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

SAR EVALUATION REPORT

For
AR5BHB116 2x2 802.11n PCIe Module

MODEL: AR5BHB116

FCC ID: PPD-AR5BHB116
IC: 4104A-AR5BHB116

REPORT NUMBER: 10U13190-1B

ISSUE DATE: December 10, 2010

Prepared for

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1700 TECHNOLOGY DR
SAN JOSE, CA 95110

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	November 1, 2010	Initial Issue	--
A	November 9, 2010	Added SAR Measurement Procedures in section 10	Sunny Shih
A1	November 10, 2010	Updated section 6 per reviewer's comment	Sunny Shih
B	December 10, 2010	Additional test due to increased antenna-to-phantom's separation distance from 1.0 cm to 1.5 cm.	Sunny shih

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1. ATTESTATION OF TEST RESULTS

Tested for:	ATHEROS COMMUNICATIONS, INC. 1700 TECHNOLOGY DR SAN JOSE, CA 95110
EUT description:	AR5BHB116 2x2 802.11n PCIe Module
Model number:	AR5BHB116
Device category:	Portable
Exposure category:	General Population/Uncontrolled Exposure
Date tested:	2.4 GHz band: October 15, 2010 and December 9, 2010 5 GHz bands: October 17 - 20, 2010 and December 5, 2010

FCC / IC Rule Parts	Freq. Range [MHz]	The Highest 1g SAR mW/g)	Limit (mW/g)
15.247 / RSS-102	2412 - 2462	0.396 (Antenna Horizontal Up)	1.6
15.407 / RSS-102	5150 – 5250	0.254 (Antenna Horizontal Up)	
	5250 – 5350	0.260 (Antenna Horizontal Up)	
	5500 – 5700	0.398 (Antenna Horizontal Up)	
15.247 / RSS-102	5725 – 5850	0.330 (Antenna Horizontal Up)	

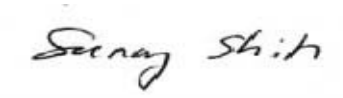
The most conservative antenna-to-user separation distances used during the test:	1.5 cm (refer to setup diagram in section 6.1 and 6.2)
Antenna-to-antenna separation distance to prevent hot spot overlapping:	3.0 cm (refer to SAR plots)

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

Compliance Certification Services, Inc. (UL CCS) tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL CCS based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

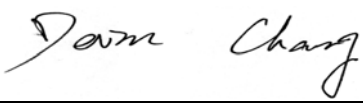
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL CCS and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL CCS will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released For UL CCS By:



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

Tested By:



Devin Chang
EMC Engineer
Compliance Certification Services (UL CCS)

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.

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
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
S-Parameter Network Analyzer	Agilent	E5071B	MY42100131	8	2	2011
Signal Generator	Agilent	E5071B	MY42100131	8	2	2011
E-Field Probe	SPEAG	EX3DV3	3531	2	23	2011
Data Acquisition Electronics	SPEAG	DAE3 V1	427	7	21	2011
System Validation Dipole	SPEAG	D2450V2	706	4	19	2013
System Validation Dipole	SPEAG	D5GHzV2	1075	9	3	2012
Thermometer	ERTCO	639-1S	1718	7	19	2011
Power Meter	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	Boonton	4541	12414	2	26	2011
Power Sensor	Boonton	57006	6871	2	23	2011
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPEAG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPEAG	M5800 (5-5.8GHz)	N/A	Within 24 hrs of first test		

Note: Per KDB 450824 D02 requirements for dipole calibration, UL 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
4. Impedance is within 5Ω of calibrated measurement

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	2.03	Normal	1	0.64	1.30
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement	-1.11	Normal	1	0.6	-0.67
				Combined Standard Uncertainty Uc(y) =	9.55
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 19.11 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.52 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) @ 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	0.43	1.24
Liquid Conductivity - measurement	2.03	Normal	1	0.43	0.87
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.49	1.41
Liquid Permittivity - measurement uncertainty	-1.11	Normal	1	0.49	-0.54
				Combined Standard Uncertainty Uc(y), % =	9.34
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 18.69 %	
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence = 1.49 dB	

3 to 6 GHz averaged over 1 gram

Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 5GHz	6.55	Normal	1	1	6.55
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	3.45	Rectangular	1.732	1	1.99
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.64	1.85
Liquid Conductivity - measurement	3.74	Normal	1	0.64	2.39
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	-6.41	Normal	1	0.6	-3.85
Combined Standard Uncertainty Uc(y), %:					11.39
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				22.33	%
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.75	dB

3 to 6 GHz averaged over 10 gram

Component	error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1) @ 5GHz	6.55	Normal	1	1	6.55
Axial Isotropy	4.03	Rectangular	1.732	0.7071	1.64
Hemispherical Isotropy	6.90	Rectangular	1.732	0.7071	2.82
Boundary Effect	1.00	Rectangular	1.732	1	0.58
Probe Linearity	9.20	Rectangular	1.732	1	5.31
System Detection Limits	1.00	Rectangular	1.732	1	0.58
Readout Electronics	1.00	Normal	1	1	1.00
Response Time	0.80	Rectangular	1.732	1	0.46
Integration Time	2.60	Rectangular	1.732	1	1.50
RF Ambient Conditions - Noise	3.00	Rectangular	1.732	1	1.73
RF Ambient Conditions - Reflections	3.00	Rectangular	1.732	1	1.73
Probe Positioner Mechanical Tolerance	0.40	Rectangular	1.732	1	0.23
Probe Positioning with respect to Phantom	2.90	Rectangular	1.732	1	1.67
Extrapolation, Interpolation and Integration	3.90	Rectangular	1.732	1	2.25
Test Sample Related					
Test Sample Positioning	1.10	Normal	1	1	1.10
Device Holder Uncertainty	3.60	Normal	1	1	3.60
Output Power Variation - SAR Drift	5.00	Rectangular	1.732	1	2.89
Phantom and Tissue Parameters					
Phantom Uncertainty (shape and thickness)	4.00	Rectangular	1.732	1	2.31
Liquid Conductivity - deviation from target	5.00	Rectangular	1.732	0.43	1.24
Liquid Conductivity - measurement	3.74	Normal	1	0.43	1.61
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.49	2.83
Liquid Permittivity - measurement uncertainty	-6.41	Normal	1	0.49	-3.14
Combined Standard Uncertainty Uc(y), %:					12.23
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				24.47	%
Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =				1.90	dB

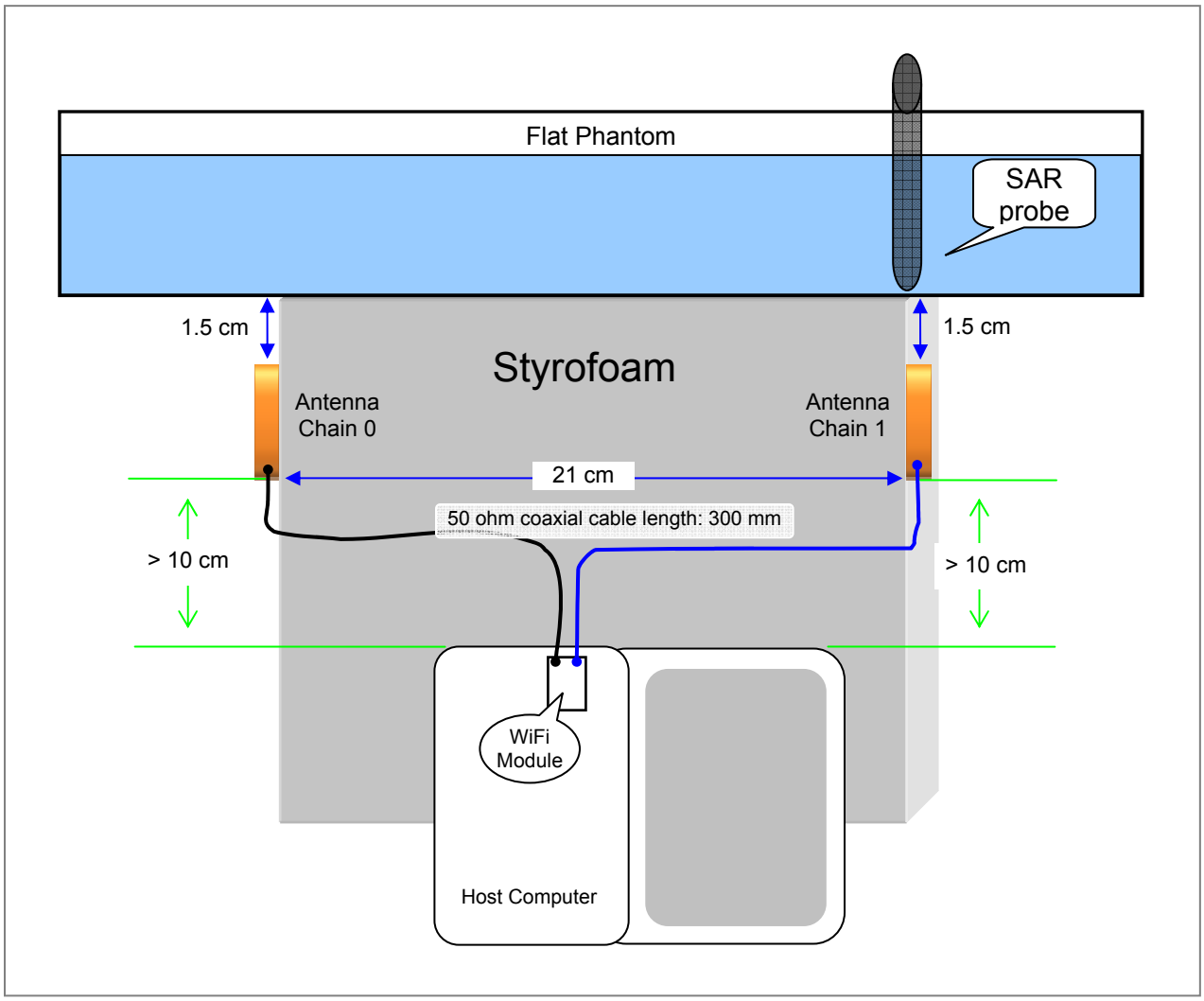
5. EQUIPMENT UNDER TEST

AR5BHB116 2x2 802.11n PCIe 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:	1.5 cm from Main (Chain 0)/Aux (Chain 1) antennas-to-user (refer to setup diagram in section 6.1 and 6.2)	
Antenna-to-antenna physical separation distances used during the test with Vertical placement:	21 cm from Main (Chain 0)-to-Aux (Chain 1) antenna (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)	
The most conservative physical separation distance between Main/Aux antennas to avoid SAR distribution overlap:	For 2.4 GHz band 3 cm for horizontal up and down antenna configurations (refer to test plots) For 5 GHz bands 3 cm for vertical up and down antenna configurations (refer to SAR test plots)	

6. ANTENNA LOCATIONS AND SEPARATION DISTANCES

6.1. ANTENNA POSITIONED VERTICALLY

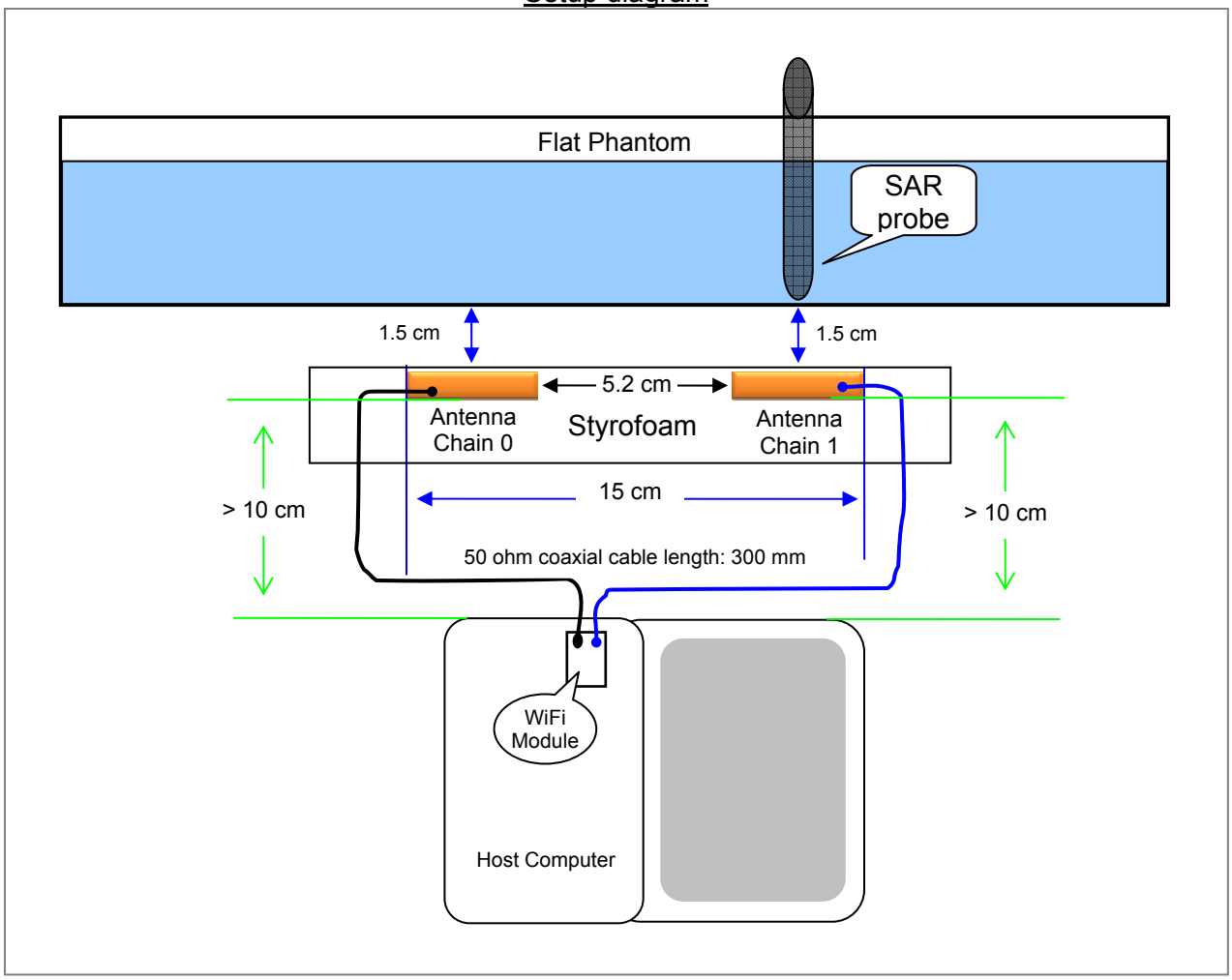
Setup diagram



Test setup: The WiFi module is installed in a host laptop computer during the tests. Test software exercised the radio card.
Test software: New Atheros Radio Test (NART-GUI), Version: 0.97

6.2. ANTENNA POSITIONED HORIZONTALLY

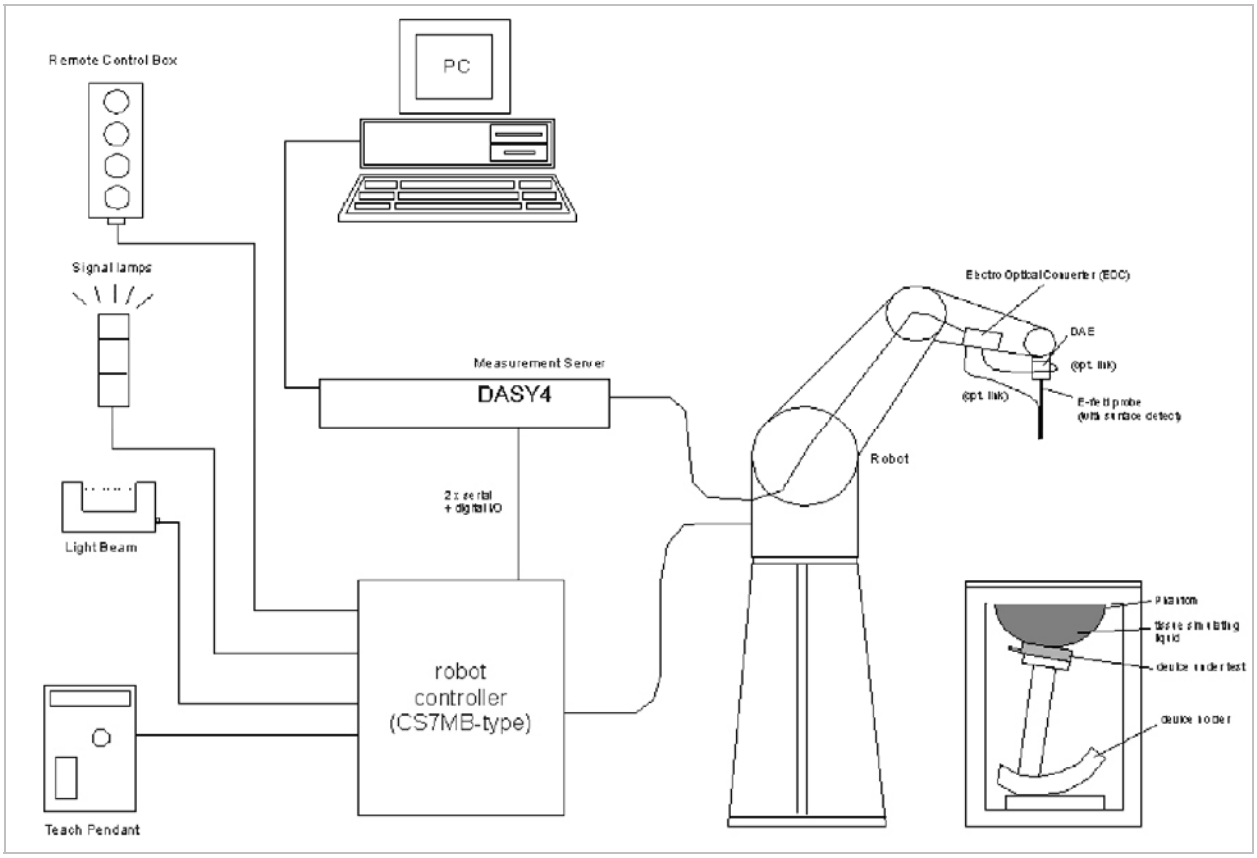
Setup diagram



Test setup: The WiFi module is installed in a host laptop computer during the tests. Test software exercised the radio card.

Test software: New Atheros Radio Test (NART-GUI), Version: 0.97

7. 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.

8. 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 Head & Body Phantom
The body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations and extrapolated according to the head parameters specified in IEEE Standard 1528.

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

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

Reference Values of Tissue Dielectric Parameters for Body Phantom (for 3000 MHz – 5800 MHz)
In the current guidelines and draft standards for compliance testing of mobile phones (i.e., IEEE P1528, OET 65 Supplement C), the dielectric parameters suggested for head and body tissue simulating liquid are given only at 3.0 GHz and 5.8 GHz. As an intermediate solution, dielectric parameters for the frequencies between 5 to 5.8 GHz were obtained using linear interpolation (see table below).

SPEAG has developed suitable head and body tissue simulating liquids consisting of the following ingredients: de-ionized water, salt and a special composition including mineral oil and an emulgators. Dielectric parameters of these liquids were measured suing a HP 8570C Dielectric Probe Kit in conjunction with HP 8753ES Network Analyzer (30 kHz – 6G Hz). The differences with respect to the interpolated values were well within the desired ±5% for the whole 5 to 5.8 GHz range.

f (MHz)	Body Tissue		Reference
	rel. permitivity	conductivity	
3000	52.0	2.73	Standard
5100	49.1	5.18	Interpolated
5200	49.0	5.30	Interpolated
5300	48.9	5.42	Interpolated
5400	48.7	5.53	Interpolated
5500	48.6	5.65	Interpolated
5600	48.5	5.77	Interpolated
5700	48.3	5.88	Interpolated
5800	48.2	6.00	Standard

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

8.1. TISSUE PARAMETERS CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	52.11	Relative Permittivity (ϵ_r):	52.115	52.7	-1.11	± 5
	e"	14.60	Conductivity (σ):	1.990	1.95	2.03	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 41%
October 15, 2010 09:27 AM

Frequency	e'	e''
2400000000.	52.2792	14.3667
2405000000.	52.2635	14.3913
2410000000.	52.2485	14.4144
2415000000.	52.2325	14.4363
2420000000.	52.2116	14.4593
2425000000.	52.1971	14.4812
2430000000.	52.1787	14.5054
2435000000.	52.1611	14.5278
2440000000.	52.1467	14.5514
2445000000.	52.1294	14.5731
2450000000.	**52.1148**	**14.5972**
2455000000.	52.0973	14.6198
2460000000.	52.0833	14.6418
2465000000.	52.0672	14.6636
2470000000.	52.0551	14.6843
2475000000.	52.0383	14.7066
2480000000.	52.0212	14.7269
2485000000.	52.0062	14.7518
2490000000.	51.9878	14.7710
2495000000.	51.9697	14.7928
2500000000.	51.9537	14.8166

The conductivity (σ) can be given as:

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

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

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

Simulating Liquid Dielectric Parameter Check Result @ Body 2450 MHz Measured by: Devin Chang

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	51.61	Relative Permittivity (ε_r):	51.614	52.7	-2.06	± 5
	e"	14.76	Conductivity (σ):	2.012	1.95	3.17	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C; Relative humidity = 40%
December 09, 2010 04:51 PM

Frequency	e'	e"
2400000000.	51.7347	14.5126
2405000000.	51.7142	14.5565
2410000000.	51.6864	14.5763
2415000000.	51.6803	14.6101
2420000000.	51.6685	14.6365
2425000000.	51.6642	14.6568
2430000000.	51.6620	14.6731
2435000000.	51.6541	14.7028
2440000000.	51.6405	14.7251
2445000000.	51.6289	14.7435
2450000000.	51.6138	14.7600
2455000000.	51.5714	14.7874
2460000000.	51.5195	14.7738
2465000000.	51.4988	14.7735
2470000000.	51.4741	14.7669
2475000000.	51.4550	14.7852
2480000000.	51.4308	14.7944
2485000000.	51.4195	14.8111
2490000000.	51.4028	14.8413
2495000000.	51.3699	14.8779
2500000000.	51.3486	14.9147

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 Parameter Check Result @ Body 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.7779	Relative Permittivity (ε_r):	46.7779	49.0	-4.53	± 10
	e"	18.3924	Conductivity (σ):	5.32060	5.30	0.39	± 5
5500	e'	46.1679	Relative Permittivity (ε_r):	46.1679	48.6	-5.00	± 10
	e"	18.7647	Conductivity (σ):	5.74147	5.65	1.62	± 5
5800	e'	45.5785	Relative Permittivity (ε_r):	45.5785	48.2	-5.44	± 10
	e"	19.1198	Conductivity (σ):	6.16922	6.00	2.82	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
October 17, 2010 11:24 AM

Frequency	e'	e"
4600000000.	47.9559	17.4744
4650000000.	47.8916	17.5579
4700000000.	47.7802	17.6396
4750000000.	47.7124	17.7221
4800000000.	47.5909	17.8003
4850000000.	47.5192	17.8827
4900000000.	47.3991	17.9525
4950000000.	47.3215	18.0412
5000000000.	47.2041	18.1048
5050000000.	47.1068	18.1952
5100000000.	46.9829	18.2587
5150000000.	46.8904	18.3304
5200000000.	**46.7779**	**18.3924**
5250000000.	46.6844	18.4637
5300000000.	46.5854	18.5243
5350000000.	46.4795	18.5837
5400000000.	46.3652	18.6481
5450000000.	46.2767	18.7189
5500000000.	**46.1679**	**18.7647**
5550000000.	46.0602	18.8302
5600000000.	45.9629	18.8881
5650000000.	45.8751	18.9519
5700000000.	45.7693	18.9933
5750000000.	45.6667	19.0697
5800000000.	**45.5785**	**19.1198**
5850000000.	45.4840	19.1810
5900000000.	45.3770	19.2390
5950000000.	45.3074	19.3194
6000000000.	45.1978	19.3508

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 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.3129	Relative Permittivity (ε_r):	46.3129	49.0	-5.48	± 10
	e"	18.4685	Conductivity (σ):	5.34262	5.30	0.80	± 5
5500	e'	45.7081	Relative Permittivity (ε_r):	45.7081	48.6	-5.95	± 10
	e"	18.8608	Conductivity (σ):	5.77088	5.65	2.14	± 5
5800	e'	45.1104	Relative Permittivity (ε_r):	45.1104	48.2	-6.41	± 10
	e"	19.2415	Conductivity (σ):	6.20849	6.00	3.47	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
October 18, 2010 10:29 AM

Frequency	e'	e"
4600000000.	47.5339	17.4981
4650000000.	47.4442	17.5585
4700000000.	47.3445	17.6707
4750000000.	47.2464	17.7317
4800000000.	47.1420	17.8418
4850000000.	47.0657	17.9066
4900000000.	46.9493	18.0001
4950000000.	46.8572	18.0692
5000000000.	46.7372	18.1606
5050000000.	46.6555	18.2332
5100000000.	46.5421	18.3218
5150000000.	46.4414	18.3690
5200000000.	**46.3129**	**18.4685**
5250000000.	46.2343	18.5186
5300000000.	46.1135	18.5990
5350000000.	46.0311	18.6546
5400000000.	45.9083	18.7300
5450000000.	45.8275	18.7945
5500000000.	**45.7081**	**18.8608**
5550000000.	45.6216	18.9221
5600000000.	45.5019	18.9837
5650000000.	45.4108	19.0470
5700000000.	45.3055	19.1184
5750000000.	45.2231	19.1829
5800000000.	**45.1104**	**19.2415**
5850000000.	45.0267	19.3072
5900000000.	44.9165	19.3592
5950000000.	44.8167	19.4308
6000000000.	44.7031	19.4986

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 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.5753	Relative Permittivity (ε_r):	46.5753	49.0	-4.95	± 10
	e"	18.4694	Conductivity (σ):	5.34288	5.30	0.81	± 5
5500	e'	45.9394	Relative Permittivity (ε_r):	45.9394	48.6	-5.47	± 10
	e"	18.8587	Conductivity (σ):	5.77023	5.65	2.13	± 5
5800	e'	45.3424	Relative Permittivity (ε_r):	45.3424	48.2	-5.93	± 10
	e"	19.2513	Conductivity (σ):	6.21165	6.00	3.53	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
October 19, 2010 09:19 AM

Frequency	e'	e"
4600000000.	47.7699	17.4836
4650000000.	47.6789	17.5472
4700000000.	47.5792	17.6604
4750000000.	47.4933	17.7243
4800000000.	47.3970	17.8279
4850000000.	47.2991	17.8875
4900000000.	47.1884	17.9976
4950000000.	47.1127	18.0657
5000000000.	46.9916	18.1509
5050000000.	46.9041	18.2200
5100000000.	46.7850	18.3123
5150000000.	46.6864	18.3673
5200000000.	**46.5753**	**18.4694**
5250000000.	46.4830	18.5124
5300000000.	46.3640	18.6050
5350000000.	46.2802	18.6501
5400000000.	46.1337	18.7289
5450000000.	46.0657	18.8003
5500000000.	**45.9394**	**18.8587**
5550000000.	45.8547	18.9384
5600000000.	45.7570	18.9972
5650000000.	45.6581	19.0582
5700000000.	45.5515	19.1248
5750000000.	45.4525	19.1790
5800000000.	**45.3424**	**19.2513**
5850000000.	45.2618	19.3279
5900000000.	45.1681	19.3866
5950000000.	45.0742	19.4493
6000000000.	44.9540	19.5176

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 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.9888	Relative Permittivity (ε_r):	46.9888	49.0	-4.10	± 10
	e"	18.5120	Conductivity (σ):	5.35520	5.30	1.04	± 5
5500	e'	46.3717	Relative Permittivity (ε_r):	46.3717	48.6	-4.58	± 10
	e"	18.8962	Conductivity (σ):	5.78171	5.65	2.33	± 5
5800	e'	45.7678	Relative Permittivity (ε_r):	45.7678	48.2	-5.05	± 10
	e"	19.2912	Conductivity (σ):	6.22453	6.00	3.74	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 40%
October 20, 2010 09:31 AM

Frequency	e'	e"
4600000000.	48.1795	17.5202
4650000000.	48.1029	17.5975
4700000000.	48.0072	17.7015
4750000000.	47.9135	17.7665
4800000000.	47.8137	17.8758
4850000000.	47.7256	17.9384
4900000000.	47.6085	18.0324
4950000000.	47.5229	18.1058
5000000000.	47.4062	18.1961
5050000000.	47.3235	18.2680
5100000000.	47.2154	18.3596
5150000000.	47.1115	18.4066
5200000000.	**46.9888**	**18.5120**
5250000000.	46.9143	18.5589
5300000000.	46.7797	18.6436
5350000000.	46.6949	18.6953
5400000000.	46.5619	18.7769
5450000000.	46.5053	18.8467
5500000000.	**46.3717**	**18.8962**
5550000000.	46.2774	18.9751
5600000000.	46.1779	19.0346
5650000000.	46.0734	19.0936
5700000000.	45.9697	19.1655
5750000000.	45.8800	19.2263
5800000000.	**45.7678**	**19.2912**
5850000000.	45.6818	19.3602
5900000000.	45.5859	19.4207
5950000000.	45.4814	19.4858
6000000000.	45.3743	19.5564

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 Muscle 5 GHz Measured by: Devin Chang

f (MHz)	Muscle Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
5200	e'	46.0047	Relative Permittivity (ε_r):	46.0047	49.0	-6.11	± 10
	e"	18.8043	Conductivity (σ):	5.43976	5.30	2.64	± 5
5500	e'	46.3271	Relative Permittivity (ε_r):	46.3271	48.6	-4.68	± 10
	e"	18.5209	Conductivity (σ):	5.66688	5.65	0.30	± 5
5800	e'	44.998	Relative Permittivity (ε_r):	44.9980	48.2	-6.64	± 10
	e"	19.3247	Conductivity (σ):	6.23533	6.00	3.92	± 5

Liquid Check
Ambient temperature: 25 deg. C; Liquid temperature: 24 deg. C; Relative humidity = 42%
December 05, 2010 9:11 AM

Frequency	e'	e"
4600000000.	47.1337	17.5947
4650000000.	48.5234	17.9020
4700000000.	47.0386	17.3054
4750000000.	47.8251	18.3672
4800000000.	47.5918	17.3979
4850000000.	46.9440	18.3133
4900000000.	47.9793	17.9670
4950000000.	46.3127	17.9999
5000000000.	47.6513	18.5465
5050000000.	46.3740	17.8808
5100000000.	46.7703	18.8293
5150000000.	46.8181	18.0808
5200000000.	**46.0047**	**18.8043**
5250000000.	47.0805	18.5570
5300000000.	45.7488	18.6155
5350000000.	46.7409	19.0471
5400000000.	45.9377	18.4350
5450000000.	46.0431	19.2641
5500000000.	**46.3271**	**18.5209**
5550000000.	45.4278	19.1384
5600000000.	46.2555	18.9636
5650000000.	45.1755	18.9234
5700000000.	45.8879	19.3665
5750000000.	45.5334	18.9249
5800000000.	**44.9980**	**19.3247**
5850000000.	45.5912	19.3274
5900000000.	44.8148	19.1021
5950000000.	44.7893	19.3539
6000000000.	44.8432	19.5039

The conductivity (σ) can be given as:

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

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

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

9. 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	Cal. Freq. (GHz)	SAR Avg (mW/g)		
				Tissue:	Head	Body
D2450V2	D2450V2-706_Apr10	4/19/10	2.4	SAR_{1g}:	51.6	52.4
				SAR_{10g}:	24.4	24.5
D5GHzV2	D5GHzV2-1075_Sep09	9/3/09	5.2	SAR_{1g}:		79.0
				SAR_{10g}:		22.0
			5.5	SAR_{1g}:		85.4
				SAR_{10g}:		23.5
			5.8	SAR_{1g}:		73.2
				SAR_{10g}:		20.1

9.1. 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	10/15/10	SAR_{1g}:	53.2	52.4	1.53	±10
		SAR_{10g}:	25.3	24.5	3.27	
D2450V2	12/09/10	SAR_{1g}:	52.2	52.4	-0.38	±10
		SAR_{10g}:	24.6	24.5	0.41	

9.2. SYSTEM CHECK RESULTS FOR D5GHzV2

Measured by: Devin Chang

System validation dipole	Date Tested	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
		Tissue:	Body			
D5GHzV2 (5.2GHz)	10/17/10	SAR_{1g}:	77.3	79.0	-2.15	±10
		SAR_{10g}:	22.5	22.0	2.27	
D5GHzV2 (5.5GHz)	10/17/10	SAR_{1g}:	84.2	85.4	-1.41	±10
		SAR_{10g}:	24.2	23.5	2.98	
D5GHzV2 (5.8GHz)	10/17/10	SAR_{1g}:	73.6	73.2	0.55	±10
		SAR_{10g}:	20.8	20.1	3.48	
D5GHzV2 (5.2GHz)	10/18/10	SAR_{1g}:	79.0	79.0	0.00	±10
		SAR_{10g}:	23.0	22.0	4.55	
D5GHzV2 (5.5GHz)	10/18/10	SAR_{1g}:	82.3	85.4	-3.63	±10
		SAR_{10g}:	23.3	23.5	-0.85	
D5GHzV2 (5.8GHz)	10/18/10	SAR_{1g}:	72.6	73.2	-0.82	±10
		SAR_{10g}:	20.7	20.1	2.99	
D5GHzV2 (5.2GHz)	10/19/10	SAR_{1g}:	77.0	79.0	-2.53	±10
		SAR_{10g}:	22.3	22.0	1.36	
D5GHzV2 (5.5GHz)	10/19/10	SAR_{1g}:	84.7	85.4	-0.82	±10
		SAR_{10g}:	24.1	23.5	2.55	
D5GHzV2 (5.8GHz)	10/19/10	SAR_{1g}:	70.2	73.2	-4.10	±10
		SAR_{10g}:	20.2	20.1	0.50	
D5GHzV2 (5.2GHz)	10/20/10	SAR_{1g}:	76.5	79.0	-3.16	±10
		SAR_{10g}:	22.5	22.0	2.27	
D5GHzV2 (5.5GHz)	10/20/10	SAR_{1g}:	85.0	85.4	-0.47	±10
		SAR_{10g}:	24.4	23.5	3.83	
D5GHzV2 (5.8GHz)	10/20/10	SAR_{1g}:	72.2	73.2	-1.37	±10
		SAR_{10g}:	21.0	20.1	4.48	
D5GHzV2 (5.2GHz)	12/05/10	SAR_{1g}:	77.2	79.0	-2.28	±10
		SAR_{10g}:	22.3	22.0	1.36	
D5GHzV2 (5.5GHz)	12/05/10	SAR_{1g}:	83.6	85.4	-2.11	±10
		SAR_{10g}:	23.9	23.5	1.70	
D5GHzV2 (5.8GHz)	12/05/10	SAR_{1g}:	69.7	73.2	-4.78	±10
		SAR_{10g}:	20.0	20.1	-0.50	

SYSTEM CHECK PLOT

Date/Time: 10/15/2010 9:29:59 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

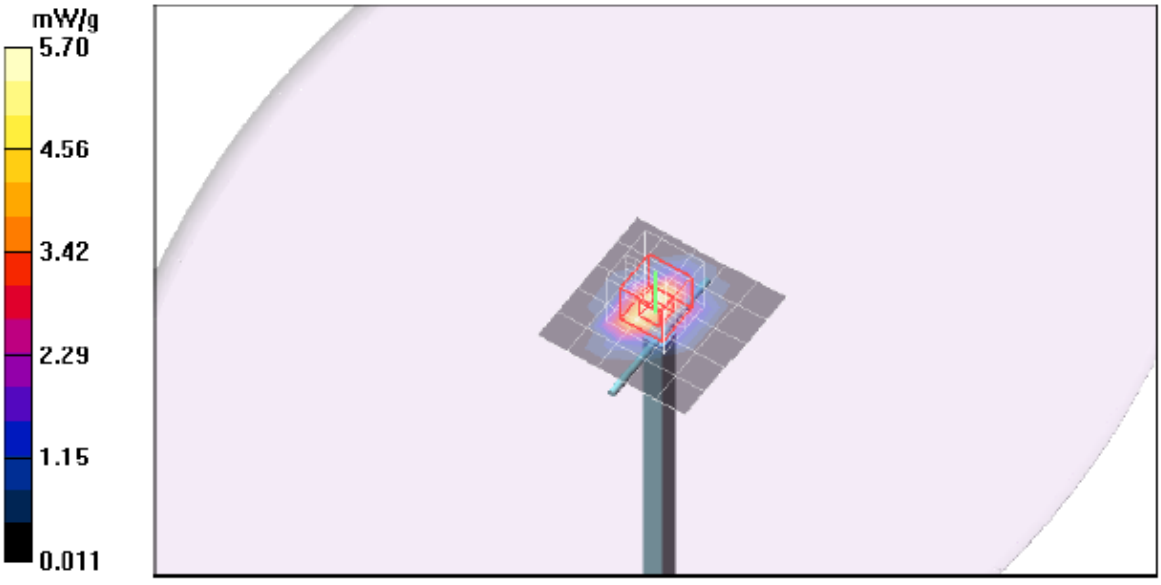
Communication System: CW 2450MHz; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.99 mho/m; ε_r = 52.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 5.70 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.2 V/m; Power Drift = 0.041 dB
Peak SAR (extrapolated) = 10.5 W/kg
SAR(1 g) = 5.32 mW/g; SAR(10 g) = 2.53 mW/g
Maximum value of SAR (measured) = 6.85 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 10/15/2010 9:46:29 AM

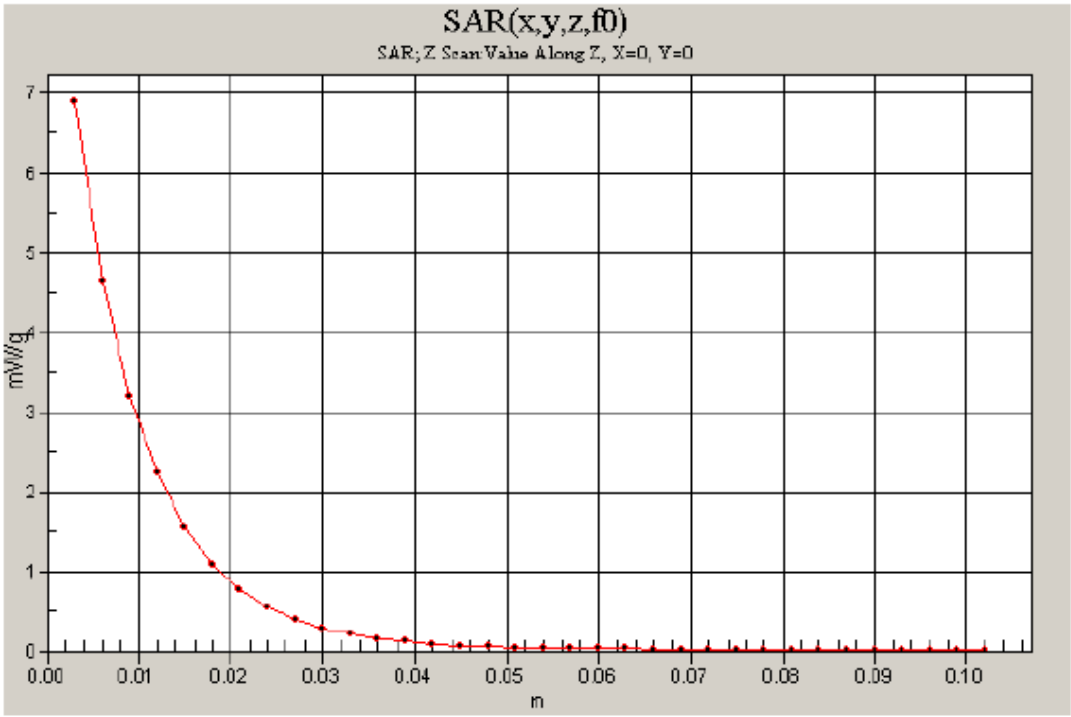
Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; 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) = 6.89 mW/g



SYSTEM CHECK PLOT

Date/Time: 12/9/2010 5:57:41 PM

Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

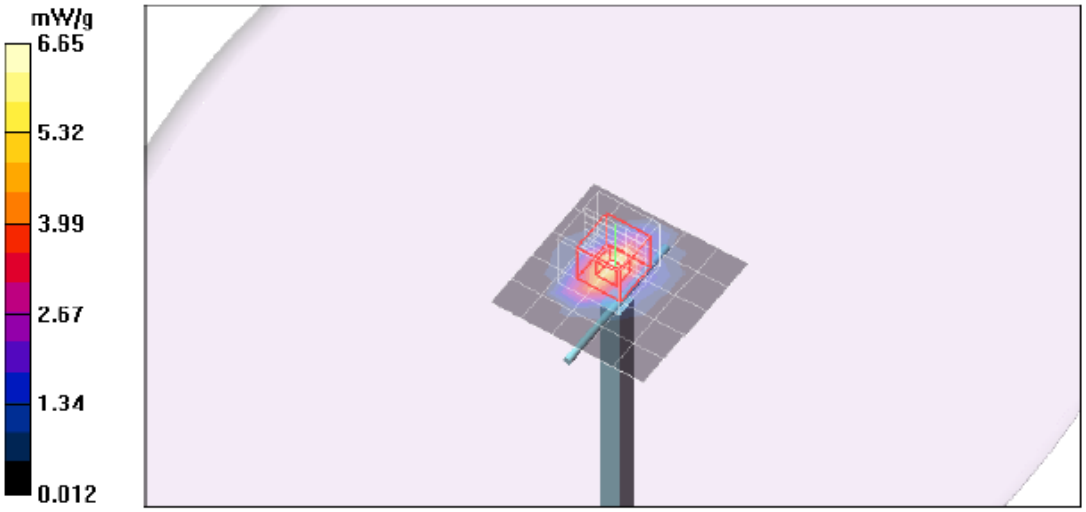
Communication System: CW 2450MHz; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.01 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW/Area Scan (6x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 6.65 mW/g

d=10mm, Pin=100mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 55.7 V/m; Power Drift = 0.191 dB
Peak SAR (extrapolated) = 10.4 W/kg
SAR(1 g) = 5.22 mW/g; SAR(10 g) = 2.46 mW/g
Maximum value of SAR (measured) = 6.80 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 12/9/2010 6:13:40 PM

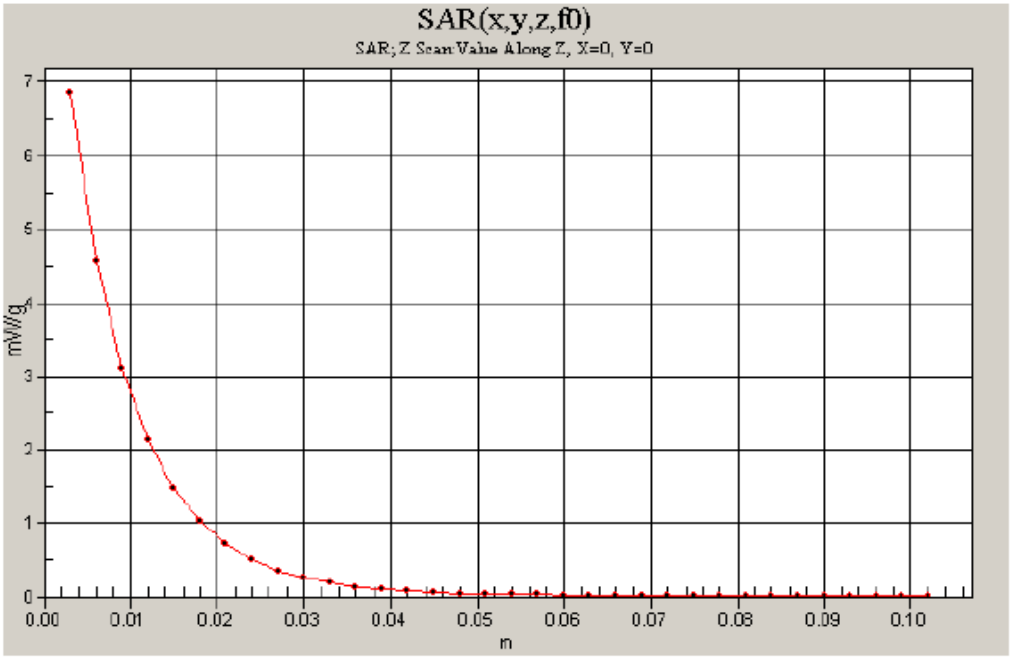
Test Laboratory: Compliance Certification Services

System Performance Check - D2450V2

DUT: D2450V2; Type: D2450V2; Serial: 706

Communication System: CW 2450MHz; 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) = 6.85 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/17/2010 12:03:33 PM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

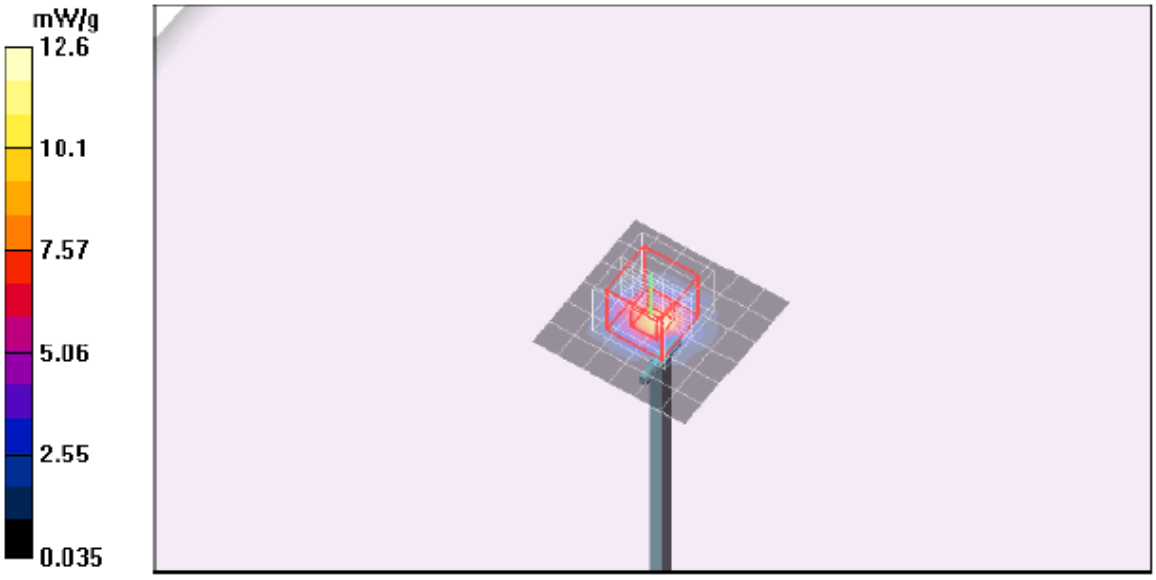
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.32 mho/m; ε_r = 46.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.6 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.1 V/m; Power Drift = 0.161 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 7.73 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 13.5 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/17/2010 2:10:21 PM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

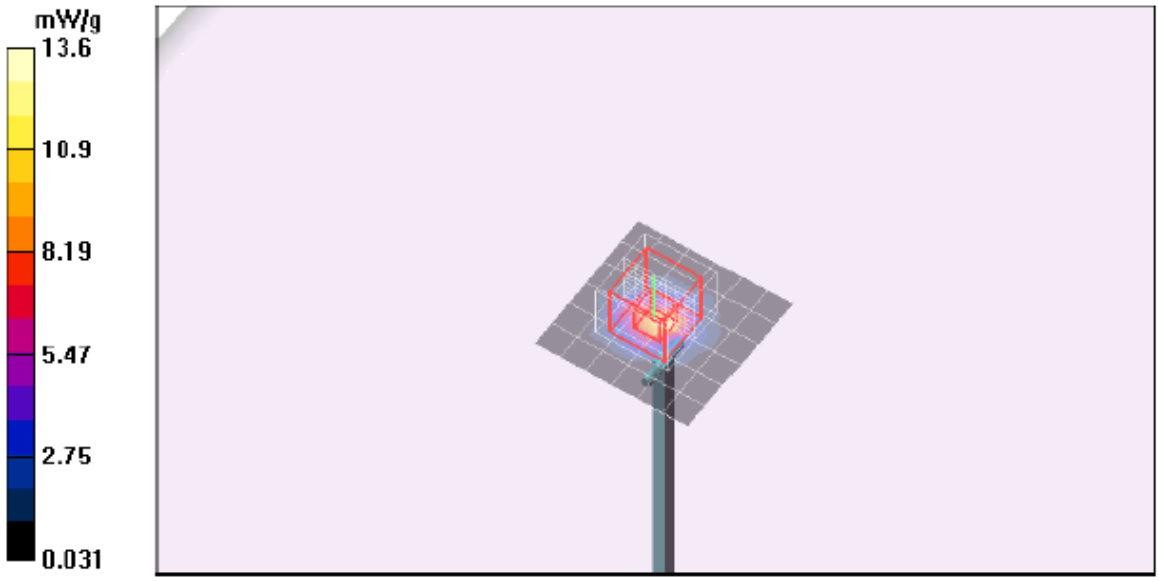
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.74 mho/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.6 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 53.3 V/m; Power Drift = 0.184 dB
Peak SAR (extrapolated) = 30.3 W/kg
SAR(1 g) = 8.42 mW/g; SAR(10 g) = 2.42 mW/g
Maximum value of SAR (measured) = 14.9 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/17/2010 2:40:38 PM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

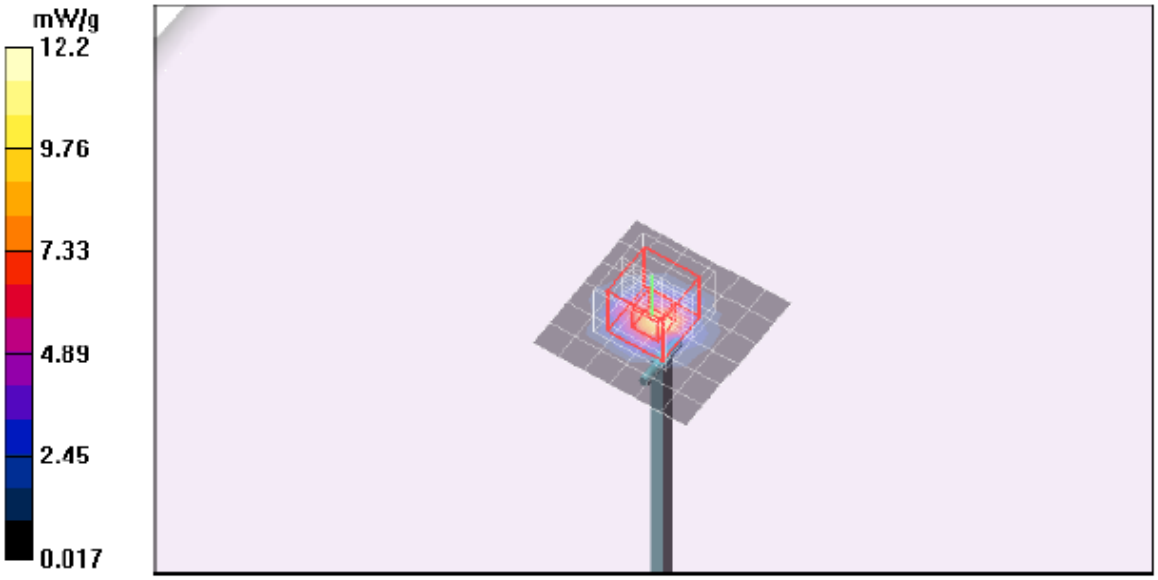
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.17 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.2 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 48.9 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 27.7 W/kg
SAR(1 g) = 7.36 mW/g; SAR(10 g) = 2.08 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 10/17/2010 3:07:25 PM

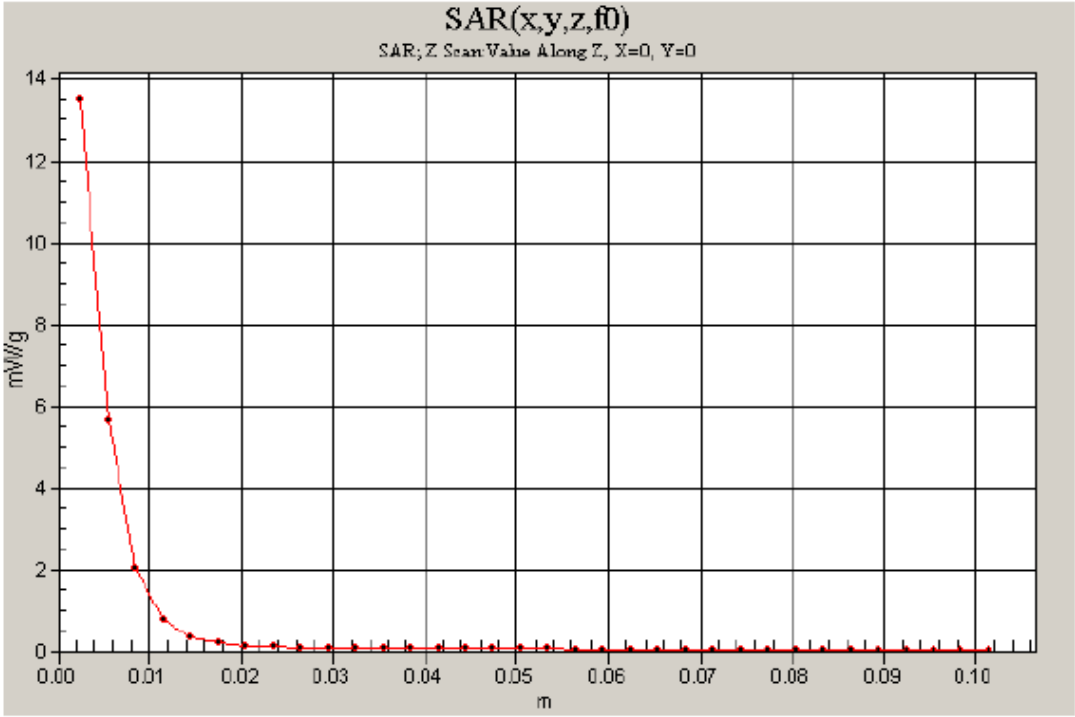
Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 13.5 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/18/2010 10:33:31 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

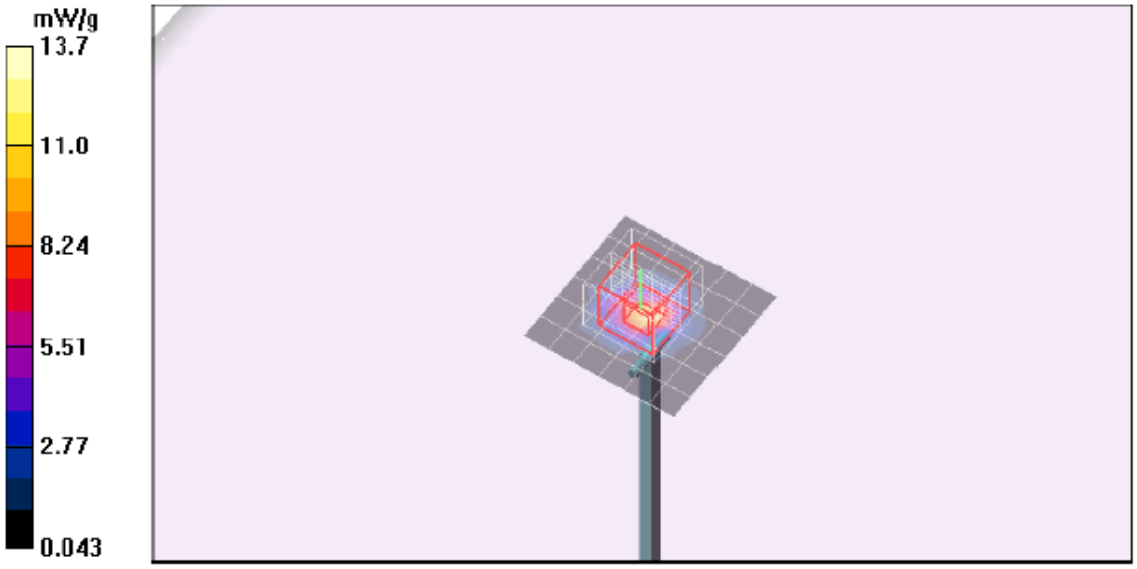
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.34 mho/m; ε_r = 46.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.7 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 53.7 V/m; Power Drift = 0.185 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 7.9 mW/g; SAR(10 g) = 2.3 mW/g
Maximum value of SAR (measured) = 13.5 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/18/2010 11:10:13 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

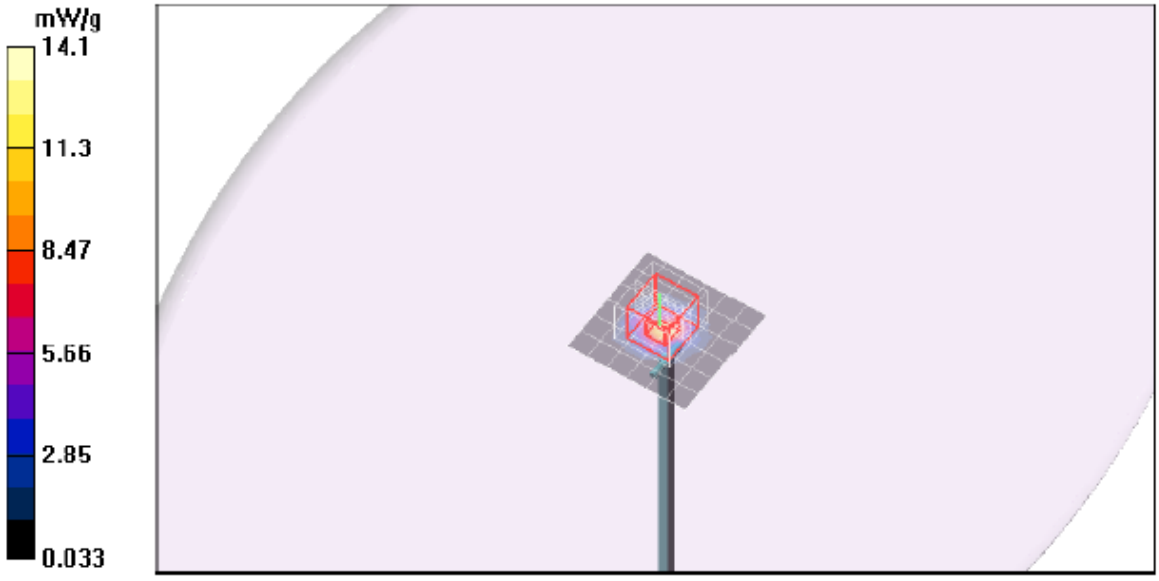
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.77 mho/m; ε_r = 45.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.1 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.9 V/m; Power Drift = 0.159 dB
Peak SAR (extrapolated) = 30.2 W/kg
SAR(1 g) = 8.23 mW/g; SAR(10 g) = 2.33 mW/g
Maximum value of SAR (measured) = 14.5 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/18/2010 11:39:51 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

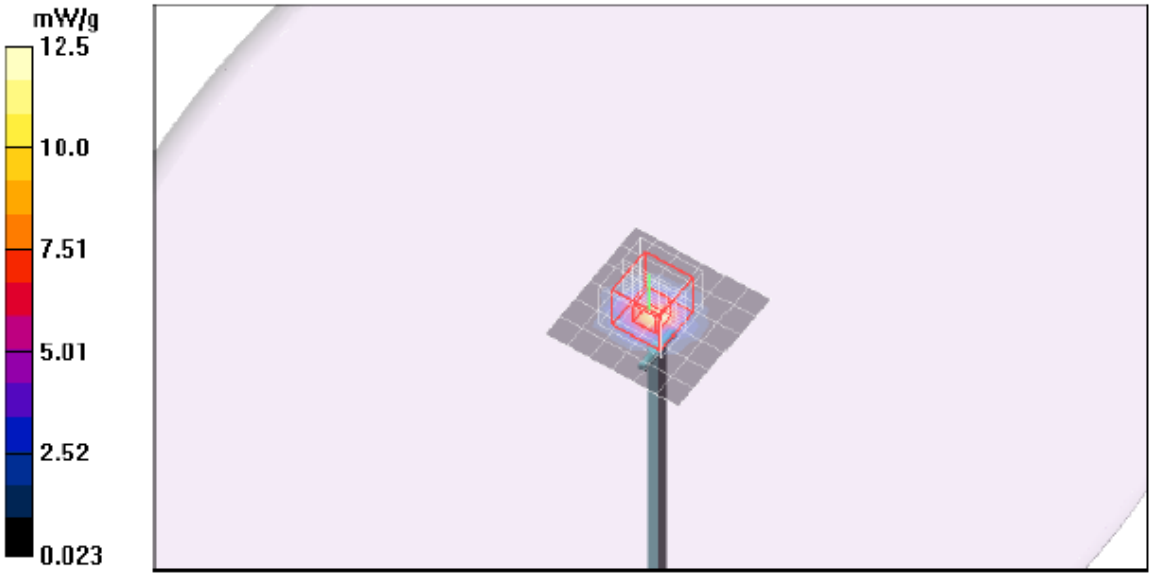
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.21 mho/m; ε_r = 45.1; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.5 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 48.8 V/m; Power Drift = 0.237 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 7.26 mW/g; SAR(10 g) = 2.07 mW/g
Maximum value of SAR (measured) = 12.8 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 10/18/2010 12:06:18 PM

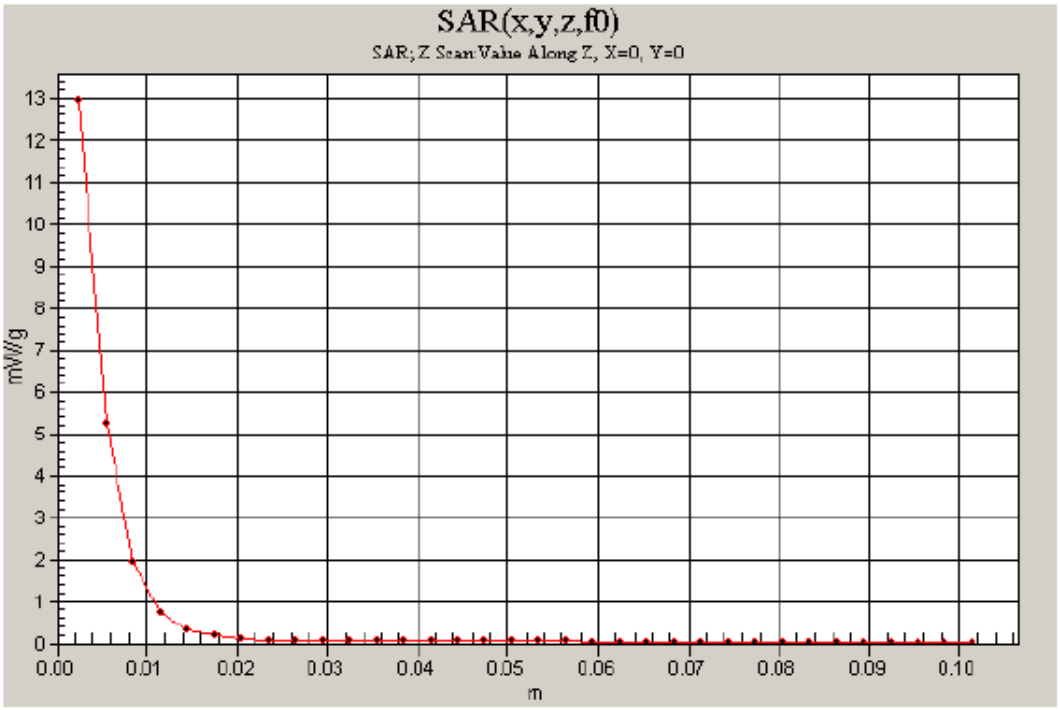
Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 12.9 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/19/2010 9:58:47 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

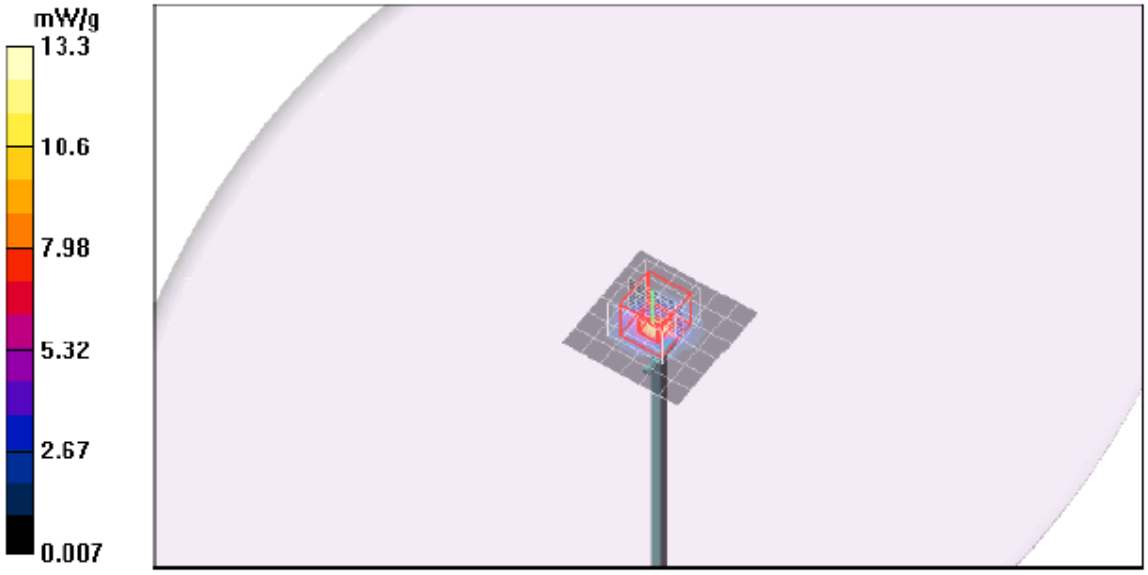
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.34 mho/m; ε_r = 46.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.1 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.5 V/m; Power Drift = 0.150 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 7.7 mW/g; SAR(10 g) = 2.23 mW/g
Maximum value of SAR (measured) = 13.3 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/19/2010 10:27:16 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

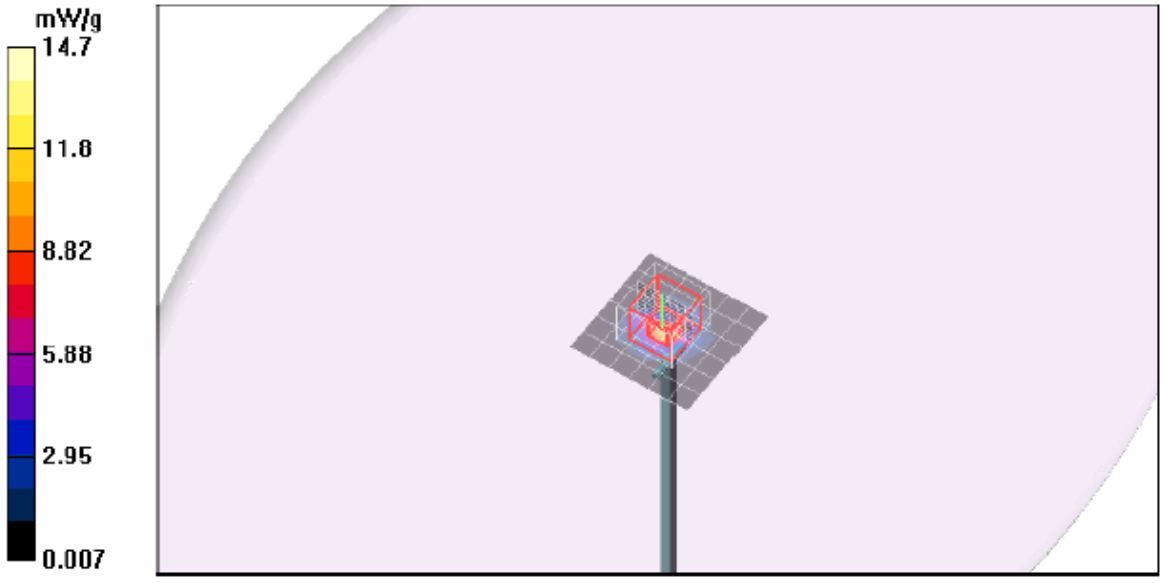
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.77 mho/m; ε_r = 45.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.7 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 54.1 V/m; Power Drift = 0.234 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 8.47 mW/g; SAR(10 g) = 2.41 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/19/2010 10:55:43 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

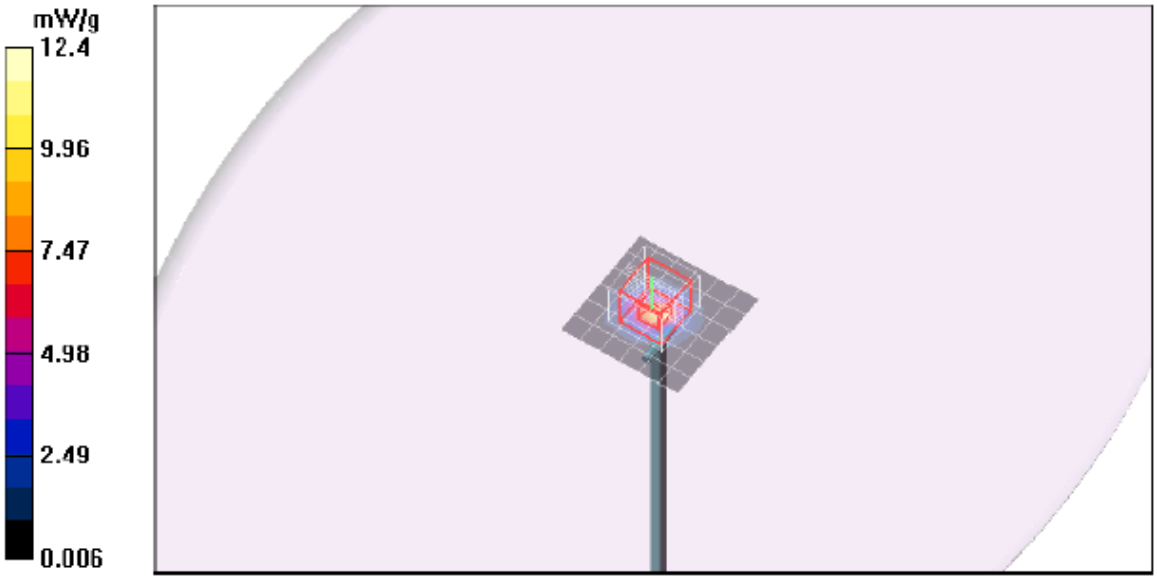
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.21 mho/m; ε_r = 45.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.2 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 47.7 V/m; Power Drift = 0.223 dB
Peak SAR (extrapolated) = 26.6 W/kg
SAR(1 g) = 7.02 mW/g; SAR(10 g) = 2.02 mW/g
Maximum value of SAR (measured) = 12.4 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 10/19/2010 11:22:02 AM

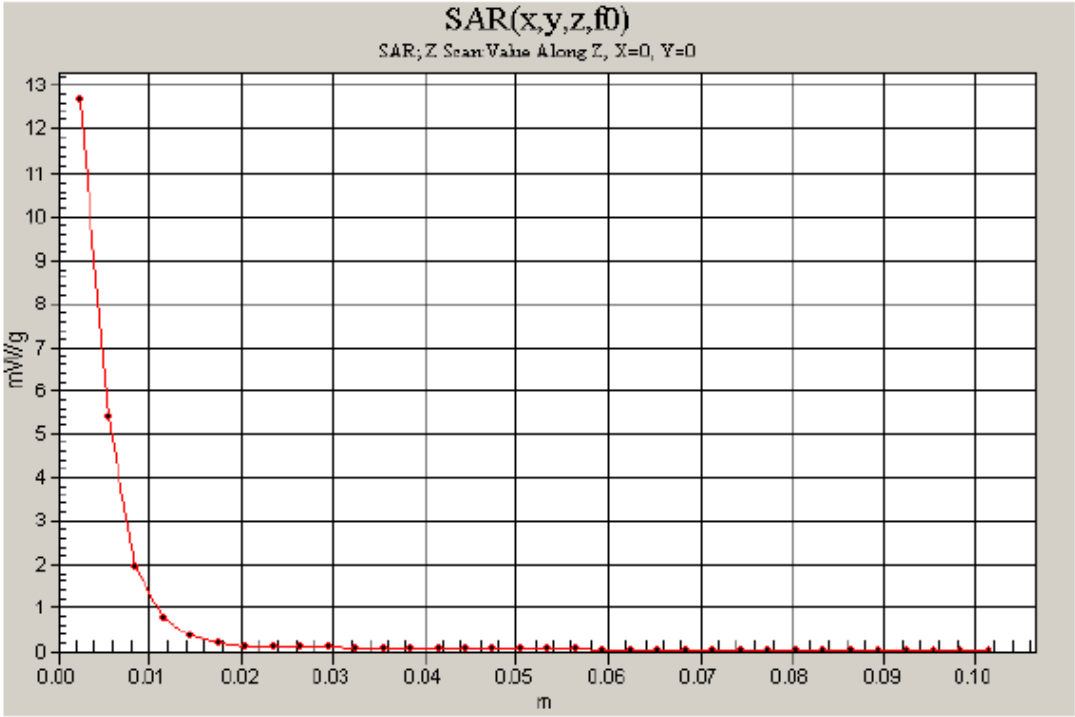
Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 12.7 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/20/2010 10:04:43 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

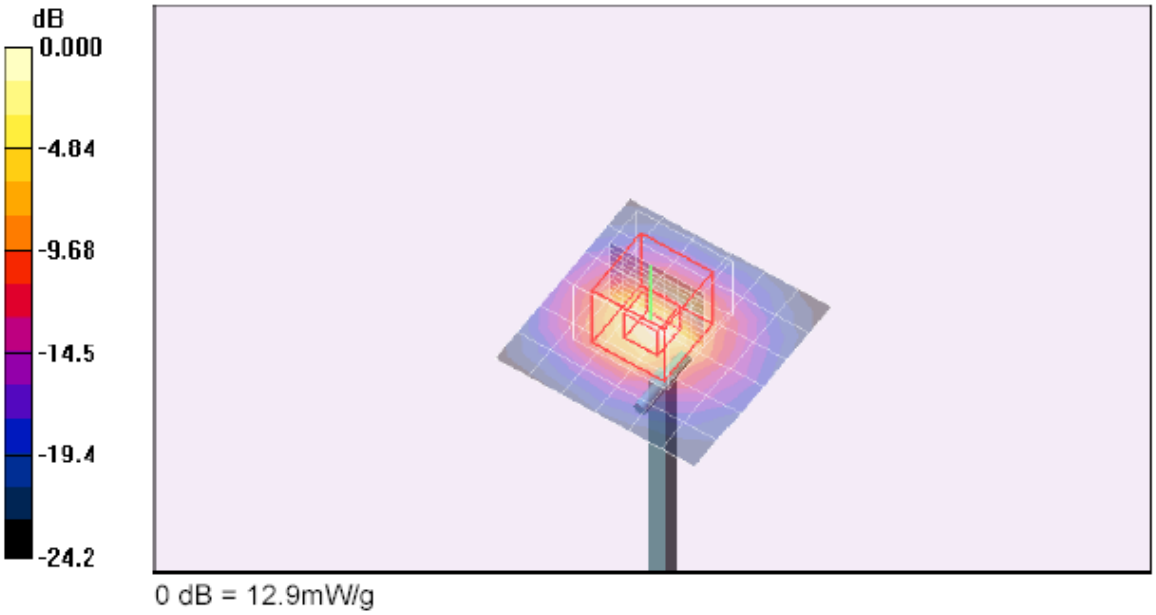
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.36 mho/m; ε_r = 47; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.1 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 50.4 V/m; Power Drift = 0.151 dB
Peak SAR (extrapolated) = 26.2 W/kg
SAR(1 g) = 7.65 mW/g; SAR(10 g) = 2.25 mW/g
Maximum value of SAR (measured) = 12.9 mW/g



0 dB = 12.9mW/g

SYSTEM CHECK PLOT

Date/Time: 10/20/2010 11:02:00 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

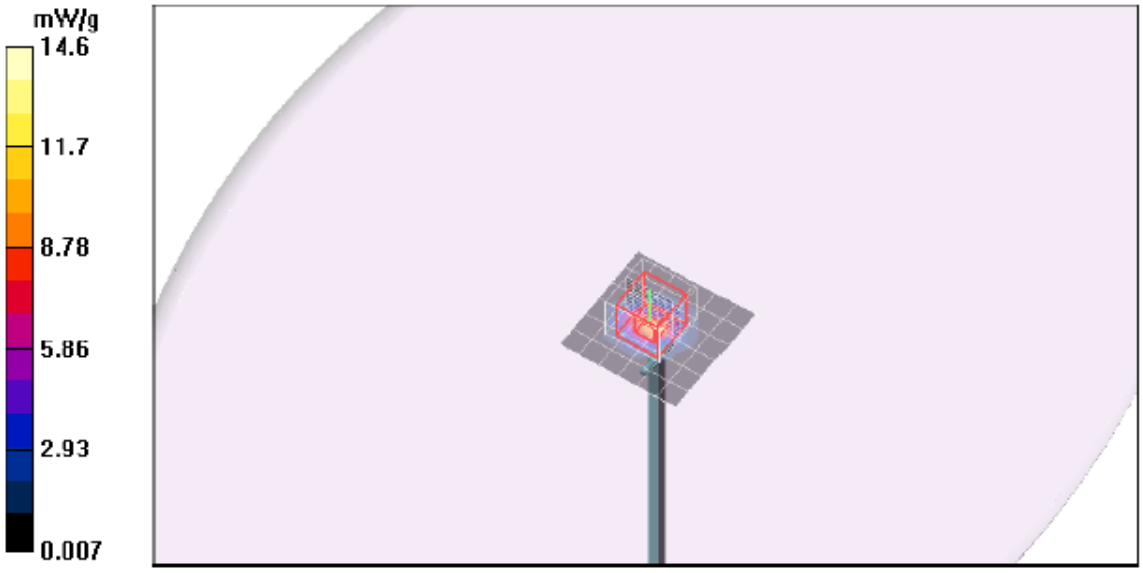
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.78 mho/m; ε_r = 46.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.2 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 52.1 V/m; Power Drift = 0.126 dB
Peak SAR (extrapolated) = 31.1 W/kg
SAR(1 g) = 8.5 mW/g; SAR(10 g) = 2.44 mW/g
Maximum value of SAR (measured) = 14.6 mW/g



SYSTEM CHECK PLOT

Date/Time: 10/20/2010 11:31:18 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

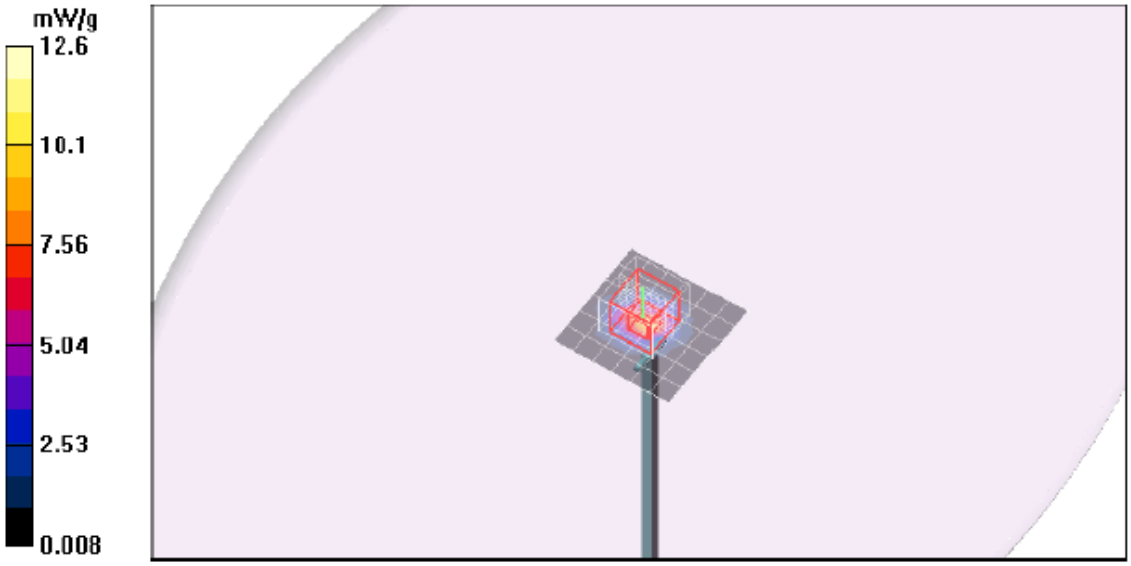
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.22 mho/m; ε_r = 45.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.2 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 45.8 V/m; Power Drift = 0.139 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 7.22 mW/g; SAR(10 g) = 2.1 mW/g
Maximum value of SAR (measured) = 12.6 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 10/20/2010 11:57:46 AM

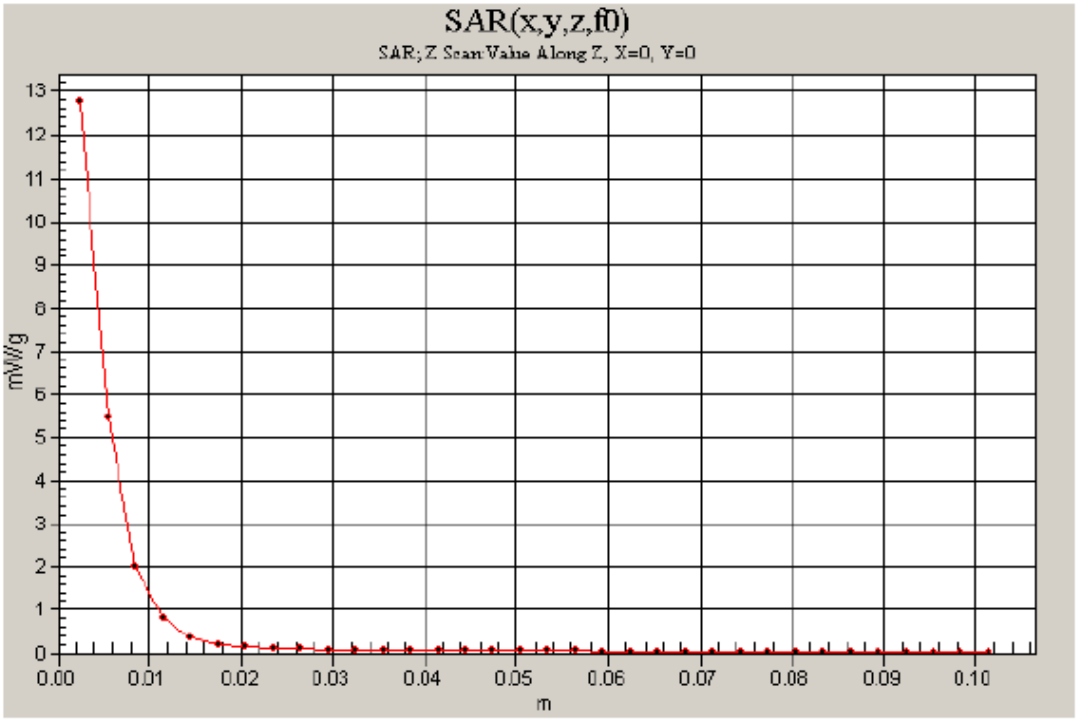
Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 12.8 mW/g



SYSTEM CHECK PLOT

Date/Time: 12/5/2010 10:19:07 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

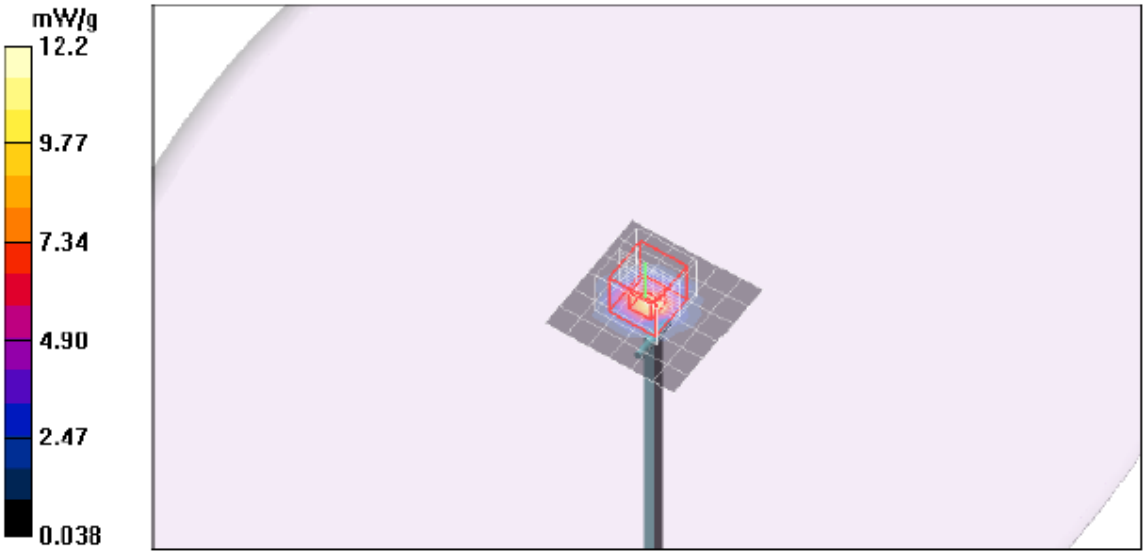
Communication System: CW 5GHz; Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 5.44 mho/m; ε_r = 46; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.2GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.2 mW/g

d=10mm, Pin=100mW, 5.2GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 50.4 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 7.72 mW/g; SAR(10 g) = 2.23 mW/g
Maximum value of SAR (measured) = 13.2 mW/g



SYSTEM CHECK PLOT

Date/Time: 12/5/2010 11:17:57 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

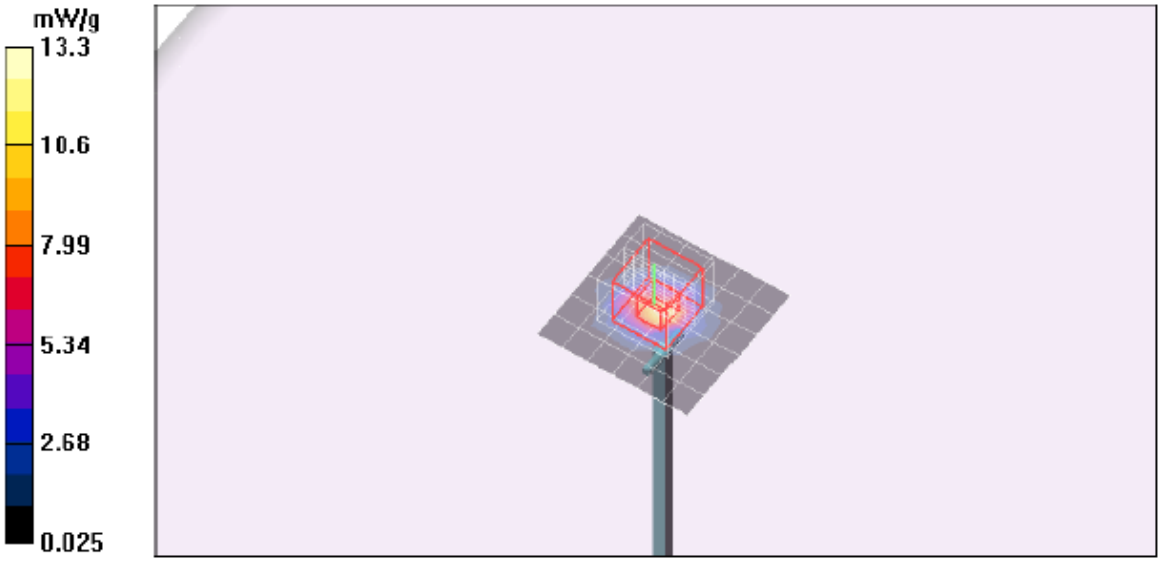
Communication System: CW 5GHz; Frequency: 5500 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 5.67 mho/m; ε_r = 46.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.57, 3.57, 3.57); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.5GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 13.3 mW/g

d=10mm, Pin=100mW, 5.5GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 51.9 V/m; Power Drift = 0.097 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 8.36 mW/g; SAR(10 g) = 2.39 mW/g
Maximum value of SAR (measured) = 14.5 mW/g



SYSTEM CHECK PLOT

Date/Time: 12/5/2010 11:57:54 AM

Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

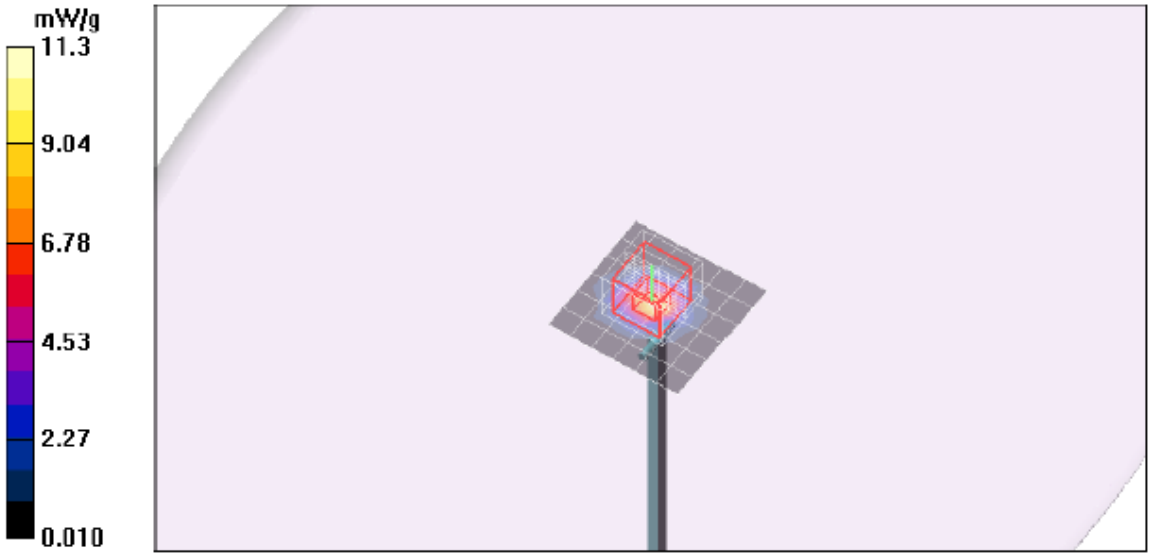
Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 6.24 mho/m; ε_r = 45; ρ = 1000 kg/m^3
Phantom section: Flat Section

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: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:XXXX
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

d=10mm, Pin=100mW, 5.8GHz/Area Scan (7x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 11.3 mW/g

d=10mm, Pin=100mW, 5.8GHz/Zoom Scan (8x8x10)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 45.8 V/m; Power Drift = 0.196 dB
Peak SAR (extrapolated) = 26.7 W/kg
SAR(1 g) = 6.97 mW/g; SAR(10 g) = 2 mW/g
Maximum value of SAR (measured) = 12.4 mW/g



SYSTEM CHECK – Z Plot

Date/Time: 12/5/2010 12:14:20 PM

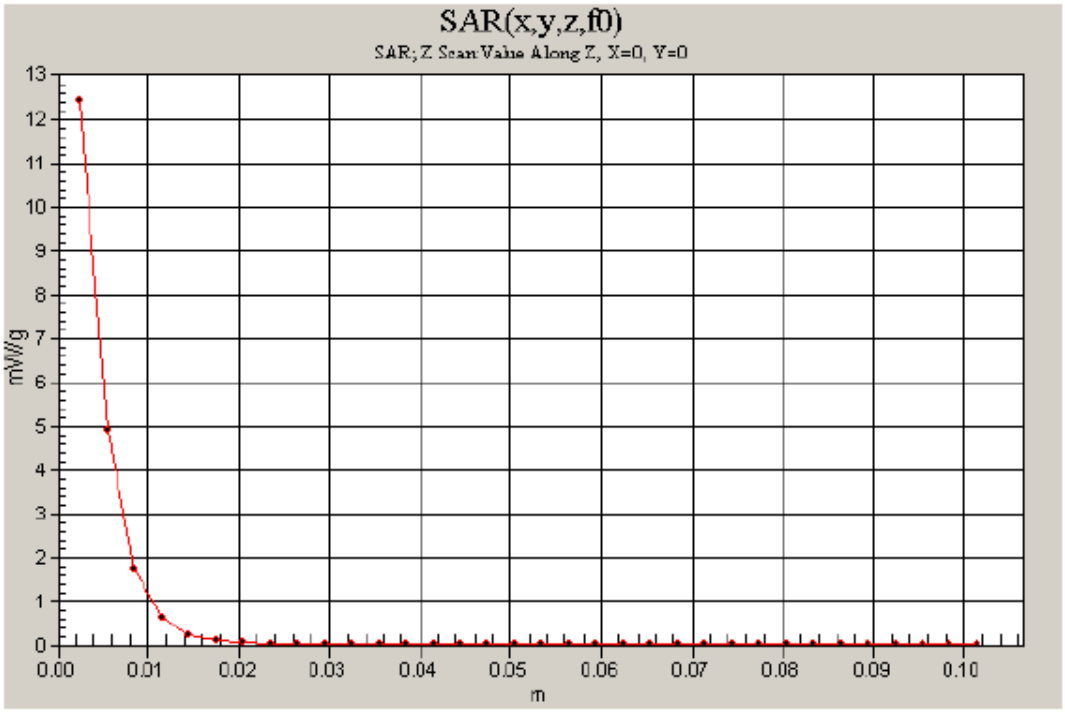
Test Laboratory: Compliance Certification Services

System Performance Check - D5GHzV2_5 GHz

DUT: D5GHzV2; Type: D5GHzV2; Serial: 1075

Communication System: CW 5GHz; Frequency: 5800 MHz;Duty Cycle: 1:1

d=10mm, Pin=100mW, 5.8GHz/Z Scan (1x1x34): Measurement grid: dx=20mm, dy=20mm, dz=3mm
Maximum value of SAR (measured) = 12.4 mW/g



10. SAR MEASUREMENT PROCEDURES

A summary of the procedure follows:

1. A measurement of the SAR value at a fixed location is used as a reference value for assessing the power drop of the EUT. The SAR at this point is measured at the start of the test, and then again at the end of the test.
2. The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 3 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 15 mm x 15 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.
   For 5 GHz band - The SAR distribution at the exposed flat section of the flat phantom is measured at a distance of 2.5 mm from the inner surface of the shell. The area covers the entire dimension of the EUT and the horizontal grid spacing is 10 mm x 10 mm. Based on this data, the area of the maximum absorption is determined by Spline interpolation. The first Area Scan covers the entire dimension of the EUT to ensure that the hotspot was correctly identified.
3. Around this point, a volume of X=Y= 30 and Z=24 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:
   For 5 GHz band - Around this point, a volume of X=Y=24 and Z=20 mm is assessed by measuring 7 x 7 x 9 mm points. On the basis of this data set, the spatial peak SAR value is evaluated with the following procedure:
   a) The data at the surface are extrapolated, since the centre of the dipoles is 1.2 mm away from the tip of the probe and the distance between the surface and the lowest measuring point is 1.3 mm. The extrapolation is based on a least square algorithm. A polynomial of the fourth order is calculated through the points in z-axes. This polynomial is then used to evaluate the points between the surface and the probe tip.
   b) The maximum interpolated value is searched with a straightforward algorithm. Around this maximum the SAR values averaged over the spatial volumes (1 g and 10 g) are computed using the 3D-Spline interpolation algorithm. The 3D-Spline is composed of three one-dimensional splines with the “Not a knot”- condition (in x, y and z-direction). The volume is integrated with the trapezoidal – algorithm. One thousand points (10 x 10 x 10) are interpolated to calculate the averages.
   c) All neighbouring volumes are evaluated until no neighbouring volume with a higher average value is found.
   d) The SAR value at the same location as in Step (a) is again measured to evaluate the actual power drift.

10.1. DASY4 SAR MEASUREMENT PROCEDURES

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 2.1 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties (for example, 1.2 mm for an EX3DV3 probe type).

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

Step 3: Zoom Scan
Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing 1 g and 10 g of simulated tissue. The Zoom Scan measures 7 x 7 x 9 points within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1 g and 10 g and displays these values next to the job's label.

Step 4: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

Step 5: Z-Scan
The Z Scan measures points along a vertical straight line. The line runs along the Z-axis of a one-dimensional grid. In order to get a reasonable extrapolation, the extrapolated distance should not be larger than the step size in Z-direction.

11. RF OUTPUT POWER VERIFICATION

11.1. 2.4 GHz Band

Results

Mode	Channel	Freq. (MHz)	Average Output Power (dBm)			Power Setting
			Chain 0	Chain 1	Total Power	
802.11b	1	2412	16.9	16.8	19.9	19.0
	6	**2437**	**17.4**	**17.2**	**20.3**	**21.0**
	11	2462	17.1	16.6	19.9	20.0
802.11g	1	2412	11.1	10.6	13.9	18.0
	6	2437	16.9	16.7	19.8	21.0
	11	2462	10.7	10.1	13.4	16.0
802.11n HT20	1	2412	11.4	11.1	14.3	16.5
	6	2437	16.2	16.0	19.1	20.5
	11	2462	10.3	9.8	13.1	15.0
802.11n HT40	3	2412	9.9	9.5	12.7	14.5
	6	2437	13.0	12.9	16.0	17.0
	9	2462	9.6	9.4	12.5	13.5

Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40
3. According to KDB 248227. SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

11.2. 5 GHz Bands

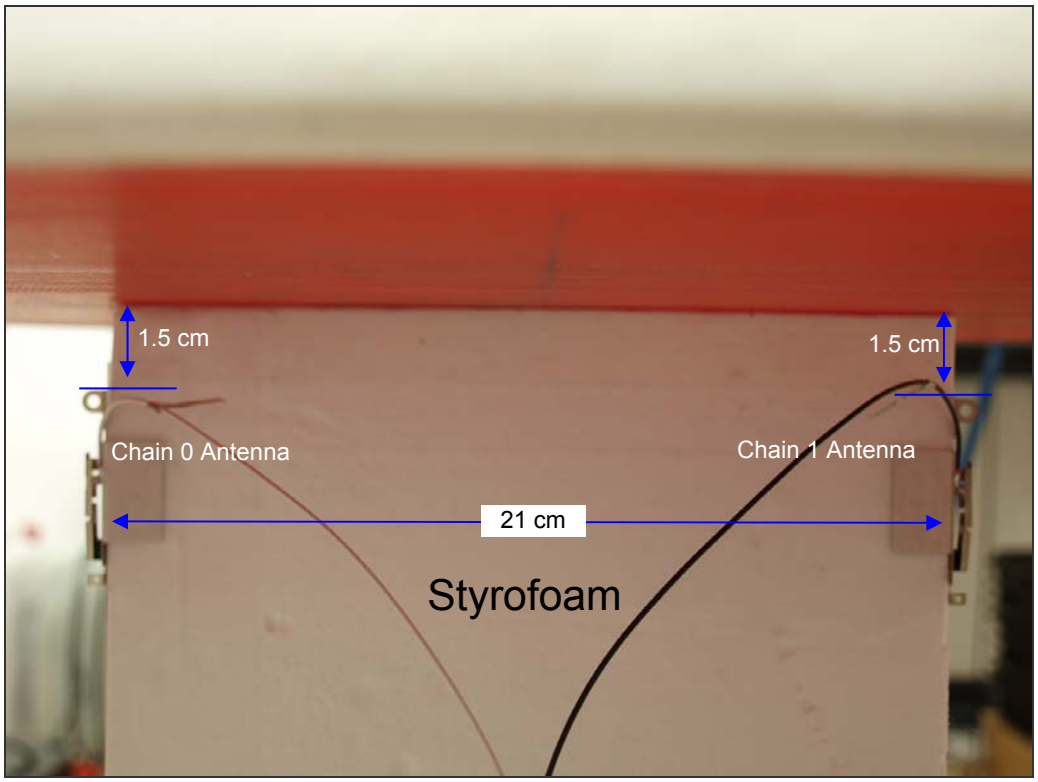
Band	Mode	Channel	Freq. (MHz)	Average Output Power (dBm)		
				Chain 0	Chain 1	Total Power
5.2 GHz	802.11a	36	5180	11.94	11.99	15.0
		44	5220	11.73	11.73	14.7
		48	5240	12.08	12.11	15.1
	802.11n HT20	36	5180	12.21	11.98	15.1
		44	5220	12.81	12.16	15.5
		48	**5240**	**14.92**	**14.45**	**17.7**
	802.11n HT40	38	5190	11.65	10.88	14.3
		46	5230	14.91	13.40	17.2
5.3 GHz	**802.11a**	**52**	**5260**	**15.43**	**14.42**	**18.0**
		60	5300	15.20	13.46	17.4
		64	5320	14.66	14.40	17.5
	802.11n HT20	52	5260	15.03	13.53	17.4
		60	5300	15.14	13.44	17.4
		64	5320	14.54	13.34	17.0
	802.11n HT40	54	5270	13.23	11.87	15.6
		62	5310	9.19	8.62	11.9
5.5 GHz	802.11a	100	5500	15.27	14.26	17.8
		120	5600	14.08	14.09	17.1
		140	5700	13.60	15.89	17.9
	802.11n HT20	100	5500	15.52	14.95	18.3
		120	5600	14.06	14.16	17.1
		140	5700	14.01	16.08	18.2
	802.11n HT40	102	5510	14.27	13.74	17.0
		118	5590	14.44	13.90	17.2
		134	**5670**	**14.41**	**16.40**	**18.5**
5.8 GHz	**802.11a**	**149**	**5745**	**14.92**	**16.33**	**18.7**
		157	5785	14.90	14.62	17.8
		165	5825	14.30	14.69	17.5
	802.11n HT20	149	5745	14.98	16.28	18.7
		157	5785	15.10	15.13	18.1
		165	5825	14.30	14.68	17.5
	802.11n HT40	151	5755	15.70	15.68	18.7
		159	5795	15.39	14.92	18.2

Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40

12. SUMMARY OF SAR TEST RESULTS FOR 2.4 GHZ BAND

12.1. Antenna Vertical Up



Test Result

Mode	Channel	f (MHz)	Avg Pwr (dBm)		1-g SAR (mW/g)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b	1	2412	16.9	16.8		
	6	2437	17.4	17.4	0.083	0.105
	11	2462	17.1	16.6		

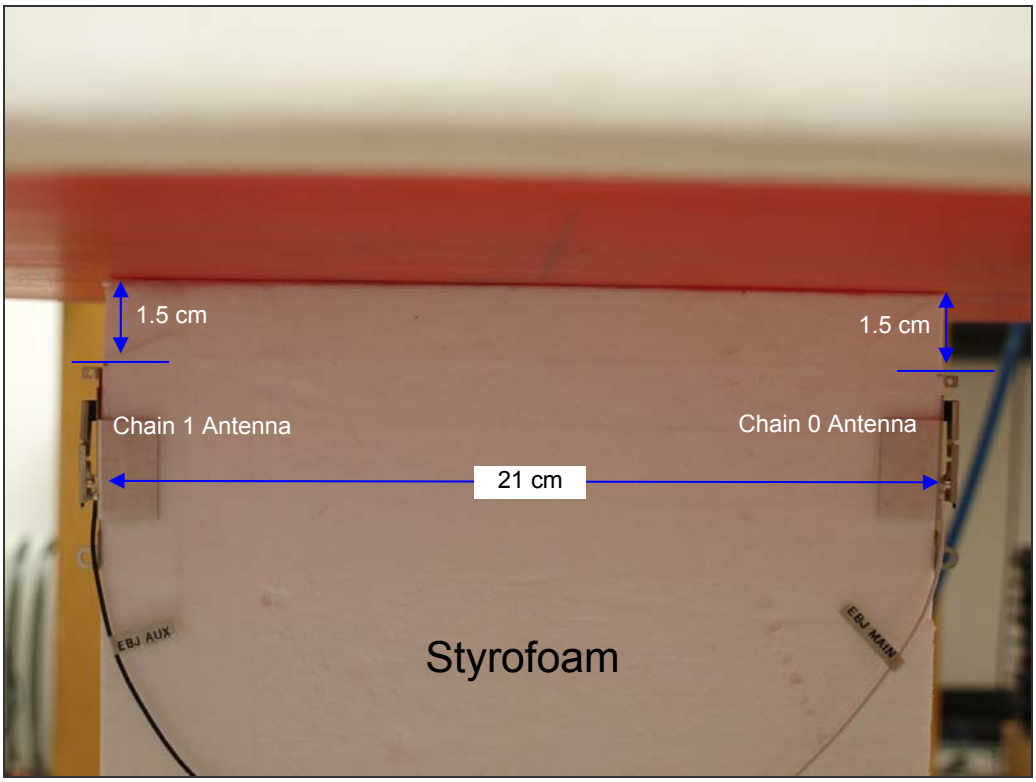
Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40
3. According to KDB 248227. SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Based upon SAR distribution plot, 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.

12.2. Antenna Vertical Down



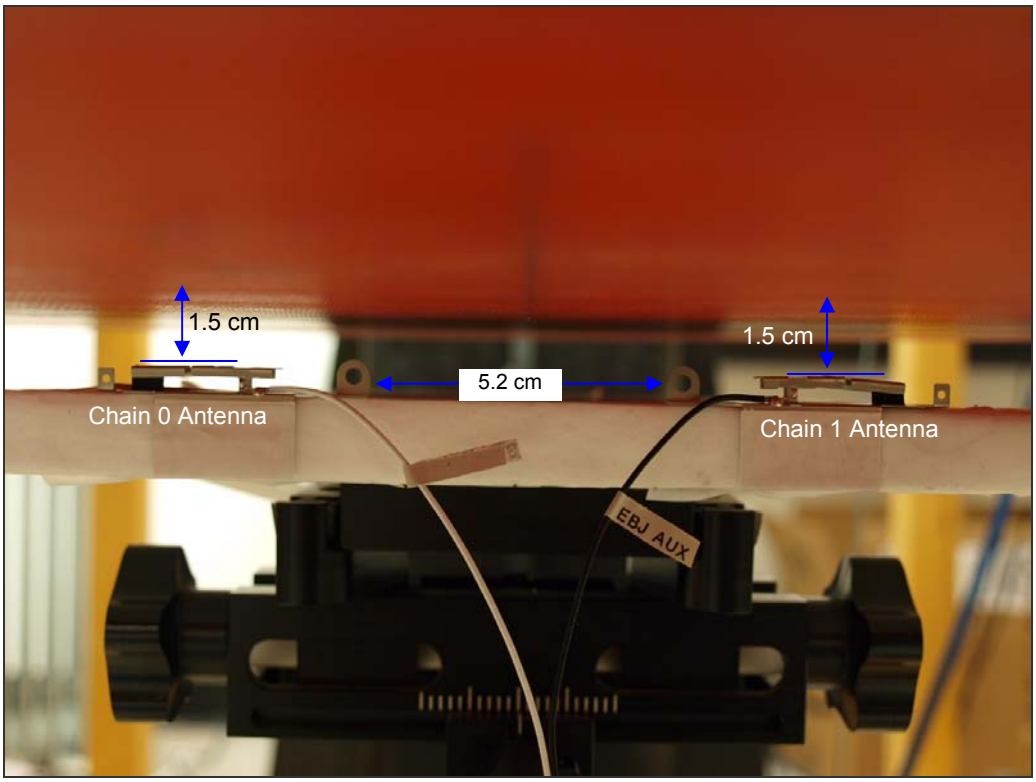
Test Result

Mode	Channel	f (MHz)	Avg Pwr (dBm)		1-g SAR (mW/g)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b	1	2412	16.9	16.8		
	6	2437	17.4	17.3	0.112	0.093
	11	2462	17.1	16.6		

Notes:
1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40
3. According to KDB 248227. SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Based upon SAR distribution plot, 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.

12.3. Antenna Horizontal Up (Worst-case)



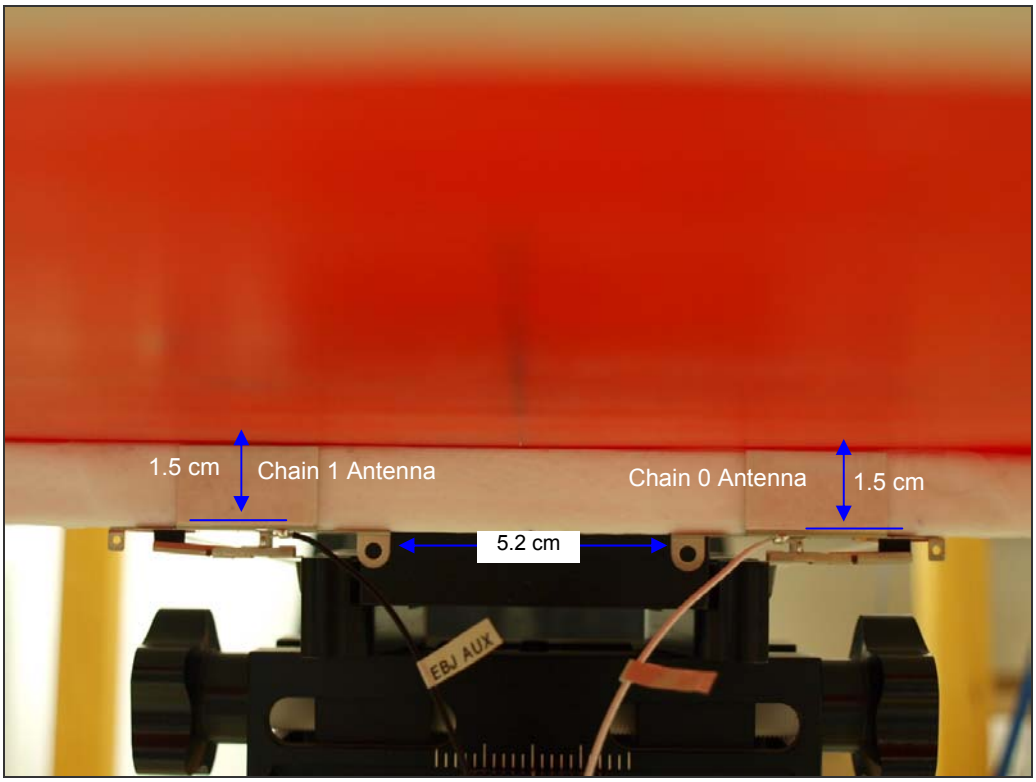
Test Result

Mode	Channel	f (MHz)	Avg Pwr (dBm)		1-g SAR (mW/g)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b	1	2412	16.9	16.8		
	6	2437	17.2	17.4	0.351	**0.396**
	11	2462	17.1	16.6		

Notes:
1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40
3. According to KDB 248227. SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Based upon SAR distribution plot, 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.

12.4. Antenna Horizontal Down



Test result

Mode	Channel	f (MHz)	Avg Pwr (dBm)		1g SAR (mW/g)	
			Chain 0	Chain 1	Chain 0	Chain 1
802.11b	1	2412	16.9	16.8		
	6	2437	17.2	17.2	0.210	0.267
	11	2462	17.1	16.6		

Notes:
1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either b/g/H20/H40
3. According to KDB 248227. SAR is not required for 802.11g/HT20/HT40 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

Based upon SAR distribution plot, 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.

12.5. Worst-case SAR Test Plots for 2.4 GHz Band

Worst-case SAR test plot for 2.4 GHz band

Date/Time: 12/9/2010 10:57:14 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 1.99 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

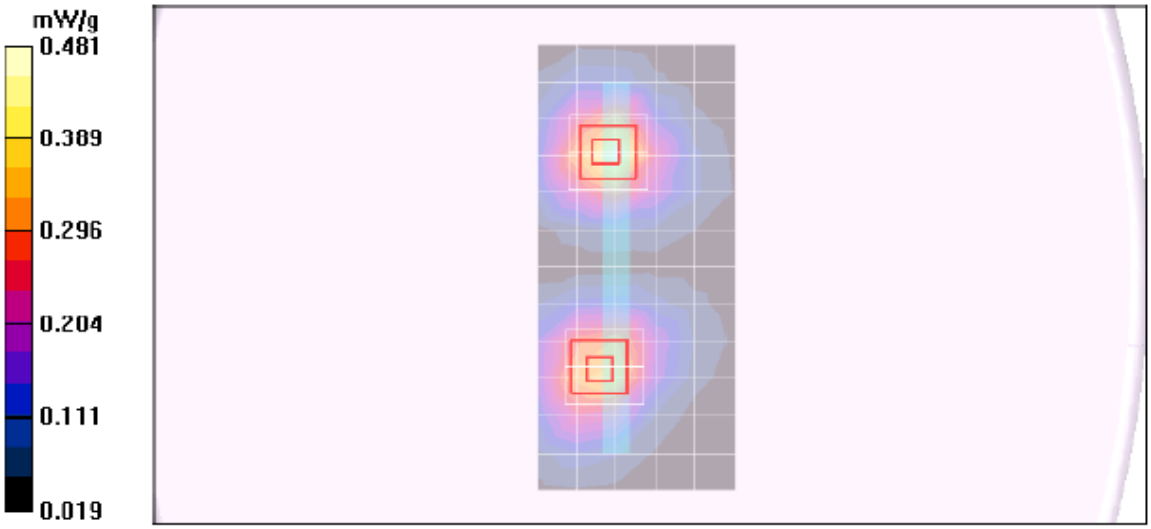
Room Ambient Temperature: 24.0 deg. C; Liquid Temperature: 23.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(7.58, 7.58, 7.58); Calibrated: 2/23/2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b 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) = 0.481 mW/g

802.11b M-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 15.4 V/m; Power Drift = 0.225 dB
Peak SAR (extrapolated) = 0.702 W/kg
SAR(1 g) = 0.396 mW/g; SAR(10 g) = 0.223 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.487 mW/g

802.11b M-ch M&A Ant/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 15.4 V/m; Power Drift = 0.225 dB
Peak SAR (extrapolated) = 0.616 W/kg
SAR(1 g) = 0.351 mW/g; SAR(10 g) = 0.202 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.425 mW/g



Worst-case SAR test Z-axis plot for 2.4 GHz band

Date/Time: 12/9/2010 11:59:56 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up

DUT: Atheros; Type: NA; Serial: NA

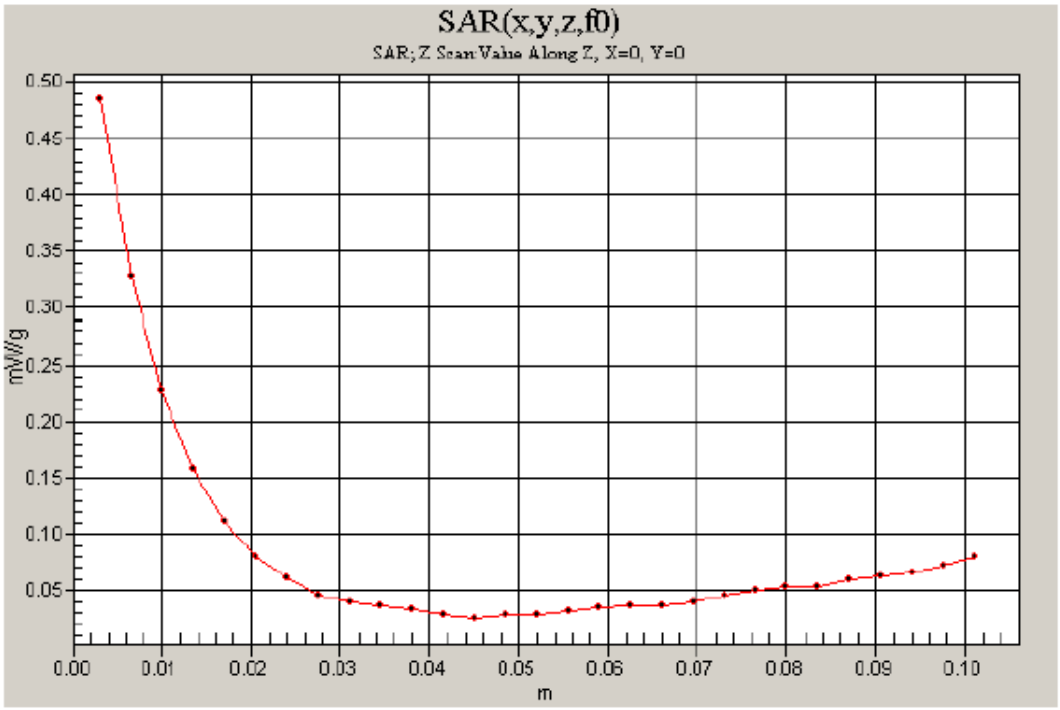
Communication System: 802.11b/g 2.4GHz; Frequency: 2437 MHz;Duty Cycle: 1:1

802.11b M-ch M&A Ant/Z Scan 2 (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.446 mW/g

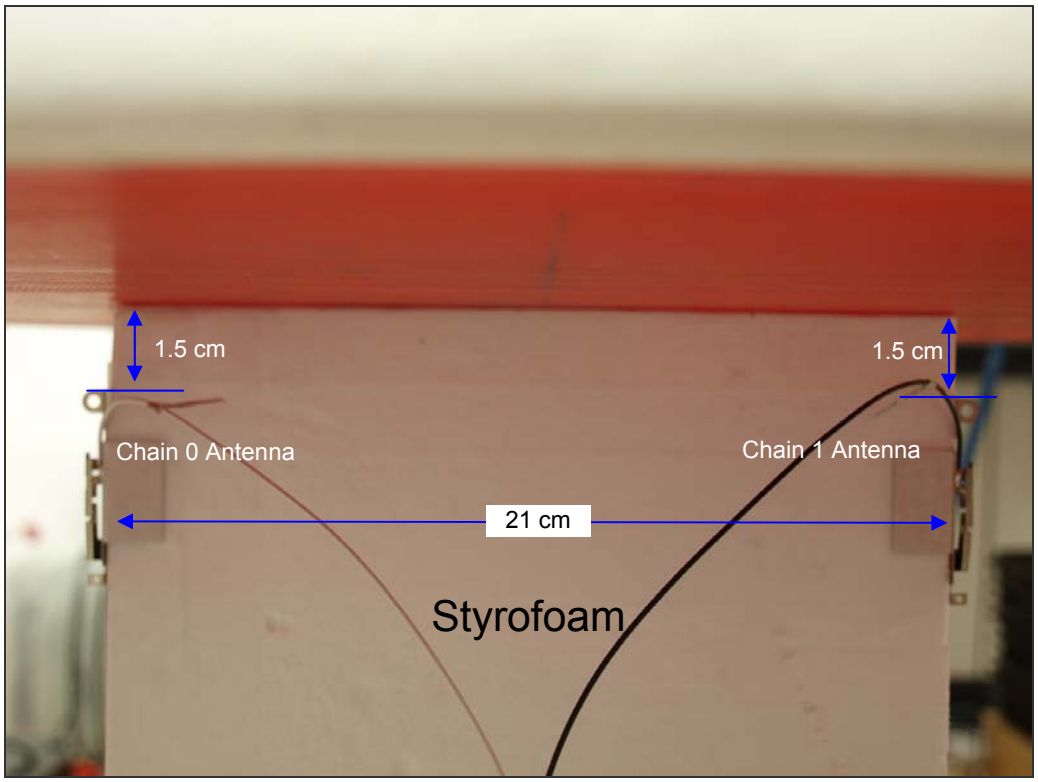
802.11b M-ch M&A Ant/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.485 mW/g



13. SUMMARY OF SAR TEST RESULTS FOR 5 GHZ BANDS

13.1. Antenna Vertical Up



Test result

Band	Mode	Channel	f (MHz)	Avg Pwr (dBm)		1-g SAR (mW/g)	
				Chain 0	Chain 1	Chain 0	Chain 1
5.2 GHz	802.11n (HT20)	36	5180	12.21	11.98		
		44	5220	12.81	12.16	0.109	0.081
		48	5240	14.92	14.45	0.122	0.097
5.3 GHz	802.11a	52	5260	15.43	14.42	0.137	0.091
		60	5300	15.20	13.46	0.123	0.102
		64	5320	14.66	14.40		
5.5GHz	802.11n (HT40)	102	5510	14.27	13.74		
		118	5590	14.44	13.90	0.135	0.134
		134	5670	14.41	16.40	0.187	0.172
5.8 GHz	802.11a	149	5745	14.92	16.33	0.162	0.139
		157	5785	14.90	14.62	0.110	0.103
		165	5825	14.30	14.69		

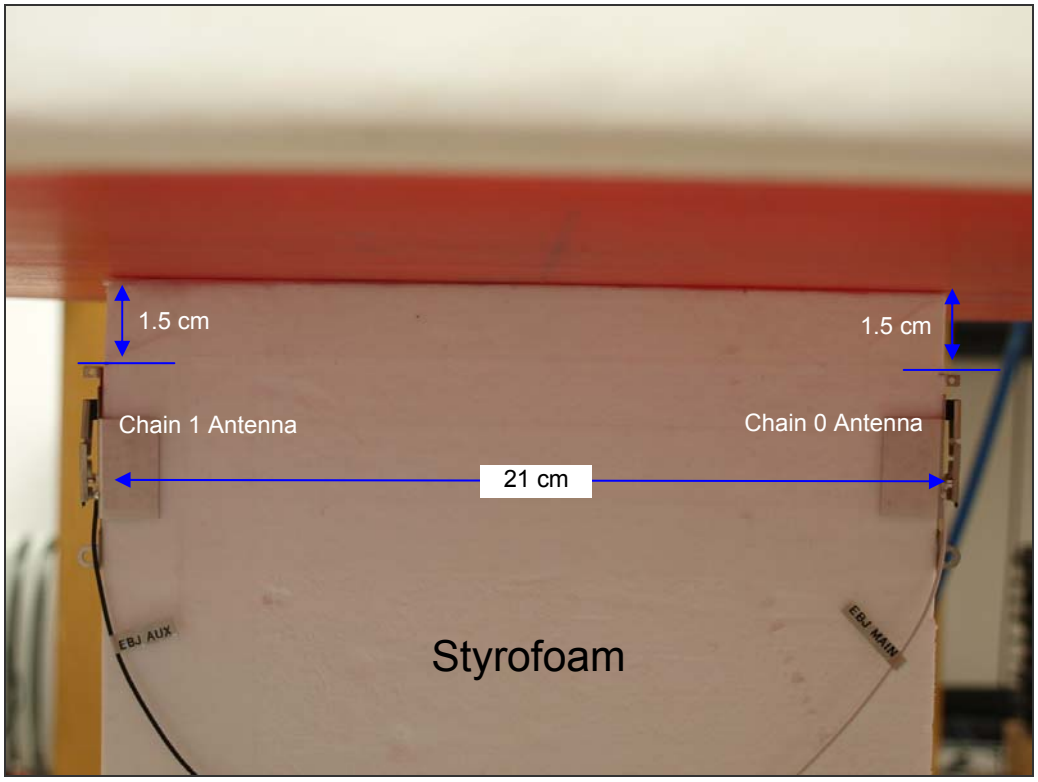
Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either a/H20/H40

Based upon SAR distribution plot, SAR hot spot will be distributed in approx. 3 grids with 1.0 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 3 grids (1.0 cm x 3) = 3 cm.

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

13.2. Antenna Vertical Down



Test result

Band	Mode	Channel	f (MHz)	Avg Pwr (dBm)		1g SAR (mW/g)	
				Chain 0	Chain 1	Chain 0	Chain 1
5.2 GHz	802.11n (HT20)	36	5180	12.21	11.98		
		44	5220	12.81	12.16	0.076	0.065
		48	5240	14.92	14.45	0.098	0.073
5.3 GHz	802.11a	52	5260	15.43	14.42	0.104	0.090
		60	5300	15.20	13.46	0.125	0.083
		64	5320	14.66	14.40		
5.5GHz	802.11n (HT40)	102	5510	14.27	13.74		
		118	5590	14.44	13.90	0.108	0.105
		134	5670	14.41	16.40	0.170	0.132
5.8 GHz	802.11a	149	5745	14.92	16.33	0.138	0.105
		157	5785	14.90	14.62	0.096	0.085
		165	5825	14.30	14.69		

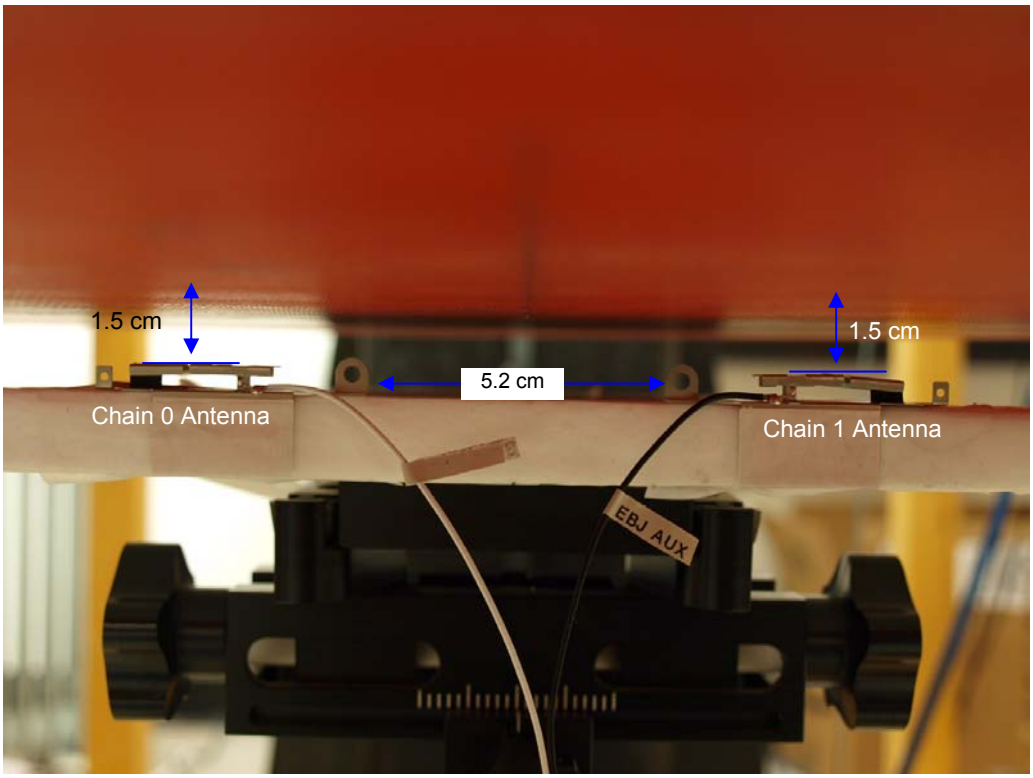
Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either a/H20/H40

Based upon SAR distribution plot, SAR hot spot will be distributed in approx. 3 grids with 1.0 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 3 grids (1.0 cm x 3) = 3 cm.

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

13.3. Antenna Horizontal Up (Worst-case)



Test Result

Band	Mode	Channel	f (MHz)	Avg Pwr (dBm)		1g SAR (mW/g)	
				Chain 0	Chain 1	Chain 0	Chain 1
5.2 GHz	802.11n (HT20)	36	5180	12.21	11.98		
		44	5220	12.81	12.16	0.215	0.184
		48	5240	14.92	14.45	**0.254**	0.203
5.3 GHz	802.11a	52	5260	15.43	14.42	0.249	0.192
		60	5300	15.20	13.46	**0.260**	0.204
		64	5320	14.66	14.40		
5.5GHz	802.11n (HT40)	102	5510	14.27	13.74		
		118	5590	14.44	13.90	0.314	0.301
		134	5670	14.41	16.40	**0.398**	0.374
5.8 GHz	802.11a	149	5745	14.92	16.33	0.301	**0.330**
		157	5785	14.90	14.62	0.286	0.275
		165	5825	14.30	14.69		

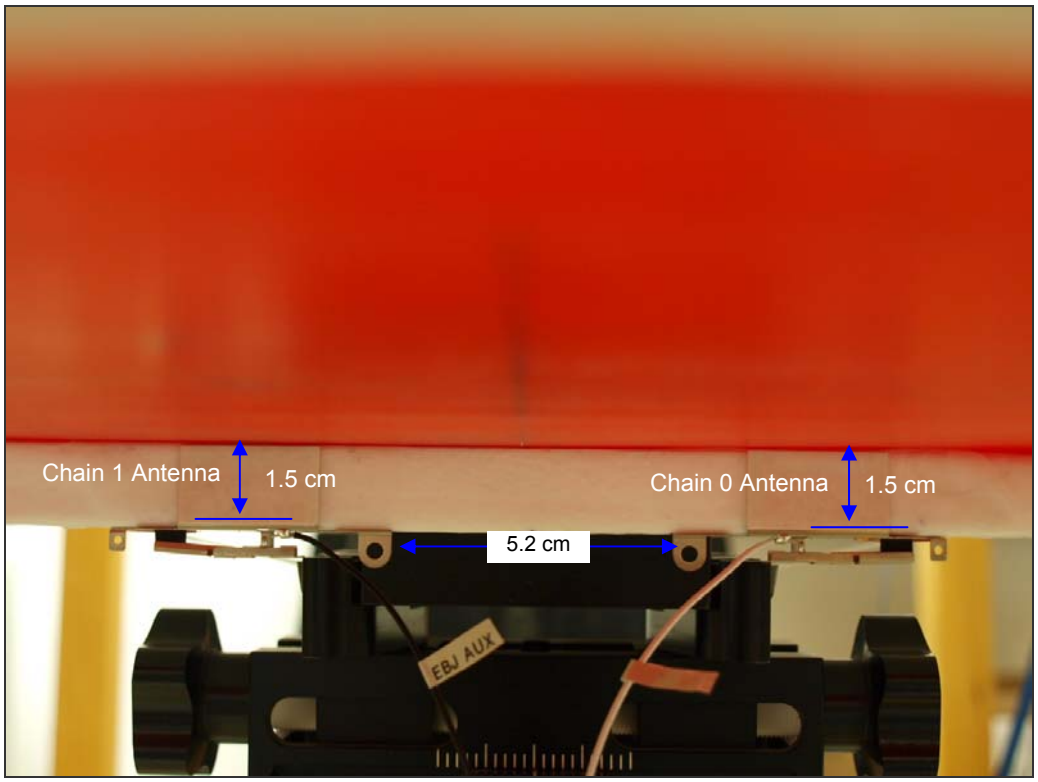
Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either a/H20/H40

Based upon SAR distribution plot, SAR hot spot will be distributed in approx. 3 grids with 1.0 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 3 grids (1.0 cm x 3) = 3 cm.

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

13.4. Antenna Horizontal Down



Test Result

Band	Mode	Channel	f (MHz)	Avg Pwr (dBm)		1g (mW/g)	
				Chain 0	Chain 1	Chain 0	Chain 1
5.2 GHz	802.11n (HT20)	36	5180	12.21	11.98		
		44	5220	12.81	12.16	0.152	0.169
		48	5240	14.92	14.45	0.157	0.177
5.3 GHz	802.11a	52	5260	15.43	14.42	0.215	0.176
		60	5300	15.20	13.46	0.208	0.165
		64	5320	14.66	14.40		
5.5GHz	802.11n (HT40)	102	5510	14.27	13.74		
		118	5590	14.44	13.90	0.201	0.243
		134	5670	14.41	16.40	0.366	0.386
5.8 GHz	802.11a	149	5745	14.92	16.33	0.306	0.277
		157	5785	14.90	14.62	0.220	0.190
		165	5825	14.30	14.69		

Notes:

1. SAR tested on the highest output power channel.
2. This module is not capable of single antnena transmitting mode in either a/H20/H40

Based upon SAR distribution plot, SAR hot spot will be distributed in approx. 3 grids with 1.0 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 3 grids (1.0 cm x 3) = 3 cm.
SAR hot spots observation: The hot spot is near the center of antenna element.

13.5. Worst-case SAR Test Plots for 5GHz Bands

Worst-case SAR test plot for 5.2 GHz band

Date/Time: 12/5/2010 5:56:43 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up_5.2GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.2GHz; Frequency: 5240 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5240 MHz; σ = 5.42 mho/m; ε_r = 46.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

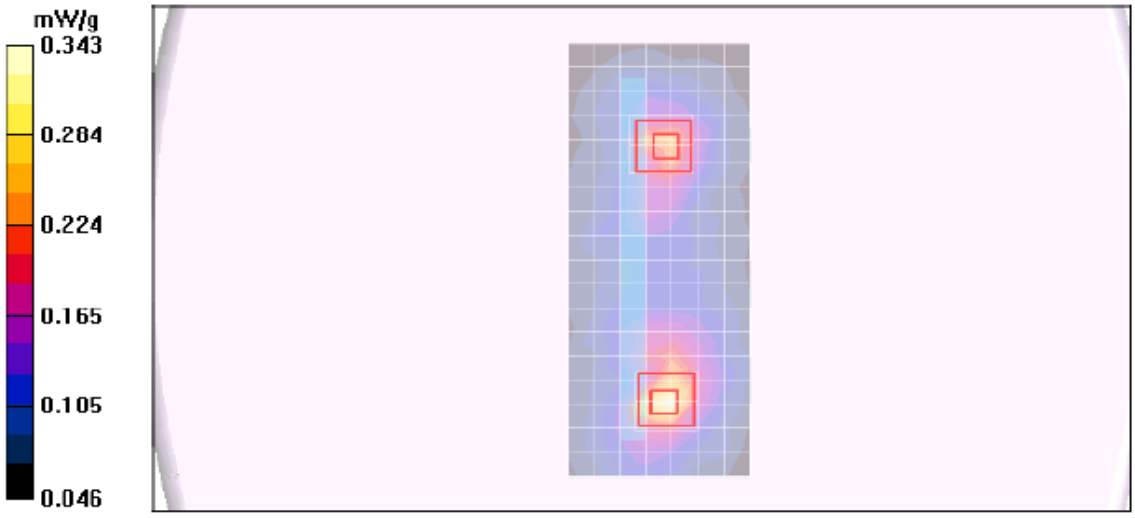
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(4.04, 4.04, 4.04); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11n_HT20_48-ch M&A Ant/Area Scan (8x19x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.343 mW/g

802.11n_HT20_48-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.85 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.933 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.113 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.390 mW/g

802.11n_HT20_48-ch M&A Ant/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 7.85 V/m; Power Drift = 0.111 dB
Peak SAR (extrapolated) = 0.719 W/kg
SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.098 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.301 mW/g



Worst-case SAR test Z-axis plot for 5.2 GHz band

Date/Time: 12/5/2010 6:42:51 PM

Test Laboratory: Compliance Certification Services

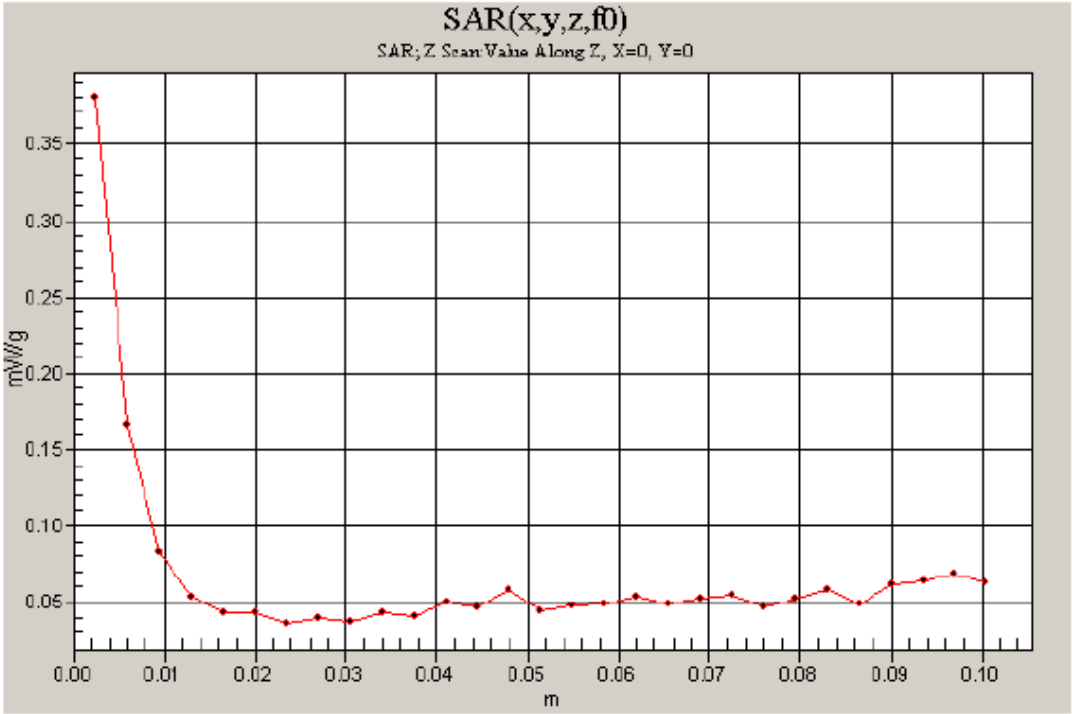
Antenna Horizontal Up_5.2GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.2GHz; Frequency: 5240 MHz;Duty Cycle: 1:1

802.11n_HT20_48-ch M&A Ant/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.380 mW/g



Worst-case SAR test plot for 5.3 GHz band

Date/Time: 12/5/2010 2:57:47 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up_5.3GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.2GHz; Frequency: 5300 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5300 MHz; σ = 5.49 mho/m; ε_r = 45.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

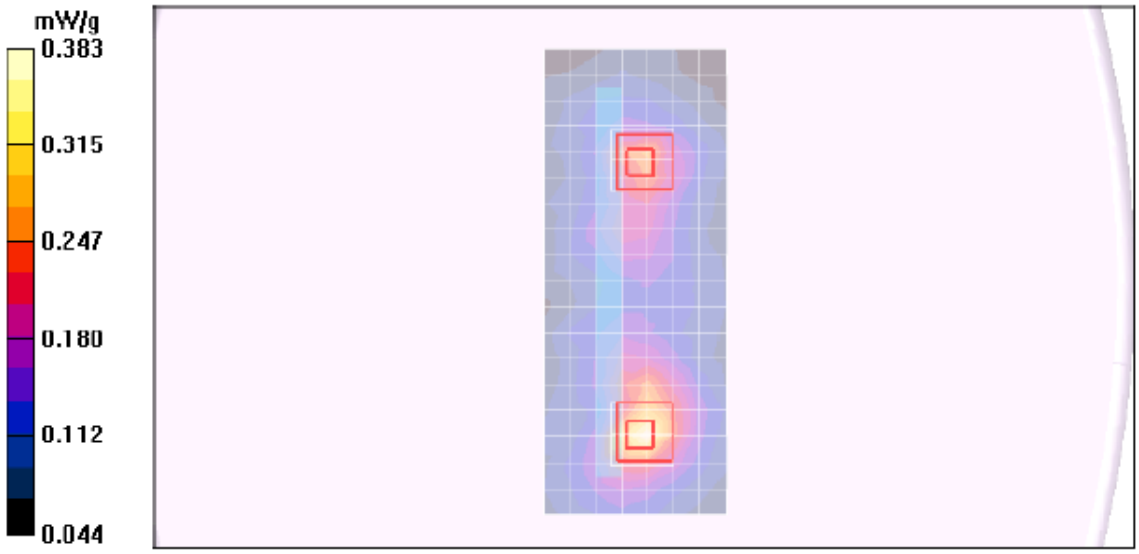
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.79, 3.79, 3.79); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_60-ch M&A Ant/Area Scan (8x19x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.383 mW/g

802.11a_60-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 8.14 V/m; Power Drift = 0.195 dB
Peak SAR (extrapolated) = 0.750 W/kg
SAR(1 g) = 0.260 mW/g; SAR(10 g) = 0.125 mW/g
Maximum value of SAR (measured) = 0.400 mW/g

802.11a_60-ch M&A Ant/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 8.14 V/m; Power Drift = 0.195 dB
Peak SAR (extrapolated) = 0.590 W/kg
SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.098 mW/g
Maximum value of SAR (measured) = 0.298 mW/g



Worst-case SAR test Z-axis plot for 5.3 GHz band

Date/Time: 12/5/2010 3:42:37 PM

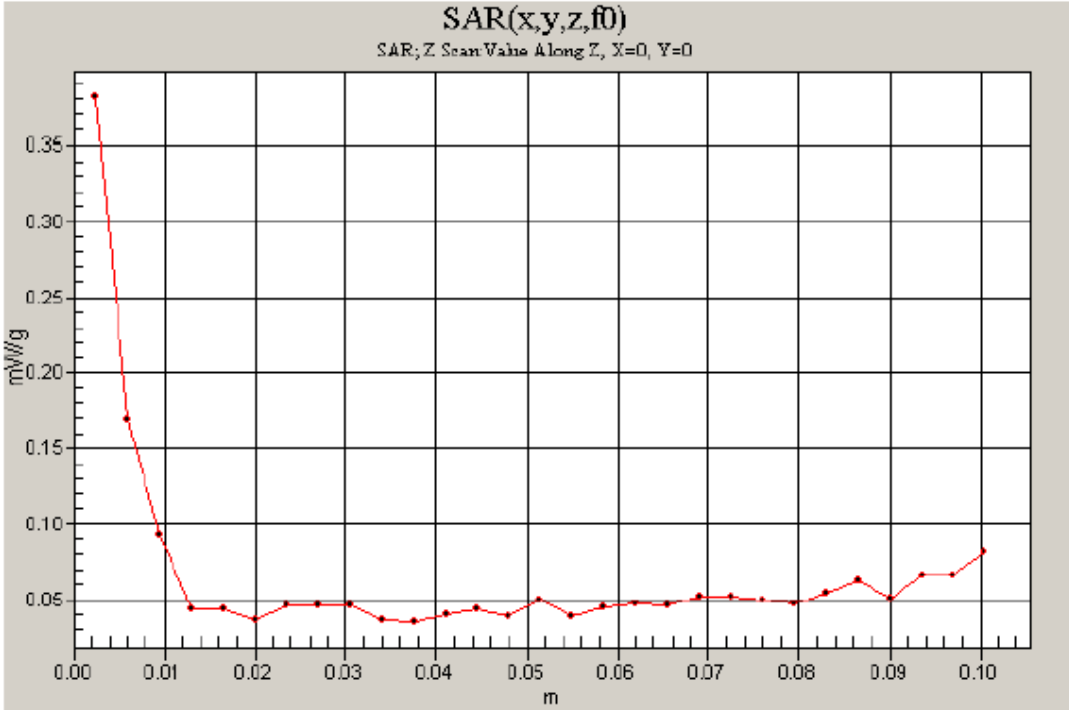
Test Laboratory: Compliance Certification Services

Antenna Horizontal Up_5.3GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.2GHz; Frequency: 5300 MHz;Duty Cycle: 1:1

802.11a_60-ch M&A Ant/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm
Maximum value of SAR (measured) = 0.381 mW/g



Worst-case SAR test plot for 5.5 GHz band

Date/Time: 12/5/2010 7:16:59 PM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up_5.6GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.6GHz; Frequency: 5670 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5670 MHz; σ = 6.03 mho/m; ε_r = 45.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

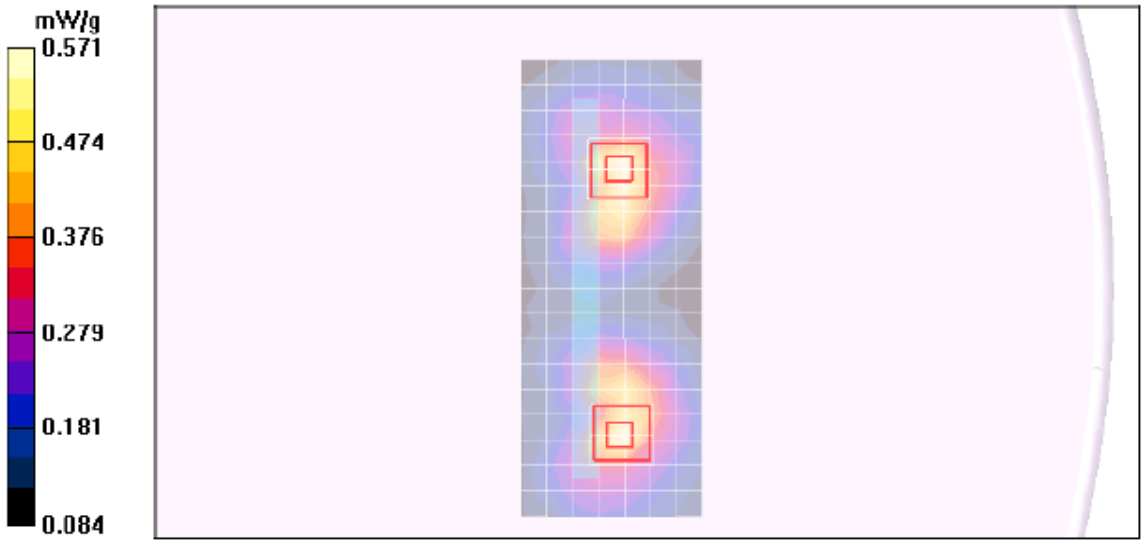
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.32, 3.32, 3.32); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11n_HT40_134-ch M&A Ant/Area Scan (8x19x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.571 mW/g

802.11n_HT40_134-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 9.29 V/m; Power Drift = 0.127 dB
Peak SAR (extrapolated) = 1.17 W/kg
SAR(1 g) = 0.398 mW/g; SAR(10 g) = 0.188 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.630 mW/g

802.11n_HT40_134-ch M&A Ant/Zoom Scan (7x7x9)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 9.29 V/m; Power Drift = 0.127 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.374 mW/g; SAR(10 g) = 0.177 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.598 mW/g



Worst-case SAR test Z-axis plot for 5.5 GHz band

Date/Time: 12/5/2010 8:04:34 PM

Test Laboratory: Compliance Certification Services

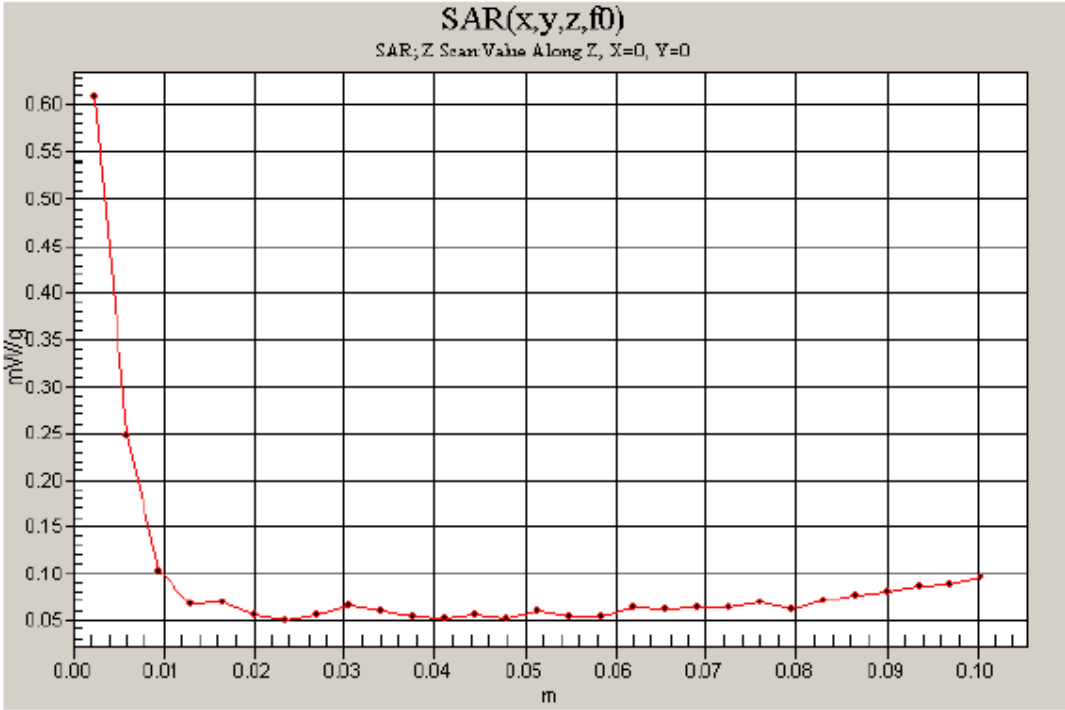
Antenna Horizontal Up_5.6GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.6GHz; Frequency: 5670 MHz;Duty Cycle: 1:1

802.11n_HT40_134-ch M&A Ant/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.608 mW/g



Worst-case SAR test plot for 5.8 GHz band

Date/Time: 12/5/2010 11:52:26 AM

Test Laboratory: Compliance Certification Services

Antenna Horizontal Up_5.8GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.8GHz; Frequency: 5745 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5745 MHz; σ = 6.06 mho/m; ε_r = 45.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

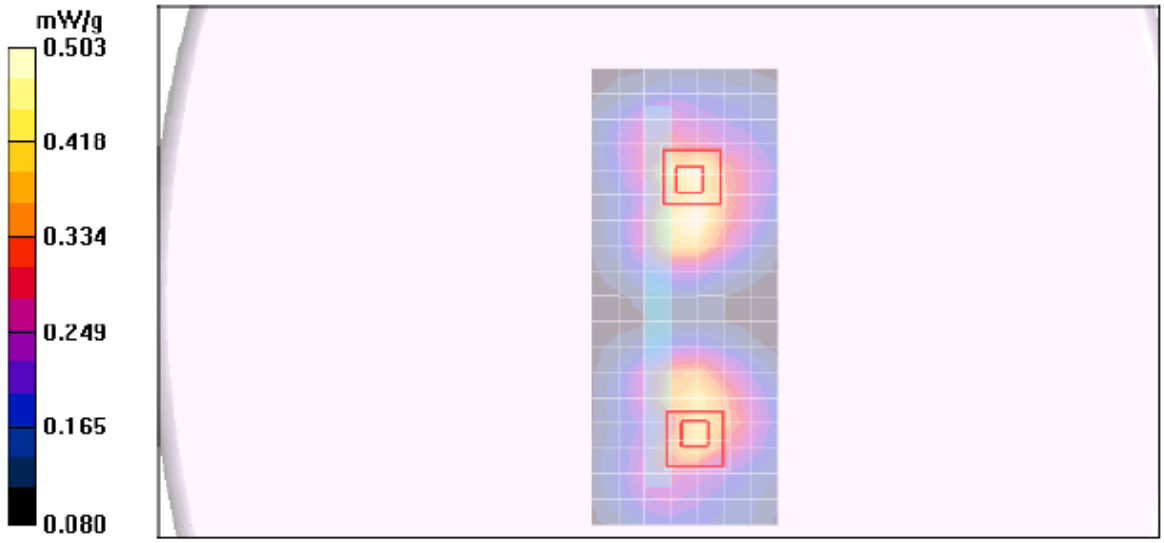
Room Ambient Temperature: 25.0 deg. C; Liquid Temperature: 24.0 deg. C

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV3 - SN3531; ConvF(3.48, 3.48, 3.48); Calibrated: 2/23/2010
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn427; Calibrated: 7/21/2010
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11a_149-ch M&A Ant/Area Scan (8x19x1): Measurement grid: dx=10mm, dy=10mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.503 mW/g

802.11a_149-ch M&A Ant/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 8.86 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.947 W/kg
SAR(1 g) = 0.330 mW/g; SAR(10 g) = 0.156 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.507 mW/g

802.11a_9Mbps_149-ch M&A Ant/Zoom Scan 2 (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 8.86 V/m; Power Drift = 0.108 dB
Peak SAR (extrapolated) = 0.885 W/kg
SAR(1 g) = 0.301 mW/g; SAR(10 g) = 0.146 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.471 mW/g



Worst-case SAR test Z-axis plot for 5.8 GHz band

Date/Time: 12/5/2010 12:38:11 PM

Test Laboratory: Compliance Certification Services

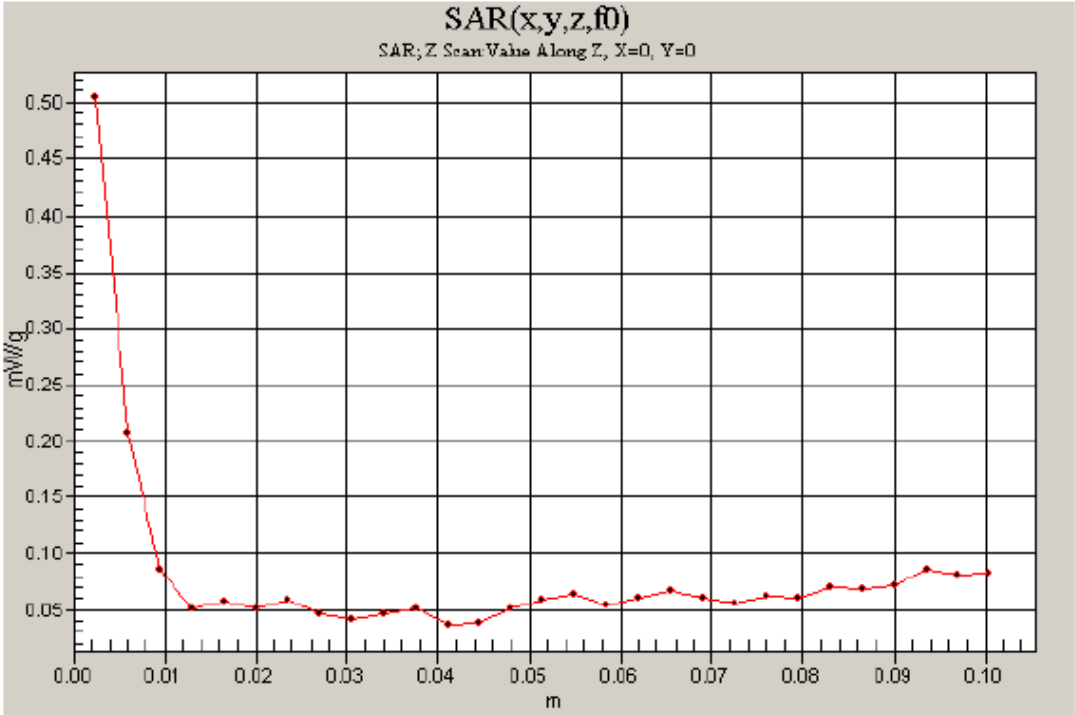
Antenna Horizontal Up_5.8GHz

DUT: Atheros; Type: NA; Serial: NA

Communication System: 802.11a 5.8GHz; Frequency: 5745 MHz;Duty Cycle: 1:1

802.11a_149-ch M&A Ant/Z Scan (1x1x29): Measurement grid: dx=20mm, dy=20mm, dz=3.5mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.504 mW/g



14. 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.

14.1. ENHANCED ENERGY COUPLING FOR 2.4 GHZ BAND

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

Antenna test configuration	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Vertical Up	Initial	1	0.105	7.80	
	1	1.5	0.08	6.74	74.6%
	2	2	0.06	5.83	55.8%
	3	2.5	0.04	5.09	42.5%

Antenna position	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Vertical Down	Initial	1	0.112	7.71	
	1	1.5	0.08	6.33	67.4%
	2	2	0.05	5.23	46.1%
	3	2.5	0.03	4.20	29.7%

Antenna position	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Horizontal Up	Initial	1	0.396	15.76	
	1	1.5	0.28	13.21	70.3%
	2	2	0.21	11.34	51.8%
	3	2.5	0.16	10.05	40.7%

Antenna position	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Horizontal Down	Initial	1.5	0.267	12.88	
	1	2	0.14	9.43	53.5%
	2	2.5	0.07	6.70	27.0%
	3	3	0.04	5.01	15.1%

14.2. ENHANCED ENERGY COUPLING FOR 5 GHZ BANDS

Antenna position	Freq. (MHz)	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Vertical Up	5240	Initial	1	0.122	5.47	
		1	1.5	0.09	4.60	70.6%
		2	2	0.06	3.94	52.0%
		3	2.5	0.05	3.59	43.1%
	5300	Initial	1	0.123	5.58	
		1	1.5	0.09	4.74	72.3%
		2	2	0.07	4.11	54.2%
		3	2.5	0.05	3.70	44.0%
	5670	Initial	1	0.187	6.77	
		1	1.5	0.12	5.45	64.9%
		2	2	0.09	4.69	48.0%
		3	2.5	0.07	4.19	38.3%
	5745	Initial	1.5	0.162	6.13	
		1	2	0.11	5.02	67.1%
		2	2.5	0.08	4.28	48.7%
		3	3	0.07	3.92	41.0%

Antenna position	Freq. (MHz)	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Vertical Down	5240	Initial	1	0.098	5.27	
		1	1.5	0.07	4.32	67.1%
		2	2	0.05	3.91	55.0%
		3	2.5	0.04	3.57	45.8%
	5300	Initial	1	0.125	4.86	
		1	1.5	0.09	4.11	71.5%
		2	2	0.07	3.70	57.8%
		3	2.5	0.06	3.42	49.4%
	5670	Initial	1	0.170	6.28	
		1	1.5	0.12	5.24	69.5%
		2	2	0.10	4.71	56.1%
		3	2.5	0.08	4.41	49.3%
	5745	Initial	1.5	0.138	5.67	
		1	2	0.11	5.02	78.4%
		2	2.5	0.09	4.60	65.9%
		3	3	0.07	3.98	49.4%

Antenna positjion	f (MHz)	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Horizontal Up	5240	Initial	1.5	0.254	8.13	
		1	2	0.15	6.20	58.1%
		2	2.5	0.12	5.60	47.4%
		3	3	0.09	4.95	37.0%
	5300	Initial	1.5	0.260	8.42	
		1	2	0.17	6.77	64.7%
		2	2.5	0.13	5.91	49.2%
		3	3	0.09	5.09	36.5%
	5670	Initial	1.5	0.398	9.65	
		1	2	0.25	7.63	62.5%
		2	2.5	0.20	6.79	49.5%
		3	3	0.13	5.62	33.9%
	5745	Initial	1.5	0.330	8.97	
		1	2	0.22	7.34	66.9%
		2	2.5	0.15	6.06	45.7%
		3	3	0.09	4.80	28.6%

Antenna position	f (MHz)	Antenna-to-person distance (cm)		Peak SAR (mW/g)	E-field (V/m)	Lower than Initial (%)
Horizontal Down	5240	Initial	1.5	0.157	6.54	
		1	2	0.14	6.14	88.1%
		2	2.5	0.10	5.30	65.7%
		3	3	0.06	4.18	40.8%
	5300	Initial	1.5	0.215	7.44	
		1	2	0.14	5.92	63.3%
		2	2.5	0.08	4.49	36.4%
		3	3	0.06	3.78	25.8%
	5670	Initial	1.5	0.366	9.79	
		1	2	0.26	8.24	70.8%
		2	2.5	0.14	6.02	37.8%
		3	3	0.08	4.48	21.0%
	5745	Initial	1.5	0.306	8.07	
		1	2	0.24	7.17	78.9%
		2	2.5	0.14	5.39	44.5%
		3	3	0.08	4.15	26.4%

15. ATTACHMENTS

No.	Contents	No. of page (s)
1-1	SAR Test Plots for 2.4GHz	5
1-2	SAR Test Plots for 5GHz	36
2	Certificate of E-Field Probe - EX3DV3 SN 3531	11
3	Certificate of System Validation Dipole - D2450 SN:706	9

END OF REPORT