731 Enterprise Drive
Lexington, KY 40510

Telephone: 859-226-1000
Facsimile: 859-226-1040
www.intertek-etlsemko.com

TEST REPORT

Report Number: 101275145LEX-001
Project Number: G101275145

Evaluation of Model Number: zLink

FCCID: XOH-ZLINK2

Tested to the SAR Criteria in
FCC Part 2.1093

For

Corventis

Test Performed by:	Test Authorized by:
Intertek 731 Enterprise Drive Lexington, KY 40510	Corventis 1410 Energy Park Drive, Suite 1 St. Paul, MN 55108

Prepared By: _____ **Date:** 4/16/2014

Bryan Taylor, Team Leader

Approved By: _____ **Date:** 4/16/2014

Jason Centers, Senior Project Engineer

TABLE OF CONTENTS

1.0 DOCUMENT HISTORY

Revision/ Project Number	Writer Initials	Date	Change
1.0 /G101275145	BT	4/14/2014	Original document

2.0 INTRODUCTION

At the request of Corventis, the zLink Gatewy was evaluated for SAR in accordance with the requirements for FCC Part 2.1093 and RSS-102. Testing was performed in accordance with IEEE Std 1528, IEC62209-2, and the Office of Engineering and Technology KDB 447498. Testing was performed at the Intertek facility in Lexington, Kentucky.

For the evaluation, the dosimetric assessment system DASY52 was used. The total uncertainty for the evaluation of the spatial peak SAR values averaged over a cube of 1g tissue mass had been assessed for this system to be ±21.4%.

The zLink was tested at the maximum output power measured by Intertek. Maximum output power measurements are tabulated under Section 9.0 Test Results.

The maximum spatial peak SAR value for the sample device averaged over 1g was found to be:

Transmit Band (MHz)	Mode	Channel	Frequency (MHz)	Conducted Output Power (dBm)	Reported SAR_{1g} – Body Mode (W/kg)	Limit (W/kg)
1852.4 – 1907.6MHz	UMTS Band II, Front Side	9262	1852.4	24.71	1.43	1.6W/kg

Table 1: Maximum Measured SAR

Based on the worst-case data presented above, the zLink Gatewy was found to be **compliant** with the 1.6 W/kg requirement for general population / uncontrolled exposure.

Modifications made to test sample

Intertek implemented no modifications.

3.0 TEST SITE DESCRIPTION

The SAR test site located at 731 Enterprise Drive, Lexington KY 40510 is comprised of the SPEAG model DASY 5.2 automated near-field scanning system, which is a package, optimized for dosimetric evaluation of mobile radios [3]. This system is installed in an ambient-free shielded chamber. The ambient temperature is controlled to 22.0 $\pm 2^{O}$C. During the SAR evaluations, the RF ambient conditions are monitored continuously for signals that might interfere with the test results. The tissue simulating liquid is also stored in this area in order to keep it at the same constant ambient temperature as the room.

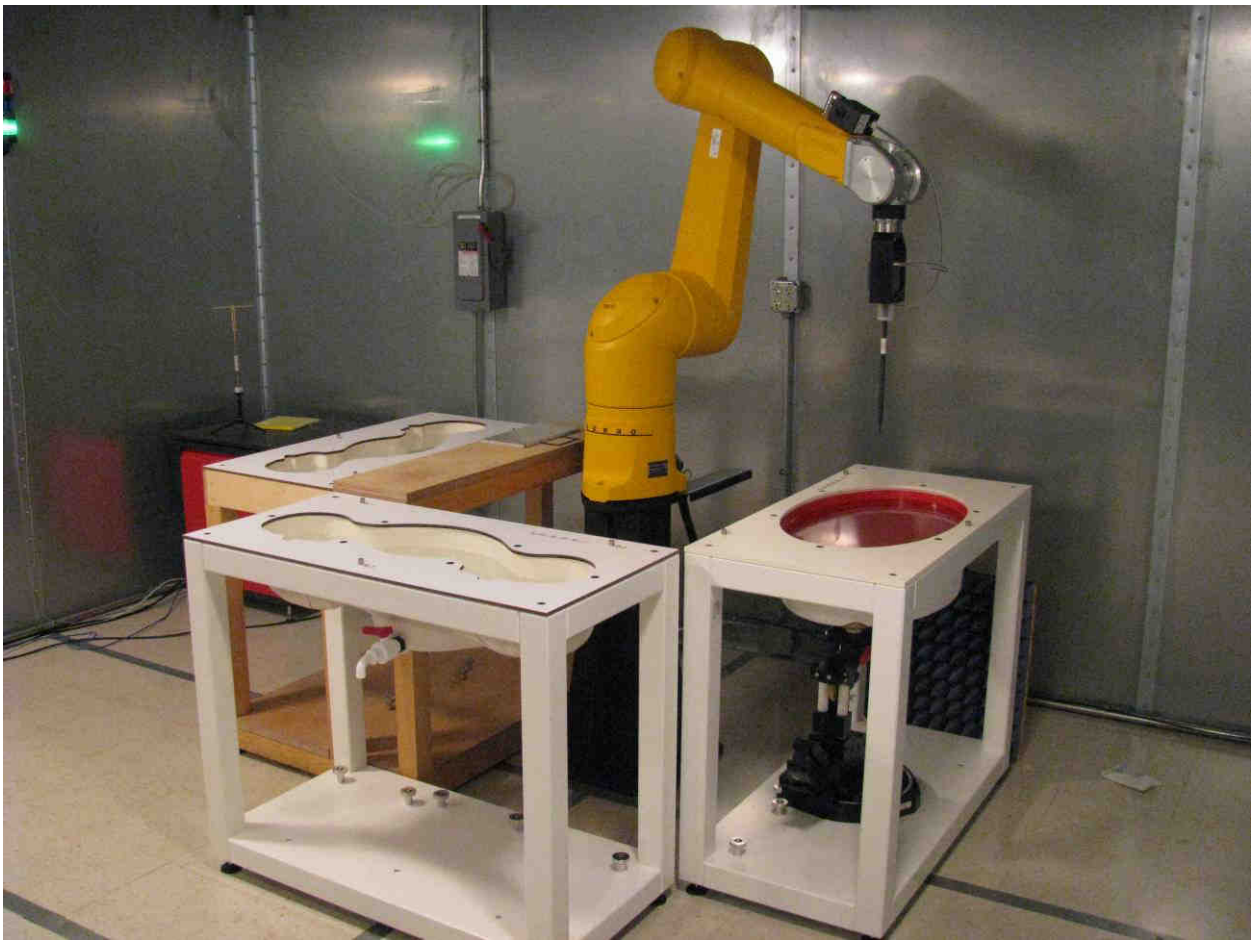


Figure 1: Intertek SAR Test Site

Measurement Equipment

The following major equipment/components were used for the SAR evaluation:

Description	Serial Number	Manufacture	Model	Cal. Date	Cal. Due	Eq. Used
SAR Probe	3516	Speag	EXDV3	12/13/13	12/13/14	☒
System Verification Dipole	4d122	Speag	D835V2	12/13/13	12/13/14	☒
System Verification Dipole	5d154	Speag	D1900V2	12/13/13	12/13/14	☒
DAE	358	Speag	DAE4	9/13/13	9/13/14	☒
Vector Signal Generator	257708	Rohde & Schwarz	SMBV100A	5/30/13	5/30/14	☒
Network Analyzer	US39173983	Agilent	8753ES	3/17/2014	3/17/2014	☒
Power Meter	1838538	Gigatronics	8542C	7/18/13	7/18/14	☒
Power Sensor	1830320	Gigatronics	80601A	7/18/13	7/18/14	☒
USB Power Sensor	100705	Rohde & Schwarz	NRP-Z51	9/11/13	9/11/14	☒
Spectrum Analyzer	3900	Rohde & Schwarz	ESU40	9/11/13	9/11/14	☒
Dielectric Probe Kit	1111	Speag	DAK-3.5	NCR	NCR	☒
Oval Flat Phantom ELI 5.0	1108	Speag	QD OVA 002 A	NCR	NCR	☒
6-axis robot	F11/5H1YA/A/01	Staubli	RX-90	NCR	NCR	☒

NCR – No Calibration Required

Table 2: Test Equipment Used for SAR Evaluation

Measurement Uncertainty

The Table below includes the uncertainty budget suggested by the IEEE Std 1528-2003 and determined by SPEAG for the DASY5 measurement System.

Error Description	Uncertainty Value	Prob. Dist.	Div.	c_i (1g)	c_i (10g)	Std.Unc. (1g)	Std.Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±5.5%	N	1	1	1	±5.5%	±5.5%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effect	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	√3	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.4%	R	√3	1	1	±0.2%	±0.2%	∞
Probe Positioning	±2.9%	R	√3	1	1	±1.7%	±1.7%	∞
Max. SAR Eval.	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Test sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	√3	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Standard Uncertainty						±10.7%	±10.5%	387
Expanded STD Uncertainty						**±21.4%**	**±21.0%**	

Notes.

1. Worst Case uncertainty budget for DASY5 assessed according to IEEE 1528-2003. The budget is valid for the frequency range 300 MHz – 3 GHz and represents a worst-case analysis. For specific tests and configurations, the uncertainty could be considerably smaller.

Error Description	Uncertainty Value	Prob. Dist.	Div.	c_i (1g)	c_i (10g)	Std.Unc. (1g)	Std.Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.55%	N	1	1	1	±6.55%	±6.55%	∞
Axial Isotropy	±4.7%	R	√3	0.7	0.7	±1.9%	±1.9%	∞
Hemispherical Isotropy	±9.6%	R	√3	0.7	0.7	±3.9%	±3.9%	∞
Boundary Effect	±2.0%	R	√3	1	1	±1.2%	±1.2%	∞
Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%	∞
System Detection Limits	±1.0%	R	√3	1	1	±0.6%	±0.6%	∞
Readout Electronics	±0.3%	N	1	1	1	±0.3%	±0.3%	∞
Response Time	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Integration Time	±2.6%	R	√3	1	1	±1.5%	±1.5%	∞
RF Ambient Noise	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
RF Ambient Reflections	±3.0%	R	√3	1	1	±1.7%	±1.7%	∞
Probe Positioner	±0.8%	R	√3	1	1	±0.5%	±0.5%	∞
Probe Positioning	±9.9%	R	√3	1	1	±5.7%	±5.7%	∞
Max. SAR Eval.	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
Test sample Related								
Device Positioning	±2.9%	N	1	1	1	±2.9%	±2.9%	145
Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%	5
Power Drift	±5.0%	R	√3	1	1	±2.9%	±2.9%	∞
Phantom and Setup								
Phantom Uncertainty	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
Liquid Conductivity (target)	±5.0%	R	√3	0.64	0.43	±1.8%	±1.2%	∞
Liquid Conductivity (meas.)	±2.5%	N	1	0.64	0.43	±1.6%	±1.1%	∞
Liquid Permittivity (target)	±5.0%	R	√3	0.6	0.49	±1.7%	±1.4%	∞
Liquid Permittivity (meas.)	±2.5%	N	1	0.6	0.49	±1.5%	±1.2%	∞
Combined Standard Uncertainty						±12.8%	±12.8%	330
Expanded STD Uncertainty						**±25.6%**	**±25.2%**	

Notes.

Worst Case uncertainty budget for DASY5 assessed according to IEEE 1528-2003. The budget is valid for the frequency range 3 GHz – 6 GHz and represents a worst-case analysis. Probe calibration error reflects uncertainty of the EX3D probe. For specific tests and configurations, the uncertainty could be considerably smaller.

4.0 JOB DESCRIPTION

At the request of Corventis, SAR testing was performed on the zLink.

Test sample	
Manufacturer	Corventis
Model Number	zLink
Serial Number	002234015801
Receive Date	4/6/2014
Device Received Condition	Good
Device Category	Portable
RF Exposure Category	General Population/Uncontrolled Environment
Antenna Type	Internal
Test sample Accessories	
Leather Pouch	Leather pouch intended to encase the product and be used with it 100% of the time.

Table 3: Product Information

Operating Bands	Frequency Range (MHz)	Modulation	Duty Cycle
2.4GHz	2402 – 2480MHz	Bluetooth	1:1
GSM850	824.2 – 848.8MHz	GPRS – 4 Slot	4:8
GSM850	824.2 – 848.8MHz	EGPRS – 4 Slot	4:8
GSM1900	1850.2 – 1909.8MHz	GPRS – 4 Slot	4:8
GSM1900	1850.2 – 1909.8MHz	EGPRS – 4 Slot	4:8
UMTS Band V	826.4 – 846.6MHz	WCDMA	1:1
UMTS Band II	1852.4 – 1908.75	WCDMA	1:1

Table 4: Operating Bands

Figure 2: Test Sample (Front)

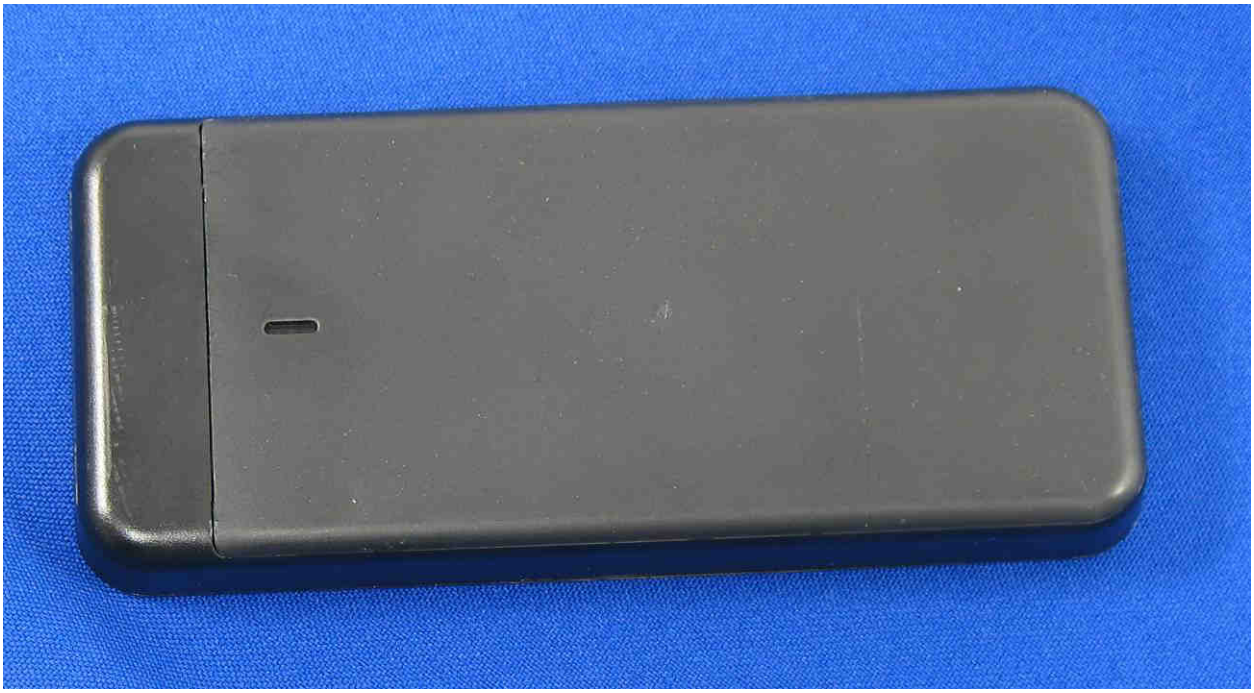


Figure 3: Test Sample (Back)

Figure 4: Test Sample and Pouch

Figure 5: Battery Pack

5.0 SYSTEM VERIFICATION

System Validation

Prior to the assessment, the system was verified to be within ±10% of the specifications by using the system validation kit. The system validation procedure tests the system against reference SAR values and the performance of probe, readout electronics and software. The test setup utilizes a phantom and reference dipole. The results from the system verifications with a dipole are shown in *Table 5*.

.

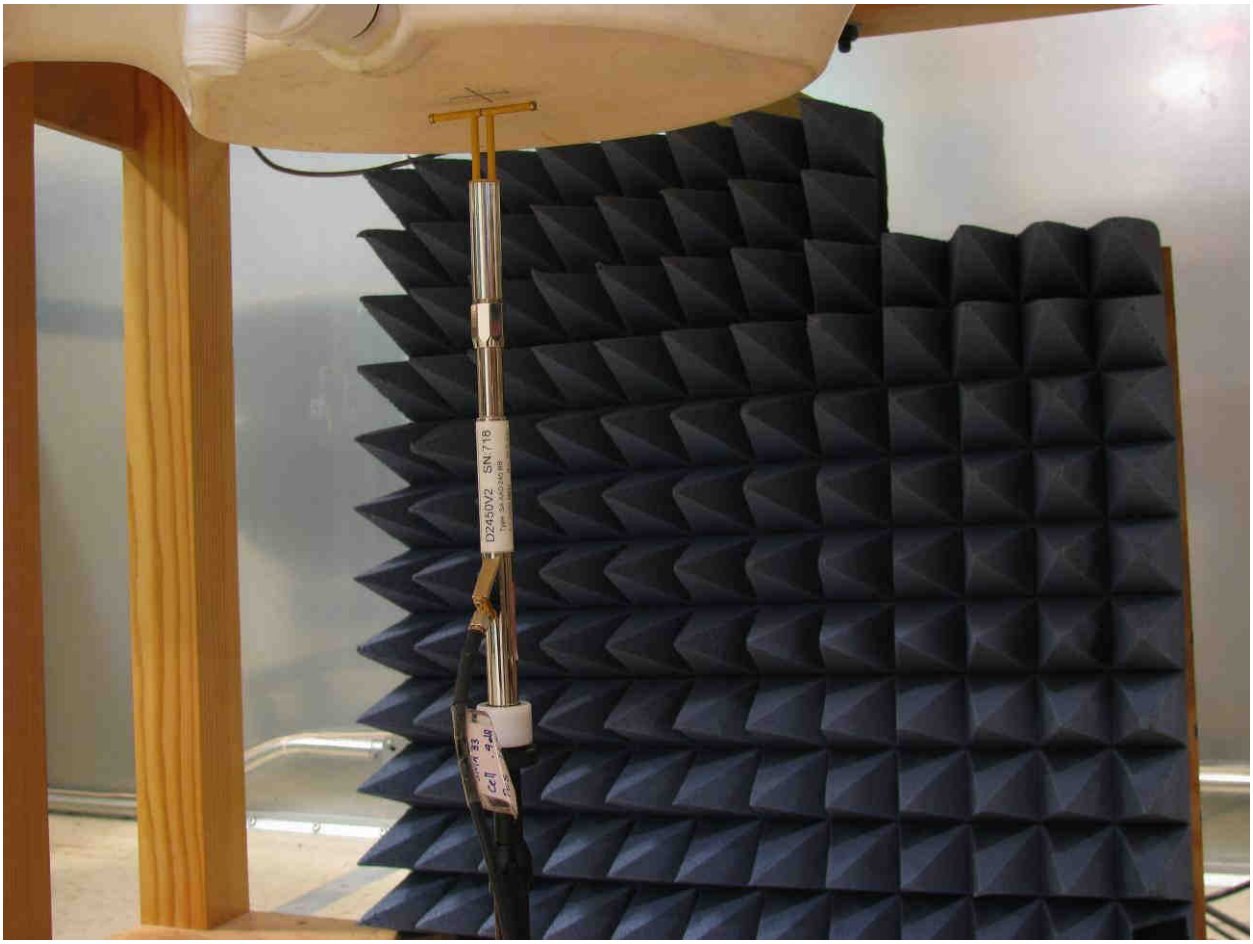


Figure 6: System Verification Setup

Ambient Temp (ºC)	Fluid Temp (ºC)	Frequency (MHz)	Dipole	Fluid Type	Dipole Power Input	Cal. Lab SAR (1g)	Measured SAR (1g)	% Error SAR (1g)	Date
22.3	22.3	1900	D1900V2	MSL1900	1W	38.4	37.1	3.39	4.6.2014
22.2	22.3	835	D835V2	MSL835	1W	9.58	9.37	2.19	4.7.2014
22.2	22.3	835	D835V2	MSL835	1W	9.58	9.52	0.63	4.8.2014
22.3	22.3	1900	D1900V2	MSL1900	1W	38.4	40.7	5.99	4.9.2014

Table 5: Dipole Validation

Tissue Simulating Liquid Description and Validation

The dielectric parameters were verified to be within 5% of the target values prior to assessment. The dielectric parameters (ε_r, σ) are shown in Table 6. A recipe for the tissue simulating fluid used is shown in Table 7.

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
	1850	53.3	1.52	53.19	14.44	1.49	0.21	2.29	4/6/2014
	1880	53.3	1.52	53.1	14.52	1.5176	0.38	0.16	4/6/2014
MSL1900	1910	53.3	1.52	53.01	14.61	1.5514	0.54	2.07	4/6/2014

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
	824.2	55.2	0.97	53.9	21.93	1.00	2.36	3.60	4/7/2014
	836.6	55.2	0.97	53.7	21.88	1.0177	2.72	4.91	4/7/2014
MSL835	848.8	55.2	0.98	53.6	22	1.0200	2.90	4.08	4/7/2014

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
	826.4	55.2	0.97	52.69	21.8	1.00	4.55	3.26	4/8/2014
	836.6	55.2	0.97	52.6	21.76	1.0121	4.71	4.34	4/8/2014
MSL835	846.6	55.2	0.98	52.5	21.71	1.0200	4.89	4.08	4/8/2014

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
	1852.4	53.3	1.52	53.21	14.47	1.49	0.17	1.96	4/9/2014
	1880	53.3	1.52	53.23	14.5	1.5155	0.13	0.29	4/9/2014
MSL1900	1907.6	53.3	1.52	53.28	14.58	1.5463	0.04	1.73	4/9/2014

Table 6: Dielectric Parameter Validation

Table 7: Tissue Simulating Fluid Recipe

TYPICAL COMPOSITION OF INGREDIENTS FOR LIQUID TISSUE PHANTOMS. (450MHz to 2450 MHz data only)												
Ingredient (% by weight)	f (MHz)											
	450		835		915		1900		2450		5500	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Water	38.56	51.16	41.45	52.4	41.05	56	54.9	70.45	62.7	68.64	65.53	78.67
Salt (NaCl)	3.95	1.49	1.45	1.4	1.35	0.76	0.18	0.36	0.5	0	0	0
Sugar	56.32	46.78	56	45	56.5	41.76	0	0	0	0	0	0
HEC	0.98	0.52	1	1	1	1.21	0	0	0	0	0	0
Bactericide	0.19	0.05	0.1	0.1	0.1	0.27	0	0	0	0	0	0
Triton X-100	0	0	0	0	0	0	0	0	36.8	0	17.235	10.665
DGBE	0	0	0	0	0	0	44.92	29.18	0	31.37	0	0
DGHE	0	0	0	0	0	0	0	0	0	0	17.235	10.665
Dielectric Constant	43.42	58	42.54	56.1	42	56.8	39.9	53.3	39.8	52.7		
Conductivity (S/m)	0.85	0.83	0.91	0.95	1	1.07	1.42	1.52	1.88	1.95		

Tissue Simulating Liquid for 5GHz, MBBL3500-5800V5 Manufactured by SPEAG (proprietary mixture)

Ingredients	**(% by weight)**
Water	78
Mineral oil	11
Emulsifiers	9
Additives and Salt	2

6.0 EVALUATION PROCEDURES

Prior to any testing, the appropriate fluid was used to fill the phantom to a depth of 15 cm ±0.2cm. The fluid parameters were verified and the dipole validation was performed as described in the previous sections.

Test Positions:

The Device was positioned against the SAM and flat phantom using the exact procedure described in IEEE Std 1528, IEC62209-2, and the Office of Engineering and Technology KDB 447498.

Reference Power Measurement:

The measurement probe was positioned at a fixed location above the reference point. A power measurement was made with the probe above this reference position so it could used for the assessing the power drift later in the test procedure.

Area Scan:

A coarse area scan was performed in order to find the approximate location of the peak SAR value. This scan was performed with the measurement probe at a constant height in the simulating fluid. A two dimensional spline interpolation algorithm was then used to determine the peaks and gradients within the scanned area. The area scan resolution conformed to the requirements of KDB 865664 as shown in Table 8.

Zoom Scan:

A zoom scan was performed around the approximate location of the peak SAR as determined from the area scan. On the basis of this data set, the spatial peak SAR value was evaluated with the following procedure. The zoom scan resolution conformed to the requirements of KDB 865664 as shown in Table 8.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm

Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.

* When zoom scan is required and the *reported* SAR from the *area scan based 1-g SAR estimation* procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.

Table 8: SAR Area and Zoom Scan Resolutions

Interpolation, Extrapolation and Detection of Maxima:

The probe is calibrated at the center of the dipole sensors which is located 1 to 2.7 mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated.

In DASY5, the choice of the coordinate system defining the location of the measurement points has no influence on the uncertainty of the interpolation, Maxima Search and extrapolation routines. The interpolation, extrapolation and maximum search routines are all based on the modified Quadratic Shepard's method.

Thereby, the interpolation scheme combines a least-square fitted function method and a weighted average method which are the two basic types of computational interpolation and approximation. The DASY5 routines construct a once-continuously differentiable function that interpolates the measurement values as follows:

- For each measurement point a trivariate (3-D) / bivariate (2-D) quadratic is computed. It interpolates the measurement values at the data point and forms a least-square fit to neighboring measurement values.
- The spatial location of the quadratic with respect to the measurement values is attenuated by an inverse distance weighting. This is performed since the calculated quadratic will fit measurement values at nearby points more accurate than at points located further away.
- After the quadratics are calculated for at all measurement points, the interpolating function is calculated as a weighted average of the quadratics.

There are two control parameters that govern the behavior of the interpolation method. One specifies the number of measurement points to be used in computing the least-square fits for the local quadratics. These measurement points are the ones nearest the input point for which the quadratic is being computed. The second parameter specifies the number of measurement points that will be used in calculating the weights for the quadratics to produce the final function. The input data points used there are the ones nearest the point at which the interpolation is desired. Appropriate defaults are chosen for each of the control parameters.

The trivariate quadratics that have been previously computed for the 3-D interpolation and whose input data are at the closest distance from the phantom surface, are used in order to extrapolate the fields to the surface of the phantom.

In order to determine all the field maxima in 2-D (Area Scan) and 3-D (Zoom Scan), the measurement grid is refined by a default factor of 10 and the interpolation function is used to evaluate all field values between corresponding measurement points. Subsequently, a linear search is applied to find all the candidate maxima. In a last step, non-physical maxima are removed and only those maxima which are within 2 dB of the global maximum value are retained.

Averaging and Determination of Spatial Peak SAR

The interpolated data is used to average the SAR over the 1g and 10g cubes by spatially discretizing the entire measured volume. The resolution of this spatial grid used to calculate the averaged SAR is 1mm or about 42875 interpolated points. The resulting volumes are defined as cubical volumes containing the appropriate tissue parameters that are centered at the location. The location is defined as the center of the incremental volume.

The spatial-peak SAR must be evaluated in cubical volumes containing a mass that is within 5% of the required mass. The cubical volume centered at each location, as defined above, should be expanded in all directions until the desired value for the mass is reached, with no surface boundaries of the averaging volume extending beyond the outermost surface of the considered region. In addition, the cubical volume should not consist of more than 10% of air. If these conditions are not satisfied then the center of the averaging volume is moved to the next location. Otherwise, the exact size of the final sampling cube is found using an inverse polynomial approximation algorithm, leading to results with improved accuracy. If one boundary of the averaging volume reaches the boundary of the measured volume during its expansion, it will not be evaluated at all. Reference is kept of all locations used and those not used for averaging the SAR. All average SAR values are finally assigned to the centered location in each valid averaging volume.

All locations included in an averaging volume are marked to indicate that they have been used at least once. If a location has been marked as used, but has never been assigned to the center of a cube, the highest averaged SAR value of all other cubical volumes which have used this location for averaging is assigned to this location. Only those locations that are not part of any valid averaging volume should be marked as unused. For the case of an unused location, a new averaging volume must be constructed which will have the unused location centered at one surface of the cube. The remaining five surfaces are expanded evenly in all directions until the required mass is enclosed, regardless of the amount of included air. Of the six possible cubes with one surface centered on the unused location, the smallest cube is used, which still contains the required mass.

If the final cube containing the highest averaged SAR touches the surface of the measured volume, an appropriate warning is issued within the post processing engine.

Power Drift Measurement:

The probe was positioned at precisely the same reference point and the reference power measurement was repeated. The difference between the initial reference power and the final one is referred to as the power drift. The power drift measurement was used to assess the output power stability of the test sample throughout the SAR scan.

RF Ambient Activity:

During the entire SAR evaluation, the RF ambient activity was monitored using a spectrum analyzer with an antenna connected to it. The spectrum analyzer was tuned to the frequency of measurement and with one trace set to max hold mode. In this way, it was possible to determine if at any point during the SAR measurement there was an interfering ambient signal. If an ambient signal was detected, then the SAR measurement was repeated.

7.0 CRITERIA

The following FCC limits for SAR apply to portable devices operating in the General Population/Uncontrolled Exposure environment:

Exposure (General Population/Uncontrolled Exposure environment)	SAR (W/kg)
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

8.0 TEST CONFIGURATION

The zLink is intended to be operated only in the leather pouch which is provided with it. Therefore SAR scans were performed on both the front and back sides of the device while installed in the pouch. The pouch was in direct contact with the phantom surface. The test positions are shown in Figure 7 through Figure 8.

Testing was performed on the middle channel of each operating band first. When the 1g SAR exceeded 0.8W/kg on the middle channel, the low and high channels were also scanned.

No standalone SAR testing was performed on the Bluetooth radio since its output power was below the level necessary for exemption. The calculation for simultaneous transmission exclusion from section 4.3.2 of KDB447498 was used to show that the estimated Bluetooth radio SAR summed with the measured cellular radio SAR was less than the 1.6W/kg limit. See the test result section for this calculation.

Figure 7: Front Test Position

Figure 8: Back Test Position

9.0 TEST RESULTS

The results on the following page(s) were obtained when the device was transmitting at maximum output power. For GSM modes the worst case transmit power was determined by the frame averaged output power since the device supported multi-slot transmissions. Detailed measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are referenced are shown in separate exhibits presented with this application. The measured conducted output power was compared to the power declared by the manufacturer and used for scaling the measured SAR values.

The device was evaluated according to the specific requirements found in FCC KDB 447498[9]. The worst case 1-g SAR value for the cellular transmitter was less than the 1.6mW/g limit.

No standalone SAR testing was performed on the Bluetooth radio since its output power was below the level necessary for exemption.

Repeatability measurements were performed on the worst case configuration for each transmit frequency band (WCDMA Band II and V for this product.)

Conducted Output Power Measurements:

Band	Channel	Frequency (MHz)	GPRS - 1 Tx Slot	GPRS - 2 Tx Slots	GPRS - 3 Tx Slots	GPRS - 4 Tx Slots	EDGE - 1 Tx Slot	EDGE - 2 Tx Slots	EDGE - 3 Tx Slots	EDGE - 4 Tx Slots
	128	824.2	34.1	30.3	29.7	28.1	33.92	31.3	29.21	27.98
	190	836.6	33.9	30	29.5	28.2	33.83	31.1	29.18	28.01
GSM 850	251	848.8	33.7	29.7	29.1	28.1	33.63	31.07	29.22	27.94
	512	1850.2	31.3	28.4	26.6	24.7	31.3	28.4	26.6	24.6
	661	1880	31.7	28.6	26.6	25.3	31.7	28.5	26.5	25.1
GSM 1900	810	1909.8	31.6	28.7	26.6	25.2	31.6	28.6	26.6	25.2

Table 9: GSM Burst Average Power Conducted Power Measurements

Band	Channel	Frequency (MHz)	GPRS - 1 Tx Slot	GPRS - 2 Tx Slots	GPRS - 3 Tx Slots	GPRS - 4 Tx Slots	EDGE - 1 Tx Slot	EDGE - 2 Tx Slots	EDGE - 3 Tx Slots	EDGE - 4 Tx Slots
	128	824.2	25.07	24.28	25.44	25.09	24.89	25.28	24.95	24.97
	190	836.6	24.87	23.98	25.24	25.19	24.80	25.08	24.92	25.00
GSM 850	251	848.8	24.67	23.68	24.84	25.09	24.60	25.05	24.96	24.93
	512	1850.2	22.27	22.38	22.34	21.69	22.27	22.38	22.34	21.59
	661	1880	22.67	22.58	22.34	22.29	22.67	22.48	22.24	22.09
GSM 1900	810	1909.8	22.57	22.68	22.34	22.19	22.57	22.58	22.34	22.19

Table 10: GSM Frame Average Power Conducted Power Measurements (For Determining the Worst Case Transmit Mode)

Band	Mode	UL Channel	Frequency (MHz)	Avg. Pwr (dBm)
		4132	826.4	24.97
		4183	836.6	24.98
UMTS850 (Band V)	Rel 99 12.2kbps RMC	4233	846.6	24.89
		9262	1852.4	24.71
		9400	1880	24.63
UMTS1900 (Band II)	Rel 99 12.2kbps RMC	9538	1907.6	24.44

Table 11: WCDMA Conducted Power Measurements

Standalone SAR Measurements:

Body Mode SAR Results Using 900MHz MSL									
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
190	836.60	GSM850, 4TX Slots	Front	0 Pouch	0.43	0.66	0.86	33.90	35.00
			Back	0 Pouch	-0.11	0.53	0.69	33.90	35.00
1g SAR Limit = 1.6W/kg									

Table 12: GSM850 SAR Results

Body Mode SAR Results Using 1900MHz MSL									
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
661	1880.00	GSM1900, 4 TX Slots	Front	0 Pouch	0.02	0.54	0.58	31.70	32.00
			Back	0 Pouch	-0.14	0.23	0.25	31.70	32.00
1g SAR Limit = 1.6W/kg									

Table 13: GSM1900 SAR Results

Body Mode SAR Results Using 900MHz MSL									
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
4183	836.60	WCDMA Band V	Front	0 Pouch	-0.39	0.97	0.97	24.98	25.00
			Back	0 Pouch	0.08	0.82	0.82	24.98	25.00
4132	826.40	WCDMA Band V	Front	0 Pouch	-0.08	0.94	0.95	24.97	25.00
			Back	0 Pouch	-0.66	0.73	0.73	24.97	25.00
4233	846.60	WCDMA Band V	Front	0 Pouch	-0.37	1.01	1.04	24.89	25.00
			Back	0 Pouch	-0.62	0.79	0.81	24.89	25.00
1g SAR Limit = 1.6W/kg									

Table 14: WCDMA Band V SAR Results

Body Mode SAR Results Using 900MHz MSL								
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Original Measured SAR 1g (W/kg)	1st Repeated Measured SAR 1g (W/kg)	2nd Reported SAR 1g (W/kg)	Ratio
4233	846.60	WCDMA Band V	Front	0 Pouch	1.01	0.87	NA	1.16

Table 15: WCDMA Band V Repeatability Measurement

Body Mode SAR Results Using 1900MHz MSL									
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
9262	1852.40	WCDMA Band II	Front	0 Pouch	0.38	1.34	1.43	24.71	25.00
			Back	0 Pouch	0.32	0.43	0.46	24.71	25.00
9400	1880.00	WCDMA Band II	Front	0 Pouch	-0.33	1.27	1.38	24.63	25.00
			Back	0 Pouch	0.02	0.34	0.37	24.63	25.00
9538	1907.60	WCDMA Band II	Front	0 Pouch	-0.62	0.83	0.95	24.44	25.00
			Back	0 Pouch	-0.25	0.25	0.29	24.44	25.00
1g SAR Limit = 1.6W/kg									

Table 16: WCDMA Band II SAR Results

Body Mode SAR Results Using 1900MHz MSL								
Channel	Frequency (MHz)	Mode	Position	Seperation Distance (mm)	Original Measured SAR 1g (W/kg)	1st Repeated Measured SAR 1g (W/kg)	2nd Reported SAR 1g (W/kg)	Ratio
9262	1852.40	WCDMA Band II	Front	0 Pouch	1.34	1.29	NA	1.04

Table 17: WCDMA Band II Repeatability Measurement

Simultaneous Transmission Calculations (Bluetooth and Cellular Radio):

Highest Bluetooth output power = 1.8mW

Estimated Bluetooth 1-g SAR = (1.8mW / 5mm) * (Sqrt [2.48Ghz]/7.5)

Estimated Bluetooth 1-g SAR = 0.075W/kg

Worst case measured Cellular Radio 1-g SAR = 1.38W/kg

Worst case simultaneous TX 1-g SAR = 0.075W/kg + 1.38W/kg = 1.455W/kg

Since the sum of the estimated Bluetooth 1-g SAR and worst case Cellular 1-g SAR is less than the 1.6W/kg limit, the device qualifies for the simultaneous TX exclusion outlined in 4.3.2 of KDB447498.

SAR Test Exclusions:

No standalone SAR testing was performed on the Bluetooth radio since its output power (1.8mW) was below the level necessary for exemption.

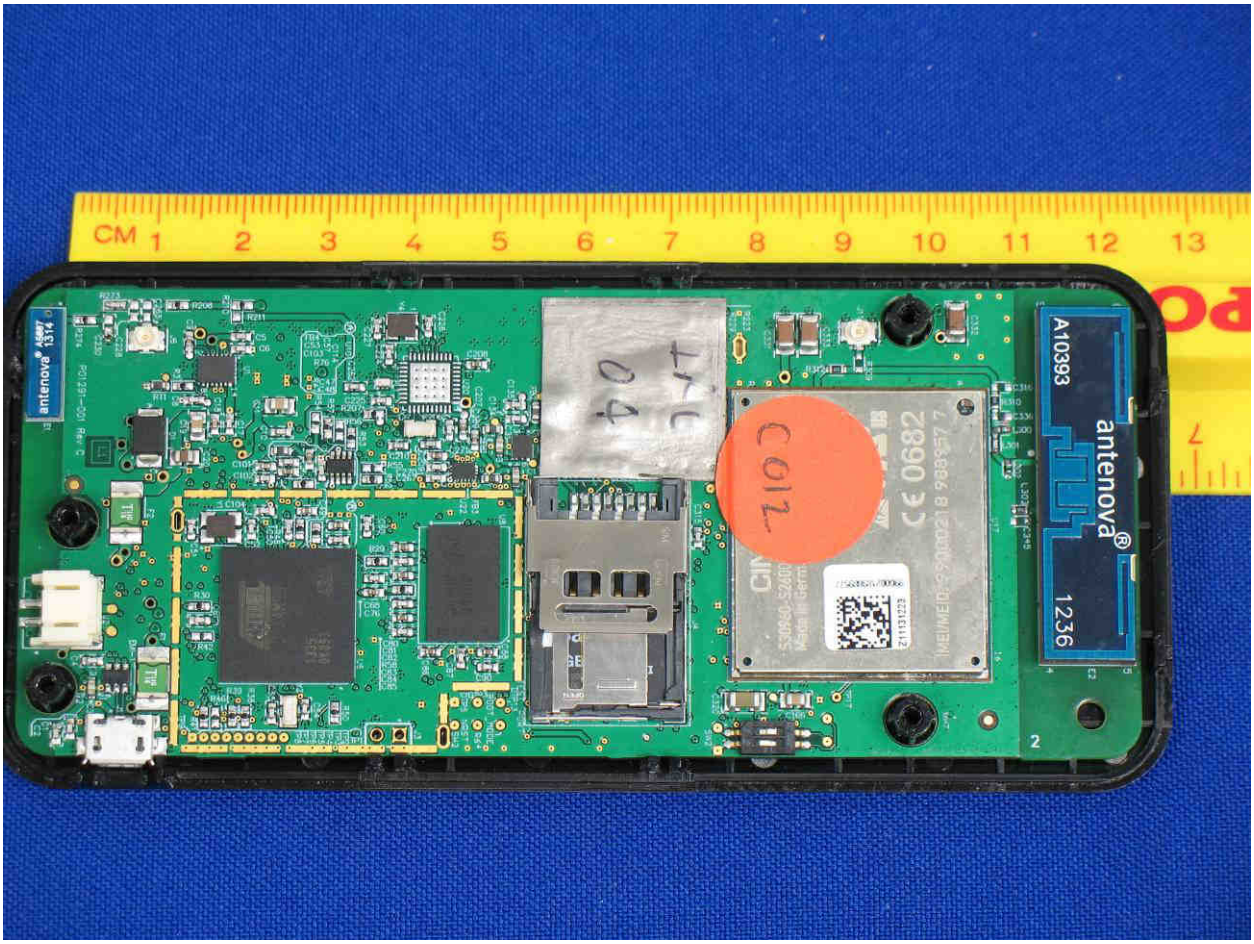


Figure 9: Antenna Spacing

10.0 REFERENCES

[1] ANSI, *ANSI/IEEE C95.1-1991: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz*, The Institute of electrical and Electronics Engineers, Inc., New York, NY 10017, 1992

[2] Federal Communications Commission, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Supplement C (Edition 01-01) to OET Bulletin 65 (Edition 97-01), FCC, Washington, D.C. 20554, 1997

[3] Thomas Schmid, Oliver Egger, and Niels Kuster, "Automated E-field scanning system for dosimetric assessments", *IEEE Transaction on Microwave Theory and Techniques*, vol. 44, pp. 105-113, Jan. 1996.

[4] Niels Kuster, Ralph Kastle, and Thomas Schmid, "Dosimetic evaluation of mobile communications equipment with know precision", IEICE Transactions on Communications, vol. E80-B, no. 5, pp.645-652, May 1997.

[5] NIS81, NAMAS, "The treatment of uncertainty in EMC measurement", Tech. Rep., NAMAS Executive, National Physical Laboratory, Teddinton, Middlesex, England, 1994.

[6] Barry N. Tayor and Chris E. Kuyatt, "Guidelines for evaluating and expressing the uncertainty of NIST measurement results", Tech. Rep., National Institute of Standards and Technology, 1994.

[7] Federal Communications Commission, KDG 248227 - "SAR Measurement Procedures for 802.11 a/b/g Transmitters"

[8] Federal Communications Commission, KDB 648474 – "SAR Evaluation Considerations for Handsets with Multiple Transmitters and Antennas".

[9] Federal Communications Commission, KDB 447498 – "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies".

[10] Federal Communications Commission, KDB 616217 – "SAR Evaluation Considerations for Laptop Computers with Antennas Built-in on Display Screens".

[11] Federal Communications Commission, KDB 450824 – "SAR Probe Calibration and System Verification Considerations for Measurements at 150MHz – 3GHz".

[12] Federal Communications Commission, KDB 865664 – "SAR Measurement Requirements for 3-6GHz".

[13] Federal Communications Commission, KDB 941225 – "SAR Measurement Procedures for 3G Devices".

[14] ANSI, ANSI/IEEE C63.10-2009: American National Standard for Testing Unlicensed Wireless Devices.

11.0 APPENDIX – SAR PLOTS

Date/Time: 4/7/2014 4:08:48 PM

Test Laboratory: Intertek
File Name: GSM 850.da52:4

GSM 850 Front

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic GSM 4slot (0); Communication System Band: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.26464

Medium parameters used: f = 836.6 MHz; σ = 1.01 S/m; ε_r = 53.7; ρ = 1000 kg/m^3

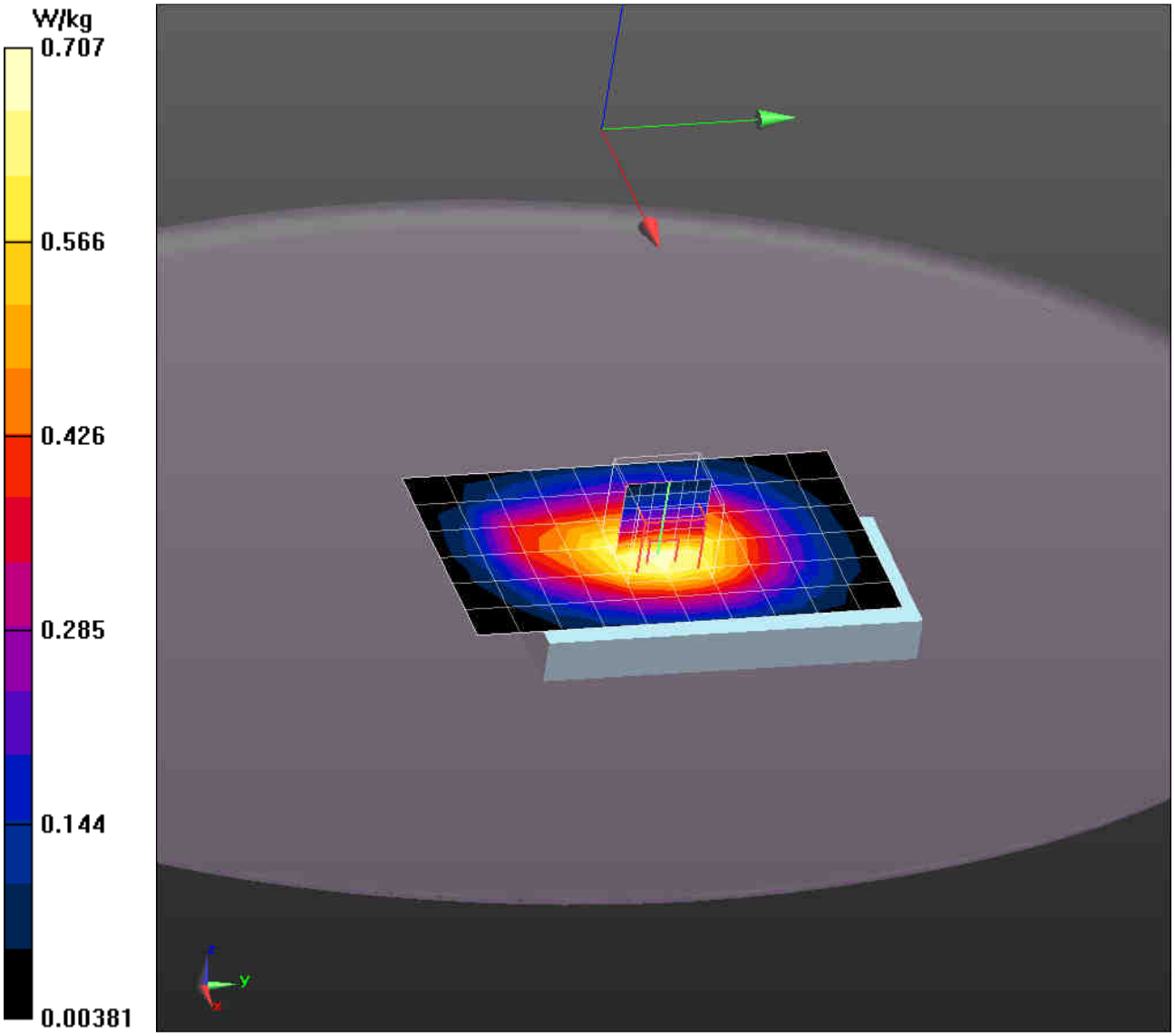
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_7_2014/Front Side of Device Against Phantom Mid Channel/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.707 W/kg

GSM Flat-Section Testing on 4_7_2014/Front Side of Device Against Phantom Mid Channel/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.174 V/m; Power Drift = 0.43 dB
Peak SAR (extrapolated) = 0.867 W/kg
SAR(1 g) = 0.664 W/kg; SAR(10 g) = 0.490 W/kg
Maximum value of SAR (measured) = 0.806 W/kg


W/kg
0.707
0.566
0.426
0.285
0.144
0.00381

Date/Time: 4/7/2014 4:49:29 PM

Test Laboratory: Intertek
File Name: GSM 850.da52:4

GSM 850 Back

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic GSM 4slot (0); Communication System Band: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2.26464

Medium parameters used: f = 836.6 MHz; σ = 1.01 S/m; εr = 53.7; ρ = 1000 kg/m3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

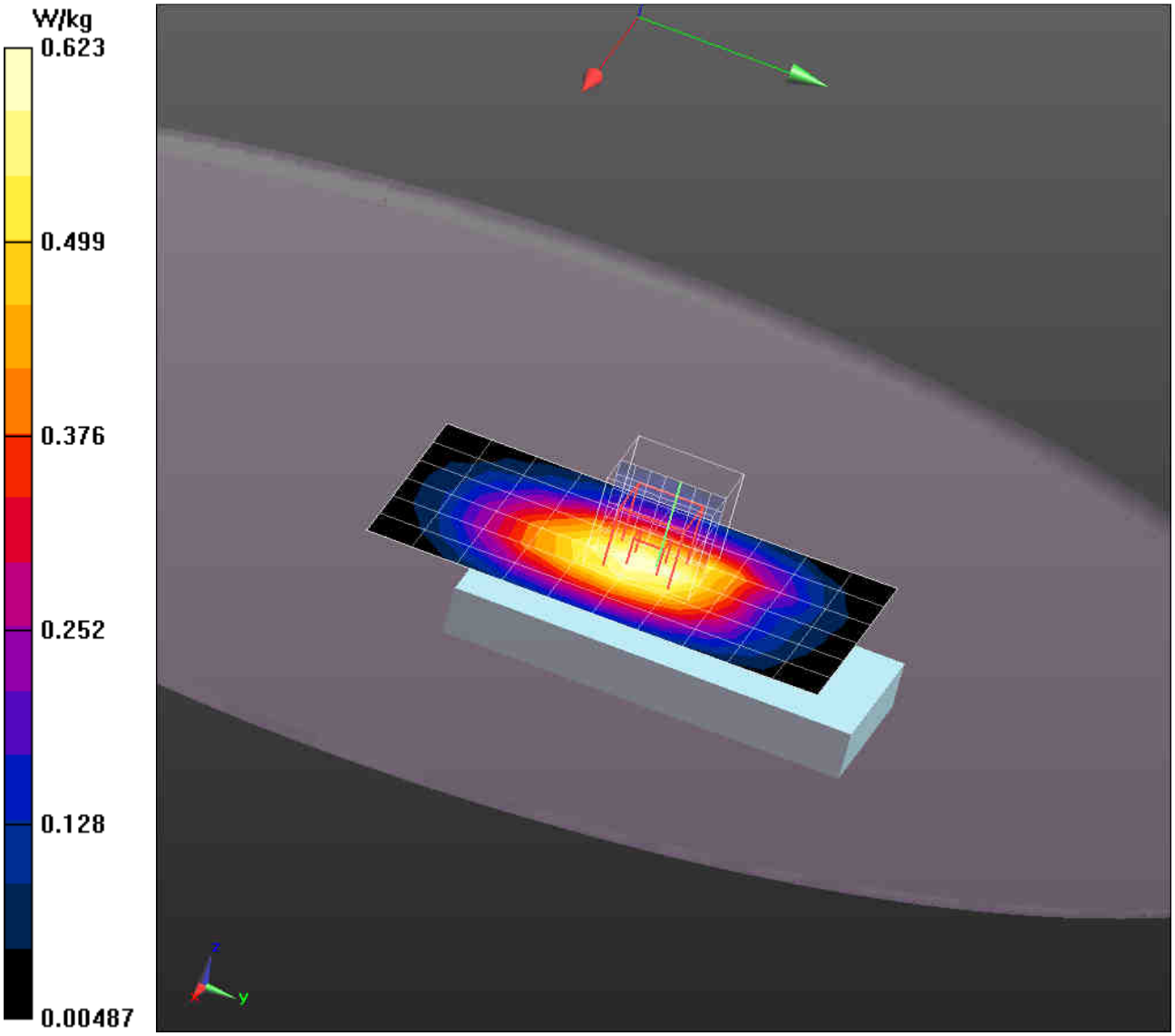
Electronics: DAE4 Sn358; Calibrated: 9/13/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_7_2014/Back Side of Device Against Phantom Mid Channel 2/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.623 W/kg

GSM Flat-Section Testing on 4_7_2014/Back Side of Device Against Phantom Mid Channel 2/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.832 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.677 W/kg
SAR(1 g) = 0.533 W/kg; SAR(10 g) = 0.400 W/kg
Maximum value of SAR (measured) = 0.633 W/kg


W/kg
0.623
0.499
0.376
0.252
0.128
0.00487

Test Laboratory: Intertek
File Name: GSM 1900.da52:4

GSM 1900 Front Side

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic GSM 4slot (0); Communication System Band: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.26464

Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 53.1; ρ = 1000 kg/m^3

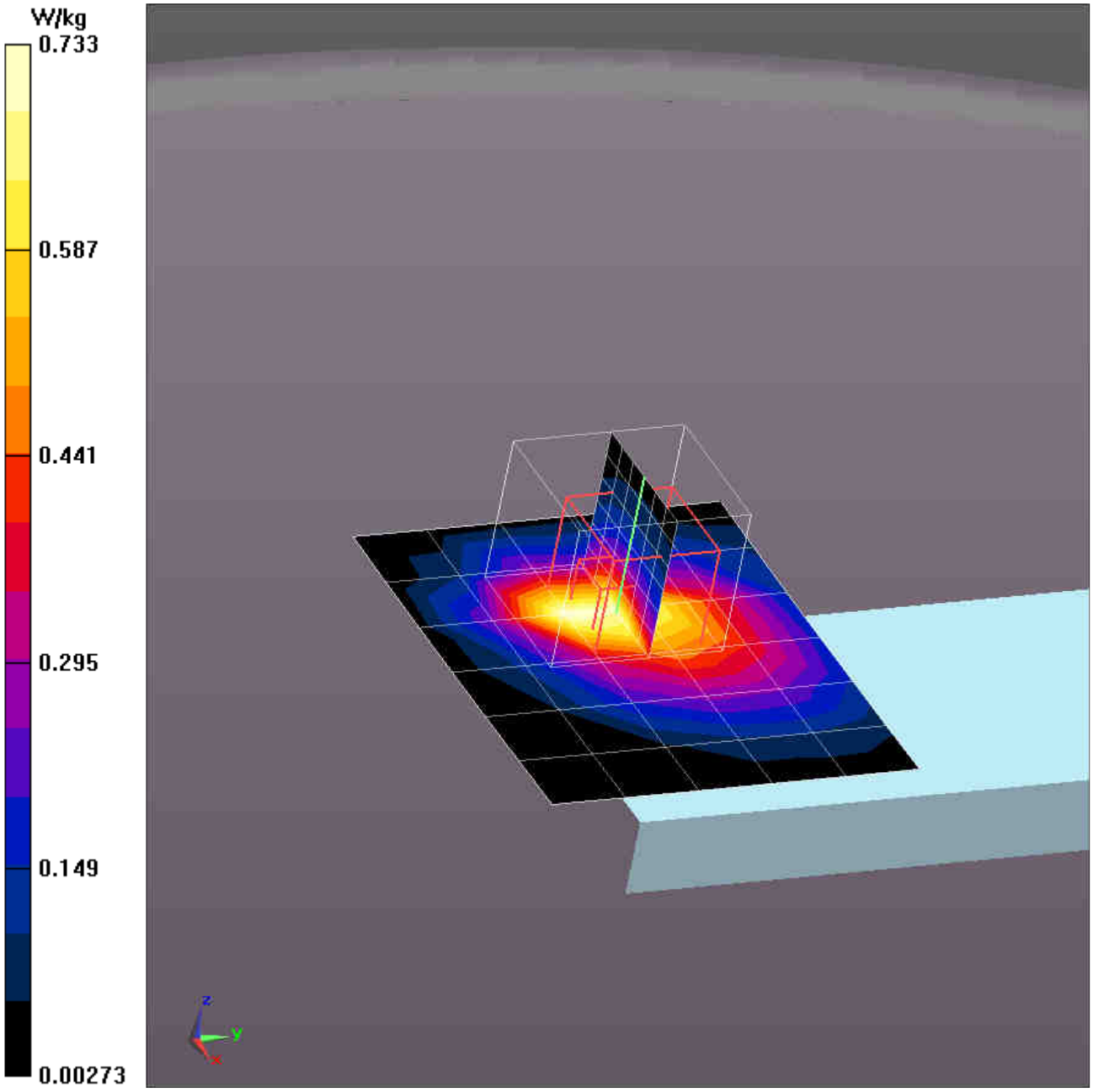
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom Mid Channel IN POUCH/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.733 W/kg

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom Mid Channel IN POUCH/Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.239 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.894 W/kg
SAR(1 g) = 0.538 W/kg; SAR(10 g) = 0.312 W/kg
Maximum value of SAR (measured) = 0.756 W/kg


W/kg
0.733
0.587
0.441
0.295
0.149
0.00273
z
y
x

Date/Time: 4/6/2014 1:51:01 PM

Test Laboratory: Intertek
File Name: GSM 1900.da52:4

GSM 1900 Back Side

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic GSM 4slot (0); Communication System Band: GSM 1900; Frequency: 1880 MHz;Duty Cycle: 1:2.26464

Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 53.1; ρ = 1000 kg/m^3

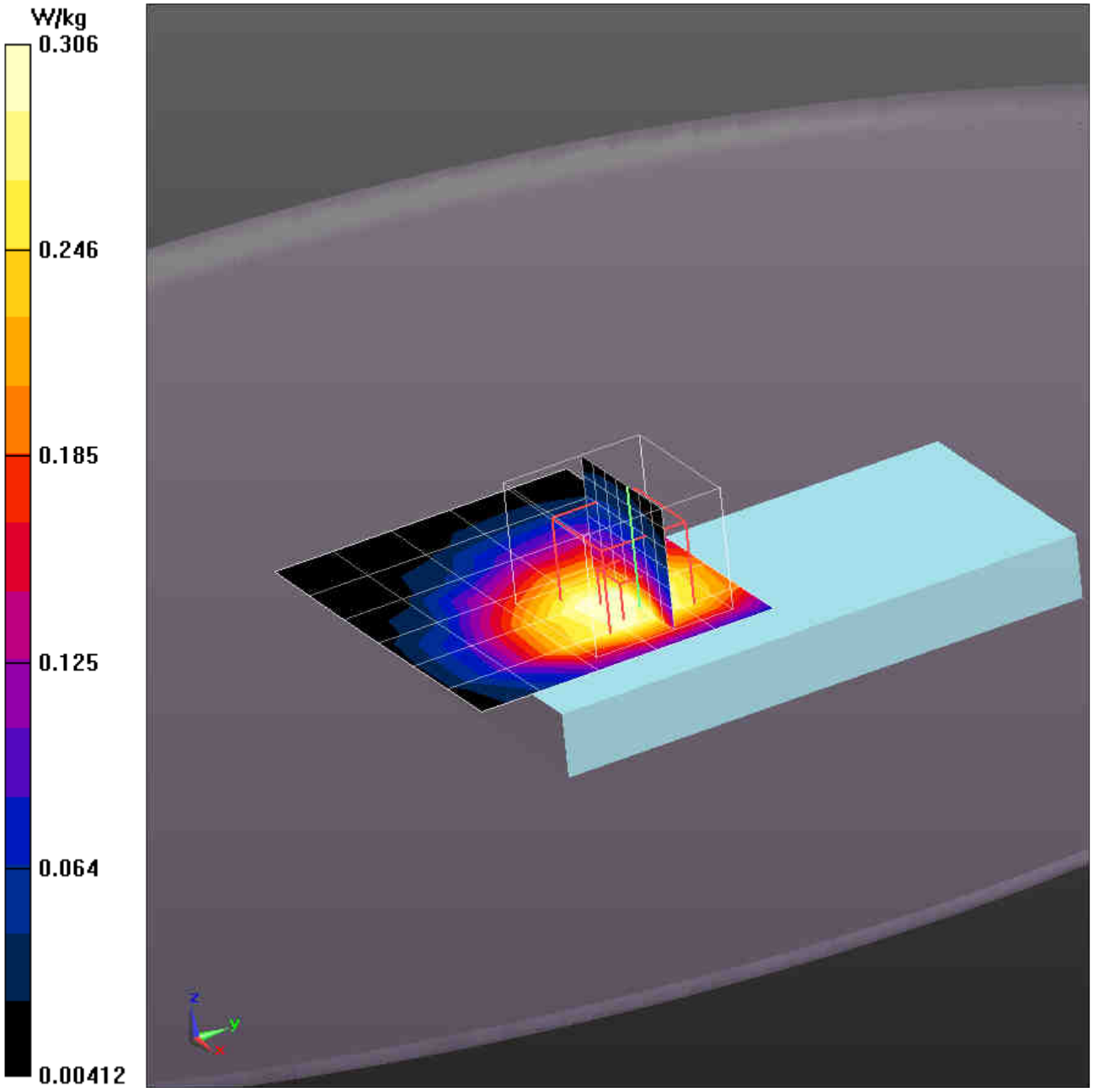
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom Mid Channel IN POUCH/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.306 W/kg

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom Mid Channel IN POUCH/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.967 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.354 W/kg
SAR(1 g) = 0.233 W/kg; SAR(10 g) = 0.148 W/kg
Maximum value of SAR (measured) = 0.311 W/kg


W/kg
0.306
0.246
0.185
0.125
0.064
0.00412

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Front: Low Frequency = 1852.4Mhz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1852.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.514 S/m; ε_r = 53.183; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

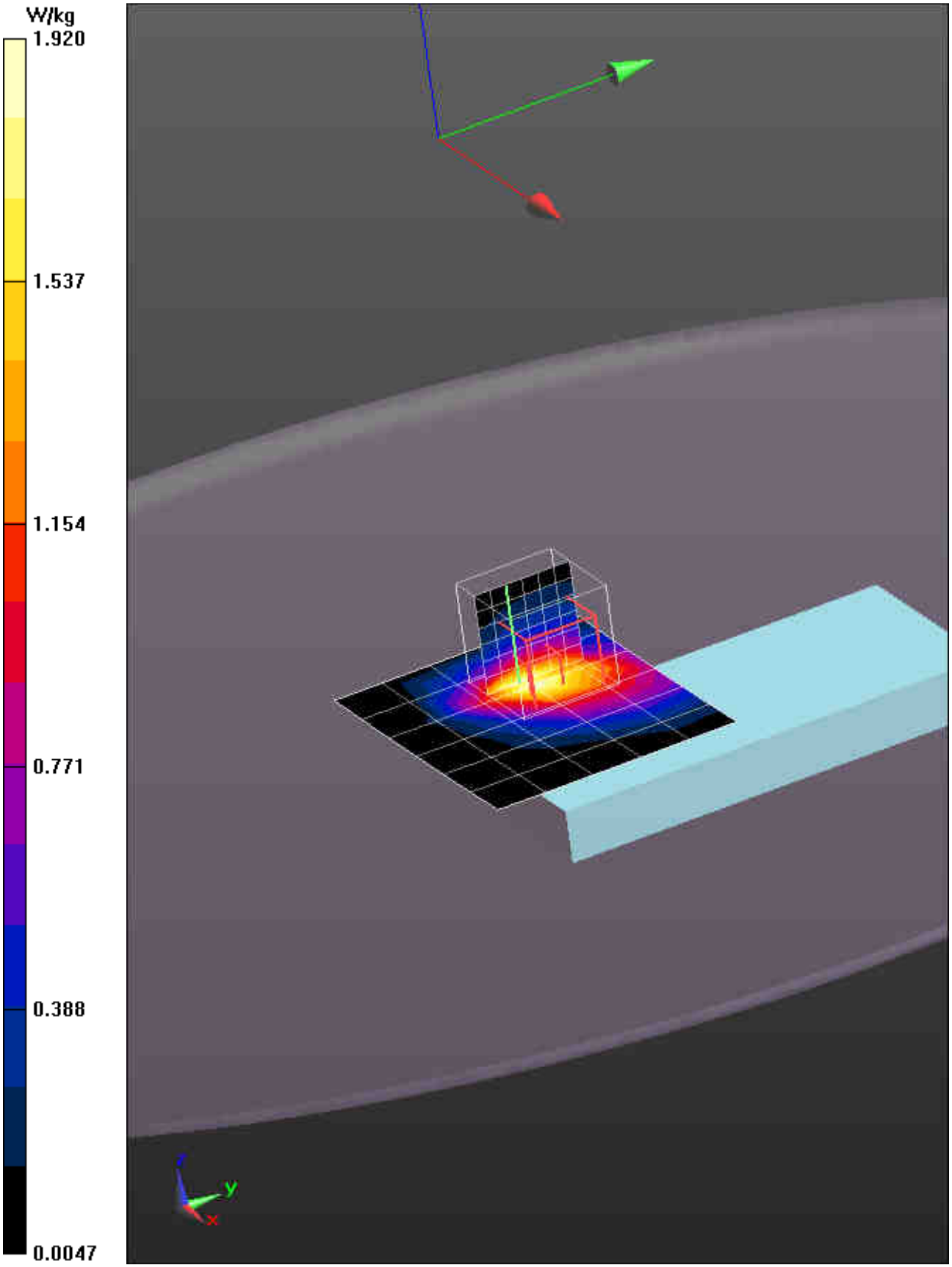
WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH 2/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.92 W/kg

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 14.047 V/m; Power Drift = 0.38 dB
Peak SAR (extrapolated) = 2.25 W/kg
SAR(1 g) = 1.34 W/kg; SAR(10 g) = 0.779 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.91 W/kg


W/kg
1.920
1.537
1.154
0.771
0.388
0.0047
z
y
x

Date/Time: 4/9/2014 11:40:26 AM

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Front: Mid Frequency= 1880MHz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 53.1; ρ = 1000 kg/m^3

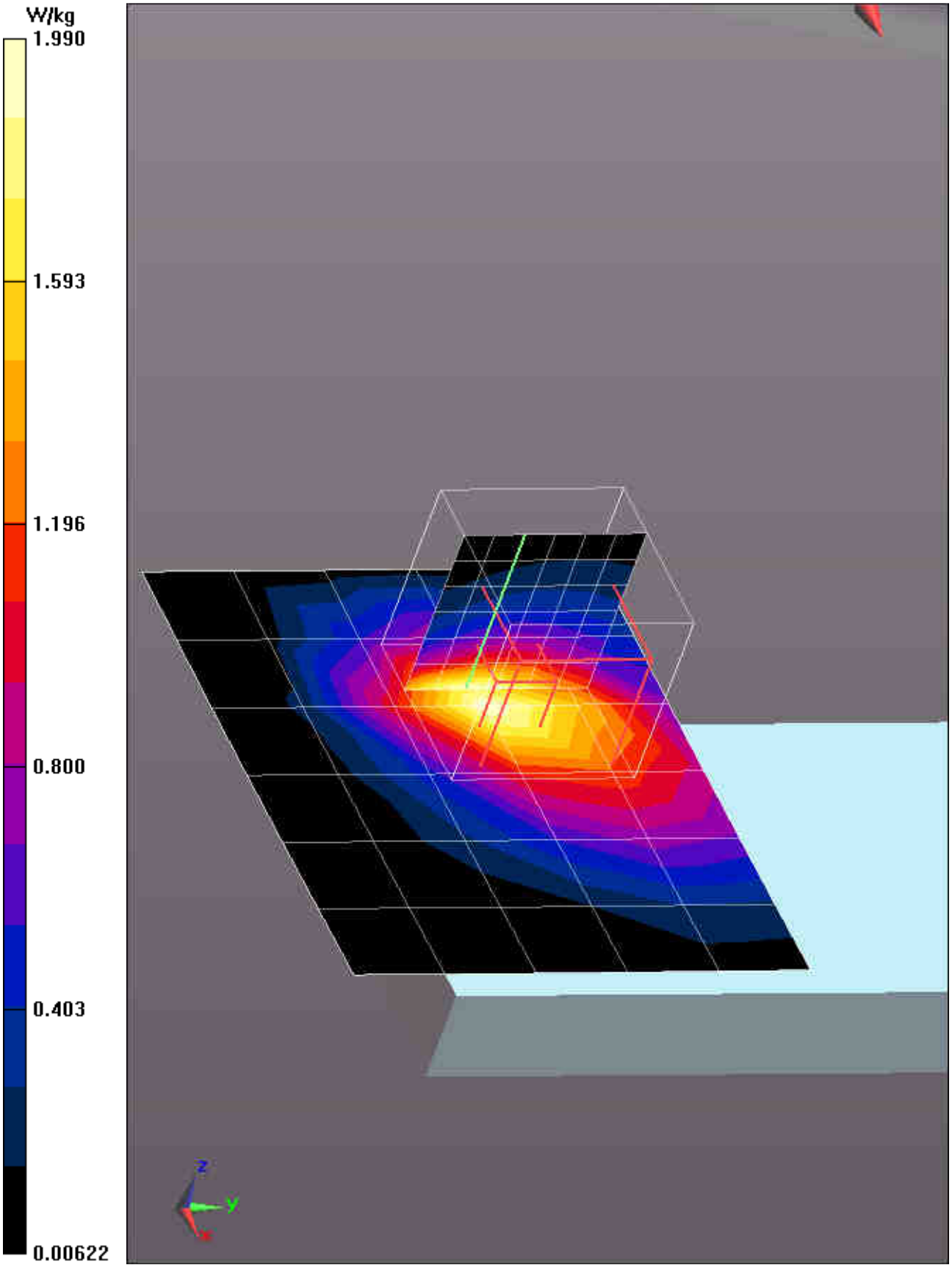
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.99 W/kg

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.863 V/m; Power Drift = -0.33 dB
Peak SAR (extrapolated) = 2.14 W/kg
SAR(1 g) = 1.27 W/kg; SAR(10 g) = 0.732 W/kg
Maximum value of SAR (measured) = 1.79 W/kg


W/kg
1.990
1.593
1.196
0.800
0.403
0.00622
z
y

Date/Time: 4/9/2014 12:31:27 PM

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Front: High Frequency= 1907.6MHz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1907.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.554 S/m; ε_r = 52.57; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

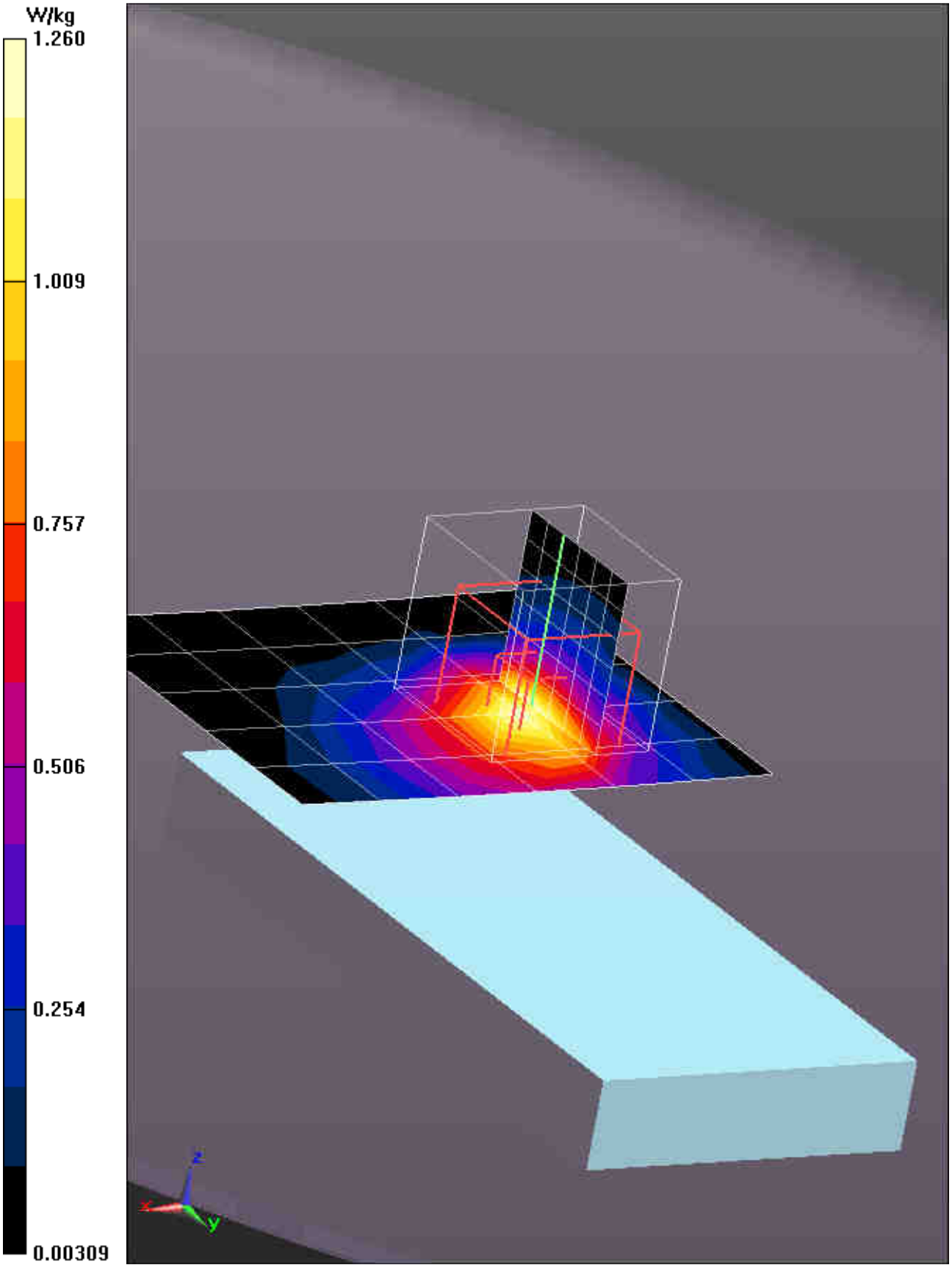
- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH 2 2/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.26 W/kg

WWAN Flat-Section MSL Testing/Front Side of Device Against Phantom IN POUCH 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.014 V/m; Power Drift = -0.62 dB
Peak SAR (extrapolated) = 1.45 W/kg
SAR(1 g) = 0.834 W/kg; SAR(10 g) = 0.471 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.22 W/kg


W/kg
1.260
1.009
0.757
0.506
0.254
0.00309
z
x
y

Date/Time: 4/9/2014 1:54:33 PM

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Back: Low Frequency= 1852.4MHz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1852.4 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.514 S/m; ε_r = 53.183; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

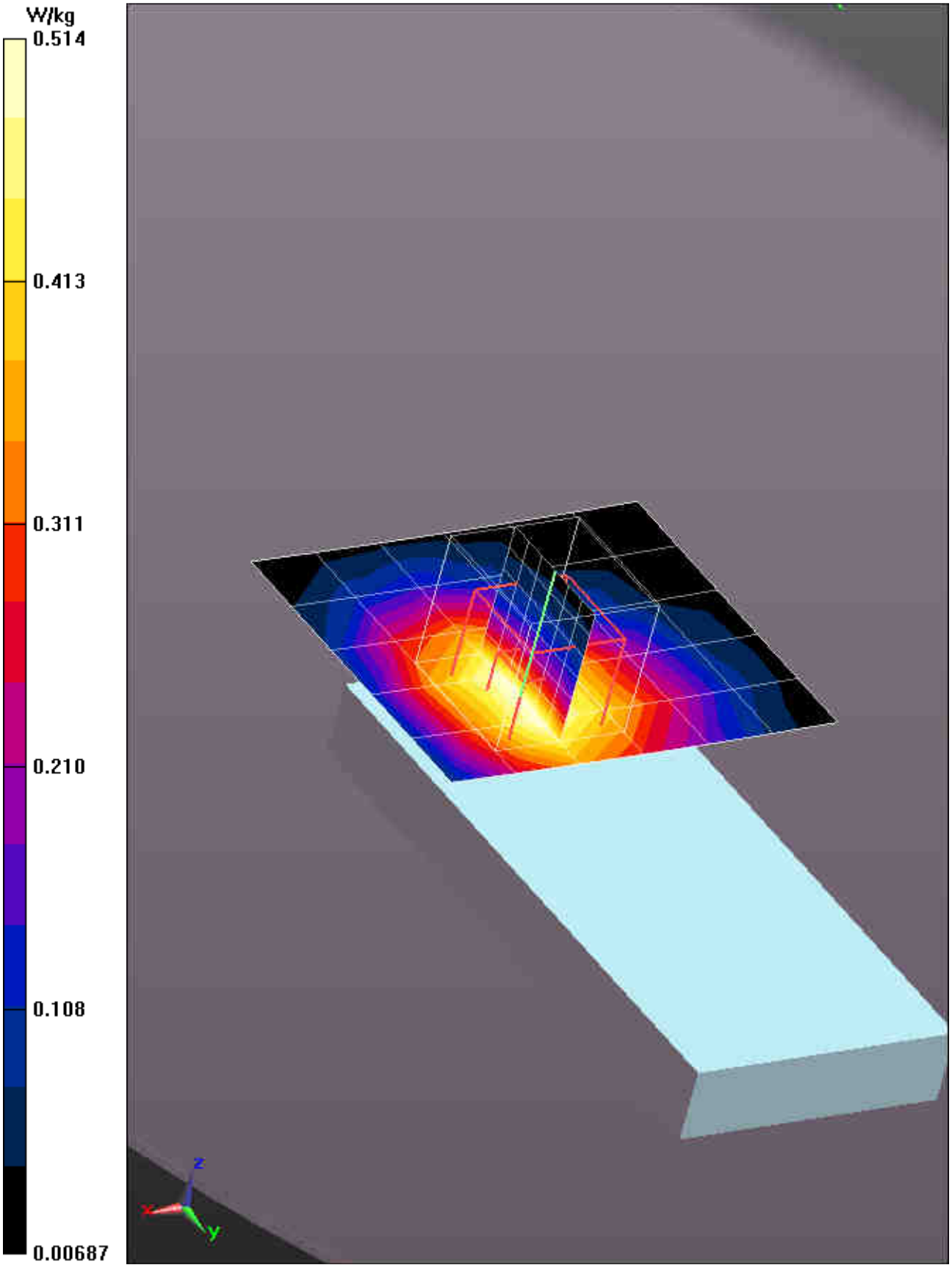
- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH 2 3/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.514 W/kg

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH 2 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.822 V/m; Power Drift = 0.32 dB
Peak SAR (extrapolated) = 0.654 W/kg
SAR(1 g) = 0.432 W/kg; SAR(10 g) = 0.276 W/kg

Maximum value of SAR (measured) = 0.574 W/kg


W/kg
0.514
0.413
0.311
0.210
0.108
0.00687
z
x
y

Date/Time: 4/9/2014 1:22:06 PM

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Back: Mid Frequency= 1880MHz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1880 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1880 MHz; σ = 1.57 S/m; ε_r = 53.1; ρ = 1000 kg/m^3

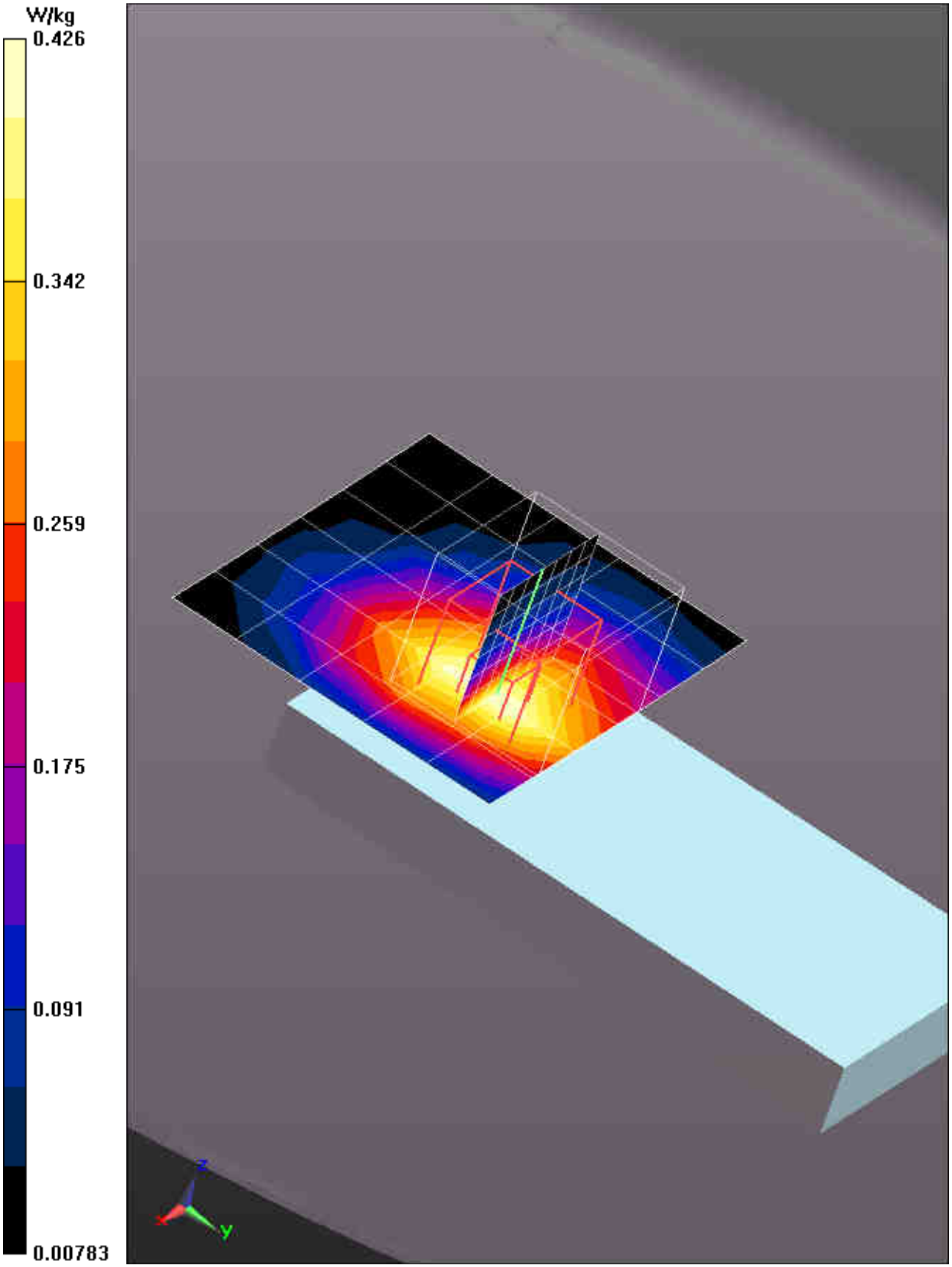
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.426 W/kg

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.964 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 0.519 W/kg
SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.212 W/kg
Maximum value of SAR (measured) = 0.459 W/kg


W/kg
0.426
0.342
0.259
0.175
0.091
0.00783
z
x
y

Date/Time: 4/9/2014 12:56:27 PM

Test Laboratory: Intertek
File Name: WCDMA Band II.da52:4

WCDMA Band II (Back: High Frequency= 1907.6MHz)

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band II; Frequency: 1907.6 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1907.6 MHz; σ = 1.554 S/m; ε_r = 52.57; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

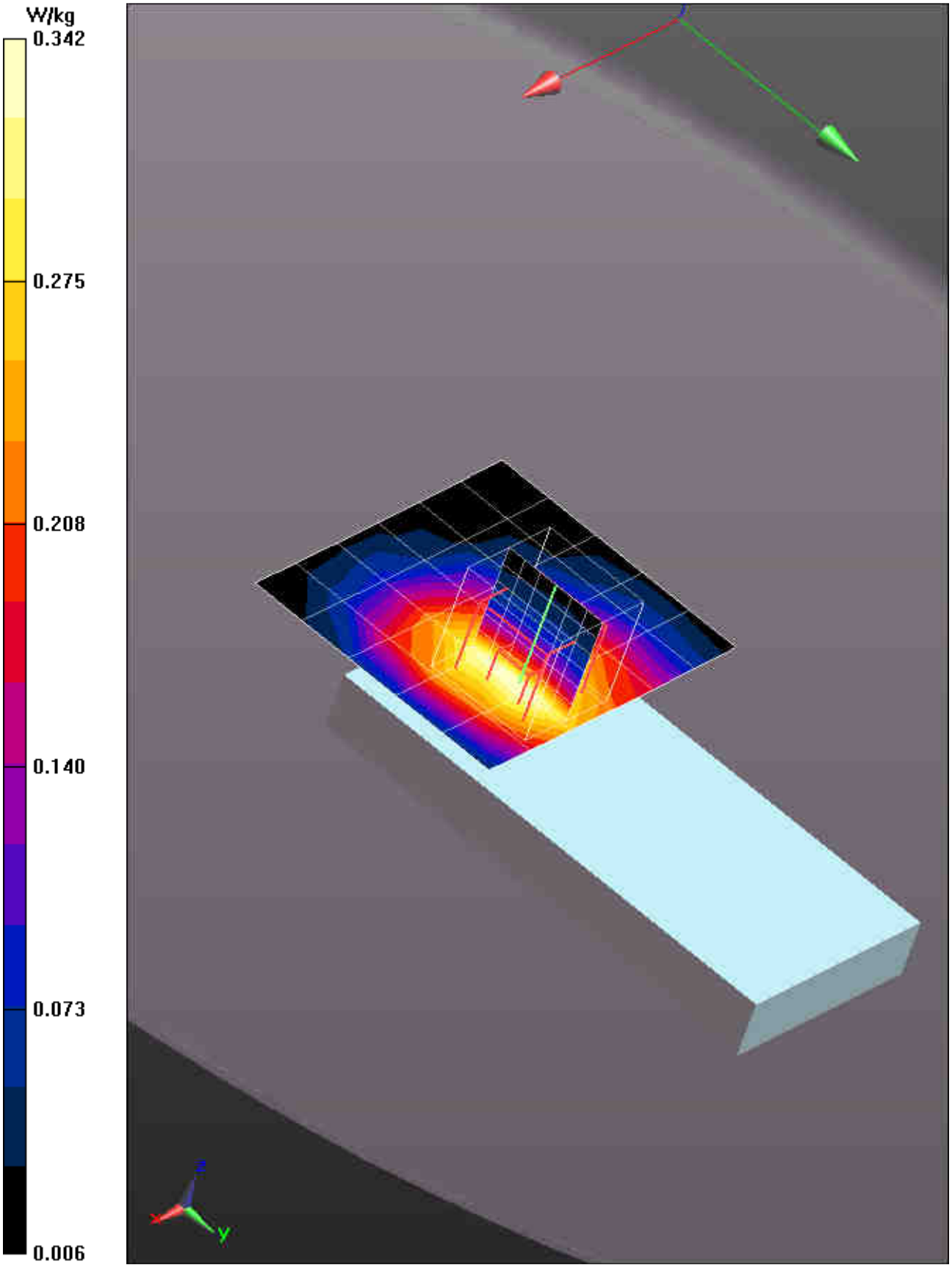
- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH 2 2 2/Area Scan (7x6x1): Measurement grid: dx=15mm, dy=15mm

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

WWAN Flat-Section MSL Testing/Back Side of Device Against Phantom IN POUCH 2 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.093 V/m; Power Drift = -0.26 dB
Peak SAR (extrapolated) = 0.383 W/kg
SAR(1 g) = 0.251 W/kg; SAR(10 g) = 0.161 W/kg

Maximum value of SAR (measured) = 0.336 W/kg


W/kg
0.342
0.275
0.208
0.140
0.073
0.006
z
y

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 836.6 MHz; σ = 1.01 S/m; ε_r = 52.6; ρ = 1000 kg/m^3

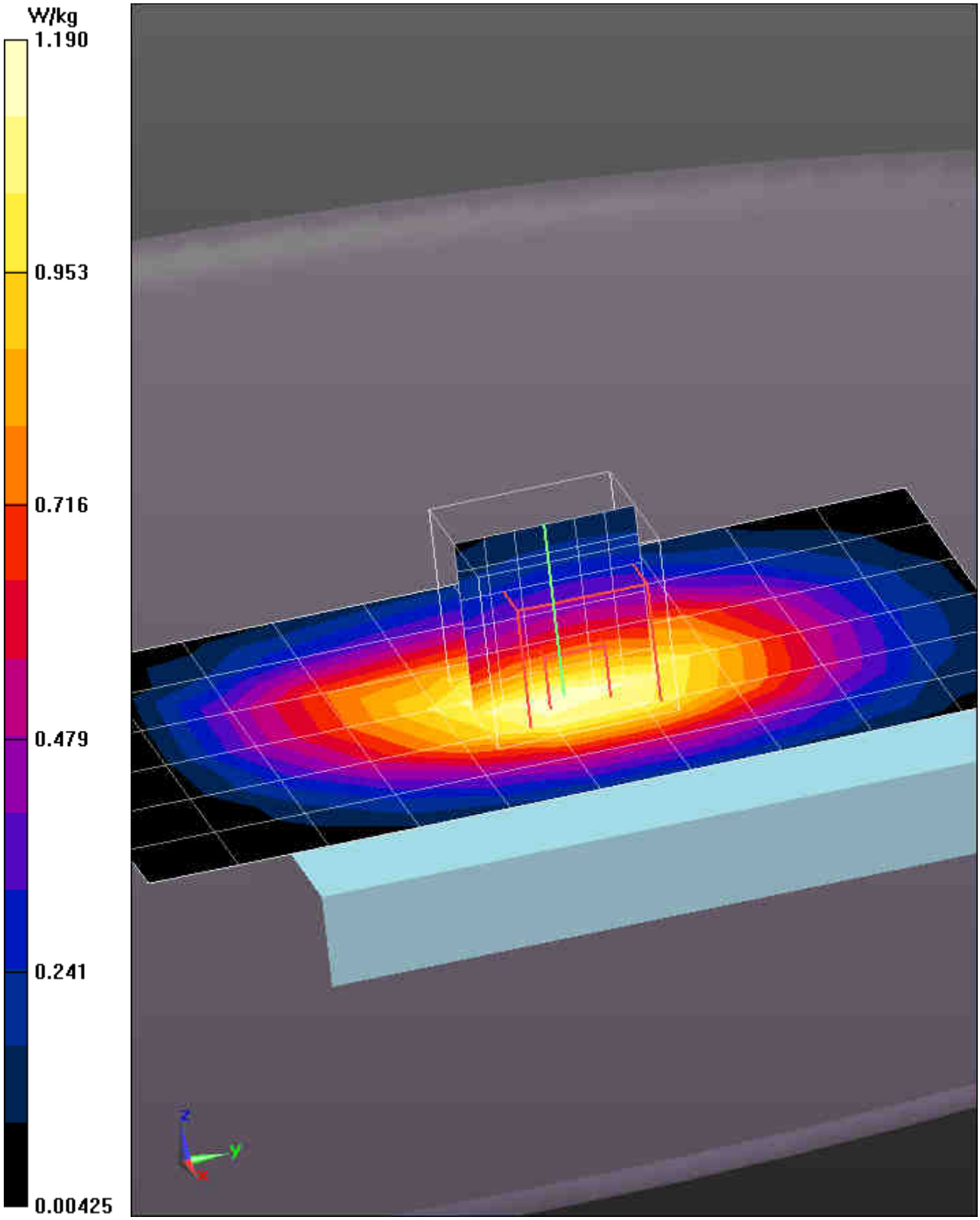
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom Mid Channel/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.19 W/kg

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom Mid Channel/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.965 V/m; Power Drift = -0.39 dB
Peak SAR (extrapolated) = 1.28 W/kg
SAR(1 g) = 0.968 W/kg; SAR(10 g) = 0.708 W/kg
Maximum value of SAR (measured) = 1.18 W/kg


W/kg
1.190
0.953
0.716
0.479
0.241
0.00425
z
y
x

Date/Time: 4/8/2014 3:26:21 PM

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 846.6 MHz; σ = 1.02 S/m; ε_r = 52.5; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

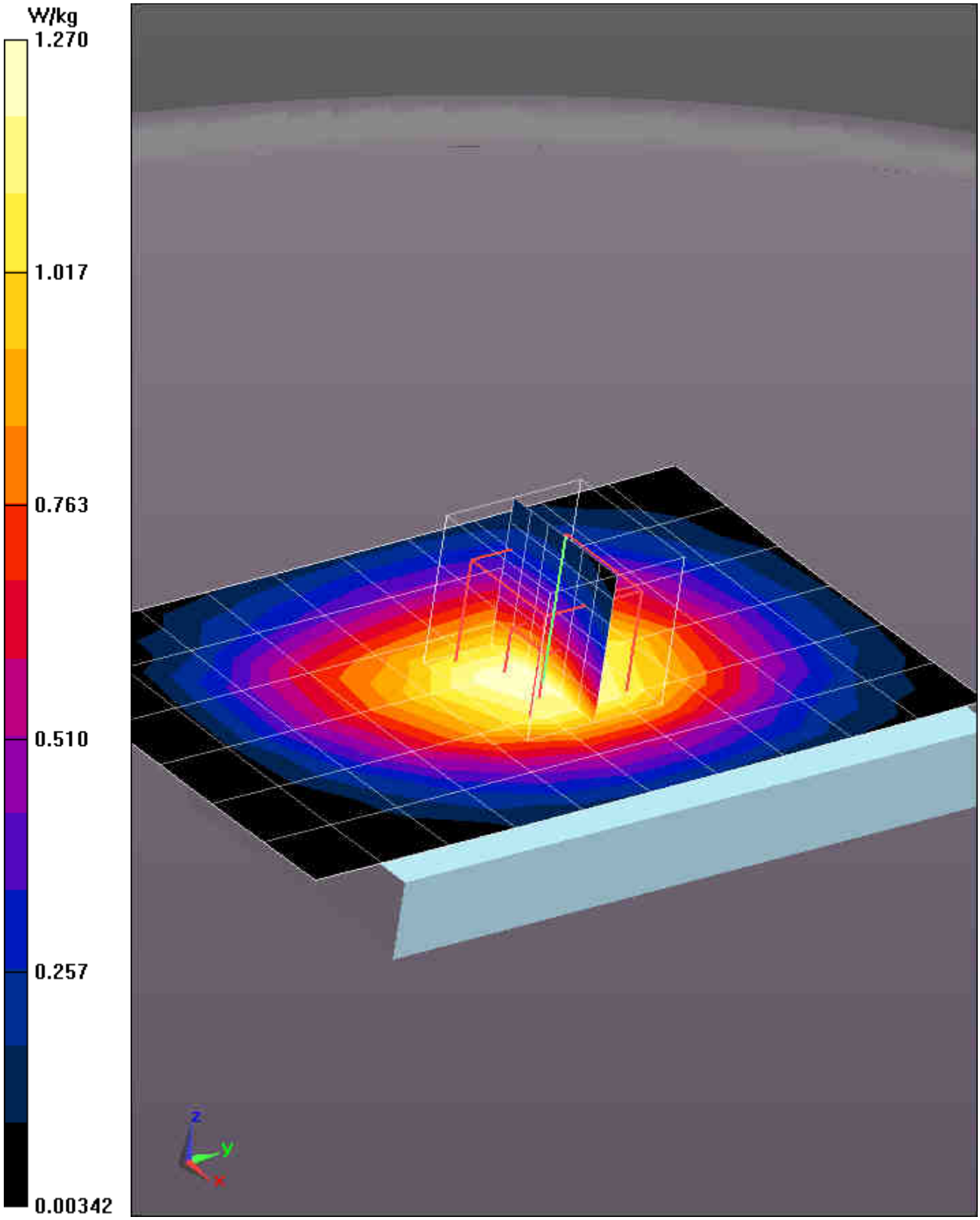
- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom High Channel 2 2/Area Scan (7x11x1):

Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.27 W/kg

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom High Channel 2 2/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.502 V/m; Power Drift = -0.37 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.738 W/kg
Maximum value of SAR (measured) = 1.23 W/kg


W/kg
1.270
1.017
0.763
0.510
0.257
0.00342
z
y
x

Date/Time: 4/8/2014 3:52:43 PM

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used: f = 826.4 MHz; σ = 1 S/m; ε_r = 52.69; ρ = 1000 kg/m^3

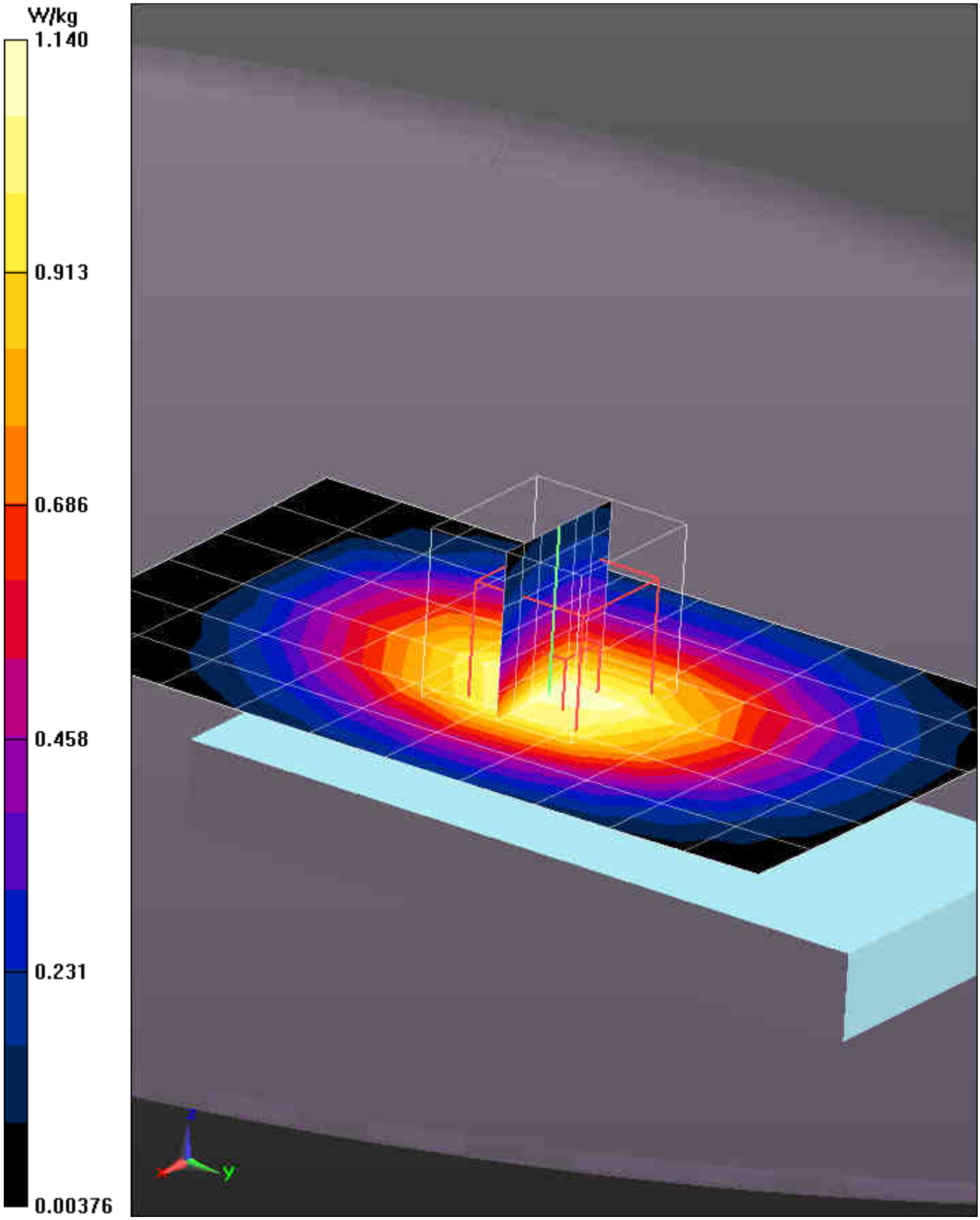
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom Low Channel 2/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.14 W/kg

GSM Flat-Section Testing on 4_8_2014/Front Side of Device Against Phantom Low Channel 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.104 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.943 W/kg; SAR(10 g) = 0.685 W/kg
Maximum value of SAR (measured) = 1.16 W/kg


W/kg
1.140
0.913
0.686
0.458
0.231
0.00376
z
y

Date/Time: 4/8/2014 11:22:39 AM

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 836.6 MHz; σ = 1.01 S/m; ε_r = 52.6; ρ = 1000 kg/m^3

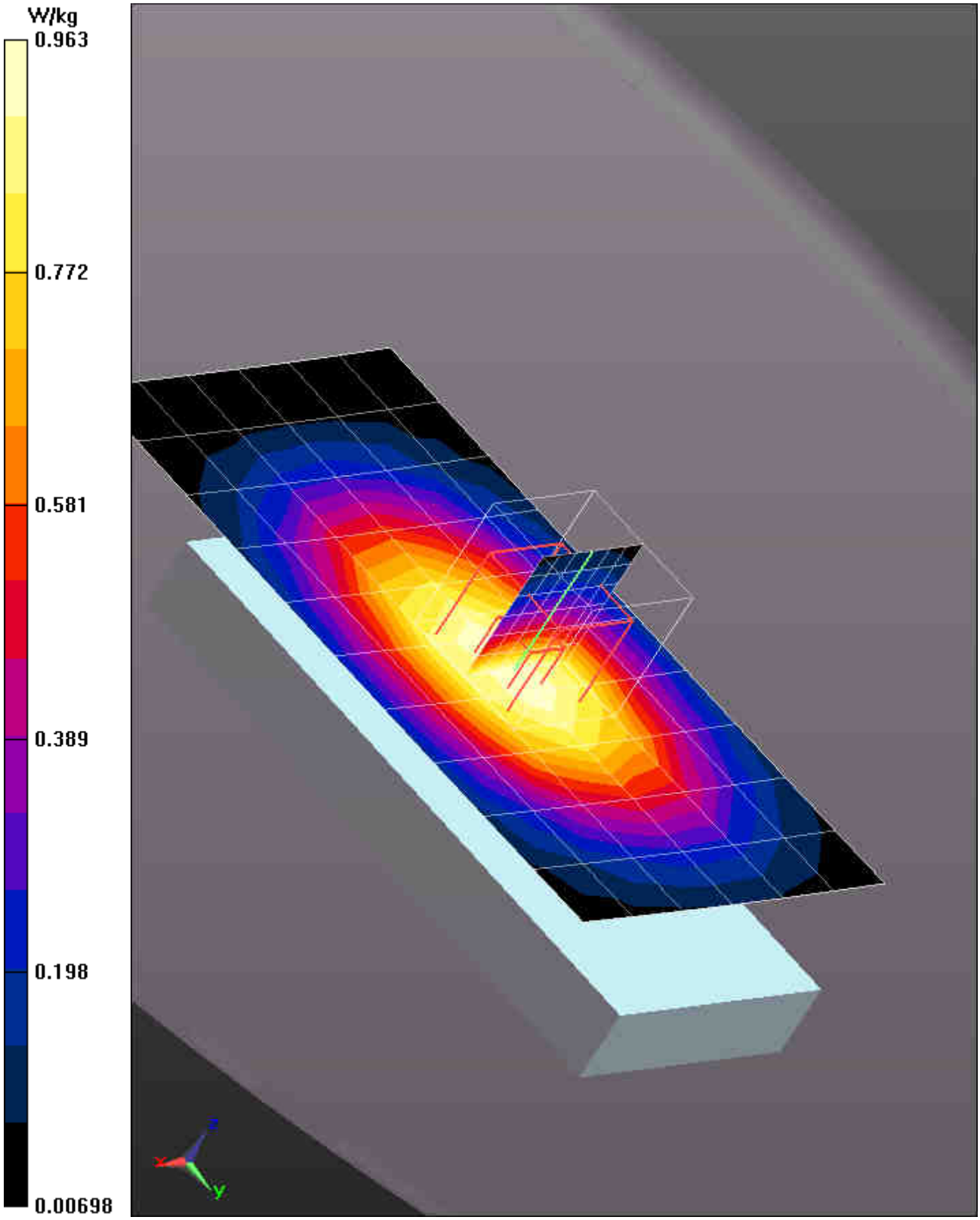
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom Mid Channel 2/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.963 W/kg

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom Mid Channel 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.418 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.821 W/kg; SAR(10 g) = 0.609 W/kg
Maximum value of SAR (measured) = 0.989 W/kg


W/kg
0.963
0.772
0.581
0.389
0.198
0.00698

Date/Time: 4/8/2014 1:07:19 PM

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 826.4 MHz;Duty Cycle: 1:1

Medium parameters used: f = 826.4 MHz; σ = 1 S/m; ε_r = 52.69; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

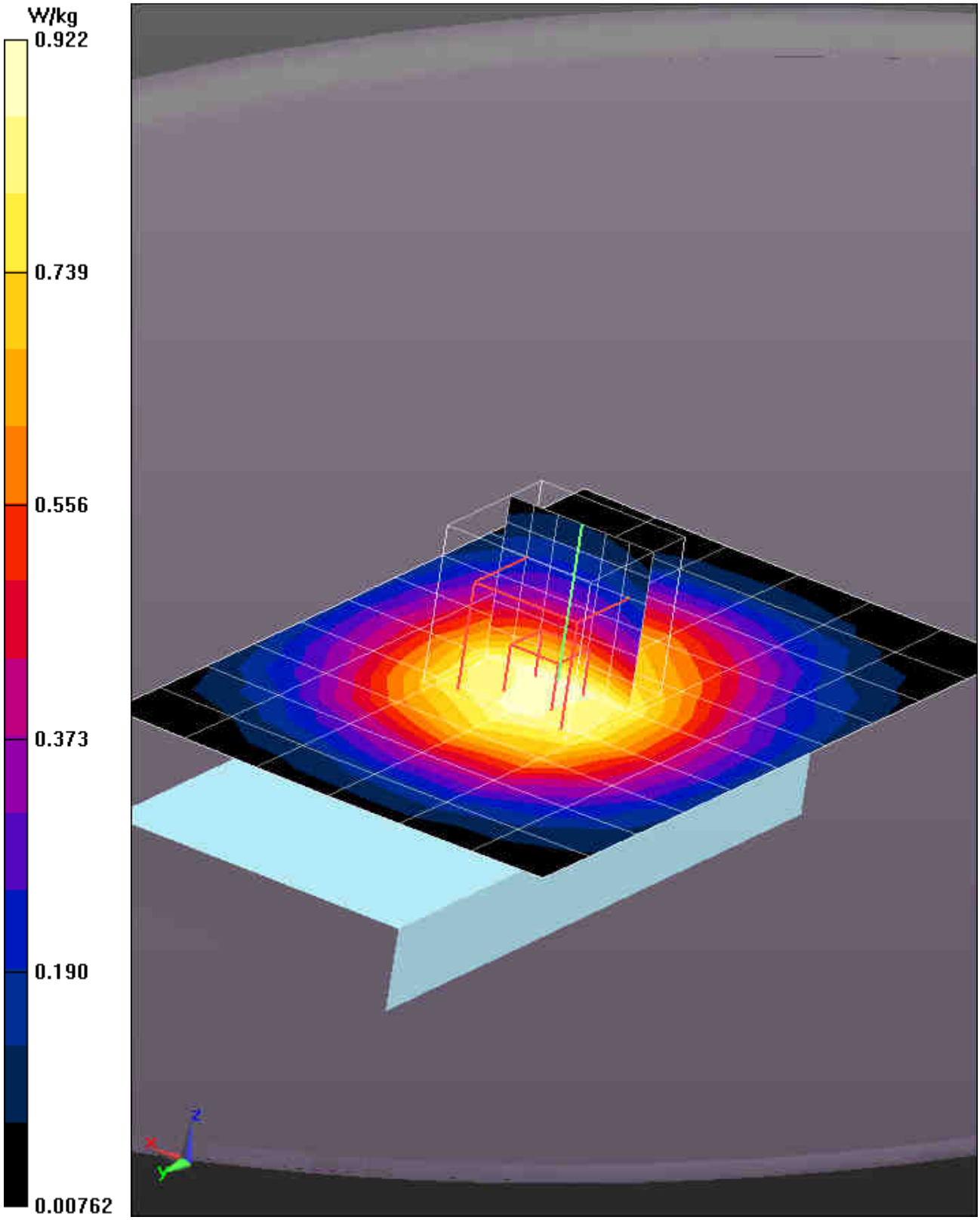
- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom Low Channel/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 0.922 W/kg

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom Low Channel/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 18.321 V/m; Power Drift = -0.66 dB
Peak SAR (extrapolated) = 0.927 W/kg
SAR(1 g) = 0.726 W/kg; SAR(10 g) = 0.545 W/kg
Maximum value of SAR (measured) = 0.866 W/kg


W/kg
0.922
0.739
0.556
0.373
0.190
0.00762

Test Laboratory: Intertek
File Name: WCDMA Band V.da52:4

WCDMA Band V

Procedure Notes:

DUT: Corventis zLink Gateway; Serial: xxx

Communication System: UID 0, Generic WCDMA (0); Communication System Band: Band V; Frequency: 846.6 MHz;Duty Cycle: 1:1

Medium parameters used: f = 846.6 MHz; σ = 1.02 S/m; ε_r = 52.5; ρ = 1000 kg/m^3

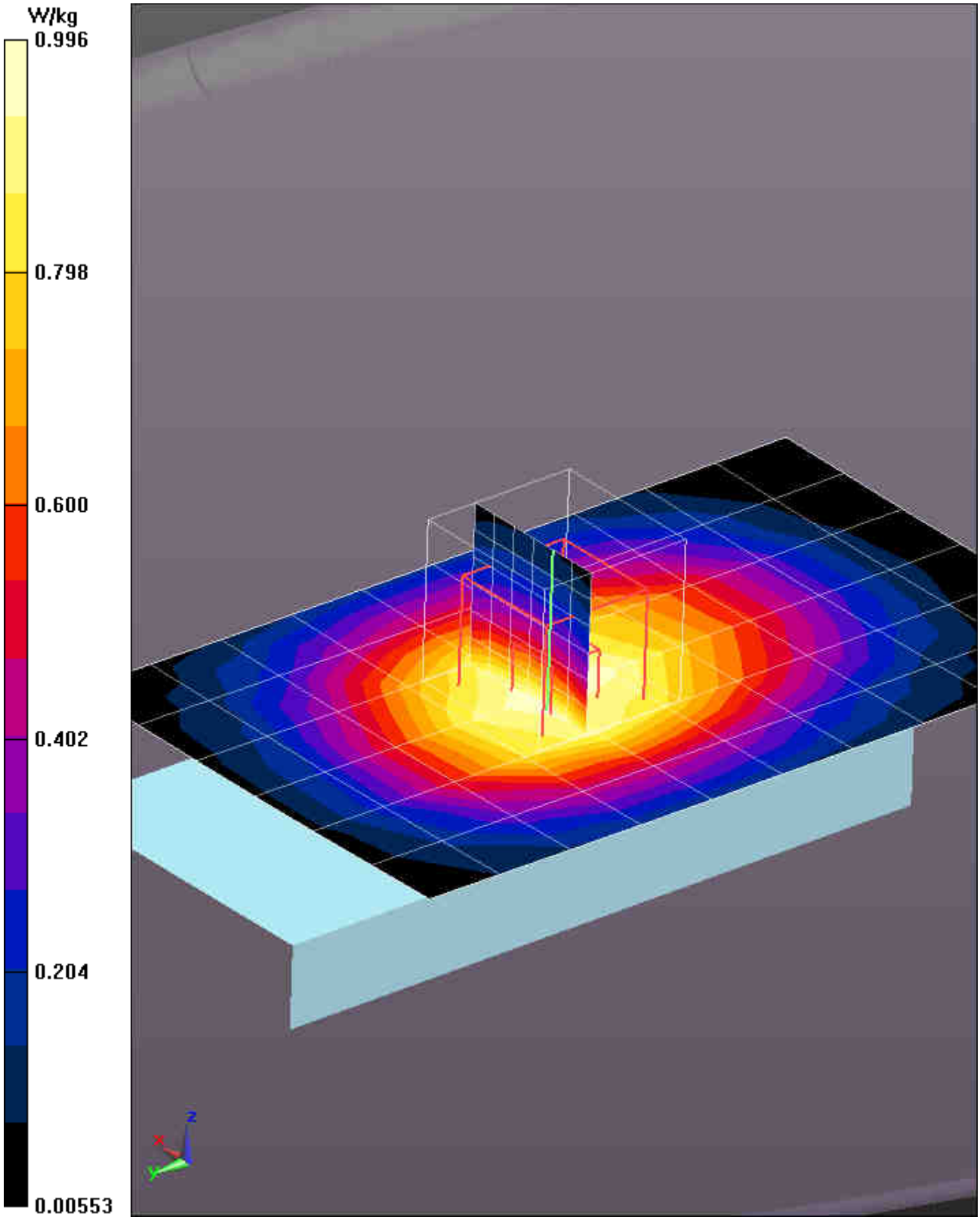
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom High Channel 2/Area Scan (7x11x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.996 W/kg

GSM Flat-Section Testing on 4_8_2014/Back Side of Device Against Phantom High Channel 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.552 V/m; Power Drift = -0.62 dB
Peak SAR (extrapolated) = 1.03 W/kg
SAR(1 g) = 0.794 W/kg; SAR(10 g) = 0.589 W/kg
Maximum value of SAR (measured) = 0.952 W/kg


W/kg
0.996
0.798
0.600
0.402
0.204
0.00553

12.0 APPENDIX – DIPOLE VALIDATION PLOTS

Date/Time: 4/6/2014 2:51:42 PM

Test Laboratory: Intertek
File Name: 1.9GHz Dipole Validation.da52:1

1.9GHz Dipole Validation

Procedure Notes:

DUT: Dipole 1900 MHz D1900V2; Serial: D1900V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.57 S/m; ε_r = 51.05; ρ = 1000 kg/m^3

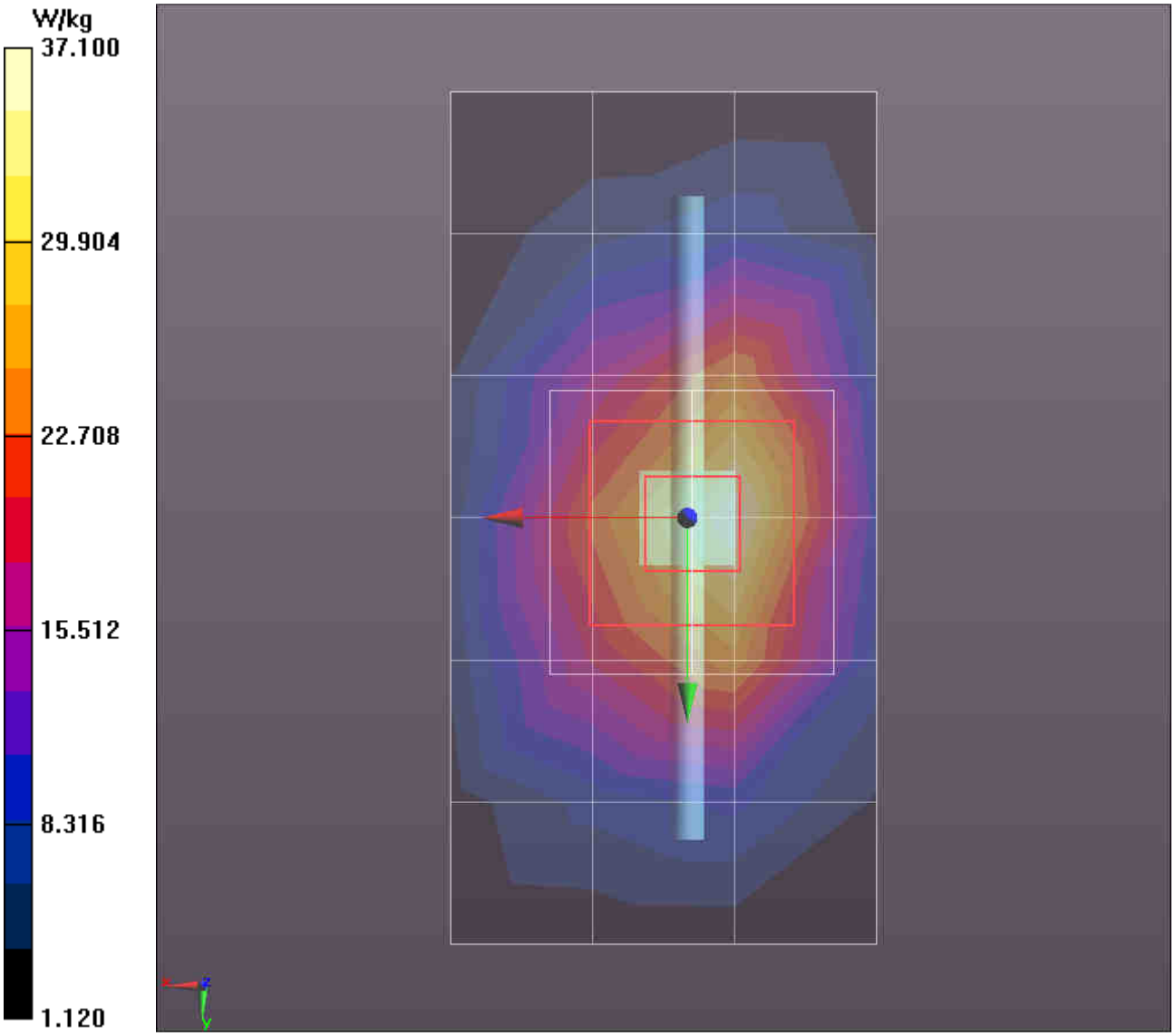
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=10mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.734 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 44.9 W/kg
SAR(1 g) = 27.4 W/kg; SAR(10 g) = 15.6 W/kg
Normalized to target power = 1 W and actual power = 0.03172 W
Maximum value of SAR (measured) = 37.1 W/kg

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=10mW, dist=2.0mm (EX-Probe)/Area Scan (4x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.07 W/kg


W/kg
37.100
29.904
22.708
15.512
8.316
1.120

Date/Time: 4/7/2014 2:01:06 PM

Test Laboratory: Intertek
File Name: 835MHz Dipole Validation.da52:0

835MHz Dipole Validation

Procedure Notes: Ambient Temp: 22.2C, Fluid Temp: 22.3C

DUT: Dipole 835 MHz D835V2; Serial: D835V2 - SN:4d122

Communication System: UID 10000, CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 835 MHz; σ = 1.009 S/m; εr = 53.726; ρ = 1000 kg/m3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;

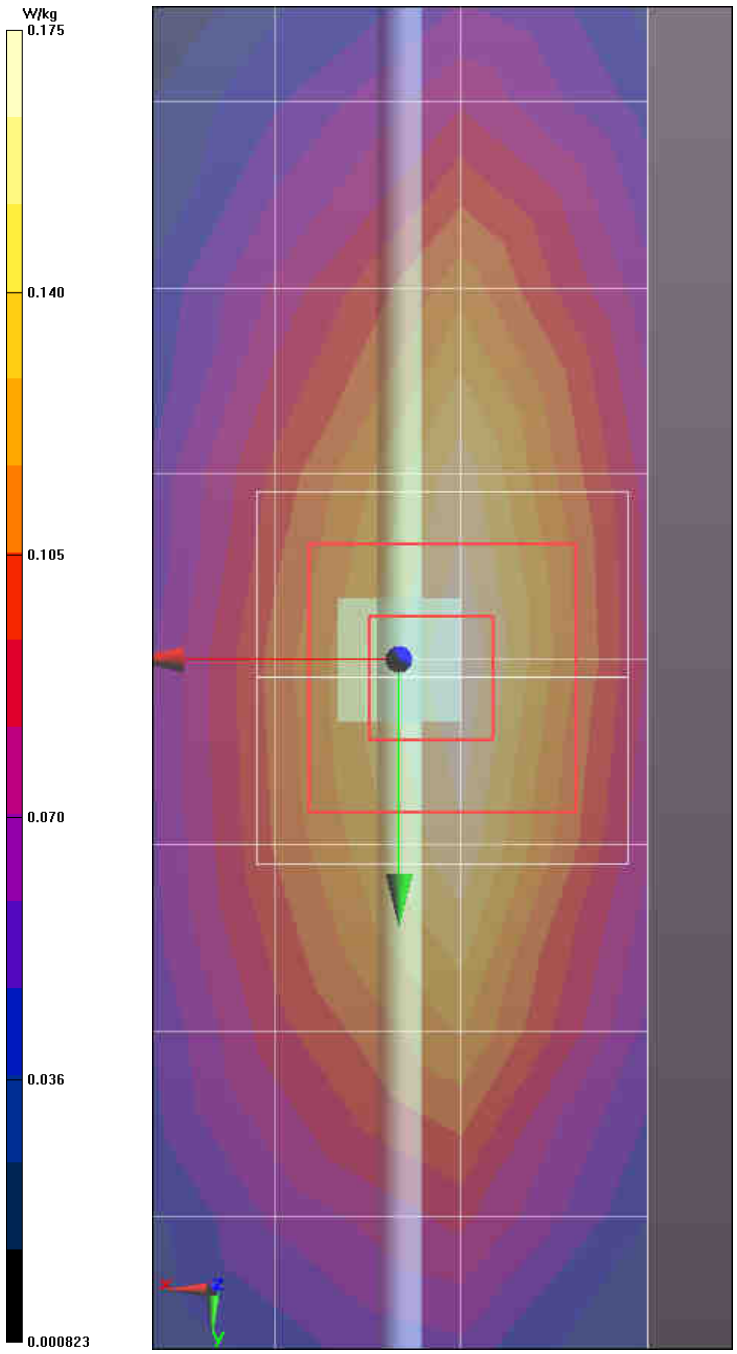
Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn358; Calibrated: 9/13/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Area Scan (4x13x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 0.175 W/kg
System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.465 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 13.9 W/kg
SAR(1 g) = 9.37 W/kg; SAR(10 g) = 6.17 W/kg
Normalized to target power = 1 W and actual power = 0.01502 W
Maximum value of SAR (measured) = 10.1 W/kg



Date/Time: 4/8/2014 9:43:37 AM

Test Laboratory: Intertek
File Name: 835MHz Dipole Validation 4.8.2014.da52:0

835MHz Dipole Validation 4.8.2014

Procedure Notes: Ambient Temp: 22.2C, Fluid Temp: 22.3C

DUT: Dipole 835 MHz D835V2; Serial: D835V2 - SN:4d122

Communication System: UID 10000, CW; Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 835 MHz; σ = 1.008 S/m; ε_r = 52.614; ρ = 1000 kg/m^3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

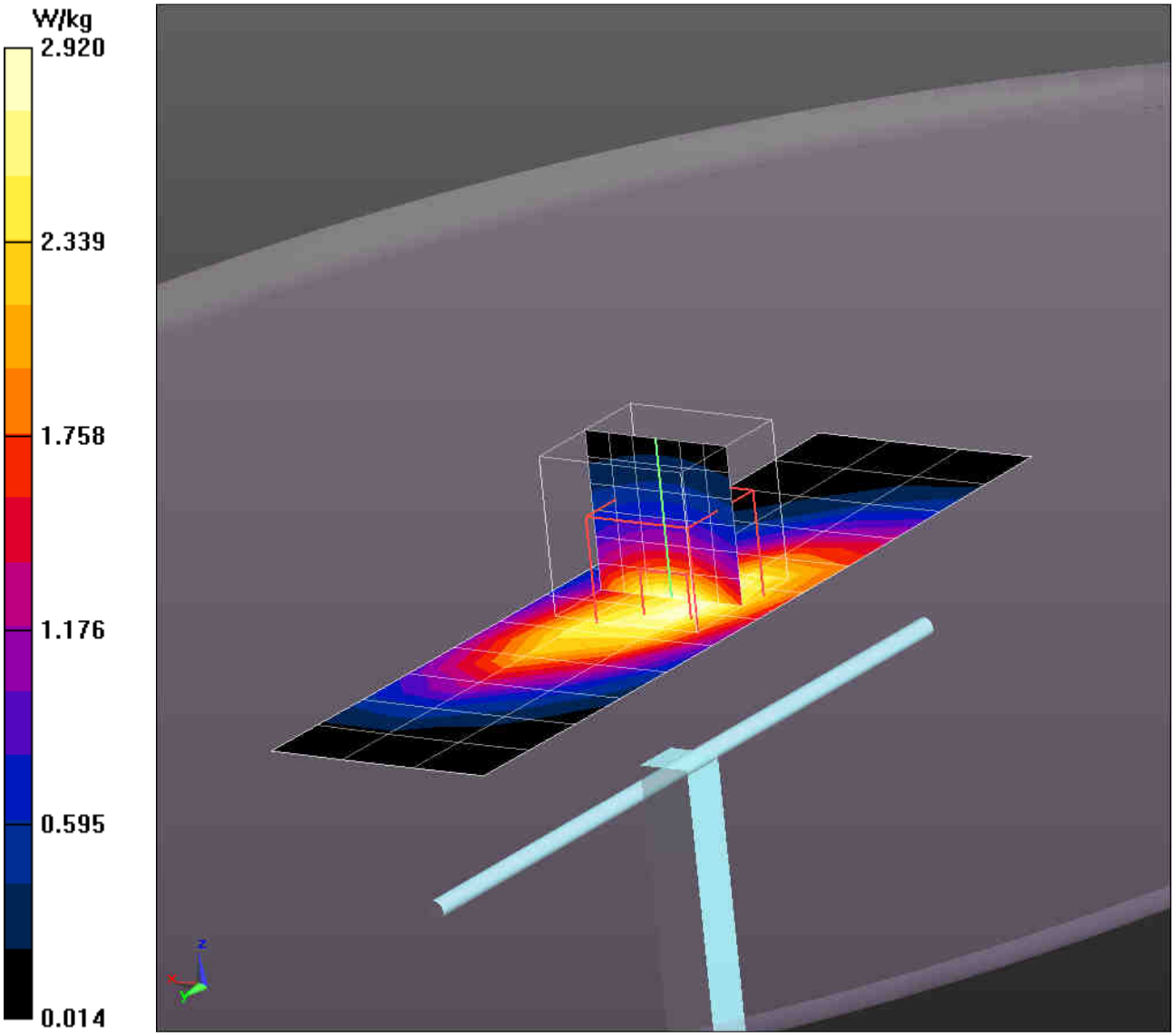
- Probe: EX3DV3 - SN3516; ConvF(10.42, 10.42, 10.42); Calibrated: 12/13/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/13/2013
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Area Scan (4x13x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 2.92 W/kg

System Performance Check at Frequencies below 1 GHz/d=15mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.598 V/m; Power Drift = -0.80 dB
Peak SAR (extrapolated) = 14.1 W/kg
SAR(1 g) = 9.52 W/kg; SAR(10 g) = 6.29 W/kg
Normalized to target power = 1 W and actual power = 0.25 W

Maximum value of SAR (measured) = 10.3 W/kg


W/kg
2.920
2.339
1.758
1.176
0.595
0.014

Date/Time: 4/9/2014 10:58:16 AM

Test Laboratory: Intertek
File Name: 1.9GHz Dipole Validation_4-9.da52:1

1.9GHz Dipole Validation_4-9

Procedure Notes:

DUT: Dipole 1900 MHz D1900V2; Serial: D1900V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 1900 MHz; σ = 1.532 S/m; εr = 53.28; ρ = 1000 kg/m3

Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: EX3DV3 - SN3516; ConvF(8.54, 8.54, 8.54); Calibrated: 12/13/2013;

Sensor-Surface: 2mm (Mechanical Surface Detection)

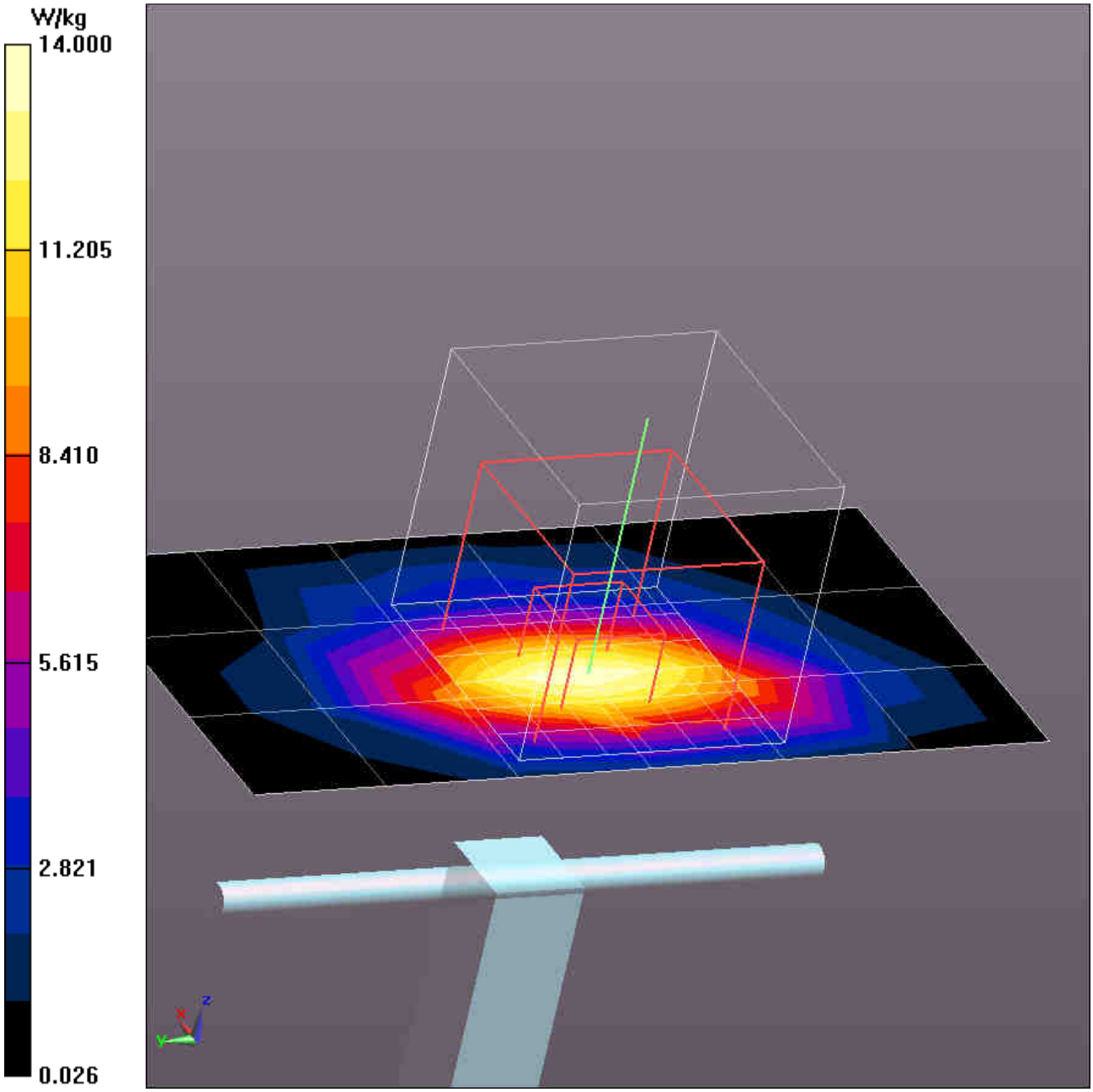
Electronics: DAE4 Sn358; Calibrated: 9/13/2013

Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx

DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=10mW, dist=2.0mm (EX-Probe)/Area Scan (4x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 14.0 W/kg
System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=10mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.560 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 72.9 W/kg
SAR(1 g) = 40.7 W/kg; SAR(10 g) = 21.4 W/kg
Normalized to target power = 1 W and actual power = 0.25 W

Maximum value of SAR (measured) = 57.8 W/kg


W/kg
14.000
11.205
8.410
5.615
2.821
0.026

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 5.0
Type No	QD OVA 002 A
Series No	1108 and higher
Manufacturer	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

Tests

Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

Test	Requirement	Details	Units tested
Shape	Internal dimensions, depth and sagging are compatible with standards	Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for f > 375 MHz	Prototypes
Material thickness	Bottom: 2.0mm +/- 0.2mm	dimension compliant with [3] for f > 800 MHz	all
Material parameters	rel. permittivity 2 – 5, loss tangent ≤ 0.05, at f ≤ 6 GHz	rel. permittivity 3.5 +/- 0.5 loss tangent ≤ 0.05	Material samples
Material resistivity	Compatibility with tissue simulating liquids .	Compatible with SPEAG liquids. **	Phantoms, Material sample
Sagging	Sagging of the flat section in tolerance when filled with tissue simulating liquid.	within tolerance for filling height up to 155 mm	Prototypes, samples

** Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

Standards

[1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01

[2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003

[3] IEC 62209–1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", 2005-02-18

[4] IEC 62209–2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", 2010-03-30

Conformity

Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of **body-worn** SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 44 245 9700, Fax +41 44 245 9779
info@speag.com, http://www.speag.com

Doc No 881 – QD OVA 002 A - A

Page 1 (1)