

Report No. : E5/2018/80015 Page: 1 of 172

SAR TEST REPORT



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

Equipment Under Test	Smart phone
Company Name	Sharp Corporation, Mobile Communication B.U.
Company Address	2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi,Hiroshima 739-0192, Japan
Standards	IEEE/ANSI C95.1-1992, IEEE 1528-2013,
	KDB248227D01v02r02,KDB865664D01v01r04,
	KDB865664D02v01r02,KDB941225D01v03r01,
	KDB941225D06v02r01,KDB447498D01v06,
	KDB648474D04v01r03, KDB941225D05v02r05
FCC ID	APYHRO00265
Date of Receipt	Aug. 01, 2018
Date of Test(s)	Aug. 23, 2018 ~ Aug. 30, 2018
Date of Issue In the configuration tested, the EL	Sep. 12, 2018 JT complied with the standards specified above.

Remarks:

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

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Signed on behalf of SGS

Clerk / Ruby Ou	Engineer / Bond Tsai	Asst. Manager / John Yeh
Kuby Ou	Bonditsai	John Teh
	·	Date: Sep. 12, 2018

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f (886-2) 2298-0488



Highest SAR Summary					
Equipment class	Frequency Band	Head (Separation 0mm)	Body-worn (Separation 10mm)	Hotspot (Separation 10mm)	Highest Simultaneous Transmission 1g SAR(W/Kg)
1g SAR(W/Kg)					
Licensed	UMTS BV	0.42	0.52	0.52	
DTS	2.4GHz WLAN	0.38	0.08	0.12	1.55
NII	5GHz WLAN	1.11	0.11	-	1.55
DSS	Bluetooth	0.12	0.05	-	
Date	Date of Testing 2018/08/23~2018/08/30				

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Revision History

Report Number	Revision	Description	Issue Date
E5/2018/80015	Rev.00	Initial creation of document	Sep. 12, 2018

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1. General Information

1.1 Testing Laboratory

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

1.2 Details of Applicant

Company Name	Sharp Corporation, Mobile Communication B.U.
Compony Addrood	2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi,Hiroshima 739-0192, Japan

1.2.1 Details of Manufacturer

Company Name	Sharp Corporation
Company Address	1 Takumi-cho, Sakai-ku, Sakai City,Osaka 590-8522,Japan

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1.3 Description of EUT

EUT Name	Smart phone				
FCC ID	APYHRO00265				
Mode of Operation	WCDMA HSDPA HSL	JPA 🖂l	_TE FD	D	
	WLAN802.11 a/b/g/n/ac(20M/40	M/80M)	Blue	etooth	
	GSM (DTM multi class B)		1/8.3		
	GPRS (support multi class 12 max)	1/2.76	(1Dn4L 3 (1Dn3 (1Dn2)	BUP)	
		1/8.3	(1Dn1	UP)	
Duty Cycle	LTE FDD		1		
	WCDMA		1		
	WLAN802.11 1				
	a/b/g/n/ac(20M/40M/80M)		•		
	Bluetooth		1		
	GSM850	824	—	849	
	GSM1900	1850	—	1910	
	WCDMA Band V	824	—	849	
	LTE FDD Band 5	824	—	849	
TX Frequency Range (MHz)	LTE FDD Band 12	699	_	716	
	LTE FDD Band 17	704	_	716	
	WiFi 2.4GHz	2400	_	2462	
	WiFi 5GHz	5150	—	5725	
	Bluetooth	2402	_	2480	

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	GSM850	128	_	251
	GSM1900	512	—	810
	WCDMA Band V	4132	—	4233
Channel Number	LTE FDD Band 5	20407	_	20643
Channel Number (ARFCN)	LTE FDD Band 12	23017	—	23173
	LTE FDD Band 17	23755	—	23825
	WiFi 2.4GHz	1	—	11
	WiFi 5GHz	36	_	144
	Bluetooth	0	_	78

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Max. SAR (1-g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel	
	GSM 850	0.35	0.41	□Left ⊠Right ⊠Cheek □Tilt <u>251</u> Channel	
	GSM 1900	0.12	0.17	∐Left ☐Right ⊠Cheek ☐Tilt <u>512</u> Channel	
Head	WCDMA Band V	0.34	0.42	☐Left ⊠Right ⊠Cheek ☐Tilt <u>4233</u> Channel	
	LTE FDD Band 5	0.29	0.32	☐Left ⊠Right ⊠Cheek ☐Tilt <u>20525</u> Channel	
	LTE FDD Band 12	0.11	0.12	□Left ⊠Right ⊠Cheek □Tilt <u>23130</u> Channel	
	LTE FDD Band 17	0.14	0.15	□Left ⊠Right ⊠Cheek □Tilt <u>23780</u> Channel	

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	Max. SAR (1-g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel		
	WLAN802.11 b	0.38	0.38	□Left ⊠Right ⊠Cheek □Tilt <u>1</u> Channel		
	WLAN802.11ac(80M)5.2G	0.82	0.89	□Left ⊠Right ⊠Cheek □Tilt <u>42</u> Channel		
	WLAN802.11n(40M)5.2G	0.77	0.80	□Left ⊠Right ⊠Cheek □Tilt <u>38</u> Channel		
Head	WLAN802.11ac(80M)5.3G	0.93	0.96	□Left ⊠Right ⊠Cheek □Tilt <u>58</u> Channel		
	WLAN802.11n(40M)5.3G	0.87	0.92	□Left ⊠Right ⊠Cheek □Tilt <u>54</u> Channel		
	WLAN802.11ac(80M)5.6G	1.08	1.11	□Left ⊠Right ⊠Cheek □Tilt <u>106</u> Channel		
	Bluetooth	0.09	0.12	□Left ⊠Right ⊠Cheek □Tilt <u>0</u> Channel		

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	Max. SAR (1-	g) (Unit: W	//Kg)	
Mode	Band	Measured	Reported	Position / Channel
	GSM 850	0.43	0.51	☐Front ⊠Back <u>251</u> Channel
	GSM 1900	0.18	0.26	☐Front ⊠Back <u>512</u> Channel
	WCDMA Band V	0.42	0.52	☐Front ⊠Back <u>4233</u> Channel
	LTE FDD Band 5	0.39	0.43	☐Front ⊠Back <u>20525</u> Channel
	LTE FDD Band 12	0.19	0.22	☐Front ⊠Back <u>23130</u> Channel
Body-worn	LTE FDD Band 17	0.22	0.24	☐Front ⊠Back <u>23780</u> Channel
	WLAN802.11 b	0.08	0.08	□Front ⊠Back <u>1</u> Channel
	WLAN802.11ac(80M)5.2G	0.10	0.11	⊠Front □Back <u>42</u> Channel
	WLAN802.11ac(80M)5.3G	0.08	0.08	⊠Front □Back <u>58</u> Channel
	WLAN802.11ac(80M)5.6G	0.09	0.09	⊠Front
	Bluetooth	0.04	0.05	□Front ⊠Back 0_Channel

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	Max. SAR	(1-g) (Unit:	: W/Kg)	
Mode	Band	Measured	Reported	Position / Channel
	GPRS 850 (1Dn4UP)	0.30	0.45	☐Front ⊠Back ☐Bottom ☐Right ☐Left <u>251</u> Channel
	GPRS 1900 (1Dn4UP)	0.34	0.49	☐Front ☐Back ☐Top ☐Right ☐Left ⊠Bottom <u>512</u> Channel
	WCDMA Band V	0.42	0.52	☐Front ⊠Back ☐Top ☐Right ☐Left <u>4233</u> Channel
Hotspot mode	LTE FDD Band 5	0.39	0.43	☐Front ⊠Back ☐Bottom ☐Right ☐Left <u>20525</u> Channel
	LTE FDD Band 12	0.19	0.22	☐Front ⊠Back ☐Top ☐Right ☐Left <u>23130</u> Channel
	LTE FDD Band 17	0.22	0.24	☐Front ⊠Back ☐Bottom ☐Right ☐Left <u>23780</u> Channel
	WLAN802.11 b	0.11	0.12	☐Front ☐Back ☐Top ☐Right ☐Left ☐Bottom <u>1</u> Channel

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GSM 850 - conducted power table:

EUT mode	Frequency (MHz)	СН	Max. Rated Avg. Power + Max.	Burst average power	Source-based time average power		
			Tolerance (dBm)	Avg. (dBm)	Avg. (dBm)		
GSM 850	824.2	128	33.5	32.49	23.46		
GSM 850 (GMSK)	836.6	190	33.5	32.64	23.61		
	848.8	251	33.5	32.79	23.76		
	The divisior	n factor com	pared to the	e number of TX tir	ne slot		
	Divisior	factor		1 TX time slot			
	DIVISIO	Taclor		-9.	03		

GPRS 850 - conducted power table:

		•	Burst avera	age power		
	ted Avg. Powe olerance (dBr		33.5	31.8	30	28.8
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	de Frequency (MHz) C		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS	824.2	128	32.49	30.17	28.24	26.85
850	836.6	190	32.64	29.97	28.33	26.94
050	848.8 251		32.79	30.38	28.41	27.03
		So	ource-based tim	e average powe	er	
GPRS	824.2	128	23.46	24.15	23.98	23.84
850	836.6	190	23.61	23.95	24.07	23.93
050	848.8	251	23.76	24.36	24.15	24.02
	The div	ision fa	actor compared	to the number of	of TX time slot	
Div	ision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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GSM 1900 - conducted power table:

EUT mode	Frequency (MHz)	СН	Max. Rated Avg. Power + Max.	Burst average power	Source-based time average power		
	(1011 12)		Tolerance (dBm)	Avg. (dBm)	Avg. (dBm)		
CSM1000	1850.2	512	30.7	29.16	20.13		
GSM1900 (GMSK)	1800	661	30.7	28.99	19.96		
	1909.8	810	30.7	29.14	20.11		
	The divisior	n factor com	pared to the	e number of TX tir	ne slot		
	Divisio	n factor		1 TX time slot			
	DIVISIO	Taciol		-9.	03		

GPRS 1900 - conducted power table:

			Burst avera	age power		
	ted Avg. Powe olerance (dBr		30.7	28.3	26.5	25.7
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency (MHz)	СН	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS	1850.2	512	29.16	27.00	25.12	24.12
1900	1880	661	28.99	26.79	25.09	24.04
1900	1909.8 810		29.14	26.89	24.94	23.95
		Sc	ource-based tim	e average powe	er	
GPRS	1850.2	512	20.13	20.98	20.86	21.11
1900	1880	661	19.96	20.77	20.83	21.03
1900	1909.8	810	20.11	20.87	20.68	20.94
	The div	ision fa	ctor compared	to the number of	of TX time slot	
Div	ision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
			-9.03	-6.02	-4.26	-3.01

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	Band		WCDMA V	'
	TX Channel	4132	4183	4233
	Frequency (MHz)	826.4	836.6	846.6
Max. Rated Ave	g. Power+Max. Tolerance (dBm)		24.00	
3GPP Rel 99	RMC 12.2Kbps	23.08	22.94	23.11
	HSDPA Subtest-1	22.35	22.19	22.28
3GPP Rel 5	HSDPA Subtest-2	21.99	21.82	21.91
JOFF IVE J	HSDPA Subtest-3	21.79	21.62	21.71
	HSDPA Subtest-4	21.80	21.62	21.71
	HSUPA Subtest-1	22.28	22.15	22.15
	HSUPA Subtest-2	20.28	20.13	20.13
3GPP Rel 6	HSUPA Subtest-3	21.25	21.15	21.22
	HSUPA Subtest-4	20.24	20.14	20.20
	HSUPA Subtest-5	22.20	22.10	22.20

WCDMA Band V - HSDPA / HSUPA Conducted power table (Unit: dBm):

Subtests for WCDMA Release 5 HSDPA

SUB-TEST	β _c	β_d	β _d (SF)	β _c /β _d	β _{HS} (Note1, Note 2)	CM (dB) <i>(Note 3)</i>	MPR (dB) (Note 3)
1	2/15	15/15	64	2/15	4/15	0.0	0.0
2	12/15	15/15	64	12/15	24/15	1.0	0.0
3	15/15	8/15	64	15/8	30/15	1.5	0.5
4	15/15	4/15	64	15/4	30/15	1.5	0.5

Subtests for WCDMA Release 6 HSUPA

SUB-TEST	βο	βd	β₀ (SF)	β _o /β _d	β _{HS} (Note1)	β _{ec}	β _{ed} (Note 5) (Note 6)	β _{ed} (SF)	β _{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	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	15/15	64	15/15	30/15	24/15	134/15	4	1	1.0	0.0	21	81

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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)
				829	20450	22.77	24	0
			0	836.5	20525	23.01	24	0
				844	20600	22.92	24	0
				829	20450	23.24	24	0
		1 RB	25	836.5	20525	23.62	24	0
				844	20600	23.45	24	0
				829	20450	23.06	24	0
			49	836.5	20525	22.74	24	0
				844	20600	22.98	24	0
			0	829	20450	22.23	23	0-1
	QPSK			836.5	20525	22.28	23	0-1
				844	20600	22.25	23	0-1
			12	829	20450	22.21	23	0-1
		25 RB		836.5	20525	22.29	23	0-1
				844	20600	22.29	23	0-1
			25	829	20450	22.28	23	0-1
				836.5	20525	22.23	23	0-1
				844	20600	22.27	23	0-1
				829	20450	22.27	23	0-1
		50RB		836.5	20525	22.32	23	0-1
10				844	20600	22.32	23	0-1
10			0	829	20450	21.85	23	0-1
				836.5	20525	21.87	23	0-1
				844	20600	22.21	23	0-1
				829	20450	21.86	23	0-1
		1 RB	25	836.5	20525	22.09	23	0-1
				844	20600	22.50	23	0-1
				829	20450	22.21	23	0-1
			49	836.5	20525	21.75	23	0-1
				844	20600	22.31	23	0-1
				829	20450	21.10	22	0-2
	16-QAM		0	836.5	20525	21.35	22	0-2
				844	20600	21.42	22	0-2
				829	20450	21.32	22	0-2
		25 RB	12	836.5	20525	21.29	22	0-2
				844	20600	21.29	22	0-2
				829	20450	21.11	22	0-2
			25	836.5	20525	21.28	22	0-2
				844	20600	21.16	22	0-2
				829	20450	21.19	22	0-2
		500)RB	836.5	20525	21.26	22	0-2
				844	20600	21.30	22	0-2

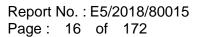
LTE FDD Band 5 / Band 12 / Band 17 - conducted power table:

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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)
				826.5	20425	22.75	24	0
			0	836.5	20525	22.63	24	0
				846.5	20625	22.80	24	0
				826.5	20425	23.14	24	0
		1 RB	12	836.5	20525	23.32	24	0
				846.5	20625	23.57	24	0
				826.5	20425	22.77	24	0
			24	836.5	20525	22.78	24	0
				846.5	20625	23.11	24	0
				826.5	20425	22.17	23	0-1
	QPSK		0	836.5	20525	22.18	23	0-1
				846.5	20625	22.18	23	0-1
				826.5	20425	22.26	23	0-1
		12 RB	6	836.5	20525	22.25	23	0-1
				846.5	20625	22.39	23	0-1
				826.5	20425	22.13	23	0-1
			13	836.5	20525	22.21	23	0-1
				846.5	20625	22.34	23	0-1
				826.5	20425	22.20	23	0-1
		25	RB	836.5	20525	22.24	23	0-1
5				846.5	20625	22.28	23	0-1
Ŭ			0	826.5	20425	21.73	23	0-1
				836.5	20525	22.01	23	0-1
				846.5	20625	21.54	23	0-1
			12	826.5	20425	21.47	23	0-1
		1 RB		836.5	20525	22.24	23	0-1
				846.5	20625	22.64	23	0-1
				826.5	20425	21.52	23	0-1
			24	836.5	20525	21.90	23	0-1
				846.5	20625	21.78	23	0-1
				826.5	20425	21.15	22	0-2
	16-QAM		0	836.5	20525	20.99	22	0-2
				846.5	20625	21.31	22	0-2
			0	826.5	20425	21.03	22	0-2
		12 RB	6	836.5	20525	21.33	22	0-2
				846.5	20625	21.23	22	0-2
			10	826.5	20425	21.06	22	0-2
			13	836.5	20525	21.13	22	0-2
				846.5	20625	21.33	22	0-2
		05	DD	826.5	20425	21.03	22	0-2
		25	RB	836.5	20525	21.06	22	0-2
				846.5	20625	21.16	22	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)
				825.5	20415	22.88	24	0
			0	836.5	20525	22.62	24	0
				847.5	20635	23.12	24	0
				825.5	20415	23.04	24	0
	1 RB	7	836.5	20525	23.01	24	0	
				847.5	20635	23.22	24	0
				825.5	20415	22.77	24	0
			14	836.5	20525	22.82	24	0
				847.5	20635	23.35	24	0
				825.5	20415	22.22	23	0-1
	QPSK		0	836.5	20525	22.30	23	0-1
				847.5	20635	22.38	23	0-1
			4	825.5	20415	22.22	23	0-1
		8 RB		836.5	20525	22.22	23	0-1
				847.5	20635	22.26	23	0-1
			7	825.5	20415	22.18	23	0-1
				836.5	20525	22.20	23	0-1
				847.5	20635	22.35	23	0-1
				825.5	20415	22.22	23	0-1
		15	RB	836.5	20525	22.19	23	0-1
3				847.5	20635	22.35	23	0-1
5			0	825.5	20415	22.50	23	0-1
				836.5	20525	21.87	23	0-1
				847.5	20635	22.40	23	0-1
				825.5	20415	22.31	23	0-1
		1 RB	7	836.5	20525	21.87	23	0-1
				847.5	20635	21.99	23	0-1
				825.5	20415	21.76	23	0-1
			14	836.5	20525	21.43	23	0-1
				847.5	20635	21.83	23	0-1
				825.5	20415	21.24	22	0-2
	16-QAM		0	836.5	20525	21.01	22	0-2
				847.5	20635	21.43	22	0-2
				825.5	20415	21.09	22	0-2
		8 RB	4	836.5	20525	20.97	22	0-2
				847.5	20635	21.21	22	0-2
				825.5	20415	21.15	22	0-2
			7	836.5	20525	20.99	22	0-2
				847.5	20635	21.34	22	0-2
				825.5	20415	20.94	22	0-2
		15	RB	836.5	20525	20.98	22	0-2
				847.5	20635	21.06	22	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)		
				824.7	20407	22.95	24	0		
			0	836.5	20525	22.92	24	0		
	1 6			848.3	20643	23.17	24	0		
				824.7	20407	23.05	24	0		
	1	1 RB	2	836.5	20525	23.18	24	0		
				848.3	20643	23.30	24	0		
				824.7	20407	23.07	24	0		
			5	836.5	20525	23.01	24	0		
				848.3	20643	23.31	24	0		
				824.7	20407	23.07	24	0		
	QPSK		0	836.5	20525	23.12	24	0		
				848.3	20643	23.33	24	0		
				824.7	20407	23.23	24	0		
		3 RB	2	836.5	20525	23.16	24	0		
				848.3	20643	23.35	24	0		
				824.7	20407	23.28	24	0		
			3	836.5	20525	23.19	24	0		
				848.3	20643	23.32	24	0		
		6RB		824.7	20407	22.21	23	0-1		
				836.5	20525	22.12	23	0-1		
1.4				848.3	20643	22.21	23	0-1		
1				824.7	20407	22.17	23	0-1		
					0	0	836.5	20525	22.26	23
				848.3	20643	21.65	23	0-1		
				824.7	20407	21.83	23	0-1		
		1 RB	2	836.5	20525	22.10	23	0-1		
				848.3	20643	22.22	23	0-1		
				824.7	20407	22.22	23	0-1		
			5	836.5	20525	21.50	23	0-1		
				848.3	20643	21.66	23	0-1		
				824.7	20407	21.84	23	0-1		
	16-QAM		0	836.5	20525	22.18	23	0-1		
				848.3	20643	22.26	23	0-1		
				824.7	20407	22.32	23	0-1		
		3 RB	2	836.5	20525	22.13	23	0-1		
				848.3	20643	22.19	23	0-1		
				824.7	20407	22.31	23	0-1		
			3	836.5	20525	22.23	23	0-1		
				848.3	20643	22.25	23	0-1		
				824.7	20407	20.99	22	0-2		
		66	RB	836.5	20525	20.80	22	0-2		
				848.3	20643	20.91	22	0-2		

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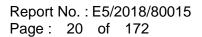
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FDD Band 12										
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)		
				704	23060	22.58	24	0		
			0	707.5	23095	22.66	24	0		
				711	23130	22.99	24	0		
		1 RB		704	23060	23.19	24	0		
			25	707.5	23095	22.97	24	0		
				711	23130	23.46	24	0		
				704	23060	22.73	24	0		
			49	707.5	23095	22.73	24	0		
				711	23130	22.99	24	0		
				704	23060	21.94	23	0-1		
	QPSK		0	707.5	23095	22.03	23	0-1		
				711	23130	21.98	23	0-1		
				704	23060	21.97	23	0-1		
		25 RB	12	707.5	23095	21.98	23	0-1		
				711	23130	22.02	23	0-1		
			25	704	23060	21.98	23	0-1		
				707.5	23095	22.03	23	0-1		
				711	23130	22.06	23	0-1		
				704	23060	22.02	23	0-1		
		50	RB	707.5	23095	22.03	23	0-1		
10				711	23130	22.32	23	0-1		
10				704	23060	21.77	23	0-1		
			0	707.5	23095	21.49	23	0-1		
				711	23130	22.20	23	0-1		
				704	23060	21.75	23	0-1		
		1 RB	25	707.5	23095	22.00	23	0-1		
				711	23130	22.23	23	0-1		
				704	23060	21.71	23	0-1		
			49	707.5	23095	21.69	23	0-1		
				711	23130	21.96	23	0-1		
				704	23060	21.03	22	0-2		
	16-QAM		0	707.5	23095	21.08	22	0-2		
				711	23130	21.12	22	0-2		
				704	23060	20.91	22	0-2		
		25 RB	12	707.5	23095	20.93	22	0-2		
				711	23130	21.40	22	0-2		
				704	23060	21.13	22	0-2		
			25	707.5	23095	21.00	22	0-2		
				711	23130	20.89	22	0-2		
				704	23060	20.87	22	0-2		
		50	RB	707.5	23095	20.80	22	0-2		
				711	23130	20.85	22	0-2		

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FDD Band 12										
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)		
				701.5	23035	22.70	24	0		
			0	707.5	23095	22.99	24	0		
				713.5	23155	22.75	24	0		
				701.5	23035	23.31	24	0		
		1 RB	12	707.5	23095	23.00	24	0		
				713.5	23155	23.44	24	0		
				701.5	23035	22.90	24	0		
			24	707.5	23095	22.74	24	0		
				713.5	23155	22.76	24	0		
				701.5	23035	22.05	23	0-1		
	QPSK		0	707.5	23095	22.06	23	0-1		
				713.5	23155	22.01	23	0-1		
				701.5	23035	22.12	23	0-1		
		12 RB	6	707.5	23095	22.16	23	0-1		
				713.5	23155	22.20	23	0-1		
				701.5	23035	21.98	23	0-1		
			13	707.5	23095	22.03	23	0-1		
				713.5	23155	22.10	23	0-1		
				701.5	23035	21.99	23	0-1		
		2	RB	707.5 713.5	23095	21.94	23	0-1		
5					23155	22.00	23	0-1		
Ū				701.5	23035	21.68	23	0-1		
			0	707.5	23095	21.70	23	0-1		
				713.5	23155	21.39	23	0-1		
				701.5	23035	22.46	23	0-1		
		1 RB	12	707.5	23095	22.23	23	0-1		
				713.5	23155	22.49	23	0-1		
				701.5	23035	21.59	23	0-1		
			24	707.5	23095	21.79	23	0-1		
				713.5	23155	21.37	23	0-1		
	10.0114			701.5	23035	21.02	22	0-2		
	16-QAM		0	707.5	23095	20.93	22	0-2		
				713.5	23155	20.85	22	0-2		
		40.00	<u> </u>	701.5	23035	21.03	22	0-2		
		12 RB	6	707.5	23095	21.06	22	0-2		
				713.5	23155	21.12	22	0-2		
			10	701.5	23035	20.92	22	0-2		
			13	707.5	23095	20.91	22	0-2		
				713.5	23155	21.03	22	0-2		
		05	DD	701.5	23035	21.19	22	0-2		
		25	RB	707.5	23095	21.02	22	0-2		
				713.5	23155	21.05	22	0-2		

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FDD Band 12											
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)			
				700.5	23025	22.89	24	0			
			0	707.5	23095	22.82	24	0			
				714.5	23165	22.81	24	0			
		1 RB		700.5	23025	23.03	24	0			
			7	707.5	23095	23.17	24	0			
				714.5	23165	23.08	24	0			
				700.5	23025	22.94	24	0			
			14	707.5	23095	22.64	24	0			
				714.5	23165	23.19	24	0			
				700.5	23025	22.15	23	0-1			
	QPSK		0	707.5	23095	22.08	23	0-1			
				714.5	23165	22.15	23	0-1			
				700.5	23025	22.12	23	0-1			
		8 RB	4	707.5	23095	22.08	23	0-1			
				714.5	23165	22.04	23	0-1			
				700.5	23025	22.03	23	0-1			
			7	707.5	23095	22.19	23	0-1			
				714.5	23165	22.07	23	0-1			
		15RB		700.5	23025	22.03	23	0-1			
				707.5	23095	22.13	23	0-1			
3				714.5	23165	22.06	23	0-1			
5				700.5	23025	21.62	23	0-1			
			0	707.5	23095	22.09	23	0-1			
				714.5	23165	21.49	23	0-1			
				700.5	23025	22.02	23	0-1			
		1 RB	7	707.5	23095	21.65	23	0-1			
				714.5	23165	21.78	23	0-1			
				700.5	23025	21.52	23	0-1			
			14	707.5	23095	21.59	23	0-1			
				714.5	23165	21.90	23	0-1			
				700.5	23025	21.14	22	0-2			
	16-QAM		0	707.5	23095	21.17	22	0-2			
				714.5	23165	20.81	22	0-2			
				700.5	23025	21.21	22	0-2			
		8 RB	4	707.5	23095	21.19	22	0-2			
				714.5	23165	20.70	22	0-2			
				700.5	23025	21.19	22	0-2			
			7	707.5	23095	21.16	22	0-2			
				714.5	23165	20.97	22	0-2			
				700.5	23025	21.02	22	0-2			
		15	RB	707.5	23095	20.87	22	0-2			
				714.5	23165	20.77	22	0-2			

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FDD Band 12											
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance (dBm)	MPR Allowed per 3GPP(dB)			
				699.7	23017	22.78	24	0			
			0	707.5	23095	23.02	24	0			
				715.3	23173	22.91	24	0			
		1 RB		699.7	23017	23.07	24	0			
			2	707.5	23095	23.05	24	0			
				715.3	23173	23.00	24	0			
				699.7	23017	22.82	24	0			
			5	707.5	23095	23.04	24	0			
				715.3	23173	23.12	24	0			
				699.7	23017	22.96	24	0			
	QPSK		0	707.5	23095	22.99	24	0			
				715.3	23173	23.03	24	0			
				699.7	23017	23.03	24	0			
		3 RB	2	707.5	23095	23.04	24	0			
				715.3	23173	23.16	24	0			
			3	699.7	23017	23.13	24	0			
				707.5	23095	23.26	24	0			
				715.3	23173	23.15	24	0			
				699.7	23017	22.09	23	0-1			
		6F	RB	707.5	23095	22.21	23	0-1			
1.4				715.3	23173	22.02	23	0-1			
1.4				699.7	23017	22.02	23	0-1			
			0	707.5	23095	22.14	23	0-1			
				715.3	23173	21.51	23	0-1			
				699.7	23017	22.22	23	0-1			
		1 RB	2	707.5	23095	21.72	23	0-1			
				715.3	23173	22.10	23	0-1			
				699.7	23017	21.85	23	0-1			
			5	707.5	23095	22.12	23	0-1			
				715.3	23173	21.74	23	0-1			
				699.7	23017	21.96	23	0-1			
	16-QAM		0	707.5	23095	21.90	23	0-1			
				715.3	23173	21.63	23	0-1			
				699.7	23017	22.05	23	0-1			
	3 RB	3 RB	2	707.5	23095	22.03	23	0-1			
				715.3	23173	22.01	23	0-1			
				699.7	23017	21.71	23	0-1			
			3	707.5	23095	22.38	23	0-1			
				715.3	23173	21.90	23	0-1			
				699.7	23017	20.98	22	0-2			
		6F	RB	707.5	23095	21.06	22	0-2			
				715.3	23173	20.67	22	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)		
				709	23780	22.96	24	0		
			0	710	23790	22.68	24	0		
				711	23800	22.40	24	0		
				709	23780	23.58	24	0		
		1 RB	25	710	23790	23.23	24	0		
				711	23800	23.14	24	0		
				709	23780	22.89	24	0		
			49	710	23790	22.94	24	0		
				711	23800	23.45	24	0		
				709	23780	22.20	23	0-1		
	QPSK		0	710	23790	21.90	23	0-1		
				711	23800	21.73	23	0-1		
				709	23780	22.38	23	0-1		
		25 RB	12	710	23790	22.06	23	0-1		
				711	23800	21.98	23	0-1		
			25	709	23780	22.14	23	0-1		
				710	23790	22.11	23	0-1		
				711	23800	22.13	23	0-1		
				709	23780	22.14	23	0-1		
		50	RB	710	23790	21.96	23	0-1		
10				711	23800	21.79	23	0-1		
10				709	23780	22.11	23	0-1		
			0	710	23790	21.74	23	0-1		
				711	23800	21.30	23	0-1		
				709	23780	22.31	23	0-1		
		1 RB	25	710	23790	22.75	23	0-1		
				711	23800	22.65	23	0-1		
				709	23780	22.00	23	0-1		
			49	710	23790	22.38	23	0-1		
				711	23800	22.88	23	0-1		
				709	23780	21.34	22	0-2		
	16-QAM		0	710	23790	21.23	22	0-2		
				711	23800	21.07	22	0-2		
				709	23780	21.24	22	0-2		
		25 RB	12	710	23790	21.29	22	0-2		
				711	23800	21.49	22	0-2		
				709	23780	21.02	22	0-2		
			25	710	23790	21.41	22	0-2		
				711	23800	21.56	22	0-2		
1				709	23780	21.25	22	0-2		
		50	RB	710	23790	21.22	22	0-2		
				711	23800	21.45	22	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)
				706.5	23755	23.08	24	0
			0	710	23790	22.59	24	0
				713.5	23825	22.40	24	0
		1 RB		706.5	23755	23.51	24	0
			12	710	23790	23.13	24	0
				713.5	23825	23.43	24	0
				706.5	23755	22.59	24	0
			24	710	23790	22.74	24	0
				713.5	23825	23.53	24	0
				706.5	23755	22.03	23	0-1
	QPSK		0	710	23790	21.78	23	0-1
				713.5	23825	21.84	23	0-1
				706.5	23755	22.36	23	0-1
		12 RB	6	710	23790	22.01	23	0-1
				713.5	23825	22.24	23	0-1
				706.5	23755	22.08	23	0-1
			13	710	23790	22.06	23	0-1
				713.5	23825	22.33	23	0-1
				706.5	23755	22.14	23	0-1
		25	RB	710	23790	21.82	23	0-1
5				713.5	23825	22.12	23	0-1
5				706.5	23755	22.01	23	0-1
			0	710	23790	21.84	23	0-1
				713.5	23825	21.37	23	0-1
				706.5	23755	22.86	23	0-1
		1 RB	12	710	23790	22.38	23	0-1
				713.5	23825	22.62	23	0-1
				706.5	23755	21.39	23	0-1
			24	710	23790	22.28	23	0-1
				713.5	23825	22.77	23	0-1
				706.5	23755	21.00	22	0-2
	16-QAM		0	710	23790	21.07	22	0-2
				713.5	23825	21.01	22	0-2
				706.5	23755	21.09	22	0-2
		12 RB	6	710	23790	21.25	22	0-2
				713.5	23825	21.19	22	0-2
				706.5	23755	20.96	22	0-2
			13	710	23790	21.11	22	0-2
				713.5	23825	21.13	22	0-2
				706.5	23755	21.23	22	0-2
		25	RB	710	23790	21.24	22	0-2
				713.5	23825	21.13	22	0-2

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Main Antenna								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)		
		1	2412		13.00	12.99		
	802.11b	6	2437	1Mbps	13.00	12.94		
		11	2462		13.00	12.98		
	802.11g	1	2412		13.00	12.97		
2450 MHz		6	2437	6Mbps	13.00	12.79		
		11	2462		13.00	12.81		
		1	2412		13.00	12.95		
	802.11n-HT20	6	2437	MCS0	13.00	12.77		
		11	2462		13.00	12.79		

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

Main Antenna									
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)			
		36	5180		13.00	12.97			
	802.11a	40	5200	6Mbps	13.00	12.76			
	002.114	44	5220	0101043	13.00	12.78			
		48	5240		13.00	12.53			
		36	5180		13.00	12.99			
	802.11n-HT20	40	5200	MCS0	13.00	12.67			
	002.111-11120	44	5220	10000	13.00	12.70			
		48	5240		13.00	12.97			
5.15-5.25 GHz		36	5180		13.00	12.96			
	802.11ac20-VHT0	40	5200	MCS0	13.00	12.55			
	002.118020-01110	44	5220	10000	13.00	12.64			
		48	5240		13.00	12.95			
	802.11n-HT40	38	5190	MCS0	13.00	12.85			
	002.111-11140	46	5230	10000	13.00	12.88			
	802.11ac40-VHT0	38	5190	MCS0	13.00	12.84			
	002.11a040-VH10	46	5230	IVIC 30	13.00	12.67			
	802.11ac80-VHT0	42	5210	MCS0	13.00	12.66			

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Main Antenna								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)		
		52	5260		13.00	12.60		
	802.11a	56	5280	6Mbps	13.00	12.89		
	002.118	60	5300	0101043	13.00	12.98		
		64	5320		13.00	12.96		
		52	5260		13.00	12.75		
	802.11n-HT20	56	5280	MCS0	13.00	12.91		
	002.1111-11120	60	5300	WC00	13.00	12.93		
		64	5320		13.00	12.94		
5.25-5.35 GHz		52	5260		13.00	12.69		
	802.11ac20-VHT0	56	5280	MCS0	13.00	12.88		
	002.118020-01110	60	5300	NICOU	13.00	12.92		
		64	5320		13.00	12.91		
	802.11n-HT40	54	5270	MCS0	13.00	12.78		
	002.111-11140	62	5310		13.00	12.55		
	802.11ac40-VHT0	54	5270	MCS0	13.00	12.75		
	002.11a0 4 0-v1110	62	5310	10000	13.00	12.53		
	802.11ac80-VHT0	58	5290	MCS0	13.00	12.85		

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Main Antenna								
Band	Mode	Channel	Frequency (MHz)	Data Rate	Max. Rated Avg. Power + Max. Tolerance (dBm)	Average power (dBm)		
		100	5500		13.00	12.99		
		116	5580		13.00	12.64		
	802.11a	120	5600	6Mbps	13.00	12.26		
	002.11a	124	5620	olviops	13.00	12.67		
		128	5640		13.00	12.73		
		140	5700		13.00	12.71		
		100	5500		13.00	12.62		
		116	5580		13.00	12.77		
	802.11n-HT20	120	5600	MCS0	13.00	12.67		
	002.1111-1120	124	5620	IVIC SU	13.00	12.58		
		128	5640		13.00	12.71		
		140	5700		13.00	12.68		
	802.1ac20-VHT0	100	5500		13.00	12.57		
		116	5580		13.00	12.70		
		120	5600	MCS0	13.00	12.59		
		124	5620		13.00	12.47		
5600 MHz		128	5640		13.00	12.63		
		140	5700		13.00	12.66		
		144	5720		13.00	12.62		
		102	5510		13.00	12.85		
		110	5550		13.00	12.59		
	802.11n-HT40	118	5590	MCS0	13.00	12.51		
		126	5630		13.00	12.68		
		134	5670		13.00	12.98		
		102	5510		13.00	12.81		
		110	5550		13.00	12.58		
		118	5590	N000	13.00	12.56		
	802.11ac40-VHT0	126	5630	MCS0	13.00	12.53		
		134	5670		13.00	12.97		
		142	5710		13.00	12.85		
		106	5530		13.00	12.87		
	802.11ac80-VHT0		5610	MCS0	13.00	12.81		
		138	5690		13.00	12.85		

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Bluetooth maximum power table:

Mode	Channel	Frequency	Average	Output Pow	ver (dBm)	Max. Rated Avg. Power + Max.	
woue	Channel	(MHz)	1Mbps	2Mbps	3Mbps	Tolerance (dBm)	
	CH 00	2402	10.42	8.41	8.40		
BR/EDR	CH 39	2441	10.22	8.13	8.13	12.5	
	CH 78	2480	10.07	8.07	8.07		

Mode	Channel	Frequency	Average Output Power (dBm)	Max. Rated Avg. Power + Max.		
		(MHz)	GFSK	Tolerance (dBm)		
LE	CH 00	2402	6.91			
	CH 19	2440	6.67	12.5		
	CH 39	2480	6.63			

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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 (MT8820C), and 1. the communication between the EUT and the tester is established by air link.
- 2. Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
- During the SAR testing, the DASY 5 system checks power drift by comparing the 3. e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
- SAR test reduction for GPRS mode is determined by the source-based 4. time-averaged output power. The data mode with highest specified time-averaged output power should be tested for SAR compliance.
- 5. 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 $\leq \frac{1}{4}$ 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:

Sub-test	βc	βa	βd (SF)	βc/βa	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: ΔACK, ΔNACK and Δcol = 30/15 with βHS = 30/15 * βc. 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, ΔACK and ΔNACK = 30/15 with βHS = 30/15 * βc, and Δcol = 24/15 with βHS = 24/15 * βc.										
Note 3: CM = 1 for β ₀ /β _d = 12/15, β _{H5} /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 _d /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.										

The 3G SAR test reduction procedure is applied to HSPA (HSUPA/HSDPA with 6. RMC) with 12.2 kbps RMC as the primary mode. Since the maximum output power

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in a secondary mode (HSPA) is $\leq \frac{1}{4}$ 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	βε	βd	β₄ (SF)	βc / βd	β _{HS} (1)	βes	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 (३)	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	βed1:47/15 βed2:47/15	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, ΔNACK} and Δ _{COI} = 30/15 with β _{HS} = 30/15 * β _C . For sub-test 5, Δ _{ACK} , Δ _{MACK} and Δ _{COI} = 5/15 with β _{HS} = 5/15 * β _C . Note 2: CM = 1 for β _J 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 _J 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 β₀ = 10/15 and β₄ = 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: β₄₂ 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.													

LTE modes test according to KDB 941225D05v02r05. 7.

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.

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 \leq 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

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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 > 1/2 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 > $\frac{1}{2}$ 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.

WLAN

802.11b DSSS SAR Test Requirements:

- SAR is measured for 2.4 GHz 802.11b DSSS mode using the highest measured 8. maximum output power channel, when the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
- 9. When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

802.11g/n OFDM SAR Test Exclusion Requirements:

- 10. SAR is not required for 802.11q/n since the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
- 11. BT and WLAN use the same antenna path and Bluetooth can't transmit with WLAN simultaneously.

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- 12. According to KDB447498D01v06, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is \leq 0.8 W/kg, when the transmission band is \leq 100MHz.
- 13. 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 \geq 1.45 W/kg (~ 10% from the 1-g SAR limit)

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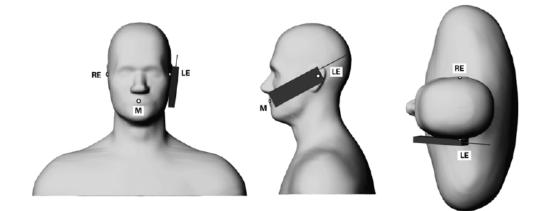
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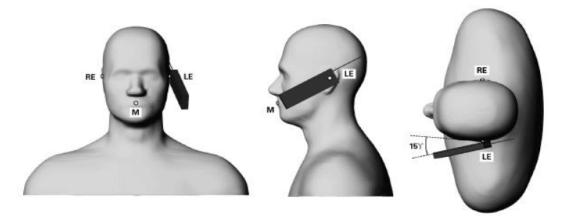
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1.6 Positioning Procedure

Head SAR measurement statement



Phone position 1, "cheek" or "touch" position. The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.



Phone position 2, "tilted position." The reference points for the right ear (RE), left ear (LE) and mouth (M), which define the reference plane for phone positioning.

Cheek/Touch Position:

The handset was brought toward the mouth of the head phantom by pivoting against the ear reference point until any point of the mouthpiece or keypad touched the phantom.

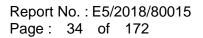
Ear/Tilt Position:

With the phone aligned in the Cheek/Touch position, the handset was tilted away from the mouth with respect to the test device reference point by 15 degrees.

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Body SAR measurement statement

1. Body-worn exposure: 10mm

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative test separation distance configuration may be used to support both SAR conditions. When the reported SAR for a body-worn accessory, measured without a headset connected to the handset, is > 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.

2. Hotspot exposure: 10mm

A test separation distance of 10 mm is required between the phantom and all surfaces and edges with a transmitting antenna located within 25 mm from that surface or edge when the form factor of a handset is larger than $9 \text{ cm} \times 5 \text{ cm}$,

Test configurations of WWAN:

- (1) Front side
- (2) Back side
- (3) Bottom side
- (4) Right side
- (5) Left side

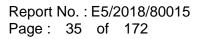
Test configurations of WLAN:

- (1) Front side
- (2) Back side
- (3) Top side
- (4) Left side
- 3. Phablet SAR test consideration

Since the device is not a phablet (overall diagonal dimension < 16.0 cm), the phablet SAR procedure is not required.

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4. Based on KDB941225D06v02r01, the hotspot mode and body-worn accessory SAR test configurations may overlap for handsets. When the same wireless mode transmission configurations for voice and data are required for SAR measurements, the more conservative configuration with a smaller separation distance should be tested for the overlapping SAR configurations. For WCDMA /LTE/WLAN, since the maximum power is the same between body-worn and hotspot mode, and the test distance of hotspot mode is the same with that of body-worn mode, hotspot mode SAR is used to support body-worn SAR. For GSM850/1900, since the wireless mode transmission configurations is different between body-worn and hotspot mode, body-worn SAR is performed.

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1.7 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

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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.

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1.8 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:

1.8.1 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.

$$SAR = C \frac{\delta T}{\delta t}$$

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:

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

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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].

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1.8.2 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.
- 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.

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- (1) N. Kuster, Q. Balzano, and J.C. Lin, Eds., Mobile Communications Safety, Chapman & Hall, London, 1997.
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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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1.9 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). Model EX3DV4 field probes are 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.

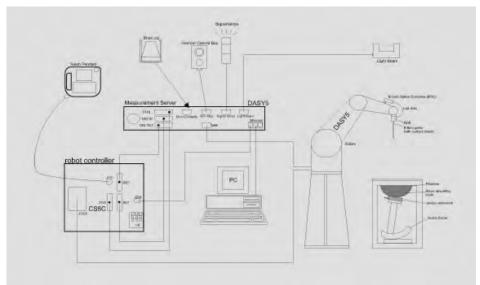


Fig. a A block diagram of the SAR measurement system

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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 in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- 3. 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.
- 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 Windows7
- 8. DASY 5 software.
- 9. Remote control with teach pendant and additional circuitry for robot safety such as warning lamps, etc.
- 10. The SAM twin phantom enabling testing left-hand and right-hand usage.
- 11. The device holder for handheld mobile phones.
- 12. Tissue simulating liquid mixed according to the given recipes.
- 13. Validation dipole kits allowing to validate the proper functioning of the system.

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1.10 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 HSL750/835/1900/2450/5200/5300/5600 MHz Additional CF for other liquids and
	frequencies upon request
Frequency	10 MHz to > 6 GHz, Linearity: \pm 0.6 dB
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic	10 μW/g to > 100 mW/g
Range	Linearity: \pm 0.2 dB (noise: typically < 1 μ W/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	Twin SAM
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.
Shell Thickness	2 ± 0.2 mm
Filling Volume	Approx. 25 liters
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm

DEVICE HOLDER

Construction	In combination with the Twin SAM Phantom	1-
	V4.0/V4.0C or Twin SAM, the Mounting	ALC: NO.
	Device (made from POM) enables the	
	rotation of the mounted transmitter in	
	spherical coordinates, whereby the rotation	
	point is the ear opening. The devices can	and the second se
	be easily and accurately positioned	A STORE
	according to IEC, IEEE, CENELEC, FCC or	
	other specifications. The device holder can	
	be locked at different phantom locations	Device Holder
	(left head, right head, flat phantom).	

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1.11 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% (according to KDB865664D01) from the target SAR values.

These tests were done at 750/835/1900/2450/5200/5300/5600 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. During the tests, the liquid depth above the ear reference points was above 15 cm (≤3G) or 10 cm (>3G) 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.

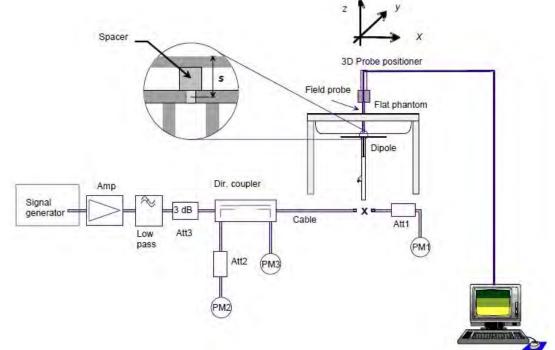


Fig. b The block diagram of system verification

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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	
D750V2	1078	750	Head	8.25	2.08	8.32	0.85%	Aug. 23, 2018	
D730V2	1070	750	Body	8.63	2.17	8.68	0.58%	Aug. 23, 2018	
D835V2	4d120	835	Head	9.37	2.36	9.44	0.75%	Aug. 23, 2018	
D033V2	40120	000	Body	9.68	2.38	9.52	-1.65%	Aug. 23, 2018	
D1900V2	5d173	1900	Head	40.7	9.80	39.20	-3.69%	Aug. 24, 2018	
D1900V2	50175	1900	Body	40.9	9.97	39.88	-2.49%	Aug. 25, 2018	
D2450V2	727	2450	Head	52.1	13.20	52.80	1.34%	Aug. 27, 2019	
D2430V2	121	2430	Body	50.8	12.80	51.20	0.79%	Aug. 25, 2019	
	1023	5200	Head	77.3	7.77	77.70	0.52%	Aug. 28, 2019	
	1025	1025	5200	Body	70.9	7.23	72.30	1.97%	Aug. 30, 2019
D5GHzV2	1023	5300	Head	80.9	8.15	81.50	0.74%	Aug. 28, 2019	
	1023	5300	Body	72.9	7.41	74.10	1.65%	Aug. 30, 2019	
	1023	5600	Head	81.9	8.25	82.50	0.73%	Aug. 28, 2019	
	1023	3000	Body	77.6	7.92	79.20	2.06%	Aug. 30, 2019	

Table 1. Results of system validation

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1.12 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 depth of the tissue simulant in the flat section of the phantom was at least 15 cm (≤3G) or 10 cm (>3G) during all tests. (Appendix Fig. 2)

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Tissue Type	Measurement Date	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, ɛr	Measured Conductivity, σ (S/m)	% dev ɛr	% dev σ
		709	42.155	0.890	42.668	0.885	-1.22%	0.58%
		711	42.144	0.890	42.624	0.886	-1.14%	0.49%
		750	41.942	0.893	42.101	0.904	-0.38%	-1.19%
	Aug, 23. 2018	835	41.500	0.900	41.335	0.914	0.40%	-1.56%
		836.5	41.500	0.902	41.328	0.916	0.41%	-1.60%
		846.6	41.500	0.912	41.157	0.923	0.83%	-1.15%
		848.8	41.500	0.915	41.115	0.925	0.93%	-1.11%
	Aug, 24. 2018	1850.2	40.000	1.400	40.120	1.383	-0.30%	1.21%
	7.009, 24. 2010	1900	40.000	1.400	39.855	1.392	0.36%	0.57%
Lined		2402	39.285	1.757	39.551	1.733	-0.68%	1.38%
Head	Aug, 27. 2018	2412	39.268	1.766	39.514	1.746	-0.63%	1.14%
		2450	39.200	1.800	39.364	1.786	-0.42%	0.78%
		5190	35.997	4.645	36.061	4.603	-0.18%	0.90%
		5200	35.986	4.655	36.163	4.639	-0.49%	0.34%
	Aug, 28. 2018	5210	35.974	4.665	36.366	4.684	-1.09%	-0.40%
		5270	35.906	4.727	36.122	4.712	-0.60%	0.31%
		5290	35.883	4.747	36.002	4.755	-0.33%	-0.16%
		5300	35.871	4.758	35.845	4.753	0.07%	0.09%
		5530	35.609	4.993	35.459	4.942	0.42%	1.03%
		5600	35.529	5.065	35.182	5.031	0.98%	0.67%
		709	55.691	0.960	56.265	0.948	-1.03%	1.27%
		711	55.683	0.960	56.233	0.948	-0.99%	1.28%
		750	55.531	0.963	55.854	0.963	-0.58%	0.04%
	Aug, 23. 2018	835	55.200	0.970	55.087	0.961	0.20%	0.93%
	<u>,</u>	836.5	55.195	0.972	55.121	0.964	0.13%	0.81%
		846.6	55.164	0.984	54.997	0.971	0.30%	1.35%
		848.8	55.158	0.987	54.950	0.973	0.38%	1.42%
		1850.2	53.300	1.520	52.667	1.494	1.19%	1.71%
	Aug, 25. 2018	1900	53.300	1.520	52.561	1.508	1.39%	0.79%
Body		2402	52.764	1.904	53.034	1.870	-0.51%	1.79%
	Aug, 25. 2018	2412	52.751	1.914	53.000	1.885	-0.47%	1.50%
	0,	2450	52.700	1.950	52.829	1.931	-0.24%	0.97%
		5200	49.014	5.299	49.618	5.267	-1.23%	0.61%
		5210	49.001	5.311	49.598	5.338	-1.22%	-0.51%
		5290	48.892	5.404	49.431	5.370	-1.10%	0.64%
	Aug, 30. 2018	5300	48.879	5.416	49.251	5.367	-0.76%	0.91%
		5530	48.566	5.685	48.658	5.730	-0.19%	-0.80%
	Table	5600	48.471	5.766	48.470	5.753	0.00%	0.23%

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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Fraguenav			Ingredient									
Frequency (MHz)	Mode	DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	Total amount				
750	Head	1	532.98 g	18.3 g	2.4 g	3.2 g	766 g	1.3L(Kg)				
750	Body		631.68 g	11.72 g	1.2 g		600 g	1.0L(Kg)				
950	Head		532.98 g	18.3 g	2.4 g	3.2 g	766 g	1.3L(Kg)				
850	Body	-	631.68 g	11.72 g	1.2 g	_	600 g	1.0L(Kg)				
1000	Head	444.52 g	552.42 g	3.06 g	_		_	1.0L(Kg)				
1900	Body	300.67 g	716.56 g	4.0 g	_		-	1.0L(Kg)				
0.450	Head	550ml	450ml	_	_	_	_	1.0L(Kg)				
2450	Body	301.7ml	698.3ml	_	_	_	_	1.0L(Kg)				

Simulating Liquids for 5 GHz, Manufactured by SPEAG:

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

Table 3. Recipes for tissue simulating liquid

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1.13 Test Standards and Limits

According to FCC 47CFR §2.1093(d) The limits to be used for evaluation are based generally on criteria published by the American National Standards Institute (ANSI) for localized specific absorption rate ("SAR") in Section 4.2 of "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz," ANSI/IEEE C95.1, 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 a 10 grams of tissue (defined as a tissue volume in the shape of a cube).

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.

2. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube).

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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 .6)

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:

- Uncontrolled environments are defined as locations where there is potential exposure of 1. 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

GSM 850

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	<u> </u>	SAR over g ⁄kg)	Plot page
						(02)		Measured	Reported	
	Re Cheek	-	251	848.8	33.50	32.79	17.76%	0.35	0.41	67
Head	Re Tilt	-	251	848.8	33.50	32.79	17.76%	0.15	0.18	-
(GSM)	Le Cheek	-	251	848.8	33.50	32.79	17.76%	0.30	0.35	-
	Le Tilt	-	251	848.8	33.50	32.79	17.76%	0.14	0.16	-
Body-worn	Front side	10	251	848.8	33.50	32.79	17.76%	0.40	0.47	-
(GSM)	Back side	10	251	848.8	33.50	32.79	17.76%	0.43	0.51	68
	Front side	10	251	848.8	28.80	27.03	50.31%	0.27	0.41	-
Hotspot	Back side	10	251	848.8	28.80	27.03	50.31%	0.30	0.45	69
(GPRS)	Bottom side	10	251	848.8	28.80	27.03	50.31%	0.07	0.11	-
<1Dn4Up>	Right side	10	251	848.8	28.80	27.03	50.31%	0.24	0.36	-
	Left side	10	251	848.8	28.80	27.03	50.31%	0.13	0.20	-

GSM 1900

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	1	SAR over g /kg)	Plot page
					,			Measured	Reported	
	Re Cheek	-	512	1850.2	30.70	29.16	42.56%	0.07	0.10	-
Head	Re Tilt	-	512	1850.2	30.70	29.16	42.56%	0.05	0.07	-
(GSM)	Le Cheek	-	512	1850.2	30.70	29.16	42.56%	0.12	0.17	70
	Le Tilt	-	512	1850.2	30.70	29.16	42.56%	0.05	0.07	-
Body-worn	Front side	10	512	1850.2	30.70	29.16	42.56%	0.16	0.23	-
(GSM)	Back side	10	512	1850.2	30.70	29.16	42.56%	0.18	0.26	71
	Front side	10	512	1850.2	25.70	24.12	43.88%	0.22	0.32	-
Hotspot	Back side	10	512	1850.2	25.70	24.12	43.88%	0.25	0.36	-
(GPRS)	Bottom side	10	512	1850.2	25.70	24.12	43.88%	0.34	0.49	72
<1Dn4Up>	Right side	10	512	1850.2	25.70	24.12	43.88%	0.10	0.14	-
	Left side	10	512	1850.2	25.70	24.12	43.88%	0.19	0.27	-

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WCDMA Band V

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	1	SAR over g ⁄kg)	Plot page
						(-)		Measured	Reported	
	RE Cheek	-	4233	846.6	24	23.11	22.74%	0.34	0.42	73
R99	RE Tilt	-	4233	846.6	24	23.11	22.74%	0.15	0.18	-
(Head)	LE Cheek	-	4233	846.6	24	23.11	22.74%	0.29	0.36	-
	LE Tilt	-	4233	846.6	24	23.11	22.74%	0.14	0.17	-
Body-Worn	Front side	10	4233	846.6	24	23.11	22.74%	0.34	0.42	-
Body-wom	Back side	10	4233	846.6	24	23.11	22.74%	0.42	0.52	-
	Front side	10	4233	846.6	24	23.11	22.74%	0.34	0.42	-
	Back side	10	4233	846.6	24	23.11	22.74%	0.42	0.52	74
Hotspot	Bottom side	10	4233	846.6	24	23.11	22.74%	0.09	0.11	-
	Right side	10	4233	846.6	24	23.11	22.74%	0.33	0.41	-
	Left side	10	4233	846.6	24	23.11	22.74%	0.16	0.20	-

LTE FDD Band 5

Mode	Bandwidth (MHz)	Modulation	PP Sizo	PR ctort	Position	Distance	СН	Freq.	Max. Rated Avg. Power +	Measured Avg.	Scaling		SAR over V/kg)	Plot
Mode	(MHz)	viodulatioi	ND SIZE	ND SIdit	FOSILION	(mm)	СП	(MHz)	Max. Tolerance (dBm)	Power (dBm)	, in the second s	Measured	Reported	page
					RE Cheek	-	20525	836.5	24	23.62	9.14%	0.29	0.32	75
Head	10MHz	QPSK	1 RB	25	RE Tilt	-	20525	836.5	24	23.62	9.14%	0.11	0.12	-
nead	1010112	GIOR	TRD	25	LE Cheek	-	20525	836.5	24	23.62	9.14%	0.27	0.29	-
					LE Tilt	-	20525	836.5	24	23.62	9.14%	0.15	0.16	-
Body-worn	10MHz	QPSK	1RB	25	Front side	10	20525	836.5	24	23.62	9.14%	0.31	0.34	-
Body-worm		QFOR	IND	25	Back side	10	20525	836.5	24	23.62	9.14%	0.39	0.43	-
					Front side	10	20525	836.5	24	23.62	9.14%	0.31	0.34	-
					Back side	10	20525	836.5	24	23.62	9.14%	0.39	0.43	76
Hotspot	10MHz	QPSK	1 RB	25	Bottom side	10	20525	836.5	24	23.62	9.14%	0.09	0.10	-
					Right side	10	20525	836.5	24	23.62	9.14%	0.28	0.31	-
					Left side	10	20525	836.5	24	23.62	9.14%	0.18	0.20	-

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LTE FDD Band 12

Mode	Bandwidth (MHz)	Modulation	PP Sizo	PR start	Position	Distance	СН	Freq.	Max. Rated Avg. Power +	Measured Avg.	Scaling	Averaged 1g (V		Plot
Mode	(MHz)	viodulation	KD SIZE	KD Start	Position	(mm)	Сп	(MHz)	Max. Tolerance (dBm)	Power (dBm)	· ·	Measured	Reported	page
					RE Cheek	-	23130	711	24	23.46	13.24%	0.11	0.12	77
Head	10MHz	QPSK	1 RB	25	RE Tilt	-	23130	711	24	23.46	13.24%	0.06	0.07	-
Tieau		Gron	TRD	25	LE Cheek	-	23130	711	24	23.46	13.24%	0.11	0.12	-
					LE Tilt	-	23130	711	24	23.46	13.24%	0.05	0.06	-
Body-worn	10MHz	QPSK	1RB	25	Front side	10	23130	711	24	23.46	13.24%	0.18	0.20	-
Body-worm		QFOR	IIXD	25	Back side	10	23130	711	24	23.46	13.24%	0.19	0.22	-
					Front side	10	23130	711	24	23.46	13.24%	0.18	0.20	-
					Back side	10	23130	711	24	23.46	13.24%	0.19	0.22	78
Hotspot	10MHz	QPSK	1 RB	25	Bottom side	10	23130	711	24	23.46	13.24%	0.05	0.06	-
					Right side	10	23130	711	24	23.46	13.24%	0.16	0.18	-
					Left side	10	23130	711	24	23.46	13.24%	0.11	0.12	-

LTE FDD Band 17

Mode	Bandwidth	Modulatior	DD Size	DR start	Position	Distance	СН	Freq.	Max. Rated Avg.	Measured Avg.		Averaged 1g (V	SAR over V/kg)	Plot
Wode	(MHz)	viodulation	KD SIZE	KD Start	Position	(mm)	Сп	(MHz)	Power + Max. Tolerance (dBm)	Power (dBm)	Scaling	Measured	Reported	page
					RE Cheek	-	23780	709	24	23.58	10.15%	0.14	0.15	79
Head	10MHz	QPSK	1 RB	25	RE Tilt	-	23780	709	24	23.58	10.15%	0.07	0.08	-
Heau	TOWINZ	QFSN	IND	25	LE Cheek	-	23780	709	24	23.58	10.15%	0.13	0.14	-
					LE Tilt	-	23780	709	24	23.58	10.15%	0.07	0.08	-
Body-worn	10MHz	QPSK	1RB	25	Front side	10	23780	709	24	23.58	10.15%	0.20	0.22	-
Body-worn	TOWINZ	QF3N	IND	25	Back side	10	23780	709	24	23.58	10.15%	0.22	0.24	-
					Front side	10	23780	709	24	23.58	10.15%	0.20	0.22	-
					Back side	10	23780	709	24	23.58	10.15%	0.22	0.24	80
Hotspot	10MHz	QPSK	1 RB	25	Bottom side	10	23780	709	24	23.58	10.15%	0.06	0.07	-
					Right side	10	23780	709	24	23.58	10.15%	0.19	0.21	-
					Left side	10	23780	709	24	23.58	10.15%	0.12	0.13	-

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WLAN 802.11b

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged S (W/	-	Plot page
					、 ,	Tolerance (dBm)	(dBm)		Measured	Reported	1 0
		RE Cheek	-	1	2412	13	12.99	0.26%	0.38	0.38	81
	Head	RE Tilt	-	1	2412	13	12.99	0.26%	0.36	0.36	-
	Tieau	LE Cheek	-	1	2412	13	12.99	0.26%	0.18	0.18	-
		LE Tilt	-	1	2412	13	12.99	0.26%	0.18	0.18	-
Main	Body-	Front side	10	1	2412	13	12.99	0.26%	0.07	0.07	-
Main	worn	Back side	10	1	2412	13	12.99	0.26%	0.08	0.08	-
		Front side	10	1	2412	13	12.99	0.26%	0.07	0.07	-
	Hotspot	Back side	10	1	2412	13	12.99	0.26%	0.08	0.08	-
	riotspot	Top side	10	1	2412	13	12.99	0.26%	0.11	0.12	82
		Left side	10	1	2412	13	12.99	0.26%	0.03	0.03	-

Bluetooth

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged S (W/	-	Plot page
					、 ,	Tolerance (dBm)	(UBIII)		Measured	Reported	
		RE Cheek	-	0	2402	12.5	10.42	61.44%	0.09	0.12	83
	Head	RE Tilt	-	0	2402	12.5	10.42	61.44%	0.07	0.09	-
Main	neau	LE Cheek	-	0	2402	12.5	10.42	61.44%	0.04	0.05	-
IVIAIIT		LE Tilt	-	0	2402	12.5	10.42	61.44%	0.04	0.05	-
	Body-	Front side	10	0	2402	12.5	10.42	61.44%	0.04	0.05	-
	worn	Back side	10	0	2402	12.5	10.42	61.44%	0.04	0.05	84

WLAN 802.11ac(80M) 5.2G

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged S (W/	-	Plot page
					· · /	Tolerance (dBm)	(dBm)		Measured	Reported	
		RE Cheek	-	42	5210	13	12.66	8.14%	0.82	0.89	85
		RE Cheek*	-	42	5210	13	12.66	8.14%	0.82	0.89	-
	Head	RE Tilt	-	42	5210	13	12.66	8.14%	0.51	0.55	-
Main		LE Cheek	-	42	5210	13	12.66	8.14%	0.45	0.49	-
		LE Tilt	-	42	5210	13	12.66	8.14%	0.35	0.38	-
	Body-	Front side	10	42	5210	13	12.66	8.14%	0.10	0.11	86
	worn	Back side	10	42	5210	13	12.66	8.14%	0.03	0.03	-

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

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WLAN 802.11n(40M) 5.2G

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged S (W/	-	Plot page
					. ,	TOIETAILCE (UDIII)	(UBIII)		Measured	Reported	
Main	Head	RE Cheek	-	38	5190	13	12.85	3.51%	0.77	0.80	87
WLAN 8	302.11a	ac(80M) 5	.3G								
Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged S (W	SAR over 1g /kg)	Plot page
					. ,		(ubili)		Measured	Reported	
		RE Cheek	-	58	5290	13	12.85	3.58%	0.93	0.96	88
		RE Cheek*	-	58	5290	13	12.85	3.58%	0.92	0.95	-
	Head	RE Tilt	-	58	5290	13	12.85	3.58%	0.55	0.57	-
Main		LE Cheek	-	58	5290	13	12.85	3.58%	0.48	0.50	-
		LE Tilt	-	58	5290	13	12.85	3.58%	0.37	0.38	-
	Body-	Front side	10	58	5290	13	12.85	3.58%	0.08	0.08	89
	worn	Back side	10	58	5290	13	12.85	3.58%	0.03	0.03	-

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

WLAN 802.11n(40M) 5.3G

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power		Averaged S (W/ Measured		Plot page
Main	Head	RE Cheek	-	54	5270	13	12.78	5.20%	0.87	0.92	90

WLAN 802.11ac(80M) 5.6G

Antenna	Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power	Scaling	Averaged S (W/	•	Plot page
					· · /	Tolerance (dBm)	(dBm)		Measured	Reported	
		RE Cheek	-	106	5530	13	12.87	3.11%	1.08	1.11	91
		RE Cheek*	-	106	5530	13	12.87	3.11%	1.06	1.09	-
	Head	RE Cheek	-	122	5610	13	12.85	3.58%	0.82	0.85	-
Main	Tieau	RE Tilt	-	106	5530	13	12.87	3.11%	0.57	0.59	-
Ividii I		LE Cheek	-	106	5530	13	12.87	3.11%	0.51	0.53	-
		LE Tilt	-	106	5530	13	12.87	3.11%	0.39	0.40	-
	Body-	Front side	10	106	5530	13	12.87	3.11%	0.09	0.09	92
	worn	Back side	10	106	5530	13	12.87	3.11%	0.04	0.04	-

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

Note:

Scaling = $\frac{\text{reported SAR}}{\text{measured SAR}} = \frac{P2(mW)}{P1(mW)} = 10^{\left(\frac{P_2-P_1}{10}\right)(dBm)}$ Reported SAR = measured SAR * (scaling) Where P2 is maximum specified power, P1 is measured conducted power

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3. Simultaneous Transmission Analysis Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Head	Body-Worn	Hotspot
GSM + 2.4GHz Wi-Fi	Yes	Yes	No
GPRS + 2.4GHz Wi-Fi	No	No	Yes
WCDMA + 2.4GHz Wi-Fi	Yes	Yes	Yes
LTE + 2.4GHz Wi-Fi	Yes	Yes	Yes
GSM + 5GHz Wi-Fi	Yes	Yes	No
GPRS + 5GHz Wi-Fi	No	Yes	No
WCDMA + 5GHz Wi-Fi	Yes	Yes	No
LTE + 5GHz Wi-Fi	Yes	Yes	No
GSM + BT	Yes	Yes	No
GPRS + BT	No	Yes	No
WCDMA + BT	Yes	Yes	No
LTE + BT	Yes	Yes	No
GSM + BT + 5GHz WiFi	Yes	Yes	No
GPRS + BT + 5GHz WiFi	No	Yes	No
WCDMA + BT + 5GHz Wi-Fi	Yes	Yes	No
LTE + BT + 5GHz Wi-Fi	Yes	Yes	No

Note:

1. The device does not support DTM function. Body-worn accessory testing is typically associated with voice operations. Therefore, GSM voice was evaluated for body-worn SAR.

2. Based on KDB447498D01 note 36, when SAR test exclusion is allowed by other published RF exposure KDB procedures, such as the 2.5 cm hotspot mode SAR test exclusion for an edge or surface, then estimated SAR is not required to determine simultaneous SAR test exclusion.

3: Based on KDB 648474 D04v01r03 note 6, simultaneous transmission SAR for 10-g extremity SAR requires consideration only when standalone 10-g SAR is required.

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3.1 Estimated SAR calculation

According to KDB447498 D01v06 – When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

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

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

3.2 SPLSR evaluation and analysis

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

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

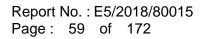
The ratio is determined by (SAR1 + SAR2)^1.5/Ri, rounded to two decimal digits, and must be \leq 0.04 for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion.

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

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

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Simultaneous Transmission Combination

reported SAR WWAN and WLAN 2.4GHz, ΣSAR evaluation Frequency reported SAR / W/kg ΣSAR												
Frequency			reported	SAR / W/kg	ΣSAR							
band	P	OSITION	WWAN	WLAN	<1.6W/kg							
		Right cheek	0.41	0.38	0.79							
GSM 850	Head	Right tilt	0.18	0.36	0.54							
GSIVI 050	пеац	Left cheek	0.35	0.18	0.53							
		Left tilt	0.16	0.18	0.34							
		Front side	0.41	0.07	0.48							
		Back side	0.45	0.08	0.53							
GPRS 850	Llatanat	Top side	-	0.12	-							
(1Dn4UP)	Hotspot	Bottom side	0.11	-	-							
		Right side	0.36	-	-							
		Left side	0.20	0.03	0.23							
		Right cheek	0.10	0.38	0.48							
CCM 4000	Llaad	Right tilt	0.07	0.36	0.43							
GSM 1900	Head	Left cheek	0.17	0.18	0.35							
		Left tilt	0.07	0.18	0.25							
		Front side	0.32	0.07	0.39							
		Back side	0.36	0.08	0.44							
GPRS 1900	Llatanat	Top side	-	0.12	-							
(1Dn4UP)	Hotspot	Bottom side	0.49	-	-							
		Right side	0.14	-	-							
		Left side	0.27	0.03	0.30							
		Right cheek	0.42	0.38	0.80							
	Head	Right tilt	0.18	0.36	0.54							
	Tieau	Left cheek	0.36	0.18	0.54							
		Left tilt	0.17	0.18	0.35							
WCDMA		Front side	0.42	0.07	0.49							
Band V		Back side	0.52	0.08	0.60							
	Hotspot	Top side	-	0.12	-							
	Πυιδρυί	Bottom side	0.11	-	-							
		Right side	0.41	-	-							
		Left side	0.20	0.03	0.23							

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report	ed SAR W	/WAN and WI	AN 2.4GHz	, ΣSAR evalu	ation	
Frequency			reported	SAR / W/kg	ΣSAR	
band	and Position		WWAN	WLAN	<1.6W/kg	
		Right cheek	0.32	0.38	0.70	
	Head	Right tilt	0.12	0.36	0.48	
	пеац	Left cheek	0.29	0.18	0.47	
		Left tilt	0.16	0.18	0.34	
LTE FDD		Front side	0.34	0.07	0.41	
Band 5		Back side	0.43	0.08	0.51	
	Hotspot	Top side	-	0.12	-	
	поізроі	Bottom side	0.10	-	-	
		Right side	0.31	-	-	
		Left side	0.20	0.03	0.23	
		Right cheek	0.12	0.38	0.50	
	Head	Right tilt	0.07	0.36	0.43	
	пеац	Left cheek	0.12	0.18	0.30	
		Left tilt	0.06	0.18	0.24	
LTE FDD		Front side	0.20	0.07	0.27	
Band 12			Back side	0.22	0.08	0.30
	Hotopot	Top side	-	0.12	-	
	Hotspot	Bottom side	0.06	-	-	
		Right side	0.18	-	-	
		Left side	0.12	0.03	0.15	
		Right cheek	0.15	0.38	0.53	
	Head	Right tilt	0.08	0.36	0.44	
	пеац	Left cheek	0.14	0.18	0.32	
		Left tilt	0.08	0.18	0.26	
LTE FDD		Front side	0.22	0.07	0.29	
Band 17		Back side	0.24	0.08	0.32	
	Hotopot	Top side	-	0.12	-	
	Hotspot	Bottom side	0.07	-		
		Right side	0.21	-	-	
		Left side	0.13	0.03	-	

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reported SAR WWAN and WLAN 2.4GHz, ΣSAR evaluation									
Frequency	D	opition	reported S	ΣSAR					
band	P	osition	WWAN	WLAN	<1.6W/kg				
GSM 850	body-	Front side	0.47	0.07	0.54				
GSIVI 850	worn	Back side	0.51	0.08	0.59				
GSM 1900	body- worn	Front side	0.23	0.07	0.30				
		Back side	0.26	0.08	0.34				
WCDMA Band V	body- worn	Front side	0.42	0.07	0.49				
		Back side	0.52	0.08	0.60				
LTE FDD Band 5	body- worn	Front side	0.34	0.07	0.41				
LTE FDD Band 5		Back side	0.43	0.08	0.51				
LTE FDD Band 12	body- worn	Front side	0.20	0.07	0.27				
LTE FDD Ballu 12		Back side	0.22	0.08	0.30				
LTE FDD Band 17	body-	Front side	0.22	0.07	0.29				
	worn		Back side	0.24	0.08	0.32			

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reported SAR WWAN and WLAN 5GHz, ΣSAR evaluation									
Frequency			reported S	reported SAR / W/kg					
band	Position		WWAN	WLAN	<1.6W/kg				
		Right cheek	0.41	1.11	1.52				
	L La s al	Right tilt	0.18	0.59	0.77				
0014 050	Head	Left cheek	0.35	0.53	0.88				
GSM 850		Left tilt	0.16	0.40	0.56				
	body-	Front side	0.47	0.11	0.58				
	worn	Back side	0.51	0.04	0.55				
		Right cheek	0.10	1.11	1.21				
	llood	Right tilt	0.07	0.59	0.66				
C SM 1000	Head	Left cheek	0.17	0.53	0.70				
GSM 1900		Left tilt	0.07	0.40	0.47				
	body-	Front side	0.23	0.11	0.34				
	worn	Back side	0.26	0.04	0.30				
	Head	Right cheek	0.42	1.11	1.53				
		Right tilt	0.18	0.59	0.77				
WCDMA Band V		Left cheek	0.36	0.53	0.89				
		Left tilt	0.17	0.40	0.57				
	body-	Front side	0.42	0.11	0.53				
	worn	Back side	0.52	0.04	0.56				
	Head	Right cheek	0.32	1.11	1.43				
		Right tilt	0.12	0.59	0.71				
LTE FDD Band 5		Left cheek	0.29	0.53	0.82				
LTE FDD Banu 5		Left tilt	0.16	0.40	0.56				
	body-	Front side	0.34	0.11	0.45				
	worn	Back side	0.43	0.04	0.47				
		Right cheek	0.12	1.11	1.23				
	Head	Right tilt	0.07	0.59	0.66				
LTE FDD Band 12	neau	Left cheek	0.12	0.53	0.65				
		Left tilt	0.06	0.40	0.46				
	body-	Front side	0.20	0.11	0.31				
	worn	Back side	0.22	0.04	0.26				
		Right cheek	0.15	1.11	1.26				
	Head	Right tilt	0.08	0.59	0.67				
LTE FDD Band 17	riedu	Left cheek	0.14	0.53	0.67				
		Left tilt	0.08	0.40	0.48				
	body-	Front side	0.22	0.11	0.33				
	worn	Back side	0.24	0.04	0.28				

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reported SAR WWAN and Bluetooth, ΣSAR evaluation									
Frequency	D		reported S	reported SAR / W/kg					
band	P	osition	WWAN	BT	<1.6W/kg				
		Right cheek	0.41	0.12	0.53				
	llaad	Right tilt	0.18	0.09	0.27				
0014.050	Head	Left cheek	0.35	0.05	0.40				
GSM 850		Left tilt	0.16	0.05	0.21				
	body-	Front side	0.47	0.05	0.52				
	worn	Back side	0.51	0.05	0.56				
		Right cheek	0.10	0.12	0.22				
	Llaad	Right tilt	0.07	0.09	0.16				
CCM 1000	Head	Left cheek	0.17	0.05	0.22				
GSM 1900		Left tilt	0.07	0.05	0.12				
	body-	Front side	0.23	0.05	0.28				
	worn	Back side	0.26	0.05	0.31				
		Right cheek	0.42	0.12	0.54				
	Head	Right tilt	0.18	0.09	0.27				
WCDMA Band V	Head	Left cheek	0.36	0.05	0.41				
		Left tilt	0.17	0.05	0.22				
	body-	Front side	0.42	0.05	0.47				
	worn	Back side	0.52	0.05	0.57				
	Head	Right cheek	0.32	0.12	0.44				
		Right tilt	0.12	0.09	0.21				
LTE FDD Band 5		Left cheek	0.29	0.05	0.34				
LIE FUU Banu 5		Left tilt	0.16	0.05	0.21				
	body-	Front side	0.34	0.05	0.39				
	worn	Back side	0.43	0.05	0.48				
		Right cheek	0.12	0.12	0.24				
	Head	Right tilt	0.07	0.09	0.16				
LTE FDD Band 12	пеац	Left cheek	0.12	0.05	0.17				
LIE FDD Banu 12		Left tilt	0.06	0.05	0.11				
	body-	Front side	0.20	0.05	0.25				
	worn	Back side	0.22	0.05	0.27				
		Right cheek	0.15	0.12	0.27				
	Head	Right tilt	0.08	0.09	0.17				
LTE FDD Band 17	neau	Left cheek	0.14	0.05	0.19				
		Left tilt	0.08	0.05	0.13				
	body-	Front side	0.22	0.05	0.27				
	worn	Back side	0.24	0.05	0.29				

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reported SAR WWAN and WLAN 5GHz and Bluetooth, Σ SAR evaluation									
Frequency	Position		repo	orted SAR / V	2010				
band			WWAN	WLAN	BT	ΣSAR	SPLSR		
		Right cheek	0.41	1.11	0.12	1.64	Yes		
	Head	Right tilt	0.18	0.59	0.09	0.86	No		
GSM 850	пеau	Left cheek	0.35	0.53	0.05	0.93	No		
G3M 650		Left tilt	0.16	0.40	0.05	0.61	No		
	body-	Front side	0.47	0.11	0.05	0.63	No		
	worn	Back side	0.51	0.04	0.05	0.60	No		
		Right cheek	0.10	1.11	0.12	1.33	No		
	المعط	Right tilt	0.07	0.59	0.09	0.75	No		
C C M 4000	Head	Left cheek	0.17	0.53	0.05	0.75	No		
GSM 1900		Left tilt	0.07	0.40	0.05	0.52	No		
	body-	Front side	0.23	0.11	0.05	0.39	No		
	worn	Back side	0.26	0.04	0.05	0.35	No		
		Right cheek	0.42	1.11	0.12	1.65	Yes		
	المعط	Right tilt	0.18	0.59	0.09	0.86	No		
	Head	Left cheek	0.36	0.53	0.05	0.94	No		
WCDMA Band V		Left tilt	0.17	0.40	0.05	0.62	No		
	body-	Front side	0.42	0.11	0.05	0.58	No		
	worn	Back side	0.52	0.04	0.05	0.61	No		
		Right cheek	0.32	1.11	0.12	1.55	No		
	Head	Right tilt	0.12	0.59	0.09	0.80	No		
LTE FDD Band 5		Left cheek	0.29	0.53	0.05	0.87	No		
LIE FOD Band 5		Left tilt	0.16	0.40	0.05	0.61	No		
	body-	Front side	0.34	0.11	0.05	0.50	No		
	worn	Back side	0.43	0.04	0.05	0.52	No		
		Right cheek	0.12	1.11	0.12	1.35	No		
	Head	Right tilt	0.07	0.59	0.09	0.75	No		
	неао	Left cheek	0.12	0.53	0.05	0.70	No		
LTE FDD Band 12		Left tilt	0.06	0.40	0.05	0.51	No		
	body-	Front side	0.20	0.11	0.05	0.36	No		
	worn	Back side	0.22	0.04	0.05	0.31	No		
		Right cheek	0.15	1.11	0.12	1.38	No		
	Head	Right tilt	0.08	0.59	0.09	0.76	No		
	пеаа	Left cheek	0.14	0.53	0.05	0.72	No		
LTE FDD Band 17		Left tilt	0.08	0.40	0.05	0.53	No		
	body-	Front side	0.22	0.11	0.05	0.38	No		
	worn	Back side	0.24	0.04	0.05	0.33	No		

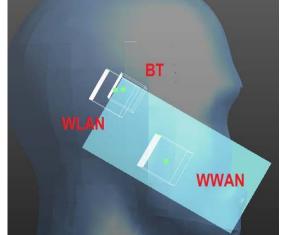
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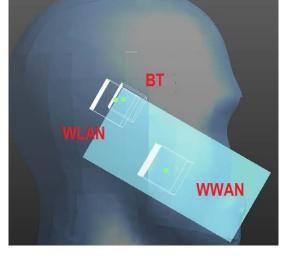


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Position Conditions	Conditions	SAR Conditions Value		Coordinates (cm)		ΣSAR	Peak Location	SPLSR	Simultaneous Transmission
	(W/kg)	х	у	z	(W/kg)	Separation Distance (mm)	SFLOR	SAR Test	
	WLAN	1.11	13.69	-22.08	-0.56			0.029	SPLSR ≤ 0.04, Not required
Re Cheek	Bluetooth	0.12	6.77	-21.70	-0.02	1.64	71.73		
	GSM 850	0.41	41 50.32 39.58 -2.06						



Position Conditions	Conditions	SAR Value	Coordinates (cm)		ΣSAR	Peak Location	SPLSR	Simultaneous Transmission	
	(W/kg)	х	у	z	(W/kg)	Separation Distance (mm)	SPLOK	SAR Test	
	WLAN	1.11	13.69	-22.08	-0.56			0.030	
Re Cheek	Bluetooth	0.12	6.77	-21.70	-0.02	1.65	71.74		SPLSR ≤ 0.04, Not required
	WCDMA B5	0.42	50.32	39.59	-2.03				·



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4. Instruments List

Manufacturer	Device	Туре	Serial number	Date of last calibration	Date of next calibration
SPEAG	Dosimetric E-Field Probe	EX3DV4	3831	Jan.23,2018	Jan.22,2019
		D750V3	1078	Jun.20,2018	Jun.19,2019
		D835V2	4d120	Jun.20,2018	Jun.19,2019
SPEAG	System Validation Dipole	D1900V2	5d173	Apr.25,2018	Apr.25,2019
	Dipolo	D2450V2	727	Apr.24,2018	Apr.23,2019
		D5GHzV2	1023	Jan.25,2018	Jan.24,2019
SPEAG	Data acquisition Electronics	DAE4	547	Mar.16,2018	Mar.15,2019
SPEAG	Software	DASY 52 V52.8.8	N/A	Calibration not required	
SPEAG	Phantom	SAM	N/A	Calibration not required	Calibration not required
Network Analyzer	Agilent	E5071C	MY46107530	Feb.26,2018	Feb.25,2019
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration not required	Calibration not required
Agilent	Dual-directional	772D	MY52180142	Jul.04,2018	Jul.03,2019
Aglient	coupler	778D	MY52180302	Jul.05,2018	Jul.04,2019
Agilent	RF Signal Generator	N5181A	MY50144143	Mar.14,2018	Mar.13,2019
Agilent	Power Meter	E4417A	MY52240003	Dec.21,2017	Dec.20,2018
Agilopt	Power Sensor	E9301H	MY52200003	Dec.21,2017	Dec.20,2018
Agilent	Power Sensor	E9301H	MY52200004	Dec.21,2017	Dec.20,2018
TECPEL	Digital thermometer	DTM-303A	TP130077	Mar.09,2018	Mar.08,2019
Anritsu	Radio Communication Test	MT8820C	6201061049	Apr.08,2018	Apr.07,2019

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5. Measurements

Date: 2018/8/23

GSM 850 Head Re Cheek CH 251

Communication System: GSM; Frequency: 848.8 MHz; Duty Cycle: 1:8.30042 Medium parameters used: f = 848.8 MHz; σ = 0.925 S/m; ϵ_r = 41.115; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

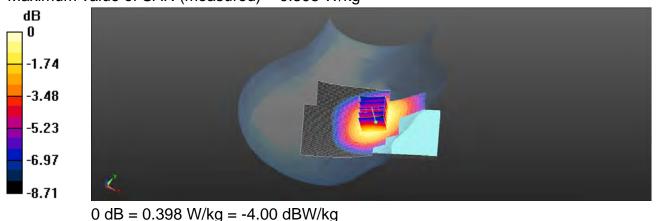
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.1, 9.1, 9.1); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.403 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.977 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 0.438 W/kg SAR(1 g) = 0.346 W/kg; SAR(10 g) = 0.260 W/kgMaximum value of SAR (measured) = 0.398 W/kg



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Date: 2018/8/23

GSM 850_Body-worn_Back side_CH 251_10mm

Communication System: GSM 850; Frequency: 848.8 MHz; Duty Cycle: 1:8.3 Medium parameters used: f = 848.8 MHz; σ = 0.973 S/m; ϵ_r = 54.95; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.18, 9.18, 9.18); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

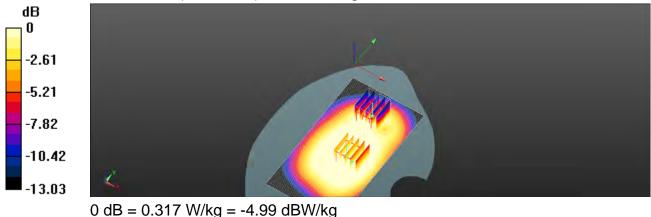
Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.500 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 22.28 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 0.549 W/kg SAR(1 g) = 0.433 W/kg; SAR(10 g) = 0.334 W/kg Maximum value of SAR (measured) = 0.495 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 22.28 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 0.387 W/kg SAR(1 g) = 0.245 W/kg; SAR(10 g) = 0.159 W/kg

Maximum value of SAR (measured) = 0.317 W/kg



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Date: 2018/8/23

GPRS 850 Hotspot Back side CH 251 10mm

Communication System: GPRS 850; Frequency: 848.8 MHz; Duty Cycle: 1:2 Medium parameters used: f = 848.8 MHz; σ = 0.973 S/m; ϵ_r = 54.95; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.18, 9.18, 9.18); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

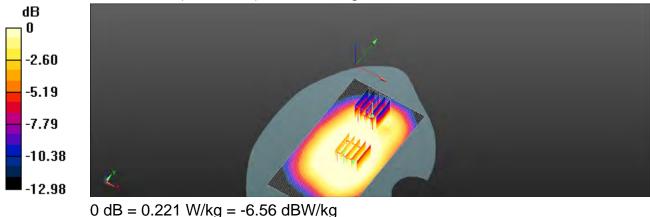
Maximum value of SAR (interpolated) = 0.347 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.25 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 0.390 W/kg SAR(1 g) = 0.304 W/kg; SAR(10 g) = 0.235 W/kg

Maximum value of SAR (measured) = 0.349 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 19.25 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 0.274 W/kg SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.111 W/kg

Maximum value of SAR (measured) = 0.221 W/kg



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Report No. : E5/2018/80015 Page: 70 of 172

Date: 2018/8/24

GSM 1900 Head Le Cheek CH 512

Communication System: GSM; Frequency: 1850.2 MHz; Duty Cycle: 1:8.30042 Medium parameters used: f = 1850.2 MHz; σ = 1.383 S/m; ϵ_r = 40.12; ρ = 1000 kg/m³ Phantom section: Left Section Ambient temperature: 22.0°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.78, 7.78, 7.78); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

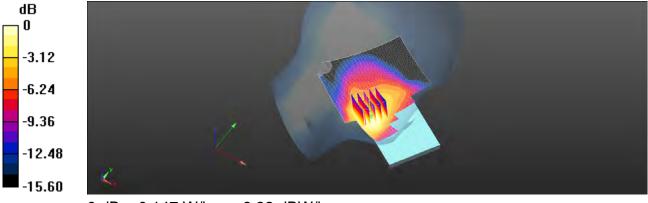
Area Scan (81x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.153 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.277 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 0.179 W/kg

SAR(1 g) = 0.116 W/kg; SAR(10 g) = 0.074 W/kg

Maximum value of SAR (measured) = 0.147 W/kg



0 dB = 0.147 W/kg = -8.32 dBW/kg

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Date: 2018/8/25

GSM 1900 Body-worn Back side CH 512 10mm

Communication System: PCS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:8.3 Medium parameters used: f = 1850.2 MHz; σ = 1.494 S/m; ϵ_r = 52.667; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.35, 7.35, 7.35); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

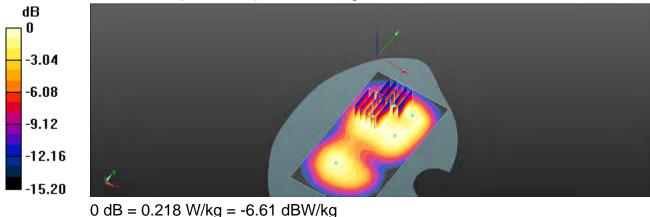
Maximum value of SAR (interpolated) = 0.236 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.163 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 0.281 W/kg SAR(1 g) = 0.166 W/kg; SAR(10 g) = 0.091 W/kg

Maximum value of SAR (measured) = 0.222 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.163 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 0.263 W/kg SAR(1 g) = 0.176 W/kg; SAR(10 g) = 0.115 W/kg

Maximum value of SAR (measured) = 0.218 W/kg



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Date: 2018/8/25

GPRS 1900 Hotspot Bottom side CH 512 10mm

Communication System: GPRS 1900; Frequency: 1850.2 MHz; Duty Cycle: 1:2 Medium parameters used: f = 1850.2 MHz; σ = 1.494 S/m; ϵ_r = 52.667; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

DASY5 Configuration:

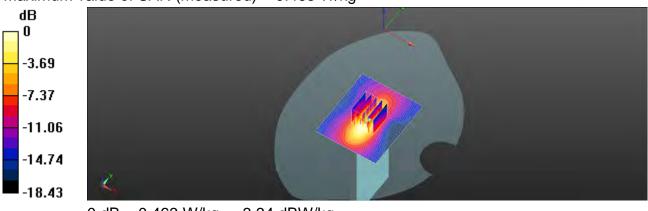
- Probe: EX3DV4 SN3831; ConvF(7.35, 7.35, 7.35); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (61x71x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.468 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 16.40 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 0.570 W/kg

SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.186 W/kg Maximum value of SAR (measured) = 0.463 W/kg



0 dB = 0.463 W/kg = -3.34 dBW/kg

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Date: 2018/8/23

WCDMA Band V_Head_Re Cheek CH 4233

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1 Medium parameters used: f = 846.6 MHz; σ = 0.923 S/m; ϵ_r = 41.157; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.1, 9.1, 9.1); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

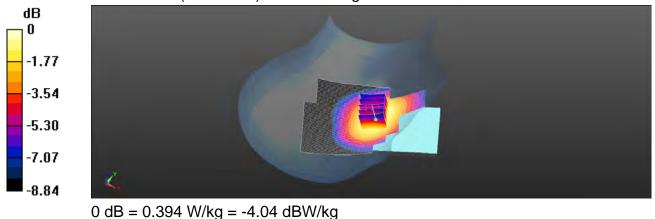
Area Scan (71x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.398 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.758 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 0.433 W/kg

SAR(1 g) = 0.341 W/kg; SAR(10 g) = 0.256 W/kg

Maximum value of SAR (measured) = 0.394 W/kg



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Date: 2018/8/23

WCDMA Band V Hotspot Back side CH 4233 10mm

Communication System: WCDMA; Frequency: 846.6 MHz; Duty Cycle: 1:1 Medium parameters used: f = 846.6 MHz; σ = 0.971 S/m; ϵ_r = 54.997; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.18, 9.18, 9.18); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

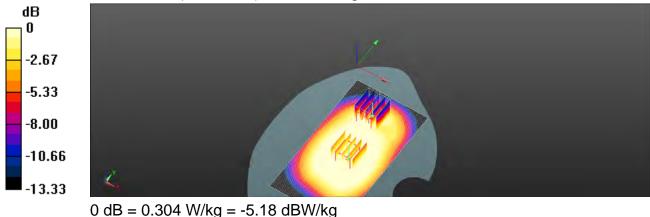
Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.489 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 22.72 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 0.535 W/kg SAR(1 g) = 0.422 W/kg; SAR(10 g) = 0.327 W/kg Maximum value of SAR (measured) = 0.483 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 22.72 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 0.375 W/kg SAR(1 g) = 0.240 W/kg; SAR(10 g) = 0.154 W/kg

Maximum value of SAR (measured) = 0.304 W/kg



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Date: 2018/8/23

LTE Band 5 (10MHz) Head Re Cheek CH 20525 QPSK 1-25

Communication System: LTE; Frequency: 836.5 MHz; Duty Cycle: 1:1 Medium parameters used: f = 836.5 MHz; σ = 0.916 S/m; ϵ_r = 41.328; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.1, 9.1, 9.1); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

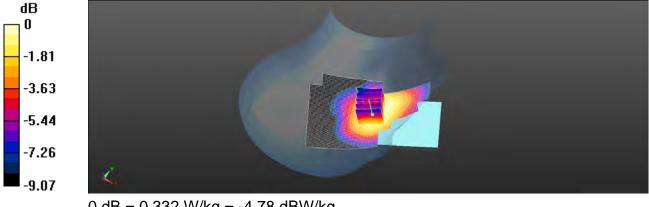
Area Scan (71x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.346 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 6.929 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 0.362 W/kg

SAR(1 g) = 0.286 W/kg; SAR(10 g) = 0.213 W/kg

Maximum value of SAR (measured) = 0.332 W/kg



0 dB = 0.332 W/kg = -4.78 dBW/kg

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Date: 2018/8/23

LTE Band 5 (10MHz) Hotspot Back side CH 20525 QPSK 1-25 10mm

Communication System: LTE; Frequency: 836.5 MHz; Duty Cycle: 1:1 Medium parameters used: f = 836.5 MHz; σ = 0.964 S/m; ϵ_r = 55.121; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.18, 9.18, 9.18); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

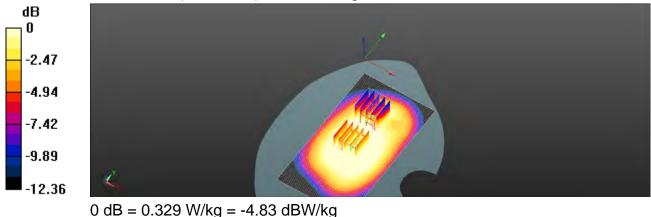
Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.447 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 21.37 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 0.493 W/kg SAR(1 g) = 0.392 W/kg; SAR(10 g) = 0.307 W/kg Maximum value of SAR (measured) = 0.449 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 21.37 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 0.365 W/kg SAR(1 g) = 0.263 W/kg; SAR(10 g) = 0.182 W/kg

Maximum value of SAR (measured) = 0.329 W/kg



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LTE Band 12 (10MHz)_Head_Re Cheek_CH 23130_QPSK_1-25

Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1 Medium parameters used: f = 711 MHz; σ = 0.886 S/m; ε_r = 42.624; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.55, 9.55, 9.55); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

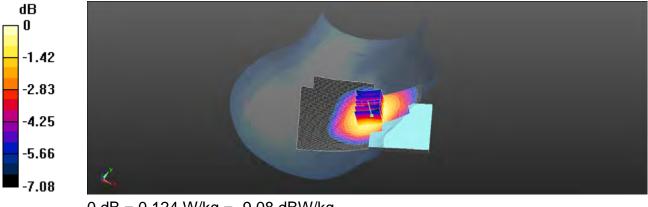
Area Scan (71x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.127 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.205 V/m; Power Drift = 0.07 dB Peak SAR (extrapolated) = 0.133 W/kg

SAR(1 g) = 0.110 W/kg; SAR(10 g) = 0.086 W/kg

Maximum value of SAR (measured) = 0.124 W/kg



0 dB = 0.124 W/kg = -9.08 dBW/kg

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LTE Band 12 (10MHz)_Hotspot_Back side_CH 23130_QPSK_1-25_10mm

Communication System: LTE; Frequency: 711 MHz; Duty Cycle: 1:1 Medium parameters used: f = 711 MHz; σ = 0.948 S/m; ϵ_r = 56.233; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.39, 9.39, 9.39); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

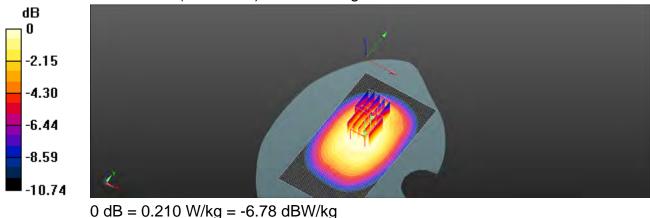
Maximum value of SAR (interpolated) = 0.210 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 14.30 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.238 W/kg

SAR(1 g) = 0.193 W/kg; SAR(10 g) = 0.152 W/kg Maximum value of SAR (measured) = 0.218 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 14.30 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.231 W/kg SAR(1 g) = 0.178 W/kg; SAR(10 g) = 0.130 W/kg

Maximum value of SAR (measured) = 0.210 W/kg



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LTE Band 17 (10MHz)_Head_Re Cheek_CH 23780_QPSK_1-25

Communication System: LTE; Frequency: 709 MHz; Duty Cycle: 1:1 Medium parameters used: f = 709 MHz; σ = 0.885 S/m; ϵ_r = 42.668; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.55, 9.55, 9.55); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

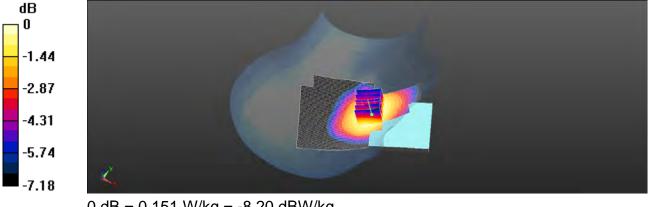
Area Scan (71x121x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.154 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 3.808 V/m; Power Drift = -0.08 dB Peak SAR (extrapolated) = 0.164 W/kg

SAR(1 g) = 0.136 W/kg; SAR(10 g) = 0.107 W/kg

Maximum value of SAR (measured) = 0.151 W/kg



0 dB = 0.151 W/kg = -8.20 dBW/kg

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LTE Band 17 (10MHz)_Hotspot_Back side_CH 23780_QPSK_1-25_10mm

Communication System: LTE; Frequency: 709 MHz; Duty Cycle: 1:1 Medium parameters used: f = 709 MHz; σ = 0.948 S/m; ϵ_r = 56.265; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.39, 9.39, 9.39); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x131x1): Interpolated grid: dx=15 mm, dy=15 mm

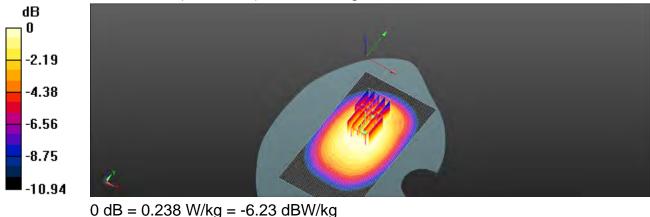
Maximum value of SAR (interpolated) = 0.246 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 15.27 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.266 W/kg SAR(1 g) = 0.217 W/kg; SAR(10 g) = 0.173 W/kg

Maximum value of SAR (measured) = 0.243 W/kg

Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 15.27 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.261 W/kg SAR(1 g) = 0.205 W/kg; SAR(10 g) = 0.149 W/kg

Maximum value of SAR (measured) = 0.238 W/kg



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Date: 2018/8/27

WLAN 802.11b Head Re Cheek CH 1

Communication System: WLAN 2.45G; Frequency: 2412 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2412 MHz; σ = 1.746 S/m; ϵ_r = 39.514; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.16, 7.16, 7.16); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

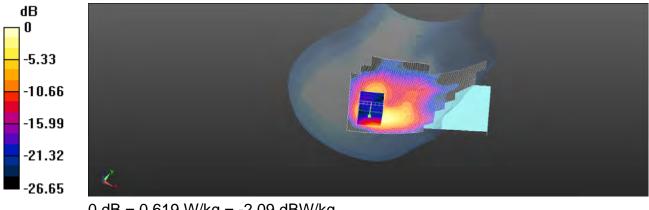
Area Scan (91x151x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.641 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 10.37 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 0.936 W/kg

SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.151 W/kg

Maximum value of SAR (measured) = 0.619 W/kg



0 dB = 0.619 W/kg = -2.09 dBW/kg

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Date: 2018/8/25

WLAN 802.11b_Hotspot_Top side_CH 1_10mm

Communication System: WLAN 2.45G; Frequency: 2412 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2412 MHz; σ = 1.885 S/m; ϵ_r = 53; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

DASY5 Configuration:

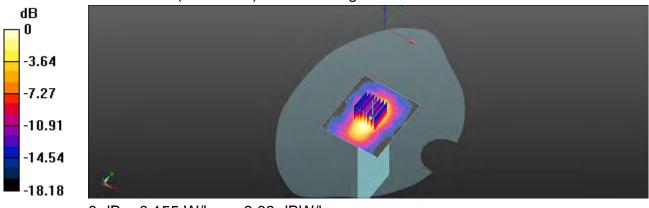
- Probe: EX3DV4 SN3831; ConvF(7.26, 7.26, 7.26); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (71x81x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.151 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 8.993 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 0.197 W/kg

SAR(1 g) = 0.109 W/kg; SAR(10 g) = 0.058 W/kg Maximum value of SAR (measured) = 0.155 W/kg



0 dB = 0.155 W/kg = -8.09 dBW/kg

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Date: 2018/8/27

Bluetooth(GFSK) Head Re Cheek CH 0

Communication System: Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2402 MHz; σ = 1.733 S/m; ϵ_r = 39.551; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.16, 7.16, 7.16); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

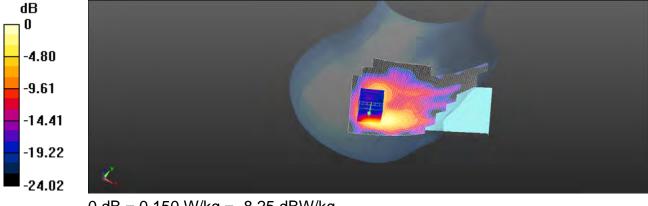
Area Scan (91x151x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.148 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 6.017 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 0.213 W/kg

SAR(1 g) = 0.091 W/kg; SAR(10 g) = 0.036 W/kg

Maximum value of SAR (measured) = 0.150 W/kg



0 dB = 0.150 W/kg = -8.25 dBW/kg

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Bluetooth(GFSK)_Body-worn_Back side_CH 0_10mm

Communication System: Bluetooth; Frequency: 2402 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2402 MHz; σ = 1.87 S/m; ϵ_r = 53.034; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.26, 7.26, 7.26); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

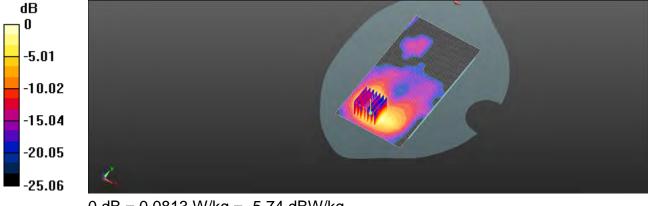
Area Scan (81x151x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 0.0981 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 4.566 V/m; Power Drift = 0.05 dB Peak SAR (extrapolated) = 0.408 W/kg

SAR(1 g) = 0.039 W/kg; SAR(10 g) = 0.017 W/kg

Maximum value of SAR (measured) = 0.0813 W/kg



0 dB = 0.0813 W/kg = -5.74 dBW/kg

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Date: 2018/8/28

WLAN 802.11ac(80M) 5.2G_Head_Re Cheek_CH 42

Communication System: WLAN 5G; Frequency: 5210 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5210 MHz; σ = 4.684 S/m; ϵ_r = 36.366; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.86, 4.86, 4.86); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

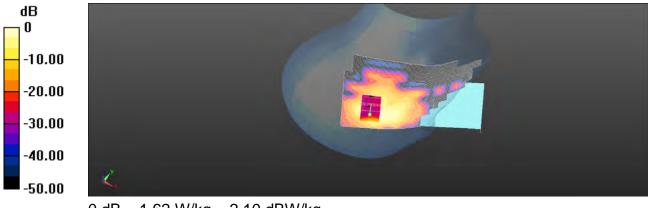
Area Scan (101x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.80 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 3.480 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 3.80 W/kg

SAR(1 g) = 0.817 W/kg; SAR(10 g) = 0.266 W/kg

Maximum value of SAR (measured) = 1.62 W/kg



0 dB = 1.62 W/kg = 2.10 dBW/kg

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Date: 2018/8/30

WLAN 802.11ac(80M) 5.2G_Body-wron_Front side_CH 42_10mm

Communication System: WLAN 5G; Frequency: 5210 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5210 MHz; σ = 5.338 S/m; ϵ_r = 49.598; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.3°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.56, 4.56, 4.56); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

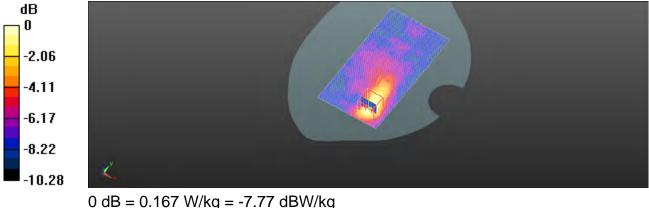
Area Scan (91x171x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.180 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 3.101 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 0.319 W/kg

SAR(1 g) = 0.102 W/kg; SAR(10 g) = 0.052 W/kg

Maximum value of SAR (measured) = 0.167 W/kg



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Date: 2018/8/28

WLAN 802.11n(40M) 5.2G Head Re Cheek CH 38

Communication System: WLAN 5G; Frequency: 5190 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5190 MHz; σ = 4.603 S/m; ϵ_r = 36.061; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.86, 4.86, 4.86); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

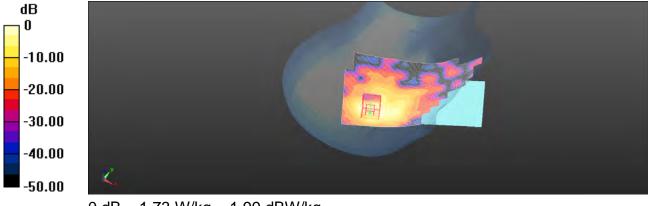
Area Scan (101x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.76 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 3.525 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 3.66 W/kg

SAR(1 g) = 0.770 W/kg; SAR(10 g) = 0.247 W/kg

Maximum value of SAR (measured) = 1.73 W/kg



0 dB = 1.73 W/kg = 1.99 dBW/kg

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Date: 2018/8/28

WLAN 802.11ac(80M) 5.3G_Head_Re Cheek_CH 58

Communication System: WLAN 5G; Frequency: 5290 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5290 MHz; σ = 4.755 S/m; ϵ_r = 36.002; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.6°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.65, 4.65, 4.65); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (101x181x1): Interpolated grid: dx=10 mm, dy=10 mm

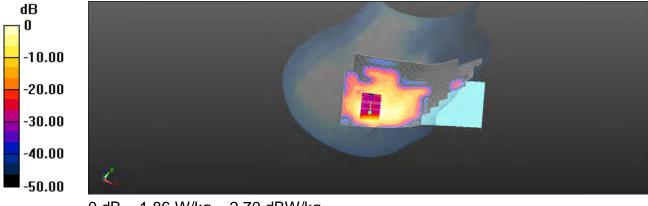
Maximum value of SAR (interpolated) = 2.19 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 4.345 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 4.47 W/kg

SAR(1 g) = 0.929 W/kg; SAR(10 g) = 0.296 W/kg

Maximum value of SAR (measured) = 1.86 W/kg



0 dB = 1.86 W/kg = 2.70 dBW/kg

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Date: 2018/8/30

WLAN 802.11ac(80M) 5.3G Body-worn Front side CH 58 10mm

Communication System: WLAN 5G; Frequency: 5290 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5290 MHz; σ = 5.370 S/m; ϵ_r = 49.431; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.0°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.39, 4.39, 4.39); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

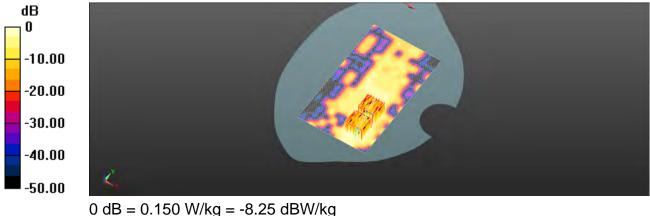
Area Scan (101x171x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.195 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 4.956 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 0.384 W/kg SAR(1 g) = 0.060 W/kg; SAR(10 g) = 0.013 W/kg Maximum value of SAR (measured) = 0.384 W/kg

Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 4.956 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 0.289 W/kg SAR(1 g) = 0.076 W/kg; SAR(10 g) = 0.030 W/kg

Maximum value of SAR (measured) = 0.150 W/kg



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Date: 2018/8/28

WLAN 802.11n(40M) 5.3G Head Re Cheek CH 54

Communication System: WLAN 5G; Frequency: 5270 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5270 MHz; σ = 4.712 S/m; ϵ_r = 36.122; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.6°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.65, 4.65, 4.65); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Area Scan (101x181x1): Interpolated grid: dx=10 mm, dy=10 mm

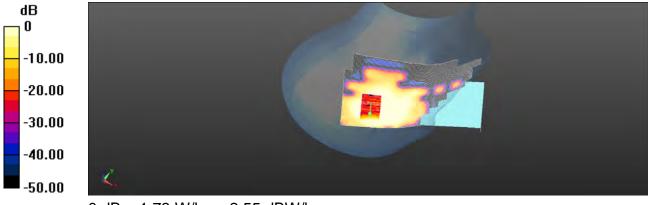
Maximum value of SAR (interpolated) = 2.01 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 3.989 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 4.38 W/kg

SAR(1 g) = 0.870 W/kg; SAR(10 g) = 0.259 W/kg

Maximum value of SAR (measured) = 1.73 W/kg



0 dB = 1.73 W/kg = 2.55 dBW/kg

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Date: 2018/8/28

WLAN 802.11ac(80M) 5.6G_Head_Re Cheek_CH 106

Communication System: WLAN 5G; Frequency: 5530 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5530 MHz; σ = 4.942 S/m; ϵ_r = 35.459; ρ = 1000 kg/m³ Phantom section: Right Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.49, 4.49, 4.49); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

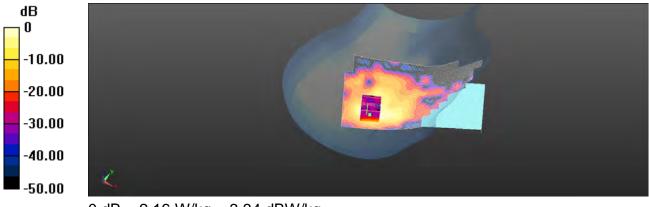
Area Scan (101x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 2.56 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 6.747 V/m; Power Drift = 0.08 dB Peak SAR (extrapolated) = 5.33 W/kg

SAR(1 g) = 1.08 W/kg; SAR(10 g) = 0.327 W/kg

Maximum value of SAR (measured) = 2.16 W/kg



0 dB = 2.16 W/kg = 3.34 dBW/kg

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Date: 2018/8/30

WLAN 802.11ac(80M) 5.6G_Body-worn_Front side_CH 106_10mm

Communication System: WLAN 5G; Frequency: 5530 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5530 MHz; σ = 5.73 S/m; ϵ_r = 48.658; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.0°C; Liquid temperature: 21.9°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.92, 3.92, 3.92); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

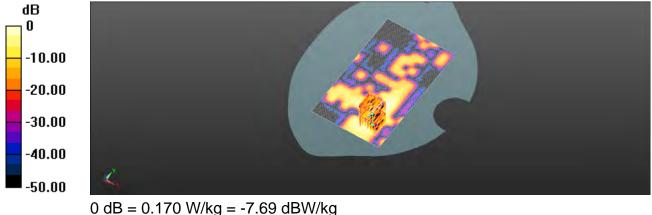
Area Scan (101x171x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.209 W/kg

Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 1.160 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 0.411 W/kg SAR(1 g) = 0.091 W/kg; SAR(10 g) = 0.029 W/kg Maximum value of SAR (measured) = 0.173 W/kg

Zoom Scan (7x7x12)/Cube 1: Measurement grid: dx=4mm, dy=4mm, dz=2mm Reference Value = 1.160 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 0.307 W/kg SAR(1 g) = 0.083 W/kg; SAR(10 g) = 0.027 W/kg

Maximum value of SAR (measured) = 0.170 W/kg



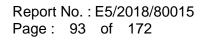
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6. SAR System Performance Verification

Date: 2018/8/23

Dipole 750 MHz SN:1078 Head

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 750 MHz; σ = 0.904 S/m; ϵ_r = 42.101; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.7°C

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.55, 9.55, 9.55); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

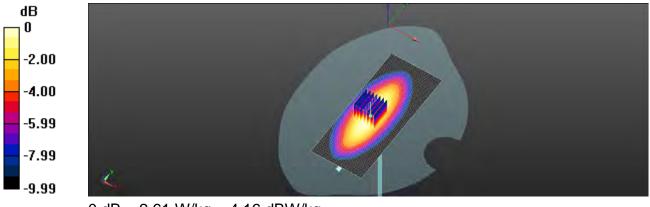
Pin=250mW/Area Scan (51x121x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 2.61 W/kg

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

dz=5mm Reference Value = 53.25 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 3.06 W/kg

SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.34 W/kg

Maximum value of SAR (measured) = 2.61 W/kg



0 dB = 2.61 W/kg = 4.16 dBW/kg

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Date: 2018/8/23

Dipole 750 MHz SN:1078 Body

Communication System: CW; Frequency: 750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 750 MHz; σ = 0.963 S/m; ϵ_r = 55.854; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.7°C

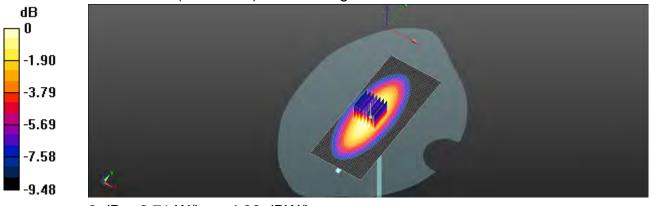
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.39, 9.39, 9.39); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (51x121x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 2.68 W/kg

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

Reference Value = 53.60 V/m: Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.13 W/kg SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.46 W/kgMaximum value of SAR (measured) = 2.71 W/kg



0 dB = 2.71 W/kg = 4.32 dBW/kg

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Date: 2018/8/23

Dipole 835 MHz SN:4d120 Head

Communication System: UID 10000, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: f = 835 MHz; σ = 0.914 S/m; ϵ_r = 41.335; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

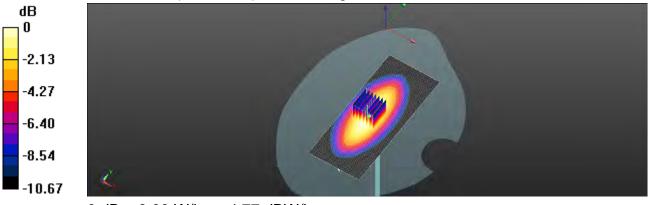
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.1, 9.1, 9.1); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (51x121x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 3.03 W/kg

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

Reference Value = 54.65 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 3.57 W/kg SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.54 W/kgMaximum value of SAR (measured) = 3.00 W/kg



0 dB = 3.00 W/kg = 4.77 dBW/kg

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Date: 2018/8/23

Dipole 835 MHz SN:4d120 Body

Communication System: CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: f = 835 MHz; σ = 0.961 S/m; ϵ_r = 55.087; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

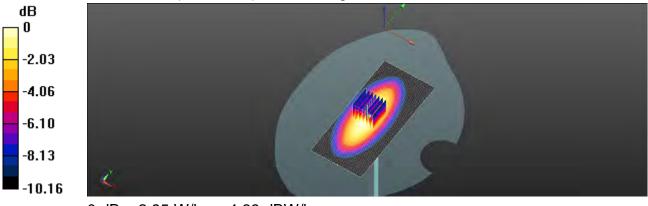
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.18, 9.18, 9.18); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (51x111x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 2.97 W/kg

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

Reference Value = 52.67 V/m: Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.40 W/kg SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.56 W/kgMaximum value of SAR (measured) = 2.95 W/kg



0 dB = 2.95 W/kg = 4.69 dBW/kg

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Date: 2018/8/24

Dipole 1900 MHz SN:5d173 Head

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1900 MHz; σ = 1.392 S/m; ϵ_r = 39.855; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.0°C; Liquid temperature: 21.8°C

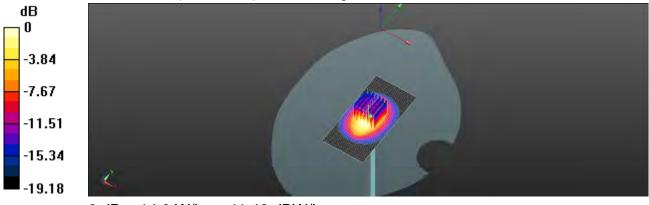
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.78, 7.78, 7.78); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (41x81x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 14.1 W/kg

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

Reference Value = 100.1 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 18.3 W/kg SAR(1 g) = 9.8 W/kg; SAR(10 g) = 5.16 W/kgMaximum value of SAR (measured) = 14.0 W/kg



0 dB = 14.0 W/kg = 11.46 dBW/kg

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Date: 2018/8/25

Dipole 1900 MHz SN:5d173 Body

Communication System: CW; Frequency: 1900 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1900 MHz; σ = 1.508 S/m; ϵ_r = 52.561; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

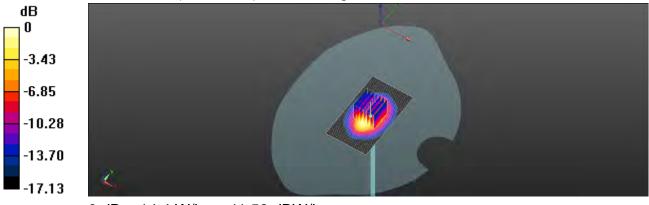
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.35, 7.35, 7.35); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (41x71x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 15.3 W/kg

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

Reference Value = 95.79 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 18.3 W/kg SAR(1 g) = 9.97 W/kg; SAR(10 g) = 5.22 W/kgMaximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.4 W/kg = 11.58 dBW/kg

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Date: 2018/8/27

Dipole 2450 MHz SN:727 Head

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2450 MHz; σ = 1.786 S/m; ϵ r = 39.364; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.9°C

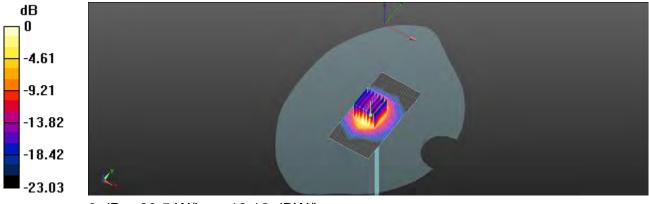
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.16, 7.16, 7.16); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (51x101x1): Interpolated grid: dx=12 mm, dy=12 mm Maximum value of SAR (interpolated) = 21.2 W/kg

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

Reference Value = 103.5 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 28.8 W/kg SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.23 W/kgMaximum value of SAR (measured) = 20.5 W/kg



0 dB = 20.5 W/kg = 13.12 dBW/kg

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Date: 2018/8/25

Dipole 2450 MHz SN:727 Body

Communication System: CW; Frequency: 2450 MHz; Duty Cycle: 1:1 Medium parameters used: f = 2450 MHz; σ = 1.931 S/m; ϵ_r = 52.829; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

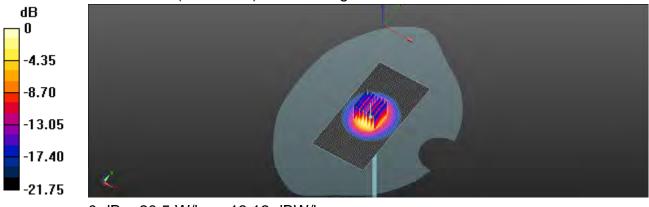
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.26, 7.26, 7.26); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=250mW/Area Scan (51x101x1): Interpolated grid: dx=15 mm, dy=15 mm Maximum value of SAR (interpolated) = 20.4 W/kg

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

Reference Value = 101.5 V/m: Power Drift = -0.02 dB Peak SAR (extrapolated) = 27.5 W/kg SAR(1 g) = 12.8 W/kg; SAR(10 g) = 6.04 W/kgMaximum value of SAR (measured) = 20.5 W/kg



0 dB = 20.5 W/kg = 13.12 dBW/kg

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Report No. : E5/2018/80015 Page: 101 of 172

Date: 2018/8/28

Dipole 5200 MHz SN:1023 Head

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5200 MHz; σ = 4.639 S/m; ϵ_r = 36.163; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.8°C

DASY5 Configuration:

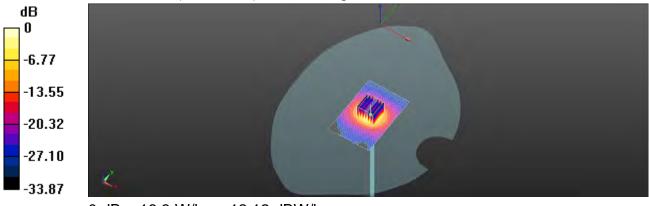
- Probe: EX3DV4 SN3831; ConvF(4.86, 4.86, 4.86); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

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

Maximum value of SAR (interpolated) = 16.4 W/kg

Pin=100mW, d=10mm/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 60.47 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 31.4 W/kg SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.23 W/kg Maximum value of SAR (measured) = 16.3 W/kg



0 dB = 16.3 W/kg = 12.12 dBW/kg

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Date: 2018/8/30

Dipole 5200 MHz SN:1023 Body

Communication System: CW; Frequency: 5200 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5200 MHz; σ = 5.267 S/m; ϵ_r = 49.618; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.3°C; Liquid temperature: 21.8°C

DASY5 Configuration:

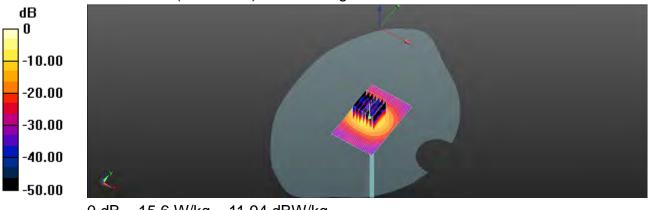
- Probe: EX3DV4 SN3831; ConvF(4.56, 4.56, 4.56); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=100mW, d=10mm/Area Scan (41x61x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 12.1 W/kg

Pin=100mW, d=10mm/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm Reference Value = 58.93 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 33.9 W/kg SAR(1 g) = 7.23 W/kg; SAR(10 g) = 2.03 W/kg Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.94 dBW/kg

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Report No. : E5/2018/80015 Page: 103 of 172

Date: 2018/8/28

Dipole 5300 MHz SN:1023 Head

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5300 MHz; σ = 4.753 S/m; ϵ_r = 35.845; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.6°C

DASY5 Configuration:

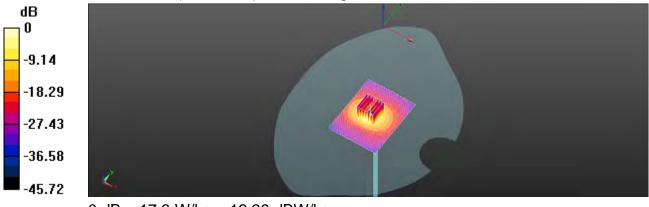
- Probe: EX3DV4 SN3831; ConvF(4.65, 4.65, 4.65); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=100mW, d=10mm/Area Scan (71x91x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.2 W/kg

Pin=100mW, d=10mm/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm,

dy=4mm, dz=2mm Reference Value = 61.01 V/m: Power Drift = -0.02 dB Peak SAR (extrapolated) = 30.4 W/kg SAR(1 g) = 8.15 W/kg; SAR(10 g) = 2.35 W/kg Maximum value of SAR (measured) = 17.3 W/kg



0 dB = 17.3 W/kg = 12.39 dBW/kg

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Report No. : E5/2018/80015 Page: 104 of 172

Date: 2018/8/30

Dipole 5300 MHz SN:1023 Body

Communication System: CW; Frequency: 5300 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5300 MHz; σ = 5.367 S/m; ϵ_r = 49.251; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.0°C; Liquid temperature: 21.9°C

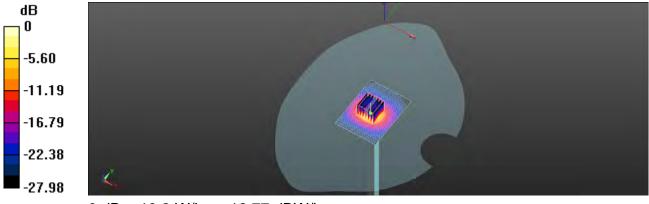
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.39, 4.39, 4.39); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection) •
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=100mW/Area Scan (61x81x1): Interpolated grid: dx=10 mm, dy=10 mm Maximum value of SAR (interpolated) = 19.4 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 63.13 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 36.7 W/kg SAR(1 g) = 7.41 W/kg; SAR(10 g) = 2.08 W/kgMaximum value of SAR (measured) = 19.2 W/kg



0 dB = 19.2 W/kg = 12.77 dBW/kg

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Report No. : E5/2018/80015 Page: 105 of 172

Date: 2018/8/28

Dipole 5600 MHz SN:1023 Head

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5600 MHz; σ = 5.031 S/m; ϵ_r = 35.182; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.2°C; Liquid temperature: 21.8°C

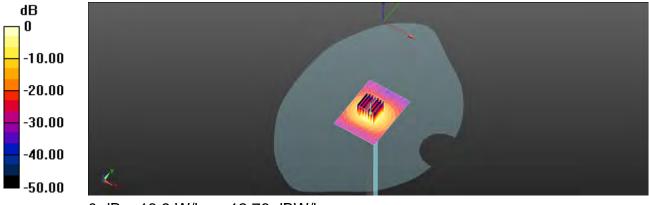
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(4.49, 4.49, 4.49); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=100mW/Area Scan (61x81x1): Interpolated grid: dx=10 mm, dy=10 mm Maximum value of SAR (interpolated) = 18.7 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 63.32 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 39.7 W/kg SAR(1 g) = 8.25 W/kg; SAR(10 g) = 2.38 W/kgMaximum value of SAR (measured) = 18.9 W/kg



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

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Report No. : E5/2018/80015 Page: 106 of 172

Date: 2018/8/30

Dipole 5600 MHz SN:1023 Body

Communication System: CW; Frequency: 5600 MHz; Duty Cycle: 1:1 Medium parameters used: f = 5600 MHz; σ = 5.753 S/m; ϵ r = 48.47; ρ = 1000 kg/m³ Phantom section: Flat Section Ambient temperature: 22.1°C; Liquid temperature: 21.7°C

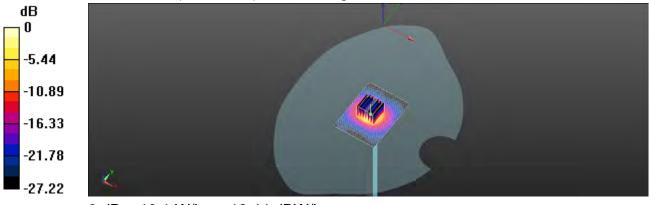
DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.92, 3.92, 3.92); Calibrated: 2018/1/23;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn547; Calibrated: 2018/3/16
- Phantom: SAM
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Pin=100mW/Area Scan (61x81x1): Interpolated grid: dx=10 mm, dy=10 mm Maximum value of SAR (interpolated) = 17.7 W/kg

Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 62.81 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 31.2 W/kg SAR(1 g) = 7.92 W/kg; SAR(10 g) = 2.21 W/kgMaximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.1 W/kg = 12.44 dBW/kg

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7. DAE & Probe Calibration Certificate

Calibration Laboratory of

conditied by the Swiss Accer he Swiss Accerditation Ser	ditation Service (SAS) wice is one of the signatories	Accredita	tion No.: SCS 0108
Multilateral Agreement for U	e recognition of calibration	certificatos	
Client SGS (Auden	,	and the second sec	No: DAE4-547_Mar18
	CERTIFICATE		
Object	DAE4 - SD 000 D	04 BM - SN: 547	
Calibration procedure(s)	QA CAL-06.v29 Calibration process	dure for the data acquisition e	lectronics (DAE)
Calibration date;	March 16, 2018		
The measurements and the u	noertainties with confidence pr ducted in the classed laboration	anal standards, which realize the physica obability are given on the following pages y leadity: emirrormant temperature (22 ±	s and are part of the certificate.
The measurements and the u All calibrations have been con Calibration Equipment used (I Primary Standards	noentainties with confidence pr ducted in the closed laboration W&TE critical for calibration)	obability are given on the following pages	s and are part of the certificate. 39°C and humidity < 70%. Scheduled Calibration
The measurements and the u All calibrations have been con Calibration Equipment used (I Primary Standards Keithiay Multimeter Type 200	Australiance with confidence pr ducted in the closed laboratory WATE critical for calibration)	obability are given on the following pages y lectility: emitronment temperature (22 ± Cal Data (Cartificate No.) 31-Aug-17 (Ne:21092)	s and are part of the certificate. 3)°C and humicity < 70%. Scheduled Calibration Aug-18
The measurements and the u All calibrations have been con Calibration Equipment used (I Primary Standards	Auctual in the closed laboratory ARTE critical for calibrationy ID A I SN: 0810278 ID A SE UNIX 053 AA 1001	obability are given on the following pages y lacility: emirorment temperature (22 ± Cal Date (Cartificate No.)	s and are part of the certificate. 39°C and humidity < 70%. Scheduled Calibration
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The measurements and the u All (salibrations have been con Calibration Equipment) used (I Primary Standards Keithley Multimeter Type 200 Secondary Standards Auto DAE Calibration Unit Calibrator Box V2.1	Auctual in the closed laboratory ARTE critical for calibrationy ID A I SN: 0810278 ID A SE UNIX 053 AA 1001	obability are given on the following pages y lectity: environment temperature (22 ± Cal Date (Cartificate No.) 31-Aug-17 (Ne:21092) Check Date (in house) D4-Jan-16 (in house check)	s and are part of the certificate. 3)°C and humicity < 70%. <u>Scheduled Calibration</u> Aug-18 <u>Scheduled Check.</u> In house check Jan-19
The measurements and the u All (salibrations have been con Calibration Equipment used () Primary Standards Keithlay Multimeter Type 200 Secondary Standards Auto DAE Calibration Unit	Alexandrian Alexan	obability are given on the following pages y lectity: environment temperatures (22 ± <u>Cal Date (Cartificate No.)</u> 31-Aug-17 (Ne:21092) <u>Check Date (in house)</u> 04-Jan-16 (in house check) 94-Jan-16 (in house check) 94-Jan-16 (in house check)	and are part of the certificate. 3)°C and humidity < 70%. <u>Scheduled Calibration</u> Aug-18 <u>Scheduled Check</u> In house check Jan-19 In house check Jan-19

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Accreditation No.: SCS 0108

Accedited 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 pertilicates

Glossarv

DAE Connector angle

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

Methods Applied and Interpretation of Parameters

- 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

High Flange:	1LS8 =	5.7µV	full range =	-100+300 mV
Low Plange:	1LSB -	6TnV.	full range =	-1 +3mV

Calibration Factors	Х	¥	Z
High Range	403-254 ± 0.02% (k=2)	403.158 ± 0.02% (k=2)	402.803 ± 0.02% (k=2)
		3.90484 ± 1.50% (k=2)	

Connector Angle

Connector Angle to be used in DASY system	90.5°±1°
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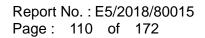
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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	200032.85	-2.13	-0.00
Channel X + Input	20008.76	3.21	0.02
Channel X - Input	-20000.69	4.51	-0.02
Channel Y + Input	200033.55	-4.13	-0.00
Channel Y + Input	20003.79	-1,78	-0.01
Channel Y - Input	-20005.44	-1.22	0.01
Channel Z + Input	200031.66	-3.06	-0.00
Channel Z + Input	20006.10	0.58	0.00
Channel Z - Input	-20003.99	1.29	-0.01

Low Range	Reading (µV)	Difference (µV)	Error (%)
Chaonel X + Input	2001.72	0.18	0,01
Channel X + Input	201,65	0.01	0.01
Channel X - Input	-198.51	-0.28	0.14
Channel Y + Input	2001.34	-0.09	-0,00
Channel Y + Input	200,96	-0.70	-0.35
Channel Y - Input	-199.61	-1.33	0.67
Channel Z + Input	2001.33	-0.06	-0.00
Channel Z + Input	200,08	-1.48	-0.74
Channel Z - Input	-200,28	-1.91	0.96

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	-3.69	-5.17
	+ 200	5.60	4.08
Channel Y	200	-0.50	-1,15
	- 200	0.25	-0,51
Channel Z	200	5.51	.5.17
-	- 200	-7.82	-8.28

3. Channel separation

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200	1	3.20	-2.58
Channel Y	200	9.59	~	3.91
Channel Z	200	5.09	7.98	-

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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	16363	15273
Channel Y	16469	16100
Channel Z	16083	17048

5. Input Offset Measurement

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

	Average (µV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	-1,57	-2.25	-0.71	0.35
Channel Y	0.27	-0.91	1.98	0,42
Channel 2	0.12	-1.25	1.42	0.47

6. Input Offset Current

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

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		+14
Supply (- Vec)	-0.01	-8	-9

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luitilateral Agreement for the lient SGS-TW (Auc	NON COMPANY OF A COMPANY OF A	NO ST N	EX3-3831 Jan18
		Transfer a	EX3-3031_341115
CALIBRATION	CERTIFICATE		
Dbject	EX3DV4 - SN:383	1	
Calibration procedure(s)		A CAL-14.v4, QA CAL-23.v5, QA ure for dosimetric E-field probes	CAL-25,v6
Calibration date:	January 23, 2018		
	receiper an intercementer intercenter à	facility: environment temperature (22 ± 3)°C a	and number $y = 70.9$
Calibration Equipment used (M		raciiry: environment temperature (22 ± 3) C a	na namaly s 70s
		Cal Date (Certificate No.)	Scheduled Calibration
Calibration Equipment used (M Primary Standards Power meter NRP	&TE critical for calibration)	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522)	
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91	&TE critical for calibration)	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521)	Scheduled Calibration Apr-18 Apr-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525)	Scheduled Calibration Apr-18 Apr-18 Apr-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator	ATE critical for calibration)	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02528)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ES3DV2	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02528) 30-Dec-17 (No. ES3-3013_Dec17)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ES3DV2	ATE critical for calibration)	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02528)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 55277 (20x) SN: 660	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02528) 30-Dec-17 (No. 217-02528) 21-Dec-17 (No. DAE4-660_Dec17)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18
Calibration Equipment used (M Phimary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013 SN: 660 ID	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02526) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check Date (in house)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Scheduled Check
Calibration Equipment used (M Phimary Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards Power meter E4419B	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103246 SN: 05277 (20x) SN: 3013 SN: 660 ID SN: GB41293874	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02528) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check Date (in house) 06-Apr-16 (in house check Jun-16)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Jun-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 3013 SN: 660 ID	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02526) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check Date (in house)	Scheduled Caldination Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 In house check Jun-18 In house check Jun-18
Calibration Equipment used (M Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 3013 SN: 660 ID SN: G841293874 SN: MY41498087	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02526) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check: Date (in house) 06-Apr-16 (in house check Jun-16) 06-Apr-16 (in house check Jun-16)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Jun-18
Calibration Equipment used (M Phimary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenustor Reference Probe ES3DV2 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A	&TE critical for calibration) ID SNL 104778 SNL 103244 SNL 103245 SNL 303245 SNL 30245 SNL 3025 SNL 3025	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02525) 07-Apr-17 (No. 217-02528) 30-Dec-17 (No. E33-3013_Dec17) 21-Dec-17 (No. E33-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check: Date (in house) 06-Apr-16 (in house check Jun-16) 08-Apr-16 (in house check Jun-16)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Dec-18 Scheduled Check In house check Jun-18 In house check Jun-18 In house check Jun-18
Calibration Equipment used (M Phimary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A RF generator HP 8648C	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 3013 SN: 660 ID SN: G841293874 SN: MY41498087 SN: MY41498087 SN: 000110210 SN: US3642U01700 SN: US37390585	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02529) 30-Dec-17 (No. 217-02528) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check: Date (in house) 06-Apr-16 (in house check Jun-16) 06-Apr-16 (in house check Jun-16) 06-Apr-16 (in house check Jun-16) 04-Aug-99 (in house check Jun-16) 18-Oct-01 (in house check Jun-16)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 In house check Jun-18 In house check Jun-18
Calibration Equipment used (M Phimary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Reference Probe ES3DV2 DAE4 Secondary Standards Power meter E44198 Power sensor E4412A Power sensor E4412A RF generator HP 8648C	&TE critical for calibration) ID SN: 104778 SN: 103244 SN: 103245 SN: 55277 (20x) SN: 660 ID SN: 660 ID SN: 661 SN: 0541293874 SN: MY41496087 SN: MY41496087 SN: 00110210 SN: US3642U01700	Cal Date (Certificate No.) 04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02528) 30-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. ES3-3013_Dec17) 21-Dec-17 (No. DAE4-660_Dec17) Check: Date (in house) 06-Apr-18 (in house check Jun-16) 06-Apr-16 (in house check Jun-16) 06-Apr-16 (in house check Jun-16) 04-Aug-99 (in house check Jun-16)	Scheduled Calibration Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Dec-18 Scheduled Check In house check Jun-18 In house check Jun-18 In house check Jun-18

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



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Accreditation No.: SCS 0108

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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	@ rotation around probe axis
Polarization 9	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

Connector Angle

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 handhald 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 whether the specific Absorption Rate (SAR) for whether the specific Absorption Rate (SAR) and the specific Absorption Rate (SAR) for whether the specific Absorpt

- 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 8 = 0 (I ≤ 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 E²-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 balibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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January 23, 2018

Probe EX3DV4

SN:3831

Manufactured: Calibrated:

September 6, 2011 January 23, 2018

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

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January 23, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm $(\mu V/(V/m)^2)^{\Lambda}$	0.43	0.41	0.42	± 10.1 %
DCP (mV) ⁸	100.3	106.6	101.4	

Modulation Calibration Parameters

UID	Communication System Name		AdB	B dBõV	С	D dB	VR mV	Unc ^t (k=2)
0	CW	X C	0.0	0.0	1.0	0.00	176.5	±3.5 %
-		Y	0.0	0.0	1.0		196.9	-
		Z	0.0	0.0	1.0		196.8	

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%.

The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Pages 5 and 6).

Numerical linearization parameter: uncertainty not required. 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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January 23, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

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	9.55	9.55	9.55	0.32	1.00	± 12.0 %
835	41.5	0.90	9.10	9.10	9.10	0.29	1.04	± 12.0 %
900	41.5	0,97	9.00	9.00	9.00	0.40	0.85	± 12.0 %
1750	40.1	1.37	8.09	8.09	8.09	0.37	0.80	± 12.0 %
1900	40.0	1.40	7.78	7.78	7.78	0.34	0.84	± 12.0 %
2000	40.0	1.40	7.79	7.79	7.79	0.27	0.84	± 12.0 %
2300	39.5	1.67	7.50	7.50	7.50	0.32	0.80	± 12.0 %
2450	39,2	1.80	7.16	7.16	7.16	0.38	0.84	± 12.0 %
2600	39.0	1,96	6.95	6.95	6.95	0.38	0.82	± 12.0 %
3500	37.9	2.91	6.64	6.64	6.64	0.30	1.20	± 13.1 %
5200	36.0	4.66	4.86	4.86	4.86	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.65	4.65	4.65	0.35	1.80	± 13,1 %
5600	35.5	5.07	4.49	4.49	4.49	0.40	1.80	± 13,1 %
5800	35.3	5.27	4.50	4.50	4.50	0.40	1.80	± 13.1 %

Calibration Parameter Determined in Head Tissue Simulating Media

^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.

validity can be extended to ± 110 MHz. F All frequencies befow 3 GHz, the validity of tissue parameters (c and d) 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 (c and d) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters. G AlphaTopeth are determined during rabibation. 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 3-5 GHz at any distance larger than half the probe tip formation frequencies.

diameter from the boundary.

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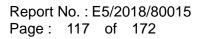
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January 23, 2018

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

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	9.39	9.39	9.39	0.34	1.00	± 12.0 %
835	55.2	0.97	9.18	9.18	9.18	0.39	0.85	± 12.0 %
900	55.0	1.05	9.13	9.13	9.13	0.32	0.96	± 12.0 %
1750	53.4	1.49	7.65	7.65	7.65	0.32	0.85	± 12.0 %
1900	53.3	1.52	7.35	7.35	7.35	0.38	0.81	± 12.0 %
2000	53.3	1.52	7.51	7.51	7.51	0.36	0.80	± 12.0 %
2300	52.9	1.81	7.29	7.29	7.29	0.36	0.88	± 12.0 %
2450	52.7	1.95	7.26	7.26	7.26	0.34	0.88	± 12.0 %
2600	52.5	2,16	6.95	6.95	6,95	0.25	0.99	± 12.0 %
3500	51.3	3.31	6.60	6.60	6.60	0.30	1.20	± 13.1 %
5200	49.0	5.30	4.56	4.56	4.56	0.35	1.90	± 13.1 %
5300	48.9	5.42	4.39	4.39	4.39	0.35	1.90	± 13.1 %
5600	48.5	5.77	3.92	3.92	3.92	0.40	1,90	± 13.1 %
5800	48.2	6.00	4.17	4.17	4.17	0.40	1.90	±13.1 %

Calibration Parameter Determined in Body Tissue Simulating Media

^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.
*Alt frequencies below 3 GHz, the validity of tissue parameters (r and r) 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 (r and r) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty to indicated target lissue parameters.
*AlphaDepth 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.

Certificate No: EX3-3831_Jan18

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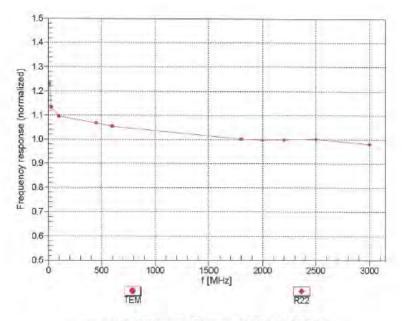
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January 23, 2018

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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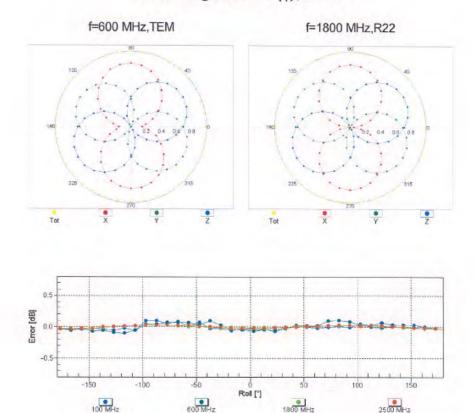
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EX3DV4-SN:3831

January 23, 2018



Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$

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

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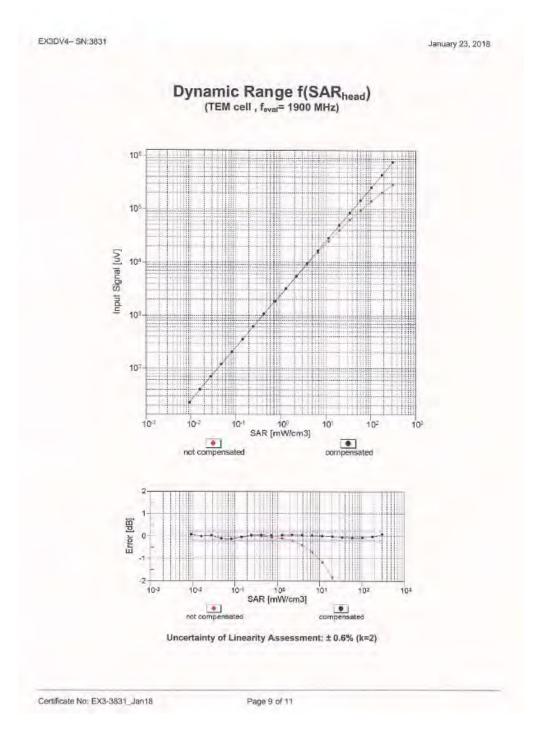
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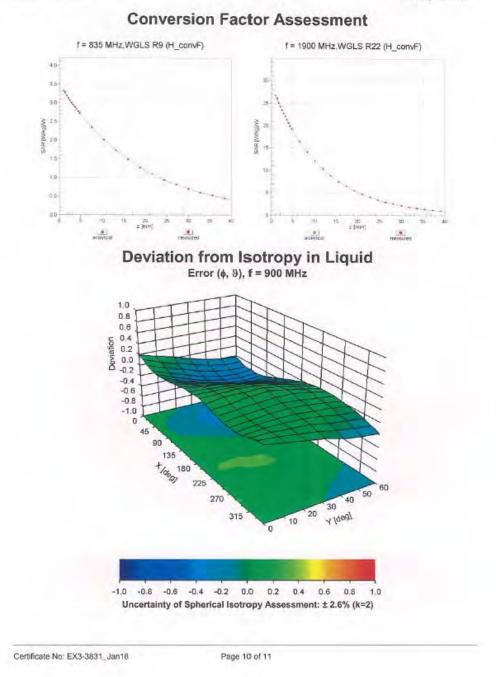
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DASY/EASY - Parameters of Probe: EX3DV4 - SN:3831

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-17.1
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

Certificate No: EX3-3831_Jan18

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8. Uncertainty Budget

A	с	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probabilit y	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	~
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
lsotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Readout Electronics	0.30%	Ν	1	1	1	1	0.30%	0.30%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	~
Test Sample related									
Test sample positioning	2.90%	Ν	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	Ν	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	~
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Liquid permittivity (mea.)	1.39%	N	1	1	0.64	0.43	0.89%	0.60%	М
Liquid Conductivity (mea.)	1.79%	N	1	1	0.6	0.49	1.07%	0.88%	М
Combined standard uncertainty		RSS					11.50%	11.46%	
Expant uncertainty (95% confidence							23.01%	22.91%	

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

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A	с	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probabilit y	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	00
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	00
lsotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	00
Modulation Response	2.40%	R	√3	1.732	1	1	1.40%	1.40%	~
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	00
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	00
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	00
Readout Electronics	0.30%	Ν	1	1	1	1	0.30%	0.30%	00
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	00
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	00
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	00
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	00
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	00
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	00
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	00
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	00
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	œ
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	00
Liquid permittivity (mea.)	1.23%	N	1	1	0.64	0.43	0.79%	0.53%	М
Liquid Conductivity (mea.)	1.03%	N	1	1	0.6	0.49	0.62%	0.50%	М
Combined standard uncertainty		RSS					11.76%	11.73%	
Expant uncertainty (95% confidence							23.52%	23.46%	

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9. Phantom Description

Schmus & Panner Engineering AG

e s а о

Zoughausstnaser 43, 8004 Zurich, Switzerlan Phone +41 1 245 9700, Fax +41 1 245 9779 Info@spasg.com, http://www.spasg.com

Certificate of Conformity / First Article Inspection

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

Tests

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

Test	Requirement	Details	Units tested
Dimensions	Compliant with the geometry according to the CAD model.	IT'IS CAD File (*)	First article, Samples
Material thickness of shell	Compliant with the requirements according to the standards	2mm +/- 0.2mm in flat and specific areas of head section	First article, Samples, TP-1314 ff,
Material thickness at ERP	Compliant with the requirements according to the standarda	6mm +/- 0.2mm at ERP	First article, All items
Material parameters	Dielectric parameters for required Mequancies	300 MHz - 0 GHz; Relative permittivity < 5. Loss tangent < 0.05	Material samples
Material resistivity	The material has been tested to be compatible with the liquids defined in the standards if handled and cleaned according to the instructions. Observe technical Note for material compatibility.	DEGMBE based simulating liquids	Pre-secies, First article, Material samples
Sagging	Compliant with the requirements according to the standards. Sagging of the flat section when filled with tissue simulating liquid	< 1% typical < 0.6% if siled with 155mm of HSL900 and without OUT below	Prototypes, Sample testing

- 5tandarda [1] CENELEC EN 50361 [2] IEEE Std 1528-2003 [3] IEC 62209 Part I 1234

- The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

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

Date	07.07.2005	8 D 6 8 9
lignature / Stamp	11 April 1	Samuto & Pagain' Engineering AG Tyrughausaptanan 43, 1004 (Juliot, Salton Phana yaff & Jes W100(Pauridi in' 245 07) Into Bapang, com. http://www.spaag.com

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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f (886-2) 2298-0488



10. System Validation from Original Equipment Supplier

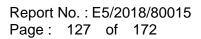
Calibration Laboratory of

accedibed by the Swiss Accesdib			coreditation No.: SCS 0108
he Swiss Accreditation Servic	e is one of the signatoria	a to the EA	condition No.: 303 0100
fulfillateral Agreement for the r	ecognition of calibration		
lient Auden		Cartificate N	lo: D750V3-1078_Jun18
CALIBRATION O	CERTIFICATI		
Object	D750V3 - SN:10	78	
Calibration processive(s)	QA CAL-05.v10		
and a second s		dure for dipole validation kits ab	ove 700 MHz
	Anna Al California		
Calibration date:	June 20, 2018		
All calibrations freve been condu	cted in the closed laborato	ry facility: environment temperature (22 \pm 3)	C and marriality < 70%s
		ry facility: environment tomperature (22 ± 31)	C and manialty < 70%
Calibration Equipment used (M8		ry facility: environment temperature (22 + 3) Gal Date (Centificate No.)	C and humidity < 78%
Calibration Equipment used (M8 Primary Standards Power meter NRP	TE critical for calibration) (ID a SN: 104778	Gal Date (Certificate No.) 04-Apr-16 (No. 217-02672/02673)	
Calibration EquipMeet used (M8 Primary Standards Power meter NRP Power antor NRP-291	TE critical for calibration) ID 4 SN: 104778 SN: 105244	Gal Date (Certificate No.) 04-4pc-16 (No. 217-02672/02673) 04-4pc-18 (No. 217-02672)	Scheduled Gatermon
Calibration EquipMeet used (M8 Primery Standards Power mater NRP Power sensor NRP-291 Power sensor NRP-291	TE critical for calibration) 10.4 SN: 104778 SN: 103245 SN: 103245	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 84-Apr-18 (No. 217-02673)	Scheduled Täntension April 19 April 19 April 19
Calibration EquipMeet used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuation	TE omical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 5058 (20x)	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 84-Apr-18 (No. 217-02682)	Schotwied Carbonion Apr-19 Apr-19 Apr-10 Apr-19
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Alternuator Type-N mismatch combination	TE omicel for calibration) 10 8 SN: 104778 SN: 103244 SN: 103245 SN: 10568 (20x) SN: 5047.2 / 06327	Gal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 94-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 04-Apr-18 (No. 217-02683)	Scheduled Garcennon Apr-18 Apr-19 Apr-19 Apr-19 Apr-19
Calibration EquipMent (M8 Primary Standards Power meter NRP Power sensor NRP-291 Primer sensor NRP-291 Reference 20 dB Attenuation Type-N mismatch combination Reference Probe EX3DV4	TE omical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 5058 (20x)	Cal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 84-Apr-18 (No. 217-02682)	Schotwied Carbonion Apr-19 Apr-19 Apr-10 Apr-19
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Neterence 20 dB Attenuator Type-N mismatch combination Type-N mismatch combination Reterence Probe EX3DV4 DAE4	TE emicel (er calibration) 10 8 SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 10568 (20x) SN: 5068 (20x) SN: 5078 (2	Cal Date (Certificate No.) 04-Apr-18 (No. 21/40672/00673) 04-Apr-18 (No. 21/40672) 04-Apr-18 (No. 217402673) 04-Apr-18 (No. 217402683) 04-Apr-18 (No. 217402683) 00 Dec-17 (No. EX3-7349, Dec17) 26-Cet-17 (No. DAE4-Col_Oct17)	Scheduled Carbonion April 19 April 19 April 19 April 19 April 19 Deci 18 Oct 18
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Alternuator Type-N mismatch combinator Type-N mismatch combinator DAE4 DAE4 Secondary Standards	TE emical for calibration) 10 8 SN: 104778 SN: 103244 SN: 103245 SN: 10568 (20x) SN: 5047.2 / 06327 SN: 5047 SN: 5047	Gal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 94-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02683) 04-Apr-18 (No. 217-02683) 30-Dec-17 (No. EX3-7349, Dec17) 26-Det-17 (No. DAE4-601_Oct17) Check Date (mithouse)	Scheduled Bastesson Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-18 Oct-18 Scheduled Check
Calibration EquipMent used (M8 Primary Standards Power serisor NRP-291 Power serisor NRP-291 Reference 20 dB Atenuation (ype-N mismatch combination Roteronce Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A	TE emicel (er calibration) 10 8 SN: 104778 SN: 103244 SN: 103245 SN: 103245 SN: 10568 (20x) SN: 5068 (20x) SN: 5078 (2	Gal Date (Certificate No.) 04-Apr-16 (No. 217-02672/00673) 04-Apr-18 (No. 217-02672) 04-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02682) 04-Apr-18 (No. 217-02683) 30-Dec-17 (No. EX3-7349, De(17) 26-Cet-17 (No. DAE4-Cot. Oct.17) Check Date (in house) 07-Cct-15 (in house check Oct-16)	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18
Calibration EquipMeet used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Ammualor Type-N miscalch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 3481A	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5057 2 / 06327 SN: 7049 SN: 601 ID 4 SN: GB37490704	Gal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02673) 94-Apr-18 (No. 217-02673) 04-Apr-18 (No. 217-02683) 04-Apr-18 (No. 217-02683) 30-Dec-17 (No. EX3-7349, Dec17) 26-Det-17 (No. DAE4-601_Oct17) Check Date (mithouse)	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Apr-19 Disc-18 Dist-18 Scheduled Check In house check: Dis-18 In house check: Dis-18
Calibration Equipment used (M8 Primary Standards Power meter NFIP Power sensor NFIP-291 Power sensor NFIP-291 Neterence 20 dB Attenuator Type-N mismatch combination Reteronce Probe EX3/DV4 DAE4 Secondary Standards Power sensor HP 2481A Power sensor HP 2481A	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5058	Gal Date (Certificate No.) 04-4pt-16 (Mo. 217-02672) (00673) 04-4pt-18 (Mo. 217-02672) 04-4pt-18 (Mo. 217-02672) 04-4pt-18 (Mo. 217-02682) 04-4pt-18 (Mo. 217-02683) 04-4pt-18 (Mo. 217-02683) 05-0pt-17 (Mo. 217-02683) 05-0pt-17 (Mo. 217-02683) 05-0pt-17 (Mo. 217-02683) 05-0pt-17 (Mo. 217-02683) 07-0pt-15 (m house 07-0pt-15 (m house theck Opt-10) 07-0pt-15 (m house theck Opt-16)	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Netherence 20 dB Alternuation Type-N mismatch combination Reterince Probe EX3DV4 DAE4 Secondary Standards Power meter EPMP-448A Power sensor HP A481A Power sensor HP A481A Private Patient PAS SMT-06	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 ID 8 SN: GB37480704 SN: GB37480704 SN: US372982783 SN: MtY41092317	Gal Date (Certificate No.) 04-Apr:18 (No. 217-02672/02673) 04-Apr:18 (No. 217-02672) 04-Apr:18 (No. 217-02673) 04-Apr:18 (No. 217-02683) 04-Date:17 (No. EX3-7349, Diet 17) 28-Cet:17 (No. DAE4-501_Oct17) Check Date (in house check Oct-10) 07-Oct-15 (in house check Oct-16)	Scheidulied Täriterminn Apri-19 Apri-19 Apri-19 Apri-19 Deci-18 Octi-18 Scheidulied Check In house check: Octi-18 In house check: Octi-18 In house check: Octi-18
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Netherence 20 dB Alternuation Type-N mismatch combination Reterince Probe EX3DV4 DAE4 Secondary Standards Power meter EPMP-448A Power sensor HP A481A Power sensor HP A481A Private Patient PAS SMT-06	TE emicel for calibration) ID 4 SN: 104778 SN: 103244 SN: 105245 SN: 5067.24() SN: 5047.2 / 06327 SN: 7349 SN: 601 ID 4 SN: GB37480704 SN: US3725217 SN: 106972	Gal Date (Certificate No.) 04-Apr-18 (No. 217-02672/02673) 04-Apr-18 (No. 217-02672) 94-Apr-18 (No. 217-02673) 94-Apr-18 (No. 217-02673) 94-Apr-18 (No. 217-02683) 90-Apr-18 (No. 217-02683) 90-Dec-17 (No. EX3-7348, Dec17) 26-De1-17 (No. DAE4-001_Oct17) Check Date (minouse) 07-De1-15 (minouse check Oct-16) 07-De1-15 (in house check Oct-16) 07-De1-15 (in house check Oct-16) 16-Jun-15 (in house check Oct-16)	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Dct-18 In house check: Dct-18 In house check: Dct-18 In house check: Dct-18
Calibration Equipment used (M8 Primary Standards Power meter NFIP Power sensor NFIP-291 Power sensor NFIP-291 Neterence 20 dB Attenuator type-N mismatch combination Reteronce Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 2481 A Power sensor HP 2481 A Power sensor HP 2481 A Power sensor HP 2481 A	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5058 (20x) SN: 5047.2 / 06327 SN: 7049 SN: 7049 SN: 6037480704 SN: 6837480704 SN: 0537280783 SN: 100972 SN: 10537390585	Gal Date (Certificate No.) 04-Apr:18 (No. 217-02672/02673) 04-Apr:18 (No. 217-02672) 04-Apr:18 (No. 217-02673) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Det:17 (No. EX3-7349, Det 17) 28-Oct-17 (No. EX3-7349, Det 17) 29-Oct-17 (No. EX3-7349, Det 17) 20-Oct-15 (in house check Oct-10) 07-Oct-15 (in house check Oct-10) 07-Oct-15 (in house check Oct-16) 16-Jun-15 (in house check Oct-16) 16-Dut-01 (in touse check Oct-17) Function	Scheduled Garcesson Apr-18 Apr-19 Apr-19 Apr-19 Apr-19 Dec-18 Oci-18 Scheduled Check In touse check: Oci-18 In fouse check: Oci-18 In fouse check: Oci-18 In fouse check: Oci-18
Calibration Equipment used (M8 Primary Standards Power meter NFIP Power sensor NFIP-291 Power sensor NFIP-291 Reference 20 dB Attenuation Type-N mismatch combination Relationse Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 2481 A Power sensor HP 2481 A Power sensor HP 2481 A Recent Parts PM-442A Power sensor HP 2481 A Recent Parts PM-442A Power sensor HP 2481 A Recent PM-445 SMT-06 Network Analyzer HP 8753E	TE emicel for calibration) ID 8 SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 6037480704 SN: 0037780203 SN: 00972 SN: 00972 SN: 00972 SN: 0037390585 Natrine	Gal Date (Certificate No.) 04-Apr-16 (No. 217-40672)(00673) 04-Apr-18 (No. 217-40672) 04-Apr-18 (No. 217-60673) 04-Apr-18 (No. 217-60673) 04-Apr-18 (No. 217-60683) 04-Apr-18 (No. 217-60683) 04-Apr-17 (No. EX3-7349, Die(17) 28-Cet-17 (No. DAE4-501, Oct17) Check Date (in house) 07-Cet-15 (in house check Oct-16) 07-Cet-15 (in house check Oct-16) 16-Det-01 (in house check Oct-16)	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Dct-18 In house check: Dct-18 In house check: Dct-18 In house check: Oct-18
Calibration Equipment used (M8 Primary Standards Power mater NRP Power sensor NRP-291 Reference 20 dB Attenuation Type-N mismatch combination Roteronce Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 9481 A Power sensor HP 9481 A	TE emicel for calibration) ID 8 SN: 104778 SN: 103244 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 5061 (20x) SN: 6037480704 SN: 0037780203 SN: 00972 SN: 00972 SN: 00972 SN: 0037390585 Natrine	Gal Date (Certificate No.) 04-Apr:18 (No. 217-02672/02673) 04-Apr:18 (No. 217-02672) 04-Apr:18 (No. 217-02673) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Apr:18 (No. 217-02683) 04-Det:17 (No. EX3-7349, Det 17) 28-Oct-17 (No. EX3-7349, Det 17) 29-Oct-17 (No. EX3-7349, Det 17) 20-Oct-15 (in house check Oct-10) 07-Oct-15 (in house check Oct-10) 07-Oct-15 (in house check Oct-16) 16-Jun-15 (in house check Oct-16) 16-Dut-01 (in touse check Oct-17) Function	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Dct-18 In house check: Dct-18 In house check: Dct-18 In house check: Oct-18
Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Reference 20 dB Attenuation Type-N mismatch combination Roteronce Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 9481A Power sensor HP 9481A Power sensor HP 9481A Rower sensor HP 9481A Rower sensor HP 9481A Rower sensor HP 9481A Regeneration R&S SMT-06 Network Analyzar HP 8753E	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5047.2 / 06327 SN: 7049 SN: 601 ID 4 SN: GB37480704 SN: US37296217 SN: US37396525 Narme Claudio Lindom	Gal Date (Certificate No.) 04-Apr:16 (Mo. 217-02672) (206673) 04-Apr:18 (Mo. 217-02672) 04-Apr:18 (Mo. 217-02673) 04-Apr:18 (Mo. 217-02673) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:19 (Mo. 217-02683) 05-0c1-17 (Mo. DAE4-001_Oct17) 26-0c1-17 (Mo. DAE4-001_Oct17) 27-0c1-15 (m house check Oct-16) 07-0c1-15 (m house check Oct-16) 10-0c1-01 (m house check Oct-16) 14-0c1-01 (m house check Oct-16) <	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Dct-18 In house check: Dct-18 In house check: Dct-18 In house check: Dct-18
Al calibrations trave been contru Calibration Equipment used (M8 Primary Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power sensor HP 2481A Power sensor HP 2481A RE generator R&S SMT-05 Network Analyzer HP 8753E Celibraties by:	TE emical for calibration) ID 8 SN: 104778 SN: 103244 SN: 103245 SN: 5058 (20x) SN: 5047.2 / 06327 SN: 7049 SN: 601 ID 4 SN: GB37480704 SN: US37296217 SN: US37396525 Narme Claudio Lindom	Gal Date (Certificate No.) 04-Apr:16 (Mo. 217-02672) (206673) 04-Apr:18 (Mo. 217-02672) 04-Apr:18 (Mo. 217-02673) 04-Apr:18 (Mo. 217-02673) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:18 (Mo. 217-02683) 04-Apr:19 (Mo. 217-02683) 05-0c1-17 (Mo. DAE4-001_Oct17) 26-0c1-17 (Mo. DAE4-001_Oct17) 27-0c1-15 (m house check Oct-16) 07-0c1-15 (m house check Oct-16) 10-0c1-01 (m house check Oct-16) 14-0c1-01 (m house check Oct-16) <	Scheduled Carbonion Apr-18 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Scheduled Check In house check: Dec-18 In house check: Dec-18 In house check: Dec-18 In house check: Dec-18

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Calibration Laboratory of Schmid & Partner Engineering AG 43, 5904 Zunich, Switzerland



Schweicherscher Kallbritstlienst Service suisse d'étaionnage C Separata svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 0108

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Accredited by the Denis Ancredition Service (SAS) The Smith Accessitation Samice is one of the signalories to the EA

Mulmateral Agreement for the recognition of calibration cartification Glossary:

TSL

fissue 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 Pate
- (SAR) from hand-held and body-mounted diavices 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:

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%.

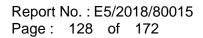
Certificate Nr D750V3-1078 Jun18

Page 2 ct 5

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Measurement Conditions

ASY 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	$40.9 \pm 6 \%$	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.25 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.38 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following) parameters	and calculations	were applie
	e :		

	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	55.2 ± 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	8.63 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
bert averaged over to cill (to g) of body roc	condition	
SAR measured	250 mW input power	1.43 W/kg

Certificate No: D750V3-1078_Jun18

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.8 Ω + 0.8 jΩ	
Return Loss	- 25.3 dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.5 Ω - 3.3 jΩ
Return Loss	- 29.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.038 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 15, 2012

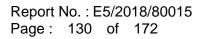
Certificate No: D750V3-1078 Jun18

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Date: 14:06.2018



DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1078

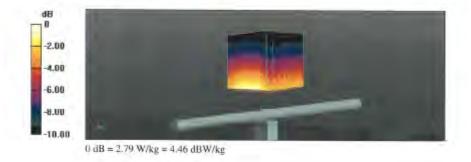
Communication System: UID 0 - CW; Frequency: 750 MHz Medium parameters used: f = 750 MHz; $\sigma = 0.9 \text{ S/m}$; $\epsilon_r = 40.9$; $\rho = 1000 \text{ kg/m}^3$ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63, 19-2011)

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
- ۰. 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 = 59.18 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.13 W/kg SAR(1 g) = 2.09 W/kg; SAR(10 g) = 1.36 W/kg Maximum value of SAR (measured) = 2.79 W/kg



Certificate No: D750V3-1078 Jun 18

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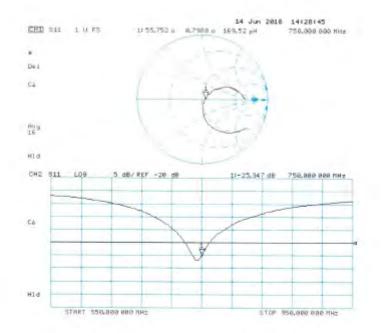
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Report No. : E5/2018/80015 Page: 131 of 172

Impedance Measurement Plot for Head TSL



Certificate No: D750V3-1078_Jun18

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DASY5 Validation Report for Body TSL

Date: 20.06.2018

Test Laboratory: SPEAG, Zurich, Switzerland

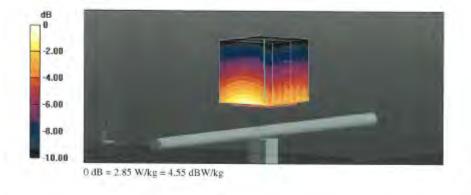
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1078

Communication System: UID 0 - CW: Frequency: 750 MHz Medium parameters used: f = 750 MHz; $\sigma = 0.96 \text{ S/m}$; $\epsilon_r = 55.2$; $\rho = 1000 \text{ kg/m}^3$ 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: L4mm (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 = 57.54 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 3.18 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



Certificate No: D750V3-1078_Jun18

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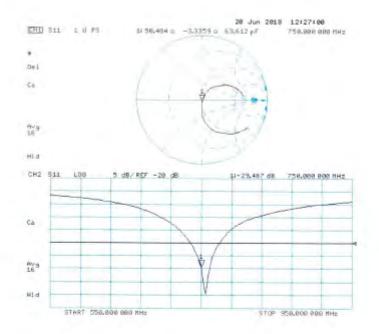
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Impedance Measurement Plot for Body TSL



Certificate No: D750V3-1078_Jun18

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CALIBRATION CERTIFICATE Diser DB35V2 - SN:4d120 Calibration procedure(a) CA CAL-05, v10 Calibration procedure for dipole validation kits above 700 MHz Calibration date: June 20, 2018 The intessmenents and the uncertainties were contracted probability we given on the following pages and are part of the centrate. All datibration functions from the closed laboration procedure for dipole validation (kits above 700 MHz) Calibration date: June 20, 2018 The intessmenents and the uncertainties were contracted probability we given on the following pages and are part of the centrate. All datibrations have been consistence were contracted probability we given on the following pages and are part of the centrate. Calibrations flaverances 10 * Power mean NNP 20 × 04778 Device mean NNP 21 × 0	Engineering AG aughausstrasse 43, 8004 Zuris	ch, Switzerland		Service auisse d'étalonnage Servizio svizzero di taratura Swiss Calibration Service
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Certificate No: DB35V2-4d120_Jun18

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留90天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms_and_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at <u>www.sgs.com/terms_ad_conditions.htm</u> and for electronic format therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's induced of this document is advised information contained reliefor reliefor the company's induced at the time of its intervention only and within the initial contained information contained reliefor reliefor the company's induced at the time of its relieformer and the induced at the time of its client as a structure of the induced at the time of its client as a structure of the company's induced at the time of its client as a structure of the induced at the time of its client as a structure of the its client as a structure of the company's induced at the time of its client as a structure of the time o prosecuted to the fullest extent of the law.

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Calibration Laboratory of Schmid & Partner Engineering AG Keeghousstrasse 43, 8004 Zurich, Switzedaed



Scheduen er Kallbrierstiensl S Smylice solese d'étalonnage C Servicio svozero di taratara S Swise Calibration Service

Accreditation No.: SCS 0108

According by the Swiss Accordingion Service (SAS)

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

Glossary: TSL

tissue simulating liquid sensitivity in TSL / NORM x,y,z ConvF 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
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate b) (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless C) 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 5 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 tilled 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%.

Centricate No. D605V2-4d120 Jun 18

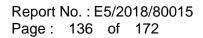
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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

除非另有說明,此報告結果僅對測試之樣品負責,同時此樣品僅保留⁹⁰天。本報告未經本公司書面許可,不可部份複製。 This document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <u>www.sgs.com/terms_and_conditions.htm</u> and for electronic format documents, subject to Terms and Conditions for Electronic Documents at www.sqs.com/terms e-document.htm. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

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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 %	0.93 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	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.37 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	6.06 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 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	2.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.68 W/kg ± 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 250 mW input power	1.61 W/kg

Certificate No: D835V2-4d120_Jun18

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.5 Ω - 3.1 jΩ
Return Loss	- 29.3 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.3 Ω - 5.8 jΩ
Return Loss	- 24.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.396 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

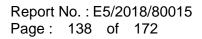
Manufactured by	SPEAG	
Manufactured on	June 29, 2010	

Certificate No: D835V2-4d120_Jun18

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Date: 20.06.2018



DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d120

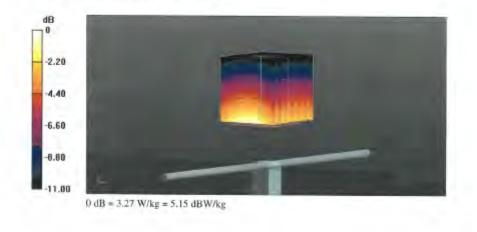
Communication System: UID 0 - CW; Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 0.93$ S/m; $v_r = 40.7$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(9.9, 9.9, 9.9) @ 835 MHz; Calibrated: 30.12.2017
- ۰. 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 = 62.60 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.71 W/kg SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.55 W/kg Maximum value of SAR (measured) = 3.27 W/kg



Certificate No: D835V2-4d120_Jun18

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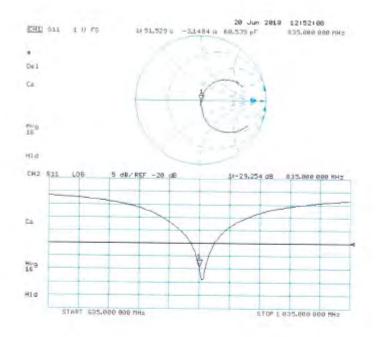
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Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d120_Jun18

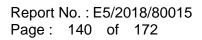
Page 6 of 8

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Date: 20.06.2018



DASY5 Validation Report for Body TSL

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d120

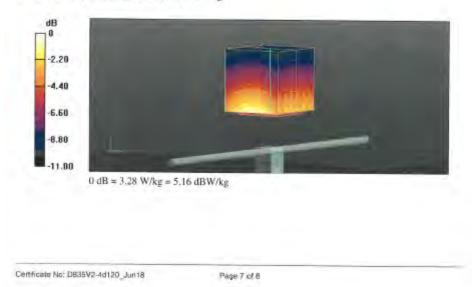
Communication System: UID 0 - CW: Frequency: 835 MHz Medium parameters used: f = 835 MHz; $\sigma = 0.99$ S/m; $r_r = 55$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63_19-2011)

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) ٠
- 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 = 61.00 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.66 W/kg SAR(1 g) = 2.46 W/kg; SAR(10 g) = 1.61 W/kg Maximum value of SAR (measured) = 3.28 W/kg



Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

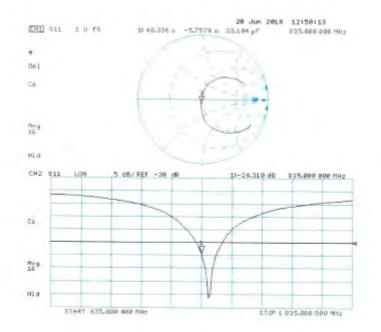
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Impedance Measurement Plot for Body TSL



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Name Function SN: 2349 30-Dac-17 (No. EXS-7349, Dec17) Dec-18 SAE4 SN: 601 29-Dd-17 (No. DAE4-601_Oct17) Dci-18 Secondary Standards ID # Check Date (in house) Scheduled Check. Power meter EPM-442A SN: GB37480704 07-Oci-15 (in house check Dci-16) In house check. Cdi-18 Power sensor HP 8481A SN: US37292785 07-Oci-15 (in house check Dci-16) In house check. Cdi-18 Power sensor HP 8481A SN: US37292785 07-Oci-15 (in house check Dci-16) In house check. Cdi-18 Power sensor HP 8481A SN: US37292785 07-Oci-15 (in house check Oci-16) In house check. Cdi-18 Power sensor HP 8481A SN: US37292785 07-Oci-15 (in house check Oci-16) In house check. Cdi-18 Power sensor HP 8481A SN: US37290585 18-Oci-01 (in house check Oci-16) In house check. Cdi-18 Name Function In house check Oci-17) In house check. Oci-18 In house check. Oci-18 Name Function Laboratory Factrician Signature Cathrated Ity Name Laboratory Factrician Signature	All celiforations have been condu Calibration Equipment used (M& Primary Standards Power sensor NRP-201 Power sensor NRP-201	cied in the closed laborate TE en(ca) for calibration(ID # SN: 104775 SN: 103244 SN 103245	ry ladity: environment temperature (22 ± 3)* Cal Date (Centificate No.) D4-Apr-15 (No. 217-02672) D4-Apr-16 (No. 217-02672) D6-Apr-16 (No. 217-02672)	Schadulett Calibration Ap+19 Ap+19 Ap+19
Secondary Standards ID # Check Date Coll (In house) Scheduled Check. Power matter EPM-442A SNI. GBS7400704 07-Oct-15 (in house check Oct-16) In house check. Oct-18 Power sensor HP 8481A SNI. LIS37292783 07-Oct-15 (in house check Oct-16) In house check. Oct-18 Power sensor HP 9481A SNI. LIS37292783 07-Oct-15 (in house check Oct-16) In house check. Oct-18 Power sensor HP 9481A SNI. LIS37292783 07-Oct-15 (in house check Oct-16) In house check. Oct-18 Primer sensor HP 9481A SNI. LIS37290785 07-Oct-15 (in house check Oct-16) In house check. Oct-18 Nic matter PM-9481A SNI. 100972 15-Jun-15 (in house check Oct-16) In house check. Oct-18 Nic matter PM-9783E SNI: LIS37290585 18-Oct-01 (in house check Oct-17) In house check. Oct-18 Name Functiont Signature Oct-18 Calibrated Hy Daumo Loubler Laboratory Factorisan Oct-18	All deficiations have been condu- Calibration Equipment used (M& Primary Standards Power metler NRP Power sensor NRP-201 Power sensor NRP-201 Palerance 20 dB Attenuator	cied in the closed laboration TE enticed for calibration) ID 4 SN: 104775 SN: 103245 SN: 5058 (20k)	ry ladity: environment temperature (22 ± 3)* <u>Cal Date (Centiticate No.)</u> D4-Apr-18 (No. 217-02672) D4-Apr-18 (No. 217-02672) D4-Apr-18 (No. 217-02573) D4-Apr-18 (No. 217-02582)	Schaduell Calibration Apr-19 Apr-19 Apr-19 Apr-19
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Power sensor HP 8481A PF genetator R&S SMT-00 Network Analyzer HP 87835 SN: WY41082317 D7-Oct-15 (in house check Oct-16) SN: 100972 SN: 100972 SN: US37390585 18-Oct-01 (in house check Oct-16) IN house check Oct-18 IN ho	All celliorations have been condu Calibration Equipment used (M& Primary Standards Power sensor NRP-201 Power Standards	cied in the closed laboration TE entical for calibration) ID 8 SN: 104775 SN: 103244 SN: 103245 SN: 5068 (20k) SN: 5068 (20k) SN: 5087.2 / 06327 SN: 7349 SN: 601	ry facility: environment temperature (22 ± 3)* Cal Date (Certificate No.) D4-Apr-18 (No. 217-02672)(02673) D4-Apr-18 (No. 217-02672) D4-Apr-18 (No. 217-02673) D4-Apr-18 (No. 217-02683) 30-Dac-17 (No. 217-02683) 30-Dac-17 (No. 227-02683) 30-Dac-17 (No. DAE4-601_0ct17) 28-0xt-17 (No. DAE4-601_0ct17)	Schaduleit Calibration April9 April9 April9 April9 April9 Decil8 Oct-18 Oct-18 Scheduled Check
NET generation R&S SMT-06 SN: 100972 15-Jun-15 (in house check Oct-16) In house check: Oct-18 Network Analyzer HP 8783E SN: US37290585 18-Oct-01 (in house check Oct-17) In house check: Oct-18 Name Function Function Signature Calibrated by Disuris Loubler Laboratory Technician Signature	All cellorations have been condu Calibration Equipment used (M& Primary Standards Power meter NFIP Power sensor NFIP-201 Reference 20 dB Alternator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power mater EPM-442A	cied in the closed laborate TE entreal for calibration) ID # SN: 104775 SN: 103244 SN: 103245 SN: 5068 (20k) SN: 5068 (20k) SN: 5068 (20k) SN: 5068 (20k) SN: 5068 (20k) SN: 5087.2 / 06327 SN: 7349 SN: 601	ry facility: environment temperature (22 ± 3)* Cal Date (Certificate No.) D4-Apr-18 (No. 217-02672)/02673) D4-Apr-16 (No. 217-02672) D4-Apr-16 (No. 217-02682) D4-Apr-16 (No. 217-02683) D4-Apr-18 (No. 217-02683) 30-Dac-17 (No. EX5-7349, Dec17) 29-Dai-17 (No. DAE-4-01_0ct17) Check Date (in house) 07-Oct-15 (in house check Oct-16)	Scheduell Calibration Apr-19 Apr-19 Apr-19 Apr-19 Apr-19 Dec-18 Dec-18 Dec-18 Dec-18 Dec-18 Scheduled Check In house check. Oct-18
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Certificate No: D1900V2-50173_Apr16

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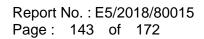
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Glossary: TSL

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

Calibration is Performed According to the Following Standards:

- a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- b) IEC 62209-1, "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 885664, "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 cartificate. 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%.

Camilcate No: D1900V2-5d173 April

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Measurement Conditions

DASY system configuration, as far as not given on page

DASY5	V52:10.0
Advanced Extrapolation	
Modular Fist Phantom	
10 mm	with Spacer
ctx, dy', dz = 5 mm	
1900 MHz ± T MHz	
	Advanced Extraporation Modular Flat Phantom 10 mm dx, dy, dz = 5 mm

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	411±8%	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 ² (10 g) of Head TSL	oppetition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	opindition 250 mW input powar	5.21 W/kg

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mhorm
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 ² (1 g) of Body TSL	Contition	
SAR measured	250 mW input power	9.93 W/kg
SAR for nominal Body TSL parameters	W1 of besilemon	40.9 W/kg ± 17.0 % (k=2)
and the second sec		
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR averaged over 10 cm ² (10 g) of Body TSL SAR measured	condition 250 mW input power	5.30 W/kg

Certificate No: D1900V2-5d173 Auri8

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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 Q + 5 1 JQ
Return Loss	- 25.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed pully	47.341 + 7.2 10
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 clipple is made of standard semirigid conxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipola. The antenna is therefore short-circuited for DC-signals, Or nome 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

Centricate No: D1900V2-5d173_Apr1II

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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; $\sigma = 1.35$ S/m; $\varepsilon = 41.1$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

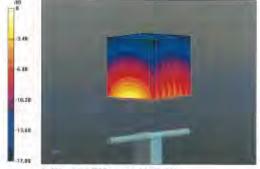
DASY52 Configuration:

- 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

Certificate No: D1900V2-5d173_Apr18

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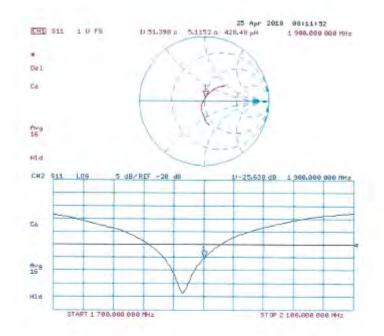
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Impedance Measurement Plot for Head TSL



Certificate No: D1900V2-5d173_Apr18.

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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; $\sigma = 1.47$ S/m; $\epsilon_f = 55.3$; p = 1000 kg/m³ 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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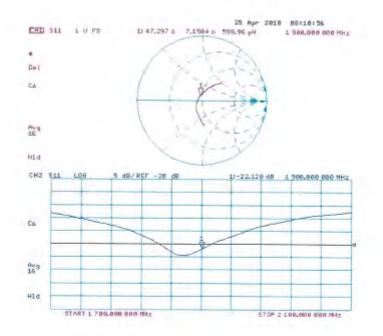
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Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d173_Apr18

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Report No. : E5/2018/80015 Page: 150 of 172

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Calibration procedure(s)	QA CAL-05.v10 Calibration proce	dure for dipole validation kits abo	We 700 MHz
	Constrainen prose		
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Certificate No: D2450V2-727_Apr18

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Report No. : E5/2018/80015 Page: 151 of 172

Calibration Laboratory of Schmid & Partner Engineering AG astrases 43, 8904 Zurich, Switzerland



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Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS) The Swites Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration conflicates Glossary:

TSL

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

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
- IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate b) (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 SAB 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%.

Certificate No: 02450V2-727_April

Page 2 of 6

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Measurement Conditions

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

DASY Version	DASYS	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	2450 MHz = 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 "C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.3 ± 6 %	1.86 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

Condition	
250 mW input power	13,3 W/kg
hormalized to 1W	52.1 W/kg ± 17.0 % (k=2)
condition	
condition 250 mW input power	B-16 W/kg
	250 m/V input power

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	2.01 mhc/m = 6 %.
Body TSL temperature change during test	< 0,5 °C	_	

SAR result with Body TSL

SAR sveraged over 1 cm ¹ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.9 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.8 W/kg ± 17,0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	conclition 250 mW input power	6.00 W/kg

Certificale No: D2450V2-727_Apr18

Page B of II

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.2 Ω + 2.7 JΩ
Return Loss	= 25.1 dB

Antenna Parameters with Body TSL

Impledance, transformed to lead point	51.2 (J + 5.8 jG
Return Loss	- 25.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns
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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 seminoid 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 capsare added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurment 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 emits, because they might bond or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

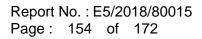
Certificate No: D2450V2+727_Apr18

Page 4 of 6

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Date: 24.04.2018

SG

DASY5 Validation Report for Head TSL

Test Laboratory: SPEAG, Zurich, Switzerland

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

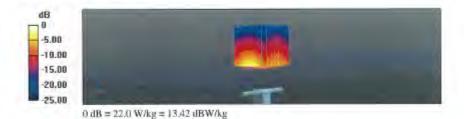
Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 1.86$ S/m; $\epsilon_t = 38.3$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(7.88, 7.88, 7.88); 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 = 116.0 V/m; Power Drift = -0.06 dB Peak SAR (extrapolated) = 26.7 W/kg SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.16 W/kg Maximum value of SAR (measured) = 22.0 W/kg



Certificate No: D2450V2-727_Apr18

Page 5 of 8

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

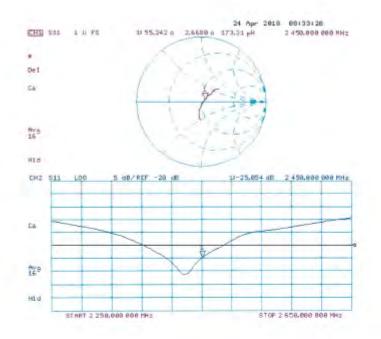
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Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-727_Apr18

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DASY5 Validation Report for Body TSL

Date: 24.04.2018

Test Laboratory: SPEAG, Zurich, Switzerland

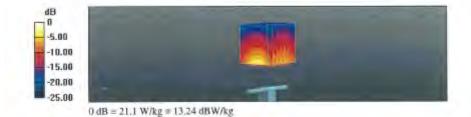
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:727

Communication System: UID 0 - CW; Frequency: 2450 MHz Medium parameters used: f = 2450 MHz; $\sigma = 2.01$ S/m; $v_r = 52.5$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN7349; ConvF(8.01, 8.01, 8.01); 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 = 108.4 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 25.5 W/kg SAR(1 g) = 12.9 W/kg; SAR(10 g) = 6 W/kg Maximum value of SAR (measured) = 21.1 W/kg



Certificate No: D2450V2-727 April8

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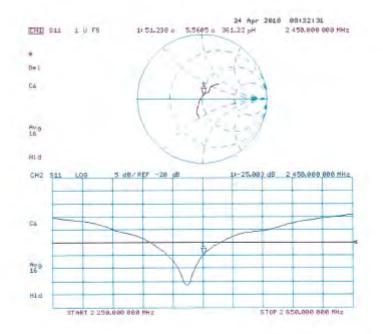
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Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727_Apr18

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bjed	D5GHzV2 - SN:1	023	
Celibration procedure(s)	QA CAL-22.v2 Calibration proce	dure for dipole validation kits bat	veen 3-6 GHz
Sector data	January 05, 2010	-	
Calibration date:	January 25, 2018		
Carboardon Editabilitaria baser (we	TE critical for calibration)		
Primery Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Primery Standards Primer meter NRP	1D #	04-Apr-17 (No. 217-02521/02522)	Apr-18
Primery Standards Power meter NRP Priwer sensor NRP-201	ID # IBN: 104778 ISN: 103244	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521)	Apr-18 Apr-18
Primery Standards Power meder NRP Power sensor NRP-291 Power sensor NRP-291	ID # EN: 104778 SN: 105244 SN: 103245	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522)	Apr-1E Apr-1E Apr-18
Primery Standards Power meter NRP Power sensor NRP-291 Power sensor NRP-291 Reference 20 dB Attenuator	ID # EN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	04-Apr-17 (No. 217-02521)02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528)	Арг-18 Арг-18 Арг-18 Арг-18
Primary Standards Privaer meter NPP Privaer sensor NPP-2291 Privaer sensor NPP-2291 Referance 20 dB Attenustor Type-N misimatch combination	ID # EN: 104778 SN: 105244 SN: 105246 SN: 5058 (20k) SN: 5047.2 / 06327	04-Apr-17 (No. 217-02521)02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528) 07-Apr-17 (No. 217-02529)	Арг-18 Арг-18 Арг-18 Арг-16 Арг-16
Primery Standards Power meter NRP Power sensor NRP-2291 Power sensor NRP-2291 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4	ID # EN: 104778 SN: 103244 SN: 103245 SN: 5058 (20k)	04-Apr-17 (No. 217-02521)02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02528)	Арг-18 Арг-18 Арг-18 Арг-18
Primery Standards Power meter NRP Power sensor NRP-Z91 Power sensor NRP-Z91 Reference 20 dB Attenuator Type-N mismatch combination Reference Probe EX3DV4 DAE4	ID # EN: 104778 SN: 105644 SN: 103645 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3047.2 / 06327 SN: 3045	84-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 213-02529)	Apr-18 Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18
Primery Standards Power meter NRP Power sensor NRP-201 Power sensor NRP-201 Recence 20 dB Attenuator Type-N mismatich combination Reference Probe EX3DV4 DAE4 Secondary Standards	ID A EN: 104778 SN: 103244 SN: 103246 SN: 5058 (20k) SN: 5057 2 / 06327 SN: 5047 2 / 06327 SN: 5055 SN: 601	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apt-17 (No. 217-02521) 07-Apt-17 (No. 217-02522) 07-Apt-17 (No. 217-02529) 07-Apt-17 (No. 217-02529) 30-Dec-17 (No. EX3-3503_Dec17) 26-Oct-17 (No. DAE4-601_Oct17)	Apr-18 Apr-18 Apr-18 Apr-16 Apr-16 Dec-18 Oct-18
Primary Standards Priver meter NPP Priver sensor NRP-201 Priver sensor NRP-201 Retraintice 20 dB Attenuistor Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Prover meter EPM-442A	ID # EN: 104778 EN: 105644 SN: 105645 SN: 5058 (20k) SN: 5058 (20k) SN: 5047.2 / 06327 SN: 5047.2 / 06327 SN: 501 ID #	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02522) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 30-Dec-17 (No. EX3-3503_Dec17) 26-Oct-17 (No. DAE4-601_Oct17) Check Date (in house)	Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Oct-18 Scheduled Offeck In house check: Oct-18 In house check: Oct-18
Primary Standards Primer meter NRP Primer sensor NRP-291 Power sensor NRP-291 Relatantics 20 dB Attenustor Type-N mismatich combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-448A Power sensor HP 8481A.	ID # EN: 104778 SN: 105644 SN: 103645 SN: 5056 (20k) SN: 5047 2 / 06327 SN: 5047 2 / 06327 SN: 505 SN: 601 ID # SN: 6837460704 SN: US37288783 SN: MY41092317	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 07-Apr-17 (No. DAE4-601_Oct17) Check Date (in house) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16)	Apr-18 Apr-18 Apr-18 Apr-16 Dec-18 Oct-18 Oct-18 Scheduled Oneck In house check: Oct-18 In house check: Oct-18 In house check: Oct-18
Primary Standards. Power meter NRP Power sensor NRP-201 Power sensor NRP-201 Power sensor NRP-201 Reterence 20 dB Atternator Type-N mismatch combination Reference Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-448A Power sensor HP 0461A APF generator R&S SMT-06	ID # EN: 104778 EN: 105244 SN: 105246 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 601 ID # SN: 6B37460704 SN: 6B37460704 SN: 0537292783 SN: MY41092317 SN: 106972	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apt-17 (No. 217-02521) 07-Apt-17 (No. 217-02529) 07-Apt-17 (No. 217-02529) 07-Apt-17 (No. 217-02529) 07-Opt-17 (No. 217-02529) 26-Opt-17 (No. 225303_Dec17) 26-Opt-17 (No. DAE4-601_Opt17) Check Date (in house) 07-Opt-15 (in house check Opt-16) 07-Opt-15 (in house check Opt-16) 15-Jun-15 (in house check Opt-16)	Apr-18 Apr-18 Apr-18 Apr-16 Apr-16 Dec-18 Oct-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18
Primary Standards Primer meter NPP Power sensor NPP-291 Pewer sensor NPP-291 Reteamce 20 dB Atternator Type-N mismatich combination Reteinence Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power meter EPM-442A Power sensor HP 0461A AF generator R&S 3MT-06	ID # EN: 104778 SN: 105644 SN: 103645 SN: 5056 (20k) SN: 5047 2 / 06327 SN: 5047 2 / 06327 SN: 505 SN: 601 ID # SN: 6837460704 SN: US37288783 SN: MY41092317	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 30-Dec-17 (No. 217-02529) 07-Apr-17 (No. DAE4-601_Oct17) Check Date (in house) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16)	Apr-18 Apr-18 Apr-18 Apr-16 Dec-18 Oct-18 Oct-18 Scheduled Oneck In house check: Oct-18 In house check: Oct-18 In house check: Oct-18
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Primary Standards Primer meter NPP Power sensor NPP-291 Pewer sensor NPP-291 Reteamce 20 dB Atternator Type-N mismatich combination Reteinence Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power meter EPM-442A Power sensor HP 0461A AF generator R&S 3MT-06	ID 4 EN: 104778 EN: 105844 SN: 105846 SN: 5058 (20k) SN: 5058 (20k) SN: 5047 2 / 06327 SN: 601 ID # SN: 6637460704 SN: 0537460704 SN: 0537460704 SN: 0537282783 BN: MY41092317 SN: 106972 SN: 0537360585	B4-Apr-1/f (No. 217-02521/02522) B4-Apr-17 (No. 217-02521) D4-Apr-17 (No. 217-02522) D7-Apr-17 (No. 217-02528) D7-Apr-17 (No. 217-02529) D9-Dec-17 (No. DAE4-601_Dec17) Check Date (in house check Cd-16) D7-Oct-15 (in house check Cd-16) D7-Oct-15 (in house check Cd-16) D9-Oct-10 (in house check Cd-17)	Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Oct-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18
Primery Standards Primer meter NIPP Prover sensor NIPP-201 Prover sensor NIPP-201 Restanction 20 dB Attenustor Type-N mismatich combination Reference Probe EX3DV4 DAE4 Secondary Standards Prover meter EPM-442A Priver meter EPM-442A Priver sensor HP 8481A Priver sensor HP 8481A	ID # EN: 104778 SN: 105344 SN: 105346 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 5047 2 / 06327 SN: 601 ID # SN: 6B37460704 SN: 0537289783 SN: MY41092317 SN: 106672 SN: 106672 SN: US37360685 Name	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 30-Dec-17 (No.	Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Oct-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18
Primary Standards Power mater NRP: 291 Power sensor NRP: 291 Releasance 20 dB Attenuator Type-N mismatch combination Releasance Probe EX3DV4 DAE4 Secondary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8461A Ar generator HP 8461A Network Analyzer HP 8753E	ID # EN: 104778 EN: 105244 SN: 105245 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 6047.2 / 06327 SN: 601 ID # SN: 6037460704 SN: 0537292783 EN: WS37292783 EN: WS37290685 Name Jorion Kastinal	04-Apr-17 (No. 217-02521/02522) 04-Apr-17 (No. 217-02521) 04-Apr-17 (No. 217-02521) 07-Apr-17 (No. 217-02529) 07-Apr-17 (No. 217-02529) 07-Dec-17 (No. 217-02529) 07-Oct-17 (No. 237-02529) 07-Oct-17 (No. DAE4-601_Oct17) Check Date (in house) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 07-Oct-15 (in house check Oct-16) 15-Jun-15 (in house check Oct-16) 16-Oct-01 (in house check Oct-17) Function Laboratory Technicase	Apr-18 Apr-18 Apr-18 Apr-18 Dec-18 Dec-18 Oct-18 Oct-18 Scheduled Check In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18 In house check: Oct-18

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



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Accreditation No.: SCS 0108

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

Glossarvt

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
- EC 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
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DASY Version	DASY5	V52,10.0
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	T0 mm	with Spacer
Zoom Scan Resolution	dx. dy = 4.0 mm, dz = 1,4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22,0 °C	36.0	4.66 mino/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	36.3 ± 6 %	4.50 mha/m ± 6 %
Head TSL temperature change during lest	<0.5 ℃	-	-

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7:72 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	77.3 W/kg = 19.9 % (k=2)
	1	
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 100 mW input power	2.22 W/kg

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Head TSL parameters at 5300 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.2 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		-

SAR result with Head TSL at 5300 MHz

Condition	
100 mW input power	8.09 W/kg
normalized to 1W	80.9 W / kg ± 19.9 % (k=2)
anadition	
condition 100 mW input power	2.32 W/ka
	100 mW input power

Head TSL parameters at 5600 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.90 mhaim ± 6 %
Head TSL temperature change during test	< 0.5 °C	-	+

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	81.9 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Head TSL	condition	
SAR averaged over 10 cm ² (10 g) of Head TSL SAR measured	condition 100 mW input power	2.34 W/kg

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Head TSL parameters at 5800 MHz

The following		

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.5±6%	5.11 mho/m ±⊚%
Head TSL temperature change during test	< 0.5 °C	(and	-

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW Input power	7.90 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.0 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Head TSL SAR measured	condition 100 mW input power	2,25 W/kg

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Body TSL parameters at 5200 MHz

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.3±6%	5.41 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		-

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ² (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	70.5 W/kg ± 19.9 % (k+2)
	and the second se	
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 100 mW input power	2.00 W/kg

Body TSL parameters at 5300 MHz

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47 1 ± 6 %	5.54 mho/m = 6 %
Body TSL temperature change during test	< 0.5 °C	-	0-0-0

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW Input power	7.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	72.9 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.06 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.4 W/kg ± 19.5 % (k=2)

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Body TSL parameters at 5600 MHz

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.6±6%	5.94 mha/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	-mail	

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.81 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	77.6 W/kg ± 19.9 % (k=2)
the second se		
SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR averaged over 10 cm ³ (10 g) of Body TSL SAR measured	condition 100 mW input power	2.19 W/kg

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mhaim
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.22 mhaim ± 6 %
Body TSL temperature change during test	< 0.5 °C	-	-

SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	74.1 W/kg ± 19.9 % (k=2)
SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR averaged over 10 cm ² (10 g) of Body TSL SAR measured	condition 100 mW input power	2.07 W/kg

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	50.1 Ω - 8.1 jΩ
Return Loss	- 21.9 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	50.5 Ω - 2.3 βλ
Return Loss	- 32.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.9 Ω - 0.7 jΩ
Return Loss	- 28.4 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.3 Ω + 2.6 jΩ	
Return Loss	- 25.1 dB	

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to teed point	49.8 Ω - 6.9 jΩ.
Return Loss	- 23.2 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to leed point	50.9 Ω - 0.9 jΩ	
Return Loss	- 37.9 dB	

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.0 Ω + 0.5 JΩ	
Return Loss	- 24.9 dB	

Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to lead point	56.6 Ω + 2.3 μΩ
Return Loss	- 23.7 dB

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General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 ns

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 05, 2004

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DASY5 Validation Report for Head TSL

Date: 25.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 = CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz Medium parameters used: f = 5200 MHz; σ = 4.5 S/m; ε = 36.3; p = 1000 kg/m³, Medium purameters used: f = 5300 MHz; a = 4.6 S/m; a = 36.2; p = 1000 kg/m Medium parameters used: i = 5600 MHz; v = 4.9 S/m; t, = 35.8; p = 1000 kg/m³ Medium parameters used: f = 5800 MHz; $\sigma = 5.11$ S/m; $e_r = 35.5$; $\rho = 1000$ kg/m² Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.75, 5.75, 5.75); Calibrated: 30.12.2017. . ConvF(5.5, 5.5, 5.5); Calibrated: 30.12.2017, ConvF(5.05, 5.05, 5.05); Calibrated: 30.12.2017. ConvF(4.96, 4,96, 4,96); 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=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 70.47 V/m; Power Drift = -0.04 dB Peak SAR (extrapolated) = 27.5 W/kg SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.22 W/kg Maximum value of SAR (measured) = 17.7 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm_dz=1.4mm Reference Value = 74.63 V/m; Power Drift = 40.06 dB Peak SAR (extrapolated) = 29.6 W/kg SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.32 W/kg Maximum value of SAR (measured) = 18.6 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid; dx=4mm, dy=4mm, dz=1.4mm Reference Value = 70.79 V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 31.5 W/kg SAR(1 g) = 8.19 W/kg; SAR(10 g) = 2.34 W/kg Maximum value of SAR (measured) = 19.6 W/kg

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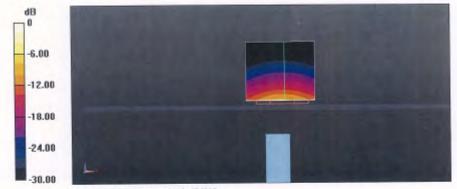
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Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 69.22 V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 31.2 W/kg SAR(1 g) = 7.9 W/kg; SAR(10 g) = 2.25 W/kg Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 17.7 W/kg = 12.48 dBW/kg



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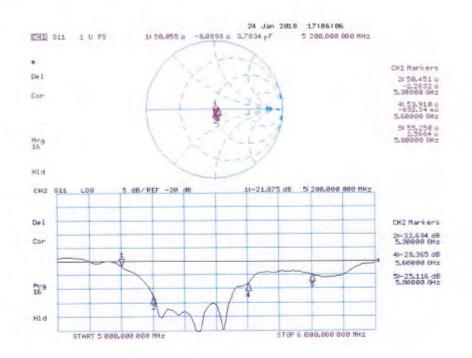
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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Date: 23.01.2018

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz Medium parameters used: f = 5200 MHz; $\sigma = 5.41 \text{ S/m}$; $\epsilon_i = 47.3$; $\rho = 1000 \text{ kg/m}^3$, Medium parameters used: f = \$300 MHz; o = 5.54 S/m; e_t = 47.1; p = 1000 kg/m³ Medium parameters used: f = 5600 MHz; $\sigma = 5.94 \text{ S/m}$; $\varepsilon_r = 46.6$; $p = 1000 \text{ kg/m}^3$. Medium parameters used: f = 5800 MHz; $\sigma = 6.22$ S/m; $\epsilon_r = 46.2$; $\rho = 1000$ kg/m³ Phantom section: Flat Section Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.35, 5.35, 5.35); Calibrated: 30.12.2017. ConvF(5.15, 5.15, 5.15); Calibrased: 30.12.2017, ConvF(4.65, 4.65); Calibrated: 30.12.2017, ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2017;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 26.10.2017
- Plantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Senal: 1002
- DASY52 52,10.0(1446); SEMCAD X 14.6.10(7417)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 66.00 V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 26.4 W/kg SAR(1 g) = 7.14 W/kg; SAR(10 g) = 2 W/kg Maximum value of SAR (measured) = 16.8 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1,4mm Reference Value = 65.19 V/m: Power Drift = -0.06 dB Peak SAR (extrapolated) = 28.4 W/kg SAR(1 g) - 7.34 W/kg; SAR(10 g) = 2.06 W/kg Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 66.21 V/m; Power Drift = -0.09 dB Peak SAR (extrapolated) = 32.8 W/kg SAR(1 g) = 7.81 W/kg; SAR(10 g) = 2.19 W/kg Maximum value of SAR (measured) = 19.1 W/kg

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Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 64.05 V/m; Power Drift = -0.05 dB Peak SAR (extrapolated) = 32.3 W/kg SAR(1 g) = 7.46 W/kg; SAR(10 g) = 2.07 W/kg Maximum value of SAR (measured) = 18.8 W/kg



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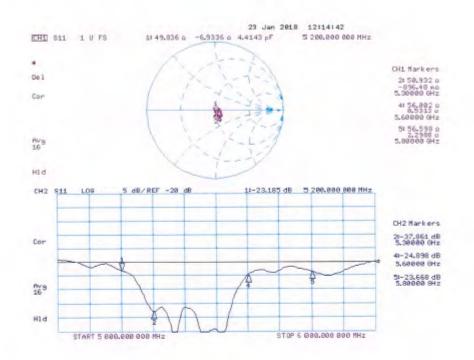
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Impedance Measurement Plot for Body TSL



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