FCC SAR Test Report

Report No.	:	**SA111221C21**
Applicant	:	**HTC Corporation**
Address	:	**23, XINGHUA RD., TAOYUAN 330, TAIWAN, R.O.C.**
Product	:	**Smartphone**
FCC ID	:	**NM8PJ53100**
Brand	:	**HTC**
Model No.	:	**PJ53100**
Standards	:	**FCC 47 CFR Part 2 (2.1093) / IEEE C95.1:1991 / IEEE 1528:2003** **FCC OET Bulletin 65 Supplement C (Edition 01-01)** **KDB 248227 D01 v01r02 / KDB 648474 D01 v01r05 / KDB 941225 D01 v02** **KDB 941225 D03 v01 / KDB 941225 D05 v01 / KDB 941225 D06 v01**
Date of Testing	:	**Jan. 05, 2012 ~ Jan. 18, 2012**

CERTIFICATION: The above equipment have been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch - Taiwan HwaYa Lab**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's SAR characteristics under the conditions specified in this report.

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Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Reason for Change	Date Issued
R01	Original release	Jan. 19, 2012

1. Summary of Maximum SAR Value

Mode / Band	Test Position	SAR-1g (W/kg)
CDMA2000 1xRTT BC0	Head	0.545
	Body (Hotspot, 1 cm Gap)	1.05
	Body (Body Worn, 1 cm Gap)	1.05
CDMA2000 1xRTT BC1	Head	0.577
	Body (Hotspot, 1 cm Gap)	0.714
	Body (Body Worn, 1 cm Gap)	0.714
CDMA2000 1xEVDO BC0	Head	0.517
	Body (Hotspot, 1 cm Gap)	0.52
	Body (Body Worn, 1 cm Gap)	0.504
CDMA2000 1xEVDO BC1	Head	0.712
	Body (Hotspot, 1 cm Gap)	0.56
	Body (Body Worn, 1 cm Gap)	0.56
LTE Band 13	Head	0.799
	Body (Hotspot, 1 cm Gap)	0.443
	Body (Body Worn, 1 cm Gap)	0.368
WLAN 2.4GHz	Head	0.129
	Body (Hotspot, 1 cm Gap)	0.167
	Body (Body Worn, 1 cm Gap)	0.167
WLAN 5GHz	Head	0.148
	Body (Hotspot, 1 cm Gap)	0.345
	Body (Body Worn, 1 cm Gap)	0.227
Bluetooth	Head	N/A
	Body (Hotspot, 1 cm Gap)	N/A
	Body (Body Worn, 1 cm Gap)	N/A

Note:

The SAR limit **(1.6 W/kg)** for general population/uncontrolled exposure is specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1991.

2. Description of Equipment Under Test

DUT Type	Smartphone
FCC ID	NM8PJ53100
Brand Name	HTC
Model Name	PJ53100
Tx Frequency Bands (Unit: MHz)	CDMA2000 BC0 : 824 ~ 849 CDMA2000 BC1 : 1850 ~ 1910 LTE Band 13 : 777 ~ 787 WLAN : 2400 ~ 2483.5, 5150 ~ 5350, 5470 ~ 5725, 5725 ~ 5825 Bluetooth : 2400 ~ 2483.5
Uplink Modulations	CDMA2000 : QPSK LTE : QPSK, 16QAM 802.11b : DSSS 802.11a/g/n : OFDM Bluetooth : GFSK
LTE Supports Channel Bandwidth	LTE Band 13 : 5 MHz, 10 MHz
Maximum AVG Conducted Power (Unit: dBm)	CDMA2000 BC 0 : 24.79 CDMA2000 BC 1 : 24.72 LTE Band 13 : 25.49 802.11b : 18.25 802.11g : 13.24 802.11n HT20 (2.4GHz) : 12.18 802.11a : 13.28 802.11n HT20 (5GHz) : 10.31 802.11n HT40 (5GHz) : 10.78 Bluetooth : 0.65
Antenna Type	Fixed Internal Antenna
DUT Stage	Production Unit

Note:

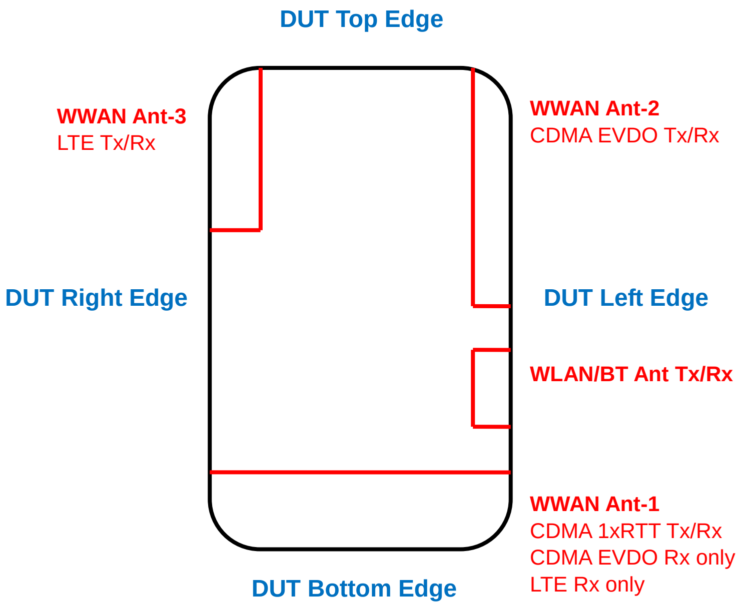
1. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.

This device supports voice/data wireless communication technologies included CDMA2000 1xRTT/1xEVDO, LTE, WLAN and Bluetooth. The data mode of 1xEVDO, LTE and WLAN support VOIP capability through 3rd party apps software. The details are listed as below.

Table 2.1 EUT Technology Support

Mode	WWAN Technology	Frequency Band
Voice	CDMA2000 1xRTT	BC 0, BC 1
VOIP / Data	CDMA2000 1xEVDO	BC 0, BC 1
VOIP / Data	LTE	Band 13 : 777 ~ 787
VOIP / Data	802.11a/b/g/n	2.4 GHz / 5 GHz
Data	Bluetooth	2.4 GHz

This device has three WWAN antennas and one WLAN/BT antenna design. The capabilities of antenna are listed as below.



This device supports WiFi hotspot function, so body SAR was tested under 1 cm for the surfaces / slide edges where a transmitting antenna is within 2.5 cm from the edge. Hotspot SAR test mode for these antennas are as below.
CDMA 1xRTT : Front Face, Rear Face, Left Side, Right Side, Bottom Side
CDMA 1xEVDO : Front Face, Rear Face, Left Side, Top Side
LTE : Front Face, Rear Face, Right Side, Top Side
WLAN : Front Face, Rear Face, Left Side

Confirming the LTE transmitter follows 3GPP standards, is category 3, BW 5MHz and 10MHz, band 13, and supports QPSK / 16QAM modulations. Tested per 3GPP 36.521 maximum transmit procedures for both QPSK / 16QAM.

LTE Maximum Power Reduction in accordance with 3GPP 36.101: Power Reduction in accordance to 3GPP is active all times during LTE operation.

Modulation	Channel bandwidth / Transmission bandwidth configuration (RB)		3GPP Requirement (dB)	MPR Setting (dB)
	BW 5 MHz	BW 10 MHz		
QPSK	> 8	> 12	<= 1	1
16QAM	<= 8	<= 12	<= 1	1
16QAM	> 8	> 12	<= 2	2

Note: MPR is according to the standard and implemented in the circuit (mandatory).

In addition, the device is compliant with A-MPR requirements defined in 36.101 section 6.2.4 that may be required to meet 3GPP Adjacent Channel Leakage Ratio (“ACLR”) requirements. A-MPR was disabled for all FCC compliance testing.

A simultaneous CDMA 1xRTT voice and CDMA 1xEVDO data connection is referred to as “SVDO” while a simultaneous CDMA 1xRTT voice and LTE data connection is referred to as “SVLTE”. The transmitters are independent in respect to the RF chains as each transmitter has dedicated RF circuitry (PA, RF filtering) and a unique transmit antenna. The device also contains an additional antenna associated with receiver diversity or unlicensed transmitters. The LTE Uplink MIMO configuration is 1x2 (1 Uplink antenna and 2 Downlink antennas).

Although the RF circuits are independent for both transmitters, the chipset solution incorporated SVDO/SVLTE implementation does include electrical connections between the voice and data transmitters such that the device can coordinate the transmit power of both transmitters. That said the transmitters operate independently in the sense that they independently support voice or data connection without interaction between the modems or signaling from the WWAN network.

Table 2.2 Simultaneous Transmission Possibilities

Simultaneous TX Combination	Configuration	Head SAR	Body SAR
1	RTT BC0 Voice + EVDO BC0 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
2	RTT BC0 Voice + EVDO BC1 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
3	RTT BC0 Voice + LTE 13 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
4	RTT BC1 Voice + EVDO BC0 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
5	RTT BC1 Voice + EVDO BC1 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
6	RTT BC1 Voice + LTE 13 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
7	RTT BC0 Voice + EVDO BC0 Data	Yes	Body-Worn: Yes Hotspot: No
8	RTT BC0 Voice + EVDO BC1 Data	Yes	Body-Worn: Yes Hotspot: No
9	RTT BC0 Voice + LTE 13 Data	Yes	Body-Worn: Yes Hotspot: No
10	RTT BC1 Voice + EVDO BC0 Data	Yes	Body-Worn: Yes Hotspot: No
11	RTT BC1 Voice + EVDO BC1 Data	Yes	Body-Worn: Yes Hotspot: No
12	RTT BC1 Voice + LTE 13 Data	Yes	Body-Worn: Yes Hotspot: No
13	RTT BC0 Voice + WLAN/BT	Yes	Body-Worn: Yes Hotspot: No
14	RTT BC1 Voice + WLAN/BT	Yes	Body-Worn: Yes Hotspot: No
15	EVDO BC0 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
16	EVDO BC1 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes
17	LTE 13 Data + WLAN/BT	Yes	Body-Worn: Yes Hotspot: Yes

1. In the SVDO modes, CDMA 1xRTT and EVDO can transmit at maximum power level simultaneously.
2. In the SVLTE modes, CDMA 1xRTT and LTE can transmit at maximum power level simultaneously.

SAR measurements were tested under maximum power level for CDMA 1xRTT/EVDO, LTE, and WLAN technologies.

The WLAN and BT cannot transmit simultaneously, so there is no co-location test requirement for WLAN and BT.

3. SAR Measurement System

3.1 Definition of Specific Absorption Rate (SAR)

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.

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:

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

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

SAR measurement can be related to the electrical field in the tissue by

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

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

3.2 SPEAG DASY System

DASY system consists of high precision robot, probe alignment sensor, phantom, robot controller, controlled measurement server and near-field probe. The robot includes six axes that can move to the precision position of the DASY4/5 software defined. The DASY software can define the area that is detected by the probe. The robot is connected to controlled box. Controlled measurement server is connected to the controlled robot box. The DAE includes amplifier, signal multiplexing, AD converter, offset measurement and surface detection. It is connected to the Electro-optical coupler (ECO). The ECO performs the conversion form the optical into digital electric signal of the DAE and transfers data to the PC.

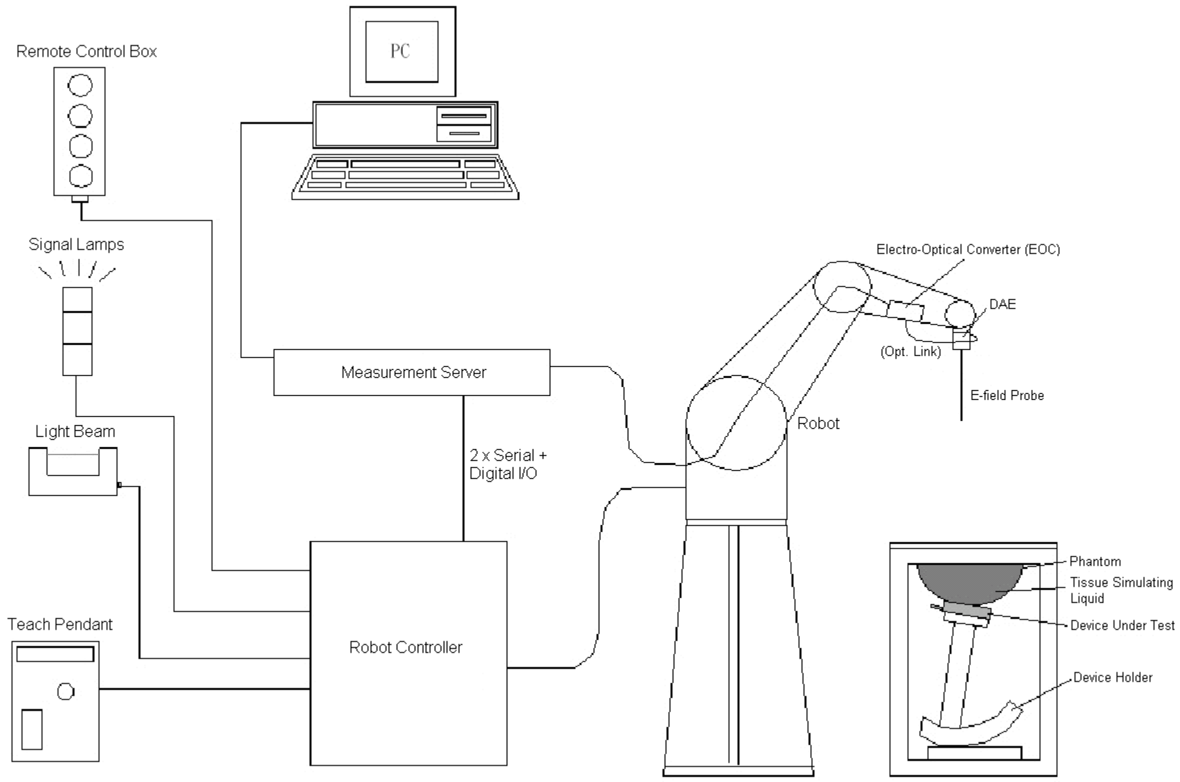


Fig-3.1 DASY System Setup

3.2.1 Robot

The DASY system uses the high precision robots 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)

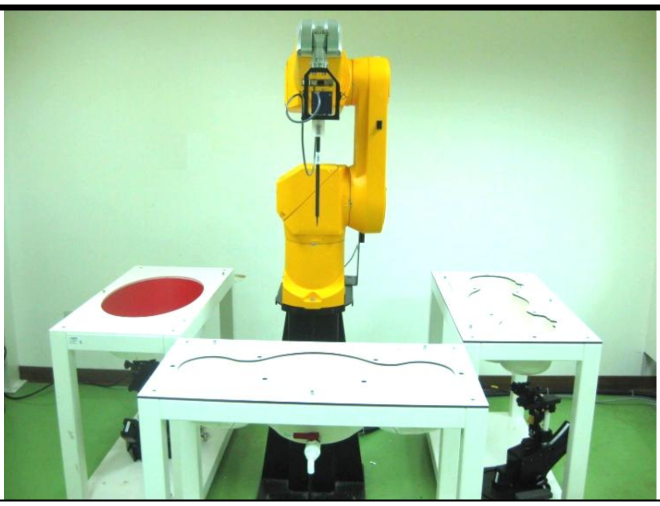


Fig-3.2 DASY4

Fig-3.3 DASY5

3.2.2 Probes

The SAR measurement is conducted with the dosimetric probe. 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.

Model	EX3DV4
Construction	Symmetrical design with triangular core. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	10 MHz to 6 GHz Linearity: ± 0.2 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 µW/g to 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm

Model	ES3DV3
Construction	Symmetrical design with triangular core. Interleaved sensors. Built-in shielding against static charges. PEEK enclosure material (resistant to organic solvents, e.g., DGBE).
Frequency	10 MHz to 4 GHz Linearity: ± 0.2 dB
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in tissue material (rotation normal to probe axis)
Dynamic Range	5 µW/g to 100 mW/g Linearity: ± 0.2 dB
Dimensions	Overall length: 337 mm (Tip: 20 mm) Tip diameter: 3.9 mm (Body: 12 mm) Distance from probe tip to dipole centers: 2.0 mm

3.2.3 Data Acquisition Electronics (DAE)

Model	DAE3, DAE4
Construction	Signal amplifier, multiplexer, A/D converter and control logic. Serial optical link for communication with DASY4/5 embedded system (fully remote controlled). Two step probe touch detector for mechanical surface detection and emergency robot stop.
Measurement Range	-100 to +300 mV (16 bit resolution and two range settings: 4mV, 400mV)
Input Offset Voltage	< 5µV (with auto zero)
Input Bias Current	< 50 fA
Dimensions	60 x 60 x 68 mm

3.2.4 Phantoms

Model	Twin SAM
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.
Material	Vinylester, glass fiber reinforced (VE-GF)
Shell Thickness	2 ± 0.2 mm (6 ± 0.2 mm at ear point)
Dimensions	Length: 1000 mm Width: 500 mm Height: adjustable feet
Filling Volume	approx. 25 liters

Model	ELI
Construction	Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.
Material	Vinylester, glass fiber reinforced (VE-GF)
Shell Thickness	2.0 ± 0.2 mm (bottom plate)
Dimensions	Major axis: 600 mm Minor axis: 400 mm
Filling Volume	approx. 30 liters

3.2.5 Device Holder

Model	Mounting Device	
Construction	In combination with the Twin SAM Phantom or ELI4, the Mounting Device enables the rotation of the mounted transmitter device in spherical coordinates. Rotation point is the ear opening point. Transmitter devices can be easily and accurately positioned according to IEC, IEEE, FCC or other specifications. The device holder can be locked for positioning at different phantom sections (left head, right head, flat).	
Material	POM	

Model	Laptop Extensions Kit	
Construction	Simple but effective and easy-to-use extension for Mounting Device that facilitates the testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.). It is lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner.	
Material	POM, Acrylic glass, Foam	

3.2.6 System Validation Dipoles

Model	D-Serial	
Construction	Symmetrical dipole with l/4 balun. Enables measurement of feed point impedance with NWA. Matched for use near flat phantoms filled with tissue simulating solutions.	
Frequency	750 MHz to 5800 MHz	
Return Loss	> 20 dB	
Power Capability	> 100 W (f < 1GHz), > 40 W (f > 1GHz)	

3.2.7 Tissue Simulating Liquids

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. 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. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5% are listed in below table.

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

Table-3.1 Targets of Tissue Simulating Liquid

Frequency (MHz)	Target Permittivity	Range of ±5%	Target Conductivity	Range of ±5%
		For Head		
750	41.9	39.8 ~ 44.0	0.89	0.85 ~ 0.93
835	41.5	39.4 ~ 43.6	0.90	0.86 ~ 0.95
900	41.5	39.4 ~ 43.6	0.97	0.92 ~ 1.02
1450	40.5	38.5 ~ 42.5	1.20	1.14 ~ 1.26
1640	40.3	38.3 ~ 42.3	1.29	1.23 ~ 1.35
1750	40.1	38.1 ~ 42.1	1.37	1.30 ~ 1.44
1800	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
1900	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2000	40.0	38.0 ~ 42.0	1.40	1.33 ~ 1.47
2300	39.5	37.5 ~ 41.5	1.67	1.59 ~ 1.75
2450	39.2	37.2 ~ 41.2	1.80	1.71 ~ 1.89
2600	39.0	37.1 ~ 41.0	1.96	1.86 ~ 2.06
3500	37.9	36.0 ~ 39.8	2.91	2.76 ~ 3.06
5200	36.0	34.2 ~ 37.8	4.66	4.43 ~ 4.89
5300	35.9	34.1 ~ 37.7	4.76	4.52 ~ 5.00
5500	35.6	33.8 ~ 37.4	4.96	4.71 ~ 5.21
5600	35.5	33.7 ~ 37.3	5.07	4.82 ~ 5.32
5800	35.3	33.5 ~ 37.1	5.27	5.01 ~ 5.53
		For Body		
750	55.5	52.7 ~ 58.3	0.96	0.91 ~ 1.01
835	55.2	52.4 ~ 58.0	0.97	0.92 ~ 1.02
900	55.0	52.3 ~ 57.8	1.05	1.00 ~ 1.10
1450	54.0	51.3 ~ 56.7	1.30	1.24 ~ 1.37
1640	53.8	51.1 ~ 56.5	1.40	1.33 ~ 1.47
1750	53.4	50.7 ~ 56.1	1.49	1.42 ~ 1.56
1800	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
1900	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2000	53.3	50.6 ~ 56.0	1.52	1.44 ~ 1.60
2300	52.9	50.3 ~ 55.5	1.81	1.72 ~ 1.90
2450	52.7	50.1 ~ 55.3	1.95	1.85 ~ 2.05
2600	52.5	49.9 ~ 55.1	2.16	2.05 ~ 2.27
3500	51.3	48.7 ~ 53.9	3.31	3.14 ~ 3.48
5200	49.0	46.6 ~ 51.5	5.30	5.04 ~ 5.57
5300	48.9	46.5 ~ 51.3	5.42	5.15 ~ 5.69
5500	48.6	46.2 ~ 51.0	5.65	5.37 ~ 5.93
5600	48.5	46.1 ~ 50.9	5.77	5.48 ~ 6.06
5800	48.2	45.8 ~ 50.6	6.00	5.70 ~ 6.30

The following table gives the recipes for tissue simulating liquids.

Table-3.2 Recipes of Tissue Simulating Liquid

Tissue Type	Bactericide	DGBE	HEC	NaCl	Sucrose	Triton X-100	Water	Diethylene Glycol Mono-hexylether
H750	0.2	-	0.2	1.5	56.0	-	42.1	-
H835	0.2	-	0.2	1.5	57.0	-	41.1	-
H900	0.2	-	0.2	1.4	58.0	-	40.2	-
H1450	-	43.3	-	0.6	-	-	56.1	-
H1640	-	45.8	-	0.5	-	-	53.7	-
H1750	-	47.0	-	0.4	-	-	52.6	-
H1800	-	44.5	-	0.3	-	-	55.2	-
H1900	-	44.5	-	0.2	-	-	55.3	-
H2000	-	44.5	-	0.1	-	-	55.4	-
H2300	-	44.9	-	0.1	-	-	55.0	-
H2450	-	45.0	-	0.1	-	-	54.9	-
H2600	-	45.1	-	0.1	-	-	54.8	-
H3500	-	8.0	-	0.2	-	20.0	71.8	-
H5G	-	-	-	-	-	17.2	65.5	17.3
B750	0.2	-	0.2	0.8	48.8	-	50.0	-
B835	0.2	-	0.2	0.9	48.5	-	50.2	-
B900	0.2	-	0.2	0.9	48.2	-	50.5	-
B1450	-	34.0	-	0.3	-	-	65.7	-
B1640	-	32.5	-	0.3	-	-	67.2	-
B1750	-	31.0	-	0.2	-	-	68.8	-
B1800	-	29.5	-	0.4	-	-	70.1	-
B1900	-	29.5	-	0.3	-	-	70.2	-
B2000	-	30.0	-	0.2	-	-	69.8	-
B2300	-	31.0	-	0.1	-	-	68.9	-
B2450	-	31.4	-	0.1	-	-	68.5	-
B2600	-	31.8	-	0.1	-	-	68.1	-
B3500	-	28.8	-	0.1	-	-	71.1	-
B5G	-	-	-	-	-	10.7	78.6	10.7

3.3 SAR System Verification

The system check verifies that the system operates within its specifications. It is performed daily or before every SAR measurement. The system check uses normal SAR measurements in the flat section of the phantom with a matched dipole at a specified distance. The system verification setup is shown as below.

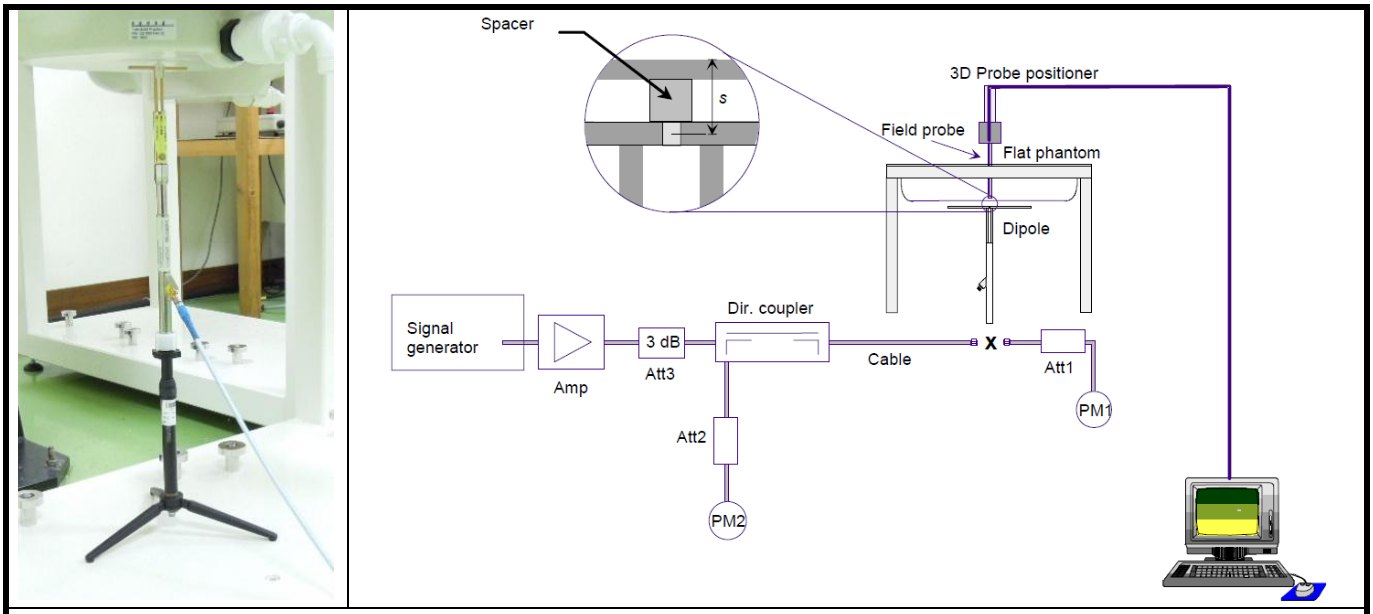


Fig-3.4 System Verification Setup

The validation dipole is placed beneath the flat phantom with the specific spacer in place. The distance spacer is touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The power meter PM1 measures the forward power at the location of the system check dipole connector. The signal generator is adjusted for the desired forward power (250 mW is used for 700 MHz to 3 GHz, 100 mW is used for 3.5 GHz to 6 GHz) at the dipole connector and the power meter PM2 is read at that level. After connecting the cable to the dipole, the signal generator is readjusted for the same reading at power meter PM2.

After system check testing, the SAR result will be normalized to 1W forward input power and compared with the reference SAR value derived from validation dipole certificate report. The deviation of system check should be within 10 %.

3.4 SAR Measurement Procedure

According to the SAR 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

The SAR measurement procedures for each of test conditions are as follows:

(a) Make EUT to transmit maximum output power
(b) Measure conducted output power through RF cable
(c) Place the EUT in the specific position of phantom
(d) Perform SAR testing steps on the DASY system
(e) Record the SAR value

3.4.1 Area & Zoom Scan Procedure

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan measures 5x5x7 points with step size 8, 8 and 5 mm for below 3 GHz, and 7x7x9 points with step size 4, 4 and 2.5 mm for above 5 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

3.4.2 Volume Scan Procedure

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 DUT 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.

3.4.3 Power Drift Monitoring

All SAR testing is under the DUT 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 DUT 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 drift more than 5%, the SAR will be retested.

3.4.4 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

3.4.5 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.

4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

For WWAN SAR testing, the EUT was linked and controlled by base station emulator. Communication between the EUT and the emulator was established by air link. The distance between the EUT and the communicating 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 DUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

The EUT is communicated with base station simulator (Agilent E5515C is used for CDMA, and Anritsu MT8820C is used for LTE) by air link. During SAR testing, the base station simulator is set to make the EUT to radiate maximum output power.

For LTE, set the related parameters of operating band, channel bandwidth, uplink channel number, modulation type, and RB in base station simulator. When the EUT has registered and communicated to base station simulator, set the simulator to make EUT transmitting the maximum radiated power. The steps for system simulator (Anritsu ET8820C) setup are as below.

1. Press the “Std” button to select “LTE 22.20S” function
2. Choose the “Screen Select” item to “Fundamental Measurement”
3. Enter the “Common” item
4. Set the Operating Band
5. Set the Channel Bandwidth
6. Set the UL Channel & Frequency
7. Set the Modulation
8. Set the RB number and RB shift
9. Press “Start Call” button when EUT register to the system simulator
10. Set the TX-1 Max. Power to make the EUT transmit maximum output power

For WLAN SAR testing, the EUT has installed WLAN engineering testing software which can provide continuous transmitting RF signal. This RF signal utilized in SAR measurement has almost 100% duty cycle. The data rates for WLAN SAR testing were set in lowest data rate as 1 Mbps for 802.11b, 6 Mbps for 802.11g, and MCS0 for 802.11n per KDB 248227 request.

4.2 EUT Testing Position

This DUT was tested in **Right Cheek**, **Right Tilted**, **Left Cheek**, **Left Tilted**, **Front Face, Rear Face, Left Side, Right Side, Top Side,** and **Bottom Side** positions as illustrated below:

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.

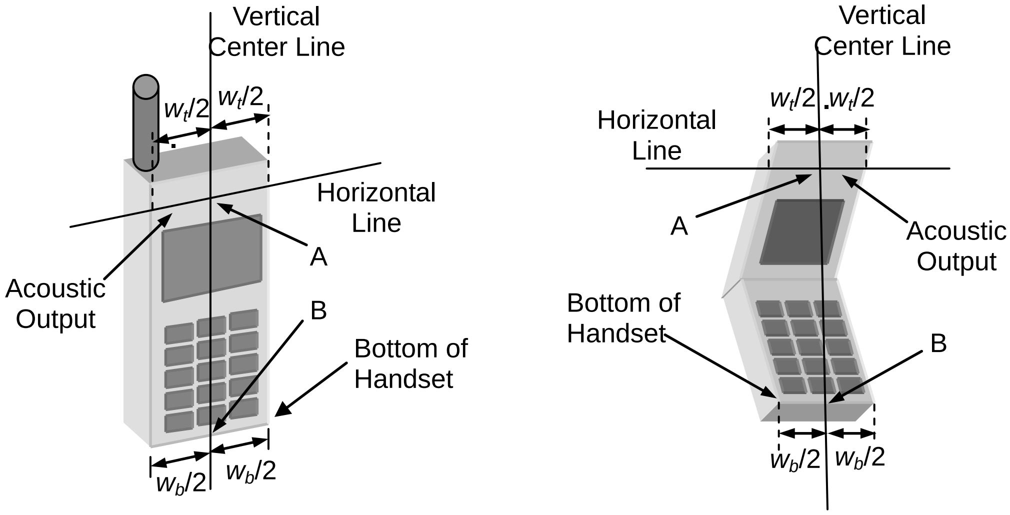


Fig-4.1 Illustration for Handset Vertical and Horizontal Reference Lines

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-4.2).

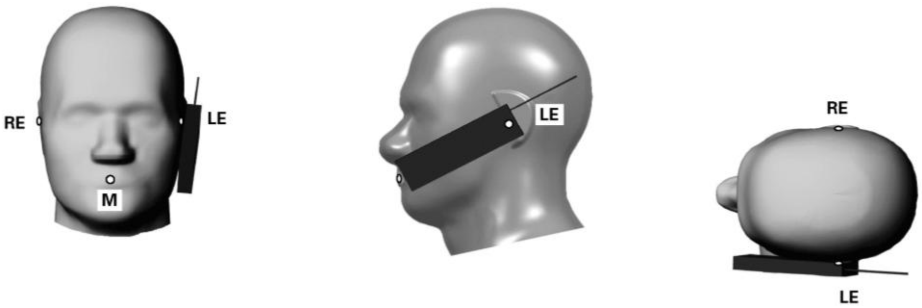


Fig-4.2 Illustration for Cheek Position

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-4.3).

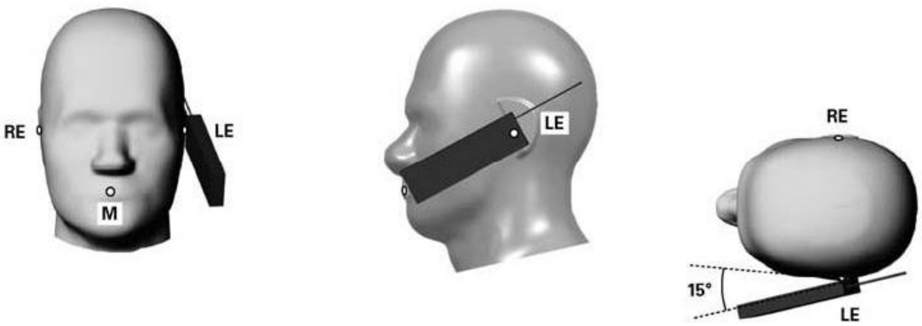


Fig-4.3 Illustration for Tilted Position

4. Body Worn Position

(a) To position the EUT parallel to the phantom surface.

(b) To adjust the EUT parallel to the flat phantom.

(c) To adjust the distance between the EUT surface and the flat phantom to 1 cm.

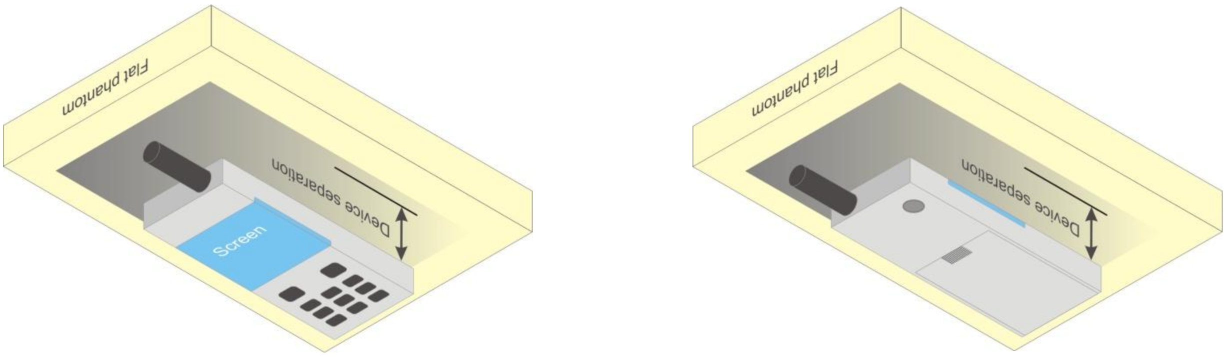


Fig-4.4 Illustration for Body Worn Position

4.3 Tissue Verification

The measuring results for tissue simulating liquid are shown as below.

Tissue Type	Frequency (MHz)	Liquid Temp. (℃)	Measured Conductivity (σ)	Measured Permittivity (ε_r)	Target Conductivity (σ)	Target Permittivity (ε_r)	Conductivity Deviation (%)	Permittivity Deviation (%)	Test Date
H835	835	21.3	0.92	43.008	0.90	41.5	2.22	3.63	Jan. 07, 2012
H835	835	20.7	0.885	41.988	0.90	41.5	-1.67	1.18	Jan. 15, 2012
B835	835	20.4	0.988	54.796	0.97	55.2	1.86	-0.73	Jan. 05, 2012
B835	835	21.4	0.994	54.98	0.97	55.2	2.47	-0.40	Jan. 16, 2012
H1900	1900	21.3	1.391	40.582	1.40	40.0	-0.64	1.46	Jan. 07, 2012
H1900	1900	20.7	1.386	40.493	1.40	40.0	-1.00	1.23	Jan. 15, 2012
B1900	1900	21.6	1.546	52.328	1.52	53.3	1.71	-1.82	Jan. 05, 2012
B1900	1900	21.4	1.529	53.719	1.52	53.3	0.59	0.79	Jan. 16, 2012
H750	750	21.4	0.908	40.492	0.89	41.9	2.02	-3.36	Jan. 08, 2012
H750	750	21.4	0.89	41.109	0.89	41.9	0.00	-1.89	Jan. 16, 2012
H750	750	20.3	0.912	40.638	0.89	41.9	2.47	-3.01	Jan. 18, 2012
B750	750	21.2	0.968	55.448	0.96	55.5	0.83	-0.09	Jan. 08, 2012
B750	750	20.9	0.971	55.6	0.96	55.5	1.15	0.18	Jan. 09, 2012
B750	750	20.7	0.974	55.909	0.96	55.5	1.46	0.74	Jan. 16, 2012
B750	750	21.3	0.966	55.243	0.96	55.5	0.63	-0.46	Jan. 18, 2012
H2450	2450	20.6	1.843	38.054	1.80	39.2	2.39	-2.92	Jan. 17, 2012
B2450	2450	20.7	1.98	51.1	1.95	52.7	1.54	-3.04	Jan. 08, 2012
B2450	2450	20.6	1.975	50.958	1.95	52.7	1.28	-3.31	Jan. 17, 2012
H5G	5200	20.8	4.71	35.3	4.66	36.0	1.07	-1.94	Jan. 09, 2012
H5G	5200	20.5	4.793	36.787	4.66	36.0	2.85	2.19	Jan. 17, 2012
B5G	5200	21.3	5.23	49.2	5.30	49.0	-1.32	0.41	Jan. 07, 2012
B5G	5200	20.5	5.163	47.875	5.30	49.0	-2.58	-2.30	Jan. 17, 2012
H5G	5500	20.8	4.86	34.8	4.96	35.6	-2.02	-2.25	Jan. 09, 2012
H5G	5500	20.5	4.988	36.385	4.96	35.6	0.56	2.21	Jan. 17, 2012
B5G	5500	21.3	5.71	49.0	5.65	48.6	1.06	0.82	Jan. 07, 2012
B5G	5500	20.5	5.662	47.761	5.65	48.6	0.21	-1.73	Jan. 17, 2012
H5G	5800	20.8	5.07	34.6	5.27	35.3	-3.80	-1.98	Jan. 09, 2012
H5G	5800	20.5	5.202	36.17	5.27	35.3	-1.29	2.46	Jan. 17, 2012
B5G	5800	21.3	6.21	48.3	6.00	48.2	3.50	0.21	Jan. 07, 2012
B5G	5800	20.5	6.256	47.082	6.00	48.2	4.27	-2.32	Jan. 17, 2012

Note:

The dielectric properties of the tissue simulating liquid must be measured within 24 hours before the SAR testing and within ±5% of the target values. Liquid temperature during the SAR testing must be within ±2 ℃.

4.4 System Verification

The measuring results for system check are shown as below.

Test Date	Frequency (MHz)	1W Target SAR-1g (W/kg)	Measured SAR-1g (W/kg)	Normalized to 1W SAR-1g (W/kg)	Deviation (%)	Dipole S/N	Probe S/N	DAE S/N
Jan. 07, 2012	835	9.65	2.26	9.04	-6.32	4d021	3800	1277
Jan. 15, 2012	835	9.65	2.33	9.32	-3.42	4d021	3650	579
Jan. 05, 2012	835	10.10	2.62	10.48	3.76	4d021	3800	1277
Jan. 16, 2012	835	10.10	2.65	10.60	4.95	4d021	3590	1277
Jan. 07, 2012	1900	40.90	9.94	39.76	-2.79	5d022	3800	1277
Jan. 15, 2012	1900	40.90	9.43	37.72	-7.78	5d022	3650	579
Jan. 05, 2012	1900	40.90	10.10	40.40	-1.22	5d022	3800	1277
Jan. 16, 2012	1900	40.90	9.94	39.76	-2.79	5d022	3590	1277
Jan. 08, 2012	750	8.39	2.21	8.84	5.36	1013	3800	1277
Jan. 16, 2012	750	8.39	2.22	8.88	5.84	1013	3590	1277
Jan. 18, 2012	750	8.39	2.22	8.88	5.84	1013	3650	579
Jan. 08, 2012	750	8.93	2.29	9.16	2.58	1013	3800	1277
Jan. 09, 2012	750	8.93	2.40	9.60	7.50	1013	3800	1277
Jan. 16, 2012	750	8.93	2.12	8.48	-5.04	1013	3590	1277
Jan. 18, 2012	750	8.93	2.32	9.28	3.92	1013	3650	579
Jan. 17, 2012	2450	54.80	13.40	53.60	-2.19	716	3650	579
Jan. 08, 2012	2450	53.30	13.90	55.60	4.32	716	3590	861
Jan. 17, 2012	2450	53.30	13.60	54.40	2.06	716	3650	579
Jan. 09, 2012	5200	81.80	7.60	76.00	-7.09	1019	3590	861
Jan. 17, 2012	5200	81.80	8.48	84.80	3.67	1019	3650	579
Jan. 07, 2012	5200	77.10	7.63	76.30	-1.04	1019	3650	579
Jan. 17, 2012	5200	77.10	7.48	74.80	-2.98	1019	3650	579
Jan. 09, 2012	5500	88.90	8.02	80.20	-9.79	1019	3590	861
Jan. 17, 2012	5500	88.90	8.67	86.70	-2.47	1019	3650	579
Jan. 07, 2012	5500	82.40	8.37	83.70	1.58	1019	3650	579
Jan. 17, 2012	5500	82.40	8.00	80.00	-2.91	1019	3650	579
Jan. 09, 2012	5800	83.20	7.80	78.00	-6.25	1019	3590	861
Jan. 17, 2012	5800	83.20	7.86	78.60	-5.53	1019	3650	579
Jan. 07, 2012	5800	73.40	7.36	73.60	0.27	1019	3650	579
Jan. 17, 2012	5800	73.40	7.87	78.70	7.22	1019	3650	579

Note:

Comparing to the reference SAR value provided by SPEAG, the validation data should be within its specification of 10 %. The result indicates the system check can meet the variation criterion and the plots can be referred to Appendix A of this report.

4.5 Conducted Power Results

The measuring conducted power (Unit: dBm) are shown as below.

Band	CDMA2000 BC0			CDMA2000 BC1		
Channel	1013	384	777	25	600	1175
Frequency	824.7	836.52	848.31	1851.25	1880	1908.75
RC1+SO55	24.63	24.56	24.78	24.63	24.71	24.70
RC3+SO55	24.60	24.53	24.79	24.64	24.72	24.68
RC3+SO32 (FCH)	24.62	24.52	24.74	24.58	24.66	24.63
RC3+SO32 (SCH)	24.57	24.54	24.75	24.65	24.69	24.63
1xEVDO Rev.0 RTAP 153.6	24.62	24.55	24.64	24.54	24.66	24.64
1xEVDO Rev.A RETAP 4096	24.55	24.58	24.57	24.55	24.58	24.57

Band	802.11b			802.11g		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	18.24	18.25	18.01	13.18	13.24	13.06

Band	802.11n (HT20)			-		
Channel	1	6	11	-	-	-
Frequency (MHz)	2412	2437	2462	-	-	-
Average Power	12.11	12.18	11.94	-	-	-

Band	802.11a							
Channel	36	40	44	48	52	56	60	64
Frequency (MHz)	5180	5200	5220	5240	5260	5280	5300	5320
Average Power	13.28	13.26	13.24	13.21	13.21	13.20	13.15	13.11

Band	802.11a							
Channel	100	104	108	112	116	132	136	140
Frequency (MHz)	5500	5520	5540	5560	5580	5660	5680	5700
Average Power	13.09	13.21	13.19	13.16	13.21	13.18	13.15	13.24

Band	802.11a							
Channel	149	153	157	161	-	-	-	-
Frequency (MHz)	5745	5765	5785	5805	-	-	-	-
Average Power	13.11	13.10	12.93	13.12	-	-	-	-

Band	802.11n (HT20)							
Channel	36	40	44	48	52	56	60	64
Frequency (MHz)	5180	5200	5220	5240	5260	5280	5300	5320
Average Power	10.26	10.24	10.22	10.20	10.18	10.21	10.16	10.24

Band	802.11n (HT20)							
Channel	100	104	108	112	116	132	136	140
Frequency (MHz)	5500	5520	5540	5560	5580	5660	5680	5700
Average Power	10.18	10.26	10.23	10.19	10.28	10.26	10.23	**10.31**

Band	802.11n (HT20)							
Channel	149	153	157	161	-	-	-	-
Frequency (MHz)	5745	5765	5785	5805	-	-	-	-
Average Power	10.12	10.16	9.96	10.13	-	-	-	-

Band	802.11n (HT40)								
Channel	38	46	54	62	102	118	134	151	159
Frequency (MHz)	5190	5230	5270	5310	5510	5590	5670	5755	5795
Average Power	10.32	10.29	10.25	10.16	10.78	10.61	10.68	10.42	10.38

LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
5 MHz	QPSK	23230	782	1	0	0	25.5	25.45
		23230	782	1	24	0	25.5	25.43
		23230	782	12	6	1	25.5	24.65
		23230	782	25	0	1	25.5	24.69
	16QAM	23230	782	1	0	1	25.5	24.72
		23230	782	1	24	1	25.5	24.74
		23230	782	12	6	2	25.5	23.59
		23230	782	25	0	2	25.5	23.63
10 MHz	QPSK	23230	782	1	0	0	25.5	25.49
		23230	782	1	49	0	25.5	25.46
		23230	782	25	12	1	25.5	24.81
		23230	782	50	0	1	25.5	24.70
	16QAM	23230	782	1	0	1	25.5	24.72
		23230	782	1	49	1	25.5	24.77
		23230	782	25	12	2	25.5	23.77
		23230	782	50	0	2	25.5	23.85

4.6 SAR Testing Results

4.6.1 SAR Results for Head

Plot No.	Band	Mode	Test Position	Channel	Battery	SAR-1g (W/kg)
01	CDMA2000 BC0	RC3+SO55	Right Cheek	777	1	0.485
02	CDMA2000 BC0	RC3+SO55	Right Tilted	777	1	0.285
03	CDMA2000 BC0	RC3+SO55	Left Cheek	777	1	**0.545**
04	CDMA2000 BC0	RC3+SO55	Left Tilted	777	1	0.255
05	CDMA2000 BC0	RC3+SO55	Left Cheek	777	2	0.505
06	CDMA2000 BC1	RC3+SO55	Right Cheek	600	1	0.48
07	CDMA2000 BC1	RC3+SO55	Right Tilted	600	1	0.228
08	CDMA2000 BC1	RC3+SO55	Left Cheek	600	1	**0.577**
09	CDMA2000 BC1	RC3+SO55	Left Tilted	600	1	0.185
10	CDMA2000 BC1	RC3+SO55	Left Cheek	600	2	0.5
11	CDMA2000 BC0	EVDO Rev.0	Right Cheek	777	1	**0.517**
12	CDMA2000 BC0	EVDO Rev.0	Right Tilted	777	1	0.278
13	CDMA2000 BC0	EVDO Rev.0	Left Cheek	777	1	0.332
14	CDMA2000 BC0	EVDO Rev.0	Left Tilted	777	1	0.167
15	CDMA2000 BC0	EVDO Rev.0	Right Cheek	777	2	0.42
16	CDMA2000 BC1	EVDO Rev.0	Right Cheek	600	1	0.599
17	CDMA2000 BC1	EVDO Rev.0	Right Tilted	600	1	0.683
18	CDMA2000 BC1	EVDO Rev.0	Left Cheek	600	1	0.511
19	CDMA2000 BC1	EVDO Rev.0	Left Tilted	600	1	**0.712**
20	CDMA2000 BC1	EVDO Rev.0	Left Tilted	600	2	0.634

Note:

1. According to KDB 941225, the SAR testing for 1xEVDO REV.A is not required since the maximum power is less than 1xEVDO REV.0.

Plot No.	Band	Mode	Test Position	Channel	Battery	RB	Offset	SAR-1g (W/kg)
101	LTE 13	QPSK_10M	Right Cheek	23230	1	25	12	0.338
102	LTE 13	QPSK_10M	Right Cheek	23230	1	1	0	0.475
103	LTE 13	QPSK_10M	Right Cheek	23230	1	1	49	0.466
104	LTE 13	QPSK_10M	Right Tilted	23230	1	25	12	0.235
105	LTE 13	QPSK_10M	Right Tilted	23230	1	1	0	0.346
106	LTE 13	QPSK_10M	Right Tilted	23230	1	1	49	0.306
107	LTE 13	QPSK_10M	Left Cheek	23230	1	25	12	0.457
108	LTE 13	QPSK_10M	Left Cheek	23230	1	1	0	0.574
109	LTE 13	QPSK_10M	Left Cheek	23230	1	1	49	**0.799**
110	LTE 13	QPSK_10M	Left Tilted	23230	1	25	12	0.402
111	LTE 13	QPSK_10M	Left Tilted	23230	1	1	0	0.466
112	LTE 13	QPSK_10M	Left Tilted	23230	1	1	49	0.591
113	LTE 13	16QAM_10M	Left Cheek	23230	1	25	12	0.341
114	LTE 13	16QAM_10M	Left Cheek	23230	1	1	0	0.516
115	LTE 13	16QAM_10M	Left Cheek	23230	1	1	49	0.63
116	LTE 13	QPSK_10M	Left Cheek	23230	2	1	49	0.309

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.

Plot No.	Band	Test Position	Channel	Battery	SAR-1g (W/kg)
201	802.11b	Right Cheek	6	1	0.074
202	802.11b	Right Tilted	6	1	0.042
203	802.11b	Left Cheek	6	1	**0.129**
204	802.11b	Left Tilted	6	1	0.035
205	802.11b	Left Cheek	6	2	0.097
206	802.11a	Right Cheek	36	1	0.032
207	802.11a	Right Tilted	36	1	0.029
208	802.11a	Left Cheek	36	1	0.102
209	802.11a	Left Tilted	36	1	0.0035
210	802.11a	Left Cheek	36	2	0.08
211	802.11a	Right Cheek	52	1	0.039
212	802.11a	Right Tilted	52	1	0.022
213	802.11a	Left Cheek	52	1	**0.148**
214	802.11a	Left Tilted	52	1	0.000585
215	802.11a	Left Cheek	52	2	0.1
216	802.11a	Right Cheek	140	1	0.044
217	802.11a	Right Tilted	140	1	0.02
218	802.11a	Left Cheek	140	1	0.115
219	802.11a	Left Tilted	140	1	0.024
220	802.11a	Left Cheek	140	2	0.111
221	802.11a	Right Cheek	161	1	0.033
222	802.11a	Right Tilted	161	1	0.00107
223	802.11a	Left Cheek	161	1	0.081
224	802.11a	Left Tilted	161	1	N/A
225	802.11a	Right Cheek	161	2	0.029

Note:

1. According to KDB 248227, the SAR testing for 802.11g/n is not required since the maximum power of 802.11g/n is less 1/4 dB higher than maximum power of 802.11b.
2. The SAR value for some test positions is too low to be measured. Therefore, only N/A was presented in the table.

4.6.2 SAR Results for Body

<Hotspot Mode>

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Earphone	SAR-1g (W/kg)
41	CDMA2000 BC0	RC3+SO32	Front Face	1	777	1	w/o	0.549
42	CDMA2000 BC0	RC3+SO32	Rear Face	1	777	1	w/o	**1.05**
43	CDMA2000 BC0	RC3+SO32	Left Side	1	777	1	w/o	0.445
44	CDMA2000 BC0	RC3+SO32	Right Side	1	777	1	w/o	0.425
45	CDMA2000 BC0	RC3+SO32	Bottom Side	1	777	1	w/o	0.011
46	CDMA2000 BC0	RC3+SO32	Rear Face	1	384	1	w/o	0.869
47	CDMA2000 BC0	RC3+SO32	Rear Face	1	1013	1	w/o	0.683
48	CDMA2000 BC0	RC3+SO32	Rear Face	1	777	2	w/o	0.545
50	CDMA2000 BC1	RC3+SO32	Front Face	1	600	1	w/o	**0.714**
51	CDMA2000 BC1	RC3+SO32	Rear Face	1	600	1	w/o	0.57
52	CDMA2000 BC1	RC3+SO32	Left Side	1	600	1	w/o	0.193
53	CDMA2000 BC1	RC3+SO32	Right Side	1	600	1	w/o	0.264
54	CDMA2000 BC1	RC3+SO32	Bottom Side	1	600	1	w/o	0.434
55	CDMA2000 BC1	RC3+SO32	Front Face	1	600	2	w/o	0.533
57	CDMA2000 BC0	RTAP153.6	Front Face	1	777	1	w/o	0.191
58	CDMA2000 BC0	RTAP153.6	Rear Face	1	777	1	w/o	0.504
59	CDMA2000 BC0	RTAP153.6	Left Side	1	777	1	w/o	0.52
60	CDMA2000 BC0	RTAP153.6	Top Side	1	777	1	w/o	0.057
61	CDMA2000 BC0	RTAP153.6	Left Side	1	777	2	w/o	0.434
63	CDMA2000 BC1	RTAP153.6	Front Face	1	600	1	w/o	0.271
64	CDMA2000 BC1	RTAP153.6	Rear Face	1	600	1	w/o	**0.56**
65	CDMA2000 BC1	RTAP153.6	Left Side	1	600	1	w/o	0.381
66	CDMA2000 BC1	RTAP153.6	Top Side	1	600	1	w/o	0.352
67	CDMA2000 BC1	RTAP153.6	Rear Face	1	600	2	w/o	0.222

Note:

1. According to KDB 941225, the SAR testing for 1xEVDO REV.A is not required since the maximum power is less than 1xEVDO REV.0.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Ear-phone	RB	Offset	SAR-1g (W/kg)
141	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	25	12	0.209
142	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	1	0	0.287
143	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	1	49	0.23
144	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	25	12	0.282
145	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	1	0	0.368
146	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	1	49	0.309
147	LTE 13	QPSK_10M	Right Side	1	23230	1	w/o	25	12	0.306
148	LTE 13	QPSK_10M	Right Side	1	23230	1	w/o	1	0	**0.443**
149	LTE 13	QPSK_10M	Right Side	1	23230	1	w/o	1	49	0.437
150	LTE 13	QPSK_10M	Top Side	1	23230	1	w/o	25	12	0.133
151	LTE 13	QPSK_10M	Top Side	1	23230	1	w/o	1	0	0.195
152	LTE 13	QPSK_10M	Top Side	1	23230	1	w/o	1	49	0.166
153	LTE 13	16QAM_10M	Right Side	1	23230	1	w/o	25	12	0.267
154	LTE 13	16QAM_10M	Right Side	1	23230	1	w/o	1	0	0.313
155	LTE 13	16QAM_10M	Right Side	1	23230	1	w/o	1	49	0.343
156	LTE 13	QPSK_10M	Right Side	1	23230	2	w/o	1	0	0.179

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.

Plot No.	Band	Test Position	Separation Distance (cm)	Channel	Battery	Earphone	SAR-1g (W/kg)
241	802.11b	Front Face	1	6	1	w/o	0.03
242	802.11b	Rear Face	1	6	1	w/o	**0.167**
243	802.11b	Left Side	1	6	1	w/o	0.163
244	802.11b	Rear Face	1	6	2	w/o	0.106
246	802.11a	Front Face	1	36	1	w/o	0.03
247	802.11a	Rear Face	1	36	1	w/o	0.148
248	802.11a	Left Side	1	36	1	w/o	0.288
249	802.11a	Left Side	1	36	2	w/o	0.252
251	802.11a	Front Face	1	52	1	w/o	0.023
252	802.11a	Rear Face	1	52	1	w/o	0.227
253	802.11a	Left Side	1	52	1	w/o	**0.345**
254	802.11a	Left Side	1	52	2	w/o	0.303
256	802.11a	Front Face	1	140	1	w/o	0.044
257	802.11a	Rear Face	1	140	1	w/o	0.181
258	802.11a	Left Side	1	140	1	w/o	0.251
259	802.11a	Left Side	1	140	2	w/o	0.226
261	802.11a	Front Face	1	161	1	w/o	0.033
262	802.11a	Rear Face	1	161	1	w/o	0.169
263	802.11a	Left Side	1	161	1	w/o	0.23
264	802.11a	Left Side	1	161	2	w/o	0.222

Note:

1. According to KDB 248227, the SAR testing for 802.11g/n is not required since the maximum power of 802.11g/n is less 1/4 dB higher than maximum power of 802.11b.
2. According to KDB 248227, the SAR testing for 802.11n is not required since the maximum power of 802.11n is less 1/4 dB higher than maximum power of 802.11a.

<Body Worn Mode>

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Ear-phone	SAR-1g (W/kg)
41	CDMA2000 BC0	RC3+SO32	Front Face	1	777	1	w/o	0.549
42	CDMA2000 BC0	RC3+SO32	Rear Face	1	777	1	w/o	**1.05**
46	CDMA2000 BC0	RC3+SO32	Rear Face	1	384	1	w/o	0.869
47	CDMA2000 BC0	RC3+SO32	Rear Face	1	1013	1	w/o	0.683
49	CDMA2000 BC0	RC3+SO32	Rear Face	1	777	1	w/	0.899
50	CDMA2000 BC1	RC3+SO32	Front Face	1	600	1	w/o	**0.714**
51	CDMA2000 BC1	RC3+SO32	Rear Face	1	600	1	w/o	0.57
56	CDMA2000 BC1	RC3+SO32	Front Face	1	600	1	w/	0.597
57	CDMA2000 BC0	RTAP153.6	Front Face	1	777	1	w/o	0.191
58	CDMA2000 BC0	RTAP153.6	Rear Face	1	777	1	w/o	0.504
62	CDMA2000 BC0	RTAP153.6	Rear Face	1	777	1	w/	0.473
63	CDMA2000 BC1	RTAP153.6	Front Face	1	600	1	w/o	0.271
64	CDMA2000 BC1	RTAP153.6	Rear Face	1	600	1	w/o	**0.56**
68	CDMA2000 BC1	RTAP153.6	Rear Face	1	600	1	w/	0.517

Note:

1. According to KDB 941225, the SAR testing for 1xEVDO REV.A is not required since the maximum power is less than 1xEVDO REV.0.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Ear-phone	RB	Offset	SAR-1g (W/kg)
141	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	25	12	0.209
142	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	1	0	0.287
143	LTE 13	QPSK_10M	Front Face	1	23230	1	w/o	1	49	0.23
144	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	25	12	0.282
145	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	1	0	**0.368**
146	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/o	1	49	0.309
157	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/	25	12	0.238
158	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/	1	0	0.345
159	LTE 13	QPSK_10M	Rear Face	1	23230	1	w/	1	49	0.277

Note:

1. According to KDB 941225, the SAR testing for 100% RB is not required since the maximum SAR of 50% RB is less than 1.45 W/kg.
2. According to KDB 941225, the SAR testing was performed on largest channel bandwidth, and SAR for other channel bandwidths is not required since the maximum power of smaller channel bandwidth is within 1/2 dB higher or lower of measured for the largest channel bandwidth and maximum SAR of largest channel bandwidth is less than 1.45 W/kg.

Plot No.	Band	Test Position	Separation Distance (cm)	Channel	Battery	Earphone	SAR-1g (W/kg)
241	802.11b	Front Face	1	6	1	w/o	0.03
242	802.11b	Rear Face	1	6	1	w/o	**0.167**
245	802.11b	Rear Face	1	6	1	w/	0.039
244	802.11b	Rear Face	1	6	2	w/o	0.106
246	802.11a	Front Face	1	36	1	w/o	0.03
247	802.11a	Rear Face	1	36	1	w/o	0.148
250	802.11a	Rear Face	1	36	1	w/	0.124
251	802.11a	Front Face	1	52	1	w/o	0.023
252	802.11a	Rear Face	1	52	1	w/o	**0.227**
255	802.11a	Rear Face	1	52	1	w/	0.203
256	802.11a	Front Face	1	140	1	w/o	0.044
257	802.11a	Rear Face	1	140	1	w/o	0.181
260	802.11a	Rear Face	1	140	1	w/	0.19
261	802.11a	Front Face	1	161	1	w/o	0.033
262	802.11a	Rear Face	1	161	1	w/o	0.169
265	802.11a	Rear Face	1	161	1	w/	0.163

Note:

1. According to KDB 248227, the SAR testing for 802.11g/n is not required since the maximum power of 802.11g/n is less 1/4 dB higher than maximum power of 802.11b.
2. According to KDB 248227, the SAR testing for 802.11n is not required since the maximum power of 802.11n is less 1/4 dB higher than maximum power of 802.11a.

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4.6.3 Simultaneous Multi-band Transmission Evaluation

<SPLSR calculation procedure>

1. Use DASY software to open SAR data file with zoom scan results.
2. Export data file to SEMCAD using 'Field Data Export' function.
3. Search for highest SAR based on the imported measured/interpolated data and identify the X, Y, and Z coordinates. Per the SAR system manufacture, DASY stores the individual coordinates of each measurement point in the measurement file where the, center coordinate (x=0, y=0) is always the Grid Reference Point as set in DASY for a phantom section.
4. Calculate the peak SAR separation distances using the Pythagoras' theorem where
   $$\text{Peak SAR separation distance} = \sqrt{(X_1 - X_2)^2 + (Y_1 - Y_2)^2 + (Z_1 - Z_2)^2}$$
5. Calculate SPLSR = (SAR1 + SAR2) / Peak SAR separation distance.
6. The SPLSR calculation plots shown in test report are for reference only as the images were generated in a separate software program to add the antenna and arrow references. The distance information in the calculations below each plot is derived from the DASY SAR zoom scan data as specified in this procedure.

Table 7.1 Simultaneous Transmission Analysis for RTT BC0 Voice + EVDO BC0 Data + WLAN

Position	Transmitter 1 RTT BC0 Voice	Transmitter 2 EVDO BC0 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.485	0.517	0.074	1.076	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.285	0.278	0.042	0.605	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.545	0.332	0.148	1.025	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.255	0.167	0.035	0.457	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.549	0.191	0.044	0.784	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.504	0.227	**1.781**	0.2	0.294	0.14	All SPLSR<0.3, Simul-TX SAR not required
Body-Left Side	0.445	0.52	0.345	1.31	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.425	0	0	0.425	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.057	0	0.057	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.011	0	0	0.011	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.549	0.191	0.044	0.784	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.504	0.227	**1.781**	0.2	0.294	0.14	All SPLSR<0.3, Simul-TX SAR not required

Note: The calculation of SPLSR is as follows.

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T2) is as below:
Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T2(0.024, 0.028, -0.178)
Peak Location Spacing = 7.8 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.504) / 7.8 = 0.2

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T3) is as below:
Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T3(0.00906, -0.0139, -0.205)
Peak Location Spacing = 4.3 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.227) / 4.3 = 0.294

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T2+T3) is as below:
Coordinate of Peak SAR Location (X, Y, Z) : T2(0.024, 0.028, -0.178), T3(0.00906, -0.0139, -0.205)
Peak Location Spacing = 5.2 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (0.504 + 0.227) / 5.2 = 0.14

Table 7.2 Simultaneous Transmission Analysis for RTT BC0 Voice + EVDO BC1 Data + WLAN

Position	Transmitter 1 RTT BC0 Voice	Transmitter 2 EVDO BC1 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.485	0.599	0.074	1.158	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.285	0.683	0.042	1.01	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.545	0.511	0.148	1.204	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.255	0.712	0.035	1.002	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.549	0.271	0.044	0.864	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.56	0.227	**1.837**	0.178	0.294	0.12	All SPLSR<0.3, Simul-TX SAR not required
Body-Left Side	0.445	0.381	0.345	1.171	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.425	0	0	0.425	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.352	0	0.352	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.011	0	0	0.011	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.549	0.271	0.044	0.864	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.56	0.227	**1.837**	0.178	0.294	0.12	All SPLSR<0.3, Simul-TX SAR not required

Note: The calculation of SPLSR is as follows.

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T2) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T2(0.01, 0.046, -0.178)

Peak Location Spacing = 9 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.56) / 9 = 0.178

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T3) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T3(0.00906, -0.0139, -0.205)

Peak Location Spacing = 4.3 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.227) / 4.3 = 0.294

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T2+T3) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T2(0.01, 0.046, -0.178), T3(0.00906, -0.0139, -0.205)

Peak Location Spacing = 6.6 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (0.56 + 0.227) / 6.6 = 0.12

Table 7.3 Simultaneous Transmission Analysis for RTT BC0 Voice + LTE 13 Data + WLAN

Position	Transmitter 1 RTT BC0 Voice	Transmitter 2 LTE 13 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.485	0.475	0.074	1.034	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.285	0.346	0.042	0.673	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.545	0.799	0.148	1.492	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.255	0.591	0.035	0.881	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.549	0.287	0.044	0.88	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.368	0.227	**1.645**	0.156	0.294	0.09	All SPLSR<0.3, Simul-TX SAR not required
Body-Left Side	0.445	0	0.345	0.79	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.425	0.443	0	0.868	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.195	0	0.195	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.011	0	0	0.011	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.549	0.287	0.044	0.88	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	1.05	0.368	0.227	**1.645**	0.156	0.294	0.09	All SPLSR<0.3, Simul-TX SAR not required

Note: The calculation of SPLSR is as follows.

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T2) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T2(-0.023, 0.044, -0.205)

Peak Location Spacing = 9.1 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.368) / 9.1 = 0.156

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T1+T3) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T1(-0.01, -0.042, -0.178), T3(0.00906, -0.0139, -0.205)

Peak Location Spacing = 4.3 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (1.05 + 0.227) / 4.3 = 0.294

The calculation of SAR to peak location separation ratio for (Body-Rear Face, T2+T3) is as below:

Coordinate of Peak SAR Location (X, Y, Z) : T2(-0.023, 0.044, -0.205), T3(0.00906, -0.0139, -0.205)

Peak Location Spacing = 6.6 cm

SPLSR (SAR to Peak Location Spacing Ratio) = (0.368 + 0.227) / 6.6 = 0.09

Table 7.4 Simultaneous Transmission Analysis for RTT BC1 Voice + EVDO BC0 Data + WLAN

Position	Transmitter 1 RTT BC1 Voice	Transmitter 2 EVDO BC0 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.48	0.517	0.074	1.071	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.228	0.278	0.042	0.548	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.577	0.332	0.148	1.057	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.185	0.167	0.035	0.387	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.714	0.191	0.044	0.949	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.504	0.227	1.301	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Left Side	0.193	0.52	0.345	1.058	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.264	0	0	0.264	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.057	0	0.057	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.434	0	0	0.434	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.714	0.191	0.044	0.949	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.504	0.227	1.301	-	-	-	SUM SAR<1.6, Simul-TX SAR not required

Table 7.5 Simultaneous Transmission Analysis for RTT BC1 Voice + EVDO BC1 Data + WLAN

Position	Transmitter 1 RTT BC1 Voice	Transmitter 2 EVDO BC1 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.48	0.599	0.074	1.153	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.228	0.683	0.042	0.953	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.577	0.511	0.148	1.236	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.185	0.712	0.035	0.932	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.714	0.271	0.044	1.029	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.56	0.227	1.357	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Left Side	0.193	0.381	0.345	0.919	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.264	0	0	0.264	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.352	0	0.352	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.434	0	0	0.434	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.714	0.271	0.044	1.029	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.56	0.227	1.357	-	-	-	SUM SAR<1.6, Simul-TX SAR not required

Table 7.6 Simultaneous Transmission Analysis for RTT BC1 Voice + LTE 13 Data + WLAN

Position	Transmitter 1 RTT BC1 Voice	Transmitter 2 LTE 13 Data	Transmitter 3 WLAN	All 3 SAR Summation	SPLSR T1&T2	SPLSR T1&T3	SPLSR T2&T3	Note
Head SAR								
Head-Right Cheek	0.48	0.475	0.074	1.029	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Right Tilted	0.228	0.346	0.042	0.616	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Cheek	0.577	0.799	0.148	1.524	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Head-Left Tilted	0.185	0.591	0.035	0.811	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Hotspot Mode								
Body-Front Face	0.714	0.287	0.044	1.045	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.368	0.227	1.165	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Left Side	0.193	0	0.345	0.538	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Right Side	0.264	0.443	0	0.707	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Top Side	0	0.195	0	0.195	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Bottom Side	0.434	0	0	0.434	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body SAR : Body Worn Mode								
Body-Front Face	0.714	0.287	0.044	1.045	-	-	-	SUM SAR<1.6, Simul-TX SAR not required
Body-Rear Face	0.57	0.368	0.227	1.165	-	-	-	SUM SAR<1.6, Simul-TX SAR not required

Summary:

According to KDB 648474, the simultaneous transmission SAR for WWAN and WLAN was not required, because the SAR summation is less than 1.6 W/kg or the SPLSR is less than 0.3. The BT standalone SAR and WWAN/BT simultaneous transmission SAR were not required, because the maximum output power of Bluetooth is less than P_{Ref} (10.8 dBm) and the closest separation distance of these antennas is larger than 2.5 cm, and maximum WWAN SAR is less than 1.2 W/kg.

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
Dosimetric E-Field Probe	SPEAG	EX3DV4	3590	Feb. 25, 2011	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3650	Oct. 26, 2011	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3800	Aug. 05, 2011	Annual
System Validation Kit	SPEAG	D750V3	1013	May 25, 2011	Annual
System Validation Kit	SPEAG	D835V2	4d021	Mar. 23, 2011	Annual
System Validation Kit	SPEAG	D900V2	156	Jan. 27, 2011	Annual
System Validation Kit	SPEAG	D1450V2	1028	Aug. 31, 2011	Annual
System Validation Kit	SPEAG	D1640V2	326	Mar. 08, 2011	Annual
System Validation Kit	SPEAG	D1750V2	1055	Aug. 09, 2011	Annual
System Validation Kit	SPEAG	D1800V2	2d041	Jan. 26, 2011	Annual
System Validation Kit	SPEAG	D1900V2	5d022	Jan. 26, 2011	Annual
System Validation Kit	SPEAG	D2000V2	1013	Aug. 29, 2011	Annual
System Validation Kit	SPEAG	D2300V2	1004	Jan. 26, 2011	Annual
System Validation Kit	SPEAG	D2450V2	716	Jan. 26, 2011	Annual
System Validation Kit	SPEAG	D2600V2	1003	Jan. 27, 2011	Annual
System Validation Kit	SPEAG	D3500V2	1007	Jan. 20, 2011	Annual
System Validation Kit	SPEAG	D5GHzV2	1019	Jan. 25, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE3	579	Sep. 23, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	861	Aug. 29, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	1277	Jul. 29, 2011	Annual
SAM Phantom	SPEAG	QD 000 P40	N/A	N/A	N/A
ELI Phantom	SPEAG	QD OVA 001B	N/A	N/A	N/A
Radio Communication Tester	Agilent	E5515C	MY50266628	Sep. 26, 2011	Biennial
Radio Communication Analyzer	Anritsu	MT8820C	6201010284	Aug. 01, 2011	Biennial
ENA Series Network Analyzer	Agilent	E5071C	MY46107999	Mar. 25, 2011	Annual
Signal Generator	Agilent	E8257C	MY43320668	Dec. 20, 2011	Annual
Power Meter	Anritsu	ML2487A	6K00001571	May 25, 2011	Annual
Power Sensor	Anritsu	MA2491A	030954	May 25, 2011	Annual
Dielectric Probe Kit	Agilent	85070D	N/A	N/A	N/A

6. Measurement Uncertainty

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)	Vi
Measurement System						
Probe Calibration	6.0	Normal	1	1	± 6.0 %	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %	∞
Boundary Effects	1.0	Rectangular	√3	1	± 0.6 %	∞
Linearity	4.7	Rectangular	√3	1	± 2.7 %	∞
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %	∞
Readout Electronics	0.6	Normal	1	1	± 0.6 %	∞
Response Time	0.0	Rectangular	√3	1	± 0.0 %	∞
Integration Time	1.7	Rectangular	√3	1	± 1.0 %	∞
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	0.5	Rectangular	√3	1	± 0.3 %	∞
Probe Positioning	2.9	Rectangular	√3	1	± 1.7 %	∞
Max. SAR Eval.	2.3	Rectangular	√3	1	± 1.3 %	∞
Test Sample Related						
Device Positioning	3.9	Normal	1	1	± 3.9 %	31
Device Holder	2.7	Normal	1	1	± 2.7 %	19
Power Drift	5.0	Rectangular	√3	1	± 2.9 %	∞
Phantom and Setup						
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %	∞
Liquid Conductivity (Meas.)	5.0	Normal	1	0.64	± 3.2 %	29
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	5.0	Normal	1	0.6	± 3.0 %	29
Combined Standard Uncertainty					± 11.7 %	
Expanded Uncertainty (K=2)					**± 23.4 %**	

Uncertainty budget for frequency range 300 MHz to 3 GHz

Error Description	Uncertainty Value (±%)	Probability Distribution	Divisor	Ci (1g)	Standard Uncertainty (1g)	Vi
Measurement System						
Probe Calibration	6.55	Normal	1	1	± 6.55 %	∞
Axial Isotropy	4.7	Rectangular	√3	0.7	± 1.9 %	∞
Hemispherical Isotropy	9.6	Rectangular	√3	0.7	± 3.9 %	∞
Boundary Effects	2.0	Rectangular	√3	1	± 1.2 %	∞
Linearity	4.7	Rectangular	√3	1	± 2.7 %	∞
System Detection Limits	1.0	Rectangular	√3	1	± 0.6 %	∞
Readout Electronics	0.3	Normal	1	1	± 0.3 %	∞
Response Time	0.8	Rectangular	√3	1	± 0.5 %	∞
Integration Time	2.6	Rectangular	√3	1	± 1.5 %	∞
RF Ambient Noise	3.0	Rectangular	√3	1	± 1.7 %	∞
RF Ambient Reflections	3.0	Rectangular	√3	1	± 1.7 %	∞
Probe Positioner	0.8	Rectangular	√3	1	± 0.5 %	∞
Probe Positioning	9.9	Rectangular	√3	1	± 5.7 %	∞
Max. SAR Eval.	4.0	Rectangular	√3	1	± 2.3 %	∞
Test Sample Related						
Device Positioning	3.9	Normal	1	1	± 3.9 %	31
Device Holder	2.7	Normal	1	1	± 2.7 %	19
Power Drift	5.0	Rectangular	√3	1	± 2.9 %	∞
Phantom and Setup						
Phantom Uncertainty	4.0	Rectangular	√3	1	± 2.3 %	∞
Liquid Conductivity (Target)	5.0	Rectangular	√3	0.64	± 1.8 %	∞
Liquid Conductivity (Meas.)	5.0	Normal	1	0.64	± 3.2 %	30
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	5.0	Normal	1	0.6	± 3.0 %	30
Combined Standard Uncertainty					± 13.4 %	
Expanded Uncertainty (K=2)					**± 26.8 %**	

Uncertainty budget for frequency range 3 GHz to 6 GHz

7. Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site. If you have any comments, please feel free to contact us at the following:

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The road map of all our labs can be found in our web site also.

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