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

SAR EVALUATION REPORT

For

Intel Centrino Ultimate-N6300
(Tested inside of Lenovo ThinkPad X200/X201 Tablet Series)

FCC ID: PD9633ANHU
IC: 1000M-633ANHU

FCC MODEL: 633ANHMW
IC MODEL: 633ANHU

REPORT NUMBER: 09U12795-3

ISSUE DATE: November 9, 2009

Prepared for

INTEL CORPORATION
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	November 9, 2009	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTEL CORPORATION 2111 N.E. 25TH AVENUE HILLSBORO, OR 97124, USA
FCC ID:	PD9633ANHU
MODEL:	633ANHMW
IC:	1000M-633ANHU
MODEL:	633ANHU
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	September 15-16, 29 & October 1, 2, 4, 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	0.139 (Primary Portrait)	1.6
	5725 – 5850	0.190 (Tablet - Lap-held)	
15.407 / RSS-102	5150 – 5250	0.195 (Primary Landscape)	
	5250 – 5350	0.172 (Primary Landscape)	
	5470 – 5725	0.189 (Tablet - Lap-held)	

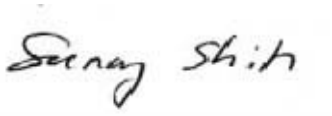
APPLICABLE STANDARDS AND TEST PROCEDURES:

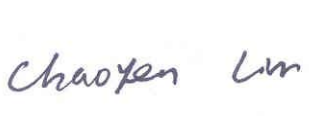
STANDARD	TEST RESULTS
FCC OET BULLETIN 65 SUPPLEMENT C and the following specific Test Procedure: o KDB 248227 SAR measurement procedures for 802.11 a/b/g transmitters o KDB 447498 RF Exposure Requirements and Procedures for mobile and portable devices	Pass
RSS-102 ISSUE 3	Pass

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: Tested By:





SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

CHAO YEN LIN
EMC ENGINEER
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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 Centrino Ultimate-N6300 (Tested inside of Lenovo ThinkPad X200/X201 Tablet Series)

820.11abgn 3x3 with HT20 and HT40

Normal operation:

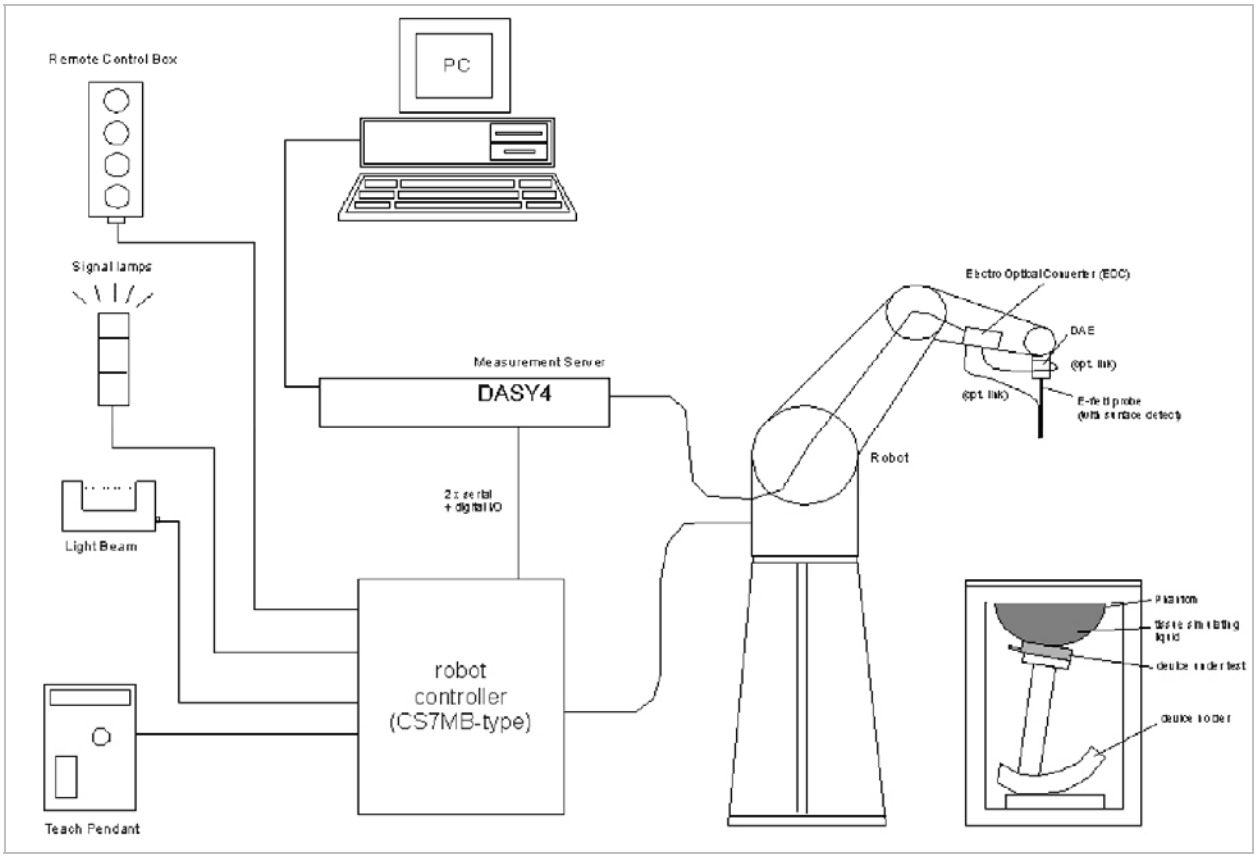
- Laptop - Lap-held,
- Tablet - Edge (underarm) & lap-held

Antenna tested:

Vendor	Antenna	Part Number	Test software ID
ACON	Main	25.90675.001	A
ACON	Auxiliary	25.90676.001	B
ACON	3rd (MIMO)	25.90677.001	C
WNC	Main	25.90669.001	A
WNC	Auxiliary	25.90670.001	B
WNC	3rd (MIMO)	25.90671.001	C

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'	52.10	Relative Permittivity (ε_r):	52.104	52.7	-1.13	± 5
	e"	13.75	Conductivity (σ):	1.875	1.95	-3.87	± 5

Liquid Temperature: 23 deg. C
September 15, 2009 8:33 AM

Frequency	e'	e"
2400000000	52.2004	13.506
2405000000	52.1883	13.5794
2410000000	52.1737	13.6446
2415000000	52.1701	13.6881
2420000000	52.1562	13.7143
2425000000	52.1516	13.7325
2430000000	52.1573	13.7258
2435000000	52.1415	13.7319
2440000000	52.1371	13.7464
2445000000	52.1081	13.7741
2450000000	**52.1042**	**13.7532**
2455000000	52.0352	13.7298
2460000000	51.9991	13.7017
2465000000	51.9353	13.6645
2470000000	51.9199	13.6169
2475000000	51.9048	13.5927
2480000000	51.9126	13.5998
2485000000	51.9058	13.6189
2490000000	51.9082	13.6762
2495000000	51.9101	13.75
2500000000	51.9052	13.8529

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'	52.00	Relative Permittivity (ϵ_r):	52.004	52.7	-1.32	± 5
	e"	13.67	Conductivity (σ):	1.864	1.95	-4.43	± 5

Liquid Temperature: 23 deg. C
September 16, 2009 8:23 AM

Frequency	e'	e"
2400000000	52.1004	13.426
2405000000	52.0883	13.4994
2410000000	52.0737	13.5646
2415000000	52.0701	13.6081
2420000000	52.0562	13.6343
2425000000	52.0516	13.6525
2430000000	52.0573	13.6458
2435000000	52.0415	13.6519
2440000000	52.0371	13.6664
2445000000	52.0081	13.6941
2450000000	**52.0042**	**13.6732**
2455000000	51.9352	13.6498
2460000000	51.8991	13.6217
2465000000	51.8353	13.5845
2470000000	51.8199	13.5369
2475000000	51.8048	13.5127
2480000000	51.8126	13.5198
2485000000	51.8058	13.5389
2490000000	51.8082	13.5962
2495000000	51.8101	13.67
2500000000	51.8052	13.7729

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

8.2. LIQUID CHECK RESULTS FOR 5 GHZ

Simulating Liquid Dielectric Parameters for Muscle 5800 MHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Chaoyen Lin

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	51.0024	Relative Permittivity (ε_r):	51.0024	49.0	4.09	± 10
	e"	18.0070	Conductivity (σ):	5.20911	5.30	-1.71	± 5
5500	e'	50.4559	Relative Permittivity (ε_r):	50.4559	48.6	3.82	± 10
	e"	18.0396	Conductivity (σ):	5.51961	5.65	-2.31	± 5
5800	e'	49.7174	Relative Permittivity (ε_r):	49.7174	48.2	3.15	± 10
	e"	18.8503	Conductivity (σ):	6.08226	6.00	1.37	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
September 29, 2009 8:32 AM

Frequency	e'	e"
4600000000	51.7653	17.31
4650000000	51.8668	17.1094
4700000000	51.5618	17.326
4750000000	51.9721	17.4483
4800000000	51.5412	17.2137
4850000000	51.7391	17.6906
4900000000	51.5445	17.4699
4950000000	51.0309	17.7797
5000000000	51.4711	17.6504
5050000000	50.6939	17.7646
5100000000	51.1197	17.8349
5150000000	50.6016	17.5043
5200000000	**51.0024**	**18.007**
5250000000	51.1458	17.7412
5300000000	50.5723	18.1776
5350000000	51.2286	18.2046
5400000000	50.3722	18.0768
5450000000	50.8298	18.4694
5500000000	**50.4559**	**18.0396**
5550000000	50.1618	18.3237
5600000000	50.4874	18.2641
5650000000	49.9855	18.2623
5700000000	50.4129	18.8807
5750000000	50.1725	18.3141
5800000000	**49.7174**	**18.8503**
5850000000	50.6449	18.9186
5900000000	49.8771	18.6582
5950000000	49.9817	19.1901
6000000000	50.1573	19.1837

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 5800 MHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Chaoyen Lin

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	50.6824	Relative Permittivity (ϵ_r):	50.6824	49.0	3.43	± 10
	e"	18.0970	Conductivity (σ):	5.23515	5.30	-1.22	± 5
5500	e'	50.1359	Relative Permittivity (ϵ_r):	50.1359	48.6	3.16	± 10
	e"	18.1296	Conductivity (σ):	5.54715	5.65	-1.82	± 5
5800	e'	49.3974	Relative Permittivity (ϵ_r):	49.3974	48.2	2.48	± 10
	e"	18.9403	Conductivity (σ):	6.11130	6.00	1.86	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
October 01, 2009 8:25 AM

Frequency	e'	e"
4600000000	51.4453	17.4
4650000000	51.5468	17.1994
4700000000	51.2418	17.416
4750000000	51.6521	17.5383
4800000000	51.2212	17.3037
4850000000	51.4191	17.7806
4900000000	51.2245	17.5599
4950000000	50.7109	17.8697
5000000000	51.1511	17.7404
5050000000	50.3739	17.8546
5100000000	50.7997	17.9249
5150000000	50.2816	17.5943
5200000000	**50.6824**	**18.097**
5250000000	50.8258	17.8312
5300000000	50.2523	18.2676
5350000000	50.9086	18.2946
5400000000	50.0522	18.1668
5450000000	50.5098	18.5594
5500000000	**50.1359**	**18.1296**
5550000000	49.8418	18.4137
5600000000	50.1674	18.3541
5650000000	49.6655	18.3523
5700000000	50.0929	18.9707
5750000000	49.8525	18.4041
5800000000	**49.3974**	**18.9403**
5850000000	50.3249	19.0086
5900000000	49.5571	18.7482
5950000000	49.6617	19.2801
6000000000	49.8373	19.2737

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 5800 MHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Chaoyen Lin

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	50.5324	Relative Permittivity (ε_r):	50.5324	49.0	3.13	± 10
	e"	17.9870	Conductivity (σ):	5.20333	5.30	-1.82	± 5
5500	e'	49.9859	Relative Permittivity (ε_r):	49.9859	48.6	2.85	± 10
	e"	18.0196	Conductivity (σ):	5.51349	5.65	-2.42	± 5
5800	e'	49.2474	Relative Permittivity (ε_r):	49.2474	48.2	2.17	± 10
	e"	18.8303	Conductivity (σ):	6.07581	6.00	1.26	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
October 02, 2009 8:15 AM

Frequency	e'	e"
4600000000	51.2953	17.29
4650000000	51.3968	17.0894
4700000000	51.0918	17.306
4750000000	51.5021	17.4283
4800000000	51.0712	17.1937
4850000000	51.2691	17.6706
4900000000	51.0745	17.4499
4950000000	50.5609	17.7597
5000000000	51.0011	17.6304
5050000000	50.2239	17.7446
5100000000	50.6497	17.8149
5150000000	50.1316	17.4843
5200000000	**50.5324**	**17.987**
5250000000	50.6758	17.7212
5300000000	50.1023	18.1576
5350000000	50.7586	18.1846
5400000000	49.9022	18.0568
5450000000	50.3598	18.4494
5500000000	**49.9859**	**18.0196**
5550000000	49.6918	18.3037
5600000000	50.0174	18.2441
5650000000	49.5155	18.2423
5700000000	49.9429	18.8607
5750000000	49.7025	18.2941
5800000000	**49.2474**	**18.8303**
5850000000	50.1749	18.8986
5900000000	49.4071	18.6382
5950000000	49.5117	19.1701
6000000000	49.6873	19.1637

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 5800 MHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Chaoyen Lin

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	50.5824	Relative Permittivity (ϵ_r):	50.5824	49.0	3.23	± 10
	e"	17.9170	Conductivity (σ):	5.18308	5.30	-2.21	± 5
5500	e'	50.0359	Relative Permittivity (ϵ_r):	50.0359	48.6	2.95	± 10
	e"	17.9496	Conductivity (σ):	5.49208	5.65	-2.80	± 5
5800	e'	49.2974	Relative Permittivity (ϵ_r):	49.2974	48.2	2.28	± 10
	e"	18.7603	Conductivity (σ):	6.05322	6.00	0.89	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
October 04, 2009 8:10 AM

Frequency	e'	e"
4600000000	51.3453	17.22
4650000000	51.4468	17.0194
4700000000	51.1418	17.236
4750000000	51.5521	17.3583
4800000000	51.1212	17.1237
4850000000	51.3191	17.6006
4900000000	51.1245	17.3799
4950000000	50.6109	17.6897
5000000000	51.0511	17.5604
5050000000	50.2739	17.6746
5100000000	50.6997	17.7449
5150000000	50.1816	17.4143
5200000000	**50.5824**	**17.917**
5250000000	50.7258	17.6512
5300000000	50.1523	18.0876
5350000000	50.8086	18.1146
5400000000	49.9522	17.9868
5450000000	50.4098	18.3794
5500000000	**50.0359**	**17.9496**
5550000000	49.7418	18.2337
5600000000	50.0674	18.1741
5650000000	49.5655	18.1723
5700000000	49.9929	18.7907
5750000000	49.7525	18.2241
5800000000	**49.2974**	**18.7603**
5850000000	50.2249	18.8286
5900000000	49.4571	18.5682
5950000000	49.5617	19.1001
6000000000	49.7373	19.0937

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: D5GHzV2-1003_Nov07 and D2450V2-748_Apr08

f (MHz)	Head Tissue		Body Tissue	
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}
2450			49.5	23.3
5200	78.6	22.1	74.7	21.1
5500	80.4	22.7	80.1	22.5
5800	79.9	22.4	70.8	19.8

9.1. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: September 15, 2009

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

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	250	1g SAR:	52.9	49.5	6.87	±10
			10g SAR:	24.9	23.3	6.87	

Date: September 16, 2009

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

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	250	1g SAR:	52.6	49.5	6.26	±10
			10g SAR:	24.7	23.3	6.01	

9.2. SYSTEM CHECK RESULTS FOR D5GHzV2

System Validation Dipole: D5GHzV2 SN 1003

Date: September 29, 2009

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Chaoyen Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Muscle	5200	250	1g SAR:	77.5	74.7	3.75	±10
			10g SAR:	22.3	21.1	5.69	
Muscle	5500	250	1g SAR:	75.9	80.1	-5.24	±10
			10g SAR:	21.8	22.5	-3.11	
Muscle	5800	250	1g SAR:	69.6	70.8	-1.69	±10
			10g SAR:	19.7	19.8	-0.51	

Date: October 01, 2009

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Chaoyen Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Muscle	5200	250	1g SAR:	76.8	74.7	2.81	±10
			10g SAR:	22.1	21.1	4.74	
Muscle	5500	250	1g SAR:	76.1	80.1	-4.99	±10
			10g SAR:	21.4	22.5	-4.89	
Muscle	5800	250	1g SAR:	69.8	70.8	-1.41	±10
			10g SAR:	19.6	19.8	-1.01	

System Validation Dipole: D5GHzV2 SN 1003

Date: October 02, 2009

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Chaoyen Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Muscle	5200	250	1g SAR:	77.1	74.7	3.21	±10
			10g SAR:	22.3	21.1	5.69	
Muscle	5500	250	1g SAR:	75.7	80.1	-5.49	±10
			10g SAR:	21.3	22.5	-5.33	
Muscle	5800	250	1g SAR:	69.4	70.8	-1.98	±10
			10g SAR:	19.5	19.8	-1.52	

Date: October 04, 2009

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Chaoyen Lin

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Muscle	5200	250	1g SAR:	77.1	74.7	3.21	±10
			10g SAR:	22.0	21.1	4.27	
Muscle	5500	250	1g SAR:	75.4	80.1	-5.87	±10
			10g SAR:	21.2	22.5	-5.78	
Muscle	5800	250	1g SAR:	69.1	70.8	-2.40	±10
			10g SAR:	19.4	19.8	-2.02	

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			ABC	Duty Cycle (%)
			A	B	C		
802.11b	6	2437	16.77				100
802.11b	6	2437		16.80			100
802.11b	6	2437			16.77		100
802.11n 20 MHz	6	2437				16.75	99

802.11an mode (5 GHz band)

Mode	Channel	f (MHz)	Antenna				Duty Cycle (%)
			A	B	C	ABC	
5.2GHz Band							
802.11a	40	5200	16.72				100
802.11a	40	5200		16.68			100
802.11a	40	5200			16.71		100
802.11n 20 MHz	40	5200				16.56	99
5.3GHz Band							
802.11a	56	5280	16.68				100
802.11a	56	5280		16.70			100
802.11a	56	5280			16.69		100
802.11n 20 MHz	56	5280				16.67	99
5.5GHz Band							
802.11a	120	5600	16.75				100
802.11a	120	5600		16.77			100
802.11a	120	5600			16.92		100
802.11n 20 MHz	120	5600				16.55	99
5.8GHz Band							
802.11a	157	5785	16.75				100
802.11a	157	5785		16.80			100
802.11a	157	5785			16.78		100
802.11n 20 MHz	157	5785				16.66	99

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	C	0.0370	1.6
802.11n 20 MHz	6	2437	ABC	0.0099	

2) Tablet Mode 1: Edge - Primary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	C	0.0230	1.6
802.11n 20 MHz	6	2437	ABC	0.0100	

3) Tablet Mode 2: Edge - Secondary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	A	0.0239	1.6
802.11n 20 MHz	6	2437	ABC	0.0086	

4) Tablet Mode 3: Edge – Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	B	0.1390	1.6
802.11b (with WNC antenna)	6	2437	B	0.1150	

5) Tablet Mode 4: Edge – Secondary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	B	0.0114	1.6

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

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	A	0.0141	1.6
802.11b	6	2437	B	0.0170	
802.11b	6	2437	C	0.0092	
802.11n 20 MHz	6	2437	ABC	0.0037	

11.2. SAR TEST RESULT FOR THE 5 GHZ BAND

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

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	C	0.1370	1.6
	802.11n 20 MHz	40	5200	ABC	0.1500	
5.3 GHz	802.11n 20 MHz	56	5280	ABC	0.1530	
5.5 GHz	802.11n 20 MHz	120	5600	ABC	0.1770	
5.8 GHz	802.11n 20 MHz	157	5785	ABC	0.1730	

2) Laptop Tablet Mode 1: Edge - Primary Landscape

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	C	0.1860	1.6
	802.11n 20 MHz	40	5200	ABC	0.1950	
	802.11n 20 MHz (with WNC antenna)	40	5200	ABC	0.1520	
5.3 GHz	802.11n 20 MHz	56	5280	ABC	0.1720	
	802.11n 20 MHz (with WNC antenna)	56	5280	ABC	0.1510	
5.5 GHz	802.11n 20 MHz	120	5600	ABC	0.1560	
5.8 GHz	802.11n 20 MHz	157	5785	ABC	0.1520	

3) Laptop Tablet Mode 2: Edge - Secondary Landscape

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	A	0.0650	1.6
	802.11n 20 MHz	40	5200	ABC	0.0970	
5.3 GHz	802.11n 20 MHz	56	5280	ABC	0.0078	
5.5 GHz	802.11n 20 MHz	120	5600	ABC	0.0480	
5.8 GHz	802.11n 20 MHz	159	5795	ABC	0.0019	

4) Laptop Tablet Mode 3: Edge - Primary Portrait

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	B	0.0640	1.6
5.3 GHz	802.11a	56	5280	B	0.0750	
5.5 GHz	802.11a	120	5600	B	0.0100	
5.8 GHz	802.11a	157	5785	B	0.0350	

5) Laptop Tablet Mode 4: Edge - Secondary Portrait

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	B	0.0001	1.6
5.3 GHz	802.11a	56	5280	B	0.0024	
5.5 GHz	802.11a	120	5600	B	0.0620	
5.8 GHz	802.11a	157	5785	B	0.0047	

6) Laptop Tablet Mode 5: Bottom Face - Lap-held (Antenna B)

Mode	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	B	0.1560	1.6
5.3 GHz	802.11a	56	5280	B	0.1660	
5.5 GHz	802.11a	120	5600	B	0.1890	
	802.11a (with WNC antenna)	120	5600	B	0.1290	
5.8 GHz	802.11a	157	5785	B	0.1900	
	802.11a (with WNC antenna)	157	5785	B	0.1380	

7) Laptop Tablet Mode 5: Bottom Face - Lap-held (Antenna A B C)

Band	Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz	802.11a	40	5200	A	0.0300	1.6
	802.11a	40	5200	C	0.0003	
	802.11n 20MHz	40	5200	ABC	0.0012	
5.3 GHz	802.11a	56	5280	A	0.0320	
5.5 GHz	802.11a	120	5600	A	0.0720	
5.8 GHz	802.11a	157	5785	A	0.0700	

12. Enhanced Energy Coupling (KDB 447498)

According to KDB 447498, the test configuration with the highest 1-g SAR must be used to determine if additional SAR evaluation is required due to enhanced energy coupling at increased separation distances.

From the test results below, additional 1-g SAR evaluation is not required.

Worst-case test configuration	Band	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Primary portrait	2.4 GHz	Initial	12.2	0.185	2.56	
		1	12.7	0.094	1.82	50.6%
		2	12.2	0.043	1.24	23.3%
Primary landscape	5.2 GHz	Initial	8	0.326	5.21	
		1	8.5	0.217	4.25	66.5%
		2	9	0.203	4.11	62.2%
		3	9.5	0.108	3.68	33.2%
Primary landscape	5.3 GHz	Initial	8	0.282	6.98	
		1	8.5	0.134	4.82	47.7%
Tablet - Lapheld	5.5 GHz	Initial	3.5	0.238	5.85	
		1	4	0.124	4.23	52.3%
		2	4.5	0.086	3.51	36.0%
Tablet - Lapheld	5.8 GHz	Initial	3.5	0.220	5.86	
		1	4	0.181	5.32	82.4%
		2	4.5	0.174	5.21	79.0%
		3	5	0.081	3.56	36.9%

13. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for 2.4 GHz Band

Date/Time: 9/16/2009 11:05:23 AM

Test Laboratory: Compliance Certification Services

Primary Portrait

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; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

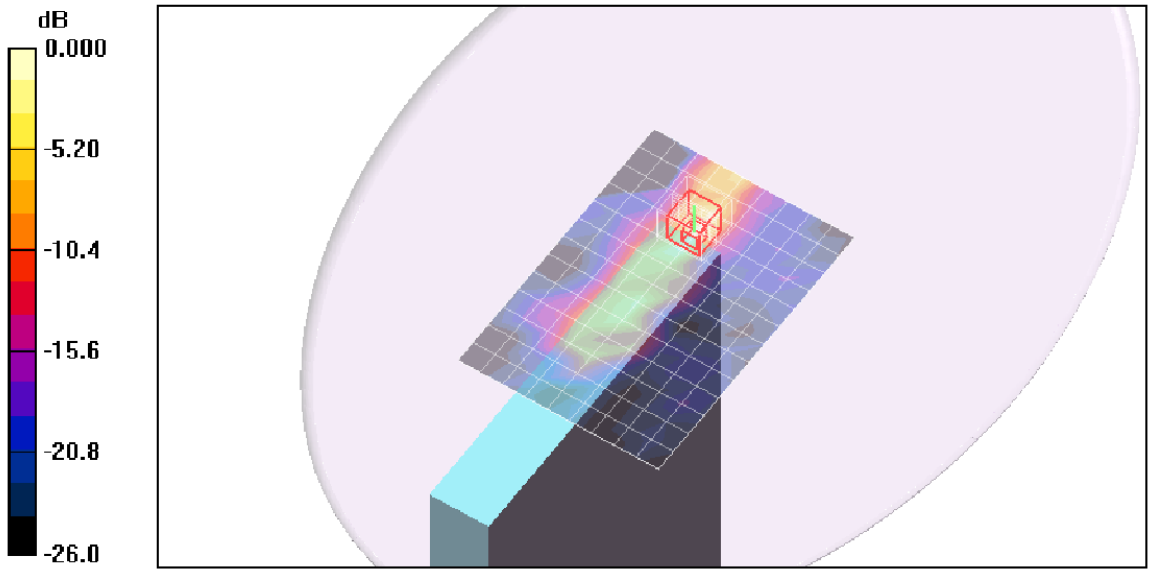
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.48, 6.48, 6.48); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- 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_B Antenna/Area Scan (10x14x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.184 mW/g

Lapheld, 802.11b M-ch_B Antenna/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 2.20 V/m; Power Drift = 2.56 dB
Peak SAR (extrapolated) = 0.300 W/kg
SAR(1 g) = 0.139 mW/g; SAR(10 g) = 0.060 mW/g

Maximum value of SAR (measured) = 0.185 mW/g



0 dB = 0.185mW/g

WORST-CASE SAR PLOT for 5.2 GHz Band

Date/Time: 9/29/2009 4:08:13 PM

Test Laboratory: Compliance Certification Services

Primary Landscape_5.2GHz

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

Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.21 mho/m; ε_r = 51; ρ = 1000 kg/m^3
Phantom section: Flat Section

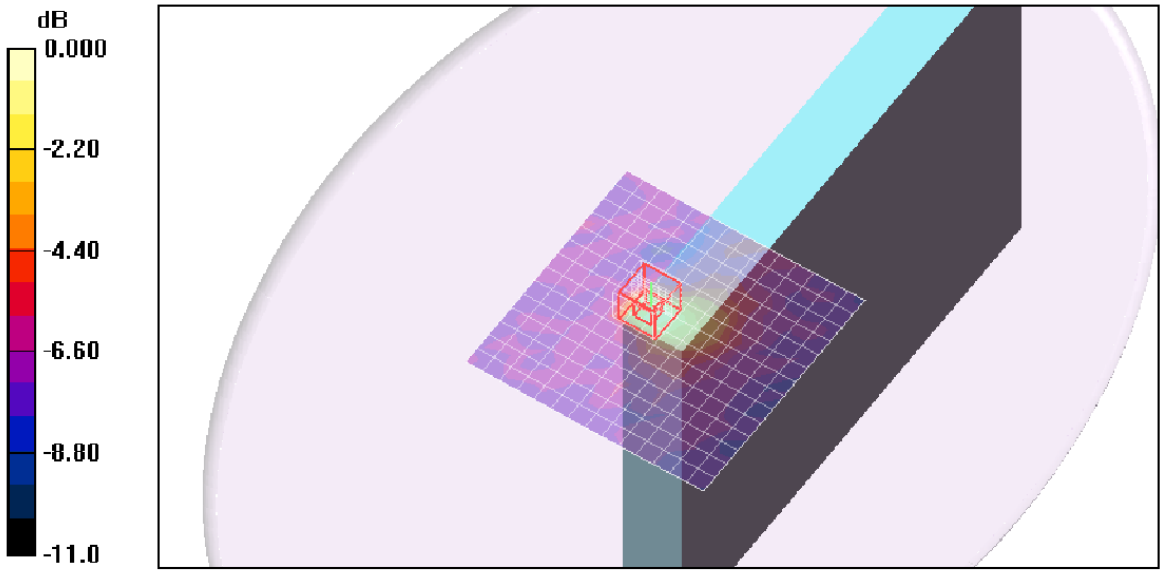
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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(4.08, 4.08, 4.08); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (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 - 802.11n 20MHz_5.2G_A+C Antenna/Area Scan (15x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.227 mW/g

Lapheld - 802.11n 20MHz_5.2G_A+C Antenna/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.83 V/m; Power Drift = -0.245 dB
Peak SAR (extrapolated) = 0.758 W/kg
SAR(1 g) = 0.195 mW/g; SAR(10 g) = 0.134 mW/g

Maximum value of SAR (measured) = 0.326 mW/g



0 dB = 0.326mW/g

WORST-CASE SAR PLOT for 5.3 GHz Band

Date/Time: 9/29/2009 5:58:13 PM

Test Laboratory: Compliance Certification Services

Primary Landscape_5.3GHz

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

Communication System: 802.11abgn; Frequency: 5280 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.29 mho/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

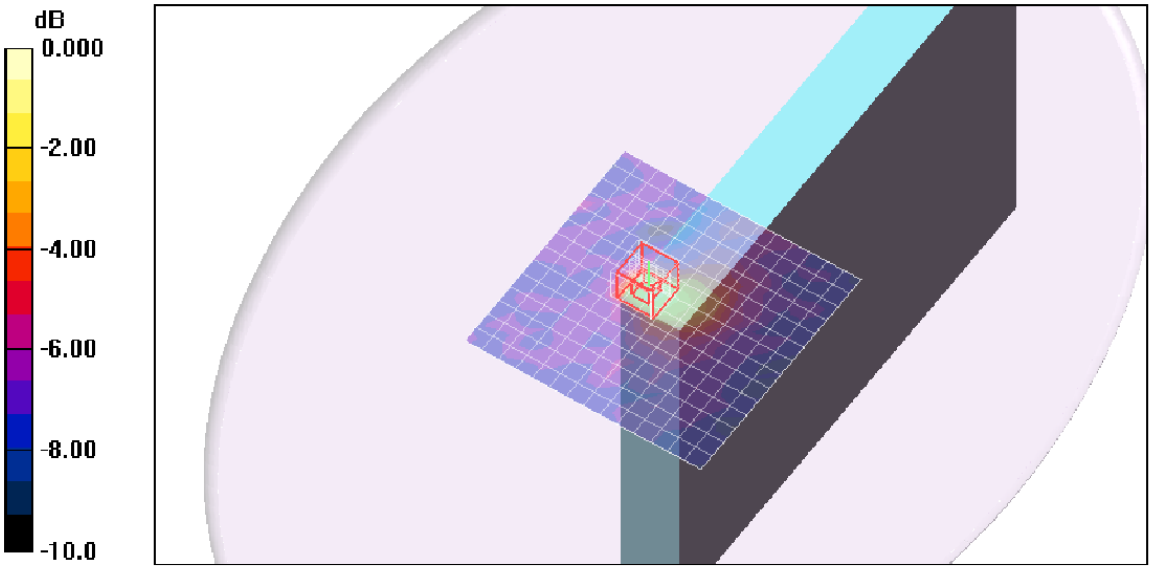
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(3.81, 3.81, 3.81); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- 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 - 802.11n 20MHz_5.3G_A+C Antenna/Area Scan (15x15x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.291 mW/g

Lapheld - 802.11n 20MHz_5.3G_A+C Antenna/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.36 V/m; Power Drift = -0.215 dB
Peak SAR (extrapolated) = 0.916 W/kg
SAR(1 g) = 0.172 mW/g; SAR(10 g) = 0.082 mW/g

Maximum value of SAR (measured) = 0.282 mW/g



0 dB = 0.282mW/g

WORST-CASE SAR PLOT for 5.5 GHz Band

Date/Time: 10/2/2009 5:42:25 PM

Test Laboratory: Compliance Certification Services

Lapheld_5.5GHz_Antenna B

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

Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.68 mho/m; ε_r = 50; ρ = 1000 kg/m^3
Phantom section: Flat Section

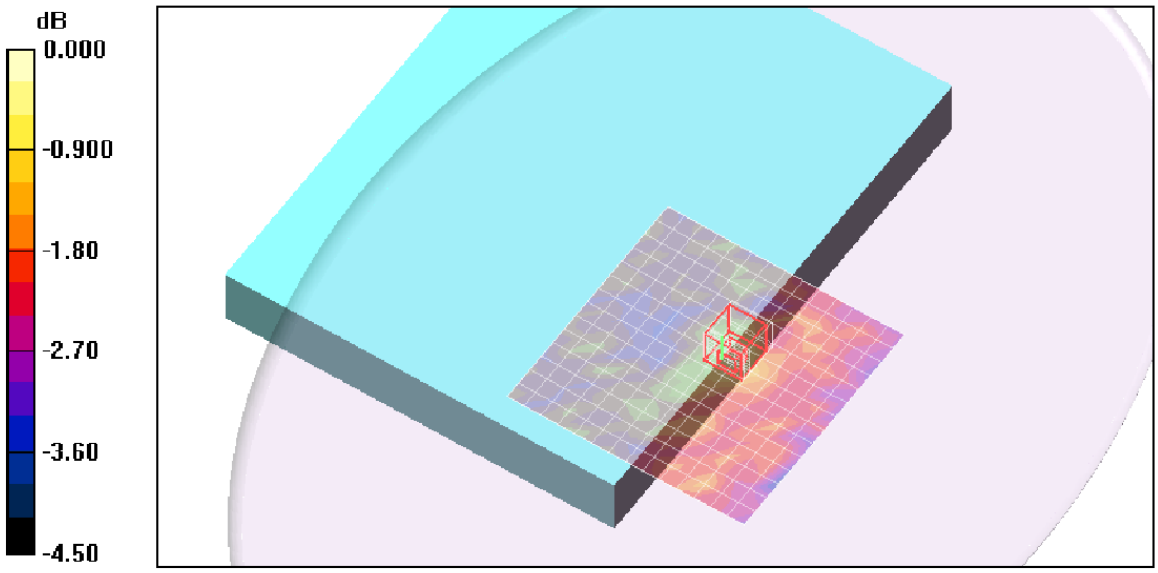
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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(3.61, 3.61, 3.61); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (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 - 802.11a_5.5G_B Antenna/Area Scan (15x15x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.217 mW/g

Lapheld - 802.11a_5.5G_B Antenna/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 5.68 V/m; Power Drift = 0.235 dB
Peak SAR (extrapolated) = 1.62 W/kg
SAR(1 g) = 0.189 mW/g; SAR(10 g) = 0.072 mW/g

Maximum value of SAR (measured) = 0.238 mW/g



0 dB = 0.242mW/g

WORST-CASE SAR PLOT for 5.8 GHz Band

Date/Time: 10/2/2009 6:30:11 PM

Test Laboratory: Compliance Certification Services

Lapheld_5.8GHz_Antenna B

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

Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 6.01 mho/m; ε_r = 49.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

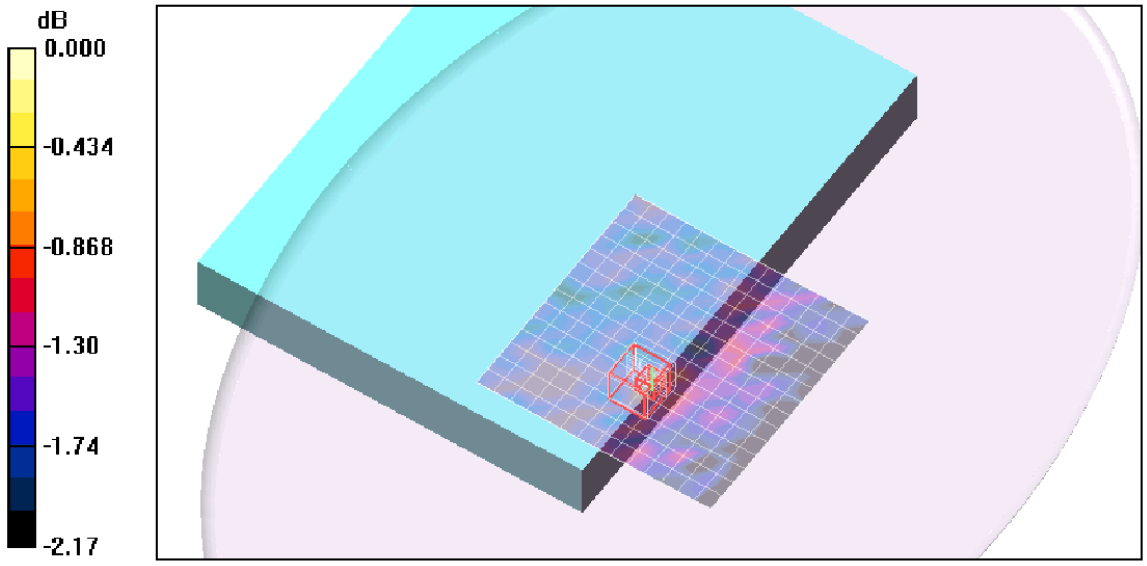
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(3.84, 3.84, 3.84); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- 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 - 802.11a_5.8G_B Antenna/Area Scan (15x15x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 0.182 mW/g

Lapheld - 802.11a_5.8G_B Antenna/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 5.12 V/m; Power Drift = 0.592 dB
Peak SAR (extrapolated) = 0.220 W/kg
SAR(1 g) = 0.190 mW/g; SAR(10 g) = 0.179 mW/g

Maximum value of SAR (measured) = 0.220 mW/g



0 dB = 0.220mW/g

14. ATTACHMENTS

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