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

SAR EVALUATION REPORT

FOR

Intel Wi-Fi Link 5300 Series
Installed inside Lenovo 3000 G430 & Lenovo 3000 G530

FCC ID: PD9533ANMU
FCC MODEL: 533AN_MMW
IC: 1000M-533ANMU
IC MODEL: 533ANMU

REPORT NUMBER: 08U11946-5A

ISSUE DATE: SEPTEMBER 30, 2008

Prepared for

INTEL CORPORATION
2111 NE 25TH AVENUE
JF3-302
HILLSBORO, OR 97124

Prepared by

COMPLIANCE CERTIFICATION SERVICES
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issued date	Revisions	Revised By
--	July 24, 2008	Initial issue	--
A	September 30, 2008	Spot test with Windows XP OS installed and different test utility CRTU Version 5.0.69.0	Sunny Shih

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1 ATTESTATION OF TEST RESULTS

COMPANY NAME:	INTEL CORPORATION 2111 NE 25TH AVENUE JF3-302 HILLSBORO, OR 97124
EUT DESCRIPTION:	Intel Wi-Fi Link 5300 Series Installed inside Installed inside Lenovo 3000 G430 & Lenovo 3000 G530
MODEL:	FCC Model: 533AN_MMW IC Model: 533ANMU
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	July 16 – 18 and September 29-30 , 2008
THE HIGHEST SAR VALUES:	See Table below

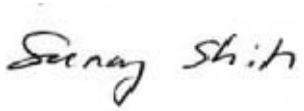
FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
15.247/RSS-102	2400 – 2483.5 5725 – 5850	0.20 0.466	1.6
15.407/RSS-102	5150 – 5250 5250 – 5350 5470 – 5725	0.636 0.627 0.665	1.6

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

Compliance Certification Services, Inc. (CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by CCS based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

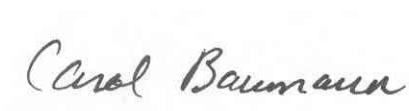
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



SUNNY SHIH
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



CAROL BAUMANN
SAR ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2 TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C and IC RSS 102 Issue 2: NOVERMBER 2005.

3 FACILITIES AND ACCREDITATION

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

4 CALIBRATION AND UNCERTAINTY

4.1 MEASURING INSTRUMENT CALIBRATION

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

5 MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

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

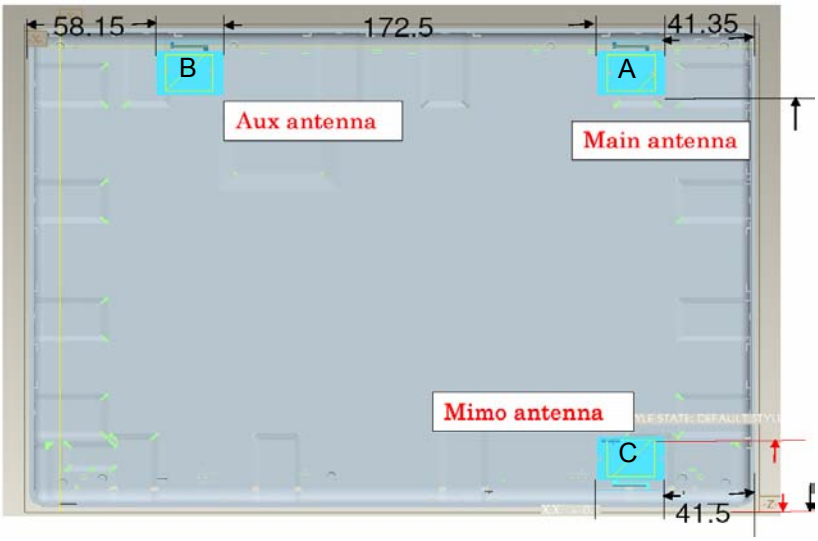
Notesfor table
1. Tol. - tolerance in influence quaitity
2. N - Nomal
3. R - Rectangular
4. Div. - Divisor used to obtain standard uncertainty
5. Ci - is te sensitivity coefficient

Measurement uncertainty for 3 GHz – 6 GHz

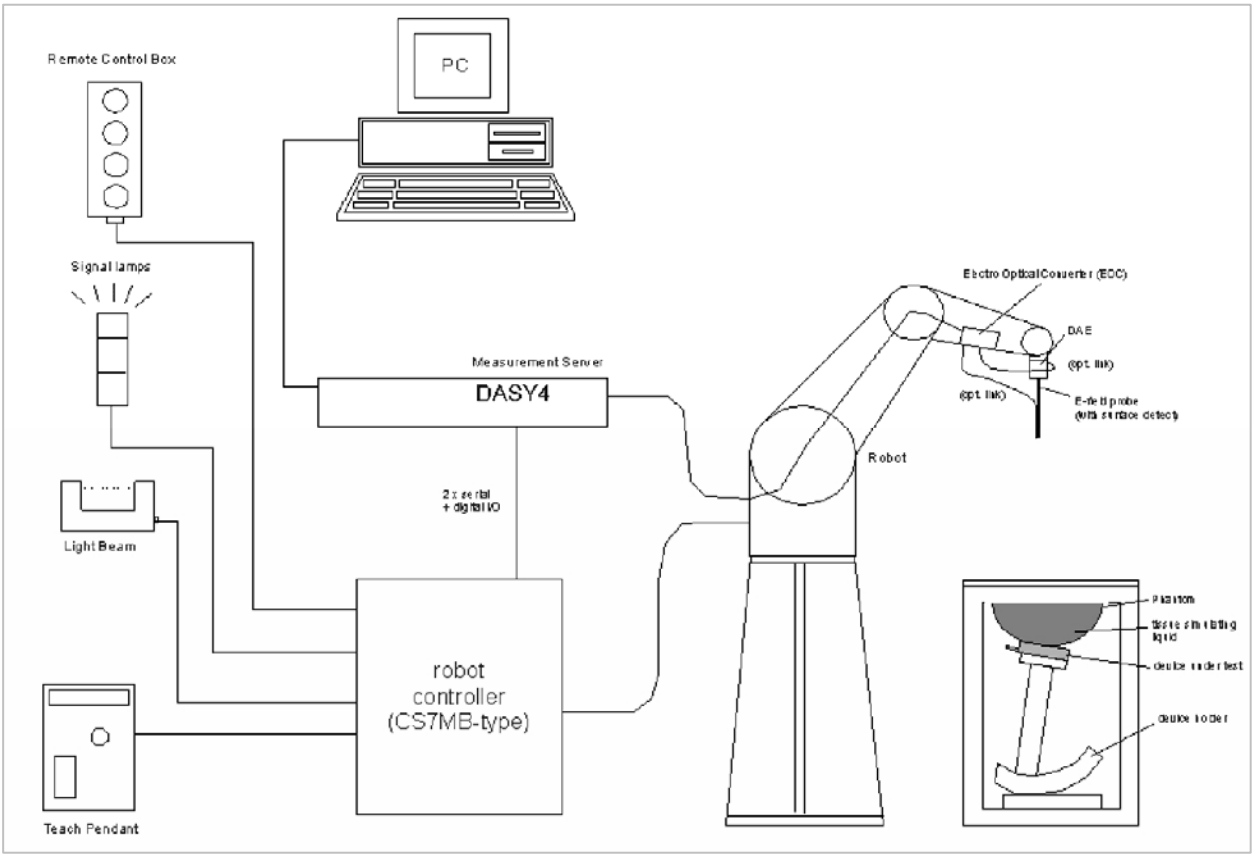
Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R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

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

6 DEVICE UNDER TEST (DUT) DESCRIPTION

Intel Wi-Fi Link 5300 Series Installed inside Installed inside Lenovo 3000 G430 & Lenovo 3000 G530	
Normal operation:	Lap-held only
Duty cycle:	99% for 802.11n 20 MHz mode 98% for 802.11n 40 MHz mode
Host device	Lenovo, 14": Lenovo 3000 G430 and 15": Lenovo 3000 G530
Antenna tested:	Smart Approach, CPL07-230010 (MIMO), located at lower right side of the LCD panel. Antenna locations: 
Power supply:	Power supplied through laptop computer (host device)

7 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.

7.1 COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

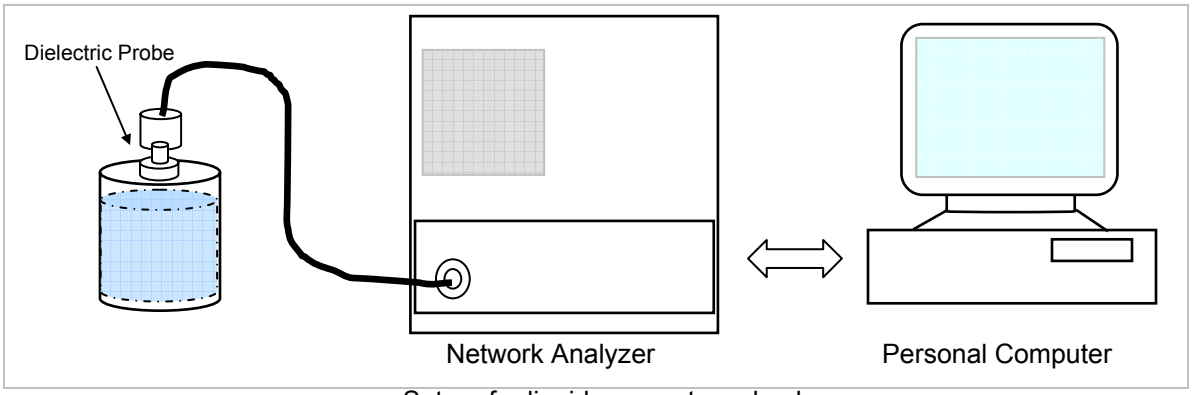
The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

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

8 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)

8.1 SIMULATING LIQUID PARAMETER CHECK RESULT

Simulating Liquid Dielectric Parameter Check Result @ Muscle 2450 MHz

Room Ambient Temperature = 25°C; Relative humidity = 43% Measured by: Walter Alvarez

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	23.5	15	e'	51.0588	Relative Permittivity (ϵ_r):	51.0588	52.7	-3.11	± 5
			e"	14.6088	Conductivity (σ):	1.99113	1.95	2.11	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 23.5 deg. C
July 16, 2008 08:38 AM

Frequency	e'	e"
2400000000.	51.1409	14.3249
2405000000.	51.1785	14.3621
2410000000.	51.0563	14.4428
2415000000.	51.0277	14.4942
2420000000.	51.0746	14.4323
2425000000.	51.1732	14.4876
2430000000.	51.0703	14.4985
2435000000.	51.0492	14.4975
2440000000.	51.0574	14.5529
2445000000.	51.0347	14.5950
2450000000.	**51.0588**	**14.6088**
2455000000.	51.0333	14.5883
2460000000.	50.9127	14.5088
2465000000.	50.9171	14.6066
2470000000.	50.9534	14.5907
2475000000.	50.8580	14.6436
2480000000.	50.9571	14.6268
2485000000.	50.8378	14.6661
2490000000.	50.7800	14.7242
2495000000.	50.8326	14.7549
2500000000.	50.8103	14.7320

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 = 42% Measured by: Carol Baumann

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
2450	24	15	e'	50.4871	Relative Permittivity (ϵ_r):	50.4871	52.7	-4.20	± 5
			e"	14.2197	Conductivity (σ):	1.93810	1.95	-0.61	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
September 29, 2008 08:44 AM

Frequency	e'	e"
2400000000.	50.7789	14.0533
2405000000.	50.6583	14.0776
2410000000.	50.7636	13.9791
2415000000.	50.7052	13.9734
2420000000.	50.6922	14.1699
2425000000.	50.5728	14.0564
2430000000.	50.6981	14.0455
2435000000.	50.5866	14.1415
2440000000.	50.6578	14.1125
2445000000.	50.4673	14.1131
2450000000.	**50.4871**	**14.2197**
2455000000.	50.5781	14.1886
2460000000.	50.5272	14.2666
2465000000.	50.4869	14.2877
2470000000.	50.5175	14.2980
2475000000.	50.5313	14.3916
2480000000.	50.5394	14.3713
2485000000.	50.4261	14.4148
2490000000.	50.4121	14.3966
2495000000.	50.3806	14.3936
2500000000.	50.3422	14.4726

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 = 25.5°C; Relative humidity = 42% Measured by: Sunny Shih

Simulating Liquid			Parameters			Measured	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)							
5200	23.5	15	e'	45.9055	Relative Permittivity (ε_r):	45.9055	49.0	-6.32	± 10
			e"	18.7373	Conductivity (σ):	5.42038	5.30	2.27	± 5
5500	23.5	15	e'	45.2898	Relative Permittivity (ε_r):	45.2898	48.6	-6.81	± 10
			e"	19.0702	Conductivity (σ):	5.83495	5.65	3.27	± 5
5800	23.5	15	e'	44.7312	Relative Permittivity (ε_r):	44.7312	48.2	-7.20	± 10
			e"	19.4010	Conductivity (σ):	6.25995	6.00	4.33	± 5

Liquid Check
Ambient temperature: 25.5 deg. C; Liquid temperature: 24.5 deg. C
July 17, 2008 03:24 PM

Frequency	e'	e"
4600000000.	47.0919	17.9045
4650000000.	46.9986	17.9995
4700000000.	46.9224	18.0483
4750000000.	46.8118	18.1446
4800000000.	46.7300	18.1955
4850000000.	46.6100	18.2765
4900000000.	46.5564	18.3475
4950000000.	46.4514	18.4330
5000000000.	46.3273	18.4875
5050000000.	46.2162	18.5470
5100000000.	46.1010	18.6293
5150000000.	46.0084	18.7015
5200000000.	**45.9055**	**18.7373**
5250000000.	45.7955	18.8190
5300000000.	45.6977	18.8456
5350000000.	45.5838	18.9318
5400000000.	45.4852	18.9656
5450000000.	45.3905	19.0354
5500000000.	**45.2898**	**19.0702**
5550000000.	45.1994	19.1424
5600000000.	45.0964	19.1764
5650000000.	45.0037	19.2371
5700000000.	44.9124	19.2754
5750000000.	44.8044	19.3336
5800000000.	**44.7312**	**19.4010**
5850000000.	44.5934	19.4354
5900000000.	44.5211	19.5056
5950000000.	44.4165	19.5398
6000000000.	44.3082	19.6076

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'	45.6268	Relative Permittivity (ϵ_r):	45.6268	49.0	-6.88	± 10
	e"	18.6441	Conductivity (σ):	5.39341	5.30	1.76	± 5
5500	e'	45.0516	Relative Permittivity (ϵ_r):	45.0516	48.6	-7.30	± 10
	e"	18.6899	Conductivity (σ):	5.71859	5.65	1.21	± 5
5800	e'	44.4059	Relative Permittivity (ϵ_r):	44.4059	48.2	-7.87	± 10
	e"	18.9626	Conductivity (σ):	6.11850	6.00	1.97	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C
September 30, 2008 08:47 AM

Frequency	e'	e"
4600000000.	47.0114	17.5001
4650000000.	46.9035	17.7390
4700000000.	46.8467	17.6681
4750000000.	46.6065	17.8775
4800000000.	46.6542	17.8735
4850000000.	46.3719	17.8762
4900000000.	46.4359	17.9430
4950000000.	46.2693	17.9490
5000000000.	46.2452	18.0938
5050000000.	46.2203	18.0719
5100000000.	46.0835	18.3282
5150000000.	46.0704	18.5052
5200000000.	**45.6268**	**18.6441**
5250000000.	45.5196	18.5722
5300000000.	45.4187	18.5105
5350000000.	45.2954	18.5850
5400000000.	45.2758	18.5765
5450000000.	45.0786	18.6932
5500000000.	**45.0516**	**18.6899**
5550000000.	44.9267	18.9017
5600000000.	44.8118	18.7935
5650000000.	44.6465	19.0129
5700000000.	44.6705	18.8458
5750000000.	44.3707	19.0198
5800000000.	**44.4059**	**18.9626**
5850000000.	44.0005	19.0608
5900000000.	44.1712	19.1070
5950000000.	43.8323	19.0294
6000000000.	43.8683	19.1349

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 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]
D450V2	15	450	5.01	3.36	7.22
D835V2	15	835	9.71	6.38	14.1
D900V2	15	900	**11.1**	**7.17**	16.3
D1450V2	10	1450	29.6	16.6	49.8
D1800V2	10	1800	**38.5**	**20.3**	67.5
D1900V2	10	1900	39.8	20.8	69.6
D2000V2	10	2000	**40.9**	**21.2**	71.5
D2450V2	10	2450	51.2	23.7	97.6

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

5 GHz Reference SAR Values for body-tissue

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

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

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

9.1 SYSTEM PERFORMANCE CHECK RESULTS

System Validation Dipole: D2450V2 SN: 748

Date: 07-16-08

Ambient Temperature = 25°C; Relative humidity = 43% Measured by: Walter Alvarez

Body Simulating Liquid			SAR (mW/g	Normalized	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
2450	23.5	15	1g	48.5	51.2	-5.27	± 10
			10g	22.7	23.7	-4.22	± 10

Date: 09-29-08

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

Body Simulating Liquid			SAR (mW/g	Normalized	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
2450	24	15	1g	47.9	51.2	-6.45	± 10
			10g	22.7	23.7	-4.22	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: 7-17-08

Ambient Temperature = 25.5°C; Relative humidity = 42% Measured by: Walter Alvarez

Body Simulating Liquid			SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5200	23.5	15	1g	76.9	71.8	7.10	± 10
			10g	22.1	20.1	9.95	± 10

Body Simulating Liquid			SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5500	23.5	15	1g	79.3	79.1	0.25	± 10
			10g	22.6	22.0	2.73	± 10

Body Simulating Liquid			SAR (mW/g)	Normalized to 1 W	Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	23.5	15	1g	77.9	74.1	5.13	± 10
			10g	22.2	20.5	8.29	± 10

System Validation Dipole: D5GHzV2 SN 1003

Date: September 30, 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	77.3	71.8	7.66	± 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	77.6	79.1	-1.90	± 10
			10g	21.9	22.0	-0.45	± 10

Body Simulating Liquid			Normalized to 1 W		Target	Deviation (%)	Limit (%)
f (MHz)	Temp. (°C)	Depth (cm)					
5800	24	15	1g	76.8	74.1	3.64	± 10
			10g	21.6	20.5	5.37	± 10

10 PROCEDURE USED TO ESTABLISH TEST SIGNAL

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

The client provided a special driver and program, CRTU Version 5.0.62.0, which enables a user to control the frequency and output power of the module.

The cable assembly insertion loss of 20.3 dB (including attenuator and connectors) was entered as an offset in the power meter to allow for direct reading of power.

RF Conducted Output Power Measurement Results:

2400 – 2483.5 MHz				
Test Mode	Frequency (MHz)	Output Power (dBm)		
		Ant (A)	Ant (B)	Ant (C)
802.11n 20 MHz	2437		14.0	13.9
802.11n 40 MHz	2437		16.5	16.4

5150 – 5250 MHz				
Test Mode	Frequency (MHz)	Output Power (dBm)		
		Ant (A)	Ant (B)	Ant (C)
802.11n 20 MHz	5200		14.7	14.7
802.11n 40 MHz	5230		16.5	16.5

5250 – 5360 MHz				
Test Mode	Frequency (MHz)	Output Power (dBm)		
		Ant (A)	Ant (B)	Ant (C)
802.11n 20 MHz	5260	16.6	16.7	16.6
802.11n 40 MHz	5270	16.5	16.4	16.6

5470 – 5725 MHz				
Test Mode	Frequency (MHz)	Output Power (dBm)		
		Ant (A)	Ant (B)	Ant (C)
802.11n 20 MHz	5600	16.6		16.6
802.11n 40 MHz	5590	16.5		16.5

5725 – 5850 MHz				
Test Mode	Frequency (MHz)	Output Power (dBm)		
		Ant (A)	Ant (B)	Ant (C)
802.11n 20 MHz	5785		16.6	16.6
802.11n 40 MHz	5795		16.8	16.8

11 SAR MEASURMENT RESULTS

11.1 2.4 GHz Band 14 inch Lenovo Laptop

Note: The modes with highest output power were chosen for the testing below

802.11n 20 MHz mode with B+C Antenna				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
6	2437	0.145	-0.053	0.147
802.11n 40 MHz mode with B+C Antenna				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
6	2437	0.181	-0.427	0.200

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

Additional Test with Windows XP and Different CRTU Version

802.11n 40 MHz mode with B+C Antenna				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
6	2437	0.026	-0.360	0.028

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

11.2 2.4 GHz Band 15 inch Lenovo Laptop

Note: The modes with highest output power were chosen for the testing below.

802.11n 20 MHz mode with B+C Antennas				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
6	2437	0.164	-0.376	0.179
802.11n 40 MHz mode with B+C Antennas				
Channel	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated[1)] SAR 1g (mW/g)
6	2437	0.159	-0.049	0.161

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

11.3 5 GHz Band 14 inch Lenovo Laptop

The modes with highest output power were chosen for the testing below

Test Results

Test Mode	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
802.11n 20 MHz mode with B+C Ant	5200	0.352	-0.270	0.375
802.11n 40 MHz mode with B+C Ant	**5230**	**0.487**	**-0.316**	**0.524**
802.11n 20 MHz mode with A+B+C Ant	5260	0.270	-0.130	0.278
802.11n 40 MHz mode with A+B+C Ant	5270	0.294	-0.120	0.302
802.11n 20 MHz mode with A+C Ant	**5600**	**0.377**	**-0.238**	**0.398**
802.11n 40 MHz mode with A+C Ant	5590	0.366	-0.210	0.384
802.11n 20 MHz mode with B+C Ant	**5785**	**0.393**	**-0.270**	**0.418**
802.11n 40 MHz mode with B+C Ant	5795	0.361	-0.130	0.372

Notes:

4) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
5) 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) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

11.4 5 GHz Band 15 inch Lenovo Laptop

The modes with worst case result from preliminary scan from 14 inch Lenovo laptop

Test Results

Test Mode	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
802.11n 40 MHz mode with B+C Ant	5230	0.601	-0.244	0.636
802.11n 40 MHz mode with A+B+C Ant	5270	0.591	-0.260	0.627
802.11n 20 MHz mode with A+C Ant	**5600**	**0.626**	**-0.260**	**0.665**
802.11n 20 MHz mode with B+C Ant	5785	0.430	-0.350	0.466

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

Additional Test with Windows XP and Different CRTU Version

Test Results

Test Mode	f (MHz)	Measured SAR 1g (mW/g)	Power Drift (dB)	Extrapolated1) SAR 1g (mW/g)
802.11n 40 MHz mode with B+C Ant	5230	0.375	-0.218	0.394
802.11n 40 MHz mode with A+B+C Ant	5270	0.344	-0.260	0.365
802.11n 20 MHz mode with A+C Ant	**5600**	**0.440**	**-0.287**	**0.470**
802.11n 20 MHz mode with B+C Ant	5785	0.370	-0.225	0.390

Notes:

1) The exact method of extrapolation is Measured SAR x 10^(-drift/10). The SAR reported at the end of the measurement process by the DASY4 system can be scaled up by the Power drift to determine the SAR at the beginning of the measurement process.
2) The SAR measured at the middle channel for this configuration is at least 3 dB lower (0.8 mW/g) than SAR limit (1.6 mW/g), thus testing at low & high channel is optional.
3) Please see attachments for the detailed measurement data and plots showing the maximum SAR location of the EUT.

12 ATTACHMENTS

No.	Contents	No. Of Pages
1	System Performance Check Plots	16
2-1	SAR Test Plots for 2.4 GHz Band	7
2-2	SAR Test Plots for 5 GHz Band	18
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

13 PHOTOS

Intel Wi-Fi Link 5300 Series

Host device: Lenovo Laptop (15 inch)

Host device: Lenovo Laptop (14 inch)

END OF REPORT