FCC SAR Test Report

Report No.	:	**SA120309C18**
Applicant	:	**Panasonic Corporation of North America**
Address	:	**One Panasonic Way, 4B-8 Secaucus, NJ 07094**
Product	:	**Tablet PC**
FCC ID	:	**ACJ9TGFZ-A12**
Brand	:	**Panasonic**
Model No.	:	**FZ-A1BDAAVAM**
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 447498 D01 v04** **KDB 941225 D01 v02 / KDB 941225 D05 v01**
Date of Testing	:	**Mar. 03, 2012 ~ Jun. 13, 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	Jun. 13, 2012

1. Summary of Maximum SAR Value

Mode / Band	Test Position	SAR-1g (W/kg)
CDMA2000 BC0	Body (0 cm Gap)	1.22
CDMA2000 BC1	Body (0 cm Gap)	1.22
LTE Band 13	Body (0 cm Gap)	1.25
WLAN 2.4GHz	Body (0 cm Gap)	0.359
WLAN 5GHz	Body (0 cm Gap)	0.531
Bluetooth	Body (0 cm Gap)	N/A

Note:

1. 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. Since the Bluetooth maximum power is less than 60/f, the SAR testing for Bluetooth is not required.

2. Description of Equipment Under Test

EUT Type	Tablet PC
FCC ID	ACJ9TGFZ-A12
Brand Name	Panasonic
Model Name	FZ-A1BDAAVAM
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 ~ 5850 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	Band 13 : 5 MHz, 10 MHz
Maximum AVG Conducted Power (Unit: dBm)	CDMA2000 BC0 : 24.08 CDMA2000 BC1 : 24.23 LTE Band 13 : 22.55 802.11b : 13.47 802.11g : 12.38 802.11n HT20 (2.4GHz) : 12.24 802.11n HT40 (2.4GHz) : 12.12 802.11a : 10.64 802.11n HT20 (5GHz) : 12.76 802.11n HT40 (5GHz) : 12.82 Bluetooth : 0.06
Antenna Type	Fixed Internal Antenna
EUT Stage	Identical Prototype

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.

List of Accessory:

AC Adapter	**Brand Name**	JRC
	Model Name	NJD-9370
	Power Rating	I/P:100-240Vac, 0.5A ~ 0.3A, 50/60Hz; O/P: 12Vdc, 2.0A
	DC Power Cord Type	0.7 meter non-shielded cable without ferrite core
Battery	**Brand Name**	SANYO
	Model Name	2UF484462-3-T0775
	Power Rating	7.4Vdc
	Type	Li-ion
LCD Panel	**Brand Name**	Hannstar
	Model Name	HSD100PXN1
Main Camera	**Brand Name**	D-Max Technology
	Model Name	HAC-001502-W1A
2nd Camera	**Brand Name**	D-Max Technology
	Model Name	HAC-002103-W1A

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.

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.

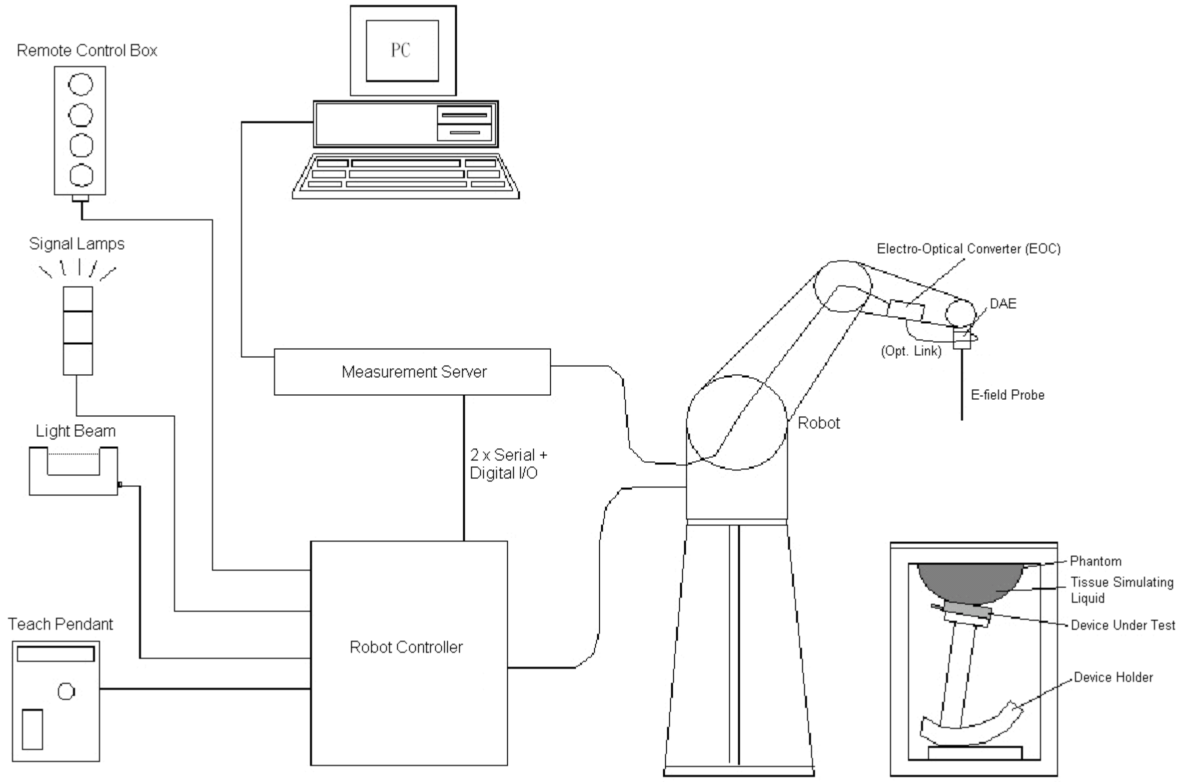


Fig-3.1 DASY System Setup

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 Table-3.1.

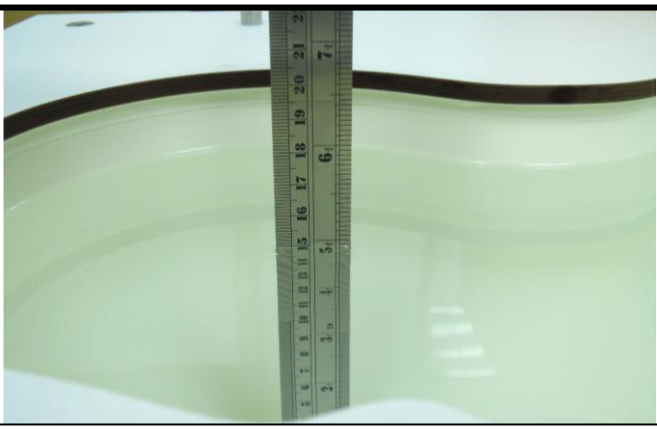


Photo of Liquid Height for Head Position

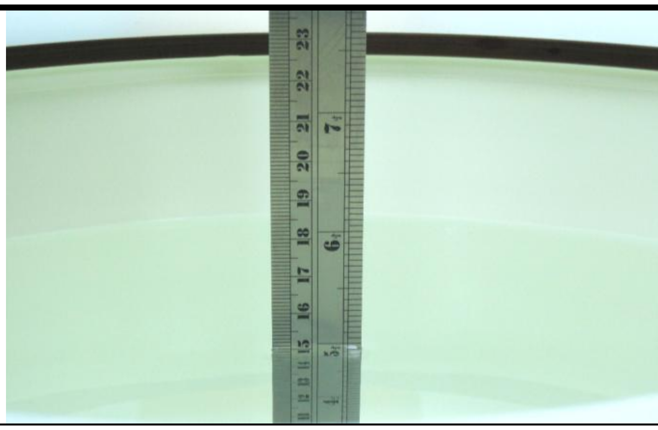


Photo of Liquid Height for Body Position

The dielectric properties of the head tissue simulating liquids are defined in IEEE 1528 and FCC OET 65 Supplement C Appendix C. For the body tissue simulating liquids, the dielectric properties are defined in FCC OET 65 Supplement C Appendix C. 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 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
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.

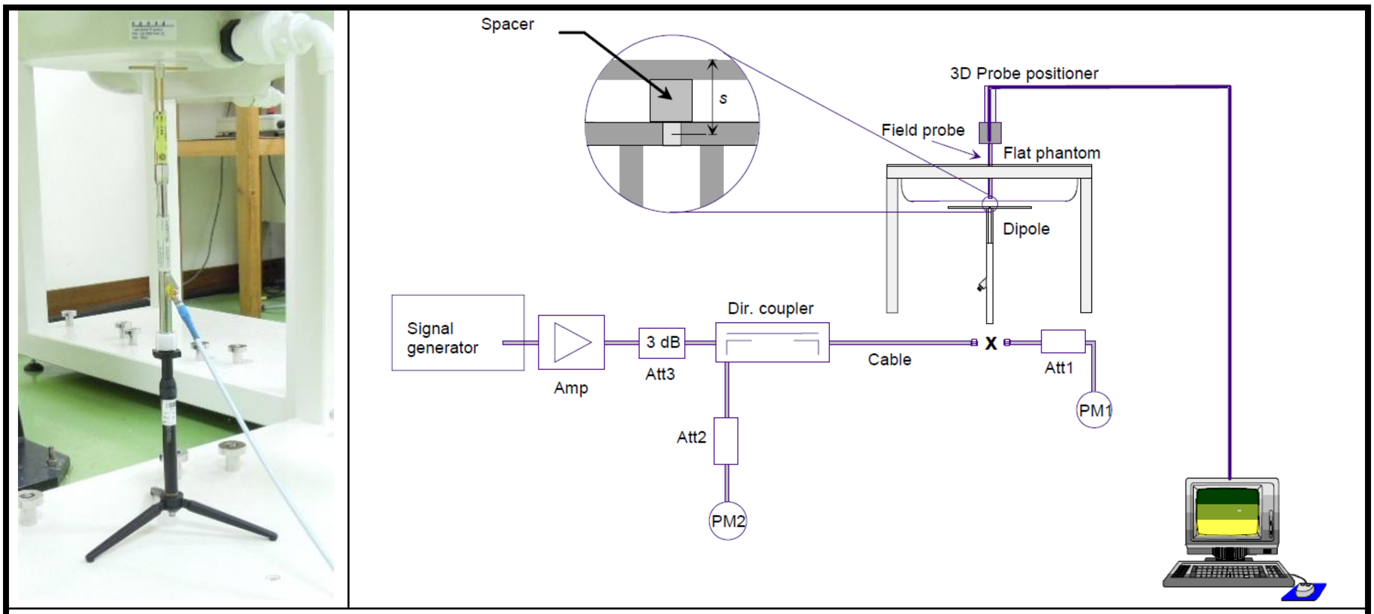


Fig-3.4 System Verification Setup

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

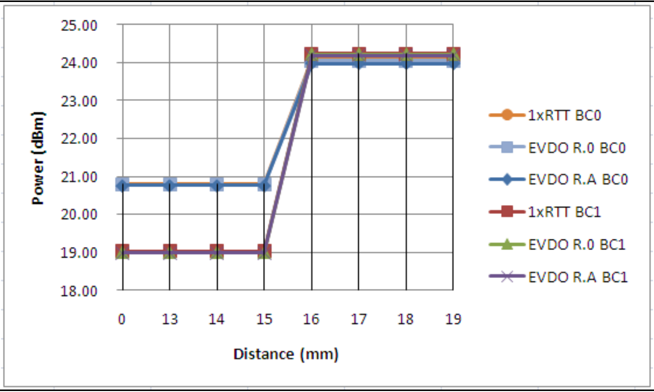
In DASY, the interpolation and extrapolation are both based on the modified Quadratic Shepard's method. The interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation.

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.

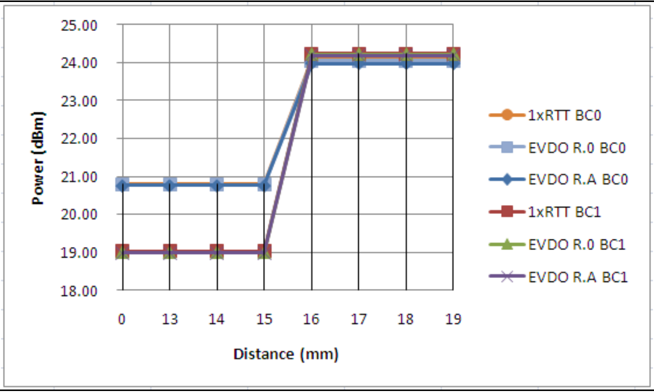
4. SAR Measurement Evaluation

4.1 EUT Configuration and Setting

The device is tablet PC which supports WWAN, WLAN, Bluetooth and wireless hotspot capabilities. This tablet PC can be used for four display orientations. It is designed with a proximity sensor which can trigger/not trigger power reduction for CDMA BC0 and BC1 on EUT Rear Face and Secondary Portrait orientations. The other RF capabilities (LTE, WLAN and BT) have no power reduction. The power vs distance plots for EUT Rear Face and Secondary Portrait edge are shown as below.



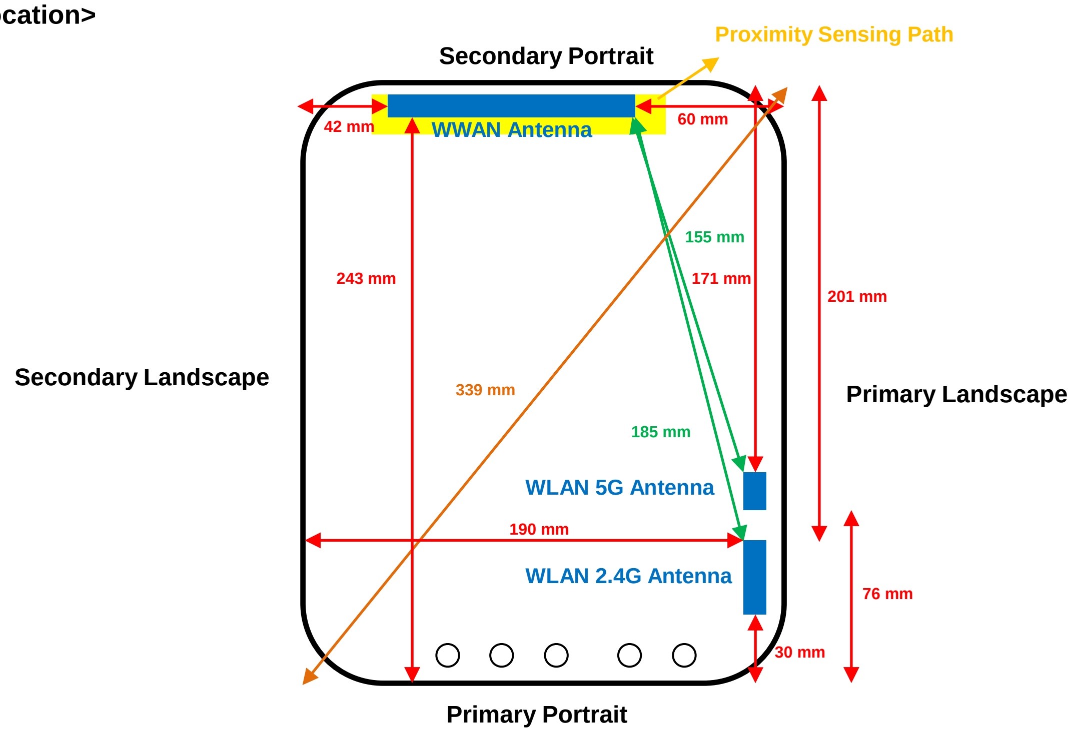
Power vs Distance for EUT Rear Face



Power vs Distance for Secondary Portrait Edge

Based on the separation distance for the sensor triggered / not triggered, we test SAR with power reduction at 0 mm, and test SAR without power reduction at 15 mm for EUT Rear Face and Secondary Portrait edge.

<Antenna Location>

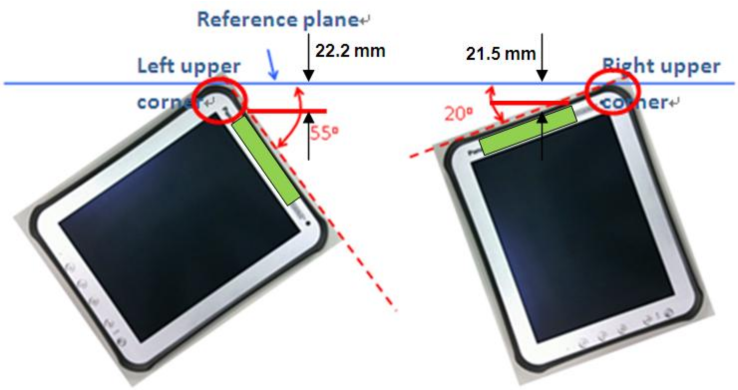


<EUT Front View>

The angle of proximity sensor triggered / not triggered at the corner of Top Left and Top Right is listed as below. Based on the angle, we test SAR without power reduction at 55° for Top Edge/Left Corner, and 20° for Top Edge/Right Corner.

Angle of Top Edge/Left Corner	0° ~ 54°	55°	56°	57°
Proximity Sensor Status	Triggered	Triggered	Not Triggered	Not Triggered

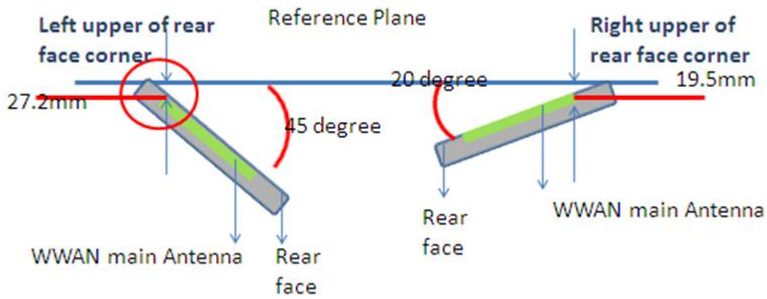
Angle of Top Edge/Right Corner	0° ~ 19°	20°	21°	22°
Proximity Sensor Status	Triggered	Triggered	Not Triggered	Not Triggered



The angle of proximity sensor triggered / not triggered at the corner of EUT Rear Face of Top Left and Top Right is listed as below. Based on the angle, we test SAR without power reduction at 45° for Top Edge/Left Rear Corner, and 20° for Top Edge/Right Rear Corner.

Angle of Top Edge/Left Rear Corner	0° ~ 44°	45°	46°	47°
Proximity Sensor Status	Triggered	Triggered	Not Triggered	Not Triggered

Angle of Top Edge/Right Rear Corner	0° ~ 19°	20°	21°	22°
Proximity Sensor Status	Triggered	Triggered	Not Triggered	Not Triggered



The simultaneous transmission possibilities are listed as below.

Simultaneous Tx Combination	RF Configuration
1	1xRTT Data (BC0) + WLAN (2.4G)
2	EVDO Data (BC0) + WLAN (2.4G)
3	1xRTT Data (BC1) + WLAN (2.4G)
4	EVDO Data (BC1) + WLAN (2.4G)
5	1xRTT Data (BC0) + WLAN (5G)
6	EVDO Data (BC0) + WLAN (5G)
7	1xRTT Data (BC1) + WLAN (5G)
8	EVDO Data (BC1) + WLAN (5G)
9	LTE Data (Band 13) + WLAN 2.4G
10	LTE Data (Band 13) + WLAN 5G
11	1xRTT Data (BC0) + BT
12	EVDO Data (BC0) + BT
13	1xRTT Data (BC1) + BT
14	EVDO Data (BC1) + BT
15	LTE Data (Band 13) + BT

Note : The WLAN operating band for 2.4GHz and 5G cannot simultaneous transmission.

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 CDMA2000, 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 CDMA, SAR is tested under EVDO Rev.0 mode using Reverse Data Channel rate of 153.6 kbps in subtype 0/1 Physical Layer Configurations, and the power control set “All Up Bits”. SAR for EVDO Rev.A is not required since its power is less than EVDO Rev.0. SAR for 1xRTT is not required since its power is less than 1/4 dB higher than EVDO Rev.0. The steps for system simulator (Agilent E5515C) setup are as below.
1. Set the Sector ID
2. Set the Protocol Release
3. Set the Cell Band and connecting Channel
4. Set the RTAP Rate
5. Set the power control
6. Press “Start Data Connection” button

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 1 Mbps for 802.11b, 6 Mbps for 802.11g, and MCS0 for 802.11n HT20 and 802.11n HT40 due to the highest RF output power.

4.2 EUT Testing Position

The proximity sensor is only active for CDMA on EUT Rear Face and Secondary Portrait edge. According to KDB 447498, the SAR is required for antenna located within 5 cm from edge. Based on the antenna location shown on section 4.1 of this report, SAR testing condition for each antenna is listed as below.

Mode	Testing Position	Power Reduction	Separation Distance (mm)	SAR Testing
CDMA BC0 / BC1	Rear Face	Yes	0	Yes
	Rear Face	No	15	Yes
	Primary Portrait	No	0	No
	Secondary Portrait	Yes	0	Yes
	Secondary Portrait	No	15	Yes
	Primary Landscape	No	0	No
	Secondary Landscape	No	0	Yes
LTE Band 13	Rear Face	No	0	Yes
	Primary Portrait	No	0	No
	Secondary Portrait	No	0	Yes
	Primary Landscape	No	0	No
	Secondary Landscape	No	0	Yes
WLAN 2.4G	Rear Face	No	0	Yes
	Primary Portrait	No	0	Yes
	Secondary Portrait	No	0	No
	Primary Landscape	No	0	Yes
	Secondary Landscape	No	0	No
WLAN 5G	Rear Face	No	0	Yes
	Primary Portrait	No	0	No
	Secondary Portrait	No	0	No
	Primary Landscape	No	0	Yes
	Secondary Landscape	No	0	No

Note : This EUT supports wireless hotspot mode operated on WWAN (CDMA and LTE) and WLAN 2.4G. SAR evaluation for wireless hotspot mode is covered by body mode.

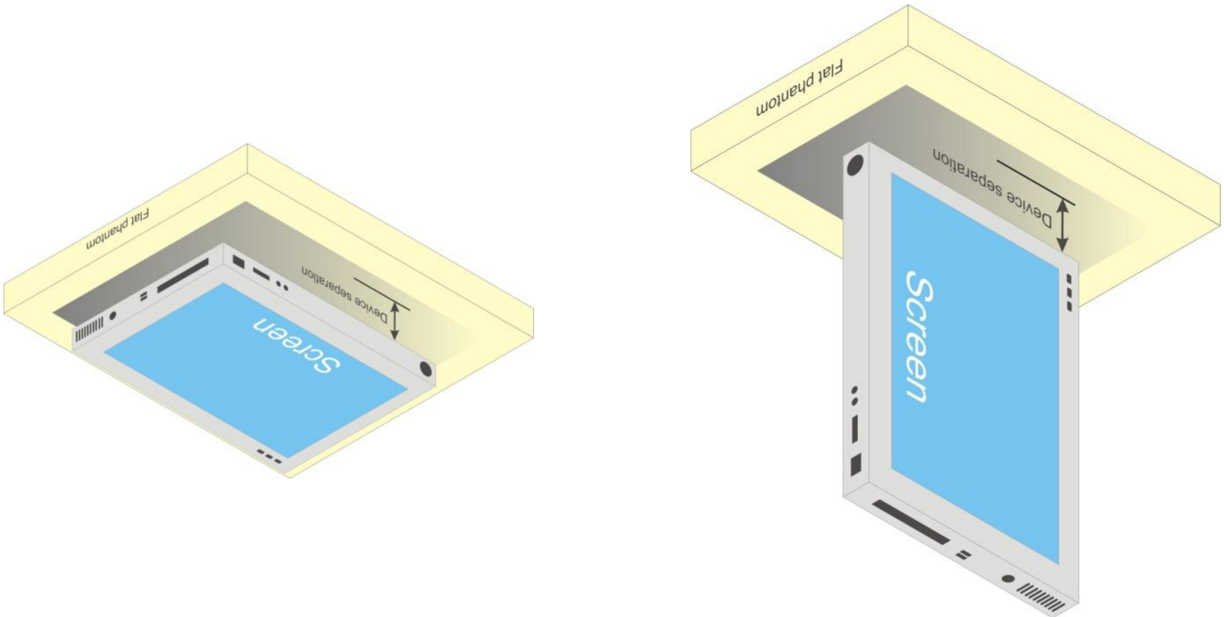


Fig-4.1 Illustration for Tablet Setup

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
B750	750	21.1	0.967	55.261	0.96	55.5	0.73	-0.43	Apr. 06, 2012
B750	750	20.8	0.961	55.175	0.96	55.5	0.10	-0.59	Jun. 08, 2012
B750	750	21.5	0.966	55.3	0.96	55.5	0.63	-0.36	Jun. 13, 2012
B835	835	21.5	0.997	55.338	0.97	55.2	2.78	0.25	Apr. 06, 2012
B835	835	20.6	0.992	55.559	0.97	55.2	2.27	0.65	Apr. 27, 2012
B835	835	21.2	0.992	55.615	0.97	55.2	2.27	0.75	May 15, 2012
B1900	1900	20.6	1.544	52.883	1.52	53.3	1.58	-0.78	Apr. 07, 2012
B1900	1900	20.7	1.56	54.832	1.52	53.3	2.63	2.87	Apr. 27, 2012
B1900	1900	20.8	1.555	54.192	1.52	53.3	2.30	1.67	Apr. 30, 2012
B1900	1900	21.0	1.56	54.488	1.52	53.3	2.63	2.23	May 16, 2012
B2450	2450	21.0	1.976	50.932	1.95	52.7	1.33	-3.35	Mar. 05, 2012
B5G	5200	20.5	5.232	49.227	5.30	49.0	-1.28	0.46	Mar. 03, 2012
B5G	5200	21.1	5.227	49.253	5.30	49.0	-1.38	0.52	Mar. 05, 2012
B5G	5500	21.1	5.701	48.97	5.65	48.6	0.90	0.76	Mar. 05, 2012
B5G	5800	21.1	6.206	48.332	6.00	48.2	3.43	0.27	Mar. 05, 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
Apr. 06, 2012	750	8.76	2.02	8.08	-7.76	1004	3800	905
Jun. 08, 2012	750	8.76	2.32	9.28	5.94	1004	3650	1277
Jun. 13, 2012	750	8.76	2.10	8.40	-4.11	1013	3590	861
Apr. 06, 2012	835	9.65	2.60	10.40	7.77	4d092	3800	905
Apr. 27, 2012	835	9.65	2.38	9.52	-1.35	4d092	3800	905
May 15, 2012	835	9.65	2.35	9.40	-2.59	4d092	3071	579
Apr. 07, 2012	1900	38.90	9.54	38.16	-1.90	5d036	3800	905
Apr. 27, 2012	1900	38.90	9.65	38.60	-0.77	5d036	3800	905
Apr. 30, 2012	1900	38.90	9.62	38.48	-1.08	5d036	3800	905
May 16, 2012	1900	38.90	9.72	38.88	-0.05	5d036	3071	579
Mar. 05, 2012	2450	50.00	12.40	49.60	-0.80	737	3650	861
Mar. 03, 2012	5200	72.70	7.60	76.00	4.54	1018	3650	861
Mar. 05, 2012	5200	72.70	7.20	72.00	-0.96	1018	3650	861
Mar. 05, 2012	5500	78.30	8.18	81.80	4.47	1018	3650	861
Mar. 05, 2012	5800	73.40	7.06	70.60	-3.81	1018	3650	861

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 (MHz)	**824.70**	**836.52**	**848.31**	**1851.25**	**1880.00**	**1908.75**
EUT without Power Reduction						
1xRTT RC3+SO32	**24.08**	23.91	23.69	24.16	24.21	**24.23**
1xEVDO Rev.0 RTAP 153.6	24.05	23.94	23.80	24.13	24.20	24.22
1xEVDO Rev.A RETAP 4096	23.98	23.82	23.74	24.19	24.12	24.13
EUT with Power Reduction						
1xRTT RC3+SO32	**20.80**	20.66	20.54	18.96	19.00	**19.03**
1xEVDO Rev.0 RTAP 153.6	20.78	20.65	20.53	18.94	18.95	18.99
1xEVDO Rev.A RETAP 4096	20.73	20.76	20.62	18.86	18.98	18.90

LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
5 MHz	QPSK	23205	779.5	1	0	0	23	22.31
		23230	782.0	1	0	0	23	22.42
		23255	784.5	1	0	0	23	22.37
		23205	779.5	1	24	0	23	22.42
		23230	782	1	24	0	23	22.45
		23255	784.5	1	24	0	23	22.39
		23205	779.5	12	6	1	23	21.22
		23230	782	12	6	1	23	21.46
		23255	784.5	12	6	1	23	21.37
		23205	779.5	25	0	1	23	21.26
		23230	782	25	0	1	23	21.33
		23255	784.5	25	0	1	23	21.29
	16QAM	23205	779.5	1	0	1	23	21.6
		23230	782.0	1	0	1	23	21.63
		23255	784.5	1	0	1	23	21.64
		23205	779.5	1	24	1	23	21.62
		23230	782	1	24	1	23	21.77
		23255	784.5	1	24	1	23	21.74
		23205	779.5	12	6	2	23	20.2
		23230	782	12	6	2	23	20.41
		23255	784.5	12	6	2	23	20.39
		23205	779.5	25	0	2	23	20.73
		23230	782	25	0	2	23	20.93
		23255	784.5	25	0	2	23	20.82
10 MHz	QPSK	23230	782	1	0	0	23	22.51
		23230	782	1	49	0	23	22.55
		23230	782	25	12	1	23	21.72
		23230	782	50	0	1	23	21.66
	16QAM	23230	782	1	0	1	23	22.03
		23230	782	1	49	1	23	22.03
		23230	782	25	12	2	23	21.09
		23230	782	50	0	2	23	20.78

Band	802.11b			802.11g		
Channel	1	6	11	1	6	11
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	13.47	12.94	13.18	12.38	11.77	11.97

Band	802.11n (HT20)			802.11n (HT40)		
Channel	1	6	11	3	6	9
Frequency (MHz)	2412	2437	2462	2422	2437	2452
Average Power	12.24	11.76	11.85	12.12	12.07	11.41

Band	802.11a							
Channel	36	40	44	48	52	56	60	64
Frequency (MHz)	5180	5200	5220	5240	5260	5280	5300	5320
Average Power	9.17	9.06	8.94	8.41	8.40	8.87	7.85	7.76

Band	802.11a							
Channel	100	104	108	112	116	132	136	140
Frequency (MHz)	5500	5520	5540	5560	5580	5660	5680	5700
Average Power	10.26	10.56	10.64	10.64	9.96	9.59	8.89	8.72

Band	802.11a							
Channel	149	153	157	161	165	-	-	-
Frequency (MHz)	5745	5765	5785	5805	5825	-	-	-
Average Power	9.01	8.92	8.68	8.81	8.86	-	-	-

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	11.06	11.07	10.74	10.18	10.22	10.85	9.68	9.59

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	12.22	12.62	12.63	12.76	11.90	11.64	10.86	10.63

Band	802.11n (HT20)							
Channel	149	153	157	161	165	-	-	-
Frequency (MHz)	5745	5765	5785	5805	5825	-	-	-
Average Power	11.45	11.33	11.10	11.27	11.21	-	-	-

Band	802.11n (HT40)							
Channel	38	46	54	62	102	134	151	159
Frequency (MHz)	5190	5230	5270	5310	5510	5670	5755	5795
Average Power	11.59	11.21	10.71	10.90	12.82	11.75	11.56	11.20

4.6 SAR Testing Results

4.6.1 SAR Results for Body

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	Power Reduction	SAR-1g (W/kg)
1	CDMA2000 BC0	EVDO Rev.0	Rear Face	0	1013	w/	1.12
2	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait	0	1013	w/	1
33	CDMA2000 BC0	EVDO Rev.0	Rear Face	0	384	w/	**1.22**
34	CDMA2000 BC0	EVDO Rev.0	Rear Face	0	777	w/	1.12
35	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait	0	384	w/	1.09
36	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait	0	777	w/	1.03
66	CDMA2000 BC0	EVDO Rev.0	Rear Face	1.5	1013	w/o	0.473
92	CDMA2000 BC0	EVDO Rev.0	Rear Face (Top Edge/Left Rear Corner at 45°)	0	1013	w/o	0.046
91	CDMA2000 BC0	EVDO Rev.0	Rear Face (Top Edge/Right Rear Corner at 20°)	0	1013	w/o	0.571
67	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait	1.5	1013	w/o	0.574
68	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait (Top Edge/Left Corner at 55°)	0	1013	w/o	0.15
69	CDMA2000 BC0	EVDO Rev.0	Secondary Portrait (Top Edge/Right Corner at 20°)	0	1013	w/o	0.121
5	CDMA2000 BC0	EVDO Rev.0	Secondary Landscape	0	1013	w/o	0.244
80	CDMA2000 BC1	EVDO Rev.0	Rear Face	0	1175	w/	0.932
81	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait	0	1175	w/	**1.22**
82	CDMA2000 BC1	EVDO Rev.0	Rear Face	0	25	w/	0.826
83	CDMA2000 BC1	EVDO Rev.0	Rear Face	0	600	w/	0.988
84	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait	0	25	w/	1
85	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait	0	600	w/	1.09
70	CDMA2000 BC1	EVDO Rev.0	Rear Face	1.5	1175	w/o	0.491
93	CDMA2000 BC1	EVDO Rev.0	Rear Face (Top Edge/Left Rear Corner at 45°)	0	1175	w/o	0.111
94	CDMA2000 BC1	EVDO Rev.0	Rear Face (Top Edge/Right Rear Corner at 20°)	0	1175	w/o	0.226
71	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait	1.5	1175	w/o	0.659
72	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait (Top Edge/Left Corner at 55°)	0	1175	w/o	1.1
73	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait (Top Edge/Right Corner at 20°)	0	1175	w/o	0.274
11	CDMA2000 BC1	EVDO Rev.0	Secondary Landscape	0	1175	w/o	0.226
74	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait (Top Edge/Left Corner at 55°)	0	25	w/o	0.564
75	CDMA2000 BC1	EVDO Rev.0	Secondary Portrait (Top Edge/Left Corner at 55°)	0	600	w/o	0.806

Note:

1. According to KDB 941225, the SAR testing for 1xRTT is not required since the 1xRTT maximum power is less 1/4 dB higher than 1xEVDO Rev.0.
2. According to KDB 941225, the SAR testing for 1xEVDO Rev.A is not required since the 1xEVDO Rev.A maximum power is less than 1xEVDO REV.0.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	RB	Offset	SAR-1g (W/kg)
12	LTE 13	QPSK_10M	Rear Face	0	23230	25	12	1.13
15	LTE 13	QPSK_10M	Rear Face	0	23230	1	0	**1.25**
18	LTE 13	QPSK_10M	Rear Face	0	23230	1	49	1.2
13	LTE 13	QPSK_10M	Secondary Portrait	0	23230	25	12	1.04
16	LTE 13	QPSK_10M	Secondary Portrait	0	23230	1	0	1.23
19	LTE 13	QPSK_10M	Secondary Portrait	0	23230	1	49	1.19
14	LTE 13	QPSK_10M	Secondary Landscape	0	23230	25	12	0.143
17	LTE 13	QPSK_10M	Secondary Landscape	0	23230	1	0	0.161
20	LTE 13	QPSK_10M	Secondary Landscape	0	23230	1	49	0.139
21	LTE 13	16QAM_10M	Rear Face	0	23230	25	12	1.04
22	LTE 13	16QAM_10M	Rear Face	0	23230	1	0	1.1
23	LTE 13	16QAM_10M	Rear Face	0	23230	1	49	1.05
95	LTE 13	16QAM_10M	Secondary Portrait	0	23230	25	12	0.92
96	LTE 13	16QAM_10M	Secondary Portrait	0	23230	1	0	1.09
97	LTE 13	16QAM_10M	Secondary Portrait	0	23230	1	49	1.05
98	LTE 13	16QAM_10M	Secondary Landscape	0	23230	25	12	0.096
99	LTE 13	16QAM_10M	Secondary Landscape	0	23230	1	0	0.104
100	LTE 13	16QAM_10M	Secondary Landscape	0	23230	1	49	0.094

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.
3. Since the SAR value on Secondary Landscape is smaller than other positions and the 16QAM SAR is also less than QPSK, SAR testing for 16QAM has performed on Rear Face and Secondary Portrait only.

Plot No.	Band	Mode	Test Position	Separation Distance (cm)	Channel	SAR-1g (W/kg)
43	802.11b	-	Rear Face	0	1	**0.359**
44	802.11b	-	Primary Portrait	0	1	0.065
45	802.11b	-	Primary Landscape	0	1	0.248
46	802.11a	-	Rear Face	0	36	0.277
47	802.11a	-	Primary Portrait	0	36	0.014
48	802.11a	-	Primary Landscape	0	36	0.196
49	802.11n	HT20	Rear Face	0	40	0.311
50	802.11n	HT40	Rear Face	0	38	0.407
51	802.11a	-	Rear Face	0	56	0.133
52	802.11a	-	Primary Portrait	0	56	0.02
53	802.11a	-	Primary Landscape	0	56	0.172
54	802.11n	HT20	Primary Landscape	0	56	0.24
55	802.11n	HT40	Primary Landscape	0	62	0.235
56	802.11a	-	Rear Face	0	112	0.354
57	802.11a	-	Primary Portrait	0	112	0.037
58	802.11a	-	Primary Landscape	0	112	0.223
59	802.11n	HT20	Rear Face	0	112	**0.531**
60	802.11n	HT40	Rear Face	0	102	0.482
61	802.11a	-	Rear Face	0	149	0.206
62	802.11a	-	Primary Portrait	0	149	0.021
63	802.11a	-	Primary Landscape	0	149	0.134
64	802.11n	HT20	Rear Face	0	149	0.262
65	802.11n	HT40	Rear Face	0	151	0.253

Note:

1. According to KDB 248227, the SAR testing for other channels is not required because the highest power channel SAR is less than 0.8 W/kg.
2. SAR testing for Bluetooth is not required because the maximum output power of Bluetooth is less than 60/f.

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4.6.2 Simultaneous Multi-band Transmission Evaluation

No.	Conditions (SAR1 + SAR2)	Position	Max. SAR1	Max. SAR2	SAR Summation	SPLSR
1	**CDMA BC0 + WLAN 2.4G**	Rear Face	1.22	0.359	1.579	-
		Primary Portrait	0	0.065	0.065	-
		Primary Landscape	0	0.248	0.248	-
		Secondary Portrait	1.09	0	1.09	-
		Secondary Landscape	0.244	0	0.244	-
	CDMA BC0 + WLAN 5G	Rear Face	1.22	0.531	**1.751**	0.084
		Primary Portrait	0	0.037	0.037	-
		Primary Landscape	0	0.24	0.24	-
		Secondary Portrait	1.09	0	1.09	-
		Secondary Landscape	0.244	0	0.244	-
2	**CDMA BC1 + WLAN 2.4G**	Rear Face	0.988	0.359	1.347	-
		Primary Portrait	0	0.065	0.065	-
		Primary Landscape	0	0.248	0.248	-
		Secondary Portrait	1.22	0	1.22	-
		Secondary Landscape	0.226	0	0.226	-
	CDMA BC1 + WLAN 5G	Rear Face	0.988	0.531	1.519	-
		Primary Portrait	0	0.037	0.037	-
		Primary Landscape	0	0.24	0.24	-
		Secondary Portrait	1.22	0	1.22	-
		Secondary Landscape	0.226	0	0.226	-
3	**LTE 13 + WLAN 2.4G**	Rear Face	1.25	0.359	**1.609**	0.064
		Primary Portrait	0	0.065	0.065	-
		Primary Landscape	0	0.248	0.248	-
		Secondary Portrait	1.23	0	1.23	-
		Secondary Landscape	0.161	0	0.161	-
	LTE 13 + WLAN 5G	Rear Face	1.25	0.531	**1.781**	0.085
		Primary Portrait	0	0.037	0.037	-
		Primary Landscape	0	0.24	0.24	-
		Secondary Portrait	1.23	0	1.23	-
		Secondary Landscape	0.161	0	0.161	-

Note:

1. The maximum SAR summation is calculated based on the same configuration and test position.
2. The calculation of SPLSR is as follows.

<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
   Peak Location Separation = $\mathrm{Sqrt}[(X_1 - X_2)^2 + (Y_1 - Y_2)^2 + (Z_1 - Z_2)^2]$
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.

The calculation of SPLSR for (CDMA BC0 + WLAN 5G, Rear Face) is as below:
Coordinate of Peak SAR Location (X, Y, Z) :
CDMA BC0 (0.02, 0.1232, -0.1793)
WLAN 5G (-0.0916, -0.052, -0.1786)
Peak Location Spacing = 20.8 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (1.22 + 0.531) / 20.8 = 0.084

The calculation of SPLSR for (LTE 13 + WLAN 2.4G, Rear Face) is as below:
Coordinate of Peak SAR Location (X, Y, Z) :
LTE 13 (0.0256, 0.1228, -0.1798)
WLAN 2.4G (-0.094, -0.1, -0.176)
Peak Location Spacing = 25.3 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (1.25 + 0.359) / 25.3 = 0.064

The calculation of SPLSR for (LTE 13 + WLAN 5G, Rear Face) is as below:
Coordinate of Peak SAR Location (X, Y, Z) :
LTE 13 (0.0256, 0.1228, -0.1798)
WLAN 5G (-0.0916, -0.052, -0.1786)
Peak Location Spacing = 21.0 cm
SPLSR (SAR to Peak Location Spacing Ratio) = (1.25 + 0.531) / 21.0 = 0.085

According to KDB 447498, the simultaneous transmission SAR for WWAN and WLAN was not required because the SAR summation is less than 1.6 W/kg or SPLSR is less than 0.3. The Bluetooth standalone SAR and simultaneous transmission SAR for WWAN and Bluetooth were not required, because the output power of Bluetooth is less than 60/f. The WLAN and Bluetooth cannot transmit simultaneously, so there is no co-location test requirement for WLAN and Bluetooth.

5. Calibration of Test Equipment

Equipment	Manufacturer	Model	SN	Cal. Date	Cal. Interval
System Validation Kit	SPEAG	D750V3	1004	Jan. 27, 2012	Annual
System Validation Kit	SPEAG	D750V3	1013	Apr. 25, 2012	Annual
System Validation Kit	SPEAG	D835V2	4d092	Jun. 22, 2011	Annual
System Validation Kit	SPEAG	D1900V2	5d036	Jan. 26, 2012	Annual
System Validation Kit	SPEAG	D2450V2	737	Jan. 24, 2012	Annual
System Validation Kit	SPEAG	D5GHzV2	1018	Jan. 18, 2012	Annual
System Validation Kit	SPEAG	ES3DV3	3071	Jun. 22, 2012	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3590	Feb. 23, 2012	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3650	Oct. 26, 2011	Annual
Dosimetric E-Field Probe	SPEAG	EX3DV4	3800	Aug. 05, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	579	Apr. 27, 2012	Annual
Data Acquisition Electronics	SPEAG	DAE4	861	Aug. 29, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	905	Jun. 24, 2011	Annual
Data Acquisition Electronics	SPEAG	DAE4	1277	Jul. 29, 2011	Annual
ELI Phantom	SPEAG	QDOVA001B	TP-1039	N/A	N/A
ELI Phantom	SPEAG	QDOVA001B	TP-1043	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. 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
Power Meter	Anritsu	ML2495A	1218009	May 07, 2012	Annual
Power Sensor	Anritsu	MA2411B	1207252	May 07, 2012	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.)	2.78	Normal	1	0.64	± 1.8 %	∞
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	3.35	Normal	1	0.6	± 2.0 %	∞
Combined Standard Uncertainty					± 11.2 %	
Expanded Uncertainty (K=2)					**± 22.3 %**	

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.)	3.43	Normal	1	0.64	± 2.2 %	∞
Liquid Permittivity (Target)	5.0	Rectangular	√3	0.6	± 1.7 %	∞
Liquid Permittivity (Meas.)	0.76	Normal	1	0.6	± 0.5 %	∞
Combined Standard Uncertainty					± 12.9 %	
Expanded Uncertainty (K=2)					**± 25.7 %**	

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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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