

SAR TEST REPORT



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

Equipment Under Test	HUAWEI MateBook
Brand Name	HUAWEI
Model No.	WT-W09,WT-W19
Company Name	HUAWEI TECHNOLOGIES CO., LTD.
Company Address	Administration Building, Headquarters of Huawei
	Technologies Co., Ltd., Bantian, Longgang District,
	Shenzhen, 518129, P.R.C
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013,
	KDB248227D01v02r02,KDB865664D01v01r04,
	KDB865664D02v01r02,KDB447498D01v06,
	KDB616217D04v01r02
FCC ID	QISWT-WX9
Date of Receipt	Feb. 02, 2017
Date of Test(s)	Feb. 13, 2017 ~ Feb. 17, 2017
Date of Issue In the configuration tested, the EUT	Mar. 14, 2017 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.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronic & Communication Laboratory or testing done by SGS Taiwan Electronic & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronic & Communication Laboratory in writing.

Signed on behalf of SGS

Engineer

Jimmy Chang

Jimmy Chang Date: Mar. 14, 2017 Supervisor

Kicky Wrang

Ricky Huang Date: Mar. 14, 2017



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Revision History

Report Number	Revision	Description	Issue Date
E5/2017/20001	Rev.00	Initial creation of document	Mar. 14, 2017



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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Elec	SGS Taiwan Ltd. Electronics & Communication Laboratory			
No. 2, Keji 1st Rd., Guishan Township, Taoyuan County, 33383, Taiwan				
Tel	Tel +886-2-2299-3279			
Fax +886-2-2298-0488				
Internet	http://www.tw.sgs.com/			

1.2 Details of Applicant

Company Name	HUAWEI TECHNOLOGIES CO., LTD.
Company Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C



1.3 Description of EUT

Equipment Under Test	HUAWEI MateBook						
Brand Name	HUAWEI						
Model No.	WT-W09,WT-W19	NT-W09,WT-W19					
FCC ID	QISWT-WX9						
Max Antenna Gain(dBi) <yageo></yageo>	Main_2.45GHz: -3.3dBi, 5GHz: -3.6dB Aux_2.45GHz: -3.5dBi, 5GHz: -3.3dBi	i					
Max Antenna Gain(dBi) <acon></acon>	Main_2.45GHz: -3.8dBi, 5GHz: -3.9dB Aux_2.45GHz: -3.8dBi, 5GHz: -3.8dBi	i					
Mode of Operation	WLAN802.11 a/b/g/n(20M/40M)/ac(20M/40)M/80	VI)			
Duty Cycle	WLAN802.11 a/b/g/n(20M/40M)/ ac(20M/40M/80M)		1				
	Bluetooth		1				
	WLAN802.11 b/g/n(20M)	2412	_	2462			
	WLAN802.11 n(40M)	2422	_	2452			
	WLAN802.11 a/n(20M)/ac(20M) 5.2G	5180	_	5240			
	WLAN802.11 n(40M)/ac(40M) 5.2G	5190	_	5230			
	WLAN802.11 ac(80M) 5.2G		5210				
	WLAN802.11 a/n(20M)/ac(20M) 5.3G	5260	_	5320			
	WLAN802.11 n(40M)/ac(40M) 5.3G	5270	—	5310			
TX Frequency Range (MHz)	WLAN802.11 ac(80M) 5.3G		5290				
	WLAN802.11 a/n/ac(20M) 5.6G	5500	—	5720			
	WLAN802.11 n/ac(40M) 5.6G	5510	_	5710			
	WLAN802.11 ac(80M) 5.6G	5530	_	5690			
	WLAN802.11 a/n(20M)/ac(20M) 5.8G	5745	_	5825			
	WLAN802.11 n(40M)/ac(40M) 5.8G 5710			5795			
	WLAN802.11 ac(80M) 5.8G		5775				
	Bluetooth	2402	_	2480			

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	WLAN802.11 b/g/n(20M)	1	_	11
	WLAN802.11 n(40M)	3	—	9
	WLAN802.11 a/n(20M)/ac(20M) 5.2G	36	—	48
	WLAN802.11 n(40M)/ac(40M) 5.2G	38	—	46
	WLAN802.11 ac(80M) 5.2G		42	
	WLAN802.11 a/n(20M)/ac(20M) 5.3G	52	—	64
	WLAN802.11 n(40M)/ac(40M) 5.3G	54	_	62
Channel Number (ARFCN)	WLAN802.11 ac(80M) 5.3G		58	
	WLAN802.11 a/n/ac(20M) 5.6G		—	144
	WLAN802.11 n/ac(40M) 5.6G	102	—	142
	WLAN802.11 ac(80M) 5.6G	106	—	138
	WLAN802.11 a/n(20M)/ac(20M) 5.8G	149	—	165
	WLAN802.11 n(40M)/ac(40M) 5.8G		—	159
	WLAN802.11 ac(80M) 5.8G		155	
	Bluetooth	0		78

Antenna gain table:

			Antenna Gain (dBi)				
Type	Manufacturer	Antenna	WLAN	WLAN	WLAN	WLAN	WLAN
Type Manufacturer		2400-2500	5150-5250	5250-5350	5470-5725	5725-5850	
			MHz	MHz	MHz	MHz	MHz
PIFA	Yageo	Main	-3.3	-3.7	-3.6	-3.7	-4.1
FILA	rayeo	Aux	-3.5	-3.5	-3.4	-3.3	-5.1
PIFA	ACON	Main	-3.8	-5.2	-3.9	-3.9	-4.7
FILA	ACON	Aux	-3.8	-4.4	-4.0	-3.8	-5.5



The highest SAR values of Yageo Antenna

Max. SAR (1 g) (Unit: W/Kg)						
Antenna	Band	Measured	Reported	Channel	Position	
	WLAN802.11 b	0.493	0.494	6	Bottom side	
	WLAN802.11 n(40M) 5.2G	0.454	0.455	46	Bottom side	
Main	WLAN802.11 a 5.3G	0.459	0.460	52	Bottom side	
	WLAN802.11 ac(80M) 5.6G	0.505	0.506	106	Bottom side	
	WLAN802.11 ac(80M) 5.8G	0.796	0.800	155	Bottom side	
	WLAN802.11 b	0.494	0.495	11	Bottom side	
	Bluetooth (GFSK)	0.051	0.051	0	Bottom side	
Διιχ	WLAN802.11 n(40M) 5.2G	0.836	0.840	46	Bottom side	
Aux	WLAN802.11 a 5.3G	0.858	0.860	64	Bottom side	
	WLAN802.11 ac(80M) 5.6G	0.791	0.795	122	Bottom side	
	WLAN802.11 ac(80M) 5.8G	0.818	0.827	155	Bottom side	



The highest SAR values of ACON Antenna

Max. SAR (1 g) (Unit: W/Kg)						
Antenna	Band	Measured	Reported	Channel	Position	
	WLAN802.11 b	0.488	0.490	6	Bottom side	
	WLAN802.11 n(40M) 5.2G	0.743	0.748	46	Bottom side	
Main	WLAN802.11 a 5.3G	0.539	0.543	52	Bottom side	
	WLAN802.11 ac(80M) 5.6G	0.720	0.725	106	Bottom side	
	WLAN802.11 ac(80M) 5.8G	0.672	0.674	155	Bottom side	
	WLAN802.11 b	0.522	0.526	11	Bottom side	
	Bluetooth (GFSK)	0.049	0.049	0	Bottom side	
Διοχ	WLAN802.11 n(40M) 5.2G	0.945	0.947	46	Bottom side	
Aux	WLAN802.11 a 5.3G	0.951	0.955	52	Bottom side	
	WLAN802.11 ac(80M) 5.6G	1.060	1.067	138	Bottom side	
	WLAN802.11 ac(80M) 5.8G	0.902	0.912	155	Bottom side	



Antenna	SI	SISO	
Band	Chain 0	Chain 1	Chain0+1
WLAN802.11b	V	V	—
WLAN802.11g	V	V	—
WLAN802.11n(20M)	V	V	V
WLAN802.11n(40M)	V	V	V
WLAN802.11ac	V	V	V
WLAN802.11a	V	V	—
WLAN802.11n(20M) 5G	V	V	V
WLAN802.11n(40M) 5G	V	V	V
WLAN802.11ac(20M) 5G	V	V	V
WLAN802.11ac(40M) 5G	V	V	V
WLAN802.11ac(80M) 5G	V	V	V

WLAN802.11 a/b/g/n(20M/40M)/ac(20M/40M/80M) conducted power table:

Main (CH0) – Yageo

Main Antenna (Yageo)							
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)	
		1	2412		17.50	17.46	
	802.11b	2	2417	1Mbps	18.50	18.47	
	002.110	6	2437		18.50	18.49	
		11	2462		18.50	18.46	
		1	2412	6Mbps	16.50	16.42	
	802.11g	6	2437		17.50	17.46	
2450 MHz		11	2462		17.50	17.41	
		1	2412		17.00	16.86	
	802.11n-HT20	6	2437	MCS0	17.00	16.94	
		11	2462		17.00	16.93	
		3	2422		17.00	16.91	
	802.11n-HT40	6	2437	MCS0	17.00	16.92	
		9	2452		17.00	16.89	

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		Main Ar	ntenna (Yag	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		17.00	16.92
	802.11a	40	5200	6Mbps	17.00	16.91
	002.11a	44	5220	0101005	17.00	16.93
		48	5240		17.00	16.88
	802.11n-HT20	36	5180	MCS0	17.00	16.85
		40	5200		17.00	16.81
		44	5220		17.00	16.92
		48	5240		17.00	16.93
5.15-5.25 GHz		36	5180		17.00	16.92
	802.11n-VHT20	40	5200	MCS0	17.00	16.91
	002.111-011120	44	5220	10030	17.00	16.94
		48	5240		17.00	16.89
	802.11n-HT40	38	5190	MCS0	17.00	16.97
	002.111-11140	46	5230		17.00	16.99
	802.11n-VHT40	38	5190	MCS0	17.00	16.84
		46	5230		17.00	16.92
	802.11n-VHT80	42	5210	MCS0	12.00	11.89



		Main Ar	ntenna (Yag	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260	6Mbps	17.00	16.99
	802.11a	56	5280		17.00	16.95
	002.11a	60	5300	0101005	17.00	16.97
		64	5320		17.00	16.98
	802.11n-HT20	52	5260	MCS0	17.00	16.99
		56	5280		17.00	16.94
		60	5300		17.00	16.85
		64	5320		17.00	16.83
5.25-5.35 GHz		52	5260		17.00	16.94
	802.11n-VHT20	56	5280	MCS0	17.00	16.91
	002.111-011120	60	5300	10030	17.00	16.79
		64	5320		17.00	Average power (dBm) 16.99 16.95 16.97 16.98 16.99 16.94 16.85 16.83 16.94 16.91
	802.11n-HT40	54	5270	MCS0	17.00	16.89
	002.111-11140	62	5310	10000	13.50	13.42
	802.11n-VHT40	54	5270	MCS0	17.00	16.93
		62	5310	10000	13.50	13.44
	802.11n-VHT80	58	5290	MCS0	12.50	12.43



		Main Ar	ntenna (Yag	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		17.00	16.92
		120	5600		17.00	16.88
	802.11a	124	5620	6Mbps	17.00	16.93
		128	5640		17.00	16.84
		140	5700		15.50	15.45
		100	5500		16.00	15.89
		120	5600		17.00	16.89
	802.11n-HT20	124	5620	MCS0	17.00	16.88
		128	5640		17.00	16.91
		140	5700		17.00	16.92
	802.11n-VHT20	100	5500		16.00	15.98
		120	5600		17.00	16.88
		124	5620	MCS0	17.00	16.89
5600 MHz		128	5640		17.00	16.73
		140	5700		17.00	16.84
		144	5720		17.00	16.82
		102	5510		15.50	15.43
	802.11n-HT40	118	5590	MCS0	17.00	16.78
	0021111111	126	5630		17.00	16.89
		134	5670		17.00	16.83
		102	5510		15.50	15.46
		118	5590		17.00	16.89
	802.11n-VHT40		5630	MCS0	17.00	16.81
		134	5670		17.00	16.93
		142	5710		17.00	16.95
		106	5530		17.00	16.99
	802.11n-VHT80		5610	MCS0	17.00	16.96
		138	5690		17.00	16.97

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		Main Ar	ntenna (Yag	eo)		
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		16.00	15.89
	802.11a	157	5785	6Mbps	17.00	16.83
		165	5825		17.00	16.92
	802.11n-HT20	149	5745	MCS0	17.00	16.94
		157	5785		17.00	16.92
		165	5825		17.00	16.85
5800 MHz		149	5745		17.00	16.99
	802.11n-VHT20	157	5785	MCS0	17.00	16.92
		165	5825		17.00	16.79
	802.11n-HT40	151	5755	MCS0	17.00	16.88
	002.111-11140	159	5795	10030	17.00	16.91
	802.11n-VHT40	151	5755	MCS0	17.00	16.97
		159	5795		17.00	16.91
	802.11n-VHT80	155	5775	MCS0	17.00	16.98



Aux (CH0) – Yageo

		Aux An	tenna (Yage	eo)		
Band	Mode	Channel	Frequency (MHz)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		1	2412		17.50	17.44
	802.11b	2	2417	1Mbps	18.50	18.47
	002.110	6	2437	Плюрз	18.50	18.45
		11	2462		18.50	18.49
	802.11g	1	2412	6Mbps	16.50	16.45
		6	2437		17.50	17.43
2450 MHz		11	2462		17.50	17.44
		1	2412		17.00	16.92
	802.11n-HT20	6	2437	MCS0	17.00	16.83
		11	2462		17.00	16.89
	802.11n-HT40	3	2422	MCS0	17.00	16.94
		6	2437		17.00	16.91
		9	2452		17.00	16.84



		Aux An	tenna (Yage	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180	6Mbps	17.00	16.94
	802.11a	40	5200		17.00	16.92
	002.11a	44	5220	0101005	17.00	16.93
		48	5240		17.00	16.82
	802.11n-HT20	36	5180	MCS0	17.00	16.88
		40	5200		17.00	16.82
		44	5220		17.00	16.89
		48	5240		17.00	16.94
5.15-5.25 GHz		36	5180		17.00	16.89
	802.11n-VHT20	40	5200	MCS0	17.00	16.83
	002.111-01120	44	5220	10030	17.00	16.84
		48	5240		17.00	Average power (dBm) 16.94 16.92 16.93 16.82 16.88 16.82 16.89 16.94 16.89 16.89 16.83
	802.11n-HT40	38	5190	MCS0	17.00	16.96
	002.111-1140	46	5230	10030	17.00	16.98
	802.11n-VHT40	38	5190	MCS0	17.00	16.95
		46	5230		17.00	16.81
	802.11n-VHT80	42	5210	MCS0	12.00	11.92



		Aux An	tenna (Yage	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260	6Mbps	17.00	16.97
	802.11a	56	5280		17.00	16.94
	002.11a	60	5300	0101005	17.00	16.95
		64	5320		17.00	16.99
	802.11n-HT20	52	5260	MCS0	17.00	16.93
		56	5280		17.00	16.99
		60	5300		17.00	16.82
		64	5320		17.00	16.90
5.25-5.35 GHz		52	5260		17.00	16.93
	802.11n-VHT20	56	5280	MCS0	17.00	16.94
	002.111-011120	60	5300	10030	17.00	16.94
		64	5320		17.00	Average power (dBm) 16.97 16.94 16.95 16.99 16.93 16.99 16.82 16.90 16.93 16.93 16.93
	802.11n-HT40	54	5270	MCS0	17.00	16.92
	002.111-11140	62	5310	10000	13.50	13.42
	802.11n-VHT40	54	5270	MCS0	17.00	16.89
		62	5310		13.50	13.39
	802.11n-VHT80	58	5290	MCS0	12.50	12.42



		Aux An	tenna (Yage	eo)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		17.00	16.91
		120	5600		17.00	16.82
	802.11a	124	5620	6Mbps	17.00	16.84
		128	5640		17.00	16.94
		140	5700		15.50	15.43
		100	5500		16.00	15.84
		120	5600		17.00	16.92
	802.11n-HT20	124	5620	MCS0	17.00	16.94
		128	5640		17.00	16.93
		140	5700		17.00	16.89
	802.11n-VHT20	100	5500		16.00	15.88
		120	5600		17.00	16.92
		124	5620	MCS0	17.00	16.83
5600 MHz		128	5640		17.00	16.79
5000 1011 12		140	5700		17.00	16.94
		144	5720		17.00	16.95
		102	5510		15.50	15.45
	802.11n-HT40	118	5590	MCS0	17.00	16.94
	002.111-11140	126	5630	10000	17.00	16.81
		134	5670		17.00	16.89
		102	5510		15.50	15.44
		118	5590		17.00	16.92
	802.11n-VHT40	126	5630	MCS0	17.00	16.84
		134	5670		17.00	16.82
		142	5710	1	17.00	16.89
		106	5530		17.00	16.95
	802.11n-VHT80	122	5610	MCS0	17.00	16.98
		138	5690		17.00	16.96

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		Aux An	tenna (Yage	eo)		
Mode	Mode	Channel	Frequency (MHz)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		16.00	15.92
	802.11a	157	5785	6Mbps	17.00	16.81
		165	5825		17.00	16.89
	802.11n-HT20	149	5745	MCS0	17.00	16.81
		157	5785		17.00	16.84
		165	5825		17.00	16.84
5800 MHz		149	5745		17.00	16.93
	802.11n-VHT20	157	5785	MCS0	17.00	16.82
		165	5825		17.00	16.92
	802.11n-HT40	151	5755	MCS0	17.00	16.94
	002.111-0140	159	5795	10030	17.00	16.93
	802.11n-VHT40	151	5755	MCS0	17.00	16.90
		159	5795	10030	17.00	16.94
	802.11n-VHT80	155	5775	MCS0	17.00	16.95

Bluetooth conducted power table (Yageo)

Mode	Channel Frequency(MHz)		Average	er (dBm)	Tune-up (dBm)	
Mode			1Mbps	2Mbps	3Mbps	Tulle-up (ubill)
	CH 00	2402	7.99	7.96	7.89	
BR/EDR	CH 39	2441	7.94	7.94	7.75	8
	CH 78	2480	7.92	7.91	7.84	

Mode	Channel Frequency(MHz)		Channel Frequency/(MHz) Average Output Power (dBm)		
wode	Channel	riequency(Mnz)	GFSK	Tune-up (dBm)	
	CH 00	2402	7.72		
LE	CH 19	2440	7.85	8	
	CH 39	2480	7.66		

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Main (CH1) – ACON

	Main Antenna (ACON)								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		1	2412		17.50	17.42			
	802.11b	2	2417	1Mbps	18.50	18.46			
	002.110	6	2437		18.50	18.48			
		11	2462		18.50	18.47			
		1	2412	6Mbps	16.50	16.44			
	802.11g	6	2437		17.50	17.45			
2450 MHz		11	2462		17.50	17.43			
		1	2412		17.00	16.82			
	802.11n-HT20	6	2437	MCS0	17.00	16.93			
		11	2462		17.00	16.89			
		3	2422	MCS0	17.00	16.94			
	802.11n-HT40	6	2437		17.00	16.93			
		9	2452		17.00	16.85			



		Main Ar	ntenna (ACC	ON)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		17.00	16.95
	802.11a	40	5200	6Mbps	17.00	16.97
	002.11a	44	5220	0101005	17.00	16.98
		48	5240		17.00	16.99
		36	5180		17.00	16.95
	802.11n-HT20	40	5200	MCS0	17.00	16.97
	002.111-11120	44	5220		17.00	16.98
		48	5240		17.00	16.99
5.15-5.25 GHz		36	5180		17.00	16.97
	802.11n-VHT20	40	5200	MCS0	17.00	16.93
	002.111-01120	44	5220	10030	17.00	16.95
		48	5240		17.00	16.88
	802.11n-HT40	38	5190	MCS0	17.00	16.95
	002.111-1140	46	5230	10030	17.00	16.98
	802.11n-VHT40	38	5190	MCS0	17.00	16.91
	002.1111-11140	46	5230	NIC30	17.00	16.90
	802.11n-VHT80	42	5210	MCS0	12.00	11.94



		Main Ar	ntenna (ACC	ON)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260		17.00	16.97
	802.11a	56	5280	6Mbps	17.00	16.95
	002.11a	60	5300	0101005	17.00	16.94
		64	5320		17.00	16.96
		52	5260		17.00	16.94
	802.11n-HT20	56	5280	MCS0	17.00	16.90
	002.111-11120	60	5300		17.00	16.93
		64	5320		17.00	16.98
5.25-5.35 GHz		52	5260		17.00	16.92
	802.11n-VHT20	56	5280	MCS0	17.00	16.90
	002.111-011120	60	5300	10030	17.00	16.94
		64	5320		17.00	16.99
	802.11n-HT40 802.11n-VHT40	54	5270	MCS0	17.00	16.94
		62	5310		13.50	13.41
		54	5270	MCS0	17.00	16.95
		62	5310	10030	13.50	13.43
	802.11n-VHT80	58	5290	MCS0	12.50	12.42



		Main Ar	ntenna (ACC	DN)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		17.00	16.91
		120	5600		17.00	16.94
	802.11a	124	5620	6Mbps	17.00	16.97
		128	5640		17.00	16.93
		140	5700		15.50	15.47
		100	5500		16.00	15.93
		120	5600		17.00	16.91
	802.11n-HT20	124	5620	MCS0	17.00	16.99
		128	5640		17.00	16.95
		140	5700		17.00	16.92
		100	5500	MCS0	16.00	15.94
		120	5600		17.00	16.96
	802.11n-VHT20	124	5620		17.00	16.91
5600 MHz		128	5640		17.00	16.98
5000 MI 12		140	5700		17.00	16.93
		144	5720		17.00	16.97
		102	5510		15.50	15.44
	802.11n-HT40	118	5590	MCS0	17.00	16.93
	002.11111140	126	5630		17.00	16.96
		134	5670		17.00	16.98
		102	5510		15.50	15.42
		118	5590		17.00	16.99
	802.11n-VHT40	126	5630	MCS0	17.00	16.93
		134	5670		17.00	16.92
		142	5710		17.00	16.96
		106	5530		17.00	16.97
	802.11n-VHT80	122	5610	MCS0	17.00	16.93
		138	5690		17.00	16.95

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		Main Ar	ntenna (ACC	ON)		
Mode	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		16.00	15.96
	802.11a	157	5785	6Mbps	17.00	16.98
		165	5825		17.00	16.94
		149	5745	MCS0	17.00	16.97
	802.11n-HT20	157	5785		17.00	16.89
		165	5825		17.00	16.94
5800 MHz		149	5745		17.00	16.99
	802.11n-VHT20	157	5785	MCS0	17.00	16.92
		165	5825		17.00	16.96
	802.11n-HT40	151	5755	MCS0	17.00	16.92
	802.11n-VHT40	159	5795	10030	17.00	16.95
		151	5755	MCS0	17.00	16.97
		159	5795		17.00	16.99
	802.11n-VHT80	155	5775	MCS0	17.00	16.99



Aux (CH0) – ACON

		Aux An	tenna (ACC	DN)		
Band	Mode	Channel	Frequency (MHz)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		1	2412		17.50	17.46
	802.11b	2	2417	1Mbps	18.50	18.46
	002.110	6	2437		18.50	18.44
		11	2462		18.50	18.47
		1	2412	6Mbps	16.50	16.41
	802.11g	6	2437		17.50	17.49
2450 MHz		11	2462		17.50	17.45
		1	2412		17.00	16.91
	802.11n-HT20	6	2437	MCS0	17.00	16.90
		11	2462		17.00	16.89
	802.11n-HT40	3	2422		17.00	16.99
		6	2437	MCS0	17.00	16.91
		9	2452		17.00	16.85



		Aux An	tenna (ACC	DN)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		36	5180		17.00	16.99
	802.11a	40	5200	6Mbps	17.00	16.95
	002.11a	44	5220		17.00	16.97
		48	5240		17.00	16.96
		36	5180		17.00	16.97
	802.11n-HT20	40	5200	MCS0	17.00	16.99
	002.111-11120	44	5220	WC30	17.00	16.98
		48	5240		17.00	16.96
5.15-5.25 GHz		36	5180		17.00	16.94
	802.11n-VHT20	40	5200	MCS0	17.00	16.98
	002.111-011120	44	5220	10030	17.00	16.99
		48	5240		17.00	16.96
	802.11n-HT40	38	5190	MCS0	17.00	16.92
	002.111-11140	46	5230	10000	17.00	16.96
	802.11n-VHT40	38	5190	MCS0	17.00	16.92
		46	5230	10030	17.00	16.96
	802.11n-VHT80	42	5210	MCS0	12.00	11.97



		Aux An	tenna (ACC	N)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		52	5260		17.00	16.98
	802.11a	56	5280	6Mbps	17.00	16.95
	002.11a	60	5300	olviops	17.00	16.96
		64	5320		17.00	16.99
		52	5260		17.00	16.95
	802.11n-HT20	56	5280	MCS0	17.00	16.97
	002.1111-1120	60	5300		17.00	16.99
		64	5320		17.00	16.94
5.25-5.35 GHz		52	5260		17.00	16.95
	802.11n-VHT20	56	5280	MCS0	17.00	16.92
	002.111-011120	60	5300	10000	17.00	16.90
		64	5320		17.00	16.93
	802.11n-HT40	54	5270	MCS0	17.00	16.98
	002.1111-11140	62	5310	10030	13.50	13.44
	802.11n-VHT40	54	5270	MCS0	17.00	16.94
		62	5310	10030	13.50	13.44
	802.11n-VHT80	58	5290	MCS0	12.50	12.43



		Aux An	tenna (ACC	DN)		
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		100	5500		17.00	16.94
		120	5600		17.00	16.98
	802.11a	124	5620	6Mbps	17.00	16.92
		128	5640		17.00	16.93
		140	5700		15.50	15.43
		100	5500		16.00	15.95
		120	5600		17.00	16.90
	802.11n-HT20	124	5620	MCS0	17.00	16.92
		128	5640		17.00	16.89
		140	5700		17.00	16.90
		100	5500	MCS0	16.00	15.98
		120	5600		17.00	16.99
	802.11n-VHT20	124	5620		17.00	16.94
5600 MHz		128	5640		17.00	16.91
5000 WI 12		140	5700		17.00	16.95
		144	5720		17.00	16.97
		102	5510		15.50	15.40
	802.11n-HT40	118	5590	MCS0	17.00	16.90
	002.11111140	126	5630	10000	17.00	16.94
		134	5670		17.00	16.97
		102	5510		15.50	15.40
		118	5590		17.00	16.90
	802.11n-VHT40	126	5630	MCS0	17.00	16.92
		134	5670		17.00	16.88
		142	5710		17.00	16.90
		106	5530		17.00	16.94
	802.11n-VHT80	122	5610	MCS0	17.00	16.99
		138	5690		17.00	16.97

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		Aux An	tenna (ACC	N)		
Mode	Mode	Channel	Frequency (MHz)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)
		149	5745		16.00	15.94
	802.11a	157	5785	6Mbps	17.00	16.95
		165	5825		17.00	16.90
		149	5745		17.00	16.93
	802.11n-HT20	157	5785	MCS0	17.00	16.95
		165	5825		17.00	16.94
5800 MHz		149	5745		17.00	16.99
	802.11n-VHT20	157	5785	MCS0	17.00	16.93
		165	5825		17.00	16.92
	802.11n-HT40	151	5755	MCS0	17.00	16.99
	802.11n-VHT40	159	5795	10030	17.00	16.93
		151	5755	MCS0	17.00	16.89
		159	5795		17.00	16.95
	802.11n-VHT80	155	5775	MCS0	17.00	16.95

Bluetooth conducted power table (Yageo)

Mode	Channel	Frequency(MHz) Average Output Power (dBm)				Tune-up (dBm)
would	Channer	Frequency(MHZ)	1Mbps	2Mbps	3Mbps	Tulle-up (ubill)
	CH 00	2402	7.98	7.95	7.89	
BR/EDR	CH 39	2441	7.95	7.91	7.73	8
	CH 78	2480	7.90	7.88	7.81	

Mode	Channel	Frequency(MHz) Average Output Power (dBm)			
woue	Channer	Frequency(MHZ)	GFSK	Tune-up (dBm)	
	CH 00	2402	7.79		
LE	CH 19	2440	7.71	8	
	CH 39	2480	7.68		

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1.4 Test Environment

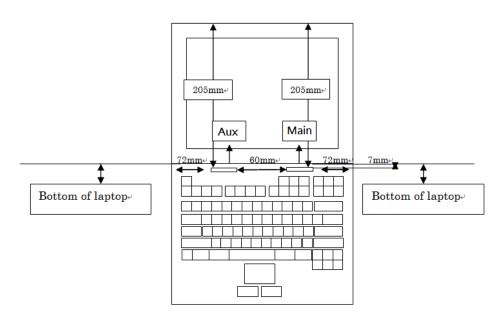
Ambient Temperature: 22±2° C Tissue Simulating Liquid: 22±2° C

1.5 Operation Description

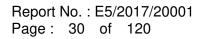
Use chipset specific software to control the EUT, and makes it transmit in maximum power. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

EUT was tested in the following configurations:

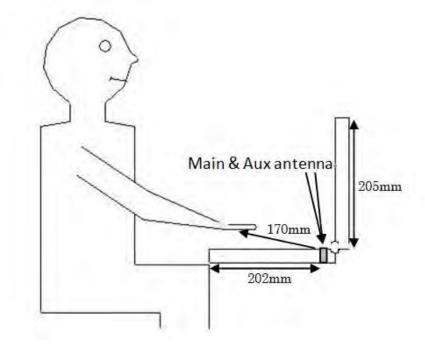
WLAN (Main / Aux): The bottom of keyboard touch the phantom (0mm)



Antenna position plot (Front view)







Antenna-to-user separation distance



Note:

802.11b DSSS SAR Test Requirements:

- SAR is measured for 2.4 GHz 802.11b DSSS mode using the highest measured maximum output power channel, when the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

802.11g/n OFDM SAR Test Exclusion Requirements:

3. SAR is not required for 802.11g/n since the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

Initial Test Configuration:

- 4. An initial test configuration is determined for OFDM transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band.
- 5. SAR is measured using the highest measured maximum output power channel. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for the subsequent next highest measured output power channel(s) in the initial test configuration until the reported SAR is ≤ 1.2 W/kg or all required channels are tested.
- 6. For WLAN Main/Aux antenna, 5.2 n(40) / 5.3a / 5.6 ac(80) / 5.8 ac(80) are chosen to be the initial test configurations.
- Since the highest reported SAR for the initial test configuration is adjusted by the ratio of the subsequent test configuration to initial test configuration specified maximum output power and the adjusted SAR is < 1.2 W/kg, SAR is not required for subsequent test configuration.
- 8. BT and WLAN Aux use the same antenna path and Bluetooth can transmit simultaneously with WLAN Main.

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- 9. According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz.
- 10. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit)
- 11. Based on KDB447498D01,
 - (1) SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:

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

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

- (2) For test separation distances > 50 mm, and the frequency at 100 MHz to 1500MHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.
 [(Threshold at 50mm in step1) + (test separation distance-50mm)x(^{f(NHz)}/_{1E0})](mW),
- (3) For test separation distances > 50 mm, and the frequency at >1500MHz to 6GHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.

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



1.6 The SAR Measurement System

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

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

- 1. 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).
- 2. A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage intissue simulating liquid. The probe is equipped with an optical surface detector system.
- 3. 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.

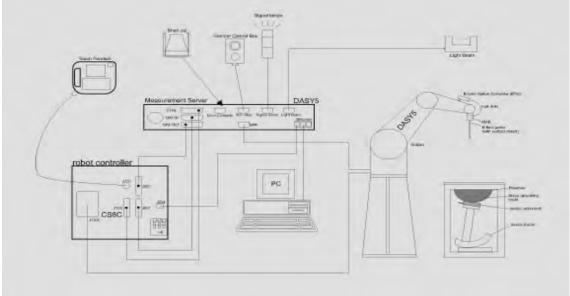


Fig. a The block diagram of SAR system



- 4. 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.
- 5. 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.
- 6. A probe alignment unit which improves the (absolute) accuracy of the probe positioning.
- 7. A computer operating Windows 7.
- 8. DASY 5 software.
- 9. Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- 10. The SAM twin phantom enabling testing left-hand and right-hand usage.
- 11. The device holder for handheld mobile phones.
- 12. Tissue simulating liquid mixed according to the given recipes.
- 13. Validation dipole kits allowing to validate the proper functioning of the system.



1.7 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	/		
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 2450/5200/5300/5600/5800 MHz Additional CF for other liquids and frequencies upon request			
Frequency	10 MHz to > 6 GHz			
Directivity	± 0.3 dB in HSL (rotation around probe a) ± 0.5 dB in tissue material (rotation norma	,		
Dynamic	$10 \mu\text{W/g}$ to > 100 mW/g			
Range	Linearity: \pm 0.2 dB (noise: typically < 1 μ V	V/g)		
Dimensions	Tip diameter: 2.5 mm			
Application	High precision dosimetric measurements (e.g., very strong gradient fields). Only procompliance testing for frequencies up to 6 better 30%.	obe which enables		



PHANTOM

Model	ELI	
Construction	The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Major axis: 600 mm	
	Minor axis: 400 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 +/- 10% from the target SAR values. These tests were done at 2450/5200/ 5300/5600/5800MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was 21.7°C, the relative humidity was 62% and the liquid depth above the ear reference points was \geq 15 cm \pm 5 mm (frequency \leq 3 GHz) or \geq 10 cm \pm 5 mm (frequency > 3 G Hz) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

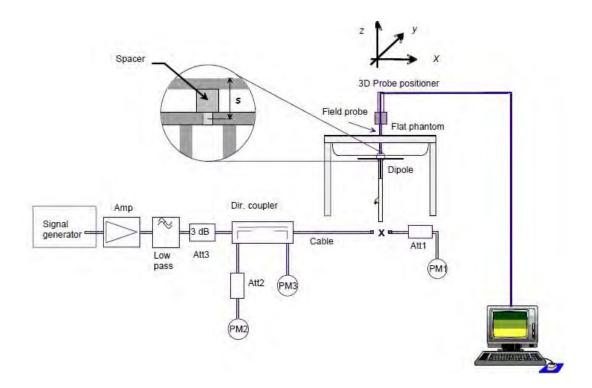


Fig. b The block diagram of system verification



Validation Kit	S/N	Frequ (Mł	-	1W Target SAR-1g (mW/g)	Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W (mW/g)	Deviation (%)	Measured Date
D2450V2	727	2450	Body	49.6	12.8	51.2	3.23%	Feb. 13, 2017
		5200	Body	72.8	7.23	72.3	-0.69%	Feb. 14, 2017
D5GHzV2	1023	5300	Body	76.1	7.44	74.4	-2.23%	Feb. 15, 2017
DJGHZVZ	1023	5600	Body	79.6	8.33	83.3	4.65%	Feb. 16, 2017
		5800	Body	75.9	7.74	77.4	1.98%	Feb. 17, 2017

Table 1. Results of system validation

1.9 Tissue Simulant Fluid for the Frequency Band

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

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The measured conductivity and permittivity are all within \pm 5% of the target values.

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, ɛr	Measured Conductivity, σ (S/m)	% dev ɛr	% dev σ
		2402	52.764	1.904	52.632	1.967	0.25%	-3.31%
	Feb. 13, 2017	2437	52.717	1.938	52.581	1.999	0.26%	-3.17%
	Feb. 13, 2017	2450	52.700	1.950	52.552	2.023	0.28%	-3.74%
		2462	52.685	1.967	52.526	2.046	0.30%	-4.02%
		5190	49.028	5.288	49.850	5.088	-1.68%	3.77%
	Feb. 14, 2017	5200	49.014	5.299	50.298	5.102	-2.62%	3.72%
		5230	48.974	5.334	50.455	5.137	-3.02%	3.70%
	Feb. 15, 2017	5260	48.933	5.369	50.011	5.154	-2.20%	4.01%
Body		5280	48.906	5.393	49.972	5.178	-2.18%	3.98%
	1 60. 10, 2017	5300	48.879	5.416	49.932	5.202	-2.16%	3.95%
		5320	48.851	5.439	49.894	5.226	-2.13%	3.92%
		5530	48.566	5.685	48.965	5.747	-0.82%	-1.10%
	Eab 16 0017	5600	48.471	5.766	48.848	5.837	-0.78%	-1.22%
	Feb. 16, 2017	5610	48.458	5.778	48.811	5.861	-0.73%	-1.43%
		5690	48.349	5.872	48.649	5.974	-0.62%	-1.75%
	Feb. 17, 2017	5775	48.234	5.971	48.084	6.161	0.31%	-3.19%
	1 60. 17, 2017	5800	48.200	6.000	48.041	6.197	0.33%	-3.28%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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Frequency				Ingr	redient			Tatal
Frequency (MHz)	Mode	DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	Total amount
2450M	Body	301.7ml	698.3ml		_		-	1.0L(Kg)

The composition of the tissue simulating liquid:

Body Simulating Liquids for 5 GHz, Manufactured by SPEAG:

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

Table 3. Recipes for Tissue Simulating Liquid



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.

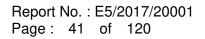
The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration 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.

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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 Probe Calibration Procedures

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

1.11.1 Transfer Calibration with Temperature Probes

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

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

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

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

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- The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.
- The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (~ 2% for c; much better for ρ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

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

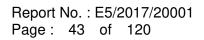
1.11.2 Calibration with Analytical Fields

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

points must be considered in the assessment of the uncertainty:

- The setup must enable accurate determination of the incident power.
- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.

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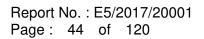




• Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

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- 1. N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.
- K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.
- K. Jokela, P. Hyysalo, and L. Puranen, \Calibration of specific absorption rate (SAR) probes in waveguide at 900 MHz", *IEEE Transactions on Instrumentation and Measurements*, vol. 47, no. 2, pp. 432{438, Apr. 1998.





1.12 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, 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

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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.)

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

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.
- 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

Yageo Antenna

WLAN802.11 - Main Antenna

Antenna	Mode	Position		Distance (mm) CH		Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged SAR over 1g (W/kg)		Plot
			(11111)		(MHz)	Tolerance	(dBm)		Measured	Reported	page
	WLAN802.11 b	Bottom side	0	6	2437	18.50	18.49	100.23%	0.493	0.494	55
	WLAN802.11 n(40M) 5.2G	Bottom side	0	46	5230	17.00	16.99	100.23%	0.454	0.455	56
Main	WLAN802.11 a 5.3G	Bottom side	0	52	5260	17.00	16.99	100.23%	0.459	0.460	57
	WLAN802.11 ac(80M) 5.6G	Bottom side	0	106	5530	17.00	16.99	100.23%	0.505	0.506	58
	WLAN802.11 ac(80M) 5.8G	Bottom side	0	155	5775	17.00	16.98	100.46%	0.796	0.800	59

WLAN802.11 - Aux Antenna

Antenna	Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged SAR over 1g (W/kg)		Plot page
			(11111)			Tolerance	(dBm)		Measured	Reported	page
	WLAN802.11 b	Bottom side	0	11	2462	18.50	18.49	100.23%	0.494	0.495	60
	Bluetooth (GFSK)	Bottom side	0	0	2402	8.00	7.99	100.23%	0.051	0.051	61
		Bottom side	0	38	5190	17.00	16.96	100.93%	0.803	0.810	-
	WLAN802.11 n(40M) 5.2G	Bottom side	0	46	5230	17.00	16.98	100.46%	0.836	0.840	62
		Bottom side*	0	46	5230	17.00	16.98	100.46%	0.831	0.835	-
Aux		Bottom side	0	52	5260	17.00	16.97	100.69%	0.846	0.852	-
	WLAN802.11 a 5.3G	Bottom side	0	64	5320	17.00	16.99	100.23%	0.856	0.858	-
		Bottom side*	0	64	5320	17.00	16.99	100.23%	0.858	0.860	63
	WLAN802.11 ac(80M) 5.6G	Bottom side	0	122	5610	17.00	16.98	100.46%	0.791	0.795	64
	W/LANR02 11 20(80M) 5.8G	Bottom side	0	155	5775	17.00	16.95	101.16%	0.818	0.827	65
	WLAN802.11 ac(80M) 5.8G	Bottom side*	0	155	5775	17.00	16.95	101.16%	0.798	0.807	-

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

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2(\text{mW})}{P4(\text{mW})} = 10^{\binom{P_{2}-P_{1}}{20}}(\text{dBm})$

Reported SAR = measured SAR * (scaling) Where P2 is maximum specified power, P1 is measured conducted power



ACON Antenna

WLAN802.11 - Main Antenna

Antenna	Mode	Position Distanc				Max. Rated Avg. Power + Max.	Avg. Power Scaling	Scaling	Averaged SAR over 1g (W/kg)		Plot page
			(11111)		(MHz)	Tolerance	(dBm)		Measured	Reported	page
	WLAN802.11 b	Bottom side	0	6	2437	18.50	18.48	100.46%	0.488	0.490	66
	WLAN802.11 n(40M) 5.2G	Bottom side	0	46	5230	17.00	16.97	100.69%	0.743	0.748	67
Main	WLAN802.11 a 5.3G	Bottom side	0	52	5260	17.00	16.97	100.69%	0.539	0.543	68
	WLAN802.11 ac(80M) 5.6G	Bottom side	0	106	5530	17.00	16.97	100.69%	0.720	0.725	69
	WLAN802.11 ac(80M) 5.8G	Bottom side	0	155	5775	17.00	16.99	100.23%	0.672	0.674	70

WLAN802.11 - Aux Antenna

Antenna	Mode	Position	Distance (mm)		Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged SAR over 1g (W/kg)		Plot
			(11111)		(11112)	Tolerance	(dBm)		Measured	Reported	page
	WLAN802.11 b	Bottom side	0	11	2462	18.50	18.47	100.69%	0.522	0.526	71
	Bluetooth (GFSK)	Bottom side	0	0	2402	8.00	7.98	100.46%	0.049	0.049	72
		Bottom side	0	38	5190	17.00	16.97	100.69%	0.819	0.825	-
	WLAN802.11 n(40M) 5.2G	Bottom side	0	46	5230	17.00	16.99	100.23%	0.945	0.947	73
		Bottom side*	0	46	5230	17.00	16.99	100.23%	0.894	0.896	-
	WLAN802.11 a 5.3G	Bottom side	0	52	5260	17.00	16.98	100.46%	0.951	0.955	74
Aux		Bottom side*	0	52	5260	17.00	16.98	100.46%	0.911	0.915	-
		Bottom side	0	64	5320	17.00	16.99	100.23%	0.845	0.847	-
		Bottom side	0	122	5610	17.00	16.99	100.23%	0.918	0.920	-
	WLAN802.11 ac(80M) 5.6G	Bottom side	0	138	5690	17.00	16.97	100.69%	1.060	1.067	75
		Bottom side*	0	138	5690	17.00	16.97	100.69%	1.040	1.047	-
	WLAN802.11 ac(80M) 5.8G	Bottom side	0	155	5775	17.00	16.95	101.16%	0.902	0.912	76
	WLANOUZ. 11 80(0010) 5.00	Bottom side*	0	155	5775	17.00	16.95	101.16%	0.882	0.892	-

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

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2(\text{mW})}{P1(\text{mW})} = 10^{\binom{P_0-P_1}{c_0}}(\text{dBm})$

Reported SAR = measured SAR * (scaling) Where P2 is maximum specified power, P1 is measured conducted power



3. Simultaneous Transmission Analysis

Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Body
2.4GHz WLAN MIMO	Yes
5GHz WLAN MIMO	Yes
BT + 2.4GHz WLAN Main	Yes
BT + 5GHz WLAN Main	Yes
BT + 5GHz WLAN Main	Yes

Note:

1. Bluetooth and WLAN Aux share the same antenna path, and BT can transmit with WLAN Main simultaneously.

2. For 2.4/5GHz WLAN Main and Aux antennas, the maximum output power of each antenna during simultaneous transmission (for 802.11n/ac) is the same with or less than that used in standalone transmission (for 802.11a/b/g/n/ac), and we used the sum of 1-g SAR provision in KDB447498D01 to exclude the SAR measurement for 802.11n/ac MIMO.



3.1 Estimated SAR calculation

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

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

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

3.2 SPLSR evaluation and analysis

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

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

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

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

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



Yageo Antenna:

2.4 GHz WLAN MIMO

Nc	. Conditions	Position	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
1	2.4 GHz WLAN Main	Bottom side	0.494	0.495	0.989	ΣSAR<1.6, Not required

5 GHz WLAN MIMO

No.	Conditions	Position	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
2	5 GHz WLAN Main + WLAN Aux	Bottom side	0.800	0.860	1.66	Analyzed as below

WLAN MIMO

Conditions	Position	SAR Value	Coordinates (cm)		ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission			
		(W/kg)	x	У	Z	(11/10)	Distance (mm)		SAR Test		
WLAN Main	Bottom	0.800	102.20	57.20	0.44	1.660 81.53	81.53	01 50	91 52	0.026	SPLSR<0.04,
WLAN Aux	side	0.860	97.60	-24.20	-0.06	1.000		0.020	Not required		
		Aux		ain							



2.4GHz WLAN Main + BT

No.	Conditions	Position	Max. WLAN Main	BT	SAR Sum	SPLSR
3	2.4 GHz WLAN Main	Bottom side	0.494	0.051	0.545	ΣSAR<1.6, Not required

5GHz WLAN Main + BT

N	lo.	Conditions	Position	Max. WLAN Main	BT	SAR Sum	SPLSR
,	4	5 GHz WLAN Main + BT	Bottom side	0.800	0.051	0.851	ΣSAR<1.6, Not required



ACON Antenna:

2.4 GHz WLAN MIMO

No	Conditions	Position	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
1	2.4 GHz WLAN Main	Bottom side	0.490	0.526	1.016	ΣSAR<1.6, Not required

5 GHz WLAN MIMO

No.	Conditions	Position	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
2	5 GHz WLAN Main + WLAN Aux	Bottom side	0.748	1.067	1.815	Analyzed as below

WLAN MIMO

Conditions	Position	SAR Value	Coordinates (cm)		ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
		(W/kg)	х	у	z	(vv/kg)	Distance (mm)		SAR Test
WLAN Main	Bottom	0.748	100.40	24.80	0.40	1.815	75	5 0.033	SPLSR<0.04, Not required
WLAN Aux	side	1.067	100.80	-50.20	-0.08	1.013			
				Aux		Main			



2.4GHz WLAN Main + BT

No.	Conditions	Position	Max. WLAN Main	BT	SAR Sum	SPLSR
3	2.4 GHz WLAN Main	Bottom side	0.490	0.049	0.539	ΣSAR<1.6, Not required

5GHz WLAN Main + BT

No.	Conditions	Position	Max. WLAN Main	BT	SAR Sum	SPLSR
4	5 GHz WLAN Main + BT	Bottom side	0.748	0.049	0.797	ΣSAR<1.6, Not required



4. Instruments List

Manufacturer	Device	Туре	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3938	Nov.25,2016	Nov.24,2017
Schmid & Partner	System Validation	D2450V2	727	Apr.19,2016	Apr.18,2017
Engineering AG	Dipole	D5GHzV2	1023	Jan.20,2017	Jan.19,2018
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	1336	Nov.22,2016	Nov.21,2017
Schmid & Partner Engineering AG	Software	DASY 52 V52.8.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	ELI	N/A	Calibration not required	Calibration not required
Agilent	Network Analyzer	E5071C	MY46107530	Jan.20,2017	Jan.19,2018
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	772D	MY52180142	Apr.13,2016	Apr.12,2017
Agiicht		778D	MY52180302	Apr.13,2016	Apr.12,2017
Agilent	RF Signal Generator	N5181A	MY50145142	Feb.19,2016	Feb.18,2017
Agilent	Power Meter	E4417A	MY52240003	Oct.17,2016	Oct.16,2017
Agilant	Dower Separ		MY52200003	Oct.17,2016	Oct.16,2017
Agilent	Power Sensor	E9301H	MY52200004	Oct.17,2016	Oct.16,2017
TECPEL	Digital thermometer	DTM-303A	TP130075	Mar.30,2016	Mar.29,2017

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

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5. Measurements

Date: 2017/2/13

WLAN 802.11b_Body_Bottom side_CH 6_Main_0mm

Communication System: WLAN(2.4G); Frequency: 2437 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2437 MHz; σ = 1.999 S/m; ϵ_r = 52.581; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

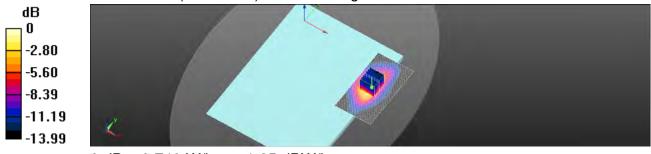
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.728 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 2.761 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 1.08 W/kg SAR(1 g) = 0.493 W/kg; SAR(10 g) = 0.255 W/kg Maximum value of SAR (measured) = 0.749 W/kg



0 dB = 0.749 W/kg = -1.25 dBW/kg



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Date: 2017/2/14

WLAN 802.11n(40M) 5.2G_Body_Bottom side_CH 46_Main_0mm

Communication System: WLAN(5G); Frequency: 5230 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5230 MHz; $\sigma = 5.137$ S/m; $\epsilon_r = 50.455$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

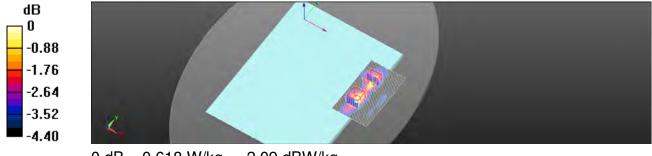
Maximum value of SAR (interpolated) = 0.692 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.385 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 1.13 W/kg SAR(1 g) = 0.454 W/kg; SAR(10 g) = 0.346 W/kg Maximum value of SAR (measured) = 0.629 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.385 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 1.12 W/kg SAR(1 g) = 0.447 W/kg; SAR(10 g) = 0.340 W/kg Maximum value of SAR (measured) = 0.618 W/kg



0 dB = 0.618 W/kg = -2.09 dBW/kg



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Date: 2017/2/15

WLAN 802.11a 5.3G_Body_Bottom side_CH 52_Main_0mm

Communication System: WLAN(5G); Frequency: 5260 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5260 MHz; $\sigma = 5.154 \text{ S/m}$; $\epsilon_r = 50.011$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

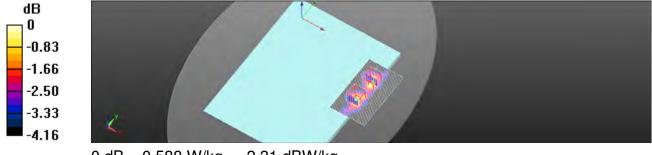
Maximum value of SAR (interpolated) = 0.601 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.305 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 2.01 W/kg SAR(1 g) = 0.459 W/kg; SAR(10 g) = 0.348 W/kg Maximum value of SAR (measured) = 0.612 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.305 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 2.56 W/kg SAR(1 g) = 0.448 W/kg; SAR(10 g) = 0.341 W/kg Maximum value of SAR (measured) = 0.588 W/kg



0 dB = 0.588 W/kg = -2.31 dBW/kg



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Date: 2017/2/16

WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 106_Main_0mm

Communication System: WLAN(5G); Frequency: 5530 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5530 MHz; σ = 5.747 S/m; ϵ_r = 48.965; ρ = 1000 kg/m³ Phantom section: Flat Section

Ambient temperature: 22.2° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(3.83, 3.83, 3.83); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.625 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 7.001 V/m; Power Drift = 0.08 dBPeak SAR (extrapolated) = 1.51 W/kgSAR(1 g) = 0.505 W/kg; SAR(10 g) = 0.392 W/kg

Maximum value of SAR (measured) = 0.723 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm

Reference Value = 7.001 V/m; Power Drift = 0.08 dB

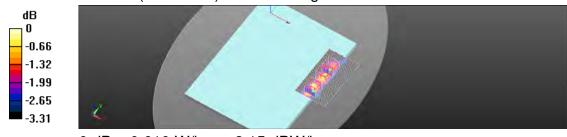
Peak SAR (extrapolated) = 1.85 W/kg

SAR(1 g) = 0.462 W/kg; SAR(10 g) = 0.380 W/kg

Maximum value of SAR (measured) = 0.600 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 2: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 7.001 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 1.12 W/kg SAR(1 g) = 0.447 W/kg; SAR(10 g) = 0.381 W/kg Maximum value of SAR (measured) = 0.610 W/kg



0 dB = 0.610 W/kg = -2.15 dBW/kg



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Date: 2017/2/17

WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_Main_0mm

Communication System: WLAN(5G); Frequency: 5775 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5775 MHz; σ = 6.161 S/m; ϵ_r = 48.084; ρ = 1000 kg/m³ Phantom section: Flat Section

Ambient temperature: 22.3° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.02, 4.02, 4.02); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x151x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.24 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 7.475 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.43 W/kg

SAR(1 g) = 0.796 W/kg; SAR(10 g) = 0.497 W/kg

Maximum value of SAR (measured) = 1.24 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm

Reference Value = 7.475 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.54 W/kg

SAR(1 g) = 0.706 W/kg; SAR(10 g) = 0.471 W/kg

Maximum value of SAR (measured) = 1.05 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 2: Measurement grid: dx=4mm,

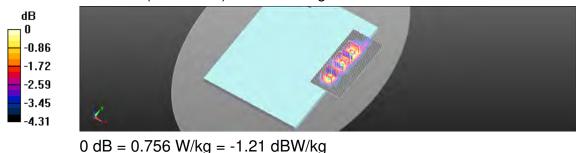
dy=4mm, dz=2mm

Reference Value = 7.475 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 2.88 W/kg

SAR(1 g) = 0.592 W/kg; SAR(10 g) = 0.430 W/kg

Maximum value of SAR (measured) = 0.756 W/kg





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Date: 2017/2/13

WLAN 802.11b_Body_Bottom side_CH 11_Aux_0mm

Communication System: WLAN(2.45G); Frequency: 2462 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2462 MHz; σ = 2.046 S/m; ϵ_r = 52.526; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

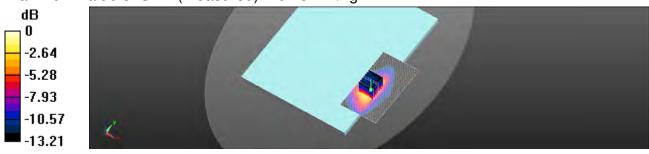
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.650 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 2.838 V/m; Power Drift = -0.00 dB Peak SAR (extrapolated) = 1.05 W/kg SAR(1 g) = 0.494 W/kg; SAR(10 g) = 0.252 W/kg Maximum value of SAR (measured) = 0.731 W/kg



0 dB = 0.731 W/kg = -1.36 dBW/kg



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Date: 2017/2/13

Bluetooth_Body_Bottom side_CH 0_Aux_0mm

Communication System: Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2402 MHz; σ = 1.967 S/m; ϵ_r = 52.632; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

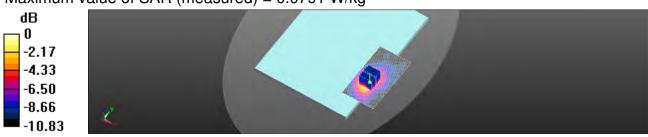
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Head/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.0749 W/kg

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 1.852 V/m; Power Drift = -0.10 dB Peak SAR (extrapolated) = 0.110 W/kg SAR(1 g) = 0.051 W/kg; SAR(10 g) = 0.028 W/kg Maximum value of SAR (measured) = 0.0791 W/kg



0 dB = 0.0791 W/kg = -11.02 dBW/kg



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Date: 2017/2/14

WLAN 802.11n(40M) 5.2G_Body_Bottom side_CH 46_Aux_0mm

Communication System: WLAN(5G); Frequency: 5230 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5230 MHz; $\sigma = 5.137$ S/m; $\epsilon_r = 50.455$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

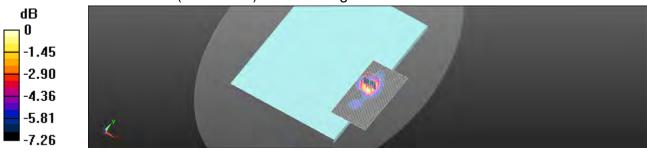
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.52 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.087 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 2.64 W/kg SAR(1 g) = 0.836 W/kg; SAR(10 g) = 0.472 W/kg Maximum value of SAR (measured) = 1.37 W/kg



0 dB = 1.37 W/kg = 1.36 dBW/kg



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Date: 2017/2/15

WLAN 802.11a 5.3G_Body_Bottom side_CH 64_Aux_0mm

Communication System: WLAN(5G); Frequency: 5320 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5320 MHz; σ = 5.226 S/m; ϵ_r = 49.894; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5° C; Liquid temperature: 22.2° C

DASY5 Configuration:

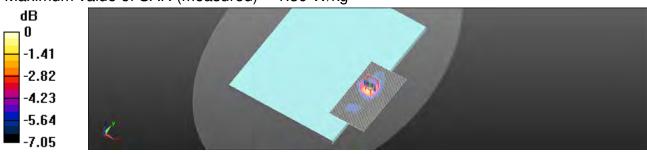
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.39 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.648 V/m; Power Drift = 0.12 dB Peak SAR (extrapolated) = 3.90 W/kg SAR(1 g) = 0.856 W/kg; SAR(10 g) = 0.480 W/kg Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.42 dBW/kg



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Date: 2017/2/16

WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 122_Aux_0mm

Communication System: WLAN(5G); Frequency: 5610 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5610 MHz; $\sigma = 5.861 \text{ S/m}$; $\epsilon_r = 48.811$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Ambient temperature: 22.2° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(3.83, 3.83, 3.83); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

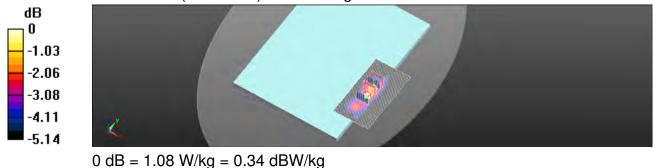
Maximum value of SAR (interpolated) = 1.18 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 7.002 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 3.37 W/kg SAR(1 g) = 0.791 W/kg; SAR(10 g) = 0.493 W/kg Maximum value of SAR (measured) = 1.25 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 7.002 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 2.69 W/kg SAR(1 g) = 0.723 W/kg; SAR(10 g) = 0.481 W/kg Maximum value of SAR (measured) = 1.08 W/kg





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Date: 2017/2/17

WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_Aux_0mm

Communication System: WLAN(5G); Frequency: 5775 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5775 MHz; $\sigma = 6.161$ S/m; $\epsilon_r = 48.084$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.3° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

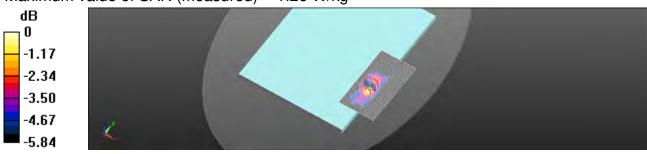
- Probe: EX3DV4 SN3938; ConvF(4.02, 4.02, 4.02); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.27 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.753 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 5.09 W/kg SAR(1 g) = 0.818 W/kg; SAR(10 g) = 0.510 W/kg Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kg = 0.99 dBW/kg



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Date: 2017/2/13

WLAN 802.11b_Body_Bottom side_CH 6_Main_0mm

Communication System: WLAN(2.45G); Frequency: 2437 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2437 MHz; σ = 1.999 S/m; ϵ_r = 52.581; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

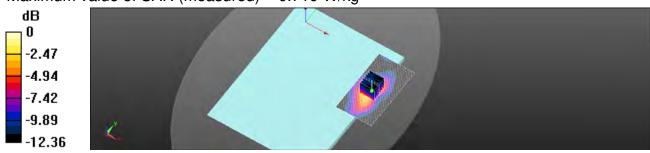
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.716 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 3.202 V/m; Power Drift = -0.15 dB Peak SAR (extrapolated) = 1.03 W/kg SAR(1 g) = 0.488 W/kg; SAR(10 g) = 0.247 W/kg Maximum value of SAR (measured) = 0.719 W/kg



0 dB = 0.719 W/kg = -1.43 dBW/kg



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Date: 2017/2/14

WLAN 802.11n(40M) 5.2G_Body_Bottom side_CH 46_Main_0mm

Communication System: WLAN(5G); Frequency: 5230 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5230 MHz; $\sigma = 5.137$ S/m; $\epsilon_r = 50.455$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.14 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 9.878 V/m; Power Drift = -0.16 dB Peak SAR (extrapolated) = 2.16 W/kg SAR(1 g) = 0.743 W/kg; SAR(10 g) = 0.570 W/kg Maximum value of SAR (measured) = 0.968 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 9.878 V/m; Power Drift = -0.16 dB Peak SAR (extrapolated) = 1.73 W/kg SAR(1 g) = 0.544 W/kg; SAR(10 g) = 0.413 W/kg Maximum value of SAR (measured) = 0.751 W/kg



0 dB = 0.751 W/kg = -1.24 dBW/kg



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Date: 2017/2/15

WLAN 802.11a 5.3G_Body_Bottom side_CH 52_Main_0mm

Communication System: WLAN(5G); Frequency: 5260 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5260 MHz; $\sigma = 5.154 \text{ S/m}$; $\epsilon_r = 50.011$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

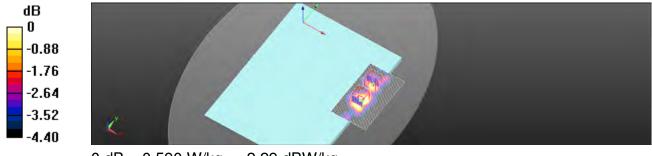
Maximum value of SAR (interpolated) = 0.828 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.139 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 2.64 W/kg SAR(1 g) = 0.539 W/kg; SAR(10 g) = 0.373 W/kg Maximum value of SAR (measured) = 0.772 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.139 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 0.925 W/kg SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.329 W/kg Maximum value of SAR (measured) = 0.590 W/kg



0 dB = 0.590 W/kg = -2.29 dBW/kg



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Date: 2017/2/16

WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 106_Main_0mm

Communication System: WLAN(5G); Frequency: 5530 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5530 MHz; σ = 5.747 S/m; ϵ_r = 48.965; ρ = 1000 kg/m³ Phantom section: Flat Section

Ambient temperature: 22.2° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(3.83, 3.83, 3.83); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

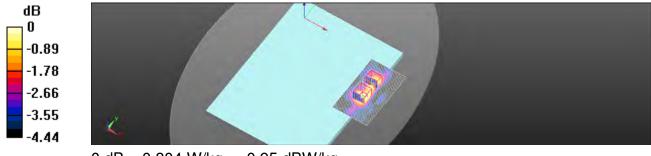
Maximum value of SAR (interpolated) = 1.05 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.511 V/m; Power Drift = 0.13 dB Peak SAR (extrapolated) = 3.12 W/kg SAR(1 g) = 0.720 W/kg; SAR(10 g) = 0.499 W/kg Maximum value of SAR (measured) = 1.04 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.511 V/m; Power Drift = 0.13 dB Peak SAR (extrapolated) = 2.24 W/kg SAR(1 g) = 0.577 W/kg; SAR(10 g) = 0.416 W/kg Maximum value of SAR (measured) = 0.804 W/kg



0 dB = 0.804 W/kg = -0.95 dBW/kg



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Date: 2017/2/17

WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_Main_0mm

Communication System: WLAN(5G); Frequency: 5775 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5775 MHz; $\sigma = 6.161$ S/m; $\epsilon_r = 48.084$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.3° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.02, 4.02, 4.02); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x121x1): Interpolated grid: dx=10 mm, dy=10 mm

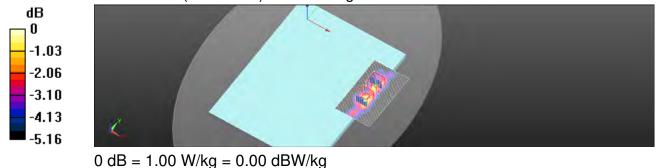
Maximum value of SAR (interpolated) = 0.948 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.765 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 4.06 W/kg SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.468 W/kg Maximum value of SAR (measured) = 0.922 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.765 V/m; Power Drift = 0.11 dB Peak SAR (extrapolated) = 3.09 W/kg SAR(1 g) = 0.672 W/kg; SAR(10 g) = 0.459 W/kg Maximum value of SAR (measured) = 1.00 W/kg





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Date: 2017/2/13

WLAN 802.11b_Body_Bottom side_CH 11_Aux_0mm

Communication System: WLAN(2.4G); Frequency: 2462 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2462 MHz; σ = 2.046 S/m; ϵ_r = 52.526; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

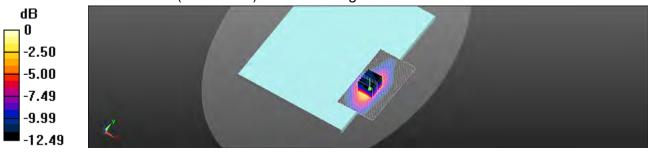
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.758 W/kg

Configuration/Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 3.410 V/m; Power Drift = -0.18 dB Peak SAR (extrapolated) = 1.14 W/kg SAR(1 g) = 0.522 W/kg; SAR(10 g) = 0.265 W/kg Maximum value of SAR (measured) = 0.804 W/kg



0 dB = 0.804 W/kg = -0.95 dBW/kg



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Date: 2017/2/13

Bluetooth_Body_Bottom side_CH 0_Aux_0mm

Communication System: Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2402 MHz; σ = 1.967 S/m; ϵ_r = 52.632; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.4° C; Liquid temperature: 22.0° C

DASY5 Configuration:

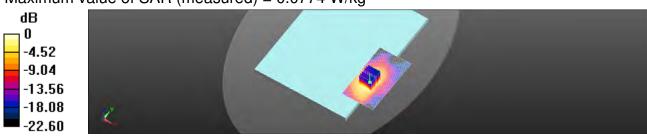
- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Head/Area Scan (61x111x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.0691 W/kg

Configuration/Head/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm,

dy=5mm, dz=5mm Reference Value = 0.2331 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 0.108 W/kg SAR(1 g) = 0.049 W/kg; SAR(10 g) = 0.023 W/kg Maximum value of SAR (measured) = 0.0774 W/kg



0 dB = 0.0774 W/kg = -11.11 dBW/kg



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Date: 2017/2/14

WLAN 802.11n(40M) 5.2G_Body_Bottom side_CH 46_Aux_0mm

Communication System: WLAN(5G); Frequency: 5230 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5230 MHz; $\sigma = 5.137$ S/m; $\epsilon_r = 50.455$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.5° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

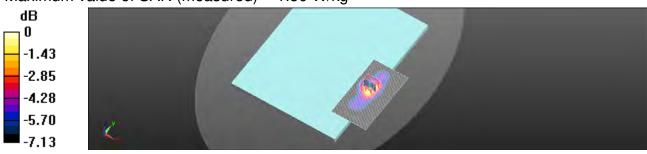
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.53 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.802 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 3.31 W/kg SAR(1 g) = 0.945 W/kg; SAR(10 g) = 0.542 W/kg Maximum value of SAR (measured) = 1.50 W/kg



0 dB = 1.50 W/kg = 1.76 dBW/kg



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Date: 2017/2/15

WLAN 802.11a 5.3G_Body_Bottom side_CH 52_Aux_0mm

Communication System: WLAN(5G); Frequency: 5260 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5260 MHz; σ = 5.154 S/m; ϵ_r = 50.011; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5° C; Liquid temperature: 22.2° C

DASY5 Configuration:

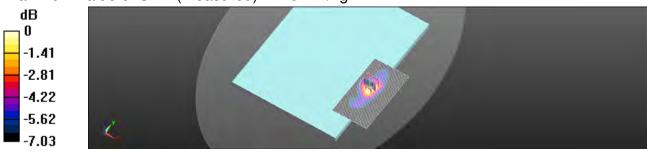
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.59 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.700 V/m; Power Drift = 0.09 dB Peak SAR (extrapolated) = 3.53 W/kg SAR(1 g) = 0.951 W/kg; SAR(10 g) = 0.549 W/kg Maximum value of SAR (measured) = 1.54 W/kg



0 dB = 1.54 W/kg = 1.88 dBW/kg



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Date: 2017/2/16

WLAN 802.11ac(80M) 5.6G_Body_Bottom side_CH 138_Aux_0mm

Communication System: WLAN(5G); Frequency: 5690 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5690 MHz; $\sigma = 5.974 \text{ S/m}$; $\epsilon_r = 48.649$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Ambient temperature: 22.2° C ; Liquid temperature: 22.2° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(3.83, 3.83, 3.83); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

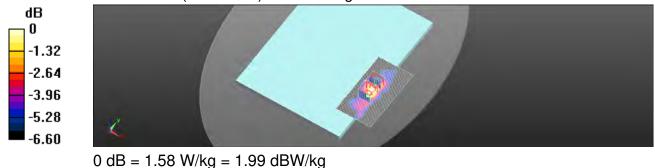
Maximum value of SAR (interpolated) = 1.64 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 7.299 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 7.21 W/kg SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.634 W/kg Maximum value of SAR (measured) = 1.67 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 7.299 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 3.65 W/kg SAR(1 g) = 0.986 W/kg; SAR(10 g) = 0.619 W/kg Maximum value of SAR (measured) = 1.58 W/kg





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Date: 2017/2/17

WLAN 802.11ac(80M) 5.8G_Body_Bottom side_CH 155_Aux_0mm

Communication System: WLAN(5G); Frequency: 5775 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5775 MHz; $\sigma = 6.161$ S/m; $\epsilon_r = 48.084$; $\rho = 1000$ kg/m³ Phantom section: Flat Section

Ambient temperature: 22.3° C ; Liquid temperature: 22.1° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(4.02, 4.02, 4.02); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Body/Area Scan (71x131x1): Interpolated grid: dx=10 mm, dy=10 mm

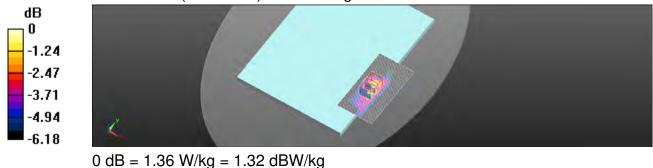
Maximum value of SAR (interpolated) = 1.39 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.950 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 3.83 W/kg SAR(1 g) = 0.902 W/kg; SAR(10 g) = 0.552 W/kg Maximum value of SAR (measured) = 1.42 W/kg

Configuration/Body/Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 6.950 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 2.36 W/kg SAR(1 g) = 0.753 W/kg; SAR(10 g) = 0.520 W/kg Maximum value of SAR (measured) = 1.36 W/kg





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6. SAR System Performance Verification

Date: 2017/2/13

Dipole 2450 MHz_SN:727

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2450 MHz; $\sigma = 2.023 \text{ S/m}$; $\epsilon_r = 52.552$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section

Ambient temperature: 22.4° C ; Liquid temperature: 22.0° C

DASY5 Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.4, 7.4, 7.4); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

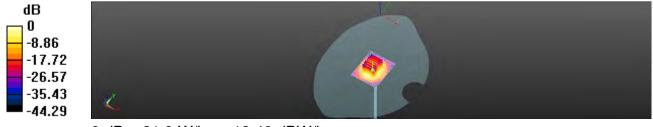
Configuration/Pin=250mW/Area Scan (51x61x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 22.8 W/kg

Configuration/Pin=250mW/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement

grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 100.7 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 30.2 W/kg SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.97 W/kg

Maximum value of SAR (measured) = 21.9 W/kg



0 dB = 21.9 W/kg = 13.40 dBW/kg



Dipole 5200 MHz_SN:1023

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5200 MHz; σ = 5.102 S/m; ϵ_r = 50.298; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5° C; Liquid temperature: 22.1° C

DASY5 Configuration:

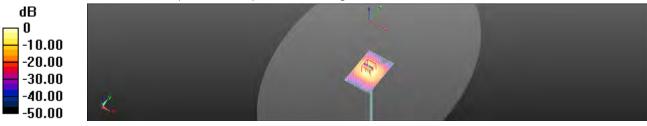
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 14.5 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 57.26 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 28.8 W/kg SAR(1 g) = 7.23 W/kg; SAR(10 g) = 2.03 W/kg Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.77 dBW/kg



Dipole 5300 MHz_SN:1023

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5300 MHz; σ = 5.202 S/m; ϵ_r = 49.932; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.5° C; Liquid temperature: 22.2° C

DASY5 Configuration:

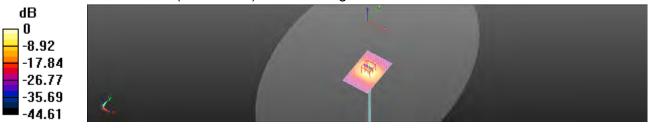
- Probe: EX3DV4 SN3938; ConvF(4.41, 4.41, 4.41); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 16.8 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 56.12 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 32.4 W/kg SAR(1 g) = 7.44 W/kg; SAR(10 g) = 2.1 W/kg Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.81 dBW/kg



Dipole 5600 MHz_SN:1023

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5600 MHz; σ = 5.837 S/m; ϵ_r = 48.848; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2° C; Liquid temperature: 22.2° C

DASY5 Configuration:

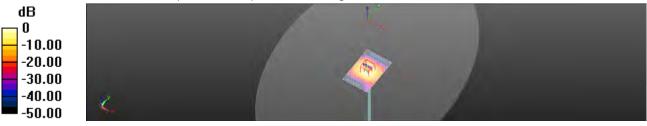
- Probe: EX3DV4 SN3938; ConvF(3.83, 3.83, 3.83); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.8 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 60.21 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 37.3 W/kg SAR(1 g) = 8.33 W/kg; SAR(10 g) = 2.33 W/kg Maximum value of SAR (measured) = 17.8 W/kg



0 dB = 17.8 W/kg = 12.50 dBW/kg



Dipole 5800 MHz_SN:1023

Communication System: CW; Frequency: 5800 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5800 MHz; σ = 6.197 S/m; ϵ_r = 48.041; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.3° C; Liquid temperature: 22.1° C

DASY5 Configuration:

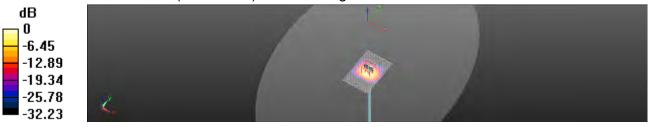
- Probe: EX3DV4 SN3938; ConvF(4.02, 4.02, 4.02); Calibrated: 2016/11/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2016/11/22
- Phantom: Body
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/Pin=100mW/Area Scan (61x91x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.7 W/kg

Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm Reference Value = 56.94 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 37.6 W/kg SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.08 W/kg Maximum value of SAR (measured) = 17.3 W/kg



0 dB = 17.3 W/kg = 12.37 dBW/kg



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7. DAE & Probe Calibration Certificate

		"Subdada"	
credited by the Swise Accredite e Swiss Accreditation Servic Utilateral Agreement for the r	e is one of the signatories	to the EA	Ho.: SCS 0108
Int SGS - TW (Aud	ien)	Certificate No:	DAE4-1336_Nov16
ALIBRATION O	CERTIFICATE		
bject	DAE4 - SD 000 D	04 BM - SN: 1336	
alibration procedure(s)	QA CAL-06.v29 Calibration proced	lure for the data acquisition elect	ronics (DAE)
Calibration date:	November 22, 201	6	
he measurements and the unce Il calibrations have been condu	ertainties with confidence pro	nal standards, which realize the physical und obsbilly are given on the following pages and r taolity: environment temperature (22 + 3)°C	are part of the certificate.
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Calibration Laboratory of Schmid & Partner Engineering AG Zeughrusstrasse 43, 8001 Zurich, Switzerland

Accredited by the Swiss Accreditation Service (SAS)



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Accreditation No.1 SCS 0108

Glossary

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

Methods Applied and Interpretation of Parameters

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

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

Derviticate No/ DAE4-1335_Nov/16

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DC Voltage Measurement

A/D - Converter Resolution nominal High Range: 1LSB =

Calibration Factors	x	Ŷ	Z
High Range	403.332 ± 0.02% (k=2)	403.635 ± 0.02% (k=2)	403.121 ± 0.02% (k=2)
Low Range	3.95216 ± 1.50% (k=2)	3.98718±1.50% (k=2)	3.99680 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	122.0 + ± 1 +
Contraction Multiple in the inped in multiple address	ICC.W 11

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	199996.24	0.16	0.00
Channel X + Input	20001.25	-0.04	-0.00
Channel X - Input	-19999.81	1.36	-0.01
Channel Y + Input	199994.04	-1.88	-6.00
Channel Y + Input	20000.69	-0.82	+0.00
Channel Y - Input	-20002.64	-1.77	0.01
Channel Z + Input	199997.44	1.49	0.00
Channel Z + Input	19999.78	-1.82	-0,01
Channel Z + Input	-20003.24	-2.19	0.01

Low Range	Reading (µV)	Difference (µV)	Ervor (%)
Channel X + Input	2001.87	0.66	0.02
Channel X + Input	201.39	-0.11	-0.06
Channel X - Input	-198.27	0.04	-0.02
Channel Y + Input	2001.34	-0,04	-0.00
Channel Y + Input	201.35	-0.36	-0.18
Channel Y - Input	-198.77	-0.62	0.31
Channel Z + Input	2001.30	0,10	10,0
Channel Z + Input	200.72	-0,71	+0.35
Channel Z - Input	-199.12	-0.78	0.39

Common mode sensitivity DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec.

	Common mode Input Voltage (mV)	High Renge Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	5.23	3.90
-	: 200	-3.72	-5.31
Channel Y	200	-4.23	-3,73
	- 500	2.71	2.31
Channel Z	500	20.93	21,36
-	- 1200	-23.91	-24.44

3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	9-11	6.47	+1.27
Channel Y	200	7,97		6.72
Channel Z	200	7.94	6,96	

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4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	15660	15881
Channel Y	15906	15597
Channel Z	(5853	15173

Input Offset Measurement DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec input 10Mia

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	-0.26	-1.07	0.37	66,0
Channel Y	-0.22	-0.92	0.62	0.34
Channel Z	-0.97	-1.73	0.29	0.36

6. Input Offset Current

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

7. Input Resistance (Typical values for Information)

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

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

Typical values	Alarm Level (VDC)	
Supply (+ Vcc)	+7,9	
Supply (- Vcc)	-7.6	

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+#4
Supply (- Vec)	-0.01	-8	·9

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Engineering AG nughwesstrasse 43, 8004 Zuri			Schweizerlicher Kellbrierdimet Service suisse d'étalomage Servicio svizzero di taratea Swiss Calibration Servico
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Calibration Laboratory of Schmid & Partner Engineering AG Zeig sstrasse 43, 9004 Zurich, Switzerland



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Accreditation No.: SCS 0108

Advantage by the Swiss Acceptation Service (SAS). The Swiss Accredition Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration contributes

Cleanne

CHUBBER Y.	
TBL	tissue simulating liquid.
NORMx.y.z	sensitivity in free space
CONVE	sensitivity in TSL7 NORMx, y,z
DCP	diade compression point
CF	crest factor (1/duty_cycle) of the RF signal
A. B. C. U	modulation dependent linearization parameters
Polarization #	wrotation around probe axis
Polarization 8	A rotation around an axis that is in the plane normal to probe axis (at measurement center),
	Let 19 = 0 is normal to probe axis.

information used in DASY system to align probe sensor X to the robol coordinate system Connector Angle

Calibration is Performed According to the Following Standards:

- a) IEEE Ski 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific a) IEEE Ski 1526-2013, "IEEE Recommendade Practice for Determining the Pask Spansi-Averages Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices. Measurement Techniques", June 2013
 b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-heid devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
 c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
 c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 300 MHz to 6 GHz)", March 2010
 k) Babella, "ABP Mean service transmit for 100 MHz to 1 GHz".

- KDB 865664, 'SAR Measurement Requirements for 100 MHz to 8 GHz

Methods Applied and Interpretation of Parameters:

- NORMs, y, z Assessed for E-field potenzation 8 = 0 (1 ≤ 900 MHz in TEM-cell, 1 > 1800 MHz; R22 waveguide) NORMx, y, z are only intermediate values, i.e., the uncertainties of NORMx, y, z does not affect the E"-field uncertainty inside TSL (see below ConvF).
- NORM/(hx,y,z = NORM/x,y,z 1 /requency_response (see Frequency Response Chart). The Internation E implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of ConvF.
- DOPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainly 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 . haracteristics
- Ax, y, z; Bx, y, z; Cx, y, z; Dx, y, z; VRx, y, z; A, B, C, D are numerical linearization parameters assessed based on Ine 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 phontom using E-field (or Temperature Transfer Standard for f < 900 MHz) and inside wavaguide using analytical field distributions based on power measurements for f > 100 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 perameters 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 help of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NCIRMs (no uncertainty required)

Gentificate No. EX3-3938 Nov16

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EXIDW- 5N 3896

Wavender 25, 2018

Probe EX3DV4

SN:3938

Manufactured: Calibrated: May 2, 2013 November 25, 2016

(Note: non-compatible with DASY2 systems)

Certificate No: EX3-3938_Nov18

impa 3 ot 1



EX30V4- SN:3909

November 25, 2016

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unic (k=2)
Norm (µV/IV/mi ²) ⁴	0.51	0.57	0.33	# 10.1 %
Norin (µV/(V/m) ²) ⁴ DCP (mV) ⁴	100,5	101.3	104.0	- 0

Modulation Calibration Parameters

UID	Communication System Name		A dB	B d⊎√µV	c	dB	VR mV	Unc" (k=2)
0	GW	8	0.0	00	1.0	0.00	54D.2	12.2 %
		Y	0.0	0.0	10		129.7	
-		Z	0.0	0.0	1.0	1000	146.0	1

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%.

⁶ The uncertainties of form 9, 9,2 do not afford the E³ field uncertainty more TSL (see Flages 6 and 8).
⁹ Numercal bioaction partmeter: uncertainty no recurved.
⁹ Uncertainty is determined using the must dovid on from incomesponse applying rectangular distribution and is expressed for the states of pin field yours.

Cumilicale No-EX3-3938_Nov10

Page 4 10 11



EX3DV4-SN:3938

Neverther 25, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

(Mitz) ²	Relative Permittivity	Conductivity (Sim)	ConvF X	ConvF Y	Gony? Z	Alpha	Depth [®] (mm)	Unc {k=2}
750	41.9	0.89	10.14	10:14	10,14	0,61	0,80	± 120 %
835	41.5	0.90	8,74	9,74	9.74	0.45	0,91	1 12.0 %
900	41.5	0.97	9.64	9.64	9.64	0.51	0.80	± 12.0 %
1450	40.5	1.20	£ 45	845	8.45	0.43	0.80	= 12.0 4
1750	40,1	1.97	B.20	8,20	8.20	0.31	0.63	= 12,0 %
1900	40,0	1.40	6.15	8 15	8.15	0.38	0.80	z 12.0 %
2000	-40.0	1.40	8.06	8.06	8.06	0.35	0.80	± 12.0 %
2300	39.5	1:87	7.74	7.74	7.74	0.35	0.60	± 12.0.9
2450	39.2	1.60	7.36	7.36	736	0,33	0.92	± 12.0 9
2600	39.0	1.96	7.08	7.09	7.09	0.44	0.80	± 12.0 3
5250	35.9	4.71	5.21	5,21	5.21	0,38	1.80	+ 13.1 1
5600	35.5	5.07	4.53	4,53	4.53	3.40	1.80	£ 13.1 5
5750	35.4	5 22	4.79	4:79	4.79	0.40	1.80	= 15.1 3

Calibration Parameter Determined in Head Tissue Simulating Media

⁵⁵ Frequency variably phone that MHz m ± 100 MHz only appleb to DASY valid and higher (see Paper2), time (is restricted to ± 00 MHz, the interstating at calculating incention) and higher (see Paper2), time (is restricted become) validity (at watch interstating at calculating incents) and (in underlamp for the indicated become) validity (at watch is ± 10.2, MD, 20 min 10 MHz to ConvF assessments ± 0.0, MP, 120, 150 and 200 MHz is ± 10.2, MD, 20 min 10 MHz to ConvF assessments ± 0.0, MP, 120, 150 and 200 MHz is a set 0.5, Above 5 GHz features) validity (at the statistic beaux 9 GHz, the validity of texts provide validity) can be estimated to ± 110 MHz.
⁷ At implantise beaux 9 GHz, the validity of locus provide (a calcular) can be estimated to ± 105, 4 lipsic comparation lamida is applied to there each way 9 GHz, the validity of texase provide accurations (a calcular) is restricted in ± 51. The uncentrality is the restricted at the state of the ConvF uncessfully in the restricted at the state of the ConvF uncessfully in the restricted in ± 51. The uncessfully in the restricted in ± 558 of the ConvF uncessfully for maximal state to the interval of any effect at the complexities above 3 GHz, the validity of texase parameters is and in a restricted in ± 558. The uncessfully in the restricted in the complexities above 3 GHz and planeters.

Centilitatie No: EX3-3938_Nov10

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EX3DV4- SN 3938

Mowember 25, 2016

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) ^T	ConvEX	ConvF Y	ConvF Z	Alpha	Depth G (mm)	Unc (k=2)
750	55.5	0.96	9.51	9.51	9.51	0.38	D.93	± 12.0 %
835	55.2	0.97	9.33	9.35	9.33	0,47	0.80	± 12.0 %
900	:55,0	1,05	9.23	B.28	₽.23	D,35	Q.98.	+12.0 %
1450	54.0	1.30	8.18	8.18	8.16	0.39	0.80	£ 12.0 %
1750	53.4	1.49	7.98	7.96	7.98	0,43	0.81	± 12.05
1900	53.3	1.52	7.77	7.77	7.77	0.27	1.06	± 12.0 %
2000	53.3	1,52	7.63	7.63	7.63	0.40	0.80	± \$2,0.5
2500	52.9	าสา	7.58	7.56	7.56	0.42	0.80	= 12.0 5
2450	52.7	1.415	7:40	7.40	7,40	0.38	0,80	± 12.0 %
2600	52.5	2.10	7.14	7.14	7.14	0.34	0.80	± 12.0 5
5250	46.9	5.36	4.41	4.41	4.41	0.40	1.90	2 13.1 9
5600	A6.5	5.77	3,83	3.83	3.83	0.50	j.90	+1213
5760	48.3	5.94	4.02	4.02	4.02	0.50	1.90	±13.14

Calibration Parameter Determined in Body Tissue Simulating Media

Proclampy which above 500 MHz or ± 100 MHz or ± 100 MHz or y applies for DAXY via a not higher (see Page 2), else 4 is retricted to 1.50 MHz. The uncertainty is the RES of the ComP incretainty in calimon, higher (see Note) the uncertainty in the indicated Vagency band. Programs, which y active 30, 64, 128, 150 and 220 MHz retrieved Vagency band. Programs, which y and which is a 10, 32, 43, 50 and 10 MHz for ComP increasements is 30, 64, 128, 150 and 220 MHz retrieved. Above 5 GHz frammery which y and which is a 10, 32, 40, 50 and 10 MHz for ComP increasements is 30, 64, 128, 150 and 220 MHz retrieved. Above 5 GHz frammery which y and the anticele below 3 GHz, the validation a parameters (a and n) can be relaxed to a 20% of (reparticle) to a 100 MHz. The validation of the validation of the complexity of the second and the second and the relaxed to a 20% of (reparticle) to a 100 MHz. The uncertainty is indicated for a 100 MHz is 20% MHz retrieved to a 20% of the complexity of the second and the complexity of the second and the parameters is and at a restricted to a 21%. The uncertainty is indicated for a 10 MHz for the second and the to the complexity of the second and the complexity of the second and the second and the restricted to a 21%. The uncertainty is indicated for a 10% MHz retrieved the complexity of the second and the second and the second and the second and the SEC at the value of the complexity of the second and the second and

Centilizate No; EX3-3938_Nov10

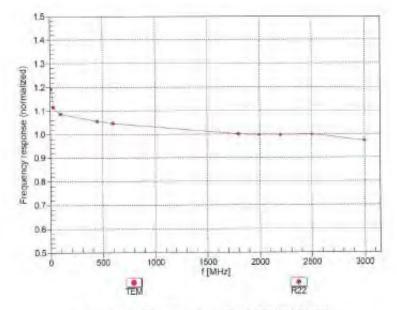
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EX3DV4- SN:3938

November 25, 2016

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



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

Certificate No: EX3-3938_Noy16

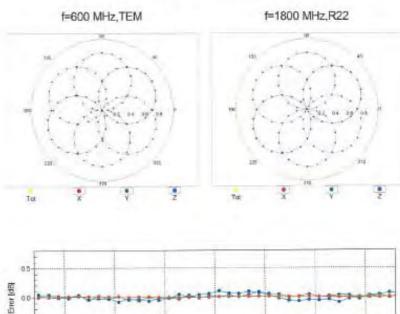
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EX3DV4- SN:3938

November 25, 2016



Receiving Pattern (o), 9 = 0°

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

Certificate No: EX3-3938_Nov16

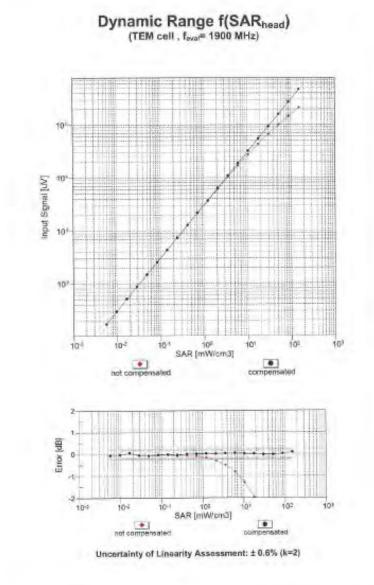
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EX3DV4-SN:3938

November 25, 2016

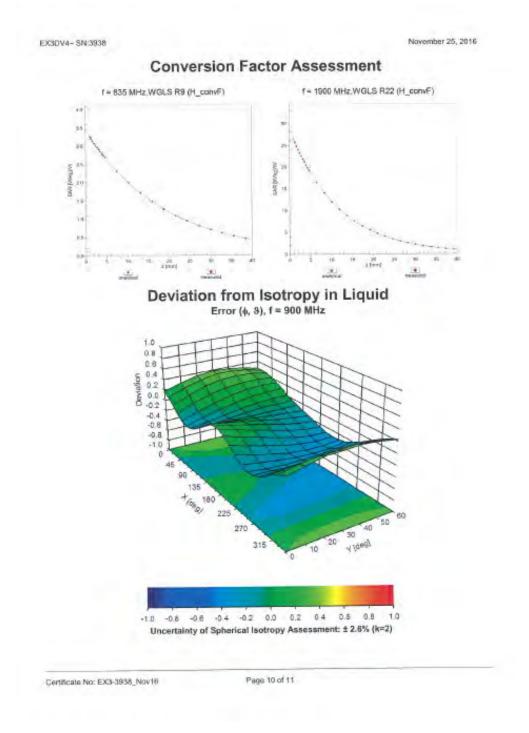


Certificate No: EX3-3938_Nov16

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EA3DV4-SN 3938

November 25, 2016

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3938

Sensor Amergement	Triangular
Connector Angle (*)	-25.9
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 mim
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommanded Measurement Distance from Surface	1.4 mm

Centhcate No: EX3-3933_Nov10

Preprint 11 (05-11-



8. Uncertainty Budget

A	с	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probabilit V	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	œ
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	œ
lsotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	œ
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	00
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	00
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	00
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	00
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	œ
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	00
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	00
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	00
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	00
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	00
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	00
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	8
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	œ
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	00
Liquid permittivity (mea.)	3.02%	N	1	1	0.64	0.43	1.93%	1.30%	М
Liquid Conductivity (mea.)	4.01%	N	1	1	0.6	0.49	2.41%	1.96%	М
Combined standard uncertainty		RSS					12.12%	11.94%	
Expant uncertainty (95% confidence							24.23%	23.88%	

Measurement Uncertainty evaluation template for DUT SAR test (3-6G)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only. 除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。

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A	с	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probabilit V	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	~
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
lsotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Readout Electronics	0.30%	Ν	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	~
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	œ
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	œ
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	~
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	8
Test Sample related									
Test sample positioning	2.90%	Ν	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	Ν	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	8
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	~
Liquid permittivity (mea.)	0.30%	N	1	1	0.64	0.43	0.19%	0.13%	М
Liquid Conductivity (mea.)	4.02%	N	1	1	0.6	0.49	2.41%	1.97%	М
Combined standard uncertainty		RSS					11.67%	11.58%	
Expant uncertainty (95% confidence							23.34%	23.16%	

Measurement Uncertainty evaluation template for DUT SAR test (0.3-3G)

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9. System Validation from Original Equipment Supplier

Engineering AG ughausstrasse 43, 8004 Zurici	y of		Service suizze d'étalognage
corectived by the Swiss Accredite he Swiss Accreditation Service Suttilateral Agreement for the m	e is one of the signatorie	s to the EA	accreditation No.: SCS 0108
SGS-TW (Aude	ю)	Contillicate N	lo: D2450V2-727_Apr16
CALIBRATION C	ERTIFICATE	5	
Dibject	D2450V2 - SN:72	27	
Califerative procedure(a)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits ab	ove 700 MHz
Calibration date:	April 19, 2016		
		ry lacilly: unviconent temperature (22 ± 3)	"C and humidity = 70%.
Calibration Equipment used (M&) Primary Standards	TE critical for calibration)	Cel Dale (Certificate No.)	Scheduled Calibitation
Calibration Equipment used (M& Primary Standards Power mister NRP	TE onlical for calibration)	Cal Daia (Cartificate No.) 06-Apr-16 (No. 217-02289/02289)	Scheduled Calibration Apr-17
Calibration Equipment used (M& Primary Standards Power mister NRP Power sensor NRP-291	TE onlitical for calibration) ID # SN: 104778 SN: 103244	Cel Dais (Certificate No.) 06-Apr-16 (No. 217-02289/02289) 06-Apr-16 (No. 217-02288)	Scheduled Calibration Apr-17 Apr-17
Calibration Equipment used (M& Primery Standards Power mister NRP Power sensor NRP-291 Power sensor NRP-291	TE oritical for calibration) ID # SN: 104778 SN: 103244 SN: 103245	Cel Date (Certificate No.) Ce-Apr-16 (No. 217-02289/02289) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02288)	Scheduled Calibration Apr-17 Apr-17 Apr-17
Calibration Equipment used (M& Primary Standards Power mister NRP Power sensor NRP-291 Power sensor NRP-291 Rotorance 20 cB Abenuator	TE onitical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	Cal Date (Continue No.) 06-Apr-16 (No. 217-02280/02289) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289)	Scheduled Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17
Calibration Equipment used (M& Primary Standards Power midler NEP Power sensor NEP-291 Power sensor NEP-291 Rotorunco 20 GB Attornator Type-N mismatch combination	TE onitical for calibration) ID 4 SN: 104778 SN: 103244 SN: 103245 SN: 5038 (20k) SN: 5047.2 / 05327	Cal Date (Cartilicate No.) 06-Apr-16 (No. 217-02288/02288) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02288)	Scheckaed Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Apr-17
Calibration Equipment used (M& Primary Standards Power mister NRP Power sensor NRP-291 Power sensor NRP-291	TE onitical for calibration) ID # SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	Cal Date (Continue No.) 06-Apr-16 (No. 217-02280/02289) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289)	Scheduled Calibration Apr-17 Apr-17 Apr-17 Apr-17
Calibration Equipment used (M& Primary Standards Power ensister NRP Power sensor NRP-291 Power sensor NRP-291 Reference 29 dB Attenuator Type-N mismatch combination Reference Probe EX30V4 DAE4	TE oritical for calibration) ID 4 SN: 104778 SN: 103244 SN: 103245 SN: 5088 (20k) SN: 5087.2 / 06327 SN: 7349 SN: 601	Cel Date (Certificate No.) 06-Apr-16 (No. 217-02289/02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 31-Dec-15 (No. EX3-7349_Dec16) 30-Dec-15 (No. DAE4-601_Dec15)	Scheduled Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Diec-16 Diec-16
Calibration Equipment used (M& Primary Standards Power mister NRP Power sensor NRP-291 Power sensor NRP-291 Reterance 29 dB Abenuator Type-N mismatch combination Reterance Probe EX30V4 DAE4 Secondary Standards	TE onitical for calibration) ID 4 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5047.2 / 05327 SN: 7349 SN: 601 ID 4	Cel Date (Certilicate No.) Ce-Apr-16 (No. 217-02288/02289) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02280) 31-Dec-15 (No. EX3-7349_Dec16) 30-Dec-15 (No. DAE4-601_Dec15) Check Dete (in house)	Scheckled Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Dec-16
Calibration Equipment used (M& Primary Standards Power sensor NRIP-291 Power sensor NRIP-291 Roterance 20 dB Attenuator Type-N mismatch combination Reterance Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A	TE oritical for calibration) ID 4 SN: 104778 SN: 103244 SN: 103245 SN: 5088 (20k) SN: 5087.2 / 06327 SN: 7349 SN: 601	Cel Date (Certificate No.) 06-Apr-16 (No. 217-02289/02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 31-Dec-15 (No. EX3-7349_Dec16) 30-Dec-15 (No. DAE4-601_Dec15)	Scheduled Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Dec-16 Dec-16 Scheduled Check
Calibration Equipment used (M& Primary Standards Power ensar NRP Power sensor NRP-291 Power sensor NRP-291 Reference 29 dB Abenuator Type-N mismatch combination Reference Probe EX30V4 DAE4	TE onitical for calibration) ID 4 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k) SN: 5058 (20k) SN: 5057.2 / 05327 SN: 7349 SN: 601 ID 4 SN: 6037460704	Cal Date (Cartilicate No.) 06-Apr-16 (No. 217-02280/02289) 06-Apr-16 (No. 217-02288) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 06-Apr-16 (No. 217-02289) 31-Dec-15 (No. 217-02289) 31-Dec-15 (No. 217-02289) 30-Dec-15 (No. 217-02289) Check Date (n. Incuse) 07-Oct-15 (No. 217-02222)	Scheduled Calibration Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Apr-17 Dec-16 Dec-16 Scheduler Check In house check: Oct-16
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Calibration Equipment used (M& Primary Standards Power sensor NRP-291 Power sensor NRP-291 Reterance 29 dB Attenuator Type-N mismatch combination Reterance Probe EX3DV4 OAE4 Sacondary Standards Power sensor HP 849A Power sensor HP 8	TE oritical for calibration) 10-4 SN: 104778 SN: 103244 SN: 003244 SN: 5038 (20k) SN: 5038 (20k) SN: 5038 (20k) SN: 5037 (20k) SN: 5037 (20k) SN: 5037 (20k) SN: 601 10-4 SN: 0837480704 SN: 0837480704 SN: 05372802709 SN: 40372 SN: 40372	Cal Data (Cartilicate No.) 06-Apr-16 (No. 217-02280 002209) 06-Apr-16 (No. 217-02280) 06-Apr-16 (No. 217-02280) 06-Apr-16 (No. 217-02280) 06-Apr-16 (No. 217-02280) 06-Apr-16 (No. 217-02280) 06-Apr-16 (No. 217-02280) 07-Det-15 (No. 217-02220) 07-Det-15 (No. 217-02220) 07-Det-15 (No. 217-02220) 07-Det-15 (No. 217-02220) 07-Det-15 (No. 217-02220) 15-Jun-15 (N Plause check Jun-15) 15-Jun-15 (N Plause check Jun-15) 15-Det-10 (N nouse	Schechled Calibitation Apr-17 Apr-17 Apr-17 Apr-17 Dec-16 Dec-16 Dec-16 Schechuled Check In house check: Oct-16 In



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



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ditation No.: SCS 0108

According by the Swiss Accordination Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA. Multiliniaral Agreement for the recognition of calibration certificates Glossary:

TSL

N/A

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held. devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)". February 2005
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) 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.
- Anterina Parameters with TSL: The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- Feed Point Impedance and Return Loss; These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

Centificate No! D2450V2-727_April 9

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Measurement Conditions

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

DASY Version	DASY5	V52.8.B
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.0 ± 6 %	1.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	51.0 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 250 mW input power	5.93 W/kg

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mbo/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.7 ± 6 %	1.98 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL

SAR averaged over 1 cm ² (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	49.6 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 250 mW input power	5.86 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.3 Ω + 2.0 jΩ
Return Loss	- 25.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to	feed point	52.1 Ω + 4.8 jΩ
Return Loss		- 25.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.148 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

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DASY5 Validation Report for Head TSL

Date: 19.04.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency; 2450 MHz Medium parameters used: f = 2450 MHz; σ = 1.83 S/m; ϵ_r = 40; ρ = 1000 kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.76, 7.76, 7.76); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- · Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 112.1 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 25.7 W/kg SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.93 W/kg

Maximum value of SAR (measured) = 20.8 W/kg



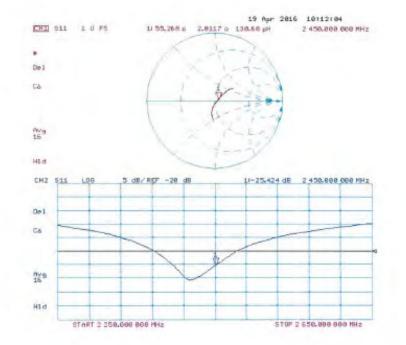
Certificate No: D2450V2-727_Apr16

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Report No. : E5/2017/20001 Page : 105 of 120

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-727_Apr16

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Primary Standards	ID+	Cal Date (Centricate No.)	Scheduled Calibiution
Power meter NPP	SN: 104778	06-Apr 16 (No. 217-02289/02289)	Apr-17
Power sensor NPP-291	Sec 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN-5058 (20k)	85-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	85-Apr-16 (No. 217-02295)	Apr-17
Fielerence Probe EX3DV4	SN: 3503	31-Dec-16 (No. EXS-8503_Dec16)	Dec-17
DAE4	SN 801	04-Jan-17 (No. DAE4-601_Jan17)	Jan-18
Secondary Stancards	101	Chack Date (In house)	Schedulet Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Dct-18
- benefit of the second second	SN: US37292783	07-Oct-15 (In house check Oct-16)	In house check, Oct-18
Powersonsor HP 8481A		07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A Power sensor HP 8481A	SNE MY41082317	an egia-sa ini navae oneen oler roi	
Power sonsor HP 8481A		15-Jun-15 (in house check Oct-16)	In house check: Oct-18
	SNE MY41082317		In house check: Oct-18 In house check: Oct-17
Power sensor HP 8481A RF generator R&S SMT-00	SN: MY41092317 SN: 100972	15-Jun-15 (in house check Oct 16)	
Power sensor HP 8481A RF generator R&S SMT-00	SN: MY41092317 SN: 100972 SN: US37390585	15-Jun-15 (in house check Oct-16) 19-Oct-01 (in house check Oct-16)	In house check Och 17

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Calibration Laboratory of Schmid & Panner Engineering AG Zeutpursteren G. 1004 Zurich, Switzerland



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Accorditation No.: SCS 0108

Accession by the Series Acondition Service (SAS)

The Swaa Accreditation Service is one of the signatorios to the EA Multitudesi Agreement for the recognition of calibration certificates

Glossary:

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

Calibration is Performed According to the Following Standards.

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Paak Spatial-Averaged Specific Absorption Pate (SAR) in the Human Head from Wireless Communications Devices. Measurement Techniques", June 2013
- b) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the cardificate. 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 penallel to the body axis.
- Feed Point Impedance and Return Loss: These parameters are measured with the dipole
 positioned under the liquid Illiad phantom. The impedance stated is transformed from the
 measurement at the SMA connector to the feed point. The Return Loss ensures low
 reflected power. No uncertainty required.
- Electrical Delay: One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

Dentricate No: 05GHzV2 1023 Jan17

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Measurement Conditions

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

DASY Version	DASYS	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Specer
Zoom Scan Resolution	dx, dy = 4,0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	38.0	4.66 mha/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.4 ± 6 %	4.45 mho/m ± 6.%
Hend TSL temperature change during test	<05°C		-

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	75.2 W/kg ± 19.9 % (k=2)
	1	
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	noitibrea rewoo tuqrii Wim 001	2.16 W/kg

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Head TSL parameters at 5300 MHz

The following	parameters	and ci	alculations	WATE B	piplied.
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	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °G	35,2 ± 6 %	4.55 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	81.0 W / kg ± 19.9 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 100 mW input power	2.35 W/kg

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Parmittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mhc/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	347 = 6 %	4.85 mho/m ± β %
Head TSL temperature change during test	< 0.5°C		

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	81.7 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Heed TSL SAR measured	condition 100 mW input power	2.33 W/kg

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Head TSL parameters at 5800 MHz The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	$34.4\pm6~\%$	5.05 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	-

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.82 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	77.6 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 100 mW input power	2.22 W/kg

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Body TSL parameters at 5200 MHz

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mhalm
Measured Body TSL parameters	(22.0 ± 0.2) "C	47.5±6%	5.36 mho/m ± 8 %
Body TSL temperature change during test	<0.5 ℃		

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7,32 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	72.8 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.05 W/kg

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20.3 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5300 MHz

SAR for nominal Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22:0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) "C	47.3 ± 6 %	5,50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm ² (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.68 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	76.1 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR everaged over 10 cm ² (10 g) of Body TSL SAR measured	condition 100 mW input power	2.15 W/kg

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Body TSL parameters at 5600 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mba/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6 ± 6 %	5.90 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 🖤	-	

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAB for nominal Body T6L parameters	normalized to 1W	79.6 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR sveraged over 10 cm ³ (10 g) of Bady TSL SAR measured	condition 100 mW input power	2.26 W/kg

Body TSL parameters at 5800 MHz

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) "C	48,3±6%	6 17 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	-	

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Body TSL	Condition	
SAR measured	100 mW Input power	7.64 W/Kg
SAR for nominal Body TSL parameters	normalized to 1W	75.9 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ² (10 g) of Body TSL SAR measured	condition 100 mW input power	2.13 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.6 Ω - 6.7 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	49.0 Ω = 1.8 μΩ
Return Loss	+33.5 @

Antenna Parameters with Head TSL at 5600 MHz

Impediance, transformed to feed point	54.1 Ω - 0.2 jΩ
Fieturn Loss	- 28.2 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.4 Q + 2.8 jQ
Return Loss	- 24.8 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	48.9 Ω - 7.0 jΩ	_
Return Loss	- 22.9 dB	

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	51.0 Ω - 1.0 jΩ
Return Loss	- 37.0 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	55.6 £2 + 1,5 §2
Return Loss	- 25.2 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.6 Ω + 2.7 jΩ
Return Loss	- 23.6 dB

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General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the leedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 05, 2004

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DASY5 Validation Report for Head TSL

Date: 20.01.2017

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz, Medium parameters used: f = 5200 MHz; $\sigma = 4.45$ S/m; $\epsilon_r = 35.4$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5300 MHz; $\sigma = 4.55$ S/m; $\epsilon_r = 35.2$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5600 MHz; $\sigma = 4.85$ S/m; $\epsilon_r = 34.7$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5800 MHz; $\pi = 5.05$ S/m; $\epsilon_r = 34.7$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5800 MHz; $\pi = 5.05$ S/m; $\epsilon_r = 34.4$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5800 MHz; $\pi = 5.05$ S/m; $\epsilon_r = 34.4$; $\rho = 1000$ kg/m³.

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.76, 5.76, 5.76); Calibrated: 31.12.2016, ConvF(5.35, 5.35, 5.35); Calibrated: 31.12.2016, ConvF(5.09, 5.09, 5.09); Calibrated: 31.12.2016, ConvF(5.0), 5.01, 5.01); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0; Measurement grid; dx=4mm, dy=4mm, dz=1.4mm Reference Value = 70.58 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 27.6 W/kg SAR(1 g) = 7.55 W/kg; SAR(10 g) = 2.16 W/kg Mitt/mum value of SAR (measured) = 17.4 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0; Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 73.0) V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 31.6 W/kg SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.35 W/kg Maximum value of SAR (measured) = 19.3 W/kg

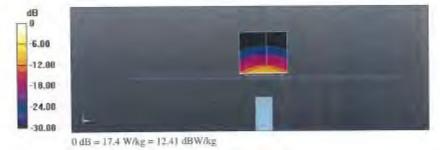
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 71.94 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 33.2 W/kg SAR(1 g) = 8.22 W/kg; SAR(10 g) = 2.33 W/kg Maximum value of SAR (measured) = 19.8 W/kg

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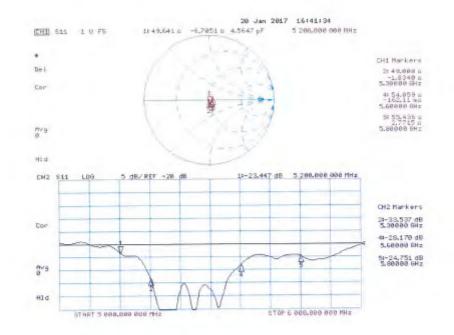
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 69.84 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 32.7 W/kg SAR(1 g) = 7.82 W/kg; SAR(10 g) = 2.22 W/kg Maximum value of SAR (measured) = 19.5 W/kg



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Impedance Measurement Plot for Head TSL



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Date: 19/01/2017

DASY5 Validation Report for Body TSL

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz, Medium parameters used: f = 5200 MHz; $\sigma = 5.36$ S/m; $v_r = 47.5$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5300 MHz; $\sigma = 5.5$ S/m; $v_r = 47.3$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5600 MHz; $\sigma = 5.9$ S/m; $v_r = 46.6$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5600 MHz; $\sigma = 6.17$ S/m; $v_r = 46.3$; $\rho = 1000$ kg/m³. Medium parameters used: f = 5800 MHz; $\sigma = 6.17$ S/m; $v_r = 46.3$; $\rho = 1000$ kg/m³. Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; CoavF(5.29, 5.29, 5.29); Calibrated: 31-12.2016, CoavF(5.04, 5.04, 5.04); Calibrated: 31.12.2016, CoavF(4.57, 4.57, 4.57); Calibrated: 31.12.2016, CoavF(4.48, 4.48); Calibrated: 31.12.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 So601, Calibrated: 04.01.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA: Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 65.54 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 28.1 W/kg SAR(1 g) = 7.32 W/kg; SAR(10 g) = 2.05 W/kg Maximum value of SAR (measured) = 16.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1,4mm Reference Value = 66.93 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 30.1 W/kg SAR(1 g) = 7.66 W/kg; SAR(10 g) = 2.15 W/kg Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 67.09 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 33.7 W/kg SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.26 W/kg Maximum value of SAR (measured) = 18.9 W/kg

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Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 65.14 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 34.0 W/kg SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.13 W/kg Maximum value of SAR (measured) = 18.3 W/kg



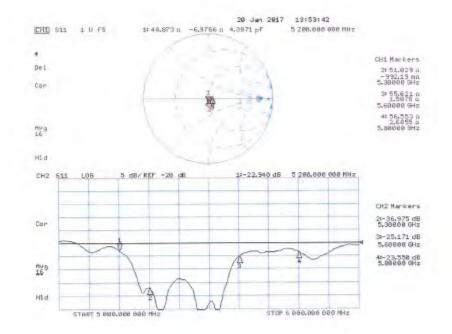
0 dB = 16.6 W/kg = 12.20 dBW/kg

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Impedance Measurement Plot for Body TSL





- End of 1st part of report -