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Avery Dennison Retail Information Services, LLC.

SAR TEST REPORT

SCOPE OF WORK

SPECIFIC ABSORBTION RATE – PATHFINDER 6059

REPORT NUMBER
103831188LEX-003

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SPECIFIC ABSORBTION RATE TEST REPORT

Report Number: **103831188LEX-003**

Project Number: **G103831188**

Report Issue Date: **7/9/2019**

Product Name: **Pathfinder 6059**

Standards: **FCC Part 2.1093**

RSS-102 Issue 5

Tested by:

Intertek Testing Services NA, Inc.
731 Enterprise Drive
Lexington, KY 40510

USA

Client:

Avery Dennison Retail Information Services, LLC.
170 Monarch Lane

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USA

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1 INTRODUCTION

At the request of Avery Dennison Retail Information Services, LLC. the Pathfinder 6059 was evaluated for SAR in accordance with the requirements for FCC Part 2.1093 and RSS-102 Issue 5. Testing was performed in accordance with IEEE Std 1528:2013, IEC62209-2:2010, 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 ±22.2% from 300MHz – 3GHz and 24.6% from 3GHz – 6GHz.

The Pathfinder 6059 was tested at the maximum output power measured by Intertek. Maximum output power measurements are tabulated under Section 10 Test Results. The maximum spatial peak SAR value for the sample device averaged over 1g (for body worn mode) and 10g (for hand held mode) is shown below.

Based on the worst-case data presented above, the Pathfinder 6059 was found to be **compliant** with the 1.6 W/kg and 4W/kg requirements for general population / uncontrolled exposure.

Table 1: Worst Case Reported SAR per Exposure Condition

Device Position	Transmit Mode	Separation Distance	Frequency (MHz)	Maximum Conducted Output Power (dBm)	Reported SAR (1g) (mW/g)	Limit (W/kg)
Top of Display	2.4Ghz WiFi 802.11b	0mm	2437MHz	20.5dBm	0.0492mW/g	1.6mW/g
Top of Display	5GHz WiFi 802.11n	0mm	5580MHz	20.5dBm	0.5093mW/g	1.6mW/g
Top of Display	Bluetooth GFSK	0mm	2440MHz	12.5dBm	0.0105mW/g	1.6mW/g
Top of Display	RFID	0mm	915MHz	23dBm	0.0105mW/g	1.6mW/g

2 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°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.

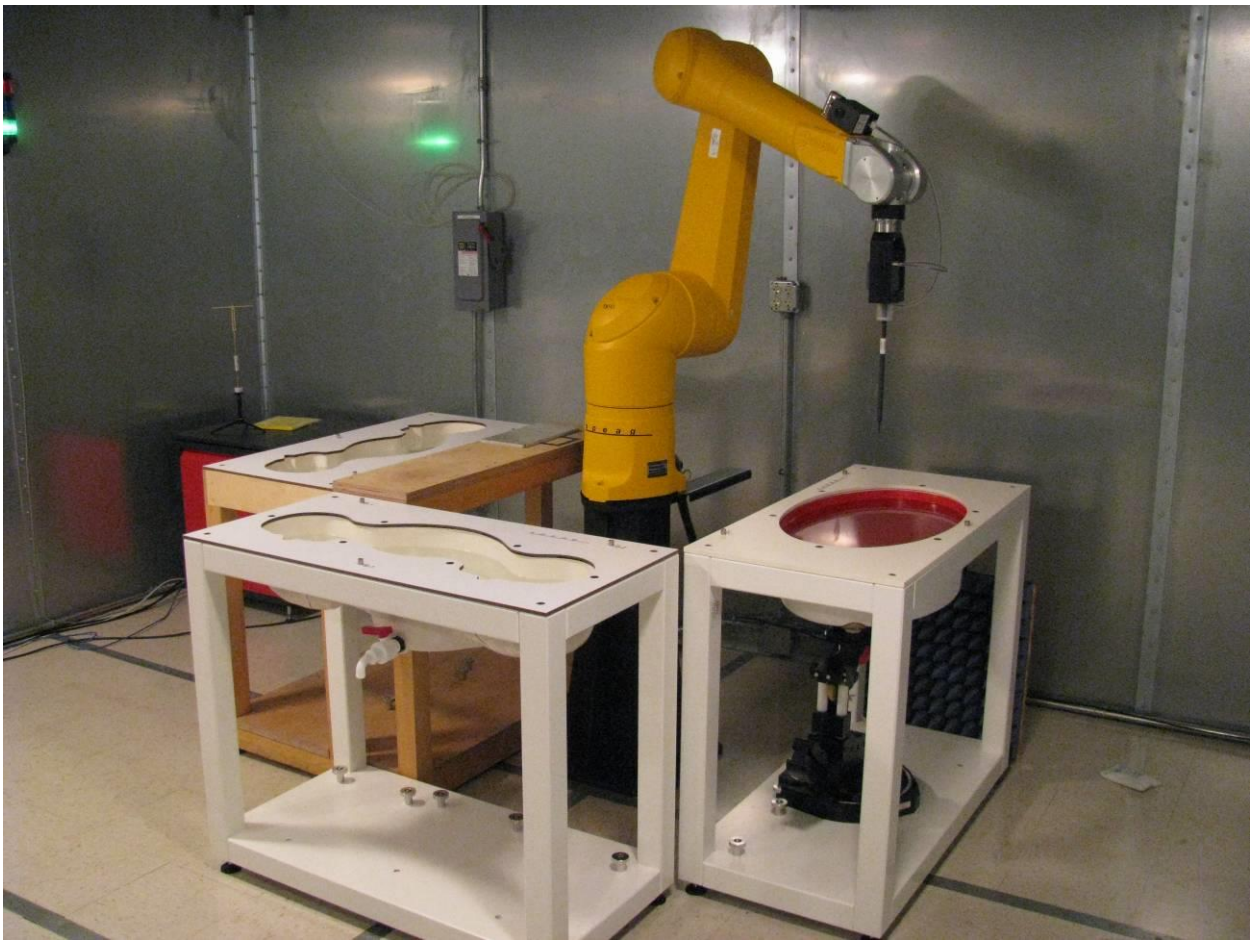

Figure 1: Intertek SAR Test Site

2.1 Measurement Equipment

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

Table 2: Test Equipment Used for SAR Evaluation

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
SAR Probe	3516	Speag	EXDV3	11/12/2018	11/12/2019
900MHz Dipole	3014	Speag	D900V2	11/6/2018	11/6/2019
2450MHz Dipole	3013	Speag	D2450V2	11/5/2018	11/5/2019
5GHz Dipole	3053	Speag	D5GHzV2	11/9/2018	11/9/2019
DAE	358	Speag	DAE4	11/6/2018	11/6/2019
Vector Signal Generator	257708	Rohde & Schwarz	SMBV100A	9/21/2018	9/21/2019
Network Analyzer	US39173983	Agilent	8753ES	3/4/2019	3/4/2020
Base Station Simulator	3917	Rohde & Schwarz	CMW500	9/26/2018	9/26/2019
USB Power Sensor	100155	Rohde & Schwarz	NRP-Z81	9/21/2018	9/21/2019
USB Power Sensor	100705	Rohde & Schwarz	NRP-Z51	9/21/2018	9/21/2019
Dielectric Probe Kit	1111	Speag	DAK-3.5	11/6/2018	11/6/2019
Spectrum Analyzer	3099	Rohde & Schwarz	FSP7	9/20/2018	9/20/2019
SAM Twin Phantom	1663	Speag	QD 000 P40 C	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*

2.2 Measurement Uncertainty

The Tables below includes the uncertainty budget suggested by the IEEE Std 1528-2013 and IEC62209-2: 2010 as 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	±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%	∞
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%	∞
Power Scaling	±0.0%	R	√3	1	1	±0%	±0%	∞
Phantom and Setup								
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(mea.)	±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%	∞
Combined Standard Uncertainty						±11.2%	±11.1%	361
Expanded STD Uncertainty						±22.3%	±22.2%	

Notes:

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}
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%	∞
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%	∞
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%	∞
Power Scaling	±0.0%	R	√3	1	1	±0%	±0%	∞
Phantom and Setup								
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(mea.)	±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%	∞
Combined Standard Uncertainty						±12.3%	±12.2%	748
Expanded STD Uncertainty						±24.6%	±24.5%	

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.

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%	∞
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%	∞
Post-Processing	±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%	∞
Power Scaling	±0.0%	R	√3	1	1	±0%	±0%	∞
Phantom and Setup								
Phantom Uncertainty	±7.9%	R	√3	1	1	±4.6%	±4.6%	∞
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(mea.)	±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%	∞
Combined Standard Uncertainty						±12.5%	±12.5%	748
Expanded STD Uncertainty						±25.1%	±25.0%	

Notes.

Worst Case uncertainty budget for DASY5 assessed according to IEC62209-2: 2010. The budget is valid for the frequency range 30MHz – 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.

3 CLIENT INFORMATION

This product was tested at the request of the following:

Client Information	
Client Name:	Avery Dennison Retail Information Services, LLC.
Address:	170 Monarch Lane Miamisburg, OH 45342-3638 USA
Contact:	Michael Ouziel
Telephone:	(937) 865-2020
Email:	Michael.ouziel@averydennison.com
Manufacturer Information	
Manufacturer Name:	Avery Dennison Retail Information Services, LLC.
Manufacturer Address:	170 Monarch Lane Miamisburg, OH 45342-3638 USA

4 PRODUCT DESCRIPTION

Equipment Under Test	
Product Name	Pathfinder 6059
Model Number	6059
Serial Number	FCC Test Sample
Receive Date	3/26/2019
Test Start Date	5/21/2019
Test End Date	5/31/2019
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	7.4VDC
Radios Onboard	RFID, Bluetooth, WiFi
Operating Frequency Ranges	**RFID:** 902 – 928MHz **Bluetooth:** 2.4 – 2.48GHz **2.4GHz WiFi:** 2.4 – 2.473GHz **5GHz WiFi:** 5.15 – 5.35GHz 5.47 – 5.725GHz 5.725 – 5.85GHz
Rated Frequency	NA – DC Powered
Number of Phases	NA – DC Powered

Description of Equipment Under Test (provided by client)
The product under test was the Pathfinder 6059 manufactured by Avery Dennison Retail Information Services, LLC. The 6059 is a handheld battery operated scanner / label printer equipped with Bluetooth, WiFi, and RFID capabilities.

4.1 EUT Photo (Top):

4.2 EUT Photo (Bottom):

4.3 EUT Photo (Left):

4.4 EUT Photo (Right):

5 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.

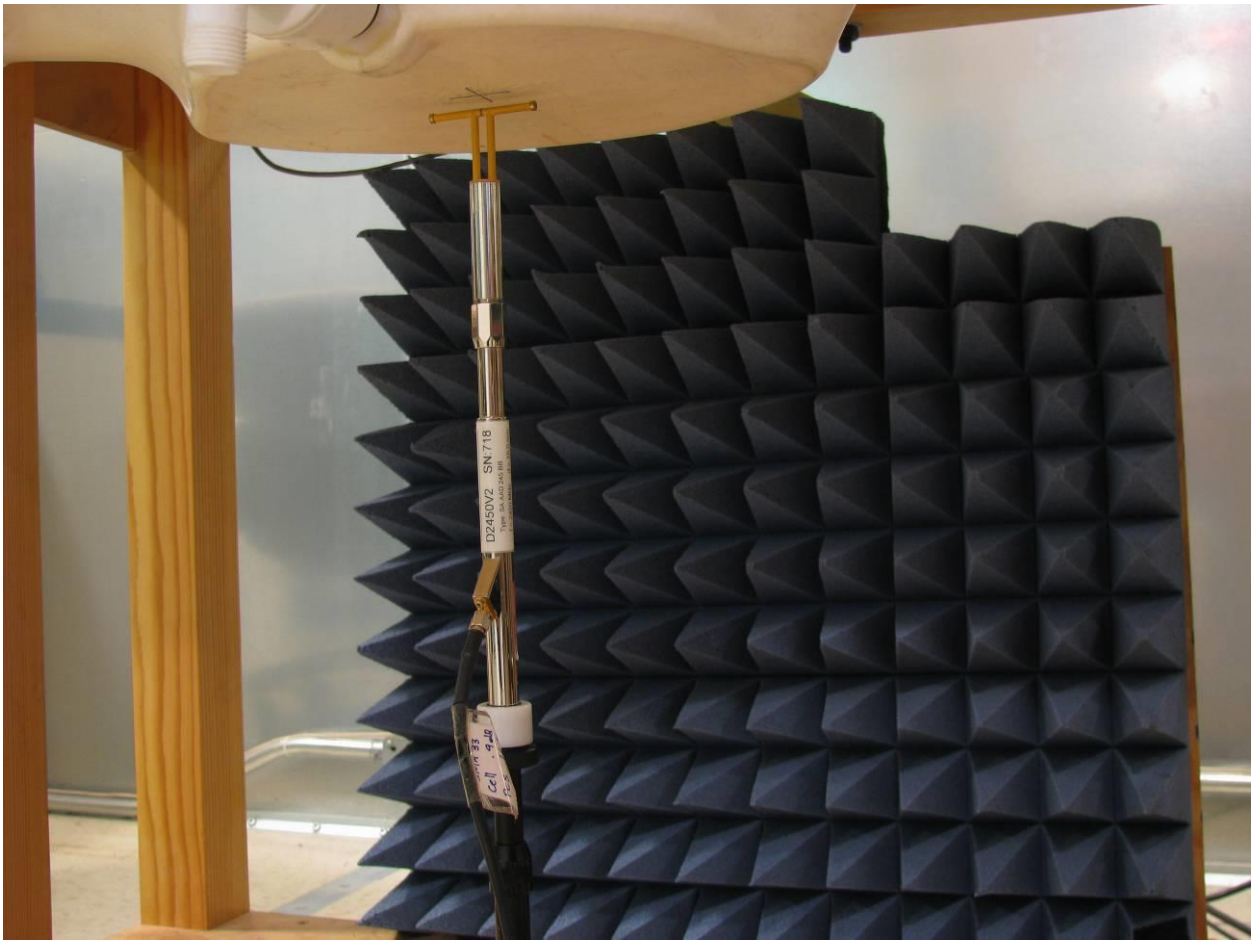

Figure 2: System Verification Setup

Table 3: Dipole Validations (1g)

Reference Dipole Validation									
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**
23.2	23.1	2450	D2450V2	MSL2450	1W	49.7	52	4.63	5/20/2019
23.2	23.1	5200	D5GHzV2	MSL5GHz	1W	73.00	67.8	7.12	5/28/2019
23.2	23.1	5500	D5GHzV2	MSL5GHz	1W	81.80	83.3	1.83	5/28/2019
23.2	23.1	5800	D5GHzV2	MSL5GHz	1W	76.80	83.7	8.98	5/28/2019
23.2	23.1	900	D900V2	MSL900	1W	11.00	11	0.00	5/31/2019

Table 4: Dipole Validations (10g)

Reference Dipole Validation									
Ambient Temp (ºC)	**Fluid Temp (ºC)**	**Frequency (MHz)**	**Dipole**	**Fluid Type**	**Dipole Power Input**	**Cal. Lab SAR (10g)**	**Measured SAR (10g)**	**% Error SAR (10g)**	**Date**
23.2	23.1	2450	D2450V2	MSL2450	1W	23.4	23.5	0.43	5/20/2019
23.2	23.1	5200	D5GHzV2	MSL5GHz	1W	20.40	19.1	6.37	5/28/2019
23.2	23.1	5500	D5GHzV2	MSL5GHz	1W	22.60	21.8	3.54	5/28/2019
23.2	23.1	5800	D5GHzV2	MSL5GHz	1W	21.30	23.1	8.45	5/28/2019
23.2	23.1	900	D900V2	MSL900	1W	7.09	7.33	3.39	5/31/2019

Measurement Uncertainty for System Validation

Source of Uncertainty	Value(dB)	Probability Distribution	Divisor	c_i	$u_i(y)$	$(u_i(y))^2$
Measurement System						
Probe Calibration	5.50	n1	1	1	5.50	30.250
Axial Isotropy	4.70	r	1.732	0.7	2.71	7.364
Hemispherical Isotropy	9.60	r	1.732	0.7	5.54	30.722
Boundary Effect	1.00	r	1.732	1	0.58	0.333
Linearity	4.70	r	1.732	1	2.71	7.364
System Detection Limits	1.00	r	1.732	1	0.58	0.333
Readout Electronics	0.30	n1	1	1	0.30	0.090
Response Time	0.80	r	1.732	1	0.46	0.213
Integration Time	2.60	r	1.732	1	1.50	2.253
RF Ambient Noise	3.00	r	1.732	1	1.73	3.000
RF Ambient Reflections	3.00	r	1.732	1	1.73	3.000
Probe Positioner	0.40	r	1.732	1	0.23	0.053
Probe Positioning	2.90	r	1.732	1	1.67	2.803
Max. SAR Eval.	1.00	r	1.732	1	0.58	0.333
Dipole / Generator / Power Meter Related						
Dipole positioning	2.90	n1	1	1	2.90	8.410
Dipole Calibration Uncertainty	0.68	r	1.732	1	0.39	0.154
Power Meter 1 Uncertainty (+20C to +25C)	0.13	n1	1	2	0.13	0.017
Power Meter 2 Uncertainty (+20C to +25C)	0.04	n1	1	3	0.04	0.002
Sig Gen VSWR Mismatch Error	1.80	n1	1	5	1.80	3.240
Sig Gen Resolution Error	0.01	n1	1	6	0.01	0.000
Sig Gen Level Error	0.90	n1	1	1	0.90	0.810
Phantom and Setup						
Phantom Uncertainty	4.00	r	1.732	1	2.31	5.334
Liquid Conductivity (target)	5.00	r	1.732	0.43	2.89	8.334
Liquid Conductivity (meas.)	2.50	n1	1	0.43	2.50	6.250
Liquid Permittivity (target)	5.00	r	1.732	0.49	2.89	8.334
Liquid Permittivity (meas.)	2.50	n1	1	0.49	2.50	6.250
Combined Standard Uncertainty		N1	1	1	11.63	135.247
Expanded Uncertainty		Normal k=	2		23.26	
Expanded Uncertainty	is	23.3	for	Normal	k=	2

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 5. A recipe for the tissue simulating fluid used is shown in Table 6.

Table 5: Dielectric Parameter Validations

Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation
	2400	52.77	1.95	51.8	14.2	1.89	1.84	2.84
	2450	52.7	1.95	51.5	14.6	1.99	2.28	1.98
2450MSL	2480	52.66	1.95	51.4	14.6	2.01	2.39	3.23

Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation
	5200	49.01	5.30	48.93	18.45	5.33	0.16	0.64
5GHz	5600	48.47	5.77	48.48	18.77	5.84	0.02	1.28
MSL	5800	48.2	6.00	48.11	19.03	6.14	0.19	2.27

Tissue Type	Frequency Measure (MHz)	Dielectric Constant Target	Conductivity Target	Dielectric Constant Measure	Imaginary Part	Conductivity Measure	Dielectric % Deviation	Conductivity % Deviation
	900	55	0.97	54.27	19.12	0.96	1.33	1.37
	915	55	0.97	54.16	19.19	0.98	1.53	0.64
900MSL	928	55	0.97	53.78	19.22	0.99	2.22	2.23

Table 6: Tissue Simulating Fluid Recipe

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 EVALUATION PROCEDURES

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

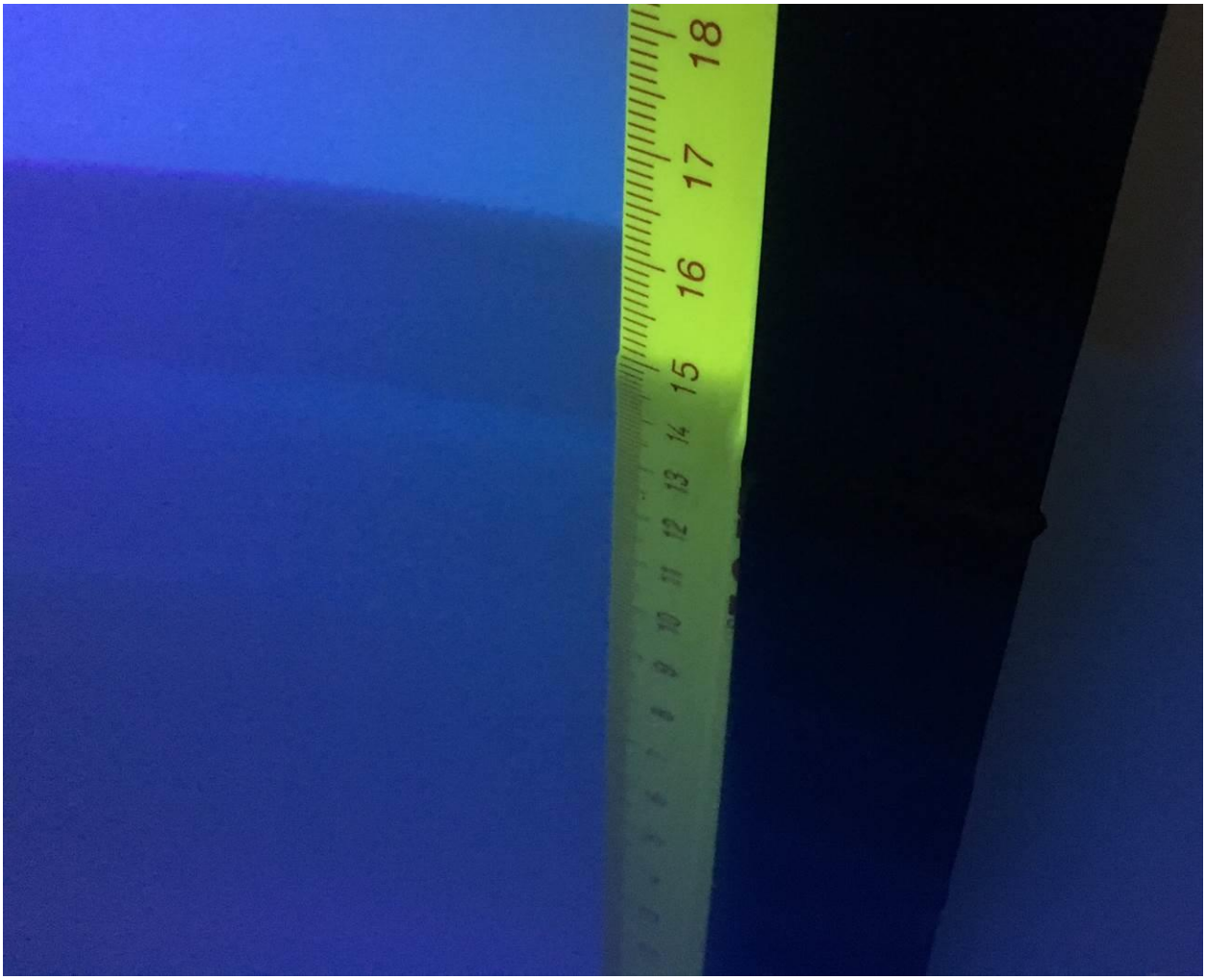

Figure 3: Fluid Depth 15cm

Test Positions:

The Device was positioned against the SAM and flat phantom using the exact procedure described in IEEE Std 1528:2013, IEC62209-2:2010, 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 7.

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 7.

Table 7: SAR Area and Zoom Scan Resolutions

			≤ 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.

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. This value should not exceed 5%. 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 CRITERIA

The following ANSI/IEEE C95.1 – 1992 limits for SAR apply to portable devices operating in the General Population/Uncontrolled Exposure environment. Uncontrolled environments are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

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

8 TEST CONFIGURATION

The Pathfinder 6059 was evaluated according to the specific requirements found in the following KDBs and Standards:

- FCC KDB 447498D01 v06, General RF Exposure Guidance
- FCC KDB 865664D01 v01r04, SAR Measurement Requirements for 100MHz to 6GHz
- FCC KDB 248227D01 801.11 Wi-Fi SAR v02r02, SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters
- RSS-102 Issue 5, Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

The Pathfinder 6059 could be used against the body or hand held. According to the manufacturer there are no against the head usage conditions. Therefore it was evaluated in body and extremity (hand held) positions. Photos of the test position s are shown below. Initial scans indicated that the left and right hand positions produced a lower SAR value that the top side positions as. The antennas were located toward the top side of the device which produced the higher SAR.

8.1 Setup Photos (Top Side Exposure Condition)

8.2 Setup Photos (Screen Top Exposure Condition)

8.3 Setup Photos (Left Side Exposure Condition)

8.4 Setup Photos (Right Side Exposure Condition)

9 CONDUCTED OUTPUT POWER

Conducted output power measurements are shown below.

Table 8: Conducted Output Power (Bluetooth)

Frequency Band	Mode	Data Rate	Channel	Freq. (MHz)	Average Power (dBm)
2390 - 2483.5MHz	BT	GFSK	0	2402	9.97
			39	2441	10.12
			78	2480	9.84
	BT	Pi/4-DQPSK	0	2402	7.68
			39	2441	7.62
			78	2480	7.42
	BT	8DPSK	0	2402	6.87
			39	2441	6.92
			78	2480	6.84
	BLE	GFSK	0	2402	6.61
			39	2441	6.67
			78	2480	5.14

Table 9: Conducted Output Power (2.4GHz, WiFi)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Average Power (dBm)
2390 - 2483.5MHz	802.11b	20MHz	1	2412	20.22
			6	2437	20.31
			11	2463	20.33
	802.11g	20MHz	1	2412	19.87
			6	2437	20.42
			11	2463	20.21
	802.11n20	20MHz	1	2412	19.57
			6	2437	19.89
			11	2463	19.46
	802.11n40	20MHz	3	2422	15.64
			6	2437	16.67
			9	2452	16.52

Table 10: Conducted Output Power (U-NII-1, WiFi)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Average Power (dBm)
U-NII-1 5150 - 5250MHz	802.11a	20MHz	36	5180	19.42
			40	5200	19.86
			44	5220	19.74
			48	5240	19.43
	802.11n (20MHz)	20MHz	36	5180	19.41
			40	5200	19.38
			44	5220	19.33
			48	5240	19.27
	802.11n (40MHz)	40MHz	38	5190	19.41
			46	5230	19.34
	802.11ac	80MHz	42	5210	15.27

Table 11: Conducted Output Power (U-NII-2A, WiFi)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Average Power (dBm)
U-NII-2A 5250 - 5350MHz	802.11a	20MHz	52	5260	19.89
			56	5280	19.92
			60	5300	20.12
			64	5320	20.07
	802.11n (20MHz)	20MHz	52	5260	19.84
			56	5280	19.93
			60	5300	20.08
			64	5320	20.04
	802.11n (40MHz)	40MHz	54	5270	19.02
			62	5310	19.41
	802.11ac	80MHz	58	5290	15.23

Table 12: Conducted Output Power (U-NII-2C, WiFi)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Average Power (dBm)
U-NII-2C 5470 - 5725MHz	802.11a	20MHz	100	5500	20.08
			104	5520	20.14
			108	5540	20.18
			112	5560	20.31
			116	5580	20.42
			120	5600	20.24
			124	5620	20.13
			128	5640	20.11
			132	5660	20.16
			136	5680	19.67
			140	5700	19.52
	802.11n	20MHz	100	5500	19.98
			104	5520	19.87
			108	5540	19.92
			112	5560	19.46
			116	5580	19.98
			120	5600	19.53
			124	5620	19.46
			128	5640	19.27
			132	5660	19.46
			136	5680	19.33
			140	5700	19.21
	802.11n	40MHz	102	5510	19.01
			118	5590	19.02
			134	5670	18.63
	802.11ac	80MHz	106	5530	15.31
			122	5610	15.12

Table 13: Conducted Output Power (U-NII-3, WiFi)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Average Power (dBm)
U-NII_3 5725 - 5850MHz	802.11a	20MHz	149	5745	19.86
			153	5765	20.14
			157	5785	20.17
			161	5805	19.94
			165	5825	19.76
	802.11n	20MHz	149	5745	19.21
			153	5765	20.04
			157	5785	20.08
			161	5805	19.43
			165	5825	19.26
	802.11n	40MHz	151	5755	19.22
			159	5795	19.31
	802.11ac	80MHz	155	5775	15.44

Table 14: Conducted Output Power (RFID)

Frequency Band	Mode	Bandwidth	Channel	Freq. (MHz)	Peak Power (dBm)
902 - 928MHz	RFID	82kHz	Low	902.75	22.87
			Mid	915.25	22.94
			High	927.25	22.76

10 TEST RESULTS

The Pathfinder 6059 is **compliant** with the SAR criteria from rule part 2.1093 and 1.1310. The Pathfinder 6059 is **compliant** with the SAR criteria from RSS-102 Issue 5. The worst case stand-alone 1g SAR value for body exposure was less than the 1.6W/kg limit.

11 SAR DATA:

The results on the following page(s) were obtained when the device was transmitting at maximum output power. The worst case plots, which reveal information about the location of the maximum SAR with respect to the device, are referenced are shown in APPENDIX B – Worst Case SAR Plots. The measured conducted output power was compared to the power declared by the manufacturer and used for scaling the measured SAR values.

Table 15: Body Worn SAR Results, (2.4GHz WiFi, DSSS)

US / Canada Body SAR Results Using 2450MHz MSL							
TX Mode	Spacing	Position	Power Drift (dB)	Raw SAR 1g (W/kg)	Scaled SAR 1g (W/kg)	Measured Power (dBm)	Rated Max Power (dBm)
DSSS Ch. 6	0mm	Top	-0.06	0.0380	0.0397	20.31	20.50
DSSS Ch. 6	0mm	Left	0.20	0.0200	0.0209	20.31	20.50
DSSS Ch. 6	0mm	Right	0.09	0.0370	0.0387	20.31	20.50
DSSS Ch. 6	0mm	Top of Display	-0.09	0.0471	0.0492	20.31	20.50
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/20/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	22.7
Power Method:	Fully Charged Battery	Relative Humidity:	36.3%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	990mBar

Table 16: Body Worn SAR Results, (U-NII-2A)

US / Canada Body SAR Results Using 5GHz MSL							
TX Mode	**Spacing**	**Position**	**Power Drift (dB)**	**Raw SAR 1g (W/kg)**	**Scaled SAR 1g (W/kg)**	**Measured Power (dBm)**	**Rated Max Power (dBm)**
802.11a; Ch 60; 5300MHz	0mm	Top of Display	-0.05	0.1020	0.1113	20.12	20.50
802.11a; Ch 60; 5300MHz	0mm	Top Side	-0.25	0.0985	0.1075	20.12	20.50
802.11a; Ch 60; 5300MHz	0mm	Left Side	-7.03	0.0577	0.0630	20.12	20.50
802.11a; Ch 60; 5300MHz	0mm	Right Side	-0.22	0.0620	0.0677	20.12	20.50
802.11n20; Ch 60; 5300MHz	0mm	Top of Display	-0.51	0.1020	0.1113	20.12	20.50
802.11n40; Ch 62; 5310MHz	0mm	Top of Display	-0.44	0.1080	0.1388	19.41	20.50
802.11ac (80MHz); Ch 58; 5290MHz	0mm	Top of Display	-0.23	0.0790	0.2658	15.23	20.50
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/28/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	21.2
Power Method:	Fully Charged Battery	Relative Humidity:	42.1%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	992mBar

Table 17: Body Worn SAR Results, (U-NII-2C)

US / Canada Body SAR Results Using 5GHz MSL							
TX Mode	**Spacing**	**Position**	**Power Drift (dB)**	**Raw SAR 1g (W/kg)**	**Scaled SAR 1g (W/kg)**	**Measured Power (dBm)**	**Rated Max Power (dBm)**
802.11a; Ch 116; 5580MHz	0mm	Top of Display	-0.04	0.4930	0.5022	20.42	20.50
802.11a; Ch 116; 5580MHz	0mm	Top Side	-0.07	0.3890	0.3962	20.42	20.50
802.11n20; Ch 116; 5580MHz	0mm	Top of Display	-0.04	0.5000	0.5093	20.42	20.50
802.11n40; Ch 118; 5590MHz	0mm	Top of Display	-0.01	0.1180	0.1659	19.02	20.50
802.11ac (80MHz); Ch 122; 5610MHz	0mm	Top of Display	-0.15	0.0119	0.0411	15.12	20.50
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/29/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	22.3C
Power Method:	Fully Charged Battery	Relative Humidity:	41.7%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	990mBar

Table 18: Body Worn SAR Results, (U-NII-3)

US / Canada Body SAR Results Using 5GHz MSL							
TX Mode	**Spacing**	**Position**	**Power Drift (dB)**	**Raw SAR 1g (W/kg)**	**Scaled SAR 1g (W/kg)**	**Measured Power (dBm)**	**Rated Max Power (dBm)**
802.11a; Ch 157; 5785MHz	0mm	Top of Display	-0.25	0.2430	0.2622	20.17	20.50
802.11a; Ch 157; 5785MHz	0mm	Top Side	-0.05	0.1510	0.1629	20.17	20.50
802.11n20; Ch 157; 5785MHz	0mm	Top of Display	0.06	0.4610	0.4974	20.17	20.50
802.11n40; Ch 159; 5795MHz	0mm	Top of Display	-0.11	0.1120	0.1473	19.31	20.50
802.11ac (80MHz); Ch 155; 5775MHz	0mm	Top of Display	0.02	0.0096	0.0308	15.44	20.50
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/30/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	22.3C
Power Method:	Fully Charged Battery	Relative Humidity:	38.6%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	989.6mBar

Table 19: Body Worn SAR Results, (Bluetooth)

US / Canada Body SAR Results Using 2450MHz MSL							
TX Mode	**Spacing**	**Position**	**Power Drift (dB)**	**Raw SAR 1g (W/kg)**	**Scaled SAR 1g (W/kg)**	**Measured Power (dBm)**	**Rated Max Power (dBm)**
BT (GFSK)	0mm	Top of Display	0.07	0.0061	0.0105	10.12	12.50
BT (GFSK)	0mm	Top Side	-0.04	0.0049	0.0085	10.12	12.50
BLE	0mm	Top of Display	-0.03	0.0048	0.0092	6.67	9.50
BLE	0mm	Top Side	-0.02	0.0041	0.0079	6.67	9.50
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/22/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	21.9C
Power Method:	Fully Charged Battery	Relative Humidity:	41.3%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	988.2mBar

Table 20: Body Worn SAR Results, (915MHz RFID)

US / Canada Body SAR Results Using 900MHz MSL							
TX Mode	**Spacing**	**Position**	**Power Drift (dB)**	**Raw SAR 1g (W/kg)**	**Scaled SAR 1g (W/kg)**	**Measured Power (dBm)**	**Rated Max Power (dBm)**
RFID	0mm	Top Side	0.00	0.0004	0.0004	22.94	23.00
RFID	0mm	Front	-0.05	0.0003	0.0003	22.94	23.00
RFID	0mm	Left	-0.02	0.0001	0.0001	22.94	23.00
RFID	0mm	Right	-0.06	0.0002	0.0002	22.94	23.00
1g SAR Limit (Head & Body) = 1.6W/kg							

Test Personnel:	Bryan Taylor	Test Date:	5/31/2019
Supervising/Reviewing Engineer:			
(Where Applicable)	NA	Tissue Depth:	15cm
Signal Setup:	Test Commands	Ambient Temperature:	22.4C
Power Method:	Fully Charged Battery	Relative Humidity:	39.6%
Pretest Verification w / Dipole:	Yes	Atmospheric Pressure:	989.6mBar

12 SIMULTANEOUS TRANSMISSION RESULTS

Per KDB447498 section 4.3.2, “Simultaneous transmission SAR test exclusion considerations Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneously transmitting antenna. When the sum of 1-g or 10-g SAR of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration”.

The sum of the worst case stand-alone SAR results is shown below and is lower than the applicable limit. Therefore the Pathfinder 6059 meets the simultaneous transmission SAR test exclusion.

Worst Case Bluetooth SAR:	0.0105mW/g
Worst Case WiFi SAR:	0.5093mW/g
Worst Case RFID SAR:	0.004mW/g
Sum:	0.5202mW/g
Limit:	1.6mW/g

1.0 REFERENCES

[1]ANSI, ANSI/IEEE C95.1-1992: 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.

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[7]Federal Communications Commission, KDB 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.

APPENDIX A – 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.

				Probe Calibration Point		Dielectric Properties		CW Validation			Modulation Validation		
Frequency (MHz)	Date	Probe (SN#)	Probe (Model #)	Frequency (MHz)	Fluid Type	σ	ϵ_r	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR
2450	1/2/2019	3516	EX3DV3	2450	Body	50.65	2.02	Pass	Pass	Pass	OFDM	N/A	Pass
5200	1/2/2019	3516	EX3DV3	5200	Body	48.71	5.54	Pass	Pass	Pass	OFDM	N/A	Pass
5500	1/2/2019	3516	EX3DV3	5500	Body	47.68	6.29	Pass	Pass	Pass	OFDM	N/A	Pass
5800	1/2/2019	3516	EX3DV3	5800	Body	48.71	5.54	Pass	Pass	Pass	OFDM	N/A	Pass
				Probe Calibration Point		Dielectric Properties		CW Validation			Modulation Validation		
Frequency (MHz)	Date	Probe (SN#)	Probe (Model #)	Frequency (MHz)	Fluid Type	σ	ϵ_r	Sensitivity	Probe Linearity	Probe Isotropy	Mod. Type	Duty Factor	PAR
835	1/3/2019	3516	EX3DV3	835	Body	54.2	0.98	Pass	Pass	Pass	GMSK	Pass	N/A
900	1/3/2019	3516	EX3DV3	900	Body	54	1.02	Pass	Pass	Pass	GMSK	Pass	N/A
1750	1/3/2019	3516	EX3DV3	1800	Body	52.9	1.41	Pass	Pass	Pass	GMSK	Pass	N/A
1900	1/3/2019	3516	EX3DV3	1900	Body	52.7	1.48	Pass	Pass	Pass	GMSK	Pass	N/A

Table 21: SAR System Validation Summary

APPENDIX B – WORST CASE SAR PLOTS

Date/Time: 5/20/2019 1:14:12 PM

Test Laboratory: Intertek
File Name: 2.4GHz WiFi SAR.da52:4

12.1.1 2.4GHz WiFi SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, Generic 802.11b/g/n (0); Communication System Band: 2.4 GHz Band; Frequency: 2437 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2437 MHz; σ = 2.013 S/m; ε_r = 50.739; ρ = 1000 kg/m^3

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

DASY5 Configuration:

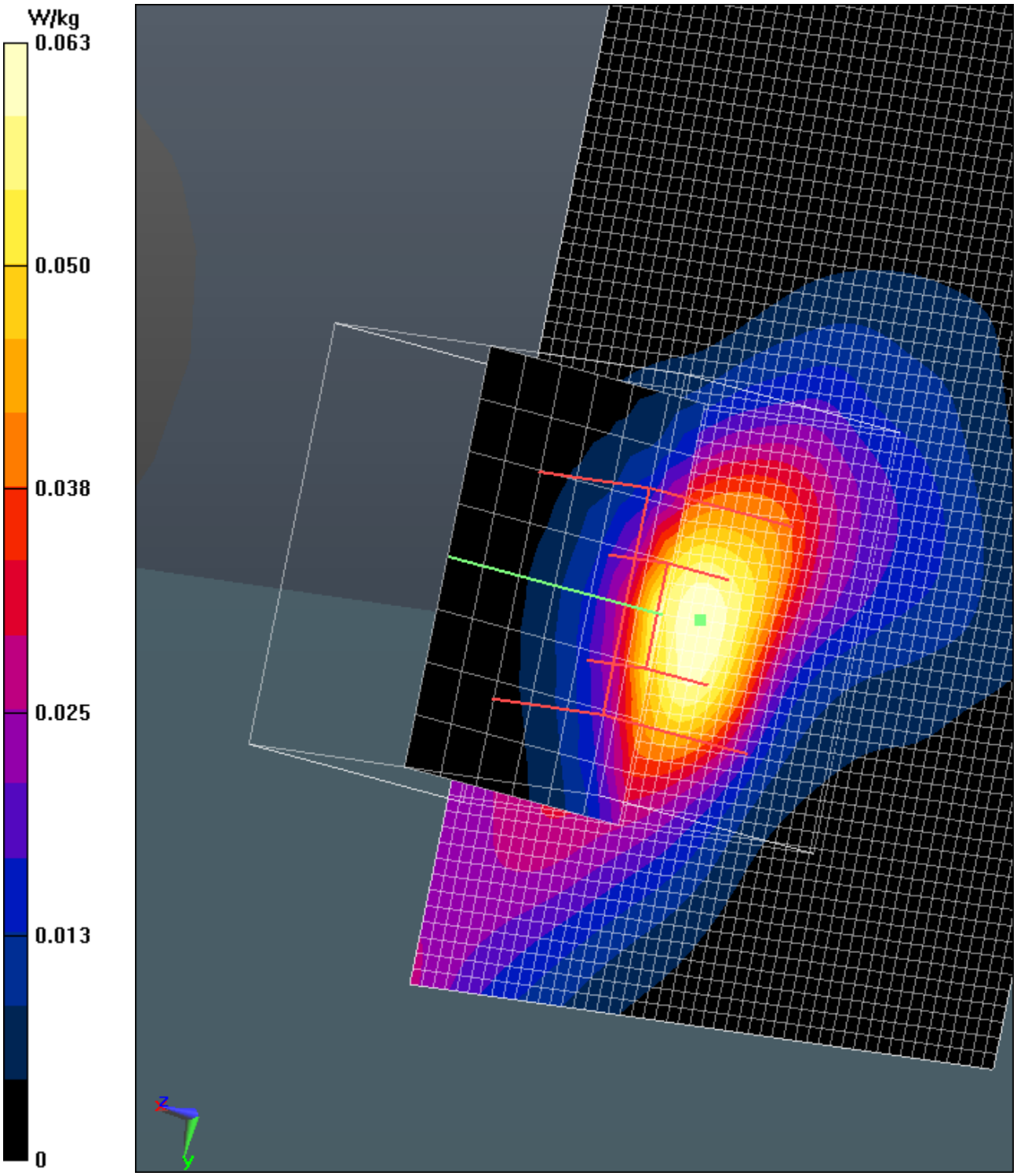
- Probe: EX3DV3 - SN3516; ConvF(8.27, 8.27, 8.27); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/DSSS Mid Channel, 0mm spacing, Right Side 2/Area Scan 2 (51x71x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0628 W/kg

WWAN Flat-Section MSL Testing/DSSS Mid Channel, 0mm spacing, Right Side 2/Zoom Scan (10x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.114 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.105 W/kg
SAR(1 g) = 0.047 W/kg; SAR(10 g) = 0.021 W/kg

Maximum value of SAR (measured) = 0.0789 W/kg


W/kg
0.063
0.050
0.038
0.025
0.013
0
z
y

Date/Time: 5/28/2019 9:29:30 AM

Test Laboratory: Intertek
File Name: 5GHz WiFi SAR.da52:4

5GHz WiFi SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, Generic 802.11a (0); Communication System Band: UNII Band 2; Frequency: 5300 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5300 MHz; σ = 5.595 S/m; ε_r = 49.08; ρ = 1000 kg/m^3

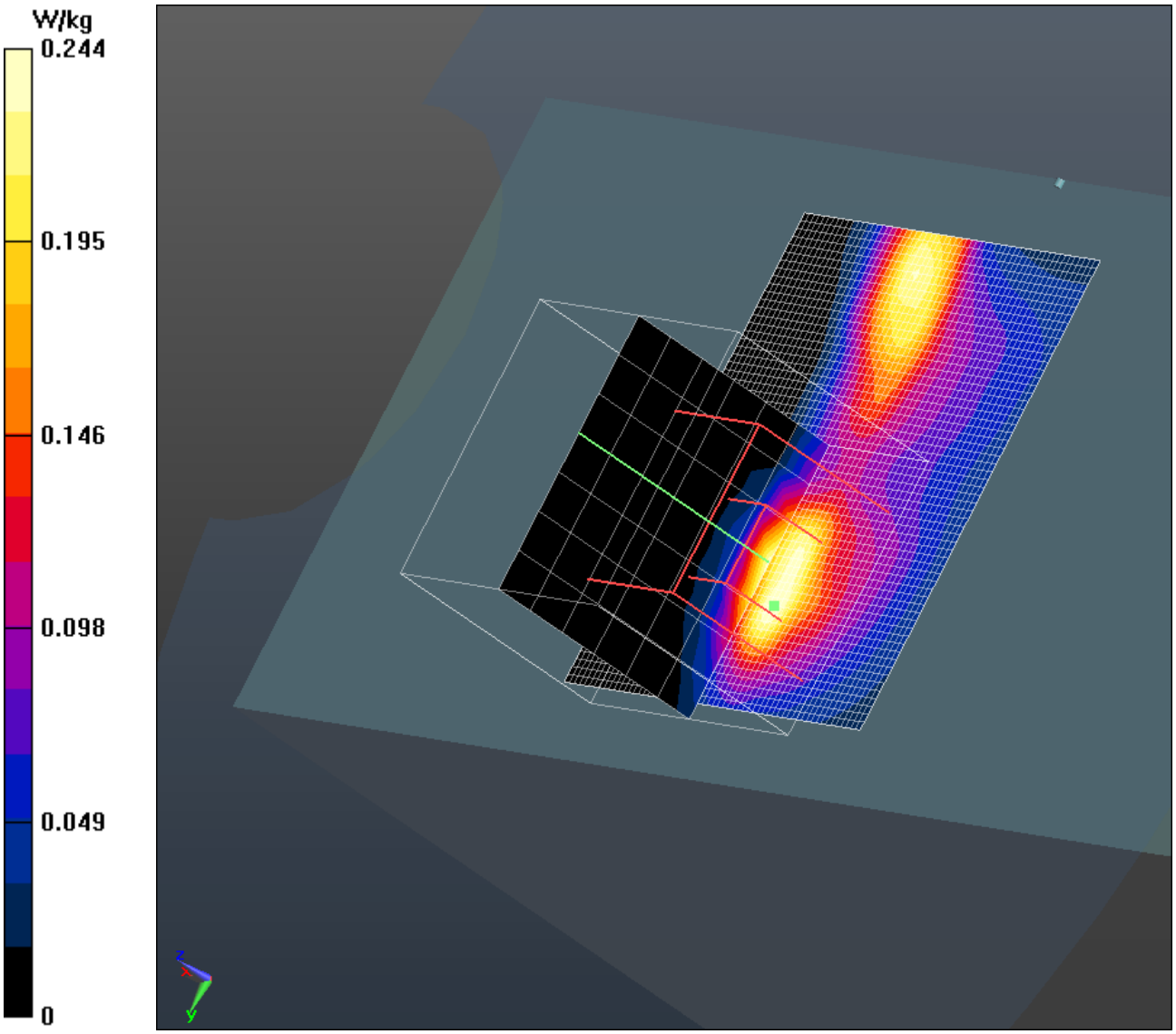
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(4.41, 4.41, 4.41); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

WWAN Flat-Section MSL Testing/802.11a ch 60 screen top/Area Scan 2 (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.244 W/kg

WWAN Flat-Section MSL Testing/802.11a ch 60 screen top/Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.652 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 0.357 W/kg
SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.033 W/kg
Maximum value of SAR (measured) = 0.249 W/kg


W/kg
0.244
0.195
0.146
0.098
0.049
0

Date/Time: 5/29/2019 10:36:02 AM

Test Laboratory: Intertek
File Name: 5GHz WiFi SAR.da52:5

12.1.2 5GHz WiFi SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, Generic 802.11a (0); Communication System Band: UNII Band 3; Frequency: 5580 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5580 MHz; σ = 5.972 S/m; ε_r = 48.61; ρ = 1000 kg/m^3

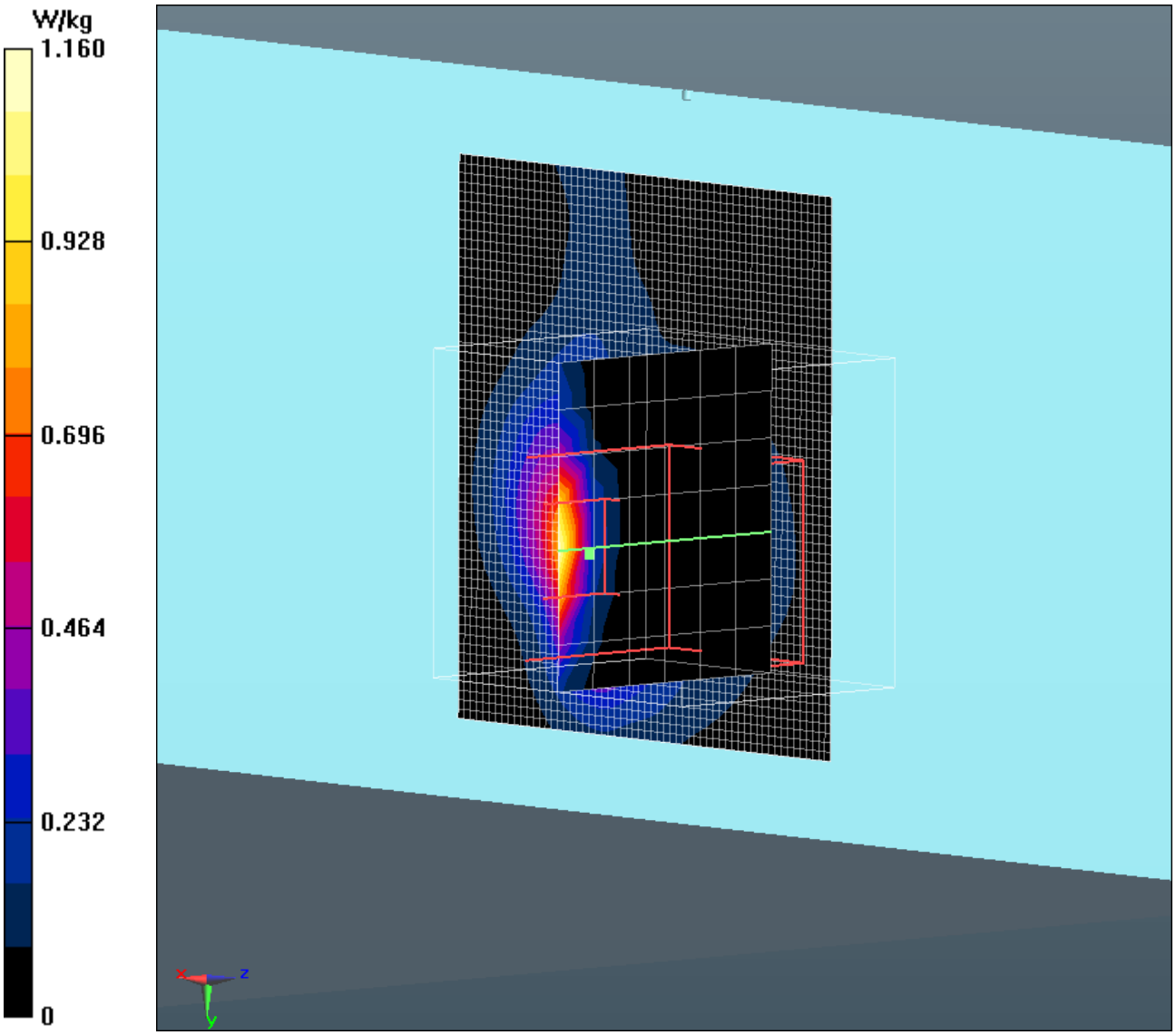
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(4.04, 4.04, 4.04); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

U-NII-2C/802.11n ch 116 screen top/Area Scan 2 (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.16 W/kg

U-NII-2C/802.11n ch 116 screen top/Zoom Scan (9x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.317 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 0.500 W/kg; SAR(10 g) = 0.139 W/kg
Maximum value of SAR (measured) = 1.22 W/kg


W/kg
1.160
0.928
0.696
0.464
0.232
0

Date/Time: 5/29/2019 4:52:44 PM

Test Laboratory: Intertek
File Name: 5GHz WiFi SAR.da52:6

12.1.3 5GHz WiFi SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, Generic 802.11a (0); Communication System Band: UNII Band 4; Frequency: 5782 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 5782 MHz; σ = 6.226 S/m; ε_r = 48.309; ρ = 1000 kg/m^3

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(3.86, 3.86, 3.86); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

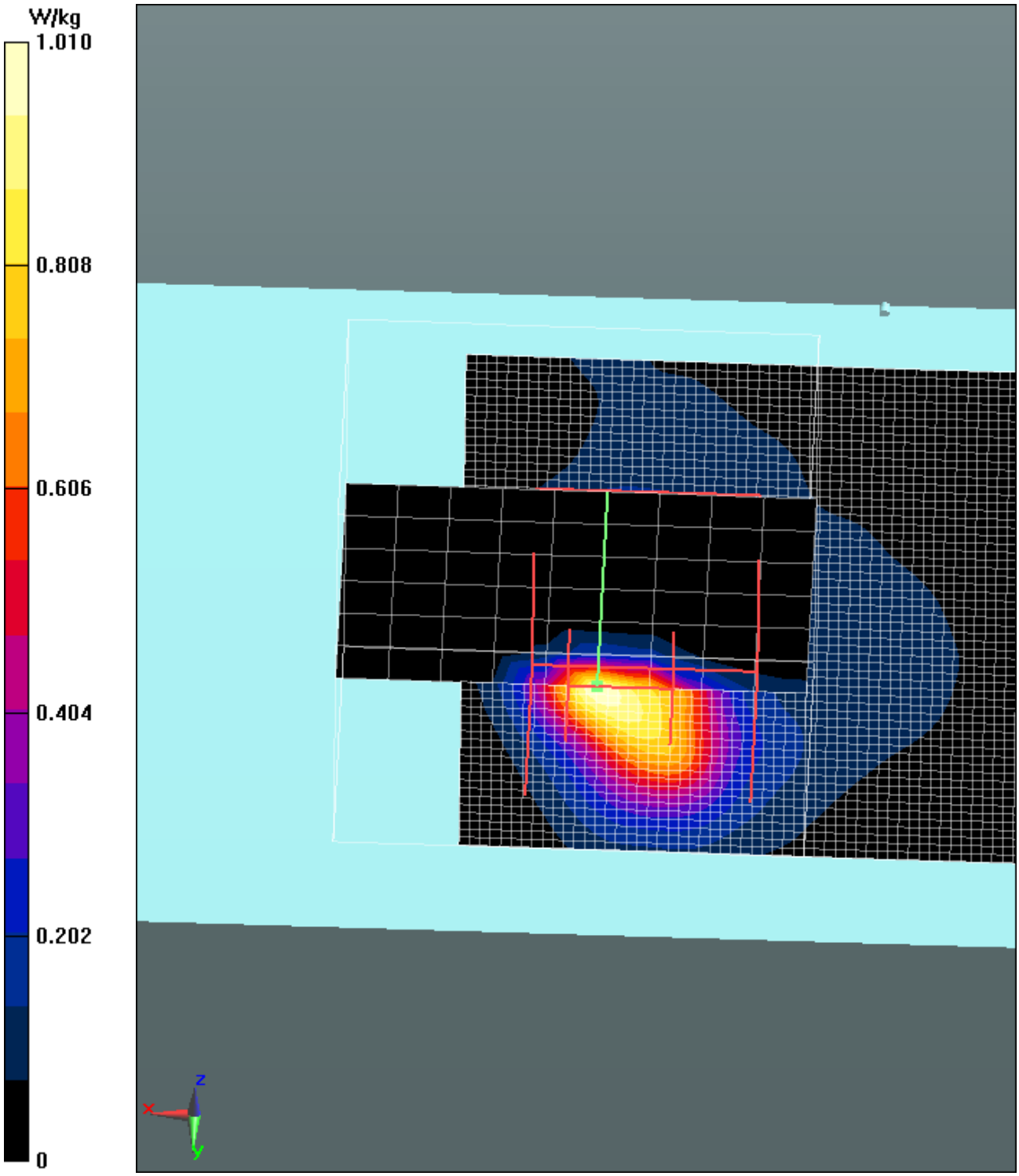
U-NII-3/802.11a ch 157 screen top side/Area Scan 2 (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Maximum value of SAR (interpolated) = 1.01 W/kg

U-NII-3/802.11a ch 157 screen top side/Zoom Scan (10x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.542 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 0.461 W/kg; SAR(10 g) = 0.115 W/kg

Maximum value of SAR (measured) = 1.17 W/kg


W/kg
1.010
0.808
0.606
0.404
0.202
0
Z
X
Y

Date/Time: 5/22/2019 1:39:30 PM

Test Laboratory: Intertek

BT SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, Generic Bluetooth (0); Communication System Band: 2.4Ghz ISM; Frequency: 2442 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 2442 MHz; σ = 2.02 S/m; ε_r = 50.719; ρ = 1000 kg/m^3

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

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.27, 8.27, 8.27); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

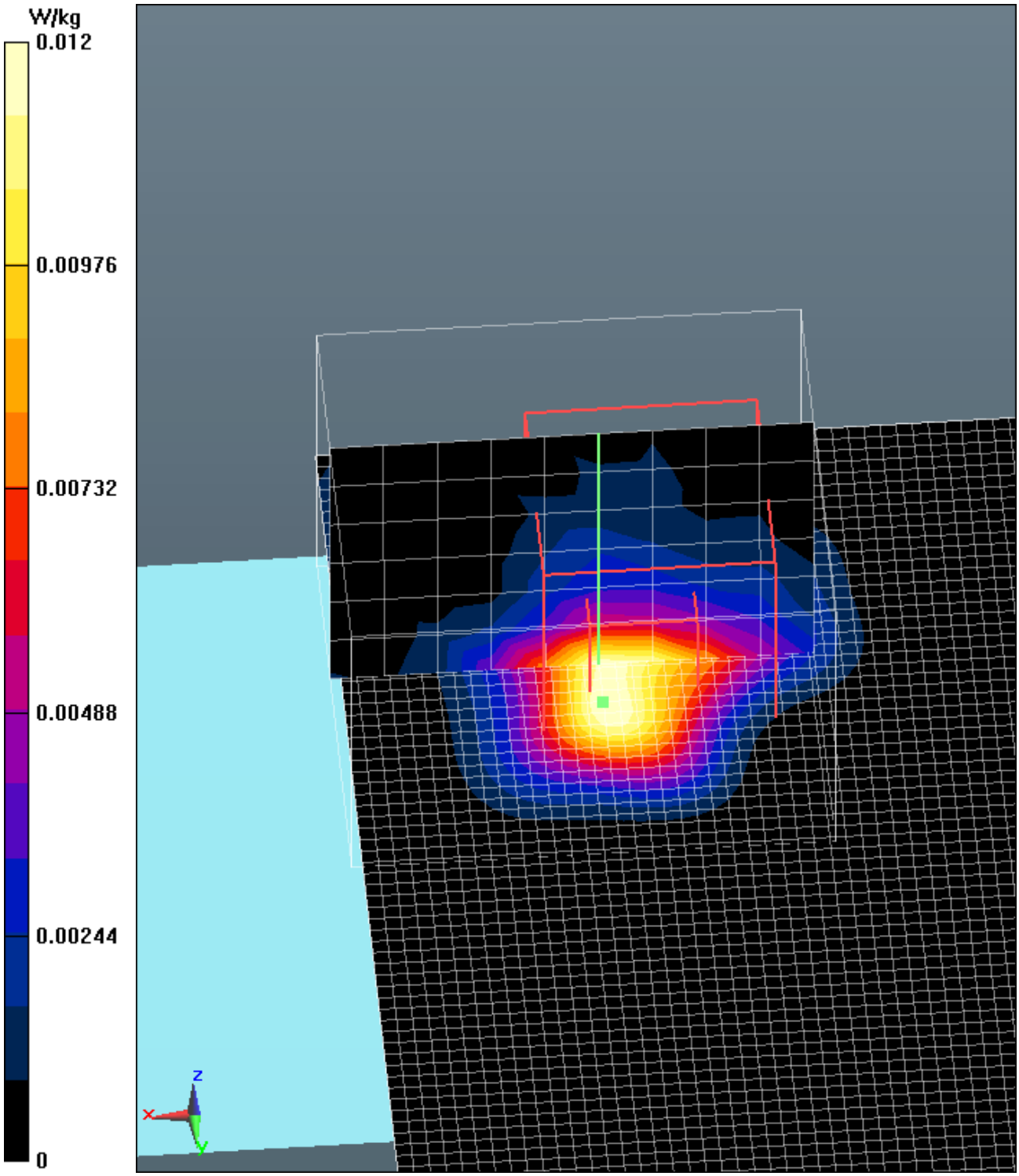
WWAN Flat-Section MSL Testing/BT Mid Channel, 0mm spacing, Top of Screen/Area Scan 2 (51x71x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.0122 W/kg

WWAN Flat-Section MSL Testing/BT Mid Channel, 0mm spacing, Top of Screen/Zoom Scan (10x9x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.250 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 0.0290 W/kg

SAR(1 g) = 0.00606 W/kg; SAR(10 g) = 0.00232 W/kg

Maximum value of SAR (measured) = 0.0104 W/kg


W/kg
0.012
0.00976
0.00732
0.00488
0.00244
0
Z
X
Y

Date/Time: 5/31/2019 2:45:42 PM

Test Laboratory: Intertek
File Name: 915MHz RFID SAR.da52:4

915MHz RFID SAR

Procedure Notes:

DUT: Avery 6059; Serial: Sample 1

Communication System: UID 0, RFID (0); Communication System Band: 915MHz; Frequency: 902.25 MHz;Duty Cycle: 1:1

Medium parameters used (interpolated): f = 902.25 MHz; σ = 1.022 S/m; ε_r = 57.964; ρ = 1000 kg/m^3

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

DASY5 Configuration:

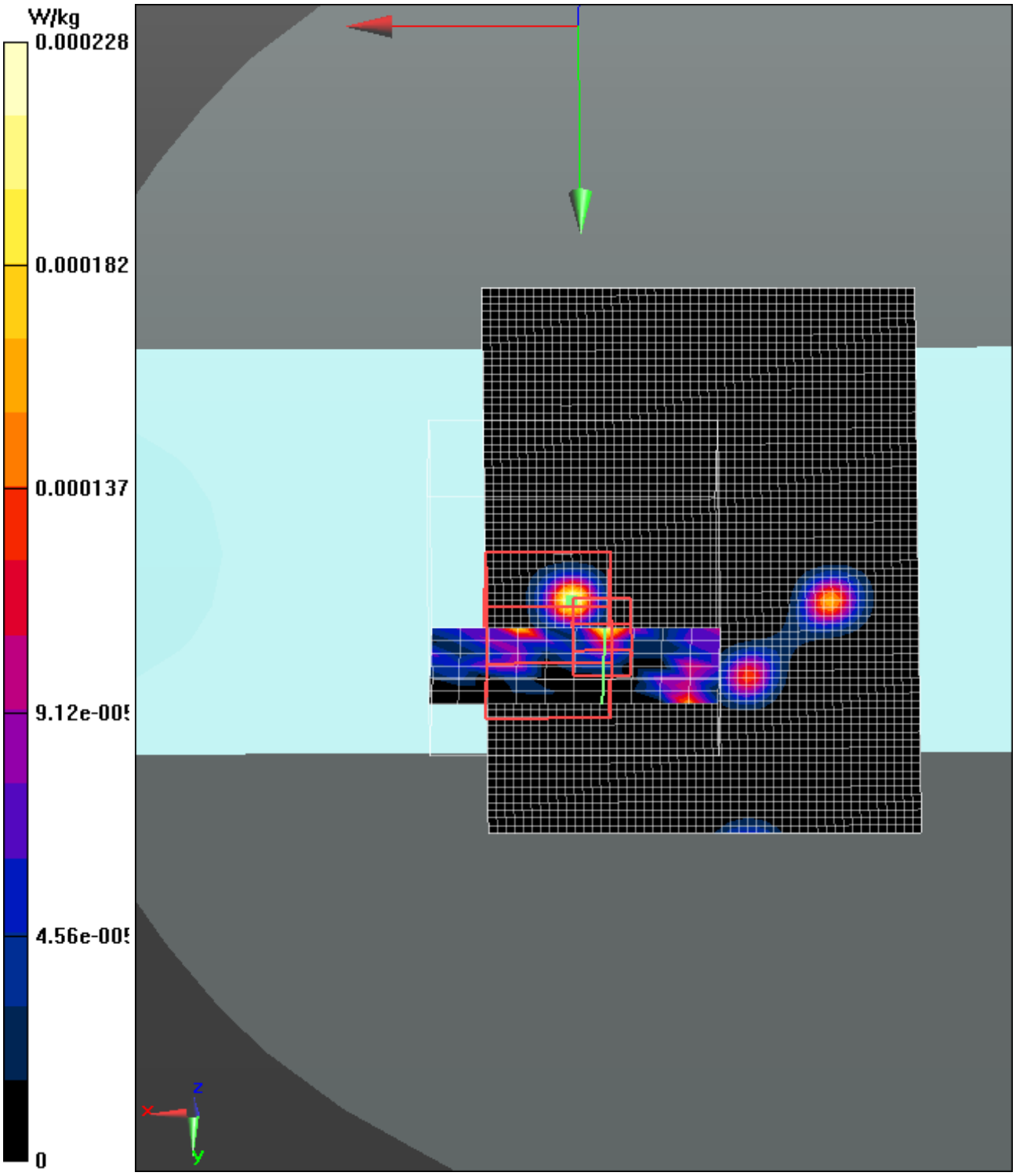
- Probe: EX3DV3 - SN3516; ConvF(10.58, 10.58, 10.58); Calibrated: 11/12/2018;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

RFID Flat-Section MSL Testing/Top/Area Scan 2 (51x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 0.000228 W/kg

RFID Flat-Section MSL Testing/Top/Zoom Scan (11x11x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 0.000435 W/kg
SAR(1 g) = 3.61e-004 W/kg; SAR(10 g) = 4.88e-005 W/kg

Maximum value of SAR (measured) = 0.000435 W/kg


W/kg
0.000228
0.000182
0.000137
9.12e-005
4.56e-005
0
Z
X
Y

APPENDIX C – DIPOLE VALIDATION PLOTS

Date/Time: 5/20/2019 2:52:23 PM

Test Laboratory: Intertek
File Name: dipole_2450.da52:0

dipole_2450

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

DUT: Dipole 2450 MHz D2450V2; Serial: D2450V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 2.02 S/m; ε_r = 50.71; ρ = 1000 kg/m^3

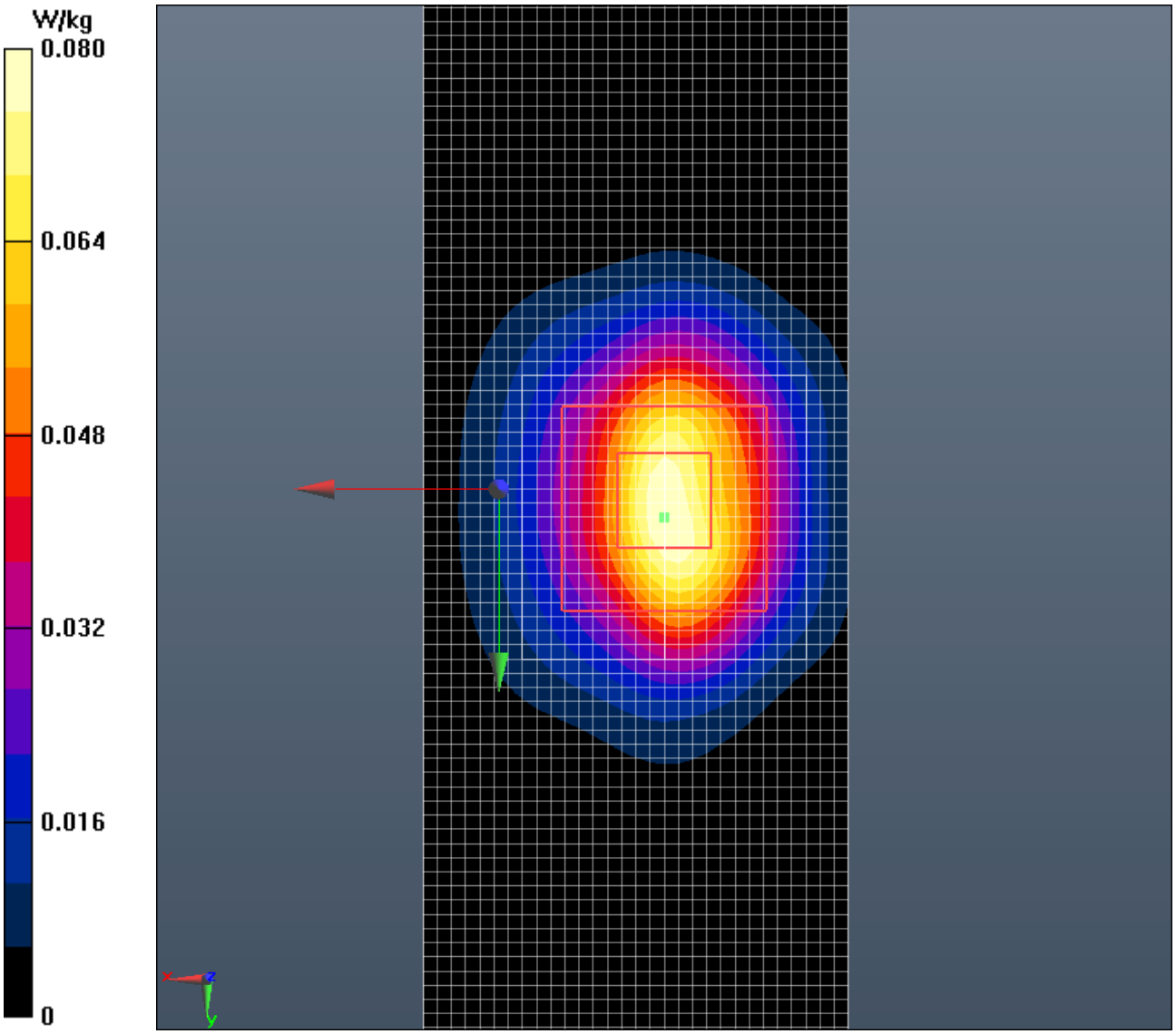
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.27, 8.27, 8.27); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Area Scan (31x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0798 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.345 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 111 W/kg
SAR(1 g) = 52 W/kg; SAR(10 g) = 23.5 W/kg
Normalized to target power = 1 W and actual power = 0.001 W
Maximum value of SAR (measured) = 59.1 W/kg


W/kg
0.080
0.064
0.048
0.032
0.016
0

Date/Time: 5/24/2019 9:44:57 AM

Test Laboratory: Intertek
File Name: dipole_2450_EU.da52:0

12.1.4 dipole_2450_EU

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

DUT: Dipole 2450 MHz D2450V2; Serial: D2450V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;Duty Cycle: 1:1

Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 37.97; ρ = 1000 kg/m^3

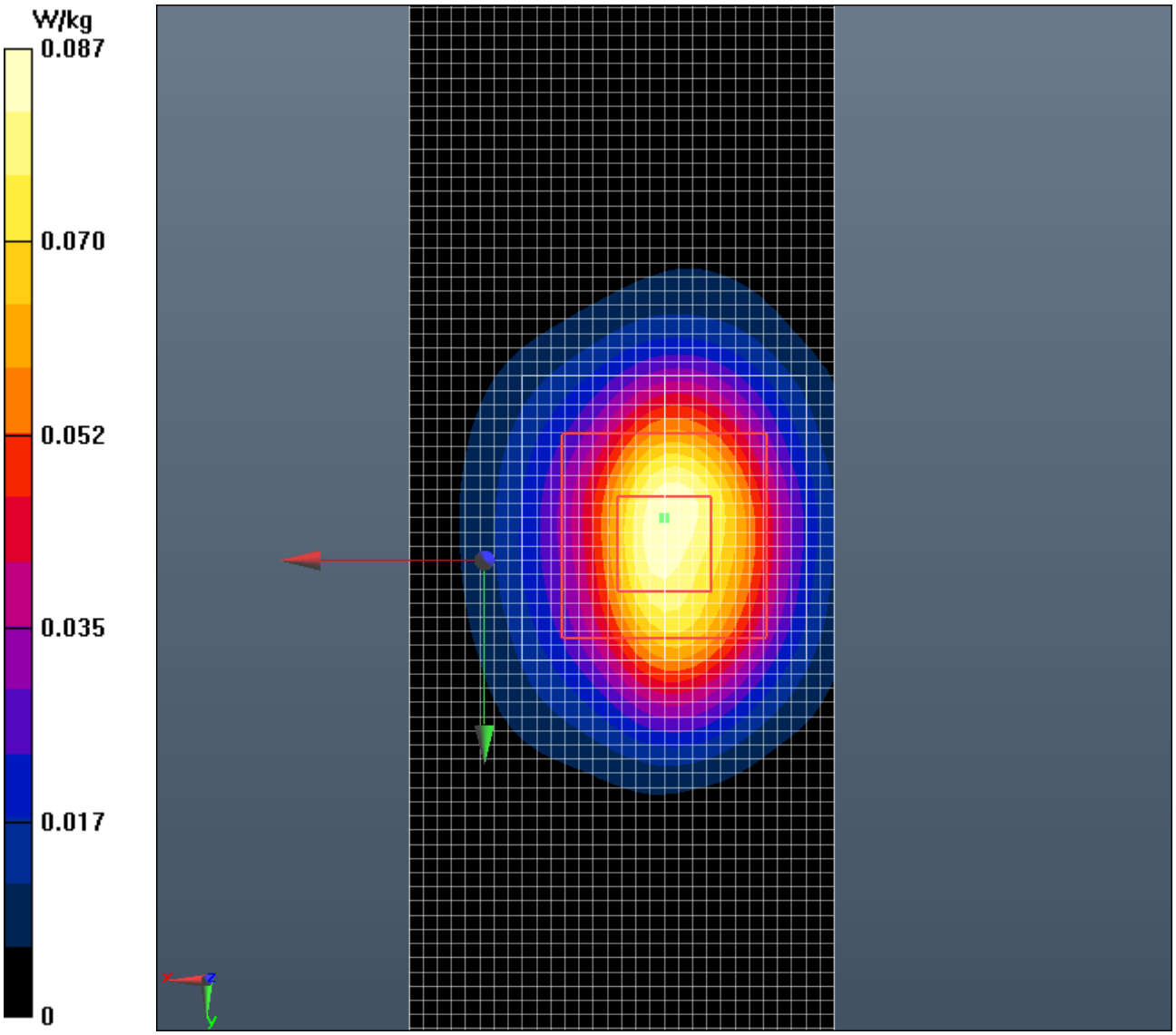
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(8.14, 8.14, 8.14); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Area Scan (31x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.0872 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 6.650 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 117 W/kg
SAR(1 g) = 54.8 W/kg; SAR(10 g) = 24.9 W/kg
Normalized to target power = 1 W and actual power = 0.001 W
Maximum value of SAR (measured) = 61.7 W/kg


W/kg
0.087
0.070
0.052
0.035
0.017
0

Date/Time: 5/28/2019 10:44:04 AM

Test Laboratory: Intertek
File Name: dipole_5GHz.da52:0

12.1.5 dipole_5GHz

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

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

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5200 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5200 MHz; σ = 5.3 S/m; ε_r = 47.4; ρ = 1000 kg/m^3

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

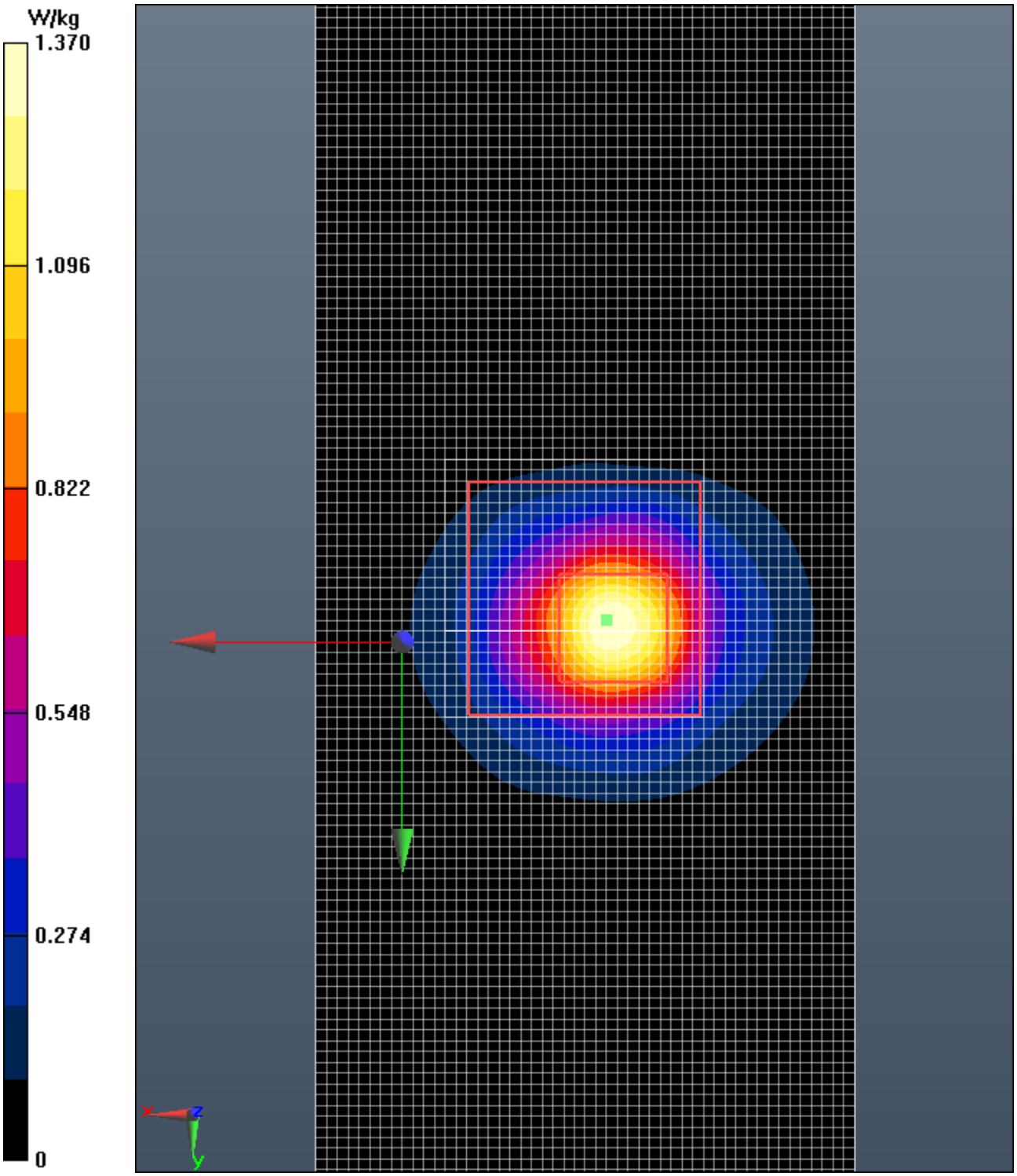
DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(4.53, 4.53, 4.53); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Area Scan (51x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.37 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x16)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 16.876 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 256 W/kg
SAR(1 g) = 67.8 W/kg; SAR(10 g) = 19.1 W/kg
Normalized to target power = 1 W and actual power = 0.01 W

Maximum value of SAR (measured) = 164 W/kg


W/kg
1.370
1.096
0.822
0.548
0.274
0

Date/Time: 5/28/2019 11:31:37 AM

Test Laboratory: Intertek
File Name: dipole_5GHz.da52:0

12.1.6 dipole_5GHz

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

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

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5500 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5500 MHz; σ = 5.868 S/m; ε_r = 48.74; ρ = 1000 kg/m^3

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

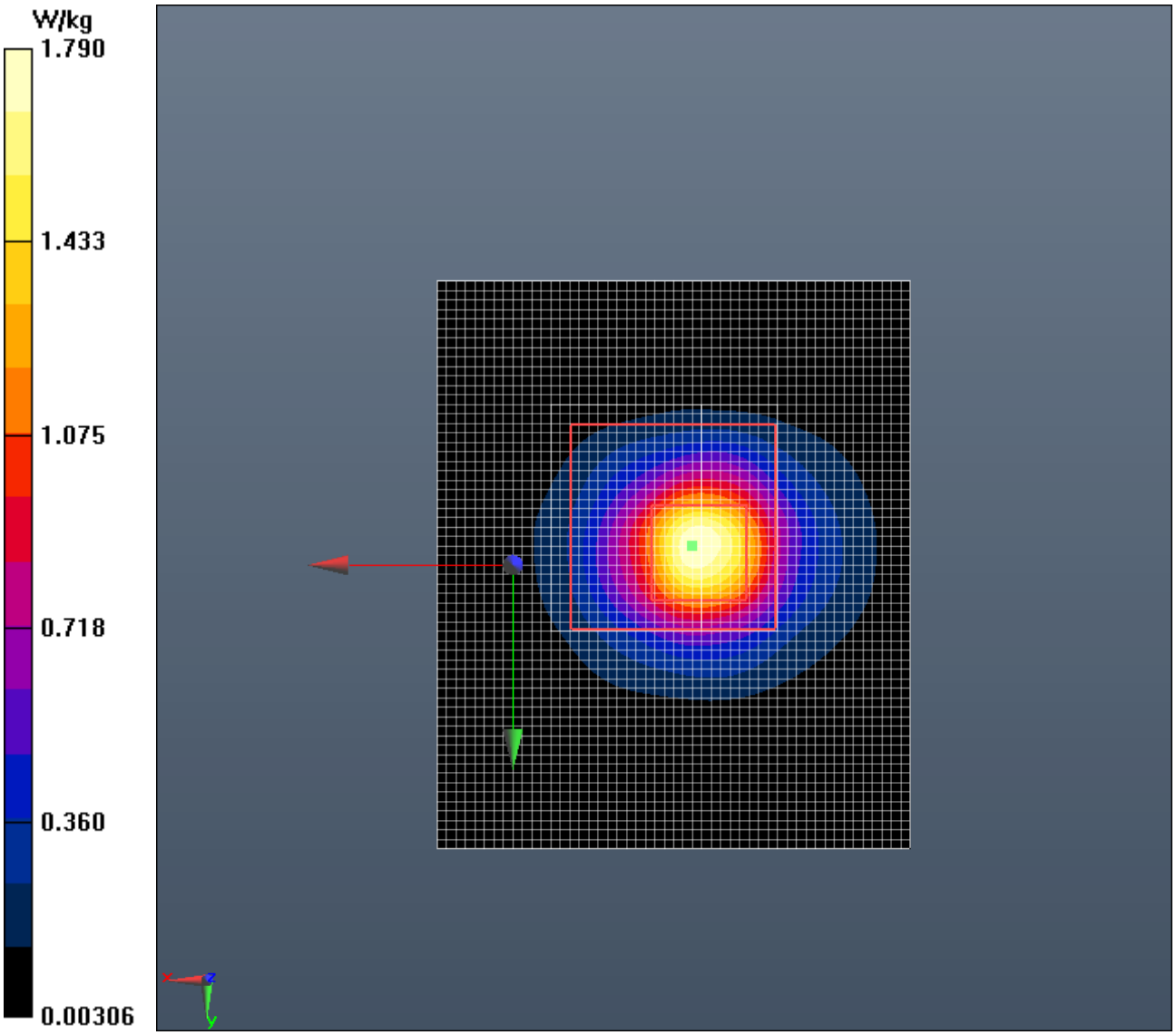
DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(4.18, 4.18, 4.18); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe) 2/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.79 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe) 2/Zoom Scan (7x7x7) (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 17.582 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 340 W/kg
SAR(1 g) = 83.3 W/kg; SAR(10 g) = 21.8 W/kg
Normalized to target power = 1 W and actual power = 0.01 W

Maximum value of SAR (measured) = 210 W/kg


W/kg
1.790
1.433
1.075
0.718
0.360
0.00306

Date/Time: 5/28/2019 1:23:33 PM

Test Laboratory: Intertek
File Name: dipole_5GHz.da52:0

12.1.7 dipole_5GHz

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

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

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5800 MHz;Duty Cycle: 1:1

Medium parameters used: f = 5800 MHz; σ = 6.294 S/m; ε_r = 48.23; ρ = 1000 kg/m^3

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

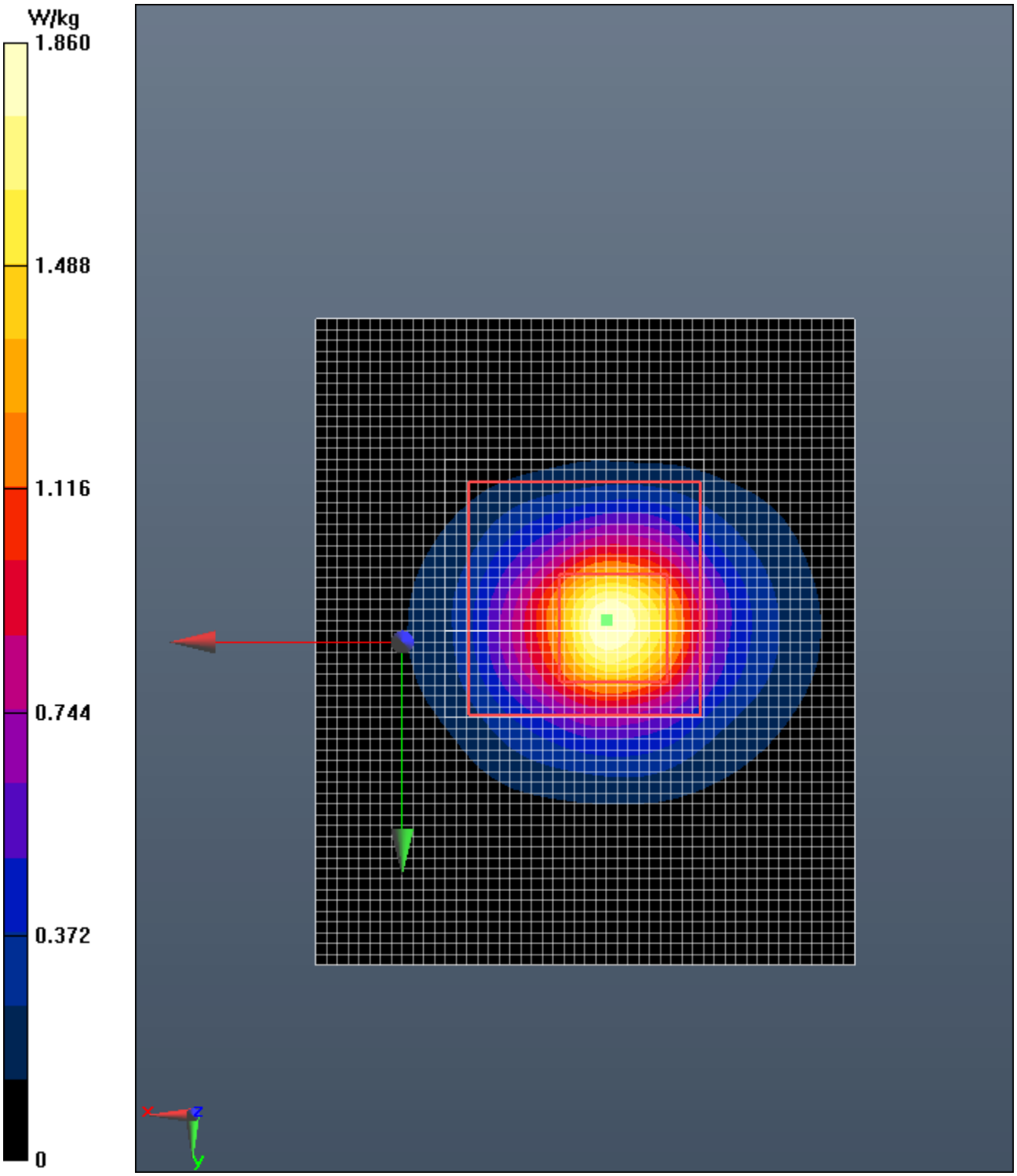
DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(3.86, 3.86, 3.86); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe) 2 2/Area Scan (51x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.86 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=10 mW, dist=2.0mm (EX-Probe) 2 2/Zoom Scan (7x7x7) (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 17.923 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 382 W/kg
SAR(1 g) = 83.7 W/kg; SAR(10 g) = 23.1 W/kg
Normalized to target power = 1 W and actual power = 0.01 W

Maximum value of SAR (measured) = 224 W/kg


W/kg
1.860
1.488
1.116
0.744
0.372
0

Date/Time: 5/31/2019 11:21:57 AM

Test Laboratory: Intertek
File Name: dipole_900MHz.da52:0

12.1.8 dipole_900MHz

Procedure Notes: Ambient Temp: 22.8C, Fluid Temp: 22.2C

DUT: Dipole 900 MHz D900V2; Serial: D900V2 - SN:xxx

Communication System: UID 0, CW (0); Communication System Band: D900 (900.0 MHz); Frequency: 900 MHz;Duty Cycle: 1:1

Medium parameters used: f = 900 MHz; σ = 1.02 S/m; ε_r = 57.98; ρ = 1000 kg/m^3

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

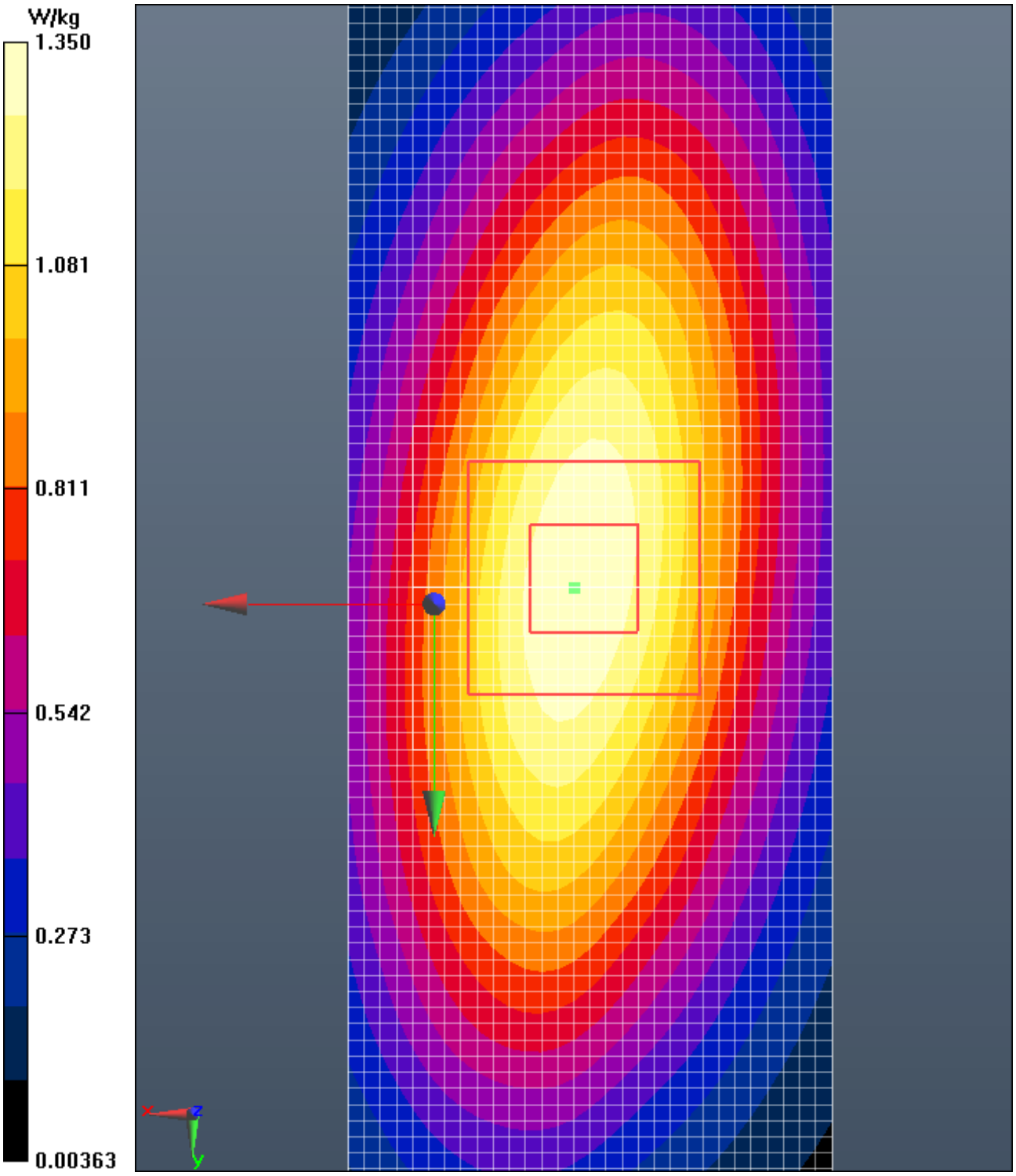
DASY5 Configuration:

- Probe: EX3DV3 - SN3516; ConvF(10.58, 10.58, 10.58); Calibrated: 11/12/2018;
- Sensor-Surface: 2mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn358; Calibrated: 11/6/2018
- Phantom: SAM 2 with CRP v5.0; Type: QD000P40CD; Serial: TP:1663
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Area Scan (31x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.35 W/kg

System Performance Check at Frequencies below 1 GHz/d=10mm, Pin=100 mW, dist=2.0mm (EX-Probe)/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.740 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 11 W/kg; SAR(10 g) = 7.33 W/kg

Normalized to target power = 1 W and actual power = 0.1 W
Maximum value of SAR (measured) = 11.8 W/kg


W/kg
1.350
1.081
0.811
0.542
0.273
0.00363