FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 2

SAR EVALUATION REPORT

FOR

Intel Wi-Fi Link 5100 Series
(Tested inside of Portege M750 Tablet)

MODEL: PA3655U-1MPC

FCC ID: CJ6UPA3655WL

IC: 248H-DPA3655W

REPORT NUMBER: 08U12001-3

ISSUE DATE: AUGUST 27, 2008

Prepared for

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DIGITAL MEDIA NETWORK COMPANY
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	August 27, 2008	Initial issue	--

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1 ATTESTATION OF TEST RESULTS

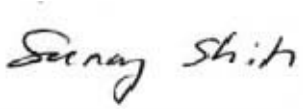
COMPANY NAME:	TOSHIBA CORPORATION DIGITAL MEDIA NETWORK COMPANY OME COMPLEX, 2-9, SUEHIRO-CHO TOKYO, 198-8710, JAPAN
EUT DESCRIPTION:	Intel Wi-Fi Link 5100 Series (Tested inside of Portege M750 Tablet)
MODEL:	PA3655U-1MPC
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	August 25-27 , 2008
THE HIGHEST SAR VALUES:	See Table below

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
15.247 / RSS-102	2400 – 2483.5 5725 – 5850	0.095 0.160	1.6
15.407 / RSS-102	5150 – 5250 5250 – 5350 5470 – 5725	0.245 0.250 0.337	1.6

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC OET BULLETIN 65 SUPPLEMENT C	Pass
RSS-102 ISSUE 2	Pass

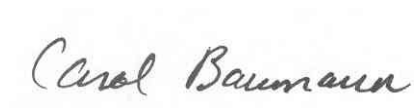
Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



CAROL BAUMANN
SAR ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2 TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C, Specific FCC Procedure KDB 248227 SAR Measurement Procedure for 820.11abg Transmitters May 2007, KDB 447498_RF Exposure Requirements and Procedures for mobile and portable devices and IC RSS 102 Issue 2: NOVEMBER 2005.

3 FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.
CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4 CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

5 MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	1.59	R	1.732	1	1	0.92	0.92
RF Ambient Conditions - Reflections	0.00	R	1.732	1	1	0.00	0.00
Probe Positioner Mechnical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.44	10.49
Expanded Uncertainty (95% Confidence Interval)	K=2					22.87	20.98

Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

Measurement uncertainty for 3 GHz – 6 GHz

Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R	1.732	1	1	0.58	0.58
Linearity	4.70	R	1.732	1	1	2.71	2.71
System Detection Limits	1.00	R	1.732	1	1	0.58	0.58
Readout Electronics	1.00	N	1	1	1	1.00	1.00
Response Time	0.80	R	1.732	1	1	0.46	0.46
Integration Time	2.60	R	1.732	1	1	1.50	1.50
RF Ambient Conditions - Noise	3.00	R	1.732	1	1	1.73	1.73
RF Ambient Conditions - Reflections	3.00	R	1.732	1	1	1.73	1.73
Probe Positioner Mechnical Tolerance	0.40	R	1.732	1	1	0.23	0.23
Probe Positioning With Respect to Phantom Shell	2.90	R	1.732	1	1	1.67	1.67
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	3.90	R	1.732	1	1	2.25	2.25
Test sample Related							
Test Sample Positioning	1.10	N	1	1	1	1.10	1.10
Device Holder Uncertainty	3.60	N	1	1	1	3.60	3.60
Power and SAR Drift Measurement	5.00	R	1.732	1	1	2.89	2.89
Phantom and Tissue Parameters							
Phantom Uncertainty	4.00	R	1.732	1	1	2.31	2.31
Liquid Conductivity - Target	5.00	R	1.732	0.64	0.43	1.85	1.24
Liquid Conductivity - Meas.	8.60	N	1	0.64	0.43	5.50	3.70
Liquid Permittivity - Target	5.00	R	1.732	0.6	0.49	1.73	1.41
Liquid Permittivity - Meas.	3.30	N	1	0.6	0.49	1.98	1.62
Combined Standard Uncertainty	RSS					11.66	10.73
Expanded Uncertainty (95% Confidence Interval)	K=2					23.32	21.46

Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

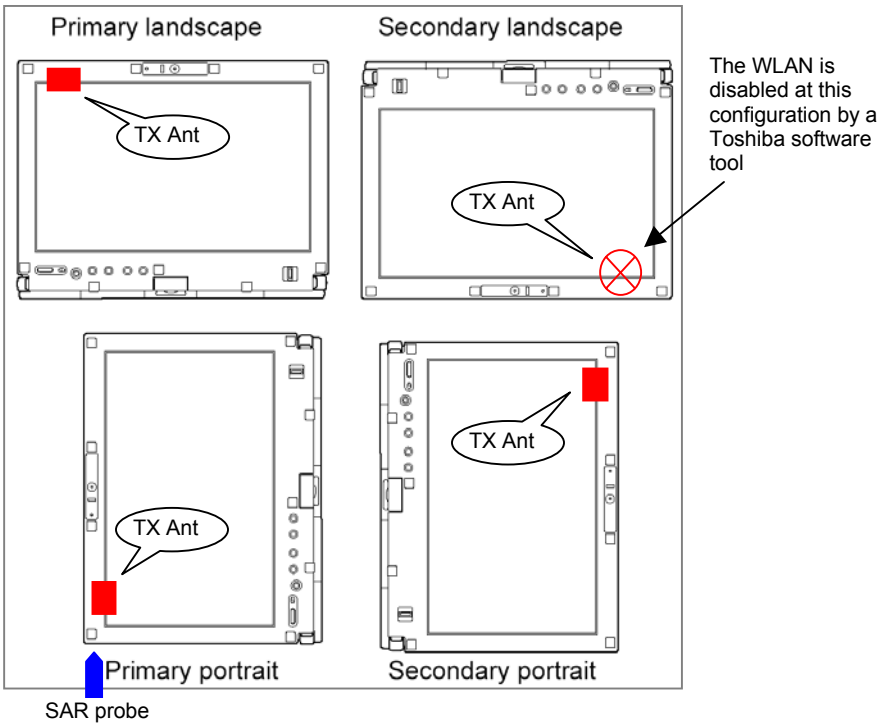
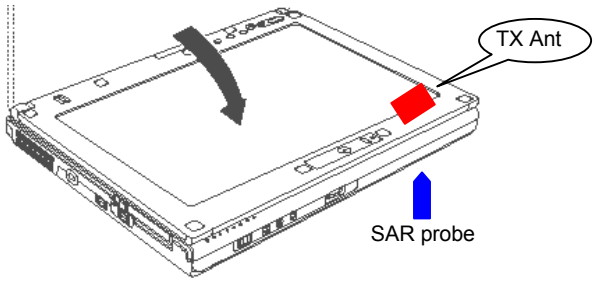
6 TEST EQUIPMENT LIST

Name of Equipment	Manufacturer	Type/Model	Serial Number	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A		N/A	
Robot Remote Control	Stäubli	CS7MB	3403-91535		N/A	
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041		N/A	
Probe Alignment Unit	SPEAG	LB (V2)	261		N/A	
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185		N/A	
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050		N/A	
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003		N/A	
Electronic Probe kit	HP	85070C	N/A		N/A	
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	14	2008
E-Field Probe	SPEAG	EX3DV3	3531	4	23	2009
Thermometer	ERTCO	639-1S	1718	8	30	2008
Data Acquisition Electronics	SPEAG	DAE3 V1	500	11	16	2008
System Validation Dipole	SPEAG	D2450V2	748	4	14	2009
System Validation Dipole	SPEAG	D5GHzV2	1003	11	21	2009
Signal Generator	R&S	SMP 04	DE34210	2	16	2009
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZVE-8G	90606		N/A	
Amplifier	Mini-Circuits	ZHL-42W	D072701-5		N/A	
Simulating Liquid	CCS	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M5200-5800	N/A	Within 24 hrs of first test		

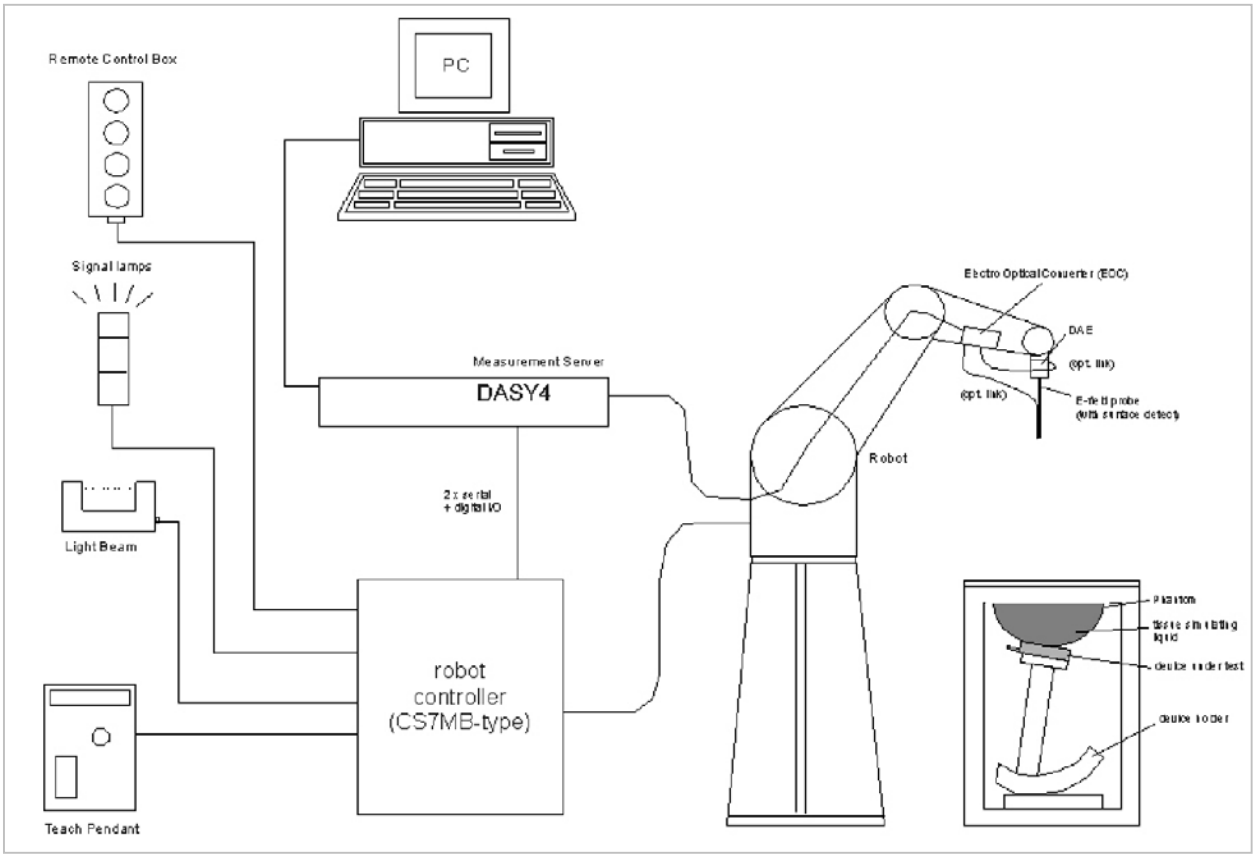
7 DEVICE UNDER TEST (DUT) DESCRIPTION

Intel Wi-Fi Link 5100 Series (Tested inside of Portege M750 Tablet)	

Normal operation:	• Laptop Mode
	• Tablet Mode – in the following configurations.
	  ○ Bottom Face
	  ○ Edge - Primary/Secondary landscape and Primary/Secondary portrait orientations.

Tablet Mode – Edge	The orientation of the computer screen can be changed to one of the following four display modes:  SAR tests on tablet mode: Edge - primary portrait only
Tablet Mode - Bottom face	 Note: SAR tests on tablet mode: Bottom Face
Antenna tested:	TBN003
Power supply:	Power supplied through laptop computer (host device)

8 SYSTEM DESCRIPTION



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

8.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

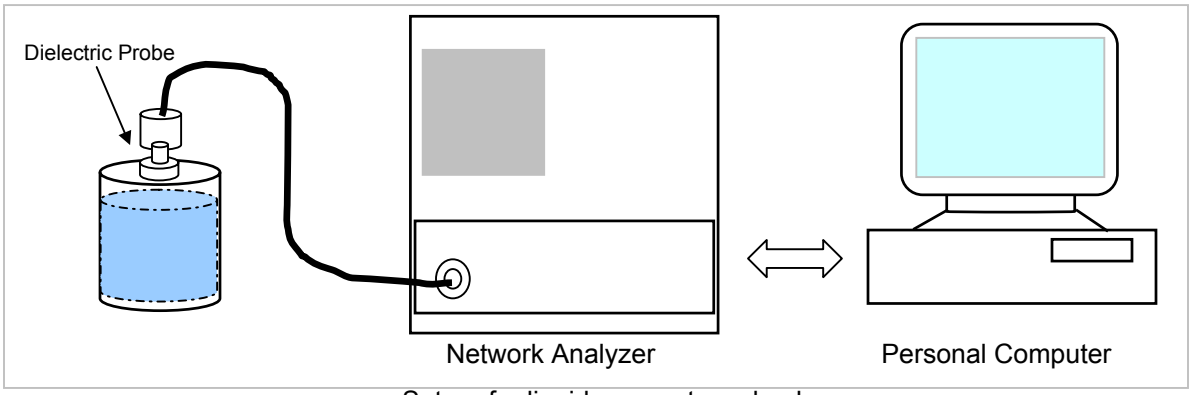
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

9 SIMULATING LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.



Set-up for liquid parameters check

Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	**55.0**	**1.05**
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	**53.3**	**1.52**
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m^3)

9.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	24	15	e'	52.2826	Relative Permittivity (ϵ_r):	52.2826	52.7	-0.79	± 5
			e"	14.1962	Conductivity (σ):	1.93489	1.95	-0.77	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
August 25, 2008 09:21 AM

Frequency	e'	e"
2400000000.	52.4367	14.0412
2405000000.	52.5324	14.0657
2410000000.	52.5220	13.9976
2415000000.	52.5399	14.0642
2420000000.	52.5337	14.0970
2425000000.	52.4161	14.1017
2430000000.	52.5188	14.1087
2435000000.	52.4444	14.1083
2440000000.	52.3354	14.1070
2445000000.	52.3069	14.1618
2450000000.	**52.2826**	**14.1962**
2455000000.	52.3631	14.2169
2460000000.	52.3087	14.1690
2465000000.	52.2201	14.2347
2470000000.	52.2913	14.2940
2475000000.	52.2450	14.4006
2480000000.	52.2356	14.3247
2485000000.	52.1805	14.4437
2490000000.	52.1339	14.4555
2495000000.	52.1240	14.4424
2500000000.	52.1179	14.4437

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

Simulating Liquid Parameter Check Result @ Muscle 5GHz

Room Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
5200	24	15	e'	45.2314	Relative Permittivity (ϵ_r):	45.2314	49.0	-7.69	± 10
			e"	18.6476	Conductivity (σ):	5.39443	5.30	1.78	± 5
5500	24	15	e'	44.6254	Relative Permittivity (ϵ_r):	44.6254	48.6	-8.18	± 10
			e"	18.8255	Conductivity (σ):	5.76008	5.65	1.95	± 5
5800	24	15	e'	43.9704	Relative Permittivity (ϵ_r):	43.9704	48.2	-8.78	± 10
			e"	19.0309	Conductivity (σ):	6.14054	6.00	2.34	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
August 26, 2008 06:51 AM

Frequency	e'	e"
4600000000.	46.5295	17.6617
4650000000.	46.4182	17.8146
4700000000.	46.3666	17.8191
4750000000.	46.1769	17.9284
4800000000.	46.1582	17.9791
4850000000.	45.9660	17.9847
4900000000.	45.9629	18.0919
4950000000.	45.8313	18.1081
5000000000.	45.7897	18.1946
5050000000.	45.7363	18.2373
5100000000.	45.6387	18.4003
5150000000.	45.5635	18.6110
5200000000.	**45.2314**	**18.6476**
5250000000.	45.0718	18.6645
5300000000.	45.0355	18.6044
5350000000.	44.8656	18.6791
5400000000.	44.8514	18.7002
5450000000.	44.6776	18.7842
5500000000.	**44.6254**	**18.8255**
5550000000.	44.4978	18.9356
5600000000.	44.4079	18.8858
5650000000.	44.2590	19.0429
5700000000.	44.2008	18.9518
5750000000.	43.9911	19.1048
5800000000.	**43.9704**	**19.0309**
5850000000.	43.7081	19.1525
5900000000.	43.7520	19.1621
5950000000.	43.4827	19.1654
6000000000.	43.4826	19.1975

The conductivity (σ) can be given as:

$$\sigma = \omega \varepsilon_0 e'' = 2 \pi f \varepsilon_0 e''$$

where $f = target\ f * 10^6$

$\varepsilon_0 = 8.854 * 10^{-12}$

10 SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (2.4 GHz) fine cube was chosen for cube integration and Special 8x8x10 (5 GHz) fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 4 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5mm
- The dipole input power (forward power) was 250 mW±3%.
- The results are normalized to 1 W input power.

450 to 2450 MHz Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using the finite-difference time-domain method and the geometry parameters.

Dipole Type	Distance (mm)	Frequency (MHz)	SAR (1g) [W/kg]	SAR (10g) [W/kg]	SAR (peak) [W/kg]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	**11.1**	**7.17**	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	**38.5**	**20.3**	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	**40.9**	**21.2**	71.5
D2450V2	10	2450	51.2	23.7	97.6

Note: All SAR values normalized to 1 W forward power.

5 GHz Reference SAR Values for body-tissue

In the table below, the numerical reference SAR values of a SPEAG validation dipoles placed below the flat phantom filled with body-tissue simulating liquid are given. The reference SAR values were calculated using finite-difference time-domain FDTD method (feed point-impedance set to 50 ohms) and the mechanical dimensions of the D5GHzV2 dipole (manufactured by SPEAG).

f (MHz)	Head Tissue		Body Tissue		
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}	SAR_{Peak}
5000	72.9	20.7	68.1	19.2	260.3
5100	74.6	21.1	78.8	19.6	272.3
5200	76.5	21.6	71.8	20.1	284.7
5500	83.3	23.4	79.1	22.0	326.3
5800	78.0	21.9	74.1	20.5	324.7

Note: All SAR values normalized to 1 W forward power.

10.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D2450V2 SN: 748

The dipole input power (forward power): 250 mW

Results

Date: August 25, 2008

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Sunny Shih

Body Simulating Liquid			SAR (mW/g)	Normalized	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
2450	24	15	1g	47.3	51.2	-7.62	± 10
			10g	24.4	23.7	2.95	± 10

System Validation Dipole: D5GHzV2 SN 1003

The dipole input power (forward power): 250 mW

Results

Date: August 26, 2008

Ambient Temperature = 25 °C; Relative humidity = 40% Measured by: Sunny Shih

Body Simulating Liquid			Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)				
5200	24	15	76.5	71.8	6.55	± 10
			22	20.1	9.45	± 10

Body Simulating Liquid			Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)				
5500	24	15	78.3	79.1	-1.01	± 10
			22.3	22.0	1.36	± 10

Body Simulating Liquid			Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)				
5800	24	15	76.4	74.1	3.10	± 10
			21.8	20.5	6.34	± 10

11 OUTPUT POWER VERIFICATION

The following procedures had been used to prepare the EUT for the SAR test.

The client provided a special driver and program, CRTU v5.0.69.0, which enable a user to control the frequency and output power of the module.

The modes with highest output power channel were chosen for the conducted output power measurement.

Results:

802.11bgn mode (2.4 GHz band)

Mode	Channel	f (MHz)	Average Output Power	Duty Cycle (%)
802.11b	6	2437 (M)	19.7	100
802.11g	6	2437 (M)	17.5	99
802.11n 20 MHz	6	2437 (M)	17.3	99
802.11n 40 MHz	6	2437 (M)	16.7	98

802.11an mode (5.8 GHz band)

Mode	Channel	f (MHz)	Average Output Power	Duty Cycle (%)
802.11a	157	5785	16.5	99
802.11n 40 MHz	159	5795	16.6	98

802.11an mode (5.2 GHz band)

Mode	Channel	f (MHz)	Average Output Power	Duty Cycle (%)
802.11a	40	5200	16.9	99
802.11n 20 MHz	40	5200	16.8	99

802.11an mode (5.3 GHz band)

Mode	Channel	f (MHz)	Average Output Power	Duty Cycle (%)
802.11a	56	5280	16.8	99
802.11n 40 MHz	54	5270	16.8	98

802.11an mode (5.5 GHz band)

Mode	Channel	f (MHz)	Average Output Power	Duty Cycle (%)
802.11a	100	5500	19.1	99
802.11n 40 MHz	118	5590	17.0	98

12 SAR TEST RESULTS

12.1 SAR TEST RESULT FOR THE BAND 2400 – 2483.5 MHZ

Laptop Mode: Lap-held with the display open at 90° to the keyboard.

- SAR is not required due to the large distance (> 20 cm) between the antenna (located at top of the LCD panel) and person's body.

Tablet Mode 1: Edge - Primary Landscape

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 2: Edge - Secondary Landscape

- Testing was skipped at this position due to WLAN device is disabled by Toshiba software tool.

Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	TX	**0.095**	1.6
802.11g	6	2437 (M)	TX	0.058	1.6
802.11n 20 MHz	6	2437 (M)	TX	0.049	1.6
802.11n 40 MHz	6	2422 (L)	TX	0.049	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

Tablet Mode 4: Edge - Secondary Portrait

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	TX	0.072	1.6
802.11n 20 MHz	6	2437 (M)	TX	0.043	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

The Highest SAR Plot & Data for 2.4 GHz Band

Date/Time: 8/25/2008 12:09:43 PM

Test Laboratory: Compliance Certification Services

Primary portrait 2.5 GHz Band

DUT: Portege M750 Tablet; Type: n/a; Serial: n/a

Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

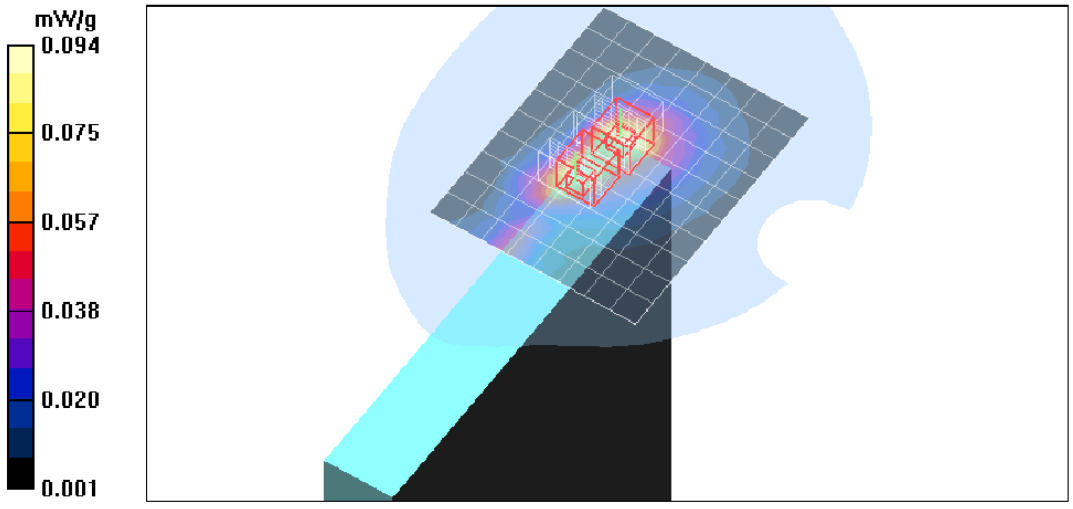
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.91, 7.91, 7.91); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11b_M ch/Area Scan (9x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.094 mW/g

802.11b_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.85 V/m; Power Drift = 0.375 dB
Peak SAR (extrapolated) = 0.200 W/kg
SAR(1 g) = 0.095 mW/g; SAR(10 g) = 0.047 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.126 mW/g

802.11b_M ch/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.85 V/m; Power Drift = 0.375 dB
Peak SAR (extrapolated) = 0.194 W/kg
SAR(1 g) = 0.094 mW/g; SAR(10 g) = 0.045 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.125 mW/g



12.2 SAR TEST RESULT FOR THE BAND 5.15 – 5.25 GHZ

Laptop Mode: Lap-held with the display open at 90° to the keyboard.

- SAR is not required due to the large distance (> 20 cm) between the antenna (located at top of the LCD panel) and person's body.

Tablet Mode 1: Edge - Primary Landscape

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 2: Edge - Secondary Landscape

- Testing was skipped at this position due to WLAN device is disabled by Toshiba software tool.

Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	40	5200 (M)	TX	**0.245**	1.6
802.11n 20 MHz	40	5200 (M)	TX	0.242	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

Tablet Mode 4: Edge - Secondary Portrait

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	40	5200 (M)	TX	0.153	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

The Highest SAR Plot & Data for 5.2 GHz Band

Date/Time: 8/26/2008 10:10:39 AM

Test Laboratory: Compliance Certification Services

Primary portrait 5 GHz Band

DUT: Portege M750 Tablet; Type: n/a; Serial: n/a

Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.39 mho/m; ε_r = 45.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

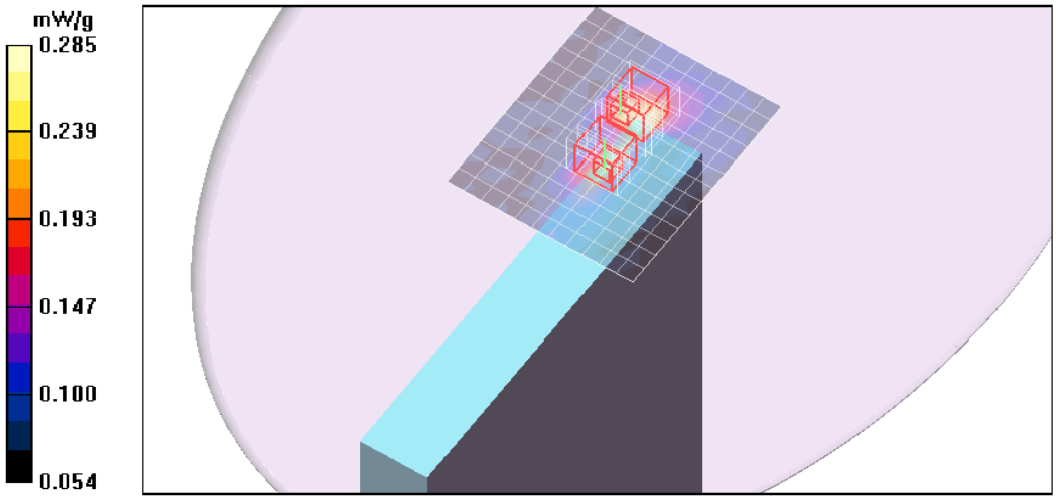
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(4.21, 4.21, 4.21); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11a_M ch/Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.285 mW/g

802.11a_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.43 V/m; Power Drift = 0.553 dB
Peak SAR (extrapolated) = 1.02 W/kg
SAR(1 g) = 0.245 mW/g; SAR(10 g) = 0.139 mW/g
Maximum value of SAR (measured) = 0.334 mW/g

802.11a_M ch/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.43 V/m; Power Drift = 0.553 dB
Peak SAR (extrapolated) = 0.772 W/kg
SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 0.263 mW/g



12.3 SAR TEST RESULT FOR THE BAND 5.25 – 5.35 GHZ

Laptop Mode: Lap-held with the display open at 90° to the keyboard.

- SAR is not required due to the large distance (> 20 cm) between the antenna (located at top of the LCD panel) and person's body.

Tablet Mode 1: Edge - Primary Landscape

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 2: Edge - Secondary Landscape

- Testing was skipped at this position due to WLAN device is disabled by Toshiba software tool.

Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	56	5280 (M)	TX	**0.250**	1.6
802.11n 40 MHz	54	5270 (M)	TX	0.228	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

Tablet Mode 4: Edge - Secondary Portrait

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11n 40 MHz	54	5270 (M)	TX	0.151	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

The Highest SAR Plot & Data for 5.3 GHz Band

Date/Time: 8/26/2008 11:55:22 AM

Test Laboratory: Compliance Certification Services

Primary portrait 5.3 GHz Band

DUT: Portege M750 Tablet; Type: n/a; Serial: n/a

Communication System: 802.11abgn; Frequency: 5280 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.47 mho/m; ε_r = 45.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

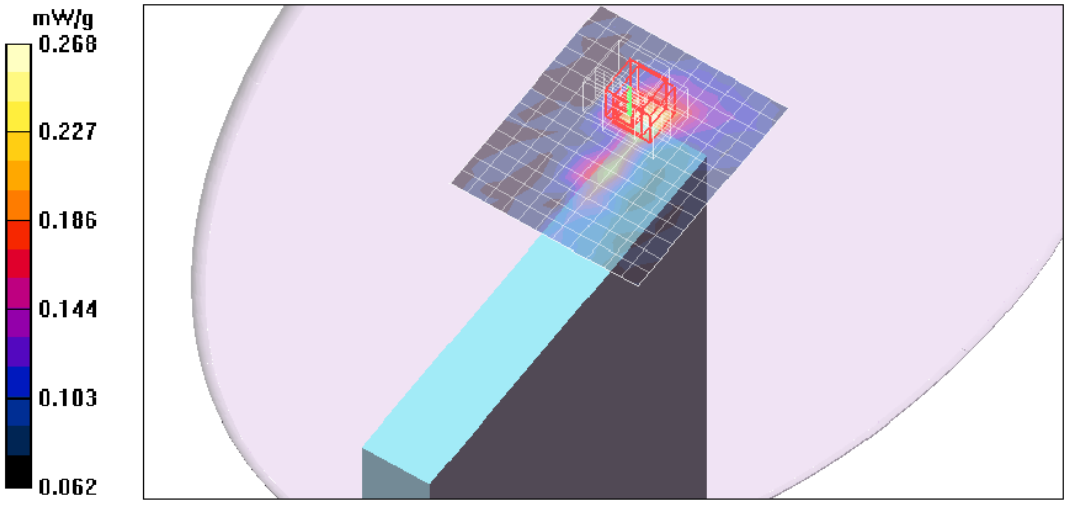
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.92, 3.92, 3.92); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11a_M ch/Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.268 mW/g

802.11a_M ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.30 V/m; Power Drift = 0.954 dB
Peak SAR (extrapolated) = 0.928 W/kg
SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.140 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.322 mW/g

802.11a_M ch/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.30 V/m; Power Drift = 0.954 dB
Peak SAR (extrapolated) = 1.56 W/kg
SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.137 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.314 mW/g



12.4 SAR TEST RESULT FOR THE BAND 5.47 – 5.725 GHZ

Laptop Mode: Lap-held with the display open at 90° to the keyboard.

- SAR is not required due to the large distance (> 20 cm) between the antenna (located at top of the LCD panel) and person's body.

Tablet Mode 1: Edge - Primary Landscape

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 2: Edge - Secondary Landscape

- Testing was skipped at this position due to WLAN device is disabled by Toshiba software tool.

Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	100	5500 (L)	TX	**0.337**	1.6
802.11n 40 MHz	118	5590 (M)	TX	0.254	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

Tablet Mode 4: Edge - Secondary Portrait

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	100	5500 (L)	TX	0.265	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

The Highest SAR Plot & Data for 5.5 GHz Band

Date/Time: 8/26/2008 1:48:36 PM

Test Laboratory: Compliance Certification Services

Primary portrait 5.5 GHz Band

DUT: Portege M750 Tablet; Type: n/a; Serial: n/a

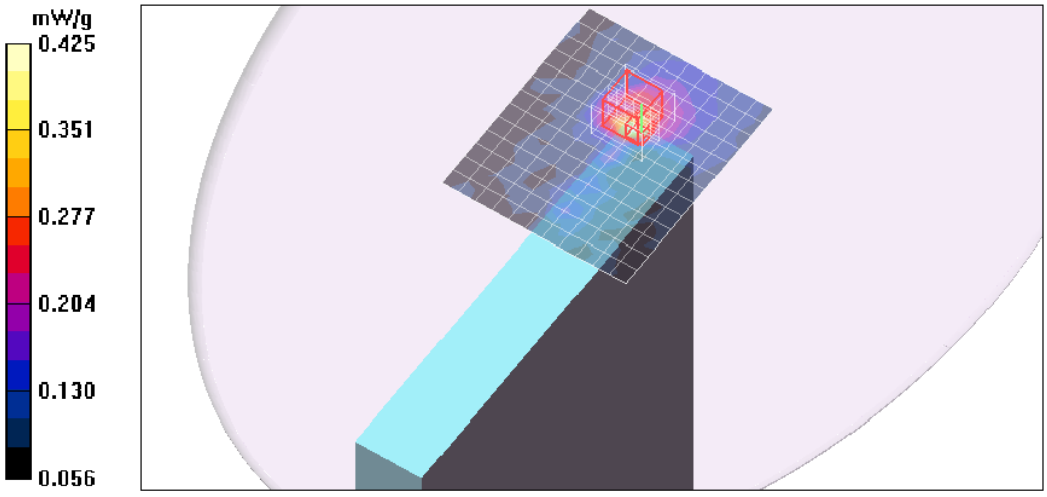
Communication System: 802.11abgn; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.76 mho/m; ε_r = 44.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.99, 3.99, 3.99); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11a_L ch/Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.425 mW/g

802.11a_L ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.43 V/m; Power Drift = 0.283 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.337 mW/g; SAR(10 g) = 0.170 mW/g
Maximum value of SAR (measured) = 0.467 mW/g



12.5 SAR TEST RESULT FOR THE BAND 5.725 – 5.850 GHZ

Laptop Mode: Lap-held with the display open at 90° to the keyboard.

- SAR is not required due to the large distance (> 20 cm) between the antenna (located at top of the LCD panel) and person's body.

Tablet Mode 1: Edge - Primary Landscape

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 2: Edge - Secondary Landscape

- Testing was skipped at this position due to WLAN device is disabled by Toshiba software tool.

Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11a	157	5785 (M)	TX	0.158	1.6
802.11n 40 MHz	159	5795 (H)	TX	**0.160**	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

Tablet Mode 4: Edge - Secondary Portrait

- SAR is not required due to the large distance (> 20 cm) between the antenna and person's body.

Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11n 40 MHz	159	5795 (H)	TX	0.153	1.6

Notes:

1) The modes with highest output power channel were chosen for the testing.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.

The Highest SAR Plot & Data for 5.8 GHz Band

Date/Time: 8/26/2008 4:36:01 PM

Test Laboratory: Compliance Certification Services

Primary portrait 5.8 GHz Band

DUT: Portege M750 Tablet; Type: n/a; Serial: n/a

Communication System: 802.11abgn; Frequency: 5795 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5795 MHz; σ = 6.14 mho/m; ε_r = 44; ρ = 1000 kg/m^3
Phantom section: Flat Section

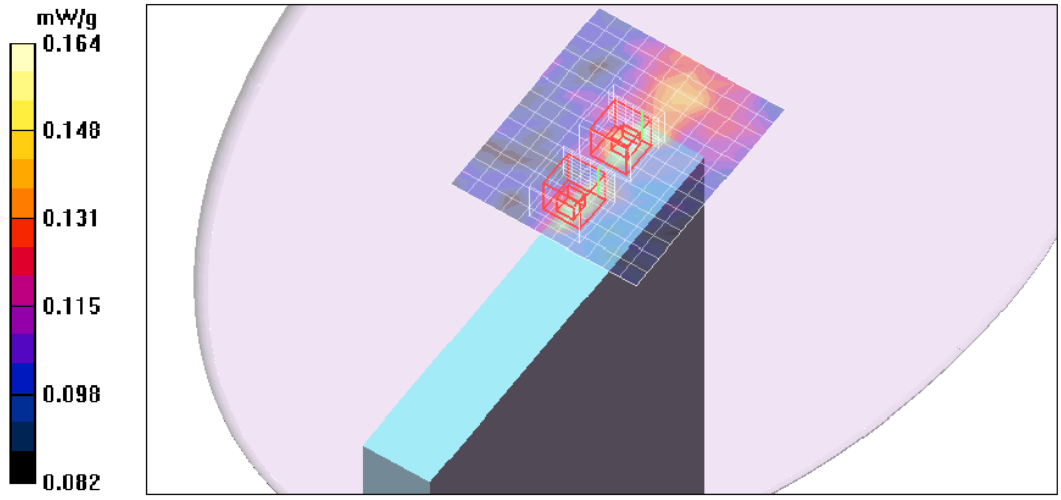
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.7, 3.7, 3.7); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 11/16/2007
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11n 40MHz_H ch/Area Scan (12x14x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.164 mW/g

802.11n 40MHz_H ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.39 V/m; Power Drift = 0.619 dB
Peak SAR (extrapolated) = 0.620 W/kg
SAR(1 g) = 0.160 mW/g; SAR(10 g) = 0.124 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.187 mW/g

802.11n 40MHz_H ch/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.39 V/m; Power Drift = 0.619 dB
Peak SAR (extrapolated) = 0.233 W/kg
SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.116 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.180 mW/g



13 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	8
2-1	SAR Test Plots for 2.4 GHz Band	7
2-2	SAR Test Plots for 5 GHz Band	12
3	Certificate of E-Field Probe - EX3DV3SN3531	10
4	Certificate of System Validation Dipole - D2450V2 SN:748	6
5	Certificate of System Validation Dipole - D5GHzV2 SN:1003	15

14 PHOTOS

Antenna Location

Setup Photo with SAM Phantom (2.4 GHz Band)

Tablet Mode: Edge – Primary Portrait

Tablet Mode: Bottom Face – Lap-held

Setup Photo with Flat ELI 4.0 Phantom (5 GHz band)

Tablet Mode: Edge – Primary Portrait

Tablet Mode: Bottom Face – Lap-held

END OF REPORT