FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 3

SAR EVALUATION REPORT

For

Intel 1000 Series WiFi Card
(Tested inside of Lenovo ThinkPad X200/X201 Tablet Series)

FCC ID: PD9112BNHU
IC: 1000M-112BNHU

FCC MODEL: 112BNHMW
IC MODEL: 112BNHU

REPORT NUMBER: 09U12794-2, Revision A

ISSUE DATE: September 16, 2009

Prepared for

INTEL CORPORATION
2111 N.E. 25TH AVENUE
HILLSBORO, OR 97124, USA

Prepared by

COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, USA

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	September 15, 2009	Initial Issue	--
A	September 16, 2009	Revised EUT description	A. Zaffar

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTEL CORPORATION 2111 N.E. 25TH AVENUE HILLSBORO, OR 97124, USA
FCC ID:	PD9112BNHU
MODEL:	112BNHMW
IC:	1000M-112BNHU
MODEL:	112BNHU
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	September 5 - 8, 2009

THE HIGHEST SAR VALUES:

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
15.247 / RSS-102	2400 – 2483.5	0.156 (Secondary Landscape)	1.6

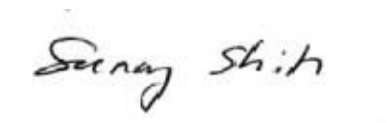
APPLICABLE STANDARDS AND TEST PROCEDURES:

STANDARD	TEST RESULTS
FCC OET BULLETIN 65 SUPPLEMENT C and the following specific Test Procedure: o KDB 248227 SAR measurement procedures for 802.11 a/b/g transmitters o KDB 447498 RF Exposure Requirements and Procedures for mobile and portable devices	Pass
RSS-102 ISSUE 3	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. Measurement Uncertainties were not taken into account and are published for informational purposes only. 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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHAO YEN LIN
EMC 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, 447498_RF Exposure Requirements and Procedures for mobile and portable devices and IC RSS 102 Issue 3.

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.

Name of Equipment	Manufacturer	Type/Model	Serial No.	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	2009
Signal Generator	Agilent	8753ES-6	MY40001647	11	14	2009
E-Field Probe	SPEAG	EX3DV4	3686	3	23	2010
Thermometer	ERTCO	639-1S	1718	5	1	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	427	10	20	2009
System Validation Dipole	SPEAG	D835V2	4d002	4	23	2011
System Validation Dipole	SPEAG	D900V2	108	1	21	2010
System Validation Dipole	SPEAG	D1800V2	294	1	29	2010
System Validation Dipole	SPEAG	D1900V2	5d043	1	29	2010
System Validation Dipole	SPEAG	D2450V2	748	4	14	2010
System Validation Dipole	SPEAG	D5GHzV2	1003	11	21	2009
MXA Signal Analyzer	Agilent	N9020A	US48350984	10	23	2009
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
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	SPAEG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800	N/A	Within 24 hrs of first test		

4.2. 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
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

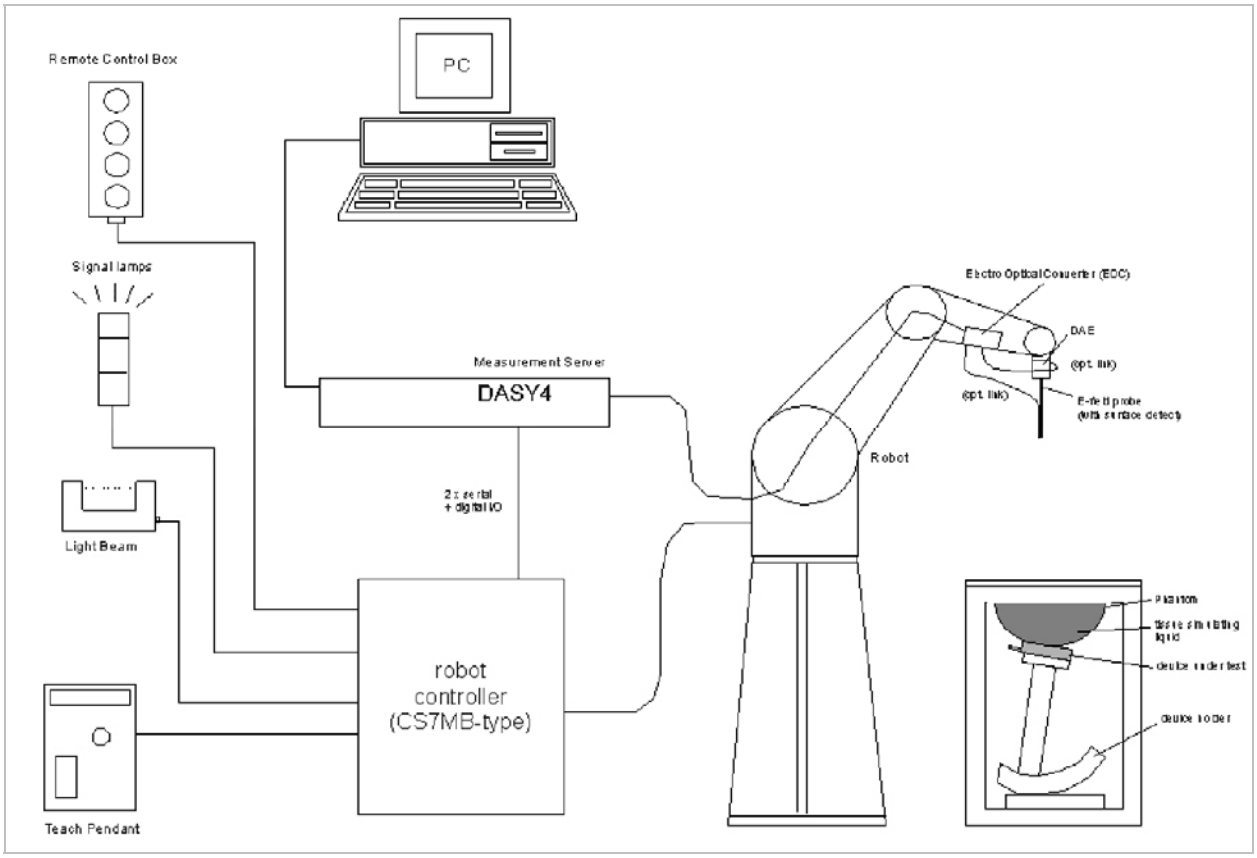
5. EQUIPMENT UNDER TEST

Intel 1000 Series WiFi Card (Tested inside of Lenovo ThinkPad X200/X201 Tablet Series)

820.11abgn MISO with HT20 and HT40

Normal operation:	Lap-held only Note: SAR test with display open at 90° to the keyboard				
Antenna tested:	Vendor	Antenna	Part Number	Test software ID	Peak Gain (dBi)
	ACON	Main	25.90675.001	**A**	**-0.39**
	WNC	Main	25.90669.001	**A**	-1.53
Power supply:	Power supplied through laptop computer (host device)				

6. SYSTEM SPECIFICATIONS



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.

7. 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

8. 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.

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	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

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

8.1. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Muscle 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chao Lin

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.38	Relative Permittivity (ε_r):	52.384	52.7	-0.60	± 5
	e"	13.94	Conductivity (σ):	1.900	1.95	-2.54	± 5

Liquid Temperature: 23 deg. C
September 05, 2009 10:03 AM

Frequency	e'	e"
2400000000	52.4804	13.696
2405000000	52.4683	13.7694
2410000000	52.4537	13.8346
2415000000	52.4501	13.8781
2420000000	52.4362	13.9043
2425000000	52.4316	13.9225
2430000000	52.4373	13.9158
2435000000	52.4215	13.9219
2440000000	52.4171	13.9364
2445000000	52.3881	13.9641
2450000000	**52.3842**	**13.9432**
2455000000	52.3152	13.9198
2460000000	52.2791	13.8917
2465000000	52.2153	13.8545
2470000000	52.1999	13.8069
2475000000	52.1848	13.7827
2480000000	52.1926	13.7898
2485000000	52.1858	13.8089
2490000000	52.1882	13.8662
2495000000	52.1901	13.94
2500000000	52.1852	14.0429

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 Dielectric Parameters for Muscle 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chao Lin

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.52	Relative Permittivity (ϵ_r):	52.524	52.7	-0.33	± 5
	e"	13.79	Conductivity (σ):	1.880	1.95	-3.59	± 5

Liquid Temperature: 23 deg. C
September 06, 2009 9:53 AM

Frequency	e'	e"
2400000000	52.6204	13.546
2405000000	52.6083	13.6194
2410000000	52.5937	13.6846
2415000000	52.5901	13.7281
2420000000	52.5762	13.7543
2425000000	52.5716	13.7725
2430000000	52.5773	13.7658
2435000000	52.5615	13.7719
2440000000	52.5571	13.7864
2445000000	52.5281	13.8141
2450000000	**52.5242**	**13.7932**
2455000000	52.4552	13.7698
2460000000	52.4191	13.7417
2465000000	52.3553	13.7045
2470000000	52.3399	13.6569
2475000000	52.3248	13.6327
2480000000	52.3326	13.6398
2485000000	52.3258	13.6589
2490000000	52.3282	13.7162
2495000000	52.3301	13.79
2500000000	52.3252	13.8929

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

9. SYSTEM 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 Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV4 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 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- 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 (From SPEAG)

Dipole Type	Distance	Frequency	SAR (1g)	SAR (10g)	SAR (peak)
	(mm)	(MHz)	[W/kg]	[W/kg]	[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

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG. Certificate no: D2450V2-748_Apr08

f (MHz)	Head Tissue		Body Tissue	
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}
5200			50.8	23.7

9.1. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: September 05, 2009

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chao Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	250	1g SAR:	53.6	50.8	5.51	±10
			10g SAR:	25.2	23.7	6.33	

Date: September 06, 2009

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Chao Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	250	1g SAR:	53	50.8	4.33	±10
			10g SAR:	24.9	23.7	5.06	

10. 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 v5.10.25.0, 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)	Antenna	Average Output Power
802.11b	6	2437 (M)	A	16.9
802.11n 20 MHz	6	2437 (M)	A	16.7

11. SUMMARY OF TEST RESULTS

WORST-CASE CONFIGURATIONS

ACON antenna is used for all SAR testing. Additional SAR testing with WNC antenna is performed at worst-case test configuration.

11.1. SAR TEST RESULT FOR THE 2.4 GHZ BAND

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

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	A	0.028	1.6
802.11n 20 MHz	6	2437 (M)	A	0.026	

2) Tablet Mode 1: Edge - Primary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	A	0.012	1.6
802.11n 20 MHz	6	2437 (M)	A	0.011	

3) Tablet Mode 2: Edge - Secondary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	A	0.156	1.6
802.11n 20 MHz	6	2437 (M)	A	0.146	
802.11b (with WNC antenna)	6	2437 (M)	A	0.032	1.6

4) Tablet Mode 3: Edge – Primary Portrait

Note: WLAN main antenna (A) is more than 25 (cm) from phantom for primary portrait mode, so SAR test is not required

5) Tablet Mode 4: Edge – Secondary Portrait

Note: WLAN main antenna (A) is disabled for secondary portrait mode, so SAR is not required

6) Tablet Mode 5: Bottom Face - Lap-held

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437 (M)	A	0.008	1.6
802.11n 20 MHz	6	2437 (M)	A	0.014	

12. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for 2.4 GHz Band

Date/Time: 9/6/2009 10:59:27 AM

Test Laboratory: Compliance Certification Services

Secondary Landscape

DUT: Lenovo; Type: X200 Tablet; Serial: NA

Communication System: 802.11bgn; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.87 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

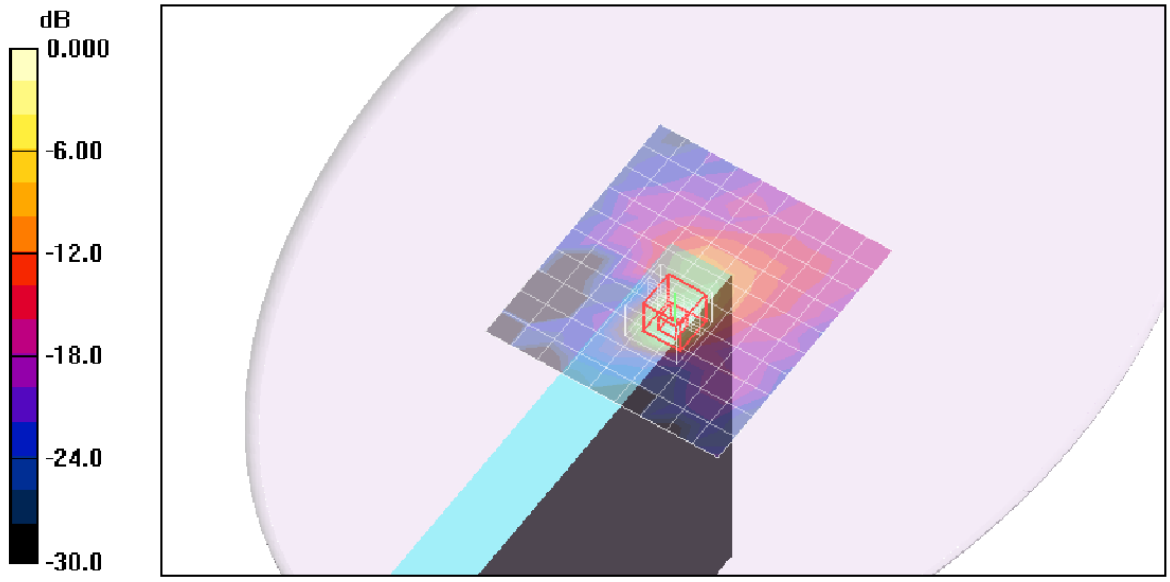
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.48, 6.48, 6.48); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, 802.11b M-ch/Area Scan (10x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.181 mW/g

Lapheld, 802.11b M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.08 V/m; Power Drift = 0.010 dB
Peak SAR (extrapolated) = 0.366 W/kg
SAR(1 g) = 0.156 mW/g; SAR(10 g) = 0.065 mW/g

Maximum value of SAR (measured) = 0.218 mW/g



0 dB = 0.218mW/g

13. ATTACHMENTS

No.	Contents	No. of page (s)
1	System Performance Check Plots	4
2	SAR Test Plots	10
3	Certificate of E-Field Probe – EX3DV4 SN 3686	10
4	Certificate of System Validation Dipole - D2450V2 SN:748	6