FCC OET BULLETIN 65 SUPPLEMENT C
IC RSS-102 ISSUE 4

SAR EVALUATION REPORT

For
802.11bgn 2x2 and Bluetooth Combo Module

MODEL: AR5B197

FCC ID: PPD-AR5B197
IC: 4104A-AR5B197

REPORT NUMBER: 10U13189-2A2

ISSUE DATE: September 27, 2010

Prepared for

ATHEROS COMMUNICATIONS, INC.
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054, U.S.A.

Prepared by

COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	June 2, 2010	Initial Issue	--
	August 23, 2010	-Change from original application to Class II permissive SAR test report -Reduce b mode output power and measure SAR testing with respect to power level certified in original filing -Added g mode SAR testing	Devin Chang
A	Sept 09, 2010	Revised based upon KDB 510165 response	Devin Chang
A1	September 22, 2010	Updated report, incl. the following Page 5: Updated KDB 616217 to "616217 D03 SAR Supp Note and Netbook Laptop V01" Page 5: Fixed typo "Electronic Probe kit" to Dielectric Probe Kit) Page 7: Updated "30 mm" to "3.0 cm", "52 mm" to "5.2 cm" and "17.9 cm" to "29.0 cm" Page 13: Updated "Cal. due date" to "Cal. date" Page 19, 20 and 21: Updated separation distance "17.9 cm" to "29 cm" Page 22, 23 and 24: Added separation distance of 15 cm from the end of antennas.	Sunny Shih
A2	September 27, 2010	Updated report based on reviewer's comments include: - Updated description in Section 1 and 5 - Renamed antenna configurations to "horizontal up/down" and "vertical up/down". - Added the following notes based on SAR distribution plots: .. 2 cm for horizontal up and down antenna configurations, and .. 9 cm for vertical up and down antenna configurations	Sunny Shih

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	ATHEROS COMMUNICATIONS, INC. 5480 GREAT AMERICA PARKWAY SANTA CLARA, CA 95054
EUT DESCRIPTION:	802.11bgn 2x2 and Bluetooth Combo Module
MODEL NUMBER:	AR5B197
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	May 24 - 25, 2010

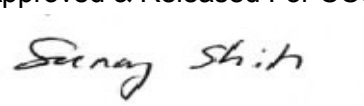
FCC / IC Rule Parts	Freq. Range [MHz]	The Highest 1g SAR mW/g)	Limit (mW/g)
15.247 / RSS-102	2412 - 2462 (b/g/n mode)	802.11g: 0.463 (Note: 0.4 is used per KDB inquiry 510165 for purpose of applying KDB 626217 Supplement procedures) - (Antenna Horizontal Up) with the most conservative antenna-to-user distance of 3 cm. - Antenna-to-antenna separation distance to prevent hot spot overlapping: 3 cm	1.6

Applicable Standards	Test Results
FCC OET Bulletin 65 Supplement C 01-01 IC RSS 102 Issue 4	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.

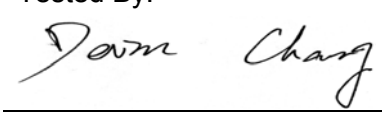
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this 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 (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

FCC OET Bulletin 65 Supplement C 01-01 and the following specific FCC test procedures:

- KDB 248227 SAR measurement procedures for 802.11a/b/g transmitters
- KDB 616217 D03 SAR Supplemental consideration for Notebook/Netbook/Laptop and Tablet

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		
Dielectric 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	EX3DV3	3531	2	23	2011
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
System Validation Dipole	SPEAG	D2450V2*	706	4	18	2013
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		

***Note:** Per KDB 450824 D02 requirements for dipole calibration, CCS has adopted three 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 (Attachment 3)
4. Impedance is within 5Ω of calibrated measurement (Attachment 4)

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) @ Body 2450 MHz	5.50	Normal	1	1	5.50
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	-3.08	Normal	1	0.64	-1.97
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement	-2.44	Normal	1	0.6	-1.46
				Combined Standard Uncertainty Uc(y) =	9.75
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.51 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.55 dB	

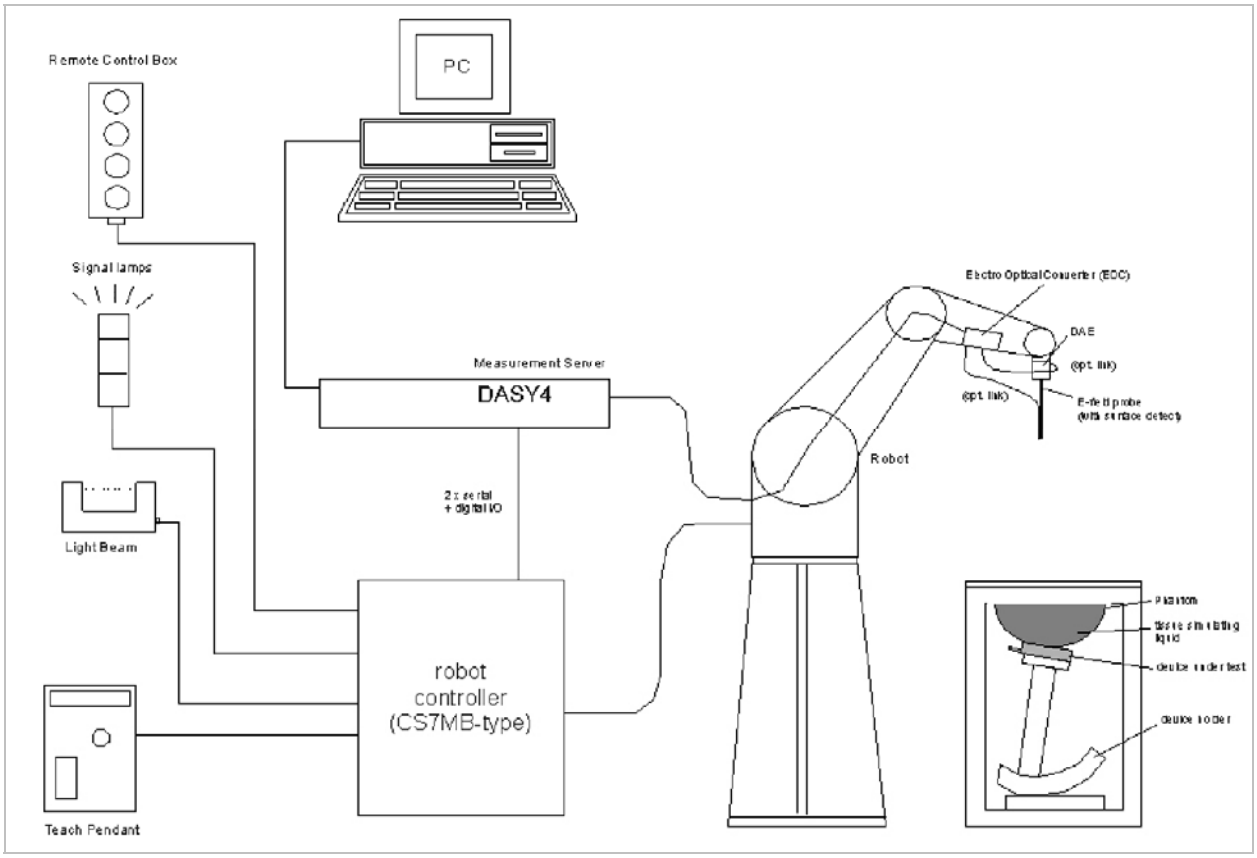
Measurement uncertainty for 300 MHz to 3 GHz averaged over 10 gram

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	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	0.30	Normal	1	1	0.30
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	1.00	Rectangular	1.732	1	0.58
Test Sample Related					
Test Sample Positioning	2.90	Normal	1	1	2.90
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.43	1.24
Liquid Conductivity - measurement	-3.08	Normal	1	0.43	-1.32
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.49	1.41
Liquid Permittivity - measurement uncertainty	-2.44	Normal	1	0.49	-1.20
				Combined Standard Uncertainty Uc(y), % =	9.46
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 18.91 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.50 dB	

5. EQUIPMENT UNDER TEST

802.11 bgn 2x2 and Bluetooth Combo Module		
Antenna tested:	Manufactured	Part number
	Wistron	Chain 0(Main): 81.EBJ15.005 Chain 1(Aux): 81.EBJ15.005
The most conservative antenna-to-user separation distances used during the test:	3.0 cm from Main/Aux antennas-to-user (refer to setup diagram in section 10.1)	
Antenna-to-antenna physical separation distances used during the test with horizontal placement	5.2 cm from Main (Chain 0)-to-Aux (Chain 1) antenna (refer to setup diagram in Section 10.2)	
Antenna-to-antenna physical separation distances used during the test with vertical placement	29.0 cm from Main (Chain 0)-to-Aux (Chain 1) antenna (refer to setup diagram in Section 10.1)	
The most conservative physical separation distance between Main/Aux antennas to avoid SAR distribution overlap.	3 cm for horizontal up and down antenna configurations (see page 31 - 34) 9 cm for vertical up and down antenna configurations (see page 27 - 30)	

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 validating the proper functioning of the system.

7. TISSUE DIELECTRIC 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. For frequencies in 300 MHz to 2 GHz, the measured conductivity and relative permittivity should be within ± 5% of the target values. For frequencies in the range of 2–3 GHz and above the measured conductivity should be within ± 5% of the target values. The measured relative permittivity tolerance can be relaxed to no more than ± 10%.

Reference Values of Tissue Dielectric Parameters for Body (for 300 – 3000 MHz and 5800 MHz)
The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

Target Frequency (MHz)	Body (Supplement C 01-01)	
	ε_r	σ (S/m)
300	58.20	0.92
450	56.70	0.94
835	55.20	0.97
900	55.00	1.05
915	55.00	1.06
1450	54.00	1.30
1610	53.80	1.40
1800 – 2000	53.30	1.52
2450	52.70	1.95
3000	52.00	2.73
5800	48.20	6.00

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

7.1. TISSUE PARAMETERS CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Body 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 41% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	51.42	Relative Permittivity (ϵ_r):	51.415	52.7	-2.44	± 5
	e"	13.98	Conductivity (σ):	1.905	1.95	-2.32	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
May 24, 2010 09:26 AM

Frequency	e'	e"
2400000000.	51.5960	13.7587
2405000000.	51.5665	13.7449
2410000000.	51.5435	13.7426
2415000000.	51.5137	13.7305
2420000000.	51.4823	13.7535
2425000000.	51.4722	13.7743
2430000000.	51.4513	13.8105
2435000000.	51.4231	13.8432
2440000000.	51.4123	13.8675
2445000000.	51.4143	13.9150
2450000000.	**51.4154**	**13.9754**
2455000000.	51.4115	14.0378
2460000000.	51.4009	14.0746
2465000000.	51.4211	14.1242
2470000000.	51.4102	14.1738
2475000000.	51.3963	14.2151
2480000000.	51.3778	14.2520
2485000000.	51.3671	14.2605
2490000000.	51.3414	14.2625
2495000000.	51.3091	14.2705
2500000000.	51.2847	14.2436

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

Simulating Liquid Dielectric Parameters for Body 2450 MHz

Room Ambient Temperature = 24°C; Relative humidity = 46% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	51.84	Relative Permittivity (ϵ_r):	51.844	52.7	-1.62	± 5
	e''	13.87	Conductivity (σ):	1.890	1.95	-3.08	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
May 25, 2010 08:37 AM

Frequency	e'	e''
2400000000.	52.0097	13.6356
2405000000.	51.9790	13.6594
2410000000.	51.9592	13.6741
2415000000.	51.9264	13.6672
2420000000.	51.9117	13.6925
2425000000.	51.8922	13.7134
2430000000.	51.8663	13.7291
2435000000.	51.8708	13.7528
2440000000.	51.8669	13.7706
2445000000.	51.8629	13.8105
2450000000.	**51.8437**	**13.8662**
2455000000.	51.8365	13.9042
2460000000.	51.8353	13.9176
2465000000.	51.8251	13.9538
2470000000.	51.8029	13.9759
2475000000.	51.7950	13.9968
2480000000.	51.7769	14.0156
2485000000.	51.7681	14.0290
2490000000.	51.7525	14.0484
2495000000.	51.7354	14.0670
2500000000.	51.7116	14.0581

The conductivity (σ) can be given as:

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

where f = target f * 10^6

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

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz
Room Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	53.03	Relative Permittivity (ϵ_r):	53.032	52.7	0.63	± 5
	e"	14.21	Conductivity (σ):	1.937	1.95	-0.69	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
July 25, 2010 9:42 AM

Frequency	e'	e"
2400000000	53.12801	13.96142
2405000000	53.11591	14.03482
2410000000	53.10131	14.10002
2415000000	53.09771	14.14352
2420000000	53.08381	14.16972
2425000000	53.07921	14.18792
2430000000	53.08491	14.18122
2435000000	53.06911	14.18732
2440000000	53.06471	14.20182
2445000000	53.03571	14.22952
2450000000	**53.03181**	**14.20862**
2455000000	52.96281	14.18522
2460000000	52.92671	14.15712
2465000000	52.86291	14.11992
2470000000	52.84751	14.07232
2475000000	52.83241	14.04812
2480000000	52.84021	14.05522
2485000000	52.83341	14.07432
2490000000	52.83581	14.13162
2495000000	52.83771	14.20542
2500000000	52.83281	14.30832

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. SYSTEM VERIFICATION

The system performance check is performed prior to any usage of the system in order to verify SAR system accuracy. The system performance check verifies that the system operates within its specifications of ±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 EX3DV3-SN: 3531 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 (2.4 GHz) fine cube was chosen for cube integration and Special 8x8x10 (5 GHz) fine cube was chosen for cube integration
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input powers (forward power) were 100 mW.
- The results are normalized to 1 W input power.

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

System validation dipole	Cal. certificate #	Cal. date	SAR Avg (mW/g)		
			Tissue:	Head	Body
D2450V2	D2450V2-706_Apr10	04/19/10	SAR_{1g}:	51.6	52.4
			SAR_{10g}:	24.4	24.5

8.1. SYSTEM CHECK RESULTS FOR D2450V2

Ambient Temperature = 24°C; Relative humidity = 38% Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D2450V2	05/18/10	SAR_{1g}:	52.5	52.4	0.19	±10
		SAR_{10g}:	24.3	24.5	-0.82	
D2450V2	07/25/10	SAR_{1g}:	52.0	52.4	-0.76	±10
		SAR_{10g}:	24.6	24.5	0.41	

SYSTEM CHECK PLOT

Date/Time: 5/24/2010 9:52:26 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

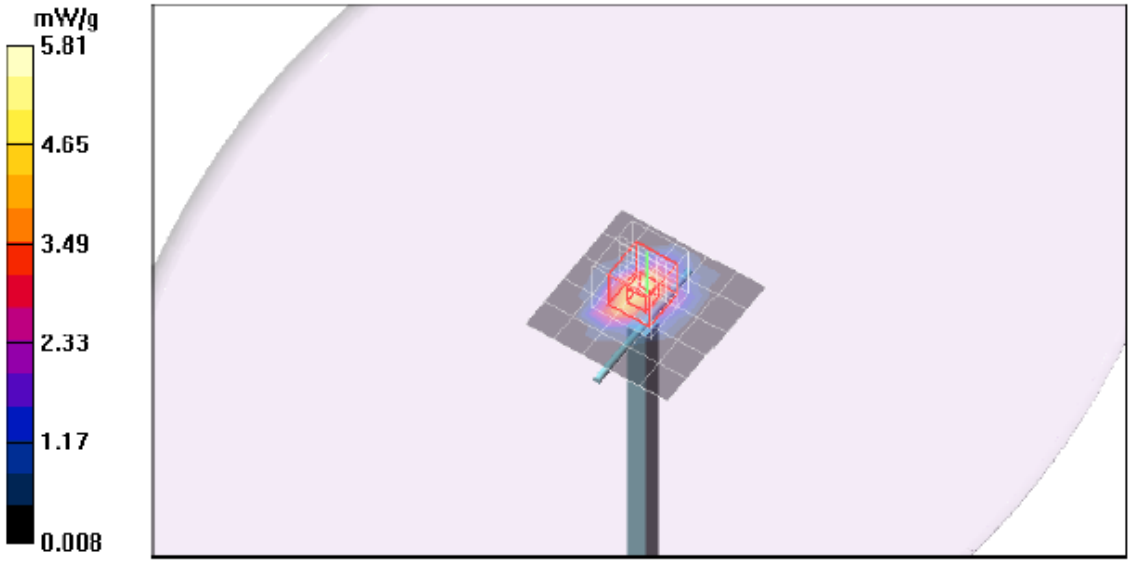
Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.9 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.81 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.7 V/m; Power Drift = 0.143 dB
Peak SAR (extrapolated) = 10.8 W/kg
SAR(1 g) = 5.25 mW/g; SAR(10 g) = 2.43 mW/g
Maximum value of SAR (measured) = 6.81 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 5/24/2010 10:08:16 AM

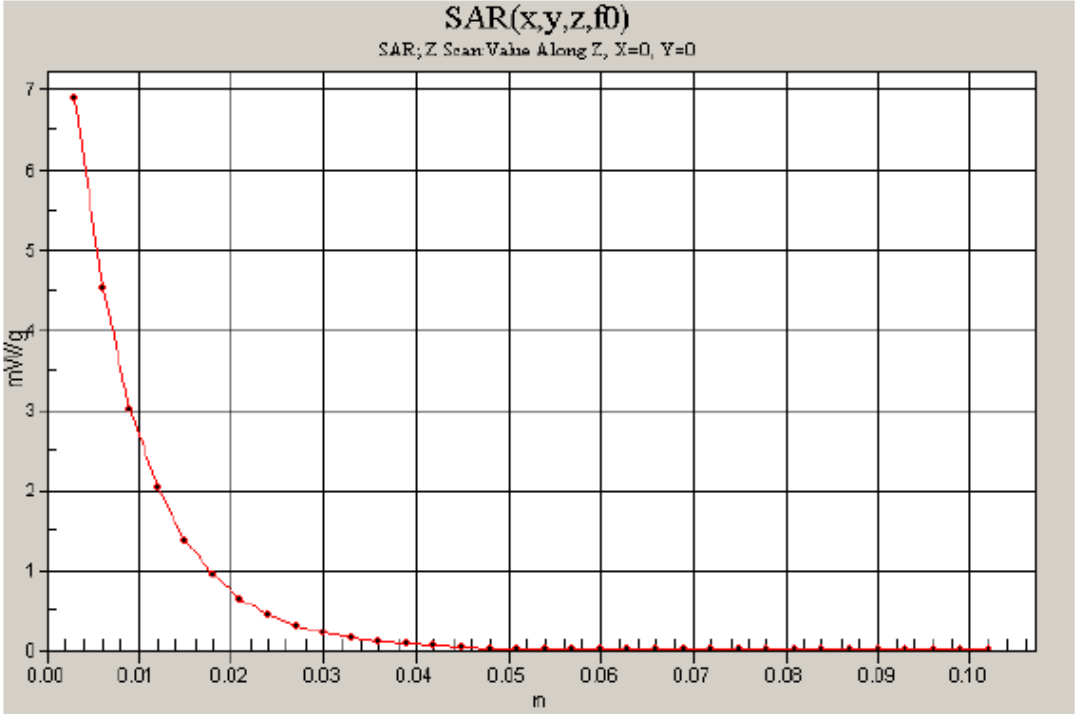
Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 6.88 mW/g



SYSTEM CHECK PLOT

Date/Time: 7/25/2010 10:45:26 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

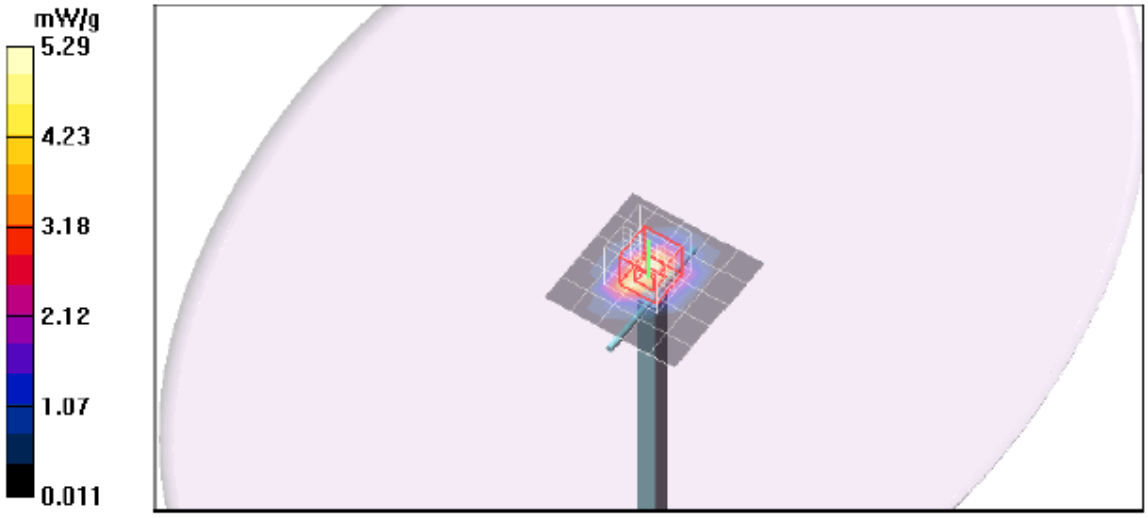
Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.94 mho/m; ε_r = 53; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.29 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.6 V/m; Power Drift = -0.061 dB
Peak SAR (extrapolated) = 10.4 W/kg
SAR(1 g) = 5.2 mW/g; SAR(10 g) = 2.46 mW/g
Maximum value of SAR (measured) = 6.75 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 7/25/2010 11:01:20 AM

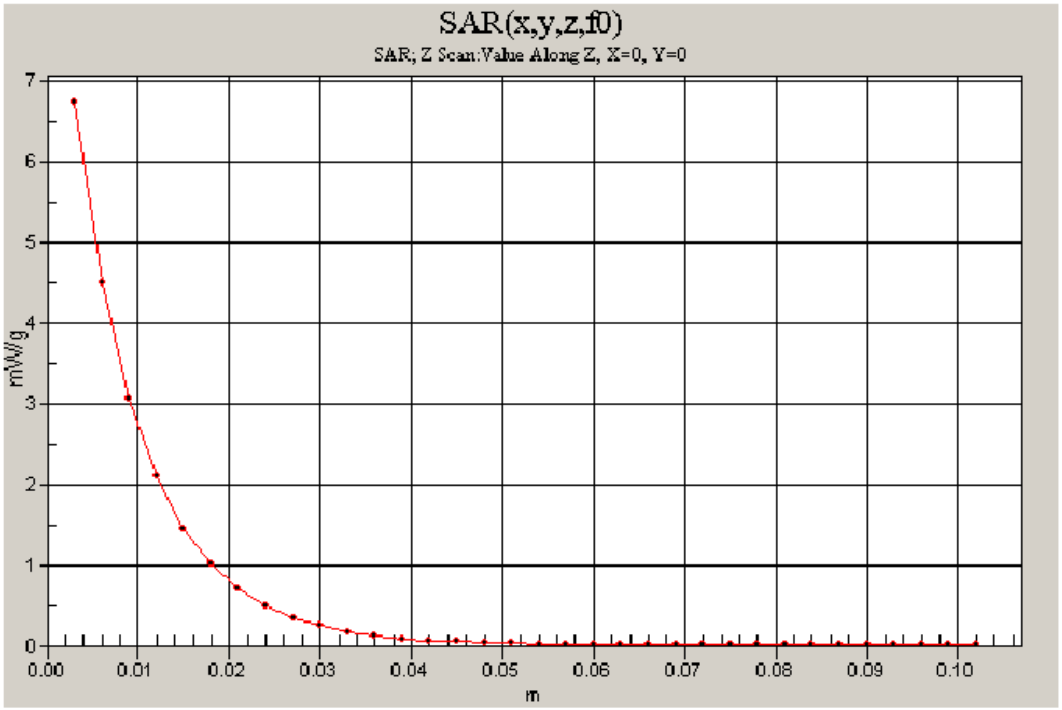
Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: Dipole ; Type: D2450V2; Serial: 706

Communication System: System Check Signal - CW; Frequency: 2450 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 6.74 mW/g



9. OUTPUT POWER VERIFICATION

Results

Mode	Channel	Freq. (MHz)	Average Output Power (dBm)		
			Chain 0	Chain 1	Total Power
802.11b	1	2412	14.2	14.5	17.4
	6	2437	14.2	14.4	17.3
	11	2462	15.2	15.1	18.2
802.11g	1	2412	13.7	14.3	17.0
	6	2437	16.2	16.6	19.4
	11	2462	12.8	12.1	15.5
802.11n HT20	1	2412	12.5	12.5	15.5
	6	2437	16.3	16.7	19.5
	11	2462	11.4	10.8	14.1
802.11n HT40	3	2412	10.3	10.2	13.3
	6	2437	13.2	13.5	16.4
	9	2462	9.4	9.1	12.3

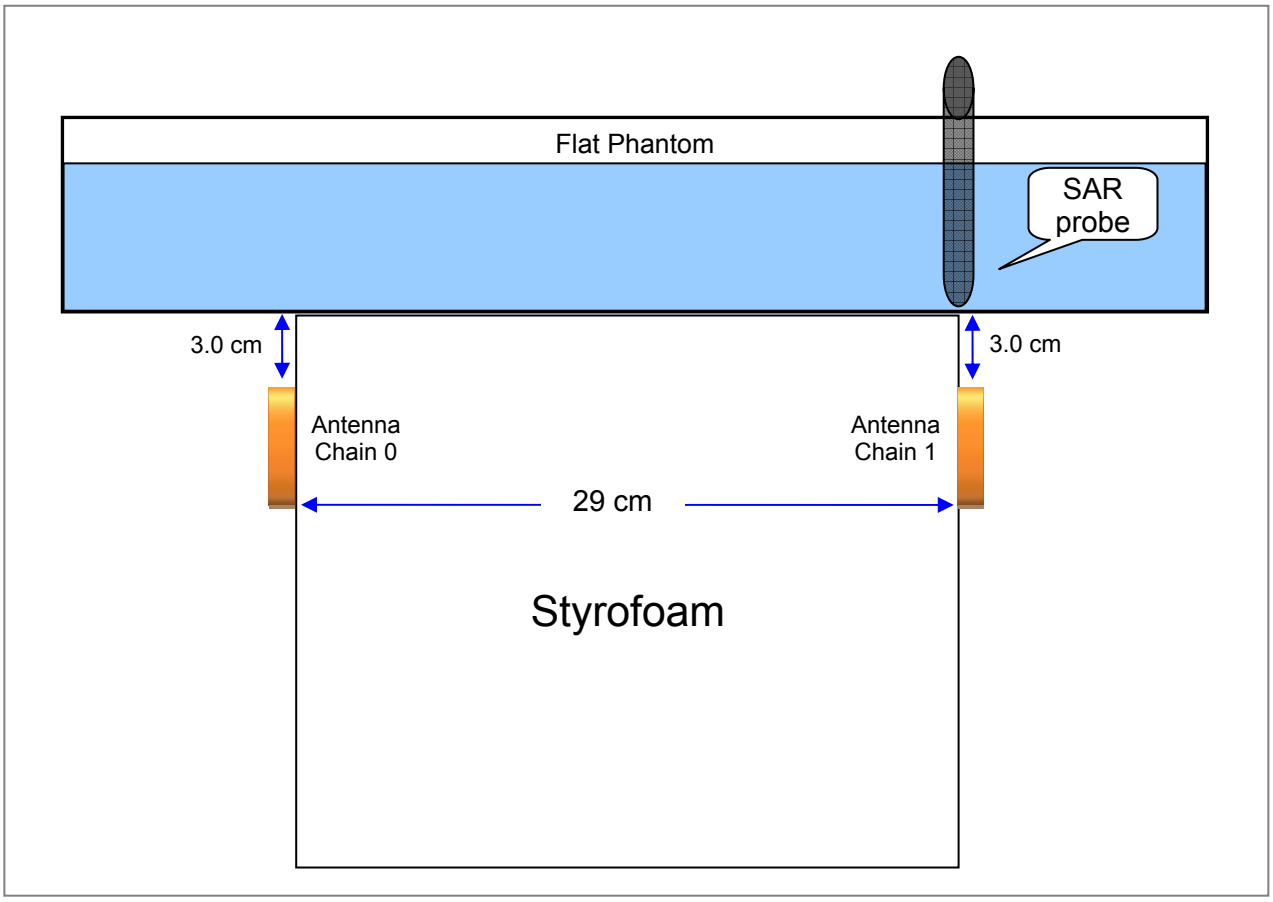
Note: During 802.11b, 802.11g, H20 and H40 mode of operaitons, both antennas are always transmitting simultenously. This module is not capable of single antnena transmitting mode in either b/g/H20/H40.
Single chain transmission is only occurred in the Bluetooth mode of operaiton.
HT20 average output power is within 0.1 dB of 802.11g highest output power thus only 802.11g mode of operation was selected for final SAR evaluation. HT40 average output power is about 3dB lower than 802.11g power thus HT40 was not tested during final SAR evaluation.

Bluetooth Output Power
Based upon test report/ RF990501E01-1 on file with FCC under FCC ID:PPD-AR5B197, the max. output power for GFSK modulation is 1.3 mW; 8DPSK modulation is 2.0 mW and π/4 DQPASK=1.7 mW. The highest output power is below low power threshold of 60/f(GHz).

10. SUMMARY OF SAR TEST RESULTS

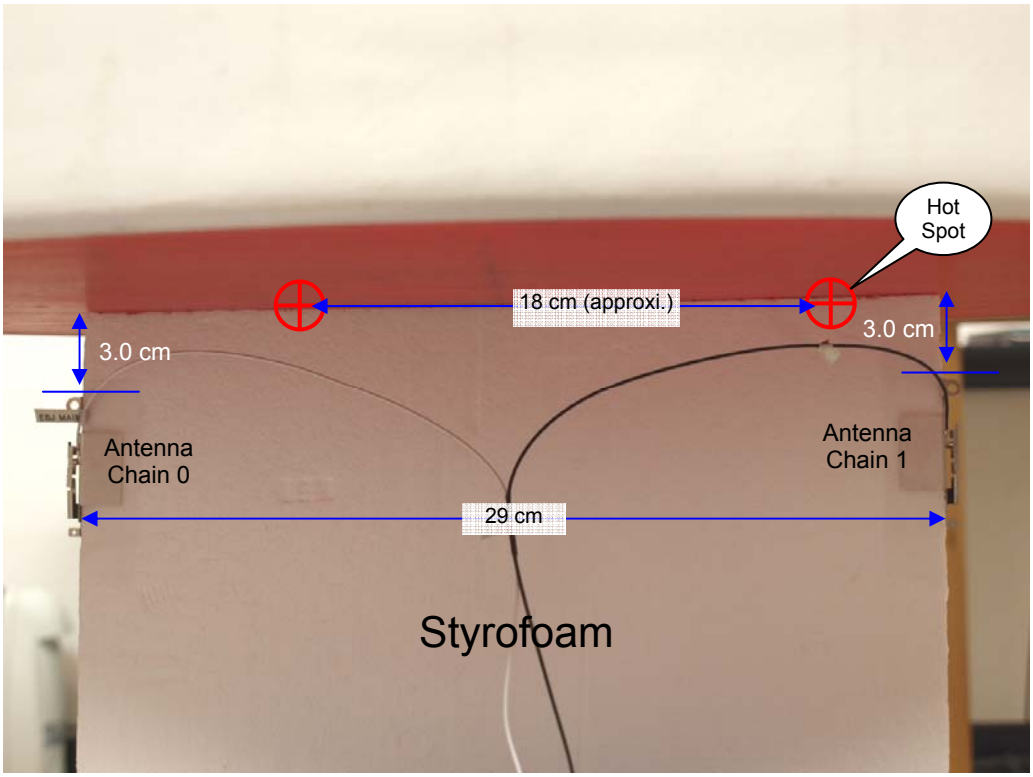
10.1. ANTENNA POSITIONED VERTICALLY

Setup diagram



10.1.1 SAR Test Result with Antenna Vertical Up

Test setup photo with Antenna Vertical Up (Bottom of antenna)



Test result

Mode	Channel	Freq. (MHz)	Avg Output Pwr		1-g SAR (W/kg)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b (2 x 2)	1	2412	14.2	14.5		
	6	2437	14.2	14.4		
	11	2462	15.2	15.1	0.089	0.067
802.11g (2 x 2)	1	2412	13.7	14.3		
	6	2437	16.2	16.6	0.160	0.167
	11	2462	12.8	12.1		

Note: KDB 248227: when the measured SAR value at the highest average output power is less than 0.8 W/kg, testing of other channels are optional.

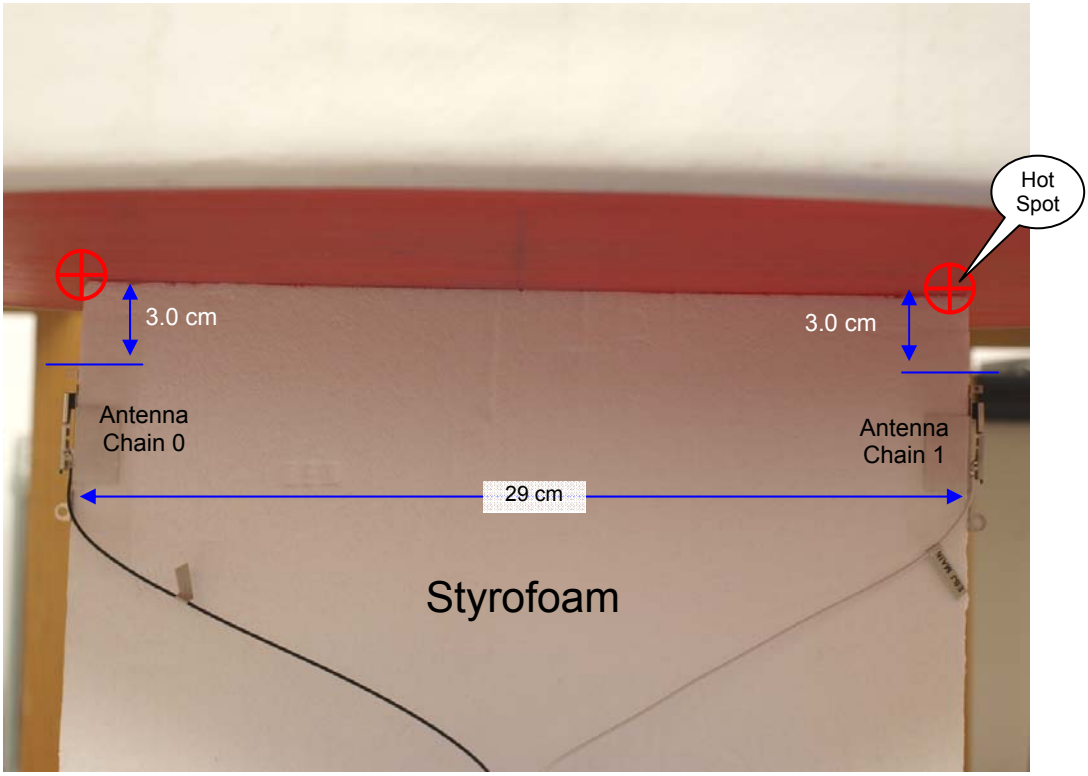
Test Reduction: Due the highest measured SAR value at the highest average output power is less than 0.8 W/kg, other channels are not tested.

Based upon SAR distribution plot in page 27 and 28 of this report, SAR hot spot will be distributed in approx. 6 grids with 1.5 cm x 1.5 cm dimension for each grid. To prevent SAR overlapping and contribute higher SAR value which main and aux are transmitting simultaneously, Main-to-Aux antenna separation shall be separated by more than 6 grids (1.5 cm x 6) = 9 cm.

SAR hot spot observation: The hot spot is not distributed near the antenna elements but at the closest point of each antenna cable.

10.2.1 SAR Test Result with Antenna Vertical Down

Test setup photo with Antenna Vertical Down (Tip of antenna)



Test result

Mode	Channel	Freq. (MHz)	Avg Output Pwr		1-g SAR (W/kg)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b (2 x 2)	1	2412	14.2	14.5		
	6	2437	14.2	14.4		
	11	2462	15.2	15.1	0.020	0.025
802.11g (2 x 2)	1	2412	13.7	14.3		
	6	2437	16.2	16.6	0.030	0.029
	11	2462	12.8	12.1		

Note: KDB 248227: when the measured SAR value at the highest average output power is less than 0.8 W/kg, testing of other channels are optional.

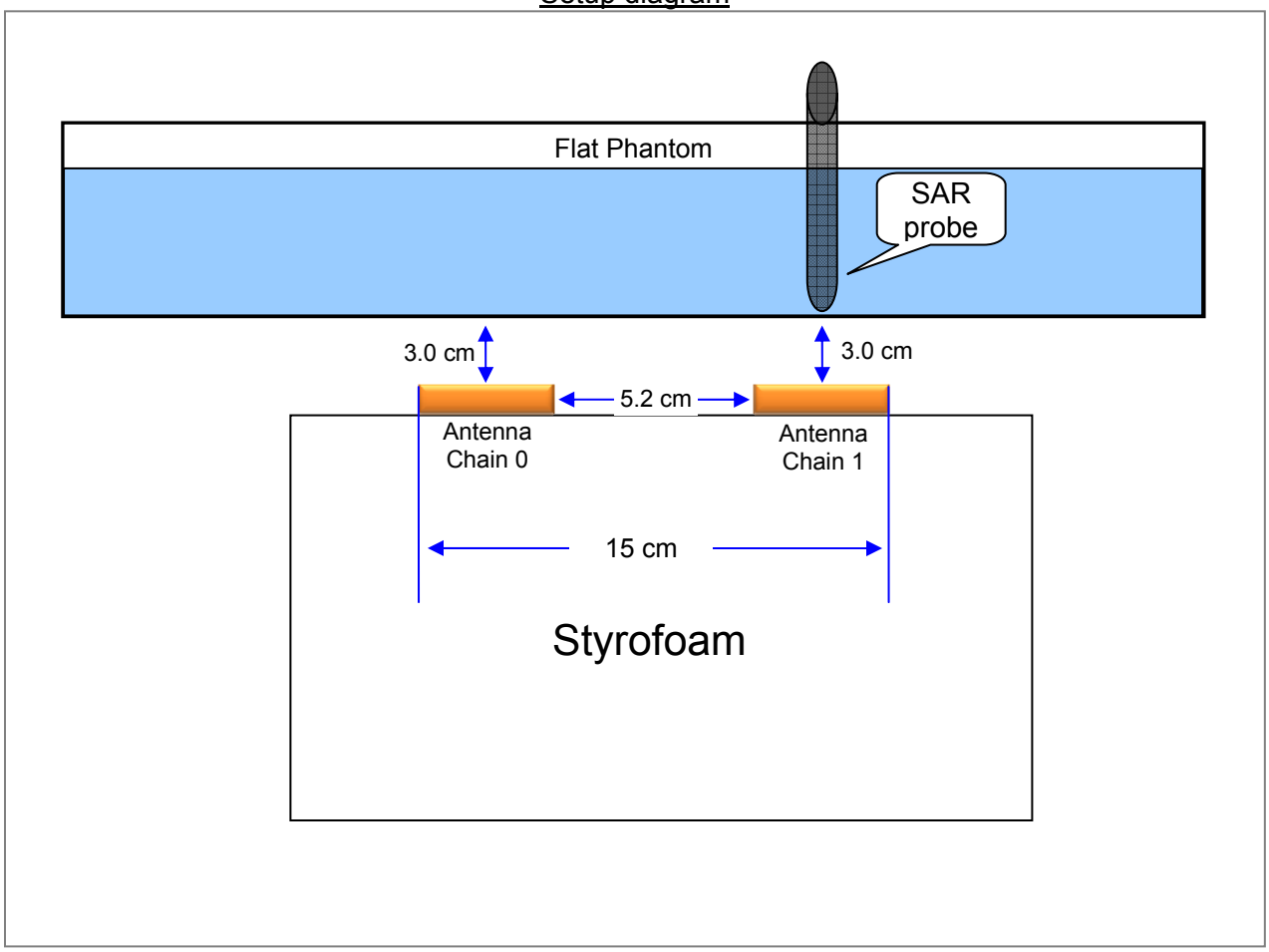
Test Reduction: Due the highest measured SAR value at the highest average output power is less than 0.8 W/kg, other channels are not tested.

Based upon SAR distribution plot in page 29 and 30 of this report, SAR hot spot will be distributed in approx. 6 grids with 1.5 cm x 1.5 cm dimension for each grid. To prevent SAR overlapping and contribute higher SAR value which main and aux are transmitting simultaneously, Main-to-Aux antenna separation shall be separated by more than 6 grids (1.5 cm x 6) = 9 cm.

Hot Spot observation: Hot spots are distributed at proximity of antenna elements.

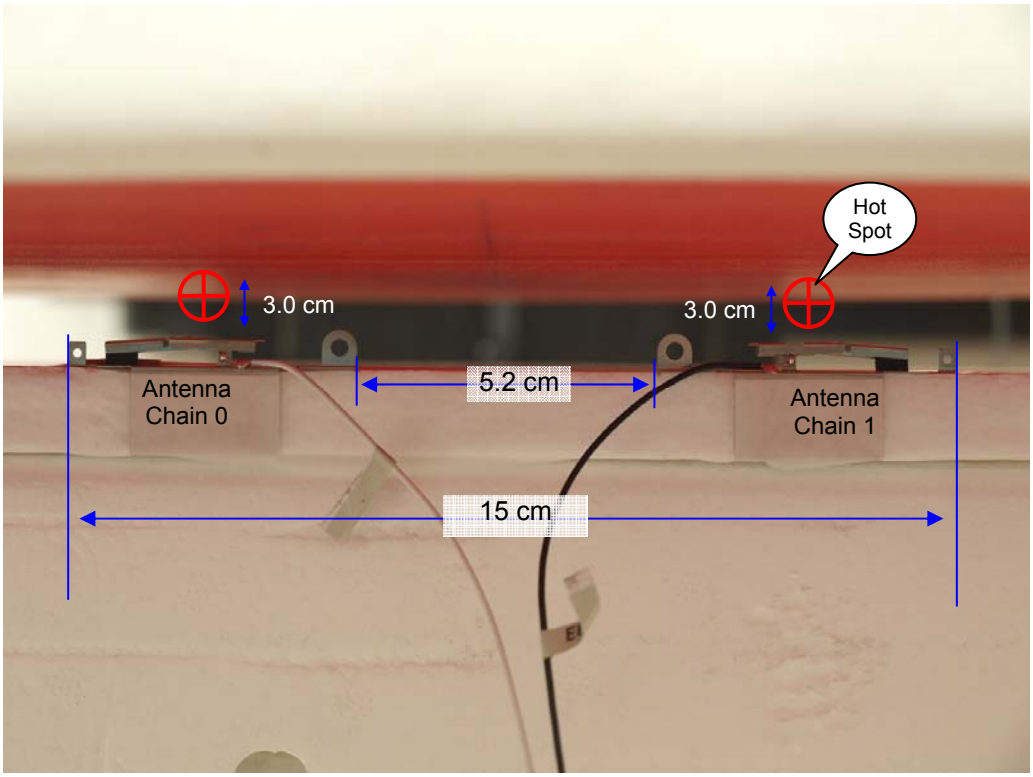
10.2. ANTENNA POSITIONED HORIZONTALLY

Setup diagram



10.2.2 SAR Test Result with Antenna Horizontal Up

Test setup photo with Antenna Horizontal Up



Test result

Mode	Channel	Freq. (MHz)	Avg Output Pwr		1-g SAR (W/kg)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b (2 x 2)	1	2412	14.2	14.5		
	6	2437	14.2	14.4		
	11	2462	15.2	15.1	0.280	0.322
802.11g (2 x 2)	1	2412	13.7	14.3		
	6	2437	16.2	16.6	0.401	0.463
	11	2462	12.8	12.1		

Note: KDB 248227: when the measured SAR value at the highest average output power is less than 0.8 W/kg, testing of other channels are optional.

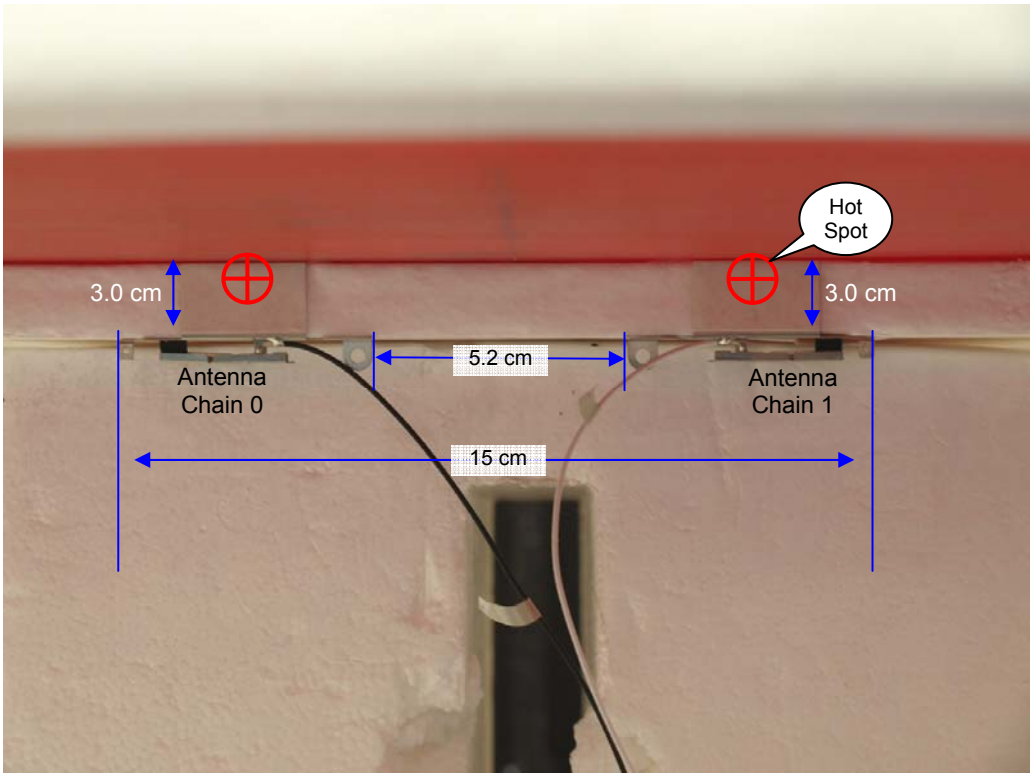
Test Reduction: Due the highest measured SAR value at the highest average output power is less than 0.8 W/kg, other channels are not tested.

Based upon SAR distribution plot in page 31 and 32 of this report, SAR hot spot will be distributed in approx. 2 grids with 1.5 cm x 1.5 cm dimension for each grid. To prevent SAR overlapping and contribute higher SAR value which main and aux are transmitting simultaneously, Main-to-Aux antenna separation shall be separated by more than 2 grids (1.5 cm x 2) = 3 cm.

SAR hot spots observation: The hot spot is near the center of antenna element.

10.2.3 SAR Test Result with Antenna Horizontal Down

Test setup photo with Antenna Horizontal Down



Test result

Mode	Channel	Freq. (MHz)	Avg Output Pwr		1-g SAR (W/kg)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b (2 x 2)	1	2412	14.2	14.5		
	6	2437	14.2	14.4		
	11	2462	15.2	15.1	0.271	0.266
802.11g (2 x 2)	1	2412	13.7	14.3		
	6	2437	16.2	16.6	0.238	0.379
	11	2462	12.8	12.1		

Note: KDB 248227: when the measured SAR value at the highest average output power is less than 0.8 W/kg, testing of other channels are optional.

Test Reduction: Due the highest measured SAR value at the highest average output power is less than 0.8 W/kg, other channels are not tested.

Based upon SAR distribution plot in page 33 and 34 of this report, SAR hot spot will be distributed in approx. 2 grids with 1.5 cm x 1.5 cm dimension for each grid. To prevent SAR overlapping and contribute higher SAR value which main and aux are transmitting simultaneously, Main-to-Aux antenna separation shall be separated by more than 2 grids (1.5 cm x 2) = 3 cm.

SAR hot spots observation: The hot spot is near the center of antenna element.

11. Enhanced Energy Coupling

According to KDB 616217 in referencing to KDB 447498, the test configuration with the highest 1-g SAR must be used to determine if additional SAR evaluation is required due to enhanced energy coupling at increased separation distances.

From the test results below, additional 1-g SAR evaluation is not required.

Worst-case test configuration	Band	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Antenna Horizontal 1 (Up)	2.4 GHz	Initial	3	0.463	17.18	
		1	3.5	0.28	13.38	60.7%
		2	4	0.18	10.64	38.4%

Due to the highest measured SAR value is 0.463 W/kg, thus only the most conservative configuration with highest measured SAR was tested.

Note: See section 10.2.1 worst-case test setup photo for most conservative SAR.

12. SAR Test Procedures

12.1. DASY4 SAR MEASURMENT PROCEDURE

Step 1: Power Reference Measurement

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

Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY4 software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in dB) is specified in the standards for compliance testing. For example, a 2 dB range is required in IEEE Standard 1528, EN 50361 and IEC 62209 standards, whereby 3 dB is a requirement when compliance is assessed in accordance with the ARIB standard (Japan). If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly.

1. When the antennas are positioned at vertical orientation, at least 7x27x1 dimension was used to capture entire radiating elements.
2. When the antennas are positioned at horizontal orientation, at least 6x13x1 dimension was used to capture entire radiating elements.

Step 3: Zoom Scan

Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. Two independent Zoom Scan procedures with 7x7x9 mm zoom scan grid points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. Each of hot spot was labeled with cube 0. Due to two antennas are transmitting simultaneously, two cube 0s were reported to present individual hot spot. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement

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

Step 5: Z-Scan

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

13. SAR TEST PLOTS

SAR Plot for Antenna Vertical Up - 802.11b Mode

Date/Time: 7/25/2010 3:07:54 PM

Test Laboratory: Compliance Certification Services

Antenna Vertical Up

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.94 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

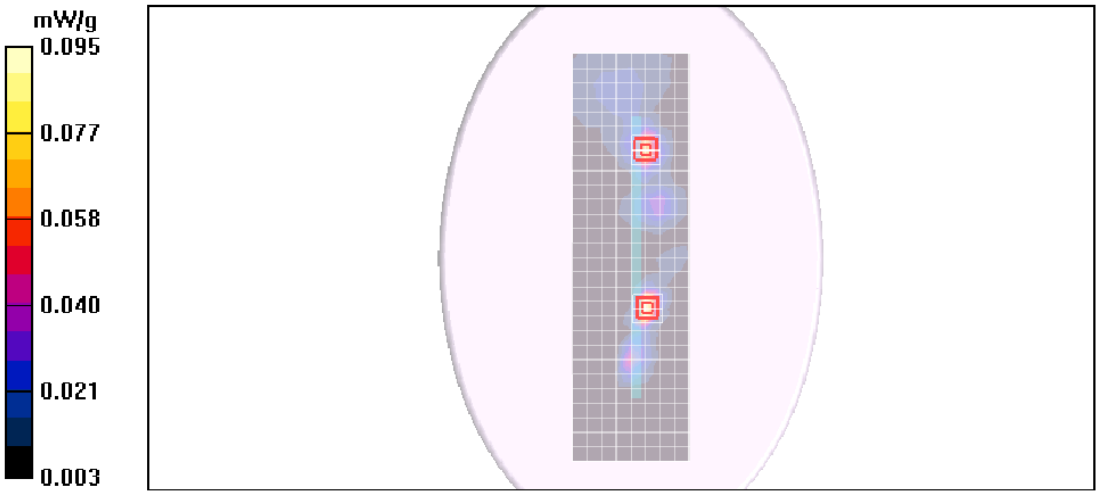
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11b H-ch Mian&Aux Ant/Area Scan (9x29x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.095 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 7.05 V/m; Power Drift = -0.134 dB
Peak SAR (extrapolated) = 0.204 W/kg
SAR(1 g) = 0.089 mW/g; SAR(10 g) = 0.041 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.120 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 7.05 V/m; Power Drift = -0.134 dB
Peak SAR (extrapolated) = 0.130 W/kg
SAR(1 g) = 0.067 mW/g; SAR(10 g) = 0.035 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.087 mW/g



SAR Plot for Antenna Vertical Up - 802.11g Mode

Date/Time: 7/25/2010 4:04:12 PM

Test Laboratory: Compliance Certification Services

Antenna Vertical Up

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.94 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

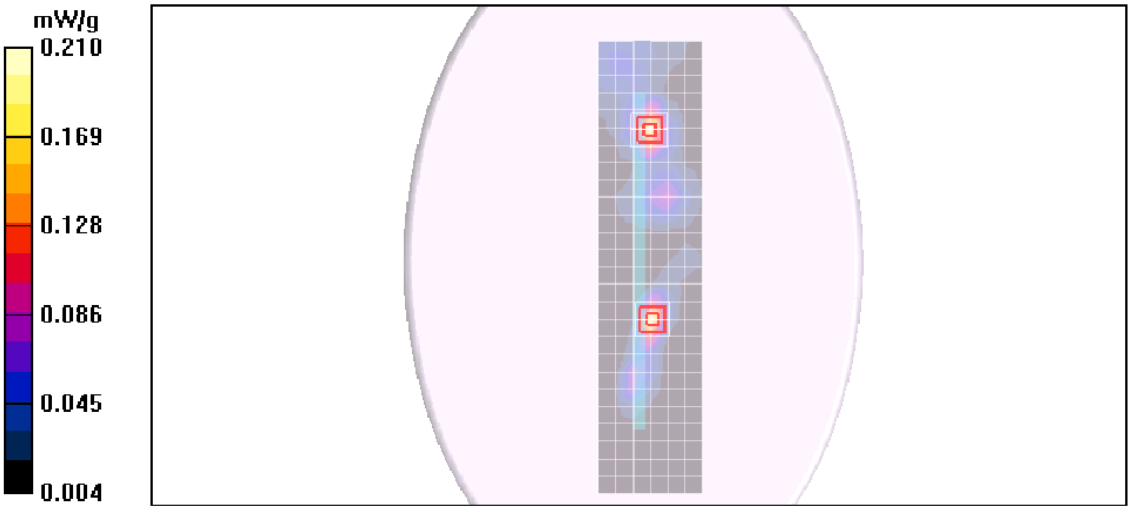
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11g M-ch Mian&Aux Ant/Area Scan (7x27x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.210 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 10.5 V/m; Power Drift = -0.162 dB
Peak SAR (extrapolated) = 0.367 W/kg
SAR(1 g) = 0.160 mW/g; SAR(10 g) = 0.072 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.219 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 10.5 V/m; Power Drift = -0.162 dB
Peak SAR (extrapolated) = 0.327 W/kg
SAR(1 g) = 0.167 mW/g; SAR(10 g) = 0.085 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.212 mW/g



SAR Plot for Antenna Vertical Down - 802.11b Mode

Date/Time: 7/25/2010 5:49:46 PM

Test Laboratory: Compliance Certification Services

Antenna Vertical Down

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.94 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

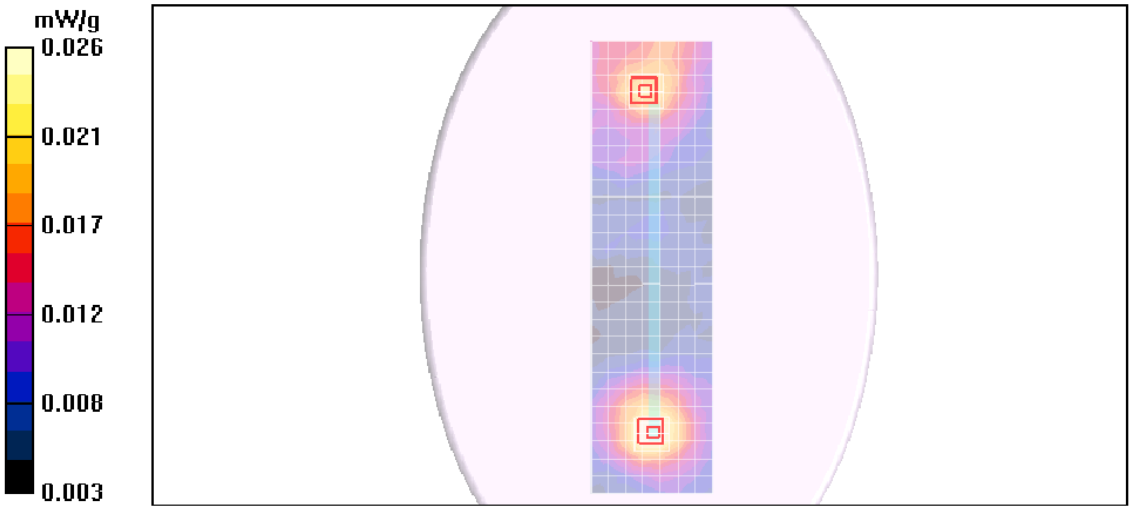
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11b H-ch Mian&Aux Ant/Area Scan (8x27x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.026 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.71 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 0.036 W/kg
SAR(1 g) = 0.020 mW/g; SAR(10 g) = 0.014 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.024 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 3.71 V/m; Power Drift = 0.082 dB
Peak SAR (extrapolated) = 0.043 W/kg
SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.016 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.029 mW/g



SAR Plot for Antenna Vertical Down - 802.11g Mode

Date/Time: 7/25/2010 4:59:13 PM

Test Laboratory: Compliance Certification Services

Antenna Vertical Down

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.92 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

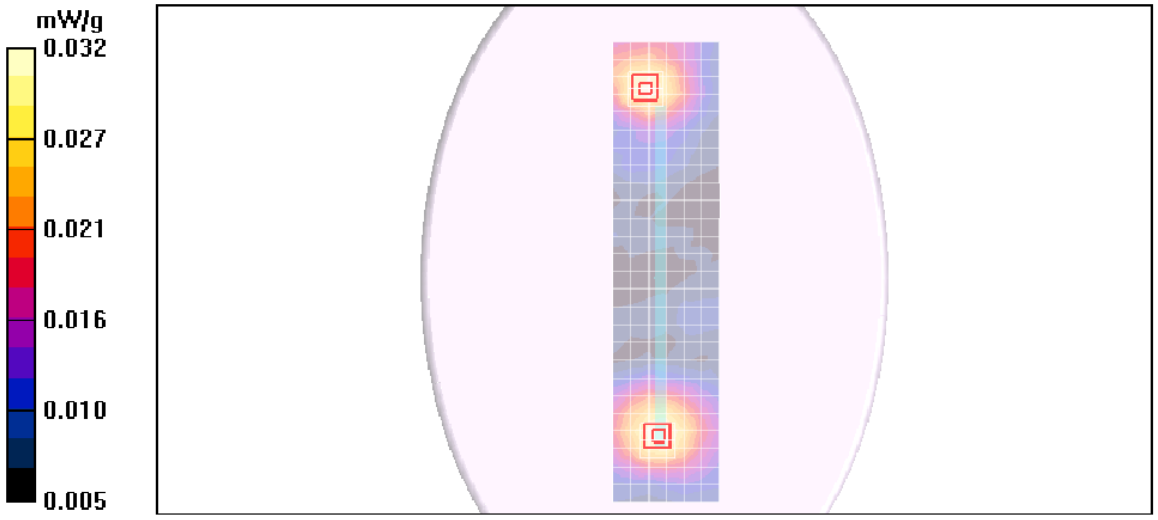
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11g M-ch Mian&Aux Ant/Area Scan (7x27x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.032 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.20 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.051 W/kg
SAR(1 g) = 0.030 mW/g; SAR(10 g) = 0.019 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.035 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 4.20 V/m; Power Drift = -0.044 dB
Peak SAR (extrapolated) = 0.046 W/kg
SAR(1 g) = 0.029 mW/g; SAR(10 g) = 0.019 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.033 mW/g



SAR Plot for Antenna Horizontal Up - 802.11b Mode

Date/Time: 7/25/2010 9:32:47 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.94 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

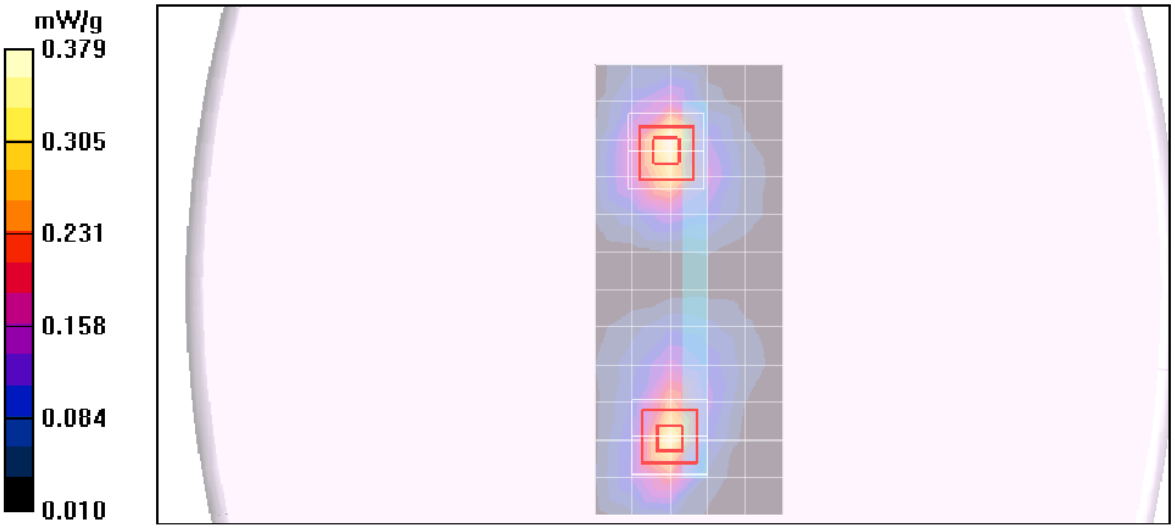
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11b H-ch Mian&Aux Ant/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.379 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 14.0 V/m; Power Drift = 0.177 dB
Peak SAR (extrapolated) = 0.526 W/kg
SAR(1 g) = 0.280 mW/g; SAR(10 g) = 0.142 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.354 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 14.0 V/m; Power Drift = 0.177 dB
Peak SAR (extrapolated) = 0.600 W/kg
SAR(1 g) = 0.322 mW/g; SAR(10 g) = 0.168 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.408 mW/g



SAR Plot for Antenna Horizontal Up - 802.11g mode

Date/Time: 7/25/2010 8:26:23 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.92 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

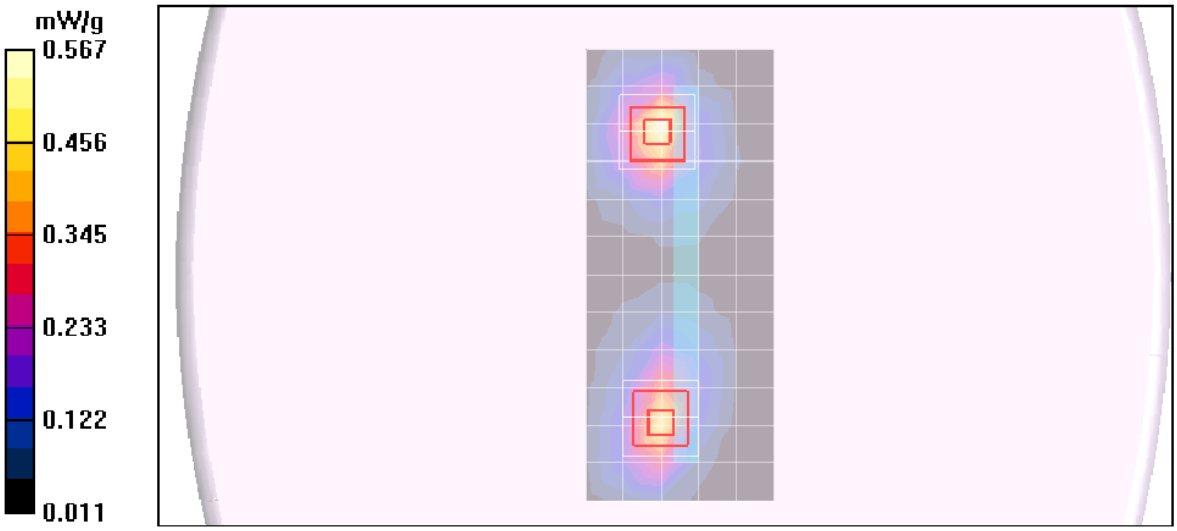
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11g M-ch Mian&Aux Ant/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.567 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 17.2 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.751 W/kg
SAR(1 g) = 0.401 mW/g; SAR(10 g) = 0.205 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.505 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 17.2 V/m; Power Drift = 0.094 dB
Peak SAR (extrapolated) = 0.862 W/kg
SAR(1 g) = 0.463 mW/g; SAR(10 g) = 0.236 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.589 mW/g



SAR Plot for Antenna Horizontal Down - 802.11b Mode

Date/Time: 7/25/2010 6:53:28 PM

Test Laboratory: Compliance Certification Services

Antenna Horizonta Down

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.94 mho/m; ε_r = 52.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

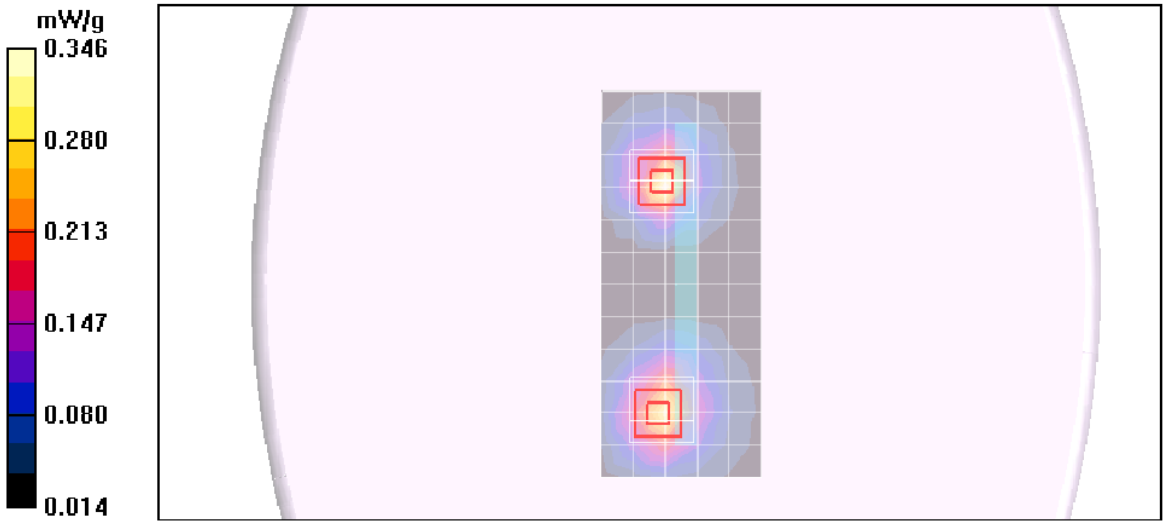
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11b H-ch Mian&Aux Ant/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.346 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.4 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 0.588 W/kg
SAR(1 g) = 0.271 mW/g; SAR(10 g) = 0.136 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.350 mW/g

802.11b H-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 13.4 V/m; Power Drift = -0.079 dB
Peak SAR (extrapolated) = 0.502 W/kg
SAR(1 g) = 0.266 mW/g; SAR(10 g) = 0.139 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.330 mW/g



SAR Plot for Antenna Horizontal Down - 802.11g Mode

Date/Time: 7/25/2010 7:35:27 PM

Test Laboratory: Compliance Certification Services

Antenna Horizonta Down

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11bg; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.92 mho/m; ε_r = 53.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

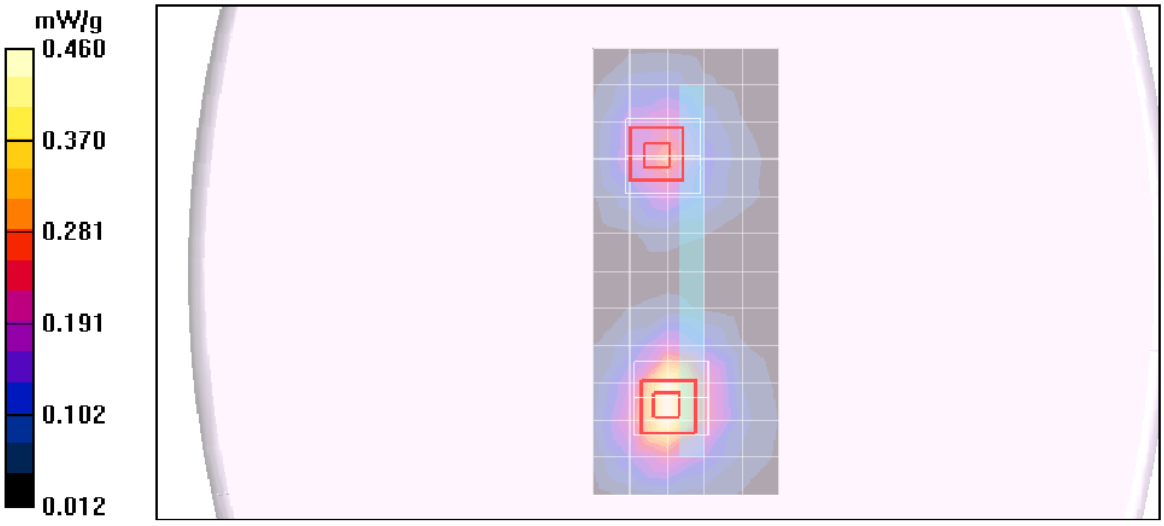
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- 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

802.11g M-ch Mian&Aux Ant/Area Scan (6x13x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.460 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Main) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 15.3 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 0.475 W/kg
SAR(1 g) = 0.238 mW/g; SAR(10 g) = 0.127 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.294 mW/g

802.11g M-ch Mian&Aux Ant/Zoom Scan (Aux) (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 15.3 V/m; Power Drift = 0.004 dB
Peak SAR (extrapolated) = 0.753 W/kg
SAR(1 g) = 0.379 mW/g; SAR(10 g) = 0.202 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.472 mW/g



14. ATTACHMENTS

No.	Contents	No. of page (s)
1	Certificate of E-Field Probe - EX3DV3 SN 3531	11
2	Certificate of System Validation Dipole - D2450 SN:706	9
3	Dipole return loss measurement	1
4	Dipole Impedance measurement	1

END OF REPORT