FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE STD 1528:2003

SAR EVALUATION REPORT

For

Intel® Centrino® Advanced-N6205
(Tested inside of Panasonic Tablet PC CF-H2)

MODEL NUMBER: WL11A
FCC ID: ACJ9TGWL11A

REPORT NUMBER: 11J13820-4

ISSUE DATE: June 9, 2011

Prepared for

PANASONIC CORPORATION OF NORTH AMERICA
ONE PANASONIC WAY, 4B-8
SECAUCUS, NEW JERSEY 07094, U.S.A.

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	June 9, 2011	Initial Issue	--

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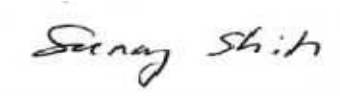
1. ATTESTATION OF TEST RESULTS

Company name:	PANASONIC CORPORATION OF NORTH AMERICA ONE PANASONIC WAY, 4B-8 SECAUCUS, NEW JERSEY 07094, U.S.A.		
EUT Description:	Intel® Centrino® Advanced-N6205 (Tested inside of Panasonic Tablet PC CF-H2)		
Model number:	WL11A		
Device Category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date of tested:	May 25 – May 31, 2011		
FCC Rule Parts	Freq. Range [MHz]	The Highest 1g SAR	Limit (W/kg)
15.247 / RSS-102	2412 – 2462	0.173 mW/g (Primary Portrait)	1.6
	5725 – 5850	0.681 mW/g (Primary Portrait)	
15.407 / RSS-102	5150 – 5250	0.343 mW/g (Secondary Portrait)	
	5250 – 5350	0.471 mW/g (Primary Portrait)	
	5470 – 5725	0.604 mW/g (Secondary Portrait)	
Applicable Standards			Test Results
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			Pass

Compliance Certification Services (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.

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.

Approved & Released For UL CCS By:



Sunny Shih
Engineering Team Leader
Compliance Certification Services (UL CCS)

Tested By:

David Rodgers and David Lee
RF Engineer
Compliance Certification Services (UL CCS)

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528:2003, and the following KDB Procedures.

- 248227 SAR measurement procedures for 802.11a/b/g transmitters
- 447498 D01 Mobile Portable RF Exposure v04

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 UNCERTANTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1017	N/A		
Dielectronic Probe kit	HP	85070C	N/A	N/A		
Wireless comunication test set	Agilent	E5515C (8960)	GB46160222	6	17	2012
E-Field Probe	SPEAG	EX3DV4	3749	12	13	2011
Data Acquisition Electronics	SPEAG	DAE4	1239	11	17	2011
Data Acquisition Electronics	SPEAG	DAE3	427	7	21	2011
System Validation Dipole	SPEAG	D2450V2	706	4	19	2012
System Validation Dipole	SPEAG	*D5GHzV2	1075	9	3	2011
Thermometer	ERTCO	639-1S	1718	7	19	2011
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
Power Meter	Giga-tronics	8651A	8651404	3	13	2012
Power Sensor	Giga-tronics	80701A	1834588	3	13	2012
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800	N/A	Within 24 hrs of first test		

***Note:**

Per KDB 450824 D02 requirements for dipole calibration, UL CCS 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 UL CCS)

4.2. MEASUREMENT UNCERTAINTY

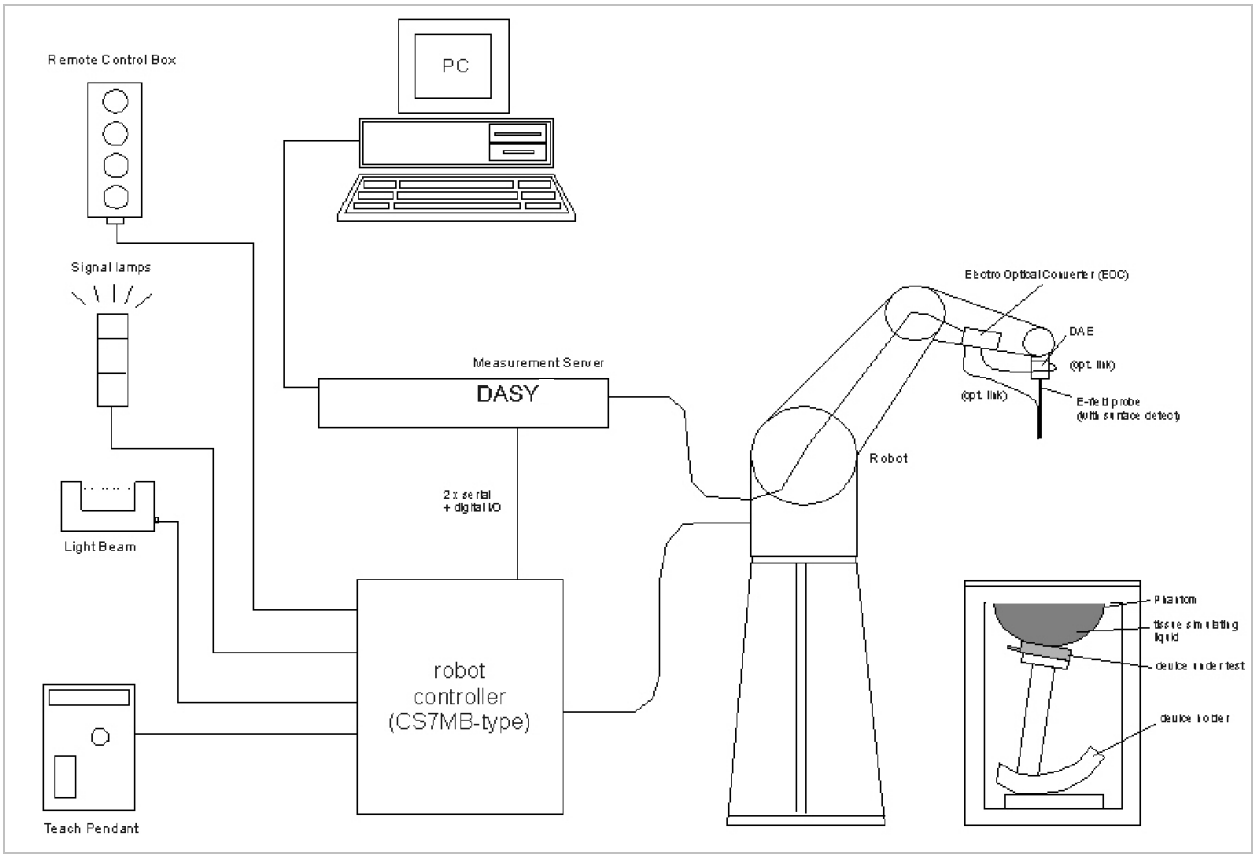
Specific Absorption Rate (SAR) uncertainty calculation					
Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram					
Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	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	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	1.16	Normal	1	0.6	0.70
				Combined Standard Uncertainty Uc(y) =	9.49
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 18.98	%
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.51	dB

Specific Absorption Rate (SAR) uncertainty calculation					
3 to 6 GHz averaged over 1 gram					
Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 5GHz	6.55	Normal	1	1	6.55
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	1.00	Normal	1	1	1.00
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	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
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	3.33	Normal	1	0.64	2.13
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	8.83	Normal	1	0.6	5.30
				Combined Standard Uncertainty Uc(y), %:	11.91
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 23.34	%
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 1.82	dB

5. EQUIPMENT UNDER TEST

Intel® Centrino® Advanced-N6205, Model WL11A. (Tested inside of Panasonic Tablet PC CF-H2)	
Normal operation:	Tablet mode - Multiple display orientations supporting portrait and landscape configurations.
Antenna tested:	Manufactured: Intel Corporation Part number: Main (Chain A): DFUP2070ZA(1) Aux (Chain B): DFUP2070ZA(2)
Antenna-to-antenna/user separation distances:	Refer to Sec. 15 for details of antenna locations and separation distances.
Assessment for SAR evaluation for Simultaneous transmission:	WiFi can transmit simultaneously with Bluetooth. WiFi can transmit simultaneously with Bluetooth. Due to Bluetooth's (FCC ID: ACJ9TGBT11B; IC: 216A-CFBT11B) maximum output < 60/f(GHz) mW and stand-alone SAR is not required, thus WiFi and Bluetooth are not considered as co-located transmitters each other WWAN co-located RF exposure assessment will be addressed in a separate FCC application filed under WWAN application.

6. SYSTEM SPECIFICATIONS



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- 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		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

Simulating Liquids for 5 GHz, Manufactured by SPEAG

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

8. TISSUE DIELECTRIC PARAMETERS

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. For frequencies in 300 MHz to just under 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 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

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 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 suing 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 ±5% for the whole 5 to 5.8 GHz range.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

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

8.1. TISSUE PARAMETERS CHECK RESULTS

Measured by: David Rodgers

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/25/2011	Body 2450	e'	51.4350	Relative Permittivity (ϵ_r):	51.44	52.70	-2.40	5
		e''	14.1301	Conductivity (σ):	1.92	1.95	-1.29	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%
May 25, 2011 08:53 AM

Frequency	e'	e''
2410000000.	51.5557	13.9706
2415000000.	51.5394	13.9898
2420000000.	51.5246	14.0115
2425000000.	51.5118	14.0313
2430000000.	51.4955	14.0529
2435000000.	51.4807	14.0718
2440000000.	51.4663	14.0906
2445000000.	51.4475	14.1111
2450000000.	**51.4350**	**14.1301**
2455000000.	51.4160	14.1484
2460000000.	51.3995	14.1687
2465000000.	51.3837	14.1876
2470000000.	51.3650	14.2060
2475000000.	51.3479	14.2279
2480000000.	51.3264	14.2482
2485000000.	51.3103	14.2656

The conductivity (σ) can be given as:

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

where f = target $f * 10^6$
$\varepsilon_0 = 8.854 * 10^{-12}$

Measured by: Art Tham

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/25/2011	Body 5200	e'	50.7829	Relative Permittivity (ϵ_r):	50.78	49.02	3.60	10
		e''	17.9883	Conductivity (σ):	5.20	5.29	-1.77	5
5/25/2011	Body 5500	e'	50.2017	Relative Permittivity (ϵ_r):	50.20	48.61	3.27	10
		e''	18.4093	Conductivity (σ):	5.63	5.64	-0.26	5
5/25/2011	Body 5800	e'	49.6407	Relative Permittivity (ϵ_r):	49.64	48.20	2.99	10
		e''	18.8256	Conductivity (σ):	6.07	6.00	1.19	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
May 25, 2011 06:52 PM

Frequency	e'	e''
4600000000.	51.9729	17.0039
4650000000.	51.8849	17.0715
4700000000.	51.7811	17.1761
4750000000.	51.6846	17.2489
4800000000.	51.5857	17.3537
4850000000.	51.4985	17.4204
4900000000.	51.3831	17.5142
4950000000.	51.2916	17.5907
5000000000.	51.1898	17.6778
5050000000.	51.0904	17.7396
5100000000.	50.9769	17.8346
5150000000.	50.8836	17.8980
5200000000.	**50.7829**	**17.9883**
5250000000.	50.6856	18.0464
5300000000.	50.5851	18.1308
5350000000.	50.4915	18.1912
5400000000.	50.3899	18.2708
5450000000.	50.2985	18.3321
5500000000.	**50.2017**	**18.4093**
5550000000.	50.1094	18.4686
5600000000.	50.0104	18.5524
5650000000.	49.9242	18.6098
5700000000.	49.8230	18.6878
5750000000.	49.7460	18.7566
5800000000.	**49.6407**	**18.8256**
5850000000.	49.5650	18.8993
5900000000.	49.4673	18.9678
5950000000.	49.3842	19.0397
6000000000.	49.2818	19.1129

The conductivity (σ) can be given as:

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

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

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

Measured by: Art Tham

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/26/2011	Body 5200	e'	51.7805	Relative Permittivity (ϵ_r):	51.78	49.02	5.63	10
		e''	17.5146	Conductivity (σ):	5.06	5.29	-4.36	5
5/26/2011	Body 5500	e'	51.2205	Relative Permittivity (ϵ_r):	51.22	48.61	5.36	10
		e''	17.9931	Conductivity (σ):	5.50	5.64	-2.51	5
5/26/2011	Body 5800	e'	50.6567	Relative Permittivity (ϵ_r):	50.66	48.20	5.10	10
		e''	18.4425	Conductivity (σ):	5.95	6.00	-0.87	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
May 26, 2011 05:53 PM

Frequency	e'	e''
4600000000.	52.9565	16.4441
4650000000.	52.8598	16.5072
4700000000.	52.7566	16.6389
4750000000.	52.6724	16.7059
4800000000.	52.5626	16.8194
4850000000.	52.4801	16.8917
4900000000.	52.3584	16.9980
4950000000.	52.2850	17.0775
5000000000.	52.1576	17.1713
5050000000.	52.0874	17.2547
5100000000.	51.9642	17.3429
5150000000.	51.8848	17.4258
5200000000.	**51.7805**	**17.5146**
5250000000.	51.6823	17.5848
5300000000.	51.5965	17.6706
5350000000.	51.4767	17.7430
5400000000.	51.4143	17.8375
5450000000.	51.2860	17.8899
5500000000.	**51.2205**	**17.9931**
5550000000.	51.1084	18.0409
5600000000.	51.0274	18.1461
5650000000.	50.9350	18.1944
5700000000.	50.8426	18.2923
5750000000.	50.7601	18.3487
5800000000.	**50.6567**	**18.4425**
5850000000.	50.5842	18.5047
5900000000.	50.4751	18.5888
5950000000.	50.4025	18.6654
6000000000.	50.2996	18.7526

The conductivity (σ) can be given as:

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

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

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

Measured by: David Rodgers

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/27/2011	Body 5200	e'	50.3381	Relative Permittivity (ϵ_r):	50.34	49.02	2.69	10
		e''	18.1062	Conductivity (σ):	5.24	5.29	-1.12	5
5/27/2011	Body 5500	e'	49.7387	Relative Permittivity (ϵ_r):	49.74	48.61	2.32	10
		e''	18.5328	Conductivity (σ):	5.67	5.64	0.41	5
5/27/2011	Body 5800	e'	49.1768	Relative Permittivity (ϵ_r):	49.18	48.20	2.03	10
		e''	18.9676	Conductivity (σ):	6.12	6.00	1.95	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
May 27, 2011 06:51 PM

Frequency	e'	e''
4600000000.	51.5174	17.0757
4650000000.	51.4303	17.1539
4700000000.	51.3298	17.2618
4750000000.	51.2448	17.3387
4800000000.	51.1398	17.4392
4850000000.	51.0462	17.5158
4900000000.	50.9481	17.6135
4950000000.	50.8522	17.6852
5000000000.	50.7501	17.7793
5050000000.	50.6460	17.8499
5100000000.	50.5507	17.9486
5150000000.	50.4439	18.0033
5200000000.	**50.3381**	**18.1062**
5250000000.	50.2449	18.1593
5300000000.	50.1317	18.2539
5350000000.	50.0490	18.3114
5400000000.	49.9307	18.3950
5450000000.	49.8534	18.4665
5500000000.	**49.7387**	**18.5328**
5550000000.	49.6531	18.6125
5600000000.	49.5532	18.6746
5650000000.	49.4519	18.7482
5700000000.	49.3614	18.8219
5750000000.	49.2678	18.8924
5800000000.	**49.1768**	**18.9676**
5850000000.	49.0843	19.0322
5900000000.	48.9887	19.1171
5950000000.	48.9135	19.1824
6000000000.	48.8016	19.2582

The conductivity (σ) can be given as:

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

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

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

Measured by: David Rodgers

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/31/2011	Body 5200	e'	53.3492	Relative Permittivity (ϵ_r):	53.35	49.02	8.83	10
		e''	18.4037	Conductivity (σ):	5.32	5.29	0.50	5
5/31/2011	Body 5500	e'	52.8010	Relative Permittivity (ϵ_r):	52.80	48.61	8.61	10
		e''	18.8083	Conductivity (σ):	5.75	5.64	1.90	5
5/31/2011	Body 5800	e'	52.2809	Relative Permittivity (ϵ_r):	52.28	48.20	8.47	10
		e''	19.2245	Conductivity (σ):	6.20	6.00	3.33	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
May 31, 2011 09:21 AM

Frequency	e'	e''
4600000000.	54.4877	17.4841
4650000000.	54.4057	17.5527
4700000000.	54.3014	17.6483
4750000000.	54.2111	17.7240
4800000000.	54.1283	17.8147
4850000000.	54.0234	17.8813
4900000000.	53.9375	17.9730
4950000000.	53.8422	18.0317
5000000000.	53.7444	18.1173
5050000000.	53.6473	18.1790
5100000000.	53.5552	18.2620
5150000000.	53.4487	18.3126
5200000000.	**53.3492**	**18.4037**
5250000000.	53.2600	18.4572
5300000000.	53.1629	18.5411
5350000000.	53.0777	18.5962
5400000000.	52.9853	18.6810
5450000000.	52.9140	18.7354
5500000000.	**52.8010**	**18.8083**
5550000000.	52.7387	18.8760
5600000000.	52.6282	18.9332
5650000000.	52.5419	19.0086
5700000000.	52.4578	19.0793
5750000000.	52.3687	19.1454
5800000000.	**52.2809**	**19.2245**
5850000000.	52.2054	19.2907
5900000000.	52.1164	19.3640
5950000000.	52.0426	19.4371
6000000000.	51.9551	19.5058

The conductivity (σ) can be given as:

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

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

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

Measured by: Art Tham

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
5/31/2011	Body 2450	e'	53.3135	Relative Permittivity (ϵ_r):	53.31	52.70	1.16	5
		e''	14.1687	Conductivity (σ):	1.93	1.95	-1.02	5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%
May 31, 2011 07:28 PM

Frequency	e'	e''
2410000000.	53.4539	14.0104
2415000000.	53.4369	14.0320
2420000000.	53.4223	14.0495
2425000000.	53.4061	14.0720
2430000000.	53.3880	14.0939
2435000000.	53.3695	14.1092
2440000000.	53.3531	14.1308
2445000000.	53.3316	14.1506
2450000000.	**53.3135**	**14.1687**
2455000000.	53.2947	14.1894
2460000000.	53.2724	14.2054
2465000000.	53.2595	14.2271
2470000000.	53.2435	14.2461
2475000000.	53.2246	14.2652
2480000000.	53.2077	14.2849
2485000000.	53.1893	14.3008

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 VERIFICATION

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

Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field EX3DV4 SN 3749 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 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 SN 706	D2450V2-706_Apr10	4/19/10	2.4	1g SAR:	51.6	52.4
				10g SAR:	24.4	24.5
D5GHzV2 SN 1075	D5GHzV2-1075_Sep09	9/3/09	5.2	1g SAR:		79.0
				10g SAR:		22.0
			5.5	1g SAR:		85.4
				10g SAR:		23.5
			5.8	1g SAR:		73.2
				10g SAR:		20.1

9.1. SYSTEM CHECK RESULTS

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D2450V2 (2.45GHz)	05/25/11	1g SAR:	51.1	52.4	-2.48	±10
		10g SAR:	23.3	24.5	-4.90	
D5GHzV2 (5.2GHz)	05/25/11	1g SAR:	78.0	79.0	-1.27	±10
		10g SAR:	22.6	22.0	2.73	
D5GHzV2 (5.5GHz)	05/25/11	1g SAR:	88.9	85.4	4.10	±10
		10g SAR:	25.2	23.5	7.23	
D5GHzV2 (5.8GHz)	05/25/11	1g SAR:	71.6	73.2	-2.19	±10
		10g SAR:	20.3	20.1	1.00	
D5GHzV2 (5.2GHz)	05/26/11	1g SAR:	74.6	79.0	-5.57	±10
		10g SAR:	21.6	22.0	-1.82	
D5GHzV2 (5.5GHz)	05/26/11	1g SAR:	79.7	85.4	-6.67	±10
		10g SAR:	22.6	23.5	-3.83	
D5GHzV2 (5.8GHz)	05/26/11	1g SAR:	69.8	73.2	-4.64	±10
		10g SAR:	20.0	20.1	-0.50	
D5GHzV2 (5.8GHz)	05/27/11	1g SAR:	67.6	73.2	-7.65	±10
		10g SAR:	19.1	20.1	-4.98	
D5GHzV2 (5.2GHz)	05/31/11	1g SAR:	78.7	79.0	-0.38	±10
		10g SAR:	22.6	22.0	2.73	
D5GHzV2 (5.5GHz)	05/31/11	1g SAR:	78.8	85.4	-7.73	±10
		10g SAR:	22.3	23.5	-5.11	
D5GHzV2 (5.8GHz)	05/31/11	1g SAR:	72.4	73.2	-1.09	±10
		10g SAR:	20.6	20.1	2.49	
D2450V2 (2.45GHz)	05/31/11	1g SAR:	53.1	52.4	1.34	±10
		10g SAR:	24.5	24.5	0.00	

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 DASY4 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 ≥ 7 x 7 x 9 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. RF 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, Intel DRTU v1.3.12-0263, which enable a user to control the frequency and output power of the module.

11.1. RF OUTPUT POWER FOR 2.4 GHZ BAND

2.4 GHz Band							
Mode	Ch. #	Freq. (MHz)	Original Target Pwr (dBm)		Actual Measured Pwr		SW Setting
			Chain A	Chain B	Chain A	Chain B	
802.11b	1	2412	15.5				
	6	2437	**15.7**		15.8		23.5
	11	2462	15.5				
	1	2412		15.6			
	6	2437		**15.5**		15.6	23.5
	11	2462		15.6			
802.11g	1	2412	14.0				
	6	2437	**16.6**		16.7		29.5
	11	2462	14.0				
	1	2412		14.1			
	6	2437		16.5			
	11	2462		14.1			
802.11n HT20	1	2412	13.1				
	6	2437	16.5				
	11	2462	12.4				
	1	2412		13.1			
	6	2437		**16.8**		16.9	28.5
	11	2462		12.8			
	1	2412	11.6	11.6			
	6	2437	13.7	13.7			
	11	2462	11.9	11.7			
802.11n HT40	3	2422	9.1				
	6	2437	16.6				
	9	2450	9.6				
	3	2422		9.6			
	6	2437		16.4			
	9	2450		10.0			
	3	2422	8.0	8.0			
	6	2437	13.7	13.7			
	9	2450	8.6	8.6			

Notes:

1. The modes with highest output power channel were chosen for the conducted output power.
2. Original target power is from EMC report. Please refer to original report (FCC ID: PD962205ANH) for Average Power information as documented in 09/13/2010 original filing.

11.2. RF OUTPUT POWER FOR 5 GHZ BANDS

5.2 GHz Band							
Mode	Ch. #	Freq. (MHz)	Original Target Pwr (dBm)		Actual Measured Pwr		SW Setting
			Chain A	Chain B	Chain A	Chain B	
802.11a	36	5180	16.1				
	40	5200	**16.0**		16.2		19.5
	48	5240	16.1				
	36	5180		16.2			
	40	5200		**16.1**		16.1	18.5
	48	5240		16.1			
802.11n HT20	36	5180	15.6				
	40	5200	16.1				
	48	5240	16.1				
	36	5180		15.6			
	40	5200		16.1			
	48	5240		16.0			
	36	5180	10.5	10.5			
	40	5200	11.0	11.1			
	48	5240	11.0	10.5			
802.11n HT40	38	5190	11.1				
	46	5230	16.1				
	38	5190		11.1			
	46	5230		16.0			
	38	5190	8.5	8.3			
	46	5230	11.7	10.6			

Notes:

1. The modes with highest output power channel were chosen for the conducted output power.
2. Original target power is from EMC report. Please refer to original report (FCC ID: PD962205ANH) for Average Power information as documented in 09/13/2010 original filing.

5.3 GHz Band							
Mode	Ch. #	Freq. (MHz)	Original Target Pwr (dBm)		Actual Measured Pwr		SW Setting
			Chain A	Chain B	Chain A	Chain B	
802.11a	52	5260	16.1				
	60	5300	**16.2**		16.2		20.5
	64	5320	16.1				
	52	5260		16.2			
	60	5300		**16.2**		16.2	20.0
	64	5320		16.2			
802.11n HT20	52	5260	16.2				
	60	5300	16.1				
	64	5320	16.0				
	52	5260		16.2			
	60	5300		16.1			
	64	5320		16.2			
	52	5260	10.6	10.9			
	60	5300	11.0	10.2			
	64	5320	10.5	10.3			
802.11n HT40	54	5270	**16.5**		16.5		22.0
	62	5310	11.2				
	54	5270		**16.6**		16.6	22.0
	62	5310		11.1			
	54	5270	10.8	11.3			
	62	5310	7.9	7.5			

Notes:

1. The modes with highest output power channel were chosen for the conducted output power.
2. Original target power is from EMC report. Please refer to original report (FCC ID: PD962205ANH) for Average Power information as documented in 09/13/2010 original filing.

5.5 GHz Band							
Mode	Ch. #	Freq. (MHz)	Original Target Pwr (dBm)		Actual Measured Pwr		SW Setting
			Chain A	Chain B	Chain A	Chain B	
802.11a	100	5500	16.6				
	120	5600	**16.6**		16.7		24.5
	140	5700	16.6				
	100	5500		16.6			
	120	5600		**16.7**		16.7	23.5
	140	5700		16.5			
802.11n HT20	100	5500	16.7				
	120	5600	16.7				
	140	5700	16.5				
	100	5500		16.6			
	120	5600		16.6			
	140	5700		16.7			
	100	5500	11.3	10.9			
	120	5600	11.5	12.2			
	140	5700	12.0	11.7			
802.11n HT40	102	5510	13.7				
	118	5590	16.5				
	134	5670	16.5				
	102	5510		13.6			
	118	5590		16.7			
	134	5670		16.7			
	102	5510	10.3	10.8			
	118	5590	11.2	11.2			
	134	5670	11.4	11.8			

Notes:

1. The modes with highest output power channel were chosen for the conducted output power.
2. Original target power is from EMC report. Please refer to original report (FCC ID: PD962205ANH) for Average Power information as documented in 09/13/2010 original filing.

5.8 GHz Band							
Mode	Ch. #	Freq. (MHz)	Original Target Pwr (dBm)		Actual Measured Pwr		SW Setting
			Chain A	Chain B	Chain A	Chain B	
802.11a	149	5745	16.6				
	157	5785	**16.5**		16.6		24.5
	165	5825	16.5				
	149	5745		16.5			
	157	5785		**16.5**		16.8	24.0
	165	5825		16.5			
802.11n HT20	149	5745	16.7				
	157	5785	**16.7**				
	165	5825	16.6				
	149	5745		**16.7**			
	157	5785		16.6			
	165	5825		16.6			
	149	5745	13.6	13.7			
	157	5785	13.7	13.7			
	165	5825	13.6	13.7			
802.11n HT40	151	5755	16.7				
	159	5795	16.6				
	151	5755		16.5			
	159	5795		16.6			
	151	5755	13.6	13.7			
	159	5795	13.5	13.7			

Notes:

1. The modes with highest output power channel were chosen for the conducted output power.
2. Original target power is from EMC report. Please refer to original report (FCC ID: PD962205ANH) for Average Power information as documented in 09/13/2010 original filing.

12. SUMMARY OF SAR TEST RESULTS

12.1. SUMMARY OF SAR TEST CONFIGURATIONS

Configuration	Antenna-to-User distance	SAR Required	Comments
(1) Bottom Face	62.28 mm From Main (Chain A)-to-user	Yes	
	14.37 mm From Aux (Chain B)-to-user	Yes	
Primary Landscape	200 mm From Main (Chain A)-to-user	No	This is not the most conservative antenna-to-user distance at edge mode. Per According to KDB 447498 4) b) ii) (2)
	30 mm From Aux (Chain B)-to-user	No	This is not the most conservative antenna-to-user distance at edge mode. Per According to KDB 447498 4) b) ii) (2)
Secondary Landscape	48 mm From Main (Chain A)-to-user	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.
	190 mm From Aux (Chain B)-to-user	No	This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2), SAR is required only for the edge with the most conservative exposure conditions.
(2) Secondary Portrait	21 mm from Main (Chain A) antenna to edge	Yes	
(3) Primary Portrait	10.5 mm from Aux (Chain B) antenna to edge	Yes	

12.2. 2.4 GHZ BAND

Bottom Face (Chain A&B)

Mode	Channel	f (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11b	1	2412				
	6	2437	15.8		0.018	0.011
	11	2462				
	1	2412				
	6	2437		15.6	0.050	0.027
	11	2462				
802.11g	1	2412				
	6	2437	16.7		0.021	0.013
	11	2462				
802.11n HT20	1	2412				
	6	2437		16.9	0.050	0.028
	11	2462				

Secondary Portrait (Main/Chain A)

Mode	Channel	f (MHz)	Avg. Output Pwr (dBm)		Results (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11b	1	2412				
	6	2437	15.8		0.103	0.054
	11	2462				
802.11g	1	2412				
	6	2437	16.7		0.128	0.068
	11	2462				

Primary Portrait (Aux/Chain B)

Mode	Channel	f (MHz)	Avg. Output Pwr (dBm)		Results (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11b	1	2412				
	6	2437		15.6	0.173	0.087
	11	2462				
802.11n HT20	1	2412				
	6	2437		16.9	0.164	0.083
	11	2462				

Note:

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

12.3. 5 GHZ BAND

Bottom Face (Chain A&B)

5.2 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Results (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	36	5180				
	40	5200	16.2		0.022	0.010
	48	5240				
	36	5180				
	40	5200		16.1	0.118	0.048
	48	5240				
5.3 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	52	5260				
	60	5300	16.2		0.020	0.00858
	64	5320				
	52	5260				
	60	5300		16.2	0.122	0.048
	64	5320				
802.11n HT40	54	5270	16.5		0.025	0.011
	62	5310				
	54	5270		16.6	0.180	0.079
	62	5310				
5.5 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	100	5500				
	120	5600	16.7		0.031	0.015
	140	5700				
	100	5500				
	120	5600		16.7	0.130	0.053
	140	5700				
5.8 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	149	5745				
	157	5785	16.6		0.024	0.00712
	165	5825				
802.11a	149	5745				
	157	5785		16.8	0.151	0.059
	165	5825				

Note:

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

Secondary Portrait (Main/Chain A)

5.2 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Pwr (dBm)		Results (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	36	5180				
	40	5200	16.2		**0.343**	**0.136**
	48	5240				
5.3 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	52	5260				
	60	5300	16.2		0.396	0.159
	64	5320				
802.11n HT40	54	5270	16.5		0.452	0.182
	62	5310				
5.5 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	100	5500				
	120	5600	16.7		**0.604**	**0.242**
	140	5700				
5.8 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	149	5745				
	157	5785	16.6		0.444	0.176
	165	5825				

Primary Portrait (Aux/Chain B)

5.2 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Pwr (dBm)		Results (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	36	5180				
	40	5200		16.1	0.297	0.115
	48	5240				

5.3 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	52	5260				
	60	5300				
	64	5320				
802.11n HT40	54	5270		16.6	**0.471**	**0.181**
	62	5310				

5.5 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	100	5500				
	120	5600		16.7	0.557	0.205
	140	5700				

5.8 GHz Band						
Mode	Ch. #	Freq. (MHz)	Avg. Output Power (dBm)		Measured Result (mW/g)	
			Chain A	Chain B	1g-SAR	10g-SAR
802.11a	149	5745				
	157	5785		16.8	**0.681**	**0.239**
	165	5825				

Note:

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

13. WORST-CASE SAR TEST PLOTS

2.4 GHZ

Date/Time: 6/1/2011 12:24:20 AM

Test Laboratory: UL CCS

Primary Portrait_2.4 GHz

DUT: Panasonic; Type: NA; Serial: NA

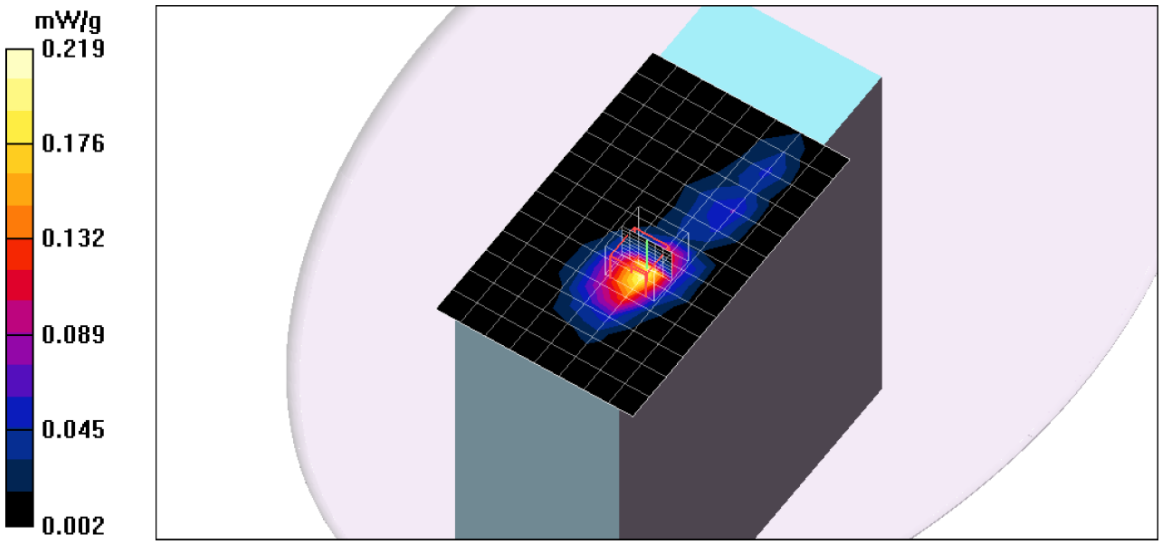
Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.91 mho/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(6.9, 6.9, 6.9); Calibrated: 12/13/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BB; Serial: SN:1017
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b_Ant B_Ch 6/Area Scan (9x14x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.205 mW/g

802.11b_Ant B_Ch 6/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 10.9 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 0.335 W/kg
SAR(1 g) = 0.173 mW/g; SAR(10 g) = 0.087 mW/g
Maximum value of SAR (measured) = 0.219 mW/g



Date/Time: 6/1/2011 12:50:05 AM

Test Laboratory: UL CCS

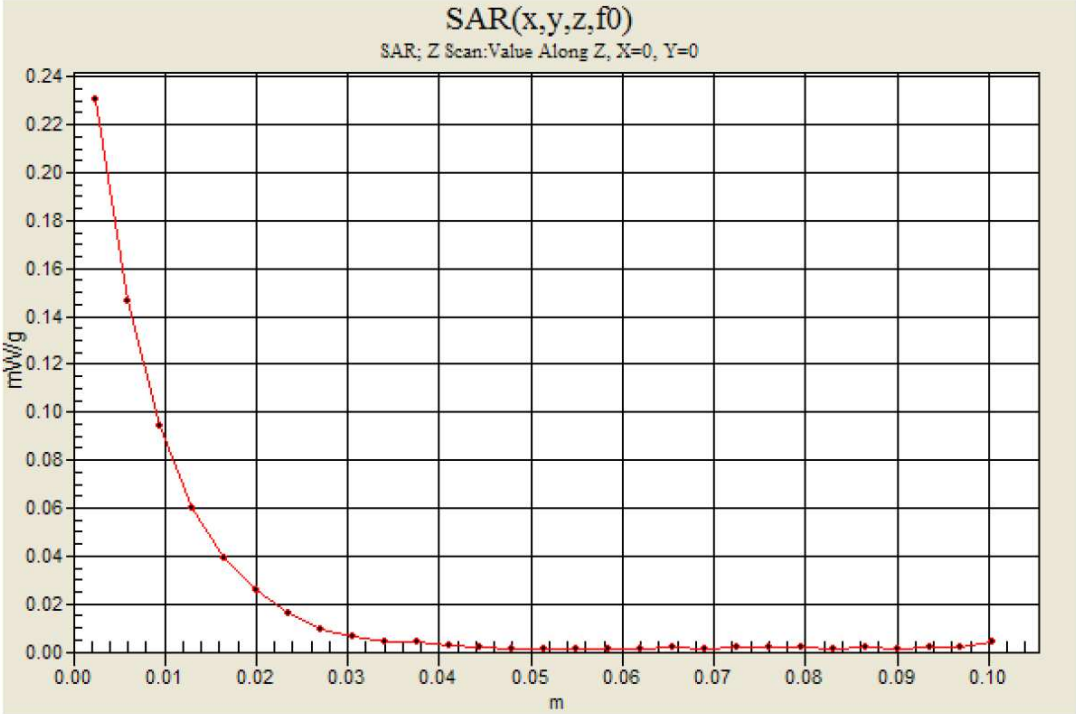
Primary Portrait_2.4 GHz

DUT: Panasonic; Type: NA; Serial: NA

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1

802.11b_Ant B_Ch 6/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Maximum value of SAR (measured) = 0.231 mW/g



5.2 GHz

Date/Time: 5/31/2011 12:12:18 PM

Test Laboratory: UL CCS

Secondary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

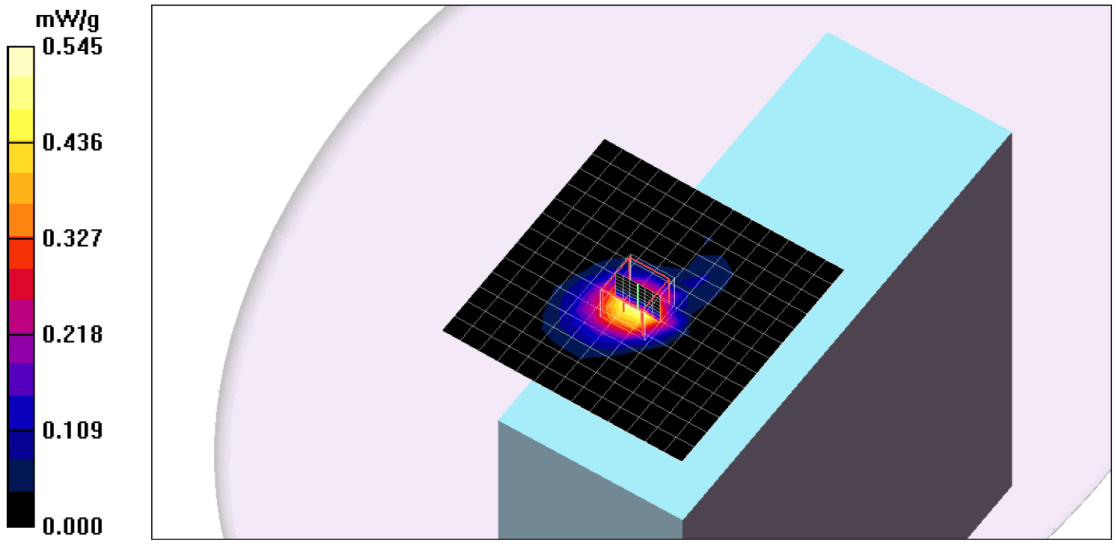
Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.24 mho/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(4.07, 4.07, 4.07); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.2 GHz_802.11a_Ant A_Ch 40/Area Scan (14x14x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.522 mW/g

5.2 GHz_802.11a_Ant A_Ch 40/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 10.9 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 0.960 W/kg
SAR(1 g) = 0.343 mW/g; SAR(10 g) = 0.136 mW/g
Maximum value of SAR (measured) = 0.545 mW/g



Date/Time: 5/31/2011 12:43:00 PM

Test Laboratory: UL CCS

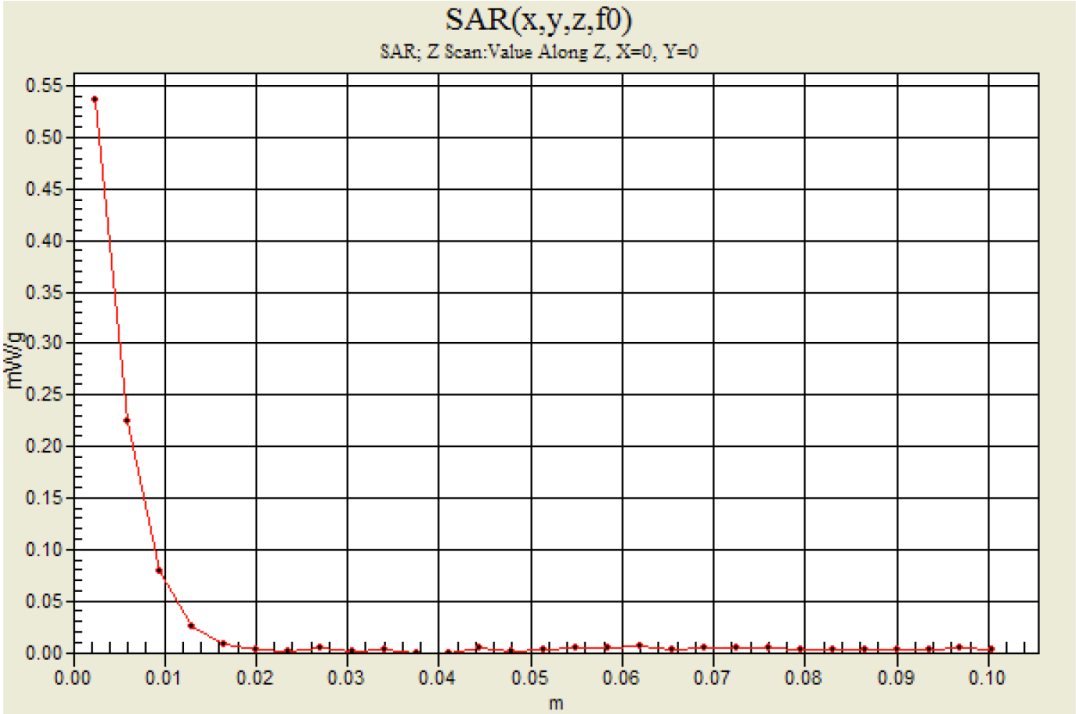
Secondary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1

5.2 GHz_802.11a_Ant A_Ch 40/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Maximum value of SAR (measured) = 0.536 mW/g



5.3 GHz

Date/Time: 5/31/2011 4:55:20 PM

Test Laboratory: UL CCS

Primary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

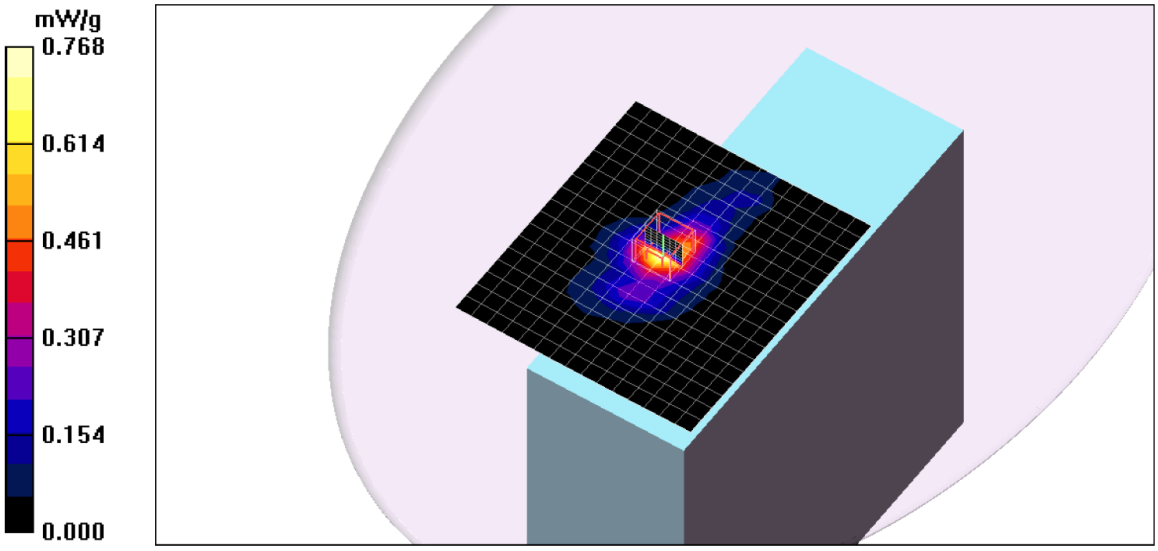
Communication System: 802.11abgn; Frequency: 5270 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5270 MHz; σ = 5.34 mho/m; ε_r = 50.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV4 - SN3749; ConvF(3.88, 3.88, 3.88); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.3 GHz_802.11n HT 40_Ant B_Ch 54/Area Scan (16x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.774 mW/g

5.3 GHz_802.11n HT 40_Ant B_Ch 54/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 13.1 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.471 mW/g; SAR(10 g) = 0.181 mW/g
Maximum value of SAR (measured) = 0.768 mW/g



Date/Time: 5/31/2011 5:36:27 PM

Test Laboratory: UL CCS

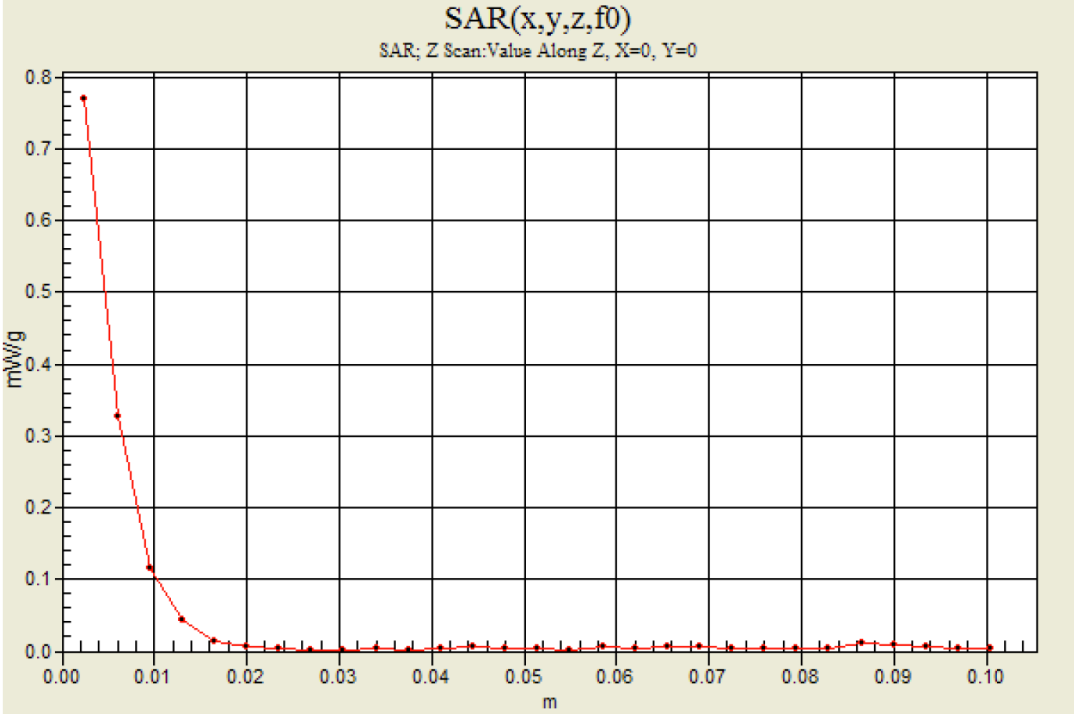
Primary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5270 MHz;Duty Cycle: 1:1

5.3 GHz_802.11n HT 40_Ant B_Ch 54/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm.

Maximum value of SAR (measured) = 0.769 mW/g



5.5 GHz

Date/Time: 5/31/2011 2:37:05 PM

Test Laboratory: UL CCS

Secondary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

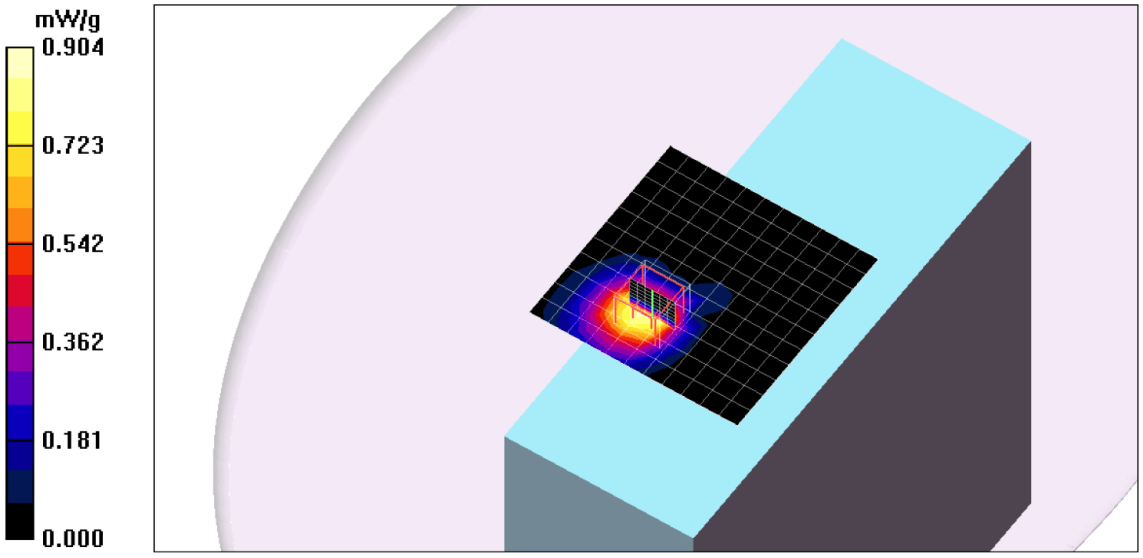
Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.82 mho/m; ε_r = 49.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.36, 3.36, 3.36); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.5GHz_802.11a_ Ant A_Ch 120/Area Scan (12x12x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.904 mW/g

5.5GHz_802.11a_ Ant A_Ch 120/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 13.8 V/m; Power Drift = -0.018 dB
Peak SAR (extrapolated) = 1.72 W/kg
SAR(1 g) = 0.604 mW/g; SAR(10 g) = 0.242 mW/g
Maximum value of SAR (measured) = 0.997 mW/g



Date/Time: 5/31/2011 2:37:05 PM

Test Laboratory: UL CCS

Secondary Portrait_5 GHz

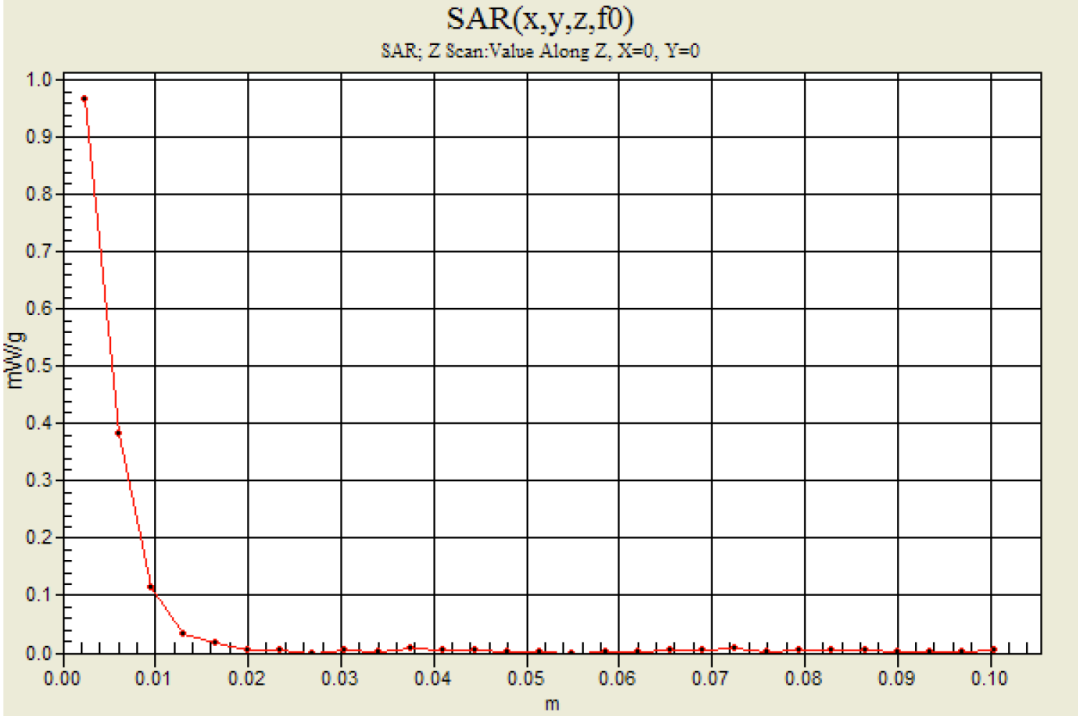
DUT: Panasonic; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1

5.5GHz_802.11a_ Ant A_Ch 120/Area Scan (12x12x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.904 mW/g

5.5GHz_802.11a_ Ant A_Ch 120/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Maximum value of SAR (measured) = 0.967 mW/g



5.8 GHz

Date/Time: 5/28/2011 12:25:27 AM

Test Laboratory: UL CCS

Primary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 6.1 mho/m; ε_r = 49.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

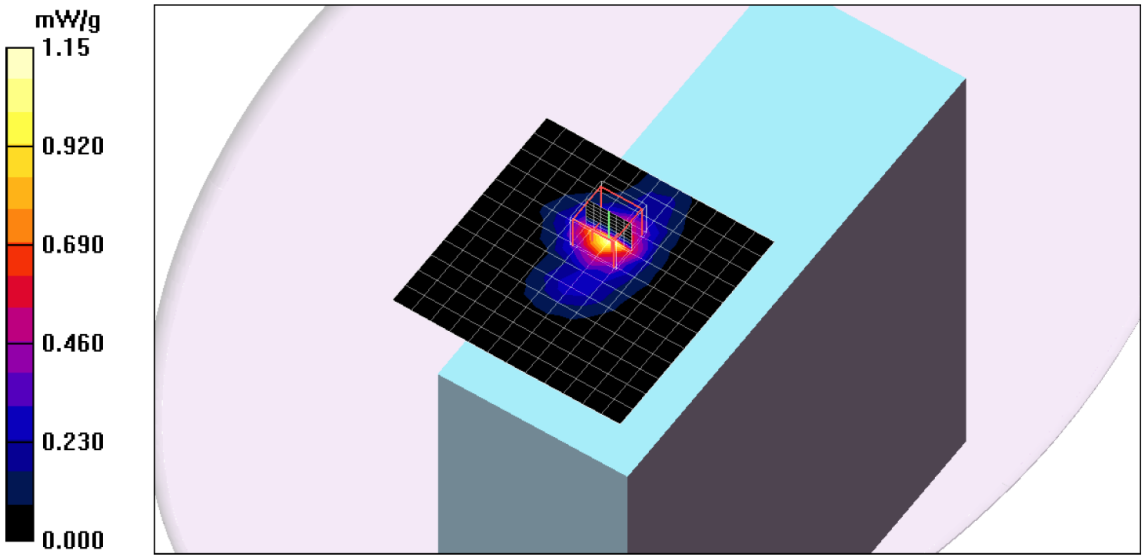
DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3749; ConvF(3.65, 3.65, 3.65); Calibrated: 12/13/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

5.8GHz_802.11a_ Ant B_Ch 157/Area Scan (13x13x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (measured) = 1.13 mW/g

5.8GHz_802.11a_ Ant B_Ch 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 14.9 V/m; Power Drift = -0.009 dB
Peak SAR (extrapolated) = 2.10 W/kg
SAR(1 g) = 0.681 mW/g; SAR(10 g) = 0.239 mW/g
Maximum value of SAR (measured) = 1.15 mW/g



Date/Time: 5/28/2011 12:57:12 AM

Test Laboratory: UL CCS

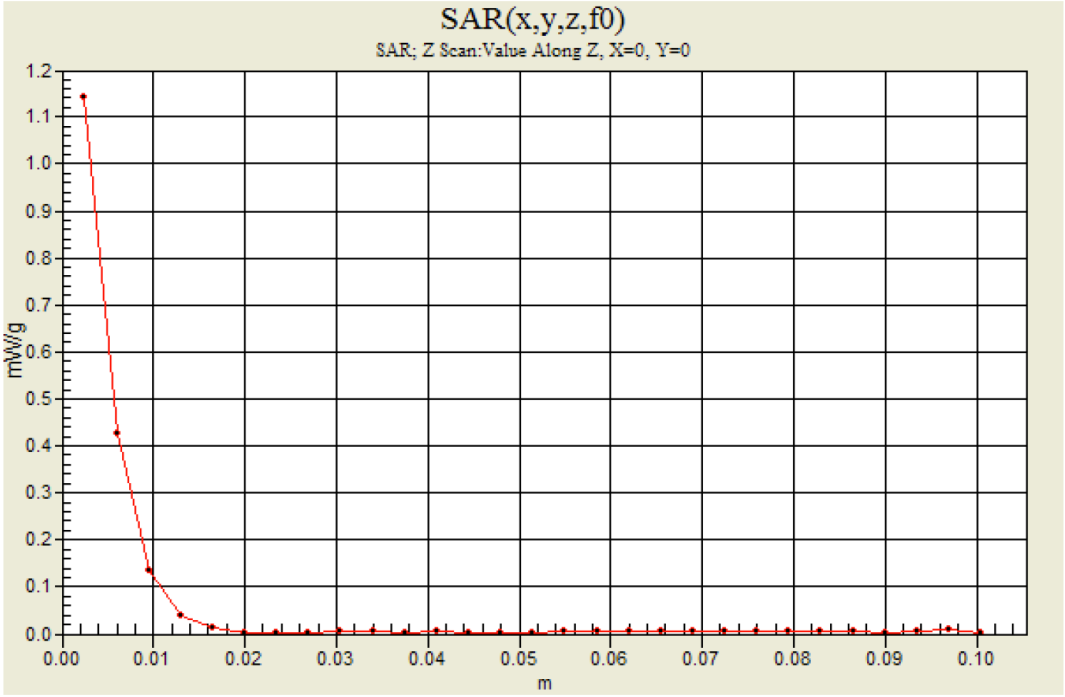
Primary Portrait_5 GHz

DUT: Panasonic; Type: N/A; Serial: N/A

Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1

5.8GHz_802.11a_ Ant B_Ch 157/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Maximum value of SAR (measured) = 1.14 mW/g



14. ATTACHMENTS

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