

## TEST REPORT

**Report Number: 102254548LEX-004**

**Project Number: G102254548**

**Evaluation of Model Number: CDMA Tracker**

**Tested to the SAR Criteria in**

**FCC Part 2.1093, RSS-102 Issue 5 per KDB 447498 D01 v06**

**For**

**3M Traffic Safety and Security Division**

Test Performed by:

Intertek  
731 Enterprise Drive  
Lexington, KY 40510

Test Authorized by:

3M Traffic Safety and Security Division  
1838 Gunn Highway  
Odessa, FL 55144

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**TABLE OF CONTENTS**

<b>1.0</b>	<b>DOCUMENT HISTORY .....</b>	<b>3</b>
<b>2.0</b>	<b>INTRODUCTION.....</b>	<b>4</b>
	MODIFICATIONS MADE TO TEST SAMPLE .....	4
<b>3.0</b>	<b>TEST SITE DESCRIPTION.....</b>	<b>5</b>
	MEASUREMENT EQUIPMENT .....	6
	MEASUREMENT UNCERTAINTY .....	7
<b>4.0</b>	<b>PRODUCT DESCRIPTION .....</b>	<b>9</b>
<b>5.0</b>	<b>SYSTEM VERIFICATION .....</b>	<b>12</b>
	SYSTEM VALIDATION.....	12
	TISSUE SIMULATING LIQUID DESCRIPTION AND VALIDATION .....	13
<b>6.0</b>	<b>EVALUATION PROCEDURES .....</b>	<b>15</b>
	TEST POSITIONS: .....	15
	REFERENCE POWER MEASUREMENT: .....	15
	AREA SCAN: .....	15
	ZOOM SCAN: .....	15
	INTERPOLATION, EXTRAPOLATION AND DETECTION OF MAXIMA: .....	17
	POWER DRIFT MEASUREMENT: .....	18
	RF AMBIENT ACTIVITY:.....	18
<b>7.0</b>	<b>CRITERIA.....</b>	<b>19</b>
<b>8.0</b>	<b>TEST CONFIGURATION.....</b>	<b>19</b>
<b>9.0</b>	<b>TABULAR TEST RESULTS.....</b>	<b>21</b>
<b>10.0</b>	<b>REFERENCES .....</b>	<b>22</b>
<b>11.0</b>	<b>APPENDIX – SAR PLOTS .....</b>	<b>23</b>
	1.1.1 CDMA Cell Band_Front Side Mid .....	25
	1.1.2 CDMA Cell Band_Front Side low.....	27
	1.1.3 CDMA Cell Band_Front Side High .....	29
	1.1.4 835 Dipole_Body Tissue.....	43
<b>12.0</b>	<b>APPENDIX – SYSTEM VALIDATION SUMMARY .....</b>	<b>47</b>

**1.0 DOCUMENT HISTORY**

Revision/ Project Number	Writer Initials	Date	Change
1.0 /G102254548	BCT	1/10/2016	Original document

## 2.0 INTRODUCTION

At the request of , the 3M Tracker – CDMA Variant was evaluated for SAR in accordance with IEEE Std 1528:2013, IEC62209-2:2010, and FCC Part 2.1093, RSS-102 Issue 5 per KDB 447498 D01 v06. 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 10g tissue mass had been assessed for this system to be  $\pm 22.2\%$ .

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

The maximum spatial peak SAR value for the sample device averaged over 10g was found to be:

Mode	Channel	Conducted Output Power (dBm)	Reported SAR <sub>10g</sub> – Body Mode (W/kg)	Limit (W/kg)
CDMA Cell	1013	24.49	0.18	4.0
CDMA PCS	25	24.21	0.62	4.0

*Table 1: Maximum Measured SAR*

Based on the worst-case data presented above, the 3M Tracker – CDMA Variant was found to be **compliant** with the 4.0 W/kg requirement for general population / uncontrolled exposure for devices used exclusively in extremity orientations.

### 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  $22.0 \pm 2^{\circ}\text{C}$ . 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	12/12/14	12/12/2015	<input checked="" type="checkbox"/>
System Verification Dipole	4d122	Speag	D835V2	9/17/2015	9/17/2016	<input checked="" type="checkbox"/>
System Verification Dipole	5d154	Speag	D1900V2	9/21/2015	9/21/2016	<input checked="" type="checkbox"/>
System Verification Dipole	718	Speag	D2450V2	12/8/2014	12/8/2015	<input type="checkbox"/>
DAE	358	Speag	DAE4	9/16/2015	9/16/2016	<input checked="" type="checkbox"/>
Vector Signal Generator	257708	Rohde & Schwarz	SMBV100A	9/18/2015	9/18/2016	<input checked="" type="checkbox"/>
Network Analyzer	US391739 83	Agilent	8753ES	3/18/15	3/18/2016	<input checked="" type="checkbox"/>
USB Power Sensor	100155	Rohde & Schwarz	NRP-Z81	9/20/2015	9/20/2016	<input checked="" type="checkbox"/>
USB Power Sensor	100705	Rohde & Schwarz	NRP-Z51	9/20/2015	9/20/2016	<input checked="" type="checkbox"/>
Dielectric Probe Kit	1111	Speag	DAK-3.5	NCR	NCR	<input checked="" type="checkbox"/>
Base Station Simulator	119981	Rohde & Schwarz	CMU200	9/22/2015	9/22/2016	<input checked="" type="checkbox"/>
SAM Twin Phantom	1663	Speag	QD 000 P40 C	NCR	NCR	<input checked="" type="checkbox"/>
Oval Flat Phantom ELI 5.0	1108	Speag	QD OVA 002 A	NCR	NCR	<input checked="" type="checkbox"/>
6-axis robot	F11/5H1Y A/A/01	Staubli	RX-90	NCR	NCR	<input checked="" type="checkbox"/>

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 1528-2013 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)	( $v_i$ ) $v_{eff}$
<b>Measurement System</b>								
Probe Calibration	±6.0%	N	1	1	1	±6.0%	±6.0%	∞
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%	∞
Modulation Response	±2.4%	R	√3	1	1	±1.4%	±1.4%	∞
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.	±2.0%	R	√3	1	1	±1.2%	±1.2%	∞
<b>Test sample Related</b>								
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%	∞
Power Scaling	±0.0%	R	√3	1	1	±0%	±0%	∞
<b>Phantom and Setup</b>								
Phantom Uncertainty	±6.1%	R	√3	1	1	±3.5%	±3.5%	∞
SAR Correction	±1.9%	R	√3	1	0.84	±1.1%	±0.9%	∞
Liquid Conductivity (mea.)	±2.5%	R	√3	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity(me.)	±2.5%	R	√3	0.26	0.26	±0.3%	±0.4%	∞
Temp unc. - Conductivity	±3.4%	R	√3	0.78	0.71	±1.5%	±1.4%	∞
Temp unc. - Permittivity	±0.4%	R	√3	0.23	0.26	±0.1%	±0.1%	∞
<b>Combined Standard Uncertainty</b>						±11.2%	±11.1%	361
<b>Expanded STD Uncertainty</b>						±22.3%	±22.2%	

Notes.

1. Worst Case uncertainty budget for DASY5 assessed according to IEEE 1528-2013. 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)	( $v_i$ ) $v_{eff}$
<b>Measurement System</b>								
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%	∞
Modulation Response	±2.4%	R	√3	1	1	±1.4%	±1.4%	∞
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	±6.7%	R	√3	1	1	±3.9%	±3.9%	∞
Max. SAR Eval.	±4.0%	R	√3	1	1	±2.3%	±2.3%	∞
<b>Test sample Related</b>								
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%	∞
Power Scaling	±0.0%	R	√3	1	1	±0%	±0%	∞
<b>Phantom and Setup</b>								
Phantom Uncertainty	±6.6%	R	√3	1	1	±3.8%	±3.8%	∞
SAR Correction	±1.9%	R	√3	1	0.84	±1.1%	±0.9%	∞
Liquid Conductivity (mea.)	±2.5%	R	√3	0.78	0.71	±1.1%	±1.0%	∞
Liquid Permittivity(me.)	±2.5%	R	√3	0.26	0.26	±0.3%	±0.4%	∞
Temp unc. - Conductivity	±3.4%	R	√3	0.78	0.71	±1.5%	±1.4%	∞
Temp unc. - Permittivity	±0.4%	R	√3	0.23	0.26	±0.1%	±0.1%	∞
<b>Combined Standard Uncertainty</b>						±12.3%	±12.2%	748
<b>Expanded STD Uncertainty</b>						<b>±24.6%</b>	<b>±24.5%</b>	

#### Notes.

Worst Case uncertainty budget for DASY5 assessed according to IEEE 1528-2013. 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 PRODUCT DESCRIPTION

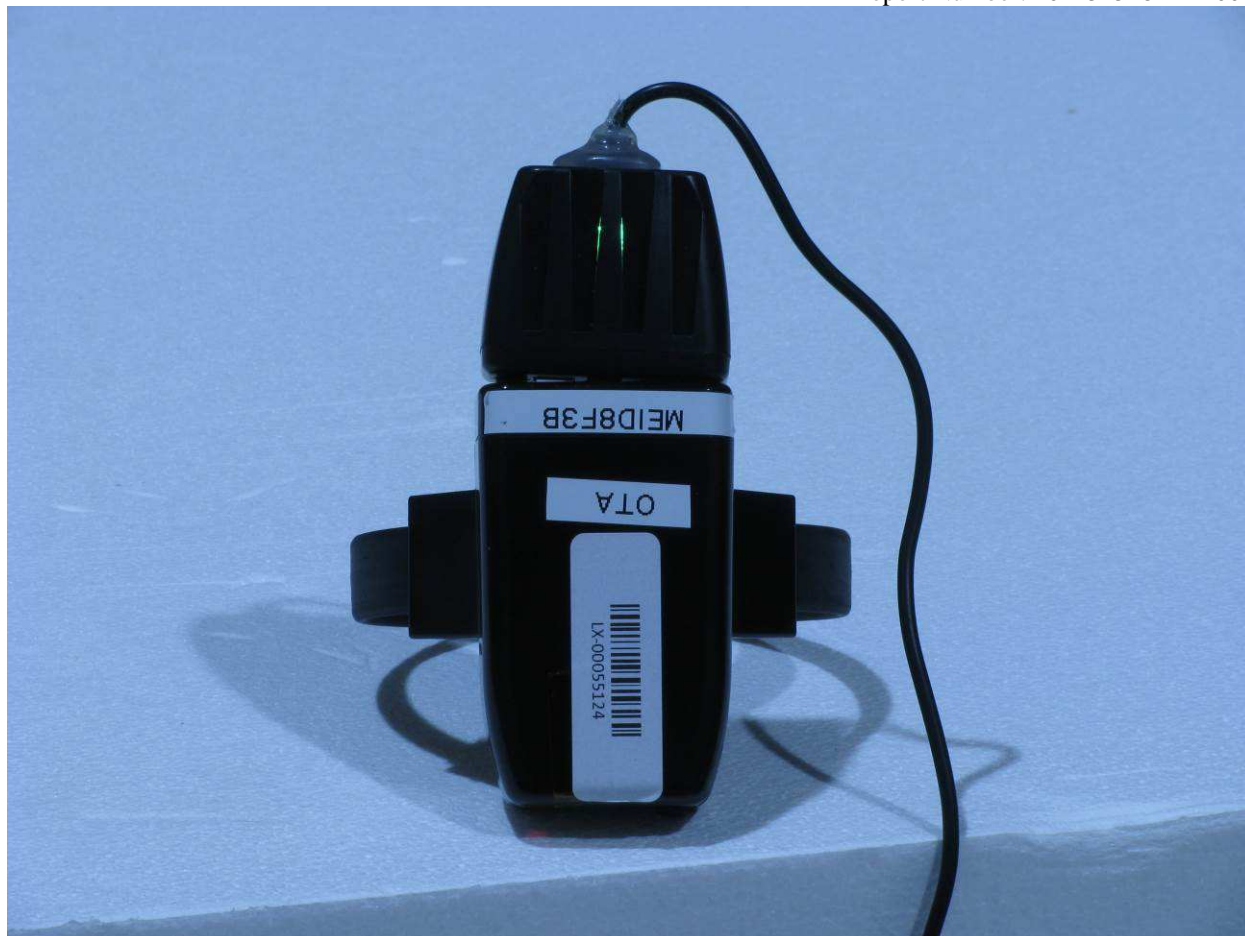
The .

Test sample	
Manufacturer	3M Traffic Safety and Security Division
Model Number	CDMA Tracker
Serial Number	MEID868D
Receive Date	11/6/2015
Device Received Condition	Good, Production
Device Category	Portable
RF Exposure Category	General Population/Uncontrolled Environment
Antenna Type	Internal

Table 3: Product Information

Operating Bands	Frequency Range (MHz)	Modulation	Duty Cycle
CDMA Cell	824MHz - 849MHz	1xrtt	100%
CDMA PCS	1850MHz - 1910MHz	1xrtt	100%

Table 4: Operating Bands



*Figure 2: Test Sample Front*



*Figure 3: Test Sample Back*

## 5.0 SYSTEM VERIFICATION

### System Validation

Prior to the assessment, the system was verified to be within  $\pm 10\%$  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

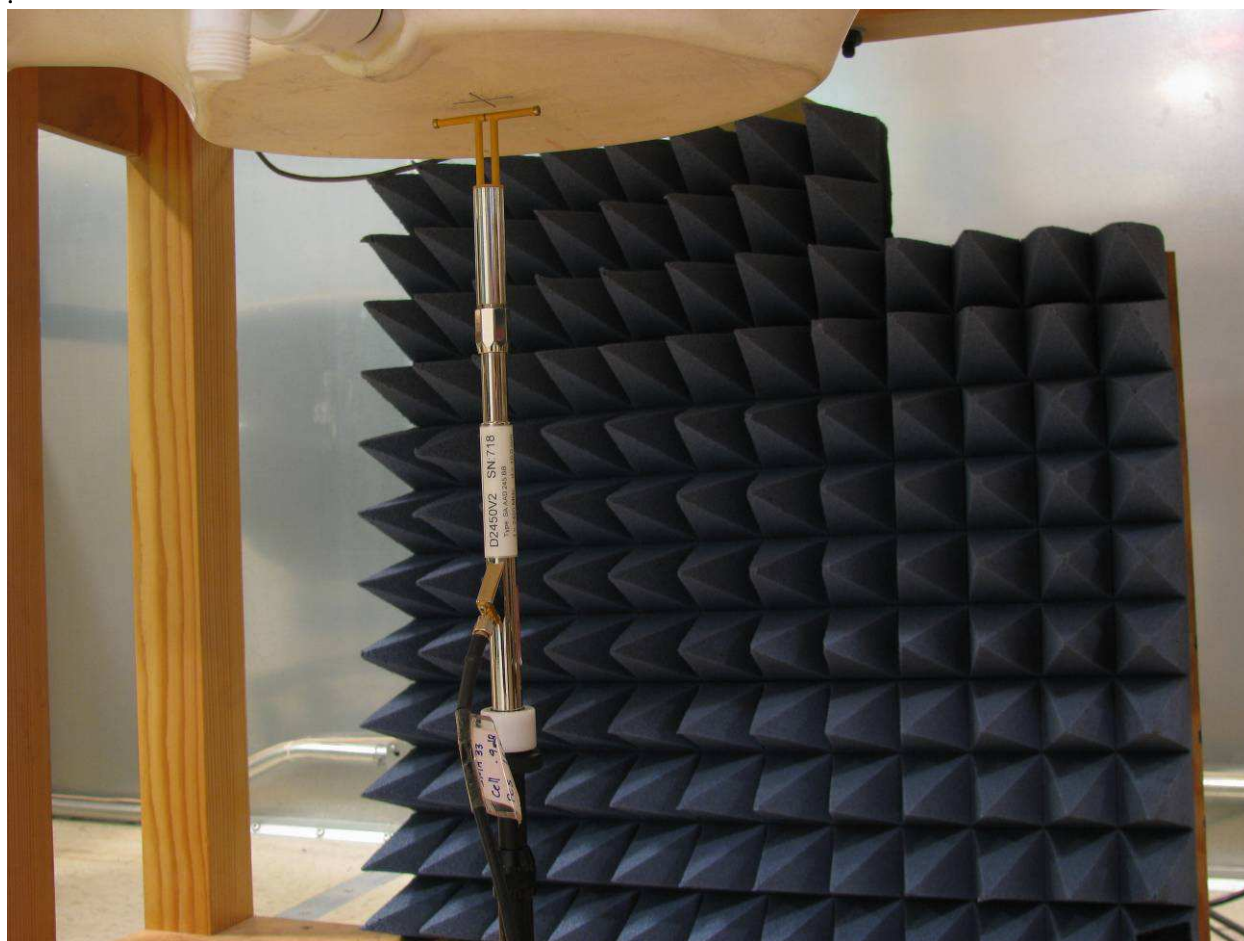


Figure 4: System Verification Setup

Reference Dipole Validation												
Ambient Temp (°C)	Fluid Temp (°C)	Frequency (MHz)	Dipole	Fluid Type	Dipole Power Input	Cal. Lab SAR (1g)	Cal. Lab SAR (10g)	Measured SAR (1g)	Measured SAR (10g)	% Error SAR (1g)	% Error SAR (10g)	Date
23.3	22.8	1900	D1900V2	MSL1900	1W	40.6	21.5	40.9	21.3	0.74	0.93	11/6/2015
23.1	22.9	835	D835V2	MSL 835	1W	9.41	6.16	10.1	6.7	7.33	8.77	11/10/2015

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 ( $\epsilon_r$ ,  $\sigma$ ) are shown in Table 6. A recipe for the tissue simulating fluid used is shown in Table 7.

Table 6: Dielectric Parameter Validation

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Permittivity Target	Conductivity Target	Permittivity Measure	Complex Permittivity	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
MSL835	815	55.27	0.97	55.34	22.12	1.00	0.13	3.33	11/10/2015
	824	55.2	0.97	55.33	21.05	0.96	0.24	0.59	11/10/2015
	836	55.2	0.97	55.28	20.87	0.97	0.14	0.00	11/10/2015
	850	55.2	0.98	55.16	20.65	0.98	0.07	0.42	11/10/2015

Measured Tissue Properties									
Tissue Type	Frequency Measure (MHz)	Permittivity Target	Conductivity Target	Permittivity Measure	Complex Permittivity	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation	Date
MSL1900	1850	53.3	1.52	53.21	15.47	1.59	0.17	4.68	11/6/2015
	1880	53.3	1.52	52.89	15.18	1.59	0.77	4.38	11/6/2015
	1910	53.3	1.52	52.56	14.93	1.59	1.39	4.30	11/6/2015

*Table 7: Tissue Simulating Fluid Recipe*

TYPICAL COMPOSITION OF INGREDIENTS FOR LIQUID TISSUE PHANTOMS													
Ingredient weight)	(% by	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  $\pm$  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 Supplement C Edition 01 – 01 of Federal Communications Commission, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, OET Bulletin 65, FCC, Washington, D.C. 20554, 1997 and KDB 447498 D01 v06.

### 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 be used for 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.



			$\leq 3\text{ GHz}$	$> 3\text{ GHz}$
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			$5 \pm 1\text{ mm}$	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5\text{ mm}$
Maximum probe angle from probe axis to phantom surface normal at the measurement location			$30^\circ \pm 1^\circ$	$20^\circ \pm 1^\circ$
Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$			$\leq 2\text{ GHz}: \leq 15\text{ mm}$ $2 - 3\text{ GHz}: \leq 12\text{ mm}$	$3 - 4\text{ GHz}: \leq 12\text{ mm}$ $4 - 6\text{ GHz}: \leq 10\text{ mm}$
			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 $\leq$ 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: $\Delta x_{\text{Zoom}}, \Delta y_{\text{Zoom}}$			$\leq 2\text{ GHz}: \leq 8\text{ mm}$ $2 - 3\text{ GHz}: \leq 5\text{ mm}^*$	$3 - 4\text{ GHz}: \leq 5\text{ mm}^*$ $4 - 6\text{ GHz}: \leq 4\text{ mm}^*$
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{\text{Zoom}}(n)$		$\leq 5\text{ mm}$	$3 - 4\text{ GHz}: \leq 4\text{ mm}$ $4 - 5\text{ GHz}: \leq 3\text{ mm}$ $5 - 6\text{ GHz}: \leq 2\text{ mm}$
	graded grid	$\Delta z_{\text{Zoom}}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface	$\leq 4\text{ mm}$	$3 - 4\text{ GHz}: \leq 3\text{ mm}$ $4 - 5\text{ GHz}: \leq 2.5\text{ mm}$ $5 - 6\text{ GHz}: \leq 2\text{ mm}$
		$\Delta z_{\text{Zoom}}(n>1)$ : between subsequent points	$\leq 1.5 \cdot \Delta z_{\text{Zoom}}(n-1)$	
Minimum zoom scan volume	x, y, z		$\geq 30\text{ mm}$	$3 - 4\text{ GHz}: \geq 28\text{ mm}$ $4 - 5\text{ GHz}: \geq 25\text{ mm}$ $5 - 6\text{ GHz}: \geq 22\text{ mm}$
Note: $\delta$ 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 <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4\text{ W/kg}$ , $\leq 8\text{ mm}$ , $\leq 7\text{ mm}$ and $\leq 5\text{ mm}$ 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:

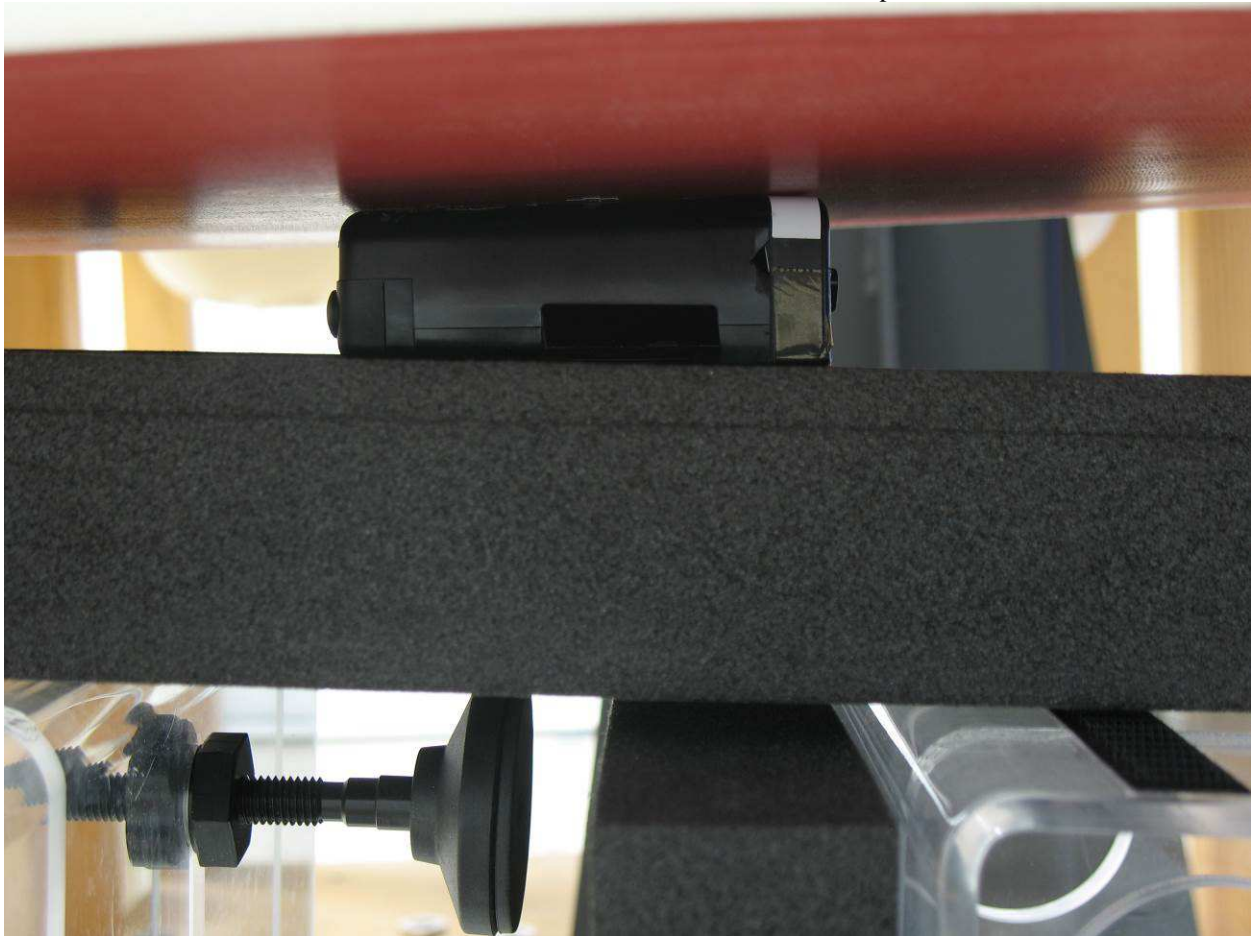
Exposure (General Population/Uncontrolled Exposure environment)	SAR (W/kg)
Average over the whole body	0.08
Spatial Peak (1g)	1.60
Spatial Peak for hands, wrists, feet and ankles (10g)	4.00

## 8.0 TEST CONFIGURATION

The device is used exclusively around the ankle so it was evaluated against the extremity SAR limits. In order to get the device to match up against the flat phantom, the ankle strap and “ears” were cut off. All SAR scans were performed with a freshly charged battery. The test channels and operating modes were selected using a base station simulator set to force the device to transmit at maximum output power.



Figure 5: Test Setup (Back Side)



*Figure 6: Test Setup (Front Side)*

**9.0 TABULAR TEST RESULTS**

The results on the following page(s) were obtained when the device was transmitting at maximum output power. Detailed measurement data and plots, which reveal information about the location of the maximum SAR with respect to the device, are referenced and shown in APPENDIX – SAR Plots. 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 D01 v06[9] and 616217[8].

*Table 9: Body Mode SAR Results*

Body Mode SAR Using 1900MHz MSL									
Mode	Position	Separation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 1g (W/kg)	Reported SAR 10g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
CDMA Ch 12	Back	0	0.05	0.34	0.21	0.37	0.22	24.21	24.50
CDMA Ch 600	Back	0	-0.26	0.31	0.19	0.32	0.19	24.33	24.50
CDMA Ch 1175	Back	0	-0.14	0.26	0.15	0.26	0.16	24.42	24.50
1g SAR Limit (Head & Body) = 1.6W/kg, 10g SAR Limit (Extremities) = 4.0									

Body Mode SAR Using 1900MHz MSL									
Mode	Position	Separation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 1g (W/kg)	Reported SAR 10g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
CDMA Ch 12	Front	0	0.20	1.23	0.58	1.31	0.62	24.21	24.50
CDMA Ch 600	Front	0	-0.27	1.22	0.57	1.27	0.59	24.33	24.50
CDMA Ch 1175	Front	0	-0.36	1.19	0.54	1.21	0.55	24.42	24.50
1g SAR Limit (Head & Body) = 1.6W/kg, 10g SAR Limit (Extremities) = 4.0									

Body Mode SAR Using 835MHz MSL									
Mode	Position	Separation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 1g (W/kg)	Reported SAR 10g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
CDMA Ch 1013	Front	0	-0.26	0.32	0.18	0.32	0.18	24.49	24.50
CDMA Ch 384	Front	0	-0.29	0.26	0.14	0.26	0.14	24.48	24.50
CDMA Ch 777	Front	0	-0.17	0.32	0.16	0.34	0.17	24.22	24.50
1g SAR Limit (Head & Body) = 1.6W/kg, 10g SAR Limit (Extremities) = 4.0									

Body Mode SAR Using 835MHz MSL									
Mode	Position	Separation Distance (mm)	Power Drift (dB)	Measured SAR 1g (W/kg)	Measured SAR 10g (W/kg)	Reported SAR 1g (W/kg)	Reported SAR 10g (W/kg)	Measured Conducted Output Power (dBm)	Maximum Conducted Output Power (dBm)
CDMA Ch 1013	Back	0						24.49	24.50
CDMA Ch 384	Back	0	-0.17	0.13	0.08	0.13	0.08	24.48	24.50
CDMA Ch 777	Back	0						24.22	24.50
1g SAR Limit (Head & Body) = 1.6W/kg, 10g SAR Limit (Extremities) = 4.0									



## 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, “Dosimetric 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. Taylor 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 D01 v02r02 - “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 D01 v06 – “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: 11/10/2015 10:33:35 AM

Test Laboratory: Intertek

File Name: [CDMA Cell Band\\_Back Side.da52:4](#)**CDMA Cell Band\_Back Side Mid**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA Cell Band; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 836.6 \text{ MHz}$ ;  $\sigma = 1.01 \text{ S/m}$ ;  $\epsilon_r = 52.6$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.51, 10.51, 10.51); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: SAM 1 with CRP v5.0; Type: QD000P40CD; Serial: TP: 1243
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom Mid Channel/Area Scan****(51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.220 W/kg

**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom Mid Channel/Area Scan 2****(51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.451 W/kg

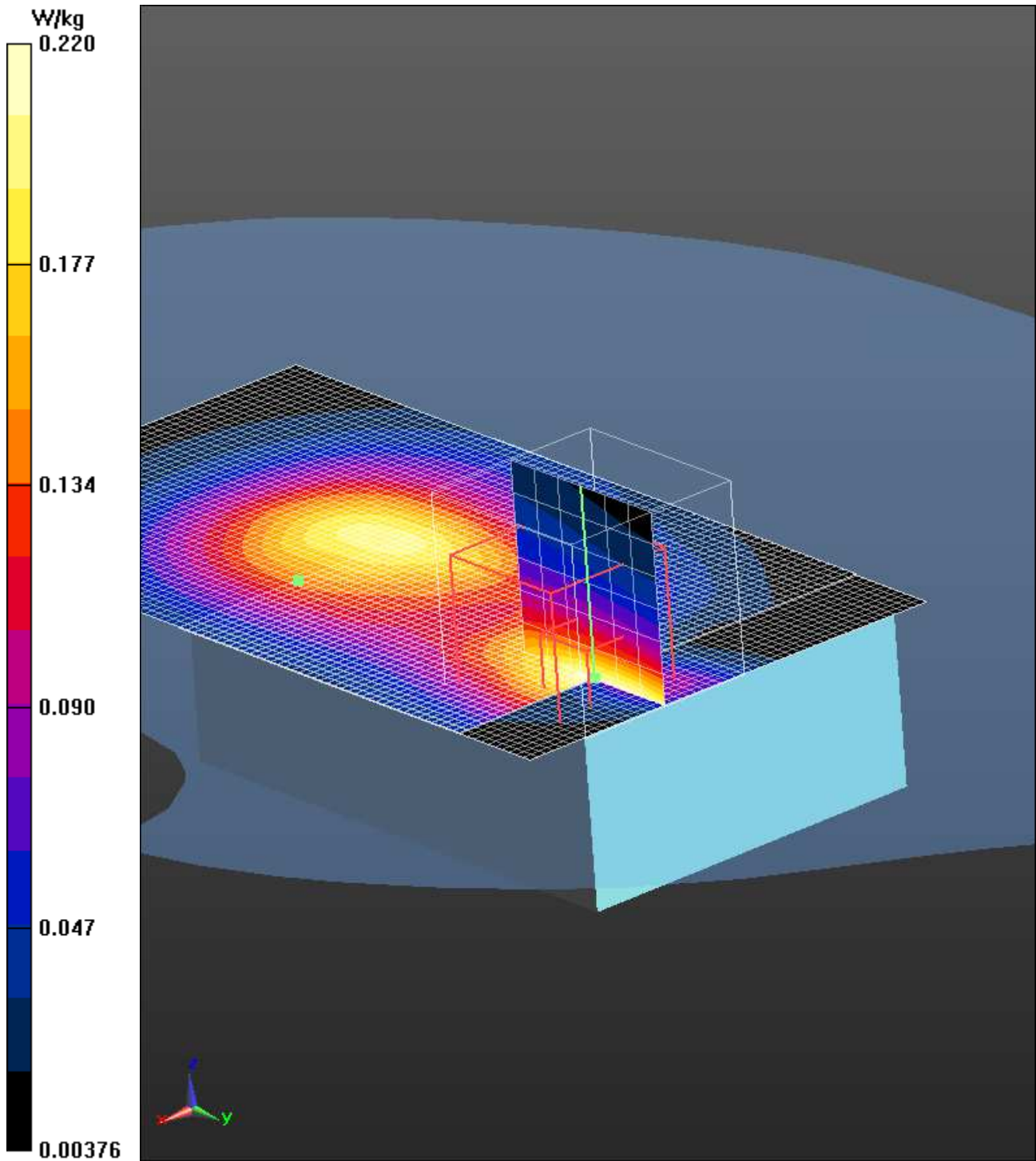
**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom Mid Channel/Zoom Scan****(7x7x7)/Cube 0:** Measurement grid:  $dx=5 \text{ mm}$ ,  $dy=5 \text{ mm}$ ,  $dz=5 \text{ mm}$ 

Reference Value = 11.430 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.210 W/kg

**SAR(1 g) = 0.128 W/kg; SAR(10 g) = 0.080 W/kg**

Maximum value of SAR (measured) = 0.180 W/kg





Test Laboratory: Intertek

File Name: [CDMA Cell Band\\_Front Side.da52:4](#)**1.1.1 CDMA Cell Band\_Front Side Mid**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA Cell Band; Frequency: 836.52 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 836.6 \text{ MHz}$ ;  $\sigma = 1.01 \text{ S/m}$ ;  $\epsilon_r = 52.6$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.51, 10.51, 10.51); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: SAM 1 with CRP v5.0; Type: QD000P40CD; Serial: TP: 1243
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Mid Channel/Area Scan (51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 0.435 W/kg

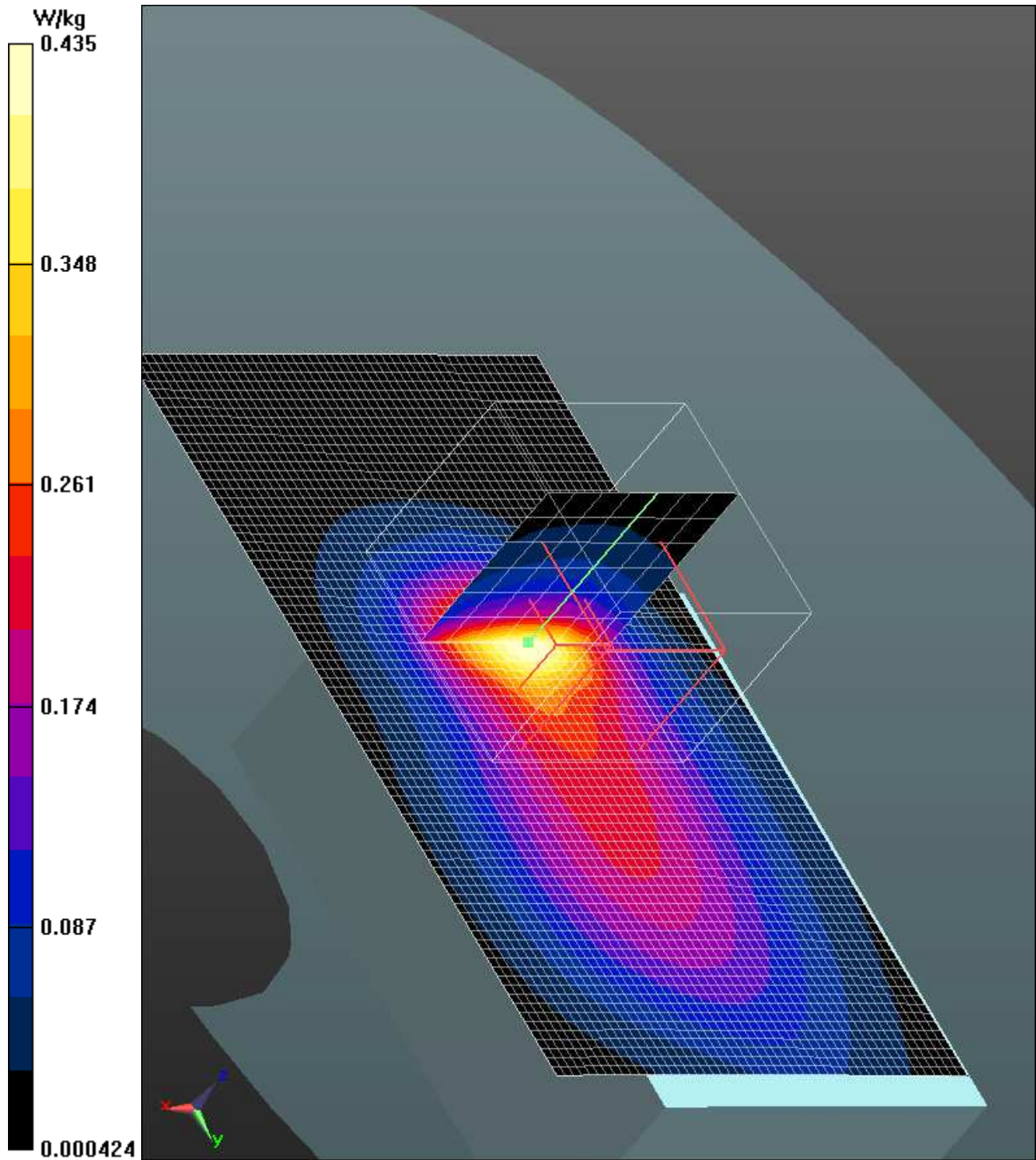
**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Mid Channel/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$

Reference Value = 13.211 V/m; Power Drift = -0.29 dB

Peak SAR (extrapolated) = 0.534 W/kg

**SAR(1 g) = 0.253 W/kg; SAR(10 g) = 0.141 W/kg**

Maximum value of SAR (measured) = 0.417 W/kg



Date/Time: 11/10/2015 1:45:46 PM

Test Laboratory: Intertek

File Name: [CDMA Cell Band\\_Front Side.da52:4](#)**1.1.2 CDMA Cell Band\_Front Side low**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA Cell Band; Frequency: 824.7 MHz; Duty Cycle: 1:1

Medium parameters used (extrapolated):  $f = 824.7 \text{ MHz}$ ;  $\sigma = 0.998 \text{ S/m}$ ;  $\epsilon_r = 52.706$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.51, 10.51, 10.51); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: SAM 1 with CRP v5.0; Type: QD000P40CD; Serial: TP: 1243
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Low Channel/Area Scan (51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.585 W/kg

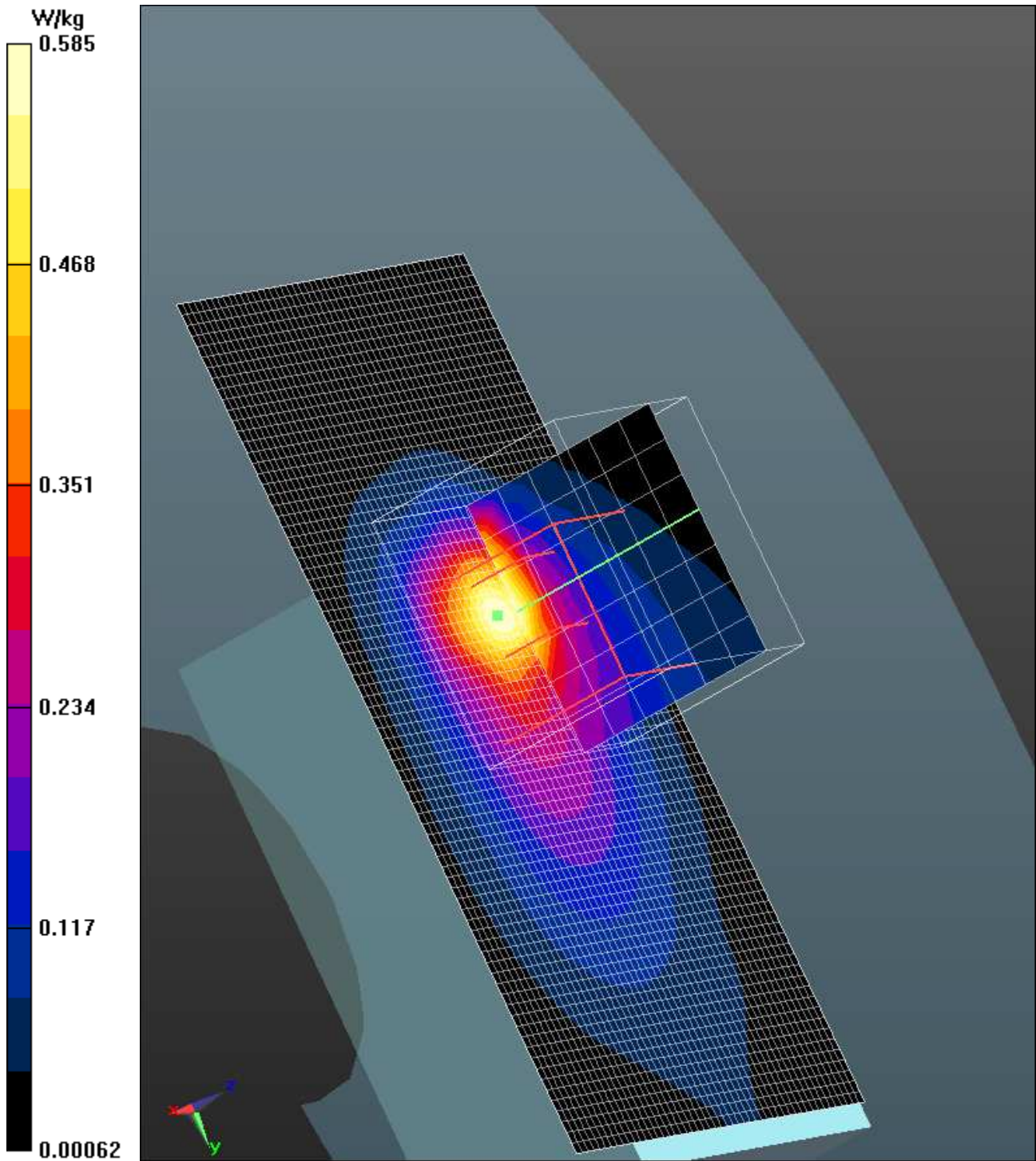
**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Low Channel/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 11.546 V/m; Power Drift = -0.26 dB

Peak SAR (extrapolated) = 0.699 W/kg

**SAR(1 g) = 0.323 W/kg; SAR(10 g) = 0.181 W/kg**

Maximum value of SAR (measured) = 0.536 W/kg



Date/Time: 11/10/2015 2:18:19 PM

Test Laboratory: Intertek

File Name: [CDMA Cell Band\\_Front Side.da52:4](#)**1.1.3 CDMA Cell Band\_Front Side High**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA Cell Band; Frequency: 848.31 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 848.31 \text{ MHz}$ ;  $\sigma = 1.02 \text{ S/m}$ ;  $\epsilon_r = 52.614$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.51, 10.51, 10.51); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: SAM 1 with CRP v5.0; Type: QD000P40CD; Serial: TP: 1243
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom High Channel/Area Scan (51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.507 W/kg

**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom High Channel/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

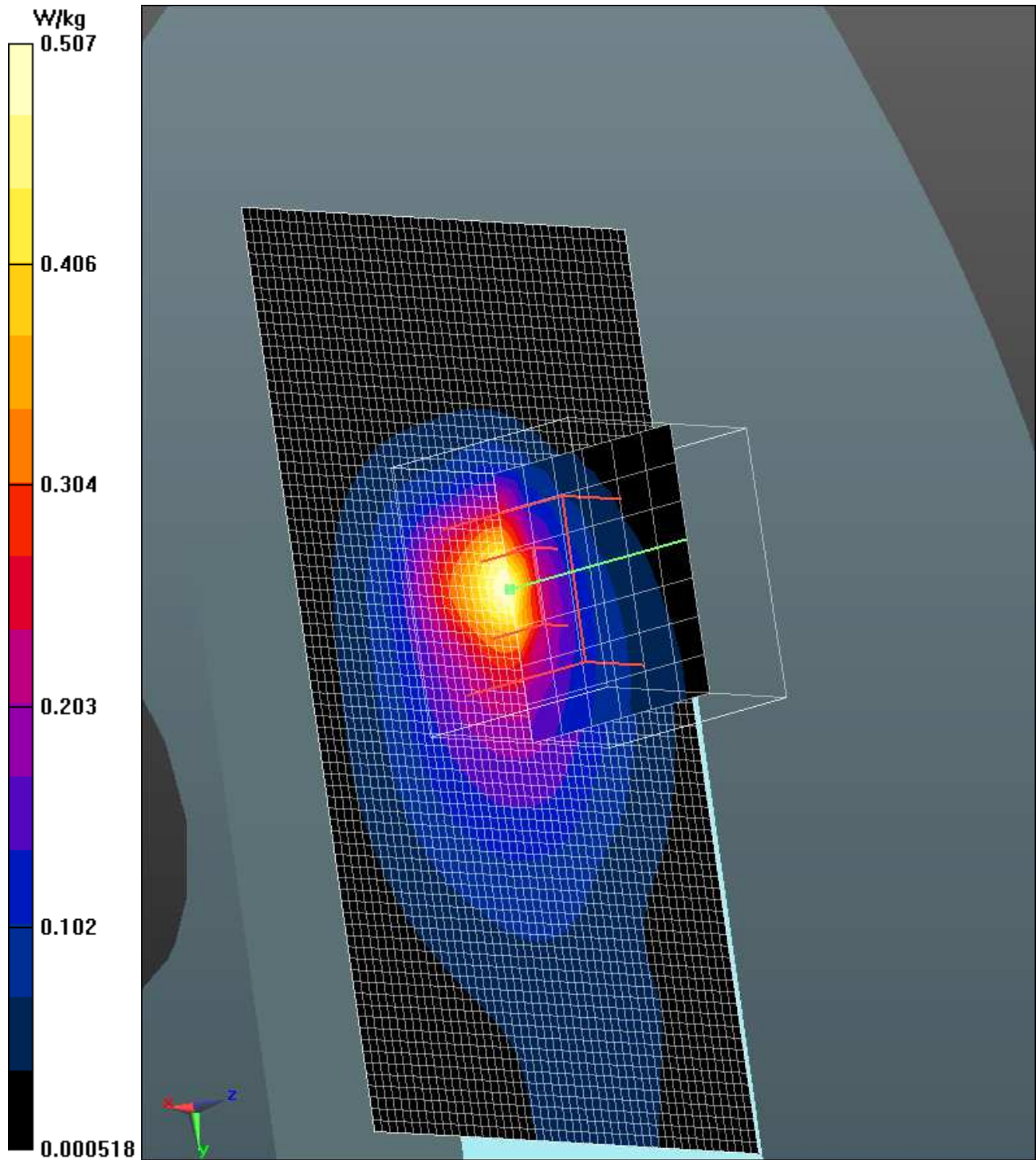
Reference Value = 9.523 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 0.686 W/kg

**SAR(1 g) = 0.315 W/kg; SAR(10 g) = 0.163 W/kg**

Maximum value of SAR (measured) = 0.535 W/kg





Evaluation For: 3M Traffic Safety and Security Division

Model Number: CDMA Tracker

Report Number: 102254548LEX-004

Date/Time: 11/6/2015 2:40:49 PM

Test Laboratory: Intertek

File Name: [CDMA PCS\\_Back Side.da52:4](#)**CDMA PCS\_Back Side\_Low**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

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

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.55 \text{ S/m}$ ;  $\epsilon_r = 50.87$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- 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 0mm Away From Phantom Mid Channel/Area Scan****(51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 0.440 W/kg

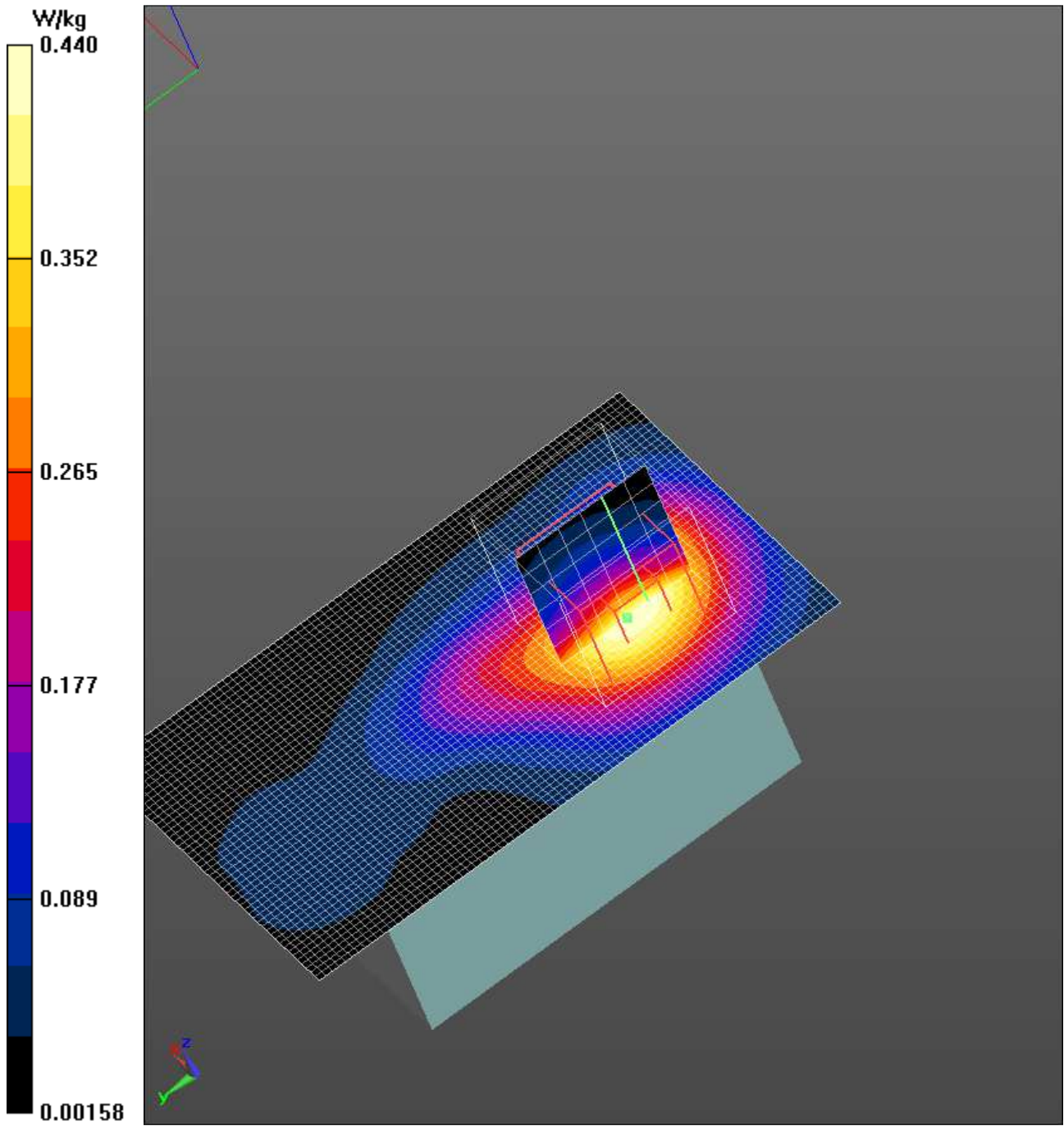
**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom Mid Channel/Zoom Scan****(7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 11.273 V/m; Power Drift = -0.26 dB

Peak SAR (extrapolated) = 0.475 W/kg

**SAR(1 g) = 0.310 W/kg; SAR(10 g) = 0.185 W/kg (SAR corrected for target medium)**

Maximum value of SAR (measured) = 0.418 W/kg





Date/Time: 11/6/2015 3:04:10 PM

Test Laboratory: Intertek

File Name: [CDMA PCS\\_Back Side.da52:4](#)**CDMA PCS\_Back Side Mid**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA PCS Band; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1851.25 \text{ MHz}$ ;  $\sigma = 1.531 \text{ S/m}$ ;  $\epsilon_r = 50.966$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- 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 0mm Away From Phantom Low Channel/Area Scan (51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ [Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (interpolated) = 0.455 W/kg

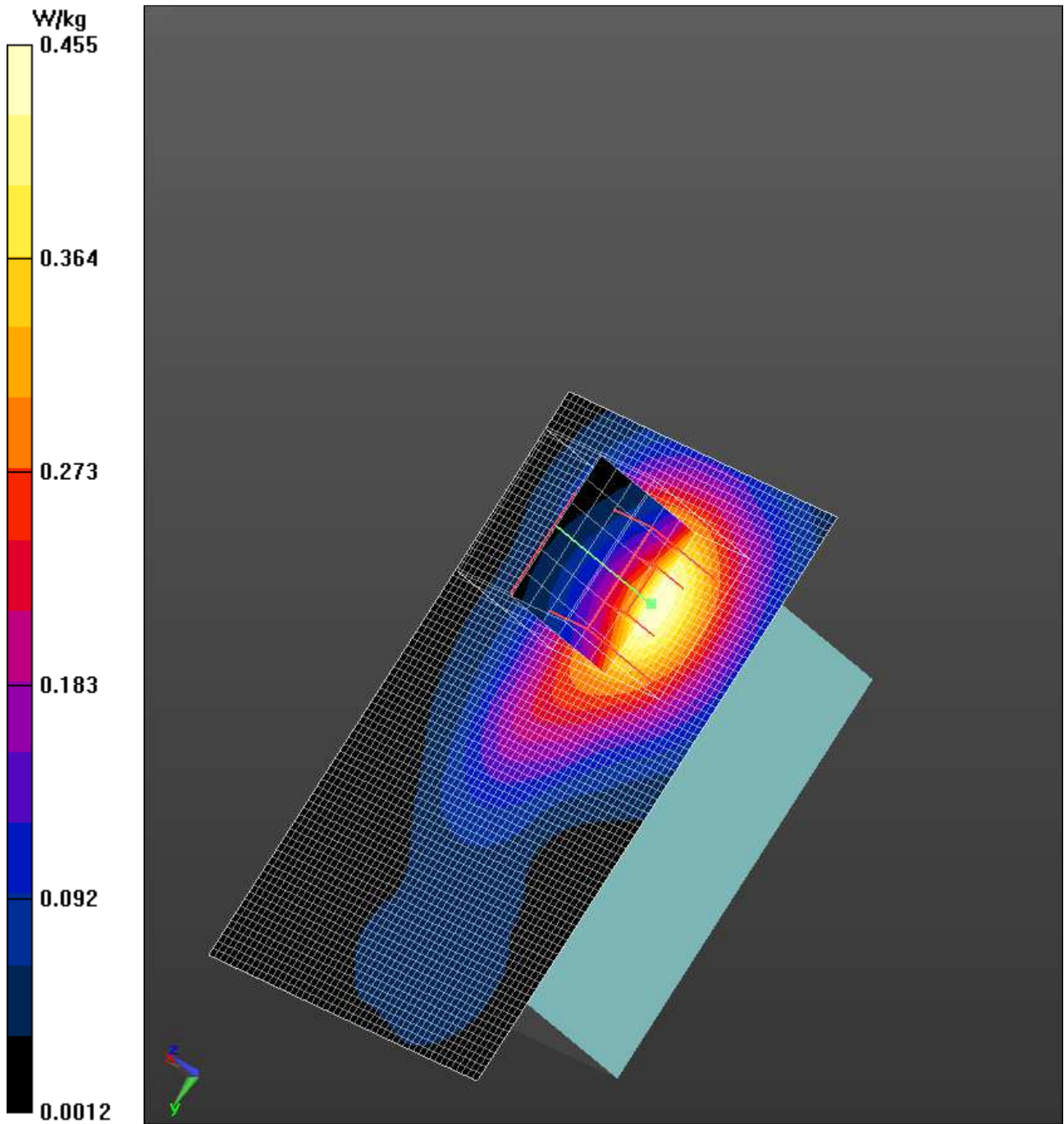
**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom Low Channel/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 10.598 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 0.523 W/kg

**SAR(1 g) = 0.344 W/kg; SAR(10 g) = 0.206 W/kg (SAR corrected for target medium)**[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.462 W/kg



Date/Time: 11/6/2015 1:51:35 PM

Test Laboratory: Intertek

File Name: [CDMA PCS\\_Back Side.da52:4](#)**CDMA PCS\_Back Side High**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA PCS Band; Frequency: 1909.92 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1910 \text{ MHz}$ ;  $\sigma = 1.58 \text{ S/m}$ ;  $\epsilon_r = 50.77$ ;  $\rho = 1000 \text{ kg/m}^3$ 

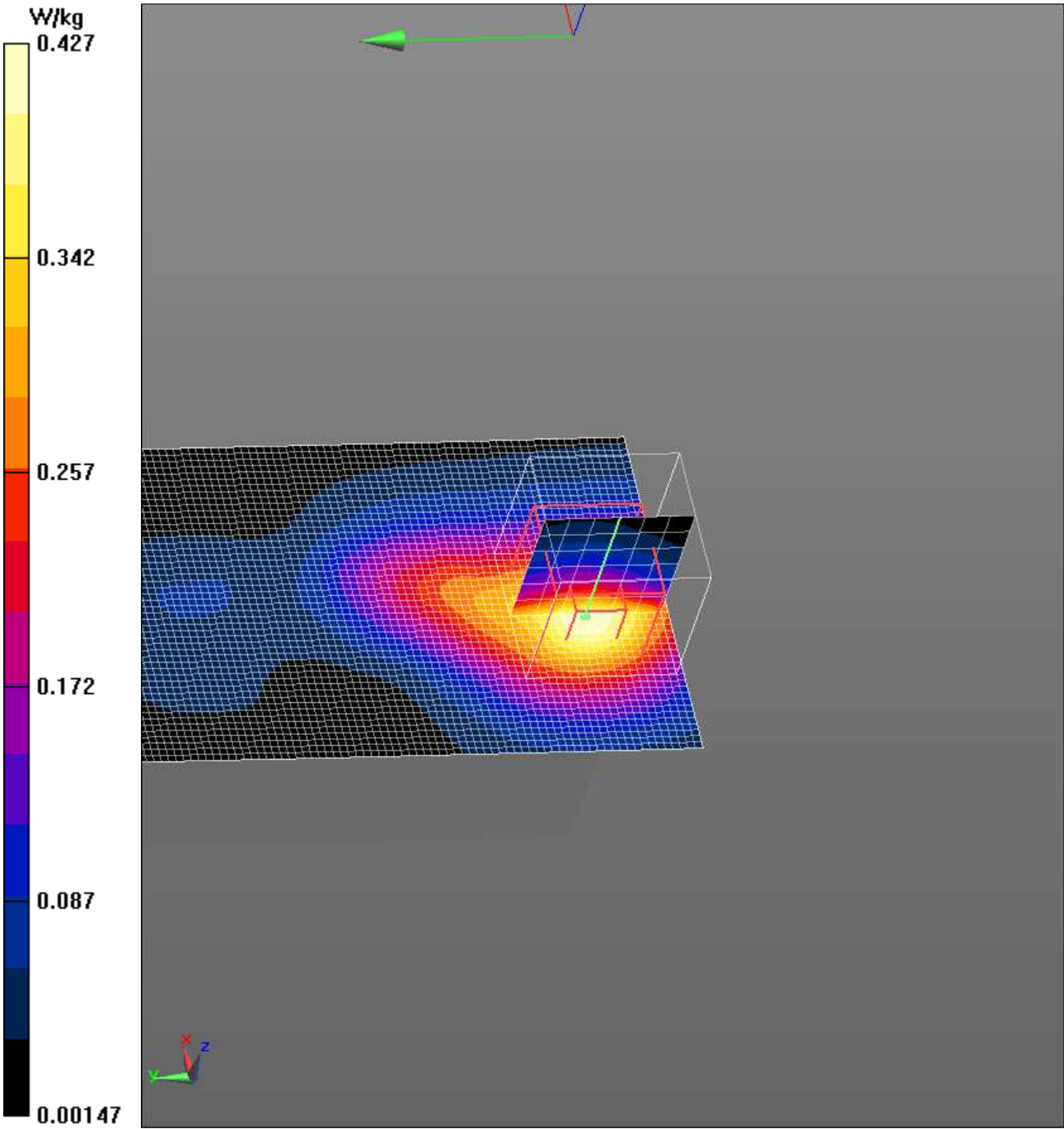
Phantom section: Flat Section

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

DASYS Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASYS 52.8.7(1137); SEMCAD X 14.6.10(7164)

**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom High Channel/Area Scan (51x81x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) = 0.427 W/kg**WWAN Flat-Section MSL Testing/Back Side of Device 0mm Away From Phantom High Channel/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$   
Reference Value = 9.164 V/m; Power Drift = -0.14 dB  
Peak SAR (extrapolated) = 0.389 W/kg  
**SAR(1 g) = 0.255 W/kg; SAR(10 g) = 0.153 W/kg (SAR corrected for target medium)**  
Maximum value of SAR (measured) = 0.343 W/kg



Test Laboratory: Intertek

File Name: [CDMA PCS\\_Front Side.da52:4](#)**CDMA PCS\_Front Side mid**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

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

Medium parameters used:  $f = 1880 \text{ MHz}$ ;  $\sigma = 1.55 \text{ S/m}$ ;  $\epsilon_r = 50.87$ ;  $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- 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 0mm Away From Phantom Mid Channel/Area Scan****2 (51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 1.60 W/kg

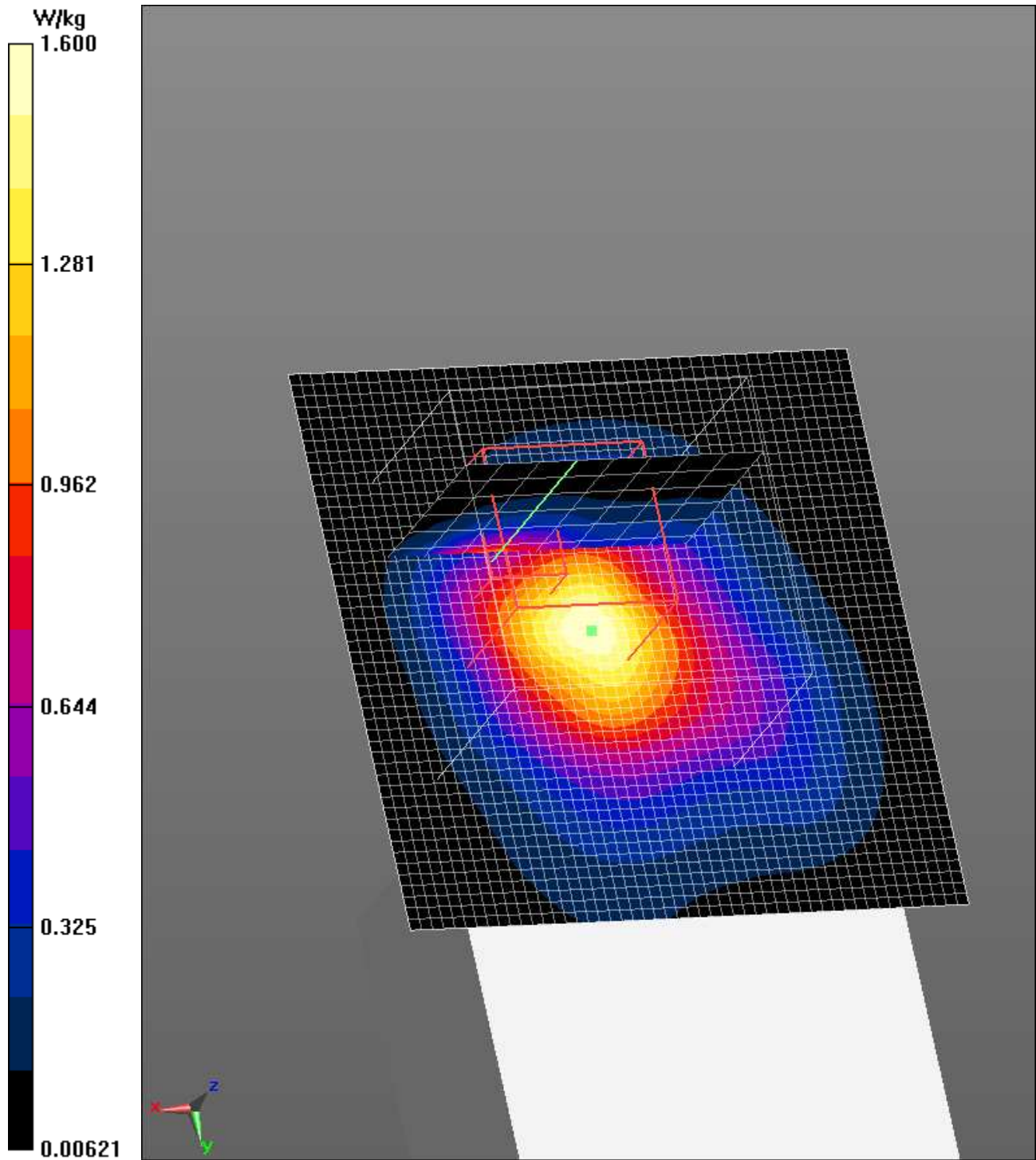
**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Mid Channel/Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 5.153 V/m; Power Drift = -0.27 dB

Peak SAR (extrapolated) = 2.76 W/kg

**SAR(1 g) = 1.22 W/kg; SAR(10 g) = 0.566 W/kg (SAR corrected for target medium)**

Maximum value of SAR (measured) = 2.16 W/kg



Date/Time: 11/6/2015 12:33:46 PM

Test Laboratory: Intertek

File Name: [CDMA PCS\\_Front Side.da52:4](#)**CDMA PCS\_Front Side low**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA PCS Band; Frequency: 1851.25 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 1851.25 \text{ MHz}$ ;  $\sigma = 1.531 \text{ S/m}$ ;  $\epsilon_r = 50.966$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- 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 0mm Away From Phantom Low Channel/Area Scan 2 (51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$ 

Maximum value of SAR (interpolated) = 1.46 W/kg

**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom Low Channel/Zoom Scan (9x9x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

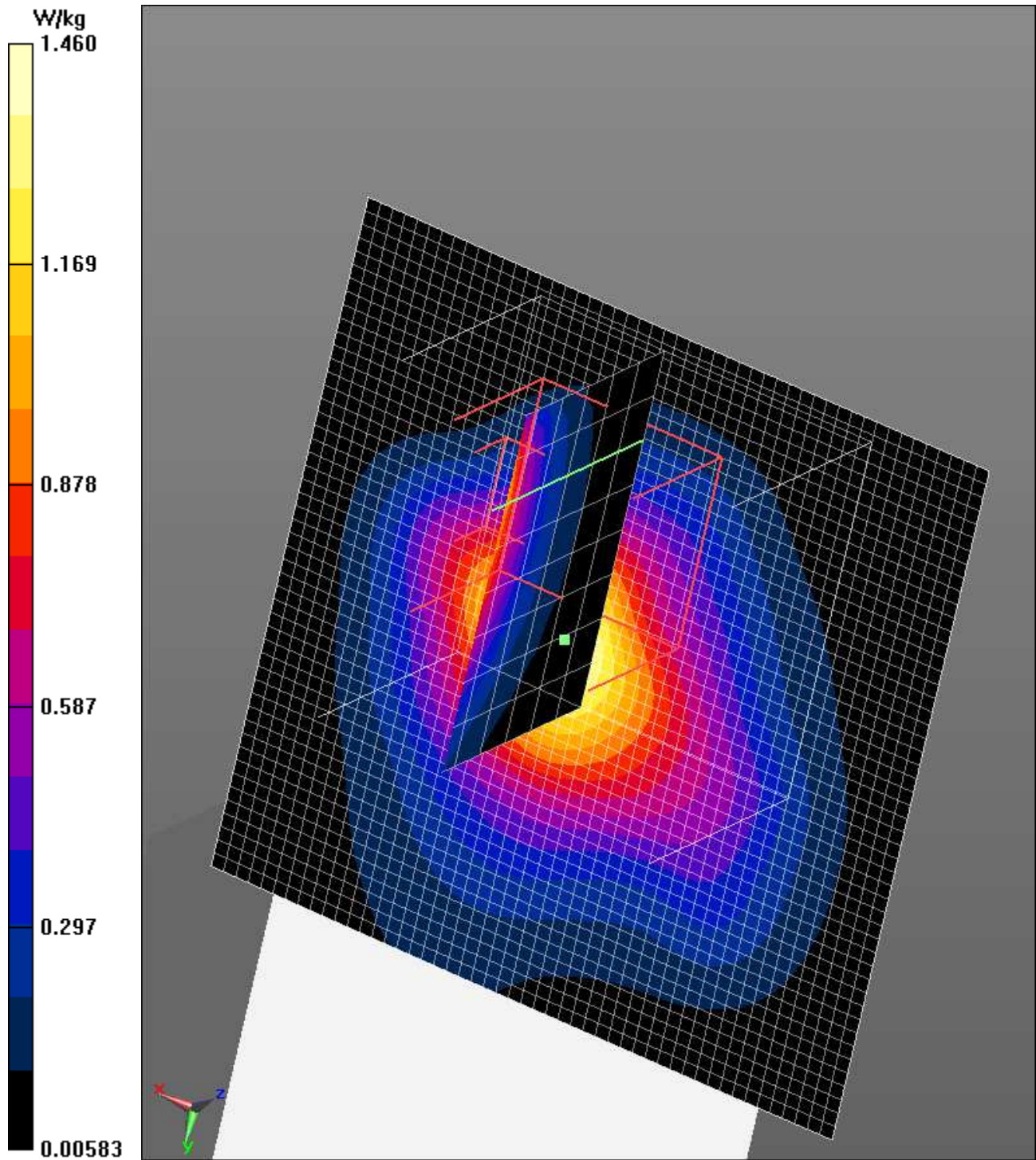
Reference Value = 4.939 V/m; Power Drift = 0.20 dB

Peak SAR (extrapolated) = 2.79 W/kg

**SAR(1 g) = 1.23 W/kg; SAR(10 g) = 0.581 W/kg (SAR corrected for target medium)**

Maximum value of SAR (measured) = 2.19 W/kg







Date/Time: 11/6/2015 12:37:58 PM

Test Laboratory: Intertek

File Name: [CDMA PCS\\_Front Side.da52:4](#)**CDMA PCS\_Front Side high**

Procedure Notes:

**DUT: 3m CDMA Tracker; Serial: Not Labeled**

Communication System: UID 0, Generic CDMA (0); Communication System Band: CDMA PCS Band; Frequency: 1909.92 MHz; Duty Cycle: 1:1

Medium parameters used:  $f = 1910 \text{ MHz}$ ;  $\sigma = 1.58 \text{ S/m}$ ;  $\epsilon_r = 50.77$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

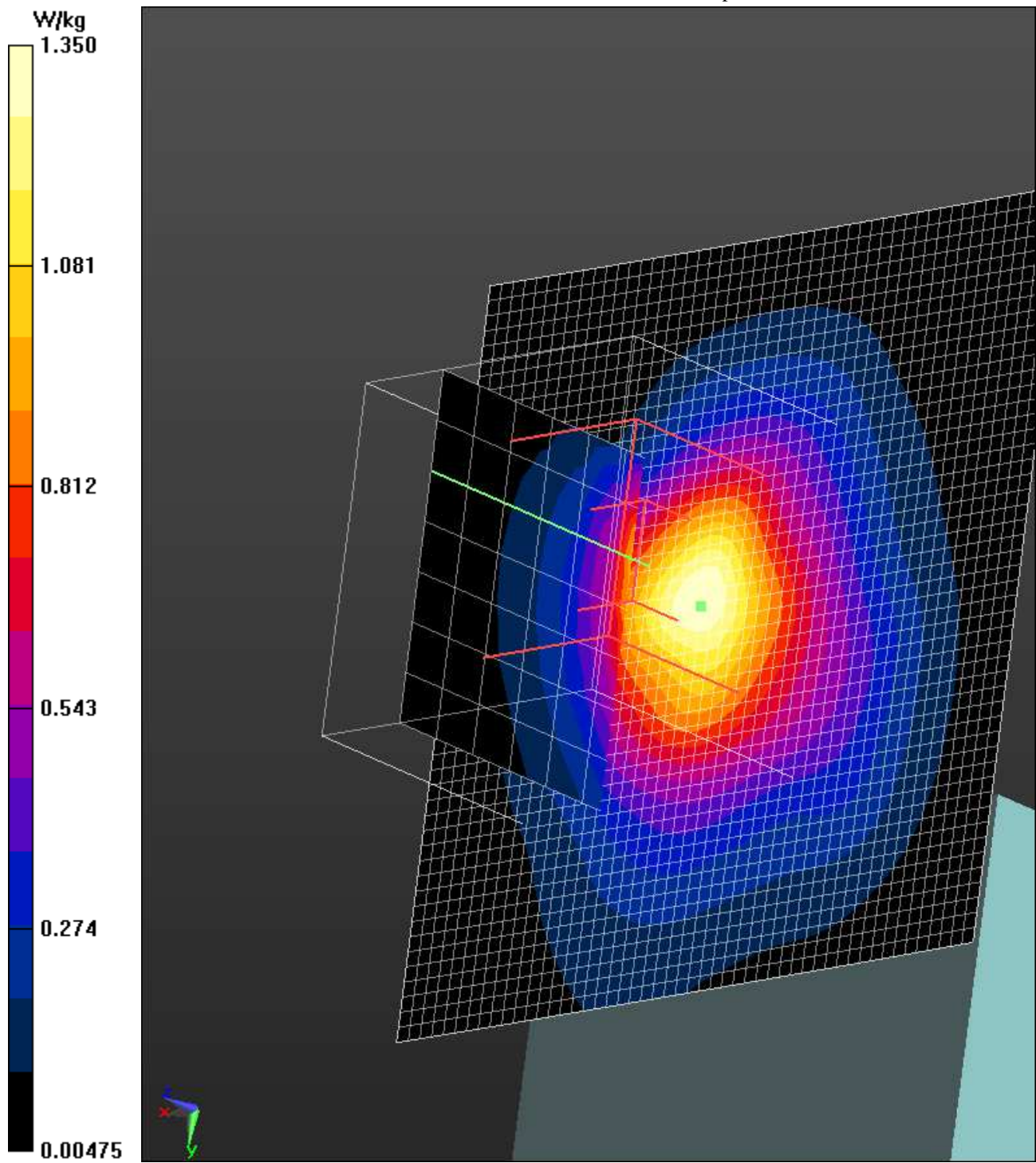
**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom High Channel/Area Scan 2 (51x51x1):** Interpolated grid:  $dx=1.500 \text{ mm}$ ,  $dy=1.500 \text{ mm}$   
Maximum value of SAR (interpolated) = 1.35 W/kg**WWAN Flat-Section MSL Testing/Front Side of Device 0mm Away From Phantom High Channel/Zoom Scan (8x8x7)/Cube 0:** Measurement grid:  $dx=5\text{mm}$ ,  $dy=5\text{mm}$ ,  $dz=5\text{mm}$ 

Reference Value = 3.591 V/m; Power Drift = -0.36 dB

Peak SAR (extrapolated) = 2.83 W/kg

**SAR(1 g) = 1.19 W/kg; SAR(10 g) = 0.542 W/kg (SAR corrected for target medium)**

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



Test Laboratory: Intertek

File Name: [835 Dipole\\_Body Tissue.da52:2](#)**1.1.4 835 Dipole\_Body Tissue**

Procedure Notes:

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

Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used (interpolated):  $f = 835 \text{ MHz}$ ;  $\sigma = 1.008 \text{ S/m}$ ;  $\epsilon_r = 52.614$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.51, 10.51, 10.51); Calibrated: 12/12/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- Phantom: SAM 1 with CRP v5.0; Type: QD000P40CD; Serial: TP: 1243
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Area Scan (31x61x1):** Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 1.26 W/kg

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

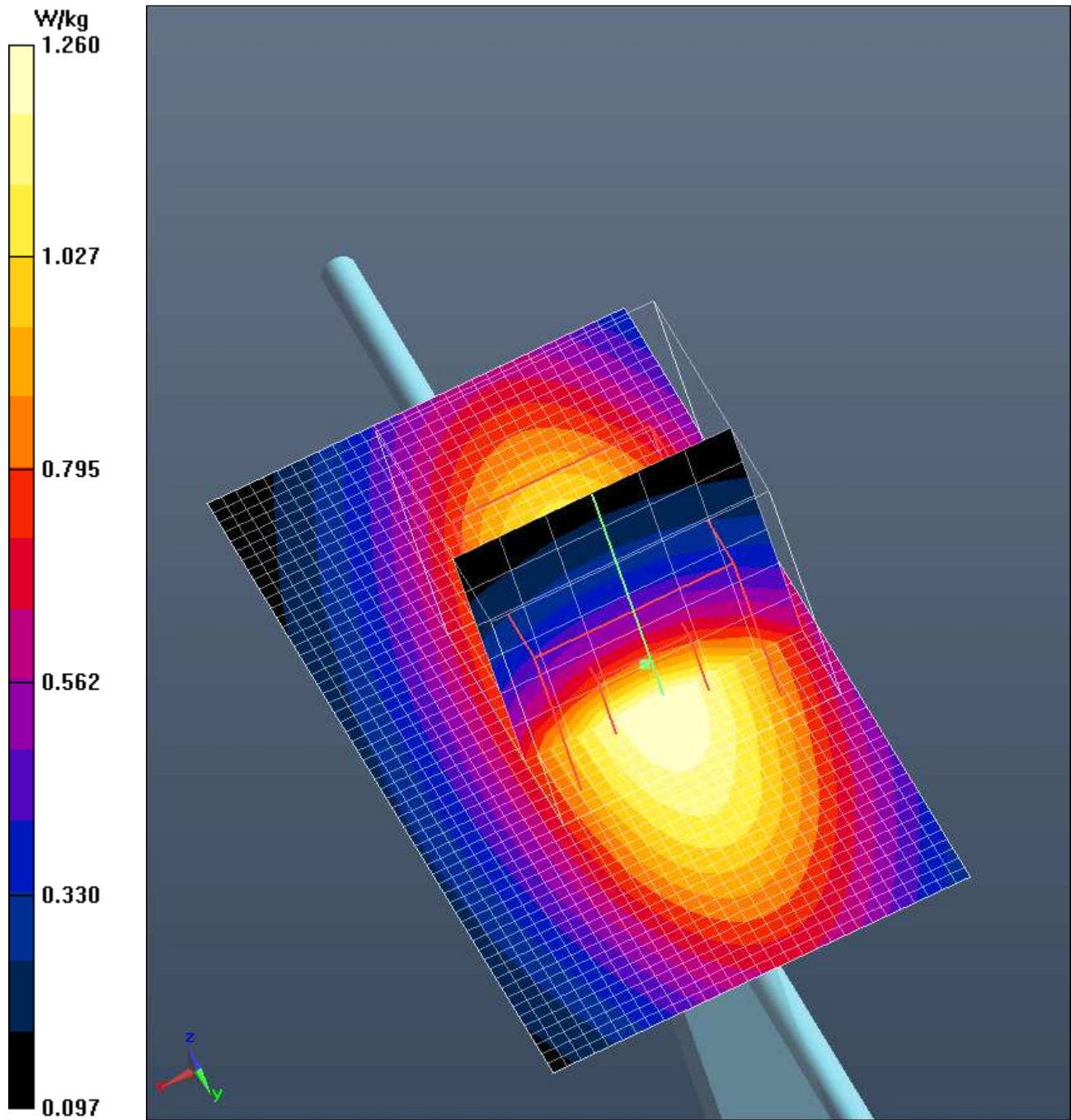
Reference Value = 35.695 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 14.8 W/kg

**SAR(1 g) = 10.1 W/kg; SAR(10 g) = 6.71 W/kg**

Normalized to target power = 1 W and actual power = 0.1 W

Maximum value of SAR (measured) = 12.6 W/kg



Evaluation For: 3M Traffic Safety and Security Division

Model Number: CDMA Tracker

Report Number: 102254548LEX-004

Date/Time: 11/6/2015 12:19:10 PM

Test Laboratory: Intertek

File Name: [1900 Dipole\\_Body Tissue.da52:2](#)**1900 Dipole\_Body Tissue**

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):  $f = 1900 \text{ MHz}$ ;  $\sigma = 1.532 \text{ S/m}$ ;  $\epsilon_r = 53.28$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.48, 8.48, 8.48); Calibrated: 12/12/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 9/16/2014
- 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=100mW, dist=2.0mm (EX-Probe)/Area Scan (4x7x1):** Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 4.88 W/kg

**System Performance Check at Frequencies above 1 GHz/d=10mm, Pin=100mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 56.995 V/m; Power Drift = 0.10 dB

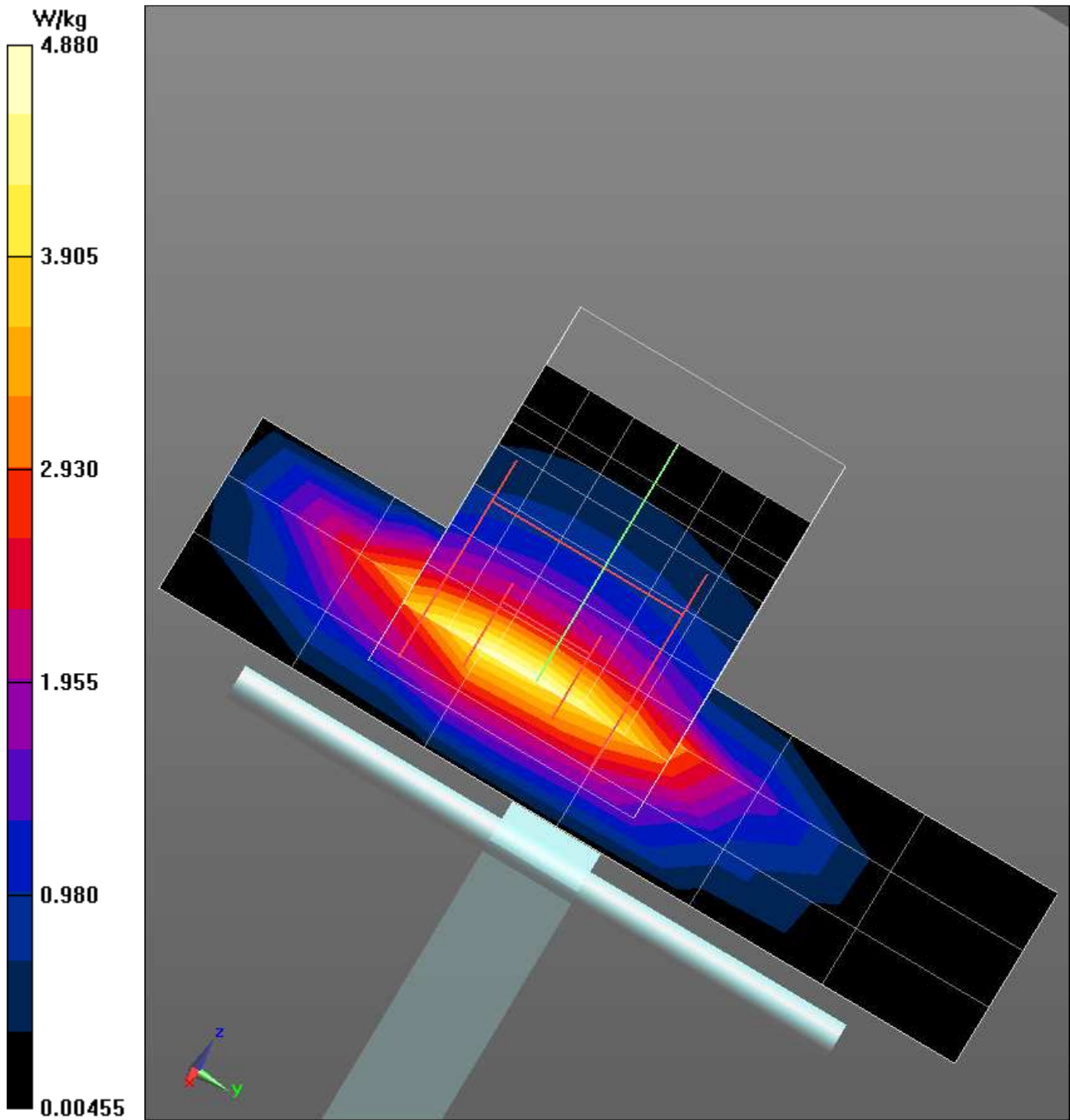
Peak SAR (extrapolated) = 74.2 W/kg

**SAR(1 g) = 40.9 W/kg; SAR(10 g) = 21.3 W/kg**

Normalized to target power = 1 W and actual power = 0.1 W

Maximum value of SAR (measured) = 58.3 W/kg







## 12.0 APPENDIX – SYSTEM VALIDATION SUMMARY

Per FCC KDB 865664, a tabulated summary of the system validation status including the validation date(s), measurement frequencies, SAR probes and tissue dielectric parameters have been included in the summary table below. The validation was performed with reference dipoles using the required tissue equivalent media for system validation according to KDB 865664. Each probe calibration point was validated at a frequency within the valid frequency range of the probe calibration point. All measurements were performed using probes calibrated for CW signals. Modulations in the table above represent test configurations for which the SAR system has been validated. The SAR system was also validated with modulated signals per KDB 865664.

Frequency (MHz)	Date	Probe (SN#)	Probe (Model #)	Probe Calibration Point		Dielectric Properties		CW Validation			Modulation Validation		
				Frequency (MHz)	Fluid Type	$\sigma$	$\epsilon_r$	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR
835	1/15/2015	3516	EX3DV3	835	Body	53.1	1.01	Pass	Pass	Pass	GMSK	Pass	N/A
1800	1/15/2015	3516	EX3DV3	1800	Body	51.7	1.48	Pass	Pass	Pass	GMSK	Pass	N/A
1900	1/15/2015	3516	EX3DV3	1900	Body	51.4	1.59	Pass	Pass	Pass	GMSK	Pass	N/A

Table 10: SAR System Validation Summary