



Microsoft Corporation
1514

SAR Evaluation Report #: MCSO1635
Evaluated to the following SAR Specifications:

FCC 2.1093:2012
Health Safety Code 6:2009



Report Prepared By Northwest EMC Inc.

NORTHWEST EMC – (888) 364-2378 – www.nwemc.com

California – Minnesota – Oregon – New York – Washington

CERTIFICATE OF EVALUATION

Last Date of Test: December 11, 2012
Microsoft Corporation
Model:1514

Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 2.1093:2012 FCC 15.247:2012 FCC 15.407:2012	FCC OET 65C:2001	Pass
		IEEE Std 1528:2003	
		FCC KDB 447498 D01 v04	
		FCC KDB 248227 D01 v01r02	
		FCC KDB 616217 D03 v01	
		FCC KDB 865664	
	Health Safety Code 6:2009	RSS-102, Issue 4:2010	Pass

Highest SAR Values

Frequency Bands (GHz)	Head 1g (W/kg)	Body 1g (W/kg)	Limit 1g (W/kg)	Exposure Environment
2.4	N/A	0.328	1.6	General Population Uncontrolled
5.2, 5.3, 5.6, 5.8	N/A	1.49		

Deviations From Test Standards

None

Approved By:



Don Facteau, IS Manager



NVLAP Lab Code: 200630-0

Test Facility

The measurement facility used to collect the data is located at:

Northwest EMC, Inc.
22975 NW Evergreen Parkway, Suite 400
Hillsboro, OR 97124

Phone: (503) 844-4066

Fax: 844-3826

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America.

Product compliance is the responsibility of the client, therefore the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. This Report may only be duplicated in its entirety. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test.

REVISION HISTORY

Revision Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.

United States

FCC - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

A2LA - Accredited by A2LA to ISO / IEC Guide 65 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

IC - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

European Union

European Commission – Validated by the European Commission as a Conformity Assessment Body (CAB) under the EMC directive and as a Notified Body under the R&TTE Directive.

Australia/New Zealand

ACMA - Recognized by ACMA as a CAB for the acceptance of test data.

Korea

KCC / RRA - Recognized by KCC's RRA as a CAB for the acceptance of test data.

Japan

VCCI - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

Taiwan

BSMI – Recognized by BSMI as a CAB for the acceptance of test data.

NCC - Recognized by NCC as a CAB for the acceptance of test data.

Singapore

IDA – Recognized by IDA as a CAB for the acceptance of test data.

Hong Kong

OFTA – Recognized by OFTA as a CAB for the acceptance of test data.

Vietnam

MIC – Recognized by MIC as a CAB for the acceptance of test data.

Russia

GOST – Accredited by Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC to perform EMC and Hygienic testing for Information Technology products to GOST standards.

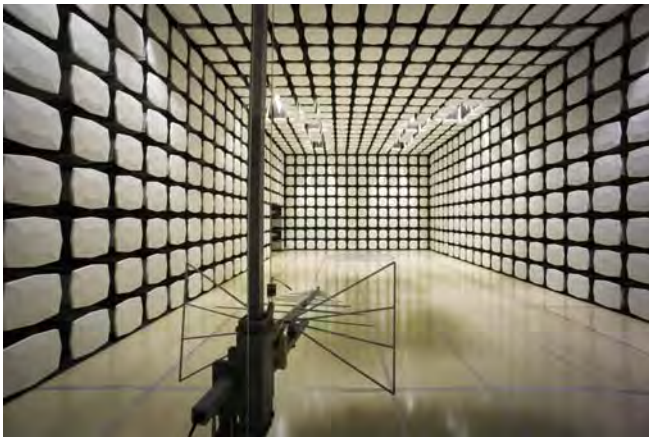
SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>



Oregon Labs EV01-EV12 22975 NW Evergreen Pkwy, #400 Hillsboro, OR 97124 (503) 844-4066	California Labs OC01-OC13 41 Tesla Irvine, CA 92618 (949) 861-8918	New York Labs WA01-WA04 4939 Jordan Rd. Elbridge, NY 13060 (315) 685-0796	Minnesota Labs MN01-MN08 9349 W Broadway Ave. Brooklyn Park, MN 55445 (763) 425-2281	Washington Labs SU01-SU07 14128 339 th Ave. SE Sultan, WA 98294 (360) 793-8675
VCCI				
A-0108	A-0029		A-0109	A-0110
Industry Canada				
2834D-1, 2834D-2	2834B-1, 2834B-2, 2834B-3		2834E-1	2834C-1



Client and Equipment Under Test (EUT) Information

Company Name:	Microsoft Corporation
Address:	One Microsoft Way
City, State, Zip:	Redmond, WA 98052-6399
Test Requested By:	Mike Boucher
Model:	1514
First Date of Test:	October 29, 2012
Last Date of Test:	December 11, 2012
Receipt Date of Samples:	October 29, 2012
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

Functional Description of the EUT (Equipment Under Test):

The EUT is the Model 1514 tablet computer containing a combination WLAN - Bluetooth radio module. The tablet contains two dual band (2.4 and 5 GHz) antennas. One antenna (MAIN) is used for both WLAN and Bluetooth, while the other (MIMO) antenna is used only for WLAN operation for MCS08 thru MCS15 data rates. The peak gain in the 2.4 GHz band is 3.9 dBi and the peak gain in the 5 GHz band is 6.0 dBi.. The WLAN and Bluetooth radios can transmit simultaneously.

The WLAN radio is an 802.11a/b/g/n radio module with 2x2 MIMO and both 20 MHz and 40 MHz channel bandwidths. The two WLAN antennas transmit simultaneously only in "n" (MIMO) modes. The frequency bands of the 802.11 a/b/g/n radio:

- 2400 – 2483.5 MHz
- 5150 – 5350 MHz
- 5470 – 5600 MHz
- 5650 – 5725 MHz
- 5725 – 5850 MHz

The Bluetooth radio is capable of both basic and extended data rates as well as low energy operation. It operates in the 2400 – 2483.5 MHz frequency band.

The closest spacing between the WLAN antennas is 9.77 cm. The antennas are near the top edge of the tablet. The closest spacing of the antennas to the user is 2.2 mm.

The diagonal screen size is greater than 20cm (7.9) inches therefore KDB 941225 is not applicable; instead, KDB 616217 is applicable.

In normal operation, the Model 1514 table is held in the hands. There is no usage model for operation near the head. There are no authorized accessories to wear the tablet on the body. Only the tablet configurations anticipated by KDB 616217 are applicable.

Testing Objective:

To demonstrate compliance with the SAR requirements of FCC 2.1093 and Canada's Health Safety Code 6. This evaluation will be used to support an original Grant of Certification for FCC ID: C3K1514, and IC: 3048A-1514.

Test Locations

The FCC's starting point for SAR guidance is KDB 447498 D01 Mobile Portable RF Exposure v04

4) b) The following procedures are applicable to tablet computers with antennas installed along the tablet edges while operating in Tablet Mode. (Footnote 21) When the output power of an antenna is $> 60/f(\text{GHz})$ mW, SAR is required for both bottom face and edge exposure conditions.

i) Each antenna is evaluated for bottom face exposure with the base/bottom of the tablet in direct contact with a flat phantom. Convertible tablets must be tested in normal use conditions with the display folded on top of the keyboard section. The simultaneous transmission test requirements in item 3) b) ii) (1) may be applied to tablet computers in this operating mode.

ii) Antennas installed along the edges of a tablet are each evaluated with the corresponding edge in direct contact with a flat phantom. The applicable edge configurations include: (A) one fixed display orientation in either portrait or landscape configuration; (B) two fixed display orientations with one in portrait and one in landscape configurations; and (C) multiple display orientations supporting both portrait and landscape configurations.

(1) For edge configuration (A): SAR is required for each antenna located within 5 cm of the tablet edge closest to the user for the applicable display orientation. For antenna(s) located ≥ 5 cm from this edge, the test reduction and exclusion procedures for laptop computers in KDB 616217 are applied. (Footnote 22)

(2) For edge configurations (B) and (C): The procedures for edge configuration (A) are applied to each antenna, for the applicable display orientations where the corresponding edge is closest to the user. For each antenna, SAR is required only for the edge with the most conservative exposure condition.

The bottom face (referred to as "back" in this report) and the top edge were tested. The antennas are located closest to the top edge.

Simultaneous Transmission

During testing, a KDB analysis was done to determine whether a SAR evaluation is required for simultaneous transmission. SAR KDB 616217 D03 SAR Supplement is the FCC's Policy for SAR evaluation of Notebooks, Netbooks, Laptops, and Tablet Computers. Whether a SAR evaluation is required for simultaneous transmission is determined by the output power, antenna spacing, and SAR distributions of each antenna.

Since the sum of the highest SAR from each of the individual antennas is greater than 1.6 W/kg, the condition of Item 4(b) of KDB 616217 was applied.

b) "for antennas included in the simultaneous transmission configuration that require SAR evaluation, when the separation distance between each antenna pair is

i) greater than $5 \cdot [(SAR1 + SAR2) / 1.6]^{1.5}$ cm, rounded to the nearest cm, and

ii) the $\sum$ of [(the highest MPE for each mobile transmitter/antenna included in the simultaneous transmission configuration) / (the corresponding MPE limit)] < 1

where: $\sum$ in a) excludes antennas that do not require SAR evaluation, and MPE does not apply to displays < 10" diagonal for both a) and b)"

The worst case SAR value in MIMO mode was measured at 5180 MHz for a 20 MHz channel bandwidth using MCS08 modulation. One antenna measured 1.33 W/kg, and the other 0.388 W/kg. The equation from 4(b)(i) becomes:

$$5 * [(1.33 + 0.388) / 1.6]^{1.5} = 6 \text{ cm}$$

Since the antenna spacing of 9.77 cm is greater than 6 cm, and there are no MPE exposure conditions to consider, simultaneous SAR is not required.

MIMO Evaluation

The FCC's Guidance for SAR testing of 802.11 a/b/g device is found in KDB 248227. It states:

"SAR for MIMO is measured with all antennas transmitting simultaneously.

For many low-power devices, when the peak SAR locations are more than 5 cm apart, the 1-g SAR can usually be treated independently with little or no noticeable impact. Therefore spatial summing could be optional"

Although the highest conducted output power modes were not MIMO, MIMO SAR evaluations were conducted in the 2.4 and 5 GHz bands to show that with a 9.77 cm antenna spacing, there were no overlapping SAR regions. The zoom scans of each hot spot were centered on the individual antennas. The maximum SAR measured for each MIMO mode was significantly lower than other modes reported in this SAR evaluation.

Scope

Per KDB 447498 D01 Mobile Portable RF Exposure v04:

4) b) The following procedures are applicable to tablet computers with antennas installed along the tablet edges while operating in Tablet Mode. (Footnote 21) When the output power of an antenna is > 60/f(GHz) mW, SAR is required for both bottom face and edge exposure conditions.

Since the maximum conducted output power of the Bluetooth radio is 1.8 mW, which is far below the 25mW threshold specified above, the Bluetooth radio does not require SAR evaluation.

The SAR evaluation documented in this report is for the 802.11 ab/g/n portion of the EUT.

Configuration MCSO1635- 1

Software/Firmware Running during test	
Description	Version
MS Windows	8
WiFi Tool	0.1.20120711

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Tablet Computer	Microsoft Corporation	1514	000006124053

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC Adapter	Microsoft	1536	482381959
USB Ethernet Adapter	Cisco	USB300M	CU906M703611

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Remote Laptop	Lenovo	ThinkPad 420s	R9-NP0D4

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	0.5m	No	AC Adapter	AC Mains
DC Power	No	1.5m	No	AC Adapter	Tablet Computer
USB	Yes	0.1m	No	USB Ethernet Adapter	Tablet Computer
Ethernet	No	4.2m	No	Remote Laptop	USB Ethernet Adapter
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	10/31/2012	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	12/11/2012	SAR	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.

2.4 AND 5 GHz Bands

Per FCC KDB 248227, the conducted output power was measured at the “default test channels” and at the “required test channels” in each band. Measurements were made while the EUT transmitted at the lowest, middle and the highest data rates for each channel. Test software insured that the EUT transmitted at 100% duty cycle.

Per FCC KDB 248227, among the channels required for normal testing, SAR must be measured on the highest output channel (highlighted). When the SAR measured on the highest output channel is >0.8 W/kg, SAR evaluation for the other required test channels is necessary.

Output power measurements are on the following pages.

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
1	2412	1	BPSK	15.7	0.037		0.001
		11	CCK	15.3	0.034		0.001
		6	OFDM	15.0	0.032		0.001
		36	OFDM	15.0	0.031		0.001
		54	OFDM	14.9	0.031		0.001
		7.2 (MCS0)	OFDM	14.8	0.030		0.001
		72.2 (MCS07)	OFDM	14.8	0.030		0.001
		14.4 (MCS08)	OFDM	14.4	0.027	14.6	0.029
		144.4 (MCS15)	OFDM	14.3	0.027	14.6	0.029
6	2437	1	BPSK	15.8	0.038		0.001
		11	CCK	15.5	0.035		0.001
		6	OFDM	15.2	0.033		0.001
		36	OFDM	15.1	0.033		0.001
		54	OFDM	15.0	0.032		0.001
		7.2 (MCS0)	OFDM	15.0	0.032		0.001
		72.2 (MCS07)	OFDM	15.0	0.031		0.001
		14.4 (MCS08)	OFDM	14.5	0.028	14.8	0.030
		144.4 (MCS15)	OFDM	14.5	0.028	14.9	0.031

Rod Peloquin

Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
11	2462	1	BPSK	15.8	0.038		0.001
		11	QCK	15.5	0.035		0.001
		6	OFDM	14.7	0.029		0.001
		36	OFDM	14.6	0.029		0.001
		54	OFDM	14.5	0.028		0.001
		7.2 (MCS0)	OFDM	14.5	0.028		0.001
		72.2 (MCS07)	OFDM	14.5	0.028		0.001
		14.4 (MCS08)	OFDM	14.2	0.026	15.0	0.031
		144.4 (MCS15)	OFDM	14.0	0.025	14.9	0.031



Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 40MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channels	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
1/5	2422	7.2 (MCS0)	OFDM	15.4	0.035		0.001
		72.2 (MCS07)	OFDM	15.5	0.035		0.001
		14.4 (MCS08)	OFDM	14.9	0.031	15.2	0.033
		144.4 (MCS15)	OFDM	15.1	0.033	15.5	0.035
4/8	2437	7.2 (MCS0)	OFDM	15.1	0.032		0.001
		72.2 (MCS07)	OFDM	15.7	0.037		0.001
		14.4 (MCS08)	OFDM	14.6	0.029	14.9	0.031
		144.4 (MCS15)	OFDM	15.6	0.037	15.6	0.036
7/11	2452	7.2 (MCS0)	OFDM	15.5	0.035		0.001
		72.2 (MCS07)	OFDM	15.6	0.037		0.001
		14.4 (MCS08)	OFDM	14.6	0.029	15.0	0.032
		144.4 (MCS15)	OFDM	15.6	0.037	15.7	0.037



Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
36	5180	6	OFDM	12.1	0.016		0.001
		7.2 (MCS0)	OFDM	11.4	0.014		0.001
		72.2 (MCS07)	OFDM	11.4	0.014		0.001
		14.4 (MCS08)	OFDM	11.4	0.014	12.4	0.017
40	5200	6	OFDM	11.5	0.014		0.001
		7.2 (MCS0)	OFDM	11.3	0.013		0.001
		72.2 (MCS07)	OFDM	11.3	0.013		0.001
		14.4 (MCS08)	OFDM	10.9	0.012	12.3	0.017
44	5220	6	OFDM	12.3	0.017		0.001
		7.2 (MCS0)	OFDM	11.6	0.014		0.001
		72.2 (MCS07)	OFDM	11.6	0.014		0.001
		14.4 (MCS08)	OFDM	11.1	0.013	12.3	0.017
48	5240	6	OFDM	12.0	0.016		0.001
		7.2 (MCS0)	OFDM	11.9	0.015		0.001
		72.2 (MCS07)	OFDM	11.9	0.015		0.001
		14.4 (MCS08)	OFDM	11.5	0.014	12.3	0.017



Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
52	5260	6	OFDM	11.8	0.015		0.001
		7.2 (MCS0)	OFDM	11.6	0.015		0.001
		72.2 (MCS07)	OFDM	11.7	0.015		0.001
		14.4 (MCS08)	OFDM	11.2	0.013	12.2	0.017
56	5280	6	OFDM	12.0	0.016		0.001
		7.2 (MCS0)	OFDM	11.5	0.014		0.001
		72.2 (MCS07)	OFDM	11.5	0.014		0.001
		14.4 (MCS08)	OFDM	11.6	0.015	12.1	0.016
60	5300	6	OFDM	11.8	0.015		0.001
		7.2 (MCS0)	OFDM	11.7	0.015		0.001
		72.2 (MCS07)	OFDM	11.7	0.015		0.001
		14.4 (MCS08)	OFDM	11.3	0.014	11.9	0.016
64	5320	6	OFDM	11.4	0.014		0.001
		7.2 (MCS0)	OFDM	11.3	0.013		0.001
		72.2 (MCS07)	OFDM	11.4	0.014		0.001
		14.4 (MCS08)	OFDM	11.1	0.013	11.8	0.015



Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
100	5500	6	OFDM	12.1	0.016		0.001
		7.2 (MCS0)	OFDM	11.9	0.016		0.001
		72.2 (MCS07)	OFDM	11.7	0.015		0.001
		14.4 (MCS08)	OFDM	11.5	0.014	12.2	0.017
104	5520	6	OFDM	12.4	0.017		0.001
		7.2 (MCS0)	OFDM	12.4	0.017		0.001
		72.2 (MCS07)	OFDM	12.3	0.017		0.001
		14.4 (MCS08)	OFDM	11.8	0.015	12.6	0.018
108	5540	6	OFDM	12.6	0.018		0.001
		7.2 (MCS0)	OFDM	12.0	0.016		0.001
		72.2 (MCS07)	OFDM	12.0	0.016		0.001
		14.4 (MCS08)	OFDM	11.6	0.015	12.3	0.017
112	5560	6	OFDM	12.4	0.017		0.001
		7.2 (MCS0)	OFDM	11.7	0.015		0.001
		72.2 (MCS07)	OFDM	11.7	0.015		0.001
		14.4 (MCS08)	OFDM	11.3	0.013	12.6	0.018

Rodry L. Peloquin

Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
116	5580	6	OFDM	12.8	0.019		0.001
		7.2 (MCS0)	OFDM	11.9	0.015		0.001
		72.2 (MCS07)	OFDM	12.0	0.016		0.001
		14.4 (MCS08)	OFDM	11.6	0.014	12.7	0.019
132	5660	6	OFDM	12.0	0.016		0.001
		7.2 (MCS0)	OFDM	11.3	0.014		0.001
		72.2 (MCS07)	OFDM	11.4	0.014		0.001
		14.4 (MCS08)	OFDM	10.9	0.012	12.1	0.016
136	5680	6	OFDM	12.0	0.016		0.001
		7.2 (MCS0)	OFDM	11.4	0.014		0.001
		72.2 (MCS07)	OFDM	11.5	0.014		0.001
		14.4 (MCS08)	OFDM	11.1	0.013	12.1	0.016
140	5700	6	OFDM	11.7	0.015		0.001
		7.2 (MCS0)	OFDM	11.1	0.013		0.001
		72.2 (MCS07)	OFDM	11.1	0.013		0.001
		14.4 (MCS08)	OFDM	10.6	0.012	11.5	0.014



Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 20MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
149	5745	6	OFDM	12.3	0.017		0.001
		7.2 (MCS0)	OFDM	11.6	0.014		0.001
		72.2 (MCS07)	OFDM	11.6	0.015		0.001
		14.4 (MCS08)	OFDM	11.2	0.013	11.3	0.013
153	5765	6	OFDM	12.3	0.017		0.001
		7.2 (MCS0)	OFDM	11.7	0.015		0.001
		72.2 (MCS07)	OFDM	11.7	0.015		0.001
		14.4 (MCS08)	OFDM	10.8	0.012	12.1	0.016
157	5785	6	OFDM	12.3	0.017		0.001
		7.2 (MCS0)	OFDM	11.7	0.015		0.001
		72.2 (MCS07)	OFDM	12.1	0.016		0.001
		14.4 (MCS08)	OFDM	11.2	0.013	12.1	0.016
161	5805	6	OFDM	11.9	0.016		0.001
		7.2 (MCS0)	OFDM	11.7	0.015		0.001
		72.2 (MCS07)	OFDM	12.2	0.016		0.001
		14.4 (MCS08)	OFDM	11.4	0.014	12.0	0.016
165	5825	6	OFDM	11.4	0.014		0.001
		7.2 (MCS0)	OFDM	11.2	0.013		0.001
		72.2 (MCS07)	OFDM	11.5	0.014		0.001
		14.4 (MCS08)	OFDM	10.7	0.012	12.0	0.016

Rod Peloquin

Tested By

EUT:	1514	Work Order:	MCSO1635
Serial Number:	000006124093	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Attendees:	Mike Boucher	Relative Humidity:	53%
Customer Project:	None	Bar. Pressure:	1017 mb
Tested By:	Brandon Hobbs, Rod Peloquin	Job Site:	EV03
Power:	110VAC/60Hz	Configuration:	MCSO1635-1

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

COMMENTS

Conducted output power, 40MHz channel bandwidths

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Channels	Frequency (MHz)	Data Rate (Mbps)	Modulation	Conducted Power (Average)			
				Antenna Port 1		Antenna Port 2	
				dBm	W	dBm	W
36/ 40	5190	7.2 (MCS0)	OFDM	12.2	0.016		0.001
		14.4 (MCS08)	OFDM	11.7	0.015	12.7	0.018
44/ 48	5230	7.2 (MCS0)	OFDM	12.8	0.019		0.001
		14.4 (MCS08)	OFDM	11.9	0.015	12.6	0.018
52/ 56	5270	7.2 (MCS0)	OFDM	12.3	0.017		0.001
		14.4 (MCS08)	OFDM	11.5	0.014	12.5	0.018
60/ 64	5310	7.2 (MCS0)	OFDM	12.4	0.017		0.001
		14.4 (MCS08)	OFDM	11.5	0.014	12.2	0.017
100/ 104	5510	7.2 (MCS0)	OFDM	12.7	0.019		0.001
		14.4 (MCS08)	OFDM	11.8	0.015	12.5	0.018
108/ 112	5550	7.2 (MCS0)	OFDM	12.8	0.019		0.001
		14.4 (MCS08)	OFDM	11.9	0.015	12.4	0.017
132/ 136	5670	7.2 (MCS0)	OFDM	11.6	0.015		0.001
		14.4 (MCS08)	OFDM	11.1	0.013	12.1	0.016
149/ 153	5755	7.2 (MCS0)	OFDM	12.3	0.017		0.001
		14.4 (MCS08)	OFDM	11.4	0.014	11.6	0.014
157/ 161	5795	7.2 (MCS0)	OFDM	12.4	0.017		0.001
		14.4 (MCS08)	OFDM	11.4	0.014	11.5	0.014



Tested By

Characterization of tissue-equivalent liquid dielectric properties

Per IEEE 1528: 2003, Section 5.2.2, the permittivity and conductivity of the tissue material should be measured at least once for any full-compliance test. The measured values must be within +/- 5% of the target values. The temperature variation in the liquid during SAR measurements must be within +/- 2 degrees C of that recorded when the dielectric properties were measured.

The dielectric parameters of the tissue-equivalent liquids were measured within 24 hours of the start of testing using the HP85070E dielectric probe kit. The dielectric measurements were made across the frequency range of the liquid. The attached data sheets show that the dielectric parameters of the liquid were within the required 5% tolerances.

Target values of dielectric parameters

Per FCC OET 65C, Appendix C:

“The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528.”

Target Frequency	Head		Body	
(MHz)	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
5800	35.3	5.27	48.2	6.00

(ϵ_r = relative permittivity, σ = conductivity and $\rho = 1000 \text{ kg/m}^3$)

Composition of Ingredients for Liquid Tissue Phantoms

Northwest EMC uses tissue-equivalent liquids prepared by SPEAG and confirmed by them to be within +/- 5% from the target values. Their recipes are based upon the following formulations as found in FCC OET 65C, Appendix C:

“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

Tissue:	MSL 501	Work Order:	MCSO1635
Serial Number:	101101	Date:	10/29/2012
Customer:	Microsoft Corporation	Temperature:	22.4°C
Customer Project:	None	Liquid Temperature:	22.4°C
Tested By:	Ethan Schoonover	Relative Humidity:	39.8
Job Site:	EV08	Bar. Pressure:	1010

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
5800	46.6	6.057	48.2	6	3.32	-0.95

Frequency (MHz)	Relative Permittivity	Conductivity
3400	50.2	3.192
3500	50.1	3.296
3600	50	3.408
3700	50	3.52
3900	49.6	3.72
4000	49.5	3.83
4100	49.3	3.935
4300	49	4.166
4400	49	4.287
4500	48.9	4.413
4600	48.6	4.536
4800	48.3	4.796
4850	48.1	4.862
4900	48.2	4.926
5000	48	5.053
5050	47.9	5.119
5100	47.7	5.18
5200	47.6	5.305
5250	47.5	5.372
5300	47.4	5.426
5350	47.3	5.497
5450	47.1	5.624
5500	47.1	5.682
5550	47.1	5.741
5650	46.8	5.865
5700	46.7	5.932
5750	46.7	5.994
5800	46.6	6.057
5850	46.5	6.123
5900	46.4	6.2

Tissue:	MSL2450	Work Order:	MCSO1635
Serial Number:	101119	Date:	11/07/2012
Customer:	Microsoft Corporation	Temperature:	23.4°C
Customer Project:	None	Liquid Temperature:	21.5°C
Tested By:	Ethan Schoonover	Relative Humidity:	46.3%
Job Site:	EV08	Bar. Pressure:	1022

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2012	FCC OET 65C:2001

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
2450	50.4	1.957	52.7	1.95	4.36	-0.36

Frequency (MHz)	Relative Permittivity	Conductivity
1900	52.1	1.286
1925	52	1.312
1950	52	1.338
1975	51.9	1.365
2000	51.8	1.393
2025	51.8	1.423
2050	51.7	1.454
2100	51.5	1.515
2125	51.5	1.546
2150	51.4	1.577
2175	51.3	1.608
2200	51.2	1.64
2225	51.1	1.671
2250	51	1.703
2300	50.9	1.767
2325	50.8	1.798
2350	50.7	1.829
2375	50.6	1.862
2400	50.5	1.893
2425	50.4	1.925
2450	50.4	1.957
2500	50.2	2.023
2525	50.1	2.055
2550	50	2.088
2575	49.9	2.122
2600	49.8	2.155
2625	49.7	2.189
2675	49.5	2.257
2700	49.4	2.291

REQUIREMENT

Per IEEE 1528, Section 8.2.1, "System checks are performed prior to compliance tests and the results must always be within $\pm 10\%$ of the target value corresponding to the test frequency, liquid, and the source used. The target values are 1 g or 10 g averaged SAR values measured on systems having current system validation and calibration status, and using the system check setup as shown in Figure 14. These target values should be determined using a standard source."

TEST DESCRIPTION

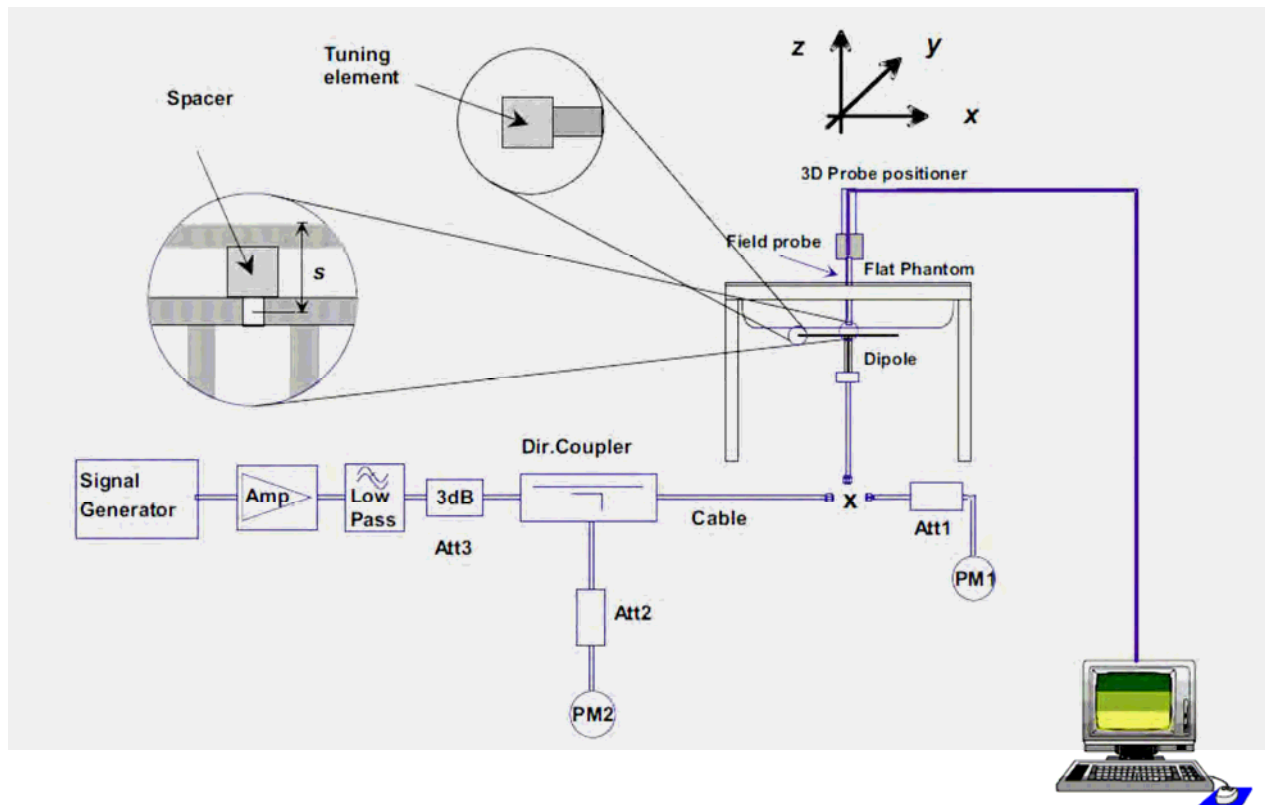
Within 24 hours of a measurement, Northwest EMC used the system validation kit (calibrated reference dipole) to test whether the system was operating within its specifications. The validation was performed in the indicated bands by making SAR measurements of the reference dipole with the phantom filled with the tissue-equivalent liquid. First, a signal generator and power amplifier were used to produce a 100mW level as measured with a power meter at the antenna terminals of the dipole. Then, the reference dipole was positioned below the bottom of the phantom and centered with its axis parallel to the longest side of the phantom. A low loss and low relative permittivity spacer was used to establish the correct distance between the center axis of the reference dipole and the liquid.

For the reference dipoles, the spacing distance s is given by:

$s = 15\text{mm}$, $\pm 0.2\text{mm}$ for $300\text{MHz} \leq f \leq 1000 \text{ MHz}$:

$s = 10\text{mm}$, $\pm 0.2\text{mm}$ for $1000\text{MHz} \leq f \leq 6000\text{MHz}$

The measured 1 g and 10 g spatial average SAR values were normalized to a 1W dipole input power for comparison to the calibration data. The results are summarized in the attached table. The deviation is less than 10% in all cases, indicating that the system performance check was within tolerance.



EUT:	1514	Work Order:	MCSO1635
Customer:	Microsoft Corporation	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2011 FCC 15.247:2011 FCC 15.407:2001	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 248227 D01 V01r02 FCC KDB 648474 D01 V01r05 FCC 865664
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	Measured		Normalized to 1W		Target (Normalized to 1W) Get from Dipole Calibration Certificate		% Difference	
				1g	10g	1g	10g	1g	10g	1g	10g
10/31/2012	MSL 501 5800 MHz	20.83	8.26	9.38	2.68	77.48	22.14	76.5	21.6	1.28	2.5
10/31/2012	MSL 501 5500 MHz	20.48	8.95	9	2.54	80.55	22.73	83.3	23.4	-3.3	-2.86
10/31/2012	MSL 501 5200 MHz	19.20	12.02	6.02	1.7	72.36	20.43	78	21.9	-7.23	-6.71
11/2/2012	MSL 501 5800 MHz	20.95	8.04	10.3	2.92	82.81	23.48	76.5	21.6	8.25	8.7
11/2/2012	MSL 501 5500 MHz	20.57	8.77	9.89	2.77	86.74	24.29	83.3	23.4	4.13	3.8
11/2/2012	MSL 501 5200 MHz	19.44	11.38	6.58	1.83	74.88	20.83	78	21.9	-4	-4.89
11/6/2012	MSL 501 5200 MHz	20.47	8.97	8.25	2.35	74	21.08	76.5	21.6	-3.27	-2.41
11/6/2012	MSL 501 5500 MHz	20.16	9.64	8.39	2.36	80.88	22.75	83.3	23.4	-2.91	-2.78
11/6/2012	MSL 501 5800 MHz	19.09	12.33	5.92	1.67	72.99	20.59	78	21.9	-6.42	-5.98
11/7/2012	MSL 2450 2450 MHz	20	10	5.26	2.41	52.6	24.1	50.4	23.7	4.37	1.69
12/4/2012	MSL 501 5200 MHz	20.72	8.47	8.42	2.4	71.32	20.33	76.5	21.6	-6.77	-5.88
12/4/2012	MSL 501 5500 MHz	20.37	9.18	8.47	2.38	77.75	21.85	83.3	23.4	-6.66	-6.62
12/4/2012	MSL 501 5800 MHz	19.05	12.45	5.72	1.61	71.21	20.04	78	21.9	-8.71	-8.49
12/6/2012	MSL 501 5200 MHz	20.81	8.3	9.24	2.64	76.69	21.91	76.5	21.6	0.25	1.44
12/6/2012	MSL 501 5500 MHz	20.48	8.95	9.11	2.56	81.53	22.91	83.3	23.4	-2.12	-2.09
12/6/2012	MSL 501 5800 MHz	19.27	11.83	5.98	1.69	70.74	19.99	78	21.9	-9.31	-8.72

SAR SYSTEM VERIFICATION

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	Measured		Normalized to 1W		Target (Normalized to 1W) Get from Dipole Calibration Certificate		% Difference	
12/10/2012	MSL 501 5200 MHz	20.88	8.17	9.03	2.59	73.78	21.16	76.5	21.6	-3.56	-2.04
12/10/2012	MSL 501 5500 MHz	20.56	8.79	9.16	2.58	80.52	22.68	83.3	23.4	-3.34	-3.08
12/10/2012	MSL 501 5800 MHz	19.39	11.51	6.17	1.73	71.02	19.91	78	21.9	-8.95	-9.09

Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	10/31/2012	Liquid Temperature (°C):	23.4
Serial Number:	000006124053	Humidity (%RH):	44.9%
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1005 mb
Comments:	None		

MSL501 5200 10-31-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 65.427 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 36.3 W/kg

SAR(1 g) = 9.38 W/kg; SAR(10 g) = 2.68 W/kg

Maximum value of SAR (measured) = 19.7 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

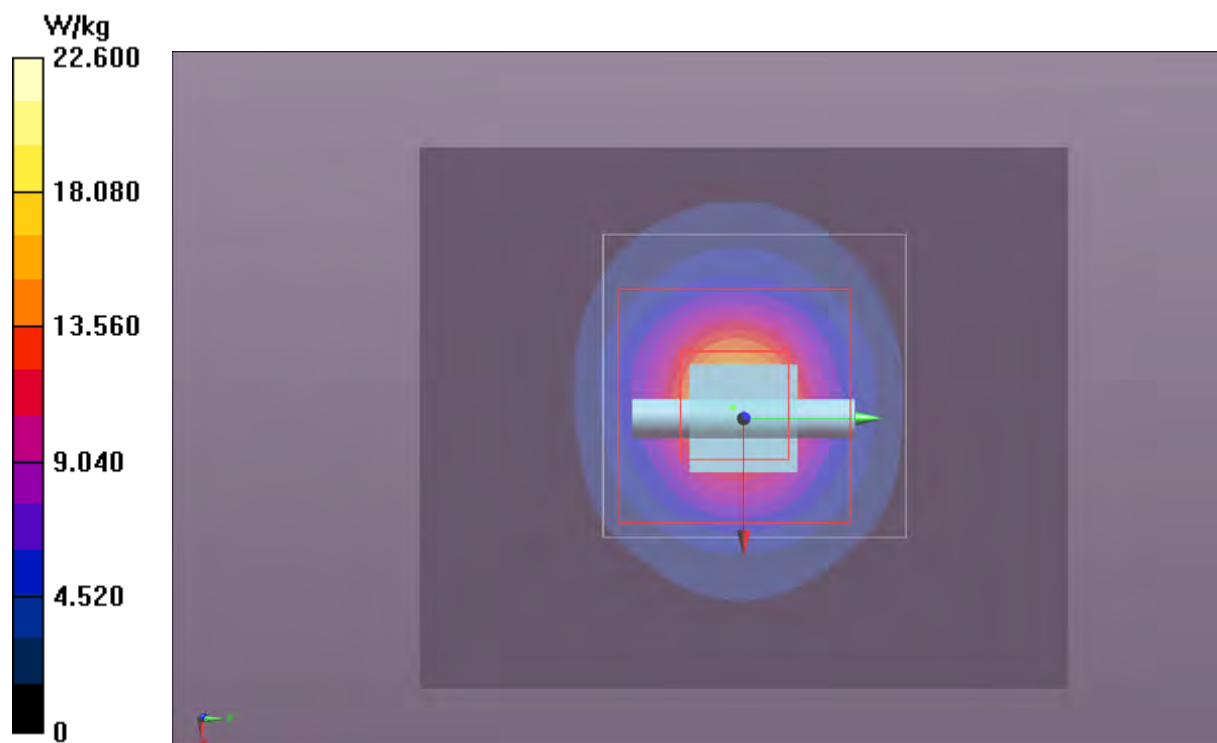
Maximum value of SAR (interpolated) = 20.4 W/kg

System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

Maximum value of SAR (measured) = 22.6 W/kg

 
Approved By

MSL501 5200 10-31-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	10/31/2012	Liquid Temperature (°C):	23.4
Serial Number:	000006124053	Humidity (%RH):	44.9%
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1005 mb
Comments:	None		

MSL501 5500 10-31-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.7 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 62.260 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 36.0 W/kg

SAR(1 g) = 9 W/kg; SAR(10 g) = 2.54 W/kg

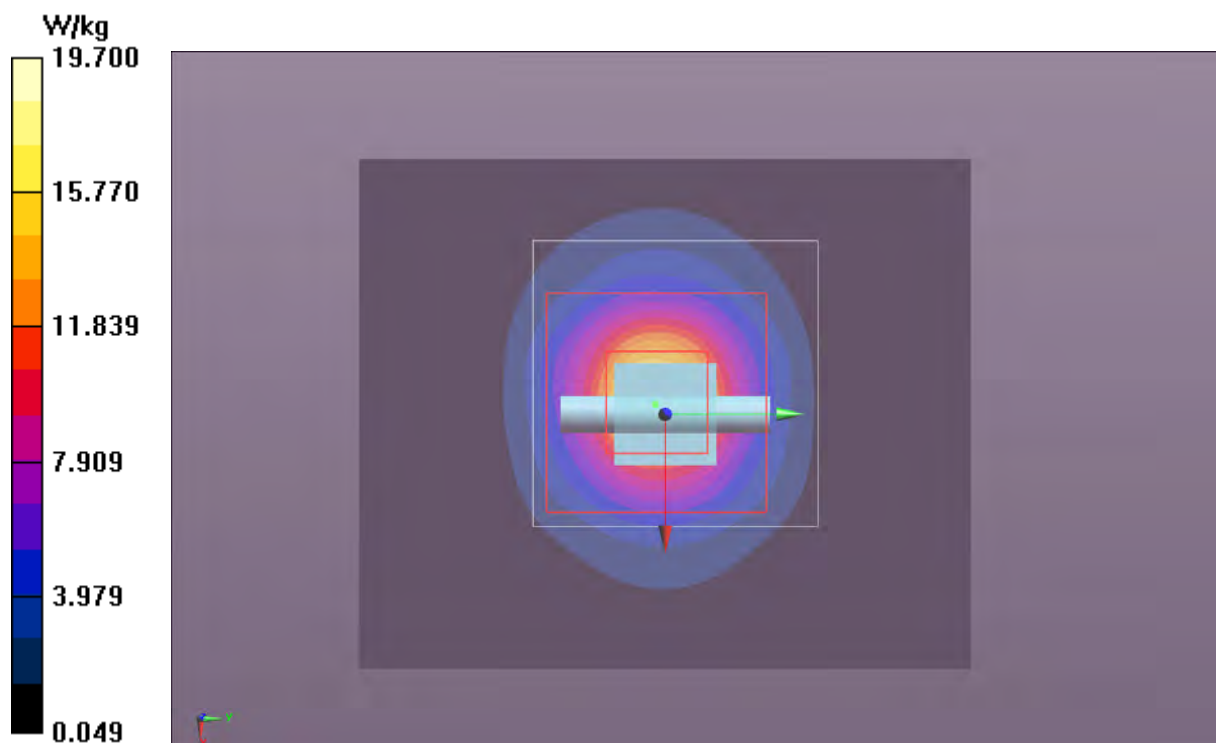
Maximum value of SAR (measured) = 19.0 W/kg

System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 21.9 W/kg

 
Approved By

MSL501 5500 10-31-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	10/31/2012	Liquid Temperature (°C):	23.4
Serial Number:	000006124053	Humidity (%RH):	44.9%
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1005 mb
Comments:	None		

MSL501 5800 10-31-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.2 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 40.78 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 40.242 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 25.7 W/kg

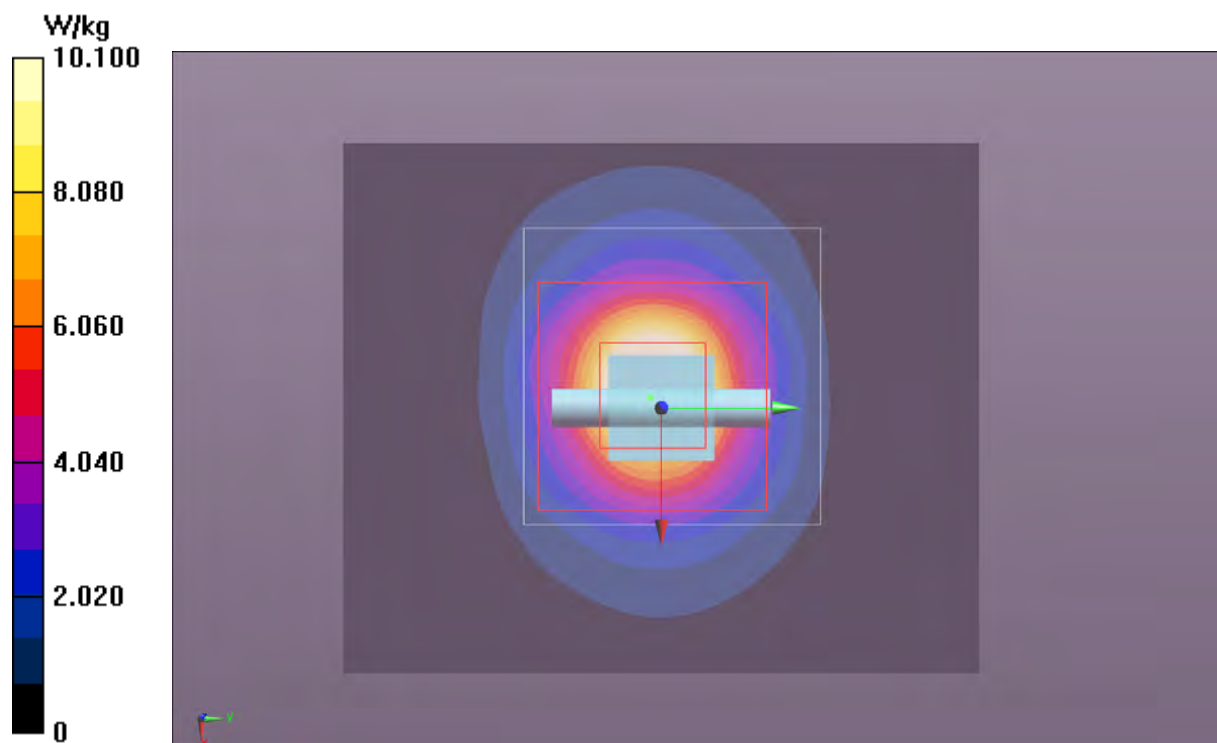
SAR(1 g) = 6.02 W/kg; SAR(10 g) = 1.7 W/kg

Maximum value of SAR (measured) = 13.0 W/kg

Maximum value of SAR (measured) = 10.1 W/kg

 
Approved By

MSL501 5800 10-31-12



Tested By:	Carl Engholm	Room Temperature (°C):	21.4°C
Date:	11/2/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	43.6%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5200 11-2-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 67.866 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 40.4 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 2.92 W/kg

Maximum value of SAR (measured) = 21.5 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 22.6 W/kg

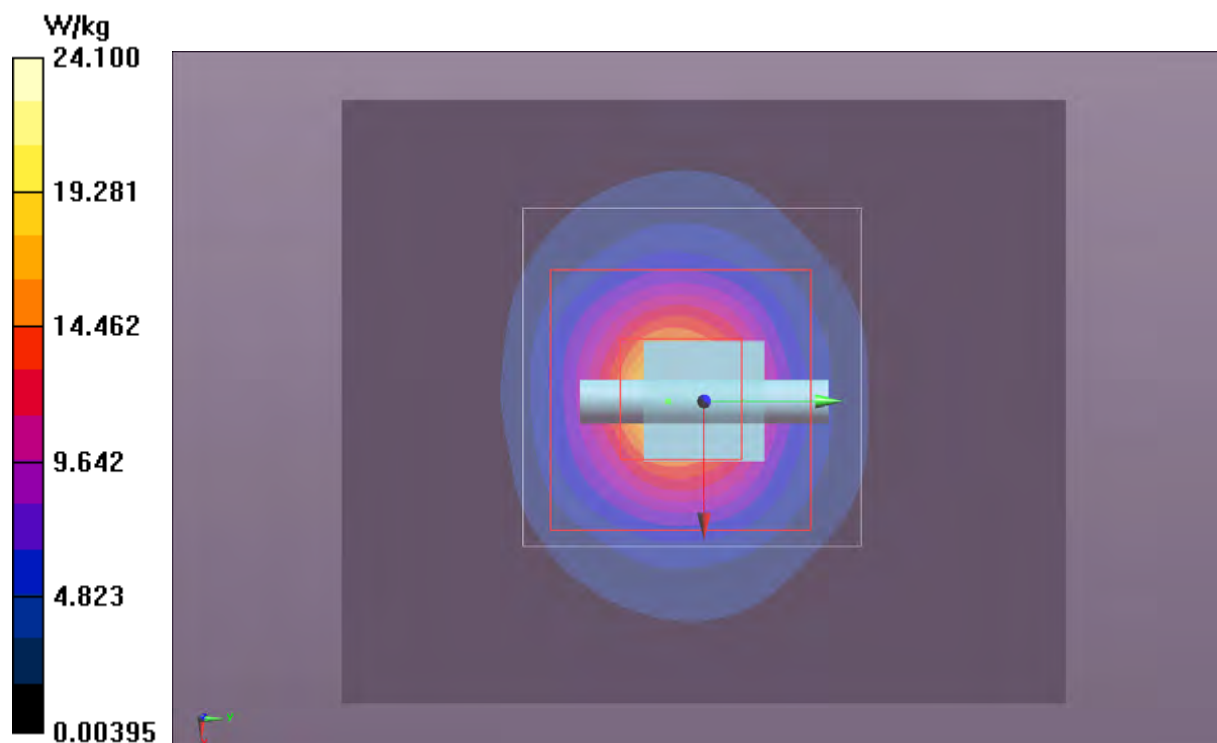
System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

Maximum value of Total (measured) = 67.46 V/m

Maximum value of SAR (measured) = 24.1 W/kg

 
Approved By

MSL501 5200 11-2-12



Tested By:	Carl Engholm	Room Temperature (°C):	21.4°C
Date:	11/2/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	43.6%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5500 11-2-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 22.9 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 64.954 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 40.2 W/kg

SAR(1 g) = 9.89 W/kg; SAR(10 g) = 2.77 W/kg

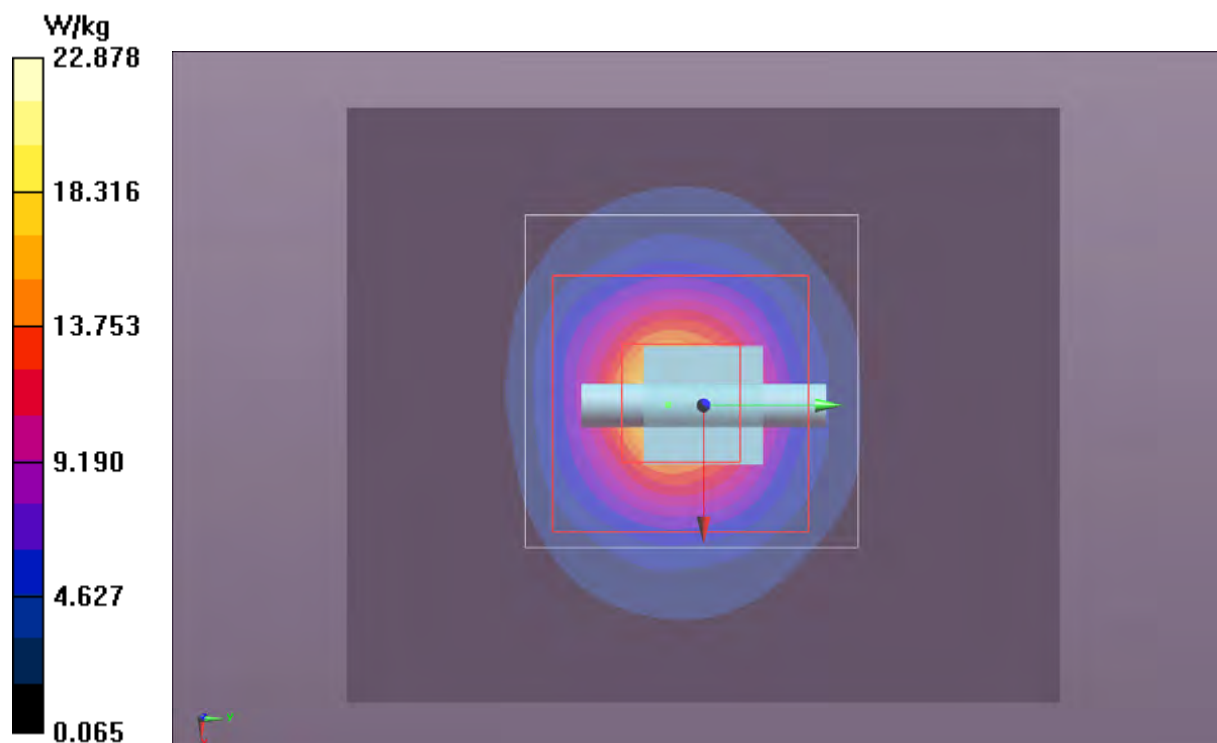
Maximum value of SAR (measured) = 21.0 W/kg

System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 64.92 V/m

 
Approved By

MSL501 5500 11-2-12



Tested By:	Carl Engholm	Room Temperature (°C):	21.4°C
Date:	11/2/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	43.6%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5800 11-2-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 15.1 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 41.62 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 41.560 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 28.6 W/kg

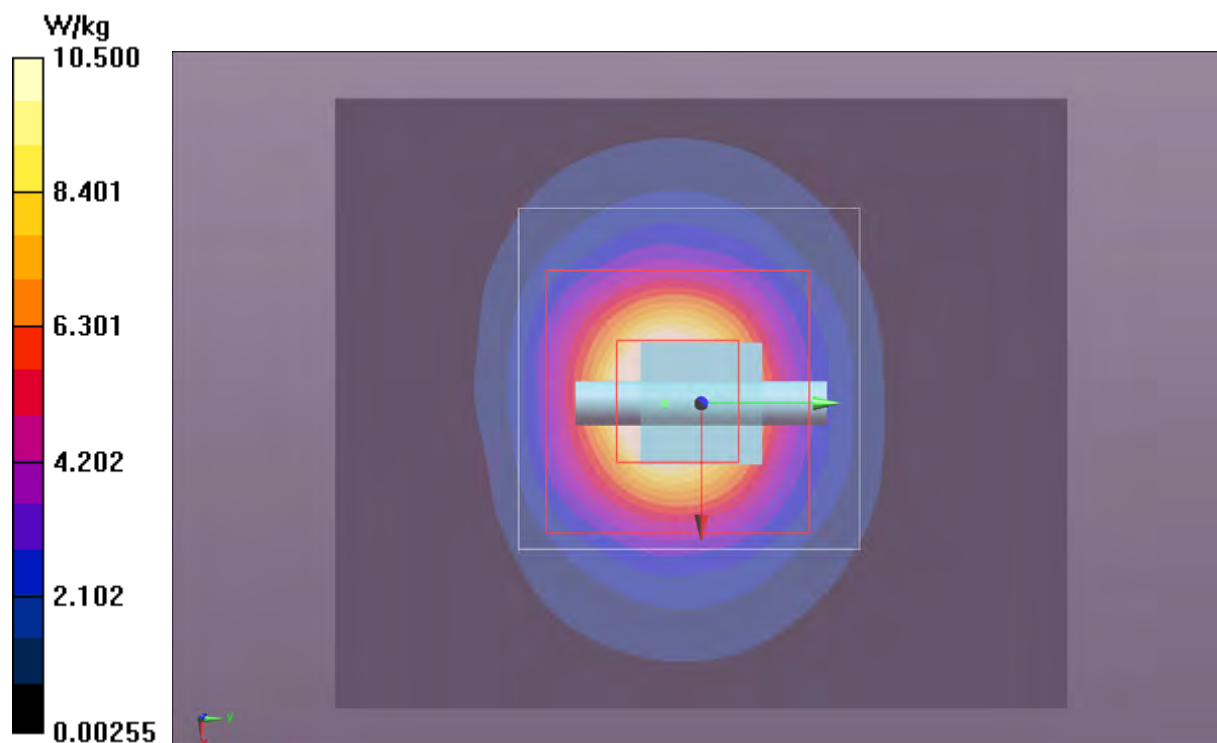
SAR(1 g) = 6.58 W/kg; SAR(10 g) = 1.83 W/kg

Maximum value of SAR (measured) = 14.2 W/kg

Maximum value of SAR (measured) = 10.5 W/kg

 
Approved By

MSL501 5800 11-2-12



Tested By:	Carl Engholm	Room Temperature (°C):	23.1°C
Date:	11/6/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	51.4%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5200 11-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 59.782 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 31.8 W/kg

SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.35 W/kg

Maximum value of SAR (measured) = 17.2 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

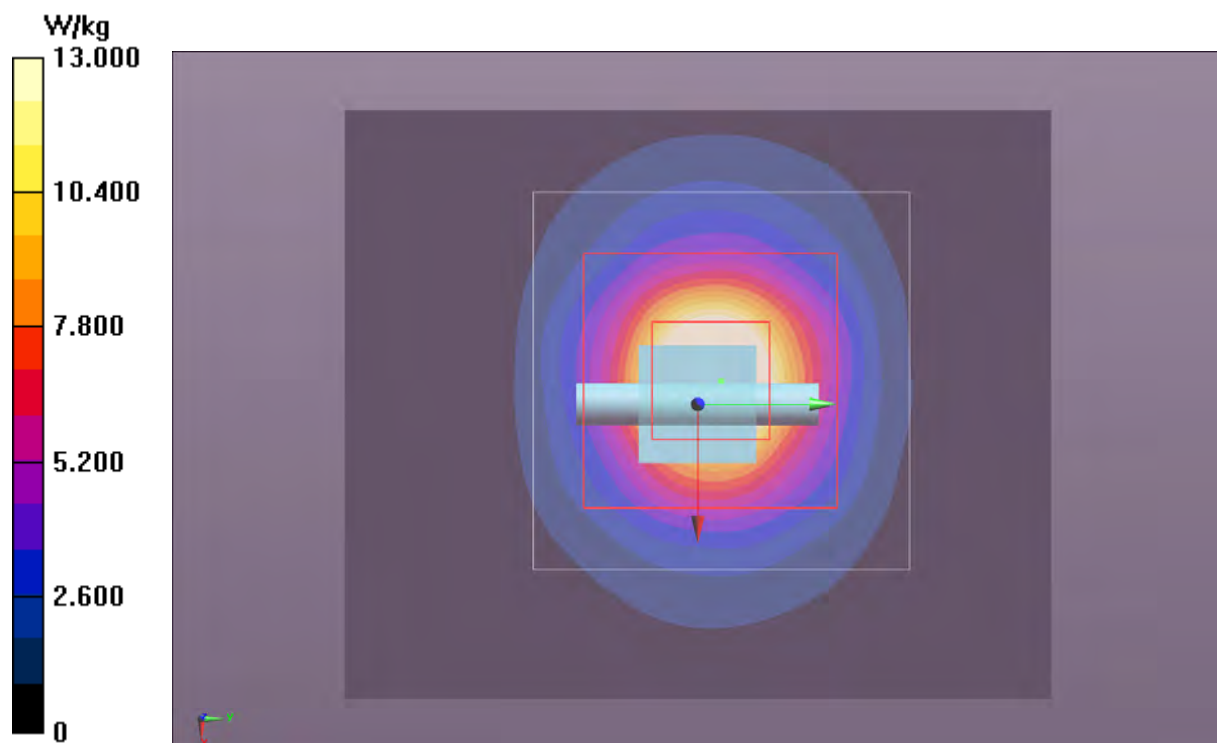
Maximum value of SAR (interpolated) = 17.7 W/kg

System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

Maximum value of SAR (measured) = 3.83 W/kg

 
Approved By

MSL501 5200 11-6-12



Tested By:	Carl Engholm	Room Temperature (°C):	23.1°C
Date:	11/6/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	51.4%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5500 11-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.5 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 58.907 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 34.1 W/kg

SAR(1 g) = 8.39 W/kg; SAR(10 g) = 2.36 W/kg

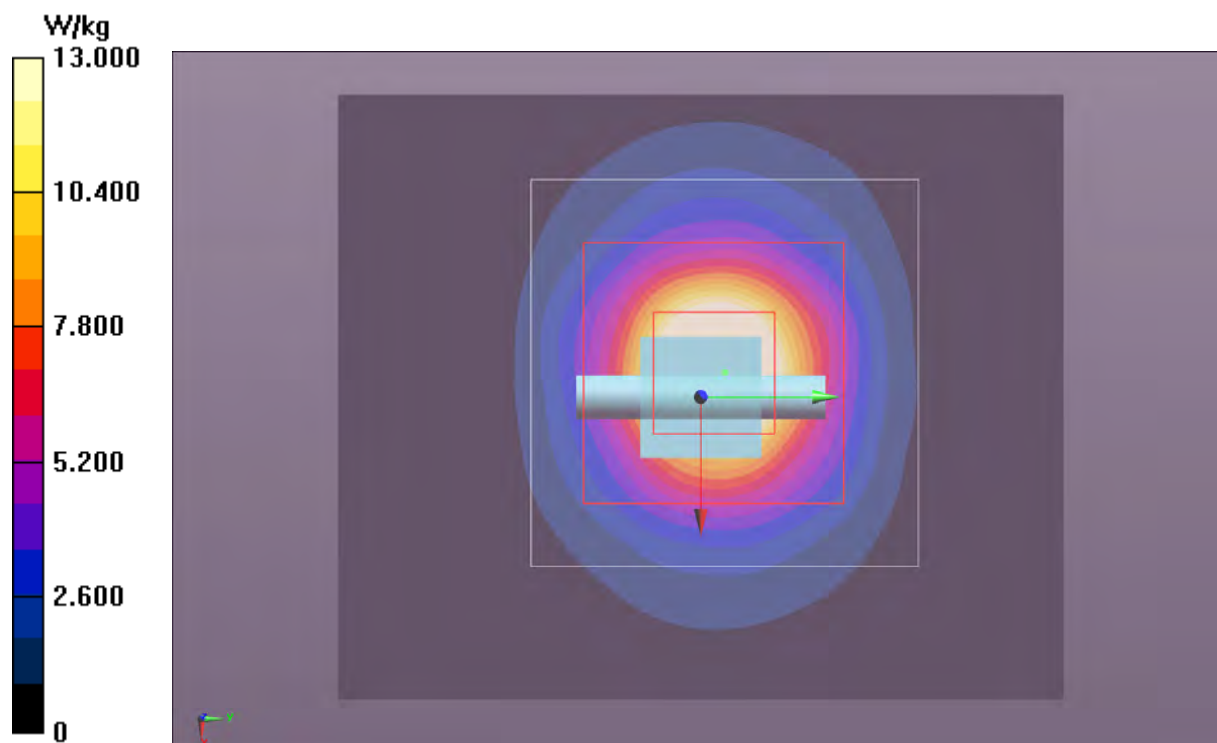
Maximum value of SAR (measured) = 17.9 W/kg

System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of SAR (measured) = 3.62 W/kg

 
Approved By

MSL501 5500 11-6-12



Tested By:	Carl Engholm	Room Temperature (°C):	23.1°C
Date:	11/6/2012	Liquid Temperature (°C):	23.3°C
Serial Number:	000006124053	Humidity (%RH):	51.4%
Configuration:	MCS01635-1	Bar. Pressure (mb):	1017 mb
Comments:	None		

MSL501 5800 11-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.0 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 39.70 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 39.110 V/m; Power Drift = 0.13 dB

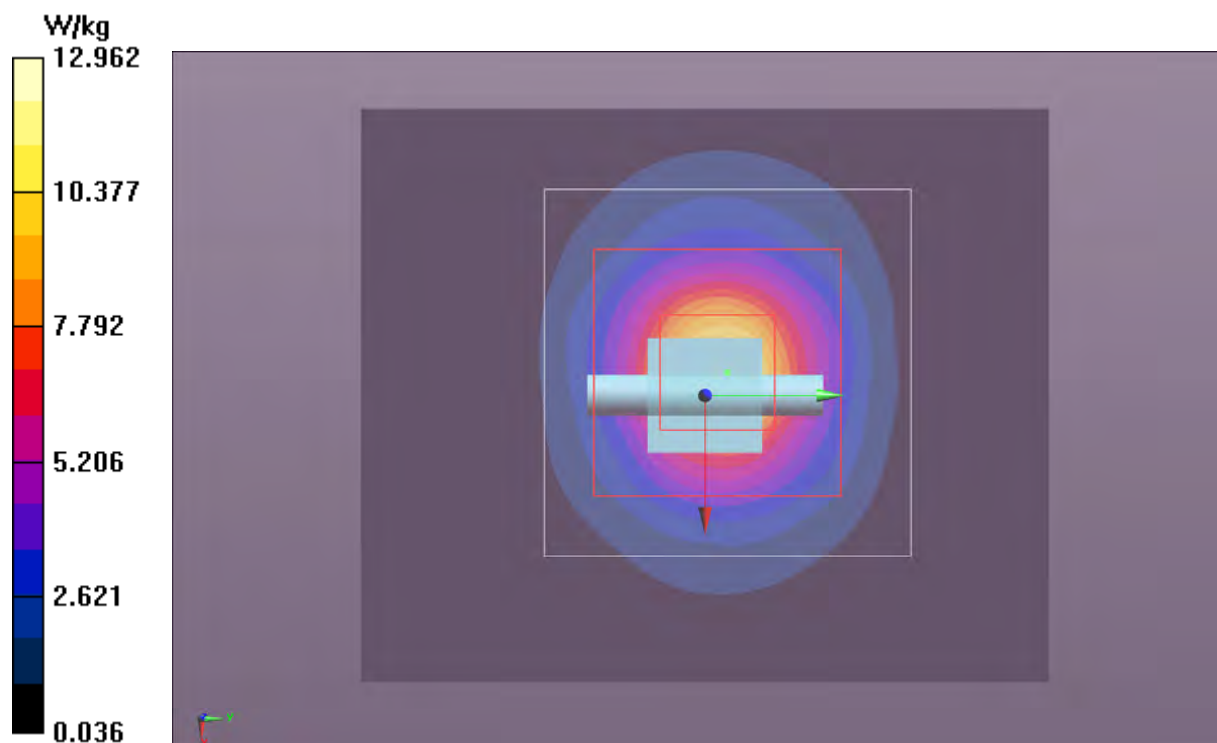
Peak SAR (extrapolated) = 25.5 W/kg

SAR(1 g) = 5.92 W/kg; SAR(10 g) = 1.67 W/kg

Maximum value of SAR (measured) = 12.8 W/kg

 
Approved By

MSL501 5800 11-6-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.4°C
Date:	11/7/2012	Liquid Temperature (°C):	21.5°C
Serial Number:	000006124053	Humidity (%RH):	46.3%
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1022 mb
Comments:	None		

MSL2450 2450 11-7-12

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:855

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2450

MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.957$ mho/m; $\epsilon_r = 50.358$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 5.43 W/kg

System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 58.51 V/m

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 51.249 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 11.2 W/kg

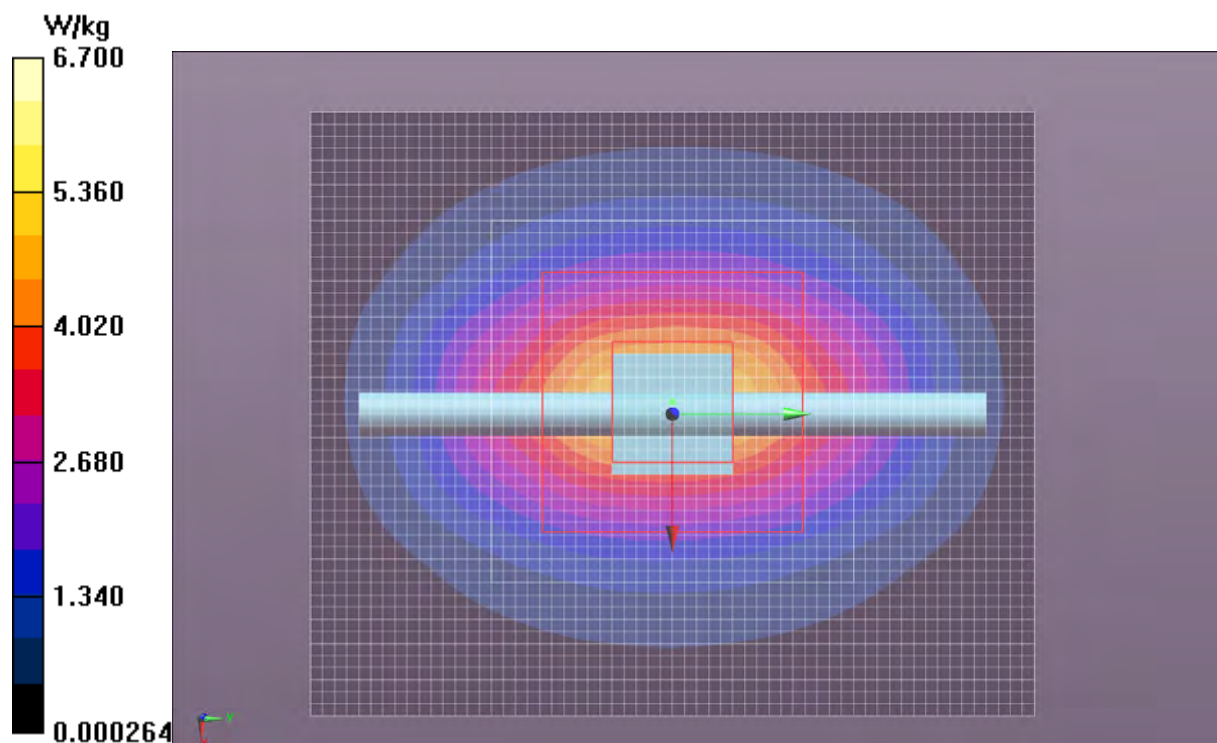
SAR(1 g) = 5.26 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 5.19 W/kg

Maximum value of SAR (measured) = 6.70 W/kg

 
Approved By

MSL2450 2450 11-7-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.1
Date:	12/4/2012	Liquid Temperature (°C):	22.6
Serial Number:	N/A	Humidity (%RH):	37.2
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5200 12-4-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 55.495 V/m; Power Drift = 0.27 dB

Peak SAR (extrapolated) = 33.4 W/kg

SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.4 W/kg

Maximum value of SAR (measured) = 17.7 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 18.1 W/kg

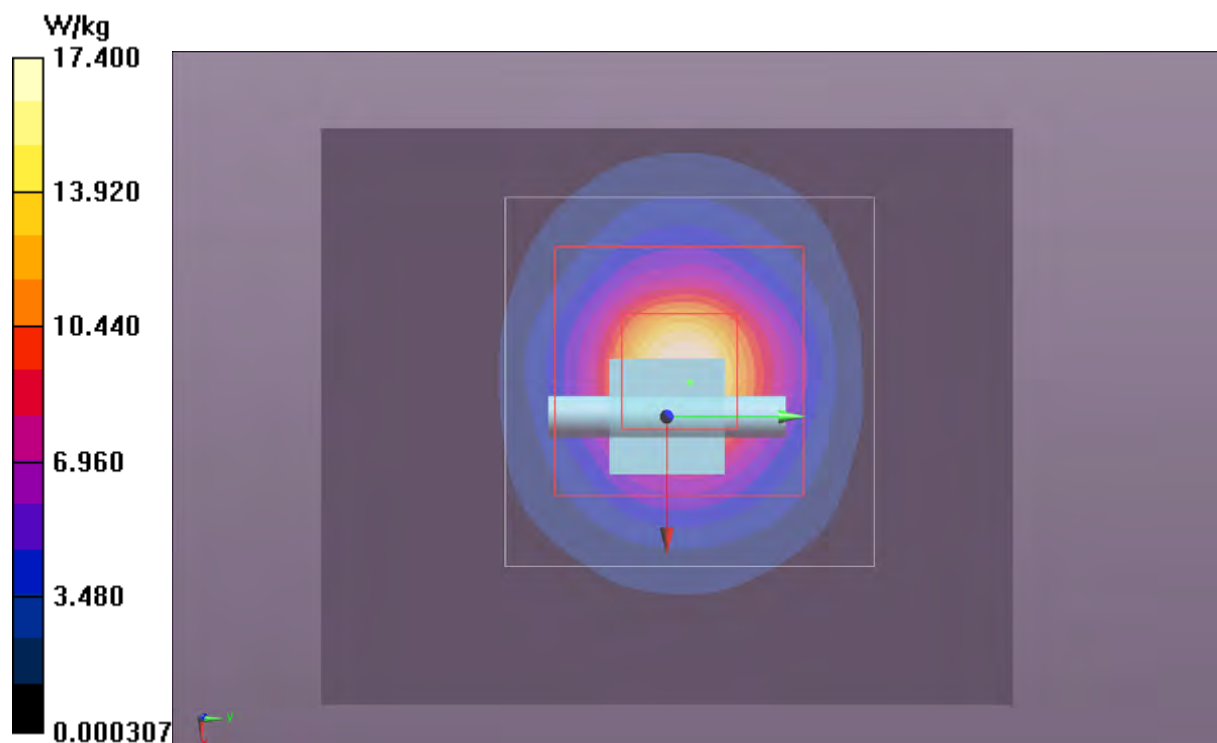
System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

Maximum value of Total (measured) = 57.28 V/m

Maximum value of SAR (measured) = 17.4 W/kg

 
Approved By

MSL501 5200 12-4-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.1
Date:	12/4/2012	Liquid Temperature (°C):	22.6
Serial Number:	N/A	Humidity (%RH):	37.2
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5500 12-4-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 18.6 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 55.526 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 35.0 W/kg

SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.38 W/kg

Maximum value of SAR (measured) = 18.1 W/kg

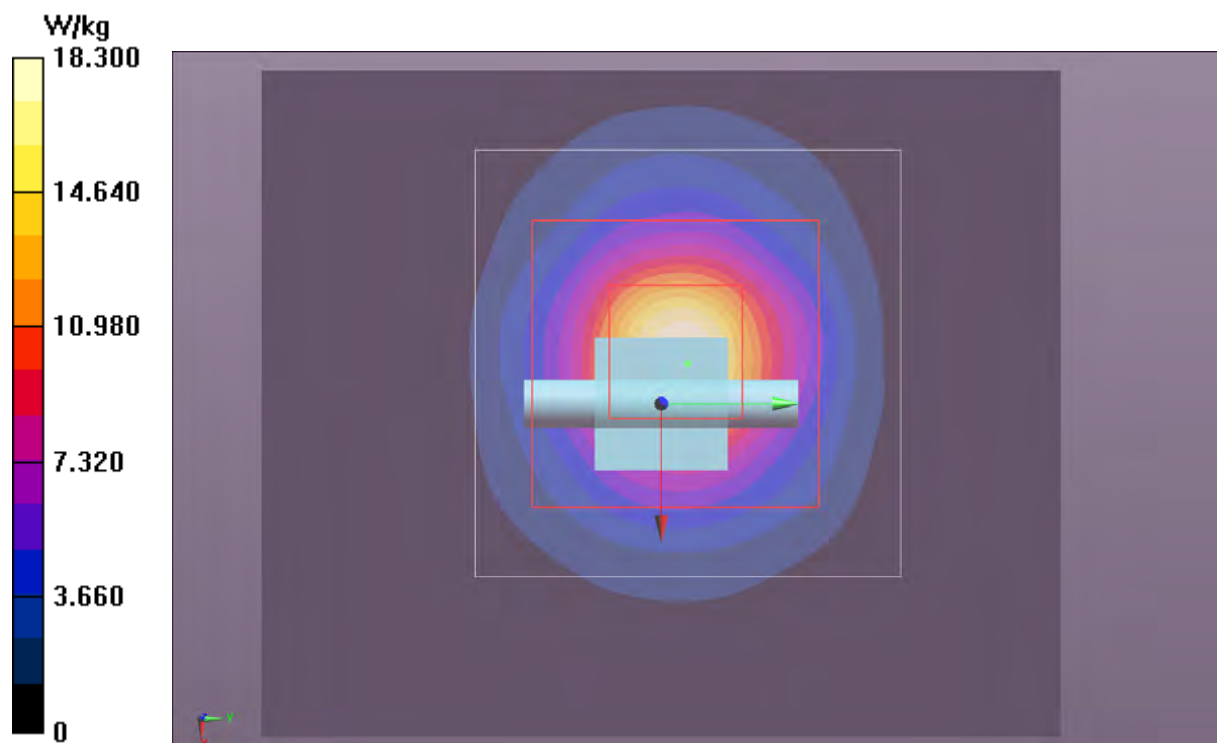
System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 56.75 V/m

Maximum value of SAR (measured) = 18.3 W/kg

 
Approved By

MSL501 5500 12-4-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.1
Date:	12/4/2012	Liquid Temperature (°C):	22.6
Serial Number:	N/A	Humidity (%RH):	37.2
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5800 12-4-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 12.4 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 37.51 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 36.361 V/m; Power Drift = 0.26 dB

Peak SAR (extrapolated) = 25.1 W/kg

SAR(1 g) = 5.72 W/kg; SAR(10 g) = 1.61 W/kg

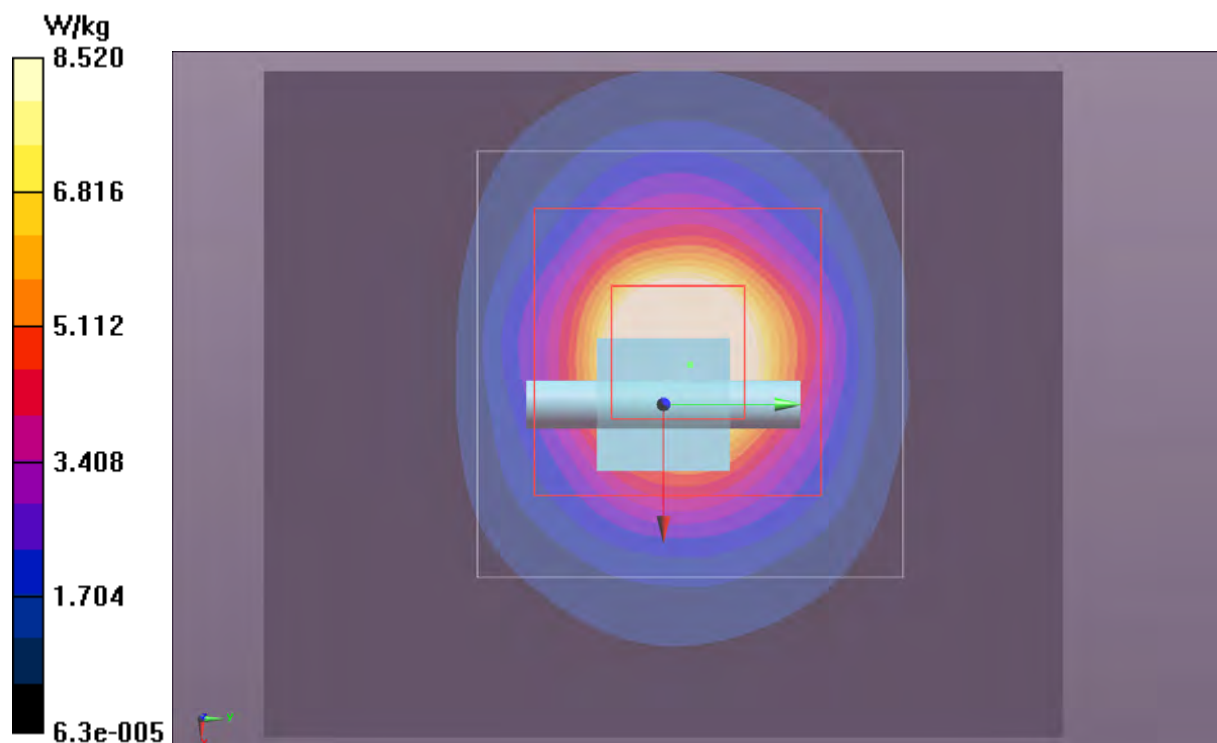
Maximum value of SAR (measured) = 12.4 W/kg

Maximum value of SAR (measured) = 8.52 W/kg

Approved By

MSL501 5800 12-4-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	12/6/2012	Liquid Temperature (°C):	22.3
Serial Number:	N/A	Humidity (%RH):	39.3
Configuration:	N/A	Bar. Pressure (mb):	1013
Comments:	None		

MSL501 5200 12-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (7x7x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 60.499 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 36.3 W/kg

SAR(1 g) = 9.24 W/kg; SAR(10 g) = 2.64 W/kg

Maximum value of SAR (measured) = 19.4 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.1 W/kg

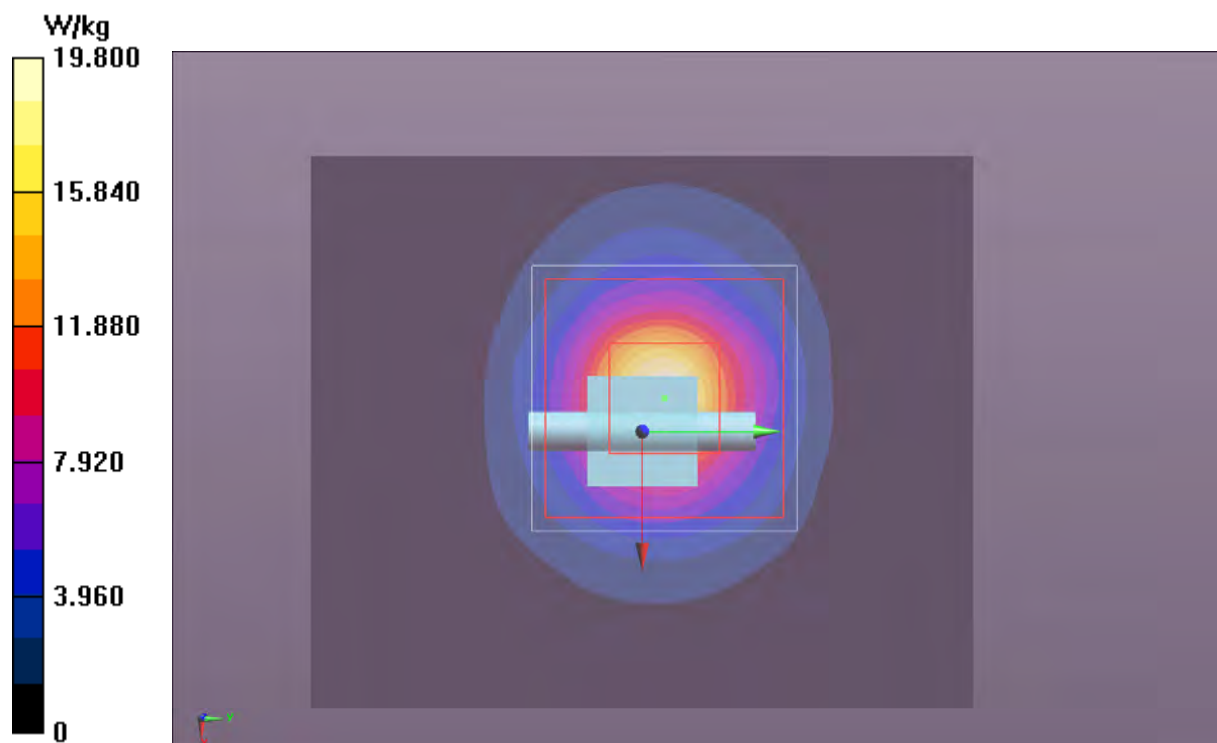
System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

Maximum value of Total (measured) = 61.02 V/m

Maximum value of SAR (measured) = 19.8 W/kg

 
Approved By

MSL501 5200 12-6-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	12/6/2012	Liquid Temperature (°C):	22.3
Serial Number:	N/A	Humidity (%RH):	39.3
Configuration:	N/A	Bar. Pressure (mb):	1013
Comments:	None		

MSL501 5500 12-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 20.3 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (7x7x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 57.880 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 37.5 W/kg

SAR(1 g) = 9.11 W/kg; SAR(10 g) = 2.56 W/kg

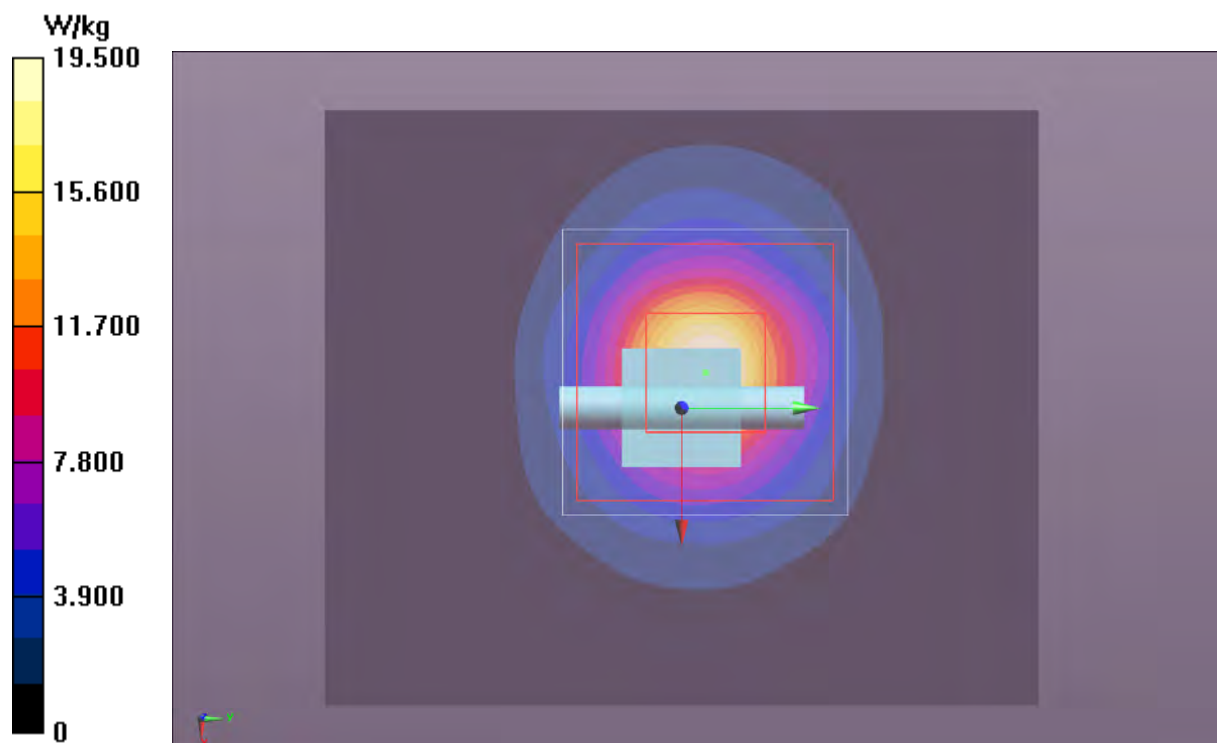
Maximum value of SAR (measured) = 19.5 W/kg

System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 58.56 V/m

 
Approved By

MSL501 5500 12-6-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	12/6/2012	Liquid Temperature (°C):	22.3
Serial Number:	N/A	Humidity (%RH):	39.3
Configuration:	N/A	Bar. Pressure (mb):	1013
Comments:	None		

MSL501 5800 12-6-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.0 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 37.48 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 36.580 V/m; Power Drift = 0.21 dB

Peak SAR (extrapolated) = 26.0 W/kg

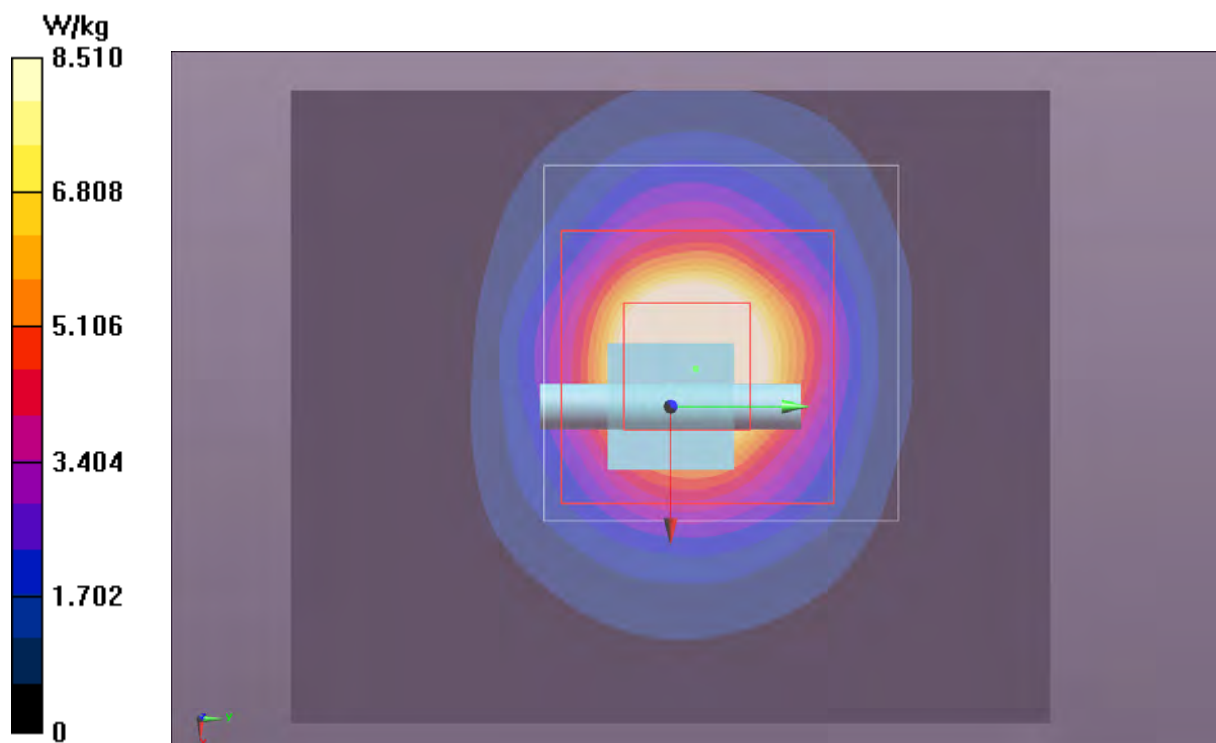
SAR(1 g) = 5.98 W/kg; SAR(10 g) = 1.69 W/kg

Maximum value of SAR (measured) = 12.9 W/kg

Maximum value of SAR (measured) = 8.51 W/kg

 
Approved By

MSL501 5800 12-6-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.6
Date:	12/10/2012	Liquid Temperature (°C):	23.9
Serial Number:	N/A	Humidity (%RH):	36.0
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5200 12-10-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5200$ MHz; $\sigma = 5.305$ mho/m; $\epsilon_r = 47.579$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Low Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

$dx=4$ mm, $dy=4$ mm, $dz=2.5$ mm

Reference Value = 59.028 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 35.3 W/kg

SAR(1 g) = 9.03 W/kg; SAR(10 g) = 2.59 W/kg

Maximum value of SAR (measured) = 18.7 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 19.4 W/kg

System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: $dx=20$ mm, $dy=20$ mm, $dz=5$ mm

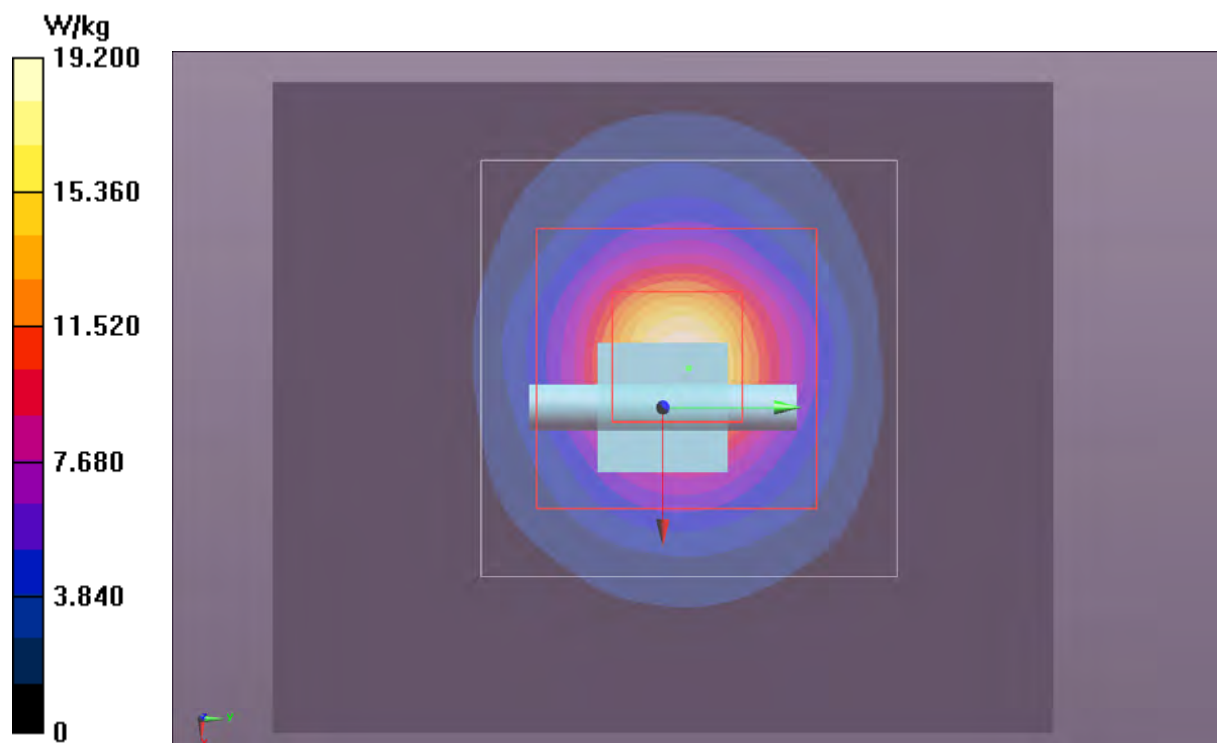
Maximum value of Total (measured) = 60.09 V/m

Maximum value of SAR (measured) = 19.2 W/kg

Approved By

MSL501 5200 12-10-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.6
Date:	12/10/2012	Liquid Temperature (°C):	23.9
Serial Number:	N/A	Humidity (%RH):	36.0
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5500 12-10-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5500$ MHz; $\sigma = 5.681$ mho/m; $\epsilon_r = 47.138$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 19.9 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 57.575 V/m; Power Drift = 0.26 dB

Peak SAR (extrapolated) = 37.3 W/kg

SAR(1 g) = 9.16 W/kg; SAR(10 g) = 2.58 W/kg

Maximum value of SAR (measured) = 19.3 W/kg

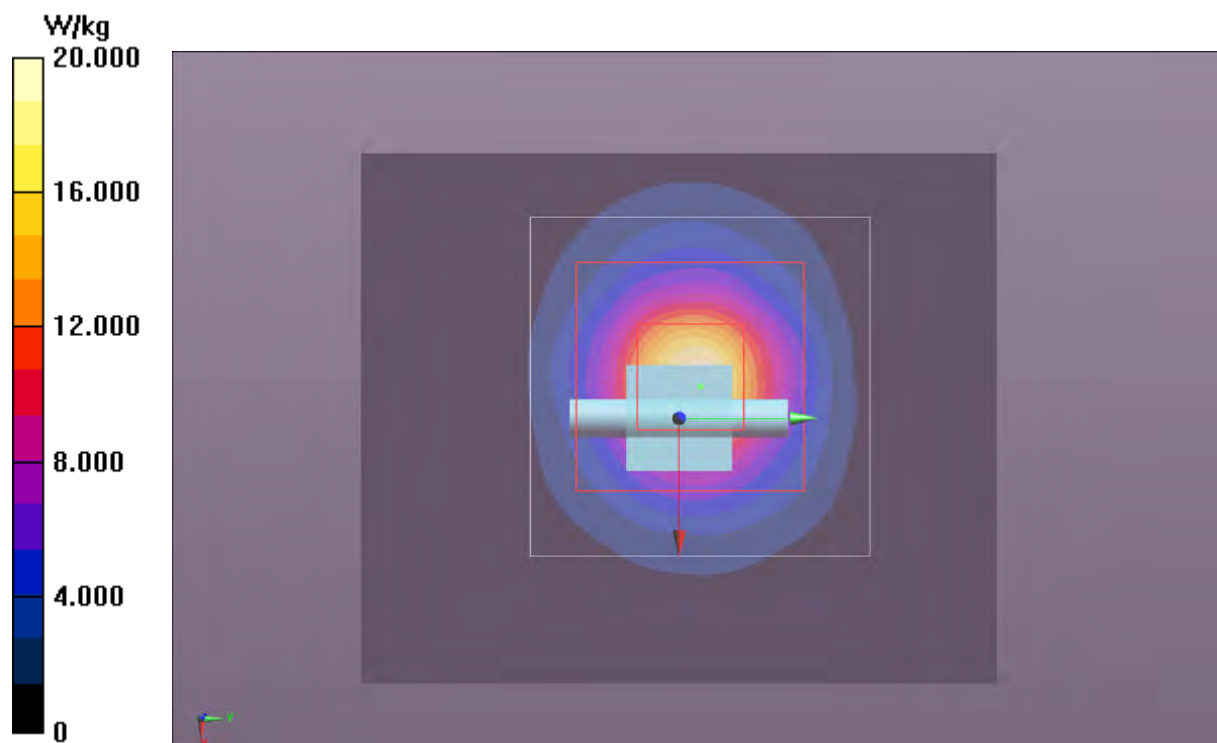
System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 59.33 V/m

Maximum value of SAR (measured) = 20.0 W/kg

 
Approved By

MSL501 5500 12-10-12



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.6
Date:	12/10/2012	Liquid Temperature (°C):	23.9
Serial Number:	N/A	Humidity (%RH):	36.0
Configuration:	N/A	Bar. Pressure (mb):	1017
Comments:	None		

MSL501 5800 12-10-12

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5800$ MHz; $\sigma = 6.057$ mho/m; $\epsilon_r = 46.565$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 13.5 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 38.66 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 37.383 V/m; Power Drift = 0.28 dB

Peak SAR (extrapolated) = 26.9 W/kg

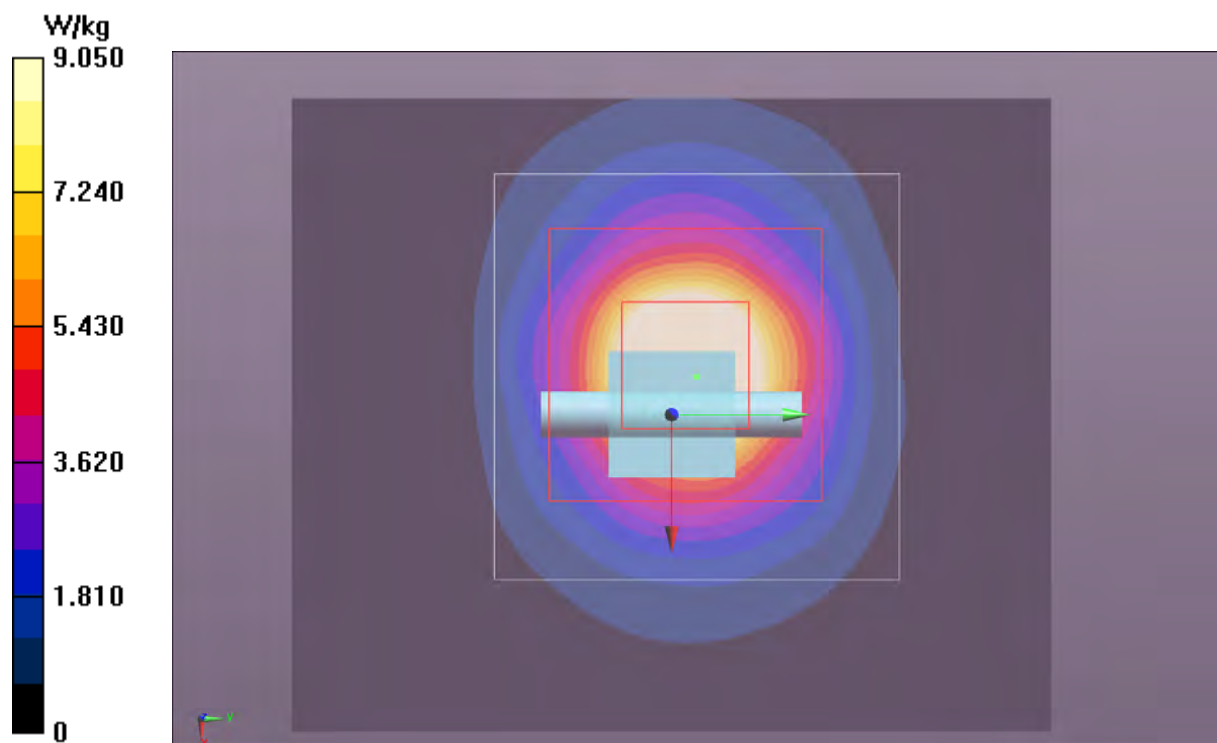
SAR(1 g) = 6.17 W/kg; SAR(10 g) = 1.73 W/kg

Maximum value of SAR (measured) = 13.2 W/kg

Maximum value of SAR (measured) = 9.05 W/kg

 
Approved By

MSL501 5800 12-10-12



Test Configurations

Test Locations

The FCC's starting point for SAR guidance is KDB 447498 D01 Mobile Portable RF Exposure v04. Per Item 4(b), the bottom face (referred to as "back" in this report) and the top edge were tested. The antennas are located closest to the top edge.

Simultaneous Transmission

During testing, a KDB analysis was done to determine whether a SAR evaluation is required for simultaneous transmission. The condition of Item 4(b) of KDB 616217 was applied. Assuming a worst case SAR value of 1.19 W/kg from each antenna in MIMO mode, the equation from 4(b)(i) becomes:

$$5 * [(1.33 + 0.388) / 1.6]^{1.5} = 6 \text{ cm}$$

Since the antenna spacing of 9.77 cm is greater than 6 cm, and there are no MPE exposure conditions to consider, simultaneous SAR is not required.

MIMO Evaluation

The FCC's Guidance for SAR testing of 802.11 a/b/g device is found in KDB 248227. It states:

"SAR for MIMO is measured with all antennas transmitting simultaneously.

For many low-power devices, when the peak SAR locations are more than 5 cm apart, the 1-g SAR can usually be treated independently with little or no noticeable impact. Therefore spatial summing could be optional"

Although the highest conducted output power modes were not MIMO, MIMO SAR evaluations were conducted in the 2.4 and 5 GHz bands to show that with a 9.77 cm antenna spacing, there were no overlapping SAR regions. The zoom scans of each hot spot were centered on the individual antennas. The maximum SAR measured for each MIMO mode was significantly lower than other modes reported in this SAR evaluation.

Summary

The following tables summarize the measured SAR values.

Per FCC KDB 248227, among the channels required for normal testing, SAR must be measured on the channel with the highest conducted output power. When the SAR measured on the highest output channel is >0.8 W/kg, SAR evaluation for the other required test channels is necessary.

EUT:	1514 (SAR)	Work Order:	MCSO1635
Customer:	Microsoft Corporation	Job Site:	EV08
Attendees:	none	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2011 FCC 15.247:2011 FCC 15.407:2001	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 248227 D01 V01r02 FCC KDB 616217 D03 V01 FCC 865664
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Accessory	EUT Position	EUT Power Setting	SAR Drift During Test (dB)	Measured 1g SAR Level (mW/g)	Test #
Body	5.2	5180	36	6	20	A	None	Top	12dBm	-0.25	1.38	9e
Body	5.2	5220	44	6	20	A	None	Top	12dBm	-0.09	1.24	9f
Body	5.2	5220	44	6	20	A	None	Back	13dBm	0.37	0.186	10
Body	5.3	5280	56	6	20	A	None	Top	12dBm	-0.56	1.14	11c
Body	5.3	5320	64	6	20	A	None	Top	12dBm	-0.3	0.979	11d
Body	5.3	5280	56	6	20	A	None	Back	13dBm	0	0.204	12
Body	5.6	5680	136	6	20	A	None	Top	13dBm	-0.18	0.64	13b
Body	5.6	5580	116	6	20	A	None	Top	12dBm	-0.21	1.49	13c
Body	5.6	5520	104	6	20	A	None	Top	12dBm	-0.29	0.492	13d
Body	5.6	5580	116	6	20	A	None	Back	13dBm	N/A	0.19	14
Body	5.8	5765	153	6	20	A	None	Top	13dBm	0.04	0.795	15
Body	5.8	5765	153	6	20	A	None	Back	13dBm	N/A	0.386	16
Body	5.2	5190	36/40	7.2 (MCS0)	40	A	None	Top	11dBm	-0.13	1.25	17f
Body	5.2	5230	44/48	7.2 (MCS0)	40	A	None	Top	11dBm	-0.28	1.01	17g
Body	5.2	5230	44/48	7.2 (MCS0)	40	A	None	Back	13dBm	N/A	0.286	18
Body	5.3	5310	60/64	7.2 (MCS0)	40	A	None	Top	12dBm	0.3	0.942	19e
Body	5.3	5270	52/56	7.2 (MCS0)	40	A	None	Top	12dBm	0.23	0.991	19f
Body	5.3	5310	60/64	7.2 (MCS0)	40	A	None	Back	13dBm	N/A	0.297	20
Body	5.6	5550	108/112	7.2 (MCS0)	40	A	None	Top	12dBm	-0.03	1.25	21e
Body	5.6	5510	100/104	7.2 (MCS0)	40	A	None	Top	12dBm	0.21	1.21	21f
Body	5.6	5550	108/112	7.2 (MCS0)	40	A	None	Back	13dBm	N/A	0.176	22
Body	5.8	5755	149/153	7.2 (MCS0)	40	A	None	Top	13dBm	-0.2	0.741	23a
Body	5.8	5795	157/161	7.2 (MCS0)	40	A	None	Top	12dBm	0.22	0.509	23c
Body	5.8	5795	157/161	7.2 (MCS0)	40	A	None	Back	13dBm	N/A	0.231	24

Tested By:	Ethan Schoonover	Room Temperature (°C):	21.8
Date:	11/30/2012	Liquid Temperature (°C):	22.3
Serial Number:	unavailable	Humidity (%RH):	39
Configuration:	3	Bar. Pressure (mb):	998
Comments:	Power set to 12dBm		

Test 9e

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5180 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 5.281$ mho/m; $\epsilon_r = 47.617$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.184 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 3.32 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 23.519 V/m; Power Drift = -0.25 dB

Peak SAR (extrapolated) = 5.88 W/kg

SAR(1 g) = 1.38 W/kg; SAR(10 g) = 0.347 W/kg

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

Maximum value of SAR (measured) = 2.98 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

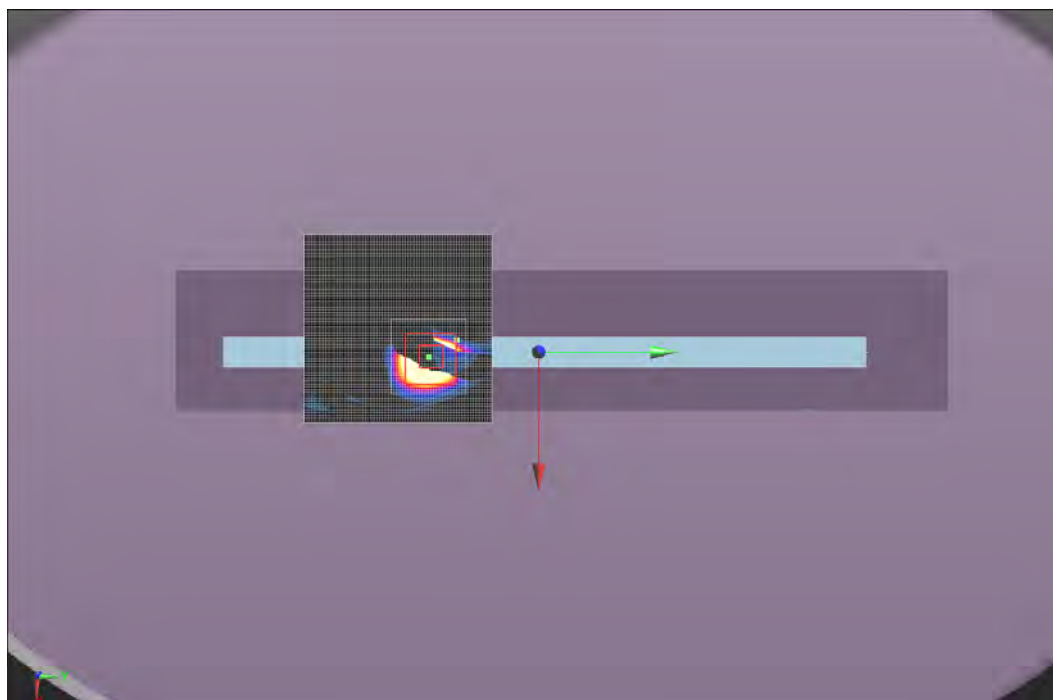
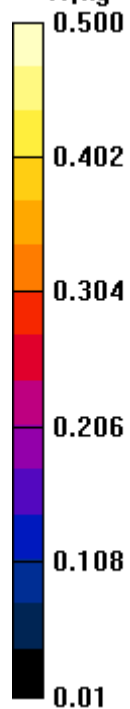
Maximum value of Total (measured) = 11.65 V/m

Maximum value of SAR (measured) = 0.717 W/kg




Approved By

Test 9e
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.8
Date:	12/3/2012	Liquid Temperature (°C):	23.6
Serial Number:	unavailable	Humidity (%RH):	39
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 12dBm		

Test 9f

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5220 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5220$ MHz; $\sigma = 5.332$ mho/m; $\epsilon_r = 47.547$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.174 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.50 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 21.359 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 5.31 W/kg

SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.321 W/kg

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

Maximum value of SAR (measured) = 2.64 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

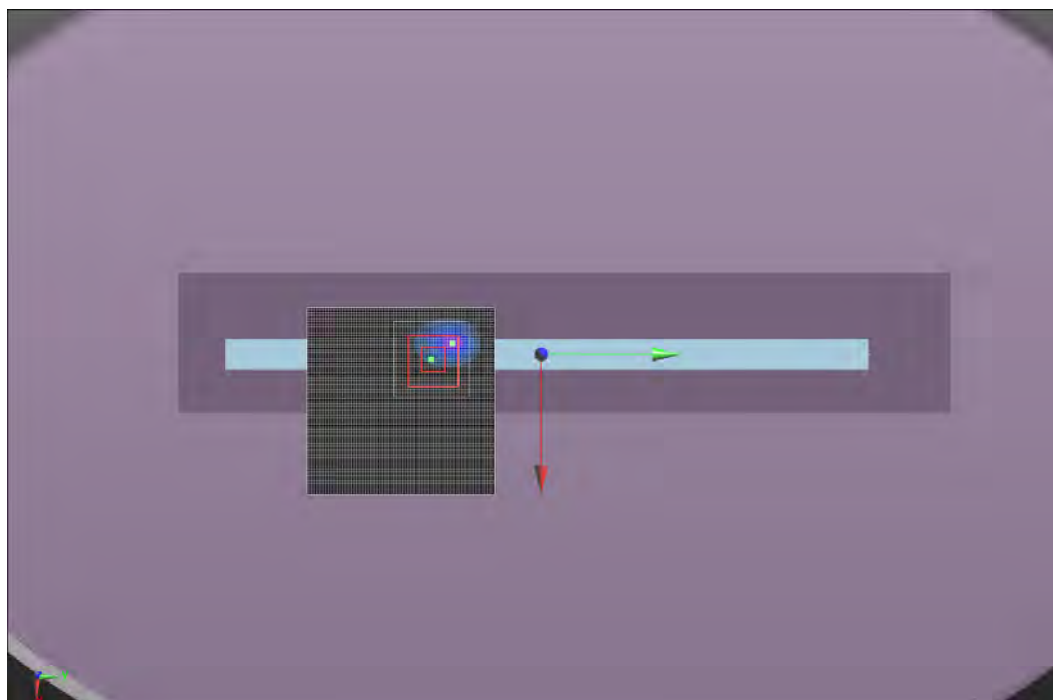
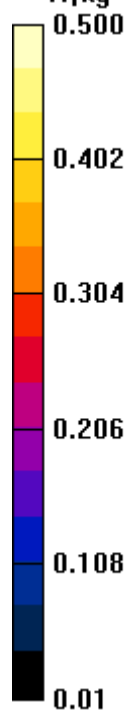
Maximum value of Total (measured) = 10.99 V/m

Maximum value of SAR (measured) = 0.644 W/kg

 
Approved By

Test 9f

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	18.3
Date:	11/1/2012	Liquid Temperature (°C):	20.1
Serial Number:	unavailable	Humidity (%RH):	50.2
Configuration:	1	Bar. Pressure (mb):	1010
Comments:	Power set to 13dBm		

Test 10

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5220 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5220$ MHz; $\sigma = 5.332$ mho/m; $\epsilon_r = 47.547$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.129 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.308 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.971 V/m; Power Drift = 0.37 dB

Peak SAR (extrapolated) = 0.630 W/kg

SAR(1 g) = 0.186 W/kg; SAR(10 g) = 0.099 W/kg

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

Maximum value of SAR (measured) = 0.356 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

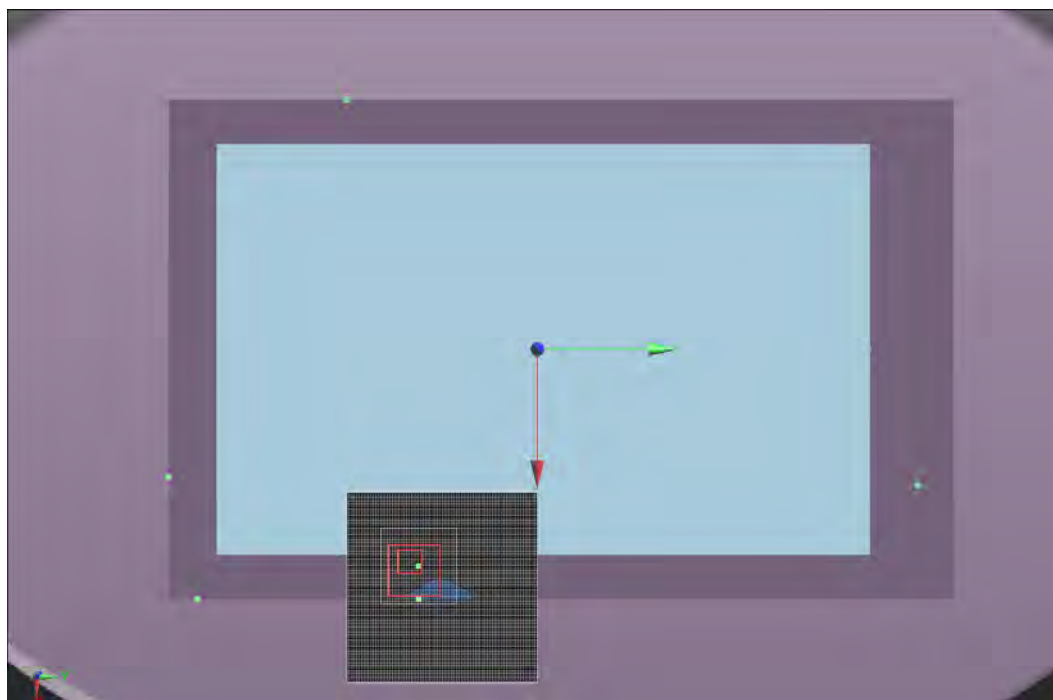
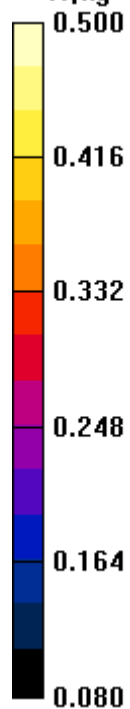
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 4.417 V/m

Maximum value of SAR (measured) = 0.104 W/kg

 
Approved By

Test 10
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.5
Date:	12/4/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	44
Configuration:	3	Bar. Pressure (mb):	1009
Comments:	Power set to 12dBm		

Test 11c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5280 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5280$ MHz; $\sigma = 5.404$ mho/m; $\epsilon_r = 47.437$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.133 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.74 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 21.411 V/m; Power Drift = -0.56 dB

Peak SAR (extrapolated) = 4.75 W/kg

SAR(1 g) = 1.14 W/kg; SAR(10 g) = 0.291 W/kg

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

Maximum value of SAR (measured) = 2.55 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

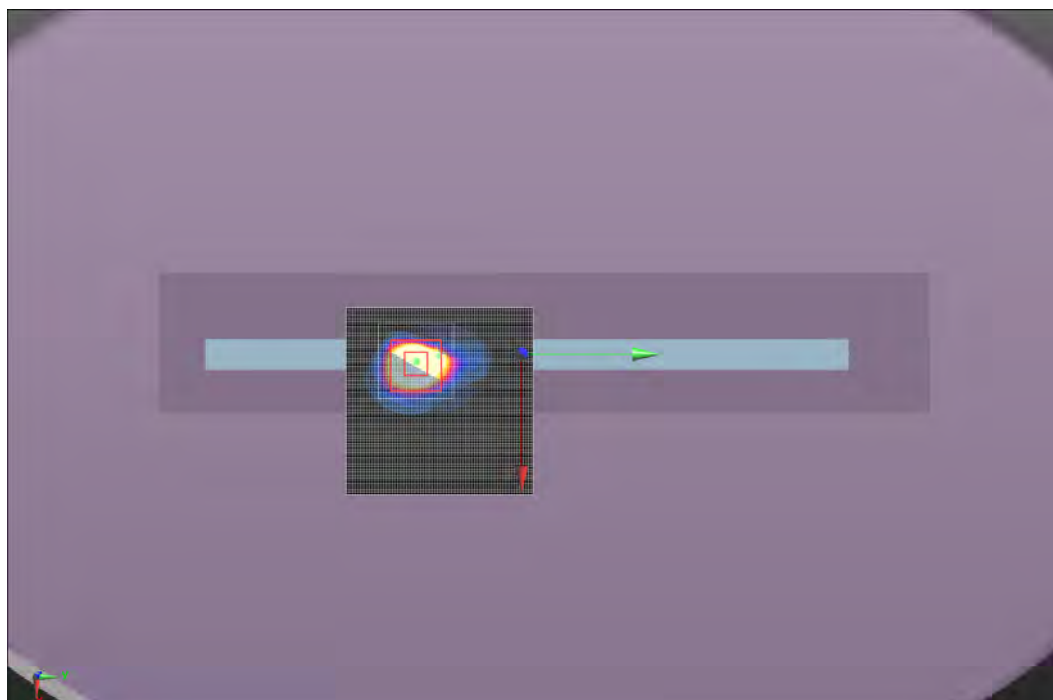
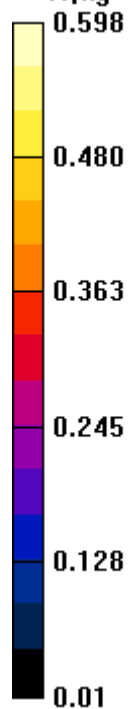
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 10.52 V/m

Maximum value of SAR (measured) = 0.598 W/kg

 
Approved By

Test 11c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.5
Date:	12/4/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	44
Configuration:	3	Bar. Pressure (mb):	1009
Comments:	Power set to 12dBm		

Test 11d

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5320 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5320$ MHz; $\sigma = 5.454$ mho/m; $\epsilon_r = 47.366$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.104 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.21 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 19.463 V/m; Power Drift = -0.30 dB

Peak SAR (extrapolated) = 4.09 W/kg

SAR(1 g) = 0.979 W/kg; SAR(10 g) = 0.259 W/kg

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

Maximum value of SAR (measured) = 2.17 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

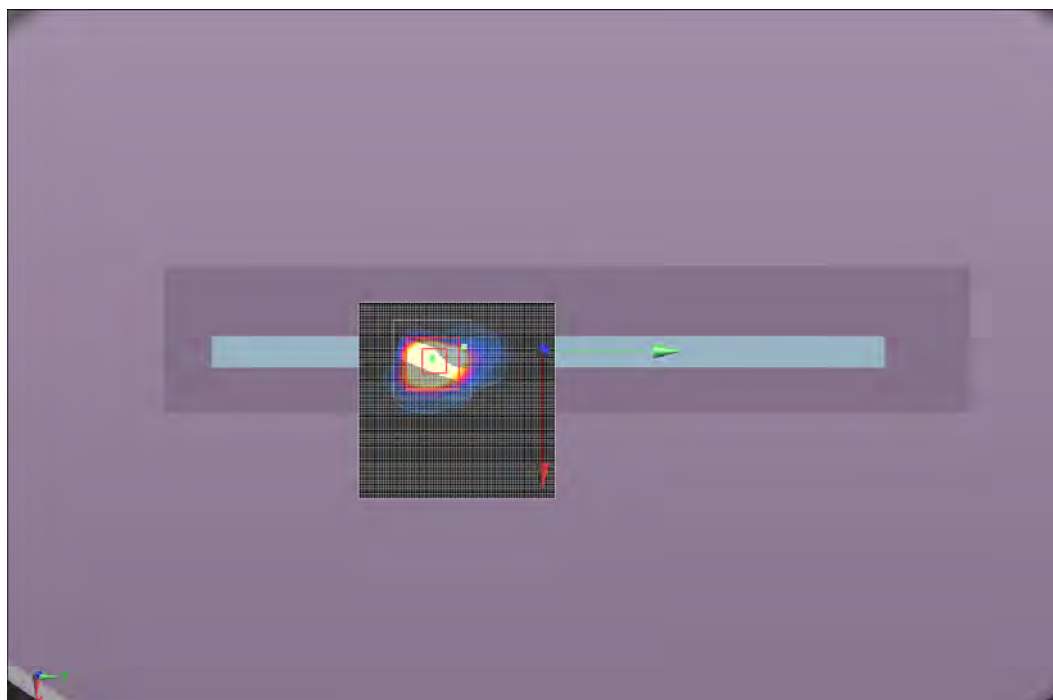
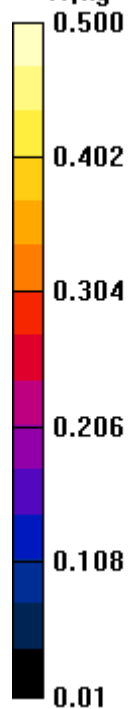
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 9.626 V/m

Maximum value of SAR (measured) = 0.505 W/kg

 
Approved By

Test 11d
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.2
Date:	11/1/2012	Liquid Temperature (°C):	20.2
Serial Number:	unavailable	Humidity (%RH):	47.3
Configuration:	1	Bar. Pressure (mb):	1010
Comments:	Power set to 13dBm		

Test 12

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5280 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5280$ MHz; $\sigma = 5.404$ mho/m; $\epsilon_r = 47.437$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.122 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.300 W/kg

Body/Body/Zoom Scan (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.657 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 0.714 W/kg

SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.116 W/kg

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

Maximum value of SAR (measured) = 0.367 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

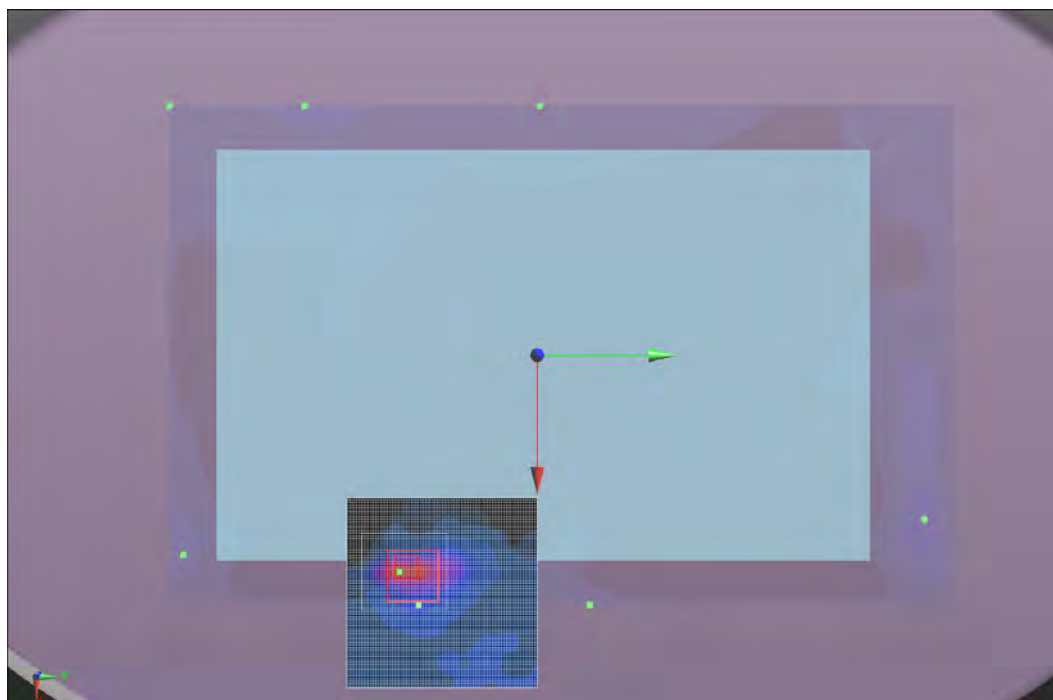
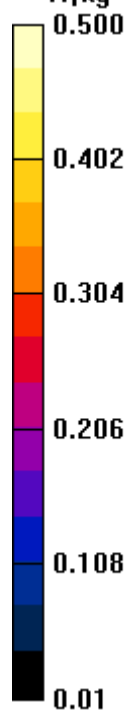
Maximum value of Total (measured) = 4.742 V/m

Maximum value of SAR (measured) = 0.121 W/kg

 
Approved By

Test 12

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.6
Date:	11/5/2012	Liquid Temperature (°C):	22.8
Serial Number:	unavailable	Humidity (%RH):	43.5
Configuration:	1	Bar. Pressure (mb):	1027
Comments:	Power set to 13dBm		

Test 13b

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5680 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5680$ MHz; $\sigma = 5.905$ mho/m; $\epsilon_r = 46.776$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.112 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.50 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 14.679 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 3.40 W/kg

SAR(1 g) = 0.640 W/kg; SAR(10 g) = 0.152 W/kg

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

Maximum value of SAR (measured) = 1.43 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

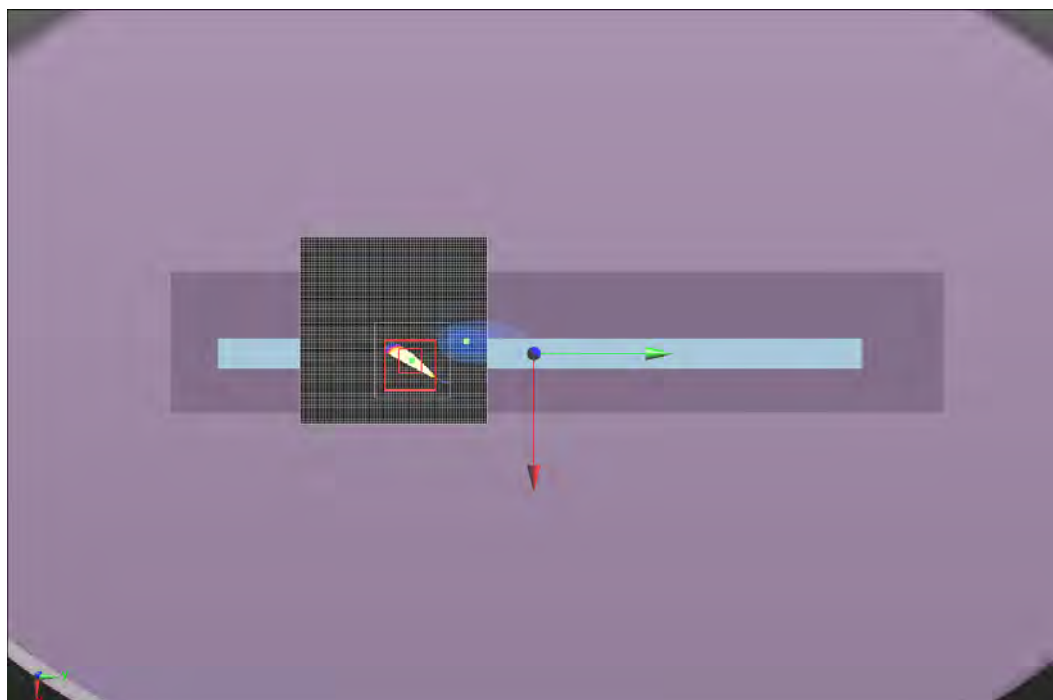
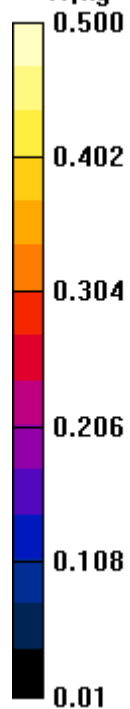
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 6.800 V/m

Maximum value of SAR (measured) = 0.273 W/kg

 
Approved By

Test 13b
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.2
Date:	12/4/2012	Liquid Temperature (°C):	24.7
Serial Number:	unavailable	Humidity (%RH):	37.9
Configuration:	3	Bar. Pressure (mb):	1009
Comments:	Power set to 12dBm		

Test 13c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5580 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5580$ MHz; $\sigma = 5.774$ mho/m; $\epsilon_r = 46.984$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.227 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 3.21 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 22.304 V/m; Power Drift = -0.21 dB

Peak SAR (extrapolated) = 6.58 W/kg

SAR(1 g) = 1.49 W/kg; SAR(10 g) = 0.397 W/kg

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

Maximum value of SAR (measured) = 3.30 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

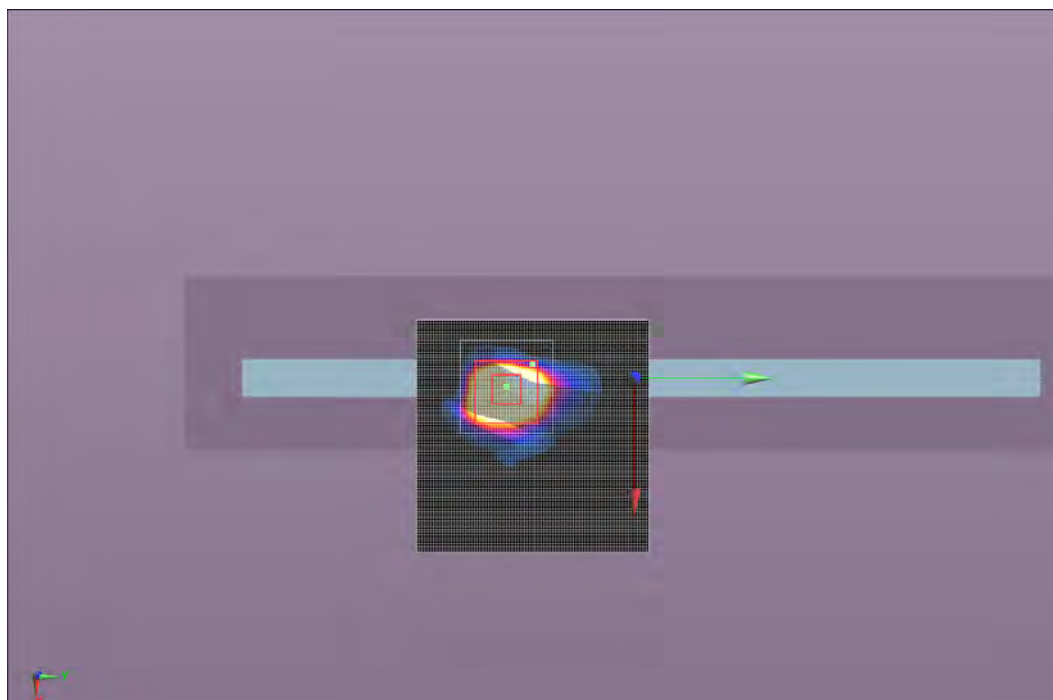
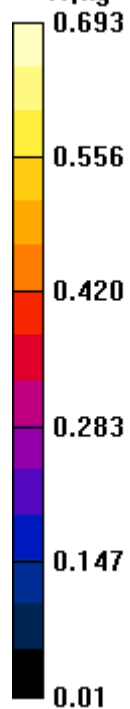
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 10.95 V/m

Maximum value of SAR (measured) = 0.693 W/kg

 
Approved By

Test 13c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.2
Date:	12/4/2012	Liquid Temperature (°C):	24.7
Serial Number:	unavailable	Humidity (%RH):	37.9
Configuration:	3	Bar. Pressure (mb):	1009
Comments:	Power set to 12dBm		

Test 13d

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5520 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5520$ MHz; $\sigma = 5.703$ mho/m; $\epsilon_r = 47.101$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0752 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.91 W/kg

Body/Body/Zoom Scan (10x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 18.959 V/m; Power Drift = -0.29 dB

Peak SAR (extrapolated) = 4.69 W/kg

SAR(1 g) = 0.492 W/kg; SAR(10 g) = 0.121 W/kg

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

Maximum value of SAR (measured) = 1.47 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

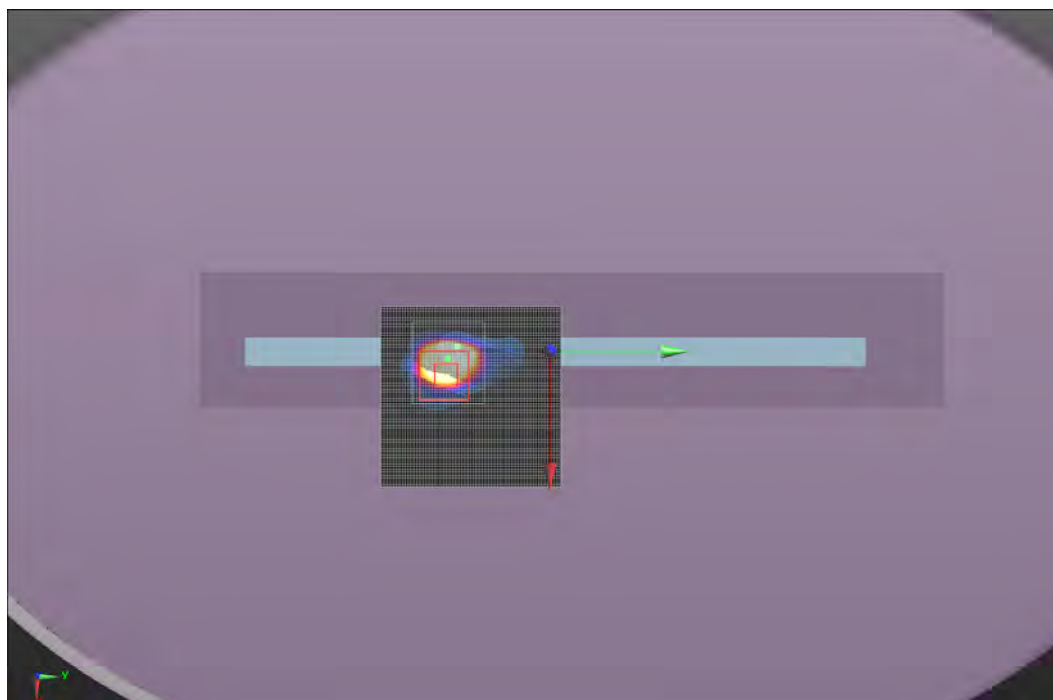
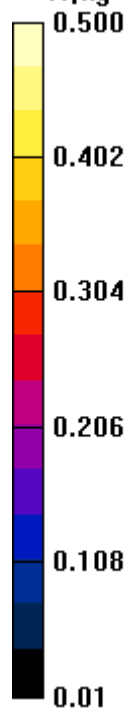
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 2.162 V/m

Maximum value of SAR (measured) = 0.0252 W/kg

 
Approved By

Test 13d
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	25.9
Date:	11/1/2012	Liquid Temperature (°C):	20.3
Serial Number:	unavailable	Humidity (%RH):	45.1
Configuration:	1	Bar. Pressure (mb):	1010
Comments:	Power set to 13dBm		

Test 14

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5580 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5580$ MHz; $\sigma = 5.774$ mho/m; $\epsilon_r = 46.984$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.130 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

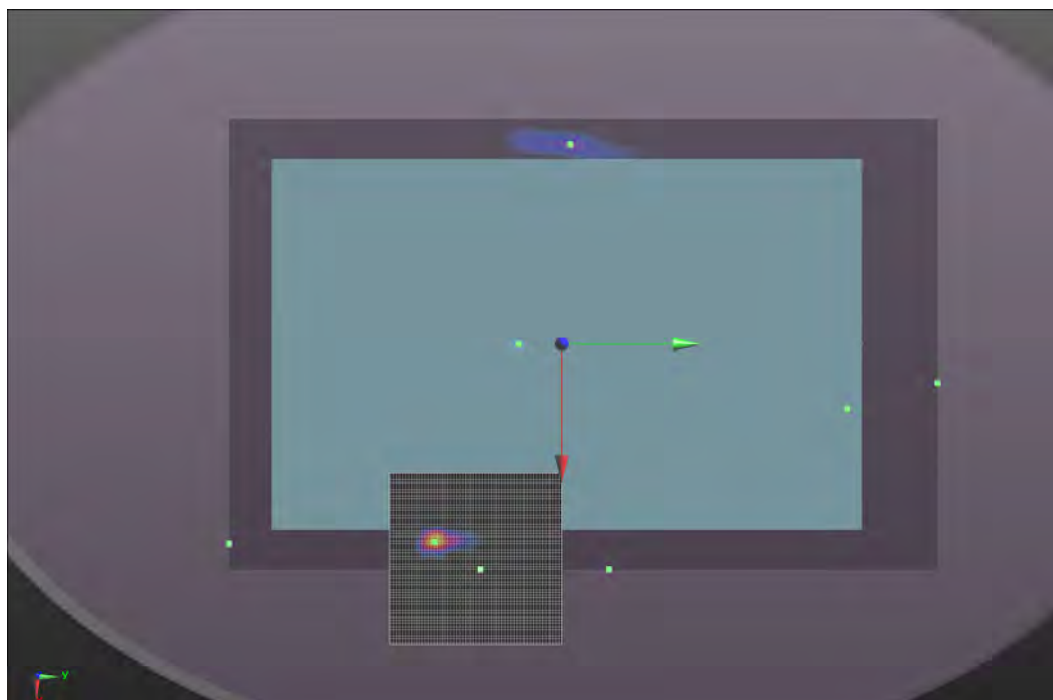
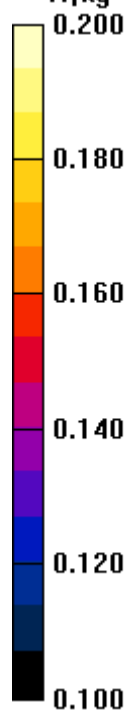
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.190 W/kg

 
Approved By

Test 14

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.4
Date:	10/30/2012	Liquid Temperature (°C):	23.7
Serial Number:	unavailable	Humidity (%RH):	44.5
Configuration:	1	Bar. Pressure (mb):	1010
Comments:	Power set to 13dBm		

Test 15

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5765 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5765$ MHz; $\sigma = 6.013$ mho/m; $\epsilon_r = 46.63$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.267 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.77 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 18.409 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.83 W/kg

SAR(1 g) = 0.795 W/kg; SAR(10 g) = 0.219 W/kg

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

Maximum value of SAR (measured) = 1.67 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

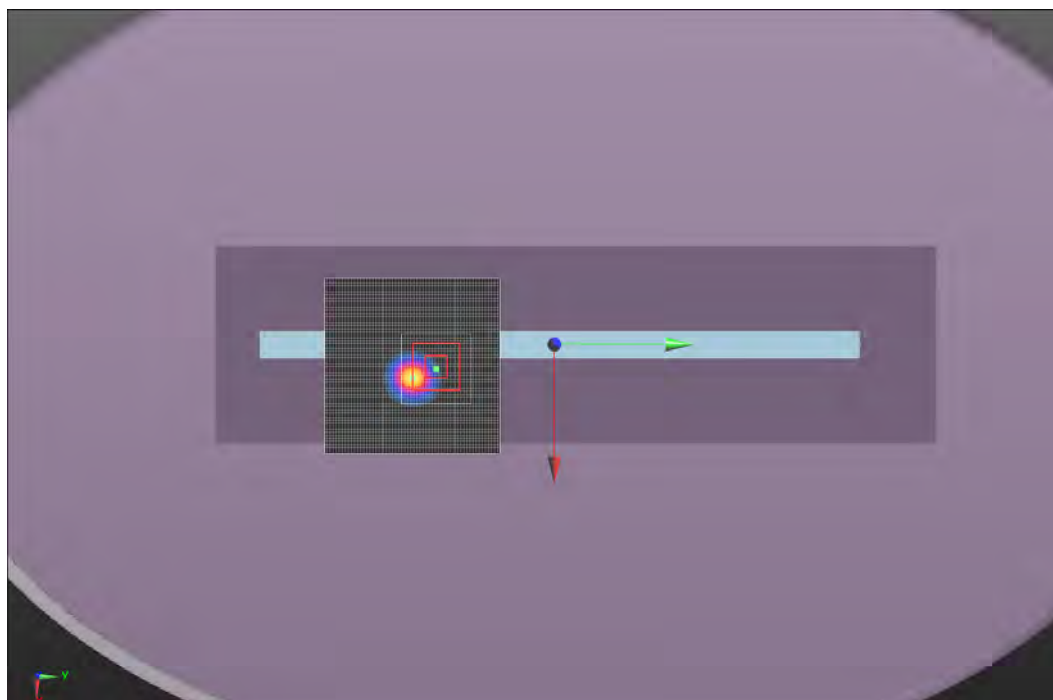
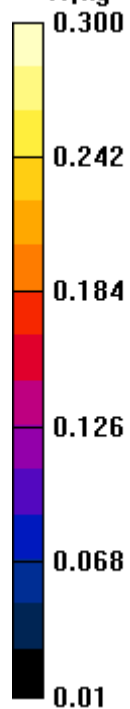
Maximum value of Total (measured) = 7.537 V/m

Maximum value of SAR (measured) = 0.342 W/kg

 
Approved By

Test 15

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	11/1/2012	Liquid Temperature (°C):	20.7
Serial Number:	unavailable	Humidity (%RH):	42.6
Configuration:	1	Bar. Pressure (mb):	1010
Comments:	Power set to 13dBm		

Test 16

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5765 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5765$ MHz; $\sigma = 6.013$ mho/m; $\epsilon_r = 46.63$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.110 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.386 W/kg

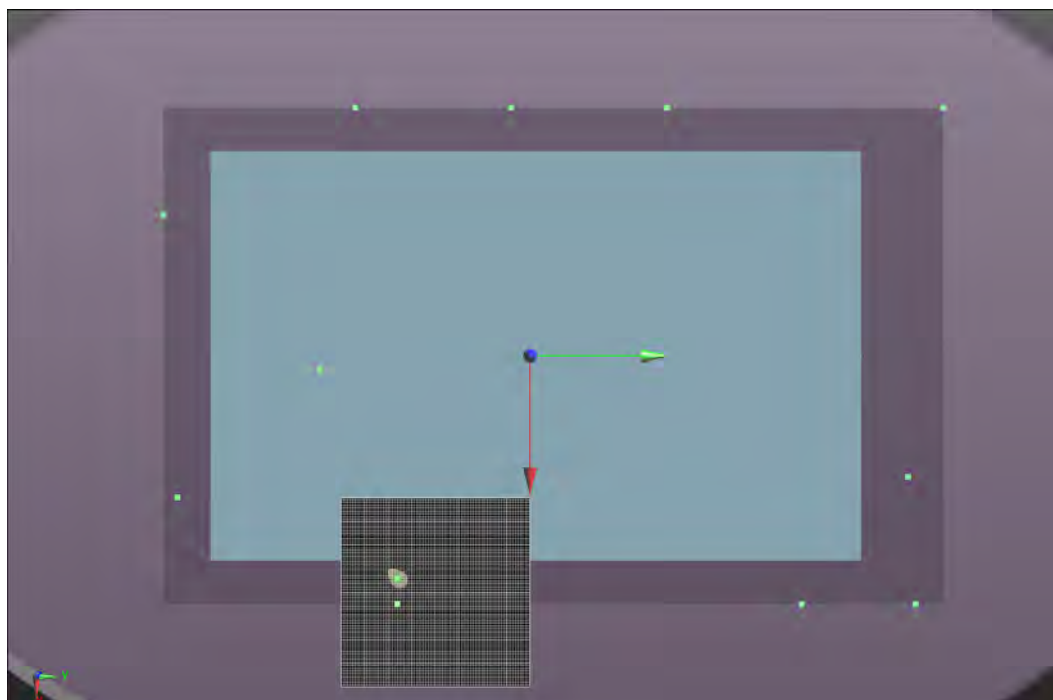
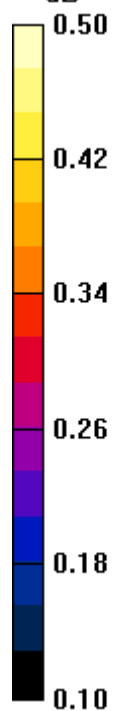
Body/Body/Area scan (9x9x1): Measurement grid: dx=10mm, dy=10mm

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

Maximum value of SAR (measured) = 0.190 W/kg

 
Approved By

Test 16
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.8
Date:	11/30/2012	Liquid Temperature (°C):	22.5
Serial Number:	unavailable	Humidity (%RH):	41
Configuration:	3	Bar. Pressure (mb):	998
Comments:	Power set to 11dBm		

Test 17f

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5190 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5190$ MHz; $\sigma = 5.293$ mho/m; $\epsilon_r = 47.598$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.202 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.76 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 22.002 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 5.33 W/kg

SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.318 W/kg

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

Maximum value of SAR (measured) = 2.69 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

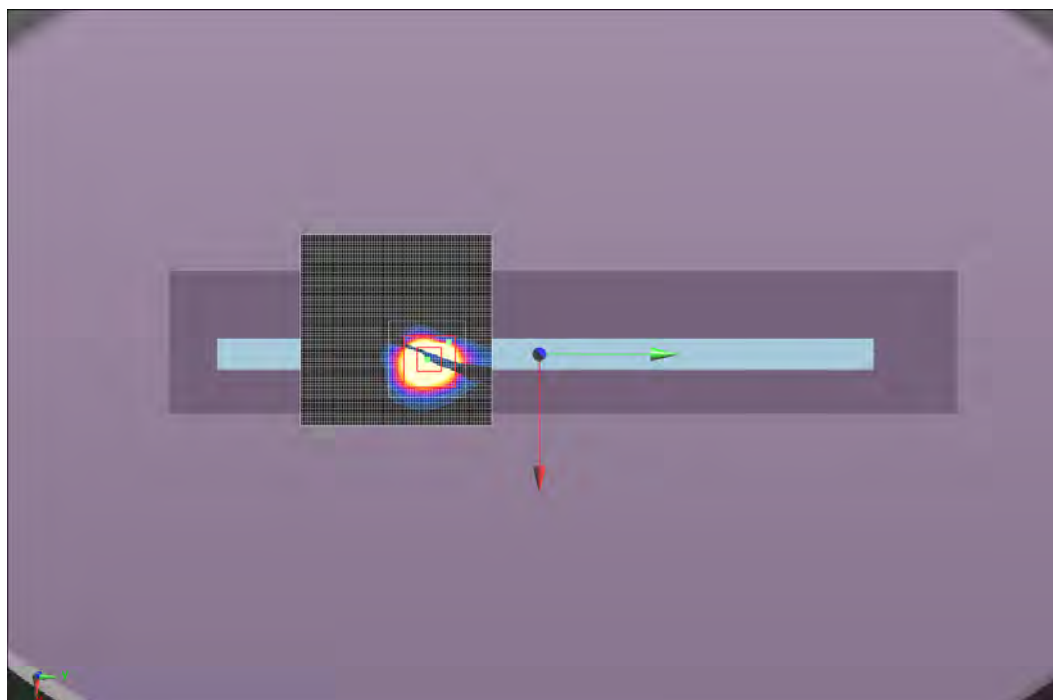
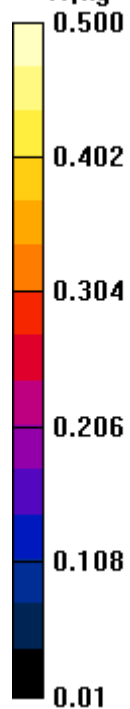
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 11.25 V/m

Maximum value of SAR (measured) = 0.670 W/kg

 
Approved By

Test 17f
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	20.8
Date:	12/3/2012	Liquid Temperature (°C):	23.3
Serial Number:	unavailable	Humidity (%RH):	40
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 11dBm		

Test 17g

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5230 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5230$ MHz; $\sigma = 5.345$ mho/m; $\epsilon_r = 47.53$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0772 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.38 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 21.940 V/m; Power Drift = -0.28 dB

Peak SAR (extrapolated) = 4.33 W/kg

SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.251 W/kg

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

Maximum value of SAR (measured) = 2.22 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

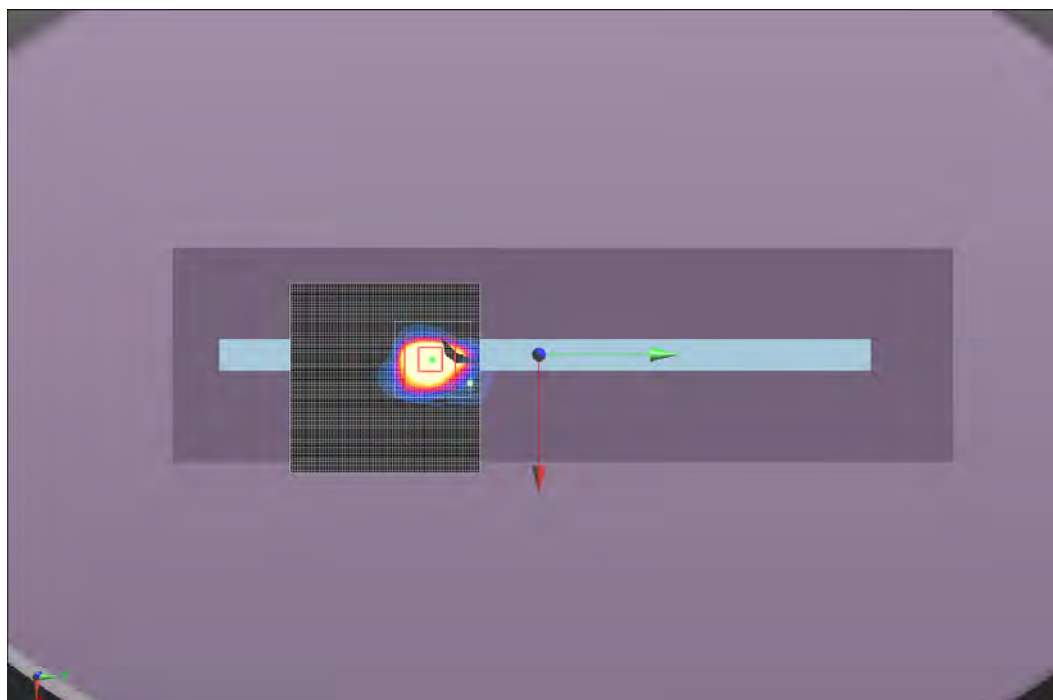
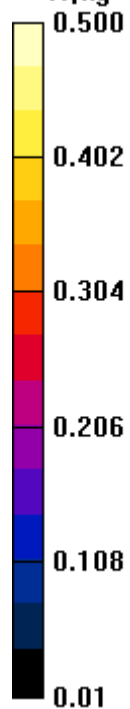
Maximum value of Total (measured) = 10.07 V/m

Maximum value of SAR (measured) = 0.542 W/kg




Approved By

Test 17g
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	25.7
Date:	11/1/2012	Liquid Temperature (°C):	21.1
Serial Number:	unavailable	Humidity (%RH):	43.8
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 18

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5230 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5230$ MHz; $\sigma = 5.345$ mho/m; $\epsilon_r = 47.53$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.116 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.286 W/kg

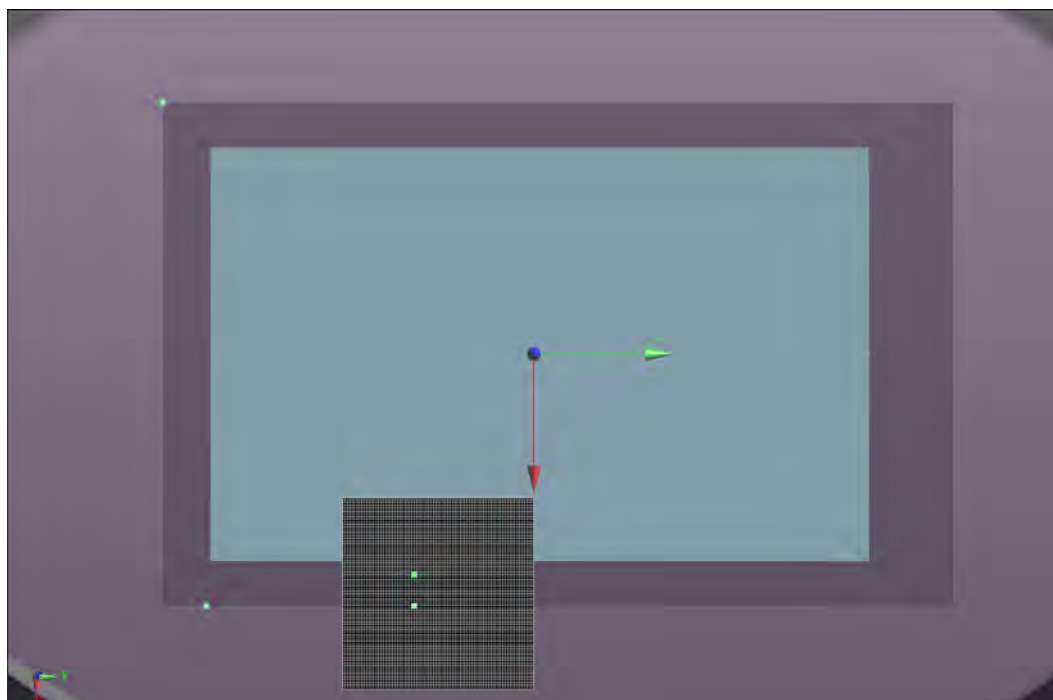
Body/Body/Area scan (9x9x1): Measurement grid: dx=10mm, dy=10mm

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

Maximum value of SAR (measured) = 0.272 W/kg

 
Approved By

Test 18
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.6
Date:	12/11/2012	Liquid Temperature (°C):	21.3
Serial Number:	unavailable	Humidity (%RH):	42.2
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 19e

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5310 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5310$ MHz; $\sigma = 5.44$ mho/m; $\epsilon_r = 47.381$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.164 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.61 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.379 V/m; Power Drift = 0.30 dB

Peak SAR (extrapolated) = 4.08 W/kg

SAR(1 g) = 0.942 W/kg; SAR(10 g) = 0.241 W/kg

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

Maximum value of SAR (measured) = 2.03 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

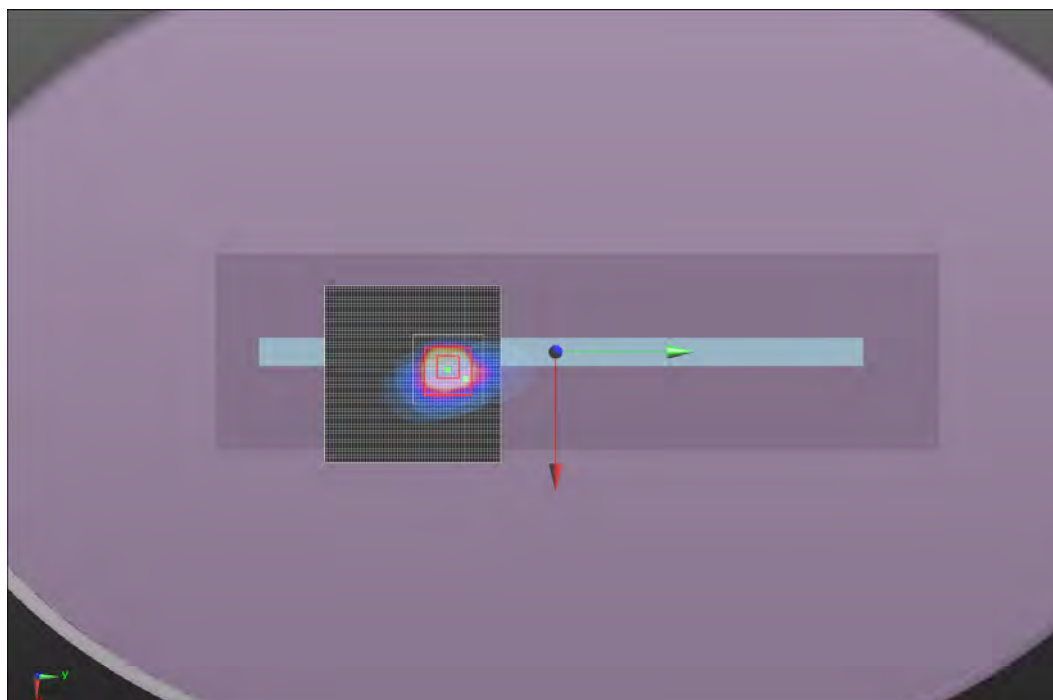
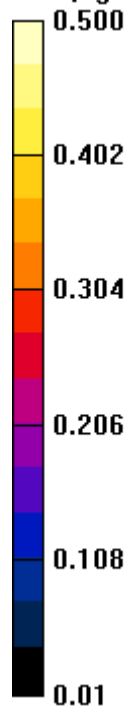
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 9.480 V/m

Maximum value of SAR (measured) = 0.489 W/kg

 
Approved By

Test 19e
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.6
Date:	12/11/2012	Liquid Temperature (°C):	21.3
Serial Number:	unavailable	Humidity (%RH):	42.2
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 19f

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5270 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5270$ MHz; $\sigma = 5.393$ mho/m; $\epsilon_r = 47.457$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.174 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.71 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.792 V/m; Power Drift = 0.23 dB

Peak SAR (extrapolated) = 4.22 W/kg

SAR(1 g) = 0.991 W/kg; SAR(10 g) = 0.257 W/kg

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

Maximum value of SAR (measured) = 2.10 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

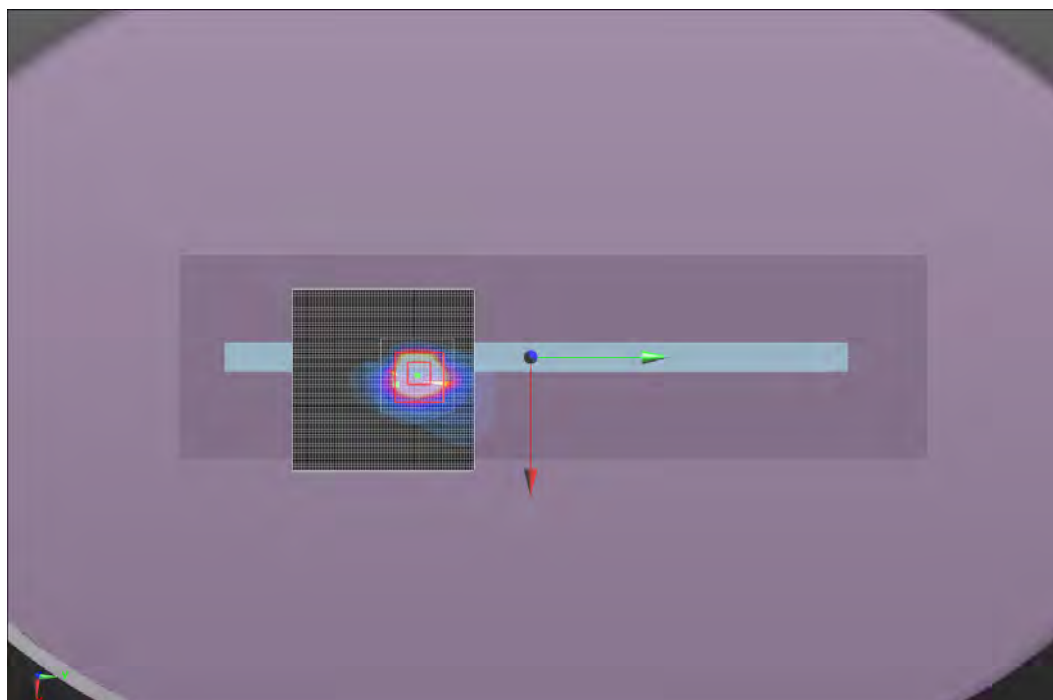
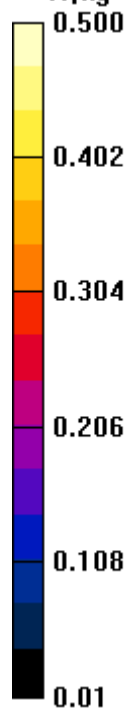
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 9.801 V/m

Maximum value of SAR (measured) = 0.518 W/kg

 
Approved By

Test 19f
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	27
Date:	11/1/2012	Liquid Temperature (°C):	21.8
Serial Number:	unavailable	Humidity (%RH):	42.2
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 20

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5310 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5310$ MHz; $\sigma = 5.44$ mho/m; $\epsilon_r = 47.381$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0975 W/kg

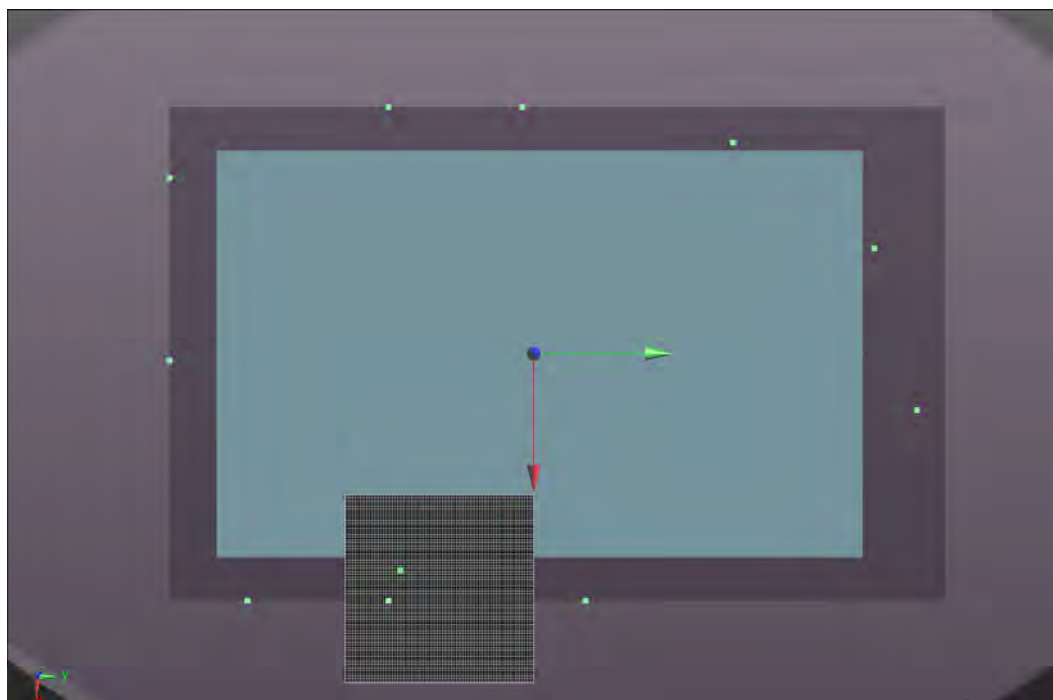
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.297 W/kg

 
Approved By

Test 20
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.4
Date:	12/11/2012	Liquid Temperature (°C):	21.6
Serial Number:	unavailable	Humidity (%RH):	43.1
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 21e

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5550 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5550$ MHz; $\sigma = 5.741$ mho/m; $\epsilon_r = 47.051$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Maximum value of SAR (interpolated) = 0.387 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 2.35 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 20.456 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 5.51 W/kg

SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.344 W/kg

Maximum value of SAR (measured) = 2.65 W/kg

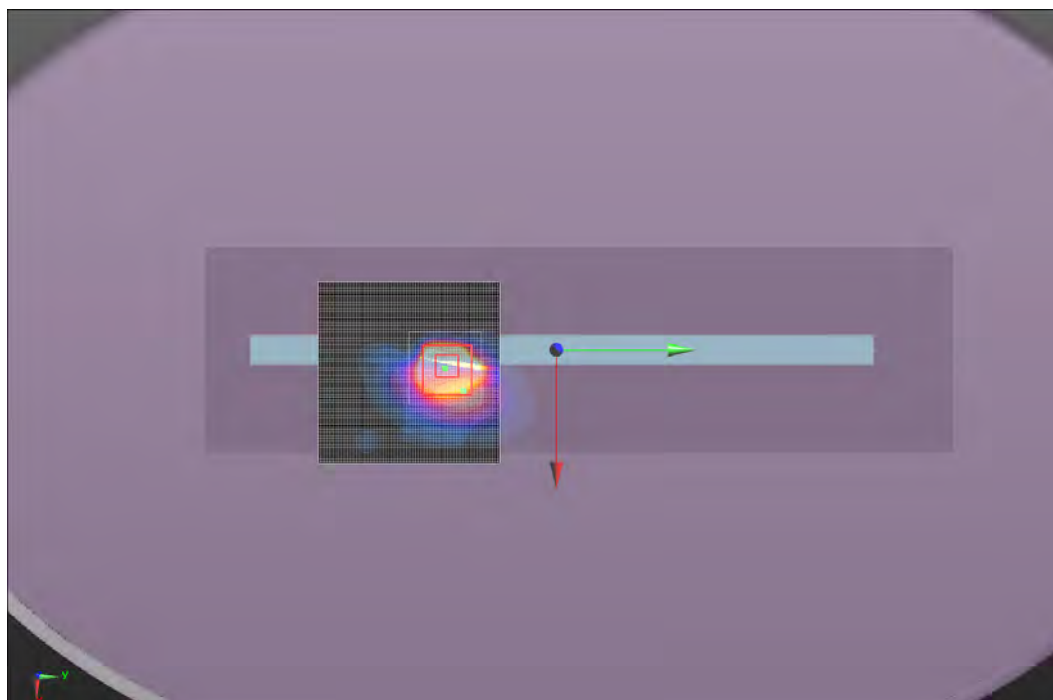
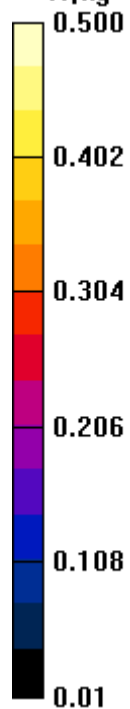
Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 9.988 V/m

Maximum value of SAR (measured) = 0.573 W/kg

 
Approved By

Test 21e
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.4
Date:	12/11/2012	Liquid Temperature (°C):	21.6
Serial Number:	unavailable	Humidity (%RH):	43.1
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 21f

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5510 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5510$ MHz; $\sigma = 5.693$ mho/m; $\epsilon_r = 47.12$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.390 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.14 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 19.909 V/m; Power Drift = 0.21 dB

Peak SAR (extrapolated) = 5.37 W/kg

SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.316 W/kg

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

Maximum value of SAR (measured) = 2.62 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

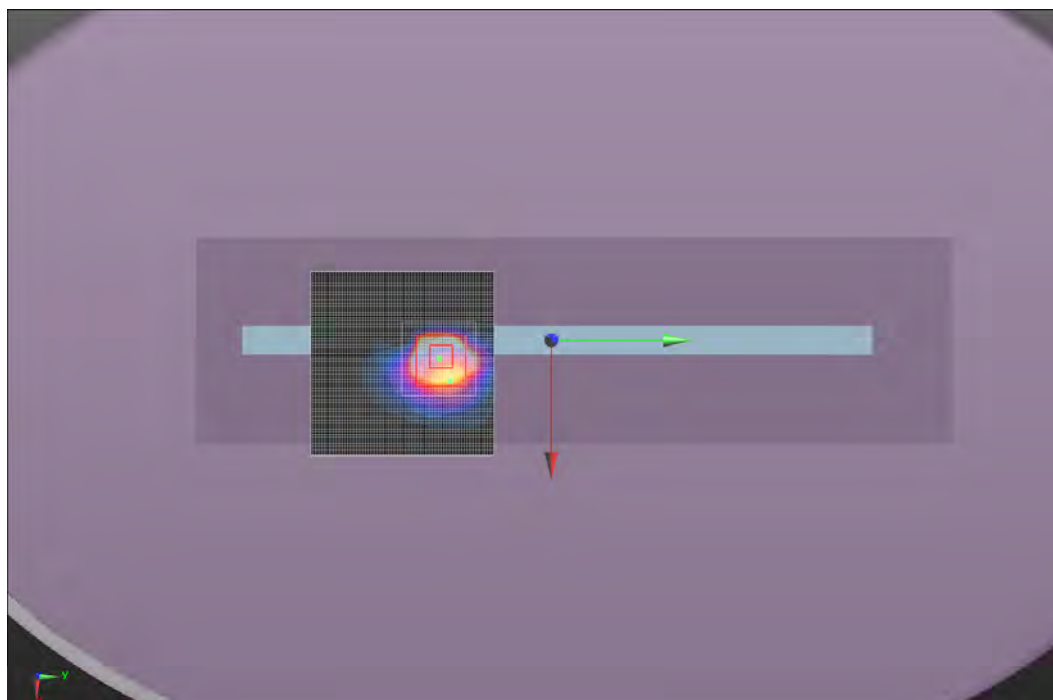
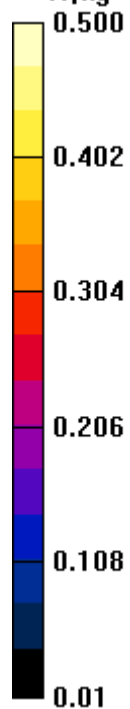
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 9.956 V/m

Maximum value of SAR (measured) = 0.564 W/kg

 
Approved By

Test 21f
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	11/1/2012	Liquid Temperature (°C):	22.1
Serial Number:	unavailable	Humidity (%RH):	42.9
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 22

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5550 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $f = 5550$ MHz; $\sigma = 5.741$ mho/m; $\epsilon_r = 47.051$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

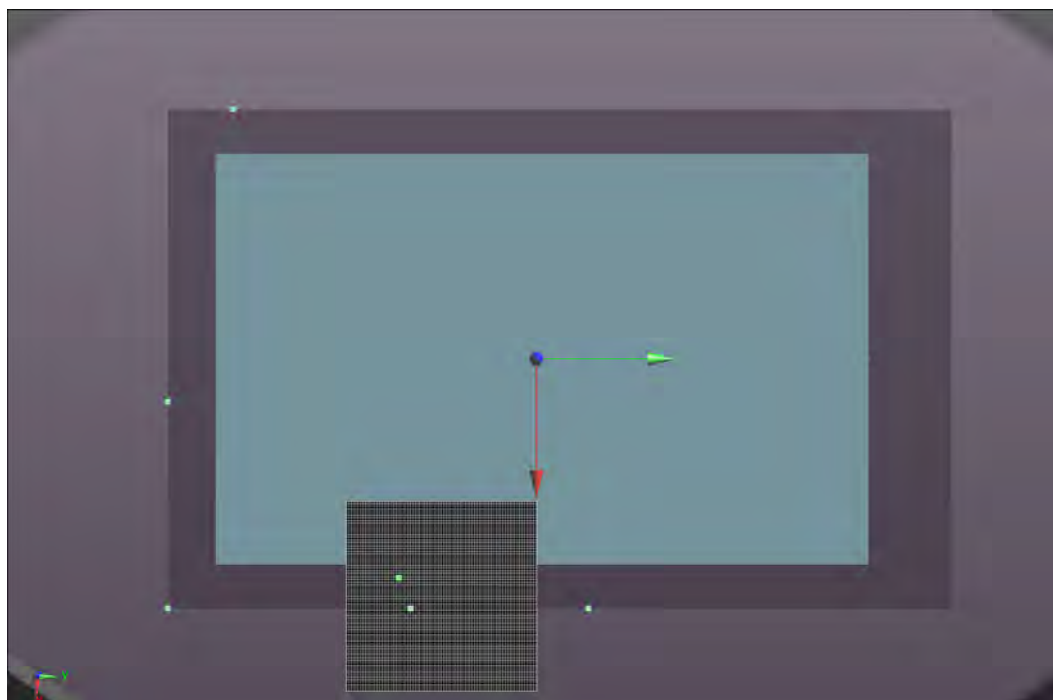
Maximum value of SAR (interpolated) = 0.119 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 0.176 W/kg

Approved By

Test 22
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	11/5/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	47.6
Configuration:	1	Bar. Pressure (mb):	1024
Comments:	Power set to 13dBm		

Test 23a

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5755 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5755$ MHz; $\sigma = 6$ mho/m; $\epsilon_r = 46.648$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.117 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.55 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 16.292 V/m; Power Drift = -0.20 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 0.741 W/kg; SAR(10 g) = 0.174 W/kg

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

Maximum value of SAR (measured) = 1.73 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

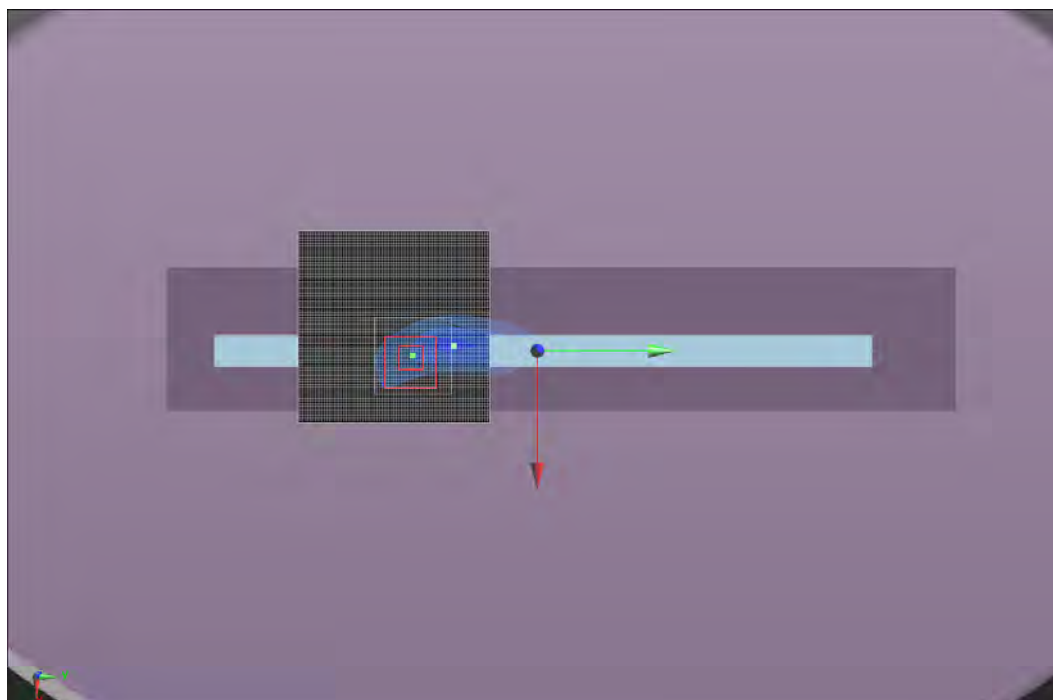
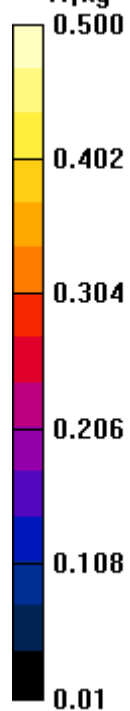
Maximum value of Total (measured) = 7.578 V/m

Maximum value of SAR (measured) = 0.345 W/kg

 
Approved By

Test 23a

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.4
Date:	12/11/2012	Liquid Temperature (°C):	21.9
Serial Number:	unavailable	Humidity (%RH):	44
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 23c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5795 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5795$ MHz; $\sigma = 6.051$ mho/m; $\epsilon_r = 46.575$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.232 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.913 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 13.564 V/m; Power Drift = 0.22 dB

Peak SAR (extrapolated) = 2.25 W/kg

SAR(1 g) = 0.509 W/kg; SAR(10 g) = 0.142 W/kg

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

Maximum value of SAR (measured) = 1.02 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

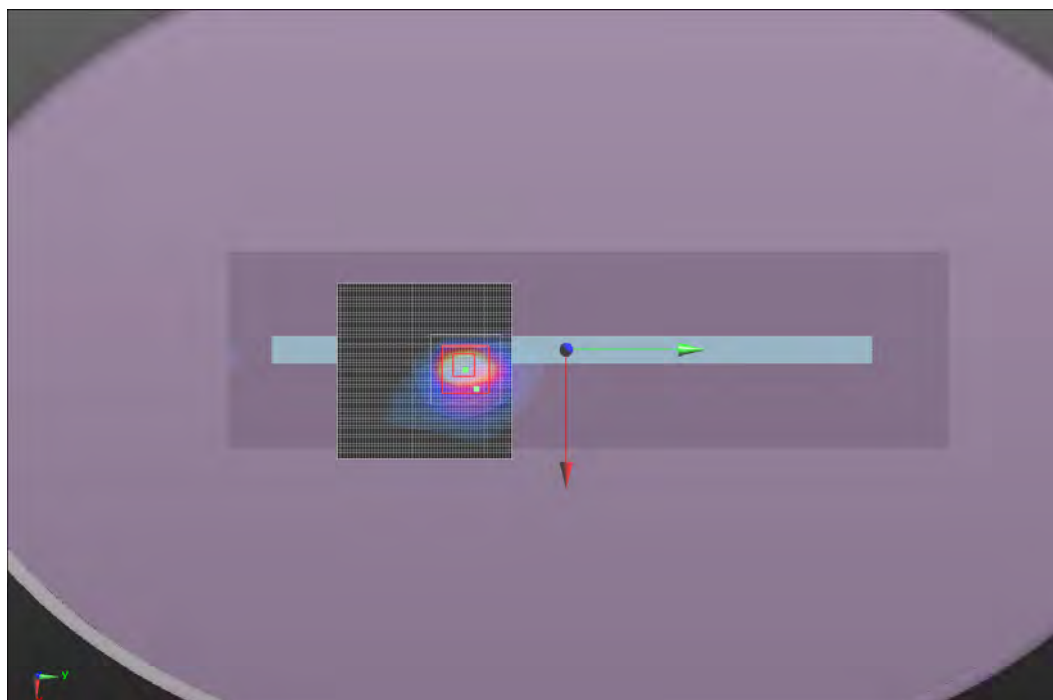
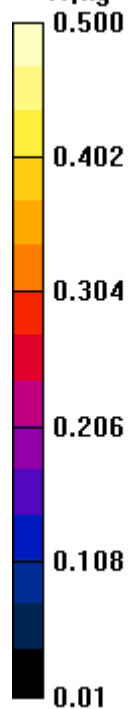
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of Total (measured) = 6.023 V/m

Maximum value of SAR (measured) = 0.220 W/kg

 
Approved By

Test 23c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	27.5
Date:	11/1/2012	Liquid Temperature (°C):	22.5
Serial Number:	unavailable	Humidity (%RH):	40.4
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 24

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5795 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5795$ MHz; $\sigma = 6.051$ mho/m; $\epsilon_r = 46.575$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0978 W/kg

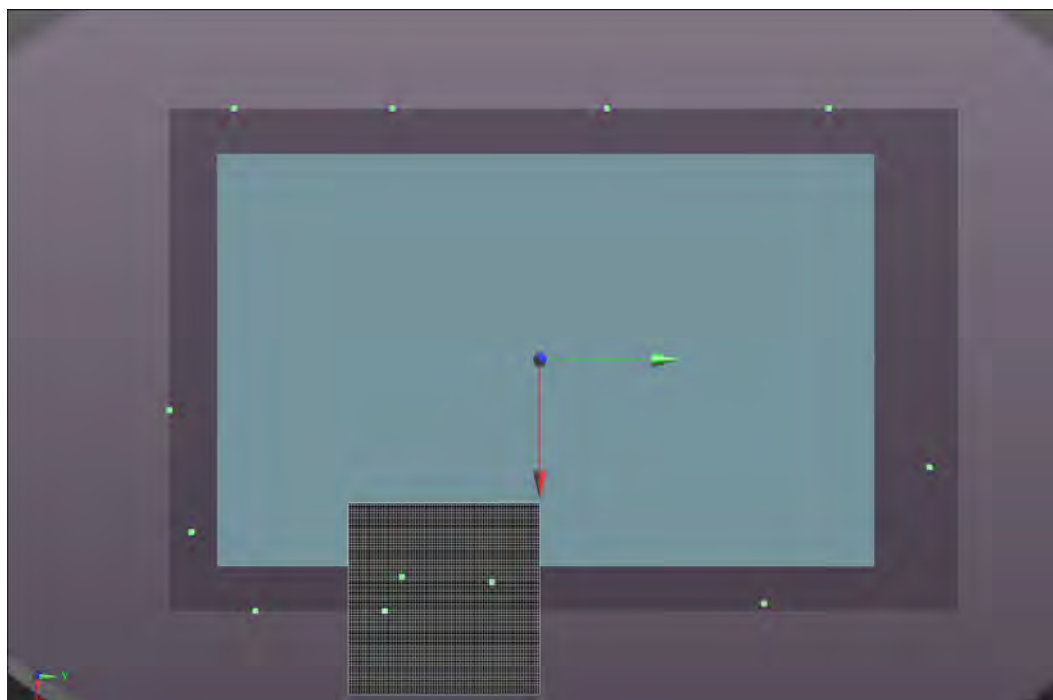
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

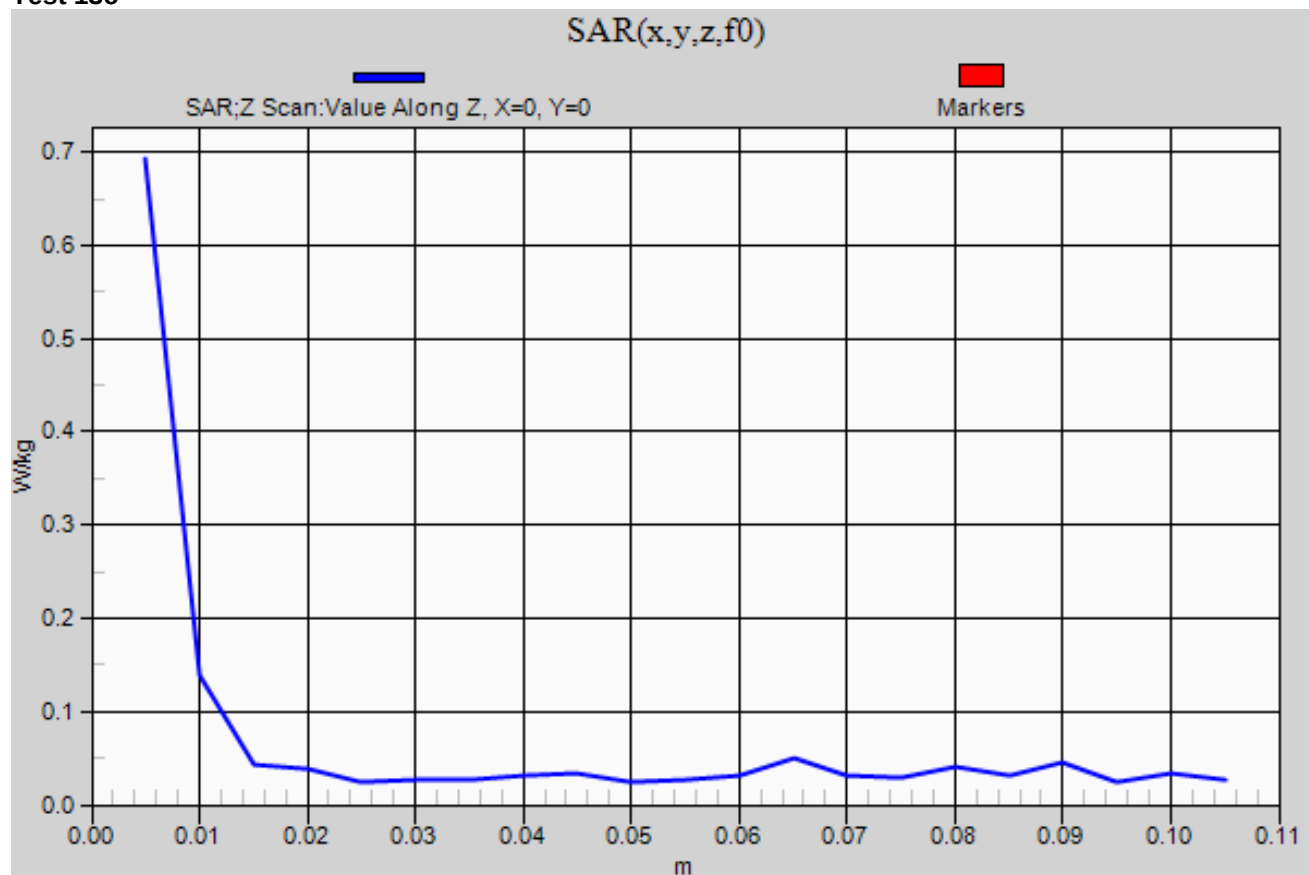
Maximum value of SAR (interpolated) = 0.231 W/kg

 
Approved By

Test 24
dB



Test 13c



EUT:	1514 (SAR)	Work Order:	MCSO1635
Customer:	Microsoft Corporation	Job Site:	EV08
Attendees:	none	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2011 FCC 15.247:2011 FCC 15.407:2001	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 248227 D01 V01r02 FCC KDB 616217 D03 V01 FCC 865664
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Accessory	EUT Position	EUT Power Setting	SAR Drift During Test (dB)	Measured 1g SAR Level (mW/g)	Test #
Body	5.2	5180	36	MCS08	20	A&B	None	Top	12dBm	-0.1	1.33	25c
Body	5.2	5240	48	MCS08	20	A&B	None	Top	12dBm	-0.33	1.12	25d
Body	5.2	5180	36	MCS08	20	A&B	None	Back	13dBm	0.13	0.179	26
Body	5.3	5280	56	MCS08	20	A&B	None	Top	12dBm	-0.78	0.986	27b
Body	5.3	5320	64	MCS08	20	A&B	None	Top	12dBm	-0.32	0.895	27c
Body	5.3	5520	104	MCS08	20	A&B	None	Back	13dBm	N/A	0.185	28
Body	5.6	5580	116	MCS08	20	A&B	None	Top	13dBm	-0.16	0.682	29a
Body	5.6	5680	136	MCS08	20	A&B	None	Top	13dBm	-0.14	0.648	29b
Body	5.6	5520	104	MCS08	20	A&B	None	Top	12dBm	-1.67	1.07	29c
Body	5.6	5280	56	MCS08	20	A&B	None	Back	13dBm	0.23	0.186	30
Body	5.8	5785	157	MCS08	20	A&B	None	Top	13dBm	-0.12	0.733	31
Body	5.8	5785	157	MCS08	20	A&B	None	Back	13dBm	N/A	0.178	32
Body	5.2	5190	36/40	MCS08	40	A&B	None	Top	12dBm	-0.15	0.933	33e
Body	5.2	5230	44/48	MCS08	40	A&B	None	Top	12dBm	0.2	1.03	33f
Body	5.2	5230	44/48	MCS08	40	A&B	None	Back	13dBm	0.25	0.182	34
Body	5.3	5270	52/56	MCS08	40	A&B	None	Top	12dBm	-0.19	0.896	35d
Body	5.3	5310	60/64	MCS08	40	A&B	None	Top	12dBm	0.06	0.941	35e
Body	5.3	5270	52/56	MCS08	40	A&B	None	Back	13dBm	-0.26	0.155	36
Body	5.6	5510	100/104	MCS08	40	A&B	None	Top	12dBm	-0.19	0.869	37b
Body	5.6	5510	100/104	MCS08	40	A&B	None	Back	13dBm	N/A	0.208	38
Body	5.8	5755	149/153	MCS08	40	A&B	None	Top	13dBm	-0.15	0.7	39
Body	5.8	5755	149/153	MCS08	40	A&B	None	Back	13dBm	N/A	0.186	40

Tested By:	Ethan Schoonover	Room Temperature (°C):	24.2
Date:	12/3/2012	Liquid Temperature (°C):	23.5
Serial Number:	unavailable	Humidity (%RH):	41
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 12dBm		

Test 25c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5180 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 5.281$ mho/m; $\epsilon_r = 47.617$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.172 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.736 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 11.42 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.91 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 24.455 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 5.61 W/kg

SAR(1 g) = 1.33 W/kg; SAR(10 g) = 0.335 W/kg

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

Maximum value of SAR (measured) = 2.93 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 11.47 V/m

Body/Body/Zoom Scan 3 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 24.792 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 3.84 W/kg

SAR(1 g) = 0.388 W/kg; SAR(10 g) = 0.117 W/kg

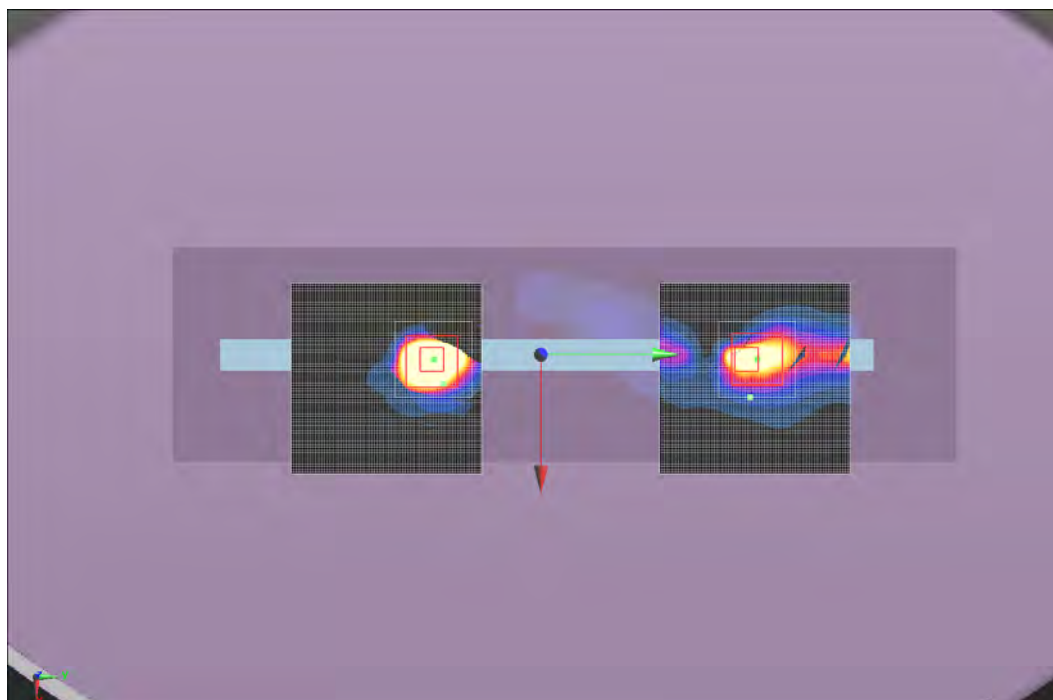
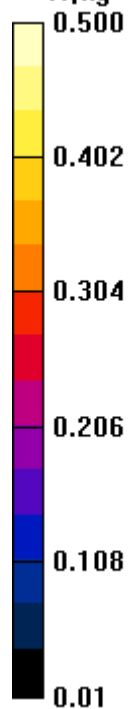
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.849 W/kg



Approved By

Test 25c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.4
Date:	12/5/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	48.9
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 12dBm		

Test 25d

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5240 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5240$ MHz; $\sigma = 5.358$ mho/m; $\epsilon_r = 47.514$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.167 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.544 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 10.26 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.02 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 18.626 V/m; Power Drift = -0.33 dB

Peak SAR (extrapolated) = 4.83 W/kg

SAR(1 g) = 1.12 W/kg; SAR(10 g) = 0.303 W/kg

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

Maximum value of SAR (measured) = 2.42 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 10.23 V/m

Body/Body/Zoom Scan 3 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 18.821 V/m; Power Drift = -0.41 dB

Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.320 W/kg; SAR(10 g) = 0.123 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

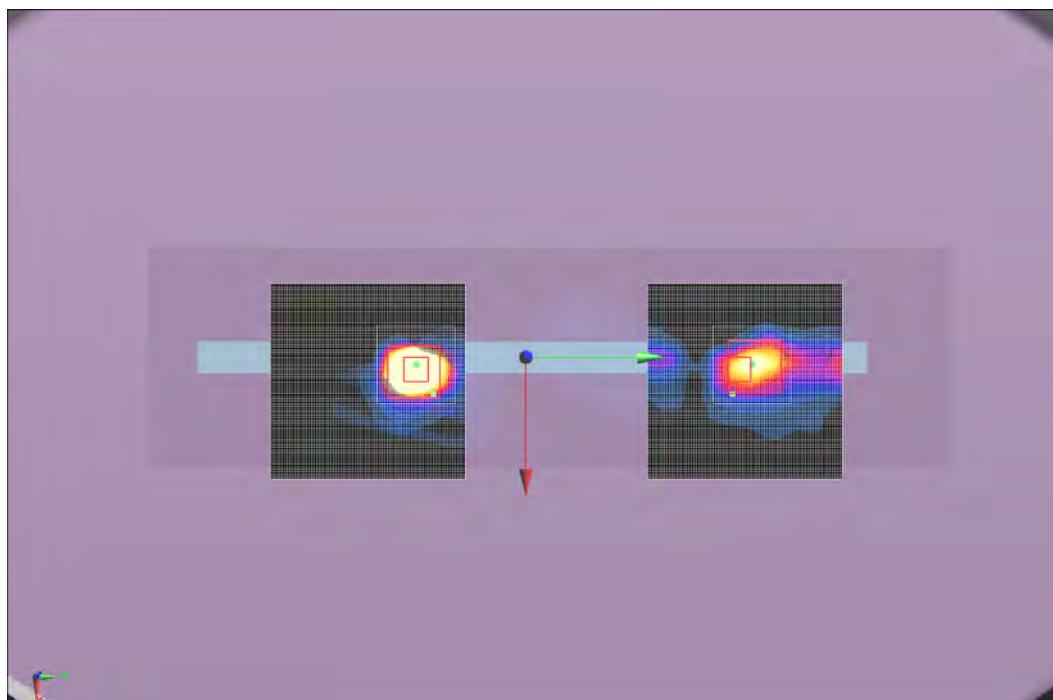
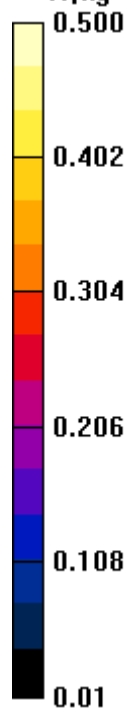
Maximum value of SAR (measured) = 0.657 W/kg

Maximum value of SAR (measured) = 0.564 W/kg



Approved By

Test 25d
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	25
Date:	11/1/2012	Liquid Temperature (°C):	23.2
Serial Number:	unavailable	Humidity (%RH):	42.3
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 26

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5180 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5180$ MHz; $\sigma = 5.281$ mho/m; $\epsilon_r = 47.617$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.110 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.302 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 8.055 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.622 W/kg

SAR(1 g) = 0.179 W/kg; SAR(10 g) = 0.092 W/kg

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

Maximum value of SAR (measured) = 0.332 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

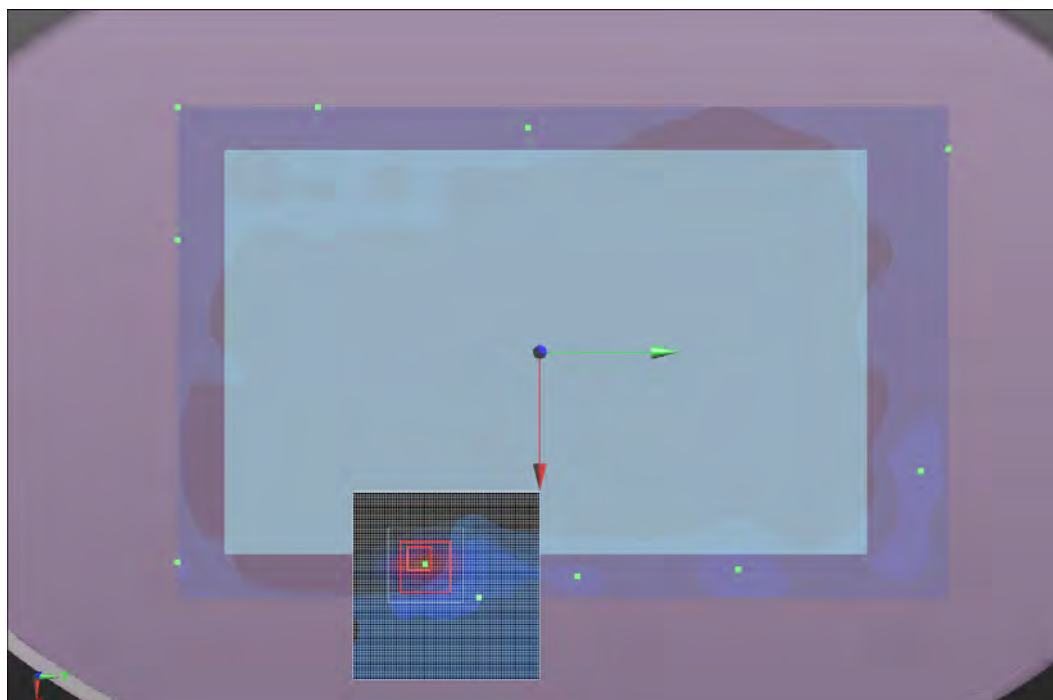
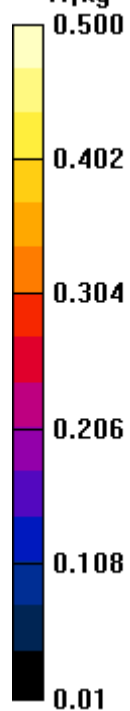
Maximum value of Total (measured) = 4.403 V/m

Maximum value of SAR (measured) = 0.102 W/kg

 
Approved By

Test 26

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.8
Date:	12/5/2012	Liquid Temperature (°C):	23.4
Serial Number:	unavailable	Humidity (%RH):	46.6
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 12dBm		

Test 27b

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5280 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5280$ MHz; $\sigma = 5.404$ mho/m; $\epsilon_r = 47.437$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.241 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.531 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.594 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.86 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.180 V/m; Power Drift = -0.78 dB

Peak SAR (extrapolated) = 4.09 W/kg

SAR(1 g) = 0.986 W/kg; SAR(10 g) = 0.253 W/kg

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

Maximum value of SAR (measured) = 2.16 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.704 V/m

Body/Body/Zoom Scan 3 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 16.044 V/m; Power Drift = -0.33 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.109 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

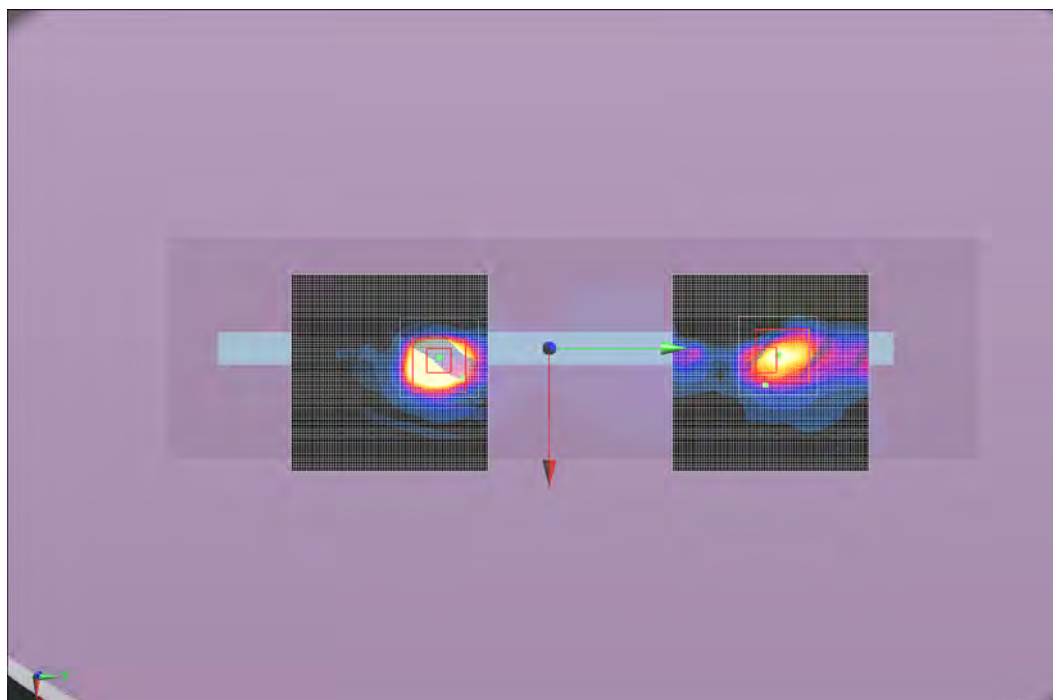
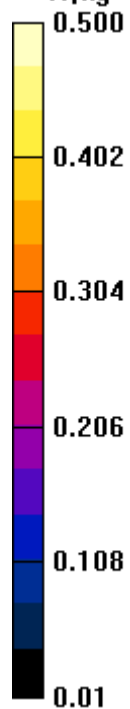
Maximum value of SAR (measured) = 0.572 W/kg

Maximum value of SAR (measured) = 0.497 W/kg



Approved By

Test 27b
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.2
Date:	12/5/2012	Liquid Temperature (°C):	23.2
Serial Number:	unavailable	Humidity (%RH):	47.5
Configuration:	3	Bar. Pressure (mb):	1016
Comments:	Power set to 12dBm		

Test 27c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5320 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5320$ MHz; $\sigma = 5.454$ mho/m; $\epsilon_r = 47.366$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.169 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.506 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.288 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.49 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.779 V/m; Power Drift = -0.32 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 0.895 W/kg; SAR(10 g) = 0.229 W/kg

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

Maximum value of SAR (measured) = 1.99 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.391 V/m

Body/Body/Zoom Scan 3 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.826 V/m; Power Drift = -0.48 dB

Peak SAR (extrapolated) = 1.15 W/kg

SAR(1 g) = 0.300 W/kg; SAR(10 g) = 0.118 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

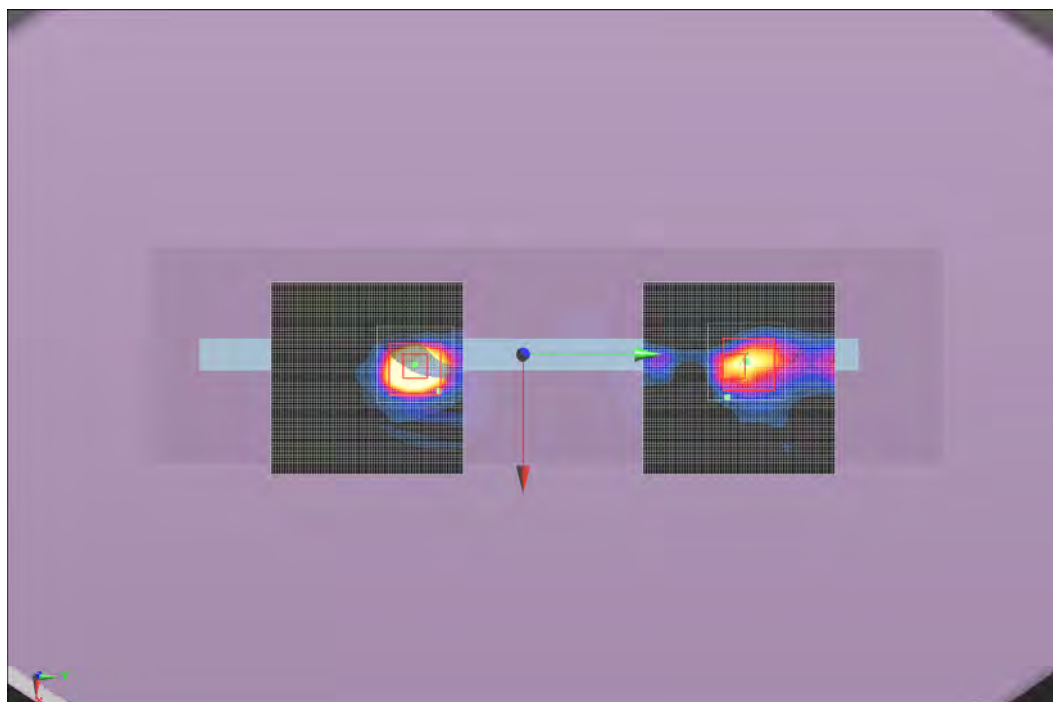
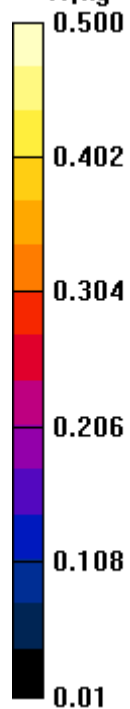
Maximum value of SAR (measured) = 0.565 W/kg

Maximum value of SAR (measured) = 0.470 W/kg



Approved By

Test 27c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.2
Date:	11/1/2012	Liquid Temperature (°C):	23.3
Serial Number:	unavailable	Humidity (%RH):	37.9
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 28

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5520 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5520$ MHz; $\sigma = 5.705$ mho/m; $\epsilon_r = 47.103$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.142 W/kg

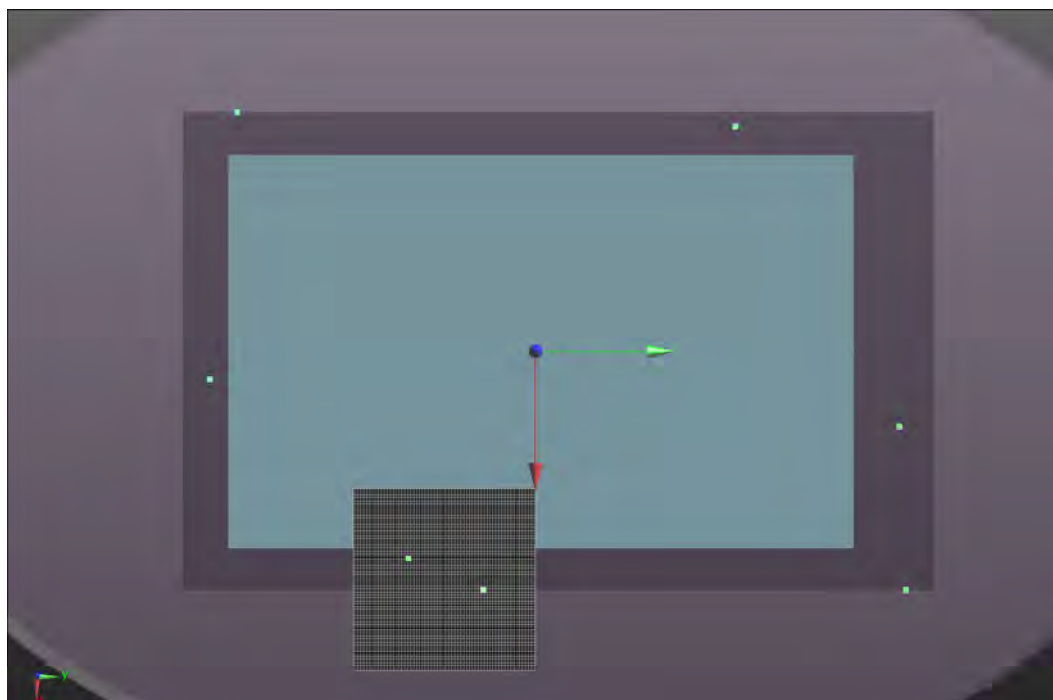
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.185 W/kg

 
Approved By

Test 28
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.9
Date:	11/6/2012	Liquid Temperature (°C):	23
Serial Number:	unavailable	Humidity (%RH):	48.8
Configuration:	1	Bar. Pressure (mb):	1018
Comments:	Power set to 13dBm		

Test 29a

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5580 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5580$ MHz; $\sigma = 5.774$ mho/m; $\epsilon_r = 46.984$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.114 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 7.297 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.60 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.662 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 3.30 W/kg

SAR(1 g) = 0.682 W/kg; SAR(10 g) = 0.170 W/kg

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

Maximum value of SAR (measured) = 1.51 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 7.234 V/m

Body/Body/Zoom Scan 2 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.612 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.282 W/kg; SAR(10 g) = 0.067 W/kg

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

Maximum value of SAR (measured) = 0.661 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

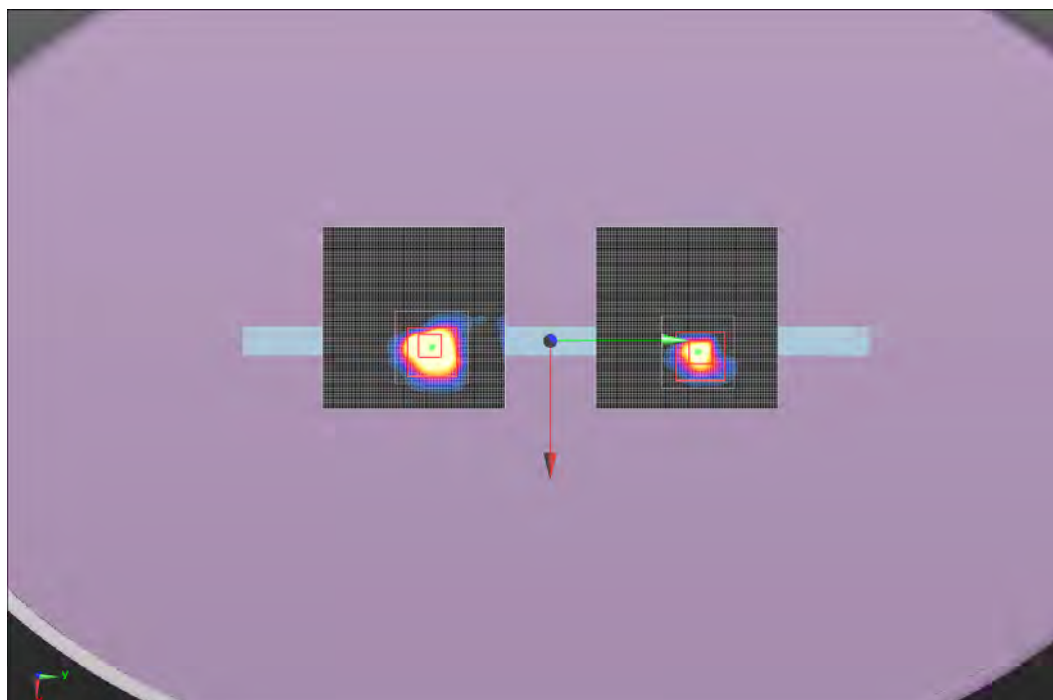
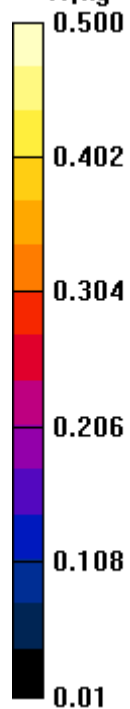
Maximum value of SAR (interpolated) = 0.765 W/kg

Maximum value of SAR (measured) = 0.307 W/kg



Approved By

Test 29a
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.4
Date:	11/6/2012	Liquid Temperature (°C):	23.2
Serial Number:	unavailable	Humidity (%RH):	48.3
Configuration:	1	Bar. Pressure (mb):	1018
Comments:	Power set to 13dBm		

Test 29b

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5680 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5680$ MHz; $\sigma = 5.905$ mho/m; $\epsilon_r = 46.776$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.103 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 6.573 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.54 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 14.522 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 3.48 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.163 W/kg

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

Maximum value of SAR (measured) = 1.40 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 6.575 V/m

Body/Body/Zoom Scan 2 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 14.642 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.931 W/kg

SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.059 W/kg

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

Maximum value of SAR (measured) = 0.554 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

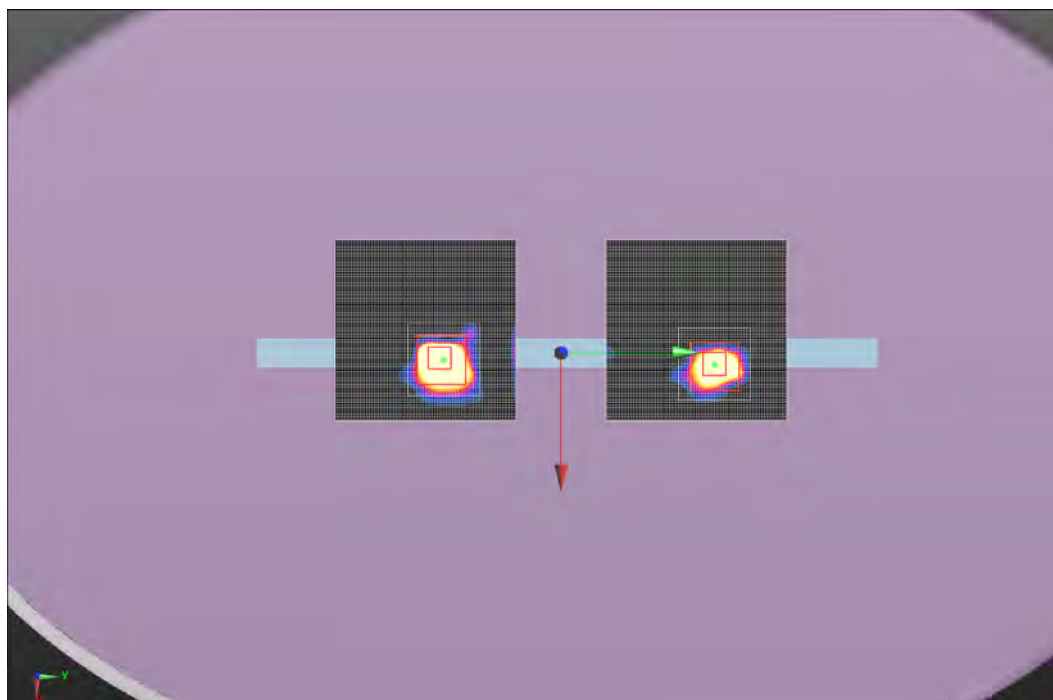
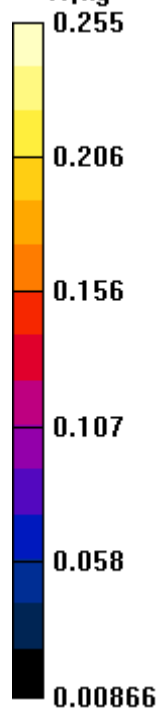
Maximum value of SAR (interpolated) = 0.683 W/kg

Maximum value of SAR (measured) = 0.255 W/kg



Approved By

Test 29b
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.2
Date:	12/6/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	33
Configuration:	3	Bar. Pressure (mb):	1023
Comments:	Power set to 12dBm		

Test 29c

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5520 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5520$ MHz; $\sigma = 5.705$ mho/m; $\epsilon_r = 47.103$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.350 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.458 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.799 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.14 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 18.913 V/m; Power Drift = -1.67 dB

Peak SAR (extrapolated) = 4.65 W/kg

SAR(1 g) = 1.07 W/kg; SAR(10 g) = 0.300 W/kg

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

Maximum value of SAR (measured) = 2.33 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.710 V/m

Body/Body/Zoom Scan 3 (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.570 V/m; Power Drift = -0.36 dB

Peak SAR (extrapolated) = 0.681 W/kg

SAR(1 g) = 0.189 W/kg; SAR(10 g) = 0.070 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

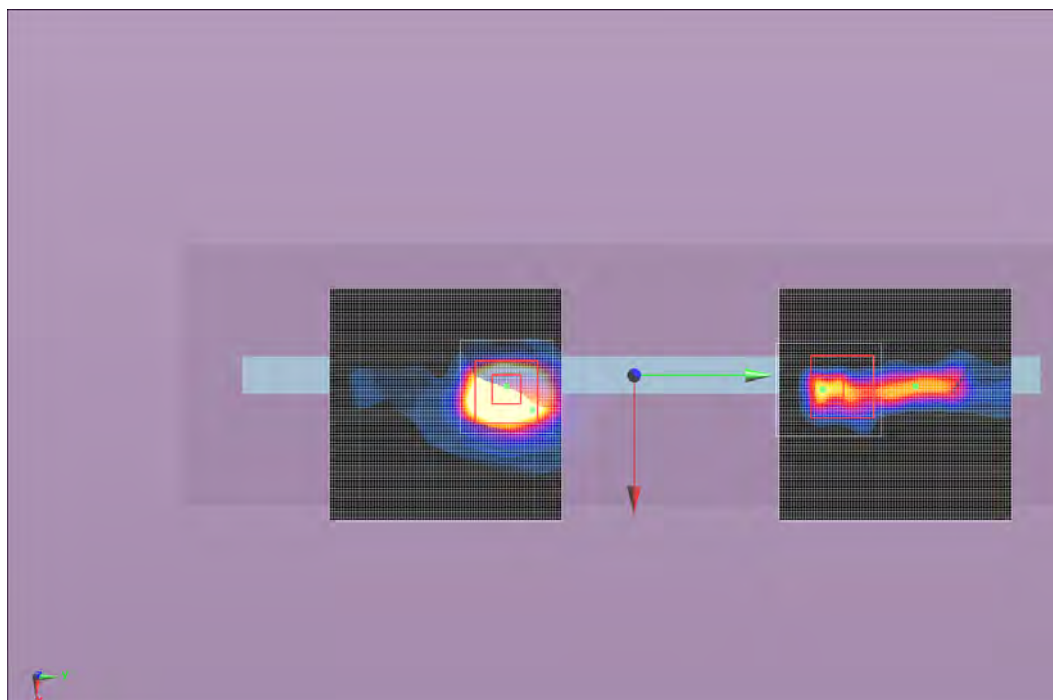
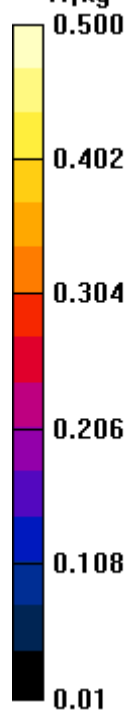
Maximum value of SAR (measured) = 0.412 W/kg

Maximum value of SAR (measured) = 0.442 W/kg



Approved By

Test 29c
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.3
Date:	11/1/2012	Liquid Temperature (°C):	23.3
Serial Number:	unavailable	Humidity (%RH):	39.8
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 30

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5280 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5280$ MHz; $\sigma = 5.404$ mho/m; $\epsilon_r = 47.437$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.134 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.280 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.763 V/m; Power Drift = 0.23 dB

Peak SAR (extrapolated) = 0.535 W/kg

SAR(1 g) = 0.186 W/kg; SAR(10 g) = 0.103 W/kg

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

Maximum value of SAR (measured) = 0.335 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

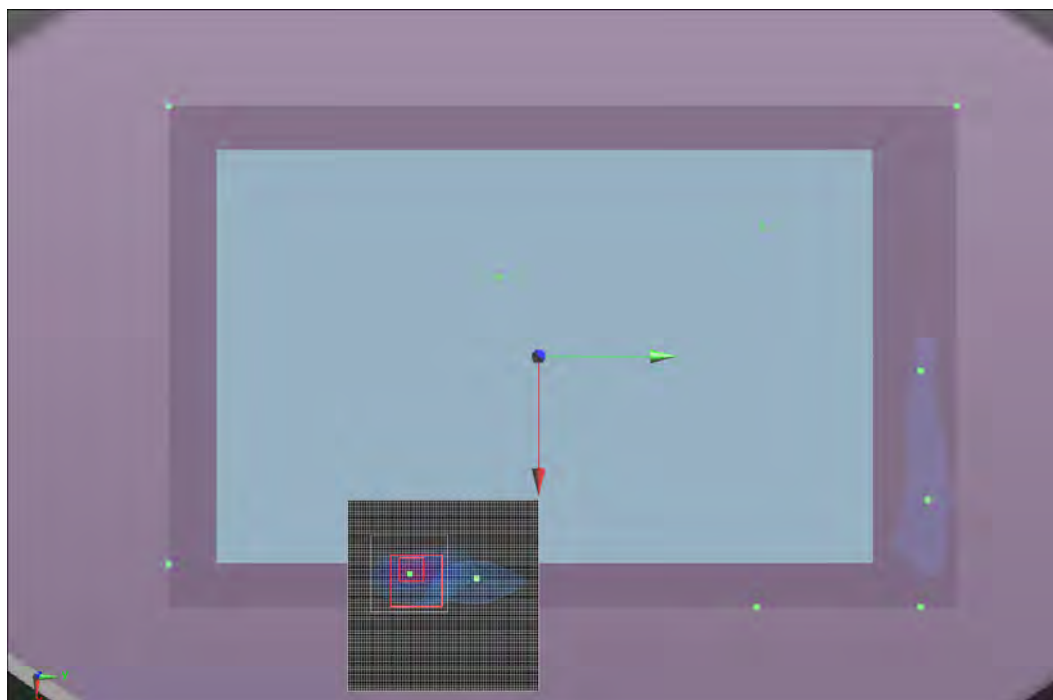
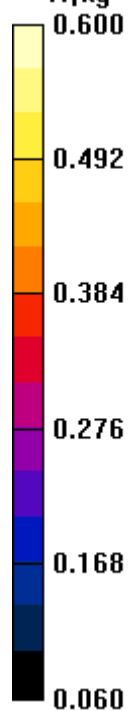
Maximum value of Total (measured) = 4.635 V/m

Maximum value of SAR (measured) = 0.116 W/kg

 
Approved By

Test 30

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	26.6
Date:	10/31/2012	Liquid Temperature (°C):	23.4
Serial Number:	unavailable	Humidity (%RH):	44.9
Configuration:	1	Bar. Pressure (mb):	1005
Comments:	Power set to 13dBm		

Test 31

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5785 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5785$ MHz; $\sigma = 6.038$ mho/m; $\epsilon_r = 46.593$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.317 W/kg

Body/Body/Zoom Scan 3 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.739 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 0.653 W/kg

SAR(1 g) = 0.166 W/kg; SAR(10 g) = 0.045 W/kg

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

Maximum value of SAR (measured) = 0.375 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.420 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.74 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.967 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 0.733 W/kg; SAR(10 g) = 0.178 W/kg

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

Maximum value of SAR (measured) = 1.57 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 6.976 V/m

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of Total (measured) = 7.317 V/m

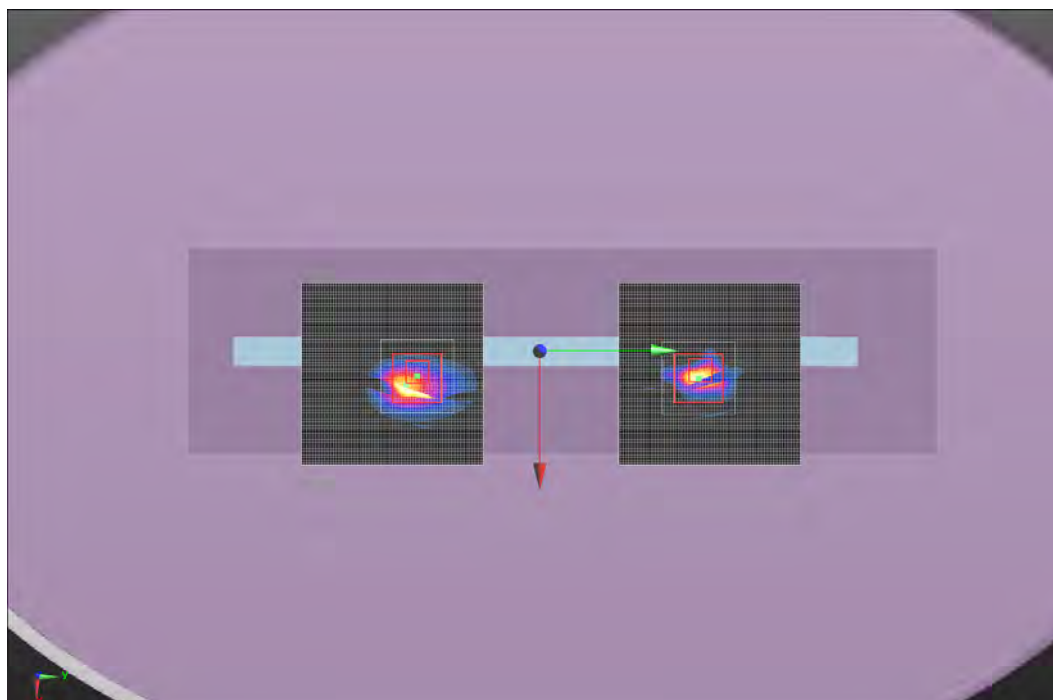
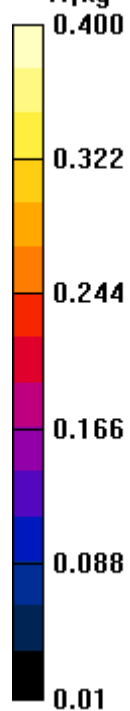
Maximum value of SAR (measured) = 0.323 W/kg



Approved By

Test 31

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.5
Date:	11/1/2012	Liquid Temperature (°C):	23.2
Serial Number:	unavailable	Humidity (%RH):	38.4
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 32

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5785 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5785$ MHz; $\sigma = 6.038$ mho/m; $\epsilon_r = 46.593$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.269 W/kg

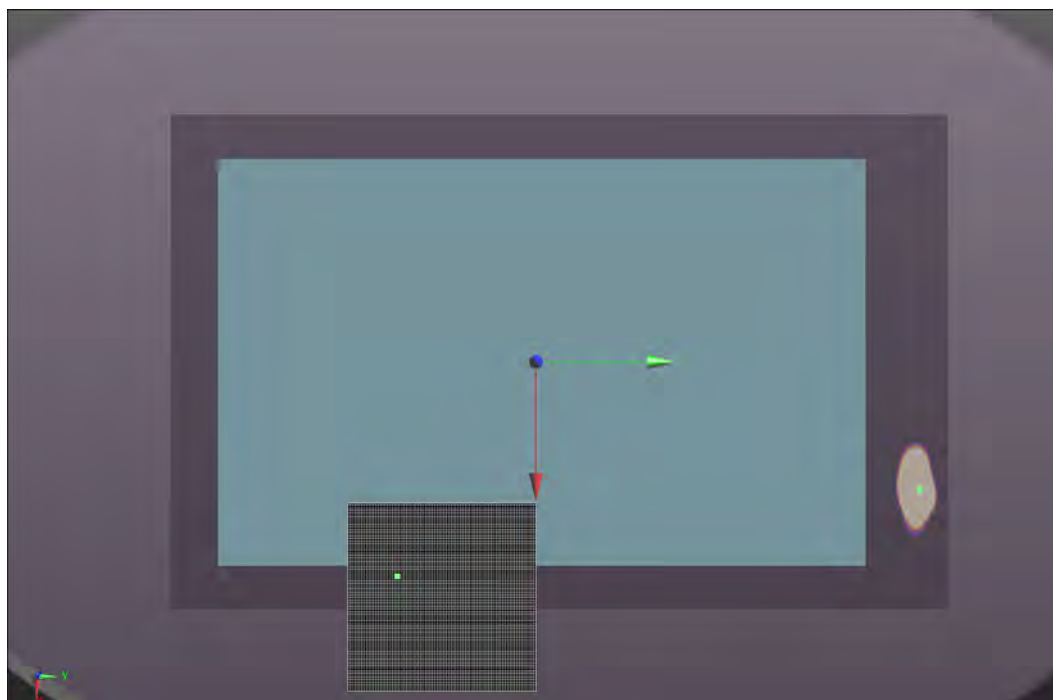
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.178 W/kg

 
Approved By

Test 32
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	20.1
Date:	12/10/2012	Liquid Temperature (°C):	23
Serial Number:	unavailable	Humidity (%RH):	46.5
Configuration:	3	Bar. Pressure (mb):	1017
Comments:	Power set to 12dBm		

Test 33e

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5190 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5190$ MHz; $\sigma = 5.293$ mho/m; $\epsilon_r = 47.598$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.188 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.060 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.06 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 20.237 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 4.06 W/kg

SAR(1 g) = 0.933 W/kg; SAR(10 g) = 0.236 W/kg

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

Maximum value of SAR (measured) = 1.94 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.214 V/m

Body/Body/Zoom Scan 2 (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 19.551 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.332 W/kg; SAR(10 g) = 0.101 W/kg

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

Maximum value of SAR (measured) = 0.694 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

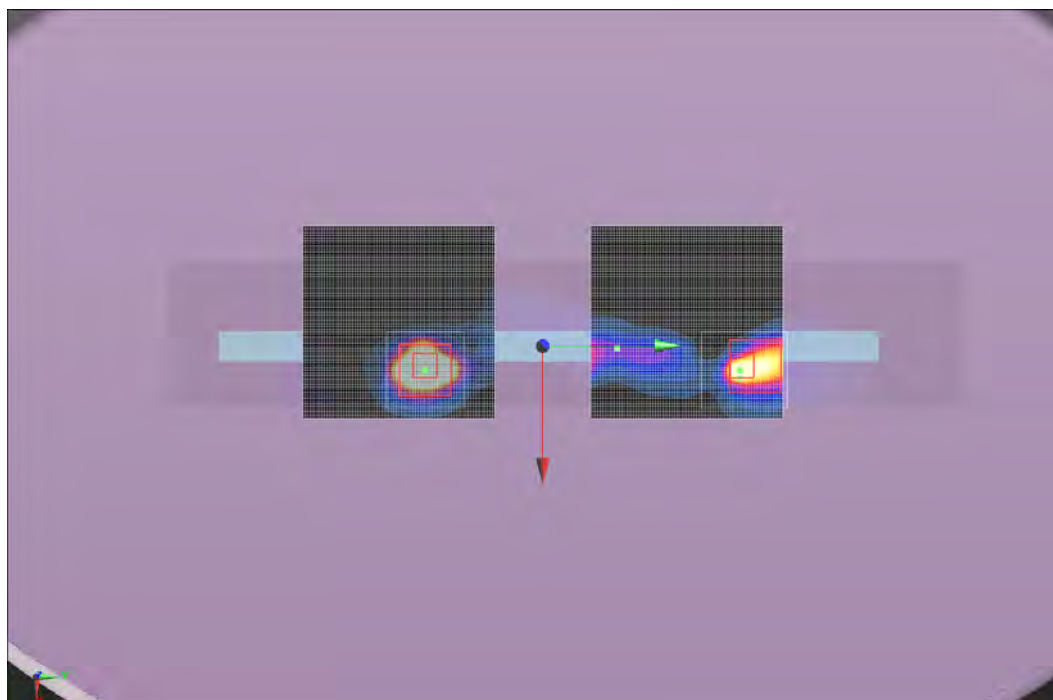
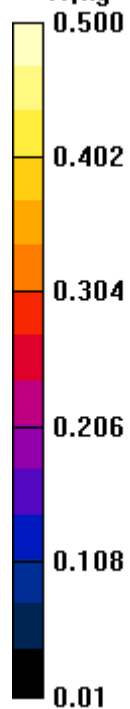
Maximum value of SAR (interpolated) = 0.774 W/kg

Maximum value of SAR (measured) = 0.435 W/kg



Approved By

Test 33e
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	19.6
Date:	12/10/2012	Liquid Temperature (°C):	22.5
Serial Number:	unavailable	Humidity (%RH):	41.2
Configuration:	3	Bar. Pressure (mb):	1017
Comments:	Power set to 12dBm		

Test 33f

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5230 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5230$ MHz; $\sigma = 5.345$ mho/m; $\epsilon_r = 47.53$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.150 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.903 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 2.04 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 21.106 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 3.81 W/kg

SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.228 W/kg

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

Maximum value of SAR (measured) = 2.21 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 10.03 V/m

Body/Body/Zoom Scan 2 (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 21.106 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 0.422 W/kg; SAR(10 g) = 0.138 W/kg

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

Maximum value of SAR (measured) = 0.867 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

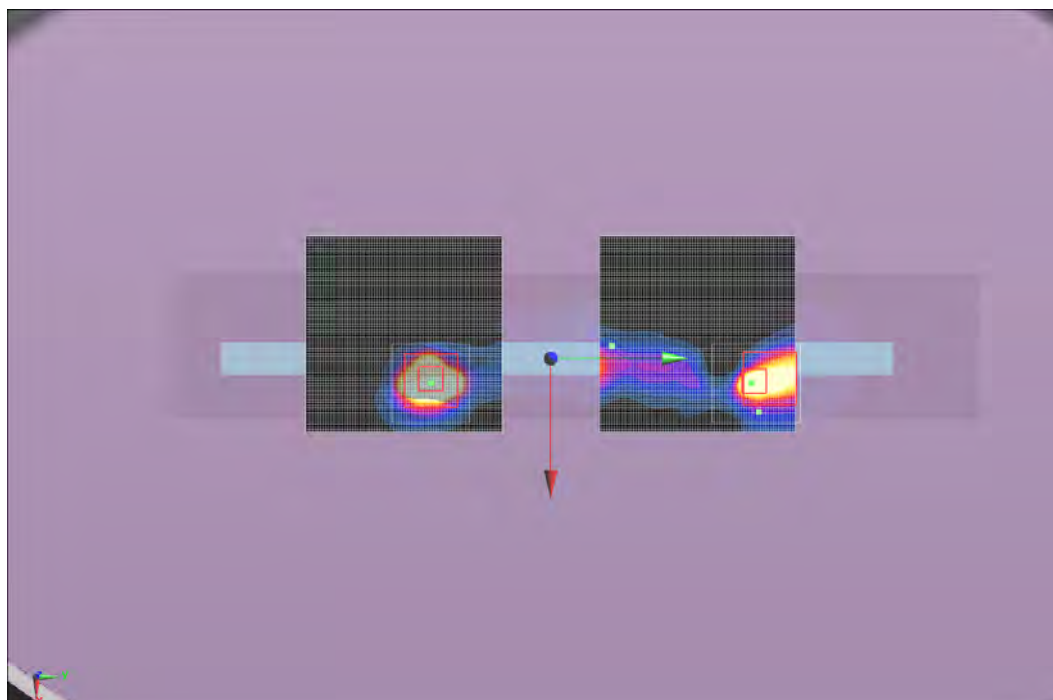
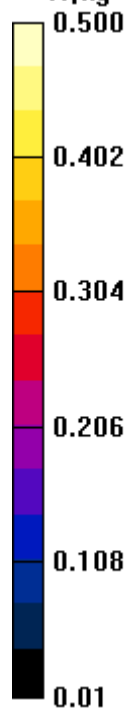
Maximum value of SAR (interpolated) = 0.910 W/kg

Maximum value of SAR (measured) = 0.524 W/kg



Approved By

Test 33f
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	11/1/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	40.6
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 34

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5230 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5230$ MHz; $\sigma = 5.345$ mho/m; $\epsilon_r = 47.53$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.175 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.282 W/kg

Body/Body/Zoom Scan (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.836 V/m; Power Drift = 0.25 dB

Peak SAR (extrapolated) = 0.458 W/kg

SAR(1 g) = 0.182 W/kg; SAR(10 g) = 0.087 W/kg

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

Maximum value of SAR (measured) = 0.317 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

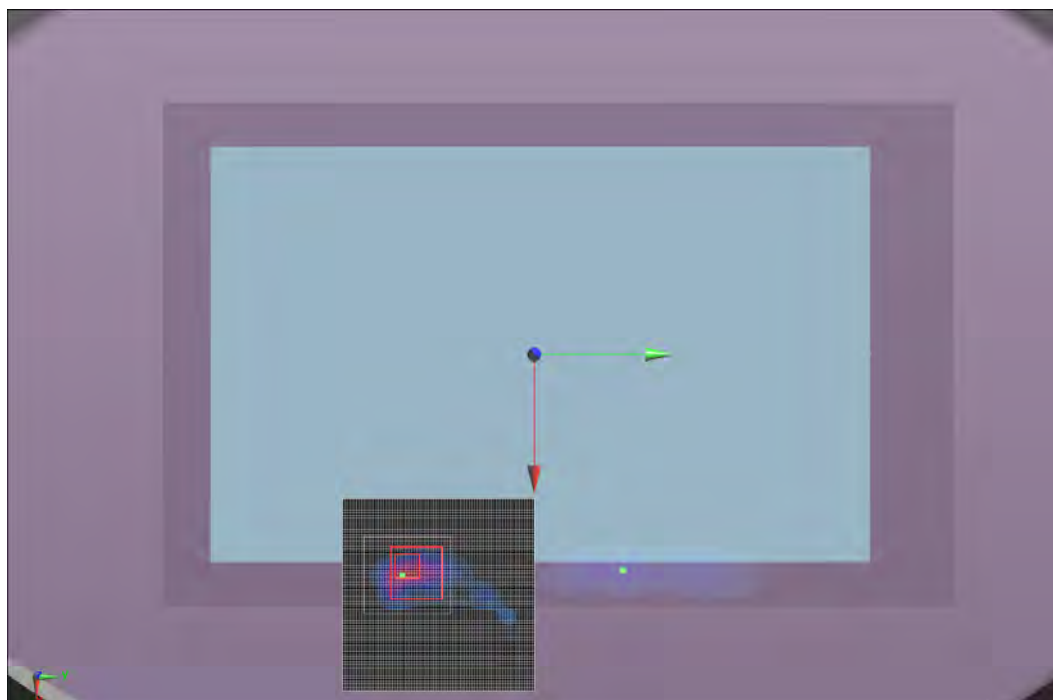
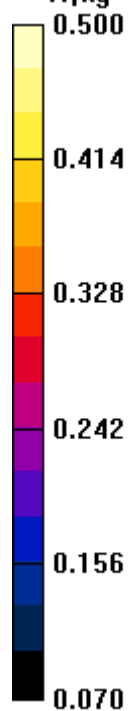
Maximum value of Total (measured) = 4.353 V/m

Maximum value of SAR (measured) = 0.101 W/kg

 
Approved By

Test 34

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	19.8
Date:	12/10/2012	Liquid Temperature (°C):	21.8
Serial Number:	unavailable	Humidity (%RH):	42
Configuration:	3	Bar. Pressure (mb):	1017
Comments:	Power set to 12dBm		

Test 35d

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5270 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5270$ MHz; $\sigma = 5.393$ mho/m; $\epsilon_r = 47.457$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASYS2 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.159 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.934 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.90 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 19.832 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 3.78 W/kg

SAR(1 g) = 0.896 W/kg; SAR(10 g) = 0.247 W/kg

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

Maximum value of SAR (measured) = 1.80 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.879 V/m

Body/Body/Zoom Scan 2 (10x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 19.057 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.916 W/kg

SAR(1 g) = 0.274 W/kg; SAR(10 g) = 0.111 W/kg

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

Maximum value of SAR (measured) = 0.646 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

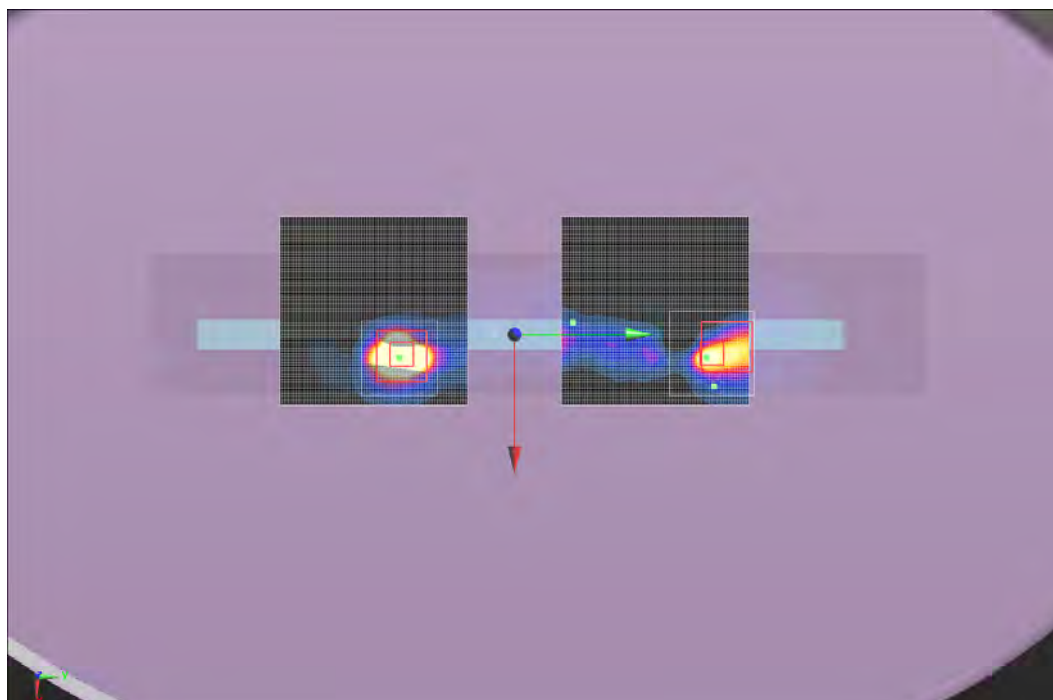
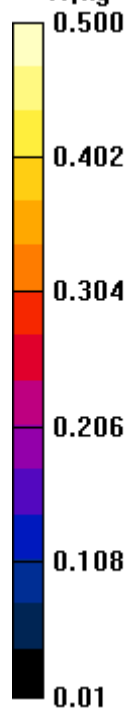
Maximum value of SAR (interpolated) = 0.686 W/kg

Maximum value of SAR (measured) = 0.430 W/kg



Approved By

Test 35d
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.1
Date:	12/10/2012	Liquid Temperature (°C):	22.2
Serial Number:	unavailable	Humidity (%RH):	36.6
Configuration:	3	Bar. Pressure (mb):	1017
Comments:	Power set to 12dBm		

Test 35e

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5310 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5310$ MHz; $\sigma = 5.44$ mho/m; $\epsilon_r = 47.381$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.214 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.297 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.87 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 20.076 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 3.94 W/kg

SAR(1 g) = 0.941 W/kg; SAR(10 g) = 0.239 W/kg

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

Maximum value of SAR (measured) = 1.87 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.240 V/m

Body/Body/Zoom Scan 2 (9x10x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 20.224 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 1.57 W/kg

SAR(1 g) = 0.379 W/kg; SAR(10 g) = 0.144 W/kg

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

Maximum value of SAR (measured) = 0.814 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

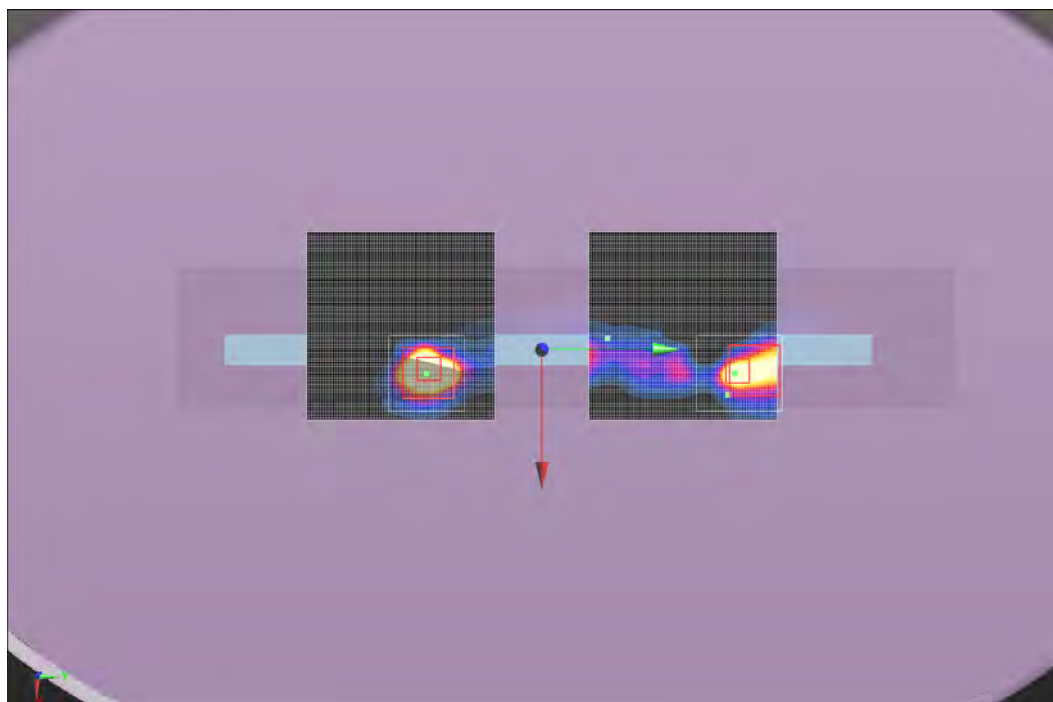
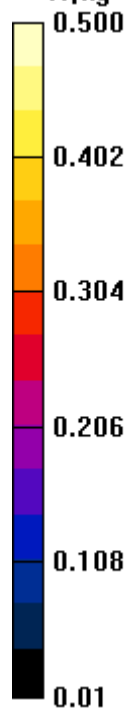
Maximum value of SAR (interpolated) = 0.825 W/kg

Maximum value of SAR (measured) = 0.470 W/kg



Approved By

Test 35e
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.8
Date:	11/1/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	43.5
Configuration:	1	Bar. Pressure (mb):	1012
Comments:	Power set to 13dBm		

Test 36

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5270 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5270$ MHz; $\sigma = 5.393$ mho/m; $\epsilon_r = 47.457$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.115 W/kg

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.277 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 7.761 V/m; Power Drift = -0.26 dB

Peak SAR (extrapolated) = 0.821 W/kg

SAR(1 g) = 0.155 W/kg; SAR(10 g) = 0.085 W/kg

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

Maximum value of SAR (measured) = 0.283 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

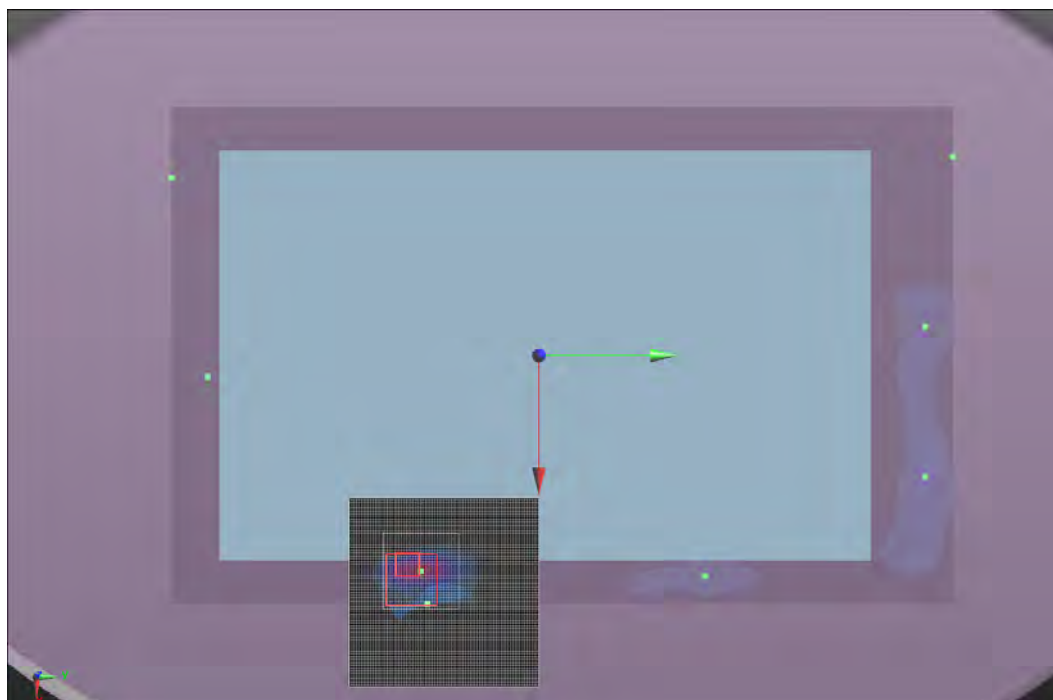
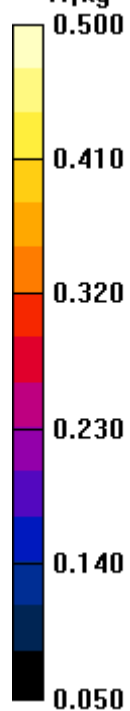
Maximum value of Total (measured) = 4.235 V/m

Maximum value of SAR (measured) = 0.0967 W/kg

 
Approved By

Test 36

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	20.8
Date:	12/11/2012	Liquid Temperature (°C):	20
Serial Number:	unavailable	Humidity (%RH):	43.4
Configuration:	3	Bar. Pressure (mb):	1004
Comments:	Power set to 12dBm		

Test 37b

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5510 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5510$ MHz; $\sigma = 5.693$ mho/m; $\epsilon_r = 47.12$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (31x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.377 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.363 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.300 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.61 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 17.476 V/m; Power Drift = -0.19 dB

Peak SAR (extrapolated) = 3.94 W/kg

SAR(1 g) = 0.869 W/kg; SAR(10 g) = 0.245 W/kg

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

Maximum value of SAR (measured) = 1.85 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.483 V/m

Body/Body/Zoom Scan 3 (9x11x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 16.469 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 0.634 W/kg

SAR(1 g) = 0.187 W/kg; SAR(10 g) = 0.059 W/kg

Info: Interpolated medium parameters used for SAR evaluation.

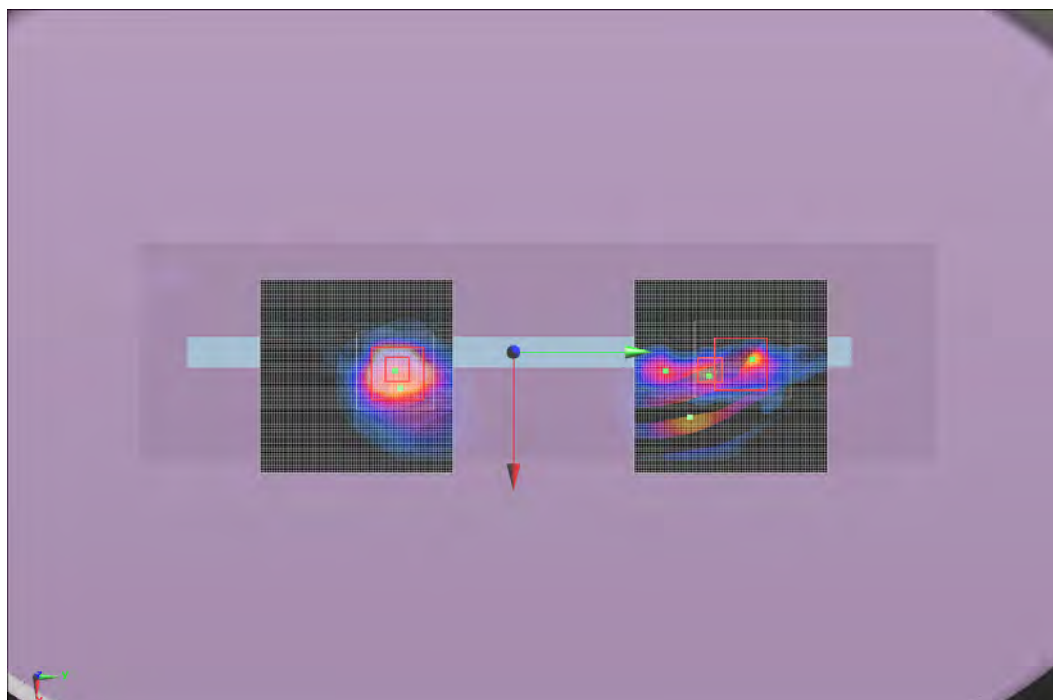
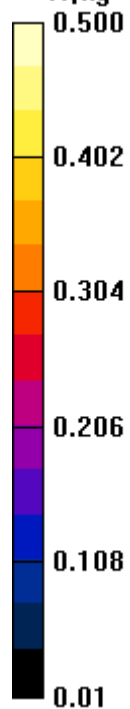
Maximum value of SAR (measured) = 0.435 W/kg

Maximum value of SAR (measured) = 0.392 W/kg



Approved By

Test 37b
W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	20.6
Date:	11/2/2012	Liquid Temperature (°C):	23.7
Serial Number:	unavailable	Humidity (%RH):	42.8
Configuration:	1	Bar. Pressure (mb):	1017
Comments:	Power set to 13dBm		

Test 38

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5510 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5510$ MHz; $\sigma = 5.693$ mho/m; $\epsilon_r = 47.12$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.209 W/kg

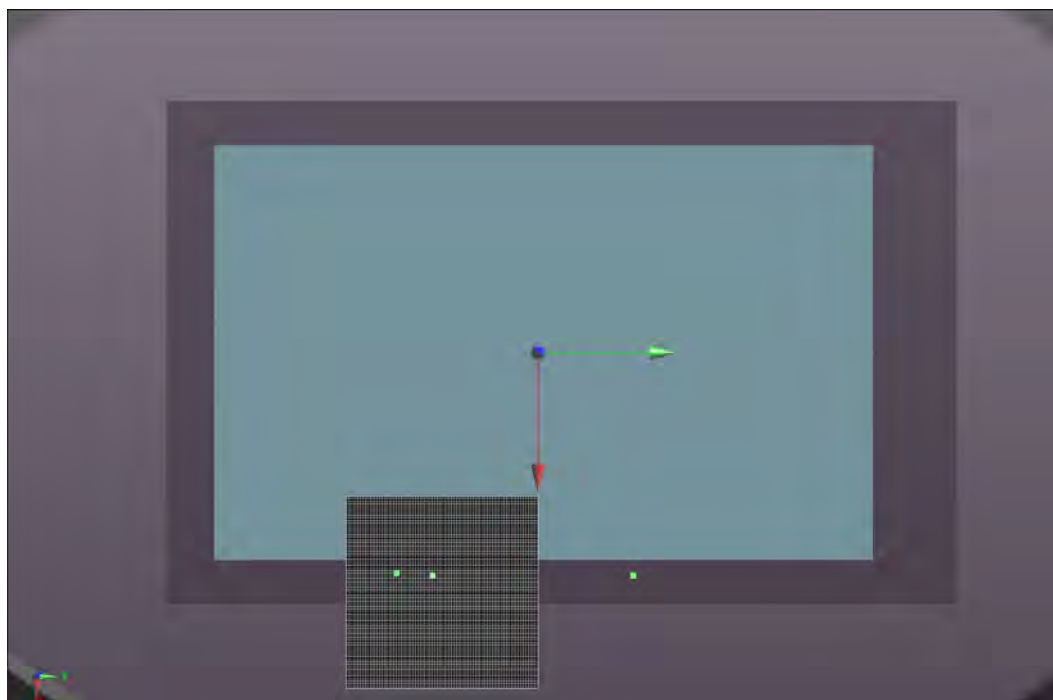
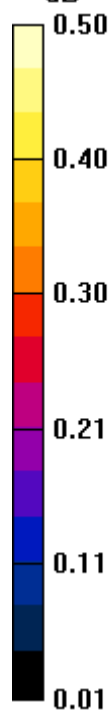
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 0.208 W/kg

 
Approved By

Test 38
dB



Tested By:	Ethan Schoonover	Room Temperature (°C):	21.6
Date:	11/6/2012	Liquid Temperature (°C):	23.1
Serial Number:	unavailable	Humidity (%RH):	46.6
Configuration:	1	Bar. Pressure (mb):	1018
Comments:	Power set to 13dBm		

Test 39

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5755 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5755$ MHz; $\sigma = 6$ mho/m; $\epsilon_r = 46.648$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.116 W/kg

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 7.101 V/m

Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

Maximum value of SAR (interpolated) = 1.43 W/kg

Body/Body/Zoom Scan (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.724 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 3.39 W/kg

SAR(1 g) = 0.700 W/kg; SAR(10 g) = 0.171 W/kg

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

Maximum value of SAR (measured) = 1.55 W/kg

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 7.097 V/m

Body/Body/Zoom Scan 2 (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm

Reference Value = 15.580 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 2.06 W/kg

SAR(1 g) = 0.182 W/kg; SAR(10 g) = 0.038 W/kg

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

Maximum value of SAR (measured) = 0.344 W/kg

Body/Body/Area scan 2 (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.346 W/kg

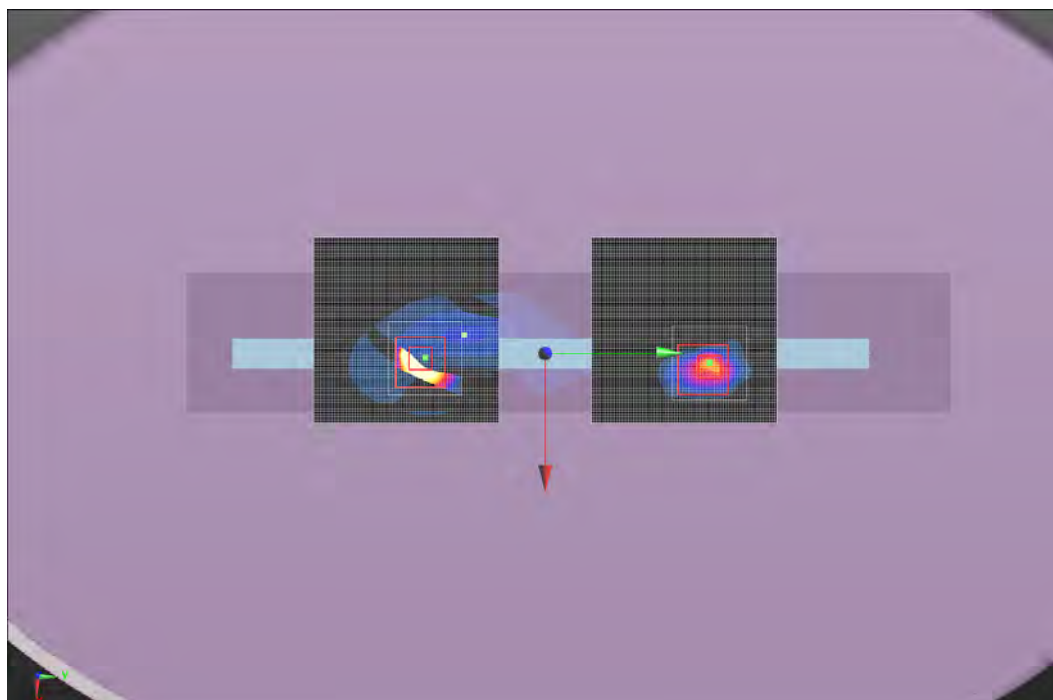
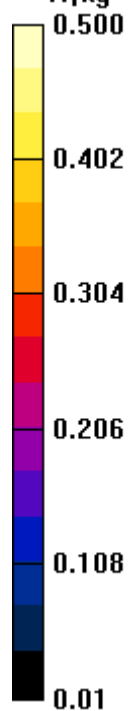
Maximum value of SAR (measured) = 0.303 W/kg



Approved By

Test 39

W/kg



Tested By:	Ethan Schoonover	Room Temperature (°C):	20.8
Date:	11/2/2012	Liquid Temperature (°C):	23.7
Serial Number:	unavailable	Humidity (%RH):	43.2
Configuration:	1	Bar. Pressure (mb):	1017
Comments:	Power set to 13dBm		

Test 40

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5755 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 5755$ MHz; $\sigma = 6$ mho/m; $\epsilon_r = 46.648$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0931 W/kg

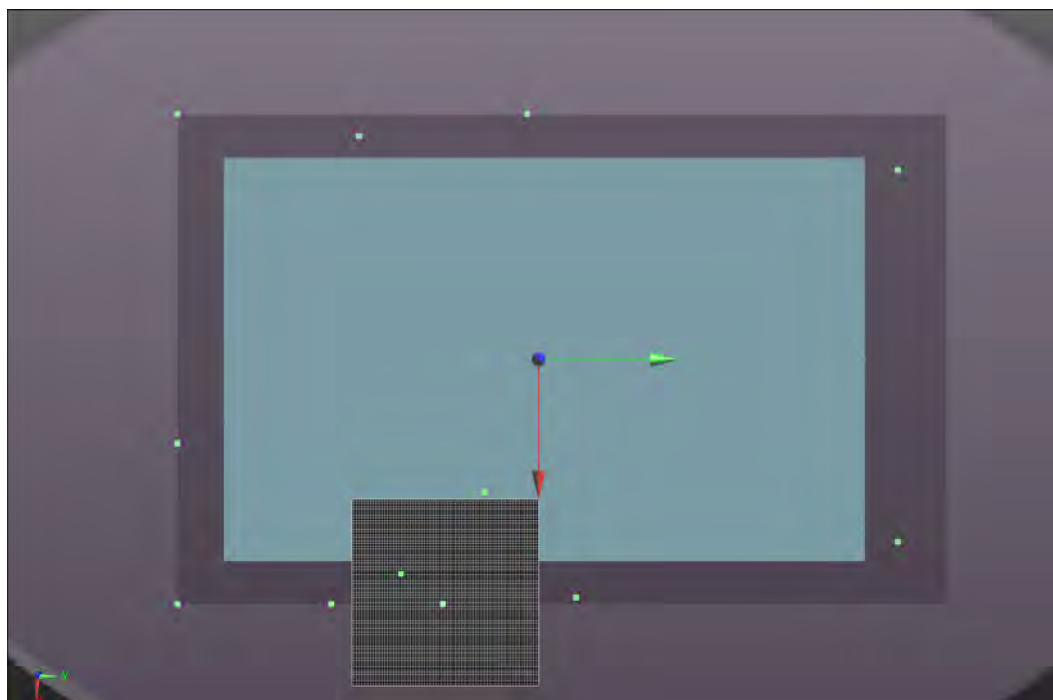
Body/Body/Area scan (81x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

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

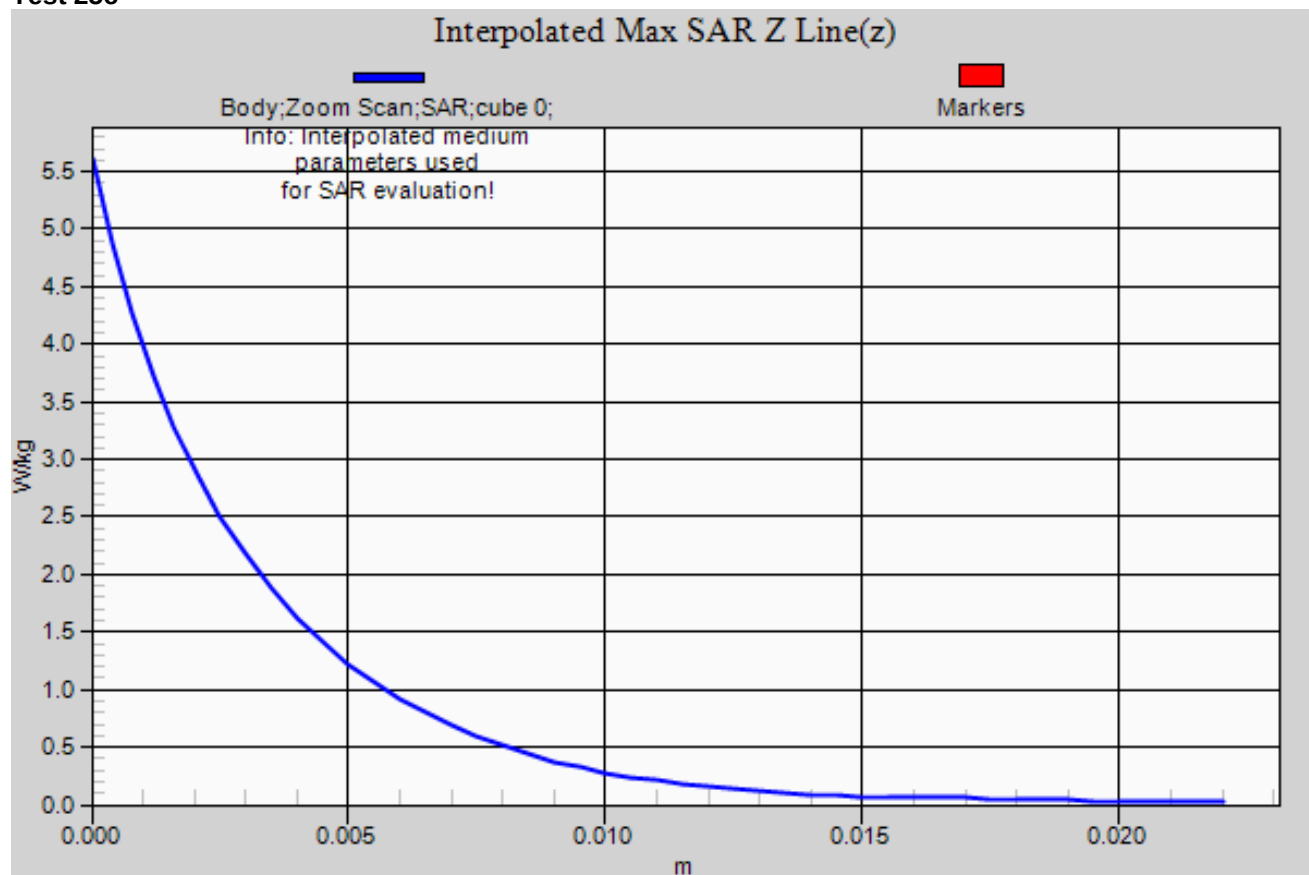
Maximum value of SAR (interpolated) = 0.186 W/kg

 
Approved By

Test 40
dB



Test 25c



EUT:	1514 (SAR)	Work Order:	MCSO1635
Customer:	Microsoft Corporation	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2011 FCC 15.247:2011 FCC 15.407:2001	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 248227 D01 V01r02 FCC KDB 616217 D03 V01 FCC 865664
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Accessory	EUT Position	EUT Power Setting	SAR Drift During Test (dB)	Measured 1g SAR Level (mW/g)	Test #
Body	2.4	2437	4/8	MCS07	40	A	None	Top	16dBm	-0.06	0.228	1
Body	2.4	2437	4/8	MCS07	40	A	None	Back	16dBm	N/A	0.097	2
Body	2.4	2437	6	1	20	A	None	Top	16dBm	0.02	0.232	3
Body	2.4	2437	6	1	20	A	None	Back	16dBm	N/A	0.067	4

Tested By:	Ethan Schoonover	Room Temperature (°C):	24.2
Date:	11/7/2012	Liquid Temperature (°C):	22.4
Serial Number:	000006124053	Humidity (%RH):	40.2
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 1

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.546 V/m

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.320 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.287 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.036 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.525 W/kg

SAR(1 g) = 0.228 W/kg; SAR(10 g) = 0.107 W/kg

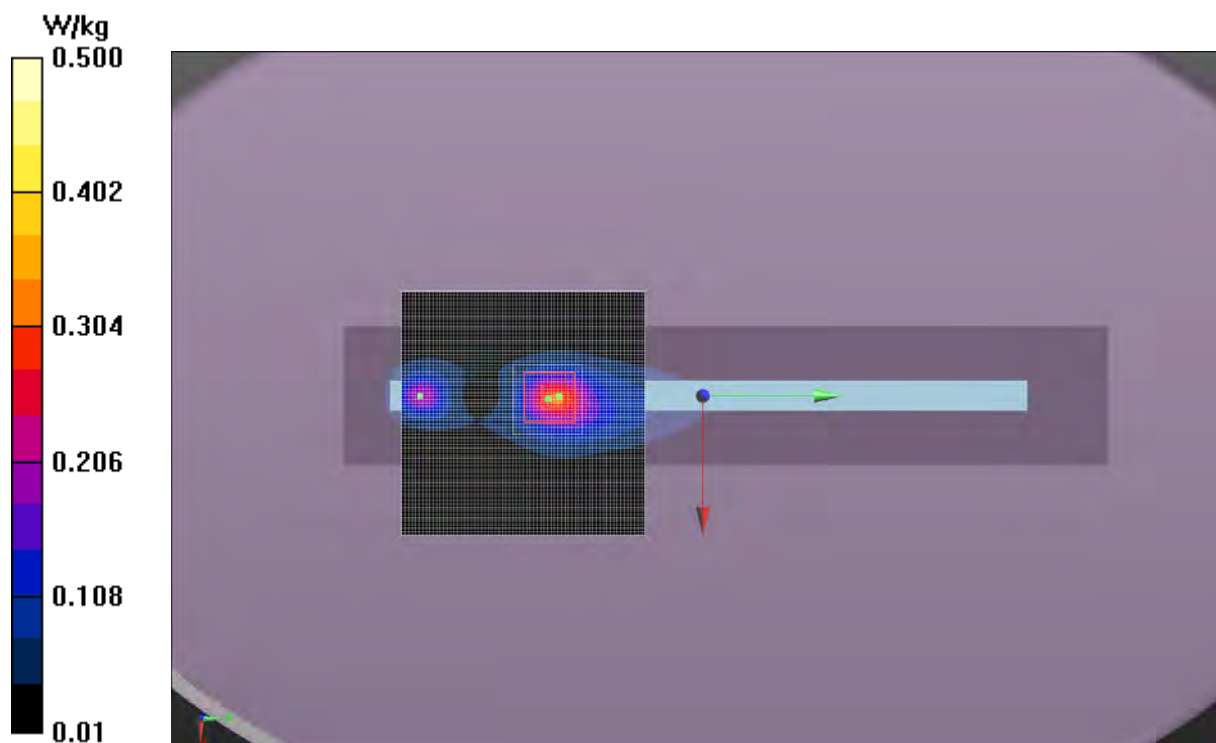
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.301 W/kg

Maximum value of SAR (measured) = 0.142 W/kg

 
Approved By

Test 1



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.0
Date:	11/7/2012	Liquid Temperature (°C):	22.3
Serial Number:	000006124053	Humidity (%RH):	43.9
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 2

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0611 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.0967 W/kg

Body/Body/Area scan (8x8x1): Measurement grid: dx=15mm, dy=15mm

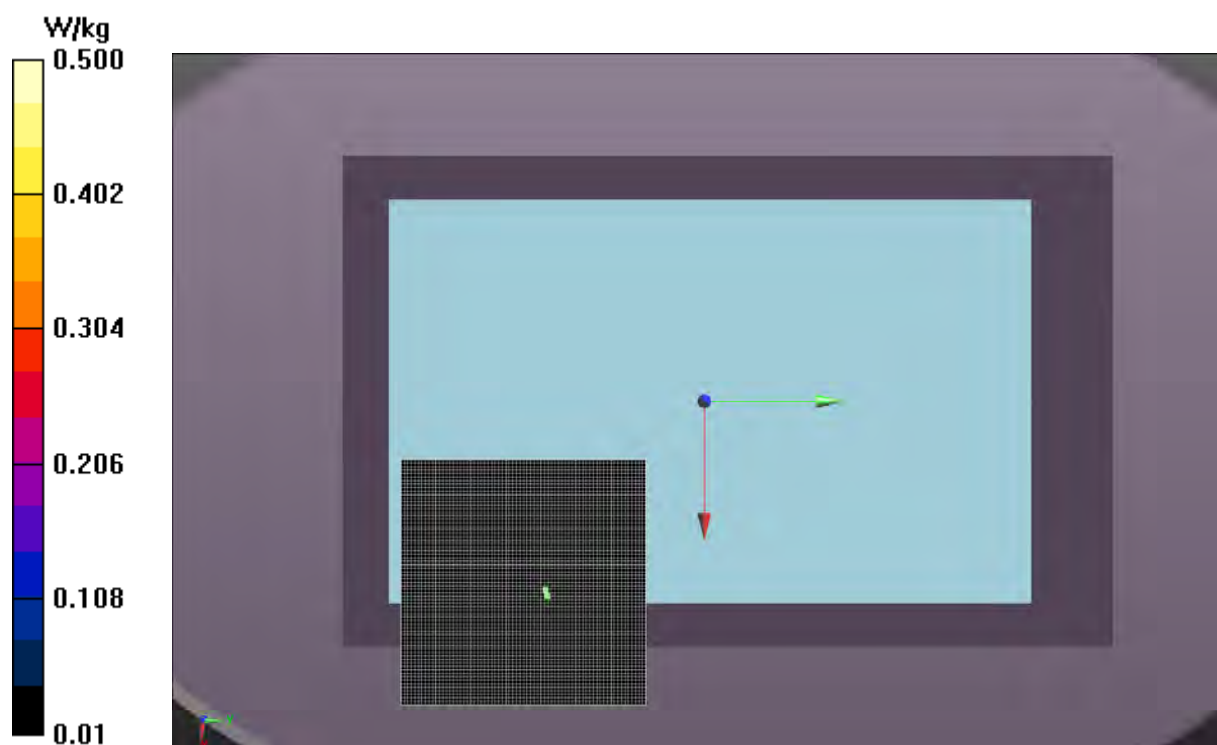
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0920 W/kg

Approved By

Test 2



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.3
Date:	11/7/2012	Liquid Temperature (°C):	22.3
Serial Number:	000006124053	Humidity (%RH):	40.8
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 3

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.683 V/m

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.319 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.289 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.107 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.536 W/kg

SAR(1 g) = 0.232 W/kg; SAR(10 g) = 0.107 W/kg

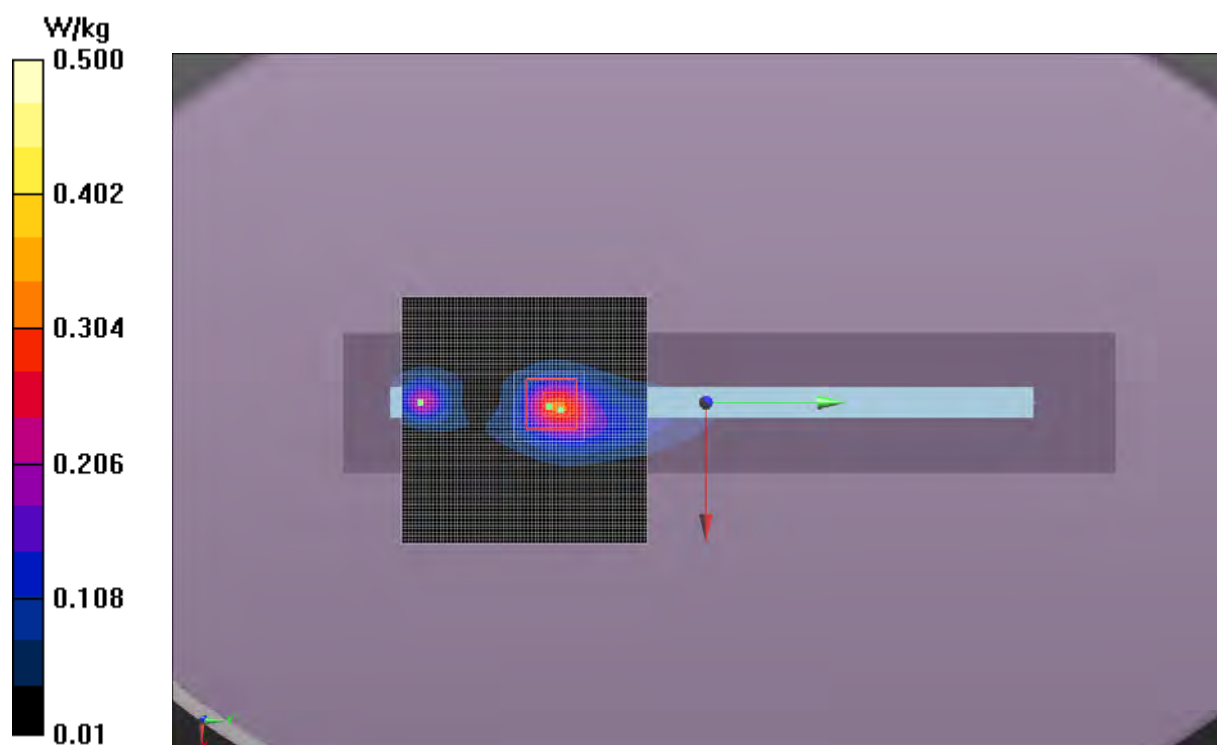
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.308 W/kg

Maximum value of SAR (measured) = 0.146 W/kg

 
Approved By

Test 3



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.2
Date:	11/7/2012	Liquid Temperature (°C):	22.4
Serial Number:	000006124053	Humidity (%RH):	42.2
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 4

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.0401 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.0666 W/kg

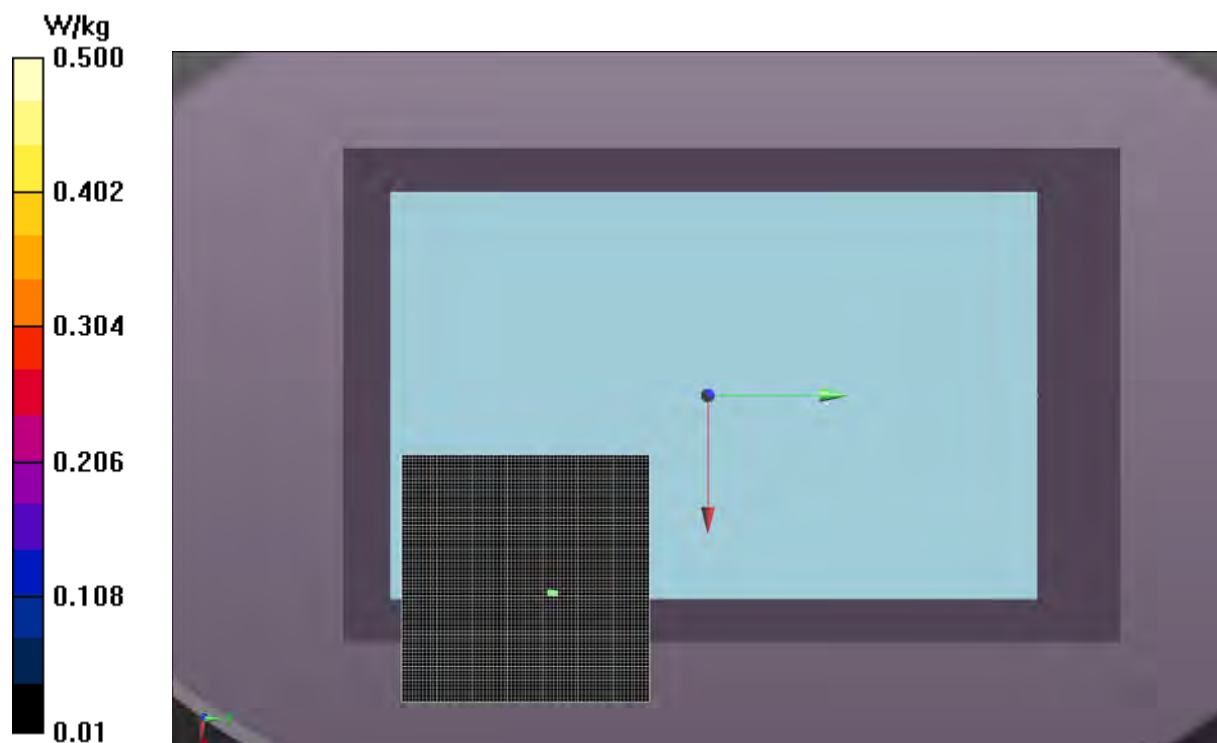
Body/Body/Area scan (8x8x1): Measurement grid: dx=15mm, dy=15mm

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

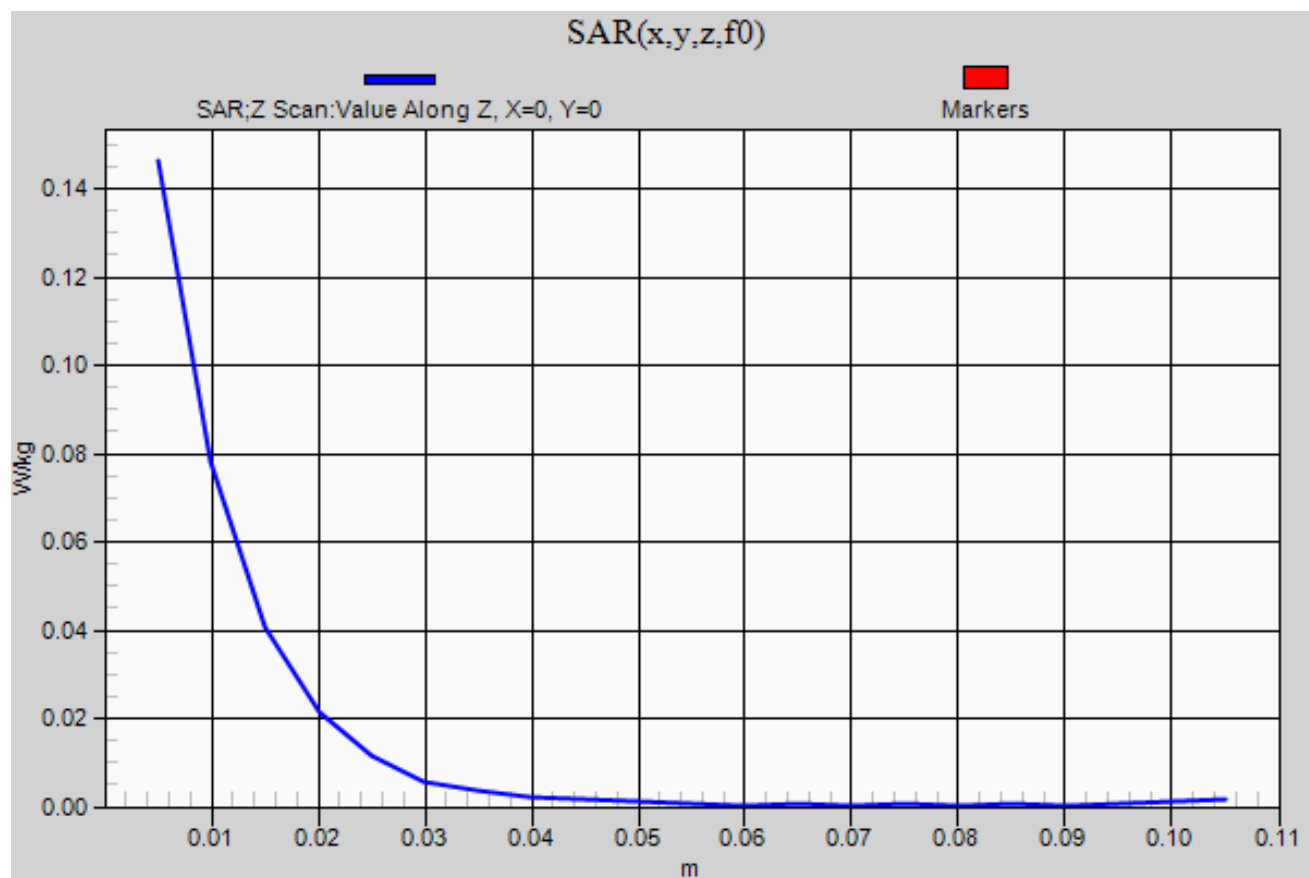
Maximum value of SAR (measured) = 0.0650 W/kg

 
Approved By

Test 4



Test 3



EUT:	1514 (SAR)	Work Order:	MCSO1635
Customer:	Microsoft Corporation	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 2.1093:2011 FCC 15.247:2011 FCC 15.407:2001	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 248227 D01 V01r02 FCC KDB 616217 D03 V01 FCC 865664
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Accessory	EUT Position	EUT Power Setting	SAR Drift During Test (dB)	Measured 1g SAR Level (mW/g)	Test #
Body	2.4	2437	6	MCS15	20	A&B	None	Top	16dBm	0.06	0.313	5
Body	2.4	2437	6	MCS15	20	A&B	None	Back	16dBm	0.13	0.203	6
Body	2.4	2452	7/11	MCS15	40	A&B	None	Top	16dBm	0.11	0.328	7
Body	2.4	2452	7/11	MCS15	40	A&B	None	Back	16dBm	0.17	0.196	8

Tested By:	Ethan Schoonover	Room Temperature (°C):	22.8
Date:	11/7/2012	Liquid Temperature (°C):	22.2
Serial Number:	000006124053	Humidity (%RH):	41.6
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 5

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.669 V/m

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 8.456 V/m

Body/Body/Area scan 2 (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.392 W/kg

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.406 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.285 W/kg

Body/Body/Zoom Scan 3 (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 11.994 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.675 W/kg

SAR(1 g) = 0.313 W/kg; SAR(10 g) = 0.153 W/kg

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

Maximum value of SAR (measured) = 0.405 W/kg

Body/Body/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.012 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.382 W/kg

SAR(1 g) = 0.165 W/kg; SAR(10 g) = 0.069 W/kg

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

Maximum value of SAR (measured) = 0.221 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.012 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.480 W/kg

SAR(1 g) = 0.221 W/kg; SAR(10 g) = 0.108 W/kg

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

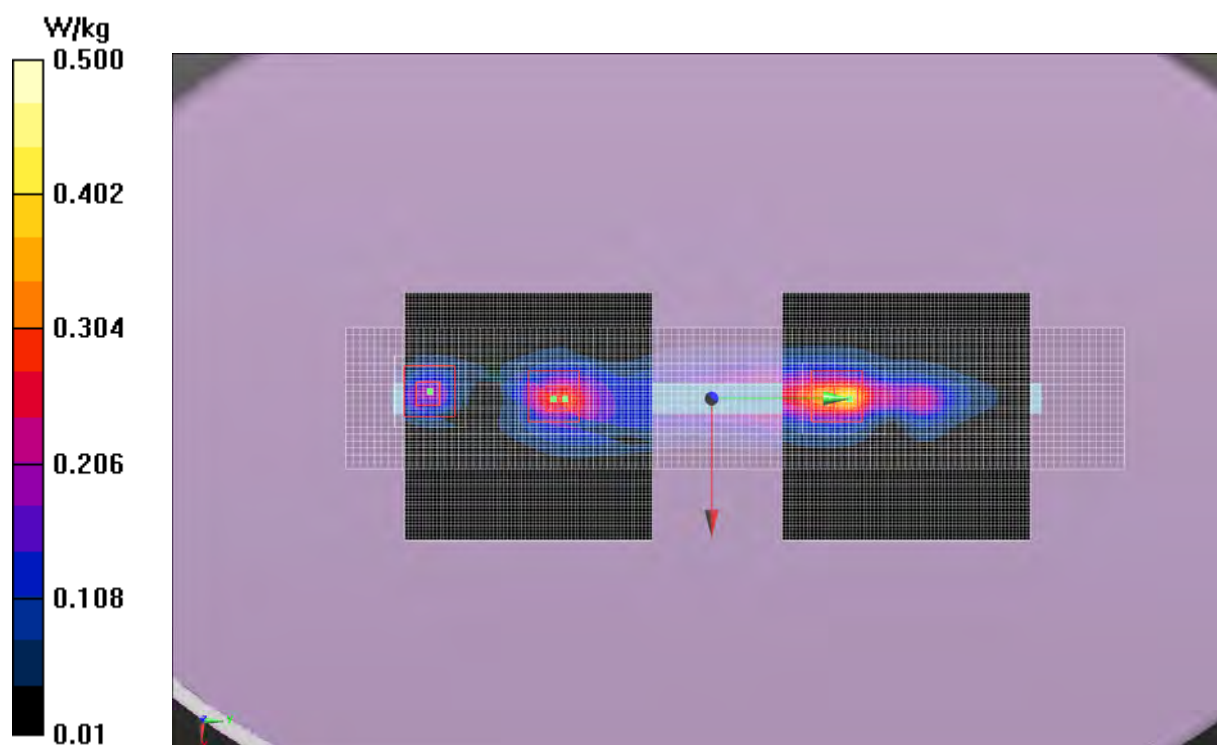
Maximum value of SAR (measured) = 0.286 W/kg

Maximum value of SAR (measured) = 0.146 W/kg



Approved By

Test 5



Tested By:	Ethan Schoonover	Room Temperature (°C):	23.0
Date:	11/7/2012	Liquid Temperature (°C):	21.6
Serial Number:	000006124053	Humidity (%RH):	44.4
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 6

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2437 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2437$ MHz; $\sigma = 1.94$ mho/m; $\epsilon_r = 50.401$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 3.826 V/m

Body/Body/Reference scan (71x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.127 W/kg

Body/Body/Area scan 2 (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.284 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.0853 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.293 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.517 W/kg

SAR(1 g) = 0.203 W/kg; SAR(10 g) = 0.085 W/kg

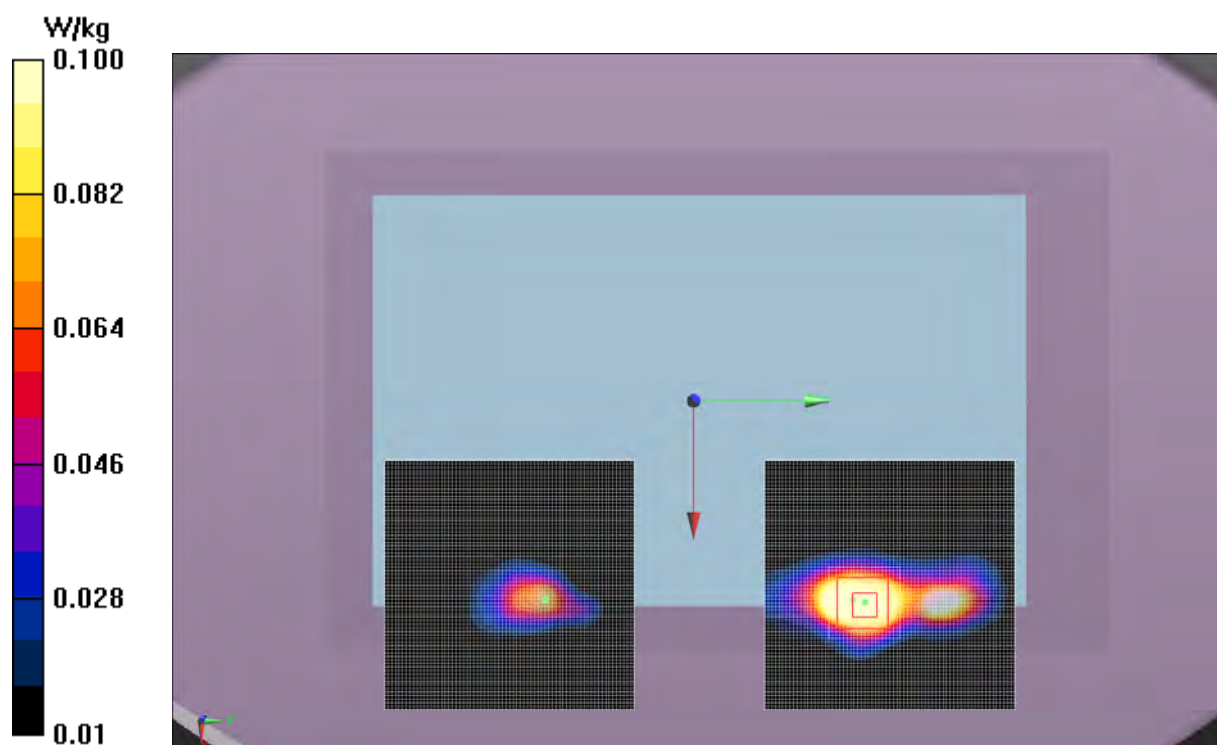
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.280 W/kg

Maximum value of SAR (measured) = 0.0284 W/kg

 
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Test 6



Tested By:	Ethan Schoonover	Room Temperature (°C):	22.3
Date:	11/7/2012	Liquid Temperature (°C):	22.0
Serial Number:	000006124053	Humidity (%RH):	43.6
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 7

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2452

MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2452$ MHz; $\sigma = 1.959$ mho/m; $\epsilon_r = 50.351$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan 2 (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.185 V/m

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 9.127 V/m

Body/Body/Area scan 2 (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.420 W/kg

Body/Body/Reference scan (21x111x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

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

Maximum value of SAR (interpolated) = 0.424 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.316 W/kg

Body/Body/Zoom Scan 3 (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.745 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.734 W/kg

SAR(1 g) = 0.328 W/kg; SAR(10 g) = 0.157 W/kg

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

Maximum value of SAR (measured) = 0.431 W/kg

Body/Body/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.729 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.435 W/kg

SAR(1 g) = 0.190 W/kg; SAR(10 g) = 0.079 W/kg

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

Maximum value of SAR (measured) = 0.253 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.729 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.555 W/kg

SAR(1 g) = 0.254 W/kg; SAR(10 g) = 0.122 W/kg

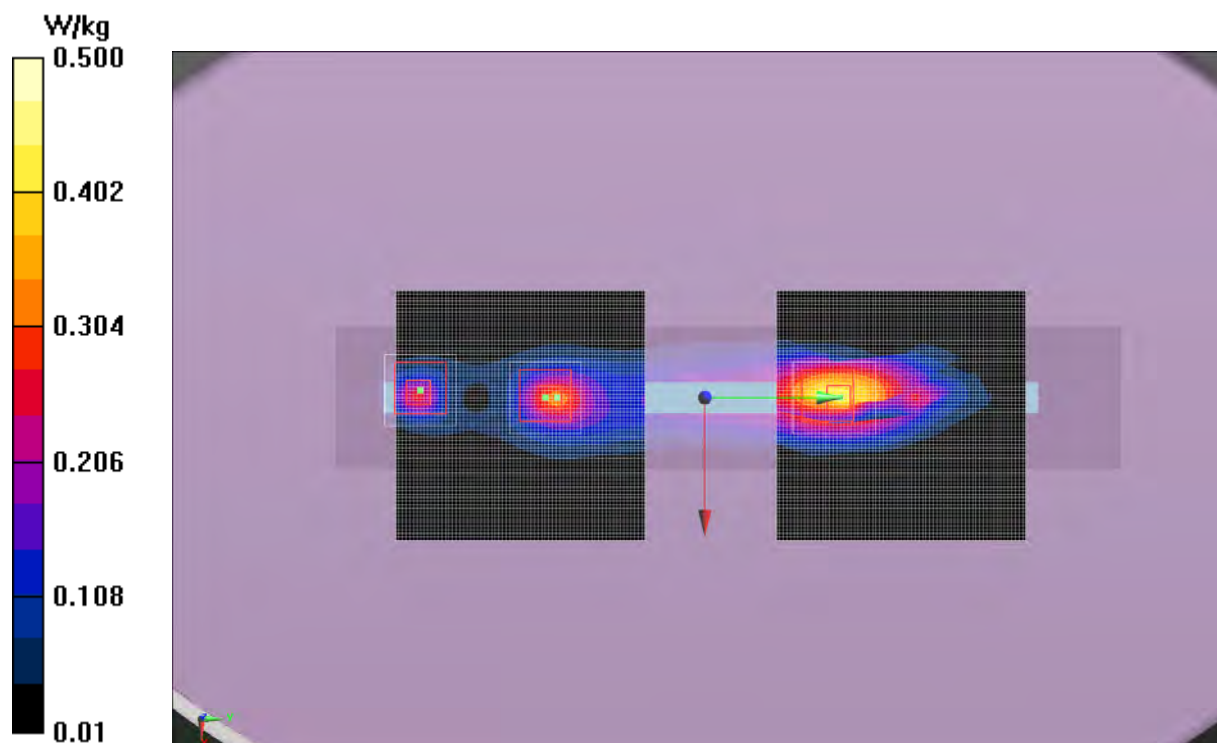
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.328 W/kg

Maximum value of SAR (measured) = 0.165 W/kg

 
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Test 7



Tested By:	Ethan Schoonover	Room Temperature (°C):	24.2
Date:	11/7/2012	Liquid Temperature (°C):	22.3
Serial Number:	000006124053	Humidity (%RH):	42.2
Configuration:	MCSO1635-1	Bar. Pressure (mb):	1021
Comments:	None		

Test 8

DUT: Tablet; Type: TBD; Serial: MB0003

Communication System: CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2452 MHz; Communication System PAR: 0 dB; PMF: 1

Medium parameters used: $\sigma = 0$ mho/m, $\epsilon_r = 1$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 2452$ MHz; $\sigma = 1.959$ mho/m; $\epsilon_r = 50.351$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY Configuration:

- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

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

Maximum value of Total (measured) = 4.007 V/m

Body/Body/Area scan 2 (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.275 W/kg

Body/Body/Area scan (71x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

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

Maximum value of SAR (interpolated) = 0.0740 W/kg

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 6.118 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.502 W/kg

SAR(1 g) = 0.196 W/kg; SAR(10 g) = 0.082 W/kg

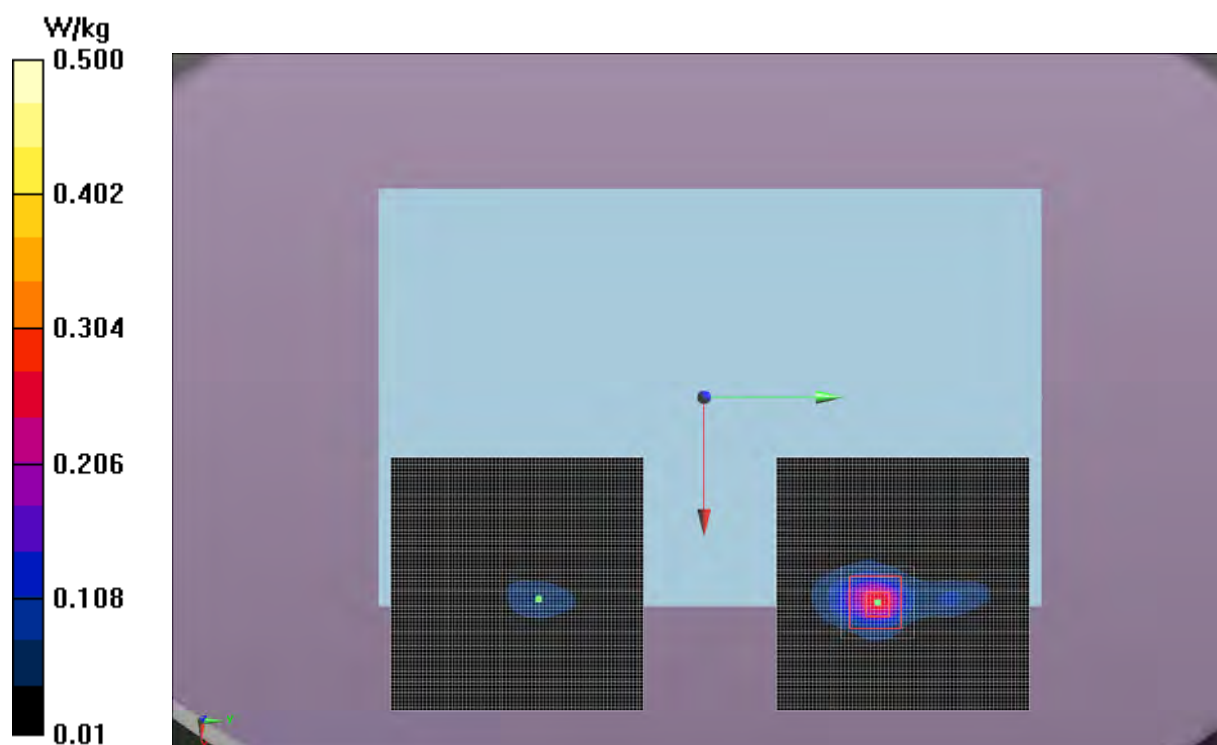
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.274 W/kg

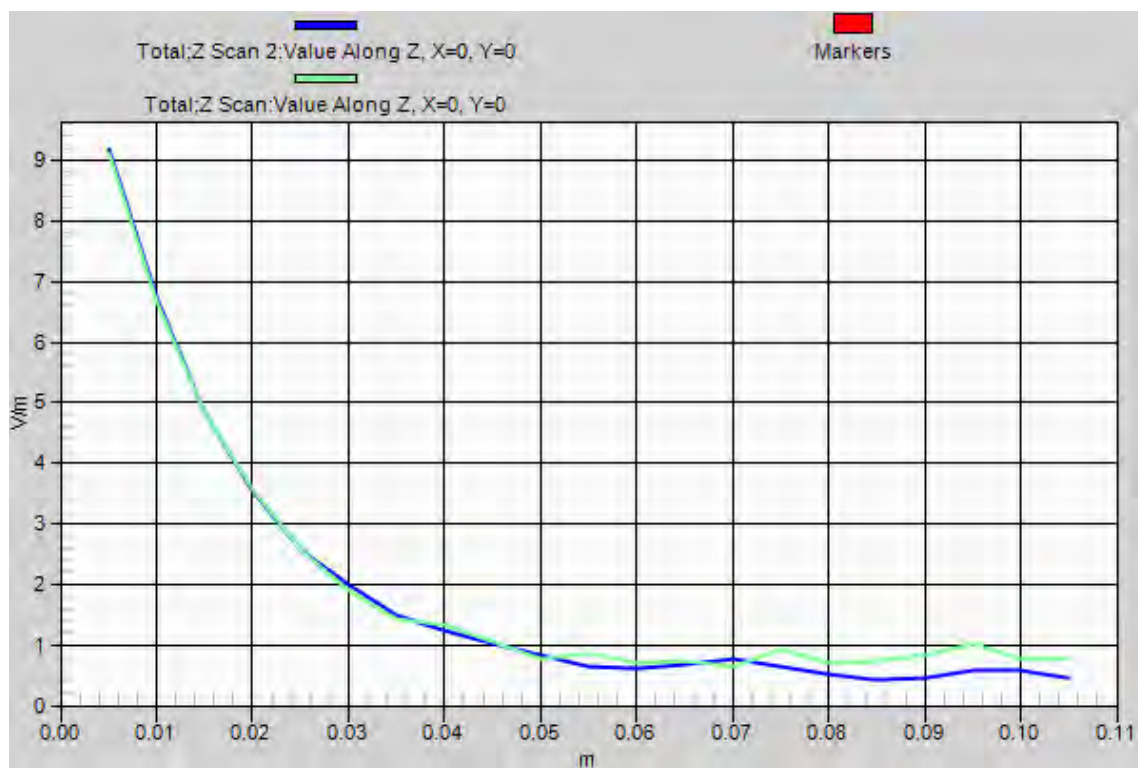
Maximum value of SAR (measured) = 0.0315 W/kg

 
Approved By

Test 8



Test 7

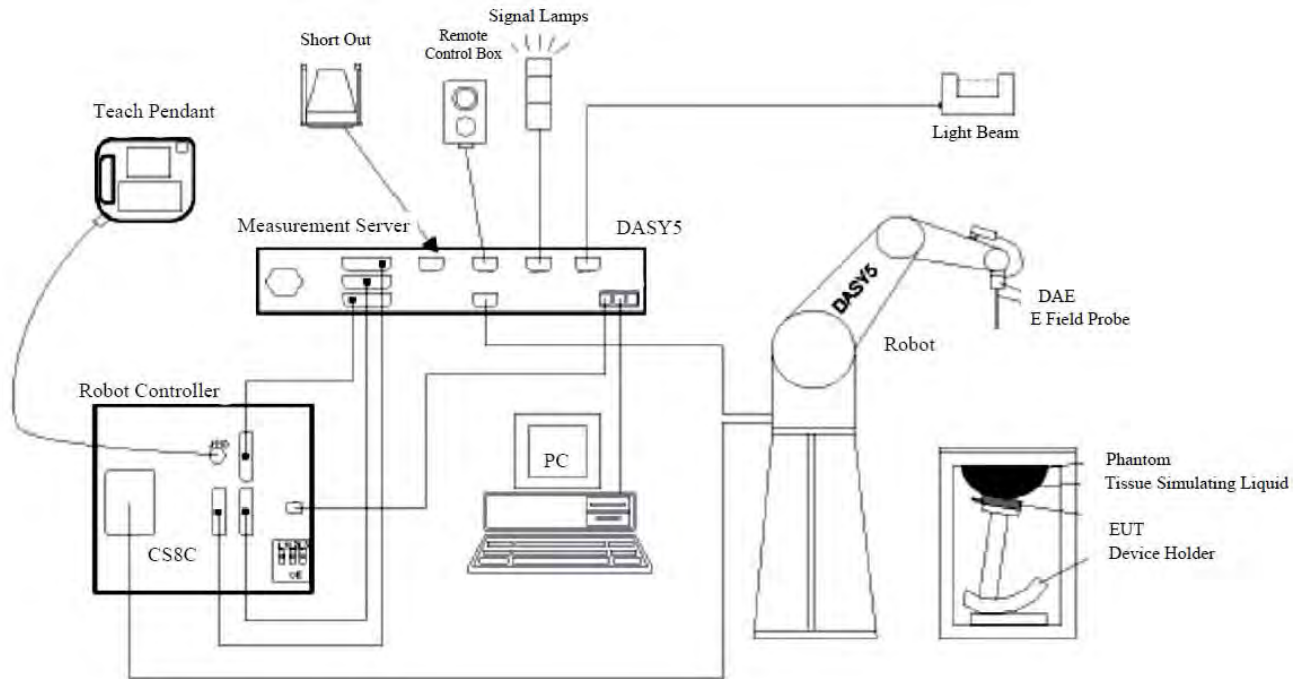


SAR MEASUREMENT SYSTEM

Schmid & Partner Engineering AG, DASY52

Northwest EMC selected the leader in SAR evaluation systems to provide the measurement tools for this evaluation. SPEAG's DASY52 is the fastest and most accurate scanner on the market. It is fully compatible with all world-wide standards for transmitters operating at the ear or within 20cm of the body. It provides full compatibility with IEC 62209-1, IEC 62209-2, IEEE 1528 as well as national adaptations such as FCC OET-65c and Korean Std. MIC #2000-93

The DASY52 system for performing compliance tests consists of the following items:



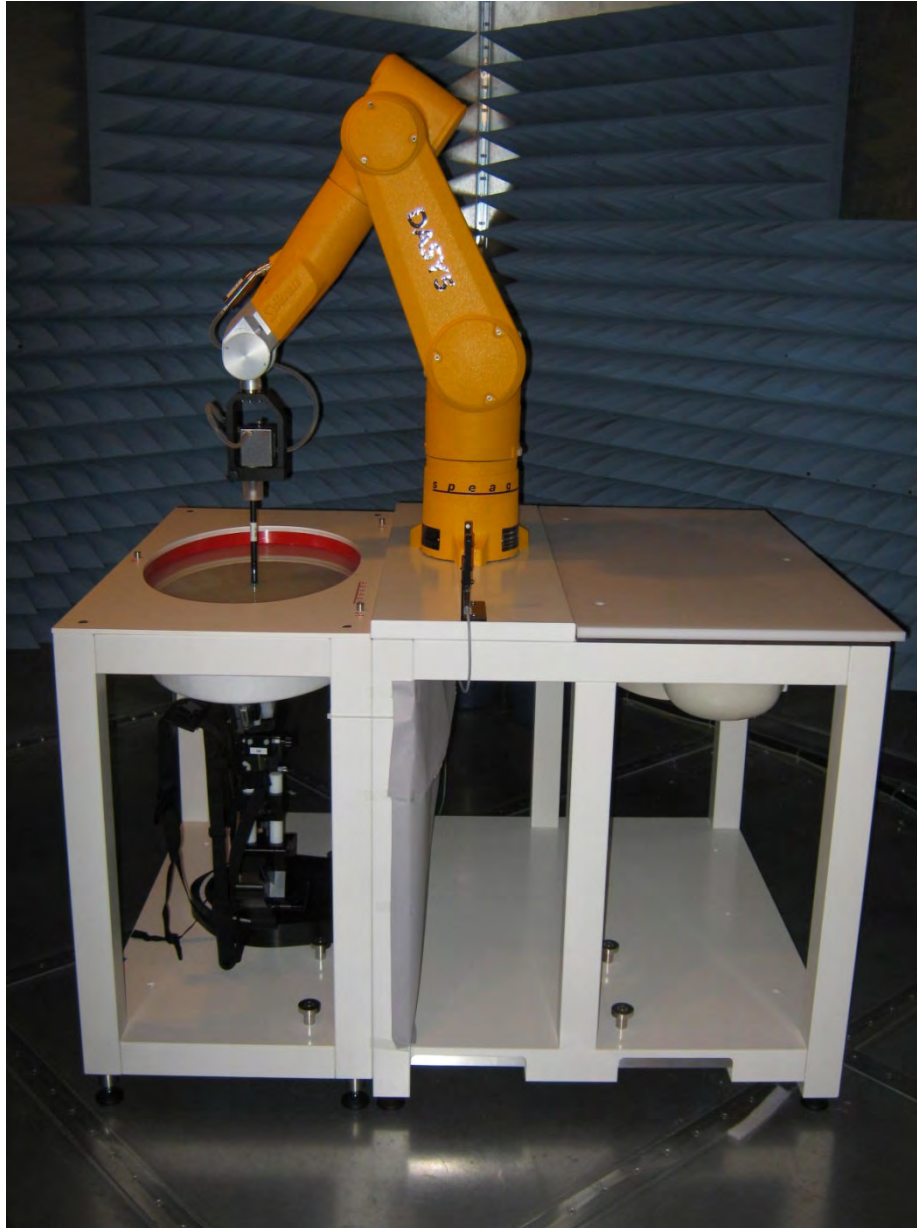
- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) 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 and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom, oval flat phantom, device holder, tissue simulating liquids, and validation dipole kits.

TEST SITE

Northwest EMC, Lab EV08

The SAR measurement system is located in a semi-anechoic chamber. This provides an ambient free environment that also eliminates reflections.

The chamber is 12 ft wide by 16 ft long x 8 ft high. A dedicated HVAC unit provides +/- 1 degree C temperature control.



TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Antenna, Dipole 2450MHz SAR	SPEAG	D2450V2	ADL	12/09/2011	12 mo
Humidity Temperature Meter	Omegaette	HH311	DTX	03/29/2011	24 mo
Humidity Temperature Meter	Omegaette	HH311	DTY	03/29/2011	24 mo
Dielectric Probe Kit	Agilent	85070E	IPP	09/08/2010	36 mo
Network Analyzer	Hewlett Packard	N5230A	NAD	06/19/2012	12 mo
Robot Arm	Staeubli	TX60LSPEAG	SAA	NCR	0 mo
Phantom, 2mm Oval ELI4 (Body)	SPEAG	QD OVA 001 BB	SAC	NCR	0 mo
Light Beam Unit	SPEAG	SE UKS 030 AA	SAD	NCR	0 mo
Robot Controller	Staeubli	CS8C	SAI	NCR	0 mo
Robot Chasis and power Supply	Staeubli	N/A	SAJ	NCR	0 mo
DASY5 Measurement Server	Staeubli	DAYS5	SAK	NCR	0 mo
Body Solution	SPEAG	MSL 2450	SAM	Within 24 hours from start of test	
Device Holder	SPEAG	N/A	SAW	NCR	0 mo
Power Sensor	Agilent	E9300H	SQO	06/06/2011	24 mo
Power Meter	Agilent	N1913A	SQR	06/06/2011	24 mo
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0 mo
Amplifier	Mini Circuits	ZVE-3W-83+	TTA	NCR	0 mo
Antenna, Dipole 5.1-5.8GHz SAR	SPEAG	D5GHzV2	ADM	12/14/2011	12 mo
Body Solution	SPEAG	MSL 501	SAV	Within 24 hours from start of test	
SAR Probe	SPEAG	EX3DV4	R078	10/25/2012	12 mo
DAE4	SPEAG	SD000D04BK	R079	04/11/2012	12 mo
SAR Probe	SPEAG	ES3DV3	R080	02/24/2012	12 mo

MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2003

300-3000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	u_i (1g) (+/-%)	u_i (10g) (+/-%)	v_i
Measurement System								
Probe calibration (k=1)	5.5	normal	1	1	1	5.5	5.5	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.4	rectangular	1.732	1	1	0.2	0.2	∞
Probe positioner with respect to phantom shell	2.9	rectangular	1.732	1	1	1.7	1.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty	RSS					11.2	10.6	387
Expanded Measurement Uncertainty (95% Confidence/	normal (k=2)					22.5	21.2	

3000-6000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c _i (1g)	c _i (10g)	u _i (1g) (+/-%)	u _i (10g) (+/-%)	v _i
Measurement System								
Probe calibration (k=1)	6.55	normal	1	1	1	6.6	6.6	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	2.0	rectangular	1.732	1	1	1.2	1.2	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Probe positioner with respect to phantom shell	9.9	rectangular	1.732	1	1	5.7	5.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty		RSS				13.2	12.7	330
Expanded Measurement Uncertainty (95% Confidence/		normal (k=2)				26.5	25.4	

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA
Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SPEAG Replacement

Certificate No: EX3-3645_Oct12

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3645
Calibration procedure(s)	QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4 Calibration procedure for dosimetric E-field probes
Calibration date:	October 25, 2012
This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.	
All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.	
Calibration Equipment used (M&TE critical for calibration)	

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	29-Mar-12 (No. 217-01508)	Apr-13
Power sensor E4412A	MY41498087	29-Mar-12 (No. 217-01508)	Apr-13
Reference 3 dB Attenuator	SN: S5054 (3c)	27-Mar-12 (No. 217-01531)	Apr-13
Reference 20 dB Attenuator	SN: S5086 (20b)	27-Mar-12 (No. 217-01529)	Apr-13
Reference 30 dB Attenuator	SN: S5129 (30b)	27-Mar-12 (No. 217-01532)	Apr-13
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 660	20-Jun-12 (No. DAE4-660_Jun12)	Jun-13
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	
Issued: October 25, 2012			
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			



Accredited by the Swiss Accreditation Service (SAS)
 The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E^2 -field uncertainty inside TSL (see below **ConvF**).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * *frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of **ConvF**.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe EX3DV4

SN:3645

Manufactured: January 8, 2006
Calibrated: October 25, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3645

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.29	0.29	0.41	± 10.1 %
DCP (mV) ^B	101.8	101.7	96.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.00	0.00	1.00	151.4	±3.3 %
			Y	0.00	0.00	1.00	151.8	
			Z	0.00	0.00	1.00	174.3	
10069	IEEE 802.11a/h WiFi 5 GHz (OFDM, 54 Mbps)	10.57	X	10.47	67.6	21.7	122.9	±4.1 %
			Y	10.98	69.7	23.3	139.2	
			Z	10.98	68.6	22.5	115.1	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).
^B Numerical linearization parameter: uncertainty not required.
^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3645

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
5200	36.0	4.66	5.39	5.39	5.39	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.27	5.27	5.27	0.30	1.80	± 13.1 %
5500	35.6	4.96	4.87	4.87	4.87	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.47	4.47	4.47	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.86	4.86	4.86	0.40	1.80	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3645

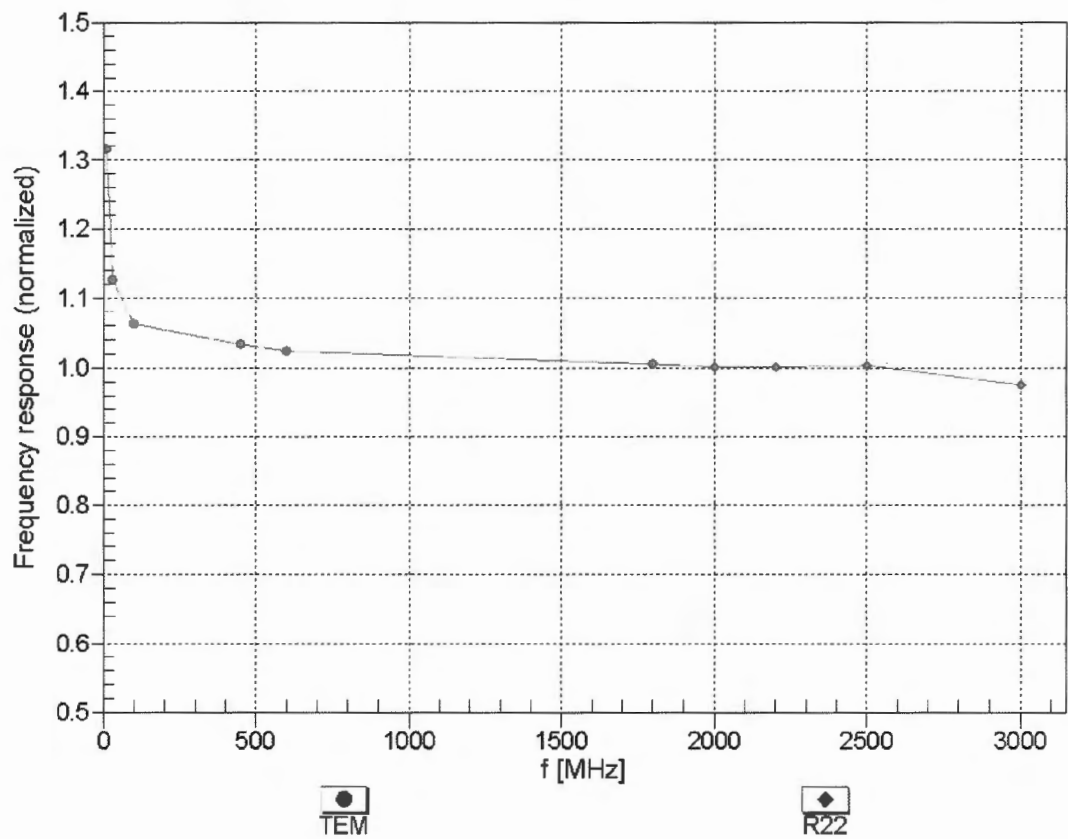
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
5200	49.0	5.30	4.49	4.49	4.49	0.43	1.90	± 13.1 %
5300	48.9	5.42	4.25	4.25	4.25	0.45	1.90	± 13.1 %
5500	48.6	5.65	4.10	4.10	4.10	0.45	1.90	± 13.1 %
5600	48.5	5.77	4.31	4.31	4.31	0.35	1.90	± 13.1 %
5800	48.2	6.00	4.35	4.35	4.35	0.45	1.90	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

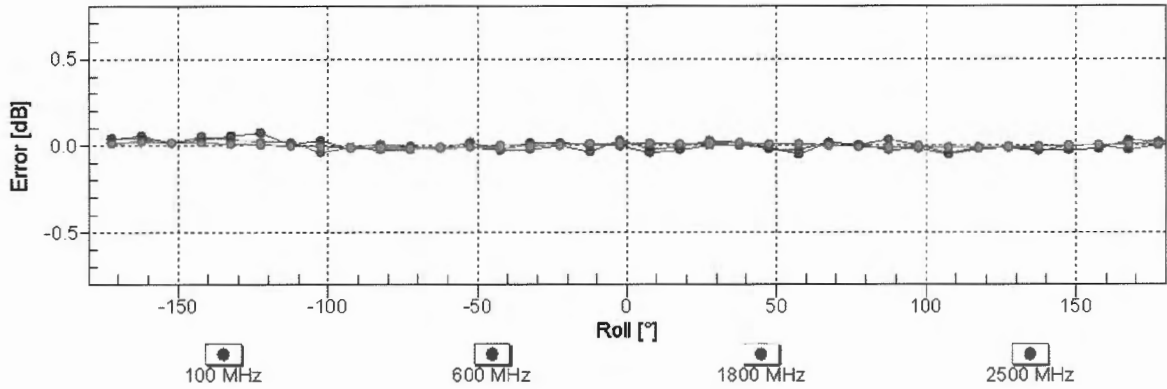
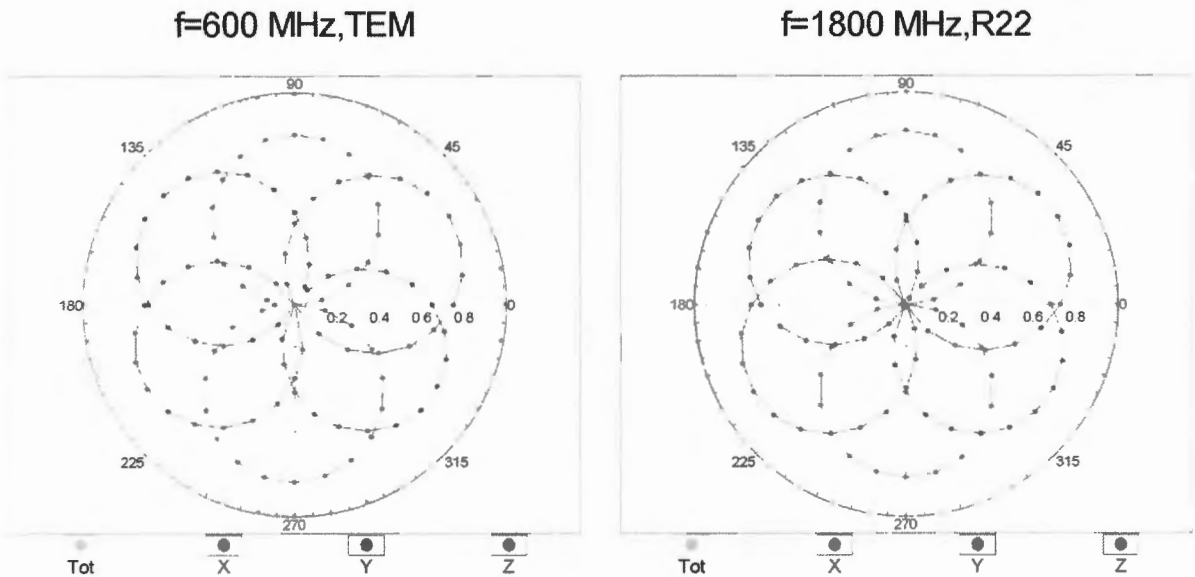
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



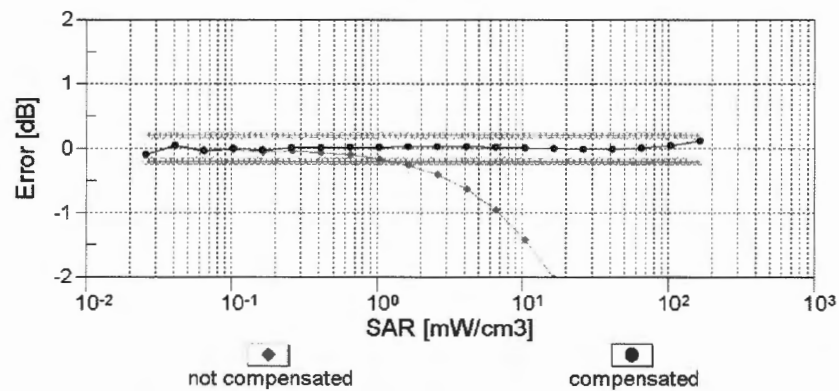
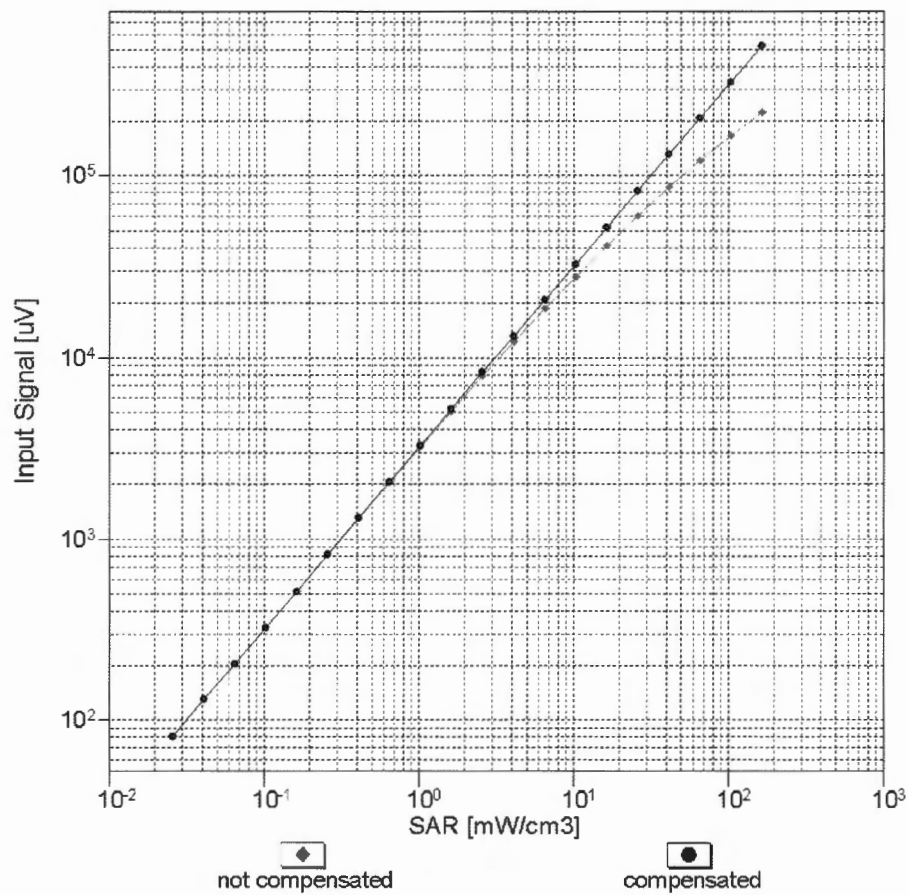
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

Receiving Pattern (ϕ), $\vartheta = 0^\circ$



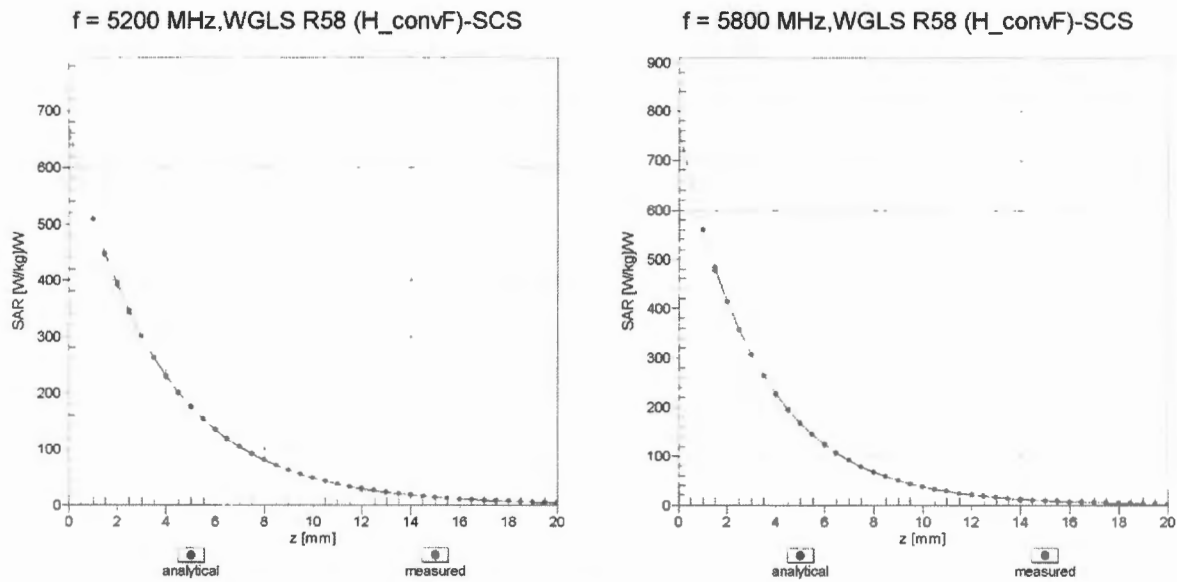
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ ($k=2$)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

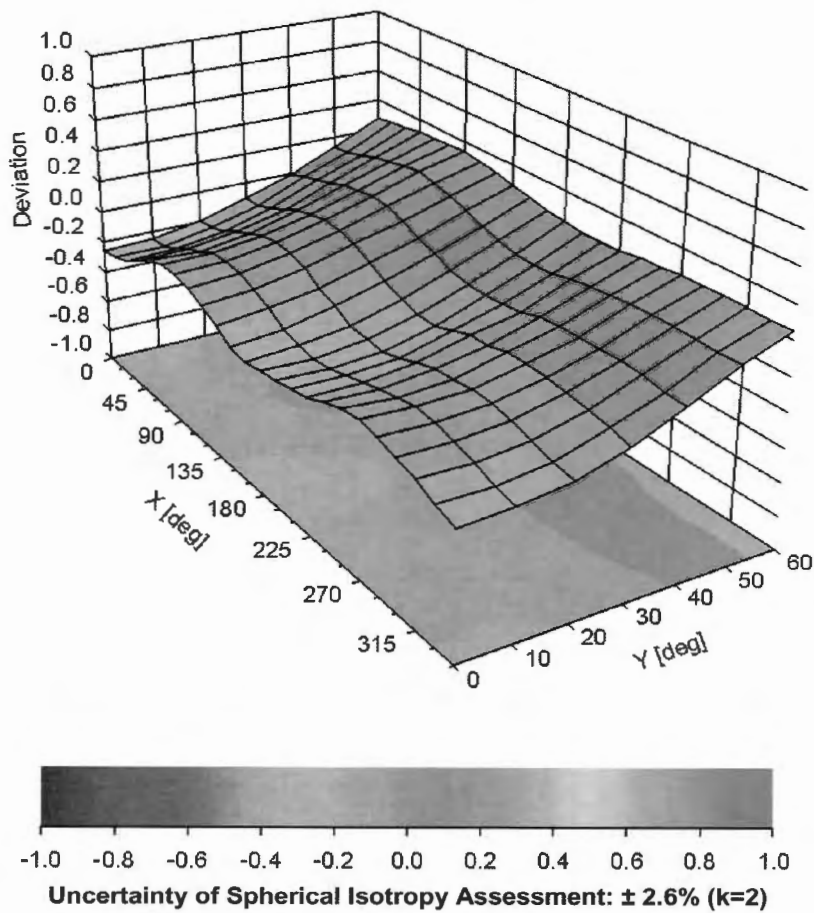


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid
Error (ϕ , ϑ), f = 900 MHz



DASY/EASY - Parameters of Probe: EX3DV4 - SN:3645

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-82.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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Accreditation No.: SCS 108

Client **SPEAG replacement**

Certificate No: **ES3-3173_Feb12**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3173**

Calibration procedure(s) **QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 24, 2012**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-11 (No. ES3-3013_Dec11)	Dec-12
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-11)	In house check: Apr-13
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by:	Name Katja Pokovic	Function Technical Manager	Signature
Approved by:	Name Niels Kuster	Function Quality Manager	Signature

Issued: February 24, 2012

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.



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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z}** = NORM_{x,y,z} * frequency_response (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR**: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}**: A, B, C are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters**: Assessed in flat phantom using E-field (or Temperature Transfer Standard for $f \leq 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f > 800$ MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,y,z} * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy)**: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset**: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.

Probe ES3DV3

SN:3173

Manufactured: January 23, 2008
Calibrated: February 24, 2012

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3173

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.20	1.26	1.33	± 10.1 %
DCP (mV) ^B	97.1	100.7	100.3	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
0	CW	0.00	X	0.0	0.0	1.0	155.3	±3.3 %
			Y	0.0	0.0	1.0	153.7	
			Z	0.0	0.0	1.0	159.8	
10021	GSM-FDD (TDMA, GMSK)	9.40	X	11.36	87.6	24.1	128.9	±2.2 %
			Y	15.56	93.9	25.9	128.0	
			Z	22.75	99.9	28.2	139.3	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

^A The uncertainties of NormX,Y,Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).
^B Numerical linearization parameter: uncertainty not required.
^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3173

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	5.93	5.93	5.93	0.24	2.20	± 12.0 %
900	41.5	0.97	5.88	5.88	5.88	0.41	1.58	± 12.0 %
1750	40.1	1.37	5.19	5.19	5.19	0.59	1.33	± 12.0 %
1900	40.0	1.40	5.06	5.06	5.06	0.80	1.16	± 12.0 %
2450	39.2	1.80	4.36	4.36	4.36	0.69	1.30	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3173

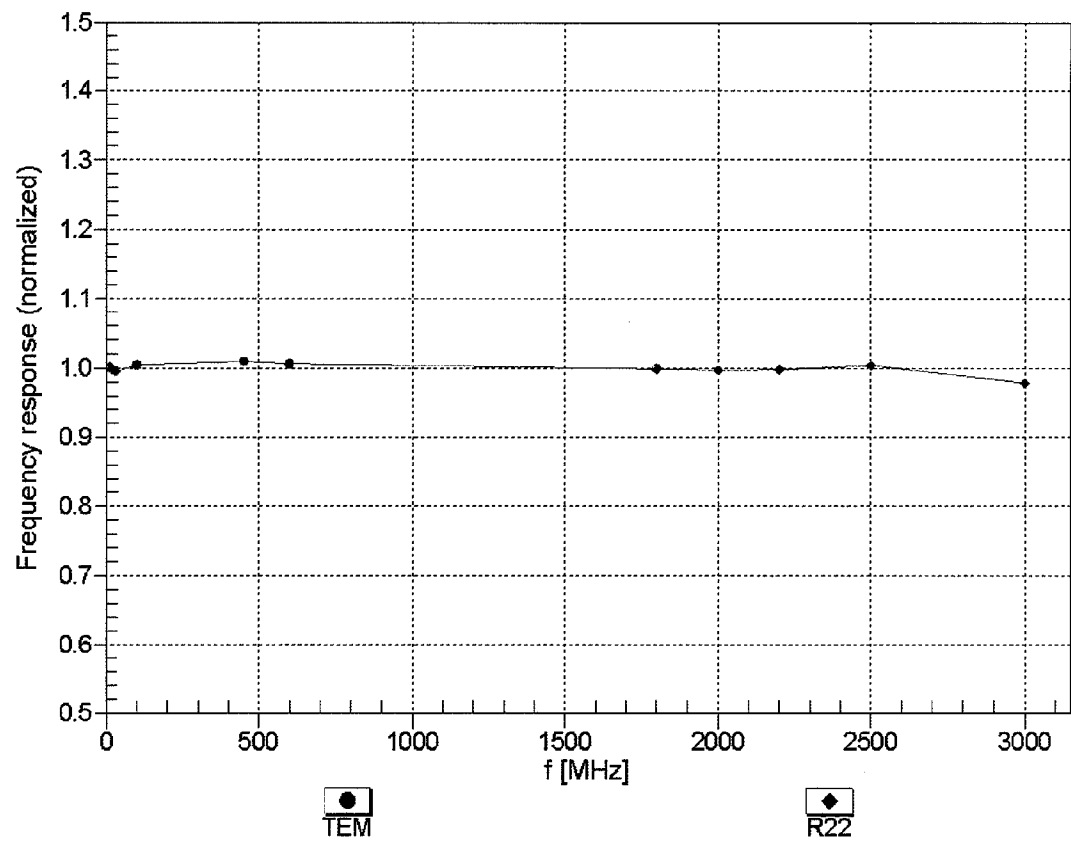
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	5.96	5.96	5.96	0.28	2.00	± 12.0 %
900	55.0	1.05	5.92	5.92	5.92	0.68	1.23	± 12.0 %
1750	53.4	1.49	4.76	4.76	4.76	0.53	1.55	± 12.0 %
1900	53.3	1.52	4.49	4.49	4.49	0.49	1.63	± 12.0 %
2450	52.7	1.95	4.13	4.13	4.13	0.64	0.95	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

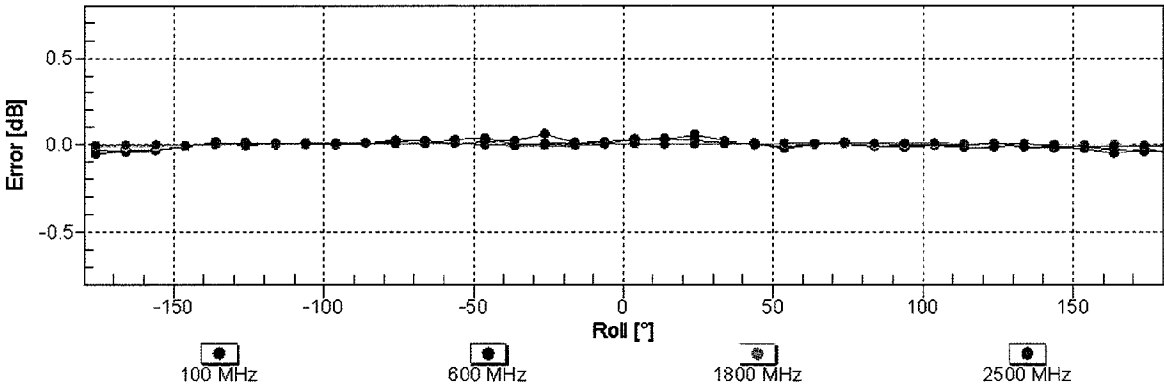
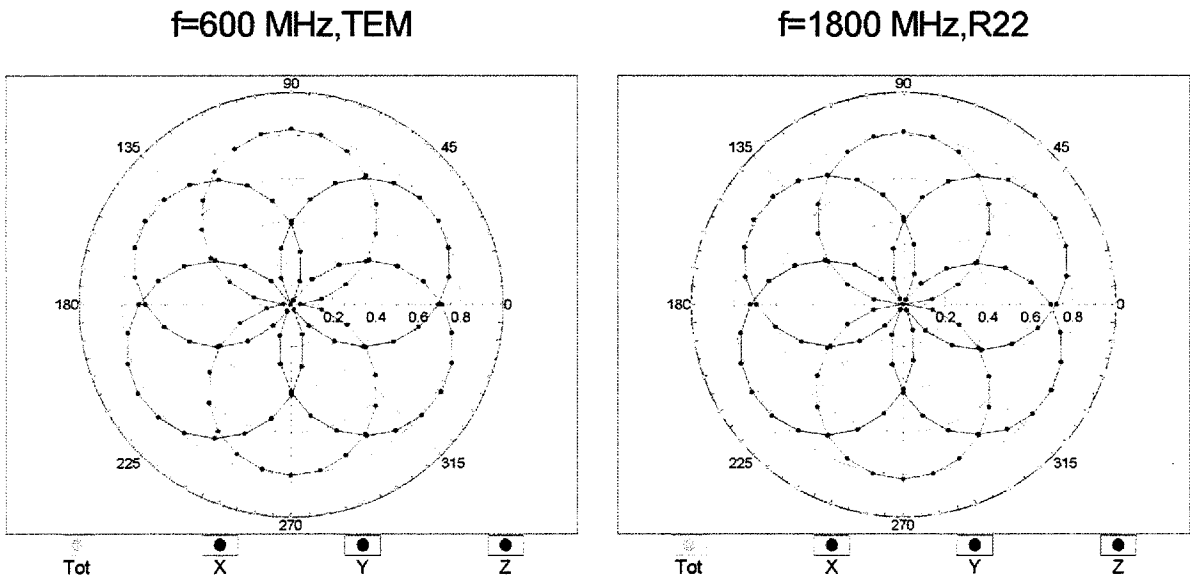
^F At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ϵ and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



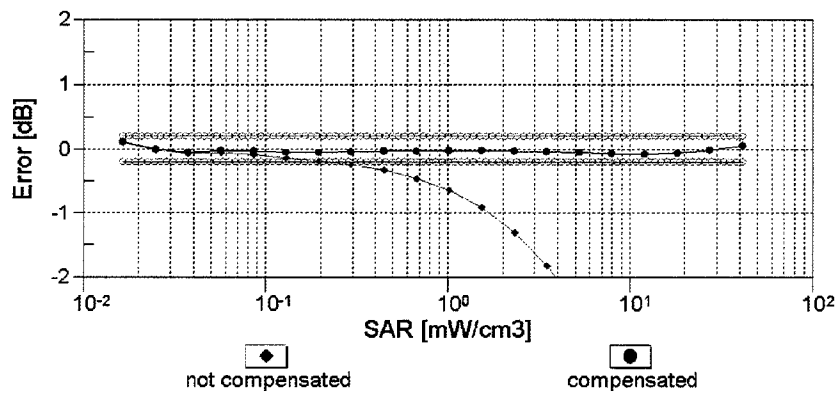
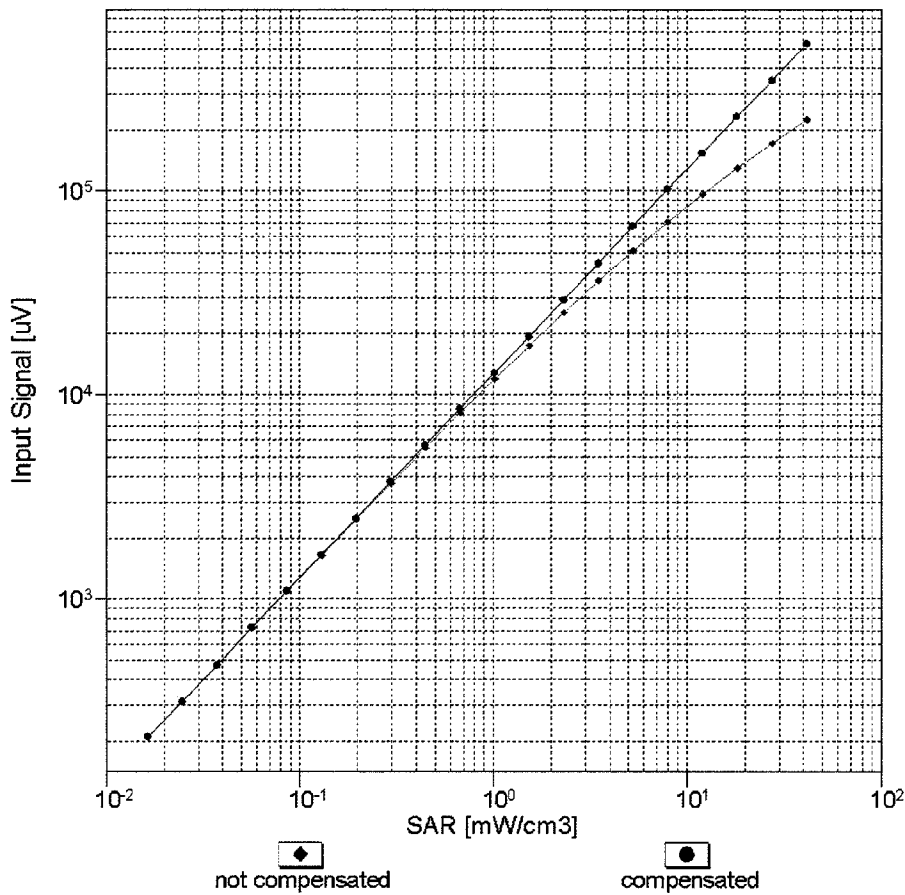
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$



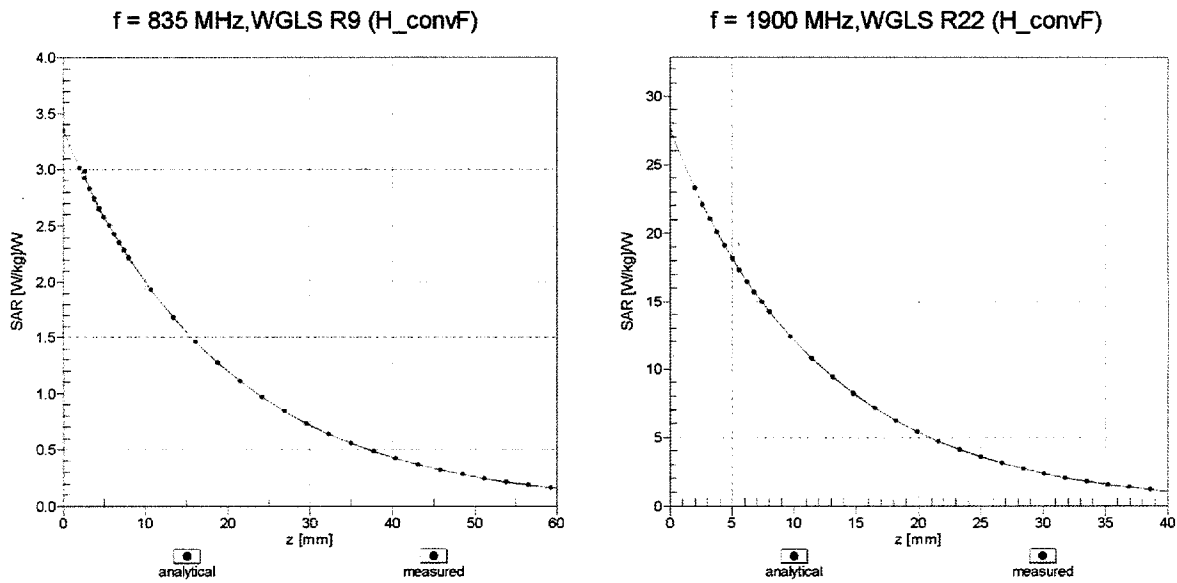
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

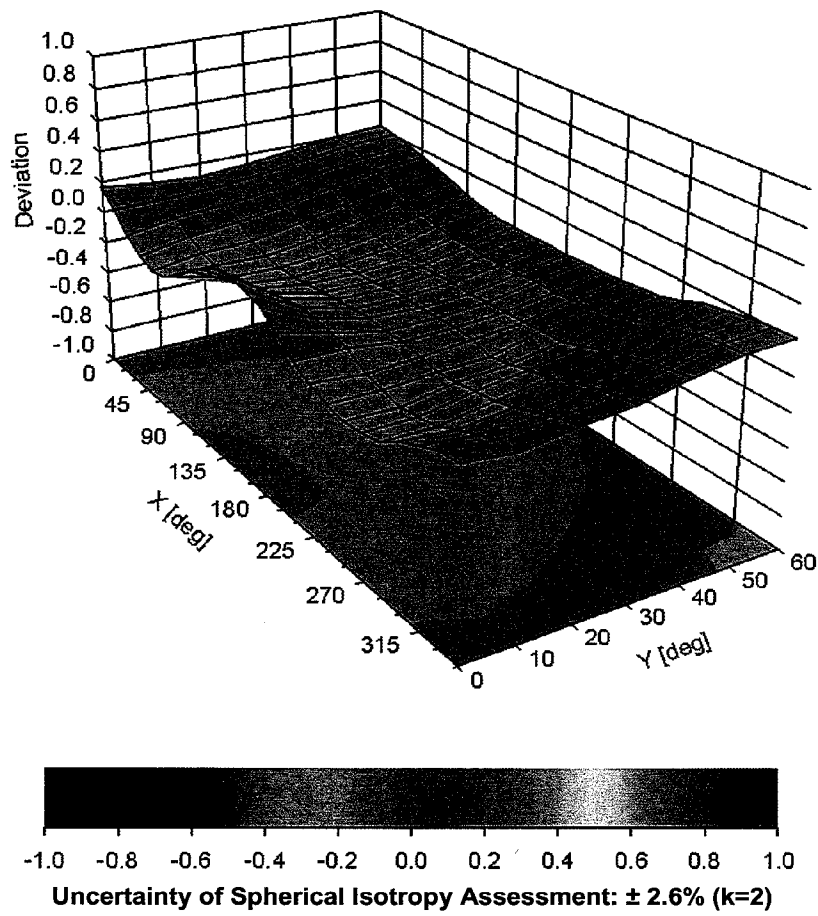


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (ϕ, ϑ), f = 900 MHz



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3173

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	123.8
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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Accreditation No.: **SCS 108**

Client **Northwest EMC**

Certificate No: **D2450V2-855_Dec11**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 855**

Calibration procedure(s) **QA CAL-05.v8**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **December 09, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

Calibrated by: **Name** **Function** **Signature**
Dimce Iliev **Laboratory Technician**

Approved by: **Katja Pokovic** **Technical Manager**

Issued: December 9, 2011

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Report No. MCS01635

226/245



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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.87 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	53.9 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.38 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	25.3 mW / g $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.7 $\pm$ 6 %	2.04 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	50.4 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.02 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	23.7 mW / g $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.9 Ω + 4.5 j Ω
Return Loss	- 25.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.4 Ω + 5.3 j Ω
Return Loss	- 25.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 10, 2009

DASY5 Validation Report for Head TSL

Date: 09.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 855

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.87$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

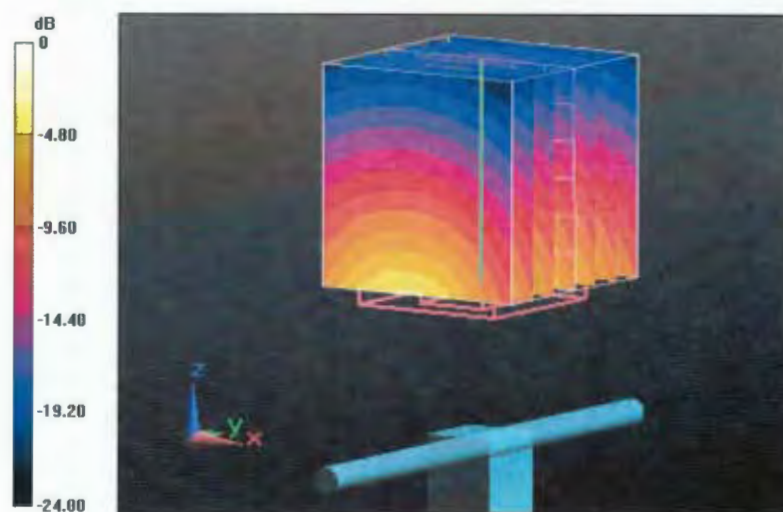
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.7 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 28.3310

SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.38 mW/g

Maximum value of SAR (measured) = 17.684 mW/g



0 dB = 17.680mW/g = 24.95 dB mW/g

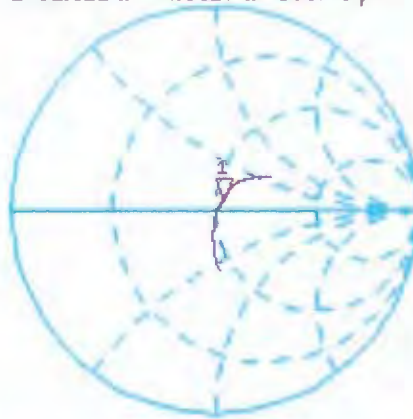
Impedance Measurement Plot for Head TSL

9 Dec 2011 13:32:30
CH1 S11 1 U FS 1: 52.912 Ω 4.5527 Ω 295.75 μH 2 450.000 000 MHz

*
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16

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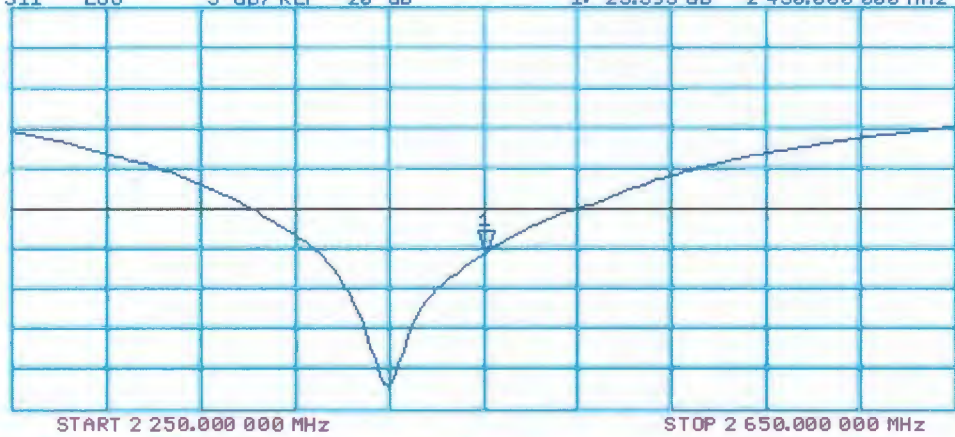


CH2 S11 LOG 5 dB/REF -20 dB 1:-25.595 dB 2 450.000 000 MHz

Cor

Avg
16

↑



DASY5 Validation Report for Body TSL

Date: 08.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 855

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.04$ mho/m; $\epsilon_r = 50.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.26, 4.26, 4.26); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

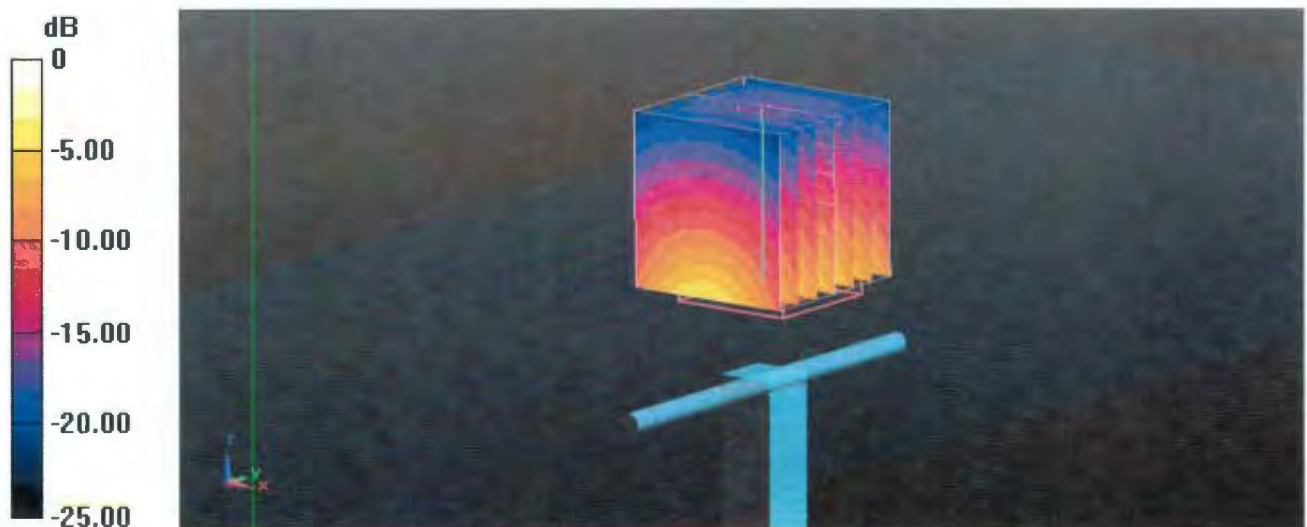
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.074 V/m; Power Drift = -0.0092 dB

Peak SAR (extrapolated) = 27.0840

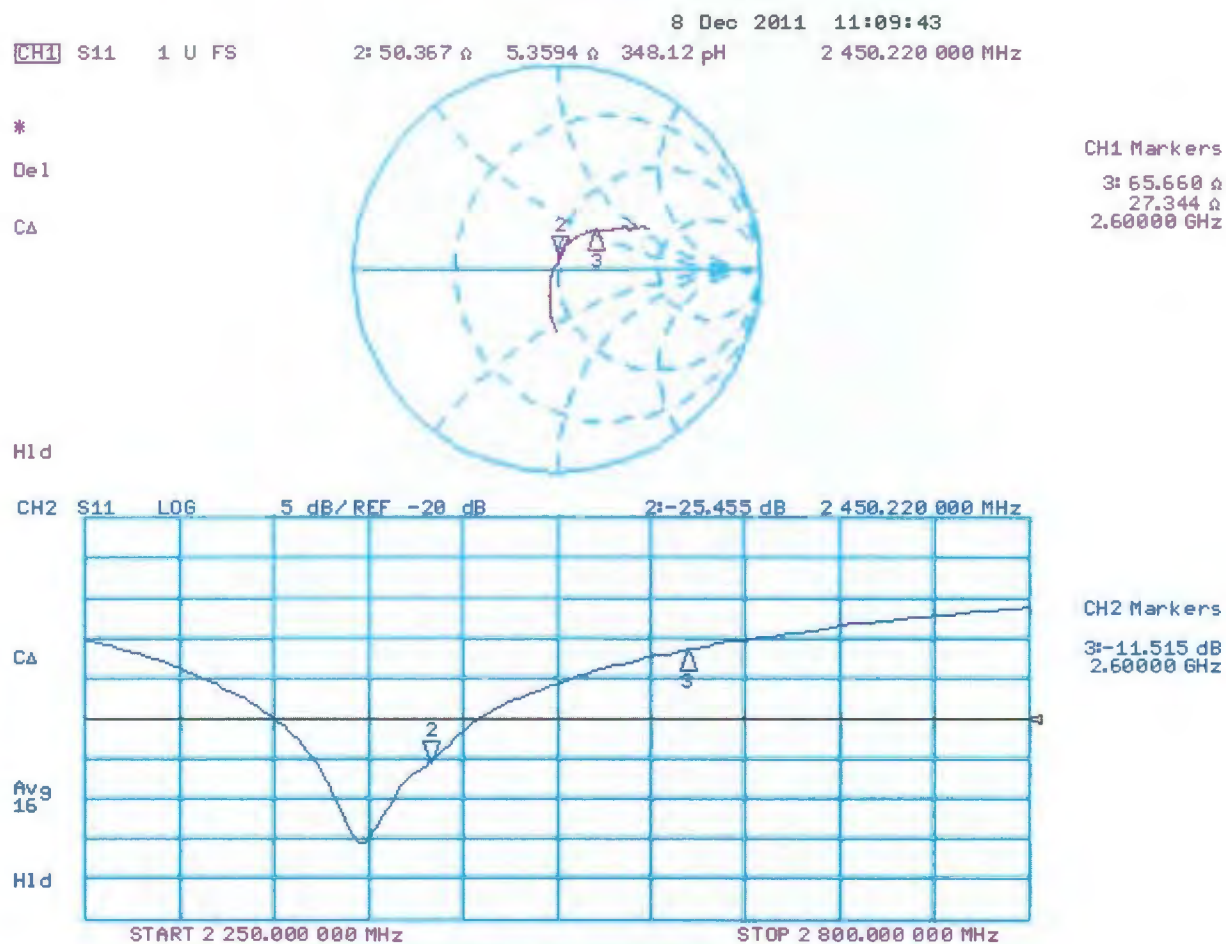
SAR(1 g) = 13 mW/g; SAR(10 g) = 6.02 mW/g

Maximum value of SAR (measured) = 17.188 mW/g



0 dB = 17.190mW/g = 24.71 dB mW/g

Impedance Measurement Plot for Body TSL



Calibration Laboratory of
Schmid & Partner
Engineering AG
 Zeughausstrasse 43, 8004 Zurich, Switzerland



S Schweizerischer Kalibrierdienst
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Accredited by the Swiss Accreditation Service (SAS)

Accreditation No.: **SCS 108**

The Swiss Accreditation Service is one of the signatories to the EA
 Multilateral Agreement for the recognition of calibration certificates

Client **Northwest EMC**

Certificate No: **D5GHzV2-1066_Dec11**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1066**

Calibration procedure(s) **QA CAL-22.v1**
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: **December 14, 2011**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
 The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	05-Oct-11 (No. 217-01451)	Oct-12
Power sensor HP 8481A	US37292783	05-Oct-11 (No. 217-01451)	Oct-12
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe EX3DV4	SN: 3503	04-Mar-11 (No. EX3-3503_Mar11)	Mar-12
DAE4	SN: 601	04-Jul-11 (No. DAE4-601_Jul11)	Jul-12
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-11)	In house check: Oct-12

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: December 14, 2011

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Report No. MCSO1635

234/245



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions:** Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL:** The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss:** These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured:** SAR measured at the stated antenna input power.
- SAR normalized:** SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters:** The measured TSL parameters are used to calculate the nominal SAR result.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz $\pm$ 1 MHz 5500 MHz $\pm$ 1 MHz 5800 MHz $\pm$ 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	36.1 $\pm$ 6 %	4.65 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.13 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	81.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.2 mW / g $\pm$ 16.5 % (k=2)

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	35.6 $\pm$ 6 %	4.96 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.53 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	85.3 mW / g $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	24.1 mW / g $\pm$ 16.5 % (k=2)

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	5.27 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.86 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	78.5 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.2 mW / g ± 16.5 % (k=2)

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	49.6 ± 6 %	5.44 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	75.3 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.09 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.0 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	49.0 ± 6 %	5.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.04 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	80.7 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.22 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	22.3 mW / g ± 17.6 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.4 ± 6 %	6.28 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.54 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	75.6 mW / g ± 18.1 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.07 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.8 mW / g ± 17.6 % (k=2)

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.8 Ω - 5.1 j Ω
Return Loss	- 25.6 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	53.2 Ω - 2.3 j Ω
Return Loss	- 28.4 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.5 Ω - 1.0 j Ω
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	51.2 Ω - 4.7 j Ω
Return Loss	- 26.4 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	53.5 Ω - 0.2 j Ω
Return Loss	- 29.4 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.4 Ω + 1.6 j Ω
Return Loss	- 24.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured. The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 14.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200 \text{ MHz}$; $\sigma = 4.65 \text{ mho/m}$; $\epsilon_r = 36.1$; $\rho = 1000 \text{ kg/m}^3$, Medium parameters used: $f = 5500 \text{ MHz}$; $\sigma = 4.96 \text{ mho/m}$; $\epsilon_r = 35.6$; $\rho = 1000 \text{ kg/m}^3$, Medium parameters used: $f = 5800 \text{ MHz}$; $\sigma = 5.27 \text{ mho/m}$; $\epsilon_r = 35.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41), ConvF(4.91, 4.91, 4.91), ConvF(4.81, 4.81, 4.81); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 64.855 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 30.2380

SAR(1 g) = 8.13 mW/g; SAR(10 g) = 2.32 mW/g

Maximum value of SAR (measured) = 18.418 mW/g

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 64.965 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 33.8680

SAR(1 g) = 8.53 mW/g; SAR(10 g) = 2.41 mW/g

Maximum value of SAR (measured) = 19.692 mW/g

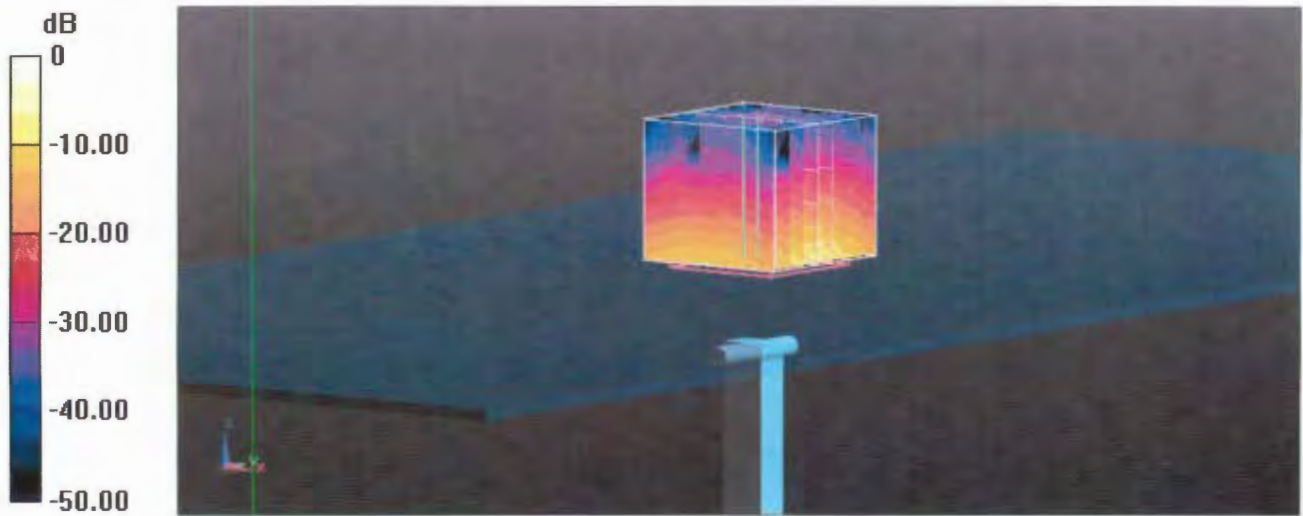
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: $dx=4\text{mm}$, $dy=4\text{mm}$, $dz=1.4\text{mm}$

Reference Value = 61.095 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 33.1420

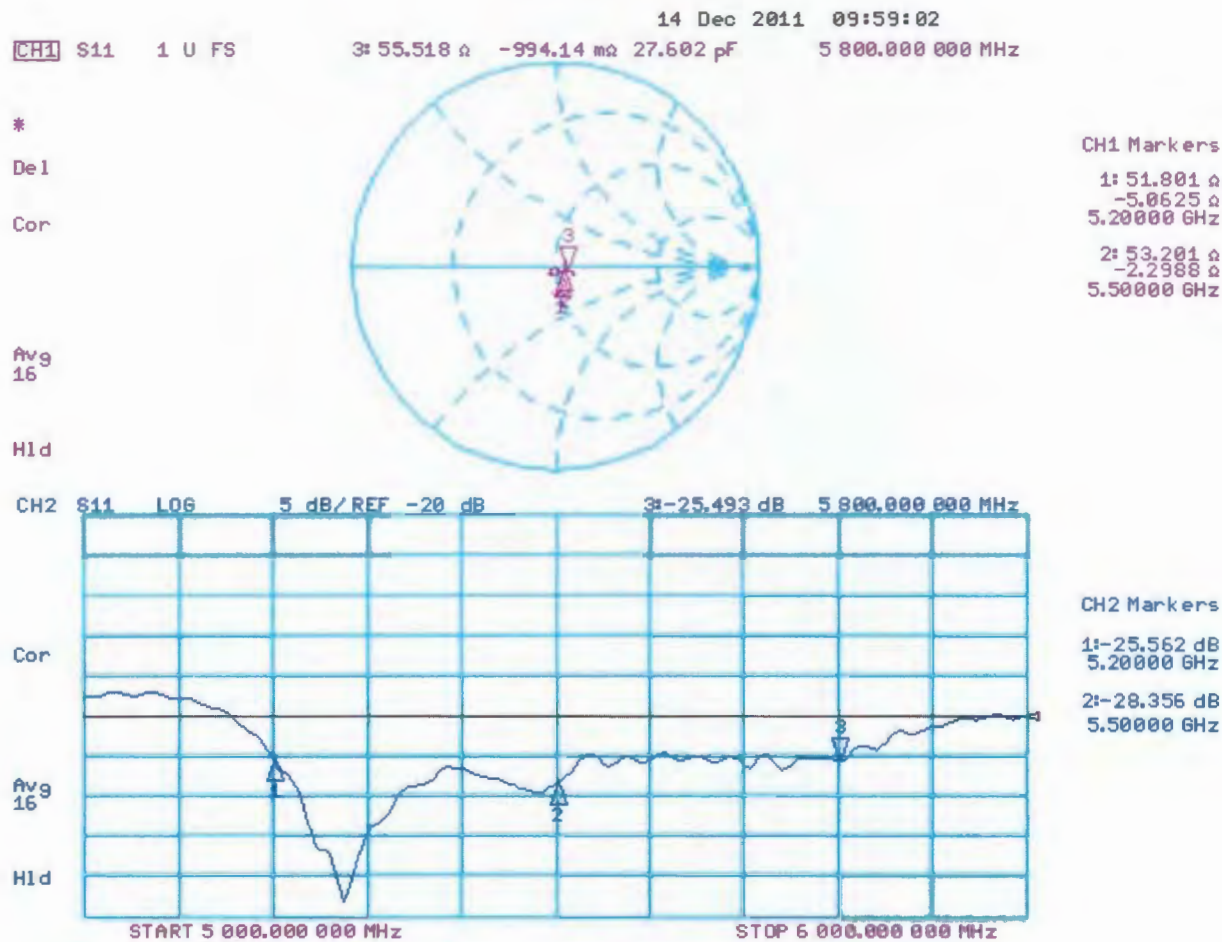
SAR(1 g) = 7.86 mW/g; SAR(10 g) = 2.22 mW/g

Maximum value of SAR (measured) = 18.642 mW/g



0 dB = 18.640mW/g = 25.41 dB mW/g

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 13.12.2011

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: CW; Frequency: 5200 MHz, Frequency: 5500 MHz, Frequency: 5800 MHz
Medium parameters used: $f = 5200$ MHz; $\sigma = 5.44$ mho/m; $\epsilon_r = 49.6$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5500$ MHz; $\sigma = 5.86$ mho/m; $\epsilon_r = 49$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 5800$ MHz; $\sigma = 6.28$ mho/m; $\epsilon_r = 48.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91), ConvF(4.43, 4.43, 4.43), ConvF(4.38, 4.38, 4.38); Calibrated: 04.03.2011
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.07.2011
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.0(692); SEMCAD X 14.6.4(4989)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.272 V/m; Power Drift = -0.0057 dB

Peak SAR (extrapolated) = 29.4900

SAR(1 g) = 7.51 mW/g; SAR(10 g) = 2.09 mW/g

Maximum value of SAR (measured) = 17.296 mW/g

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 58.543 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 34.4970

SAR(1 g) = 8.04 mW/g; SAR(10 g) = 2.22 mW/g

Maximum value of SAR (measured) = 19.193 mW/g

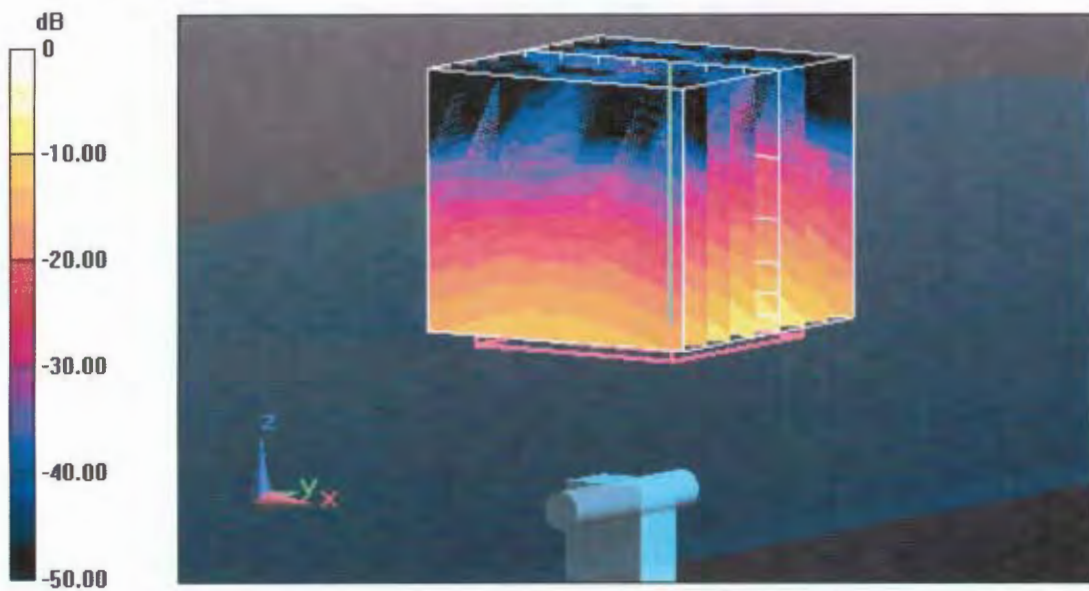
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 54.820 V/m; Power Drift = -0.0098 dB

Peak SAR (extrapolated) = 35.3730

SAR(1 g) = 7.54 mW/g; SAR(10 g) = 2.07 mW/g

Maximum value of SAR (measured) = 18.371 mW/g



0 dB = 18.370mW/g = 25.28 dB mW/g

Impedance Measurement Plot for Body TSL

