FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT

FOR

INTEL WIMAX/WIFI LINK 5350 SERIES
(WI-FI)

MODEL: 533ANXMMW

FCC ID: PD9533ANXMU

REPORT NUMBER: 08U12161-4

ISSUE DATE: NOVEMBER 25, 2008

Prepared for

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

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	November 25, 2008	Initial issue	--

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1 ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTEL CORPORATION 2111 N.E. 25TH AVENUE HILLSBORO, OR 97124, USA
EUT DESCRIPTION:	INTEL WIMAX/WIFI LINK 5350 SERIES
FCC ID: **MODEL:**	PD9533ANXMU 533ANXMMW
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	October 31, November 3-5, 15, 17-18, 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	0.179 (Secondary Landscape) 0.091 (Secondary Landscape)	1.6
15.407 / RSS-102	5150 – 5250 5250 – 5350 5470 - 5725	0.144 (Secondary Landscape) 0.177 (Secondary Landscape) 0.126 (Primary Landscape)	1.6

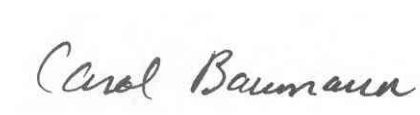
APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC OET BULLETIN 65 SUPPLEMENT C	Pass
	Pass

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 and KDB 447498_RF Exposure Requirements and Procedures for mobile and portable devices.

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

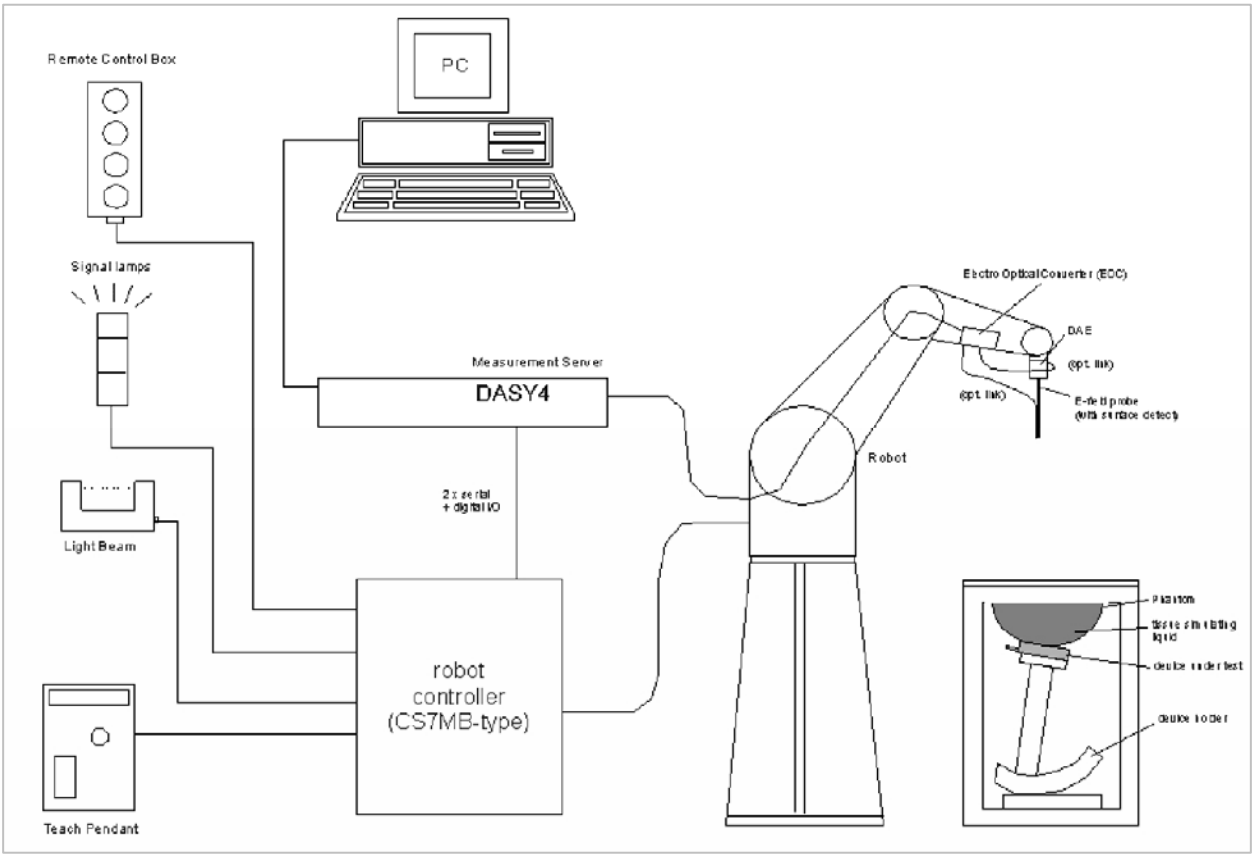
6 TEST EQUIPMENT LIST

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	2009
E-Field Probe	SPEAG	EX3DV3	3531	4	23	2009
Thermometer	ERTCO	639-1S	1718	5	28	2009
Data Acquisition Electronics	SPEAG	DAE3 V1	500	11	16	2008
Data Acquisition Electronics	SPEAG	DAE3 V1	427	10	20	2009
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		

7 DEVICE UNDER TEST (DUT) DESCRIPTION

INTEL WIMAX/WIFI LINK 5350 SERIES (Tested inside of LENOVO THINKPAD X200 TABLET SERIES)				
Normal operation:	• Laptop Mode • Tablet Mode – in the following configurations. o Bottom Face o Edge - Primary/Secondary landscape and Primary/Secondary portrait orientations.			
Antenna tested:	Vendor	Antenna	Part Number	Test software ID
	ACON	Main	25.90675.001	A
	WNC	Auxiliary	25.90670.001	B
	ACON	3rd (MIMO)	25.90677.001	C
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

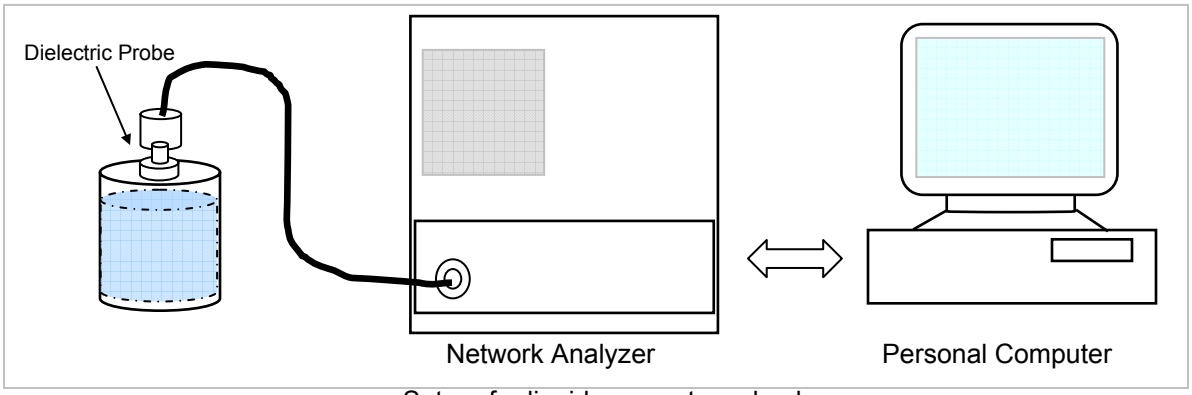
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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 = 37% Measured by: Carol Baumann

Simulating Liquid		Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)							
2450	15	e'	50.7288	Relative Permittivity (ϵ_r):	50.7288	52.7	-3.74	± 5
		e"	14.6391	Conductivity (σ):	1.99526	1.95	2.32	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 17, 2008 09:13 AM

Frequency	e'	e"
2400000000.	50.9233	14.3960
2405000000.	50.9411	14.4504
2410000000.	50.8656	14.3907
2415000000.	50.8531	14.4160
2420000000.	50.8234	14.5025
2425000000.	50.8173	14.4363
2430000000.	50.7164	14.5294
2435000000.	50.7588	14.4995
2440000000.	50.7684	14.5025
2445000000.	50.6816	14.5283
2450000000.	**50.7288**	**14.6391**
2455000000.	50.7431	14.5557
2460000000.	50.7214	14.7227
2465000000.	50.6623	14.6268
2470000000.	50.7479	14.6209
2475000000.	50.6652	14.6839
2480000000.	50.6975	14.6554
2485000000.	50.6248	14.7139
2490000000.	50.6258	14.7099
2495000000.	50.5516	14.6751
2500000000.	50.5741	14.8290

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 Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Carol Baumann

Simulating Liquid		Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Depth (cm)							
2450	15	e'	50.6034	Relative Permittivity (ϵ_r):	50.6034	52.7	-3.98	± 5
		e"	14.4704	Conductivity (σ):	1.97227	1.95	1.14	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 18, 2008 07:10 AM

Frequency	e'	e"
2400000000.	50.6081	14.4298
2405000000.	50.7168	14.4452
2410000000.	50.6554	14.3879
2415000000.	50.6993	14.4514
2420000000.	50.6812	14.3966
2425000000.	50.6572	14.4330
2430000000.	50.6327	14.4299
2435000000.	50.5661	14.5508
2440000000.	50.5796	14.5273
2445000000.	50.5267	14.4248
2450000000.	**50.6034**	**14.4704**
2455000000.	50.5014	14.5011
2460000000.	50.5825	14.5556
2465000000.	50.4645	14.5846
2470000000.	50.5072	14.5475
2475000000.	50.4284	14.5986
2480000000.	50.4764	14.6099
2485000000.	50.4358	14.6765
2490000000.	50.4112	14.7084
2495000000.	50.3267	14.6504
2500000000.	50.4511	14.8275

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 = 42% Measured by: Carol Baumann

Simulating Liquid f (MHz)	Parameters			Measured	Target	Deviation (%)	Limit (%)
5200	e'	45.1744	Relative Permittivity (ε_r):	45.1744	49.0	-7.81	± 10
	e"	18.7800	Conductivity (σ):	5.43273	5.30	2.50	± 5
5500	e'	44.5294	Relative Permittivity (ε_r):	44.5294	48.6	-8.38	± 10
	e"	19.0992	Conductivity (σ):	5.84382	5.65	3.43	± 5
5800	e'	43.9196	Relative Permittivity (ε_r):	43.9196	48.2	-8.88	± 10
	e"	19.3995	Conductivity (σ):	6.25947	6.00	4.32	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
October 31, 2008 10:49 AM

Frequency	e'	e"
4600000000.	46.4963	17.9982
4650000000.	46.3737	18.0860
4700000000.	46.2884	18.1640
4750000000.	46.1717	18.2233
4800000000.	46.0908	18.3063
4850000000.	45.9662	18.3592
4900000000.	45.8614	18.4402
4950000000.	45.7217	18.4879
5000000000.	45.6122	18.5559
5050000000.	45.5239	18.6291
5100000000.	45.3932	18.6702
5150000000.	45.2965	18.7601
5200000000.	**45.1744**	**18.7800**
5250000000.	45.0621	18.8708
5300000000.	44.9675	18.8954
5350000000.	44.8385	18.9513
5400000000.	44.7552	19.0049
5450000000.	44.6388	19.0735
5500000000.	**44.5294**	**19.0992**
5550000000.	44.4361	19.1613
5600000000.	44.3210	19.1920
5650000000.	44.2254	19.2640
5700000000.	44.1239	19.2866
5750000000.	44.0192	19.3356
5800000000.	**43.9196**	**19.3995**
5850000000.	43.7948	19.4451
5900000000.	43.7010	19.5063
5950000000.	43.6054	19.5364
6000000000.	43.4831	19.5786

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: Carol Baumann

Simulating Liquid f (MHz)	Parameters			Measured	Target	Deviation (%)	Limit (%)
5200	e'	44.7635	Relative Permittivity (ε_r):	44.7635	49.0	-8.65	± 10
	e"	18.6611	Conductivity (σ):	5.39833	5.30	1.86	± 5
5500	e'	44.2065	Relative Permittivity (ε_r):	44.2065	48.6	-9.04	± 10
	e"	18.9397	Conductivity (σ):	5.79502	5.65	2.57	± 5
5800	e'	43.6258	Relative Permittivity (ε_r):	43.6258	48.2	-9.49	± 10
	e"	19.3381	Conductivity (σ):	6.23966	6.00	3.99	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 03, 2008 09:13 AM

Frequency	e'	e"
4600000000.	46.2859	17.8181
4650000000.	46.1881	18.0064
4700000000.	46.0911	17.9607
4750000000.	45.8318	18.1444
4800000000.	45.9114	18.1844
4850000000.	45.5950	18.1990
4900000000.	45.6088	18.3112
4950000000.	45.4406	18.3043
5000000000.	45.2756	18.4930
5050000000.	45.2188	18.4398
5100000000.	44.9558	18.5850
5150000000.	45.0016	18.6097
5200000000.	**44.7635**	**18.6611**
5250000000.	44.6932	18.7503
5300000000.	44.6118	18.7802
5350000000.	44.4483	18.8551
5400000000.	44.4078	18.8565
5450000000.	44.2234	18.9901
5500000000.	**44.2065**	**18.9397**
5550000000.	44.0712	19.1563
5600000000.	43.9414	19.0915
5650000000.	43.8112	19.2472
5700000000.	43.8130	19.1559
5750000000.	43.6167	19.3334
5800000000.	**43.6258**	**19.3381**
5850000000.	43.2794	19.3601
5900000000.	43.3193	19.4793
5950000000.	43.1451	19.3627
6000000000.	43.0687	19.6002

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 = 38% Measured by: Carol Baumann

Simulating Liquid f (MHz)	Parameters			Measured	Target	Deviation (%)	Limit (%)
5200	e'	45.6494	Relative Permittivity (ε_r):	45.6494	49.0	-6.84	± 10
	e"	18.8446	Conductivity (σ):	5.45142	5.30	2.86	± 5
5500	e'	44.9763	Relative Permittivity (ε_r):	44.9763	48.6	-7.46	± 10
	e"	19.1539	Conductivity (σ):	5.86056	5.65	3.73	± 5
5800	e'	44.318	Relative Permittivity (ε_r):	44.3180	48.2	-8.05	± 10
	e"	19.4647	Conductivity (σ):	6.28051	6.00	4.68	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 04, 2008 09:43 AM

Frequency	e'	e"
4600000000.	46.9798	18.0226
4650000000.	46.8671	18.1127
4700000000.	46.7956	18.1636
4750000000.	46.6655	18.2465
4800000000.	46.5783	18.3291
4850000000.	46.4501	18.3613
4900000000.	46.3580	18.4515
4950000000.	46.1959	18.5430
5000000000.	46.1280	18.5907
5050000000.	45.9914	18.6604
5100000000.	45.8929	18.7282
5150000000.	45.7611	18.7862
5200000000.	**45.6494**	**18.8446**
5250000000.	45.5352	18.9073
5300000000.	45.4288	18.9569
5350000000.	45.3115	19.0091
5400000000.	45.1925	19.0508
5450000000.	45.0906	19.1355
5500000000.	**44.9763**	**19.1539**
5550000000.	44.8529	19.2297
5600000000.	44.7602	19.2456
5650000000.	44.6300	19.3224
5700000000.	44.5378	19.3663
5750000000.	44.4260	19.3973
5800000000.	**44.3180**	**19.4647**
5850000000.	44.1982	19.4969
5900000000.	44.1068	19.5614
5950000000.	44.0055	19.5890
6000000000.	43.8816	19.6296

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 = 32% Measured by: Carol Baumann

Simulating Liquid f (MHz)	Parameters			Measured	Target	Deviation (%)	Limit (%)
5200	e'	46.2449	Relative Permittivity (ε_r):	46.2449	49.0	-5.62	± 10
	e"	18.3034	Conductivity (σ):	5.29486	5.30	-0.10	± 5
5500	e'	45.6221	Relative Permittivity (ε_r):	45.6221	48.6	-6.13	± 10
	e"	18.6479	Conductivity (σ):	5.70574	5.65	0.99	± 5
5800	e'	45.0369	Relative Permittivity (ε_r):	45.0369	48.2	-6.56	± 10
	e"	18.9955	Conductivity (σ):	6.12911	6.00	2.15	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 05, 2008 09:57 AM

Frequency	e'	e"
4600000000.	47.4685	17.4362
4650000000.	47.3794	17.5281
4700000000.	47.2887	17.5946
4750000000.	47.1776	17.6823
4800000000.	47.0959	17.7633
4850000000.	46.9663	17.8295
4900000000.	46.8975	17.8987
4950000000.	46.7473	17.9762
5000000000.	46.6601	18.0461
5050000000.	46.5648	18.1098
5100000000.	46.4580	18.1835
5150000000.	46.3591	18.2354
5200000000.	**46.2449**	**18.3034**
5250000000.	46.1570	18.3727
5300000000.	46.0305	18.4134
5350000000.	45.9415	18.4852
5400000000.	45.8287	18.5255
5450000000.	45.7347	18.6062
5500000000.	**45.6221**	**18.6479**
5550000000.	45.5317	18.7244
5600000000.	45.4359	18.7688
5650000000.	45.3219	18.8327
5700000000.	45.2427	18.8796
5750000000.	45.1185	18.9229
5800000000.	**45.0369**	**18.9955**
5850000000.	44.9294	19.0355
5900000000.	44.8411	19.1186
5950000000.	44.7415	19.1389
6000000000.	44.6388	19.2081

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 = 30% Measured by: Carol Baumann

Simulating Liquid f (MHz)	Parameters			Measured	Target	Deviation (%)	Limit (%)
5200	e'	46.5904	Relative Permittivity (ε_r):	46.5904	49.0	-4.92	± 10
	e"	18.2520	Conductivity (σ):	5.27999	5.30	-0.38	± 5
5500	e'	46.023	Relative Permittivity (ε_r):	46.0230	48.6	-5.30	± 10
	e"	18.6110	Conductivity (σ):	5.69445	5.65	0.79	± 5
5800	e'	45.439	Relative Permittivity (ε_r):	45.4390	48.2	-5.73	± 10
	e"	18.9462	Conductivity (σ):	6.11321	6.00	1.89	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
November 15, 2008 11:37 AM

Frequency	e'	e"
4600000000.	47.7445	17.4428
4650000000.	47.6713	17.4728
4700000000.	47.5586	17.5748
4750000000.	47.4843	17.6507
4800000000.	47.3746	17.7317
4850000000.	47.2969	17.7850
4900000000.	47.2019	17.8742
4950000000.	47.0576	17.9430
5000000000.	46.9907	18.0177
5050000000.	46.9061	18.0605
5100000000.	46.7898	18.1178
5150000000.	46.7053	18.1921
5200000000.	**46.5904**	**18.2520**
5250000000.	46.4946	18.3179
5300000000.	46.3767	18.3801
5350000000.	46.3089	18.4412
5400000000.	46.2101	18.4866
5450000000.	46.1012	18.5437
5500000000.	**46.0230**	**18.6110**
5550000000.	45.8906	18.6553
5600000000.	45.8211	18.7256
5650000000.	45.6979	18.7651
5700000000.	45.6365	18.8387
5750000000.	45.5013	18.8682
5800000000.	**45.4390**	**18.9462**
5850000000.	45.3418	18.9904
5900000000.	45.2704	19.0503
5950000000.	45.1697	19.1122
6000000000.	45.0803	19.1836

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 3 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]
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: November 17, 2008

Ambient Temperature = 25°C; Relative humidity = 37% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
2450	24	15	1g	48.6	51.2	-5.08	± 10
			10g	22.6	23.7	-4.64	± 10

System Validation Dipole: D2450V2 SN: 748

The dipole input power (forward power): 250 mW

Results

Date: November 18, 2008

Ambient Temperature = 25°C; Relative humidity = 35% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
2450	24	15	1g	50.4	51.2	-1.56	± 10
			10g	23.4	23.7	-1.27	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: October 31, 2008

Ambient Temperature = 25 °C; Relative humidity = 42% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	24	15	1g	76.5	71.8	6.55	± 10
			10g	21.8	20.1	8.46	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	24	15	1g	82.3	79.1	4.05	± 10
			10g	23	22.0	4.55	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	80	74.1	7.96	± 10
			10g	22.4	20.5	9.27	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: November 3, 2008

Ambient Temperature = 25 °C; Relative humidity = 40% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	24	15	1g	74.9	71.8	4.32	± 10
			10g	21.1	20.1	4.98	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	24	15	1g	75.2	79.1	-4.93	± 10
			10g	20.9	22.0	-5.00	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	75.8	74.1	2.29	± 10
			10g	21.1	20.5	2.93	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: November 4, 2008

Ambient Temperature = 25 °C; Relative humidity = 38% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	24	15	1g	72.6	71.8	1.11	± 10
			10g	20.6	20.1	2.49	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	24	15	1g	77.4	79.1	-2.15	± 10
			10g	21.6	22.0	-1.82	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	77.3	74.1	4.32	± 10
			10g	21.7	20.5	5.85	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: November 5, 2008

Ambient Temperature = 25 °C; Relative humidity = 32% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	24	15	1g	72.9	71.8	1.53	± 10
			10g	20.5	20.1	1.99	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	24	15	1g	80.5	79.1	1.77	± 10
			10g	22.4	22.0	1.82	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	74.9	74.1	1.08	± 10
			10g	20.9	20.5	1.95	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: November 15, 2008

Ambient Temperature = 25 °C; Relative humidity = 30% Measured by: Carol Baumann

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	24	15	1g	74.9	71.8	4.32	± 10
			10g	21.3	20.1	5.97	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	24	15	1g	80.8	79.1	2.15	± 10
			10g	22.6	22.0	2.73	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	75.6	74.1	2.02	± 10
			10g	21.3	20.5	3.90	± 10

11 OUTPUT POWER VERIFICATION

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

The client provided a special driver and program, CRTU v5.0.76.0, which enables 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:

802.11gn mode (2.4 GHz band)

Mode	Channel	f (MHz)	Antenna			Duty cycle (%)	Gain power setting
			A	B	C		
802.11b	6	2437	16.84			100	24.5
802.11b	6	2437		16.67		100	23.5
802.11b	6	2437			17.00	100	22.5
802.11n 20 MHz	6	2437	16.62	16.51	16.62	98	30 / 29.5 / 28

Note: A, B and C denote Main, Aux and 3rd Antenna

802.11an mode (5 GHz band)

Mode	Channel	f (MHz)	Antenna			Duty cycle (%)	Gain power setting
			A	B	C		
5.2 GHz Band							
802.11a	40	5200	16.91			99	26.5
802.11a	40	5200		16.93		99	27
802.11a	40	5200			16.80	99	28
802.11n 40 MHz	46	5230	16.84	16.70	16.82	96	30 / 31 / 31
5.3 GHz Band							
802.11a	56	5280	16.94			99	25.5
802.11a	56	5280		17.22		99	27
802.11a	56	5280			16.82	99	26
802.11n 20 MHz	56	5280	16.83	16.61	16.96	98	29.5 / 31 / 30.5
5.5 GHz Band							
802.11a	120	5600	17.05			99	26.5
802.11a	120	5600		16.87		99	26
802.11a	120	5600			17.08	99	25
802.11n 40 MHz	118	5590	16.65	16.59	16.88	96	30.5 / 30.5 / 29
5.8 GHz Band							
802.11a	157	5785	17.01			99	27.5
802.11a	157	5785		16.90		99	27.5
802.11a	157	5785			16.73	99	26
802.11n 40 MHz	151	5755	16.85	17.06	16.97	96	31.5 / 32 / 30.5

12 KDB 447498 RF EXPOSURE ASSESSMENT

KDB 447498, b) iii): For each edge positioned closest to the user, simultaneous transmission SAR evaluation is not required when the simultaneous transmitting antennas along that edge are:

(1) Located < 5 cm from the edge and the sum of the stand-alone 1-g SAR is < the SAR limit for these antennas or the SAR-to-peak location separation ratios are < 0.3 for all antenna pairs.

Assessment: Please refer to report 08U12063-3 for details.

As the result, simultaneous SAR evaluation for WLAN-AUX and BT antenna pair is not required.

13 SAR TEST RESULTS

13.1 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	0.050	1.6
802.11n 20 MHz	6	2437	A + B + C	0.064	1.6

2) Tablet Mode 1: Edge - Primary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	C	0.031	1.6
802.11n 40 MHz	6	2437	A + B + C	0.064	1.6

3) Tablet Mode 2: Edge - Secondary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	A	0.032	1.6
802.11n 20 MHz	**6**	**2437**	**A + B + C**	**0.179**	**1.6**

4) Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	B	0.017	1.6

5) Tablet Mode 4: Edge - Secondary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
802.11b	6	2437	B	0.083	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	B	0.023	1.6
802.11b	6	2437	C	0.014	1.6
802.11n 40 MHz	6	2437	A + B + C	0.023	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.

b. 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: 11/18/2008 11:56:31 AM

Test Laboratory: Compliance Certification Services

Tablet Mode 2 Edge - Secondary Landscape

DUT: Lenovo X200 Tablet; Type: N/A; Serial: N/A

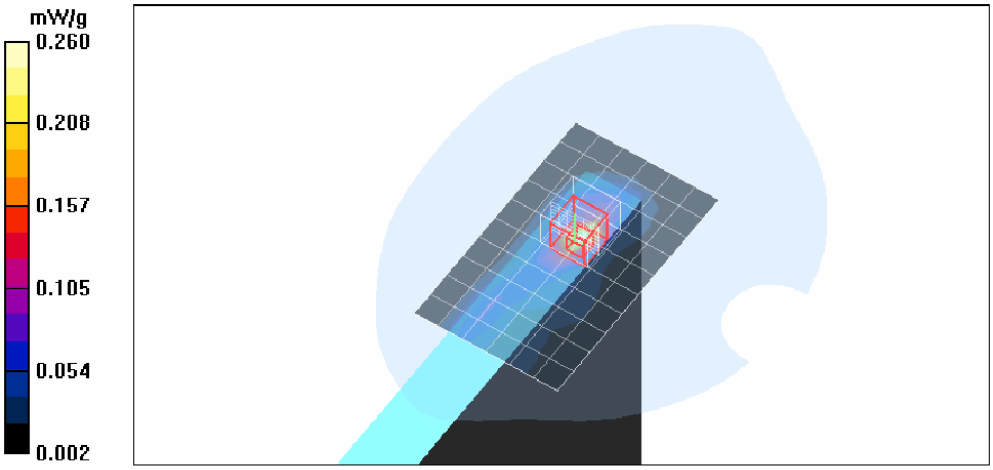
Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1.02
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.97 mho/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(7.91, 7.91, 7.91); Calibrated: 4/23/2008
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: SAM 2 (Twin); Type: SAM 2; Serial: 1050
- Measurement SW: DASY4, V4.7 Build 71; Postprocessing SW: SEMCAD, V1.8 Build 184

802.11n 20 MHz_M-Ch A+B+C Ant/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.260 mW/g

802.11n 20 MHz_M-Ch A+B+C Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 6.47 V/m; Power Drift = -0.386 dB
Peak SAR (extrapolated) = 0.432 W/kg
SAR(1 g) = 0.179 mW/g; SAR(10 g) = 0.075 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.234 mW/g



13.2 SAR TEST RESULT FOR 5 GHZ BANDS

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
5.2 GHz Band					
802.11a	40	5200	A	0.056	1.6
802.11n 40 MHz	46	5230	A + B + C	0.065	1.6
5.3 GHz Band					
802.11n 20 MHz	56	5280	A + B + C	0.073	1.6
5.5 GHz Band					
802.11n 40 MHz	118	5590	A + B + C	0.049	1.6
5.8 GHz Band					
802.11n 40 MHz	151	5755	A + B + C	0.063	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.
b. 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.

2) Tablet Mode 1: Edge - Primary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	C	0.061	1.6
802.11n 40 MHz	46	5230	A + B + C	0.082	1.6
5.3 GHz Band					
802.11n 20 MHz	56	5280	A + B + C	0.100	1.6
5.5 GHz Band					
802.11n 40 MHz	118	5590	A + B + C	**0.126**	1.6
5.8 GHz Band					
802.11n 40 MHz	151	5575	A + B + C	0.084	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.
b. 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.

3) Tablet Mode 2: Edge - Secondary Landscape

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	A	0.058	1.6
802.11n 40 MHz	46	5230	A + B + C	**0.144**	1.6
5.3 GHz Band					
802.11n 20 MHz	56	5280	A + B + C	**0.177**	1.6
5.5 GHz Band					
802.11n 40 MHz	118	5590	A + B + C	0.123	1.6
5.8 GHz Band					
802.11n 40 MHz	151	5575	A + B + C	0.091	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.

b. 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.

4) Tablet Mode 3: Edge - Primary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	B	0.107	1.6
5.3 GHz Band					
802.11a	56	5280	B	0.136	1.6
5.5 GHz Band					
802.11a	120	5600	B	0.045	1.6
5.8 GHz Band					
802.11a	157	5785	B	0.026	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.

b. 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.

5) Tablet Mode 4: Edge - Secondary Portrait

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	B	0.126	1.6
5.3 GHz Band					
802.11a	56	5280	B	0.155	1.6
5.5 GHz Band					
802.11a	120	5600	B	0.115	1.6
5.8 GHz Band					
802.11a	157	5785	B	0.062	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.
b. 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

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

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	B	0.026	1.6
5.3 GHz Band					
802.11a	56	5280	B	0.027	1.6
5.5 GHz Band					
802.11a	120	5600	B	0.028	1.6
5.8 GHz Band					
802.11a	157	5785	B	0.029	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.
b. 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.

7) Tablet Mode 5: Bottom Face - Lap-held (Antennas A, B and C)

Mode	Channel	f (MHz)	Antenna	Measured SAR 1g (mW/g)	Limit
5.2 GHz Band					
802.11a	40	5200	A	0.018	1.6
802.11a	40	5200	C	0.016	1.6
802.11n 40 MHz	46	5230	A+B+C	0.039	1.6
5.3 GHz Band					
802.11n 20 MHz	56	5280	A+B+C	0.053	1.6
5.5 GHz Band					
802.11n 40 MHz	118	5590	A+B+C	0.032	1.6
5.8 GHz Band					
802.11n 40 MHz	151	5755	A+B+C	0.023	1.6

Notes:

a. The modes with highest output power channel were chosen for the testing.

b. 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: 11/15/2008 3:38:52 PM

Test Laboratory: Compliance Certification Services

Tablet Mode 2 Edge - Secondary Landscape

DUT: Lenovo X200 Tablet; Type: N/A; Serial: N/A

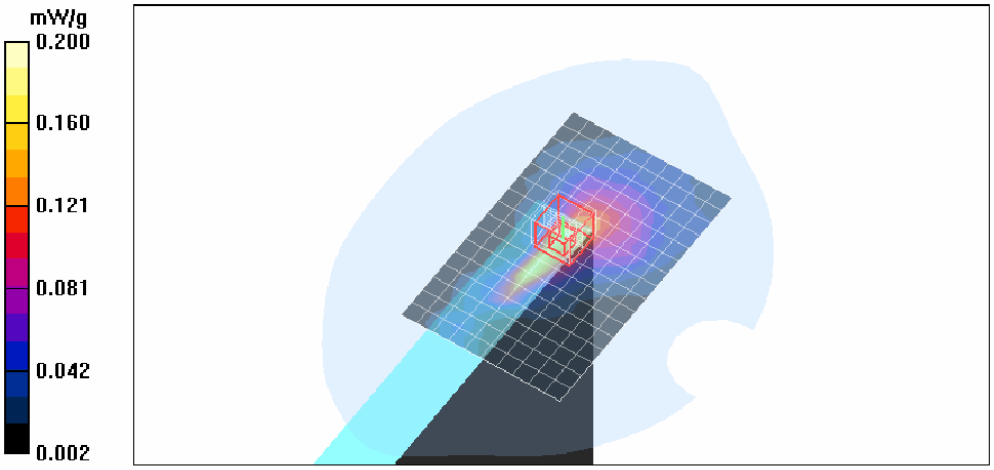
Communication System: 802.11abgn; Frequency: 5230 MHz;Duty Cycle: 1:1.03
Medium parameters used (interpolated): f = 5230 MHz; σ = 5.32 mho/m; ε_r = 46.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: 2.5mm (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

802.11n 40 MHz_H-Ch A+C Ant/Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.200 mW/g

802.11n 40 MHz_H-Ch A+C Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 5.13 V/m; Power Drift = 0.238 dB
Peak SAR (extrapolated) = 0.567 W/kg
SAR(1 g) = 0.144 mW/g; SAR(10 g) = 0.049 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.242 mW/g



The Highest SAR Plot & Data for 5.3 GHz Band

Date/Time: 11/15/2008 4:32:20 PM

Test Laboratory: Compliance Certification Services

Tablet Mode 2 Edge - Secondary Landscape

DUT: Lenovo X200 Tablet; Type: N/A; Serial: N/A

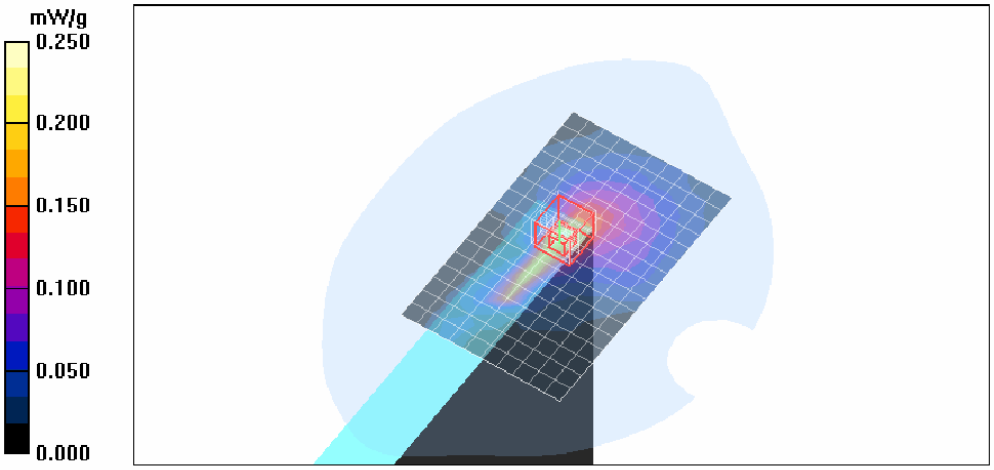
Communication System: 802.11abgn; Frequency: 5280 MHz;Duty Cycle: 1:1.02
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.39 mho/m; ε_r = 46.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(3.92, 3.92, 3.92); Calibrated: 4/23/2008
- Sensor-Surface: 2.5mm (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

802.11n 20 MHz_M-Ch A+C Ant/Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.250 mW/g

802.11n 20 MHz_M-Ch A+C Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.60 V/m; Power Drift = 0.702 dB
Peak SAR (extrapolated) = 0.701 W/kg
SAR(1 g) = 0.177 mW/g; SAR(10 g) = 0.058 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.312 mW/g



The Highest SAR Plot & Data for 5.5 GHz Band

Date/Time: 11/3/2008 3:17:51 PM

Test Laboratory: Compliance Certification Services

Tablet Mode 1 Edge - Primary Landscape 5.5 GHz

DUT: Lenovo X200 Tablet; Type: N/A; Serial: N/A

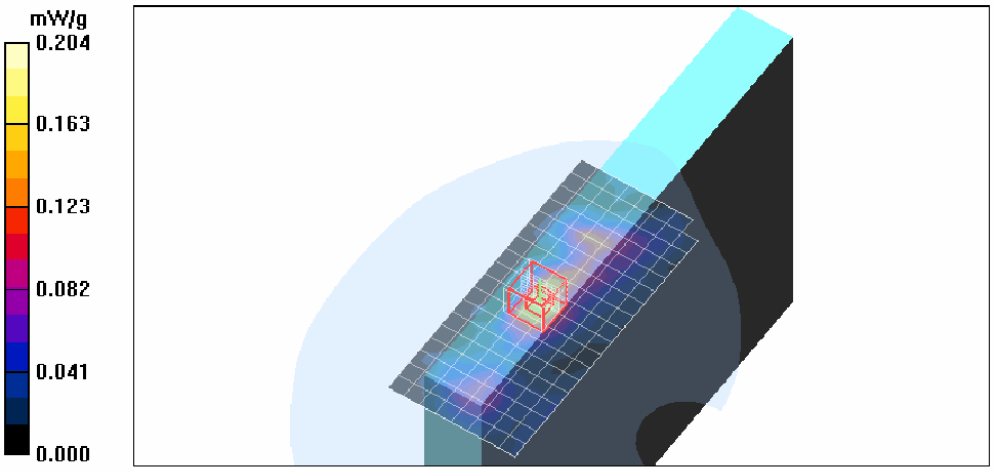
Communication System: 802.11abgn; Frequency: 5590 MHz;Duty Cycle: 1:1.04
Medium parameters used (interpolated): f = 5590 MHz; σ = 5.94 mho/m; ε_r = 44; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(3.5, 3.5, 3.5); Calibrated: 4/23/2008
- Sensor-Surface: 2.5mm (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

802.11n 40 MHz_M-Ch A+B+C Ant/Area Scan (9x19x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.173 mW/g

802.11n 40 MHz_M-Ch A+B+C Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.57 V/m; Power Drift = -1.15 dB
Peak SAR (extrapolated) = 0.455 W/kg
SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.044 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.204 mW/g



The Highest SAR Plot & Data for 5.8 GHz Band

Date/Time: 11/15/2008 5:52:47 PM

Test Laboratory: Compliance Certification Services

Tablet Mode 2 Edge - Secondary Landscape

DUT: Lenovo X200 Tablet; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5755 MHz;Duty Cycle: 1:1.03
Medium parameters used (interpolated): f = 5755 MHz; σ = 6.04 mho/m; ε_r = 45.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

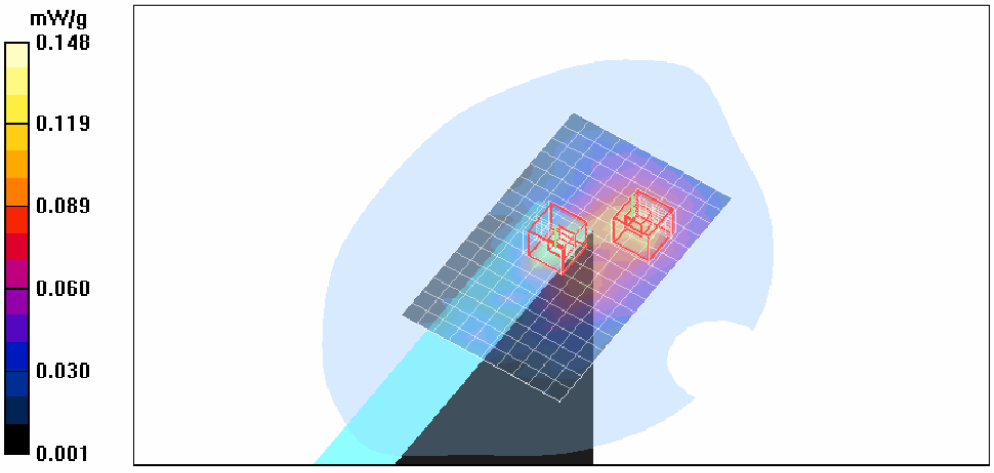
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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: 2.5mm (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

802.11n 40 MHz_L-Ch A+C Ant/Area Scan (11x17x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.148 mW/g

802.11n 40 MHz_L-Ch A+C Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.70 V/m; Power Drift = -0.386 dB
Peak SAR (extrapolated) = 0.346 W/kg
SAR(1 g) = 0.091 mW/g; SAR(10 g) = 0.030 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.159 mW/g

802.11n 40 MHz_L-Ch A+C Ant/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 3.70 V/m; Power Drift = -0.386 dB
Peak SAR (extrapolated) = 0.359 W/kg
SAR(1 g) = 0.072 mW/g; SAR(10 g) = 0.032 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.109 mW/g

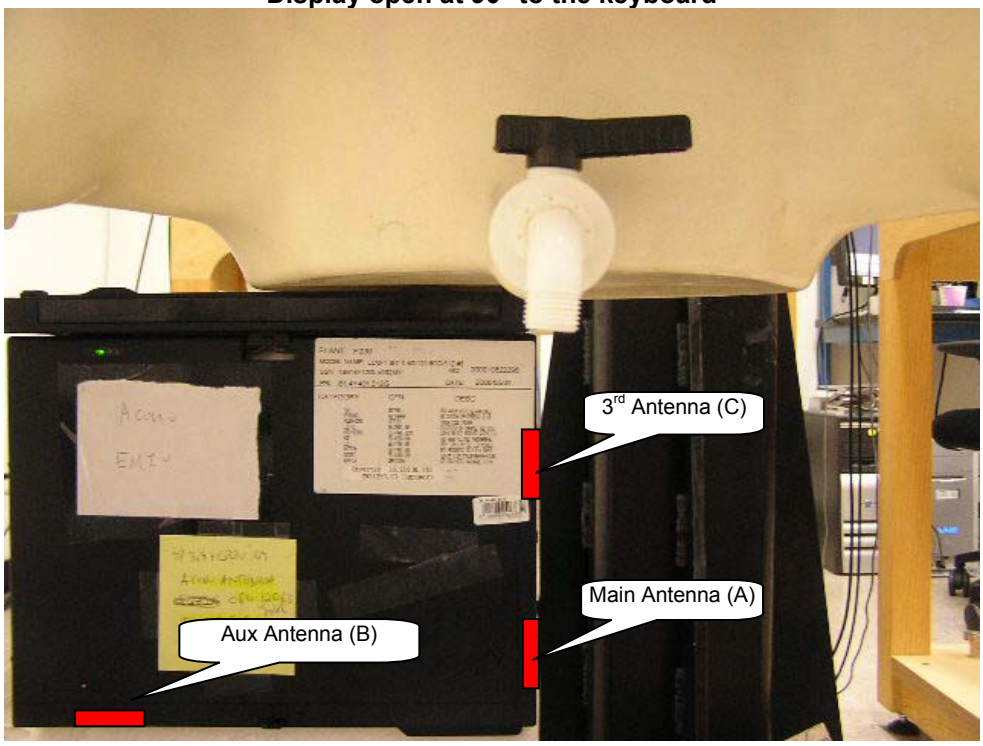


14 ATTACHMENTS

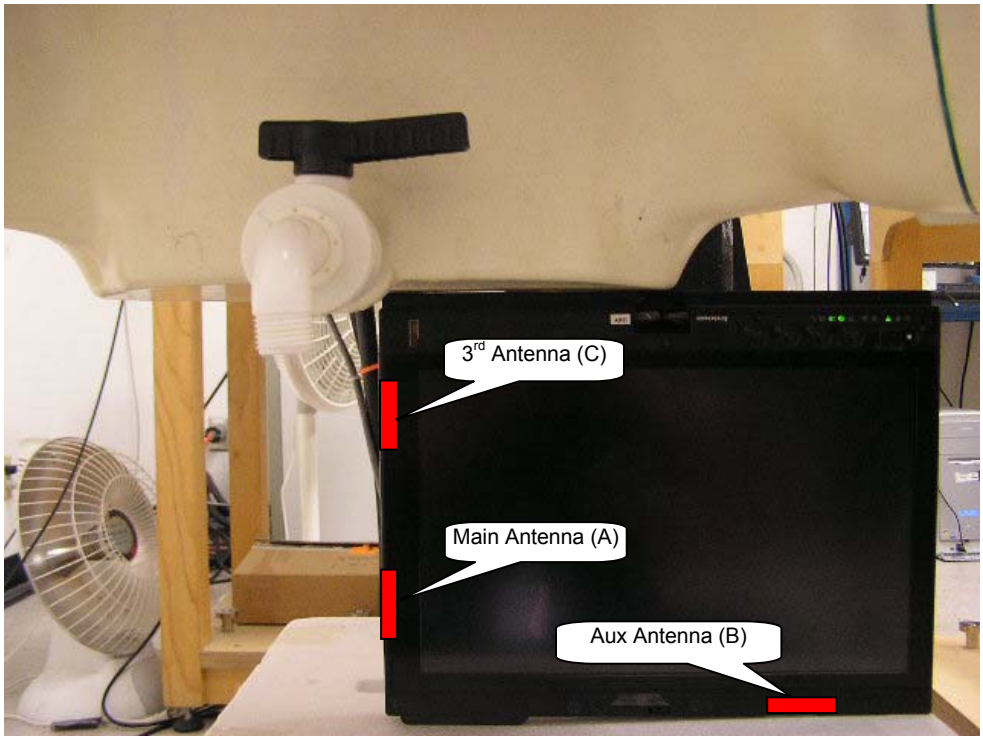
No.	Contents	No. Of Pages
1	System Performance Check Plots	34
2-1	SAR Test Plots for 2.4 GHz Band	12
2-2	SAR Test Plots for 5 GHz Band	37
3	Certificate of E-Field Probe - EX3DV3SN3531	10
4	Certificate of System Validation Dipole - D2450V2 SN:748	6
5	Certificate of System Validation Dipole - D5GHzV2 SN:1003	15

15 SETUP PHOTOS

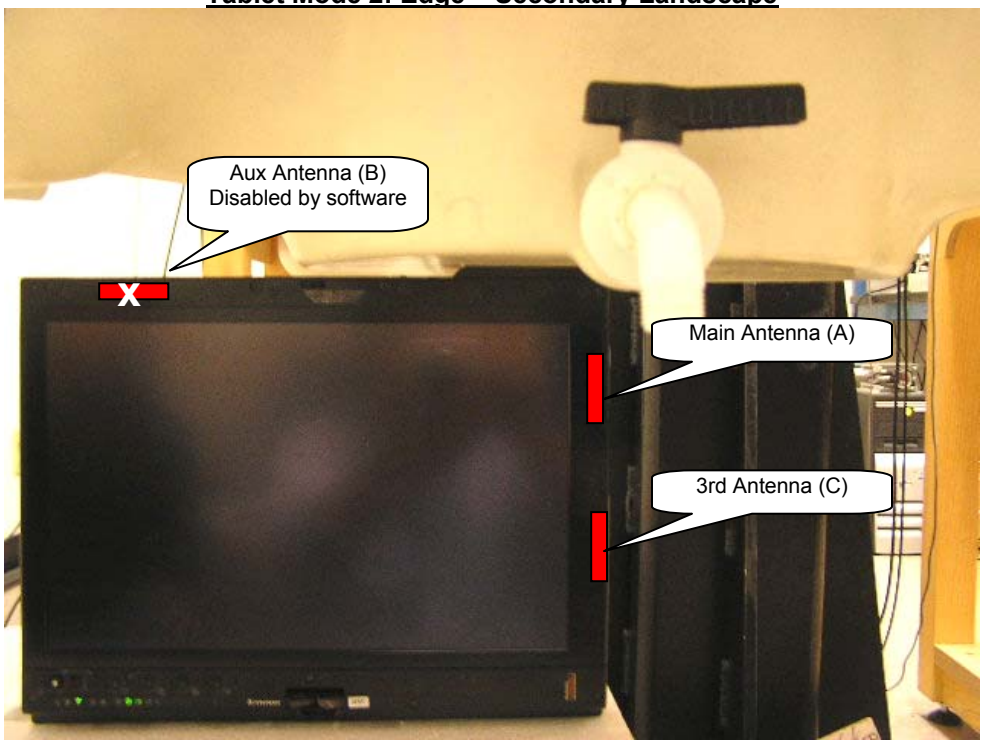
Laptop Mode
Display open at 90° to the keyboard



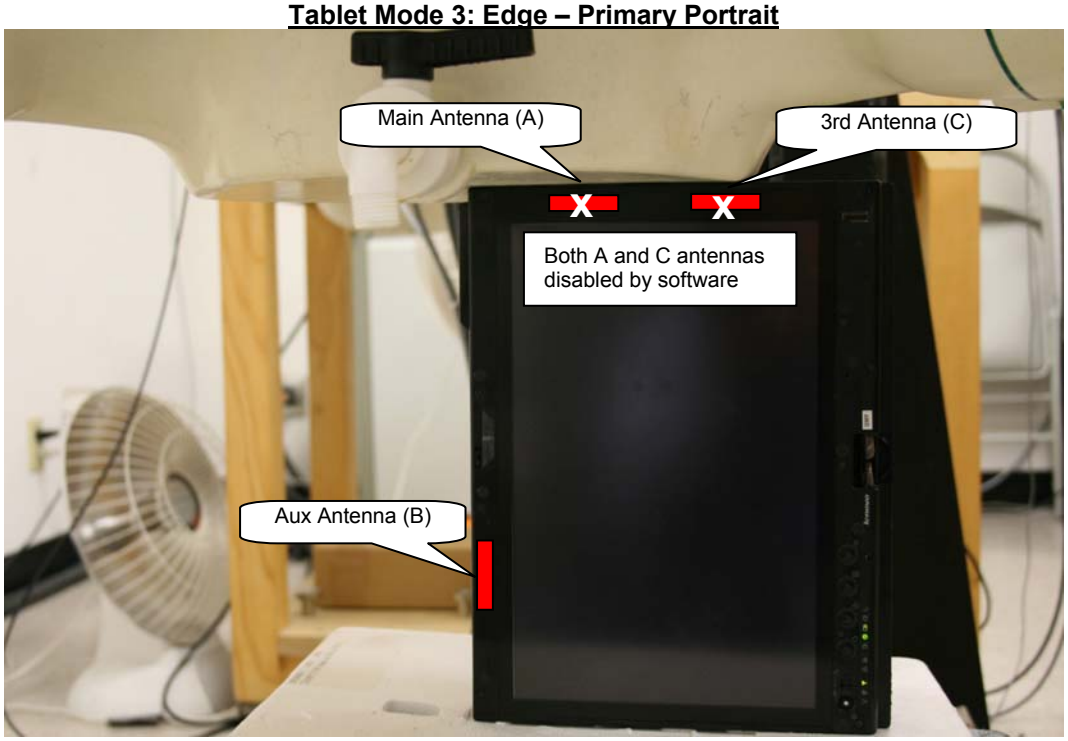
Tablet Mode 1: Edge - Primary Landscape



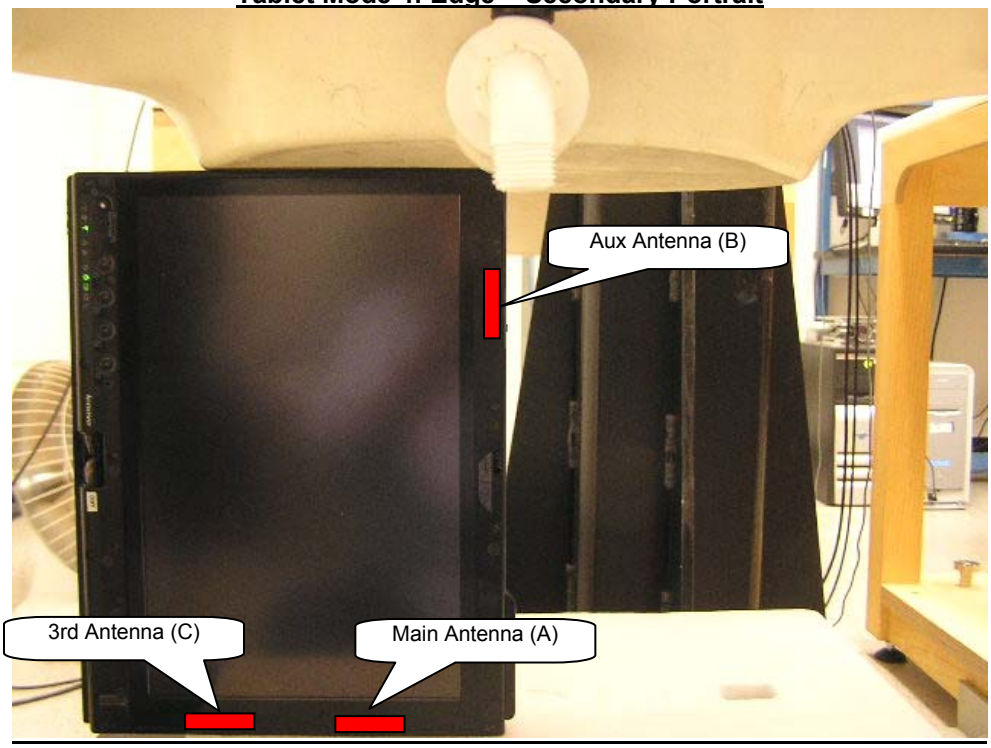
Tablet Mode 2: Edge – Secondary Landscape



Tablet Mode 3: Edge – Primary Portrait



Tablet Mode 4: Edge – Secondary Portrait



Tablet Mode 6: Bottom Face – Lap-held

B Antenna

Tablet Mode 5: Bottom Face – Lap-held

A and C Antennas

END OF REPORT