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IEEE STD 1528:2003
RSS-102 Issue 4, March 2010
RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011

SAR EVALUATION REPORT

For
Intel® Centrino® Wireless-N 130
(Tested inside of a Samsung Notebook PC, NP300U1A)

MODEL: 130BNHMW
FCC ID: A3L130BNH
IC: 649E-130BNH

REPORT NUMBER: 11113881-1
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Prepared for
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NVLAP LAB CODE 200065-0

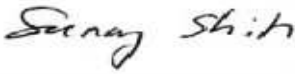

Revision History

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1. ATTESTATION OF TEST RESULTS

Applicant name:	Samsung Electronics Co., LTD 416, Maetan 3-Dong, Yeongtong-Gu Suwon-City, GyeonGggi-Do 443-742, South Korea		
EUT description:	Intel® Centrino® Wireless-N 130 (Tested inside a Samsung Notebook PC, NP300U1A)		
Model number:	130BNHMW		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	July 05, 2011		
FCC / IC Rule Parts	Freq. Range [MHz]	The Highest 1g SAR mW/g	Limit (mW/g)
15.247 / RSS-102	2412 – 2462	FCC: 0.081 mW/g (lap held) IC: 0.168 mW/g (Bystanders with 15 mm separation distance)	1.6
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528: 2003, RSS-102 Issue 4, March 2010 and RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011			Pass
<p>Compliance Certification Services, Inc. (UL 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 UL 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.</p> <p>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 UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL 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 (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.</p>			
Approved & Released For CCS By:		Tested By:	
			
Sunny Shih Engineering Team Leader Compliance Certification Services (UL CCS)		David Rodger SAR Engineer Compliance Certification Services (UL CCS)	

2. TEST METHODOLOGY

FCC OET Bulletin 65 Supplement C 01-01, IEEE STD 1528: 2003, RSS-102 Issue 4, March 2010
RSS-102 Supplementary Procedures (SPR)-001, January 1, 2011 and the following KDB test procedures:

- KDB 248227 SAR measurement procedures for 802.11a/b/g transmitters
- KDB 616217 D03 SAR Supp Note and Netbook Laptop V01

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL 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	S-0396	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1246	N/A		
Probe Alignment Unit	SPEAG	LB5/ 80	SE UKS 030 AA	N/A		
SAM Twin Phantom	SPEAG	QDOOOP40CD	1629	N/A		
Oval Flat Phantom (ELI 5.0) A	SPEAG	QDOVA001BB	1120	N/A		
Oval Flat Phantom (ELI 5.0) B	SPEAG	QDOVA001BB	1118	N/A		
Dielectronic Probe kit	HP	85070C	N/A	N/A		
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3773	5	3	2012
Thermometer	ERTCO	639-1S	1718	7	19	2011
Data Acquisition Electronics	SPEAG	DAE4	1258	5	2	2012
System Validation Dipole	SPEAG	D2450V2	706	4	19	2012
Power Meter	Giga-tronics	8651A	8651404	3	13	2012
Power Sensor	Giga-tronics	80701A	1834588	3	13	2012
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		

Note:

Per KDB 450824 D02 requirements for dipole calibration, ULCCS has adopted two years calibration intervals. On annual basis, each measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole
2. System validation with specific dipole is within 10% of calibrated value.
3. Return-loss is within 20% of calibrated measurement (test data on file in UL CCS)
4. Impedance is within 5Ω of calibrated measurement (test data on file in ULCCS)

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	1.02	Normal	1	0.64	0.65
Liquid Permittivity - deviation from target		Rectangular	1.732	0.6	0.00
Liquid Permittivity - measurement uncertainty	-1.80	Normal	1	0.6	-1.08
Combined Standard Uncertainty U _c (y) =					9.37
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				18.73	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.49	dB

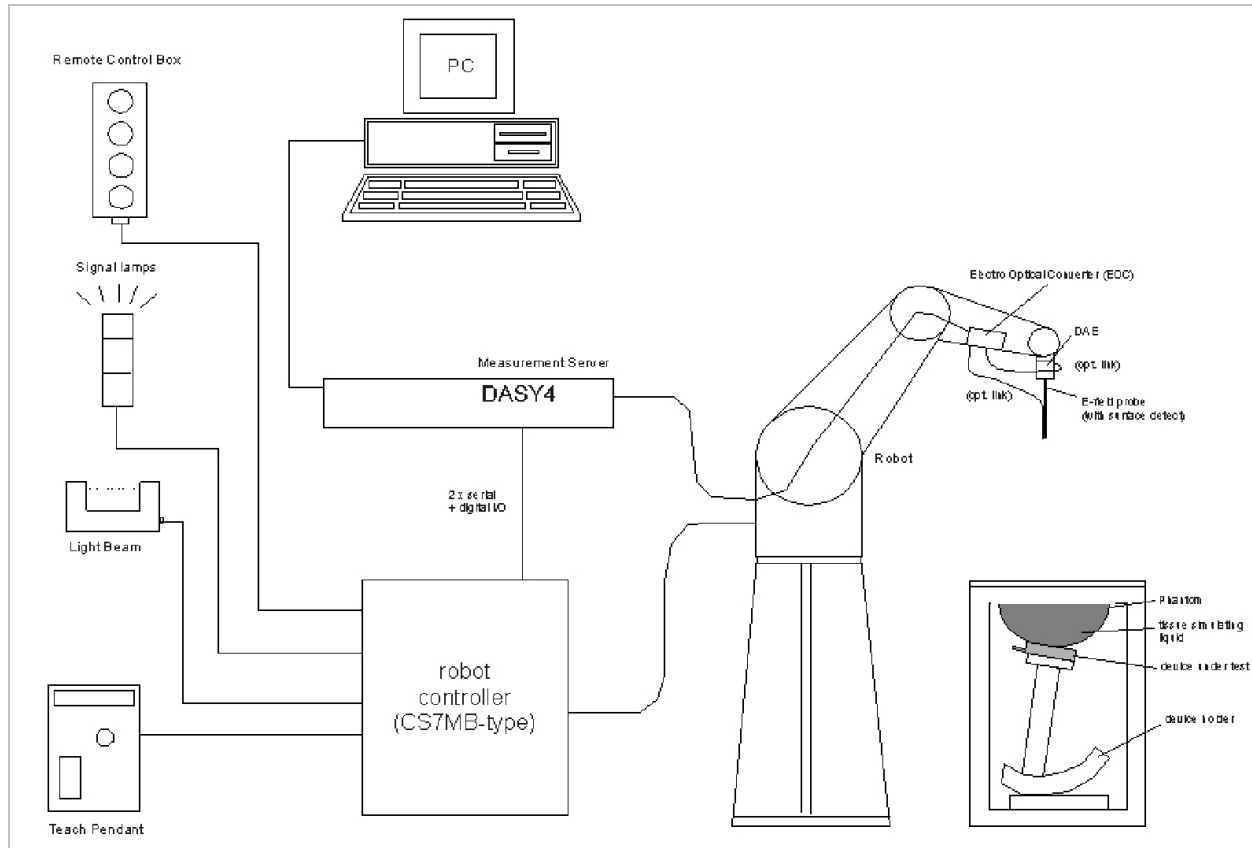
5. EQUIPMENT UNDER TEST

The Intel® Centrino® Wireless-N 130 is a PCIe Half Mini Card form factor Bluetooth / IEEE 802.11b/g/n wireless network adapter that supports 1x1 (SISO) for 802.11bgn modes. Bluetooth operation supports a 1x1 mode.

(Tested inside a Samsung Notebook PC, NP300U1A)

Normal operation:	Laptop mode (display open at 90° to the keyboard)									
Antenna tested:	<table border="0"> <thead> <tr> <th><u>Manufactured</u></th> <th><u>Part number</u></th> <th><u>2.4 Gain</u></th> </tr> </thead> <tbody> <tr> <td>TE</td> <td><input checked="" type="checkbox"/> Aux: 2108192-1</td> <td>0.47</td> </tr> <tr> <td>TE</td> <td><input checked="" type="checkbox"/> Main: 2108191-1</td> <td>2.09</td> </tr> </tbody> </table> <p>Note: All SAR testing done on TE main antenna.</p>	<u>Manufactured</u>	<u>Part number</u>	<u>2.4 Gain</u>	TE	<input checked="" type="checkbox"/> Aux: 2108192-1	0.47	TE	<input checked="" type="checkbox"/> Main: 2108191-1	2.09
<u>Manufactured</u>	<u>Part number</u>	<u>2.4 Gain</u>								
TE	<input checked="" type="checkbox"/> Aux: 2108192-1	0.47								
TE	<input checked="" type="checkbox"/> Main: 2108191-1	2.09								
Antenna-to-antenna/user separation distances:	See Section 15 for details of antenna locations and separation distances									
Simultaneous transmission:	WiFi cannot transmit simultaneously with Bluetooth									
Assessment for SAR evaluation for Simultaneous transmission:	<p>WiFi and BT</p> <p>The simultaneous transmission SAR evaluation is not required for WiFi and Bluetooth as they do not transmit simultaneously.</p>									

6. SYSTEM SPECIFICATIONS



The DASY 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.
- DASY 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 validating 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		900		1800 - 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

Simulating Liquids for 5 GHz, Manufactured by SPEAG

Ingredients	(% by weight)
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

8. SIMULATING LIQUID PARAMETERS

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. For frequencies in 300 MHz to just under 2 GHz, the measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within $\pm 5\%$ of the target values. The measured relative permittivity tolerance can be relaxed to no more than $\pm 10\%$.

Reference Values of Tissue Dielectric Parameters for Head & Body Phantom

The 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 $\rho = 1000 \text{ kg/m}^3$)

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

In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).

SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured using a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz). The differences with respect to the interpolated values were well within the desired $\pm 5\%$ for the whole 5 to 5.8 GHz range.

f (MHz)	Body Tissue		Reference
	rel. permittivity	conductivity	
3000	52.0	2.73	Standard
5100	49.1	5.18	Interpolated
5200	49.0	5.30	Interpolated
5300	48.9	5.42	Interpolated
5400	48.7	5.53	Interpolated
5500	48.6	5.65	Interpolated
5600	48.5	5.77	Interpolated
5700	48.3	5.88	Interpolated
5800	48.2	6.00	Standard

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

8.1. SIMULATING LIQUID CHECK RESULTS

Measured by: David Rodgers

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
7/5/2011	Body 2450	e'	51.7530	Relative Permittivity (ε _r):	51.75	52.70	-1.80	5
		e''	14.4596	Conductivity (σ):	1.97	1.95	1.02	5

Liquid Check

Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%

July 05, 2011 08:21 AM

Frequency	e'	e''
2300000000.	52.2162	13.8583
2310000000.	52.1894	13.8994
2320000000.	52.1603	13.9359
2330000000.	52.1307	13.9750
2340000000.	52.1004	14.0129
2350000000.	52.0677	14.0502
2360000000.	52.0328	14.0885
2370000000.	52.0004	14.1297
2380000000.	51.9664	14.1715
2390000000.	51.9339	14.2178
2400000000.	51.9059	14.2635
2410000000.	51.8787	14.3083
2420000000.	51.8505	14.3467
2430000000.	51.8206	14.3848
2440000000.	51.7870	14.4227
2450000000.	51.7530	14.4596
2460000000.	51.7190	14.4978
2470000000.	51.6823	14.5370
2480000000.	51.6481	14.5789
2490000000.	51.6137	14.6223
2500000000.	51.5831	14.6652
2510000000.	51.5541	14.7099
2520000000.	51.5258	14.7453
2530000000.	51.4957	14.7836
2540000000.	51.4653	14.8201
2550000000.	51.4331	14.8565
2560000000.	51.4001	14.8955
2570000000.	51.3659	14.9351
2580000000.	51.3320	14.9761
2590000000.	51.2999	15.0211
2600000000.	51.2692	15.0630

The conductivity (σ) can be given as:

$$\sigma = \omega \epsilon_0 e'' = 2 \pi f \epsilon_0 e''$$

where $f = \text{target } f * 10^6$

$$\epsilon_0 = 8.854 * 10^{-12}$$

9. SYSTEM VERIFICATION

The system performance check is performed prior to any usage of the system in order to verify SAR system accuracy. The system performance check verifies that the system operates within its specifications of $\pm 10\%$.

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 EX3DV4-SN: 3773 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 2.5 mm
- The dipole input powers (forward power) were 100 mW.
- The results are normalized to 1 W input power.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.

System validation dipole	Cal. certificate #	Cal. date	Cal. Freq. (GHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D2450V2	D2450V2-706_Apr10	4/19/10	2.4	1g SAR:	51.6	52.4
				10g SAR:	24.4	24.5

9.1. SYSTEM CHECK RESULTS

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D2450V2	07/05/11	1g SAR:	52.8	52.4	0.76	± 10
		10g SAR:	24.3	24.5	-0.82	

10. SAR MEASUREMENT PROCEDURES

Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASYS4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (below 3 GHz) points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan

The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

11. OUTPUT POWER VERIFICATION

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

The client provided a special driver and program, DRTU, v1.3.11-0254, which enables control of the frequency and output power of the module.

Mode	Ch. #	Freq. (MHz)	Avg output Pwr (dBm)	
			Original output power from EMC report	Actual Measured power
802.11b (1 Mbps)	1	2412	16.8	16.9
	6	2437	16.8	16.9
	11	2462	16.8	16.9
802.11g (6 Mbps)	1	2412	16.7	
	6	2437	16.7	
	11	2462	14.1	
802.11n HT20 (MCS 0)	1	2412	14.2	
	6	2437	16.7	
	11	2462	13.8	
802.11n HT40 (MCS0)	3	2422	12.2	
	6	2437	14.7	
	9	2452	12.3	

Note:

The modes with highest output power channel were chosen for the conducted output power measurement. Please refer to original report (FCC ID: PD9130BNH and PD9130BNHU) for Average Power information as documented in 10/01/2010 original filing.

12. SUMMARY OF SAR TEST RESULTS

12.1. SUMMARY OF SAR TEST CONFIGURATIONS

Configuration	Antenna-to-User distance	SAR Require	Comments
Lap-held	10 mm From Main-to-user	Yes	
Bystander	15 mm From Main-to-bystanders	Yes	SAR tested w/ 15 mm distance from back of the display. Per RSS-102 Supplementary Procedures (SPR)-001 January 1, 2011. IC requires SAR measurements to be performed if the integrated antenna(s) are located in the back side of the display screen.
Bystander	108 mm From Main-to-user	No	Per RSS-102 Supplementary Procedures (SPR)-001 January 1, 2011. IC requires SAR measurements to be performed if the integrated antenna(s) are installed along the edge(s) of the display screen. SAR is not required because antennas are located in the back side of the display screen.

12.2. SAR TEST RESULTS

Lap-held

Mode	Channel	f (MHz)	Antenna	Results (mW/g)	
				1g-SAR	10g-SAR
802.11b	1	2412	Main		
	6	2437	Main	0.081	0.066
	11	2462	Main		

Bystanders w/ 15 mm separation distance

Mode	Channel	f (MHz)	Antenna	Results (mW/g)	
				1g-SAR	10g-SAR
802.11b	1	2412	Main		
	6	2437	Main	0.168	0.100
	11	2462	Main		

Note:

According to KDB 248227, SAR is not required for 802.11g/n HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

13. SAR TEST PLOTS

Date: 7/5/2011

Test Laboratory: UL CCS SAR Lab B

Lap held

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.954$ mho/m; $\epsilon_r = 51.797$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

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

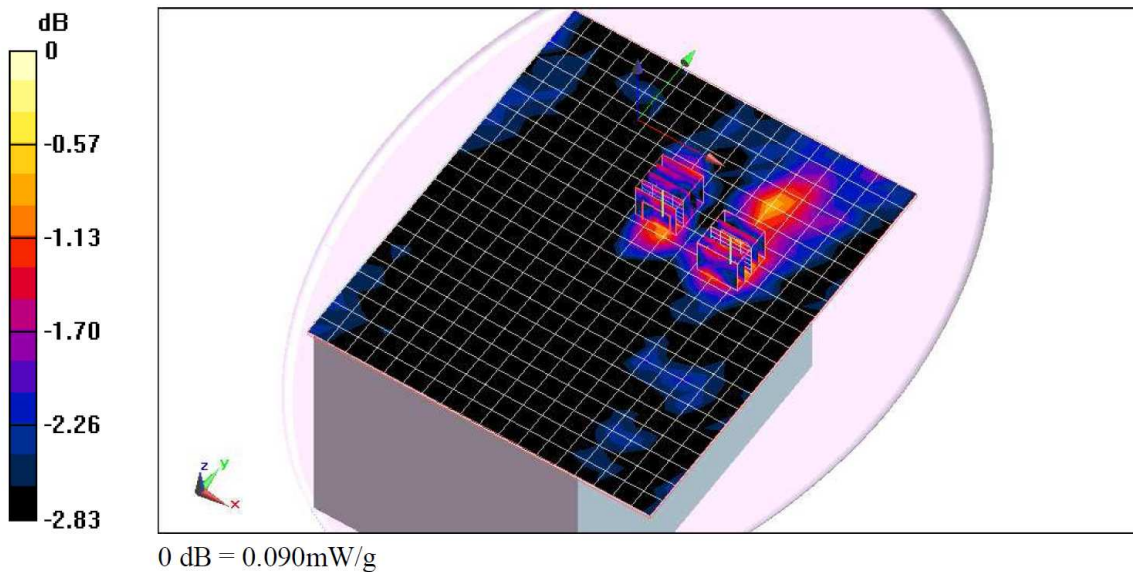
DASY5 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3773; ConvF(6.87, 6.87, 6.87); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Ant A/Ch 6/Area Scan (19x22x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.086 mW/g

Ant A/Ch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.647 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.115 W/kg
SAR(1 g) = 0.081 mW/g; SAR(10 g) = 0.066 mW/g
Maximum value of SAR (measured) = 0.088 mW/g

Ant A/Ch 6/Zoom Scan 2 (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.647 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 0.126 W/kg
SAR(1 g) = 0.078 mW/g; SAR(10 g) = 0.062 mW/g
Maximum value of SAR (measured) = 0.087 mW/g



Date: 7/5/2011

Test Laboratory: UL CCS SAR Lab B

Bystanders

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.954$ mho/m; $\epsilon_r = 51.797$; $\rho = 1000$ kg/m³
Phantom section: Flat Section

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

DASY5 Configuration:

- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3773; ConvF(6.87, 6.87, 6.87); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118
- Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.5 (3634)

Ant A/Ch 6/Area Scan (19x22x1): Measurement grid: dx=15mm, dy=15mm

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

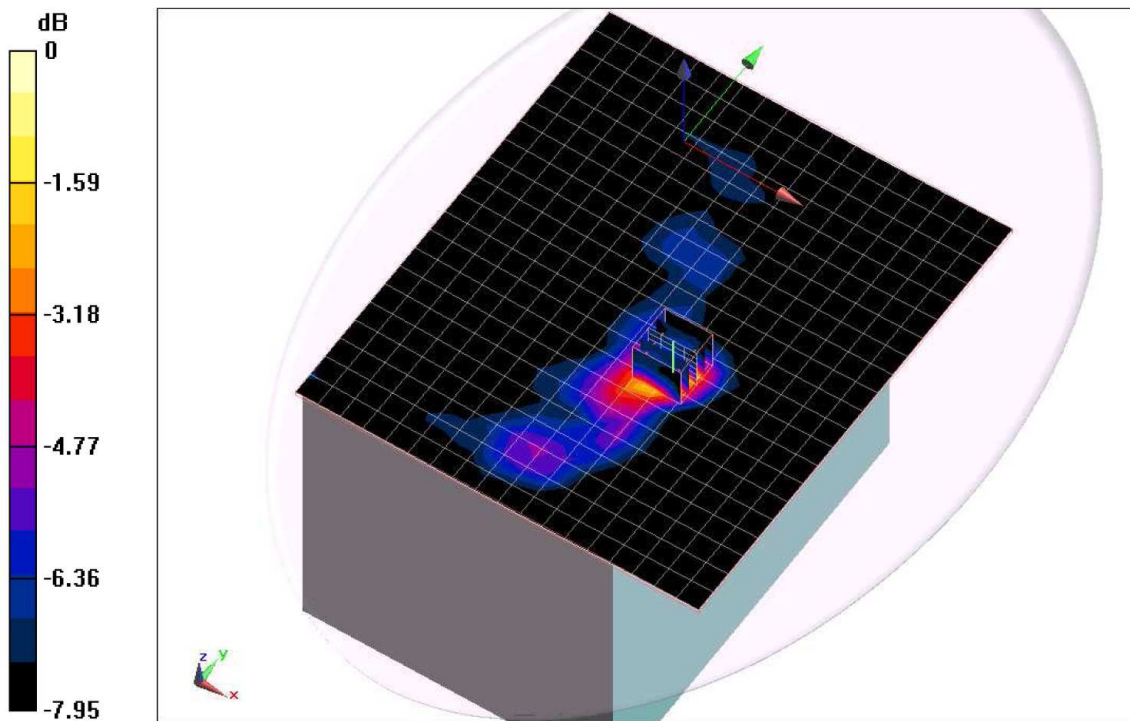
Ant A/Ch 6/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

Reference Value = 9.672 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 0.306 W/kg

SAR(1 g) = 0.168 mW/g; SAR(10 g) = 0.100 mW/g

Maximum value of SAR (measured) = 0.217 mW/g



0 dB = 0.220mW/g

14. APPENDIX

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