FCC OET BULLETIN 65 SUPPLEMENT C

SAR EVALUATION REPORT

For

WiFi-WIN Card
(Tested inside of Kohjinsha PA)

MODEL: 0201JVA

FCC ID: EW4-0201JVA

REPORT NUMBER: 10J13061-3B

ISSUE DATE: March 10, 2010

Prepared for

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1601, Sakai, Atsugi-shi
Kanagawa-ken 243, Japan

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	February 20, 2010	Initial Issue	--
A	March 9, 2010	- Added antenna-to-antenna separation distances in Section 5 - Updated EUT description	Sunny Shih
B	March 10, 2010	- Updated Section 5 Equipment Under Test. - Removed Section 12 Antenna-to-antenna separation distances from this report.	Sunny Shih

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Mitsumi Electric Co Ltd 1601, Sakai, Atsugi-shi Kanagawa-ken 243, Japan
EUT DESCRIPTION:	WiFi-WIN Card (Tested inside of Kohjinsha PA)
MODEL NUMBER:	0201JVA
DEVICE CATEGORY:	Portable
EXPOSURE CATEGORY:	General Population/Uncontrolled Exposure
DATE TESTED:	February 18, 2010

THE HIGHEST SAR VALUES:

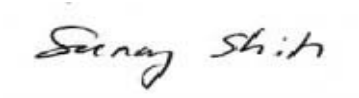
FCC/IC Rule Parts	Frequency Range [MHz]	1g SAR (mW/g)	Limit (mW/g)
15.247 / RSS-102	2400 – 2483.5	0.126 (Tablet mode - Bottom Face)	1.6

Applicable Standards and Test Procedures	Test Results
OET 65, Supplement C and the following specific Test Procedures: o KDB 248227 SAR measurement procedures for 802.11a/b/g transmitters o KDB 447498 D01 Mobile Portable RF Exposure v04, suppl. to KDB 616217 D03	Pass

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

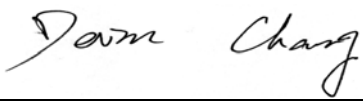
Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by CCS and all revisions are duly noted in the revisions section. Any alteration of this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

Approved & Released For CCS By:



SUNNY SHIH
ENGINEERING SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



DEVIN CHANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Robot - Six Axes	Stäubli	RX90BL	N/A	N/A		
Robot Remote Control	Stäubli	CS7MB	3403-91535	N/A		
DASY4 Measurement Server	SPEAG	SEUMS001BA	1041	N/A		
Probe Alignment Unit	SPEAG	LB (V2)	261	N/A		
SAM Phantom (SAM1)	SPEAG	QD000P40CA	1185	N/A		
SAM Phantom (SAM2)	SPEAG	QD000P40CA	1050	N/A		
Oval Flat Phantom (ELI 4.0)	SPEAG	QD OVA001 B	1003	N/A		
Electronic Probe kit	HP	85070C	N/A	N/A		
S-Parameter Network Analyzer	Agilent	8753ES-6	MY40001647	11	22	2010
Signal Generator	Agilent	8753ES-6	MY40001647	11	22	2010
E-Field Probe	SPEAG	EX3DV4	3686	3	23	2010
Data Acquisition Electronics	SPEAG	DAE3 V1	500	9	15	2010
System Validation Dipole	SPEAG	D2450V2	748	4	14	2010
System Validation Dipole	SPEAG	D5GHzV2	1075	9	3	2011
ESG Vector Signal Generator	Agilent	E4438C	US44271090	9	17	2010
Amplifier	Mini-Circuits	ZVE-8G	90606	N/A		
Amplifier	Mini-Circuits	ZHL-42W	D072701-5	N/A		
Simulating Liquid	SPAEG	H2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M2450	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	H5800	N/A	Within 24 hrs of first test		
Simulating Liquid	SPAEG	M5800	N/A	Within 24 hrs of first test		

4.2. MEASUREMENT UNCERTAINTY

Measurement uncertainty for 300 MHz – 3000 MHz

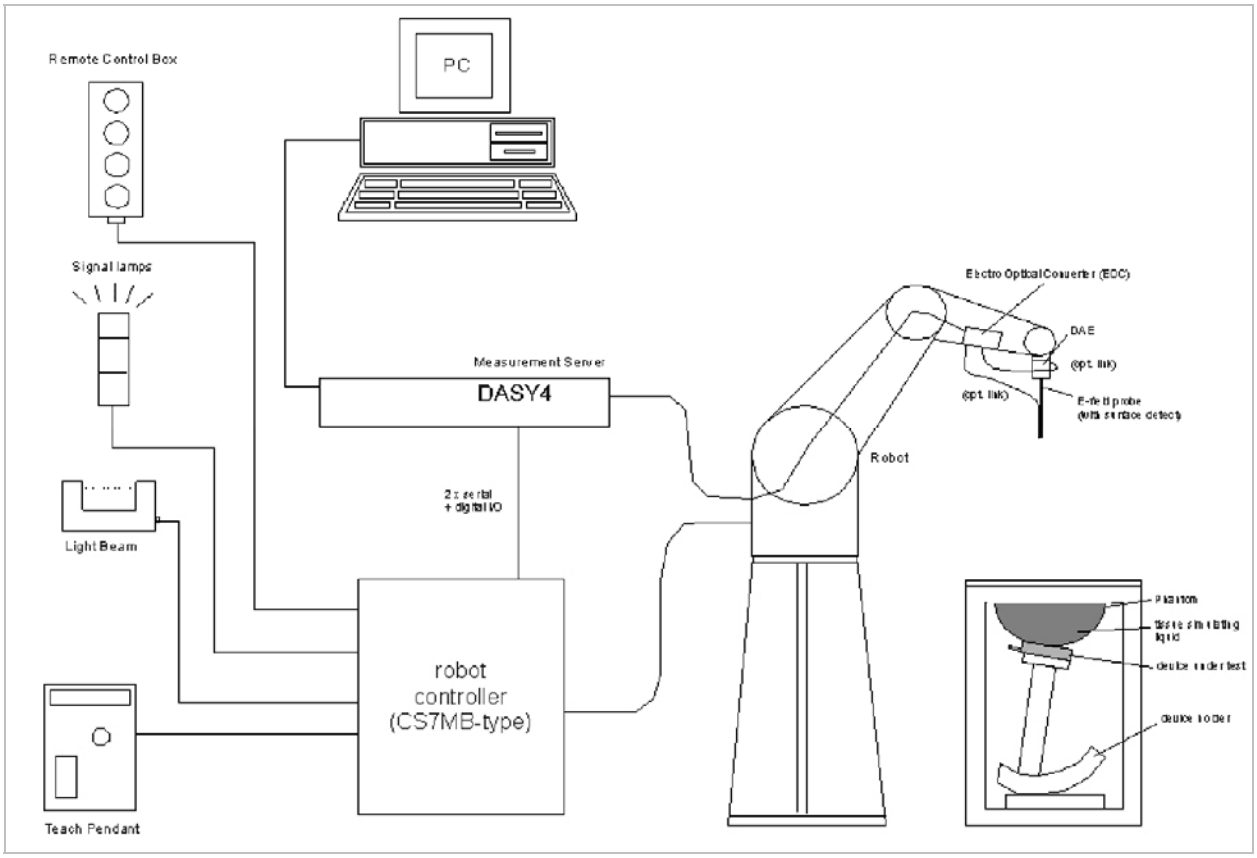
Uncertainty component	Tol. (±%)	Probe Dist.	Div.	Ci (1g)	Ci (10g)	Std. Unc.(±%)	
						Ui (1g)	Ui(10g)
Measurement System							
Probe Calibration	4.80	N	1	1	1	4.80	4.80
Axial Isotropy	4.70	R	1.732	0.707	0.707	1.92	1.92
Hemispherical Isotropy	9.60	R	1.732	0.707	0.707	3.92	3.92
Boundary Effects	1.00	R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

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

5. EQUIPMENT UNDER TEST

WiFi-WIN Card (Tested inside of Kohjinsha PA Tablet)	
LCD Sizes:	5"
Normal operation:	Laptop mode (display open at 90° to the keyboard), Tablet bottom face, and Tablet edges - Multiple display orientations supporting both portrait and landscape configurations
Antenna tested:	Built-in 802.11bg micro SD card, part number: AMD0302-ST02
Antenna-to-user separation distances:	Laptop Mode - Lap-held with the display open at 90° to the keyboard 0.5 cm from 802.11bg micro SD card antenna-to-user Tablet - Bottom face 0.5 cm from 802.11bg micro SD card antenna to-user Table - Edges with the following configurations - Primary landscape: (No SAR) 9.5 cm from 802.11bg micro SD card antenna-to-user - Secondary landscape: 1.5 cm from 802.11bg micro SD card antenna-to-user - Primary Portrait: (No SAR) 13.0 cm from 802.11bg micro SD card antenna-to-user - Secondary Portrait: 2.2 cm from 802.11bg micro SD card antenna-to-user
Assessment for SAR evaluation for Simultaneous transmission:	SAR evaluation for simultaneous transmission is not required acc. to KDB 447498 2) a)

6. SYSTEM SPECIFICATIONS



The DASY4 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Stäubli RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 2000 or Windows XP.
- DASY4 software.
- Remote controls with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

7. COMPOSITION OF INGREDIENTS FOR TISSUE SIMULATING LIQUIDS

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

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

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

8. LIQUID PARAMETERS CHECK

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

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

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

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

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

8.1. LIQUID CHECK RESULTS FOR 2450 MHZ

Simulating Liquid Dielectric Parameters for Body 2450 MHz

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

f (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit (%)
2450	e'	53.88	Relative Permittivity (ε_r):	53.884	52.7	2.25	± 5
	e"	14.77	Conductivity (σ):	2.013	1.95	3.24	± 5

Liquid Check
Ambient temperature: 24 deg. C; Liquid temperature: 23 deg. C
February 18, 2010 06:30 PM

Frequency	e'	e"
2400000000.	53.9768	14.5725
2405000000.	53.9679	14.6213
2410000000.	53.9562	14.6779
2415000000.	53.9495	14.6760
2420000000.	53.9494	14.7228
2425000000.	53.9369	14.7251
2430000000.	53.9353	14.7244
2435000000.	53.9339	14.7351
2440000000.	53.9257	14.7522
2445000000.	53.8962	14.7654
2450000000.	**53.8836**	**14.7710**
2455000000.	53.8276	14.7827
2460000000.	53.7986	14.7723
2465000000.	53.7349	14.7577
2470000000.	53.7075	14.7270
2475000000.	53.6748	14.7287
2480000000.	53.6722	14.7301
2485000000.	53.6695	14.7382
2490000000.	53.6750	14.7858
2495000000.	53.6603	14.8393
2500000000.	53.6437	14.9170

The conductivity (σ) can be given as:

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

where f = target f * 10^6

ε_0 = 8.854 * 10^{-12}

9. SYSTEM CHECK

The system performance check is performed prior to any usage of the system in order to verify SAR system measurement 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 Head or Body simulating liquid of the following parameters.
- The DASY4 system with an Isotropic E-Field Probe EX3DV4 was used for the measurements.
- The dipole was mounted on the small tripod so that the dipole feed point was positioned below the center marking of the flat phantom section and the dipole was oriented parallel to the body axis (the long side of the phantom). The standard measuring distance was 10 mm (above 1 GHz) and 15 mm (below 1 GHz) from dipole center to the simulating liquid surface.
- The coarse grid with a grid spacing of 15 mm was aligned with the dipole.
  For 5 GHz band - The coarse grid with a grid spacing of 10 mm was aligned with the dipole.
- Special 7x7x7 fine cube was chosen for cube
- Distance between probe sensors and phantom surface was set to 3 mm.
  For 5 GHz band - Distance between probe sensors and phantom surface was set to 2.5 mm
- The dipole input power (forward power) was 100 mW±3%.
- The results are normalized to 1 W input power.

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

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

9.1. SYSTEM CHECK RESULTS FOR D2450V2

System Validation Dipole: D2450V2 SN: 748

Date: February 15, 2010

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

Medium	CW Signal (MHz)	Forward Pwr (mW)	Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
Body	2450	100	1g SAR:	53.2	49.5	7.47	±10
			10g SAR:	24.6	23.3	5.58	

10. OUTPUT POWER VERIFICATION

The following procedures had been used to prepare the EUT for the SAR test.

The client provided a special driver and program, ART 6000 Revision 2.3 Build #21 v53_mercury, which enable a user to control the frequency and output power of the module.

Results

802.11bg

Mode	Channel	f (MHz)	Average Output Power (dBm)
802.11b	1	2412	14.10
	6	2437	13.32
	11	2462	13.51
802.11g	1	2412	12.20
	6	2437	11.88
	11	2462	11.80

Note: KDB 248227 - SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels

11. SUMMARY OF TEST RESULTS

KDB 248227 - SAR is not required for 802.11g channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

11.1. TEST RESULT FOR THE 2.4GHZ BAND

1) **Laptop Mode: Lap-held with the display open at 90° to the keyboard** (0.5 cm from antenna-to-user)

Mode	Channel	f (MHz)	Results (mW/g)	
			1g-SAR	10g-SAR
802.11b	6	2437	0.122	0.092

2) **Tablet Mode : Bottom Face** (0.5 cm from antenna-to-user)

Mode	Channel	f (MHz)	Results (mW/g)	
			1g-SAR	10g-SAR
802.11b	6	2437	**0.126**	**0.092**

3) **Tablet Mode : Edge - Primary Landscape** (9.5 cm from antenna-to-user)

This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2).- SAR is required only for the edge with the most conservative exposure conditions

4) **Tablet Mode : Edge - Secondary Landscape** (1.5 cm from antenna-to-user)

Mode	Channel	f (MHz)	Results (mW/g)	
			1g-SAR	10g-SAR
802.11b	6	2437	0.046	0.036

5) Tablet Mode : Edge - Primary Portrait (13.0 cm from antenna-to-user)

This is not the most conservative antenna-to-user distance at edge mode. According to KDB 447498 4) b) ii) (2).- SAR is required only for the edge with the most conservative exposure conditions

6) **Tablet Mode : Edge – Secondary Portrait** (2.2 cm from antenna-to-user)

Mode	Channel	f (MHz)	Results (mW/g)	
			1g-SAR	10g-SAR
802.11b	6	2437	0.030	0.014

12. WORST-CASE SAR TEST PLOTS

WORST-CASE SAR PLOT FOR 2.4 GHZ

Date/Time: 2/18/2010 9:27:47 PM

Test Laboratory: Compliance Certification Services

Table Mode_Bottom face

DUT: Mitsumi; Type: NA; Serial: NA

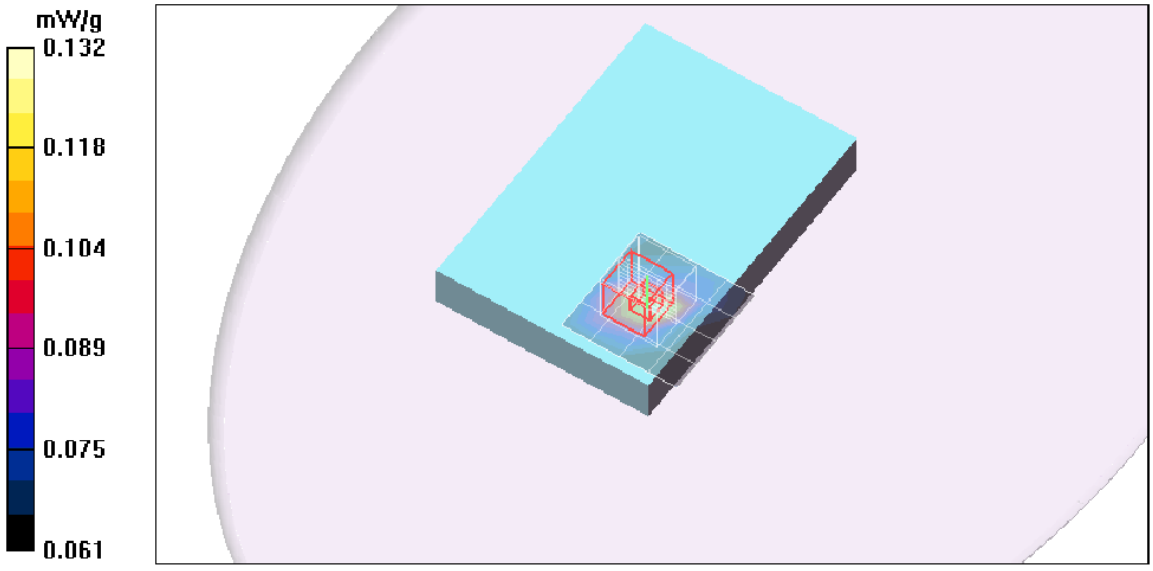
Communication System: 802.11bgn; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 2 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

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

DASY4 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Probe: EX3DV4 - SN3686; ConvF(6.48, 6.48, 6.48); Calibrated: 3/23/2009
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn500; Calibrated: 9/15/2009
- Phantom: Flat Phantom ELI4.0; Type: QDOVA001BA; Serial: SN:1003
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

802.11b_ch6/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.132 mW/g

802.11b_ch6/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=3mm
Reference Value = 5.62 V/m; Power Drift = 0.391 dB
Peak SAR (extrapolated) = 0.212 W/kg
SAR(1 g) = 0.126 mW/g; SAR(10 g) = 0.092 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.147 mW/g



13. ATTACHMENTS

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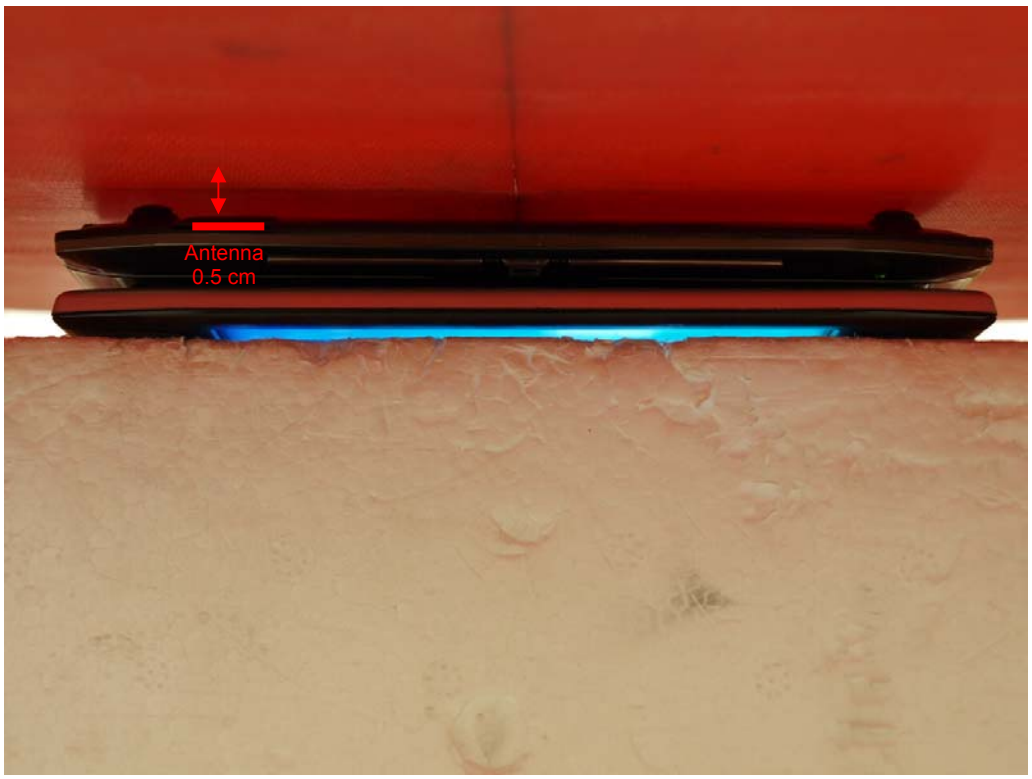
1	System Validation Plots	2
2	SAR Test Plots for 2.4 GHz band	4
3	Certificate of E-Field Probe - EX3DV4 SN 3686	10
4	Certificate of System Validation Dipole D2450V2 SN 748	6

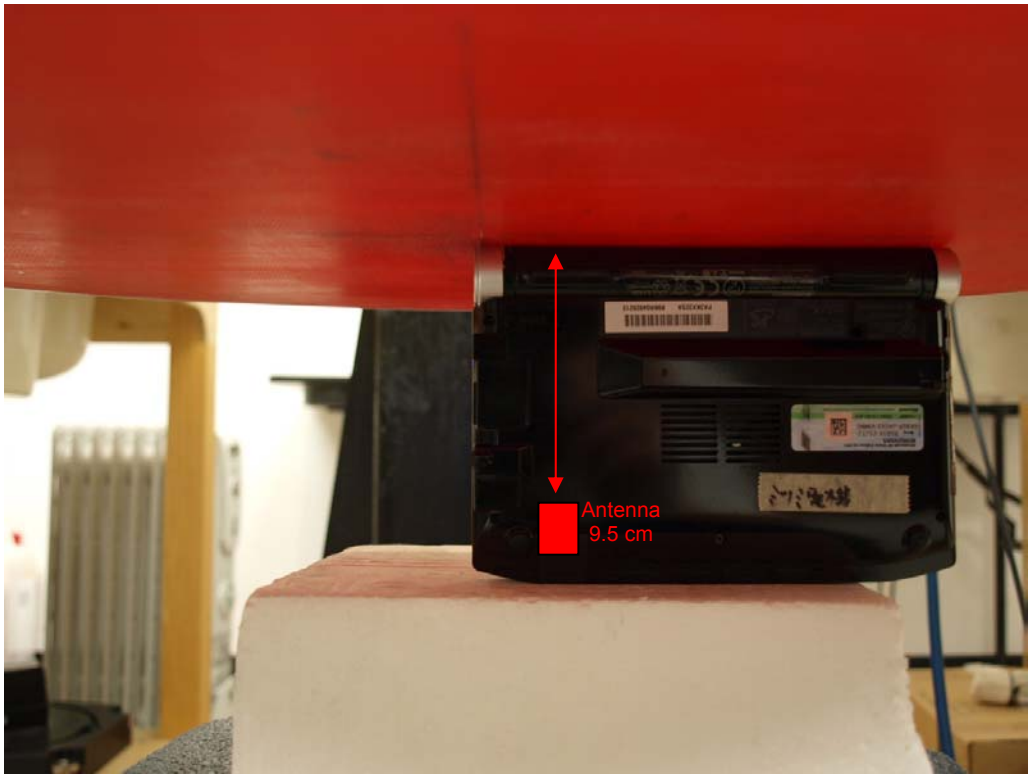
14. TEST SETUP PHOTO

1. Laptop Mode - Lap held (w/ 0.5 cm separation)

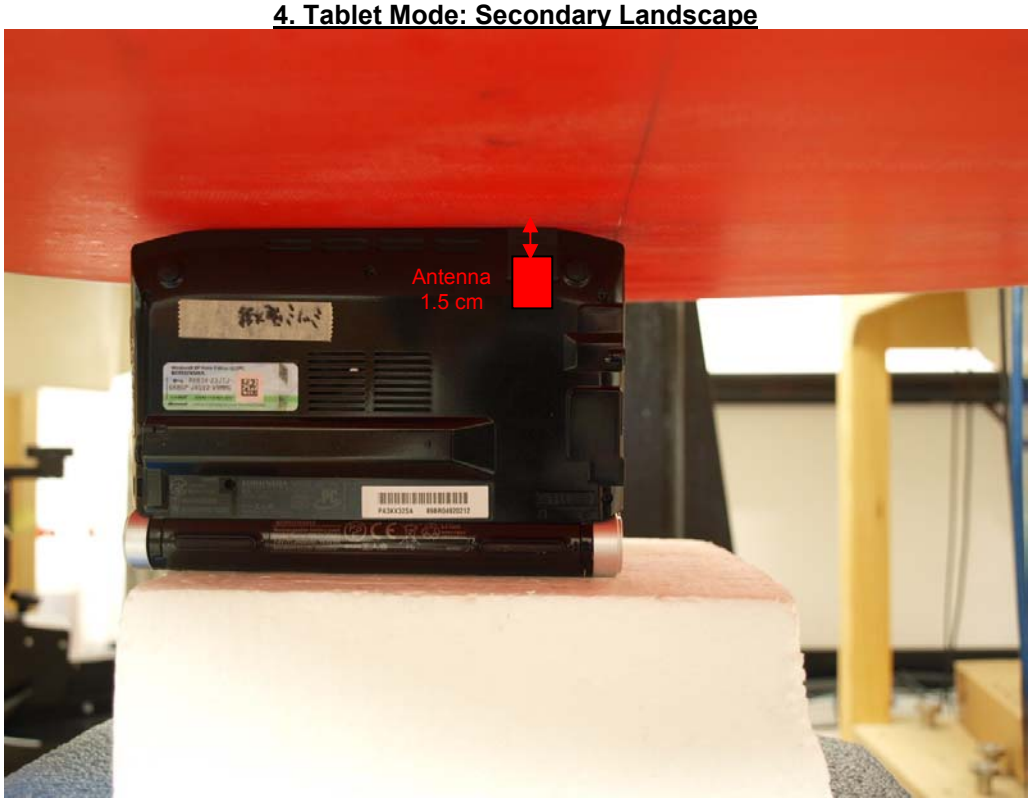
2. Tablet Mode: Bottom Face (w/ 0.5 cm separation)



3. Tablet Mode: Primary Landscape (No SAR)



4. Tablet Mode: Secondary Landscape



5. Tablet Mode: Primary Portrait (No SAR)

6. Tablet Mode: Secondary Portrait

15. HOST DEVICE PHOTO

Laptop Mode - Front

Laptop Mode - Back

Tablet Mode

END OF REPORT

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