VARIANT FCC SAR Test Report

Report No.	:	**SA120117C24B**
Applicant	:	**HTC Corporation**
Address	:	**23, XINGHUA RD., TAOYUAN 330, TAIWAN, R.O.C.**
Product	:	**Smartphone**
FCC ID	:	**NM8PJ75100**
Brand	:	**HTC**
Model No.	:	**PJ75100**
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 D05 v01 / KDB 941225 D06 v01**
Date of Testing	:	**May 07, 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.

This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of the original BVADT report no.: SA120117C24. The difference compared with the original report is extending the channel of BC10 to Ch684.

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Testing Laboratory 2021

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Release Control Record

Issue No.	Reason for Change	Date Issued
R01	Original release	May 16, 2012

1. Summary of Maximum SAR Value

Mode / Band	Test Position	SAR-1g (W/kg)
CDMA2000 1xRTT BC10	Head	0.361
	Hotspot Mode (1 cm Gap)	0.91
	Body Worn (1 cm Gap)	0.91
CDMA2000 1xEVDO BC10	Head	0.416
	Hotspot Mode (1 cm Gap)	0.354
	Body Worn (1 cm Gap)	0.325

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

EUT Type	Smartphone
FCC ID	NM8PJ75100
Brand Name	HTC
Model Name	PJ75100
Tx Frequency Bands (Unit: MHz)	CDMA BC0 : 824.7 ~ 848.31 CDMA BC1 : 1851.25 ~ 1908.75 CDMA BC10 : 817.9 ~ 823.1 LTE Band 25 : 1852.5 ~ 1912.5 WLAN : 2412 ~ 2462, 5180 ~ 5320, 5500 ~ 5700, 5745 ~ 5825 Bluetooth : 2402 ~ 2480
Uplink Modulations	CDMA : QPSK LTE : QPSK, 16QAM 802.11b : DSSS 802.11a/g/n : OFDM Bluetooth : GFSK
Maximum AVG Conducted Power (Unit: dBm)	CDMA2000 1xRTT BC0 : 24.90 CDMA2000 1xRTT BC1 : 24.83 CDMA2000 1xRTT BC10 : 25.04 CDMA2000 1xEVDO BC0 : 23.95 CDMA2000 1xEVDO BC1 : 23.89 CDMA2000 1xEVDO BC10 : 24.06 LTE Band 25 : 23.99 802.11b : 18.19 802.11g : 13.36 802.11n HT20 (2.4GHz) : 12.25 802.11a : 13.36 802.11n HT20 (5GHz) : 10.36 802.11n HT40 (5GHz) : 10.56
Antenna Type	Fixed Internal Antenna
EUT Stage	Production Unit

Note:

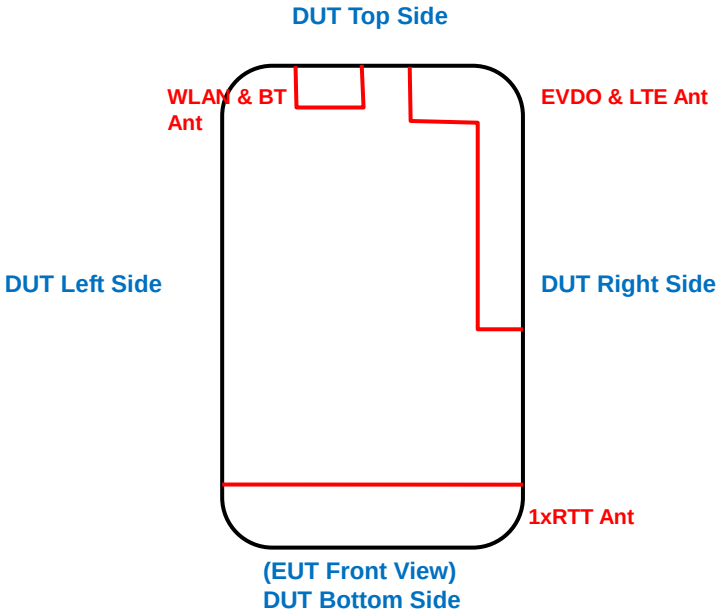
1. This report is prepared for FCC class II permissive change. This report is issued as a supplementary report of the original BVADT report no.: SA120117C24. The difference compared with the original report is extending the channel of BC10 to Ch684.
2. The above EUT information is declared by manufacturer and for more detailed features description please refers to the manufacturer's specifications or User's Manual.
3. The EUT's accessories list refers to Ext Pho_NM8PJ75100.pdf.

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, BC10
VOIP / Data	CDMA2000 1xEVDO	BC 0, BC 1, BC10
VOIP / Data	LTE	Band 25
VOIP / Data	802.11a/b/g/n	2.4 GHz / 5 GHz
Data	Bluetooth	2.4 GHz

This device has two 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, Right Side, Top Side
LTE : Front Face, Rear Face, Right Side, Top Side
WLAN : Front Face, Rear Face, Left Side, Top Side

Confirming the LTE transmitter follows 3GPP standards, is category 3, BW 5MHz and 10MHz, band 25, 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	Hotspot SAR	Body-Worn SAR
1	RTT BC0 Voice + EVDO BC0 Data + WLAN/BT	Yes	Yes	Yes
2	RTT BC0 Voice + EVDO BC1 Data + WLAN/BT	Yes	Yes	Yes
3	RTT BC0 Voice + EVDO BC10 Data + WLAN/BT	Yes	Yes	Yes
4	RTT BC0 Voice + LTE 25 Data + WLAN/BT	Yes	Yes	Yes
5	RTT BC1 Voice + EVDO BC0 Data + WLAN/BT	Yes	Yes	Yes
6	RTT BC1 Voice + EVDO BC1 Data + WLAN/BT	Yes	Yes	Yes
7	RTT BC1 Voice + EVDO BC10 Data + WLAN/BT	Yes	Yes	Yes
8	RTT BC1 Voice + LTE 25 Data + WLAN/BT	Yes	Yes	Yes
9	RTT BC10 Voice + EVDO BC0 Data + WLAN/BT	Yes	Yes	Yes
10	RTT BC10 Voice + EVDO BC1 Data + WLAN/BT	Yes	Yes	Yes
11	RTT BC10 Voice + EVDO BC10 Data + WLAN/BT	Yes	Yes	Yes
12	RTT BC10 Voice + LTE 25 Data + WLAN/BT	Yes	Yes	Yes
13	RTT BC0 Voice + EVDO BC0 Data	Yes	No	Yes
14	RTT BC0 Voice + EVDO BC1 Data	Yes	No	Yes
15	RTT BC0 Voice + EVDO BC10 Data	Yes	No	Yes
16	RTT BC0 Voice + LTE 25 Data	Yes	No	Yes
17	RTT BC1 Voice + EVDO BC0 Data	Yes	No	Yes
18	RTT BC1 Voice + EVDO BC1 Data	Yes	No	Yes
19	RTT BC1 Voice + EVDO BC10 Data	Yes	No	Yes
20	RTT BC1 Voice + LTE 25 Data	Yes	No	Yes
21	RTT BC10 Voice + EVDO BC0 Data	Yes	No	Yes
22	RTT BC10 Voice + EVDO BC1 Data	Yes	No	Yes
23	RTT BC10 Voice + EVDO BC10 Data	Yes	No	Yes
24	RTT BC10 Voice + LTE 25 Data	Yes	No	Yes
25	RTT BC0 Voice + WLAN/BT	Yes	No	Yes
26	RTT BC1 Voice + WLAN/BT	Yes	No	Yes
27	RTT BC10 Voice + WLAN/BT	Yes	No	Yes
28	EVDO BC0 Data + WLAN/BT	Yes	Yes	Yes
29	EVDO BC1 Data + WLAN/BT	Yes	Yes	Yes
30	EVDO BC10 Data + WLAN/BT	Yes	Yes	Yes
31	LTE 25 Data + WLAN/BT	Yes	Yes	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:

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

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be 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.

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.

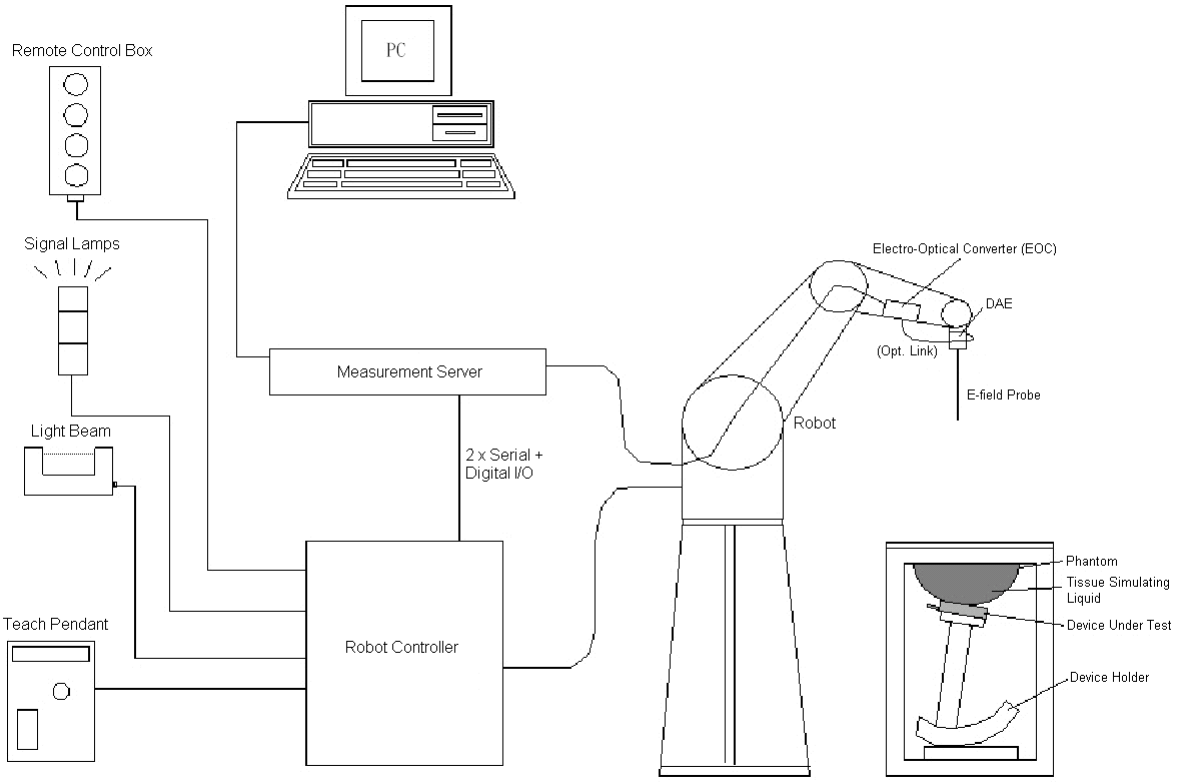


Fig-3.1 DASY System Setup

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 body tissue parameters that have not been specified in IEEE 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE 1528. 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.

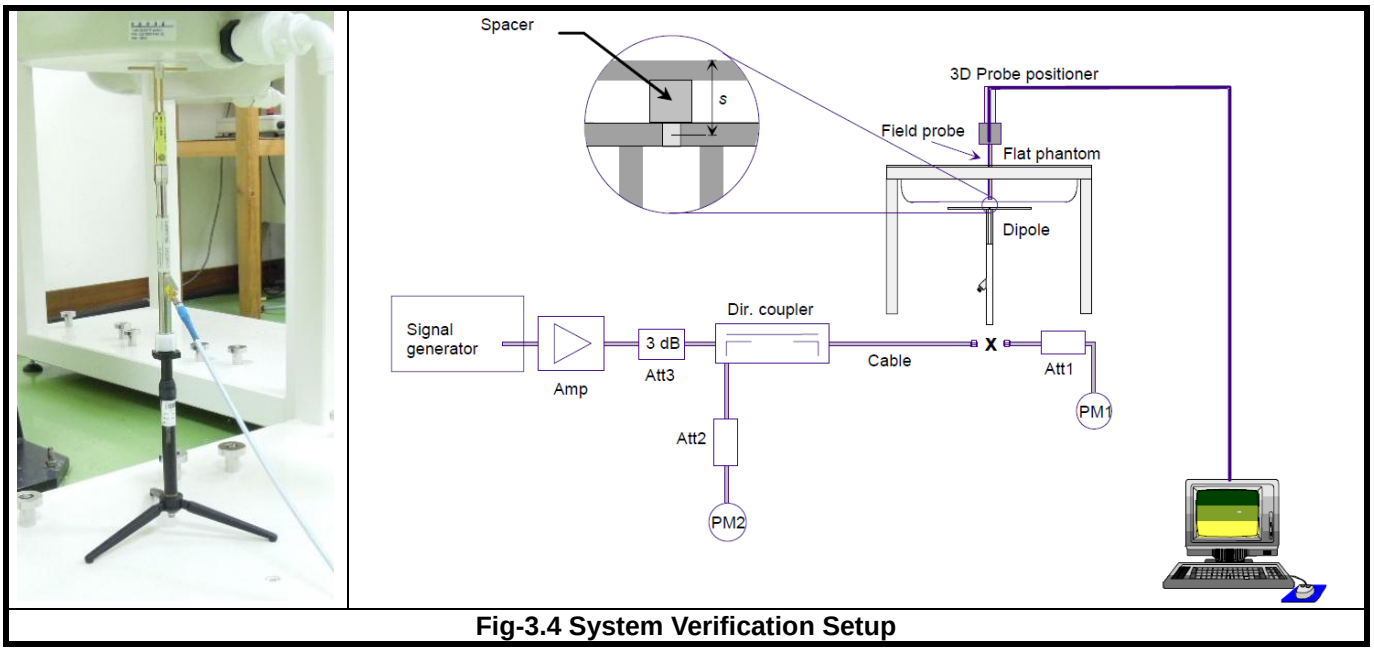


Fig-3.4 System Verification Setup

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 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.

3.4.3 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 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 EUT. The EUT was set from the emulator to radiate maximum output power during SAR testing.

4.2 EUT Testing Position

Based on the SAR testing for middle and highest channel of BC10 from original SAR report, the EUT was tested in **Rear Face** position as illustrated below:

1. 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.

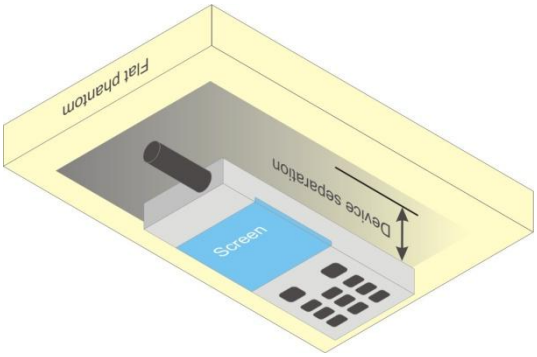


Fig-4.1 Illustration for Body Worn Position

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
B835	835	21.6	0.994	56.023	0.97	55.2	2.47	1.49	May 07, 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
May 07, 2012	835	9.52	2.43	9.72	2.10	4d092	3590	1277

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 BC10			-		
Channel	476	580	684	-	-	-
Frequency (MHz)	817.9	820.5	823.1	-	-	-
1xRTT RC1+SO55	25.03	24.98	24.89	-	-	-
1xRTT RC3+SO55	25.04	25.02	24.86	-	-	-
1xRTT RC3+SO32 (FCH)	25.02	25.01	24.80	-	-	-
1xRTT RC3+SO32 (SCH)	25.03	25.01	24.79	-	-	-
1xEVDO Rev.0 RTAP 153.6	24.06	24.04	23.83	-	-	-
1xEVDO Rev.A RETAP 4096	23.96	23.96	23.99	-	-	-

4.6 SAR Testing Results

4.6.1 SAR Results for Head

The SAR testing result from original SAR report (BVADT report no.: SA120117C24) is as below.

Plot No.	Band	Mode	Test Position	Channel	Battery	SAR-1g (W/kg)
11	CDMA2000 BC10	RC3+SO55	Right Cheek	476	1	0.332
12	CDMA2000 BC10	RC3+SO55	Right Tilted	476	1	0.191
13	CDMA2000 BC10	RC3+SO55	Left Cheek	476	1	**0.361**
14	CDMA2000 BC10	RC3+SO55	Left Tilted	476	1	0.187
15	CDMA2000 BC10	RC3+SO55	Left Cheek	476	2	0.329
26	CDMA2000 BC10	EVDO Rev.0	Right Cheek	476	1	**0.416**
27	CDMA2000 BC10	EVDO Rev.0	Right Tilted	476	1	0.318
28	CDMA2000 BC10	EVDO Rev.0	Left Cheek	476	1	0.378
29	CDMA2000 BC10	EVDO Rev.0	Left Tilted	476	1	0.267
30	CDMA2000 BC10	EVDO Rev.0	Right Cheek	476	2	0.389

Since the SAR testing for highest power channel on head position is not larger than 0.8 W/kg, middle and highest channel is no needed to verify.

4.6.2 SAR Results for Body

<Hotspot Mode>

The SAR testing result from original SAR report (BVADT report no.: SA120117C24) is as below.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	SAR-1g (W/kg)
327	CDMA2000 BC10	RC3+SO32	Front Face	1	476	1	0.467
328	CDMA2000 BC10	RC3+SO32	Rear Face	1	476	1	0.859
329	CDMA2000 BC10	RC3+SO32	Left Side	1	476	1	0.556
330	CDMA2000 BC10	RC3+SO32	Right Side	1	476	1	0.242
331	CDMA2000 BC10	RC3+SO32	Bottom Side	1	476	1	0.375
332	CDMA2000 BC10	RC3+SO32	Rear Face	1	573	1	**0.901**
333	CDMA2000 BC10	RC3+SO32	Rear Face	1	670	1	0.823
334	CDMA2000 BC10	RC3+SO32	Rear Face	1	573	2	0.778
348	CDMA2000 BC10	EVDO Rev.0	Front Face	1	476	1	0.208
349	CDMA2000 BC10	EVDO Rev.0	Rear Face	1	476	1	0.291
350	CDMA2000 BC10	EVDO Rev.0	Right Side	1	476	1	**0.354**
351	CDMA2000 BC10	EVDO Rev.0	Top Side	1	476	1	0.042
352	CDMA2000 BC10	EVDO Rev.0	Right Side	1	476	2	0.328

The verified SAR testing result for middle and highest channel is as below.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	SAR-1g (W/kg)
A02	CDMA2000 BC10	RC3+SO32	Rear Face	1	580	1	**0.91**
A01	CDMA2000 BC10	RC3+SO32	Rear Face	1	684	1	0.83

<Body Worn Mode>

The SAR testing result from original SAR report (BVADT report no.: SA120117C24) is as below.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Ear-phone	SAR-1g (W/kg)
327	CDMA2000 BC10	RC3+SO32	Front Face	1	476	1	w/o	0.467
328	CDMA2000 BC10	RC3+SO32	Rear Face	1	476	1	w/o	0.859
332	CDMA2000 BC10	RC3+SO32	Rear Face	1	573	1	w/o	**0.901**
333	CDMA2000 BC10	RC3+SO32	Rear Face	1	670	1	w/o	0.823
335	CDMA2000 BC10	RC3+SO32	Rear Face	1	573	1	w/	0.719
348	CDMA2000 BC10	EVDO Rev.0	Front Face	1	476	1	w/o	0.208
349	CDMA2000 BC10	EVDO Rev.0	Rear Face	1	476	1	w/o	0.291
353	CDMA2000 BC10	EVDO Rev.0	Rear Face	1	476	1	w/	**0.325**

The verified SAR testing result for middle and highest channel is as below.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Battery	Ear-phone	SAR-1g (W/kg)
A02	CDMA2000 BC10	RC3+SO32	Rear Face	1	580	1	w/o	**0.91**
A01	CDMA2000 BC10	RC3+SO32	Rear Face	1	684	1	w/o	0.83

Test Engineer：Herbort Liu

4.6.3 Simultaneous Multi-band Transmission Evaluation

<Simultaneous Transmission Configuration 1>

Position	1xRTT BC0 (Voice)	1xEVDO BC0 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.388	0.23	0.205	0.823
Right Tilted	0.233	0.33	0.185	0.748
Left Cheek	0.434	0.188	0.129	0.751
Left Tilted	0.215	0.306	0.234	0.755
Hotspot Mode SAR				
Front Face	0.582	0.199	0.042	0.823
Rear Face	0.977	0.352	0.201	1.53
Left Side	0.735	0	0.053	0.788
Right Side	0.417	0.389	0	0.806
Top Side	0	0.067	0.28	0.347
Bottom Side	0.534	0	0	0.534
Body-Worn SAR				
Front Face	0.582	0.199	0.042	0.823
Rear Face	0.977	0.352	0.201	1.53

<Simultaneous Transmission Configuration 2>

Position	1xRTT BC0 (Voice)	1xEVDO BC1 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.388	0.406	0.205	0.999
Right Tilted	0.233	0.461	0.185	0.879
Left Cheek	0.434	0.497	0.129	1.06
Left Tilted	0.215	0.266	0.234	0.715
Hotspot Mode SAR				
Front Face	0.582	0.123	0.042	0.747
Rear Face	0.977	0.329	0.201	1.507
Left Side	0.735	0	0.053	0.788
Right Side	0.417	0.074	0	0.491
Top Side	0	0.291	0.28	0.571
Bottom Side	0.534	0	0	0.534
Body-Worn SAR				
Front Face	0.582	0.123	0.042	0.747
Rear Face	0.977	0.329	0.201	1.507

<Simultaneous Transmission Configuration 3>

Position	1xRTT BC0 (Voice)	1xEVDO BC10 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.388	0.416	0.205	1.009
Right Tilted	0.233	0.318	0.185	0.736
Left Cheek	0.434	0.378	0.129	0.941
Left Tilted	0.215	0.267	0.234	0.716
Hotspot Mode SAR				
Front Face	0.582	0.208	0.042	0.832
Rear Face	0.977	0.291	0.201	1.469
Left Side	0.735	0	0.053	0.788
Right Side	0.417	0.354	0	0.771
Top Side	0	0.042	0.28	0.322
Bottom Side	0.534	0	0	0.534
Body-Worn SAR				
Front Face	0.582	0.208	0.042	0.832
Rear Face	0.977	0.325	0.201	1.503

<Simultaneous Transmission Configuration 4>

Position	1xRTT BC0 (Voice)	LTE 25 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.388	0.21	0.205	0.803
Right Tilted	0.233	0.246	0.185	0.664
Left Cheek	0.434	0.292	0.129	0.855
Left Tilted	0.215	0.164	0.234	0.613
Hotspot Mode SAR				
Front Face	0.582	0.094	0.042	0.718
Rear Face	0.977	0.253	0.201	1.431
Left Side	0.735	0	0.053	0.788
Right Side	0.417	0.046	0	0.463
Top Side	0	0.217	0.28	0.497
Bottom Side	0.534	0	0	0.534
Body-Worn SAR				
Front Face	0.582	0.094	0.042	0.718
Rear Face	0.977	0.253	0.201	1.431

<Simultaneous Transmission Configuration 5>

Position	1xRTT BC1 (Voice)	1xEVDO BC0 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.724	0.23	0.205	1.159
Right Tilted	0.237	0.33	0.185	0.752
Left Cheek	0.715	0.188	0.129	1.032
Left Tilted	0.31	0.306	0.234	0.85
Hotspot Mode SAR				
Front Face	1.29	0.199	0.042	1.531
Rear Face	0.999	0.352	0.201	1.552
Left Side	0.113	0	0.053	0.166
Right Side	0.146	0.389	0	0.535
Top Side	0	0.067	0.28	0.347
Bottom Side	0.319	0	0	0.319
Body-Worn SAR				
Front Face	1.29	0.199	0.042	1.531
Rear Face	0.999	0.352	0.201	1.552

<Simultaneous Transmission Configuration 6>

Position	1xRTT BC1 (Voice)	1xEVDO BC1 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.724	0.406	0.205	1.335
Right Tilted	0.237	0.461	0.185	0.883
Left Cheek	0.715	0.497	0.129	1.341
Left Tilted	0.31	0.266	0.234	0.81
Hotspot Mode SAR				
Front Face	1.29	0.123	0.042	1.455
Rear Face	0.999	0.329	0.201	1.529
Left Side	0.113	0	0.053	0.166
Right Side	0.146	0.074	0	0.22
Top Side	0	0.291	0.28	0.571
Bottom Side	0.319	0	0	0.319
Body-Worn SAR				
Front Face	1.29	0.123	0.042	1.455
Rear Face	0.999	0.329	0.201	1.529

<Simultaneous Transmission Configuration 7>

Position	1xRTT BC1 (Voice)	1xEVDO BC10 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.724	0.416	0.205	1.345
Right Tilted	0.237	0.318	0.185	0.74
Left Cheek	0.715	0.378	0.129	1.222
Left Tilted	0.31	0.267	0.234	0.811
Hotspot Mode SAR				
Front Face	1.29	0.208	0.042	1.54
Rear Face	0.999	0.291	0.201	1.491
Left Side	0.113	0	0.053	0.166
Right Side	0.146	0.354	0	0.5
Top Side	0	0.042	0.28	0.322
Bottom Side	0.319	0	0	0.319
Body-Worn SAR				
Front Face	1.29	0.208	0.042	1.54
Rear Face	0.999	0.325	0.201	1.525

<Simultaneous Transmission Configuration 8>

Position	1xRTT BC1 (Voice)	LTE 25 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.724	0.21	0.205	1.139
Right Tilted	0.237	0.246	0.185	0.668
Left Cheek	0.715	0.292	0.129	1.136
Left Tilted	0.31	0.164	0.234	0.708
Hotspot Mode SAR				
Front Face	1.29	0.094	0.042	1.426
Rear Face	0.999	0.253	0.201	1.453
Left Side	0.113	0	0.053	0.166
Right Side	0.146	0.046	0	0.192
Top Side	0	0.217	0.28	0.497
Bottom Side	0.319	0	0	0.319
Body-Worn SAR				
Front Face	1.29	0.094	0.042	1.426
Rear Face	0.999	0.253	0.201	1.453

<Simultaneous Transmission Configuration 9>

Position	1xRTT BC10 (Voice)	1xEVDO BC0 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.332	0.23	0.205	0.767
Right Tilted	0.191	0.33	0.185	0.706
Left Cheek	0.361	0.188	0.129	0.678
Left Tilted	0.187	0.306	0.234	0.727
Hotspot Mode SAR				
Front Face	0.467	0.199	0.042	0.708
Rear Face	0.91	0.352	0.201	1.463
Left Side	0.556	0	0.053	0.609
Right Side	0.242	0.389	0	0.631
Top Side	0	0.067	0.28	0.347
Bottom Side	0.375	0	0	0.375
Body-Worn SAR				
Front Face	0.467	0.199	0.042	0.708
Rear Face	0.91	0.352	0.201	1.463

<Simultaneous Transmission Configuration 10>

Position	1xRTT BC10 (Voice)	1xEVDO BC1 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.332	0.406	0.205	0.943
Right Tilted	0.191	0.461	0.185	0.837
Left Cheek	0.361	0.497	0.129	0.987
Left Tilted	0.187	0.266	0.234	0.687
Hotspot Mode SAR				
Front Face	0.467	0.123	0.042	0.632
Rear Face	0.91	0.329	0.201	1.44
Left Side	0.556	0	0.053	0.609
Right Side	0.242	0.074	0	0.316
Top Side	0	0.291	0.28	0.571
Bottom Side	0.375	0	0	0.375
Body-Worn SAR				
Front Face	0.467	0.123	0.042	0.632
Rear Face	0.91	0.329	0.201	1.44

<Simultaneous Transmission Configuration 11>

Position	1xRTT BC10 (Voice)	1xEVDO BC10 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.332	0.416	0.205	0.953
Right Tilted	0.191	0.318	0.185	0.694
Left Cheek	0.361	0.378	0.129	0.868
Left Tilted	0.187	0.267	0.234	0.688
Hotspot Mode SAR				
Front Face	0.467	0.208	0.042	0.717
Rear Face	0.91	0.291	0.201	1.402
Left Side	0.556	0	0.053	0.609
Right Side	0.242	0.354	0	0.596
Top Side	0	0.042	0.28	0.322
Bottom Side	0.375	0	0	0.375
Body-Worn SAR				
Front Face	0.467	0.208	0.042	0.717
Rear Face	0.91	0.325	0.201	1.436

<Simultaneous Transmission Configuration 12>

Position	1xRTT BC10 (Voice)	LTE 25 (Data)	WLAN (Data)	Max. SAR Summation
Head SAR				
Right Cheek	0.332	0.21	0.205	0.747
Right Tilted	0.191	0.246	0.185	0.622
Left Cheek	0.361	0.292	0.129	0.782
Left Tilted	0.187	0.164	0.234	0.585
Hotspot Mode SAR				
Front Face	0.467	0.094	0.042	0.603
Rear Face	0.91	0.253	0.201	1.364
Left Side	0.556	0	0.053	0.609
Right Side	0.242	0.046	0	0.288
Top Side	0	0.217	0.28	0.497
Bottom Side	0.375	0	0	0.375
Body-Worn SAR				
Front Face	0.467	0.094	0.042	0.603
Rear Face	0.91	0.253	0.201	1.364

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. 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
System Validation Kit	SPEAG	D835V2	4d092	Jun. 22, 2011	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3590	Feb. 23, 2012	Annual
Data Acquisition Electronics	SPEAG	DAE4	1277	Jul. 29, 2011	Annual
SAM Phantom	SPEAG	QD000P40CD	TP-1653	N/A	N/A
Radio Communication Tester	Agilent	E5515C	MY50266628	Sep. 26, 2011	Biennial
ENA Series Network Analyzer	Agilent	E5071C	MY46107999	Mar. 24, 2012	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
Thermometer	YFE	YF-160A	110600361	Feb. 21, 2012	Annual

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:

Taiwan HwaYa EMC/RF/Safety/Telecom Lab:
Add: No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil., Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.
Tel: 886-3-318-3232
Fax: 886-3-318-5050

Taiwan LinKo EMC/RF Lab:
Add: No. 47, 14th Ling, Chia Pau Vil., Linkou Dist., New Taipei City 244, Taiwan, R.O.C.
Tel: 886-2-2605-2180
Fax: 886-2-2605-1924

Taiwan HsinChu EMC/RF Lab:
Add: No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Vil., Chiung Lin Township, Hsinchu County 307, Taiwan, R.O.C.
Tel: 886-3-593-5343
Fax: 886-3-593-5342

Email: service.adt@tw.bureauveritas.com
Web Site: www.adt.com.tw

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

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Appendix A. SAR Plots of System Verification

The plots for system verification are shown as follows.

Appendix B. SAR Plots of SAR Measurement

The plots for SAR measurement are shown as follows.

Appendix C. Calibration Certificate for Probe and Dipole

The SPEAG calibration certificates are shown as follows.

Appendix D. Photographs of EUT and Setup