NORTHWEST EMC

FUJIFILM Sonosite Manufacturing, LLC

iViz

SAR Evaluation Report # SONO0375

Evaluated to the following SAR specification:

FCC 2.1093:2015

FCC 15.247:2015

WiFi and Bluetooth Radio

NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

NORTHWEST EMC
2015-07-22

Last Date of Test: August 14, 2015
FUJIFILM Sonosite Manufacturing, LLC
Model: iViz

Applicable Standard

Test Description	Specification	Test Method	Pass/Fail
SAR Evaluation	FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 616217 D04 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 IEEE Std 1528:2013	Pass

Highest SAR Values:

Frequency Bands (GHz)	Body (W/kg) 1g	Limit (W/kg) 1g	Exposure Environment
2.4	1.21	1.6	General Population
5.2	0.12		
5.3	0.14		
5.6	0.30		
5.8	0.07		

Deviations From Test Standards

None

Approved By:

Don Facteau, IS Manager

REVISION HISTORY

NORTHWEST EMC
REV 2014.10.14

Revision Number	Description	Date	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS

NORTHWEST EMC
REV 2015.2.19

United States

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

A2LA - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

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

European Union

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

Australia/New Zealand

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

Korea

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

Japan

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

Taiwan

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

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

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

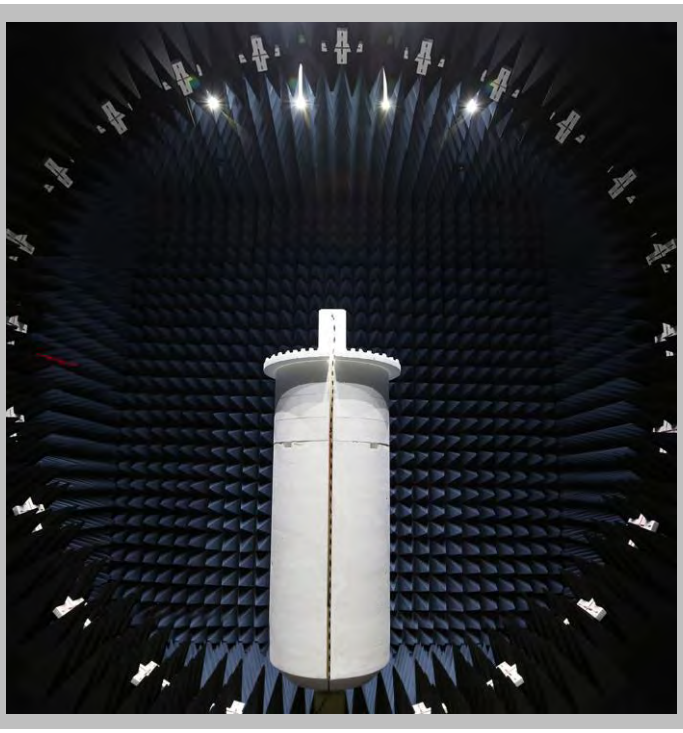
SCOPE

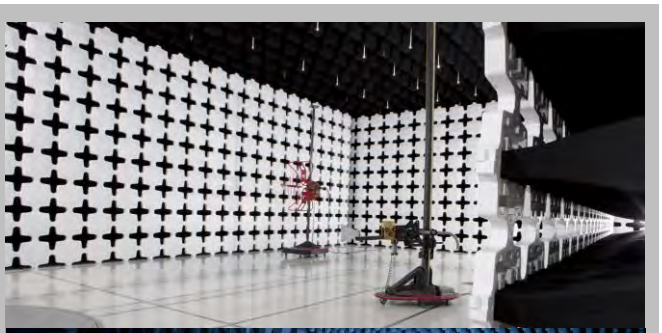
For details on the Scopes of our Accreditations, please visit:
http://www.nwemc.com/accreditations/
http://gsi.nist.gov/global/docs/cabs/designations.html

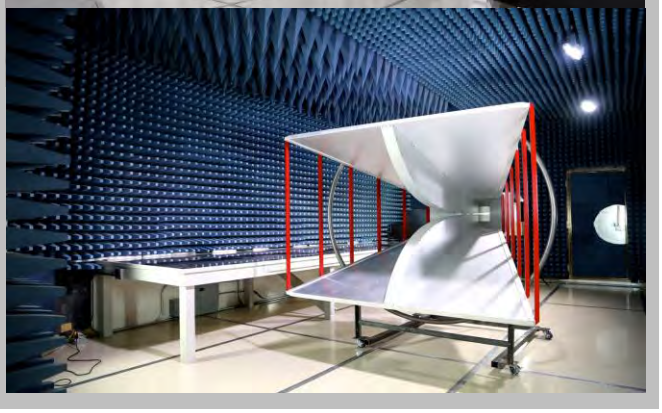
FACILITIES

NORTHWEST EMC
REV 2015.2.19

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 9801 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Industry Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







PRODUCT DESCRIPTION

NORTHWEST EMC
2014-12-10

Client and Equipment Under Test (EUT) Information

Company Name:	FUJIFILM Sonosite Manufacturing, LLC
Address:	21919 30th Drive SE
City, State, Zip:	Bothell, WA 98021
Test Requested By:	Niko Pagoulatos
Model:	iViz
First Date of Test:	August 12, 2015
Last Date of Test:	August 14, 2015
Receipt Date of Samples:	August 12, 2015
Equipment Design Stage:	Production
Equipment Condition:	No Damage

Information Provided by the Party Requesting the Test

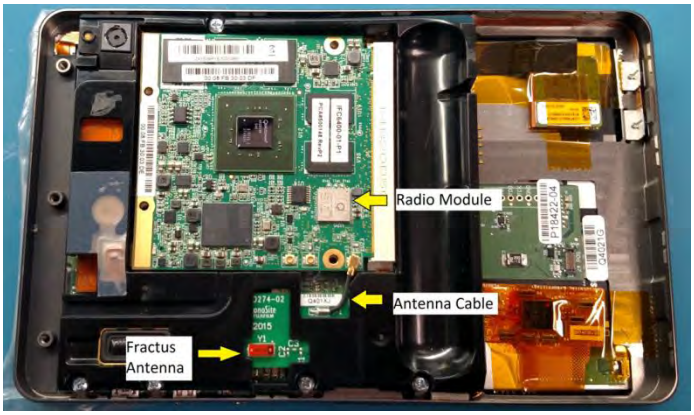
Functional Description of the EUT:

The iViz is a portable, battery operated, medical ultrasound tablet device containing a WLAN/Bluetooth modular radio.

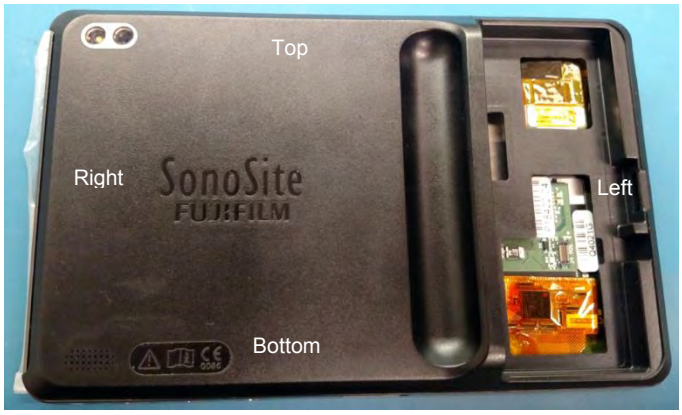
The WLAN radio is an 802.11a/b/g/n SISO operating in the 2.4, 5.2, 5.3, 5.6 and 5.8 GHz bands. The 2.4 and 5 GHz bands use 20 MHz channel bandwidths only. The Bluetooth radio operates in Low Energy (LE) mode only.

The monopole antenna is shared by the WLAN and Bluetooth radios. The antenna is integral to the tablet and has a peak gain of 1.8 dBi in the 2.4 GHz band and 4.9 dBi in the 5 GHz bands.

The diagram below shows where the radio module and antennas are located in the tablet.



Back of Base Unit, Cover Off



Back of Base Unit, Cover On

PRODUCT DESCRIPTION

Testing Requirements

Testing Locations

After a review of the usage scenarios, the following positions were tested for the WLAN radio: right edge, left edge, top edge, bottom edge, and back side.

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

There is no usage model for operation near the head. There are no authorized accessories to wear the device on the body. When used in "tablet mode", only the tablet configurations anticipated by KDB 616217 are applicable. Testing was done with a 0 cm spacing to the phantom without any protective case installed.

The WLAN antenna is closest to the back side of the display near the bottom edge. The back side of the display can be used next to the torso. Since the other sides are all closer than 20 cm to the antenna, the remaining edges as well as the back side were tested.

KDB 447498 D01 General RF Exposure Guidance v05r02 is the FCC's starting point for RF exposure policy. Section 4.3.1, Item #1 provides the SAR test exclusion thresholds for test separation distances ≤ 50mm:

> "[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] * [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where
>
> - f(GHz) is the RF channel transmit frequency in GHz
> - Power and distance are rounded to the nearest mW and mm before calculation
> - The result is rounded to one decimal place for comparison
> - 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below
>
> The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion."

The highest output power of the Bluetooth LE radio is equal to 5.1 mW (see DTS grant for FCC ID: PPD-QCA6234). Using the formula above, the exclusion threshold is 1.6 compared to a limit of 3.0; therefore it is excluded from stand-alone SAR testing.

Maximum Conducted Output Power (mW)	Duty Cycle	Test Separation (mm)	Transmit Frequency (GHz)	Exclusion Threshold	Spec
5.1	1	5	2.48	1.6	3

Testing Objective:

To demonstrate compliance with the SAR requirements of FCC 2.1093

Scope

The stand-alone SAR evaluation documented in this report is for the 802.11abgn portion of the EUT.

CONFIGURATIONS

NORTHWEST EMC
2014-12-10

Configuration SONO0375- 1

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Ultrasound/Tablet	FUJIFILM Sonosite Manufacturing	iViz	Q401Q1

MODIFICATIONS

NORTHWEST EMC
2014-12-10

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	8/12/2015	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	8/14/2015	SAR Evaluation	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

TISSUE – EQUIVALENT LIQUID DESCRIPTION

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 the start of testing using the SPEAG DAKS:200 dielectric assessment kit. The dielectric measurements were made across the frequency range of the liquid. The attached data sheets show that the dielectric parameters of the liquid were within the required 5% tolerances.

Target values of dielectric parameters

Per KDB 865664 D01 v01r01, Appendix A.1:

"The head tissue dielectric parameters recommended by IEEE Std 1528-2003 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 1528 are derived from tissue dielectric parameters computed from the 4-Cole-Cole equations described above and extrapolated according to the head parameters specified in 1528."

Target Frequency	Head		Body	
(MHz)	ε_r	σ (S/m)	ε_r	σ (S/m)
150	52.3	0.76	61.9	0.80
300	45.3	0.87	58.2	0.92
450	43.5	0.87	56.7	0.94
835	41.5	0.90	55.2	0.97
900	41.5	0.97	55.0	1.05
915	41.5	0.98	55.0	1.06
1450	40.5	1.20	54.0	1.30
1610	40.3	1.29	53.8	1.40
1800 – 2000	40.0	1.40	53.3	1.52
2450	39.2	1.80	52.7	1.95
3000	38.5	2.40	52.0	2.73
5800	35.3	5.27	48.2	6.00

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

TISSUE – EQUIVALENT LIQUID DESCRIPTION

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 IEEE 1528: 2003, Annex C:

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

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

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

Above 3.0 GHz, the SPEAG formulations for the body are based upon IEC 62209-2:2010, Table E.1:

Frequency (MHz)	**4 000**	**5 000**	**5 200**	**5 800**	**6 000**
Recipe source number	4	4	1	1	4
Ingredients (% by weight)					
Deionised water	56	56	65,53	65,53	56
Tween					
Oxidised mineral oil	44	44			44
Diethylenglycol monohexylether			17,24	17,24	
Triton X-100			17,24	17,24	
Diacetin					
DGBE					
NaCl					
Additives and salt					

TISSUE – EQUIVALENT LIQUID

Date:	08/13/2015	Temperature:	24.5°C
Tissue:	Body, MSL501, 5800MHz	Liquid Temperature:	22.6°C
Tested By:	Luke Richardson	Relative Humidity:	41%
Job Site:	EV08	Bar. Pressure:	1015 mb

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
5800	46.56	6.096	48.2	6.0	3.4	-1.6

Frequency (MHz)	Relative Permittivity	Conductivity
5000	47.48	5.158
5025	47.22	5.133
5050	47.39	5.211
5100	47.37	5.258
5125	47.4	5.258
5175	47.12	5.323
5200	47.01	5.377
5250	46.99	5.526
5275	46.79	5.521
5325	46.84	5.639
5350	46.96	5.685
5400	47	5.662
5425	46.91	5.737
5475	46.9	5.774
5500	46.79	5.788
5550	46.73	5.794
5575	46.56	5.833
5625	46.5	5.904
5650	46.21	5.944
5700	46.45	6.109
5725	46.4	6.146
5775	46.06	6.164
5800	46.56	6.096
5850	46.14	6.071
5875	46.1	6.078
5925	46.05	6.196
5950	45.87	6.248
5975	45.76	6.339

TISSUE – EQUIVALENT LIQUID

Date:	08/13/2015	Temperature:	24.3°C
Tissue:	Body, MSL2450, 2450MHz	Liquid Temperature:	22.5°C
Tested By:	Carl Engholm	Relative Humidity:	41%
Job Site:	EV08	Bar. Pressure:	1013 mb

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

RESULTS

	Actual Values		Target Values		Deviation (%)	
Frequency (MHz)	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity	Relative Permittivity	Conductivity
2450	52.59	1.954	52.7	1.95	0.21	-0.21

Frequency (MHz)	Relative Permittivity	Conductivity
2300	53.22	1.751
2300	53.22	1.751
2300	53.22	1.751
2325	53.12	1.785
2325	53.12	1.785
2350	53.03	1.82
2350	53.03	1.82
2375	52.93	1.855
2375	52.93	1.855
2400	52.75	1.883
2400	52.75	1.883
2400	52.75	1.883
2425	52.68	1.923
2425	52.68	1.923
2450	52.59	1.954
2475	52.48	1.992
2475	52.48	1.992
2500	52.41	2.026
2500	52.41	2.026
2500	52.41	2.026
2525	52.38	2.061
2525	52.38	2.061
2550	52.27	2.089
2550	52.27	2.089
2575	52.13	2.125

SAR SYSTEM VERIFICATION DESCRIPTION

NORTHWEST EMC
WSSV.2013.09.09

REQUIREMENT

Per IEEE 1528, Section 8.2.1, “System checks are performed prior to compliance tests and the results must always be within ± 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.”

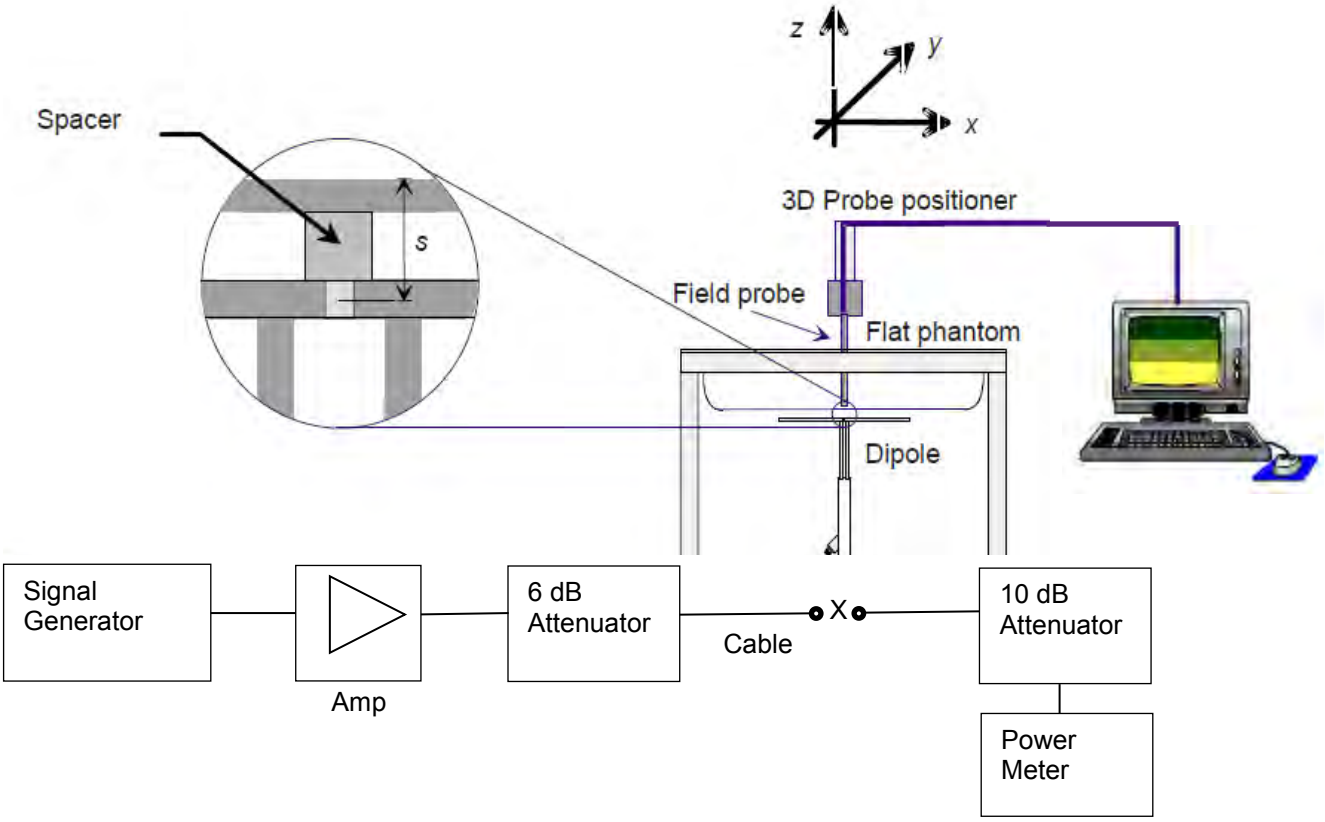
TEST DESCRIPTION

Within 24 hours of a measurement, then every 72 hours thereafter, 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 (X). 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 = 15mm, +/- 0.2mm for 300MHz ≤ f ≥ 1000 MHz:
s = 10mm, +/- 0.2mm for 1000MHz ≤ f ≥ 6000MHz

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.



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

RESULTS

Date	Liquid part number and frequency	Conducted Power into the Dipole (dBm)	Correction Factor	Measured		Normalized to 1W		Target (Normalized to 1W) Get from Dipole Calibration Certificate		% Difference	
				1g	10g	1g	10g	1g	10g	1g	10g
8/12/2015	MSL 501 (5200 MHz)	18.93	12.79	6.31	1.75	80.70	22.38	77.00	21.40	4.81	4.58
8/12/2015	MSL 501 (5500 MHz)	18.39	14.49	5.30	1.48	76.80	21.45	82.40	22.90	-6.80	-6.33
8/13/2015	MSL 2450 (2450 MHz)	19.78	10.52	4.90	2.30	51.55	24.20	50.60	23.70	1.88	2.11
8/12/2015	MSL 501 (5800 MHz)	17.07	19.63	3.57	1.02	70.08	20.02	77.60	21.40	-9.69	-6.45

SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Luke Richardson	Room Temperature (°C):	24.2°C
Date:	8/12/2015	Liquid Temperature (°C):	21.4°C
Configuration:	Body	Humidity (%RH):	48.2%
		Bar. Pressure (mb):	1014.4 mb

MSL501 5200 8-12-15
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: ADM
Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5200 MHz; σ = 5.377 S/m; ε_r = 47.01; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

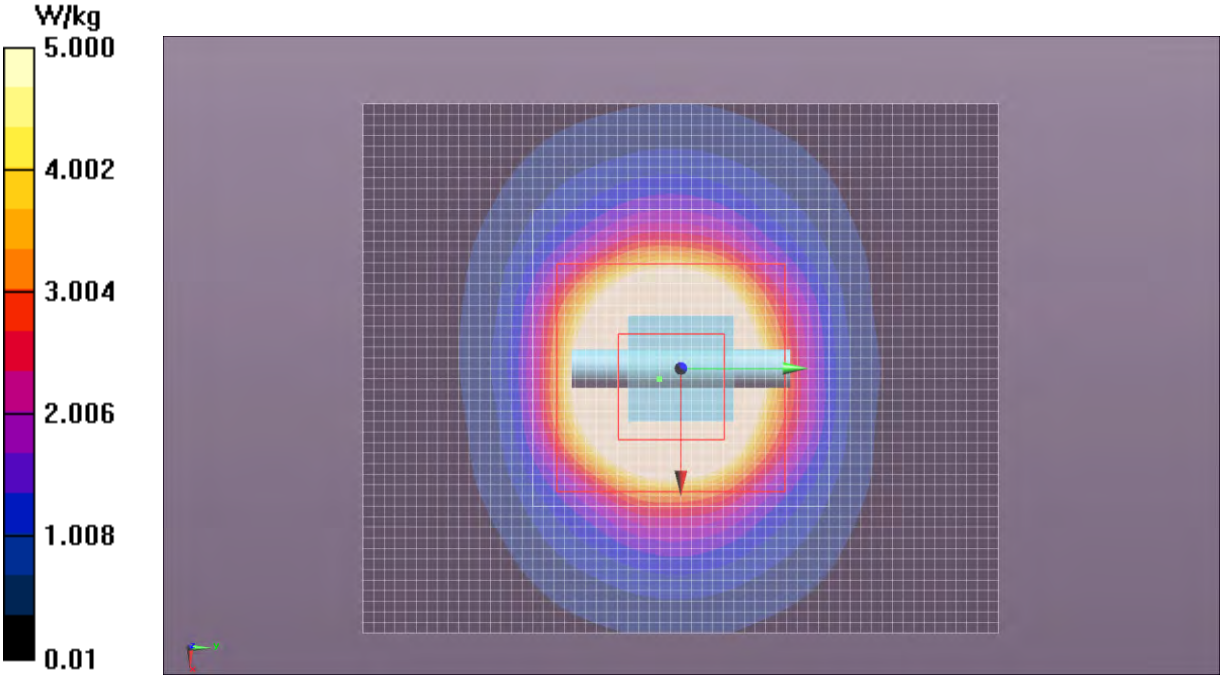
System Check/System Check - Low Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 55.61 V/m; Power Drift = -1.04 dB
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 6.31 W/kg; SAR(10 g) = 1.75 W/kg
Maximum value of SAR (measured) = 13.8 W/kg

System Check/System Check - Low Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 14.5 W/kg

System Check/System Check - Low Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 22.02 V/m
Maximum value of SAR (measured) = 2.61 W/kg

Approved By

MSL501 5200 8-12-15



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Luke Richardson	Room Temperature (°C):	24.2°C
Date:	8/12/2015	Liquid Temperature (°C):	21.4°C
Configuration:	Body	Humidity (%RH):	48.2%
		Bar. Pressure (mb):	1014.4 mb

MSL501 5500 8-12-15
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN: ADM
Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

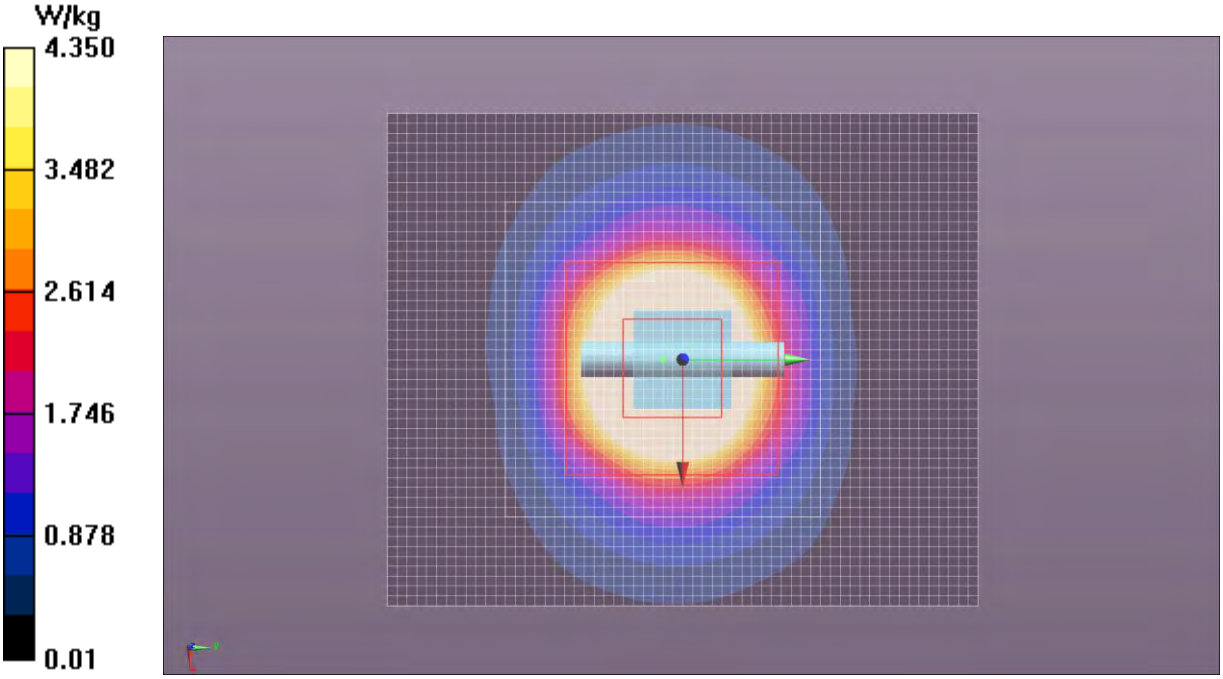
System Check/System Check - Mid Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 11.7 W/kg

System Check/System Check - Mid Channel/Zoom Scan (7x9x7) (9x9x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 48.43 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 21.4 W/kg
SAR(1 g) = 5.3 W/kg; SAR(10 g) = 1.48 W/kg
Maximum value of SAR (measured) = 11.3 W/kg

System Check/System Check - Mid Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 20.15 V/m
Maximum value of SAR (measured) = 2.35 W/kg

Approved By

MSL501 5500 8-12-15



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Luke Richardson	Room Temperature (°C):	23.8°C
Date:	8/12/2015	Liquid Temperature (°C):	21.5°C
Configuration:	Body	Humidity (%RH):	46.8%
		Bar. Pressure (mb):	1013.9 mb

MSL501 5800 8-12-15
DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx
Communication System: UID 10000, CW; Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5800 MHz; σ = 6.096 S/m; ε_r = 46.564; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

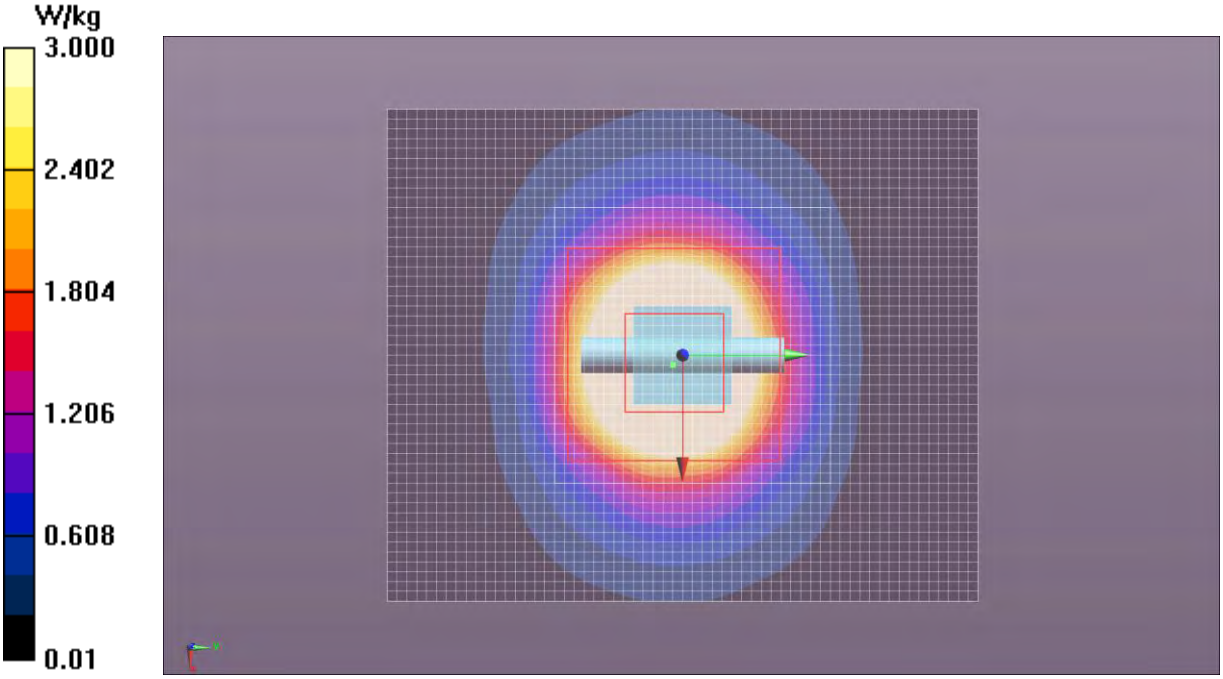
System Check/System Check - High Channel/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 7.81 W/kg

System Check/System Check - High Channel/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 13.83 V/m

System Check/System Check - High Channel/Zoom Scan (7x9x7) (8x8x9)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2.5mm
Reference Value = 31.51 V/m; Power Drift = 0.57 dB
Peak SAR (extrapolated) = 15.1 W/kg
SAR(1 g) = 3.57 W/kg; SAR(10 g) = 1.02 W/kg
Maximum value of SAR (measured) = 7.76 W/kg
Maximum value of SAR (measured) = 1.17 W/kg

Approved By

MSL501 5800 8-12-15



SAR SYSTEM VERIFICATION

NORTHWEST EMC
WSSV.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	24.8°C
Date:	8/13/2015	Liquid Temperature (°C):	22.5°C
Configuration:	Body	Humidity (%RH):	49%
		Bar. Pressure (mb):	1013 mb

MSL2450 System Check, 8-13-15
DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN: ADL
Communication System: UID 10000, CW; Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2450 MHz; σ = 1.954 S/m; ε_r = 52.586; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

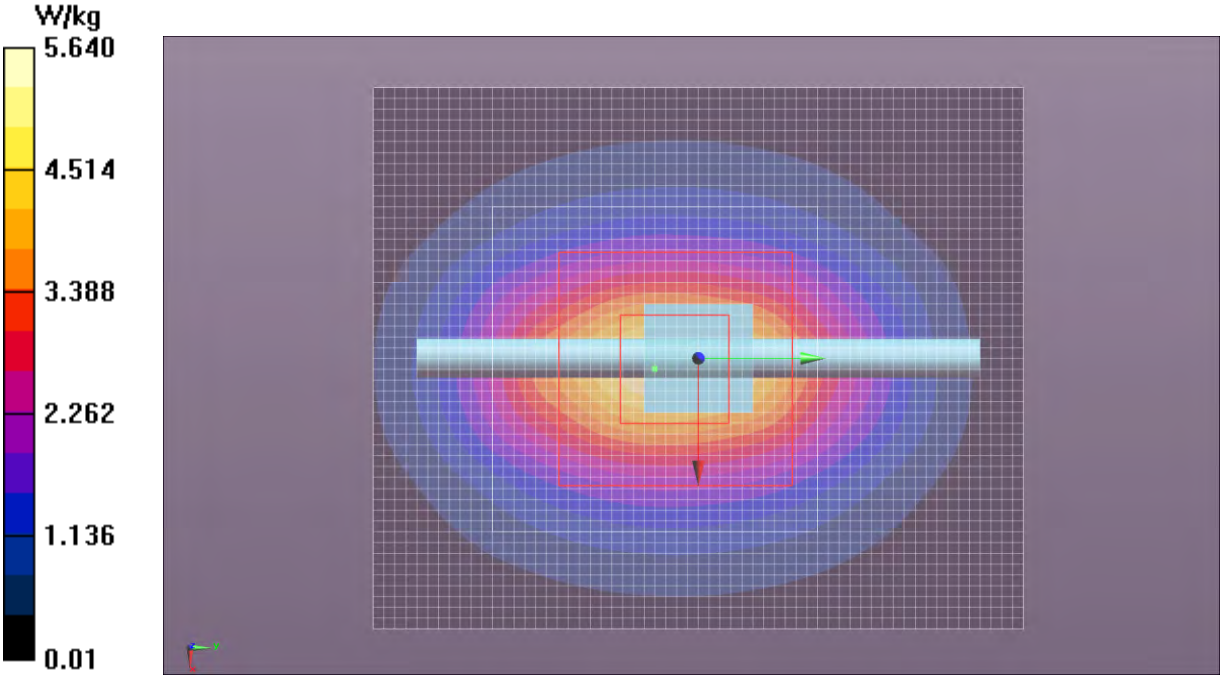
System Check/System Check/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 5.25 W/kg

System Check/System Check/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 53.70 V/m

System Check/System Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.00 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 9.69 W/kg
SAR(1 g) = 4.9 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 4.93 W/kg
Maximum value of SAR (measured) = 5.64 W/kg

Approved By

MSL2450 System Check, 8-13-15



OUTPUT POWER DESCRIPTION

2.4 AND 5 GHz Bands

Per FCC KDB 248227, the conducted output power was measured at the lowest, a middle, and highest channel in each band. Measurements were made while the EUT transmitted at the lowest, middle and the highest data rates for each channel.

The test software used the following settings for output power and SAR measurements.

2.4 GHz Band

CCK

1L	2S/2L	5.5S/5.5L	11S/11L
19	19	19	19

OFDM

6/9/12/18/24	36	48	54
17	17	16	15

HT20

MCS0/8	MCS1/2/3/9/10/11	MCS4	MCS5	MCS6	MCS7
16	16	16	16	15	13.5

5 GHz Bands

OFDM

6/9/12/18/24	36	48	54
14	14	12	11.5

HT20

MCS0/8	MCS1/2/3/9/10/11	MCS4	MCS5	MCS6	MCS7
13.5	13.5	13.5	13.5	10.5	9

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

Output power measurements are on the following pages.

OUTPUT POWER

EUT:	iViz	Work Order:	SONO0375
Serial Number:	Q401Q1	Date:	7/22/2015
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Temperature:	23.5°C
Attendees:	None	Relative Humidity:	42%
Customer Project:	None	Bar. Pressure:	1005 mb
Tested By:	Luke Richardson	Job Site:	EV08
Power:	Battery	Configuration:	SONO0375

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

Conducted output power

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Pass

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Target Power	Conducted Power (Average)	
					dBm	W
1	2412	1	BPSK	19	14.4	0.028
		11	CCK	19	15.1	0.033
		6	BPSK	17	13.2	0.021
		36	16-QAM	17	12.6	0.018
		54	64-QAM	15	10.4	0.011
		7.2 (MCS0)	BPSK	16	11.9	0.016
		72.2 (MCS07)	64-QAM	13.5	9.0	0.008
6	2437	1	BPSK	19	15.6	0.036
		11	CCK	19	16.3	0.043
		6	BPSK	17	14.2	0.026
		36	16-QAM	17	13.6	0.023
		54	64-QAM	15	11.7	0.015
		7.2 (MCS0)	BPSK	16	13.0	0.020
		72.2 (MCS07)	64-QAM	13.5	10.0	0.010
11	2462	1	BPSK	19	16.5	0.045
		11	CCK	19	17.2	0.053
		6	BPSK	17	15.0	0.032
		36	16-QAM	17	14.4	0.028
		54	64-QAM	15	12.5	0.018
		7.2 (MCS0)	BPSK	16	14.2	0.026
		72.2 (MCS07)	64-QAM	13.5	11.1	0.013

OUTPUT POWER

NORTHWEST EMC
WSTD.2013.09.09

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Target Power	Conducted Power (Average)	
					dBm	W
36	5180	6	BPSK	14	4.4	0.003
		7.2 (MCS0)	BPSK	13.5	6.7	0.005
		72.2 (MCS07)	64-QAM	9	1.8	0.002
40	5200	6	BPSK	14	4.5	0.003
		7.2 (MCS0)	BPSK	13.5	6.6	0.005
		72.2 (MCS07)	64-QAM	9	1.5	0.001
44	5220	6	BPSK	14	4.7	0.003
		7.2 (MCS0)	BPSK	13.5	7.1	0.005
		72.2 (MCS07)	64-QAM	9	2.0	0.002
48	5240	6	BPSK	14	5.0	0.003
		7.2 (MCS0)	BPSK	13.5	6.2	0.004
		72.2 (MCS07)	64-QAM	9	1.7	0.001
52	5260	6	BPSK	14	4.7	0.003
		7.2 (MCS0)	BPSK	13.5	6.0	0.004
		72.2 (MCS07)	64-QAM	9	1.5	0.001
56	5280	6	BPSK	14	6.9	0.005
		7.2 (MCS0)	BPSK	13.5	6.3	0.004
		72.2 (MCS07)	64-QAM	9	1.9	0.002
60	5300	6	BPSK	14	6.6	0.005
		7.2 (MCS0)	BPSK	13.5	6.0	0.004
		72.2 (MCS07)	64-QAM	9	1.7	0.001
64	5320	6	BPSK	14	7.5	0.006
		7.2 (MCS0)	BPSK	13.5	5.9	0.004
		72.2 (MCS07)	64-QAM	9	1.6	0.001
100	5500	6	BPSK	14	9.8	0.010
		7.2 (MCS0)	BPSK	13.5	9.0	0.008
		72.2 (MCS07)	64-QAM	9	4.6	0.003
104	5520	6	BPSK	14	9.1	0.008
		7.2 (MCS0)	BPSK	13.5	8.7	0.007
		72.2 (MCS07)	64-QAM	9	4.2	0.003
108	5540	6	BPSK	14	8.2	0.007
		7.2 (MCS0)	BPSK	13.5	8.2	0.007
		72.2 (MCS07)	64-QAM	9	3.9	0.002
112	5560	6	BPSK	14	7.6	0.006
		7.2 (MCS0)	BPSK	13.5	7.9	0.006
		72.2 (MCS07)	64-QAM	9	3.4	0.002

OUTPUT POWER

NORTHWEST EMC
WSTD.2013.09.09

Channel	Frequency (MHz)	Data Rate (Mbps)	Modulation	Target Power	Conducted Power (Average)	
					dBm	W
116	5580	6	BPSK	14	7.1	0.005
		7.2 (MCS0)	BPSK	13.5	7.8	0.006
		72.2 (MCS07)	64-QAM	9	3.3	0.002
132	5660	6	BPSK	14	6.1	0.004
		7.2 (MCS0)	BPSK	13.5	7.2	0.005
		72.2 (MCS07)	64-QAM	9	2.1	0.002
136	5680	6	BPSK	14	6.0	0.004
		7.2 (MCS0)	BPSK	13.5	7.1	0.005
		72.2 (MCS07)	64-QAM	9	2.6	0.002
140	5700	6	BPSK	14	5.9	0.004
		7.2 (MCS0)	BPSK	13.5	7.1	0.005
		72.2 (MCS07)	64-QAM	9	2.6	0.002
149	5745	6	BPSK	14	5.8	0.004
		7.2 (MCS0)	BPSK	13.5	6.7	0.005
		72.2 (MCS07)	64-QAM	9	2.5	0.002
153	5765	6	BPSK	14	5.7	0.004
		7.2 (MCS0)	BPSK	13.5	6.7	0.005
		72.2 (MCS07)	64-QAM	9	2.4	0.002
157	5785	6	BPSK	14	5.6	0.004
		7.2 (MCS0)	BPSK	13.5	6.6	0.005
		72.2 (MCS07)	64-QAM	9	2.4	0.002
161	5805	6	BPSK	14	5.6	0.004
		7.2 (MCS0)	BPSK	13.5	6.6	0.005
		72.2 (MCS07)	64-QAM	9	2.7	0.002
165	5825	6	BPSK	14	6.0	0.004
		7.2 (MCS0)	BPSK	13.5	6.8	0.005
		72.2 (MCS07)	64-QAM	9	2.3	0.002

TEST RESULTS

Test Locations

After a review of the usage scenarios, the following positions were tested for the WLAN radio: right edge, left edge, top edge, bottom edge, and back side.

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

There is no usage model for operation near the head. There are no authorized accessories to wear the device on the body. When used in "tablet mode", only the tablet configurations anticipated by KDB 616217 are applicable. Testing was done with a 0 cm spacing to the phantom without any protective case installed.

The WLAN antenna is closest to the back side of the display near the bottom edge. The back side of the display can be used next to the torso. Since the other sides are all closer than 20 cm to the antenna, the remaining edges as well as the back side were tested.

The highest output power of the Bluetooth LE radio is equal to 5.1 mW. . Using the formula from KDB 447498 D01 v05r02, Section 4.3.1, Item #1, the exclusion threshold is 1.6; therefore it is excluded from stand-alone SAR testing.

Operating Mode

All testing was performed with the EUT configured in a worst – case configuration and operating mode to produce the highest SAR levels. The EUT used client provided test software that permitted the selection of transmit channel, modulation type, and data rate. The radio module operated continuously at nearly 100% duty cycle at the maximum rated power.

Summary

Per FCC KDB 447498, SAR must be measured on the channel with the highest conducted output power. When the SAR measured on the highest output channel is >0.8 W/kg, SAR evaluation for the other required test channels is necessary.

SAR TEST DATA – 2.4 GHz

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	2.4	2462	11	11 Mbit	20	A	Back	-0.29	1.21	1
Body	2.4	2462	11	11 Mbit	20	A	Right	Note 1	Note 2	2
Body	2.4	2462	11	11 Mbit	20	A	Left	Note 1	Note 2	3
Body	2.4	2462	11	11 Mbit	20	A	Bottom	0.01	0.161	4
Body	2.4	2462	11	11 Mbit	20	A	Top	Note 1	Note 2	5

Note 1: Power drift measurement was not performed because the area scan results were less than 0.1 W/kg
Note 2: Zoom scans not performed because the area scan results were less than 0.1 W/kg

SAR TEST DATA – 2.4 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	24.5
Date:	8/13/2015	Liquid Temperature (°C):	22.4
Serial Number:	Q401Q1	Humidity (%RH):	52
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	None		

Test 1
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.24 V/m; Power Drift = -0.29 dB
Peak SAR (extrapolated) = 3.04 W/kg
SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.496 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.64 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.71 W/kg

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

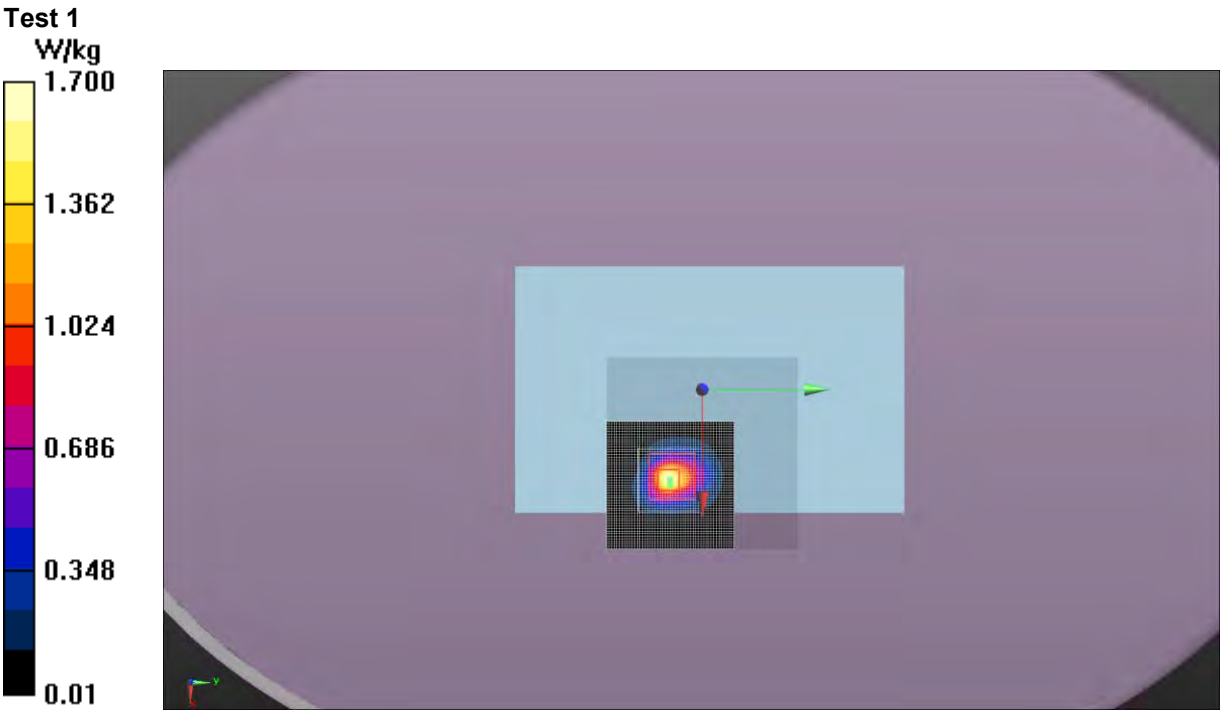
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 19.32 V/m

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.66 W/kg
Maximum value of SAR (measured) = 0.736 W/kg

Approved By

SAR TEST DATA – 2.4 GHz



SAR TEST DATA – 2.4 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	25
Date:	8/13/2015	Liquid Temperature (°C):	22.4
Serial Number:	Q401Q1	Humidity (%RH):	43
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	None		

Test 2
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.00895 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

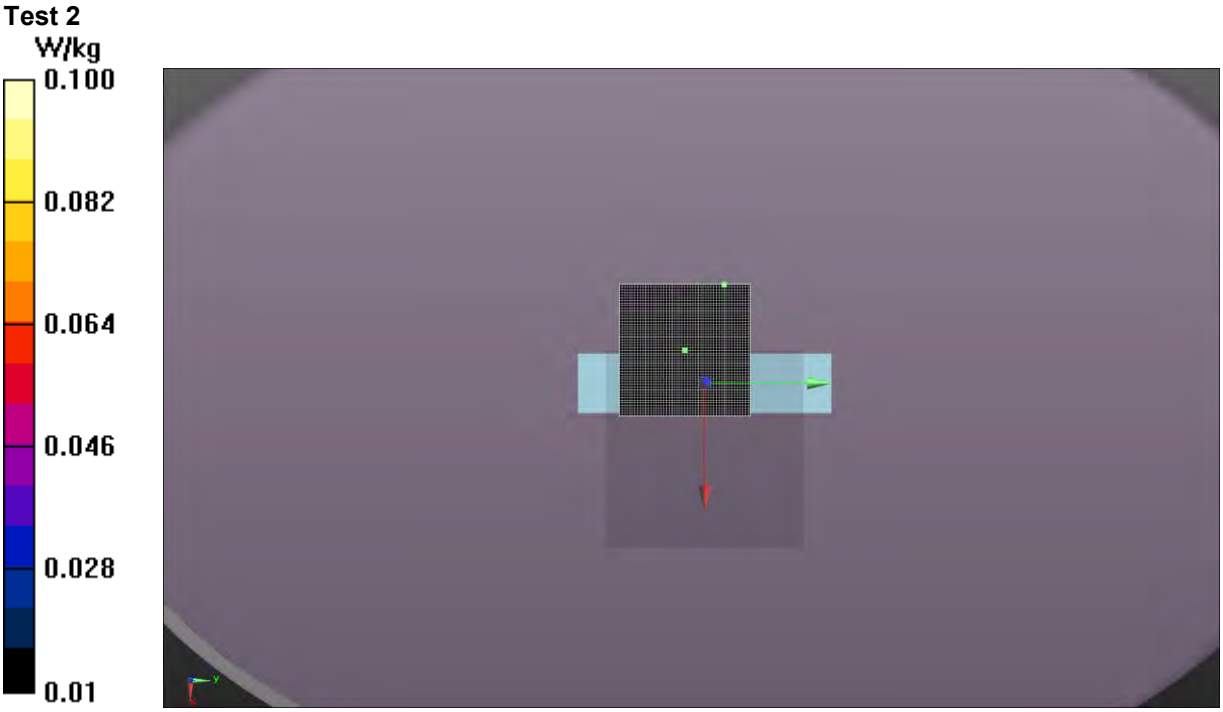
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.00859 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00895 W/kg

Approved By

SAR TEST DATA – 2.4 GHz



SAR TEST DATA – 2.4 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	25
Date:	8/13/2015	Liquid Temperature (°C):	22.4
Serial Number:	Q401Q1	Humidity (%RH):	43
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	None		

Test 3
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

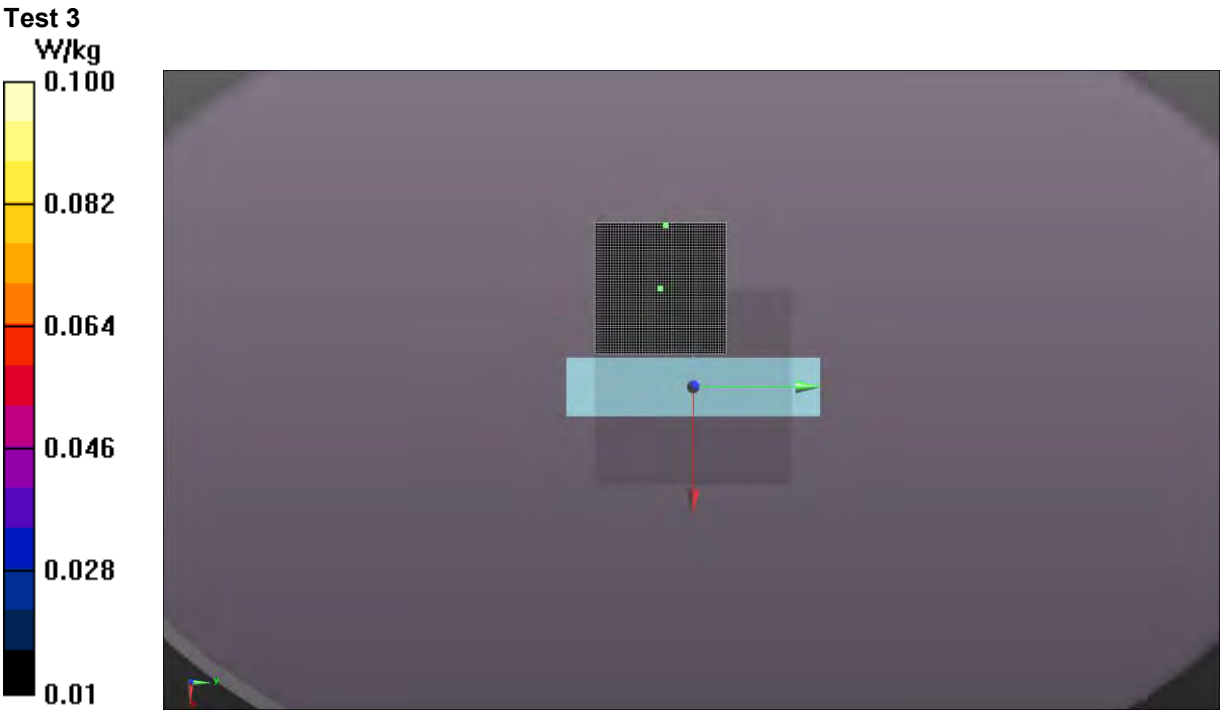
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.00839 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.00806 W/kg

Approved By

SAR TEST DATA – 2.4 GHz



SAR TEST DATA – 2.4 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	25
Date:	8/13/2015	Liquid Temperature (°C):	22.4
Serial Number:	Q401Q1	Humidity (%RH):	43
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	None		

Test 4
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.67 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 0.327 W/kg
SAR(1 g) = 0.161 W/kg; SAR(10 g) = 0.074 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.217 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.204 W/kg

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

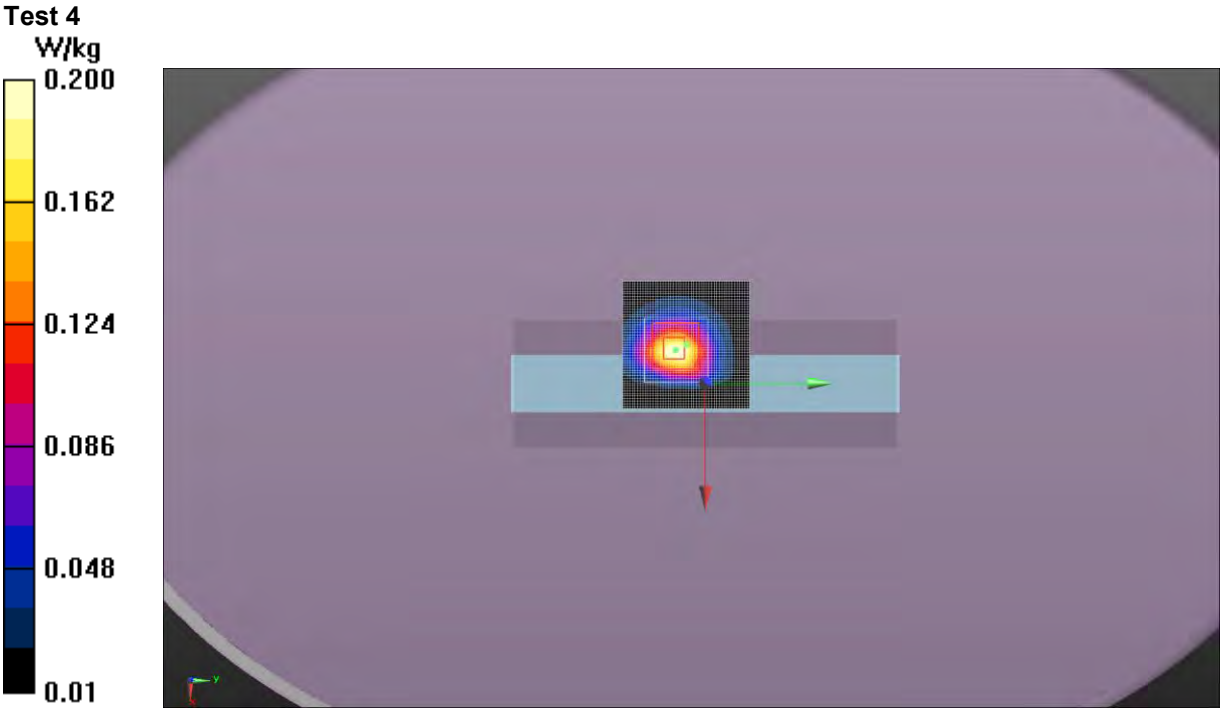
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 7.383 V/m

Body/Body/Reference scan (21x61x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.130 W/kg
Maximum value of SAR (measured) = 0.108 W/kg

Approved By

SAR TEST DATA – 2.4 GHz



SAR TEST DATA – 2.4 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.7
Date:	8/13/2015	Liquid Temperature (°C):	22.2
Serial Number:	Q401Q1	Humidity (%RH):	41
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	None		

Test 5
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (21x61x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

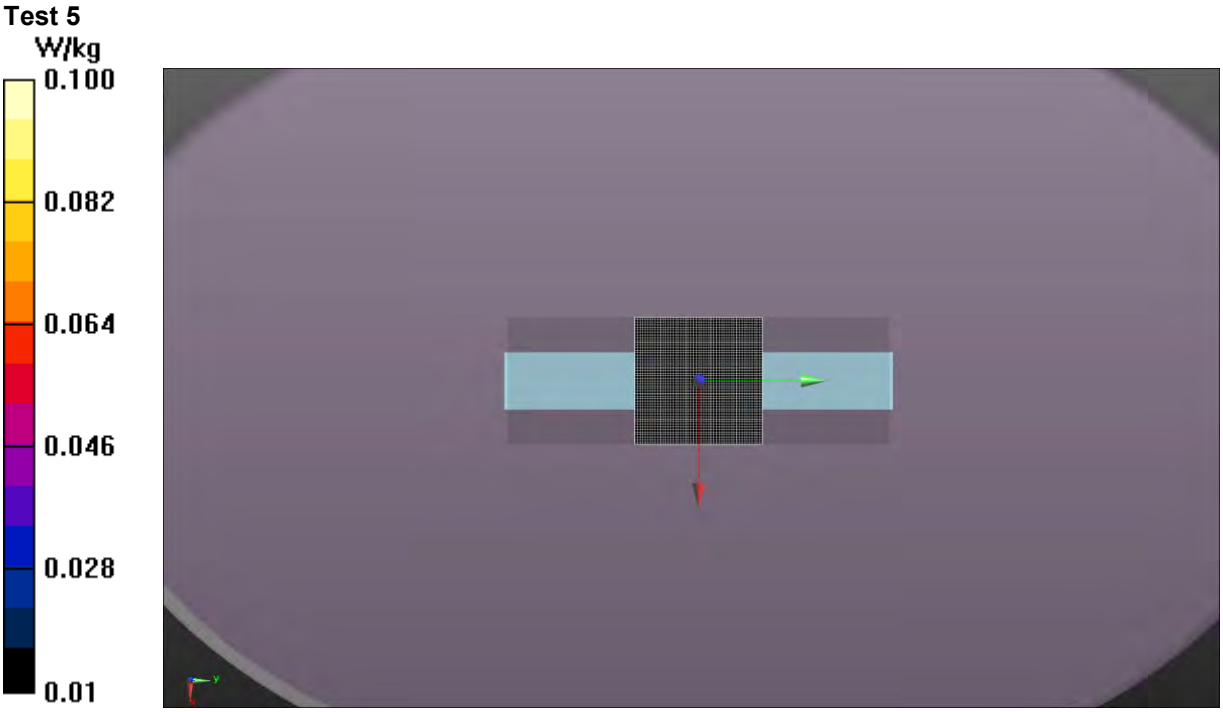
Info: Interpolated medium parameters used for SAR evaluation.

Body/Body/Area scan (6x6x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00323 W/kg

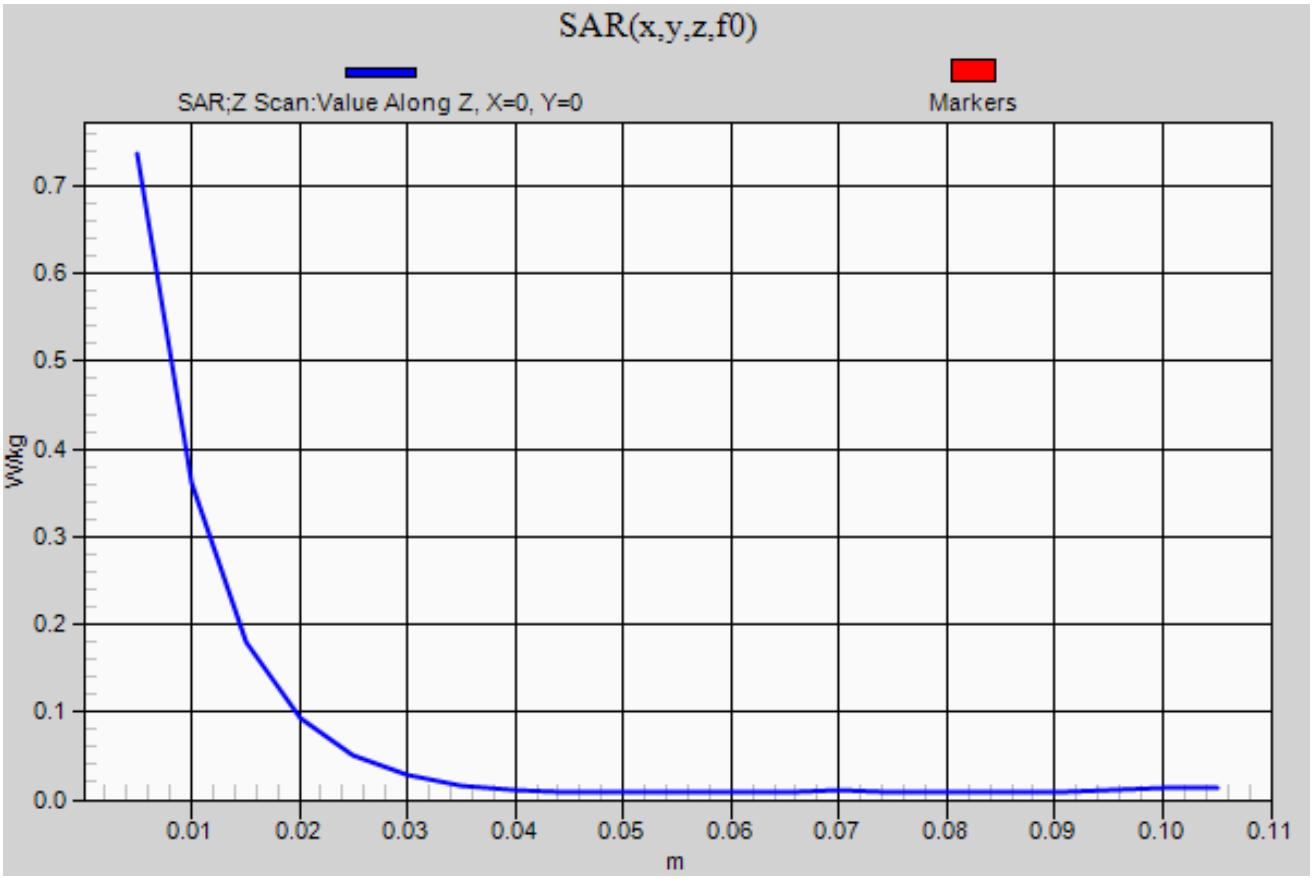
Approved By

SAR TEST DATA – 2.4 GHz



SAR TEST DATA – 2.4 GHz

Test 1 – Z Scan



SAR TEST DATA – 5.2 GHz

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	5.2	5220	44	MCS0	20	A	Back	-0.95	0.119	101
Body	5.2	5220	44	MCS0	20	A	Right	Note 1	Note 2	102
Body	5.2	5220	44	MCS0	20	A	Left	Note 1	Note 2	103
Body	5.2	5220	44	MCS0	20	A	Bottom	Note 1	Note 2	104
Body	5.2	5220	44	MCS0	20	A	Top	Note 1	Note 2	105

Note 1: Power drift measurement was not performed because the area scan results were less than 0.1 W/kg
Note 2: Zoom scans not performed because the area scan results were less than 0.1 W/kg

SAR TEST DATA – 5.2 GHz

Tested By:	Luke Richardson	Room Temperature (°C):	24.5
Date:	8/12/2015	Liquid Temperature (°C):	22.6
Serial Number:	Q401Q1	Humidity (%RH):	40.5
Configuration:	SONO0375-1	Bar. Pressure (mb):	1015.1
Comments:	None		

Test 101
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (10x9x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 6.031 V/m; Power Drift = -0.95 dB
Peak SAR (extrapolated) = 0.278 W/kg
SAR(1 g) = 0.119 W/kg; SAR(10 g) = 0.062 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.201 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.213 W/kg

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

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 3.330 V/m

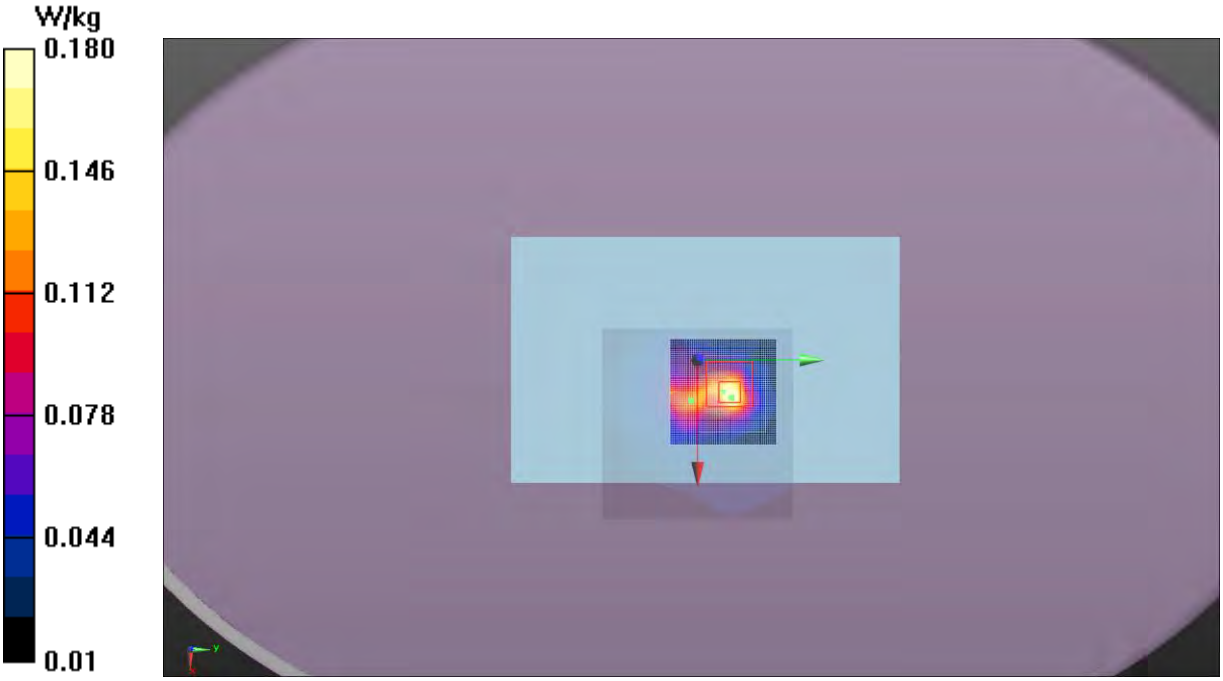
Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.189 W/kg
Maximum value of SAR (measured) = 0.0614 W/kg

Approved By

SAR TEST DATA – 5.2 GHz

Test 101



SAR TEST DATA – 5.2 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.9°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	40%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 102
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5220 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5220 MHz; σ = 5.41 S/m; ε_r = 47.011; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

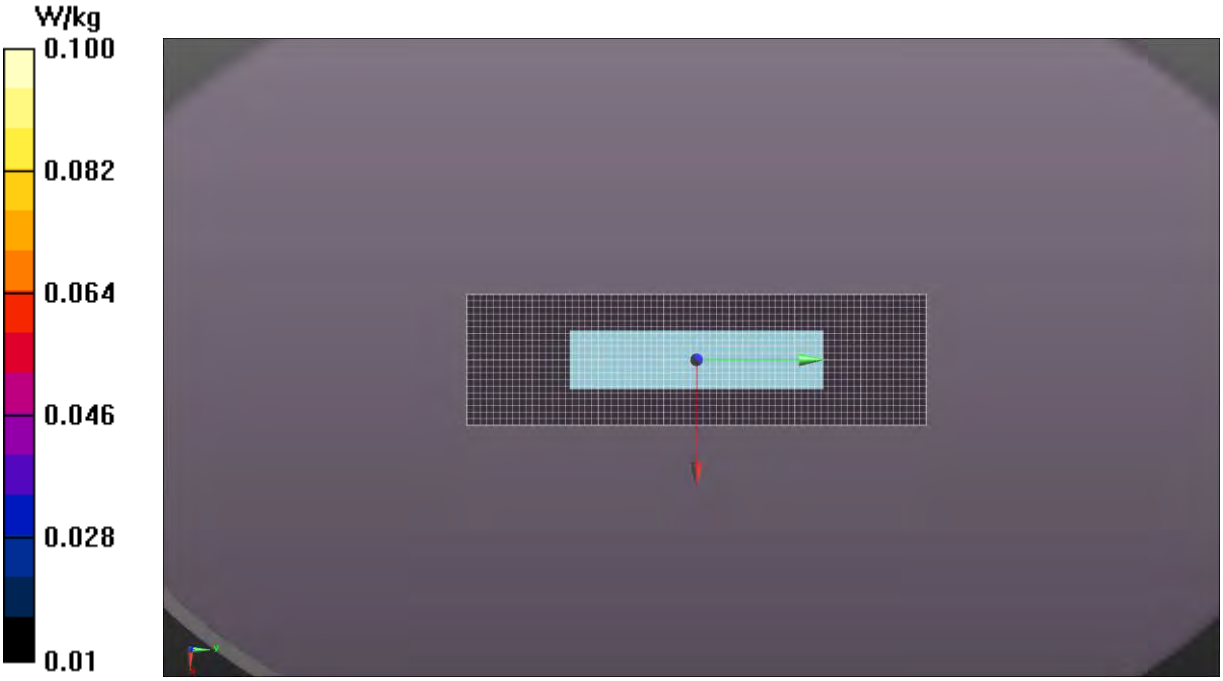
Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00867 W/kg

Approved By

SAR TEST DATA – 5.2 GHz

Test 102



SAR TEST DATA – 5.2 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.9°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	40%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 103
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5220 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5220 MHz; σ = 5.41 S/m; ε_r = 47.011; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

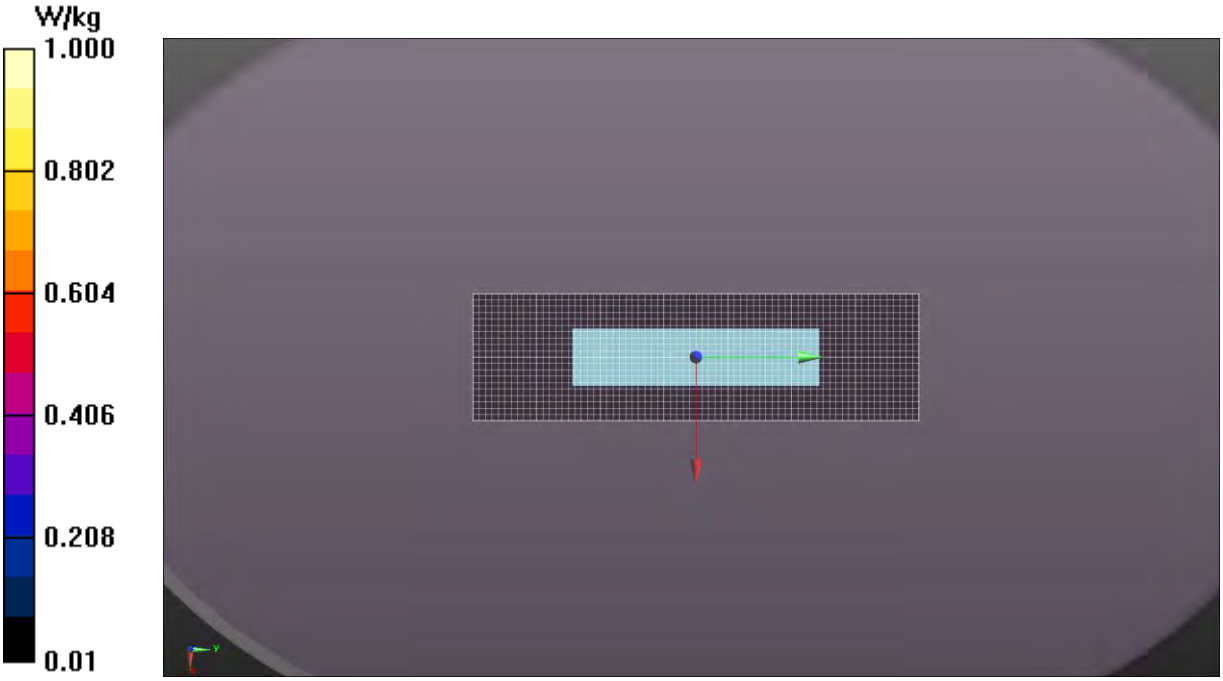
Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00546 W/kg

Approved By

SAR TEST DATA – 5.2 GHz

Test 103



SAR TEST DATA – 5.2 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.9°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	40%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 104
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5220 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5220 MHz; σ = 5.41 S/m; ε_r = 47.011; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm

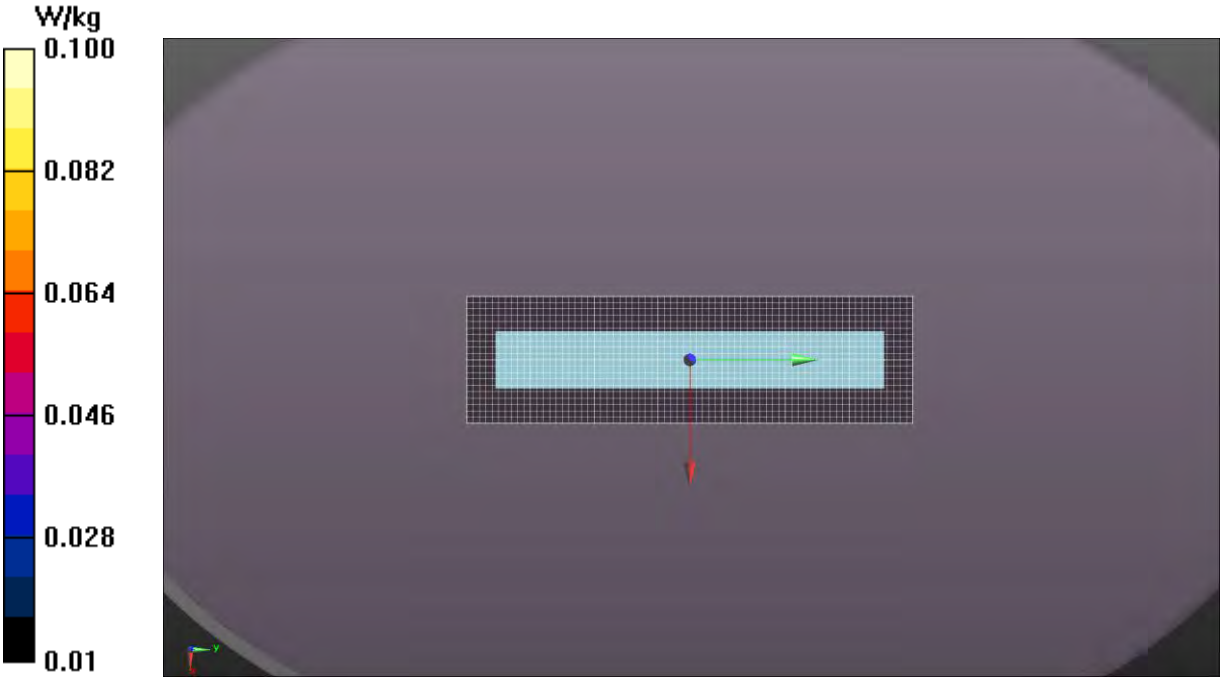
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0120 W/kg

Approved By

SAR TEST DATA – 5.2 GHz

NORTHWEST EMC
WSTD.2013.09.09

Test 104



SAR TEST DATA – 5.2 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.9°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	40%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 105
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5220 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5220 MHz; σ = 5.41 S/m; ε_r = 47.011; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm

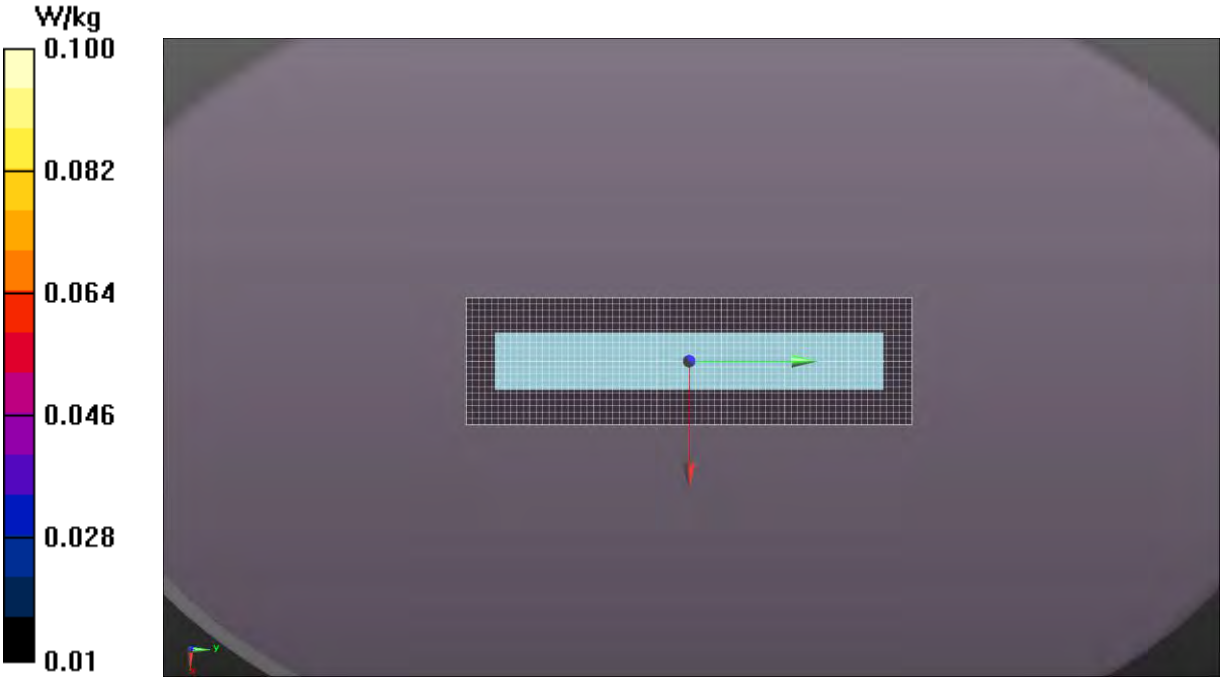
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00742 W/kg

Approved By

SAR TEST DATA – 5.2 GHz

NORTHWEST EMC
WSTD.2013.09.09

Test 105



SAR TEST DATA – 5.3 GHz

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	5.3	5280	56	MCS7	20	A	Back	-0.31	0.061	106
Body	5.3	5280	56	MCS7	20	A	Right	Note 1	Note 2	107
Body	5.3	5280	56	MCS7	20	A	Left	Note 1	Note 2	108
Body	5.3	5280	56	MCS7	20	A	Bottom	Note 1	Note 2	109
Body	5.3	5280	56	MCS7	20	A	Top	Note 1	Note 2	110
Body	5.3	5320	64	6 Mbit	20	A	Back	1.13	0.137	121

Note 1: Power drift measurement was not performed because the area scan results were less than 0.1 W/kg
Note 2: Zoom scans not performed because the area scan results were less than 0.1 W/kg

SAR TEST DATA – 5.3 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.6°C
Date:	8/12/2015	Liquid Temperature (°C):	21.3°C
Serial Number:	Q401Q1	Humidity (%RH):	49.9%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1015.2 mb
Comments:	Body		

Test 106
DUT: iViz; Type: Ultrasound; Serial: Unknown
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz); Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (12x11x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.179 V/m; Power Drift = -0.31 dB
Peak SAR (extrapolated) = 0.143 W/kg
SAR(1 g) = 0.061 W/kg; SAR(10 g) = 0.052 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0792 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0689 W/kg

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

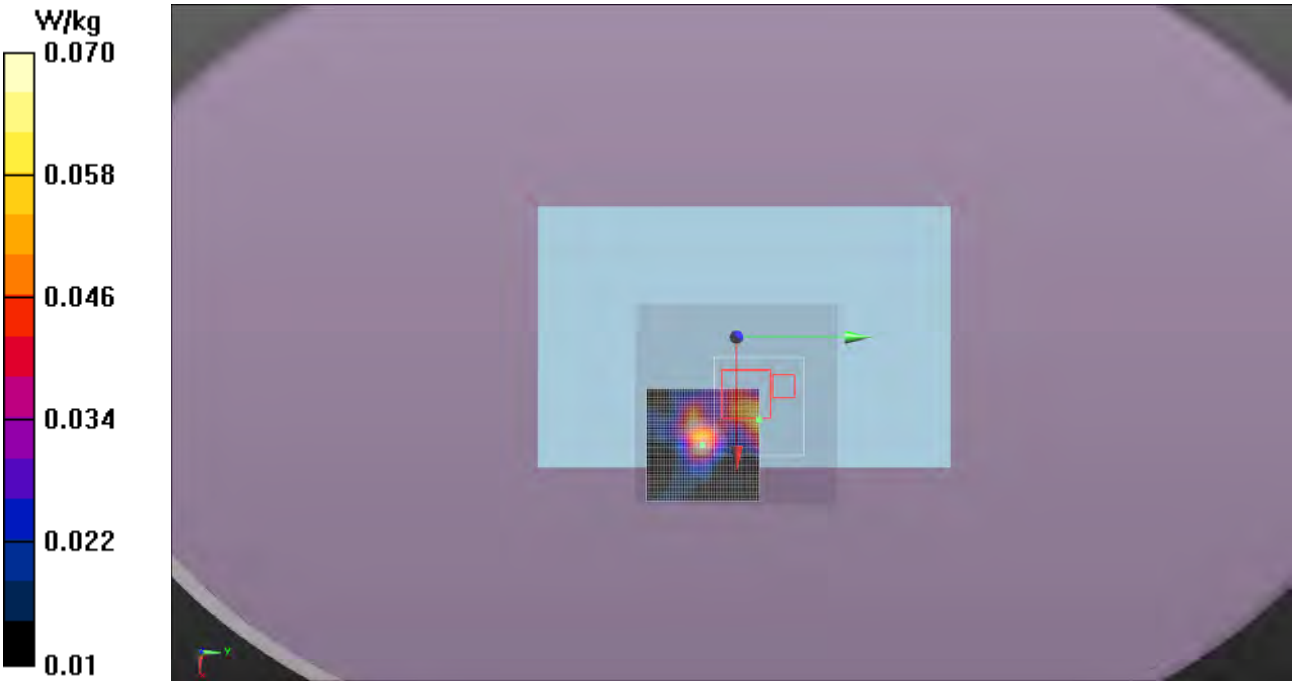
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 4.371 V/m

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0664 W/kg
Maximum value of SAR (measured) = 0.106 W/kg

SAR TEST DATA – 5.3 GHz

Test 106



SAR TEST DATA – 5.3 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.8°C
Date:	8/12/2015 6:38:45 PM	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	47%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1015.2 mb
Comments:	Body		

Test 107
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0162 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0411 W/kg

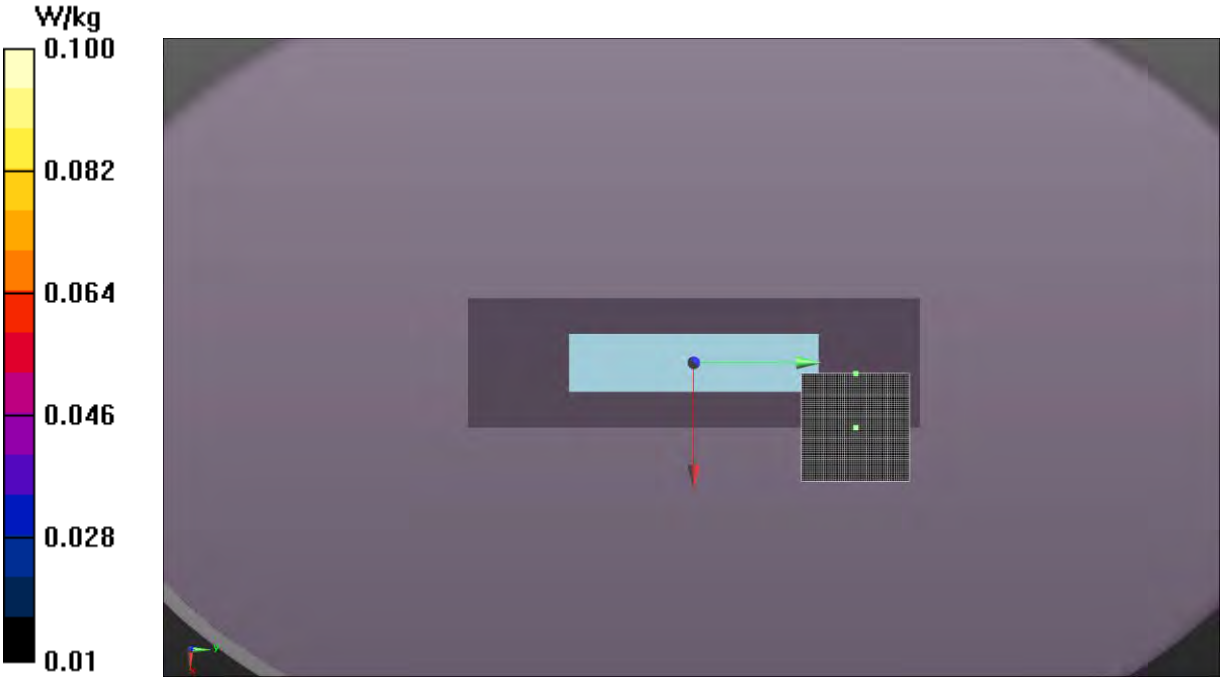
Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0208 W/kg

Approved By

SAR TEST DATA – 5.3 GHz

Test 107



SAR TEST DATA – 5.3 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	22.8°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	47%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 108
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0371 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0421 W/kg

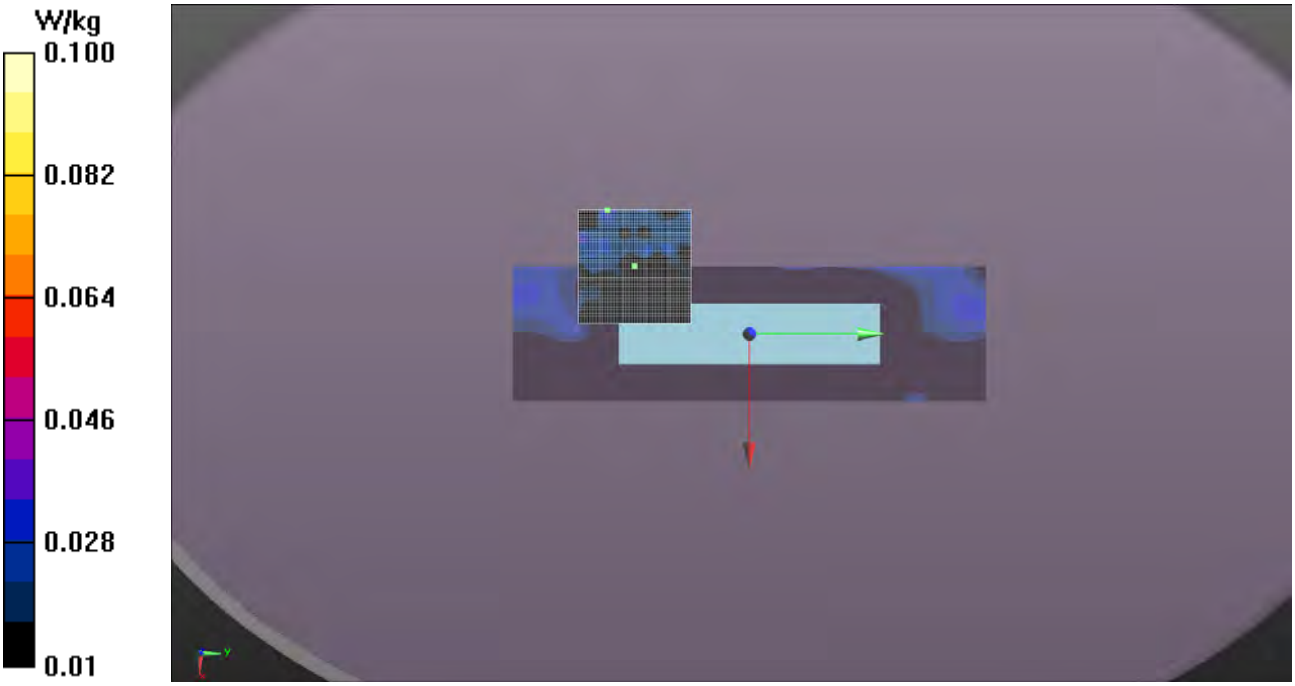
Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0245 W/kg

SAR TEST DATA – 5.3 GHz

NORTHWEST EMC
WSTD.2013.09.09

Test 108



SAR TEST DATA – 5.3 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.8°C
Date:	8/12/2015 6:56:14 PM	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	47%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 109
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0134 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

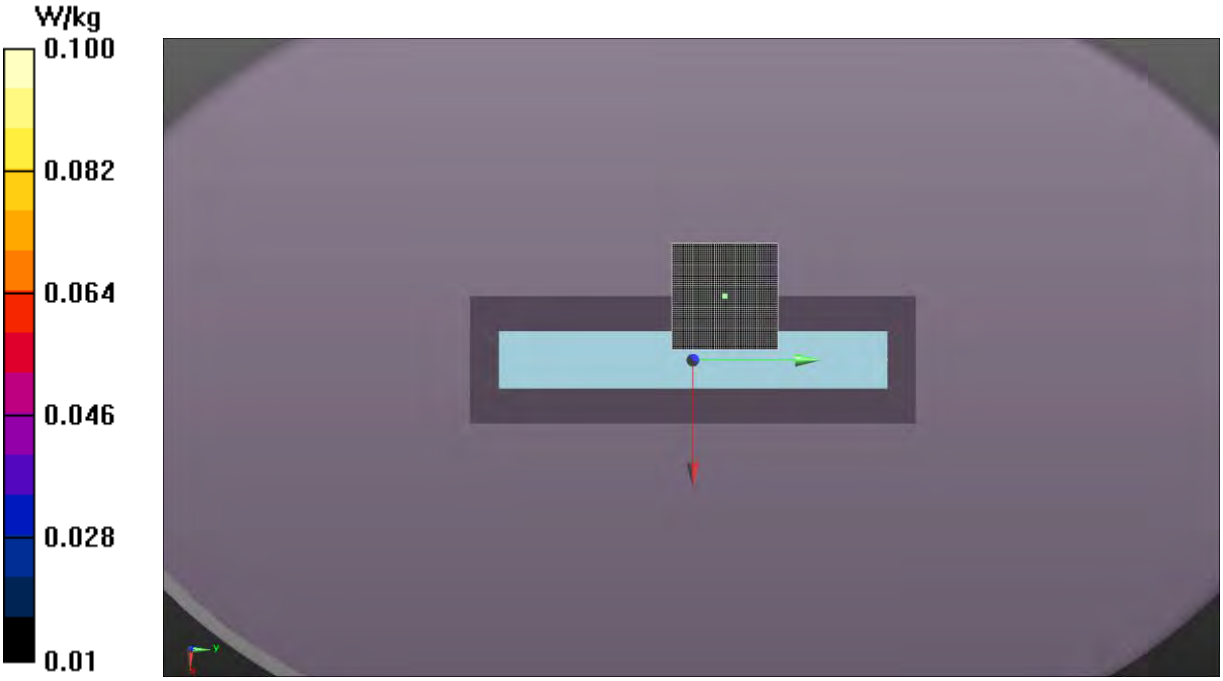
Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00971 W/kg

Approved By

SAR TEST DATA – 5.3 GHz

Test 109



SAR TEST DATA – 5.3 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	22.8°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	47%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 110
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5280 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5280 MHz; σ = 5.538 S/m; ε_r = 46.818; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0 W/kg

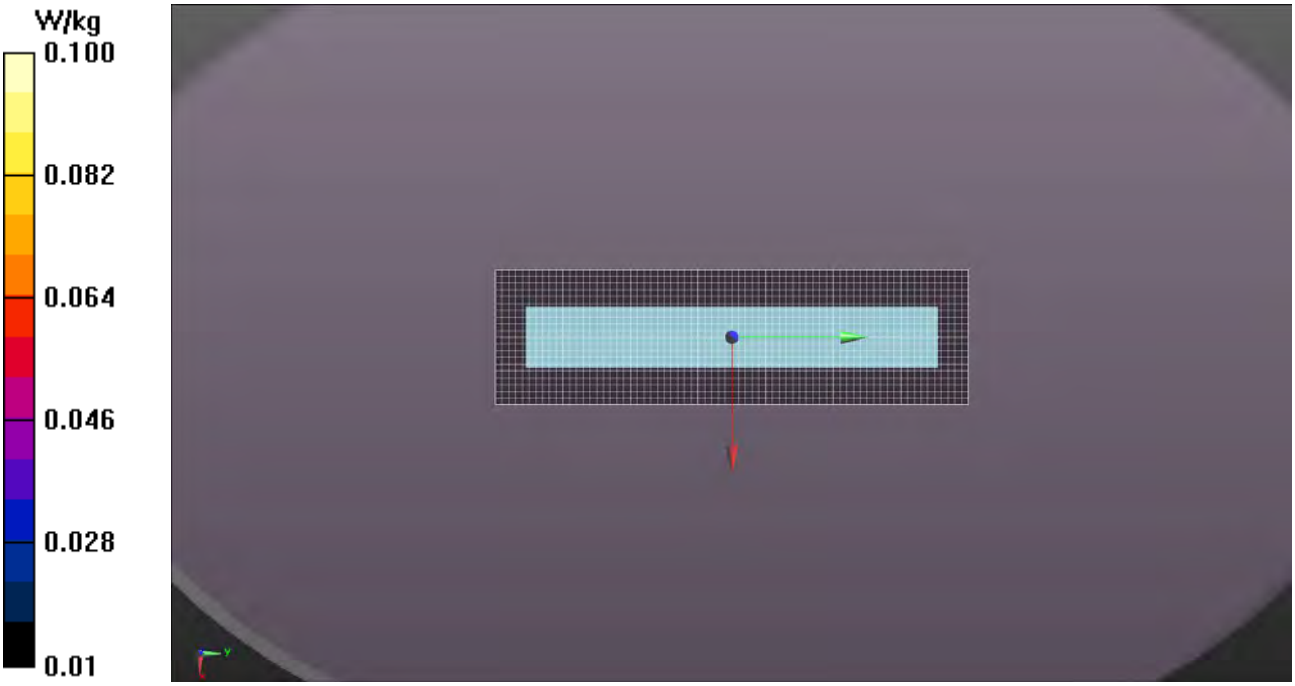
Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00722 W/kg

SAR TEST DATA – 5.3 GHz

NORTHWEST EMC
WSTD.2013.09.09

Test 110



SAR TEST DATA – 5.3 GHz

Tested By:	Luke Richardson	Room Temperature (°C):	23.7°C
Date:	8/14/2015 2:33:14 PM	Liquid Temperature (°C):	21.3°C
Serial Number:	Q401Q1	Humidity (%RH):	42.4%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1019 mb
Comments:	Body		

Test 121
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5320 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 5320 MHz; σ = 5.65 S/m; ε_r = 46.992; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.348 V/m; Power Drift = 1.13 dB
Peak SAR (extrapolated) = 0.369 W/kg
SAR(1 g) = 0.137 W/kg; SAR(10 g) = 0.063 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.252 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.196 W/kg

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

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 3.065 V/m

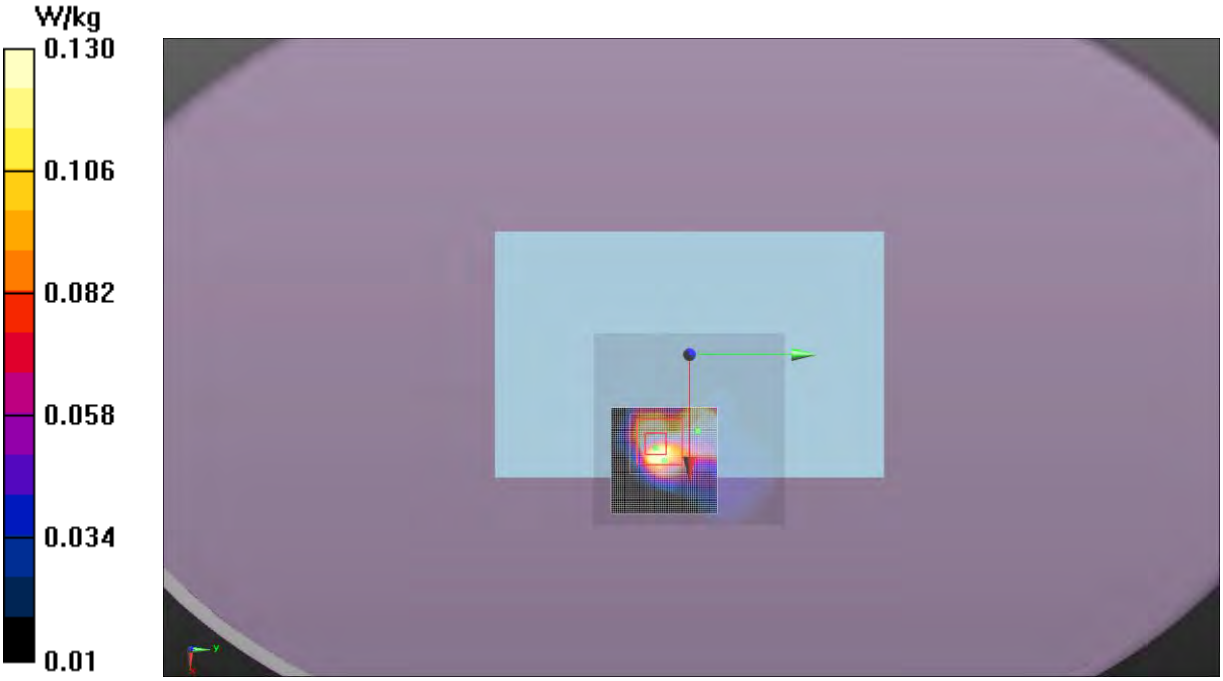
Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.288 W/kg
Maximum value of SAR (measured) = 0.0531 W/kg

Approved By

SAR TEST DATA – 5.3 GHz

Test 121



SAR TEST DATA – 5.6 GHz

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	5.6	5500	100	6 Mbit	20	A	Back	-0.38	0.297	111a
Body	5.6	5500	100	6 Mbit	20	A	Right	Note 1	Note 2	112
Body	5.6	5500	100	6 Mbit	20	A	Left	Note 1	Note 2	113
Body	5.6	5500	100	6 Mbit	20	A	Bottom	Note 1	Note 2	114
Body	5.6	5500	100	6 Mbit	20	A	Top	Note 1	Note 2	115

Note 1: Power drift measurement was not performed because the area scan results were less than 0.1 W/kg
Note 2: Zoom scans not performed because the area scan results were less than 0.1 W/kg

SAR TEST DATA – 5.6 GHz

Tested By:	Luke Richardson	Room Temperature (°C):	23.4°C
Date:	8/12/2015 3:13:43 PM	Liquid Temperature (°C):	21.3°C
Serial Number:	Q401Q1	Humidity (%RH):	50.2%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1014.4 mb
Comments:	Body		

Test 111a
DUT: iViz; Type: Ultrasound; Serial: Unknown
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (8x8x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.913 V/m; Power Drift = -0.38 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.297 W/kg; SAR(10 g) = 0.111 W/kg
Maximum value of SAR (measured) = 0.565 W/kg

Body/Body/Reference scan (41x41x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.164 W/kg

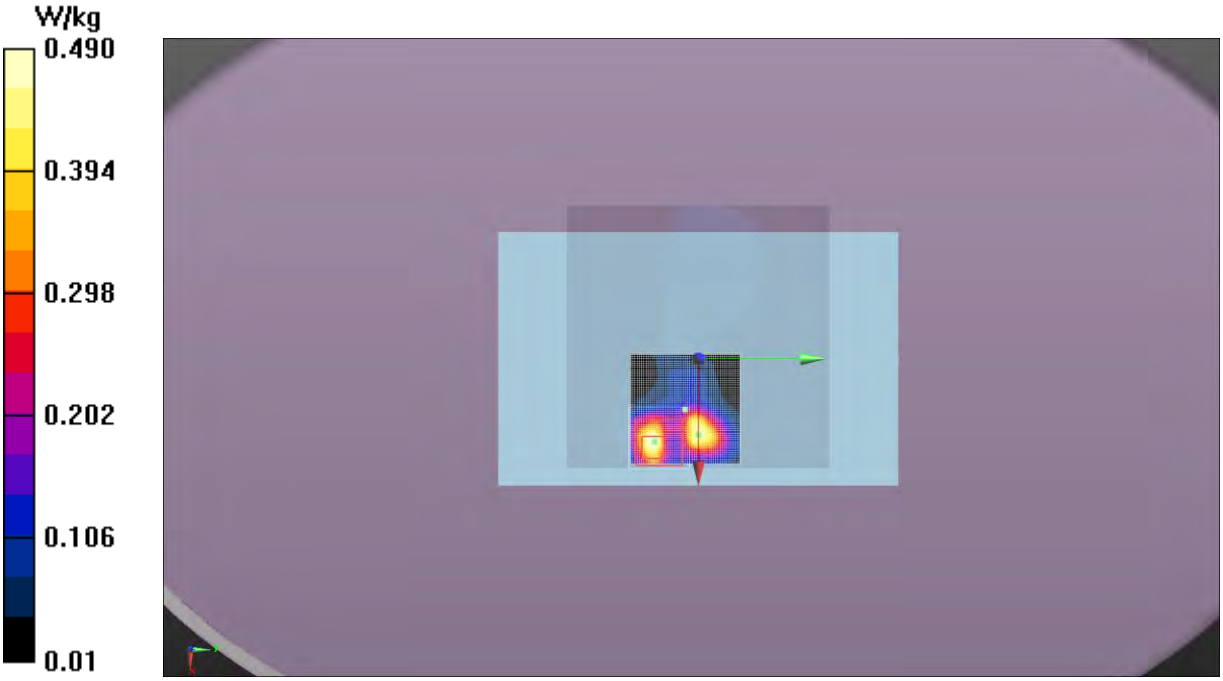
Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 2.882 V/m

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.540 W/kg
Maximum value of SAR (measured) = 0.0481 W/kg

Approved By

SAR TEST DATA – 5.6 GHz

Test 111a



SAR TEST DATA – 5.6 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.8°C
Date:	8/12/2015	Liquid Temperature (°C):	21.3°C
Serial Number:	Q401Q1	Humidity (%RH):	40.4%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013.9 mb
Comments:	Body		

Test 112
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

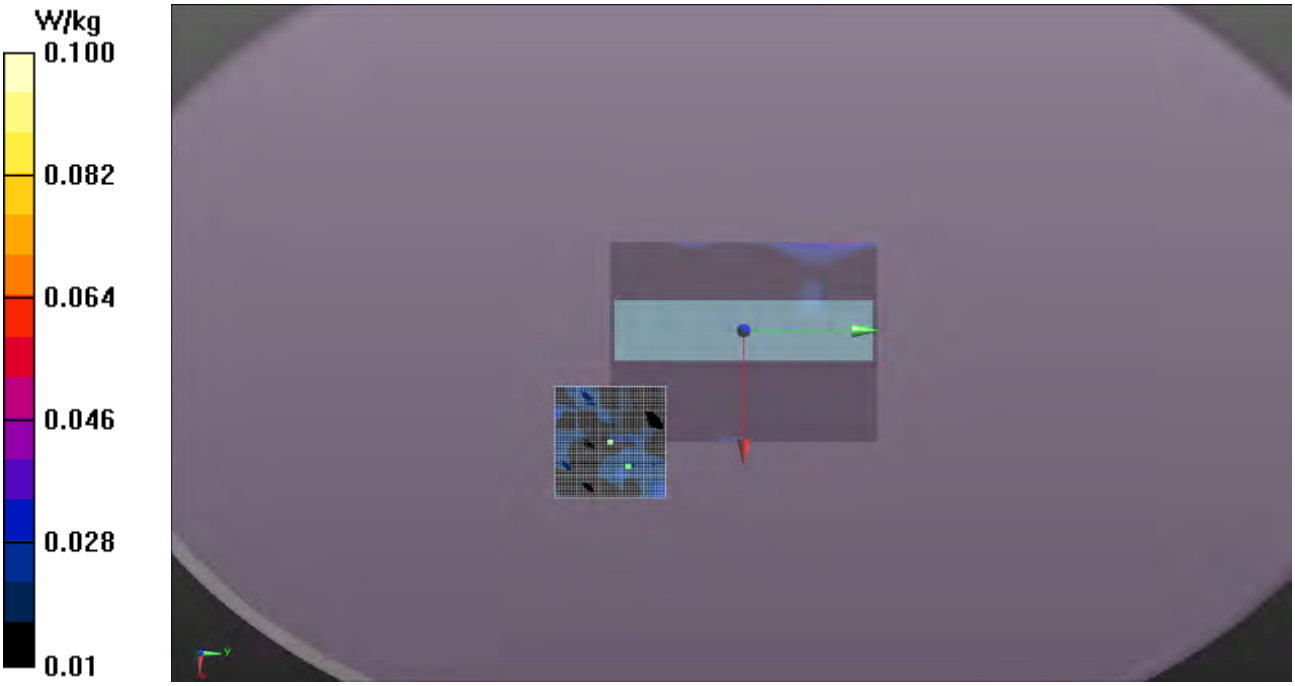
Body/Body/Reference scan (31x41x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0471 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0433 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0305 W/kg

SAR TEST DATA – 5.6 GHz

Test 112



SAR TEST DATA – 5.6 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.8°C
Date:	8/12/2015 3:56:13 PM	Liquid Temperature (°C):	21.3°C
Serial Number:	Q401Q1	Humidity (%RH):	40.5%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013.9 mb
Comments:	Body		

Test 113
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (41x41x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0479 W/kg

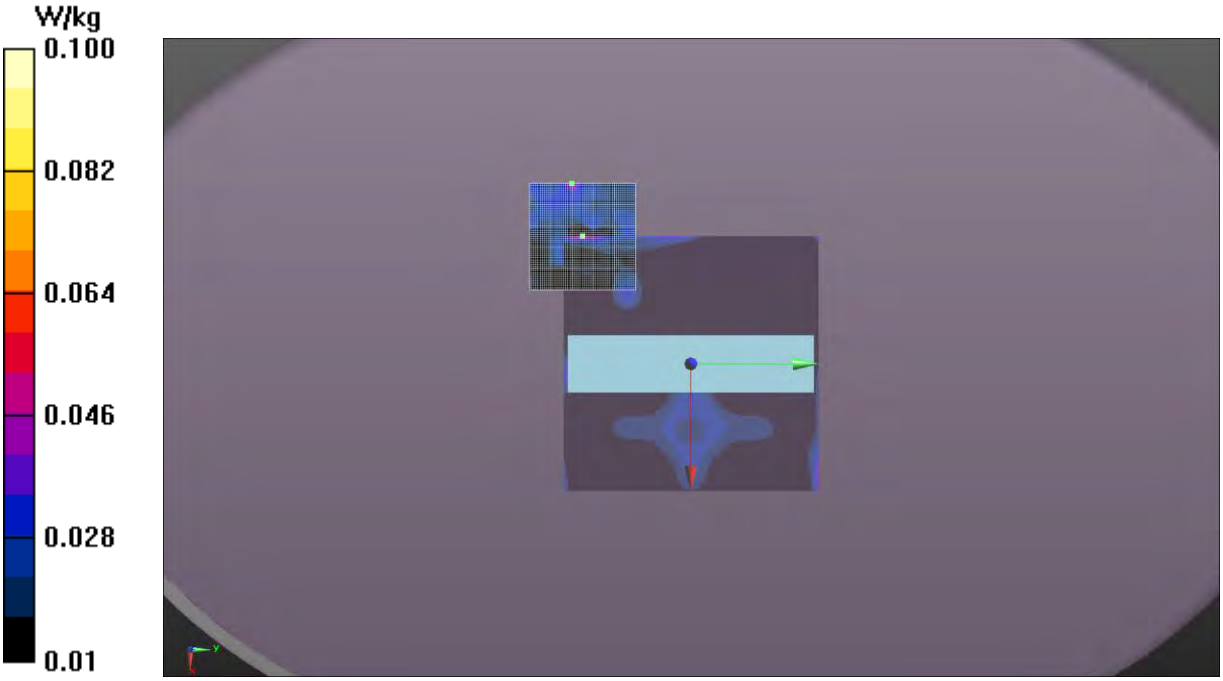
Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0401 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0401 W/kg

Approved By

SAR TEST DATA – 5.6 GHz

Test 113



SAR TEST DATA – 5.6 GHz

Tested By:	Carl Engholm	Room Temperature (°C):	24°C
Date:	8/12/2015	Liquid Temperature (°C):	21.5°C
Serial Number:	Q401Q1	Humidity (%RH):	41%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 114
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0437 W/kg

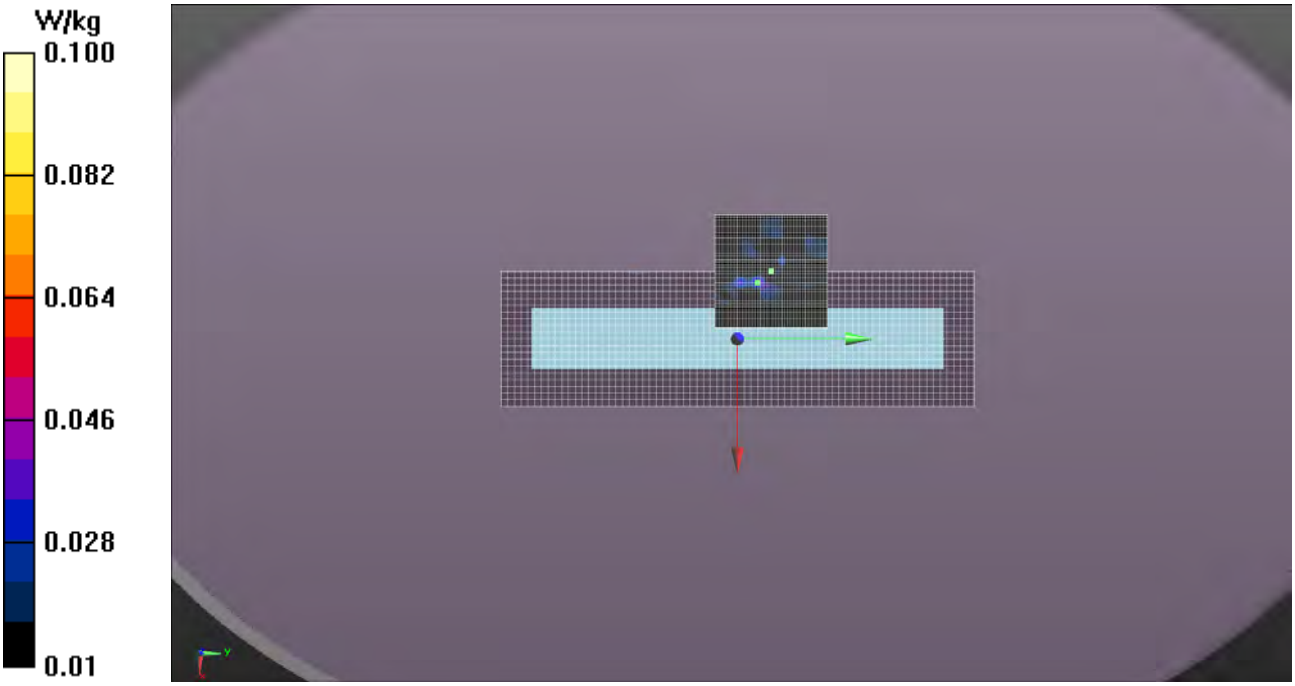
Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0438 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0427 W/kg

SAR TEST DATA – 5.6 GHz

NORTHWEST EMC
WSTD.2013.09.09

Test 114



SAR TEST DATA – 5.6 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	22.8°C
Date:	8/12/2015	Liquid Temperature (°C):	21°C
Serial Number:	Q401Q1	Humidity (%RH):	41%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 115
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: ITD5500 (5000.0 - 5900.0 MHz);
Frequency: 5500 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5500 MHz; σ = 5.788 S/m; ε_r = 46.788; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

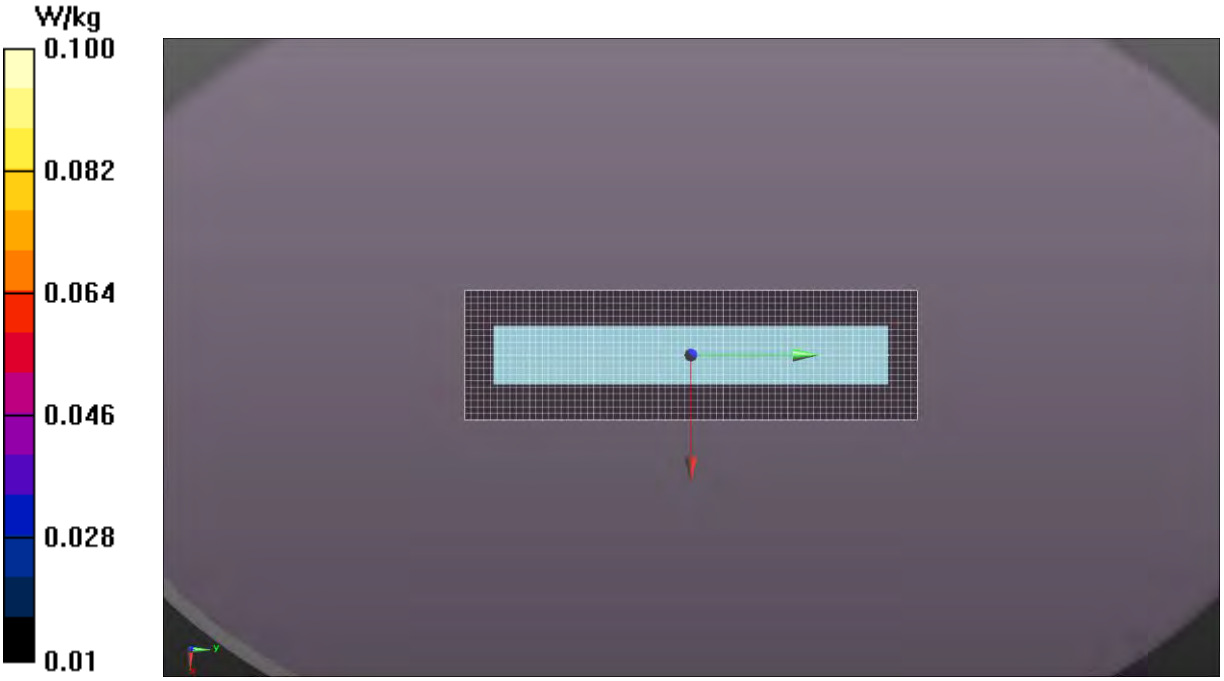
Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm
Maximum value of SAR (measured) = 0.0133 W/kg

Approved By

SAR TEST DATA – 5.6 GHz

Test 115



SAR TEST DATA – 5.8 GHz

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	5.8	5825	165	MCS0	20	A	Back	-0.40	0.070	116
Body	5.8	5825	165	MCS0	20	A	Right	Note 1	Note 2	117
Body	5.8	5825	165	MCS0	20	A	Left	Note 1	Note 2	118
Body	5.8	5825	165	MCS0	20	A	Bottom	Note 1	Note 2	119
Body	5.8	5825	165	MCS0	20	A	Top	Note 1	Note 2	120

Note 1: Power drift measurement was not performed because the area scan results were less than 0.1 W/kg
Note 2: Zoom scans not performed because the area scan results were less than 0.1 W/kg

SAR TEST DATA – 5.8 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.3°C
Date:	8/12/2015 7:59:50 PM	Liquid Temperature (°C):	20.7°C
Serial Number:	Q401Q1	Humidity (%RH):	48%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 116
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5825 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5825 MHz; σ = 6.106 S/m; ε_r = 46.428; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (9x9x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.379 V/m; Power Drift = -0.40 dB
Peak SAR (extrapolated) = 0.449 W/kg
SAR(1 g) = 0.070 W/kg; SAR(10 g) = 0.014 W/kg
Maximum value of SAR (measured) = 0.173 W/kg

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0356 W/kg

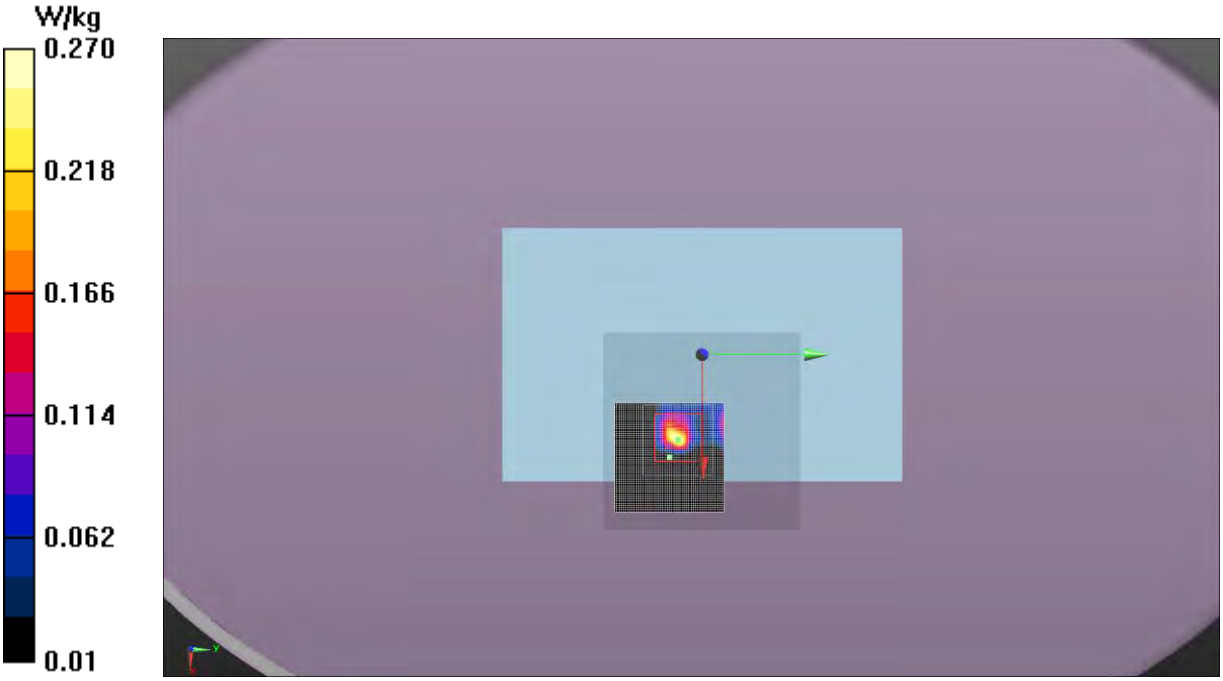
Body/Body/Z Scan (1x1x21): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Maximum value of Total (measured) = 2.024 V/m

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.273 W/kg
Maximum value of SAR (measured) = 0.0250 W/kg

Approved By

SAR TEST DATA – 5.8 GHz

Test 116



SAR TEST DATA – 5.8 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.3°C
Date:	8/12/2015	Liquid Temperature (°C):	20.7°C
Serial Number:	Q401Q1	Humidity (%RH):	48%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 117
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5825 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5825 MHz; σ = 6.106 S/m; ε_r = 46.428; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

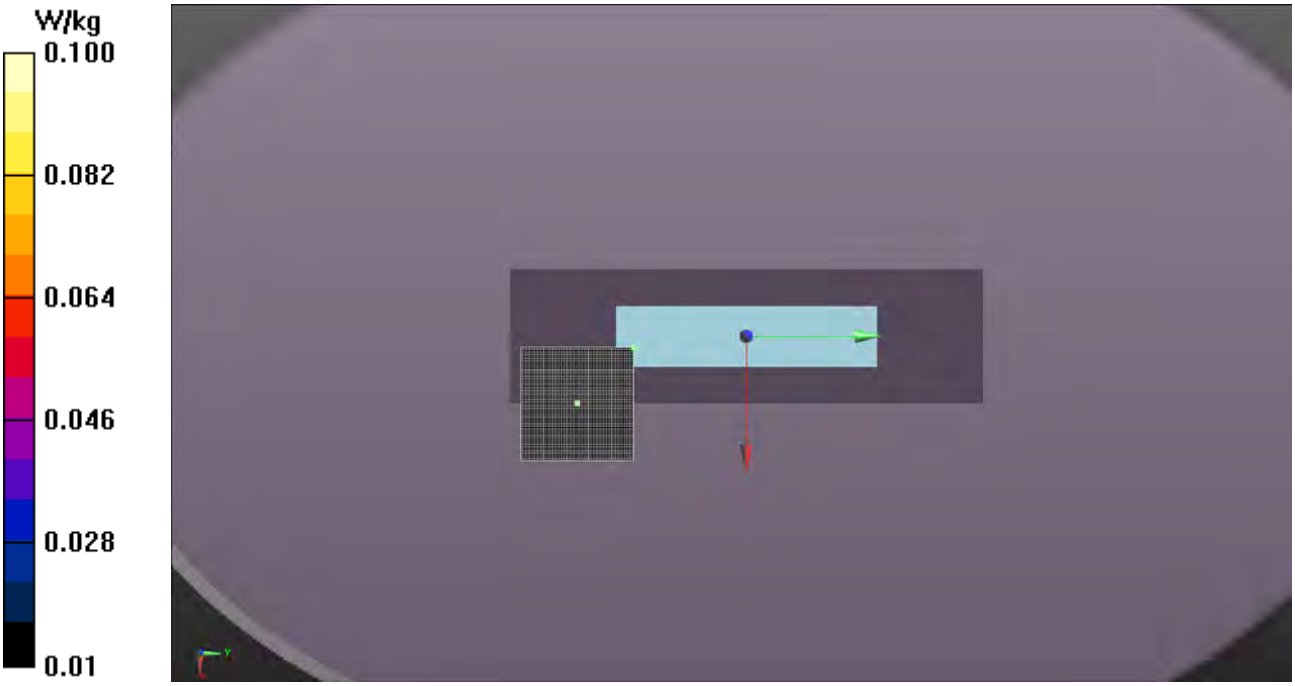
Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.00717 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.00133 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0118 W/kg

SAR TEST DATA – 5.8 GHz

Test 117



SAR TEST DATA – 5.8 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.3°C
Date:	8/12/2015	Liquid Temperature (°C):	20.7°C
Serial Number:	Q401Q1	Humidity (%RH):	48%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 118
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5825 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5825 MHz; σ = 6.106 S/m; ε_r = 46.428; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

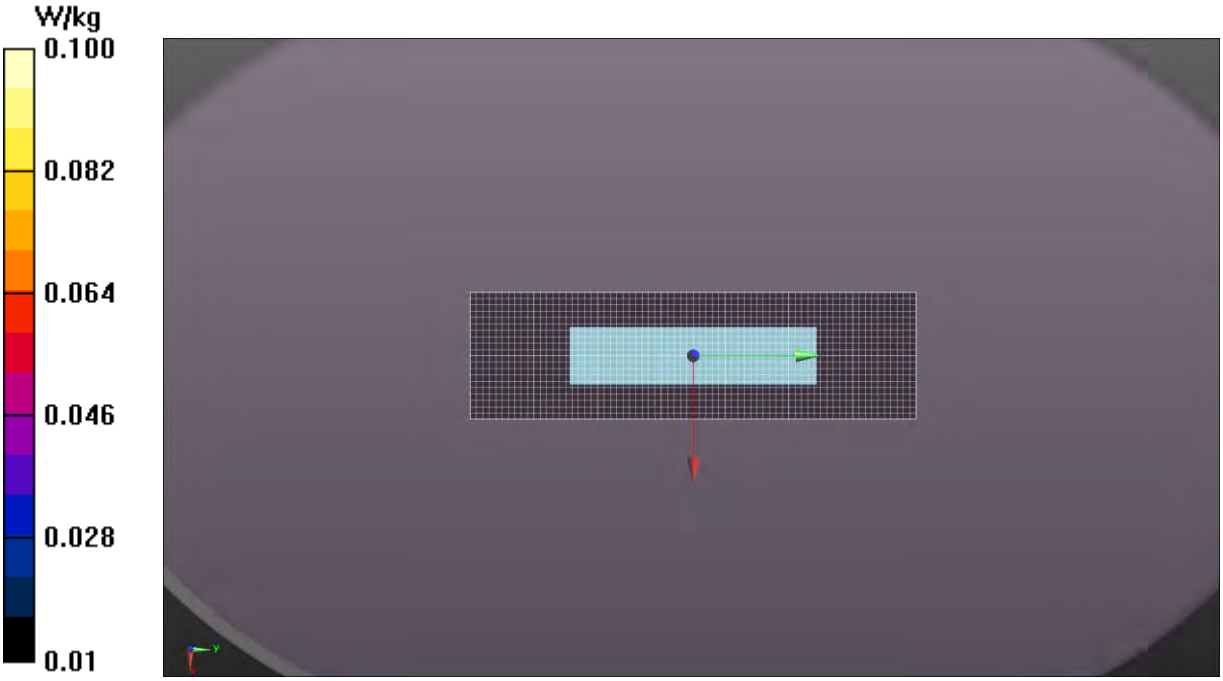
Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm
Maximum value of SAR (measured) = 0.0127 W/kg

Approved By

SAR TEST DATA – 5.8 GHz

Test 118



SAR TEST DATA – 5.8 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.3°C
Date:	8/12/2015 7:24:35 PM	Liquid Temperature (°C):	20.7°C
Serial Number:	Q401Q1	Humidity (%RH):	48%
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013 mb
Comments:	Body		

Test 119
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5825 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5825 MHz; σ = 6.106 S/m; ε_r = 46.428; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0.0170 W/kg

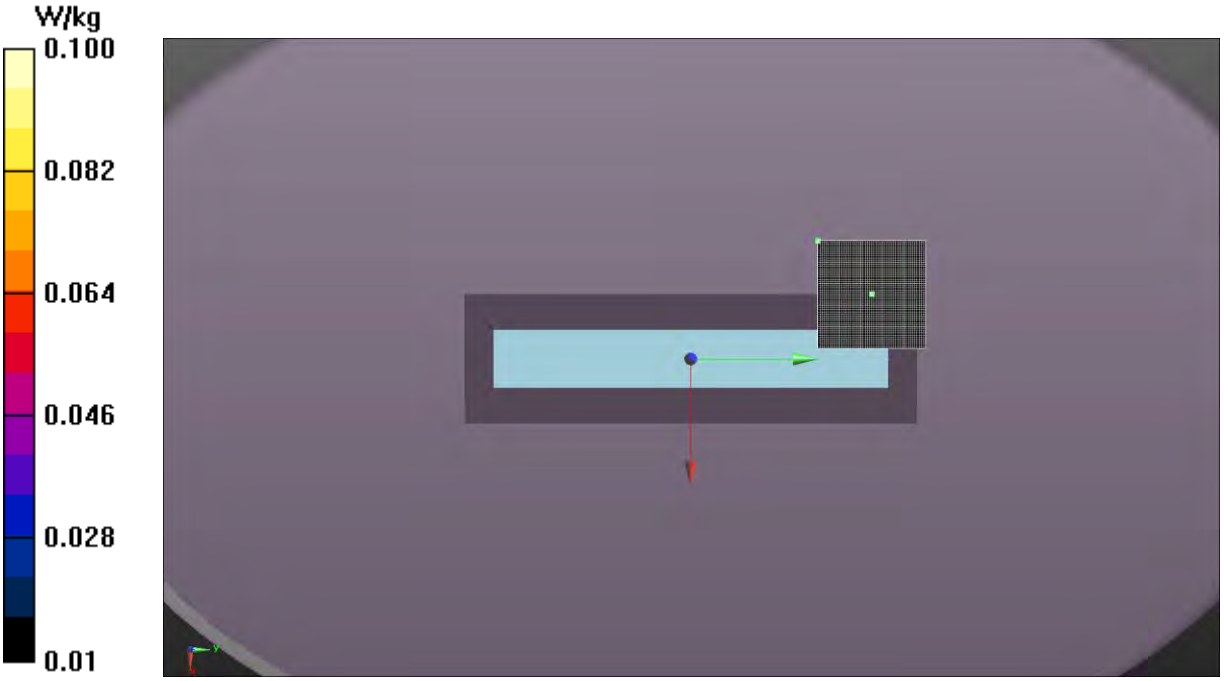
Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0113 W/kg

Body/Body/Area scan (6x6x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0138 W/kg

Approved By

SAR TEST DATA – 5.8 GHz

Test 119



SAR TEST DATA – 5.8 GHz

NORTHWEST EMC
WSTD.2013.09.09

Tested By:	Carl Engholm	Room Temperature (°C):	23.3
Date:	8/12/2015 7:31:46 PM	Liquid Temperature (°C):	20.7
Serial Number:	Q401Q1	Humidity (%RH):	48
Configuration:	SONO0375-1	Bar. Pressure (mb):	1013
Comments:	Body		

Test 120
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz);
Frequency: 5825 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 5825 MHz; σ = 6.106 S/m; ε_r = 46.428; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

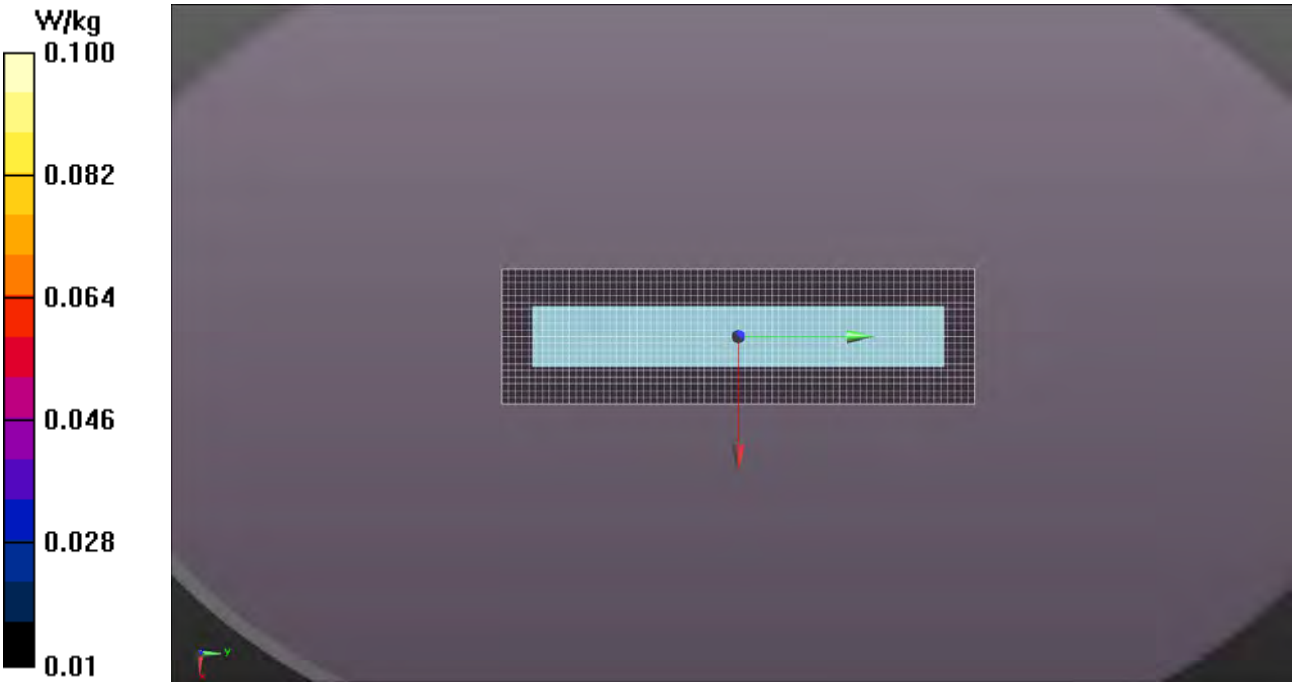
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Reference scan (21x71x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm
Maximum value of SAR (interpolated) = 0 W/kg

Body/Body/Reference scan (3x8x1): Measurement grid: dx=30mm, dy=30mm
Maximum value of SAR (measured) = 0.00770 W/kg

SAR TEST DATA – 5.8 GHz

Test 120



SAR TEST DATA - REPEATABILITY

EUT:	iViz	Work Order:	SONO0375
Customer:	FUJIFILM Sonosite Manufacturing, LLC	Job Site:	EV08
Attendees:	None	Customer Project:	None

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2015 FCC 2.1093:2015	FCC KDB 865664 D01 v01r03 FCC KDB 865664 D02 v01r01 FCC KDB 248227 D01 V02r01 FCC KDB 447498 D01 v05r02 FCC KDB 616217 D04 v01r01 IEEE Std 1528:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

RESULTS

Test Configuration	Frequency Band	Transmit Frequency (MHz)	Transmit Channel	Data Rate (Mbps)	Channel Bandwidth (MHz)	Antenna Port	Side	Power Drift During Test (dB)	Measured 1g SAR Level (W/kg)	Test #
Body	2.4	2462	11	11 Mbit	20	A	Back	-0.25	1.16	1a

SAR TEST DATA - REPEATABILITY

Tested By:	Carl Engholm	Room Temperature (°C):	24.7
Date:	8/13/2015	Liquid Temperature (°C):	22.4
Serial Number:	Q401Q1	Humidity (%RH):	47
Configuration:	SONO0375-1	Bar. Pressure (mb):	1012
Comments:	Repeatability		

Test 1a
DUT: iViz; Type: Ultrasound; Serial: Q401Q1
Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2462 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.973 S/m; ε_r = 52.536; ρ = 1000 kg/m^3 , Medium parameters used: σ = 0 S/m, ε_r = 1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY Configuration:

- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Body/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.99 V/m; Power Drift = -0.25 dB
Peak SAR (extrapolated) = 2.93 W/kg
SAR(1 g) = 1.16 W/kg; SAR(10 g) = 0.481 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.52 W/kg

Body/Body/Area scan (51x51x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 1.57 W/kg

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

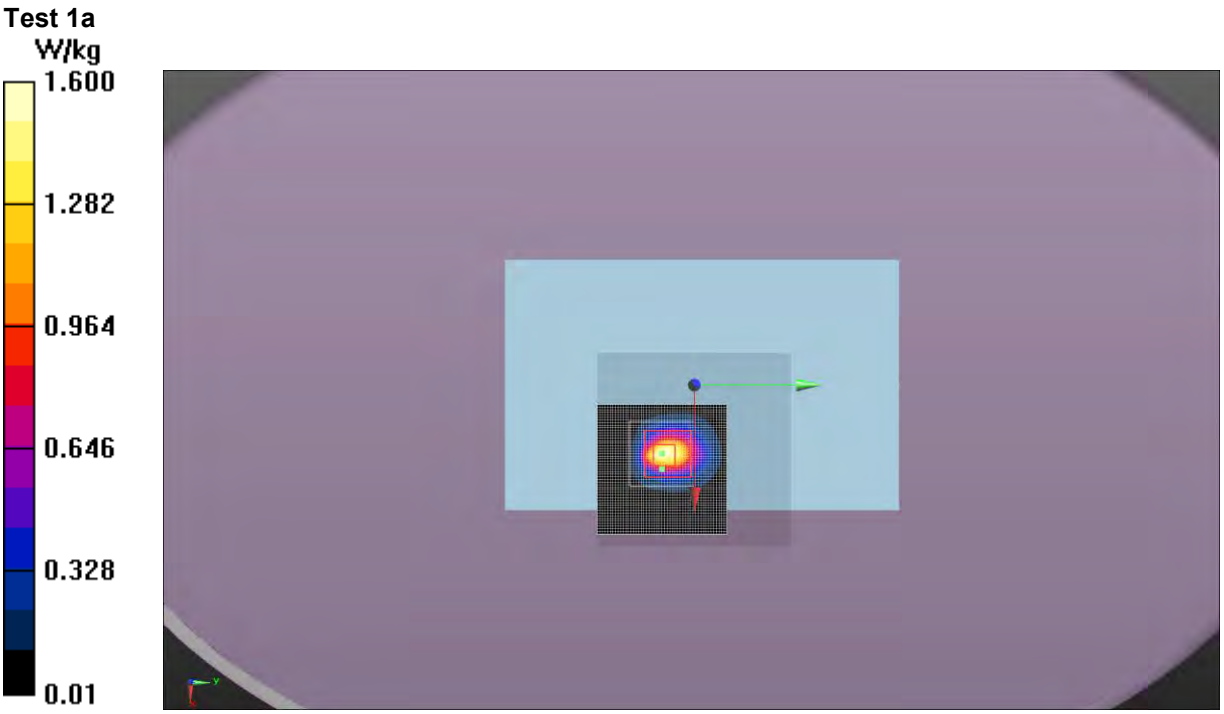
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of Total (measured) = 18.81 V/m

Body/Body/Reference scan (31x31x1): Interpolated grid: dx=3.000 mm, dy=3.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.314 W/kg
Maximum value of SAR (measured) = 0.698 W/kg

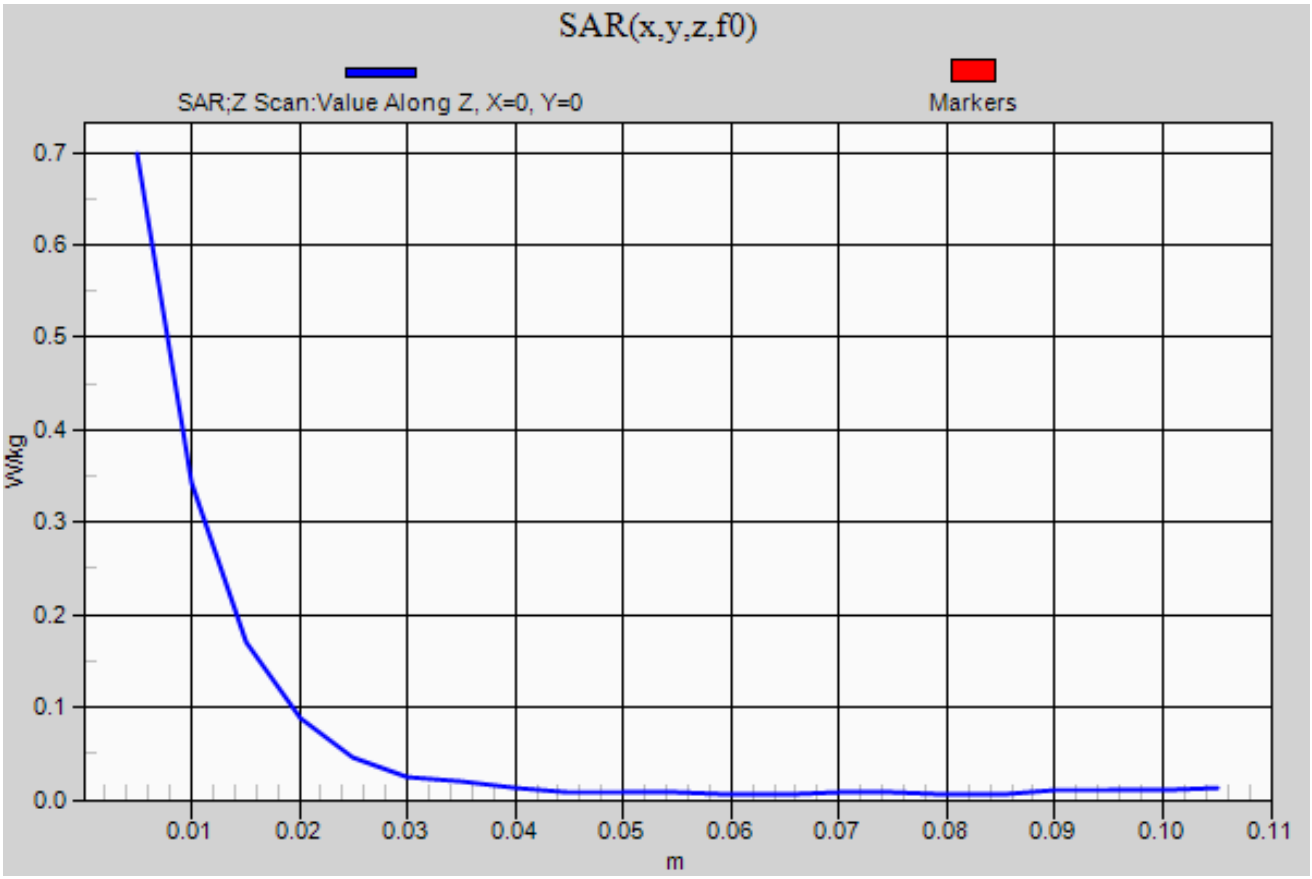
Approved By

SAR TEST DATA - REPEATABILITY



SAR TEST DATA - REPEATABILITY

Test 1a – Z Scan

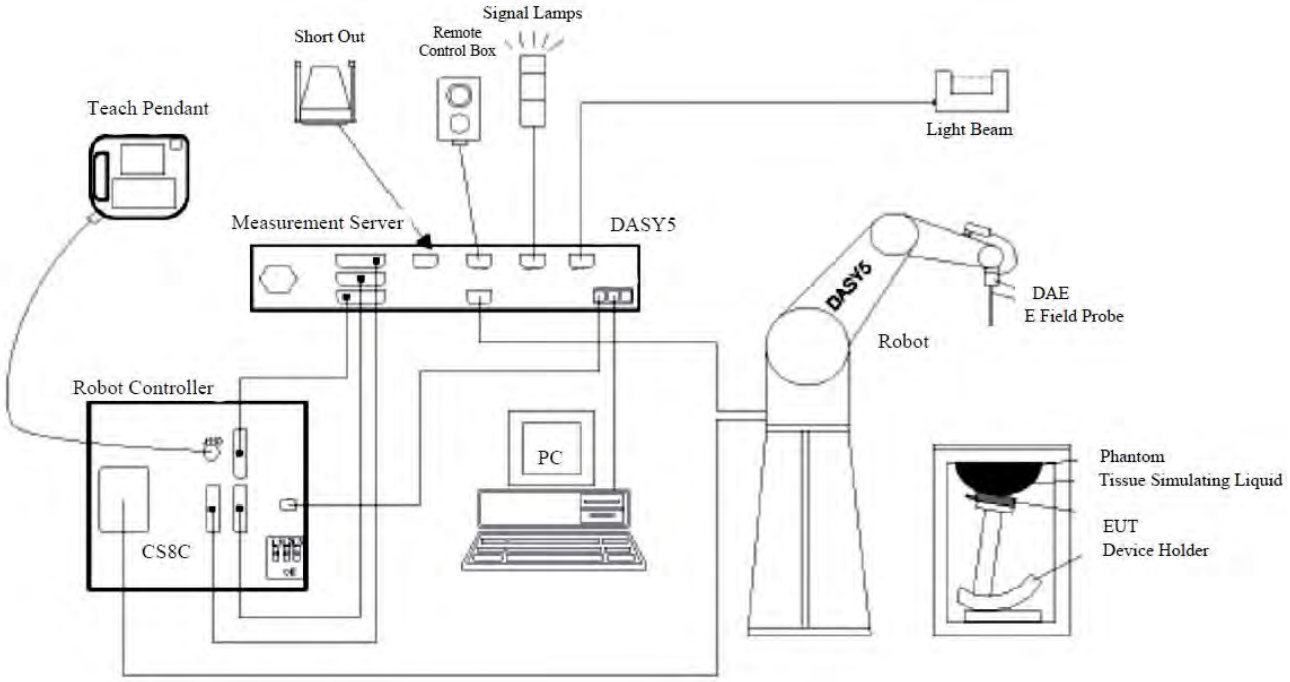


SAR MEASUREMENT SYSTEM

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.

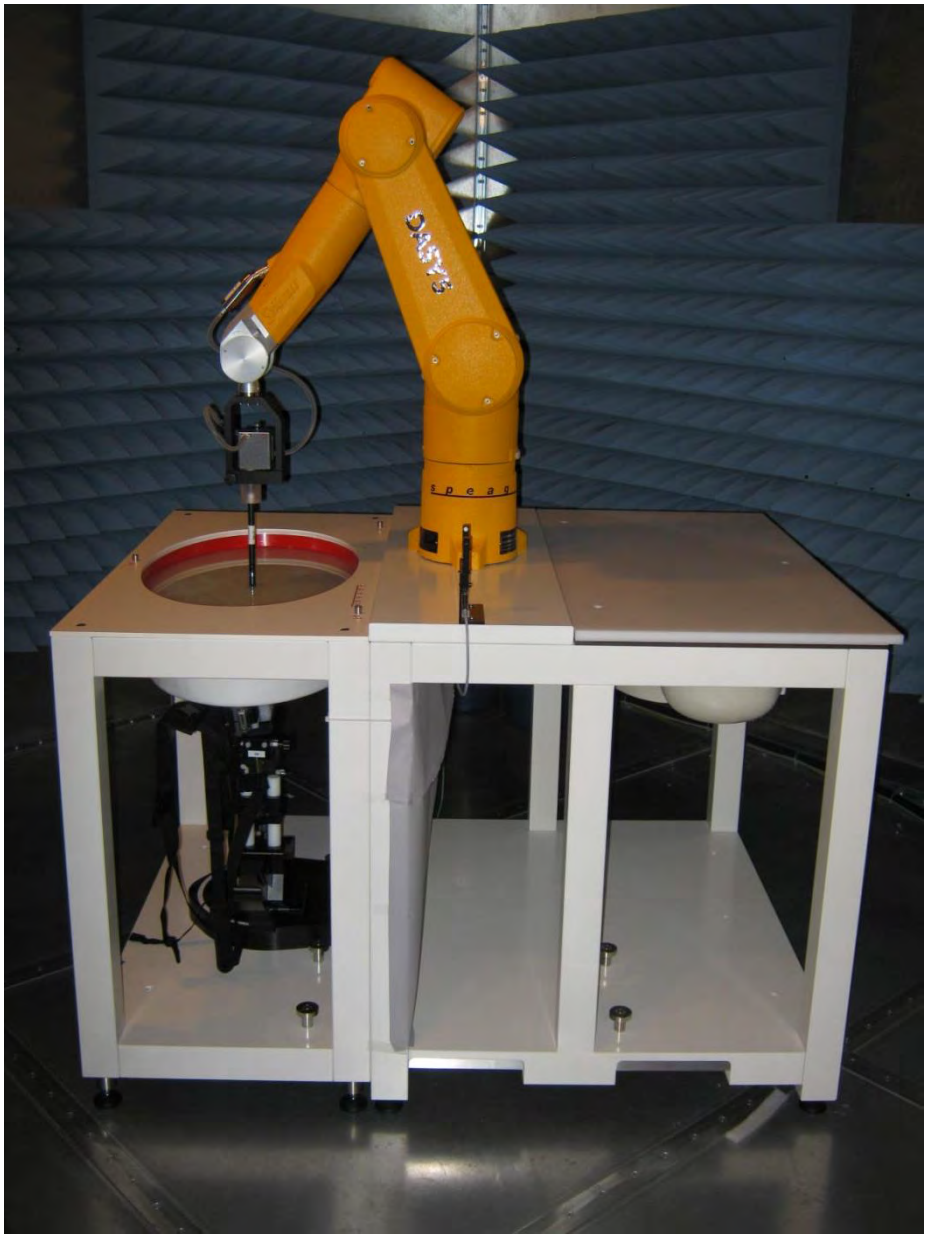
SYSTEM AND TEST SITE DESCRIPTION

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

NORTHWEST EMC
WSEQ.13.09.09

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Amplifier	Mini Circuits	ZVE-3W-83+	TTA	NCR [1]	0 mo
Antenna - Dipole	SPEAG	D2450V2	ADL	11/4/2014	12 mo
Antenna - Dipole	SPEAG	D5GHzV2	ADM	11/12/2014	12 mo
DAE	SPEAG	SD 000 D04 EJ	SAH	11/3/2014	12 mo
Device Holder	SPEAG	N/A	SAW	NCR	0 mo
Fixture/Kit - Calibration/Verification	SPEAG	DAKS:200	IPR	3/6/2014	36 mo
Generator - Signal	Agilent	V2920A	TIH	NCR[1]	0 mo
Light Beam Unit	SPEAG	SE UKS 030 AA	SAD	NCR	0 mo
Meter - Power	Agilent	N1913A	SQR	10/30/2014	12 mo
Power Sensor	Agilent	E9300H	SQO	10/30/2014	12 mo
SAR - Tissue Test Solution	SPEAG	MSL 2450	SAM	At start of testing	
SAR - Tissue Test Solution	SPEAG	MSL 501	SAV	At start of testing	
SAR Probe	SPEAG	EX3DV4	SAG	11/10/2014	12 mo
SAR Test System	Staeubli	DAYS5	SAK	11/1/2013	36 mo
SAR Test System	SPEAG	QD OVA 001 BB	SAC	NCR	0 mo
SAR Test System	Staeubli	TX60LSPEAG	SAA	NCR	0 mo
SAR Test System	Staeubli	N/A	SAJ	NCR	0 mo
SAR Test System	Staeubli	CS8C	SAI	NCR	0 mo
Thermometer	Omega Engineering, Inc.	HH311	DUI	1/26/2015	36 mo

Note 1: The output of the signal generator / amplifier is verified with the calibrated power meter listed above.

MEASUREMENT UNCERTAINTY

MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2003

300-3000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	u_i (1g) (+/-%)	u_i (10g) (+/-%)	v_i
Measurement System								
Probe calibration (k=1)	5.5	normal	1	1	1	5.5	5.5	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.4	rectangular	1.732	1	1	0.2	0.2	∞
Probe positioner with respect to phantom shell	2.9	rectangular	1.732	1	1	1.7	1.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty		RSS				11.2	10.6	387
Expanded Measurement Uncertainty (95% Confidence/		normal (k=2)				22.5	21.2	

MEASUREMENT UNCERTAINTY

NORTHWEST EMC

MEASUREMENT UNCERTAINTY BUDGETS PER IEEE 1528:2003

3000-6000 MHz Range

Uncertainty Component	Tolerance (+/- %)	Probability Distribution	Divisor	c_i (1g)	c_i (10g)	u_i (1g) (+/-%)	u_i (10g) (+/-%)	v_i
Measurement System								
Probe calibration (k=1)	6.55	normal	1	1	1	6.6	6.6	∞
Axial isotropy	4.7	rectangular	1.732	0.707	0.707	1.9	1.9	∞
Hemispherical isotropy	9.6	rectangular	1.732	0.707	0.707	3.9	3.9	∞
Boundary effect	2.0	rectangular	1.732	1	1	1.2	1.2	∞
Linearity	4.7	rectangular	1.732	1	1	2.7	2.7	∞
System detection limits	1.0	rectangular	1.732	1	1	0.6	0.6	∞
Readout electronics	0.3	normal	1	1	1	0.3	0.3	∞
Response time	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Integration time	2.6	rectangular	1.732	1	1	1.5	1.5	∞
RF ambient conditions - noise	1.7	rectangular	1.732	1	1	1.0	1.0	∞
RF Ambient Reflections	0.0	rectangular	1.732	1	1	0.0	0.0	∞
Probe positioner mechanical tolerance	0.8	rectangular	1.732	1	1	0.5	0.5	∞
Probe positioner with respect to phantom shell	9.9	rectangular	1.732	1	1	5.7	5.7	∞
Extrapolation, interpolation, and integration algorithms for max. SAR evaluation	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Test Sample Related								
Device Positioning	2.9	normal	1	1	1	2.9	2.9	145
Device Holder	3.6	normal	1	1	1	3.6	3.6	5
Power Drift	5.0	rectangular	1.732	1	1	2.9	2.9	∞
Phantom and tissue parameters								
Phantom Uncertainty - shell thickness tolerances	4.0	rectangular	1.732	1	1	2.3	2.3	∞
Liquid conductivity - deviation from target values	5.0	rectangular	1.732	0.64	0.43	1.8	1.2	∞
Liquid conductivity - measurement uncertainty	6.5	normal	1	0.64	0.43	4.2	2.8	∞
Liquid permittivity - deviation from target values	5.0	rectangular	1.732	0.6	0.49	1.7	1.4	∞
Liquid permittivity - measurement uncertainty	3.2	normal	1	0.6	0.49	1.9	1.6	∞
Combined Standard Uncertainty		RSS				13.2	12.7	330
Expanded Measurement Uncertainty (95% Confidence/		normal (k=2)				26.5	25.4	

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Accreditation No.: SCS 108

Client Northwest EMC

Certificate No: D2450V2-855_Nov14

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 855

Calibration procedure(s): QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: November 04, 2014

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	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 4, 2014

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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:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) 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
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) 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.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.0 ± 6 %	1.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.4 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.0 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.01 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.0 Ω + 3.2 jΩ
Return Loss	- 27.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.2 Ω + 5.3 jΩ
Return Loss	- 25.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 10, 2009

DASY5 Validation Report for Head TSL

Date: 04.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

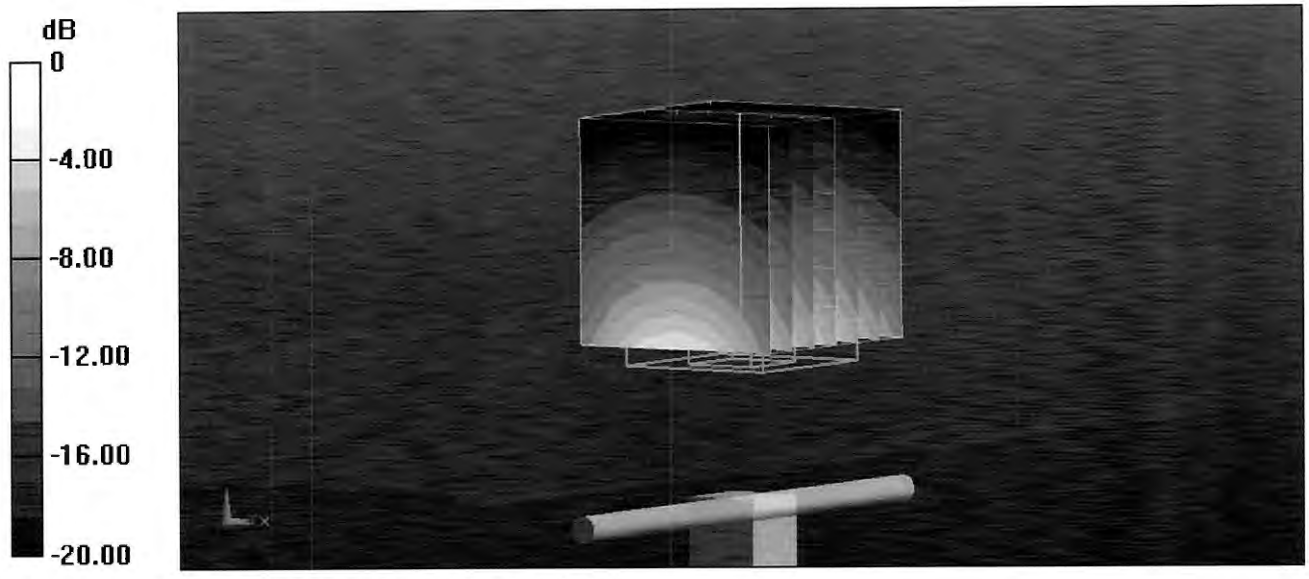
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.86 S/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

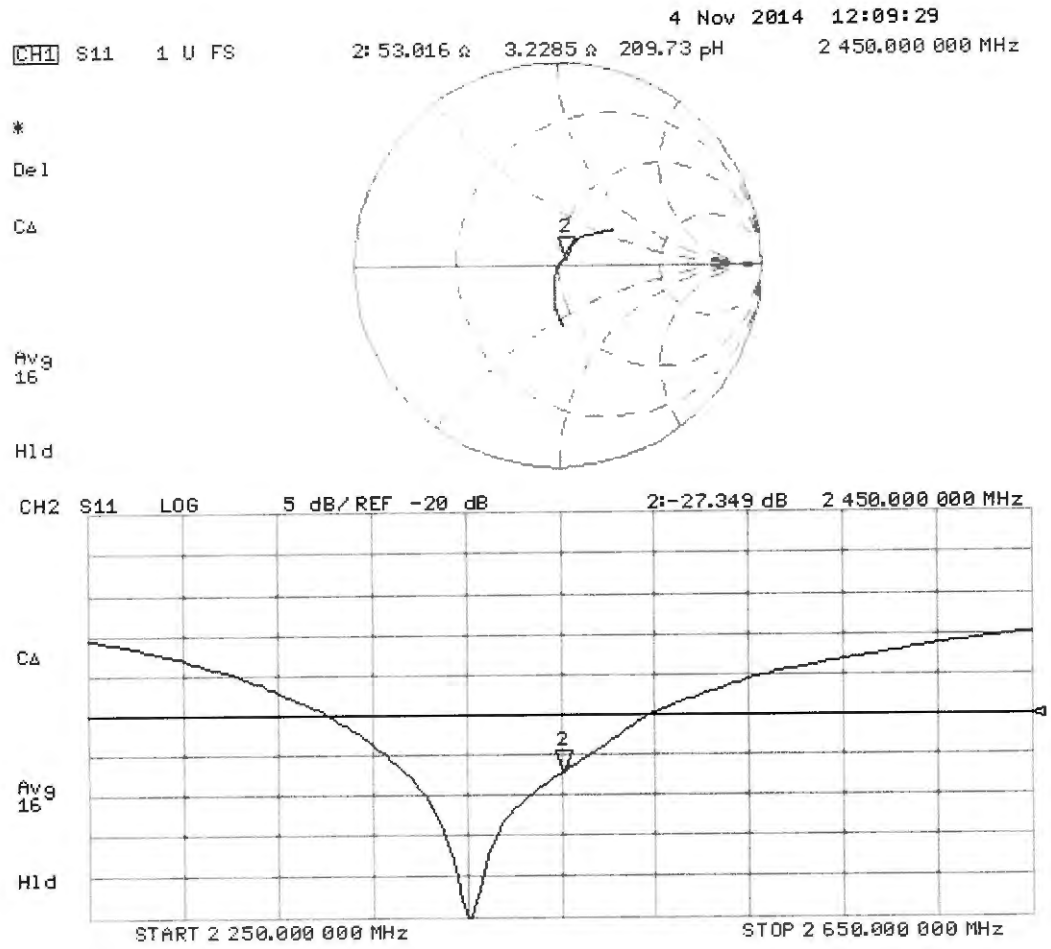
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.9 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.15 W/kg
Maximum value of SAR (measured) = 17.6 W/kg



0 dB = 17.6 W/kg = 12.46 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 04.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

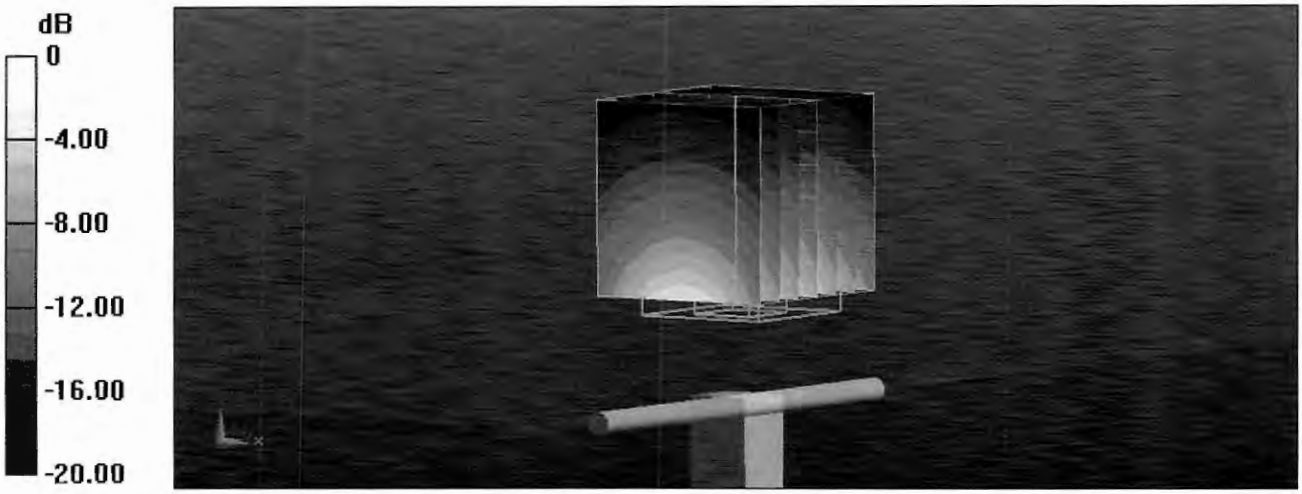
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 50.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

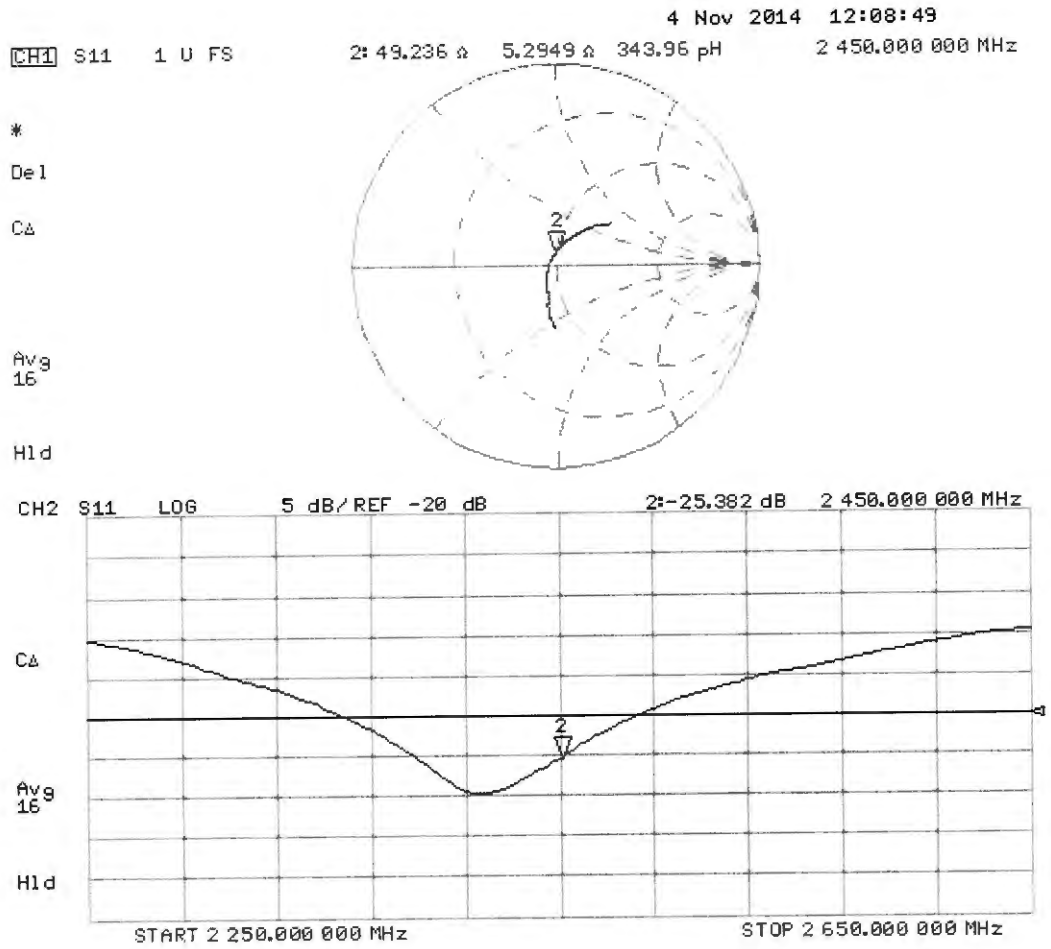
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.95 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 13 W/kg; SAR(10 g) = 6.01 W/kg
Maximum value of SAR (measured) = 17.2 W/kg



0 dB = 17.2 W/kg = 12.36 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client **Northwest EMC**

Certificate No: D5GHzV2-1066_Nov14

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1066
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	November 12, 2014

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	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
Power sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 12, 2014

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

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

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:

a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
c) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013

Additional Documentation:

d) 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.

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%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5500 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.9 ± 6 %	4.59 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.68 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.70 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**86.4 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.47 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.6	4.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.84 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**87.7 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.3 ± 6 %	4.98 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.9 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.0 ± 6 %	5.19 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.45 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.76 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.9 ± 6 %	5.58 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.00 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.6	5.65 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.83 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5500 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.30 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**82.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.31 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.9 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.4 ± 6 %	5.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**83.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.25 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.82 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.4 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	51.0 Ω - 6.7 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	50.2 Ω - 2.4 jΩ
Return Loss	- 32.3 dB

Antenna Parameters with Head TSL at 5500 MHz

Impedance, transformed to feed point	51.2 Ω - 1.1 jΩ
Return Loss	- 35.8 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	56.0 Ω - 1.1 jΩ
Return Loss	- 24.8 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.8 Ω + 0.7 jΩ
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.5 Ω - 4.4 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	50.5 Ω - 1.3 jΩ
Return Loss	- 37.3 dB

Antenna Parameters with Body TSL at 5500 MHz

Impedance, transformed to feed point	51.6 Ω - 0.3 jΩ
Return Loss	- 35.7 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.3 Ω + 0.7 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	55.7 Ω + 1.9 jΩ
Return Loss	- 24.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 11.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.59 S/m; ε_r = 34.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 4.68 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 4.88 S/m; ε_r = 34.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.98 S/m; ε_r = 34.3; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.19 S/m; ε_r = 34.0; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2013, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2013, ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2013, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.07 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 30.0 W/kg
SAR(1 g) = 8.18 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 18.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

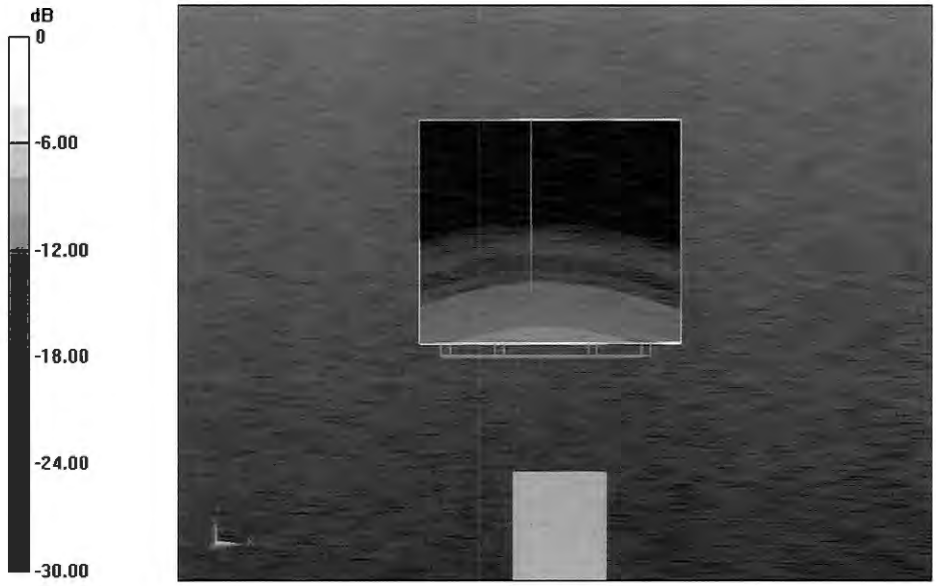
Reference Value = 64.75 V/m; Power Drift = 0.24 dB
Peak SAR (extrapolated) = 33.4 W/kg
SAR(1 g) = 8.7 W/kg; SAR(10 g) = 2.47 W/kg
Maximum value of SAR (measured) = 20.6 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 67.28 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 35.2 W/kg
SAR(1 g) = 8.84 W/kg; SAR(10 g) = 2.51 W/kg
Maximum value of SAR (measured) = 20.5 W/kg

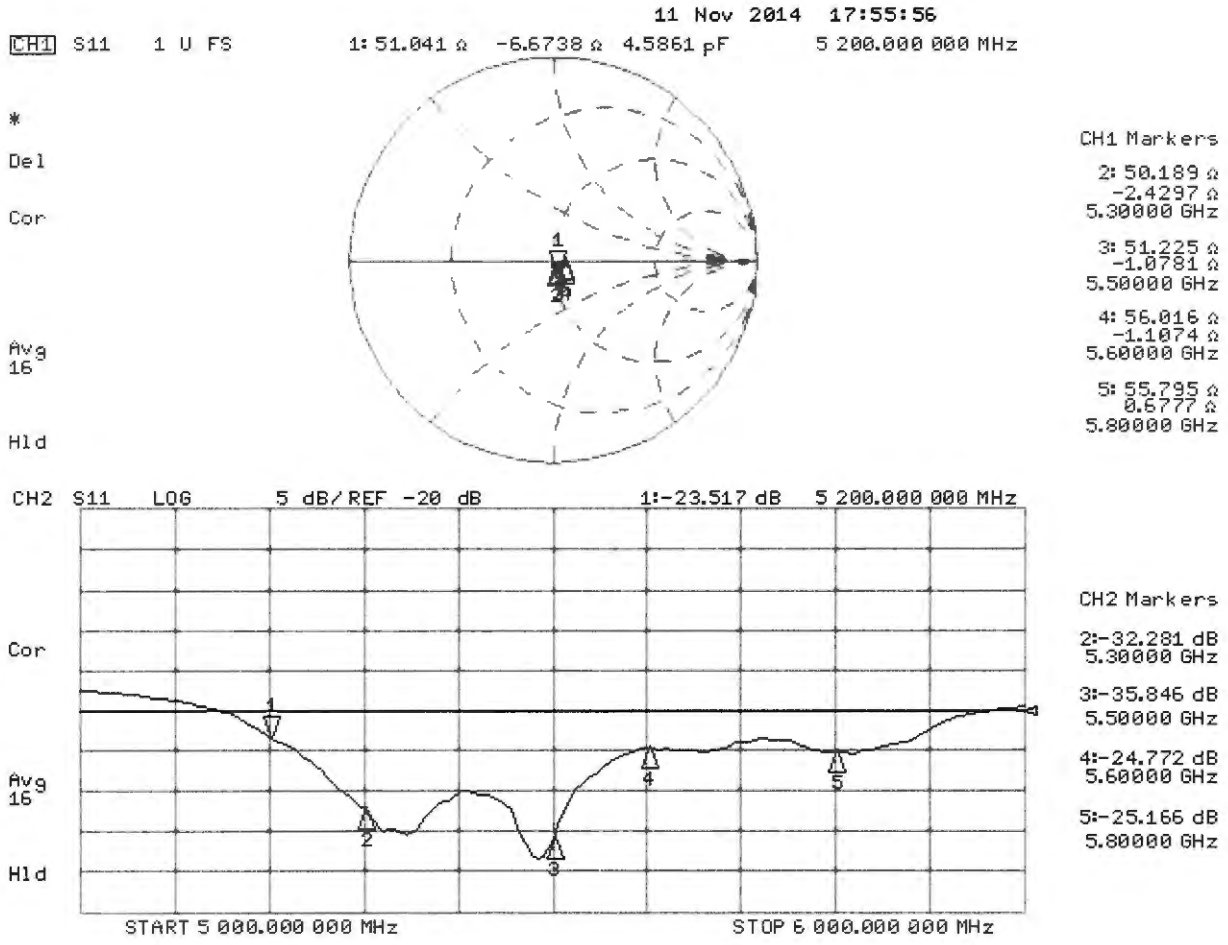
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.91 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 34.1 W/kg
SAR(1 g) = 8.52 W/kg; SAR(10 g) = 2.41 W/kg
Maximum value of SAR (measured) = 20.5 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.12 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 34.3 W/kg
SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.33 W/kg
Maximum value of SAR (measured) = 19.5 W/kg



0 dB = 19.5 W/kg = 12.90 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.11.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1066

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.45 S/m; ε_r = 47.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 5.58 S/m; ε_r = 46.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5500 MHz; σ = 5.83 S/m; ε_r = 46.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.98 S/m; ε_r = 46.4; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.25 S/m; ε_r = 46.0; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013, ConvF(4.52, 4.52, 4.52); Calibrated: 30.12.2013, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2013, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.03 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 30.5 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

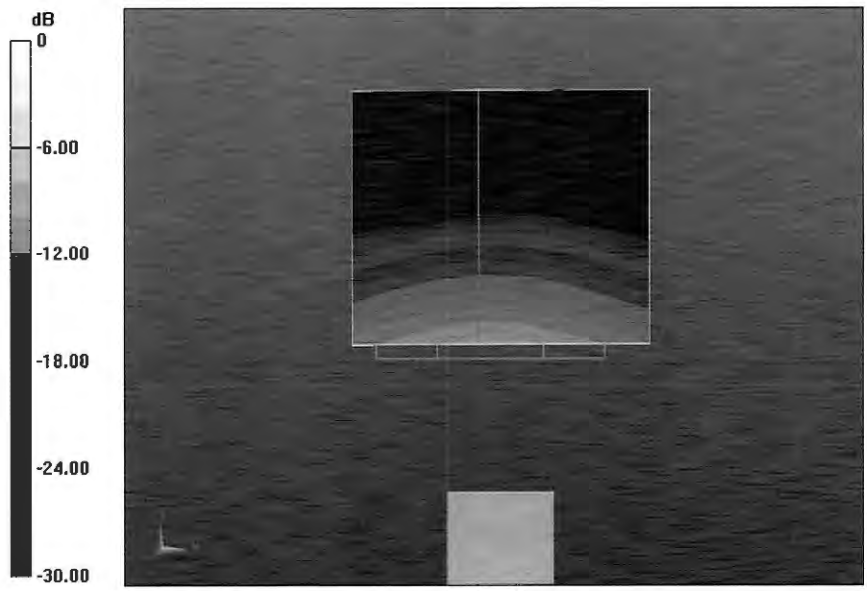
Reference Value = 60.74 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 8 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.0 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5500 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 60.36 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 35.4 W/kg
SAR(1 g) = 8.3 W/kg; SAR(10 g) = 2.31 W/kg
Maximum value of SAR (measured) = 19.8 W/kg

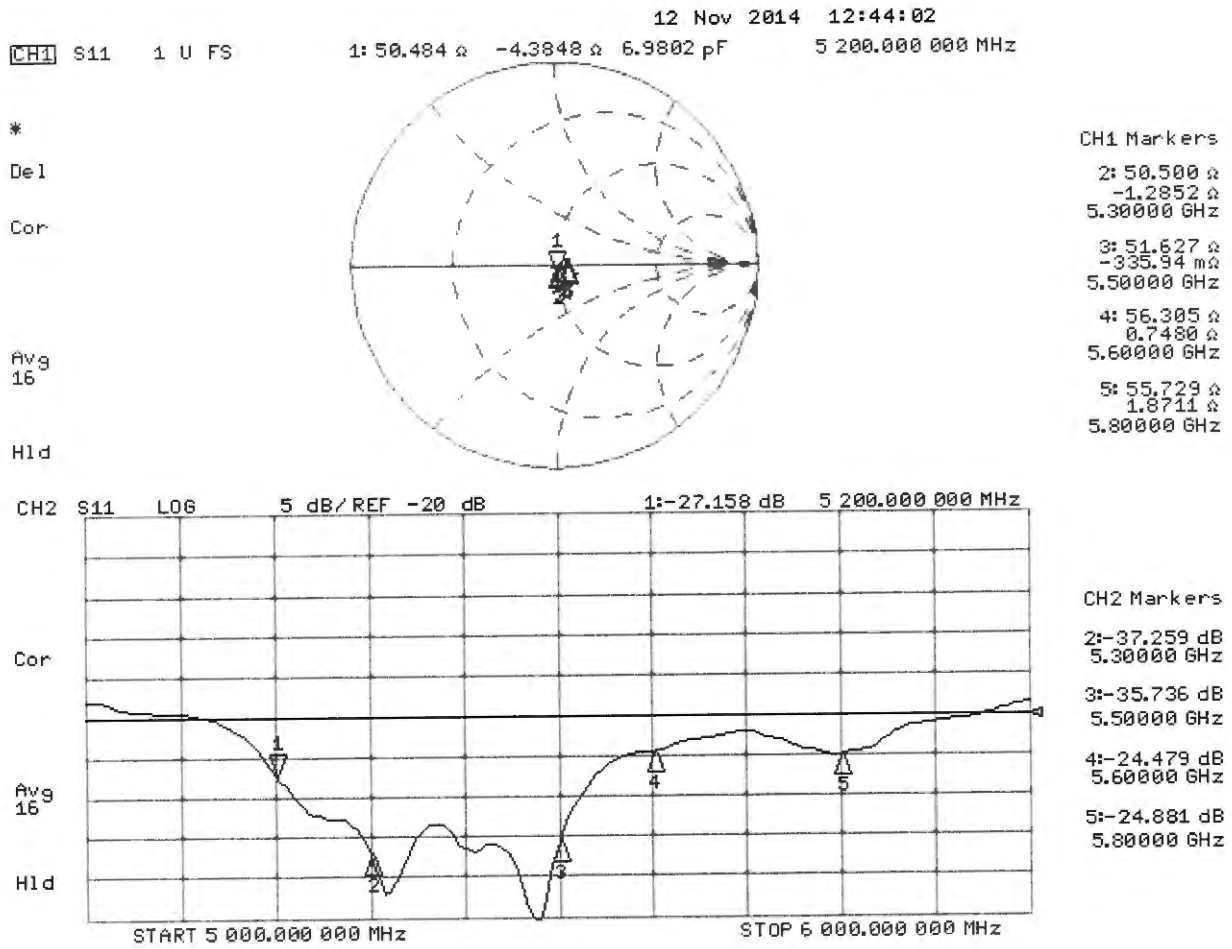
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.32 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 37.3 W/kg
SAR(1 g) = 8.44 W/kg; SAR(10 g) = 2.34 W/kg
Maximum value of SAR (measured) = 20.7 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.68 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 36.2 W/kg
SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.83 dBW/kg

Impedance Measurement Plot for Body TSL



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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: EX3-3746_Nov14

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3746

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: November 10, 2014

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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: November 10, 2014

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	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., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) 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:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,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.*
- *DCPx,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
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* 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 ≤ 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 *NORMx,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.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

Probe EX3DV4

SN:3746

Manufactured: March 26, 2010
Calibrated: November 10, 2014

Calibrated for DASY/EASY Systems
(Note: non-compatible with DASY2 system!)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.49	0.46	0.50	± 10.1 %
DCP (mV)[B]	98.2	100.7	97.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	157.3	±2.7 %
		Y	0.0	0.0	1.0		153.5	
		Z	0.0	0.0	1.0		157.4	

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: EX3DV4 - SN:3746

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 [G]	Depth [G] (mm)	Unct. (k=2)
2450	39.2	1.80	6.83	6.83	6.83	0.28	1.15	± 12.0 %
2550	39.1	1.91	6.59	6.59	6.59	0.37	0.92	± 12.0 %
5200	36.0	4.66	4.92	4.92	4.92	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.74	4.74	4.74	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.47	4.47	4.47	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.37	4.37	4.37	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.35	4.35	4.35	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[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.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

Calibration Parameter Determined in Body Tissue Simulating Media

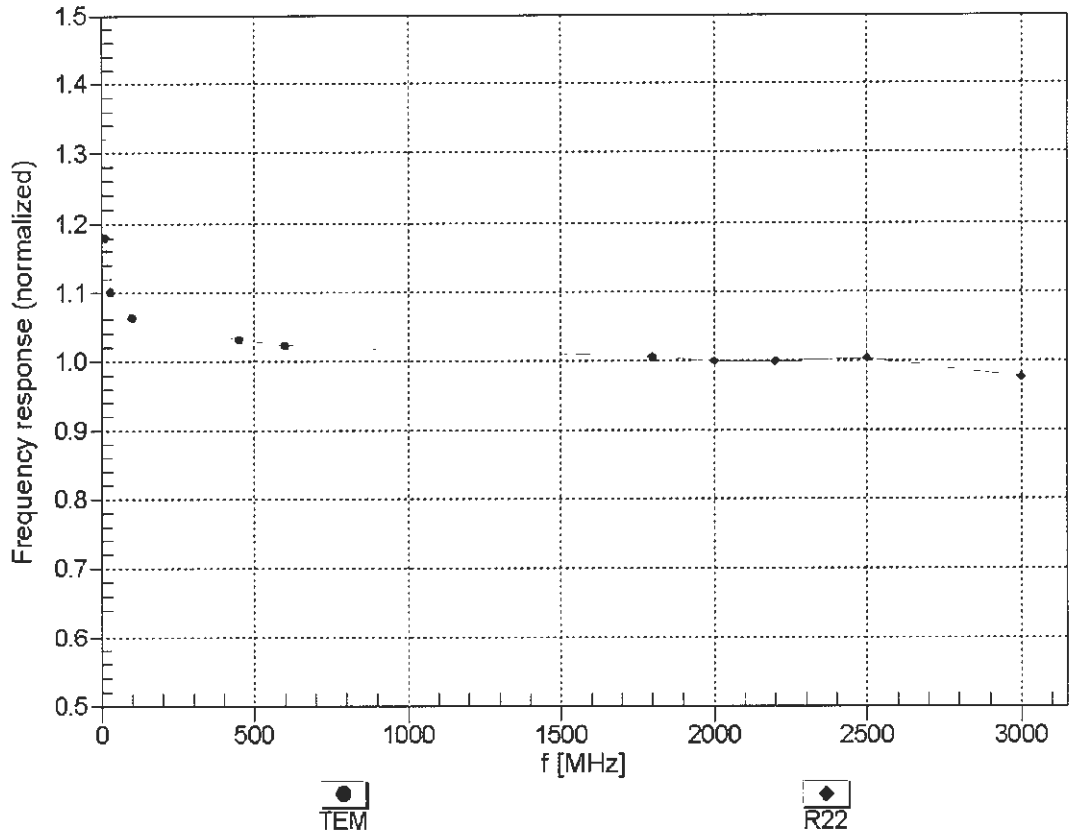
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
2450	52.7	1.95	7.06	7.06	7.06	0.80	0.57	± 12.0 %
2550	52.6	2.09	6.82	6.82	6.82	0.76	0.59	± 12.0 %
5200	49.0	5.30	4.31	4.31	4.31	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.13	4.13	4.13	0.45	1.90	± 13.1 %
5500	48.6	5.65	3.81	3.81	3.81	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.74	3.74	3.74	0.50	1.90	± 13.1 %
5800	48.2	6.00	4.06	4.06	4.06	0.50	1.90	± 13.1 %

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[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.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

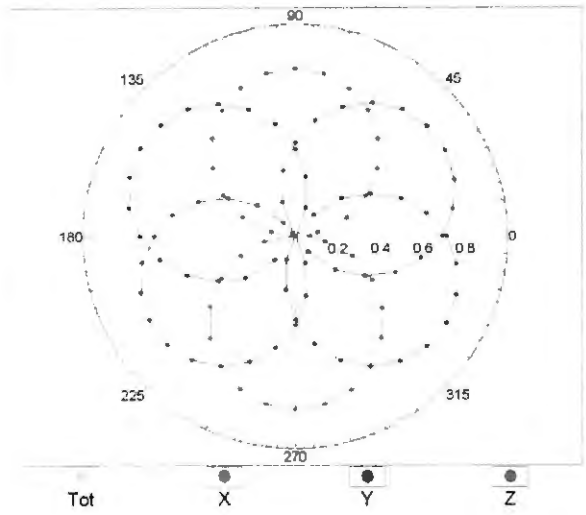
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



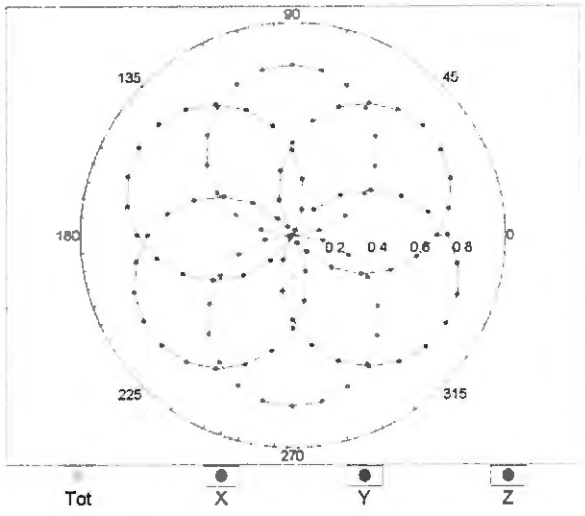
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

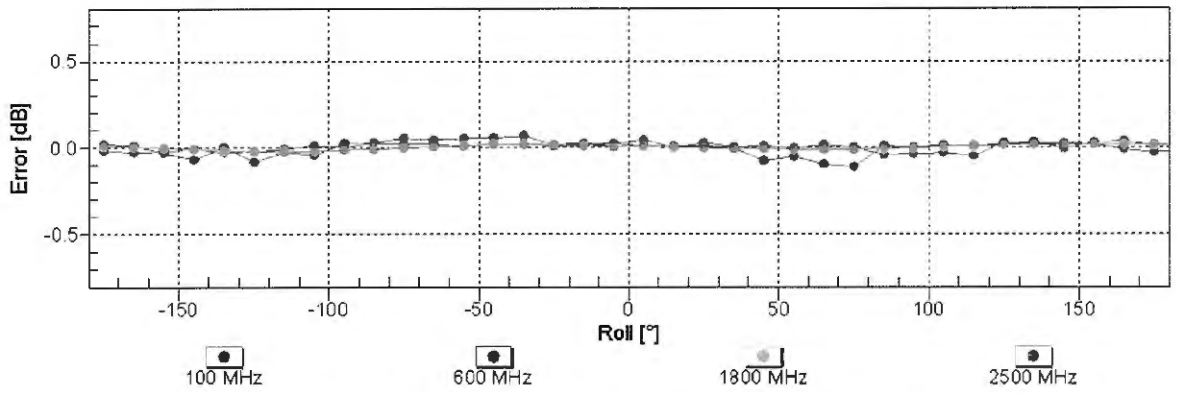
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

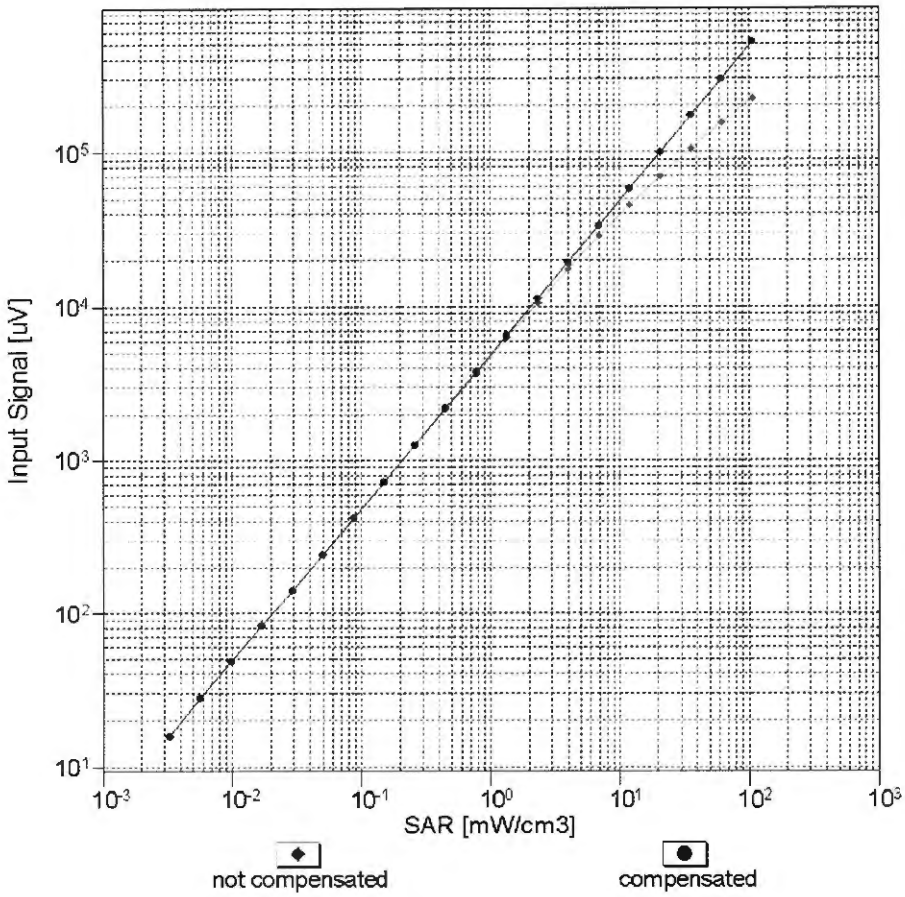


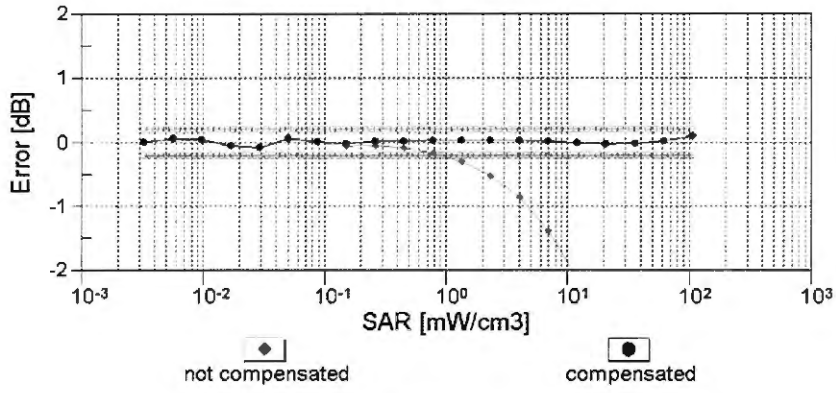


Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})

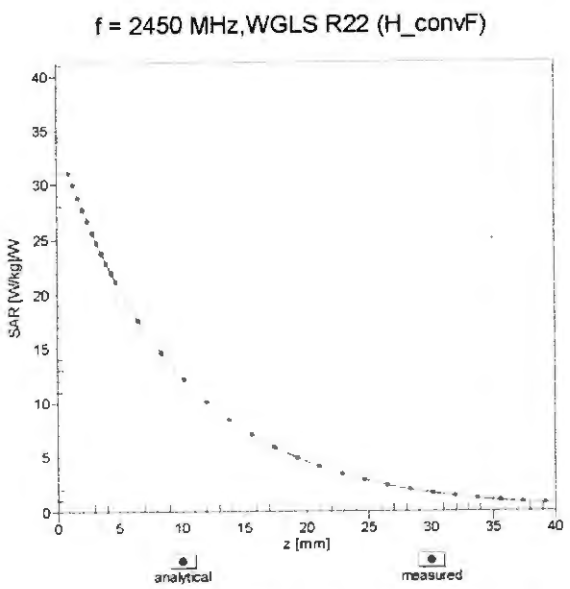
(TEM cell , f_{eval}= 1900 MHz)

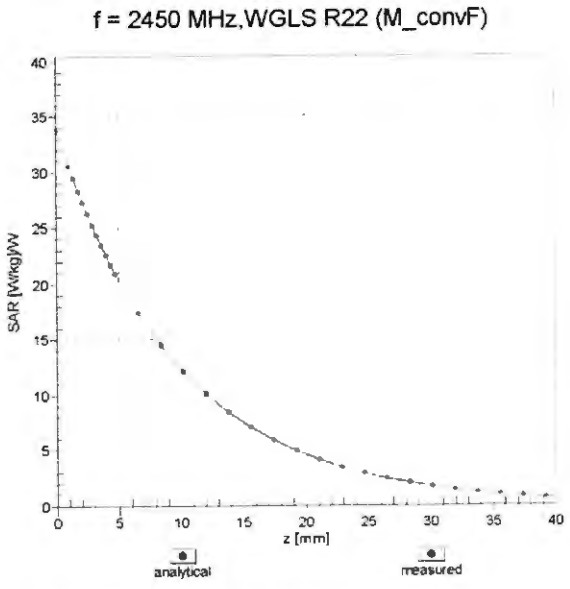




Uncertainty of Linearity Assessment: ± 0.6% (k=2)

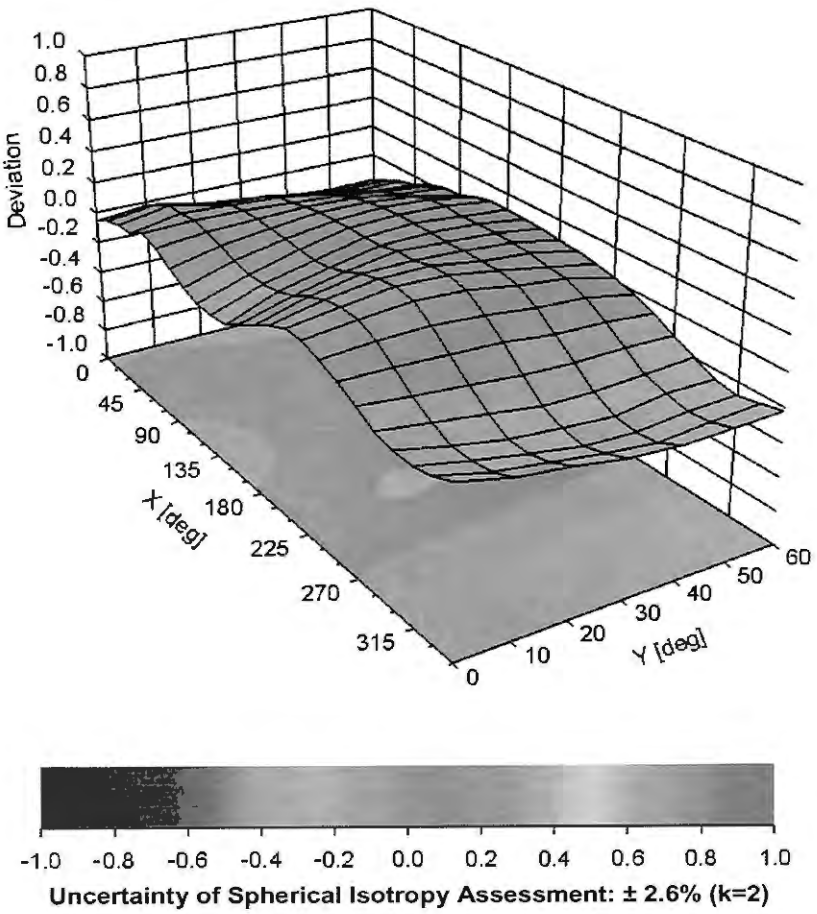
Conversion Factor Assessment





Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3746

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-135
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm