FCC SAR Test Report

APPLICANT	**:**	**DAP Technologies**
EQUIPMENT	**:**	**Tablet PC**
BRAND NAME	**:**	**DAP Technologies**
MODEL NAME	**:**	**MT1010**
FCC ID	**:**	**T5M-M1010WBWW**
STANDARD	**:**	**FCC 47 CFR Part 2 (2.1093)** **ANSI/IEEE C95.1-1992** **IEEE 1528-2003** **FCC OET Bulletin 65 Supplement C (Edition 01-01)**

The product was completely tested on Feb. 20, 2013. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA312810	Rev. 01	Initial issue of report	Mar. 27, 2013

1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **DAP Technologies Tablet PC, DAP Technologies, MT1010** are as follows.

<Highest Reported standalone SAR Summary>

Frequency Band	Exposure Position	Reported 1g-SAR (W/kg)	Equipment Class	Highest Reported 1g-SAR (W/kg)
GPRS850	**Body (0 cm Gap)**	**1.39**	PCB	**1.40**
GPRS1900	**Body (0 cm Gap)**	**1.37**		
WCDMA Band V	**Body (0 cm Gap)**	**1.40**		
WCDMA Band IV	**Body (0 cm Gap)**	**1.29**		
WCDMA Band II	**Body (0 cm Gap)**	**1.30**		
CDMA 2000 BC0	**Body (0 cm Gap)**	**1.39**		
CDMA 2000 BC1	**Body (0 cm Gap)**	**1.26**		

<Highest Simultaneous transmission SAR>

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
WCDMA V	PCB	Edge 1 (0 cm Gap)	1.53
Bluetooth	DSS		

The highest simultaneous transmission is scalar summation of reported standalone SAR per FCC KDB 690783 D01 v01r02, and 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 INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

2.2 Applicant

Company Name	DAP Technologies
Address	4535 Wilfrid Hamel Blvd., Suite 100, Quebec City, QC Canada G1P 2J7

2.3 Manufacturer

Company Name	Pegatron Corporation
Address	NO.5 , Shing Yeh St., Kwei Shan Hsiang Toayuan Hsien, TAIWAN (R.O.C.)

2.4 Application Details

Date of Start during the Test	Feb. 06, 2013
Date of End during the Test	Feb. 20, 2013

3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	Tablet PC
Brand Name	DAP Technologies
Model Name	MT1010
FCC ID	T5M-M1010WBWW
IMEI Code	013322000006125
TX Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz
Antenna Type	WWAN: PIFA Antenna
Uplink Modulations	GPRS: GMSK EDGE: GMSK / 8PSK WCDMA (Rel 99): QPSK HSDPA (Rel 6): QPSK HSUPA (Rel 6): QPSK CDMA2000 : QPSK CDMA2000 1xEV-DO : 8PSK

Remark:
1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. Voice call is not supported.
3. WLAN/Bluetooth module FCC ID: PPD-AR5B22 will be integrated into this host device.
4. By implemented software design, WWAN and WLAN simultaneous transmission is prohibited, and no WLAN ad-hoc or hotspot supported. WWAN can only transmit with Bluetooth simultaneously

Product Feature & Specification	
Module	PCIE 802.11a/b/g/n 2.4GHz/5GHz + USB BT 4.0 card
Brand Name	Qualcomm Atheros, Inc.
Model Name	AR5B22
FCC ID	PPD-AR5B22
TX Frequency	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna
Uplink Modulations	802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth : GFSK Bluetooth EDR : π/4-DQPSK, 8-DPSK Bluetooth 4.0 LE: GFSK

3.2 Maximum RF output power among production units

Band	average power (dBm)			
	GSM 850		GSM 1900	
Output Power Status	Normal	Reduced	Normal	Reduced
GPRS/EDGE (GMSK, 1 Tx slot)	33	29.5	30	28
GPRS/EDGE (GMSK, 2 Tx slots)	33	29.5	30	27.5
EDGE (GMSK, 3 Tx slots)	29.5	27	27.5	26
EDGE (GMSK, 4 Tx slots)	27.5	26	26.5	25
EDGE (8PSK, 1 Tx slot)	28	28	27	27
EDGE (8PSK, 2 Tx slots)	28	28	27	27
EDGE (8PSK, 3 Tx slots)	28	27	27	26
EDGE (8PSK, 4 Tx slots)	28	26	27	25

Band	average power(dBm)					
	WCDMA Band V		WCDMA Band IV		WCDMA Band II	
Output Power Status	Normal	Normal	Reduced	Reduced	Normal	Reduced
RMC 12.2Kbps	24	22	24	18	24	20
HSDPA Subtest-1	24	22	24	18	24	20
HSUPA Subtest-5	24	22	24	18	24	20

Band	average power(dBm)			
	CDMA BC0		CDMA BC1	
Output Power Status	Normal	Reduced	Normal	Reduced
1xRTT RC3 SO55	24.5	22	24.5	20.5
1xRTT RC3 SO32	24.5	22	24.5	20.5
1xEV-DO Rev 0 (RTAP 153.6kbps)	24.5	22	24.5	20.5
1xEV-DO Rev A (RETAP 4096 bits)	24.5	22	24.5	20.5

3.3 Applied Standard

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

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v05
- FCC KDB 616217 D04 v01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D03 v01

KDB 616217 D04v01 section 6 is applicable for proximity sensor power reduction verification, and the details in included in “Operation Description of proximity sensor” exhibit. It’s justified KDB 616217 is applicable and PBA can be exempted according to KDB 388624 D02v12 item#18.

3.4 Device Category and SAR Limits

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

3.5 Test Conditions

3.5.1 Ambient Condition

Ambient Temperature	20 to 24 ℃
Humidity	< 60 %

3.5.2 Test Configuration

For WWAN SAR testing, the 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.

Target Power reduction applied for each wireless mode and orientation

Exposure Position / wireless mode	Bottom Face(1)	Edge 1(1)	Edge 2	Edge 3	Edge 4
GSM850 GPRS/EDGE (GMSK 1 Tx slot) - CS1/MCS1	3.5 dB	3.5 dB	0 dB	0 dB	0 dB
GSM850 GPRS/EDGE (GMSK 2 Tx slot) - CS1/MCS1	3.5 dB	3.5 dB	0 dB	0 dB	0 dB
GSM850 EDGE (GMSK 3 Tx slot) – MCS1	2.5 dB	2.5 dB	0 dB	0 dB	0 dB
GSM850 EDGE (GMSK 4 Tx slot) – MCS1	1.5 dB	1.5 dB	0 dB	0 dB	0 dB
GSM850 EDGE (8PSK 1 Tx slot) - MCS5	0 dB	0 dB	0 dB	0 dB	0 dB
GSM850 EDGE (8PSK 2 Tx slot) - MCS5	0 dB	0 dB	0 dB	0 dB	0 dB
GSM850 EDGE (8PSK 3 Tx slot) - MCS5	1 dB	1 dB	0 dB	0 dB	0 dB
GSM850 EDGE (8PSK 4 Tx slot) - MCS5	2 dB	2 dB	0 dB	0 dB	0 dB
GSM1900 GPRS/EDGE (GMSK 1 Tx slot) - CS1/MCS1	2.5 dB	2.5 dB	0 dB	0 dB	0 dB
GSM1900 GPRS/EDGE (GMSK 2 Tx slot) - CS1/MCS1	2.5 dB	2.5 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (GMSK 3 Tx slot) – MCS1	1.5 dB	1.5 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (GMSK 4 Tx slot) – MCS1	1.5 dB	1.5 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (8PSK 1 Tx slot) - MCS5	0 dB	0 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (8PSK 2 Tx slot) - MCS5	0 dB	0 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (8PSK 3 Tx slot) - MCS5	1 dB	1 dB	0 dB	0 dB	0 dB
GSM1900 EDGE (8PSK 4 Tx slot) - MCS5	2 dB	2 dB	0 dB	0 dB	0 dB
WCDMA Band V	2 dB	2 dB	0 dB	0 dB	0 dB
WCDMA Band IV	6 dB	6 dB	0 dB	0 dB	0 dB
WCDMA Band II	4 dB	4 dB	0 dB	0 dB	0 dB
CDMA2000 BC0	2.5 dB	2.5 dB	0 dB	0 dB	0 dB
CDMA2000 BC1	4 dB	4 dB	0 dB	0 dB	0 dB

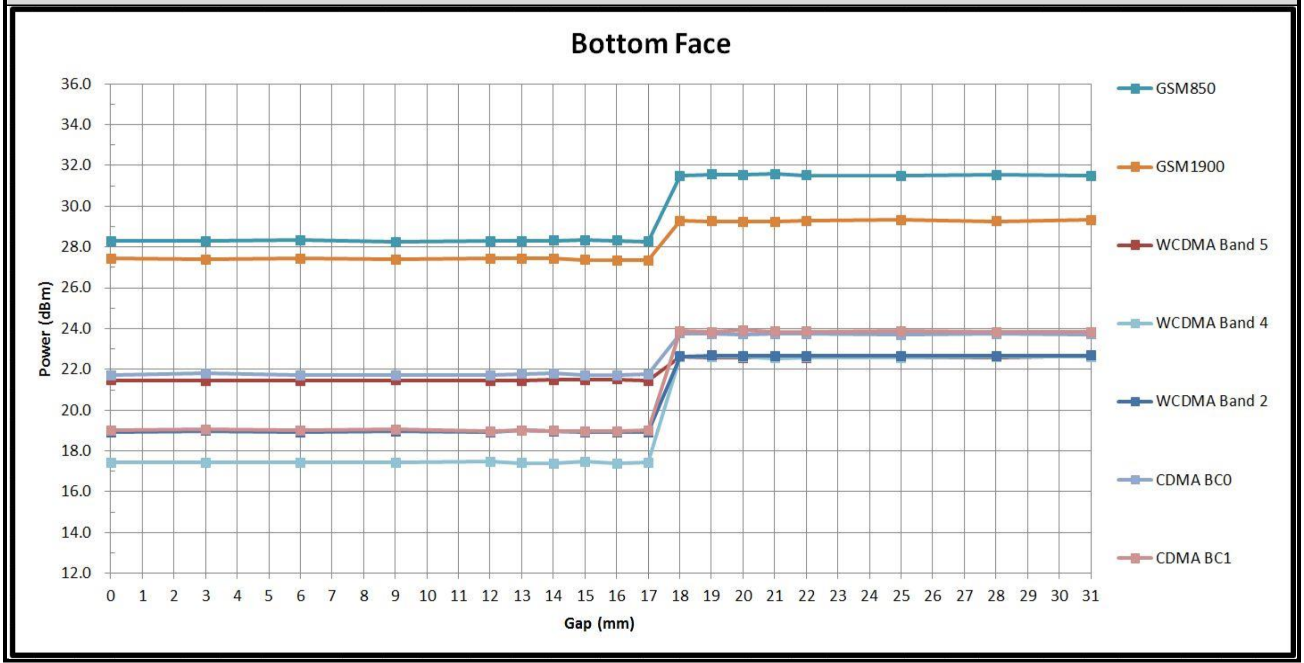
Remark:

1. (1): Reduced maximum limit applied by activation of proximity sensor.

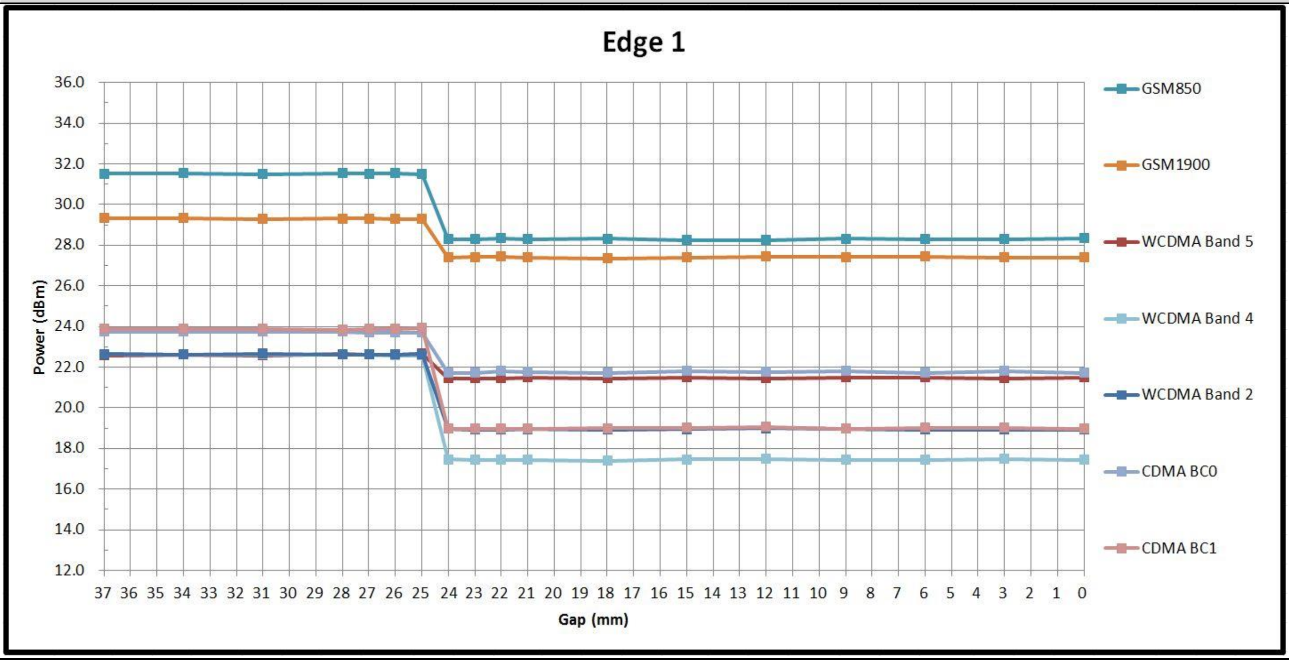
Measurement on EUT:

Band/Mode	Ch #	Measured power reduction (dBm)		Reduction Levels
		w/o power back-off	w/ power back-off	(dB)
GSM850 GPRS (GMSK 2 Tx slot) - CS1	189	31.53	28.29	3.24
GSM1900 GPRS (GMSK 2 Tx slot) - CS1	661	29.18	27.38	1.8
WCDMA Band 5 (RMC 12.2Kbps)	4182	22.49	21.33	1.16
WCDMA Band 4 (RMC 12.2Kbps)	1413	22.56	17.32	5.24
WCDMA Band 2 (RMC 12.2Kbps)	9400	22.57	18.9	3.67
EVDO BC0 (RTAP 153.6Kbps)	384	23.64	21.66	1.81
EVDO BC1 (RTAP 153.6Kbps)	600	23.83	18.97	4.86

Proximity Sensor for Bottom Face detection



Proximity Sensor for Edge 1 detection



4. Specific Absorption Rate (SAR)

4.1 Introduction

SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

4.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$\mathbf{SAR} = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\mathbf{dm}}\right) = \frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\mathbf{dW}}{\boldsymbol{\rho}\mathbf{dv}}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\mathbf{SAR} = \mathbf{C}\left(\frac{\boldsymbol{\delta}\mathbf{T}}{\boldsymbol{\delta}\mathbf{t}}\right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

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

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

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

5. SAR Measurement System

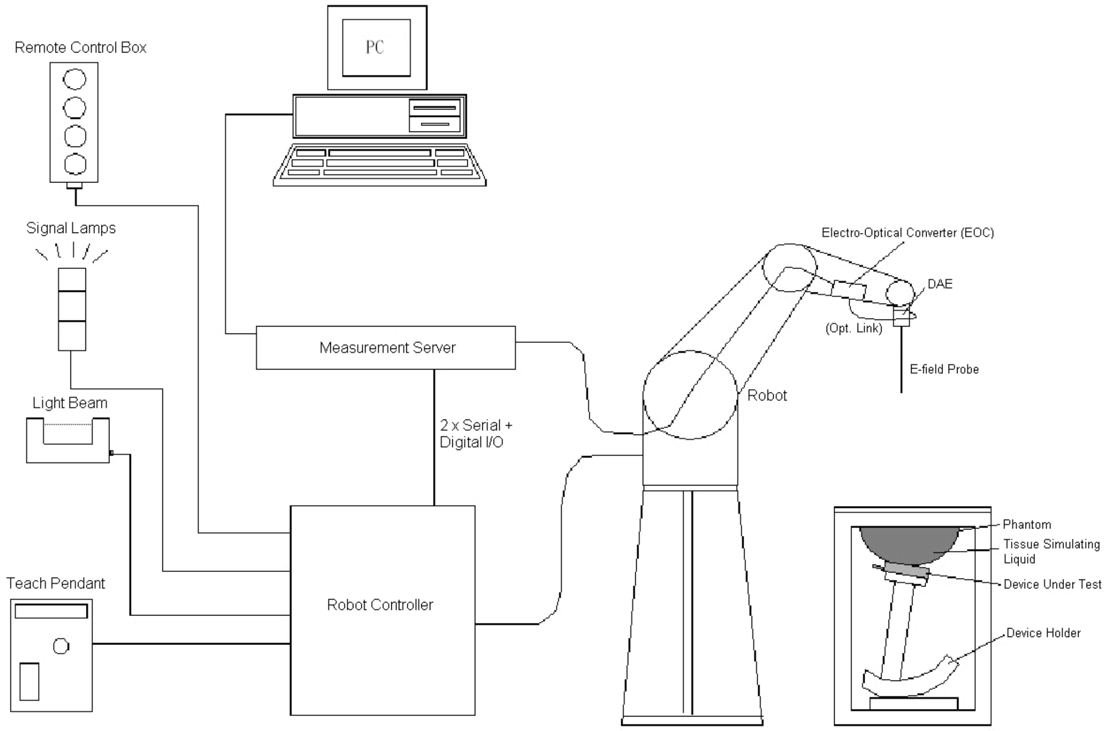


Fig 5.1 SPEAG DASY System Configurations

The DASY system for performance compliance tests is illustrated above graphically. This system consists of the following items:

- A standard high precision 6-axis robot with controller, a teach pendant and software
- A data acquisition electronic (DAE) attached to the robot arm extension
- A dosimetric probe equipped with an optical surface detector system
- The electro-optical converter (EOC) performs the conversion between optical and electrical signals
- A measurement server performs the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the accuracy of the probe positioning
- A computer operating Windows XP
- DASY software
- Remove control with teach pendant and additional circuitry for robot safety such as warming lamps, etc.
- The SAM twin phantom
- A device holder
- Tissue simulating liquid
- Dipole for evaluating the proper functioning of the system

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

5.1 E-Field Probe

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

5.1.1 E-Field Probe Specification

<ET3DV6 Probe >

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

Fig 5.2 Photo of ET3DV6/ET3DV6

<ES3DV3 Probe >

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

Fig 5.3 Photo of ES3DV3

5.1.2 E-Field Probe Calibration

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

5.2 Data Acquisition Electronics (DAE)

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

Fig 5.4 Photo of DAE

5.3 Robot

The SPEAG DASY system uses the high precision robots (DASY4: RX90BL; DASY5: TX90XL) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version (DASY4: CS7MB; DASY5: CS8c) from Stäubli is used. The Stäubli robot series have many features that are important for our application:

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

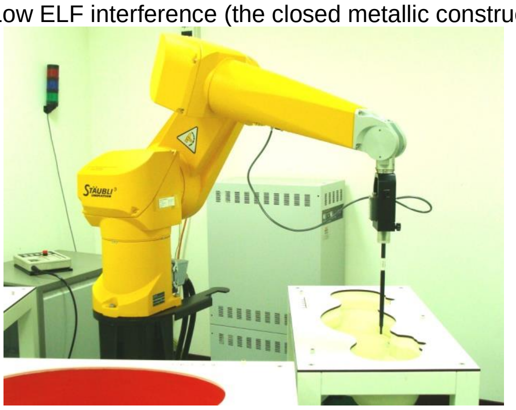


Fig 5.5 Photo of DASY4

Fig 5.6 Photo of DASY5

5.4 Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY4: 166 MHz, Intel Pentium; DASY5: 400 MHz, Intel Celeron), chipdisk (DASY4: 32 MB; DASY5: 128 MB), RAM (DASY4: 64 MB, DASY5: 128 MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DASY I/O board, which is directly connected to the PC/104 bus of the CPU board.

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

Fig 5.7 Photo of Server for DASY4

Fig 5.8 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

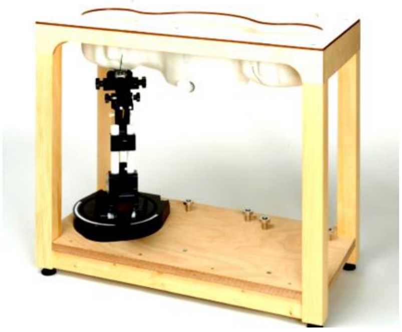


Fig 5.9 Photo of SAM Phantom

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

<ELI4 Phantom>

Shell Thickness	2 ± 0.2 mm (sagging: <1%)
Filling Volume	Approx. 30 liters
Dimensions	Major ellipse axis: 600 mm Minor axis: 400 mm

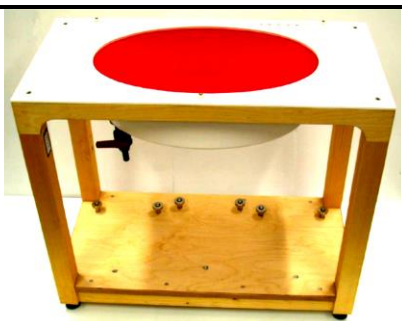


Fig 5.10 Photo of ELI4 Phantom

The ELI4 phantom is intended for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI4 is fully compatible with standard and all known tissue simulating liquids.

5.6 Device Holder

<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 $\varepsilon = 3$ and loss tangent $\delta = 0.02$. 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 5.11 Device Holder

<Laptop Extension Kit>

The extension is lightweight and made of POM, acrylic glass and foam. It fits easily on the upper part of the mounting device in place of the phone positioned. The extension is fully compatible with the SAM Twin and ELI phantoms.

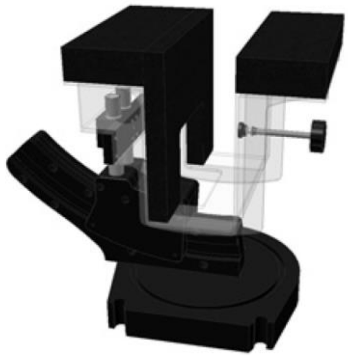


Fig 5.12 Laptop Extension Kit

5.7 Data Storage and Evaluation

5.7.1 Data Storage

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

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

5.7.2 Data Evaluation

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

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

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

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

The formula for each channel can be given as：

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

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

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

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

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

with V_i = compensated signal of channel i, (i = x, y, z)
$Norm_i$ = sensor sensitivity of channel i, (i = x, y, z), $\mu V/(V/m)^2$ 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	499	Mar. 22, 2010	Mar. 21, 2013
SPEAG	1750MHz System Validation Kit	D1750V2	1068	Jun. 20, 2012	Jun. 19, 2013
SPEAG	1900MHz System Validation Kit	D1900V2	5d041	Mar. 23, 2010	Mar. 22, 2013
SPEAG	Data Acquisition Electronics	DAE4	778	Aug. 27, 2012	Aug. 26, 2013
SPEAG	Data Acquisition Electronics	DAE3	495	Apr. 23, 2012	Apr. 22, 2013
SPEAG	Dosimetric E-Field Probe	ET3DV6	1787	May. 29, 2012	May. 28, 2013
SPEAG	Dosimetric E-Field Probe	ES3DV3	3270	Sep. 28, 2012	Sep. 27, 2013
H.M.IRIS	Thermometer	TH-08	TM658	Nov. 13, 2012	Nov. 12, 2013
SPEAG	ELI4 Phantom	QD 0VA 001 BB	1026	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1127	NCR	NCR
SPEAG	ELI4 Phantom	QD 0VA 002 AA	TP-1131	NCR	NCR
Agilent	Network Analyzer	E5071C	MY46101588	May. 11, 2012	May. 10, 2013
Agilent	ESG Vector Series Signal Generator	E4438C	MY49070755	Oct. 02, 2012	Oct. 01, 2013
Anritsu	Power Meter	ML2495A	1132003	Aug. 14, 2012	Aug. 13, 2013
Agilent	Wireless Communication Test Set	E5515C	MY50266977	Nov. 13, 2011	Nov. 12, 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	328767	Note 6	
R&S	Spectrum Analyzer	FSP	101131	Jul. 23, 2012	Jul. 22, 2013

Table 5.1 Test Equipment List

Note:

1. The calibration certificate of DASY can be referred to appendix C of this report.
2. Referring to KDB 865664 D01v01, the dipole calibration interval can be extended to 3 years with justification. The dipoles are also not physically damaged, or repaired during the interval.
3. The justification data of dipole D835V2, SN: 499, D1900V2, SN: 5d041 can be found in appendix C. The return loss is < -20dB, within 20% of prior calibration, the impedance is within 5 ohm of prior calibration.
4. The Insertion Loss calibration of Dual Directional Coupler and Attenuator were characterized via the network analyzer and compensated during system check.
5. The dielectric probe kit was calibrated via the network analyzer, with the specified procedure (calibrated in pure water) and calibration kit (standard) short circuit, before the dielectric measurement. The specific procedure and calibration kit are provided by Agilent.
6. In system check we need to monitor the level on the power meter, and adjust the power amplifier level to have precise power level to the dipole; the measured SAR will be normalized to 1W input power according to the ratio of 1W to the input power to the dipole. For system check, the calibration of the power amplifier is deemed not critically required for correct measurement; the power meter is critical and we do have calibration for it
7. Attenuator 1 insertion loss is calibrated by the network Analyzer, which the calibration is valid, before system check.

6. Tissue Simulating Liquids

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

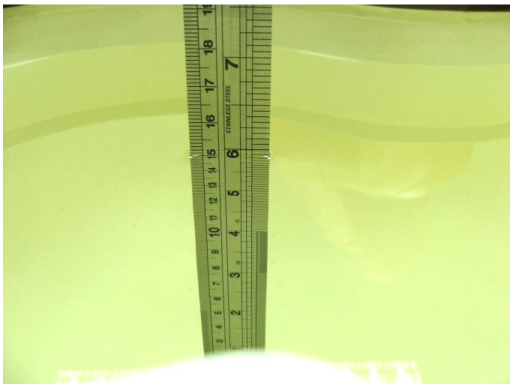


Fig 6.1 Photo of Liquid Height for Head SAR

Fig 6.2 Photo of Liquid Height for Body SAR

The following table gives the recipes for tissue simulating liquid.

Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity (σ)	Permittivity (ε_r)
For Body								
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0	0	31.4	1.95	52.7

Table 6.1 Recipes of Tissue Simulating Liquid

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

The following table shows the measuring results for simulating liquid.

Frequency (MHz)	Liquid Type	Liquid Temp. (℃)	Conductivity (σ)	Permittivity (εr)	Conductivity Target (σ)	Permittivity Target (εr)	Delta (σ) (%)	Delta (εr) (%)	Limit (%)	Date
835	Body	21.5	0.955	52.69	0.97	55.2	-1.55	-4.55	±5	2013/2/6
835	Body	21.4	0.963	54.544	0.97	55.2	-0.72	-1.19	±5	2013/2/9
835	Body	21.7	0.953	52.72	0.97	55.2	-1.75	-4.49	±5	2013/2/13
1750	Body	21.6	1.479	52.368	1.52	53.3	-2.70	-1.75	±5	2013/2/20
1900	Body	21.6	1.503	53.023	1.52	53.3	-1.12	-0.52	±5	2013/2/6
1900	Body	21.5	1.545	53.277	1.52	53.3	1.64	-0.04	±5	2013/2/8

Table 6.2 Measuring Results for Simulating Liquid

7. SAR System Verification

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

7.1 Purpose of System Performance check

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

7.2 System Setup

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

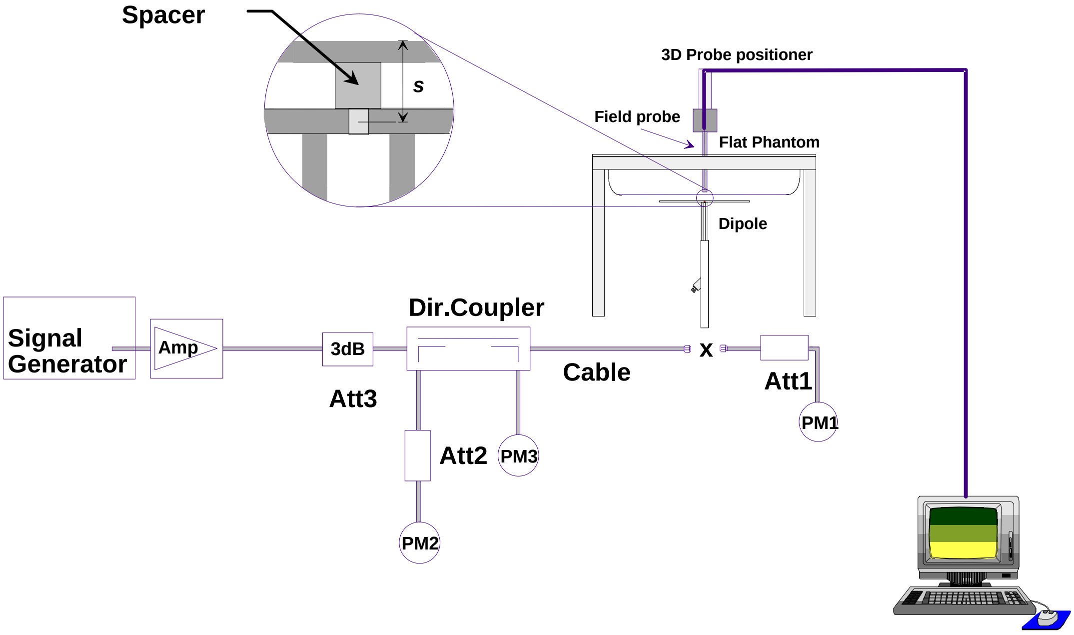


Fig 7.1 System Setup for System Evaluation

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

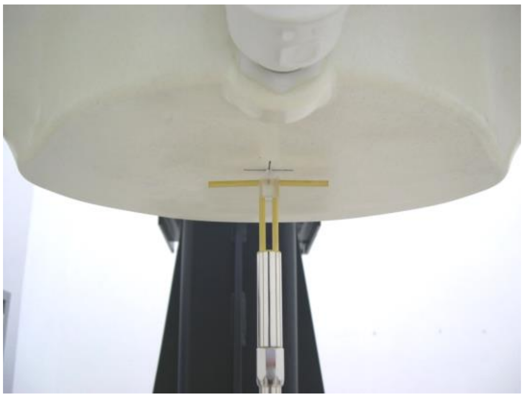


Fig 7.2 Photo of Dipole Setup

7.3 SAR System Verification Results

Comparing to the original SAR value provided by SPEAG, the verification data should be within its specification of 10 %. Table 7.1 shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion and the plots can be referred to Appendix A of this report.

Date	Frequency (MHz)2	Liquid Type	Power fed onto reference dipole (mW)	Targeted SAR (W/kg)	Measured SAR (W/kg)	Normalized SAR (W/kg)	Deviation (%)
2013/2/6	835	Body	250	9.82	2.43	9.72	-1.02
2013/2/9	835	Body	250	9.82	2.5	10	1.83
2013/2/13	835	Body	250	9.82	2.55	10.2	3.87
2013/2/20	1750	Body	250	36.8	8.59	34.36	-6.63
2013/2/6	1900	Body	250	40	9.73	38.92	-2.70
2013/2/8	1900	Body	250	40	10	40	0.00

Table 7.1 Target and Measurement SAR after Normalized

8. EUT Testing Position

This EUT was tested in three different positions. They are bottom-face of tablet PC, Edge1, and Edge4. In these positions, the surface of EUT is touching with phantom 0cm, and additional 1cm separation for bottom-face, additional 1.2 cm for Edge1. Please refer to Appendix D 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 D demonstrates.
(c) Set scan area, grid size and other setting on the DASY software.
(d) Measure SAR results for the highest power channel on each testing position.
(e) Find out the largest SAR result on these testing positions of each band
(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg

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

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

9.1 Spatial Peak SAR Evaluation

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

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

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

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

9.2 Power Reference Measurement

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

9.3 Area & Zoom Scan Procedures

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01v01 quoted below.

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

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

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

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

9.4 Volume Scan Procedures

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

9.5 SAR Averaged Methods

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

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

9.6 Power Drift Monitoring

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

10. Conducted RF Output Power (Unit: dBm)

<GSM Conducted Power>

Maximum Average RF Power (Proximity Sensor Inactive)

Band GSM850	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	128	189	251	128	189	251
Frequency	824.2	836.4	848.8	824.2	836.4	848.8
GPRS (GMSK, 1 Tx slot) – CS1	32.14	32.19	32.17	23.14	23.19	23.17
GPRS (GMSK, 2 Tx slots) – CS1	31.51	31.53	31.49	25.51	25.53	25.49
EDGE (GMSK, 1 Tx slot) – MCS1	32.11	32.17	32.16	23.11	23.17	23.16
EDGE (GMSK, 2 Tx slots) – MCS1	31.46	31.51	31.49	25.46	25.51	25.49
EDGE (GMSK, 3 Tx slots) – MCS1	29.05	29.14	29.25	24.79	24.88	24.99
EDGE (GMSK, 4 Tx slots) – MCS1	26.29	26.30	26.28	23.29	23.30	23.28
EDGE (8PSK, 1 Tx slot) – MCS5	26.70	26.76	26.58	17.70	17.76	17.58
EDGE (8PSK, 2 Tx slots) – MCS5	26.54	26.60	26.81	20.54	20.60	20.81
EDGE (8PSK, 3 Tx slots) – MCS5	26.46	26.46	26.69	22.20	22.20	22.43
EDGE (8PSK, 4 Tx slots) – MCS5	26.02	26.23	26.32	23.02	23.23	23.32

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Reduced Average RF Power (Proximity Sensor active)

Band GSM850	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	128	189	251	128	189	251
Frequency	824.2	836.4	848.8	824.2	836.4	848.8
GPRS (GMSK, 1 Tx slot) – CS1	28.83	28.88	28.86	19.83	19.88	19.86
GPRS (GMSK, 2 Tx slots) – CS1	28.19	28.29	28.28	22.19	22.29	22.28
EDGE (GMSK, 1 Tx slot) – MCS1	28.80	28.86	28.85	19.80	19.86	19.85
EDGE (GMSK, 2 Tx slots) – MCS1	28.18	28.26	28.23	22.18	22.26	22.23
EDGE (GMSK, 3 Tx slots) – MCS1	26.15	26.27	26.35	21.89	22.01	22.09
EDGE (GMSK, 4 Tx slots) – MCS1	25.22	25.23	25.20	22.22	22.23	22.20
EDGE (8PSK, 1 Tx slot) – MCS5	26.70	26.76	26.58	17.70	17.76	17.58
EDGE (8PSK, 2 Tx slots) – MCS5	26.54	26.60	26.81	20.54	20.60	20.81
EDGE (8PSK, 3 Tx slots) – MCS5	25.39	25.42	25.48	21.13	21.16	21.22
EDGE (8PSK, 4 Tx slots) – MCS5	24.21	24.24	24.30	21.21	21.24	21.30

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Note:

1. Per KDB 447498 D01v05, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Following KDB 941225 D03, for Body SAR testing, the EUT operating without power back-off was set in GPRS (2 Tx slots) and the EUT operating with power back-off was set in GPRS (2 Tx slots) due to its highest frame-average power.

Maximum Average RF Power (Proximity Sensor Inactive)

Band GSM1900	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	512	661	810	512	661	810
Frequency	1850.2	1880	1909.8	1850.2	1880	1909.8
GPRS (GMSK, 1 Tx slot) – CS1	29.20	29.33	29.36	20.20	20.33	20.36
GPRS (GMSK, 2 Tx slots) – CS1	29.04	29.18	29.28	23.04	23.18	23.28
EDGE (GMSK, 1 Tx slot) – MCS1	29.15	29.30	29.32	20.15	20.30	20.32
EDGE (GMSK, 2 Tx slots) – MCS1	29.06	29.21	29.26	23.06	23.21	23.26
EDGE (GMSK, 3 Tx slots) – MCS1	27.13	27.39	27.34	22.87	23.13	23.08
EDGE (GMSK, 4 Tx slots) – MCS1	25.10	25.27	25.32	22.10	22.27	22.32
EDGE (8PSK, 1 Tx slot) – MCS5	25.40	25.56	25.53	16.40	16.56	16.53
EDGE (8PSK, 2 Tx slots) – MCS5	25.33	25.48	25.52	19.33	19.48	19.52
EDGE (8PSK, 3 Tx slots) – MCS5	25.24	25.36	25.36	20.98	21.10	21.10
EDGE (8PSK, 4 Tx slots) – MCS5	25.04	25.21	25.27	22.04	22.21	22.27

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Reduced Average RF Power (Proximity Sensor active)

Band GSM1900	Burst Average Power (dBm)			Frame-Average Power (dBm)		
Channel	512	661	810	512	661	810
Frequency	1850.2	1880	1909.8	1850.2	1880	1909.8
GPRS (GMSK, 1 Tx slot) – CS1	27.82	27.93	27.76	18.82	18.93	18.76
GPRS (GMSK, 2 Tx slots) – CS1	27.36	27.38	27.40	21.36	21.38	21.40
EDGE (GMSK, 1 Tx slot) – MCS1	27.81	27.91	27.74	18.81	18.91	18.74
EDGE (GMSK, 2 Tx slots) – MCS1	27.35	27.37	27.26	21.35	21.37	21.26
EDGE (GMSK, 3 Tx slots) – MCS1	25.23	25.36	25.13	20.97	21.10	20.87
EDGE (GMSK, 4 Tx slots) – MCS1	24.16	24.17	24.06	21.16	21.17	21.06
EDGE (8PSK, 1 Tx slot) – MCS5	25.40	25.56	25.53	16.40	16.56	16.53
EDGE (8PSK, 2 Tx slots) – MCS5	25.33	25.48	25.52	19.33	19.48	19.52
EDGE (8PSK, 3 Tx slots) – MCS5	24.77	24.83	24.74	20.51	20.57	20.48
EDGE (8PSK, 4 Tx slots) – MCS5	23.68	23.73	23.61	20.68	20.73	20.61

Remark: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots.
The calculated method are shown as below:
Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9 dB
Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6 dB
Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB
Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3 dB

Note:

1. Per KDB 447498 D01v05, the maximum output power channel is used for SAR testing and for further SAR test reduction.
2. Following KDB 941225 D03, for Body SAR testing, the EUT operating without power back-off was set in GPRS (2 Tx slots) and the EUT operating with power back-off was set in GPRS (2 Tx slots) due to its highest frame-average power.

<WCDMA Conducted Power>

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

A summary of these settings are illustrated below:

HSDPA Setup Configuration:

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

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

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

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with $\beta_{hs} = 30/15 * \beta_c$.

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

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

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

Setup Configuration

HSUPA Setup Configuration:

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

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

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

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

Setup Configuration

<WCDMA Conducted Power>

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

Maximum Average RF Power (Proximity Sensor Inactive)

Average power (dBm)										
Band		WCDMA V			WCDMA II			WCDMA IV		
Tx Channel		4132	4182	4233	9262	9400	9538	1312	1413	1513
Rx Channel		4357	4407	4458	9662	9800	9938	1537	1638	1738
Frequency		826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
3GPP Rel 99	RMC 12.2kbps	22.60	22.49	22.46	22.63	22.57	22.59	22.58	22.56	22.54
3GPP Rel 6	HSDPA Subtest-1	22.10	22.06	21.98	22.18	22.17	22.23	22.12	22.05	22.05
3GPP Rel 6	HSDPA Subtest-2	22.07	22.05	21.92	22.15	22.14	22.15	22.10	22.02	21.99
3GPP Rel 6	HSDPA Subtest-3	21.65	21.58	21.45	21.63	21.61	21.68	21.57	21.56	21.43
3GPP Rel 6	HSDPA Subtest-4	21.64	21.60	21.45	21.61	21.58	21.64	21.53	21.49	21.46
3GPP Rel 6	HSUPA Subtest-1	22.08	22.06	22.03	22.13	22.02	22.03	21.70	21.73	21.69
3GPP Rel 6	HSUPA Subtest-2	20.70	20.63	20.75	20.58	20.71	20.65	20.60	20.80	20.67
3GPP Rel 6	HSUPA Subtest-3	21.56	21.51	21.64	21.48	21.63	21.57	20.67	20.88	20.72
3GPP Rel 6	HSUPA Subtest-4	20.50	20.46	20.32	20.66	20.80	20.67	20.65	20.88	20.75
3GPP Rel 6	HSUPA Subtest-5	22.03	22.02	22.06	22.05	22.10	22.03	22.22	22.19	22.08
3GPP MPR specification	MPR result	WCDMA V			WCDMA II			WCDMA IV		
0	HSDPA Subtest-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	HSDPA Subtest-2	0.03	0.01	0.06	0.03	0.03	0.08	0.02	0.03	0.06
≦0.5	HSDPA Subtest-3	0.45	0.48	0.53	0.55	0.56	0.55	0.55	0.49	0.62
≦0.5	HSDPA Subtest-4	0.46	0.46	0.53	0.57	0.59	0.59	0.59	0.56	0.59
≦0	HSUPA Subtest-1	-0.05	-0.04	0.03	-0.08	0.08	0.00	0.52	0.46	0.39
≦2	HSUPA Subtest-2	1.33	1.39	1.31	1.47	1.39	1.38	1.62	1.39	1.41
≦1	HSUPA Subtest-3	0.47	0.51	0.42	0.57	0.47	0.46	1.55	1.31	1.36
≦2	HSUPA Subtest-4	1.53	1.56	1.74	1.39	1.30	1.36	1.57	1.31	1.33
≦0	HSUPA Subtest-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Reduced Average RF Power (Proximity Sensor active)

Average power (dBm)										
Band		WCDMA V			WCDMA II			WCDMA IV		
Tx Channel		4132	4182	4233	9262	9400	9538	1312	1413	1513
Rx Channel		4357	4407	4458	9662	9800	9938	1537	1638	1738
Frequency		826.4	836.4	846.6	1852.4	1880	1907.6	1712.4	1732.6	1752.6
3GPP Rel 99	RMC 12.2kbps	21.46	21.33	21.29	18.95	18.9	18.91	17.42	17.32	17.35
3GPP Rel 6	HSDPA Subtest-1	21.11	20.82	20.82	18.75	18.66	18.70	17.19	17.04	17.09
3GPP Rel 6	HSDPA Subtest-2	21.10	20.91	21.04	18.42	18.43	18.50	17.07	17.00	16.99
3GPP Rel 6	HSDPA Subtest-3	20.64	20.47	20.37	18.02	17.88	18.04	16.53	16.45	16.39
3GPP Rel 6	HSDPA Subtest-4	20.57	20.39	20.37	18.05	17.91	18.01	16.85	16.77	16.69
3GPP Rel 6	HSUPA Subtest-1	20.81	20.52	20.35	18.01	18.09	18.22	16.90	16.85	16.78
3GPP Rel 6	HSUPA Subtest-2	19.80	19.61	19.60	16.95	17.00	16.93	15.70	15.54	15.49
3GPP Rel 6	HSUPA Subtest-3	20.12	19.97	19.64	17.41	17.54	17.38	16.19	16.01	15.92
3GPP Rel 6	HSUPA Subtest-4	19.80	19.71	19.59	17.30	17.25	17.32	15.73	15.70	15.62
3GPP Rel 6	HSUPA Subtest-5	21.12	21.04	21.01	18.61	18.56	18.71	17.32	17.18	16.99
3GPP MPR specification	MPR result	WCDMA V			WCDMA II			WCDMA IV		
0	HSDPA Subtest-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0	HSDPA Subtest-2	0.01	-0.09	-0.22	0.33	0.23	0.20	0.12	0.04	0.10
≦0.5	HSDPA Subtest-3	0.47	0.35	0.45	0.73	0.78	0.66	0.66	0.59	0.70
≦0.5	HSDPA Subtest-4	0.54	0.43	0.45	0.70	0.75	0.69	0.34	0.27	0.40
≦0	HSUPA Subtest-1	0.31	0.52	0.66	0.60	0.47	0.49	0.42	0.33	0.21
≦2	HSUPA Subtest-2	1.32	1.43	1.41	1.66	1.56	1.78	1.62	1.64	1.50
≦1	HSUPA Subtest-3	1.00	1.07	1.37	1.20	1.02	1.33	1.13	1.17	1.07
≦2	HSUPA Subtest-4	1.32	1.33	1.42	1.31	1.31	1.39	1.59	1.48	1.37
≦0	HSUPA Subtest-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

<CDMA2000 Conducted Power>

Note:

1. Referring to KDB 941225 D01, the data device SAR is tested with Ev-Do Rev 0 (RTAP 153.6kbps). If 1xRTT and Ev-Do Rev A (RETAP 4096 bits) power is less than 1/4dB higher than Re v0, SAR tests with those settings are not necessary.

Maximum Average RF Power (Proximity Sensor Inactive)

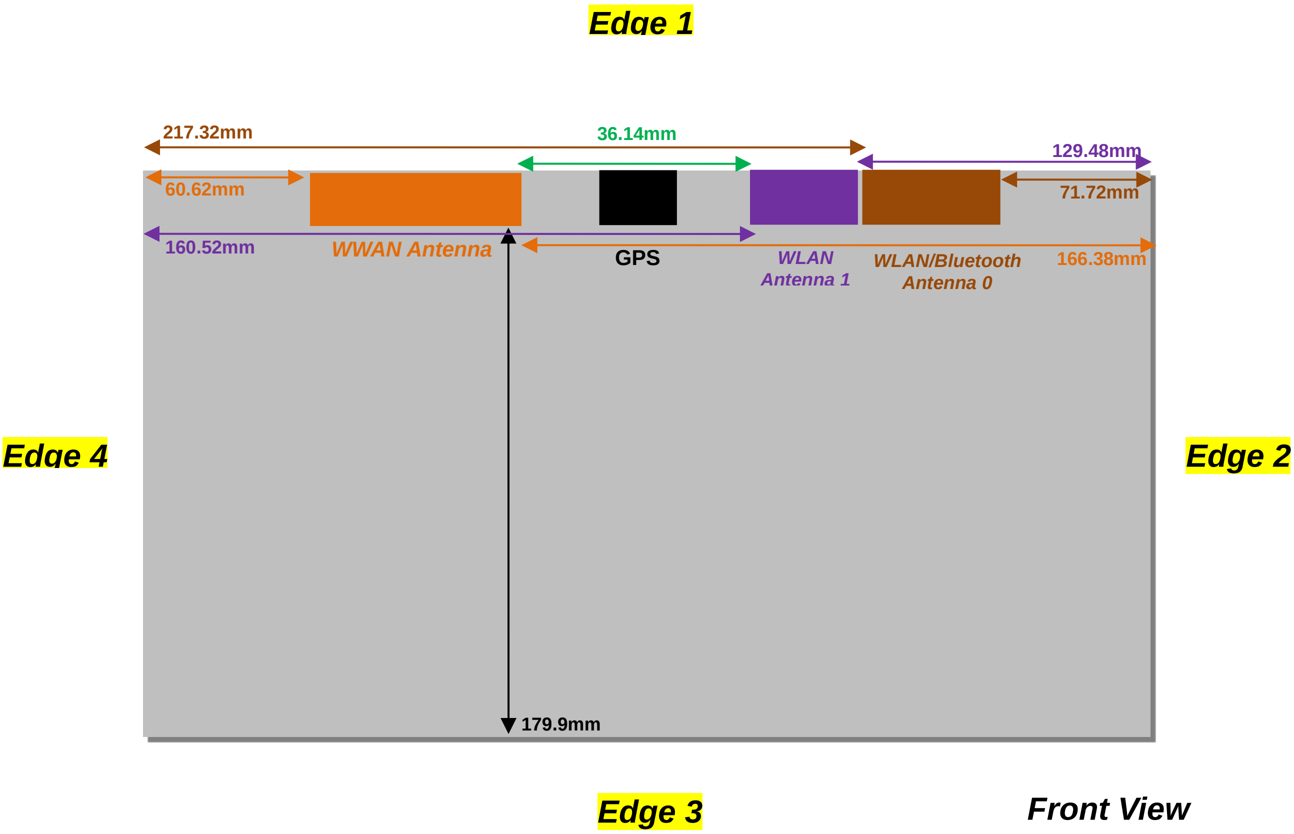
Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC3 SO55	23.64	23.62	23.45	23.57	23.55	23.51
1xRTT RC3 SO32(+ F-SCH)	23.71	23.69	23.52	23.59	23.57	23.47
1xRTT RC3 SO32(+SCH)	23.70	23.69	23.55	23.53	23.56	23.51
1xEVDO RTAP 153.6 kbps	23.72	23.64	23.47	23.87	23.83	23.74
1xEVDO RETAP 4096 bits	23.69	23.63	23.40	23.86	23.82	23.73

Reduced Average RF Power (Proximity Sensor active)

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
1xRTT RC3 SO55	21.71	21.65	21.54	18.96	18.92	18.98
1xRTT RC3 SO32(+ F-SCH)	21.72	21.63	21.55	18.93	18.98	18.96
1xRTT RC3 SO32(+SCH)	21.70	21.59	21.54	18.97	18.96	18.95
1xEVDO RTAP 153.6 kbps	21.74	21.66	21.51	18.99	18.97	18.98
1xEVDO RETAP 4096 bits	21.60	21.56	21.50	18.92	18.94	18.95

11. Exposure Positions Consideration

<Tablet PC>



Antennas	Wireless Interface
WWAN Main Antenna (Tx / Rx)	GSM850 GSM1900 WCDMA Band V WCDMA Band IV WCDMA Band II CDMA2000 BC0 CDMA 2000 BC1

<WWAN SAR test exclusion table>

Exposure Position	Wireless Interface	GPRS850 Class 10	GPRS1900 Class 10	WCDMA Band V	WCDMA Band IV	WCDMA Band II	CDMA 2000 BC0	CDMA 2000 BC1
	Tune-up Maximum power (dBm)	27	24	24	24	24	24.5	24.5
	Tune-up Maximum rated power (mW)	501.19	251.19	251.19	251.19	251.19	281.84	281.84
Bottom Face	Antenna to user (mm)	5						
	SAR exclusion threshold (mW)	16	11	16	11	11	16	11
	SAR testing required?	YES	YES	YES	YES	YES	YES	YES
Edge 1	Antenna to user (mm)	5						
	SAR exclusion threshold (mW)	16	11	16	11	11	16	11
	SAR testing required?	YES	YES	YES	YES	YES	YES	YES
Edge 2	Antenna to user (mm)	166.38						
	SAR exclusion threshold (mW)	821	1272	819	1277	1272	821	1272
	SAR testing required?	NO	NO	NO	NO	NO	NO	NO
Edge 3	Antenna to user (mm)	179.9						
	SAR exclusion threshold (mW)	897	1408	896	1412	1408	897	1408
	SAR testing required?	NO	NO	NO	NO	NO	NO	NO
Edge 4	Antenna to user (mm)	60.62						
	SAR exclusion threshold (mW)	223	215	223	220	215	223	215
	SAR testing required?	YES	YES	YES	YES	YES	YES	YES

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
2. Per KDB 447498 D01v05, for larger devices, the *test separation distance* is determined by the closest separation between the antenna and the user.
3. For Edge1 SAR testing, the mechanical structure limit the test setup for curved surface not feasible, and the gap is between only 2~3mm introduced by the mechanical structure. Details are illustrated in “Operation Description of proximity sensor” exhibit.
4. Per KDB 447498 D01v05, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
5. Per KDB 447498 D01v05, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:
   [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the RF channel transmit frequency in GHz
   - Power and distance are rounded to the nearest mW and mm before calculation
   - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v05, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
   a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

12. SAR Test Results

Note:

1. Per KDB 447498 D01v05, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
   Scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)= Measured SAR(W/kg) Scaling Factor*
2. For the exposure positions that proximity sensor power reduction is applied for SAR compliance, additional SAR testing with EUT transmitting full power in normal mode was performed; 1cm for bottom face, 1.2cm for edge1
3. 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 Body SAR Test

<GSM SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR_{1g} (W/kg)
51	GSM850	GPRS (2TX slots)	Bottom Face	1cm	189	836.4	OFF	31.53	33	1.403	-0.1	0.485	0.680
56	GSM850	GPRS (2TX slots)	Edge 1	1.2cm	189	836.4	OFF	31.53	33	1.403	-0.1	0.764	1.072
57	GSM850	GPRS (2TX slots)	Edge 1	1.2cm	128	824.2	OFF	31.51	33	1.409	-0.02	0.707	0.996
58	GSM850	GPRS (2TX slots)	Edge 1	1.2cm	251	848.8	OFF	31.49	33	1.416	0	0.813	1.151
59	GSM850	GPRS (2TX slots)	Edge 4	0cm	189	836.4	OFF	31.53	33	1.403	-0.17	0.18	0.253
52	GSM850	GPRS (2TX slots)	Bottom Face	0cm	189	836.4	0N	28.29	29.5	1.321	-0.07	0.788	1.041
54	GSM850	GPRS (2TX slots)	Bottom Face	0cm	128	824.2	0N	28.19	29.5	1.352	-0.02	0.561	0.759
55	GSM850	GPRS (2TX slots)	Bottom Face	0cm	251	848.8	0N	28.28	29.5	1.324	-0.164	0.85	1.126
17	GSM850	GPRS (2TX slots)	Edge 1	0cm	189	836.4	0N	28.29	29.5	1.321	0.05	0.989	1.307
18	GSM850	GPRS (2TX slots)	Edge 1	0cm	128	824.2	0N	28.19	29.5	1.352	-0.09	0.97	1.312
53	**GSM850**	**GPRS (2TX slots)**	**Edge 1**	**0cm**	**251**	**848.8**	**0N**	**28.28**	**29.5**	**1.324**	**-0.121**	**1.05**	**1.391**

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR_{1g} (W/kg)
24	GSM1900	GPRS (2TX slots)	Bottom Face	1cm	810	1909.8	OFF	29.28	30	1.180	0.172	0.273	0.322
20	GSM1900	GPRS (2TX slots)	Edge 1	1.2cm	810	1909.8	OFF	29.28	30	1.180	0.07	0.754	0.890
21	GSM1900	GPRS (2TX slots)	Edge 1	1.2cm	512	1850.2	OFF	29.04	30	1.247	0.07	0.887	1.106
22	GSM1900	GPRS (2TX slots)	Edge 1	1.2cm	661	1880	OFF	29.18	30	1.208	-0.16	0.806	0.973
23	GSM1900	GPRS (2TX slots)	Edge 4	0cm	810	1909.8	OFF	29.28	30	1.180	0.03	0.045	0.053
25	GSM1900	GPRS (2TX slots)	Bottom Face	0cm	810	1909.8	0N	27.4	27.5	1.023	-0.02	0.742	0.759
14	GSM1900	GPRS (2TX slots)	Edge 1	0cm	810	1909.8	0N	27.4	27.5	1.023	-0.19	1.23	1.259
15	GSM1900	GPRS (2TX slots)	Edge 1	0cm	512	1850.2	0N	27.36	27.5	1.033	0.04	1.23	1.270
26	**GSM1900**	**GPRS (2TX slots)**	**Edge 1**	**0cm**	**661**	**1880**	**0N**	**27.38**	**27.5**	**1.028**	**0.125**	**1.33**	**1.367**

<WCDMA SAR>

Note:

1. If Reported SAR with RMC 12.2kbps setting is > 1.2W/kg, HSDPA subtest-1 and HSUPA subtest-5 SAR is additionally tested at that exposure position.

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
65	WCDMA V	RMC 12.2Kbps	Bottom Face	1cm	4132	826.4	OFF	22.6	24	1.380	-0.1	0.201	0.277
66	WCDMA V	RMC 12.2Kbps	Edge 1	1.2cm	4132	826.4	OFF	22.6	24	1.380	0.01	0.209	0.289
67	WCDMA V	RMC 12.2Kbps	Edge 4	0cm	4132	826.4	OFF	22.6	24	1.380	0.02	0.066	0.091
68	WCDMA V	RMC 12.2Kbps	Bottom Face	0cm	4132	826.4	0N	21.46	22	1.132	-0.1	0.612	0.693
7	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	4132	826.4	0N	21.46	22	1.132	0.16	1.19	1.348
8	**WCDMA V**	**RMC 12.2Kbps**	**Edge 1**	**0cm**	**4182**	**836.4**	**0N**	**21.33**	**22**	**1.167**	**-0.14**	**1.2**	**1.400**
9	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	4233	846.6	0N	21.29	22	1.178	-0.155	1.18	1.390
69	WCDMA V	HSDPA Subtest-1	Edge 1	0cm	4132	826.4	0N	21.11	22	1.227	0.16	0.972	1.193
70	WCDMA V	HSDPA Subtest-1	Edge 1	0cm	4182	836.4	0N	20.82	22	1.312	0	0.934	1.226
71	WCDMA V	HSDPA Subtest-1	Edge 1	0cm	4233	846.6	0N	20.82	22	1.312	0.04	0.898	1.178
72	WCDMA V	HSUPA Subtest-5	Edge 1	0cm	4132	826.4	0N	21.12	22	1.225	-0.17	0.953	1.167
73	WCDMA V	HSUPA Subtest-5	Edge 1	0cm	4182	836.4	0N	21.04	22	1.247	0	0.901	1.124
74	WCDMA V	HSUPA Subtest-5	Edge 1	0cm	4233	846.6	0N	21.01	22	1.256	0.02	0.963	1.210

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
81	WCDMA IV	RMC 12.2Kbps	Bottom Face	1cm	1312	1712.4	OFF	22.58	24	1.387	-0.07	0.377	0.523
82	WCDMA IV	RMC 12.2Kbps	Edge 1	1.2cm	1312	1712.4	OFF	22.58	24	1.387	-0.02	0.756	1.048
83	WCDMA IV	RMC 12.2Kbps	Edge 1	1.2cm	1413	1732.6	OFF	22.56	24	1.393	0.06	0.816	1.137
84	WCDMA IV	RMC 12.2Kbps	Edge 1	1.2cm	1513	1752.6	OFF	22.54	24	1.400	-0.03	0.849	1.188
85	WCDMA IV	RMC 12.2Kbps	Edge 4	0cm	1312	1712.4	OFF	22.58	24	1.387	0.07	0.043	0.060
86	WCDMA IV	RMC 12.2Kbps	Bottom Face	0cm	1312	1712.4	0N	17.42	18	1.143	0.03	0.737	0.842
87	WCDMA IV	RMC 12.2Kbps	Bottom Face	0cm	1413	1732.6	0N	17.32	18	1.169	0.01	0.832	0.973
88	WCDMA IV	RMC 12.2Kbps	Bottom Face	0cm	1513	1752.6	0N	17.35	18	1.161	0.12	0.882	1.024
89	**WCDMA IV**	**RMC 12.2Kbps**	**Edge 1**	**0cm**	**1312**	**1712.4**	**0N**	**17.42**	**18**	**1.143**	**-0.03**	**1.13**	**1.291**
90	WCDMA IV	RMC 12.2Kbps	Edge 1	0cm	1413	1732.6	0N	17.32	18	1.169	0.07	1.09	1.275
91	WCDMA IV	RMC 12.2Kbps	Edge 1	0cm	1513	1752.6	0N	17.35	18	1.161	0.18	1.02	1.185
92	WCDMA IV	HSDPA Subtest-1	Edge 1	0cm	1312	1712.4	0N	17.19	18	1.205	-0.1	0.881	1.062
93	WCDMA IV	HSDPA Subtest-1	Edge 1	0cm	1413	1732.6	0N	17.04	18	1.247	-0.04	0.849	1.059
94	WCDMA IV	HSDPA Subtest-1	Edge 1	0cm	1513	1752.6	0N	17.09	18	1.233	0	0.81	0.999
95	WCDMA IV	HSUPA Subtest-5	Edge 1	0cm	1312	1712.4	0N	17.32	18	1.169	-0.09	0.619	0.724
96	WCDMA IV	HSUPA Subtest-5	Edge 1	0cm	1413	1732.6	0N	17.18	18	1.208	0.01	0.59	0.713
97	WCDMA IV	HSUPA Subtest-5	Edge 1	0cm	1513	1752.6	0N	16.99	18	1.262	-0.03	0.57	0.719

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
36	WCDMA II	RMC 12.2Kbps	Bottom Face	1cm	9262	1852.4	OFF	22.63	24	1.371	0.02	0.384	0.526
37	WCDMA II	RMC 12.2Kbps	Edge 1	1.2cm	9262	1852.4	OFF	22.63	24	1.371	-0.01	0.842	1.154
38	WCDMA II	RMC 12.2Kbps	Edge 1	1.2cm	9400	1880	OFF	22.57	24	1.390	0.1	0.831	1.155
39	WCDMA II	RMC 12.2Kbps	Edge 1	1.2cm	9538	1907.6	OFF	22.59	24	1.384	0.08	0.797	1.103
40	WCDMA II	RMC 12.2Kbps	Edge 4	0cm	9262	1852.4	OFF	22.63	24	1.371	0.01	0.057	0.078
41	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	9262	1852.4	0N	18.95	20	1.274	0.11	0.762	0.970
42	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	9400	1880	0N	18.9	20	1.288	-0.06	0.766	0.987
43	WCDMA II	RMC 12.2Kbps	Bottom Face	0cm	9538	1907.6	0N	18.91	20	1.285	-0.13	0.753	0.968
3	**WCDMA II**	**RMC 12.2Kbps**	**Edge 1**	**0cm**	**9262**	**1852.4**	**0N**	**18.95**	**20**	**1.274**	**0.08**	**1.02**	**1.299**
4	WCDMA II	RMC 12.2Kbps	Edge 1	0cm	9400	1880	0N	18.9	20	1.288	0.19	0.972	1.252
5	WCDMA II	RMC 12.2Kbps	Edge 1	0cm	9538	1907.6	0N	18.91	20	1.285	0.19	0.921	1.184
44	WCDMA II	HSDPA Subtest-1	Edge 1	0cm	9262	1852.4	0N	18.75	20	1.334	0.1	0.895	1.194
45	WCDMA II	HSDPA Subtest-1	Edge 1	0cm	9400	1880	0N	18.66	20	1.361	0.02	0.816	1.111
46	WCDMA II	HSDPA Subtest-1	Edge 1	0cm	9538	1907.6	0N	18.7	20	1.349	0.03	0.794	1.071
47	WCDMA II	HSUPA Subtest-5	Edge 1	0cm	9262	1852.4	0N	18.61	20	1.377	0.01	0.802	1.105
48	WCDMA II	HSUPA Subtest-5	Edge 1	0cm	9400	1880	0N	18.56	20	1.393	0.01	0.888	1.237
49	WCDMA II	HSUPA Subtest-5	Edge 1	0cm	9538	1907.6	0N	18.71	20	1.346	0.03	0.883	1.188

<CDMA2000 SAR>

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
60	CDMA BC0	RTAP 153.6kbps	Bottom Face	1cm	1013	824.7	OFF	23.72	24.5	1.197	0.064	0.207	0.248
63	CDMA BC0	RTAP 153.6Kbps	Edge 1	1.2cm	1013	824.7	OFF	23.72	24.5	1.197	-0.03	0.351	0.420
64	CDMA BC0	RTAP 153.6Kbps	Edge 4	0cm	1013	824.7	OFF	23.72	24.5	1.197	0.133	0.063	0.075
62	CDMA BC0	RTAP 153.6kbps	Bottom Face	0cm	1013	824.7	0N	21.74	22	1.062	-0.08	0.531	0.564
6	CDMA BC0	RTAP 153.6Kbps	Edge 1	0cm	1013	824.7	0N	21.74	22	1.062	0.07	1.29	1.370
10	CDMA BC0	RTAP 153.6Kbps	Edge 1	0cm	384	836.52	0N	21.66	22	1.081	0.129	1.28	1.384
11	**CDMA BC0**	**RTAP 153.6Kbps**	**Edge 1**	**0cm**	**777**	**848.31**	**0N**	**21.51**	**22**	**1.119**	**0.04**	**1.24**	**1.388**

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Burst Average Power (dBm)	Tune-up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measure SAR_{1g} (W/kg)	Reported SAR_{1g} (W/kg)
34	CDMA BC1	RTAP 153.6Kbps	Bottom Face	1cm	25	1851.25	OFF	23.87	24.5	1.156	-0.08	0.456	0.527
2	CDMA BC1	RTAP 153.6Kbps	Edge 1	1.2cm	25	1851.25	OFF	23.87	24.5	1.156	0.17	1.09	1.260
28	CDMA BC1	RTAP 153.6Kbps	Edge 1	1.2cm	600	1880	OFF	23.83	24.5	1.167	0.06	1.03	1.202
29	CDMA BC1	RTAP 153.6Kbps	Edge 1	1.2cm	1175	1908.75	OFF	23.74	24.5	1.191	0	0.98	1.167
30	CDMA BC1	RTAP 153.6Kbps	Edge 4	0cm	25	1851.25	OFF	23.87	24.5	1.156	0.08	0.071	0.082
31	CDMA BC1	RTAP 153.6Kbps	Bottom Face	0cm	25	1851.25	0N	18.99	20.5	1.416	0.16	0.792	1.121
32	CDMA BC1	RTAP 153.6Kbps	Bottom Face	0cm	600	1880	0N	18.97	20.5	1.422	0.14	0.799	1.136
33	CDMA BC1	RTAP 153.6Kbps	Bottom Face	0cm	1175	1908.75	0N	18.98	20.5	1.419	0.05	0.73	1.036
1	CDMA BC1	RTAP 153.6Kbps	Edge 1	0cm	25	1851.25	0N	18.99	20.5	1.416	-0.02	0.959	1.358
12	**CDMA BC1**	**RTAP 153.6Kbps**	**Edge 1**	**0cm**	**600**	**1880**	**0N**	**18.97**	**20.5**	**1.422**	**0.03**	**0.983**	**1.398**
13	CDMA BC1	RTAP 153.6Kbps	Edge 1	0cm	1175	1908.75	0N	18.98	20.5	1.419	0.02	0.965	1.369

12.2 Repeated SAR Measurement

Plot No.	Band	Mode	Test Position	Gap (cm)	Ch.	Freq. (MHz)	Power Back-off	Average Power (dBm)	Tune-Up Limit (dBm)	Tune-up Scaling Factor	Power Drift (dB)	Measured SAR 1g (W/kg)	Ratio	Reported SAR 1g (W/kg)
53	GSM850	GPRS (2TX slots)	Edge 1	0cm	251	848.8	0N	28.28	29.5	1.324	-0.121	1.05	1	1.391
19	GSM850	GPRS (2TX slots)	Edge 1	0cm	251	848.8	0N	28.28	29.5	1.324	-0.08	1.02	1..03	1.351
26	GSM1900	GPRS (2TX slots)	Edge 1	0cm	661	1880	0N	27.38	27.5	1.028	0.125	1.33	1	1.367
16	GSM1900	GPRS (2TX slots)	Edge 1	0cm	661	1880	0N	27.38	27.5	1.028	0.12	1.25	1.06	1.285
8	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	4182	836.4	0N	21.33	22	1.167	-0.14	1.2	1	1.400
75	WCDMA V	RMC 12.2Kbps	Edge 1	0cm	4182	836.4	0N	21.33	22	1.167	0.19	1.12	1.07	1.307
89	WCDMA IV	RMC 12.2Kbps	Edge 1	0cm	1312	1712.4	0N	17.42	18	1.143	-0.03	1.13	1	1.291
98	WCDMA IV	RMC 12.2Kbps	Edge 1	0cm	1312	1712.4	0N	17.42	18	1.143	-0.01	1.07	1.06	1.223
3	WCDMA II	RMC 12.2Kbps	Edge 1	0cm	9262	1852.4	0N	18.95	20	1.274	0.08	1.02	1	1.299
50	WVDMA II	RMC 12.2Kbps	Edge 1	0cm	9262	1852.4	0N	18.95	20	1.274	-0.03	1.01	1.01	1.286
6	CDMA BC0	RTAP 153.6Kbps	Edge 1	0cm	1013	824.7	0N	21.74	22	1.062	0.07	1.29	1	1.370
61	CDMA BC0	RTAP 153.6Kbps	Edge 1	0cm	1013	824.7	0N	21.74	22	1.062	-0.04	1.22	1.06	1.295
2	CDMA BC1	RTAP 153.6Kbps	Edge 1	1.2cm	25	1851.25	OFF	23.87	24.5	1.156	0.17	1.09	1.260	24.5
35	CDMA BC1	RTAP 153.6Kbps	Edge 1	1.2cm	25	1851.25	OFF	23.87	24.5	1.156	0	1.08	1.249	24.5

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.
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.

12.3 Highest SAR Plot

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/9

#53_GSM850_GPRS (2TX slots)_Edge 1_0cm_Ch251

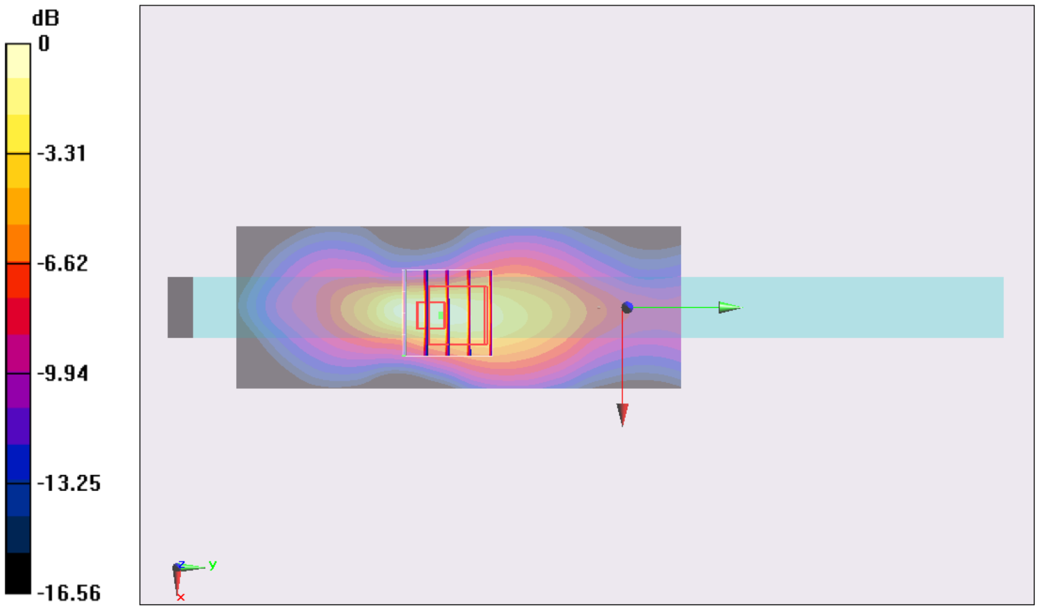
DUT: 312810

Communication System: GSM850; Frequency: 848.8 MHz;Duty Cycle: 1:4
Medium: MSL_850_130209 Medium parameters used: f = 849 MHz; σ = 0.976 mho/m; ε_r = 54.411; ρ = 1000 kg/m^3
Ambient Temperature：22.4 ℃; Liquid Temperature：21.4 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.08, 6.08, 6.08); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v5.0 Left; Type: QDOVA002AA; Serial: TP:1131
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch251/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.20 mW/g

Configuration/Ch251/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 34.227 V/m; Power Drift = -0.121 dB
Peak SAR (extrapolated) = 2.661 mW/g
SAR(1 g) = 1.05 mW/g; SAR(10 g) = 0.539 mW/g
Maximum value of SAR (measured) = 1.31 mW/g



0 dB = 1.31 mW/g = 2.35 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/6

#26_GSM1900_GPRS (2TX slots)_Edge 1_0cm_Ch661

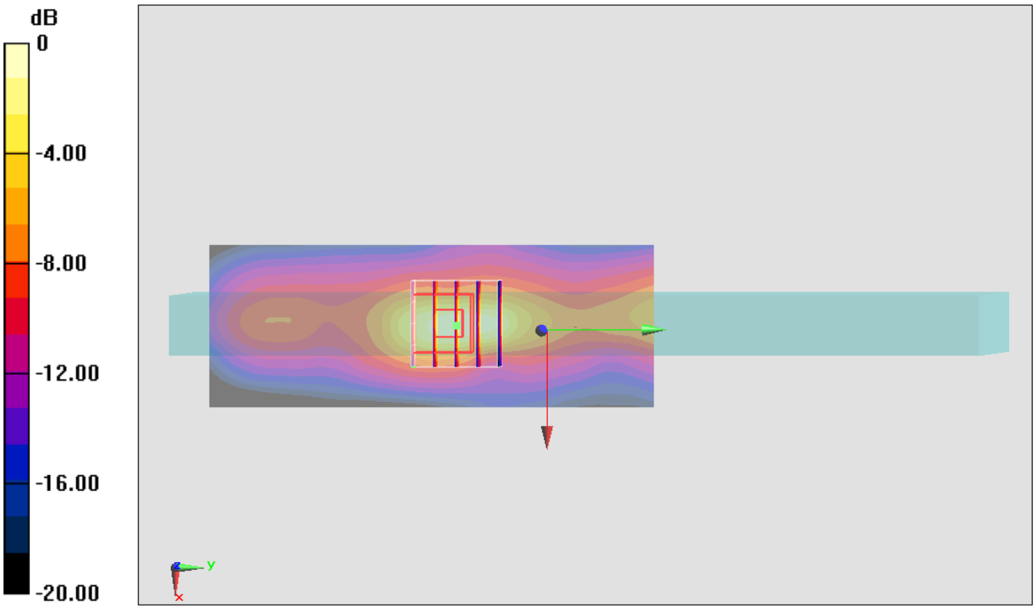
DUT: 312810

Communication System: PCS; Frequency: 1880 MHz;Duty Cycle: 1:4
Medium: MSL_1900_130206 Medium parameters used: f = 1880 MHz; σ = 1.481 mho/m; ε_r = 53.093; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

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

Configuration/Ch661/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.46 mW/g

Configuration/Ch661/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 33.611 V/m; Power Drift = 0.125 dB
Peak SAR (extrapolated) = 2.292 mW/g
SAR(1 g) = 1.33 mW/g; SAR(10 g) = 0.676 mW/g
Maximum value of SAR (measured) = 1.54 mW/g



0 dB = 1.54 mW/g = 3.75 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab   Date: 2013/2/6

#08_WCDMA V_RMC 12.2Kbps_Edge 1_0cm_Ch4182

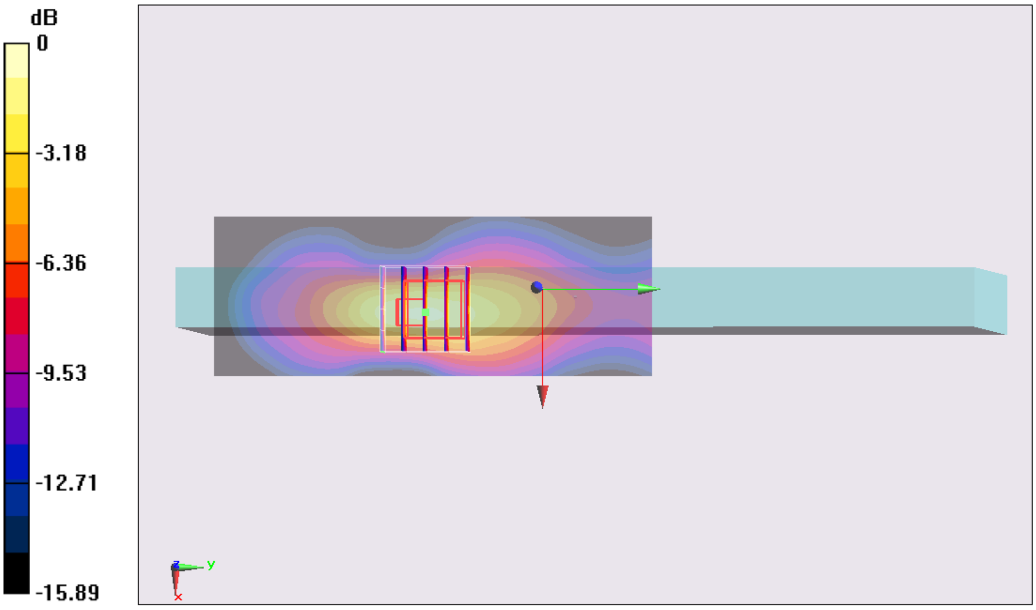
DUT: 312810

Communication System: WCDMA; Frequency: 836.4 MHz;Duty Cycle: 1:1
Medium: MSL_850_130206 Medium parameters used : f = 836.4 MHz; σ = 0.956 mho/m; ε_r = 52.678; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.08, 6.08, 6.08); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v5.0 Left; Type: QDOVA002AA; Serial: TP:1131
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch4182/Area Scan (41x111x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.22 mW/g

Configuration/Ch4182/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 40.027 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 2.730 mW/g
SAR(1 g) = 1.2 mW/g; SAR(10 g) = 0.605 mW/g
Maximum value of SAR (measured) = 1.46 mW/g



0 dB = 1.46 mW/g = 3.29 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/20

#89_WCDMA IV_RMC 12.2Kbps_Edge 1_0cm_Ch1312

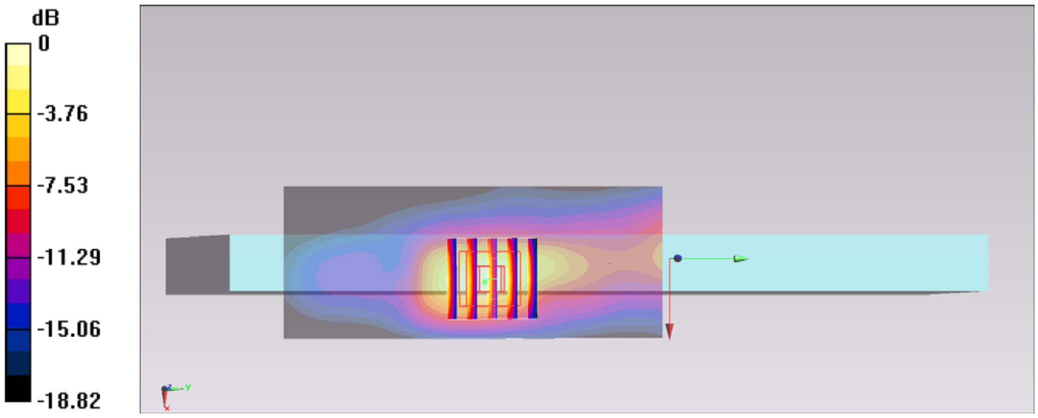
DUT: 312810

Communication System: WCDMA; Frequency: 1712.4 MHz;Duty Cycle: 1:1
Medium: MSL_1750_130220 Medium parameters used: f = 1712.4 MHz; σ = 1.451 mho/m; ε_r = 52.567; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

DASY5 Configuration:
- Probe: ES3DV3 - SN3270; ConvF(4.98, 4.98, 4.98); Calibrated: 2012/9/28;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn778; Calibrated: 2012/8/27
- Phantom: ELI 4.0_Front; Type: QDOVA001BB; Serial: 1026
- Measurement SW: DASY52, Version 52.8 (2); SEMCAD X Version 14.6.6 (6477)

Configuration/Ch1312/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.42 mW/g

Configuration/Ch1312/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 32.600 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.095 mW/g
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.568 mW/g
Maximum value of SAR (measured) = 1.46 mW/g



0 dB = 1.46 mW/g = 3.29 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/6

#03_WCDMA II_RMC 12.2Kbps_Edge 1_0cm_Ch9262

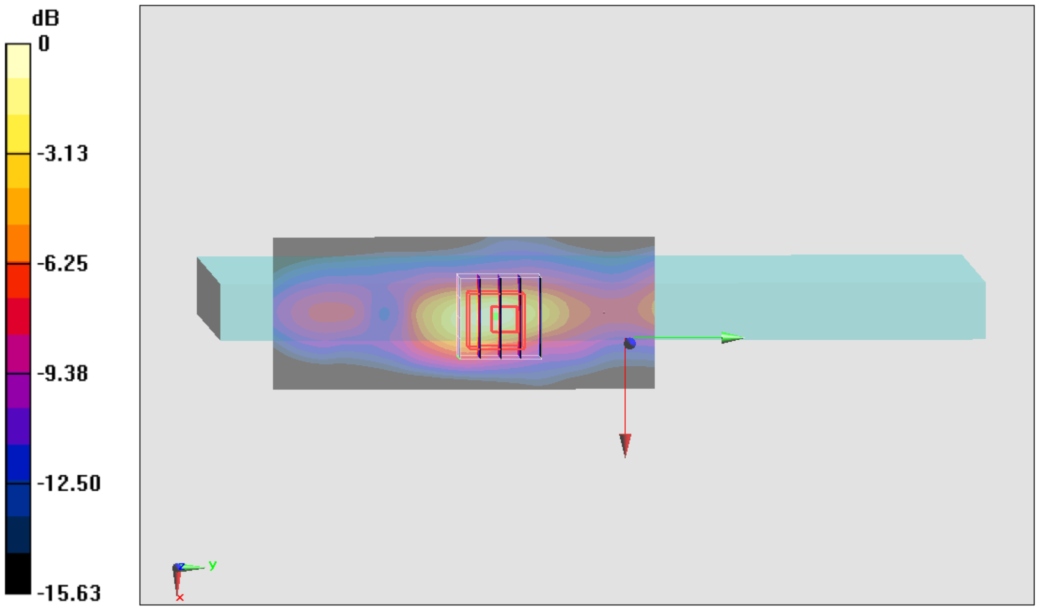
DUT: 312810

Communication System: WCDMA; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130206 Medium parameters used : f = 1852.4 MHz; σ = 1.45 mho/m; ε_r = 53.183; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

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

Configuration/Ch9262/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.18 mW/g

Configuration/Ch9262/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 31.157 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 2.081 mW/g
SAR(1 g) = 1.02 mW/g; SAR(10 g) = 0.481 mW/g
Maximum value of SAR (measured) = 1.25 mW/g



0 dB = 1.25 mW/g = 1.94 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/6

#11_CDMA BC0_RTAP 153.6Kbps_Edge 1_0cm_Ch777

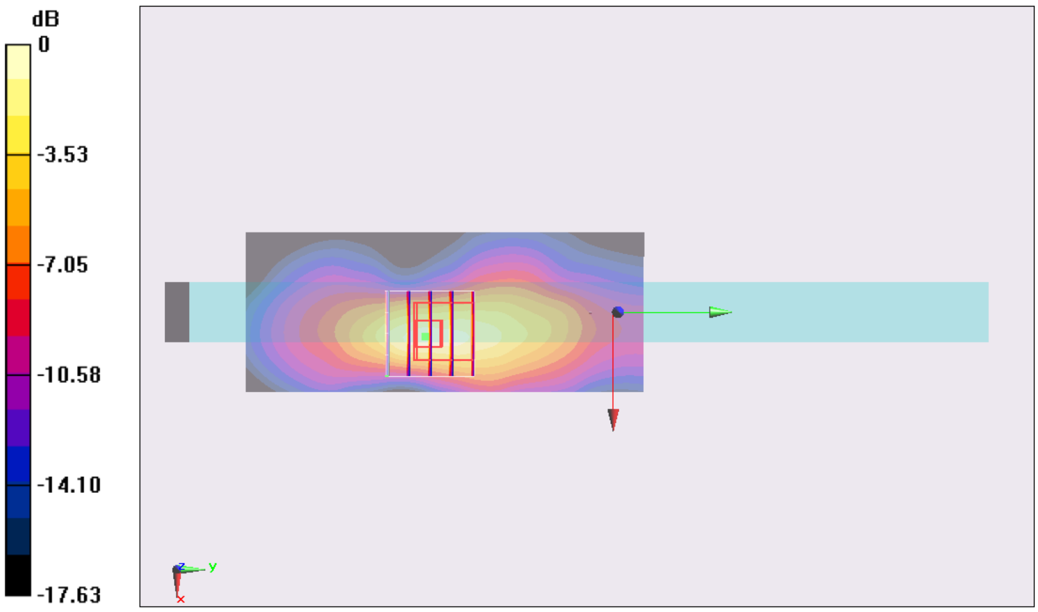
DUT: 312810

Communication System: CDMA ; Frequency: 848.31 MHz;Duty Cycle: 1:1
Medium: MSL_850_130206 Medium parameters used : f = 848.31 MHz; σ = 0.968 mho/m; ε_r = 52.555; ρ = 1000 kg/m^3
Ambient Temperature：22.5 ℃; Liquid Temperature：21.5 ℃

DASY5 Configuration:
- Probe: ET3DV6 - SN1787; ConvF(6.08, 6.08, 6.08); Calibrated: 2012/5/29;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn495; Calibrated: 2012/4/23
- Phantom: ELI v5.0 Left; Type: QDOVA002AA; Serial: TP:1131
- Measurement SW: DASY52, Version 52.8 (3); SEMCAD X Version 14.6.5 (6469)

Configuration/Ch777/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.33 mW/g

Configuration/Ch777/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 40.335 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.853 mW/g
SAR(1 g) = 1.24 mW/g; SAR(10 g) = 0.619 mW/g
Maximum value of SAR (measured) = 1.48 mW/g



0 dB = 1.48 mW/g = 3.41 dB mW/g

Test Laboratory: Sporton International Inc. SAR/HAC Testing Lab Date: 2013/2/6

#12_CDMA BC1_RTAP 153.6Kbps_Edge 1_0cm_Ch600

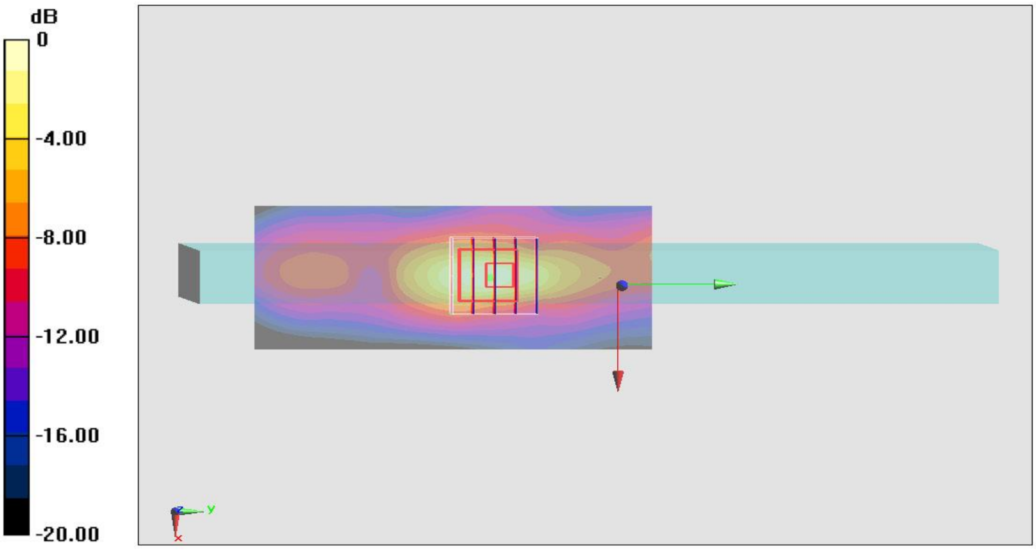
DUT: 312810

Communication System: CDMA ; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: MSL_1900_130206 Medium parameters used: f = 1880 MHz; σ = 1.481 mho/m; ε_r = 53.093; ρ = 1000 kg/m^3
Ambient Temperature：22.6 ℃; Liquid Temperature：21.6 ℃

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

Configuration/Ch600/Area Scan (41x101x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.16 mW/g

Configuration/Ch600/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.647 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 2.001 mW/g
SAR(1 g) = 0.983 mW/g; SAR(10 g) = 0.459 mW/g
Maximum value of SAR (measured) = 1.21 mW/g



0 dB = 1.21 mW/g = 1.66 dB mW/g

12.4 Simultaneous Multi-band Transmission Analysis

No.	Applicable Simultaneous Transmission Combination
1.	WWAN + Bluetooth

Note:

1. The Scaled SAR summation is calculated based on the same configuration and test position.
2. WLAN/Bluetooth module FCC ID: PPD-AR5B22 will be integrated into this host device.
3. By implemented software design, WWAN and WLAN simultaneous transmission is prohibited, and no WLAN ad-hoc or hotspot supported. WWAN can only transmit with Bluetooth simultaneously
4. Per KDB 447498 D01v05, simultaneous transmission SAR is compliant if,
   i) Scalar SAR summation < 1.6W/kg.
   ii) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (*min. separation distance, mm*), and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
   If SPLSR ≤ 0.04, simultaneously transmission SAR measurement is not necessary
   iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg
5. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05 based on the formula below.
   i) (*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]·[$\sqrt{f(GHz)}$/*x*] W/kg for *test separation distances* ≤ 50 mm; where *x* = 7.5 for 1-g SAR, and *x* = 18.75 for 10-g SAR.
   ii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distances* is > 50 mm.

Max Power	Exposure Position	Bottom Face	Bottom Face	Edge 1	Edge 1	Edge 4
	Test separation	0mm	10mm	0mm	12mm	0mm
5 dBm	Antenna to user distance	5mm	10mm	5mm	12mm	217.32mm
	Estimated SAR (W/kg)	0.133W/kg	0.066W/kg	0.133W/kg	0.055 W/kg	0.4W/kg

<WWAN + Bluetooth>

	WWAN			Bluetooth	WWAN + Bluetooth	SPLSR	Case No
Position	WWAN Band	Plot No	Reported SAR (W/kg)	Estimated SAR (W/kg)			
Bottom Face At 1 cm	GSM850	51	0.68	0.066	0.75		
	GSM1900	24	0.322	0.066	0.39		
	WCDMA V	65	0.277	0.066	0.34		
	WCDMA IV	81	0.523	0.066	0.59		
	WCDMA II	36	0.526	0.066	0.59		
	CDMA BC0	60	0.278	0.066	0.34		
	CDMA BC1	34	0.592	0.066	0.66		
Edge1 At 1.2 cm	GSM850	58	1.151	0.055	1.21		
	GSM1900	21	1.106	0.055	1.16		
	WCDMA V	66	0.289	0.055	0.34		
	WCDMA IV	84	1.188	0.055	1.24		
	WCDMA II	38	1.155	0.055	1.21		
	CDMA BC0	63	0.471	0.055	0.53		
	CDMA BC1	2	1.414	0.055	1.47		
Bottom Face At 0cm	GSM850	55	1.126	0.133	1.26		
	GSM1900	25	0.759	0.133	0.89		
	WCDMA V	68	0.693	0.133	0.83		
	WCDMA IV	88	1.024	0.133	1.16		
	WCDMA II	42	0.987	0.133	1.12		
	CDMA BC0	62	0.564	0.133	0.70		
	CDMA BC1	32	1.136	0.133	1.27		
Edge1 At 0cm	GSM850	53	1.391	0.133	1.52		
	GSM1900	26	1.367	0.133	1.50		
	WCDMA V	8	1.4	0.133	1.53		
	WCDMA IV	89	1.291	0.133	1.42		
	WCDMA II	3	1.299	0.133	1.43		
	CDMA BC0	11	1.388	0.133	1.52		
	CDMA BC1	12	1.398	0.133	1.53		
Edge4 At 0cm	GSM850	59	0.253	0.4	0.65		
	GSM1900	23	0.053	0.4	0.45		
	WCDMA V	67	0.091	0.4	0.49		
	WCDMA IV	85	0.06	0.4	0.46		
	WCDMA II	40	0.078	0.4	0.48		
	CDMA BC0	64	0.085	0.4	0.49		
	CDMA BC1	30	0.092	0.4	0.49		

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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/√3	1/√6	1/√2

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

(b) *κ* is the coverage factor

Table 13.1 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 13.2 Uncertainty Budget for frequency range 300 MHz to 3 GHz

14. References

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

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

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

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

[5] SPEAG DASY System Handbook

[6] FCC KDB 941225 D02 v02 "3GPP R6 HSPA and R7 HSPA+ SAR Guidance", December 2009.

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

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

[9] 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.