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SAR COMPLIANCE EVALUATION REPORT

Applicant Name: Panasonic Corporation of North America One Panasonic Way, 4B-8 Secaucus, NJ 07094 United States	**Date of Testing:** 03/22/10 - 05/20/10 **Test Site/Location:** PCTEST Lab, Columbia, MD, USA **Test Report Serial No.:** 0Y1004290745.ACJ

FCC ID:	**ACJ9TGCF-19E**
APPLICANT:	**PANASONIC CORPORATION OF NORTH AMERICA**

EUT Type:	Convertible Tablet PC with WLAN, Bluetooth and WWAN
Application Type:	Certification
FCC Rule Part(s):	CFR §2.1093; FCC/OET Bulletin 65 Supplement C [June 2001]
FCC Classification:	Unlicensed National Information Infrastructure (UNII)/ Licensed Non-Broadcast Transmitter (TNB) / Digital Transmission system (DTS)/FCC Part 15 Frequency Hopping Spread Spectrum Transceiver (DSS)
FCC Model(s):	CF-19mk4
Tx Frequency:	2501 - 2685.6 MHz(TD-CDMA) 2412 - 2462 MHz(WLAN 802.11b/g/n) / 5180 - 5240 MHz(WLAN 802.11a/n) 5260 - 5320 MHz(WLAN 802.11a/n) / 5500 - 5700 MHz(WLAN 802.11a/n)
Conducted Power:	24.7 dBm TD-CDMA 13.61 dBm 802.11b/14.47 dBm 802.11g/14.72 dBm 802.11n 2.4GHz 14.46 dBm 802.11a 5.2 GHz / 13.85 dBm 802.11n 5.2 GHz 14.44 dBm 802.11a 5.3 GHz / 13.72 dBm 802.11n 5.3 GHz 14.96 dBm 802.11a 5.5 GHz / 13.94 dBm 802.11n 5.5 GHz 14.35 dBm 802.11a 5.8 GHz / 14.23 dBm 802.11n 5.8 GHz 13.67 dBm Bluetooth
Max. SAR Measurement:	0.26 W/kg TD-CDMA 0.06 W/kg 802.11b / 0.08 W/kg 802.11g / 0.04 W/kg 802.11n 2.4 GHz 0.03 W/kg 802.11a 5.2 GHz /0.04 W/kg 802.11a 5.3 GHz 0.04 W/kg 802.11a 5.5 GHz / 0.10 W/kg 802.11a 5.8 GHz 0.05 W/kg Bluetooth
EUT Serial No.:	Pre-Production [S/N: 9JKSA00026]

This wireless portable device has been shown to be capable of compliance for localized specific absorption rate (SAR) for uncontrolled environment/general population exposure limits specified in ANSI/IEEE C95.1-1992 and has been tested in accordance with the measurement procedures specified in FCC/OET Bulletin 65 Supplement C (2001), IEEE 1528-2003 and in applicable Industry Canada Radio Standards Specifications (RSS); for North American frequency bands only.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them. Test results reported herein relate only to the item(s) tested.

PCTEST certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 862.

Randy Ortanez
President

ACCREDITED
TESTING LABORATORY
CERTIFICATE #2041.01

T A B L E O F C O N T E N T S

1 INTRODUCTION

The FCC have adopted the guidelines for evaluating the environmental effects of radio frequency (RF) radiation in ET Docket 93-62 on Aug. 6, 1996 to protect the public and workers from the potential hazards of RF emissions due to FCC-regulated portable devices.[1]

The safety limits used for the environmental evaluation measurements are based on the criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate (SAR) in IEEE/ANSI C95.1-1992 Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz[2]. The measurement procedure described in IEEE/ANSI C95.3-2002 Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields - RF and Microwave [3] is used for guidance in measuring the Specific Absorption Rate (SAR) due to the RF radiation exposure from the Equipment Under Test (EUT). These criteria for SAR evaluation are similar to those recommended by the International Committee for Non-Ionizing Radiation Protection (ICNIRP) in Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," Report No. Vol 74. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards.

1.1 SAR Definition

Specific Absorption Rate is defined as the time derivative (rate) of the incremental energy (dU) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dV) of a given density (ρ). It is also defined as the rate of RF energy absorption per unit mass at a point in an absorbing body (see Fig. 1-1).

$$\boxed{SAR = \frac{d}{dt}\left(\frac{dU}{dm}\right) = \frac{d}{dt}\left(\frac{dU}{\rho\, dv}\right)}$$

Figure 1-1
SAR Mathematical Equation

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

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

where:

σ = conductivity of the tissue-simulating material (S/m)
ρ = mass density of the tissue-simulating material (kg/m^3)
E = Total RMS electric field strength (V/m)

NOTE: The primary factors that control rate of energy absorption were found to be the wavelength of the incident field in relation to the dimensions and geometry of the irradiated organism, the orientation of the organism in relation to the polarity of field vectors, the presence of reflecting surfaces, and whether conductive contact is made by the organism with a ground plane.[6]

2 TEST SITE LOCATION

2.1 INTRODUCTION

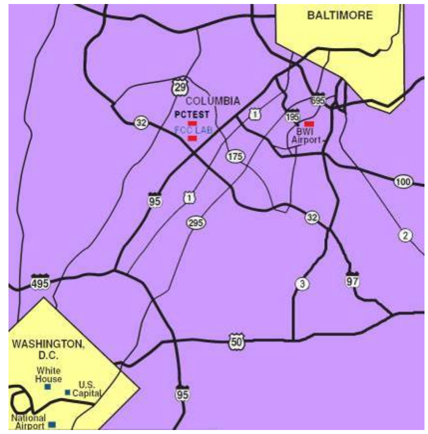


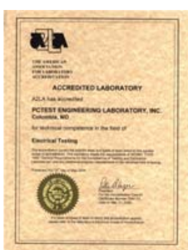
Figure 2-1
Map of the Greater Baltimore and Metropolitan Washington, D.C. area

The map at the right shows the location of the PCTEST LABORATORY in Columbia, Maryland. It is in proximity to the FCC Laboratory, the Baltimore-Washington International (BWI) airport, the city of Baltimore and Washington, DC (See Figure 2).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility in New Concept Business Park, Guilford Industrial Park, Columbia, Maryland. The site address is 6660-B Dobbin Road, Columbia, MD 21045. The test site is one of the highest points in the Columbia area with an elevation of 390 feet above mean sea level. The site coordinates are 39° 11'15" N latitude and 76° 49' 38" W longitude. The facility is 1.5 miles north of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. There are no FM or TV transmitters within 15 miles of the site. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on January 27, 2006 and Industry Canada.

2.2 Test Facility / Accreditations:

Measurements were performed at an independent accredited PCTEST Engineering Lab located in Columbia, MD 21045, U.S.A.



- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing-Aid Compatibility (HAC), CTIA Test Plans, and wireless testing for FCC and Industry Canada Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST facility is an FCC registered (PCTEST Reg. No. 90864) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules and Industry Canada (IC-2451).
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules and all Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (IC-2451) test laboratory with the site description on file at Industry Canada.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS and CDMA, and EvDO mobile phones.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO Data, CDMA 1xRTT Data

3 SAR MEASUREMENT SETUP

3.1 Robotic System

Measurements are performed using the DASY4 automated dosimetric assessment system. The DASY4 is made by Schmid & Partner Engineering AG (SPEAG) in Zurich, Switzerland and consists of high precision robotics system (Staubli), robot controller, Pentium 4 computer, near-field probe, probe alignment sensor, and the generic twin phantom containing the brain equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF) (see Figure 3-1).

3.2 System Hardware

A cell controller system contains the power supply, robot controller, teach pendant (Joystick), and a remote control used to drive the robot motors. The PC consists of the Gateway Pentium 4 2.53 GHz computer with Windows XP system and SAR Measurement Software DASY4, A/D interface card, monitor, mouse, and keyboard. The Staubli Robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit that performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical into digital electric signal of the DAE and transfers data to the PC plug-in card.

3.3 System Electronics

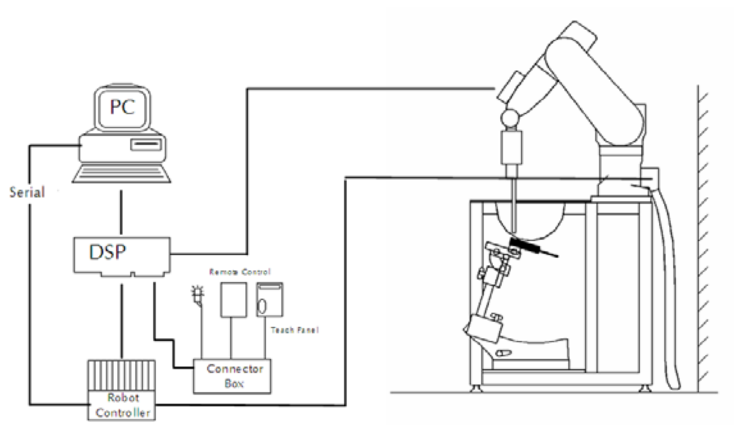


Figure 3-1
SAR Measurement System Setup

The DAE4 consists of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder and control logic unit. Transmission to the PC-card is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe mounting device includes two different sensor systems for frontal and sidewise probe contacts. They are also used for mechanical surface detection and probe collision detection. The robot uses its own controller with a built in VME-bus computer. The system is described in detail in [7].

3.4 Automated Test System Specifications

<u>Positioner</u>

Robot:	Stäubli Unimation Corp. Robot RX60L
Repeatability:	0.02 mm
No. of Axes:	6

<u>Data Acquisition Electronic System (DAE)</u>

Cell Controller

Processor:	Pentium 4
Clock Speed:	2.53 GHz
Operating System:	Windows XP Professional

Data Converter

Features:	Signal Amplifier, multiplexer, A/D converter & control logic
Software:	DASY4, SEMCAD software
Connecting Lines:	Optical Downlink for data and status info Optical upload for commands and clock

<u>PC Interface Card</u>

Function:	166MHz low power Pentium MMX 32MB chipdisk Link to DAE 16-bit A/D converter for surface detection system Two Serial & Ethernet link to robotics Direct emergency stop output for robot

<u>Phantom</u>

Type:	SAM Twin Phantom (V4.0)
Shell Material:	Composite
Thickness:	2.0 ± 0.2 mm

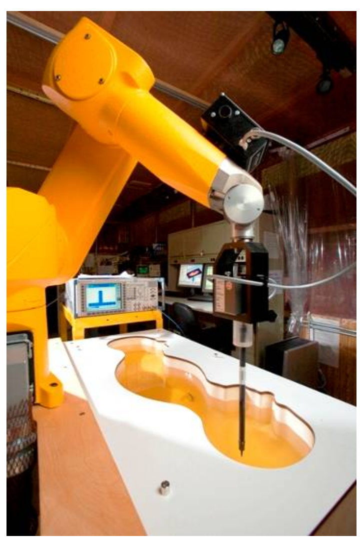


Figure 3-2
DASY4 SAR Measurement System

4 DASY E-FIELD PROBE SYSTEM

4.1 Probe Measurement System

Figure 4-1
SAR System

The SAR measurements were conducted with the dosimetric probe EX3DV4, designed in the classical triangular configuration [7] (see Figure 4-3) and optimized for dosimetric evaluation. The probe is constructed using the thick film technique; with printed resistive lines on ceramic substrates. The probe is equipped with an optical multi-fiber line ending at the front of the probe tip. It is connected to the EOC box on the robot arm and provides an automatic detection of the phantom surface. Half of the fibers are connected to a pulsed infrared transmitter, the other half to a synchronized receiver. As the probe approaches the surface, the reflection from the surface produces a coupling from the transmitting to the receiving fibers. This reflection increases first during the approach, reaches maximum and then decreases. If the probe is flatly touching the surface, the coupling is zero. The distance of the coupling maximum to the surface is independent of the surface reflectivity and largely independent of the surface to probe angle. The DASY4 software reads the reflection during a software approach and looks for the maximum using a 2nd order fitting (see Figure 5-1). The approach is stopped at reaching the maximum.

4.2 Probe Specifications

Model:	ES3DV3, EX3DV4
Frequency Range:	10 MHz – 6.0 GHz (EX3DV4) 10 MHz – 4 GHz (ES3DV3)
Calibration:	In brain and muscle simulating tissue at Frequencies from 835 up to 5800MHz
Linearity:	± 0.2 dB (30 MHz to 6 GHz) for EX3DV4 ± 0.2 dB (30 MHz to 4 GHz) for ES3DV3
Dynamic Range:	10 mW/kg – 100 W/kg
Probe Length:	330 mm
Probe Tip Length:	20 mm
Body Diameter:	12 mm
Tip Diameter:	2.5 mm (3.9mm for ES3DV3)
Tip-Center:	1 mm (2.0 mm for ES3DV3)
Application:	SAR Dosimetry Testing Compliance tests of mobile phones Dosimetry in strong gradient fields

Figure 4-2
Near-Field Probe

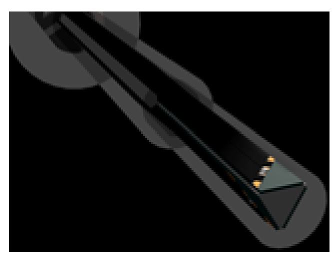


Figure 4-3
Triangular Probe
Configuration

5 PROBE CALIBRATION PROCESS

5.1 Dosimetric Assessment Procedure

Each E-Probe/Probe amplifier combination has unique calibration parameters. A TEM cell calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm^2) using an RF Signal generator, TEM cell, and RF Power Meter.

5.2 Free Space Assessment

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1 mW/cm^2.

5.3 Temperature Assessment

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated brain tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

SAR = $C\dfrac{\Delta T}{\Delta t}$

where:
Δt = exposure time (30 seconds),
C = heat capacity of tissue (brain or muscle),
ΔT = temperature increase due to RF exposure.

SAR = $\dfrac{|E|^2 \cdot \sigma}{\rho}$

where:
σ = simulated tissue conductivity,
ρ = Tissue density (1.25 g/cm3 for brain tissue)

SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. Now it's possible to quantify the electric field in the simulated tissue by equating the thermally derived SAR to the E- field;

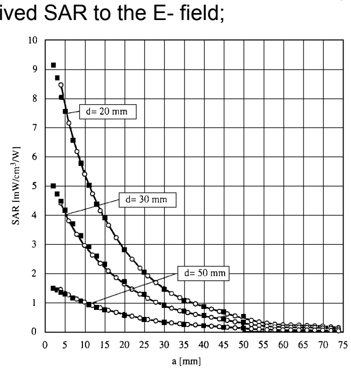


Figure 5-1 E-Field and Temperature measurements at 900MHz [7]

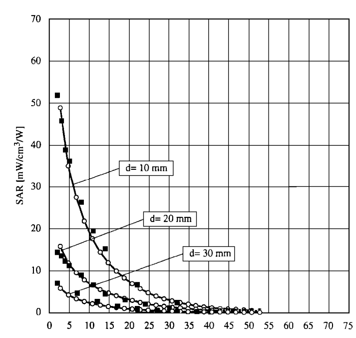


Figure 5-2 E-Field and temperature measurements at 1.9GHz [7]

6 PHANTOM AND EQUIVALENT TISSUES

6.1 SAM Phantoms

Figure 6-1
SAM Phantoms

The SAM Twin Phantom V4.0 is constructed of a fiberglass shell integrated in a wooden table. The shape of the shell is based on data from an anatomical study designed to determine the maximum exposure in at least 90% of all users [11][12]. 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 the evaporation of the liquid. Reference markings on the Phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points in the robot. (see Fig. 5.1)

6.2 Brain & Muscle Simulating Mixture Characterization

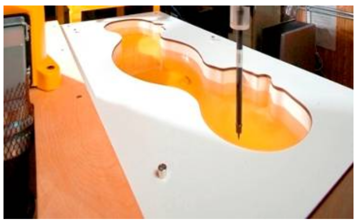


Figure 6-2
Head Simulated

The brain and muscle mixtures consist of a viscous gel using hydroxethylcellulose (HEC) gelling agent and saline solution (see Table 6-1). Preservation with a bactericide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue. The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table. Other head and 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 The mixture characterizations used for the brain and muscle tissue simulating liquids are according to the data by C. Gabriel and G. Hartsgrove [13].(See Table 6-1)

Table 6-1
Composition of the Brain & Muscle Tissue Equivalent Matter

Frequency (MHz)	300	450		835	900			1450	1800				1900		1950	2000	2100		2450		3000
Recipe #	1	1	3	1	1	2	3	1	1	2	2	3	1	2	4	1	1	2	2	3	2
Ingredients (% by weight)																					
1,2-Pro-panediol						64.81															
Bactericide	0.19	0.19	0.50	0.10	0.10		0.50					0.50								0.50	
Diacetin			48.90				49.20					49.43								49.75	
DGBE								45.41	47.00	13.84	44.92		44.94	13.84	45.00	50.00	50.00	7.99	7.99		7.99
HEC	0.98	0.98		1.00	1.00																
NaCl	5.95	3.95	1.70	1.45	1.48	0.79	1.10	0.67	0.36	0.35	0.18	0.64	0.18	0.35				0.16	0.16		0.16
Sucrose	55.32	56.32		57.00	56.50																
Triton X-100										30.45				30.45				19.97	19.97		19.97
Water	37.56	38.56	48.90	40.45	40.92	34.40	49.20	53.80	52.64	55.36	54.90	49.43	54.90	55.36	55.00	50.00	50.00	71.88	71.88	49.75	71.88
Measured dielectric parameters																					
ε_r'	46.00	43.4	44.3	41.6	41.2	41.8	42.7	40.9	39.3	41	40.4	39.2	39.9	41	40.1	37	36.8	41.1	40.3	39.2	37.9
σ(S/m)	0.86	0.85	0.9	0.9	0.98	0.97	0.99	1.21	1.39	1.38	1.4	1.4	1.42	1.38	1.41	1.4	1.51	1.55	1.88	1.82	2.46
Temp. (°C)	22	22	20	22	22	22	20	22	22	21	22	20	21	21	20	22	22	20	20	20	20
Target dielectric parameters (Table 2)																					
ε_r'	45.30	43.50		41.5	41.50			40.5	40.0								39.80		39.2		38.5
σ(S/m)	0.87	0.87		0.9	0.97			1.2	1.4								1.49		1.8		2.4
NOTE—Multiple columns for any single frequency are optional recipes. Recipe #, reference: 1 (Kanda et al. [B85]), 2 (Vigneras [B143]), 3 (Peyman and Gabriel [B119]), 4 (Fukunaga et al. [B50]).																					

*The formulas containing Triton X-100 and corresponding measured parameters are under review and verification.

7 DOSIMETRIC ASSESSMENT & PHANTOM SPECS

7.1 Measurement Procedure

The evaluation was performed using the following procedure:

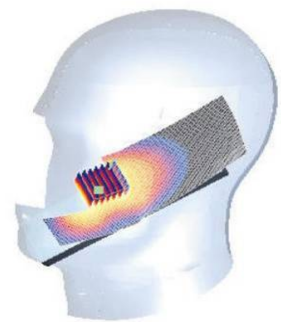


Figure 7-1
Sample SAR Area Scan

1. The SAR measurement was taken at a selected spatial reference point to monitor power variations during testing. This fixed point was measured and used as a reference value.
2. The SAR distribution at the exposed side of the head was measured at a distance of 3.0mm from the inner surface of the shell. The area covered the entire dimension of the head and the horizontal grid spacing was 15mm x 15mm.
3. Based on the area scan data, the area of the maximum absorption was determined by spline interpolation. Around this point, a volume of 32mm x 32mm x 30mm (fine resolution volume scan, zoom scan) was assessed by measuring 5 x 5 x 7 points. On this basis of this data set, the spatial peak SAR value was evaluated with the following procedure (see Figure 7-1):
   a. The data at the surface was extrapolated, since the center of the dipoles is 2.7mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.2mm. The extrapolation was based on a least square algorithm [15]. A polynomial of the fourth order was calculated through the points in z-axes. This polynomial was then used to evaluate the points between the surface and the probe tip.
   b. The maximum interpolated value was searched with a straight-forward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1g or 10g) were computed using the 3D-Spline interpolation algorithm. The 3D-spline is composed of three one-dimensional splines with the “Not a knot” condition (in x, y, and z directions) [15][16]. The volume was integrated with the trapezoidal algorithm. One thousand points (10 x 10 x 10) were interpolated to calculate the average.
   c. All neighboring volumes were evaluated until no neighboring volume with a higher average value was found.
4. The SAR reference value, at the same location as step 1, was re-measured. If the value changed by more than 5%, the evaluation is repeated.

7.2 Specific Anthropomorphic Mannequin (SAM) Specifications

The phantom for handset SAR assessment testing is a low-loss dielectric shell, with shape and dimensions derived from the anthropometric data of the 90th percentile adult male head dimensions as tabulated by the US Army. The SAM Twin Phantom shell is bisected along the mid-sagittal plane into right and left halves (see Figure 7-2). The perimeter sidewalls of each phantom halves are extended to allow filling with liquid to a depth that is sufficient to minimized reflections from the upper surface. The liquid depth is maintained at a minimum depth of 15cm to minimize reflections from the upper surface.

Figure 7-2
SAM Twin Phantom Shell

8 DEFINITION OF REFERENCE POINTS

8.1 SAR Testing with IEEE 802.11 a/b/g Transmitters (if applicable)

Normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

8.1.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. The test frequencies should correspond to actual channel frequencies defined for domestic use. SAR for devices with switched diversity should be measured with only one antenna transmitting at a time during each SAR measurement, according to a fixed modulation and data rate. The same data pattern should be used for all measurements.

8.1.2 Frequency Channel Configurations[22]

802.11 a/b/g and 4.9 GHz operating modes are tested independently according to the service requirements in each frequency band. 802.11 b/g modes are tested on channels 1, 6 and 11. 802.11a is tested for UNII operations on channels 36 and 48 in the 5.15-5.25 GHz band; channels 52 and 64 in the 5.25-5.35 GHz band; channels 104, 116, 124 and 136 in the 5.470-5.725 GHz band; and channels 149 and 161 in the 5.8 GHz band. When 5.8 GHz §15.247 is also available, channels 149, 157 and 165 should be tested instead of the UNII channels. 4.9 GHz is tested on channels 1, 10 and 5 or 6, whichever has the higher output power, for 5 MHz channels; channels 11, 15 and 19 for 10 MHz channels; and channels 21 and 25 for 20 MHz channels. These are referred to as the "default test channels". 802.11g mode was evaluated only if the output power was 0.25 dB higher than the 802.11b mode.

Table 8-1
802.11 Test Channels per FCC Requirements

Mode		GHz	Channel	Turbo Channel	"Default Test Channels"			
					§15.247		UNII	
					802.11b	802.11g		
802.11 b/g		2.412	1		√	∇		
		2.437	6	6	√	∇		
		2.462	11		√	∇		
802.11a	UNII	5.18	36				√	
		5.20	40	42 (5.21 GHz)				*
		5.22	44					*
		5.24	48	50 (5.25 GHz)			√	
		5.26	52				√	
		5.28	56	58 (5.29 GHz)				*
		5.30	60					*
		5.32	64				√	
		5.500	100	Unknown				*
		5.520	104				√	
		5.540	108					*
		5.560	112					*
		5.580	116				√	
		5.600	120					*
		5.620	124				√	
		5.640	128					*
		5.660	132					*
		5.680	136				√	
		5.700	140					*
	UNII or §15.247	5.745	149		√		√	
		5.765	153	152 (5.76 GHz)		*		*
		5.785	157		√			*
		5.805	161	160 (5.80 GHz)		*	√	
	§15.247	5.825	165		√			

9 NOTEBOOK PCS AND USB DONGLES

9.1 SAR for Notebooks and Lap-touching Devices

Lap-touching devices that have transmitting antennas located less than 20 cm from the lap of the user require routine SAR evaluation. Such devices are considered portable and are capable of being held to the body. Devices are to be setup touching the phantom and are configured with maximum output power during SAR assessment for a worst-case SAR evaluation.

Figure 9-1
Notebook Setup for SAR

9.2 Positioning for Convertible and Slate Tablet Computers

Figure 9-2
Tablet Computer Form Factors

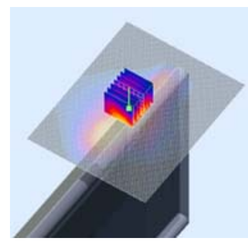


Figure 9-3
Tablet PC Body SAR

KDB 447498. Tablet (notepad) computers are tested in a lap-held position with the bottom of the computer in direct contact against a flat phantom for all user-enabled portrait and landscape positions.

9.3 SAR test procedure for USB Dongles

(A)	(B)	(C)	(D)
Horizontal-Up	Horizontal-Down	Vertical-Front	Vertical-Back

Note: these are USB connector orientations on laptop computers; USB dongles have the reverse configuration for plugging into the corresponding laptop computers.

Figure 9-4
USB Dongle Test Configurations

KDB 447498. USB orientations (see Figure 9-4) with a device to phantom separation distance of 5 mm or less, according to KDB 447498 requirements. Current generation laptop computers should be used to ensure proper measurement distances. The same test separation distance should be used for all frequency bands and modes in each USB orientation. The typical Horizontal-Up USB connection (A), found in the majority of laptop computers, must be tested using an appropriate laptop computer. A laptop with either Vertical-Front (C) or Vertical-Back (D) USB connection should be used to test one of the vertical USB orientations. If laptop computers are not available for testing the Horizontal-Down (B) or the remaining Vertical USB orientation, a short and high quality USB cable (12 inches or less) may be used for testing these other orientations. It should be ensured that the USB cable does not affect device radiating characteristics and output power of the dongle.

10 FCC RF EXPOSURE LIMITS

10.1 Uncontrolled Environment

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

10.2 Controlled Environment

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Table 10-1
SAR Human Exposure Specified in ANSI/IEEE C95.1-1992

HUMAN EXPOSURE LIMITS		
	UNCONTROLLED ENVIRONMENT *General Population* (W/kg) or (mW/g)	CONTROLLED ENVIRONMENT *Occupational* (W/kg) or (mW/g)
SPATIAL PEAK SAR Brain	1.6	8.0
SPATIAL AVERAGE SAR Whole Body	0.08	0.4
SPATIAL PEAK SAR Hands, Feet, Ankles, Wrists	4.0	20

1 The Spatial Peak value of the SAR averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2 The Spatial Average value of the SAR averaged over the whole body.
3 The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

11 MEASUREMENT UNCERTAINTIES

a	b	c	d	e= f(d,k)		g	h = c x f/e	f i = c x g/e	k
Uncertainty Component	IEEE 1528 Sec.	Tol. (± %)	Prob. Dist.	Div.	c_i 1gm	c_i 10 gms	1gm u_i (± %)	10gms u_i (± %)	v_i
Measurement System									
Probe Calibration	E2.1	6.6	N	1	1.0	1.0	6.6	6.6	∞
Axial Isotropy	E2.2	0.25	N	1	0.7	0.7	0.2	0.2	∞
Hemishperical Isotropy	E2.2	1.3	N	1	1.0	1.0	1.3	1.3	∞
Boundary Effect	E2.3	0.4	N	1	1.0	1.0	0.4	0.4	∞
Linearity	E2.4	0.3	N	1	1.0	1.0	0.3	0.3	∞
System Detection Limits	E2.5	5.1	N	1	1.0	1.0	5.1	5.1	∞
Readout Electronics	E2.6	1.0	N	1	1.0	1.0	1.0	1.0	∞
Response Time	E2.7	0.8	R	1.73	1.0	1.0	0.5	0.5	∞
Integration Time	E2.8	2.6	R	1.73	1.0	1.0	1.5	1.5	∞
RF Ambient Conditions	E6.1	3.0	R	1.73	1.0	1.0	1.7	1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	0.4	R	1.73	1.0	1.0	0.2	0.2	∞
Probe Positioning w/ respect to Phantom	E6.3	2.9	R	1.73	1.0	1.0	1.7	1.7	∞
Extrapolation, Interpolation & Integration algorithms for Max. SAR Evaluation	E5	1.0	R	1.73	1.0	1.0	0.6	0.6	∞
Test Sample Related									
Test Sample Positioning	E4.2	6.0	N	1	1.0	1.0	6.0	6.0	287
Device Holder Uncertainty	E4.1	3.32	R	1.73	1.0	1.0	1.9	1.9	∞
Output Power Variation - SAR drift measurement	6.6.2	5.0	R	1.73	1.0	1.0	2.9	2.9	∞
Phantom & Tissue Parameters									
Phantom Uncertainty (Shape & Thickness tolerances)	E3.1	4.0	R	1.73	1.0	1.0	2.3	2.3	∞
Liquid Conductivity - deviation from target values	E3.2	5.0	R	1.73	0.64	0.43	1.8	1.2	∞
Liquid Conductivity - measurement uncertainty	E3.3	3.8	N	1	0.64	0.43	2.4	1.6	6
Liquid Permittivity - deviation from target values	E3.2	5.0	R	1.73	0.60	0.49	1.7	1.4	∞
Liquid Permittivity - measurement uncertainty	E3.3	4.5	N	1	0.60	0.49	2.7	2.2	6
Combined Standard Uncertainty (k=1)			RSS				12.4	12.0	299
Expanded Uncertainty (95% CONFIDENCE LEVEL)			k=2				24.7	24.0	

The above measurement uncertainties are according to IEEE Std. 1528-2003

12 SYSTEM VERIFICATION

12.1 Tissue Verification

Table 12-1
Measured Tissue Properties

Calibrated Date:	Tissue Type	Measured Frequency (MHz)	Measured Conductivity, σ (S/m)	Measured Dielectric Constant, ε	TARGET Conductivity, σ (S/m)	TARGET Dielectric Constant, ε	% dev σ	% dev ε
03/22/2010	2450M	2401	1.887	52.64	1.95	52.70	-3.23%	-0.11%
		2450	1.963	52.25	1.95	52.70	0.67%	-0.85%
		2499	2.026	52.10	1.95	52.70	3.90%	-1.14%
04/05/2010	2450M	2401	1.886	50.97	1.95	52.70	-3.28%	-3.28%
		2450	1.956	50.62	1.95	52.70	0.31%	-3.95%
		2499	2.020	50.57	1.95	52.70	3.59%	-4.04%
05/20/2010	2600M	2500	2.046	50.35	2.02	52.64	1.24%	-4.34%
		2550	2.115	50.16	2.09	52.57	1.10%	-4.59%
		2600	2.178	49.96	2.16	52.51	0.69%	-4.85%
		2650	2.249	49.85	2.23	52.44	0.85%	-4.94%
		2700	2.314	49.77	2.30	52.38	0.61%	-4.98%
03/29/2010	5200-5800M	5170	5.408	48.81	5.26	49.15	2.74%	-0.69%
		5210	5.446	48.81	5.31	48.95	2.52%	-0.29%
		5250	5.483	48.74	5.36	48.75	2.29%	-0.02%
		5270	5.542	48.64	5.38	48.65	2.93%	-0.02%
		5310	5.586	48.57	5.43	48.45	2.84%	0.25%
		5350	5.638	48.54	5.48	48.25	2.88%	0.60%
		5470	5.835	48.25	5.61	48.63	3.94%	-0.78%
		5510	5.882	48.21	5.66	48.59	3.89%	-0.78%
		5550	5.929	48.20	5.71	48.55	3.84%	-0.72%
		5570	5.978	48.11	5.73	48.53	4.26%	-0.87%
		5610	6.008	48.03	5.78	48.49	3.91%	-0.95%
		5650	6.077	48.20	5.83	48.45	4.24%	-0.52%
		5670	6.140	47.87	5.85	48.40	4.89%	-1.08%
		5710	6.172	47.88	5.90	48.34	4.57%	-0.94%
		5750	6.217	47.79	5.95	48.28	4.49%	-1.00%
		5770	6.266	47.72	5.97	48.25	4.89%	-1.09%
		5800	6.290	47.65	6.01	48.20	4.66%	-1.14%
		5850	6.300	47.61	6.07	48.13	3.79%	-1.07%

Note: KDB 450824 was ensured to be applied for probe calibration frequencies greater than or equal to 50 MHz of the DUT frequencies.

The above measured tissue parameters were used in the DASY software to perform interpolation via the DASY software to determine actual dielectric parameters at the test frequencies (per IEEE 1528 6.6.1.2).

12.2 Measurement Procedure for Tissue verification

1) The network analyzer and probe system was configured and calibrated.
2) The probe was immersed in the sample which was placed in a nonmetallic container. Trapped air bubbles beneath the flange were minimized by placing the probe at a slight angle.
3) The complex admittance with respect to the probe aperture was measured
4) The complex relative permittivity , for example from the below equation (Pournaropoulos and Misra):

$$Y = \frac{j2\omega\varepsilon_r\varepsilon_0}{[\ln(b/a)]^2}\int_a^b\int_a^b\int_0^\pi \cos\phi' \frac{\exp\left[-j\omega r(\mu_0\varepsilon_r'\varepsilon_0)^{1/2}\right]}{r}d\phi' d\rho' d\rho$$

where Y is the admittance of the probe in contact with the sample, the primed and unprimed coordinates refer to source and observation points, respectively, $r^2 = \rho^2 + \rho'^2 - 2\rho\rho'\cos\phi'$, ω is the angular frequency, and $j = \sqrt{-1}$.

12.3 Test System Verification

Prior to assessment, the system is verified to ±10% of the manufacturer SAR result on the reference dipole at the time of calibration, by using the below system validation kit(s).

Table 12-2
System Verification Results

System Verification TARGET & MEASURED									
Date:	**Amb. Temp (°C)**	**Liquid Temp (°C)**	**Input Power (W)**	**Tissue Frequency (MHz)**	**Dipole SN**	**Tissue Type**	**Targeted SAR_{1g} (W/kg)**	**Measured SAR_{1g} (W/kg)**	**Deviation (%)**
04/12/2010	23.9	23	0.025	2450	719	Muscle	1.29	1.29	0.39
03/22/2010	23.9	22.5	0.025	2450	719	Muscle	1.29	1.34	4.28
03/29/2010	23.2	21.8	0.025	5200	1057	Muscle	1.98	1.91	-3.41
03/30/2010	23.6	22.1	0.025	5500	1057	Muscle	2.04	1.91	-5.88
03/31/2010	23.7	22.3	0.025	5800	1057	Muscle	1.79	1.67	-6.70
05/20/2010	24.3	22,8	0.025	2600	1004	Muscle	1.39	1.37	-1.44

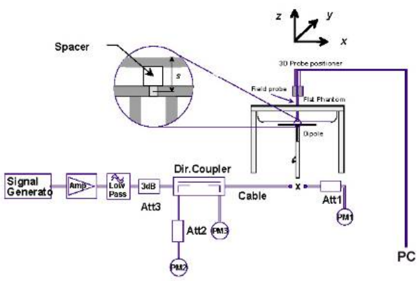


Figure 12-1
System Verification Setup Diagram

Figure 12-2
System Verification Setup Photo

13 TD-CDMA SAR CONSIDERATIONS

Power measurements were performed using a power meter under digital average power.

13.1 Procedures Used to Establish RF Signal for SAR

The modem was placed into a simulated call using a radio manufacturer test script in a shielded chamber. The worst-case scenario for the operation of this device is utilizing all 6 uplink slots from the total of 15 slots (others are for downlink purposes); resulting in a 40% duty cycle. Within this operation, one or two codes can be utilized for the transmission. The single code version was used since the PAR was lower, to allow for the highest output power, and the worst-case SAR measurement. See manufacturer operational description for further details.

SAR measurements were taken with a fully charged battery. The SAR measurement software calculates a reference point at the start and end of the test to check for power drifts. If conducted power deviations of more than 5% occurred, the tests were repeated.

13.1 Probe Linearity Evaluation

For technologies with high PAR, probe linearity within the square law region needs to be verified to ensure SAR below the limit when under-estimated from PAR effects.

13.2 Crest Factor For DASY Calcuation

For 6Tx out of 15Tx slots,
DASY CF=15/6=**2.5**

13.3 RF Conducted Powers

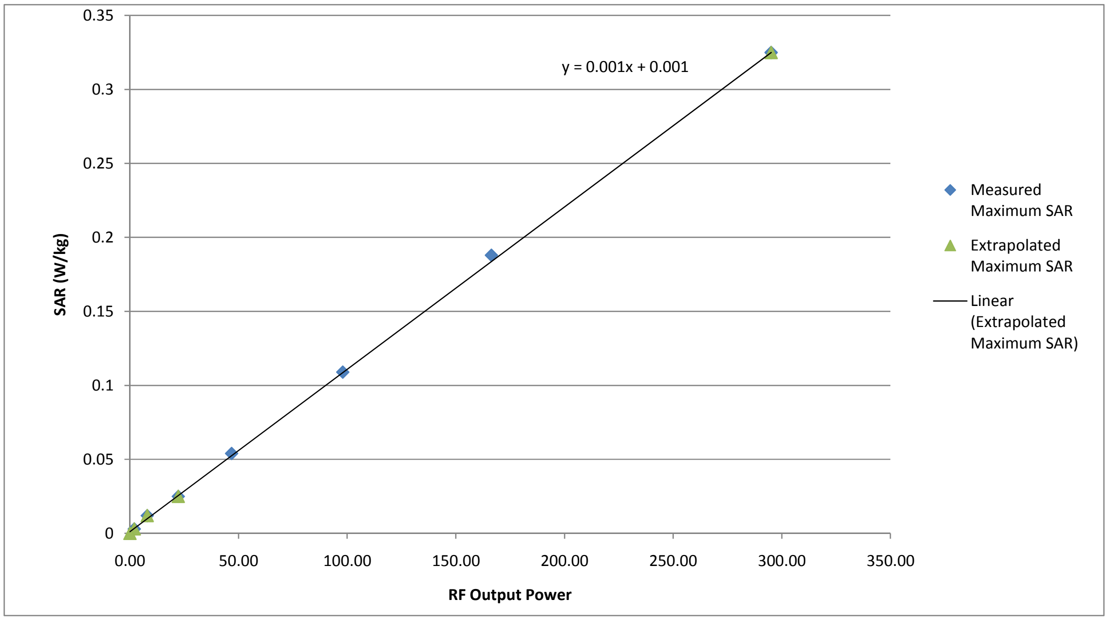
13.3.1 TD-CDMA Conducted Powers

		RF Conducted Power Table	
Mode	Channel	Frequency [MHz]	TD-CDMA Avg.Conducted Power [dBm]
TD-CDMA	12507	2501.4	24.39
	12965	2593.0	24.47
	13420	2684.6	24.70

13.3.2 Bluetooth Conducted Powers

Frequency [MHz]	Data Rate [Mbps]	Channel No.	Conducted Power [DH5 Packet Type] [dBm]	[mW]
2402	1.0	0	12.81	19.094
2441	1.0	39	13.67	23.254
2480	1.0	78	13.67	23.276

13.3.3 Probe Linearity Plot



13.3.4 WLAN Conducted Powers Main Antenna

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	A	13.44	13.48	13.44	13.45
802.11b	2437	6	A	13.51	13.57	**13.61**	13.51
802.11b	2462	11	A	13.30	13.39	13.44	13.42

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	2412	1	A	12.61	12.59	12.60	12.61	12.57	12.44	12.55	11.90
802.11g	2437	6	A	14.20	14.39	**14.47**	14.15	14.25	13.13	13.19	11.23
802.11g	2462	11	A	14.41	14.08	14.45	13.08	14.35	14.33	12.72	10.42

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				13.5	27	40	54	81	108	122	135
802.11n	2422	3	A	7.31	7.42	5.93	6.90	6.93	7.03	6.71	6.86
802.11n	2437	6	A	14.40	14.02	**14.72**	14.25	14.16	12.95	11.23	9.56
802.11n	2452	9	A	8.16	7.81	7.52	8.08	8.08	8.16	8.00	7.81

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11a	5180	36	A	12.51	12.36	12.32	12.38	12.26	12.20	12.22	10.95
802.11a	5200	40	A	14.14	14.08	14.00	14.05	13.95	13.89	12.90	11.13
802.11a	5220	44	A	14.14	14.22	14.42	14.45	14.36	14.34	13.58	11.40
802.11a	5240	48	A	14.42	**14.46**	14.01	14.42	13.89	13.85	13.20	11.03
802.11a	5260	52	A	14.02	14.12	13.97	14.08	13.88	13.88	13.00	11.30
802.11a	5280	56	A	14.31	14.25	13.92	14.12	13.96	13.76	12.80	11.18
802.11a	5300	60	A	**14.44**	14.23	14.22	14.27	14.19	14.18	13.38	11.61
802.11a	5320	64	A	13.99	14.15	14.00	14.19	13.79	13.70	12.86	11.22
802.11a	5500	100	A	13.28	13.50	13.40	13.42	13.20	13.10	12.45	10.98
802.11a	5520	104	A	14.02	13.97	13.99	14.12	14.01	14.06	13.30	11.60
802.11a	5540	108	A	14.20	14.05	13.98	14.38	14.29	13.90	13.53	11.63
802.11a	5560	112	A	14.30	14.29	14.25	14.33	14.20	14.24	13.45	11.65
802.11a	5580	116	A	14.48	14.51	14.48	14.58	14.18	14.50	13.29	11.60
802.11a	5600	120	A	13.79	13.66	13.65	13.71	13.56	13.45	12.62	10.81
802.11a	5620	124	A	14.54	14.51	14.46	14.55	14.42	14.45	13.62	11.36
802.11a	5640	128	A	**14.96**	14.54	14.57	14.70	14.52	14.55	13.84	11.64
802.11a	5660	132	A	14.85	14.80	14.77	14.83	14.73	14.73	13.92	11.40
802.11a	5680	136	A	14.95	14.92	14.91	14.73	14.60	13.98	13.39	11.22
802.11a	5700	140	A	13.77	13.68	13.65	13.71	13.51	13.47	12.71	10.83
802.11a	5745	149	A	14.12	14.01	14.00	14.04	13.85	13.82	12.98	10.81
802.11a	5785	157	A	14.08	**14.35**	13.89	13.92	13.74	13.70	13.17	11.43
802.11a	5825	165	A	13.99	13.88	13.98	14.19	14.04	14.02	13.55	11.05

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				13.5	27	40	54	81	108	122	135
802.11n	5190	38	A	9.62	9.63	9.41	9.37	9.25	9.18	9.25	9.15
802.11n	5230	46	A	13.85	13.75	13.71	13.47	13.40	12.90	11.20	9.82
802.11n	5270	54	A	13.51	13.72	13.63	13.22	13.20	12.91	11.14	9.62
802.11n	5310	62	A	11.02	11.02	10.98	10.62	10.73	10.67	10.63	9.67
802.11n	5510	102	A	13.02	13.00	13.17	12.71	12.61	12.18	10.50	9.35
802.11n	5550	110	A	13.90	13.89	13.87	13.37	13.47	13.03	12.06	9.94
802.11n	5590	118	A	13.36	13.34	13.20	13.08	12.99	12.43	10.80	9.38
802.11n	5630	126	A	13.75	13.90	13.94	13.79	13.87	13.45	11.35	7.04
802.11n	5670	134	A	13.22	13.21	13.07	12.94	12.87	12.27	10.60	5.90
802.11n	5755	151	A	14.23	14.15	14.19	14.09	14.15	13.71	11.51	7.34
802.11n	5795	159	A	14.22	13.89	13.89	13.15	13.92	13.50	11.56	7.56

13.3.5 WLAN Conducted Powers Auxiliary Antenna

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]			
				1	2	5.5	11
802.11b	2412	1	B	13.54	13.00	13.50	13.05
802.11b	2437	6	B	13.54	13.52	13.55	13.25
802.11b	2462	11	B	12.84	13.25	13.23	13.10

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11g	2412	1	B	11.91	11.78	11.77	11.78	11.68	11.00	11.54	10.30
802.11g	2437	6	B	14.22	14.16	14.03	14.01	13.84	13.80	12.50	10.70
802.11g	2462	11	B	12.56	12.50	12.45	12.44	12.28	12.20	12.22	11.15

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				13.5	27	40	54	81	108	122	135
802.11n	2422	3	B	7.42	7.43	7.77	7.15	7.08	7.00	7.01	6.90
802.11n	2437	6	B	14.05	14.00	13.93	13.68	13.61	12.20	10.49	8.80
802.11n	2452	9	B	7.73	7.78	8.14	7.50	7.40	7.84	7.38	7.31

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				6	9	12	18	24	36	48	54
802.11a	5180	36	B	12.28	12.20	12.11	12.12	12.20	11.94	11.96	9.80
802.11a	**5200**	40	B	12.98	12.92	12.80	12.84	12.72	12.62	11.85	10.03
802.11a	5220	44	B	13.34	13.34	13.73	13.76	13.86	13.80	12.94	11.15
802.11a	**5240**	48	B	12.65	13.11	13.04	13.05	12.92	12.83	11.63	10.23
802.11a	5260	52	B	12.84	13.24	12.80	12.83	12.70	12.66	11.85	10.04
802.11a	**5280**	56	B	13.11	13.10	13.10	13.14	12.97	12.91	11.71	10.23
802.11a	5300	60	B	13.18	13.30	13.39	13.19	13.24	13.24	12.33	10.60
802.11a	**5320**	64	B	13.22	13.18	12.94	12.92	12.73	13.02	11.78	9.95
802.11a	**5500**	100	B	13.10	13.32	13.24	13.31	12.81	12.80	12.30	10.64
802.11a	5520	104	B	13.51	13.42	13.70	13.02	13.12	13.16	12.22	10.68
802.11a	**5540**	108	B	13.27	13.26	14.05	12.84	12.90	12.97	12.04	10.37
802.11a	5560	112	B	13.11	13.50	13.89	13.20	12.86	12.89	11.75	10.51
802.11a	**5580**	116	B	13.45	13.39	13.39	12.71	12.80	13.05	11.81	10.09
802.11a	5600	120	B	12.74	12.67	12.62	12.72	12.56	12.54	11.74	9.49
802.11a	**5620**	124	B	12.82	13.07	13.34	13.86	12.28	12.33	11.27	9.16
802.11a	5640	128	B	13.07	12.91	13.34	12.40	12.22	12.48	11.63	9.31
802.11a	**5660**	132	B	12.71	12.88	13.06	12.53	12.52	12.54	11.61	9.27
802.11a	5680	136	B	12.75	12.66	12.93	12.30	12.97	12.41	11.64	9.30
802.11a	**5700**	140	B	12.47	12.43	12.06	12.12	12.00	11.93	11.10	9.28
802.11a	5745	149	B	11.82	12.04	12.00	12.03	11.84	11.76	10.85	8.50
802.11a	5785	157	B	12.31	12.35	12.10	12.20	12.03	11.95	11.10	8.78
802.11a	5825	165	B	12.92	12.80	12.40	12.62	12.10	12.10	11.25	8.85

Mode	Freq [MHz]	Channel	Tx Chain	Conducted Power [dBm] Data Rate [Mbps]							
				13.5	27	40	54	81	108	122	135
802.11n	5190	38	B	9.06	9.01	8.97	8.81	8.67	8.73	8.68	8.63
802.11n	5230	46	B	12.82	12.41	12.72	12.40	12.08	11.56	9.81	7.97
802.11n	5270	54	B	12.22	12.60	12.52	12.32	12.22	11.76	10.01	8.25
802.11n	5310	62	B	10.03	10.01	9.96	9.78	9.71	9.69	9.73	8.35
802.11n	5510	102	B	11.47	11.43	11.36	11.16	11.10	10.63	10.27	8.48
802.11n	5550	110	B	11.21	11.09	11.42	11.05	11.40	11.04	9.14	7.68
802.11n	5590	118	B	**12.59**	12.57	12.45	11.93	11.81	11.43	10.00	8.25
802.11n	5630	126	B	10.72	10.89	10.80	10.44	10.56	10.47	8.17	6.72
802.11n	5670	134	B	11.80	11.79	11.69	11.47	11.42	11.24	9.17	5.06
802.11n	5755	151	B	11.35	11.66	11.54	11.35	11.30	10.72	8.60	5.60
802.11n	5795	159	B	12.00	11.90	11.76	11.56	11.40	11.00	8.81	6.01

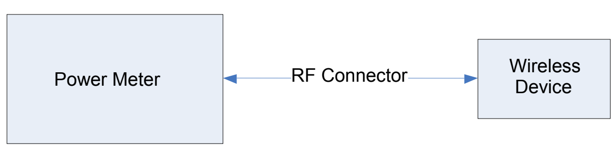


Figure 13-1
Power Measurement Setup

14 FCC MULTI-TX AND ANTENNA SAR CONSIDERATIONS

14.1 Maximum Conducted Power

Maximum Conducted Power						
Transmitter	Frequency Band	Highest Frequency	Conducted Power		60/f (GHz)	>60/f
	MHz	MHz	dBm	mW	mW	
TD-CDMA 25	00	2,684.60	24.70	295.12	22.35	yes
Bluetooth	2441	2,480.00	13.67	23.28	24.19	no
802.11b	2437	2,462.00	13.54	22.59	24.37	no
802.11g	2437	2,462.00	14.22	26.42	24.37	yes
802.11n	2437	2,452.00	14.05	25.41	24.47	yes
802.11a	5200	5,240.00	13.86	24.32	11.45	yes
802.11a	5300	5,320.00	13.39	21.83	11.28	yes
802.11a	5500	5,700.00	14.05	25.41	10.53	yes
802.11a	5800	5,825.00	12.92	19.59	10.30	yes
802.11n	5200	5,230.00	12.82	19.14	11.47	yes
802.11n	5300	5,310.00	12.60	18.20	11.30	yes
802.11n	5500	5,670.00	12.59	18.16	10.58	yes
802.11n	5800	5,795.00	12.00	15.85	10.35	yes

14.2 Co-Transmission

Co-Transmission										
TX		**TD-CDMA**	**BT**	**802.11b**	**802.11g**	**802.11n**	**802.11a**	**802.11a**	**802.11a**	**802.11a**
	Freq	2593	2441	2437	2437	2437	5200	5300	5500	5800
TD-CDMA	2593	N/A	yes	yes	yes	yes	yes	yes	yes	yes
BT	2441	yes	N/A	yes	yes	yes	yes	yes	yes	yes
802.11b	2437	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11g	2437	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	2437	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5200	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5300	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5500	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11a	5800	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	2437	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5200	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5300	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5500	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5800	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A
802.11n	5800	yes	yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A

14.3 Distance-Antenna to Antenna

Distance - Antenna to Antenna (Unit: mm)				
Antenna	**WWAN Main**	**WLAN Main**	**WLAN Aux**	**BT**
WWAN Main	NA	270	35	95
WLAN Main	270	NA	268	268
WLAN Aux	35	268	NA	60
BT	95	268	60	NA

14.4 Distance-Antenna to Body

Distance - Antenna to Body (Unit: mm)				
Position	**Antenna**			
	WWAN Main	**WLAN Main**	**WLAN Aux**	**BT**
Lap (LCD Flip)	40	40	40	40
Tablet / Edge Bottom	135	100	100	40
Tablet / Edge Top	25	100	100	158

14.5 Summary of ∑ SAR

14.5.1 TD-CDMA and WLAN

WWAN	Position	LCD Side	SAR Result [W/kg] Maximum								
			TD-CDMA	**BT**	**802.11b**	**802.11g**	**802.11n**	**802.11a**	**802.11a**	**802.11a**	**802.11a**	**Sigma SAR**
			PCS		2.4 GHz	2.4 GHz	2.4 GHz	5.2 GHz	5.3 GHz	5.5 GHz	5.8 GHz	
TD-CDMA			0.259	0.050	0.1040							**0.413**
TD-CDMA			0.259	0.050		0.0764						**0.385**
TD-CDMA	Tablet	Top	0.259	0.050			0.0352					**0.344**
TD-CDMA	Tablet	Top	0.259	0.050				0.0268				**0.336**
TD-CDMA	Tablet	Top	0.259	0.050					0.044			**0.353**
TD-CDMA	Tablet	Top	0.259	0.050						0.0383		**0.347**
TD-CDMA	Tablet	Top	0.259	0.050							0.0965	**0.405**

15 SAR DATA SUMMARY

15.1 TD-CDMA SAR Results

MEASUREMENT RESULTS							
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Spacing (cm)	SAR
MHz	Ch.		Start	End			(W/kg)
2501.4	12507	TD-CDMA	24.39	24.27	Lap	0.0 cm	0.055
2593	12965	TD-CDMA	24.47	24.36	Lap	0.0 cm	0.068
2684.6	13420	TD-CDMA	24.70	24.77	Lap	0.0 cm	0.065
2501.4	12507	TD-CDMA	24.39	24.44	Edge Bottom	0.0 cm	0.007
2593	12965	TD-CDMA	24.47	24.55	Edge Bottom	0.0 cm	0.016
2684.6	13420	TD-CDMA	24.70	24.65	Edge Bottom	0.0 cm	0.025
2501.4	12507	TD-CDMA	24.39	24.32	Edge Top	0.0 cm	0.247
2593	12965	TD-CDMA	24.47	24.45	Edge Top	0.0 cm	0.259
2684.6	13420	TD-CDMA	24.70	24.64	Edge Top	0.0 cm	0.255
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population					Body 1.6 W/kg (mW/g) averaged over 1 gram		

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. Device tested at full power with 6 Tx Slots.
7. The TX WWAN antenna is located on “Edge Right” but is disabled in corresponding display mode so only the “Edge Top” and “Edge Bottom” configurations of the tablet mode were tested.
8. Transmission was verified using a spectrum analyzer.

15.2 2.4 GHz SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Antenna Chain	Spacing (cm)	Data Rate (Mbps)	SAR	Mode
MHz	Ch.		Start	End		A-Main / B-Aux			(W/kg)	
2437	6	DSSS	13.54	13.71	Lap	A	0.00	1 Mbps	0.0557	**802.11b**
2437	6	DSSS	13.54	13.69	Lap	B	0.00	1 Mbps	0.0615	**802.11b**
2437	6	DSSS	13.54	13.68	Edge Bottom	A	0.00	1 Mbps	0.0213	**802.11b**
2437	6	DSSS	13.54	13.72	Edge Bottom	B	0.00	1 Mbps	0.104	**802.11b**
2437	6	DSSS	13.54	13.69	Edge Top	A	0.00	1 Mbps	0.0146	**802.11b**
2437	6	DSSS	13.54	13.69	Edge Top	B	0.00	1 Mbps	0.0375	**802.11b**
2437	6	OFDM	14.22	14.40	Lap	A	0.00	6 Mbps	0.0109	**802.11g**
2437	6	OFDM	14.22	14.41	Lap	B	0.00	6 Mbps	0.0121	**802.11g**
2437	6	OFDM	14.22	14.40	Edge Bottom	A	0.00	6 Mbps	0.0055	**802.11g**
2437	6	OFDM	14.22	14.37	Edge Bottom	B	0.00	6 Mbps	0.0147	**802.11g**
2437	6	OFDM	14.22	14.35	Edge Top	A	0.00	6 Mbps	0.0378	**802.11g**
2437	6	OFDM	14.22	14.09	Edge Top	B	0.00	6 Mbps	0.0764	**802.11g**
2437	6	OFDM	14.05	14.22	Lap	A	0.00	13.5 Mbps	0.0052	**802.11n**
2437	6	OFDM	14.05	14.25	Lap	B	0.00	13.5 Mbps	0.0105	**802.11n**
2437	6	OFDM	14.05	14.21	Edge Bottom	A	0.00	13.5 Mbps	0.0085	**802.11n**
2437	6	OFDM	14.05	14.24	Edge Bottom	B	0.00	13.5 Mbps	0.0211	**802.11n**
2437	6	OFDM	14.05	14.01	Edge Top	A	0.00	13.5 Mbps	0.0352	**802.11n**
2437	6	OFDM	14.05	14.05	Edge Top	B	0.00	13.5 Mbps	0.0224	**802.11n**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. WLAN antennas are located on “Edge Right” and “Edge Left.” Each can only transmit when the transmitting antenna is positioned away from body, per restriction due to the display orientation.
7. WLAN transmission was verified using a spectrum analyzer.
8. Justification for reduced test configurations per KDB 248227: Highest average RF output power channel was selected for WLAN for SAR evaluation or mid channel was tested.
9. SAR testing performed on the WLAN portion of this device on 03/22/2010 were done on electrically identical representative units with respect to WLAN.

15.3 5.2 GHz SAR Results

MEASUREMENT RESULTS											
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Antenna	Spacing (cm)	Data Rate (Mbps)	SAR	Mode
MHz	Ch.		Start	End		A-Main / B-Aux			(W/kg)	
5240.0	48	OFDM	14.46 1	4.02	Lap	A	0.00	24	0.0268	**802.11a**
5220.0	44	OFDM	13.86 1	3.97	Lap	B	0.00	24	0.0241	**802.11a**
5240.0	48	OFDM	14.46 1	3.99	Edge Bottom	A	0.00	24	0.0038	**802.11a**
5220.0	44	OFDM	13.86 1	4.03	Edge Bottom	B	0.00	24	0.0118	**802.11a**
5240.0	48	OFDM	14.46 1	4.01	Edge Top	A	0.00	24	0.0026	**802.11a**
5220.0	44	OFDM	13.86 1	4.05	Edge Top	B	0.00	24	0.0202	**802.11a**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General					**Body 1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. WLAN antennas are located on “Edge Right” and “Edge Left.” Each can only transmit when the transmitting antenna is positioned away from body, per restriction due to the display orientation.
7. WLAN transmission was verified using a spectrum analyzer.
8. Justification for reduced test configurations per KDB 248227: Highest average RF output power channel was selected for WLAN for SAR evaluation or mid channel was tested.
9. SAR testing performed on the WLAN portion of this device on 03/30/2010 were done on electrically identical representative units with respect to WLAN.

15.4 5.3 GHz SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Antenna	Spacing (cm)	Data Rate (Mbps)	SAR	Mode
MHz	Ch.		Start	End		A-Main / B-Aux			(W/kg)	
5300.0	60	OFDM	14.44 1	3. 58	Lap	A	0.00	12	0.0318	**802.11a**
5300.0	60	OFDM	13.39 1	3. 55	Lap	B	0.00	12	0.0319	**802.11a**
5300.0	60	OFDM	14.44 1	3. 51	Edge Bottom	A	0.00	12	0.021	**802.11a**
5300.0	60	OFDM	13.39 1	3. 59	Edge Bottom	B	0.00	12	0.0262	**802.11a**
5300.0	60	OFDM	14.44 1	3. 54	Edge Top	A	0.00	12	0.044	**802.11a**
5300.0	60	OFDM	13.39 1	3. 42	Edge Top	B	0.00	12	0.027	**802.11a**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. WLAN antennas are located on “Edge Right” and “Edge Left.” Each can only transmit when the transmitting antenna is positioned away from body, per restriction due to the display orientation.
7. WLAN transmission was verified using a spectrum analyzer.
8. Justification for reduced test configurations per KDB 248227: Highest average RF output power channel was selected for WLAN for SAR evaluation or mid channel was tested.
9. SAR testing performed on the WLAN portion of this device on 03/30/2010 were done on electrically identical representative units with respect to WLAN.

15.5 5.5 GHz SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Antenna	Spacing (cm)	Data Rate (Mbps)	SAR	Mode
MHz	Ch.		Start	End		A-Main / B-Aux			(W/kg)	
5640.0	128	OFDM	14.96	13.94	Laptop	A	0.00	12	0.0383	**802.11a**
5540.0	108	OFDM	14.05	14.21	Laptop	B	0.00	12	0.0374	**802.11a**
5640.0	128	OFDM	14.96	14.17	Edge Bottom	A	0.00	12	0.0328	**802.11a**
5540.0	108	OFDM	14.05	14.24	Edge Bottom	B	0.00	12	0.0331	**802.11a**
5640.0	128	OFDM	14.96	14.16	Edge Top	A	0.00	12	0.0251	**802.11a**
5540.0	108	OFDM	14.05	14.20	Edge Top	B	0.00	12	0.0315	**802.11a**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. WLAN antennas are located on “Edge Right” and “Edge Left.” Each can only transmit when the transmitting antenna is positioned away from body, per restriction due to the display orientation.
7. WLAN transmission was verified using a spectrum analyzer.
8. Justification for reduced test configurations per KDB 248227: Highest average RF output power channel was selected for WLAN for SAR evaluation or mid channel was tested.
9. SAR testing performed on the WLAN portion of this device on 03/31/2010 were done on electrically identical representative units with respect to WLAN.

15.6 5.8 GHz SAR Results

MEASUREMENT RESULTS										
FREQUENCY		Modulation	Conducted Power [dBm]		Test Position	Antenna	Spacing (cm)	Data Rate (Mbps)	SAR	Mode
MHz	Ch.		Start	End		A-Main / B-Aux			(W/kg)	
5785.0	157	OFDM	14.35	13.09	Lap	A	0.00	6	0.0406	**802.11a**
5825.0	165	OFDM	12.92	13.07	Lap	B	0.00	6	0.0316	**802.11a**
5785.0	157	OFDM	14.35	13.12	Edge Bottom	A	0.00	6	0.0965	**802.11a**
5825.0	165	OFDM	12.92	13.07	Edge Bottom	B	0.00	6	0.0216	**802.11a**
5785.0	157	OFDM	14.35	13.11	Edge Top	A	0.00	6	0.0182	**802.11a**
5825.0	165	OFDM	12.92	13.09	Edge Top	B	0.00	6	0.0196	**802.11a**
ANSI / IEEE C95.1 1992 - SAFETY LIMIT **Spatial Peak** **Uncontrolled Exposure/General**					**Body** **1.6 W/kg (mW/g)** averaged over 1 gram					

Notes:

1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. WLAN antennas are located on “Edge Right” and “Edge Left.” Each can only transmit when the transmitting antenna is positioned away from body, per restriction due to the display orientation.
7. WLAN transmission was verified using a spectrum analyzer.
8. Justification for reduced test configurations per KDB 248227: Highest average RF output power channel was selected for WLAN for SAR evaluation or mid channel was tested.
9. SAR testing performed on the WLAN portion of this device on 03/31/2010 were done on electrically identical representative units with respect to WLAN.

15.7 BT SAR Results

MEASUREMENT RESULTS									
FREQUENCY		Modulation	Service	Conducted Power [dBm]		Test Position	LCD Side	Spacing (cm)	SAR
MHz	Ch.			Start	End				(W/kg)
2441	39	Bluetooth	FHSS	13.67	13.82	Laptop	-	0.0 cm	0.000
2441	39	Bluetooth	FHSS	13.67	13.52	Edge	Bottom	0.0 cm	0.050
2441	39	Bluetooth	FHSS	13.67	13.79	Edge	Top	0.0 cm	0.010
ANSI / IEEE C95.1 2005 - SAFETY LIMIT Spatial Peak Uncontrolled Exposure/General Population						Body 1.6 W/kg (mW/g) averaged over 1 gram			

Notes:
1. The test data reported are the worst-case SAR value with the position set in a typical configuration. Test procedures used were according to FCC/OET Bulletin 65, Supplement C [June 2001], IEEE1528-2003 and RSS-102.
2. All modes of operation were investigated, and worst-case results are reported.
3. Tissue parameters and temperatures are listed on the SAR plots.
4. Batteries are fully charged for all readings.
5. Liquid tissue depth was at least 15.0 cm.
6. Bluetooth transmission was verified using a spectrum analyzer.
7. Justification for reduced test configurations: Per FCC/OET Bulletin 65 Supplement C (June, 2001) and Public Notice DA-02-1438, if the SAR measured at the middle channel for each test configuration is at least 3.0 dB lower than the SAR limit, testing at the high and low channels is optional for such test configuration(s).
8. SAR testing performed on the Bluetooth portion of this device on 04/12/2010 were done on electrically identical representative units with respect to WLAN.

16 EQUIPMENT LIST

16.1 Testing Finished on or before 04/07/2010

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8648D	(9kHz-4GHz) Signal Generator	9/19/2009	Biennial	9/19/2011	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/31/2010	Annual	3/31/2011	JP38020182
Agilent	E5515C	Wireless Communications Test Set	9/10/2009	Annual	9/10/2010	GB46110872
Agilent	E5515C	Wireless Communications Test Set	9/11/2009	Annual	9/11/2010	GB46310798
Agilent	E5515C	Wireless Communications Test Set	8/25/2009	Annual	8/25/2010	GB41450275
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Biennial	3/30/2012	MY45470194
Gigatronics	80701A	(0.05-18GHz) Power Sensor	9/9/2009	Annual	9/9/2010	1833460
Gigatronics	8651A	Universal Power Meter	9/9/2009	Annual	9/9/2010	8650319
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	9/11/2009	Annual	9/11/2010	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	9/4/2009	Annual	9/4/2010	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	8/20/2008	Biennial	8/20/2010	101695
Rohde & Schwarz	NRV-Z32	Peak Power Sensor (100uW-2W)	12/5/2008	Biennial	12/5/2010	100155
Rohde & Schwarz	NRV-Z33	Peak Power Sensor (1mW-20W)	12/5/2008	Biennial	12/5/2010	100004
SPEAG	D1450V2	1450 MHz SAR Dipole	5/20/2009	Biennial	5/20/2011	1025
SPEAG	D1765V2	1765 MHz SAR Dipole	5/19/2009	Biennial	5/19/2011	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	1/20/2009	Biennial	1/20/2011	502
SPEAG	D1900V2	1900 MHz SAR Dipole	8/18/2009	Biennial	8/18/2011	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	8/27/2009	Biennial	8/27/2011	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/8/2009	Biennial	1/8/2011	797
SPEAG	D2600V2	2600 MHz SAR Dipole	8/12/2009	Biennial	8/12/2011	1004
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/19/2009	Biennial	8/19/2011	1007
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/15/2009	Biennial	1/15/2011	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/19/2009	Biennial	1/19/2011	4d047
SPEAG	D835V2	835 MHz SAR Dipole	8/24/2009	Biennial	8/24/2011	4d026
SPEAG	DAE3	Dasy Data Acquisition Electronics	9/17/2009	Annual	9/17/2010	455
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/22/2010	Annual	3/22/2011	704
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/22/2010	Annual	1/22/2011	649
SPEAG	ES3DV2	SAR Probe	9/18/2009	Annual	9/18/2010	3022
SPEAG	EX3DV4	SAR Probe	1/26/2010	Annual	1/26/2011	3550
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/21/2009	Annual	7/21/2010	859
SPEAG	D750V3	750 MHz Dipole	2/19/2009	Biennial	2/19/2011	1003
Speag	ES3DV3	SAR Probe	3/16/2010	Annual	3/16/2011	3213
Rohde & Schwarz	SMIQ03B	Signal Generator	5/21/2009	Annual	5/21/2010	832810/021
Speag	D1640V2	1640 MHz Dipole	8/21/2008	Biennial	8/21/2010	321
Rohde & Schwarz	CMW500	LTE Base Station Simulator	8/25/2009	Annual	8/25/2010	100976
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5318
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	5442
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1190013
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	98150041
Agilent	8648D	Signal Generator	4/1/2010	Annual	4/1/2011	3629U00687
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1070030
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5821
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	8013
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	2400
Aprel	ALS-PR-DIEL	Dielectric Probe Kit	N/A		N/A	260-00959

16.2 Testing finished on 05/20/2010

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	8648D	(9kHz-4GHz) Signal Generator	9/19/2009	Biennial	9/19/2011	3613A00315
Agilent	8753E	(30kHz-6GHz) Network Analyzer	3/31/2010	Annual	3/31/2011	JP38020182
Agilent	E5515C	Wireless Communications Test Set	9/10/2009	Annual	9/10/2010	GB46110872
Agilent	E5515C	Wireless Communications Test Set	9/11/2009	Annual	9/11/2010	GB46310798
Agilent	E5515C	Wireless Communications Test Set	8/25/2009	Annual	8/25/2010	GB41450275
Agilent	E6651A	Mobile WiMAX Tester	8/23/2007	Biennial	8/23/2009	MY47310109
Agilent	E8257D	(250kHz-20GHz) Signal Generator	3/30/2010	Annual	3/30/2011	MY45470194
Gigatronics	80701A	(0.05-18GHz) Power Sensor	9/9/2009	Annual	9/9/2010	1833460
Gigatronics	8651A	Universal Power Meter	9/9/2009	Annual	9/9/2010	8650319
Index SAR	IXTL-010	Dielectric Measurement Kit	N/A		N/A	N/A
Index SAR	IXTL-030	30MM TEM line for 6 GHz	N/A		N/A	N/A
Rohde & Schwarz	CMU200	Base Station Simulator	9/11/2009	Annual	9/11/2010	836371/0079
Rohde & Schwarz	CMU200	Base Station Simulator	9/4/2009	Annual	9/4/2010	109892
Rohde & Schwarz	NRVD	Dual Channel Power Meter	8/20/2008	Biennial	8/20/2010	101695
Rohde & Schwarz	NRV-Z32	Peak Power Sensor (100uW-2W)	12/5/2008	Biennial	12/5/2010	100155
Rohde & Schwarz	NRV-Z33	Peak Power Sensor (1mW-20W)	12/5/2008	Biennial	12/5/2010	100004
SPEAG	D1765V2	1765 MHz SAR Dipole	5/19/2009	Biennial	5/19/2011	1008
SPEAG	D1900V2	1900 MHz SAR Dipole	1/20/2009	Biennial	1/20/2011	502
SPEAG	D1900V2	1900 MHz SAR Dipole	8/18/2009	Biennial	8/18/2011	5d080
SPEAG	D2450V2	2450 MHz SAR Dipole	8/27/2009	Biennial	8/27/2011	719
SPEAG	D2450V2	2450 MHz SAR Dipole	1/8/2009	Biennial	1/8/2011	797
SPEAG	D2600V2	2600 MHz SAR Dipole	8/12/2009	Biennial	8/12/2011	1004
SPEAG	D5GHzV2	5 GHz SAR Dipole	8/19/2009	Biennial	8/19/2011	1007
SPEAG	D5GHzV2	5 GHz SAR Dipole	1/15/2009	Biennial	1/15/2011	1057
SPEAG	D835V2	835 MHz SAR Dipole	1/19/2009	Biennial	1/19/2011	4d047
SPEAG	D835V2	835 MHz SAR Dipole	8/24/2009	Biennial	8/24/2011	4d026
SPEAG	DAE3	Dasy Data Acquisition Electronics	9/17/2009	Annual	9/17/2010	455
SPEAG	DAE4	Dasy Data Acquisition Electronics	3/22/2010	Annual	3/22/2011	704
SPEAG	DAE4	Dasy Data Acquisition Electronics	4/21/2010	Annual	4/21/2011	665
SPEAG	DAE4	Dasy Data Acquisition Electronics	1/22/2010	Annual	1/22/2011	649
SPEAG	ES3DV2	SAR Probe	9/18/2009	Annual	9/18/2010	3022
SPEAG	EX3DV4	SAR Probe	1/26/2010	Annual	1/26/2011	3550
SPEAG	DAE4	Dasy Data Acquisition Electronics	7/21/2009	Annual	7/21/2010	859
SPEAG	D750V3	750 MHz Dipole	2/19/2009	Biennial	2/19/2011	1003
Speag	ES3DV3	SAR Probe	3/16/2010	Annual	3/16/2011	3213
Speag	ES3DV3	SAR Probe	4/20/2010	Annual	4/20/2011	3209
Rohde & Schwarz	SMIQ03B	Signal Generator	4/1/2010	Annual	4/1/2011	DE27259
Speag	D1640V2	1640 MHz Dipole	8/21/2008	Biennial	8/21/2010	321
Rohde & Schwarz	CMW500	LTE Base Station Simulator	8/25/2009	Annual	8/25/2010	100976
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5318
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	5442
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1190013
Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	98150041
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Anritsu	ML2438A	Power Meter	12/3/2009	Annual	12/3/2010	1070030
Anritsu	MA2481A	Power Sensor	12/2/2009	Annual	12/2/2010	5821
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	8013
Anritsu	MA2481A	Power Sensor	12/3/2009	Annual	12/3/2010	2400
Aprel	ALS-PR-DIEL	Dielectric Probe Kit	N/A		N/A	260-00959
Agilent	E5515C	Wireless Communications Tester	4/14/2010	Annual	4/14/2011	US41140256

Notes:
The E-field probe was calibrated by SPEAG, by the waveguide technique procedure. Dipole Validation measurement is performed by PCTEST prior to SAR evaluation. The brain simulating material is calibrated by PCTEST using the dielectric probe system and network analyzer to determine the conductivity and permittivity (dielectric constant) of the brain-equivalent material.

17 CONCLUSION

17.1 Measurement Conclusion

The SAR evaluation indicates that the EUT complies with the RF radiation exposure limits of the FCC and Industry Canada, with respect to all parameters subject to this test. These measurements were taken to simulate the RF effects of RF exposure under worst-case conditions. Precise laboratory measures were taken to assure repeatability of the tests. The results and statements relate only to the item(s) tested.

Please note that the absorption and distribution of electromagnetic energy in the body are very complex phenomena that depend on the mass, shape, and size of the body, the orientation of the body with respect to the field vectors, and the electrical properties of both the body and the environment. Other variables that may play a substantial role in possible biological effects are those that characterize the environment (e.g. ambient temperature, air velocity, relative humidity, and body insulation) and those that characterize the individual (e.g. age, gender, activity level, debilitation, or disease). Because various factors may interact with one another to vary the specific biological outcome of an exposure to electromagnetic fields, any protection guide should consider maximal amplification of biological effects as a result of field-body interactions, environmental conditions, and physiological variables. [3]

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