**	**0.02**	**0**
#39	LTE	LTE Band 25	QPSK	10	1	49	Back w/ headset	1	26640	1910	23.21	23.5	1.069	0.984	1.052	-0.041	0

<WLAN 2.4GHz>

Plot No.	Antenna	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#47	WLAN/BT	WLAN 2.4GHz	802.11b	Front	1	1	2412	15.28	15.5	1.052	0.00355	0.004	0.03	0
#48	**WLAN/BT**	**WLAN 2.4GHz**	**802.11b**	**Back**	**1**	**1**	**2412**	**15.28**	**15.5**	**1.052**	**0.045**	**0.047**	**0.04**	0
#50	WLAN/BT	WLAN 2.4GHz	802.11b	Back w/ headset	1	1	2412	15.28	15.5	1.052	0.036	0.038	0.01	0

Note: Though per KDB 648474 D04v01, when the reported SAR for a body-worn accessory measured without a headset connected to the handset is ≤ 1.2 W/kg, the SAR testing with a headset connected to the handset is not required, but considered the simultaneous SAR for body-worn, we still perform the WLAN and Bluetooth SAR with headset mode.

12.4 Repeated SAR Measurement

Plot No.	Antenna	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#38	LTE	LTE Band 25	QPSK	10	1	49	Back w/ headset	1	26090	1855	23.22	23.5	1.067	1.110	1.184	0.02	0
#54	LTE	LTE Band 25	QPSK	10	1	49	Back w/ headset	1	26090	1855	23.22	23.5	1.067	1.080	1.152	-0.04	0

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, if the deviation among the repeated measurement is ≤20% and the measured SAR <1.45W/kg, only one repeated measurement is required. The deviation is the difference in percentage between original and repeated *measured SAR*.
3. The deviation is the difference in percentage between original and repeated measured SAR.
4. All measurement SAR result is scaled-up to account for tune-up tolerance and is compliant.

12.5 Highest SAR Plot

Plot No.	Antenna	Band	Mode	BW (MHz)	RB Size	RB Offset	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Output Power (dBm)	Tune-Up Limit (dBm)	Scaling Factor	SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)	Power Drift (dB)	Reduced Power (dB)
#01	1xRTT / EVDO	CDMA2000 BC0	RC3 SO55	-	-	-	Right Cheek	-	777	848.31	24.14	25	1.219	0.362	0.441	0.12	0
#06	1xRTT / EVDO	CDMA2000 BC1	RETAP 4096	-	-	-	Left Cheek	-	600	1880	23.93	24.7	1.194	0.366	0.437	0.045	0
#10	1xRTT / EVDO	CDMA2000 BC10	RETAP 4096	-	-	-	Right Cheek	-	476	817.9	24.25	25	1.194	0.276	0.328	0.09	0
#12	LTE	LTE Band 25	QPSK	10	1	49	Left Cheek	-	26365	1882.5	23.29	23.5	1.050	0.670	0.703	0.035	0
#15	WLAN/BT	WLAN 2.4GHz	802.11b	-	-	-	Left Cheek	-	1	2412	15.28	15.5	1.052	0.049	0.052	0.09	0
#21	1xRTT / EVDO	CDMA2000 BC0	RTAP 153.6	-	-	-	Back	1	777	848.31	24.14	25	1.219	0.557	0.679	-0.06	0
#31	1xRTT / EVDO	CDMA2000 BC1	RTAP 153.6	-	-	-	Back	1	1175	1908.75	24.02	24.7	1.169	0.656	0.767	-0.07	0
#36	1xRTT / EVDO	CDMA2000 BC10	RTAP 153.6	-	-	-	Back	1	476	817.9	24.23	25	1.194	0.651	0.777	0.0056	0
#48	WLAN/BT	WLAN 2.4GHz	802.11b	-	-	-	Back	1	1	2412	15.28	15.5	1.052	0.045	0.047	0.04	0
#20	1xRTT / EVDO	CDMA2000 BC0	RETAP 4096	-	-	-	Back	1	777	848.31	24.13	25	1.222	0.551	0.673	0.02	0
#24	1xRTT / EVDO	CDMA2000 BC1	RC3 SO32	-	-	-	Back	1	600	1880	24.09	24.7	1.151	0.718	0.826	-0.01	0
#35	1xRTT / EVDO	CDMA2000 BC10	RETAP 4096	-	-	-	Back	1	476	817.9	24.25	25	1.189	0.670	0.796	-0.01	0
#38	LTE	LTE Band 25	QPSK	10	1	49	Back w/ headset	1	26090	1855	23.22	23.5	1.067	1.110	1.184	0.02	0

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012-12-18

#01 CDMA2000 BC0_RC3 SO55_Right Cheek_Ch777

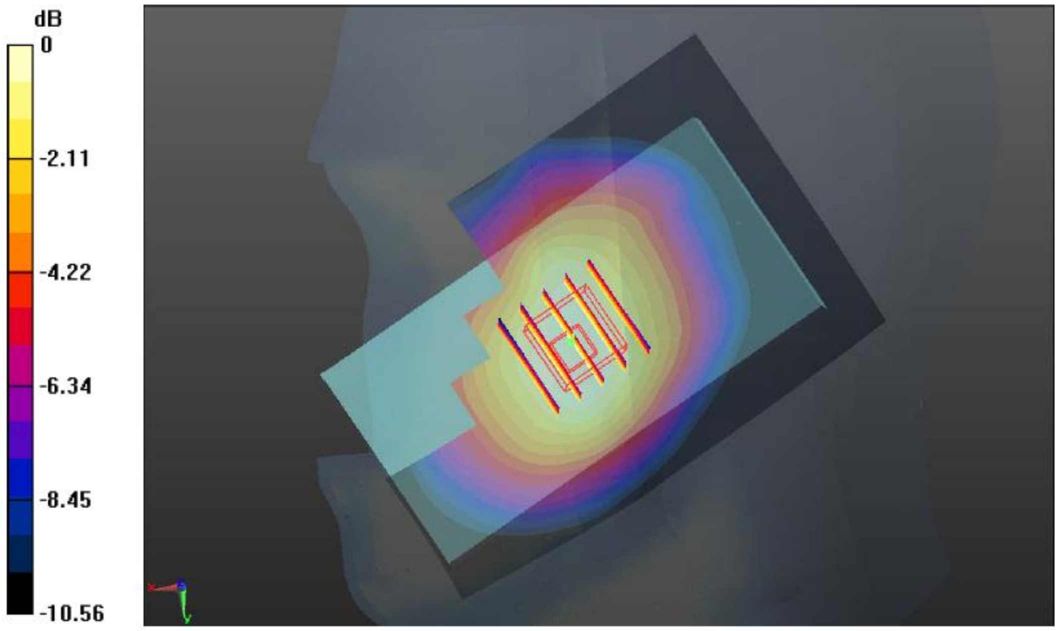
DUT: 270201-03

Communication System: CDMA2000; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium: HSL_835_121218 Medium parameters used: f = 848.31 MHz; σ = 0.905 mho/m; ε_r = 41.204; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.74, 8.74, 8.74); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch777/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.421 mW/g

Ch777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.221 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.447 W/kg
SAR(1 g) = 0.362 mW/g; SAR(10 g) = 0.272 mW/g
Maximum value of SAR (measured) = 0.410 mW/g



0 dB = 0.410mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012-12-18

#06 CDMA2000 BC1_RETAP4096_Left Cheek_Ch600

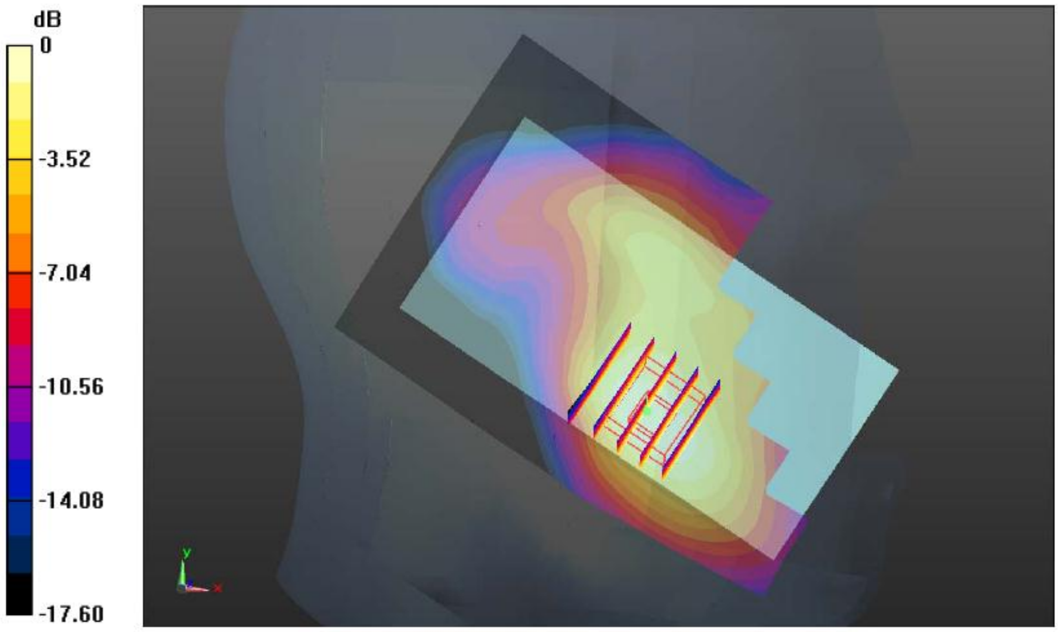
DUT: 270201-03

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: HSL_1900_121218 Medium parameters used: f = 1880 MHz; σ = 1.402 mho/m; ε_r = 39.102; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.84, 7.84, 7.84); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch600/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.512 mW/g

Ch600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.086 V/m; Power Drift = 0.045 dB
Peak SAR (extrapolated) = 0.583 W/kg
SAR(1 g) = 0.366 mW/g; SAR(10 g) = 0.217 mW/g
Maximum value of SAR (measured) = 0.475 mW/g



0 dB = 0.470mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012-12-18

#10 CDMA2000 BC10_RETAP 4096_Right Cheek_Ch476

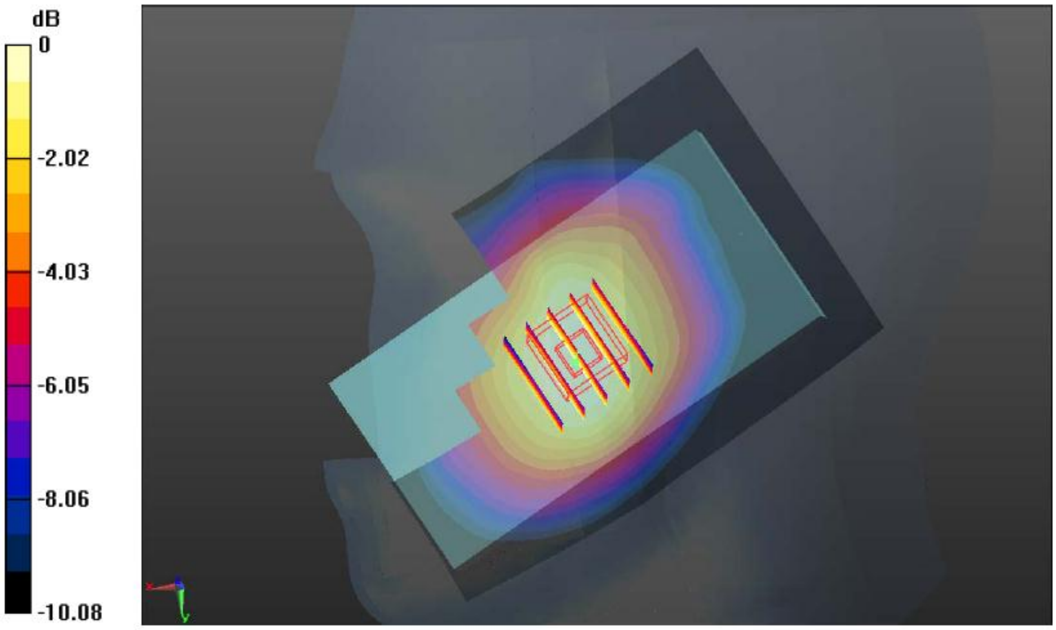
DUT: 270201-03

Communication System: CDMA2000; Frequency: 817.9 MHz;Duty Cycle: 1:1
Medium: HSL_835_121218 Medium parameters used: f = 817.9 MHz; σ = 0.878 mho/m; ε_r = 41.589; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.1 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.74, 8.74, 8.74); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch476/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.308 mW/g

Ch476/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.460 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.338 W/kg
SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.210 mW/g
Maximum value of SAR (measured) = 0.314 mW/g



0 dB = 0.310mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012-12-18

#12 LTE Band 25_QPSK(1 49)_Left Cheek_Ch26365

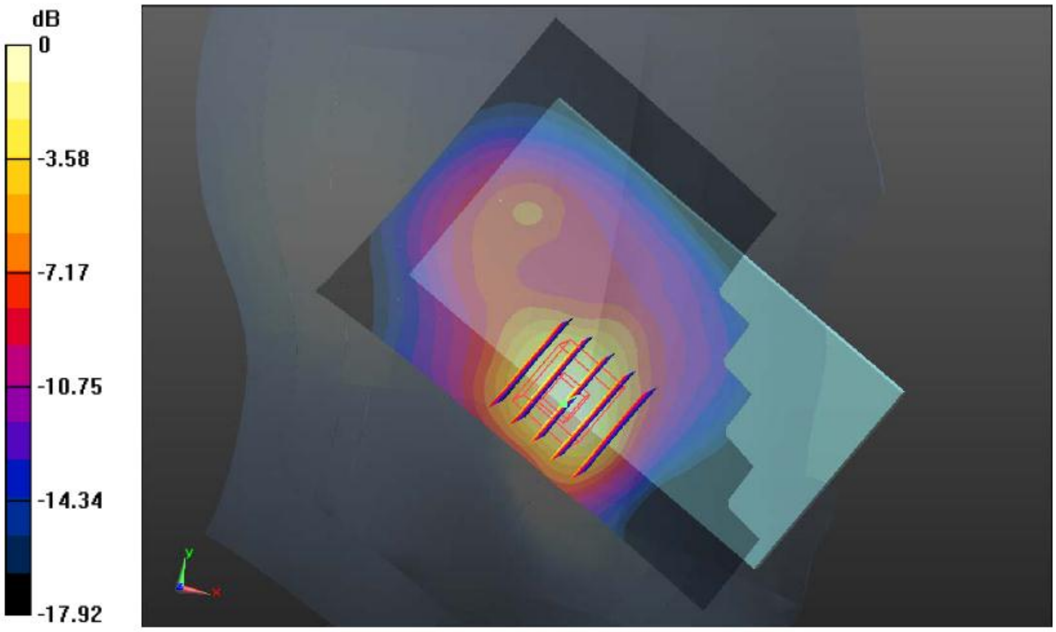
DUT: 270201-03

Communication System: LTE; Frequency: 1882.5 MHz;Duty Cycle: 1:1
Medium: HSL_1900_121218 Medium parameters used: f = 1882.5 MHz; σ = 1.405 mho/m; ε_r = 39.093; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：21.3 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.84, 7.84, 7.84); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch26365/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.968 mW/g

Ch26365/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.533 V/m; Power Drift = 0.035 dB
Peak SAR (extrapolated) = 1.332 W/kg
SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.345 mW/g
Maximum value of SAR (measured) = 0.994 mW/g



0 dB = 0.990mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2012-12-18

#15 802.11b_Left Check_1M_Ch1

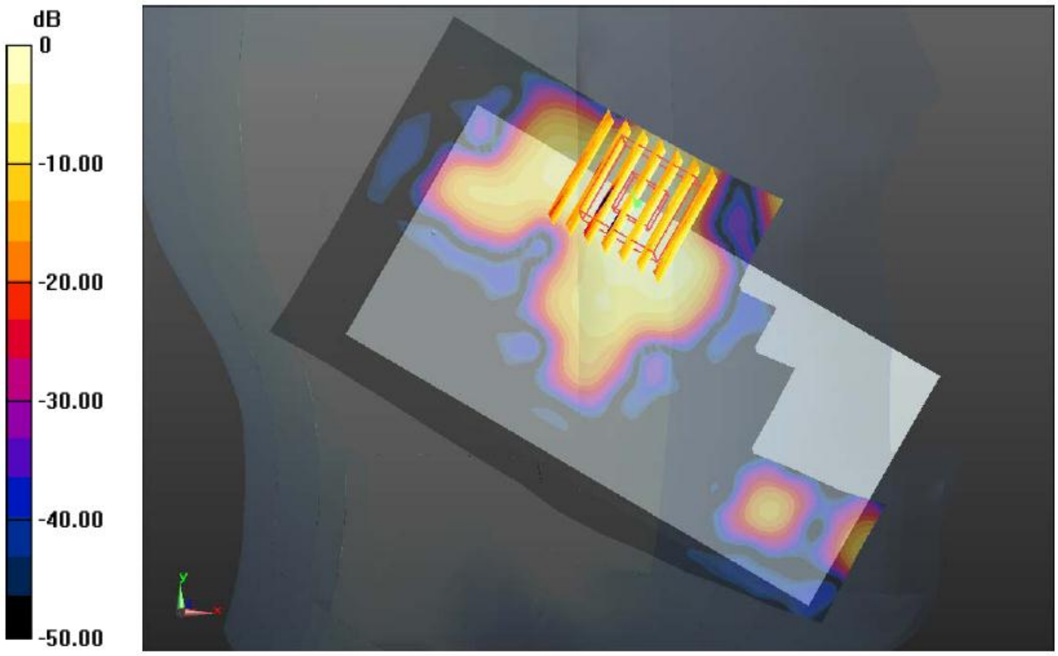
DUT: 270201-03

Communication System: WIFI; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: HSL_2450_121218 Medium parameters used: f = 2412 MHz; σ = 1.814 mho/m; ε_r = 37.834; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(6.87, 6.87, 6.87); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch1/Area Scan (81x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.086 mW/g

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.310 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.114 W/kg
SAR(1 g) = 0.049 mW/g; SAR(10 g) = 0.021 mW/g
Maximum value of SAR (measured) = 0.079 mW/g



0 dB = 0.080mW/g

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

#21 CDMA2000 BC0_RTAP 153.6_Back_1cm_Ch777

DUT: 270201-03

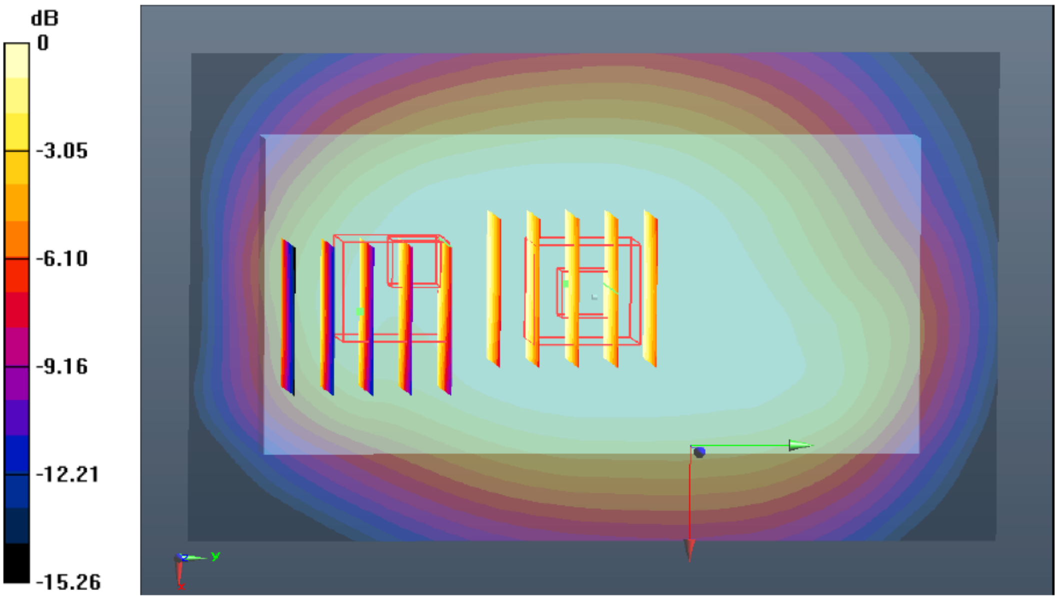
Communication System: CDMA2000; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium: MSL_835_121219 Medium parameters used: f = 848.31 MHz; $\sigma = 0.994$ mho/m; $\varepsilon_r = 54.336$; $\rho = 1000$ kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch777/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.635 mW/g

Ch777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.361 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.700 W/kg
SAR(1 g) = 0.557 mW/g; SAR(10 g) = 0.425 mW/g
Maximum value of SAR (measured) = 0.638 mW/g

Ch777/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.361 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.594 W/kg
SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.251 mW/g
Maximum value of SAR (measured) = 0.533 mW/g



0 dB = 0.530mW/g

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

#31 CDMA2000 BC1_RTAP 153.6_Back_1cm_Ch1175

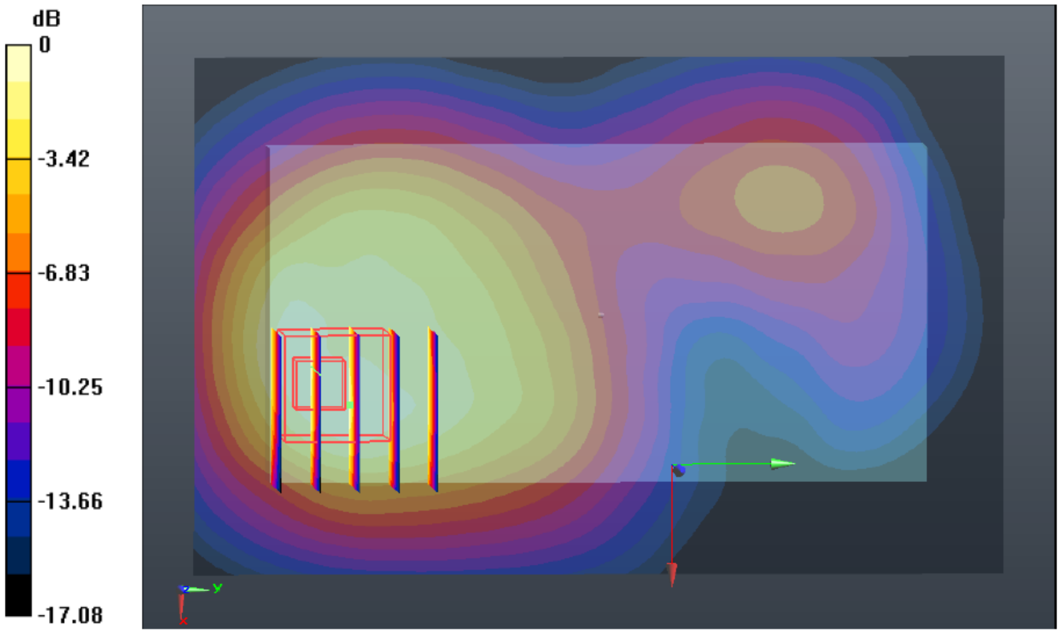
DUT: 270201-03

Communication System: CDMA2000; Frequency: 1908.75 MHz;Duty Cycle: 1:1
Medium: MSL_1900_121219 Medium parameters used: f = 1909 MHz; σ = 1.561 mho/m; ε_r = 53.225; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.35, 7.35, 7.35); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch1175/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.905 mW/g

Ch1175/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.053 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 1.111 W/kg
SAR(1 g) = 0.656 mW/g; SAR(10 g) = 0.378 mW/g
Maximum value of SAR (measured) = 0.896 mW/g



0 dB = 0.900mW/g

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

#36 CDMA2000 BC10_RTAP 153.6_Back_1cm_Ch476

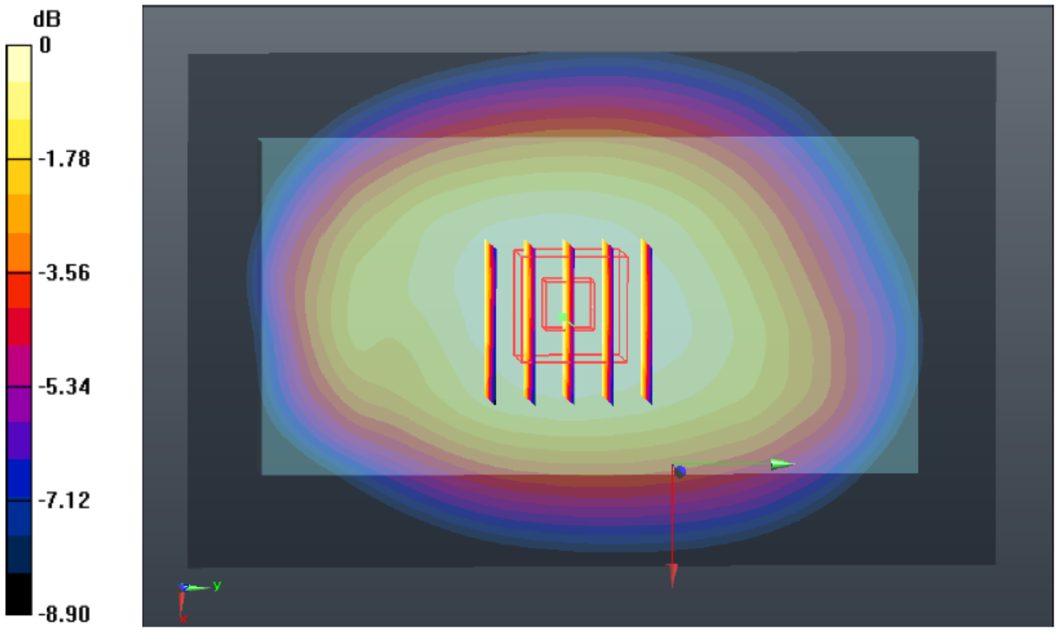
DUT: 270201-03

Communication System: CDMA2000; Frequency: 817.9 MHz;Duty Cycle: 1:1
Medium: MSL_835_121219 Medium parameters used: f = 817.9 MHz; σ = 0.963 mho/m; ε_r = 54.641; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch476/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.754 mW/g

Ch476/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.539 V/m; Power Drift = 0.0056 dB
Peak SAR (extrapolated) = 0.814 W/kg
SAR(1 g) = 0.651 mW/g; SAR(10 g) = 0.501 mW/g
Maximum value of SAR (measured) = 0.745 mW/g



0 dB = 0.740mW/g

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

#48 802.11b_Back 1cm_1M_Ch1

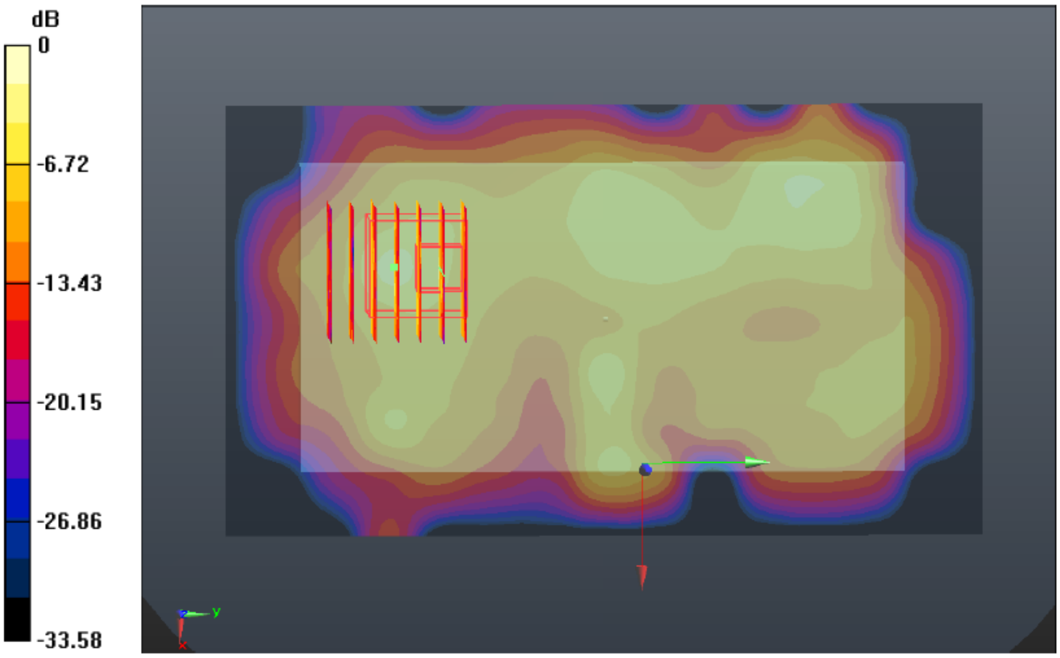
DUT: 270201-03

Communication System: WIFI; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium: MSL_2450_121219 Medium parameters used: f = 2412 MHz; σ = 1.933 mho/m; ε_r = 53.535; ρ = 1000 kg/m^3
Ambient Temperature：23.3 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(6.94, 6.94, 6.94); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM1; Type: SAM; Serial: TP-1479
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch1/Area Scan (81x141x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (interpolated) = 0.076 mW/g

Ch1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.897 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 0.199 W/kg
SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.022 mW/g
Maximum value of SAR (measured) = 0.172 mW/g



0 dB = 0.170mW/g

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

#20 CDMA2000 BC0_RTEAP 4096_Back_1cm_Ch777

DUT: 270201-03

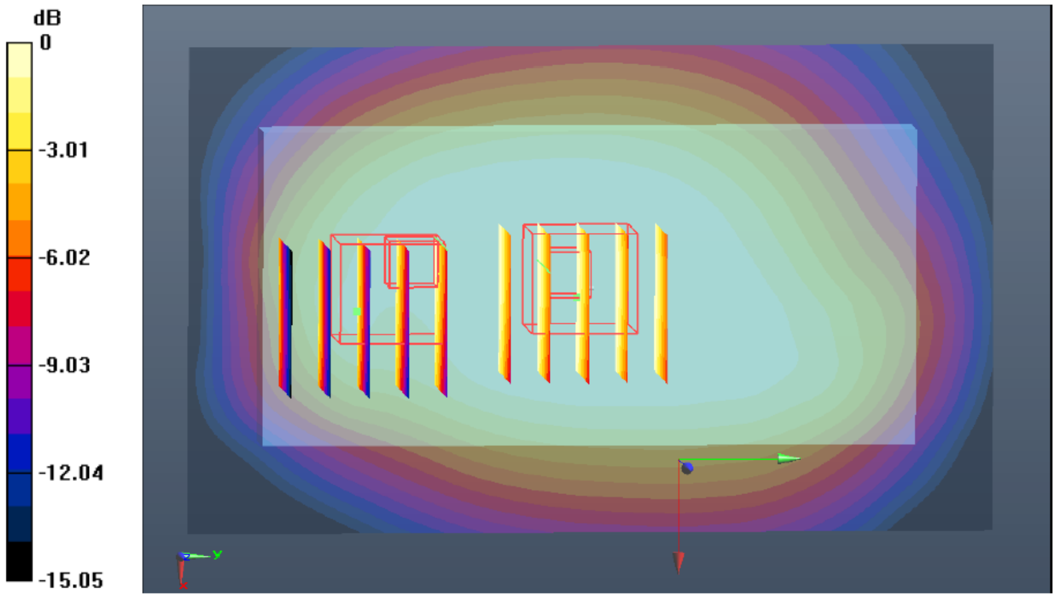
Communication System: CDMA2000; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium: MSL_835_121219 Medium parameters used: f = 848.31 MHz; σ = 0.994 mho/m; ε_r = 54.336; ρ = 1000 kg/m^3
Ambient Temperature : 23.2 ℃; Liquid Temperature : 21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch777/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.630 mW/g

Ch777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.085 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.693 W/kg
SAR(1 g) = 0.551 mW/g; SAR(10 g) = 0.422 mW/g
Maximum value of SAR (measured) = 0.629 mW/g

Ch777/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 24.085 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.592 W/kg
SAR(1 g) = 0.389 mW/g; SAR(10 g) = 0.243 mW/g
Maximum value of SAR (measured) = 0.531 mW/g



0 dB = 0.530mW/g

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

#24 CDMA2000 BC1_RC3 SO32_Back_1cm_Ch600

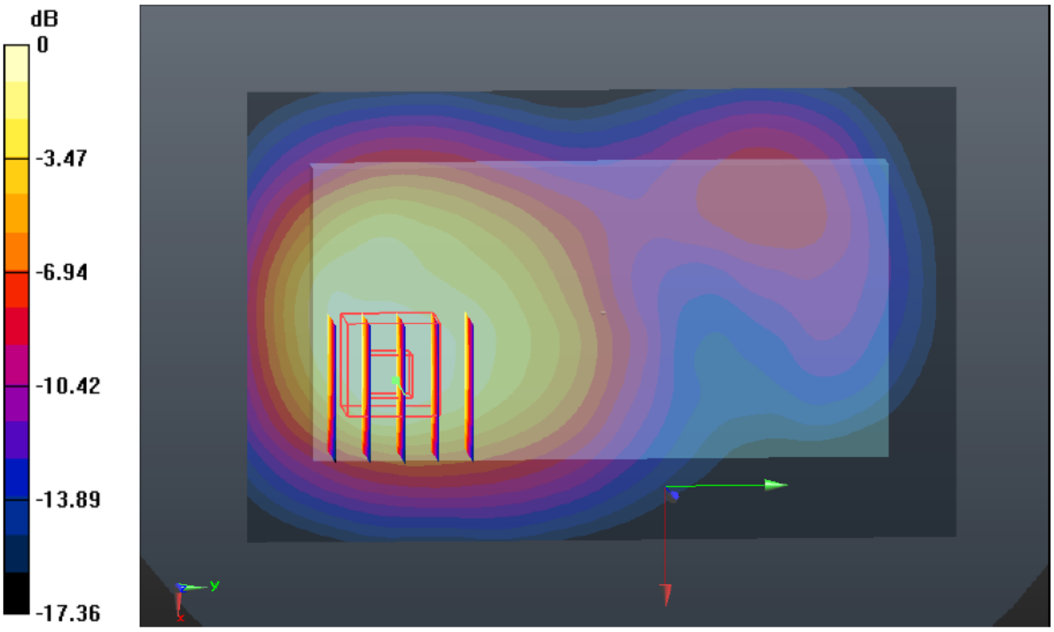
DUT: 270201-03

Communication System: CDMA2000; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900_121219 Medium parameters used: f = 1880 MHz; σ = 1.527 mho/m; ε_r = 53.305; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.35, 7.35, 7.35); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch600/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.994 mW/g

Ch600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 10.287 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 1.224 W/kg
SAR(1 g) = 0.718 mW/g; SAR(10 g) = 0.422 mW/g
Maximum value of SAR (measured) = 0.975 mW/g



0 dB = 0.980mW/g

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

#35 CDMA2000 BC10_RTEAP 4096_Back_1cm_Ch476

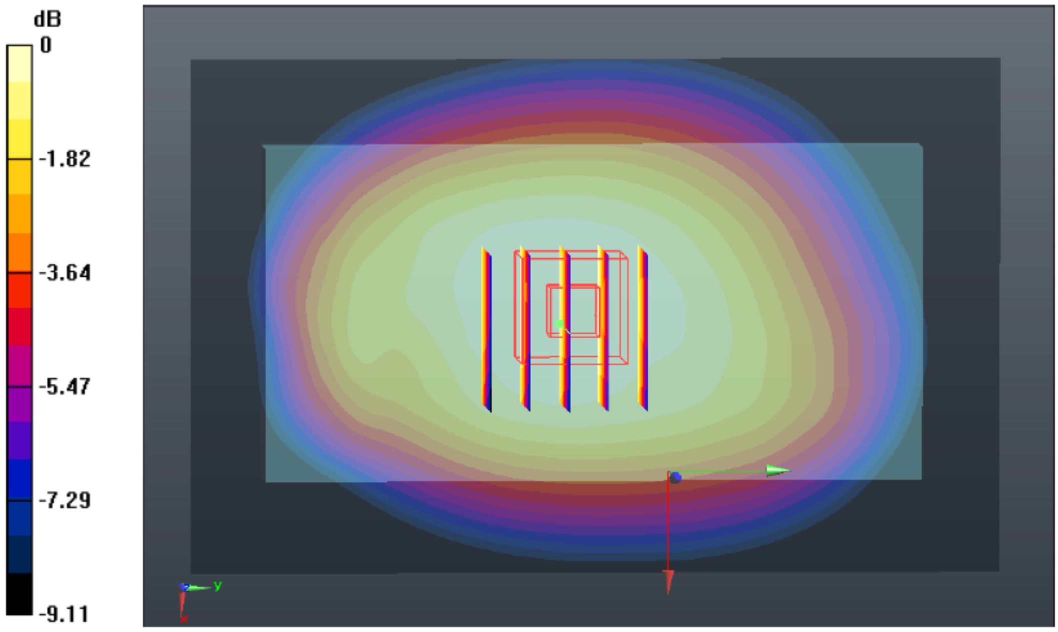
DUT: 270201-03

Communication System: CDMA2000; Frequency: 817.9 MHz;Duty Cycle: 1:1
Medium: MSL_835_121219 Medium parameters used: f = 817.9 MHz; σ = 0.963 mho/m; ε_r = 54.641; ρ = 1000 kg/m^3
Ambient Temperature：23.2 ℃; Liquid Temperature：21.2 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(8.98, 8.98, 8.98); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch476/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.772 mW/g

Ch476/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 26.900 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.838 W/kg
SAR(1 g) = 0.670 mW/g; SAR(10 g) = 0.514 mW/g
Maximum value of SAR (measured) = 0.765 mW/g



0 dB = 0.760mW/g

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

#38 LTE Band 25_QPSK(1 49)_10M_Back_Ch26090_Headset

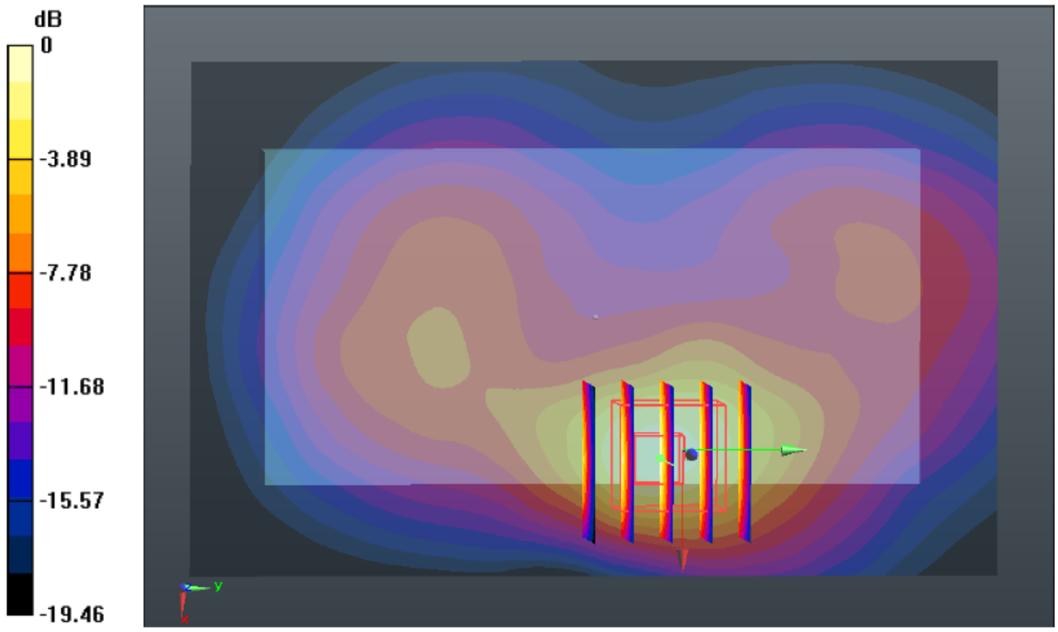
DUT: 270201-03

Communication System: LTE; Frequency: 1855 MHz;Duty Cycle: 1:1
Medium: MSL_1900_121219 Medium parameters used: f = 1855 MHz; σ = 1.497 mho/m; ε_r = 53.359; ρ = 1000 kg/m^3
Ambient Temperature：23.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: EX3DV4 - SN3857; ConvF(7.35, 7.35, 7.35); Calibrated: 2012-6-20
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn360; Calibrated: 2012-11-15
- Phantom: SAM2; Type: SAM; Serial: TP-1477
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.4.5 (3634)

Ch26090/Area Scan (71x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.466 mW/g

Ch26090/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.218 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 2.041 W/kg
SAR(1 g) = 1.110 mW/g; SAR(10 g) = 0.552 mW/g
Maximum value of SAR (measured) = 1.602 mW/g



0 dB = 1.600mW/g

12.6 Simultaneous Multi-band Transmission Analysis

	Position	Applicable Combination
Simultaneous Transmission	Head	1x CDMA (voice) + WLAN
		1x CDMA (voice) + LTE (data) + WLAN (router)
		1x CDMA (voice) + BT
		1x CDMA (voice) + LTE (data) + BT
		1x EVDO (VOIP) + WLAN
		1x EVDO (VOIP) + BT
	Hotspot	1x EVDO (data) + WLAN
		LTE (data) + WLAN
	Body-worn	1x CDMA (voice) + WLAN
		1x CDMA (voice) + LTE (data) + WLAN (router)
		1x CDMA (voice) + BT
		1x CDMA (voice) + LTE (data) + BT
		1x EVDO (VOIP) + WLAN
		1x EVDO (VOIP) + BT

Note:

1. WLAN and Bluetooth share the same antenna, and cannot transmit simultaneously.
2. CDMA2000 1XRTT and EVDO share the same antenna, and cannot transmit simultaneously.
3. When stand-alone 1-g SAR is not required for a transmitter or antenna, its SAR is considered zero in the 1-g SAR summing process to determine simultaneous transmission SAR evaluation requirements
4. The reported SAR summation is calculated based on the same configuration and test position.
5. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05 based on the formula below.

   (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[√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.
   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	Tune-up Maximum power (dBm)	Head 0mm gap	Body 10mm gap
Estimated SAR (W/kg)	3	0.082 W/kg	0.041 W/kg

6. Per KDB 447498 D01v05, simultaneous transmission SAR is compliant if,
   1) Scalar SAR summation < 1.6W/kg.
   2) 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 is compliant.
   3) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg.

The implemented power combinations (Unit: dBm)

SVLTE Mode		Data Mode
Voice		LTE Band 25 BW=1.4/3/5/10MHz QPSK 1RB
1xRTT BC0/BC10	16.5	23.5
	25	20.5
1xRTT BC1	16.5	23.5
	24.7	20.5

Alternative combinations (Unit: dBm) – For analysis purpose only

Power combination	CDMA2000 1x voice	LTE data mode
#1	**Full Power** BC0/BC10: 25 BC1: 24.7	**Full Power** 23.5
#2	**Reduced Power** BC0/BC10: 16.5 BC1: 16.5	**Full Power** 23.5
#3	**Full Power** BC0/BC10: 25 BC1: 24.7	**Reduced Power** 20.5

Note:

1. For SVLTE mode which means LTE (data) and CDMA 1xRTT (voice) transmitting simultaneously, power reduction is implemented.
2. When EUT 1xRTT output power is > 16.5dBm, LTE maximum output power is limited to 20.5dBm regardless of the power control command from the base station.

Analysis Procedure:

Step1

1. Per KDB 941225 D05, maximum power standalone SAR of 1xRTT/EVDO/LTE is used for simultaneous transmission analysis.
2. Start analysis from full power combination (Alternative Power combination #1).
3. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
4. If 1g-SAR summation >1.6W/kg, step2 analysis is required.

Step2

5. For the cases from step1, power combinations #2/#3 are used in further step2 analysis.
6. If 1g-SAR scalar summation < 1.6W/kg, simultaneous SAR measurement and further evaluations are not necessary.
7. If 1g-SAR summation >1.6W/kg, SPLSR calculation is necessary.
8. If resulting SPLSR < 0.04, further evaluation is not required.
9. If resulting SPLSR > 0.04, volume scan measurement is required.

Table 12.6-A1: Head SAR analysis <Step 1>

	Position	Applicable Combination
Simultaneous Transmission	**Head**	1x CDMA (voice) + WLAN
		1x CDMA (voice) + LTE (data) + WLAN (router)
		1x CDMA (voice) + BT
		1x CDMA (voice) + LTE (data) + BT
		1x EVDO (VOIP) + WLAN
		1x EVDO (VOIP) + BT

	WWAN-PCE (voice)				WWAN-PCE (data)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**Plot No**	**Output Power (dBm)**	**Max. WLAN SAR (W/kg)**			
Right Cheek	CDMA2000 BC0	#01	24.14	0.441	LTE Band 25	#11	23.29	0.575	#13	15.28	0.022	**1.04**	-	-
	CDMA2000 BC1	-	-	-	LTE Band 25	#11	23.29	0.575	#13	15.28	0.022	**0.60**	-	-
	CDMA2000 BC10	#09	24.31	0.321	LTE Band 25	#11	23.29	0.575	#13	15.28	0.022	**0.92**	-	-
Left Cheek	CDMA2000 BC0	-	-	-	LTE Band 25	#12	23.29	0.703	#15	15.28	0.052	**0.76**	-	-
	CDMA2000 BC1	#03	24.04	0.426	LTE Band 25	#12	23.29	0.703	#15	15.28	0.052	**1.18**	-	-
	CDMA2000 BC10	-	-	-	LTE Band 25	#12	23.29	0.703	#15	15.28	0.052	**0.76**	-	-

	WWAN-PCE (voice)				WWAN-PCE (data)				Bluetooth-DSS		WWAN + Bluetooth (W/kg)	SPLSR ≤ 0.04	Case No
Position	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**Output Power (dBm)**	**Estimated Bluetooth SAR (W/kg)**			
Right Cheek	CDMA2000 BC0	#01	24.14	0.441	LTE Band 25	#11	23.29	0.575	3	0.082	**1.10**	-	-
	CDMA2000 BC1	-	-	-	LTE Band 25	#11	23.29	0.575	3	0.082	**0.66**	-	-
	CDMA2000 BC10	#09	24.31	0.321	LTE Band 25	#11	23.29	0.575	3	0.082	**0.98**	-	-
Left Cheek	CDMA2000 BC0	-	-	-	LTE Band 25	#12	23.29	0.703	3	0.082	**0.79**	-	-
	CDMA2000 BC1	#03	24.04	0.426	LTE Band 25	#12	23.29	0.703	3	0.082	**1.21**	-	-
	CDMA2000 BC10	-	-	-	LTE Band 25	#12	23.29	0.703	3	0.082	**0.79**	-	-

	WWAN-PCE (VOIP)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**Plot No**	**Output Power (dBm)**	**Max. WLAN SAR (W/kg)**			
Right Cheek	CDMA2000 BC0	#02	24.13	0.441	#13	15.28	0.022	**0.46**	-	-
	CDMA2000 BC1	-	-	-	#13	15.28	0.022	**0.02**	-	-
	CDMA2000 BC10	#10	24.23	0.328	#13	15.28	0.022	**0.35**		-
Left Cheek	CDMA2000 BC0	-	-	-	#15	15.28	0.052	**0.05**		
	CDMA2000 BC1	#06	23.93	0.437	#15	15.28	0.052	**0.49**		
	CDMA2000 BC10	-	-	-	#15	15.28	0.052	**0.05**		

	WWAN-PCE (VOIP)				Bluetooth-DSS		WWAN + Bluetooth (W/kg)	SPLSR ≤ 0.04	Case No
Position	**WWAN Band**	**Plot No**	**Output Power (dBm)**	**Max. WWAN SAR (W/kg)**	**Output Power (dBm)**	**Estimated Bluetooth SAR (W/kg)**			
Right Cheek	CDMA2000 BC0	#02	24.13	0.441	3	0.082	**0.52**	-	-
	CDMA2000 BC1	-	-	-	3	0.082	**0.08**	-	-
	CDMA2000 BC10	#10	24.23	0.328	3	0.082	**0.41**		-
Left Cheek	CDMA2000 BC0	-	-	-	3	0.082	**0.08**		
	CDMA2000 BC1	#06	23.93	0.437	3	0.082	**0.52**		
	CDMA2000 BC10	-	-	-	3	0.082	**0.08f**		

Table 12.6-B1: Hotspot mode SAR analysis <Step 1>

	Position	Applicable Combination
Simultaneous Transmission	Hotspot	1x EVDO (data) + WLAN
		LTE (data) + WLAN

	WWAN-PCE (data)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Plot No	Output Power (dBm)	Max. WLAN SAR (W/kg)			
Back	CDMA2000 BC0	#21	24.14	0.679	#48	15.28	0.047	**0.73**	-	-
	CDMA2000 BC1	#31	24.02	0.767	#48	15.28	0.047	**0.81**	-	-
	CDMA2000 BC10	#36	24.23	0.777	#48	15.28	0.047	**0.82**		-
	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**0.79**	-	-

	WWAN-PCE (data)				Bluetooth-DSS		WWAN + Bluetooth (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Output Power (dBm)	Estimated Bluetooth SAR (W/kg)			
Back	CDMA2000 BC0	#21	24.14	0.679	3	0.041	**0.72**	-	-
	CDMA2000 BC1	#31	24.02	0.767	3	0.041	**0.81**	-	-
	CDMA2000 BC10	#36	24.23	0.777	3	0.041	**0.82**		-
	LTE Band 25	#40	23.29	0.741	3	0.041	**0.78**	-	-

Table 12.6-C1: Body-worn SAR analysis <Step 1>

	Position	Applicable Combination
Simultaneous Transmission	**Body-worn**	1x CDMA (voice) + WLAN
		1x CDMA (voice) + LTE (data) + WLAN (router)
		1x CDMA (voice) + BT
		1x CDMA (voice) + LTE (data) + BT
		1x EVDO (VOIP) + WLAN
		1x EVDO (VOIP) + BT

	WWAN-PCE (voice)				WWAN-PCE (data)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Plot No	Output Power (dBm)	Max. WLAN SAR (W/kg)			
Back	CDMA2000 BC0	#17	24.21	0.668	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**1.46**	-	-
	CDMA2000 BC1	#24	24.09	0.826	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**1.61**	-	#C1-1
	CDMA2000 BC10	#34	24.33	0.755	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**1.54**	-	-
Back (w/ headset)	CDMA2000 BC0	-	-	-	LTE Band 25	#38	23.22	1.184	#50	15.28	0.038	**1.22**	-	-
	CDMA2000 BC1	-	-	-	LTE Band 25	#38	23.22	1.184	#50	15.28	0.038	**1.22**	-	-
	CDMA2000 BC10	-	-	-	LTE Band 25	#38	23.22	1.184	#50	15.28	0.038	**1.22**	-	-

Table 12.6-C2: Body-worn SAR analysis <Step 2>

	WWAN-PCE (voice)				WWAN-PCE (data)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Plot No	Output Power (dBm)	Max. WLAN SAR (W/kg)			
Back	CDMA2000 BC1	#24	24.09	0.826	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**1.61**	-	#C1-1
	CDMA2000 BC1	#51	16.05	0.163	LTE Band 25	#40	23.29	0.741	#48	15.28	0.047	**0.95**	-	-
	CDMA2000 BC1	#24	24.09	0.826	LTE Band 25	#52	19.46	0.574	#48	15.28	0.047	**1.45**	-	-

	WWAN-PCE (voice)				WWAN-PCE (data)				Bluetooth-DSS		WWAN + Bluetooth (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Output Power (dBm)	Estimated Bluetooth SAR (W/kg)			
Back	CDMA2000 BC1	#51	16.05	0.163	LTE Band 25	#40	23.29	0.741	3	0.041	**0.95**	-	-
	CDMA2000 BC1	#24	24.09	0.826	LTE Band 25	#52	19.46	0.574	3	0.041	**1.44**	-	-

	WWAN-PCE (VOIP)				WLAN-DTS			WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Plot No	Output Power (dBm)	Max. WLAN SAR (W/kg)			
Back	CDMA2000 BC0	#20	24.13	0.673	#48	15.28	0.047	**0.72**	-	-
	CDMA2000 BC1	#27	23.95	0.732	#48	15.28	0.047	**0.78**	-	-
	CDMA2000 BC10	#35	24.25	0.796	#48	15.28	0.047	**0.84**		
Back (w/ headset)	CDMA2000 BC0	-	-	-	#50	15.28	0.038	**0.04**		
	CDMA2000 BC1	-	-	-	#50	15.28	0.038	**0.04**		
	CDMA2000 BC10	-	-	-	#50	15.28	0.038	**0.04**		

	WWAN-PCE (VOIP)				Bluetooth-DSS		WWAN + Bluetooth (W/kg)	SPLSR ≤ 0.04	Case No
Position	WWAN Band	Plot No	Output Power (dBm)	Max. WWAN SAR (W/kg)	Output Power (dBm)	Estimated Bluetooth SAR (W/kg)			
Back	CDMA2000 BC0	#20	24.13	0.673	3	0.041	**0.71**	-	-
	CDMA2000 BC1	#27	23.95	0.732	3	0.041	**0.77**	-	-
	CDMA2000 BC10	#35	24.25	0.796	3	0.041	**0.84**		
Back (w/ headset)	CDMA2000 BC0	-	-	-	3	0.041	**0.04**		
	CDMA2000 BC1	-	-	-	3	0.041	**0.04**		
	CDMA2000 BC10	-	-	-	3	0.041	**0.04**		

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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)]	$1/\sqrt{3}$	$1/\sqrt{6}$	$1/\sqrt{2}$

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

(b) κ is the coverage factor

Table 12.1 Standard Uncertainty for Assumed Distribution

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

Expanded uncertainty is a measure of uncertainty that defines an interval about the measurement result within which the measured value is confidently believed to lie. It is obtained by multiplying the combined standard uncertainty by a coverage factor. Typically, the coverage factor ranges from 2 to 3. Using a coverage factor allows the true value of a measured quantity to be specified with a defined probability within the specified uncertainty range. For 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 according to IEEE 1528-2003

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 6 GHz”, October 2012

[9] FCC KDB 648474 D04 v01, “SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas”, October 2012

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

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

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

Appendix A. Plots of System Performance Check

The plots are shown as follows.

Appendix B. Plots of SAR Measurement

The plots are shown as follows.

Appendix C. DASY Calibration Certificate

The DASY calibration certificates are shown as follows

Appendix F. Product Equality Declaration