



**FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE STD 1528:2003**

SAR EVALUATION REPORT

For
Tablet with 802.11bgn, BT3.0

**MODEL: GT-P3113
FCC ID: A3LGTP3113**

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Revision History

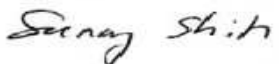

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--	February 10, 2012	Initial Issue	--
A	February 14, 2012	Updated report based upon reviewer's comments 1. Sec. 5.3: Corrected typo from "abgn' to "bgn" 2. Sec. 5.2: Updated simulataneous transmission conditions. 3. Sec. 11: Did additional testing for conture exposure as requested	Sunny Shih

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1. Attestation of Test Results

Applicant:	SAMSUNG ELECTRONICS CO., LTD.		
DUT description:	Tablet with 802.11bgn, BT3.0		
Model number:	GT-P3113		
Device category:	Portable		
Exposure category:	General Population/Uncontrolled Exposure		
Date tested:	January 19 and February 14, 2012		
FCC Rule Parts	Freq. Range [MHz]	Highest 1-g SAR (W/kg)	Limit (W/kg)
15.247	2412 – 2462	Body: 0.631 W/kg (Rear)	1.6
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528:2003			Pass
<p>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.</p> <p>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.</p>			
Approved & Released For UL CCS By:		Tested By:	
			
Sunny Shih Engineering Team Leader Compliance Certification Services (UL CCS)		David Rodgers SAR Engineer Compliance Certification Services (UL CCS)	

2. Test Methodology

The tests documented in this report were performed in accordance with FCC OET Bulletin 65 Supplement C Edition 01-01, IEEE STD 1528:2003 and the following KDB Procedures.

- 248227 D01 SAR meas for 802.11abg v01r02
- 447498 D01 Mobile Portable RF Exposure v04

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 used 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
Dielectronic Probe kit	HP	85070C	N/A	N/A		
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3772	5	3	2012
E-Field Probe	SPEAG	EX3DV3	3531	12	19	2012
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE3	500	7	14	2012
Data Acquisition Electronics	SPEAG	DAE4	1258	5	2	2012
System Validation Dipole	SPEAG	*D2450V2	706	4	19	2012
Power Meter	Giga-tronics	8651A	8651404	5	13	2012
Power Sensor	Giga-tronics	80701A	1834588	5	13	2012
Power Meter	HP	437B	3125U16345	5	13	2012
Power Sensor	HP	8481A	2702A60780	5	13	2012
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

Notes:

*Per KDB 450824 D02 requirements for dipole calibration, UL CCS has adopted two 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. (See Appendix "15.3. Calibration Certificate for D2450V2 SN 706" with extended cal. data)
4. Impedance is within 5Ω of calibrated measurement (See Appendix "15.3. Calibration Certificate for D2450V2 SN 706" with extended cal. data)

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) @ 2450 MHz	6.00	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	9.20	Rectangular	1.732	0.7071	3.76
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 @ 2450 MHz	2.90	Normal	1	0.64	1.86
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement @ 2450 MHz	-3.99	Normal	1	0.6	-2.39
Combined Standard Uncertainty Uc(y) =					10.83
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				21.66	%
Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =				1.70	dB

5. Device Under Test

Tablet PC 802.11bgn 1x1+BT3.0 Model: GT-P3113	
Normal operation:	- Bottom face, and - Edges - Multiple display orientations supporting both portrait and landscape configurations
Body Worn Accessory	- Headset
Antenna-to-antenna and antenna-to-edges separation distances:	Please refer to section 16 Antenna Locations & Separation Distances for details

5.1. Band and Air interfaces

Tx Frequency Bands:	WiFi: 802.11bgn: 2.4GHz Bluetooth: 2.4 GHz
Air Interfaces:	WiFi: 802.11bgn: 2.4GHz Bluetooth Ver 3.0

5.2. Simultaneous Transmission Conditions

WiFi and Bluetooth share the same antenna, and WiFi cannot transmit simultaneously with Bluetooth.

6. RF Output Power Measurement

6.1. WiFi

Mode	Channel #	Freq. (MHz)	Average output power	
			(dBm)	(mW)
802.11b	1	2412	11.68	14.72
	6	2437	11.69	14.76
	11	2462	11.66	14.66
802.11g	1	2412	11.52	14.19
	6	2437	11.67	14.69
	11	2462	11.74	14.93
802.11n (HT20)	1	2412	11.46	14.00
	6	2437	11.45	13.96
	11	2462	11.46	14.00

Note(s):

KDB 248227 - SAR is not required for 802.11g/HT20 channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

6.2. Bluetooth

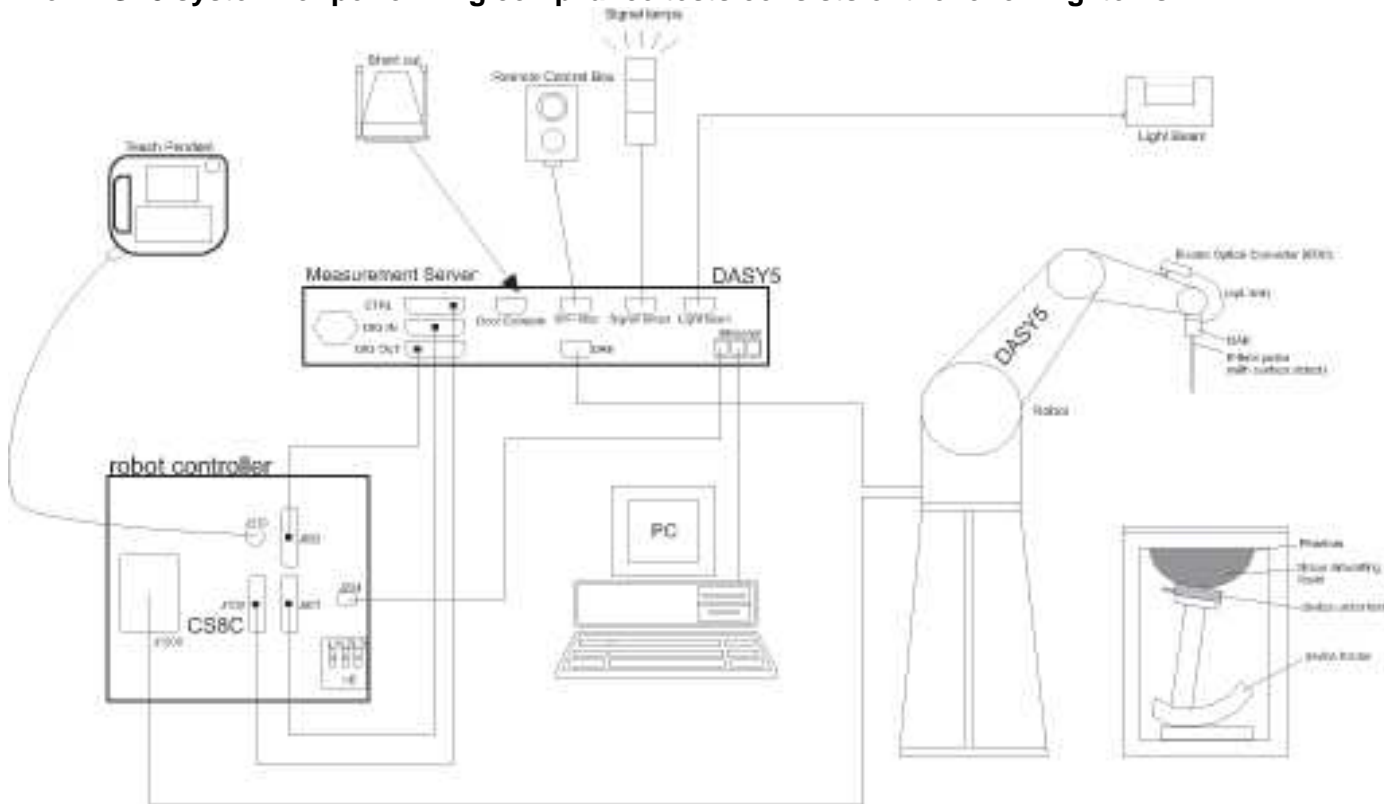
Mode	Channel #	Freq. (MHz)	Average output power	
			(dBm)	(mW)
GFSK	0	2402	11.10	12.88
	39	2441	11.30	13.49
	78	2480	11.10	12.88
8PSK	0	2402	8.90	7.76
	39	2441	9.30	8.51
	78	2480	9.20	8.32

Note(s):

- Stand-alone SAR is not required due to output power is $\leq 60/f(\text{GHz})$ mW

7. Measurement System Description and Setup

The DASY5 system for performing compliance tests consists of the following items:



- A standard high precision 6-axis robot with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic Field probe optimized and calibrated for the targeted measurement.
- 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 Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- 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.
- The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP or Win7 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The phantom, the device holder and other accessories according to the targeted measurement

8. Tissue Dielectric Property

IEEE Std 1528-2003 Table 2

Target Frequency (MHz)	Head	
	ϵ_r	σ (S/m)
300	45.3	0.87
450	43.5	0.87
835	41.5	0.90
900	41.5	0.97
1450	40.5	1.20
1800 – 2000	40.0	1.40
2450	39.2	1.80
2600	39.0	1.96
3000	38.5	2.40

FCC OET Bulletin 65 Supplement C 01-01 & IC RSS-102

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
5000	36.2	4.45	49.3	5.07
5100	36.1	4.55	49.1	5.18
5200	36.0	4.66	49.0	5.30
5300	35.9	4.76	48.9	5.42
5400	35.8	4.86	48.7	5.53
5500	35.6	4.96	48.6	5.65
5600	35.5	5.07	48.5	5.77
5700	35.4	5.17	48.3	5.88
5800	35.3	5.27	48.2	6.00

8.2. Tissue dielectric parameters check results

Tissue dielectric parameters measured at the low, middle and high frequency of each operating frequency range of the test device.

Date	Freq. (MHz)	Liquid Parameters		Measured	Target	Delta (%)	Limit ±(%)	
01/19/2012	Body 2450	e'	53.9914	Relative Permittivity (ϵ_r):	53.99	52.70	2.45	5
		e''	14.2786	Conductivity (σ):	1.95	1.95	-0.25	5
	Body 2410	e'	54.1280	Relative Permittivity (ϵ_r):	54.13	52.76	2.59	5
		e''	14.1110	Conductivity (σ):	1.89	1.91	-0.87	5
	Body 2435	e'	54.0455	Relative Permittivity (ϵ_r):	54.05	52.73	2.50	5
		e''	14.2138	Conductivity (σ):	1.92	1.93	-0.34	5
Body 2475	e'	53.9047	Relative Permittivity (ϵ_r):	53.90	52.67	2.35	5	
	e''	14.3902	Conductivity (σ):	1.98	1.99	-0.24	5	
02/14/2012	Body 2450	e'	50.6547	Relative Permittivity (ϵ_r):	50.65	52.70	-3.88	5
		e''	14.7300	Conductivity (σ):	2.01	1.95	2.90	5
	Body 2410	e'	50.8295	Relative Permittivity (ϵ_r):	50.83	52.76	-3.66	5
		e''	14.5648	Conductivity (σ):	1.95	1.91	2.32	5
	Body 2435	e'	50.7185	Relative Permittivity (ϵ_r):	50.72	52.73	-3.81	5
		e''	14.6689	Conductivity (σ):	1.99	1.93	2.85	5
Body 2475	e'	50.5688	Relative Permittivity (ϵ_r):	50.57	52.67	-3.99	5	
	e''	14.8356	Conductivity (σ):	2.04	1.99	2.85	5	

9. 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.

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 DASY 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 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 $\geq 7 \times 7 \times 9$ (above 4.5 GHz) or $5 \times 5 \times 7$ (below 3 GHz) 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.

10. System Performance 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 $\pm 10\%$.

10.1. System performance check measurement conditions

- The measurements were performed in the flat section of the TWIN SAM or ELI phantom, shell thickness: 2.0 ± 0.2 mm (bottom plate) filled with Body or Head simulating liquid of the following parameters.
- The DASY system with an E-Field Probe 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.
- The results are normalized to 1 W input power.

10.2. Reference SAR values for system performance check

The reference SAR values can be obtained from the calibration certificate of system validation dipoles

System Dipole	Serial No.	Cal. Date	Freq. (MHz)	SAR Measured (mW/g)		
				1g/10g	Head	Body
D2450V2	706	4/19/11	2450	1g	51.6	52.4
				10g	24.4	24.5

10.3. System performance check results

Date Tested	System dipole		Measured (Normalized to 1 W)		Target	Delta (%)	Tolerance (%)
			1g SAR	10g SAR			
1/19/2012	Body	D2450V2	1g SAR	52.9	52.4	0.95	± 10
			10g SAR	24.3	24.5	-0.82	
2/14/2012	Body	D2450V2	1g SAR	53.0	52.4	1.15	± 10
			10g SAR	24.4	24.5	-0.41	

11. SAR Test Results

Test configuration	Sep. distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	0	802.11b	1	2412	11.68			
			6	2437	11.69	0.631	0.255	1
			6	2437	11.69	0.630	0.254	2
			11	2462	11.66			

Test configuration	Sep. distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Edge 4	0	802.11b	1	2412	11.68			
			6	2437	11.69	0.454	0.188	1
			11	2462	11.66			

Test configuration	Sep. distance (mm)	Mode	Ch No.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Edge 4 W/45 deg. tilt	0	802.11b	1	2412	11.68			
			6	2437	11.69	0.188	0.074	1
			11	2462	11.66			

Note(s):

1. Testing was performed on the channel with the highest output power only as the SAR was ≤ 0.8 W/kg with the operating frequency band having a range of < 100 MHz. Per KDB 447498 1) e) i).
2. With Headset.

12. Summary of Highest 1g SAR

Technology/Band	Test configuration		Mode	Separation distance (mm)	Highest 1g SAR (W/kg)
WiFi 2.4 GHz	Head:	N/A	N/A	--	--
	Body:	Rear	802.11b 1Mbps	N/A	0.631

13. Worst-case SAR Plots

2.4GHz Plot

Test Laboratory: UL CCS SAR Lab A

Date: 1/19/2012

2.4GHz Band

Frequency: 2437 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.928$ mho/m; $\epsilon_r = 54.038$; $\rho = 1000$ kg/m³

DASY5 Configuration:

- Electronics: DAE3 Sn500; Calibrated: 7/14/2011
- Probe: EX3DV4 - SN3772; ConvF(6.41, 6.41, 6.41); Calibrated: 5/3/2011
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1118

802.11b/Rear/Area Scan (8x10x1): Measurement grid: dx=15mm, dy=15mm

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.656 mW/g

802.11b/Rear/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm

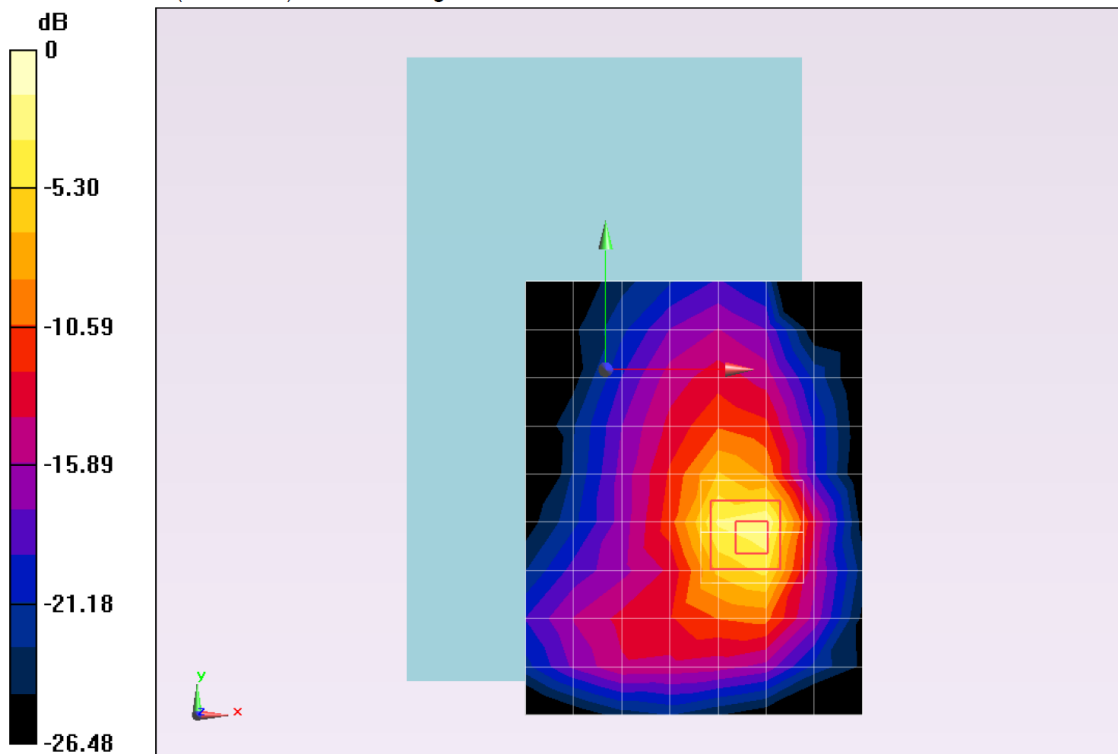
Reference Value = 19.091 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 1.6700

SAR(1 g) = 0.631 mW/g; SAR(10 g) = 0.255 mW/g

Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.992 mW/g



0 dB = 0.990mW/g = -0.09 dB mW/g

2.4GHz Z Plot

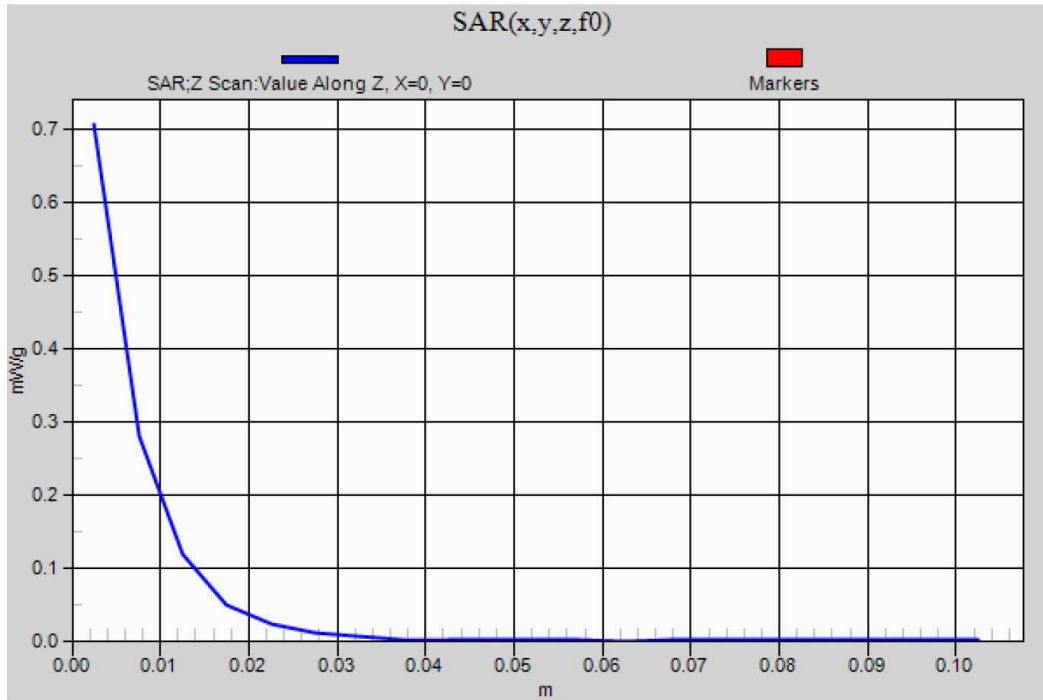
Test Laboratory: UL CCS SAR Lab A

Date: 1/19/2012

2.4GHz Band

Frequency: 2437 MHz; Duty Cycle: 1:1

802.11b/Rear/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.707 mW/g



14. Appendixes

Refer to separate files for the following appendixes

- 14.1. System Check Plots
- 14.2. SAR Body Test Plots
- 14.3. Calibration Certificate - Validation Dipole D2450V2 - SN 706w/ extended cal. data
- 14.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3772
- 14.5. Calibration Certificate for E-Field Probe EX3DV3 - SN 3531