

Intermec Technologies Corporation

Model: 1000CP02S

Evaluated to the following SAR Specifications:

FCC 2.1093: 2011
Health Safety Code 6:2009

Report No. ITRM0248.7

Report Prepared By



www.nwemc.com
1-888-EMI-CERT

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SAR Evaluation Report

Certificate of Evaluation
Last Date of Test: September 2, 2011
Intermec Technologies Corporation
Model: 1000CP02S

Applicable Standards			
Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 2.1093:2011	FCC OET 65C:2001	Pass
		IEEE Std 1528:2003	
		FCC KDB 447498 D01 v04	
		FCC KDB 941225 D01 v02, and D03	
	FCC KDB 648474 D01 v01r05	Pass	
Health Safety Code 6:2009	RSS-102, Issue 4:2010		

Highest SAR Values				
Frequency Band	Head 1g (W/kg)	Body 1g (W/kg)	Limit 1g (W/kg)	Exposure Environment
Cellular	.411	.543	1.6	General Population Uncontrolled
PCS	.327	.613		

Modifications made to the product
See the Modifications section of this report

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

Approved By:



Don Facteau, IS Manager



NVLAP Lab Code: 200630-0

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 Number	Description	Date	Page Number
00	None		

Barometric Pressure

The recorded barometric pressure has been normalized to sea level.



Accreditations and Authorizations

FCC

Accredited by NVLAP for performance of FCC radio, digital, and ISM device testing. Our Open Area Test Sites, certification chambers, and conducted measurement facilities have been fully described in reports filed with the FCC and accepted by the FCC in letters maintained in our files. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by the FCC as a Telecommunications Certification Body (TCB). This allows Northwest EMC to certify transmitters to FCC specifications in accordance with 47 CFR 2.960 and 2.962.

NVLAP

Northwest EMC, Inc. is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP) for satisfactory compliance with the requirements of ISO/IEC 17025 for Testing Laboratories. NVLAP is administered by the National Institute of Standards and Technology (NIST), an agency of the U.S. Commerce Department. The NVLAP accreditation encompasses Electromagnetic Compatibility Testing in accordance with the European Union EMC Directive 2004/108/EC, and ANSI C63.4. Additionally, Northwest EMC is accredited by NVLAP to perform radio testing in accordance with the European Union R&TTE Directive 1999/5/EEC, the requirements of FCC, and the RSS radio standards for Industry Canada.

Industry Canada

Accredited by NVLAP for performance of Industry Canada RSS and ICES testing. Our Open Area Test Sites and certification chambers comply with RSS-Gen, Issue 2 and have been filed with Industry Canada and accepted. Northwest EMC has been accredited by ANSI to ISO / IEC Guide 65 as a product certifier. We have been designated by NIST and recognized by Industry Canada as a Certification Body (CB) per the APEC Mutual Recognition Arrangement (MRA). This allows Northwest EMC to certify transmitters to Industry Canada technical requirements. (*Site Filing Numbers - Hillsboro: 2834D-1, 2834D-2, Sultan: 2834C-1, Irvine: 2834B-1, 2834B-2, Brooklyn Park: 2834E-1*)

CAB

Designated by NIST and validated by the European Commission as a Conformity Assessment Body (CAB) to conduct tests and approve products to the EMC directive and transmitters to the R&TTE directive, as described in the U.S. - EU Mutual Recognition Agreement.

Australia/New Zealand

The National Association of Testing Authorities (NATA), Australia has been appointed by the ACA as an accreditation body to accredit test laboratories and competent bodies for EMC standards. Accredited test reports or assessments by competent bodies must carry the NATA logo. Test reports made by an overseas laboratory that has been accredited for the relevant standards by an overseas accreditation body that has a Mutual Recognition Agreement (MRA) with NATA are also accepted as technical grounds for product conformity. The report should be endorsed with the respective logo of the accreditation body (NVLAP).



Accreditations and Authorizations

VCCI

Accepted as an Associate Member to the VCCI, Acceptance No. 564. Conducted and radiated measurement facilities have been registered in accordance with Regulations for Voluntary Control Measures, Article 8. (*Registration Numbers. - Hillsboro: C-1071, R-1025, G-84, C-2687, T-1658, and R-2318, Irvine: R-1943, G-85, C-2766, and T-1659, Sultan: R-871, G-83, C-1784, and T-1511, Brooklyn Park: R-3125, G-86, G-141, C-3464, and T-1634.*)

BSMI

Northwest EMC has been designated by NIST and validated by C-Taipei (BSMI) as a CAB to conduct tests as described in the APEC Mutual Recognition Agreement (US0017).

GOST

Northwest EMC, Inc. has been assessed and accredited by the Russian Certification bodies Certinform VNIINMASH, CERTINFO, SAMTES, and Federal CHEC, to perform EMC and Hygienic testing for Information Technology Products. As a result of their laboratory assessment, they will accept test results from Northwest EMC, Inc. for product certification

KCC

Northwest EMC, Inc is a CAB designated by MRA partners and recognized by Korea. (*Assigned Lab Numbers: Hillsboro: US0017, Irvine: US0158, Sultan: US0157, Brooklyn Park: US0175*)

VIETNAM

Vietnam MIC has approved Northwest EMC as an accredited test lab. Per Decision No. 194/QD-QLCL (dated December 15, 2009), Northwest EMC test reports can be used for Vietnam approval submissions.

SCOPE

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

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



Northwest EMC Locations



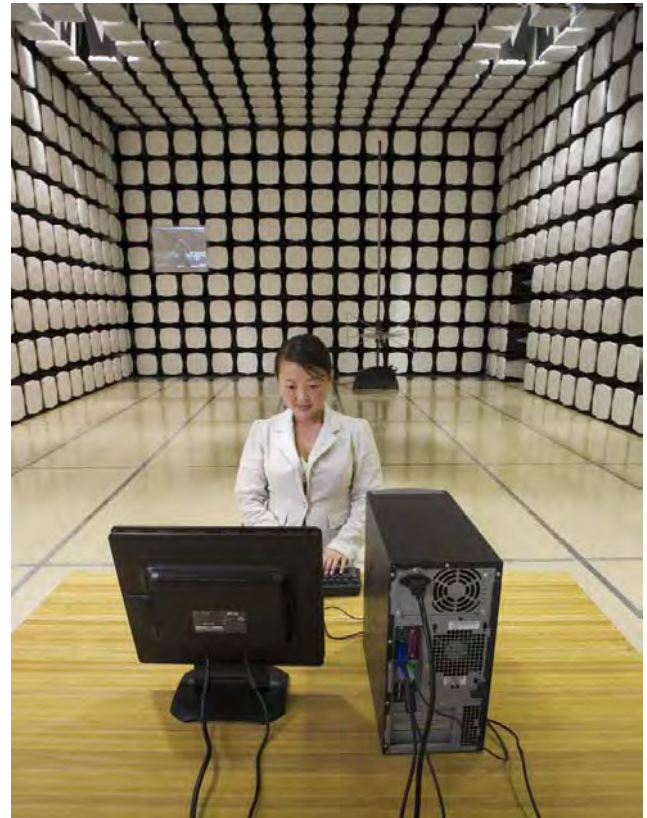
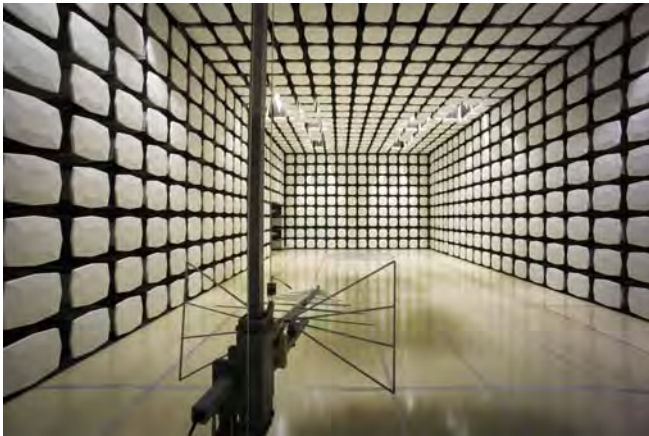
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Sultan, WA 98294
(360) 793-8675

New York
Labs WA01-WA04
4939 Jordan Rd.
Elbridge, NY 13060
(315) 685-0796



Party Requesting the Test

Company Name:	Intermec Technologies Corporation
Address:	550 Second St. SE
City, State, Zip:	Cedar Rapids, IA 52401-2023
Test Requested By:	Stu Adams
Model:	1000CP02S
First Date of Test:	August 26, 2011
Last Date of Test:	September 2, 2011
Receipt Date of Samples:	August 23, 2011
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 a handheld computer containing two radio modules, the Intermec Model RC12 and the Sierra Wireless MC8355, each with their own integral antenna.

The Intermec Model RC12 radio module is an 802.11a/b/g/n – Bluetooth radio. It is not capable of 40 MHz channel operation. The 802.11a/b/g/n and Bluetooth radios share the same antenna, but cannot transmit simultaneously. The frequency range of the 802.11a/b/g/n radio:

- 2412 – 2462 MHz
- 5180 – 5320 MHz
- 5500 – 5700 MHz
- 5745 – 5825 MHz

The frequency range of the Bluetooth radio:

- 2402 – 2480 MHz

The Sierra Wireless MC8355 radio module is a UMTS - CDMA (EVDO Rev A) radio. The UMTS and CDMA radios share the same antenna, but cannot transmit simultaneously. The frequency range of the UMTS radio:

- 824.2 – 848.8 MHz (GPRS, EDGE)
- 826.4 – 846.6 MHz (WCDMA, HSDPA, HSUPA)
- 1850.2 – 1909.8 MHz (GPRS, EDGE)
- 1852.4 – 1907.5 MHz (WCDMA, HSDPA, HSUPA)
- 1712.4 – 1752.6 MHz (WCDMA)

The frequency range of the CDMA (EVDO Rev A) radio:

- 824.7 – 848.31 MHz
- 1851.25 – 1908.8 MHz

The closest spacing between the CDMA antenna and 802.11a/b/g/n antenna is 3.7cm. The 802.11a/b/g/n antenna is on the right side of the handheld computer and the CDMA antenna is on the left side.

In normal operation, the EUT can be held in the hand, or next to the head like a cellular handset, or worn on the body. The only Intermec approved accessory for body worn operation is a holster that contains metal. The EUT can only fit in the holster with the top end of the unit pointing down. The holster cup can be attached to the holster belt with either the keypad facing the user, or the side facing the user. In no case can the back of the EUT face the user.

An optional snap-on audio accessory is available. It connects to the bottom end of the unit and provides a standard audio jack for connection of a VR10 headset.

The EUT is powered by a lithium-ion battery, Model 1000AB01.

Overview of the SAR Evaluation

Objective

To demonstrate compliance with the SAR requirements of FCC 2.1093 and Canada's Health Safety Code 6.

Scope

The 802.11a/b/g/n – Bluetooth radio was evaluated under a separate SAR evaluation report.

The UMTS radio was evaluated under a separate SAR evaluation report.

Regarding the CDMA (EVDO Rev A) radio:

KDB 648474 D01 is the FCC's Policy for SAR evaluation of handsets with multiple transmitters and antennas. It states:

"Routine SAR evaluation with respect to Section 2.1093 of the rules is required for licensed transmitter to show compliance,"

The SAR evaluation documented in this report is for the CDMA (EVDO Rev A) portion of the EUT.

CONFIGURATION 12 ITRM0248

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
B1 Handheld Computer	Intermec Technologies Corporation	1000CP02S	178U1191047
B1 Holster	Intermec Technologies Corporation	X11184-V1-R1	None
Headset	Intermec Technologies Corporation	VR10	None
Standard Audio Snap-On	Intermec Technologies Corporation	225-771-001	Proto 2
A1/B1 Battery	Intermec Technologies Corporation	1000AB01	16961001770
A1/B1 Battery	Intermec Technologies Corporation	1000AB01	24561000347
B1 Handheld Computer	Intermec Technologies Corporation	1000CP02S	178U1191047

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
Audio Accessory	PA	1.3m	PA	Audio Accessory - Headset	Handheld Computer
PA = Cable is permanently attached to the device. Shielding and/or presence of ferrite may be unknown.					

CONFIGURATION 13 ITRM0248

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
A1/B1 Battery	Intermec Technologies Corporation	1000AB01	16961001770
A1/B1 Battery	Intermec Technologies Corporation	1000AB01	24561000347
B1 Handheld Computer	Intermec Technologies Corporation	1000CP02S	178U1191047

Equipment modifications					
Item	Date	Test	Modification	Note	Disposition of EUT
1	8/26/11	SAR Evaluation	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	9/2/11	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Per FCC KDB 941225, the conducted output power was measured at the low, middle and high channels in each band. An Agilent 8960 test set, Model E5515C, was used to control the EUT. The following applications were installed on the test set: CDMA 2000 Mobile Test Rev B.18.12, and EVDO Term Test Rev A.13.10. This provided all the necessary tools to operate the EUT in the prescribed manner without any difficulties or equipment limitations.

Per KDB 648474, among the channels required for normal testing, SAR must be measured on the highest conducted output channel (highlighted in the following pages). When the SAR measured on the highest output channel is < 0.8 W/kg, SAR evaluation for the other required channels is unnecessary.

1XRTT

Per FCC KDB 941225, measurements for 1XRTT were made according to the procedures in section 4.4.5.2 of 3GPP2C.S0011/TIA-98-E. Results for steps 3, 4, and 10 of the power measurement procedure are tabulated on the following pages. SO55 was measured with power control bits in "All Up" condition; TDSO/SO32 was measured with power control bits in the "Bits Hold" condition.

The Agilent 8960 test set was configured as follows:

- Cell Info > Cell Parameters > System ID (SID) > 16420
 - Network ID (NID) > 65535
- Protocol Rev > 6 (IS-2000-0)
- Radio Config (RC) > See attached data sheet
- FCH Service Option (SO) Setup > See attached data sheet
- Traffic Data Rate > Full (9.6kbps)
- TDSO SCH Info > F-SCH Parameters > F-SCH Data Rate > 153.6 kbps
 - R-SCH Parameters > R-SCH Data Rate > 153.6 kbps
- Rvs Power Ctrl > Active bits (SO32)
- Rvs Power Ctrl > All Up bits (Maximum TxPout) (SO55)
- Call Params
 - Cell Power > set to -104 dBm/1.23 MHz (SO55)
 - Cell Power > Start at -86 dBm/1.23 MHz, then decrease until max power is reached (SO32)

EVDO Rev 0

Per FCC KDB 941225, measurements for EVDO Rev 0 were made according to the procedures in section 3.1.2.3.4 of 3GPP2 C.S0033-0/TIA-866. The results are tabulated on the following pages.

The Agilent 8960 test set was configured as follows:

RTAP Settings

- Call Control:
 - Generator Info > Channel Data Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
- Call Params:
 - Cell Power > Set to -105.5 dBm/1.23 MHz
 - Application Config > Enhanced Test Application Protocol > RTAP
 - RTAP Rate > 153.6 kbps
 - Protocol Rel > 0 (1xEV-DO)
- Rvs Power Ctrl > All Up bits (Maximum TxPout)

FTAP Settings

Call Control:
Generator Info > Channel Data Info > Termination Parameters > Max Forward Packet Duration > 16 Slots

Call Params:
Cell Power > Set to -105.5 dBm/1.23 MHz
Application Config > Enhanced Test Application Protocol > FTAP
FTAP Rate > 307.2 kbps (2 slot, QPSK)
Protocol Rel > 0 (1xEV-DO)
Rvs Power Ctrl > All Up bits (Maximum TxPout)

EVDO Rev A

For EVDO Rev A mode, measurements were made according to the procedures in section 4.3.4 of 3GPP2 C.S0033-A. The results are tabulated on the following pages.

The Agilent 8960 test set was configured as follows:

RETAP Settings

Call Params:
Cell Power > Set to -60 dBm/1.23 MHz
Protocol Rev > A (1xEV-DO-A)
Application Config > Enhanced Test Application Protocol > RETAP
R-Data Pkt Size > 4096
Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2

Call Control:
PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0):
Generator Info > Channel Data Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
ACK R-Data After > Subpacket 0 (All ACK)
Rvs Power Ctrl > All Up bits (Maximum TxPout)

FETAP Settings

Call Params:
Cell Power > Set to -60 dBm/1.23 MHz
Protocol Rev > A (1xEV-DO-A)
Application Config > Enhanced Test Application Protocol > FETAP
F-Traffic Format > 4 (1024, 2, 128) Canonical (307.2k, QPSK)
Protocol Subtype Config > Release A Physical Layer Subtype > Subtype 2

Call Control:
PL Subtype 2 Access Channel MAC Subtype > Default (Subtype 0):
Generator Info > Channel Data Info > Termination Parameters > Max Forward Packet Duration > 16 Slots
ACK R-Data After > Subpacket 0 (All ACK)
Rvs Power Ctrl > All Up bits (Maximum TxPout)

EMC		Output Power		NORTHWEST		XMR 2011.01.18	
EUT: 1000CP02S				Work Order: ITRM0248			
Serial Number: 178U11910147				Date: 08/04/11			
Customer: Intermec Technologies Corporation				Temperature: 24			
Attendees: None				Humidity: 47%			
Project: ITRM0227				Barometric Pres.: 1014.4			
Tested by: Rod Peloquin		EUT Power		Battery		Job Site: EV08	
TEST SPECIFICATIONS				Test Method			
FCC 2.1093:2011				FCC OET 65C:2001			
COMMENTS							
Conducted output power							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	13	Signature <i>Rod Peloquin</i>					

CDMA 2000 1x

Band	Channel	Frequency (MHz)	Radio Configuration (RC)	Service Option (SO)	Conducted Power (Average)	
					dBm	W
Cellular	1013	824.7	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	24.88	0.308
				SO32 (FCH+SCH)	23.66	0.232
				S032(FCH)	23.89	0.245
	384	836.52	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	24.93	0.311
				SO32 (FCH+SCH)	24.83	0.304
				S032(FCH)	23.88	0.244
	777	848.31	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	23.92	0.247
				SO32 (FCH+SCH)	24.84	0.305
				S032(FCH)	24.73	0.297
PCS	25	1851.25	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	24.73	0.297
				SO32 (FCH+SCH)	24.73	0.297
				S032(FCH)	23.79	0.239
	600	1880	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	23.85	0.243
				SO32 (FCH+SCH)	24.82	0.303
				S032(FCH)	24.82	0.303
	1175	1908.75	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	25.03	0.318
				SO32 (FCH+SCH)	23.57	0.228
				S032(FCH)	24.81	0.303
Cellular	25	1851.25	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	24.69	0.294
				SO32 (FCH+SCH)	24.78	0.301
				S032(FCH)	24.47	0.280
	600	1880	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	23.88	0.244
				SO32 (FCH+SCH)	24.83	0.304
				S032(FCH)	24.83	0.304
1175	1908.75	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	24.52	0.283	
			SO32 (FCH+SCH)	24.32	0.270	
			S032(FCH)	22.58	0.181	
PCS	25	1851.25	RC3 (Fwd3, Rvs3)	SO55 (Loopback)	25.14	0.327
				SO32 (FCH+SCH)	25.14	0.327
				S032(FCH)	25.14	0.327

EV-DO Rev 0

Band	Channel	Frequency (MHz)	FTAP Rate (kbps)	RTAP Rate (kbps)	Conducted Power (Average - MAP)	
					dBm	W
Cellular	1013	824.70	307.2 (2 slot, QPSK)	153.6	24.99	0.316
	384	836.52			24.91	0.310
	777	848.31			24.81	0.303
PCS	25	1851.25	307.2 (2 slot, QPSK)	153.6	25.25	0.335
	600	1880.00			24.89	0.308
	1175	1908.75			24.78	0.301

EV-DO Rev A

Band	Channel	Frequency (MHz)	FETAP-Traffic Format (kbps)	RETAP-Data Payload Size	Conducted Power (Average)	
					dBm	W
Cellular	1013	824.70	307.2 (QPSK/ACK channel is transmitted at all the slots)	4096	24.95	0.313
	384	836.52			24.91	0.310
	777	848.31			24.79	0.301
PCS	25	1851.25	307.2 (QPSK/ACK channel is transmitted at all the slots)	4096	25.11	0.324
	600	1880.00			24.89	0.308
	1175	1908.75			24.68	0.294

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 within 24 hours of 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 testing using the HP85070E dielectric probe kit. The dielectric measurements were made at 50 MHz intervals. 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 (MHz)	Head		Body	
	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
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 M Ω ⁺ 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

EMC**Tissue - Equivalent Liquid**

EUT: HSL1900		Work Order: ITRM0248	
Serial Number: SAN		Date: 08/26/11	
Customer: Intermec Technologies Corporation		Temperature (°C): 23.2	
Attendees: none		Humidity: 49%	
Project: ITRM0227		Barometric Pres. (mb): 1015.7	
Tested by: Jennifer Herrett		Power: None	
Job Site: Cal Lab			
TEST SPECIFICATIONS		Test Method	
FCC 2.1093:2011		FCC OET 65C:2001	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	None	Signature <i>Jennifer Herrett</i>	
Tissue: HSL1900		Liquid Temperature (°C): 22	

Frequency (GHz)	Actual Values		Target Values		Deviation (%)	
	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
1900	38.935	1.438	40.000	1.400	2.66	-2.70

1600.0	40.2	1.130
1612.5	40.2	1.142
1625.0	40.1	1.154
1637.5	40.1	1.166
1650.0	40.0	1.179
1662.5	40.0	1.191
1675.0	39.9	1.204
1687.5	39.9	1.216
1700.0	39.8	1.229
1712.5	39.7	1.242
1725.0	39.7	1.254
1737.5	39.6	1.267
1750.0	39.5	1.278
1762.5	39.5	1.291
1775.0	39.4	1.303
1787.5	39.4	1.314
1800.0	39.3	1.328
1812.5	39.3	1.340
1825.0	39.3	1.354
1837.5	39.2	1.368
1850.0	39.2	1.382
1862.5	39.1	1.396
1875.0	39.0	1.410
1887.5	39.0	1.424
1900.0	38.9	1.438
1912.5	38.9	1.451
1925.0	38.8	1.465
1937.5	38.8	1.478
1950.0	38.7	1.491
1962.5	38.6	1.504
1975.0	38.6	1.517
1987.5	38.5	1.530
2000.0	38.5	1.544

EMC**Tissue - Equivalent Liquid**

EUT: HSL1900	Work Order: ITRM0248
Serial Number: SAN	Date: 08/30/2011
Customer: Intermec Technologies Corporation	Temperature (°C): 23.1
Attendees: none	Humidity: 44%
Project: ITRM0227	Barometric Pres. (mb): 1016.6
Tested by: Jennifer Herrett	Power: None
Job Site: Cal Lab	
TEST SPECIFICATIONS	
FCC 2.1093:2011	Test Method: FCC OET 65C:2001
COMMENTS	
None	
DEVIATIONS FROM TEST STANDARD	
None	
Configuration #	None
Signature <i>Jennifer Herrett</i>	
Tissue: HSL1900	
Liquid Temperature (°C): 22	

Frequency (GHz)	Actual Values		Target Values		Deviation (%)	
	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
1900	39.007	1.429	40.000	1.400	2.48	-2.07

1600.0	40.2	1.107
1612.5	40.1	1.120
1625.0	40.1	1.133
1637.5	40.0	1.145
1650.0	39.9	1.158
1662.5	39.9	1.172
1675.0	39.8	1.185
1687.5	39.8	1.200
1700.0	39.7	1.214
1712.5	39.7	1.227
1725.0	39.6	1.241
1737.5	39.6	1.253
1750.0	39.5	1.266
1762.5	39.5	1.278
1775.0	39.5	1.290
1787.5	39.4	1.302
1800.0	39.4	1.314
1812.5	39.3	1.327
1825.0	39.3	1.341
1837.5	39.2	1.355
1850.0	39.2	1.370
1862.5	39.1	1.386
1875.0	39.1	1.400
1887.5	39.0	1.415
1900.0	39.0	1.429
1912.5	39.0	1.442
1925.0	38.9	1.455
1937.5	38.9	1.467
1950.0	38.8	1.479
1962.5	38.8	1.491
1975.0	38.7	1.503
1987.5	38.7	1.515
2000.0	38.6	1.528

EMC**Tissue - Equivalent Liquid**

EUT: MSL1900		Work Order: ITRM0248	
Serial Number: SAO		Date: 08/30/2011	
Customer: Intermec Technologies Corporation		Temperature (°C): 23.8	
Attendees: none		Humidity: 43.5	
Project: ITRM0227		Barometric Pres. (mb): 1016.60	
Tested by: Jennifer Herrett		Power: None	
Job Site: Cal Lab			
TEST SPECIFICATIONS		Test Method	
FCC 2.1093:2011		FCC OET 65C:2001	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	None	Signature <i>Jennifer Herrett</i>	
Tissue: MSL1900		Liquid Temperature (°C): 22	

Frequency (GHz)	Actual Values		Target Values		Deviation (%)	
	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
1900	52.150	1.502	53.300	1.520	2.16	1.20

1600.0	53.0	1.164
1612.5	52.9	1.177
1625.0	52.9	1.191
1637.5	52.8	1.204
1650.0	52.8	1.218
1662.5	52.7	1.232
1675.0	52.7	1.246
1687.5	52.7	1.261
1700.0	52.6	1.275
1712.5	52.6	1.290
1725.0	52.6	1.303
1737.5	52.5	1.317
1750.0	52.5	1.329
1762.5	52.5	1.342
1775.0	52.4	1.354
1787.5	52.4	1.366
1800.0	52.4	1.379
1812.5	52.3	1.393
1825.0	52.3	1.408
1837.5	52.3	1.423
1850.0	52.3	1.439
1862.5	52.2	1.455
1875.0	52.2	1.471
1887.5	52.2	1.487
1900.0	52.1	1.502
1912.5	52.1	1.516
1925.0	52.1	1.530
1937.5	52.1	1.542
1950.0	52.0	1.554
1962.5	52.0	1.567
1975.0	51.9	1.580
1987.5	51.9	1.594
2000.0	51.8	1.608

NORTHWEST		Tissue - Equivalent Liquid		SAR 2011.02.21	
EMC					
EUT: HSL900			Work Order: ITRM0248		
Serial Number: SAS			Date: 08/31/2011		
Customer: Intermec Technologies Corporation			Temperature (°C): 23.2		
Attendees: none			Humidity: 41		
Project: ITRM0227			Barometric Pres. (mb): 1016.20		
Tested by: Jennifer Herrett		Power: None		Job Site: Cal Lab	
TEST SPECIFICATIONS			Test Method		
FCC 2.1093:2011			FCC OET 65C:2001		
COMMENTS					
None					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	None	Signature <i>Jennifer Herrett</i>			
Tissue: HSL900			Liquid Temperature (°C): 22		

Frequency (GHz)	Actual Values		Target Values		Deviation (%)	
	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
835	40.108	0.861	41.500	0.900	3.35	4.37
700.0	41.9	0.739				
705.0	41.8	0.744				
710.0	41.7	0.748				
715.0	41.7	0.753				
720.0	41.6	0.757				
725.0	41.5	0.762				
730.0	41.5	0.766				
735.0	41.4	0.771				
740.0	41.3	0.775				
745.0	41.3	0.779				
750.0	41.2	0.784				
755.0	41.1	0.789				
760.0	41.1	0.793				
765.0	41.0	0.797				
770.0	40.9	0.802				
775.0	40.9	0.806				
780.0	40.8	0.811				
785.0	40.7	0.816				
790.0	40.7	0.820				
795.0	40.6	0.825				
800.0	40.5	0.829				
805.0	40.5	0.834				
810.0	40.4	0.838				
815.0	40.4	0.843				
820.0	40.3	0.847				
825.0	40.2	0.851				
830.0	40.2	0.856				
835.0	40.1	0.861				
840.0	40.0	0.865				
845.0	40.0	0.870				
850.0	39.9	0.874				
855.0	39.9	0.879				
860.0	39.8	0.883				
865.0	39.7	0.888				
870.0	39.7	0.892				
875.0	39.6	0.897				
880.0	39.6	0.901				
885.0	39.5	0.905				
890.0	39.4	0.909				
895.0	39.4	0.914				
900.0	39.3	0.919				
905.0	39.3	0.923				
910.0	39.2	0.928				
915.0	39.2	0.932				
920.0	39.1	0.936				
925.0	39.0	0.941				
930.0	39.0	0.946				
935.0	38.9	0.950				
940.0	38.9	0.954				
945.0	38.8	0.959				
950.0	38.8	0.963				
955.0	38.7	0.967				
960.0	38.6	0.971				
965.0	38.6	0.976				
970.0	38.5	0.980				
975.0	38.5	0.984				
980.0	38.4	0.989				
985.0	38.4	0.993				
990.0	38.3	0.998				
995.0	38.3	1.002				
1000.0	38.2	1.007				
1005.0	38.2	1.011				
1010.0	38.1	1.016				
1015.0	38.1	1.020				
1020.0	38.0	1.025				
1025.0	38.0	1.030				
1030.0	37.9	1.034				
1035.0	37.9	1.039				
1040.0	37.8	1.043				
1045.0	37.8	1.048				
1050.0	37.7	1.053				
1055.0	37.7	1.056				
1060.0	37.6	1.061				
1065.0	37.6	1.065				
1070.0	37.5	1.070				
1075.0	37.5	1.074				
1080.0	37.5	1.079				
1085.0	37.4	1.084				
1090.0	37.4	1.089				
1095.0	37.3	1.093				
1100.0	37.3	1.098				
1105.0	37.2	1.102				
1110.0	37.2	1.107				
1115.0	37.1	1.111				
1120.0	37.1	1.116				
1125.0	37.0	1.121				
1130.0	37.0	1.125				
1135.0	36.9	1.130				
1140.0	36.9	1.134				
1145.0	36.8	1.139				
1150.0	36.8	1.143				
1155.0	36.7	1.148				
1160.0	36.7	1.152				
1165.0	36.6	1.157				
1170.0	36.6	1.161				
1175.0	36.5	1.165				
1180.0	36.5	1.169				
1185.0	36.5	1.174				
1190.0	36.4	1.178				
1195.0	36.4	1.183				
1200.0	36.3	1.187				

NORTHWEST		EMC		Tissue - Equivalent Liquid		SAR 2011.02.21	
EUT: MSL900				Work Order: ITRM0248			
Serial Number: SAT				Date: 09/01/2011			
Customer: Intermec Technologies Corporation				Temperature (°C): 22.8			
Attendees: none				Humidity: 43.6			
Project: ITRM0227				Barometric Pres. (mb): 1022.70			
Tested by: Jennifer Herrett				Power: None			
Job Site: Cal Lab							
TEST SPECIFICATIONS				Test Method			
FCC 2.1093:2011				FCC OET 65C:2001			
COMMENTS							
None							
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #		None		Signature <i>Jennifer Herrett</i>			
Tissue: MSL900				Liquid Temperature (°C): 22.9			

Frequency (GHz)	Actual Values		Target Values		Deviation (%)	
	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
835	54.728	0.998	55.200	0.970	0.85	-2.86
700.0	56.0	0.873				
705.0	56.0	0.877				
710.0	55.9	0.882				
715.0	55.9	0.886				
720.0	55.8	0.891				
725.0	55.8	0.895				
730.0	55.7	0.900				
735.0	55.7	0.904				
740.0	55.6	0.909				
745.0	55.6	0.913				
750.0	55.5	0.918				
755.0	55.5	0.923				
760.0	55.4	0.927				
765.0	55.4	0.932				
770.0	55.3	0.937				
775.0	55.3	0.942				
780.0	55.2	0.946				
785.0	55.2	0.951				
790.0	55.1	0.956				
795.0	55.1	0.960				
800.0	55.0	0.965				
805.0	55.0	0.970				
810.0	54.9	0.974				
815.0	54.9	0.979				
820.0	54.9	0.984				
825.0	54.8	0.988				
830.0	54.8	0.993				
835.0	54.7	0.998				
840.0	54.7	1.002				
845.0	54.6	1.007				
850.0	54.6	1.012				
855.0	54.6	1.016				
860.0	54.5	1.021				
865.0	54.5	1.025				
870.0	54.4	1.030				
875.0	54.4	1.035				
880.0	54.3	1.039				
885.0	54.3	1.044				
890.0	54.2	1.048				
895.0	54.2	1.053				
900.0	54.1	1.058				
905.0	54.1	1.063				
910.0	54.0	1.068				
915.0	54.0	1.072				
920.0	53.9	1.077				
925.0	53.9	1.082				
930.0	53.9	1.087				
935.0	53.8	1.092				
940.0	53.8	1.096				
945.0	53.7	1.101				
950.0	53.7	1.106				
955.0	53.6	1.111				
960.0	53.6	1.116				
965.0	53.6	1.121				
970.0	53.5	1.125				
975.0	53.5	1.130				
980.0	53.4	1.135				
985.0	53.4	1.139				
990.0	53.4	1.144				
995.0	53.3	1.149				
1000.0	53.3	1.153				
1005.0	53.3	1.158				
1010.0	53.2	1.164				
1015.0	53.2	1.169				
1020.0	53.2	1.174				
1025.0	53.1	1.179				
1030.0	53.1	1.184				
1035.0	53.0	1.190				
1040.0	53.0	1.195				
1045.0	52.9	1.199				
1050.0	52.9	1.205				
1055.0	52.9	1.209				
1060.0	52.8	1.214				
1065.0	52.8	1.219				
1070.0	52.7	1.225				
1075.0	52.7	1.230				
1080.0	52.7	1.235				
1085.0	52.6	1.241				
1090.0	52.6	1.246				
1095.0	52.6	1.251				
1100.0	52.5	1.257				
1105.0	52.5	1.262				
1110.0	52.4	1.268				
1115.0	52.4	1.273				
1120.0	52.3	1.279				
1125.0	52.3	1.284				
1130.0	52.3	1.289				
1135.0	52.2	1.294				
1140.0	52.2	1.300				
1145.0	52.1	1.304				
1150.0	52.1	1.309				
1155.0	52.1	1.315				
1160.0	52.0	1.319				
1165.0	52.0	1.325				
1170.0	51.9	1.330				
1175.0	51.9	1.335				
1180.0	51.9	1.340				
1185.0	51.8	1.345				
1190.0	51.8	1.350				
1195.0	51.7	1.355				
1200.0	51.7	1.360				

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

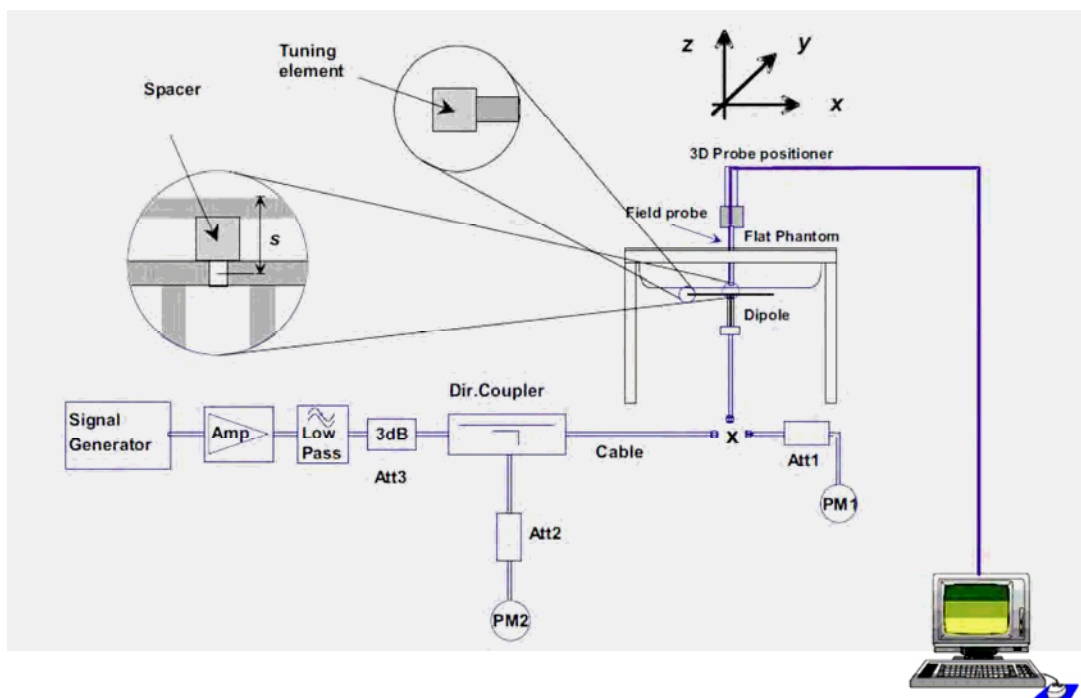
Within 24 hours of a measurement, Northwest EMC used the system validation kit (calibrated reference dipole) to test whether the system was operating within its specifications. The validation was performed in the indicated bands by making SAR measurements of the reference dipole with the phantom filled 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.



NORTHWEST		System Verification		SAR 2011.02.07
EMC				
EUT: System Verifications		Work Order: ITRM0248		
Serial Number: Various		Date: See Data Sheets		
Customer: Intermec Technologies Corporation		Temperature: See Data Sheets		
Attendees: None		Humidity: See Data Sheets		
Project: ITRM0227		Barometric Pres.: See Data Sheets		
Tested by: Jennifer Herrett		Job Site: EV08		
TEST SPECIFICATIONS		Test Method		
FCC 2.1093:2011		FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 941225 D01 v02, and D03 FCC KDB 648474 D01 V01r05		
Health Safety Code 6:2009		RSS-102, Issue 4:2010		
COMMENTS				
None				
DEVIATIONS FROM TEST STANDARD				
No Deviations				
Configuration #	N/A	Signature <i>Jennifer Herrett</i>		

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	1g Measured	10g Measured	1g Normalized to 1W	10g Normalized to 1W	Target 1g (Normalized to 1W) - Get from Dipole cal cert	Target 10g (Normalized to 1W) - Get from Dipole cal cert	% difference 1g	% difference 10 g	Comments
8/26/2011	HSL1900 1900MHz	20.00	10.00	4.09	2.10	40.90	21.00	40.20	20.90	1.74	0.48	
8/30/2011	HSL1900 1900MHz	19.99	10.02	4.06	2.09	40.69	20.95	40.20	20.90	1.23	0.23	
8/31/2011	MSL1900 1900MHz	19.97	10.07	4.02	2.11	40.48	21.25	39.90	21.00	1.45	1.17	
9/1/2011	HSL900 835MHz	20.00	10.00	0.95	0.63	9.52	6.27	9.64	6.29	-1.24	-0.32	
9/2/2011	MSL900 835MHz	20.01	9.98	0.98	0.64	9.75	6.42	9.93	6.51	-1.84	-1.46	

EMC

SAR TEST DATA

Room Temperature (°C):	23.3	Humidity (%):	49.5	Test Date:	08/26/11
Liquid Temperature (°C):	21.2	Barometric Pressure (mb):	1015.7	Tested by:	Jennifer Herrett

HSL1900 System Check_1900MHz 8-26-11

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:1040

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.45$ mho/m; $\epsilon = 39.75$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.45$ mho/m, $\epsilon = 39.75$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 5mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

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

Reference Value = 52.299 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 7.899 W/kg

SAR(1 g) = 4.09 mW/g; SAR(10 g) = 2.1 mW/g

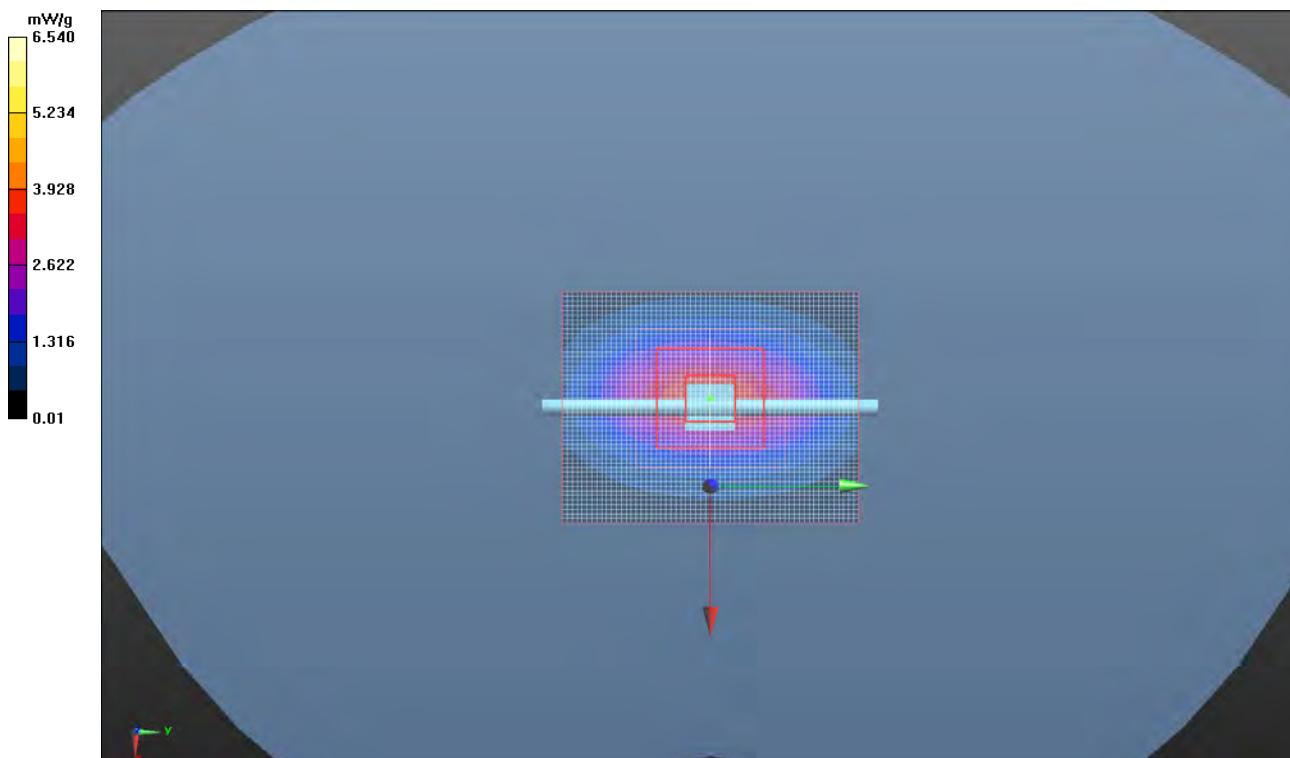
Maximum value of SAR (measured) = 4.033 mW/g

System Check/System Check/Area Scan (51x61x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.023 mW/g

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

Maximum value of Total (measured) = 67.162 V/m



EMC

SAR TEST DATA

Room Temperature (°C):	23.9	Humidity (%):	45	Test Date:	08/30/11
Liquid Temperature (°C):	23	Barometric Pressure (mb):	1016.6	Tested by:	Jennifer Herrett

HSL1900 System Check_1900MHz 8-30-11

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:5d131

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.438$ mho/m; $\epsilon = 38.935$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.43778$ mho/m; $\epsilon = 38.9346$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 5mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

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

Reference Value = 52.519 V/m; Power Drift = 0.0014 dB

Peak SAR (extrapolated) = 7.810 W/kg

SAR(1 g) = 4.06 mW/g; SAR(10 g) = 2.09 mW/g

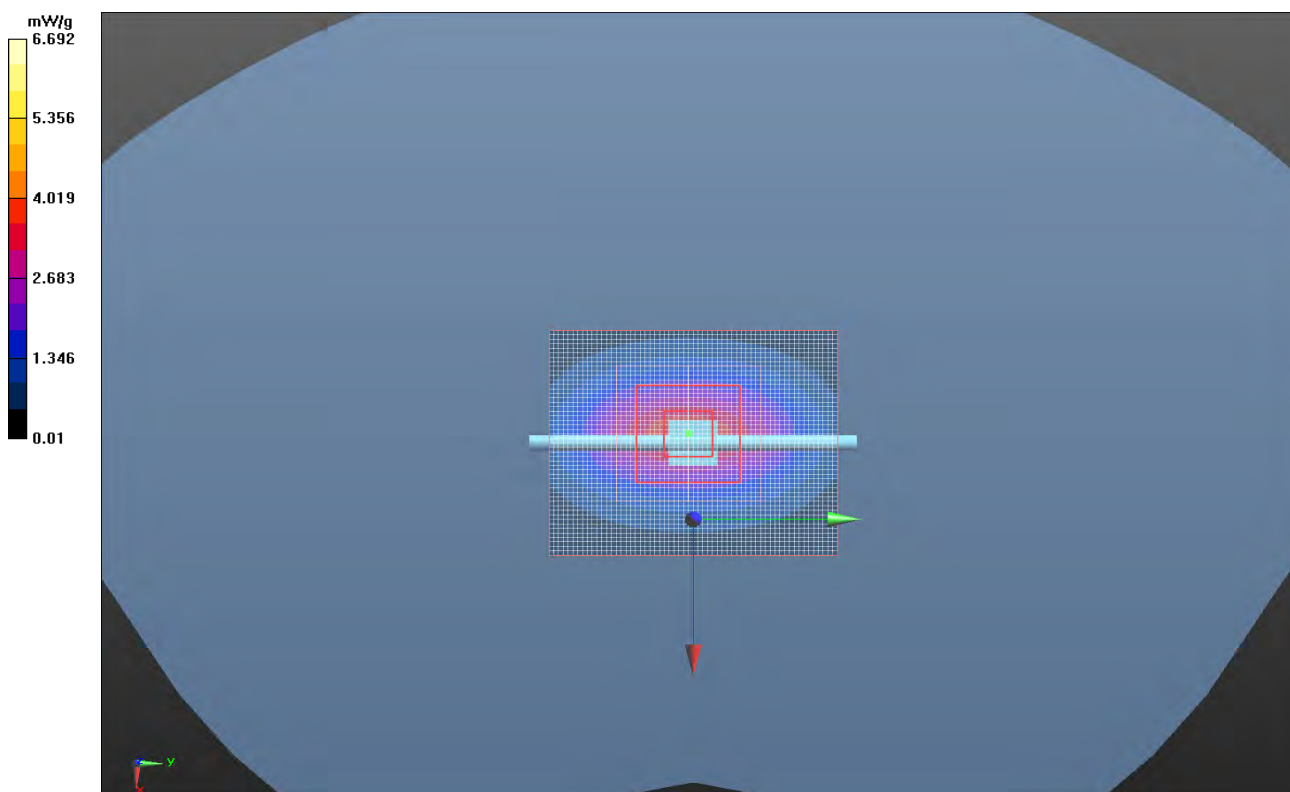
Maximum value of SAR (measured) = 3.996 mW/g

System Check/System Check/Area Scan (51x61x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 3.998 mW/g

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

Maximum value of Total (measured) = 68.223 V/m



Room Temperature (°C):	23.7	Humidity (%):	41.7	Test Date:	08/31/11
Liquid Temperature (°C):	22.5	Barometric Pressure (mb):	1016.2	Tested by:	Jennifer Herrett

MSL1900 System Check_1900MHz 8-31-11

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN 5d131

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.502$ mho/m; $\epsilon = 52.15$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.50168$ mho/m, $\epsilon = 52.1495$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.55, 4.55, 4.55); Calibrated: 2/23/2011

Sensor-Surface: 5mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

System Check/System Check/Area Scan (51x61x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 4.065 mW/g

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

Reference Value = 51.560 V/m; Power Drift = -0.07 dB

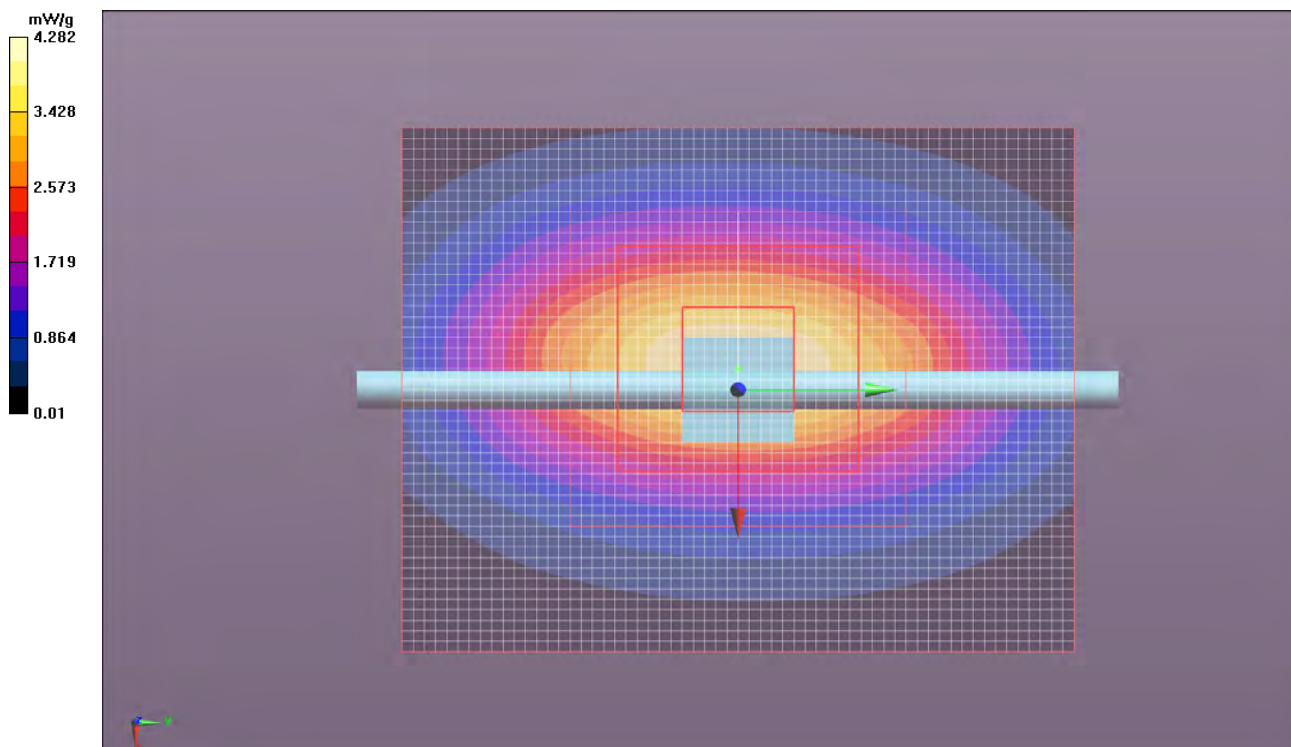
Peak SAR (extrapolated) = 7.334 W/kg

SAR(1 g) = 4.02 mW/g; SAR(10 g) = 2.11 mW/g

Maximum value of SAR (measured) = 4.021 mW/g

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

Maximum value of Total (measured) = 53.396 V/m



EMC

SAR TEST DATA

Room Temperature (°C):	23.8	Humidity (%):	36.9	Test Date:	09/01/11
Liquid Temperature (°C):	23.8	Barometric Pressure (mb):	1022.7	Tested by:	Jennifer Herrett

HSL900 System Check_835MHz 9-1-11

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4D108

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.861$ mho/m; $\epsilon = 40.108$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon = 40.1082$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 5mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

System Check/System Check/Area Scan (71x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.967 mW/g

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

Reference Value = 33.689 V/m; Power Drift = -0.07 dB

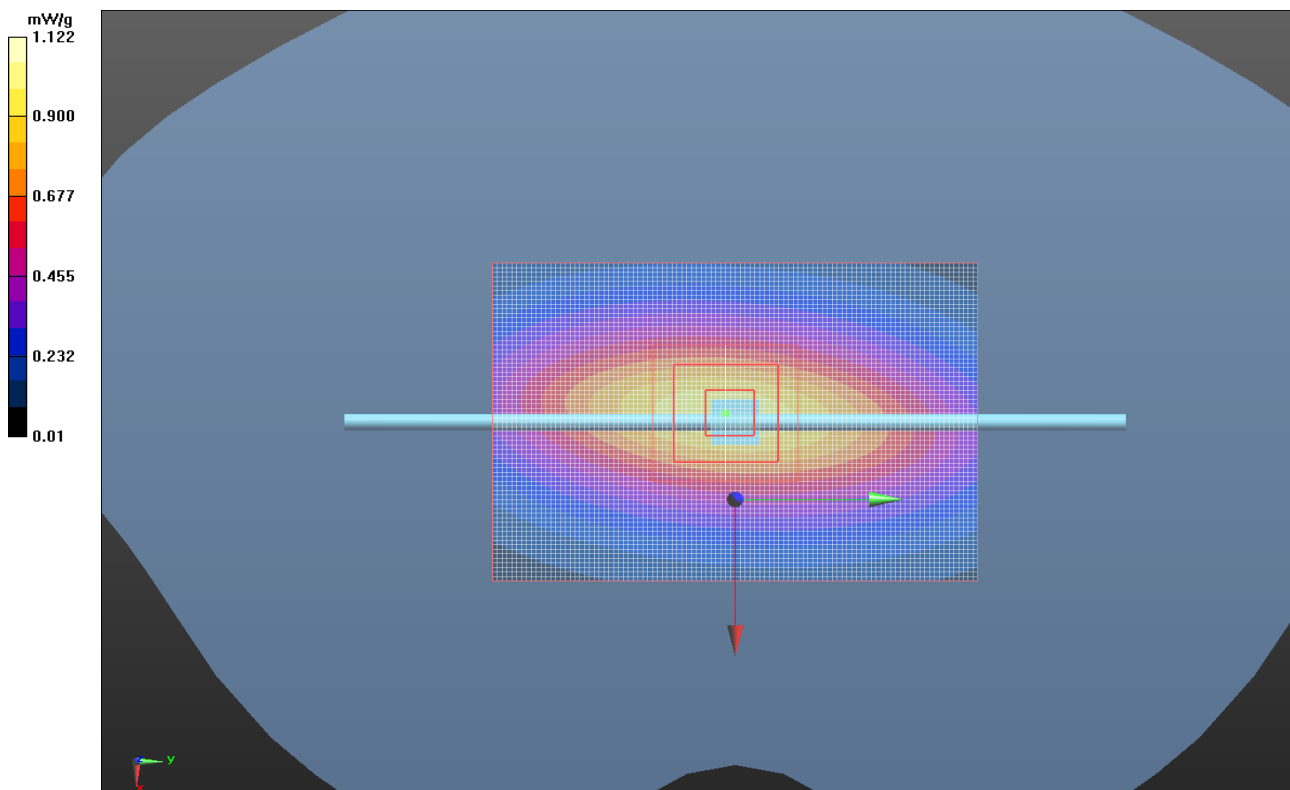
Peak SAR (extrapolated) = 1.411 W/kg

SAR(1 g) = 0.952 mW/g; SAR(10 g) = 0.627 mW/g

Maximum value of SAR (measured) = 0.947 mW/g

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

Maximum value of Total (measured) = 36.112 V/m



EMC

SAR TEST DATA

Room Temperature (°C):	25.1	Humidity (%):	39.6	Test Date:	09/02/11
Liquid Temperature (°C):	23.1	Barometric Pressure (mb):	1023.1	Tested by:	Jennifer Herrett

MSL900 System Check_835MHz 9-2-11

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4D108

Communication System: CW; Frequency: 835 MHz

Medium parameters used: $\sigma = 0.997699$ mho/m, $\epsilon = 54.7283$; $\rho = 1000$ kg/m³, Medium parameters used: $f = 835$ MHz; $\sigma = 0.998$ mho/m; $\epsilon = 54.728$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(5.97, 5.97, 5.97); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 5mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

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

Maximum value of Total (measured) = 32.583 V/m

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

Reference Value = 31.673 V/m; Power Drift = -0.10 dB

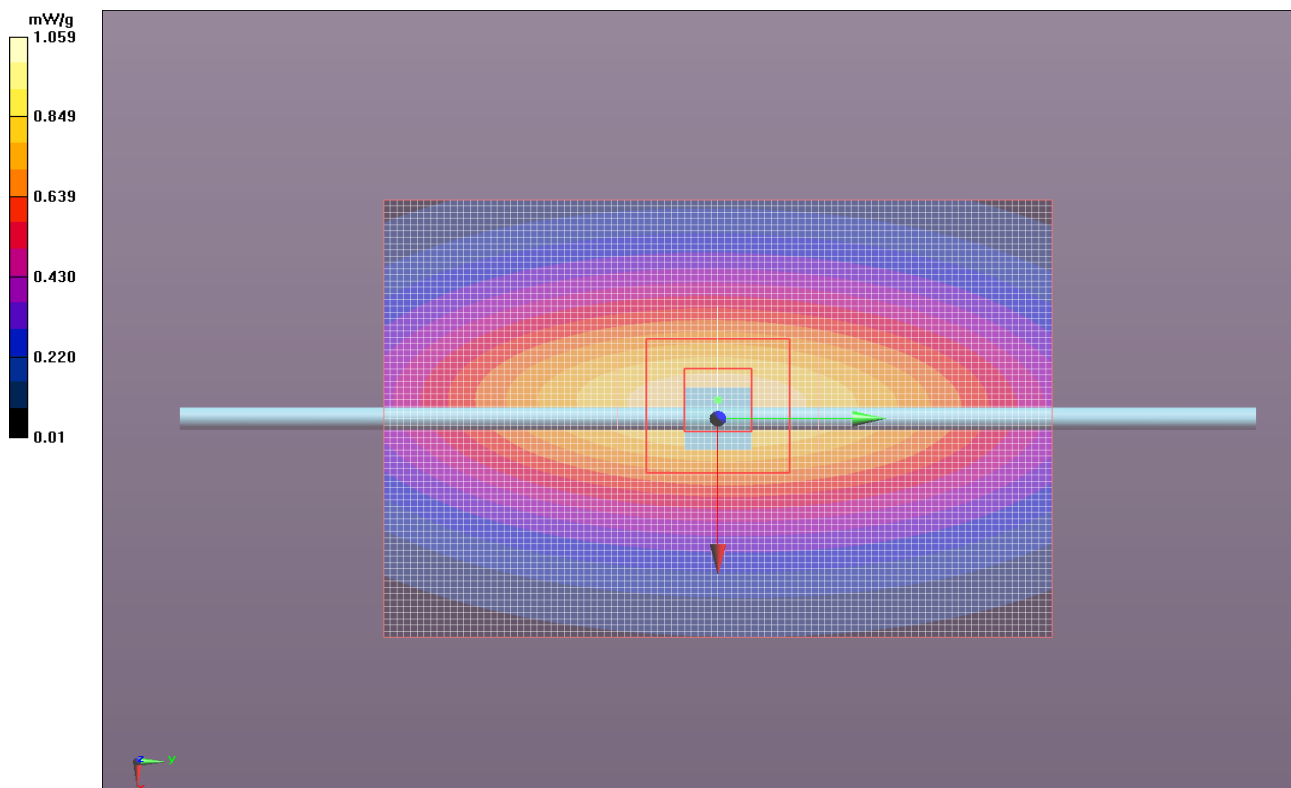
Peak SAR (extrapolated) = 1.441 W/kg

SAR(1 g) = 0.977 mW/g; SAR(10 g) = 0.643 mW/g

Maximum value of SAR (measured) = 0.978 mW/g

System Check/System Check/Area Scan (71x101x1): Measurement grid: dx=10mm, dy=10mm

Maximum value of SAR (interpolated) = 0.974 mW/g



Test Configurations

In normal operation, the EUT can be held in the hand, or next to the head like a cellular handset, or worn on the body. The only Intermec approved accessory for body worn operation is a holster that contains metal. The EUT can only fit in the holster with the top end of the unit pointing down. The holster cup can be attached to the holster belt with either the keypad facing the user, or the side facing the user. In no case can the back of the EUT face the user. For body worn operation, the keypad side was tested. The holster provides 1.5 mm spacing from the keypad side to the flat phantom.

The CDMA antenna is on the left side of the EUT. The closest portion of the antenna is more than 5 cm from the right side of the unit. For body worn operation, in addition to the keypad side, the left side was also tested. The holster provides 1.2 mm spacing from the left or right side to the flat phantom.

An optional snap-on audio accessory is available. It connects to the bottom end of the unit and provides a standard audio jack for connection of a VR10 headset. Measurements were made with and without the headset.

The EUT is powered by a lithium-ion battery, Model 1000AB01. It was fully charged before each SAR evaluation.

Per KDB 648474, among the channels required for normal testing, SAR must be measured on the highest conducted output power channel in each band (see highlighted values in the Output Power section of this report). When the SAR measured on the highest output channel is < 0.8 W/kg, SAR evaluation for the other required channels is unnecessary.

All testing was performed with the EUT configured in a worst-case configuration and operating mode to produce the highest SAR levels. An Agilent 8960 test set, Model E5515C, was used to control the EUT. The following applications were installed on the test set: CDMA 2000 Mobile Test Rev B.18.12, and EVDO Term Test Rev A.13.10. This provided all the necessary tools to operate the EUT in the prescribed manner without any difficulties or equipment limitations.

Summary

The following tables summarize the measured SAR values.

SAR TEST DATA

SAR 2011.02.07

EUT: 1000CP02S	Work Order: ITRM0248
Serial Number: 178U1191047	Date: See Data Sheets
Customer: Intermec Technologies Corporation	Temperature: See Data Sheets
Attendees: None	Humidity: See Data Sheets
Project: ITRM0227	Barometric Pres.: See Data Sheets
Tested by: Jennifer Herrett and Ethan Schoonover	Job Site: EV08

TEST SPECIFICATIONS	Test Method
FCC 2.1093:2011	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 941225 D01 v02, D03 FCC KDB 648474 D01 V01r05
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
No Deviations

Configuration #	13	<i>Signature</i>
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Test Configuration	Frequency Band	Body-Worn Accessory	Transmit Frequency	Transmit Channel	Transmit Mode	Data Rate (Mbps)	Audio Accessory	EUT Position	Start Power (Conducted)	SAR Drift During Test (dB)	1g SAR Level	Test #
Head	Cellular	None	836.52	384	RC3 (Fwd 3, Rvs 3), SO55 (Loopback)	9.6	None	Right - cheek	0.304	-0.04	0.025	9
								Right - tilt	0.304	-0.85	0.045	10
								Left - cheek	0.304	-0.06	0.237	11
								Left - tilt	0.304	0.18	0.217	12
					Right - cheek	0.31		-0.05	0.411	13		
					Right - tilt	0.31		0.03	0.382	14		
					Left - cheek	0.31		0.06	0.282	15		
					Left - tilt	0.31		0.11	0.247	16		

Room Temperature (°C):	23	Humidity (%):	39.9	Test Date:	09/01/11
Liquid Temperature (°C):	22.2	Barometric Pressure (mb):	1020.8	Tested by:	Ethan Schoonover

Head Test 9 9-1-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.884189$ mho/m, $\epsilon = 41.7001$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.886$ mho/m; $\epsilon = 41.681$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASYS Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 4.358 V/m

Head - Right/Cheek - Mid/Reference scan (51x81x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.024 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.028 mW/g

Head - Right/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

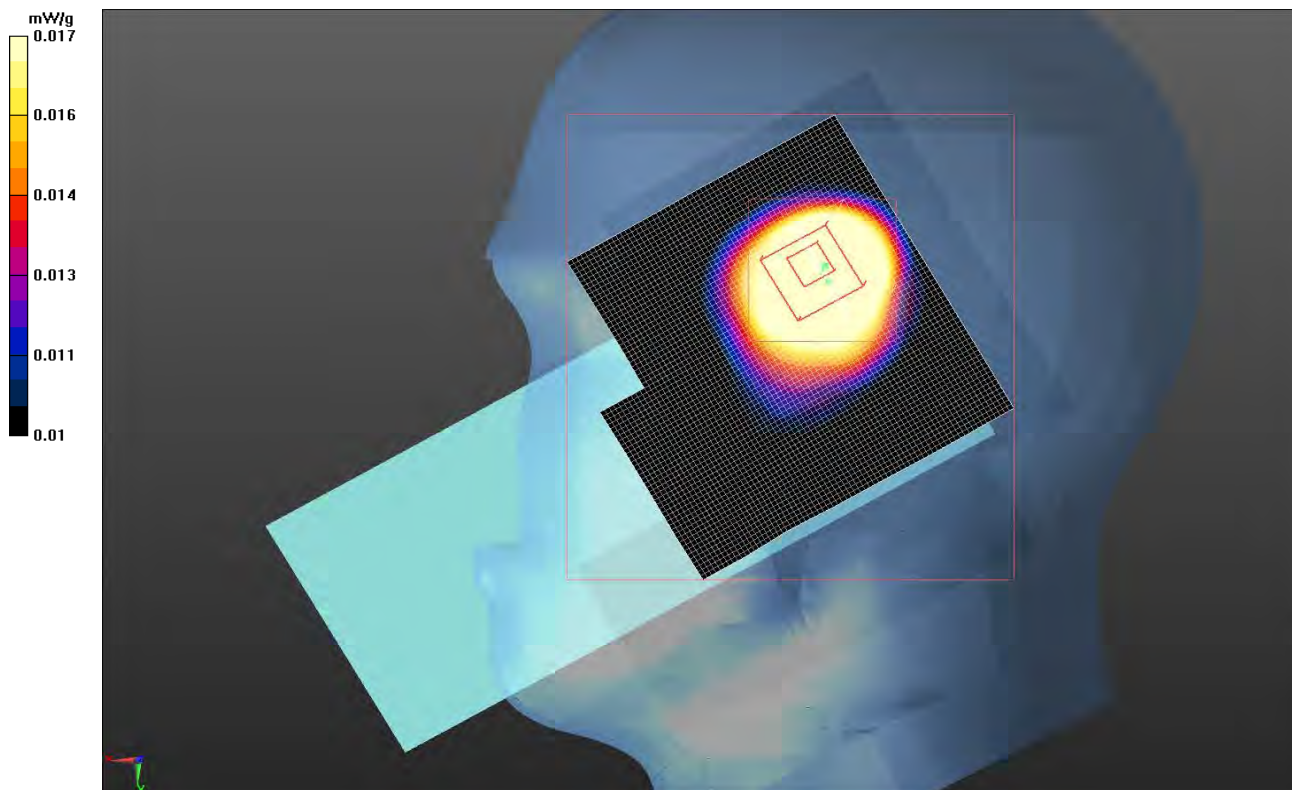
Reference Value = 5.558 V/m; Power Drift = -0.12 dB

Peak SAR (extrapolated) = 0.039 W/kg

SAR(1 g) = 0.025 mW/g; SAR(10 g) = 0.016 mW/g

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

Maximum value of SAR (measured) = 0.030 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	22.7	Humidity (%):	40.5	Test Date:	09/01/11
Liquid Temperature (°C):	22.2	Barometric Pressure (mb):	1020.8	Tested by:	Ethan Schoonover

Head Test 10 9-1-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.886$ mho/m; $\epsilon_r = 41.681$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0.884189$ mho/m, $\epsilon_r = 41.7001$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.046 mW/g

Head - Right/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.050 V/m; Power Drift = -0.85 dB

Peak SAR (extrapolated) = 0.070 W/kg

SAR(1 g) = 0.045 mW/g; SAR(10 g) = 0.029 mW/g

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

Maximum value of SAR (measured) = 0.055 mW/g

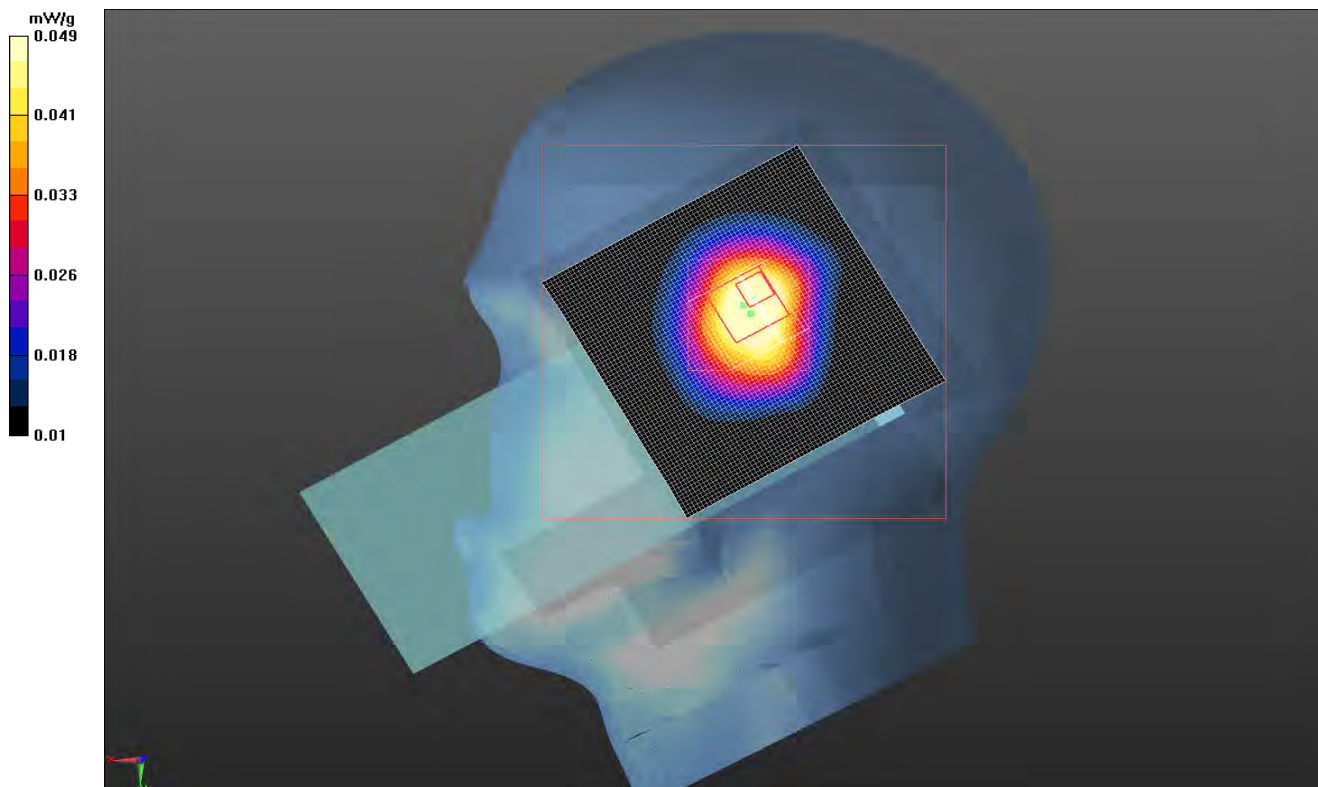
Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 7.408 V/m

Head - Right/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.056 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	25.9	Humidity (%):	47.9	Test Date:	09/01/11
Liquid Temperature (°C):	22.3	Barometric Pressure (mb):	1020.8	Tested by:	Ethan Schoonover

Head Test 11 9-1-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.884189$ mho/m, $\epsilon = 41.7001$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.886$ mho/m; $\epsilon = 41.681$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASYS Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 15.169 V/m

Head - Right/Cheek - Mid/Reference scan (51x81x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.319 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.274 mW/g

Head - Right/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

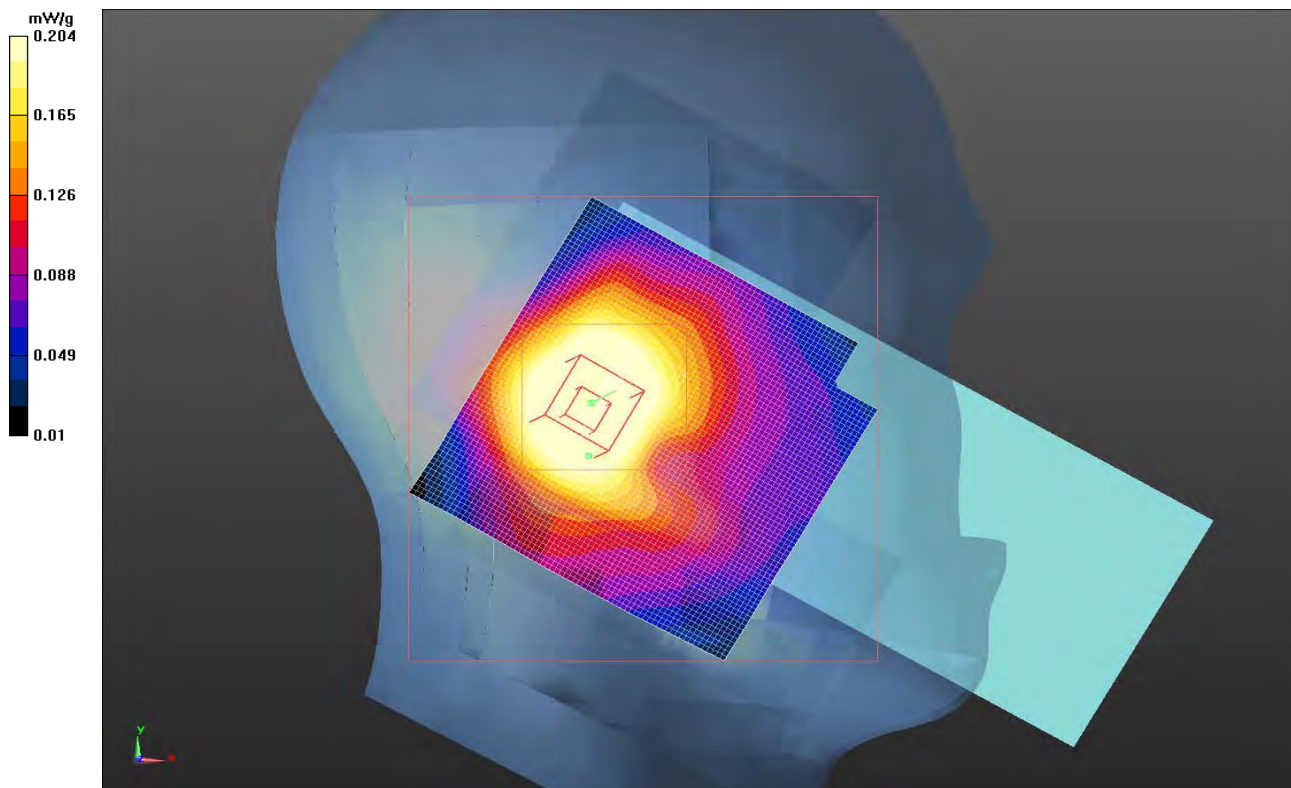
Reference Value = 17.935 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.313 W/kg

SAR(1 g) = 0.237 mW/g; SAR(10 g) = 0.164 mW/g

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

Maximum value of SAR (measured) = 0.267 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	26	Humidity (%):	47.4	Test Date:	09/01/11
Liquid Temperature (°C):	27.8	Barometric Pressure (mb):	1020.8	Tested by:	Ethan Schoonover

Head Test 12 9-1-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.886$ mho/m; $\epsilon_r = 41.681$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0.884189$ mho/m, $\epsilon_r = 41.7001$; $\rho = 1000$ kg/m³

Phantom section: Left Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.239 mW/g

Head - Right/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.550 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.299 W/kg

SAR(1 g) = 0.217 mW/g; SAR(10 g) = 0.148 mW/g

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

Maximum value of SAR (measured) = 0.248 mW/g

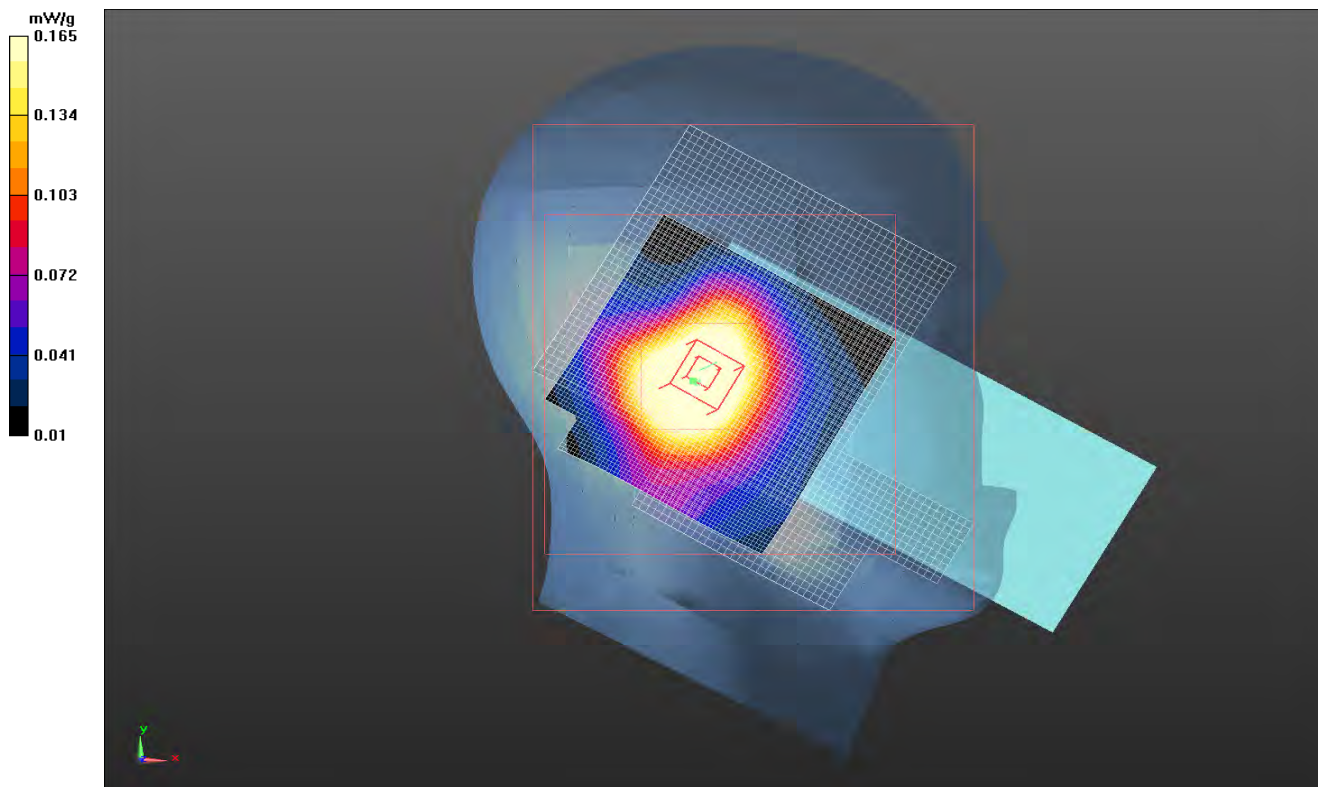
Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 13.665 V/m

Head - Right/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.252 mW/g



Room Temperature (°C):	25.7	Humidity (%):	38.5	Test Date:	08/31/11
Liquid Temperature (°C):	23	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Head Test 13 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon_r = 40.1082$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.862$ mho/m; $\epsilon_r = 40.088$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 19.721 V/m

Head - Right/Cheek - Mid/Reference scan (51x81x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.421 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.516 mW/g

Head - Right/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

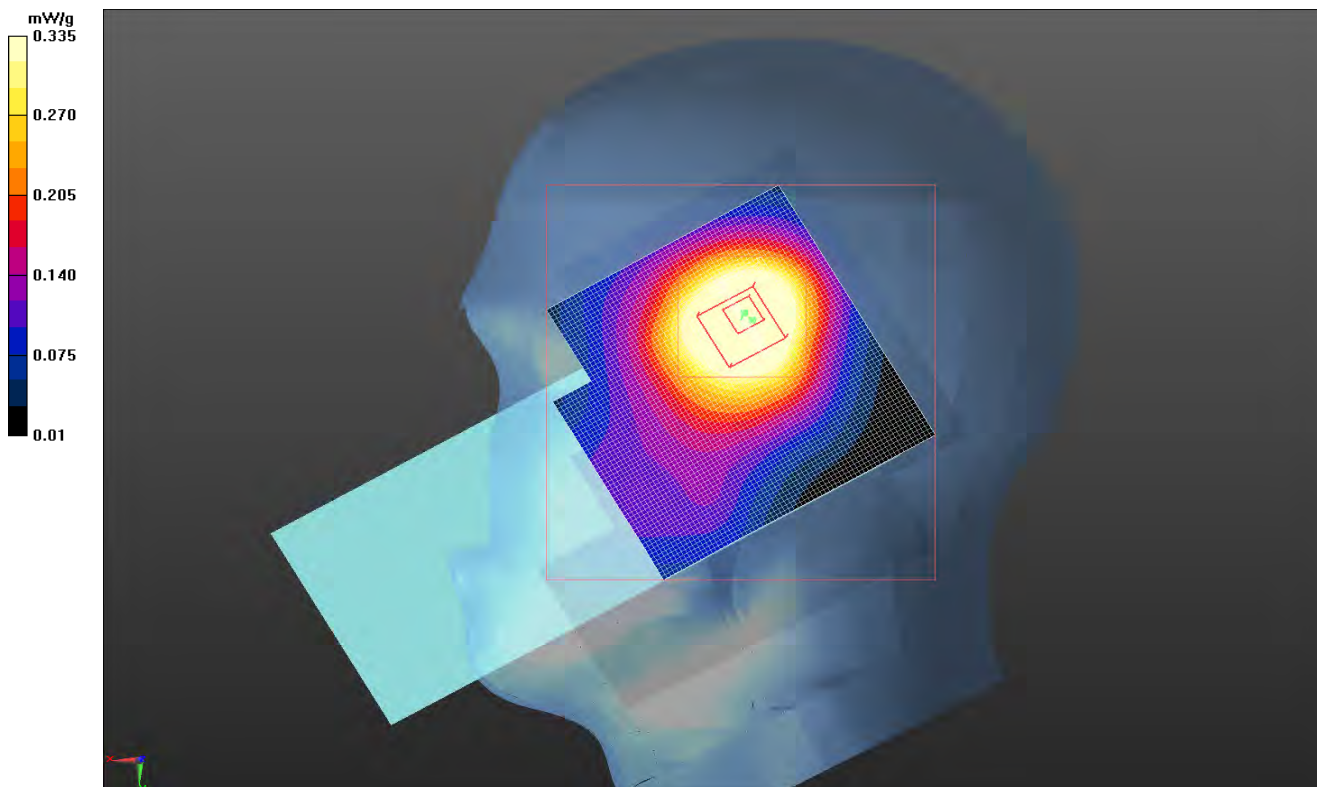
Reference Value = 24.181 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 0.603 W/kg

SAR(1 g) = 0.411 mW/g; SAR(10 g) = 0.272 mW/g

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

Maximum value of SAR (measured) = 0.477 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	22.4	Humidity (%):	36.4	Test Date:	08/31/11
Liquid Temperature (°C):	22.5	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Head Test 14 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.862$ mho/m; $\epsilon_r = 40.088$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon_r = 40.1082$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.427 mW/g

Head - Right/Tilt - Mid/Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 23.166 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 0.542 W/kg

SAR(1 g) = 0.382 mW/g; SAR(10 g) = 0.258 mW/g

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

Maximum value of SAR (measured) = 0.437 mW/g

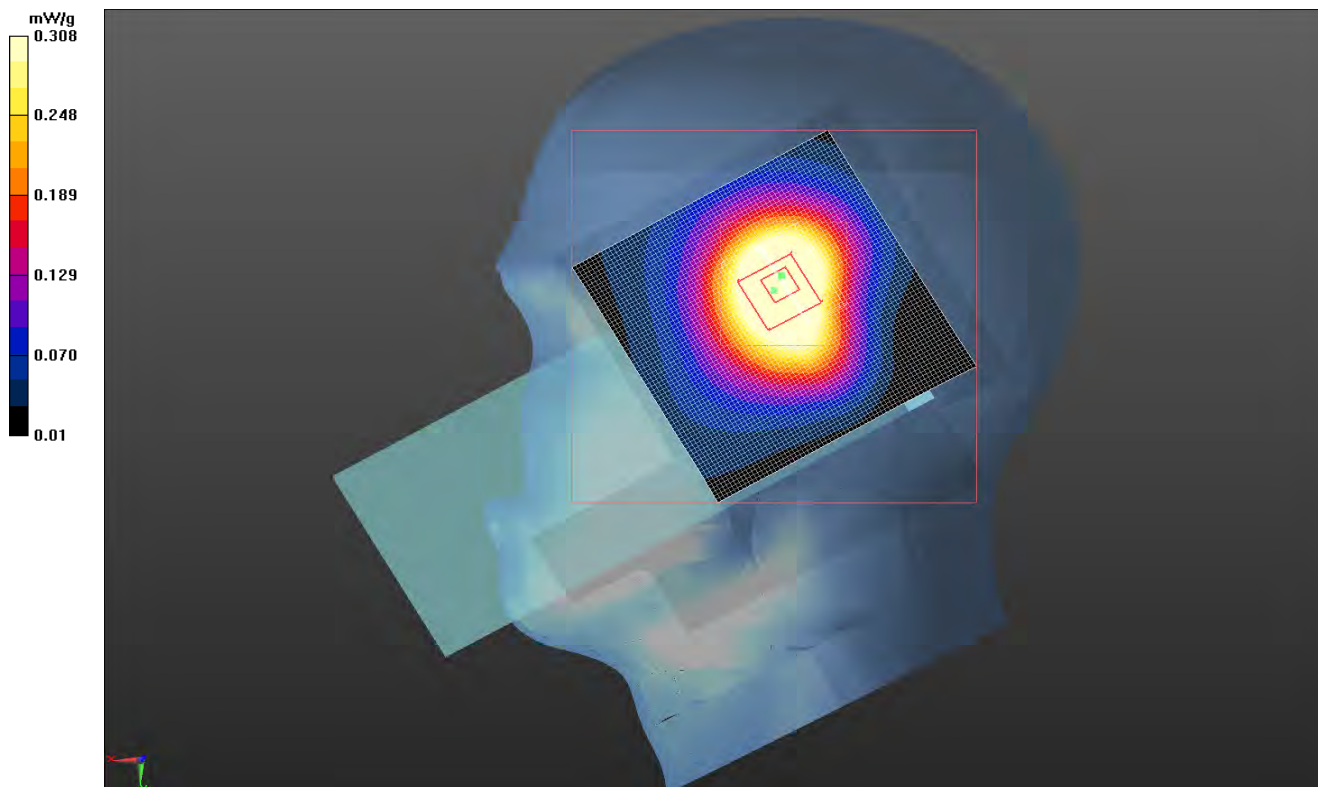
Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 18.913 V/m

Head - Right/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.433 mW/g



Room Temperature (°C):	23.8	Humidity (%):	48.5	Test Date:	08/31/11
Liquid Temperature (°C):	22.3	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Head Test 15 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon_r = 40.1082$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.862$ mho/m; $\epsilon_r = 40.088$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Left/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 16.322 V/m

Head - Left/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.500 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 0.384 W/kg

SAR(1 g) = 0.282 mW/g; SAR(10 g) = 0.197 mW/g

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

Maximum value of SAR (measured) = 0.320 mW/g

Head - Left/Cheek - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

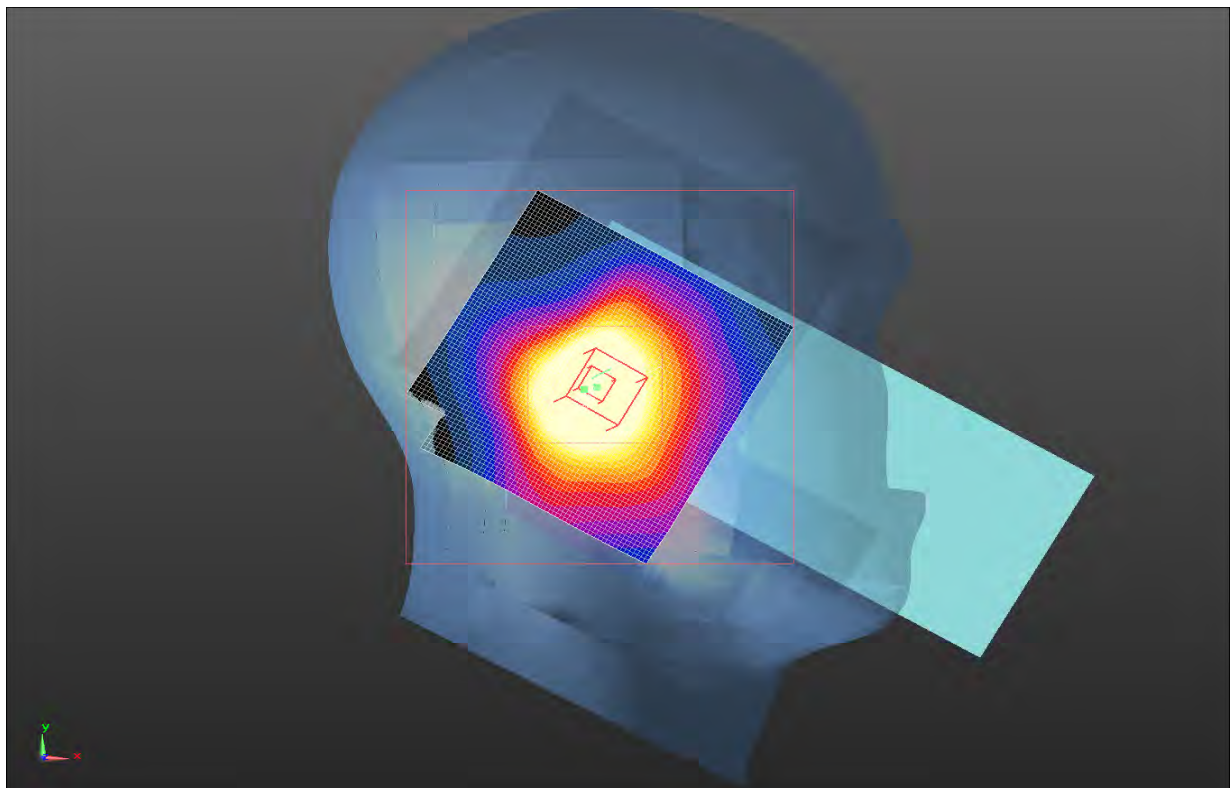
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.347 mW/g

Head - Left/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.323 mW/g



Room Temperature (°C):	25.3	Humidity (%):	42.2	Test Date:	08/31/11
Liquid Temperature (°C):	22.6	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Head Test 16 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon_r = 40.1082$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.862$ mho/m; $\epsilon_r = 40.088$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Left/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 15.278 V/m

Head - Left/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.295 mW/g

Head - Left/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.847 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.340 W/kg

SAR(1 g) = 0.247 mW/g; SAR(10 g) = 0.169 mW/g

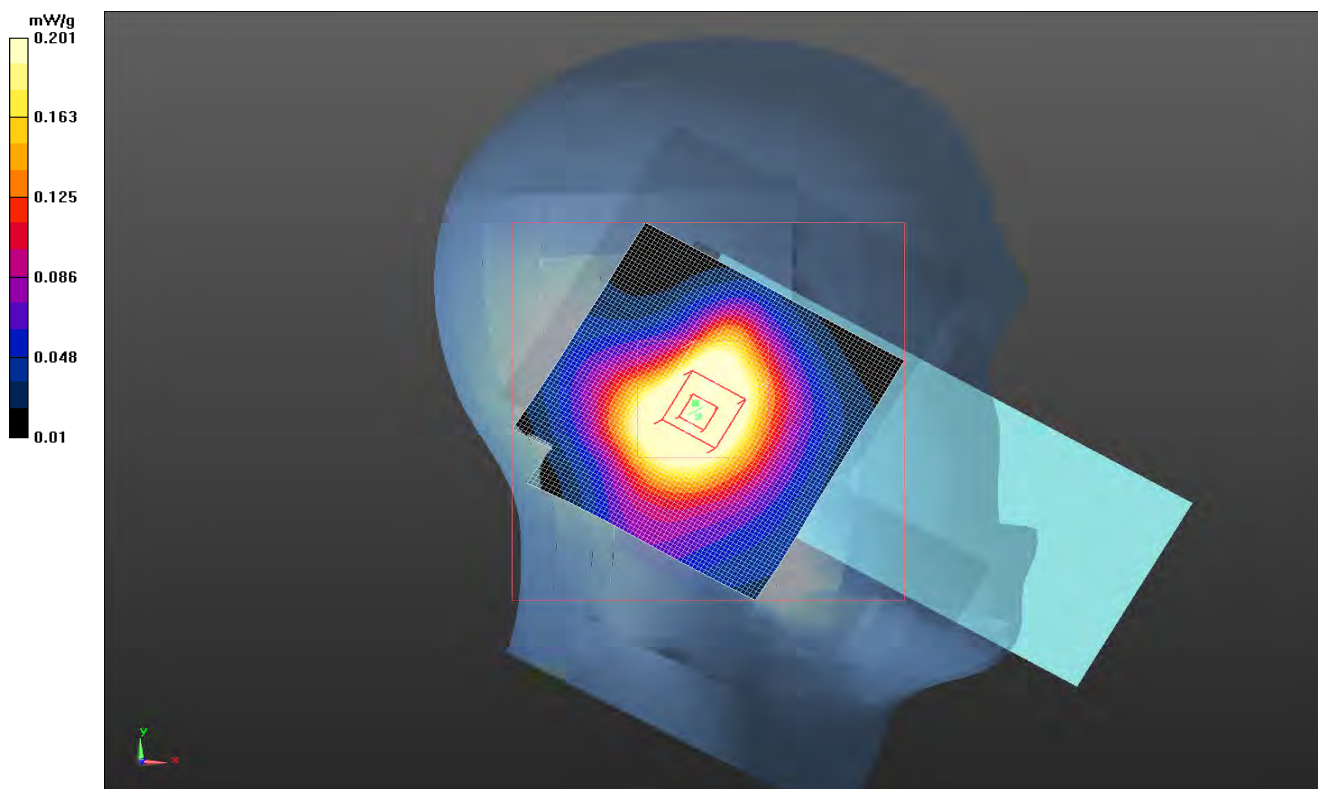
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.281 mW/g

Head - Left/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.288 mW/g

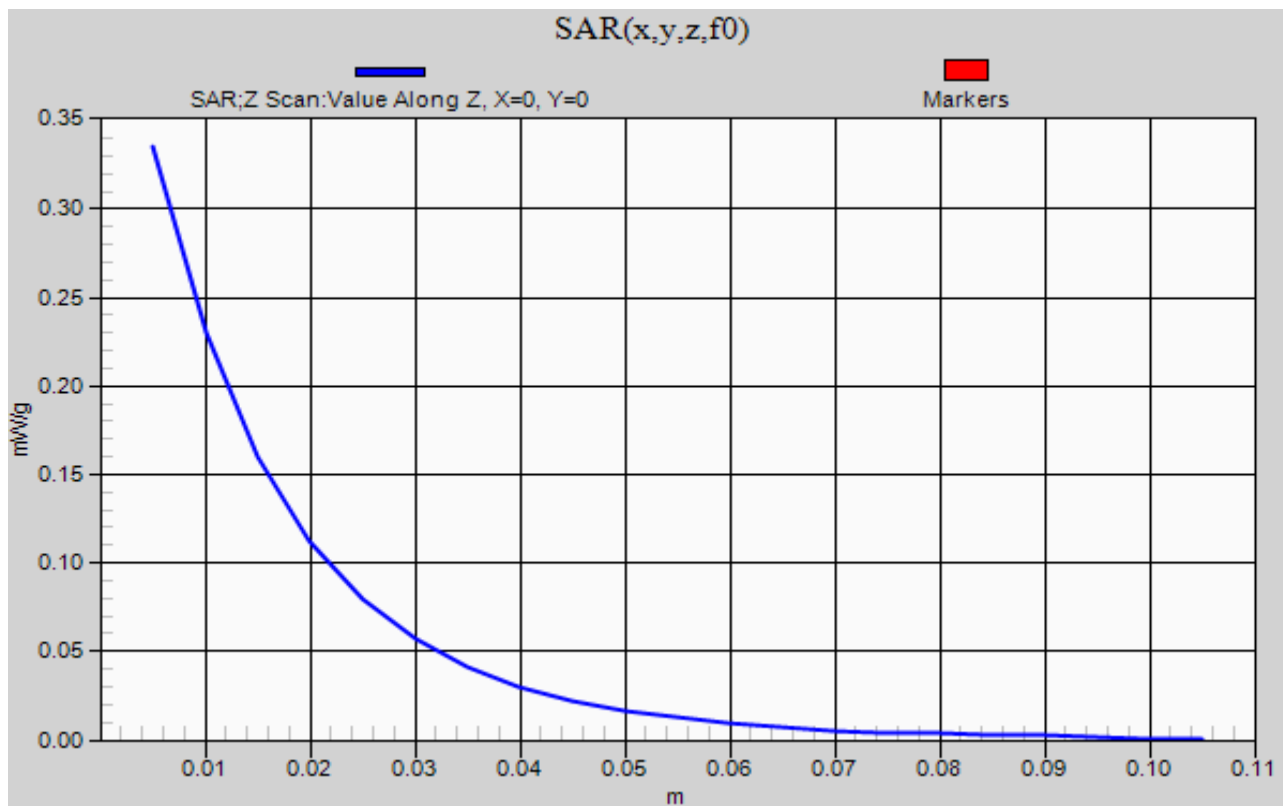


EMC SAR TEST DATA

Room Temperature (°C):	25.7	Humidity (%):	38.5	Test Date:	08/31/11
Liquid Temperature (°C):	23	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Head Test 13 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047



SAR TEST DATA

EMC

EUT:	1000CP02S	Work Order:	ITRM0248
Serial Number:	178U1191047	Date:	See Data Sheets
Customer:	Intermec Technologies Corporation	Temperature:	See Data Sheets
Attendees:	None	Humidity:	See Data Sheets
Project:	ITRM0227	Barometric Pres.:	See Data Sheets
Tested by:	Jennifer Herrett and Ethan Schoonover	Job Site:	EV08
TEST SPECIFICATIONS		Test Method	
FCC 2.1093:2011		FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 941225 D01 v02, and D03 FCC KDB 648474 D01 V01r05	
Health Safety Code 6:2009		RSS-102, Issue 4:2010	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	12	Signature <i>Jennifer Herrett</i>	

Test Configuration	Frequency Band	Transmit Frequency	Transmit Channel	Transmit Mode	Data Rate (kbps)	Body-Worn Accessory	Audio Accessory	EUT Position	Start Power (Conducted)	Drift	Measured SAR Level	Test #
Body	Cellular	836.52	384	EV-DO Rev. 0	FTAP: 307.2 RTAP: 153.6	Holster	VR10 Headset	Left	0.31	-0.05	0.324	5
				EV-DO Rev. A	FETAP: 307.2 RETAP: 4096			Front	0.31	-0.16	0.041	6
								Left	0.31	-0.09	0.543	7
								Front	0.31	0.08	0.25	8

EMC

SAR TEST DATA

Room Temperature (°C):	26.3	Humidity (%):	44.4	Test Date:	09/01/11
Liquid Temperature (°C):	24.3	Barometric Pressure (mb):	1020.8	Tested by:	Ethan Schoonover

Body Test 6 9-1-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.860614$ mho/m, $\epsilon = 40.1082$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.862$ mho/m; $\epsilon = 40.088$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(6.01, 6.01, 6.01); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

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

Maximum value of Total (measured) = 5.535 V/m

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.765 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 0.074 W/kg

SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.024 mW/g

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

Maximum value of SAR (measured) = 0.050 mW/g

Body/Body - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

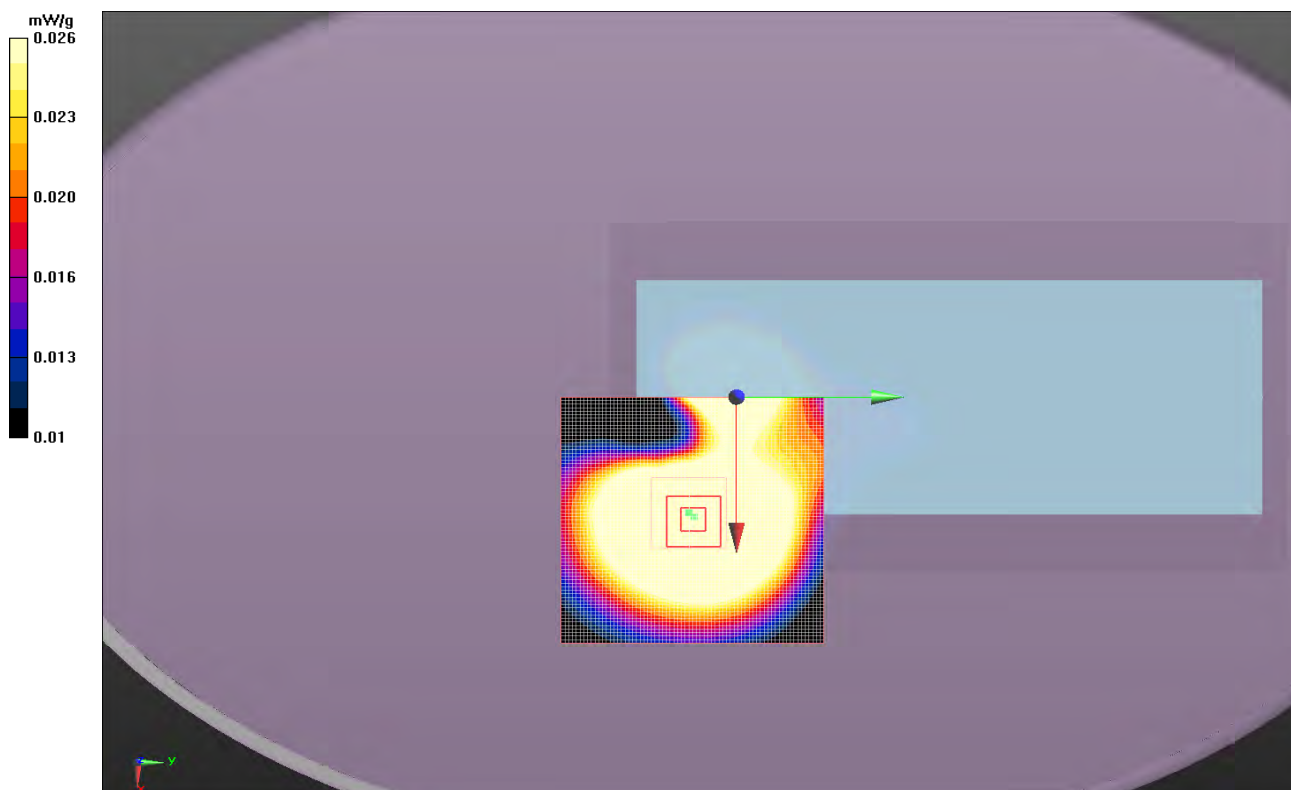
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.051 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.053 mW/g



Room Temperature (°C):	24.2	Humidity (%):	44.3	Test Date:	09/02/11
Liquid Temperature (°C):	23.1	Barometric Pressure (mb):	1023.1	Tested by:	Jennifer Herrett

Body Test 7 9-2-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.997699$ mho/m, $\epsilon_r = 54.7283$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.999$ mho/m; $\epsilon_r = 54.716$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASYS Configuration:

Probe: ES3DV3 - SN3173; ConvF(5.97, 5.97, 5.97); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Body/Body - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 20.349 V/m

Body/Body - Mid/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.077 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.623 W/kg
SAR(1 g) = 0.438 mW/g; SAR(10 g) = 0.300 mW/g

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

Maximum value of SAR (measured) = 0.504 mW/g

Body/Body - Mid/Area scan 2 (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.625 mW/g

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 25.077 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.851 W/kg
SAR(1 g) = 0.543 mW/g; SAR(10 g) = 0.339 mW/g

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

Maximum value of SAR (measured) = 0.650 mW/g

Body/Body - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

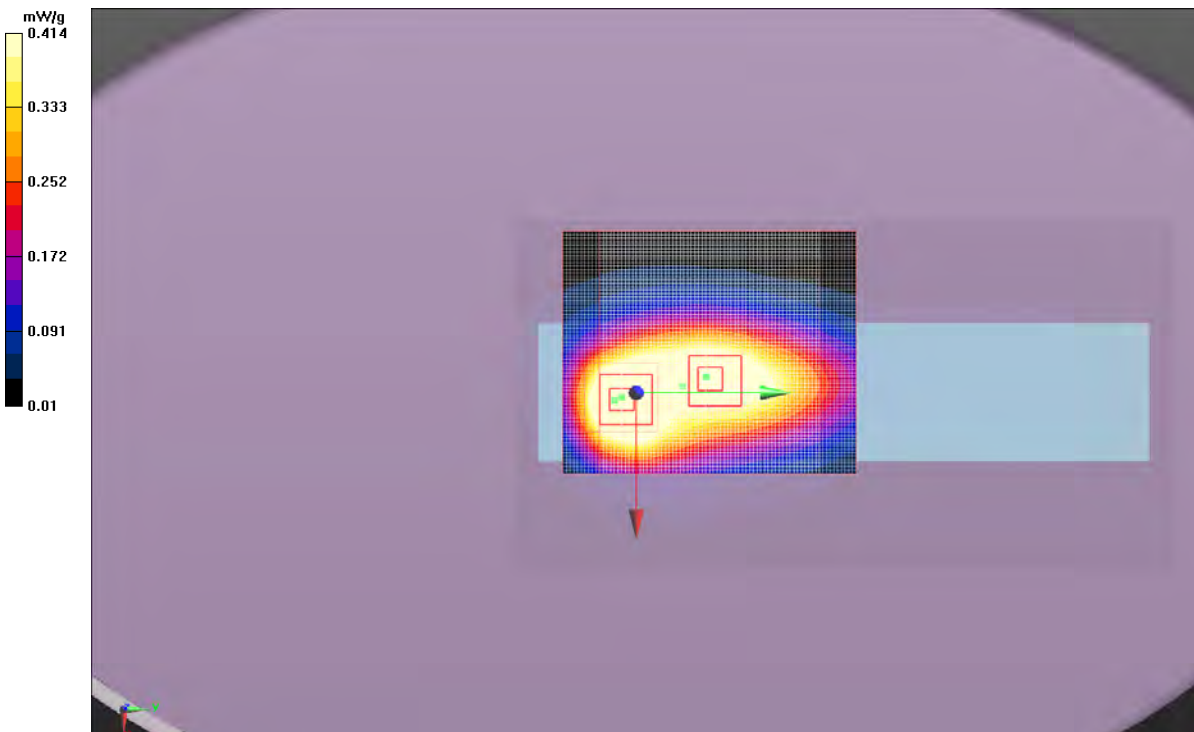
Info: [Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.621 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.586 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	24.2	Humidity (%):	44.3	Test Date:	09/02/11
Liquid Temperature (°C):	23.1	Barometric Pressure (mb):	1023.1	Tested by:	Jennifer Herrett

Body Test 8 9-2-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 836.52 MHz

Medium parameters used: $\sigma = 0.997699$ mho/m, $\epsilon = 54.7283$; $\rho = 1000$ kg/m³, Medium parameters used (interpolated): $f = 836.52$ MHz; $\sigma = 0.999$ mho/m; $\epsilon = 54.716$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(5.97, 5.97, 5.97); Calibrated: 2/23/2011

Sensor-Surface: 0mm (Fix Surface), Sensor-Surface: 3mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

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

Maximum value of Total (measured) = 14.278 V/m

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 17.314 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.343 W/kg

SAR(1 g) = 0.250 mW/g; SAR(10 g) = 0.172 mW/g

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

Maximum value of SAR (measured) = 0.285 mW/g

Body/Body - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

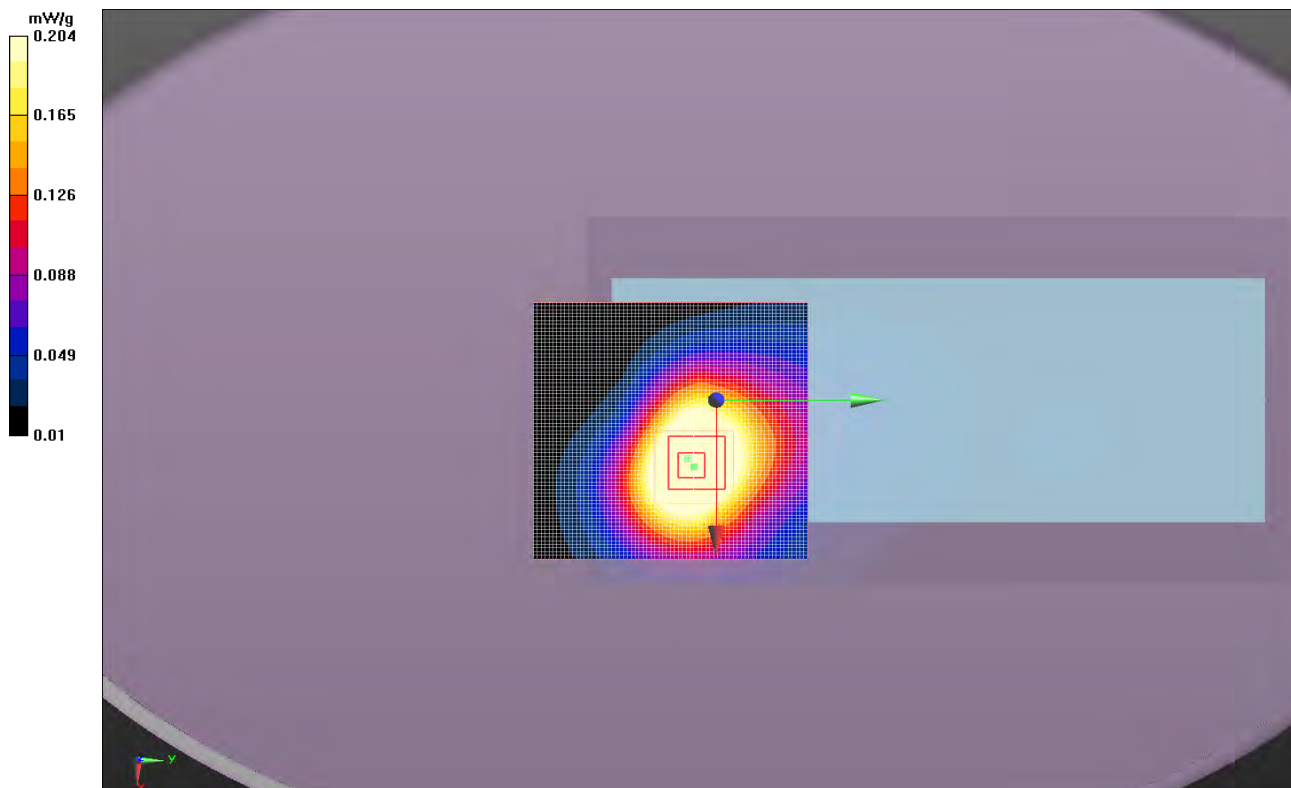
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.278 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.291 mW/g

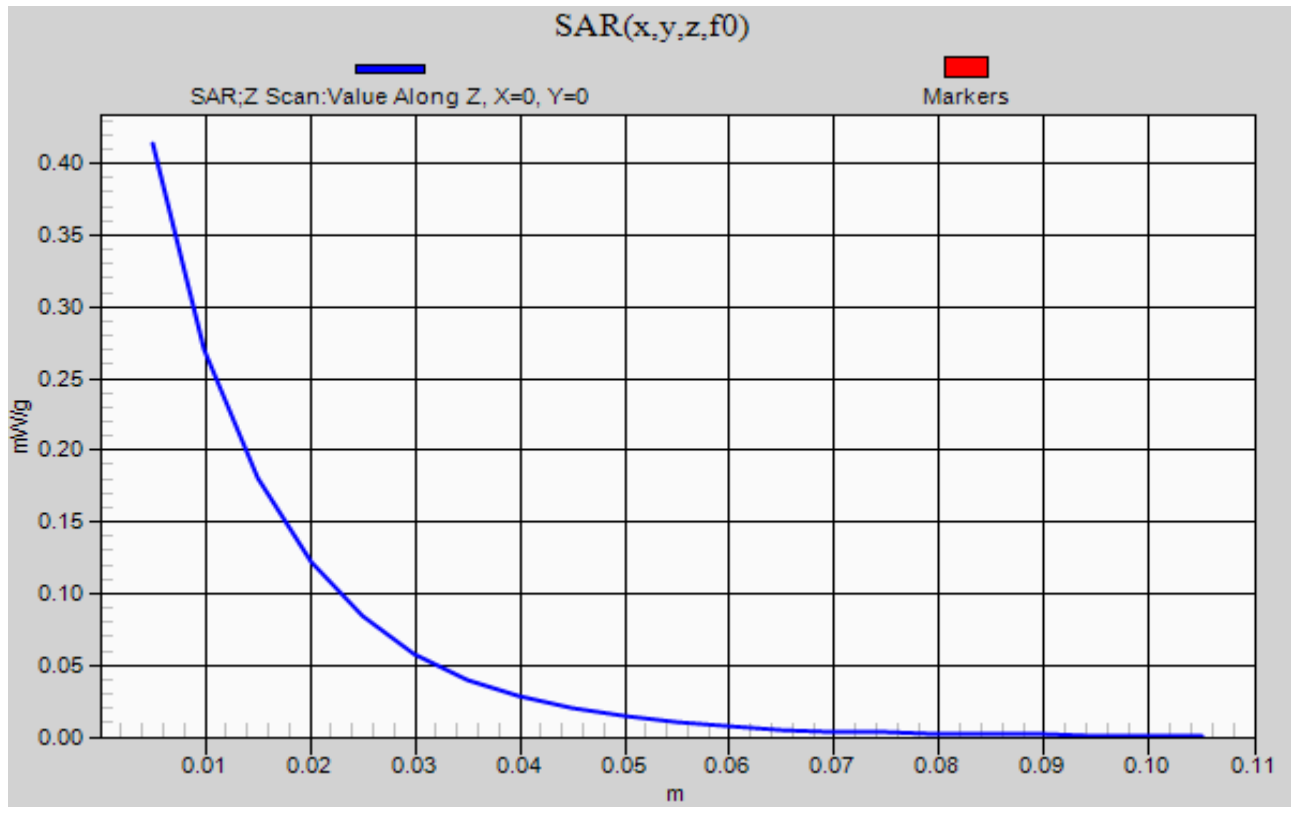


EMC SAR TEST DATA

Room Temperature (°C):	24.2	Humidity (%):	44.3	Test Date:	09/02/11
Liquid Temperature (°C):	23.1	Barometric Pressure (mb):	1023.1	Tested by:	Jennifer Herrett

Body Test 7 9-2-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047



SAR TEST DATA

SAR 2011.02.07

EUT: 1000CP02S		Work Order: ITRM0248	
Serial Number: 178U1191047		Date: See Data Sheets	
Customer: Intermec Technologies Corporation		Temperature: See Data Sheets	
Attendees: None		Humidity: See Data Sheets	
Project: ITRM0227		Barometric Pres.: See Data Sheets	
Tested by: Jennifer Herrett and Ethan Schoonover		Job Site: EV08	

TEST SPECIFICATIONS	Test Method
FCC 2.1093:2011	FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 941225 D01 v02, D03 FCC KDB 648474 D01 V01r05
Health Safety Code 6:2009	RSS-102, Issue 4:2010

COMMENTS
None

DEVIATIONS FROM TEST STANDARD
No Deviations

Configuration #	13	Signature
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Test Configuration	Frequency Band	Body-Worn Accessory	Transmit Frequency	Transmit Channel	Transmit Mode	Data Rate (Mbps)	Audio Accessory	EUT Position	Start Power (Conducted)	SAR Drift During Test (dB)	1g SAR Level	Test #
Head	PCS	None	1880	600	RC3 (Fwd 3, Rvs 3), SO55 (Loopback)	9.6	None	Right - cheek	0.301	-0.01	0.289	33
								Right - tilt	0.301	0.05	0.204	34
								Left - cheek	0.301	0.01	0.197	35
								Left - tilt	0.301	-0.1	0.203	36
					Right - cheek	0.308		-0.07	0.327	37		
					Right - tilt	0.308		-0.04	0.230	38		
					Left - cheek	0.308		-0.06	0.204	39		
					Left - tilt	0.308		0.23	0.206	40		
					EV-DO Rev. A	FETAP: 307.2 RETAP: 4096 payload						

EMC

Room Temperature (°C):	23.7	Humidity (%):	45.4	Test Date:	08/30/11
Liquid Temperature (°C):	22.1	Barometric Pressure (mb):	1016.6	Tested by:	Jennifer Herrett

Head Test 33 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.260 mW/g

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 12.353 V/m

Head - Right/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.353 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.469 W/kg

SAR(1 g) = 0.289 mW/g; SAR(10 g) = 0.170 mW/g

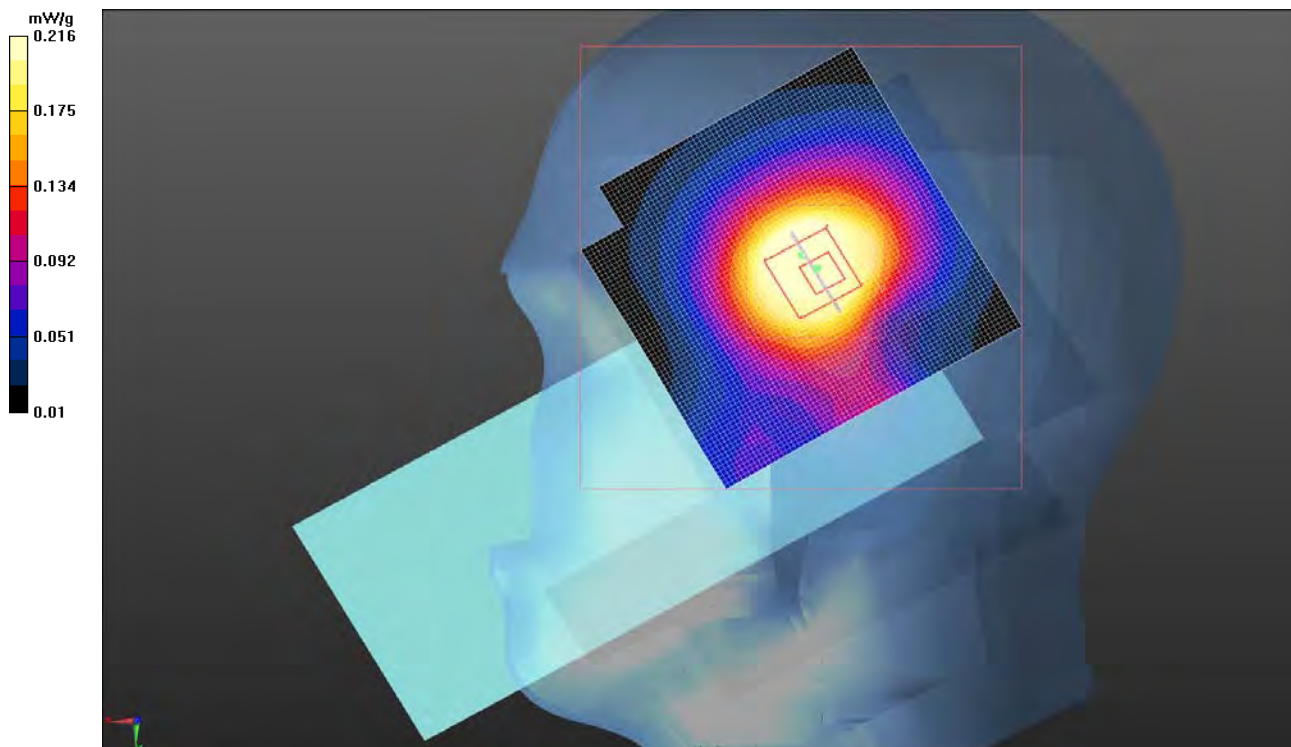
Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.346 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.359 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	23.1	Humidity (%):	45.4	Test Date:	08/30/11
Liquid Temperature (°C):	22.1	Barometric Pressure (mb):	1016.6	Tested by:	Jennifer Herrett

Head Test 34 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.070 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.330 W/kg

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.121 mW/g

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

Maximum value of SAR (measured) = 0.245 mW/g

Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.402 V/m

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

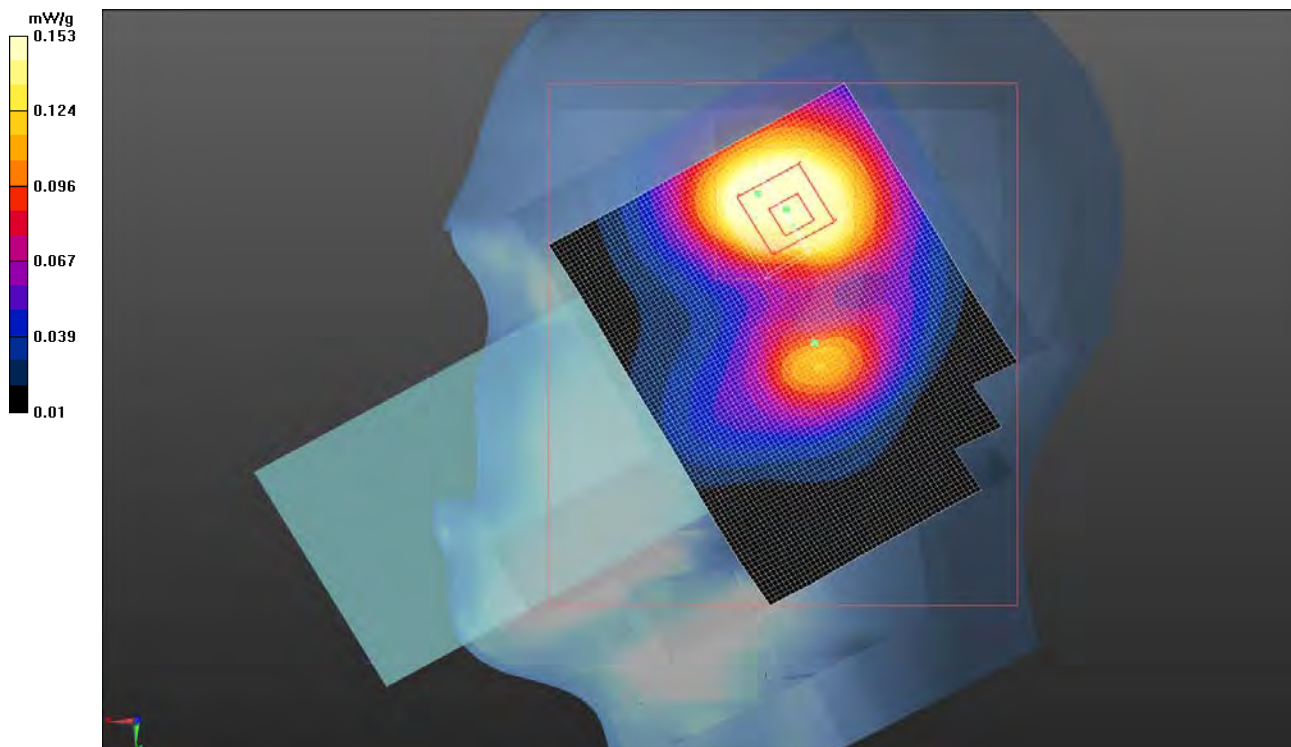
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.165 mW/g

Head - Right/Tilt - Mid/Area scan (91x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.239 mW/g



Room Temperature (°C):	23.8	Humidity (%):	45	Test Date:	08/30/11
Liquid Temperature (°C):	21.7	Barometric Pressure (mb):	1016.6	Tested by:	Jennifer Herrett

Head Test 35 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon_r = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon_r = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Left/Cheek - Mid/Area scan 2 (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.219 mW/g

Head - Left/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.348 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.306 W/kg

SAR(1 g) = 0.197 mW/g; SAR(10 g) = 0.118 mW/g

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

Maximum value of SAR (measured) = 0.235 mW/g

Head - Left/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.226 mW/g

Head - Left/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.369 V/m

Head - Left/Cheek - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.250 mW/g

Head - Left/Cheek - Mid/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

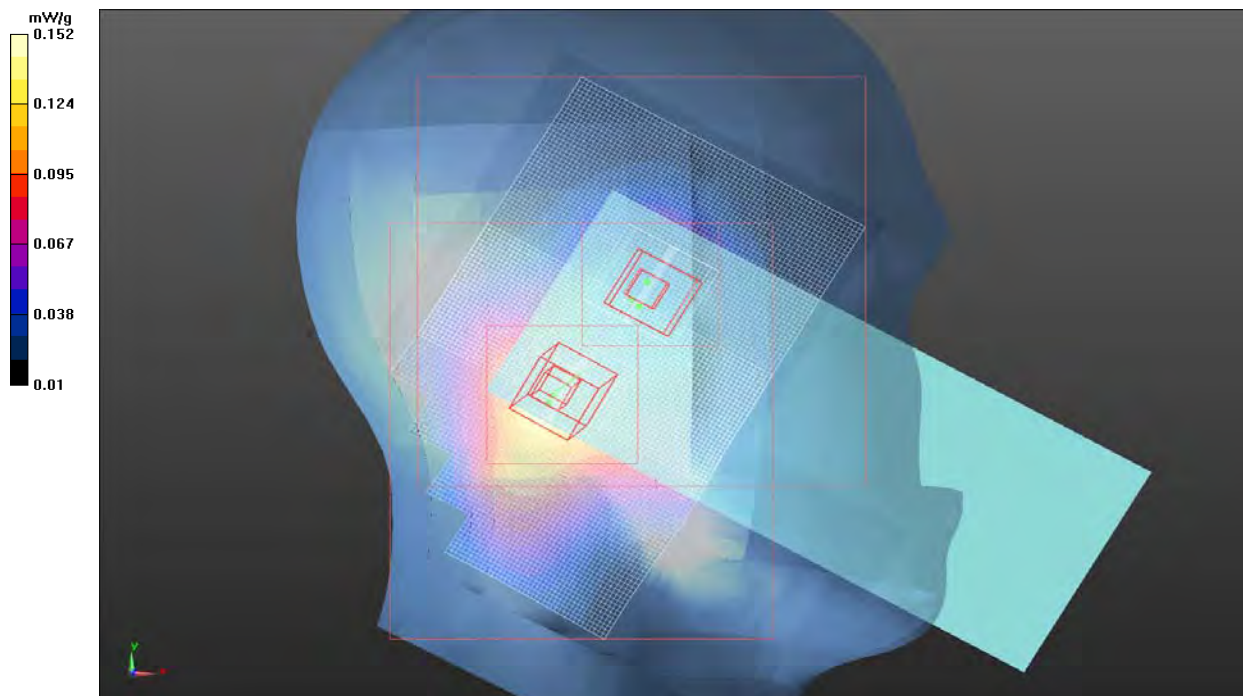
Reference Value = 12.348 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.230 W/kg

SAR(1 g) = 0.145 mW/g; SAR(10 g) = 0.087 mW/g

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

Maximum value of SAR (measured) = 0.174 mW/g



EMC

SAR TEST DATA

Room Temperature (°C):	23.8	Humidity (%):	45	Test Date:	08/30/11
Liquid Temperature (°C):	21.7	Barometric Pressure (mb):	1016.6	Tested by:	Jennifer Herrett

Head Test 36 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASYS Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Left/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.701 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 0.330 W/kg

SAR(1 g) = 0.203 mW/g; SAR(10 g) = 0.118 mW/g

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

Maximum value of SAR (measured) = 0.248 mW/g

Head - Left/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.242 mW/g

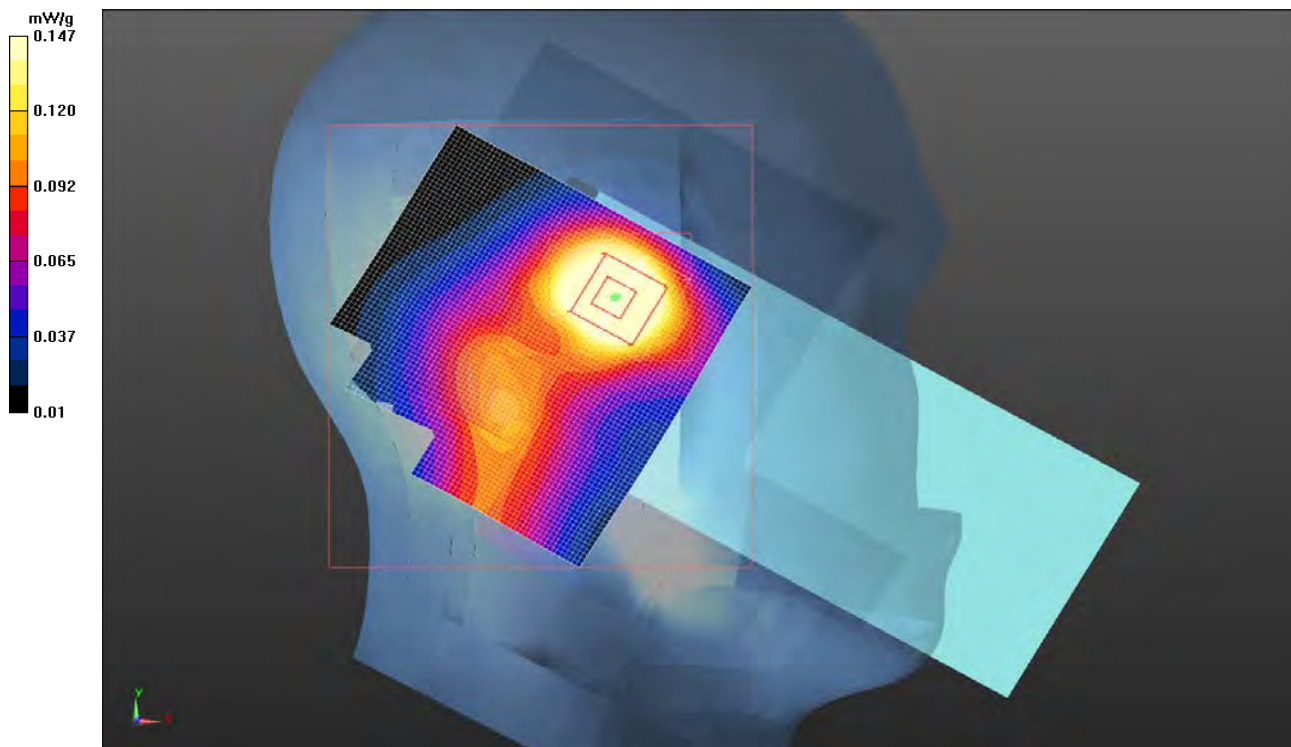
Head - Left/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.177 V/m

Head - Left/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.239 mW/g



Room Temperature (°C):	24.1	Humidity (%):	46.3	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Head Test 37b 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.406$ mho/m; $\epsilon_r = 39.074$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.39973$ mho/m, $\epsilon_r = 39.0909$; $\rho = 1000$ kg/m³

Phantom section: Right Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Reference scan (51x71x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.301 mW/g

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 13.169 V/m

Head - Right/Cheek - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 16.945 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.533 W/kg

SAR(1 g) = 0.327 mW/g; SAR(10 g) = 0.193 mW/g

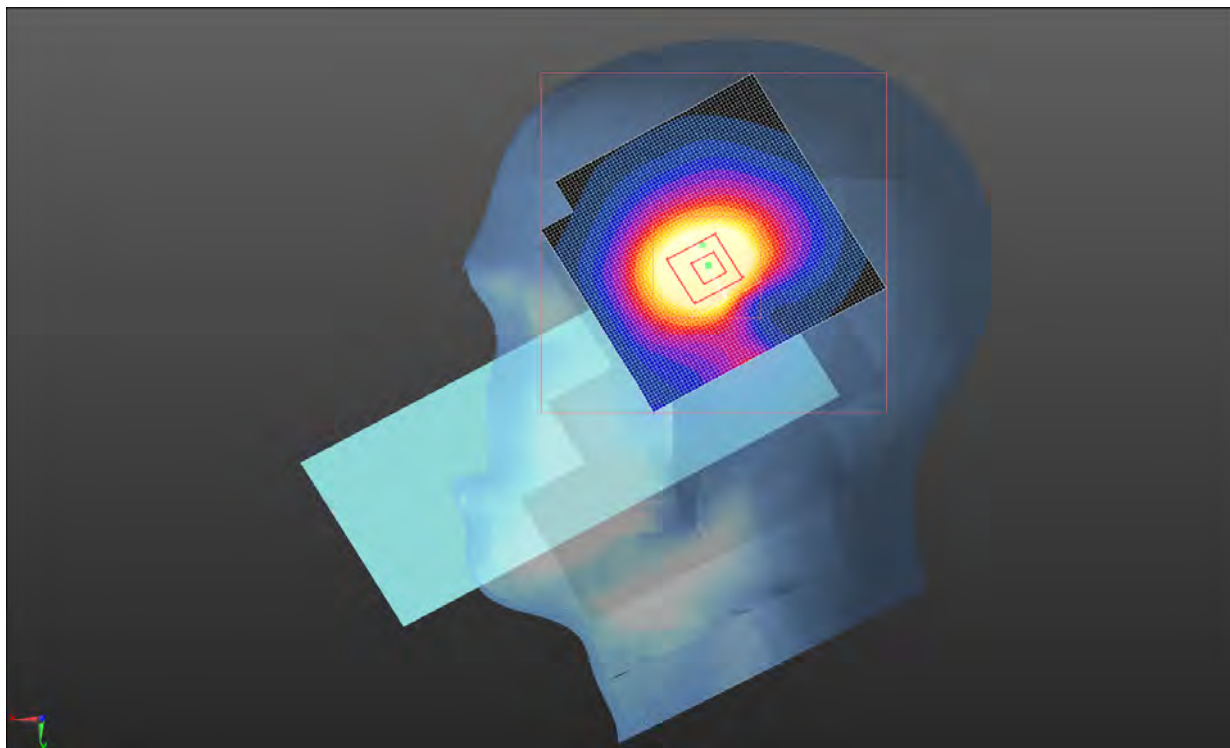
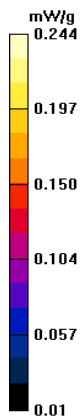
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.395 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.392 mW/g



Room Temperature (°C):	24.2	Humidity (%):	44.4	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Head Test 38b 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.406$ mho/m; $\epsilon_r = 39.074$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.39973$ mho/m, $\epsilon_r = 39.0909$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.349 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.380 W/kg

SAR(1 g) = 0.230 mW/g; SAR(10 g) = 0.135 mW/g

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

Maximum value of SAR (measured) = 0.277 mW/g

Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.890 V/m

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

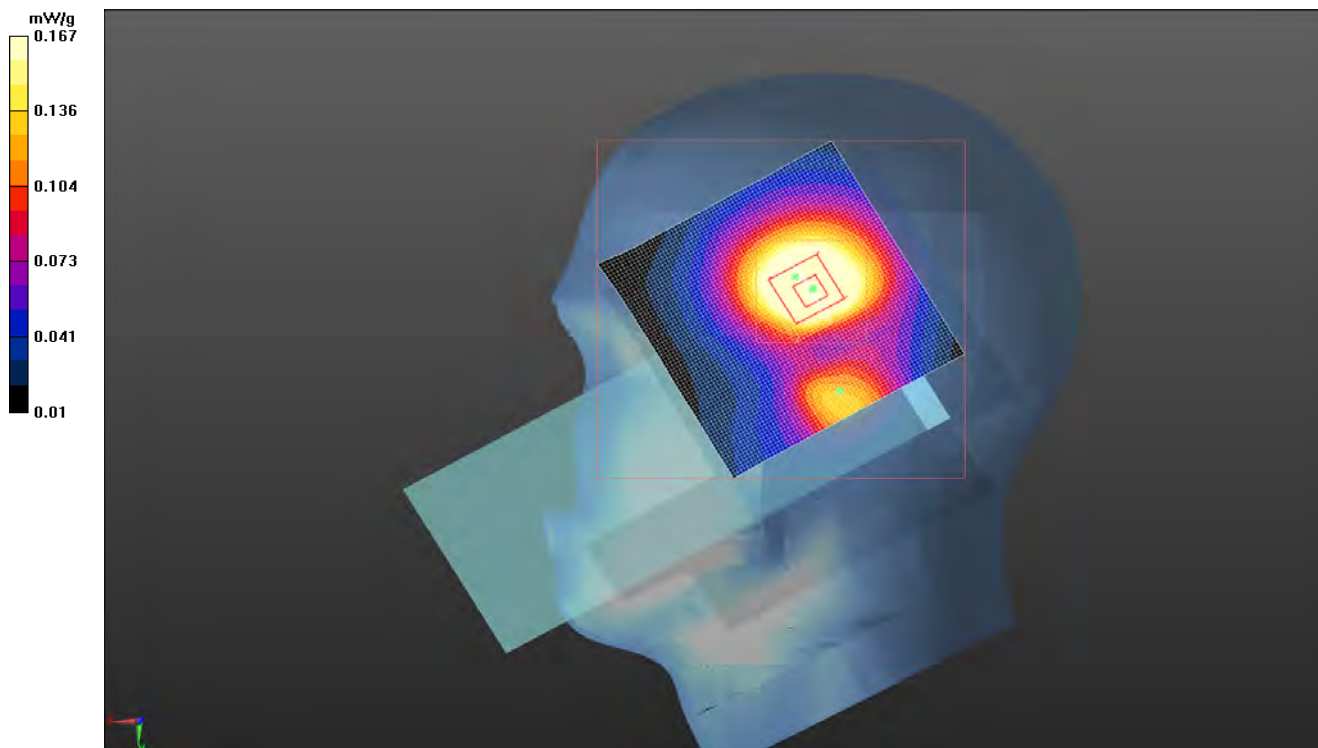
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.196 mW/g

Head - Right/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.260 mW/g



Room Temperature (°C):	24.4	Humidity (%):	44.6	Test Date:	08/29/11
Liquid Temperature (°C):	21.1	Barometric Pressure (mb):	1015.6	Tested by:	Ethan Schoonover

Head Test 39 8-29-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon_r = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon_r = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASY52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Cheek - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

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

Maximum value of SAR (interpolated) = 0.270 mW/g

Head - Right/Cheek - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.323 V/m

Head - Right/Cheek - Mid/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 12.814 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 0.318 W/kg

SAR(1 g) = 0.204 mW/g; SAR(10 g) = 0.125 mW/g

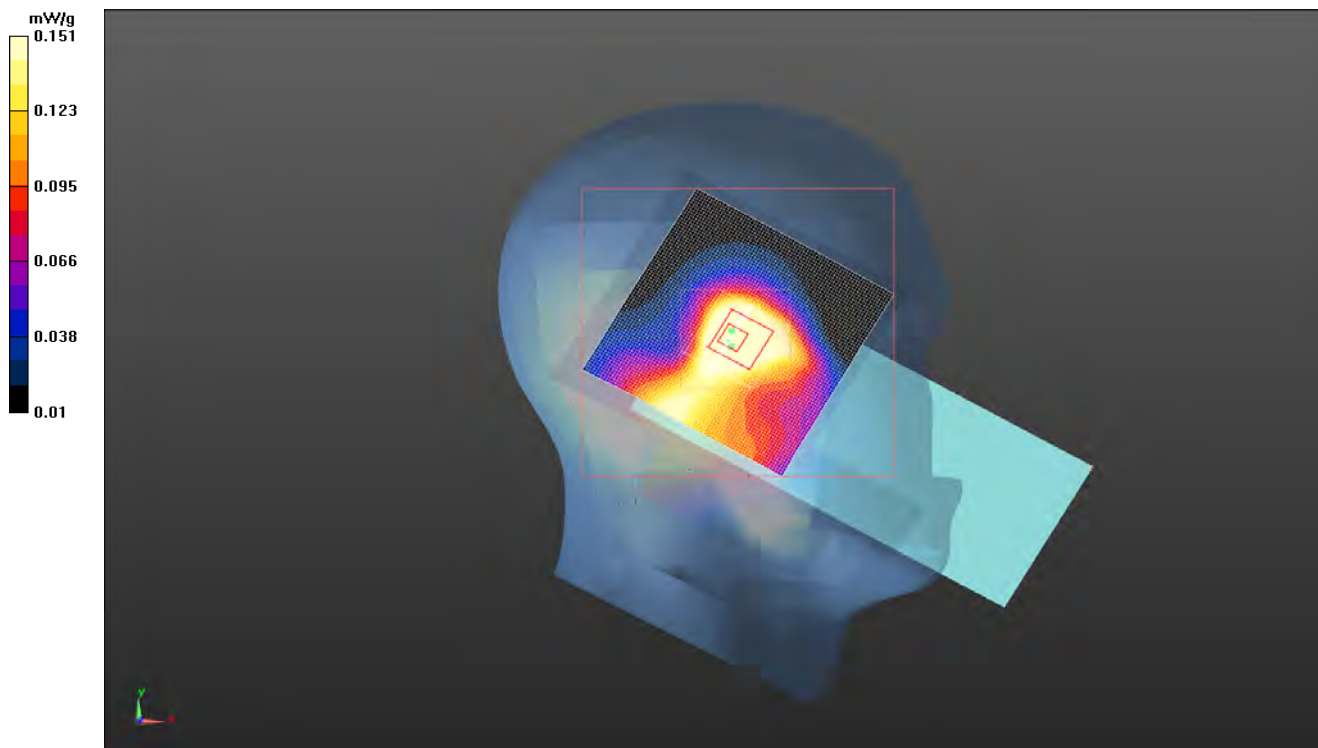
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.243 mW/g

Head - Right/Cheek - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.248 mW/g



Room Temperature (°C):	24.4	Humidity (%):	44.6	Test Date:	08/29/11
Liquid Temperature (°C):	21.1	Barometric Pressure (mb):	1015.6	Tested by:	Ethan Schoonover

Head Test 40 8-29-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.416$ mho/m; $\epsilon_r = 39.022$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.40999$ mho/m, $\epsilon_r = 39.0437$; $\rho = 1000$ kg/m³

Phantom section: Left Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.96, 4.96, 4.96); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: SAM with CRP; Type: SAM; Serial: 1598

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Head - Right/Tilt - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 13.840 V/m; Power Drift = 0.23 dB

Peak SAR (extrapolated) = 0.333 W/kg

SAR(1 g) = 0.206 mW/g; SAR(10 g) = 0.119 mW/g

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

Maximum value of SAR (measured) = 0.253 mW/g

Head - Right/Tilt - Mid/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm

Maximum value of Total (measured) = 10.451 V/m

Head - Right/Tilt - Mid/Reference scan (51x91x1): Measurement grid: dx=30mm, dy=30mm

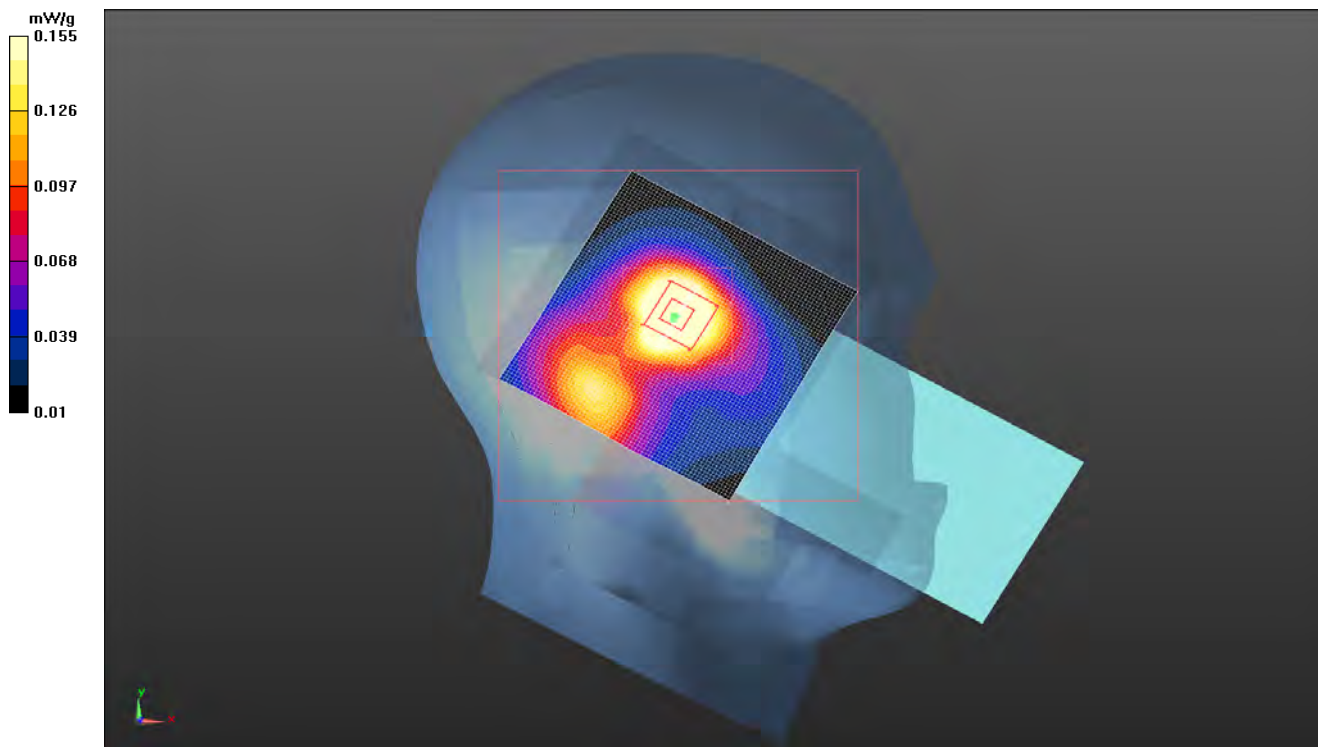
[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.250 mW/g

Head - Right/Tilt - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

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

Maximum value of SAR (interpolated) = 0.253 mW/g

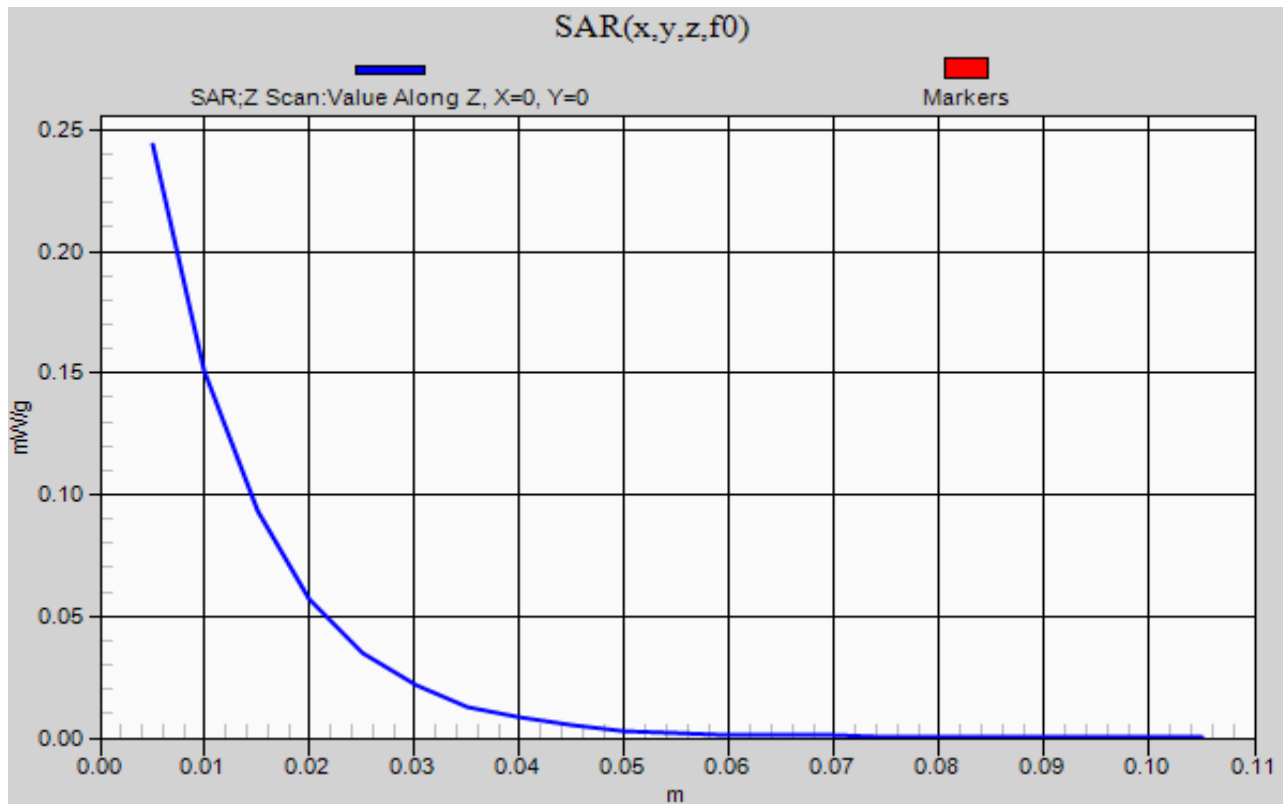


EMC SAR TEST DATA

Room Temperature (°C):	24.1	Humidity (%):	46.3	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Head Test 37b 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047



SAR TEST DATA

EMC

EUT:	1000CP01S	Work Order:	ITRM0248
Serial Number:	178U1191047	Date:	See Data Sheets
Customer:	Intermec Technologies Corporation	Temperature:	See Data Sheets
Attendees:	None	Humidity:	See Data Sheets
Project:	ITRM0227	Barometric Pres.:	See Data Sheets
Tested by:	Jennifer Herrett and Ethan Schoonover	Job Site:	EV08
TEST SPECIFICATIONS		Test Method	
FCC 2.1093:2011		FCC OET 65C:2001 IEEE Std 1528:2003 FCC KDB 447498 D01 v04 FCC KDB 941225 D01 v02, and D03 FCC KDB 648474 D01 V01r05	
Health Safety Code 6:2009		RSS-102, Issue 4:2010	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
No Deviations			
Configuration #	12	Signature <i>Jennifer Herrett</i>	

Test Configuration	Frequency Band	Transmit Frequency	Transmit Channel	Transmit Mode	Data Rate (kbps)	Body-Worn Accessory	Audio Accessory	EUT Position	Start Power (Conducted)	Drift	Measured SAR Level	Test #
Body	PCS	1880	600	EV-DO Rev. 0	FTAP: 307.2 RTAP: 153.6	Holster	VR10 Headset	Left	0.308	-0.04	0.613	17
								Front	0.308	-0.08	0.091	18
				EV-DO Rev. A	FETAP: 307.2 RETAP: 4096			Left	0.308	-0.02	0.545	19
								Front	0.308	-0.04	0.097	20

EMC

SAR TEST DATA

Room Temperature (°C):	24	Humidity (%):	44.6	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Body Test 17 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.477$ mho/m; $\epsilon_r = 52.189$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.471$ mho/m, $\epsilon_r = 52.1999$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.55, 4.55, 4.55); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Body/Body - Mid/Reference scan (41x91x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.633 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.711 mW/g

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 21.198 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.938 W/kg

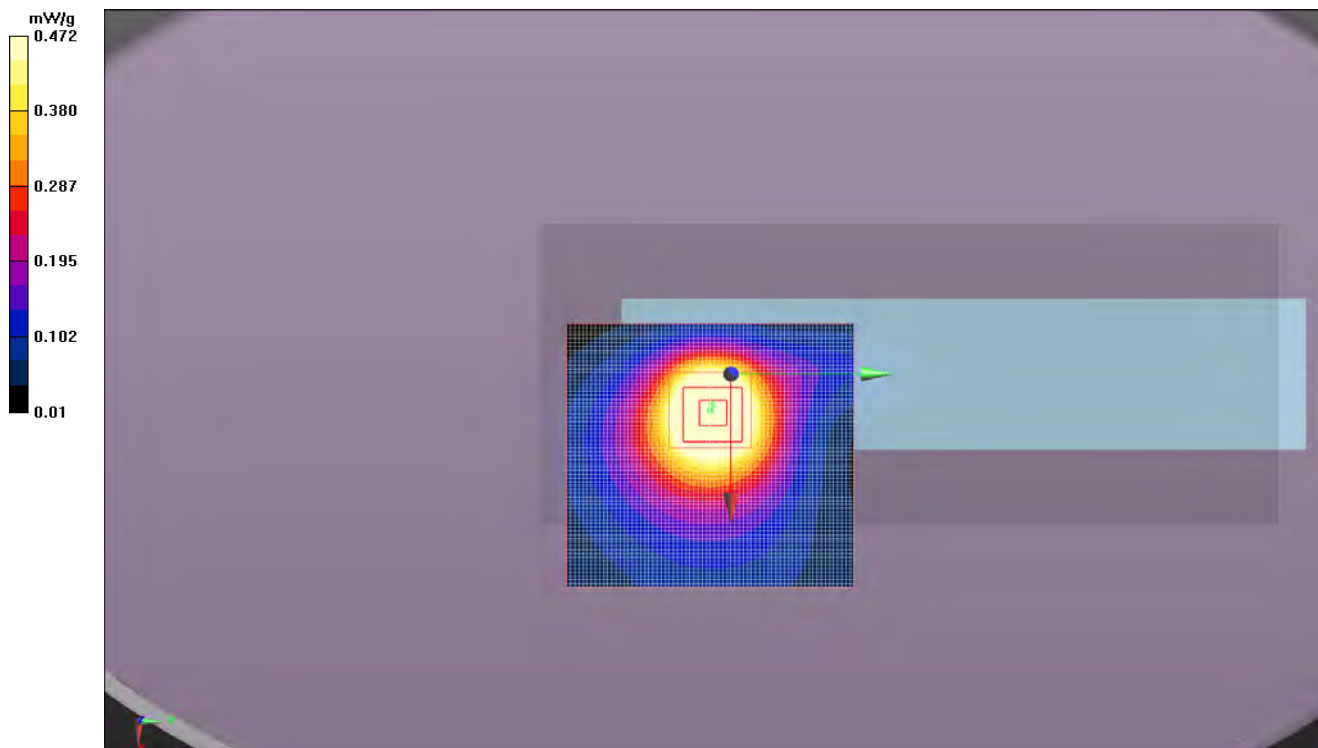
SAR(1 g) = 0.613 mW/g; SAR(10 g) = 0.375 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.727 mW/g

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

Maximum value of Total (measured) = 17.879 V/m



EMC

SAR TEST DATA

Room Temperature (°C):	24.2	Humidity (%):	44.9	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Body Test 18 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.477$ mho/m; $\epsilon_r = 52.189$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.471$ mho/m, $\epsilon_r = 52.1999$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.55, 4.55, 4.55); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Body/Body - Mid/Reference scan (41x91x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.111 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.113 mW/g

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.646 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 0.135 W/kg

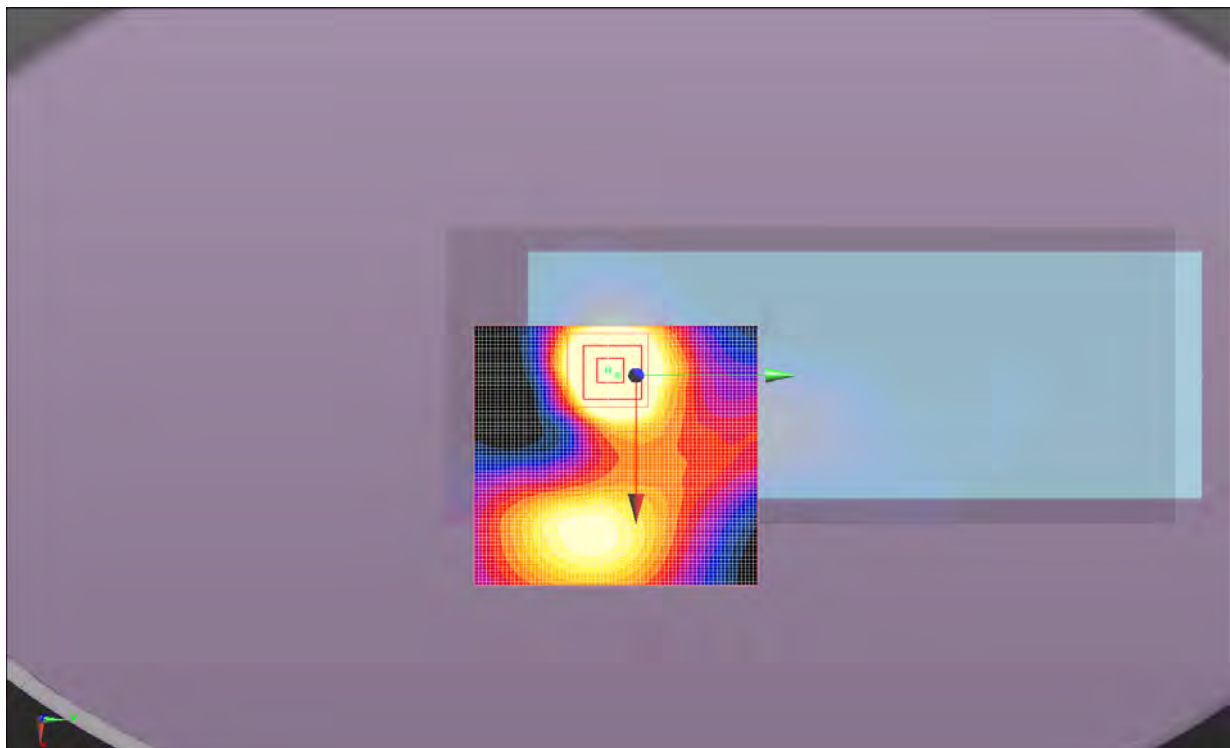
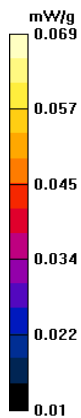
SAR(1 g) = 0.091 mW/g; SAR(10 g) = 0.058 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.106 mW/g

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

Maximum value of Total (measured) = 6.812 V/m



Room Temperature (°C):	26.9	Humidity (%):	36.6	Test Date:	08/31/11
Liquid Temperature (°C):	22.2	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Body Test 19 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.477$ mho/m; $\epsilon_r = 52.189$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.471$ mho/m, $\epsilon_r = 52.1999$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.55, 4.55, 4.55); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS52, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Body/Body - Mid/Reference scan (41x91x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.597 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.678 mW/g

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 22.027 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.836 W/kg

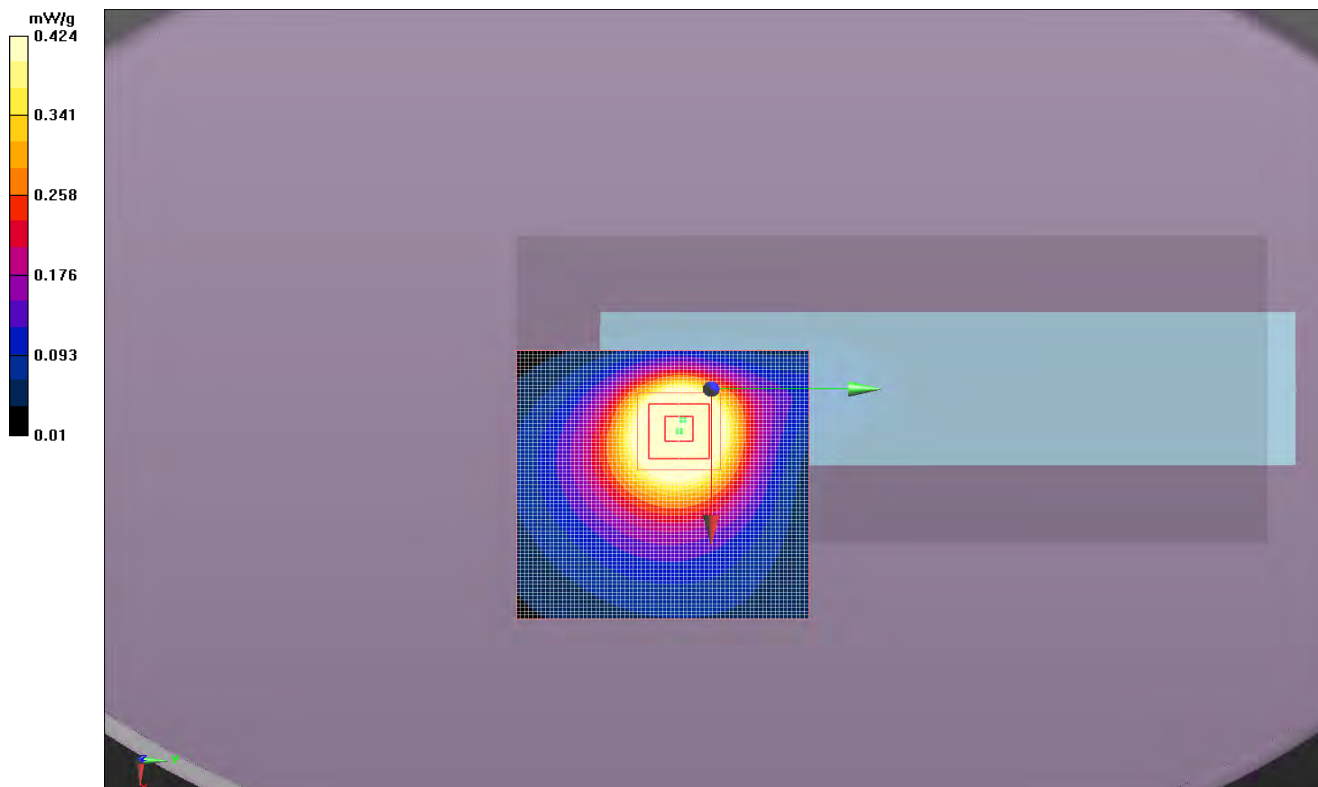
SAR(1 g) = 0.545 mW/g; SAR(10 g) = 0.336 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.649 mW/g

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

Maximum value of Total (measured) = 16.950 V/m



EMC

SAR TEST DATA

Room Temperature (°C):	23.3	Humidity (%):	42.6	Test Date:	08/31/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1017.4	Tested by:	Ethan Schoonover

Body Test 20 8-31-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

Communication System: CW; Frequency: 1880 MHz

Medium parameters used (interpolated): $f = 1880$ MHz; $\sigma = 1.477$ mho/m; $\epsilon_r = 52.189$; $\rho = 1000$ kg/m³, Medium parameters used: $\sigma = 1.471$ mho/m, $\epsilon_r = 52.1999$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2007)

DASYS5 Configuration:

Probe: ES3DV3 - SN3173; ConvF(4.55, 4.55, 4.55); Calibrated: 2/23/2011

Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 0mm (Fix Surface)

Electronics: DAE4 Sn1237; Calibrated: 11/10/2010

Phantom: ELI 4.0; Type: QDOVA001BA; Serial: 1096

Measurement SW: DASYS2, Version 52.6 (2); SEMCAD X Version 14.4.4 (2829)

Body/Body - Mid/Zoom Scan 2 (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.773 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 0.110 W/kg

SAR(1 g) = 0.073 mW/g; SAR(10 g) = 0.049 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.086 mW/g

Body/Body - Mid/Reference scan (41x91x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0 mW/g

Body/Body - Mid/Area scan (71x71x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (interpolated) = 0.114 mW/g

Body/Body - Mid/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 8.773 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 0.143 W/kg

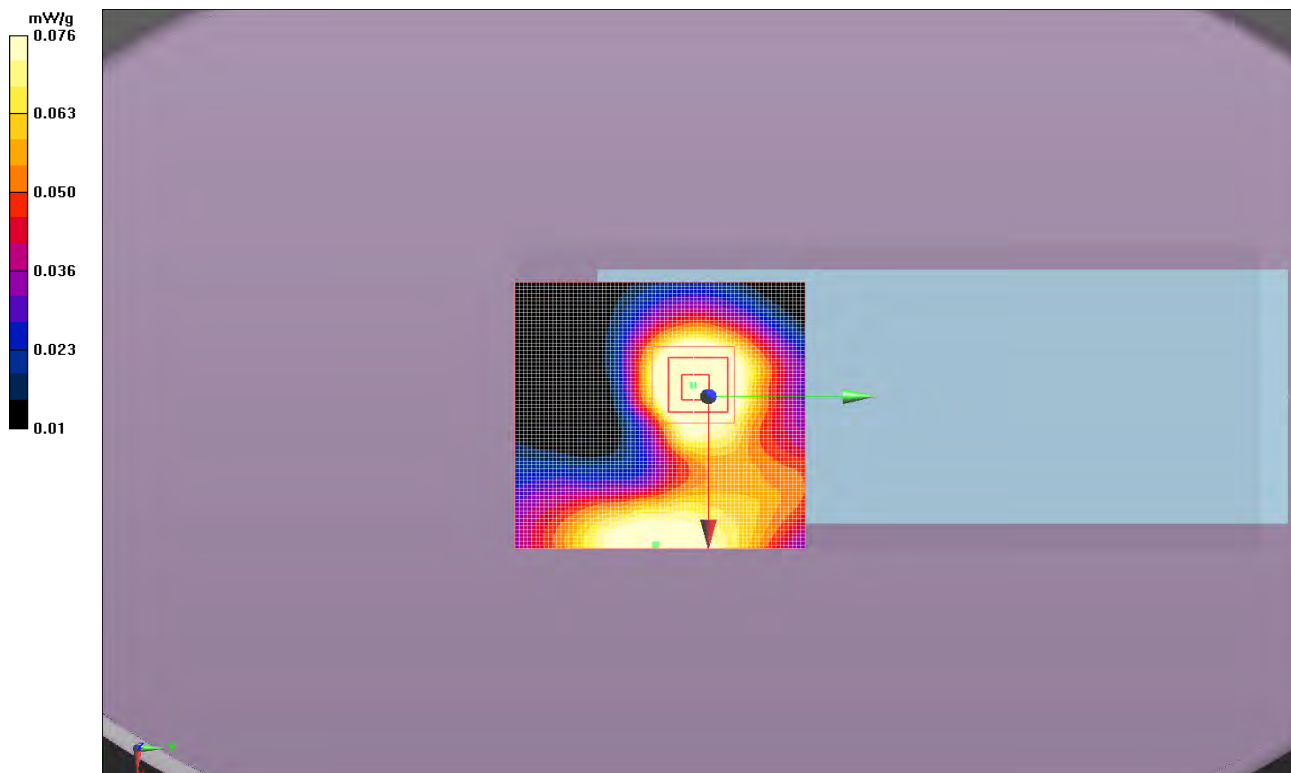
SAR(1 g) = 0.097 mW/g; SAR(10 g) = 0.061 mW/g

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.112 mW/g

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

Maximum value of Total (measured) = 7.190 V/m

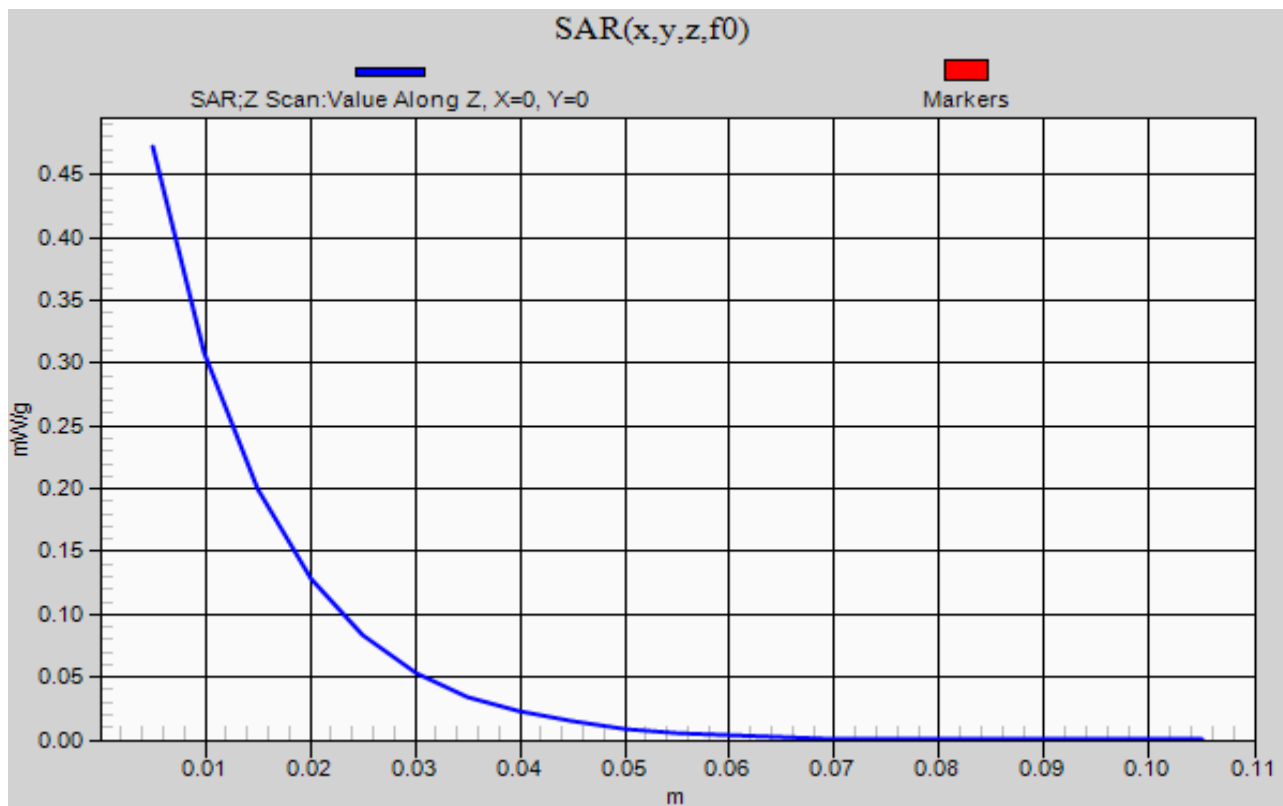


EMC SAR TEST DATA

Room Temperature (°C):	24	Humidity (%):	44.6	Test Date:	08/30/11
Liquid Temperature (°C):	22	Barometric Pressure (mb):	1015.1	Tested by:	Ethan Schoonover

Body Test 17 8-30-11

DUT: Handheld Computer (B1); Type: 1000CP02S; Serial: 178U1191047

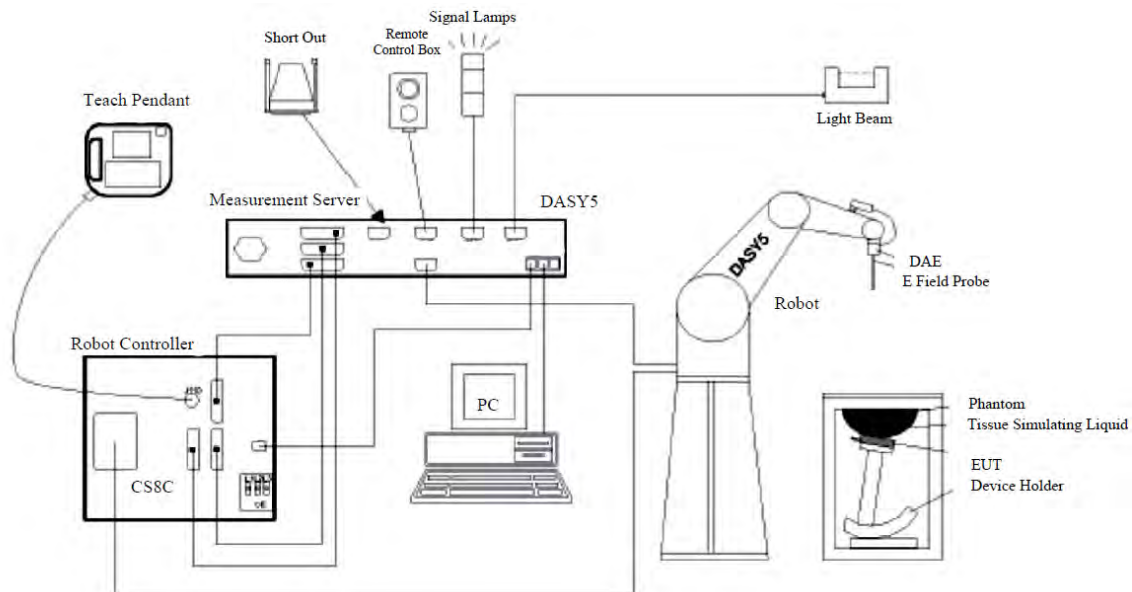


SAR Measurement System

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:



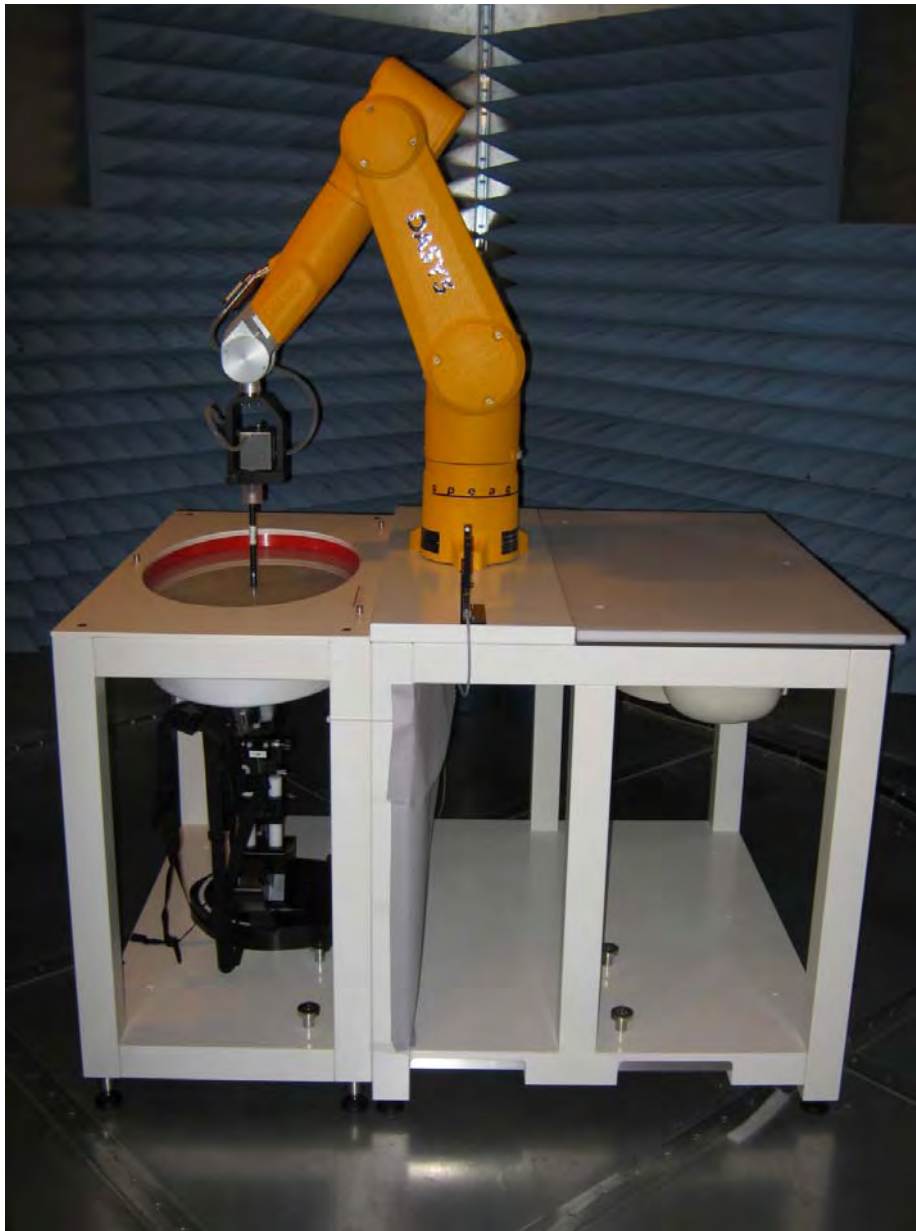
- A standard high precision 6-axis robot (Staubli TX=RX family) with controller, teach pendant and software. An arm extension for accommodating the data acquisition electronics (DAE).
- An isotropic field probe optimized and calibrated for the targeted measurement.
- A data acquisition electronics (DAE) 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
Wireless Communication Test Set	Agilent	E5515C	BSV	NCR	0 mo
Humidity Temperature Meter	Omegaette	HH311	DTY	3/29/2011	24 mo
Humidity Temperature Meter	Omegaette	HH311	DTX	3/29/2011	24 mo
Wideband Amplifier, SMA, 800-2000 MHz	Mini Circuits	ZHL-5W-2G-S+	TRZ	NCR	0 mo
MXG Analog Signal Generator	Agilent	N5181A	TIG	NCR	0 mo
Power Sensor	Agilent	E9300H	SQO	6/6/2011	24 mo
Power Meter	Agilent	N1913A	SQR	6/6/2011	24 mo
Dielectric Probe Kit	Agilent	85070E	IPP	9/8/2010	24 mo
Network Analyzer	Hewlett Packard	N5230A	NAD	8/3/2011	12 mo
Antenna, Dipole 1900MHz SAR	SPEAG	D1900v2	ADO	11/24/2010	12 mo
Antenna, Dipole 835MHz SAR	SPEAG	D835V2	ADK	10/19/2010	12 mo
Device Holder	SPEAG	N/A	SAW	NCR	0 mo
Body Solution	SPEAG	MSL 900	SAT	Within 24 of hours of a measurement	
Head Solution	SPEAG	HSL 900	SAS		
Body Solution	SPEAG	MSL 1900	SAO		
Head Solution	SPEAG	HSL 1900	SAN		
DASY5 Measurement Server	Staeubli	DAYS5	SAK	NCR	0 mo
Robot Chasis and power Supply	Staeubli	N/A	SAJ	NCR	0 mo
Robot Controller	Staeubli	CS8C	SAI	11/11/2010	12 mo
DAE	Schid & Partner Engineering	SD 000 D04 EJ	SAH	11/11/2010	12 mo
SAR Probe	SPEAG	ES3DV3	R035	2/23/2011	12 mo
Light Beam Unit	SPEAG	SE UKS 030 AA	SAD	NCR	0 mo
Phantom, 2mm Oval ELI4 (Body)	SPEAG	QD OVA 001 BB	SAC	NCR	0 mo
Phantom, Twin SAM (Head)	SPEAG	QD 000 P40 CC	SAB	NCR	0 mo
Robot Arm	Staeubli	TX60LSPEAG	SAA	NCR	0 mo

Measurement Uncertainty Budget 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	

Probe Calibration

Please see attached calibration data

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



**S
C
S** Schweizerischer Kalibrierdienst
Service suisse d'étalonnage
Servizio svizzero di taratura
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Accreditation No.: **SCS 108**

Client **SPEAG Replacement**

Certificate No: **ES3-3173_Feb11**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3173**

Calibration procedure(s) **QA CAL-01.v7, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes**

Calibration date: **February 23, 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 E4419B	GB41293874	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41495277	01-Apr-10 (No. 217-01136)	Apr-11
Power sensor E4412A	MY41498087	01-Apr-10 (No. 217-01136)	Apr-11
Reference 3 dB Attenuator	SN: S5054 (3c)	30-Mar-10 (No. 217-01159)	Mar-11
Reference 20 dB Attenuator	SN: S5086 (20b)	30-Mar-10 (No. 217-01161)	Mar-11
Reference 30 dB Attenuator	SN: S5129 (30b)	30-Mar-10 (No. 217-01160)	Mar-11
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

Calibrated by:	Name Claudio Leubler	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Function Technical Manager	Signature

Issued: February 24, 2011

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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 23, 2011

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	1.21	1.28	1.35	$\pm 10.1\%$
DCP (mV) ^B	95.9	100.2	100.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc ^E (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	144.1	$\pm 2.7\%$
			Y	0.00	0.00	1.00	114.9	
			Z	0.00	0.00	1.00	113.4	

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 E^2 -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)
750	41.9	0.89	6.25	6.25	6.25	0.99	1.11	± 12.0 %
835	41.5	0.90	6.01	6.01	6.01	0.99	1.12	± 12.0 %
900	41.5	0.97	5.93	5.93	5.93	0.99	1.12	± 12.0 %
1640	40.3	1.29	5.34	5.34	5.34	0.99	1.11	± 12.0 %
1750	40.1	1.37	5.20	5.20	5.20	0.99	1.13	± 12.0 %
1810	40.0	1.40	5.05	5.05	5.05	0.94	1.15	± 12.0 %
1900	40.0	1.40	4.96	4.96	4.96	0.96	1.13	± 12.0 %
1950	40.0	1.40	4.80	4.80	4.80	0.91	1.17	± 12.0 %
2000	40.0	1.40	4.88	4.88	4.88	0.99	1.06	± 12.0 %
2150	39.7	1.53	4.72	4.72	4.72	0.95	1.13	± 12.0 %
2300	39.5	1.67	4.58	4.58	4.58	0.96	1.09	± 12.0 %
2450	39.2	1.80	4.26	4.26	4.26	0.92	1.14	± 12.0 %
2600	39.0	1.96	4.13	4.13	4.13	0.90	1.16	± 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

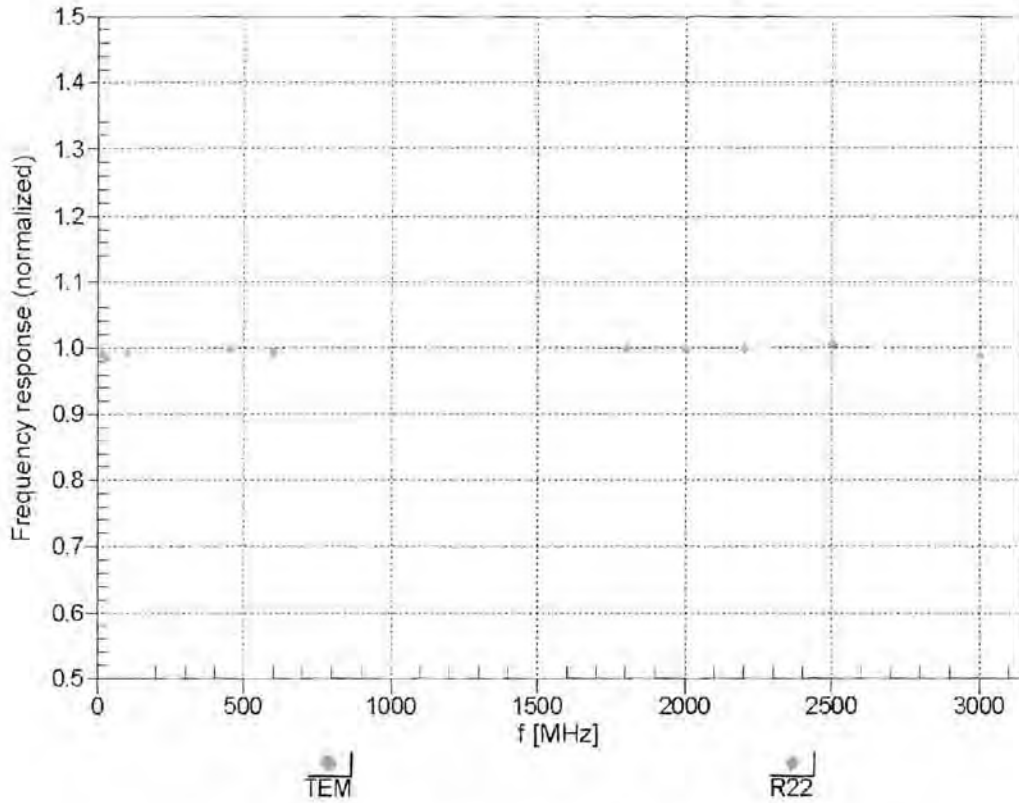
Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	6.01	6.01	6.01	0.99	1.15	± 12.0 %
835	55.2	0.97	5.97	5.97	5.97	0.99	1.16	± 12.0 %
900	55.0	1.05	5.89	5.89	5.89	0.99	1.14	± 12.0 %
1640	53.8	1.40	5.30	5.30	5.30	0.99	1.18	± 12.0 %
1750	53.4	1.49	4.87	4.87	4.87	0.95	1.22	± 12.0 %
1810	53.3	1.52	4.71	4.71	4.71	0.95	1.20	± 12.0 %
1900	53.3	1.52	4.55	4.55	4.55	0.90	1.24	± 12.0 %
1950	53.3	1.52	4.61	4.61	4.61	0.93	1.20	± 12.0 %
2000	53.3	1.52	4.49	4.49	4.49	0.89	1.24	± 12.0 %
2150	53.1	1.66	4.37	4.37	4.37	0.98	1.16	± 12.0 %
2300	52.9	1.81	4.19	4.19	4.19	0.99	1.08	± 12.0 %
2450	52.7	1.95	4.05	4.05	4.05	0.99	1.01	± 12.0 %
2600	52.5	2.16	3.90	3.90	3.90	0.99	1.03	± 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)

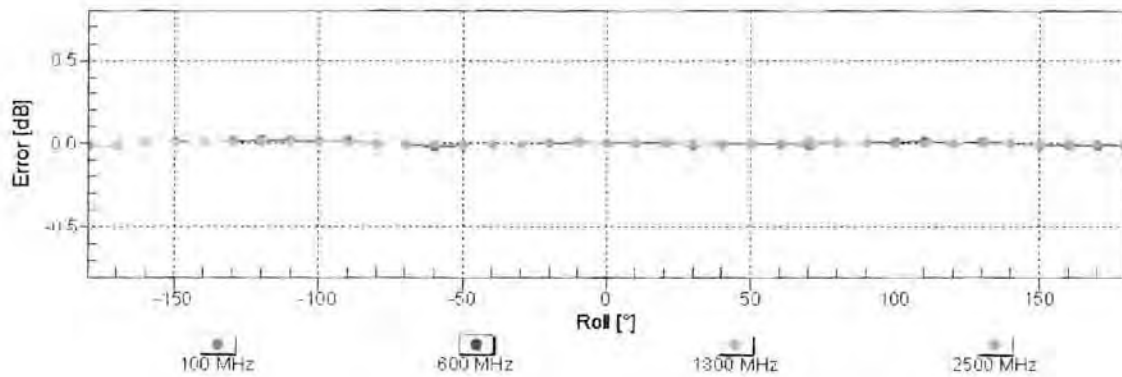
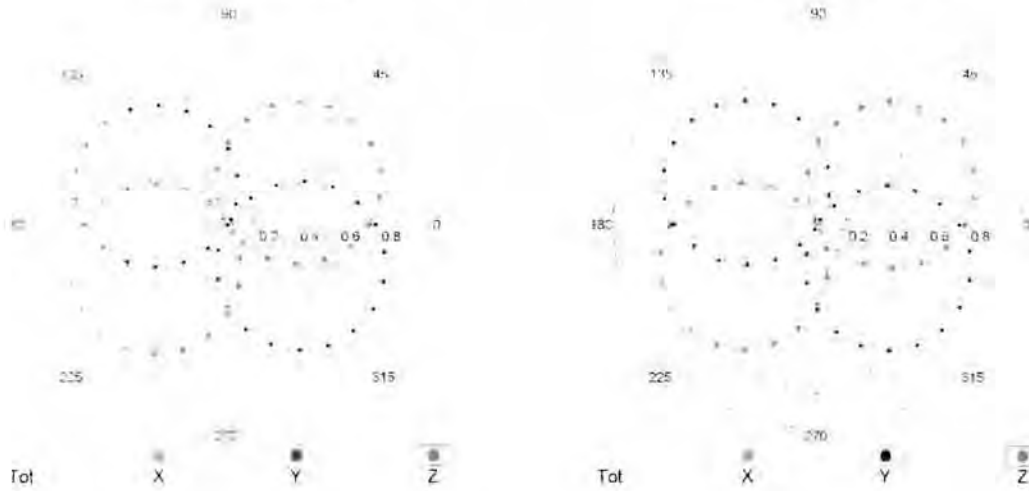


Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

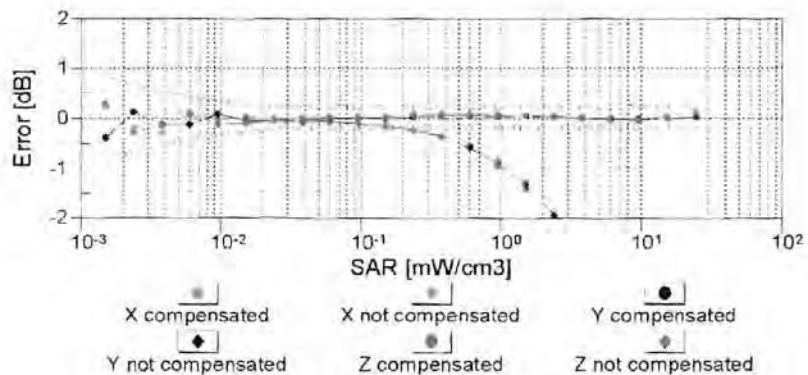
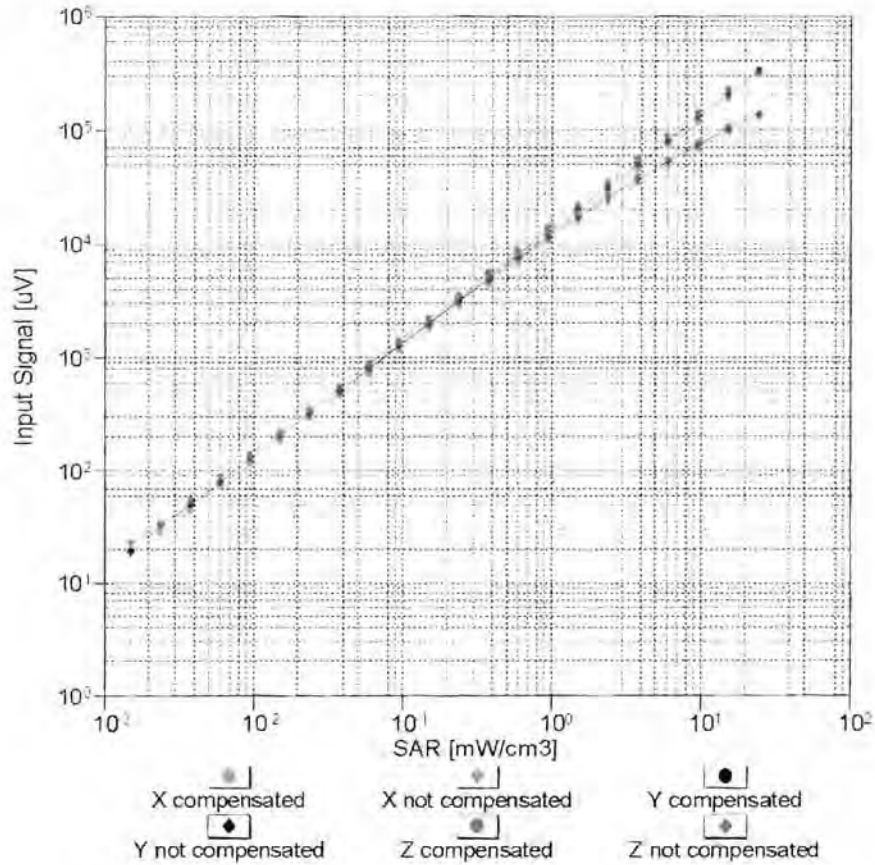
f=600 MHz,TEM

f=1800 MHz,R22



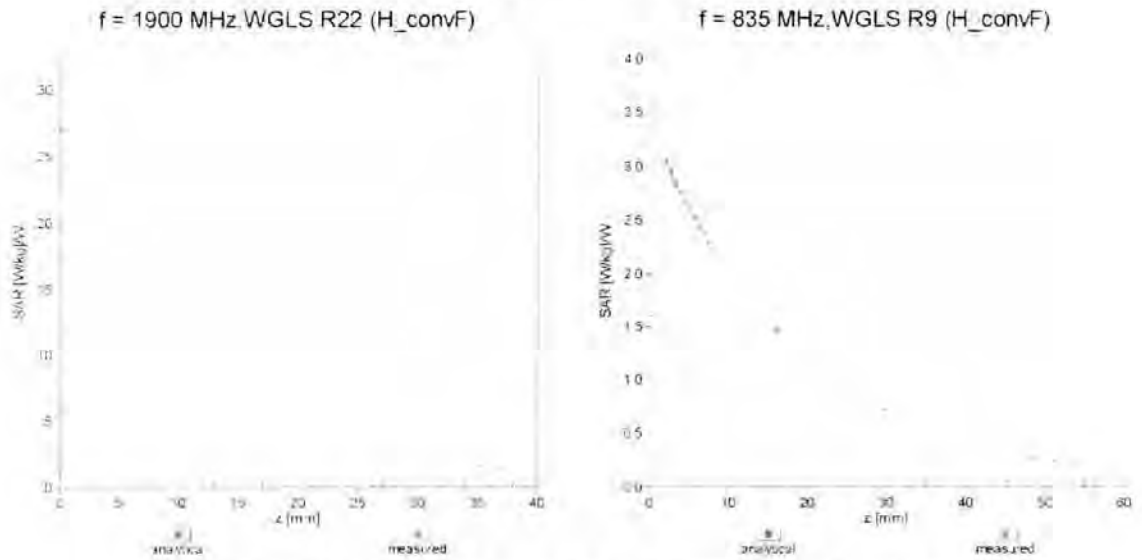
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

Dynamic Range $f(SAR_{head})$ (TEM cell , $f = 900$ MHz)



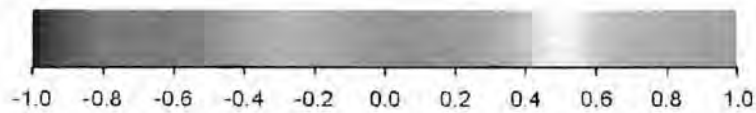
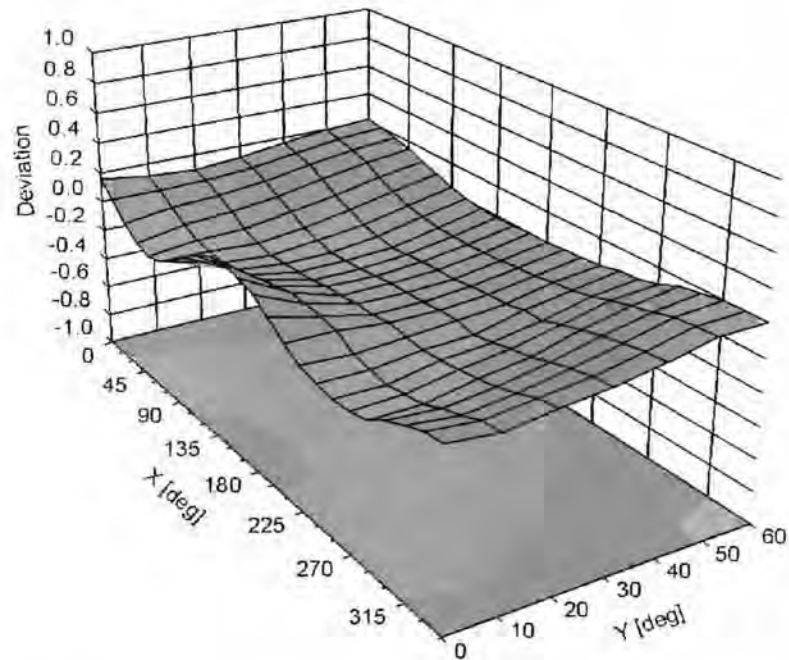
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: $\pm 2.6\%$ (k=2)

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3173**Other Probe Parameters**

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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

Dipole Calibration

Please see attached calibration data

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
Zeughausstrasse 43, 8004 Zurich, Switzerland



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Accreditation No.: **SCS 108**

Client **Northwest EMC**

Certificate No: **D835V2-4d108_Oct10**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d108**

Calibration procedure(s) **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **October 19, 2010**

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: October 19, 2010

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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	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.3 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 mW / g
SAR normalized	normalized to 1W	9.60 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	9.64 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.57 mW / g
SAR normalized	normalized to 1W	6.28 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	6.29 mW / g ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.4 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.53 mW / g
SAR normalized	normalized to 1W	10.1 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	9.93 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.65 mW / g
SAR normalized	normalized to 1W	6.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	6.51 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω - 3.2 j Ω
Return Loss	- 28.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.0 Ω - 4.4 j Ω
Return Loss	- 26.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.396 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.

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	May 26, 2010

DASY5 Validation Report for Head TSL

Date/Time: 18.10.2010 12:32:33

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d108

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: HSL900

Medium parameters used: $f = 835$ MHz; $\sigma = 0.9$ mho/m; $\epsilon_r = 42.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

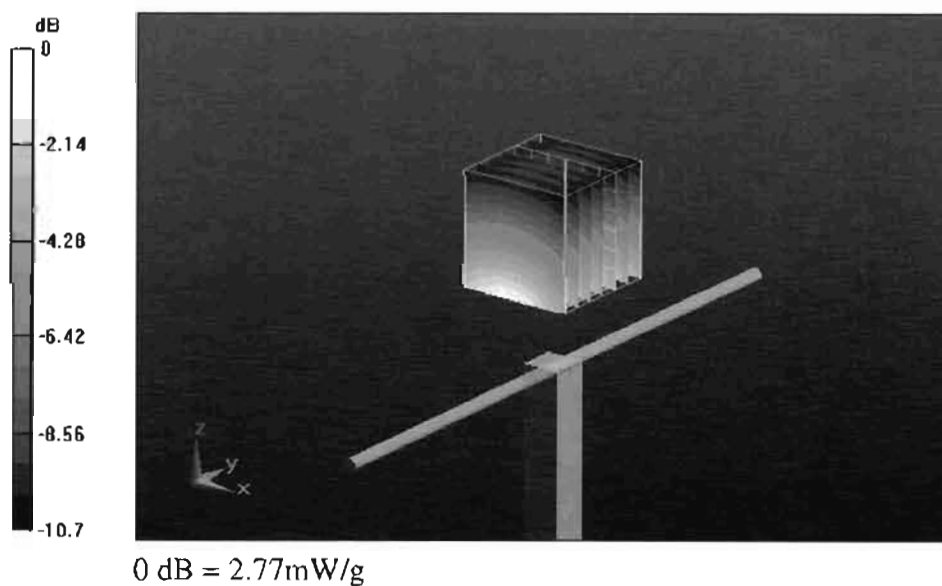
Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.1 V/m; Power Drift = 0.000575 dB

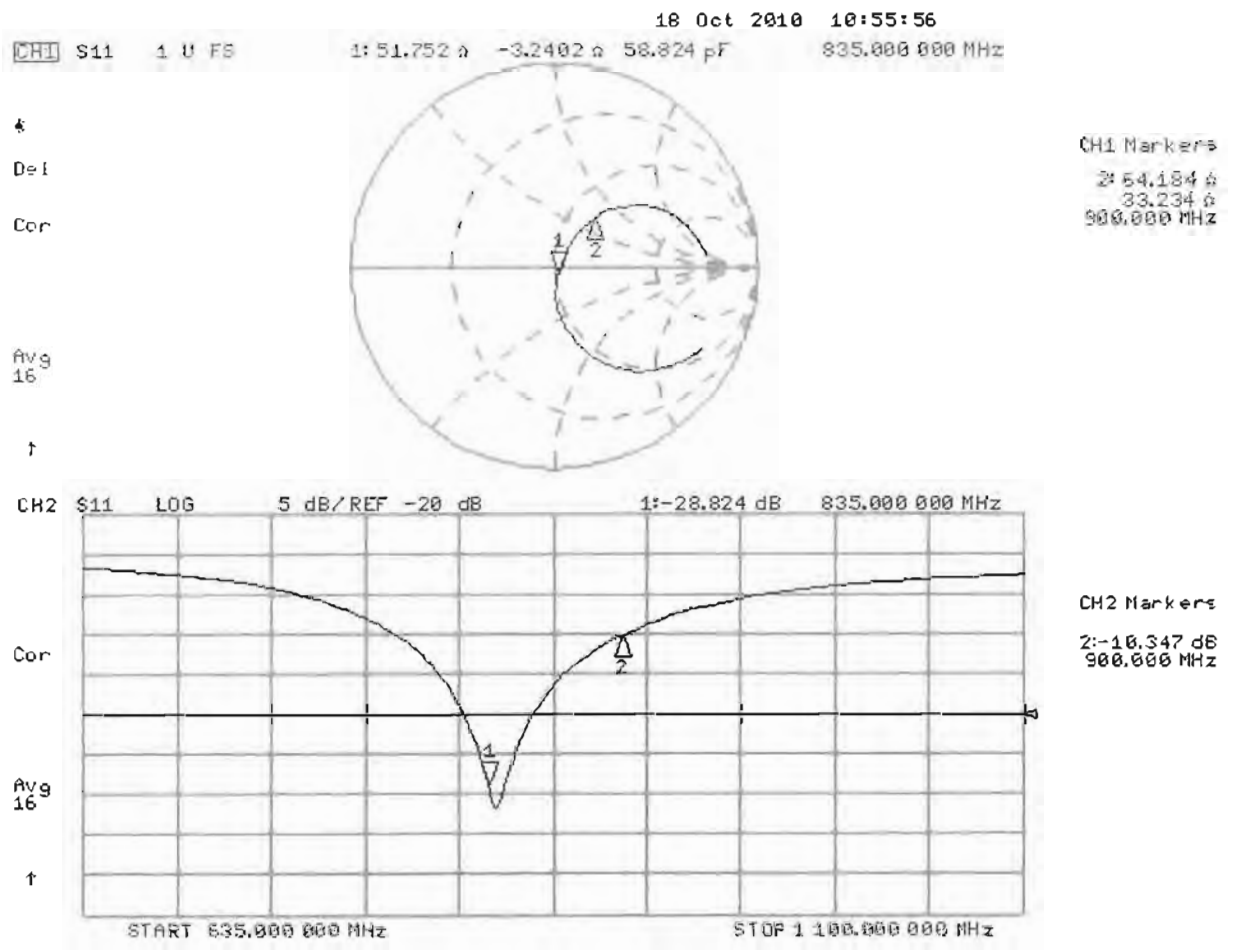
Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.57 mW/g

Maximum value of SAR (measured) = 2.77 mW/g



Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body

Date/Time: 19.10.2010 11:59:09

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d108

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium: MSL900

Medium parameters used: $f = 835$ MHz; $\sigma = 0.99$ mho/m; $\epsilon_r = 54.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

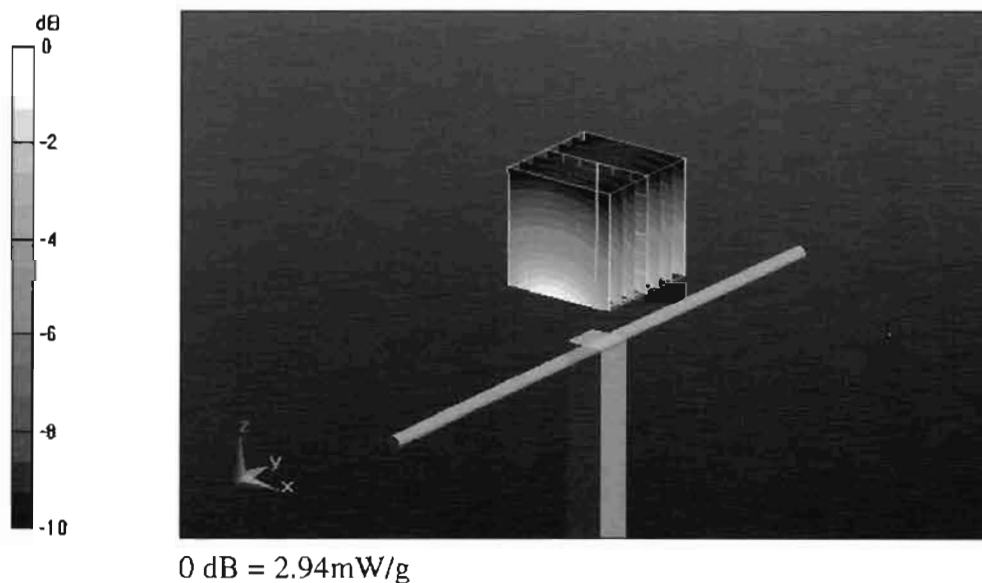
Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.4 V/m; Power Drift = 0.0047 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 2.53 mW/g; SAR(10 g) = 1.65 mW/g

Maximum value of SAR (measured) = 2.94 mW/g



Impedance Measurement Plot for Body TSL

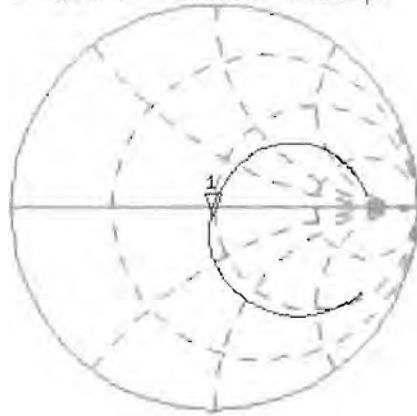
19 Oct 2010 09:56:43
CH1 S11 1 U FS 1: 48.027 Ω -4.3809 Ω 43.509 pF 835.000 000 MHz

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De l

Cor

avg
16

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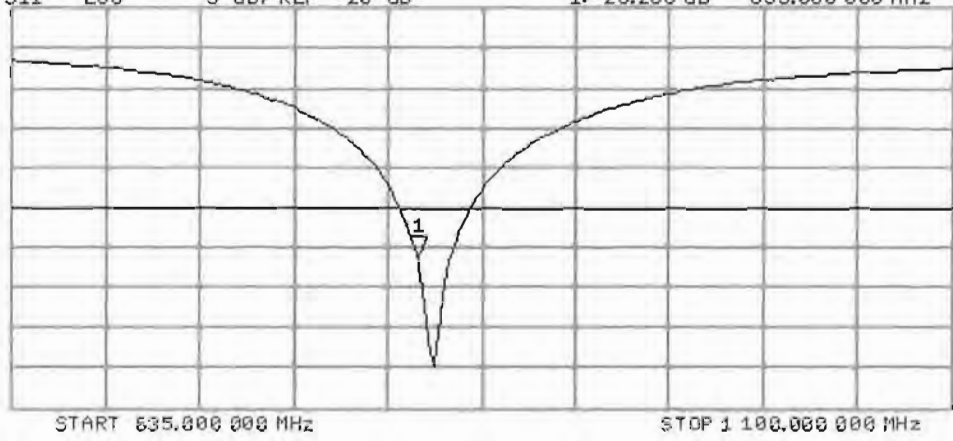


CH2 S11 LOG 5 dB/REF -20 dB 1: -26.208 dB 835.000 000 MHz

Cor

avg
16

↑



**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 **Northwest EMC**

Certificate No: **D1900V2-5d131_Nov10**

CALIBRATION CERTIFICATE

Object: **D1900V2 - SN: 5d131**

Calibration procedure(s): **QA CAL-05.v7
Calibration procedure for dipole validation kits**

Calibration date: **November 24, 2010**

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 25, 2010



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
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	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz \pm 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 \pm 0.2) °C	39.3 \pm 6 %	1.40 mho/m \pm 6 %
Head TSL temperature during test	(22.0 \pm 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	40.2 mW / g \pm 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.23 mW / g
SAR normalized	normalized to 1W	20.9 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	20.9 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	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.8 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.0 mW / g
SAR normalized	normalized to 1W	40.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	39.9 mW / g ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.25 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.0 mW / g ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.7 Ω + 6.5 j Ω
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 6.9 j Ω
Return Loss	- 22.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.206 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.

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	April 14, 2010

DASY5 Validation Report for Head TSL

Date/Time: 10.11.2010 16:31:30

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d131

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: HSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.4$ mho/m; $\epsilon_r = 39.3$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Head/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

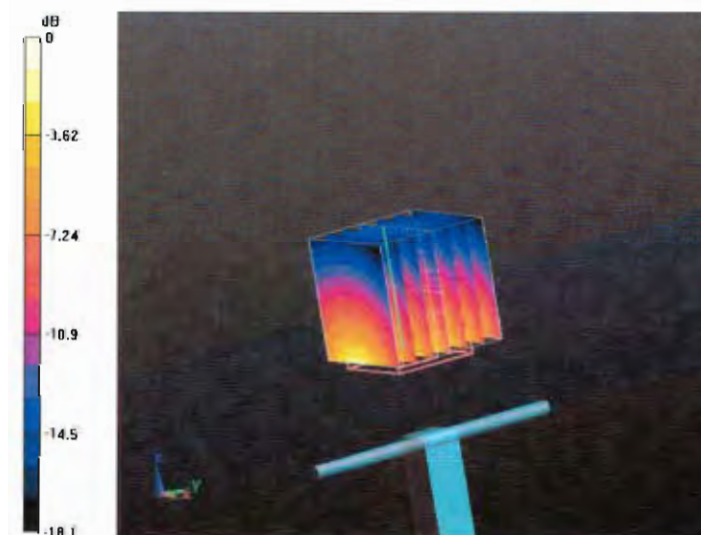
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.1 V/m; Power Drift = 0.064 dB

Peak SAR (extrapolated) = 18.4 W/kg

SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.23 mW/g

Maximum value of SAR (measured) = 12.6 mW/g



0 dB = 12.6mW/g

Impedance Measurement Plot for Head TSL

10 Nov 2010 13:03:53

CH1 S11 1 U FS

1: 52.686 Ω 6.4824 Ω 543.01 μH

1 900,000 000 MHz

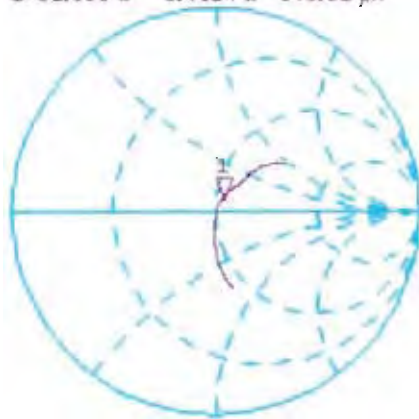
+

Del

CA

Avg 16

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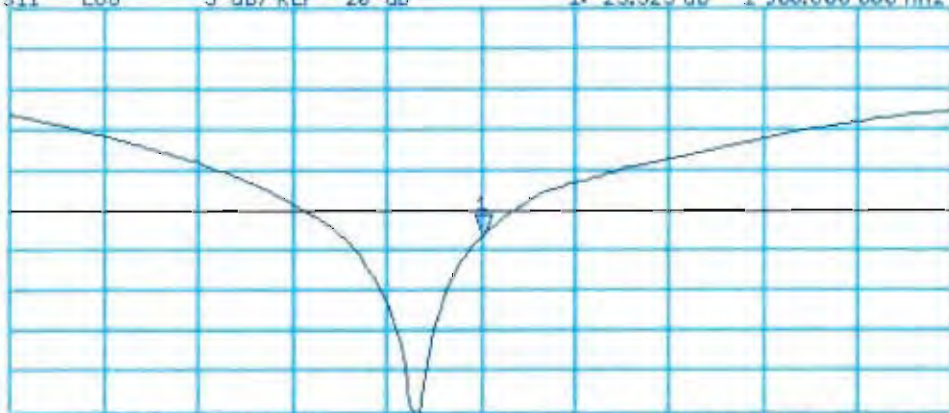


CH2 S11 LOG 5 dB/REF -20 dB 1: -23.325 dB 1 900,000 000 MHz

CA

Avg 16

↑



START 1 700,000 000 MHz

STOP 2 100,000 000 MHz

DASY5 Validation Report for Body

Date/Time: 24.11.2010 12:48:29

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d131

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: MSL U12 BB

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Body/d=10mm, Pin=250 mW, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.7 V/m; Power Drift = -0.00519 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 10 mW/g; SAR(10 g) = 5.25 mW/g

Maximum value of SAR (measured) = 12.3 mW/g



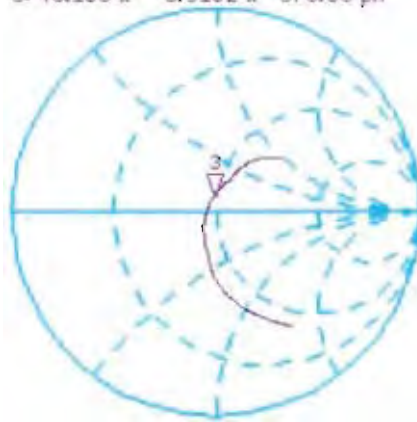
0 dB = 12.3mW/g

Impedance Measurement Plot for Body TSL

24 Nov 2010 10:39:26

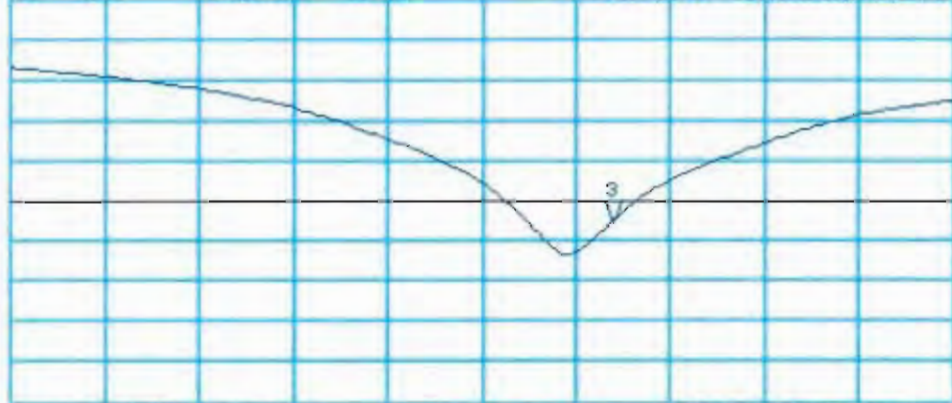
CH1 S11 1 V FS 3: 48.105 Ω 6.9102 Ω 578.83 μH 1 900.000 000 MHz

Del
Cor
Avg 16
↑



CH2 S11 LOG 5 dB/REF -20 dB 3:-22.750 dB 1 900.000 000 MHz

Cor
Avg 16
↑



START 1 550.000 000 MHz STOP 2 100.000 000 MHz