FCC OET BULLETIN 65 SUPPLEMENT C
CLASS II PERMISSIVE CHANGE
IC RSS-102 ISSUE 3

SAR EVALUATION REPORT

FOR

802.11ag/Draft 802.11n WLAN PCI-E Minicard
(Tested inside of HP PC, HSTNN-Q42C)

Model: BCM943224HMS

FCC ID: QDS-BRCM1041

REPORT NUMBER: 10U13029-1

ISSUE DATE: February 17, 2010

Prepared for

BROADCOM CORPORATION
190 MATHILDA PLACE
SUNNYVALE, CA 94086

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	February 17, 2010	Initial Issue	--

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	BROADCOM CORPORATION 190 MATHILDA PLACE SUNNYVALE, CA 94086
EUT DESCRIPTION:	802.11ag/Draft 802.11n WLAN PCI-E Minicard (Tested inside of HP HSTNN-Q42C)
MODEL NUMBER:	BCM943224HMS
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	February 12 - 13, 2010

THE HIGHEST SAR VALUES:

FCC / IC rule parts	Freq. range (MHz)	SAR (mW/g)		Limit
		1g	10g	
15.247 / RSS-102	2400 – 2483.5	0.498	0.259	1g = 1.6 mW/g 10g = 2.0 mW/g
	5725 – 5850	0.507	0.175	
15.407 / RSS-102	5150 – 5250	0.223	0.157	
	5250 – 5350	0.516	0.258	
	5470 – 5725	0.596	0.229	

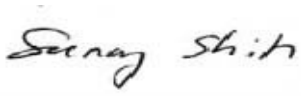
APPLICABLE STANDARDS:

STANDARD	TEST RESULTS
FCC OET BULLETIN 65 SUPPLEMENT C and the following Test Procedures: ○ KDB 248227 SAR measurement procedures for 802.11a/b/g transmitters ○ KDB 447498 D01 Mobile Portable RF Exposure v04, supplemental to KDB 616217 D03	Pass
Schedule 2 of Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003 incl Amendment No 1, 2007 and NZS 2772.1:1999 Radiofrequency fields - Maximum exposure levels - 3 kHz to 300 GHz incl Amendment No. 1, 1999.	Pass

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

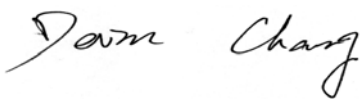
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by CCS will constitute fraud and shall nullify the document. 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.

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C, Specific FCC Procedure KDB 248227 SAR Measurement Procedure for 802.11abg Transmitters, KDB 447498 D01 Mobile Portable RF Exposure v04, supplemental to KDB 616217 D03 and IC RSS 102 Issue 3.

And Schedule 2 of Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 2003 incl Amendment No 1, 2007 and NZS 2772.1:1999 Radiofrequency fields - Maximum exposure levels - 3 kHz to 300 GHz incl Amendment No. 1, 1999.

3. FACILITIES AND ACCREDITATION

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

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

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		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	22	2010
Signal Generator	Agilent	8753ES-6	MY40001647	11	22	2010
E-Field Probe	SPEAG	EX3DV4	3686	3	23	1010
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
System Validation Dipole	SPEAG	D2450V2	748	4	14	2010
System Validation Dipole	SPEAG	D5GHzV2	1075	10	3	2011
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPAEG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

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

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

Measurement uncertainty for 3 GHz – 6 GHz

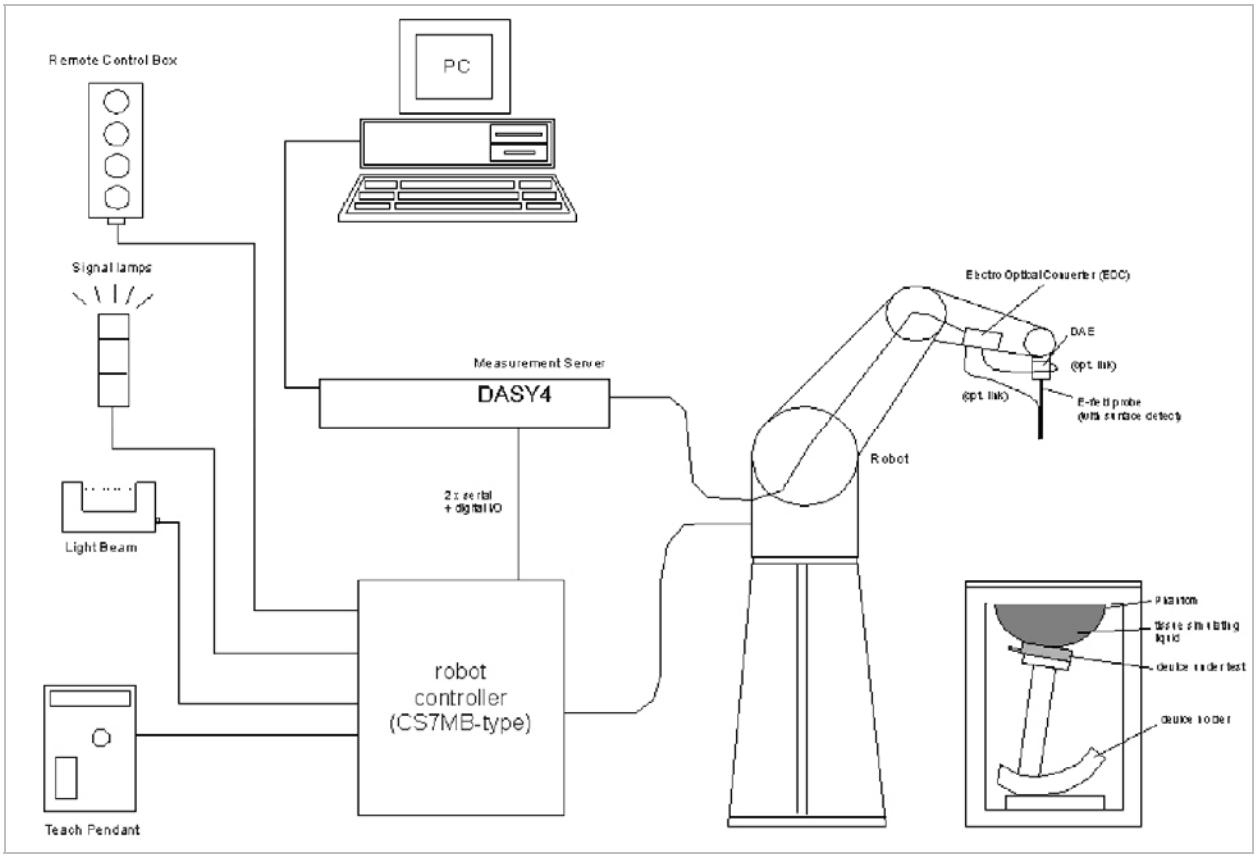
Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R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

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

5. EQUIPMENT UNDER TEST

802.11ag/Draft 802.11n WLAN PCI-E Minicard (Tested inside of HP HSTNN-Q42C)	
Normal operation:	Lap-held only SAR test with display open at 90° to the keyboard
Antenna tested:	Install in HP PC Manufactured / Part number Quanta Computer Inc. — Tx1 (Main) Antenna: DQ64313900 Tx2 (Aux) Antenna: DQ643139000
Antenna-to-user distances:	1.8 cm from Main (Tx1) antenna-to-user. 1.8 cm from Aux (Tx2) antenna-to-user.
Antenna-to-Antenna distances:	> 5 cm from Main (Tx1) antenna-to-Aux (TX2) antenna.
Require SAR evaluation for Simultaneous transmission?	Bluetooth's output power is ≤ 60/*f*(GHz) mW. Therefore, SAR evaluation for simultaneous transmission is not required.

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.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

7. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

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

Ingredients (% by weight)	Frequency (MHz)									
	450		835		915		1900		2450	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56.0	54.9	40.4	62.7	73.2
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.5	0.5	0.04
Sugar	56.32	46.78	56.0	45.0	56.5	41.76	0.0	58.0	0.0	0.0
HEC	0.98	0.52	1.0	1.0	1.0	1.21	0.0	1.0	0.0	0.0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0.0	0.1	0.0	0.0
Triton X-100	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.8	0.0
DGBE	0.0	0.0	0.0	0.0	0.0	0.0	44.92	0.0	0.0	26.7
Dielectric Constant	43.42	58.0	42.54	56.1	42.0	56.8	39.9	54.0	39.8	52.5
Conductivity (S/m)	0.85	0.83	0.91	0.95	1.0	1.07	1.42	1.45	1.88	1.78

Salt: 99+% Pure Sodium Chloride Sugar: 98+% Pure Sucrose
Water: De-ionized, 16 MΩ+ resistivity HEC: Hydroxyethyl Cellulose
DGBE: 99+% Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy)ethanol]
Triton X-100 (ultra pure): Polyethylene glycol mono [4-(1,1, 3, 3-tetramethylbutyl)phenyl]ether

8. 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)

8.1. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Body 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	53.80	Relative Permittivity (ϵ_r):	53.802	52.7	2.09	± 5
	e"	14.43	Conductivity (σ):	1.966	1.95	0.84	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
February 13, 2010 01:22 PM

Frequency	e'	e"
2400000000.	53.9370	14.1957
2405000000.	53.9055	14.2540
2410000000.	53.8965	14.3025
2415000000.	53.8624	14.3224
2420000000.	53.8446	14.3485
2425000000.	53.8453	14.3633
2430000000.	53.8149	14.3703
2435000000.	53.8118	14.3784
2440000000.	53.8139	14.3678
2445000000.	53.8144	14.3975
2450000000.	**53.8016**	**14.4265**
2455000000.	53.7414	14.4370
2460000000.	53.7132	14.4000
2465000000.	53.6653	14.3921
2470000000.	53.6528	14.3632
2475000000.	53.6312	14.3468
2480000000.	53.6335	14.3460
2485000000.	53.6481	14.3609
2490000000.	53.6758	14.3963
2495000000.	53.6712	14.4581
2500000000.	53.6626	14.5317

The conductivity (σ) can be given as:

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

where f = target f * 10^6

ε_0 = 8.854 * 10^{-12}

8.2. LIQUID CHECK RESULTS FOR 5 GHZ

Simulating Liquid Dielectric Parameters for Body 5 GHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	48.159	Relative Permittivity (ϵ_r):	48.1590	49.0	-1.72	± 10
	e"	18.6746	Conductivity (σ):	5.40224	5.30	1.93	± 5
5500	e'	47.7091	Relative Permittivity (ϵ_r):	47.7091	48.6	-1.83	± 10
	e"	19.0016	Conductivity (σ):	5.81396	5.65	2.90	± 5
5800	e'	47.085	Relative Permittivity (ϵ_r):	47.0850	48.2	-2.31	± 10
	e"	19.3630	Conductivity (σ):	6.24769	6.00	4.13	± 5

Liquid temperature: 24 deg. C
February 12, 2010 03:17 PM

Frequency	e'	e"
4600000000.	49.3075	17.5435
4650000000.	49.4429	17.7688
4700000000.	49.2267	17.7022
4750000000.	49.1748	17.9610
4800000000.	49.1374	17.9164
4850000000.	48.9026	18.0703
4900000000.	48.9307	18.1233
4950000000.	48.7504	18.1331
5000000000.	48.7294	18.3330
5050000000.	48.6379	18.3072
5100000000.	48.5180	18.5247
5150000000.	48.5409	18.5931
5200000000.	**48.1590**	**18.6746**
5250000000.	48.1815	18.7161
5300000000.	47.9878	18.7140
5350000000.	47.9693	18.8007
5400000000.	47.8737	18.8515
5450000000.	47.7242	18.8987
5500000000.	**47.7091**	**19.0016**
5550000000.	47.5393	19.0044
5600000000.	47.4582	19.1650
5650000000.	47.3815	19.1333
5700000000.	47.2572	19.2503
5750000000.	47.2176	19.3137
5800000000.	**47.0850**	**19.3630**
5850000000.	46.9563	19.4313
5900000000.	46.9151	19.4684
5950000000.	46.6914	19.5471
6000000000.	46.7122	19.6567

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

9. SYSTEM PERFORMANCE CHECK

The system performance check is performed prior to any usage of the system in order to guarantee reproducible results. The system performance check verifies that the system operates within its specifications of ±10%.

System Performance Check Measurement Conditions

- The measurements were performed in the flat section of the SAM twin phantom filled with Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV4-SN: 3686 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (2.4 GHz) fine cube was chosen for cube integration and Special 8x8x10 (5 GHz) fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 3mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5mm
- The dipole input power (forward power) were 100 mW (5GHz) and 250 mW (2.4GHz) ±3%
- The results are normalized to 1 W input power.

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG.
Certificate no: D2450V2-748_April 14, 2008

f (MHz)	Head Tissue		Body Tissue	
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}
2450			49.5	23.3

Reference SAR Values for BODY-tissue from calibration certificate of SPEAG.
Certificate no: D5GHzV2-1075_Sep09

f (MHz)	Head Tissue		Body Tissue	
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}
5200			78.7	21.9
5500			85.0	23.4
5800			72.9	20.0

9.1. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: February 13, 2010

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Devin Chang

Medium	CW Signal (MHz)	Forward Pwr (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	100	1g SAR:	48.7	49.5	-1.62	±10
			10g SAR:	22.6	23.3	-3.00	

9.2. SYSTEM CHECK RESULTS FOR D5GHzV2

System Validation Dipole: D5GHzV2 SN 1075

Date: February 12, 2010

Ambient Temperature = 25°C; Relative humidity = 40% Measured by: Devin Chang

Medium	CW Signal (MHz)	Forward Pwr (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	5200	100	1g SAR:	78.8	78.7	0.13	±10
			10g SAR:	22.3	21.9	1.83	
Body	5500	100	1g SAR:	83.7	85.0	-1.53	±10
			10g SAR:	23.4	23.4	0.00	
Body	5800	100	1g SAR:	74.3	72.9	1.92	±10
			10g SAR:	20.8	20.0	4.00	

10. 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, wl_tools, which enable a user to control the frequency and output power of the module.

RF Conducted Output Power Measurement Results:

Please refer to Broadcom's Operational Description document for Average Power information (confidential exhibit) as documented in 04/02/2009 original filing.

Before SAR evaluation, CCS has verified the RF conducted average power which is in a agreement with previous reported average output power.

11. TEST RESULTS

According to the KB 248227 D01. When the maximum average output channel in each frequency band is not included in the "default test channels", the maximum channel should be tested instead of an adjacent "default test channels". Thus, the following maximum channels were tested.

11.1. TEST RESULTS FOR 2.4 GHZ BAND

Mode	Channel	f (MHz)	Antenna	Results (mW/g)	
				1g-SAR	10g-SAR
802.11b	1	2412	Main		
	6	2437	Main	0.374	0.187
	11	2462	Main		
802.11g*	6	2437	Aux	0.404	0.219
802.11n HT20	6	2437	Main & Aux	**0.498**	**0.259**

*: 802.11b doesn't operate for Aux antenna. Thus, 802.11g is performed for Aux antenna instead.

11.2. TEST RESULTS FOR 5 GHZ BANDS

Mode	Channel	f (MHz)	Antenna	Results (mW/g)	
				1g-SAR	10g-SAR
802.11a (5.2 GHz)	36	5180	Main		
	40	5200	Main	0.223	0.157
	48	5240	Main		
802.11a (5.3 GHz)	52	5260	Main		
	60	5300	Main	0.438	0.316
	64	5320	Main		
802.11a (5.2 GHz)	36	5180	Aux		
	40	5200	Aux	**0.223**	**0.157**
	48	5240	Aux		
802.11a (5.3 GHz)	52	5260	Aux		
	60	5300	Aux	**0.516**	**0.258**
	64	5320	Aux		
802.11n HT40 (5.6GHz)	102	5510	Main / Aux		
	118	5590	Main / Aux	**0.596**	**0.229**
	134	5670	Main / Aux		
802.11n HT40 (5.8GHz)	157	5785	Main / Aux	**0.507**	**0.175**

12. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT FOR 2.4 GHZ

Date/Time: 2/13/2010 3:29:57 PM

Test Laboratory: Compliance Certification Services

Laptop Mode_Lap-hepd

DUT: Broadcom; Type: NA; Serial: NA

Communication System: 802.11bgn; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.95 mho/m; ε_r = 53.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

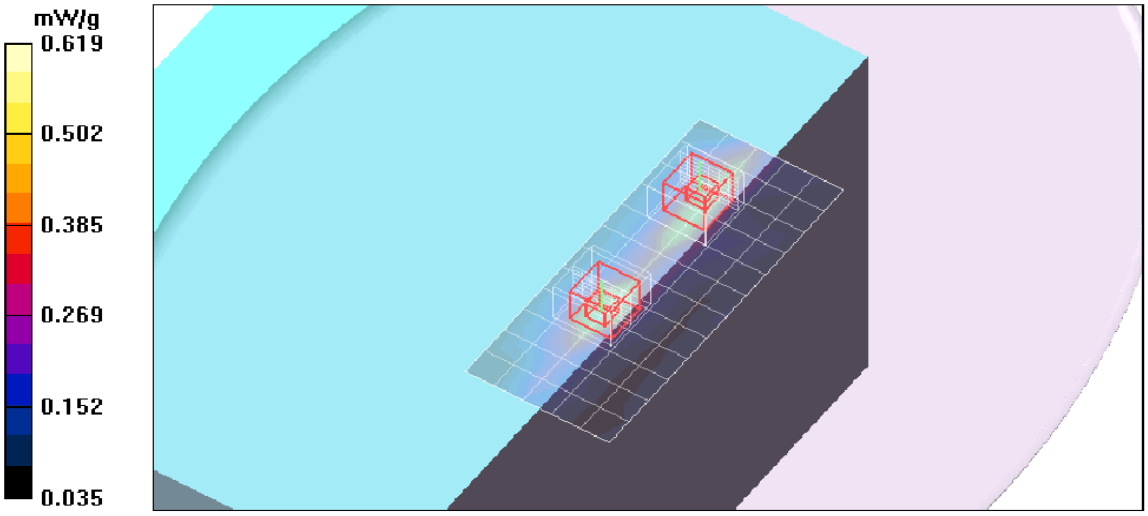
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

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 - SN3686; ConvF(6.48, 6.48, 6.48); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11n HT20 M-ch M&A Ant/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.619 mW/g

802.11n HT20 M-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 17.9 V/m; Power Drift = 0.147 dB
Peak SAR (extrapolated) = 1.01 W/kg
SAR(1 g) = 0.498 mW/g; SAR(10 g) = 0.259 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.631 mW/g

802.11n HT20 M-ch M&A Ant/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 17.9 V/m; Power Drift = 0.147 dB
Peak SAR (extrapolated) = 0.884 W/kg
SAR(1 g) = 0.453 mW/g; SAR(10 g) = 0.230 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.577 mW/g



WORST-CASE SAR PLOT FOR 5.2 GHZ

Date/Time: 2/12/2010 9:23:25 PM

Test Laboratory: Compliance Certification Services

Laptop Mode_Lap-hepd

DUT: Broadcom; Type: NA; Serial: NA

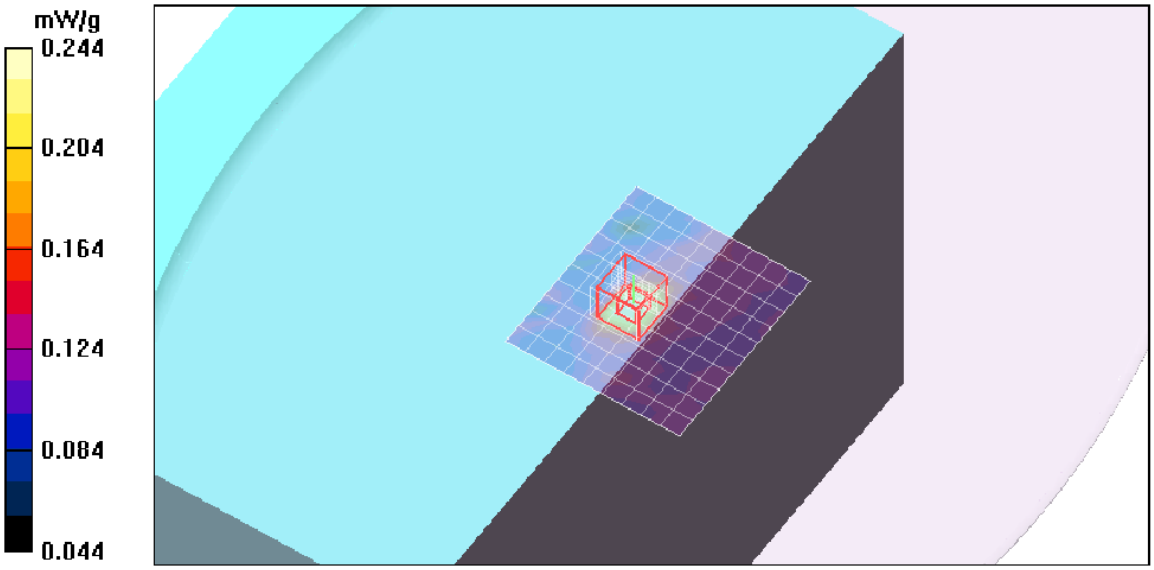
Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.4 mho/m; ε_r = 48.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(4.08, 4.08, 4.08); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_Aux Ant_Ch40/Area Scan (10x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.244 mW/g

802.11a_Aux Ant_Ch40/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.75 V/m; Power Drift = 0.212 dB
Peak SAR (extrapolated) = 0.402 W/kg
SAR(1 g) = 0.223 mW/g; SAR(10 g) = 0.157 mW/g
Maximum value of SAR (measured) = 0.288 mW/g



WORST-CASE SAR PLOT FOR 5.3 GHZ

Date/Time: 2/12/2010 9:50:32 PM

Test Laboratory: Compliance Certification Services

Laptop Mode_Lap-hepd

DUT: Broadcom; Type: NA; Serial: NA

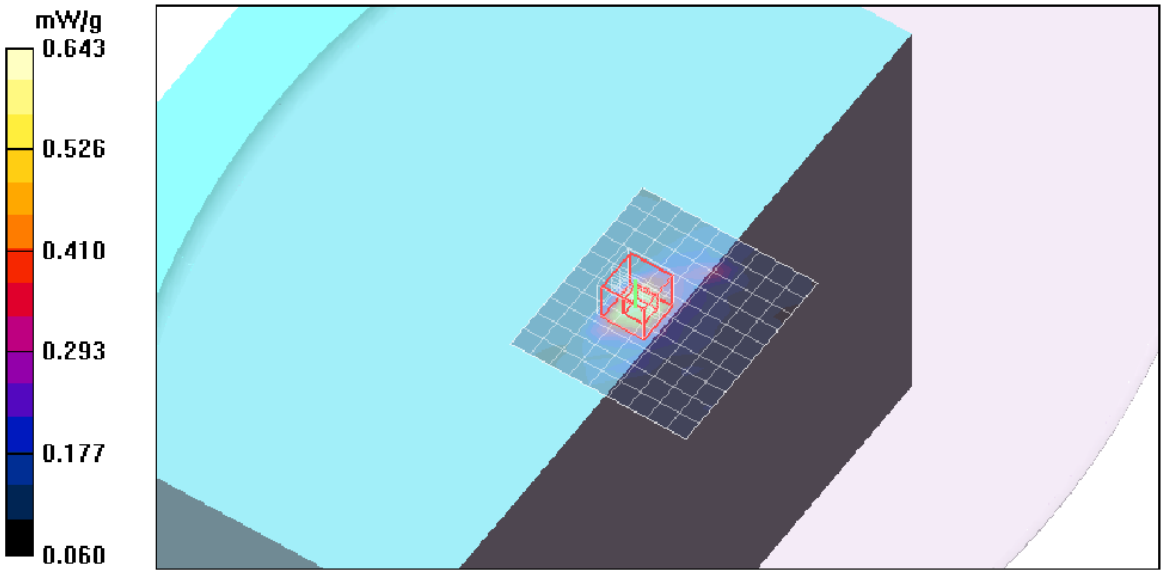
Communication System: 802.11abgn; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.52 mho/m; ε_r = 48; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(3.81, 3.81, 3.81); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_Aux Ant_Ch60/Area Scan (10x11x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.643 mW/g

802.11a_Aux Ant_Ch60/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 11.6 V/m; Power Drift = -1.18 dB
Peak SAR (extrapolated) = 1.48 W/kg
SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.258 mW/g
Maximum value of SAR (measured) = 0.776 mW/g



WORST-CASE SAR PLOT FOR 5.6 GHZ

Date/Time: 2/12/2010 10:29:18 PM

Test Laboratory: Compliance Certification Services

Laptop Mode_Lap-hepd

DUT: Broadcom; Type: NA; Serial: NA

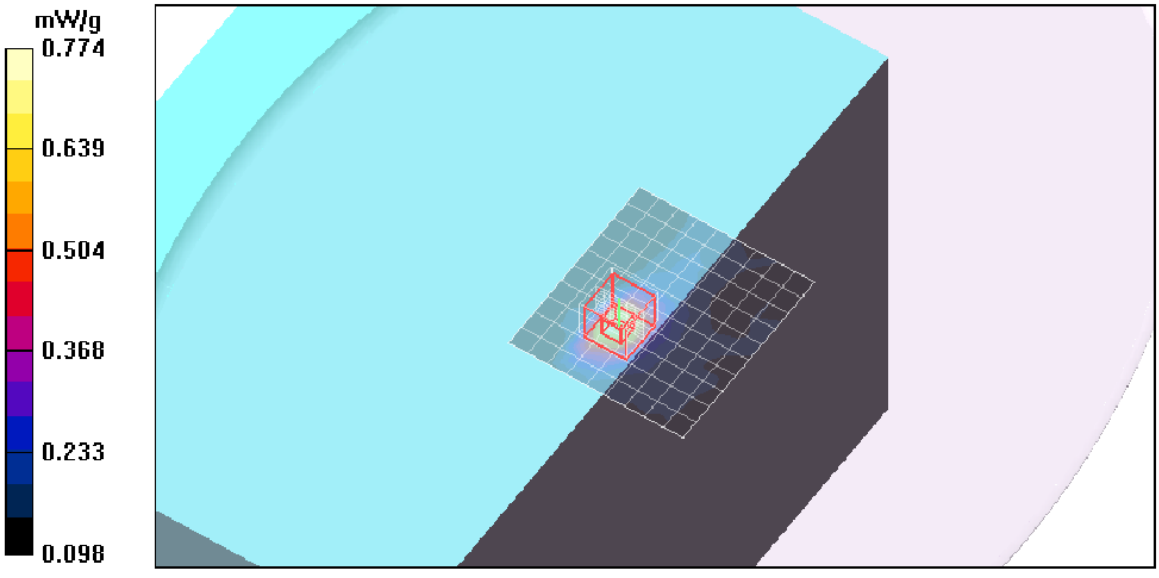
Communication System: 802.11abgn; Frequency: 5590 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5590 MHz; σ = 5.95 mho/m; ε_r = 47.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(3.61, 3.61, 3.61); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11n HT40_Main&Aux Ant_Ch118/Area Scan (10x11x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.774 mW/g

802.11n HT40_Main&Aux Ant_Ch118/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 12.4 V/m; Power Drift = -0.980 dB
Peak SAR (extrapolated) = 1.66 W/kg
SAR(1 g) = 0.596 mW/g; SAR(10 g) = 0.229 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.915 mW/g



WORST-CASE SAR PLOT FOR 5.8 GHZ

Date/Time: 2/12/2010 10:56:08 PM

Test Laboratory: Compliance Certification Services

Laptop Mode_Lap-hepd

DUT: Broadcom; Type: NA; Serial: NA

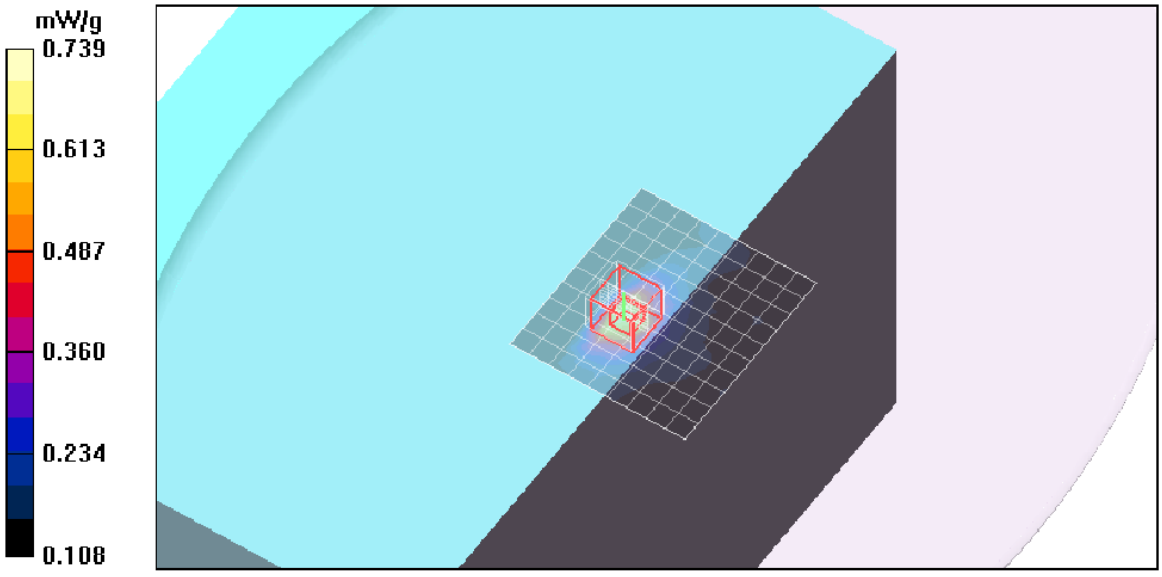
Communication System: 802.11abgn; Frequency: 5795 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5795 MHz; σ = 6.24 mho/m; ε_r = 47.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(3.84, 3.84, 3.84); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11n HT40_Main&Aux Ant_Ch159/Area Scan (10x11x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.739 mW/g

802.11n HT40_Main&Aux Ant_Ch159/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 11.8 V/m; Power Drift = -0.870 dB
Peak SAR (extrapolated) = 3.05 W/kg
SAR(1 g) = 0.507 mW/g; SAR(10 g) = 0.175 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.864 mW/g



13. ATTACHMENTS

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