SAR TEST REPORT

Equipment Under Test	Mobile Internet Device
Model Number	M02M002
Company Name	Huawei Technologies Co.,Ltd
Company Address	Bantian, Longgang District , Shenzhen , China
Date of Receipt	2011.03.17
Date of Test(s)	2011.05.20~2011.05.22;2011.08.03,2011.08.25
Date of Issue	2011.08.26

Standards:

FCC OET 65 supplement C,
IEEE / ANSI C95.1 , C95.3, IEEE 1528,
RSS-102

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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Tested by : Ricky Huang **Date : 2011.08.26**
Asst. Supervisor

Approved by : Robert Chang **Date : 2011.08.26**
Tech Manager

Revision Version

Report Number	Revision	Date	Memo
ES/2011/30019	00	2011/Jun/21	Initial creation of test report.
ES/2011/30019	01	2011/Jun/29	1st modification
ES/2011/30019	02	2011/Jul/13	2nd modification
ES/2011/30019	03	2011/Jul/15	3rd modification
ES/2011/30019	04	2011/Aug/04	4th modification
ES/2011/30019	05	2011/Aug/16	5th modification
ES/2011/30019	06	2011/Aug/26	6th modification

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1. General Information

1.1 Testing Laboratory

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1.2 Details of Applicant

Name	Huawei Technologies Co.,Ltd
Address	Bantian, Longgang District , Shenzhen , China
Contact Person	Zhang Xinghai

1.3 Description of EUT

EUT Name	Mobile Internet Device
Model No. of Modular	EM820W
Model No. of Host	M02M002
Brand Name	DELL
Marketing Name	Looking Glass
FCC ID	QISEM820W
IC ID	6369A-EM820W
IMEI code	354283040021234

<table>
<tr><td>Definition</td><td colspan="12">Production unit</td></tr>
<tr><td>Mode of Operation</td><td colspan="12">GSM\GPRS\EGPRS\WCDMA\HSDPA\HSUPA</td></tr>
<tr><td rowspan="3">Duty Cycle</td><td colspan="4">GPRS</td><td colspan="4">EGPRS</td><td colspan="4">WCDMA</td></tr>
<tr><td colspan="4">1/4.1
(multi-class 10)</td><td colspan="4">1/2
(multi-class 12)</td><td colspan="4" rowspan="2">1</td></tr>
<tr><td colspan="4">DTM multi-class B</td><td colspan="4">DTM multi-class B</td></tr>
<tr><td rowspan="2">TX Frequency range (MHz)</td><td colspan="3">GPRS 850</td><td colspan="3">GPRS1900</td><td colspan="3">WCDMA Band II</td><td colspan="3">WCDMA Band V</td></tr>
<tr><td colspan="3">824.2-848.8</td><td colspan="3">1850.20 -1909.80</td><td colspan="3">1852.40 -1907.60</td><td colspan="3">826.40 -846.60</td></tr>
<tr><td rowspan="2">Channel Number (ARFCN)</td><td colspan="3">GPRS 850</td><td colspan="3">GPRS1900</td><td colspan="3">WCDMA Band II</td><td colspan="3">WCDMA Band V</td></tr>
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<tr><td colspan="12">1.15W/kg
At GPRS 850_ CH190_ Lap-held mode_(2 multi-slot)
(Proximity sensor is NOT activated_ test distance is 12mm)</td></tr>
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<tr><td colspan="12">1W/kg
At EGPRS 1900_ CH661_ Lap-held mode_(4 multi-slot)
(proximity sensor is activated)_ test distance is 0mm)</td></tr>
<tr><td colspan="12">WCDMA Band II</td></tr>
<tr><td colspan="12">1.34W/kg
At WCDMA B2_ CH9400_ Lap-held mode
(proximity sensor is activated)_ test distance is 0mm)</td></tr>
<tr><td colspan="12">WCDMA Band V</td></tr>
<tr><td colspan="12">0.914W/kg
At WCDMA B5_ CH4233_Lap-held mode
(Proximity sensor is NOT activated_ test distance is 12mm)</td></tr>
</table>

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The division factor compared to the number of TX time slot

	1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
Division factor	-9.03	-6.02	-4.26	-3.01

#Proximity sensor not activated, the conducted transmit pow1er for WWAN:

Burst average power				
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)
GPRS 850	824.2	128	32.2	30.54
	836.6	190	32.49	30.6
	848.8	251	32.39	30.56

Source-based time- averaged power				
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)
GPRS 850	824.2	128	23.17	24.52
	836.6	190	23.46	24.58
	848.8	251	23.36	24.54

#.Proximity sensor activated, the conducted power of WWAN module:

Burst average power				
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)
GPRS 850	824.2	128	18.83	18.73
	836.6	190	18.84	18.79
	848.8	251	18.77	18.74

Source-based time- averaged power				
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)
GPRS 850	824.2	128	9.8	12.71
	836.6	190	9.81	12.77
	848.8	251	9.74	12.72

#Proximity sensor not activated, the conducted transmit power for WWAN:

Burst average power				
EUT Mode	**Frequency (MHz)**	**CH**	**(1DN 1UP) (dBm)**	**(1DN 2UP) (dBm)**
GPRS 1900	1850.2	512	28.68	28.72
	1880.0	661	28.59	28.67
	1909.8	810	28.54	28.66

Source-based time- averaged power				
EUT Mode	**Frequency (MHz)**	**CH**	**(1DN 1UP) (dBm)**	**(1DN 2UP) (dBm)**
GPRS 1900	1850.2	512	19.65	22.7
	1880.0	661	19.56	22.65
	1909.8	810	19.51	22.64

#.Proximity sensor activated, the conducted power of WWAN module:

Burst average power				
EUT Mode	**Frequency (MHz)**	**CH**	**(1DN 1UP) (dBm)**	**(1DN 2UP) (dBm)**
GPRS 1900	1850.2	512	18.52	18.49
	1880.0	661	18.67	18.65
	1909.8	810	18.52	18.52

Source-based time- averaged power				
EUT Mode	**Frequency (MHz)**	**CH**	**(1DN 1UP) (dBm)**	**(1DN 2UP) (dBm)**
GPRS 1900	1850.2	512	9.49	12.47
	1880.0	661	9.64	12.63
	1909.8	810	9.49	12.50

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Proximity sensor not activated, the conducted transmit power for WWAN:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (8PSK)	824.2	128	26.91	26.13	24.09	23.03
	836.6	190	26.96	26.17	24.13	23.02
	848.8	251	26.84	26.08	24.11	23.03

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (8PSK)	824.2	128	17.88	20.11	19.83	20.02
	836.6	190	17.93	20.15	19.87	20.01
	848.8	251	17.81	20.06	19.85	20.01

.Proximity sensor activated, the conducted power of WWAN module:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (8PSK)	824.2	128	18.95	18.83	18.8	18.77
	836.6	190	18.94	18.89	18.85	18.83
	848.8	251	18.89	18.84	18.87	18.79

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (8PSK)	824.2	128	9.92	12.81	14.54	15.76
	836.6	190	9,91	12.87	14.59	15.82
	848.8	251	9.86	12.82	14.61	15.78

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Proximity sensor not activated, the conducted transmit power for WWAN:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (GMSK)	824.2	128	27.82	27. 03	25.09	23.03
	836.6	190	27.85	27.07	25.13	23.02
	848.8	251	27.67	27.09	25.11	23.03

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (GMSK)	824.2	128	18.79	21.01	20.83	20.02
	836.6	190	18.82	21.05	20.87	20.01
	848.8	251	18.64	21.07	20.85	20.02

.Proximity sensor activated, the conducted power of WWAN module:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (GMSK)	824.2	128	19.46	19.43	19.51	19.37
	836.6	190	19.35	19.49	19.55	19.33
	848.8	251	19.48	19.44	19.54	19.39

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 850 (GMSK)	824.2	128	10.43	13.41	15.25	16.36
	836.6	190	10.32	13.47	15.29	16.32
	848.8	251	10.45	13.42	15.28	16.38

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#.Proximity sensor not activated, the conducted power of WWAN module:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (8PSK)	1850.2	512	25.54	25.03	23.47	22.48
	1880.0	661	25.53	25.07	23.54	22.49
	1909.8	810	25.51	25.02	23.33	22.34

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (8PSK)	1850.2	512	16.51	19.01	19.21	19.47
	1880.0	661	16.5	19.05	19.28	19.48
	1909.8	810	16.48	19	19.07	19.33

#.Proximity sensor activated, the conducted power of WWAN module:

Burst average power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (8PSK)	1850.2	512	18.65	18.64	18.63	18.59
	1880.0	661	18.8	18.79	18.77	18.73
	1909.8	810	18.65	18.64	18.62	18.59

Source-based time- averaged power

EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (8PSK)	1850.2	512	9.62	12.62	14.37	15.58
	1880.0	661	9.77	12.77	14.51	15.72
	1909.8	810	9.62	12.62	14.36	15.58

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#.Proximity sensor not activated, the conducted power of WWAN module:

Burst average power						
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dBm)	(1DN 4UP) (dBm)
EDGE 1900 (GMSK)	1850.2	512	25.91	25.46	23.92	22.95
	1880.0	661	25.92	25.54	23.97	22.99
	1909.8	810	25.97	25.53	23.92	22.97

Source-based time- averaged power						
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dBm)	(1DN 4UP) (dBm)
EDGE 1900 (GMSK)	1850.2	512	16.88	19.44	19.66	19.94
	1880.0	661	16.89	19.52	19.71	19.98
	1909.8	810	16.94	19.51	19.66	19.96

#.Proximity sensor activated, the conducted power of WWAN module:

Burst average power						
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (GMSK)	1850.2	512	19.05	19.04	19.03	19.09
	1880.0	661	19.18	19.09	19.07	19.03
	1909.8	810	19.15	19.04	19.02	19.09

Source-based time- averaged power						
EUT Mode	Frequency (MHz)	CH	(1DN 1UP) (dBm)	(1DN 2UP) (dBm)	(1DN 3UP) (dbm)	(1DN 4UP) (dBm)
EDGE 1900 (GMSK)	1850.2	512	10.02	13.02	14.77	16.08
	1880.0	661	10.16	13.07	14.81	16.02
	1909.8	810	10.13	13.02	14.76	16.08

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Proximity sensor not activated, the conducted transmit power for WWAN:

Freq. Band	Frequency	CH	R99 Avg. Power	HSDPA mode Avg. Power				HSUPA mode Avg. Power				
	(MHz)		(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band II	1852.4	9262	22.97	23.14	22.85	22.66	22.67	22.54	21.94	21.95	21.07	21.84
	1880.0	9400	22.83	22.61	22.58	22.16	22.17	21.89	20.77	21.72	20.82	21.86
	1907.6	9538	22.81	22.67	22.66	22.14	22.26	22.75	20.49	21.55	20.35	22.33

#.Proximity sensor activated, the conducted power of WWAN module:

Freq. Band	Frequency	CH	R99 Avg. Power	HSDPA mode Avg. Power				HSUPA mode Avg. Power				
	(MHz)		(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band II	1852.4	9262	17.36	15.97	15.84	15.76	15.8	16.29	16.71	16.17	16.5	16.31
	1880.0	9400	17.28	15.86	15.55	15.52	15.52	16	16.41	15.85	16.13	16.01
	1907.6	9538	17.24	15.74	15.39	15.46	15.41	15.83	16.35	15.97	16.02	15.81

HSPA+ conducted power table:

Freq. Band	Frequency	CH	R99 Avg. Power
	(MHz)		(dBm)
WCDMA Band II	1852.4	9262	23.07
	1880.0	9400	23.25
	1907.6	9538	22.97

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Proximity sensor not activated, the conducted transmit power for WWAN:

Freq. Band	Frequency	CH	R99 Avg. Power	HSDPA mode				HSUPA mode				
	(MHz)		(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band V	826.4	4132	22.93	22.55	22.36	21.57	21.21	22.09	17.85	19.45	19.65	21.27
	836.6	4183	22.96	22.66	22.26	21.99	21.26	22.19	17.75	19.39	19.53	21.56
	846.6	4233	22.98	22.87	22.68	21.46	21.48	21.89	17.94	19.99	19.66	21.48

#.Proximity sensor activated, the conducted power of WWAN module:

Freq. Band	Frequency	CH	R99 Avg. Power	HSDPA mode				HSUPA mode				
	(MHz)		(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA Band V	826.4	4132	17.46	16.18	16.12	16.05	16.06	16.45	15.87	16.53	16.57	16.42
	836.6	4183	17	15.87	15.67	15.67	15.65	15.97	15.54	16.16	16.66	15.94
	846.6	4233	16.84	15.91	15.61	15.6	15.56	15.95	15.31	16.05	16.21	15.88

HSPA+ conducted power table:

Freq. Band	Frequency	CH	R99 Avg. Power
	(MHz)		(dBm)
WCDMA Band V	826.4	4132	22.78
	836.6	4183	22.77
	846.6	4233	22.65

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Grants power & EUT conducted power table:

Power as obtained							Power Reduction										Delta				
		1UP	2UP				1UP	2UP				Originally Modolar Athorization									
GPRS	824.2	32.2	30.54				18.83	18.73				32.52					-0.32				
	836.6	32.49	30.6				18.84	18.79				32.29					0.2				
	848.8	32.39	30.56				18.77	18.74				31.96					0.43				
	1850.2	28.68	28.72				18.52	18.49				28.89					-0.21				
	1880	28.59	28.67				18.67	18.65				28.89					-0.3				
	1909.8	28.54	28.66				18.52	18.52				28.94					-0.4				
EDGE		1UP	2UP	3UP	4UP		1UP	2UP	3UP	4UP											
	824.2	26.91	26.13	24.09	23.03		18.95	18.83	18.8	18.77		27.03					-0.12				
	836.6	26.96	26.17	24.13	23.02		18.94	18.89	18.85	18.83		26.91					0.05				
	848.8	26.84	26.08	24.11	23.03		18.89	18.84	18.87	18.79		26.56					0.28				
	1850.2	25.54	25.03	23.47	22.48		18.65	18.64	18.63	18.59		25.5					0.04				
	1880	25.53	25.07	23.54	22.49		18.8	18.79	18.77	18.73		25.43					0.1				
	1909.8	25.51	25.02	23.33	22.34		18.65	18.64	18.62	18.59		25.52					-0.01				
WCDMA		R99																			
	826.4	22.93					17.46					22.67					0.26				
	836.6	22.96					17					22.65					0.31				
	846.6	22.98					16.84					22.87					0.11				
		HSDPA																			
	826.4	22.55	22.36	21.57	21.21		16.18	16.12	16.05	16.06		22.15	21.98	21.47	21.41		-0.4	-0.38	-0.1	0.2	
	836.6	22.66	22.26	21.99	21.26		15.87	15.67	15.67	15.65		22.26	22.16	21.59	21.56		-0.4	-0.1	-0.4	0.3	
	846.6	22.87	22.68	21.46	21.48		15.91	15.61	15.6	15.56		22.47	22.29	21.8	21.77		-0.4	-0.39	0.34	0.29	
		HSUPA																			
	826.4	22.09	17.85	19.45	19.65	21.27	16.45	15.87	16.53	16.57	16.42	21.64	17.37	19.32	19.95	21.4	-0.45	-0.48	-0.13	0.3	0.13
	836.6	22.19	17.75	19.39	19.53	21.56	15.97	15.54	16.16	16.66	15.94	21.85	17.27	19.19	19.78	21.83	-0.34	-0.48	-0.2	0.25	0.27
	846.6	21.89	17.94	19.99	19.66	21.48	15.95	15.31	16.05	16.21	15.88	21.88	17.61	19.59	19.87	21.85	-0.01	-0.33	-0.4	0.21	0.37
		R99																			
		22.97				17.36						23.47					0.5				
		22.83				17.28						23.31					0.48				
		22.81				17.24						22.93					0.12				
	1852.4	23.14	22.85	22.66	22.67		15.97	15.84	15.76	15.8		22.9	22.8	22.22	22.19		-0.24	-0.05	-0.44	-0.48	
	1880	22.61	22.58	22.16	22.17		15.86	15.55	15.52	15.52		22.91	22.62	22.11	22.08		0.3	0.04	-0.05	-0.09	
	1907.6	22.67	22.66	22.14	22.26		15.74	15.39	15.46	15.41		22.39	22.58	21.96	21.92		-0.28	-0.08	-0.18	-0.34	
	1852.4	22.54	20.94	21.95	21.07	21.84	16.29	16.71	16.17	16.5	16.31	22.08	21.06	22.16	21.25	21.41	-0.46	0.12	0.21	0.18	-0.43
	1880	21.89	20.77	21.72	20.82	21.86	16	16.41	15.85	16.13	16.01	21.43	20.63	21.57	20.9	21.36	-0.46	-0.14	-0.15	0.08	-0.5
	1907.6	21.75	20.49	21.55	20.35	22.33	15.83	16.35	15.97	16.02	15.81	21.47	20.16	21.06	19.96	21.85	-0.28	-0.33	-0.49	-0.39	-0.48

Actual Target Design Power Reduction

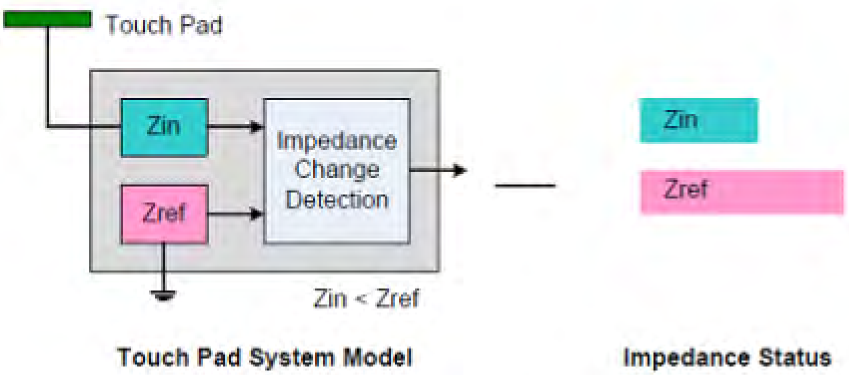
	dB	dB
	800	1900
GPRS 1-slot	13.65	10.16
GPRS 2-slot	11.82	10.23
EDGE 1-slot GMSK	8.5	6.86
EDGE 2-slot GMSK	7.65	6.49
EDGE 3-slot GMSK	5.58	4.9
EDGE 4-slot GMSK	3.69	3.96
EDGE 1-slot 8PSK	8.02	6.89
EDGE 2-slot 8PSK	7.3	6.39
EDGE 3-slot 8PSK	5.29	4.84
EDGE 4-slot 8PSK	4.26	3.89
UMTS	6.14	5.61
HSDPA	7.07	7.03
HSUPA	5.94	6.92

1.4 Test Environment

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

1.5 Operation description

Working theory of Touch/proximity sensor
The proximity sensor was designed on bottom position, which means the proximity sensor will be activated when test object(end-user) close to bottom position of testing devices. The proximity sensor will not be activated on the all edges.
When users not approach/touch the sensor pad, the impedance of the sensor input Zin should be kept less than the impedance of the reference Zref, as shown in Figure 4. If users approach/touch sense pad, as shown in Figure 5, Zin is increased by Zsense. When Zsense by approaching/touching becomes greater than the difference between Zin and Zref in the not approached/touched state, i.e., if Zin in approached/touched state becomes greater than Zref by a value higher than 0.1pF (value setting for suitable detect distance), the sense IC generates the acknowledged output signal indicating it senses the approach/touch. Summary, it detects impedance difference between reference and sensor input.



Pad is not approached / touched

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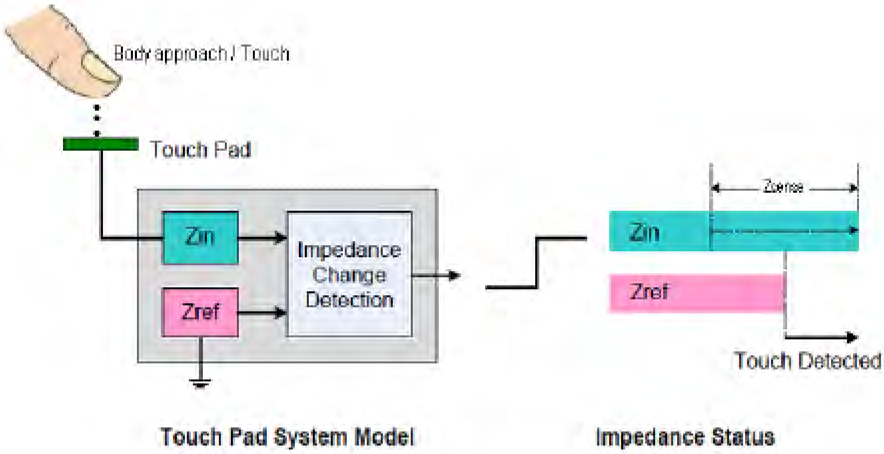
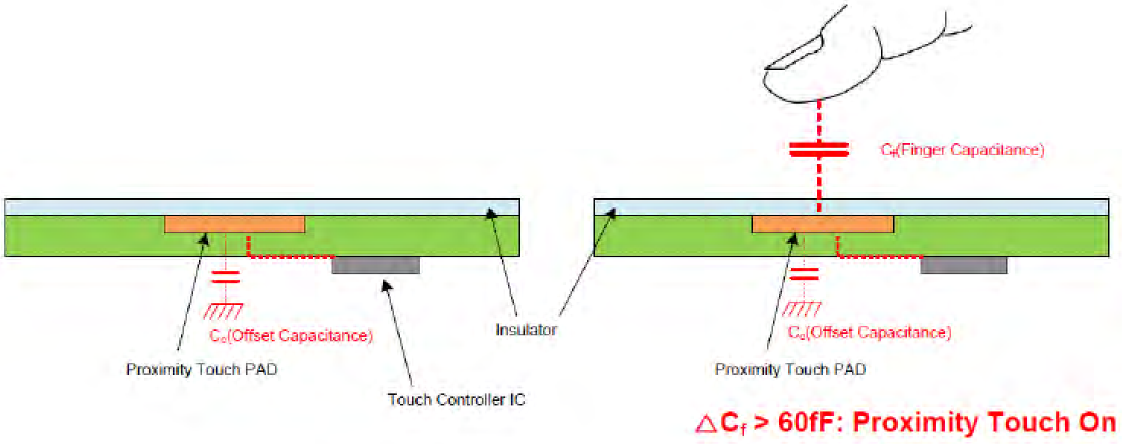


Pad is approached / touched.

Additional explanation for proximity sensor

- ATA5101 memorize the C_o(Offset Capacitance) value when finger is not presented in the chip.
- C_f (Finger Capacitance) between the touch sensor input(pad) and finger is made when finger is getting close to the touch sensor input.(pad)
- ATA5101 recognize the proximity if C_f is over 60fF.



- ✓ The sensitivity of the ATA5101 will be decreased if GND pattern or conductor material is located close to the sensor input pad and line because an electrical field generated by GND patterns will attenuate the strength of capacitance generated by the finger touch.
- ✓ Capacitance between the sensor input pads and finger is constant as C_f. But if GND pattern is located close to the sensor input pads, the capacitance will be decreased to 1/3 C_f.
- ✓ This will decrease the sensitivity of the sensor input as shown in Figure 2. Also that means ATA5101 can recognize the proximity when the distance between finger and the sensor input pad should be decreased to 1/3 as shown in Figure3.

Figure 1. Case of No-GND pattern(@d distance)

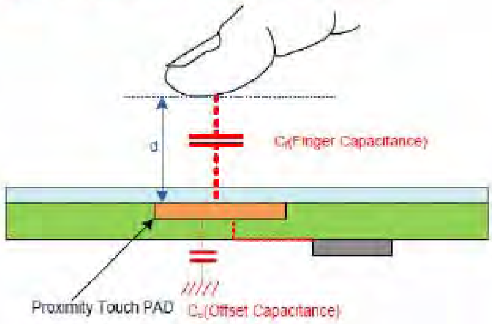


Figure 2. Case of GND pattern(@d distance)

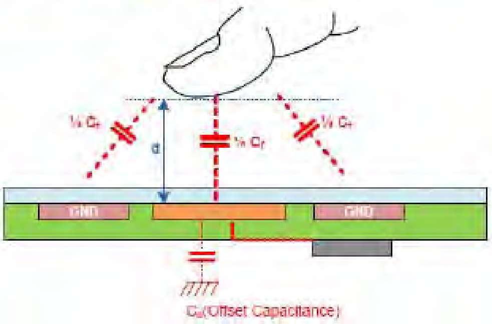
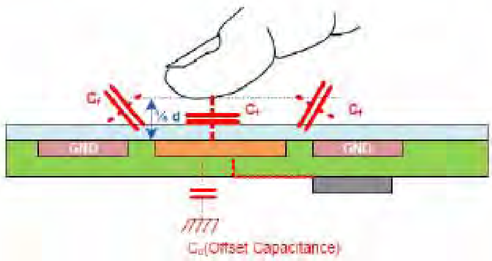


Figure 3. Case of GND pattern(@1/3d distance)



There is only one sensor for the back of the device (no sensors for the edges). Please see below for sensor activation/de-activation information:

Table 1

Body Sensor Distance from Back of Mini-Tablet

Distance in mm	9	10	11	12	13	14
Condition of Sensor in the back of the device	on	on	on	off	off	off

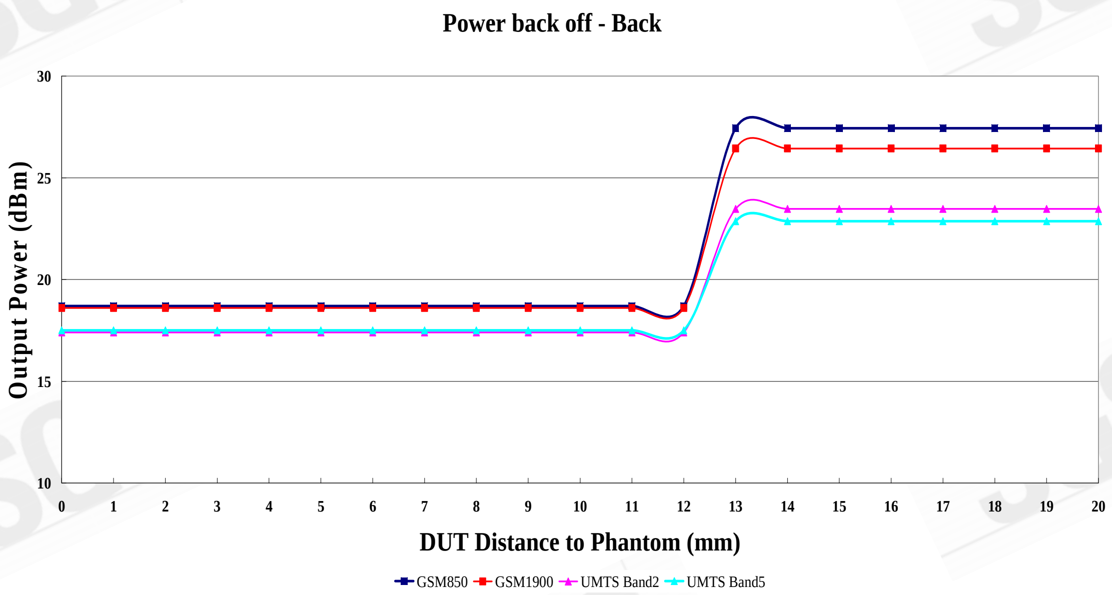
Proximity Sensor Operational Theory for Power Back off

Due to SAR requirement for protect human, proximity sensor pad be designed close to WWAN antenna. When users are not close to sense area, the output power of WWAN modem follows the regulation of 3GPP/ETSI. When user touches/approaches the yellow sense area, sense IC will be trigged an event for human body approach/touch. The output power of modem will be decreased to lower level for meet SAR requirement.

Please note that users don't need to touch the tablet, sensor is activated and power reduced while user approaches the sensor pad. Of course, it works if user touches the sense pad as well. We use only one sensor IC, sense pads are for sensing area coverage.

Manual tool for sensor forced activated and in-activated has been implemented as well. This tool is only for manufacturer internal use, publics will not have this tool.

This plot shows the output power (dBm) and the distance between sensor pad and human body.



Distance vs. output power plot

#.Back off power table please refer report page 6~11.

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The EUT is controlled by using a Radio Communication Tester (R&S CMU200), and the communication between the EUT and the tester is established by air link. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

The test configuration tested at the low, middle and high frequency channels, and then test of set in highest power. Finally, we will test it by dividing into 3 configurations:

Configuration 1: Lap-held mode.
(back side of device is parallel to human body, proximity sensor is activated with 0mm separation distance based on KDB447498)

Configuration 2: Primary Portrait mode.
(Not tested , since the WWAN antenna distance to right side edge is larger than 5cm based on KDB447498)

Configuration 3: Secondary Portrait mode.
(Not tested, since this orientation of screen is disabled by software)

Configuration 4: Primary Landscape mode.
(proximity sensor is NOT activated with 0mm separation distance based on KDB447498)

Configuration 5: Secondary Landscape mode.
(proximity sensor is NOT activated with 0mm separation distance based on KDB447498)

#. If the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

#. When the maximum transmitter and antenna output power are ≦ 60/f(GHz) (mW) SAR evaluation is not required for FCC or TCB approval. (BT power=3.94dBm)

#. Per KDB941225 FCC 3G procedures, HSDPA and HSUPA have been omitted since the maximum transmit power results are NOT 1/4dB larger than the WCDMA R99 test result.

#. Per KDB941225 D03 procedures, EGPRS/EDGE have been omitted since the maximum transmit power results are less than the GPRS test results.

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#. Bluetooth and WLAN can not be transmitted simultaneously, according to client's operational description.

#. The highest 1-g SAR for WLAN is 0.538 W/kg (Refer to SGS Report No.ES/2011/10009) and the highest 1-g SAR for WWAN is 1.34 W/kg. The sum of 1-g for simultaneous transmitting WLAN and WWAN antenna pair is 0.538+1.34 = 1.878 W/kg > 1.6 W/kg which higher than the limit 1.6W/kg.

Lap-held mode	WLAN802.11 b	WLAN802.11 g	WLAN802.11 n(20M)
GPRS850	1.688	1.661	1.556
GPRS1900	1.538	1.511	1.406
WCDMA Band II	**1.878**	1.851	1.746
WCDMA Band V	1.452	1.425	1.32
Primary Landscape mode	WLAN802.11 b	WLAN802.11 g	WLAN802.11 n(20M)
GPRS850	0.805	0.818	0.796
GPRS1900	0.208	0.221	0.199
WCDMA Band II	0.483	0.496	0.474
WCDMA Band V	0.676	0.689	0.667
Secondary Landscape mode	WLAN802.11 b	WLAN802.11 g	WLAN802.11 n(20M)
GPRS850	0.482	0.526	0.458
GPRS1900	0.307	0.351	0.283
WCDMA Band II	0.375	0.419	0.351
WCDMA Band V	0.435	0.479	0.411

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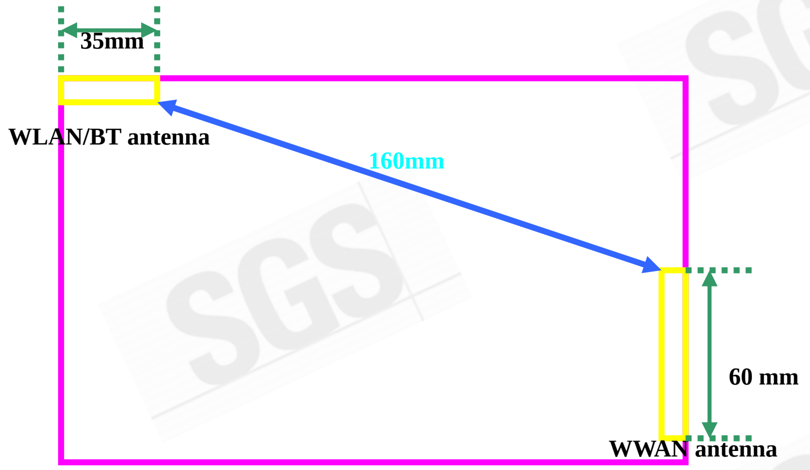
#.By the way, the hotspot peak to peak distance for WWAN and WLAN is **13.571 cm**, we have made my calculations per the DASY and SEMCAD document: TN_110201_DASY_Calculate_Hotspot_Distance.

% Value of SAR		X		Y		Z		
% mW/g		m		m		m		
1.34		-0.0127		-0.0705		-0.203		WWAN
0.538		-0.0589		0.0571		-0.204		WLAN
m	cm							
0.13571	**13.571**							

#. We calculate the peak location separation ratio of simultaneous transmitting antenna pair, the value is **0.138 (**(1.34+0.538)/13.571=0.138**)**, which less than 0.3. According to **KDB648474,** simultaneous SAR evaluation is not required.

#. Distance between WWAN and WALN antenna is 160mm

#. FCC KDB inquiry tracking number: 362636



Antenna distance from
Back view of EUT

1.6 The SAR Measurement System

A photograph 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 4 professional system). A Model EX3DV4/ES3DV3 field probe is used to determine the internal electric fields. The SAR can be obtained from the equation SAR= $\sigma (|Ei|^2) / \rho$ where σ and ρ are the conductivity and mass density of the tissue-simulant.

The DASY4 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 in tissue 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.

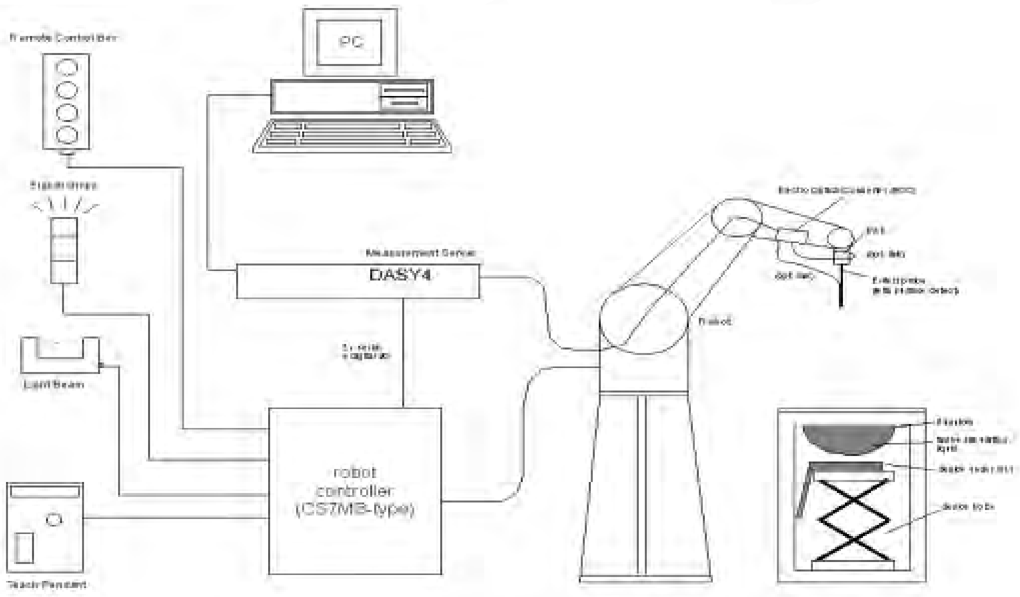


Fig.a The block diagram of SAR system

- 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 2000 or Windows XP.
  - DASY4 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.

1.7 System Components

EX3DV4/ES3DV3 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 HSL835/1900 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz, Linearity: ± 0.2 dB (30 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)	

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Dimensions	Overall length: 330 mm (Tip: 20 mm) Tip diameter: 2.5 mm (Body: 12 mm) Typical distance from probe tip to dipole centers: 1 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%.

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: 251 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

1.8 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 +/- 5% from the target SAR values. These tests were done at 835/1900 MHz. 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 in the range 22.1°C, the relative humidity was in the range 62% and the liquid depth above the ear reference points was above 15 cm 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.

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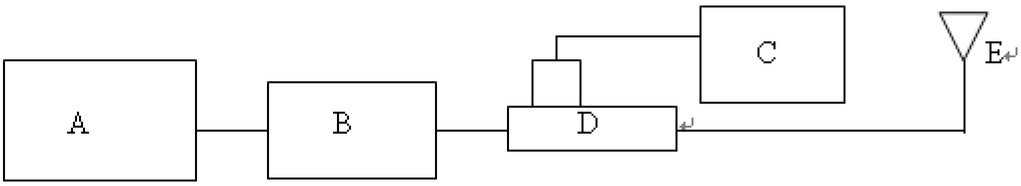

Fig.b The block diagram of system verification

A. Agilent Model 8648D Signal Generator
B. Mini circuits Model ZHL-42 Amplifier
C. Agilent ModelU2001B Power sensor
D. Agilent Model 778D Dual directional coupling
E. Reference dipole antenna

Photograph of the dipole Antenna

Validation Kit	Frequency Hz	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)	Measured Date
D835V2 S/N:4d082	850 MHz (Body)	2.58m W/g	2.55m W/g	2011-05-20
D1900V2 S/N:5d027	1900 MHz (Body)	9.93m W/g	9.98 mW/g	2011-05-21
D835V2 S/N:4d063	850 MHz (Body)	2.43m W/g	2.42m W/g	2011-08-03
D1900V2 S/N:5d027	1900 MHz (Body)	9.93m W/g	9.99 mW/g	2011-08-03
D835V2 S/N:4d063	850 MHz (Body)	2.43m W/g	2.42mW/g	2011-08-25
D1900V2 S/N:5d027	1900 MHz (Body)	9.93m W/g	9.64mW/g	2011-08-25

Table 2. Results of system validation

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1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this body-simulant fluid were measured by using the Agilent Model 85070D Dielectric Probe (rates frequency band 200 MHz to 20 GHz) in conjunction with HP 8753D 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 15cm±5mm during all tests. (Fig .2)

Frequency (MHz)	Tissue type	Measurement date/ Limits	Dielectric Parameters		
			ρ	σ (S/m)	Simulated Tissue Temperature(° C)
850	Body	Measured, 2011.05.20	53.5	0.981	21.7
		Recommended Limits	52.25-57.75	0.96-1.06	20-24
1900	Body	Measured, 2011.05.21	52.5	1.59	21.7
		Recommended Limits	48.55-53.66	1.44-1.6	20-24
850	Body	Measured, 2011.08.03	55.4	1.02	21.7
		Recommended Limits	51.21-56.60	0.95-1.05	20-24
1900	Body	Measured, 2011.08.03	51.4	1.59	21.7
		Recommended Limits	48.55-53.66	1.44-1.6	20-24
850	Body	Measured, 2011.08.25	55.3	1.02	21.7
		Recommended Limits	51.21-56.60	0.95-1.05	20-24
1900	Body	Measured, 2011.08.25	51.6	1.54	21.7
		Recommended Limits	48.55-53.66	1.44-1.6	20-24

Table 3. Dielectric Parameters of Tissue Simulant Fluid

The composition of the body tissue simulating liquid is:

Ingredient	850MHz (Body)	1900MHz (Body)
DGMBE	X	300.67g
Water	631.68 g	716.56 g
Salt	11.72 g	4.0 g
Preventol D-7	1.2 g	X
Cellulose	X	X
Sugar	600 g	X
Total amount	1 L (1.0kg)	1 L (1.0kg)

Table 3. Recipes for tissue simulating liquid

1.10 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. 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.

1.11 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) of this section.(Table .4)

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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.

2. Summary of Results

GPRS 850

Lap-held mode: (proximity sensor is activated)_0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	12.77dBm	0.177	22.1	21.7

Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	24.58dBm	0.254	22.1	21.7

Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	24.58dBm	0.757	22.1	21.7

Lap-held mode: (proximity sensor is NOT activated)_12 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	128	824.20	24.52dBm	1.15	22.1	21.7
	190	836.60	24.58dBm	1.07	22.1	21.7
	251	848.80	24.54dBm	1.01	22.1	21.7

#. Using KDB941225 D03 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

#.GPRS 850 class10 for 2 multi-slot : the maximum number of uplink is 2 and the maximum number of downlink is 1.

GRRS 850

Lap-held mode: (proximity sensor is activated)_0 mm(1 multi-slot_1UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	9.81dBm	0.091	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	23.46dBm	0.209	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	23.46dBm	0.624	22.1	21.7

#. Using KDB941225 D03 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

#.GPRS 850 class10 for 1 multi-slot : the maximum number of uplink is 1 and the maximum number of downlink is 1.

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EGRRS 850

Lap-held mode: (proximity sensor is activated)_0 mm(4 multi-slot_4UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	16.32dBM	0.381	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	21.05dBm	0.014	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	190	836.6	21.05dBm	0.041	22.1	21.7

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

GPRS 1900

Lap-held mode: (proximity sensor is activated) _0mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	12.63dBm	0.506	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	22.65dBm	0.079	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	22.65dBm	0.160	22.1	21.7
Lap-held mode: (proximity sensor is NOT activated) _12mm (2 multi-slot_2UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	22.65dBm	0.412	22.1	21.7

#. Using KDB941225 D03 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

#.GPRS 1900 class10 for 2 multi-slot : the maximum number of uplink is 2 and the maximum number of downlink is 1.

GPRS 1900

Lap-held mode: (proximity sensor is activated) _0mm (1 multi-slot_1UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	9.64dBm	0.257	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (1 multi-slot_1UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	19.56dBm	0.051	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (1 multi-slot_1UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	19.56dBm	0.106	22.1	21.7

#. Using KDB941225 D03 to exclude SAR test requirements for EDGE modes due to the source-based time-averaged output power for edge mode is lower than that in the GPRS mode.

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

#.GPRS 1900 class10 for 1 multi-slot : the maximum number of uplink is 1 and the maximum number of downlink is 1.

EGPRS 1900

Lap-held mode: (proximity sensor is activated) _0mm (41 multi-slot_4UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	16.02dBm	1	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm (4 multi-slot_4UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	19.98dBm	0.051	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm (4 multi-slot_4UP_1Dn)						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	661	1880.00	19.98dBm	0.267	22.1	21.7

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

WCDMA Band II

Lap-held mode: (proximity sensor is activated) _0mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	9262	1852.40	17.36dBm	1.28	22.1	21.7
	9400	1880.00	17.28dBm	1.34	22.1	21.7
	9538	1907.60	17.24dBm	1.27	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	9400	1880.00	22.83dBm	0.147	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	9400	1880.00	22.83dBm	0.435	22.1	21.7
Lap-held mode: (proximity sensor is NOT activated) _12 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
1900MHz	9400	1880.00	22.83dBm	0.786	22.1	21.7

#. Using KDB941225 D01 to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

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WCDMA Band V

Lap-held mode: (proximity sensor is activated) _0mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	4183	836.60	17dBm	0.276	22.1	21.7
Secondary landscape mode: (proximity sensor is NOT activated) _0 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	4183	836.60	22.96dBm	0.207	22.1	21.7
Primary Landscape mode: (proximity sensor is NOT activated) _0 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	4183	836.60	22.96dBm	0.628	22.1	21.7
Lap-held mode: (proximity sensor is NOT activated) _12 mm						
Frequency	Channel	MHz	Conducted Output Power (Average)	Measured(W/kg) 1g	Amb. Temp[˚C]	Liquid Temp[˚C]
850MHz	4132	826.40	22.93dBm	0.895	22.1	21.7
	4183	836.60	22.96dBm	0.843	22.1	21.7
	4233	846.60	22.98dBm	0.914	22.1	21.7

#. Using KDB941225 D01 to exclude SAR test requirements for HSPA modes due to the maximum average output power of HSPA active is less than 1/4 dB higher than that measured without HSPA using 12.2kbps RMC

#. According to KDB447498 the 1-g SAR for the highest output channel is less than 0.8 W/kg, where the transmission band corresponding to all channels is ≤ 100 MHz, testing for the other channels is not required.

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3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4 ES3DV3	3770 3071	Apr.19.2011 Jun.22.2011
Schmid & Partner Engineering AG	850/1900 MHz System Validation Dipole	D835V2	4d082	Jul.20.2010
		D1900V2	5d027	Apr.19.2011
		D835V2	4d063	May.25.2011
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	547 679	Aug.18.2010 Jun.24.2011
Schmid & Partner Engineering AG	Software	DASY 4 V4.7 Build 80	N/A	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required
HP	Network Analyzer	8753D	3410A05547	Mar.16.2011
HP	Dielectric Probe Kit	85070D	US01440168	Calibration not required
Agilent	Dual-directional coupler	778D	50313	Aug.25.2010 Aug.19.2011
Agilent	RF Signal Generator	8648D	3847M00432	Jun.04.2010 Jun.01.2011
Agilent	Power Sensor	U2001B	MY48100169	Apr.28.2011
R&S	Radio Communication Test	CMU200	109326	Apr.01.2011

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4. Measurements

Date: 2011/5/20

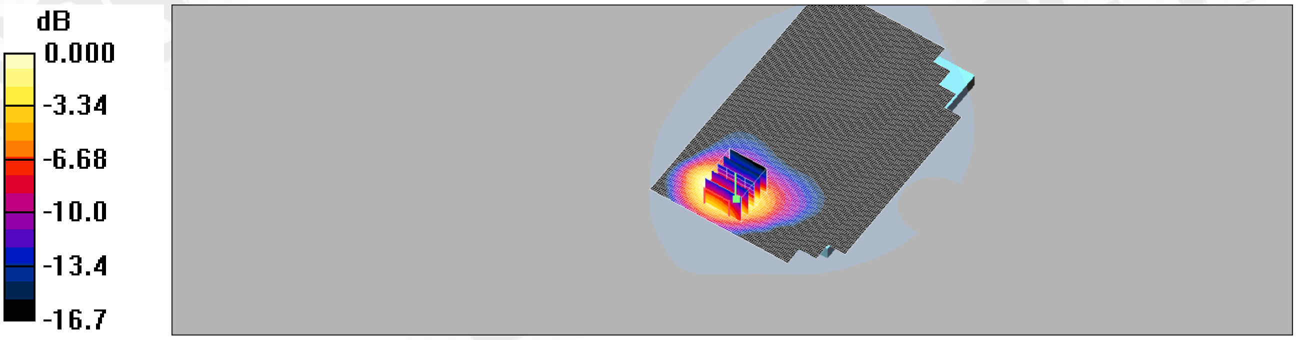
Lap-held_GPRS850_CH190_(Multi class 10)

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.192 mW/g
body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.951 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 0.349 W/kg
SAR(1 g) = 0.177 mW/g; SAR(10 g) = 0.092 mW/g
Maximum value of SAR (measured) = 0.188 mW/g



0 dB = 0.188mW/g

Secondary Landscape_GPRS850_CH190_(Multi class 10)

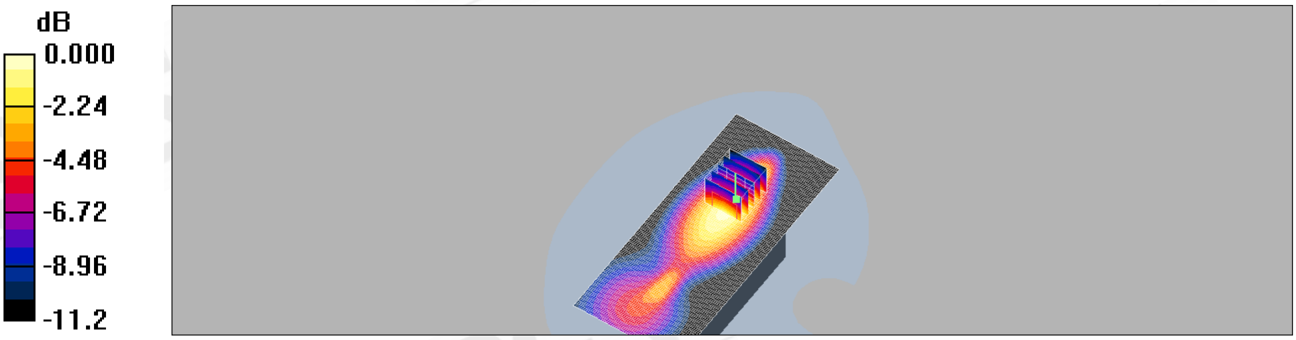
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.287 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.9 V/m; Power Drift = 0.021 dB
Peak SAR (extrapolated) = 0.396 W/kg
SAR(1 g) = 0.254 mW/g; SAR(10 g) = 0.163 mW/g
Maximum value of SAR (measured) = 0.279 mW/g



0 dB = 0.279mW/g

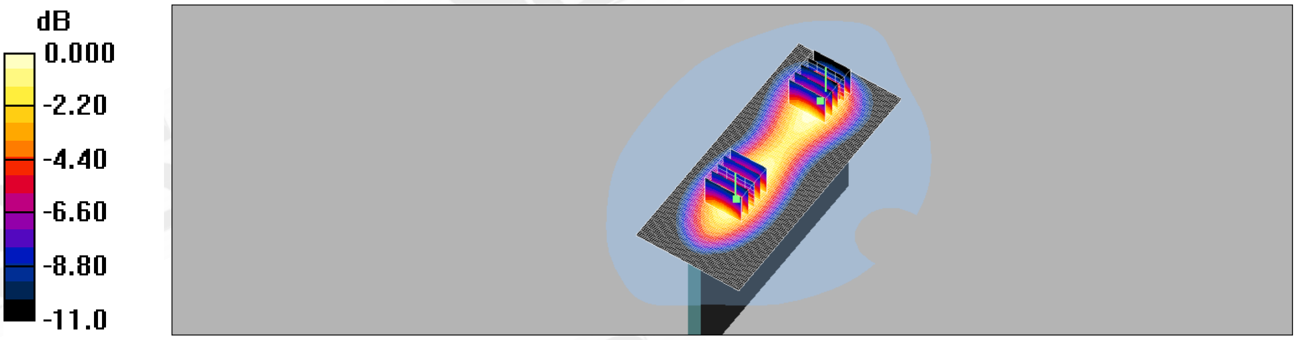
Primary Landscape_GPRS850_CH190_(Multi class 10)

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.882 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.1 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 1.32 W/kg
SAR(1 g) = 0.757 mW/g; SAR(10 g) = 0.466 mW/g
Maximum value of SAR (measured) = 0.823 mW/g

body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 22.1 V/m; Power Drift = -0.072 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.706 mW/g; SAR(10 g) = 0.456 mW/g
Maximum value of SAR (measured) = 0.771 mW/g



0 dB = 0.771mW/g

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Lap-held_GPRS850_CH128_(multi class 10)_test distance is 12mm

DUT: Lap-held;

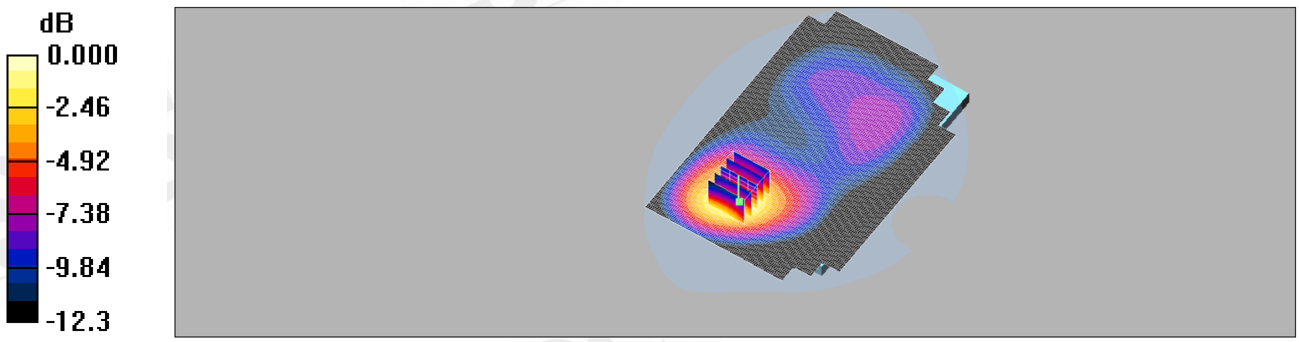
Communication System: GSM 850; Frequency: 824.2 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used (interpolated): f = 824.2 MHz; σ = 1.01 mho/m; ε_r = 55.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.24 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = -0.074 dB
Peak SAR (extrapolated) = 1.74 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.735 mW/g
Maximum value of SAR (measured) = 1.25 mW/g



0 dB = 1.25mW/g

Lap-held_GPRS850_CH190_(multi class 10)_test distance is 12mm

DUT: Lap-held;

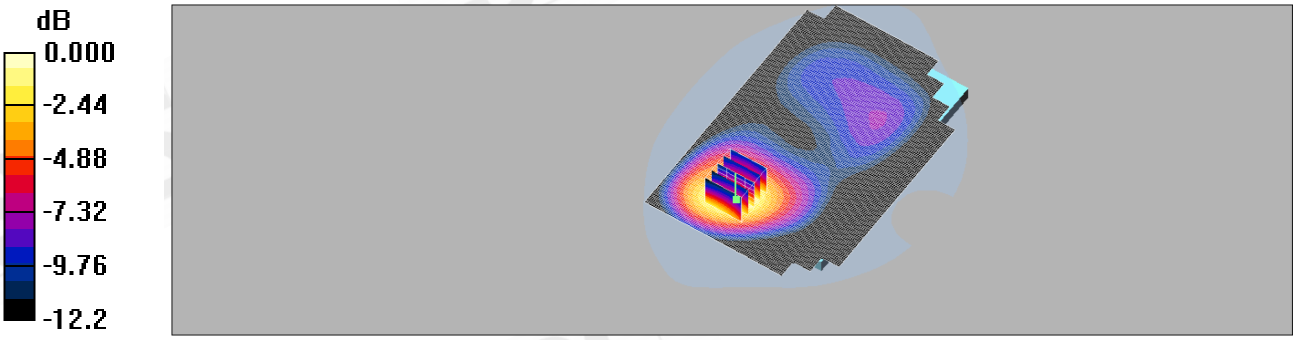
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.14 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.20 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.07 mW/g; SAR(10 g) = 0.679 mW/g
Maximum value of SAR (measured) = 1.17 mW/g



0 dB = 1.17mW/g

Lap-held_GPRS850_CH251_(multi class 10)_test distance is 12mm

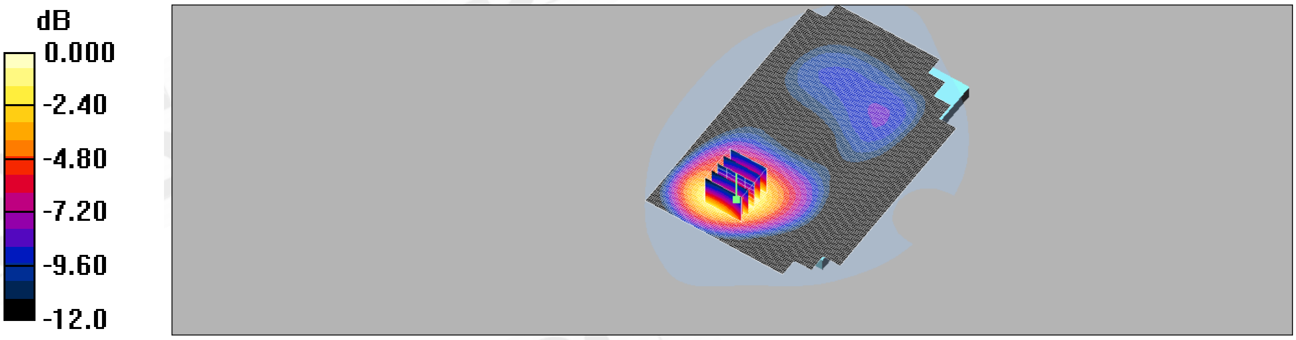
Communication System: GSM 850; Frequency: 848.8 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 849 MHz; σ = 1.04 mho/m; ε_r = 55.2; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.08 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 8.03 V/m; Power Drift = -0.061 dB
Peak SAR (extrapolated) = 1.57 W/kg
SAR(1 g) = 1.01 mW/g; SAR(10 g) = 0.636 mW/g
Maximum value of SAR (measured) = 1.10 mW/g



0 dB = 1.10mW/g

Lap-held_GPRS850_CH190_(Multi class 8)

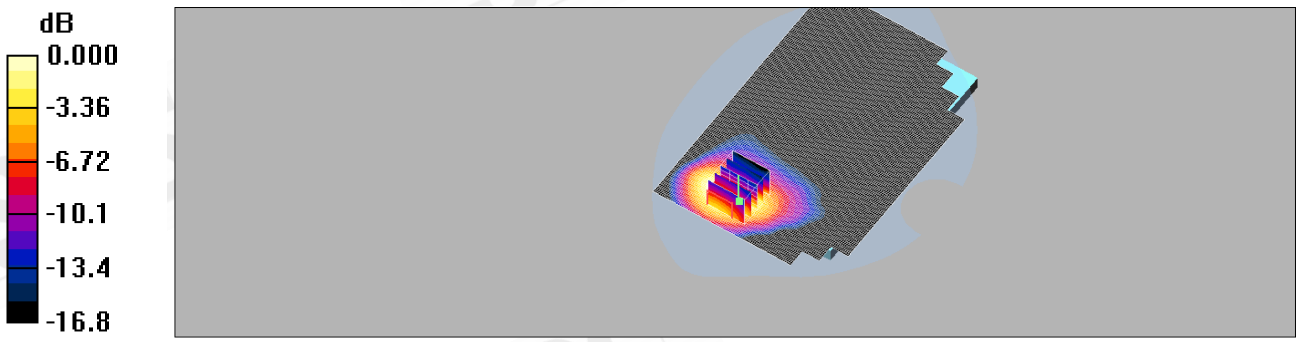
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.098 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.722 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 0.180 W/kg
SAR(1 g) = 0.091 mW/g; SAR(10 g) = 0.047 mW/g
Maximum value of SAR (measured) = 0.096 mW/g



0 dB = 0.096mW/g

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Secondary Landscape_GPRS850_CH190_(Multi class 8)

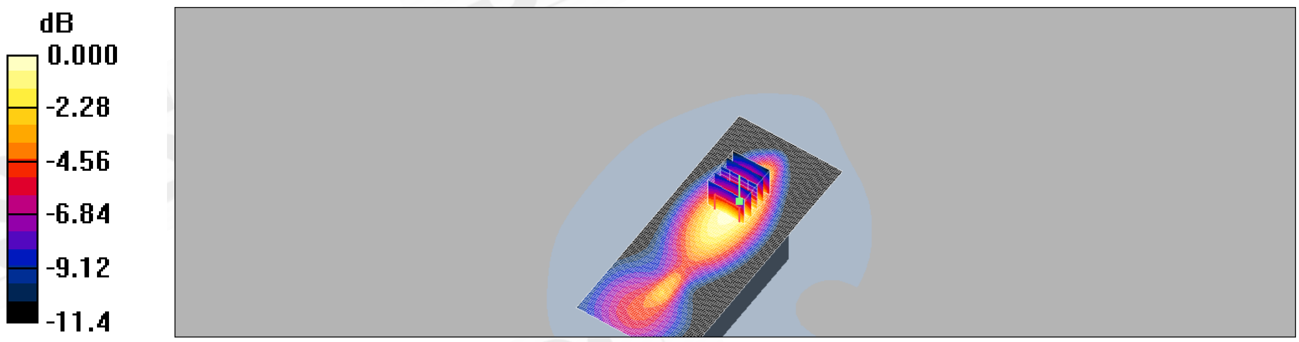
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.238 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.6 V/m; Power Drift = 0.155 dB
Peak SAR (extrapolated) = 0.323 W/kg
SAR(1 g) = 0.209 mW/g; SAR(10 g) = 0.136 mW/g
Maximum value of SAR (measured) = 0.229 mW/g



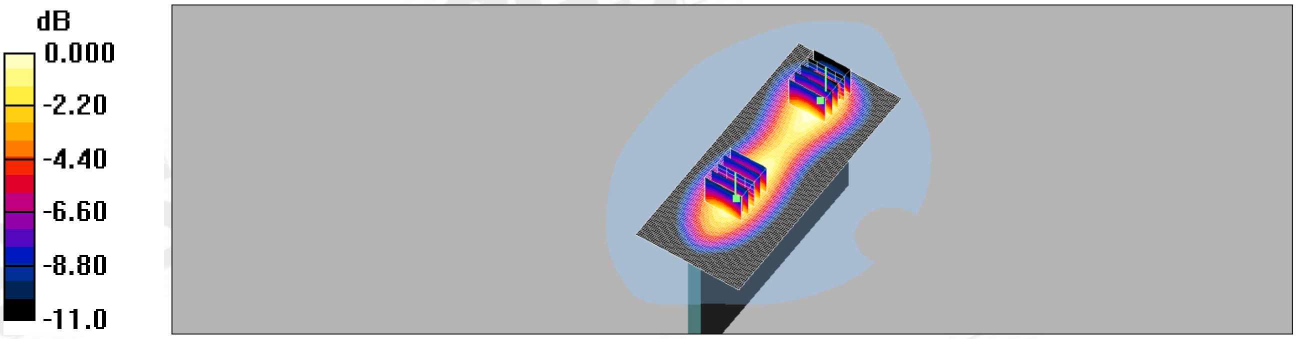
0 dB = 0.229mW/g

Primary Landscape_GPRS850_CH190_(Multi class 8)

Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:8.3
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.729 mW/g
body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.7 V/m; Power Drift = 0.064 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.624 mW/g; SAR(10 g) = 0.385 mW/g
Maximum value of SAR (measured) = 0.676 mW/g

body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.7 V/m; Power Drift = 0.064 dB
Peak SAR (extrapolated) = 0.890 W/kg
SAR(1 g) = 0.583 mW/g; SAR(10 g) = 0.377 mW/g
Maximum value of SAR (measured) = 0.635 mW/g



0 dB = 0.635mW/g

Lap-held_EGPRS850_CH190_(Multi class 12)

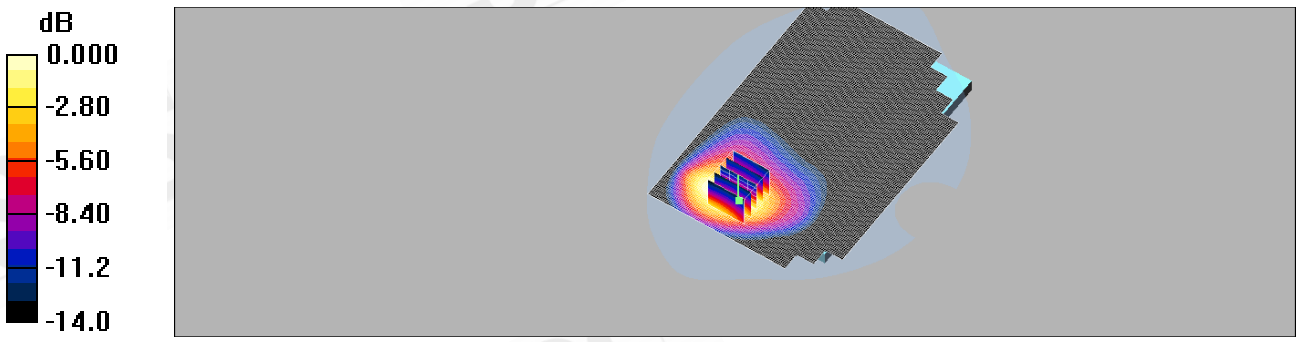
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:2
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(5.68, 5.68, 5.68); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.433 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.39 V/m; Power Drift = -0.193 dB
Peak SAR (extrapolated) = 0.726 W/kg
SAR(1 g) = 0.381 mW/g; SAR(10 g) = 0.208 mW/g
Maximum value of SAR (measured) = 0.420 mW/g



0 dB = 0.420mW/g

Secondary Landscape_EGPRS850_CH190_(Multi class 10)

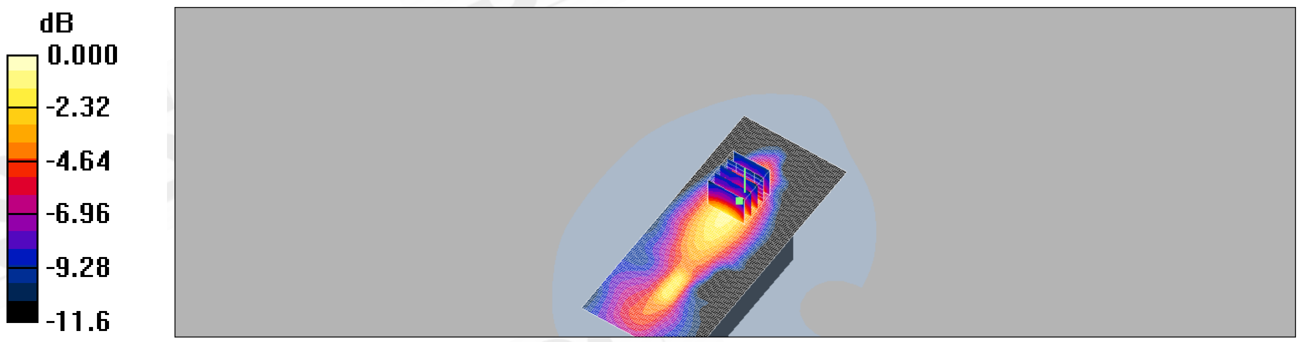
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(5.68, 5.68, 5.68); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.013 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.95 V/m; Power Drift = 0.062 dB
Peak SAR (extrapolated) = 0.028 W/kg
SAR(1 g) = 0.014 mW/g; SAR(10 g) = 0.00827 mW/g
Maximum value of SAR (measured) = 0.017 mW/g



0 dB = 0.017mW/g

Date: 2011/8/25

Primary Landscape_EGPRS850_CH190_(Multi class 10)

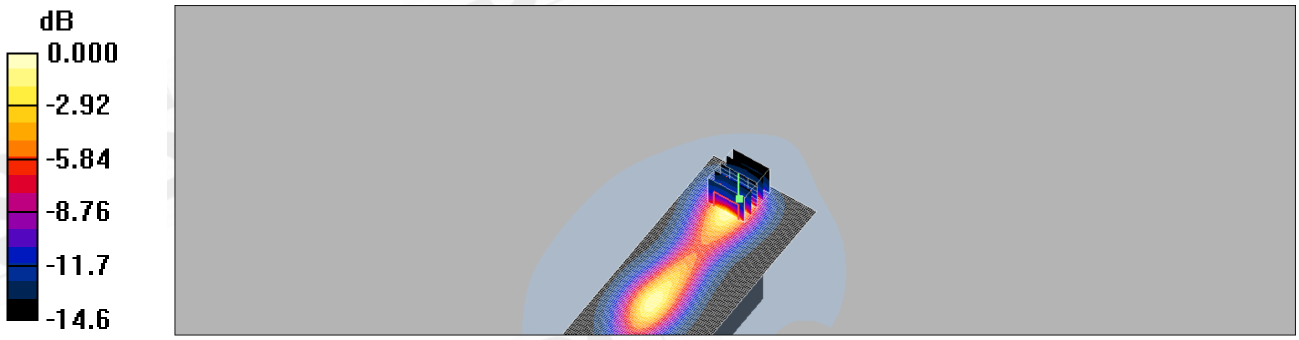
Communication System: GSM 850; Frequency: 836.6 MHz;Duty Cycle: 1:4.1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(5.68, 5.68, 5.68); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.047 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.73 V/m; Power Drift = 0.176 dB
Peak SAR (extrapolated) = 0.068 W/kg
SAR(1 g) = 0.041 mW/g; SAR(10 g) = 0.026 mW/g
Maximum value of SAR (measured) = 0.044 mW/g



0 dB = 0.044mW/g

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Lap-held_GPRS1900_CH661_(Multi class 10)

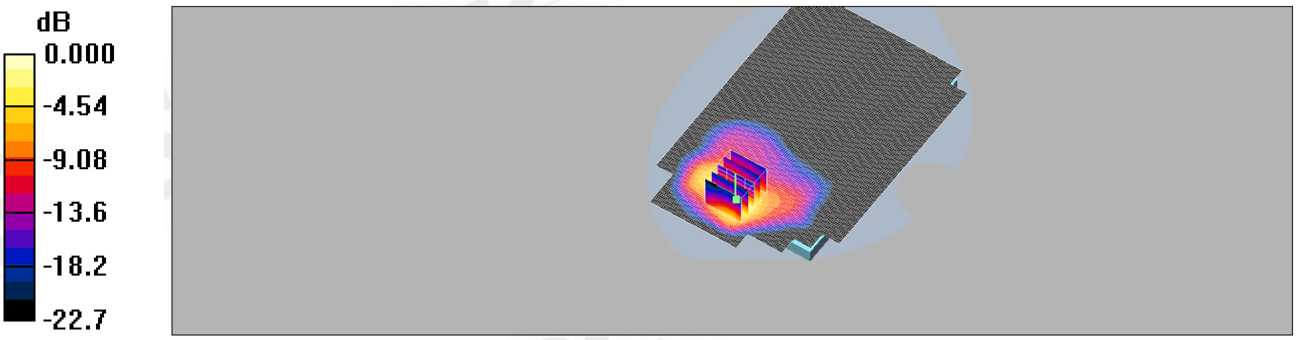
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:4.1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.513 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.331 V/m; Power Drift = 0.156 dB
Peak SAR (extrapolated) = 1.11 W/kg
SAR(1 g) = 0.506 mW/g; SAR(10 g) = 0.230 mW/g
Maximum value of SAR (measured) = 0.580 mW/g



0 dB = 0.580mW/g

Secondary Landscape_GPRS1900_CH661_(Multi class 10)

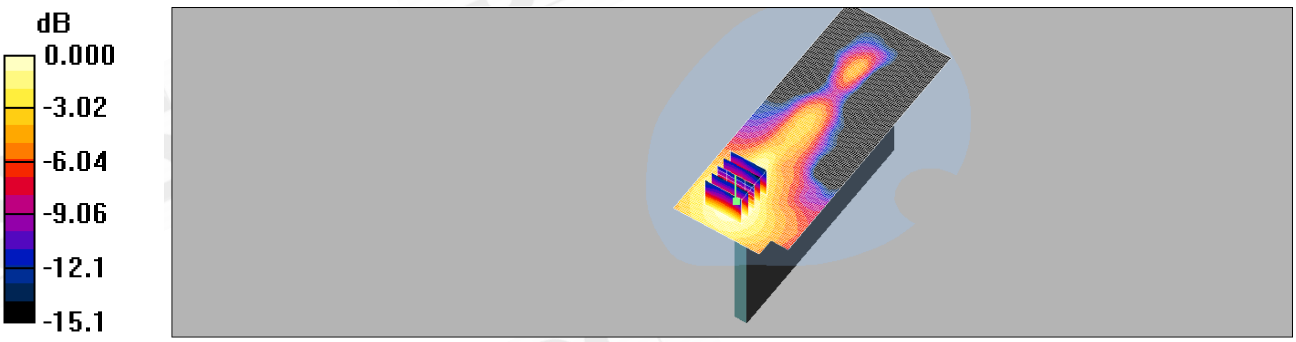
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:4.1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.084 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.39 V/m; Power Drift = 0.175 dB
Peak SAR (extrapolated) = 0.132 W/kg
SAR(1 g) = 0.079 mW/g; SAR(10 g) = 0.049 mW/g
Maximum value of SAR (measured) = 0.084 mW/g



0 dB = 0.084mW/g

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Primary Landscape_GPRS1900_CH661_(Multi class 10)

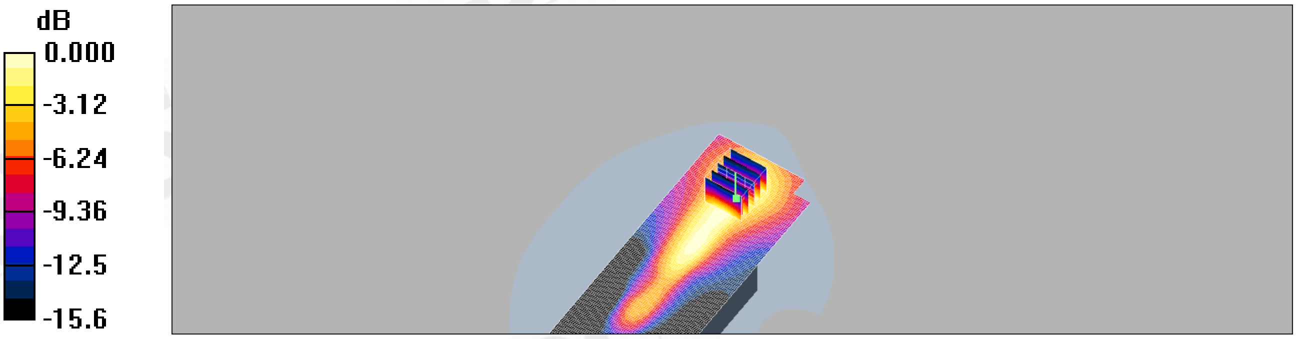
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:4.1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.172 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.29 V/m; Power Drift = 0.191 dB
Peak SAR (extrapolated) = 0.291 W/kg
SAR(1 g) = 0.160 mW/g; SAR(10 g) = 0.090 mW/g
Maximum value of SAR (measured) = 0.176 mW/g



0 dB = 0.176mW/g

Lap-held_GPRS1900_CH661_(Multi class 10)_test distance is 12mm

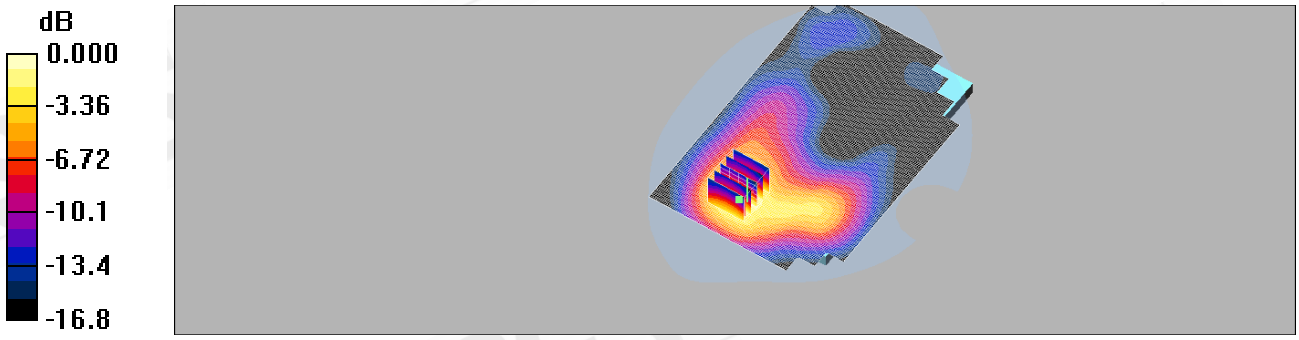
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:4.1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.462 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.13 V/m; Power Drift = 0.148 dB
Peak SAR (extrapolated) = 0.689 W/kg
SAR(1 g) = 0.412 mW/g; SAR(10 g) = 0.242 mW/g
Maximum value of SAR (measured) = 0.444 mW/g



0 dB = 0.444mW/g

Lap-held_GPRS1900_CH661_(Multi class 8)

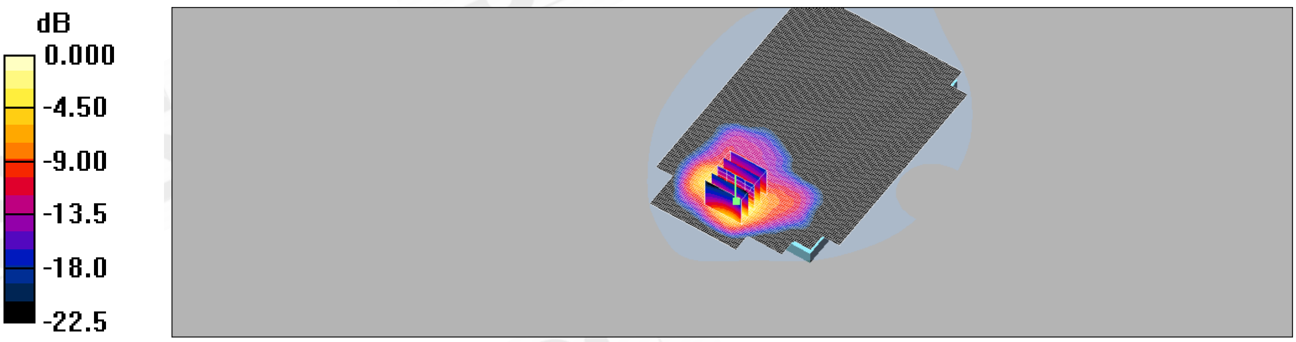
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.256 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.200 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 0.576 W/kg
SAR(1 g) = 0.257 mW/g; SAR(10 g) = 0.116 mW/g
Maximum value of SAR (measured) = 0.294 mW/g



0 dB = 0.294mW/g

Secondary Landscape_GPRS1900_CH661_(Multi class 8)

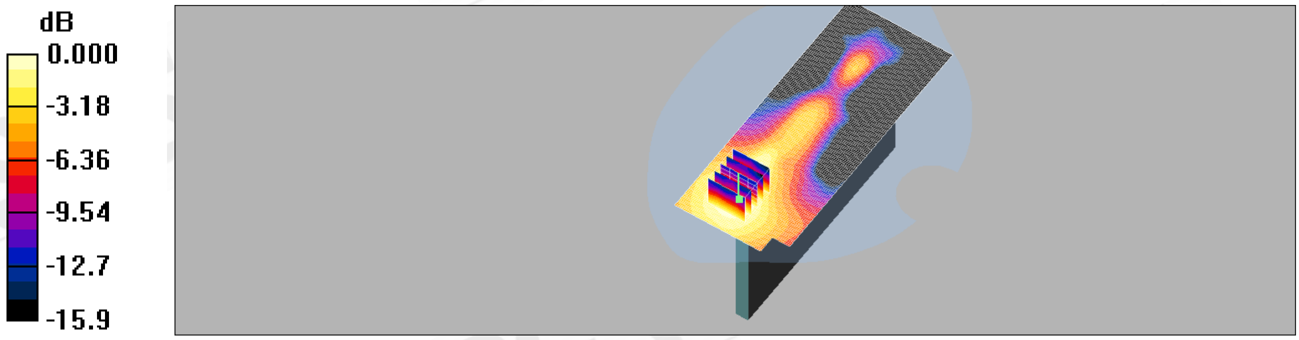
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.054 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.54 V/m; Power Drift = 0.138 dB
Peak SAR (extrapolated) = 0.082 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.031 mW/g
Maximum value of SAR (measured) = 0.055 mW/g



0 dB = 0.055mW/g

Primary Landscape_GPRS1900_CH661_(Multi class 8)

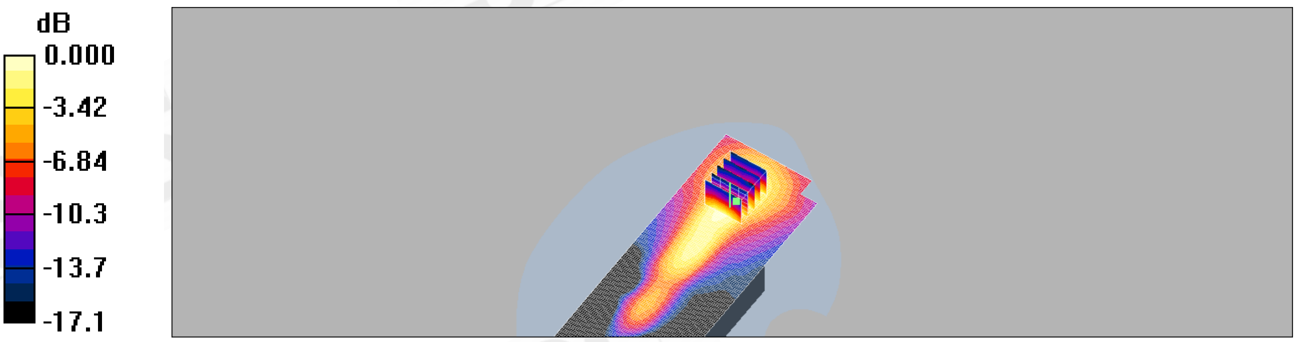
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:8.3
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.113 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.38 V/m; Power Drift = 0.022 dB
Peak SAR (extrapolated) = 0.192 W/kg
SAR(1 g) = 0.106 mW/g; SAR(10 g) = 0.059 mW/g
Maximum value of SAR (measured) = 0.119 mW/g



0 dB = 0.119mW/g

Lap-held_EGPRS1900_CH661_(Multi class 12)

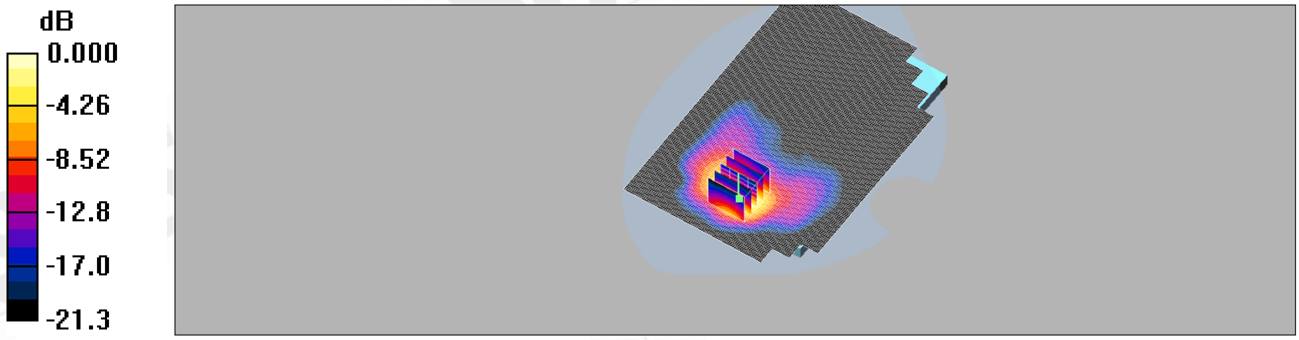
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.51 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(4.32, 4.32, 4.32); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.10 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 2.19 V/m; Power Drift = 0.101 dB
Peak SAR (extrapolated) = 2.27 W/kg
SAR(1 g) = 1.000 mW/g; SAR(10 g) = 0.456 mW/g
Maximum value of SAR (measured) = 1.04 mW/g



0 dB = 1.04mW/g

Secondary Landscape_EGPRS1900_CH661_(Multi class 12)

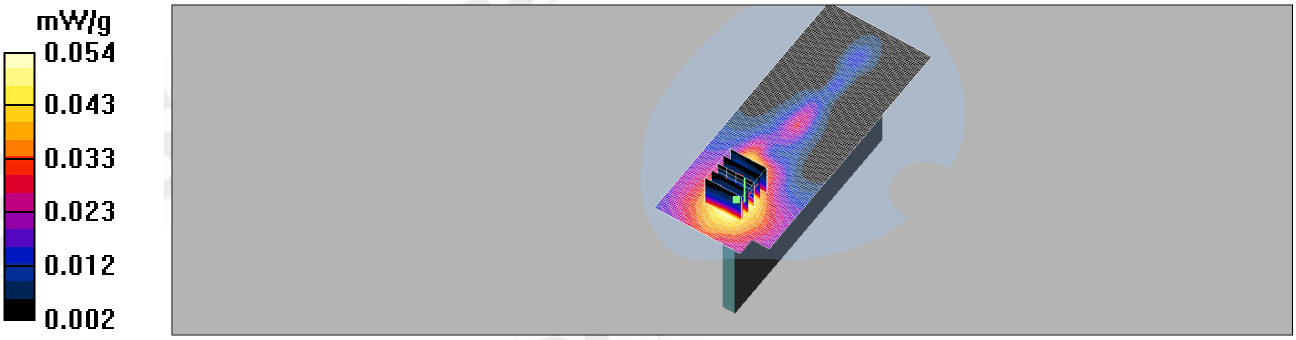
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.51 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(4.32, 4.32, 4.32); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.057 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 3.98 V/m; Power Drift = 0.125 dB
Peak SAR (extrapolated) = 0.082 W/kg
SAR(1 g) = 0.051 mW/g; SAR(10 g) = 0.032 mW/g
Maximum value of SAR (measured) = 0.054 mW/g



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Primary Landscape_EGPRS1900_CH661_(Multi class 12)

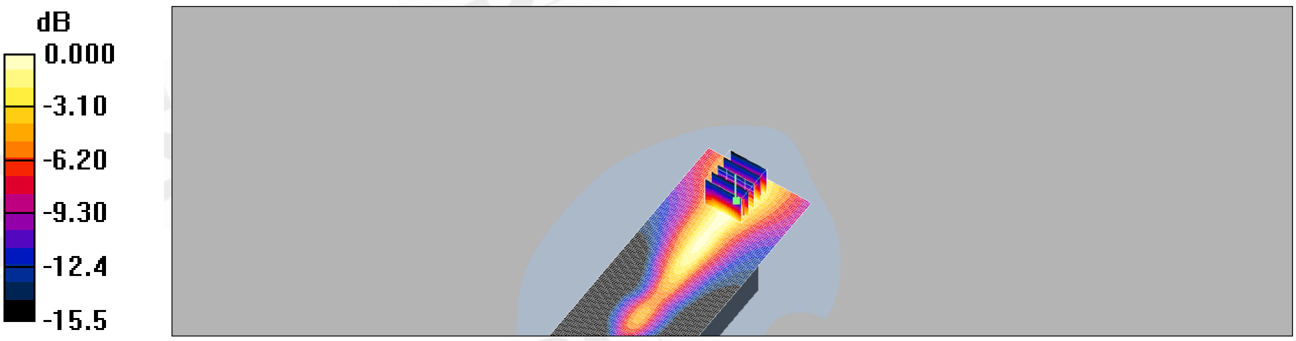
Communication System: GSM1900; Frequency: 1880 MHz;Duty Cycle: 1:2
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.51 mho/m; ε_r = 51.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(4.32, 4.32, 4.32); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.297 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.64 V/m; Power Drift = -0.155 dB
Peak SAR (extrapolated) = 0.482 W/kg
SAR(1 g) = 0.267 mW/g; SAR(10 g) = 0.151 mW/g
Maximum value of SAR (measured) = 0.294 mW/g



0 dB = 0.294mW/g

Lap-held_WCDMA Band II_CH9262

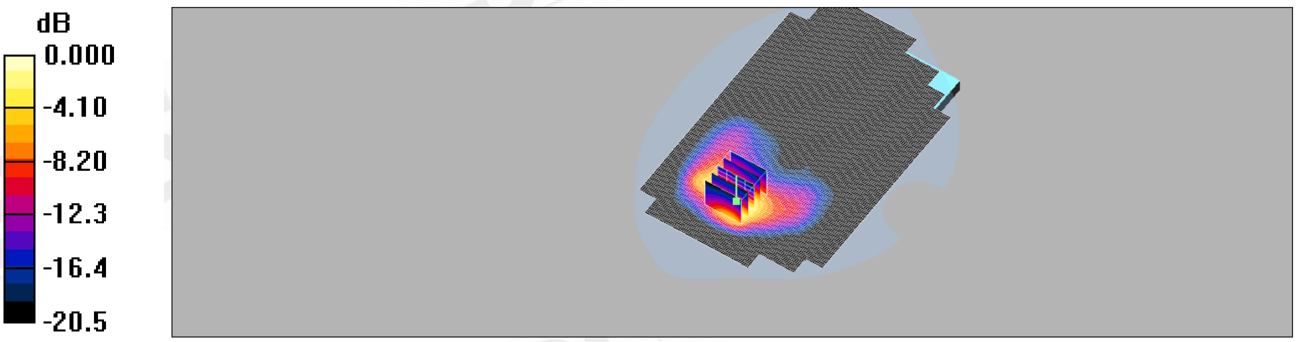
Communication System: WCDMA BAND2; Frequency: 1852.4 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used (interpolated): f = 1852.4 MHz; σ = 1.57 mho/m; ε_r = 52.7; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.48 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.02 V/m; Power Drift = 0.163 dB
Peak SAR (extrapolated) = 2.88 W/kg
SAR(1 g) = 1.28 mW/g; SAR(10 g) = 0.585 mW/g
Maximum value of SAR (measured) = 1.42 mW/g



0 dB = 1.42mW/g

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Lap-held_WCDMA Band II_CH9400

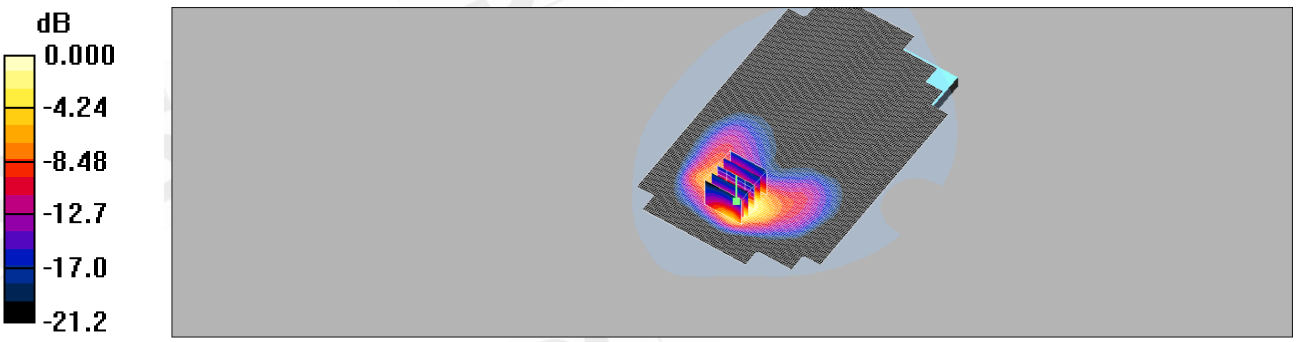
Communication System: WCDMA BAND2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

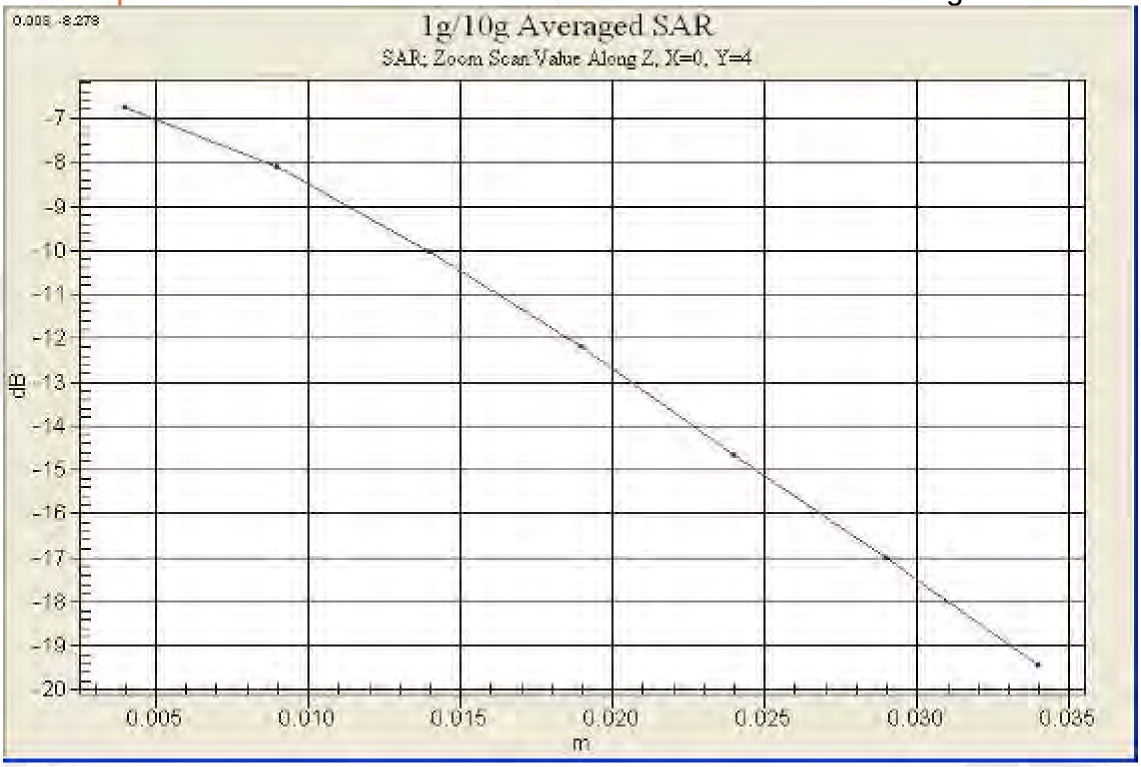
- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.60 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 1.39 V/m; Power Drift = 0.189 dB
Peak SAR (extrapolated) = 3.25 W/kg
SAR(1 g) = 1.34 mW/g; SAR(10 g) = 0.633 mW/g
Maximum value of SAR (measured) = 1.49 mW/g



0 dB = 1.49mW/g


0.008 -8.278
1g/10g Averaged SAR
SAR; Zoom Scan Value Along Z, X=0, Y=4
dB
-7
-8
-9
-10
-11
-12
-13
-14
-15
-16
-17
-18
-19
-20
0.005
0.010
0.015
0.020
0.025
0.030
0.035
m

Lap-held_WCDMA Band II_CH9538

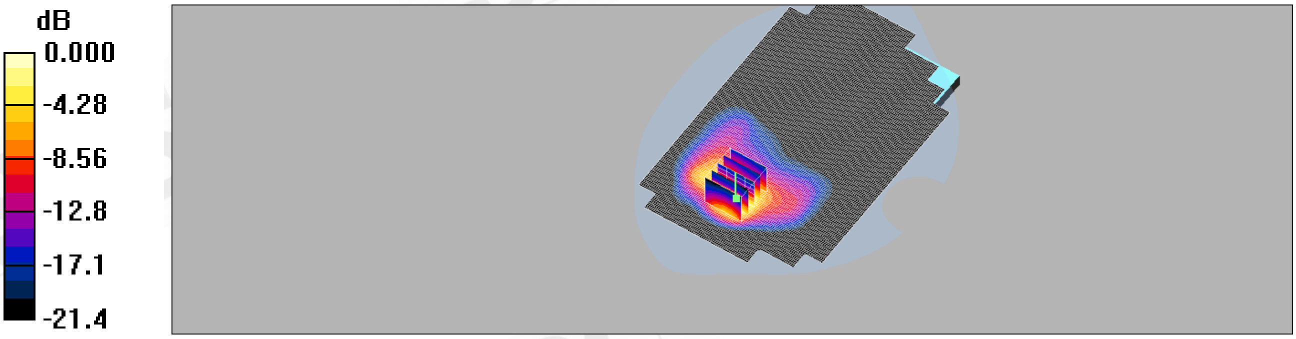
Communication System: WCDMA BAND2; Frequency: 1907.6 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1908 MHz; σ = 1.59 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.57 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.903 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 2.99 W/kg
SAR(1 g) = 1.27 mW/g; SAR(10 g) = 0.582 mW/g
Maximum value of SAR (measured) = 1.36 mW/g



0 dB = 1.36mW/g

Secondary Landscape_WCDMA Band II_CH9400

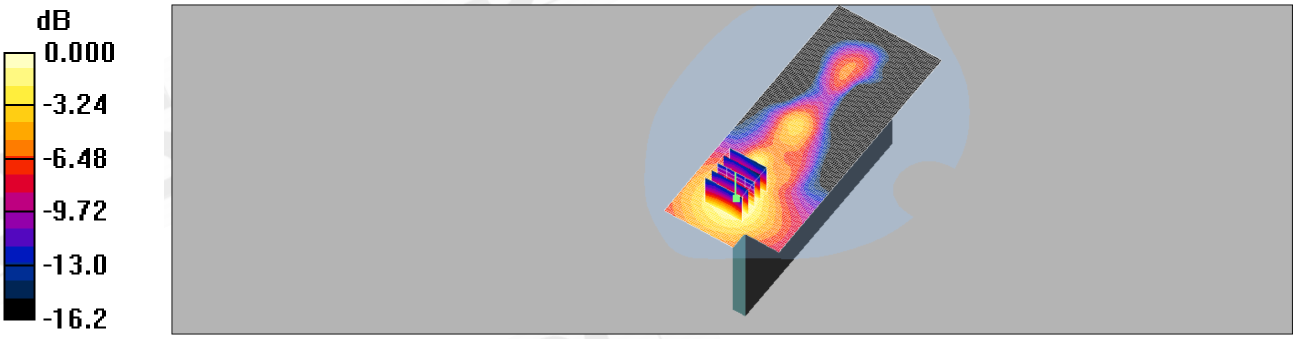
Communication System: WCDMA BAND2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.154 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 5.02 V/m; Power Drift = 0.100 dB
Peak SAR (extrapolated) = 0.255 W/kg
SAR(1 g) = 0.147 mW/g; SAR(10 g) = 0.086 mW/g
Maximum value of SAR (measured) = 0.159 mW/g



0 dB = 0.159mW/g

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Primary Landscape_WCDMA Band II_CH9400

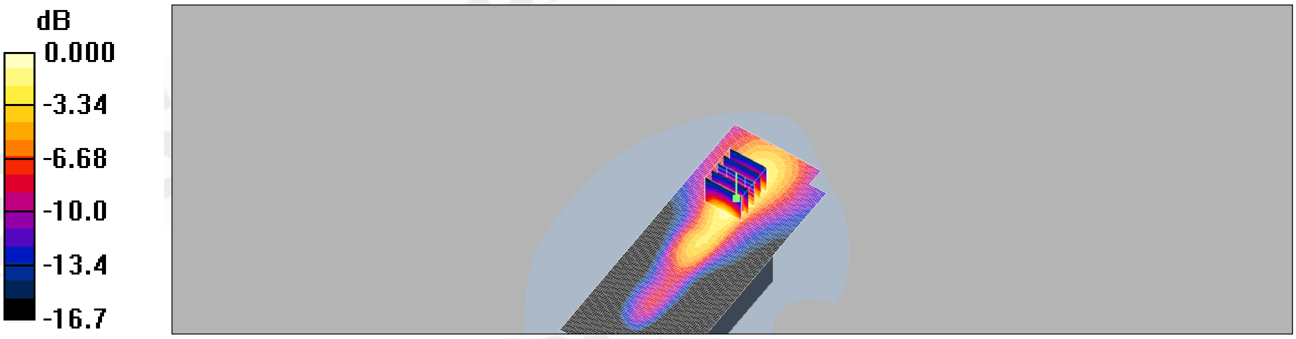
Communication System: WCDMA BAND2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.58 mho/m; ε_r = 52.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.456 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.0 V/m; Power Drift = -0.131 dB
Peak SAR (extrapolated) = 0.796 W/kg
SAR(1 g) = 0.435 mW/g; SAR(10 g) = 0.234 mW/g
Maximum value of SAR (measured) = 0.487 mW/g



0 dB = 0.487mW/g

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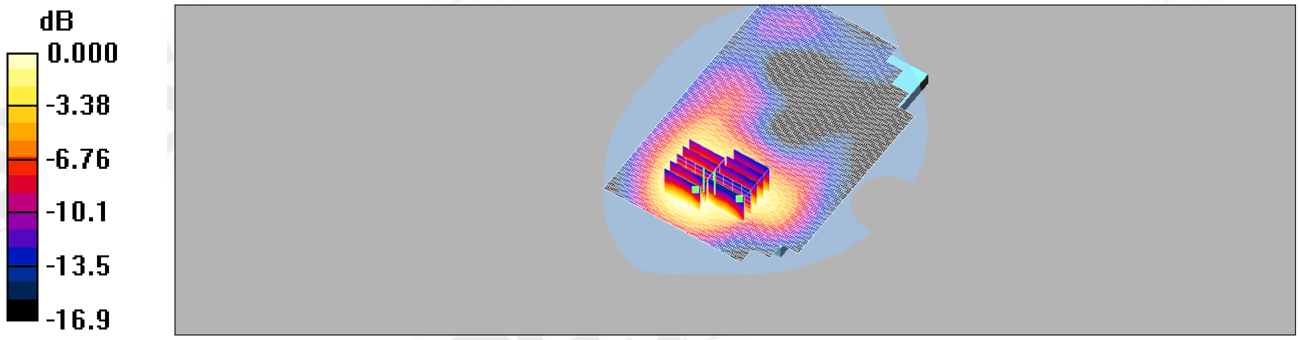
Lap-held_WCDMAB2_CH9400_test distance is 12mm

Communication System: WCDMA BAND2; Frequency: 1880 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1880 MHz; σ = 1.57 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.872 mW/g
body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.14 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 1.33 W/kg
SAR(1 g) = 0.786 mW/g; SAR(10 g) = 0.468 mW/g
Maximum value of SAR (measured) = 0.847 mW/g
body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 4.14 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 1.06 W/kg
SAR(1 g) = 0.522 mW/g; SAR(10 g) = 0.324 mW/g
Maximum value of SAR (measured) = 0.645 mW/g



0 dB = 0.645mW/g

Lap-held_WCDMA Band V_CH4183

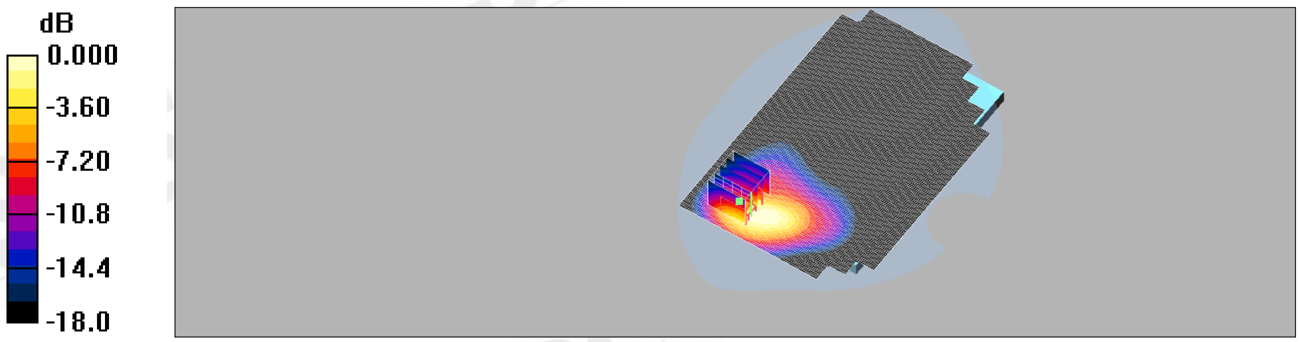
Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.327 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 0.970 V/m; Power Drift = 0.106 dB
Peak SAR (extrapolated) = 0.695 W/kg
SAR(1 g) = 0.276 mW/g; SAR(10 g) = 0.141 mW/g
Maximum value of SAR (measured) = 0.315 mW/g



0 dB = 0.315mW/g

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Secondary Landscape_WCDMA Band V_CH4183

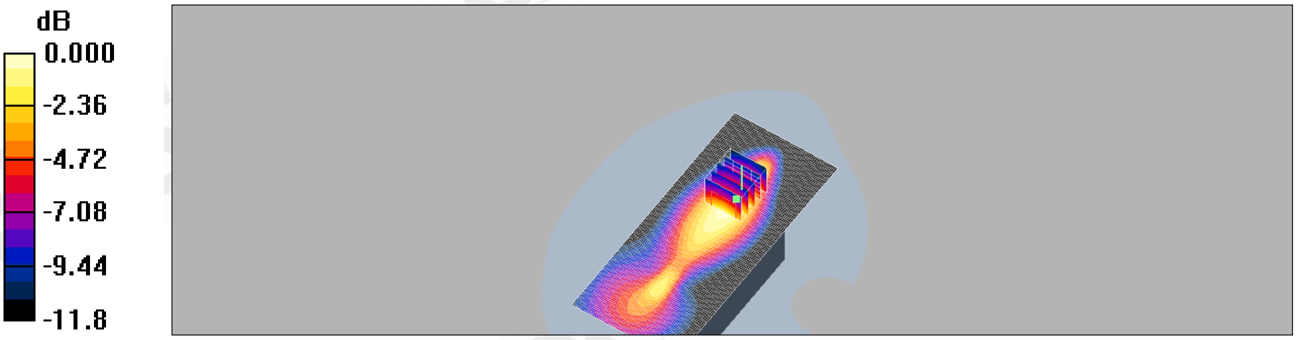
Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.247 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.5 V/m; Power Drift = 0.155 dB
Peak SAR (extrapolated) = 0.325 W/kg
SAR(1 g) = 0.207 mW/g; SAR(10 g) = 0.130 mW/g
Maximum value of SAR (measured) = 0.230 mW/g



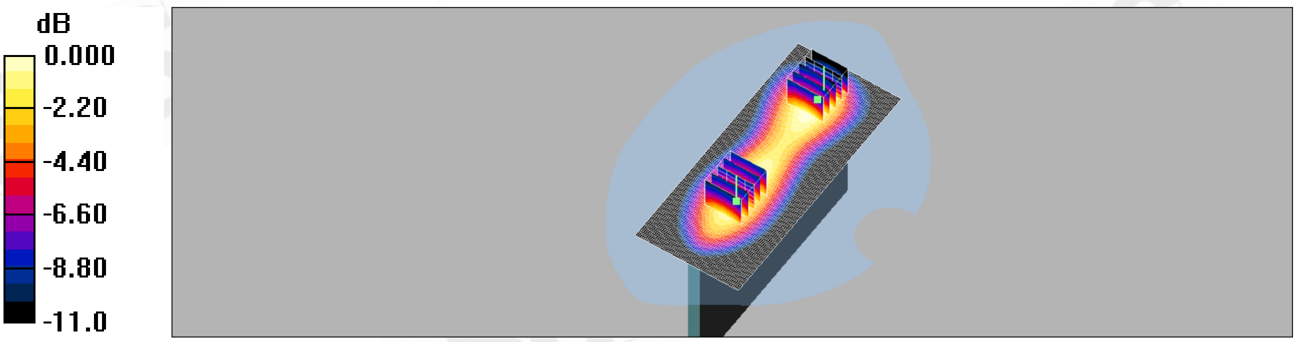
0 dB = 0.230mW/g

Primary Landscape_WCDMA Band V_CH4183

Communication System: WCDMA Band V; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 0.983 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (61x141x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.724 mW/g
body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.6 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 1.09 W/kg
SAR(1 g) = 0.628 mW/g; SAR(10 g) = 0.385 mW/g
Maximum value of SAR (measured) = 0.681 mW/g
body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.6 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 0.860 W/kg
SAR(1 g) = 0.564 mW/g; SAR(10 g) = 0.366 mW/g
Maximum value of SAR (measured) = 0.611 mW/g



0 dB = 0.611mW/g

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Lap-held_WCDMAB5_CH4132_test distance is 12mm

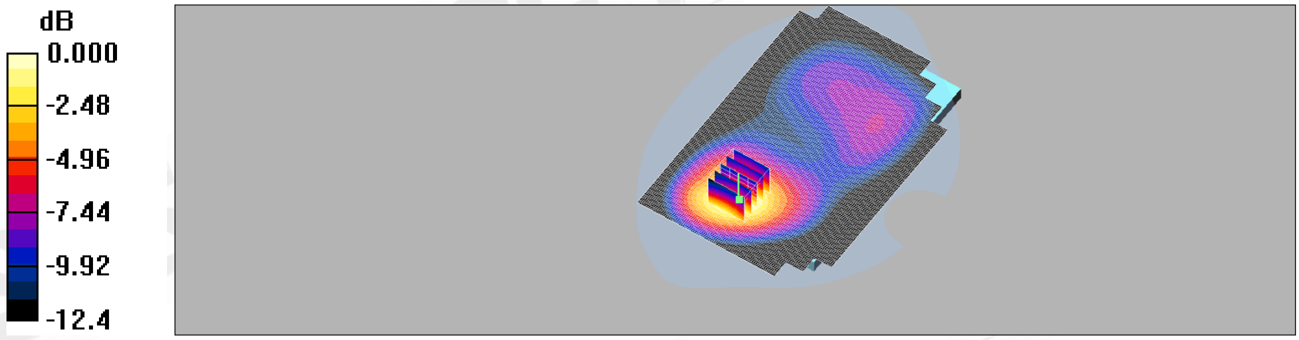
Communication System: WCDMA BAND5; Frequency: 826.4 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used (interpolated): f = 826.4 MHz; σ = 1.01 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.959 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.28 V/m; Power Drift = 0.011 dB
Peak SAR (extrapolated) = 1.37 W/kg
SAR(1 g) = 0.895 mW/g; SAR(10 g) = 0.566 mW/g
Maximum value of SAR (measured) = 0.966 mW/g



0 dB = 0.966mW/g

Lap-held_WCDMAB5_CH4183_test distance is 12mm

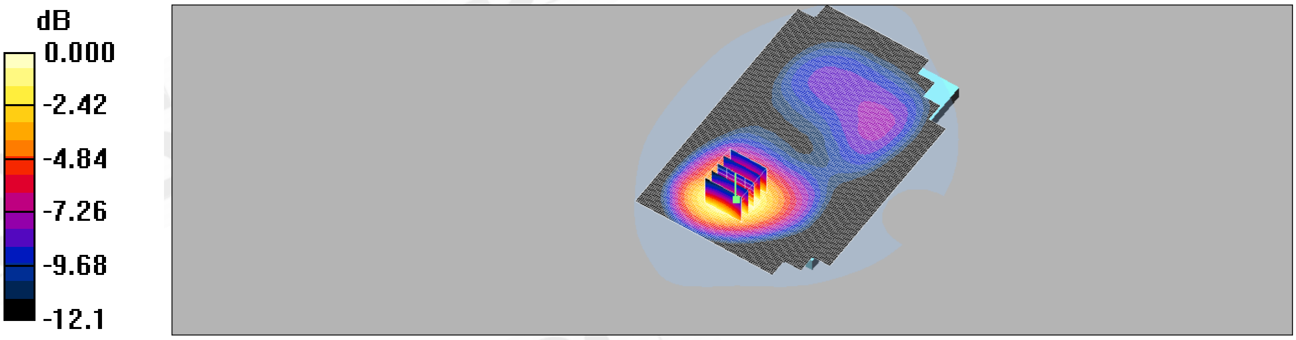
Communication System: WCDMA BAND5; Frequency: 836.6 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 837 MHz; σ = 1.02 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.925 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.94 V/m; Power Drift = 0.129 dB
Peak SAR (extrapolated) = 1.30 W/kg
SAR(1 g) = 0.843 mW/g; SAR(10 g) = 0.534 mW/g
Maximum value of SAR (measured) = 0.898 mW/g



0 dB = 0.898mW/g

Lap-held_WCDMAB5_CH4233_test distance is 12mm

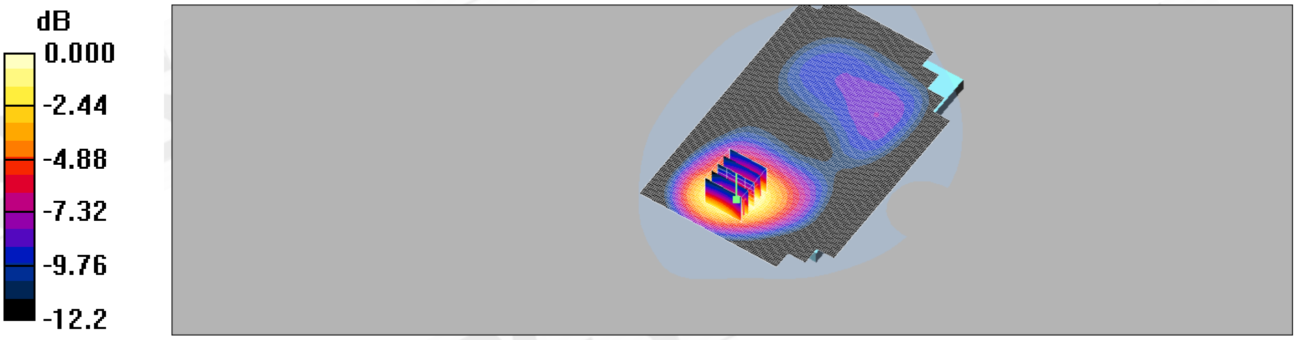
Communication System: WCDMA BAND5; Frequency: 846.6 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 847 MHz; σ = 1.04 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

body/Area Scan (101x151x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 0.975 mW/g

body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 7.25 V/m; Power Drift = 0.135 dB
Peak SAR (extrapolated) = 1.44 W/kg
SAR(1 g) = 0.914 mW/g; SAR(10 g) = 0.571 mW/g
Maximum value of SAR (measured) = 0.975 mW/g



0 dB = 0.975mW/g

5. SAR System Performance Verification

Date: 2011/5/20

DUT: Dipole 835 MHz;

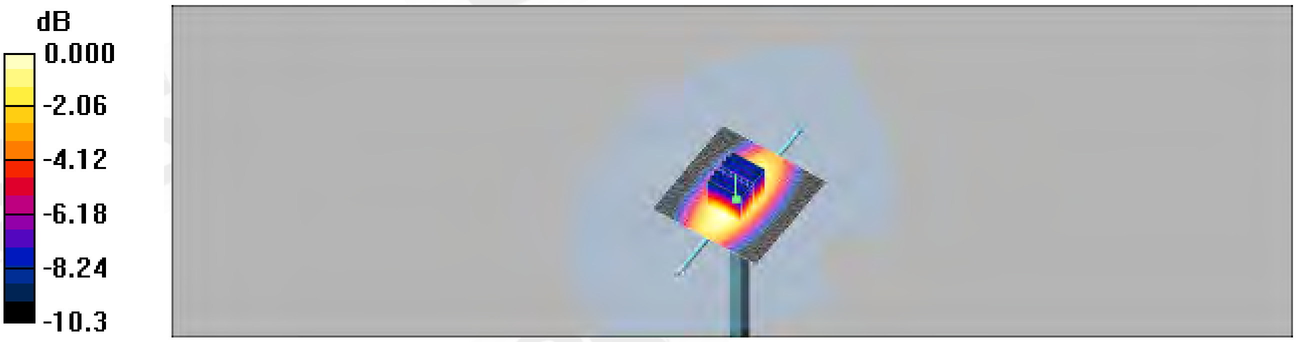
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: Muscle835 MHz Medium parameters used: f = 835 MHz; σ = 0.981 mho/m; ε_r = 53.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.71 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 53.5 V/m; Power Drift = -0.007 dB
Peak SAR (extrapolated) = 3.89 W/kg
SAR(1 g) = 2.55 mW/g; SAR(10 g) = 1.71 mW/g
Maximum value of SAR (measured) = 2.80 mW/g



0 dB = 2.80mW/g

DUT: Dipole 1900 MHz;

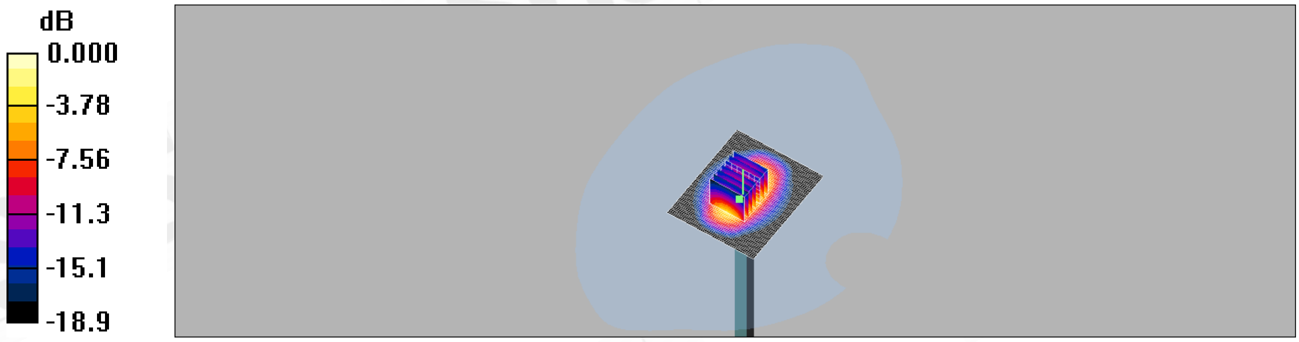
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: M1900 Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.6 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.2 V/m; Power Drift = -0.015 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.98 mW/g; SAR(10 g) = 5.23 mW/g
Maximum value of SAR (measured) = 11.7 mW/g



0 dB = 11.7mW/g

DUT: Dipole 835 MHz;

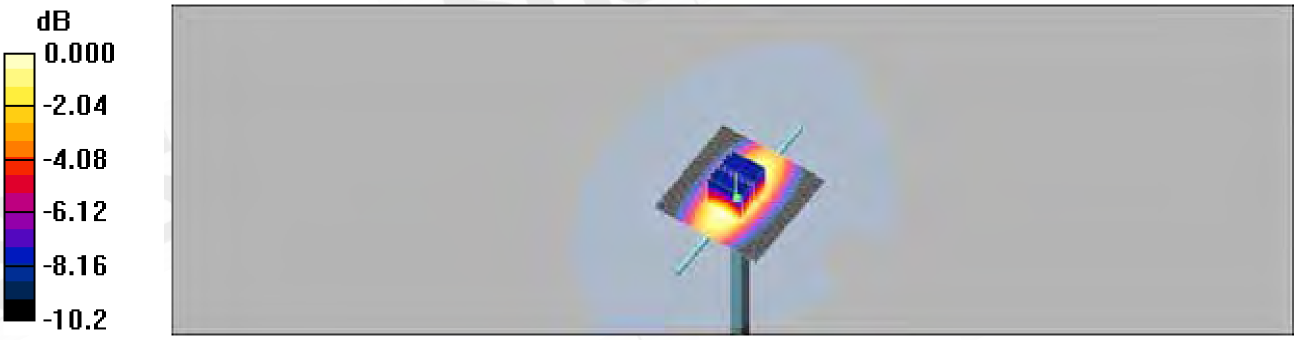
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 835 MHz; σ = 1.02 mho/m; ε_r = 55.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(9.3, 9.3, 9.3); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.63 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 50.9 V/m; Power Drift = -0.043 dB
Peak SAR (extrapolated) = 3.58 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.59 mW/g
Maximum value of SAR (measured) = 2.61 mW/g



0 dB = 2.61mW/g

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DUT: Dipole 1900 MHz;

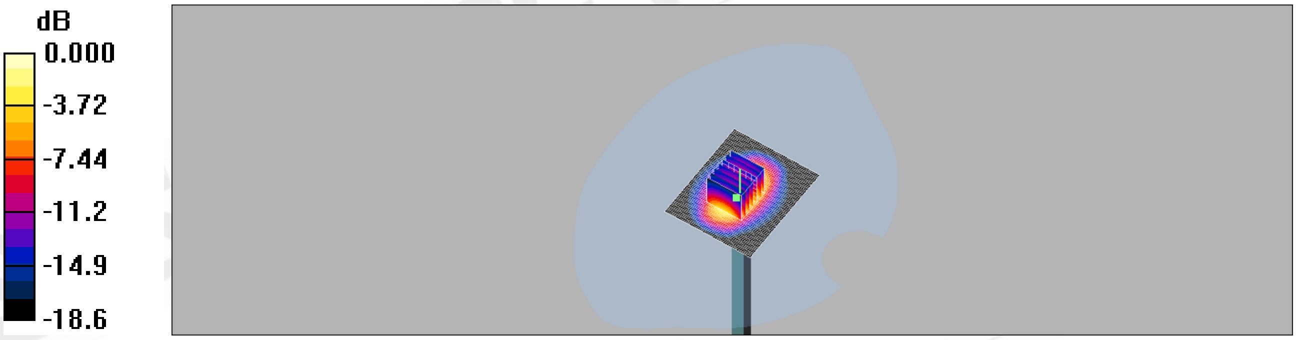
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1900 MHz; σ = 1.59 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.51, 7.51, 7.51); Calibrated: 2011/4/19
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2010/8/18
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 13.2 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 83.3 V/m; Power Drift = -0.016 dB
Peak SAR (extrapolated) = 18.7 W/kg
SAR(1 g) = 9.99 mW/g; SAR(10 g) = 5.14 mW/g
Maximum value of SAR (measured) = 11.3 mW/g



0 dB = 11.3mW/g

DUT: Dipole 835 MHz;

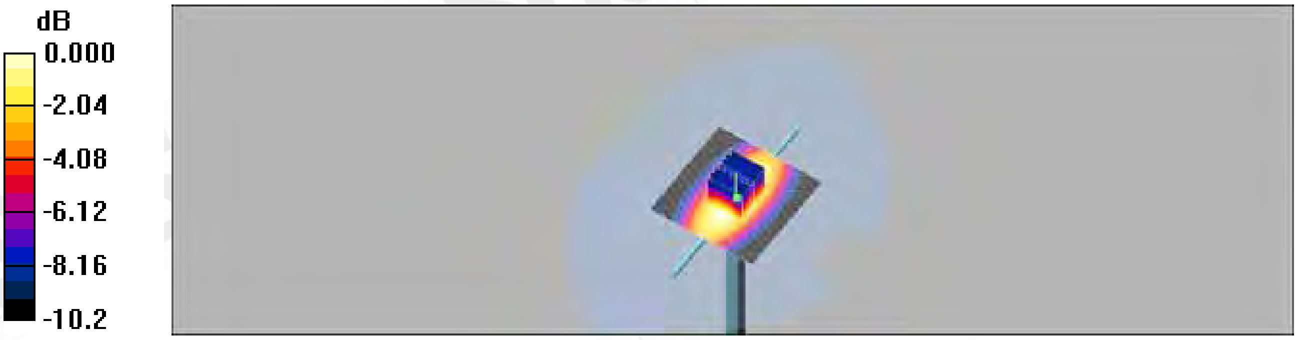
Communication System: CW; Frequency: 835 MHz;Duty Cycle: 1:1
Medium: Muscle 900 MHz Medium parameters used: f = 835 MHz; σ = 1.02 mho/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(5.68, 5.68, 5.68); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (61x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 2.63 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 51.3 V/m; Power Drift = -0.001 dB
Peak SAR (extrapolated) = 3.55 W/kg
SAR(1 g) = 2.42 mW/g; SAR(10 g) = 1.59 mW/g
Maximum value of SAR (measured) = 2.62 mW/g



0 dB = 2.62mW/g

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DUT: Dipole 1900 MHz;

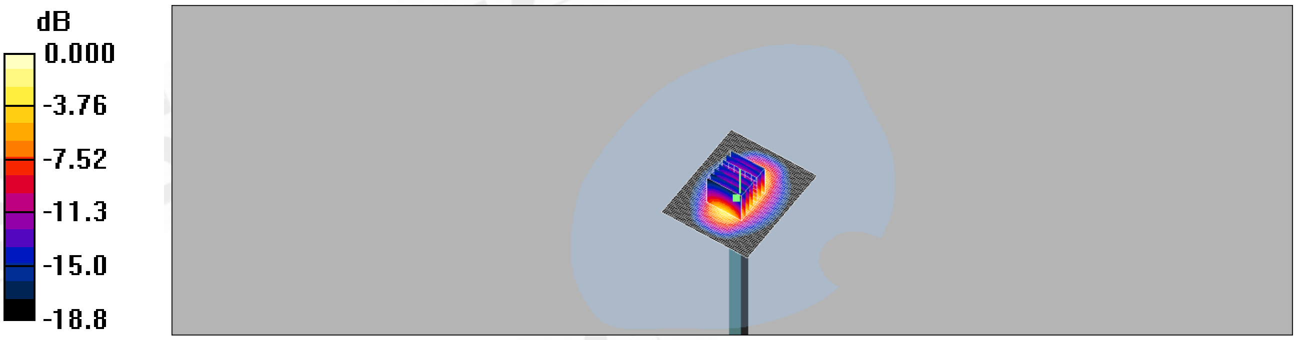
Communication System: CW; Frequency: 1900 MHz;Duty Cycle: 1:1
Medium: M1800 & 1900 Medium parameters used: f = 1900 MHz; σ = 1.54 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY4 Configuration:

- Probe: ES3DV3 - SN3071; ConvF(4.32, 4.32, 4.32); Calibrated: 2011/6/22
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn679; Calibrated: 2011/6/24
- Phantom: SAM1; Type: SAM 4.0; Serial: TP:1419
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Pin=250mW/Area Scan (51x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 12.6 mW/g

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 84.9 V/m; Power Drift = -0.014 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.64 mW/g; SAR(10 g) = 4.86 mW/g
Maximum value of SAR (measured) = 10.7 mW/g



0 dB = 10.7mW/g

6. DAE & Probe Calibration certificate

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Accreditation No.: **SCS 108**

Client **SGS-TW**

Certificate No: **DAE4-547_Aug10**

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 547
Calibration procedure(s)	QA CAL-06.v22 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	August 18, 2010

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	1-Oct-09 (No: 9055)	Oct-10
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	07-Jun-10 (in house check)	In house check: Jun-11

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	
Approved by:	Fin Bomholt	R&D Director	

Issued: August 18, 2010

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Certificate No: DAE4-547_Aug10 Page 1 of 5

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Accreditation No.: SCS 108

Client: Auden

Certificate No: DAE4-679_Jun11

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BJ - SN: 679
Calibration procedure(s)	QA CAL-06.v23 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	June 24, 2011

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	28-Sep-10 (No:10376)	Sep-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Calibrator Box V1.1	SE UMS 006 AB 1004	08-Jun-11 (in house check)	In house check: Jun-12

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Technician	[signature]
Approved by:	Fin Bomholt	R&D Director	i.V. [signature]

Issued: June 24, 2011

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Certificate No: DAE4-679_Jun11 — Page 1 of 5

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Client **SGS-TW (Auden)**

Certificate No: **EX3-3770_Apr11**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3770

Calibration procedure(s): QA CAL-01.v7, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v3
Calibration procedure for dosimetric E-field probes

Calibration date: April 19, 2011

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41495277	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	23-Apr-10 (No. DAE4-654_Apr10)	Apr-11
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

	Name	Function	Signature
Calibrated by:	Katja Pokovic	Technical Manager	
Approved by:	Fin Bomholt	R&D Director	

Issued: April 19, 2011

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Certificate No: EX3-3770_Apr11 Page 1 of 11

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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	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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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* are numerical linearization parameters in dB assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media.
- *VR:* VR is the validity range of the calibration related to the average diode voltage or DAE voltage in mV.
- *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.

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Probe EX3DV4

SN:3770

Manufactured: July 6, 2010
Calibrated: April 19, 2011

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

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.32	0.62	0.40	± 10.1 %
DCP (mV)[B]	106.8	98.3	102.8	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	120.8	±2.7 %
			Y	0.00	0.00	1.00	134.3	
			Z	0.00	0.00	1.00	133.5	

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:3770

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	9.58	9.58	9.58	0.80	0.70	± 12.0 %
835	41.5	0.90	9.25	9.25	9.25	0.60	0.67	± 12.0 %
900	41.5	0.97	9.06	9.06	9.06	0.76	0.71	± 12.0 %
1750	40.1	1.37	7.97	7.97	7.97	0.80	0.61	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.71	0.62	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.75	0.58	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.80	0.56	± 12.0 %
2600	39.0	1.96	6.95	6.95	6.95	0.66	0.62	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 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.

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DASY/EASY - Parameters of Probe: EX3DV4- SN:3770

Calibration Parameter Determined in Body Tissue Simulating Media

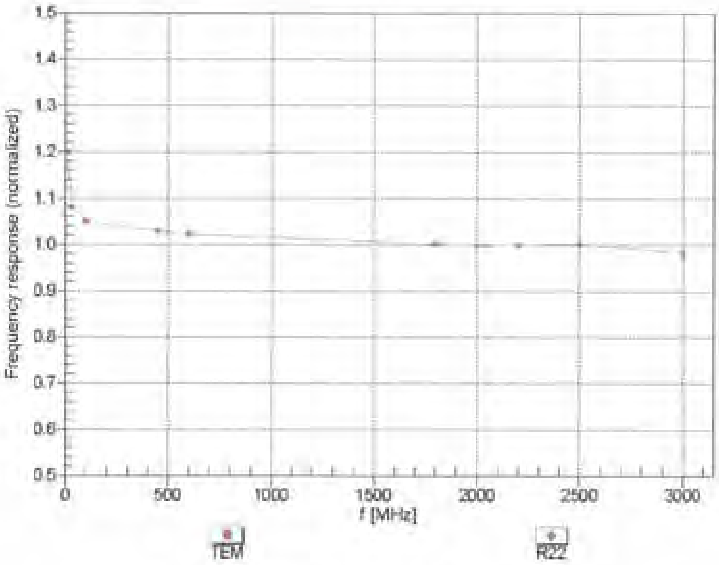
f (MHz)[C]	Relative Permittivity[F]	Conductivity (S/m)[F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.42	9.42	9.42	0.73	0.72	± 12.0 %
835	55.2	0.97	9.30	9.30	9.30	0.72	0.72	± 12.0 %
900	55.0	1.05	9.12	9.12	9.12	0.73	0.75	± 12.0 %
1750	53.4	1.49	7.84	7.84	7.84	0.80	0.68	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.80	0.62	± 12.0 %
2000	53.3	1.52	7.44	7.44	7.44	0.80	0.66	± 12.0 %
2450	52.7	1.95	6.96	6.96	6.96	0.80	0.50	± 12.0 %
2600	52.5	2.16	6.78	6.78	6.78	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.42	4.42	4.42	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.12	4.12	4.12	0.52	1.90	± 13.1 %
5600	48.5	5.77	3.54	3.54	3.54	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.60	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. 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.

EX3DV4– SN:3770 April 19, 2011

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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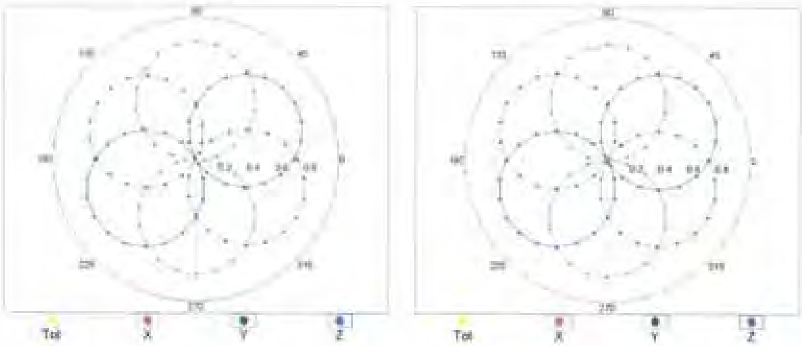
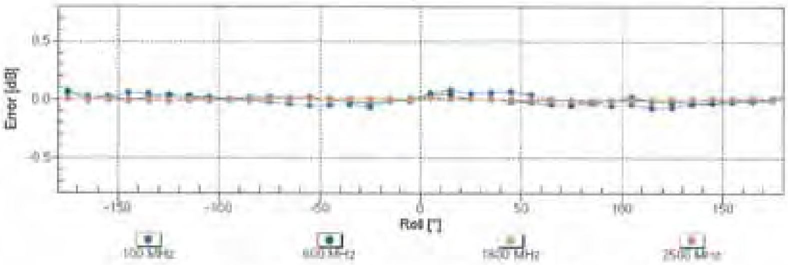
Receiving Pattern (φ), ϑ = 0°

f=600 MHz,TEM f=1800 MHz,R22





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

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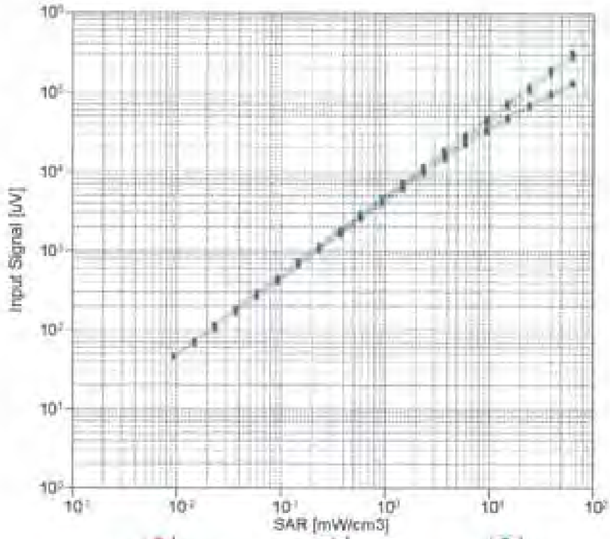
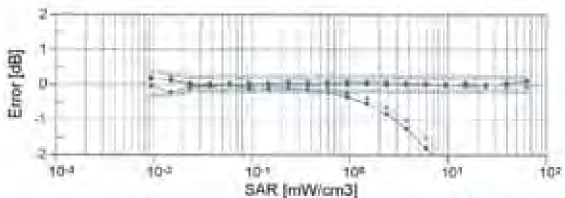
Dynamic Range f(SAR$_{head}$)

(TEM cell , f = 900 MHz)





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

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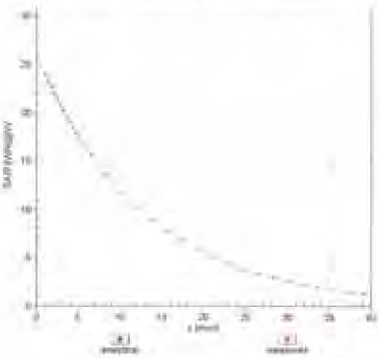
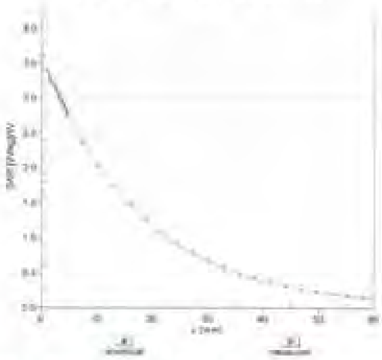
Conversion Factor Assessment

f = 1750 MHz,WGLS R22 (H_convF)

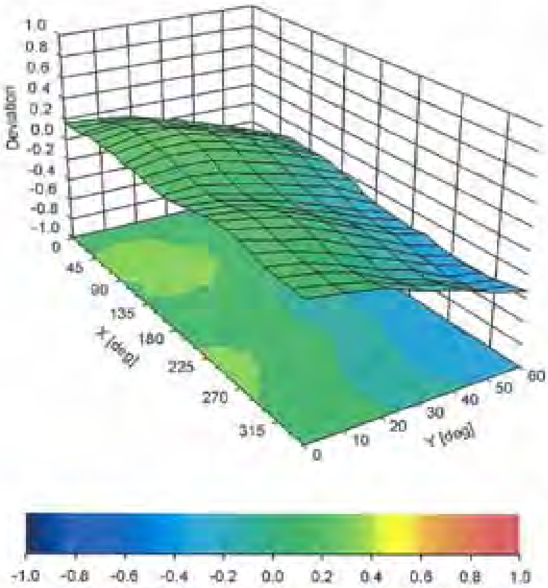


f = 900 MHz,WGLS R9 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3770

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
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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Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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 Auden

Certificate No: ES3-3071_Jun11

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3071

Calibration procedure(s): QA CAL-01.v8, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: June 22, 2011

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	31-Mar-11 (No. 217-01372)	Apr-12
Power sensor E4412A	MY41498087	31-Mar-11 (No. 217-01372)	Apr-12
Reference 3 dB Attenuator	SN: S5054 (3c)	29-Mar-11 (No. 217-01369)	Apr-12
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Reference 30 dB Attenuator	SN: S5129 (30b)	29-Mar-11 (No. 217-01370)	Apr-12
Reference Probe ES3DV2	SN: 3013	29-Dec-10 (No. ES3-3013_Dec10)	Dec-11
DAE4	SN: 654	3-May-11 (No. DAE4-654_May11)	May-12
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: June 23, 2011

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

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Calibration Laboratory of
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S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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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	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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
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, VRx,y,z: A, B, C* 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.

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Probe ES3DV3

SN:3071

Manufactured: December 14, 2004
Calibrated: June 22, 2011

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

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DASY/EASY - Parameters of Probe: ES3DV3 - SN:3071

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)^2)[A]	1.12	1.21	0.98	± 10.1 %
DCP (mV)[B]	101.2	101.2	97.4	

Modulation Calibration Parameters

UID	Communication System Name	PAR		A dB	B dB	C dB	VR mV	Unc[E] (k=2)
10000	CW	0.00	X	0.00	0.00	1.00	102.4	±3.0 %
			Y	0.00	0.00	1.00	110.9	
			Z	0.00	0.00	1.00	130.0	

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: ES3DV3 - SN:3071

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	Depth (mm)	Unct. (k=2)
750	41.9	0.89	6.00	6.00	6.00	0.90	1.10	± 12.0 %
835	41.5	0.90	5.78	5.78	5.78	0.90	1.10	± 12.0 %
900	41.5	0.97	5.67	5.67	5.67	0.90	1.10	± 12.0 %
1450	40.5	1.20	5.22	5.22	5.22	0.83	1.23	± 12.0 %
1750	40.1	1.37	5.03	5.03	5.03	0.90	1.15	± 12.0 %
1900	40.0	1.40	4.83	4.83	4.83	0.86	1.19	± 12.0 %
2000	40.0	1.40	4.80	4.80	4.80	0.89	1.14	± 12.0 %
2450	39.2	1.80	4.19	4.19	4.19	0.74	1.29	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 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.

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DASY/EASY - Parameters of Probe: ES3DV3- SN:3071

Calibration Parameter Determined in Body Tissue Simulating Media

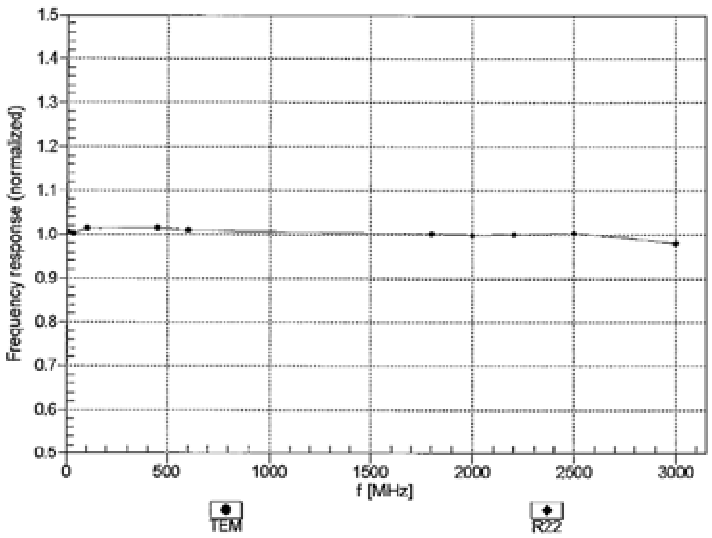
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	5.78	5.78	5.78	0.80	1.20	± 12.0 %
835	55.2	0.97	5.68	5.68	5.68	0.80	1.20	± 12.0 %
900	55.0	1.05	5.63	5.63	5.63	0.90	1.10	± 12.0 %
1450	54.0	1.30	5.22	5.22	5.22	1.00	1.21	± 12.0 %
1750	53.4	1.49	4.66	4.66	4.66	0.72	1.43	± 12.0 %
1900	53.3	1.52	4.32	4.32	4.32	0.72	1.37	± 12.0 %
2000	53.3	1.52	4.29	4.29	4.29	0.74	1.30	± 12.0 %
2450	52.7	1.95	3.89	3.89	3.89	0.75	1.22	± 12.0 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 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.

ES3DV3– SN:3071 June 22, 2011

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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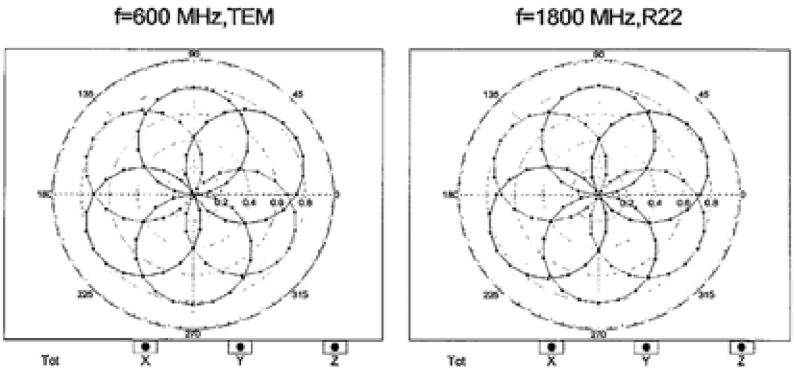
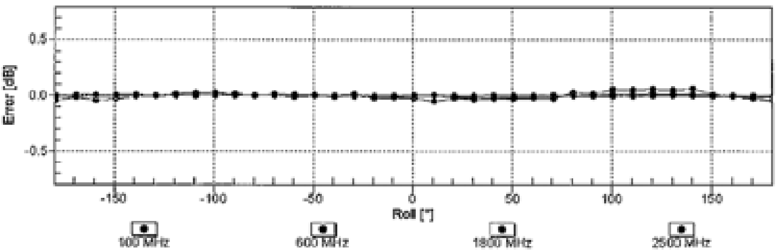
ES3DV3– SN:3071 June 22, 2011

Receiving Pattern (ϕ), ϑ = 0°





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

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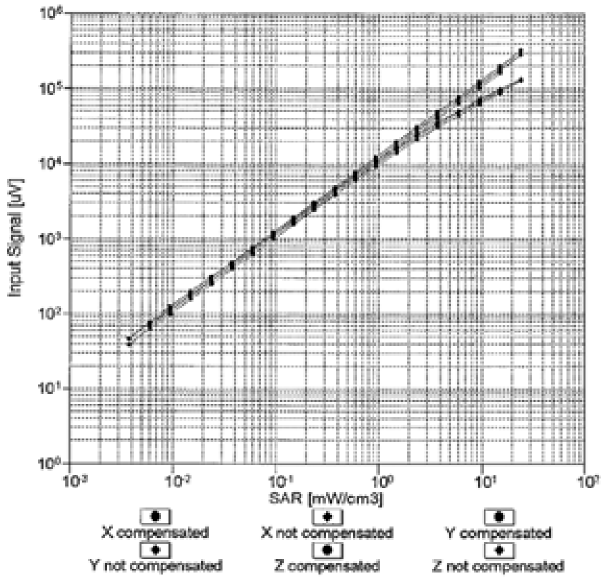
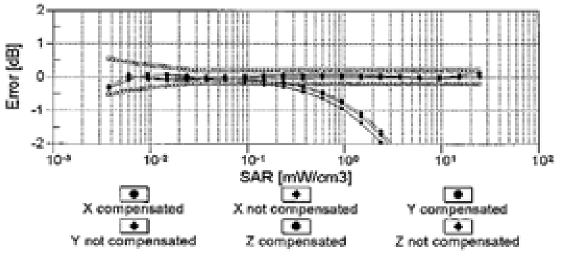
ES3DV3– SN:3071 June 22, 2011

Dynamic Range f(SAR$_{head}$)

(TEM cell , f = 900 MHz)





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

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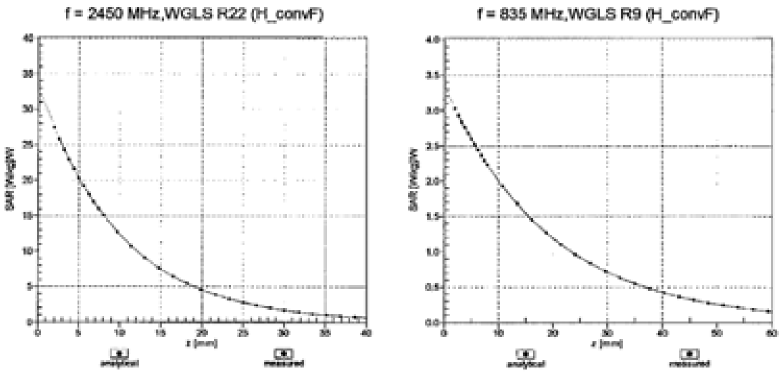
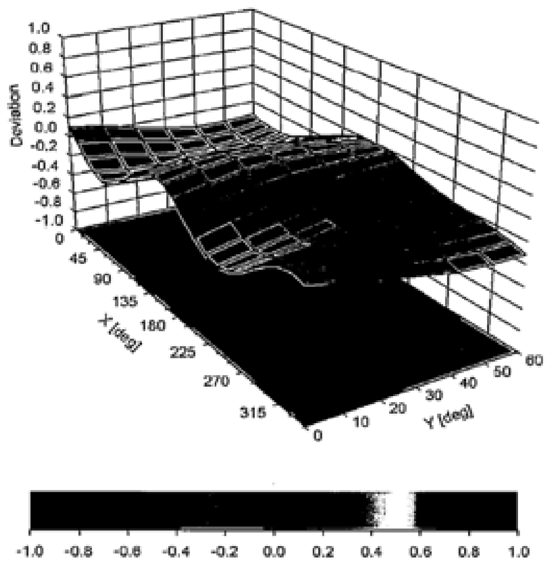
Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (φ, ϑ), f = 900 MHz



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

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DASY/EASY - Parameters of Probe: ES3DV3 - SN:3071

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	Not applicable
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

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7. 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 Distributioin	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system								
Probe calibration (Frequency below 2GMHz)	6%(12.0/2)	N	1	1	1	6%	6%	∞
Isotropy , Axial	4.7%	R	√3	1	1	2.7%	2.7%	∞
Isotropy, Hemispherical	9.6%	R	√3	1	1	5.5%	5.5%	∞
Boundary Effect	1.0%	R	√3	1	1	0.6%	0.6%	∞
Linearity	4.7%	R	√3	1	1	2.7%	2.7%	∞
Detection Limits	1.0%	R	√3	1	1	0.6%	0.6%	∞
Readout Electronics	0.3%	N	1	1	1	0.3%	0.3%	∞
Response time	0.8%	R	√3	1	1	0.5%	0.5%	∞
Integration Time	2.6%	R	√3	1	1	1.5%	1.5%	∞
Measurement drift	1.8%	R	√	1	1	1.0%	1.0%	∞

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(class A evaluation)			3					
RF ambient condition - noise	3.0%	R	√3	1	1	1.7%	1.7%	∞
RF ambient conditions -reflections	3.0%	R	√3	1	1	1.7%	1.7%	∞
Probe positioner Mechanical restrictions	0.4%	R	√3	1	1	0.2%	0.2%	∞
Probe Positioning with respect to phantom shell	2.9%	R	√3	1	1	1.7%	1.7%	∞
Post-processing	1.0%	R	√3	1	1	0.6%	0.6%	∞
Max SAR Eval	1.0%	R	√3	1	1	0.6%	0.6%	∞
Test Sample related								
Test sample positioning	2.9%	N	1	1	1	2.9%	2.9%	M-1
Device Holder Uncertainty	3.6%	N	1	1	1	3.6%	3.6%	M-1
Drift of output power	5.0%	R	√3	1	1	2.9%	2.9%	∞
Phantom and Setup								
Phantom Uncertainty	4.0%	R	√3	1	1	2.3%	2.3%	∞
Liquid conductivity(meas.) Max at 1900 band	4.6%	N	1	0.64	0.43	2.9%	2.0%	M

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Liquid permitivity(meas.) Max at 835 band	2.2%	N	1	0.6	0.49	1.3%	1.1%	M
Combined standard uncertainty		RSS				11.8%	11.6%	
Expant uncertainty (95% confidence interval), K=2						23.6%	23.2%	

8. 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
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Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

Doc No 881 – QD 000 P40 C – F   Page 1 (1)

9. System Validation from Original equipment supplier

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

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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 **ATL (Auden)**

Certificate No: D835V2-4d082_Jul10

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d082
Calibration procedure(s)	QA CAL-05.v7 Calibration procedure for dipole validation kits
Calibration date:	July 20, 2010

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	06-Oct-09 (No. 217-01086)	Oct-10
Power sensor HP 8481A	US37292783	06-Oct-09 (No. 217-01086)	Oct-10
Reference 20 dB Attenuator	SN: 5086 (20g)	30-Mar-10 (No. 217-01158)	Mar-11
Type-N mismatch combination	SN: 5047.2 / 06327	30-Mar-10 (No. 217-01162)	Mar-11
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-09)	In house check: Oct-10

	Name	Function	Signature
Calibrated by:	Dimce Iliev	Laboratory Technician	[signature]
Approved by:	Katja Pokovic	Technical Manager	[signature]

Issued: July 20, 2010

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Certificate No: D835V2-4d082_Jul10 Page 1 of 9

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S Swiss Calibration Service

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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**

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

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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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.

Measurement Conditions

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

DASY Version	DASY5	V52.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V4.9	
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 %	0.90 mho/m ± 6 %
Head TSL temperature during test	(23.1 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.40 mW / g
SAR normalized	normalized to 1W	9.60 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.65 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 mW / g
SAR normalized	normalized to 1W	6.24 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.26 mW /g ± 16.5 % (k=2)**

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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	55.0 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature during test	(22.0 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.58 mW / g
SAR normalized	normalized to 1W	10.3 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**10.0 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.69 mW / g
SAR normalized	normalized to 1W	6.76 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.60 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.7 Ω - 3.2 jΩ
Return Loss	- 29.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 4.6 jΩ
Return Loss	- 26.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.389ns

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.
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	October 17, 2008

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DASY5 Validation Report for Head TSL

Date/Time: 20.07.2010 15:48:57

Test Laboratory: SPEAG, Zurich, Switzerland

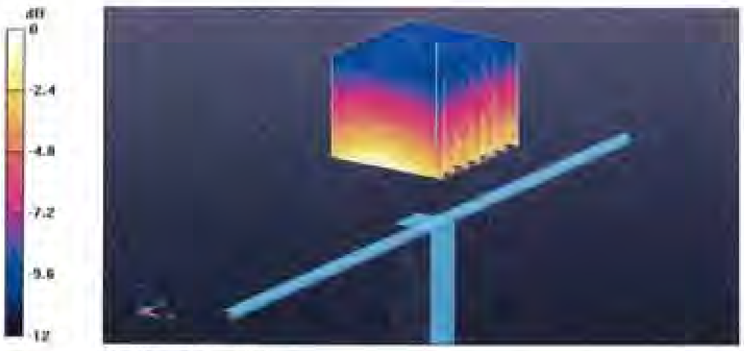
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.9 mho/m; ε_r = 42.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.03, 6.03, 6.03); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

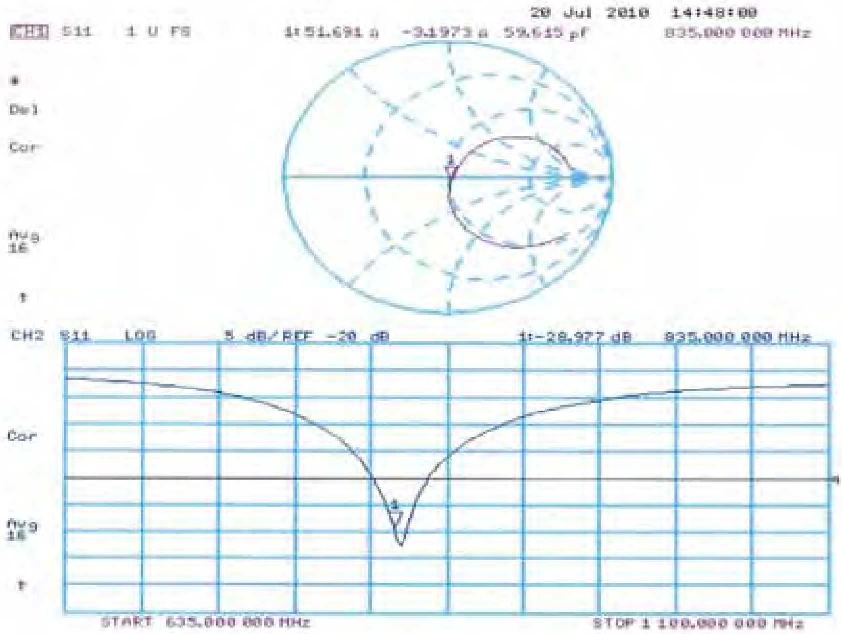
Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.1 V/m; Power Drift = 0.020 dB
Peak SAR (extrapolated) = 3.63 W/kg
SAR(1 g) = 2.4 mW/g; SAR(10 g) = 1.56 mW/g
Maximum value of SAR (measured) = 2.8 mW/g



0 dB = 2.8mW/g

Certificate No: D835V2-4d082_Jul10 Page 6 of 9

Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d082_Jul10 Page 7 of 9

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DASY5 Validation Report for Body

Date/Time: 20.07.2010 12:03:13

Test Laboratory: SPEAG, Zurich, Switzerland

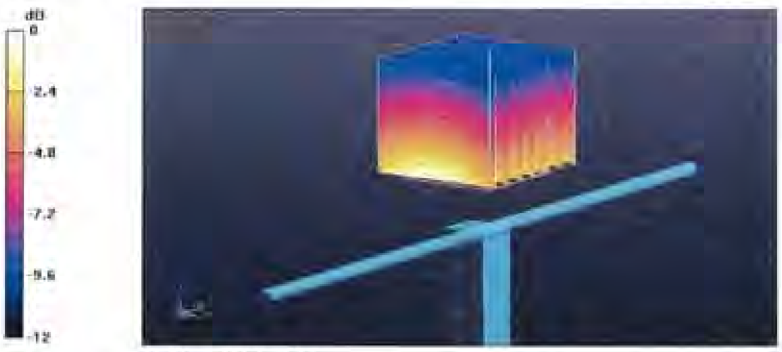
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d082

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1.01 mho/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.86, 5.86, 5.86); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.2 Build 0, Version 52.2.0 (163)
- Postprocessing SW: SEMCAD X, V14.2 Build 2, Version 14.2.2 (1685)

Pin=250 mW /d=15mm, dist=3.0mm (ES-Probe)/Zoom Scan (7x7x7) /Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.1 V/m; Power Drift = 0.017 dB
Peak SAR (extrapolated) = 3.81 W/kg
SAR(1 g) = 2.58 mW/g; SAR(10 g) = 1.69 mW/g
Maximum value of SAR (measured) = 2.98 mW/g



0 dB = 2.98mW/g

Certificate No: D835V2-4d082_Jul10 Page 8 of 9

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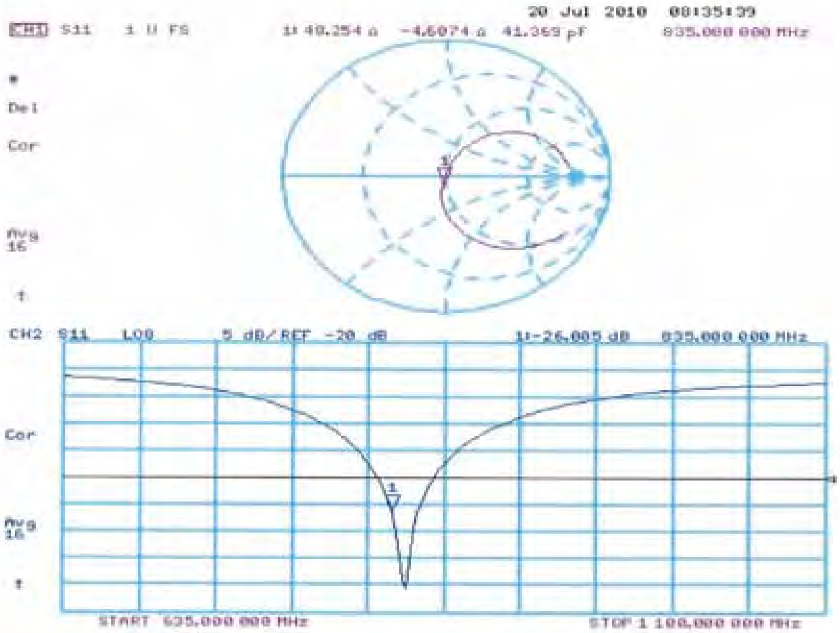
Impedance Measurement Plot for Body TSL



Certificate No: D835V2-4d082_Jul10 Page 9 of 9

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Accreditation No.: **SCS 108**

Client **SGS TW (Auden)**

Certificate No: **D1900V2-5d027_Apr11**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d027
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits
Calibration date:	April 19, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: 5086 (20g)	29-Mar-11 (No. 217-01368)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	30-Apr-10 (No. ES3-3205_Apr10)	Apr-11
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: April 19, 2011

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

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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
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	38.9 ± 6 %	1.41 mho/m ± 6 %
Head TSL temperature during test	(21.0 ± 0.2) °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 mW / g
SAR normalized	normalized to 1W	40.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**40.1 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.26 mW / g
SAR normalized	normalized to 1W	21.0 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**20.9 mW /g ± 16.5 % (k=2)**

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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	51.1 ± 6 %	1.52 mho/m ± 6 %
Body TSL temperature during test	(21.8 ± 0.2) °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.93 mW / g
SAR normalized	normalized to 1W	39.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**39.4 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.18 mW / g
SAR normalized	normalized to 1W	20.7 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**20.6 mW / g ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.8 Ω + 6.4 jΩ
Return Loss	- 23.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.1 Ω + 6.6 jΩ
Return Loss	- 23.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 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.
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/Time: 18.04.2011 15:27:22

Test Laboratory: SPEAG, Zurich, Switzerland

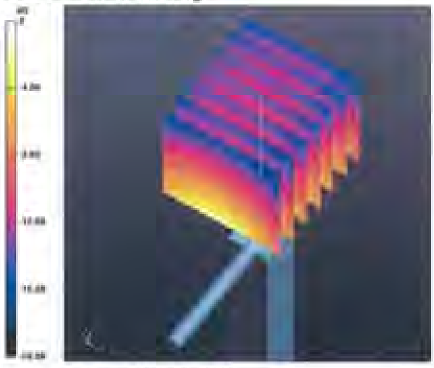
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: HSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.41 mho/m; ε_r = 39; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.09, 5.09, 5.09); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.235 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.650 W/kg
SAR(1 g) = 10.1 mW/g; SAR(10 g) = 5.26 mW/g
Maximum value of SAR (measured) = 12.424 mW/g



0 dB = 12.420mW/g

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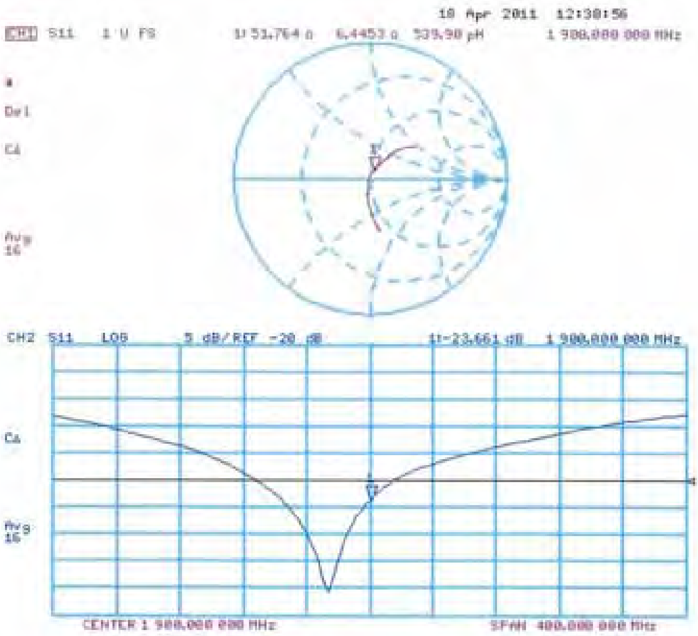
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date/Time: 19.04.2011 12:53:51

Test Laboratory: SPEAG, Zurich, Switzerland

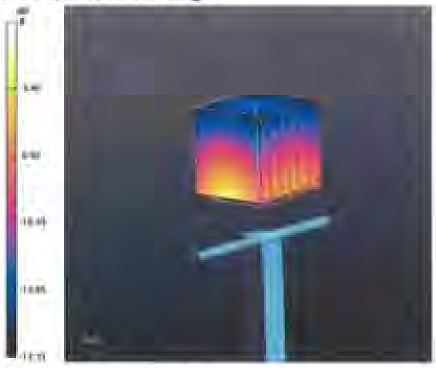
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d027

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium: MSL U12 BB
Medium parameters used: f = 1900 MHz; σ = 1.52 mho/m; ε_r = 51.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.59, 4.59, 4.59); Calibrated: 30.04.2010
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.2 Build (2829)

Pin=250 mW, Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.170 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.156 W/kg
SAR(1 g) = 9.93 mW/g; SAR(10 g) = 5.18 mW/g
Maximum value of SAR (measured) = 12.615 mW/g



0 dB = 12.610mW/g

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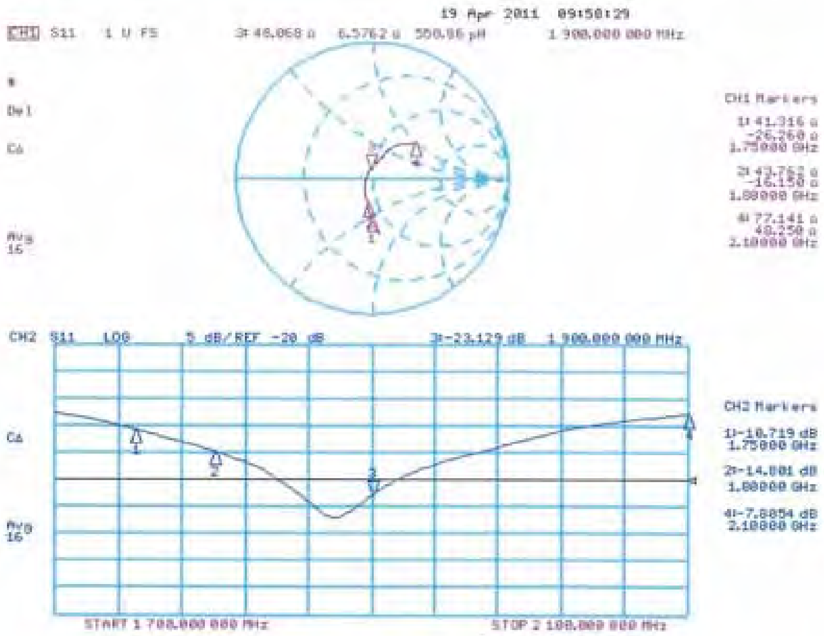
Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **D835V2-4d063_May11**

CALIBRATION CERTIFICATE

Object	D835V2 - SN: 4d063
Calibration procedure(s)	QA CAL-05.v8 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 25, 2011

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	06-Oct-10 (No. 217-01266)	Oct-11
Power sensor HP 8481A	US37292783	06-Oct-10 (No. 217-01266)	Oct-11
Reference 20 dB Attenuator	SN: S5086 (20b)	29-Mar-11 (No. 217-01367)	Apr-12
Type-N mismatch combination	SN: 5047.2 / 06327	29-Mar-11 (No. 217-01371)	Apr-12
Reference Probe ES3DV3	SN: 3205	29-Apr-11 (No. ES3-3205_Apr11)	Apr-12
DAE4	SN: 601	10-Jun-10 (No. DAE4-601_Jun10)	Jun-11

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-09)	In house check: Oct-11
RF generator R&S SMT-06	100005	4-Aug-99 (in house check Oct-09)	In house check: Oct-11
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-10)	In house check: Oct-11

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

Issued: May 25, 2011

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

Certificate No: D835V2-4d063_May11 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 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003

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) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

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.

Measurement Conditions

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

DASY Version	DASY5	V52.6.2
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	40.4 ± 6 %	0.88 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.31 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**9.34 mW /g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	**6.13 mW /g ± 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	53.9 ± 6 %	1.00 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**9.45 mW / g ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.60 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	**6.27 mW / g ± 16.5 % (k=2)**

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Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω - 1.5 jΩ
Return Loss	- 28.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.7 Ω - 4.1 jΩ
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.426 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.
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: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

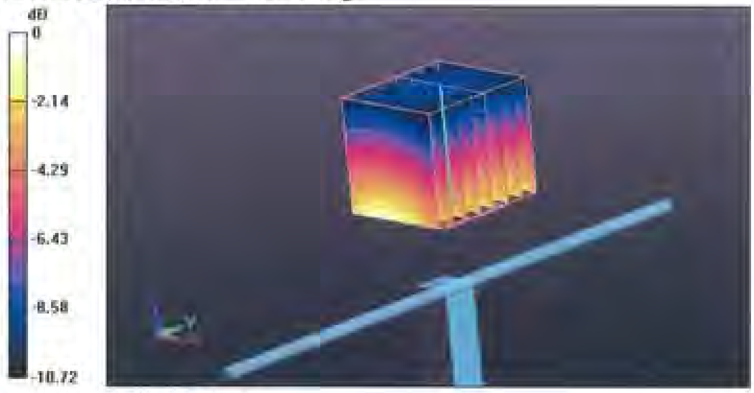
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: HSL900
Medium parameters used: f = 835 MHz; σ = 0.88 mho/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.07, 6.07, 6.07); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.554 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 3.427 W/kg
SAR(1 g) = 2.31 mW/g; SAR(10 g) = 1.52 mW/g
Maximum value of SAR (measured) = 2.669 mW/g



0 dB = 2.670mW/g

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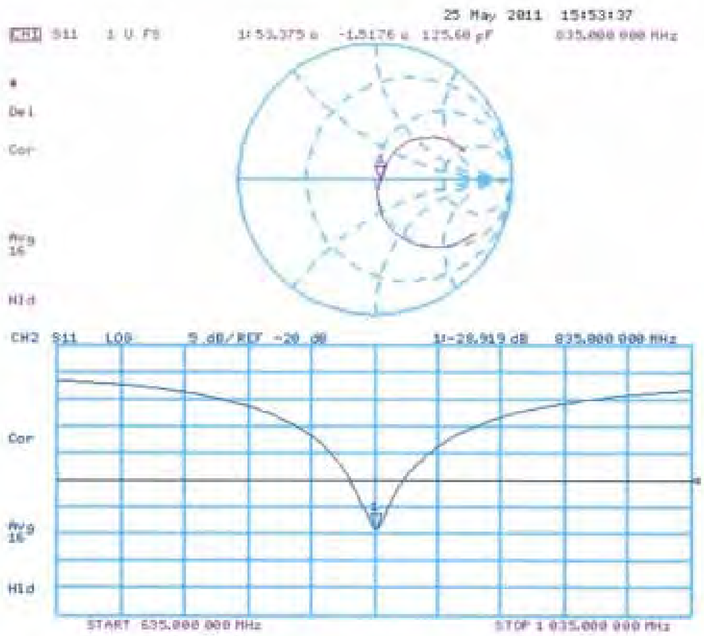
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 25.05.2011

Test Laboratory: SPEAG, Zurich, Switzerland

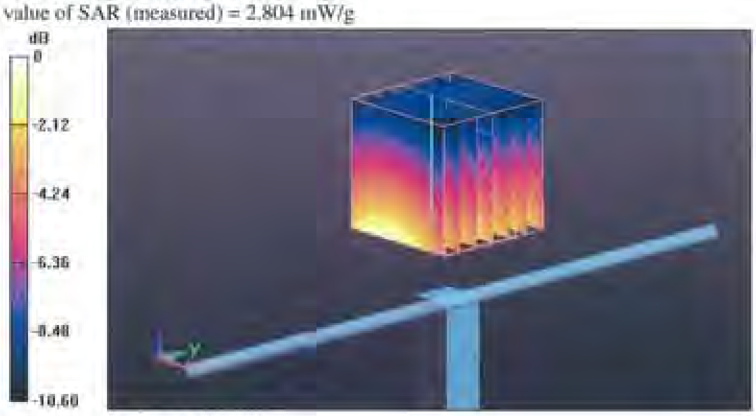
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d063

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium: MSL900
Medium parameters used: f = 835 MHz; σ = 1 mho/m; ε_r = 53.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.02, 6.02, 6.02); Calibrated: 29.04.2011
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 10.06.2010
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- Measurement SW: DASY52, V52.6.2 Build (424)
- Postprocessing SW: SEMCAD X, V14.4.4 Build (2829)

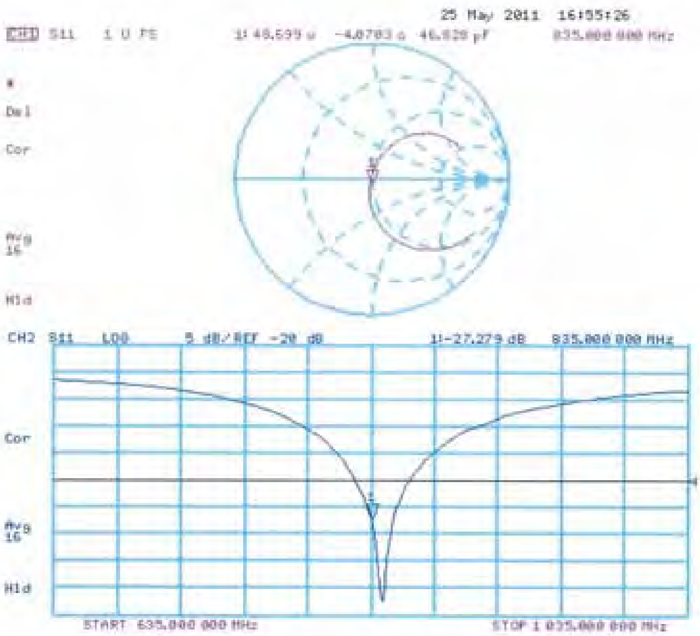
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.297 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 3.530 W/kg
SAR(1 g) = 2.43 mW/g; SAR(10 g) = 1.6 mW/g
Maximum value of SAR (measured) = 2.804 mW/g



0 dB = 2.800mW/g

Certificate No: D835V2-4d063_May11 Page 7 of 8

Impedance Measurement Plot for Body TSL



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End of 1st part of report

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