SAR TEST REPORT

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

Equipment Under Test	LTE/WCDMA Module
Marketing Name	MCM3
Brand Name	Mobile Create
Model No.	MCM3
Company Name	Mobile Create Co ., Ltd.
Company Address	2-5-60 Higashi-Omichi Oita City,Oita Prefecture 870-0823,Japan
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013, KDB865664D01v01r04,KDB865664D02v01r02, KDB941225D01v03r01,KDB941225D05v02r05, KDB447498D01v06,
FCC ID	N7NHL7588
Date of Receipt	Aug. 09, 2018
Date of Test(s)	Sep. 18, 2018 ~ Sep. 19, 2018
Date of Issue	Jan. 29, 2019

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

Clerk / Annie Chang	Asst. Supervisor / Afu Chen	Asst. Manager / John Yeh
Annie Chang	afu Chen	John Yeh

Date: Jan. 29, 2019

Revision History

Report Number	Revision	Description	Issue Date
EN/2018/80001	Rev.00	Initial creation of document	Nov. 12, 2018
EN/2018/80001	Rev.01	Add dipole 1900	Jan. 29, 2019

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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory	
1F, No. 8, Alley 15, Lane 120, Sec. 1, NeiHu Rd., NeiHu Dist., Taipei City, Taiwan, 11493.	
Tel	+886-2-2299-3279
Fax	+886-2-2298-0488
Internet	http://www.tw.sgs.com/

1.2 Details of Applicant

Company Name	Mobile Create Co ., Ltd.
Company Address	2-5-60 Higashi-Omichi Oita City, Oita Prefecture 870-0823, Japan

1.3 Description of EUT

Equipment Under Test	LTE/WCDMA Module			
Marketing Name	MCM3			
Brand Name	Mobile Create			
Model No.	MCM3			
FCC ID	N7NHL7588			
Mode of Operation	☒WCDMA ☒HSDPA ☒HSUPA ☒LTE FDD			
Duty Cycle	WCDMA	1		
	LTE FDD	1		
TX Frequency Range (MHz)	WCDMA Band II	1850	–	1910
	WCDMA Band V	824	–	849
	LTE FDD Band 2	1850	–	1910
	LTE FDD Band 4	1710	–	1755
	LTE FDD Band 5	824	–	849
	LTE FDD Band 13	777	–	787
	LTE FDD Band 17	704	–	716
Channel Number (ARFCN)	WCDMA Band II	18607	–	19193
	WCDMA Band V	4132	–	4233
	LTE FDD Band 2	20407	–	20643
	LTE FDD Band 4	23017	–	23173
	LTE FDD Band 5	26047	–	26683
	LTE FDD Band 13	23205	–	23255
	LTE FDD Band 17	23755	–	23825

Max. SAR (1 g) (Unit: W/Kg)				
Band	Measured	Reported	Channel	Position
WCDMA Band II	1.25	1.28	9538	Back side
WCDMA Band V	1.30	1.33	4233	Back side
LTE FDD Band 2	1.30	1.30	19100	Back side
LTE FDD Band 4	0.68	0.68	20300	Back side
LTE FDD Band 5	0.99	1.14	20600	Back side
LTE FDD Band 13	0.72	0.83	23230	Back side
LTE FDD Band 17	0.69	0.74	23800	Back side

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

Unit: dBm

Band		WCDMA II		
TX Channel		9262	9400	9538
Frequency (MHz)		1852.4	1880	1907.6
Max. Rated Avg. Power+Max. Tolerance (dBm)		**23.00**		
3GPP Rel 99	RMC 12.2Kbps	22.77	22.95	22.90
3GPP Rel 5	HSDPA Subtest-1	22.22	22.49	22.53
	HSDPA Subtest-2	21.74	22.07	22.08
	HSDPA Subtest-3	21.31	21.58	21.72
	HSDPA Subtest-4	21.02	21.34	21.46
3GPP Rel 6	HSUPA Subtest-1	22.17	22.55	22.72
	HSUPA Subtest-2	22.18	22.54	22.62
	HSUPA Subtest-3	21.28	21.67	21.77
	HSUPA Subtest-4	22.20	22.55	22.65
	HSUPA Subtest-5	21.68	22.12	22.22

Band		WCDMA V		
TX Channel		4132	4183	4233
Frequency (MHz)		826.4	836.6	846.6
Max. Rated Avg. Power+Max. Tolerance (dBm)		**23.00**		
3GPP Rel 99	RMC 12.2Kbps	22.95	22.99	22.89
3GPP Rel 5	HSDPA Subtest-1	22.37	22.48	22.45
	HSDPA Subtest-2	21.92	22.00	21.92
	HSDPA Subtest-3	21.44	21.57	21.51
	HSDPA Subtest-4	21.21	21.37	21.29
3GPP Rel 6	HSUPA Subtest-1	22.49	22.53	22.23
	HSUPA Subtest-2	22.47	22.51	22.34
	HSUPA Subtest-3	21.52	21.55	21.39
	HSUPA Subtest-4	22.47	22.50	22.32
	HSUPA Subtest-5	21.94	22.05	21.86

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LTE FDD Band 2 / Band 4 / Band 5 / Band 13 / Band 17 power table:

FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
20	QPSK	1 RB	0	1860	18700	22.83	23	0
				1880	18900	22.55	23	0
				1900	19100	23.00	23	0
			50	1860	18700	22.05	23	0
				1880	18900	22.14	23	0
				1900	19100	22.55	23	0
			99	1860	18700	22.08	23	0
				1880	18900	22.25	23	0
				1900	19100	22.17	23	0
		50 RB	0	1860	18700	21.83	22	0-1
				1880	18900	21.74	22	0-1
				1900	19100	21.93	22	0-1
			25	1860	18700	21.42	22	0-1
				1880	18900	21.50	22	0-1
				1900	19100	21.79	22	0-1
			50	1860	18700	21.40	22	0-1
				1880	18900	21.54	22	0-1
				1900	19100	21.72	22	0-1
		100RB		1860	18700	21.69	22	0-1
				1880	18900	21.61	22	0-1
				1900	19100	21.93	22	0-1
	16-QAM	1 RB	0	1860	18700	21.85	22	0-1
				1880	18900	22.00	22	0-1
				1900	19100	21.62	22	0-1
			50	1860	18700	21.79	22	0-1
				1880	18900	21.33	22	0-1
				1900	19100	21.77	22	0-1
			99	1860	18700	21.80	22	0-1
				1880	18900	21.72	22	0-1
				1900	19100	21.66	22	0-1
		50 RB	0	1860	18700	20.80	21	0-2
				1880	18900	20.75	21	0-2
				1900	19100	20.71	21	0-2
			25	1860	18700	20.32	21	0-2
				1880	18900	20.49	21	0-2
				1900	19100	20.79	21	0-2
			50	1860	18700	20.44	21	0-2
				1880	18900	20.56	21	0-2
				1900	19100	20.75	21	0-2
		100RB		1860	18700	20.64	21	0-2
				1880	18900	20.66	21	0-2
				1900	19100	20.88	21	0-2

FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
20	64-QAM	1 RB	0	1860	18700	21.88	22	0-1
				1880	18900	21.78	22	0-1
				1900	19100	21.69	22	0-1
			50	1860	18700	21.30	22	0-1
				1880	18900	21.24	22	0-1
				1900	19100	21.75	22	0-1
			99	1860	18700	21.76	22	0-1
				1880	18900	21.57	22	0-1
				1900	19100	21.48	22	0-1
		50 RB	0	1860	18700	20.85	21	0-2
				1880	18900	20.81	21	0-2
				1900	19100	20.83	21	0-2
			25	1860	18700	20.45	21	0-2
				1880	18900	20.38	21	0-2
				1900	19100	20.76	21	0-2
			50	1860	18700	20.41	21	0-2
				1880	18900	20.55	21	0-2
				1900	19100	20.64	21	0-2
		100RB		1860	18700	20.53	21	0-2
				1880	18900	20.66	21	0-2
				1900	19100	20.98	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
15	QPSK	1 RB	0	1857.5	18675	22.69	23	0
				1880	18900	22.52	23	0
				1902.5	19125	22.90	23	0
			36	1857.5	18675	21.95	23	0
				1880	18900	21.94	23	0
				1902.5	19125	22.38	23	0
			74	1857.5	18675	21.99	23	0
				1880	18900	22.06	23	0
				1902.5	19125	22.07	23	0
		36 RB	0	1857.5	18675	21.76	22	0-1
				1880	18900	21.61	22	0-1
				1902.5	19125	21.78	22	0-1
			18	1857.5	18675	21.23	22	0-1
				1880	18900	21.39	22	0-1
				1902.5	19125	21.67	22	0-1
			37	1857.5	18675	21.22	22	0-1
				1880	18900	21.34	22	0-1
				1902.5	19125	21.59	22	0-1
		75RB		1857.5	18675	21.51	22	0-1
				1880	18900	21.51	22	0-1
				1902.5	19125	21.78	22	0-1
	16-QAM	1 RB	0	1857.5	18675	21.74	22	0-1
				1880	18900	21.92	22	0-1
				1902.5	19125	21.49	22	0-1
			36	1857.5	18675	21.77	22	0-1
				1880	18900	21.30	22	0-1
				1902.5	19125	21.59	22	0-1
			74	1857.5	18675	21.73	22	0-1
				1880	18900	21.69	22	0-1
				1902.5	19125	21.46	22	0-1
		36 RB	0	1857.5	18675	20.73	21	0-2
				1880	18900	20.62	21	0-2
				1902.5	19125	20.60	21	0-2
			18	1857.5	18675	20.12	21	0-2
				1880	18900	20.41	21	0-2
				1902.5	19125	20.67	21	0-2
			37	1857.5	18675	20.35	21	0-2
				1880	18900	20.36	21	0-2
				1902.5	19125	20.55	21	0-2
		75RB		1857.5	18675	20.57	21	0-2
				1880	18900	20.56	21	0-2
				1902.5	19125	20.80	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
15	64-QAM	1 RB	0	1857.5	18675	21.83	22	0-1
				1880	18900	21.67	22	0-1
				1902.5	19125	21.58	22	0-1
			36	1857.5	18675	21.10	22	0-1
				1880	18900	21.10	22	0-1
				1902.5	19125	21.55	22	0-1
			74	1857.5	18675	21.71	22	0-1
				1880	18900	21.43	22	0-1
				1902.5	19125	21.44	22	0-1
		36 RB	0	1857.5	18675	20.77	21	0-2
				1880	18900	20.61	21	0-2
				1902.5	19125	20.65	21	0-2
			18	1857.5	18675	20.38	21	0-2
				1880	18900	20.29	21	0-2
				1902.5	19125	20.70	21	0-2
			37	1857.5	18675	20.24	21	0-2
				1880	18900	20.48	21	0-2
				1902.5	19125	20.56	21	0-2
		75RB		1857.5	18675	20.40	21	0-2
				1880	18900	20.60	21	0-2
				1902.5	19125	20.85	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	QPSK	1 RB	0	1855	18650	22.65	23	0
				1880	18900	22.50	23	0
				1905	19150	22.75	23	0
			25	1855	18650	21.88	23	0
				1880	18900	21.77	23	0
				1905	19150	22.22	23	0
			49	1855	18650	21.94	23	0
				1880	18900	21.95	23	0
				1905	19150	21.94	23	0
		25 RB	0	1855	18650	21.58	22	0-1
				1880	18900	21.50	22	0-1
				1905	19150	21.72	22	0-1
			12	1855	18650	21.18	22	0-1
				1880	18900	21.23	22	0-1
				1905	19150	21.54	22	0-1
			25	1855	18650	21.01	22	0-1
				1880	18900	21.31	22	0-1
				1905	19150	21.40	22	0-1
		50RB		1855	18650	21.33	22	0-1
				1880	18900	21.33	22	0-1
				1905	19150	21.57	22	0-1
	16-QAM	1 RB	0	1855	18650	21.60	22	0-1
				1880	18900	21.77	22	0-1
				1905	19150	21.38	22	0-1
			25	1855	18650	21.64	22	0-1
				1880	18900	21.16	22	0-1
				1905	19150	21.56	22	0-1
			49	1855	18650	21.62	22	0-1
				1880	18900	21.49	22	0-1
				1905	19150	21.44	22	0-1
		25 RB	0	1855	18650	20.63	21	0-2
				1880	18900	20.60	21	0-2
				1905	19150	20.54	21	0-2
			12	1855	18650	20.02	21	0-2
				1880	18900	20.26	21	0-2
				1905	19150	20.55	21	0-2
			25	1855	18650	20.30	21	0-2
				1880	18900	20.30	21	0-2
				1905	19150	20.53	21	0-2
		50RB		1855	18650	20.49	21	0-2
				1880	18900	20.43	21	0-2
				1905	19150	20.75	21	0-2

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BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	64-QAM	1 RB	0	1855	18650	21.65	22	0-1
				1880	18900	21.48	22	0-1
				1905	19150	21.46	22	0-1
			25	1855	18650	21.03	22	0-1
				1880	18900	20.95	22	0-1
				1905	19150	21.43	22	0-1
			49	1855	18650	21.57	22	0-1
				1880	18900	21.41	22	0-1
				1905	19150	21.34	22	0-1
		25 RB	0	1855	18650	20.62	21	0-2
				1880	18900	20.46	21	0-2
				1905	19150	20.59	21	0-2
			12	1855	18650	20.21	21	0-2
				1880	18900	20.25	21	0-2
				1905	19150	20.59	21	0-2
			25	1855	18650	20.18	21	0-2
				1880	18900	20.28	21	0-2
				1905	19150	20.46	21	0-2
		50RB		1855	18650	20.21	21	0-2
				1880	18900	20.57	21	0-2
				1905	19150	20.71	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	QPSK	1 RB	0	1852.5	18625	22.62	23	0
				1880	18900	22.39	23	0
				1907.5	19175	22.67	23	0
			12	1852.5	18625	21.84	23	0
				1880	18900	21.64	23	0
				1907.5	19175	22.01	23	0
			24	1852.5	18625	21.77	23	0
				1880	18900	21.78	23	0
				1907.5	19175	21.75	23	0
		12 RB	0	1852.5	18625	21.52	22	0-1
				1880	18900	21.43	22	0-1
				1907.5	19175	21.70	22	0-1
			6	1852.5	18625	21.10	22	0-1
				1880	18900	21.19	22	0-1
				1907.5	19175	21.33	22	0-1
			13	1852.5	18625	20.97	22	0-1
				1880	18900	21.29	22	0-1
				1907.5	19175	21.29	22	0-1
		25RB		1852.5	18625	21.13	22	0-1
				1880	18900	21.27	22	0-1
				1907.5	19175	21.54	22	0-1
	16-QAM	1 RB	0	1852.5	18625	21.47	22	0-1
				1880	18900	21.64	22	0-1
				1907.5	19175	21.22	22	0-1
			12	1852.5	18625	21.47	22	0-1
				1880	18900	21.05	22	0-1
				1907.5	19175	21.43	22	0-1
			24	1852.5	18625	21.56	22	0-1
				1880	18900	21.36	22	0-1
				1907.5	19175	21.42	22	0-1
		12 RB	0	1852.5	18625	20.48	21	0-2
				1880	18900	20.48	21	0-2
				1907.5	19175	20.41	21	0-2
			6	1852.5	18625	19.89	21	0-2
				1880	18900	20.21	21	0-2
				1907.5	19175	20.47	21	0-2
			13	1852.5	18625	20.12	21	0-2
				1880	18900	20.15	21	0-2
				1907.5	19175	20.35	21	0-2
		25RB		1852.5	18625	20.40	21	0-2
				1880	18900	20.31	21	0-2
				1907.5	19175	20.60	21	0-2

FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	64-QAM	1 RB	0	1852.5	18625	21.63	22	0-1
				1880	18900	21.33	22	0-1
				1907.5	19175	21.32	22	0-1
			12	1852.5	18625	20.96	22	0-1
				1880	18900	20.77	22	0-1
				1907.5	19175	21.25	22	0-1
			24	1852.5	18625	21.42	22	0-1
				1880	18900	21.39	22	0-1
				1907.5	19175	21.14	22	0-1
		12 RB	0	1852.5	18625	20.54	21	0-2
				1880	18900	20.29	21	0-2
				1907.5	19175	20.38	21	0-2
			6	1852.5	18625	20.10	21	0-2
				1880	18900	20.05	21	0-2
				1907.5	19175	20.44	21	0-2
			13	1852.5	18625	20.00	21	0-2
				1880	18900	20.12	21	0-2
				1907.5	19175	20.32	21	0-2
		25RB		1852.5	18625	20.00	21	0-2
				1880	18900	20.40	21	0-2
				1907.5	19175	20.69	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	QPSK	1 RB	0	1851.5	18615	22.52	23	0
				1880	18900	22.20	23	0
				1908.5	19185	22.49	23	0
			7	1851.5	18615	21.75	23	0
				1880	18900	21.56	23	0
				1908.5	19185	21.89	23	0
			14	1851.5	18615	21.65	23	0
				1880	18900	21.67	23	0
				1908.5	19185	21.61	23	0
		8 RB	0	1851.5	18615	21.41	22	0-1
				1880	18900	21.26	22	0-1
				1908.5	19185	21.61	22	0-1
			4	1851.5	18615	21.08	22	0-1
				1880	18900	21.16	22	0-1
				1908.5	19185	21.24	22	0-1
			7	1851.5	18615	20.94	22	0-1
				1880	18900	21.16	22	0-1
				1908.5	19185	21.17	22	0-1
		15RB		1851.5	18615	21.04	22	0-1
				1880	18900	21.09	22	0-1
				1908.5	19185	21.51	22	0-1
	16-QAM	1 RB	0	1851.5	18615	21.36	22	0-1
				1880	18900	21.55	22	0-1
				1908.5	19185	21.02	22	0-1
			7	1851.5	18615	21.44	22	0-1
				1880	18900	20.98	22	0-1
				1908.5	19185	21.29	22	0-1
			14	1851.5	18615	21.35	22	0-1
				1880	18900	21.18	22	0-1
				1908.5	19185	21.33	22	0-1
		8 RB	0	1851.5	18615	20.42	21	0-2
				1880	18900	20.38	21	0-2
				1908.5	19185	20.30	21	0-2
			4	1851.5	18615	19.72	21	0-2
				1880	18900	20.14	21	0-2
				1908.5	19185	20.28	21	0-2
			7	1851.5	18615	19.95	21	0-2
				1880	18900	20.13	21	0-2
				1908.5	19185	20.19	21	0-2
		15RB		1851.5	18615	20.33	21	0-2
				1880	18900	20.29	21	0-2
				1908.5	19185	20.47	21	0-2

FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	64-QAM	1 RB	0	1851.5	18615	21.52	22	0-1
				1880	18900	21.30	22	0-1
				1908.5	19185	21.30	22	0-1
			7	1851.5	18615	20.83	22	0-1
				1880	18900	20.68	22	0-1
				1908.5	19185	21.22	22	0-1
			14	1851.5	18615	21.29	22	0-1
				1880	18900	21.24	22	0-1
				1908.5	19185	21.02	22	0-1
		8 RB	0	1851.5	18615	20.50	21	0-2
				1880	18900	20.27	21	0-2
				1908.5	19185	20.28	21	0-2
			4	1851.5	18615	19.93	21	0-2
				1880	18900	19.86	21	0-2
				1908.5	19185	20.32	21	0-2
			7	1851.5	18615	19.88	21	0-2
				1880	18900	20.03	21	0-2
				1908.5	19185	20.26	21	0-2
		15RB		1851.5	18615	19.91	21	0-2
				1880	18900	20.37	21	0-2
				1908.5	19185	20.51	21	0-2

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FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	QPSK	1 RB	0	1850.7	18607	22.32	23	0
				1880	18900	22.04	23	0
				1909.3	19193	22.32	23	0
			2	1850.7	18607	21.71	23	0
				1880	18900	21.48	23	0
				1909.3	19193	21.74	23	0
			5	1850.7	18607	21.54	23	0
				1880	18900	21.49	23	0
				1909.3	19193	21.52	23	0
		3 RB	0	1850.7	18607	21.33	22	0-1
				1880	18900	21.12	22	0-1
				1909.3	19193	21.53	22	0-1
			2	1850.7	18607	20.93	22	0-1
				1880	18900	21.08	22	0-1
				1909.3	19193	21.11	22	0-1
			3	1850.7	18607	20.75	22	0-1
				1880	18900	21.07	22	0-1
				1909.3	19193	21.00	22	0-1
		6RB		1850.7	18607	21.01	22	0-1
				1880	18900	20.93	22	0-1
				1909.3	19193	21.40	22	0-1
	16-QAM	1 RB	0	1850.7	18607	21.30	22	0-1
				1880	18900	21.48	22	0-1
				1909.3	19193	20.86	22	0-1
			2	1850.7	18607	21.29	22	0-1
				1880	18900	20.92	22	0-1
				1909.3	19193	21.18	22	0-1
			5	1850.7	18607	21.19	22	0-1
				1880	18900	21.02	22	0-1
				1909.3	19193	21.22	22	0-1
		3 RB	0	1850.7	18607	20.27	21	0-1
				1880	18900	20.34	21	0-1
				1909.3	19193	20.19	21	0-1
			2	1850.7	18607	19.69	21	0-1
				1880	18900	19.93	21	0-1
				1909.3	19193	20.13	21	0-1
			3	1850.7	18607	19.80	21	0-1
				1880	18900	20.08	21	0-1
				1909.3	19193	20.15	21	0-1
		6RB		1850.7	18607	20.25	21	0-2
				1880	18900	20.17	21	0-2
				1909.3	19193	20.40	21	0-2

FDD Band 2								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	64-QAM	1 RB	0	1850.7	18607	21.47	22	0-1
				1880	18900	21.13	22	0-1
				1909.3	19193	21.19	22	0-1
			2	1850.7	18607	20.70	22	0-1
				1880	18900	20.59	22	0-1
				1909.3	19193	21.17	22	0-1
			5	1850.7	18607	21.17	22	0-1
				1880	18900	21.08	22	0-1
				1909.3	19193	20.98	22	0-1
		3 RB	0	1850.7	18607	20.35	21	0-1
				1880	18900	20.24	21	0-1
				1909.3	19193	20.14	21	0-1
			2	1850.7	18607	19.91	21	0-1
				1880	18900	19.82	21	0-1
				1909.3	19193	20.21	21	0-1
			3	1850.7	18607	19.83	21	0-1
				1880	18900	19.85	21	0-1
				1909.3	19193	20.21	21	0-1
		6RB		1850.7	18607	19.86	21	0-2
				1880	18900	20.20	21	0-2
				1909.3	19193	20.49	21	0-2

FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
20	QPSK	1 RB	0	1720	20050	22.79	23	0
				1732.5	20175	22.88	23	0
				1745	20300	22.97	23	0
			50	1720	20050	22.63	23	0
				1732.5	20175	22.59	23	0
				1745	20300	22.50	23	0
			99	1720	20050	22.46	23	0
				1732.5	20175	22.35	23	0
				1745	20300	22.57	23	0
		50 RB	0	1720	20050	21.71	22	0-1
				1732.5	20175	21.81	22	0-1
				1745	20300	21.94	22	0-1
			25	1720	20050	21.55	22	0-1
				1732.5	20175	21.58	22	0-1
				1745	20300	21.87	22	0-1
			50	1720	20050	21.56	22	0-1
				1732.5	20175	21.70	22	0-1
				1745	20300	21.91	22	0-1
		100RB		1720	20050	21.78	22	0-1
				1732.5	20175	21.82	22	0-1
				1745	20300	21.95	22	0-1
	16-QAM	1 RB	0	1720	20050	21.84	22	0-1
				1732.5	20175	21.35	22	0-1
				1745	20300	21.89	22	0-1
			50	1720	20050	21.64	22	0-1
				1732.5	20175	21.67	22	0-1
				1745	20300	21.43	22	0-1
			99	1720	20050	21.64	22	0-1
				1732.5	20175	21.62	22	0-1
				1745	20300	21.73	22	0-1
		50 RB	0	1720	20050	20.91	21	0-1
				1732.5	20175	20.90	21	0-1
				1745	20300	20.74	21	0-1
			25	1720	20050	20.75	21	0-1
				1732.5	20175	20.75	21	0-1
				1745	20300	20.90	21	0-1
			50	1720	20050	20.75	21	0-1
				1732.5	20175	20.80	21	0-1
				1745	20300	20.75	21	0-1
		100RB		1720	20050	20.74	21	0-2
				1732.5	20175	20.88	21	0-2
				1745	20300	20.91	21	0-2

FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
20	64-QAM	1 RB	0	1720	20050	21.82	22	0-1
				1732.5	20175	21.73	22	0-1
				1745	20300	21.77	22	0-1
			50	1720	20050	21.93	22	0-1
				1732.5	20175	21.85	22	0-1
				1745	20300	21.73	22	0-1
			99	1720	20050	21.80	22	0-1
				1732.5	20175	21.64	22	0-1
				1745	20300	21.67	22	0-1
		50 RB	0	1720	20050	20.93	21	0-1
				1732.5	20175	20.99	21	0-1
				1745	20300	20.82	21	0-1
			25	1720	20050	20.66	21	0-1
				1732.5	20175	20.70	21	0-1
				1745	20300	20.86	21	0-1
			50	1720	20050	20.60	21	0-1
				1732.5	20175	20.68	21	0-1
				1745	20300	20.98	21	0-1
		100RB		1720	20050	20.69	21	0-2
				1732.5	20175	20.71	21	0-2
				1745	20300	20.92	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
15	QPSK	1 RB	0	1717.5	20025	22.59	23	0
				1732.5	20175	22.57	23	0
				1747.5	20325	22.76	23	0
			36	1717.5	20025	22.27	23	0
				1732.5	20175	21.99	23	0
				1747.5	20325	22.32	23	0
			74	1717.5	20025	22.04	23	0
				1732.5	20175	22.27	23	0
				1747.5	20325	22.52	23	0
		36 RB	0	1717.5	20025	21.62	22	0-1
				1732.5	20175	21.69	22	0-1
				1747.5	20325	21.85	22	0-1
			18	1717.5	20025	21.38	22	0-1
				1732.5	20175	21.46	22	0-1
				1747.5	20325	21.77	22	0-1
			37	1717.5	20025	21.49	22	0-1
				1732.5	20175	21.48	22	0-1
				1747.5	20325	21.83	22	0-1
		75RB		1717.5	20025	21.65	22	0-1
				1732.5	20175	21.77	22	0-1
				1747.5	20325	21.79	22	0-1
	16-QAM	1 RB	0	1717.5	20025	21.65	22	0-1
				1732.5	20175	21.24	22	0-1
				1747.5	20325	21.70	22	0-1
			36	1717.5	20025	21.44	22	0-1
				1732.5	20175	21.57	22	0-1
				1747.5	20325	21.39	22	0-1
			74	1717.5	20025	21.47	22	0-1
				1732.5	20175	21.44	22	0-1
				1747.5	20325	21.67	22	0-1
		36 RB	0	1717.5	20025	20.82	21	0-2
				1732.5	20175	20.73	21	0-2
				1747.5	20325	20.71	21	0-2
			18	1717.5	20025	20.72	21	0-2
				1732.5	20175	20.56	21	0-2
				1747.5	20325	20.85	21	0-2
			37	1717.5	20025	20.64	21	0-2
				1732.5	20175	20.76	21	0-2
				1747.5	20325	20.59	21	0-2
		75RB		1717.5	20025	20.62	21	0-2
				1732.5	20175	20.79	21	0-2
				1747.5	20325	20.80	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
15	64-QAM	1 RB	0	1717.5	20025	21.60	22	0-1
				1732.5	20175	21.52	22	0-1
				1747.5	20325	21.59	22	0-1
			36	1717.5	20025	21.76	22	0-1
				1732.5	20175	21.81	22	0-1
				1747.5	20325	21.68	22	0-1
			74	1717.5	20025	21.75	22	0-1
				1732.5	20175	21.53	22	0-1
				1747.5	20325	21.48	22	0-1
		36 RB	0	1717.5	20025	20.82	21	0-2
				1732.5	20175	20.92	21	0-2
				1747.5	20325	20.61	21	0-2
			18	1717.5	20025	20.61	21	0-2
				1732.5	20175	20.61	21	0-2
				1747.5	20325	20.77	21	0-2
			37	1717.5	20025	20.40	21	0-2
				1732.5	20175	20.53	21	0-2
				1747.5	20325	20.88	21	0-2
		75RB		1717.5	20025	20.66	21	0-2
				1732.5	20175	20.51	21	0-2
				1747.5	20325	20.89	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	QPSK	1 RB	0	1715	20000	22.41	23	0
				1732.5	20175	22.53	23	0
				1750	20350	22.69	23	0
			25	1715	20000	22.22	23	0
				1732.5	20175	21.96	23	0
				1750	20350	22.22	23	0
			49	1715	20000	21.82	23	0
				1732.5	20175	22.08	23	0
				1750	20350	22.31	23	0
		25 RB	0	1715	20000	21.51	22	0-1
				1732.5	20175	21.66	22	0-1
				1750	20350	21.78	22	0-1
			12	1715	20000	21.16	22	0-1
				1732.5	20175	21.42	22	0-1
				1750	20350	21.68	22	0-1
			25	1715	20000	21.38	22	0-1
				1732.5	20175	21.40	22	0-1
				1750	20350	21.76	22	0-1
		50RB		1715	20000	21.51	22	0-1
				1732.5	20175	21.56	22	0-1
				1750	20350	21.67	22	0-1
	16-QAM	1 RB	0	1715	20000	21.52	22	0-1
				1732.5	20175	21.15	22	0-1
				1750	20350	21.62	22	0-1
			25	1715	20000	21.29	22	0-1
				1732.5	20175	21.53	22	0-1
				1750	20350	21.34	22	0-1
			49	1715	20000	21.25	22	0-1
				1732.5	20175	21.41	22	0-1
				1750	20350	21.52	22	0-1
		25 RB	0	1715	20000	20.74	21	0-2
				1732.5	20175	20.60	21	0-2
				1750	20350	20.49	21	0-2
			12	1715	20000	20.57	21	0-2
				1732.5	20175	20.42	21	0-2
				1750	20350	20.72	21	0-2
			25	1715	20000	20.47	21	0-2
				1732.5	20175	20.63	21	0-2
				1750	20350	20.45	21	0-2
		50RB		1715	20000	20.58	21	0-2
				1732.5	20175	20.68	21	0-2
				1750	20350	20.64	21	0-2

FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	64-QAM	1 RB	0	1715	20000	21.52	22	0-1
				1732.5	20175	21.30	22	0-1
				1750	20350	21.49	22	0-1
			25	1715	20000	21.67	22	0-1
				1732.5	20175	21.64	22	0-1
				1750	20350	21.53	22	0-1
			49	1715	20000	21.59	22	0-1
				1732.5	20175	21.50	22	0-1
				1750	20350	21.30	22	0-1
		25 RB	0	1715	20000	20.66	21	0-2
				1732.5	20175	20.72	21	0-2
				1750	20350	20.53	21	0-2
			12	1715	20000	20.40	21	0-2
				1732.5	20175	20.40	21	0-2
				1750	20350	20.64	21	0-2
			25	1715	20000	20.21	21	0-2
				1732.5	20175	20.49	21	0-2
				1750	20350	20.79	21	0-2
		50RB		1715	20000	20.51	21	0-2
				1732.5	20175	20.31	21	0-2
				1750	20350	20.67	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	QPSK	1 RB	0	1712.5	19975	22.31	23	0
				1732.5	20175	22.42	23	0
				1752.5	20375	22.55	23	0
			12	1712.5	19975	22.08	23	0
				1732.5	20175	21.86	23	0
				1752.5	20375	22.05	23	0
			24	1712.5	19975	21.78	23	0
				1732.5	20175	21.93	23	0
				1752.5	20375	22.09	23	0
		12 RB	0	1712.5	19975	21.47	22	0-1
				1732.5	20175	21.51	22	0-1
				1752.5	20375	21.66	22	0-1
			6	1712.5	19975	21.13	22	0-1
				1732.5	20175	21.30	22	0-1
				1752.5	20375	21.56	22	0-1
			13	1712.5	19975	21.20	22	0-1
				1732.5	20175	21.32	22	0-1
				1752.5	20375	21.73	22	0-1
		25RB		1712.5	19975	21.45	22	0-1
				1732.5	20175	21.49	22	0-1
				1752.5	20375	21.56	22	0-1
	16-QAM	1 RB	0	1712.5	19975	21.47	22	0-1
				1732.5	20175	20.96	22	0-1
				1752.5	20375	21.50	22	0-1
			12	1712.5	19975	21.15	22	0-1
				1732.5	20175	21.32	22	0-1
				1752.5	20375	21.13	22	0-1
			24	1712.5	19975	21.05	22	0-1
				1732.5	20175	21.20	22	0-1
				1752.5	20375	21.35	22	0-1
		12 RB	0	1712.5	19975	20.67	21	0-2
				1732.5	20175	20.48	21	0-2
				1752.5	20375	20.35	21	0-2
			6	1712.5	19975	20.43	21	0-2
				1732.5	20175	20.36	21	0-2
				1752.5	20375	20.51	21	0-2
			13	1712.5	19975	20.40	21	0-2
				1732.5	20175	20.44	21	0-2
				1752.5	20375	20.27	21	0-2
		25RB		1712.5	19975	20.55	21	0-2
				1732.5	20175	20.46	21	0-2
				1752.5	20375	20.48	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	64-QAM	1 RB	0	1712.5	19975	21.37	22	0-1
				1732.5	20175	21.11	22	0-1
				1752.5	20375	21.40	22	0-1
			12	1712.5	19975	21.48	22	0-1
				1732.5	20175	21.50	22	0-1
				1752.5	20375	21.50	22	0-1
			24	1712.5	19975	21.39	22	0-1
				1732.5	20175	21.30	22	0-1
				1752.5	20375	21.10	22	0-1
		12 RB	0	1712.5	19975	20.53	21	0-2
				1732.5	20175	20.53	21	0-2
				1752.5	20375	20.48	21	0-2
			6	1712.5	19975	20.22	21	0-2
				1732.5	20175	20.25	21	0-2
				1752.5	20375	20.56	21	0-2
			13	1712.5	19975	20.05	21	0-2
				1732.5	20175	20.32	21	0-2
				1752.5	20375	20.68	21	0-2
		25RB		1712.5	19975	20.45	21	0-2
				1732.5	20175	20.18	21	0-2
				1752.5	20375	20.62	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	QPSK	1 RB	0	1711.5	19965	22.21	23	0
				1732.5	20175	22.34	23	0
				1753.5	20385	22.41	23	0
			7	1711.5	19965	21.89	23	0
				1732.5	20175	21.81	23	0
				1753.5	20385	21.85	23	0
			14	1711.5	19965	21.65	23	0
				1732.5	20175	21.88	23	0
				1753.5	20385	22.05	23	0
		8 RB	0	1711.5	19965	21.29	22	0-1
				1732.5	20175	21.31	22	0-1
				1753.5	20385	21.62	22	0-1
			4	1711.5	19965	20.94	22	0-1
				1732.5	20175	21.21	22	0-1
				1753.5	20385	21.36	22	0-1
			7	1711.5	19965	21.08	22	0-1
				1732.5	20175	21.12	22	0-1
				1753.5	20385	21.64	22	0-1
		15RB		1711.5	19965	21.27	22	0-1
				1732.5	20175	21.36	22	0-1
				1753.5	20385	21.42	22	0-1
	16-QAM	1 RB	0	1711.5	19965	21.40	22	0-1
				1732.5	20175	20.77	22	0-1
				1753.5	20385	21.40	22	0-1
			7	1711.5	19965	21.08	22	0-1
				1732.5	20175	21.15	22	0-1
				1753.5	20385	20.97	22	0-1
			14	1711.5	19965	20.83	22	0-1
				1732.5	20175	21.13	22	0-1
				1753.5	20385	21.31	22	0-1
		8 RB	0	1711.5	19965	20.56	21	0-2
				1732.5	20175	20.38	21	0-2
				1753.5	20385	20.20	21	0-2
			4	1711.5	19965	20.25	21	0-2
				1732.5	20175	20.26	21	0-2
				1753.5	20385	20.41	21	0-2
			7	1711.5	19965	20.26	21	0-2
				1732.5	20175	20.37	21	0-2
				1753.5	20385	20.15	21	0-2
		15RB		1711.5	19965	20.49	21	0-2
				1732.5	20175	20.41	21	0-2
				1753.5	20385	20.36	21	0-2

FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	64-QAM	1 RB	0	1711.5	19965	21.23	22	0-1
				1732.5	20175	21.00	22	0-1
				1753.5	20385	21.36	22	0-1
			7	1711.5	19965	21.32	22	0-1
				1732.5	20175	21.28	22	0-1
				1753.5	20385	21.28	22	0-1
			14	1711.5	19965	21.19	22	0-1
				1732.5	20175	21.23	22	0-1
				1753.5	20385	21.07	22	0-1
		8 RB	0	1711.5	19965	20.50	21	0-2
				1732.5	20175	20.49	21	0-2
				1753.5	20385	20.37	21	0-2
			4	1711.5	19965	20.03	21	0-2
				1732.5	20175	20.19	21	0-2
				1753.5	20385	20.43	21	0-2
			7	1711.5	19965	19.95	21	0-2
				1732.5	20175	20.14	21	0-2
				1753.5	20385	20.47	21	0-2
		15RB		1711.5	19965	20.30	21	0-2
				1732.5	20175	20.15	21	0-2
				1753.5	20385	20.45	21	0-2

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FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	QPSK	1 RB	0	1710.7	19957	22.15	23	0
				1732.5	20175	22.17	23	0
				1754.3	20393	22.30	23	0
			2	1710.7	19957	21.81	23	0
				1732.5	20175	21.64	23	0
				1754.3	20393	21.68	23	0
			5	1710.7	19957	21.48	23	0
				1732.5	20175	21.87	23	0
				1754.3	20393	21.91	23	0
		3 RB	0	1710.7	19957	21.10	22	0-1
				1732.5	20175	21.14	22	0-1
				1754.3	20393	21.46	22	0-1
			2	1710.7	19957	20.90	22	0-1
				1732.5	20175	21.14	22	0-1
				1754.3	20393	21.27	22	0-1
			3	1710.7	19957	20.90	22	0-1
				1732.5	20175	20.93	22	0-1
				1754.3	20393	21.59	22	0-1
		6RB		1710.7	19957	21.19	22	0-1
				1732.5	20175	21.25	22	0-1
				1754.3	20393	21.28	22	0-1
	16-QAM	1 RB	0	1710.7	19957	21.29	22	0-1
				1732.5	20175	20.64	22	0-1
				1754.3	20393	21.30	22	0-1
			2	1710.7	19957	21.02	22	0-1
				1732.5	20175	20.95	22	0-1
				1754.3	20393	20.82	22	0-1
			5	1710.7	19957	20.71	22	0-1
				1732.5	20175	21.08	22	0-1
				1754.3	20393	21.28	22	0-1
		3 RB	0	1710.7	19957	20.36	21	0-1
				1732.5	20175	20.23	21	0-1
				1754.3	20393	20.17	21	0-1
			2	1710.7	19957	20.17	21	0-1
				1732.5	20175	20.12	21	0-1
				1754.3	20393	20.39	21	0-1
			3	1710.7	19957	20.17	21	0-1
				1732.5	20175	20.18	21	0-1
				1754.3	20393	20.14	21	0-1
		6RB		1710.7	19957	20.30	21	0-2
				1732.5	20175	20.34	21	0-2
				1754.3	20393	20.21	21	0-2

FDD Band 4								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	64-QAM	1 RB	0	1710.7	19957	21.18	22	0-1
				1732.5	20175	20.85	22	0-1
				1754.3	20393	21.17	22	0-1
			2	1710.7	19957	21.15	22	0-1
				1732.5	20175	21.23	22	0-1
				1754.3	20393	21.26	22	0-1
			5	1710.7	19957	21.17	22	0-1
				1732.5	20175	21.22	22	0-1
				1754.3	20393	21.06	22	0-1
		3 RB	0	1710.7	19957	20.45	21	0-1
				1732.5	20175	20.39	21	0-1
				1754.3	20393	20.20	21	0-1
			2	1710.7	19957	19.98	21	0-1
				1732.5	20175	20.14	21	0-1
				1754.3	20393	20.35	21	0-1
			3	1710.7	19957	19.84	21	0-1
				1732.5	20175	20.08	21	0-1
				1754.3	20393	20.46	21	0-1
		6RB		1710.7	19957	20.14	21	0-2
				1732.5	20175	20.02	21	0-2
				1754.3	20393	20.38	21	0-2

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FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	QPSK	1 RB	0	829	20450	22.45	23	0
				836.5	20525	22.42	23	0
				844	20600	22.38	23	0
			25	829	20450	22.22	23	0
				836.5	20525	22.19	23	0
				844	20600	22.17	23	0
			49	829	20450	22.33	23	0
				836.5	20525	22.13	23	0
				844	20600	21.91	23	0
		25 RB	0	829	20450	21.73	22	0-1
				836.5	20525	21.64	22	0-1
				844	20600	21.52	22	0-1
			12	829	20450	21.61	22	0-1
				836.5	20525	21.53	22	0-1
				844	20600	21.43	22	0-1
			25	829	20450	21.61	22	0-1
				836.5	20525	21.60	22	0-1
				844	20600	21.37	22	0-1
		50RB		829	20450	21.69	22	0-1
				836.5	20525	21.63	22	0-1
				844	20600	21.50	22	0-1
	16-QAM	1 RB	0	829	20450	21.85	22	0-1
				836.5	20525	21.76	22	0-1
				844	20600	21.82	22	0-1
			25	829	20450	21.63	22	0-1
				836.5	20525	21.55	22	0-1
				844	20600	21.97	22	0-1
			49	829	20450	21.69	22	0-1
				836.5	20525	21.98	22	0-1
				844	20600	21.47	22	0-1
		25 RB	0	829	20450	20.85	21	0-2
				836.5	20525	20.78	21	0-2
				844	20600	20.50	21	0-2
			12	829	20450	20.75	21	0-2
				836.5	20525	20.74	21	0-2
				844	20600	20.52	21	0-2
			25	829	20450	20.72	21	0-2
				836.5	20525	20.56	21	0-2
				844	20600	20.44	21	0-2
		500RB		829	20450	20.74	21	0-2
				836.5	20525	20.70	21	0-2
				844	20600	20.43	21	0-2

FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	64-QAM	1 RB	0	829	20450	21.90	22	0-1
				836.5	20525	21.78	22	0-1
				844	20600	21.35	22	0-1
			25	829	20450	21.99	22	0-1
				836.5	20525	21.99	22	0-1
				844	20600	21.38	22	0-1
			49	829	20450	21.88	22	0-1
				836.5	20525	21.64	22	0-1
				844	20600	21.54	22	0-1
		25 RB	0	829	20450	20.83	21	0-2
				836.5	20525	20.66	21	0-2
				844	20600	20.60	21	0-2
			12	829	20450	20.75	21	0-2
				836.5	20525	20.40	21	0-2
				844	20600	20.51	21	0-2
			25	829	20450	20.74	21	0-2
				836.5	20525	20.57	21	0-2
				844	20600	20.46	21	0-2
		500RB		829	20450	20.81	21	0-2
				836.5	20525	20.59	21	0-2
				844	20600	20.51	21	0-2

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FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	QPSK	1 RB	0	826.5	20425	22.32	23	0
				836.5	20525	22.21	23	0
				846.5	20625	22.09	23	0
			12	826.5	20425	22.09	23	0
				836.5	20525	22.11	23	0
				846.5	20625	22.12	23	0
			24	826.5	20425	22.15	23	0
				836.5	20525	21.97	23	0
				846.5	20625	21.75	23	0
		12 RB	0	826.5	20425	21.66	22	0-1
				836.5	20525	21.42	22	0-1
				846.5	20625	21.41	22	0-1
			6	826.5	20425	21.47	22	0-1
				836.5	20525	21.32	22	0-1
				846.5	20625	21.36	22	0-1
			13	826.5	20425	21.49	22	0-1
				836.5	20525	21.54	22	0-1
				846.5	20625	21.29	22	0-1
		25RB		826.5	20425	21.58	22	0-1
				836.5	20525	21.46	22	0-1
				846.5	20625	21.40	22	0-1
	16-QAM	1 RB	0	826.5	20425	21.70	22	0-1
				836.5	20525	21.63	22	0-1
				846.5	20625	21.60	22	0-1
			12	826.5	20425	21.59	22	0-1
				836.5	20525	21.46	22	0-1
				846.5	20625	21.81	22	0-1
			24	826.5	20425	21.61	22	0-1
				836.5	20525	21.78	22	0-1
				846.5	20625	21.27	22	0-1
		12 RB	0	826.5	20425	20.82	21	0-2
				836.5	20525	20.69	21	0-2
				846.5	20625	20.28	21	0-2
			6	826.5	20425	20.55	21	0-2
				836.5	20525	20.58	21	0-2
				846.5	20625	20.40	21	0-2
			13	826.5	20425	20.54	21	0-2
				836.5	20525	20.42	21	0-2
				846.5	20625	20.31	21	0-2
		25RB		826.5	20425	20.57	21	0-2
				836.5	20525	20.53	21	0-2
				846.5	20625	20.32	21	0-2

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FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	64-QAM	1 RB	0	826.5	20425	21.83	22	0-1
				836.5	20525	21.72	22	0-1
				846.5	20625	21.13	22	0-1
			12	826.5	20425	21.80	22	0-1
				836.5	20525	21.89	22	0-1
				846.5	20625	21.23	22	0-1
			24	826.5	20425	21.68	22	0-1
				836.5	20525	21.54	22	0-1
				846.5	20625	21.40	22	0-1
		12 RB	0	826.5	20425	20.69	21	0-2
				836.5	20525	20.61	21	0-2
				846.5	20625	20.47	21	0-2
			6	826.5	20425	20.53	21	0-2
				836.5	20525	20.32	21	0-2
				846.5	20625	20.29	21	0-2
			13	826.5	20425	20.53	21	0-2
				836.5	20525	20.48	21	0-2
				846.5	20625	20.32	21	0-2
		25RB		826.5	20425	20.60	21	0-2
				836.5	20525	20.50	21	0-2
				846.5	20625	20.35	21	0-2

FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	QPSK	1 RB	0	825.5	20415	22.28	23	0
				836.5	20525	22.29	23	0
				847.5	20635	21.87	23	0
			7	825.5	20415	21.93	23	0
				836.5	20525	22.05	23	0
				847.5	20635	22.03	23	0
			14	825.5	20415	21.93	23	0
				836.5	20525	21.90	23	0
				847.5	20635	21.61	23	0
		8 RB	0	825.5	20415	21.58	22	0-1
				836.5	20525	21.20	22	0-1
				847.5	20635	21.34	22	0-1
			4	825.5	20415	21.36	22	0-1
				836.5	20525	21.12	22	0-1
				847.5	20635	21.31	22	0-1
			7	825.5	20415	21.34	22	0-1
				836.5	20525	21.34	22	0-1
				847.5	20635	21.22	22	0-1
		15RB		825.5	20415	21.51	22	0-1
				836.5	20525	21.30	22	0-1
				847.5	20635	21.26	22	0-1
	16-QAM	1 RB	0	825.5	20415	21.66	22	0-1
				836.5	20525	21.49	22	0-1
				847.5	20635	21.54	22	0-1
			7	825.5	20415	21.56	22	0-1
				836.5	20525	21.27	22	0-1
				847.5	20635	21.59	22	0-1
			14	825.5	20415	21.44	22	0-1
				836.5	20525	21.58	22	0-1
				847.5	20635	21.17	22	0-1
		8 RB	0	825.5	20415	20.72	21	0-2
				836.5	20525	20.49	21	0-2
				847.5	20635	20.22	21	0-2
			4	825.5	20415	20.38	21	0-2
				836.5	20525	20.43	21	0-2
				847.5	20635	20.34	21	0-2
			7	825.5	20415	20.44	21	0-2
				836.5	20525	20.21	21	0-2
				847.5	20635	20.09	21	0-2
		15RB		825.5	20415	20.46	21	0-2
				836.5	20525	20.50	21	0-2
				847.5	20635	20.16	21	0-2

FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
3	64-QAM	1 RB	0	825.5	20415	21.65	22	0-1
				836.5	20525	21.61	22	0-1
				847.5	20635	21.03	22	0-1
			7	825.5	20415	21.77	22	0-1
				836.5	20525	21.73	22	0-1
				847.5	20635	21.03	22	0-1
			14	825.5	20415	21.49	22	0-1
				836.5	20525	21.37	22	0-1
				847.5	20635	21.36	22	0-1
		8 RB	0	825.5	20415	20.64	21	0-2
				836.5	20525	20.40	21	0-2
				847.5	20635	20.28	21	0-2
			4	825.5	20415	20.37	21	0-2
				836.5	20525	20.29	21	0-2
				847.5	20635	20.08	21	0-2
			7	825.5	20415	20.44	21	0-2
				836.5	20525	20.34	21	0-2
				847.5	20635	20.11	21	0-2
		15RB		825.5	20415	20.47	21	0-2
				836.5	20525	20.35	21	0-2
				847.5	20635	20.13	21	0-2

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FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	QPSK	1 RB	0	824.7	20407	22.35	23	0
				836.5	20525	22.27	23	0
				848.3	20643	22.01	23	0
			2	824.7	20407	22.25	23	0
				836.5	20525	22.32	23	0
				848.3	20643	22.02	23	0
			5	824.7	20407	22.34	23	0
				836.5	20525	22.29	23	0
				848.3	20643	21.87	23	0
		3 RB	0	824.7	20407	21.96	22	0-1
				836.5	20525	21.92	22	0-1
				848.3	20643	21.59	22	0-1
			2	824.7	20407	21.62	22	0-1
				836.5	20525	21.80	22	0-1
				848.3	20643	21.64	22	0-1
			3	824.7	20407	21.98	22	0-1
				836.5	20525	21.78	22	0-1
				848.3	20643	22.00	22	0-1
		6RB		824.7	20407	21.63	22	0-1
				836.5	20525	21.57	22	0-1
				848.3	20643	21.35	22	0-1
	16-QAM	1 RB	0	824.7	20407	21.83	22	0-1
				836.5	20525	21.74	22	0-1
				848.3	20643	21.79	22	0-1
			2	824.7	20407	21.73	22	0-1
				836.5	20525	21.71	22	0-1
				848.3	20643	21.69	22	0-1
			5	824.7	20407	21.93	22	0-1
				836.5	20525	21.81	22	0-1
				848.3	20643	21.77	22	0-1
		3 RB	0	824.7	20407	20.77	21	0-1
				836.5	20525	20.85	21	0-1
				848.3	20643	20.74	21	0-1
			2	824.7	20407	20.67	21	0-1
				836.5	20525	20.95	21	0-1
				848.3	20643	20.59	21	0-1
			3	824.7	20407	20.98	21	0-1
				836.5	20525	20.93	21	0-1
				848.3	20643	20.64	21	0-1
		6RB		824.7	20407	20.77	21	0-2
				836.5	20525	20.87	21	0-2
				848.3	20643	20.43	21	0-2

FDD Band 5								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
1.4	64-QAM	1 RB	0	824.7	20407	21.79	22	0-1
				836.5	20525	21.55	22	0-1
				848.3	20643	21.68	22	0-1
			2	824.7	20407	21.94	22	0-1
				836.5	20525	21.73	22	0-1
				848.3	20643	21.44	22	0-1
			5	824.7	20407	21.85	22	0-1
				836.5	20525	21.64	22	0-1
				848.3	20643	21.47	22	0-1
		3 RB	0	824.7	20407	20.65	21	0-1
				836.5	20525	20.88	21	0-1
				848.3	20643	20.56	21	0-1
			2	824.7	20407	20.66	21	0-1
				836.5	20525	20.85	21	0-1
				848.3	20643	20.67	21	0-1
			3	824.7	20407	20.82	21	0-1
				836.5	20525	20.65	21	0-1
				848.3	20643	20.72	21	0-1
		6RB		824.7	20407	20.80	21	0-2
				836.5	20525	20.70	21	0-2
				848.3	20643	20.54	21	0-2

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FDD Band 13								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	QPSK	1 RB	0	782	23230	22.35	23	0
			25	782	23230	22.66	23	0
			49	782	23230	22.41	23	0
		25 RB	0	782	23230	21.61	22	0-1
			12	782	23230	21.60	22	0-1
			25	782	23230	21.40	22	0-1
		50RB		782	23230	21.58	22	0-1
	16-QAM	1 RB	0	782	23230	21.53	22	0-1
			25	782	23230	21.64	22	0-1
			49	782	23230	21.16	22	0-1
		25 RB	0	782	23230	20.83	21	0-2
			12	782	23230	20.69	21	0-2
			25	782	23230	20.52	21	0-2
		50RB		782	23230	20.64	21	0-2
	64-QAM	1 RB	0	782	23230	21.65	22	0-1
			25	782	23230	21.19	22	0-1
			49	782	23230	21.26	22	0-1
		25 RB	0	782	23230	20.67	21	0-2
			12	782	23230	20.66	21	0-2
			25	782	23230	20.57	21	0-2
		50RB		782	23230	20.61	21	0-2

FDD Band 13								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	QPSK	1 RB	0	779.5	23205	22.49	23	0
				782	23230	22.52	23	0
				784.5	23255	22.46	23	0
			12	779.5	23205	22.45	23	0
				782	23230	22.60	23	0
				784.5	23255	22.56	23	0
			24	779.5	23205	22.47	23	0
				782	23230	22.37	23	0
				784.5	23255	22.36	23	0
		12 RB	0	779.5	23205	21.66	22	0-1
				782	23230	21.68	22	0-1
				784.5	23255	21.63	22	0-1
			6	779.5	23205	21.61	22	0-1
				782	23230	21.67	22	0-1
				784.5	23255	21.69	22	0-1
			13	779.5	23205	21.54	22	0-1
				782	23230	21.60	22	0-1
				784.5	23255	21.48	22	0-1
		25RB		779.5	23205	21.67	22	0-1
				782	23230	21.62	22	0-1
				784.5	23255	21.60	22	0-1
	16-QAM	1 RB	0	779.5	23205	21.85	22	0-1
				782	23230	21.74	22	0-1
				784.5	23255	21.84	22	0-1
			12	779.5	23205	21.89	22	0-1
				782	23230	21.78	22	0-1
				784.5	23255	21.83	22	0-1
			24	779.5	23205	21.82	22	0-1
				782	23230	21.78	22	0-1
				784.5	23255	21.66	22	0-1
		12 RB	0	779.5	23205	20.84	21	0-2
				782	23230	20.87	21	0-2
				784.5	23255	20.91	21	0-2
			6	779.5	23205	20.71	21	0-2
				782	23230	20.80	21	0-2
				784.5	23255	20.67	21	0-2
			13	779.5	23205	20.65	21	0-2
				782	23230	20.72	21	0-2
				784.5	23255	20.68	21	0-2
		25RB		779.5	23205	20.80	21	0-2
				782	23230	20.80	21	0-2
				784.5	23255	20.73	21	0-2

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FDD Band 13								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	64-QAM	1 RB	0	779.5	23205	21.87	22	0-1
				782	23230	21.71	22	0-1
				784.5	23255	21.78	22	0-1
			12	779.5	23205	21.69	22	0-1
				782	23230	21.38	22	0-1
				784.5	23255	21.40	22	0-1
			24	779.5	23205	21.66	22	0-1
				782	23230	21.68	22	0-1
				784.5	23255	21.40	22	0-1
		12 RB	0	779.5	23205	20.65	21	0-2
				782	23230	20.89	21	0-2
				784.5	23255	20.81	21	0-2
			6	779.5	23205	20.64	21	0-2
				782	23230	20.77	21	0-2
				784.5	23255	20.57	21	0-2
			13	779.5	23205	20.69	21	0-2
				782	23230	20.74	21	0-2
				784.5	23255	20.72	21	0-2
		25RB		779.5	23205	20.60	21	0-2
				782	23230	20.72	21	0-2
				784.5	23255	20.59	21	0-2

FDD Band 17								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted pow er (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allow ed per 3GPP(dB)
10	QPSK	1 RB	0	709	23780	22.57	23	0
				710	23790	22.68	23	0
				711	23800	22.72	23	0
			25	709	23780	22.35	23	0
				710	23790	22.34	23	0
				711	23800	22.29	23	0
			49	709	23780	22.33	23	0
				710	23790	22.43	23	0
				711	23800	22.30	23	0
		25 RB	0	709	23780	21.51	22	0-1
				710	23790	21.43	22	0-1
				711	23800	21.36	22	0-1
			12	709	23780	21.49	22	0-1
				710	23790	21.45	22	0-1
				711	23800	21.49	22	0-1
			25	709	23780	21.36	22	0-1
				710	23790	21.50	22	0-1
				711	23800	21.42	22	0-1
		50RB		709	23780	21.55	22	0-1
				710	23790	21.42	22	0-1
				711	23800	21.47	22	0-1
	16-QAM	1 RB	0	709	23780	21.47	22	0-1
				710	23790	21.72	22	0-1
				711	23800	21.46	22	0-1
			25	709	23780	21.57	22	0-1
				710	23790	21.73	22	0-1
				711	23800	21.97	22	0-1
			49	709	23780	21.90	22	0-1
				710	23790	21.66	22	0-1
				711	23800	21.69	22	0-1
		25 RB	0	709	23780	20.56	21	0-2
				710	23790	20.63	21	0-2
				711	23800	20.61	21	0-2
			12	709	23780	20.52	21	0-2
				710	23790	20.60	21	0-2
				711	23800	20.54	21	0-2
			25	709	23780	20.48	21	0-2
				710	23790	20.55	21	0-2
				711	23800	20.55	21	0-2
		50RB		709	23780	20.56	21	0-2
				710	23790	20.52	21	0-2
				711	23800	20.53	21	0-2

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FDD Band 17								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
10	64-QAM	1 RB	0	709	23780	21.61	22	0-1
				710	23790	21.21	22	0-1
				711	23800	21.43	22	0-1
			25	709	23780	21.67	22	0-1
				710	23790	21.64	22	0-1
				711	23800	21.11	22	0-1
			49	709	23780	21.98	22	0-1
				710	23790	21.43	22	0-1
				711	23800	21.65	22	0-1
		25 RB	0	709	23780	20.56	21	0-2
				710	23790	20.60	21	0-2
				711	23800	20.55	21	0-2
			12	709	23780	20.55	21	0-2
				710	23790	20.61	21	0-2
				711	23800	20.45	21	0-2
			25	709	23780	20.54	21	0-2
				710	23790	20.58	21	0-2
				711	23800	20.60	21	0-2
		50RB		709	23780	20.56	21	0-2
				710	23790	20.51	21	0-2
				711	23800	20.56	21	0-2

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FDD Band 17								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	QPSK	1 RB	0	706.5	23755	22.45	23	0
				710	23790	22.11	23	0
				713.5	23825	22.20	23	0
			12	706.5	23755	22.52	23	0
				710	23790	22.20	23	0
				713.5	23825	22.07	23	0
			24	706.5	23755	22.35	23	0
				710	23790	22.15	23	0
				713.5	23825	22.09	23	0
		12 RB	0	706.5	23755	21.53	22	0-1
				710	23790	21.35	22	0-1
				713.5	23825	21.42	22	0-1
			6	706.5	23755	21.46	22	0-1
				710	23790	21.42	22	0-1
				713.5	23825	21.33	22	0-1
			13	706.5	23755	21.48	22	0-1
				710	23790	21.57	22	0-1
				713.5	23825	21.41	22	0-1
		25RB		706.5	23755	21.43	22	0-1
				710	23790	21.42	22	0-1
				713.5	23825	21.45	22	0-1
	16-QAM	1 RB	0	706.5	23755	21.54	22	0-1
				710	23790	21.79	22	0-1
				713.5	23825	21.49	22	0-1
			12	706.5	23755	21.63	22	0-1
				710	23790	21.83	22	0-1
				713.5	23825	21.63	22	0-1
			24	706.5	23755	21.74	22	0-1
				710	23790	21.66	22	0-1
				713.5	23825	21.34	22	0-1
		12 RB	0	706.5	23755	20.56	21	0-2
				710	23790	20.59	21	0-2
				713.5	23825	20.56	21	0-2
			6	706.5	23755	20.63	21	0-2
				710	23790	20.48	21	0-2
				713.5	23825	20.48	21	0-2
			13	706.5	23755	20.62	21	0-2
				710	23790	20.60	21	0-2
				713.5	23825	20.55	21	0-2
		25RB		706.5	23755	20.63	21	0-2
				710	23790	20.59	21	0-2
				713.5	23825	20.58	21	0-2

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FDD Band 17								
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)
5	64-QAM	1 RB	0	706.5	23755	21.53	22	0-1
				710	23790	21.21	22	0-1
				713.5	23825	21.88	22	0-1
			12	706.5	23755	21.59	22	0-1
				710	23790	21.24	22	0-1
				713.5	23825	21.59	22	0-1
			24	706.5	23755	21.59	22	0-1
				710	23790	21.51	22	0-1
				713.5	23825	21.48	22	0-1
		12 RB	0	706.5	23755	20.35	21	0-2
				710	23790	20.55	21	0-2
				713.5	23825	20.47	21	0-2
			6	706.5	23755	20.44	21	0-2
				710	23790	20.55	21	0-2
				713.5	23825	20.57	21	0-2
			13	706.5	23755	20.55	21	0-2
				710	23790	20.66	21	0-2
				713.5	23825	20.56	21	0-2
		25RB		706.5	23755	20.50	21	0-2
				710	23790	20.54	21	0-2
				713.5	23825	20.51	21	0-2

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1.4 Test Environment

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

1.5 Operation Description

The EUT is controlled by using a Radio Communication Tester, and the communication between the EUT and the tester is established by air link.
The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.

EUT was tested as below.

Front/back/top/right/bottom sides_10mm

Note:

1. During the SAR testing, the DASY 5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.

2. The 3G SAR test reduction procedure is applied to HSDPA with 12.2 kbps RMC as the primary mode. Since the maximum output power in a secondary mode (HSDPA) is ≤ ¼ dB higher than the primary mode (WCDMA), SAR measurement is not required for the secondary mode (HSDPA). The following 4 sub-tests were completed according to Release 5 procedures in section 5.2 of 3GPP TS 34.121. A summary of these setting are illustrated below:

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Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (1)(2)	CM (3) (dB)	MPR (3) (dB)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15 (4)	15/15 (4)	64	12/15 (4)	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Note 1: Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15 * β_c.
Note 2: For the HS-DPCCH power mask requirement test in clause 5.2C, 5.7A, and the Error Vector Magnitude (EVM) with HS-DPCCH test in clause 5.13.1A, and HSDPA EVM with phase discontinuity in clause 5.13.1AA, Δ_{ACK} and Δ_{NACK} = 30/15 with β_{HS} = 30/15 * β_c, and Δ_{CQI} = 24/15 with β_{HS} = 24/15 * β_c.
Note 3: CM = 1 for β_c/β_d = 12/15, β_{HS}/β_c = 24/15. For all other combinations of DPDCH, DPCCH and HS-DPCCH the MPR is based on the relative CM difference. This is applicable for only UEs that support HSDPA in release 6 and later releases.
Note 4: For subtest 2 the β_c/β_d ratio of 12/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 11/15 and β_d = 15/15.

3. The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with RMC) with 12.2 kbps RMC as the primary mode. Since the maximum output power in a secondary mode (HSPA) is ≤ ¼ dB higher than the primary mode (WCDMA), SAR measurement is not required for the secondary mode (HSPA). The following 5 sub-tests were completed according to Release 6 procedures in section 5.2 of 3GPP TS 34.121. A summary of these setting are illustrated below:

Sub-test	β_c	β_d	β_d (SF)	β_c / β_d	β_{HS} (1)	β_{ec}	β_{ed} (4)(5)	β_{ed} (SF)	β_{ed} (Codes)	CM (2) (dB)	MPR (2)(6) (dB)	AG (5) Index	E-TFCI
1	11/15 (3)	15/15 (3)	64	11/15 (3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed}1: 47/15 β_{ed}2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	0	-	-	5/15	5/15	47/15	4	1	1.0	0.0	12	67

Note 1: For sub-test 1 to 4, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{HS} = 30/15 * β_c. For sub-test 5, Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 5/15 with β_{HS} = 5/15 * β_c.
Note 2: CM = 1 for β_c/β_d = 12/15, β_{HS}/β_c = 24/15. For all other combinations of DPDCH, DPCCH, HS-DPCCH, E-DPDCH and E-DPCCH the MPR is based on the relative CM difference.
Note 3: For subtest 1 the β_c/β_d ratio of 11/15 for the TFC during the measurement period (TF1, TF0) is achieved by setting the signalled gain factors for the reference TFC (TF1, TF1) to β_c = 10/15 and β_d = 15/15.
Note 4: In case of testing by UE using E-DPDCH Physical Layer category 1, Sub-test 3 is omitted according to TS25.306 Table 5.1g.
Note 5: β_{ed} can not be set directly; it is set by Absolute Grant Value.
Note 6: For subtests 2, 3 and 4, UE may perform E-DPDCH power scaling at max power which could results in slightly smaller MPR values.

4. LTE modes test according to **KDB 941225D05v02r05.**

a. Per Section 5.2.1, the largest channel bandwidth and measure SAR for QPSK with 1 RB allocation.

- Using the RB offset and required test channel combination with the highest maximum output power for RB offsets at the upper edge, middle and lower edge of each required test channel.
- When the reported SAR is ≤ 0.8 W/kg, testing of the remaining RB offset configurations and required test channels is not required for 1 RB allocation; otherwise, SAR is required for the remaining required test channels and only for the RB offset configuration with the highest output power for that channel.

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- When the reported SAR of a required test channel is > 1.45 W/kg, SAR is required for all three RB offset configurations for that required test channel.

b. Per Section 5.2.2, the largest channel bandwidth and measure SAR for QPSK with 50% RB allocation

- The procedures required for 1 RB allocation in 5.2.1 are applied to measure the SAR for QPSK with 50% RB allocation.

c. Per Section 5.2.3, the largest channel bandwidth and measure SAR for QPSK with 100% RB allocation

- For QPSK with 100% RB allocation, SAR is not required when the highest maximum output power for 100 % RB allocation is less than the highest maximum output power in 50% and 1 RB allocations and the highest reported SAR for 1 RB and 50% RB allocation in 5.2.1 and 5.2.2 are ≤ 0.8 W/kg.
- Otherwise, SAR is measured for the highest output power channel and if the reported SAR is > 1.45 W/kg, the remaining required test channels must also be tested.

d. Per Section 5.2.4, Higher order modulations

- For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK procedures in sections 5.2.1, 5.2.2 and 5.2.3 to determine the QAM configurations that may need SAR measurement. For each configuration identified as required for testing, SAR is required only when the highest maximum output power for the configuration in the higher order modulation is > ½ dB higher than the same configuration in QPSK or when the reported SAR for the QPSK configuration is > 1.45 W/kg.

e. Per Section 5.3, other channel bandwidth standalone SAR test requirements

- For the other channel bandwidths used by the device in a frequency band, apply all the procedures required for the largest channel bandwidth in section 5.2 to determine the channels and RB configurations that need SAR testing and only measure SAR when the highest maximum output power of a configuration requiring testing in the smaller channel bandwidth is > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg. The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth.

5. According to KDB447498D01v06, SAR test exclusion evaluation for surfaces/edges of tablet mode is not required since SAR measurements for all the surfaces/edges were performed.
6. According to KDB447498D01v06, 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.
7. According to KDB865664D01v01r04, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit)

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1.6 The SAR Measurement System

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

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

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

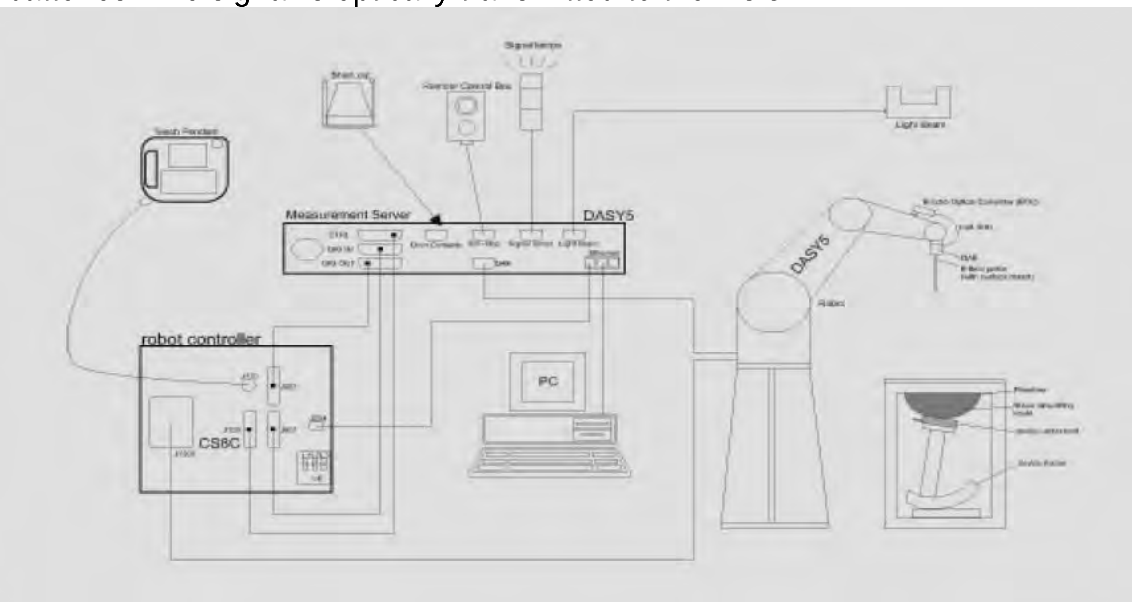

Fig. a The block diagram of SAR system

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

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1.7 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)	
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 750/835/1750/1900 MHz Additional CF for other liquids and frequencies upon request	
Frequency	10 MHz to > 6 GHz	
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)	
Dynamic Range	10 µW/g to > 100 mW/g Linearity: ± 0.2 dB (noise: typically < 1 µW/g)	
Dimensions	Tip diameter: 2.5 mm	
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.	

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PHANTOM

Model	ELI	
Construction	The ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.	
Shell Thickness	2 ± 0.2 mm	
Filling Volume	Approx. 30 liters	
Dimensions	Major axis: 600 mm Minor axis: 400 mm	

DEVICE HOLDER

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

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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 750/835/1750/1900 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the 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.

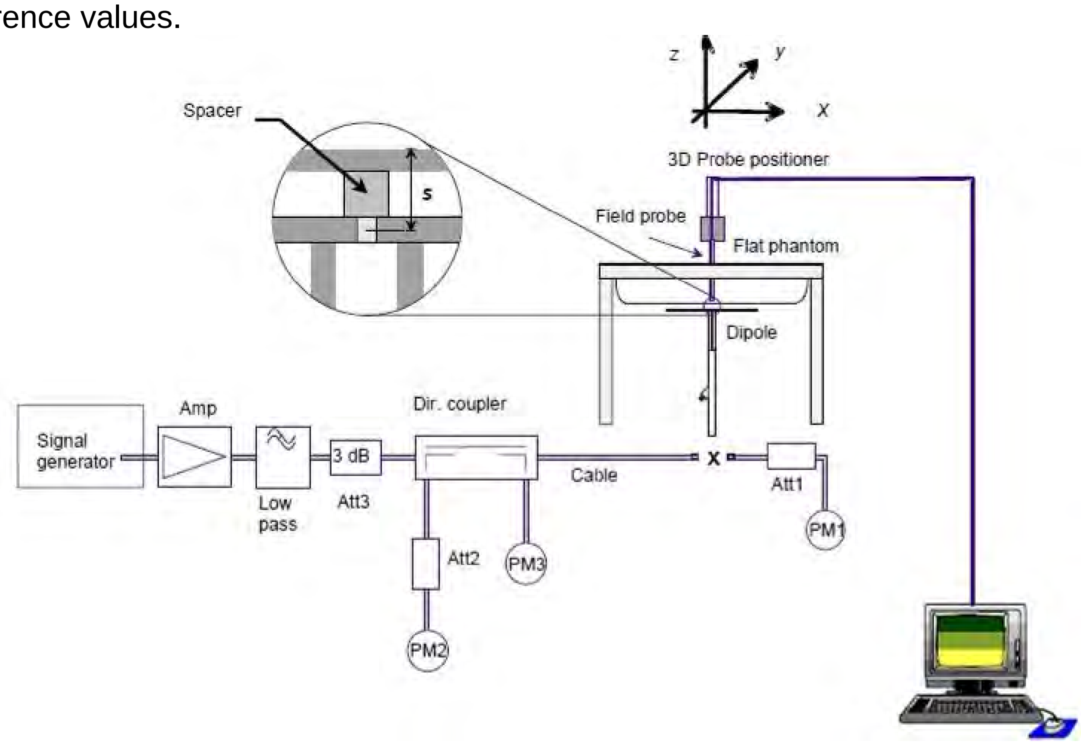

Fig. b The block diagram of system verification

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Validation Kit	S/N	Frequency (MHz)		1W Target SAR-1g (mW/g)	Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W (mW/g)	Deviation (%)	Measured Date
D750V3	1015	750	Body	8.62	2.19	8.76	1.62%	Sep. 18, 2018
D835V2	4d063	835	Body	9.56	2.45	9.80	2.51%	Sep. 18, 2018
D1750V2	1008	1750	Body	37.00	9.34	37.36	0.97%	Sep. 19, 2018
D1900V2	5d173	1900	Body	40.9	10.30	41.20	0.73%	Sep. 19, 2018

Table 1. Results of system verification

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1.9 Tissue Simulant Fluid for the Frequency Band

The dielectric properties for this Head-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.

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

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

Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ
Body	Sep, 18. 2018	709.00	55.691	0.960	57.627	0.926	-3.48%	3.56%
		710.00	55.687	0.960	57.596	0.930	-3.43%	3.15%
		711.00	55.683	0.960	57.669	0.929	-3.57%	3.26%
		750.00	55.531	0.963	57.228	0.970	-3.06%	-0.69%
		782.00	55.406	0.966	56.976	1.003	-2.83%	-3.84%
		826.40	55.234	0.969	57.264	0.987	-3.68%	-1.82%
		829.00	55.223	0.970	57.267	0.990	-3.70%	-2.11%
		835.00	55.200	0.970	57.227	0.996	-3.67%	-2.68%
		836.50	55.195	0.972	57.219	0.998	-3.67%	-2.69%
		836.60	55.195	0.972	57.215	0.997	-3.66%	-2.58%
		844.00	55.165	0.971	57.166	1.004	-3.63%	-3.43%
		846.60	55.164	0.984	57.142	1.008	-3.59%	-2.41%
	Sep, 19. 2018	1720.00	53.511	1.469	51.488	1.433	3.78%	2.48%
		1732.50	53.478	1.477	51.476	1.447	3.74%	2.06%
		1745.00	53.445	1.485	51.411	1.461	3.81%	1.63%
		1750.00	53.432	1.488	51.391	1.468	3.82%	1.37%
		1852.40	53.300	1.520	51.066	1.576	4.19%	-3.68%
		1860.00	53.300	1.520	51.044	1.583	4.23%	-4.14%
		1880.00	53.300	1.520	50.917	1.567	4.47%	-3.09%
		1900.00	53.300	1.520	50.848	1.586	4.60%	-4.34%
		1907.60	53.300	1.520	50.898	1.594	4.51%	-4.87%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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The composition of the body tissue simulating liquid:

Frequency (MHz)	Mode	Ingredient						Total amount
		DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	
750	Body	—	631.68 g	11.72 g	1.2 g	—	600 g	1.0L(Kg)
835	Body	—	631.68 g	11.72 g	1.2 g	—	600 g	1.0L(Kg)
1750	Body	300.67 g	716.56 g	4.0 g	—	—	—	1.0L(Kg)
1900	Body	300.67 g	716.56 g	4.0 g	—	—	—	1.0L(Kg)

Table 3. Recipes for Tissue Simulating Liquid

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1.10 Evaluation Procedures

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

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

The probe is calibrated at the center of the dipole sensors that is located 1 to 2.7mm away from the probe tip. During measurements, the probe stops shortly above the phantom surface, depending on the probe and the surface detecting system. Both distances are included as parameters in the probe configuration file. The software always knows exactly how far away the measured point is from the surface. As the probe cannot directly measure at the surface, the values between the deepest measured point and the surface must be extrapolated. The angle between the probe axis and the surface normal line is less than 30 degree.

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

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

these cube measurements.
The measured volume of 30x30x30mm contains about 30g of tissue.
The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found. If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

1.11 Probe Calibration Procedures

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

1.11.1 Transfer Calibration with Temperature Probes

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

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

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

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

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1. 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.
2. 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.
3. 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%.
4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

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

1.11.2 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:

1. The setup must enable accurate determination of the incident power.

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2. The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
3. 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

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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.

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1.12 Test Standards and Limits

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

1. Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 10 grams of tissue (defined as a tissue volume in the shape of a cube).
2. Occupational/Controlled limits apply when persons are exposed as a consequence of their employment provided these persons are fully aware of and exercise control over their exposure. Awareness of exposure can be accomplished by use of warning labels or by specific training or education through appropriate means, such as an RF safety program in a work environment.
3. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape

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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 W/Kg	8.00 W/Kg
Spatial Average SAR (Whole Body)	0.08 W/Kg	0.40 W/Kg
Spatial Peak SAR (Hands/Feet/Ankle/Wrist)	4.00 W/Kg	20.00 W/Kg

Table 4. RF exposure limits

Notes:

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

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2. Summary of Results

WCDMA Band II

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band II	Back side	10	9262	1852.4	23.00	22.77	5.44%	1.160	1.223	-
	Back side	10	9400	1880	23.00	22.95	1.16%	1.210	1.224	-
	Back side	10	9538	1907.6	23.00	22.90	2.33%	1.250	1.279	70
	Back side*	10	9538	1907.6	23.00	22.90	2.33%	1.220	1.248	-
	Front side	10	9262	1852.4	23.00	22.70	7.15%	0.987	1.058	-
	Front side	10	9400	1880	23.00	22.95	1.16%	1.030	1.042	-
	Front side	10	9538	1907.6	23.00	22.90	2.33%	1.050	1.074	-
	Top side	10	9400	1880	23.00	22.95	1.16%	0.276	0.279	-
	Bottom side	10	9400	1880	23.00	22.95	1.16%	0.394	0.399	-
	Right side	10	9400	1880	23.00	22.95	1.16%	0.308	0.312	-

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

WCDMA Band V

Mode	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
								Measured	Reported	
WCDMA Band V	Back side	10	4132	826.4	23	22.95	1.16%	1.250	1.264	-
	Back side	10	4183	836.6	23	22.99	0.23%	1.280	1.283	-
	Back side	10	4233	846.6	23	22.89	2.57%	1.300	1.333	71
	Back side*	10	4233	846.6	23	22.89	2.57%	1.240	1.272	-
	Front side	10	4132	826.4	23	22.95	1.16%	1.200	1.214	-
	Front side	10	4183	836.6	23	22.99	0.23%	1.240	1.243	-
	Front side	10	4233	846.6	23	22.89	2.57%	1.250	1.282	-
	Top side	10	4183	836.6	23	22.99	0.23%	0.791	0.793	-
	Bottom side	10	4183	836.6	23	22.99	0.23%	0.354	0.355	-
	Right side	10	4183	836.6	23	22.99	0.23%	0.089	0.089	-

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

LTE FDD Band 2

Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg) Measured	Averaged SAR over 1g (W/kg) Reported	Plot page
LTE Band 2	20MHz	QPSK	1 RB	0	Back side	10	18700	1860	23	22.83	3.99%	1.270	1.321	-
					Back side	10	18900	1880	23	22.55	10.92%	1.230	1.364	-
					Back side	10	19100	1900	23	23.00	0.00%	1.300	1.300	72
					Back side*	10	19100	1900	23	23.00	0.00%	1.260	1.260	-
					Front side	10	18700	1860	23	22.83	3.99%	0.983	1.022	-
					Front side	10	18900	1880	23	22.55	10.92%	1.000	1.109	-
					Front side	10	19100	1900	23	23.00	0.00%	1.030	1.030	-
					Top side	10	19100	1900	23	23.00	0.00%	0.449	0.449	-
					Bottom side	10	19100	1900	23	23.00	0.00%	0.435	0.435	-
					Right side	10	19100	1900	23	23.00	0.00%	0.261	0.261	-
			50 RB	0	Back side	10	18700	1860	22	21.83	3.99%	1.150	1.196	-
					Back side	10	18900	1880	22	21.74	6.17%	1.180	1.253	-
					Back side	10	19100	1900	22	21.93	1.62%	1.210	1.230	-
					Front side	10	18700	1860	22	21.83	3.99%	0.976	1.015	-
					Front side	10	18900	1880	22	21.74	6.17%	0.985	1.046	-
					Front side	10	19100	1900	22	21.93	1.62%	0.991	1.007	-
					Top side	10	19100	1900	22	21.93	1.62%	0.384	0.390	-
					Bottom side	10	19100	1900	22	21.93	1.62%	0.376	0.382	-
					Right side	10	19100	1900	22	21.93	1.62%	0.235	0.239	-
			100 RB		Back side	10	18700	1860	22	21.69	7.40%	1.080	1.160	-
					Back side	10	18900	1880	22	21.61	9.40%	1.100	1.203	-
					Back side	10	19100	1900	22	21.93	1.62%	1.130	1.148	-
					Front side	10	18700	1860	22	21.69	7.40%	0.967	1.039	-
					Front side	10	18900	1880	22	21.61	9.40%	0.976	1.068	-
					Front side	10	19100	1900	22	21.93	1.62%	0.983	0.999	-
					Top side	10	19100	1900	22	21.93	1.62%	0.316	0.321	-
					Bottom side	10	19100	1900	22	21.93	1.62%	0.309	0.314	-
					Right side	10	19100	1900	22	21.93	1.62%	0.226	0.230	-

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

LTE FDD Band 4

Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg) Measured	Averaged SAR over 1g (W/kg) Reported	Plot page
LTE Band 4	20MHz	QPSK	1 RB	0	Back side	10	20050	1720	23	22.79	4.95%	0.643	0.675	-
					Back side	10	20175	1732.5	23	22.88	2.80%	0.658	0.676	-
					Back side	10	20300	1745	23	22.97	0.69%	0.677	0.682	73
					Front side	10	20300	1745	23	22.97	0.69%	0.637	0.641	-
					Top side	10	20300	1745	23	22.97	0.69%	0.284	0.286	-
					Bottom side	10	20300	1745	23	22.97	0.69%	0.277	0.279	-
					Right side	10	20300	1745	23	22.97	0.69%	0.191	0.192	-
			50 RB	0	Back side	10	20300	1745	22	21.94	1.39%	0.651	0.660	-
					Front side	10	20300	1745	22	21.94	1.39%	0.629	0.638	-
					Top side	10	20300	1745	22	21.94	1.39%	0.276	0.280	-
					Bottom side	10	20300	1745	22	21.94	1.39%	0.265	0.269	-
					Right side	10	20300	1745	22	21.94	1.39%	0.186	0.189	-
			100 RB		Back side	10	20300	1745	22	21.95	1.16%	0.648	0.656	-
					Front side	10	20300	1745	22	21.95	1.16%	0.617	0.624	-
					Top side	10	20300	1745	22	21.95	1.16%	0.265	0.268	-
					Bottom side	10	20300	1745	22	21.95	1.16%	0.251	0.254	-
					Right side	10	20300	1745	22	21.95	1.16%	0.173	0.175	-

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LTE FDD Band 5

Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
												Measured	Reported	
LTE Band 5	10MHz	QPSK	1 RB	0	Back side	10	20450	829	23	22.45	13.50%	0.977	1.109	-
					Back side	10	20525	836.5	23	22.42	14.29%	1.000	1.143	-
					Back side	10	20600	844	23	22.38	15.35%	0.992	1.144	74
					Back side*	10	20600	844	23	22.38	15.35%	0.987	1.138	-
					Front side	10	20450	829	23	22.45	13.50%	0.886	1.006	-
					Top side	10	20450	829	23	22.45	13.50%	0.638	0.724	-
					Bottom side	10	20450	829	23	22.45	13.50%	0.369	0.419	-
					Right side	10	20450	829	23	22.45	13.50%	0.073	0.083	-
			25 RB	0	Back side	10	20450	829	22	21.73	6.41%	0.964	1.026	-
					Back side	10	20525	836.5	22	21.64	8.64%	0.951	1.033	-
					Back side	10	20600	844	22	21.52	11.69%	0.946	1.057	-
					Front side	10	20450	829	22	21.73	6.41%	0.873	0.929	-
					Top side	10	20450	829	22	21.73	6.41%	0.621	0.661	-
					Bottom side	10	20450	829	22	21.73	6.41%	0.351	0.374	-
					Right side	10	20450	829	22	21.73	6.41%	0.064	0.068	-
			50 RB		Back side	10	20450	829	22	21.69	7.40%	0.937	1.006	-
					Back side	10	20525	836.5	22	21.63	8.89%	0.925	1.007	-
					Back side	10	20600	844	22	21.50	12.20%	0.919	1.031	-
					Front side	10	20450	829	22	21.69	7.40%	0.861	0.925	-
					Top side	10	20450	829	22	21.69	7.40%	0.619	0.665	-
					Bottom side	10	20450	829	22	21.69	7.40%	0.349	0.375	-
					Right side	10	20450	829	22	21.69	7.40%	0.056	0.060	-

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

LTE FDD Band 13

Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
												Measured	Reported	
LTE Band 13	10MHz	QPSK	1 RB	0	Back side	10	23230	782	23	22.35	16.14%	0.717	0.833	75
					Back side*	10	23230	782	23	22.35	16.14%	0.710	0.825	-
				25	Back side	10	23230	782	23	22.66	8.14%	0.714	0.772	-
					Front side	10	23230	782	23	22.66	8.14%	0.610	0.660	-
					Top side	10	23230	782	23	22.66	8.14%	0.482	0.521	-
					Bottom side	10	23230	782	23	22.66	8.14%	0.267	0.289	-
					Right side	10	23230	782	23	22.66	8.14%	0.085	0.092	-
				49	Back side	10	23230	782	23	22.41	14.55%	0.709	0.812	-
			25 RB	0	Back side	10	23230	782	22	21.61	9.40%	0.691	0.756	-
					Front side	10	23230	782	22	21.61	9.40%	0.591	0.647	-
					Top side	10	23230	782	22	21.61	9.40%	0.467	0.511	-
					Bottom side	10	23230	782	22	21.61	9.40%	0.256	0.280	-
					Right side	10	23230	782	22	21.61	9.40%	0.076	0.083	-
			50 RB		Back side	10	23230	782	22	21.58	10.15%	0.664	0.731	-
					Front side	10	23230	782	22	21.58	10.15%	0.568	0.626	-
					Top side	10	23230	782	22	21.58	10.15%	0.455	0.501	-
					Bottom side	10	23230	782	22	21.58	10.15%	0.245	0.270	-
					Right side	10	23230	782	22	21.58	10.15%	0.069	0.076	-

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

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LTE FDD Band 17

Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	CH	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged SAR over 1g (W/kg)		Plot page
												Measured	Reported	
LTE Band 17	10MHz	QPSK	1 RB	0	Back side	10	23780	709	23	22.57	10.41%	0.660	0.729	-
					Back side	10	23790	710	23	22.68	7.65%	0.671	0.722	-
					Back side	10	23800	711	23	22.72	6.66%	0.693	0.739	76
					Front side	10	23800	711	23	22.72	6.66%	0.453	0.483	-
					Top side	10	23800	711	23	22.72	6.66%	0.231	0.246	-
					Bottom side	10	23800	711	23	22.72	6.66%	0.215	0.229	-
					Right side	10	23800	711	23	22.72	6.66%	0.088	0.094	-
			25 RB	0	Back side	10	23780	709	22	21.51	11.94%	0.654	0.732	-
					Front side	10	23780	709	22	21.51	11.94%	0.449	0.503	-
					Top side	10	23780	709	22	21.51	11.94%	0.218	0.244	-
					Bottom side	10	23780	709	22	21.51	11.94%	0.187	0.209	-
					Right side	10	23780	709	22	21.51	11.94%	0.076	0.085	-
			50 RB		Back side	10	23780	709	22	21.55	10.92%	0.639	0.709	-
					Front side	10	23780	709	22	21.55	10.92%	0.439	0.487	-
					Top side	10	23780	709	22	21.55	10.92%	0.213	0.236	-
					Bottom side	10	23780	709	22	21.55	10.92%	0.176	0.195	-
					Right side	10	23780	709	22	21.55	10.92%	0.069	0.077	-

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2(mW)}{P1(mW)} = 10^{\left(\frac{P2-P1}{10}\right)(dBm)}$

Reported SAR = measured SAR * (scaling)

Where P2 is maximum specified power, P1 is measured conducted power

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3. Instruments List

Manufacturer	Device	Type	Serial number	Date of last calibration	Date of next calibration
SPEAG	Dosimetric E-Field Probe	EX3DV4	3938	Sep.29,2017	Sep.28,2018
SPEAG	System Validation Dipole	D750V3	1015	Aug.23,2018	Aug.22,2019
		D835V2	4d063	Aug.23,2018	Aug.22,2019
		D1750V2	1008	Aug.30,2018	Aug.29,2019
		D1900V2	5d173	Apr.25,2018	Apr.25,2019
SPEAG	Data acquisition Electronics	DAE4	1260	Sep.28,2017	Sep.27,2018
SPEAG	Software	DASY 52 V52.10.1	N/A	Calibration not required	Calibration not required
SPEAG	Phantom	ELI	N/A	Calibration not required	Calibration not required
Agilent	Network Analyzer	E5071C	MY46107530	Feb.26,2018	Feb.25,2019
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional coupler	778D	MY52180302	Jul.05,2018	Jul.04,2019
Agilent	RF Signal Generator	N5181A	MY50144143	Mar.15,2018	Mar.14,2019
Agilent	Power Meter	E4417A	MY52240003	Dec.21,2017	Dec.20,2018
Agilent	Power Sensor	E9301H	MY52200003	Dec.21,2017	Dec.20,2018
			MY52200004	Dec.21,2017	Dec.20,2018
TECPEL	Digital thermometer	DTM-303A	TP130075	Mar.09,2018	Mar.08,2019
Anritsu	Radio Communication Test	MT8820C	6201061014	Mar.14,2018	Mar.13,2019

4. Measurements

Date: 2018/9/19

WCDMA Band II_Body_Back side_CH 9538_10mm

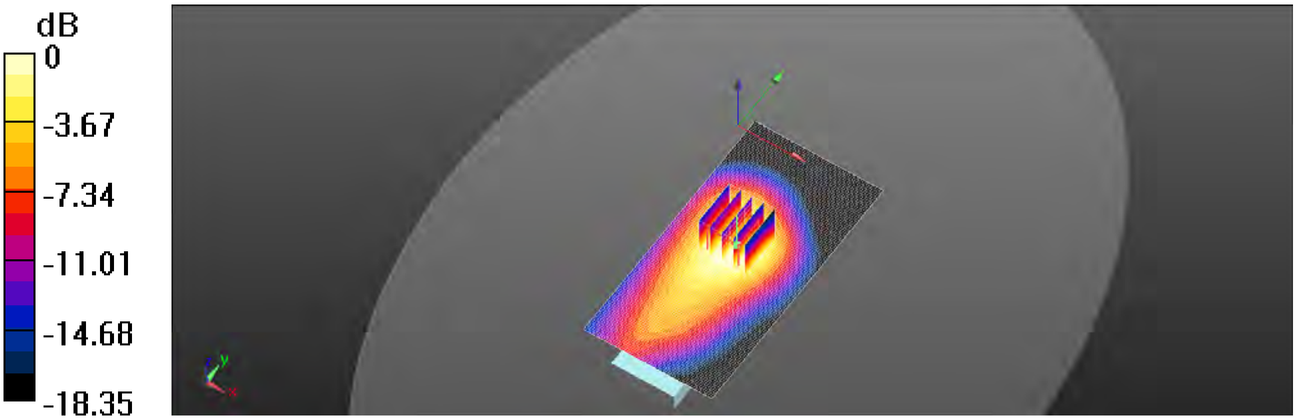
Communication System: WCDMA; Frequency: 1907.6 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1908 MHz; σ = 1.594 S/m; ε_r = 50.898; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.5°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.7, 7.7, 7.7); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.67 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 11.23 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 2.06 W/kg
SAR(1 g) = 1.25 W/kg; SAR(10 g) = 0.741 W/kg
Maximum value of SAR (measured) = 1.66 W/kg



0 dB = 1.66 W/kg = 2.20 dBW/kg

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Date: 2018/9/18

WCDMA Band V_Body_Back side_CH 4233_10mm

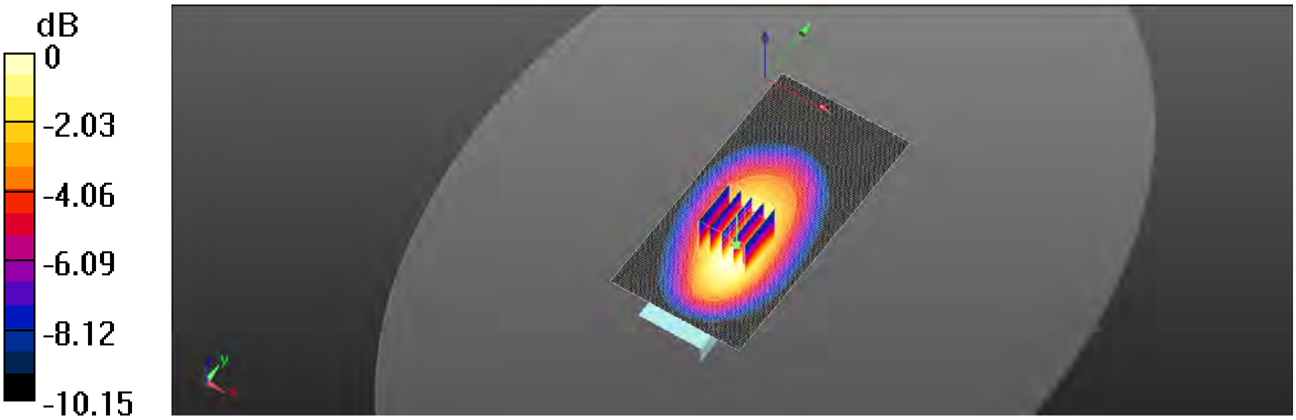
Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1
Medium parameters used: f = 847 MHz; σ = 1.008 S/m; ε_r = 57.142; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.48, 9.48, 9.48); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.60 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 30.17 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.87 W/kg
SAR(1 g) = 1.3 W/kg; SAR(10 g) = 0.897 W/kg
Maximum value of SAR (measured) = 1.60 W/kg



0 dB = 1.60 W/kg = 2.04 dBW/kg

Date: 2018/9/19

LTE Band 2 (20MHz)_Body_Back side_CH 19100_QPSK_1-0_5mm

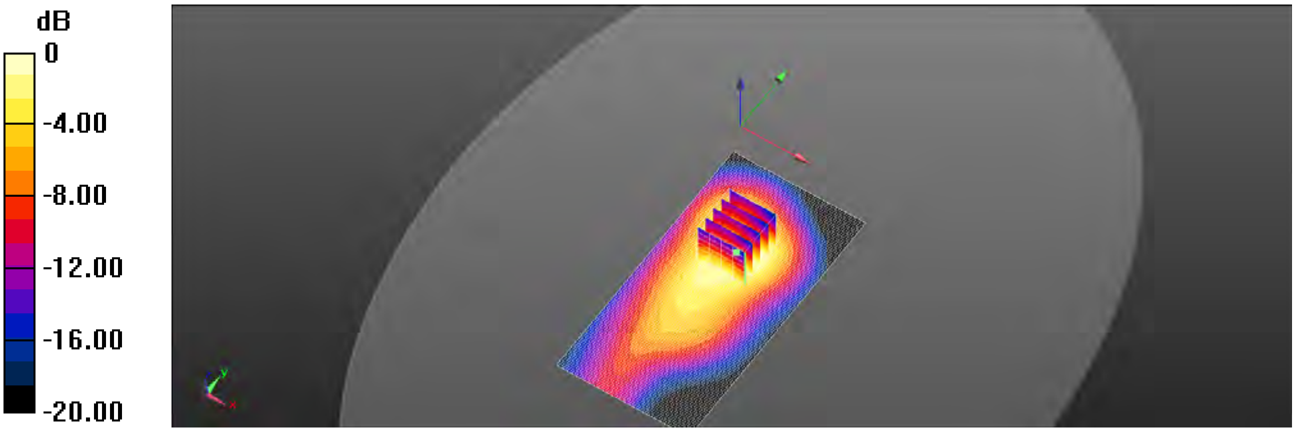
Communication System: LTE; Frequency: 1900 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1900 MHz; σ = 1.586 S/m; ε_r = 50.848; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.5°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.7, 7.7, 7.7); Calibrated: 2017/9/29
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.11(7439)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.75 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 12.48 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 2.15 W/kg
SAR(1 g) = 1.3 W/kg; SAR(10 g) = 0.776 W/kg
Maximum value of SAR (measured) = 1.73 W/kg



0 dB = 1.73 W/kg = 2.38 dBW/kg

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Date: 2018/9/19

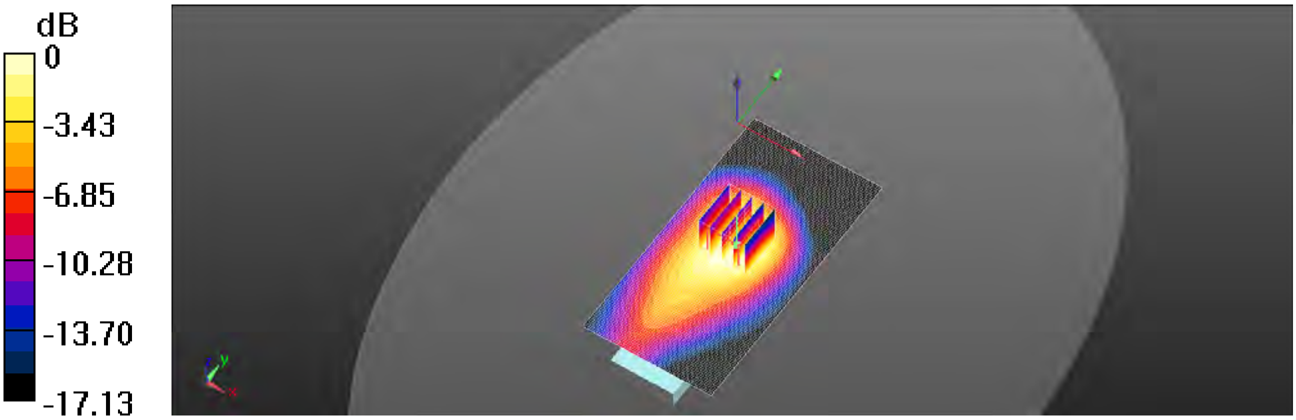
LTE Band 4 (20MHz)_Body_Back side_CH 20300_QPSK_1-0_10mm
Communication System: LTE; Frequency: 1745 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1745 MHz; σ = 1.461 S/m; ε_r = 51.411; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.5°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.96, 7.96, 7.96); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.891 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 9.515 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.08 W/kg
SAR(1 g) = 0.677 W/kg; SAR(10 g) = 0.419 W/kg
Maximum value of SAR (measured) = 0.879 W/kg



0 dB = 0.879 W/kg = -0.56 dBW/kg

Date: 2018/9/18

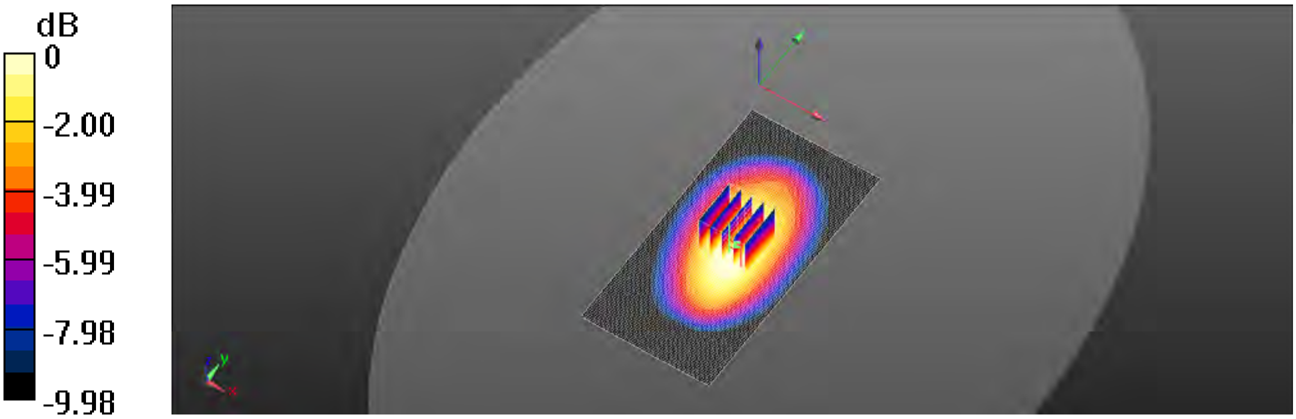
LTE Band 5 (10MHz)_Body_Back side_CH 20600_QPSK_1-0_10mm
Communication System: LTE; Frequency: 844 MHz; Duty Cycle: 1:1
Medium parameters used: f = 844 MHz; σ = 1.004 S/m; ε_r = 57.166; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.48, 9.48, 9.48); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 1.20 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 28.39 V/m; Power Drift = -0.16 dB
Peak SAR (extrapolated) = 1.39 W/kg
SAR(1 g) = 0.992 W/kg; SAR(10 g) = 0.696 W/kg
Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.20 W/kg = 0.79 dBW/kg

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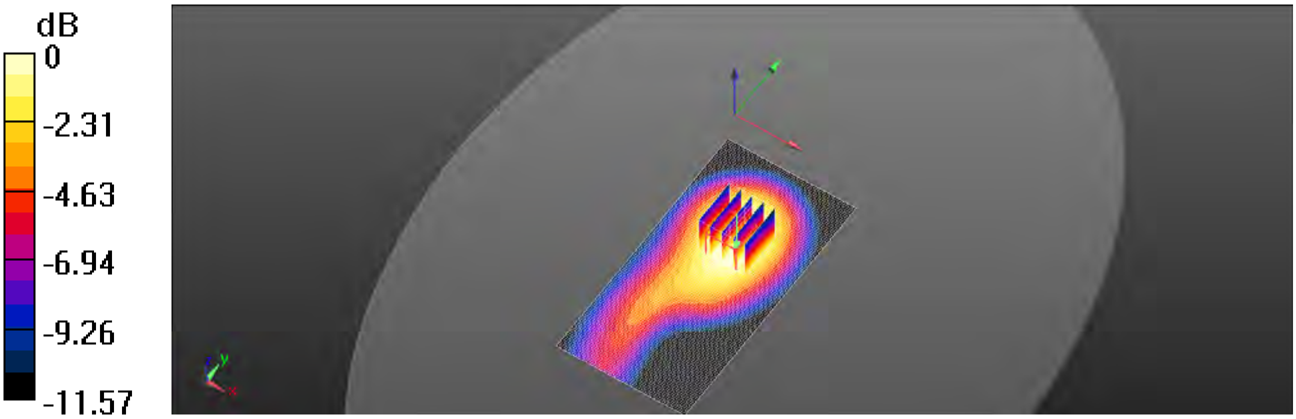
Date: 2018/9/18

LTE Band 13 (10MHz)_Body_Back side_CH 23230_QPSK_1-0_10mm
Communication System: LTE; Frequency: 782 MHz; Duty Cycle: 1:1
Medium parameters used: f = 782 MHz; σ = 1.003 S/m; ε_r = 56.976; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 21.5°C

DASY5 Configuration:
- Probe: EX3DV4 - SN3938; ConvF(9.62, 9.62, 9.62); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.884 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 18.46 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 1.05 W/kg
SAR(1 g) = 0.717 W/kg; SAR(10 g) = 0.489 W/kg
Maximum value of SAR (measured) = 0.884 W/kg



0 dB = 0.884 W/kg = -0.54 dBW/kg

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Date: 2018/9/18

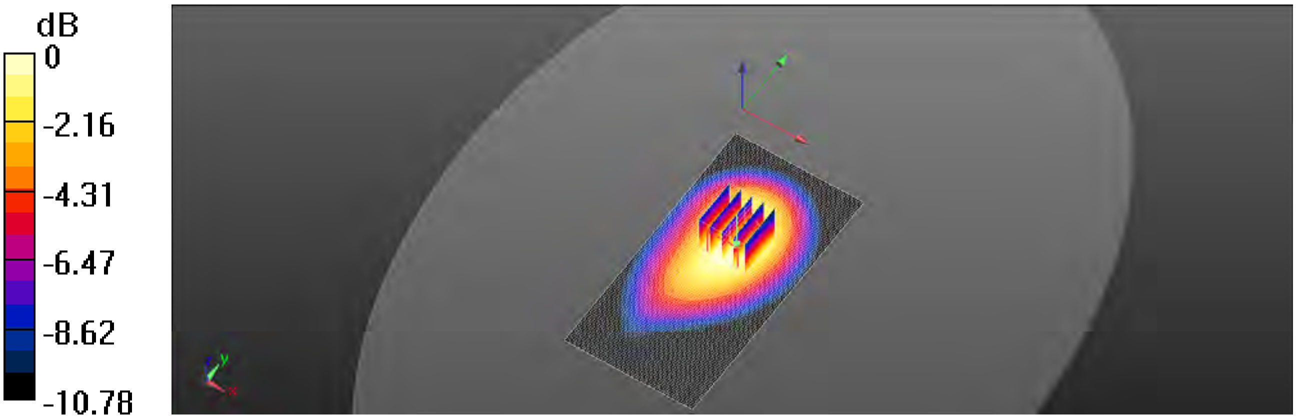
LTE Band 17 (10MHz)_Body_Back side_CH 23800_QPSK_1-0_10mm
Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1
Medium parameters used: f = 711 MHz; σ = 0.929 S/m; ε_r = 57.669; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 21.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.62, 9.62, 9.62); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 0.820 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm
Reference Value = 19.09 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 0.969 W/kg
SAR(1 g) = 0.693 W/kg; SAR(10 g) = 0.487 W/kg
Maximum value of SAR (measured) = 0.842 W/kg



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

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5. SAR System Performance Verification

Date: 2018/9/18

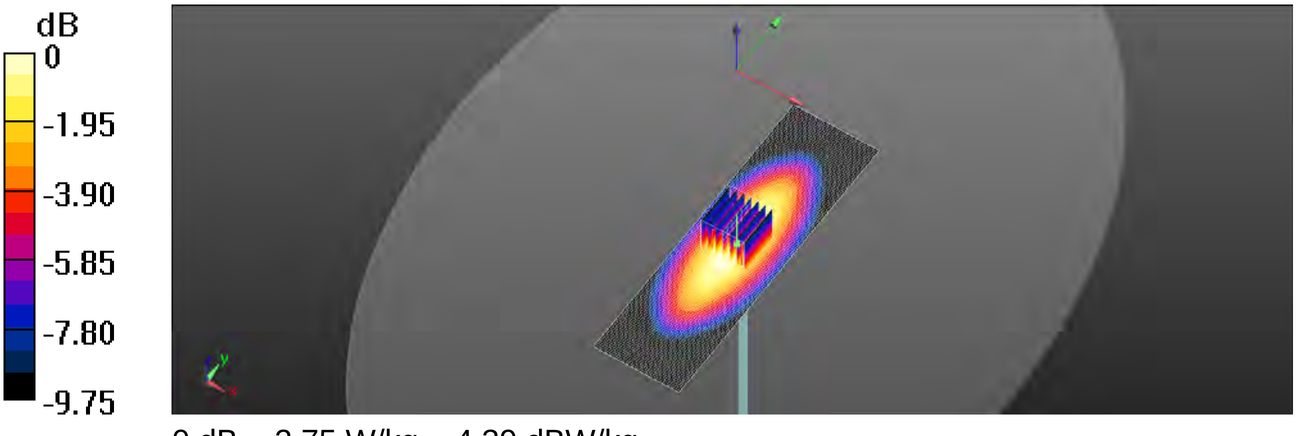
Dipole 750 MHz_SN:1015
Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 750 MHz; σ = 0.97 S/m; ε_r = 57.228; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.9°C; Liquid temperature: 21.5°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.62, 9.62, 9.62); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (41x141x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 2.75 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.42 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.19 W/kg
SAR(1 g) = 2.19 W/kg; SAR(10 g) = 1.46 W/kg
Maximum value of SAR (measured) = 2.75 W/kg



0 dB = 2.75 W/kg = 4.39 dBW/kg

Date: 2018/9/18

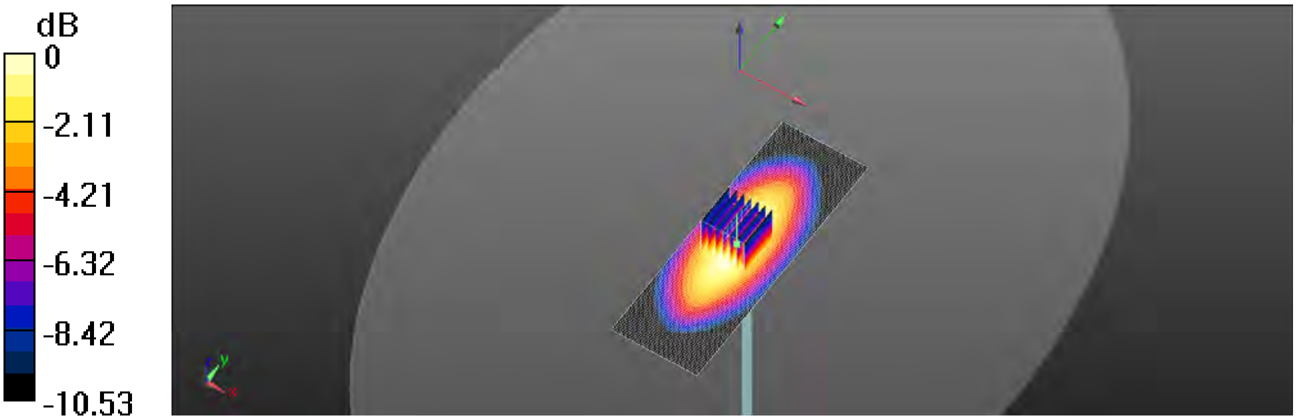
Dipole 835 MHz_SN:4d063
Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.996 S/m; ε_r = 57.227; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.7°C; Liquid temperature: 21.4°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(9.48, 9.48, 9.48); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (41x121x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 3.08 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.43 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.64 W/kg
SAR(1 g) = 2.45 W/kg; SAR(10 g) = 1.6 W/kg
Maximum value of SAR (measured) = 3.10 W/kg



0 dB = 3.10 W/kg = 4.91 dBW/kg

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Date: 2018/9/19

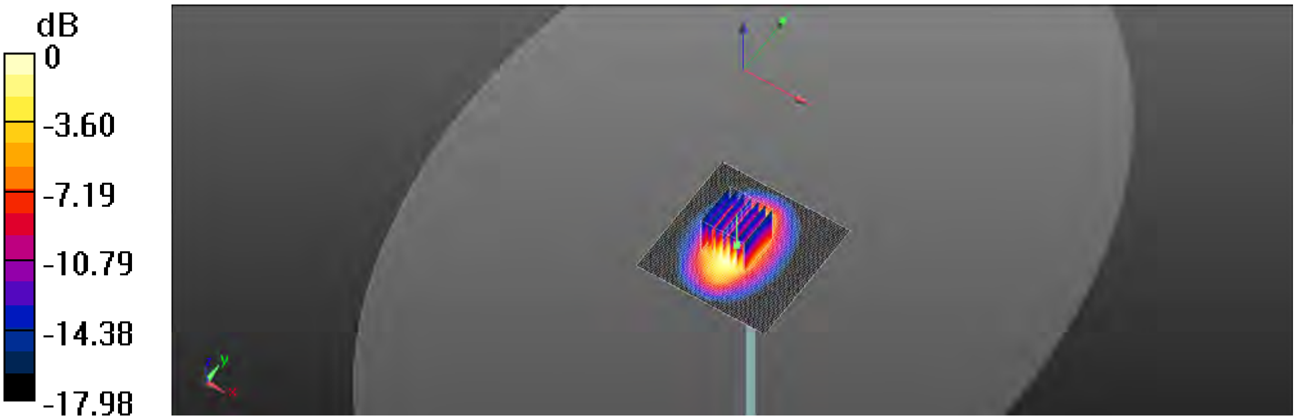
Dipole 1750 MHz_SN:1008
Communication System: CW; Frequency: 1750 MHz; Duty Cycle: 1:1
Medium parameters used: f = 1750 MHz; σ = 1.468 S/m; ε_r = 51.391; ρ = 1000 kg/m^3
Phantom section: Flat Section
Ambient temperature: 21.5°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.96, 7.96, 7.96); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15 mm, dy=15 mm
Maximum value of SAR (interpolated) = 13.6 W/kg

Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 93.51 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 17.8 W/kg
SAR(1 g) = 9.34 W/kg; SAR(10 g) = 4.8 W/kg
Maximum value of SAR (measured) = 13.6 W/kg



0 dB = 13.6 W/kg = 11.34 dBW/kg

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Date: 2018/9/19

Dipole 1900 MHz_SN:5d173

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1900 MHz; σ = 1.586 S/m; ε_r = 50.848; ρ = 1000 kg/m^3

Phantom section: Flat Section

Ambient temperature: 21.5°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 - SN3938; ConvF(7.96, 7.96, 7.96); Calibrated: 2017/9/29;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2017/9/28
- Phantom: ELI
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (61x61x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.8 W/kg

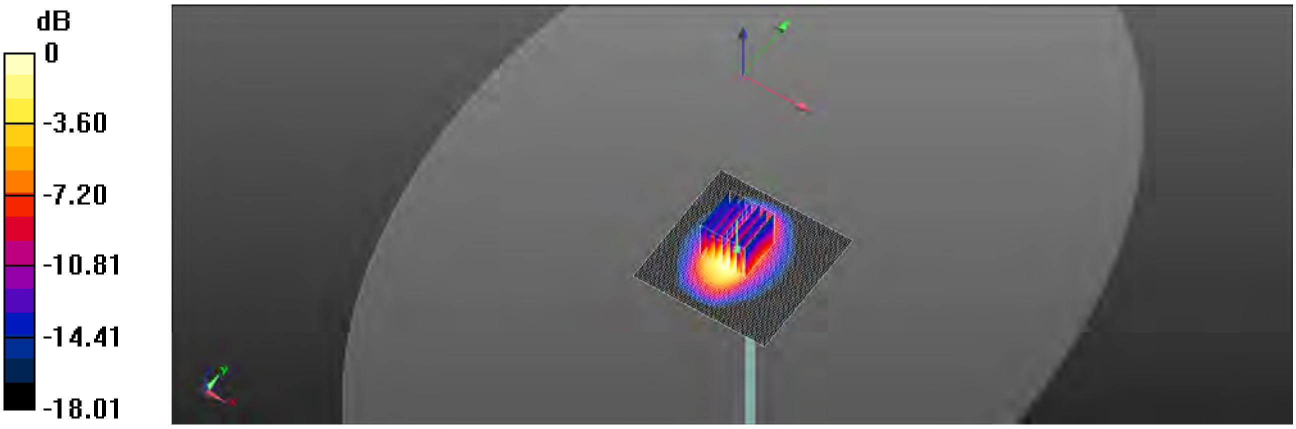
Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 85.47 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 19.3 W/kg

SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 15.0 W/kg



0 dB = 15.0 W/kg = 11.76 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
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 0108

Client SGS-TW (Auden)

Certificate No: DAE4-1260_Sep17

CALIBRATION CERTIFICATE

Object: DAE4 - SD 000 D04 BM - SN: 1260

Calibration procedure(s): QA CAL-06.v29
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: September 28, 2017

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	31-Aug-17 (No:21092)	Aug-18
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	05-Jan-17 (in house check)	In house check: Jan-18
Calibrator Box V2.1	SE UMS 006 AA 1002	05-Jan-17 (in house check)	In house check: Jan-18

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	

Issued: September 28, 2017

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

Certificate No: DAE4-1260_Sep17 Page 1 of 5

Calibration Laboratory of
Schmid & Partner
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Accreditation No.: **SCS 0108**

Glossary

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

Methods Applied and Interpretation of Parameters

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

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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.......+3mV

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

Calibration Factors	X	Y	Z
High Range	405.082 ± 0.02% (k=2)	405.133 ± 0.02% (k=2)	404.970 ± 0.02% (k=2)
Low Range	3.98948 ± 1.50% (k=2)	3.95701 ± 1.50% (k=2)	3.98426 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	341.5 ° ± 1 °

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	200030.04	-3.23	-0.00
Channel X	+ Input	20005.05	0.72	0.00
Channel X	- Input	-20003.19	2.57	-0.01
Channel Y	+ Input	200031.04	-2.35	-0.00
Channel Y	+ Input	20004.17	-0.10	-0.00
Channel Y	- Input	-20006.05	-0.28	0.00
Channel Z	+ Input	200033.38	-0.04	-0.00
Channel Z	+ Input	20003.27	-0.97	-0.00
Channel Z	- Input	-20007.67	-1.85	0.01

Low Range		Reading (µV)	Difference (µV)	Error (%)
Channel X	+ Input	2000.34	-0.06	-0.00
Channel X	+ Input	201.28	0.95	0.47
Channel X	- Input	-198.35	1.25	-0.63
Channel Y	+ Input	2000.88	0.54	0.03
Channel Y	+ Input	199.53	-0.80	-0.40
Channel Y	- Input	-200.22	-0.64	0.32
Channel Z	+ Input	2000.27	0.04	0.00
Channel Z	+ Input	198.83	-1.41	-0.70
Channel Z	- Input	-200.94	-1.26	0.63

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	29.02	27.07
	- 200	-24.87	-27.14
Channel Y	200	-18.44	-18.59
	- 200	18.33	18.03
Channel Z	200	15.00	15.39
	- 200	-18.17	-18.23

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	-	-1.16	-4.49
Channel Y	200	7.88	-	1.01
Channel Z	200	10.65	4.72	-

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4. AD-Converter Values with inputs shorted

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

	High Range (LSB)	Low Range (LSB)
Channel X	16017	16757
Channel Y	15556	15598
Channel Z	15950	16735

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	0.90	-0.03	1.89	0.40
Channel Y	0.57	-0.29	1.84	0.37
Channel Z	-1.27	-2.75	0.35	0.59

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

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Accreditation No.: **SCS 0108**

Client: SGS-TW (Auden)

Certificate No: EX3-3938_Sep17

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3938

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6
Calibration procedure for dosimetric E-field probes

Calibration date: September 29, 2017

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 NRP	SN: 104778	04-Apr-17 (No. 217-02521/02522)	Apr-18
Power sensor NRP-Z91	SN: 103244	04-Apr-17 (No. 217-02521)	Apr-18
Power sensor NRP-Z91	SN: 103245	04-Apr-17 (No. 217-02525)	Apr-18
Reference 20 dB Attenuator	SN: S5277 (20x)	07-Apr-17 (No. 217-02528)	Apr-18
Reference Probe ES3DV2	SN: 3013	31-Dec-16 (No. ES3-3013_Dec16)	Dec-17
DAE4	SN: 660	7-Dec-16 (No. DAE4-660_Dec16)	Dec-17
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-16)	In house check: Jun-18
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-16)	In house check: Jun-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-16)	In house check: Oct-17

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

Issued: October 2, 2017

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

Certificate No: EX3-3938_Sep17 Page 1 of 11

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Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

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

Probe EX3DV4

SN:3938

Manufactured: May 2, 2013
Calibrated: September 29, 2017

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

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.51	0.57	0.33	± 10.1 %
DCP (mV)[B]	102.0	101.2	103.4	

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	139.3	±2.5 %
		Y	0.0	0.0	1.0		146.0	
		Z	0.0	0.0	1.0		131.9	

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

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

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	10.26	10.26	10.26	0.53	0.80	± 12.0 %
835	41.5	0.90	9.69	9.69	9.69	0.50	0.83	± 12.0 %
900	41.5	0.97	9.50	9.50	9.50	0.51	0.80	± 12.0 %
1450	40.5	1.20	8.49	8.49	8.49	0.45	0.80	± 12.0 %
1750	40.1	1.37	8.35	8.35	8.35	0.33	0.85	± 12.0 %
1900	40.0	1.40	8.07	8.07	8.07	0.36	0.84	± 12.0 %
2000	40.0	1.40	8.04	8.04	8.04	0.30	0.86	± 12.0 %
2300	39.5	1.67	7.66	7.66	7.66	0.32	0.84	± 12.0 %
2450	39.2	1.80	7.30	7.30	7.30	0.37	0.80	± 12.0 %
2600	39.0	1.96	7.14	7.14	7.14	0.33	0.86	± 12.0 %
5250	35.9	4.71	5.04	5.04	5.04	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.70	4.70	4.70	0.40	1.80	± 13.1 %
5750	35.4	5.22	4.85	4.85	4.85	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	55.5	0.96	9.62	9.62	9.62	0.51	0.80	± 12.0 %
835	55.2	0.97	9.48	9.48	9.48	0.50	0.83	± 12.0 %
900	55.0	1.05	9.35	9.35	9.35	0.55	0.80	± 12.0 %
1450	54.0	1.30	8.29	8.29	8.29	0.36	0.80	± 12.0 %
1750	53.4	1.49	7.96	7.96	7.96	0.45	0.80	± 12.0 %
1900	53.3	1.52	7.70	7.70	7.70	0.40	0.80	± 12.0 %
2000	53.3	1.52	7.87	7.87	7.87	0.38	0.86	± 12.0 %
2300	52.9	1.81	7.51	7.51	7.51	0.41	0.85	± 12.0 %
2450	52.7	1.95	7.42	7.42	7.42	0.39	0.80	± 12.0 %
2600	52.5	2.16	7.15	7.15	7.15	0.35	0.89	± 12.0 %
5250	48.9	5.36	4.41	4.41	4.41	0.40	1.90	± 13.1 %
5600	48.5	5.77	3.90	3.90	3.90	0.45	1.90	± 13.1 %
5750	48.3	5.94	4.09	4.09	4.09	0.45	1.90	± 13.1 %

[C] Frequency validity above 300 MHz 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. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.
[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

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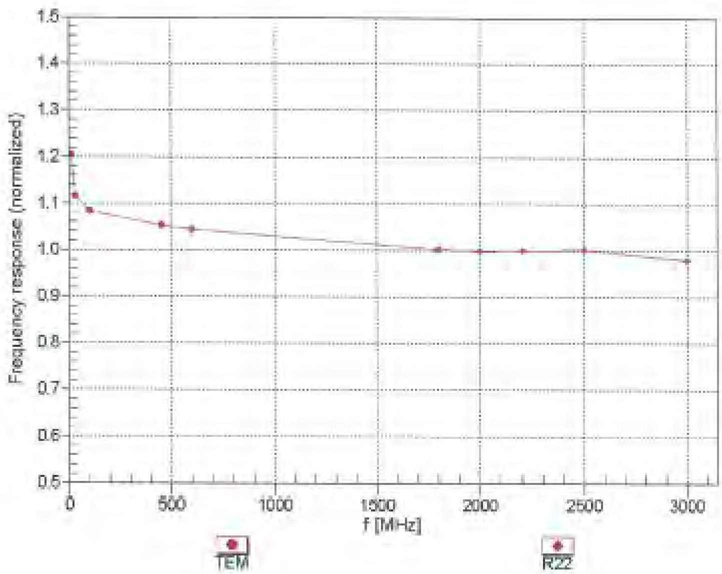
EX3DV4– SN:3938 September 29, 2017

Frequency Response of E-Field

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



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

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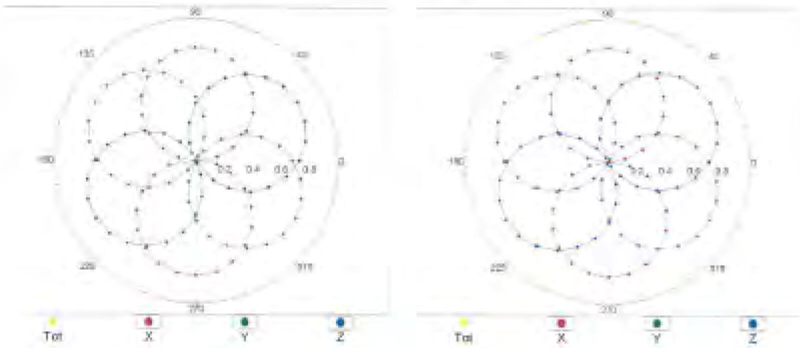
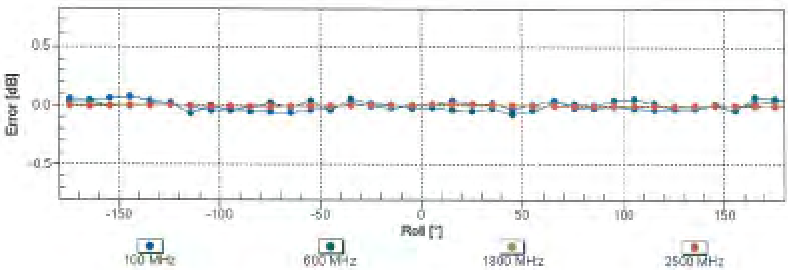
Receiving Pattern (ϕ), $\vartheta = 0°$

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





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

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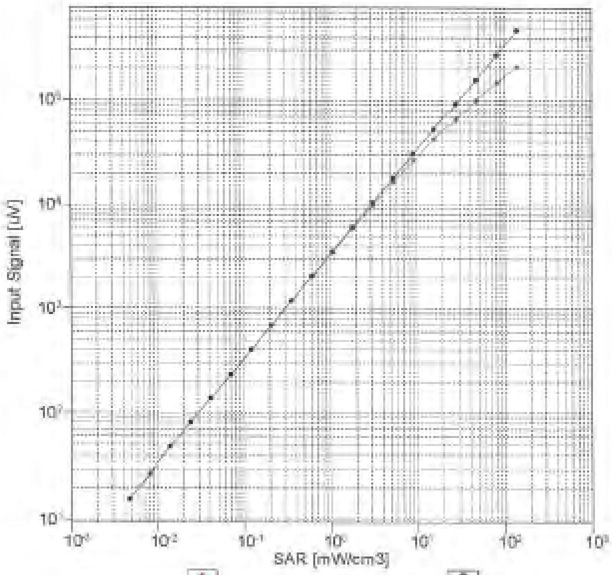
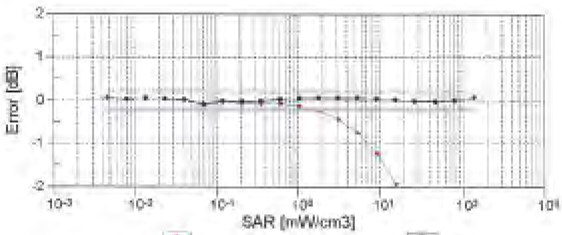
Dynamic Range f(SAR$_{head}$)

(TEM cell , f_{eval}= 1900 MHz)





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

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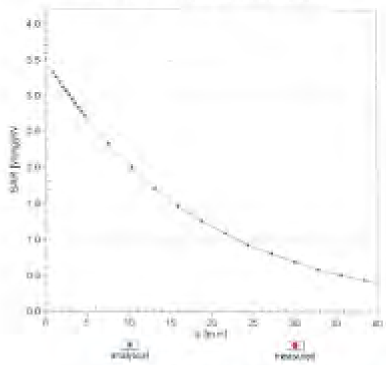
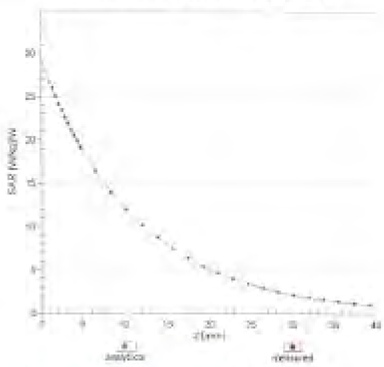
Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

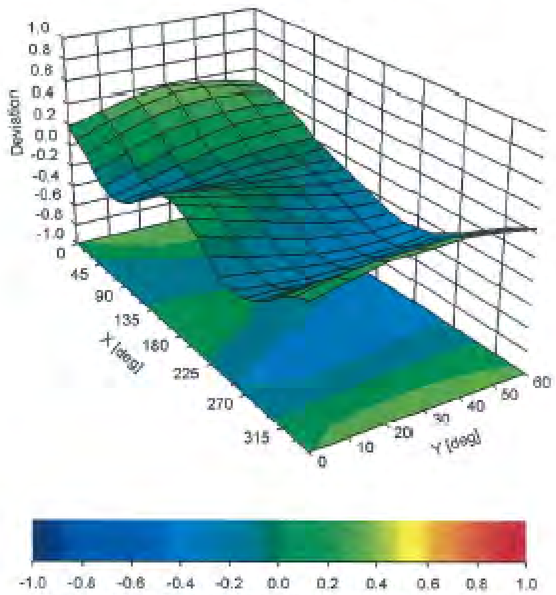


f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz



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

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-24.6
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	1.4 mm

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7. Uncertainty Budget

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

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	6.00%	N	1	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	$\sqrt{3}$	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	$\sqrt{3}$	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	$\sqrt{3}$	1.732	1	1	1.40%	1.40%	∞
Boundary Effect	1.00%	R	$\sqrt{3}$	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	$\sqrt{3}$	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	$\sqrt{3}$	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	$\sqrt{3}$	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	$\sqrt{3}$	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	$\sqrt{3}$	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	$\sqrt{3}$	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	$\sqrt{3}$	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	$\sqrt{3}$	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	$\sqrt{3}$	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	$\sqrt{3}$	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	$\sqrt{3}$	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	$\sqrt{3}$	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	$\sqrt{3}$	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	4.13%	N	1	1	0.64	0.43	2.64%	1.78%	M
Liquid Conductivity (mea.)	3.84%	N	1	1	0.6	0.49	2.30%	1.88%	M
Combined standard uncertainty		RSS					11.94%	11.70%	
Expant uncertainty (95% confidence							23.89%	23.40%	

8. Phantom Description

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info@speag.com, http://www.speag.com

Certificate of Conformity / First Article Inspection

Item	Oval Flat Phantom ELI 5.0
Type No	QD OVA 002 A
Series No	1108 and higher
Manufacturer	Untersee Composites Knebelstrasse 8, CH-8268 Mannenbach, Switzerland

Tests
Complete tests were made on the prototype units QD OVA 001 A, pre-series units QD OVA 001 B as well as on some series units QD OVA 001 B. Some tests are made on all series units QD OVA 002 A.

Test	Requirement	Details	Units tested
Shape	Internal dimensions, depth and sagging are compatible with standards	Bottom elliptical 600 x 400 mm, Depth 190 mm, dimension compliant with [1] for f > 375 MHz	Prototypes
Material thickness	Bottom: 2.0mm +/- 0.2mm	dimension compliant with [3] for f > 800 MHz	all
Material parameters	rel. permittivity 2 – 5, loss tangent ≤ 0.05, at f ≤ 6 GHz	rel. permittivity 3.5 +/- 0.5 loss tangent ≤ 0.05	Material samples
Material resistivity	Compatibility with tissue simulating liquids .	Compatible with SPEAG liquids. **	Phantoms, Material sample
Sagging	Sagging of the flat section in tolerance when filled with tissue simulating liquid.	within tolerance for filling height up to 155 mm	Prototypes, samples

** Note: Compatibility restrictions apply certain liquid components mentioned in the standard, containing e.g. DGBE, DGMHE or Triton X-100. Observe technical note on material compatibility.

Standards
[1] OET Bulletin 65, Supplement C, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Edition 01-01
[2] IEEE 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques, December 2003
[3] IEC 62209–1 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", 2005-02-18
[4] IEC 62209–2 ed1.0, "Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Human models, instrumentation, and procedures - Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", 2010-03-30

Conformity
Based on the sample tests above, we certify that this item is in compliance with the uncertainty requirements of body-worn SAR measurements and system performance checks as specified in [1 – 4] and further standards.

Date 25.7.2011

Signature / Stamp

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Doc No 881 – QD OVA 002 A - A Page 1 (1)

9. System Validation from Original Equipment Supplier

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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SGS-TW (Auden)**

Certificate No: **D750V3-1015_Aug18**

CALIBRATION CERTIFICATE

Object	D750V3 - SN:1015
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 23, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: August 24, 2018

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Certificate No: D750V3-1015_Aug18 Page 1 of 8

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.9 ± 6 %	0.89 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.23 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.34 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	55.5	0.96 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 6 %	0.96 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**8.62 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**5.71 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.4 Ω + 0.0 jΩ
Return Loss	- 29.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.2 Ω - 3.6 jΩ
Return Loss	- 27.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.037 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	March 22, 2010

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DASY5 Validation Report for Head TSL

Date: 22.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

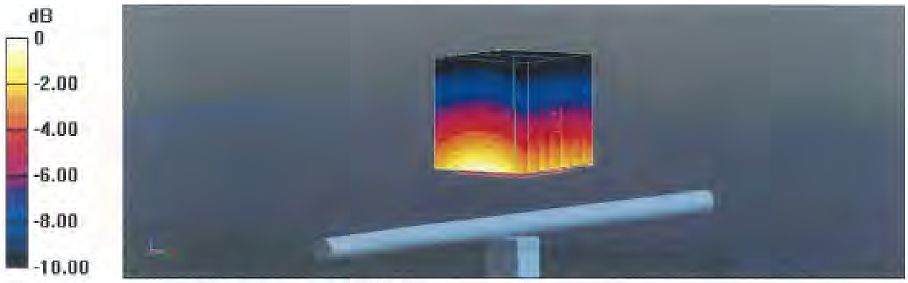
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1015

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 40.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.22, 10.22, 10.22) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

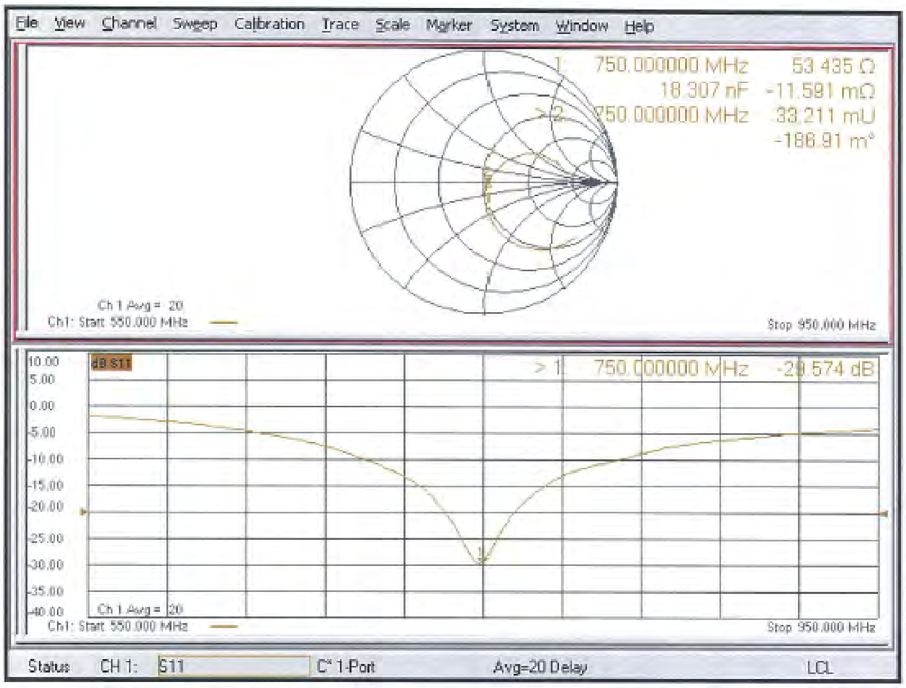
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 59.12 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.11 W/kg
SAR(1 g) = 2.07 W/kg; SAR(10 g) = 1.34 W/kg
Maximum value of SAR (measured) = 2.77 W/kg



0 dB = 2.77 W/kg = 4.42 dBW/kg

Certificate No: D750V3-1015_Aug18 Page 5 of 8

Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 23.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

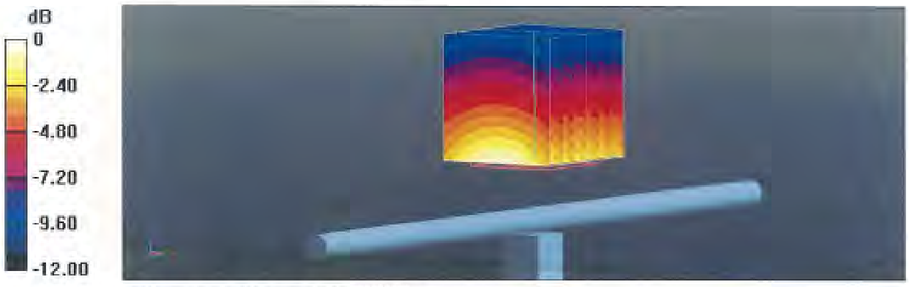
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1015

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.96 S/m; ε_r = 55; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.19, 10.19, 10.19) @ 750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.93 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.43 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



0 dB = 2.85 W/kg = 4.55 dBW/kg

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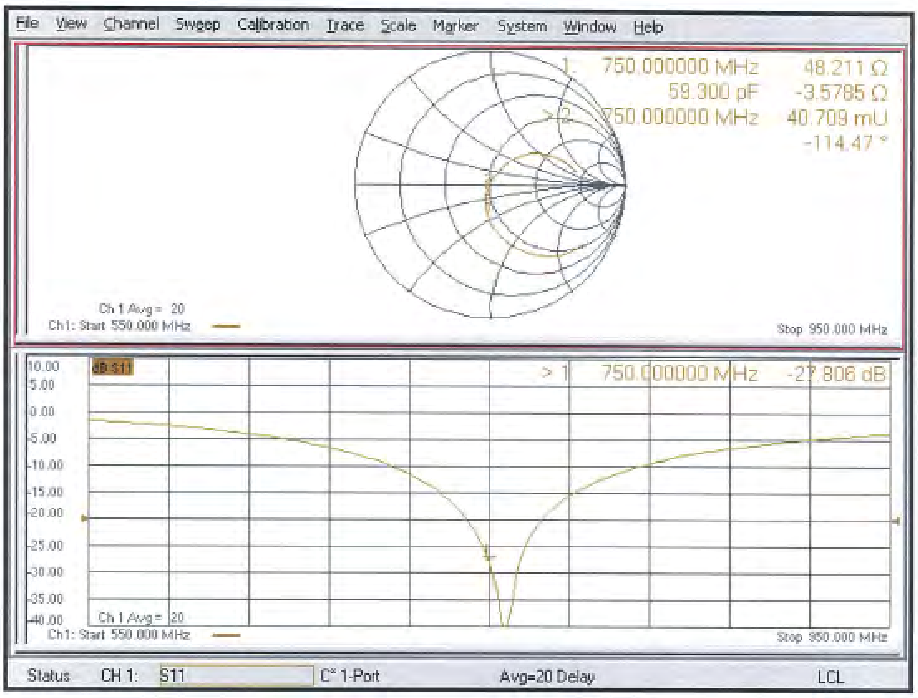
Impedance Measurement Plot for Body TSL



Certificate No: D750V3-1015_Aug18 Page 8 of 8

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Accreditation No.: **SCS 0108**

Client **SGS-TW (Auden)**

Certificate No: **D835V2-4d063_Aug18**

CALIBRATION CERTIFICATE

Object	D835V2 - SN:4d063
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 23, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: August 24, 2018

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Certificate No: D835V2-4d063_Aug18 Page 1 of 8

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.92 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.48 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.10 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.9 ± 6 %	0.99 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.56 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.28 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω - 1.8 jΩ
Return Loss	- 33.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.7 Ω - 4.4 jΩ
Return Loss	- 25.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.393 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

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DASY5 Validation Report for Head TSL

Date: 22.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

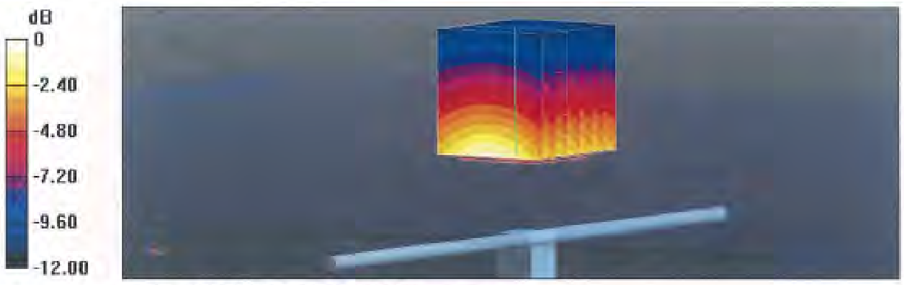
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.92 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 62.96 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.70 W/kg
SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.55 W/kg
Maximum value of SAR (measured) = 3.25 W/kg



0 dB = 3.25 W/kg = 5.12 dBW/kg

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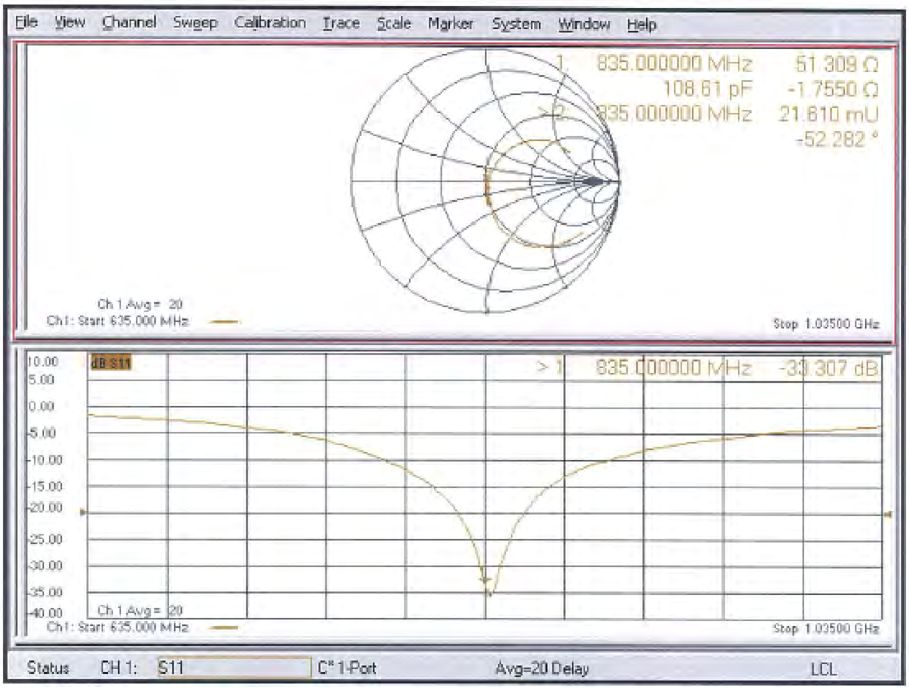
Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d063_Aug18 Page 6 of 8

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DASY5 Validation Report for Body TSL

Date: 23.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

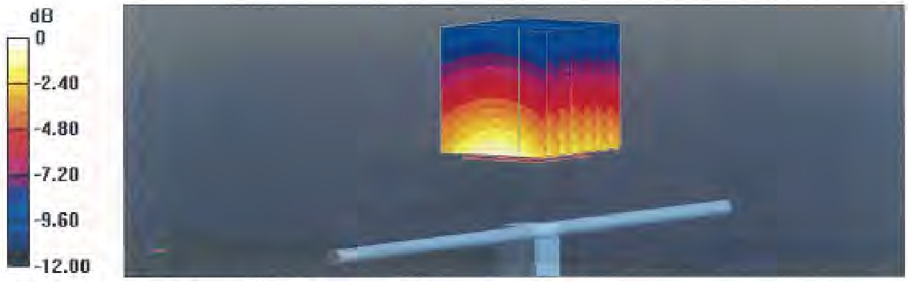
DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d063

Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.99 S/m; ε_r = 54.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.05, 10.05, 10.05) @ 835 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 4.9 (Back); Type: QD 00R P49 AA; Serial: 1005
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.67 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.59 W/kg
Maximum value of SAR (measured) = 3.23 W/kg



0 dB = 3.23 W/kg = 5.09 dBW/kg

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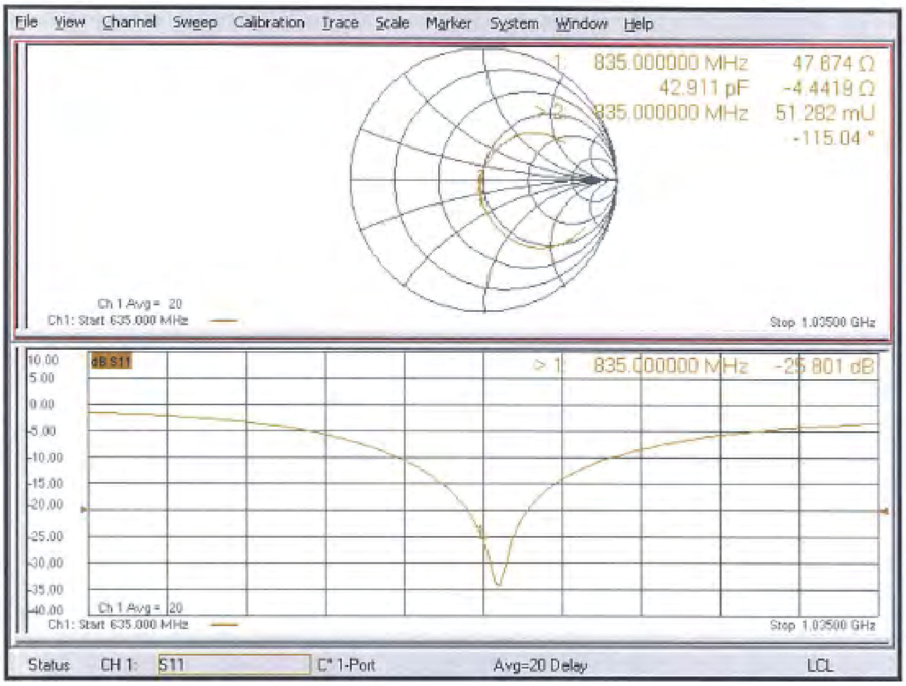
Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 0108**

Client **SGS-TW (Auden)**

Certificate No: **D1750V2-1008_Aug18**

CALIBRATION CERTIFICATE

Object	D1750V2 - SN:1008
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	August 30, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-17)	In house check: Oct-18

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

Issued: August 30, 2018

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

Certificate No: D1750V2-1008_Aug18 Page 1 of 8

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY5	V52.10.1
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.9 ± 6 %	1.34 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	9.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.5 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.81 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.3 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.4 ± 6 %	1.47 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	9.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**37.0 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	4.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**19.8 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω + 1.6 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω + 0.6 jΩ
Return Loss	- 34.7 dB

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	February 11, 2009

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DASY5 Validation Report for Head TSL

Date: 30.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

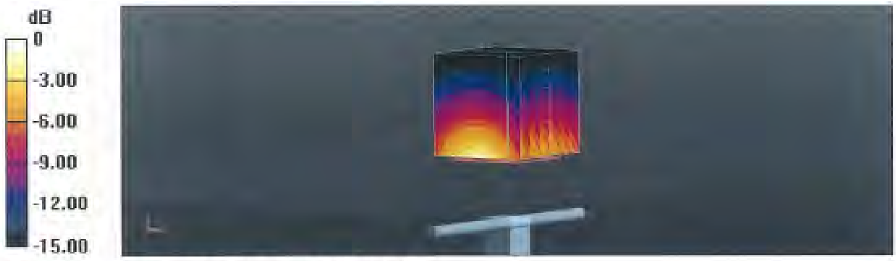
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.34 S/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.5, 8.5, 8.5) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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 = 107.6 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 16.3 W/kg
SAR(1 g) = 9.07 W/kg; SAR(10 g) = 4.81 W/kg
Maximum value of SAR (measured) = 13.9 W/kg



0 dB = 13.9 W/kg = 11.43 dBW/kg

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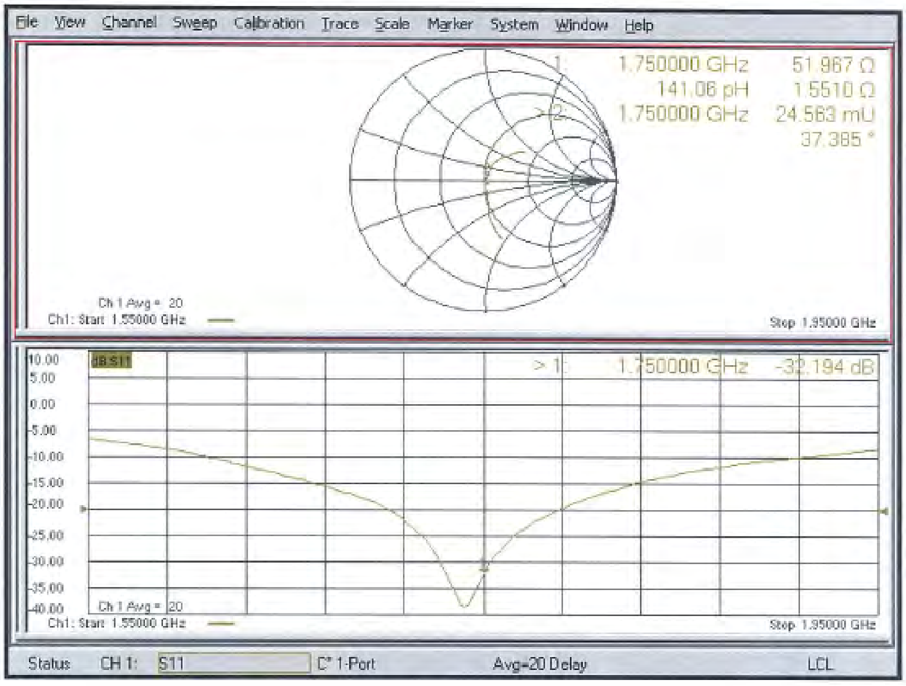
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 30.08.2018

Test Laboratory: SPEAG, Zurich, Switzerland

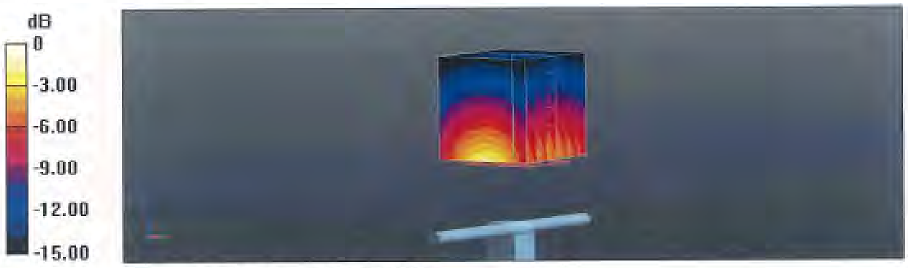
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1008

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.47 S/m; ε_r = 53.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.35, 8.35, 8.35) @ 1750 MHz; Calibrated: 30.12.2017
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.1(1476); SEMCAD X 14.6.11(7439)

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 = 101.7 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 9.16 W/kg; SAR(10 g) = 4.93 W/kg
Maximum value of SAR (measured) = 13.7 W/kg



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

Certificate No: D1750V2-1008_Aug18 Page 7 of 8

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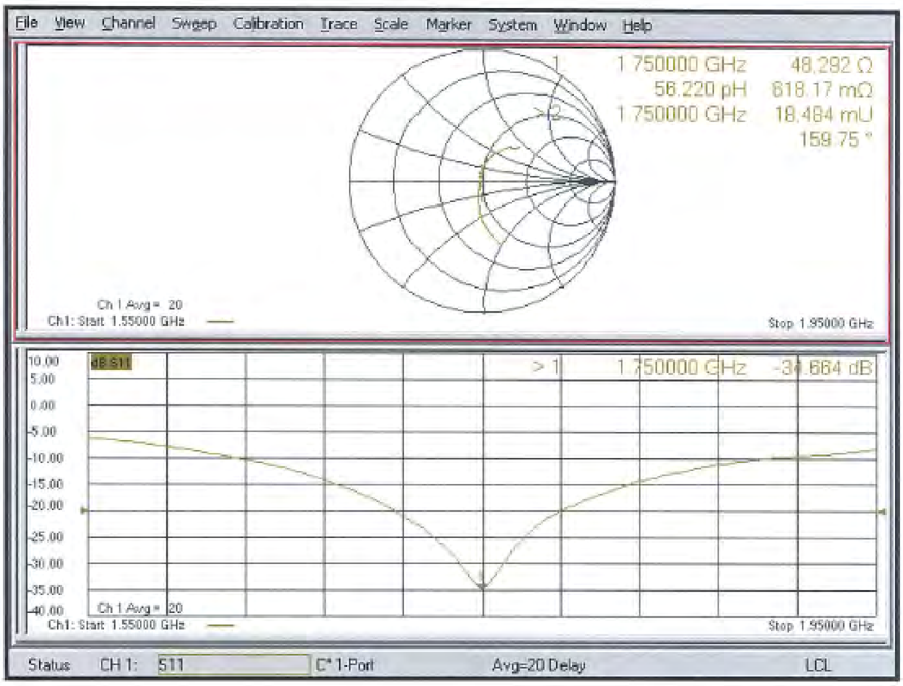
Impedance Measurement Plot for Body TSL



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Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: **SCS 0108**

Client **SGS-TW (Auden)**

Certificate No: **D1900V2-5d173_Apr18**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d173
Calibration procedure(s)	QA CAL-05.v10 Calibration procedure for dipole validation kits above 700 MHz
Calibration date:	April 25, 2018

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 NRP	SN: 104778	04-Apr-18 (No. 217-02672/02673)	Apr-19
Power sensor NRP-Z91	SN: 103244	04-Apr-18 (No. 217-02672)	Apr-19
Power sensor NRP-Z91	SN: 103245	04-Apr-18 (No. 217-02673)	Apr-19
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-18 (No. 217-02682)	Apr-19
Type-N mismatch combination	SN: 5047.2 / 06327	04-Apr-18 (No. 217-02683)	Apr-19
Reference Probe EX3DV4	SN: 7349	30-Dec-17 (No. EX3-7349_Dec17)	Dec-18
DAE4	SN: 601	26-Oct-17 (No. DAE4-601_Oct17)	Oct-18

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (in house check Oct-16)	In house check: Oct-18
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-16)	In house check: Oct-18
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-17)	In house check: Oct-18

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

Issued: April 25, 2018

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

Certificate No: D1900V2-5d173_Apr18 Page 1 of 8

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Accreditation No.: **SCS 0108**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY5	V52.10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	1.35 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	9.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**40.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.2 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.3 ± 6 %	1.47 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	9.93 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.30 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.6 W/kg ± 16.5 % (k=2)**

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.4 Ω + 5.1 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.3 Ω + 7.2 jΩ
Return Loss	- 22.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.195 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	June 08, 2012

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DASY5 Validation Report for Head TSL

Date: 25.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

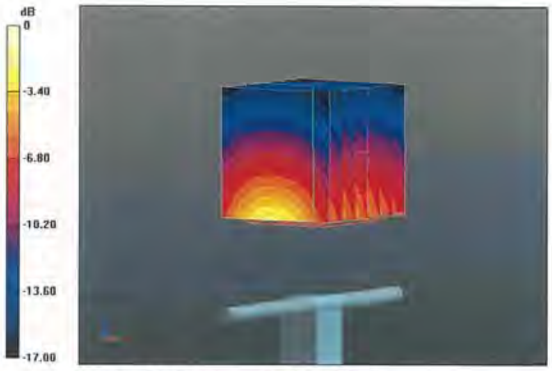
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d173

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.35 S/m; ε_r = 41.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.18, 8.18, 8.18); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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 = 110.9 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.89 W/kg; SAR(10 g) = 5.21 W/kg
Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dBW/kg

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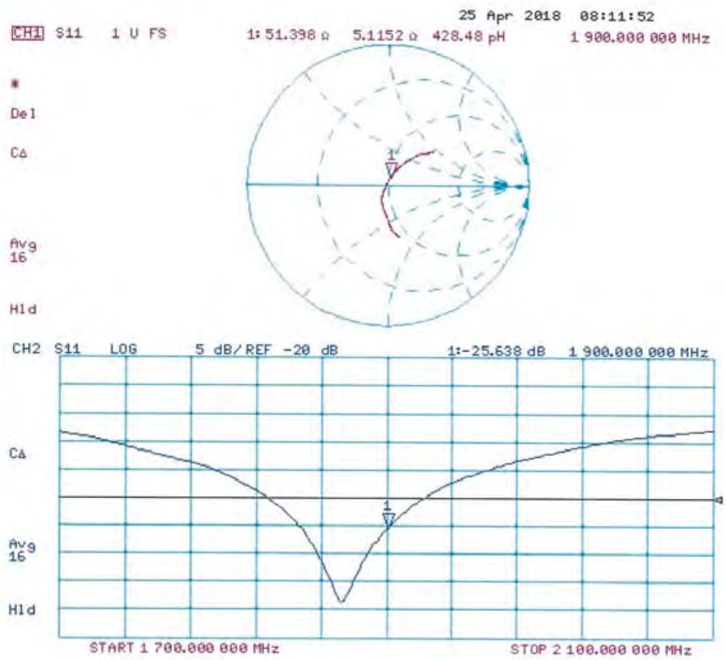
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 25.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

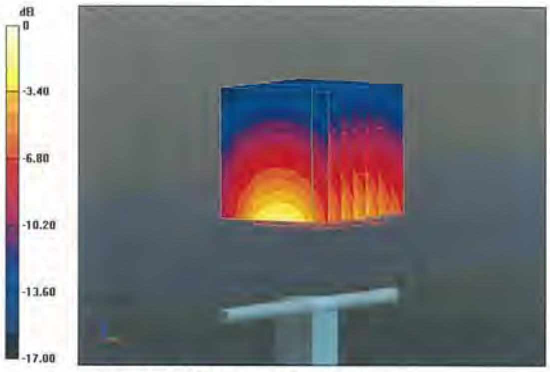
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d173

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.47 S/m; ε_r = 55.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.15, 8.15, 8.15); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.0(1446); SEMCAD X 14.6.10(7417)

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 = 104.6 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 17.7 W/kg
SAR(1 g) = 9.93 W/kg; SAR(10 g) = 5.3 W/kg
Maximum value of SAR (measured) = 14.7 W/kg



0 dB = 14.7 W/kg = 11.67 dBW/kg

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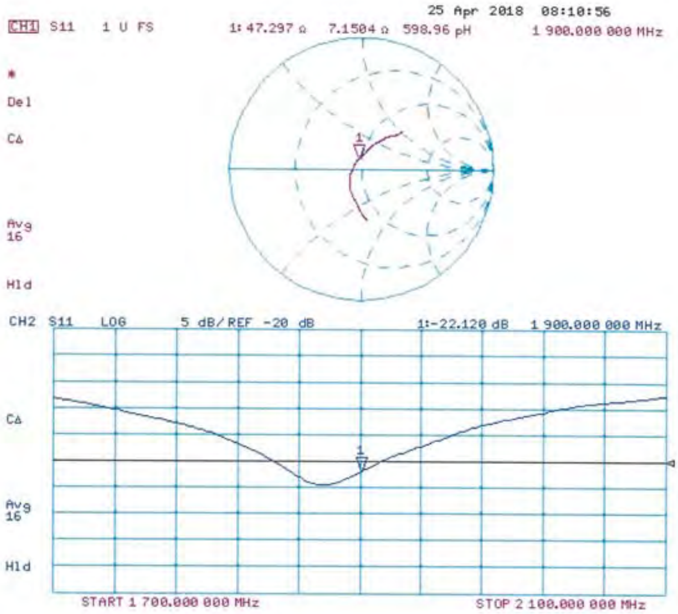
Impedance Measurement Plot for Body TSL



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- End of report -