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

SAR EVALUATION REPORT

For

802.11ag/Draft 802.11n WLAN PCI-E Minicard
(Tested inside of HP Notebook PC, HSTNN-Q44C)

MODEL: BCM943224HMS

FCC ID: QDS-BRCM1041
IC: 4324A-BRCM1041

REPORT NUMBER: 09U12582-2

ISSUE DATE: June 18, 2009

Prepared for

BROADCOM CORPORATION
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Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	June 18, 2009	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 Notebook PC, HSTNN-Q44C)
MODEL NUMBER:	BCM943224HMS
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	June 17 - 18 , 2009

THE HIGHEST SAR VALUES:

FCC / IC Rule Parts	Frequency Range [MHz]	The Highest SAR Values (1g_mW/g)	Limit (mW/g)
15.247 / RSS-102	2400 – 2483.5	0.037	1.6
	5725 – 5850	0.00493	
15.407 / RSS-102	5150 – 5250	0.0000262	
	5250 – 5350	0.011	
	5470 – 5725	0.00272	

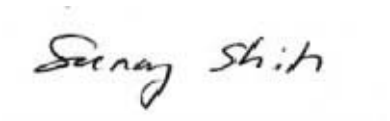
APPLICABLE STANDARDS AND TEST PROCEDURES:

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

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

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 820.11abg Transmitters and IC RSS 102 Issue 2.

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	14	2009
Signal Generator	Agilent	8753ES-6	MY40001647	11	14	2009
E-Field Probe	SPEAG	EX3DV4	3686	3	23	1010
Thermometer	ERTCO	639-1S	1718	5	1	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	427	10	20	2009
System Validation Dipole	SPEAG	D835V2	4d002	6	22	2009
System Validation Dipole	SPEAG	D900V2	108	1	21	2010
System Validation Dipole	SPEAG	D1800V2	294	1	29	2010
System Validation Dipole	SPEAG	D1900V2	5d043	1	29	2010
System Validation Dipole	SPEAG	D2450V2	748	4	14	2010
System Validation Dipole	SPEAG	D5GHzV2	1003	11	21	2009
MXA Signal Analyzer	Agilent	N9020A	US48350984	10	23	2009
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Power Meter	Giga-tronics	8651A	8651404	1	11	2010
Power Sensor	Giga-tronics	80701A	1834588	1	11	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPAEG	H2450	N/A	Within 24 hrs of first test		
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

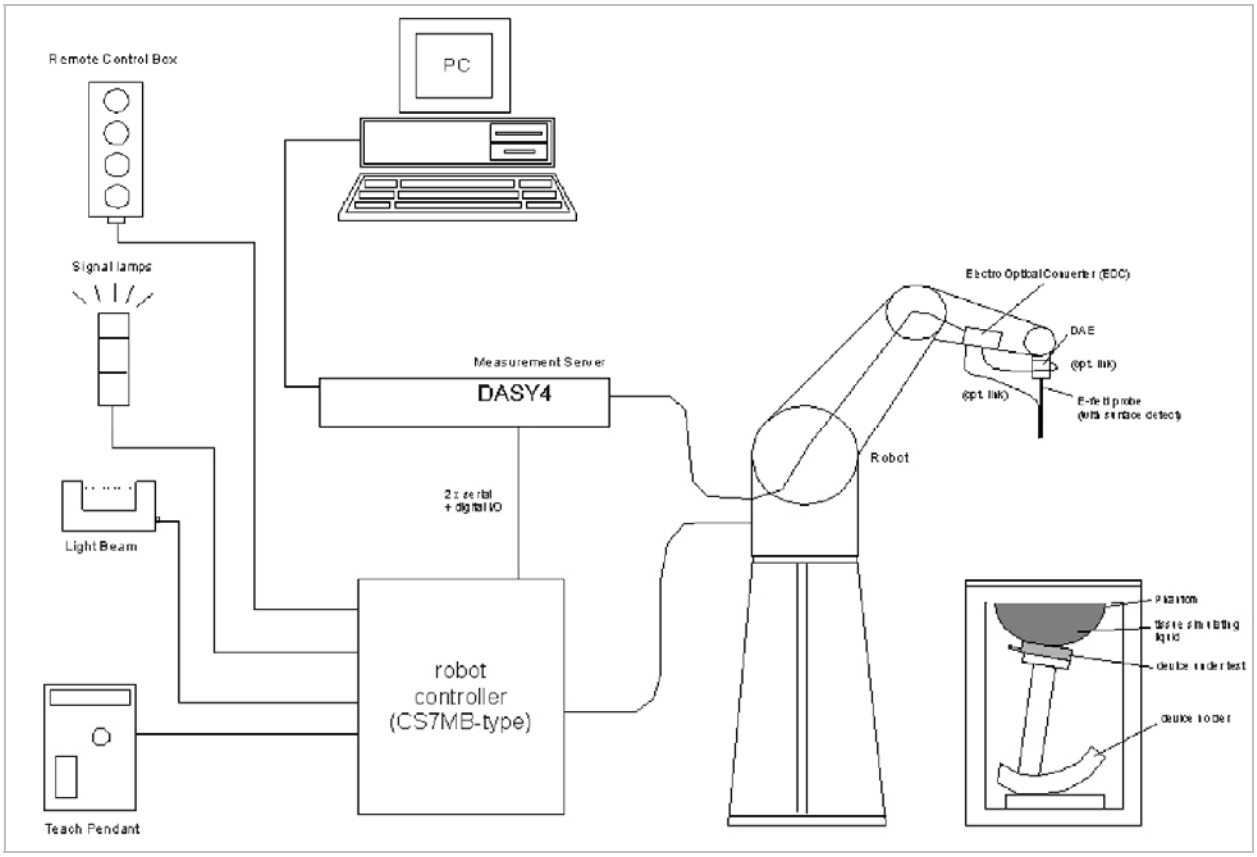
5. EQUIPMENT UNDER TEST

802.11ag/Draft 802.11n WLAN PCI-E Minicard

(Tested inside of HP Notebook PC, HSTNN-Q44C)

Normal operation:	Lap-held only Note: SAR test with display open at 90° to the keyboard	
Antenna tested:	Manufactured	Model Number
	WNC	81.EKA15.G01 (Main)
		81.EKA15.G01 (Aux)
Power supply:	Power supplied through laptop computer (host device)	

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 Muscle 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.073	Relative Permittivity (ε_r):	52.073	52.7	-1.19	± 5
	e"	13.898	Conductivity (σ):	1.894	1.95	-2.86	± 5

Liquid Temperature: 23 deg. C
June 17, 2009 11:02 AM

Frequency	e'	e"
2400000000.	52.1021	13.6400
2405000000.	52.1032	13.7309
2410000000.	52.0956	13.7879
2415000000.	52.1073	13.8359
2420000000.	52.0923	13.8653
2425000000.	52.1088	13.8925
2430000000.	52.1183	13.8872
2435000000.	52.1162	13.8932
2440000000.	52.1057	13.9099
2445000000.	52.0952	13.9117
2450000000.	**52.0731**	**13.8984**
2455000000.	52.0019	13.8732
2460000000.	51.9690	13.8365
2465000000.	51.8995	13.7948
2470000000.	51.8762	13.7538
2475000000.	51.8492	13.7330
2480000000.	51.8484	13.7120
2485000000.	51.8401	13.7311
2490000000.	51.8422	13.7781
2495000000.	51.8431	13.8611
2500000000.	51.8391	13.9773

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

8.2. LIQUID CHECK RESULTS FOR 5 GHZ

Simulating Liquid Dielectric Parameters for Muscle 5800 MHz

Room Ambient Temperature = 25°C; Relative humidity = 38% Measured by: Sunny Shih

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	47.2126	Relative Permittivity (ε_r):	47.2126	49.0	-3.65	± 10
	e"	18.4392	Conductivity (σ):	5.33414	5.30	0.64	± 5
5500	e'	46.9216	Relative Permittivity (ε_r):	46.9216	48.6	-3.45	± 10
	e"	18.6901	Conductivity (σ):	5.71865	5.65	1.22	± 5
5800	e'	45.9162	Relative Permittivity (ε_r):	45.9162	48.2	-4.74	± 10
	e"	19.3111	Conductivity (σ):	6.23095	6.00	3.85	± 5

Liquid temperature: 24 deg. C
June 18, 2009 09:38 AM

Frequency	e'	e"
4600000000.	48.4760	17.5390
4650000000.	48.5573	17.7067
4700000000.	48.2918	17.6065
4750000000.	48.2913	17.9121
4800000000.	48.2647	17.7865
4850000000.	48.1001	17.9563
4900000000.	48.0941	18.0700
4950000000.	47.7460	18.0282
5000000000.	47.7238	18.2323
5050000000.	47.4641	18.1906
5100000000.	47.2515	18.3702
5150000000.	47.3262	18.2622
5200000000.	**47.2126**	**18.4392**
5250000000.	47.4275	18.4587
5300000000.	47.1618	18.6020
5350000000.	47.2847	18.7375
5400000000.	47.0210	18.6610
5450000000.	46.9370	18.8380
5500000000.	**46.9216**	**18.6901**
5550000000.	46.6653	18.8751
5600000000.	46.6296	18.9066
5650000000.	46.3170	18.9188
5700000000.	46.5304	19.2353
5750000000.	46.3832	18.9834
5800000000.	**45.9162**	**19.3111**
5850000000.	46.2833	19.3866
5900000000.	45.9526	19.1927
5950000000.	45.5933	19.4145
6000000000.	46.0036	19.7344

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 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 Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV3 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 250 mW±3%.
- The results are normalized to 1 W input power.

Reference SAR Values for BODY-tissue from calibration certificate of SPEAG. Certificate no: D2450V2-748_Apr08

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	condition	
SAR measured	250 mW input power	12.7 mW / g
SAR normalized	normalized to 1W	50.8 mW / g
SAR for nominal Body TSL parameters [1]	normalized to 1W	**49.5 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.92 mW / g
SAR normalized	normalized to 1W	23.7 mW / g
SAR for nominal Body TSL parameters [1]	normalized to 1W	**23.3 mW / g ± 16.5 % (k=2)**

Reference SAR Values for HEAD & BODY-tissue from calibration certificate of SPEAG. Certificate no: D5GHzV2-1003_Nov07

f (MHz)	Head Tissue		Body Tissue	
	SAR_{1g}	SAR_{10g}	SAR_{1g}	SAR_{10g}
5200	78.6	22.1	74.7	21.1
5500	80.4	22.7	80.1	22.5
5800	79.9	22.4	70.8	19.8

9.1. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: June 17, 2009

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Head	2450	250	1g SAR:	53.0	50.8	4.33	±10
			10g SAR:	24.9	23.7	5.06	

9.2. SYSTEM CHECK RESULTS FOR D5GHzV2

System Validation Dipole: D5GHzV2 SN 1003

Date: June 18, 2009

Ambient Temperature = 24°C; Relative humidity = 40% Measured by: Sunny Shih

Medium	CW Signal (MHz)	Forward power (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Muscle	5200	250	1g SAR:	80.2	74.7	7.36	±10
			10g SAR:	23.2	21.1	9.95	
Muscle	5500	250	1g SAR:	78.7	80.1	-1.75	±10
			10g SAR:	22.1	22.5	-1.78	
Muscle	5800	250	1g SAR:	72.5	70.8	2.40	±10
			10g SAR:	20.4	19.8	3.03	

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:

See Broadcom's Operational Description document for Average Power information.

11. SUMMARY OF TEST RESULTS

If the SAR measured at the middle channel for each test configuration is at least 3.0 dB (0.8 mW/g) lower than the SAR limit (1.6 mW/g), testing at the high and low channels is optional for such test configuration(s).

11.1. SAR TEST RESULT FOR THE 2.4 GHZ BAND

Mode	Channel	f (MHz)	Antenna	1g SAR (mW/g)	Limit (mW/g)
802.11b	6	2437	Main	0.035	1.6
			Aux	0.037	

11.2. 11.2. SAR TEST RESULT FOR THE 5 GHZ BANDS

Band	Mode	Channel	f (MHz)	Antenna	1g SAR (mW/g)	Limit (mW/g)
5.2 GHz	802.11a	40	5200	Main	0.000005	1.6
				Aux	0.000026	
5.3 GHz	802.11a	60	5300	Main	0.011	
				Aux	0.00006	
5.5 GHz	802.11a	120	5600	Main	0.00272	
				Aux	0.000025	
5.8 GHz	802.11a	157	5785	Main	0.000493	
				Aux	0.000336	

12. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT for 2.4 GHz Band

Date/Time: 6/17/2009 1:59:39 PM

Test Laboratory: Compliance Certification Services

Lapheld for 802.11b

DUT: Broadcom; Type: HP Laptop; Serial: NA

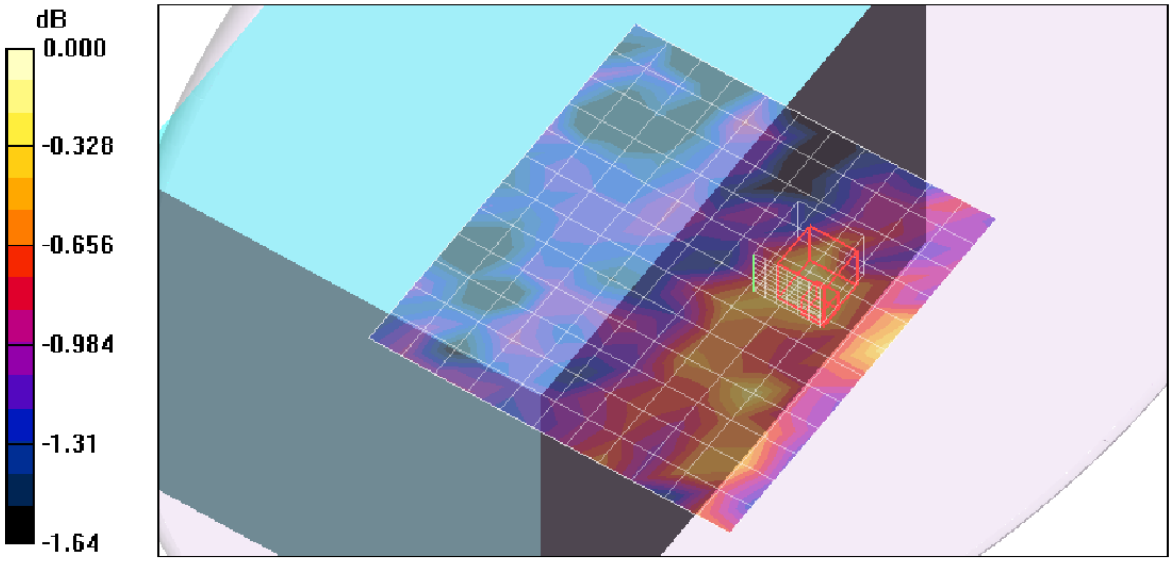
Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.88 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, Aux Ant M-ch/Area Scan (12x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.040 mW/g

Lapheld, Aux Ant M-ch/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.22 V/m; Power Drift = -0.681 dB
Peak SAR (extrapolated) = 0.055 W/kg
SAR(1 g) = 0.037 mW/g; SAR(10 g) = 0.034 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.042 mW/g



0 dB = 0.042mW/g

WORST-CASE SAR PLOT for 5.2 GHz Band

Date/Time: 6/18/2009 10:48:17 AM

Test Laboratory: Compliance Certification Services

802.11a 5.2GHz

DUT: Broadcom; Type: HP Laptop; Serial: NA

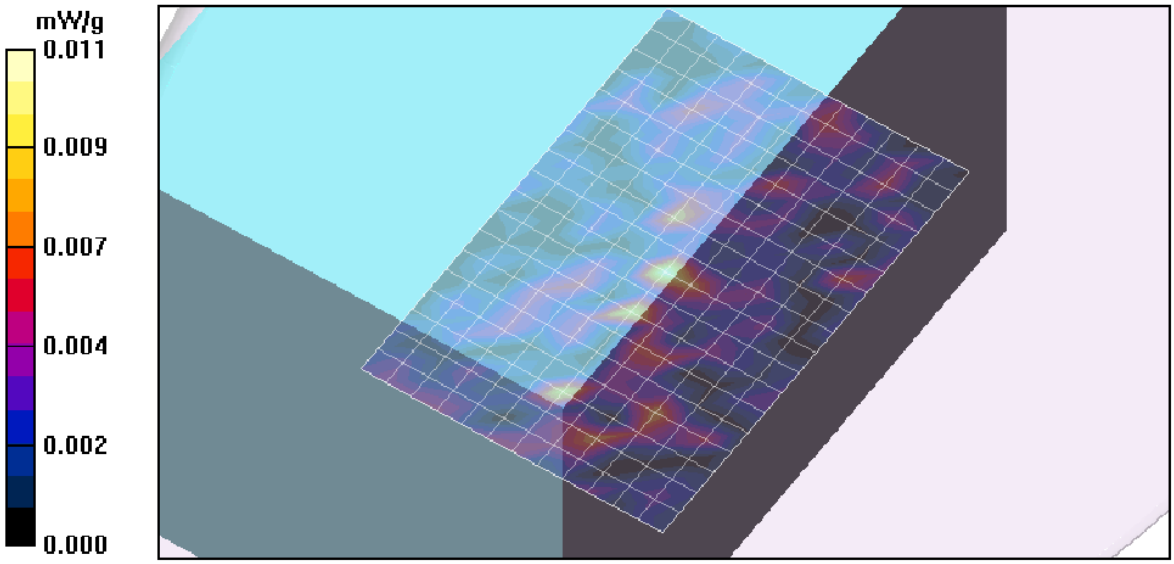
Communication System: 802.11abgn; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.33 mho/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(4.08, 4.08, 4.08); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, Aux Ant/Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.011 mW/g

Lapheld, Aux Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 0.255 V/m; Power Drift = 9.77 dB
Peak SAR (extrapolated) = 0.012 W/kg
SAR(1 g) = 2.57e-005 mW/g; SAR(10 g) = 4.6e-007 mW/g
Maximum value of SAR (measured) = 0.012 mW/g



WORST-CASE SAR PLOT for 5.3 GHz Band

Date/Time: 6/18/2009 11:27:47 AM

Test Laboratory: Compliance Certification Services

802.11a 5.3GHz

DUT: Broadcom; Type: HP Laptop; Serial: NA

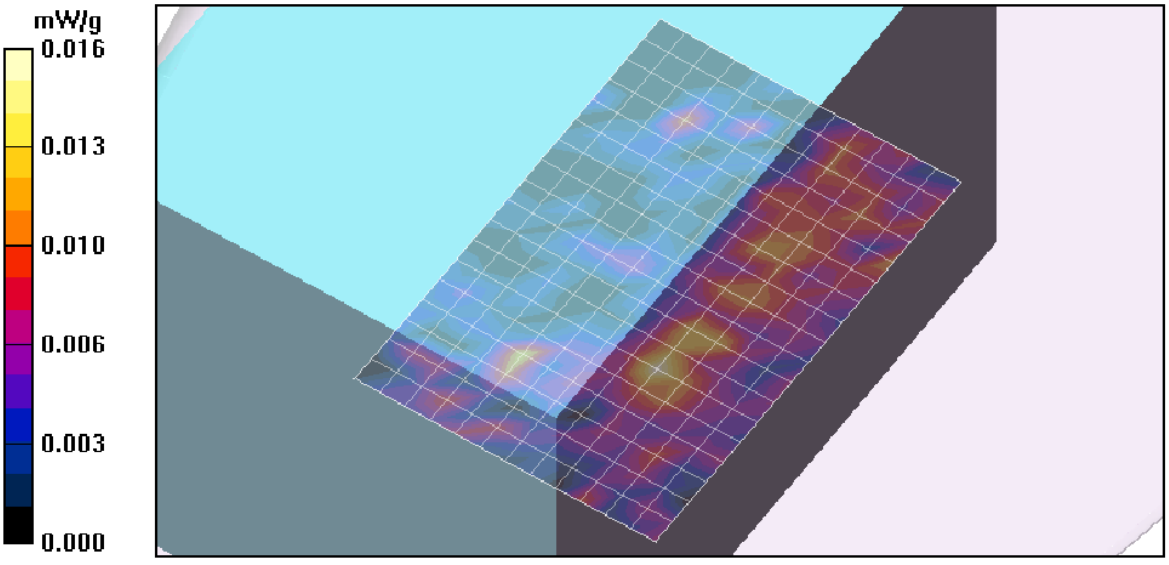
Communication System: 802.11abgn; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.48 mho/m; ε_r = 47.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(3.81, 3.81, 3.81); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, Main Ant/Area Scan (13x19x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.016 mW/g

Lapheld, Main Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 1.27 V/m; Power Drift = -4.92 dB
Peak SAR (extrapolated) = 0.110 W/kg
SAR(1 g) = 0.011 mW/g; SAR(10 g) = 0.00247 mW/g
Maximum value of SAR (measured) = 0.054 mW/g



WORST-CASE SAR PLOT for 5.5 GHz Band

Date/Time: 6/18/2009 1:52:30 PM

Test Laboratory: Compliance Certification Services

802.11a 5.5 GHz

DUT: Broadcom; Type: HP Laptop; Serial: NA

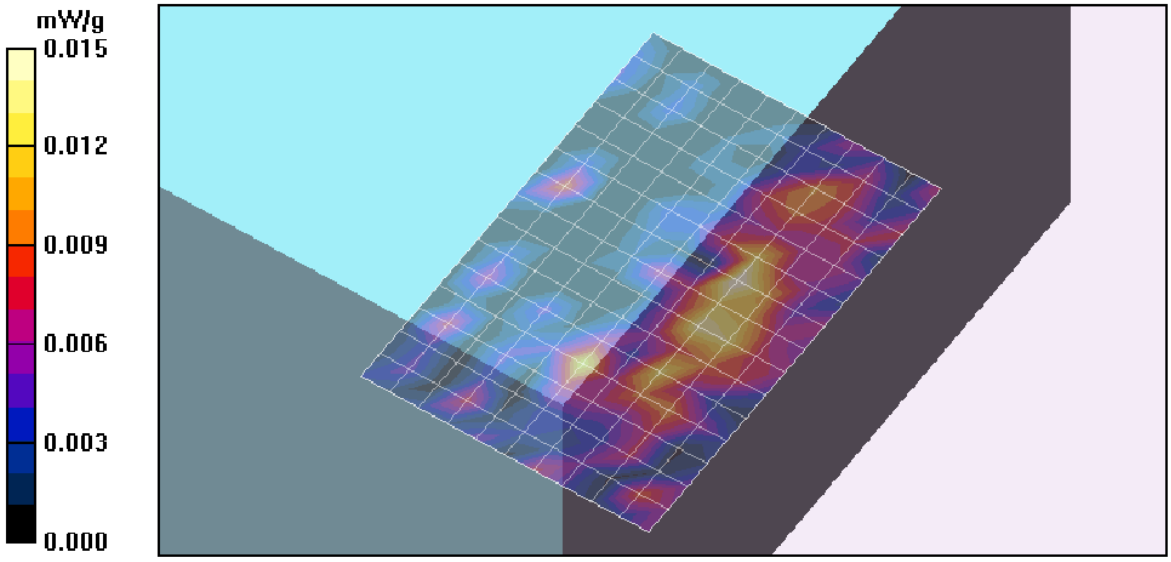
Communication System: 802.11abgn; Frequency: 5600 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.89 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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 - SN3686; ConvF(3.61, 3.61, 3.61); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, Main Ant/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.015 mW/g

Lapheld, Main Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 0.776 V/m; Power Drift = -0.740 dB
Peak SAR (extrapolated) = 0.060 W/kg
SAR(1 g) = 0.000272 mW/g; SAR(10 g) = 2.64e-005 mW/g
Maximum value of SAR (measured) = 0.259 mW/g



WORST-CASE SAR PLOT for 5.8 GHz Band

Date/Time: 6/18/2009 3:03:35 PM

Test Laboratory: Compliance Certification Services

802.11a 5.8 GHz

DUT: Broadcom; Type: HP Laptop; Serial: NA

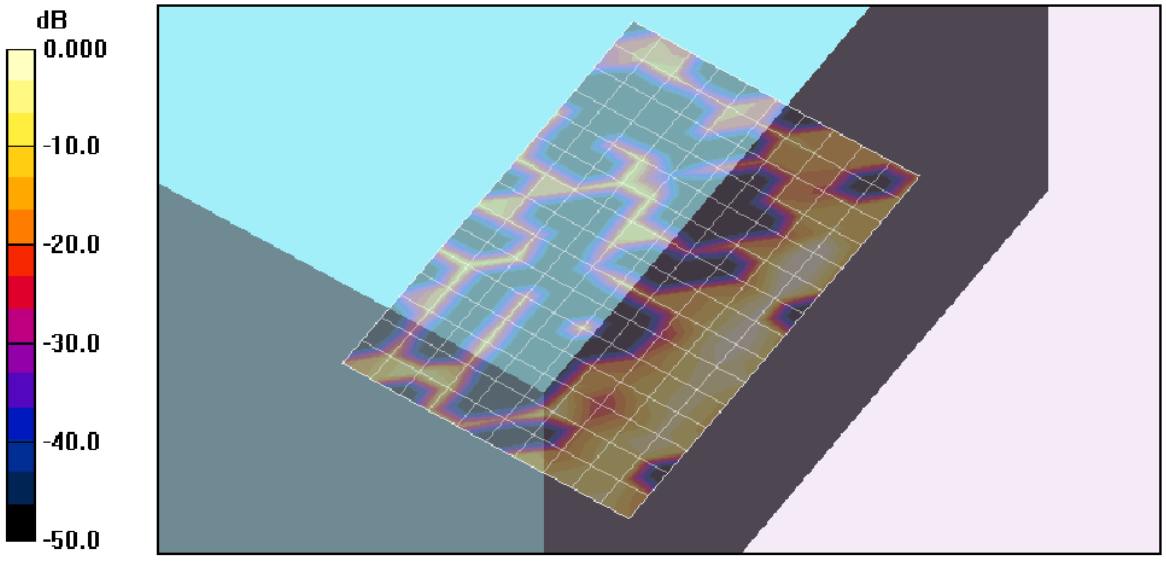
Communication System: 802.11abgn; Frequency: 5785 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5785 MHz; σ = 6.18 mho/m; ε_r = 46.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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(3.84, 3.84, 3.84); Calibrated: 3/23/2009
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 10/20/2008
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Lapheld, Main Ant/Area Scan (11x16x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.120 mW/g

Lapheld, Main Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 0.000 V/m; Power Drift = 0.000 dB
Peak SAR (extrapolated) = 0.044 W/kg
SAR(1 g) = 0.000493 mW/g; SAR(10 g) = 5.72e-005 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.060 mW/g



0 dB = 0.060mW/g

13. ATTACHMENTS

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