FCC OET BULLETIN 65 SUPPLEMENT C 01-01
IEEE Std 1528-2003 and 1528a-2005

SAR EVALUATION REPORT

For
10.1 inch Tablet with 802.11abgn and BT 4.0

Model: TP00043A/TP00043AFX
FCC ID: PU5-TP00043AFX

Report Number: 12U14464-1
Issue Date: 9/6/2012

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	9/6/2012	Initial Issue	--

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1. Attestation of Test Results

Applicant	Wistron Corporation		
DUT description	10.1 inch Tablet with 802.11abgn and BT4.0		
Model	TP00043A/ TP00043AFX		
Test device is	An identical prototype		
Device category	Portable		
Exposure category	General Population/Uncontrolled Exposure		
Date tested	6/15/2012 – 6/18/2012		
FCC Rule Parts	Freq. Range	Highest 1-g SAR	Limit
15.247	2412-2462	1.380 W/kg (Rear)	1.6 W/kg
	5725-5850	0.485 W/kg (Edge 3)	
15.407	5150-5250	0.355 W/kg (Edge 3)	
	5250-5350	0.163 W/kg (Rear 20º Tilt @Edge3)	
	5500-5700	0.516 W/kg (Edge 3)	
Applicable Standards			Test Results
FCC OET Bulletin 65 Supplement C 01-01, IEEE Std 1528-2003 and 1528a-2005			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:

Dave Weaver
Staff Engineer
UL CCS

Tested By:

Kent Huang
SAR Engineer
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 & 1528a-2005 and the following KDB Procedures:

- 447498 D01 Mobile Portable RF Exposure v04
- 248227 D01 SAR meas for 802 11abg v01r02
- 865664 SAR 3 to 6 GHz Rev SAR measurement procedures for transmitters operating in the 3 to 6 GHz range

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 manufacturers' recommendations, and is traceable to recognized national standards.

Name of Equipment	Manufacturer	Type/Model	Serial No.	Cal. Due date		
				MM	DD	Year
Synthesized Signal Generator	HP	83732B	US34490599	7	14	2012
E-Field Probe	SPEAG	EX3DV4	3772	2	16	2013
Thermometer	ERTCO	639-1S	1718	7	19	2012
Data Acquisition Electronics	SPEAG	DAE4	1258	3	8	2013
System Validation Dipole	SPEAG	*D2450V2	748	2	7	2013
System Validation Dipole	SPEAG	D5GHzV2	1075	2	14	2013
Power Sensor	HP	438A	2822A05684	10	7	2013
Power Meter	HP	8481A	2237A31744	5	22	2013
Power Sensor	HP	438A	3513U04320	5	22	2013
Amplifier	MITEQ	4D00400600-50-30P	1620606	N/A		
Directional coupler	Werlatone	C8060-102	2141	N/A		

4.2. Measurement Uncertainty

Measurement uncertainty for 300 MHz to 3 GHz averaged over 1 gram

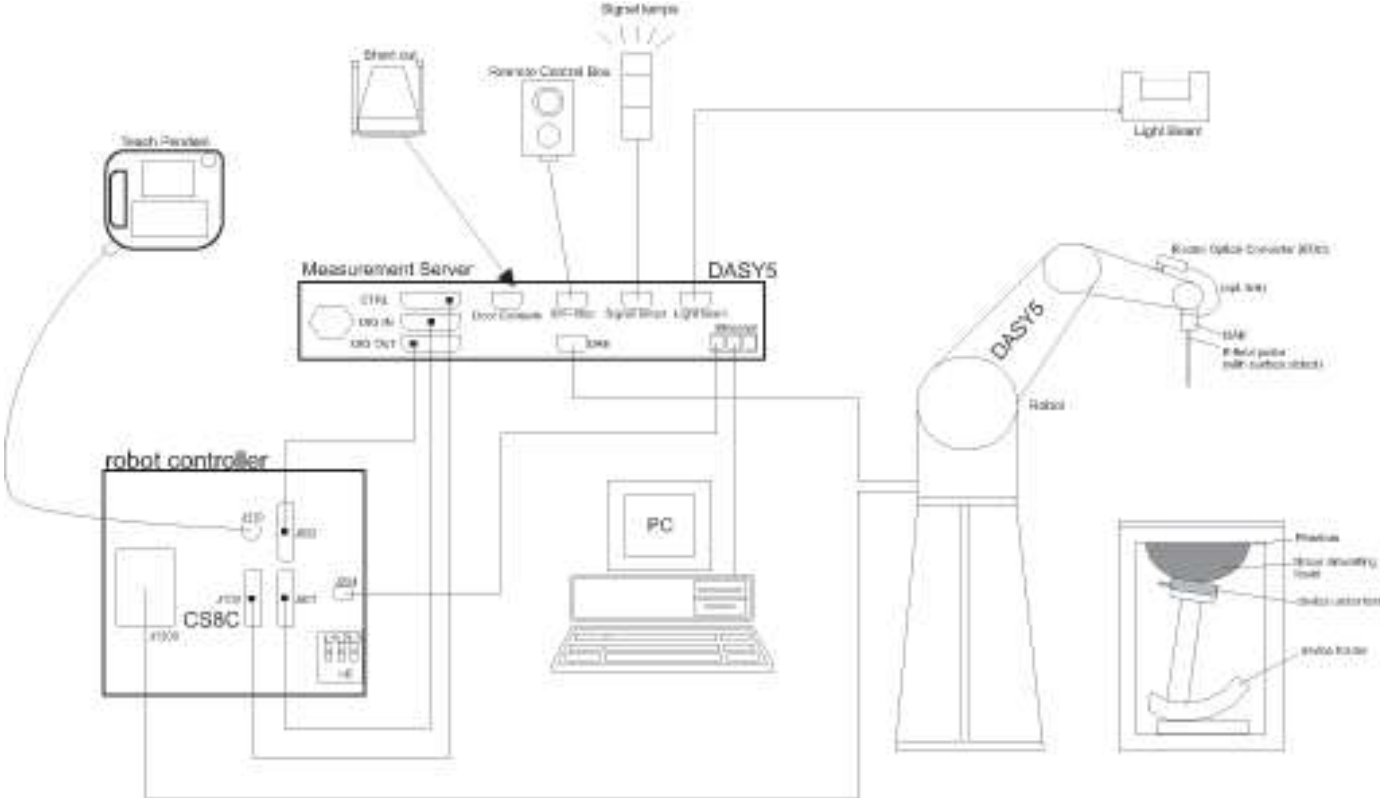
Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**6.00**	Normal	1	1	6.00
Axial Isotropy	1.15	Rectangular	1.732	0.7071	0.47
Hemispherical Isotropy	2.30	Rectangular	1.732	0.7071	0.94
Boundary Effect	0.90	Rectangular	1.732	1	0.52
Probe Linearity	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	**1.00**	Normal	1	0.64	0.64
Liquid Permittivity - deviation from target	5.00	Rectangular	1.732	0.6	1.73
Liquid Permittivity - measurement uncertainty	**-1.10**	Normal	1	0.6	-0.66
				Combined Standard Uncertainty Uc(y) =	9.78
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	19.57 %
				Expanded Uncertainty U, Coverage Factor = 2, > 95 % Confidence =	1.55 dB

Measurement uncertainty for 3 to 6 GHz averaged over 1 gram

Component	Error, %	Distribution	Divisor	Sensitivity	U (Xi), %
Measurement System					
Probe Calibration (k=1)	**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	**3.06**	Normal	1	0.64	1.96
Liquid Permittivity - deviation from target	10.00	Rectangular	1.732	0.6	3.46
Liquid Permittivity - measurement uncertainty	**5.63**	Normal	1	0.6	3.38
				Combined Standard Uncertainty Uc(y), %:	11.16
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =	21.87 %
				Expanded Uncertainty U, Coverage Factor = 1.96, > 95 % Confidence =	1.72 dB

5. Measurement System Description and Setup

The DASY5 system used 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.

6. SAR Measurement Procedures

6.1. Normal SAR Measurement Procedure

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

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 ≥ 7x7x9 (above 4.5 GHz) or 5x5x7 (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 (FCC only)
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.

6.2. Volume Scan 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 ≥ 7x7x9 (above 4.5 GHz) or 5x5x7 (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: Volume Scan
Volume Scans are used to assess peak SAR and averaged SAR measurements in largely extended 3-dimensional volumes within any phantom. This measurement does not need any previous area scan. The grid can be anchored to a user specific point or to the current probe location.

Step 5: 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.

7. Device Under Test

10.1 inch Tablet with WIFI Bands +BT 3.0+LE Models: TP00043A	
Normal operation	Body (Rear/bottom and each edge): Multiple display orientations supporting both portrait and landscape configurations
Device Dimension (mm)	266 mm(L) x 163 mm(W) x 8 mm (H)
Antenna Tested	Manufactured / Part number Wistron / Main Ant: 81.EK615.G12 (25.90ADN.001) Aux. Ant: 81.EK615.G13 (25.90ADP.001)

7.1. Band and Air Interfaces

Air Interfaces	- 802.11a/b/g/n - Bluetooth Ver 3.0 + LE
Tx Frequency Bands	- 802.11a/b/g/n: 2412 - 2462 MHz - 5180 - 5240 MHz - 5260 - 5320 MHz - 5500 - 5700 MHz - 5745 - 5825 MHz - Bluetooth: 2402 - 2480 MHz Note: There are two antennas for WLAN. Wi-Fi 2.4GHz and BT only transmits on the Main antenna. WiFi 5GHz only transmits on the Aux antenna.

7.2. Simultaneous Transmission

No.	Conditions	Head	Body	Hotspot
1	WiFi 5.2GHz Band+ BT	☐	☒	☐
2	WiFi 5.3GHz Band+ BT	☐	☒	☐
3	WiFi 5.5GHz Band+ BT	☐	☒	☐
4	WiFi 5.8GHz Band+ BT	☐	☒	☐

Note(s):

WiFi 2.4GHz band and BT cannot simultaneously transmit.

8. Summary of Test Configurations

The following test configurations are based on KDB 447498 4) b) Tablet Mode

8.1. Body Exposure Conditions for WiFi 2.4GHz Band (Main Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	4.05 mm	Yes	
Rear (20° Tilt @Edge1)	< 25 mm	Yes	Due to the chamfered edge this is the most conservative antenna-to-user distance at base/bottom mode
Edge 1	2.5 mm	Yes	
Edge 2	23.9 mm	Yes	
Edge 3	152.1 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 4	211.7 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)

8.2. Body Exposure Conditions for WiFi 5GHz Bands (Aux Antenna)

Test Configurations	Antenna-to-edge/surface	SAR Required	Note
Rear	6.45 mm	Yes	
Rear (20° Tilt @Edge3)	< 25 mm	Yes	Due to the chamfered edge this is the most conservative antenna-to-user distance at base/bottom mode
Edge 1	156.1 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 2	39.5 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)
Edge 3	2.5 mm	Yes	
Edge 4	182.6 mm	No	This is not the most conservative antenna-to-user distance at edge mode as per KDB 447498 4) b) ii) (2)

9. RF Output Power Measurement

9.1. WiFi (2.4 GHz Band)

Required Test Channels per KDB 248227 D01

Mode	Band	GHz	Channel	"Default Test Channels"	
				802.11b	802.11g
802.11b/g	2.4 GHz	**2.412**	1#	√	∇
		2.437	6	√	∇
		2.462	11#	√	∇

Notes:
√ = "default test channels"
∇ = possible 802.11g channels with maximum average output ¼ dB ≥ the "default test channels"
= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Band (MHz)	Mode	Data rate (Mbps)	Ch #	Freq. (MHz)	Target Pwr (dBm)	Avg Pwr (dBm)
2.4	802.11b	1	1	2412	15.5	15.5
			6	2437	15.5	15.6
			11	2462	15.5	15.6
	802.11g	6	1	2412	14.5	14.5
			6	2437	14.5	14.6
			11	2462	14.5	14.5
	802.11n (HT20)	6.5	1	2412	13.5	13.6
			6	2437	13.5	13.5
			11	2462	13.5	13.5

Note(s):

1. 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 802.11a/b channels. As per KDB 248227

9.2. WiFi (5 GHz Bands)

Mode		Band	GHz	Channel	"Default Test Channels"	
					802.11a	
802.11a	UNII (15.407)	5.2 GHz	5.180	36	√	
			5.200	40		*
			2.220	44		*
			5.240	48	√	
		5.3 GHz	5.260	52	√	
			5.280	56		*
			5.300	60		*
			5.320	64	√	
		5.5 GHz	5.500	100		
			5.520	104	√	
			5.540	108		*
			5.560	112		*
			5.580	116	√	
			5.600	120		*
			5.620	124	√	
			5.640	128		*
			5.660	132		*
			5.680	136	√	
			5.700	140		*
	DTS (15.247)	5.8 GHz	5.745	149	√	
			5.765	153		*
			5.785	157	√	
			5.805	161		*
			5.825	165	√	

√ = "default test channels"

* = possible 802.11a channels with maximum average output > the "default test channels"

= when output power is reduced for channel 1 and /or 11 to meet restricted band requirements the highest output channels closest to each of these channels should be tested.

Band (MHz)	Mode	Ch #	Freq. (MHz)	Target Pwr (dBm)	Avg Pwr (dBm)
5.2	802.11a	36	5180	13.0	13.1
		40	5200	13.0	13.0
		44	5220	13.0	13.0
		48	5240	13.0	13.0
	802.11n (HT20)	36	5180	12.0	12.0
		40	5200	12.0	12.0
		48	5240	12.0	12.0
5.3	802.11a	52	5260	13.0	13.1
		56	5280	13.0	13.1
		60	5300	13.0	13.0
		64	5320	13.0	13.0
	802.11n (HT20)	52	5260	12.0	12.0
		60	5300	12.0	12.0
		64	5320	12.0	12.0
5.5	802.11a	100	5500	13.0	13.0
		104	5520	13.0	13.1
		108	5540	13.0	13.0
		112	5560	13.0	13.0
		116	5580	13.0	13.1
		120	5600	13.0	13.1
		124	5620	13.0	13.2
		128	5640	13.0	13.1
		132	5660	13.0	13.1
		136	5680	13.0	13.1
		140	5700	13.0	13.1
	802.11n (HT20)	100	5500	12.0	12.0
		120	5600	12.0	12.0
		140	5700	12.0	12.0
5.8	802.11a	149	5745	13.0	13.1
		153	5765	13.0	13.1
		157	5785	13.0	13.0
		161	5805	13.0	13.0
		165	5825	13.0	13.0
	802.11n (HT20)	149	5745	12.0	12.0
		157	5785	12.0	12.0
		161	5805	12.0	12.0

9.3. Bluetooth

Version 4.0, Power class: 2 (2.5 mW/4 dBm)

Mode	Channel #	Freq. (MHz)	Measured Avg Pwr(dBm)
GFSK	0	2402	3.73
	39	2441	3.48
	78	2480	3.81
8-PSK	0	2402	-2.83
	39	2441	-2.25
	78	2480	-2.51

Note(s):

According to KDB 648474, Table 2, Unlicensed transmitters

When there is simultaneous transmission, Stand-alone SAR not required due to

- ☒ Output ≤ 2 · P_{Ref} (13.8dBm / 24 mW) and antenna is ≥ 5.0 cm from other antennas
- ☐ Output ≤ P_{Ref} (10.79dBm / 12 mW) and antenna is ≥ 2.5 cm from other antennas
- ☐ Output ≤ P_{Ref} (10.79dBm / 12 mW) and antenna is < 2.5 cm from other antennas

10. Tissue Dielectric Properties

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

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Target Frequency (MHz)	Head		Body	
	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	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

10.1. Composition of Ingredients for the Tissue Material Used in the SAR Tests

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

10.2. Tissue Dielectric Parameter Check Results

Tissue dielectric parameters were 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 ±(%)
06/15/2012	Body 2450	e'	52.1638	Relative Permittivity (ϵ_r):	52.16	52.70	-1.02	5
		e''	14.4571	Conductivity (σ):	1.97	1.95	1.00	5
	Body 2410	e'	52.3038	Relative Permittivity (ϵ_r):	52.30	52.76	-0.86	5
		e''	14.2802	Conductivity (σ):	1.91	1.91	0.32	5
	Body 2435	e'	52.2132	Relative Permittivity (ϵ_r):	52.21	52.73	-0.97	5
		e''	14.3908	Conductivity (σ):	1.95	1.93	0.90	5
	Body 2475	e'	52.0881	Relative Permittivity (ϵ_r):	52.09	52.67	-1.10	5
		e''	14.5650	Conductivity (σ):	2.00	1.99	0.97	5
06/17/2012	Body 5180	e'	50.5213	Relative Permittivity (ϵ_r):	50.52	49.05	3.01	10
		e''	18.4255	Conductivity (σ):	5.31	5.27	0.68	5
	Body 5200	e'	50.4882	Relative Permittivity (ϵ_r):	50.49	49.02	3.00	10
		e''	18.4252	Conductivity (σ):	5.33	5.29	0.62	5
	Body 5500	e'	49.9804	Relative Permittivity (ϵ_r):	49.98	48.61	2.81	10
		e''	18.6432	Conductivity (σ):	5.70	5.64	1.01	5
	Body 5800	e'	49.4224	Relative Permittivity (ϵ_r):	49.42	48.20	2.54	10
		e''	18.8530	Conductivity (σ):	6.08	6.00	1.33	5
	Body 5825	e'	49.4335	Relative Permittivity (ϵ_r):	49.43	48.20	2.56	10
		e''	18.9133	Conductivity (σ):	6.13	6.00	2.10	5
06/18/2012	Body 5180	e'	50.6679	Relative Permittivity (ϵ_r):	50.67	49.05	3.31	10
		e''	17.9037	Conductivity (σ):	5.16	5.27	-2.18	5
	Body 5200	e'	50.6432	Relative Permittivity (ϵ_r):	50.64	49.02	3.31	10
		e''	17.9662	Conductivity (σ):	5.19	5.29	-1.89	5
	Body 5500	e'	50.1610	Relative Permittivity (ϵ_r):	50.16	48.61	3.18	10
		e''	18.2364	Conductivity (σ):	5.58	5.64	-1.19	5
	Body 5800	e'	49.6554	Relative Permittivity (ϵ_r):	49.66	48.20	3.02	10
		e''	18.5976	Conductivity (σ):	6.00	6.00	-0.04	5
	Body 5825	e'	49.6190	Relative Permittivity (ϵ_r):	49.62	48.20	2.94	10
		e''	18.7522	Conductivity (σ):	6.07	6.00	1.23	5

10.3. Tissue Dielectric Parameter Check Results

Date	Freq. (MHz)	Liquid Parameters			Measured	Target	Delta (%)	Limit ±(%)
05/19/2012	Body 5180	e'	51.8097	Relative Permittivity (ϵ_r):	51.81	49.05	5.63	10
		e''	18.2079	Conductivity (σ):	5.24	5.27	-0.51	5
	Body 5200	e'	51.7789	Relative Permittivity (ϵ_r):	51.78	49.02	5.63	10
		e''	18.2470	Conductivity (σ):	5.28	5.29	-0.36	5
	Body 5500	e'	51.2788	Relative Permittivity (ϵ_r):	51.28	48.61	5.48	10
		e''	18.5571	Conductivity (σ):	5.68	5.64	0.54	5
	Body 5800	e'	50.6526	Relative Permittivity (ϵ_r):	50.65	48.20	5.09	10
		e''	18.8559	Conductivity (σ):	6.08	6.00	1.35	5
	Body 5825	e'	50.6113	Relative Permittivity (ϵ_r):	50.61	48.20	5.00	10
		e''	19.0505	Conductivity (σ):	6.17	6.00	2.84	5
06/20/2012	Body 5180	e'	51.6634	Relative Permittivity (ϵ_r):	51.66	49.05	5.34	10
		e''	18.4138	Conductivity (σ):	5.30	5.27	0.61	5
	Body 5200	e'	51.6382	Relative Permittivity (ϵ_r):	51.64	49.02	5.34	10
		e''	18.4425	Conductivity (σ):	5.33	5.29	0.71	5
	Body 5500	e'	51.1186	Relative Permittivity (ϵ_r):	51.12	48.61	5.15	10
		e''	18.7359	Conductivity (σ):	5.73	5.64	1.51	5
	Body 5800	e'	50.7209	Relative Permittivity (ϵ_r):	50.72	48.20	5.23	10
		e''	19.0422	Conductivity (σ):	6.14	6.00	2.35	5
	Body 5825	e'	50.5629	Relative Permittivity (ϵ_r):	50.56	48.20	4.90	10
		e''	19.0915	Conductivity (σ):	6.18	6.00	3.06	5

11. 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 ±10%.

11.1. 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 (below 3 GHz) and/or 8x8x7 (above 3 GHz) fine cube was chosen for the 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.

11.2. 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	748	2/7/12	2450	1g	53.6	50.8
				10g	24.8	23.6
D5GHzV2	1075	2/14/12	5200	1g	79.7	72.8
				10g	22.9	20.5
			5500	1g	86.1	77.7
				10g	24.5	21.7
			5800	1g	79.4	72.4
				10g	22.7	20.2

11.3. System Performance Check Results

Date Tested	System Dipole		T.S. Liquid	SAR Measured (Normalized to 1 W)		Target (Ref. Value)	Delta (%)	Tolerance (%)
	Type	Serial No.						
6/15/2012	D2450V2	748	Body	1g	50.3	50.8	-0.98	±10
				10g	23.4	23.6	-0.85	
6/17/2012	D5GHz V2 (5.2 GHz)	1075	Body	1g	73.80	72.8	1.37	±10
				10g	20.90	20.5	1.95	
	D5GHz V2 (5.5 GHz)	1075	Body	1g	79.50	77.7	2.32	±10
				10g	22.30	21.7	2.76	
	D5GHz V2 (5.8 GHz)	1075	Body	1g	71.30	72.4	-1.52	±10
				10g	20.00	20.2	-0.99	
6/18/2012	D5GHz V2 (5.2 GHz)	1075	Body	1g	73.60	72.8	1.10	±10
				10g	20.90	20.5	1.95	
6/19/2012	D5GHz V2 (5.5 GHz)	1075	Body	1g	76.70	77.7	-1.29	±10
				10g	21.50	21.7	-0.92	
	D5GHz V2 (5.8 GHz)	1075	Body	1g	69.90	72.4	-3.45	±10
				10g	19.60	20.2	-2.97	
6/20/2012	D5GHz V2 (5.5 GHz)	1075	Body	1g	75.90	77.7	-2.32	±10
				10g	21.40	21.7	-1.38	
	D5GHz V2 (5.8 GHz)	1075	Body	1g	73.10	72.4	0.97	±10
				10g	20.50	20.2	1.49	

12. SAR Test Results

12.1. WiFi (2.4GHz Band)

Test Reduction Consideration

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

Body SAR

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11b	0	1	2412	15.5	1.350	0.544	
			6	2437	15.6	1.350	0.548	
			11	2462	15.6	**1.380**	**0.571**	
Rear (20º Tilt @Edge1)	802.11b	0	1	2412	15.5	0.968	0.421	
			6	2437	15.6	1.080	0.461	
			11	2462	15.6	1.040	0.454	
Edge 1	802.11b	0	1	2412	15.5	0.944	0.424	
			6	2437	15.6	0.955	0.429	
			11	2462	15.6	0.921	0.414	
Edge 2	802.11b	0	1	2412	15.5			1
			6	2437	15.6	0.326	0.142	
			11	2462	15.6			1

Note(s):

1. For frequency bands with an operating range of < 100 MHz, when the SAR for the highest output power channel within is ≤ 0.8 W/kg, SAR for the remaining channels is not required. Per KDB 447498 1) e) i)

12.2. WiFi (5GHz Bands)

Test Reduction Consideration

SAR is not required for 802.11n (HT20) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels as per KDB 248227.

5.2GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11a	0	36	5180	13.1	0.092	0.024	
			48	5240	13.0	0.139	0.112	
Rear (20º Tilt @Edge3)	802.11a	0	36	5180	13.1	0.048	0.016	
			48	5240	13.0	0.119	0.080	
Edge 3	802.11a	0	36	5180	13.1	**0.355**	**0.070**	
			48	5240	13.0	0.131	0.033	

5.3GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11a	0	52	5260	13.1	0.158	0.112	
			64	5320	13.0	0.131	0.110	
Rear (20º Tilt @Edge3)	802.11a	0	52	5260	13.1	0.112	0.069	
			64	5320	13.0	**0.163**	**0.087**	
Edge 3	802.11a	0	52	5260	13.1	0.136	0.070	
			64	5320	13.0	0.134	0.068	

5.5GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11a	0	104	5520	13.1	0.084	0.027	
			116	5580	13.1	0.305	0.095	
			124	5620	13.2	0.143	0.049	
			136	5680	13.1	0.260	0.081	
Rear (20º Tilt @Edge3)	802.11a	0	104	5520	13.1	0.085	0.019	
			116	5580	13.1	0.186	0.047	
			124	5620	13.2	0.126	0.036	
			136	5680	13.1	0.220	0.059	
Edge 3	802.11a	0	104	5520	13.1	0.289	0.092	
			116	5580	13.1	0.324	0.113	
			124	5620	13.2	0.371	0.115	
			136	5680	13.1	**0.516**	**0.143**	

5.8GHz Band

Test Position	Mode	Dist. (mm)	Ch #.	Freq. (MHz)	Avg Pwr (dBm)	SAR (mW/g)		Note
						1-g	10-g	
Rear	802.11a	0	149	5745	13.1	0.267	0.178	
			157	5785	13.1	0.227	0.170	
			165	5825	13.0	0.249	0.176	
Rear (20º Tilt @Edge3)	802.11a	0	149	5745	13.1	0.100	0.030	
			157	5785	13.1	0.151	0.040	
			165	5825	13.0	0.134	0.035	
Edge 3	802.11a	0	149	5745	13.1	**0.485**	**0.123**	
			157	5785	13.1	0.407	0.107	
			165	5825	13.0	0.366	0.097	

13. Summary of Highest SAR Values

Results for highest Body SAR values for each frequency band and mode

Technology/Band	Test configuration	Mode	Highest Measured 1g-SAR (W/kg)
WiFi 2.4 GHz	Rear	802.11b 1Mbps	1.380
WiFi 5.2 GHz	Edge 3	802.11a 6Mbps	0.355
WiFi 5.3 GHz	Rear 20º Tilt @Edge3	802.11a 6Mbps	0.163
WiFi 5.5 GHz	Edge 3	802.11a 6Mbps	0.516
WiFi 5.8 GHz	Edge 3	802.11a 6Mbps	0.485

13.1. Scaled SAR Values to the Maximum tune-up Tolerances

The following measured results were scaled to the maximum tune-up tolerance, according to the output power of the channel tested for the highest measured results in each frequency band.

Technology/Band	Test Configuration	Mode	Ch #.	Freq. (MHz)	Power (dBm)		SAR (W/kg)	
					Max. tune-up limit	Measured	Measured	Scaled
WiFi 2.4 GHz	Rear	802.11b	11	2462.00	15.5	15.6	1.380	1.380
WiFi 5.2 GHz	Edge 3	802.11a	36	5180.00	13.0	13.1	0.355	0.355
WiFi 5.3 GHz	Rear 20º Tilt @Edge3	802.11a	64	5320.00	13.0	13.0	0.163	0.163
WiFi 5.5 GHz	Edge 3	802.11a	136	5680.00	13.0	13.1	0.516	0.516
WiFi 5.8 GHz	Edge 3	802.11a	149	5745.00	13.0	13.0	0.485	0.485

13.2. SAR Plots (from Summary of Highest Measured SAR Values)

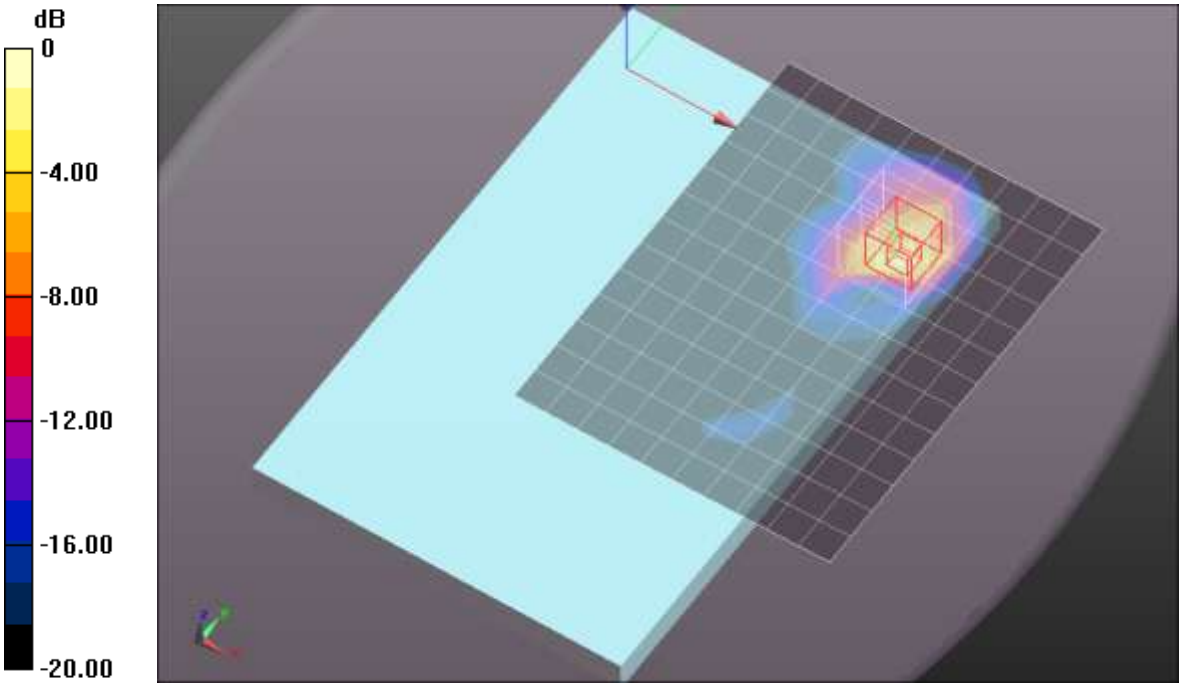
Test Laboratory: UL CCS SAR Lab A Date: 6/15/2012

WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 24.0°C; Liquid Temperature: 23.0°C
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.987 mho/m; ε_r = 52.127; ρ = 1000 kg/m^3
DASY5 Configuration:
- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(6.65, 6.65, 6.65); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (A); Type: QDOVA001BB; Serial: 1120

Rear/802.11b_Ch 11/Area Scan (11x14x1): Measurement grid: dx=15mm, dy=15mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.471 mW/g

Rear/802.11b_Ch 11/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 27.702 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.3130
SAR(1 g) = 1.38 mW/g; SAR(10 g) = 0.571 mW/g
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.073 mW/g



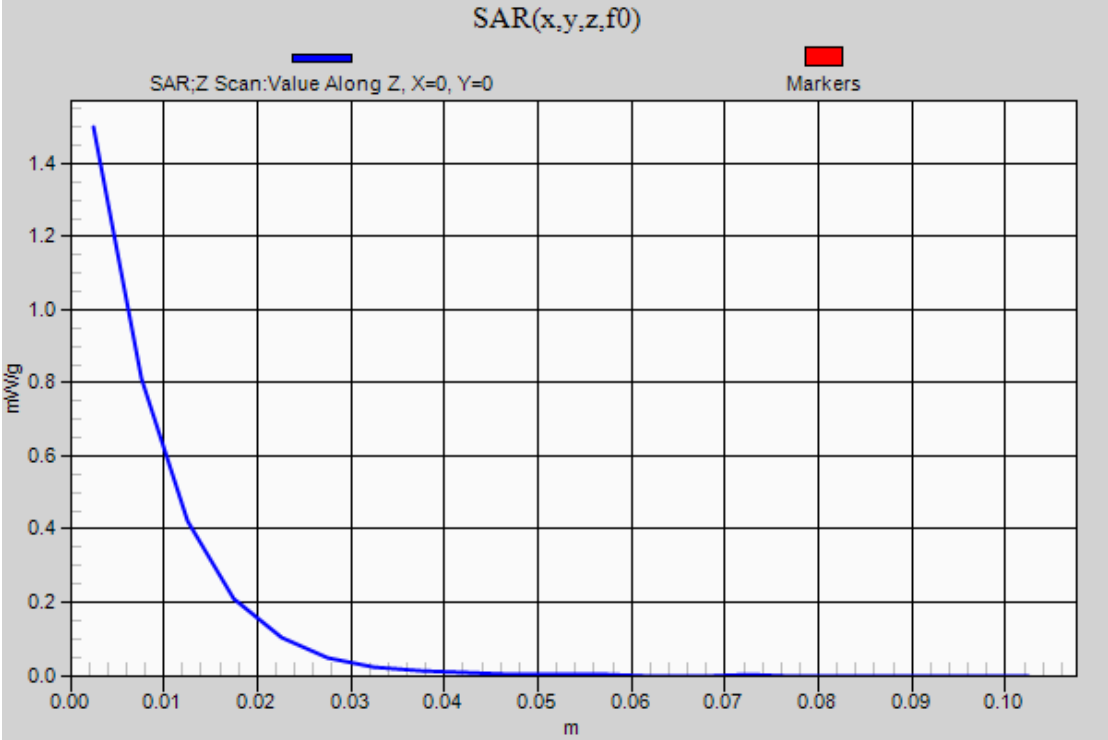
0 dB = 2.070mW/g = 6.32 dB mW/g

Test Laboratory: UL CCS SAR Lab A Date: 6/15/2012

WiFi 2.4GHz

Frequency: 2462 MHz; Duty Cycle: 1:1

Rear/802.11b_Ch 11/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.499 mW/g



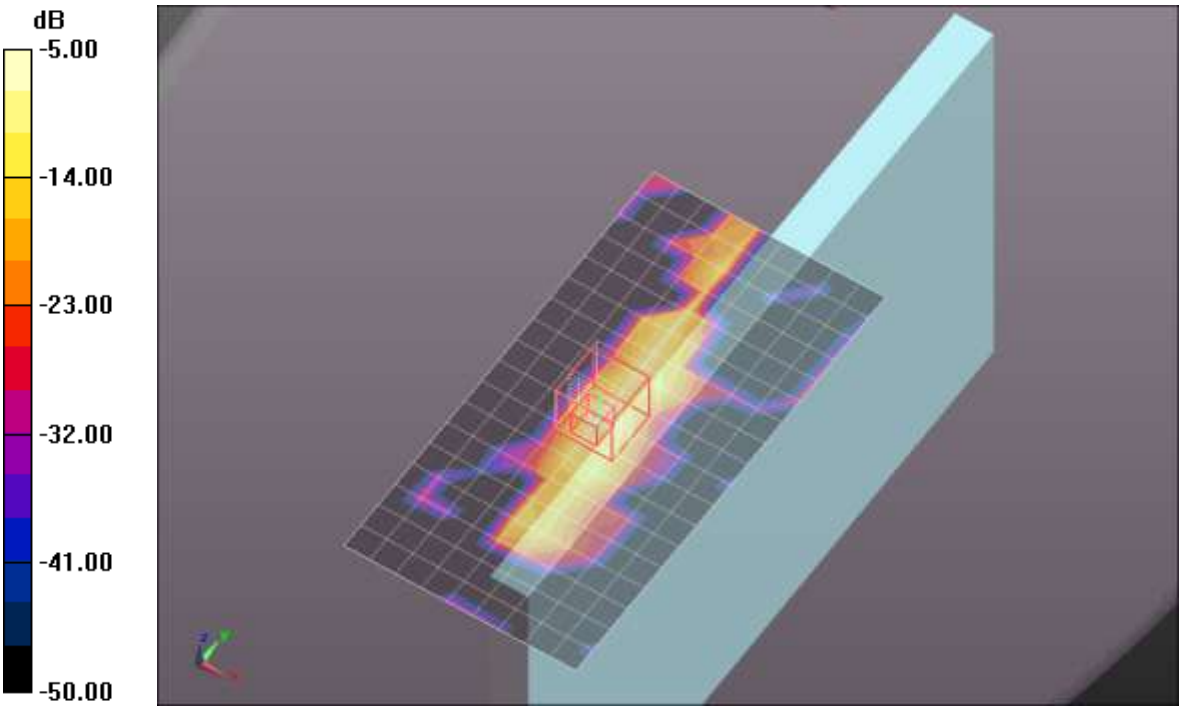
Test Laboratory: UL CCS SAR Lab A Date: 6/18/2012

WiFi 5.2 GHz band

Frequency: 5180 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5180 MHz; σ = 5.159 mho/m; ε_r = 50.668; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(4.17, 4.17, 4.17); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1099

Edge 3/Ch 36/Area Scan (10x19x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.356 mW/g

Edge 3/Ch 36/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.200 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.0460
SAR(1 g) = 0.355 mW/g; SAR(10 g) = 0.070 mW/g
Maximum value of SAR (measured) = 1.029 mW/g



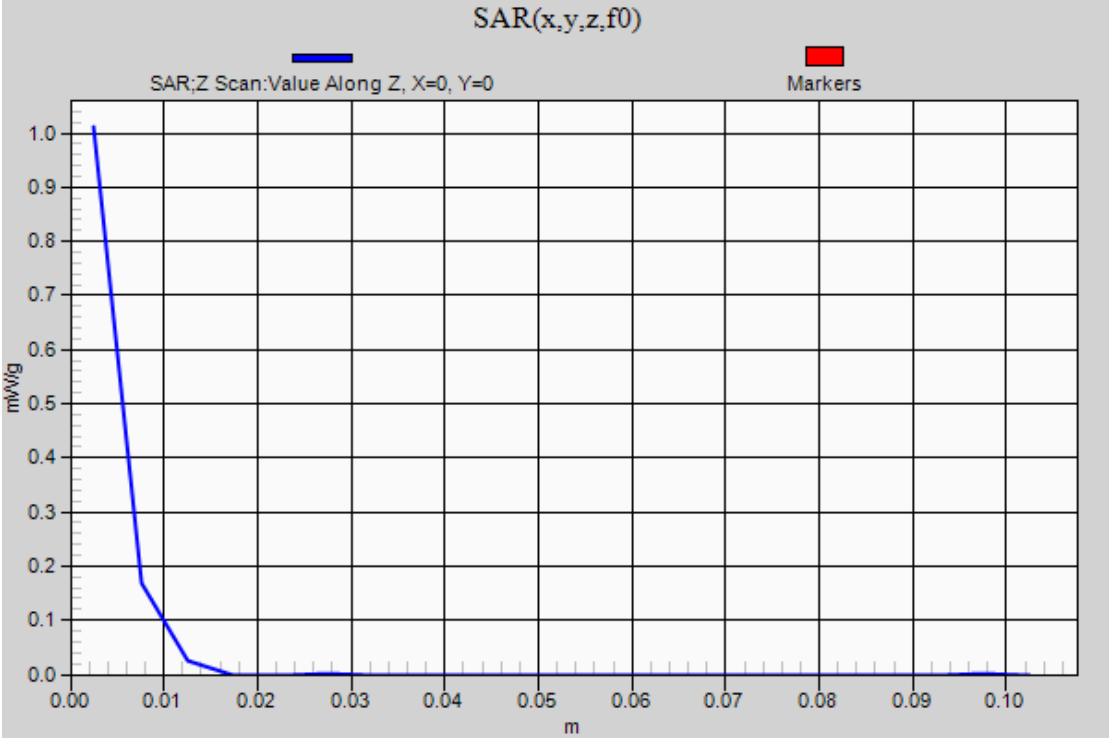
0 dB = 1.030mW/g = 0.26 dB mW/g

Test Laboratory: UL CCS SAR Lab A Date: 6/18/2012

WiFi 5.2 GHz band

Frequency: 5180 MHz; Duty Cycle: 1:1

Edge 3/Ch 36 2/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.011 mW/g



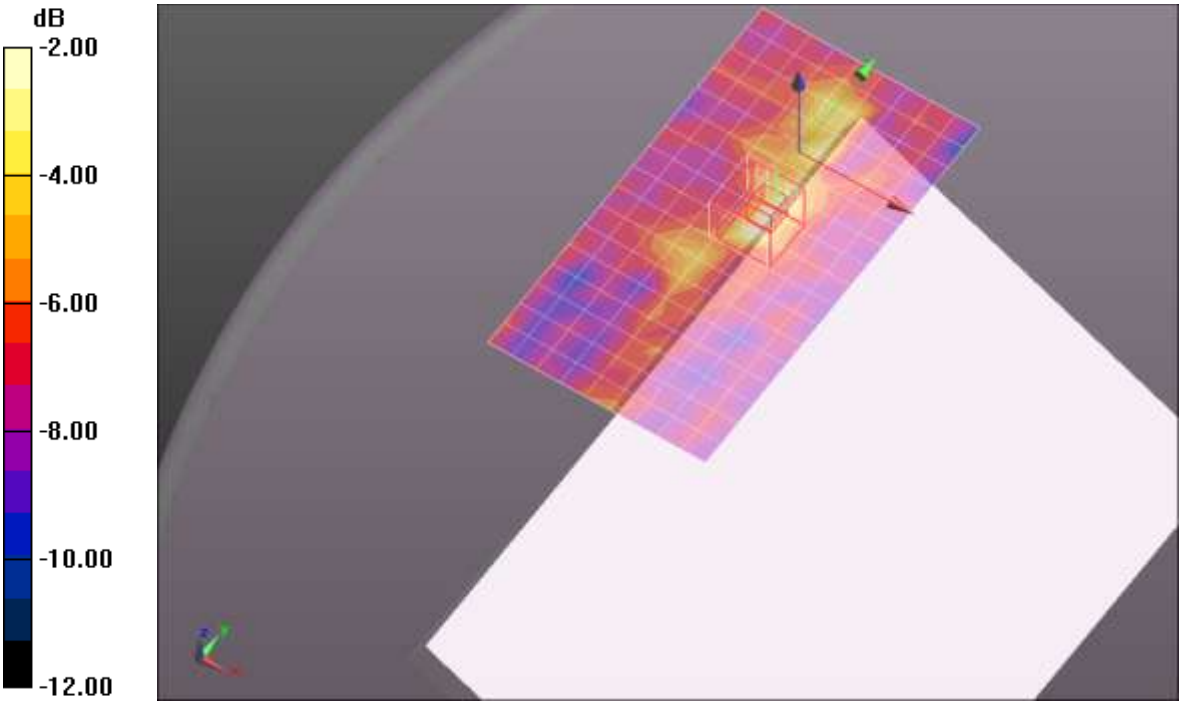
Test Laboratory: UL CCS SAR Lab A Date: 6/19/2012

WiFi 5.3 GHz band

Frequency: 5320 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5320 MHz; σ = 5.352 mho/m; ε_r = 50.448; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(3.99, 3.99, 3.99); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1099

Rear 20 deg. tilt @ Edge 3/Ch 64/Area Scan (10x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.245 mW/g

Rear 20 deg. tilt @ Edge 3/Ch 64/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 4.460 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.3170
SAR(1 g) = 0.163 mW/g; SAR(10 g) = 0.087 mW/g
Maximum value of SAR (measured) = 0.341 mW/g



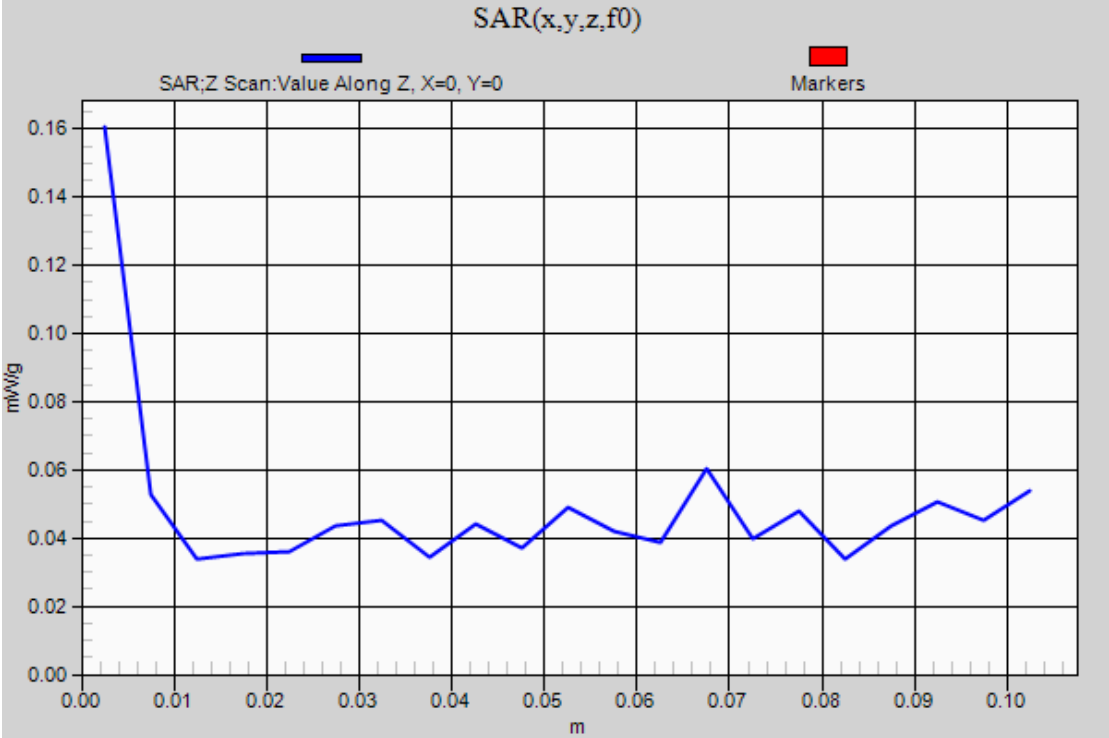
0 dB = 0.340mW/g = -9.37 dB mW/g

Test Laboratory: UL CCS SAR Lab A Date: 6/19/2012

WiFi 5.3 GHz band

Frequency: 5320 MHz; Duty Cycle: 1:1

Edge 3/Ch 64/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 0.178 mW/g



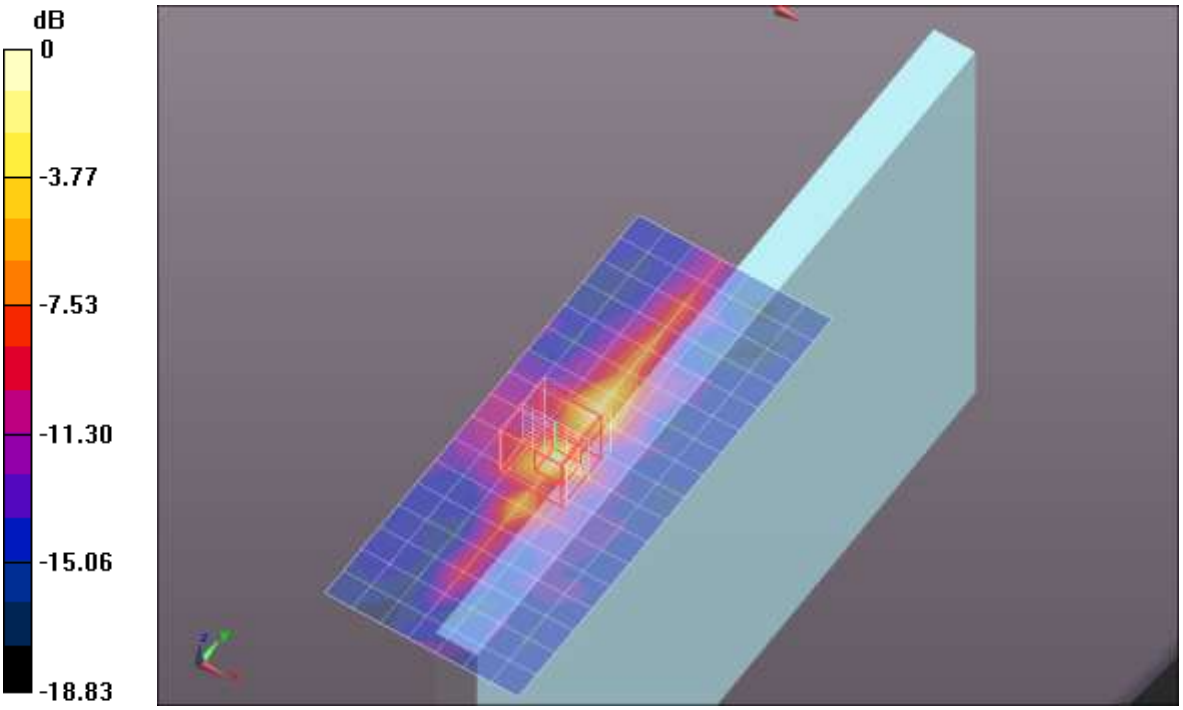
Test Laboratory: UL CCS SAR Lab A Date: 6/19/2012

WiFi 5.5 GHz band

Frequency: 5680 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5680 MHz; σ = 5.913 mho/m; ε_r = 50.908; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(3.26, 3.26, 3.26); Calibrated: 2/16/2012
- 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: 1099

Edge 3/Ch 136/Area Scan (8x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.278 mW/g

Edge 3/Ch 136/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 15.555 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 3.3250
SAR(1 g) = 0.516 mW/g; SAR(10 g) = 0.143 mW/g
Maximum value of SAR (measured) = 1.191 mW/g



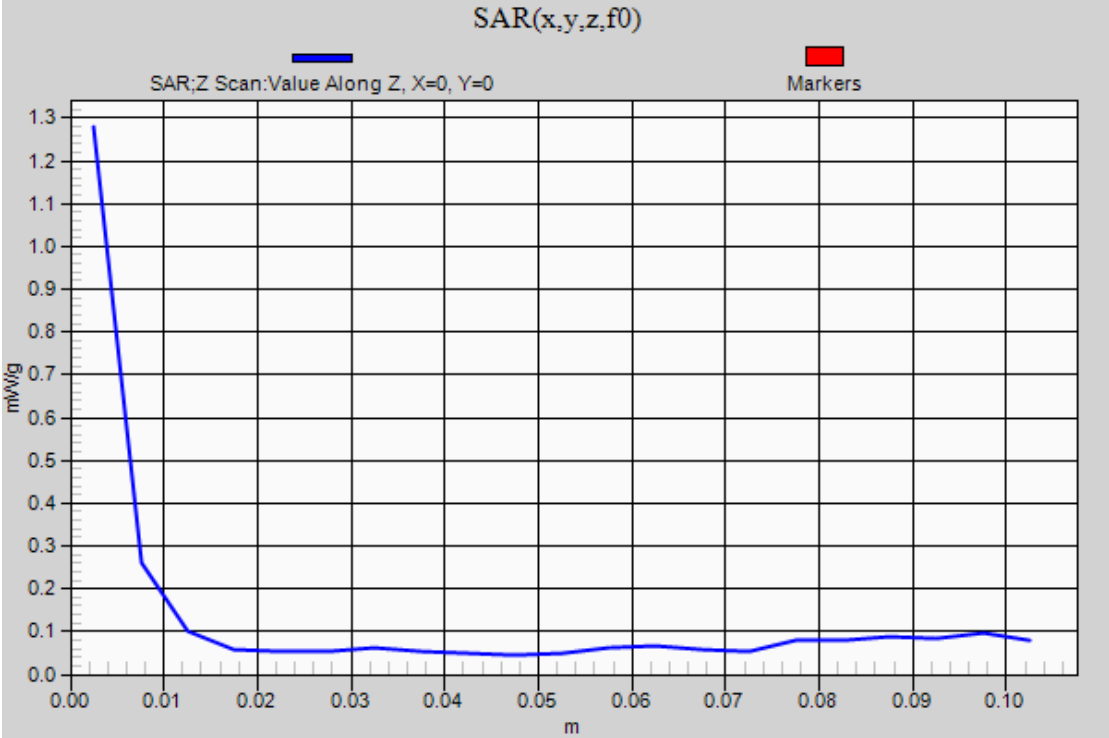
0 dB = 1.190mW/g = 1.51 dB mW/g

Test Laboratory: UL CCS SAR Lab A Date: 6/19/2012

WiFi 5.5 GHz band

Frequency: 5680 MHz; Duty Cycle: 1:1

Edge 3/Ch 136/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.279 mW/g



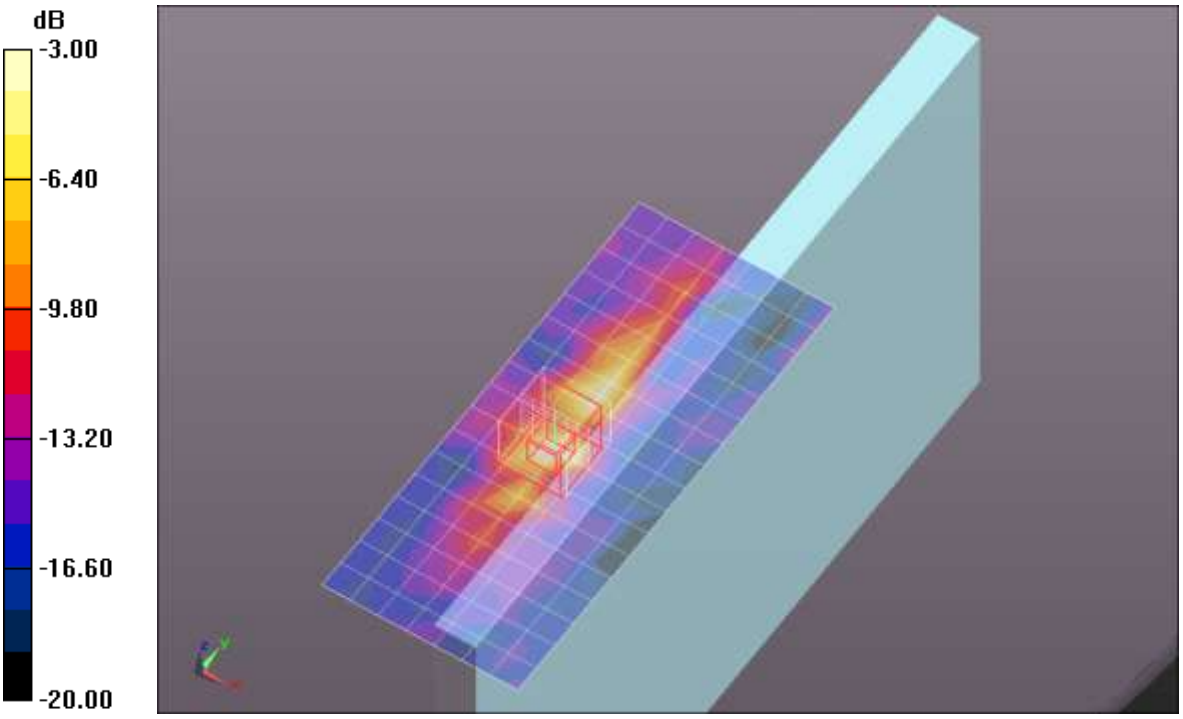
Test Laboratory: UL CCS SAR Lab A Date: 6/20/2012

WiFi 5.8 GHz band

Frequency: 5745 MHz; Duty Cycle: 1:1; Room Ambient Temperature: 25.0°C; Liquid Temperature: 24.0°C
Medium parameters used: f = 5745 MHz; σ = 6 mho/m; ε_r = 50.95; ρ = 1000 kg/m^3
DASY5 Configuration:
- Area Scan setting - Find Secondary Maximum Within: 2.0 dB and with a peak SAR value greater than 0.0012W/kg
- Electronics: DAE4 Sn1258; Calibrated: 3/8/2012
- Probe: EX3DV4 - SN3772; ConvF(3.58, 3.58, 3.58); Calibrated: 2/16/2012
- Sensor-Surface: 2.5mm (Mechanical Surface Detection)
- Phantom: ELI v5.0 (B); Type: QDOVA001BB; Serial: 1099

Edge 3/Ch 149/Area Scan (8x18x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.108 mW/g

Edge 3/Ch 149/Zoom Scan (7x7x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 14.869 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.1560
SAR(1 g) = 0.485 mW/g; SAR(10 g) = 0.123 mW/g
Maximum value of SAR (measured) = 1.100 mW/g



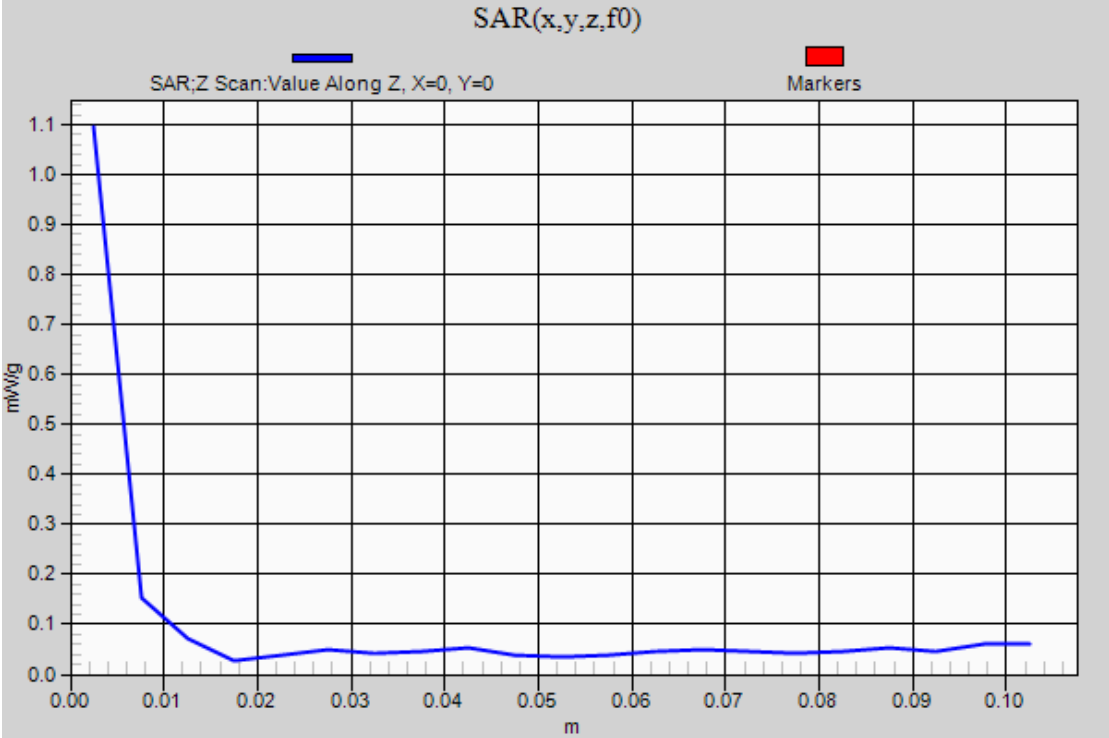
0 dB = 1.100mW/g = 0.83 dB mW/g

Test Laboratory: UL CCS SAR Lab A Date: 6/20/2012

WiFi 5.8 GHz band

Frequency: 5745 MHz; Duty Cycle: 1:1

Edge 3/Ch 149/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of SAR (measured) = 1.095 mW/g



14. Simultaneous Transmission SAR Analysis

As Bluetooth's max average power is 17 mW [<60/f(GHz) mW] standalone SAR is not required. Therefore, Bluetooth simultaneous transmission SAR evaluation with WiFi 5 GHz Bands is not required. Also, Bluetooth simultaneous transmission with WiFi 2.4GHz band is not supported.

14.1. Sum of the 1g SAR for Body Exposure Condition

N.A

14.2. SAR to Peak Location Separation Ratio (SPLSR)

N.A

15. Appendixes

Refer to separated files for the following appendixes.

15.1. System Performance Check Plots

15.2. SAR Test Plots for WiFi 2.4 GHz Band

15.3. SAR Test Plots for WiFi 5 GHz Bands

15.4. Calibration Certificate for E-Field Probe EX3DV4 - SN 3772

15.5. Calibration Certificate for D2450V2 - SN 748

15.6. Calibration Certificate for D5GHzV2 - SN 1075