SAR TEST REPORT

The following samples were submitted and identified on behalf of the client as:

Equipment Under Test	Tablet
Brand Name	hp
Model No.	HSTNH-I508OC
Company Name	Hewlett-Packard Company
Company Address	Hewlett-Packard Company, 16399 West Bernardo Dr. , San Diego, CA 92127, USA
Standards	IEEE /ANSI C95.1 , C95.3, IEEE 1528, KDB248227 D01, KDB616217 D04, KDB865664 D01, KDB865664 D02, KDB941225 D01, KDB941225 D02, KDB941225 D03, KDB447498 D01
FCC ID	B94HHI508OC
Date of Receipt	Nov. 18, 2014
Date of Test(s)	Nov. 24, 2014 ~ Dec. 10, 2014
Date of Issue	Dec. 22, 2014

In the configuration tested, the EUT complied with the standards specified above.

Remarks:

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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Signed on behalf of SGS

Engineer	**Sr. Engineer**
Mason Wu Mason Wu	**John Yeh** John Yeh
Date: Dec. 22, 2014	**Date: Dec. 22, 2014**

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Version

Report Number	Revision	Date	Memo
EN/2014/B0020	00	2014/12/15	Initial creation of test report.
EN/2014/B0020	01	2014/12/22	1st modification

This test report contains a reference to the previous version test report that it replaces.

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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan	
Tel	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

1.2 Details of Applicant

Company Name	Hewlett-Packard Company
Company Address	Hewlett-Packard Company, 16399 West Bernardo Dr. , San Diego, CA 92127, USA

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1.3 Description of EUT

Equipment Under Test	Tablet	
Brand Name	hp	
Model No.	HSTNH-I508OC	
FCC ID	B94HHI508OC	
Mode of Operation	☒GPRS ☒EDGE ☒WCDMA ☒HSDPA ☒HSUPA ☒HSPA+ ☒WLAN802.11 a/b/g/n(20M/40M) ☒Bluetooth	
Duty Cycle	GPRS	1/2 (1Dn4UP) 1/2.76 (1Dn3UP) 1/4.1 (1Dn2UP) 1/8.3 (1Dn1UP)
	EDGE	1/2 (1Dn4UP) 1/2.76 (1Dn3UP) 1/4.1 (1Dn2UP) 1/8.3 (1Dn1UP)
	WCDMA	1
	WLAN802.11 a/b/g/n(20M/40M)	1
	Bluetooth	1

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TX Frequency Range (MHz)	GPRS850	824.2	—	848.8
	GPRS1900	1850.2	—	1909.8
	WCDMA Band II	1852.4	—	1907.6
	WCDMA Band IV	1712.4	—	1752.6
	WCDMA Band V	826.4	—	846.6
	WLAN802.11 b/g/n(20M)	2412	—	2462
	WLAN802.11 a 5.2G	5180	—	5240
	WLAN802.11 n (20M) 5.2G	5180	—	5240
	WLAN802.11 n (40M) 5.2G	5190	—	5230
	WLAN802.11 a 5.3G	5260	—	5320
	WLAN802.11 n (20M) 5.3G	5260	—	5320
	WLAN802.11 n (40M) 5.3G	5270	—	5310
	WLAN802.11 a 5.6G	5500	—	5700
	WLAN802.11 n (20M) 5.6G	5500	—	5700
	WLAN802.11 n (40M) 5.6G	5510	—	5670
	WLAN802.11 a 5.8G	5745	—	5825
	WLAN802.11 n (20M) 5.8G	5745	—	5825
	WLAN802.11 n (40M) 5.8G	5755	—	5795
	Bluetooth	2402	—	2480

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Channel Number (ARFCN)	GPRS850	128	—	251
	GPRS1900	512	—	810
	WCDMA Band II	9262	—	9538
	WCDMA Band IV	1312	—	1513
	WCDMA Band V	4132	—	4233
	WLAN802.11 b/g/n(20M)	1	—	11
	WLAN802.11 a 5.2G	36	—	48
	WLAN802.11 n (20M) 5.2G	36	—	48
	WLAN802.11 n (40M) 5.2G	38	—	46
	WLAN802.11 a 5.3G	52	—	64
	WLAN802.11 n (20M) 5.3G	52	—	64
	WLAN802.11 n (40M) 5.3G	54	—	62
	WLAN802.11 a 5.6G	100	—	140
	WLAN802.11 n (20M) 5.6G	100	—	140
	WLAN802.11 n (40M) 5.6G	102	—	134
	WLAN802.11 a 5.8G	149	—	165
	WLAN802.11 n (20M) 5.8G	149	—	165
	WLAN802.11 n (40M) 5.8G	151	—	159
	Bluetooth	0	—	78

Max. SAR (1 g) (Unit: W/Kg)				
Band	Measured	Reported	Channel	Position
GPRS 850	0.659	0.869	251	Back side
GRPS 1900	0.267	0.336	512	Left side
WCDMA Band II	0.969	1.045	9400	Back side
WCDMA Band IV	0.861	0.91	1312	Back side*
WCDMA Band V	1.04	1.213	4183	Back side

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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Max. SAR (1 g) (Unit: W/Kg)					
Antenna	Band	Measured	Reported	Channel	Position
Main	WLAN802.11 b	1.03	1.052	1	Top side
	WLAN802.11 n(20M)	0.679	0.696	6	Top side
	WLAN802.11 a 5.2G	1.26	1.322	44	Back side
	WLAN802.11 n(40M) 5.2G	1.13	1.175	46	Back side
	WLAN802.11 a 5.3G	1.4	1.429	60	Back side
	WLAN802.11 n(40M) 5.3G	1.33	1.409	62	Back side
	WLAN802.11 a 5.6G	1.31	1.536	100	Back side
	WLAN802.11 n(40M) 5.6G	1.24	1.287	102	Back side
	WLAN802.11 a 5.8G	1.18	1.513	165	Back side
	WLAN802.11 n(40M) 5.8G	0.951	1.012	159	Back side
Aux	WLAN802.11 b	1.28	1.307	6	Back side*
	WLAN802.11 n(20M)	0.763	0.767	1	Back side
	WLAN802.11 a 5.2G	0.871	1.274	44	Back side*
	WLAN802.11 n(40M) 5.2G	0.78	0.789	38	Back side
	WLAN802.11 a 5.3G	0.857	1.271	52	Back side*
	WLAN802.11 n(40M) 5.3G	0.959	0.972	54	Back side
	WLAN802.11 a 5.6G	0.684	1.019	136	Back side
	WLAN802.11 n(40M) 5.6G	0.726	0.753	134	Back side
	WLAN802.11 a 5.8G	0.608	0.628	161	Back side
	WLAN802.11 n(40M) 5.8G	0.58	0.588	151	Back side

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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GPRS/EDGE conducted power table:

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			33.5	31	29.5	28
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 850 (GMSK)	824.2	128	31.80	29.60	28.00	26.60
	836.6	190	31.80	29.70	28.20	26.70
	848.8	251	31.90	29.70	28.20	26.80
Source-based time average power						
GPRS 850 (GMSK)	824.2	128	22.77	23.58	23.74	23.59
	836.6	190	22.77	23.68	23.94	23.69
	848.8	251	22.87	23.68	23.94	23.79
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			28	25.5	24	22.5
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850	824.2	128	26.20	23.80	22.40	20.90
	836.6	190	26.30	23.80	22.40	20.90
	848.8	251	26.40	23.90	22.50	21.00
Source-based time average power						
EDGE 850	824.2	128	17.17	17.78	18.14	17.89
	836.6	190	17.27	17.78	18.14	17.89
	848.8	251	17.37	17.88	18.24	17.99
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			30.5	28	26.5	25
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 1900 (GMSK)	1850.2	512	29.70	27.00	25.50	24.10
	1880	661	29.60	27.00	25.40	24.00
	1909.8	810	29.50	26.90	25.40	24.00
Source-based time average power						
GPRS 1900 (GMSK)	1850.2	512	20.67	20.98	21.24	21.09
	1880	661	20.57	20.98	21.14	20.99
	1909.8	810	20.47	20.88	21.14	20.99
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			27	24.5	23	21.5
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900	1850.2	512	26.10	23.60	22.20	20.60
	1880	661	26.00	23.50	22.00	20.50
	1909.8	810	25.90	23.50	22.00	20.40
Source-based time average power						
EDGE 1900	1850.2	512	17.07	17.58	17.94	17.59
	1880	661	16.97	17.48	17.74	17.49
	1909.8	810	16.87	17.48	17.74	17.39
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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GPRS 850 / EDGE 850 /GPRS 1900 / EDGE 1900 conducted power table (Reduced power):

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			27.5	24.5	22.5	21.5
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 850 (GMSK)	824.2	128	26.10	23.20	21.20	20.10
	836.6	190	26.10	23.20	21.30	20.20
	848.8	251	26.20	23.30	21.30	20.30
Source-based time average power						
GPRS 850 (GMSK)	824.2	128	17.07	17.18	16.94	17.09
	836.6	190	17.07	17.18	17.04	17.19
	848.8	251	17.17	17.28	17.04	17.29
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			26.5	23.5	21.5	20.5
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 850	824.2	128	25.20	22.40	20.30	19.30
	836.6	190	25.20	22.40	20.40	19.40
	848.8	251	25.30	22.40	20.40	19.40
Source-based time average power						
EDGE 850	824.2	128	16.17	16.38	16.04	16.29
	836.6	190	16.17	16.38	16.14	16.39
	848.8	251	16.27	16.38	16.14	16.39
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			22	19	17	16
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS 1900 (GMSK)	1850.2	512	20.60	17.80	15.70	14.60
	1880	661	20.50	17.70	15.60	14.50
	1909.8	810	20.40	17.60	15.50	14.40
Source-based time average power						
GPRS 1900 (GMSK)	1850.2	512	11.57	11.78	11.44	11.59
	1880	661	11.47	11.68	11.34	11.49
	1909.8	810	11.37	11.58	11.24	11.39
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

Burst average power						
Max. Rated Avg. Power + Max. Tolerance (dBm)			21	18	16	15
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
EDGE 1900	1850.2	512	20.10	17.10	15.20	14.10
	1880	661	20.00	17.00	15.10	14.00
	1909.8	810	19.90	16.90	15.00	13.90
Source-based time average power						
EDGE 1900	1850.2	512	11.07	11.08	10.94	11.09
	1880	661	10.97	10.98	10.84	10.99
	1909.8	810	10.87	10.88	10.74	10.89
The division factor compared to the number of TX time slot						
Division factor			1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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WCDMA Band II / Band IV / Band V - HSDPA / HSUPA/ HSDPA+ conducted power table:

Band	CH	Max. Rated Avg. Power + Max. Tolerance (dBm)	Rel99 AV(dBm)	HSDPA mode AV(dBm)				HSUPA mode AV(dBm)					HSPA+ mode AV(dBm)				
				SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band II Rel 7	9262	24.5	23.08	22.01	22.96	21.53	21.6	23.00	20.97	21.48	21.10	21.86	23.01	20.99	21.98	21.10	22.81
	9400	24.5	23.12	22.04	22.98	21.48	21.49	23.10	21.15	21.60	21.20	22.03	23.09	21.13	22.08	21.17	22.94
	9538	24.5	23.17	22.12	23.02	21.45	21.57	23.11	21.09	21.63	21.13	22.09	23.12	21.11	22.13	21.15	22.98
WCDMA Band IV Rel 7	1312	24.5	23.48	22.39	23.36	21.91	21.98	23.40	21.37	21.88	21.50	22.24	23.41	21.39	22.38	21.50	23.21
	1412	24.5	23.25	22.21	23.11	21.65	21.66	23.23	21.28	21.73	21.33	22.11	23.22	21.26	22.21	21.30	23.07
	1513	24.5	23.18	22.09	23.03	21.42	21.54	23.12	21.10	21.64	21.14	22.00	23.13	21.12	22.14	21.16	22.99
WCDMA Band V Rel 7	4132	24.5	22.75	22.27	22.68	21.60	21.65	22.71	20.73	21.21	20.78	21.59	22.72	20.75	21.70	20.78	22.53
	4183	24.5	22.80	22.29	22.69	21.67	21.71	22.73	20.74	21.22	20.80	21.68	22.72	20.74	21.72	20.80	22.49
	4233	24.5	22.68	22.17	22.55	21.80	21.86	22.60	20.56	21.10	20.62	21.51	22.59	20.56	21.58	20.62	22.41

HSDPA

SUB-TEST	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1, Note 2)*	CM (dB) *(Note 3)*	MPR (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

HSUPA

SUB-TEST	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1)*	β_{ec}	β_{ed} *(Note 5) (Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB) (Note 2)*	MPR *(dB) (Note 2)*	*AG Index (Note 6)*	*E-TFCI*
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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WCDMA Band II / Band IV / Band V - HSDPA / HSUPA / HSPA+ conducted power table (Reduced power) :

Band	CH	Max. Rated Avg. Power + Max. Tolerance (dBm)	Rel99 AV(dBm)	HSDPA mode AV(dBm)				HSUPA mode AV(dBm)					HSPA+ mode AV(dBm)				
				SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band II Rel 7	9262	16	15.61	15.48	15.49	15	15.07	15.53	13.50	14.51	13.63	15.41	15.54	13.52	14.51	13.63	15.34
	9400	16	15.67	15.50	15.53	14.94	14.95	15.65	13.70	14.65	13.75	15.34	15.64	13.68	14.63	13.72	15.49
	9538	16	15.60	15.37	15.45	14.70	14.82	15.54	13.52	14.56	13.56	15.27	15.55	13.54	14.56	13.58	15.41
WCDMA Band IV Rel 7	1312	17	16.76	16.61	16.64	16.13	16.2	16.68	14.65	15.66	14.78	16.53	16.69	14.67	15.66	14.78	16.49
	1412	17	16.71	16.48	16.57	15.92	15.93	16.69	14.74	15.69	14.79	16.38	16.68	14.72	15.67	14.76	16.53
	1513	17	16.51	16.42	16.36	15.75	15.87	16.45	14.43	15.47	14.47	16.28	16.46	14.45	15.47	14.49	16.32
WCDMA Band V Rel 7	4132	19	18.20	18.04	18.13	17.37	17.42	18.16	16.18	17.16	16.23	18.00	18.17	16.20	17.15	16.23	17.98
	4183	19	18.33	18.11	18.22	17.49	17.53	18.26	16.27	17.25	16.33	18.04	18.25	16.27	17.25	16.33	18.02
	4233	19	18.20	18.01	18.07	17.64	17.70	18.12	16.08	17.12	16.14	17.94	18.11	16.08	17.10	16.14	17.93

HSDPA

SUB-TEST	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1, Note 2)*	CM (dB) *(Note 3)*	MPR (dB) *(Note 3)*
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

HSUPA

SUB-TEST	β_c	β_d	β_d *(SF)*	β_c/β_d	β_{HS} *(Note1)*	β_{ec}	β_{ed} *(Note 5) (Note 6)*	β_{ed} *(SF)*	β_{ed} *(Codes)*	CM *(dB) (Note 2)*	MPR *(dB) (Note 2)*	*AG Index (Note 6)*	*E-TFCI*
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	$\beta_{ed}1$: 47/15 $\beta_{ed}2$: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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#. WLAN802.11 a/b/g/n(20M/40M) conducted power table:

Band \ Antenna	SISO		MIMO
	Chain 0	Chain 1	Chain0+1
WLAN802.11b	V	V	—
WLAN802.11g	V	V	—
WLAN802.11n(20M)	V	V	V
WLAN802.11a	V	V	—
WLAN802.11n(20M) 5G	V	V	V
WLAN802.11n(40M) 5G	V	V	V

Main Antenna (CH0)

802.11 b		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)			
CH	Frequency (MHz)		Data Rate (Mbps)			
			1	2	5.5	11
1	2412	17	16.91	16.89	16.87	16.86
6	2437	17	16.96	16.94	16.93	16.91
11	2462	17	16.71	16.68	16.66	16.65

802.11 g		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
1	2412	10.5	10.46	10.35	10.18	10.06	9.85	9.64	9.37	9.11
6	2437	10.5	10.48	10.39	10.28	10.12	9.91	9.69	9.41	9.17
11	2462	10.5	10.35	10.22	10.09	9.97	9.76	9.53	9.26	9.04

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Main Antenna (CH0)

802.11 n (20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6.5	13	19.5	26	39	52	58.5	65
1	2412	15.5	15.47	15.30	15.11	14.93	14.74	14.56	14.39	14.27
6	2437	15.5	15.39	15.20	15.01	14.83	14.65	14.48	14.30	14.21
11	2462	15.5	15.33	15.16	14.97	14.80	14.61	14.43	14.25	14.02

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Main Antenna (CH0)

802.11 a 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
36	5180	12.5	12.30	12.18	12.01	11.83	11.63	11.43	11.25	11.07
40	5200	12.5	12.39	12.23	12.06	11.89	11.73	11.57	11.38	11.23
44	5220	12.5	12.29	12.09	11.95	11.79	11.65	11.51	11.31	11.16
48	5240	12.5	12.20	12.07	11.87	11.72	11.59	11.41	11.23	11.03
52	5260	12.5	12.45	12.30	12.18	11.99	11.81	11.64	11.52	11.36
56	5280	12.5	12.26	12.13	11.98	11.86	11.66	11.49	11.37	11.25
60	5300	12.5	12.41	12.29	12.13	11.97	11.81	11.63	11.46	11.26
64	5320	12.5	12.19	12.01	11.85	11.71	11.53	11.37	11.20	11.04
100	5500	13	12.31	12.06	11.92	11.75	11.62	11.48	11.35	11.16
104	5520	13	12.27	12.11	11.96	11.82	11.64	11.52	11.38	11.23
108	5540	13	12,29	12.17	12.05	11.89	11.77	11.63	11.48	11.35
112	5560	13	12.22	12.04	11.90	11.76	11.58	11.44	11.26	11.13
116	5580	13	12.42	12.28	12.15	11.99	11.79	11.59	11.40	11.28
132	5660	13	12.27	12.09	11.89	11.77	11.64	11.47	11.29	11.14
136	5680	13	12.29	12.17	12.01	11.88	11.71	11.56	11.43	11.27
140	5700	13	12.31	12.15	11.99	11.85	11.72	11.59	11.42	11.27
149	5745	13.5	12.29	12.10	11.95	11.75	11.61	11.44	11.29	11.15
153	5765	13.5	12.25	12.06	11.93	11.78	11.66	11.50	11.33	11.13
157	5785	13.5	12.45	12.30	12.11	11.99	11.82	11.63	11.45	11.31
161	5805	13.5	12.36	12.19	12.02	11.84	11.71	11.57	11.45	11.32
165	5825	13.5	12.42	12.23	12.06	11.94	11.78	11.61	11.49	11.34

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Main Antenna (CH0)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6.5	13	19.5	26	39	52	58.5	65
36	5180	12	11.95	11.77	11.57	11.42	11.20	11.04	10.84	10.69
40	5200	12	11.96	11.79	11.60	11.39	11.22	11.00	10.80	10.59
44	5220	12	11.89	11.74	11.56	11.34	11.14	10.95	10.74	10.55
48	5240	12	11.85	11.69	11.54	11.35	11.14	10.98	10.83	10.68
52	5260	12	11.94	11.73	11.53	11.31	11.12	10.92	10.75	10.57
56	5280	12	11.76	11.58	11.37	11.18	11.01	10.83	10.67	10.51
60	5300	12	11.88	11.73	11.55	11.39	11.24	11.07	10.85	10.64
64	5320	12	11.93	11.75	11.58	11.39	11.19	10.97	10.82	10.64
100	5500	12	11.86	11.71	11.54	11.38	11.19	10.99	10.83	10.63
104	5520	12	11.91	11.74	11.57	11.41	11.23	11.08	10.91	10.71
108	5540	12	11.90	11.68	11.49	11.32	11.12	10.90	10.74	10.56
112	5560	12	11.72	11.56	11.40	11.19	11.04	10.87	10.66	10.50
116	5580	12	11.84	11.65	11.48	11.31	11.10	10.92	10.70	10.55
132	5660	12	11.95	11.74	11.54	11.35	11.18	10.98	10.77	10.57
136	5680	12	11.96	11.76	11.60	11.44	11.24	11.04	10.89	10.70
140	5700	12	11.82	11.67	11.46	11.25	11.10	10.89	10.71	10.51
149	5745	12	11.80	11.61	11.43	11.21	11.01	10.82	10.62	10.42
153	5765	12	11.76	11.57	11.40	11.19	11.01	10.79	10.62	10.45
157	5785	12	11.70	11.53	11.31	11.10	10.95	10.75	10.54	10.34
161	5805	12	11.97	11.78	11.57	11.37	11.15	10.97	10.80	10.62
165	5825	12	11.87	11.70	11.55	11.40	11.20	11.05	10.84	10.69

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Main Antenna (CH0)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			13.5	27	40.5	54	81	108	121.5	135
38	5190	12	11.94	11.64	11.37	11.07	10.81	10.48	10.17	9.84
46	5230	12	11.83	11.51	11.21	10.88	10.61	10.28	10.01	9.87
54	5270	12	11.91	11.64	11.32	11.05	10.78	10.45	10.19	9.90
62	5310	12	11.75	11.43	11.11	10.85	10.52	10.26	9.96	9.67
102	5510	12	11.84	11.53	11.21	10.88	10.58	10.31	10.04	9.73
110	5550	12	11.97	11.66	11.39	11.12	10.85	10.52	10.25	9.95
134	5670	12	11.92	11.59	11.30	10.98	10.69	10.43	10.17	9.95
151	5755	12	11.85	11.56	11.24	10.98	10.67	10.41	10.12	9.85
159	5795	12	11.73	11.40	11.10	10.82	10.51	10.20	9.94	9.64

#. Per FCC KDB443999, transmission on channels which overlap the 5600-5650 MHz is prohibited as a client.

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Aux Antenna (CH1)

802.11 b		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)			
CH	Frequency (MHz)		Data Rate (Mbps)			
			1	2	5.5	11
1	2412	17	16.88	16.84	16.81	16.75
6	2437	17	16.93	16.88	16.82	16.79
11	2462	17	16.91	16.86	16.80	16.77

802.11 g		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6	9	12	18	24	36	48	54
1	2412	10.5	10.43	10.29	10.16	10.04	9.88	9.71	9.56	9.34
6	2437	10.5	10.36	10.21	10.08	9.91	9.77	9.59	9.39	9.22
11	2462	10.5	10.32	10.16	10.03	9.85	9.66	9.43	9.18	9.06

802.11 n (20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6.5	13	19.5	26	39	52	58.5	65
1	2412	15.5	15.48	15.30	15.11	14.93	14.75	14.56	14.37	14.15
6	2437	15.5	15.39	15.21	15.02	14.84	14.65	14.46	14.27	14.04
11	2462	15.5	15.46	15.28	15.10	14.89	14.67	14.44	14.24	13.96

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Aux Antenna (CH1)

802.11 a 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
36	5180	14	12.25	12.07	11.88	11.70	11.55	11.40	11.19	11.01
40	5200	14	12.33	12.15	11.95	11.78	11.58	11.37	11.15	10.95
44	5220	14	12.35	12.16	12.01	11.84	11.66	11.46	11.25	11.06
48	5240	14	12.35	12.17	12.02	11.81	11.59	11.43	11.24	11.04
52	5260	14	12.29	12.09	11.92	11.76	11.56	11.40	11.23	11.05
56	5280	14	12.25	12.03	11.81	11.66	11.47	11.30	11.11	10.95
60	5300	14	12.39	12.18	12.00	11.79	11.59	11.44	11.25	11.05
64	5320	14	12.27	12.10	11.95	11.76	11.59	11.40	11.22	11.03
100	5500	14	12.38	12.19	12.00	11.85	11.64	11.48	11.30	11.12
104	5520	14	12.31	12.15	11.96	11.79	11.60	11.43	11.28	11.08
108	5540	14	12.26	12.09	11.90	11.75	11.55	11.36	11.21	11.03
112	5560	14	12.40	12.21	12.05	11.83	11.64	11.48	11.27	11.11
116	5580	14	12.49	12.28	12.10	11.90	11.70	11.54	11.38	11.19
132	5660	14	12.21	12.00	11.85	11.68	11.47	11.25	11.06	10.84
136	5680	14	12.27	12.11	11.89	11.72	11.53	11.31	11.12	10.95
140	5700	14	12.26	12.06	11.87	11.72	11.54	11.36	11.16	10.97
149	5745	12.5	12.31	12.15	12.00	11.82	11.62	11.44	11.24	11.03
153	5765	12.5	12.33	12.16	11.98	11.78	11.58	11.37	11.15	10.93
157	5785	12.5	12.44	12.22	12.05	11.84	11.62	11.41	11.19	10.98
161	5805	12.5	12.36	12.21	12.01	11.80	11.65	11.47	11.28	11.09
165	5825	12.5	12.22	12.05	11.88	11.71	11.52	11.35	11.16	11.01

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Aux Antenna (CH1)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6.5	13	19.5	26	39	52	58.5	65
36	5180	12	11.84	11.67	11.47	11.30	11.15	10.97	10.83	10.66
40	5200	12	11.92	11.78	11.63	11.42	11.27	11.12	10.91	10.74
44	5220	12	11.82	11.61	11.42	11.22	11.03	10.82	10.62	10.41
48	5240	12	11.78	11.59	11.39	11.21	11.00	10.83	10.69	10.48
52	5260	12	11.87	11.72	11.53	11.34	11.18	10.99	10.81	10.60
56	5280	12	11.88	11.70	11.51	11.37	11.21	11.03	10.89	10.72
60	5300	12	11.98	11.80	11.65	11.48	11.30	11.15	10.96	10.76
64	5320	12	11.91	11.75	11.56	11.40	11.24	11.06	10.89	10.72
100	5500	12	11.78	11.63	11.42	11.22	11.03	10.89	10.72	10.58
104	5520	12	11.71	11.57	11.40	11.23	11.06	10.86	10.69	10.53
108	5540	12	11.70	11.54	11.38	11.19	11.00	10.80	10.59	10.39
112	5560	12	11.85	11.71	11.54	11.40	11.19	11.01	10.82	10.64
116	5580	12	11.73	11.53	11.36	11.19	11.01	10.84	10.66	10.51
132	5660	12	11.83	11.67	11.46	11.31	11.16	11.00	10.81	10.60
136	5680	12	11.74	11.59	11.44	11.30	11.11	10.95	10.79	10.62
140	5700	12	11.91	11.75	11.58	11.43	11.25	11.11	10.90	10.69
149	5745	12	11.88	11.67	11.46	11.25	11.04	10.88	10.69	10.52
153	5765	12	11.89	11.68	11.49	11.31	11.16	10.96	10.77	10.63
157	5785	12	11.77	11.56	11.40	11.23	11.06	10.91	10.72	10.57
161	5805	12	11.90	11.75	11.54	11.36	11.22	11.01	10.84	10.70
165	5825	12	11.86	11.66	11.46	11.25	11.06	10.92	10.77	10.62

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Aux Antenna (CH1)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			13.5	27	40.5	54	81	108	121.5	135
38	5190	12	11.95	11.68	11.40	11.14	10.85	10.55	10.24	9.96
46	5230	12	11.88	11.58	11.28	10.99	10.67	10.40	10.11	9.81
54	5270	12	11.94	11.63	11.33	11.01	10.72	10.40	10.09	9.84
62	5310	12	11.84	11.58	11.33	11.02	10.77	10.45	10.14	9.86
102	5510	12	11.85	11.56	11.30	11.01	10.69	10.43	10.17	9.86
110	5550	12	11.75	11.45	11.17	10.85	10.56	10.30	10.04	9.75
134	5670	12	11.84	11.55	11.27	11.00	10.69	10.39	10.12	9.84
151	5755	12	11.94	11.69	11.44	11.18	10.93	10.64	10.33	10.06
159	5795	12	11.87	11.56	11.24	10.93	10.62	10.31	10.03	9.77

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MIMO (CH0 + CH1)

802.11 n(20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			13			26			39			52		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
1	2412	15.5	12.42	11.37	14.94	12.19	11.25	14.76	11.98	10.97	14.51	11.75	10.79	14.31
6	2437	15.5	12.51	11.15	14.89	12.18	10.93	14.61	11.86	10.71	14.33	11.54	10.48	14.05
11	2462	15.5	12.68	10.75	14.83	12.35	10.56	14.56	12.03	10.37	14.29	11.69	10.16	14.00

802.11 n(20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			78			104			117			130		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
1	2412	15.5	11.51	10.55	14.07	11.26	10.28	13.81	11.31	10.09	13.75	10.31	9.85	13.10
6	2437	15.5	11.21	10.24	13.76	10.88	10.02	13.48	10.54	9.78	13.19	10.23	9.55	12.91
11	2462	15.5	11.37	9.98	13.74	11.05	9.77	13.47	10.72	9.58	13.20	10.35	9.42	12.92

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MIMO (CH0 + CH1)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			13			26			39			52		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
36	5180	15	11.94	10.79	14.41	11.65	10.52	14.13	11.36	10.25	13.85	11.08	9.98	13.58
40	5200	15	11.85	10.66	14.31	11.60	10.39	14.05	11.35	10.14	13.80	11.09	9.87	13.53
44	5220	15	11.71	10.63	14.21	11.45	10.36	13.95	11.20	10.09	13.69	10.92	9.81	13.41
48	5240	15	11.91	10.81	14.41	11.65	10.55	14.15	11.38	10.29	13.88	11.09	10.04	13.61
52	5260	15	11.83	10.98	14.44	11.57	10.69	14.16	11.28	10.44	13.89	11.01	10.19	13.63
56	5280	15	11.82	10.63	14.28	11.56	10.37	14.02	11.30	10.12	13.76	11.05	9.84	13.50
60	5300	15	11.94	10.18	14.16	11.66	9.89	13.87	11.40	9.63	13.61	11.12	9.37	13.34
64	5320	15	11.40	11.01	14.22	11.15	10.72	13.95	10.87	10.47	13.68	10.60	10.20	13.41
100	5500	15	11.91	10.67	14.34	11.62	10.39	14.06	11.35	10.10	13.78	11.10	9.84	13.53
104	5520	15	11.81	10.59	14.25	11.53	10.33	13.98	11.24	10.08	13.71	10.98	9.82	13.45
108	5540	15	11.83	10.88	14.39	11.54	10.62	14.11	11.27	10.34	13.84	11.01	10.05	13.57
112	5560	15	11.91	11.05	14.51	11.66	10.76	14.24	11.41	10.47	13.98	11.16	10.21	13.72
116	5580	15	11.83	10.36	14.17	11.56	10.11	13.91	11.28	9.84	13.63	11.00	9.58	13.36
132	5660	15	11.88	10.35	14.19	11.59	10.08	13.91	11.32	9.79	13.63	11.07	9.51	13.37
136	5680	15	11.81	10.39	14.17	11.54	10.13	13.90	11.27	9.86	13.63	11.02	9.58	13.37
140	5700	15	11.79	10.48	14.19	11.51	10.21	13.92	11.25	9.93	13.65	11.00	9.64	13.38
149	5745	15	11.88	10.33	14.18	11.63	10.07	13.93	11.36	9.80	13.66	11.08	9.54	13.39
153	5765	15	11.97	10.76	14.42	11.72	10.47	14.15	11.47	10.22	13.90	11.20	9.96	13.63
157	5785	15	11.88	10.72	14.35	11.61	10.47	14.09	11.35	10.22	13.83	11.07	9.94	13.55
161	5805	15	11.78	11.08	14.45	11.51	10.79	14.18	11.26	10.52	13.92	11.00	10.25	13.65
165	5825	15	11.86	10.87	14.40	11.60	10.59	14.13	11.32	10.32	13.86	11.05	10.05	13.59

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MIMO (CH0+CH1)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			78			104			117			130		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
36	5180	15	10.81	9.70	13.30	10.52	9.42	13.02	10.25	9.17	12.75	9.96	8.88	12.46
40	5200	15	10.80	9.60	13.25	10.54	9.31	12.98	10.28	9.04	12.71	10.01	8.77	12.44
44	5220	15	10.67	9.52	13.14	10.39	9.27	12.88	10.10	9.00	12.60	9.82	8.75	12.33
48	5240	15	10.81	9.78	13.34	10.56	9.52	13.08	10.27	9.27	12.81	10.02	8.99	12.55
52	5260	15	10.74	9.90	13.35	10.45	9.62	13.07	10.17	9.36	12.79	9.89	9.11	12.53
56	5280	15	10.76	9.55	13.21	10.47	9.28	12.93	10.18	9.02	12.65	9.93	8.73	12.38
60	5300	15	10.86	9.10	13.08	10.60	8.84	12.82	10.34	8.55	12.55	10.09	8.28	12.29
64	5320	15	10.34	9.93	13.15	10.07	9.68	12.89	9.78	9.42	12.61	9.49	9.16	12.34
100	5500	15	10.84	9.59	13.27	10.57	9.32	13.00	10.28	9.03	12.71	10.00	8.76	12.43
104	5520	15	10.73	9.53	13.18	10.44	9.28	12.91	10.17	9.02	12.64	9.89	8.76	12.37
108	5540	15	10.75	9.78	13.30	10.49	9.53	13.05	10.20	9.28	12.77	9.94	8.99	12.50
112	5560	15	10.91	9.95	13.47	10.65	9.67	13.20	10.37	9.40	12.92	10.09	9.11	12.64
116	5580	15	10.72	9.29	13.07	10.43	9.03	12.80	10.14	8.76	12.51	9.86	8.49	12.24
132	5660	15	10.79	9.22	13.09	10.54	8.93	12.82	10.28	8.65	12.55	10.02	8.40	12.30
136	5680	15	10.73	9.29	13.08	10.47	9.03	12.82	10.20	8.78	12.56	9.92	8.51	12.28
140	5700	15	10.71	9.36	13.10	10.44	9.07	12.82	10.17	8.80	12.55	9.90	8.52	12.27
149	5745	15	10.81	9.29	13.13	10.52	9.01	12.84	10.27	8.72	12.57	10.02	8.45	12.32
153	5765	15	10.93	9.69	13.36	10.67	9.42	13.10	10.39	9.13	12.82	10.12	8.84	12.54
157	5785	15	10.81	9.66	13.28	10.52	9.40	13.01	10.24	9.15	12.74	9.98	8.89	12.48
161	5805	15	10.73	9.97	13.38	10.45	9.72	13.11	10.16	9.47	12.84	9.88	9.19	12.56
165	5825	15	10.76	9.80	13.32	10.49	9.51	13.04	10.24	9.25	12.78	9.96	8.99	12.51

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MIMO (CH0 + CH1)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			27			54			81			108		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
38	5190	15	11.87	11.53	14.71	11.52	11.16	14.35	11.17	10.83	14.01	10.81	10.46	13.65
46	5230	15	11.73	11.30	14.53	11.36	10.96	14.17	10.99	10.60	13.81	10.63	10.25	13.45
54	5270	15	11.58	11.35	14.48	11.26	10.99	14.14	10.92	10.64	13.79	10.58	10.28	13.44
62	5310	15	11.91	11.54	14.74	11.58	11.20	14.40	11.26	10.86	14.07	10.94	10.49	13.73
102	5510	15	11.75	11.30	14.54	11.40	10.97	14.20	11.03	10.63	13.84	10.70	10.28	13.51
110	5550	15	11.76	11.72	14.75	11.44	11.37	14.42	11.11	11.03	14.08	10.78	10.67	13.74
134	5670	15	11.50	10.75	14.15	11.17	10.42	13.82	10.84	10.10	13.50	10.49	9.74	13.14
151	5755	15	11.93	11.24	14.61	11.60	10.88	14.27	11.26	10.51	13.91	10.93	10.16	13.57
159	5795	15	11.66	11.35	14.52	11.32	11.03	14.19	10.97	10.68	13.84	10.63	10.33	13.49

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MIMO (CH0+CH1)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)											
			Data Rate (Mbps)											
			162			216			243			270		
CH	Frequency (MHz)		ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1	ch 0	ch 1	ch 0+1
38	5190	15	10.45	10.09	13.28	10.08	9.73	12.92	9.73	9.41	12.58	9.39	9.04	12.23
46	5230	15	10.31	9.92	13.13	9.96	9.60	12.79	9.64	9.27	12.47	9.32	8.91	12.13
54	5270	15	10.24	9.96	13.11	9.89	9.63	12.77	9.52	9.27	12.41	9.19	8.93	12.07
62	5310	15	10.61	10.15	13.40	10.26	9.82	13.06	9.94	9.49	12.73	9.58	9.13	12.37
102	5510	15	10.38	9.93	13.17	10.03	9.57	12.82	9.69	9.23	12.48	9.32	8.90	12.13
110	5550	15	10.43	10.34	13.40	10.07	9.97	13.03	9.74	9.65	12.71	9.41	9.31	12.37
134	5670	15	10.17	9.38	12.80	9.81	9.06	12.46	9.48	8.70	12.12	9.16	8.35	11.78
151	5755	15	10.57	9.84	13.23	10.20	9.47	12.86	9.86	9.14	12.53	9.51	8.77	12.17
159	5795	15	10.30	9.96	13.14	9.95	9.61	12.79	9.59	9.27	12.44	9.22	8.93	12.09

#. Per FCC KDB443999, transmission on channels which overlap the 5600-5650 MHz is prohibited as a client.

#. The maximum power of CH0 and CH1 in 5G MIMO is minus 3dB from the maximum power of CH0+CH1

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#. Bluetooth conducted power table:

Frequency (MHz)	Data Rate	Peak	
		dBm	mW
2402	1	4.72	2.965
2441	1	5.85	3.846
2480	1	5.54	3.581
2402	2	3.93	2.472
2441	2	4.75	2.985
2480	2	5.1	3.236
2402	3	4.42	2.767
2441	3	5.34	3.420
2480	3	4.79	3.013

Frequency (MHz)	Avg. (dBm)
	BT4.0
2402	4.52
2442	5.14
2480	5.25

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1.4 Test Environment

Ambient Temperature: 22±2° C
Tissue Simulating Liquid: 22±2° C

1.5 Operation Description

1. WWAN (GPRS/EDGE/WCDMA/HSDPA/HSUPA):

The EUT is controlled by using Radio Communication Tester(R&S CMU200), and the communication between the EUT and the tester is established by air link. The EUT was tested in four configurations:

Configuration 1: Back side_0mm with power reduction and_26mm without power reduction.

Configuration 2: Bottom side_0mm with power reduction and_10mm without power reduction.

Configuration 3: Left side_0mm without power reduction.

Configuration 4: Right side_0mm without power reduction.

Band	Power Reduction
GPRS850	YES
EDGE850	YES
GPRS1900	YES
EDGE1900	YES
WCDMA B2	YES
WCDMA B4	YES
WCDMA B5	YES
WLAN	NO
BT	NO

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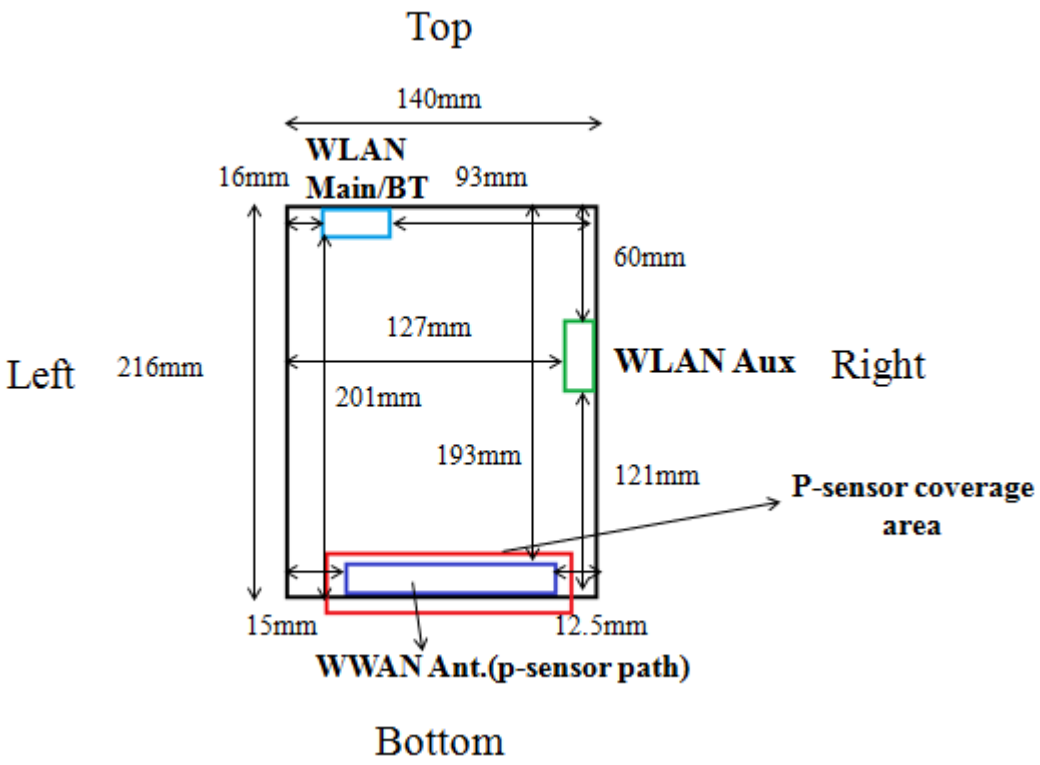
2. WLAN (802.11 a/b/g/n):

Use chipset specific software to control the EUT, and makes it transmit in maximum power. The EUT was tested in five configurations:

Configurations: Back/Right/Left/Bottom/Top side_0mm.



Front view of the tablet

(Note:The proximity sensor is collocated with WWAN antenna.)

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Note:

1. The SAR test of GPRS was performed on the maximum sourced-based time-averaged power.

2. The SAR measurement is not required for HSPA since its maximum output power is less than ¼ dB higher than RMC without HSPA.

3. The SAR measurement is not required for HSPA+ since its maximum output power is less than ¼ dB higher than RMC without HSPA+.

4. The SAR measurement is not required for 802.11g/n since its maximum output power is less than 1/4 dB higher than 802.11b.

5. The SAR measurement is not required for 802.11n since its maximum output power is less than 1/4 dB higher than 802.11a.

6. Testing at higher data rates is not required since the maximum output power is less than 1/4 dB higher than those measured at the lowest data rate.

7. BT and WLAN technology can't transmit simultaneously according to client's description.

8. For 2.4GHz WLAN Main and Aux antennas, the maximum output power for 802.11b is larger than that for 802.11n and the maximum output power of each antenna during simultaneous transmission for 802.11n is less than that used in standalone transmission for 802.11n, so it is more conservative to use the sum of 1-g SAR provision in KDB447498D01 for 802.11b to exclude the SAR measurement for 802.11n MIMO.

9. For 5GHz WLAN Main and Aux antennas, the maximum output power for 802.11a is larger than that for 802.11n, so it is more conservative to use the sum of 1-g SAR provision in KDB447498D01 for 802.11a to exclude the SAR measurement for 802.11n MIMO.

10. According to KDB447498 D01,

    (1) The SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:

$$\frac{\text{Max. tune up power(mW)}}{\text{Min. test separation distance(mm)}} \times \sqrt{f(\text{GHz})} \leq 3$$

    When the minimum test separation distance is < 5mm, 5mm is applied to determine SAR test exclusion.

    (2) For test separation distances > 50 mm, and the frequency at 100 MHz to 1500MHz,

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the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.

[(Threshold at 50mm in step1) + (test separation distance-50mm)x($\frac{f(MHz)}{150}$)](mW),

(3) For test separation distances > 50 mm, and the frequency at >1500MHz to 6GHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.

[(Threshold at 50mm in step1) + (test separation distance-50mm)x10](mW),

Mode	Max. tune-up power(dBm)	Max. tune-up power(mW)	Top side			Right side			Left side		
			Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?
GPRS850 class11	29.5	891.251	193	825.612	NO	12.5	65.689	YES	15	54.741	YES
GPRS1900 class11	26.5	446.684	193	1442.346	NO	12.5	49.384	YES	15	41.153	YES
WCDMA B2	24.5	281.838	193	1437.785	NO	12.5	31.141	YES	15	25.951	YES
WCDMA B4	24.5	281.838	193	1437.462	NO	12.5	29.849	YES	15	24.874	YES
WCDMA B5	24.5	281.838	193	812.278	NO	12.5	20.746	YES	15	17.288	YES
WLAN Main	17	50.119	less than 5	15.728	YES	93	431.573	NO	16	4.915	YES
WLAN Aux	17	50.119	60	101.573	NO	less than 5	15.728	YES	127	771.573	NO

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Mode	Max. tune-up power(dBm)	Max. tune-up power(mW)	Bottom side			Back side		
			Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?
GPRS850 class11	29.5	891.251	less than 5	164.223	YES	less than 5	164.223	YES
GPRS1900 class10	26.5	446.684	less than 5	123.459	YES	less than 5	123.459	YES
WCDMA B2	24.5	281.838	less than 5	77.853	YES	less than 5	77.853	YES
WCDMA B4	24.5	281.838	less than 5	74.623	YES	less than 5	74.623	YES
WCDMA B5	24.5	281.838	less than 5	51.864	YES	less than 5	51.864	YES
WLAN Main	17	50.119	201	-	NO	less than 5	15.728	YES
WLAN Aux	17	50.119	121	711.573	NO	less than 5	15.728	YES

Mode	Maximum power(dBm)	Maximum power(mW)	**Top side**			**Right side**			**Left side**		
			Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?
BT	5.85	3.846	less than 5	1.211	NO	93	430.12	NO	16	0.379	NO

Mode	Maximum power(dBm)	Maximum power(mW)	**Bottom side**			**Back side**		
			Ant. to surface (mm)	Exclusion threshold (mW)	Require SAR testing?	Ant. to surface (mm)	over 200mm	Require SAR testing?
BT	5.85	3.846	201	-	NO	less than 5	1.211	NO

11. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz.

12. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200MHz.

13. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.4 W/kg, when the transmission band is ≥ 200MHz.

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14. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit)

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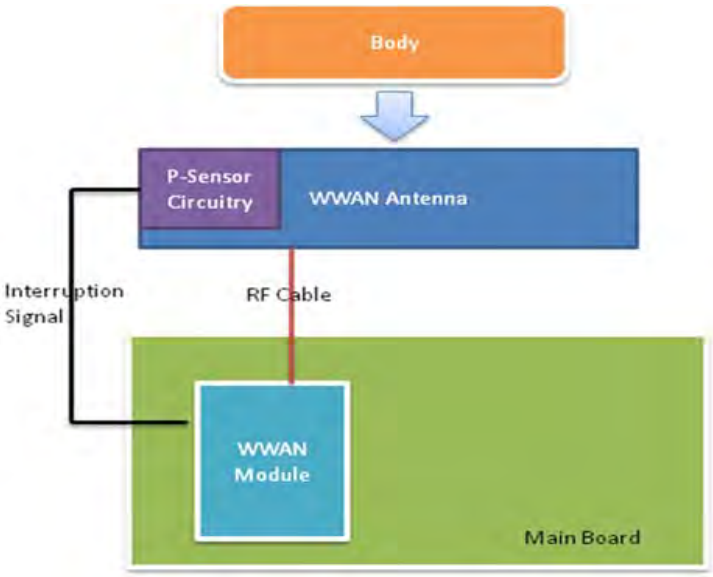
1.6 Proximity sensor operation description

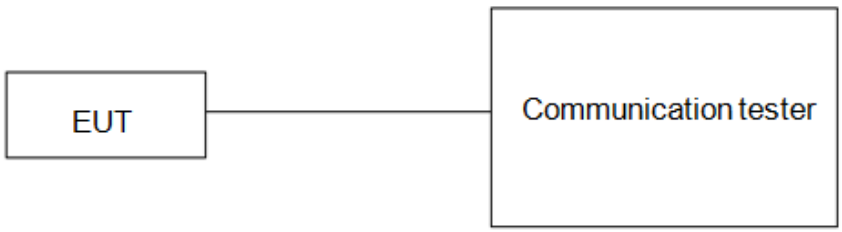
The P-sensor being used to reduce output power is capacitive in which when the object such as human body, metal or plastic is being approached, the sensing capacitance would be increased with the antenna pad. Once the capacitance is accumulated, and reached over the threshold as set in MCU of the microchip, the interruption signal is pulled low (High state without trigger) and further inform modem module of the transmitter to make power reduction.



1.6.1 Proximity sensor measurement procedure

(1) The proximity sensor is collocated with WWAN antenna.

(2) Output power is measured, and monitored by using the communication tester. A RF cables with sufficient length was being attached from the antenna port of the module, and used for the measurement. The appropriate loss attenuated from cable is compensated in the communication tester.



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1.6.2 Trigger distances for back and bottom sides

Test procedure:

1) The entire back surface or edge of the tablet is positioned below a flat phantom filled with the required tissue equivalent medium and positioned at least 20 mm further than the distance that triggers power reduction.

2) The back surface or edge is moved toward the phantom in 3 mm steps until the sensor triggers.

3) The back surface or edge is then moved back (further away) from the phantom until maximum output power is returned to the normal maximum level.

4) The back surface or edge is again moved toward the phantom, but in 1 mm steps, until it is at least 5 mm past the triggering point or touching the phantom

5) If the tablet is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered and the maximum power stays reduced.

6) The process is then reversed by moving the tablet away from the phantom to determine triggering release, until it is at least 10 mm beyond the point that triggers the return of normal maximum power.

7) The measured output power within ± 5 mm of the triggering points, or until the tablet is touching the phantom, for movements to and from the phantom should be tabulated.

8) To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.

9) For back side, the trigger distance of proximity sensor is 27mm.

10) For bottom side, the trigger distance of proximity sensor is 15mm, and we perform the 1.6.3 tilt angle testing in next step.

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1.6.3 Tilt angle testing

Test procedure:

1) The influence of table tilt angles to proximity sensor triggering is determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance determined in sections 1.6.2 by rotating the tablet around the edge next to the phantom in ≤ 10 deg increments until the tablet is +/- 45deg or more from the vertical position at 0 deg.

2) If sensor triggering is released and normal maximum output power is restored within the +/- 45deg range, the procedures in step 1) should be repeated by reducing the tablet to phantom separation distance by 1 mm until the proximity sensor no longer releases triggering, and maximum output power remains in the reduced mode.

3) The smallest separation distance determined in steps 1) and 2), minus 1 mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance determined in sections 1.6.2, 1.6.3 minus 1 mm should be used in the SAR measurements.

4) The influence of table tilt angles to proximity sensor triggering is determined by positioning top and left sides, please refer to table 1.6.5 and 1.6.6.

5) After the tilt angle testing for bottom side, the sensor is released during +/- 45deg until 12mm, so 12-1=11mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance minus 1 mm(11-1=10mm) should be used in the SAR measurements.

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1.6.4 Proximity sensor coverage

The following procedures do not apply and are not required for configurations where the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

Test procedure:

1) The back surface or edges of the tablet is positioned at a test separation distance less than or equal to the distance required for back surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset.

2) The similar sequence of steps applied to determine sensor triggering distance in section 1.6.2 are used to verify back surface and edge sensor coverage by moving the tablet (sensor and antenna) horizontally toward the phantom while maintaining the same vertical separation between the back surface or edge and the phantom.

3) After the exact location where triggering of power reduction is determined, with respect to the sensor and antenna, the tablet movement should be continued, in 3 mm increments, until both the sensor and antenna(s) are fully under the phantom and at least 20 mm inside the phantom edge.

4) The process is then repeated from the other direction, at the opposite end of maximum antenna and sensor offset, by rotating the tablet 180 degrees.

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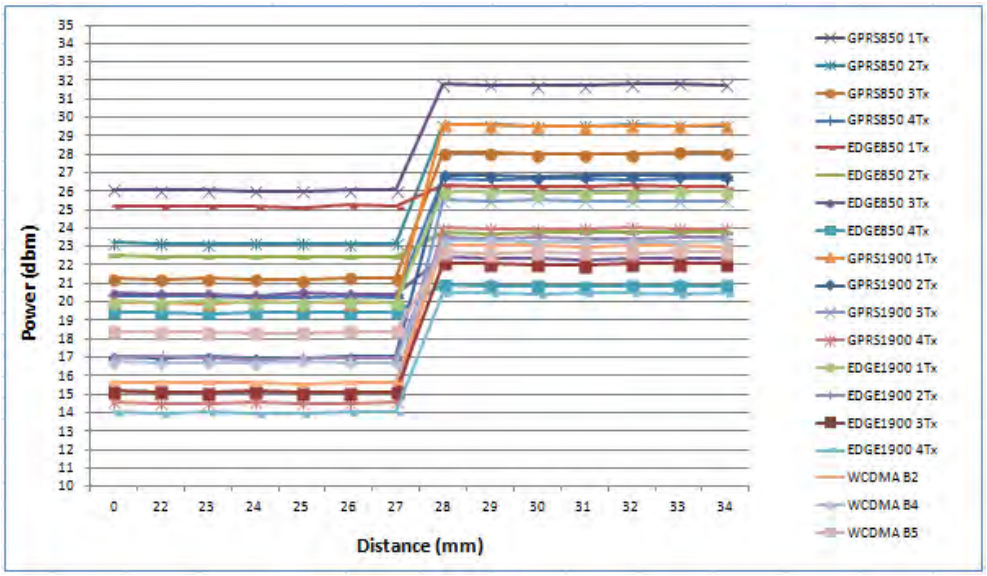
1.6.5 Results

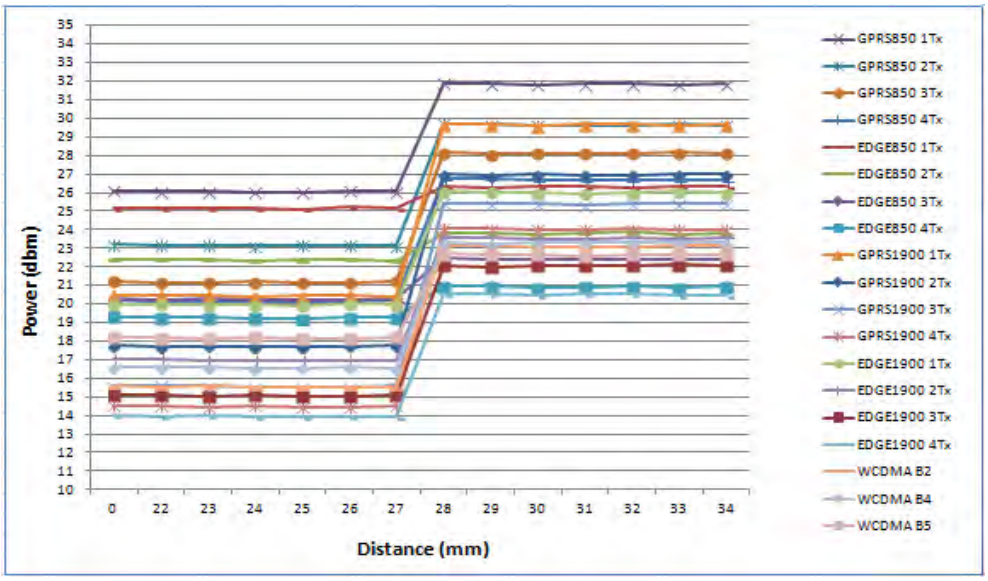
The measured output power within ± 5 mm of the triggering points, or until the tablet is touching the phantom, for movements to and from the phantom is tabulated in the following.

Back side

Moving device toward the phantom



Moving device away from the phantom



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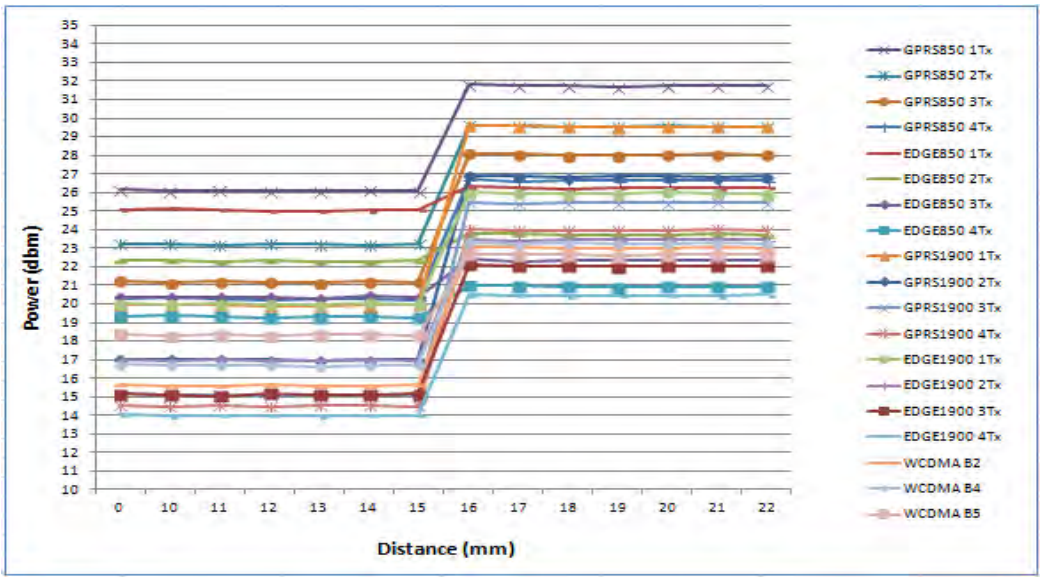
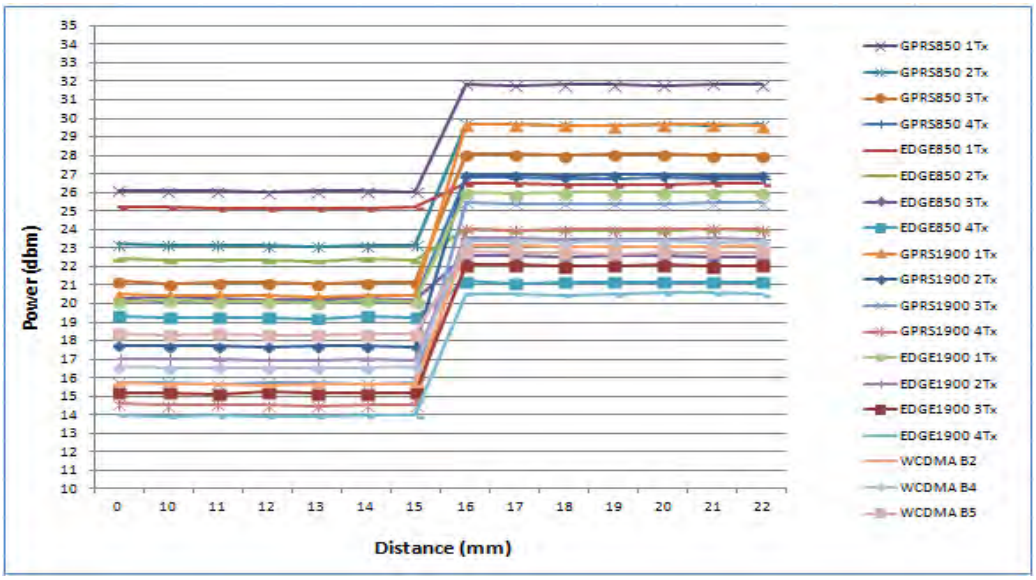
For back side, the worst trigger distance of proximity sensor is 27mm, thus we test back side SAR in 26mm without power reduction and 0mm with power reduction.

Bottom side

Moving device toward the phantom



Moving device away from the phantom



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For bottom side, the worst trigger distance of proximity sensor is 15mm, so next we perform the tilt angle testing.

Table 1.6.5 Tilt angle test results for bottom side

P-sensor ON/OFF	-50 deg	-45 deg	-40 deg	-30 deg	-20 deg	-10 deg	0 deg	10 deg	20 deg	30 deg	40 deg	45 deg	50 deg
12mm	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON
13mm	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF
14mm	OFF	OFF	OFF	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF
15mm	OFF	OFF	OFF	OFF	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF

During the tilt angle testing for top side, the sensor is released during ± 45° until 12mm, so 12-1=11mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance minus 1 mm(11-1=10mm) should be used in the SAR measurements for bottom side.

Note:

1. The triggering variations and hysteresis effect has been evaluated separately according to the tissue-equivalent medium required for each frequency band, and sensor triggering does not change with different tissue-equivalent media.

2. The default power level for sensor failure and malfunctioning, including all compliance concerns, has been addressed in the client's operation description (1.6.6) for the proximity sensor implementation to be acceptable.

3. Conducted power is monitored qualitatively to identify the general triggering characteristics and recorded quantitatively, versus spacing.

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1.6.6 Operation description for P-sensor

Power Reduction Design Specification (for P-sensor)

The mechanism of power reduction is used only for WWAN, not for Wi-Fi and Bluetooth. The reduced power for each technology/band is defined in Table1-1. With P-sensor mechanism, the GPRS/WCDMA default power when P-sensor failure or malfunction are show in Table1-2 as below.

Table1-1：The power reduction scenario table

Band	Power Reduction
GPRS850	YES
EDGE850	YES
GPRS1900	YES
EDGE1900	YES
WCDMA B2	YES
WCDMA B4	YES
WCDMA B5	YES
WLAN	NO
BT	NO

Table1-2：The default power when p-sensor failure or malfunction

Technology / Band	Mode	Default Power (dBm)
GPRS 850	Class 8	25.5~27.5
	Class 10	22.5~24.5
	Class 11	20.5~22.5
	Class 12	19.5~21.5
EDGE 850	Class 8	24.5~26.5
	Class 10	21.5~23.5
	Class 11	19.5~21.5
	Class 12	18.5~20.5
GPRS 1900	Class 8	20~22
	Class 10	17~19
	Class 11	15~17
	Class 12	14~16
EDGE 1900	Class 8	19~21
	Class 10	16~18
	Class 11	14~16
	Class 12	13~15

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UMTS B2	RMC 12.2K data	14~16
	HSDPA	13.5~16
	HSUPA	12~16
UMTS B4	RMC 12.2K data	15~17
	HSDPA	14.5~17
	HSUPA	13~17
UMTS B5	RMC 12.2K data	17~19
	HSDPA	16.5~19
	HSUPA	15~19

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1.7 The SAR Measurement System

A block diagram of the SAR measurement System is given in Fig. a. This SAR Measurement System uses a Computer-controlled 3-D stepper motor system (SPEAG DASY 5 professional system). The model EX3DV4 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= σ ($|Ei|^2$)/ ρ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY 5 system for performing compliance tests consists of the following items:

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage intissue simulating liquid. The probe is equipped with an optical surface detector system.
- A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.

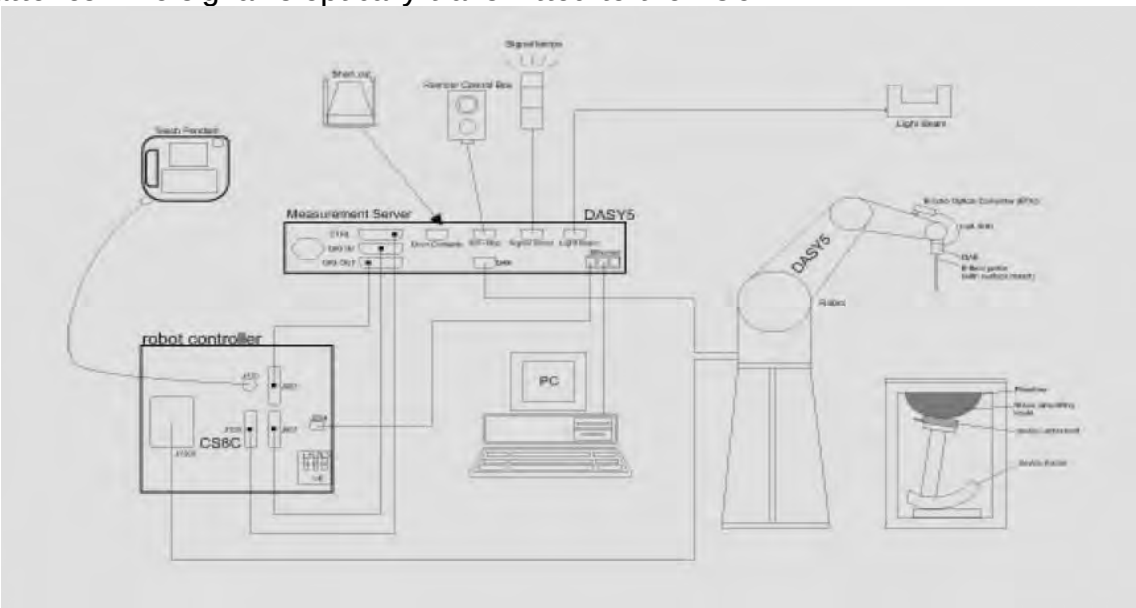

Fig. a The block diagram of SAR system

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- The Electro-optical converter (EOC) performs the conversion between optical and electrical of the signals for the digital communication to the DAE and for the analog signal from the optical surface detection. The EOC is connected to the measurement server.
- The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movement interrupts.
- A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- A computer operating Windows 7.
- DASY 5 software.
- Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- The SAM twin phantom enabling testing left-hand and right-hand usage.
- The device holder for handheld mobile phones.
- Tissue simulating liquid mixed according to the given recipes.
- Validation dipole kits allowing to validate the proper functioning of the system.

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1.8 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835/ 1750/1900/2450/5200/5300/5600/5800 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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SAM PHANTOM V4.0C

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm	

DEVICE HOLDER

Construction	The device holder (Supporter) for Notebook is made by POM (polyoxymethylene resin) , which is non-metal and non-conductive. The height can be adjusted to fit varies kind of notebooks.	 Device Holder

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1.9 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 835/1750/1900/2450/5200/5300/5600/ 5800MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was 21.7°C, the relative humidity was 62% and the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

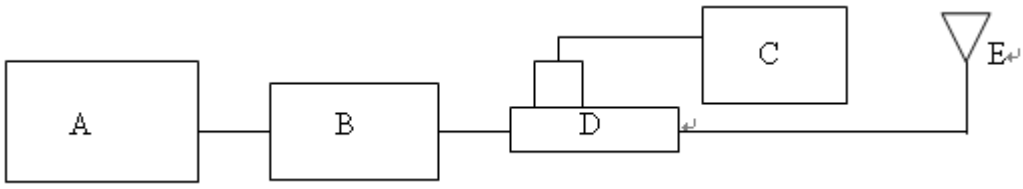


Fig. b The block diagram of system verification

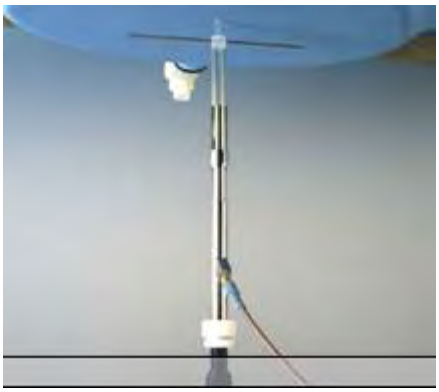
A. Signal generator

B. Amplifier

C. Power meter

D. Dual directional coupling

E. Reference dipole antenna



Photograph of the dipole Antenna

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Validation Kit	S/N	Frequency (MHz)		Target SAR (1g) (Pin=250mW) (mW/g)	Measured SAR (1g)(mW/g)	Deviation (%)	Measured Date
D835V2	4d063	835	Body	2.41	2.45	-1.66%	Nov. 24, 2014
D1750V2	1008	1750	Body	9.44	9.06	4.03%	Nov. 25, 2014
D1900V2	5d027	1900	Body	9.87	9.77	1.01%	Nov. 26, 2014
D2450V2	727	2450	Body	12.8	12.1	5.47%	Dec. 5, 2014
D5GHzV2	1023	5200	Body	7.39	7.76	-5.01%	Dec. 6, 2014
		5300	Body	7.62	7.39	3.02%	Dec. 7, 2014
		5600	Body	8.04	8.45	-5.10%	Dec. 8, 2014
		5800	Body	7.44	7.36	1.08%	Dec. 10, 2014

Table 1. Results of system validation

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1.10 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070E Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with Network Analyzer (30 KHz-6000 MHz).

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section of the phantom was ≥ 15 cm ± 5 mm (Frequency ≤3G) or ≥ 10 cm ± 5 mm (Frequency >3G) during all tests. (Fig. 2)

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
Body	Nov. 24, 2014	824.2	55.242	0.969	53.002	0.997	4.06%	-2.87%
		826.4	55.234	0.969	52.991	0.998	4.06%	-2.99%
		835	55.2	0.97	52.823	0.999	4.31%	-2.99%
		836.6	55.195	0.972	52.75	1	4.43%	-2.88%
		846.6	55.164	0.984	52.619	1.008	4.61%	-2.44%
		848.8	55.158	0.987	52.576	1.011	4.68%	-2.43%
	Nov. 25, 2014	1712.4	53.531	1.465	55.156	1.428	-3.04%	2.53%
		1732.4	53.478	1.477	54.958	1.43	-2.77%	3.18%
		1750	55.432	1.488	54.916	1.445	0.93%	2.89%
		1752.6	53.425	1.49	54.755	1.448	-2.49%	2.82%
	Nov. 26, 2014	1850.2	53.300	1.520	54.823	1.483	-2.86%	2.43%
		1852.4	53.300	1.520	54.734	1.489	-2.69%	2.04%
		1880	53.300	1.520	54.692	1.543	-2.61%	-1.51%
		1900	53.300	1.520	54.591	1.57	-2.42%	-3.29%
		1907.6	53.300	1.520	54.585	1.572	-2.41%	-3.42%
		1909.8	53.300	1.520	54.582	1.586	-2.41%	-4.34%
	Dec. 05, 2014	2412	52.751	1.914	53.618	1.94	-1.64%	-1.36%
		2437	52.717	1.938	53.445	1.969	-1.38%	-1.62%
		2450	52.700	1.950	53.416	1.997	-1.36%	-2.41%
		2462	52.685	1.967	53.318	2.003	-1.20%	-1.83%

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Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
Body	Dec. 6, 2014	5200	49.014	5.299	47.940	5.215	2.19%	1.59%
		5220	48.987	5.323	47.918	5.241	2.18%	1.54%
		5230	48.974	5.334	47.874	5.248	2.25%	1.61%
	Dec. 7, 2014	5260	48.933	5.369	47.837	5.293	2.24%	1.42%
		5270	48.919	5.381	47.795	5.303	2.30%	1.45%
		5300	48.879	5.416	47.700	5.388	2.41%	0.52%
		5310	48.865	5.428	47.585	5.391	2.62%	0.68%
	Dec. 8, 2014	5500	48.607	5.650	47.522	5.694	2.23%	-0.78%
		5510	48.594	5.661	47.492	5.713	2.27%	-0.91%
		5550	48.539	5.708	47.365	5.764	2.42%	-0.98%
		5580	48.499	5.743	47.316	5.830	2.44%	-1.51%
		5600	48.471	5.766	47.150	5.838	2.73%	-1.25%
		5670	48.376	5.848	47.031	5.948	2.78%	-1.71%
		5680	48.363	5.860	46.979	5.992	2.86%	-2.26%
		5700	48.336	5.883	46.921	6.017	2.93%	-2.28%
	Dec. 10, 2014	5745	48.275	5.936	46.551	6.112	3.57%	-2.96%
		5755	48.261	5.947	46.486	6.141	3.68%	-3.25%
		5765	48.248	5.959	46.397	6.172	3.84%	-3.57%
		5785	48.220	5.982	46.322	6.182	3.94%	-3.34%
		5795	48.207	5.994	46.273	6.200	4.01%	-3.43%
		5800	48.200	6.000	46.238	6.217	4.07%	-3.62%
		5805	48.193	6.006	46.217	6.236	4.10%	-3.83%
		5825	48.166	6.029	46.180	6.278	4.12%	-4.13%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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The composition of the body tissue simulating liquid:

Frequency (MHz)	Mode	Ingredient						Total amount
		DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	
850	Body	—	631.68 g	11.72 g	1.2 g	—	600 g	1.0L(Kg)
1900	Body	300.67 g	716.56 g	4.0 g	—	—	—	1.0L(Kg)
2450	Body	301.7ml	698.3ml	—	—	—	—	1.0L(Kg)

Simulating Liquids for 5 GHz, Manufactured by SPEAG:

Ingredients	Water	Esters, Emulsifiers, Inhibitors	Sodium and Salt
(% by weight)	60-80	20-40	0-1.5

Table 3. Recipes for Tissue Simulating Liquid

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1.11 Evaluation Procedures

The entire evaluation of the spatial peak values is performed within the Post-processing engine (SEMCAD). The system always gives the maximum values for the 1 g and 10 g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

1. The extraction of the measured data (grid and values) from the Zoom Scan.
2. The calculation of the SAR value at every measurement point based on all stored data (A/D values and measurement parameters)
3. The generation of a high-resolution mesh within the measured volume
4. The interpolation of all measured values from the measurement grid to the high-resolution grid
5. The extrapolation of the entire 3-D field distribution to the phantom surface over the distance from sensor to surface
6. The calculation of the averaged SAR within masses of 1g and 10g.

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm 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. The angle between the probe axis and the surface normal line is less than 30 degree.

In the Area Scan, the gradient of the interpolation function is evaluated to find all the extreme of the SAR distribution. The uncertainty on the locations of the extreme is less than 1/20 of the grid size. Only local maximum within –2 dB of the global maximum are searched and passed for the Cube Scan measurement. In the Cube Scan, the interpolation function is used to extrapolate the Peak SAR from the lowest measurement points to the inner phantom surface (the extrapolation distance). The uncertainty increases with the extrapolation distance. To keep the uncertainty within 1% for the 1 g and 10 g cubes, the extrapolation distance should not be larger than 5mm.

The maximum search is automatically performed after each area scan measurement. It is based on splines in two or three dimensions. The procedure can find the maximum for most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans. The routines are verified and optimized for the grid dimensions used in these cube measurements.

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The measured volume of 30x30x30mm contains about 30g of tissue.

The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.12 Probe Calibration Procedures

For the calibration of E-field probes in lossy liquids, an electric field with an accurately known field strength must be produced within the measured liquid. For standardization purposes it would be desirable if all measurements which are necessary to assess the correct field strength would be traceable to standardized measurement procedures. In the following two different calibration techniques are summarized:

1.12.1 Transfer Calibration with Temperature Probes

In lossy liquids the specific absorption rate (SAR) is related both to the electric field (E) and the temperature gradient ($\delta T / \delta t$) in the liquid.

$$SAR = \frac{\sigma}{\rho}|E|^2 = c\frac{\delta T}{\delta t}$$

whereby σ is the conductivity, ρ the density and c the heat capacity of the liquid.

Hence, the electric field in lossy liquid can be measured indirectly by measuring the temperature gradient in the liquid. Non-disturbing temperature probes (optical probes or thermistor probes with resistive lines) with high spatial resolution (<1-2 mm) and fast reaction time (<1 s) are available and can be easily calibrated with high precision [1]. The setup and the exciting source have no influence on the calibration; only the relative positioning uncertainties of the standard temperature probe and the E-field probe to be calibrated must be considered. However, several problems limit the available accuracy of probe calibrations with temperature probes:

- The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.

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- The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ) , there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

Considering these problems, the possible accuracy of the calibration of E-field probes with temperature gradient measurements in a carefully designed setup is about ±10% (RSS) [2]. Recently, a setup which is a combination of the waveguide techniques and the thermal measurements was presented in [3]. The estimated uncertainty of the setup is ±5% (RSS) when the same liquid is used for the calibration and for actual measurements and ±7-9% (RSS) when not, which is in good agreement with the estimates given in [2].

1.12.2 Calibration with Analytical Fields

In this method a technical setup is used in which the field can be calculated analytically from measurements of other physical magnitudes (e.g., input power). This corresponds to the standard field method for probe calibration in air; however, there is no standard defined for fields in lossy liquids.

When using calculated fields in lossy liquids for probe calibration, several points must be considered in the assessment of the uncertainty:

- The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

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1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1–1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017. These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

(1) Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).

(2) Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.

(3) Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1)

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of this section. (Table 4.)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 m W/g	8.00 m W/g
Spatial Average SAR (Whole Body)	0.08 m W/g	0.40 m W/g
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 m W/g	20.00 m W/g

Table 4. RF exposure limits

Notes:
1. Uncontrolled environments are defined as locations where there is potential exposure of individuals who have no knowledge or control of their potential exposure.
2. Controlled environments are defined as locations where there is potential exposure of individuals who have knowledge of their potential exposure and can exercise control over their exposure.

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2. Summary of Results

GPRS 850 MHz (without power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
GPRS (1D3UP)	Back side	26mm	190	836.6	29.5	28.2	34.90%	0.197	0.266	-
	Bottom side	10mm	128	824.2	29.5	28	41.25%	0.528	0.746	-
	Bottom side	10mm	190	836.6	29.5	28.2	34.90%	0.608	0.820	-
	Bottom side	10mm	251	848.8	29.5	28.2	34.90%	0.619	0.835	-
	Left side	0mm	190	836.6	29.5	28.2	34.90%	0.169	0.228	-
	Right side	0mm	190	836.6	29.5	28.2	34.90%	0.503	0.679	-

GPRS 850 MHz (with power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
GPRS (1D4UP)	Back side	0mm	128	824.2	21.5	20.1	38.04%	0.599	0.827	-
	Back side	0mm	190	836.6	21.5	20.2	34.90%	0.63	0.850	-
	Back side	0mm	251	848.8	21.5	20.3	31.83%	0.659	0.869	97
	Bottom side	0mm	251	848.8	21.5	20.3	31.83%	0.401	0.529	-

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GPRS 1900 MHz (without power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
GPRS (1Dn3UP)	Back side	26mm	512	1850.2	26.5	25.5	25.89%	0.078	0.098	-
	Bottom side	10mm	512	1850.2	26.5	25.5	25.89%	0.206	0.259	-
	Left side	0mm	512	1850.2	26.5	25.5	25.89%	0.267	0.336	98
	Left side	0mm	661	1880	26.5	25.4	28.82%	0.2	0.258	-
	Left side	0mm	810	1909.8	26.5	25.4	28.82%	0.164	0.211	-
	Right side	0mm	512	1850.2	26.5	25.5	25.89%	0.03	0.038	-

GPRS 1900 MHz (with power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
GPRS (1Dn2UP)	Back side	0mm	512	1850.2	19	17.8	31.83%	0.25	0.330	-
	Bottom side	0mm	512	1850.2	19	17.8	31.83%	0.104	0.137	-

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WCDMA Band II (without power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band II	Back side	26mm	9538	1907.6	24.5	23.17	35.83%	0.175	0.238	-
	Bottom side	10mm	9538	1907.6	24.5	23.17	35.83%	0.442	0.600	-
	Left side	0mm	9538	1907.6	24.5	23.17	35.83%	0.374	0.508	-
	Right side	0mm	9538	1907.6	24.5	23.17	35.83%	0.164	0.223	-

WCDMA Band II (with power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band II	Back side	0mm	9262	1852.4	16	15.61	9.40%	0.759	0.830	-
	Back side	0mm	9400	1880	16	15.67	7.89%	0.969	1.045	99
	Back side	0mm	9538	1907.6	16	15.60	9.65%	0.9	0.987	-
	Back side*	0mm	9400	1880	16	15.67	7.89%	0.968	1.044	-
	Bottom side	0mm	9400	1880	16	15.67	7.89%	0.363	0.392	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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WCDMA Band IV (without power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band IV	Back side	26mm	1312	1712.4	24.5	23.48	26.47%	0.149	0.188	-
	Bottom side	10mm	1312	1712.4	24.5	23.48	26.47%	0.337	0.426	-
	Left side	0mm	1312	1712.4	24.5	23.48	26.47%	0.316	0.400	-
	Right side	0mm	1312	1712.4	24.5	23.48	26.47%	0.121	0.153	-

WCDMA Band IV (with power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band IV	Back side	0mm	1312	1712.4	17	16.76	5.68%	0.848	0.896	-
	Back side	0mm	1412	1732.4	17	16.71	6.91%	0.769	0.822	-
	Back side	0mm	1513	1752.6	17	16.51	11.94%	0.776	0.869	-
	Back side*	0mm	1312	1712.4	17	16.76	5.68%	0.861	0.910	100
	Bottom side	0mm	1312	1712.4	17	16.76	5.68%	0.295	0.312	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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WCDMA Band V (without power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band V	Back side	26mm	4183	836.6	24.5	22.80	47.91%	0.16	0.237	-
	Bottom side	10mm	4132	826.4	24.5	22.75	49.62%	0.523	0.783	-
	Bottom side	10mm	4183	836.6	24.5	22.80	47.91%	0.545	0.806	-
	Bottom side	10mm	4233	846.6	24.5	22.68	52.05%	0.537	0.817	-
	Left side	0mm	4183	836.6	24.5	22.80	47.91%	0.129	0.191	-
	Right side	0mm	4183	836.6	24.5	22.80	47.91%	0.278	0.411	-

WCDMA Band V (with power reduction)

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band V	Back side	0mm	4132	826.4	19	18.20	20.23%	0.996	1.197	-
	Back side	0mm	4183	836.6	19	18.33	16.68%	1.04	1.213	101
	Back side	0mm	4233	846.6	19	18.20	20.23%	1	1.202	-
	Back side*	0mm	4183	836.6	19	18.33	16.68%	1	1.167	-
	Bottom side	0mm	4183	836.6	19	18.33	16.68%	0.616	0.719	-

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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WLAN802.11

Antenna	Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
Main	WLAN802.11 b	Back side	-	6	2437	17.00	16.96	0.93%	0.725	0.732	-
		Top side	-	1	2412	17.00	16.91	2.09%	1.03	1.052	102
		Top side	-	6	2437	17.00	16.96	0.93%	0.952	0.961	-
		Top side	-	11	2462	17.00	16.71	6.91%	0.883	0.944	-
		Top side*	-	1	2412	17.00	16.91	2.09%	0.965	0.985	-
		Left side	-	6	2437	17.00	16.96	0.93%	0.069	0.070	-
		Right side	-	6	2437	17.00	16.96	0.93%	0.041	0.041	-
		Bottom side	-	6	2437	17.00	16.96	0.93%	0.016	0.016	-
	WLAN802.11 n (20M)	Top side	-	6	2437	15.50	15.39	2.57%	0.679	0.696	103
	WLAN802.11 a 5.2G	Back side	-	40	5200	12.50	12.39	2.57%	1.27	1.303	104
		Back side	-	44	5220	12.50	12.29	4.95%	1.26	1.322	-
		Back side*	-	40	5200	12.50	12.39	2.57%	1.22	1.251	-
		Top side	-	40	5200	12.50	12.39	2.57%	0.213	0.218	-
		Left side	-	40	5200	12.50	12.39	2.57%	0.042	0.043	-
		Right side	-	40	5200	12.50	12.39	2.57%	0.014	0.014	-
		Bottom side	-	40	5200	12.50	12.39	2.57%	0.0059	0.006	-
	WLAN802.11 n(40M) 5.2G	Back side	-	38	5190	12.00	11.94	1.39%	1.12	1.136	-
		Back side	-	46	5230	12.00	11.83	3.99%	1.13	1.175	105
	WLAN802.11 a 5.3G	Back side	-	52	5260	12.50	12.45	1.16%	1.4	1.416	-
		Back side	-	60	5300	12.50	12.41	2.09%	1.4	1.429	106
		Back side*	-	60	5300	12.50	12.41	2.09%	1.38	1.409	-
		Top side	-	52	5260	12.50	12.45	1.16%	0.314	0.318	-
		Left side	-	52	5260	12.50	12.45	1.16%	0.04	0.040	-
		Right side	-	52	5260	12.50	12.45	1.16%	0.0112	0.011	-
		Bottom side	-	52	5260	12.50	12.45	1.16%	0.00232	0.002	-
	WLAN802.11 n(40M) 5.3G	Back side	-	54	5270	12.00	11.91	2.09%	1.23	1.256	-
		Back side	-	62	5310	12.00	11.75	5.93%	1.33	1.409	107
	WLAN802.11 a 5.6G	Back side	-	100	5500	13.00	12.31	17.22%	1.31	1.536	108
		Back side	-	116	5580	13.00	12.42	14.29%	1.31	1.497	-
		Back side	-	140	5700	13.00	12.31	17.22%	0.945	1.108	-
		Back side*	-	116	5580	13.00	12.42	14.29%	1.27	1.451	-
		Top side	-	116	5580	13.00	12.42	14.29%	0.198	0.226	-
		Left side	-	116	5580	13.00	12.42	14.29%	0.071	0.081	-
		Right side	-	116	5580	13.00	12.42	14.29%	0.0117	0.013	-
		Bottom side	-	116	5580	13.00	12.42	14.29%	0.00263	0.003	-
	WLAN802.11 n(40M) 5.6G	Back side	-	102	5510	12.00	11.84	3.75%	1.24	1.287	109
		Back side	-	110	5550	12.00	11.97	0.69%	1.16	1.168	-
		Back side	-	134	5670	12.00	11.92	1.86%	1.02	1.039	-

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Antenna	Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
Main	WLAN802.11 a 5.8G	Back side	-	149	5745	13.50	12.29	32.13%	0.955	1.262	-
		Back side	-	157	5785	13.50	12.45	27.35%	1.09	1.388	-
		Back side	-	165	5825	13.50	12.42	28.23%	1.17	1.500	-
		Back side*	-	165	5825	13.50	12.42	28.23%	1.18	1.513	110
		Top side	-	157	5785	13.50	12.45	27.35%	0.184	0.234	-
		Left side	-	157	5785	13.50	12.45	27.35%	0.052	0.066	-
		Right side	-	157	5785	13.50	12.45	27.35%	0.0124	0.016	-
		Bottom side	-	157	5785	13.50	12.45	27.35%	0.00318	0.004	-
	WLAN802.11 n(40M) 5.8G	Back side	-	151	5755	12.00	11.85	3.51%	0.919	0.951	-
		Back side	-	159	5795	12.00	11.73	6.41%	0.951	1.012	111

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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Antenna	Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
Aux	WLAN802.11 b	Back side	-	1	2412	17.00	16.88	2.80%	1.15	1.182	-
		Back side	-	6	2437	17.00	16.93	1.62%	1.12	1.138	-
		Back side	-	11	2462	17.00	16.91	2.09%	1.23	1.256	-
		Back side*	-	11	2462	17.00	16.91	2.09%	1.28	1.307	112
		Top side	-	6	2437	17.00	16.93	1.62%	0.088	0.089	-
		Right side	-	6	2437	17.00	16.93	1.62%	0.542	0.551	-
		Bottom side	-	6	2437	17.00	16.93	1.62%	0.027	0.027	-
	WLAN802.11 n (20M)	Back side	-	1	2412	15.50	15.48	0.46%	0.763	0.767	113
	WLAN802.11 a 5.2G	Back side	-	40	5200	14.00	12.33	46.89%	0.807	1.185	-
		Back side	-	44	5220	14.00	12.35	46.22%	0.863	1.262	-
		Back side*	-	44	5220	14.00	12.35	46.22%	0.871	1.274	114
		Top side	-	44	5220	14.00	12.35	46.22%	0.045	0.066	-
		Right side	-	44	5220	14.00	12.35	46.22%	0.403	0.589	-
		Bottom side		44	5220	14.00	12.35	46.22%	0.014	0.020	-
	WLAN802.11 n(40M) 5.2G	Back side	-	38	5190	12.00	11.95	1.16%	0.78	0.789	115
	WLAN802.11 a 5.3G	Back side	-	52	5260	14.00	12.29	48.25%	0.852	1.263	-
		Back side	-	60	5300	14.00	12.39	44.88%	0.822	1.191	-
		Back side*	-	52	5260	14.00	12.29	48.25%	0.857	1.271	116
		Top side	-	60	5300	14.00	12.39	44.88%	0.00584	0.008	-
		Right side	-	60	5300	14.00	12.39	44.88%	0.552	0.800	-
		Bottom side	-	60	5300	14.00	12.39	44.88%	0.0737	0.107	-
	WLAN802.11 n(40M) 5.3G	Back side	-	54	5270	12.00	11.94	1.39%	0.959	0.972	117
		Back side	-	62	5310	12.00	11.84	3.75%	0.872	0.905	-
	WLAN802.11 a 5.6G	Back side	-	100	5500	14.00	12.38	45.21%	0.676	0.982	-
		Back side	-	116	5580	14.00	12.49	41.58%	0.677	0.958	-
		Back side	-	136	5680	14.00	12.27	48.94%	0.684	1.019	118
		Top side	-	116	5580	14.00	12.49	41.58%	0.0044	0.006	-
		Right side	-	100	5500	14.00	12.38	45.21%	0.392	0.569	-
		Right side	-	116	5580	14.00	12.49	41.58%	0.422	0.597	-
		Right side	-	136	5680	14.00	12.27	48.94%	0.47	0.700	-
		Bottom side	-	116	5580	14.00	12.49	41.58%	0.0239	0.034	-
	WLAN802.11 n(40M) 5.6G	Back side	-	102	5510	12.00	11.85	3.51%	0.713	0.738	-
		Back side	-	110	5550	12.00	11.75	5.93%	0.687	0.728	-
		Back side	-	134	5670	12.00	11.84	3.75%	0.726	0.753	119

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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Antenna	Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
									Measured	Reported	
Aux	WLAN802.11 a 5.8G	Back side	-	153	5765	12.50	12.33	3.99%	0.528	0.549	-
		Back side	-	157	5785	12.50	12.44	1.39%	0.548	0.556	-
		Back side	-	161	5805	12.50	12.36	3.28%	0.608	0.628	120
		Top side	-	157	5785	12.50	12.44	1.39%	0.0148	0.015	-
		Right side	-	157	5785	12.50	12.44	1.39%	0.403	0.409	-
		Bottom side	-	157	5785	12.50	12.44	1.39%	0.00153	0.002	-
	WLAN802.11 n(40M) 5.8G	Back side	-	151	5755	12.00	11.94	1.39%	0.58	0.588	121

* - repeated at the highest SAR measurement according to the KDB 865664 D01

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3. Simultaneous Transmission Analysis

Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Body
GPRS850/1900 + 2.4GHz WLAN Main	Yes
GPRS850/1900 + 2.4GHz WLAN Aux	Yes
GPRS850/1900 + 2.4GHz WLAN MIMO	Yes
WCDMA B2/4/5 + 2.4GHz WLAN Main	Yes
WCDMA B2/4/5 + 2.4GHz WLAN Aux	Yes
WCDMA B2/4/5 + 2.4GHz WLAN MIMO	Yes
GPRS850/1900 + 5GHz WLAN Main	Yes
GPRS850/1900 + 5GHz WLAN Aux	Yes
GPRS850/1900 + 5GHz WLAN MIMO	Yes
WCDMA B2/4/5 + 5GHz WLAN Main	Yes
WCDMA B2/4/5 + 5GHz WLAN Aux	Yes
WCDMA B2/4/5 + 5GHz WLAN MIMO	Yes
GPRS850/1900 + BT	Yes
WCDMA B2/4/5 + BT	Yes

Note:
1. WWAN and WLAN antennas may transmit simultaneously.
2. Bluetooth and WLAN technologies cannot transmit simultaneously.
3. For 2.4GHz WLAN Main and Aux antennas, the maximum output power for 802.11b is larger than that for 802.11n and the maximum output power of each antenna during simultaneous transmission for 802.11n is less than that used in standalone transmission for 802.11n, so it is more conservative to use the sum of 1-g SAR provision in KDB447498D01 for 802.11b to exclude the SAR measurement for 802.11n MIMO.
4. For 5GHz WLAN Main and Aux antennas, the maximum output power for 802.11a is larger than that for 802.11n, so it is more conservative to use the sum of 1-g SAR provision in KDB447498D01 for 802.11a to exclude the SAR measurement for 802.11n MIMO.

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3.1 Estimated SAR calculation

According to KDB447498 D01v05 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$$\text{Estimated SAR} = \frac{\text{Max. tune up power(mW)}}{\text{Min. test separation distance(mm)}} \times \frac{\sqrt{f(\text{GHz})}}{7.5}$$

If the minimum test separation distance is < 5mm, a distance of 5mm is used for estimated SAR calculation. When the test separation distance is >50mm, the 0.4W/kg is used for SAR-1g.

Mode / Band	frequency(GHz)	Max. tune-up power(dBm)	Test position	test separation distance(mm)	Estimated SAR(W/kg)
GPRS 850 (class 11)	0.8488	29.5	Top side	193	0.4
GPRS 1900 (class 11)	1.9098	26.5	Top side	193	0.4
WCDMA B2	1.9076	24.5	Top side	193	0.4
WCDMA B4	1.7526	24.5	Top side	193	0.4
WCDMA B5	0.8466	24.5	Top side	193	0.4
WLAN(Aux)	2.462	17	Left	127	0.4
WLAN(Aux)	5.825	14	Left	127	0.4

Mode / Band	frequency(GHz)	Maximum power(dBm)	Test position	test separation distance(mm)	Estimated SAR(W/kg)
BT	2.48	5.85	Top/Back sides	0	0.162
BT	2.48	5.85	Left side	16	0.05
BT	2.48	5.85	Right / Bottom sides	Larger than 50	0.4

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3.2 SPLSR evaluation and analysis

Per KDB447498D01, when the sum of SAR is larger than the limit, SAR test exclusion is determined by the SAR sum to peak location separation ratio(SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion.

The ratio is determined by **(SAR1 + SAR2)^1.5/Ri**, rounded to two decimal digits, and must be **≤ 0.04** for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and Ri is the separation distance between the peak SAR locations for the antenna pair in mm.

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

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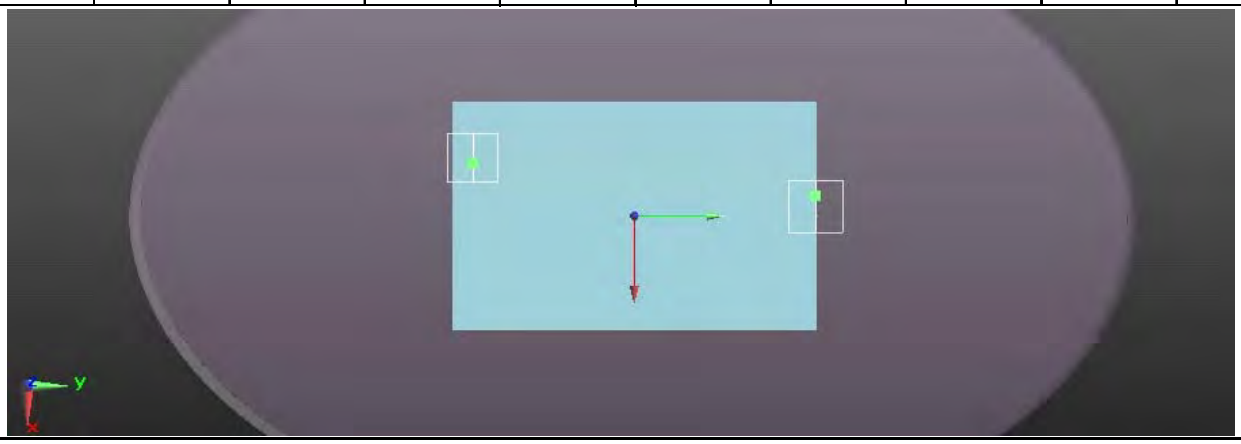
GPRS 850 + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. GPRS850	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR GPRS850 & WLAN Main	SPLSR GPRS850 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
1	GPRS850 + 2.4GHz WLAN MIMO	Back side	0	0.869	0.732	1.307	**2.908**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.266	-	-	0.266	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	1.052	0.089	1.541	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.679	0.07	0.4 (Estimated SAR)	1.149	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.228	0.041	0.551	0.82	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.529	0.016	0.027	0.572	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.835	-	-	0.835	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR GPRS850 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS850 CH 251	Back side	0.869	-1.24	10.75	0.37	1.601	204.1	0.010	SPLSR<0.04, Not required
802.11b CH 6		0.732	-3.28	-9.56	0.45				



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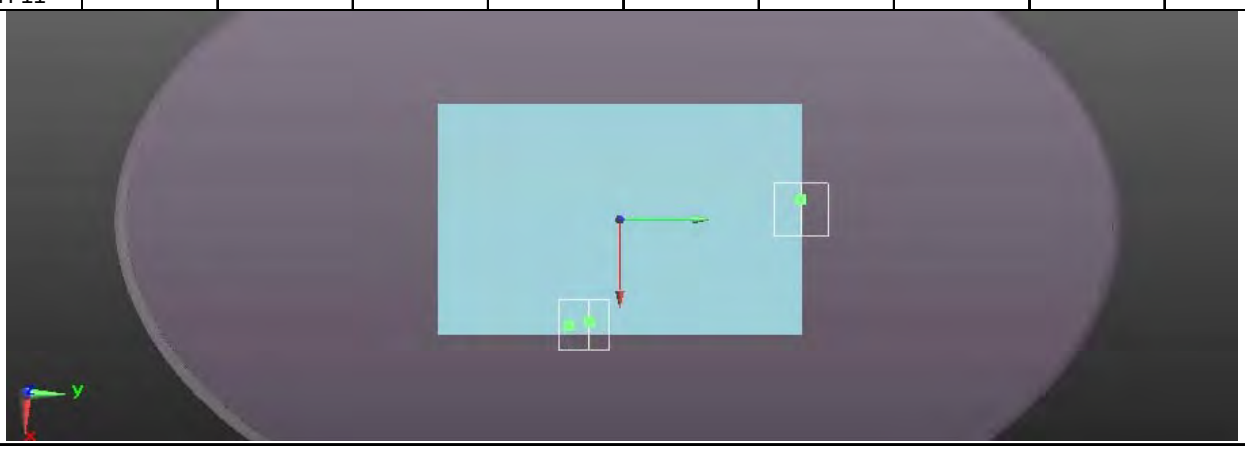
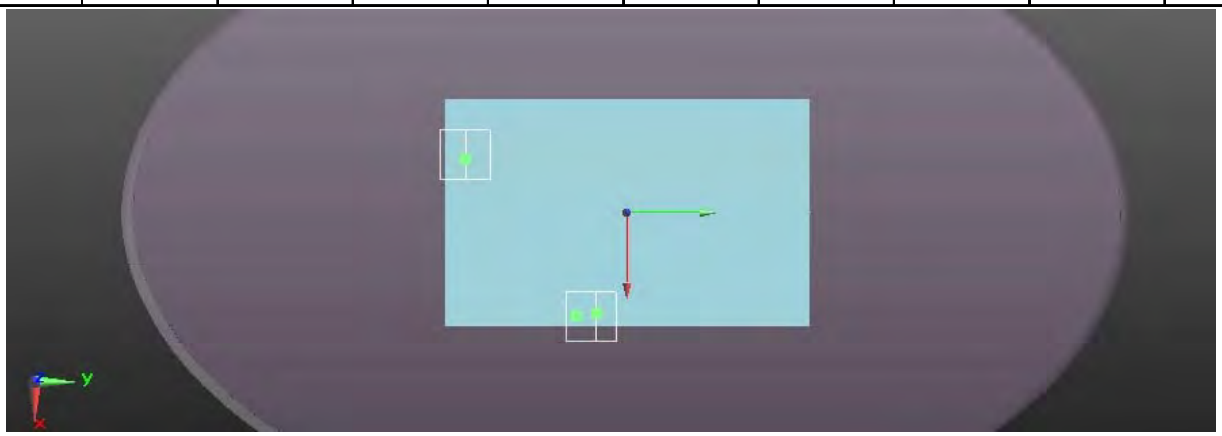
SPLSR GPRS850 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS850 CH 251	Back side	0.869	-1.24	10.75	0.37	2.176	145.8	0.022	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11b CH 6	Back side	0.732	-3.28	-9.56	0.45	2.039	122.4	0.024	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



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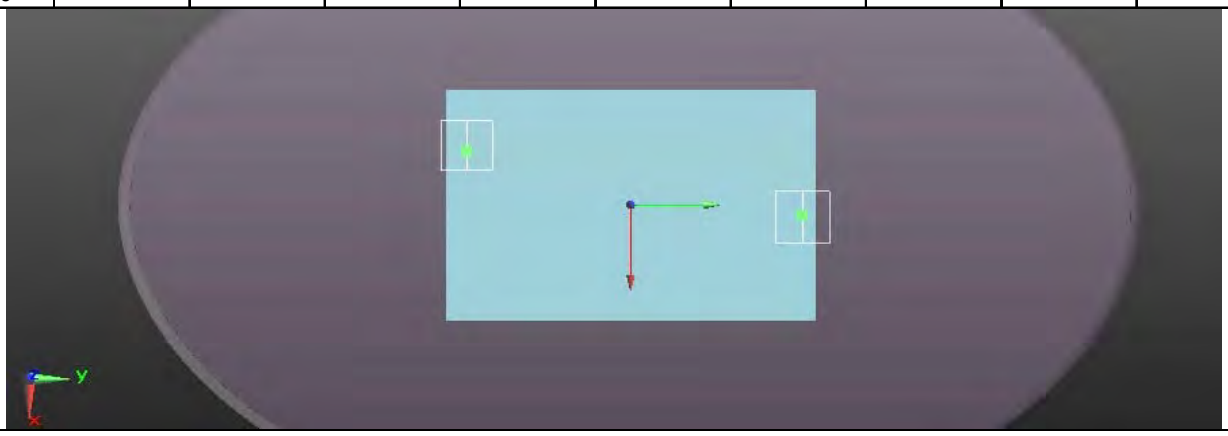
GPRS 1900 + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. GPRS1900	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR GPRS1900 & WLAN Main	SPLSR GPRS1900 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
2	GPRS1900 + 2.4GHz WLAN MIMO	Back side	0	0.33	0.732	1.307	**2.369**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.098	-	-	0.098	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	1.052	0.089	1.541	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.336	0.07	0.4 (Estimated SAR)	0.806	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.038	0.041	0.551	0.63	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.137	0.016	0.027	0.18	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.259	-	-	0.259	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR GPRS1900 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS1900 CH 512	Back side	0.33	0.59	10.05	0.45	1.062	199.9	0.005	SPLSR<0.04, Not required
802.11b CH 6		0.732	-3.28	-9.56	0.45				



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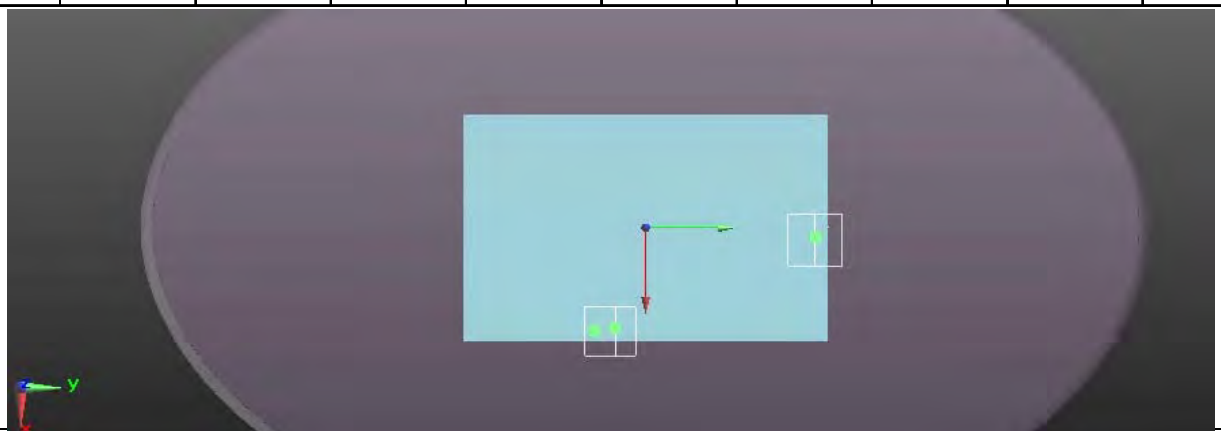
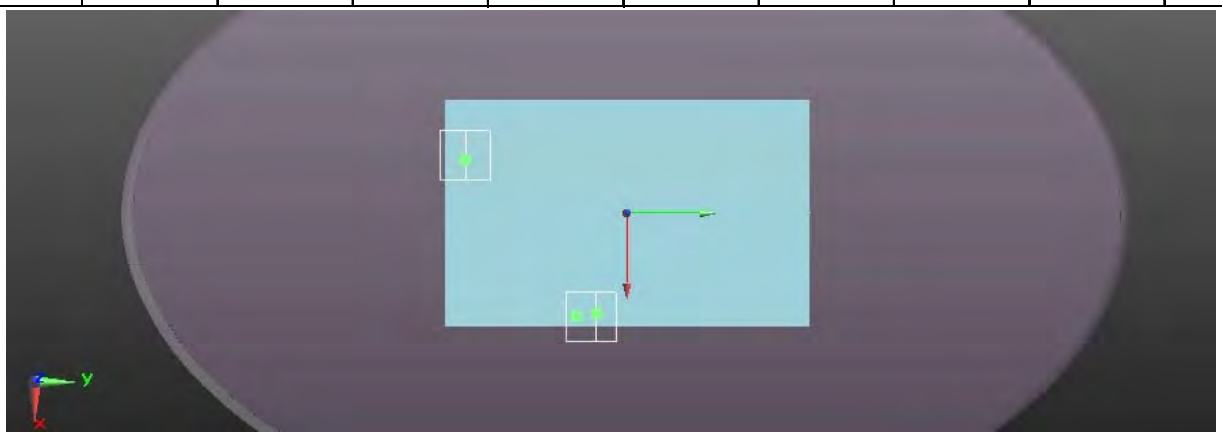
SPLSR GPRS1900 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS1900 CH 512	Back side	0.33	0.59	10.05	0.45	1.637	131	0.016	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11b CH 6	Back side	0.732	-3.28	-9.56	0.45	2.039	122.4	0.024	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



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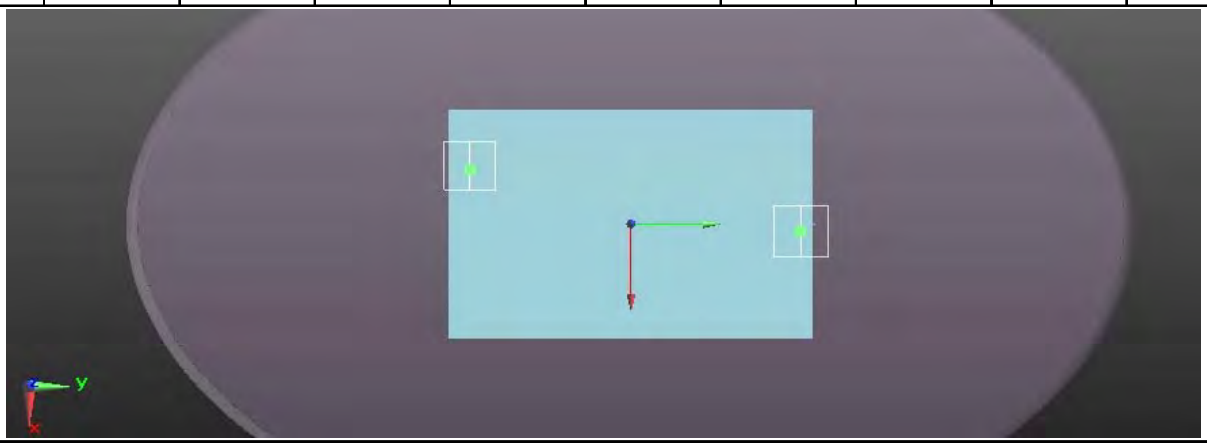
WCDMA Band II + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B2	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B2 & WLAN Main	SPLSR WCDMA B2 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
3	WCDMA B2 + 2.4GHz WLAN MIMO	Back side	0	1.045	0.732	1.307	**3.084**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.238	-	-	0.238	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	1.052	0.089	1.541	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.508	0.07	0.4 (Estimated SAR)	0.978	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.223	0.041	0.551	0.815	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.392	0.016	0.027	0.435	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.6	-	-	0.6	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B2 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B2 CH 9400	Back side	1.045	0.45	10.05	0.49	1.777	199.6	0.012	SPLSR<0.04, Not required
802.11b CH 6		0.732	-3.28	-9.56	0.45				



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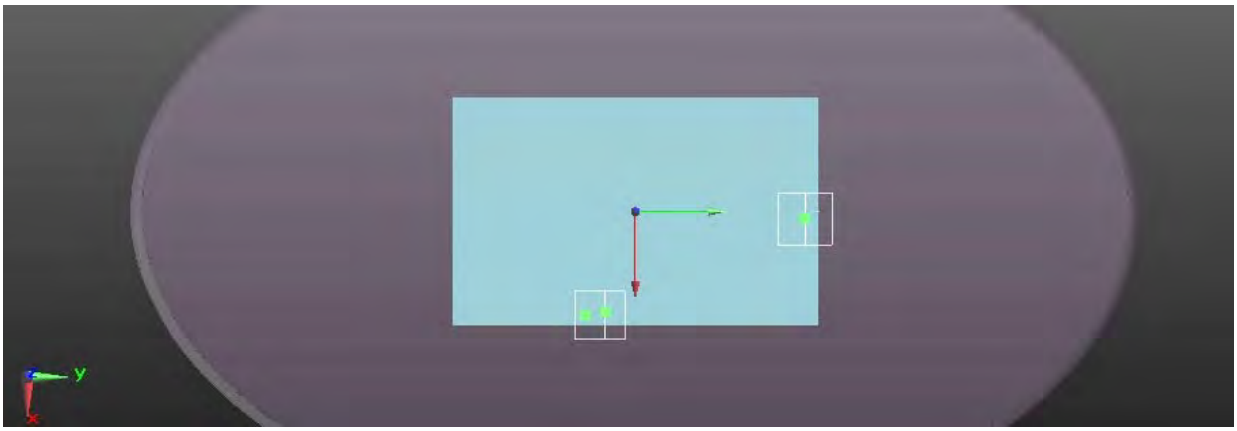
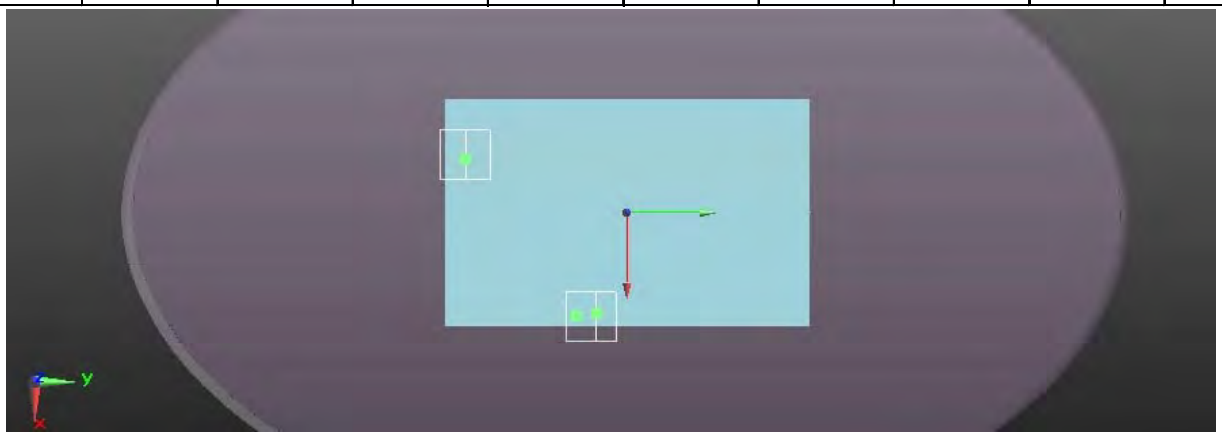
SPLSR WCDMA B2 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B2 CH 9400	Back side	1.045	0.45	10.05	0.49	2.352	131.6	0.027	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11b CH 6	Back side	0.732	-3.28	-9.56	0.45	2.039	122.4	0.024	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



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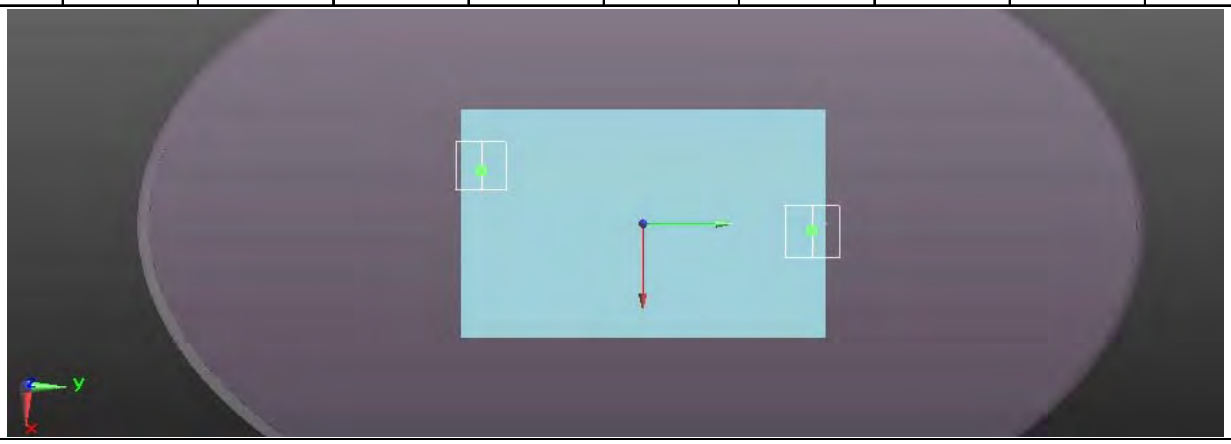
WCDMA Band IV + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B4	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B4 & WLAN Main	SPLSR WCDMA B4 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
4	WCDMA B4 + 2.4GHz WLAN MIMO	Back side	0	0.91	0.732	1.307	**2.949**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.188	-	-	0.188	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	1.052	0.089	1.541	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.4	0.07	0.4 (Estimated SAR)	0.87	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.153	0.041	0.551	0.745	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.312	0.016	0.027	0.355	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.426	-	-	0.426	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B4 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B4 CH 1312	Back side	0.91	0.45	10.05	0.49	1.642	199.6	0.011	SPLSR<0.04, Not required
802.11b CH 6		0.732	-3.28	-9.56	0.45				



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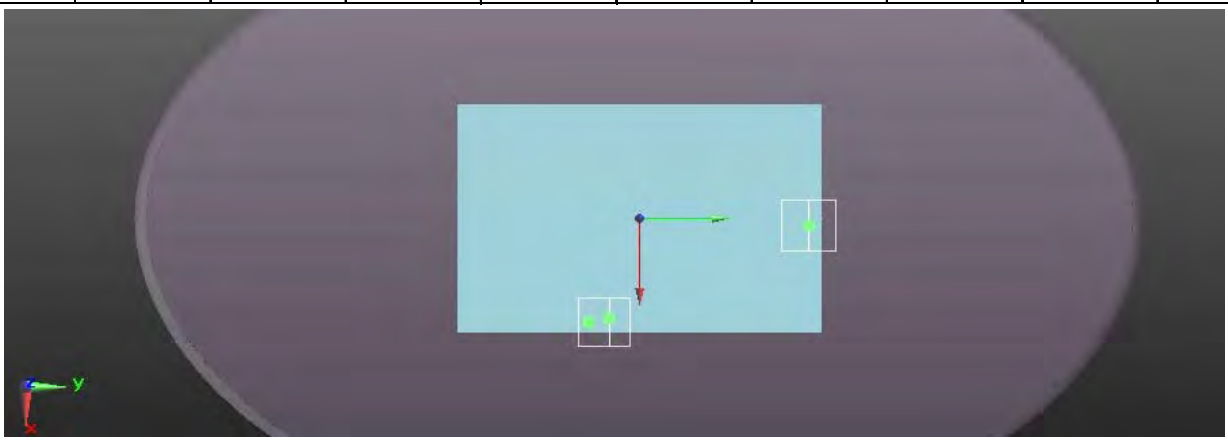
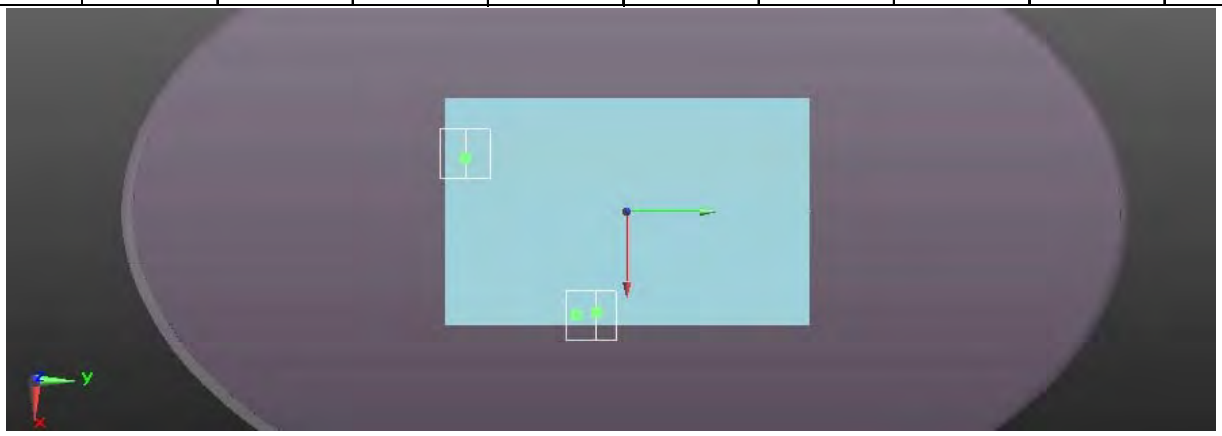
SPLSR WCDMA B4 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B4 CH 1312	Back side	0.91	0.45	10.05	0.49	2.217	131.6	0.025	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11b CH 6	Back side	0.732	-3.28	-9.56	0.45	2.039	122.4	0.024	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



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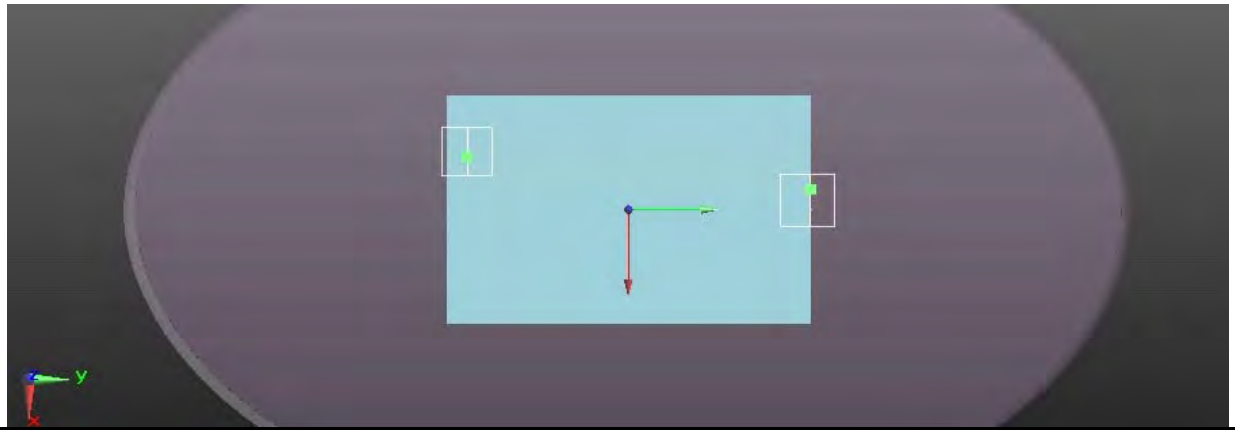
WCDMA Band V + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B5	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B5 & WLAN Main	SPLSR WCDMA B5 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
5	WCDMA B5 + 2.4GHz WLAN MIMO	Back side	0	1.213	0.732	1.307	**3.252**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.237	-	-	0.237	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	1.052	0.089	1.541	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.191	0.07	0.4 (Estimated SAR)	0.661	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.411	0.041	0.551	1.003	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.719	0.016	0.027	0.762	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.817	-	-	0.817	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B5 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B5 CH 4183	Back side	1.213	-1.24	10.81	0.39	1.945	204.7	0.013	SPLSR<0.04, Not required
802.11b CH 6		0.732	-3.28	-9.56	0.45				



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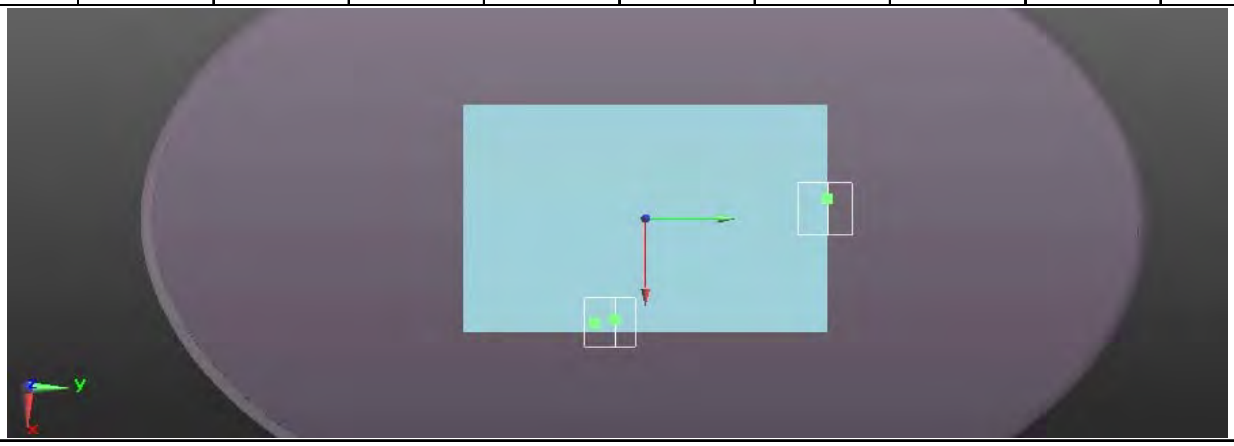
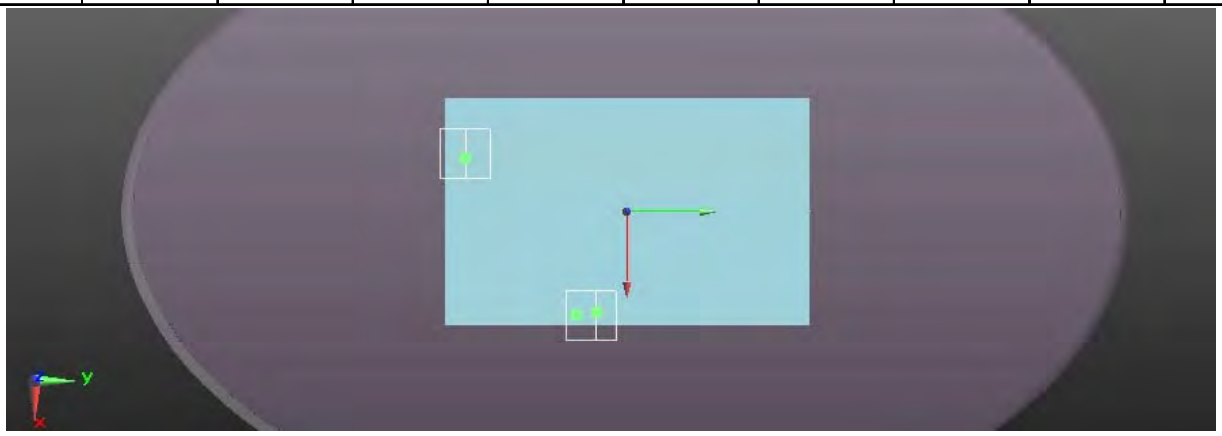
SPLSR WCDMA B5 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B5 CH 4183	Back side	1.213	-1.24	10.81	0.39	2.52	146.3	0.027	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11b CH 6	Back side	0.732	-3.28	-9.56	0.45	2.039	122.4	0.024	SPLSR<0.04, Not required
802.11b CH 11		1.307	6.18	-1.8	0.6				



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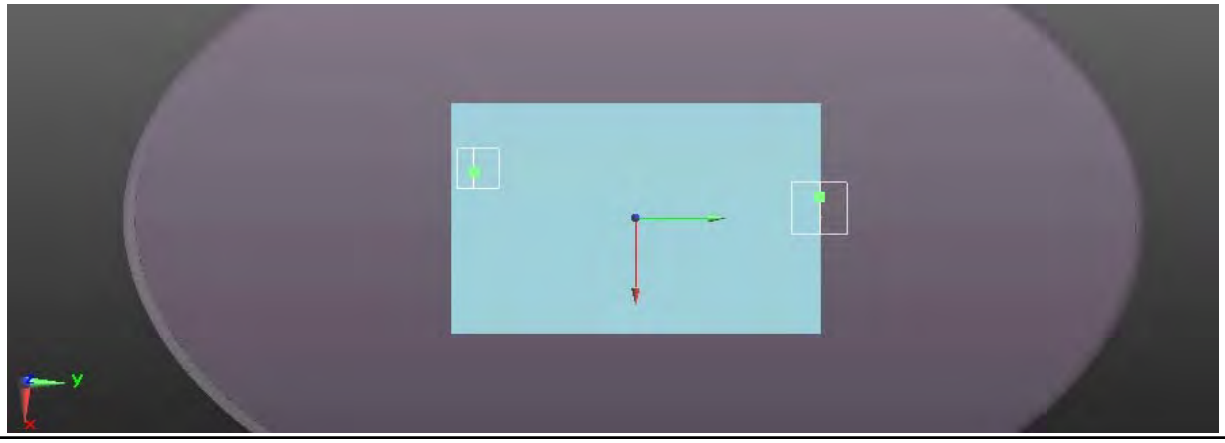
GPRS 850 + 5GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. GPRS850	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR GPRS850 & WLAN Main	SPLSR GPRS850 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
6	GPRS850 + 5GHz WLAN MIMO	Back side	0	0.869	1.536	1.274	**3.679**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.266	-	-	0.266	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.318	0.107	0.825	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.679	0.081	0.4 (Estimated SAR)	1.16	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.228	0.016	0.8	1.044	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.529	0.006	0.02	0.555	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.835	-	-	0.835	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR GPRS850 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS850 CH 251	Back side	0.869	-1.24	10.75	0.37	2.405	202.5	0.018	SPLSR<0.04, Not required
802.11a CH 100		1.536	-2.76	-9.44	0.48				



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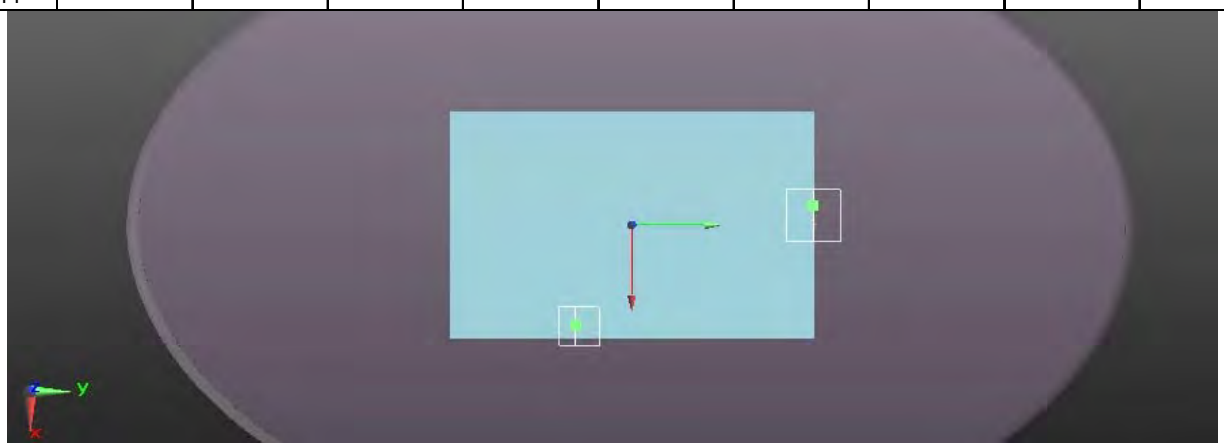
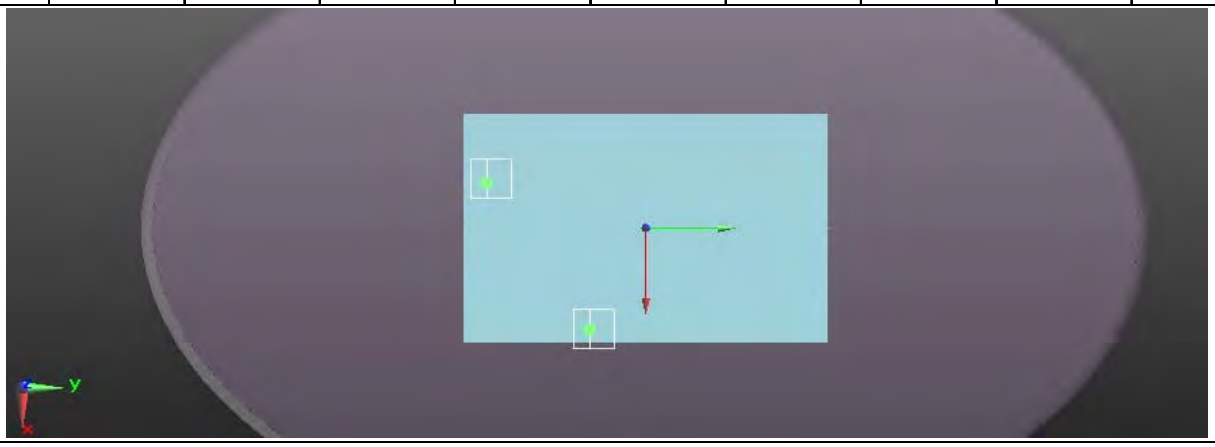
SPLSR GPRS850 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS850 CH 251	Back side	0.869	-1.24	10.75	0.37	2.143	159.9	0.020	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11a CH 100	Back side	1.536	-2.76	-9.44	0.48	2.81	119.49	0.039	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



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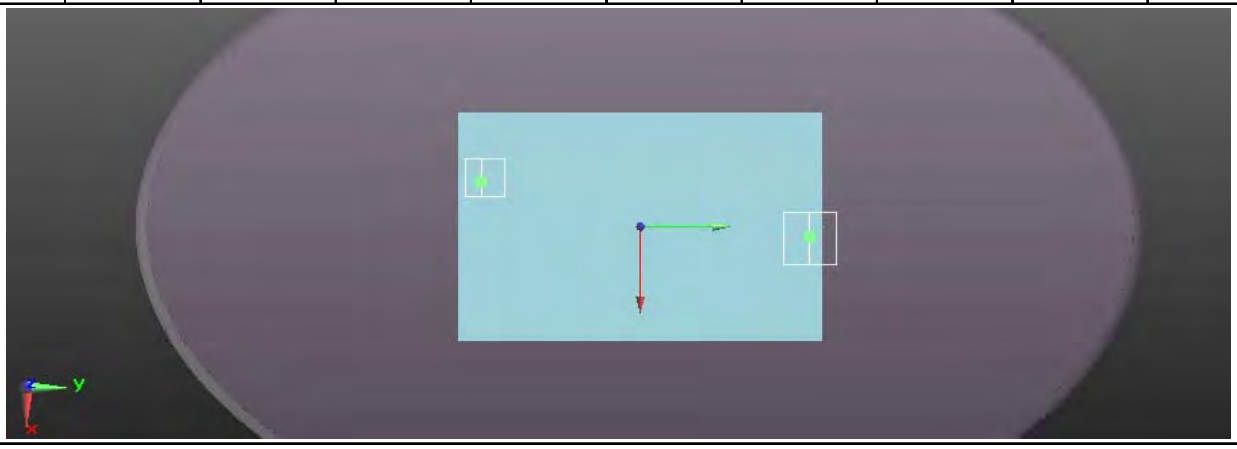
GPRS 1900 + 5GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. GPRS1900	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR GPRS1900 & WLAN Main	SPLSR GPRS1900 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
7	GPRS1900 + 5GHz WLAN MIMO	Back side	0	0.33	1.536	1.274	**3.14**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.098	-	-	0.098	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.318	0.107	0.825	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.336	0.081	0.4 (Estimated SAR)	0.817	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.038	0.016	0.8	0.854	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.137	0.006	0.02	0.163	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.259	-	-	0.259	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR GPRS1900 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS1900 CH 512	Back side	0.33	0.59	10.05	0.45	1.866	197.8	0.013	SPLSR<0.04, Not required
802.11a CH 100		1.536	-2.76	-9.44	0.48				



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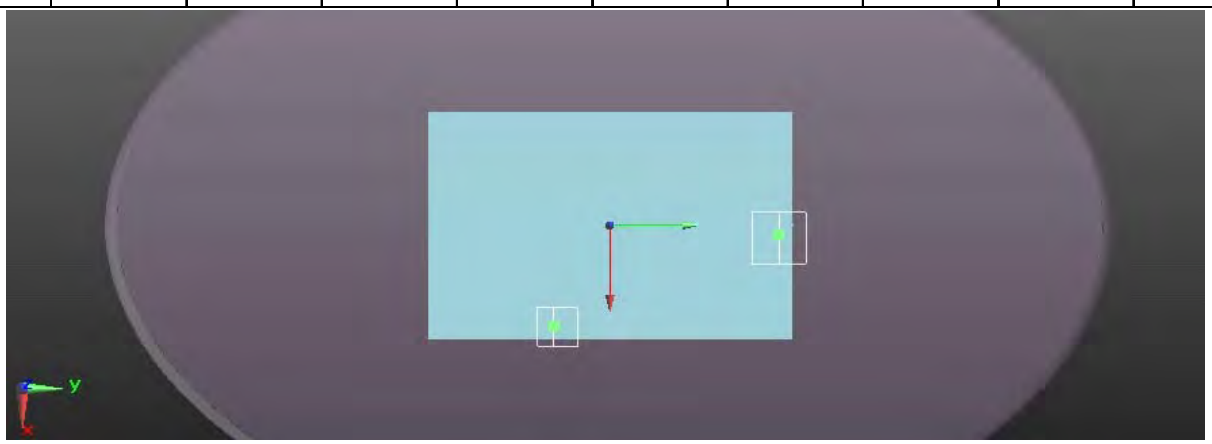
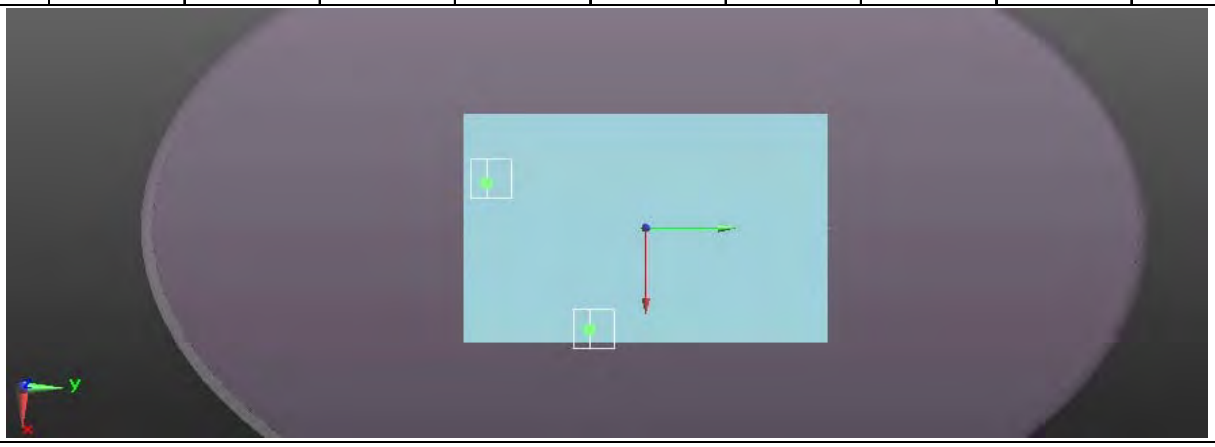
SPLSR GPRS1900 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
GPRS1900 CH 512	Back side	0.33	0.59	10.05	0.45	1.604	144.87	0.014	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11a CH 100	Back side	1.536	-2.76	-9.44	0.48	2.81	119.49	0.039	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



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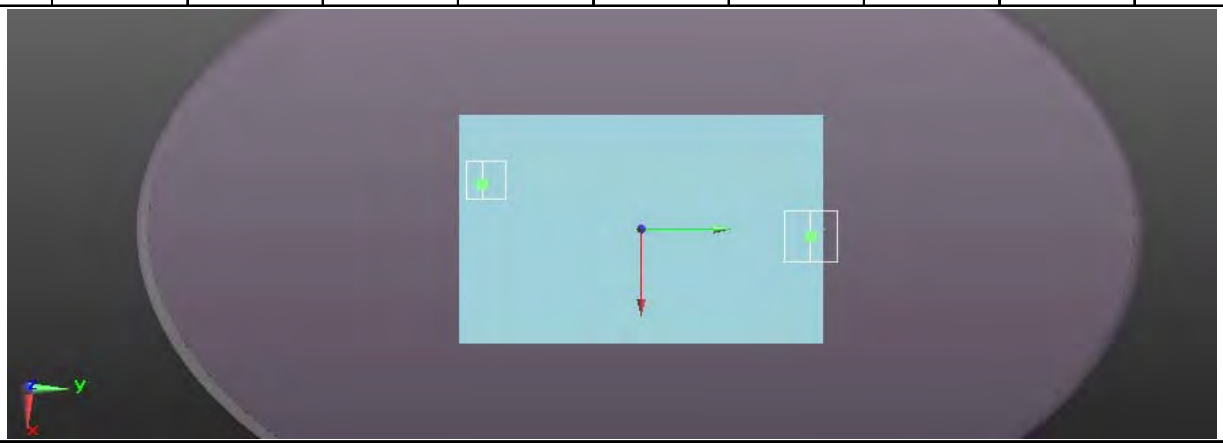
WCDMA Band II + 5GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B2	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B2 & WLAN Main	SPLSR WCDMA B2 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
8	WCDMA B2 + 5GHz WLAN MIMO	Back side	0	1.045	1.536	1.274	**3.855**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.238	-	-	0.238	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.318	0.107	0.825	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.508	0.081	0.4 (Estimated SAR)	0.989	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.223	0.016	0.8	1.039	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.392	0.006	0.02	0.418	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.6	-	-	0.6	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B2 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B2 CH 9400	Back side	1.045	0.45	10.05	0.49	2.581	197.5	0.021	SPLSR<0.04, Not required
802.11a CH 100		1.536	-2.76	-9.44	0.48				



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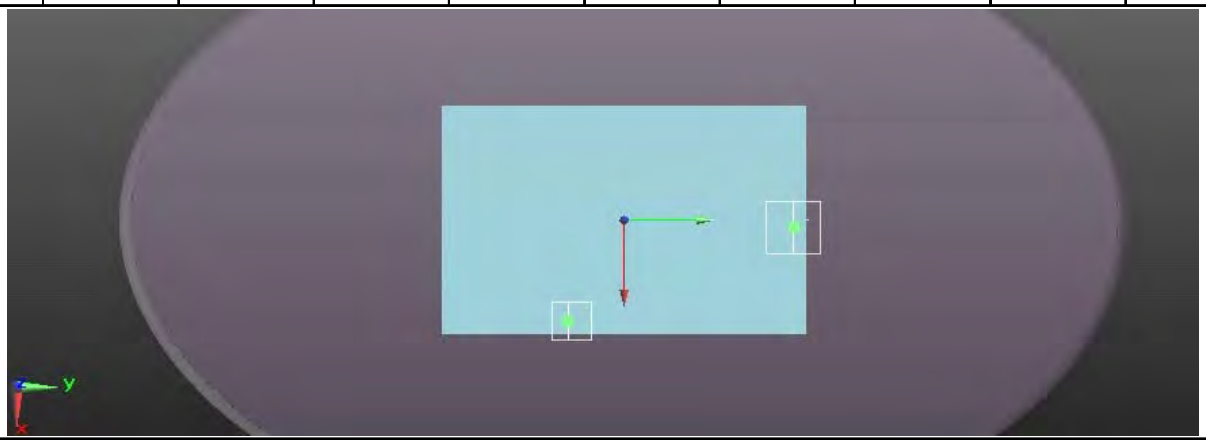
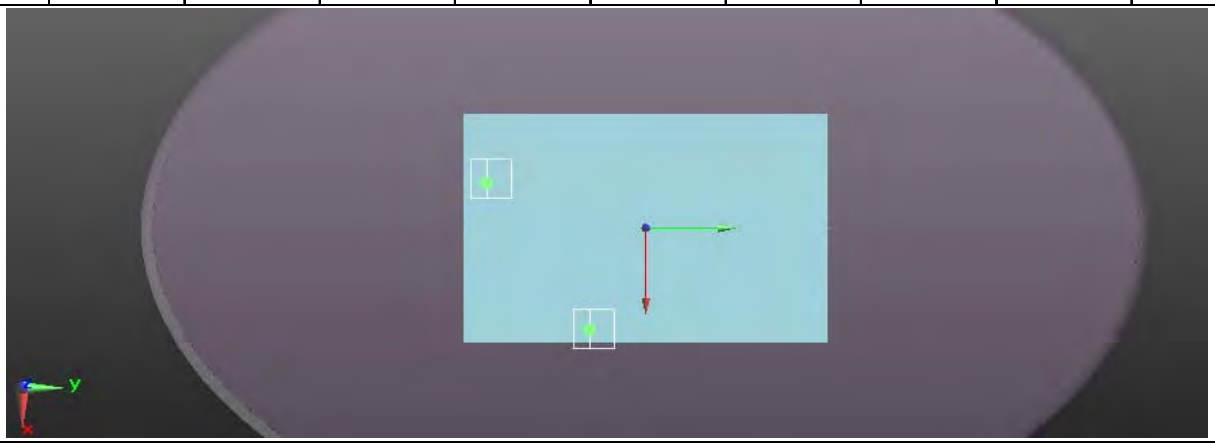
SPLSR WCDMA B2 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B2 CH 9400	Back side	1.045	0.45	10.05	0.49	2.319	145.51	0.024	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11a CH 100	Back side	1.536	-2.76	-9.44	0.48	2.81	119.49	0.039	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



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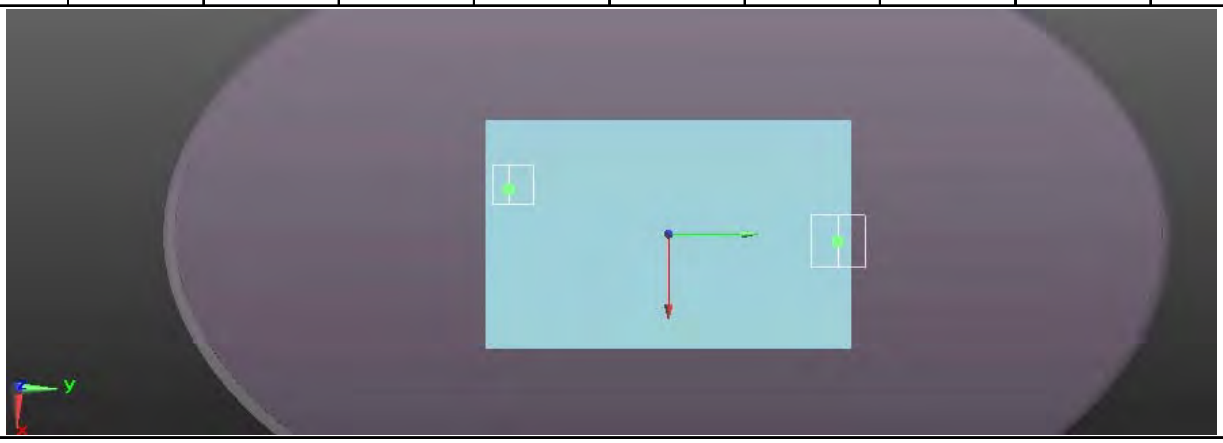
WCDMA Band IV + 5GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B4	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B4 & WLAN Main	SPLSR WCDMA B4 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
9	WCDMA B4 + 5GHz WLAN MIMO	Back side	0	0.91	1.536	1.274	**3.72**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.188	-	-	0.188	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.318	0.107	0.825	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.4	0.081	0.4 (Estimated SAR)	0.881	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.153	0.016	0.8	0.969	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.312	0.006	0.02	0.338	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.426	-	-	0.426	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B4 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B4 CH 1312	Back side	0.91	0.45	10.05	0.49	2.446	197.5	0.019	SPLSR<0.04, Not required
802.11a CH 100		1.536	-2.76	-9.44	0.48				



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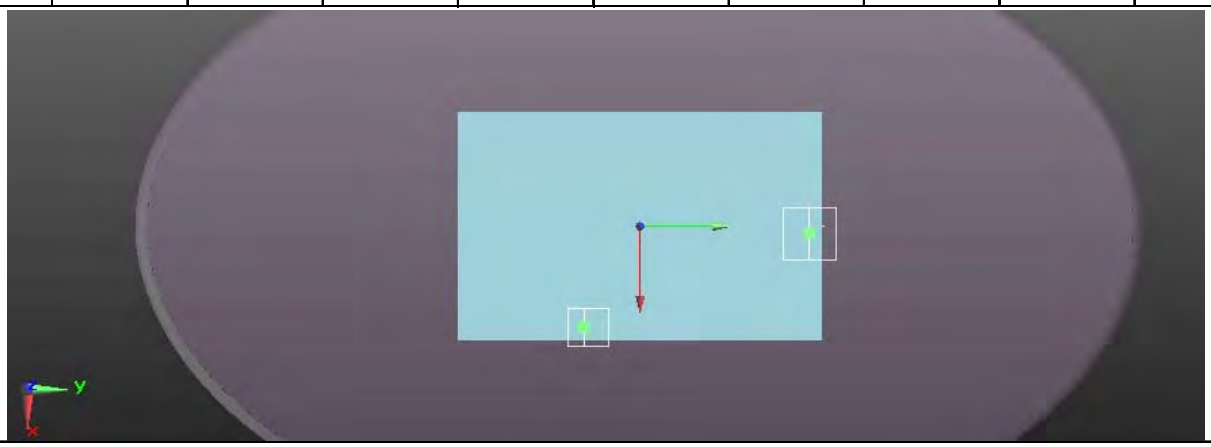
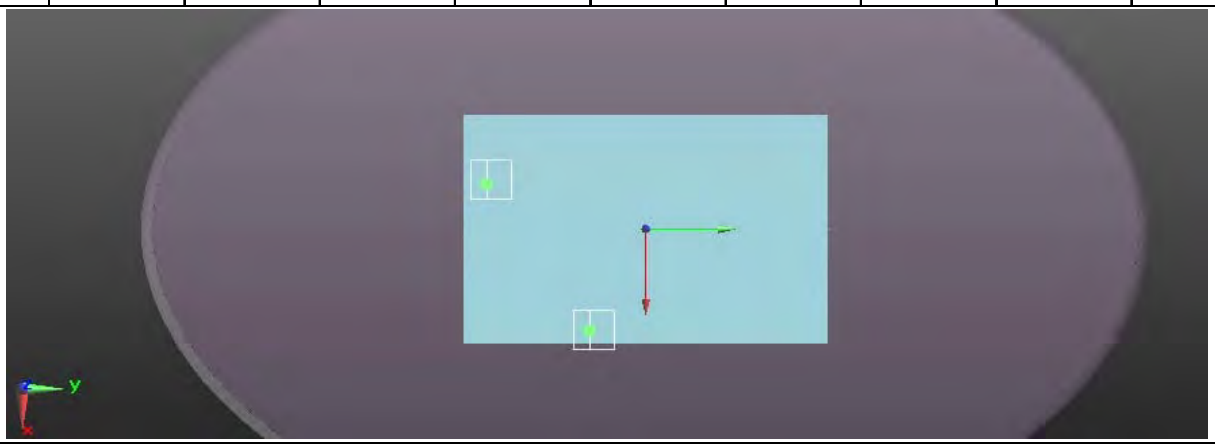
SPLSR WCDMA B4 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B4 CH 1312	Back side	0.91	0.45	10.05	0.49	2.184	145.51	0.022	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11a CH 100	Back side	1.536	-2.76	-9.44	0.48	2.81	119.49	0.039	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



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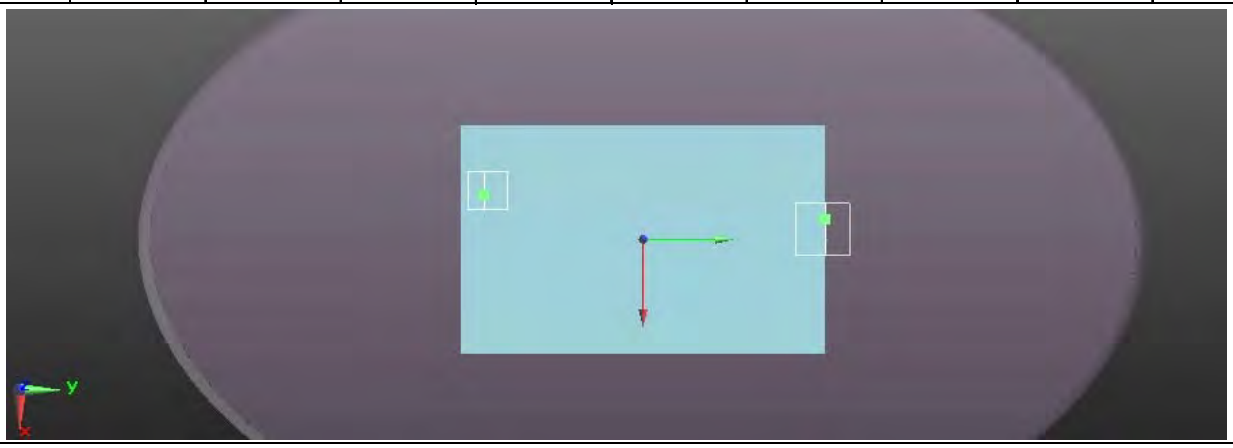
WCDMA Band V + 5GHz WLAN MIMO

No.	Conditions	Position	Distance (mm)	Max. WCDMA B5	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR WCDMA B5 & WLAN Main	SPLSR WCDMA B5 & WLAN Aux	SPLSR WLAN Main & WLAN Aux
10	WCDMA B5 + 5GHz WLAN MIMO	Back side	0	1.213	1.536	1.274	**4.023**	Analyzed as below	Analyzed as below	Analyzed as below
		Back side	26	0.237	-	-	0.237	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.318	0.107	0.825	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Left side	0	0.191	0.081	0.4 (Estimated SAR)	0.672	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Right side	0	0.411	0.016	0.8	1.227	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	0	0.719	0.006	0.02	0.745	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required
		Bottom side	10	0.817	-	-	0.817	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required	ΣSAR<1.6, Not required

SPLSR WCDMA B5 & WLAN Main

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B5 CH 4183	Back side	1.213	-1.24	10.81	0.39	2.749	203.1	0.022	SPLSR<0.04, Not required
802.11a CH 100		1.536	-2.76	-9.44	0.48				



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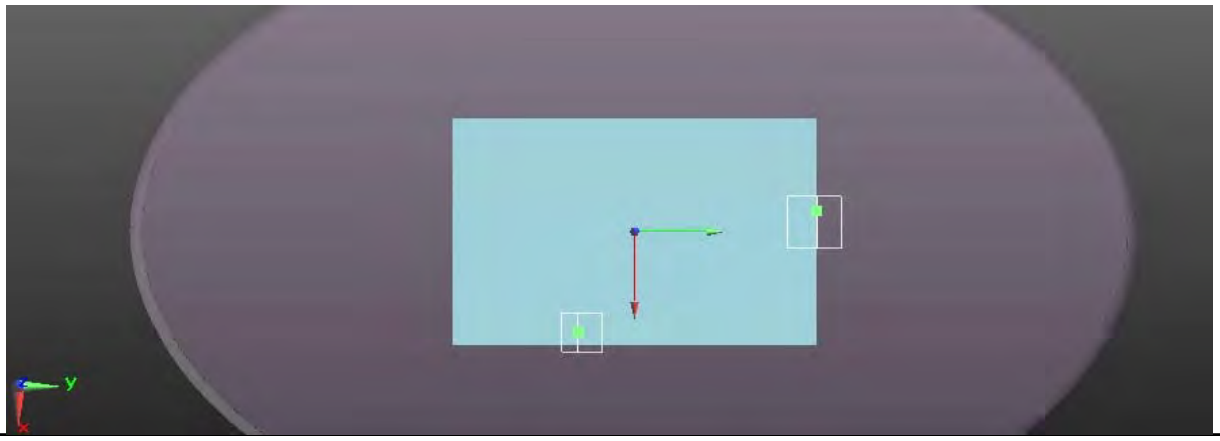
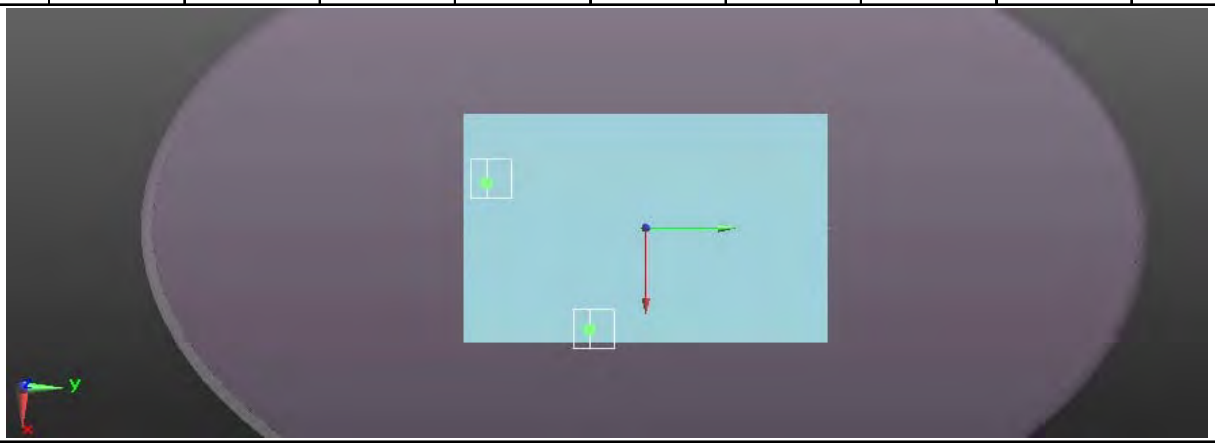
SPLSR WCDMA B5 & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
WCDMA B5 CH 4183	Back side	1.213	-1.24	10.81	0.39	2.487	160.5	0.024	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



SPLSR WLAN Main & WLAN Aux

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
			x	y	z				
802.11a CH 100	Back side	1.536	-2.76	-9.44	0.48	2.81	119.49	0.039	SPLSR<0.04, Not required
802.11a CH 44		1.274	7.2	-2.84	0.59				



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GPRS 850 + BT

No.	Conditions	Position	Distance (mm)	Max. GPRS850	Max. BT	SAR Sum	SPLSR GPRS850 & BT
11	GPRS850 + BT	Back side	0	0.869	0.162	1.031	ΣSAR<1.6, Not required
		Back side	26	0.266	-	0.266	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.162	0.562	ΣSAR<1.6, Not required
		Left side	0	0.679	0.05	0.729	ΣSAR<1.6, Not required
		Right side	0	0.228	0.4	0.628	ΣSAR<1.6, Not required
		Bottom side	0	0.529	0.4	0.929	ΣSAR<1.6, Not required
		Bottom side	10	0.835	-	0.835	ΣSAR<1.6, Not required

GPRS 1900 + BT

No.	Conditions	Position	Distance (mm)	Max. GPRS1900	Max. BT	SAR Sum	SPLSR GPRS1900 & BT
12	GPRS1900 + BT	Back side	0	0.33	0.162	0.492	ΣSAR<1.6, Not required
		Back side	26	0.098	-	0.098	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.162	0.562	ΣSAR<1.6, Not required
		Left side	0	0.336	0.05	0.386	ΣSAR<1.6, Not required
		Right side	0	0.038	0.4	0.438	ΣSAR<1.6, Not required
		Bottom side	0	0.137	0.4	0.537	ΣSAR<1.6, Not required
		Bottom side	10	0.259	-	0.259	ΣSAR<1.6, Not required

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WCDMA Band II + BT

No.	Conditions	Position	Distance (mm)	Max. WCDMA B2	Max. BT	SAR Sum	SPLSR WCDMA B2 & BT
13	WCDMA B2 + BT	Back side	0	1.045	0.162	1.207	ΣSAR<1.6, Not required
		Back side	26	0.238	-	0.238	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.162	0.562	ΣSAR<1.6, Not required
		Left side	0	0.508	0.05	0.558	ΣSAR<1.6, Not required
		Right side	0	0.223	0.4	0.623	ΣSAR<1.6, Not required
		Bottom side	0	0.392	0.4	0.792	ΣSAR<1.6, Not required
		Bottom side	10	0.6	-	0.6	ΣSAR<1.6, Not required

WCDMA Band IV + BT

No.	Conditions	Position	Distance (mm)	Max. WCDMA B4	Max. BT	SAR Sum	SPLSR WCDMA B4 & BT
14	WCDMA B4 + BT	Back side	0	0.91	0.162	1.072	ΣSAR<1.6, Not required
		Back side	26	0.188	-	0.188	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.162	0.562	ΣSAR<1.6, Not required
		Left side	0	0.4	0.05	0.45	ΣSAR<1.6, Not required
		Right side	0	0.153	0.4	0.553	ΣSAR<1.6, Not required
		Bottom side	0	0.312	0.4	0.712	ΣSAR<1.6, Not required
		Bottom side	10	0.426	-	0.426	ΣSAR<1.6, Not required

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WCDMA Band V + BT

No.	Conditions	Position	Distance (mm)	Max. WCDMA B5	Max. BT	SAR Sum	SPLSR WCDMA B5 & BT
15	WCDMA B5 + BT	Back side	0	1.213	0.162	1.375	ΣSAR<1.6, Not required
		Back side	26	0.237	-	0.237	ΣSAR<1.6, Not required
		Top side	0	0.4 (Estimated SAR)	0.162	0.562	ΣSAR<1.6, Not required
		Left side	0	0.191	0.05	0.241	ΣSAR<1.6, Not required
		Right side	0	0.411	0.4	0.811	ΣSAR<1.6, Not required
		Bottom side	0	0.719	0.4	1.119	ΣSAR<1.6, Not required
		Bottom side	10	0.817	-	0.817	ΣSAR<1.6, Not required

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4. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3820	May.15,2014	May.14,2015
Schmid & Partner Engineering AG	System Validation Dipole	D835V2	4d063	Aug.28,2014	Aug.27,2015
		D1750V2	1008	Aug.28,2014	Aug.27,2015
		D1900V2	5d027	Apr.23,2014	Apr.22,2015
		D2450V2	727	Apr.23,2014	Apr.22,2015
		D5GHzV2	1023	Jan.30,2014	Jan.29,2015
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547	Mar.26,2014	Mar.25,2015
Schmid & Partner Engineering AG	Software	DASY 52 V52.8.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required	Calibration not required
Agilent	Network Analyzer	E5071C	MY46107530	Feb.14,2014	Feb.13,2015
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	772D	MY46151242	Jul.14,2014	Jul.13,2015
		778D	MY48220468	Apr.01,2014	Mar.31,2015
Agilent	RF Signal Generator	N5181A	MY50144143	Jun.25.2014	Jun.24.2015
Agilent	Power Meter	E4417A	MY51410006	Oct.25,2013	Oct.24,2015
Agilent	Power Sensor	E9301H	MY51470001	Dec.16,2013	Dec.15,2014
TECPEL	Digital thermometer	DTM-303A	TP130077	Mar.17,2014	Mar.16,2015

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Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
R&S	Radio Communication Test	CMU200	113505	May.08,2014	May.07,2015
Anritsu	Power Meter	ML2495A	1005007	Jan.13,2014	Jan.12,2015
Anritsu	Power Sensor	MA2411B	917032	Jan.13,2014	Jan.12,2015
Mini-Circuit	Attenuator	BW-S10W2+	002	Feb.27,2014	Feb.26,2015

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Member of SGS Group

5. Measurements

Date: 2014/11/24

GPRS 850_Body-worn_Back side_CH 251_4up_0mm

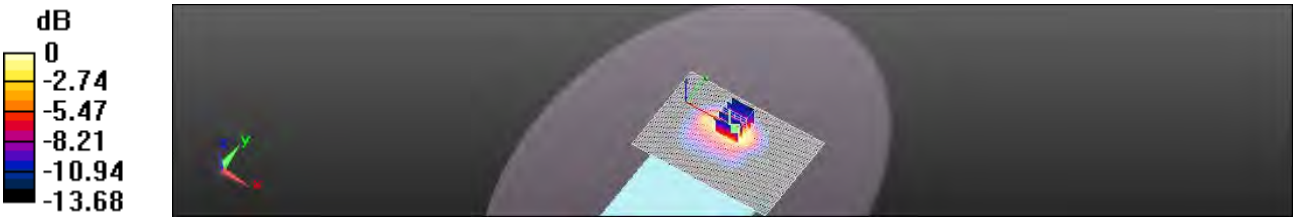
Communication System: GPRS (1Dn4Up); Frequency: 848.8 MHz
Medium parameters used: f = 849 MHz; σ = 1.011 S/m; ε_r = 52.576; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(9.01, 9.01, 9.01); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (121x81x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.804 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.703 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 1.25 W/kg
SAR(1 g) = 0.659 W/kg; SAR(10 g) = 0.367 W/kg
Maximum value of SAR (measured) = 0.971 W/kg



0 dB = 0.971 W/kg = -0.13 dBW/kg

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Date: 2014/11/26

GPRS 1900_Body-worn_Left side_CH 512_3up_0mm

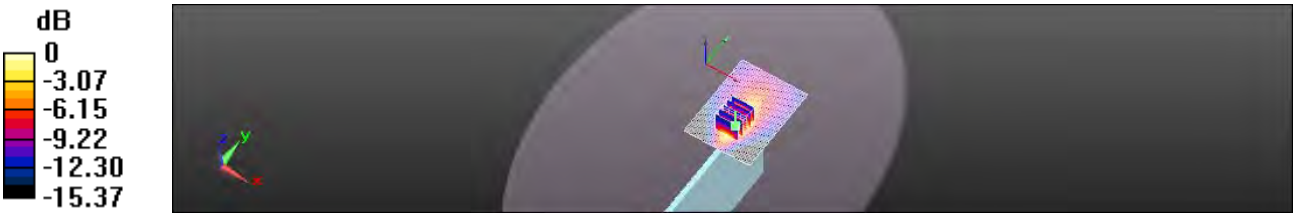
Communication System: GPRS (1Dn3Up); Frequency: 1850.2 MHz
Medium parameters used: f = 1850.2 MHz; σ = 1.483 S/m; ε_r = 54.823; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.23, 7.23, 7.23); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (61x81x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.402 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.332 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.484 W/kg
SAR(1 g) = 0.267 W/kg; SAR(10 g) = 0.149 W/kg
Maximum value of SAR (measured) = 0.375 W/kg



0 dB = 0.375 W/kg = -4.26 dBW/kg

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Date: 2014/11/26

WCDMA Band 2_Body-worn_Back side_CH 9400_0mm

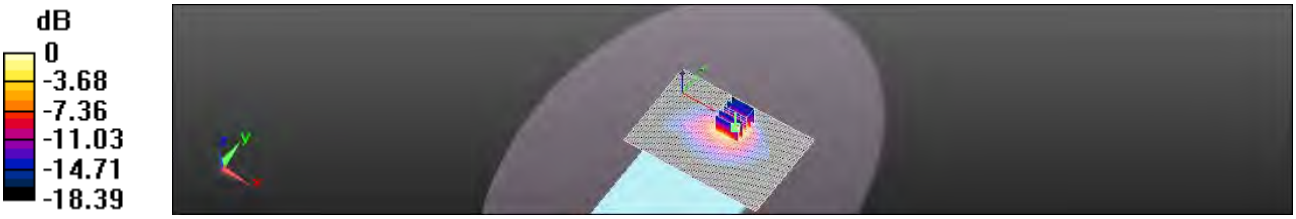
Communication System: WCDMA; Frequency: 1880 MHz
Medium parameters used: f = 1880 MHz; σ = 1.543 S/m; ε_r = 54.692; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.23, 7.23, 7.23); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (121x81x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.54 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.063 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 2.04 W/kg
SAR(1 g) = 0.969 W/kg; SAR(10 g) = 0.443 W/kg
Maximum value of SAR (measured) = 1.56 W/kg



0 dB = 1.56 W/kg = 1.94 dBW/kg

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Date: 2014/11/25

WCDMA Band 4_Body-worn_Back side_CH 1312_0mm_repeat SAR test at the highest SAR measurement

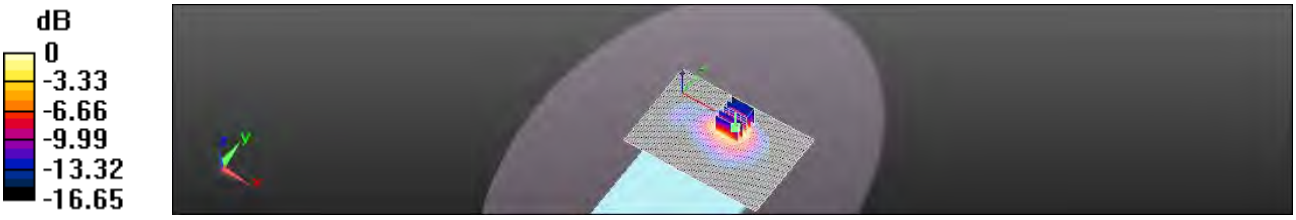
Communication System: WCDMA; Frequency: 1712.4 MHz
Medium parameters used: f = 1712.4 MHz; σ = 1.428 S/m; ε_r = 55.156; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.48, 7.48, 7.48); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (121x81x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.41 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.561 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.75 W/kg
SAR(1 g) = 0.861 W/kg; SAR(10 g) = 0.430 W/kg
Maximum value of SAR (measured) = 1.33 W/kg



0 dB = 1.33 W/kg = 1.25 dBW/kg

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Date: 2014/11/24

WCDMA Band 5_Body-worn_Back side_CH 4183_0mm

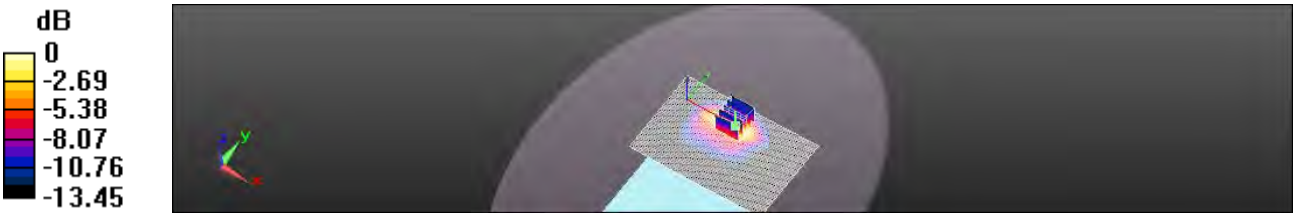
Communication System: WCDMA; Frequency: 836.6 MHz
Medium parameters used: f = 837 MHz; σ = 1 S/m; ε_r = 52.75; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(9.01, 9.01, 9.01); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (121x81x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.45 W/kg

Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.544 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 1.95 W/kg
SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.568 W/kg
Maximum value of SAR (measured) = 1.50 W/kg



0 dB = 1.50 W/kg = 1.75 dBW/kg

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Date: 2014/12/5

WLAN802.11b_Body-worn_Top side_CH 1_Main

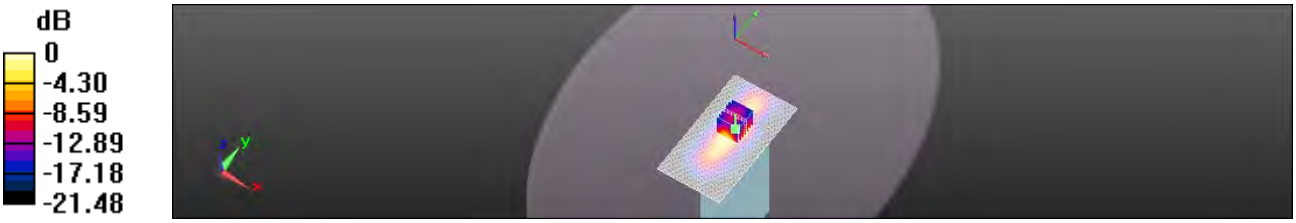
Communication System: WLAN(2.45G); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.94 S/m; ε_r = 53.618; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(6.87, 6.87, 6.87); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.62 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.00 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 2.06 W/kg
SAR(1 g) = 1.03 W/kg; SAR(10 g) = 0.475 W/kg
Maximum value of SAR (measured) = 1.56 W/kg



0 dB = 1.56 W/kg = 1.93 dBW/kg

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Date: 2014/12/5

WLAN802.11n(20M)_Body-worn_Top side_CH 6_Main

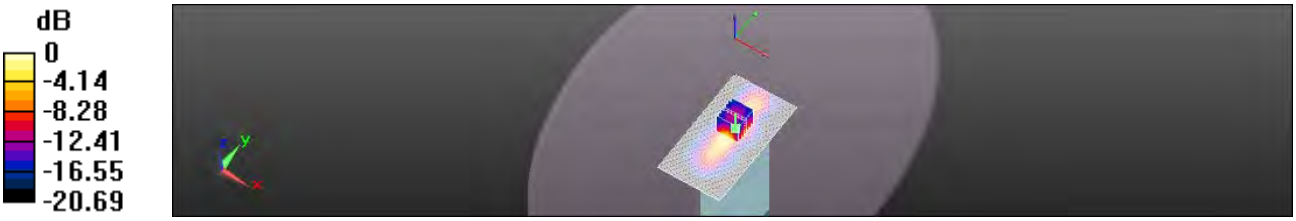
Communication System: WLAN(2.45G); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.969 S/m; ε_r = 53.445; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(6.87, 6.87, 6.87); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.04 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.10 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.679 W/kg; SAR(10 g) = 0.312 W/kg
Maximum value of SAR (measured) = 1.03 W/kg



0 dB = 1.03 W/kg = 0.13 dBW/kg

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Date: 2014/12/6

WLAN802.11a 5.2G_Body-worn_Back side_CH 40_Main

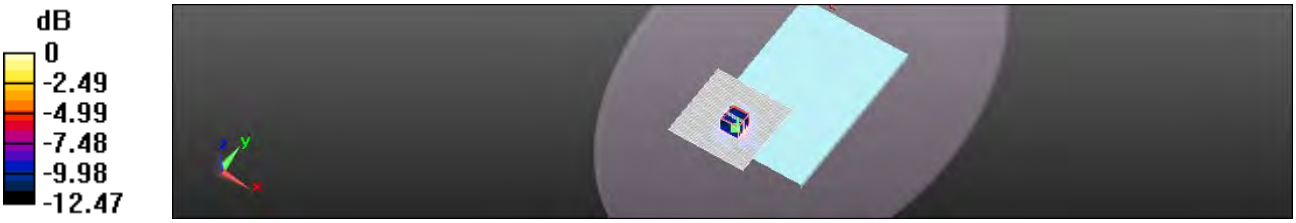
Communication System: WLAN(5G); Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.215 S/m; ε_r = 47.94; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.44, 4.44, 4.44); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.25 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.953 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 5.04 W/kg
SAR(1 g) = 1.27 W/kg; SAR(10 g) = 0.534 W/kg
Maximum value of SAR (measured) = 2.30 W/kg



0 dB = 2.30 W/kg = 3.62 dBW/kg

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Date: 2014/12/6

WLAN802.11n(40M) 5.2G_Body-worn_Back side_CH 46_Main

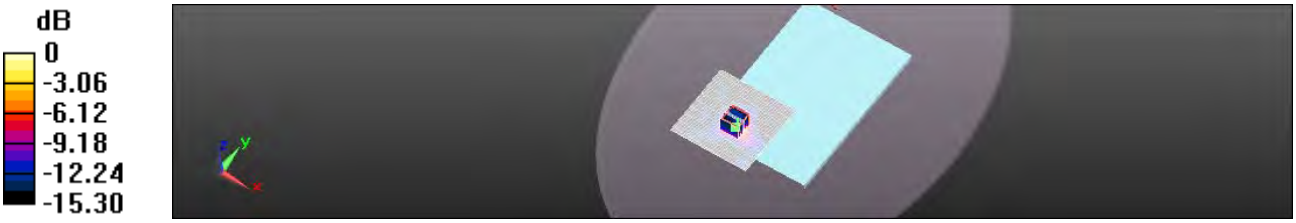
Communication System: WLAN(5G); Frequency: 5230 MHz
Medium parameters used: f = 5230 MHz; σ = 5.248 S/m; ε_r = 47.874; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.44, 4.44, 4.44); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.29 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.113 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 4.61 W/kg
SAR(1 g) = 1.13 W/kg; SAR(10 g) = 0.429 W/kg
Maximum value of SAR (measured) = 2.12 W/kg



0 dB = 2.12 W/kg = 3.26 dBW/kg

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Date: 2014/12/7

WLAN802.11a 5.3G_Body-worn_Back side_CH 60_Main

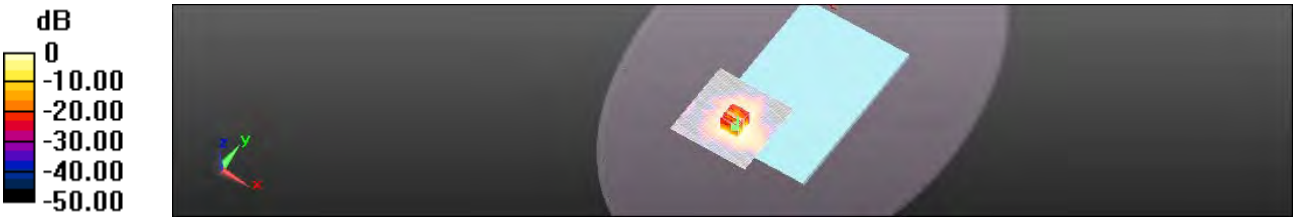
Communication System: WLAN(5G); Frequency: 5300 MHz
Medium parameters used: f = 5300 MHz; σ = 5.388 S/m; ε_r = 47.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.90 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.245 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 5.69 W/kg
SAR(1 g) = 1.4 W/kg; SAR(10 g) = 0.450 W/kg
Maximum value of SAR (measured) = 2.76 W/kg



0 dB = 2.76 W/kg = 4.41 dBW/kg

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Date: 2014/12/7

WLAN802.11n(40M) 5.3G_Body-worn_Back side_CH 62_Main

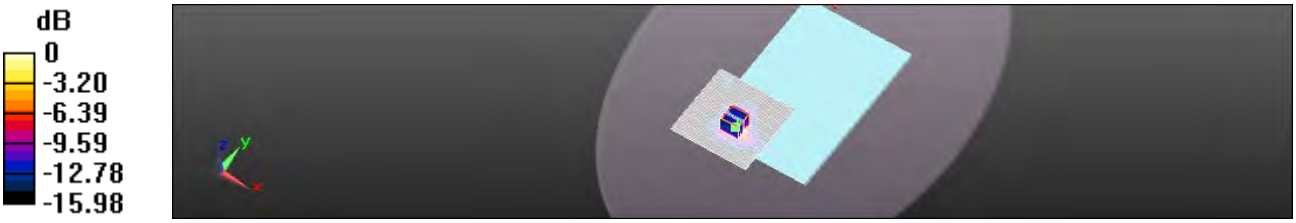
Communication System: WLAN(5G); Frequency: 5310 MHz
Medium parameters used: f = 5310 MHz; σ = 5.391 S/m; ε_r = 47.585; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.76 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.731 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 5.24 W/kg
SAR(1 g) = 1.33 W/kg; SAR(10 g) = 0.508 W/kg
Maximum value of SAR (measured) = 2.51 W/kg



0 dB = 2.51 W/kg = 4.00 dBW/kg

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Date: 2014/12/8

WLAN802.11a 5.6G_Body-worn_Back side_CH 100_Main

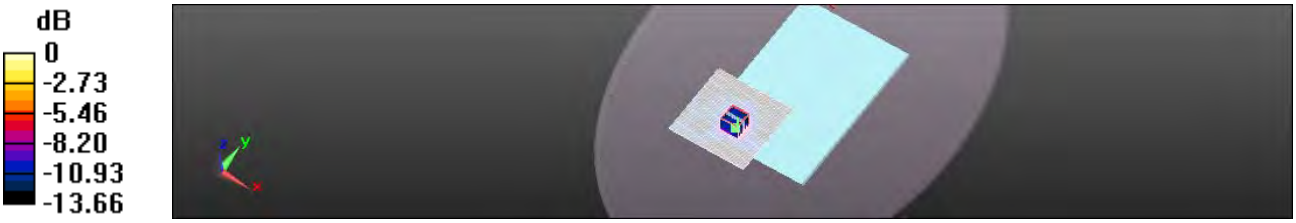
Communication System: WLAN(5G); Frequency: 5500 MHz
Medium parameters used: f = 5500 MHz; σ = 5.694 S/m; ε_r = 47.522; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(3.99, 3.99, 3.99); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.59 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.836 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 5.68 W/kg
SAR(1 g) = 1.31 W/kg; SAR(10 g) = 0.519 W/kg
Maximum value of SAR (measured) = 2.41 W/kg



0 dB = 2.41 W/kg = 3.82 dBW/kg

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Date: 2014/12/8

WLAN802.11n(40M) 5.6G_Body-worn_Back side_CH 102_Main

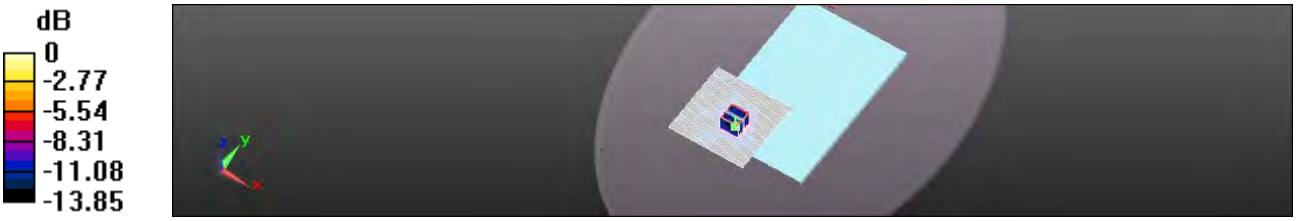
Communication System: WLAN(5G); Frequency: 5510 MHz
Medium parameters used: f = 5510 MHz; σ = 5.713 S/m; ε_r = 47.492; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(3.99, 3.99, 3.99); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.46 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.258 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 5.23 W/kg
SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.483 W/kg
Maximum value of SAR (measured) = 2.31 W/kg



0 dB = 2.31 W/kg = 3.64 dBW/kg

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Date: 2014/12/10

WLAN802.11a 5.8G_Body-worn_Back side_CH 165_Main_repeat SAR test at the highest SAR measurement

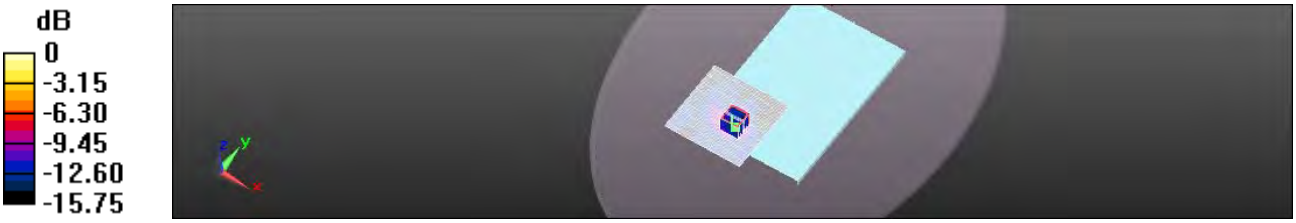
Communication System: WLAN(5G); Frequency: 5825 MHz
Medium parameters used: f = 5825 MHz; σ = 6.278 S/m; ε_r = 46.18; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4, 4, 4); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 2.58 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.382 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 5.52 W/kg
SAR(1 g) = 1.18 W/kg; SAR(10 g) = 0.404 W/kg
Maximum value of SAR (measured) = 2.35 W/kg



0 dB = 2.35 W/kg = 3.71 dBW/kg

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Date: 2014/12/10

WLAN802.11n(40M) 5.8G_Body-worn_Back side_CH 159_Main

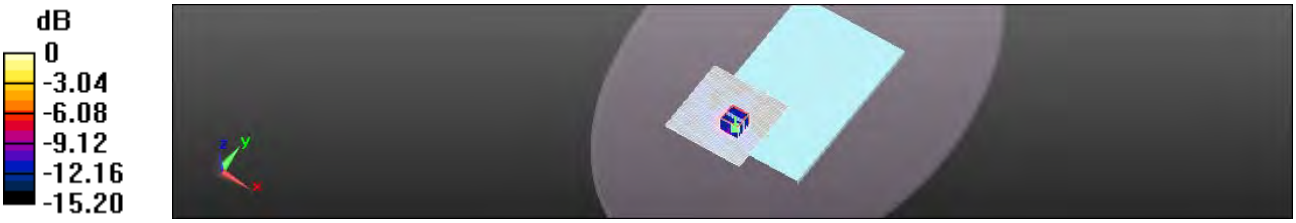
Communication System: WLAN(5G); Frequency: 5795 MHz
Medium parameters used: f = 5795 MHz; σ = 6.2 S/m; ε_r = 46.273; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4, 4, 4); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (101x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.96 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.258 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 4.58 W/kg
SAR(1 g) = 0.951 W/kg; SAR(10 g) = 0.344 W/kg
Maximum value of SAR (measured) = 1.85 W/kg



0 dB = 1.85 W/kg = 2.67 dBW/kg

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Date: 2014/12/5

WLAN802.11b_Body-worn_Back side_CH 11_Aux_repeat SAR test at the highest SAR measurement

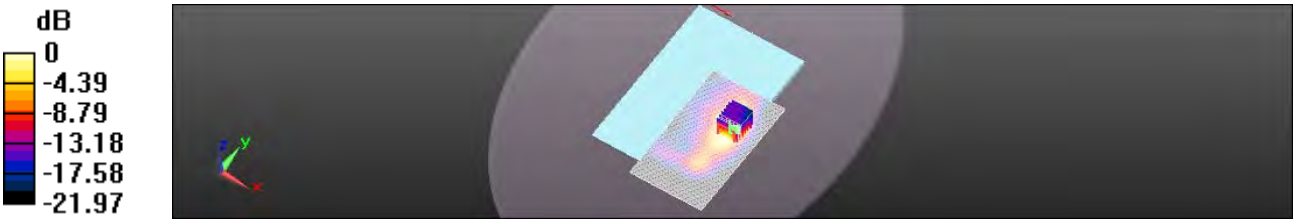
Communication System: WLAN(2.45G); Frequency: 2462 MHz
Medium parameters used: f = 2462 MHz; σ = 2.003 S/m; ε_r = 53.318; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(6.87, 6.87, 6.87); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (81x141x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 2.05 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.400 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 2.62 W/kg
SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.636 W/kg
Maximum value of SAR (measured) = 1.96 W/kg



0 dB = 1.96 W/kg = 2.92 dBW/kg

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Date: 2014/12/5

WLAN802.11n(20M)_Body-worn_Back side_CH 1_Aux

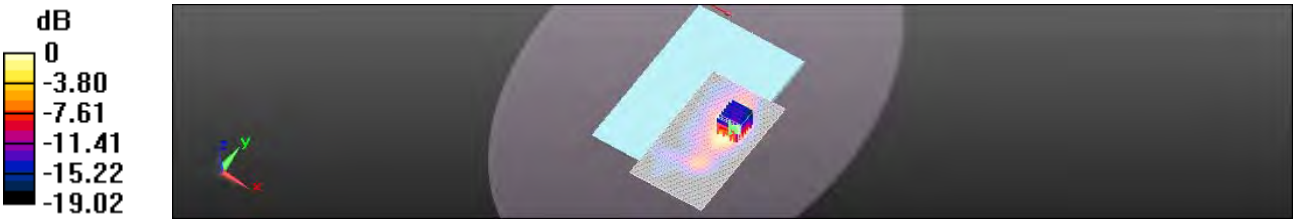
Communication System: WLAN(2.45G); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.94 S/m; ε_r = 53.618; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(6.87, 6.87, 6.87); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (81x141x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 1.13 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.361 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.60 W/kg
SAR(1 g) = 0.763 W/kg; SAR(10 g) = 0.383 W/kg
Maximum value of SAR (measured) = 1.18 W/kg



0 dB = 1.18 W/kg = 0.72 dBW/kg

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Date: 2014/12/6

WLAN802.11a 5.2G_Body-worn_Back side_CH 44_Aux_repeat SAR test at the highest SAR measurement

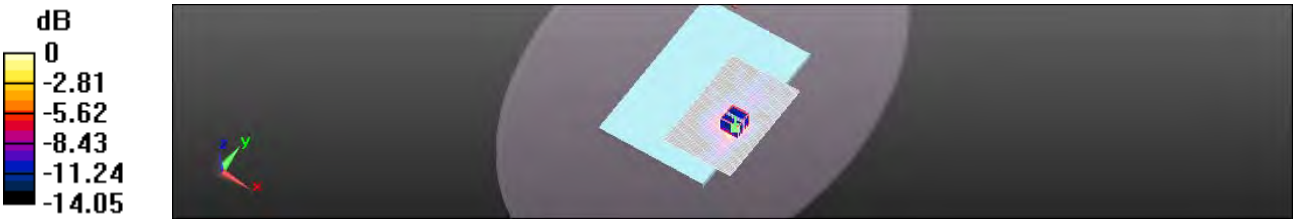
Communication System: WLAN(5G); Frequency: 5220 MHz
Medium parameters used: f = 5220 MHz; σ = 5.241 S/m; ε_r = 47.918; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.44, 4.44, 4.44); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x141x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.69 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.480 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 3.23 W/kg
SAR(1 g) = 0.871 W/kg; SAR(10 g) = 0.367 W/kg
Maximum value of SAR (measured) = 1.59 W/kg



0 dB = 1.59 W/kg = 2.01 dBW/kg

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Date: 2014/12/6

WLAN802.11n(40M) 5.2G_Body-worn_Back side_CH 38_Aux

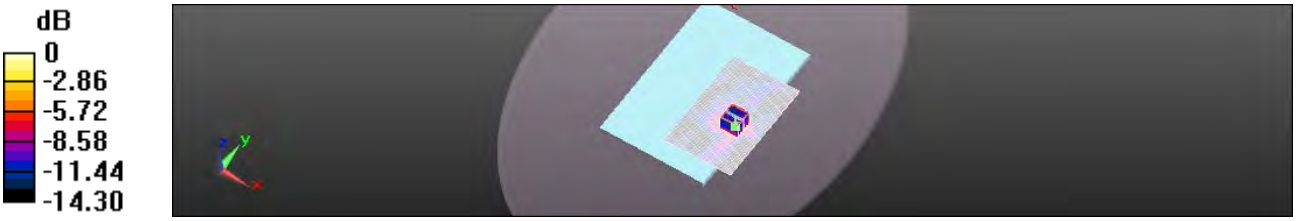
Communication System: WLAN(5G); Frequency: 5190 MHz
Medium parameters used: f = 5190 MHz; σ = 5.203 S/m; ε_r = 47.969; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.44, 4.44, 4.44); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x141x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.43 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.098 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 2.84 W/kg
SAR(1 g) = 0.780 W/kg; SAR(10 g) = 0.330 W/kg
Maximum value of SAR (measured) = 1.40 W/kg



0 dB = 1.40 W/kg = 1.46 dBW/kg

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Date: 2014/12/7

WLAN802.11a 5.3G_Body-worn_Back side_CH 52_Aux_repeat SAR test at the highest SAR measurement

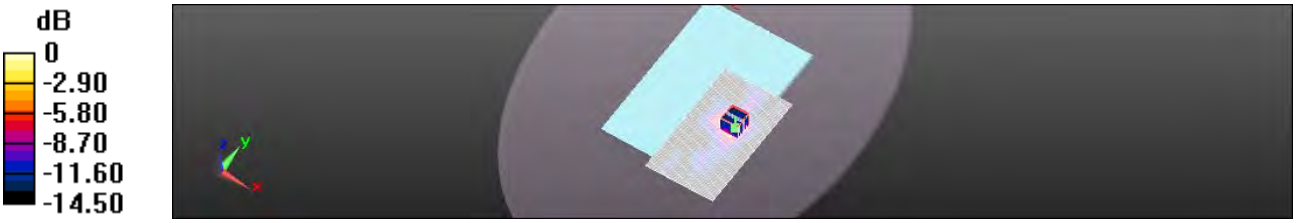
Communication System: WLAN(5G); Frequency: 5260 MHz
Medium parameters used: f = 5260 MHz; σ = 5.293 S/m; ε_r = 47.837; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x161x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.45 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.847 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 3.15 W/kg
SAR(1 g) = 0.857 W/kg; SAR(10 g) = 0.336 W/kg
Maximum value of SAR (measured) = 1.53 W/kg



0 dB = 1.53 W/kg = 1.85 dBW/kg

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Date: 2014/12/7

WLAN802.11n(40M) 5.3G_Body-worn_Back side_CH 54_Aux

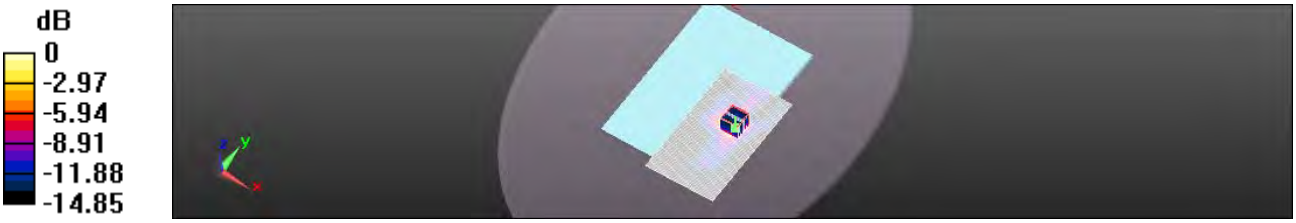
Communication System: WLAN(5G); Frequency: 5270 MHz
Medium parameters used: f = 5270 MHz; σ = 5.303 S/m; ε_r = 47.795; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x161x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.64 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.449 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 0.959 W/kg; SAR(10 g) = 0.370 W/kg
Maximum value of SAR (measured) = 1.70 W/kg



0 dB = 1.70 W/kg = 2.30 dBW/kg

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Date: 2014/12/8

WLAN802.11a 5.6G_Body-worn_Back side_CH 136_Aux

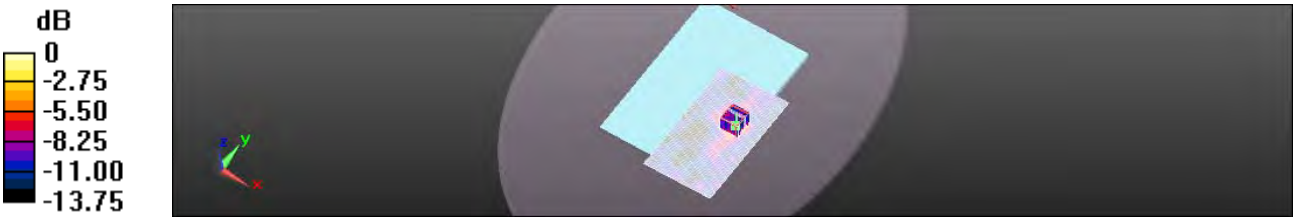
Communication System: WLAN(5G); Frequency: 5680 MHz
Medium parameters used: f = 5680 MHz; σ = 5.992 S/m; ε_r = 46.979; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(3.83, 3.83, 3.83); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x161x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.12 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 5.768 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 2.71 W/kg
SAR(1 g) = 0.684 W/kg; SAR(10 g) = 0.306 W/kg
Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kg = 0.86 dBW/kg

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Date: 2014/12/8

WLAN802.11n(40M) 5.6G_Body-worn_Back side_CH 134_Aux

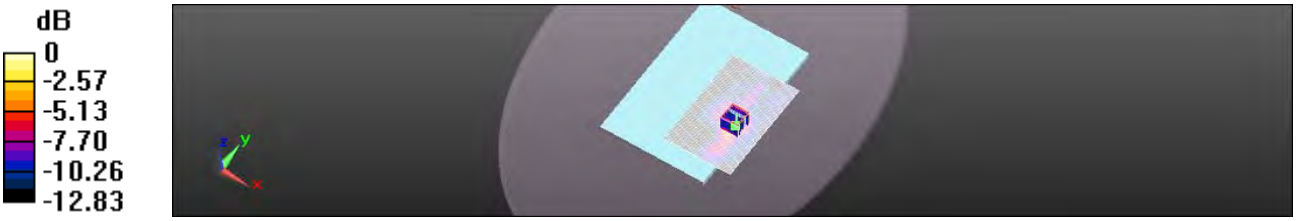
Communication System: WLAN(5G); Frequency: 5670 MHz
Medium parameters used: f = 5670 MHz; σ = 5.948 S/m; ε_r = 47.031; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(3.83, 3.83, 3.83); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x141x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.27 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.775 V/m; Power Drift = -0.19 dB
Peak SAR (extrapolated) = 2.83 W/kg
SAR(1 g) = 0.726 W/kg; SAR(10 g) = 0.326 W/kg
Maximum value of SAR (measured) = 1.38 W/kg



0 dB = 1.38 W/kg = 1.40 dBW/kg

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Date: 2014/12/10

WLAN802.11a 5.8G_Body-worn_Back side_CH 161_Aux

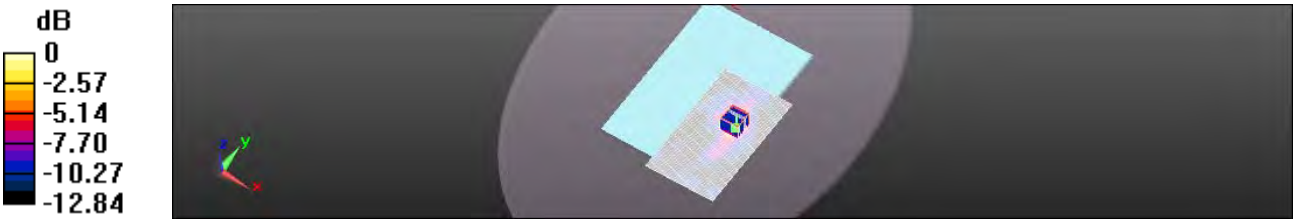
Communication System: WLAN(5G); Frequency: 5805 MHz
Medium parameters used: f = 5805 MHz; σ = 6.236 S/m; ε_r = 46.217; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4, 4, 4); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x161x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.911 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.731 V/m; Power Drift = 0.11 dB
Peak SAR (extrapolated) = 2.35 W/kg
SAR(1 g) = 0.608 W/kg; SAR(10 g) = 0.260 W/kg
Maximum value of SAR (measured) = 1.10 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

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Date: 2014/12/10

WLAN802.11n(40M) 5.8G_Body-worn_Back side_CH 151_Aux

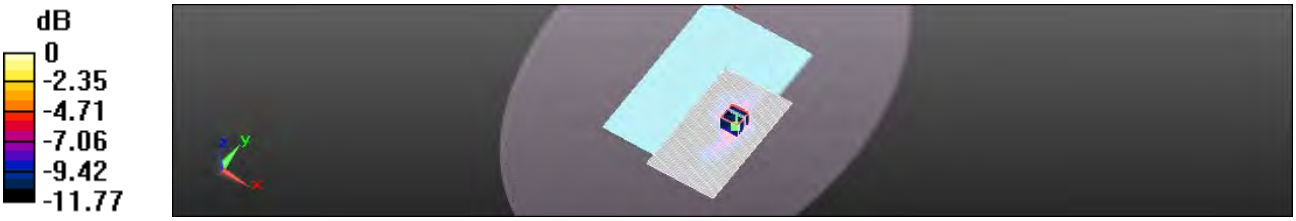
Communication System: WLAN(5G); Frequency: 5755 MHz
Medium parameters used: f = 5755 MHz; σ = 6.141 S/m; ε_r = 46.486; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4, 4, 4); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (91x161x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.921 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 4.023 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 2.24 W/kg
SAR(1 g) = 0.580 W/kg; SAR(10 g) = 0.250 W/kg
Maximum value of SAR (measured) = 1.10 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

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6. SAR System Performance Verification

Date: 2014/11/24

Dipole 835 MHz_SN:4d063_Body

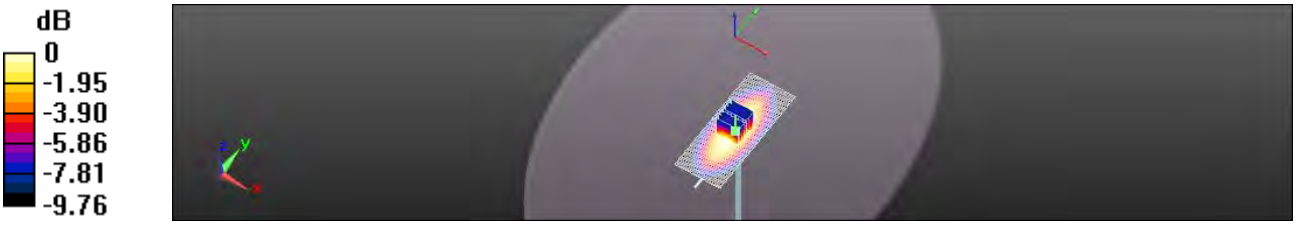
Communication System: CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.999 S/m; ε_r = 52.823; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(9.01, 9.01, 9.01); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=250mW/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 3.09 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.81 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 3.56 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.65 W/kg
Maximum value of SAR (measured) = 3.06 W/kg



0 dB = 3.06 W/kg = 4.86 dBW/kg

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Date: 2014/11/25

Dipole 1750 MHz_SN:1008_Body

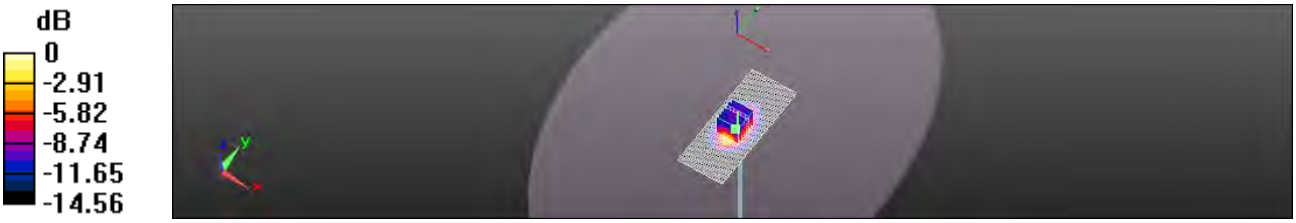
Communication System: CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.445 S/m; ε_r = 54.916; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.48, 7.48, 7.48); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=250mW/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 12.5 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.66 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 15.4 W/kg
SAR(1 g) = 9.06 W/kg; SAR(10 g) = 5.06 W/kg
Maximum value of SAR (measured) = 12.4 W/kg



0 dB = 12.4 W/kg = 10.93 dBW/kg

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Date: 2014/11/26

Dipole 1900 MHz_SN:5d027_Body

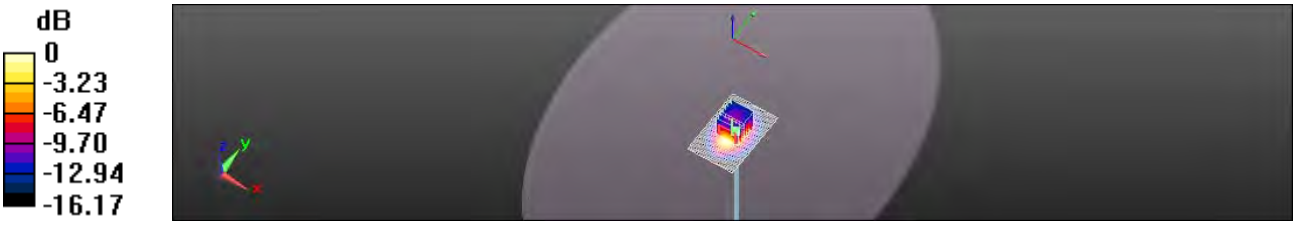
Communication System: CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.57 S/m; ε_r = 54.591; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(7.23, 7.23, 7.23); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 14.0 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.28 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.77 W/kg; SAR(10 g) = 5.28 W/kg
Maximum value of SAR (measured) = 13.7 W/kg



0 dB = 13.7 W/kg = 11.37 dBW/kg

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Date: 2014/12/5

Dipole 2450 MHz_SN:727_Body

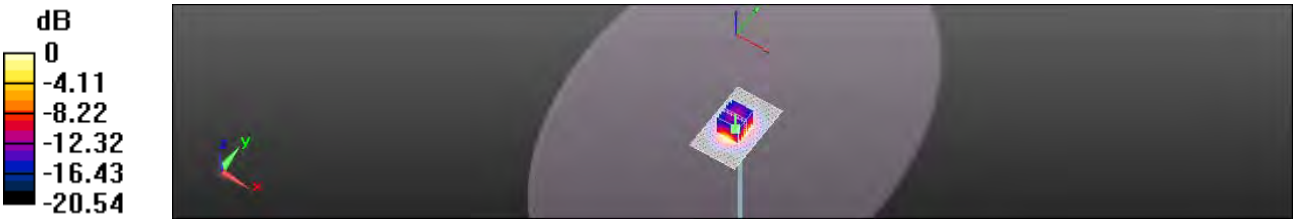
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.997 S/m; ε_r = 53.416; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(6.87, 6.87, 6.87); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=250mW/Area Scan (51x81x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 19.0 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.26 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 24.1 W/kg
SAR(1 g) = 12.1 W/kg; SAR(10 g) = 5.78 W/kg
Maximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.1 W/kg = 12.58 dBW/kg

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Date: 2014/12/6

Dipole 5200 MHz_SN:1023_Body

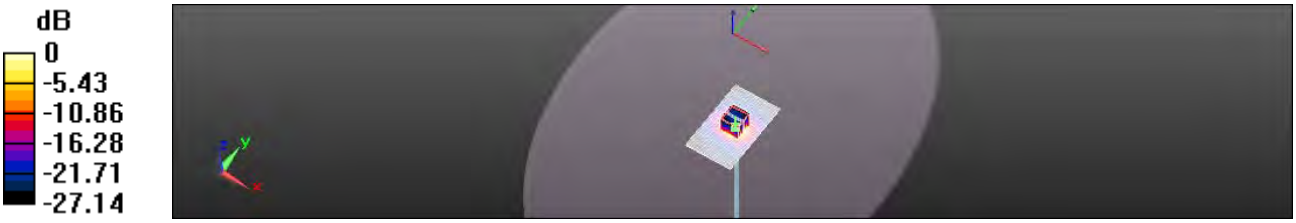
Communication System: CW; Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.215 S/m; ε_r = 47.94; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.44, 4.44, 4.44); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=100mW/Area Scan (61x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 16.0 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.17 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 7.76 W/kg; SAR(10 g) = 2.18 W/kg
Maximum value of SAR (measured) = 15.8 W/kg



0 dB = 15.8 W/kg = 11.99 dBW/kg

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Date: 2014/12/7

Dipole 5300 MHz_SN:1023_Body

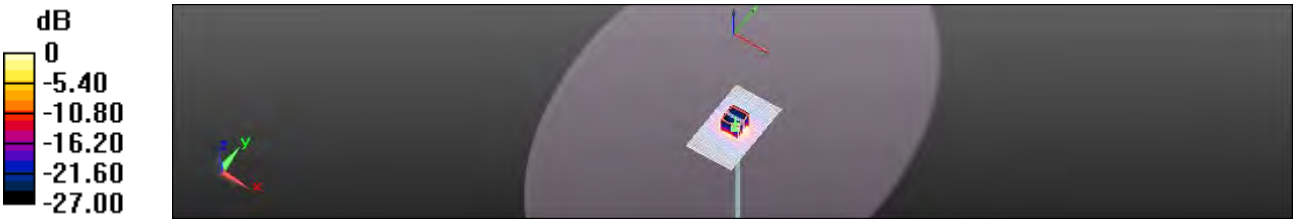
Communication System: CW; Frequency: 5300 MHz
Medium parameters used: f = 5300 MHz; σ = 5.388 S/m; ε_r = 47.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4.25, 4.25, 4.25); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=100mW/Area Scan (61x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 15.4 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 57.18 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.11 W/kg
Maximum value of SAR (measured) = 15.1 W/kg



0 dB = 15.1 W/kg = 11.79 dBW/kg

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Date: 2014/12/8

Dipole 5600 MHz_SN:1023_Body

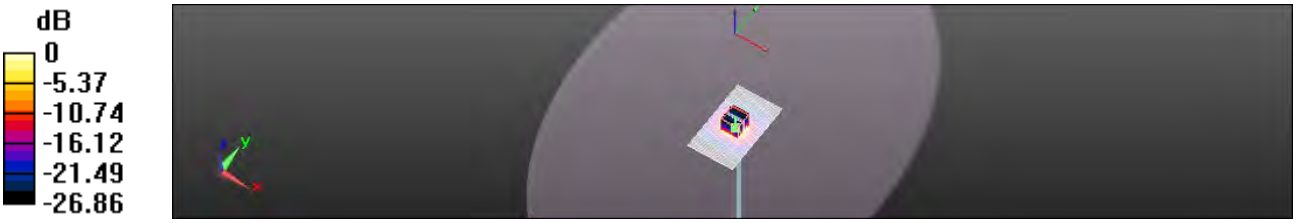
Communication System: CW; Frequency: 5600 MHz
Medium parameters used: f = 5600 MHz; σ = 5.838 S/m; ε_r = 47.15; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(3.99, 3.99, 3.99); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=100mW/Area Scan (61x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 18.9 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 63.52 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 34.2 W/kg
SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



0 dB = 18.9 W/kg = 12.76 dBW/kg

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Date: 2014/12/10

Dipole 5800 MHz_SN:1023_Body

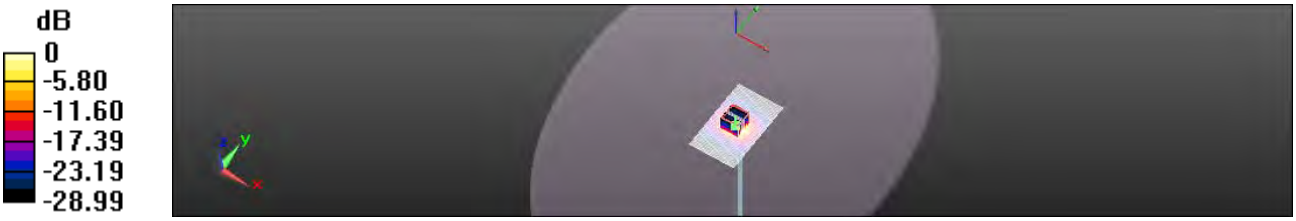
Communication System: CW; Frequency: 5800 MHz
Medium parameters used: f = 5800 MHz; σ = 6.217 S/m; ε_r = 46.238; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3820; ConvF(4, 4, 4); Calibrated: 2014/5/15;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2014/3/26
- Phantom: Body;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Pin=100mW/Area Scan (61x101x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 15.7 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.62 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 31.5 W/kg
SAR(1 g) = 7.36 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 15.7 W/kg



0 dB = 15.7 W/kg = 11.96 dBW/kg

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7. DAE & Probe Calibration Certificate

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS - TW (Auden)

Certificate No: DAE4-547_Mar14

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 547
Calibration procedure(s)	QA CAL-06.v26 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	March 26, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	01-Oct-13 (No.13976)	Oct-14
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-14 (in house check)	In house check: Jan-15
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-14 (in house check)	In house check: Jan-15

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Technician	
Approved by:	Fin Bomholt	Deputy Technical Manager	

Issued: March 26, 2014

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Certificate No: DAE4-547_Mar14 Page 1 of 5

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Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1μV , full range = -100...+300 mV

Low Range: 1LSB = 61nV , full range = -1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	404.032 ± 0.02% (k=2)	404.058 ± 0.02% (k=2)	404.202 ± 0.02% (k=2)
Low Range	3.95713 ± 1.50% (k=2)	3.96202 ± 1.50% (k=2)	3.97561 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	158.0 ° ± 1 °

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Appendix

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	199995.43	-0.60	-0.00
Channel X	+ Input	20004.43	4.15	0.02
Channel X	- Input	-19997.69	3.25	-0.02
Channel Y	+ Input	199994.87	-1.15	-0.00
Channel Y	+ Input	19998.43	-1.93	-0.01
Channel Y	- Input	-20001.87	-0.85	0.00
Channel Z	+ Input	199997.48	1.41	0.00
Channel Z	+ Input	20001.10	0.79	0.00
Channel Z	- Input	-20003.63	-2.53	0.01

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.64	0.17	0.01
Channel X	+ Input	201.77	0.85	0.42
Channel X	- Input	-199.11	-0.24	0.12
Channel Y	+ Input	2000.97	0.62	0.03
Channel Y	+ Input	200.19	-0.69	-0.34
Channel Y	- Input	-199.95	-0.97	0.49
Channel Z	+ Input	2000.53	0.21	0.01
Channel Z	+ Input	200.38	-0.40	-0.20
Channel Z	- Input	-199.62	-0.59	0.29

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	19.65	17.65
	- 200	-14.62	-15.76
Channel Y	200	-6.89	-7.43
	- 200	3.98	4.06
Channel Z	200	20.93	20.96
	- 200	-22.42	-22.42

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	2.53	-2.12
Channel Y	200	9.67	-	3.63
Channel Z	200	5.84	6.75	-

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4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16141	15478
Channel Y	16453	16523
Channel Z	15984	17120

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	2.01	0.79	3.52	0.47
Channel Y	-0.51	-1.15	0.66	0.34
Channel Z	-0.87	-1.96	0.11	0.45

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

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Accreditation No.: **SCS 108**

Client **Auden**

Certificate No: **EX3-3820_May14**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3820
Calibration procedure(s)	QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6 Calibration procedure for dosimetric E-field probes
Calibration date	May 15, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal. Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	**ID**	**Check Date (in house)**	**Scheduled Check**
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Claudio Leuber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 17, 2014

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy):* in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset:* The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle:* The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

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Probe EX3DV4

SN:3820

Manufactured:	September 2, 2011
Repaired:	April 28, 2014
Calibrated:	May 15, 2014

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

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3820

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.41	0.48	0.51	± 10.1 %
DCP (mV)[B]	101.9	94.0	97.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√µV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	144.8	±3.5 %
		Y	0.0	0.0	1.0		131.9	
		Z	0.0	0.0	1.0		142.9	

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

[A] The uncertainties of NormX,Y,Z do not affect the E^2-field uncertainty inside TSL (see Pages 5 and 6).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3820

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	41.9	0.89	9.55	9.55	9.55	0.41	0.88	± 12.0 %
835	41.5	0.90	9.22	9.22	9.22	0.30	1.08	± 12.0 %
900	41.5	0.97	9.23	9.23	9.23	0.47	0.78	± 12.0 %
1450	40.5	1.20	8.49	8.49	8.49	0.27	1.21	± 12.0 %
1750	40.1	1.37	8.26	8.26	8.26	0.80	0.59	± 12.0 %
1900	40.0	1.40	7.73	7.73	7.73	0.58	0.68	± 12.0 %
2100	39.8	1.49	7.71	7.71	7.71	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.85	6.85	6.85	0.41	0.85	± 12.0 %
2600	39.0	1.96	6.73	6.73	6.73	0.40	0.85	± 12.0 %
5200	36.0	4.66	4.94	4.94	4.94	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.66	4.66	4.66	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.70	4.70	4.70	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.47	4.47	4.47	0.35	1.80	± 13.1 %
5800	35.3	5.27	4.29	4.29	4.29	0.40	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3820

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unct. (k=2)
750	55.5	0.96	9.12	9.12	9.12	0.42	0.92	± 12.0 %
835	55.2	0.97	9.01	9.01	9.01	0.37	0.97	± 12.0 %
900	55.0	1.05	8.83	8.83	8.83	0.59	0.73	± 12.0 %
1450	54.0	1.30	7.88	7.88	7.88	0.58	0.73	± 12.0 %
1750	53.4	1.49	7.48	7.48	7.48	0.80	0.61	± 12.0 %
1900	53.3	1.52	7.23	7.23	7.23	0.63	0.70	± 12.0 %
2100	53.2	1.62	7.54	7.54	7.54	0.53	0.75	± 12.0 %
2450	52.7	1.95	6.87	6.87	6.87	0.80	0.58	± 12.0 %
2600	52.5	2.16	6.63	6.63	6.63	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.44	4.44	4.44	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.25	4.25	4.25	0.40	1.90	± 13.1 %
5500	48.6	5.65	3.99	3.99	3.99	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.83	3.83	3.83	0.45	1.90	± 13.1 %
5800	48.2	6.00	4.00	4.00	4.00	0.50	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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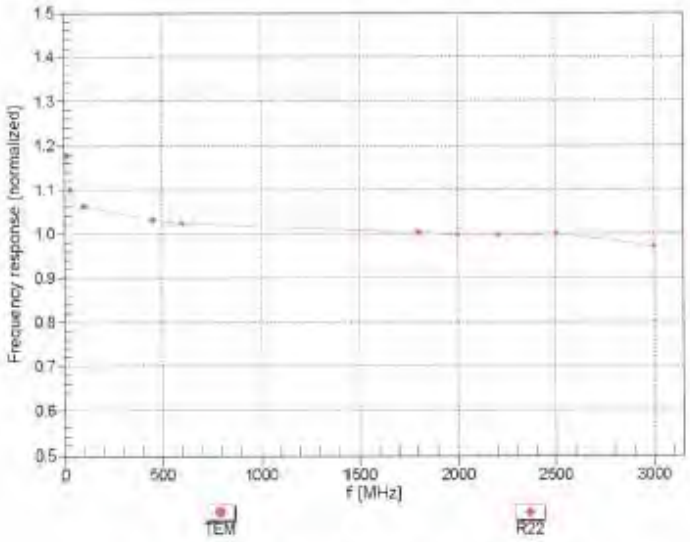
EX3DV4- SN:3820 May 15, 2014

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



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

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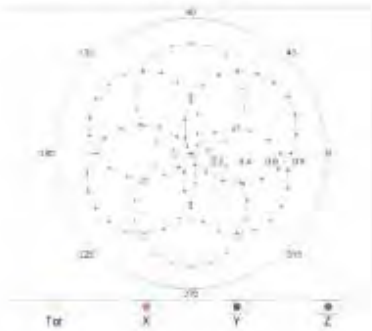
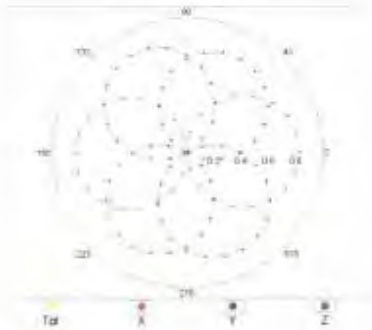
EX3DV4- SN:3820 May 15, 2014

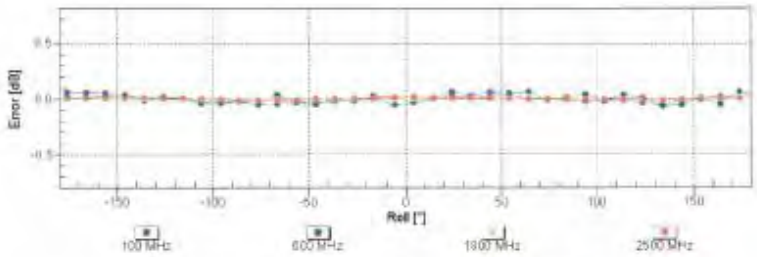
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22





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

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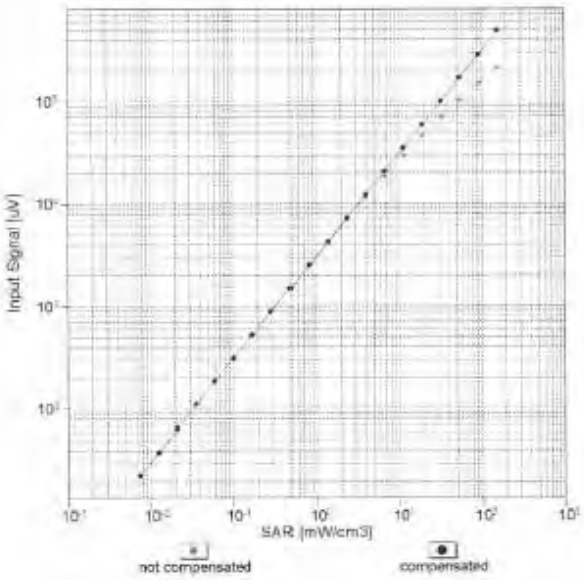
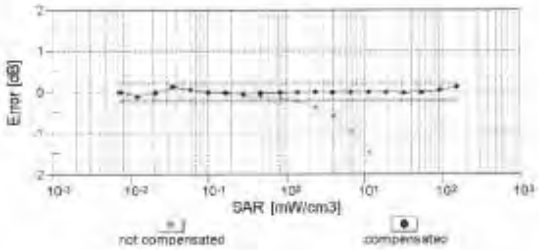
Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)





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

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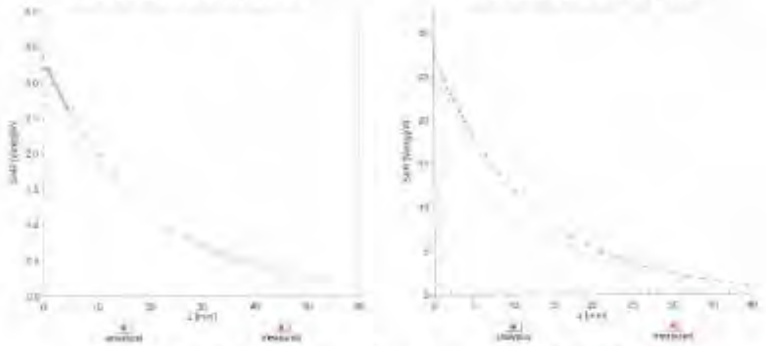
EX3DV4- SN:3820 May 15, 2014

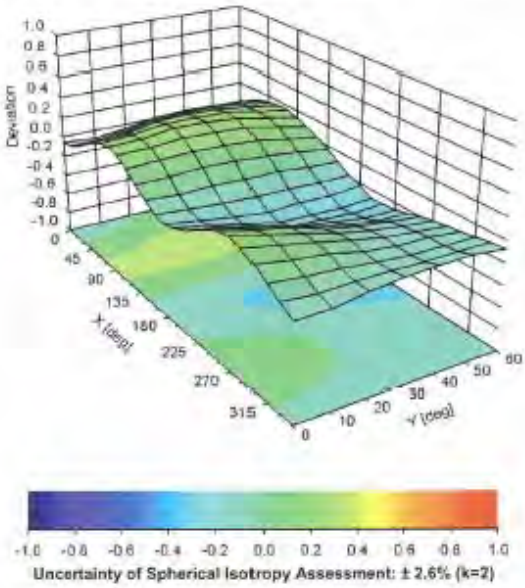
Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF) f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (φ, θ), f = 900 MHz



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

Certificate No: EX3-3820_May14 Page 10 of 11

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3820

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-56
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

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8. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test
IEEE 1528

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Deviation from reference	4.68%	N	1	1	0.64	0.43	3.00%	2.01%	M
Deviation from reference	4.34%	N	1	1	0.6	0.49	2.60%	2.13%	M
Combined standard uncertainty		RSS					12.23%	11.94%	
Expant uncertainty (95% confidence							24.46%	23.87%	

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9. Phantom Description

Schmid & Partner Engineering AG

s p e a g

Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	SAM Twin Phantom V4.0
Type No	QD 000 P40 C
Series No	TP-1150 and higher
Manufacturer	SPEAG Zeughausstrasse 43 CH-8004 Zürich Switzerland

Tests
The series production process used allows the limitation to test of first articles.
Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been retested using further series items (called samples) or are tested at each item.

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff.
Material thickness at ERP	Compliant with the requirements according to the standards	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required frequencies	300 MHz – 6 GHz: Relative permittivity < 5, Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-series, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid	< 1% typical < 0.8% if filled with 155mm of HSL900 and without DUT below	Prototypes, Sample testing

Standards
[1] CENELEC EN 50361
[2] IEEE Std 1528-2003
[3] IEC 62209 Part I
[4] FCC OET Bulletin 65, Supplement C, Edition 01-01
(*) The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of SAR measurements specified in standards [1] to [4].

Date 07.07.2005

Signature / Stamp

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
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Doc No 841 – QD 000 P40 C – F Page 1 (1)

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10. System Validation from Original Equipment Supplier

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

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

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D835V2-4d063_Aug14

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d063
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date	August 28, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01916)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2014

The calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D835V2-4d063_Aug14 Page 1 of 8

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S Schweizerischer Kalibrierdienst
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Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.24 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.05 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.2 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.35 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.21 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 3.6 jΩ
Return Loss	- 28.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 Ω - 5.8 jΩ
Return Loss	- 23.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.391 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

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DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

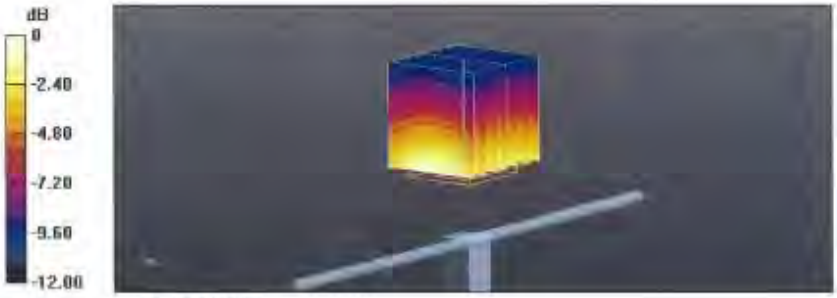
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 42; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.23 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

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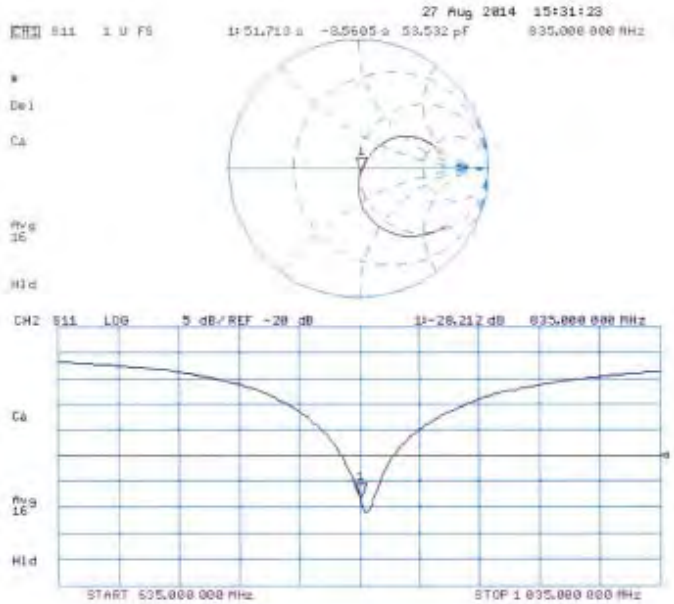
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

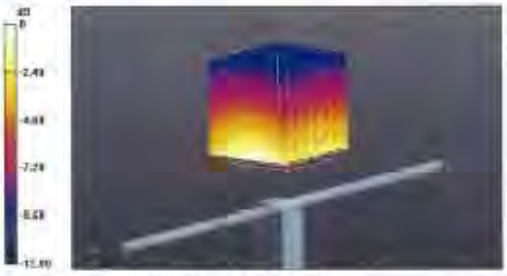
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.01 S/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.65 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.53 W/kg
SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

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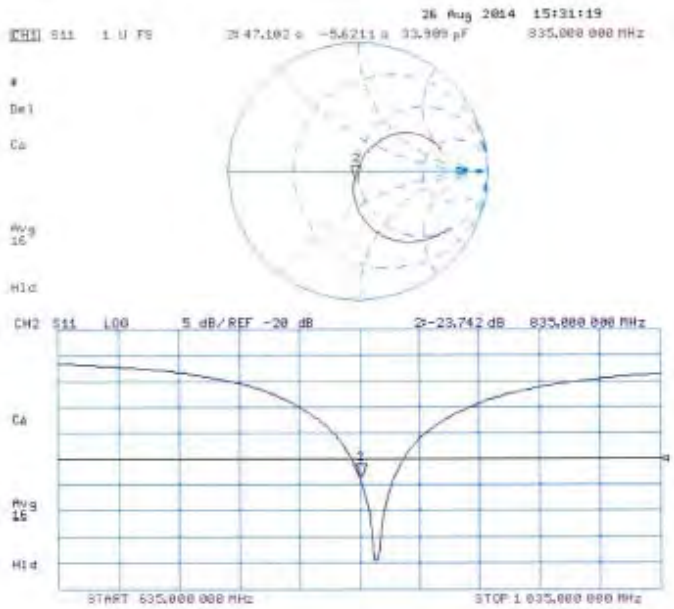
Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D1750V2-1008_Aug14

CALIBRATION CERTIFICATE

Object	D1750V2 - SN: 1008
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date	August 28, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	18-Aug-14 (No. DAE4-601_Aug14)	Aug-15
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	in house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	in house check: Oct-14

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 28, 2014

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1750V2-1008_Aug14 Page 1 of 8

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Swiss Calibration Service

Accreditation No.: **SCS 108**

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY5	V52.6.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center – TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.2 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.6 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.0 ± 6 %	1.49 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.07 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.2 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.4 Ω + 0.3 jΩ
Return Loss	- 46.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω + 0.3 jΩ
Return Loss	- 28.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.222 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 11, 2009

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DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1008

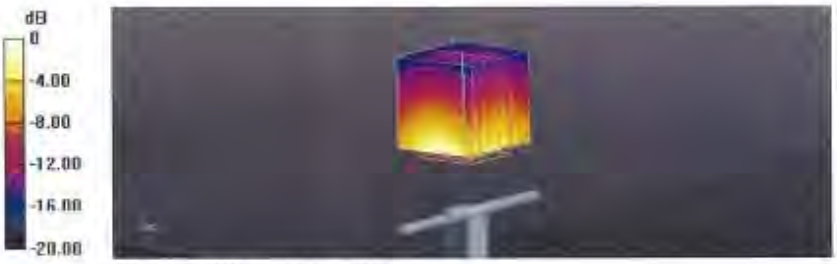
Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.37 S/m; ε_r = 39.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.53 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.91 W/kg
Maximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg = 10.64 dBW/kg

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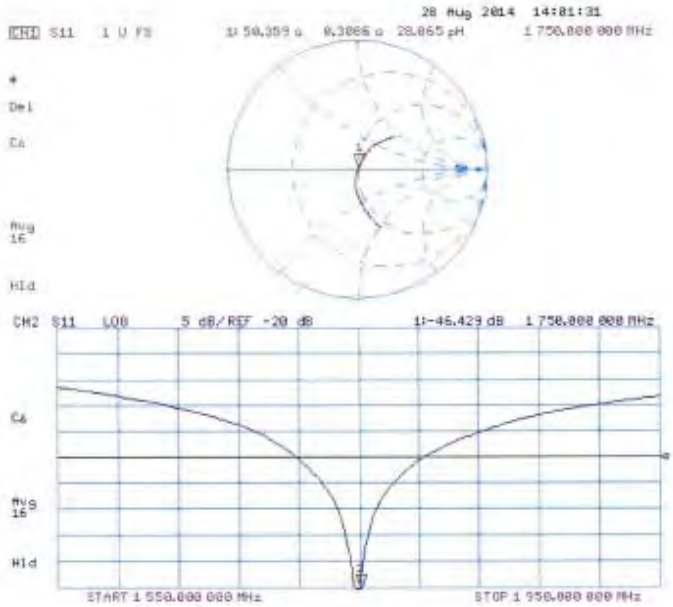

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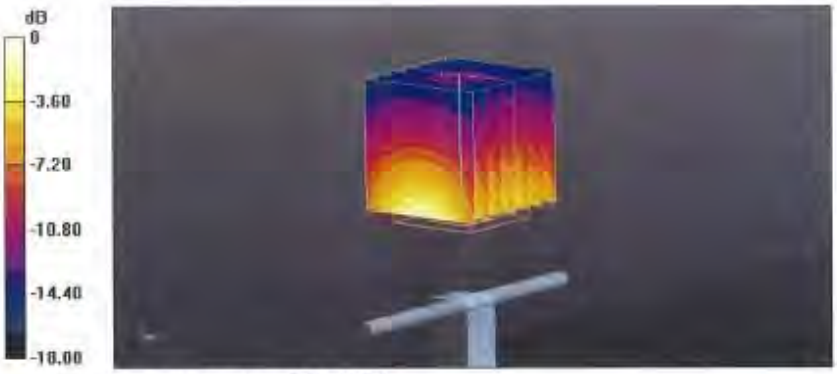
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1008

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.49 S/m; ε_r = 52; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.44 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.44 W/kg; SAR(10 g) = 5.07 W/kg
Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

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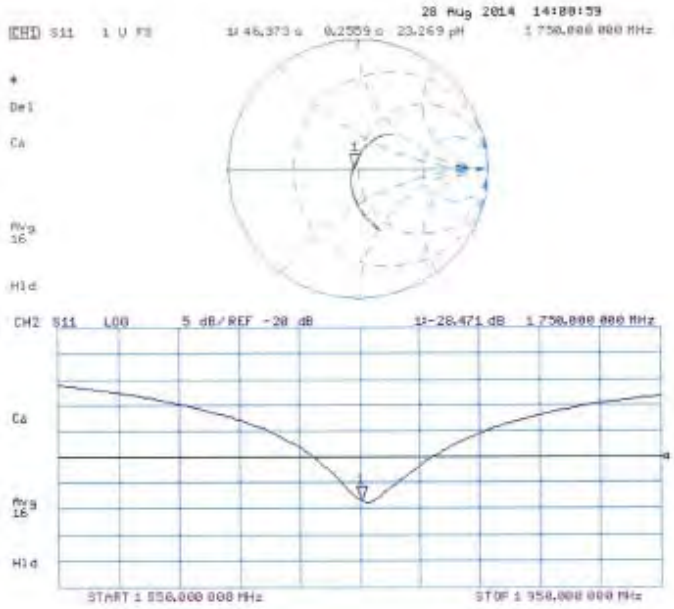
Impedance Measurement Plot for Body TSL



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

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The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D1900V2-5d027_Apr14

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d027
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date	April 23, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (25 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

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

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

Issued: April 23, 2014

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Certificate No: D1900V2-5d027_Apr14 Page 1 of 8

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Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.1 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.6 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**39.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 W/kg ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 6.8 jΩ
Return Loss	- 23.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω + 2.8 jΩ
Return Loss	- 26.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

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DASY5 Validation Report for Head TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

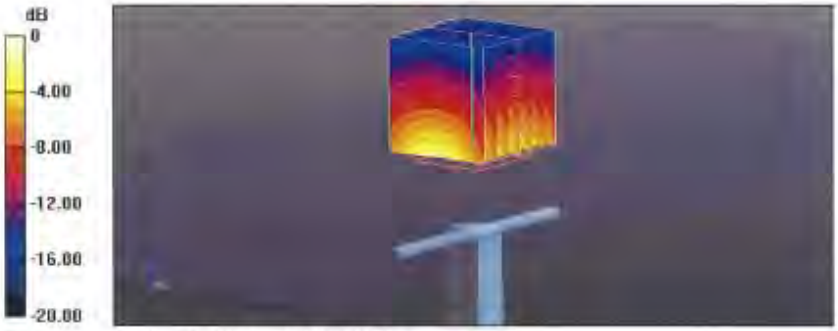
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d027

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.36 S/m; ε_r = 39.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.825 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.1 W/kg
Maximum value of SAR (measured) = 12.3 W/kg



0 dB = 12.3 W/kg = 10.90 dBW/kg

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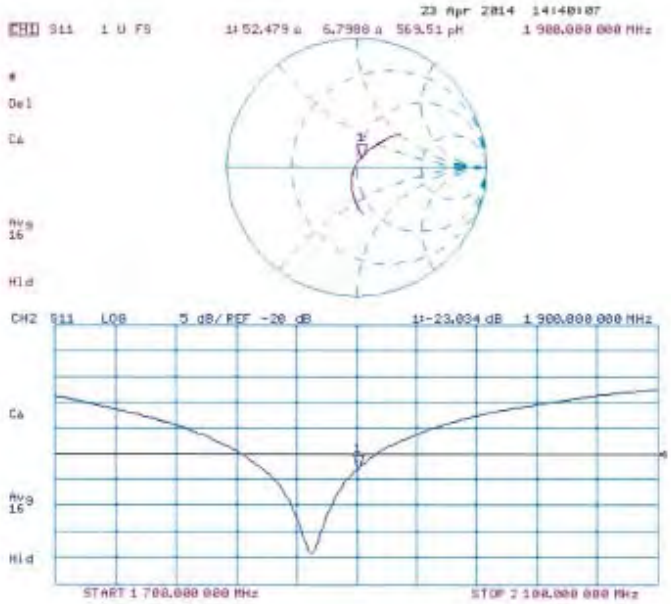
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 22.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

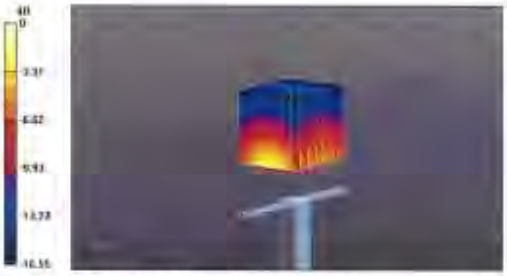
DUT; Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d027

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 S/m; ε_r = 52.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.526 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.22 W/kg
Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg

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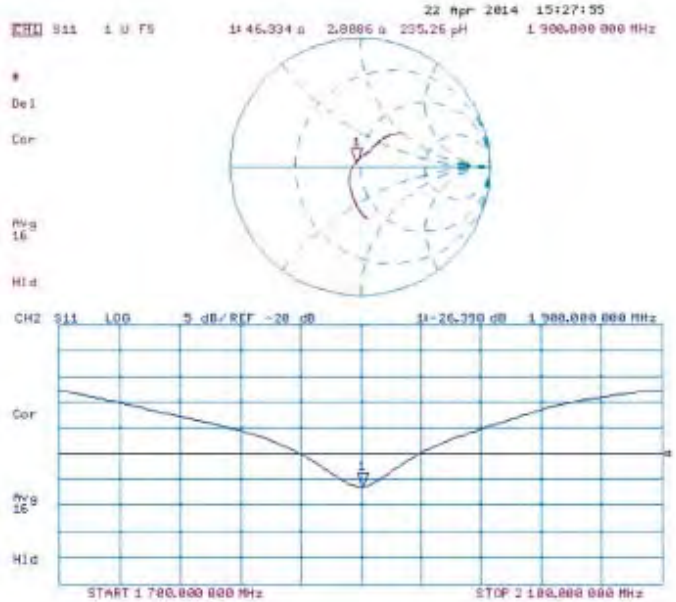

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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D2450V2-727_Apr14

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:727
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date	April 23, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

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Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

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

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

Issued: April 23, 2014

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Certificate No: D2450V2-727_Apr14 Page 1 of 8

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Accreditation No.: **SCS 108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.2 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.6 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.90 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.3 W/kg ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω + 1.9 jΩ
Return Loss	- 26.5 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.1 Ω + 3.5 jΩ
Return Loss	- 28.7 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.148 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

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DASY5 Validation Report for Head TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

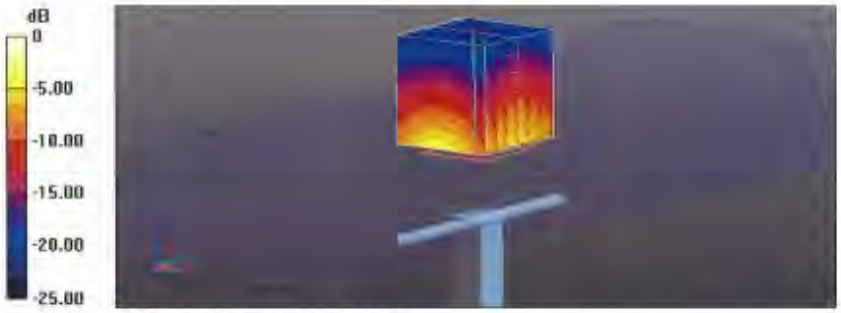
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.81 S/m; ε_r = 38.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.01 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 27.0 W/kg
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kg
Maximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

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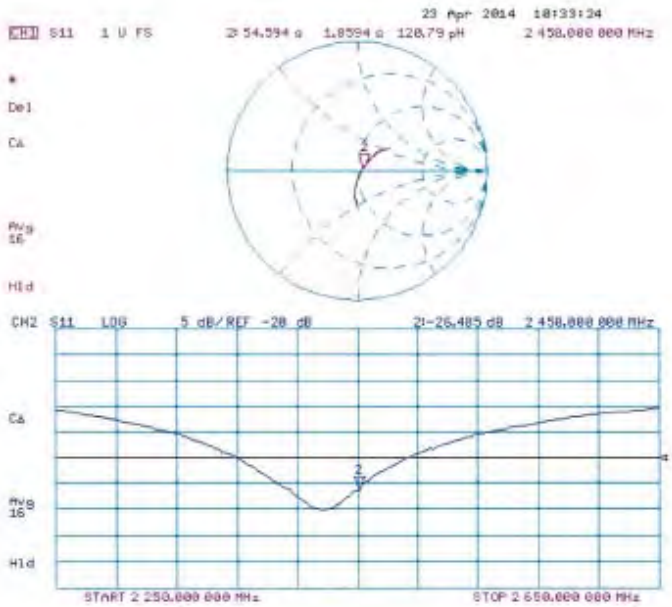
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

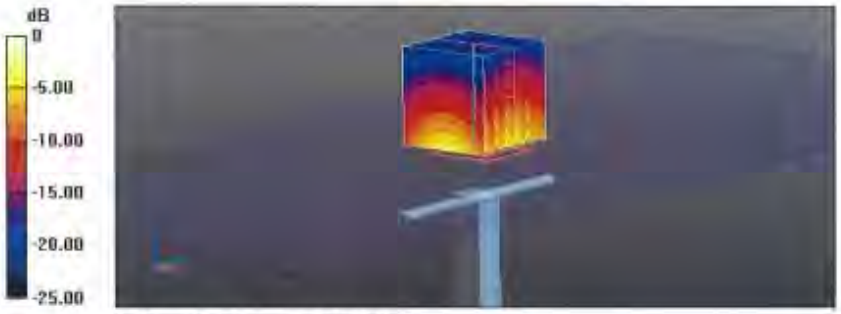
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.01 S/m; ε_r = 50.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 94.356 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.9 W/kg
Maximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

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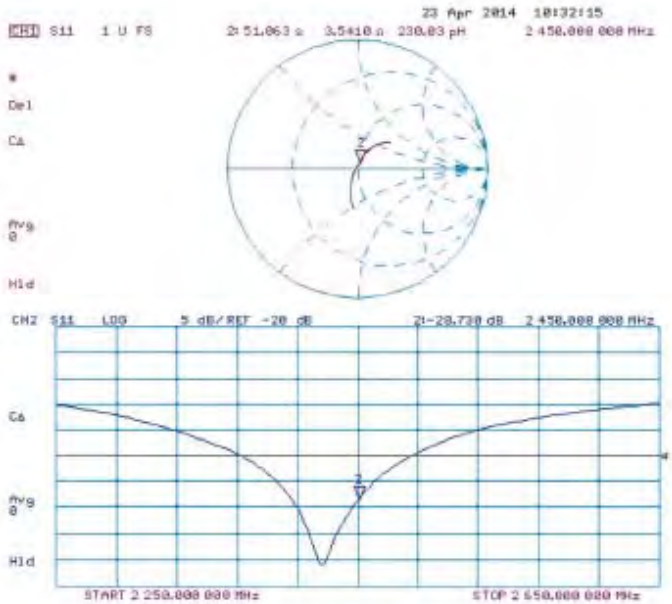
Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D5GHzV2-1023_Jan14

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN: 1023
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date	January 30, 2014

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of this certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe EX3DV4	SN: 3503	30-Dec-13 (No. EX3-3503_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

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

	Name	Function	Signature
Calibrated by:	Jelco Kastelic	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: January 31, 2014

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Certificate No: D5GHzV2-1023_Jan14 Page 1 of 14

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S Servizio svizzero di taratura
Swiss Calibration Service

Accreditation No.: SCS 108

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

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

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

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Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.2 ± 6 %	4.54 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**77.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.0 ± 6 %	4.65 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.8 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.32 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 W/kg ± 19.5 % (k=2)**

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Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.6 ± 6 %	4.96 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ± 6 %	5.18 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.77 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.20 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

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Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.8 ± 6 %	5.40 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**73.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.6 ± 6 %	5.53 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

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Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.93 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.04 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**80.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	6.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.44 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.4 W/kg ± 19.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.9 Ω - 7.7 jΩ
Return Loss	- 22.3 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	51.2 Ω - 4.0 jΩ
Return Loss	- 27.6 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.8 Ω - 2.5 jΩ
Return Loss	- 27.1 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	56.5 Ω + 0.5 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	50.0 Ω - 6.1 jΩ
Return Loss	- 24.3 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	51.3 Ω - 1.9 jΩ
Return Loss	- 32.7 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	54.3 Ω - 0.4 jΩ
Return Loss	- 27.6 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	57.1 Ω + 3.3 jΩ
Return Loss	- 22.7 dB

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General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 05, 2004

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DASY5 Validation Report for Head TSL

Date: 30.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1023

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.54 S/m; ε_r = 37.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 4.65 S/m; ε_r = 37; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.96 S/m; ε_r = 36.6; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.18 S/m; ε_r = 36.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2013, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2013, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2013, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.583 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 28.2 W/kg
SAR(1 g) = 7.67 W/kg; SAR(10 g) = 2.19 W/kg
Maximum value of SAR (measured) = 18.2 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.619 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.8 W/kg
SAR(1 g) = 8.14 W/kg; SAR(10 g) = 2.32 W/kg
Maximum value of SAR (measured) = 19.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 61.852 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 32.3 W/kg
SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

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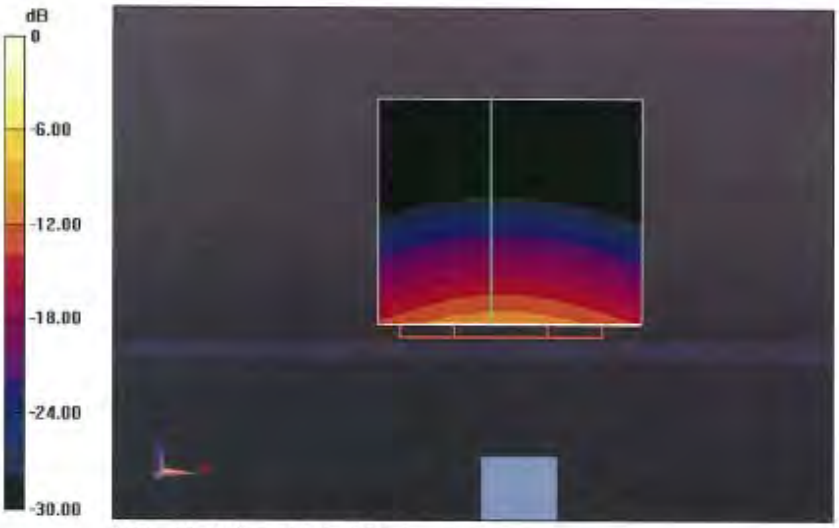
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.398 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 32.6 W/kg
SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.2 W/kg
Maximum value of SAR (measured) = 19.2 W/kg



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

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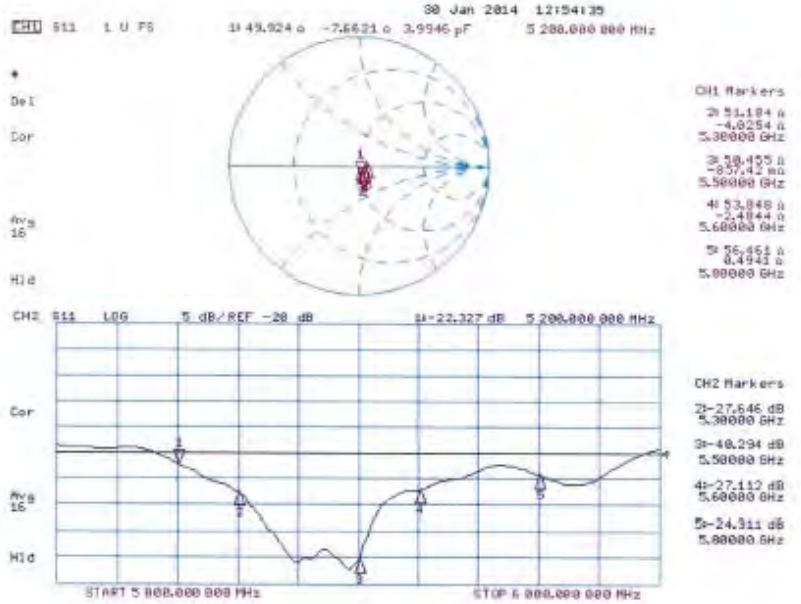
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 29.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1023

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5500 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.4 S/m; ε_r = 47.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 5.53 S/m; ε_r = 47.6; ρ = 1000 kg/m^3, Medium parameters used: f = 5600 MHz; σ = 5.93 S/m; ε_r = 47.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.21 S/m; ε_r = 46.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2013, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 57.977 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 29.2 W/kg
SAR(1 g) = 7.39 W/kg; SAR(10 g) = 2.06 W/kg
Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.404 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.13 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 58.115 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 35.7 W/kg
SAR(1 g) = 8.04 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 20.0 W/kg

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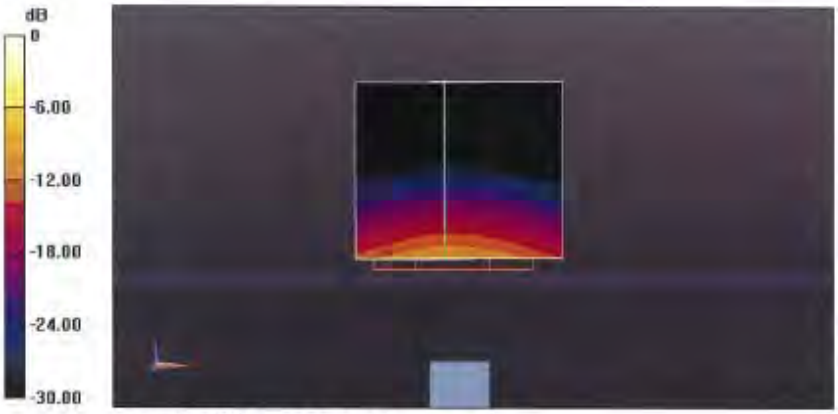
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 54.877 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 34.9 W/kg
SAR(1 g) = 7.44 W/kg; SAR(10 g) = 2.05 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

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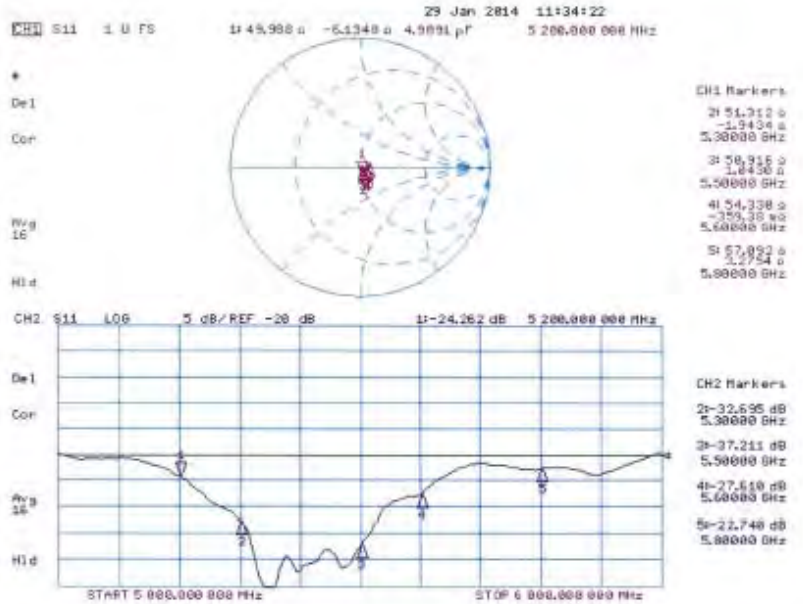

- End of 1st part of report -

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