SAR TEST REPORT

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

Equipment Under Test	Intel 7260NGW
Marketing Name	802.11 Wireless Network Adapter Module
Brand Name	Intel Mobile Communications
Model No. for Platform	Dell Junction
Regulatory Model No.	Dell T07G
Company Name	Intel Mobile Communications
Company Address	100 Center Point Circle Suite 200 Columbia South Carolina 29210 United States
Standards	FCC OET 65 supplement C,IEEE /ANSI C95.1 , C95.3, IEEE 1528, RSS 102
FCC ID	PD97260NGU
IC ID	1000M-7260NG
Date of Receipt	Aug, 29, 2013
Date of Test(s)	Sep. 03, 2013 ~ Sep. 04, 2013
Date of Issue	Sep. 20, 2013

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

Remarks:

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

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	**Supervisor**
Pin Chu	Ricky Huang
Pin Chu	**Ricky Huang**
Date: Sep. 20, 2013	**Date: Sep. 20, 2013**

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Version

Report Number	Revision	Date	Memo
EN/2013/80004	00	2013/09/16	Initial creation of test report.
EN/2013/80004	01	2013/09/20	1st modification

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Contents

1. General Information

1.1 Testing Laboratory

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

1.2 Details of Applicant

Company Name	Intel Mobile Communications
Company Address	100 Center Point Circle Suite 200 Columbia South Carolina 29210 United States

1.3 Description of EUT

Equipment Under Test	Intel 7260NGW	
Marketing Name	802.11 Wireless Network Adapter Module	
Brand Name	Intel Mobile Communications	
Model No. for Platform	Dell Junction	
Regulatory Model No.	Dell T07G	
FCC ID	PD97260NGU	
IC ID	1000M-7260NG	
Mode of Operation	☒WLAN802.11 a/b/g/n(20M/40M)/ac(20M/40M/80M) band	
Duty Cycle	WLAN802.11 a/b/g/n(20M/40M)/ ac(20M/40M/80M)	1
TX Frequency Range (MHz)	WLAN802.11 b/g/n(20M)	2412 — 2462
	WLAN802.11 n (40M)	2422 — 2452
	WLAN802.11 a/n(20M) 5.2G	5180 — 5240
	WLAN802.11 n(40M) 5.2G	5190 — 5230
	WLAN802.11 ac(80M) 5.2G	5210 — 5210
	WLAN802.11 a/n(20M) 5.3G	5260 — 5320
	WLAN802.11 n(40M) 5.3G	5270 — 5310
	WLAN802.11 ac(80M) 5.3G	5290 — 5290
	WLAN802.11 a/n(20M) 5.6G	5500 — 5700
	WLAN802.11 ac(20M) 5.6G	5720
	WLAN802.11 n(40M) 5.6G	5510 — 5670
	WLAN802.11 ac(40M) 5.6G	5710
	WLAN802.11 ac(80M) 5.6G	5530 — 5690

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

TX Frequency Range (MHz)	WLAN802.11 a/n(20M) 5.8G	5745	—	5825
	WLAN802.11 n(40M) 5.8G	5755	—	5795
	WLAN802.11 ac(80M) 5.8G	5775	—	5775
Channel Number (ARFCN)	WLAN802.11 b/g/n(20M)	1	—	11
	WLAN802.11 n (40M)	3	—	9
	WLAN802.11 a/n(20M) 5.2G	36	—	48
	WLAN802.11 n(40M) 5.2G	38	—	46
	WLAN802.11 ac(80M) 5.2G	42	—	42
	WLAN802.11 a/n(20M) 5.3G	52	—	64
	WLAN802.11 n(40M) 5.3G	52	—	64
	WLAN802.11 ac(80M) 5.3G	58	—	58
	WLAN802.11 a/n(20M) 5.6G	100	—	140
	WLAN802.11 ac(20M) 5.6G		144	
	WLAN802.11 n(40M) 5.6G	102	—	134
	WLAN802.11 ac(40M) 5.6G		142	
	WLAN802.11 ac(80M) 5.6G	106	—	138
	WLAN802.11 a/n(20M) 5.8G	149	—	165
	WLAN802.11 n(40M) 5.8G	151	—	159
	WLAN802.11 ac(80M) 5.8G	155	—	155

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Max. SAR (1 g) (Unit: W/Kg)					
Antenna	Band	Position	Channel	Measured	Reported
Main	WLAN802.11b	Top edge	1	0.414	0.42
	WLAN802.11a 5.2G	Top edge	40	0.695	0.70
	WLAN802.11ac(80M) 5.2G	Top edge	42	0.308	0.31
	WLAN802.11a 5.3G	Top edge	60	0.801	0.82
	WLAN802.11ac(80M) 5.3G	Top edge	58	0.543	0.55
	WLAN802.11a 5.6G	Top edge	108	0.388	0.39
	WLAN802.11ac(20M) 5.6G	Top edge	144	0.293	0.30
	WLAN802.11ac(40M) 5.6G	Top edge	142	0.328	0.34
	WLAN802.11ac(80M) 5.6G	Top edge	138	0.596	0.60
	WLAN802.11a 5.8G	Top edge	161	0.278	0.28
	WLAN802.11ac(80M) 5.8G	Top edge	155	0.416	0.42
Aux	WLAN802.11b	Right edge	1	0.313	0.31
	WLAN802.11g	Right edge	6	0.372	0.39
	WLAN802.11n(20M)	Right edge	6	0.367	0.37
	WLAN802.11a 5.2G	Right edge	40	0.637	0.65
	WLAN802.11ac(80M) 5.2G	Right edge	42	0.361	0.36
	WLAN802.11a 5.3G	Right edge	52	0.648	0.66
	WLAN802.11ac(80M) 5.3G	Right edge	58	0.364	0.36
	WLAN802.11a 5.6G	Right edge	116	0.545	0.55
	WLAN802.11ac(20M) 5.6G	Right edge	144	0.336	0.34
	WLAN802.11ac(40M) 5.6G	Right edge	142	0.413	0.43
	WLAN802.11ac(80M) 5.6G	Right edge	138	0.53	0.53
	WLAN802.11a 5.8G	Right edge	153	0.229	0.23
	WLAN802.11ac(80M) 5.8G	Right edge	155	0.338	0.34

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

Antenna / Band	SISO		MIMO
	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
WLAN802.11a	V	V	—
WLAN802.11ac(20M)	V	V	V
WLAN802.11ac(40M)	V	V	V
WLAN802.11ac(80M)	V	V	V

Main Antenna (CH0)

802.11 b		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)			
			Data Rate (Mbps)			
CH	Frequency (MHz)		1	2	5.5	11
1	2412	15	14.98	14.79	14.77	14.54
6	2437	15	14.93	14.89	14.73	14.66
11	2462	15	14.94	14.85	14.69	14.48

802.11 g		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
1	2412	13	12.96	12.93	12.86	12.76	12.73	12.67	12.67	12.62
6	2437	15	14.83	14.83	14.71	14.66	14.55	14.52	14.49	14.44
11	2462	13	12.93	12.84	12.84	12.72	12.65	12.54	12.54	12.47

SGS Taiwan Ltd.
台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Main Antenna (CH0)

802.11 n (20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			6.5	13	19.5	26	39	52	58.5	65
1	2412	13	12.93	12.91	12.86	12.76	12.76	12.7	12.61	12.51
6	2437	15	14.89	14.87	14.75	14.68	14.59	14.54	14.51	14.44
11	2462	13	12.96	12.93	12.84	12.81	12.8	12.71	12.66	12.51

802.11 n (40M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
CH	Frequency (MHz)		Data Rate (Mbps)							
			13.5	27	40.5	54	81	108	121.5	135
3	2422	12	11.83	11.7	11.64	11.57	11.52	11.45	11.45	11.43
6	2437	15	14.89	14.84	14.72	14.64	14.62	14.54	14.49	14.49
9	2452	13	12.95	12.82	12.74	12.7	12.56	12.56	12.51	12.49

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Main Antenna (CH0)

802.11 a 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm) Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
36	5180	13.5	13.41	13.24	13.16	13.06	12.89	12.85	12.84	12.7
40	5200	13.5	13.44	13.37	13.19	13.09	12.92	12.76	12.67	12.67
44	5220	13.5	13.4	13.26	13.1	13.03	12.86	12.78	12.73	12.6
48	5240	13.5	13.38	13.34	13.33	13.22	13.11	12.94	12.93	12.79
52	5260	13.5	13.4	13.32	13.32	13.17	13.06	12.93	12.91	12.73
56	5280	13.5	13.35	13.23	13.2	13.13	12.95	12.81	12.72	12.64
60	5300	13.5	13.4	13.26	13.12	12.99	12.85	12.81	12.75	12.65
64	5320	13.5	13.26	13.16	13.15	13.08	13.07	12.96	12.84	12.74
100	5500	13.5	13.44	13.34	13.27	13.18	13.06	13	12.86	12.83
104	5520	13.5	13.41	13.31	13.19	13.05	13.02	12.98	12.86	12.86
108	5540	13.5	13.49	13.43	13.3	13.27	13.25	13.25	13.2	13.08
112	5560	13.5	13.35	13.31	13.22	13.08	12.99	12.86	12.75	12.71
116	5580	13.5	13.48	13.47	13.35	13.22	13.09	13.07	13.04	12.92
132	5660	13.5	13.47	13.4	13.4	13.39	13.29	13.18	13.05	13
136	5680	13.5	13.41	13.41	13.33	13.27	13.15	13.03	12.97	12.89
140	5700	12.5	12.46	12.43	12.43	12.32	12.24	12.18	12.15	12.02
149	5745	13.5	13.46	13.36	13.36	13.33	13.21	13.09	12.97	12.96
153	5765	13.5	13.48	13.42	13.34	13.33	13.31	13.2	13.13	13.07
157	5785	13.5	13.48	13.41	13.32	13.22	13.14	13.1	13.07	12.95
161	5805	13.5	13.49	13.44	13.3	13.28	13.15	13.1	13.01	12.96
165	5825	13.5	13.45	13.33	13.23	13.18	13.04	13.04	13.02	12.97

Main Antenna (CH0)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65
36	5180	13.5	13.45	13.34	13.22	13.13	13.06	13.01	12.93	12.92
40	5200	13.5	13.50	13.47	13.34	13.26	13.16	13.02	12.95	12.92
44	5220	13.5	13.39	13.37	13.24	13.22	13.17	13.12	13.12	12.98
48	5240	13.5	13.40	13.29	13.26	13.23	13.18	13.1	12.99	12.89
52	5260	13.5	13.41	13.36	13.31	13.21	13.13	13	12.87	12.77
56	5280	13.5	13.38	13.27	13.2	13.12	13	12.95	12.93	12.92
60	5300	13.5	13.42	13.28	13.24	13.12	13	12.93	12.8	12.66
64	5320	13.5	13.31	13.29	13.27	13.14	13.13	13	12.91	12.89
100	5500	13.5	13.46	13.39	13.37	13.3	13.26	13.12	12.99	12.85
104	5520	13.5	13.40	13.26	13.15	13.07	12.97	12.86	12.85	12.71
108	5540	13.5	13.45	13.36	13.31	13.3	13.23	13.1	13.02	12.94
112	5560	13.5	13.38	13.24	13.14	13.11	13.05	12.95	12.84	12.82
116	5580	13.5	13.44	13.32	13.24	13.15	13.09	12.96	12.83	12.76
132	5660	13.5	13.45	13.43	13.43	13.31	13.17	13.12	13	12.96
136	5680	13.5	13.43	13.33	13.27	13.23	13.11	13.1	12.96	12.92
140	5700	12.5	12.44	12.35	12.23	12.19	12.07	11.99	11.98	11.96
149	5745	13.5	13.44	13.44	13.42	13.37	13.32	13.32	13.19	13.07
153	5765	13.5	13.47	13.43	13.38	13.26	13.19	13.13	13.02	12.96
157	5785	13.5	13.49	13.37	13.31	13.31	13.29	13.26	13.22	13.12
161	5805	13.5	13.43	13.4	13.37	13.26	13.17	13.04	12.96	12.88
165	5825	13.5	13.46	13.36	13.34	13.27	13.2	13.07	13.07	12.98

Main Antenna (CH0)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)							
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135
38	5190	11	10.99	10.93	10.8	10.73	10.66	10.59	10.52	10.43
46	5230	13.5	13.44	13.4	13.26	13.14	13.04	12.99	12.87	12.83
54	5270	11	10.9	10.87	10.82	10.74	10.6	10.57	10.44	10.42
62	5310	12.5	12.47	12.36	12.25	12.25	12.15	12.09	12	11.97
102	5510	10.5	10.45	10.41	10.39	10.36	10.3	10.18	10.08	9.97
110	5550	13.5	13.43	13.3	13.24	13.13	13.08	13.02	13	12.9
134	5670	13.5	13.49	13.42	13.28	13.15	13.02	12.99	12.99	12.93
151	5755	13.5	13.5	13.49	13.42	13.28	13.21	13.18	13.06	12.93
159	5795	13.5	13.47	13.42	13.41	13.33	13.22	13.09	13.03	12.91

802.11 ac(20M) 5.6G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)								
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65	78
144	5720	13.5	13.41	13.29	13.29	13.16	13.09	13.06	12.99	12.86	12.78

802.11 ac(40M) 5.6G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)									
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135	162	180
142	5710	13.5	13.39	13.31	13.18	13.06	13.03	12.89	12.86	12.74	12.73	12.73

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Main Antenna (CH0)

802.11 ac(80M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)									
			Data Rate (Mbps)									
CH	Frequency (MHz)		29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
42	5210	9.5	9.49	9.44	9.35	9.22	9.15	9.1	8.97	8.87	8.87	8.87
58	5290	11	10.98	10.92	10.9	10.82	10.74	10.65	10.61	10.55	10.49	10.4
106	5530	8.5	8.49	8.47	8.35	8.25	8.25	8.23	8.2	8.1	8.01	7.92
138	5690	13.5	13.48	13.48	13.38	13.36	13.31	13.25	13.14	13	12.99	12.98
155	5775	13.5	13.49	13.4	13.32	13.25	13.21	13.11	12.99	12.89	12.84	12.7

Aux Antenna (CH1)

802.11 b		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)			
			Data Rate (Mbps)			
CH	Frequency (MHz)		1	2	5.5	11
1	2412	14	13.98	13.75	13.63	13.44
6	2437	14	13.71	13.67	13.66	13.62
11	2462	14	13.84	13.71	13.58	13.37

802.11 g		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
1	2412	12	11.96	11.92	11.82	11.79	11.65	11.59	11.56	11.47
6	2437	15	14.77	14.65	14.6	14.54	14.49	14.43	14.36	14.36
11	2462	13.5	13.31	13.26	13.14	13.14	13.14	13.01	12.88	12.89

802.11 n (20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65
1	2412	12	11.95	11.89	11.86	11.81	11.76	11.69	11.69	11.69
6	2437	15	14.95	14.95	14.87	14.77	14.76	14.62	14.6	14.5
11	2462	13.5	13.44	13.44	13.37	13.27	13.17	13.14	13.04	13

802.11 n (40M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135
3	2422	10	9.98	9.84	9.7	9.56	9.56	9.56	9.49	9.48
6	2437	14	13.89	13.84	13.71	13.64	13.62	13.57	13.52	13.46
9	2452	12.5	12.45	12.45	12.37	12.37	12.3	12.25	12.16	12.07

Aux Antenna (CH1)

802.11 a 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6	9	12	18	24	36	48	54
36	5180	12.5	12.44	12.41	12.32	12.27	12.15	12.05	11.93	11.89
40	5200	13.5	13.41	13.41	13.3	13.18	13.18	13.09	12.95	12.85
44	5220	13.5	13.38	13.24	13.19	13.16	13.03	12.89	12.84	12.78
48	5240	13.5	13.36	13.35	13.3	13.19	13.09	13.05	12.92	12.82
52	5260	13.5	13.39	13.26	13.16	13.16	13.05	12.96	12.93	12.93
56	5280	13.5	13.33	13.28	13.19	13.14	13.07	12.96	12.87	12.77
60	5300	13.5	13.38	13.32	13.21	13.1	13.06	12.94	12.87	12.81
64	5320	13.5	13.25	13.17	13.1	12.98	12.9	12.83	12.72	12.69
100	5500	13.5	13.41	13.31	13.23	13.23	13.1	12.96	12.93	12.86
104	5520	13.5	13.39	13.36	13.29	13.16	13.13	13.08	12.95	12.84
108	5540	13.5	13.45	13.33	13.26	13.25	13.24	13.19	13.06	12.97
112	5560	13.5	13.32	13.26	13.13	13.06	13.03	13.01	13	12.87
116	5580	13.5	13.43	13.37	13.32	13.19	13.07	13.03	13	12.88
132	5660	13.5	13.44	13.4	13.32	13.23	13.19	13.08	12.98	12.87
136	5680	13.5	13.37	13.28	13.15	13.1	12.97	12.92	12.85	12.78
140	5700	12.5	12.43	12.36	12.35	12.26	12.13	12.07	11.99	11.97
149	5745	13.5	13.41	13.33	13.25	13.12	13.11	12.97	12.87	12.78
153	5765	13.5	13.45	13.34	13.33	13.19	13.18	13.09	12.99	12.87
157	5785	13.5	13.44	13.44	13.3	13.28	13.15	13.01	12.87	12.73
161	5805	13.5	13.44	13.33	13.31	13.17	13.17	13.07	12.98	12.95
165	5825	13.5	13.40	13.36	13.34	13.3	13.21	13.13	13.02	12.99

Aux Antenna (CH1)

802.11 n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65
36	5180.00	12.5	12.41	12.31	12.2	12.18	12.07	11.97	11.97	11.9
40	5200.00	13.5	13.47	13.39	13.29	13.18	13.1	13.07	12.95	12.84
44	5220.00	13.5	13.36	13.24	13.11	13.05	13.02	12.93	12.93	12.89
48	5240.00	13.5	13.37	13.36	13.22	13.09	13.01	12.98	12.89	12.89
52	5260.00	13.5	13.40	13.4	13.38	13.36	13.23	13.12	13	12.94
56	5280.00	13.5	13.33	13.24	13.19	13.1	13.1	13.04	12.9	12.77
60	5300.00	13.5	13.41	13.39	13.38	13.24	13.15	13.1	13	12.92
64	5320.00	13.5	13.29	13.15	13.11	13.04	13.02	12.94	12.91	12.77
100	5500.00	13.5	13.41	13.35	13.23	13.17	13.1	13.04	13.01	12.89
104	5520.00	13.5	13.37	13.3	13.17	13.15	13.09	13	12.9	12.78
108	5540.00	13.5	13.43	13.39	13.27	13.14	13.07	12.99	12.92	12.89
112	5560.00	13.5	13.36	13.28	13.25	13.11	12.98	12.9	12.78	12.76
116	5580.00	13.5	13.41	13.29	13.16	13.02	13.02	12.98	12.9	12.79
132	5660.00	13.5	13.42	13.28	13.21	13.07	13.04	12.91	12.78	12.71
136	5680.00	13.5	13.41	13.36	13.3	13.17	13.09	13.02	12.92	12.85
140	5700.00	12.5	12.40	12.34	12.28	12.26	12.13	12.03	11.92	11.91
149	5745.00	13.5	13.39	13.25	13.14	13.11	12.97	12.95	12.84	12.83
153	5765.00	13.5	13.45	13.31	13.23	13.11	13.11	13.02	12.93	12.85
157	5785.00	13.5	13.41	13.32	13.29	13.27	13.23	13.13	13	12.86
161	5805.00	13.5	13.42	13.3	13.25	13.12	13.01	12.87	12.77	12.7
165	5825.00	13.5	13.40	13.31	13.26	13.21	13.18	13.09	13.04	12.96

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Aux Antenna (CH1)

802.11 n(40M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135
38	5190	10.5	10.4	10.28	10.21	10.21	10.1	10.03	9.96	9.84
46	5230	13.5	13.39	13.26	13.24	13.1	13.05	13.03	13.02	12.88
54	5270	10.5	10.37	10.23	10.16	10.04	9.93	9.93	9.85	9.83
62	5310	12.5	12.5	12.47	12.42	12.3	12.23	12.23	12.13	12.04
102	5510	11	10.84	10.82	10.8	10.76	10.76	10.69	10.66	10.56
110	5550	13.5	13.41	13.35	13.26	13.19	13.08	13.03	12.98	12.9
134	5670	13.5	13.45	13.32	13.24	13.18	13.17	13.07	12.97	12.84
151	5755	13.5	13.47	13.39	13.27	13.23	13.11	13	12.9	12.81
159	5795	13.5	13.46	13.37	13.23	13.23	13.23	13.09	13	12.87

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Aux Antenna (CH1)

802.11 ac(20M) 5.6G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)								
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65	78
144	5720	13.5	13.47	13.35	13.23	13.18	13.07	13	12.91	12.86	12.77

802.11 ac(40M) 5.6G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)									
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135	162	180
142	5710	13.5	13.35	13.27	13.19	13.17	13.14	13.08	13.04	12.91	12.91	12.90

802.11 ac(80M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output (dBm) Data Rate (Mbps)									
CH	Frequency (MHz)		29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
42	5210	9.5	9.5	9.48	9.44	9.44	9.34	9.22	9.11	9	8.86	8.77
58	5290	11.5	11.49	11.39	11.37	11.32	11.23	11.18	11.12	11.08	10.99	10.9
106	5530	8.5	8.43	8.4	8.25	8.13	8.02	8.02	7.89	7.88	7.83	7.78
138	5690	13.5	13.48	13.39	13.38	13.24	13.15	13.08	13.05	12.97	12.91	12.88
155	5775	13.5	13.49	13.42	13.26	13.12	13.06	13.06	13	12.96	12.89	12.78

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

MIMO (CH0 + CH1)

802.11n(20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65
1	2412	11	10.90	10.89	10.84	10.76	10.71	10.67	10.61	10.53
6	2437	13.5	13.49	13.47	13.35	13.30	13.23	13.17	13.17	13.11
11	2462	10.5	10.46	10.35	10.25	10.23	10.16	10.15	10.09	10.03

802.11n(40M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135
3	2422	8.5	8.48	8.47	8.38	8.32	8.26	8.20	8.17	8.15
6	2437	12.5	12.24	12.15	12.09	11.99	11.87	11.82	11.69	11.59
9	2452	12	11.80	11.75	11.68	11.60	11.48	11.47	11.40	11.30

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

MIMO (CH0 + CH1)

802.11n(20M) 5.2/5.3/5.6/5.8G		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
			Data Rate (Mbps)							
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65
36	5180	12	11.96	11.91	11.87	11.79	11.69	11.60	11.57	11.53
40	5200	12.5	12.32	12.22	12.15	12.11	12.04	11.93	11.85	11.79
44	5220	12.5	12.48	12.38	12.33	12.28	12.24	12.14	12.05	12.04
48	5240	12.5	12.42	12.31	12.20	12.11	12.03	12.02	11.99	11.89
52	5260	13	12.91	12.83	12.76	12.68	12.62	12.54	12.48	12.41
56	5280	13	12.93	12.86	12.82	12.77	12.66	12.61	12.54	12.51
60	5300	13	12.92	12.85	12.81	12.78	12.67	12.57	12.55	12.48
64	5320	12.5	12.43	12.38	12.32	12.30	12.23	12.17	12.08	12.00
100	5500	10.5	10.48	10.47	10.42	10.33	10.27	10.19	10.08	9.97
104	5520	13.5	13.49	13.43	13.38	13.26	13.21	13.14	13.07	12.96
108	5540	13.5	13.40	13.39	13.32	13.29	13.23	13.22	13.11	13.03
112	5560	13.5	13.44	13.37	13.30	13.23	13.22	13.15	13.10	13.00
116	5580	13.5	13.44	13.40	13.33	13.29	13.23	13.16	13.07	13.00
132	5660	13.5	13.42	13.35	13.31	13.21	13.14	13.05	13.00	12.96
136	5680	13.5	13.45	13.39	13.26	13.24	13.14	13.06	12.95	12.90
140	5700	10.5	10.41	10.40	10.35	10.29	10.18	10.09	10.04	9.97
149	5745	13.5	13.42	13.37	13.24	13.21	13.18	13.12	13.05	13.01
153	5765	13.5	13.44	13.40	13.34	13.27	13.16	13.11	13.07	13.00
157	5785	13.5	13.39	13.35	13.28	13.20	13.19	13.11	13.09	13.01
161	5805	13.5	13.42	13.31	13.23	13.13	13.11	13.03	12.96	12.89
165	5825	13.5	13.38	13.27	13.23	13.18	13.14	13.06	13.01	12.87

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

MIMO (CH0 + CH1)

802.11n(40M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)							
5.2/5.3/5.6/5.8G			Data Rate (Mbps)							
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135
38	5190	8	7.98	7.90	7.80	7.74	7.69	7.58	7.52	7.44
46	5230	12.5	12.46	12.37	12.31	12.25	12.23	12.15	12.04	12.02
54	5270	9	8.82	8.73	8.70	8.62	8.60	8.52	8.51	8.49
62	5310	10.5	10.22	10.12	10.02	9.90	9.82	9.77	9.75	9.64
102	5510	8	7.94	7.90	7.78	7.66	7.56	7.49	7.44	7.43
110	5550	13.5	13.49	13.41	13.34	13.28	13.22	13.14	13.04	12.94
134	5670	13	12.98	12.94	12.90	12.81	12.73	12.71	12.68	12.56
151	5755	13.5	13.43	13.35	13.32	13.29	13.19	13.16	13.09	13.01
159	5795	13.5	13.43	13.35	13.22	13.16	13.10	13.01	12.90	12.82

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

MIMO (CH0 + CH1)

802.11ac(20M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)								
5.6G			Data Rate (Mbps)								
CH	Frequency (MHz)		6.5	13	19.5	26	39	52	58.5	65	78
144	5720	13.50	13.48	13.45	13.36	13.26	13.22	13.17	13.06	12.99	12.93

802.11ac(40M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)									
5.6G			Data Rate (Mbps)									
CH	Frequency (MHz)		13.5	27	40.5	54	81	108	121.5	135	162	180
142	5710	13.5	13.38	13.32	13.30	13.23	13.13	13.11	13.10	12.98	12.96	12.87

802.11ac(80M)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Average Power Output(dBm)									
5.2/5.3/5.6/5.8G			Data Rate (Mbps)									
CH	Frequency (MHz)		29.3	58.5	87.8	117	175.5	234	263.3	292.5	351	390
42	5210	8	7.79	7.76	7.76	7.71	7.63	7.59	7.55	7.50	7.46	7.44
58	5290	9	8.71	8.66	8.63	8.62	8.60	8.56	8.54	8.49	8.44	8.40
106	5530	6.5	6.40	6.39	6.33	6.27	6.19	6.10	6.06	5.98	5.91	5.84
138	5690	13.5	13.48	13.46	13.37	13.33	13.29	13.23	13.18	13.07	12.99	12.91
155	5775	13.5	13.47	13.39	13.33	13.22	13.18	13.12	13.04	12.98	12.91	12.86

#. **Bluetooth conducted power table:**

Frequency (MHz)	Data Rate	Peak	
		dBm	mW
2402	1	4.20	2.630
2441	1	6.54	4.508
2480	1	7.22	5.272
2402	2	1.63	1.455
2441	2	6.49	4.457
2480	2	7.11	5.140
2402	3	1.66	1.466
2441	3	6.51	4.477
2480	3	7.14	5.176

#. **Bluetooth LE conducted power table:**

Frequency (MHz)	Bluetooth Mode	Peak	
		dBm	mW
2402	LE	5.11	3.243
2440	LE	7.23	5.284
2480	LE	7.69	5.875

#. Due to the highest maximum output power (5.875mW) of Bluetooth portion is below 20mW, Bluetooth is exempted from SAR evaluation per RSS102 Issue 4.

#.According to KDB447498 D01v05 – The 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion. Based on the maximum power of Bluetooth and the min. test separation distance, Bluetooth SAR was not required.
(Max. power of channel: 7.69dBm, min. test separation distance=5mm, f=2480MHz,
[(5.875/5)* √2.48]=1.85 ≤ 3.0

#. For Bluetooth operational modes the transmission is at Aux output. Bluetooth can only be transmitted simultaneously with Main antenna according to client's operation description.

#.According to KDB447498 D01v05 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the stand alone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz) / 7.5] for test separation distances≤ 50 mm. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine estimated SAR. When the test separation distances is > 50 mm, 0.4 W/kg for 1-g SAR can be used to be the estimated SAR.

#. Estimated SAR for Bluetooth at Min. Separation Distance:

Frequency (MHz)	Bluetooth Mode	Peak		Separation distance	Estimated SAR
		dBm	mW	mm	W/kg
2480	LE	7.69	5.875	5	0.247
2480	LE	7.69	5.875	26.38	0.047

#. Simultaneous Transmission SAR test exclusion:

Simul Tx	configuration	Maximum **BT** SAR at Aux output(Estimated)	Maximum **WLAN** SAR at Main output(Reported)	ΣSAR (W/kg)	Separation distance between the peak SAR locations	SPLSR
Body	Lap-held	0.247	0.483	0.73<limit 1.6	N/A	N/A
Body	Top edge	0.047	0.82	0.867<limit 1.6	N/A	N/A

#. Simultaneous Transmission SAR test exclusion:

Simul Tx	configuration	Maximum **BT** SAR at Aux output(Estimated)	Maximum **WLAN** SAR at Main output(Estimated)	ΣSAR (W/kg)	Separation distance between the peak SAR locations	SPLSR
Body	Right edge	0.247	0.4	0.647<limit 1.6	N/A	N/A

#. Simultaneous Transmission SAR test exclusion can be applied due to the sum of the 1-g SAR for all the simultaneous transmitting antennas in the same test configuration is ≤ 1.6 W/kg.

#. Because the ΣSAR for Lap-held mode, Top edge mode and Right edge mode is < 1.6, simultaneous transmission SAR test exclusion can be applied.

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

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.

We will test it with 3 configurations:

(Test distance is 0mm)

Configuration 1: Lap-held mode.

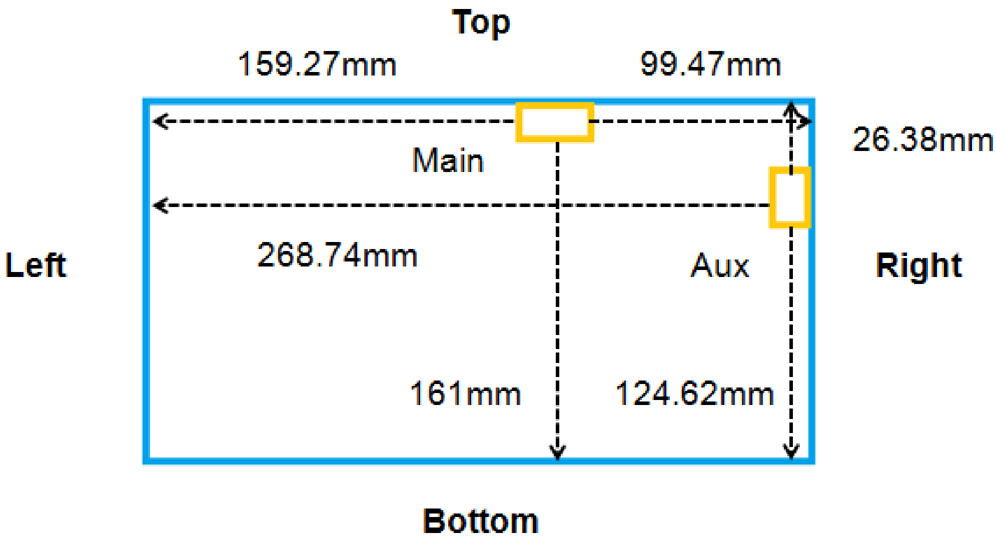
Configuration 2: **Top edge.** (No tested for Aux antenna, since the SAR test exclusion threshold in FCC KDB447498 D01v05 is applied to this edge)

Configuration 3: Right edge. (Not tested for Main antenna, since the SAR test exclusion threshold in FCC KDB447498 D01v05 is applied to this edge.)

Configuration 4: Left edge. (Not tested for Main antenna, since the SAR test exclusion threshold in FCC KDB447498 D01v05 is applied to this edge.Not tested for Aux antenna, since minimum separation distance between Aux antenna and left edge is more than 20 cm.)

Configuration 5: Bottom edge. (No tested for Main and Aux antenna, since the SAR test exclusion threshold in FCC KDB447498 D01v05 is applied to this edge.)

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group



Front view of the tablet

Note:

#. According to KDB447498 D01 v05 4.3.1, at 100 MHz to 6 GHz and for test separation distances > 50 mm, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01 v05.
[[(max. power of channel, including tune-up tolerance, mW)/50mm] ·
[√f(GHz)] + (test separation distance - 50 mm)·10] mW at > 1500 MHz and ≤ 6 GHz

Based on the maximum power of Main antenna at 2.4G=15dBm(maximum tune-up tolerance limit), max. f=2462MHz, and the min. test separation distance 99.47mm, Main antenna SAR is not required for right edge.
[(31.623 mW/50mm) · (√2.462) + (99.47 - 50 mm)·10] mW = 495.692mW is compared with Appendix B of KDB447498 D01 v05.

Based on the maximum power of Main antenna at 5G=13.5dBm(maximum tune-up tolerance limit), max. f=5825MHz, and the min. test separation distance 99.47mm, Main antenna SAR is not required for right edge.
[(22.39 mW/50mm) · (√5.825) + (99.47 - 50 mm)·10] mW = 495.781mW is compared with Appendix B of KDB447498 D01 v05.

#. Because the distance between Main antenna and left edge(159.27mm) is larger than the distance between Main antenna and right edge(99.47mm), left edge is not required to be tested for Main antenna.

#. Because the distance between Main antenna and bottom edge(161mm) is larger than the

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

distance between Main antenna and right edge(99.47mm), bottom edge is not required to be tested for Main antenna.

#. According to KDB447498 D01v05 – The 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Based on the maximum power of Aux antenna at 2.4G and 5G, and the min. test separation distance cmm, Aux antenna SAR is not required for top edge.
(Max. power of 2.4G Aux=15dBm(maximum tune-up tolerance limit), min. test separation distance=26.38mm, max. f=2462MHz, [(31.623/26.38)* √2.462]=1.881 ≤ 3.0
Max. power of 5G Aux=13.5dBm(maximum tune-up tolerance limit), min. test separation distance=26.38mm, max. f=5825MHz, [(22.39/26.38)* √5.825]=2.048 ≤ 3.0

#. Because the distance between Aux antenna and left edge(268.74mm) is larger than 20cm, left edge is not required to be tested for Aux antenna.

#. Based on the maximum power of Aux antenna at 2.4G=15dBm(maximum tune-up tolerance limit), max. f=2462MHz, and the min. test separation distance mm, Aux antenna SAR is not required for bottom edge.
[(31.623 mW/50mm) · (√2.462) + (124.62 - 50 mm)·10] mW = 747.192mW is compared with Appendix B of KDB447498 D01 v05.

Based on the maximum power of Main antenna at 5G=13.5dBm(maximum tune-up tolerance limit), max. f=5825MHz, and the min. test separation distance mm, Aux antenna SAR is not required for bottom edge.
[(22.39 mW/50mm) · (√5.825) + (124.62 - 50 mm)·10] mW = 747.281mW is compared with Appendix B of KDB447498 D01 v05.

#. MIMO SAR is not necessary since combined MIMO output (maximum tune-up tolerance limit power) is less than or equal to the any single chain output Main or Aux(maximum tune-up tolerance limit power), and there is a antenna separation in MIMO.

#. The EUT is a tablet computer and the main and aux antennas locates at the top and right edge of the tablet computer, separately.

#. Per FCC KDB 616217, the back surface and edges of the tablet should be tested for SAR

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

compliance with the tablet touching the phantom.

#. For 802.11a/b/g modes the EUT can transmit at both Main and Aux RF outputs individually but not simultaneously.
#. For 802.11n/ac modes the EUT can transmit at both Main and Aux RF outputs individually and simultaneously.

#. According to FCC KDB248227 and October 10, 2012 TCB Workshop, SAR is not required for 802.11g/n(20M)/n(40M) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11b channels.

#. According to FCC KDB248227, for each band, testing at higher data rates and higher order modulation is not required when the maximum average output power for each of these configurations is less than 1/4 dB higher than those measured at the lowest data rate.

#. Due to the maximum average output power of higher data rates is less than 1/4 dB higher than lowest data rate, thus only lowest data rate is required for SAR test.

#. For 2.4GHz Main antenna, due to the maximum average output power of 802.11g/ n(20M)/ n(40M) is less than 1/4 dB higher than 802.11b, thus 802.11g/ n(20M)/ n(40M) is not required for SAR test.

#. For 2.4GHz Aux antenna, due to the maximum average output power of 802.11n(40M) is less than 1/4 dB higher than 802.11b, thus 802.11n(40M) is not required for SAR test.

#. According to FCC KDB248227, when the maximum average output channel in each 802.11a frequency band is not included in the "default test channels", the maximum channel should be tested instead of an adjacent "default test channel". These are referred to as the "required test channels".

#. According to FCC KDB248227 and October 10, 2012 TCB Workshop, SAR is not required for 802.11 n(20M)/n(40M)/ac(80M) channels when the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

#. For 5GHz Main and Aux antenna, SAR is not required for 5.2/5.3/5.6/5.8G n(20M)/n(40M)/ac(20M)/ac(40M)/ac(80M), due to the maximum average output power is less than 1/4 dB higher than that measured on the corresponding 802.11a channels.

#. The device supports 802.11ac(20M), ac(40M), ac(80M) and transmitting one channel at time, not simultaneously, in different 5GHz bands. According to April 2013 TCB Workshop, apply usual 802.11 test exclusion considerations, but include 802.11ac SAR for highest 802.11a configuration in each 5 GHz band and each exposure condition.

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Therefore, 802.11ac SAR is required for the highest SAR configuration in each 5 GHz band.

#. According to KDB447498 D01v05, 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.

#. According to KDB447498 D01v05, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.6 W/kg, when the transmission band is between 100 MHz and 200MHz.

#. According to KDB447498 D01v05, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.4 W/kg, when the transmission band is ≥ 200MHz.

#. According to KDB865664 D01v01, 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)

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:

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

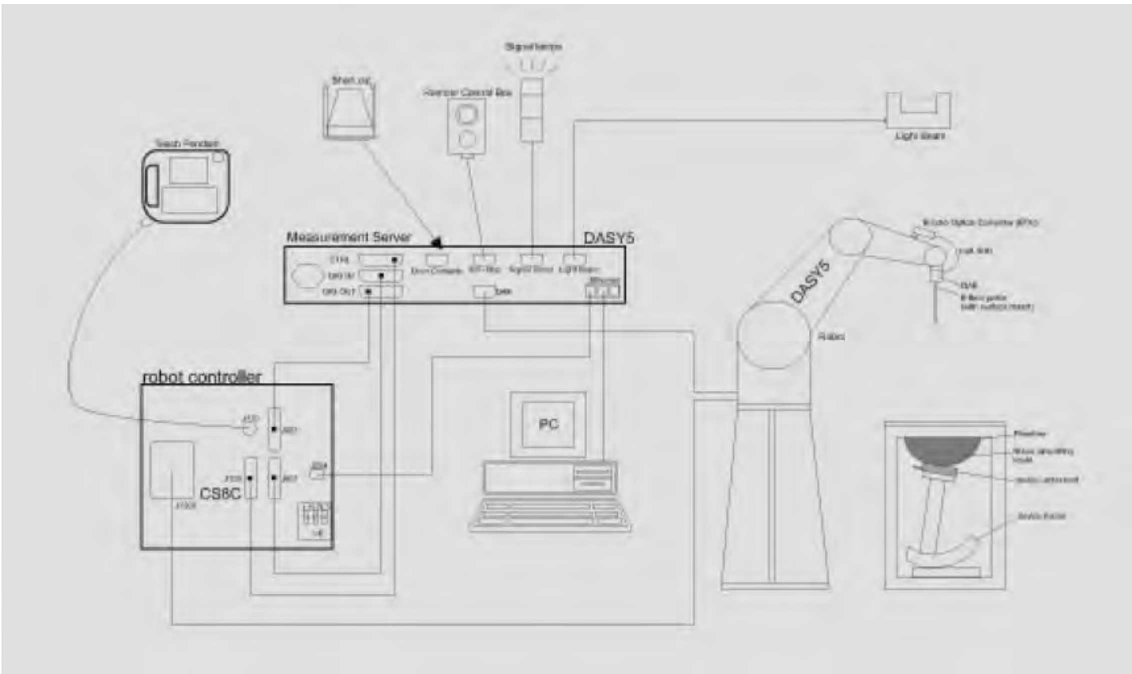


Fig. a The block diagram of SAR system

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

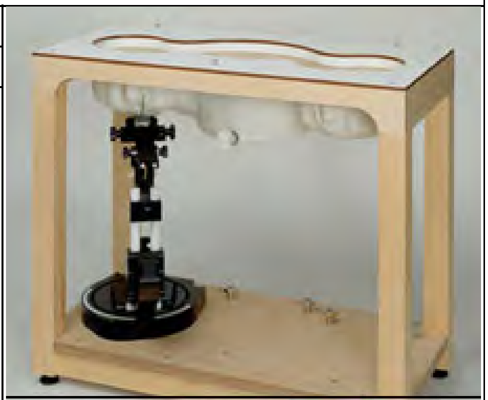
1.7 System Components

EX3DV4 E-Field Probe

<table>
<tr><td>Construction</td><td>Symmetrical design with triangular core
Built-in shielding against static charges
PEEK enclosure material (resistant to organic solvents, e.g., DGBE)</td><td rowspan="2"></td></tr>
<tr><td>Calibration</td><td>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</td></tr>
<tr><td>Frequency</td><td colspan="2">10 MHz to > 6 GHz, Linearity: ± 0.6 dB (30 MHz to 4 GHz)</td></tr>
<tr><td>Directivity</td><td colspan="2">± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in tissue material (rotation normal to probe axis)</td></tr>
<tr><td>Dynamic Range</td><td colspan="2">10 µW/g to > 100 mW/g
Linearity: ± 0.2 dB (noise: typically < 1 µW/g)</td></tr>
<tr><td>Dimensions</td><td colspan="2">Overall length: 337 mm (Tip: 9 mm)
Tip diameter: 2.5 mm (Body: 10 mm)
Typical distance from probe tip to dipole centers: 1 mm</td></tr>
<tr><td>Application</td><td colspan="2">High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.</td></tr>
</table>

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

SAM PHANTOM V4.0C

Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X, CENELEC 50361 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 25 liters	
Dimensions	Height: 210 mm; Length: 1000 mm; Width: 500 mm	

DEVICE HOLDER

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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 2450/5200/5300/5600/5800 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was 21.7°C, the relative humidity was 62% and the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz)in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

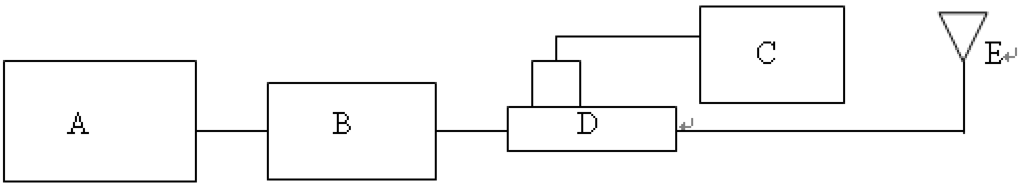
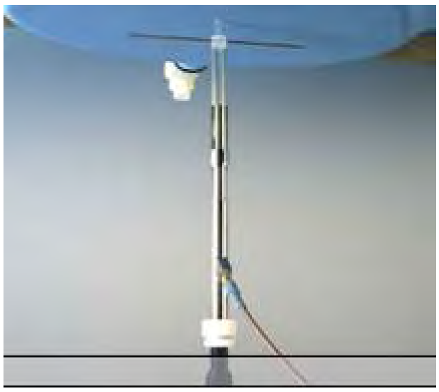


Fig. b The block diagram of system verification

A. Signal generator
B. Amplifier
C. Power meter
D. Dual directional coupling
E. Reference dipole antenna



Photograph of the dipole Antenna

Validation Kit	S/N	Frequency (MHz)		Target SAR (1g) (Pin=250mW) (mW/g)	Measured SAR (1g)(mW/g)	Deviation (%)	Measured Date
D2450V2	727	2450	Body	13.2	13.1	0.76%	Sep. 03,2013
D5GHzV2	1104	5200	Body	7.64	7.61	0.39%	Sep. 03,2013
		5300	Body	7.77	7.81	-0.51%	Sep. 03,2013
		5600	Body	8.25	7.97	3.39%	Sep. 04,2013
		5800	Body	7.6	7.6	0.00%	Sep. 04,2013

Table 1. Results of system validation

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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 depth of the tissue simulant in the flat section of the phantom was ≥ 15 cm ± 5 mm (Frequency ≤3G) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz)during all tests. (Fig. 2)

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
Body	Sep. 03,2013	2412	52.751	1.914	50.439	1.962	4.38%	-2.52%
		2437	52.717	1.938	50.350	1.997	4.49%	-3.07%
		5200	49.014	5.299	48.158	5.210	1.75%	1.68%
		5210	49.001	5.311	48.128	5.226	1.78%	1.60%
		5260	48.933	5.369	47.984	5.298	1.94%	1.33%
		5290	48.892	5.404	47.912	5.345	2.00%	1.10%
		5300	48.879	5.416	47.891	5.357	2.02%	1.09%
	Sep. 04,2013	5540	48.553	5.696	47.267	5.710	2.65%	-0.24%
		5580	48.499	5.743	47.153	5.775	2.77%	-0.56%
		5660	48.390	5.837	46.953	5.886	2.97%	-0.85%
		5690	48.349	5.872	46.883	5.934	3.03%	-1.06%
		5710	48.322	5.895	46.834	5.962	3.08%	-1.14%
		5720	48.309	5.907	46.804	5.978	3.11%	-1.21%
		5765	48.248	5.959	46.688	6.043	3.23%	-1.41%
		5775	48.234	5.971	46.665	6.062	3.25%	-1.53%
		5805	48.193	6.006	46.604	6.102	3.30%	-1.60%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

The composition of the brain tissue simulating liquid:

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

Simulating Liquids for 5 GHz, Manufactured by SPEAG:

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

Table 3. Recipes for Tissue Simulating Liquid

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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.

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

1.11 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:

- 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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

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

1.11.2 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.
- 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.

References

[1] N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.

[2] 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.

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

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

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

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

of this section. (Table 4.)

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

Table 4. RF exposure limits

Notes:

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

2. Summary of Results

Antenna	Band	Position	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
Main	WLAN802.11b	Lap-held	1	2412	15	14.98	0.46%	0.318	0.32	-
		Top edge	1	2412	15	14.98	0.46%	0.414	0.42	47
	WLAN802.11a 5.2G	Lap-held	40	5200	13.5	13.44	1.39%	0.292	0.30	-
		Top edge	40	5200	13.5	13.44	1.39%	0.695	0.70	48
	WLAN802.11ac(80M) 5.2G	Top edge	42	5210	9.5	9.49	0.23%	0.308	0.31	49
	WLAN802.11a 5.3G	Lap-held	52	5260	13.5	13.40	2.33%	0.412	0.42	-
		Lap-held	60	5300	13.5	13.40	2.33%	0.472	0.48	-
		Top edge	52	5260	13.5	13.40	2.33%	0.762	0.78	-
		Top edge	60	5300	13.5	13.40	2.33%	0.801	0.82	50
		Top edge*	60	5300	13.5	13.40	2.33%	0.726	0.74	-
	WLAN802.11ac(80M) 5.3G	Top edge	58	5290	11	10.98	0.46%	0.543	0.55	51
	WLAN802.11a 5.6G	Lap-held	108	5540	13.5	13.49	0.23%	0.198	0.20	-
		Top edge	108	5540	13.5	13.49	0.23%	0.388	0.39	52
	WLAN802.11ac(20M) 5.6G	Lap-held	144	5720	13.5	13.41	2.09%	0.084	0.09	-
		Top edge	144	5720	13.5	13.41	2.09%	0.293	0.30	53
	WLAN802.11ac(40M) 5.6G	Lap-held	142	5710	13.5	13.39	2.57%	0.169	0.17	
		Top edge	142	5710	13.5	13.39	2.57%	0.328	0.34	54
	WLAN802.11ac(80M) 5.6G	Lap-held	138	5690	13.5	13.48	0.46%	0.267	0.27	-
		Top edge	138	5690	13.5	13.48	0.46%	0.596	0.60	55
	WLAN802.11a 5.8G	Lap-held	161	5805	13.5	13.49	0.23%	0.118	0.12	-
		Top edge	161	5805	13.5	13.49	0.23%	0.278	0.28	56
	WLAN802.11ac(80M) 5.8G	Top edge	155	5775	13.5	13.49	0.23%	0.416	0.42	57

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

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Antenna	Band	Position	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
Aux	WLAN802.11b	Lap-held	1	2412	14	13.98	0.46%	0.208	0.21	-
		Right edge	1	2412	14	13.98	0.46%	0.313	0.31	58
	WLAN802.11g	Lap-held	6	2437	15	14.77	5.44%	0.221	0.23	-
		Right edge	6	2437	15	14.77	5.44%	0.372	0.39	59
	WLAN802.11n(20M)	Lap-held	6	2437	15	14.95	1.16%	0.299	0.30	-
		Right edge	6	2437	15	14.95	1.16%	0.367	0.37	60
	WLAN802.11a 5.2G	Lap-held	40	5200	13.5	13.41	2.09%	0.377	0.38	-
		Right edge	40	5200	13.5	13.41	2.09%	0.637	0.65	61
	WLAN802.11ac(80M) 5.2G	Right edge	42	5210	9.5	9.50	0.00%	0.361	0.36	62
	WLAN802.11a 5.3G	Lap-held	52	5260	13.5	13.39	2.57%	0.152	0.16	-
		Right edge	52	5260	13.5	13.39	2.57%	0.648	0.66	63
	WLAN802.11ac(80M) 5.3G	Right edge	58	5290	11.5	11.49	0.23%	0.364	0.36	64
	WLAN802.11a 5.6G	Lap-held	108	5540	13.5	13.45	1.16%	0.394	0.40	-
		Right edge	108	5540	13.5	13.45	1.16%	0.497	0.50	-
		Right edge	116	5580	13.5	13.43	1.62%	0.545	0.55	65
		Right edge	132	5660	13.5	13.44	1.39%	0.54	0.55	-
	WLAN802.11ac(20M) 5.6G	Lap-held	144	5720	13.5	13.47	0.69%	0.233	0.23	-
		Right edge	144	5720	13.5	13.47	0.69%	0.336	0.34	66
	WLAN802.11ac(40M) 5.6G	Lap-held	142	5710	13.5	13.35	3.51%	0.212	0.22	-
		Right edge	142	5710	13.5	13.35	3.51%	0.413	0.43	67
	WLAN802.11ac(80M) 5.6G	Lap-held	138	5690	13.5	13.48	0.46%	0.335	0.34	-
		Right edge	138	5690	13.5	13.48	0.46%	0.53	0.53	68
	WLAN802.11a 5.8G	Lap-held	153	5765	13.5	13.45	1.16%	0.228	0.23	-
		Right edge	153	5765	13.5	13.45	1.16%	0.229	0.23	69
	WLAN802.11ac(80M) 5.8G	Right edge	155	5775	13.5	13.49	0.23%	0.338	0.34	70

3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
Schmid & Partner Engineering AG	Dosimetric E-Field Probe	EX3DV4	3770	Apr.30,2013	Apr.29,2014
Schmid & Partner Engineering AG	2450/5200/5300/ 5600/5800 MHz System Validation Dipole	D2450V2	727	May02,2013	May01,2014
		D5GHzV2	1104	May07,2013	May06,2014
Schmid & Partner Engineering AG	Data acquisition Electronics	DAE4	856	May23,2013	May22,2014
Schmid & Partner Engineering AG	Software	DASY 52 V52.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required	Calibration not required
HP	Network Analyzer	E5071C	MY46107530	Feb.22,2013	Feb.21,2014
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	772D	MY46151242	Jul.04,2013	Jul.03,2014
		778D	MY48220468	Mar.29,2013	Mar.28,2014
Agilent	RF Signal Generator	N5181A	MY50141235	Dec.12,2010	Dec.11,2013
Agilent	Power Meter	E4417A	MY51410006	Oct.24,2011	Oct.23,2013
Agilent	Power Sensor	E9301H	MY51470001	Nov.22,2012	Nov.21,2013
TECPEL	Digital thermometer	DTM-303A	TP130074	Mar.04,2013	Mar.03,2014

4. Measurements

Date: 9/3/2013

Top edge_WLAN802.11b_CH1_Main

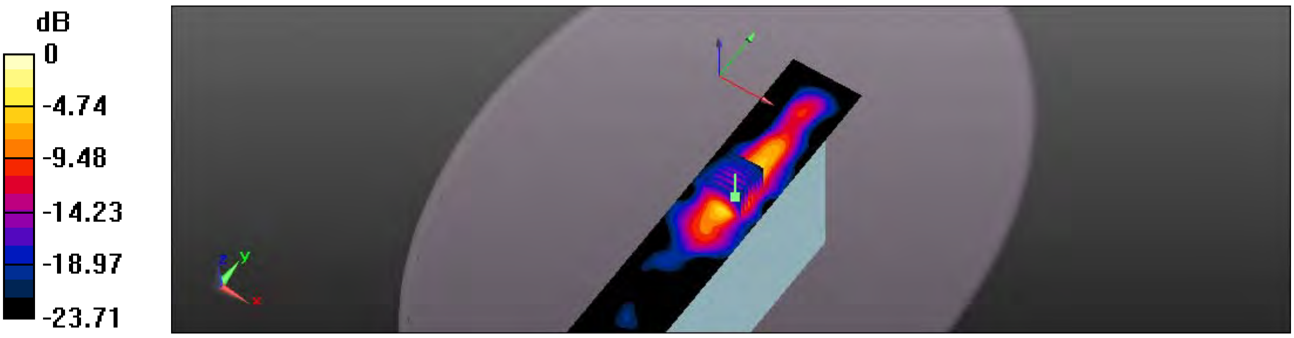
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.962 S/m; ε_r = 50.439; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.21, 7.21, 7.21); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (51x251x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.675 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 7.275 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 0.991 W/kg

SAR(1 g) = 0.414 W/kg; SAR(10 g) = 0.169 W/kg
Maximum value of SAR (measured) = 0.685 W/kg



0 dB = 0.685 W/kg = -1.64 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/3/2013

Top edge_WLAN802.11a 5.2G_CH40_Main

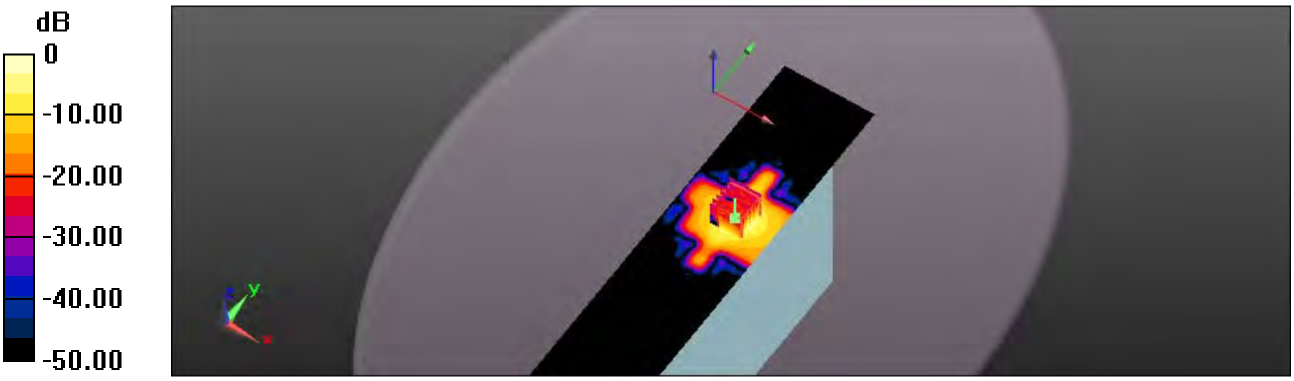
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.21 S/m; ε_r = 48.158; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.71, 4.71, 4.71); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.44 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.433 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 6.81 W/kg

SAR(1 g) = 0.695 W/kg; SAR(10 g) = 0.143 W/kg
Maximum value of SAR (measured) = 1.44 W/kg



0 dB = 1.44 W/kg = 1.58 dBW/kg

Date: 9/3/2013

Top edge_WLAN802.11ac(80M) 5.2G_CH42_Main

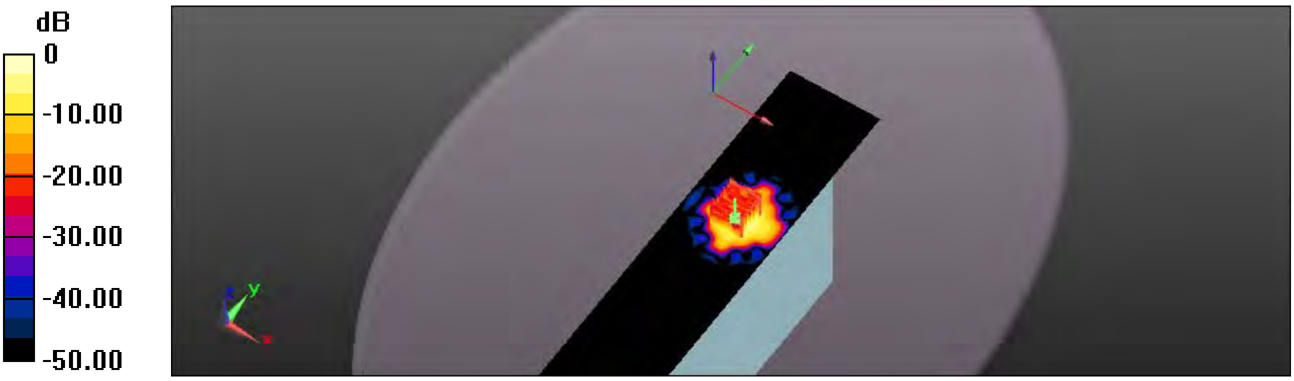
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5210 MHz
Medium parameters used: f= 5210 MHz; σ = 5.226 S/m; ε_r = 48.128; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.71, 4.71, 4.71); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.632 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.023 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 1.45 W/kg

SAR(1 g) = 0.308 W/kg; SAR(10 g) = 0.088 W/kg
Maximum value of SAR (measured) = 0.626 W/kg



0 dB = 0.626 W/kg = -2.03 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/3/2013

Top edge_WLAN802.11a 5.3G_CH60_Main

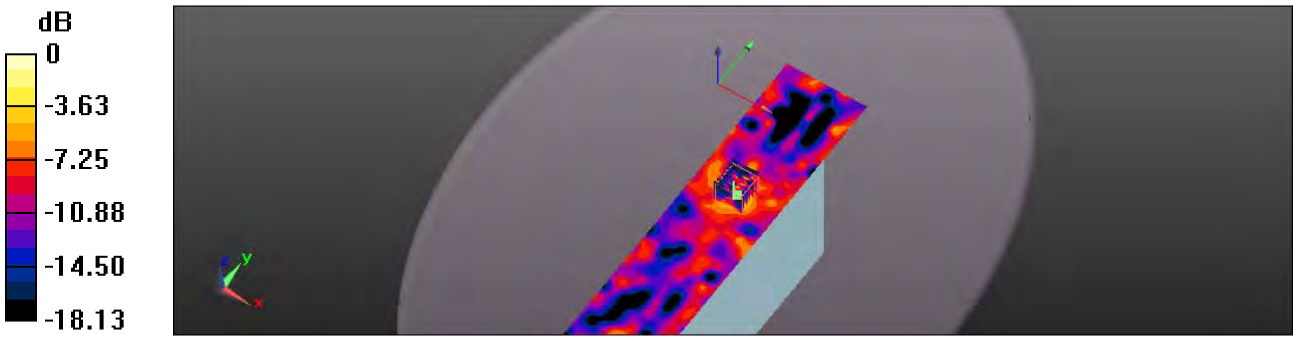
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5300 MHz
Medium parameters used: f = 5300 MHz; σ = 5.357 S/m; ε_r = 47.891; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.28 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.032 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 2.96 W/kg

SAR(1 g) = 0.801 W/kg; SAR(10 g) = 0.294 W/kg
Maximum value of SAR (measured) = 1.51 W/kg



0 dB = 1.51 W/kg = 1.79 dBW/kg

Date: 9/3/2013

Top edge_WLAN802.11ac(80M) 5.3G_CH58_Main

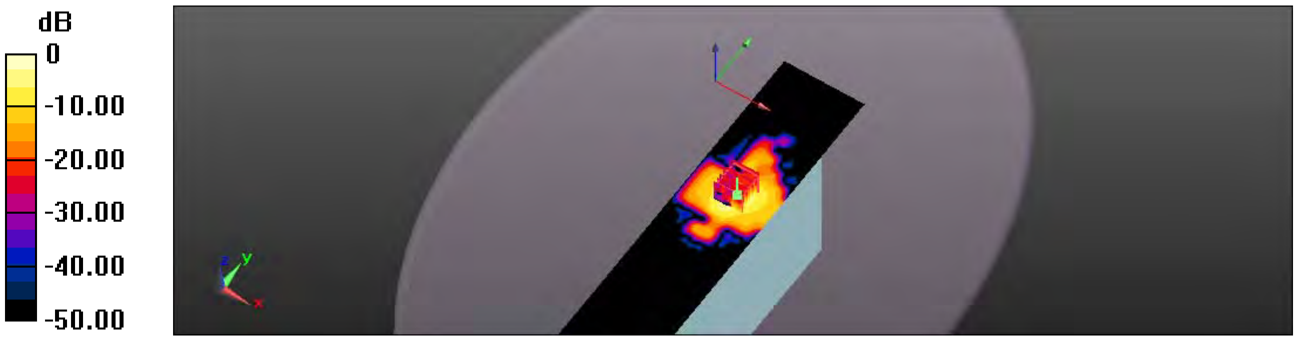
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5290 MHz
Medium parameters used: f= 5290 MHz; σ = 5.345 S/m; ε_r = 47.912; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.30 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.829 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 2.54 W/kg

SAR(1 g) = 0.543 W/kg; SAR(10 g) = 0.117 W/kg
Maximum value of SAR (measured) = 1.39 W/kg



0 dB = 1.39 W/kg = 1.43 dBW/kg

Date: 9/4/2013

Top edge_WLAN802.11a 5.6G_CH108_Main

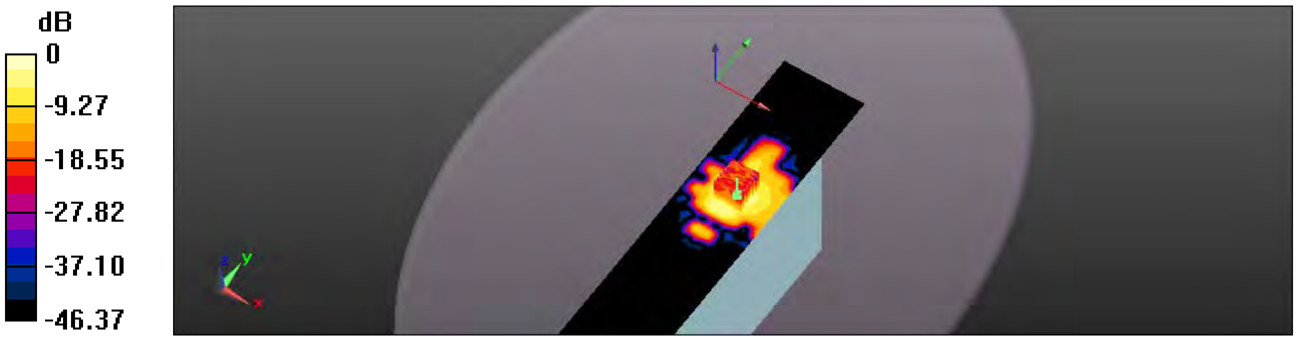
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5540 MHz
Medium parameters used: f = 5540 MHz; σ = 5.71 S/m; ε_r = 47.267; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.01, 4.01, 4.01); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.711 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.073 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 1.79 W/kg

SAR(1 g) = 0.388 W/kg; SAR(10 g) = 0.123 W/kg
Maximum value of SAR (measured) = 0.766 W/kg



0 dB = 0.766 W/kg = -1.16 dBW/kg

Date: 9/4/2013

Top edge_WLAN802.11ac(20M) 5.6G_CH144_Main

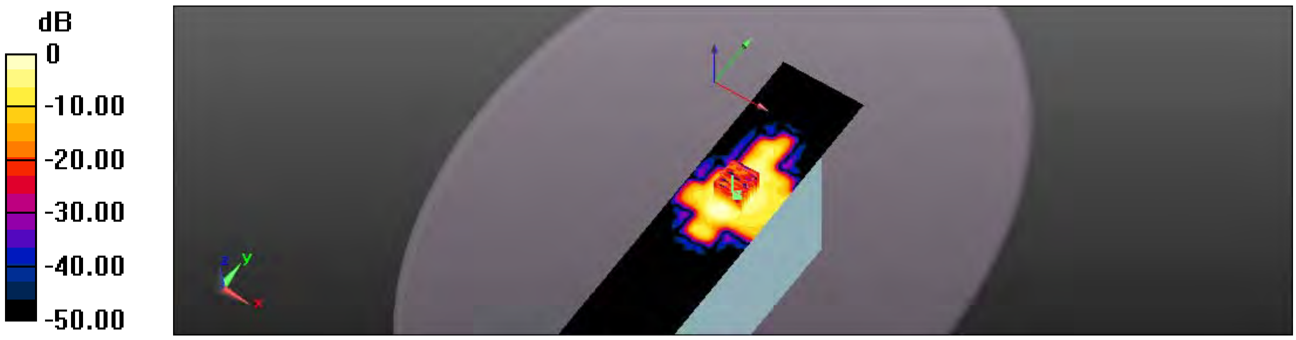
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5720 MHz
Medium parameters used: f = 5720 MHz; σ = 5.978 S/m; ε_r = 46.804; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.698 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.790 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 1.34 W/kg

SAR(1 g) = 0.293 W/kg; SAR(10 g) = 0.093 W/kg
Maximum value of SAR (measured) = 0.581 W/kg



0 dB = 0.581 W/kg = -2.36 dBW/kg

Date: 9/4/2013

Top edge_WLAN802.11ac(40M) 5.6G_CH142_Main

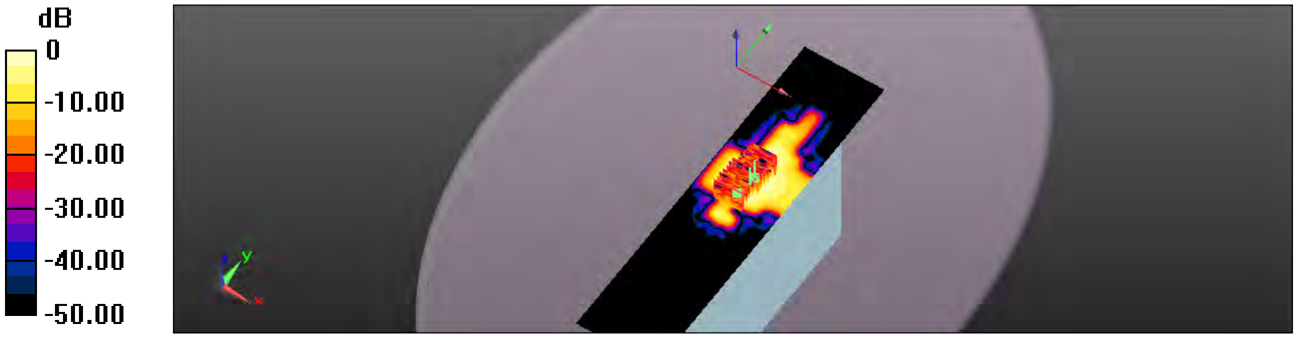
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5710 MHz
Medium parameters used: f= 5710 MHz; σ = 5.962 S/m; ε_r = 46.834; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.735 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.705 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.50 W/kg
SAR(1 g) = 0.328 W/kg; SAR(10 g) = 0.104 W/kg
Maximum value of SAR (measured) = 0.675 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 1:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.705 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.204 W/kg; SAR(10 g) = 0.062 W/kg
Maximum value of SAR (measured) = 0.524 W/kg



0 dB = 0.524 W/kg = -2.81 dBW/kg

Date: 9/4/2013

Top edge_WLAN802.11ac(80M) 5.6G_CH138_Main

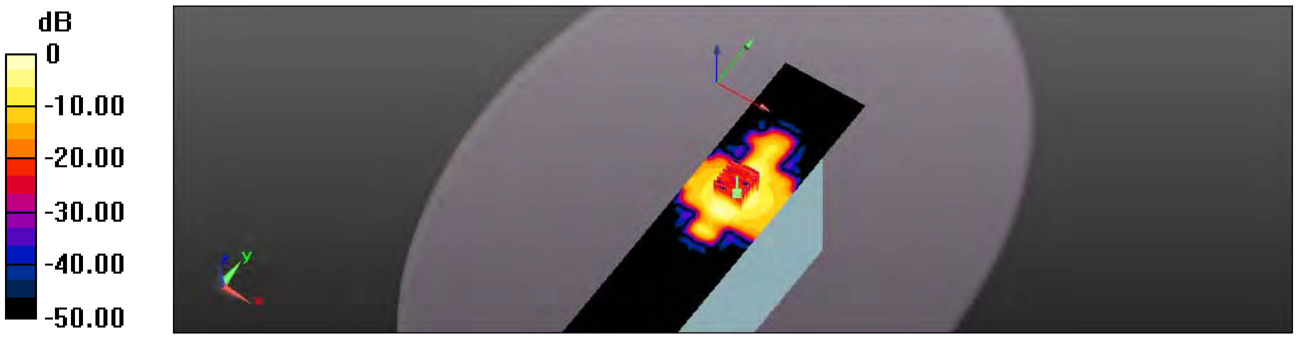
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5690 MHz
Medium parameters used: f= 5690 MHz; σ = 5.934 S/m; ε_r = 46.883; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.01, 4.01, 4.01); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.06 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.794 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 2.75 W/kg

SAR(1 g) = 0.596 W/kg; SAR(10 g) = 0.190 W/kg
Maximum value of SAR (measured) = 1.21 W/kg



0 dB = 1.21 W/kg = 0.83 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/4/2013

Top edge_WLAN802.11a 5.8G_CH161_Main

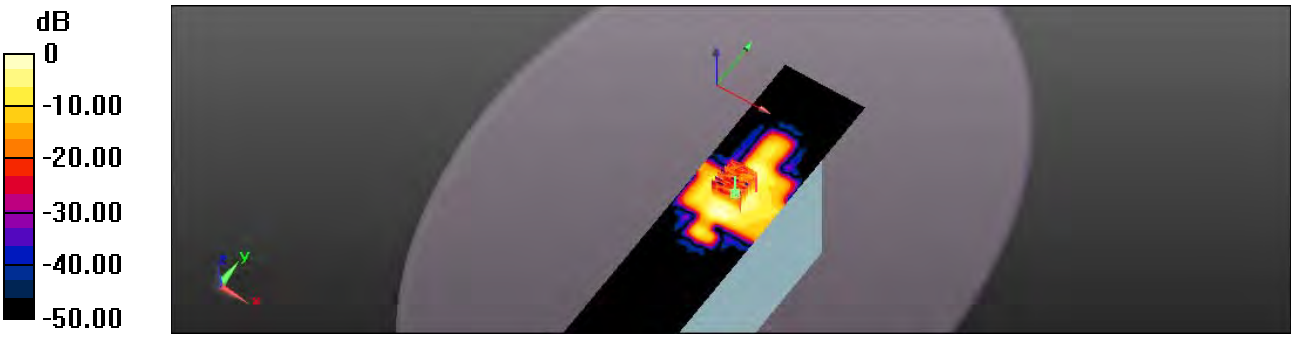
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5805 MHz
Medium parameters used: f= 5805 MHz; σ = 6.102 S/m; ε_r = 46.604; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.507 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.112 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.35 W/kg

SAR(1 g) = 0.278 W/kg; SAR(10 g) = 0.094 W/kg
Maximum value of SAR (measured) = 0.550 W/kg



0 dB = 0.550 W/kg = -2.60 dBW/kg

Date: 9/4/2013

Top edge_WLAN802.11ac(80M) 5.8G_CH155_Main

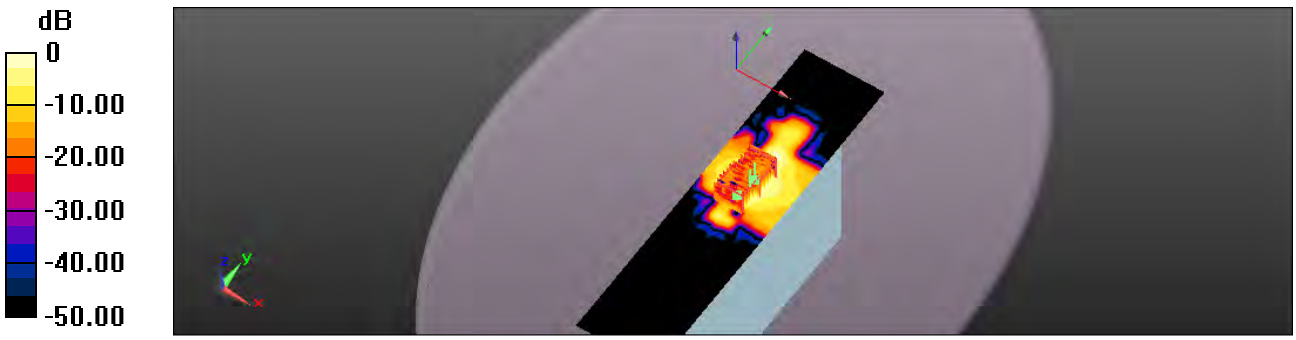
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5775 MHz
Medium parameters used: f= 5775 MHz; σ = 6.062 S/m; ε_r = 46.665; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Top edge/Area Scan (71x301x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.758 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.737 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.89 W/kg
SAR(1 g) = 0.416 W/kg; SAR(10 g) = 0.138 W/kg
Maximum value of SAR (measured) = 0.850 W/kg

Configuration/Top edge/Zoom Scan (7x7x7) (7x7x12)/Cube 1:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.737 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 0.281 W/kg; SAR(10 g) = 0.086 W/kg
Maximum value of SAR (measured) = 0.647 W/kg



0 dB = 0.647 W/kg = -1.89 dBW/kg

Date: 9/3/2013

Right edge_WLAN802.11b_CH1_Aux

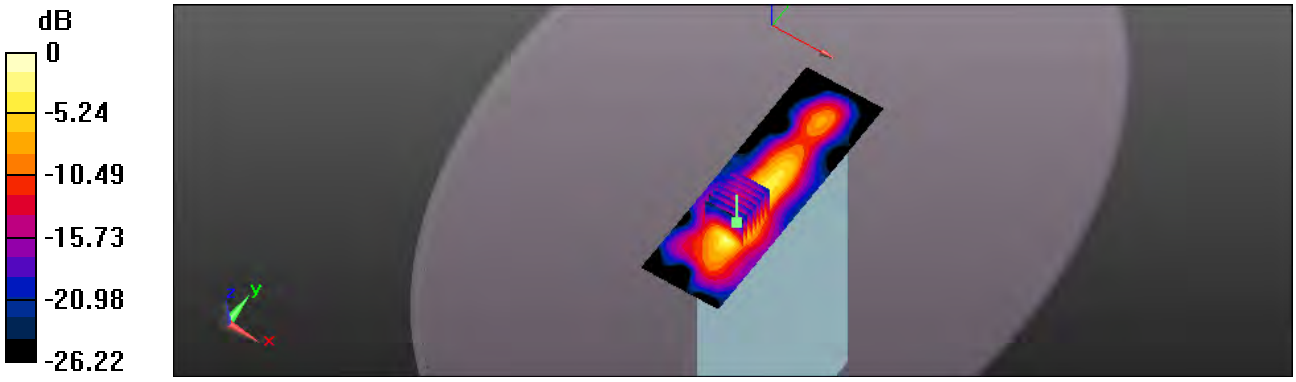
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2412 MHz
Medium parameters used: f = 2412 MHz; σ = 1.962 S/m; ε_r = 50.439; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.21, 7.21, 7.21); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (51x161x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.503 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.797 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.705 W/kg

SAR(1 g) = 0.313 W/kg; SAR(10 g) = 0.136 W/kg
Maximum value of SAR (measured) = 0.513 W/kg



0 dB = 0.513 W/kg = -2.90 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/3/2013

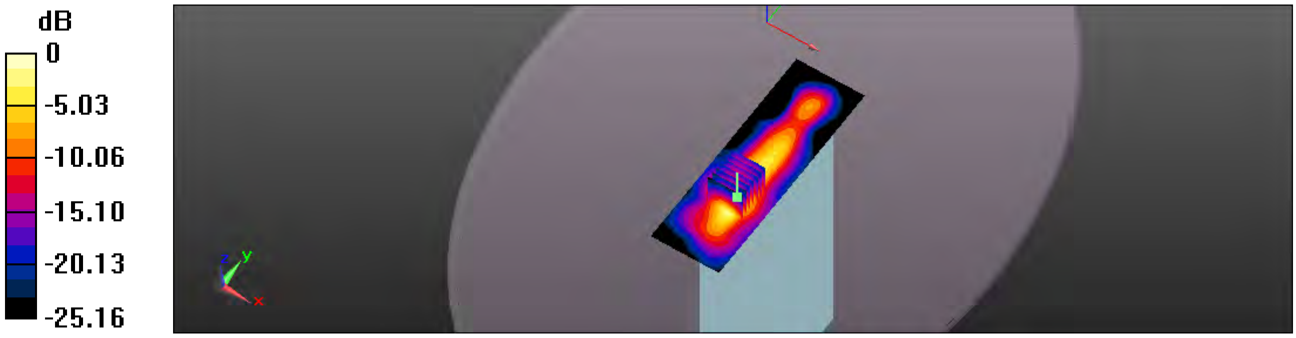
Right edge_WLAN802.11g_CH6_Aux

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.997 S/m; ε_r = 50.35; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.21, 7.21, 7.21); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (51x161x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 0.601 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.806 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 0.848 W/kg
SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.162 W/kg
Maximum value of SAR (measured) = 0.614 W/kg



0 dB = 0.614 W/kg = -2.12 dBW/kg

Date: 9/3/2013

Right edge_WLAN802.11n(20M)_CH6_Aux

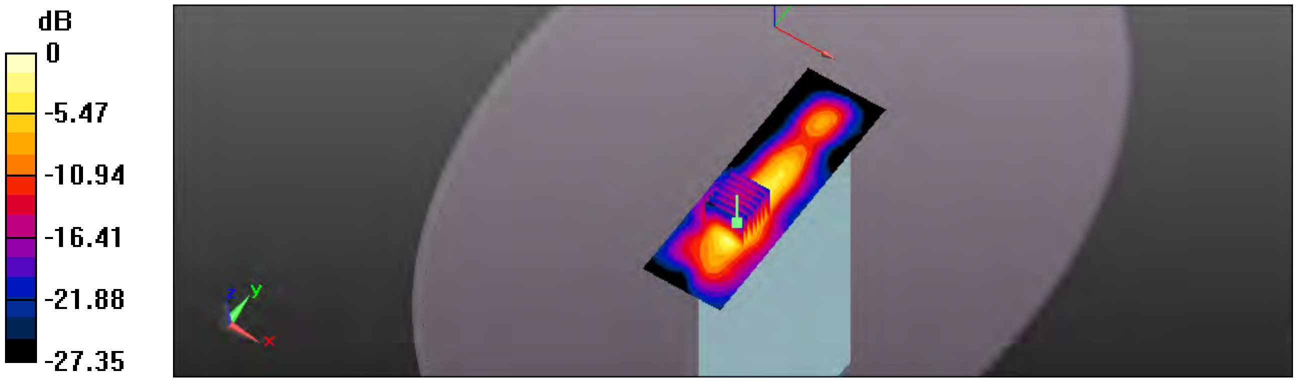
Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2437 MHz
Medium parameters used: f = 2437 MHz; σ = 1.997 S/m; ε_r = 50.35; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.21, 7.21, 7.21); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (51x161x1): Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 0.586 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.196 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 0.834 W/kg

SAR(1 g) = 0.367 W/kg; SAR(10 g) = 0.158 W/kg
Maximum value of SAR (measured) = 0.603 W/kg



0 dB = 0.603 W/kg = -2.20 dBW/kg

Date: 9/3/2013

Right edge_WLAN802.11a 5.2G_CH40_Aux

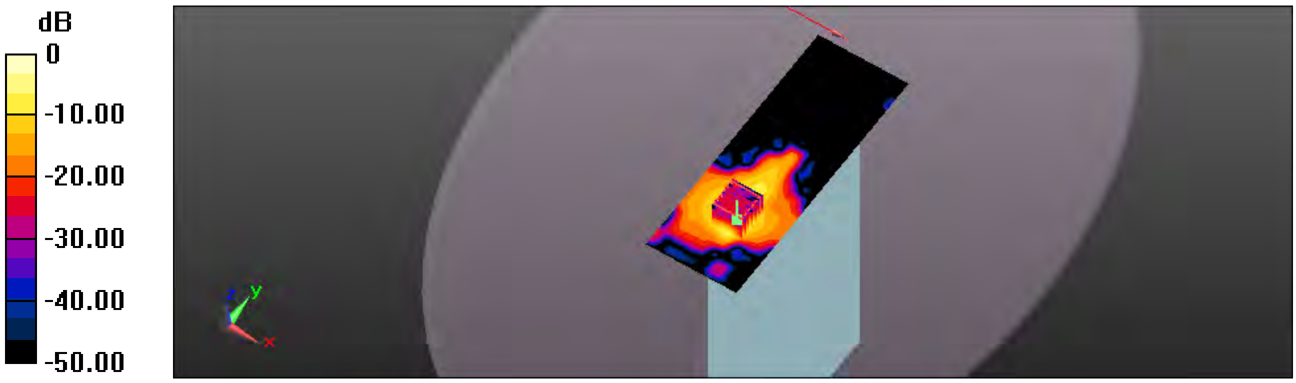
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.21 S/m; ε_r = 48.158; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.71, 4.71, 4.71); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.38 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.555 V/m; Power Drift = 0.14 dB
Peak SAR (extrapolated) = 3.42 W/kg

SAR(1 g) = 0.637 W/kg; SAR(10 g) = 0.158 W/kg
Maximum value of SAR (measured) = 1.44 W/kg



0 dB = 1.44 W/kg = 1.58 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/3/2013

Right edge_WLAN802.11ac(80M) 5.2G_CH42_Aux

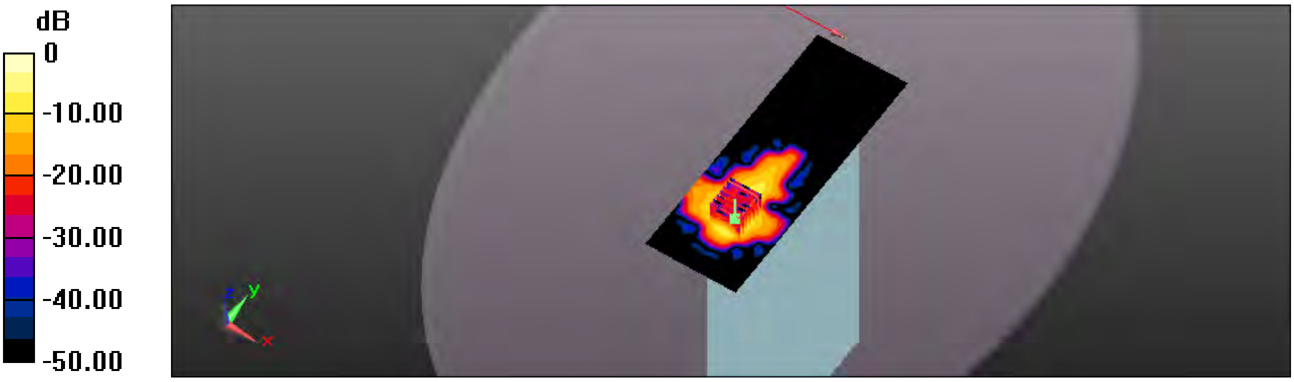
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5210 MHz
Medium parameters used: f= 5210 MHz; σ = 5.226 S/m; ε_r = 48.128; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.71, 4.71, 4.71); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.718 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.167 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 1.98 W/kg

SAR(1 g) = 0.361 W/kg; SAR(10 g) = 0.092 W/kg
Maximum value of SAR (measured) = 0.813 W/kg



0 dB = 0.813 W/kg = -0.90 dBW/kg

Date: 9/3/2013

Right edge_WLAN802.11a 5.3G_CH52_Aux

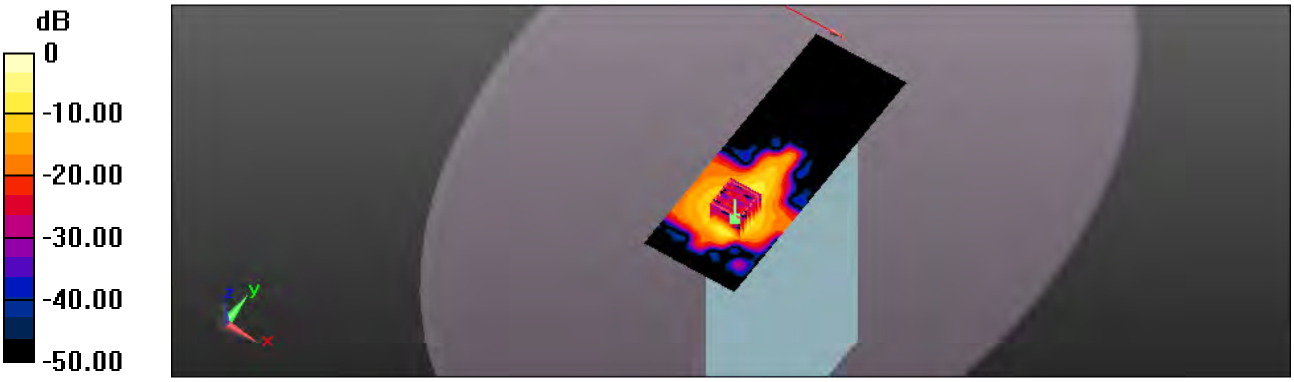
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5260 MHz
Medium parameters used: f = 5260 MHz; σ = 5.298 S/m; ε_r = 47.984; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.34 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.922 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 3.39 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.165 W/kg
Maximum value of SAR (measured) = 1.46 W/kg



0 dB = 1.46 W/kg = 1.64 dBW/kg

Date: 9/3/2013

Right edge_WLAN802.11ac(80M) 5.3G_CH58_Aux

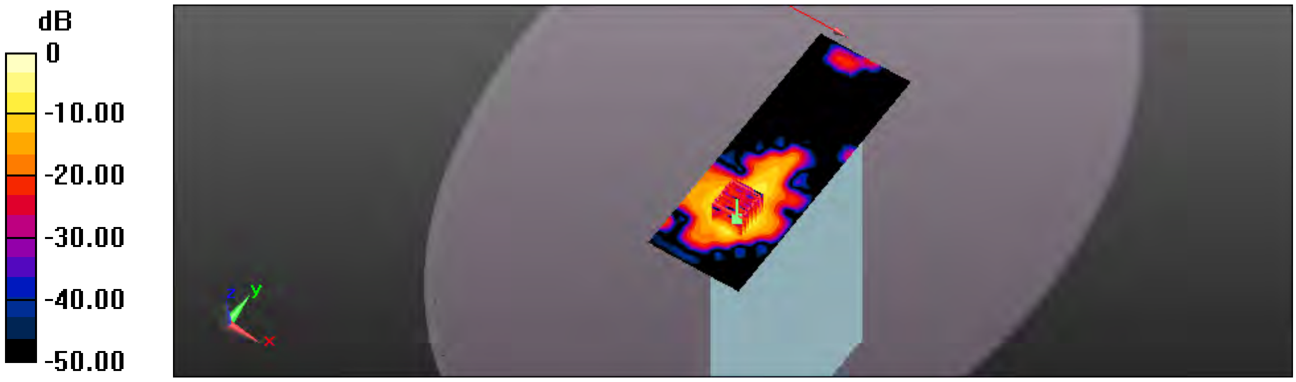
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5290 MHz
Medium parameters used: f= 5290 MHz; σ = 5.345 S/m; ε_r = 47.912; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.708 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.253 V/m; Power Drift = 0.13 dB
Peak SAR (extrapolated) = 1.91 W/kg

SAR(1 g) = 0.364 W/kg; SAR(10 g) = 0.092 W/kg
Maximum value of SAR (measured) = 0.842 W/kg



0 dB = 0.842 W/kg = -0.75 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/4/2013

Right edge_WLAN802.11a 5.6G_CH116_Aux

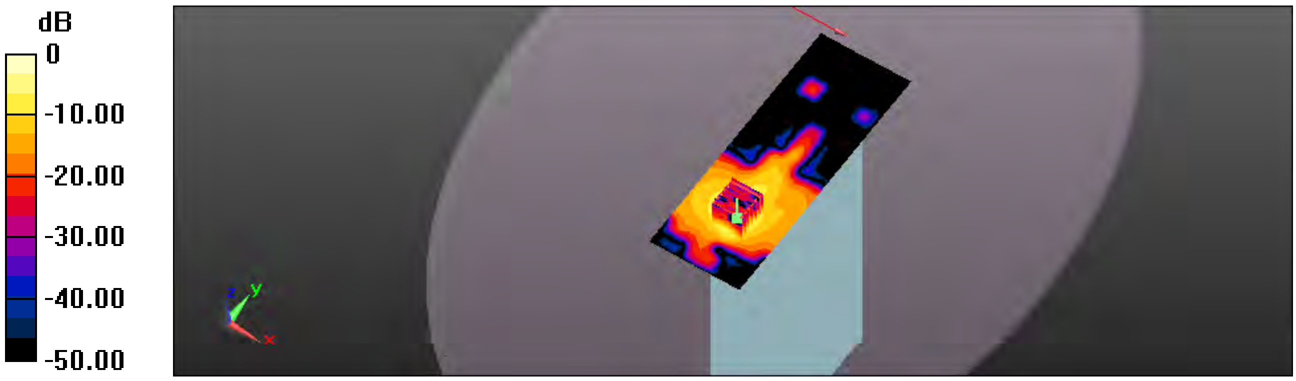
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5580 MHz
Medium parameters used: f = 5580 MHz; σ = 5.775 S/m; ε_r = 47.153; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.01, 4.01, 4.01); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 1.01 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 3.236 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 3.13 W/kg

SAR(1 g) = 0.545 W/kg; SAR(10 g) = 0.142 W/kg
Maximum value of SAR (measured) = 1.27 W/kg



0 dB = 1.27 W/kg = 1.04 dBW/kg

Date: 9/4/2013

Right edge_WLAN802.11ac(20M) 5.6G_CH144_Aux

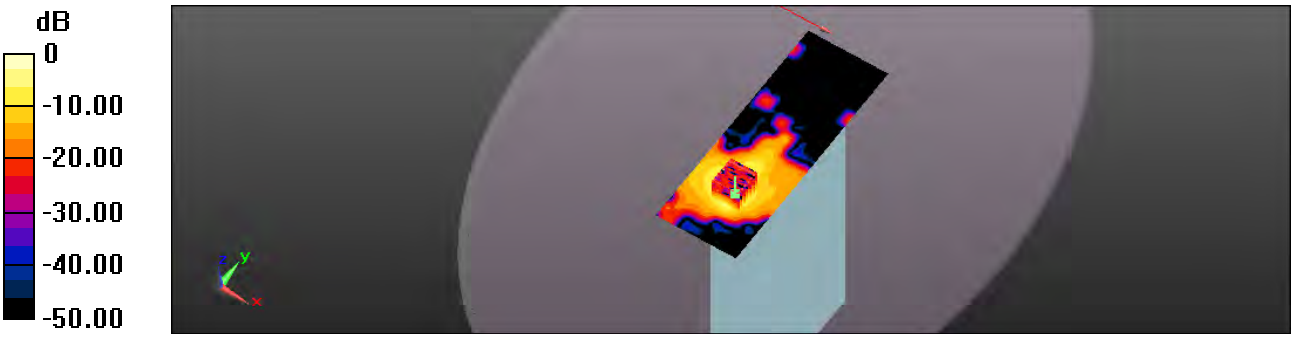
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5720 MHz
Medium parameters used: f = 5720 MHz; σ = 5.978 S/m; ε_r = 46.804; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.586 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.650 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.85 W/kg

SAR(1 g) = 0.336 W/kg; SAR(10 g) = 0.090 W/kg
Maximum value of SAR (measured) = 0.744 W/kg



0 dB = 0.744 W/kg = -1.28 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/4/2013

Right edge_WLAN802.11ac(40M) 5.6G_CH142_Aux

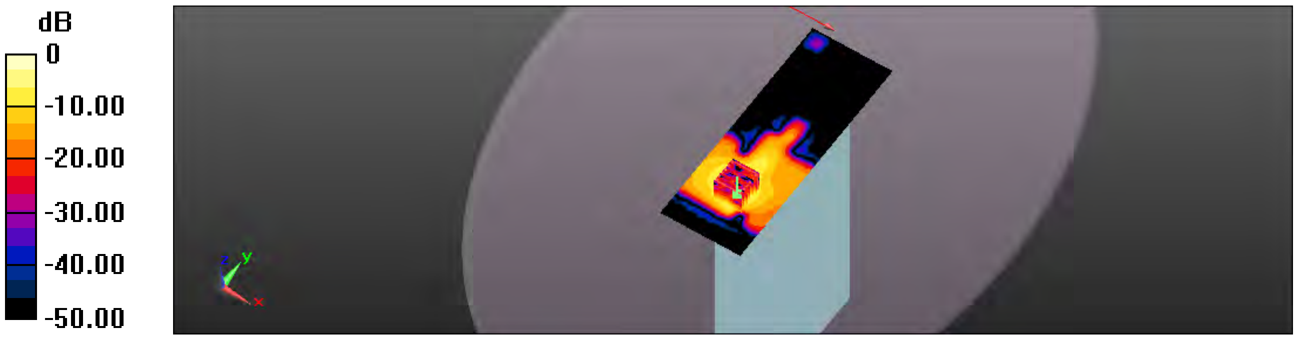
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5710 MHz
Medium parameters used: f= 5710 MHz; σ = 5.962 S/m; ε_r = 46.834; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.734 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.397 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 2.32 W/kg

SAR(1 g) = 0.413 W/kg; SAR(10 g) = 0.109 W/kg
Maximum value of SAR (measured) = 0.935 W/kg



0 dB = 0.935 W/kg = -0.29 dBW/kg

Date: 9/4/2013

Right edge_WLAN802.11ac(80M) 5.6G_CH138_Aux

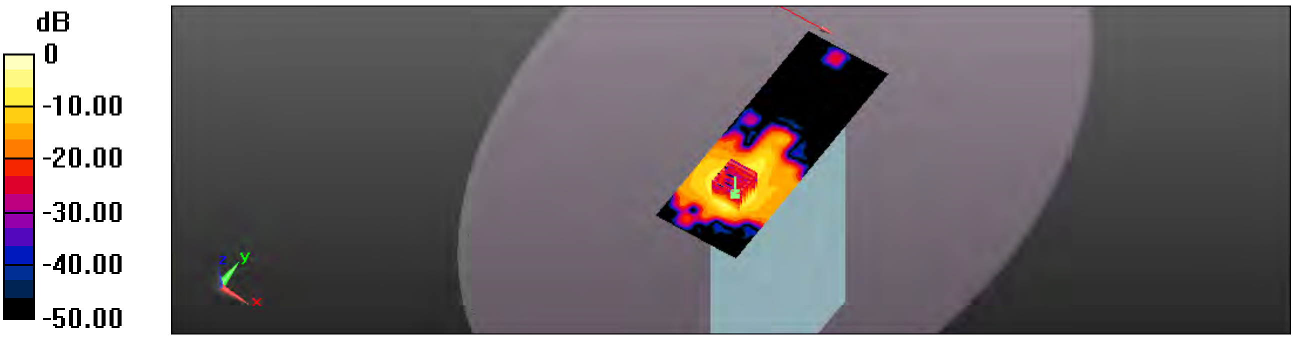
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5690 MHz
Medium parameters used: f= 5690 MHz; σ = 5.934 S/m; ε_r = 46.883; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.01, 4.01, 4.01); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.927 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.806 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 3.20 W/kg

SAR(1 g) = 0.530 W/kg; SAR(10 g) = 0.140 W/kg
Maximum value of SAR (measured) = 1.19 W/kg



0 dB = 1.19 W/kg = 0.76 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/4/2013

Right edge_WLAN802.11a 5.8G_CH153_Aux

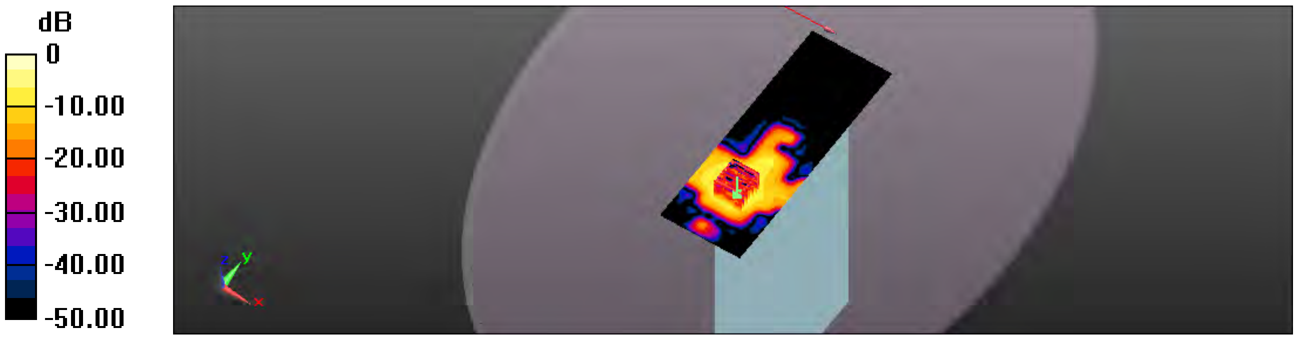
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5765 MHz
Medium parameters used: f= 5765 MHz; σ = 6.043 S/m; ε_r = 46.688; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.382 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.542 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 1.36 W/kg

SAR(1 g) = 0.229 W/kg; SAR(10 g) = 0.062 W/kg
Maximum value of SAR (measured) = 0.528 W/kg



0 dB = 0.528 W/kg = -2.77 dBW/kg

Date: 9/4/2013

Right edge_WLAN802.11ac(80M) 5.8G_CH155_Aux

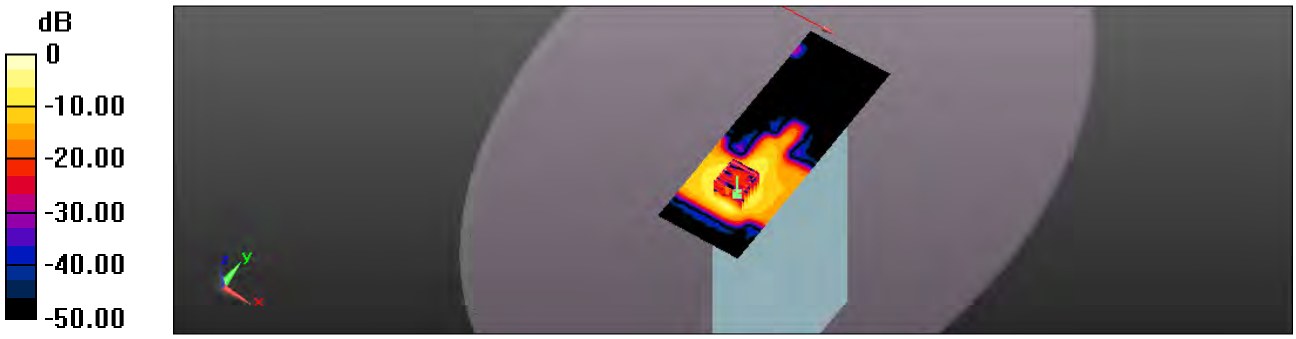
Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5775 MHz
Medium parameters used: f= 5775 MHz; σ = 6.062 S/m; ε_r = 46.665; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/Right edge/Area Scan (71x201x1): Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 0.567 W/kg

Configuration/Right edge/Zoom Scan (7x7x7) (7x7x12)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 2.720 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 2.01 W/kg

SAR(1 g) = 0.338 W/kg; SAR(10 g) = 0.092 W/kg
Maximum value of SAR (measured) = 0.756 W/kg



0 dB = 0.756 W/kg = -1.21 dBW/kg

5. SAR System Performance Verification

Date: 9/3/2013

Dipole 2450 MHz (Body)

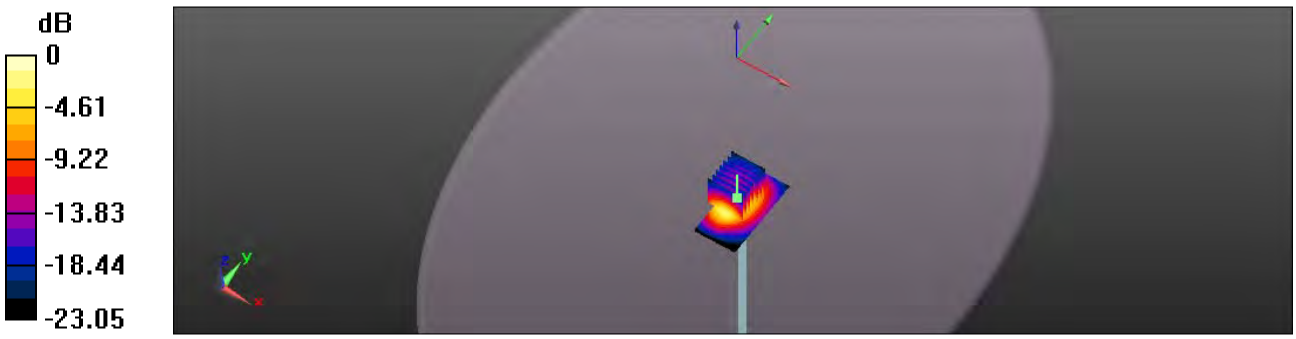
Communication System: CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.015 S/m; ε_r = 50.315; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(7.21, 7.21, 7.21); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/d=10mm, Pin=250mW, dist=2mm: Interpolated grid: dx=12 mm, dy=12 mm
Maximum value of SAR (interpolated) = 21.5 W/kg

Configuration/d=10mm, Pin=250mW, dist=2mm: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.9 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 28.1 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 5.96 W/kg
Maximum value of SAR (measured) = 20.4 W/kg



0 dB = 20.4 W/kg = 13.10 dBW/kg

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/3/2013

Dipole 5200 MHz (Body)

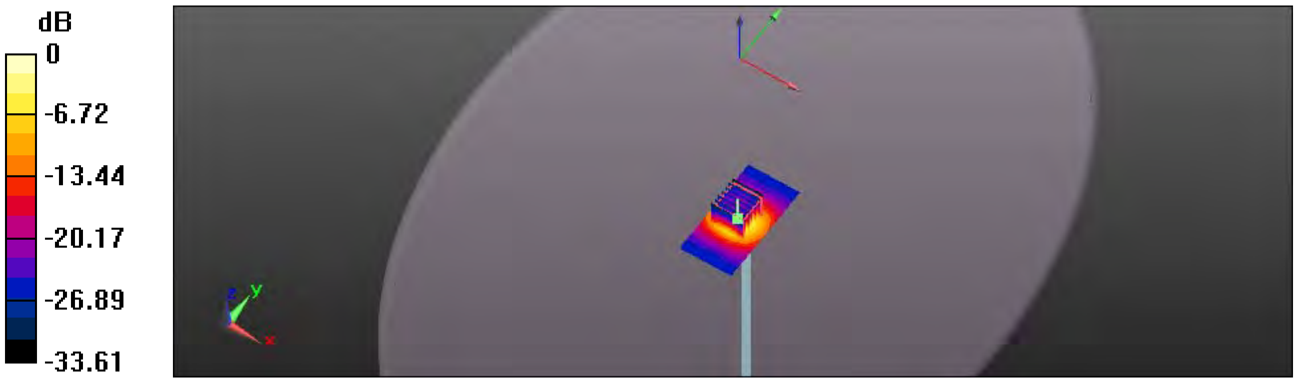
Communication System: CW; Frequency: 5200 MHz
Medium parameters used: f = 5200 MHz; σ = 5.21 S/m; ε_r = 48.158; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.71, 4.71, 4.71); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 15.6 W/kg

Configuration/d=10mm, Pin=100mW, dist=2mm: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.029 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 29.3 W/kg

SAR(1 g) = 7.61 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 15.4 W/kg



0 dB = 15.4 W/kg = 11.88 dBW/kg

Date: 9/3/2013

Dipole 5300 MHz (Body)

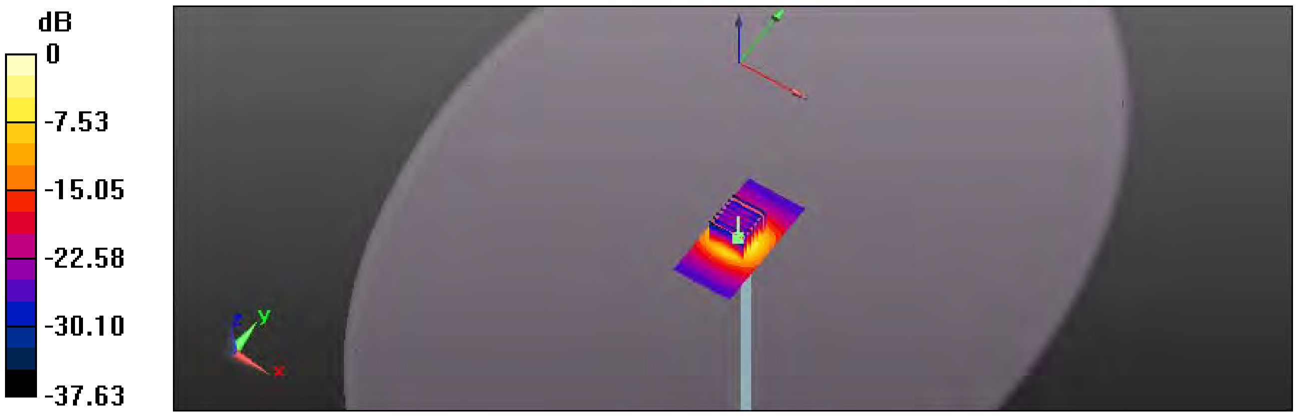
Communication System: CW; Frequency: 5300 MHz
Medium parameters used: f = 5300 MHz; σ = 5.357 S/m; ε_r = 47.891; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.42, 4.42, 4.42); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 15.8 W/kg

Configuration/d=10mm, Pin=100mW, dist=2mm: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 58.217 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 30.4 W/kg

SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.21 W/kg
Maximum value of SAR (measured) = 16.0 W/kg



0 dB = 16.0 W/kg = 12.04 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Date: 9/4/2013

Dipole 5600 MHz (Body)

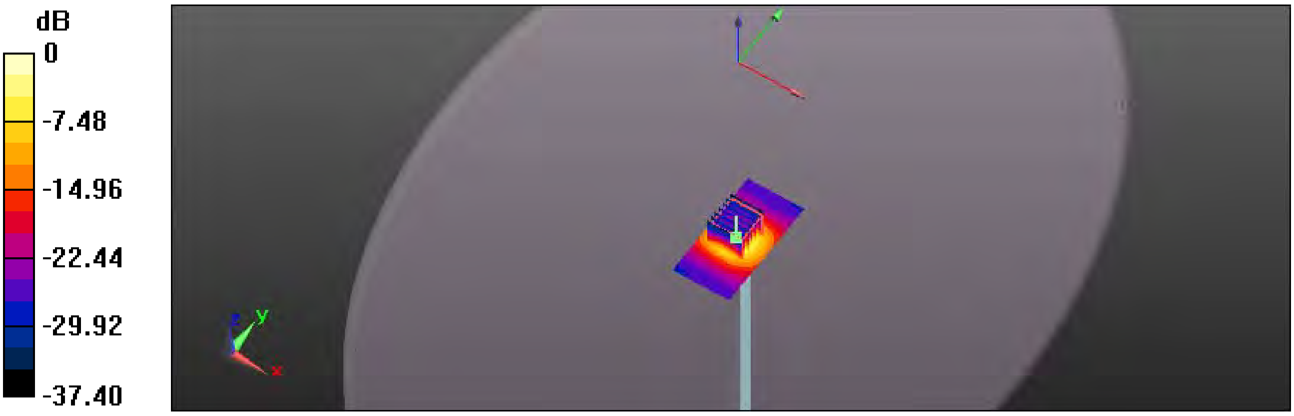
Communication System: CW; Frequency: 5600 MHz
Medium parameters used: f = 5600 MHz; σ = 5.799 S/m; ε_r = 47.119; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.01, 4.01, 4.01); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 17.9 W/kg

Configuration/d=10mm, Pin=100mW, dist=2mm: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 59.611 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 36.2 W/kg

SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



0 dB = 18.0 W/kg = 12.55 dBW/kg

Date: 9/4/2013

Dipole 5800 MHz (Body)

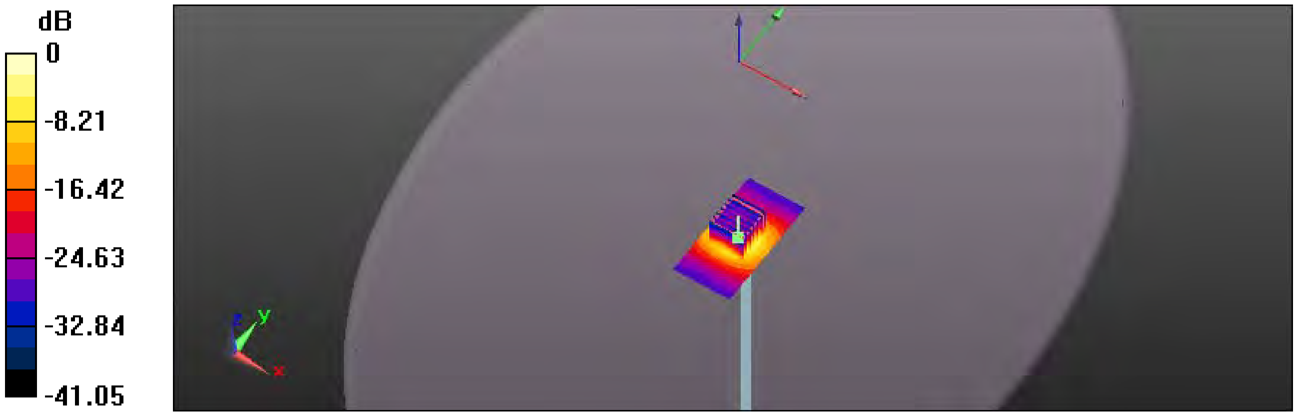
Communication System: CW; Frequency: 5800 MHz
Medium parameters used: f = 5800 MHz; σ = 6.094 S/m; ε_r = 46.62; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)
DASY5 Configuration:

- Probe: EX3DV4 - SN3770; ConvF(4.29, 4.29, 4.29); Calibrated: 4/30/2013;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 5/23/2013
- Phantom: ELI v5.0; Type: QDOVA002AA
- Measurement SW: DASY52, Version 52.8 (6); SEMCAD X Version 14.6.9 (7117)

Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10 mm, dy=10 mm
Maximum value of SAR (interpolated) = 16.0 W/kg

Configuration/d=10mm, Pin=100mW, dist=2mm: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 55.767 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 32.5 W/kg

SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.12 W/kg
Maximum value of SAR (measured) = 16.1 W/kg



0 dB = 16.1 W/kg = 12.07 dBW/kg

6. DAE & Probe Calibration Certificate

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

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

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

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: DAE4-856_May13

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BM - SN: 856

Calibration procedure(s): QA CAL-06.v26
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: May 23, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Keithley Multimeter Type 2001	SN: 0810278	02-Oct-12 (No:12728)	Oct-13
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	07-Jan-13 (in house check)	In house check: Jan-14
Calibrator Box V2.1	SE UMS 006 AA 1002	07-Jan-13 (in house check)	In house check: Jan-14

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

Issued: May 23, 2013

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

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

Accreditation No.: **SCS 108**

Glossary

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

Methods Applied and Interpretation of Parameters

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

DC Voltage Measurement

A/D - Converter Resolution nominal

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

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

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

Calibration Factors	X	Y	Z
High Range	403.416 ± 0.02% (k=2)	404.540 ± 0.02% (k=2)	403.867 ± 0.02% (k=2)
Low Range	3.97422 ± 1.50% (k=2)	3.97703 ± 1.50% (k=2)	3.97733 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	52.5 ° ± 1 °

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Appendix

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	199987.92	-6.55	-0.00
Channel X	+ Input	19997.24	-3.32	-0.02
Channel X	- Input	-19998.80	1.29	-0.01
Channel Y	+ Input	199992.46	-2.23	-0.00
Channel Y	+ Input	19997.79	-2.80	-0.01
Channel Y	- Input	-19998.99	1.02	-0.01
Channel Z	+ Input	199989.59	-5.43	-0.00
Channel Z	+ Input	19995.44	-5.08	-0.03
Channel Z	- Input	-20001.02	-0.96	0.00

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2001.12	0.11	0.01
Channel X	+ Input	202.01	0.43	0.21
Channel X	- Input	-199.13	-0.70	0.35
Channel Y	+ Input	2001.13	0.10	0.00
Channel Y	+ Input	200.48	-1.04	-0.52
Channel Y	- Input	-199.06	-0.54	0.27
Channel Z	+ Input	2001.11	0.21	0.01
Channel Z	+ Input	200.59	-0.87	-0.43
Channel Z	- Input	-199.44	-0.99	0.50

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	-15.25	-16.64
	- 200	18.50	16.42
Channel Y	200	-1.88	-1.90
	- 200	1.30	0.86
Channel Z	200	10.99	10.38
	- 200	-13.49	-12.90

3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	-	2.15	-3.07
Channel Y	200	7.09	-	3.02
Channel Z	200	8.11	5.37	-

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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	16270	16836
Channel Y	15934	16230
Channel Z	15862	15687

5. Input Offset Measurement

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

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.87	-0.19	2.70	0.40
Channel Y	-0.41	-1.96	0.66	0.46
Channel Z	-0.75	-1.60	0.05	0.32

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

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

Accreditation No.: **SCS 108**

Client **SGS-TW (Auden)**

Certificate No: **EX3-3770_Apr13**

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3770

Calibration procedure(s): QA CAL-01.v8, QA CAL-14.v3, QA CAL-23.v4, QA CAL-25.v4
Calibration procedure for dosimetric E-field probes

Calibration date: April 30, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	31-Jan-13 (No. DAE4-660_Jan13)	Jan-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe El-Naouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 1, 2013

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Probe EX3DV4

SN:3770

Manufactured: July 6, 2010
Calibrated: April 30, 2013

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.31	0.60	0.41	± 10.1 %
DCP (mV)[B]	106.9	96.2	103.0	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	125.8	±2.5 %
		Y	0.0	0.0	1.0		129.7	
		Z	0.0	0.0	1.0		142.2	

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

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	10.28	10.28	10.28	0.74	0.65	± 12.0 %
835	41.5	0.90	9.83	9.83	9.83	0.77	0.60	± 12.0 %
900	41.5	0.97	9.89	9.89	9.89	0.78	0.55	± 12.0 %
1750	40.1	1.37	8.29	8.29	8.29	0.72	0.65	± 12.0 %
1900	40.0	1.40	7.98	7.98	7.98	0.44	0.83	± 12.0 %
2000	40.0	1.40	7.94	7.94	7.94	0.45	0.79	± 12.0 %
2300	39.5	1.67	7.48	7.48	7.48	0.45	0.78	± 12.0 %
2450	39.2	1.80	7.12	7.12	7.12	0.33	0.99	± 12.0 %
5200	36.0	4.66	5.15	5.15	5.15	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.95	4.95	4.95	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.49	4.49	4.49	0.45	1.80	± 13.1 %
5800	35.3	5.27	4.66	4.66	4.66	0.45	1.80	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

Calibration Parameter Determined in Body Tissue Simulating Media

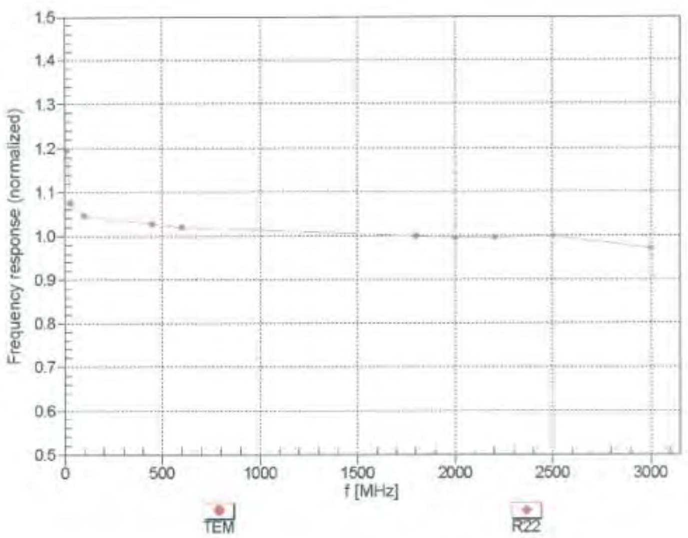
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	9.74	9.74	9.74	0.47	0.84	± 12.0 %
835	55.2	0.97	9.62	9.62	9.62	0.62	0.69	± 12.0 %
900	55.0	1.05	9.50	9.50	9.50	0.35	0.97	± 12.0 %
1750	53.4	1.49	7.85	7.85	7.85	0.39	0.88	± 12.0 %
1900	53.3	1.52	7.63	7.63	7.63	0.27	1.08	± 12.0 %
2000	53.3	1.52	7.72	7.72	7.72	0.27	1.17	± 12.0 %
2300	52.9	1.81	7.36	7.36	7.36	0.50	0.78	± 12.0 %
2450	52.7	1.95	7.21	7.21	7.21	0.56	0.68	± 12.0 %
5200	49.0	5.30	4.71	4.71	4.71	0.40	1.90	± 13.1 %
5300	48.9	5.42	4.42	4.42	4.42	0.45	1.90	± 13.1 %
5600	48.5	5.77	4.01	4.01	4.01	0.45	1.90	± 13.1 %
5800	48.2	6.00	4.29	4.29	4.29	0.50	1.90	± 13.1 %

[C] Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Frequency Response of E-Field

(TEM-Cell:ifi110 EXX, Waveguide: R22)



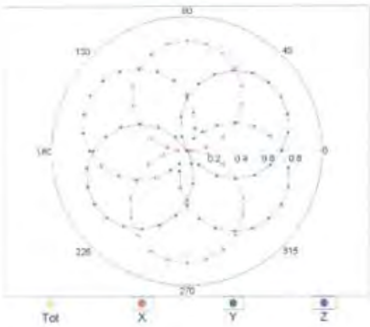
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

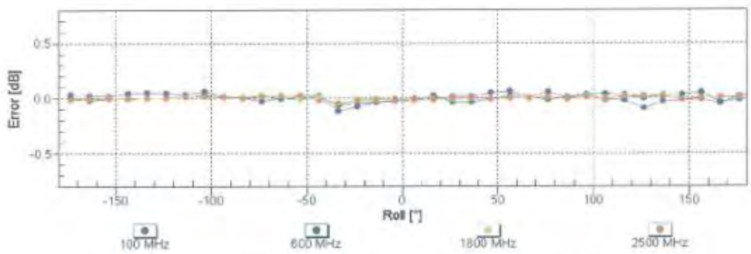
EX3DV4– SN:3770 April 30, 2013

Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



f=1800 MHz,R22

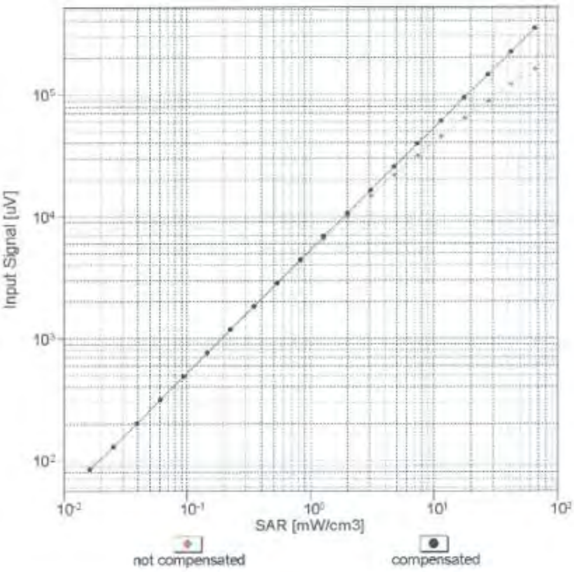


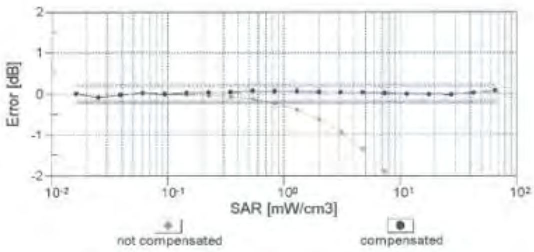
Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

EX3DV4– SN:3770 April 30, 2013

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)





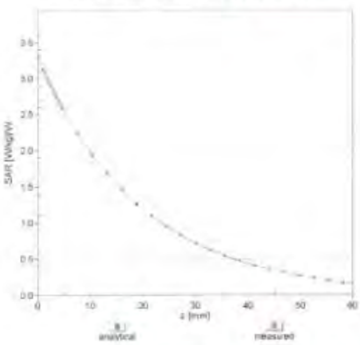
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

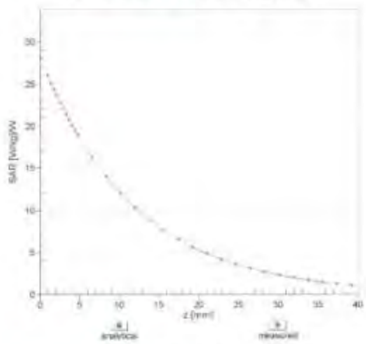
EX3DV4– SN:3770 April 30, 2013

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

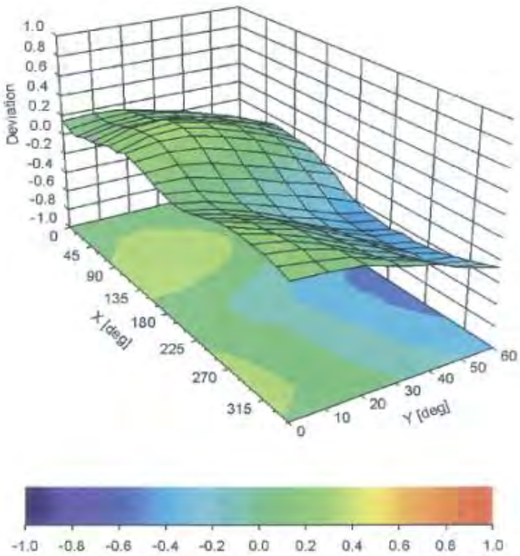


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

Certificate No: EX3-3770_Apr13 Page 10 of 11

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-33.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

7. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test
IEEE 1528

A	c	D	e		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probability	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Deviation from reference liquid target ε 'r(Body)	4.63%	N	1	1	0.64	0.43	2.96%	1.99%	M
Deviation from reference liquid target σ (Body)	3.32%	N	1	1	0.6	0.49	1.99%	1.63%	M
Combined standard uncertainty		RSS					12.11%	11.85%	
Expant uncertainty (95% confidence							24.22%	23.71%	

8. Phantom Description

Schmid & Partner Engineering AG **s p e a g**

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

Certificate of Conformity / First Article Inspection

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

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

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

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

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

Date 07.07.2005

Signature / Stamp

s p e a g
Schmid & Partner Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland
Phone +41 1 245 9700, Fax +41 1 245 9779
info@speag.com, http://www.speag.com

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

9. System Validation from Original Equipment Supplier

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

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

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

Accreditation No.: SCS 108

Client **SGS-TW (Auden)**

Certificate No: **D2450V2-727_May13**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 727
Calibration procedure(s)	QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	May 02, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

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

Issued: May 2, 2013

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

Certificate No: D2450V2-727_May13 Page 1 of 8

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

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

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2003, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
c) Federal Communications Commission Office of Engineering & Technology (FCC OET), "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields; Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emissions", Supplement C (Edition 01-01) to Bulletin 65

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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%.

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Measurement Conditions

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

DASY Version	DASY5	V52.8.6
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	37.7 ± 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^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.35 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.2 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.0 W/kg ± 16.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.6 Ω + 1.9 jΩ
Return Loss	- 25.0 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.9 Ω + 4.0 jΩ
Return Loss	- 27.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

DASY5 Validation Report for Head TSL

Date: 02.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

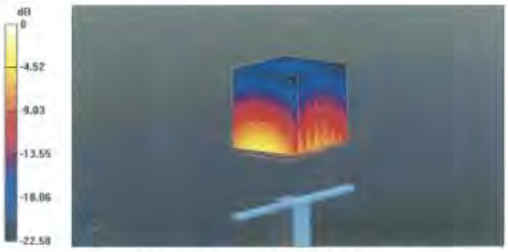
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.83 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

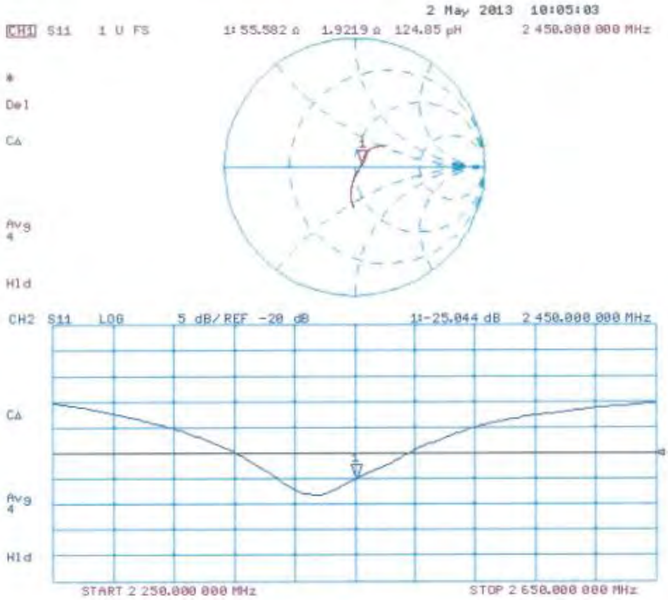
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.668 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.35 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-727_May13 Page 6 of 8

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

DASY5 Validation Report for Body TSL

Date: 02.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

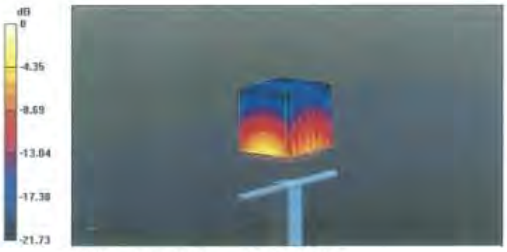
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 727

Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 51.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

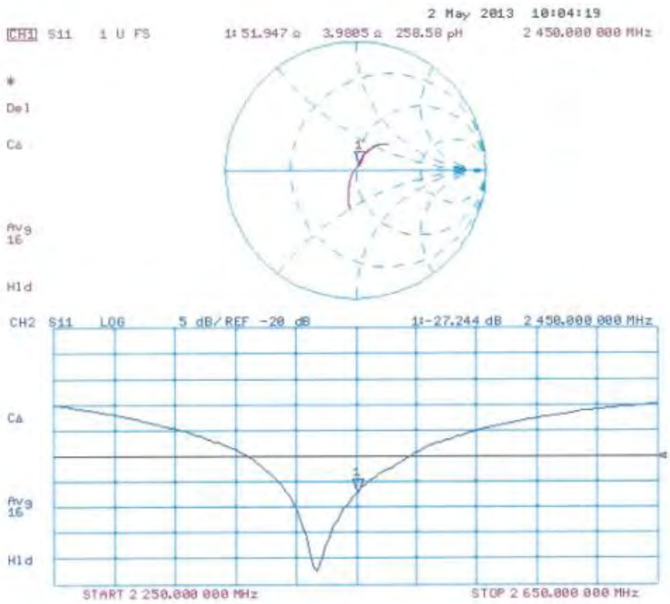
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.668 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.09 W/kg
Maximum value of SAR (measured) = 17.5 W/kg



0 dB = 17.5 W/kg = 12.43 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727_May13 Page 8 of 8

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

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

Accreditation No.: SCS 108

Client SGS-TW (Auden)

Certificate No: D5GHzV2-1104_May13

CALIBRATION CERTIFICATE

Object: D5GHzV2 - SN: 1104

Calibration procedure(s): QA CAL-22.v2
Calibration procedure for dipole validation kits between 3-6 GHz

Calibration date: May 07, 2013

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe EX3DV4	SN: 3503	28-Dec-12 (No. EX3-3503_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Israe El-Naouq	Laboratory Technician	Israe Elnaouq
Approved by:	Katja Pokovic	Technical Manager	

Issued: May 7, 2013

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

SGS Taiwan Ltd. 台灣檢驗科技股份有限公司
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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

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

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

Accreditation No.: SCS 108

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010

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

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Measurement Conditions

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

DASY Version	DASY5	V52.8.6
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.58 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °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	8.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**82.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 W/kg ± 19.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Head TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.5 ± 6 %	4.68 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	8.51 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.4 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.1 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.1 ± 6 %	4.96 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.62 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**85.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 19.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

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	33.8 ± 6 %	5.17 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^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Body TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.9 ± 6 %	5.43 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm^3 (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	**75.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.56 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^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.77 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**77.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.17 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.5 W/kg ± 19.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	5.94 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**81.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.6 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	45.9 ± 6 %	6.22 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.60 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 W/kg ± 19.5 % (k=2)**

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Appendix

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	52.6 Ω - 9.7 jΩ
Return Loss	- 20.2 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	52.6 Ω - 2.8 jΩ
Return Loss	- 28.6 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	57.2 Ω - 5.1 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.5 Ω - 1.0 jΩ
Return Loss	- 25.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	53.1 Ω - 8.0 jΩ
Return Loss	- 21.7 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	51.9 Ω - 2.0 jΩ
Return Loss	- 31.4 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.7 Ω - 3.7 jΩ
Return Loss	- 21.2 dB

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.0 Ω + 1.5 jΩ
Return Loss	- 24.7 dB

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

General Antenna Parameters and Design

Electrical Delay (one direction)	1.207 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	September 24, 2010

DASY5 Validation Report for Head TSL

Date: 07.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1104

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 4.58 S/m; ε_r = 34.7; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 4.68 S/m; ε_r = 34.5; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 4.96 S/m; ε_r = 34.1; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 5.17 S/m; ε_r = 33.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.41, 5.41, 5.41); Calibrated: 28.12.2012, ConvF(5.1, 5.1, 5.1); Calibrated: 28.12.2012, ConvF(4.76, 4.76, 4.76); Calibrated: 28.12.2012, ConvF(4.81, 4.81, 4.81); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

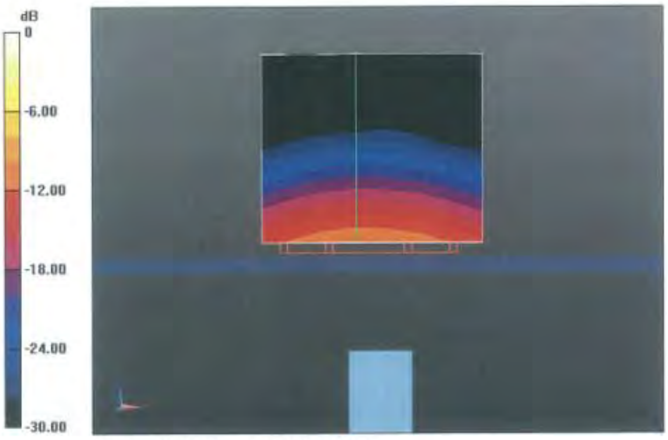
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.914 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 31.2 W/kg
SAR(1 g) = 8.27 W/kg; SAR(10 g) = 2.36 W/kg
Maximum value of SAR (measured) = 19.3 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 = 66.338 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 32.5 W/kg
SAR(1 g) = 8.51 W/kg; SAR(10 g) = 2.44 W/kg
Maximum value of SAR (measured) = 20.0 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 = 65.836 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 34.4 W/kg
SAR(1 g) = 8.62 W/kg; SAR(10 g) = 2.45 W/kg
Maximum value of SAR (measured) = 20.7 W/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

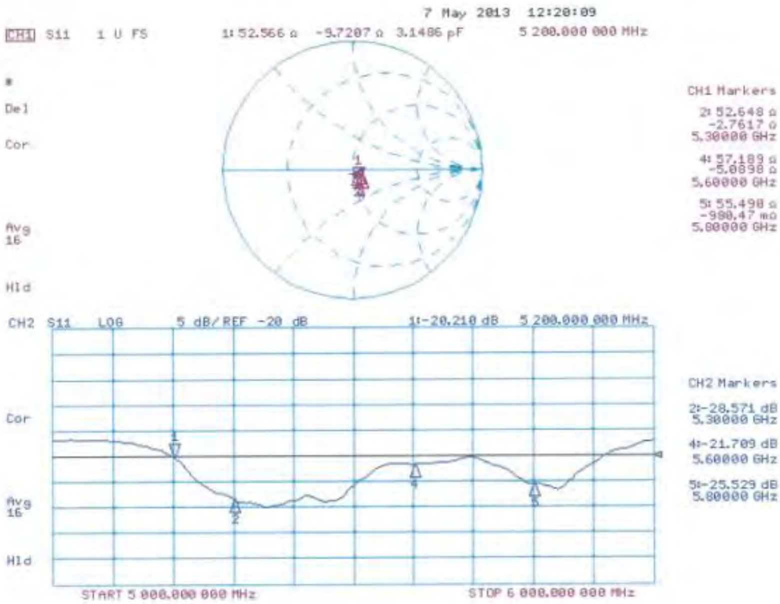
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz 2/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.381 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 33.9 W/kg
SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 19.8 W/kg



0 dB = 19.8 W/kg = 12.97 dBW/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Impedance Measurement Plot for Head TSL



Certificate No: D5GHzV2-1104_May13 Page 12 of 15

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

DASY5 Validation Report for Body TSL

Date: 06.05.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1104

Communication System: UID 0 - CW ; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz
Medium parameters used: f = 5200 MHz; σ = 5.43 S/m; ε_r = 46.9; ρ = 1000 kg/m^3 , Medium parameters used: f = 5300 MHz; σ = 5.56 S/m; ε_r = 46.8; ρ = 1000 kg/m^3 , Medium parameters used: f = 5600 MHz; σ = 5.94 S/m; ε_r = 46.2; ρ = 1000 kg/m^3 , Medium parameters used: f = 5800 MHz; σ = 6.22 S/m; ε_r = 45.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.91, 4.91, 4.91); Calibrated: 28.12.2012, ConvF(4.67, 4.67, 4.67); Calibrated: 28.12.2012, ConvF(4.22, 4.22, 4.22); Calibrated: 28.12.2012, ConvF(4.38, 4.38, 4.38); Calibrated: 28.12.2012;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.6(1115); SEMCAD X 14.6.9(7117)

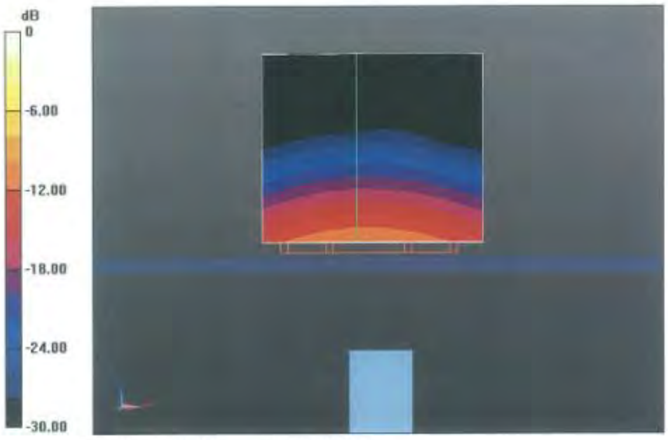
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.375 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 30.1 W/kg
SAR(1 g) = 7.64 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.0 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 = 59.419 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 18.5 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 59.408 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 36.4 W/kg
SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.29 W/kg
Maximum value of SAR (measured) = 20.3 W/kg

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

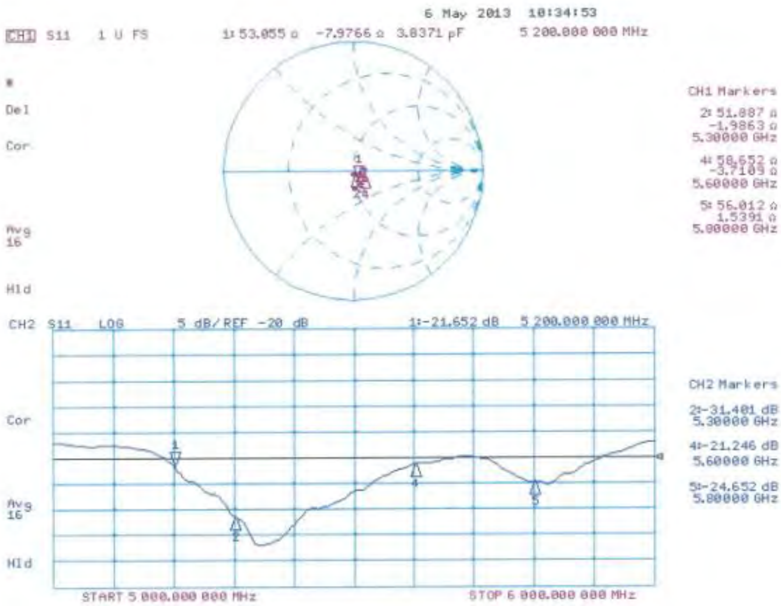
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 56.084 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 35.3 W/kg
SAR(1 g) = 7.6 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 18.9 W/kg



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

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group

Impedance Measurement Plot for Body TSL



Certificate No: D5GHzV2-1104_May13 Page 15 of 15

- End of 1st part of report -

SGS Taiwan Ltd. No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路134號
台灣檢驗科技股份有限公司 t (886-2) 2299-3279 f (886-2) 2298-0488 www.tw.sgs.com
Member of SGS Group