Figure 51. Phantom Measurement Locations

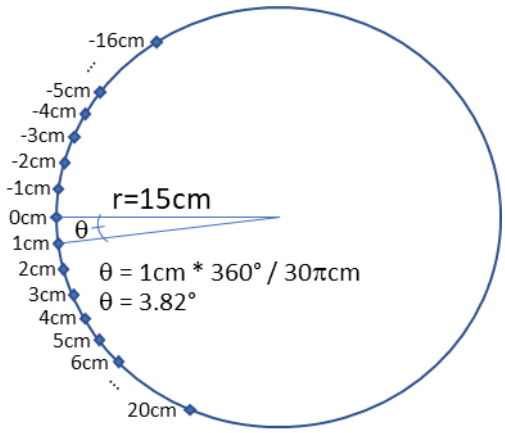


Figure 52. Phantom numbering

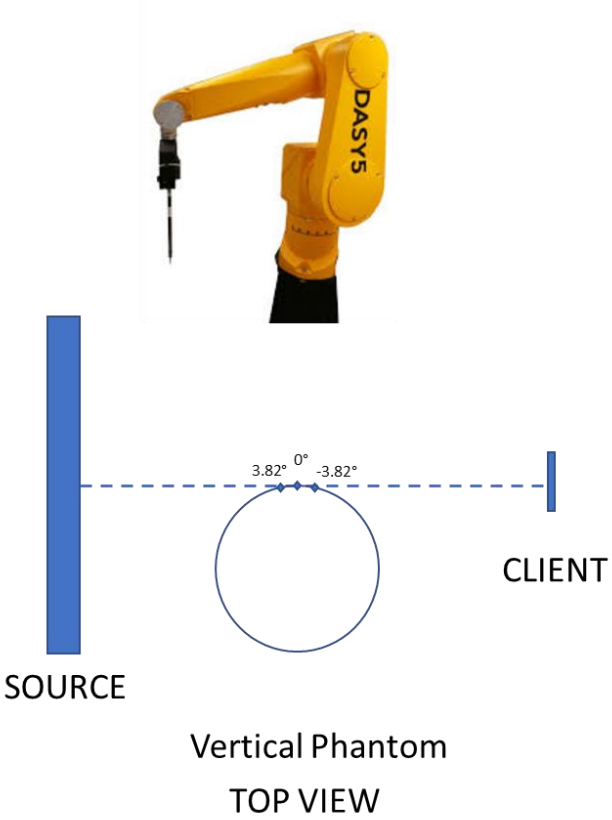


Figure 53. Setup for field strength measurements

Table 12 Details: Field Strength Adjacent to Vertical Phantom (1 m)

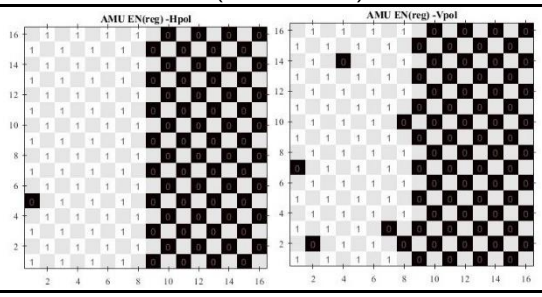
Test Scenario	Reference	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
25	n/a	0	0	0	n/a (all antenna off)
26	n/a	7.5	0	0	n/a (all antenna off)
27	n/a	15	0	0	n/a (all antenna off)
28	Table 13	22.5	73.2	63 (H) + 58 (V) = 121 (47.3% ON)	

Table 13. Field strength measurements adjacent to phantom. Phantom 50 cm from Source, 20 cm from Client, 22.5 cm offset

1 Meter Tx/Rx distance - Phantom 50cm to source, 22.5cm Offset		
cm offset	degrees	V/m
-16.0	-61.12	25.03
-15.0	-57.30	27.61
-14.0	-53.48	29.65
-13.0	-49.66	33.80
-12.0	-45.84	39.56
-11.0	-42.02	44.31
-10.0	-38.20	44.14
-9.0	-34.38	42.67
-8.0	-30.56	42.87
-7.0	-26.74	53.27
-6.0	-22.92	61.72
-5.0	-19.10	65.28
-4.0	-15.28	63.77
-3.0	-11.46	58.76
-2.0	-7.64	53.82
-1.0	-3.82	58.06
0.0	0.00	**68.28**
1.0	3.82	**73.20**

1 Meter Tx/Rx distance - Phantom 50cm to source, 22.5cm Offset		
cm offset	degrees	V/m
2.0	7.64	**70.44**
3.0	11.46	62.83
4.0	15.28	58.43
5.0	19.10	59.23
6.0	22.92	63.79
7.0	26.74	64.94
8.0	30.56	66.32
9.0	34.38	58.34
10.0	38.20	50.26
11.0	42.02	45.80
12.0	45.84	43.20
13.0	49.66	41.54
14.0	53.48	39.10
15.0	57.30	36.62
16.0	61.12	32.34
17.0	64.94	31.47
18.0	68.75	29.50
19.0	72.57	25.92
20.0	76.39	24.26

10.5.2.7 Single Point SAR, Single Phantom (1 m)

In addition to field strength measurements that were performed adjacent to the phantom, single point SAR measurements were similarly taken inside the phantom and adjacent to the edge. These measurements were performed with the WPT client positioned 1 m away from the power source and at offset 22.5 cm from the centerline, because this was the worst case reported from the field measurement (See Section 10.5.2.2).

These tests involved manually steering the probe inside the phantom at a step size of 1 cm (based on the area scan step size per IEEE 1528-2013). The distance between the probe and the phantom edge was 2 mm. The physical orientation of measurement points around the perimeter of the phantom are identical to those described in Section 10.5.2.6 for field strength measurements outside of and immediately adjacent to the phantom. Figure 53 illustrates the orientation of the WPT Source, client, phantom, and robot during the measurement.

Table 15 records the single-point SAR measurement taken inside the phantom at 1 m separation, 22.5 cm offset. The highest single-point SAR values measured in this scenario was 0.468 W/kg at 34.38 degrees offset from the boresight line.

Table 14 Details: Single Point SAR (1 m)

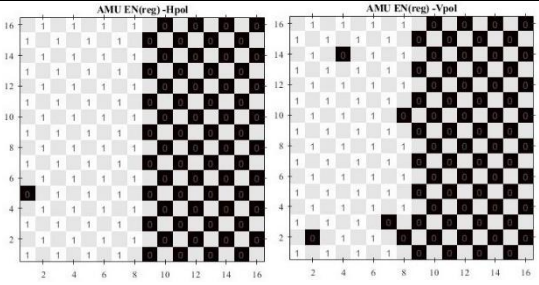
Test Scenario	Reference	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
29	Table 15	22.5	0.468	63 (H) + 59 (V) = 121 (47.7% ON)	

Table 15. SAR measurements. Phantom 50 cm from Source, 20 cm from Client, 22.5 cm offset

1 Meter Tx/Rx distance - Phantom 50cm to source, 22.5cm Offset		
cm offset	degrees	W/kg
-16.0	-61.12	0.043
-15.0	-57.30	0.041
-14.0	-53.48	0.037
-13.0	-49.66	0.038
-12.0	-45.84	0.040
-11.0	-42.02	0.098
-10.0	-38.20	0.137
-9.0	-34.38	0.150
-8.0	-30.56	0.151
-7.0	-26.74	0.115
-6.0	-22.92	0.122
-5.0	-19.10	0.156
-4.0	-15.28	0.233
-3.0	-11.46	0.278
-2.0	-7.64	0.284
-1.0	-3.82	0.259
0.0	0.00	0.250
1.0	3.82	0.284

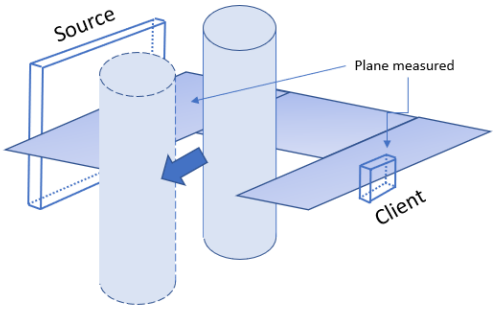
1 Meter Tx/Rx distance - Phantom 50cm to source, 22.5cm Offset		
cm offset	degrees	W/kg
2.0	7.64	0.353
3.0	11.46	0.394
4.0	15.28	**0.434**
5.0	19.10	**0.429**
6.0	22.92	0.366
7.0	26.74	0.336
8.0	30.56	0.398
9.0	34.38	**0.468**
10.0	38.20	0.388
11.0	42.02	0.330
12.0	45.84	0.282
13.0	49.66	0.245
14.0	53.48	0.205
15.0	57.30	0.196
16.0	61.12	0.130
17.0	64.94	0.119
18.0	68.75	0.131
19.0	72.57	0.065
20.0	76.39	0.045

10.5.3 Obstructed Case with Single Phantom, WPT Source/Client distance: 75 cm

10.5.3.1 General

In the following sections, we present the results for a single phantom obstruction using a separation distance of 75 cm. For the 75 cm case, the phantom is placed 25 cm from the WPT source, and 20 cm from the client.

10.5.3.2 Field Strength with Single Phantom, Stepped off-Axis, Vertical Orientation (75 cm)



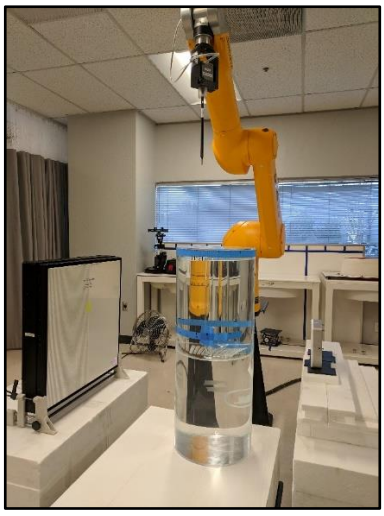
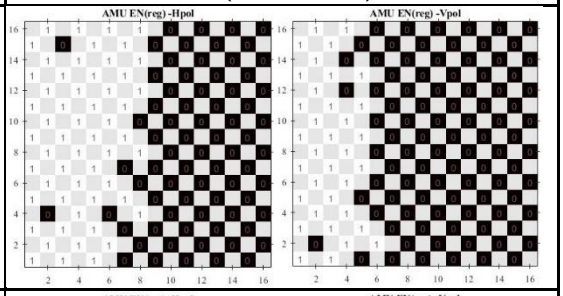
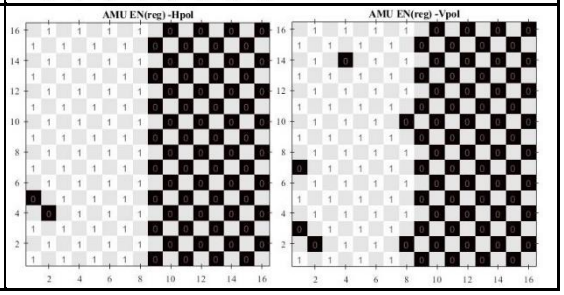


Figure 54 – Test setup – single phantom, vertical orientation (75 cm)

Table 16 Details: Field Strength, Vertical Orientation (75 cm)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	# Antenna elements (Horiz./Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
30	n/a	0	0	0	n/a (all antenna off)
31	n/a	7.5	0	0	n/a (all antenna off)
32	Figure 55	15	111.9	55 (H) + 35 (V) = 90 (35.2% ON)	
33	Figure 56	22.5	130.2	62 (H) + 58 (V) = 120 (46.9% ON)	

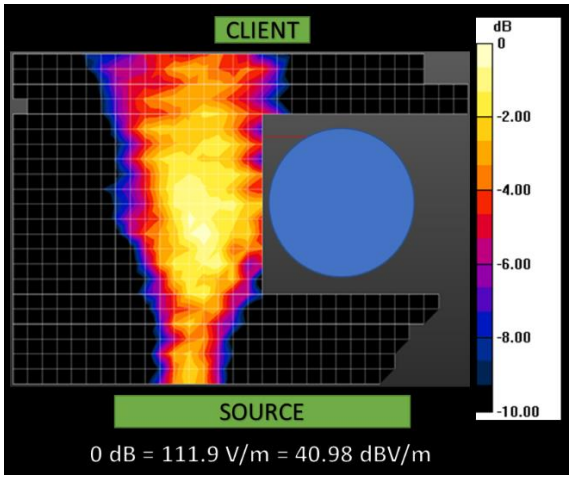


Figure 55. Obstructed E-field scan at 75 cm between Source and Client with 15 cm offset– Vertical Phantom

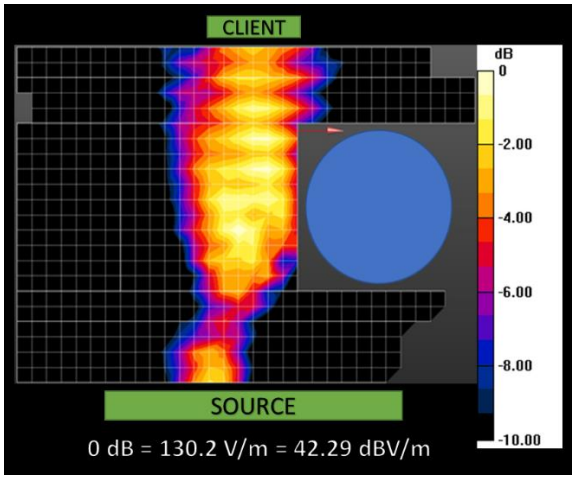


Figure 56. Obstructed E-field scan at 75 cm between Source and Client with 22.5 cm offset– Vertical Phantom

10.5.3.3 Field Strength with Single Phantom, Stepped off-Axis, Transverse Orientation (75 cm)

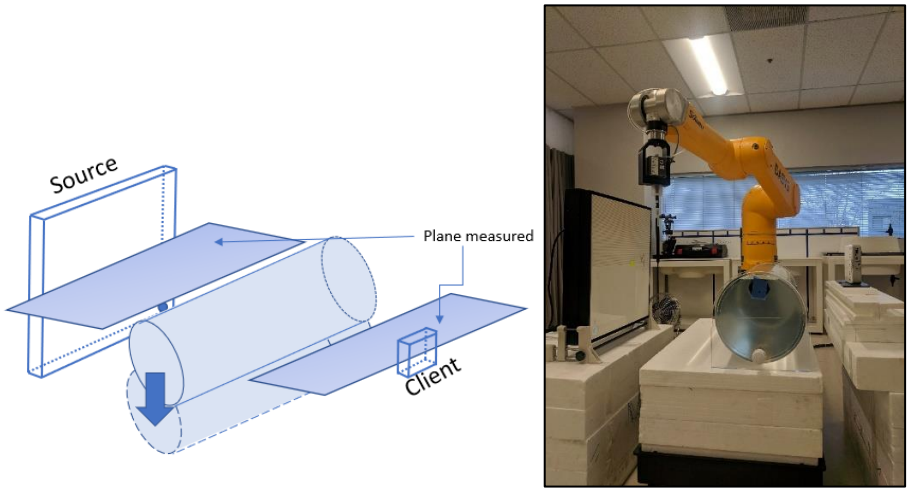
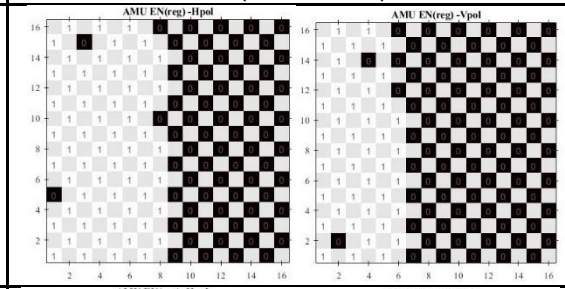
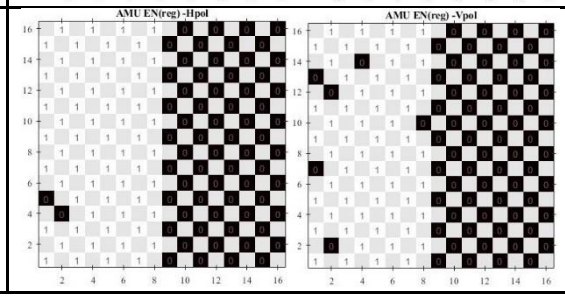


Figure 57 - Test setup - single phantom, transverse orientation (75 cm)

Table 17 Details: Field Strength, Transverse Orientation (75 cm)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	# Antenna elements (Horiz./Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
34	n/a	0	0	0	n/a (all antenna off)
35	n/a	7.5	0	0	n/a (all antenna off)
36	Figure 58	15	94.26	60 (H) + 43 (V) = 103 (40.2% ON)	
37	Figure 59	22.5	127.5	62 (H) + 58 (V) = 124 (46.9% ON)	

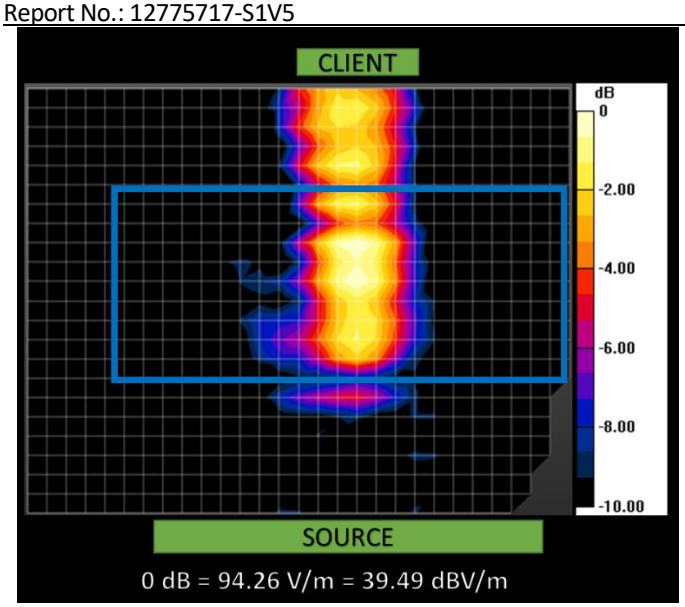


Figure 58. Obstructed E-field scan at 75 cm between Source and Client with 15 cm offset– Transverse Phantom

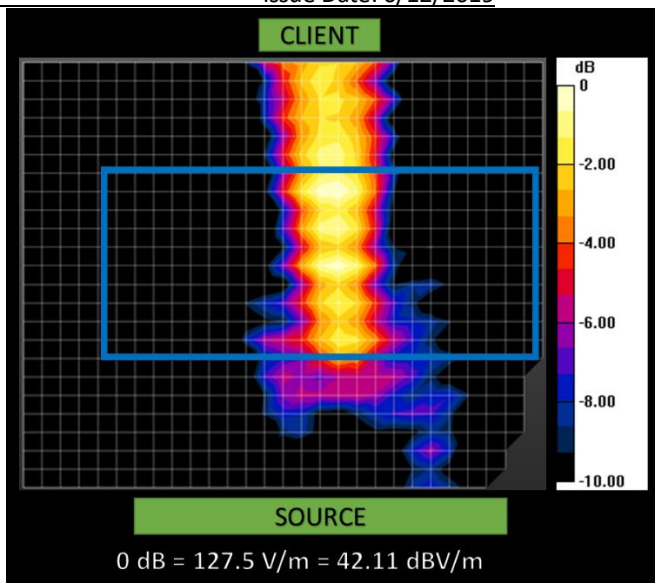


Figure 59. Obstructed E-field scan at 75 cm between Source and Client with 22.5 cm offset– Transverse Phantom

10.5.3.4 Field Strength Adjacent to Single Vertical Phantom (75 cm);

In addition to e-field mapping, additional field strength measurements were performed adjacent to the phantom as requested by OET (June 14, 2018) for better resolution of potential exposure near the phantom. These field strength measurements were performed with the power client positioned 75 cm away from the power source and at offsets of 15 and 22.5 cm from the centerline. (See Section 10.5.2.6 for details regarding the measurement.)

Table 19 records the field strength next to the phantom at 75 cm separation, 15 cm offset. The highest field strength measured in this scenario was 79.8 V/m at -3.82 degrees offset from the boresight line.

Table 20 records the field strength next to the phantom at 75 cm separation, 22.5 cm offset. The highest field strength measured in this scenario was 74.4 V/m at -3.82 degrees offset from the boresight line.

Table 18 Details: Field Strength Adjacent to Vertical Phantom (75 cm)

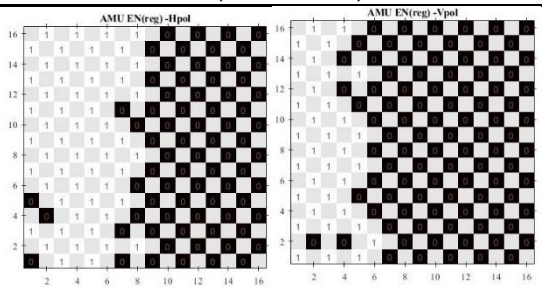
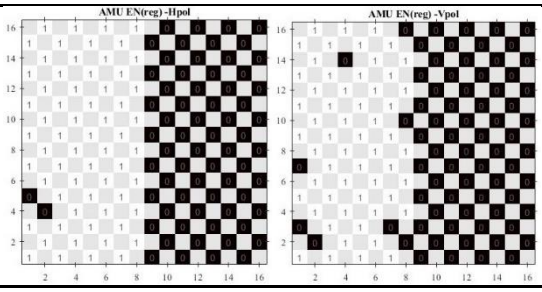
Test Scenario	Reference	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
38	n/a	0	0	0	n/a (all antenna off)
39	n/a	7.5	0	0	n/a (all antenna off)
40	Table 19	15	79.8	55 (H) + 34 (V) = 89 (34.8% ON)	
41	Table 20	22.5	74.4	62 (H) + 56 (V) = 123 (47.7% ON)	

Table 19. Field strength measurements adjacent to phantom. Phantom 25 cm from Source, 20 cm from Client, 15 cm offset

75cm Tx/Rx distance - Phantom 50cm to source, 15cm Offset					
cm offset	degrees	V/m	cm offset	degrees	V/m
-16.0	-61.12	35.62	2.0	7.64	57.94
-15.0	-57.30	40.84	3.0	11.46	59.45
-14.0	-53.48	50.99	4.0	15.28	59.98
-13.0	-49.66	55.10	5.0	19.10	58.77
-12.0	-45.84	55.12	6.0	22.92	51.77
-11.0	-42.02	50.52	7.0	26.74	43.66
-10.0	-38.20	48.96	8.0	30.56	39.32
-9.0	-34.38	59.86	9.0	34.38	37.28
-8.0	-30.56	68.85	10.0	38.20	34.11
-7.0	-26.74	**78.04**	11.0	42.02	31.77
-6.0	-22.92	75.72	12.0	45.84	27.18
-5.0	-19.10	58.99	13.0	49.66	21.91
-4.0	-15.28	63.90	14.0	53.48	19.23
-3.0	-11.46	67.09	15.0	57.30	24.66
-2.0	-7.64	74.29	16.0	61.12	17.67
-1.0	-3.82	**79.80**	17.0	64.94	16.49
0.0	0.00	**76.99**	18.0	68.75	14.65
1.0	3.82	67.94	19.0	72.57	14.14
			20.0	76.39	14.12

Table 20. Field strength measurements adjacent to phantom. Phantom 25 cm from Source, 20 cm from Client, 22.5 cm offset

75 cm Tx/Rx distance - Phantom 25cm to source, 22.5cm Offset					
cm offset	degrees	V/m	2.0	7.64	50.10
-16.0	-61.12	37.58	3.0	11.46	49.84
-15.0	-57.30	41.70	4.0	15.28	51.19
-14.0	-53.48	46.53	5.0	19.10	49.42
-13.0	-49.66	50.45	6.0	22.92	43.38
-12.0	-45.84	51.03	7.0	26.74	36.22
-11.0	-42.02	51.72	8.0	30.56	30.11
-10.0	-38.20	51.84	9.0	34.38	26.20
-9.0	-34.38	57.77	10.0	38.20	23.39
-8.0	-30.56	63.40	11.0	42.02	21.52
-7.0	-26.74	**70.32**	12.0	45.84	17.72
-6.0	-22.92	69.44	13.0	49.66	13.07
-5.0	-19.10	63.06	14.0	53.48	8.01
-4.0	-15.28	59.78	15.0	57.30	6.77
-3.0	-11.46	64.34	16.0	61.12	5.35
-2.0	-7.64	**72.39**	17.0	64.94	7.08
-1.0	-3.82	**74.40**	18.0	68.75	8.73
0.0	0.00	68.99	19.0	72.57	9.27
1.0	3.82	57.90	20.0	76.39	11.19

10.5.3.5 Single Point SAR, Single Phantom (75 cm)

In addition to field strength measurements that were performed adjacent to the phantom, single point SAR measurements were similarly taken inside the phantom and adjacent to the edge. These field strength measurements were performed with the power client positioned 75 cm away from the power source and at offsets of 15 and 22.5 cm from the centerline. (See Section 10.5.2.6 for details regarding the measurement.)

Table 22 includes single-point SAR values inside the phantom at 75 cm separation, 15 cm offset. The highest SAR values measured in this scenario was 0.277 W/kg at -3.82 degrees offset from the boresight line.

Table 23 records single-point SAR inside the phantom at 75 cm separation, 22.5 cm offset. The highest SAR value measured in this scenario was 0.315 W/kg at 3.82 degrees offset from the boresight line.

Table 21 Details: Single Point SAR (75 cm)

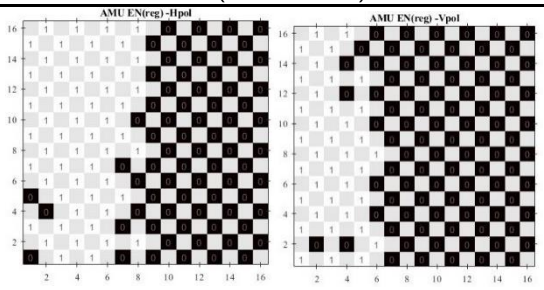
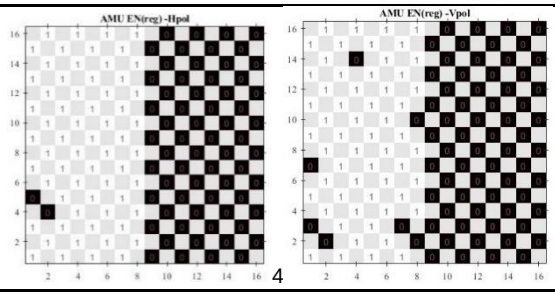
Test Scenario	Reference	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
42	n/a	0	0	0	n/a (all antenna off)
43	n/a	7.5	0	0	n/a (all antenna off)
44	Table 22	15	0.277	63 (H) + 60 (V) = 123 (48% ON)	
45	Table 23	22.5	0.315	62 (H) + 57 (V) = 123 (46.5% ON)	

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Table 22. SAR measurements. Phantom 25 cm from Source, 20 cm from Client, 15 cm offset

75cm Tx/Rx distance - Phantom 50cm to source, 15cm Offset		
cm offset	degrees	W/kg
-16.0	-61.12	0.031
-15.0	-57.30	0.046
-14.0	-53.48	0.095
-13.0	-49.66	0.144
-12.0	-45.84	0.132
-11.0	-42.02	0.157
-10.0	-38.20	0.093
-9.0	-34.38	0.090
-8.0	-30.56	0.119
-7.0	-26.74	0.197
-6.0	-22.92	0.220
-5.0	-19.10	0.192
-4.0	-15.28	0.170
-3.0	-11.46	0.161
-2.0	-7.64	**0.240**
-1.0	-3.82	**0.277**
0.0	0.00	**0.258**
1.0	3.82	0.232
2.0	7.64	0.204
3.0	11.46	0.179
4.0	15.28	0.169
5.0	19.10	0.159
6.0	22.92	0.149
7.0	26.74	0.115
8.0	30.56	0.105
9.0	34.38	0.103
10.0	38.20	0.069
11.0	42.02	0.052
12.0	45.84	0.044
13.0	49.66	0.038
14.0	53.48	0.030
15.0	57.30	0.030
16.0	61.12	0.029
17.0	64.94	0.032
18.0	68.75	0.036
19.0	72.57	0.039
20.0	76.39	0.044

Table 23. SAR measurements. Phantom 25 cm from Source, 20 cm from Client, 22.5 cm offset

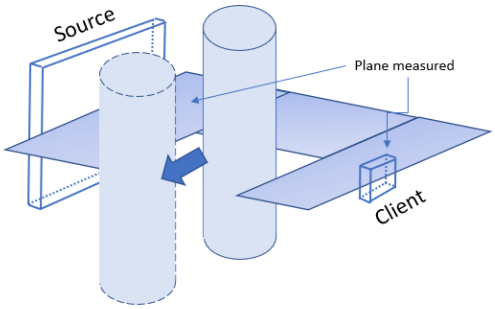
75cm Tx/Rx distance - Phantom 25cm to source,		
cm offset	degrees	W/kg
-16.0	-61.12	0.041
-15.0	-57.30	0.055
-14.0	-53.48	0.063
-13.0	-49.66	0.103
-12.0	-45.84	0.117
-11.0	-42.02	0.155
-10.0	-38.20	0.151
-9.0	-34.38	0.135
-8.0	-30.56	0.132
-7.0	-26.74	0.143
-6.0	-22.92	0.170
-5.0	-19.10	0.216
-4.0	-15.28	0.244
-3.0	-11.46	0.242
-2.0	-7.64	0.229
-1.0	-3.82	0.245
0.0	0.00	0.282
1.0	3.82	**0.315**
2.0	7.64	**0.310**
3.0	11.46	**0.291**
4.0	15.28	0.269
5.0	19.10	0.232
6.0	22.92	0.172
7.0	26.74	0.180
8.0	30.56	0.172
9.0	34.38	0.116
10.0	38.20	0.086
11.0	42.02	0.079
12.0	45.84	0.039
13.0	49.66	0.029
14.0	53.48	0.016
15.0	57.30	0.017
16.0	61.12	0.018
17.0	64.94	0.014
18.0	68.75	0.020
19.0	72.57	0.018
20.0	76.39	0.016

10.5.4 Obstructed Case with Single Phantom; WPT Source/Client Distance of 50 cm;

10.5.4.1 General

In the following sections, we present the results for a single phantom obstruction using a separation distance of 50 cm. For the 50 cm case, the phantom is placed 20 cm from the WPT source and adjacent to the client.

10.5.4.2 Field Strength with Single Phantom, Stepped off-Axis, Vertical Orientation (50 cm)



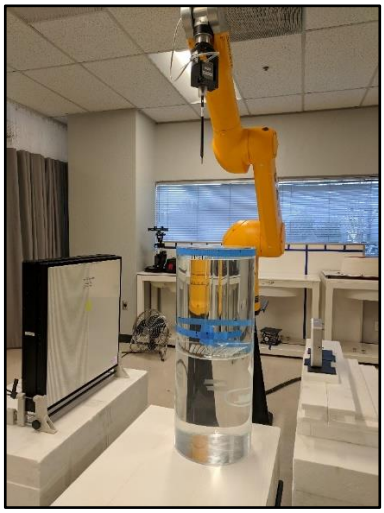
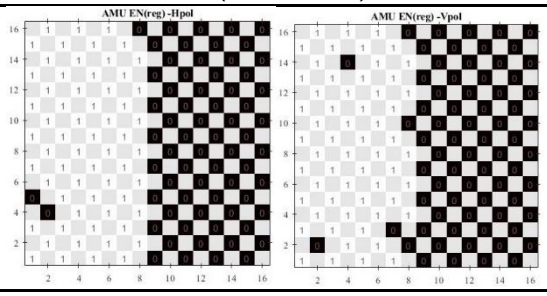


Figure 60 – Test setup – Single phantom, vertical orientation (50 cm)

Table 24 Details: Field Strength, Vertical Orientation (50 cm)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	# Antenna elements (Horiz./Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
46	n/a	0	0	0	n/a (all antenna off)
47	n/a	7.5	0	0	n/a (all antenna off)
48	n/a	15	0	0	n/a (all antenna off)
49	Figure 61	22.5	169.6	61 (H) + 58 (V) = 119 (46.5% ON)	

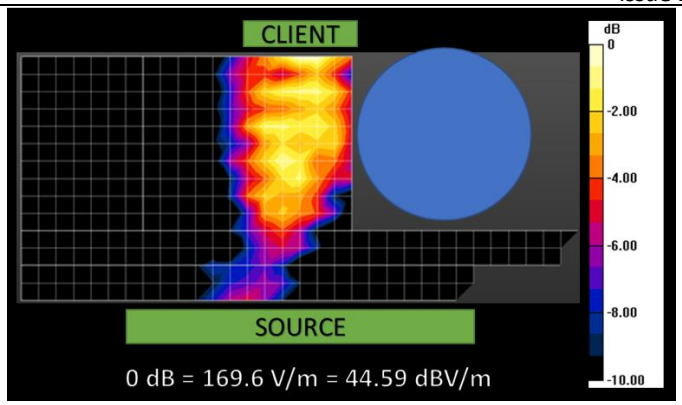


Figure 61. Obstructed E-field scan at 50 cm between Source and Client with 22.5 cm offset– Vertical Phantom

10.5.4.3 Field Strength with Single Phantom, Stepped off-Axis, Transverse Orientation (50 cm)

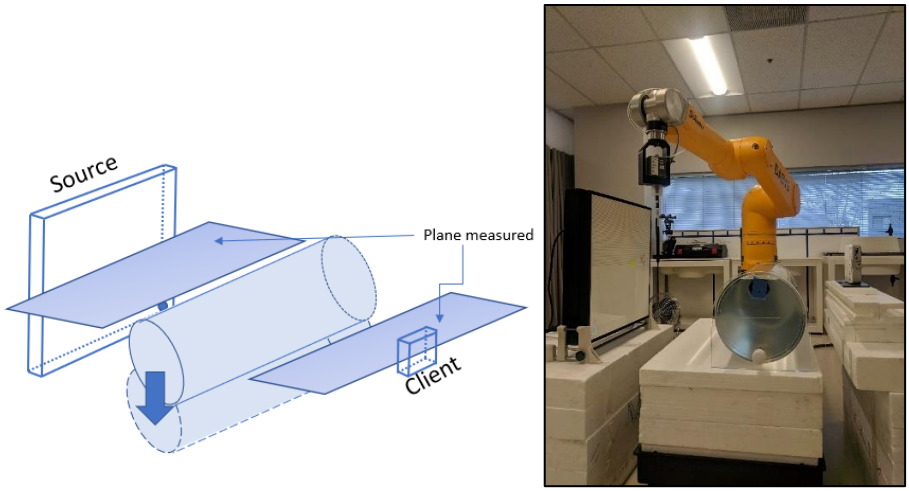
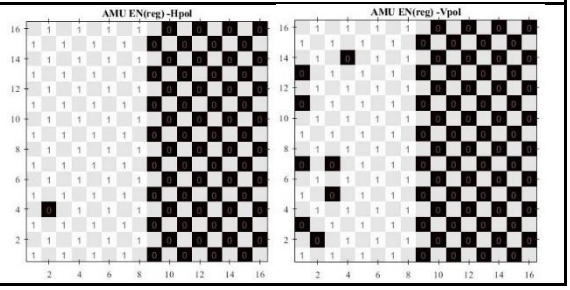


Figure 62 - Test setup - single phantom, transverse orientation (50 cm)

Table 25 Details: Field Strength, Transverse Orientation (50 cm)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	# Antenna elements (Horiz./Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
50	n/a	0	0	0	n/a (all antenna off)
51	n/a	7.5	0	0	n/a (all antenna off)
52	n/a	15	0	n/a	n/a
53	Figure 63	22.5	175.2	63 (H) + 56 (V) = 119 (46.5% ON)	

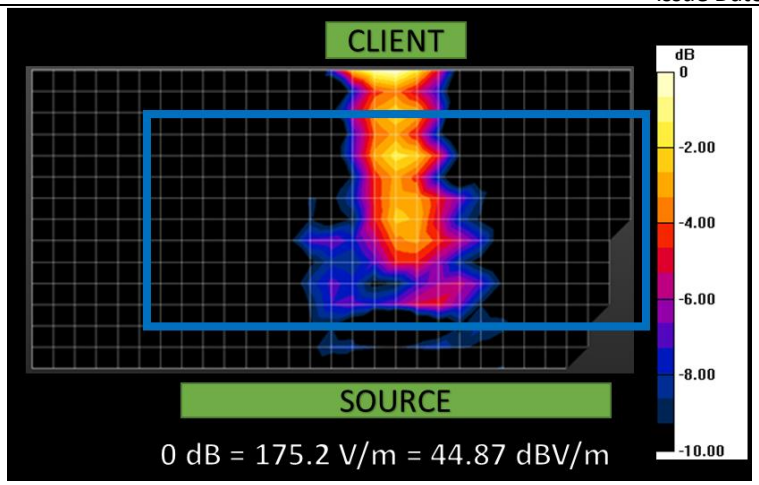


Figure 63. Obstructed E-field scan at 75 cm between Source and Client with 22.5 cm offset– Transverse Phantom

10.5.4.4 Field Strength Adjacent to Single Vertical Phantom (50 cm)

In addition to e-field mapping, additional field strength measurements were performed adjacent to the phantom as requested by OET for better resolution of potential exposure near the phantom. These field strength measurements were performed with the power client positioned 50 cm away from the power source and at an offset of 22.5 cm from the centerline. (See Section 10.5.2.6 for details regarding the measurement.)

Table 27 records the field strength next to the phantom at 50 cm separation, 22.5 cm offset. The highest field strength measured in this scenario was 127.7 V/m at -3.82 degrees offset from the boresight line.

Table 26 Details: Field Strength Adjacent to Vertical Phantom (50 cm)

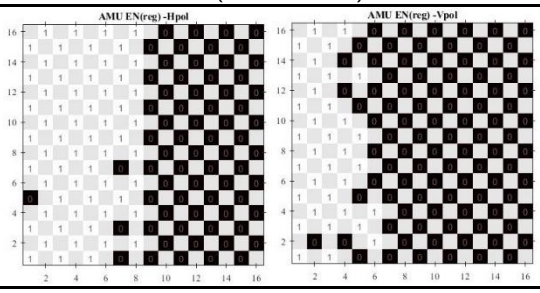
Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
54	n/a	0	0	0	n/a (all antenna off)
55	n/a	7.5	0	0	n/a (all antenna off)
56	n/a	15	0	0	n/a (all antenna off)
57	n/a	22.5	127.7	60 (H) + 34 (V) = 94 (36.7% ON)	

Table 27. Field strength measurements adjacent to phantom. Phantom 20 cm from Source, Adjacent to Client, 22.5 cm offset

50cm Tx/Rx distance - Phantom 20cm to source, 22.5cm Offset					
cm offset	degrees	V/m	2.0	7.64	49.27
-16.0	-61.12	49.57	3.0	11.46	54.40
-15.0	-57.30	58.71	4.0	15.28	71.22
-14.0	-53.48	71.28	5.0	19.10	80.06
-13.0	-49.66	77.95	6.0	22.92	73.85
-12.0	-45.84	75.08	7.0	26.74	56.64
-11.0	-42.02	62.48	8.0	30.56	38.25
-10.0	-38.20	57.71	9.0	34.38	25.16
-9.0	-34.38	74.23	10.0	38.20	28.29
-8.0	-30.56	102.90	11.0	42.02	33.53
-7.0	-26.74	**119.10**	12.0	45.84	34.09
-6.0	-22.92	107.60	13.0	49.66	31.97
-5.0	-19.10	81.52	14.0	53.48	27.06
-4.0	-15.28	61.19	15.0	57.30	24.03
-3.0	-11.46	84.24	16.0	61.12	22.72
-2.0	-7.64	117.60	17.0	64.94	23.50
-1.0	-3.82	**127.70**	18.0	68.75	26.24
0.0	0.00	**118.60**	19.0	72.57	25.11
1.0	3.82	78.58	20.0	76.39	24.35

10.5.4.5 Single Point SAR, Single Phantom (50 cm)

In addition to field strength measurements that were performed adjacent to the phantom, single point SAR measurements were similarly taken inside the phantom and adjacent to the edge. These field strength measurements were performed with the power client positioned 50 cm away from the power source and at an offset of 22.5 cm from the centerline. (See Section 10.5.2.6 for details regarding the measurement.)

Table 29 records single-point SAR inside the phantom at 50 cm separation, 22.5 cm offset. The highest single-point SAR measured in this scenario was 0.575 W/kg at 7.64 degrees offset from the boresight line.

Table 28 Details: Single Point SAR (50 cm)

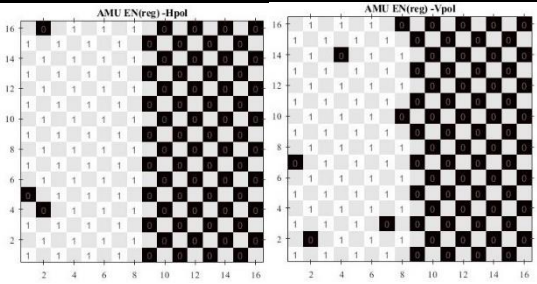
Test Scenario	Figures	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
58	n/a	0	0	0	n/a (all antenna off)
59	n/a	7.5	0	0	n/a (all antenna off)
60	n/a	15	0	0	n/a (all antenna off)
61	Table 29	22.5	0.575	61 (H) + 58 (V) = 119 (46.5% ON)	

Table 29. SAR measurements. Phantom 25 cm from Source, Adjacent to Client, 22.5 cm offset

50cm Tx/Rx distance - Phantom 20cm to source, 22.5cm Offset					
cm offset	degrees	W/kg	2.0	7.64	**0.575**
-16.0	-61.12	0.098	3.0	11.46	**0.543**
-15.0	-57.30	0.091	4.0	15.28	**0.500**
-14.0	-53.48	0.103	5.0	19.10	0.433
-13.0	-49.66	0.109	6.0	22.92	0.362
-12.0	-45.84	0.151	7.0	26.74	0.250
-11.0	-42.02	0.203	8.0	30.56	0.213
-10.0	-38.20	0.229	9.0	34.38	0.235
-9.0	-34.38	0.246	10.0	38.20	0.190
-8.0	-30.56	0.227	11.0	42.02	0.149
-7.0	-26.74	0.220	12.0	45.84	0.091
-6.0	-22.92	0.247	13.0	49.66	0.029
-5.0	-19.10	0.347	14.0	53.48	0.017
-4.0	-15.28	0.437	15.0	57.30	0.016
-3.0	-11.46	0.459	16.0	61.12	0.011
-2.0	-7.64	0.449	17.0	64.94	0.013
-1.0	-3.82	0.415	18.0	68.75	0.018
0.0	0.00	0.447	19.0	72.57	0.019
1.0	3.82	0.499	20.0	76.39	0.022

10.6 Measuring Energy Field Behind the WPT Client

10.6.1 General

While prior field scans indicate that the highest levels of potential RF exposure appear in the case of a partial obstruction of the power field between the WPT Source and WPT Client, the potential also exists for RF exposure outside of this zone, immediately adjacent to the WPT Client and opposite the WPT Source. This section therefore shows field strength and single-point SAR values for a phantom placed immediately behind the WPT Client, which is positioned 1 m away from the WPT Source.

10.6.2 Field Strength between Source and Client with Single Phantom behind the WPT Client

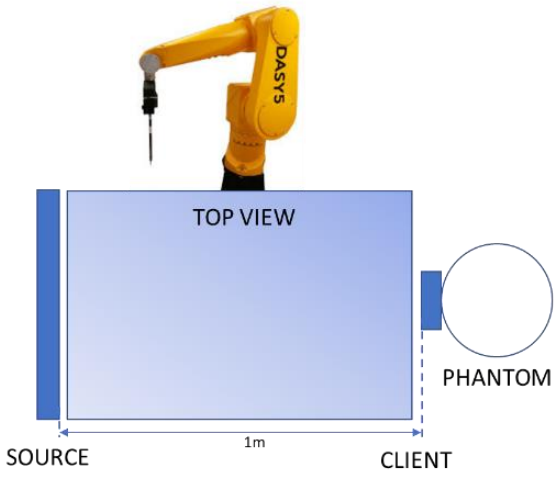


Figure 64 – scenario 62 diagram showing test setup

Figure 65 – Photo of test setup

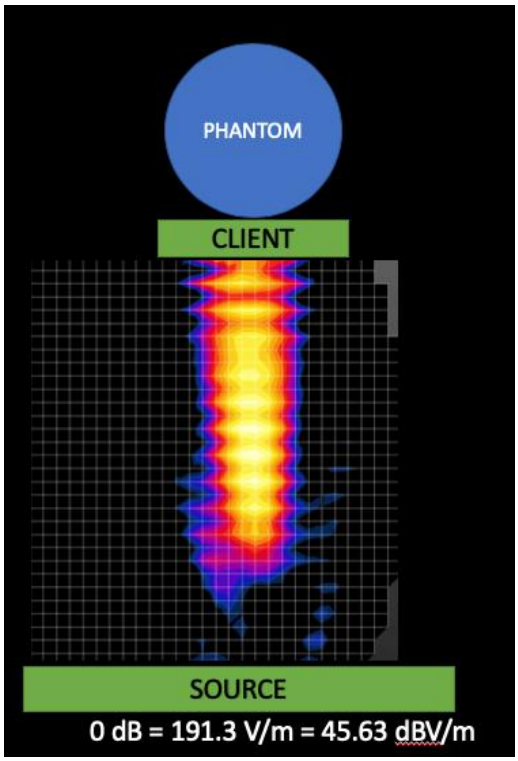


Figure 66 - Field scan with phantom behind client

Figure 66 shows a field scan of the area between the WPT Source and WPT Client, with the phantom placed behind the WPT Client, relative to the WPT Source. We note that this field scan is very similar to the scans shown in Figure 8 and Figure 9, which are with regard to the same scenario without the phantom placed behind the client.

10.6.3 Field Strength Adjacent to WPT Client

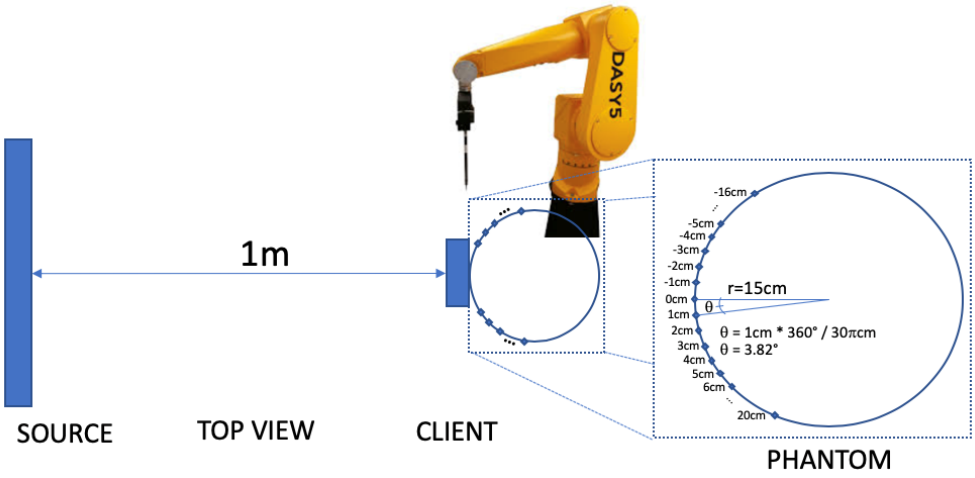


Figure 67 - Test Setup – Scenario 63 RF field adjacent to phantom

Table 30 - field strength adjacent to phantom

1 Meter Phantom Behind Client		
cm offset	Degree offset	V/m
20	-76.4	36.950
19	-72.6	36.560
18	-68.8	37.140
17	-64.9	41.630
16	-61.1	45.010
15	-57.3	50.190
14	-53.5	51.990
13	-49.7	52.650
12	-45.8	54.470
11	-42.0	58.640
10	-38.2	**61.970**
9	-34.4	**62.680**
8	-30.6	**62.660**
7	-26.7	58.720
6	-22.9	54.150
5	-19.1	48.740
4	-15.3	45.250
3	-11.5	37.960
2	-7.6	42.590
1	-3.8	42.230

1 Meter Phantom Behind Client		
cm offset	Degree offset	V/m
CLIENT	0.0	
1	3.8	28.010
2	7.6	28.670
3	11.5	36.910
4	15.3	44.070
5	19.1	52.650
6	22.9	56.510
7	26.7	59.030
8	30.6	61.780
9	34.4	**66.790**
10	38.2	**70.860**
11	42.0	**65.550**
12	45.8	60.020
13	49.7	58.330
14	53.5	56.760
15	57.3	55.670
16	61.1	54.310
17	64.9	45.100
18	68.8	44.950
19	72.6	38.370

Table 30 shows field strength values for several points measured around the phantom, based on the test setup depicted in Figure 67, which shows the cylindrical phantom directly behind the WPT Client, with the WPT Source at a distance of 1 m. We note that the peak value of 70.86 V/m is consistent with the scans in Figure 10 and Figure 11, in section 10.2.2, showing the energy field behind the client also at an unobstructed distance from the WPT

Source of 1 m. Those scans had an average peak value of 78.5 V/m. As the difference between these fields is negligible, we believe the two scans are highly consistent.

10.6.4 Single-point SAR, Single Phantom

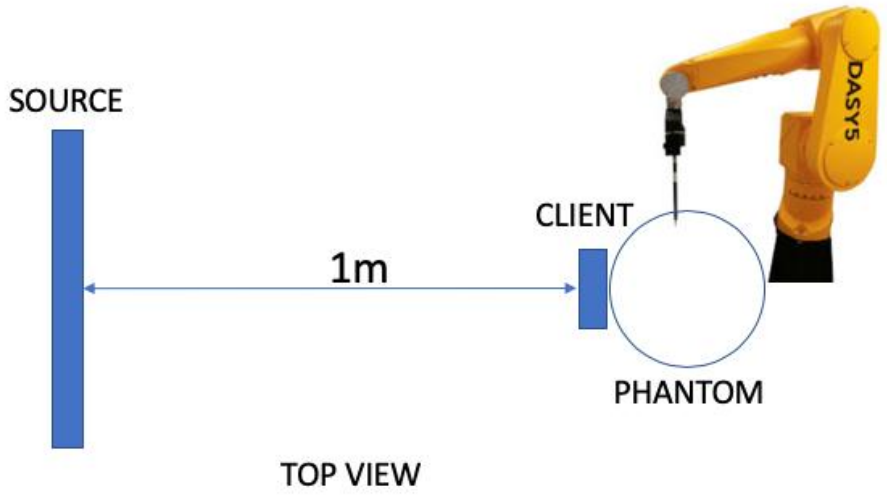


Figure 68 - Test Setup – Scenario 64 Single-point SAR

Table 31 – Single-point SAR values

1 Meter Phantom Behind Client		
Section	Degree offset	W/kg
1.0	-76.4	0.063
1.1	-72.6	0.064
1.2	-68.8	0.083
1.3	-64.9	0.091
2.0	-61.1	0.099
2.1	-57.3	0.116
2.2	-53.5	0.136
2.3	-49.7	0.162
3.0	-45.8	0.182
3.1	-42.0	0.190
3.2	-38.2	0.204
3.3	-34.4	**0.214**
4.0	-30.6	0.199
4.1	-26.7	0.201
4.2	-22.9	**0.231**
4.3	-19.1	**0.232**
5.0	-15.3	0.163
5.1	-11.5	0.090
5.2	-7.6	0.067
5.3	-3.8	0.075

1 Meter Phantom Behind Client		
Section	Degree offset	W/kg
CLIENT	0.0	
9.2	3.8	0.101
9.3	7.6	0.099
10.0	11.5	0.185
10.1	15.3	0.255
10.2	19.1	**0.350**
10.3	22.9	**0.354**
11.0	26.7	**0.356**
11.1	30.6	0.336
11.2	34.4	0.311
11.3	38.2	0.283
12.0	42.0	0.250
12.1	45.8	0.187
12.2	49.7	0.195
12.3	53.5	0.147
13.0	57.3	0.129
13.1	61.1	0.120
13.2	64.9	0.094
13.3	68.8	0.084
14.0	72.6	0.065

10.7 Two Phantoms

The following measurements support the determination of the worst case compliance configuration with respect to a pair of human analog obstructions between WPT client and WPT.

10.7.1 General

Based on OET feedback, we have conducted tests with two phantoms obstructing the path between WPT Source and client. Measurements were taken at WPT Source/client distances of 50 cm and 1 m. Measurements for 50 cm WPT Source/client distance were taken at phantom distances (as measured from phantom edge to phantom edge) of 7.5 cm, 15 cm, and 22.5 cm. Measurements for 1 m WPT Source/client distance were taken at 17.5 cm.

As shown in Table 32, the highest field strength and single-point SAR readings are for a phantom distance of 15 cm and a WPT Source/client distance of 50 cm. Single-point SAR readings were taken for that scenario and for the 1 m WPT Source/client distance and phantom distance of 17.5 cm. We note that in the case of a dual phantom distance of 15 cm, the edges of both phantoms are offset from boresight by 7.5 cm, and that the center of each is thus offset 22.5 cm from boresight. We note that the maximum field strength and single-point SAR readings for this case is in agreement with the equivalent single phantom results at 22.5 cm offset and 50 cm WPT Source/client distances as shown in Table 7. We therefore conclude that the dual phantom results are no worse than the single phantom results and that further dual phantom tests are not necessary.

Table 32 Summary of the maximum measured single point SAR and maximum measured field strength adjacent (outside) the phantom for the realistic double phantom scenarios

Distance - WPT Source/client	Phantoms to source distance	Phantoms distance	Max field strength measured adjacent to phantom	Max field strength measured adjacent to the SAR-fluid filled phantom	Max single point SAR
100 cm	50 cm	17.5 cm	56.9 V/m	52.8 V/m	0.35 W/kg
50 cm	20 cm	7.5 cm	125.8 V/m	n/a	n/a
50 cm	20 cm	15 cm	136.8 V/m*	122.3 V/m	0.53 W/kg
50 cm	20 cm	22.5	78.3 V/m	n/a	n/a

* showing maximum value recorded adjacent phantom for the three tests performed at this distance. See section 10.7.4 for details.

For the dual phantom case, measurements were ***first*** taken at WPT Source/Client distance of 50 cm with water in both phantoms. Due to the lack of enough SAR fluid to fill both phantoms, one phantom was filled with water rather than SAR fluid. These measurements were taken at phantom spacings of 7.5 cm, 15 cm, and 22.5 cm. Phantom spacing refers to the measurement between the edges of each of the two phantoms, and the gap is always centered on the boresight line.

Comparison tests between a phantom filed with either 2.4GHz TSL or water showed that the E-field was largely unaffected by the medium used. Compare the data in sections 10.7.4, 10.7.6. The only variable in these sections is the choice of the liquid in the phantom. The results are comparable within the limits of repeatability variables such as sample and phantom positioning.

Because the robot cannot navigate the narrow spaces around two phantoms, these measurements were taken manually. ***1 cm graph paper was used to measure the field between the phantoms with 3 cm spacing resolution***. Figure 69 illustrates how the graph paper was used to measure the field between the phantoms. The dots on the graph paper are where the measurements were taken. In section 10.7.2, we demonstrate the validity of this methodology.

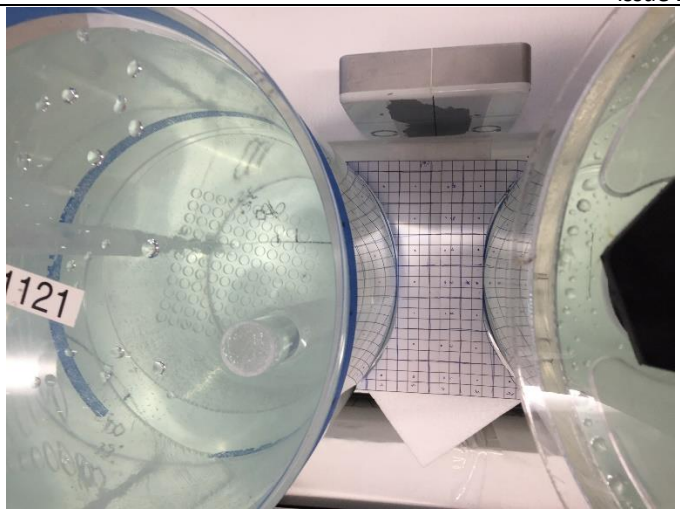


Figure 69. Dual Phantom E-field Scan, Example Grid Setup

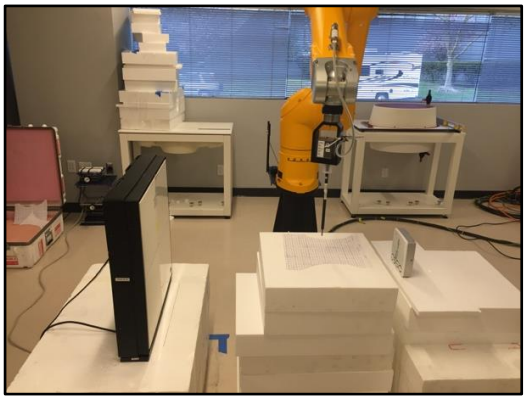
From the measurements taken with water-filled phantoms, we found for client distance of 50 cm that 15 cm phantom spacing is the worst case with the highest field levels next to the phantoms. We then filled one of the two phantoms with SAR fluid and retook measurements for the 15 cm phantom spacing case (worst-case); once with the water-filled phantom closest to the robot, and then with the SAR filled phantom closest to the robot. The reason that we switched the phantoms and took the measurement again is that the two phantoms are not completely identical. We also measured SAR inside the phantom filled with SAR fluid for the case with the SAR filled phantom closest to the robot.

Note that the 15 cm phantom spacing case is equivalent to the 22.5 cm of the single phantom which was the worst single phantom scenario.

Lastly, we tried to take the same field and SAR measurements at WPT Source/Client distance of 1 m, with 15 cm spacing, but the WPT source was completely off due to obstruction of the beacon signal. In order to get the WPT source to turn on, we had to increase the phantoms' spacing to 17.5 cm, which is where we took the final measurements.

10.7.2 Validation of manual testing

To validate the manual testing approach used to measure field strength between the phantoms, we conducted two sets of measurements in an unobstructed space between the Power Source and Power Client. This testing is to enable comparison of manual and automated testing setups, as shown in Figure 70. This testing involves one manual measurement with a handheld field probe and one automated measurement performed by the Speag robot of the same energy field. The WPT Client is positioned 1 m from and directly facing the WPT Source.



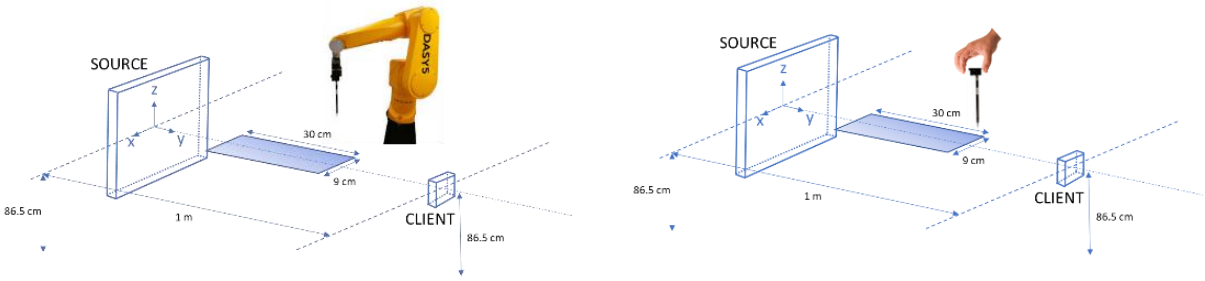


Figure 70 - Test setup for manual measurement validation

The measured plane is 9 cm x 30 cm. Manual field strength measurements were taken at measurement points arranged in a 3 cm grid. Th results of these measurements are shown in Figure 72. An automated field scan was also taken covering the same area using the same robotic methodology as undertaken to produce all other field strength measurements in this report. This scan is shown in Figure 73. Data from this automated scan was extracted covering the same 3 cm grid that was scanned manually. These data are shown in Figure 71. It is notable that the two measurements are closely correlated, indicating that the manual field scan is a suitable substitute for the automated scans in areas where such scans are not feasible.

WPT Source										WPT Client
	69	63	77	74	85	75	88	83	93	91
	108	101	116	110	120	108	118	110	117	118
	140	130	144	133	144	131	136	127	129	134
	156	143	157	144	153	141	144	136	132	140
	152	137	149	140	145	134	134	131	123	131
	125	115	123	119	122	115	114	113	105	112
	86	83	88	88	88	87	85	85	82	87

Figure 71 Automated measurement - field strength 3 cm blocks (not to scale)

WPT Source										WPT Client
	71	63	76	81	85	78	86	85	92	92
	106	104	115	109	117	113	118	114	117	120
	140	138	148	134	143	131	141	131	130	138
	158	146	161	149	157	140	146	140	132	143
	154	140	153	145	145	138	137	136	126	135
	128	119	124	121	124	117	113	116	113	116
	89	88	90	89	90	90	90	91	86	93

Figure 72 Manual measurement - field strength 3 cm blocks (not to scale)

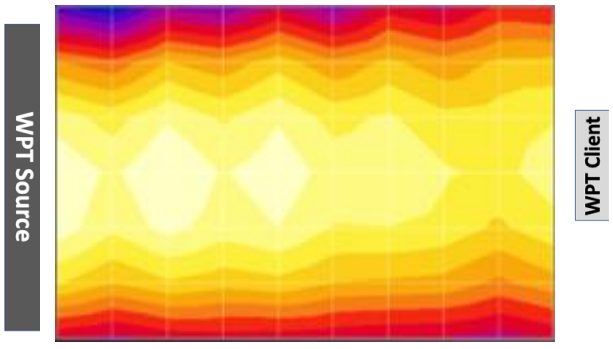


Figure 73 Automated measurement – system scan (not to scale)

10.7.3 Field Strength (Water/Water), 7.5 cm phantom spacing (50 cm client distance)'

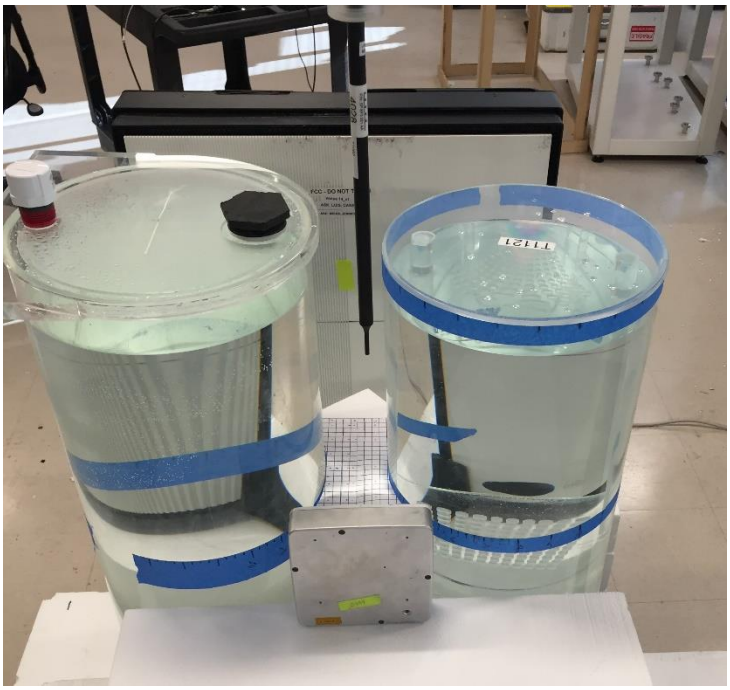
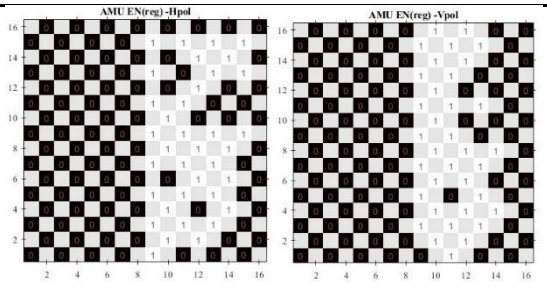


Figure 74 - photo of two phantom test configuration

Figure 75 illustrates the field strength between two phantoms with 7.5 cm spacing. The bold/boxed numbers are measurements taken 1 mm from the outside edge of the phantom. These measurements are taken this way because the actual data point for that grid location is inside the phantom. The blue dots on the edge of the phantom represent the approximate location where the bold/boxed data point was recorded.

Table 33 Details: Field Strength (Water/Water), 7.5 cm phantom spacing (50 cm client distance)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
65	Figure 75	7.5	150.8	36 (H) + 35 (V) = 119 (27.7% ON)	

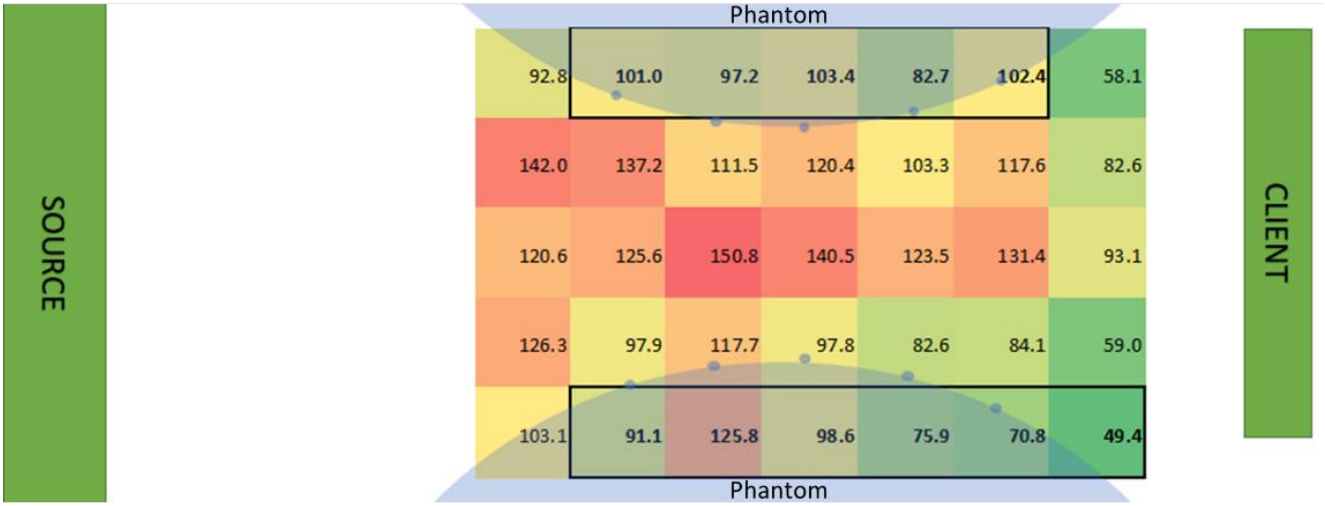


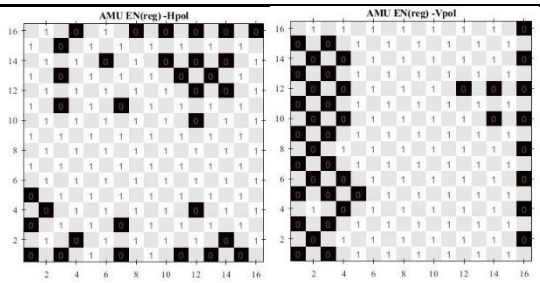
Figure 75. Dual Phantom E-field Scan (Water & Water) at 50 cm between Source and Client, 7.5 cm spacing

10.7.4 Field Strength, (Water/Water), 15 cm spacing (50 cm client distance)

Figure 76 - - photo of two phantom test configuration

Figure 77 illustrates the field strength between two phantoms with 15 cm spacing. (See Section 10.7.3 for full explanation of grid measurement details.)

Table 34 Details: Field Strength, (Water/Water), 15 cm spacing (50 cm client distance)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
66	Figure 77	15	236.9	96 (H) + 89 (V) = 185 (72.3% ON)	

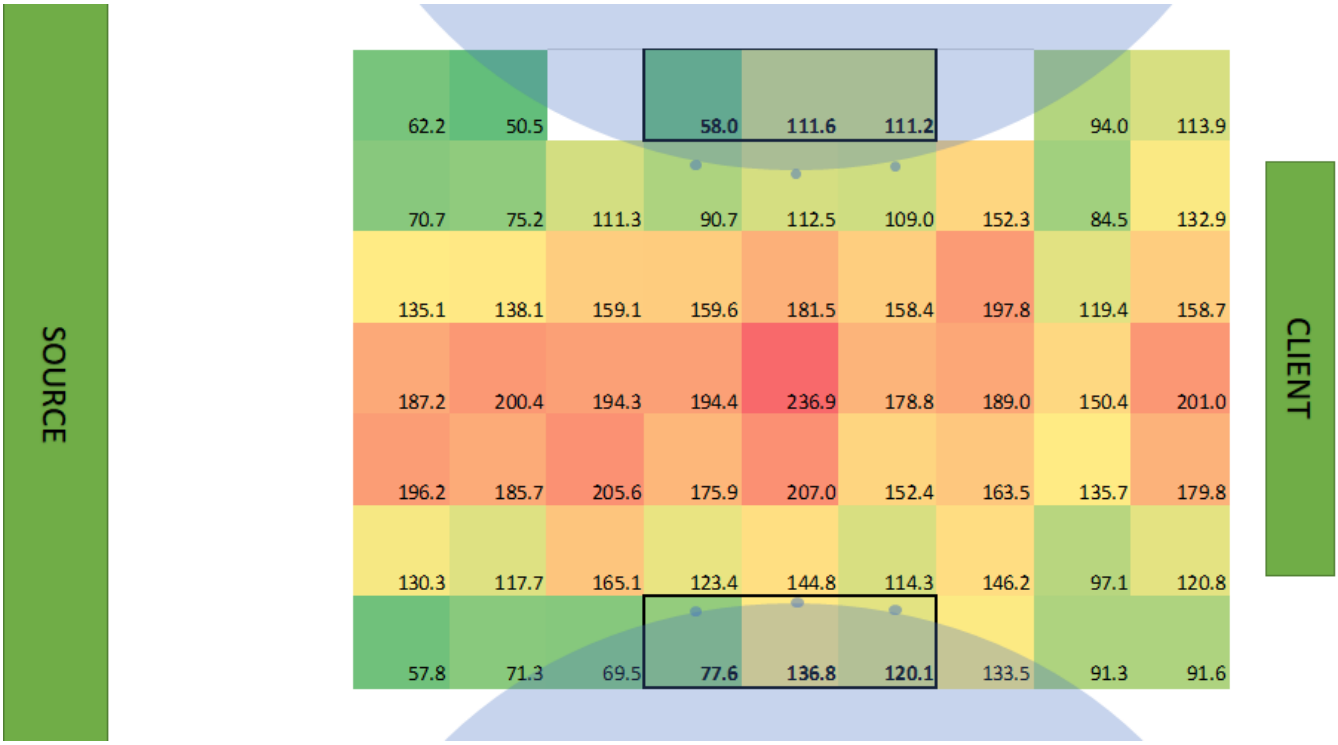


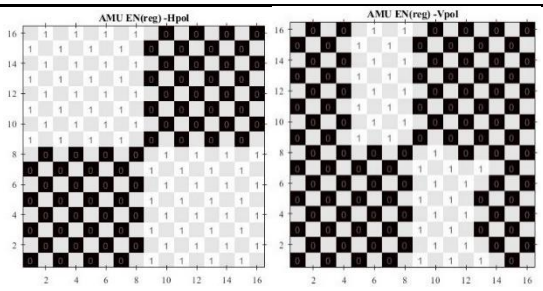
Figure 77. Dual Phantom E-field Scan (Water & Water) at 50 cm between Source and Client, 15 cm spacing

10.7.5 Field Strength, (Water/Water), 22.5 cm spacing (50 cm client distance)

Figure 78 - - photo of two phantom test configuration

Figure 79 illustrates the field strength between two phantoms with 22.5 cm spacing. (See Section 10.7.3 for full explanation of grid measurement details.)

Table 35 Details: Field Strength, (Water/Water), 22.5 cm spacing (50 cm client distance)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
67	Figure 79	22.5	180.0	64 (H) + 33 (V) = 160 (37.9% ON)	

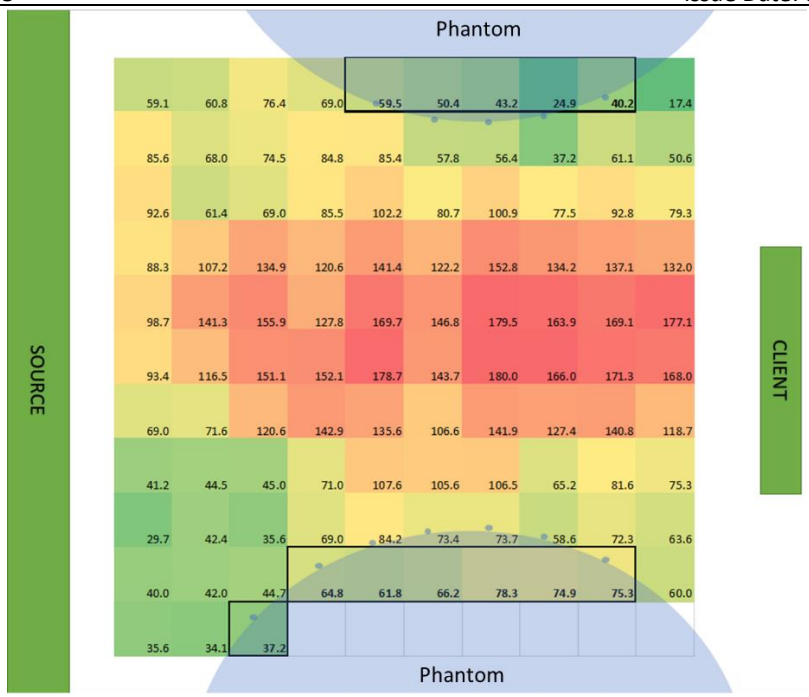


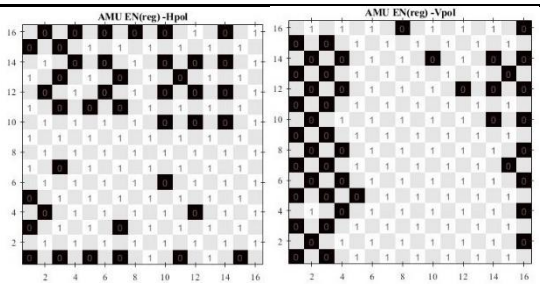
Figure 79. Dual Phantom E-field Scan (Water & Water) at 50 cm between Source and Client, 22.5 cm spacing

10.7.6 Field Strength, (Water/SAR Fluid, SAR Fluid Closest to Robot), 15 cm spacing (50 cm client distance)

Figure 80 - photo of two phantom test configuration

Figure 81 illustrates the field strength between two phantoms with 50 cm separation between source and client, and 15 cm spacing between the two phantoms. In this scenario the phantom closest to the robot is filled with SAR fluid. (See Section 10.7.3 for full explanation grid measurement details.)

Table 36 Details: Field Strength, (Water/SAR Fluid, SAR Fluid Closest to Robot), 15 cm spacing (50 cm client distance)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
68	Figure 81	15	223.7	88 (H) + 84 (V) = 172 (67.2% ON)	

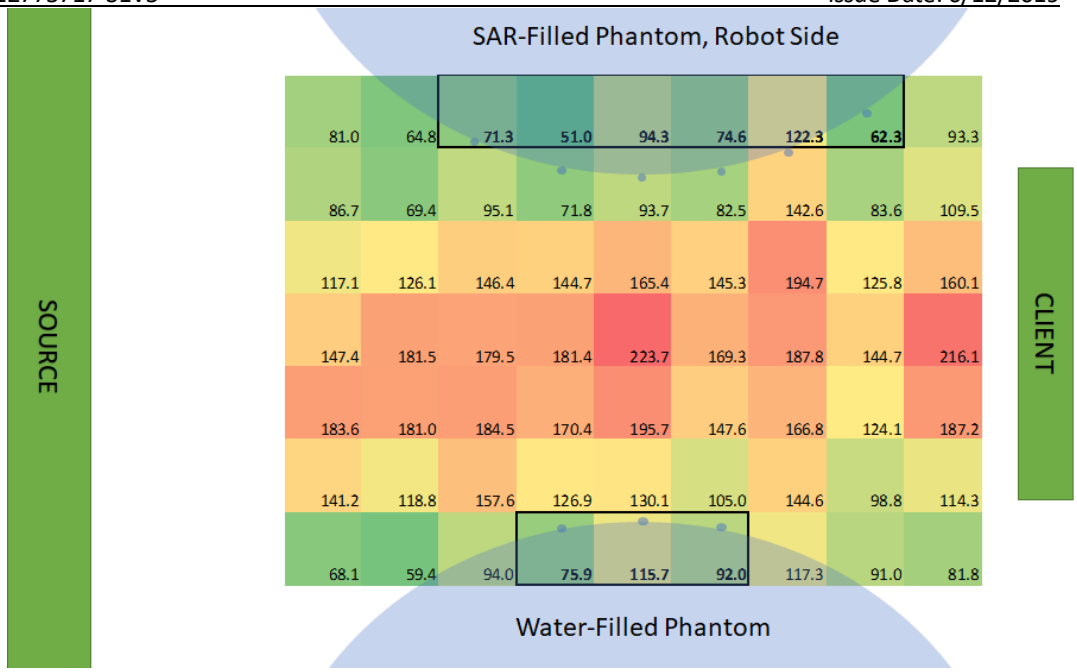
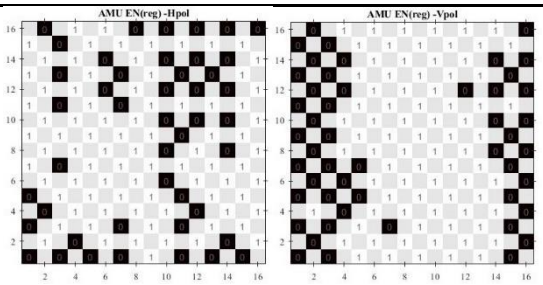


Figure 81. Dual Phantom E-field Scan (SAR & Water) at 50 cm between Source and Client, 15 cm spacing

10.7.7 Field Strength, (Water/SAR Fluid, Water Closest to Robot), 15 cm spacing (50 cm client distance)

Figure 82 illustrates the field strength between two phantoms with 50 cm separation between source and client, and 15 cm spacing between the two phantoms. In this scenario the phantom closest to the robot is filled with SAR fluid. (See Section 10.7.3 for full explanation of grid measurement details.)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
69	Figure 82	15	218.2	79 (H) + 83 (V) = 162 (63.3% ON)	

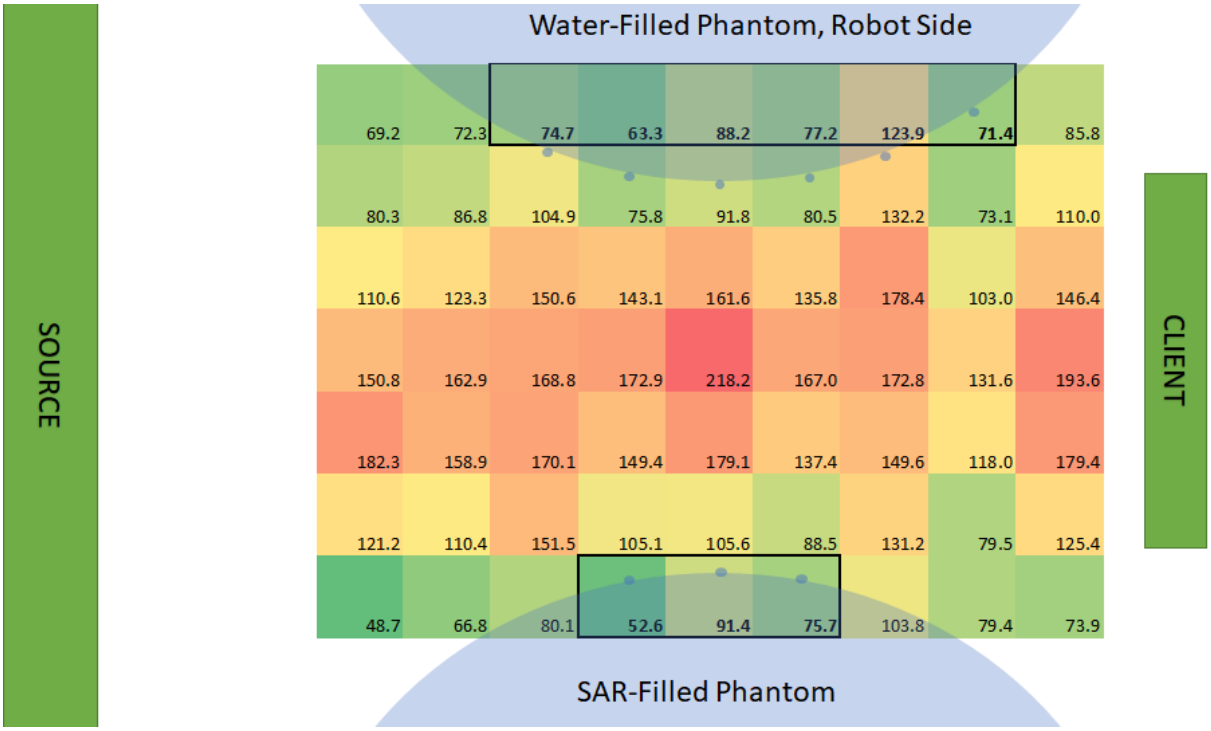


Figure 82. Dual Phantom E-field Scan (SAR & Water) at 50 cm between Source and Client, 15 cm spacing

10.7.8 Single-point SAR, (Water/SAR Fluid, Water Closest to Robot), 15 cm spacing (50 cm client distance)

Table 37 records single point SAR measurements for two phantoms, with 50 cm separation between source and client, and 15 cm spacing between the two phantoms. (See Section 10.5.2.6 for details regarding the measurement.)

In this scenario the phantom closest to the robot is filled with water. The highest single-point SAR measured in this scenario was 0.529 W/kg at -11.46 degrees offset from the boresight line.

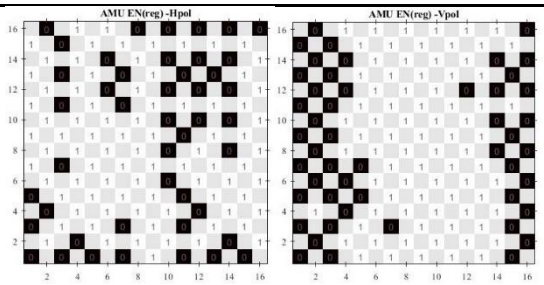
Test Scenario	Reference	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
70	Table 37	15	0.529	79 (H) + 83 (V) = 162 (63.3% ON)	

Table 37. Dual Phantom (SAR & Water) Single Point SAR, 50 cm between Source and Client, 15 cm spacing

50cm Tx/Rx distance - Phantom 20cm to source, 15cm Offset					
cm offset	degrees	W/kg	2.0	7.64	0.301
-16.0	-61.12	0.065	3.0	11.46	0.399
-15.0	-57.30	0.067	4.0	15.28	0.415
-14.0	-53.48	0.162	5.0	19.10	0.399
-13.0	-49.66	0.248	6.0	22.92	0.329
-12.0	-45.84	0.318	7.0	26.74	0.250
-11.0	-42.02	0.373	8.0	30.56	0.220
-10.0	-38.20	0.366	9.0	34.38	0.220
-9.0	-34.38	0.324	10.0	38.20	0.302
-8.0	-30.56	0.246	11.0	42.02	0.377
-7.0	-26.74	0.201	12.0	45.84	0.437
-6.0	-22.92	0.264	13.0	49.66	0.353
-5.0	-19.10	0.397	14.0	53.48	0.242
-4.0	-15.28	**0.510**	15.0	57.30	0.208
-3.0	-11.46	**0.529**	16.0	61.12	0.149
-2.0	-7.64	**0.414**	17.0	64.94	0.180
-1.0	-3.82	0.244	18.0	68.75	0.166
0.0	0.00	0.185	19.0	72.57	0.195
1.0	3.82	0.196	20.0	76.39	0.150

10.7.9 Field Strength, (Water/SAR Fluid, Water Closest to Robot), 17.5 cm spacing (1 m client distance)

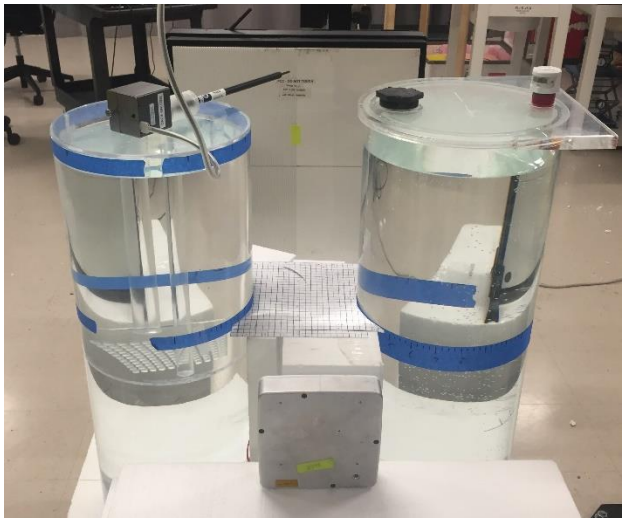
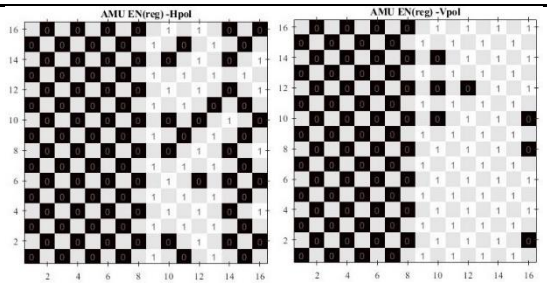


Figure 83 - photo of two phantom test configuration

Figure 84 illustrates the field strength between two phantoms with 1 m separation between source and client, and 17.5 cm spacing between the two phantoms. In this scenario the phantom closest to the robot is filled with water. (See Section 10.7.3 for full explanation of grid measurement details.)

Test Scenario	Figures	Phantom Offset (cm)	Max V/m	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
71	Figure 84	17.5	109.4	36 (H) + 57 (V) = 93 (36.3% ON)	

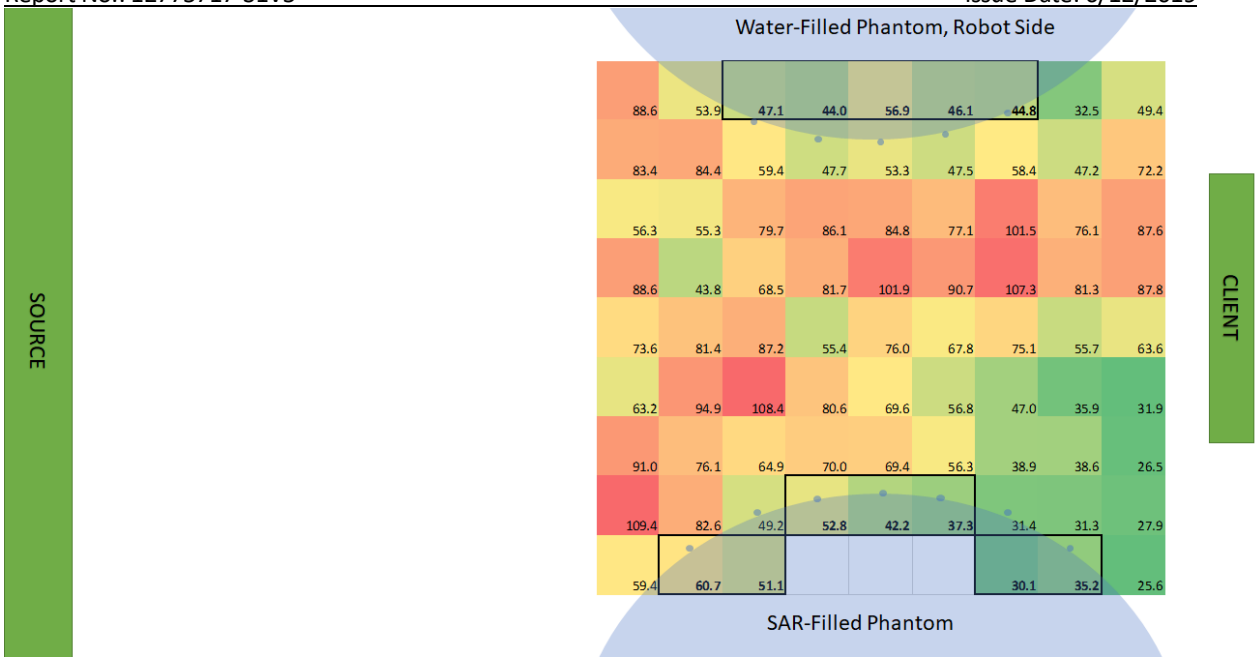


Figure 84. Dual Phantom E-field Scan (SAR & Water) at 1 m between Source and Client, 17.5 cm spacing

10.7.10Single point SAR, (Water/SAR Fluid, Water Closest to Robot), 17.5 cm spacing (1 m client distance)

Figure 85 shows the orientation of the numbered measurement points on the phantom (See Section 10.5.2.6 for details regarding how these numbers are converted to degrees).

Table 38 records single-point SAR measurements for two phantoms, with 1 m separation between source and client, and 17.5 cm spacing between the two phantoms (See Section 10.5.2.6 for details regarding the measurement). In this scenario the phantom closest to the robot is filled with water. The highest single-point SAR measured in this scenario was 0.346 W/kg at 42.02 degrees offset from the boresight line.

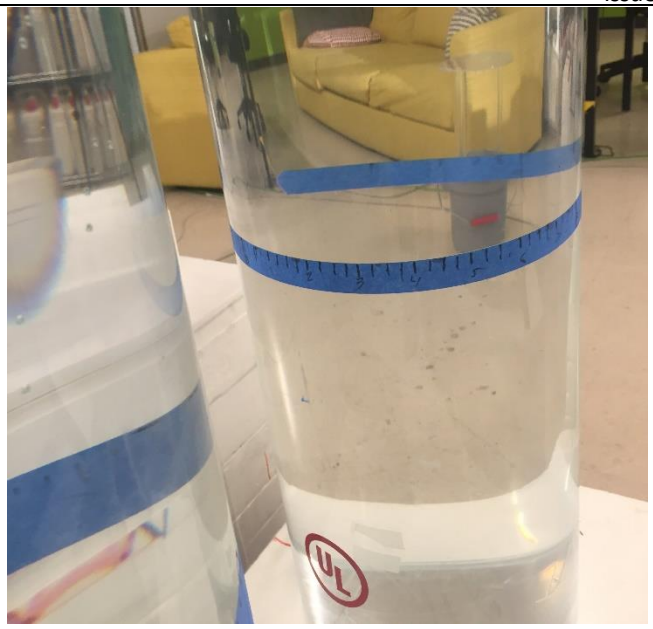


Figure 85. Dual Phantom E-field Scan (SAR & Water) at 50 cm between Source and Client, 15 cm spacing

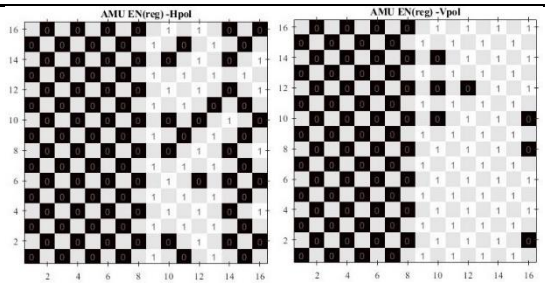
Test Scenario	Reference	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
72	Table 38	17.5	0.346	36 (H) + 57 (V) = 93 (36.3% ON)	

Table 38. Dual Phantom (SAR & Water) Single Point SAR, 1 m between Source and Client, 17.5 cm spacing

1 Meter Tx/Rx distance - Phantom 50cm to source, 17.5cm Offset		
cm offset	degrees	W/kg
-16.0	-61.12	0.018
-15.0	-57.30	0.019
-14.0	-53.48	0.022
-13.0	-49.66	0.031
-12.0	-45.84	0.039
-11.0	-42.02	0.047
-10.0	-38.20	0.051
-9.0	-34.38	0.044
-8.0	-30.56	0.038
-7.0	-26.74	0.029
-6.0	-22.92	0.035
-5.0	-19.10	0.037
-4.0	-15.28	0.042
-3.0	-11.46	0.045
-2.0	-7.64	0.064
-1.0	-3.82	0.087
0.0	0.00	0.116
1.0	3.82	0.160
2.0	7.64	0.185
3.0	11.46	0.174
4.0	15.28	0.157
5.0	19.10	0.144
6.0	22.92	0.173
7.0	26.74	0.222
8.0	30.56	0.269
9.0	34.38	0.314
10.0	38.20	**0.337**
11.0	42.02	**0.346**
12.0	45.84	**0.330**
13.0	49.66	0.201
14.0	53.48	0.248
15.0	57.30	0.238
16.0	61.12	0.213
17.0	64.94	0.236
18.0	68.75	0.234
19.0	72.57	0.142
20.0	76.39	0.134

10.8 Measurements with half-cylinder phantom

10.8.1 General

During KDB inquiry, it was thought possible artifacts with SAR setup and flat phantoms required construction of a new phantom, modelled on the "MedRadio" phantom as described in FCC KDB 617965, used in previous tests, but turned horizontally and the top half removed. It is a half-cylindrical Plexiglass container, measuring 30 cm in diameter, with sidewalls extending 10 cm in height and 76 cm in length, and a sidewall thickness of 0.635 cm, as depicted in Figure 86. Subsequent to these discussions, and contrary to initial indications, it was determined that 1g and whole-body SAR testing is not feasible with this phantom design due to spatial calibration issues with the SPEAG robot. Thus, only single-point SAR values are provided.

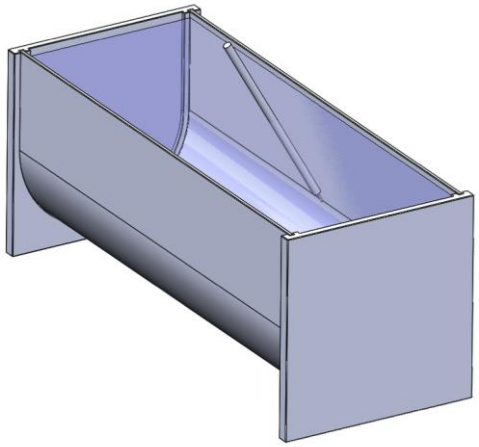


Figure 86 Half-cylinder phantom

10.8.2 Partial obstruction

This scenario is the same positioning as was determined the worst-case obstructed scenario, as described in section 10.5.4, with the WPT Client/Source distance of 50 cm and an offset of 22.5 cm, as depicted in Figure 87. Maximum Single-point SAR value is set out in

Table 39.

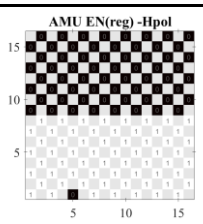
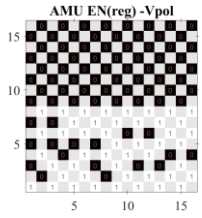
Test Scenario	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
73	22.5	0.479	96 (H) + 83 (V) = 179 (69.9% ON)	 

Table 39: Single-point SAR value - partial obstruction

Highest Peak SAR W/kg	
1	0.479

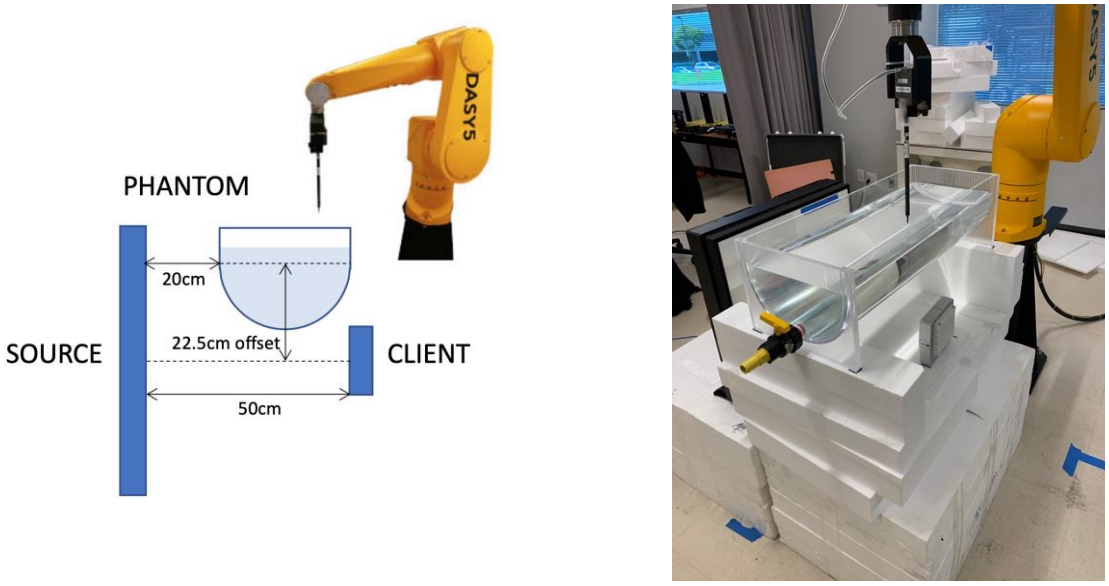


Figure 87: Half-cylinder phantom - partial obstruction

10.8.3 Client behind phantom

This scenario is the same scenario as described in section 10.6, with the phantom positioned immediately behind the WPT client, as set out in Figure 88. The maximum single-point SAR value is set out in Table 40.

Table 40: Half-cylinder phantom behind WPT Client - Single-point SAR values

Highest Peak SAR W/kg	
1	1.005

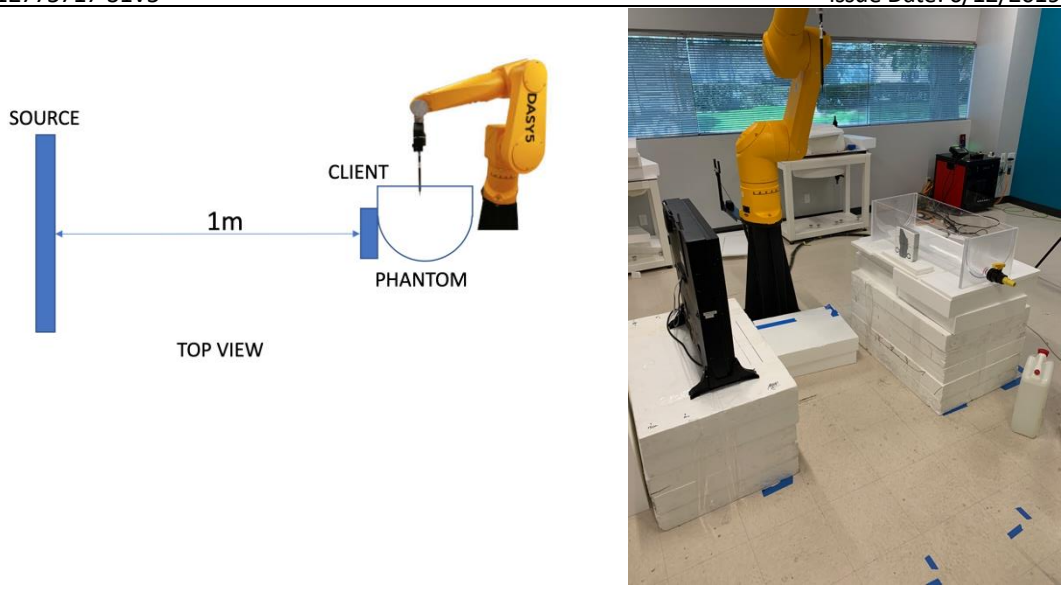


Figure 88: Half-cylinder phantom behind WPT client

We note that this single-point SAR value, i.e., 1.005 W/kg, differs from the single point SAR value of 0.356 W/kg recorded for a similar scenario detailed in section 10.6.4. Figure 89 shows the top view of both scenarios superimposed, showing both cylindrical (as in Section 10.6.4.) and half-cylindrical (described in section 10.8.1) phantoms. Because of its curved surface, the cylindrical phantom is positioned tangential to the client only along a narrow vertical line along the center of the client. Closer to the client edges, the cylindrical phantom is further away. As for half-cylindrical phantom, because of its large and wide flat surface, the phantom sidewall is immediately adjacent to the client over a much broader surface area. The half-cylindrical phantom is therefore exposed to significantly higher RF fields (which in turn results in higher single point SAR values) compared to the cylindrical phantom.

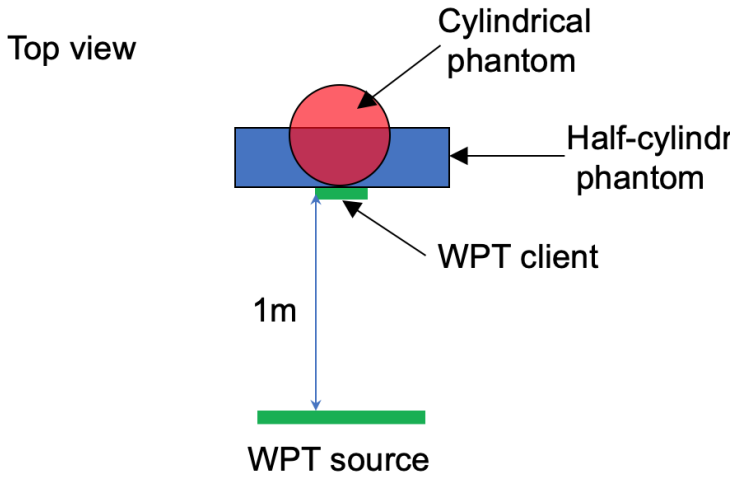


Figure 89 Top view of the scenario with phantom behind the client: Cylindrical phantom (as in Section 10.6.4.) and U-shaped phantom (as in Section 10.8.3)

11 Conducting the 1g-average SAR and whole-body average SAR for the worst-case scenario

11.1 Partial obstruction

In order to be able to measure the 1g-SAR and the whole-body SAR in the worst-case scenario identified in section 10.3, we replace the cylindrical phantom used in the tests described above with the "small box-shaped phantom," measuring 0.96 m x 0.233 m, as specified in IEC 62232. This phantom is placed such that we replicate the worst-case scenario described in section 10.3 as much as possible, as detailed in Figure 90. The measured value for 1 g average SAR for this scenario is 0.153 and whole-body SAR is 0.0027 W/kg. SAR plots are set out in Figure 92 and Figure 93.

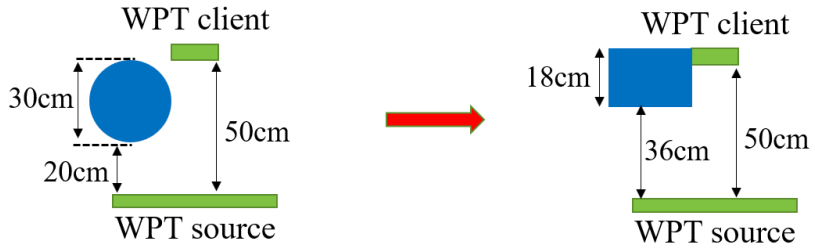


Figure 90 (Left image) The worst-case scenario with cylindrical phantom and (Right image) replicating the worst-case scenario with child phantom.

IEC 62232 requires a correction factor to be applied to whole-body and 1g average peak SAR measurements. The factor is determined according to the following formulas:

1g average peak SAR:

$$SAR_{PSA}(d) = SAR_m(d) \times CF_1(d) \times CF_2(d)$$

$$CF_1(d) = \begin{cases} 1 & d < 200\ \text{mm} \\ \dfrac{d}{200} & 200\ \text{mm} \le d < 400\ \text{mm} \\ 2 & 400\ \text{mm} \le d \le 1\,000\ \text{mm} \end{cases}$$

$$CF_2(d) = \begin{cases} 2 & d \le \dfrac{\lambda}{4} \quad \text{AND } N_e > 1 \\ -\dfrac{4d}{7\lambda} + \dfrac{15}{7} & \dfrac{\lambda}{4} < d < 2\lambda \quad \text{AND } N_e > 1 \\ 1 & d \ge 2\lambda \quad \text{OR } N_e = 1 \end{cases}$$

Where d (the distance from the phantom to WPT Source) = 360 mm and λ = 124 mm.

For these values, $CF_1(d)$ = 1.8 and $CF_2(d)$ = 1. The total correction factor [$CF_1(d)$ x $CF_2(d)$] is 1.8.

Whole body SAR:

$$SAR_{wb}(d) = \frac{P_A(d) \times CF_3(d) \times CF_4(f)}{M}$$

$P_A(d)$ is the average temporal absorbed power (watts) in the phantom measured at a distance *d*, the EUT distance (mm) measured from the liquid surface;

$CF3(d)$ is a correction factor to account for a possible increase in whole-body *SAR* due to a tissue layering effect defined by:

$$CF_3(d) = \begin{cases} 1 + \dfrac{0{,}8d}{400} & d < 400 \text{ mm} \\ 1{,}8 & d \geq 400 \text{ mm} \end{cases};$$

*CF*4(*f*) is a correction factor to compensate for a possible bias in the obtained general public whole-body *SAR* when assessed using the large box-shaped phantom for child exposure configurations. For frequencies between the data points a linear interpolation shall be used. For other exposure configurations and phantom type combinations, *CF*4(*f*) = 1;

M is the mass specified in IEC62232 representing the body. For general public exposure *M* = 12.5 kg.

As d is 360 mm $CF_3(d)$ = 1.72. $CF_4(f)$ = 1 as the large box shaped phantom was not used. The total correction factor is 1.72.

The corrected SAR values are 1g SAR = 0.311 W/kg and whole body SAR = 0.0050 W/kg. These values are well below the FCC's limits. Section 1.1310 of the FCC's rules define the general population limits for peak SAR averaged over any 1g of tissue as 1.6 W/kg and whole-body average SAR as 0.08 W/kg.

Table 41 Measured and corrected SAR values

	Measured value	Corrected value	Gen. pop. limits	Pass/Fail
1g SAR	0.153 W/kg	0.311 W/kg	1.6 W/kg	Pass
Whole-body SAR	0.0029 W/kg	0.0050 W/kg	0.08 W/kg	Pass

As the SAR peak was located at the edge of the phantom it was not appropriate to use the extrapolation methodology described in Section 4.2. The whole body SAR measured value was calculated by dividing the total absorbed power of 0.0367 W by 12.5 kg as described in IEC 62232 clause B.3.2.3.4. This test data should only be considered informative.

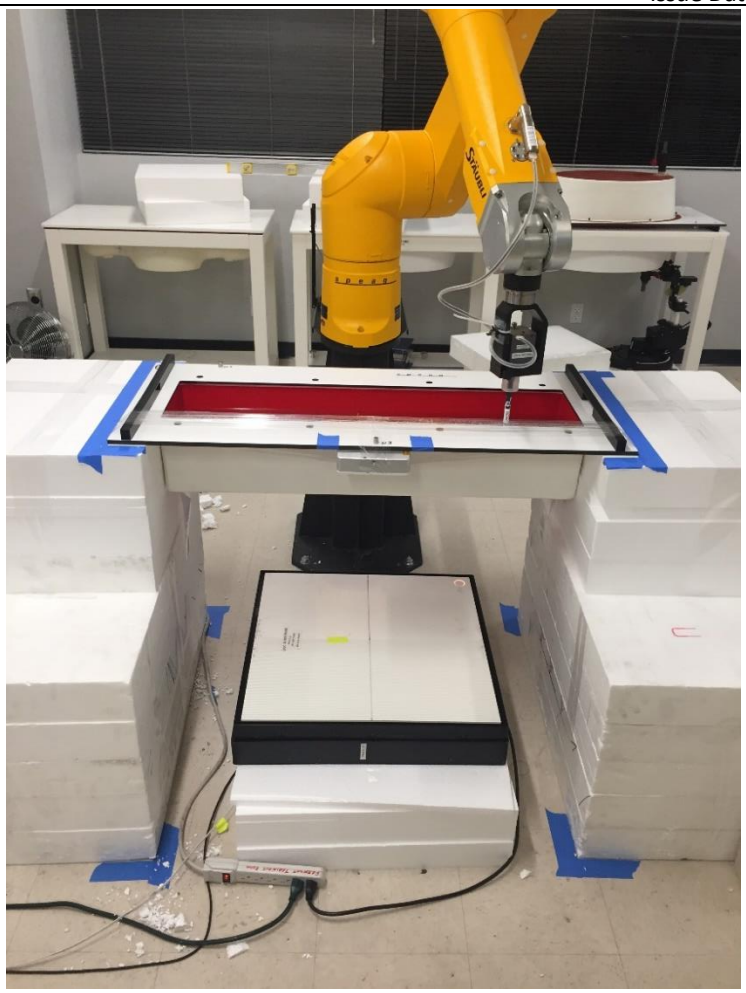
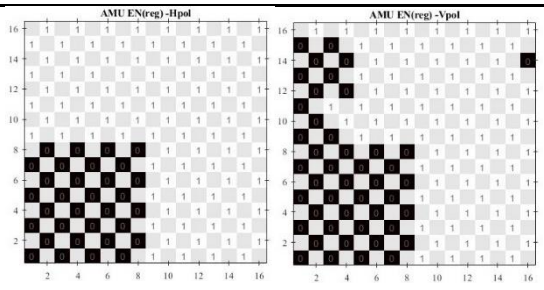


Figure 91 - SAR measurement test setup

Test Scenario	Figures	Phantom Offset (cm)	Max W/kg	Number of antenna elements (Horiz./ Vert.) ON (out of 256 Total)	Antenna map (dark squares = off)
74	Figure 92	22.5	0.153	96 (H) + 83 (V) = 179 (69.9% ON)	

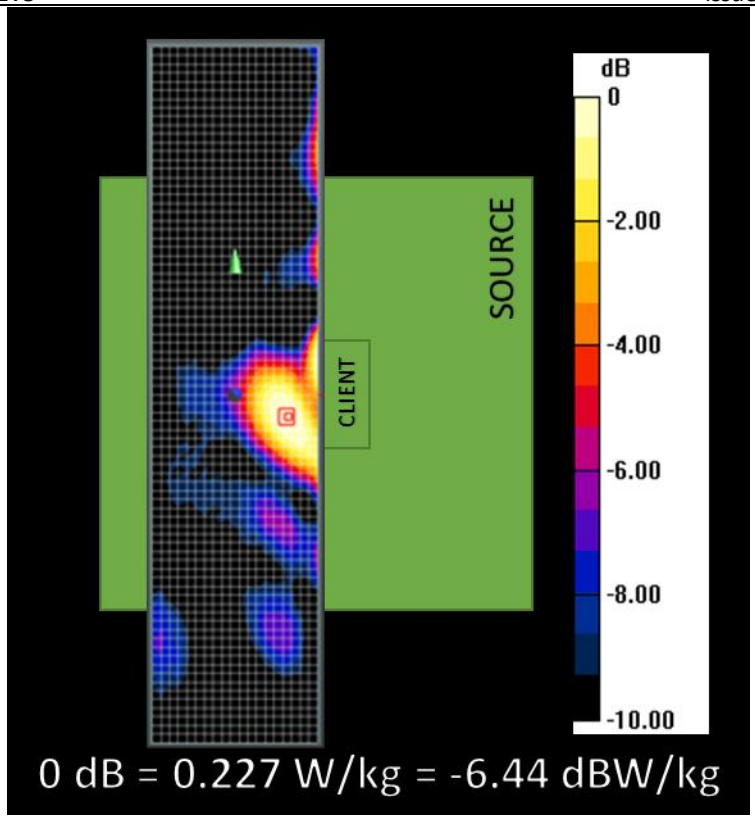


Figure 92. 1g SAR at 50 cm between Source and Client with 22.5 cm offset– Child Phantom (worst-case scenario)

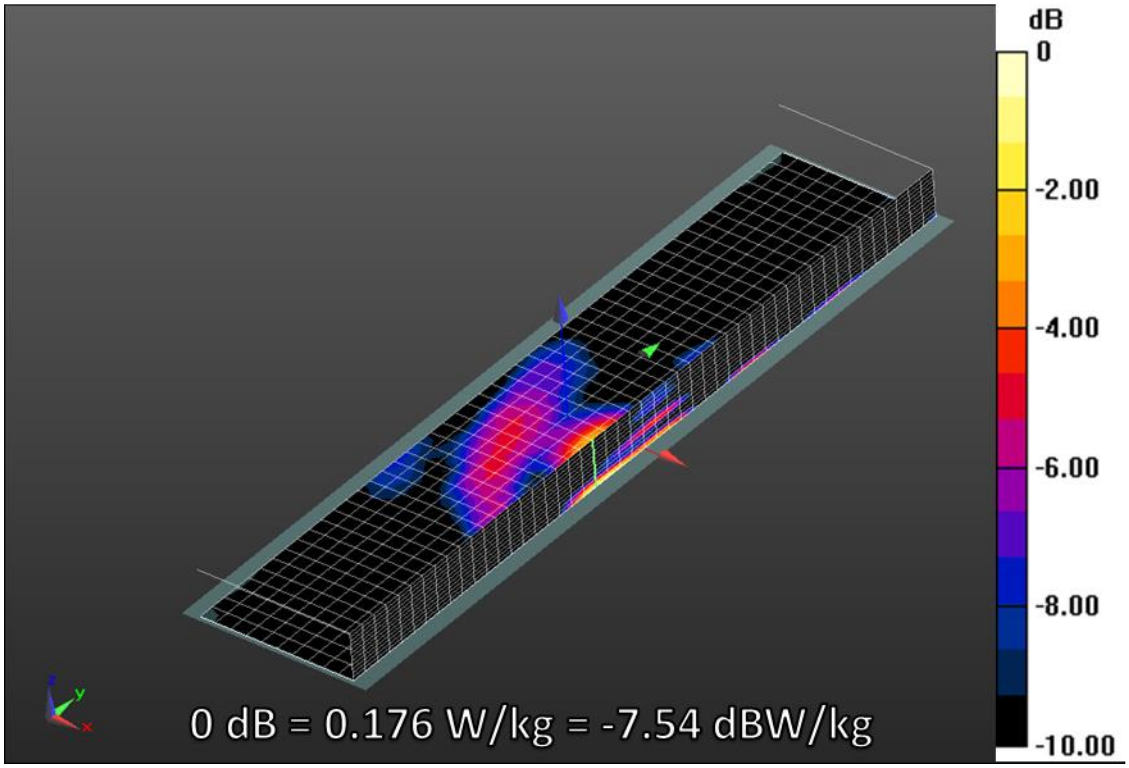


Figure 93. Volume Scan at 50 cm between Source and Client with 22.5 cm offset– Child Phantom

11.2 Phantom behind power client

Per OET request, we provide SAR values for phantom placement outside of 1 m. As utilized in the testing described in the previous section, the "small box-shaped phantom," measuring 0.96 m x 0.233 m and as specified in IEC 62232 was used. The phantom is placed behind the client, relative to the power source, as pictured in Figure 94, with the client 90 cm from the WPT Source. The 90 cm distance was used, instead of the 1 m distance described section 10.2, because the position of the SAR robot relative to the floor would not allow higher placement of the phantom. The test setup is shown in Figure 94.

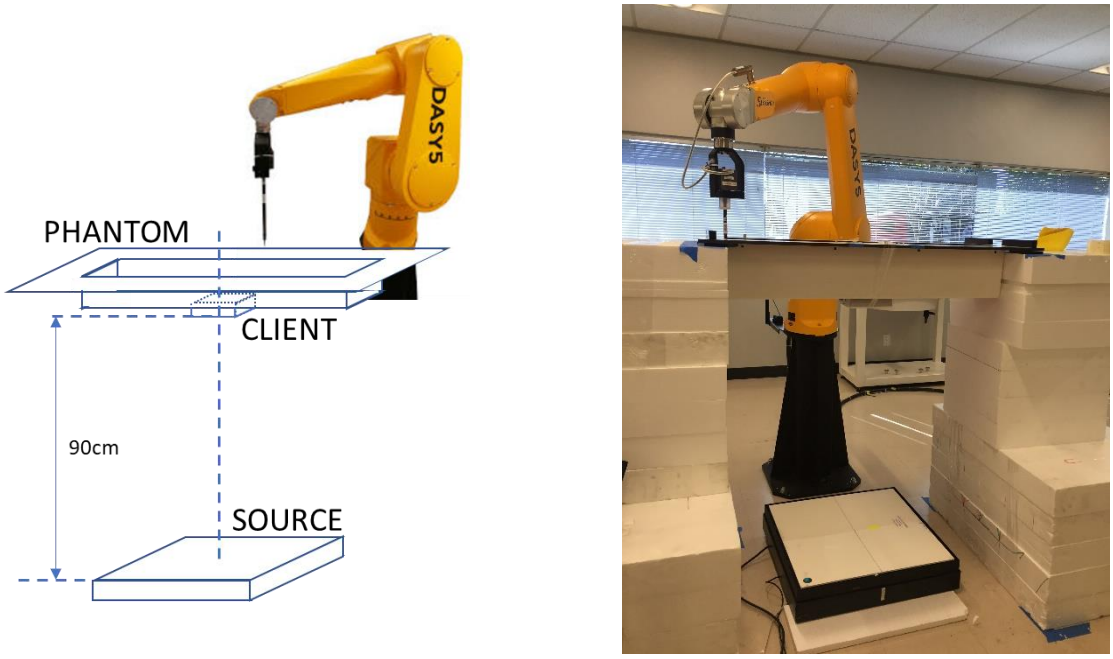


Figure 94 - SAR measurement test setup

IEC 62232 requires a correction factor to be applied to whole-body and 1g average peak SAR measurements. The factor is determined according to the following formulas:

1g average peak SAR:

$$SAR_{PSA}(d) = SAR_m(d) \times CF_1(d) \times CF_2(d)$$

$$CF_1(d) = \begin{cases} 1 & d < 200\ \text{mm} \\ \frac{d}{200} & 200\ \text{mm} \le d < 400\ \text{mm} \\ 2 & 400\ \text{mm} \le d \le 1\,000\ \text{mm} \end{cases}$$

$$CF_2(d) = \begin{cases} 2 & d \le \frac{\lambda}{4} \quad \text{AND } N_e > 1 \\ -\frac{4d}{7\lambda} + \frac{15}{7} & \frac{\lambda}{4} < d < 2\lambda \quad \text{AND } N_e > 1 \\ 1 & d \ge 2\lambda \quad \text{OR } N_e = 1 \end{cases}$$

Where d (the distance from the phantom to WPT Source) = 900 mm and λ = 124 mm.

For these values, $CF_1(d) = 2$ and $CF_2(d) = 1$. The total correction factor $[CF_1(d) \times CF_2(d)]$ is 2.

Whole body SAR:

$$SAR_{wb}(d) = \frac{P_A(d) \times CF_3(d) \times CF_4(f)}{M}$$

$P_A(d)$ is the average temporal absorbed power (watts) in the phantom measured at a distance d, the EUT distance (mm) measured from the liquid surface;

$CF_3(d)$ is a correction factor to account for a possible increase in whole-body *SAR* due to a tissue layering effect defined by:

$$CF_3(d) = \begin{cases} 1 + \frac{0{,}8d}{400} & d < 400 \text{ mm} \\ 1{,}8 & d \geq 400 \text{ mm} \end{cases};$$

$CF_4(f)$ is a correction factor to compensate for a possible bias in the obtained general public whole-body *SAR* when assessed using the large box-shaped phantom for child exposure configurations. For frequencies between the data points a linear interpolation shall be used. For other exposure configurations and phantom type combinations, $CF4(f) = 1$;

M is the mass specified in IEC62232 representing the body. For general public exposure M = 12.5 kg.

As d is 900 mm $CF_3(d)$ = 1.8. $CF_4(f)$ = 1 as the large box shaped phantom was not used. The total correction factor is 1.8.

The corrected SAR values are 1g SAR = 1.426 W/kg and whole body SAR = 0.0591 W/kg. These values are below the FCC's limits. 47 CFR § 1.1310 defines the general population limits for peak SAR averaged over any 1g of tissue as 1.6 W/kg and whole-body average SAR as 0.08 W/kg.

Table 42 Measured and corrected SAR values

	Measured value	Corrected value	Gen. pop. limits	Pass/Fail
1g SAR	0.631 W/kg	1.426 W/kg	1.6 W/kg	Pass
Whole-body SAR[1]	0.0523 W/kg	0.0591 W/kg	0.08 W/kg	Pass

Note 1. The test equipment reports the Whole Body SAR result with the $CF_3(d)$ included for a value of d >400 mm. The whole body corrected value in table 42 is corrected for power scaling only.

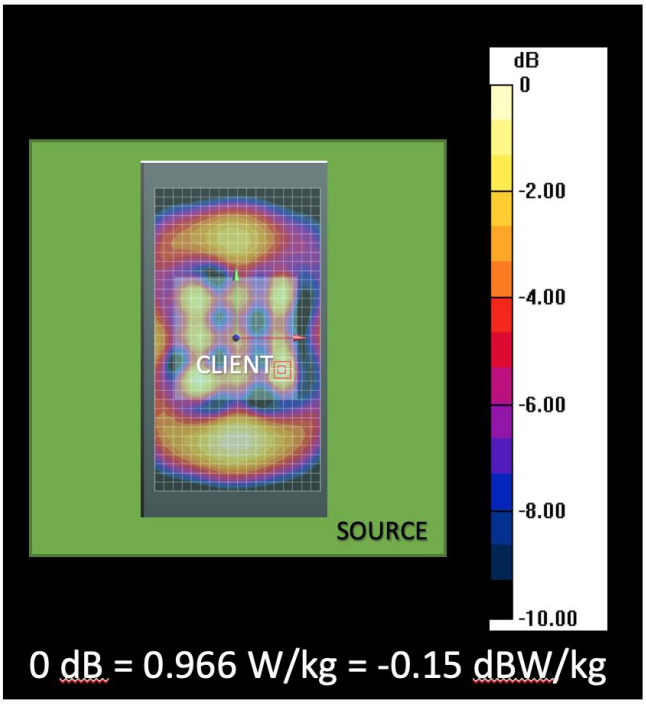


Figure 95: 1g SAR scan with phantom placed behind WPT client

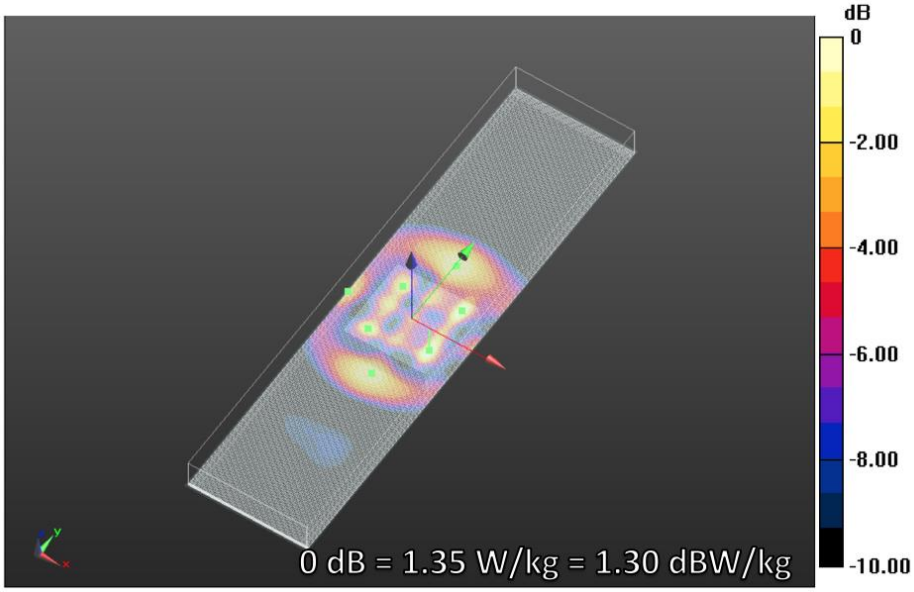


Figure 96: Volume scan with phantom placed behind WPT client

Appendixes

Refer to separated files for the following appendixes.

Appendix A: SAR System Check Plots

Appendix B: SAR Probe Certificates

Appendix C: SAR Dipole Certificates

Appendix D: SAR Tissue Ingredients

Appendix E: Test Case Summary Table

Appendix F: SAR Plot and Volume Scan

Appendix G: E-Field Plots

END OF REPORT