FCC OET BULLETIN 65 SUPPLEMENT C (Edition 01-01)
FCC 47 CFR Part 2 (2.1093)
IEEE 1528-2003

SAR EVALUATION REPORT

For

WIRELESS X-RAY PANEL

MODEL: PaxScan 4336W/X

FCC ID: ZZ6-AR5BXB112
Serial Number: E-Y1-214R171NQ02 Rev A

REPORT NUMBER: 11U13957-24A

ISSUE DATE: April 3, 2012

Prepared for

VARIAN MEDICAL SYSTEMS, INC. X-RAY PRODUCTS
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	January 25, 2012	Initial Issue	--
A	April 3, 2012	Added the following based upon TCB reviewer's comments: Section 5 – stated that transmitters are disabled in tethered mode	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	VARIAN MEDICAL SYSTEMS, INC
EUT DESCRIPTION:	Wireless X-ray panel
MODEL NUMBER	4336W E-Y1-214R171NQ02 Rev A
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	December 02, 2011 to December 10, 2011

FCC / IC rule parts	Frequency Range [MHz]	Max 1g SAR (mW/g)	Limit (mW/g)
15.247	2412 - 2462	Head: 0.101 W/kg Body: 0.085 W/kg (Front Face)	1.6
15.247	5180 - 5240	Head: 0.154 W/kg Body: 0.223 W/kg (Front Face)	1.6
15.247	5745 - 5825	Head: 0.181 W/kg Body: 0..229 W/kg (Front Face)	1.6

Standards and Test Procedures	
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528:2003	Pass

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.

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:

Dave Weaver
Staff Engineering
Compliance Certification Services (UL CCS)

Tested By:

Hung Thai
SAR 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 and the following specific FCC Test Procedures.

- 248227 D01 SAR measuring for 802.11abg v01r02
- 447498 D01 Mobile Portable RF Exposure v04
- 865664 SAR 3 to 6 GHz Rev “SAR measurement procedures for transmitters operating in the 3 to 6 GHz range.”

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
Dielectronic Probe kit	HP	85070C	N/A	N/A		
ESA Series Network Analyzer	Agilent	E5071B	MY42100131	2	2	2012
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3773	5	3	2012
Thermometer, Mercury Bulb	ERTCO	639-1S	8350	7	30	2012
Data Acquisition Electronics	SPEAG	DAE4	1258	5	2	2012
System Validation Dipole	SPEAG	D2450V2*	706	4	19	2012
System Validation Dipole	SPEAG	D5GHzV2	1003	8	23	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		
Simulating Liquid	SPEAG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	H5800	N/A	Within 24 hrs of first test		

Notes:

*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. (See Appendix “14.7 _Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data).
4. Impedance is within 5Ω of calibrated measurement (See Appendix “14.7_Calibration Certificate - Validation Dipole D2450V2 - SN 706” with extended cal. data).

4.2. MEASUREMENT UNCERTAINTY

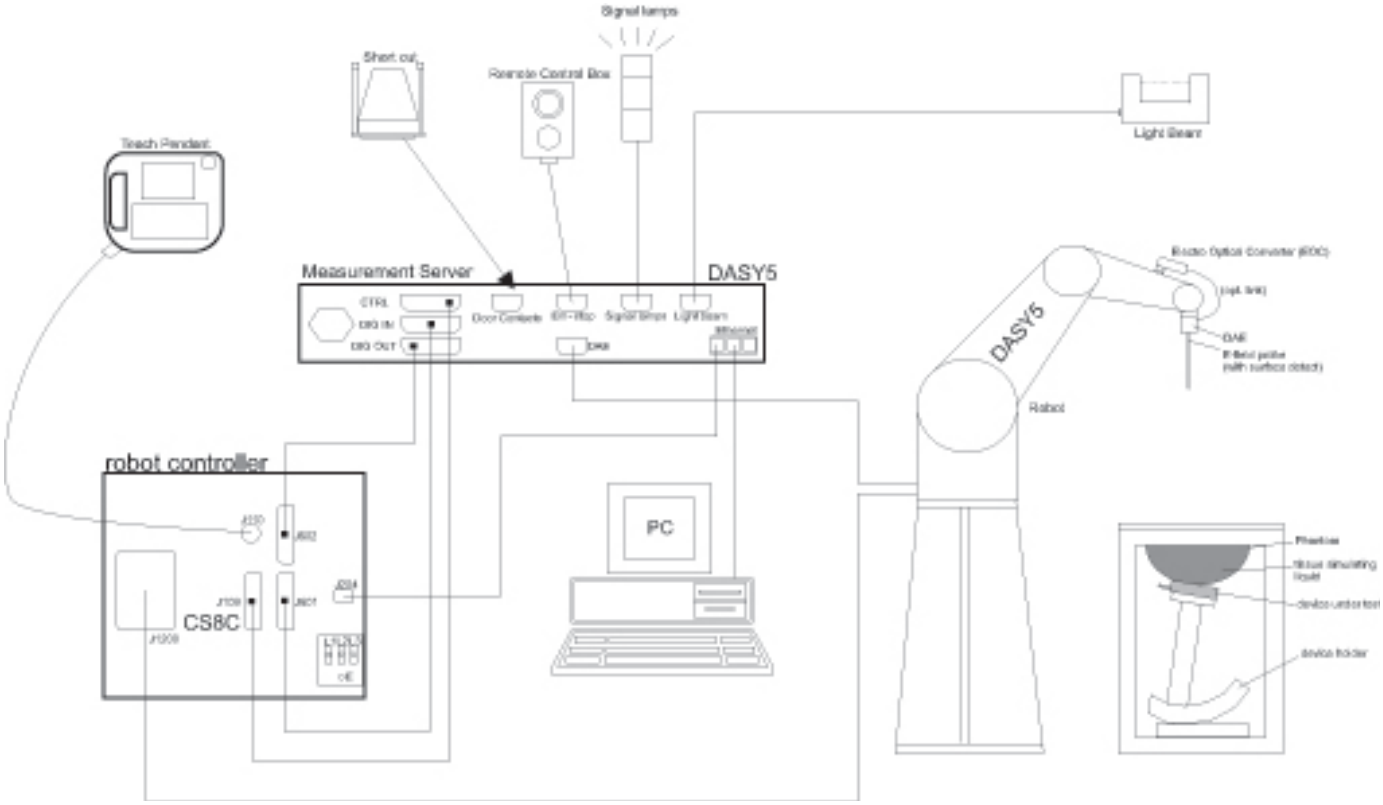
Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram					
Component	error, %	Probe Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 2450 MHz	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	9.20	Rectangular	1.732	0.7071	3.76
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 @ Head 2450 MHz	4.11	Normal	1	0.64	2.63
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement @ Head 2450 MHz	-3.61	Normal	1	0.6	-2.17
				Combined Standard Uncertainty Uc(y) =	10.67
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 21.35	%
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.68	dB

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	3.95	Normal	1	0.64	2.53
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	5.40	Normal	1	0.6	3.24
				Combined Standard Uncertainty Uc(y), %:	11.23
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 22.01	%
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence = 1.73	dB

5. DEVICE UNDER TEST

The WPEA-127N Atheros XB112 is an 802.11agn wireless card and is installed inside the Varian Medical Systems, Inc. X-Ray Products X-Ray Panel model number 4336W. Modes: 802.11agn USA Operational Frequency Range: 2412-2472 MHz, 5150-5850 MHz Serial number: E-Y1-214R171NQ02 Rev A	
Normal operation:	Uses an 802.11agn 3X3 MIMO Client DUT is an X-Ray panel for use with the patient's body or head lying against the front of the panel. All the tests were performed with 0 mm separation against a flat phantom for both Head and Body. DUT may be connected (tethered) via a cable to the access point. The DUT transmitter is disabled when tethered.
Antennas tested:	Type: Fractal Cavity Radiator Antenna Antenna gain: 2.4 GHz band = -6 dBi 5.2 GHz band =3 dBi 5.8 GHz band = -1 dBi
Antenna-to-antenna/user separation distances:	Please refer to section **15 Antenna Locations and Separation Distances** for details.

6. SYSTEM SPECIFICATIONS



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- 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 Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement.

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. LIQUID PARAMETERS CHECK

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameters are within the tolerances of the specified target values. The relative permittivity and conductivity of the tissue material should be within ± 5% of the values given in the table below.

Reference Values of Tissue Dielectric Parameters for Head and Body Phantom (for 150 – 3000 MHz and 5800 MHz)

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in IEEE Standard 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.8
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.9	55.2	0.97
900	41.5	0.97	55	1.05
915	41.5	0.98	55	1.06
1450	40.5	1.2	54	1.3
1610	40.3	1.29	53.8	1.4
1800 – 2000	40	1.4	53.3	1.52
2450	39.2	1.8	52.7	1.95
3000	38.5	2.4	52	2.73
5800	35.3	5.27	48.2	6

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

9. LIQUID CHECK RESULTS FOR Head & Body 2450 MHz

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/2/2011	Body 2450	e'	52.3951	Relative Permittivity (ϵ_r):	52.40	52.70	-0.58	5
		e"	14.5000	Conductivity (σ):	1.98	1.95	1.30	5
	Body 2410	e'	52.5290	Relative Permittivity (ϵ_r):	52.53	52.76	-0.44	5
		e"	14.3543	Conductivity (σ):	1.92	1.91	0.84	5
	Body 2435	e'	52.4467	Relative Permittivity (ϵ_r):	52.45	52.73	-0.53	5
		e"	14.4439	Conductivity (σ):	1.96	1.93	1.27	5
	Body 2475	e'	52.3058	Relative Permittivity (ϵ_r):	52.31	52.67	-0.69	5
		e"	14.5987	Conductivity (σ):	2.01	1.99	1.20	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/5/2011	Body 2450	e'	52.0282	Relative Permittivity (ϵ_r):	52.03	52.70	-1.27	5
		e"	14.2662	Conductivity (σ):	1.94	1.95	-0.34	5
	Body 2410	e'	52.1575	Relative Permittivity (ϵ_r):	52.16	52.76	-1.14	5
		e"	14.1114	Conductivity (σ):	1.89	1.91	-0.86	5
	Body 2435	e'	52.0789	Relative Permittivity (ϵ_r):	52.08	52.73	-1.23	5
		e"	14.2096	Conductivity (σ):	1.92	1.93	-0.37	5
	Body 2475	e'	51.9360	Relative Permittivity (ϵ_r):	51.94	52.67	-1.39	5
		e"	14.3654	Conductivity (σ):	1.98	1.99	-0.41	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/2/2011	Head 2450	e'	37.7840	Relative Permittivity (ϵ_r):	37.78	39.20	-3.61	5
		e"	13.7452	Conductivity (σ):	1.87	1.80	4.03	5
	Head 2410	e'	37.9305	Relative Permittivity (ϵ_r):	37.93	39.28	-3.43	5
		e"	13.6427	Conductivity (σ):	1.83	1.76	3.85	5
	Head 2435	e'	37.8390	Relative Permittivity (ϵ_r):	37.84	39.24	-3.56	5
		e"	13.7061	Conductivity (σ):	1.86	1.78	4.11	5
	Head 2475	e'	37.6877	Relative Permittivity (ϵ_r):	37.69	39.17	-3.78	5
		e"	13.8138	Conductivity (σ):	1.90	1.83	4.05	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/5/2011	Head 2450	e'	38.2626	Relative Permittivity (ϵ_r):	38.26	39.20	-2.39	5
		e"	13.6172	Conductivity (σ):	1.86	1.80	3.06	5
	Head 2410	e'	38.3914	Relative Permittivity (ϵ_r):	38.39	39.28	-2.26	5
		e"	13.5129	Conductivity (σ):	1.81	1.76	2.86	5
	Head 2435	e'	38.3100	Relative Permittivity (ϵ_r):	38.31	39.24	-2.36	5
		e"	13.5795	Conductivity (σ):	1.84	1.78	3.15	5
	Head 2475	e'	38.1623	Relative Permittivity (ϵ_r):	38.16	39.17	-2.57	5
		e"	13.6909	Conductivity (σ):	1.88	1.83	3.12	5

9.1. LIQUID CHECK RESULTS FOR Head & Body 5GHz Bands

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/6/2011	Body 5180	e'	50.2291	Relative Permittivity (ε_r):	50.23	49.05	2.41	10
		e''	18.0065	Conductivity (σ):	5.19	5.27	-1.61	5
	Body 5200	e'	50.2010	Relative Permittivity (ε_r):	50.20	49.02	2.41	10
		e''	18.0493	Conductivity (σ):	5.22	5.29	-1.44	5
	Body 5500	e'	49.6234	Relative Permittivity (ε_r):	49.62	48.61	2.08	10
		e''	18.4679	Conductivity (σ):	5.65	5.64	0.06	5
	Body 5800	e'	49.0566	Relative Permittivity (ε_r):	49.06	48.20	1.78	10
		e''	18.8726	Conductivity (σ):	6.09	6.00	1.44	5
	Body 5825	e'	49.0231	Relative Permittivity (ε_r):	49.02	48.20	1.71	10
		e''	18.9042	Conductivity (σ):	6.12	6.00	2.05	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/7/2011	Body 5180	e'	51.6965	Relative Permittivity (ε_r):	51.70	49.05	5.40	10
		e''	18.1488	Conductivity (σ):	5.23	5.27	-0.84	5
	Body 5200	e'	51.6701	Relative Permittivity (ε_r):	51.67	49.02	5.41	10
		e''	18.1887	Conductivity (σ):	5.26	5.29	-0.67	5
	Body 5500	e'	51.1123	Relative Permittivity (ε_r):	51.11	48.61	5.14	10
		e''	18.5930	Conductivity (σ):	5.69	5.64	0.74	5
	Body 5800	e'	50.5615	Relative Permittivity (ε_r):	50.56	48.20	4.90	10
		e''	18.9318	Conductivity (σ):	6.11	6.00	1.76	5
	Body 5825	e'	50.5247	Relative Permittivity (ε_r):	50.52	48.20	4.82	10
		e''	18.9561	Conductivity (σ):	6.14	6.00	2.33	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/8/2011	Head 5180	e'	36.6168	Relative Permittivity (ε_r):	36.62	36.01	1.68	10
		e''	16.5146	Conductivity (σ):	4.76	4.63	2.72	5
	Head 5200	e'	36.6017	Relative Permittivity (ε_r):	36.60	35.99	1.70	10
		e''	16.5610	Conductivity (σ):	4.79	4.65	2.95	5
	Head 5500	e'	36.0551	Relative Permittivity (ε_r):	36.06	35.65	1.14	10
		e''	16.7671	Conductivity (σ):	5.13	4.96	3.42	5
	Head 5800	e'	35.5348	Relative Permittivity (ε_r):	35.53	35.30	0.67	10
		e''	16.9868	Conductivity (σ):	5.48	5.27	3.95	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/9/2011	Head 5200	e'	37.1795	Relative Permittivity (ε_r):	37.18	35.99	3.30	10
		e''	16.3733	Conductivity (σ):	4.73	4.65	1.79	5
	Head 5500	e'	36.6976	Relative Permittivity (ε_r):	36.70	35.65	2.94	10
		e''	16.6083	Conductivity (σ):	5.08	4.96	2.44	5
	Head 5800	e'	36.2065	Relative Permittivity (ε_r):	36.21	35.30	2.57	10
		e''	16.8304	Conductivity (σ):	5.43	5.27	2.99	5
	Head 5180	e'	37.1979	Relative Permittivity (ε_r):	37.20	36.01	3.29	10
		e''	16.3374	Conductivity (σ):	4.71	4.63	1.62	5

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
12/10/2011	Head 5200	e'	36.3027	Relative Permittivity (ϵ_r):	36.30	35.99	0.87	10
		e''	16.5450	Conductivity (σ):	4.78	4.65	2.85	5
	Head 5500	e'	35.7412	Relative Permittivity (ϵ_r):	35.74	35.65	0.26	10
		e''	16.7448	Conductivity (σ):	5.12	4.96	3.29	5
	Head 5800	e'	35.1786	Relative Permittivity (ϵ_r):	35.18	35.30	-0.34	10
		e''	16.9335	Conductivity (σ):	5.46	5.27	3.62	5
	Head 5180	e'	36.3251	Relative Permittivity (ϵ_r):	36.33	36.01	0.87	10
		e''	16.5101	Conductivity (σ):	4.76	4.63	2.69	5

10. SYSTEM PERFORMANCE

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 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 fine cube was chosen for the 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±3%.
- The results are normalized to 1 W input power.

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

Cal. certificate #	Validation dipole	Cal. date	Freq. (MHz)	Ref. SAR values (mW/g) (from cal. certificate)		
				Tissue:	Head	Body
D2450V2-706_Apr10	D2450V2	4/19/10	2450	1g SAR:	51.6	52.4
				10g SAR:	24.4	24.5
D5GHz-1003_Aug11	D5GHzV2	8/23/11	5200	1g SAR:	76.5	74.5
				10g SAR:	21.8	20.8
			5800	1g SAR:	76.3	76.3
				10g SAR:	21.7	21.2

10.1. SYSTEM CHECK RESULTS FOR D2450V2 and D5GHzV2

Ambient Temperature = 24°C; Relative humidity = 40%

Date Tested	System Validation Dipole	Freq. (MHz)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
12/02/11	D2450V2-706 Head	2450	1g SAR:	52.3	51.6	1.36	±10
			10g SAR:	23.9	24.4	-2.05	
12/05/11	D2450V2-706 Head	2450	1g SAR:	51.8	51.6	0.39	±10
			10g SAR:	24	24.4	-1.64	
12/02/11	D2450V2-706 Body	2450	1g SAR:	53.10	52.40	1.34	±10
			10g SAR:	24.50	24.50	0.00	
12/05/11	D2450V2-706 Body	2450	1g SAR:	52.90	52.40	0.95	±10
			10g SAR:	24.90	24.50	1.63	
12/06/11	D5GHzV2 Body	5200	1g SAR:	75.3	74.5	1.07	±10
			10g SAR:	21.5	20.8	3.37	
12/06/11	D5GHzV2 Body	5800	1g SAR:	74.3	76.3	-2.62	±10
			10g SAR:	21.1	21.2	-0.47	
12/07/11	D5GHzV2 Body	5200	1g SAR:	73.9	74.5	-0.81	±10
			10g SAR:	21.0	20.8	0.96	
12/07/11	D5GHzV2 Body	5800	1g SAR:	76.8	76.3	0.66	±10
			10g SAR:	21.8	21.2	2.83	
12/08/11	D5GHzV2 Head	5200	1g SAR:	76.3	76.5	-0.26	±10
			10g SAR:	21.9	21.8	0.46	
12/08/11	D5GHzV2 Head	5800	1g SAR:	72.7	76.3	-4.72	±10
			10g SAR:	20.7	21.7	-4.61	
12/09/11	D5GHzV2 Head	5200	1g SAR:	75.1	76.5	-1.83	±10
			10g SAR:	21.5	21.8	-1.38	
12/09/11	D5GHzV2 Head	5800	1g SAR:	72.2	76.3	-5.37	±10
			10g SAR:	20.5	21.7	-5.53	
12/10/11	D5GHzV2 Head	5200	1g SAR:	79.4	76.5	3.79	±10
			10g SAR:	22.7	21.8	4.13	
12/10/11	D5GHzV2 Head	5800	1g SAR:	78.6	76.3	3.01	±10
			10g SAR:	22.4	21.7	3.23	

System Check Plot 2.4GHz

Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

20111202_SystemPerformanceCheck-D2450V2 SN 706

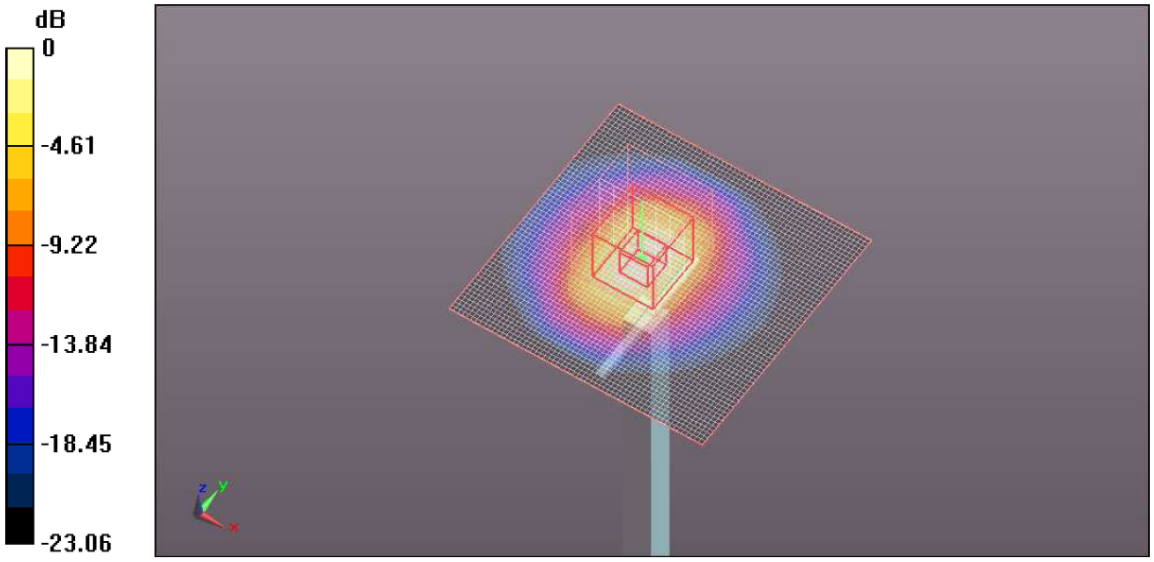
Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.873 mho/m; ε_r = 37.784; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(6.56, 6.56, 6.56); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Phantom: ELI v5.0 (A); Type: QDOVA002BB; Serial: 1120
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

Head/Pin=100 mW 2/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 7.413 mW/g

Head/Pin=100 mW 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.671 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 11.303 W/kg
SAR(1 g) = 5.23 mW/g; SAR(10 g) = 2.39 mW/g
Maximum value of SAR (measured) = 7.512 mW/g



0 dB = 7.510mW/g

System Check Z Plot 2.4 GHz

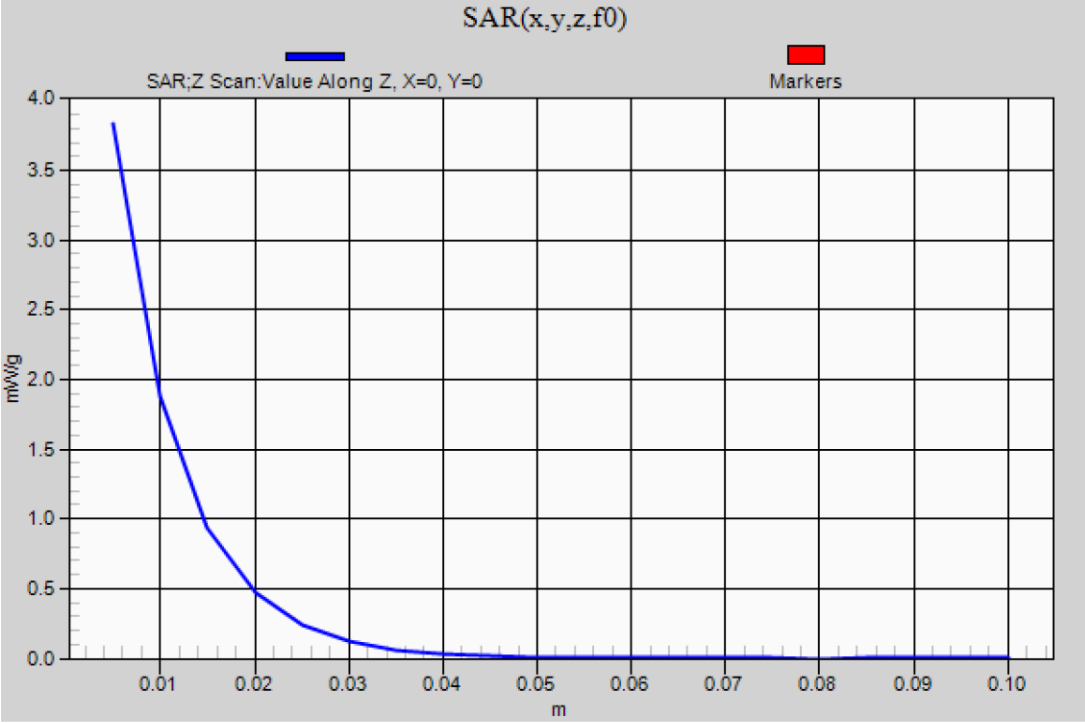
Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

20111202_SystemPerformanceCheck-D2450V2 SN 706

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Head/Pin=100 mW 2/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.832 mW/g



System Check Plot 5.2 GHz

Date: 12/10/2011

Test Laboratory: UL CCS SAR Lab B

20111210 SystemPerformanceCheck-D5GHzV2 SN 1003

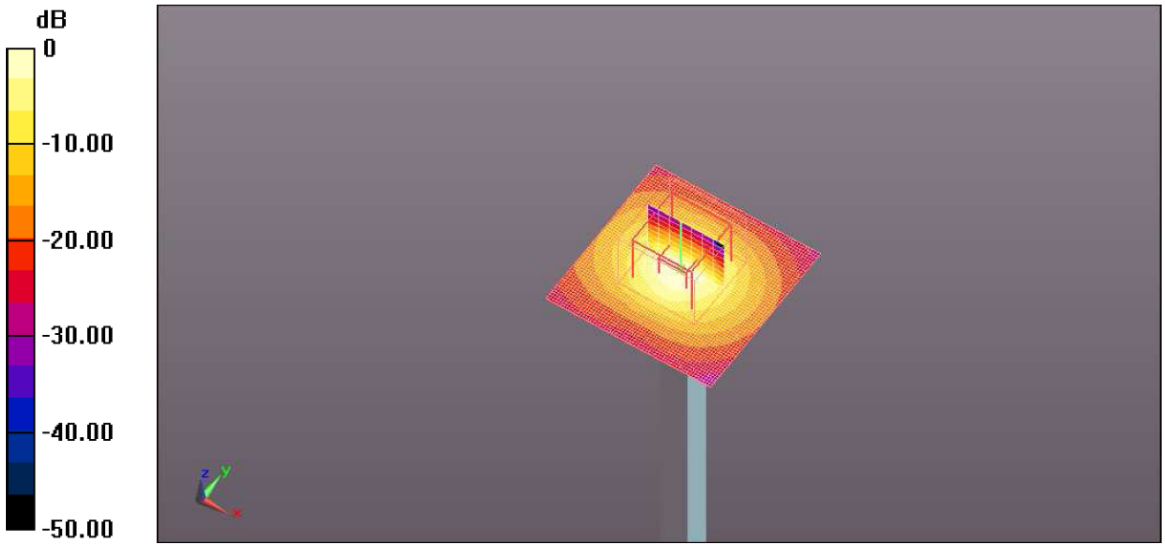
Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.786 mho/m; ε_r = 36.303; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(4.39, 4.39, 4.39); 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)

Head/5.2 GHz, Pin=100mW/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 14.796 mW/g

Head/5.2 GHz, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 57.361 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 29.142 W/kg
SAR(1 g) = 7.94 mW/g; SAR(10 g) = 2.27 mW/g
Maximum value of SAR (measured) = 13.951 mW/g



0 dB = 13.950mW/g

System Check Z Plot 5.2 GHz

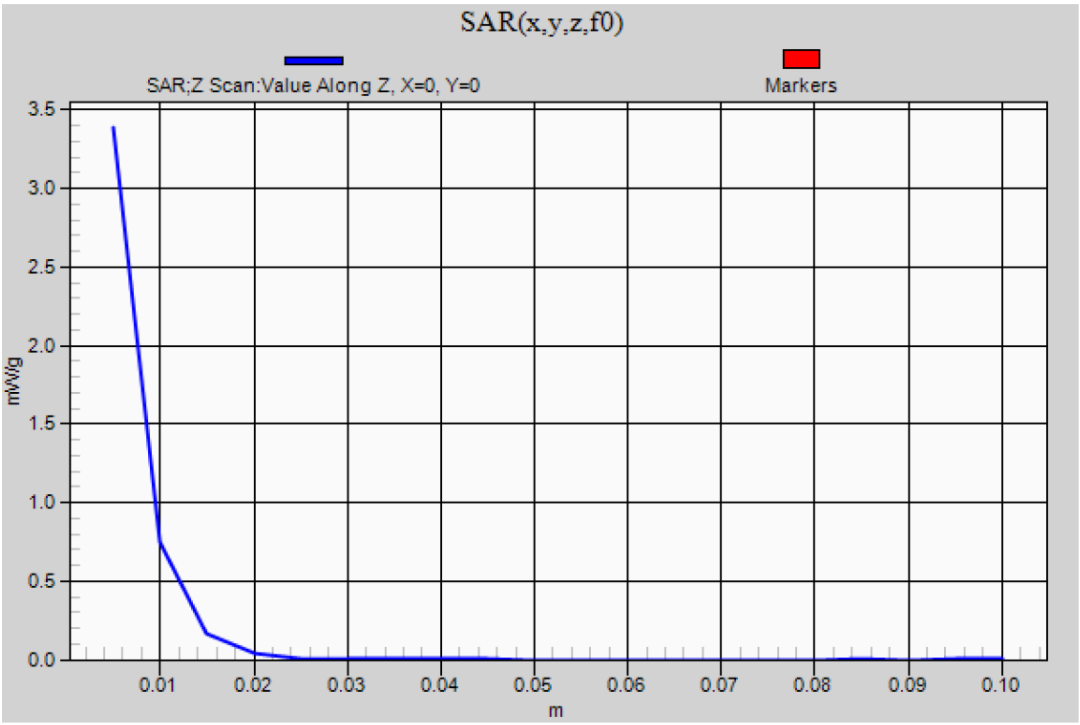
Date: 12/10/2011

Test Laboratory: UL CCS SAR Lab B

20111210 SystemPerformanceCheck-D5GHzV2 SN 1003

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1

Head/5.2 GHz, Pin=100mW/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.386 mW/g



System Check Plot 5.8 GHz

Date: 12/9/2011

Test Laboratory: UL CCS SAR Lab B

20111209 SystemPerformanceCheck-D5GHzV2 SN 1003

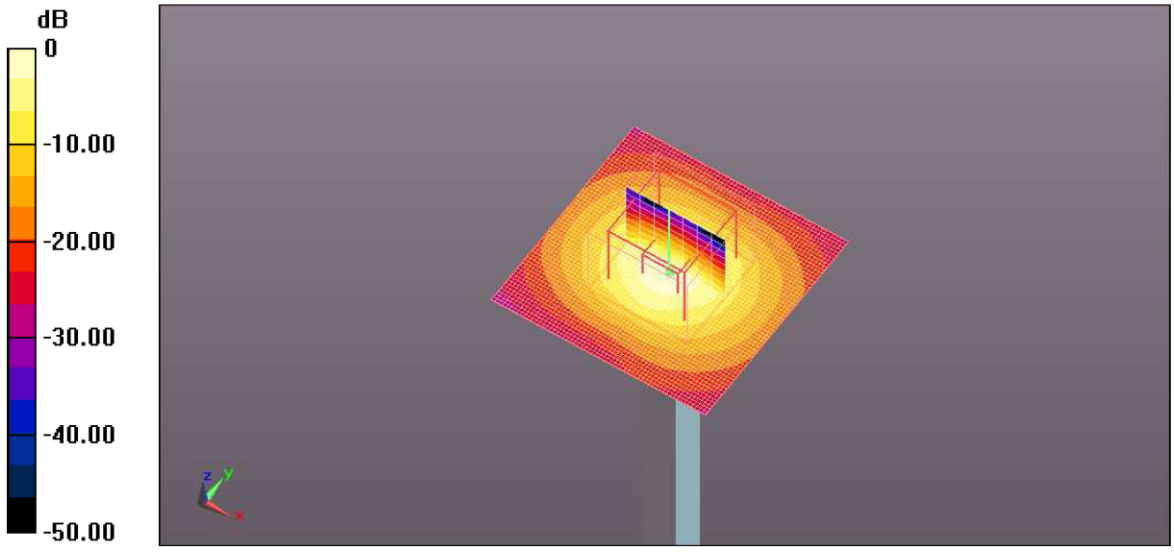
Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.431 mho/m; ε_r = 36.206; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(3.98, 3.98, 3.98); 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)

Head/5.8 GHz, Pin=100mW/Area Scan (61x61x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 13.213 mW/g

Head/5.8 GHz, Pin=100mW/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.961 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 28.668 W/kg
SAR(1 g) = 7.22 mW/g; SAR(10 g) = 2.05 mW/g
Maximum value of SAR (measured) = 12.966 mW/g



0 dB = 12.970mW/g

System Check Z Plot 5.8 GHz

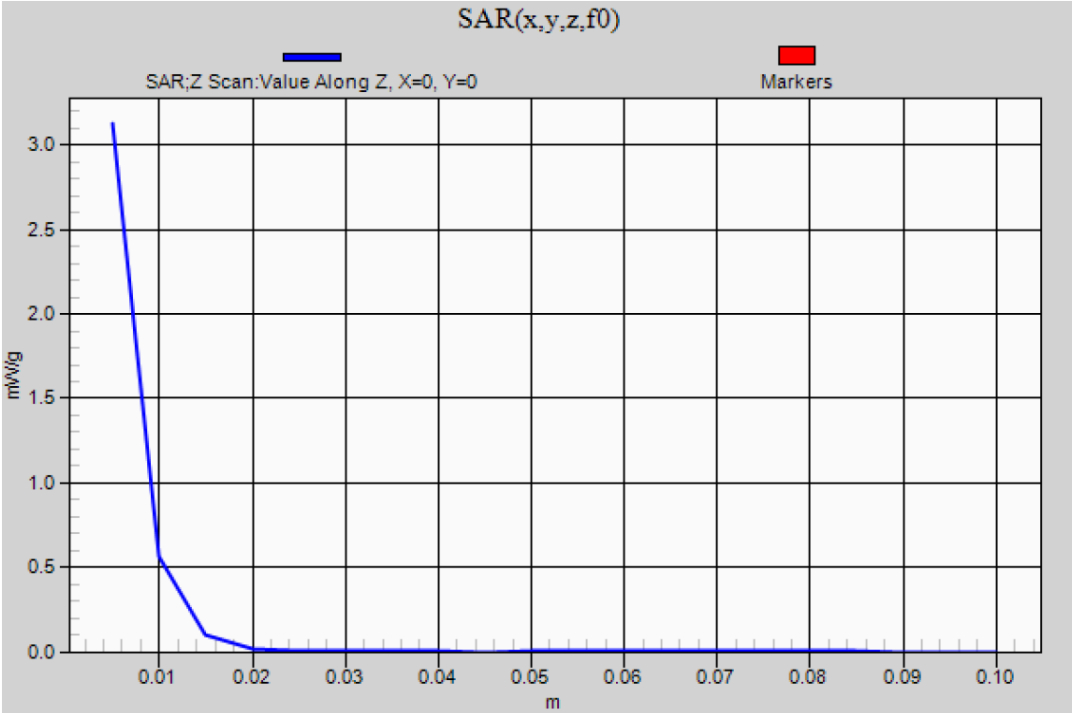
Date: 12/9/2011

Test Laboratory: UL CCS SAR Lab B

20111209 SystemPerformanceCheck-D5GHzV2 SN 1003

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1

Head/5.8 GHz, Pin=100mW/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 3.128 mW/g



11. RF OUTPUT POWER MEASUREMENT

Wi-Fi 2.4 GHz

802.11g 3TX						
Channel #	Freq. (MHz)	Conducted Avg Power (dBm)			Total Power (dBm)	Power Setting (dBm)
		Chain 1	Chain 2	Chain 3		
Low	2412	13.4	13.4	13.4	18.2	12.5
Mid	2437	13.4	13.4	13.4	18.2	12.5
High	2462	13.6	13.6	13.6	18.4	12.5
802.11n HT20 MCS0 3TX						
Low	2412	14.2	14.2	14.2	19.0	12.5
Mid	2437	14.0	14.0	14.0	18.8	12.5
High	2462	14.0	14.0	14.0	18.8	12.5
802.11n HT20 MCS8 3TX						
Low	2412	14.2	14.2	14.2	19.0	12.5
Mid	2437	14.0	14.0	14.0	18.8	12.5
High	2462	14.0	14.0	14.0	18.8	12.5
802.11n HT20 MCS16 3TX						
Low	2412	14.2	14.2	14.2	19.0	12.5
Mid	2437	14.0	14.0	14.0	18.8	12.5
High	2462	14.0	14.0	14.0	18.8	12.5
802.11n HT40 MCS0 3TX						
Low	2422	10.0	10.0	10.0	14.8	8.0
Mid	2437	10.0	10.0	10.0	14.8	8.0
High	2452	10.0	10.0	10.0	14.8	8.0
802.11n HT40 MCS8 3TX						
Low	2422	10.0	10.0	10.0	14.8	8.0
Mid	2437	10.0	10.0	10.0	14.8	8.0
High	2452	10.0	10.0	10.0	14.8	8.0
802.11n HT40 MCS16 3TX						
Low	2422	10.0	10.0	10.0	14.8	8.0
Mid	2437	10.0	10.0	10.0	14.8	8.0
High	2452	10.0	10.0	10.0	14.8	8.0

Notes:

1 802.11b mode is not supported.

2 The cable assembly insertion loss of 11 dB (including 10 dB pad and 1 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Wi-Fi 5 GHz Bands

802.11a 3TX						
Channel #	Freq. (MHz)	Conducted Avg Power (dBm)			Total Power (dBm)	Power Setting (dBm)
		Chain 1	Chain 2	Chain 3		
Low	5180	5.8	5.1	6.2	10.5	11.5
Mid	5200	6.0	5.3	5.9	10.5	11.5
High	5240	5.9	5.3	5.8	10.4	11.5
802.11n HT20 MCS0 3TX						
Low	5180	9.5	9.0	10.0	14.3	11.5
Mid	5200	9.7	9.0	9.8	14.3	11.5
High	5240	9.9	9.3	9.6	14.4	11.5
802.11n HT20 MCS8 3TX						
Low	5180	9.6	9.0	10.2	14.4	11.5
Mid	5200	9.7	9.2	10.0	14.4	11.5
High	5240	9.9	9.4	9.6	14.4	11.5
802.11n HT20 MCS16 3TX						
Low	5180	9.6	9.3	10.2	14.5	11.5
Mid	5200	9.5	9.4	9.9	14.4	11.5
High	5240	9.8	9.6	9.6	14.4	11.5
802.11n HT40 MCS0 3TX						
Low	5190	12.1	11.3	12.4	16.7	11.0
High	5230	12.1	12.0	11.9	16.8	11.0
802.11n HT40 MCS8 3TX						
Low	5190	12.0	11.3	12.6	16.8	11.0
High	5230	12.0	12.0	11.9	16.7	11.0
802.11n HT40 MCS16 3TX						
Low	5190	12.0	11.4	12.5	16.8	11.0
High	5230	12.1	12.0	12.0	16.8	11.0

Notes:

1 The cable assembly insertion loss of 11.3 dB (including 10 dB pad and 1.3 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a 3TX						
Channel #	Freq. (MHz)	Conducted Avg Power (dBm)			Total Power (dBm)	Power Setting (dBm)
		Chain 1	Chain 2	Chain 3		
Low	5745	15.50	15.50	15.50	20.27	14.50
Mid	5785	15.50	15.50	15.50	20.27	14.50
High	5825	15.50	15.50	15.50	20.27	14.50
802.11n HT20 MCS0 3TX						
Low	5745	13.80	13.80	13.80	18.57	14.50
Mid	5785	13.70	13.70	13.70	18.47	14.50
High	5825	13.20	13.20	13.20	17.97	14.50
802.11n HT20 MCS8 3TX						
Low	5745	13.70	13.70	13.70	18.47	14.50
Mid	5785	13.70	13.70	13.70	18.47	14.50
High	5825	13.30	13.30	13.30	18.07	14.50
802.11n HT20 MCS16 3TX						
Low	5745	13.70	13.70	13.70	18.47	14.50
Mid	5785	13.60	13.60	13.60	18.37	14.50
High	5825	13.50	13.50	13.50	18.27	14.50
802.11n HT40 MCS0 3TX						
Low	5755	12.10	12.10	12.10	16.87	12.5
High	5795	12.60	12.60	12.60	17.37	12.5
802.11n HT40 MCS8 3TX						
Low	5755	12.00	12.00	12.00	16.77	12.5
High	5795	12.60	12.60	12.60	17.37	12.5
802.11n HT40 MCS16 3TX						
Low	5755	12.00	12.00	12.00	16.77	12.5
High	5795	12.50	12.50	12.50	17.27	12.5

Notes:

1 The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

2.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 802.11a, b channels.

12. SUMMARY OF TEST RESULTS

12.1. Body 2.4 GHz Front Face (802.11 n HT 20)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.085	0.051	
	6	2437	14.00			1
	11	2462	14.00			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.072	0.046	
	6	2437	14.00			1
	11	2462	14.00			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.060	0.041	
	6	2437	14.00			1
	11	2462	14.00			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Head 2.4 GHz Front Face (802.11 n HT 20)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.101	0.061	
	6	2437	14.00			1
	11	2462	14.00			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.081	0.055	
	6	2437	14.00			1
	11	2462	14.00			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	1	2412	14.20	0.072	0.050	
	6	2437	14.00			1
	11	2462	14.00			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Body 5.2 GHz Front Face (802.11a)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	5.8			1
	Mid	5200	6.0	0.171	0.135	
	High	5240	5.9			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	5.1			1
	Mid	5200	5.3	0.164	0.134	
	High	5240	5.3			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	6.2	0.214	0.146	
	Mid	5200	5.9			1
	High	5240	5.8			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Body 5.2 GHz Front Face (802.11n HT40 MCS8)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	12.0	0.131	0.119	
	High	5230	12.0			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	11.3			1
	High	5230	12.0	0.130	0.124	

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	12.6	0.223	0.152	
	High	5230	11.9			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Body 5.8 GHz Front Face (802.11a)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.199	0.172	
	High	5825	15.5			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.229	0.175	
	High	5825	15.5			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.181	0.159	
	High	5825	15.5			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

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Head 5.2 GHz Front Face (802.11a)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	5.8			1
	Mid	5200	6.0	0.126	0.101	
	High	5240	5.9			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	5.1			1
	Mid	5200	5.3	0.117	0.099	
	High	5240	5.3			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5180	6.2	0.154	0.111	
	Mid	5200	5.9			1
	High	5240	5.8			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Head 5.2 GHz Front Face (802.11n HT40 MCS8)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	12.0	0.101	0.089	
	High	5230	12.0			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	11.3			1
	High	5230	12.0	0.092	0.077	

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11n	Low	5190	12.6	0.148	0.100	
	High	5230	11.9			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

Head 5.8 GHz Front Face (802.11a)

Ant 0

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.181	0.149	
	High	5825	15.5			1

Ant 1

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.180	0.126	
	High	5825	15.5			1

Ant 2

Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
				1-g	10-g	
802.11a	Low	5745	15.5			1
	Mid	5785	15.5	0.143	0.118	
	High	5825	15.5			1

Note(s):

1. Testing was performed on the channel with the highest output power only due to SAR is $\leq$ 0.8 W/kg, as per TCB workshop Feb. 2008 & KDB 447498 1) e) i).

13. SAR TEST PLOTS

13.1. Body SAR Plot 2.4GHz 802.11n

Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

Body 2.4 GHz

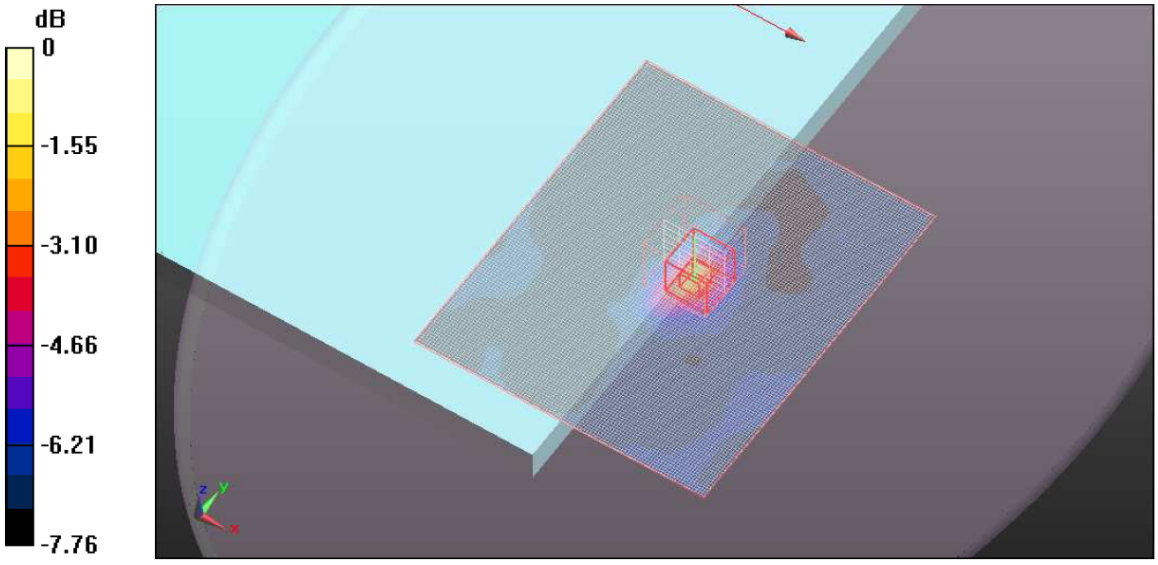
Communication System: WLAN_2.4GHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.927 mho/m; ε_r = 52.523; ρ = 1000 kg/m^3
Phantom section: Flat Section

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)

802.11n_Ant 0/ch 1/Area Scan (101x121x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.084 mW/g

802.11n_Ant 0/ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.574 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.173 W/kg
SAR(1 g) = 0.085 mW/g; SAR(10 g) = 0.051 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.126 mW/g



0 dB = 0.130mW/g

Body SAR Z Plot 2.4GHz

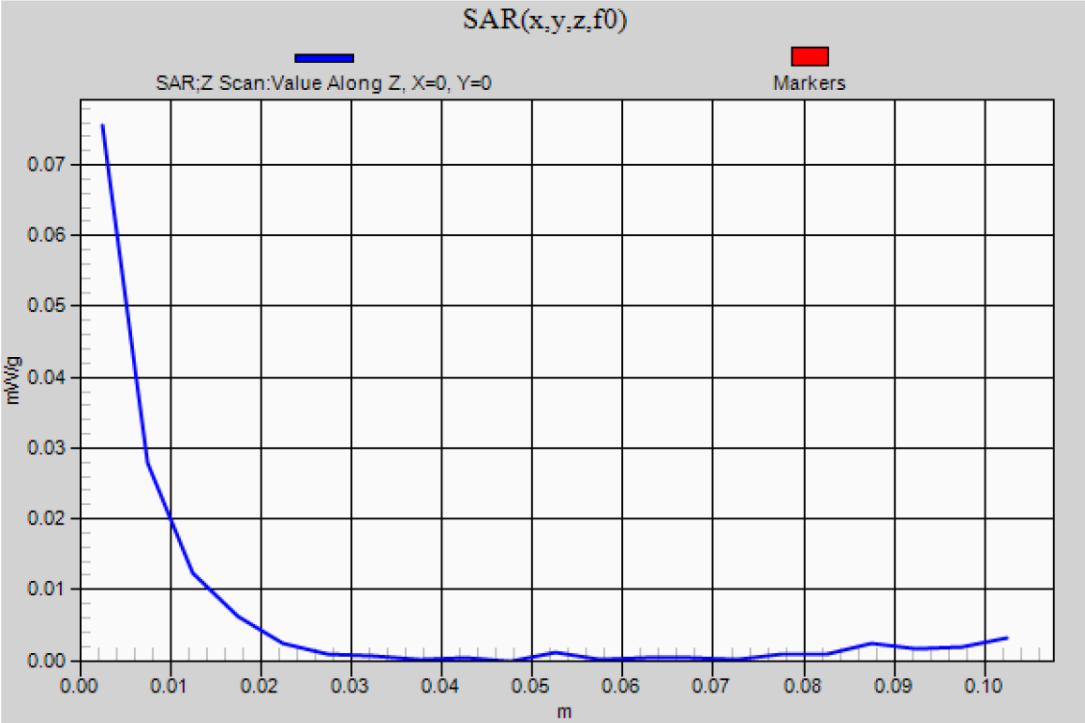
Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

Body 2.4 GHz

Communication System: WLAN_2.4GHz; Frequency: 2412 MHz; Duty Cycle: 1:1

802.11n_Ant 0/ch 1/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.076 mW/g



13.2. Head SAR Plot 2.4GHz 802.11n HT20

Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

Head 2.4 GHz

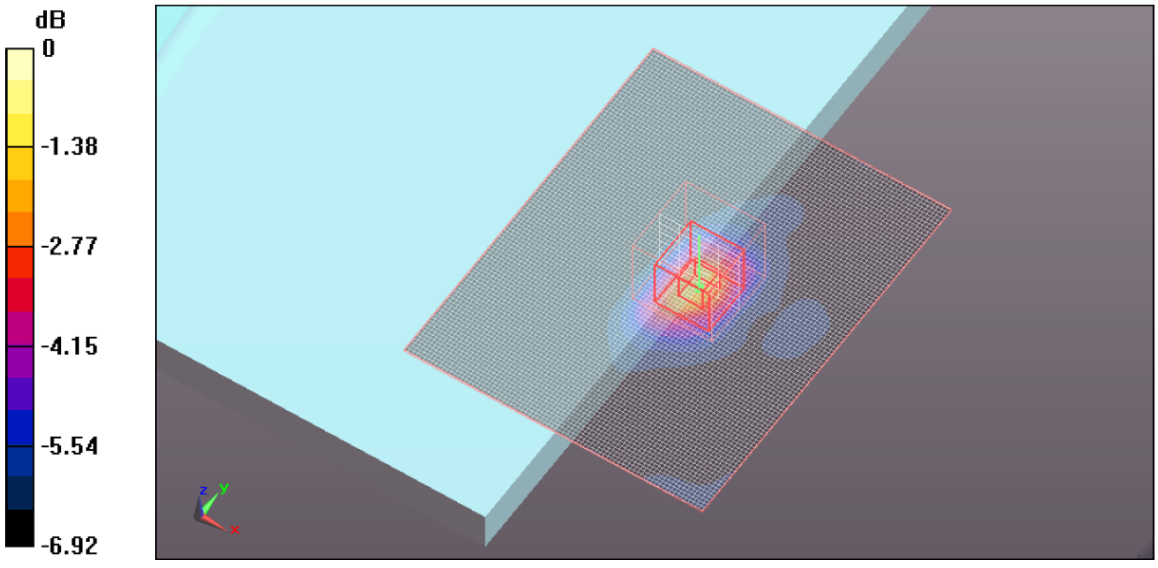
Communication System: WLAN_2.4GHz; Frequency: 2412 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.831 mho/m; ε_r = 37.924; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(6.56, 6.56, 6.56); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1258; Calibrated: 5/2/2011
- Phantom: ELI v5.0 (A); Type: QDOVA002BB; Serial: 1120
- Measurement SW: DASY52, Version 52.6 (2);SEMCAD X Version 14.4.5 (3634)

802.11n_Ant 0/ch 1/Area Scan (81x101x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.103 mW/g

802.11n_Ant 0/ch 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 6.455 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 0.215 W/kg
SAR(1 g) = 0.101 mW/g; SAR(10 g) = 0.061 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.144 mW/g



0 dB = 0.140mW/g

Head SAR Z Plot 2.4GHz

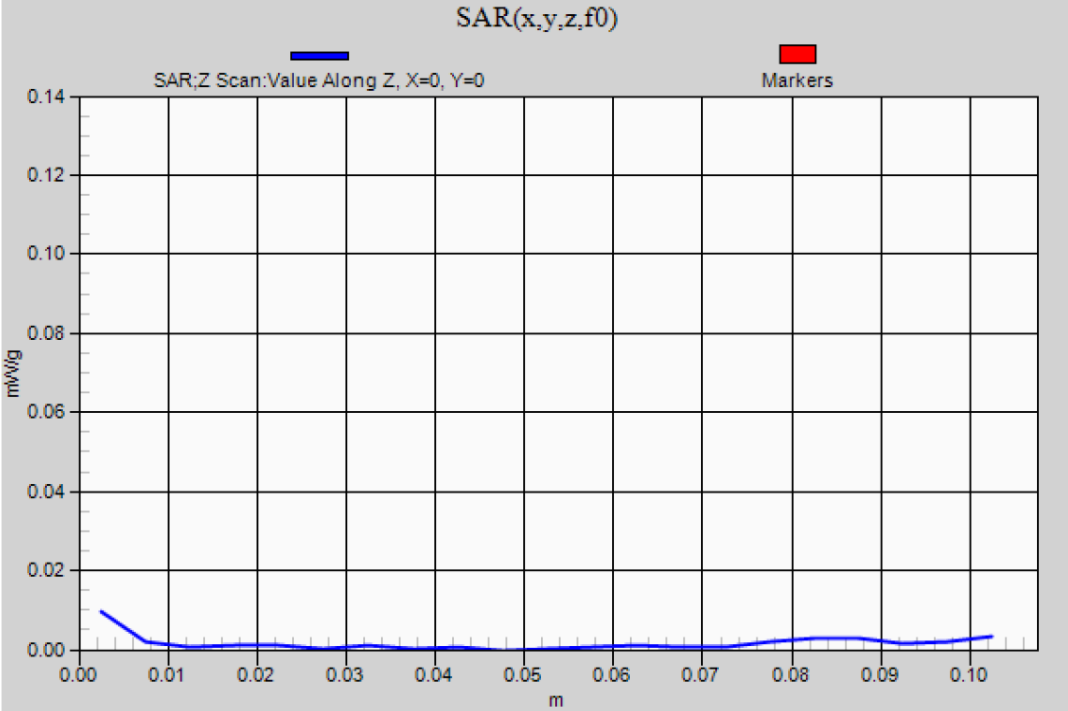
Date: 12/2/2011

Test Laboratory: UL CCS SAR Lab B

Head 2.4 GHz

Communication System: WLAN_2.4GHz; Frequency: 2412 MHz; Duty Cycle: 1:1

802.11n_Ant 0/ch 1/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00949 mW/g



13.3. Body SAR Plot 5.2GHz 802.11a

Date: 12/6/2011

Test Laboratory: UL CCS SAR Lab B

Body 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5180 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 5.189 mho/m; ε_r = 50.229; ρ = 1000 kg/m^3
Phantom section: Flat Section

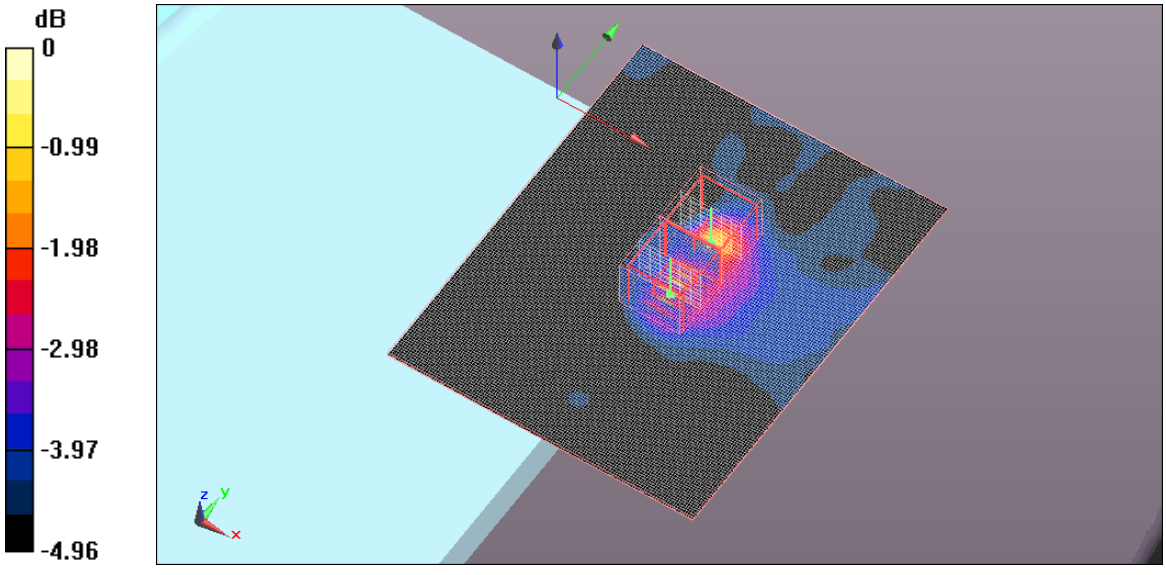
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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(4.1, 4.1, 4.1); 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)

802.11a/Ant 2/Ch 36/Area Scan (121x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.238 mW/g

802.11a/Ant 2/Ch 36/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.143 V/m; Power Drift = 0.0066 dB
Peak SAR (extrapolated) = 0.459 W/kg
SAR(1 g) = 0.199 mW/g; SAR(10 g) = 0.144 mW/g
Maximum value of SAR (measured) = 0.265 mW/g

802.11a/Ant 2/Ch 36/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.143 V/m; Power Drift = 0.0066 dB
Peak SAR (extrapolated) = 0.525 W/kg
SAR(1 g) = 0.214 mW/g; SAR(10 g) = 0.146 mW/g
Maximum value of SAR (measured) = 0.311 mW/g



0 dB = 0.310mW/g

Body SAR Z Plot 5.2GHz

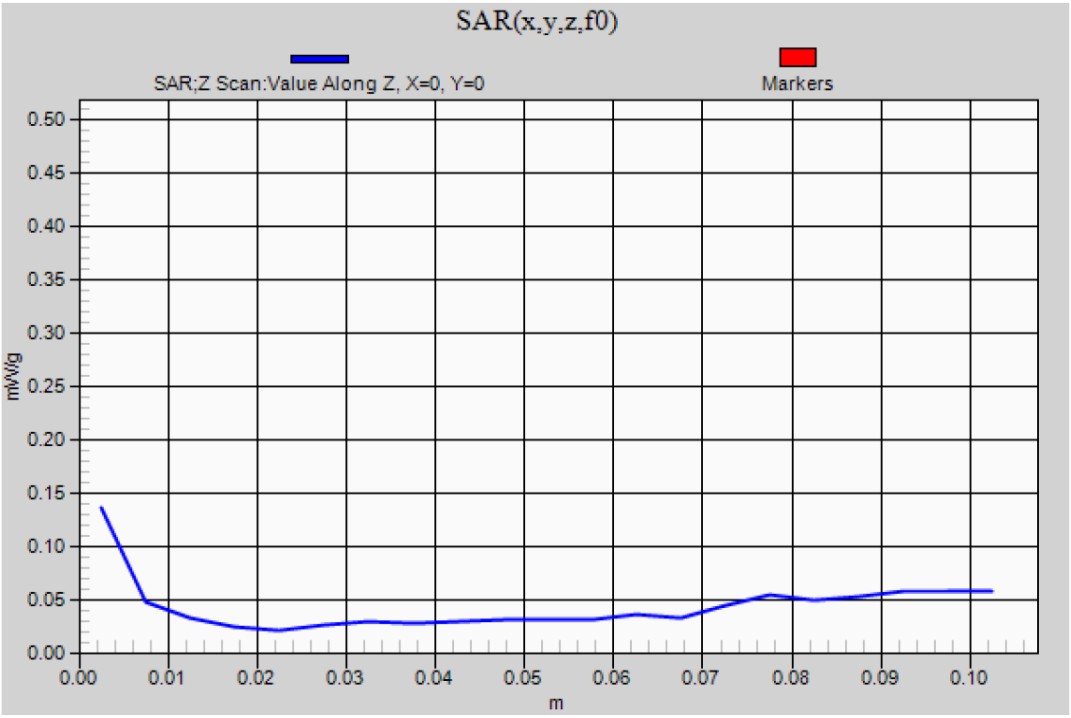
Date: 12/6/2011

Test Laboratory: UL CCS SAR Lab B

Body 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5190 MHz; Duty Cycle: 1:1

802.11n_Ant 2/Ch 38/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.137 mW/g



13.4. Body SAR Plot 5.2GHz 802.11n HT40

Date: 12/6/2011

Test Laboratory: UL CCS SAR Lab B

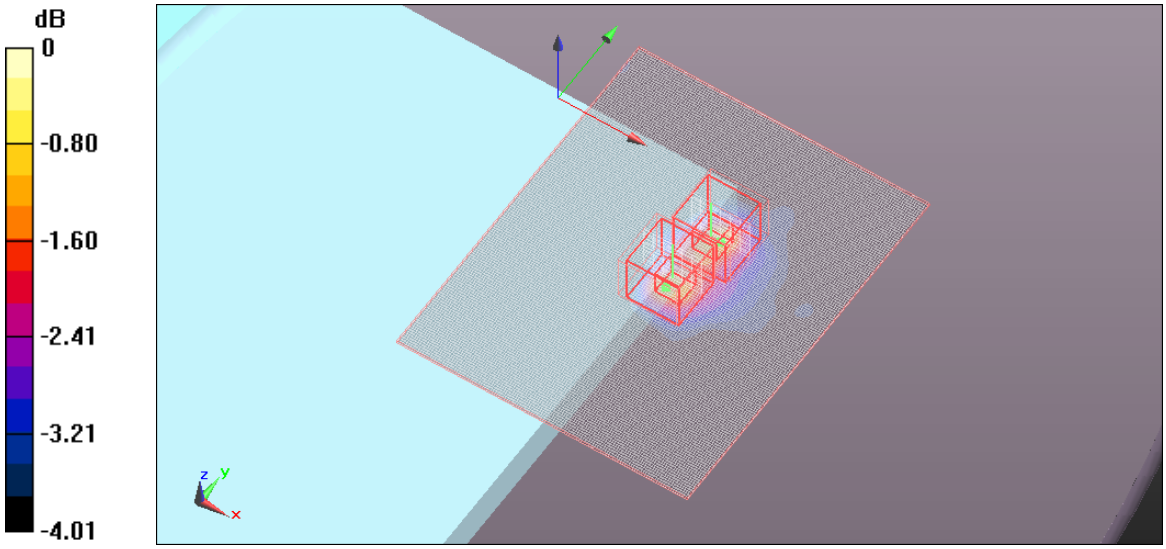
Body 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5190 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5190 MHz; σ = 5.206 mho/m; ε_r = 50.212; ρ = 1000 kg/m^3
Phantom section: Flat Section
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(4.1, 4.1, 4.1); 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)

802.11n_Ant 2/Ch 38/Area Scan (121x151x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.229 mW/g

802.11n_Ant 2/Ch 38/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.246 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.528 W/kg
SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.152 mW/g
Maximum value of SAR (measured) = 0.322 mW/g

802.11n_Ant 2/Ch 38/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.246 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 0.531 W/kg
SAR(1 g) = 0.211 mW/g; SAR(10 g) = 0.150 mW/g
Maximum value of SAR (measured) = 0.278 mW/g



0 dB = 0.280mW/g

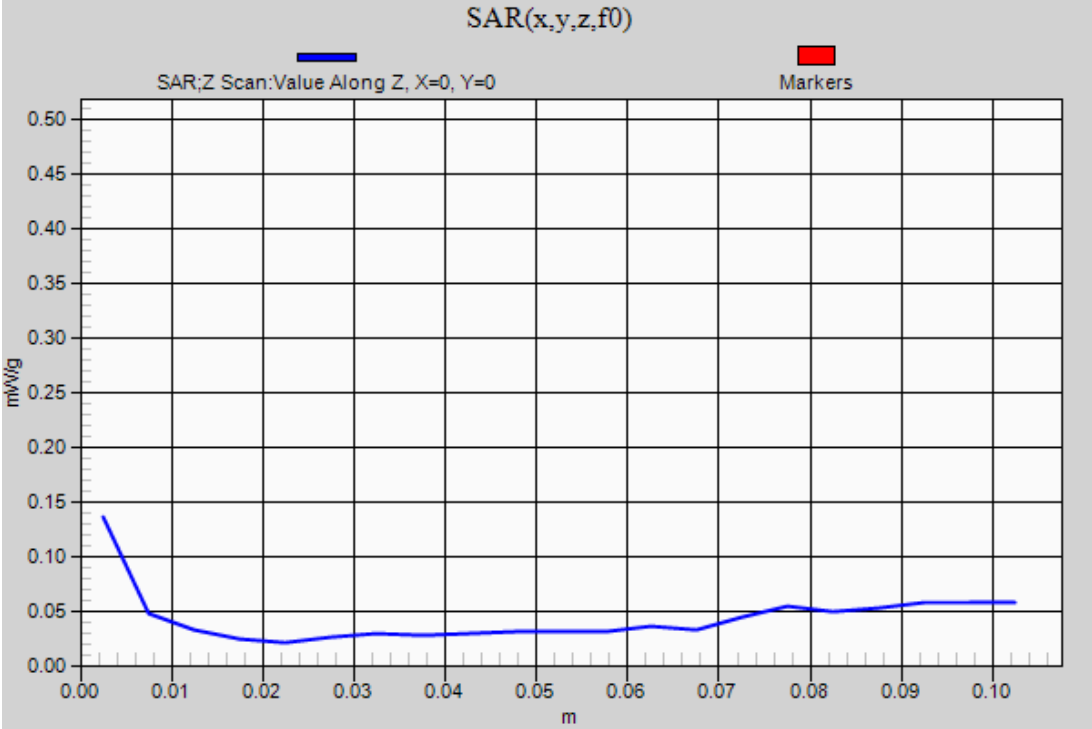
Date: 12/6/2011

Test Laboratory: UL CCS SAR Lab B

Body 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5190 MHz; Duty Cycle: 1:1

802.11n_Ant 2/Ch 38/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.137 mW/g



13.5. Body SAR Plot 5.8GHz 802.11a

Date: 12/7/2011

Test Laboratory: UL CCS SAR Lab B

Body 5.8 GHz

Communication System: WLAN_5GHz; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 6.082 mho/m; ε_r = 50.588; ρ = 1000 kg/m^3
Phantom section: Flat Section

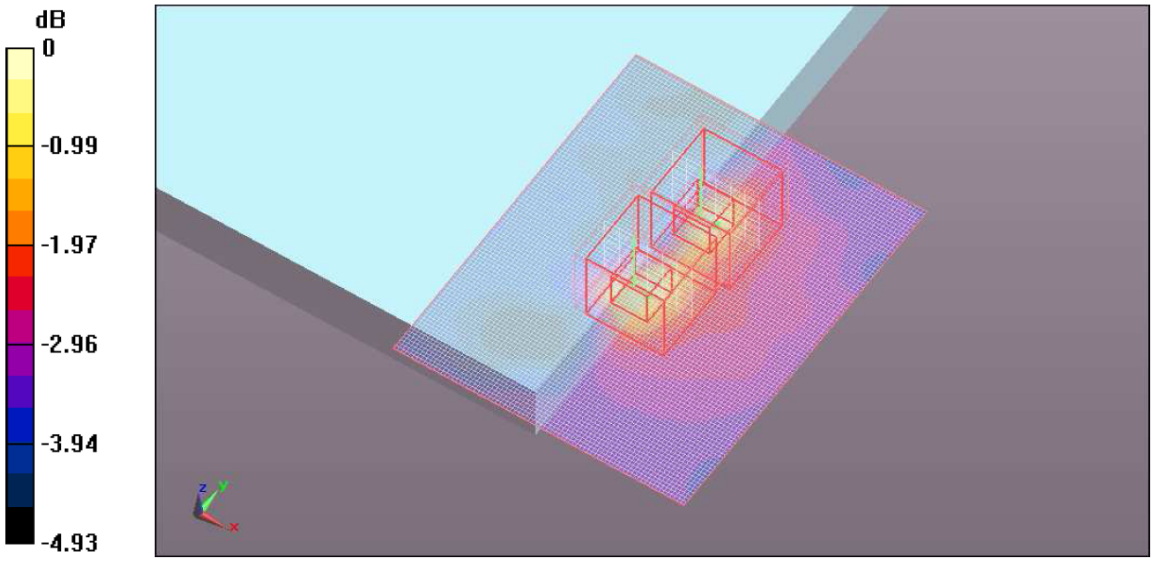
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

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(3.58, 3.58, 3.58); 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)

802.11a Ant 1/Ch 157/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.287 mW/g

802.11a Ant 1/Ch 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.316 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.614 W/kg
SAR(1 g) = 0.219 mW/g; SAR(10 g) = 0.171 mW/g
Maximum value of SAR (measured) = 0.285 mW/g

802.11a Ant 1/Ch 157/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.316 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 0.631 W/kg
SAR(1 g) = 0.229 mW/g; SAR(10 g) = 0.175 mW/g
Maximum value of SAR (measured) = 0.298 mW/g



0 dB = 0.300mW/g

Body SAR Z Plot 5.8GHz

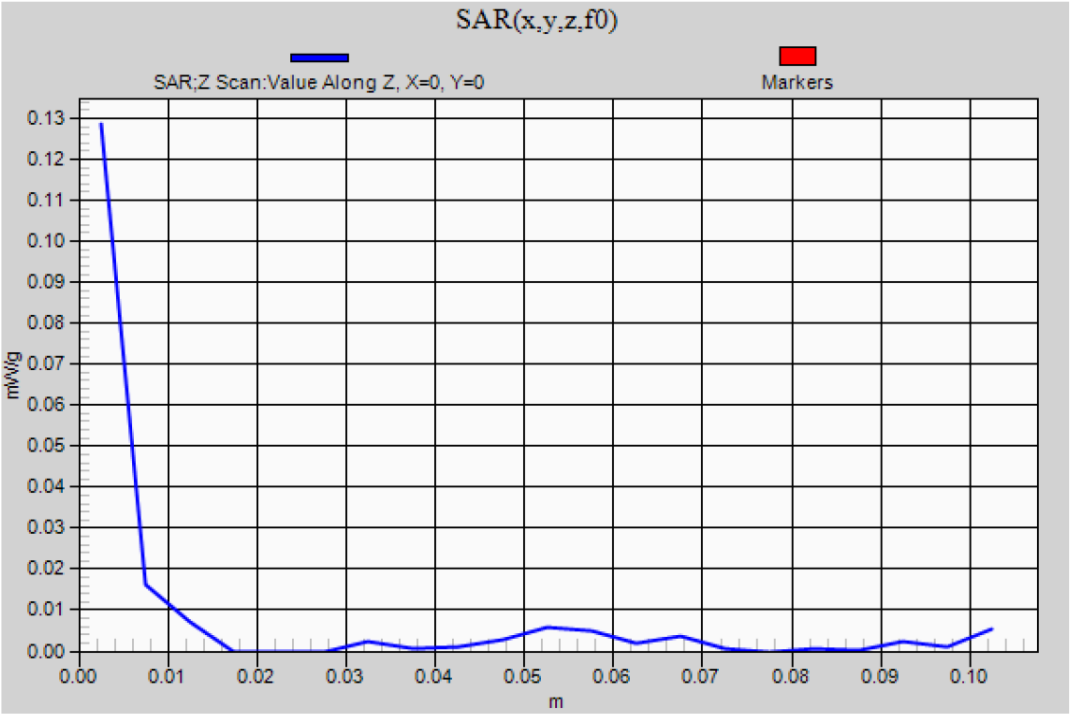
Date: 12/8/2011

Test Laboratory: UL CCS SAR Lab B

Body 5.8 GHz

Communication System: WLAN_5GHz; Frequency: 5785 MHz; Duty Cycle: 1:1

802.11a Ant 1/Ch 157/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.129 mW/g



13.6. Head SAR Plot 5.2GHz 802.11a

Date: 12/8/2011

Test Laboratory: UL CCS SAR Lab B

Head 5.2 GHz

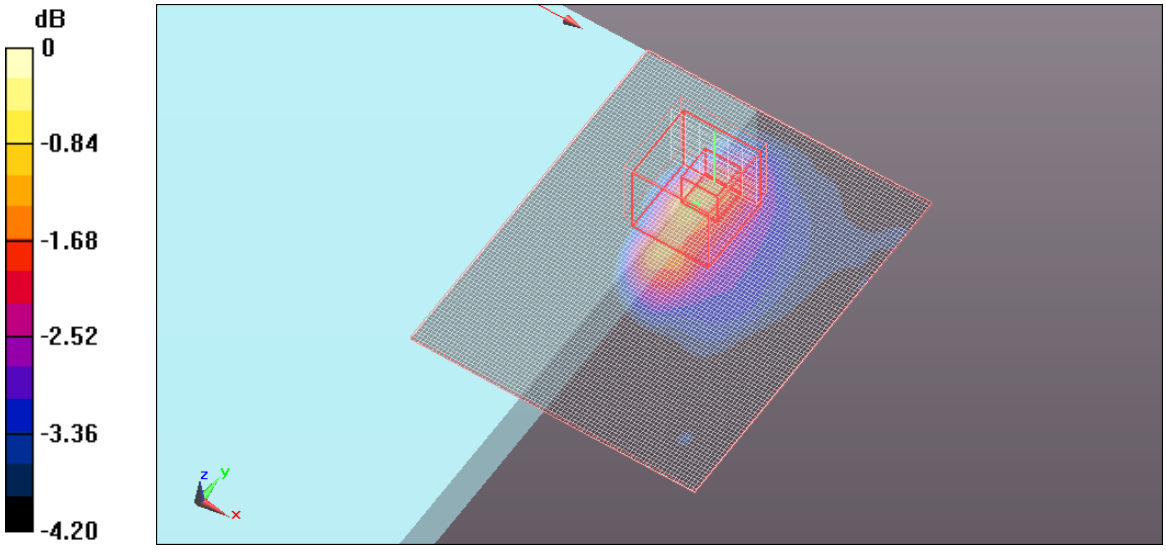
Communication System: WLAN_5GHz; Frequency: 5180 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5180 MHz; σ = 4.759 mho/m; ε_r = 36.617; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(4.39, 4.39, 4.39); 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)

802.11a_Ant 2/Ch 36/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.162 mW/g

802.11a_Ant 2/Ch 36/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.010 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 0.539 W/kg
SAR(1 g) = 0.154 mW/g; SAR(10 g) = 0.111 mW/g
Maximum value of SAR (measured) = 0.209 mW/g

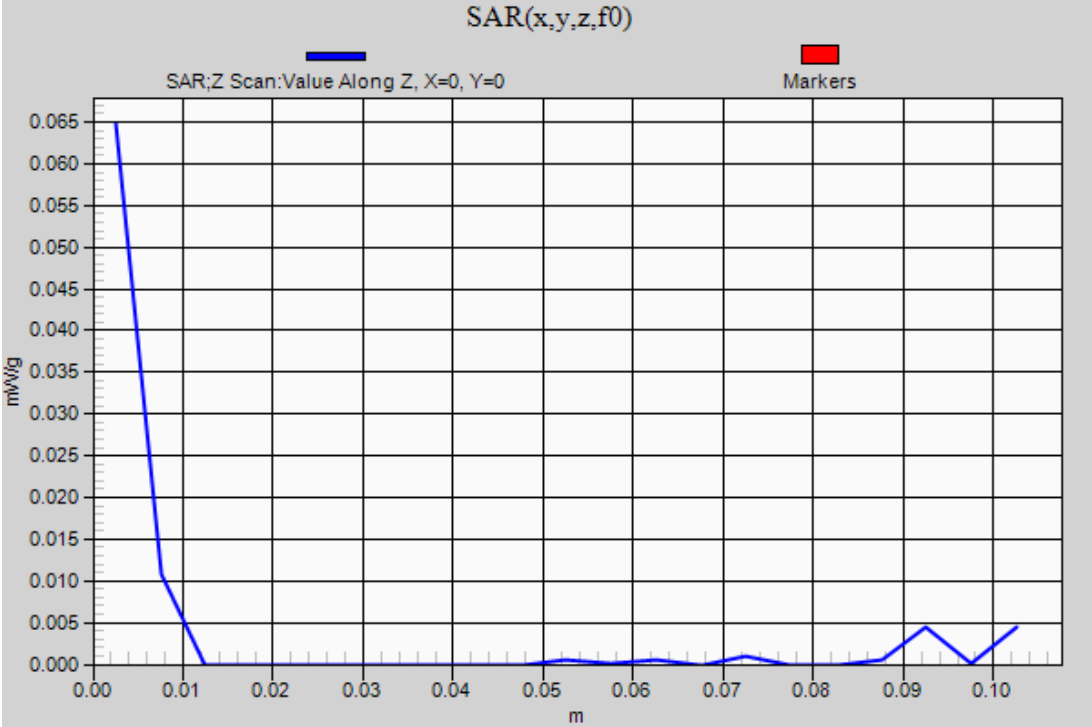


0 dB = 0.210mW/g

Head 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5180 MHz; Duty Cycle: 1:1

802.11a_Ant 2/Ch 36/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.065 mW/g



13.7. Head SAR Plot 5.2GHz 802.11n HT40

Date: 12/9/2011

Test Laboratory: UL CCS SAR Lab B

Head 5.2 GHz

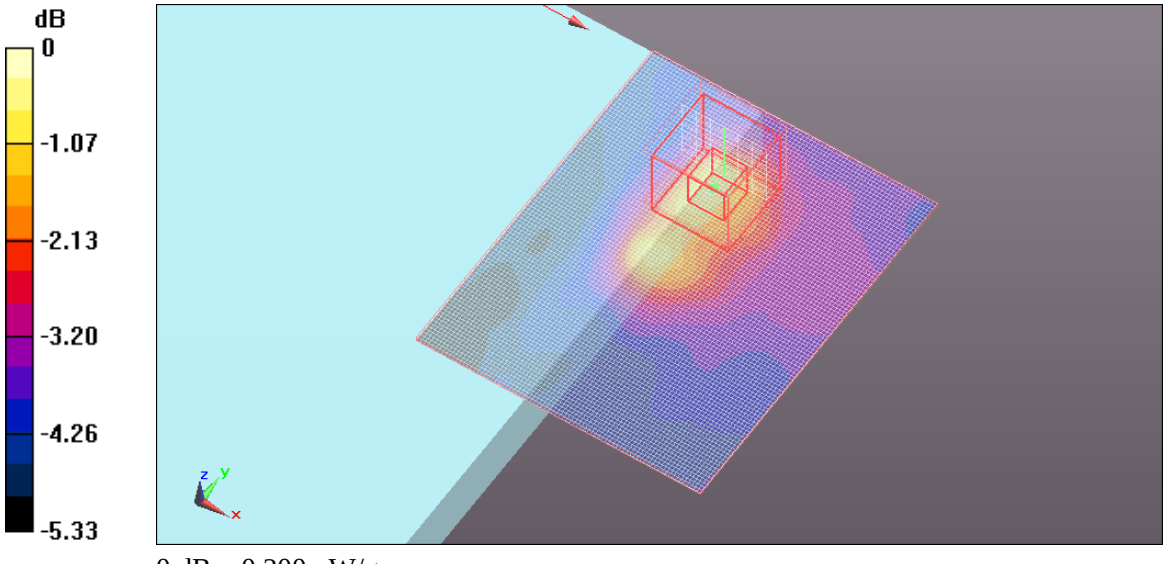
Communication System: WLAN_5GHz; Frequency: 5190 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5190 MHz; σ = 4.723 mho/m; ε_r = 37.184; ρ = 1000 kg/m^3
Phantom section: Flat Section

Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(4.39, 4.39, 4.39); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), 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)

802.11n HT40_Ant 2/Ch 38/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.174 mW/g

802.11n HT40_Ant 2/Ch 38/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.040 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 0.455 W/kg
SAR(1 g) = 0.148 mW/g; SAR(10 g) = 0.100 mW/g
Maximum value of SAR (measured) = 0.202 mW/g



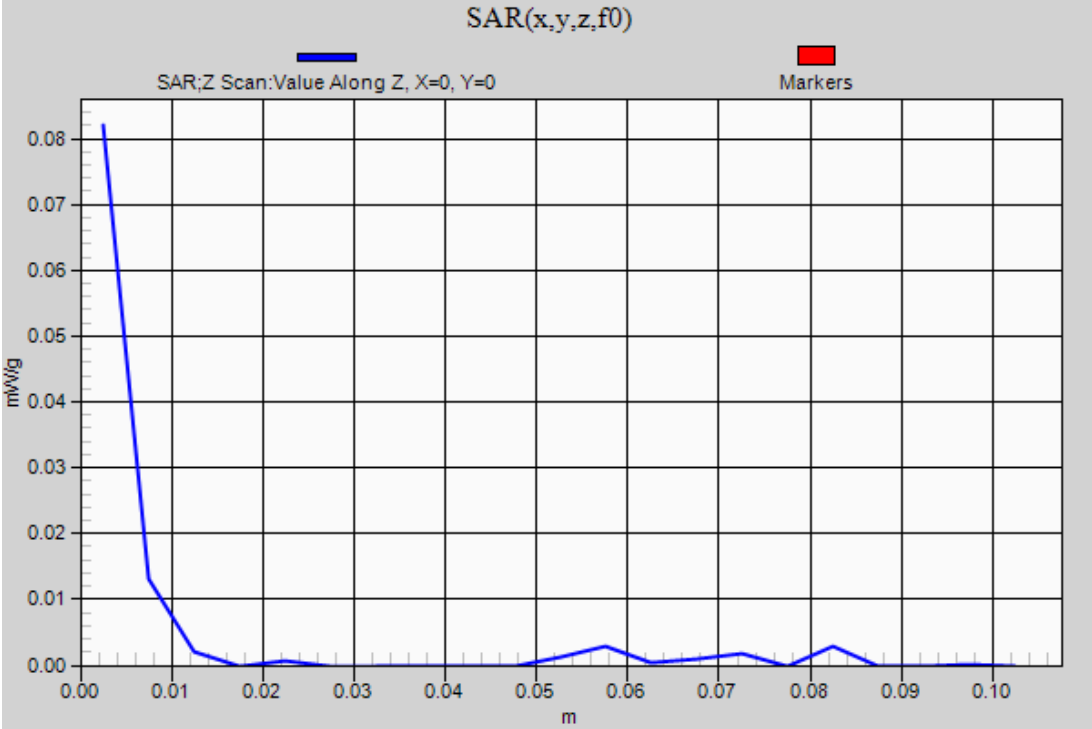
0 dB = 0.200mW/g

Test Laboratory: UL CCS SAR Lab B

Head 5.2 GHz

Communication System: WLAN_5GHz; Frequency: 5190 MHz;Duty Cycle: 1:1

802.11n HT40_Ant 2/Ch 38/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.082 mW/g



13.8. Head SAR Plot 5.8GHz 802.11a

Date: 12/10/2011

Test Laboratory: UL CCS SAR Lab B

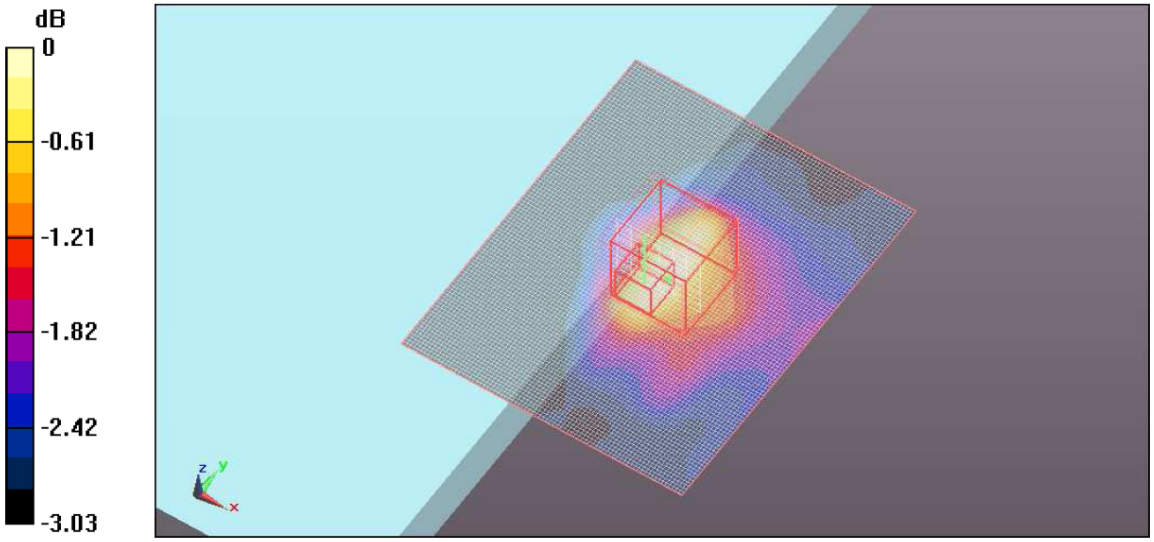
Head 5.8 GHz

Communication System: WLAN_5GHz; Frequency: 5785 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5785 MHz; σ = 5.44 mho/m; ε_r = 35.209; ρ = 1000 kg/m^3
Phantom section: Flat Section
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 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(3.98, 3.98, 3.98); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), 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)

802.11a_Ant 0/Ch 157/Area Scan (81x101x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (interpolated) = 0.213 mW/g

802.11a_Ant 0/Ch 157/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 6.396 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.781 W/kg
SAR(1 g) = 0.181 mW/g; SAR(10 g) = 0.149 mW/g
Maximum value of SAR (measured) = 0.209 mW/g



0 dB = 0.210mW/g

Head SAR Z Plot 5.8GHz

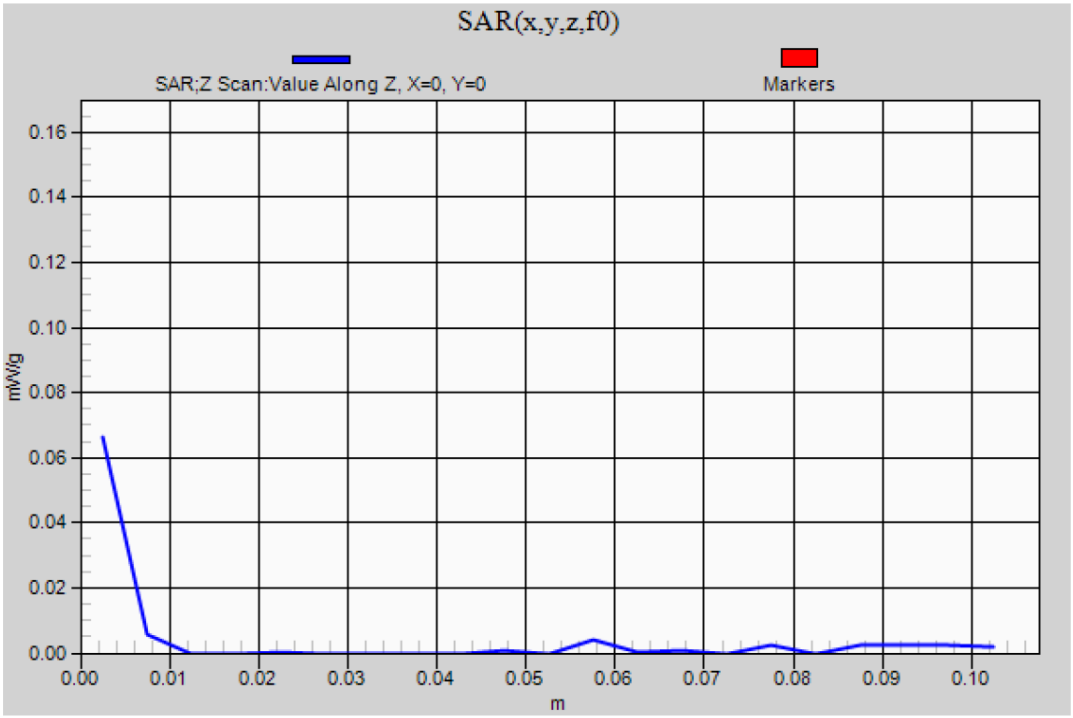
Date: 12/10/2011

Test Laboratory: UL CCS SAR Lab B

Head 5.8 GHz

Communication System: WLAN_5GHz; Frequency: 5785 MHz; Duty Cycle: 1:1

802.11a_Ant 0/Ch 157/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.067 mW/g



14. APPENDIXES

Refer to separate files for the following appendixes

14.1. System Check Plots 2.4 GHz and 5 GHz

14.2. Body SAR Test Plots for 2.4GHz

14.3. Head SAR Test Plots 2.4GHz

14.4. Body SAR test Plots 5 GHz Bands 802.11a and n

14.5. Head SAR test Plots 5 GHz Bands 802.11a and n

14.6. Calibration Certificate -Field Probe EX3DV4 - SN 3773

14.7. Calibration Certificate - Validation Dipole D2450V2 - SN 706

14.8. Calibration Certificate - Validation Dipole D5GHzV2 - SN 1003

14.9. Calibration Certificate - DAE4 - SN 1258