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# SAR TEST REPORT

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

**Equipment Under Test** Mobile Phone

Brand Name Sony

**Type No.** PM-0854-BV

Company Name Sony Mobile Communications AB

Company Address Nya Vattentornet 22188 Lund/SWEDEN

**Standards** IEEE /ANSI C95.1, C95.3, IEEE 1528, KDB447498D01v05r02,

KDB248227D01v01r02,KDB941225D01v03,

KDB941225D05v02r03,KDB941225D06v02,KDB865664D01v

01r03, KDB865664D02v01r01, KDB648474D04v01r02.

FCC ID PY7-PM0854

Date of Receipt Nov. 06, 2014

**Date of Test(s)** Nov. 17, 2014 ~ Dec. 08, 2014

Date of Issue Jan. 16, 2015

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

#### Remarks:

This report details the results of the testing carried out on three samples, 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					
Engineer	Supervisor				
Sam Kuo	Ricky Huang				
Date: Jan. 16, 2015	Date: Jan. 16, 2015				

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# Version

Report Number	Revision	Description	Issue Date
E5/2014/B0008	00	Initial Version	Jan. 10, 2015
E5/2014/B0008	01	1 <sup>st</sup> modification	Jan. 16, 2015

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

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# 1. General Information

### 1.1 Testing Laboratory

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

### 1.2 Details of Applicant

Company Name	Sony Mobile Communications AB
Company Address	Nya Vattentornet 22188 Lund/SWEDEN

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#### 1.3 Description of EUT

Description of EUT					
EUT Name	Mobile Phone				
Brand Name	Sony				
Type No.	PM-0854-BV				
HW Version	A				
SW Version	25.0.A.0.33				
	2G/3G: ZH8005Y2UR				
Serial No.	LTE: ZH8005XVW4				
	WLAN: ZH8005YAB8				
	2G/3G: 004402453545489				
IMEI Code	LTE: 004402453548541				
	WLAN: 004402453545687				
FCC ID	PY7-PM0854				
Mode of	$\square$ GSM $\square$ GPRS $\square$ EDGE	— —			
Operation	HSUPA ☐HSPA+ ☐LTE I				
	WLAN802.11 a/b/g/n (20M/40M)	Bluetooth			
	GSM	1/8.3			
	ODDO	1/2 (1Dn4UP)			
	GPRS	1/2.76 (1Dn3UP)			
	(support multi class 12 max)	1/4.1 (1Dn2UP)			
		1/8.3 (1Dn1UP)			
		1/2 (1Dn4UP)			
Duty Cycle	EDGE	1/2.76 (1Dn3UP)			
	(support multi class 12 max)	1/4.1 (1Dn2UP)			
		1/8.3 (1Dn1UP)			
	WCDMA	1			
	LTE	1			
	WLAN 802.11 a/b/g/n(20M/40M)	1			
	Bluetooth	1			

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	GSM850	824.2		848.8
	GSM1900	1850.2		1909.8
	WCDMA Band II	1852.4	_	1907.6
	WCDMA Band IV	1712.4	_	1752.6
	WCDMA Band V	826.4	_	846.6
	LTE FDD Band II	1850	_	1910
	LTE FDD Band IV	1710	_	1755
	LTE FDD Band V	824		849
	LTE FDD Band VII	2500	_	2570
TX Frequency	WLAN 802.11 b/g/n(20M)	2412	_	2462
Range (MHz)	WLAN 802.11 n(40M)	2422		2452
(	WLAN802.11 a/n(20M) 5.2G	5180	_	5240
	WLAN802.11 a/n(20M) 5.3G	5260	_	5320
	WLAN802.11 a/n(20M) 5.5G	5500	_	5700
	WLAN802.11 a/n(20M) 5.8G	5745	_	5825
	WLAN802.11 n(40M) 5.2G	5190		5230
	WLAN802.11 n(40M) 5.3G	5270		5310
	WLAN802.11 n(40M) 5.5G	5510		5670
	WLAN802.11 n(40M) 5.8G	5755		5795
	Bluetooth	2402		2480

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	GSM850	128		251
	GSM1900	512		810
	WCDMA Band II	9262		9538
	WCDMA Band IV	1312	_	1513
	WCDMA Band V	4132		4233
	LTE FDD Band II	18607	_	19193
	LTE FDD Band IV	19957		20393
	LTE FDD Band V	20407	_	20643
	LTE FDD Band VII	20775		21425
Channel Number	WLAN 802.11 b/g/n(20M)	1	_	11
(ARFCN)	WLAN 802.11 n(40M)	3		9
( 5)	WLAN802.11 a/n(20M) 5.2G	36	_	48
	WLAN802.11 a/n(20M) 5.3G	52	_	64
	WLAN802.11 a/n(20M)5.6G	100	_	140
	WLAN802.11 a/n(20M)5.8G	149	_	165
	WLAN802.11 n(40M) 5.2G	38	_	46
	WLAN802.11 n(40M) 5.3G	54	_	62
	WLAN802.11 n(40M) 5.6G	102	_	134
	WLAN802.11 n(40M) 5.8G	151		159
	Bluetooth	0	_	78

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Max. SAR (1 g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel	
	GSM 850	0.387	0.424		
	GSM 1900	0.147	0.147		
	WCDMA Band II	0.228	0.234		
	WCDMA Band IV	0.519	0.519	<pre></pre>	
Head	WCDMA Band V	0.355	0.392		
	LTE FDD Band II	0.429	0.432	<pre></pre>	
	LTE FDD Band IV	0.38	0.388	<pre></pre>	
	LTE FDD Band V	0.373	0.444	<pre></pre>	
	LTE FDD Band VII	0.38	0.382	□ Right     □ Cheek    □ Tilt     □ Tilt     □ Channel	

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Max. SAR (1 g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel	
	WLAN802.11 b	0.786	0.797	□Left ⊠Right ⊠Cheek □Tilt 11 Channel	
	WLAN802.11a 5.2G	0.158	0.161	☐Left ☐Right ☐Cheek ☐Tilt 48 Channel	
Head	WLAN802.11a 5.3G	0.17	0.171	□Left ⊠Right ⊠Cheek □Tilt 60 Channel	
	WLAN802.11a 5.6G	0.423	0.424	□Left ⊠Right ⊠Cheek □Tilt <u>140</u> Channel	
	WLAN802.11a 5.8G	0.478	0.507	□Left ⊠Right □Cheek ⊠Tilt <u>161</u> Channel	

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Max. SAR (1 g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel	
	GSM 850	0.29	0.318	☐Front ☐Back 128 Channel	
	GSM 1900	0.47	0.47	☐Front ⊠Back 810 Channel	
	WCDMA Band II	0.817	0.84	Front Back 9538 Channel -repeat with worse case	
	WCDMA Band IV	0.689	0.689	☐Front ☐Back 1312 Channel	
	WCDMA Band V	0.288	0.318	☐Front ☐Back 4233 Channel	
Body worn	LTE FDD Band II	0.804	0.81	☐Front ☐Back 19100 Channel	
(speech mode)	LTE FDD Band IV	0.559	0.571	☐Front ☐Back 20050 Channel	
,	LTE FDD Band V	0.517	0.541	☐Front ☐Back 20600 Channel	
	LTE FDD Band VII	0.489	0.507	☐Front ☐Back 20850 Channel	
	WLAN802.11a 5.2G	0.339	0.353	☐Front ☐Back 40 Channel	
	WLAN802.11a 5.3G	0.316	0.317	☐Front ☐Back 60_Channel	
	WLAN802.11a 5.6G	0.402	0.408	☐Front ☐Back 132 Channel	
	WLAN802.11a 5.8G	0.369	0.392	☐Front ⊠Back 161 Channel	

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Max. SAR (1 g) (Unit: W/Kg)					
Mode	Band	Measured	Reported	Position / Channel	
	GPRS 850 (1Dn1UP)	0.638	0.7	☐Front ☐Back ☐Bottom ☐Right ☐Left128Channel	
	GPRS 1900 (1Dn1UP)	0.898	0.898	☐Front ☐Back ☐Bottom ☐Right ☐Left810Channel	
	WCDMA Band II	0.87	1.02	☐ Front ☐ Back ☐ Bottom ☐ Right ☐ Left ☐ 9538 Channel	
Hotspot	WCDMA Band IV	0.947	1.192	☐Front ☐Back ☐Bottom ☐Right ☐Left 1513 Channel	
mode	WCDMA Band V	0.758	0.837	☐Front ☐Back ☐Bottom ☐Right ☐Left4233Channel	
	LTE FDD Band II	0.919	1.01	☐Front ☐Back ☐Bottom ☐Right ☐Left	
	LTE FDD Band IV	1.28	1.307	☐ Front ☐ Back ☐ Bottom ☐ Right ☐ Left	
	LTE FDD Band V	0.716	0.762	☐ Front ☐ Back☐ Bottom☐ Right☐ Left☐ 20525☐ Channel☐ Cha	

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	Max. SAR (1 g) (Unit: W/Kg)												
Mode	Band	Measured	Reported	Position / Channel									
Hotspot	LTE FDD Band VII	1	1.038	☐Front ☐Back ☐Bottom ☐Right ☐Left									
mode	WLAN802.11b	0.679	0.688	☐Front ☐Back ☐Bottom ☐Right ☐Left11Channel									

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#### #. Conducted power table:

#### **GSM/GPRS/EDGE** conducted power table:

EUT mode	Frequency		•	Burst average power	Source-based time average power			
	(MHz)	СН	Power + Max. Tolerance (dBm)	Avg.(dBm)	Avg.(dBm)			
GSM 850	824.2	128	33.5	33.10	24.07			
(GMSK)	836.6	190	33.5	33.20	24.17			
(GIVISK)	848.8	251	33.5	33.50	24.47			
	The div	ision f	actor compared to	the number of TX tin	ne slot			
	Divisio	n facto	or.	1 TX time slot				
	סוצוטום	iii iacit	וע	-9.03				

			Burst avera	age power						
	ted Avg. Powe olerance (dBn		33.5	30.5	28.5	27.5				
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP				
EUT mode	Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)				
GPRS 850	824.2	128	33.10	29.50	27.80	26.90				
(GMSK)	836.6	190	33.20	29.50	27.90	27.10				
(GIVISK)	848.8	251	33.50	29.70	28.10	27.30				
		S	ource-based tim	urce-based time average power						
GPRS 850	824.2	128	24.07	23.48	23.54	23.89				
(GMSK)	836.6	190	24.17	23.48	23.64	24.09				
(GIVISK)	848.8	251	24.47	23.68	23.84	24.29				
	The div	ision fa	actor compared	to the number c	f TX time slot					
Div	ision factor	·	1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot				
	rision ractor		-9.03	-6.02	-4.26	-3.01				

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			Burst avera	age power					
	ted Avg. Powe olerance (dBr		28	25.5	25	25			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
EDCE SEO	824.2	128	27.90	24.90	24.50	24.50			
EDGE 850	836.6	190	27.90	25.00	24.50	24.50			
(MCS 5)	848.8	251	28.00	25.10	24.60	24.60			
		S	urce-based time average power						
EDGE 850	824.2	128	18.87	18.88	20.24	21.49			
	836.6	190	18.87	18.98	20.24	21.49			
(MCS 5)	848.8	251	18.97	19.08	20.34	21.59			
	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			
l DIV	rision ractor		-9.03	-6.02	-4.26	-3.01			

			Burst ave	rage power					
	Max. Rated Avg. Power + Max. Tolerance (dBm)			30.5	28.5	27.5			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency (MHz)	СН	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
EDGE 850	824.2	128	33.00	29.50	27.70	26.90			
(MCS 4)	836.6	190	33.10	29.50	27.80	27.00			
(10103 4)	848.8 251		33.30	29.60	28.00	27.20			
		Ç	Source-based tir	ource-based time average power					
EDGE 850	824.2	128	23.97	23.48	23.44	23.89			
(MCS 4)	836.6	190	24.07	23.48	23.54	23.99			
(10103 4)	848.8	251	24.27	23.58	23.74	24.19			
	The di	vision 1	factor compared	to the number	of TX time slot				
Divi	sion factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot			
DIVI	SIOTI TACTOL		-9.03	-6.02	-4.26	-3.01			

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			Burst avera	age power					
	ted Avg. Powe olerance (dBr		28	25.5	25	25			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency CH (MHz)		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
EDCE 0E0	824.2	128	27.80	24.90	24.50	24.50			
EDGE 850 (MCS 9)	836.6	190	27.90	24.90	24.50	24.50			
(10103 9)	848.8	251	28.00	25.10	24.60	24.60			
		S	urce-based time average power						
EDGE 850	824.2	128	18.77	18.88	20.24	21.49			
(MCS 9)	836.6	190	18.87	18.88	20.24	21.49			
(10103 9)	848.8	251	18.97	19.08	20.34	21.59			
	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			
DIV	יוטוטוז זמננטו		-9.03	-6.02	-4.26	-3.01			

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EUT mode	Frequency	CLI	Max. Rated Avg.	Burst average power	Source-based time average power			
	(MHz)	СН	Power + Max. Tolerance (dBm)	Avg.(dBm)	Avg.(dBm)			
GSM 1900	1850.2	512	30.5	30.30	21.27			
(GMSK)	1880	661	30.5	30.30	21.27			
(GIVISK)	1909.8	810	30.5	30.50	21.47			
	The div	ision fa	ctor compared to	the number of TX time	e slot			
	Division	factor		1 TX time slot				
	וטוצוטוט	i iactoi		-9.03				

			Burst avera	age power		
	ted Avg. Powe olerance (dBr		30.5	27	25	24.5
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP
EUT mode	Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)
GPRS	1850.2	512	30.30	26.50	24.70	24.00
1900	1880	661	30.30	26.50 24.70		23.90
(GMSK)	1909.8	810	30.50	26.60	24.80	24.20
		S	ource-based tim	e average powe	er	
GPRS	1850.2	512	21.27	20.48	20.44	20.99
1900	1880	661	21.27	20.48	20.44	20.89
(GMSK)	1909.8	810	21.47	20.58	20.54	21.19
	The div	ision fa	actor compared	to the number o	of TX time slot	
Div	ision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot
DIV	rision racioi		-9.03	-6.02	-4.26	-3.01

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			Burst avera	age power					
	ted Avg. Powe olerance (dBr		27.5	27.5 24.5		22.5			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency	СН	Avg.	Avg.	Avg.	Avg.			
LOT Mode	(MHz)	011	(dBm)	(dBm)	(dBm)	(dBm)			
EDGE	1850.2	512	27.00	24.20	22.50	21.50			
1900	1880	661	27.00	24.00	22.50	21.50			
(MCS 5)	1909.8	810	27.00	24.10	22.50	21.50			
		S	urce-based time average power						
EDGE	1850.2	512	17.97	18.18	18.24	18.49			
1900	1880	661	17.97	17.98	18.24	18.49			
(MCS 5)	1909.8	810	17.97	18.08	18.24	18.49			
	The div	ision fa	actor compared	to the number o	of TX time slot				
Div	ision factor		1 TX time slot	2 TX time slot 3 TX time slot		4 TX time slot			
DIV	risioni iactoi		-9.03	-6.02	-4.26	-3.01			

			Burst aver	age power					
	ed Avg. Powe olerance (dBr		30.5	27	25	24.5			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency (MHz)	СН	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
EDGE	1850.2	512	30.30	26.40	24.50	24.00			
1900	1880	661	30.30	26.30	24.50	23.90			
(MCS 4)	1909.8	810	30.50	26.60	24.70	24.10			
		S	urce-based time average power						
EDGE	1850.2	512	21.27	20.38	20.24	20.99			
1900	1880	661	21.27	20.28	20.24	20.89			
(MCS 4)	1909.8	810	21.47	20.58	20.44	21.09			
	The div	ision fa	actor compared						
Div	vision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot			
DIV	יוטוטוו ומכנטו		-9.03	-6.02	-4.26	-3.01			

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			D 1							
			Burst avera	age power						
	ted Avg. Power olerance (dBr		27.5	27.5 24.5 23.5		22.5				
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP				
EUT mode	Frequency	СН	Avg.	Avg.	Avg.	Avg.				
LOT IIIOGE	(MHz)	CII	(dBm)	(dBm)	(dBm)	(dBm)				
EDGE	EDGE 1850.2		27.00	24.10	22.50	21.50				
1900	1880	661	26.90	24.00	22.50	21.50				
(MCS 9)	1909.8	810	26.90	24.00	22.50	21.50				
		S	ource-based tim	rce-based time average power						
EDGE	1850.2	512	17.97	18.08	18.24	18.49				
1900	1880	661	17.87	17.98	18.24	18.49				
(MCS 9)	1909.8	810	17.87	17.98	18.24	18.49				
	The div	ision fa	actor compared	to the number o	of TX time slot					
Div	ision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot				
DIV	יוטוטוז זמטנטו		-9.03	-6.02	-4.26	-3.01				

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#### WCDMA Band II / Band IV / Band V - HSDPA / HSDPA / HSPA+ conducted power table:

Band CH	CII	Max. Rated Avg. Rel99		HSDPA mode AV(dBm)			HSUPA mode AV(dBm)				HSPA+ mode AV(dBm)						
		AV (dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5	
WCDMA	9262	24.5	24.48	23.42	23.36	22.94	23.01	24.40	22.45	23.46	22.58	23.02	24.41	22.39	23.38	22.50	24.21
Band II	9400	24.5	24.50	23.11	23.36	22.66	22.67	24.48	22.55	23.5	22.6	22.90	24.47	22.51	23.46	22.55	24.32
Dallu II	9538	24.5	24.38	22.83	23.23	22.3	22.42	24.32	22.36	23.4	22.4	22.85	24.33	22.32	23.34	22.36	24.19
WCDMA	1312	24.5	24.50	23.42	23.38	22.94	23.01	24.42	22.47	23.48	22.6	23.46	24.13	22.23	23.17	22.34	23.15
Band IV	1412	24.5	24.48	23.28	23.34	22.83	22.84	24.46	22.53	23.48	22.58	23.55	24.19	22.33	23.28	22.35	23.28
Dallu IV	1513	24.5	24.47	23.21	23.32	22.68	22.8	24.41	22.45	23.49	22.49	23.46	24.09	22.21	23.15	22.25	23.21
WCDMA	4132	24.5	24.44	23.29	23.37	22.83	22.88	24.40	22.46	23.44	22.51	23.30	24.41	22.44	23.39	22.47	24.22
Band V	4183	24.5	24.20	23.12	23.09	22.64	22.68	24.13	22.21	23.19	22.27	23.14	24.12	22.14	23.12	22.20	23.89
Dariu V	4233	24.5	24.07	22.78	23.01	22.29	22.35	23.99	22.03	23.07	22.11	22.77	23.98	21.95	22.97	22.01	23.80

#### WCDMA Band II / Band IV - HSDPA / HSUPA / HSPA+ conducted power table (Reduced power):

Dond	CH F	Max. Rated Avg. Rel99 Power + AV	HSDPA mode AV(dBm)			HSUPA mode AV(dBm)				HSPA+ mode AV(dBm)							
Band	СН	Max. Tolerance (dBm)	(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA	9262	22	21.57	21.54	21.45	21.06	21.13	21.49	19.54	20.55	19.67	21.52	21.50	19.48	20.47	19.59	21.30
Band II	9400	22	21.53	21.51	21.39	21.06	21.07	21.51	19.58	20.53	19.63	21.45	21.50	19.54	20.49	19.58	21.35
Dallu II	9538	22	21.31	21.29	21.16	20.76	20.88	21.25	19.29	20.33	19.33	21.26	21.26	19.25	20.27	19.29	21.12
WCDMA	1312	22.5	21.48	21.46	21.36	21.34	21.34	21.40	19.45	20.46	19.58	21.43	21.45	19.48	20.43	19.51	21.26
Band IV	1412	22.5	21.56	21.53	21.42	21.08	21.09	21.54	19.61	20.56	19.66	21.50	21.48	19.50	20.48	19.56	21.25
Dailu IV	1513	22.5	21.50	21.48	21.35	20.95	21.07	21.44	19.48	20.52	19.52	21.45	21.41	19.38	20.40	19.44	21.23

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#### **HSDPA**

SUB-TEST	$eta_{c}$	$\beta_{\sf d}$	β <sub>d</sub> (SF)	$\beta_c/\beta_d$	β <sub>HS</sub> (Note1, Note 2)	CM (dB) (Note 3)	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

#### **HSUPA**

SUB-TEST	$eta_{c}$	$eta_{ extsf{d}}$	β <sub>d</sub> (SF)	$\beta_c/\beta_d$	β <sub>HS</sub> (Note1)	$eta_{ec}$	β <sub>ed</sub> (Note 5) (Note 6)	β <sub>ed</sub> (SF)	β <sub>ed</sub> (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 <sub>ed</sub> 1: 47/15 β <sub>ed</sub> 2: 47/15	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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## LTE FDD Band II / Band IV / Band V / Band VII power table:

	<u> </u>	Jana IV		DD Band 2	-	tubic.		
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1860	18700	24.25	24.5	0
			0	1880	18900	24.14	24.5	0
				1900	19100	24.26	24.5	0
				1860	18700	24.20	24.5	0
		1 RB	50	1880	18900	24.19	24.5	0
				1900	19100	24.29	24.5	0
				1860	18700	24.27	24.5	0
			99	1880	18900	24.37	24.5	0
				1900	19100	24.47	24.5	0
				1860	18700	23.33	24	0-1
	QPSK		0	1880	18900	23.34	24	0-1
				1900	19100	23.42	24	0-1
				1860	18700	23.35	24	0-1
		50 RB	25	1880	18900	23.38	24	0-1
				1900	19100	23.50	24	0-1
				1860	18700	23.34	24	0-1
			50	1880	18900	23.42	24	0-1
				1900	19100	23.69	24	0-1
				1860	18700	23.35	24	0-1
		100	)RB	1880	18900	23.36	24	0-1
			Ī	1900	19100	23.44	24	0-1
20			_	1860	18700	23.24	24	0-1
			0	1880	18900	23.74	24	0-1
				1900	19100	23.76	24	0-1
			50	1860	18700	23.39	24	0-1
		1 RB	50	1880	18900	23.73	24	0-1
				1900	19100	23.33	24	0-1
			0.5	1860	18700	23.77	24	0-1
			99	1880	18900	23.72	24	0-1
				1900	19100	23.86	24	0-1
				1860	18700	22.35	23	0-2
	16-QAM		0	1880	18900	22.44	23	0-2
	10 30 tivi			1900	19100	22.42	23	0-2
				1860	18700	22.38	23	0-2
		50 RB	25	1880	18900	22.38	23	0-2
				1900	19100	22.49	23	0-2
				1860	18700	22.35	23	0-2
			50	1880	18900	22.49	23	0-2
			30					
				1900	19100	22.63	23	0-2
				1860	18700	22.37	23	0-2
		100	)RB	1880	18900	22.35	23	0-2
	.	1001		1900	19100	22.48	23	0-2

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				DD Band 2	2			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1857.5	18675	24.18	24.5	0
			0	1880	18900	24.18	24.5	0
				1902.5	19125	24.21	24.5	0
				1857.5	18675	24.18	24.5	0
		1 RB	36	1880	18900	24.25	24.5	0
				1902.5	19125	24.25	24.5	0
				1857.5	18675	24.19	24.5	0
			74	1880	18900	24.27	24.5	0
				1902.5	19125	24.41	24.5	0
				1857.5	18675	23.37	24	0-1
	QPSK		0	1880	18900	23.31	24	0-1
				1902.5	19125	23.46	24	0-1
				1857.5	18675	23.32	24	0-1
		36 RB	18	1880	18900	23.35	24	0-1
				1902.5	19125	23.54	24	0-1
				1857.5	18675	23.34	24	0-1
			37	1880	18900	23.43	24	0-1
				1902.5	19125	23.62	24	0-1
				1857.5	18675	23.28	24	0-1
		75	RB	1880	18900	23.35	24	0-1
15				1902.5	19125	23.47	24	0-1
13				1857.5	18675	23.28	24	0-1
			0	1880	18900	23.63	24	0-1
				1902.5	19125	23.24	24	0-1
				1857.5	18675	23.35	24	0-1
ſ		1 RB	36	1880	18900	23.47	24	0-1
				1902.5	19125	23.44	24	0-1
İ				1857.5	18675	23.80	24	0-1
			74	1880	18900	23.46	24	0-1
				1902.5	19125	23.27	24	0-1
				1857.5	18675	22.37	23	0-2
	16-QAM		0	1880	18900	22.36	23	0-2
				1902.5	19125	22.52	23	0-2
				1857.5	18675	22.41	23	0-2
		36 RB	18	1880	18900	22.41	23	0-2
				1902.5	19125	22.56	23	0-2
				1857.5	18675	22.42	23	0-2
			37	1880	18900	22.47	23	0-2
				1902.5	19125	22.63	23	0-2
				1857.5	18675	22.41	23	0-2
		75	RB	1880	18900	22.38	23	0-2
				1902.5	19125	22.55	23	0-2

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			·	DD Band 2	2			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1855	18650	24.06	24.5	0
			0	1880	18900	24.22	24.5	0
				1905	19150	24.38	24.5	0
				1855	18650	24.30	24.5	0
		1 RB	25	1880	18900	24.21	24.5	0
				1905	19150	24.36	24.5	0
				1855	18650	24.16	24.5	0
			49	1880	18900	24.19	24.5	0
				1905	19150	24.43	24.5	0
				1855	18650	23.28	24	0-1
	QPSK		0	1880	18900	23.32	24	0-1
				1905	19150	23.46	24	0-1
				1855	18650	23.26	24	0-1
		25 RB	12	1880	18900	23.33	24	0-1
				1905	19150	23.53	24	0-1
				1855	18650	23.25	24	0-1
			25	1880	18900	23.32	24	0-1
				1905	19150	23.59	24	0-1
				1855	18650	23.33	24	0-1
		50	RB	1880	18900	23.35	24	0-1
10				1905	19150	23.54	24	0-1
10				1855	18650	23.32	24	0-1
			0	1880	18900	23.27	24	0-1
				1905	19150	23.50	24	0-1
				1855	18650	23.25	24	0-1
		1 RB	25	1880	18900	23.44	24	0-1
				1905	19150	23.62	24	0-1
				1855	18650	23.40	24	0-1
			49	1880	18900	23.40	24	0-1
				1905	19150	23.47	24	0-1
				1855	18650	22.38	23	0-2
	16-QAM		0	1880	18900	22.38	23	0-2
				1905	19150	22.47	23	0-2
		05.55	40	1855	18650	22.37	23	0-2
		25 RB	12	1880	18900	22.40	23	0-2
				1905	19150	22.48	23	0-2
			25	1855	18650	22.28	23	0-2
			25	1880	18900	22.31	23	0-2
				1905	19150	22.58	23	0-2
			חח	1855	18650	22.38	23	0-2
		50	RB	1880	18900	22.42	23	0-2
				1905	19150	22.52	23	0-2

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				FDD Band 2	2			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1852.5	18625	23.93	24.5	0
			0	1880	18900	23.93	24.5	0
				1907.5	19175	24.17	24.5	0
				1852.5	18625	24.04	24.5	0
		1 RB	12	1880	18900	24.13	24.5	0
				1907.5	19175	24.18	24.5	0
				1852.5	18625	24.00	24.5	0
			24	1880	18900	23.93	24.5	0
				1907.5	19175	24.27	24.5	0
				1852.5	18625	23.09	24	0-1
	QPSK		0	1880	18900	23.09	24	0-1
				1907.5	19175	23.41	24	0-1
				1852.5	18625	23.08	24	0-1
		12 RB	6	1880	18900	23.13	24	0-1
				1907.5	19175	23.38	24	0-1
				1852.5	18625	23.05	24	0-1
			13	1880	18900	23.17	24	0-1
				1907.5	19175	23.33	24	0-1
				1852.5	18625	23.05	24	0-1
		25	RB	1880	18900	23.10	24	0-1
F				1907.5	19175	23.32	24	0-1
5				1852.5	18625	23.08	24	0-1
			0	1880	18900	23.57	24	0-1
				1907.5	19175	23.70	24	0-1
				1852.5	18625	23.14	24	0-1
		1 RB	12	1880	18900	23.43	24	0-1
				1907.5	19175	23.53	24	0-1
				1852.5	18625	23.11	24	0-1
			24	1880	18900	23.07	24	0-1
				1907.5	19175	23.07	24	0-1
				1852.5	18625	22.15	23	0-2
	16-QAM		0	1880	18900	22.25	23	0-2
				1907.5	19175	22.37	23	0-2
				1852.5	18625	22.05	23	0-2
		12 RB	6	1880	18900	22.22	23	0-2
				1907.5	19175	22.40	23	0-2
				1852.5	18625	22.11	23	0-2
			13	1880	18900	22.26	23	0-2
				1907.5	19175	22.29	23	0-2
				1852.5	18625	22.12	23	0-2
		25	RB	1880	18900	22.19	23	0-2
				1907.5	19175	22.33	23	0-2

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			F	DD Band 2	2			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1851.5	18615	24.13	24.5	0
			0	1880	18900	24.18	24.5	0
				1908.5	19185	24.35	24.5	0
				1851.5	18615	24.12	24.5	0
		1 RB	7	1880	18900	24.25	24.5	0
				1908.5	19185	24.37	24.5	0
				1851.5	18615	24.18	24.5	0
			14	1880	18900	24.09	24.5	0
				1908.5	19185	24.34	24.5	0
				1851.5	18615	23.22	24	0-1
	QPSK		0	1880	18900	23.31	24	0-1
				1908.5	19185	23.55	24	0-1
				1851.5	18615	23.27	24	0-1
		8 RB	4	1880	18900	23.31	24	0-1
				1908.5	19185	23.51	24	0-1
			_	1851.5	18615	23.25	24	0-1
			7	1880	18900	23.33	24	0-1
				1908.5	19185	23.53	24	0-1
		45		1851.5	18615	23.31	24	0-1
		15	RB	1880	18900	23.39	24	0-1
3				1908.5	19185	23.47	24	0-1
			0	1851.5	18615	23.28	24	0-1
			0	1880	18900	23.29	24	0-1 0-1
				1908.5 1851.5	19185 18615	23.22 23.24	24 24	0-1
		1 RB	7	1880	18900	23.59	24	0-1
		TIND	,	1908.5	19185	23.43	24	0-1
				1851.5	18615	23.40	24	0-1
			14	1880	18900	23.68	24	0-1
				1908.5	19185	23.38	24	0-1
				1851.5	18615	22.35	23	0-2
	16-QAM		0	1880	18900	22.36	23	0-2
				1908.5	19185	22.62	23	0-2
				1851.5	18615	22.34	23	0-2
		8 RB	4	1880	18900	22.35	23	0-2
				1908.5	19185	22.49	23	0-2
				1851.5	18615	22.39	23	0-2
			7	1880	18900	22.42	23	0-2
				1908.5	19185	22.49	23	0-2
				1851.5	18615	22.39	23	0-2
		15	RB	1880	18900	22.41	23	0-2
				1908.5	19185	22.41	23	0-2

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				FDD Band 2	)			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1850.7	18607	24.15	24.5	0
			0	1880	18900	24.18	24.5	0
				1909.3	19193	24.29	24.5	0
				1850.7	18607	24.24	24.5	0
		1 RB	2	1880	18900	24.30	24.5	0
				1909.3	19193	24.28	24.5	0
				1850.7	18607	24.03	24.5	0
			5	1880	18900	24.18	24.5	0
				1909.3	19193	24.43	24.5	0
				1850.7	18607	23.28	24	0-1
	QPSK		0	1880	18900	23.31	24	0-1
				1909.3	19193	23.34	24	0-1
		2 DD	2	1850.7	18607	23.21	24	0-1
		3 RB	2	1880	18900	23.26	24	0-1
				1909.3 1850.7	19193 18607	23.43 23.29	24 24	0-1 0-1
			3	1880	18900	23.29	24	0-1
			3	1909.3	19193	23.20	24	0-1
				1850.7	18607	23.29	24	0-1
		61	RB	1880	18900	23.33	24	0-1
		0.		1909.3	19193	23.52	24	0-1
1.4				1850.7	18607	23.34	24	0-1
			0	1880	18900	23.45	24	0-1
				1909.3	19193	23.59	24	0-1
				1850.7	18607	23.26	24	0-1
		1 RB	2	1880	18900	23.71	24	0-1
				1909.3	19193	23.57	24	0-1
				1850.7	18607	23.61	24	0-1
			5	1880	18900	23.24	24	0-1
				1909.3	19193	23.72	24	0-1
				1850.7	18607	22.24	23	0-2
	16-QAM		0	1880	18900	22.27	23	0-2
				1909.3	19193	22.44	23	0-2
				1850.7	18607	22.28	23	0-2
		3 RB	2	1880	18900	22.31	23	0-2
				1909.3	19193	22.38	23	0-2
			_	1850.7	18607	22.31	23	0-2
			3	1880	18900	22.37	23	0-2
			<u> </u>	1909.3	19193	22.43	23	0-2
		/ /	DD	1850.7	18607	22.46	23	0-2
		01	RB	1880	18900	22.39	23	0-2
				1909.3	19193	22.45	23	0-2

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			FDD Band	2 _Reduct	ion Power			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1860	18700	21.67	22	0
			0	1880	18900	21.66	22	0
				1900	19100	21.64	22	0
				1860	18700	21.69	22	0
		1 RB	50	1880	18900	21.57	22	0
				1900	19100	21.81	22	0
				1860	18700	21.71	22	0
			99	1880	18900	21.67	22	0
				1900	19100	21.92	22	0
				1860	18700	21.50	22	0-1
	QPSK		0	1880	18900	21.63	22	0-1
				1900	19100	21.83	22	0-1
				1860	18700	21.55	22	0-1
		50 RB	25	1880	18900	21.65	22	0-1
				1900	19100	21.90	22	0-1
				1860	18700	21.66	22	0-1
			50	1880	18900	21.69	22	0-1
				1900	19100	21.96	22	0-1
				1860	18700	21.59	22	0-1
		10	ORB	1880	18900	21.65	22	0-1
00				1900	19100	21.84	22	0-1
20				1860	18700	21.57	22	0-1
			0	1880	18900	21.61	22	0-1
				1900	19100	21.54	22	0-1
				1860	18700	21.62	22	0-1
		1 RB	50	1880	18900	21.52	22	0-1
				1900	19100	21.76	22	0-1
				1860	18700	21.64	22	0-1
			99	1880	18900	21.55	22	0-1
				1900	19100	21.73	22	0-1
				1860	18700	21.49	22	0-2
	16-QAM		0	1880	18900	21.47	22	0-2
				1900	19100	21.61	22	0-2
				1860	18700	21.53	22	0-2
		50 RB	25	1880	18900	21.47	22	0-2
				1900	19100	21.71	22	0-2
				1860	18700	21.52	22	0-2
			50	1880	18900	21.49	22	0-2
				1900	19100	21.74	22	0-2
			-	1860	18700	21.49	22	0-2
		10	ORB	1880	18900	21.46	22	0-2
				1900	19100	21.59	22	0-2

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			FDD Band	2 _Reduct	ion Power			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1857.5	18675	21.56	22	0
			0	1880	18900	21.49	22	0
				1902.5	19125	21.63	22	0
				1857.5	18675	21.52	22	0
		1 RB	36	1880	18900	21.50	22	0
				1902.5	19125	21.76	22	0
				1857.5	18675	21.54	22	0
			74	1880	18900	21.56	22	0
				1902.5	19125	21.82	22	0
				1857.5	18675	21.52	22	0-1
	QPSK		0	1880	18900	21.50	22	0-1
				1902.5	19125	21.78	22	0-1
				1857.5	18675	21.52	22	0-1
		36 RB	18	1880	18900	21.57	22	0-1
				1902.5	19125	21.84	22	0-1
				1857.5	18675	21.51	22	0-1
			37	1880	18900	21.58	22	0-1
				1902.5	19125	21.87	22	0-1
				1857.5	18675	21.57	22	0-1
		75	RB	1880	18900	21.48	22	0-1
15				1902.5	19125	21.73	22	0-1
13				1857.5	18675	21.63	22	0-1
			0	1880	18900	21.51	22	0-1
				1902.5	19125	21.58	22	0-1
				1857.5	18675	21.67	22	0-1
		1 RB	36	1880	18900	21.47	22	0-1
				1902.5	19125	21.76	22	0-1
				1857.5	18675	21.71	22	0-1
			74	1880	18900	21.50	22	0-1
				1902.5	19125	21.69	22	0-1
				1857.5	18675	21.42	22	0-2
	16-QAM		0	1880	18900	21.37	22	0-2
				1902.5	19125	21.58	22	0-2
				1857.5	18675	21.44	22	0-2
		36 RB	18	1880	18900	21.41	22	0-2
				1902.5	19125	21.68	22	0-2
				1857.5	18675	21.44	22	0-2
			37	1880	18900	21.40	22	0-2
				1902.5	19125	21.70	22	0-2
				1857.5	18675	21.47	22	0-2
		75	RB	1880	18900	21.32	22	0-2
				1902.5	19125	21.57	22	0-2

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			FDD Band	2 Reduct	ion Power			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1855	18650	21.51	22	0
			0	1880	18900	21.52	22	0
				1905	19150	21.68	22	0
				1855	18650	21.51	22	0
		1 RB	25	1880	18900	21.54	22	0
				1905	19150	21.84	22	0
				1855	18650	21.48	22	0
			49	1880	18900	21.55	22	0
				1905	19150	21.77	22	0
				1855	18650	21.47	22	0-1
	QPSK		0	1880	18900	21.49	22	0-1
				1905	19150	21.81	22	0-1
				1855	18650	21.47	22	0-1
		25 RB	12	1880	18900	21.50	22	0-1
				1905	19150	21.84	22	0-1
				1855	18650	21.47	22	0-1
			25	1880	18900	21.50	22	0-1
				1905	19150	21.81	22	0-1
				1855	18650	21.67	22	0-1
		50	RB	1880	18900	21.76	22	0-1
10				1905	19150	21.89	22	0-1
10				1855	18650	21.20	22	0-1
			0	1880	18900	21.24	22	0-1
				1905	19150	21.58	22	0-1
				1855	18650	21.21	22	0-1
		1 RB	25	1880	18900	21.25	22	0-1
				1905	19150	21.68	22	0-1
				1855	18650	21.23	22	0-1
			49	1880	18900	21.22	22	0-1
				1905	19150	21.56	22	0-1
				1855	18650	21.34	22	0-2
	16-QAM		0	1880	18900	21.35	22	0-2
				1905	19150	21.64	22	0-2
				1855	18650	21.35	22	0-2
		25 RB	12	1880	18900	21.36	22	0-2
				1905	19150	21.66	22	0-2
				1855	18650	21.36	22	0-2
			25	1880	18900	21.35	22	0-2
				1905	19150	21.60	22	0-2
				1855	18650	21.57	22	0-2
		50	RB	1880	18900	21.60	22	0-2
				1905	19150	21.59	22	0-2

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			FDD Band	2 _Reduct	ion Power			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1852.5	18625	21.44	22	0
			0	1880	18900	21.44	22	0
				1907.5	19175	21.55	22	0
				1852.5	18625	21.45	22	0
		1 RB	12	1880	18900	21.49	22	0
				1907.5	19175	21.77	22	0
				1852.5	18625	21.39	22	0
			24	1880	18900	21.46	22	0
				1907.5	19175	21.72	22	0
				1852.5	18625	21.48	22	0-1
	QPSK		0	1880	18900	21.50	22	0-1
				1907.5	19175	21.80	22	0-1
		12 RB	6	1852.5	18625	21.49	22	0-1
				1880	18900	21.53	22	0-1
				1907.5	19175	21.83	22	0-1
			13	1852.5	18625	21.48	22	0-1
				1880	18900	21.52	22	0-1
				1907.5	19175	21.78	22	0-1
		25RB		1852.5	18625	21.59	22	0-1
				1880	18900	21.65	22	0-1
5				1907.5	19175	21.92	22	0-1
			0	1852.5	18625	21.56	22	0-1
				1880	18900	21.59	22	0-1
				1907.5	19175	21.87	22	0-1
		1 RB	12	1852.5	18625	21.59	22	0-1 0-1
				1880	18900	21.61	22	
				1907.5	19175 18625	21.82	22 22	0-1
			24	1852.5 1880	18625	21.56 21.53	22	0-1 0-1
			24	1907.5	19175	21.72	22	0-1
				1852.5	18625	21.72	22	0-1
	16-QAM		0	1880	18900	21.38	22	0-2
	10-QAIVI			1907.5	19175	21.40	22	0-2
				1852.5	18625	21.41	22	0-2
		12 RB	6	1880	18900	21.41	22	0-2
		IZ KB		1907.5	19175	21.42	22	0-2
				1852.5	18625	21.40	22	0-2
			13	1880	18900	21.43	22	0-2
			13	1907.5	19175	21.54	22	0-2
			1	1852.5	18625	21.44	22	0-2
		25	irb	1880	18900	21.47	22	0-2
		231(0		1907.5	19175	21.57	22	0-2

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	FDD Band 2 _Reduction Power									
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)		
				1851.5	18615	21.30	22	0		
			0	1880	18900	21.33	22	0		
				1908.5	19185	21.68	22	0		
				1851.5	18615	21.38	22	0		
		1 RB	7	1880	18900	21.45	22	0		
				1908.5	19185	21.76	22	0		
				1851.5	18615	21.40	22	0		
			14	1880	18900	21.70	22	0		
				1908.5	19185	21.30	22	0		
				1851.5	18615	21.52	22	0-1		
	QPSK		0	1880	18900	21.57	22	0-1		
				1908.5	19185	21.83	22	0-1		
				1851.5	18615	21.52	22	0-1		
		8 RB	4	1880	18900	21.56	22	0-1		
				1908.5	19185	21.83	22	0-1		
			7	1851.5	18615	21.52	22	0-1		
				1880	18900	21.54	22	0-1		
				1908.5	19185	21.80	22	0-1		
		15RB		1851.5	18615	21.51	22	0-1		
				1880	18900	21.55	22	0-1		
3				1908.5	19185	21.82	22	0-1		
3		1 RB 7	0	1851.5	18615	21.35	22	0-1		
				1880	18900	21.39	22	0-1		
			1908.5	19185	21.69	22	0-1			
			7	1851.5	18615	21.42	22	0-1		
				1880	18900	21.52	22	0-1		
				1908.5	19185	21.73	22	0-1		
				1851.5	18615	21.36	22	0-1		
			14	1880	18900	21.41	22	0-1		
				1908.5	19185	21.64	22	0-1		
				1851.5	18615	21.39	22	0-2		
	16-QAM		0	1880	18900	21.31	22	0-2		
				1908.5	19185	21.56	22	0-2		
				1851.5	18615	21.40	22	0-2		
		8 RB	4	1880	18900	21.42	22	0-2		
				1908.5	19185	21.54	22	0-2		
				1851.5	18615	21.40	22	0-2		
			7	1880	18900	21.40	22	0-2		
				1908.5	19185	21.53	22	0-2		
				1851.5	18615	21.32	22	0-2		
		15	RB	1880	18900	21.42	22	0-2		
				1908.5	19185	21.60	22	0-2		

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FDD Band 2 _Reduction Power									
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)	
				1850.7	18607	21.39	22	0	
			0	1880	18900	21.45	22	0	
				1909.3	19193	21.72	22	0	
				1850.7	18607	21.48	22	0	
		1 RB	2	1880	18900	21.53	22	0	
				1909.3	19193	21.79	22	0	
			_	1850.7	18607	21.40	22	0	
			5	1880	18900	21.49	22	0	
				1909.3	19193	21.73	22	0	
	ODOV			1850.7	18607	21.54	22	0-1	
	QPSK		0	1880	18900	21.50	22	0-1	
				1909.3	19193	21.73	22	0-1	
		3 RB	3	1850.7 1880	18607 18900	21.46 21.50	22 22	0-1 0-1	
		3 KB		1909.3	19193	21.73	22	0-1	
				1850.7	18607	21.73	22	0-1	
				1880	18900	21.53	22	0-1	
				1909.3	19193	21.73	22	0-1	
				1850.7	18607	21.55	22	0-1	
		6RB		1880	18900	21.60	22	0-1	
				1909.3	19193	21.85	22	0-1	
1.4				1850.7	18607	21.63	22	0-1	
		0	1880	18900	21.66	22	0-1		
				1909.3	19193	21.61	22	0-1	
		1 RB	2	1850.7	18607	21.72	22	0-1	
				1880	18900	21.61	22	0-1	
				1909.3	19193	21.64	22	0-1	
				1850.7	18607	21.67	22	0-1	
			5	1880	18900	21.63	22	0-1	
				1909.3	19193	21.80	22	0-1	
				1850.7	18607	21.38	22	0-2	
	16-QAM		0	1880	18900	21.41	22	0-2	
				1909.3	19193	21.58	22	0-2	
		0.00		1850.7	18607	21.34	22	0-2	
		3 RB	2	1880	18900	21.40	22	0-2	
				1909.3	19193	21.58	22	0-2	
			,	1850.7	18607	21.38	22	0-2	
			3	1880 1909.3	18900 19193	21.43 21.56	22	0-2 0-2	
			<u> </u>	1909.3	18607	21.56	22 22	0-2	
		6	RB	1880	18900	21.45	22	0-2	
		O.		1909.3	19193	21.40	22	0-2	

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			F	FDD Band 4	1			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1720	20050	24.40	24.5	0
			0	1732.5	20175	24.34	24.5	0
				1745	20300	24.38	24.5	0
				1720	20050	24.41	24.5	0
		1 RB	50	1732.5	20175	24.39	24.5	0
				1745	20300	24.25	24.5	0
				1720	20050	24.27	24.5	0
			99	1732.5	20175	24.29	24.5	0
				1745	20300	24.19	24.5	0
				1720	20050	23.52	24	0-1
	QPSK		0	1732.5	20175	23.43	24	0-1
				1745	20300	23.55	24	0-1
			25	1720	20050	23.45	24	0-1
		50 RB		1732.5	20175	23.47	24	0-1
				1745	20300	23.40	24	0-1
			50	1720	20050	23.44	24	0-1
				1732.5	20175	23.54	24	0-1
				1745	20300	23.53	24	0-1
				1720	20050	23.40	24	0-1
		100	ORB	1732.5	20175	23.44	24	0-1
20			1	1745	20300	23.46	24	0-1
			0	1720	20050	23.67	24	0-1
				1732.5	20175	23.67	24	0-1
				1745	20300	23.58	24	0-1
		1 RB	50	1720	20050	23.51	24	0-1
				1732.5	20175	23.79	24	0-1
				1745	20300	23.54	24	0-1
				1720	20050	23.59	24	0-1
			99	1732.5	20175	23.48	24	0-1
				1745	20300	23.47	24	0-1
	14 0 1 1 1		0	1720	20050	22.52	23	0-2
	16-QAM		0	1732.5	20175	22.53	23	0-2
				1745	20300	22.45	23	0-2
		EO DD	25	1720	20050	22.48	23	0-2
		50 RB	25	1732.5	20175	22.44	23	0-2
				1745	20300	22.49	23	0-2
			EO.	1720	20050	22.49	23	0-2
			50	1732.5	20175	22.47	23	0-2
				1745 1720	20300	22.43	23	0-2
		10	ORB	1720 1732.5	20050 20175	22.43 22.48	23	0-2
		100	JND	1732.5			23	0-2
					20300	22.44	23	0-2

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			F	DD Band 4	1			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1717.5	20025	24.44	24.5	0
			0	1732.5	20175	24.29	24.5	0
				1747.5	20325	24.25	24.5	0
				1717.5	20025	24.26	24.5	0
		1 RB	36	1732.5	20175	24.21	24.5	0
				1747.5	20325	24.24	24.5	0
				1717.5	20025	24.24	24.5	0
			74	1732.5	20175	24.17	24.5	0
				1747.5	20325	24.18	24.5	0
				1717.5	20025	23.55	24	0-1
	QPSK		0	1732.5	20175	23.43	24	0-1
				1747.5	20325	23.37	24	0-1
				1717.5	20025	23.49	24	0-1
		36 RB	37	1732.5	20175	23.41	24	0-1
				1747.5	20325	23.37	24	0-1
				1717.5	20025	23.43	24	0-1
				1732.5	20175	23.42	24	0-1
				1747.5	20325	23.37	24	0-1
				1717.5	20025	23.51	24	0-1
		75	RB	1732.5	20175	23.43	24	0-1
15				1747.5	20325	23.34	24	0-1
10			0	1717.5	20025	23.55	24	0-1
				1732.5	20175	23.73	24	0-1
				1747.5	20325	23.23	24	0-1
		1 RB	36 74	1717.5	20025	23.25	24	0-1
				1732.5	20175	23.76	24	0-1
				1747.5	20325	23.51	24	0-1
				1717.5	20025	23.18	24	0-1
				1732.5	20175	23.45	24	0-1
				1747.5	20325	23.25	24	0-1
				1717.5	20025	22.57	23	0-2
	16-QAM		0	1732.5	20175	22.43	23	0-2
				1747.5	20325	22.45	23	0-2
				1717.5	20025	22.48	23	0-2
		36 RB	18	1732.5	20175	22.47	23	0-2
				1747.5	20325	22.38	23	0-2
				1717.5	20025	22.44	23	0-2
			37	1732.5	20175	22.45	23	0-2
				1747.5	20325	22.43	23	0-2
				1717.5	20025	22.46	23	0-2
		75	RB	1732.5	20175	22.46	23	0-2
				1747.5	20325	22.46	23	0-2

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			ſ	FDD Band 4	1			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1715	20000	24.40	24.5	0
			0	1732.5	20175	24.14	24.5	0
				1750	20350	24.23	24.5	0
				1715	20000	24.24	24.5	0
		1 RB	25	1732.5	20175	24.35	24.5	0
				1750	20350	24.27	24.5	0
				1715	20000	24.33	24.5	0
			49	1732.5	20175	24.15	24.5	0
				1750	20350	24.17	24.5	0
				1715	20000	23.48	24	0-1
	QPSK		0	1732.5	20175	23.40	24	0-1
				1750	20350	23.32	24	0-1
				1715	20000	23.46	24	0-1
		25 RB	12	1732.5	20175	23.34	24	0-1
				1750	20350	23.30	24	0-1
			25	1715	20000	23.40	24	0-1
				1732.5	20175	23.35	24	0-1
				1750	20350	23.29	24	0-1
		50RB		1715	20000	23.39	24	0-1
				1732.5	20175	23.36	24	0-1
10				1750	20350	23.33	24	0-1
10			0	1715	20000	23.64	24	0-1
				1732.5	20175	23.75	24	0-1
				1750	20350	23.26	24	0-1
		1 RB	25	1715	20000	23.48	24	0-1
				1732.5	20175	23.66	24	0-1
				1750	20350	23.44	24	0-1
				1715	20000	23.45	24	0-1
			49	1732.5	20175	23.26	24	0-1
				1750	20350	23.31	24	0-1
				1715	20000	22.52	23	0-2
	16-QAM		0	1732.5	20175	22.48	23	0-2
				1750	20350	22.37	23	0-2
				1715	20000	22.49	23	0-2
		25 RB	12	1732.5	20175	22.42	23	0-2
				1750	20350	22.31	23	0-2
				1715	20000	22.47	23	0-2
			25	1732.5	20175	22.41	23	0-2
				1750	20350	22.25	23	0-2
				1715	20000	22.46	23	0-2
		50	RB	1732.5	20175	22.45	23	0-2
				1750	20350	22.36	23	0-2

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			F	DD Band 4	1			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1712.5	19975	24.34	24.5	0
			0	1732.5	20175	24.30	24.5	0
				1752.5	20375	24.29	24.5	0
				1712.5	19975	24.12	24.5	0
		1 RB	12	1732.5	20175	24.25	24.5	0
				1752.5	20375	24.15	24.5	0
				1712.5	19975	24.28	24.5	0
			24	1732.5	20175	24.11	24.5	0
				1752.5	20375	24.13	24.5	0
				1712.5	19975	23.54	24	0-1
	QPSK		0	1732.5	20175	23.37	24	0-1
				1752.5	20375	23.37	24	0-1
			6	1712.5	19975	23.53	24	0-1
		12 RB		1732.5	20175	23.37	24	0-1
				1752.5	20375	23.33	24	0-1
			13	1712.5	19975	23.52	24	0-1
				1732.5	20175	23.36	24	0-1
				1752.5	20375	23.32	24	0-1
		25RB		1712.5	19975	23.47	24	0-1
				1732.5	20175	23.31	24	0-1
-				1752.5	20375	23.28	24	0-1
5		1 RB	0	1712.5	19975	23.69	24	0-1
				1732.5	20175	23.73	24	0-1
				1752.5	20375	23.51	24	0-1
			12	1712.5	19975	23.56	24	0-1
				1732.5	20175	23.29	24	0-1
				1752.5	20375	23.44	24	0-1
				1712.5	19975	23.81	24	0-1
			24	1732.5	20175	23.77	24	0-1
				1752.5	20375	23.27	24	0-1
				1712.5	19975	22.58	23	0-2
	16-QAM		0	1732.5	20175	22.34	23	0-2
				1752.5	20375	22.47	23	0-2
				1712.5	19975	22.54	23	0-2
		12 RB	6	1732.5	20175	22.47	23	0-2
				1752.5	20375	22.39	23	0-2
				1712.5	19975	22.59	23	0-2
			13	1732.5	20175	22.46	23	0-2
				1752.5	20375	22.28	23	0-2
				1712.5	19975	22.52	23	0-2
		25	RB	1732.5	20175	22.28	23	0-2
				1752.5	20375	22.37	23	0-2

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				DD Band 4	4			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				1711.5	19965	24.37	24.5	0
			0	1732.5	20175	24.08	24.5	0
				1753.5	20385	24.14	24.5	0
				1711.5	19965	24.21	24.5	0
		1 RB	7	1732.5	20175	24.23	24.5	0
				1753.5	20385	24.20	24.5	0
				1711.5	19965	24.27	24.5	0
			14	1732.5	20175	24.22	24.5	0
				1753.5	20385	24.09	24.5	0
				1711.5	19965	23.52	24	0-1
	QPSK		0	1732.5	20175	23.36	24	0-1
				1753.5	20385	23.33	24	0-1
				1711.5	19965	23.50	24	+ MPR Allowed per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		8 RB	4	1732.5	20175	23.36	24	0-1
				1753.5	20385	23.30	24	Ver         Horn           Aux.         MPR Allowed per 3GPP(dB)           Per 3GPP(dB)         Per 3GPP(dB) </td
				1711.5	19965	23.49	24	
			7	1732.5	20175	23.34	24	
				1753.5	20385	23.29	24	0-1
				1711.5	19965	23.50	24	0-1
		15	RB	1732.5	20175	23.35	24	0 0 0 0 0 0 0 0-1 0-1 0-1 0-1 0-1 0-1 0-
3				1753.5	20385	23.33	24	0-1
3				1711.5	19965	23.70	24	0-1
			0	1732.5	20175	23.65	24	0-1
				1753.5	20385	23.37	24	0-1
				1711.5	19965	23.94	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		1 RB	7	1732.5	20175	23.32	24	0-1
				1753.5	20385	23.58	24	0-1
İ				1711.5	19965	23.33	24	0-1
ſ			14	1732.5	20175	23.52	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				1753.5	20385	23.29	24	
				1711.5	19965	22.59	23	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
	16-QAM		0	1732.5	20175	22.51	23	
				1753.5	20385	22.46	23	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				1711.5	19965	22.55	23	
		8 RB	4	1732.5	20175	22.51	23	
				1753.5	20385	22.36	23	
				1711.5	19965	22.53	23	+
			7	1732.5	20175	22.39	23	
				1753.5	20385	22.36	23	
				1711.5	19965	22.50	23	
		15RB		1732.5	20175	22.53	23	
				1753.5	20385	22.28	23	0-2

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				DD Band 4	1					
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)		
			0	1710.7	19957	24.35 24.18	24.5 24.5	0		
			0	1732.5 1754.3	20175	24.16	24.5	1		
				1734.3	19957	24.13	24.5	1		
		1 RB	2	1732.5	20175	24.23	24.5			
			_	1754.3	20393	24.19	24.5	ł		
				1710.7	19957	24.26	24.5	ł		
			5	1732.5	20175	24.27	24.5	ł		
				1754.3	20393	24.27	24.5	0		
				1710.7	19957	23.46	24	0-1		
	QPSK		0	1732.5	20175	23.31	24	0-1		
				1754.3	20393	23.29	24	0-1		
				1710.7	19957	23.27	24	0-1		
		3 RB	2	1732.5	20175	23.31	24	0-1		
				1754.3	20393	23.26	24	0-1		
				1710.7	19957	23.38	24	0 0 0 0 0 0 0 0 0 0-1 0-1 0-1 0-1		
			3	1732.5	20175	23.31	24			
				1754.3	20393	23.29	24	0-1		
				1710.7	19957	23.44	24	0-1		
		6	RB	1732.5	20175	23.36	24	0 0 0 0 0 0 0 0 0 0 0 0-1 0-1 0-1 0-1 0-		
1.4				1754.3	20393	23.29	24	0-1		
1.4				1710.7	19957	23.51	24	0-1		
			0	1732.5	20175	23.71	24	0-1		
				1754.3	20393	23.36	24	0-1		
				1710.7	19957	23.44	24	0-1		
		1 RB	2	1732.5	20175	23.50	24	0-1		
				1754.3	20393	23.58	24	0-1		
				1710.7	19957	23.26	24	0-1		
			5	1732.5	20175	23.36	24			
				1754.3	20393	23.25	24			
				1710.7	19957	22.43	23			
	16-QAM		0	1732.5	20175	22.44	23			
				1754.3	20393	22.36	23			
			_	1710.7	19957	22.32	23			
		3 RB	2	1732.5	20175	22.35	23			
				1754.3	20393	22.28	23			
			_	1710.7	19957	22.52	23	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1		
			3	1732.5	20175	22.28	23	1		
				1754.3	20393	22.33	23	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-2 0-2 0-2 0-2 0-2 0-2 0-2 0-2 0-2 0-2		
1			D.D.	1710.7	19957	22.47	23			
		6	RB	1732.5	20175	22.58	23	1		
				1754.3	20393	22.37	23	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	MPR Allowed per 3GPP(dB)		
				829	20450	24.36	24.5	0		
			0	836.5	20525	24.22	24.5	0		
				844	20600	24.16	24.5	0		
				829	20450	24.22	24.5	0		
		1 RB	25	836.5	20525	24.23	24.5	0		
				844	20600	24.30	24.5	0		
				829	20450	24.25	24.5	0		
			49	836.5	20525	24.21	24.5	0		
				844	20600	24.24	24.5	0		
ſ				829	20450	23.38	24	0-1		
	QPSK		0	836.5	20525	23.25	24	0-1		
				844	20600	23.27	24	0-1		
				829	20450	23.37	24	0-1		
		25 RB	12	836.5	20525	23.27	24	0-1		
				844	20600	23.40	24	0-1		
				829	20450	23.34	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
			25	836.5	20525	23.29	24			
				844	20600	23.41	24	0-1		
				829	20450	23.38	24	0-1		
		50	RB	836.5	20525	23.24	24	0-1		
10				844	20600	23.41	24	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1		
10				829	20450	23.88	24	0-1		
			0	836.5	20525	23.58	24	3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0-1		
				844	20600	23.43	24	0-1		
				829	20450	23.59	24	0-1		
		1 RB	25	836.5	20525	23.25	24	0-1		
İ				844	20600	23.58	24	0-1		
				829	20450	23.46	24			
			49	836.5	20525	23.48	24	ł		
				844	20600	23.77	24			
				829	20450	22.47	23			
	16-QAM		0	836.5	20525	22.34	23			
				844	20600	22.54	23	i e		
		0		829	20450	22.47	23			
		25 RB	12	836.5	20525	22.34	23			
				844	20600	22.58	23			
			0.5	829	20450	22.42	23			
			25	836.5	20525	22.46	23			
				844	20600	22.51	23	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1		
				829	20450	22.44	23			
		50RB		836.5	20525	22.38	23			
				844	20600	22.48	23	0-2		

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			-	DD Band 5	5							
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)				
				826.5	20425	24.36	(dRm) 24.5	0				
			0	836.5	20525	24.30	24.5					
				846.5	20625	24.17	24.5	-				
				826.5	20425	24.19	24.5					
		1 RB	12	836.5	20525	24.12	24.5					
				846.5	20625	24.29	24.5	0				
				826.5	20425	24.28	24.5	0				
			24	836.5	20525	24.14	24.5	0				
				846.5	20625	24.11	24.5	0				
				826.5	20425	23.42	24	0-1				
	QPSK		0	836.5	20525	23.21	24	0-1				
				846.5	20625	23.23	24	0-1				
				826.5	20425	23.31	24	0-1				
		12 RB	6	836.5	20525	23.26	24	0-1				
				846.5	20625	23.39	24	0-1				
				826.5	20425	23.32	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				
			13	836.5	20525	23.28	24					
				846.5	20625	23.40	24	0-1				
				826.5	20425	23.31	24					
		25	RB	836.5	20525	23.19	24					
5			1	846.5	20625	23.38	24	0 0 0 0 0 0 0 0-1 0-1 0-1 0-1 0-1 0-1 0-				
			0	826.5	20425	23.34	24					
			0	836.5	20525	23.40	24					
				846.5	20625	23.46	24	-				
		4 DD	10	826.5	20425	23.65	24					
		1 RB	12	836.5	20525	23.28	24					
				846.5 826.5	20625	23.66	24					
			24	836.5	20425	23.49 23.35	24 24					
			24	846.5	20625	23.33	24					
				826.5	20425	22.42	23					
	16-QAM		0	836.5	20525	22.30	23					
	10 (2) (1)			846.5	20625	22.54	23					
				826.5	20425	22.47	23	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0-1				
		12 RB	6	836.5	20525	22.32	23					
			12 KB 6	846.5	20625	22.56	23					
				826.5	20425	22.41	23					
			13	836.5	20525	22.37	23					
				846.5	20625	22.50	23					
			-	826.5	20425	22.41	23	0-2				
		25RB		836.5	20525	22.30	23	0-2				
				846.5	20625	22.45	23	0-2				

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			ſ	DD Band 5	5			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				825.5	20415	24.27	24.5	0
			0	836.5	20525	24.08	24.5	3GPP(dB)
				847.5	20635	24.15	24.5	0
				825.5	20415	23.24	24.5	0
		1 RB	7	836.5	20525	24.07	24.5	0
				847.5	20635	24.18	24.5	0
				825.5	20415	24.22	24.5	0
			14	836.5	20525	24.15	24.5	0
				847.5	20635	24.06	24.5	0
				825.5	20415	23.34	24	0-1
	QPSK		0	836.5	20525	23.24	24	0-1
				847.5	20635	23.25	24	0-1
				825.5	20415	23.36	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		8 RB	4	836.5	20525	23.24	24	0-1
				847.5	20635	23.36	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
				825.5	20415	23.36	24	0-1
			7	836.5	20525	23.23	24	0-1 0-1 0-1 0-1
				847.5	20635	23.35	24	0-1
				825.5	20415	23.41	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0-1 0-
		15	RB	836.5	20525	23.20	24	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1
3				847.5	20635	23.39	24	0-1
J				825.5	20415	23.29	24	0-1
			0 836.5 20525 23.53	23.53	24	0-1		
				847.5	20635	23.46	24	0-1
				825.5	20415	23.51	24	0-1
		1 RB	7	836.5	20525	23.06	24	0-1
				847.5	20635	23.51	24	0-1
				825.5	20415	23.61	24	0-1
			14	836.5	20525	23.52	24	0-1
				847.5	20635	23.10	24	0-1
				825.5	20415	22.58	23	
	16-QAM		0	836.5	20525	22.31	23	1
				847.5	20635	22.52	23	†
				825.5	20415	22.58	23	.5     0       .5     0       .5     0       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .4     0-1       .5     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2       .3     0-2
		8 RB	4	836.5	20525	22.36	23	
				847.5	20635	22.47	23	
			_	825.5	20415	22.52	23	
			7	836.5	20525	22.45	23	
				847.5	20635	22.55	23	
				825.5	20415	22.54	23	1
		15RB		836.5	20525	22.27	23	<del>                                     </del>
				847.5	20635	22.45	23	0-2

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			ſ	DD Band 5	5						
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)			
				824.7	20407	24.19	24.5	0			
			0	836.5	20525	24.06	24.5	0			
				848.3	20643	24.15	24.5	0			
				824.7	20407	24.29	24.5	0			
		1 RB	2	836.5	20525	24.14	24.5	0			
				848.3	20643	24.35	24.5	0			
				824.7	20407	24.21	24.5	0			
			5	836.5	20525	24.13	24.5	0			
				848.3	20643	24.14	24.5	0			
				824.7	20407	23.30	24	0-1			
	QPSK		0	836.5	20525	23.21	24	0-1			
				848.3	20643	23.32	24	0-1			
				824.7	20407	23.29	24	3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
		3 RB	2	836.5	20525	23.13	24				
				848.3	20643	23.23	24				
				824.7	20407	23.23	24	0-1			
			3	836.5	20525	23.19	24	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1			
				848.3	20643	23.36	24	0-1			
				824.7	20407	23.33	24	0-1			
		61	RB	836.5	20525	23.18	24	3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0-1 0-1 0-1 0-			
1.4				848.3	20643	23.39	24	0-1			
1.4				824.7	20407	23.46	24	0-1			
			0	836.5	20525	23.60	24	0-1			
				848.3	20643	23.19	24	0-1			
				824.7	20407	23.76	24	0-1			
		1 RB	2	836.5	20525	23.38	24	0-1			
				848.3	20643	23.79	24	0-1			
				824.7	20407	23.13	24	0-1			
			5	836.5	20525	23.43	24	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			
				848.3	20643	23.47	24	0-1			
				824.7	20407	22.35	23	0-2			
	16-QAM		0	836.5	20525	22.33	23	0-2			
				848.3	20643	22.39	23	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0-1 0-			
				824.7	20407	22.31	23	0-2			
		3 RB	2	836.5	20525	22.17	23	0-2			
				848.3	20643	22.31	23				
				824.7	20407	22.45	23				
			3	836.5	20525	22.16	23	1			
İ				848.3	20643	22.37	23	0-2			
				824.7	20407	22.39	23 0-2 23 0-2 23 0-2	0-2			
		6RB		836.5	20525	22.47	23	0-2			
				848.3	20643	22.49	23	0-2			

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			ſ	DD Band 7	7			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				2510	20850	22.01	22.3	0
			0	2535	21100	21.97	22.3	0
				2560	21350	22.09	22.3	0
				2510	20850	22.03	22.3	0
		1 RB	50	2535	21100	22.06	22.3	0
				2560	21350	22.16	22.3	0
				2510	20850	22.14	22.3	0
			99	2535	21100	22.28	22.3	0
				2560	21350	22.27	22.3	0
				2510	20850	21.03	22	0-1
	QPSK		0	2535	21100	21.12	22	0-1
				2560	21350	21.26	22	0-1
				2510	20850	21.02	22	0-1
		50 RB	25	2535	21100	21.13	22	0-1
				2560	21350	21.26	22	0-1
				2510	20850	21.14	22	0 0 0 0 0 0 0 0 0-1 0-1 0-1 0-1
			50	2535	21100	21.23	22	
				2560	21350	21.32	22	0-1
				2510	20850	21.02	22	0-1
		100	ORB	2535	21100	21.17	22	0-1
20				2560	21350	21.24	22	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0-1 0-1
20				2510	20850	21.22	22	0-1
			0	2535	21100	21.02	22	0-1
				2560	21350	21.06	22	0-1
				2510	20850	21.19	22	0-1
		1 RB	50	2535	21100	21.10	22	0-1
				2560	21350	21.02	22	0-1
				2510	20850	21.34	22	0-1
			99	2535	21100	21.28	22	0-1
				2560	21350	21.25	22	0-1
				2510	20850	20.01	21	0-2
	16-QAM		0	2535	21100	20.21	21	0-2
				2560	21350	20.18	21	0-2
				2510	20850	20.08	21	0-2
		50 RB	25	2535	21100	20.23	21	0-2
				2560	21350	20.33	21	0-2
				2510	20850	20.15	21	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1
			50	2535	21100	20.30	21	0-2
				2560	21350	20.36	21	0-2
				2510	20850	20.10	21	0-2
		100RB		2535	21100	20.16	21	
				2560	21350	20.20	21	0-2

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			ı	DD Band	7					
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)		
				2507.5	20825	21.99	22.3	0		
			0	2535	21100	22.00	22.3	0		
				2562.5	21375	22.09	22.3	0		
				2507.5	20825	21.99	22.3	0		
		1 RB	36	2535	21100	22.12	22.3	0		
				2562.5	21375	22.17	22.3	0		
				2507.5	20825	22.06	22.3	0		
			74	2535	21100	22.23	22.3	0		
				2562.5	21375	22.26	22.3	0		
				2507.5	20825	21.04	22	0-1		
	QPSK		0	2535	21100	21.15	22	0-1		
				2562.5	21375	21.29	22	0-1		
				2507.5	20825	21.07	22	0-1		
		36 RB	18	2535	21100	21.18	22	0-1		
				2562.5	21375	21.24	22	0-1		
				2507.5	20825	21.18	22	0 0 0 0 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1		
			37	2535	21100	21.27	22			
				2562.5	21375	21.31	22	0-1		
				2507.5	20825	21.08	22	0-1		
		75	RB	2535	21100	21.20	22	per 3GPP(dB) 0 0 0 0 0 0 0 0 0 0 0 0 0		
15				2562.5	21375	21.26	22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1 22 0-1			
13				2507.5	20825	21.19	22	0-1		
			0	2535	21100	21.20	22	0-1		
				2562.5	21375	21.49	22	0-1		
				2507.5	20825	21.17	22	0-1		
		1 RB	36	2535	21100	21.33	22	0-1		
				2562.5	21375	21.59	22	0-1		
				2507.5	20825	21.21	22	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
			74	2535	21100	21.30	22			
				2562.5	21375	21.71	22			
				2507.5	20825	20.03	21	0-2		
	16-QAM		0	2535	21100	20.11	21			
				2562.5	21375	20.13	21			
				2507.5	20825	20.03 20.11 20.13 20.02	21			
		36 RB	18	2535	21100	20.16	21	0 0 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1		
				2562.5	21375	20.13	21			
			l <u>.</u>	2507.5	20825	20.07	21	+		
			37	2535	21100	20.21	21			
				2562.5	21375	20.23	21			
				2507.5	20825	20.04	21			
		75RB		2535	21100	20.17	21			
				2562.5	21375	20.15	21	0-2		

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			ſ	DD Band 7	7			
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)
				2505	20800	21.82	22.3	0
			0	2535	21100	21.98	22.3	0
				2565	21400	22.16	22.3	0
		4.00		2505	20800	21.81	22.3	
		1 RB	25	2535	21100	21.99	22.3	
				2565 2505	21400 20800	22.19 21.87	22.3	
			49	2535	21100	22.09	22.3	
			1,	2565	21400	22.25	22.3	
				2505	20800	21.03	22	0-1
	QPSK		0	2535	21100	21.14	22	0-1
				2565	21400	21.20	22	0-1
				2505	20800	21.05	22	0-1
		25 RB	12	2535	21100	21.14	22	0-1
				2565	21400	21.20	22	0-1
				2505	20800	21.04	22	0-1
			25	2535	21100	21.17	22	
				2565	21400	21.14	22	
		E0	RB	2505	20800	21.02	22 22	
		30	IKD	2535 2565	21100 21400	21.16 21.22	22	
10				2505	20800	21.22	22	
			0	2535	21100	21.50	22	
				2565	21400	21.43	22	0-1
				2505	20800	21.15	22	0-1
		1 RB	25	2535	21100	21.53	22	0-1
				2565	21400	21.49	22	0-1
				2505	20800	21.20	22	0-1
			49	2535	21100	21.60	22	0-1
				2565	21400	21.54	22	0-1
	1/ 0444			2505	20800	20.04	21	
	16-QAM		0	2535	21100	20.08	21	
				2565 2505	21400 20800	20.08	21 21	
		25 RB	12	2535	21100	20.03 20.07	21	
		2010	12	2565	21400	20.07	21	
				2505	20800	20.02	21	0-2
			25	2535	21100	20.12	21	3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0-1 0-
				2565	21400	20.12	21	
				2505	20800	20.00	21	0-2
		50RB		2535	21100	20.14	21	0-2
				2565	21400	20.11	21	0-2

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D) A // A Al )		FDD Band 7												
BW(Mhz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	Target Power + Max. Tolerance	MPR Allowed per 3GPP(dB)						
				2502.5	20775	21.93	22.3	0						
			0	2535	21100	22.04	22.3	0						
				2567.5	21425	22.12	22.3	0						
				2502.5	20775	22.01	22.3	0						
		1 RB	12	2535	21100	22.12	22.3	0						
				2567.5	21425	22.24	22.3	0						
				2502.5	20775	21.89	22.3	0						
			24	2535	21100	22.05	22.3	0						
				2567.5	21425	22.11	22.3							
				2502.5	20775	21.07	22							
	QPSK		0	2535	21100	21.18	22							
				2567.5	21425	21.25	22							
		10 DD	,	2502.5	20775	21.12	22							
		12 RB	6	2535	21100	21.16	22							
				2567.5	21425	21.26	22 22	per 3GPP(dB) 0 0 0 0 0 0						
			13	2502.5 2535	20775	21.06 21.19	22							
			13	2567.5	21425	21.19	22							
	ŀ			2502.5	20775	21.03	22							
		25	RB	2535	21100	21.15	22							
		20		2567.5	21425	21.23	22							
5				2502.5	20775	21.18	22							
			0	2535	21100	21.24	22	+						
				2567.5	21425	21.30	22	0-1						
				2502.5	20775	21.27	22	0-1						
		1 RB	12	2535	21100	21.25	22	0-1						
				2567.5	21425	21.35	22	0-1						
				2502.5	20775	21.07	22	per 3GPP(dB)  0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
			24	2535	21100	21.26	22							
				2567.5	21425	21.27	22	0-1						
				2502.5	20775	20.07	21	0-2						
	16-QAM		0	2535	21100	20.17	21							
				2567.5	21425	20.24	21	1						
				2502.5	20775	20.06	21	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1						
		12 RB	6	2535	21100	20.17	21							
				2567.5	21425	20.26	21							
			12	2502.5	20775	20.08	21							
			13	2535	21100	20.19	21							
	}			2567.5	21425	20.23	21							
		25	RB	2502.5	20775	20.01	21							
		20	טאיי	2535 2567.5	21100 21425	20.07	21 21							

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

	802.11b	Max. Rated Avg.	Average Power Output (dBm)									
СН	Frequency	Power + Max.		Data Rat	e (Mbps)							
СП	(MHz)	Tolerance (dBm)	1	2	5.5	11						
1	2412	16.00	15.99	15.87	15.76	15.66						
6	2437	16.00	15.87	15.77	15.65	15.51						
11	2462	16.00	15.94	15.87	15.79	15.65						

	802.11g	Max. Rated Avg.	Max. Rated Avg. Average Power Output(dBm)							
СН	Frequency	Power + Max.			D	ata Rat	e (Mbp	s)		
СП	(MHz)	Tolerance (dBm)	6	9	12	18	24	36	48	54
1	2412	15.00	14.74	14.68	14.61	14.54	14.33	14.21	14.17	14.11
6	2437	15.00	14.78	14.62	14.55	14.41	14.32	14.27	14.07	14.00
11	2462	15.00	14.82	14.72	14.64	14.53	14.41	14.36	14.22	14.12

802	2.11n (20M)	Max. Rated Avg.	Average Power Output(dBm)								
CLI	Frequency	Power + Max.	Data Rate (Mbps)								
СН	(MHz)	Tolerance (dBm)	6.5	13	19.5	26	39	52	58.5	65	
1	2412	11.50	11.20	11.14	11.09	11.01	10.92	10.84	10.74	10.62	
6	2437	11.50	11.12	11.04	10.98	10.91	10.82	10.72	10.64	10.55	
11	2462	11.50	11.14	11.09	10.95	10.84	10.78	10.72	10.62	10.58	

802.11n (40M) Max. Rated Avg.			Average Power Output(dBm)								
CLI	Frequency	Power + Max.	Data Rate (Mbps)								
СН	(MHz)	Tolerance (dBm)	13.5	27	40.5	54	81	108	121.5	135	
3	2422	11.50	11.31	11.08	10.92	10.84	10.73	10.63	10.57	10.51	
6	2437	11.50	11.40	11.33	11.20	11.14	11.07	11.01	10.94	10.85	
9	2452	11.50	11.48	11.35	11.21	11.08	11.00	10.95	10.85	10.64	

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80	02.11a	Max. Rated								
	3G/5.6G/5.8G	Avg. Power +			Aver	age Po	wer (d	lBm)		
CII	Frequency	Max. Tolerance			Da	ita Rat	e (Mbp	s)		
СН	(MHz)	(dBm)	6	9	12	18	24	36	48	54
36	5180	14.00	13.77	13.62	13.54	13.41	13.34	13.28	13.18	13.07
40	5200	14.00	13.82	13.72	13.61	13.57	13.42	13.39	13.32	13.27
44	5220	14.00	13.87	13.75	13.70	13.64	13.54	13.48	13.42	13.37
48	5240	14.00	13.93	13.88	13.72	13.62	13.51	13.41	13.38	13.21
52	5260	14.00	13.99	13.84	13.75	13.62	13.54	13.43	13.31	13.28
56	5280	14.00	13.95	13.87	13.81	13.74	13.54	13.42	13.36	13.28
60	5300	14.00	13.98	13.85	13.81	13.64	13.58	13.50	13.47	13.32
64	5320	14.00	13.67	13.52	13.44	13.36	13.27	13.18	13.07	13.02
100	5500	14.00	13.87	13.76	13.61	13.54	13.41	13.27	13.18	13.08
104	5520	14.00	13.86	13.75	13.66	13.54	13.43	13.31	13.25	13.15
108	5540	14.00	13.88	13.81	13.72	13.61	13.52	13.41	13.34	13.24
112	5560	14.00	13.68	13.54	13.44	13.35	13.26	13.22	13.15	13.04
116	5580	14.00	13.82	13.72	13.64	13.51	13.48	13.22	13.17	13.05
132	5660	14.00	13.94	13.88	13.74	13.64	13.53	13.48	13.34	13.25
136	5680	14.00	13.65	13.61	13.52	13.42	13.34	13.27	13.15	13.02
140	5700	14.00	13.99	13.85	13.72	13.61	13.54	13.42	13.34	13.28
149	5745	14.00	13.77	13.62	13.54	13.42	13.34	13.27	13.18	13.14
153	5765	14.00	13.82	13.71	13.61	13.54	13.42	13.37	13.32	13.24
157	5785	14.00	13.83	13.72	13.67	13.55	13.41	13.38	13.24	13.12
161	5805	14.00	13.74	13.66	13.54	13.48	13.37	13.27	13.15	13.03
165	5825	14.00	13.72	13.61	13.54	13.42	13.31	13.21	13.17	13.08

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	11n(20M)	Max. Rated			Aver	age Po	wer (d	lBm)		
5.2G/5.3	3G/5.6G/5.8G	Avg. Power +								
СН	Frequency	Max. Tolerance			Da	ta Rat	e (Mbp	s)		
CIT	(MHz)	(dBm)	6.5	13	19.5	26	39	52	58.5	65
36	5180	13.00	12.86	12.75	12.62	12.54	12.41	12.34	12.26	12.15
40	5200	13.00	12.47	12.42	12.34	12.28	12.23	12.18	12.14	12.02
44	5220	13.00	12.73	12.62	12.54	12.42	12.37	12.25	12.17	12.08
48	5240	13.00	12.44	12.38	12.33	12.27	12.22	12.19	12.12	12.01
52	5260	13.00	12.86	12.75	12.62	12.52	12.42	12.34	12.28	12.17
56	5280	13.00	12.52	12.48	12.45	12.31	12.26	12.22	12.12	12.02
60	5300	13.00	12.99	12.84	12.72	12.67	12.50	12.42	12.31	12.25
64	5320	13.00	12.60	12.52	12.41	12.37	12.21	12.17	12.12	12.04
100	5500	13.00	12.86	12.81	12.72	12.61	12.52	12.41	12.34	12.28
104	5520	13.00	12.83	12.72	12.61	12.57	12.42	12.32	12.18	12.08
108	5540	13.00	12.91	12.85	12.75	12.64	12.52	12.46	12.34	12.25
112	5560	13.00	12.74	12.64	12.52	12.41	12.34	12.28	12.18	12.08
116	5580	13.00	12.54	12.44	12.38	12.32	12.25	12.16	12.12	12.05
132	5660	13.00	12.97	12.82	12.73	12.62	12.54	12.42	12.37	12.24
136	5680	13.00	12.96	12.82	12.74	12.61	12.57	12.40	12.33	12.25
140	5700	13.00	12.58	12.52	12.44	12.34	12.28	12.25	12.17	12.09
149	5745	13.00	12.60	12.54	12.42	12.39	12.29	12.18	12.09	12.01
153	5765	13.00	12.76	12.65	12.60	12.52	12.41	12.34	12.28	12.18
157	5785	13.00	12.78	12.62	12.53	12.44	12.35	12.28	12.24	12.16
161	5805	13.00	12.83	12.64	12.55	12.41	12.37	12.31	12.27	12.18
165	5825	13.00	12.66	12.61	12.59	12.45	12.31	12.25	12.12	12.05

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	11n(40M)	Max. Rated	Average Power (dBm)							
5.2G/5.3	3G/5.6G/5.8G	Avg. Power +								
СН	Frequency	Max. Tolerance	Data Rate (Mbps)							
СП	(MHz)	(dBm)	13.5	27	40.5	54	81	108	121.5	135
38	5190	10.50	10.25	10.17	10.11	10.05	9.98	9.85	9.77	9.68
46	5230	12.00	11.77	11.65	11.57	11.45	11.36	11.21	11.18	11.11
54	5270	12.00	11.74	11.65	11.54	11.42	11.32	11.24	11.16	11.06
62	5310	11.50	11.40	11.32	11.29	11.22	11.13	11.02	10.94	10.86
102	5510	11.50	11.30	11.21	11.15	11.07	10.96	10.81	10.76	10.69
110	5550	12.00	11.79	11.70	11.61	11.52	11.44	11.36	11.28	11.19
134	5670	12.00	11.87	11.79	11.65	11.52	11.43	11.33	11.21	11.18
151	5755	12.00	11.99	11.91	11.82	11.73	11.66	11.58	11.51	11.40
159	5795	12.00	11.76	11.68	11.57	11.44	11.36	11.28	11.16	11.09

## Bluetooth conducted power table:

Frequency		Peak (dBm)								
(MHz)	BR-DH5	ER-2DH5	ER-3DH5							
2402	3.50	3.13	3.24							
2441	5.38	4.74	4.80							
2480	4.42	3.80	3.90							

Frequency	Avg. (dBm)			
(MHz)	BT4.0			
2402	-6			
2442	-3.86			
2480	-5.21			

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#### 1.4 Test Environment

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

## 1.5 Operation Description

#### **General:**

- 1. The EUT is controlled by using a Radio Communication Tester (R&S CMU200 and Antrisu MT8820C), and the communication between the EUT and the tester is established by air link.
- Measurements are performed respectively on the lowest, middle and highest channels of the operating band(s). The EUT is set to maximum power level during all tests, and at the beginning of each test the battery is fully charged.
- 3. During the SAR testing, the DASY 5 system checks power drift by comparing the e-field strength of one specific location measured at the beginning with that measured at the end of the SAR testing.
- 4. Testing head SAR at lowest, middle and highest channel for all bands with Left Tilt /Left Cheek/Right Tilt/Right Cheek conditions.
- 5. Testing body-worn SAR by separating the EUT and the phantom **15mm** distance when performing GSM850/1900, WCDMA Band II/IV/V, LTE Band 2/4/5/7 and WLAN 5G. (Both front side & back side)
- 6. Testing hotspot mode SAR by separating the EUT and the phantom **10mm** distance.
  - #. The SAR testing for portable devices with wireless router capability is referred as test guidance of KDB 941225D06v02 (SAR Evaluation Procedures for Portable Devices with Wireless Router Capabilities).
  - #. The following procedures are applicable when the overall device length and width are ≥9 cm x 5 cm respectively. A test separation of 10 mm is required. SAR must be measured for all sides and surfaces with a transmitting antenna located within 25 mm from that surface or edge, for the data modes, wireless technologies and frequency bands supporting hotspot mode.

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# For WLAN 2.4G (15mm separation): the testing device support mobile hotspot function, the separation distance is 10mm (No need to perform body-worn SAR testing due to the hotspot mode (10mm separation distance) is more conservative than body-worn mode (15mm separation distance).

Test configurations:

- (1) Front side
- (2) Back side
- (3) Top side. (WWAN antenna to edge distance > 25mm\_ No SAR measurement is necessary for this configuration)
- (4) Bottom side. (WLAN antenna to edge distance >25mm\_ No SAR measurement is necessary for this configuration)
- (5) Right side. (WLAN antenna to edge distance >25mm\_ No SAR measurement is necessary for this configuration)
- (6) Left side.
- 7. According to KDB447498D01v05r02 The 1-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by: [(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)]  $\cdot [\sqrt{f(GHz)}] \le 3.0$  for 1-g SAR, SAR evaluation is not required. (Max power of Bluetooth = 5.38 dBm)

When SAR evaluation is not required to be measured, per FCC KDB447498D01v05r02, the following equation must be used to estimate the 1g SAR for simultaneous transmission assessment involving that transmitter.

Estimated SAR =  $[\sqrt{f(GHz)/7.5}] \cdot [(max. power of channel, mW)/(min. test separation)]$ distance, mm)]

Estimated 10g SAR =  $[\sqrt{f(GHz)/18.75}] \cdot [(max. power of channel, mW)/(min. test)]$ separation distance, mm)]

Mode	Frequency (MHz)	Maximum Power (dBm)	Separation Distance (Body) (mm)	Estimated SAR 1g (Body) (W/kg)	
Bluetooth	2441	5.38	15	0.048	
Bluetooth	2441	5.38	10	0.072	

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- 8. The SAR measurement for EDGE mode is not required since the source-based time-averaged power for EDGE mode is lower than that for GPRS mode.
- 9. The SAR measurement is not required for HSPA since its maximum output power is less than ¼ dB higher than RMC without HSPA.
- 10. The SAR measurement is not required for HSPA+ since its maximum output power is less than ¼ dB higher than RMC without HSPA+.
- 11. LTE modes test according to KDB 941225D05v02r03.
  - 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  $\leq 0.8$  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
    - For each modulation besides QPSK; e.g., 16-QAM, 64-QAM, apply the QPSK

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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 > ½ dB higher than the equivalent channel configurations in the largest channel bandwidth configuration or the reported SAR of a configuration for the largest channel bandwidth is > 1.45 W/kg.
  - The equivalent channel configuration for the RB allocation, RB offset and modulation etc. is determined for the smaller channel bandwidth according to the same number of RB allocated in the largest channel bandwidth.
- 12. The SAR measurement is not required for 802.11g/n since its maximum output power is less than 1/4 dB higher than 802.11b.
- 13. The SAR measurement is not required for 802.11n since its maximum output power is less than 1/4 dB higher than 802.11a.
- 14. The highest body SAR configuration is repeated with a headset attached.
- 15. According to KDB447498D01v05r02, 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  $\leq$  100 MHz.
- 16. According to KDB447498D01v05r02, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.6$  W/kg, when the transmission band is between 100 MHz and 200MHz.
- 17. According to KDB447498 D01v05r02, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is  $\leq 0.4$  W/kg, when the transmission band is  $\geq$  200MHz.

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18. According to KDB865664D01v01r03, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-q SAR limit)

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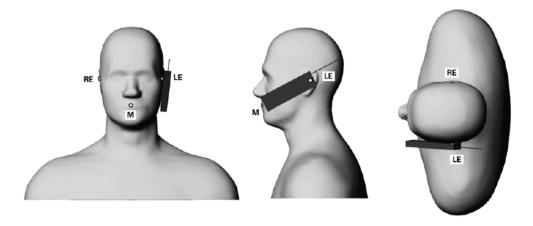
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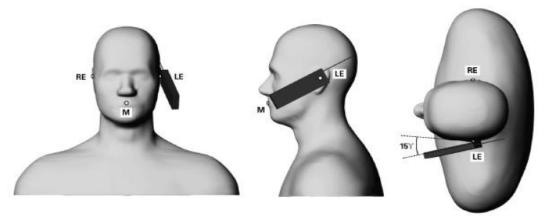


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## 1.6 Positioning Procedure



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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#### 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

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most SAR distributions even with relatively large grid spacing. After the area scanning measurement, the probe is automatically moved to a position at the interpolated maximum. The following scan can directly use this position for reference, e.g., for a finer resolution grid or the cube evaluations. The 1g and 10g peak evaluations are only available for the predefined cube 7x7x7 scans.

The routines are verified and optimized for the grid dimensions used in these cube measurements. The measured volume of 30x30x30mm contains about 30g of tissue. The first procedure is an extrapolation (incl. Boundary correction) to get the points between the lowest measured plane and the surface. The next step uses 3D interpolation to get all points within the measured volume. In the last step, a 1g cube is placed numerically into the volume and its averaged SAR is calculated. This cube is the moved around until the highest averaged SAR is found.

If the highest SAR is found at the edge of the measured volume, the system will issue a warning: higher SAR values might be found outside of the measured volume. In that case the cube measurement can be repeated, using the new interpolated maximum as the center.

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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.

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

Whereby  $\sigma$  is the conductivity,  $\rho$  the density and c the heat capacity of the liquid.

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

 The temperature gradient is not directly measurable but must be evaluated from temperature measurements at different time steps. Special precaution is necessary to avoid measurement errors caused by temperature gradients due to energy equalizing effects or convection currents in the liquid. Such effects cannot be completely avoided, as the measured field itself destroys the thermal equilibrium in the liquid. With a careful setup these errors can be kept small.

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• The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.

- The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures ( $\sim 2\%$  for c; much better for  $\rho$ ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed  $\pm 5\%$ .
- Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

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

## 1.8.2 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:

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

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- The accuracy of the calculated field strength will depend on the assessment of the dielectric parameters of the liquid.
- Due to the small wavelength in liquids with high permittivity, even small setups might be above the resonant cutoff frequencies. The field distribution in the setup must be carefully checked for conformity with the theoretical field distribution.

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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=  $\sigma$  ( $|Ei|^2$ )/  $\rho$ where  $\sigma$  and  $\rho$  are the conductivity and mass density of the tissue-simulant.

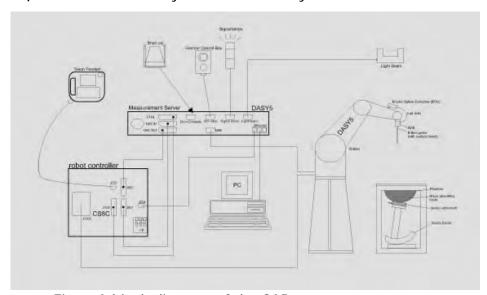


Fig. a A block diagram of the SAR measurement system

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

- A standard high precision 6-axis robot (Staubli RX family) with controller, teach pendant and software. An arm extension is for accommodating the data acquisition electronics (DAE).
- A dosimetric probe, i.e., an isotropic E-field probe optimized and calibrated for usage in tissue simulating liquid. The probe is equipped with an optical surface detector system.
- 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.

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

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## 1.10 System Components

## **EX3DV4 E-Field Probe**

Symmetrical design with triangular core Built-in
shielding against static charges PEEK enclosure
material (resistant to organic solvents, e.g.,
DGBE)
Basic Broad Band Calibration in air
Conversion Factors (CF) for HSL
835/1750/1900/2450/2600/5200/5300/
5600/5800 MHz Additional CF for other liquids
and frequencies upon request
10 MHz to > 6 GHz, Linearity: ± 0.6 dB
± 0.3 dB in HSL (rotation around probe axis)
± 0.5 dB in tissue material (rotation normal to probe axis)
$10 \mu W/g \text{ to } > 100 \text{ mW/g}$
Linearity: ± 0.2 dB (noise: typically < 1 μW/g)
Tip diameter: 2.5 mm
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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## **SAM PHANTOM V4.0C**

Construction: The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528-200X and IEC 62209.

It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.

Shell Thickness: 2 ± 0.2 mm

Filling Volume: Approx. 25 liters

Dimensions: Height: 210 mm;

> Length: 1000 mm; Width: 500 mm



#### **DEVICE HOLDER**

Construction	In combination with the Twin SAM Phantom
	V4.0/V4.0C or Twin SAM, the Mounting
	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 be easily and
	accurately positioned according to IEC, IEEE,
	CENELEC, FCC or other specifications. The
	device holder can be locked at different
	phantom locations (left head, right head, flat
	phantom).



Device Holder

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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 KDB865664 D01) from the target SAR values.

These tests were done at 835/1750/1900/2450/2600/5200/5300/5600/5800 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1. During the tests, the ambient temperature of the laboratory was  $21.7^{\circ}$ C, the relative humidity was 62% and the liquid depth above the ear reference points was above 15 cm ( $\leq$ 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.

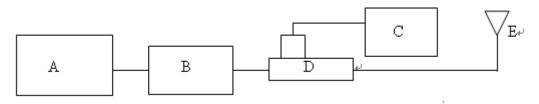
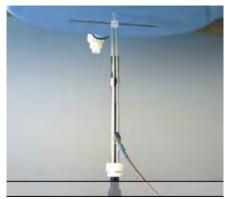


Fig. b The block diagram of system verification

- A. Signal Generator
- B. Amplifier
- C. Power Sensor
- D. Dual Directional Coupling
- E. Reference Dipole Antenna



Photograph of the Dipole Antenna

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Validation Kit	S/N	Frequ (MI	•	Target SAR (1g) (Pin=250mW)	Measured SAR (1g)(mW/g)	Deviation (%)	Measured Date	
			Head	2.38	2.35	1.26%	Nov. 17, 2014	
D835V2	4d063	835	Ticau	2.38	2.44	-2.52%	Dec. 04, 2014	
D033V2	4000	033	Body	2.41	2.41	0.00%	Nov. 17, 2014	
				2.41	2.47	-2.49%	Dec. 05, 2014	
			Head	9.26	8.96	3.24%	Nov. 18, 2014	
D1750V2	1008	1750	Heau	9.26	9.22	0.43%	Dec. 02, 2014	
D1/30V2	1008		Body	9.44	9.34	1.06%	Nov. 18, 2014	
			Бойу	9.44	9.26	1.91%	Dec. 03, 2014	
			Head	9.71	9.4	3.19%	Nov. 19, 2014	
D1900V2	5d027	027   1900	пеаи	9.71	9.95	-2.47%	Nov. 20, 2014	
D 1900 V 2	5u027	1900	Body	9.87	10.1	-2.33%	Nov. 19, 2014	
			Бойу	9.87	10.1	-2.33%	Dec. 01, 2014	
D2450V2	727	2450	Head	13.1	13.4	-2.29%	Nov. 23, 2014	
D2450V2	121	2430	Body	12.8	13.1	-2.34%	1100. 23, 2014	
D2600V2	1005	2600	Head	14.7	14.8	-0.68%	Dec. 06, 2014	
D2000V2	1005	2000	Body	14.3	14.2	0.70%	Dec. 08, 2014	
		5200	Head	8.02	7.94	1.00%	Nov. 20, 2014	
		5200	Body	7.69	7.51	2.34%	Nov. 22, 2014	
		5300	Head	8.45	8.66	-2.49%	Nov. 21, 2014	
D5GHzV2	1104	5300	Body	7.84	7.88	-0.51%	Nov. 22, 2014	
DOGUTAN	1104	5600	Head	8.31	8.47	-1.93%	Nov. 20, 2014	
		2000	Body	8.21	8.17	0.49%	Nov. 22, 2014	
		5800	Head	7.95	7.96	-0.13%	Nov. 21, 2014	
			Body	7.73	7.56	2.20%	Nov. 22, 2014	

Table 1. System validation (follow manufacture target value)

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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 conjuncation 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)

		T		N4					
Tissue Type	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, εr	Measured Conductivity, σ (S/m)	% dev εr	% dev σ	Measurement Date	
	824.2	41.556	0.899	41.276	0.872	0.67%	3.02%		
	826.4	41.545	0.899	41.250	0.874	0.71%	2.78%		
Head	835	41.500	0.900	41.143	0.883	0.86%	1.89%	Nov.17, 2014	
Head	836.6	41.500	0.902	41.119	0.885	0.92%	1.88%	1100.17, 2014	
	846.6	41.500	0.912	40.990	0.894	1.23%	1.97%		
	848.8	41.500	0.915	40.965	0.896	1.29%	2.08%		
	824.2	55.242	0.969	52.977	1.001	4.10%	-3.29%		
	826.4	55.234	0.969	52.958	1.004	4.12%	-3.61%	Nov.17, 2014	
Body	835	55.2	0.97	52.883	1.013	4.20%	-4.43%		
Бойу	836.6	55.195	0.972	52.864	1.015	4.22%	-4.42%		
	846.6	55.164	0.984	52.778	1.025	4.33%	-4.17%		
	848.8	55.158	0.987	52.759	1.027	4.35%	-4.05%		
	829	41.531	0.9	40.238	0.887	3.11%	1.44%		
Head	835	41.500	0.9	40.231	0.893	3.06%	0.78%	Dec. 04, 2014	
Heau	836.5	41.500	0.902	40.227	0.896	3.07%	0.67%		
	844	41.500	0.91	40.219	0.903	3.09%	0.77%		
	829	55.223	0.97	54.161	0.962	1.92%	0.82%		
Body	835	55.2	0.97	54.153	0.97	1.90%	0.00%	Dec. 05, 2014	
Бойу	836.5	55.195	0.972	54.149	0.973	1.90%	-0.10%	Dec. 05, 2014	
	844	55.172	0.981	54.002	0.992	2.12%	-1.12%		
	1712.4	40.138	1.349	39.596	1.343	1.35%	0.44%		
Head	1732.4	40.107	1.361	39.609	1.364	1.24%	-0.22%		
пеаи	1750	40.079	1.371	39.577	1.377	1.25%	-0.44%		
	1752.6	40.075	1.373	39.561	1.379	1.28%	-0.44%	Nov. 10, 2014	
	1712.4	53.531	1.465	54.495	1.431	-1.80%	2.32%	Nov. 18, 2014	
Dody.	1732.4	53.478	1.477	54.462	1.446	-1.84%	2.10%		
Body	1750	53.432	1.488	54.398	1.458	-1.81%	2.02%		
	1752.6	53.425	1.49	54.383	1.461	-1.79%	1.95%		

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Tissue Type	Measured Frequency (MHz)	Target Dielectric Constant, Er	Target Conductivity, σ (S/m)	Measured Dielectric Constant,	Measured Conductivity, σ (S/m)	% dev εr	% dev σ	Measurement Date
	1720	40.126	1.354	40.523	1.294	-0.99%	4.43%	
Head	1732.5	40.107	1.361	40.392	1.306	-0.71%	4.04%	Dec. 02, 2014
пеац	1745	40.187	1.368	40.211	1.314	-0.06%	3.95%	Dec. 02, 2014
	1750	40.079	1.371	40.155	1.321	-0.19%	3.65%	
	1720	53.511	1.469	54.922	1.448	-2.64%	1.43%	
Body	1732.5	53.478	1.477	54.757	1.457	-2.39%	1.35%	Dec. 03, 2014
	1745	53.445	1.485	54.533	1.469	-2.04%	1.08%	Dec. 03, 2014
	1750	53.432	1.488	54.458	1.476	-1.92%	0.81%	
	1850.2	40.000	1.400	39.758	1.358	0.60%	3.00%	
	1852.4	40.000	1.400	39.748	1.340	0.63%	4.29%	
Hood	1880	40.000	1.400	39.651	1.368	0.87%	2.29%	
Head	1900	40.000	1.400	39.567	1.388	1.08%	0.86%	
	1907.6	40.000	1.400	39.538	1.396	1.16%	0.29%	N 40 0044
	1909.8	40.000	1.400	39.531	1.398	1.17%	0.14%	
	1850.2	53.300	1.520	51.913	1.450	2.60%	4.61%	Nov. 19, 2014
	1852.4	53.300	1.520	51.902	1.459	2.62%	4.01%	
Daraha	1880	53.300	1.520	51.735	1.468	2.94%	3.42%	
Body	1900	53.300	1.520	51.639	1.492	3.12%	1.84%	
	1907.6	53.300	1.520	51.621	1.503	3.15%	1.12%	
	1909.8	53.300	1.520	51.618	1.505	3.16%	0.99%	
	1860	40.000	1.400	39.406	1.419	1.49%	-1.36%	
Head	1880	40.000	1.400	39.349	1.424	1.63%	-1.71%	Nov. 20, 2014
	1900	40.000	1.400	39.256	1.432	1.86%	-2.29%	
	1860	53.300	1.520	54.016	1.492	-1.34%	1.84%	
Body	1880	53.300	1.520	53.769	1.527	-0.88%	-0.46%	Dec. 01, 2014
2009	1900	53.300	1.520	53.523	1.549	-0.42%	-1.91%	
	2412	39.268	1.766	39.3	1.779	-0.08%	-0.74%	
	2437	39.223	1.788	39.231	1.808	-0.02%	-1.12%	
Head	2450	39.200	1.800	39.185	1.823	0.04%	-1.28%	
	2462	39.185	1.813	39.117	1.836	0.17%	-1.27%	N. 00 0044
	2412	52.751	1.914	50.237	1.992	4.77%	-4.08%	Nov. 23, 2014
D. 1	2437	52.717	1.938	50.142	2.027	4.88%	-4.59%	
Body	2450	52.700	1.950	50.104	2.045	4.93%	-4.87%	
	2462	52.685	1.967	50.06	2.063	4.98%	-4.88%	

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Tissue Type	Measured Frequency (MHz)	Target Dielectric Constant, Er	Target Conductivity, σ (S/m)	Measured Dielectric Constant, Er	Measured Conductivity, σ (S/m)	% dev ɛr	% dev σ	Measurement Date
	2510	39.124	1.865	41.058	1.812	-4.94%	2.84%	
heal	2535	39.092	1.893	41.027	1.827	-4.95%	3.49%	Dec. 06, 2014
Heau	2560	39.060	1.920	40.809	1.848	-4.48%	3.75%	Dec. 00, 2014
	2600	39.009	1.964	40.522	1.886	-3.88%	3.97%	
	2510	52.624	2.035	53.492	1.976	-1.65%	2.90%	
Dody	2535	52.592	2.071	53.211	2.019	-1.18%	2.51%	Dog 00 2014
Head	2560	52.560	2.106	53.008	2.062	-0.85%	2.09%	Dec. 08, 2014
	2600	52.509	2.163	52.776	2.11	-0.51%	2.45%	1
	5200	35.986	4.655	36.085	4.615	-0.28%	0.86%	
	5240	35.940	4.696	36.083	4.666	-0.40%	0.64%	
	5540	35.597	5.004	35.299	5.015	0.84%	-0.23%	Nov. 20, 2014
	5600	35.529	5.065	35.154	5.078	1.05%	-0.26%	Nov. 20, 2014
	5660	35.460	5.127	35.047	5.151	1.16%	-0.48%	
Hood	5700	35.414	5.168	34.941	5.193	1.34%	-0.48%	
неаи	5260	35.917	4.717	36.013	4.675	-0.27%	0.89%	
	5300	35.871	4.758	35.839	4.728	0.09%	0.62%	
	5765	35.340	5.234	34.773	5.274	1.60%	-0.76%	Nov. 21, 2014
	5785	35.317	5.255	34.739	5.302	1.64%	-0.89%	
	5800	35.300	5.270	34.714	5.312	1.66%	-0.80%	
	5805	35.294	5.275	34.689	5.317	1.71%	-0.79%	
	5200	49.014	5.299	48.522	5.337	1.00%	-0.71%	
	5240	48.960	5.346	48.343	5.351	1.26%	-0.09%	1
	5260	48.933	5.369	48.196	5.408	1.51%	-0.72%	
Body	5300	48.879	5.416	47.787	5.474	2.23%	-1.07%	
	5540	48.553	5.696	47.094	5.821	3.00%	-2.19%	
	5600	48.471	5.766	47.056	5.911	2.92%	-2.51%	Nov 22 2014
	5660	48.390	5.837	46.833	6.004	3.22%	-2.87%	Nov. 22, 2014
	5700	48.336	5.883	46.798	6.027	3.18%	-2.44%	
	5765	48.248	5.959	46.666	6.143	3.28%	-3.09%	
	5785	48.220	5.982	46.545	6.174	3.47%	-3.20%	
	5800	48.200	6.000	46.450	6.190	3.63%	-3.17%	
	5805	48.193	6.006	46.422	6.193	3.68%	-3.12%	

Table 2. Dielectric Parameters of Tissue Simulant Fluid

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The composition of the brain tissue simulating liquid:

	Mode	line compe						
Frequency (MHz)		DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	Total amount
050	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)
1750	Head	444.52 g	552.42 g	3.06 g				1.0L(Kg)
1750	Body	300.67 g	716.56 g	4.0 g				1.0L(Kg)
1900	Head	444.52 g	552.42 g	3.06 g	_	_	_	1.0L(Kg)
	Body	300.67 g	716.56 g	4.0 g				1.0L(Kg)
2450	Head	550ml	450ml					1.0L(Kg)
	Body	301.7ml	698.3ml		_	_	_	1.0L(Kg)
2600	Head	550ml	450ml	_	_	_	_	1.0L(Kg)
	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 C95.1-1992, Copyright 1992 by the Institute of Electrical and Electronics Engineers, Inc., New York, New York 10017.

These criteria for SAR evaluation are similar to those recommended by the National Council on Radiation Protection and Measurements (NCRP) in "Biological Effects and Exposure Criteria for Radio frequency Electromagnetic Fields," NCRP Report No. 86, Section 17.4.5. Copyright NCRP, 1986, Bethesda, Maryland 20814. SAR is a measure of the rate of energy absorption due to exposure to an RF transmitting source. SAR values have been related to threshold levels for potential biological hazards. The criteria to be used are specified in paragraphs (d)(1) and (d)(2) of this section and shall apply for portable devices transmitting in the frequency range from 100 kHz to 6 GHz. Portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in § 1.1310 of this chapter.

Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

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

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(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).

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

Table 4. RF exposure limits

#### Notes:

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

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# 2. Summary of Results

#### **GSM 850 MHz**

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged 1 (W/ Measured		Plot page
	Re Cheek	_	251	848.8	33.50	33.50	0.00%	0.265	0.265	-
	Re Tilt	-	251	848.8	33.50	33.50	0.00%	0.184	0.184	-
GSM850	Le Cheek	-	128	824.2	33.50	33.10	9.65%	0.387	0.424	108
(GMSK) (Head)	Le Cheek	-	190	836.6	33.50	33.20	7.15%	0.341	0.365	-
(Ficad)	Le Cheek	-	251	848.8	33.50	33.50	0.00%	0.311	0.311	-
	Le Tilt	-	251	848.8	33.50	33.50	0.00%	0.176	0.176	-
GSM850	Front side	15mm	251	848.8	33.50	33.50	0.00%	0.146	0.146	-
(GMSK)	Back side	15mm	128	824.2	33.50	33.10	9.65%	0.29	0.318	109
(Speech	Back side	15mm	190	836.6	33.50	33.20	7.15%	0.261	0.280	-
mode)	Back side	15mm	251	848.8	33.50	33.50	0.00%	0.236	0.236	-
	Front side	10mm	251	848.8	33.50	33.50	0.00%	0.337	0.337	-
	Back side	10mm	128	824.2	33.50	33.10	9.65%	0.638	0.700	110
GPRS850	Back side	10mm	190	836.6	33.50	33.20	7.15%	0.588	0.630	-
(GMSK)	Back side	10mm	251	848.8	33.50	33.50	0.00%	0.54	0.540	-
(Hotspot)	Bottom side	10mm	251	848.8	33.50	33.50	0.00%	0.182	0.182	-
	Right side	10mm	251	848.8	33.50	33.50	0.00%	0.28	0.280	-
	Left side	10mm	251	848.8	33.50	33.50	0.00%	0.478	0.478	-

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## **GSM 1900 MHz**

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance	Measured Avg. Power (dBm)	Scaling	1	SAR over g /kg) Reported	Plot page
	Re Cheek	-	810	1909.8	30.50	30.50	0.00%	0.09	0.090	-
	Re Tilt	-	810	1909.8	30.50	30.50	0.00%	0.048	0.048	-
GSM1900 (GMSK)	Le Cheek	-	512	1850.2	30.50	30.30	4.71%	0.089	0.093	-
(Head)	Le Cheek	-	661	1880	30.50	30.30	4.71%	0.122	0.128	-
(,	Le Cheek	-	810	1909.8	30.50	30.50	0.00%	0.147	0.147	111
	Le Tilt	-	810	1909.8	30.50	30.50	0.00%	0.052	0.052	-
GSM1900	Front side	15mm	810	1909.8	30.50	30.50	0.00%	0.304	0.304	-
(GMSK)	Back side	15mm	512	1850.2	30.50	30.30	4.71%	0.356	0.373	-
(Speech	Back side	15mm	661	1880	30.50	30.30	4.71%	0.389	0.407	-
mode)	Back side	15mm	810	1909.8	30.50	30.50	0.00%	0.47	0.470	112
	Front side	10mm	810	1909.8	30.50	30.50	0.00%	0.432	0.432	-
	Back side	10mm	810	1909.8	30.50	30.50	0.00%	0.711	0.711	-
0.00.01.000	Bottom side	10mm	512	1850.2	30.50	30.30	4.71%	0.74	0.775	-
GPRS1900 (GMSK)	Bottom side	10mm	661	1880	30.50	30.30	4.71%	0.791	0.828	-
(Hotspot)	Bottom side	10mm	810	1909.8	30.50	30.50	0.00%	0.898	0.898	113
(111000)	*Bottom side	10mm	810	1909.8	30.50	30.50	0.00%	0.889	0.889	-
	Right side	10mm	810	1909.8	30.50	30.50	0.00%	0.11	0.110	-
	Left side	10mm	810	1909.8	30.50	30.50	0.00%	0.124	0.124	-

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## **WCDMA Band II**

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling		SAR over 1g /kg)	Plot page
		(11111)		(1711 12)	Tolerance (dBm)	(dBm)		Measured	Reported	page
	RE Cheek	-	9400	1880	24.5	24.50	0.00%	0.159	0.159	-
	RE Tilt	-	9400	1880	24.5	24.50	0.00%	0.098	0.098	-
R99	LE Cheek	-	9262	1852.4	24.5	24.48	0.46%	0.151	0.152	-
(Head)	LE Cheek	-	9400	1880	24.5	24.50	0.00%	0.192	0.192	-
	LE Cheek	-	9538	1907.6	24.5	24.38	2.80%	0.228	0.234	114
	LE Tilt	-	9400	1880	24.5	24.50	0.00%	0.082	0.082	-
	Front side	15mm	9400	1880	24.5	24.50	0.00%	0.468	0.468	-
Body-worn	Back side	15mm	9262	1852.4	24.5	24.48	0.46%	0.733	0.736	-
(speech	Back side	15mm	9400	1880	24.5	24.50	0.00%	0.784	0.784	-
mode)	Back side	15mm	9538	1907.6	24.5	24.38	2.80%	0.792	0.814	-
	Back side*	15mm	9538	1907.6	24.5	24.38	2.80%	0.817	0.840	115
	Front side	10mm	9262	1852.4	22	21.57	10.41%	0.48	0.530	-
	Back side	10mm	9262	1852.4	22	21.57	10.41%	0.773	0.853	-
	Back side	10mm	9400	1880	22	21.53	11.43%	0.864	0.963	-
	Back side	10mm	9538	1907.6	22	21.31	17.22%	0.844	0.989	-
Hotspot	Bottom side	10mm	9262	1852.4	22	21.57	10.41%	0.918	1.014	116
πυιδρυι	Bottom side	10mm	9400	1880	22	21.53	11.43%	0.907	1.011	-
	Bottom side	10mm	9538	1907.6	22	21.31	17.22%	0.87	1.020	-
	Bottom side*	10mm	9538	1907.6	22	21.31	17.22%	0.867	1.016	-
	Right side	10mm	9262	1852.4	22	21.57	10.41%	0.071	0.078	-
	Left side	10mm	9262	1852.4	22	21.57	10.41%	0.113	0.125	-

<sup>\* -</sup> repeated at the highest SAR measurement according to the KDB 865664 D01v01

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## WCDMA Band IV

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling		AR over 1g 'kg)	Plot page
		(11111)		(1711 12)	Tolerance (dBm)	(dBm)		Measured	Reported	page
	RE Cheek	-	1312	1712.4	24.5	24.50	0.00%	0.41	0.410	-
	RE Tilt	-	1312	1712.4	24.5	24.50	0.00%	0.109	0.109	-
R99	LE Cheek	-	1312	1712.4	24.5	24.50	0.00%	0.519	0.519	117
(Head)	LE Cheek	-	1412	1732.4	24.5	24.48	0.46%	0.456	0.458	-
	LE Cheek	-	1513	1752.6	24.5	24.47	0.69%	0.428	0.431	-
	LE Tilt	-	1312	1712.4	24.5	24.50	0.00%	0.081	0.081	-
	Front side	15mm	1312	1712.4	24.5	24.50	0.00%	0.635	0.635	-
Body-worn	Back side	15mm	1312	1712.4	24.5	24.50	0.00%	0.689	0.689	118
(speech mode)	Back side	15mm	1412	1732.4	24.5	24.48	0.46%	0.611	0.614	-
	Back side	15mm	1513	1752.6	24.5	24.47	0.69%	0.665	0.670	-
	Front side	10mm	1412	1732.4	22.5	21.56	24.17%	0.6	0.745	-
	Back side	10mm	1412	1732.4	22.5	21.56	24.17%	0.615	0.764	-
	Bottom side	10mm	1312	1712.4	22.5	21.48	26.47%	0.787	0.995	-
Hotspot	Bottom side	10mm	1412	1732.4	22.5	21.56	24.17%	0.879	1.091	-
потѕрот	Bottom side	10mm	1513	1752.6	22.5	21.50	25.89%	0.947	1.192	119
	Bottom side*	10mm	1513	1752.6	22.5	21.50	25.89%	0.946	1.191	-
	Right side	10mm	1412	1732.4	22.5	21.56	24.17%	0.154	0.191	-
	Left side	10mm	1412	1732.4	22.5	21.56	24.17%	0.141	0.175	-

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## WCDMA Band V

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	•	SAR over 1g /kg)	Plot page
		(11111)		(IVII IZ)	Tolerance (dBm)	(dBm)		Measured	Reported	page
	RE Cheek	-	4132	826.4	24.5	24.44	1.39%	0.306	0.310	-
	RE Tilt	-	4132	826.4	24.5	24.44	1.39%	0.205	0.208	-
R99	LE Cheek	-	4132	826.4	24.5	24.44	1.39%	0.372	0.377	120
(Head)	LE Cheek	-	4183	836.6	24.5	24.20	7.15%	0.349	0.374	-
	LE Cheek	-	4233	846.6	24.5	24.07	10.41%	0.355	0.392	-
	LE Tilt	-	4132	826.4	24.5	24.44	1.39%	0.21	0.213	-
	Front side	15mm	4132	826.4	24.5	24.44	1.39%	0.235	0.238	-
Body-worn	Back side	15mm	4132	826.4	24.5	24.44	1.39%	0.294	0.298	121
(speech mode)	Back side	15mm	4183	836.6	24.5	24.20	7.15%	0.282	0.302	-
	Back side	15mm	4233	846.6	24.5	24.07	10.41%	0.288	0.318	-
	Front side	10mm	4132	826.4	24.5	24.44	1.39%	0.49	0.497	-
	Back side	10mm	4132	826.4	24.5	24.44	1.39%	0.796	0.807	122
	Back side	10mm	4183	836.6	24.5	24.20	7.15%	0.729	0.781	-
Hotspot	Back side	10mm	4233	846.6	24.5	24.07	10.41%	0.758	0.837	-
	Bottom side	10mm	4132	826.4	24.5	24.44	1.39%	0.201	0.204	-
	Right side	10mm	4132	826.4	24.5	24.44	1.39%	0.34	0.345	-
	Left side	10mm	4132	826.4	24.5	24.44	1.39%	0.545	0.553	-

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#### LTE FDD Band II

LIEFL	Dai	14 11												
									Max.			Averaged		
Mode	Bandwidth (MHz)	Modulation	DD Sizo	DD ctart	Position	Distance	СН	Freq.	Rated Avg.	Measured Avg.	Scaling	1g (V	V/kg)	Plot
Widue	(MHz)	viouulatioi	ND SIZE	KD Start	FUSITION	(mm)	СП	(MHz)	Power + Max. Tolerance	Power (dBm)	Scaling	Measured	Reported	page
									(dBm)					
					RE Cheek	-	19100	1900	24.5	24.47	0.69%	0.381	0.384	-
					RE Tilt	-	19100	1900	24.5	24.47	0.69%	0.117	0.118	-
			1 RB	99	LE Cheek	-	18700	1860	24.5	24.27	5.44%	0.384	0.405	-
			TIND	,,	LE Cheek	-	18900	1880	24.5	24.37	3.04%	0.415	0.428	-
					LE Cheek	-	19100	1900	24.5	24.47	0.69%	0.429	0.432	123
	TE D. 10				LE Tilt	-	19100	1900	24.5	24.47	0.69%	0.081	0.082	-
LTE Band 2	20MHz	QPSK			RE Cheek	-	19100	1900	24	23.69	7.40%	0.315	0.338	-
(Head)	ZUIVII IZ	QFSK	50 RB	50	RE Tilt	-	19100	1900	24	23.69	7.40%	0.095	0.102	-
			30 KD	30	LE Cheek	-	19100	1900	24	23.69	7.40%	0.359	0.386	-
					LE Tilt	-	19100	1900	24	23.69	7.40%	0.066	0.071	-
					RE Cheek	-	19100	1900	24	23.44	13.76%	0.311	0.354	-
			100	) RB	RE Tilt	-	19100	1900	24	23.44	13.76%	0.091	0.104	-
			100	/ KD	LE Cheek	-	19100	1900	24	23.44	13.76%	0.356	0.405	-
					LE Tilt	-	19100	1900	24	23.44	13.76%	0.064	0.073	-
					Front side	15mm	19100	1900	24.5	24.47	0.69%	0.434	0.437	-
			1 RB	99	Back side	15mm	18700	1860	24.5	24.27	5.44%	0.738	0.778	-
LTE Band 2			I KD	77	Back side	15mm	18900	1880	24.5	24.37	3.04%	0.758	0.781	-
	20MHz	QPSK			Back side	15mm	19100	1900	24.5	24.47	0.69%	0.804	0.810	124
(Body- Worn)	ZUIVITIZ	Ursk	50 RB	50	Front side	15mm	19100	1900	24	23.69	7.40%	0.346	0.372	-
(VVOITI)			מא טכ	50	Back side	15mm	19100	1900	24	23.69	7.40%	0.644	0.692	-
			100	RB (	Front side	15mm	19100	1900	24	23.44	13.76%	0.327	0.372	-
		100	, KD	Back side	15mm	19100	1900	24	23.44	13.76%	0.643	0.731	-	

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	Bandwidth					Distance		Freq.	Max. Rated Avg.	Measured Avg.			SAR over V/kg)	Plot
Mode	Bandwidth (MHz)	Modulatior	RB Size	RB start	Position	(mm)	СН	(MHz)	Power + Max. Tolerance (dRm)	Power (dBm)	Scaling	Measured	Reported	page
					Front side	10mm	19100	1900	22	21.92	1.86%	0.426	0.434	-
					Back side	10mm	18700	1860	22	21.71	6.91%	0.707	0.756	-
					Back side	10mm	18900	1880	22	21.67	7.89%	0.747	0.806	-
					Back side	10mm	19100	1900	22	21.92	1.86%	0.786	0.801	-
			1 RB	99	Bottom side	10mm	18700	1860	22	21.71	6.91%	0.874	0.934	-
					Bottom side	10mm	18900	1880	22	21.67	7.89%	0.859	0.927	-
					Bottom side	10mm	19100	1900	22	21.92	1.86%	0.899	0.916	-
					Right side	10mm	19100	1900	22	21.92	1.86%	0.086	0.088	-
					Left side	10mm	19100	1900	22	21.92	1.86%	0.091	0.093	-
					Front side	10mm	19100	1900	22	21.96	0.93%	0.445	0.449	-
					Back side	10mm	18700	1860	22	21.66	8.14%	0.715	0.773	-
					Back side	10mm	18900	1880	22	21.69	7.40%	0.771	0.828	-
					Back side	10mm	19100	1900	22	21.96	0.93%	0.83	0.838	-
LTE Band 2	20MHz	QPSK	50 RB	50	Bottom side	10mm	18700	1860	22	21.66	8.14%	0.916	0.991	-
(Hotspot)	ZUIVITIZ	UFSK	30 KB	50	Bottom side	10mm	18900	1880	22	21.69	7.40%	0.897	0.963	-
					Bottom side	10mm	19100	1900	22	21.96	0.93%	0.949	0.958	125
					Bottom side*	10mm	19100	1900	22	21.96	0.93%	0.949	0.958	-
					Right side	10mm	19100	1900	22	21.96	0.93%	0.089	0.090	-
					Left side	10mm	19100	1900	22	21.96	0.93%	0.096	0.097	-
					Front side	10mm	19100	1900	22	21.84	3.75%	0.432	0.448	-
					Back side	10mm	18700	1860	22	21.59	9.90%	0.715	0.786	-
					Back side	10mm	18900	1880	22	21.65	8.39%	0.758	0.822	-
					Back side	10mm	19100	1900	22	21.84	3.75%	0.805	0.835	-
			100	) RB	Bottom side	10mm	18700	1860	22	21.59	9.90%	0.919	1.010	-
					Bottom side	10mm	18900	1880	22	21.65	8.39%	0.889	0.964	-
					Bottom side	10mm	19100	1900	22	21.84	3.75%	0.931	0.966	-
					Right side	10mm	19100	1900	22	21.84	3.75%	0.09	0.093	-
					Left side	10mm	19100	1900	22	21.84	3.75%	0.095	0.099	-

<sup>\* -</sup> repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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## LTE FDD Band IV

	D Bai								Max. Rated	Measured			SAR over V/kg)	
Mode	Bandwidth (MHz)	Modulatior	RB Size	RB start	Position	Distance (mm)	СН	Freq. (MHz)	Avg. Power + Max. Tolerance (dBm)	Avg. Power (dBm)	Scaling	Measured	Reported	Plot page
				50	RE Cheek	-	20050	1720	24.5	24.41	2.09%	0.311	0.318	-
				50	RE Tilt	-	20050	1720	24.5	24.41	2.09%	0.102	0.104	-
			1 RB	0	LE Cheek	-	20300	1745	24.5	24.38	2.80%	0.328	0.337	-
			I KD	50	LE Cheek	-	20050	1720	24.5	24.41	2.09%	0.38	0.388	126
				50	LE Cheek	-	20175	1732.5	24.5	24.39	2.57%	0.328	0.336	-
				50	LE Tilt	-	20050	1720	24.5	24.41	2.09%	0.043	0.044	-
LTE Band 4	20MHz	QPSK			RE Cheek	-	20300	1745	24	23.55	10.92%	0.253	0.281	-
(Head)	ZUIVII IZ	QI JIX	50 RB	0	RE Tilt	-	20300	1745	24	23.55	10.92%	0.097	0.108	-
			30 KB	0	LE Cheek	-	20300	1745	24	23.55	10.92%	0.285	0.316	-
					LE Tilt	-	20300	1745	24	23.55	10.92%	0.037	0.041	-
					RE Cheek	-	20300	1745	24	23.46	13.24%	0.24	0.272	-
			100	) RB	RE Tilt	-	20300	1745	24	23.46	13.24%	0.095	0.108	-
			100	, KD	LE Cheek	-	20300	1745	24	23.46	13.24%	0.308	0.349	-
					LE Tilt	-	20300	1745	24	23.46	13.24%	0.038	0.043	-
				50	Front side	15mm	20050	1720	24.5	24.41	2.09%	0.298	0.304	-
			1 RB	0	Back side	15mm	20300	1745	24.5	24.38	2.80%	0.461	0.474	-
LTE Band 4			TILD	50	Back side	15mm	20050	1720	24.5	24.41	2.09%	0.559	0.571	127
(Body-	20MHz	QPSK		50	Back side	15mm	20175	1732.5	24.5	24.39	2.57%	0.464	0.476	-
Worn)	ZOWINZ	21 510	50 RB	0	Front side	15mm	20300	1745	24	23.55	10.92%	0.142	0.158	-
			OU ND		Back side	15mm	20300	1745	24	23.55	10.92%	0.47	0.521	-
			100	) RB	Front side	15mm	20300	1745	24	23.46	13.24%	0.147	0.166	-
		100	, ,,,,	Back side	15mm	20300	1745	24	23.46	13.24%	0.466	0.528	-	

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									Max. Rated	Measured		Averaged 1g (V	SAR over V/kg)	
Mode	Bandwidth (MHz)	Modulatior	RB Size	RB start	Position	Distance (mm)	СН	Freq. (MHz)	Avg. Power + Max. Tolerance (dRm)	Avg. Power (dBm)	Scaling	Measured	Reported	Plot page
				50	Front side	10mm	20050	1720	24.5	24.41	2.09%	0.562	0.574	-
				0	Back side	10mm	20300	1745	24.5	24.38	2.80%	0.891	0.916	-
				50	Back side	10mm	20050	1720	24.5	24.41	2.09%	0.964	0.984	-
				50	Back side	10mm	20175	1732.5	24.5	24.39	2.57%	0.87	0.892	-
				0	Bottom side	10mm	20300	1745	24.5	24.38	2.80%	1.15	1.182	-
			1 RB	50	Bottom side	10mm	20050	1720	24.5	24.41	2.09%	1.28	1.307	128
			ו ועט	50	Bottom side	10mm	20175	1732.5	24.5	24.39	2.57%	1.1	1.128	-
			50	Bottom side*	10mm	20050	1720	24.5	24.41	2.09%	1.27	1.297	-	
				50	Bottom side -with headset	10mm	20050	1720	24.5	24.41	2.09%	1.07	1.092	-
				50	Right side	10mm	20050	1720	24.5	24.41	2.09%	0.226	0.231	-
				50	Left side	10mm	20050	1720	24.5	24.41	2.09%	0.248	0.253	-
					Front side	10mm	20300	1745	24	23.55	10.92%	0.337	0.374	-
					Back side	10mm	20050	1720	24	23.52	11.69%	0.792	0.885	-
LTE Band 4	20MHz	QPSK			Back side	10mm	20300	1745	24	23.55	10.92%	0.74	0.821	-
(Hotspot)	ZUIVITZ	UPSK		0	Bottom side	10mm	20050	1720	24	23.52	11.69%	1.04	1.162	-
			50 RB		Bottom side	10mm	20300	1745	24	23.55	10.92%	1.09	1.209	-
					Right side	10mm	20300	1745	24	23.55	10.92%	0.203	0.225	-
					Left side	10mm	20300	1745	24	23.55	10.92%	0.194	0.215	-
				50	Back side	10mm	20175	1732.5	24	23.54	11.17%	0.733	0.815	-
				30	Bottom side	10mm	20175	1732.5	24	23.54	11.17%	1.09	1.212	-
					Front side	10mm	20300	1745	24	23.46	13.24%	0.335	0.379	-
					Back side	10mm	20050	1720	24	23.4	14.82%	0.7	0.804	-
					Back side	10mm	20175	1732.5	24	23.44	13.76%	0.774	0.881	-
					Back side	10mm	20300	1745	24	23.46	13.24%	0.743	0.841	-
			100	) RB	Bottom side	10mm	20050	1720	24	23.4	14.82%	1.03	1.183	-
					Bottom side	10mm	20175	1732.5	24	23.44	13.76%	1.09	1.240	-
					Bottom side	10mm	20300	1745	24	23.46	13.24%	1.1	1.246	-
					Right side	10mm	20300	1745	24	23.46	13.24%	0.194	0.220	-
					Left side	10mm	20300	1745	24	23.46	13.24%	0.191	0.216	-

<sup>\* -</sup> repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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#### LTE FDD Band V

	D Bai								Max. Rated	Measured		Averaged 1g (V	SAR over V/kg)	
Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	СН	Freq. (MHz)	Avg. Power + Max. Tolerance (dBm)	Avg. Power (dBm)	Scaling		Reported	Plot page
					RE Cheek	-	20450	829	24.5	24.36	3.28%	0.338	0.349	-
			1 RB	0	RE Tilt	-	20450	829	24.5	24.36	3.28%	0.234	0.242	-
			I ND		LE Cheek	-	20450	829	24.5	24.36	3.28%	0.418	0.432	129
					LE Tilt	-	20450	829	24.5	24.36	3.28%	0.231	0.239	-
					RE Cheek	-	20600	844	24	23.41	14.55%	0.254	0.291	-
			25 RB	25	RE Tilt	-	20600	844	24	23.41	14.55%	0.176	0.202	-
LTE Band 5	10MHz	QPSK	23 ND	25	LE Cheek	-	20600	844	24	23.41	14.55%	0.302	0.346	-
(Head)	TOWNIZ	QISK			LE Tilt	-	20600	844	24	23.41	14.55%	0.2	0.229	-
					RE Cheek	-	20600	844	24	23.41	14.55%	0.31	0.355	-
					RE Tilt	-	20600	844	24	23.41	14.55%	0.21	0.241	-
			50	RB	LE Cheek	-	20450	829	24	23.38	15.35%	0.372	0.429	-
			30	ΝD	LE Cheek	-	20525	836.5	24	23.24	19.12%	0.373	0.444	-
					LE Cheek	-	20600	844	24	23.41	14.55%	0.379	0.434	-
					LE Tilt	-	20600	844	24	23.41	14.55%	0.199	0.228	-
				0	Front side	15mm	20450	829	24.5	24.36	3.28%	0.351	0.362	-
			1 RB	0	Back side	15mm	20450	829	24.5	24.36	3.28%	0.494	0.510	-
LTE Band 5			IKD	25	Back side	15mm	20525	836.5	24.5	24.23	6.41%	0.47	0.500	-
(Body-	10MHz	QPSK		25	Back side	15mm	20600	844	24.5	24.3	4.71%	0.517	0.541	130
Worn)	TOWINZ	UFSK	25 RB	25	Front side	15mm	20600	844	24	23.41	14.55%	0.263	0.301	-
WOITI)			20 KD	23	Back side	15mm	20600	844	24	23.41	14.55%	0.363	0.416	-
			50	RB	Front side	15mm	20600	844	24	23.41	14.55%	0.328	0.376	-
			30	KD	Back side	15mm	20600	844	24	23.41	14.55%	0.443	0.507	-
				0	Front side	10mm	20450	829	24.5	24.36	3.28%	0.414	0.428	-
				0	Back side	10mm	20450	829	24.5	24.36	3.28%	0.645	0.666	-
				25	Back side	10mm	20525	836.5	24.5	24.23	6.41%	0.716	0.762	131
			1 RB	25	Back side	10mm	20600	844	24.5	24.3	4.71%	0.627	0.657	-
				0	Bottom side	10mm	20450	829	24.5	24.36	3.28%	0.194	0.200	-
				0	Right side	10mm	20450	829	24.5	24.36	3.28%	0.241	0.249	-
				0	Left side	10mm	20450	829	24.5	24.36	3.28%	0.311	0.321	-
LTC Daniel C					Front side	10mm	20600	844	24	23.41	14.55%	0.342	0.392	-
LTE Band 5	10MHz	QPSK			Back side	10mm	20600	844	24	23.41	14.55%	0.465	0.533	-
(Hotspot)			25 RB	25	Bottom side	10mm	20600	844	24	23.41	14.55%	0.138	0.158	-
					Right side	10mm	20600	844	24	23.41	14.55%	0.215	0.246	-
					Left side	10mm	20600	844	24	23.41	14.55%	0.225	0.258	-
					Front side	10mm	20600	844	24	23.41	14.55%	0.378	0.433	-
					Back side	10mm	20600	844	24	23.41	14.55%	0.571	0.654	-
			50	RB	Bottom side	10mm	20600	844	24	23.41	14.55%	0.161	0.184	-
					Right side	10mm	20600	844	24	23.41	14.55%	0.233	0.267	-
				ŀ	Left side	10mm	20600	844	24	23.41	14.55%	0.228	0.261	-

<sup>\* -</sup> repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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#### LTE FDD Band VII

									Max. Rated	Measured		Averaged SA (W/I		
Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	СН	Freq. (MHz)	Avg. Power + Max. Tolerance (dBm)	Avg. Power (dBm)	Scaling	Measured	Reported	Plot page
					RE Cheek	-	21100	2535	22.3	22.28	0.46%	0.294	0.295	-
					RE Tilt	-	21100	2535	22.3	22.28	0.46%	0.106	0.106	-
			1 RB	99	LE Cheek	-	20850	2510	22.3	22.14	3.75%	0.325	0.337	-
			IND	77	LE Cheek	-	21100	2535	22.3	22.28	0.46%	0.38	0.382	132
	LTE Band 7 20MHz Q				LE Cheek	-	21350	2560	22.3	22.27	0.69%	0.328	0.330	-
					LE Tilt	-	21100	2535	22.3	22.28	0.46%	0.072	0.072	-
LTE Band 7		QPSK			RE Cheek	-	21350	2560	22	21.32	16.95%	0.234	0.274	-
(Head)	ZUIVITIZ	QF3K	50 RB	50	RE Tilt	-	21350	2560	22	21.32	16.95%	0.088	0.103	-
			30 KD	30	LE Cheek	-	21350	2560	22	21.32	16.95%	0.288	0.337	-
					LE Tilt	-	21350	2560	22	21.32	16.95%	0.054	0.063	-
					RE Cheek	-	21350	2560	22	21.24	19.12%	0.232	0.276	-
			100	) RB	RE Tilt	-	21350	2560	22	21.24	19.12%	0.086	0.102	-
			100	טא ט	LE Cheek	-	21350	2560	22	21.24	19.12%	0.294	0.350	-
					LE Tilt	-	21350	2560	22	21.24	19.12%	0.054	0.064	-
					Front side	15mm	21100	2535	22.3	22.28	0.46%	0.279	0.280	-
			1 RB	99	Back side	15mm	20850	2510	22.3	22.14	3.75%	0.489	0.507	-
LTE Band 7			IND	77	Back side	15mm	21100	2535	22.3	22.28	0.46%	0.497	0.499	133
(Body-	20MHz	OPSK			Back side	15mm	21350	2560	22.3	22.27	0.69%	0.459	0.462	-
Worn)	ZUIVITIZ	QF3K	50 RB	50	Front side	15mm	21350	2560	22	21.32	16.95%	0.233	0.272	-
vvoiii)			JU KD	50	Back side	15mm	21350	2560	22	21.32	16.95%	0.384	0.449	-
			100	RB (	Front side	15mm	21350	2560	22	21.24	19.12%	0.235	0.280	-
			100	י ועט	Back side	15mm	21350	2560	22	21.24	19.12%	0.386	0.460	-

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									Max. Rated	Measured		Averaged SA (W/												
Mode	Bandwidth (MHz)	Modulation	RB Size	RB start	Position	Distance (mm)	СН	Freq. (MHz)	Avg. Power + Max. Tolerance (dBm)	Avg. Power (dBm)	Scaling	Measured	Reported	Plot page										
					Front side	10mm	21100	2535	22.3	22.28	0.46%	0.537	0.539	-										
					Back side	10mm	20850	2510	22.3	22.14	3.75%	0.971	1.007	-										
					Back side	10mm	21100	2535	22.3	22.28	0.46%	1.01	1.015	-										
					Back side	10mm	21350	2560	22.3	22.27	0.69%	0.932	0.938	-										
			1 RB	99	Bottom side	10mm	20850	2510	22.3	22.14	3.75%	1	1.038	-										
			I KD	99	Bottom side	10mm	21100	2535	22.3	22.28	0.46%	1.02	1.025	134										
					Bottom side	10mm	21350	2560	22.3	22.27	0.69%	0.922	0.928	-										
					Bottom side*	10mm	21100	2535	22.3	22.28	0.46%	1.02	1.025	-										
					Right side	10mm	21100	2535	22.3	22.28	0.46%	0.159	0.160	-										
					Left side	10mm	21100	2535	22.3	22.28	0.46%	0.142	0.143	-										
			J.D.C.V		Front side	10mm	21350	2560	22	21.32	16.95%	0.431	0.504	-										
							Back side	10mm	20850	2510	22	21.14	21.90%	0.777	0.947	-								
															Back side	10mm	21100	2535	22	21.23	19.40%	0.798	0.953	-
LTE Band 7	20MHz	QPSK											50.00	50 00 50			Back side	10mm	21350	2560	22	21.32	16.95%	0.772
(Hotspot)	ZUIVII IZ	QF 3K	50 RB	50	Bottom side	10mm	20850	2510	22	21.14	21.90%	0.822	1.002	-										
					Bottom side	10mm	21100	2535	22	21.23	19.40%	0.819	0.978	-										
					Bottom side	10mm	21350	2560	22	21.32	16.95%	0.76	0.889	-										
					Right side	10mm	21350	2560	22	21.32	16.95%	0.131	0.153	-										
					Left side	10mm	21350	2560	22	21.32	16.95%	0.111	0.130	-										
					Front side	10mm	21350	2560	22	21.24	19.12%	0.433	0.516	-										
					Back side	10mm	20850	2510	22	21.02	25.31%	0.775	0.971	-										
					Back side	10mm	21100	2535	22	21.17	21.06%	0.798	0.966	-										
					Back side	10mm	21350	2560	22	21.24	19.12%	0.768	0.915	-										
			100	RB	Bottom side	10mm	20850	2510	22	21.02	25.31%	0.819	1.026	-										
					Bottom side	10mm	21100	2535	22	21.17	21.06%	0.83	1.005											
					Bottom side	10mm	21350	2560	22	21.24	19.12%	0.771	0.918											
					Right side	10mm	21350	2560	22	21.24	19.12%	0.133	0.158											
					Left side	10mm	21350	2560	22	21.24	19.12%	0.102	0.122	<u> </u>										

<sup>\* -</sup> repeated at the highest SAR measurement according to the FCC KDB 865664 D01v01

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#### WLAN802.11 b

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg.	Measured Avg.	Scaling	Averaged S (W/		Plot page
		(11111)		(1711 12)	Power + Max.	Power		Measured	Reported	page
	RE Cheek	-	1	2412	16.00	15.99	0.23%	0.422	0.423	-
	RE Cheek	-	6	2437	16.00	15.87	3.04%	0.64	0.659	-
Head	RE Cheek	-	11	2462	16.00	15.94	1.39%	0.786	0.797	135
пеаи	RE Tilt	-	1	2412	16.00	15.99	0.23%	0.283	0.284	-
	LE Cheek	-	1	2412	16.00	15.99	0.23%	0.193	0.193	-
	LE Tilt	-	1	2412	16.00	15.99	0.23%	0.138	0.138	-
	Front side	10mm	1	2412	16.00	15.99	0.23%	0.12	0.120	-
	Back side	10mm	1	2412	16.00	15.99	0.23%	0.447	0.448	-
Hotspot	Back side	10mm	6	2437	16.00	15.87	3.04%	0.529	0.545	-
потгрот	Back side	10mm	11	2462	16.00	15.94	1.39%	0.679	0.688	136
	Top side	10mm	1	2412	16.00	15.99	0.23%	0.049	0.049	-
	Left side	10mm	1	2412	16.00	15.99	0.23%	0.182	0.182	-

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## WLAN802.11 a 5.2G

Mode	Position	Distance	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	Averaged S (W/	AR over 1g 'kg)	Plot
		(mm)		(IVITZ)	Tolerance (dBm)	(dBm)		Measured	Reported	page
	RE Cheek	-	48	5240	14.00	13.93	1.62%	0.126	0.128	-
	RE Tilt	-	40	5200	14.00	13.82	4.23%	0.154	0.161	-
Head	RE Tilt	-	48	5240	14.00	13.93	1.62%	0.158	0.161	137
	LE Cheek	-	48	5240	14.00	13.93	1.62%	0.138	0.140	-
	LE Tilt	-	48	5240	14.00	13.93	1.62%	0.139	0.141	-
<b>.</b>	Front side	15mm	48	5240	14.00	13.93	1.62%	0.039	0.040	-
Body- worn	Back side	15mm	40	5200	14.00	13.82	4.23%	0.339	0.353	138
WOIII	Back side	15mm	48	5240	14.00	13.93	1.62%	0.305	0.310	-

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## WLAN802.11 a 5.3G

Mode	Mode Position		СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling	J	SAR over 1g /kg)	Plot page
		(mm)		(IVII IZ)	Tolerance (dBm)	(dBm)		Measured	Reported	paye
	RE Cheek	-	52	5260	14.00	13.99	0.23%	0.135	0.135	-
	RE Cheek	-	60	5300	14.00	13.98	0.46%	0.17	0.171	139
Head	RE Tilt	-	52	5260	14.00	13.99	0.23%	0.134	0.134	-
	LE Cheek	-	52	5260	14.00	13.99	0.23%	0.133	0.133	-
	LE Tilt	-	52	5260	14.00	13.99	0.23%	0.119	0.119	-
Dody	Front side	15mm	52	5260	14.00	13.99	0.23%	0.031	0.031	-
Body- worn	Back side	15mm	52	5260	14.00	13.99	0.23%	0.306	0.307	-
WOITI	Back side	15mm	60	5300	14.00	13.98	0.46%	0.316	0.317	140

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## WLAN802.11 a 5.6G

Mode	Position	Distance (mm)	СН	Power + Max. Av		Measured Avg. Power	Scaling		SAR over 1g /kg)	Plot page
		(111111)		(IVII IZ)	Tolerance (dBm)	(dBm)		Measured	Reported	paye
	RE Cheek	-	108	5540	14.00	13.88	2.80%	0.293	0.301	-
	RE Cheek	-	132	5660	14.00	13.94	1.39%	0.354	0.359	-
Head	RE Cheek	-	140	5700	14.00	13.99	0.23%	0.423	0.424	141
пеаи	RE Tilt	-	140	5700	14.00	13.99	0.23%	0.388	0.389	-
	LE Cheek	-	140	5700	14.00	13.99	0.23%	0.287	0.288	-
	LE Tilt	-	140	5700	14.00	13.99	0.23%	0.282	0.283	-
	Front side	15mm	140	5700	14.00	13.99	0.23%	0.05	0.050	-
Body-	Back side	15mm	108	5540	14.00	13.88	2.80%	0.367	0.377	-
worn	Back side	15mm	132	5660	14.00	13.94	1.39%	0.402	0.408	142
	Back side	15mm	140	5700	14.00	13.99	0.23%	0.382	0.383	-

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## WLAN802.11 a 5.8G

Mode	Position	Distance (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max.	Measured Avg. Power	Scaling		AR over 1g 'kg)	Plot
		(111111)		(IVII IZ)	Tolerance (dBm)	(dBm)		Measured	Reported	page
	RE Cheek	-	157	5785	14.00	13.83	3.99%	0.463	0.481	-
	RE Tilt	-	153	5765	14.00	13.82	4.23%	0.455	0.474	-
Head	RE Tilt	-	157	5785	14.00	13.83	3.99%	0.471	0.490	-
пеаи	RE Tilt	-	161	5805	14.00	13.74	6.17%	0.478	0.507	143
	LE Cheek	-	157	5785	14.00	13.83	3.99%	0.308	0.320	-
	LE Tilt	-	157	5785	14.00	13.83	3.99%	0.333	0.346	-
	Front side	15mm	157	5785	14.00	13.83	3.99%	0.066	0.069	-
Body-	Back side	15mm	153	5765	14.00	13.82	4.23%	0.363	0.378	-
worn	Back side	15mm	157	5785	14.00	13.83	3.99%	0.343	0.357	-
	Back side	15mm	161	5805	14.00	13.74	6.17%	0.369	0.392	144

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# 3. Simultaneous Transmission Analysis

## **Simultaneous Transmission Scenarios:**

Simultaneous Transmit Configurations	Head	Body-Worn	Hotspot
GSM850/1900 + 2.4GHz Wi-Fi	Yes	No	No
GPRS850/1900 + 2.4GHz Wi-Fi	No	No	Yes
UMTS B2/4/5 + 2.4GHz Wi-Fi	Yes	No	Yes
LTE FDD B2/4/5/7 + 2.4GHz Wi-Fi	Yes	No	Yes
GSM850/1900 + 5GHz Wi-Fi	Yes	Yes	No
GPRS850/1900 + 5GHz Wi-Fi	No	No	No
UMTS B2/4/5 + 5GHz Wi-Fi	Yes	Yes	No
LTE FDD B2/4/5/7 + 5GHz Wi-Fi	Yes	Yes	No
GSM850/1900 + Bluetooth	No	Yes	No
GPRS850/1900 + Bluetooth	No	No	Yes
UMTS B2/4/5 + Bluetooth	No	Yes	Yes
LTE FDD B2/4/5/7 + Bluetooth	No	Yes	Yes

#### Notes:

- GSM & WCDMA & LTE share the same antenna path and cannot transmit simultaneously
- Bluetooth, 5GHz WiFi, and 2.4GHz WiFi share the same antenna path and cannot transmit simultaneously.

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#### 3.1 Estimated SAR calculation

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

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

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

# 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**

	repo	rted SAR WW	AN and WLA	N DTS 2.4GI	Hz, ΣSAR ev	aluation	
Frequency	D <sub>C</sub>	osition	reported S	AR / W/kg	ΣSAR	Calculated	SPLSR
band	1 (	osition	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.265	0.797	1.062	1	-
GSM 850	Head	RE tilt	0.184	0.284	0.468	ı	-
G3W 630	Heau	LE cheek	0.424	0.193	0.617	1	-
		LE tilt	0.176	0.138	0.314	-	-
		Front	0.337	0.120	0.457	-	-
		Back	0.7	0.688	1.388	-	-
GPRS 850	I Hotsnot	Тор	-	0.049	-	-	-
(1Dn1UP)	Ποισμοί	Bottom	0.182	-	-	-	-
		Right	0.28	-	-	-	-
		Left	0.478	0.182	0.660	-	-
		RE cheek	0.09	0.797	0.887	-	-
GSM 1900	Head	RE tilt	0.048	0.284	0.332	-	-
G3W 1700	Heau	LE cheek	0.147	0.193	0.340	-	-
		LE tilt	0.052	0.138	0.190	-	-
		Front	0.432	0.120	0.552	-	-
		Back	0.711	0.688	1.399	-	-
GPRS 1900	Hotspot	Тор	=	0.049	=	-	-
(1Dn1UP)	Ποιδροί	Bottom	0.898	-	=	-	-
		Right	0.11	-	=	-	-
		Left	0.124	0.182	0.306	-	-

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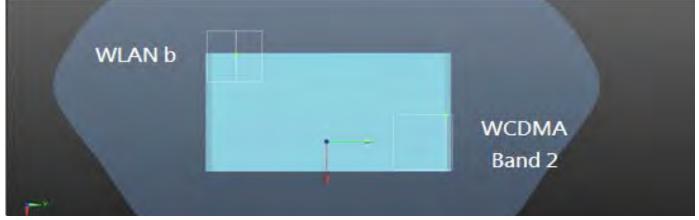
	repo	rted SAR WW	AN and WLA	N DTS 2.4G	Hz, ΣSAR ev	aluation	
Frequency	D	osition	reported S	SAR / W/kg	ΣSAR	Calculated	SPLSR
band	P	osition	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.159	0.797	0.956	-	-
	Head	RE tilt	0.098	0.284	0.382	-	-
	пеац	LE cheek	0.234	0.193	0.427	-	-
		LE tilt	0.082	0.138	0.220	-	-
WCDMA		Front	0.53	0.120	0.650	-	-
Band II		Back	0.989	0.688	1.677	120	0.018
	Hotspot	Тор	-	0.049	-	-	-
	Ποισμοί	Bottom	1.02	-	-	-	-
		Right	0.078	-	-	-	-
		Left	0.125	0.182	0.307	-	-
		RE cheek	0.41	0.797	1.207	-	-
	Head	RE tilt	0.109	0.284	0.393	-	-
	Head	LE cheek	0.519	0.193	0.712	-	-
		LE tilt	0.081	0.138	0.219	-	-
WCDMA		Front	0.745	0.120	0.865	-	-
Band IV		Back	0.764	0.688	1.452	-	-
	Hotspot	Тор	-	0.049	-	-	-
	Ποισμοί	Bottom	1.192	-	-	-	-
		Right	0.191	-	-	-	-
		Left	0.175	0.182	0.357	-	-
		RE cheek	0.31	0.797	1.107	-	-
	Hood	RE tilt	0.208	0.284	0.492	-	-
	Head	LE cheek	0.392	0.193	0.585	-	-
		LE tilt	0.213	0.138	0.351	-	-
WCDMA		Front	0.497	0.120	0.617	-	-
Band V		Back	0.837	0.688	1.525	-	-
		Тор	-	0.049	-	-	-
	Hotspot	Bottom	0.204	-	-	-	-
		Right	0.345	-	-	-	-
		Left	0.553	0.182	0.735	-	-

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			Co	oordinates (cr	n)		Peak		
Conditions	Position	SAR Value (W/kg)	х	у	Z	ΣSAR (W/kg)	Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
WCDMA B2 CH 9538	Back side	0.989	0.15	6.53	-0.05	1.677	120	0.018	SPLSR<0.04,
802.11b CH 11	Dack Side	0.688	-3.36	-4.94	-0.09	1.077	120	0.016	Not required



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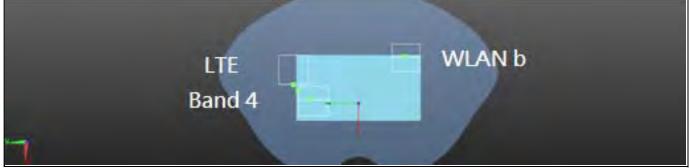
	repo	orted SAR WW	'AN and WLA	N DTS 2.4GI	Hz, ΣSAR ev	aluation	
Frequency	D	noition.	reported S	SAR / W/kg	ΣSAR	Calculated	SPLSR
band	P(	osition	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.384	0.797	1.181	-	-
	l la a al	RE tilt	0.118	0.284	0.402	-	-
	Head	LE cheek	0.432	0.193	0.625	-	-
		LE tilt	0.082	0.138	0.220	-	-
LTE FDD		Front	0.449	0.120	0.569	-	-
Band 2		Back	0.838	0.688	1.526	-	-
	Hotenot	Тор	-	0.049	-	-	-
	Hotspot	Bottom	1.01	-	-	1	-
		Right	0.093	-	-	-	-
		Left	0.099	0.182	0.281	-	-
		RE cheek	0.318	0.797	1.115	1	-
	   Head	RE tilt	0.108	0.284	0.392	-	-
	пеаи	LE cheek	0.388	0.193	0.581	1	-
		LE tilt	0.044	0.138	0.182	-	-
LTE FDD		Front	0.574	0.120	0.694	-	-
Band 4		Back	0.984	0.688	1.672	113	0.019
	Hotspot	Тор	-	0.049	-	1	-
	потѕрот	Bottom	1.307	-	-	1	-
		Right	0.231	-	-	1	-
		Left	0.253	0.182	0.435	1	-
		RE cheek	0.355	0.797	1.152	1	-
	Head	RE tilt	0.242	0.284	0.526	-	-
	пеаи	LE cheek	0.444	0.193	0.637	ı	-
		LE tilt	0.239	0.138	0.377	-	-
LTE FDD		Front	0.433	0.120	0.553	-	-
Band 5		Back	0.762	0.688	1.450	-	-
	Hotspot	Тор	-	0.049	-	-	-
	Πυιδρυί	Bottom	0.2	-	-	-	-
		Right	0.267	-	-	-	-
		Left	0.321	0.182	0.503	-	-

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			Ci	oordinates (cr	n)		Peak		
Conditions	Position	SAR Value (W/kg)	х	у	Z	ΣSAR (W/kg)	Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
LTE Band 4 CH 20050	Back side	0.984	1.34	5.33	-0.02	1.672	113	0.019	SPLSR<0.04,
802.11b CH 11	Dack side	0.688	-3.36	-4.94	-0.09	1.072	113	0.019	Not required



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	repo	orted SAR WW	AN and WLA	N DTS 2.4G	Hz, ΣSAR ev	aluation	
Frequency		osition	reported S	AR / W/kg	ΣSAR	Calculated	SPLSR
band	F	JSILIOII	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.295	0.797	1.092	-	-
LTE FDD Band 7 Hotsp	Hoad	RE tilt	0.106	0.284	0.390	-	-
	Head	LE cheek	0.382	0.193	0.575	-	-
		LE tilt	0.072	0.138	0.210	1	-
		Front	0.539	0.120	0.659	1	-
		Back	1.015	0.688	1.703	112.4	0.020
	Hotenot	Тор	-	0.049	-	1	-
	Ποιδροί	Bottom	1.038	-	-	-	-
		Right	0.160	-	-	-	-
		Left	0.143	0.182	0.325	-	-

			Co	oordinates (cr	n)		Peak		
Conditions	Position	SAR Value (W/kg)	х	у	Z	ΣSAR (W/kg)	Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
LTE Band 7 CH 21100	Back side	1.015	-0.62	5.96	-0.04	1.703	112.4	0.020	SPLSR<0.04,
802.11b CH 11	Dack Slue	0.688	-3.36	-4.94	-0.09	1.703	112.4	0.020	Not required



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	reported	SAR WWAI	N and WLAN	N DTS 5.8 G	Hz, ΣSAR e	valuation	
Frequency			reported S	AR / W/kg	ΣSAR	Calculated	SPLSR
band		ition	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.265	0.481	0.746	-	-
	Head	RE tilt	0.184	0.507	0.691	-	-
GSM 850	ricad	LE cheek	0.424	0.32	0.744	-	-
G3W 636		LE tilt	0.176	0.346	0.522	-	-
	Body-	Front	0.146	0.069	0.215	-	-
	Worn	Back	0.318	0.392	0.71	-	-
		RE cheek	0.09	0.481	0.571	-	-
	Head	RE tilt	0.048	0.507	0.555	-	-
GSM 1900	ricad	LE cheek	0.147	0.32	0.467	-	-
03W 1700		LE tilt	0.052	0.346	0.398	-	-
	Body-	Front	0.304	0.069	0.373	-	-
	Worn	Back	0.47	0.392	0.862	-	-
		RE cheek	0.159	0.481	0.64	-	-
	Head	RE tilt	0.098	0.507	0.605	-	-
WCDMA	ricad	LE cheek	0.234	0.32	0.554	-	-
Band II		LE tilt	0.082	0.346	0.428	-	-
	Body-	Front	0.468	0.069	0.537	-	-
	Worn	Back	0.84	0.392	1.232	-	-
		RE cheek	0.41	0.481	0.891	-	-
	Head	RE tilt	0.109	0.507	0.616	-	-
WCDMA	пеац	LE cheek	0.519	0.32	0.839	-	1
Band IV		LE tilt	0.081	0.346	0.427	-	-
	Body-	Front	0.635	0.069	0.704	-	-
	Worn	Back	0.689	0.392	1.081	-	1
		RE cheek	0.31	0.481	0.791	-	-
	Head	RE tilt	0.208	0.507	0.715	-	-
WCDMA	пеаи	LE cheek	0.392	0.32	0.712	-	-
Band V		LE tilt	0.213	0.346	0.559	-	-
[	Body-	Front	0.238	0.069	0.307	-	-
	Worn	Back	0.318	0.392	0.71	-	-

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	report	ed SAR WWA	AN and WLAN	N DTS 5.8 GH	lz, ΣSAR eva	luation	
Frequency			reported S	AR / W/kg	ΣSAR	Calculated	SPLSR
band	Posi	tion	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.384	0.481	0.865	-	ı
	Head	RE tilt	0.118	0.507	0.625	-	ı
LTE FDD	Heau	LE cheek	0.432	0.32	0.752	-	-
Band 2		LE tilt	0.082	0.346	0.428	-	ı
	Body-Worn	Front	0.437	0.069	0.506	-	ı
	Body-Worth	Back	0.81	0.392	1.202	-	ı
		RE cheek	0.318	0.481	0.799	-	-
LTE FDD Band 4	Head	RE tilt	0.108	0.507	0.615	-	-
		LE cheek	0.388	0.32	0.708	-	-
		LE tilt	0.044	0.346	0.39	-	ı
	Body-Worn	Front	0.304	0.069	0.373	-	ı
	body-worn	Back	0.571	0.392	0.963	-	-
		RE cheek	0.355	0.481	0.836	-	-
	Head	RE tilt	0.242	0.507	0.749	-	ı
LTE FDD		LE cheek	0.444	0.32	0.764	-	ı
Band 5		LE tilt	0.239	0.346	0.585	-	ı
	Body-Worn	Front	0.376	0.069	0.445	-	ı
	Body-Worth	Back	0.541	0.392	0.933	=	-
		RE cheek	0.295	0.481	0.776	=	-
	Head	RE tilt	0.106	0.507	0.613	-	-
LTE FDD	neau	LE cheek	0.382	0.32	0.702	=	=
Band 7		LE tilt	0.072	0.346	0.418	-	-
	Body-Worn	Front	0.28	0.069	0.349	-	-
	Dody-Worth	Back	0.507	0.392	0.899	-	-

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	repor	ted SAR WW	/AN and WLA	N DTS 5 GH	z, ΣSAR evalı	uation	
Frequency	_		reported S	AR / W/kg	ΣSAR	Calculated	SPLSR
band		ition	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.265	0.424	0.689	-	-
	Head	RE tilt	0.184	0.389	0.573	-	-
GSM 850	Heau	LE cheek	0.424	0.288	0.712	-	-
03W 030		LE tilt	0.176	0.283	0.459	-	-
	Body-Worn	Front	0.146	0.05	0.196	-	-
	body-worth	Back	0.318	0.408	0.726	-	-
		RE cheek	0.09	0.424	0.514	-	-
	Head	RE tilt	0.048	0.389	0.437	-	-
GSM 1900	ricau	LE cheek	0.147	0.288	0.435	-	-
USIVI 1700		LE tilt	0.052	0.283	0.335	-	-
	Body-Worn	Front	0.304	0.05	0.354	-	-
		Back	0.47	0.408	0.878	-	-
WCDMA Band II		RE cheek	0.159	0.424	0.583	-	-
	Head	RE tilt	0.098	0.389	0.487	-	-
	Head	LE cheek	0.234	0.288	0.522	-	-
		LE tilt	0.082	0.283	0.365	-	-
	Body-Worn	Front	0.468	0.05	0.518	-	-
		Back	0.84	0.408	1.248	-	-
		RE cheek	0.41	0.424	0.834	-	-
	Head	RE tilt	0.109	0.389	0.498	-	-
WCDMA	пеаи	LE cheek	0.519	0.288	0.807	-	-
Band IV		LE tilt	0.081	0.283	0.364	-	-
	Body-Worn	Front	0.635	0.05	0.685	-	-
	body-worth	Back	0.689	0.408	1.097	-	-
		RE cheek	0.31	0.424	0.734	-	-
	Head	RE tilt	0.208	0.389	0.597	-	-
WCDMA	neau	LE cheek	0.392	0.288	0.68	-	-
Band V		LE tilt	0.213	0.283	0.496	-	-
	Body-Worn	Front	0.238	0.05	0.288	-	-
	Douy-WUITI	Back	0.318	0.408	0.726	-	-

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	repor	ted SAR WW	/AN and WLA	N DTS 5 GHz	z, ΣSAR evalu	uation	
Frequency			reported SAR / W/kg		ΣSAR	Calculated	SPLSR
band	Posi	tion	WWAN	WLAN	<1.6W/kg	distance (mm)	(≦0.04)
		RE cheek	0.384	0.424	0.808	-	-
	Head	RE tilt	0.118	0.389	0.507	-	=
LTE FDD Band 2	LE cheek	0.432	0.288	0.72	-	=	
		LE tilt	0.082	0.283	0.365	-	=
	Pody Worn	Front	0.437	0.05	0.487	-	=
	Body-Worn	Back	0.81	0.408	1.218	-	=
		RE cheek	0.318	0.424	0.742	ı	-
LTE FDD Band 4	Head	RE tilt	0.108	0.389	0.497	ı	-
	пеаи	LE cheek	0.388	0.288	0.676	=	-
		LE tilt	0.044	0.283	0.327	=	-
	Body-Worn	Front	0.304	0.05	0.354	=	-
	Body-Worn	Back	0.571	0.408	0.979	-	-
		RE cheek	0.355	0.424	0.779	-	=
	Head	RE tilt	0.242	0.389	0.631	-	=
LTE FDD	пеац	LE cheek	0.444	0.288	0.732	-	-
Band 5		LE tilt	0.239	0.283	0.522	-	-
	Dody Worn	Front	0.376	0.05	0.426	-	-
	Body-Worn	Back	0.541	0.408	0.949	-	-
		RE cheek	0.295	0.424	0.719	-	-
	Head	RE tilt	0.106	0.389	0.495	-	-
LTE FDD	пеаи	LE cheek	0.382	0.288	0.67	-	-
Band 7		LE tilt	0.072	0.283	0.355	-	-
	Rody Morn	Front	0.28	0.05	0.33	-	-
	Body-Worn	Back	0.507	0.408	0.915	-	-

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	reported SAR WWAN and Bluetooth, ΣSAR evaluation									
Frequency			reported S	SAR / W/kg	ΣSAR	Calculated	SPLSR			
band	Pos	ition	WWAN	Bluetooth	<1.6W/kg	distance (mm)	(≦0.04)			
GSM 850	Body-	Front	0.146	0.048	0.194	-	-			
G3W 630	Worn	Back	0.318	0.048	0.366	-	-			
		Front	0.337	0.072	0.409	-	-			
		Back	0.7	0.072	0.772	-	-			
GPRS 850	Hotspot	Тор	-	0.072	-	-	-			
(1Dn4UP)	поізроі	Bottom	0.182	0.072	0.254	-	-			
		Right	0.28	0.072	0.352	-	-			
		Left	0.478	0.072	0.55	-	-			
1 GSM 19001	Body-	Front	0.304	0.048	0.352	-	-			
	Worn	Back	0.47	0.048	0.518	-	-			
		Front	0.432	0.072	0.504	-	-			
		Back	0.711	0.072	0.783	-	-			
GPRS 1900	Hotspot	Тор	-	0.072	-	-	-			
(1Dn4UP)		Bottom	0.898	0.072	0.97	-	-			
(1011401)		Right	0.11	0.072	0.182	-	-			
		Left	0.124	0.072	0.196	-	-			
	Body-	Front	0.468	0.048	0.516	-	-			
	Worn	Back	0.84	0.048	0.888	-	-			
		Front	0.53	0.072	0.602	-	-			
WCDMA		Back	0.989	0.072	1.061	-	-			
Band II	Untenet	Тор	-	0.072	-	-	-			
	Hotspot	Bottom	1.02	0.072	1.092	-	-			
		Right	0.078	0.072	0.15	-	-			
		Left	0.125	0.072	0.197	-	-			

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	reported SAR WWAN and Bluetooth, ΣSAR evaluation								
Frequency			reported S	SAR / W/kg	ΣSAR	Calculated	SPLSR		
band	Pos	ition	WWAN	Bluetooth	<1.6W/kg	distance (mm)	(≦0.04)		
	Body-	Front	0.635	0.048	0.683	-	-		
	Worn	Back	0.689	0.048	0.737	-	-		
		Front	0.745	0.072	0.817	-	-		
WCDMA		Back	0.764	0.072	0.836	-	-		
Band IV	Hotspot	Тор	-	0.072	-	-	-		
	Hotspot	Bottom	1.192	0.072	1.264	-	-		
		Right	0.191	0.072	0.263	-	-		
		Left	0.175	0.072	0.247	-	-		
	Body-	Front	0.238	0.048	0.286	-	-		
	Worn	Back	0.318	0.048	0.366	-	-		
		Front	0.497	0.072	0.569	-	-		
WCDMA Band V		Back	0.837	0.072	0.909	-	-		
	Hotspot	Тор	-	0.072	-	-	-		
	Поторот	Bottom	0.204	0.072	0.276	-	-		
		Right	0.345	0.072	0.417	-	1		
		Left	0.553	0.072	0.625	-	-		
	Body-	Front	0.437	0.048	0.485	-	-		
	Worn	Back	0.81	0.048	0.858	-	-		
		Front	0.449	0.072	0.521	-	-		
LTE FDD		Back	0.838	0.072	0.91	-	-		
Band 2	Hotspot	Тор	-	0.072	-	-	-		
	πυιδρυι	Bottom	1.01	0.072	1.082	-	-		
		Right	0.093	0.072	0.165	-	-		
		Left	0.099	0.072	0.171	-	-		

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



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	rep	orted SAR V	WWAN and	Bluetooth, Σ	SAR evalua	tion	
Frequency	_		reported S	SAR / W/kg	ΣSAR	Calculated	SPLSR
band	Pos	ition	WWAN	Bluetooth	<1.6W/kg	distance (mm)	(≦0.04)
	Body-	Front	0.304	0.048	0.352	-	-
	Worn	Back	0.571	0.048	0.619	-	-
		Front	0.574	0.072	0.646	-	-
LTE FDD		Back	0.984	0.072	1.056	-	-
Band 4	Hotspot	Тор	-	0.072	-	-	-
	Посърос	Bottom	1.307	0.072	1.379	-	-
		Right	0.231	0.072	0.303	-	-
		Left	0.253	0.072	0.325	-	-
	Body-	Front	0.376	0.048	0.424	-	-
	Worn	Back	0.541	0.048	0.589	-	-
		Front	0.433	0.072	0.505	-	-
LTE FDD Band 5		Back	0.762	0.072	0.834	-	-
	Hotspot	Тор	-	0.072	-	-	-
	Поторот	Bottom	0.2	0.072	0.272	-	-
		Right	0.267	0.072	0.339	-	-
		Left	0.321	0.072	0.393	-	-
	Body-	Front	0.28	0.048	0.328	-	-
	Worn	Back	0.507	0.048	0.555	-	-
		Front	0.539	0.072	0.611	-	-
LTE FDD		Back	1.015	0.072	1.087	-	-
Band 7	Uotenot	Тор	-	0.072	-	-	-
	Hotspot	Bottom	1.038	0.072	1.11	-	-
		Right	0.160	0.072	0.232	-	-
		Left	0.143	0.072	0.215	-	-

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



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# 4. Instruments List

Device	i ilisti allicitts	LIST				
Dosimetric E-Field Probe   Schmid & Partner Engineering AG   EX3DV4   3923   Aug.28,2014   Aug.27,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.23,2014   Aug.27,20   Apr.23,2014   Apr.23,20   Apr.23,2014   Apr.23,20   Apr.23,2014   Apr.23,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.23,20   Apr.2	Dovico	Manufacturor	Tuno	Serial	Date of last	Date of next
Dosimetric E-Field Probe   Schmid & Partner Engineering AG   EX3DV4   3831   Jan.31,2014   Jan.30,20   Jul.24,20   Jul.24,20   3770   Apr.24,2014   Apr.23,20   Apr.24,2014   Aug.27,20   Apr.24,2014   Aug.27,20   Apr.24,2014   Aug.27,20   Apr.24,2014   Aug.27,20   Apr.23,2014   Aug.27,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.15,20   Apr.16,2014   Apr.16,2014   Apr.16,2014   Apr.16,2014   Apr.15,20   Aug.26,2014   Aug.25,20   Apr.23,2014   Apr.23,2014   Apr.15,20   Apr.23,2014   Apr.16,2014	Device	Manufacturei	туре	number	calibration	calibration
Probe   Engineering AG   EX3DV4   3938   Jul.25,2014   Jul.24,20   3770   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Apr.23,20   Apr.24,2014   Aug.27,20   Aug.28,2014   Aug.27,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.23,2014   Apr.15,20   Apr.16,2014   Apr.15,20   Apr.16,2014   Apr.15,20   Apr.23,2014   Apr.15,20   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.15,20   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.15,20   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.15,200   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014				3923	Aug.28,2014	Aug.27,2015
System Validation   Schmid & Partner   Engineering AG   Data acquisition   Electronics   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Calibration   Calibr	Dosimetric E-Field	Schmid & Partner	EV2DV4	3831	Jan.31,2014	Jan.30,2015
System Validation   Schmid & Partner   Engineering AG   Data acquisition   Electronics   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   Data acquisition   Schmid & Partner   Engineering AG   N/A   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calibration   Calib	Probe	Engineering AG	EX3DV4	3938	Jul.25,2014	Jul.24,2015
System Validation Dipole   Schmid & Partner Engineering AG   D1750V2   1008   Aug.28,2014   Aug.27,202   Apr.23,2014   Apr.22,202   Apr.23,2014   Apr.27,202   Apr.23,2014   Apr.22,202   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.				3770	Apr.24,2014	Apr.23,2015
System Validation Dipole			D835V2	4d063	Aug.28,2014	Aug.27,2015
Dipole   Engineering AG   D2450V2   727   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.15,20   Apr.15,20   Apr.15,20   Apr.15,20   Apr.15,20   Apr.26,20   Apr.23,2014   Apr.15,20   Apr.25,20   Apr.23,2014   Apr.22,20   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Apr.23,2014   Ap			D1750V2	1008	Aug.28,2014	Aug.27,2015
D2600V2   1005   Jan.28,2014   Jan.27,2016     D5GHzV2   1104   Apr.16,2014   Apr.15,2016     D5GHzV2   1104   Apr.16,2014   Apr.15,2016     D4G00V2   1005   Jan.28,2014   Jan.27,2016     Aug.26,2014   Aug.25,2017     Aug.26,2014   Aug.25,2017     Aug.26,2017   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     Aug.26,2017   Aug.26,2017     Aug.26,2017   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     Aug.26,2017   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     Aug.26,2017   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26,2017     B56   Aug.27,2014   Aug.26	System Validation		D1900V2	5d027	Apr.23,2014	Apr.22,2015
D5GHzV2	Dipole		D2450V2	727	Apr.23,2014	Apr.22,2015
Data acquisition Electronics  Schmid & Partner Engineering AG  Software  Schmid & Partner Engineering AG  Software  Schmid & Partner Engineering AG  Software  Schmid & Partner Engineering AG  Phantom  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering A			D2600V2	1005	Jan.28,2014	Jan.27,2015
Data acquisition Electronics  Schmid & Partner Engineering AG  Software  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Software  Schmid & Partner Engineering AG  Phantom  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid			D5GHzV2	1104	Apr.16,2014	Apr.15,2015
DAE4   Schmid & Faither   Engineering AG   DAE4   S56   Aug.27,2014   Aug.26,20		Schmid & Partner	DAE4	1260	Aug.26,2014	Aug.25,2015
Software  Software  Schmid & Partner Engineering AG  Phantom  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  SAM  N/A  SAM  N/A  Calibration Calibration not required not required not required Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration Calibration	-			915	Jun.18,2014	Jun.17,2015
Software  Schmid & Partner Engineering AG  Phantom  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  Schmid & Partner Engineering AG  N/A  Schmid & Partner Engineering AG  N/A  SAM  N/A  Calibration not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not requir		Engineering AG		856	Aug.27,2014	Aug.26,2015
Software  Engineering AG  V52.8.8  N/A  not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not				1374	Nov.18,2014	Nov.17,2015
Phantom  Schmid & Partner Engineering AG  Network Analyzer  Agilent  Schmid & Partner Engineering AG  SAM  N/A  SAM  N/A  Calibration  not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required not required	Software	Schmid & Partner	DASY 52	NI/A	Calibration	Calibration
Phantom Engineering AG SAM N/A not required not required Network Analyzer Agilent E5071C MY46107530 Feb.14,2014 Feb.13,20 Calibration Calibration	Software	Engineering AG	V52.8.8	IN/ A	not required	not required
Network Analyzer Agilent E5071C MY46107530 Feb.14,2014 Feb.13,20  Calibration Calibration	Phantom	Schmid & Partner	SAM	Ν/Δ	Calibration	Calibration
Calibration Calibration	Thuntom	Engineering AG	JAW	TV/ /A	not required	not required
Dielectric Probe Kit Agilent 85070F MY44300677 Calibration Calibration	Network Analyzer	Agilent	E5071C	MY46107530	Feb.14,2014	Feb.13,2015
	Dielectric Probe Kit	Δαilent	85070F	MV44300677	Calibration	Calibration
not required not requi	Diciectific Frobe Kit	Agilett	03070L	101144300077	not required	not required
Δαμοή		Aailent	772D	MY46151242	Jul.14,2014	Jul.13,2015
coupler 778D MY48220468 Apr.01,2014 Mar.31,20	coupler	Agnorit	778D	MY48220468	Apr.01,2014	Mar.31,2015
RF Signal Generator Agilent N5181A MY50141235 Dec.14,2013 Dec.13,20	RF Signal Generator	Agilent	N5181A	MY50141235	Dec.14,2013	Dec.13,2016
Power Meter Agilent E4417A MY52240003 Apr.30,2014 Apr.29,20	Power Meter	Agilent	E4417A	MY52240003	Apr.30,2014	Apr.29,2015
Power Sensor Agilent E9301H MY52200004 Apr.30,2014 Apr.29,20	Power Sensor	Agilent	E9301H	MY52200004	Apr.30,2014	Apr.29,2015

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Device	Manufacturer	Туре	Serial number	Date of last calibration	Date of next calibration
Radio Communication Test	R&S	CMU200	122498	Aug.14,2014	Aug.13,2015
Radio Communication Test	Anritsu	MT8820C	6201061014	Aug.06,2014	Aug.05,2015
TECPEL	Digital thermometer	DTM-303A	TP130074	Mar.20,2014	Mar.19,2015

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# 5. Measurements

Date: 2014/11/17

# GSM 850\_Head\_Le Cheek\_CH 128

Communication System: GSM Frequency: 824.2 MHz, Duty factor: 1:8.3

Medium parameters used: f = 824.2 MHz;  $\sigma = 0.872 \text{ S/m}$ ;  $\varepsilon_r = 41.276$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

## **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;

• Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.460 W/kg

# Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

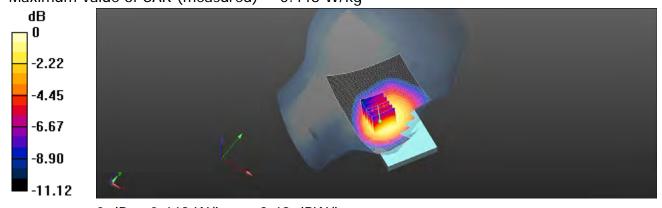
dy=8mm, dz=5mm

Reference Value = 4.938 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.498 W/kg

## SAR(1 g) = 0.387 W/kg; SAR(10 g) = 0.286 W/kg

Maximum value of SAR (measured) = 0.448 W/kg



0 dB = 0.448 W/kq = -3.49 dBW/kq

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#### GSM 850\_Speech mode\_Back side\_CH 128\_15mm

Communication System: GSM Frequency: 824.2 MHz, Duty factor: 1:8.3

Medium parameters used: f = 824.2 MHz;  $\sigma = 1.001 \text{ S/m}$ ;  $\varepsilon_r = 52.977$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.400 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

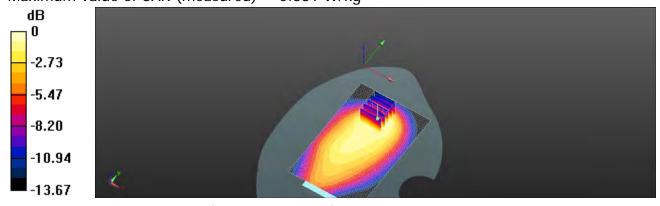
dy=8mm, dz=5mm

Reference Value = 15.80 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.459 W/kg

#### SAR(1 g) = 0.290 W/kg; SAR(10 g) = 0.183 W/kg

Maximum value of SAR (measured) = 0.381 W/kg



0 dB = 0.381 W/kg = -4.19 dBW/kg

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#### GPRS 850\_Hotspot mode\_Back side\_CH 128\_10mm

Communication System: GPRS (1Dn1Up) Frequency: 824.2 MHz, Duty factor: 1:8.3 Medium parameters used: f=824.2 MHz;  $\sigma=1.001$  S/m;  $\epsilon_r=52.977$ ;  $\rho=1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.741 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

dy=8mm, dz=5mm

Reference Value = 26.43 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.819 W/kg

SAR(1 g) = 0.638 W/kg; SAR(10 g) = 0.473 W/kg

Maximum value of SAR (measured) = 0.737 W/kg

## Configuration/Body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm,

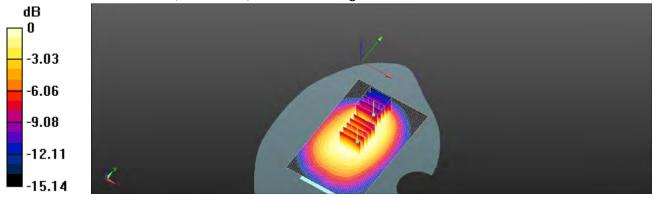
dy=8mm, dz=5mm

Reference Value = 26.43 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 0.946 W/kg

SAR(1 g) = 0.578 W/kg; SAR(10 g) = 0.361 W/kg

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



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

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#### GSM 1900 Head Le Cheek CH 810

Communication System: GSM Frequency: 1909.8 MHz, Duty factor: 1:8.3

Medium parameters used: f = 1910 MHz;  $\sigma = 1.398 \text{ S/m}$ ;  $\epsilon_r = 39.531$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head:

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.184 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

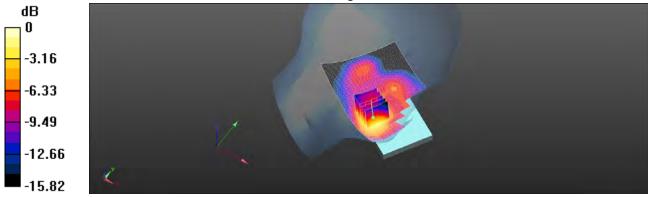
dv=8mm, dz=5mm

Reference Value = 5.042 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 0.219 W/kg

#### SAR(1 g) = 0.147 W/kg; SAR(10 g) = 0.091 W/kg

Maximum value of SAR (measured) = 0.183 W/kg



0 dB = 0.183 W/kq = -7.38 dBW/kq

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#### GSM 1900\_Speech mode\_Back side\_CH 810\_15mm

Communication System: GSM Frequency: 1909.8 MHz, Duty factor: 1:8.3

Medium parameters used: f = 1910 MHz;  $\sigma = 1.505$  S/m;  $\epsilon_r = 51.618$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.613 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

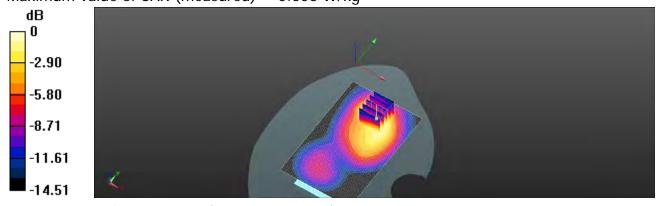
dy=8mm, dz=5mm

Reference Value = 6.986 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 0.721 W/kg

#### SAR(1 g) = 0.470 W/kg; SAR(10 g) = 0.283 W/kg

Maximum value of SAR (measured) = 0.606 W/kg



0 dB = 0.606 W/kq = -2.18 dBW/kq

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#### GPRS 1900\_Hotspot mode\_Bottom side\_CH 810\_10mm

Communication System: GPRS (1Dn1Up) Frequency: 1909.8 MHz, Duty factor: 1:8.3 Medium parameters used: f = 1910 MHz;  $\sigma = 1.505 \text{ S/m}$ ;  $\epsilon_r = 51.618$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head:
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (41x61x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.22 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

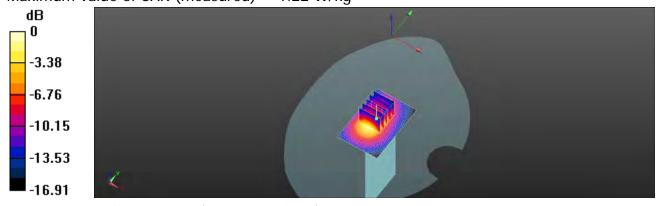
dv=8mm, dz=5mm

Reference Value = 20.13 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.48 W/kg

#### SAR(1 g) = 0.898 W/kg; SAR(10 g) = 0.485 W/kg

Maximum value of SAR (measured) = 1.22 W/kg



0 dB = 1.22 W/kq = 0.86 dBW/kq

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#### WCDMA Band 2 Head Le Cheek CH 9538

Communication System: WCDMA Frequency: 1907.6 MHz, Duty factor: 1:1

Medium parameters used: f = 1908 MHz;  $\sigma = 1.396$  S/m;  $\epsilon_r = 39.538$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head:
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.290 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

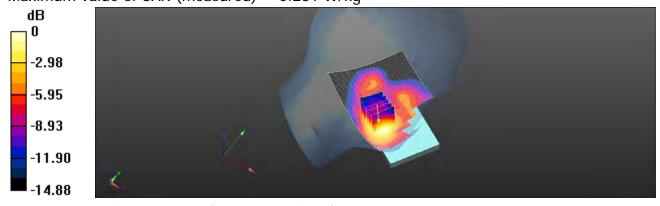
dv=8mm, dz=5mm

Reference Value = 6.050 V/m; Power Drift = -0.18 dB

Peak SAR (extrapolated) = 0.352 W/kg

#### SAR(1 g) = 0.228 W/kg; SAR(10 g) = 0.139 W/kg

Maximum value of SAR (measured) = 0.281 W/kg



0 dB = 0.281 W/kq = -5.51 dBW/kq

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# WCDMA Band 2\_Speech mode\_Back side\_CH 9538\_repeat SAR test at the highest SAR measurement\_15mm

Communication System: WCDMA Frequency: 1907.6 MHz, Duty factor: 1:1

Medium parameters used: f = 1908 MHz;  $\sigma = 1.503$  S/m;  $\epsilon_r = 51.621$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

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

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

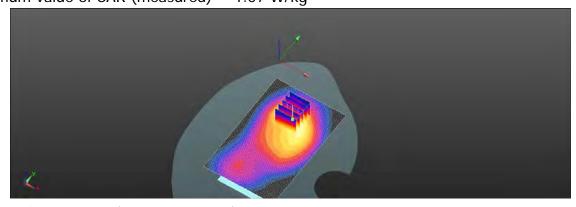
dy=8mm, dz=5mm

Reference Value = 12.71 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.27 W/kg

SAR(1 g) = 0.817 W/kg; SAR(10 g) = 0.489 W/kg

Maximum value of SAR (measured) = 1.07 W/kg



0 dB = 1.07 W/kq = 0.29 dBW/kq

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Date: 2014/11/19

#### WCDMA Band 2\_Hotspot mode\_Bottom side\_CH 9262\_10mm

Communication System: WCDMA Frequency: 1852.4 MHz, Duty factor: 1:1

Medium parameters used: f = 1852.4 MHz;  $\sigma = 1.459$  S/m;  $\epsilon_r = 51.902$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (51x71x1): Interpolated grid: dx=15 mm, dy=15 mm

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

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

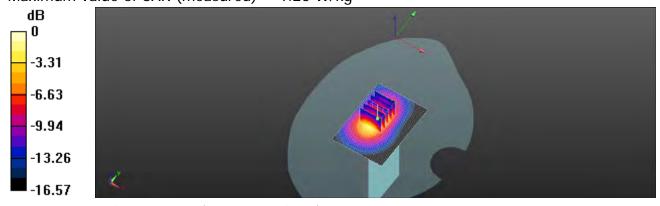
dy=8mm, dz=5mm

Reference Value = 16.70 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 1.50 W/kg

#### SAR(1 g) = 0.918 W/kg; SAR(10 g) = 0.498 W/kg

Maximum value of SAR (measured) = 1.26 W/kg



0 dB = 1.26 W/kq = 1.00 dBW/kq

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Date: 2014/11/18

#### WCDMA Band 4\_Head\_Le Cheek\_CH 1312

Communication System: WCDMA Frequency: 1712.4 MHz, Duty factor: 1:1

Medium parameters used: f = 1712.4 MHz;  $\sigma = 1.343$  S/m;  $\epsilon_r = 39.596$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(8, 8, 8); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.649 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

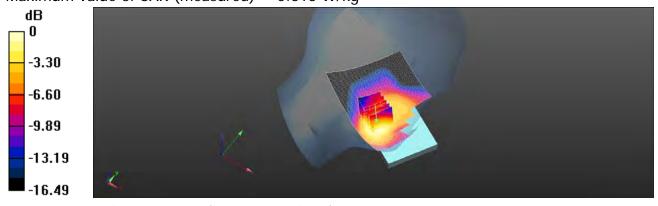
dy=8mm, dz=5mm

Reference Value = 4.064 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 0.749 W/kg

#### SAR(1 g) = 0.519 W/kg; SAR(10 g) = 0.338 W/kg

Maximum value of SAR (measured) = 0.613 W/kg



0 dB = 0.613 W/kq = -2.13 dBW/kq

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#### WCDMA Band 4\_Speech mode\_Back side\_CH 1312\_15mm

Communication System: WCDMA Frequency: 1712.4 MHz, Duty factor: 1:1

Medium parameters used: f = 1712.4 MHz;  $\sigma = 1.431 \text{ S/m}$ ;  $\epsilon_r = 54.495$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.830 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

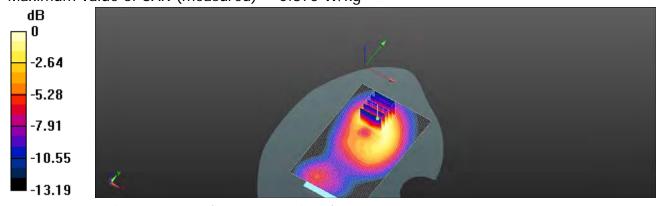
dy=8mm, dz=5mm

Reference Value = 13.50 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 1.02 W/kg

#### SAR(1 g) = 0.689 W/kg; SAR(10 g) = 0.427 W/kg

Maximum value of SAR (measured) = 0.875 W/kg



0 dB = 0.875 W/kq = -0.58 dBW/kq

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Date: 2014/11/18

#### WCDMA Band 4\_Hotspot mode\_Bottom side\_CH 1513\_10mm

Communication System: WCDMA Frequency: 1752.6 MHz, Duty factor: 1:1

Medium parameters used: f = 1753 MHz;  $\sigma = 1.461$  S/m;  $\epsilon_r = 54.383$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (51x81x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.33 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

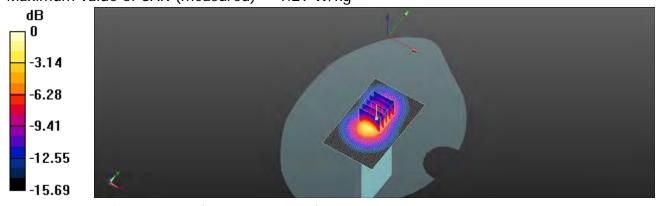
dy=8mm, dz=5mm

Reference Value = 24.84 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.52 W/kg

#### SAR(1 g) = 0.947 W/kg; SAR(10 g) = 0.517 W/kg

Maximum value of SAR (measured) = 1.29 W/kg



0 dB = 1.29 W/kq = 1.11 dBW/kq

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#### WCDMA Band 5 Head Le Cheek CH 4132

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used: f = 826.4 MHz;  $\sigma = 0.874 \text{ S/m}$ ;  $\epsilon_r = 41.25$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head:
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.443 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

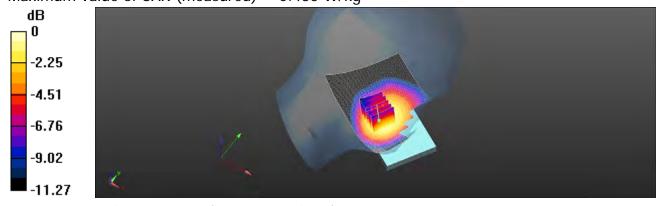
dv=8mm, dz=5mm

Reference Value = 4.960 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 0.486 W/kg

#### SAR(1 g) = 0.372 W/kg; SAR(10 g) = 0.273 W/kg

Maximum value of SAR (measured) = 0.435 W/kg



0 dB = 0.435 W/kq = -3.62 dBW/kq

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#### WCDMA Band 5\_Speech mode\_Back side\_CH 4132\_15mm

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used: f = 826.4 MHz;  $\sigma = 1.004 \text{ S/m}$ ;  $\varepsilon_r = 52.958$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.393 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

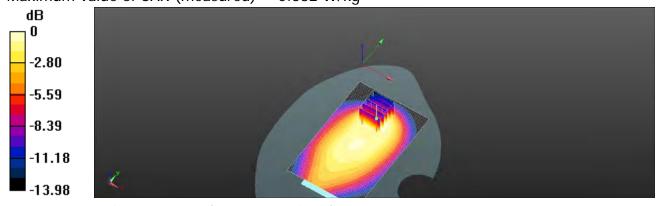
dy=8mm, dz=5mm

Reference Value = 17.63 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 0.461 W/kg

#### SAR(1 g) = 0.294 W/kg; SAR(10 g) = 0.190 W/kg

Maximum value of SAR (measured) = 0.382 W/kg



0 dB = 0.382 W/kq = -4.18 dBW/kq

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#### WCDMA Band 5\_Hotspot mode\_Back side\_CH 4132\_10mm

Communication System: WCDMA Frequency: 826.4 MHz, Duty factor: 1:1

Medium parameters used: f = 826.4 MHz;  $\sigma = 1.004 \text{ S/m}$ ;  $\epsilon_r = 52.958$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.930 W/kg

#### Configuration/Body/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

dy=8mm, dz=5mm

Reference Value = 29.90 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 1.03 W/kg

SAR(1 g) = 0.796 W/kg; SAR(10 g) = 0.587 W/kg

Maximum value of SAR (measured) = 0.929 W/kg

## Configuration/Body/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm,

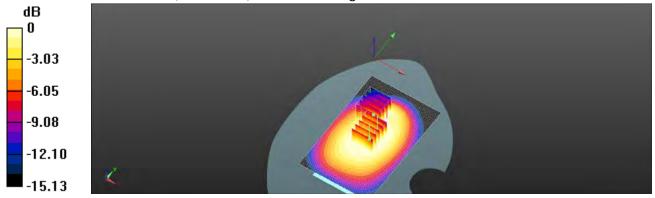
dy=8mm, dz=5mm

Reference Value = 29.90 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 0.905 W/kg

SAR(1 g) = 0.608 W/kg; SAR(10 g) = 0.414 W/kg

Maximum value of SAR (measured) = 0.804 W/kg



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

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#### LTE Band 2 (20MHz)\_Head\_Le Cheek\_CH 19100\_QPSK\_1-99

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.432 \text{ S/m}$ ;  $\epsilon r = 39.256$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.65, 7.65, 7.65); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Head/Area Scan (71x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.579 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

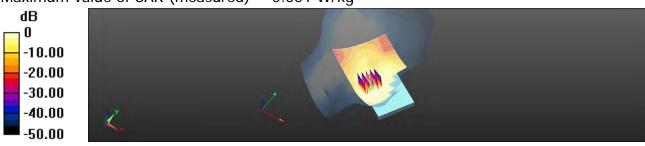
dy=8mm, dz=5mm

Reference Value = 6.023 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 0.683 W/kg

#### SAR(1 g) = 0.429 W/kg; SAR(10 g) = 0.257 W/kg

Maximum value of SAR (measured) = 0.551 W/kg



0 dB = 0.579 W/kq = -2.37 dBW/kq

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# LTE Band 2 (20MHz)\_Body-worn\_Back side\_CH 19100 QPSK 1-99 15mm

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.549 \text{ S/m}$ ;  $\epsilon_r = 53.523$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;

• Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

· Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Head/Area Scan (61x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 1.10 W/kg

### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

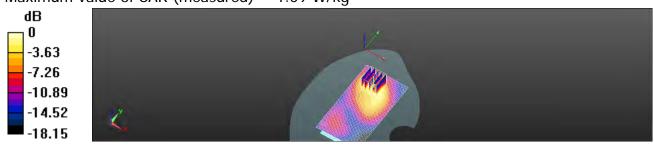
dy=8mm, dz=5mm

Reference Value = 8.789 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 1.30 W/kg

SAR(1 g) = 0.804 W/kg; SAR(10 g) = 0.441 W/kg

Maximum value of SAR (measured) = 1.09 W/kg



0 dB = 1.10 W/kg = 0.41 dBW/kg

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Date: 2014/12/1

# LTE Band 2 (20MHz) reduced\_Hotspot\_Bottom side\_CH 19100\_QPSK\_50-50\_10mm

Communication System: LTE; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.549 \text{ S/m}$ ;  $\epsilon_r = 53.523$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (51x71x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.35 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

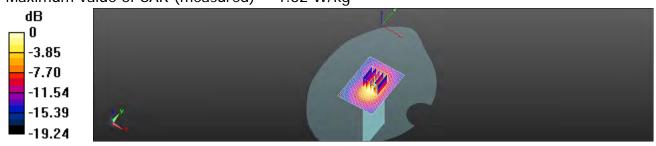
dy=8mm, dz=5mm

Reference Value = 28.84 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 1.60 W/kg

SAR(1 g) = 0.949 W/kg; SAR(10 g) = 0.501 W/kg

Maximum value of SAR (measured) = 1.32 W/kg



0 dB = 1.35 W/kg = 1.30 dBW/kg

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Date: 2014/12/2

#### LTE Band 4 (20MHz)\_Head\_Le Cheek\_CH 20050\_QPSK\_1-50

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used: f = 1720 MHz;  $\sigma = 1.294 \text{ S/m}$ ;  $\epsilon r = 40.523$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3938; ConvF(7.91, 7.91, 7.91); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (61x101x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.523 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

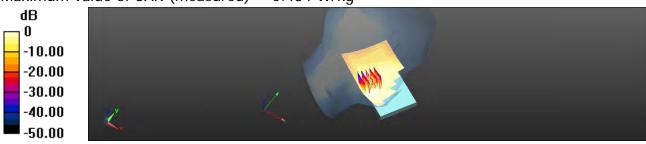
dv=8mm, dz=5mm

Reference Value = 4.441 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 0.571 W/kg

#### SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.239 W/kg

Maximum value of SAR (measured) = 0.484 W/kg



0 dB = 0.523 W/kq = -2.81 dBW/kq

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Date: 2014/12/3

# LTE Band 4 (20MHz)\_Body-worn\_Back side\_CH 20050\_QPSK\_1-50\_15mm

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used: f = 1720 MHz;  $\sigma = 1.448 \text{ S/m}$ ;  $\epsilon r = 54.922$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### DASY5 Configuration:

• Probe: EX3DV4 - SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Head/Area Scan (61x111x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.736 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

dy=8mm, dz=5mm

Reference Value = 11.13 V/m; Power Drift = -0.13 dB

Peak SAR (extrapolated) = 0.874 W/kg

SAR(1 g) = 0.559 W/kg; SAR(10 g) = 0.346 W/kg

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



0 dB = 0.736 W/kg = -1.33 dBW/kg

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Date: 2014/12/3

#### LTE Band 4 (20MHz)\_Hotspot\_Bottom side\_CH 20050 QPSK 1-50 10mm

Communication System: LTE; Frequency: 1720 MHz, Duty factor: 1:1

Medium parameters used: f = 1720 MHz;  $\sigma = 1.448 \text{ S/m}$ ;  $\epsilon r = 54.922$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (51x71x1): Interpolated grid: dx=15 mm, dy=15

Maximum value of SAR (interpolated) = 1.83 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

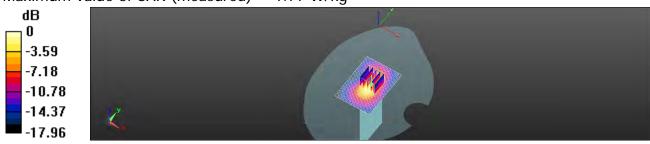
dy=8mm, dz=5mm

Reference Value = 33.57 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 2.16 W/kg

SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.682 W/kg

Maximum value of SAR (measured) = 1.77 W/kg



0 dB = 1.83 W/kg = 2.62 dBW/kg

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Date: 2014/12/4

#### LTE Band 5 (10MHz)\_Head\_Le Cheek\_CH 20450\_QPSK\_1-0

Communication System: LTE; Frequency: 829 MHz, Duty factor: 1:1

Medium parameters used: f = 829 MHz;  $\sigma = 0.887$  S/m;  $\epsilon r = 40.238$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Left Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.41, 9.41, 9.41); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (61x101x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.491 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

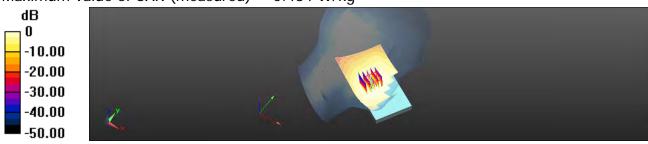
dy=8mm, dz=5mm

Reference Value = 5.390 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 0.542 W/kg

#### SAR(1 g) = 0.418 W/kg; SAR(10 g) = 0.315 W/kg

Maximum value of SAR (measured) = 0.484 W/kg



0 dB = 0.491 W/kq = -3.09 dBW/kq

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Date: 2014/12/5

# LTE Band 5 (10MHz)\_Body-worn\_Back side\_CH 20600 QPSK 1-25 15mm

Communication System: LTE; Frequency: 844 MHz, Duty factor: 1:1

Medium parameters used: f = 844 MHz;  $\sigma = 0.992$  S/m;  $\epsilon r = 54.002$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;

• Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Head/Area Scan (61x101x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.594 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

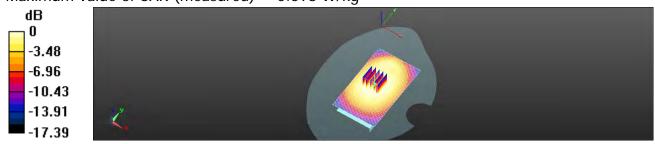
dy=8mm, dz=5mm

Reference Value = 24.83 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 0.659 W/kg

SAR(1 g) = 0.517 W/kg; SAR(10 g) = 0.391 W/kg

Maximum value of SAR (measured) = 0.598 W/kg



0 dB = 0.594 W/kg = -2.26 dBW/kg

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### LTE Band 5 (10MHz)\_Hotspot\_Back side\_CH 20525\_QPSK\_1-25\_10mm

Communication System: LTE; Frequency: 836.5 MHz, Duty factor: 1:1

Medium parameters used: f = 836.5 MHz;  $\sigma = 0.973 \text{ S/m}$ ;  $\epsilon r = 54.149$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (61x101x1): Interpolated grid: dx=15 mm,

dy=15 mm

Maximum value of SAR (interpolated) = 0.825 W/kg

#### Configuration/Head/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm,

dy=8mm, dz=5mm

Reference Value = 26.38 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.829 W/kg

SAR(1 g) = 0.519 W/kg; SAR(10 g) = 0.328 W/kg

Maximum value of SAR (measured) = 0.665 W/kg

## Configuration/Head/Zoom Scan (5x5x7)/Cube 1: Measurement grid: dx=8mm,

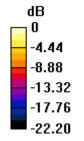
dy=8mm, dz=5mm

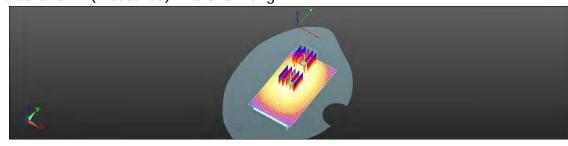
Reference Value = 26.38 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 0.919 W/kg

SAR(1 g) = 0.716 W/kg; SAR(10 g) = 0.534 W/kg

Maximum value of SAR (measured) = 0.826 W/kg





0 dB = 0.825 W/kg = -0.84 dBW/kg

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Date: 2014/12/6

#### LTE Band 7 (20MHz) Head Le Cheek CH 21100 QPSK 1-99

Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used: f = 2535 MHz;  $\sigma = 1.827 \text{ S/m}$ ;  $\epsilon r = 41.027$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Left Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(6.83, 6.83, 6.83); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (81x141x1): Interpolated grid: dx=12 mm,

dy=12 mm

Maximum value of SAR (interpolated) = 0.562 W/kg

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

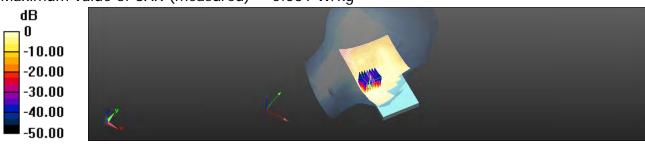
dv=5mm, dz=5mm

Reference Value = 4.968 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 0.685 W/kg

#### SAR(1 g) = 0.380 W/kg; SAR(10 g) = 0.200 W/kg

Maximum value of SAR (measured) = 0.531 W/kg



0 dB = 0.562 W/kq = -2.50 dBW/kq

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Date: 2014/12/8

#### LTE Band 7 (20MHz)\_Body-worn\_Back side\_CH 21100 QPSK 1-99 15mm

Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used: f = 2535 MHz;  $\sigma = 2.019 \text{ S/m}$ ;  $\epsilon r = 53.211$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/Head/Area Scan (81x131x1): Interpolated grid: dx=12 mm,

dy=12 mm

Maximum value of SAR (interpolated) = 0.719 W/kg

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

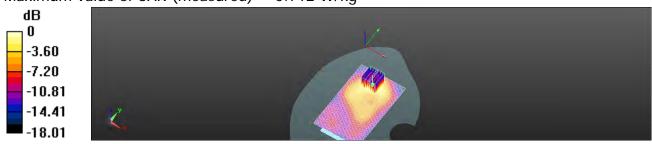
dy=5mm, dz=5mm

Reference Value = 9.727 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 0.941 W/kg

SAR(1 g) = 0.497 W/kg; SAR(10 g) = 0.262 W/kg

Maximum value of SAR (measured) = 0.712 W/kg



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

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Date: 2014/12/8

#### LTE Band 7 (20MHz)\_Hotspot\_Bottom side\_CH 21100 QPSK 1-99 10mm

Communication System: LTE; Frequency: 2535 MHz, Duty factor: 1:1

Medium parameters used: f = 2535 MHz;  $\sigma = 2.019 \text{ S/m}$ ;  $\epsilon r = 53.211$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### DASY5 Configuration:

Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Head/Area Scan (61x81x1): Interpolated grid: dx=12 mm, dy=12

Maximum value of SAR (interpolated) = 1.56 W/kg

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

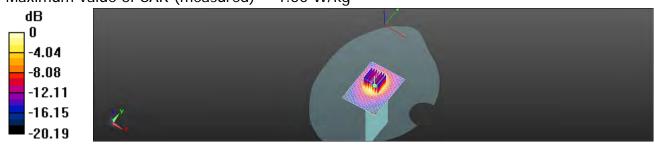
dy=5mm, dz=5mm

Reference Value = 23.85 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 2.03 W/kg

SAR(1 g) = 1.02 W/kg; SAR(10 g) = 0.502 W/kg

Maximum value of SAR (measured) = 1.50 W/kg



0 dB = 1.56 W/kg = 1.93 dBW/kg

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Date: 2014/11/23

#### WLAN802.11b\_Head\_RE Cheek\_CH 11

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz

, Duty factor: 1:1

Medium parameters used: f = 2462 MHz;  $\sigma = 1.836 \text{ S/m}$ ;  $\epsilon_r = 39.117$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(6.97, 6.97, 6.97); Calibrated: 4/24/2014;

- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/RE Cheek/Area Scan (91x141x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 1.30 W/kg

#### Configuration/RE Cheek/Zoom Scan (7x7x7) / Cube 0: Measurement grid:

dx=5mm, dy=5mm, dz=5mm

Reference Value = 10.15 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 0.786 W/kg; SAR(10 g) = 0.356 W/kg

Maximum value of SAR (measured) = 1.20 W/kg



0 dB = 1.30 W/kq = 1.15 dBW/kq

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#### WLAN802.11b\_Hotspot\_Back side\_CH 11\_10mm

Communication System: WLAN802.11 b & g & n(20M)(40M); Frequency: 2462 MHz

, Duty factor: 1:1

Medium parameters used: f = 2462 MHz;  $\sigma = 2.063 \text{ S/m}$ ;  $\epsilon_r = 50.06$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/24/2014;

- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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

Maximum value of SAR (interpolated) = 1.13 W/kg

#### Configuration/Hotspot/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

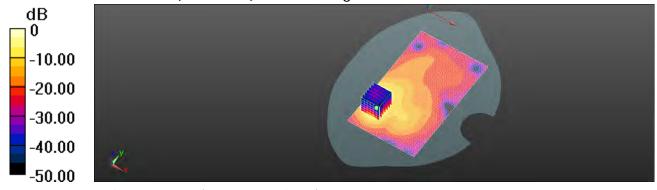
dx=5mm, dy=5mm, dz=5mm

Reference Value = 3.208 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 1.53 W/kg

SAR(1 g) = 0.679 W/kg; SAR(10 g) = 0.294 W/kg

Maximum value of SAR (measured) = 1.07 W/kg



0 dB = 1.13 W/kq = 0.53 dBW/kq

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Date: 2014/11/20

#### WLAN802.11a5.2G\_Head\_RE Tilt\_CH 48

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5240 MHz,

Duty factor: 1:1

Medium parameters used: f = 5240 MHz;  $\sigma = 4.666 \text{ S/m}$ ;  $\epsilon_r = 36.083$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

**DASY5** Configuration:

• Probe: EX3DV4 - SN3770; ConvF(5.25, 5.25, 5.25); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/RE Tilt/Area Scan (111x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.270 W/kg

#### Configuration/RE Tilt/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

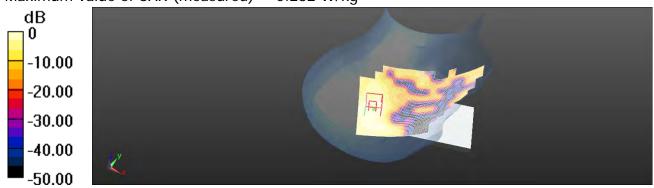
dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.017 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 0.523 W/kg

#### SAR(1 g) = 0.158 W/kg; SAR(10 g) = 0.066 W/kg

Maximum value of SAR (measured) = 0.282 W/kg



0 dB = 0.270 W/kq = -5.68 dBW/kq

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Date: 2014/11/22

#### WLAN802.11a5.2G\_Body-worn\_Back side\_CH 40\_15mm

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5200 MHz

, Duty factor: 1:1

Medium parameters used: f = 5200 MHz;  $\sigma = 5.337 \text{ S/m}$ ;  $\epsilon_r = 48.522$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(4.56, 4.56, 4.56); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head:

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (111x181x1): Interpolated grid: dx=10 mm,

dy=10 mm

Maximum value of SAR (interpolated) = 0.606 W/kg

#### Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

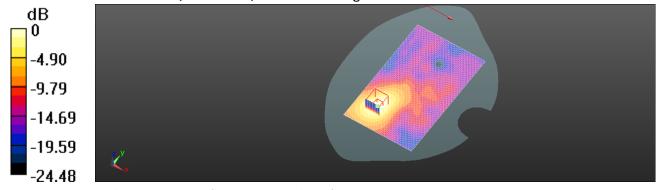
dx=4mm, dv=4mm, dz=2mm

Reference Value = 3.644 V/m; Power Drift = 0.17 dB

Peak SAR (extrapolated) = 1.16 W/kg

#### SAR(1 g) = 0.339 W/kg; SAR(10 g) = 0.147 W/kg

Maximum value of SAR (measured) = 0.598 W/kg



0 dB = 0.606 W/kq = -2.18 dBW/kq

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Date: 2014/11/21

#### WLAN802.11a5.3G Head RE Cheek CH 60

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5300 MHz,

Duty factor: 1:1

Medium parameters used: f = 5300 MHz;  $\sigma = 4.728 \text{ S/m}$ ;  $\epsilon_r = 35.839$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(5.07, 5.07, 5.07); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head:

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/RE Cheek/Area Scan (111x181x1): Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.339 W/kg

#### Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

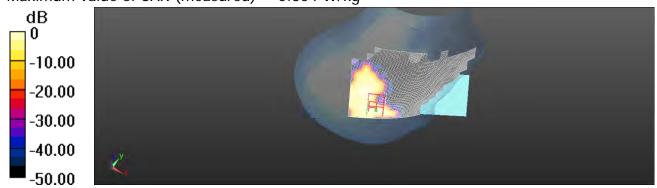
dx=4mm, dv=4mm, dz=2mm

Reference Value = 4.240 V/m; Power Drift =0.19 dB

Peak SAR (extrapolated) = 0.672 W/kg

#### SAR(1 g) = 0.170 W/kg; SAR(10 g) = 0.076 W/kg

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



0 dB = 0.339 W/kq = -4.70 dBW/kq

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#### WLAN802.11a5.3G Body-worn Back side CH 60 15mm

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5300 MHz

, Duty factor: 1:1

Medium parameters used: f = 5300 MHz;  $\sigma = 5.474 \text{ S/m}$ ;  $\epsilon_r = 47.787$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(4.38, 4.38, 4.38); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head:

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (111x181x1): Interpolated grid: dx=10 mm,

dy=10 mm

Maximum value of SAR (interpolated) = 0.574 W/kg

#### Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

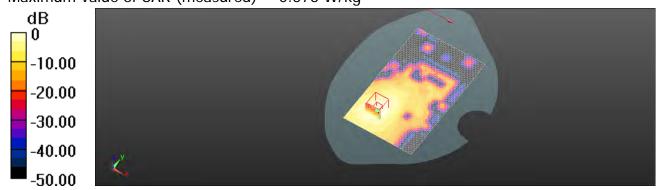
dx=4mm, dv=4mm, dz=2mm

Reference Value = 3.168 V/m; Power Drift = 0.18 dB

Peak SAR (extrapolated) = 1.14 W/kg

#### SAR(1 g) = 0.316 W/kg; SAR(10 g) = 0.126 W/kg

Maximum value of SAR (measured) = 0.576 W/kg



0 dB = 0.574 W/kq = -2.41 dBW/kq

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Date: 2014/11/20

#### WLAN802.11a5.6G Head RE Cheek CH 140

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5700 MHz

, Duty factor: 1:1

Medium parameters used: f = 5700 MHz;  $\sigma = 5.193 \text{ S/m}$ ;  $\epsilon_r = 34.941$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(4.48, 4.48, 4.48); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head:

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

#### Configuration/RE Cheek/Area Scan (111x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.768 W/kg

#### Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.421 V/m: Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.78 W/kg

SAR(1 g) = 0.423 W/kg; SAR(10 g) = 0.159 W/kg

Maximum value of SAR (measured) = 0.804 W/kg

## Configuration/RE Cheek/Zoom Scan (7x7x12)/Cube 1: Measurement grid:

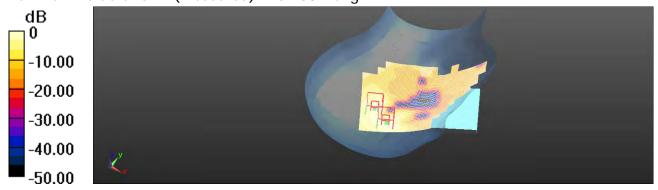
dx=4mm, dy=4mm, dz=2mm

Reference Value = 5.421 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 1.86 W/kg

SAR(1 g) = 0.361 W/kg; SAR(10 g) = 0.128 W/kg

Maximum value of SAR (measured) = 0.738 W/kg



0 dB = 0.768 W/kq = -1.15 dBW/kq

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#### WLAN802.11a5.6G\_Body-worn\_Back side\_CH 132\_15mm

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5660 MHz

, Duty factor: 1:1

Medium parameters used: f = 5660 MHz;  $\sigma = 6.004 \text{ S/m}$ ;  $\epsilon_r = 46.833$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(3.76, 3.76, 3.76); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (111x181x1): Interpolated grid: dx=10 mm,

dy=10 mm

Maximum value of SAR (interpolated) = 0.766 W/kg

#### Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

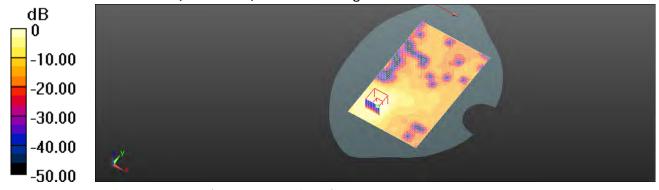
dx=4mm, dy=4mm, dz=2mm

Reference Value = 2.921 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.402 W/kg; SAR(10 g) = 0.163 W/kg

Maximum value of SAR (measured) = 0.750 W/kg



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

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Date: 2014/11/21

#### WLAN802.11a5.8G\_Head\_RE Tilt\_CH 161

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5805 MHz

, Duty factor: 1:1

Medium parameters used: f = 5805 MHz;  $\sigma = 5.317 \text{ S/m}$ ;  $\epsilon_r = 34.689$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Right Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(4.65, 4.65, 4.65); Calibrated: 4/24/2014;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 8/27/2014

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/RE Tilt/Area Scan (111x181x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 0.946 W/kg

#### Configuration/RE Tilt/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

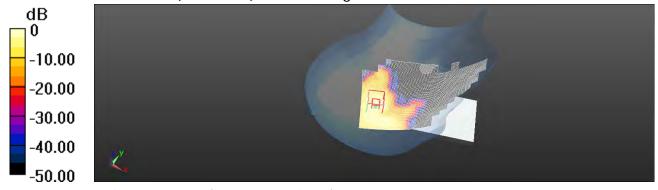
dx=4mm, dv=4mm, dz=2mm

Reference Value = 5.390 V/m; Power Drift = -0.14 dB

Peak SAR (extrapolated) = 2.30 W/kg

SAR(1 g) = 0.478 W/kg; SAR(10 g) = 0.133 W/kg

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



0 dB = 0.946 W/kq = -0.24 dBW/kq

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Date: 2014/11/22

#### WLAN802.11a5.8G\_Body-worn\_Back side\_CH 161\_15mm

Communication System: WLAN 802.11n/a(5G) FCC; Frequency: 5805 MHz

, Duty factor: 1:1

Medium parameters used: f = 5805 MHz;  $\sigma = 6.193 \text{ S/m}$ ;  $\epsilon_r = 46.422$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.13, 4.13, 4.13); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Configuration/Body/Area Scan (111x181x1): Interpolated grid: dx=10 mm,

dy=10 mm

Maximum value of SAR (interpolated) = 0.702 W/kg

#### Configuration/Body/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

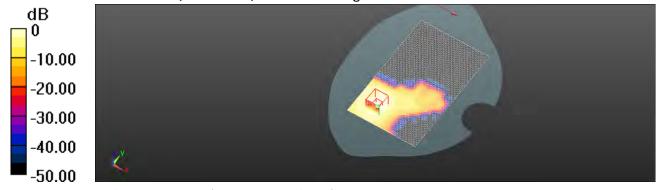
dx=4mm, dy=4mm, dz=2mm

Reference Value = 1.906 V/m; Power Drift = 0.13 dB

Peak SAR (extrapolated) = 1.59 W/kg

SAR(1 g) = 0.369 W/kg; SAR(10 g) = 0.138 W/kg

Maximum value of SAR (measured) = 0.713 W/kg



0 dB = 0.702 W/kq = -1.54 dBW/kq

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# 6. System Verification

Date: 2014/11/17

#### Dipole 835 MHz\_SN:4d063\_Head

Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 0.883 \text{ S/m}$ ;  $\epsilon_r = 41.143$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(9.14, 9.14, 9.14); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (41x121x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 3.62 W/kg

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

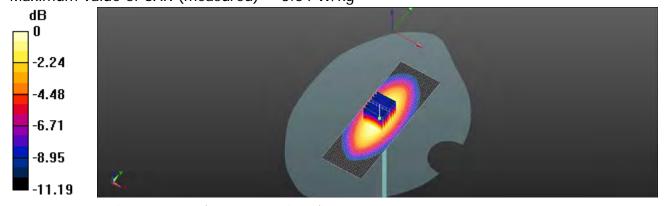
dx=5mm, dy=5mm, dz=5mm

Reference Value = 65.07 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 4.32 W/kg

#### SAR(1 g) = 2.35 W/kg; SAR(10 g) = 1.53 W/kg

Maximum value of SAR (measured) = 3.64 W/kg



0 dB = 3.64 W/kq = 5.61 dBW/kq

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Date: 2014/12/4

# Dipole 835 MHz\_SN:4d063\_Head

Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 0.893$  S/m;  $\varepsilon_r = 40.231$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3938; ConvF(9.41, 9.41, 9.41); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x121x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 3.06 W/kg

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

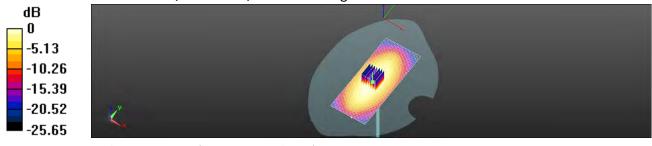
dx=5mm, dv=5mm, dz=5mm

Reference Value = 59.23 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 3.69 W/kg

SAR(1 q) = 2.44 W/kq; SAR(10 q) = 1.6 W/kq

Maximum value of SAR (measured) = 3.09 W/kg



0 dB = 3.06 W/kq = 4.86 dBW/kq

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Date: 2014/11/17

#### Dipole 835 MHz\_SN:4d063\_Body

Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 1.013$  S/m;  $\varepsilon_r = 52.883$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(9.03, 9.03, 9.03); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

• Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x131x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 3.15 W/kg

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

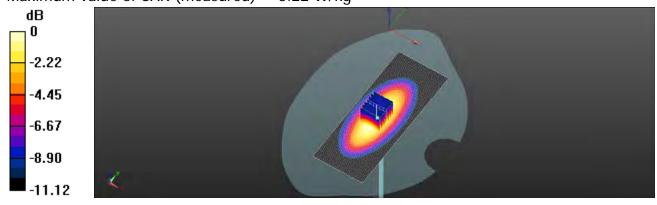
dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.87 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 3.81 W/kg

# SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.62 W/kg

Maximum value of SAR (measured) = 3.22 W/kg



0 dB = 3.22 W/kq = 5.08 dBW/kq

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Date: 2014/12/5

# Dipole 835 MHz\_SN:4d063\_Body

Communication System: CW; Frequency: 835 MHz, Duty factor: 1:1

Medium parameters used: f = 835 MHz;  $\sigma = 0.97$  S/m;  $\varepsilon_r = 54.153$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(9.35, 9.35, 9.35); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x111x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 3.15 W/kg

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

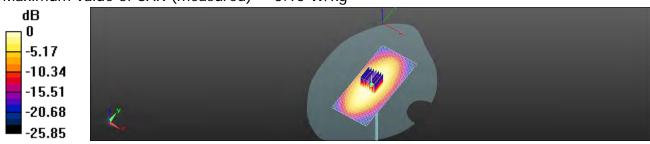
dx=5mm, dy=5mm, dz=5mm

Reference Value = 55.70 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.73 W/kg

SAR(1 g) = 2.47 W/kg; SAR(10 g) = 1.61 W/kg

Maximum value of SAR (measured) = 3.15 W/kg



0 dB = 3.15 W/kq = 4.98 dBW/kq

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Date: 2014/11/18

#### Dipole 1750 MHz\_SN:1008\_Head

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used: f = 1750 MHz;  $\sigma = 1.377 \text{ S/m}$ ;  $\epsilon_r = 39.577$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(8, 8, 8); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.0 W/kg

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

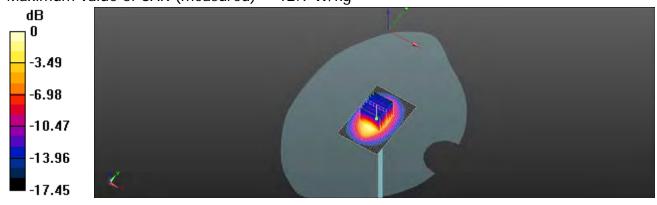
dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.42 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 16.7 W/kg

# SAR(1 g) = 8.96 W/kg; SAR(10 g) = 4.69 W/kg

Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kq = 11.11 dBW/kq

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Date: 2014/12/2

#### Dipole 1750 MHz\_SN:1008\_Head

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used: f = 1750 MHz;  $\sigma = 1.321 \text{ S/m}$ ;  $\epsilon_r = 40.155$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.91, 7.91, 7.91); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x101x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.2 W/kg

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

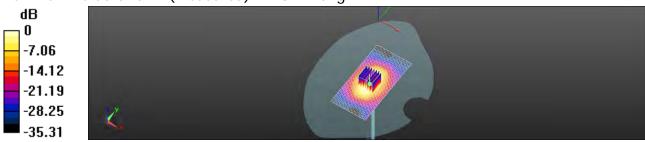
dx=5mm, dv=5mm, dz=5mm

Reference Value = 102.2 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.22 W/kg; SAR(10 g) = 4.89 W/kg

Maximum value of SAR (measured) = 13.1 W/kg



0 dB = 14.2 W/kq = 11.52 dBW/kq

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Date: 2014/11/18

#### Dipole 1750 MHz\_SN:1008\_Body

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used: f = 1750 MHz;  $\sigma = 1.458 \text{ S/m}$ ;  $\epsilon_r = 54.398$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(7.63, 7.63, 7.63); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x61x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.8 W/kg

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

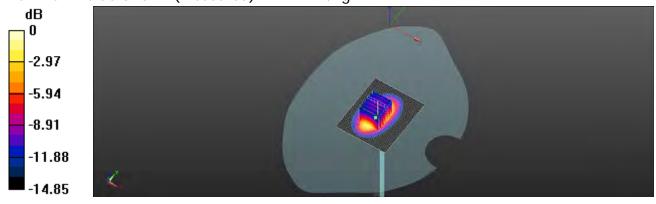
dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.57 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 15.6 W/kg

SAR(1 g) = 9.34 W/kg; SAR(10 g) = 5.22 W/kg

Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kq = 11.04 dBW/kq

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Date: 2014/12/3

# Dipole 1750 MHz\_SN:1008\_Body

Communication System: CW; Frequency: 1750 MHz, Duty factor: 1:1

Medium parameters used: f = 1750 MHz;  $\sigma = 1.476 \text{ S/m}$ ;  $\epsilon_r = 54.458$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(7.36, 7.36, 7.36); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x101x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.9 W/kg

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

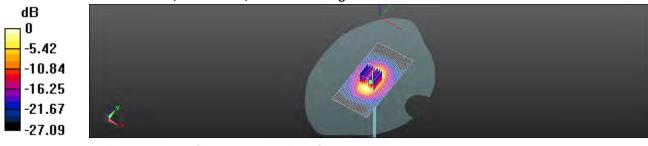
dx=5mm, dy=5mm, dz=5mm

Reference Value = 92.81 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 15.8 W/kg

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.98 W/kg

Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 14.9 W/kq = 11.73 dBW/kq

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Date: 2014/11/19

#### Dipole 1900 MHz\_SN:5d027\_Head

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.388 \text{ S/m}$ ;  $\epsilon_r = 39.567$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3831; ConvF(7.79, 7.79, 7.79); Calibrated: 2014/1/31;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn915; Calibrated: 2014/6/18

Phantom: Head;

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (41x61x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 13.5 W/kg

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

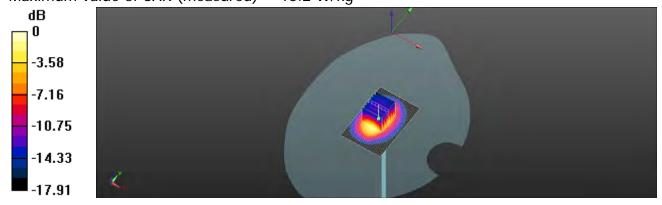
dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.96 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.4 W/kg; SAR(10 g) = 4.97 W/kg

Maximum value of SAR (measured) = 13.2 W/kg



0 dB = 13.2 W/kq = 11.21 dBW/kq

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Date: 2014/11/20

#### Dipole 1900 MHz\_SN:5d027\_Head

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.432 \text{ S/m}$ ;  $\varepsilon_r = 39.256$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3923; ConvF(8.42, 8.42, 8.42); Calibrated: 2014/8/28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1260; Calibrated: 2014/8/26
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (41x81x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.7 W/kg

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

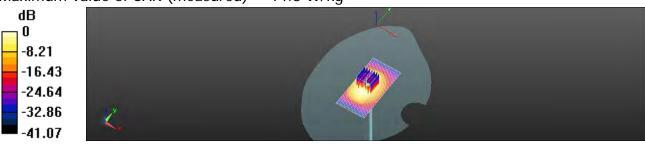
dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.131 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 19.3 W/kg

SAR(1 g) = 9.95 W/kg; SAR(10 g) = 5.17 W/kg

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



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

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#### Dipole 1900 MHz\_SN:5d027\_Body

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.492 \text{ S/m}$ ;  $\epsilon_r = 51.639$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3831; ConvF(7.19, 7.19, 7.19); Calibrated: 2014/1/31;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn915; Calibrated: 2014/6/18
- Phantom: Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x61x1): Interpolated grid: dx=15

mm, dy=15 mm

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

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

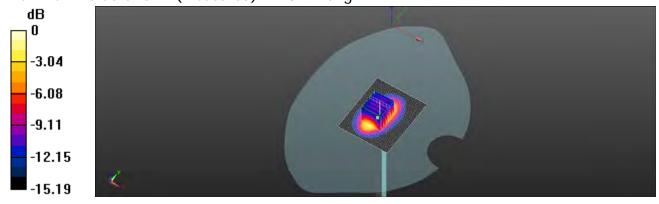
dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.47 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.1 W/kg

#### SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.42 W/kg

Maximum value of SAR (measured) = 13.9 W/kg



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

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#### Dipole 1900 MHz\_SN:5d027\_Body

Communication System: CW; Frequency: 1900 MHz, Duty factor: 1:1

Medium parameters used: f = 1900 MHz;  $\sigma = 1.549 \text{ S/m}$ ;  $\varepsilon_r = 53.523$ ;  $\rho = 1000 \text{ g/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3938; ConvF(7.03, 7.03, 7.03); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (41x81x1): Interpolated grid: dx=15

mm, dy=15 mm

Maximum value of SAR (interpolated) = 14.6 W/kg

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

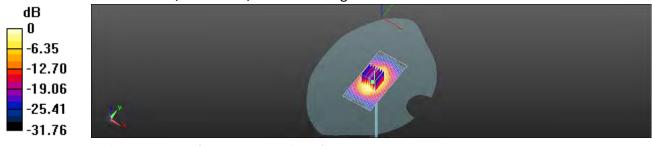
dx=5mm, dv=5mm, dz=5mm

Reference Value = 96.00 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 17.9 W/kg

# SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 14.4 W/kg



0 dB = 14.6 W/kq = 11.64 dBW/kq

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#### Dipole 2450 MHz\_SN:727\_Head

Communication System: CW; Frequency: 2450 MHz, Duty factor: 1:1

Medium parameters used: f = 2450 MHz;  $\sigma = 1.823 \text{ S/m}$ ;  $\epsilon_r = 39.185$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(6.97, 6.97, 6.97); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head:
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=250mW, dist=2mm: Interpolated grid: dx=12

mm, dy=12 mm

Maximum value of SAR (interpolated) = 22.3 W/kg

# Configuration/d=10mm, Pin=250mW, dist=2mm /Cube 0: Measurement

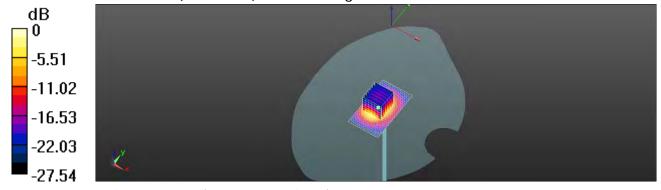
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.77 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 29.0 W/kg

#### SAR(1 g) = 13.4 W/kg; SAR(10 g) = 6.02 W/kg

Maximum value of SAR (measured) = 20.9 W/kg



0 dB = 22.3 W/kq = 13.47 dBW/kq

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#### Dipole 2450 MHz\_SN:727\_Body

Communication System: CW; Frequency: 2450 MHz, Duty factor: 1:1

Medium parameters used: f = 2450 MHz;  $\sigma = 2.045 \text{ S/m}$ ;  $\epsilon_r = 50.104$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.15, 7.15, 7.15); Calibrated: 4/24/2014;

- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=250mW, dist=2mm: Interpolated grid: dx=12

mm, dy=12 mm

Maximum value of SAR (interpolated) = 23.8 W/kg

#### Configuration/d=10mm, Pin=250mW, dist=2mm /Cube 0: Measurement

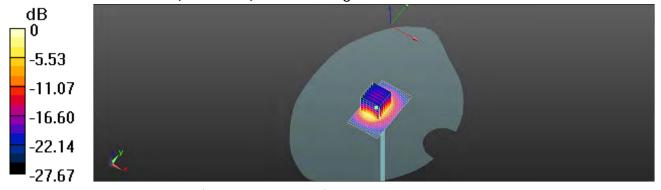
grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.07 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 30.7 W/kg

#### SAR(1 g) = 13.1 W/kg; SAR(10 g) = 5.85 W/kg

Maximum value of SAR (measured) = 22.3 W/kg



0 dB = 23.8 W/kq = 13.76 dBW/kq

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Date: 2014/12/6

#### Dipole 2600 MHz\_SN:1005\_Head

Communication System: CW; Frequency: 2600 MHz, Duty factor: 1:1

Medium parameters used: f = 2600 MHz;  $\sigma = 1.886 \text{ S/m}$ ;  $\varepsilon_r = 40.522$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3938; ConvF(6.83, 6.83, 6.83); Calibrated: 2014/7/25;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1374; Calibrated: 2014/11/18
- Phantom: Head
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (61x121x1): Interpolated grid: dx=12

mm, dy=12 mm

Maximum value of SAR (interpolated) = 23.4 W/kg

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

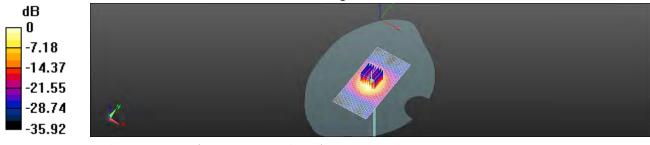
dx=5mm, dy=5mm, dz=5mm

Reference Value = 98.13 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 33.3 W/kg

SAR(1 g) = 14.8 W/kg; SAR(10 g) = 6.42 W/kg

Maximum value of SAR (measured) = 23.3 W/kg



0 dB = 23.4 W/kq = 13.69 dBW/kq

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Date: 2014/12/8

# Dipole 2600 MHz\_SN:1005\_Body

Communication System: CW; Frequency: 2600 MHz, Duty factor: 1:1

Medium parameters used: f = 2600 MHz;  $\sigma = 2.11 \text{ S/m}$ ;  $\varepsilon_r = 52.776$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

Probe: EX3DV4 - SN3938; ConvF(6.57, 6.57, 6.57); Calibrated: 2014/7/25;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1374; Calibrated: 2014/11/18

Phantom: Head

DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/Pin=250mW/Area Scan (51x91x1): Interpolated grid: dx=12

mm, dy=12 mm

Maximum value of SAR (interpolated) = 24.8 W/kg

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

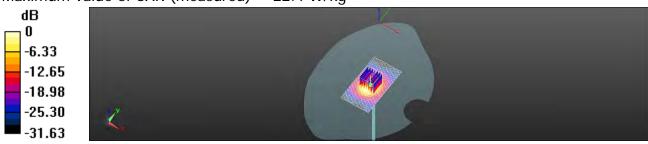
dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.0 V/m; Power Drift = -0.07 dB

Peak SAR (extrapolated) = 31.0 W/kg

SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.24 W/kg

Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 24.8 W/kq = 13.94 dBW/kq

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#### Dipole 5200 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5200 MHz, Duty factor: 1:1

Medium parameters used: f = 5200 MHz;  $\sigma = 4.615 \text{ S/m}$ ;  $\epsilon_r = 36.085$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(5.25, 5.25, 5.25); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.5 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm /Cube 0: Measurement

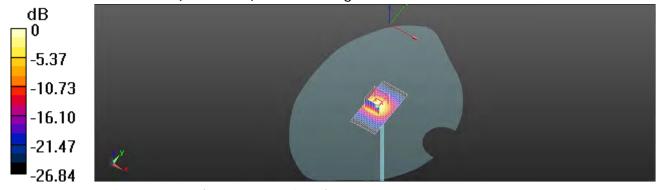
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.62 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 37.6 W/kg

#### SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 18.5 W/kq = 12.76 dBW/kq

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# Dipole 5200 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5200 MHz, Duty factor: 1:1

Medium parameters used: f = 5200 MHz;  $\sigma = 5.337 \text{ S/m}$ ;  $\epsilon_r = 48.522$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.56, 4.56, 4.56); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 19.2 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm /Cube 0: Measurement

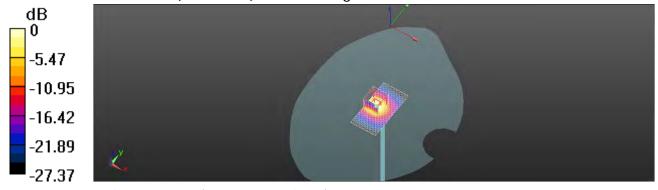
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 47.19 V/m; Power Drift = -0.16 dB

Peak SAR (extrapolated) = 39.8 W/kg

#### SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.06 W/kg

Maximum value of SAR (measured) = 15.3 W/kg



0 dB = 19.4 W/kq = 12.92 dBW/kq

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#### Dipole 5300 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5300 MHz, Duty factor: 1:1

Medium parameters used: f = 5300 MHz;  $\sigma = 4.728 \text{ S/m}$ ;  $\epsilon_r = 35.839$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(5.07, 5.07, 5.07); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.4 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm /Cube 0: Measurement

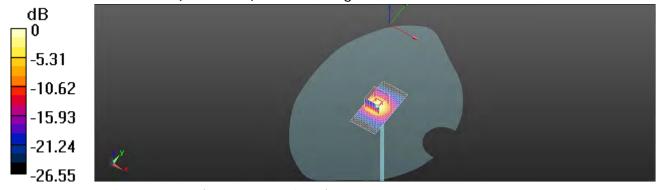
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 58.38 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 35.8 W/kg

#### SAR(1 g) = 8.66 W/kg; SAR(10 g) = 2.47 W/kg

Maximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.4 W/kq = 12.40 dBW/kq

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#### Dipole 5300 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5300 MHz, Duty factor: 1:1

Medium parameters used: f = 5300 MHz;  $\sigma = 5.474 \text{ S/m}$ ;  $\epsilon_r = 47.787$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.38, 4.38, 4.38); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.5 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm/Cube 0: Measurement

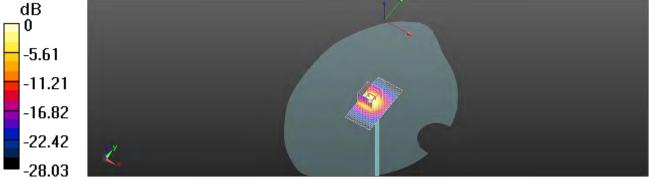
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 44.32 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 39.4 W/kg

#### SAR(1 g) = 7.88 W/kg; SAR(10 g) = 2.22 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 18.5 W/kq = 12.47 dBW/kq

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#### Dipole 5600 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5600 MHz, Duty factor: 1:1

Medium parameters used: f = 5600 MHz;  $\sigma = 5.078 \text{ S/m}$ ;  $\epsilon_r = 35.154$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.48, 4.48, 4.48); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 18.7 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm /Cube 0: Measurement

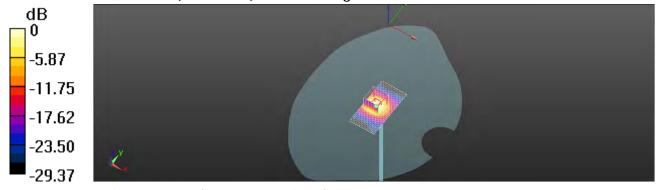
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 59.23 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 37.8 W/kg

#### SAR(1 g) = 8.47 W/kg; SAR(10 g) = 2.42 W/kg

Maximum value of SAR (measured) = 18.1 W/kg



0 dB = 18.7 W/kq = 12.53 dBW/kq

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#### Dipole 5600 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5600 MHz, Duty factor: 1:1

Medium parameters used: f = 5600 MHz;  $\sigma = 5.911 \text{ S/m}$ ;  $\varepsilon_r = 47.056$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(3.76, 3.76, 3.76); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 16.5 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm/Cube 0: Measurement

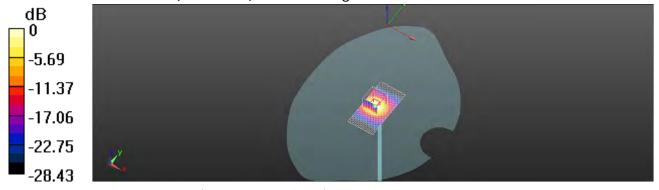
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 53.13 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 39 W/kg

#### SAR(1 g) = 8.17 W/kg; SAR(10 g) = 2.15 W/kg

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



0 dB = 18.2 W/kq = 12.49 dBW/kq

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#### Dipole 5800 MHz\_SN:1104\_Head

Communication System: CW; Frequency: 5800 MHz, Duty factor: 1:1

Medium parameters used: f = 5800 MHz;  $\sigma = 5.312 \text{ S/m}$ ;  $\epsilon_r = 34.714$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.65, 4.65, 4.65); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom: Head:
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

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

#### Configuration/d=10mm, Pin=100mW, dist=2mm /Cube 0: Measurement

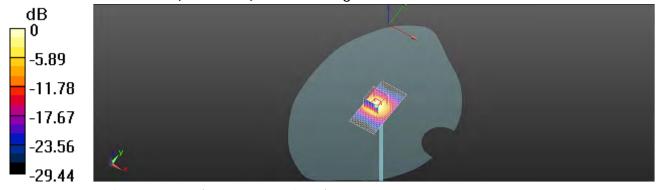
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 59.30 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 38.6 W/kg

#### SAR(1 g) = 7.96 W/kg; SAR(10 g) = 2.26 W/kg

Maximum value of SAR (measured) = 18.7 W/kg



0 dB = 19.8 W/kq = 12.40 dBW/kq

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#### Dipole 5800 MHz\_SN:1104\_Body

Communication System: CW; Frequency: 5800 MHz, Duty factor: 1:1

Medium parameters used: f = 5800 MHz;  $\sigma = 6.19 \text{ S/m}$ ;  $\epsilon_r = 46.45$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

#### **DASY5** Configuration:

- Probe: EX3DV4 SN3770; ConvF(4.13, 4.13, 4.13); Calibrated: 4/24/2014;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 8/27/2014
- Phantom:Head;
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

# Configuration/d=10mm, Pin=100mW, dist=2mm: Interpolated grid: dx=10

mm, dy=10 mm

Maximum value of SAR (interpolated) = 17.9 W/kg

#### Configuration/d=10mm, Pin=100mW, dist=2mm/Cube 0: Measurement

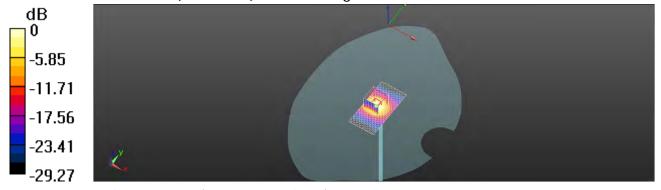
grid: dx=4mm, dy=4mm, dz=2mm

Reference Value = 54.27 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 39.3 W/kg

#### SAR(1 g) = 7.56 W/kg; SAR(10 g) = 2.32 W/kg

Maximum value of SAR (measured) = 16.9 W/kg



0 dB = 18.3 W/kq = 12.63 dBW/kq

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# 7. DAE & Probe Calibration Certificate

Calibration Laboratory of CHISS Schweizerischer Kalibriardienst S Schmid & Partner Sarvice suisse d'étalonnage C C TORATO Engineering AG sughausstrasse 43, 8004 Zurich, Switzerland Servizio svizzero di terature Swiss Calibration Service Accredited by the Swiss Accreditation Service (SAS) Accreditation No.: SCS 108 The Swiss Accreditation Service is one of the signatories to the EA Multillateral Agreement for the recognition of calibration certificates Certificate No: DAE4-1260\_Aug14 SGS-TW (Auden) CALIBRATION CERTIFICATE DAE4 - SD 000 D04 BM - SN: 1260 QA CAL-06.v26 Calibration procedure for the data acquisition electronics (DAE) Dathration date: August 26, 2014 This calibration conflictor occurrents the paceptality to redone standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory tacility, environment temperature (22 ± 3)°C and humidity < 70%. Calibration Equipment used (M&TE princil for calibration) Primary Standards ID P Cas Date (Certificate No.) Scheduled Calibration 01-De-13 (No:13976) Doi:14 SN 0810278 Kathley Multimater Type 2001 Dheck Date (in house) Scheduled Check SE UWS 053 AA 1001 U7-Jan-14 (in figure check) Auto DAE Californion Unit in house check JanvitS SE LINES 000 AA 1002 07-Jan-14 (in house check) In bouse check: Jan-15 Calibrator Box V2.1 Function Calibrated by: Domnique Statten Deputy Fectifical Misnager Approved by: Fin Edmhob Issued: August 26, 2014 This calibration certificate shall not be reproduced except in full without written approval of the laboratory. Certificate No: DAE4-1260, Aug 14 Page 9 at 5

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#### Glossary

DAE

data acquisition electronics

Connector angle

information used in DASY system to align probe sensor X to the robot

coordinate system.

#### Methods Applied and Interpretation of Parameters

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

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#### DC Voltage Measurement

A/D Convener Resolution nominal

High Rerige ILSB = 6.1µV, full range = -100, +600 mV Low Range: ILSB = 61nV, full range = -1,.....+2mV DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec.

Calibration Factors	X	Y	3
High Range	406.033 ± 0.02% (k=2)	405.001 ± 0.02% (k=2)	405 579 ± 0.02% (k-2)
Low Range	3.95663 ± 1.50% (k=2)	4.01886 ± 1.50% (k=2)	4.00468 ± 1.50% (k=2)

#### Connector Angle

١	Connector Angle to be used in DASY system	B4.0 * ± 1 "

Certificate No. DAE4-1260\_Aug14

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#### Appendix (Additional assessments outside the scope of SCS108)

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	190997,43	-0.04	-0.00
Channel X + Input	20003.49	2.49	0.01
Channel X - Input	-19998.62	2,32	-0.01
Channel Y + Input	199988.97	1.33	0,00
Channel Y - Input	20001.53	0.51	D.DO
Channel Y - Input	-20000.52	0.34	-0.00
Channel Z + Input	199996,52	1.01	0.00
Channel Z + Input	19999.80	-1/11	-0.01
Channel Z - Input	-20001.65	-0.71	0.00

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	2005,98	0.17	0.01
Channel X + Input	201.72	0.48	0,24
Channel K - Input	-198.19	0:50	-0.25
Channel Y + Input	1999.92	-1.02	0.05
Channel Y + input	201,16	-0.25	0.12
Channel V - Input	-198.53	0.05	-0.03
Channel Z + Input	2001.06	0.10	0.01
Channel Z + Input	200.04	-1.27	-0,53
Channel Z - Input	-200.02	-1.46	0.74

#### 2. Common mode sensitivity

Input Vultage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
200	1.17	-0,56
- 200	1.57	-0.48
200	12.66	12,37
200	13.46	-12.07
200	-0.46	-0.74
- 500	-1.73	-1.63
	200 200 200 200	200 1.17 -200 1.57 200 12.66 200 13.46 200 -0.46

#### 3. Channel separation

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (µV)
Channel X	200		5,89	A2.24
Channel Y	200	9,64	-	7.42
Channel Z	200	9,68	7.16	

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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	15914	14950
Channel Y	15817	16075
Channel Z	16045	16582

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sub; Measuring firms: 3 sec.

OMOD TOMO

	Average (μV)	min. Offset (uV)	max. Offset (μV)	Std. Deviation (µV)
Channel X	0.26	-0.78	1,42	0.43
Channel Y	-0.44	-1,36	0.61	0.43
Channel Z	-1,66	2.60	-0.69	0.44

#### 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25/A

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channal Z	200	500

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

Typical values	Alarm Level (VDC)	
Supply (+ Vec)	+7.9	
Supply (- Vcc)	:7.8	

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (* Vcc)	+0.01	+6	-+14
Supply (- Vco)	-0.01	48	-8

Certificate No. DAE4-1260 Aug 14

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Accreditation No.: SCS 108

Certificate No: DAE4-915\_Jun14

#### CALIBRATION CERTIFICATE DAE4 - SD 000 D04 BK - SN 915 Calibration procedure(e) QA CAL-06.v26 Calibration procedure for the data acquisition electronics (DAE) Calibration date: June 18, 2014 This calibration conflicute documents the Inspecially to national standards, which residue the physical units of messagements (Si). The measurements and the uncommitted with confidence procedulity are given on the blowing pages and are part of the confidence. Micalibrations have been conducted in the closed laboratory facility: enuronment compensions (22 ± 31 C and humiday < 70%). Callimiture Equipmen used (M&TE critical for calbration) Primary Standards Car Date (Certificate No.) Scredued Calibration Keithley Multimoter Type 2001 SN: 0810278 01-Out-13 (Nu:13076) Qt+14 Check Date (in house) Schooland Check Auto DAE Galbration Line SE UWS 050 AA 1001 07-Jan-14 lin house check in house chuck: Jury 15 Calibrator Box V2.1 SE UMS 006 AA 1000 - 07-Jan-14 IIII ris-ue atueki hi house check: Jen-16 Hame Function Calbrated by: Dominique Staffer Technician Approved by Debuty Technical Manager Issued June 18, 2014 This calibration conflicate shall not be reproduced except to full without written applicable the laboratory

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#### Glossary

data acquisition electronics

Connector angle information used in DASY system to align probe sensor X to the robot

coordinate system.

#### Methods Applied and Interpretation of Parameters

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- Connector angle: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
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  - 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.

Certificate No: DAE4-915 Jun14 Page 2 of 5

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#### DC Voltage Measurement

A/D - Converter Resolution nominal High Range: 1LSB = full range = -100...+300 mV full range = -1......+3mV Low Range: 1LSB = 61nV. DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	z
High Range	404.307 ± 0.02% (k=2)	404.432 ± 0.02% (k=2)	404.778 ± 0.02% (k=2)
Low Range	3.97786 ± 1.50% (k=2)	4.00889 ± 1.50% (k=2)	3.98763 ± 1.50% (k=2)

#### Connector Angle

Connector Angle to be used in DASY system	115.0 ° ± 1 °

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#### Appendix (Additional assessments outside the scope of SCS108)

#### 1. DC Voltage Linearity

High Range	Reading (µV)	Difference (μV)	Error (%)
Channel X + Input	199998.08	1.14	0.00
Channel X + Input	20000.26	-0.79	-0.00
Channel X - Input	-19999.34	1.47	-0.01
Channel Y + Input	200000.17	3.04	0.00
Channel Y + Input	19999.35	-1.60	-0.01
Channel Y - Input	-20000.40	0.40	-0.00
Channel Z + Input	199996.89	-0.05	-0.00
Channel Z + Input	19999.67	-1.07	-0.01
Channel Z - Input	-20001.83	-0.82	0.00

Reading (µV)	Difference (µV)	Error (%)
2000.78	-0.15	-0.01
201.37	-0.01	-0.00
-198.71	-0.07	0.04
2001.08	0.23	0.01
201.11	-0.04	-0.02
-198.95	-0.16	0.08
2000.69	-0.17	-0.01
200.66	-0.48	-0.24
-200.04	-1.33	0.67
	2000.78 201.37 -198.71 2001.08 201.11 -198.95 2000.69 200.66	2000.78 -0.15 201.37 -0.01 -198.71 -0.07 2001.08 0.23 201.11 -0.04 -198.95 -0.16 2000.69 -0.17 200.66 -0.48

#### 2. Common mode sensitivity

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-15.73	-17.62
	- 200	17.95	16.40
Channel Y	200	-5.63	-5.61
	- 200	4.75	4.70
Channel Z	200	-0.98	-1.03
	- 200	-0.88	-0.86

#### 3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel Y (µV)	Channel Z (μV)
Channel X	200	- "	4.09	-3.56
Channel Y	200	7.89	-	5.02
Channel Z	200	8.61	6.69	

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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	16112	13093
Channel Y	15985	14777
Channel Z	1588:1	15729

#### 5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec Input  $10M\Omega$ 

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (µV)
Channel X	0.08	-1.17	1.32	0.43
Channel Y	-0.58	-1.57	0.70	0.47
Channel Z	-0.51	-1.47	1.80	0.44

#### 6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Tunical values for information)

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

Certificate No: DAE4-915\_Jun14

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SGS - TW (Auden)

Accorditation No.: SCS 108

Certificate No. DAE4-856\_Aug14

#### CALIBRATION CERTIFICATE DAE4 - SD 000 D04 BM - SN: 856 QA CAL-06.v26 Calibration procedure(s) Calibration procedure for the data acquisition electronics (DAE) Cartronios date. August 27, 2014 This patibation certificate documents the proceeding to national standards, which reside the physical units of measurements (3i). The insecurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature (P2 ± 3) To and humidity = 70%. Califination Equipment used (M&TE critical for calibration) Primary Standards ID:0 Car Date (Certificate No.) Scheduled Calibration Keitney Musimeler Type 2007 SN 0810278 Secondary Standards Auto DAE Calibration Unit Check Date (in Irousa) Scheduled Check SE UWS 053 AA 1001 07-Jan-14 (in house d'edu) In house check, Jan 15 Calibrator Box V2.1 SE LA/IS 005 AA 1002 07-Jan-14 (in house check) In house check: Jan-10 Calibrated by: Tectvicies Deputy Technical Manager Fin Bompoir Approved by: This cultivation certificate shall not be reproduced except in full without written approval of the lapprapay

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#### Glossary

DAE data acquisition electronics

Connector angle information used in DASY system to align probe sensor X to the robot

coordinate system.

#### Methods Applied and Interpretation of Parameters

- DC Voltage Measurement: Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to reallonal 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 informal 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.

Certificate No: DAE4-666\_Aug14

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# DC Voltage Measurement

A/D - Converter Resolution nominal

full range = -1.00,\_+300 mV full range = -1. +3mV High Range: 1LSB = ETHY. Low Range: 1LSB = 61nV ; DASY measurement parameters: Auto Zern Time: 3 sec; Measuring Illmir: 3 sec

Calibration Factors	X	Ÿ	Z
High Range	403,468 ± 0.02% (4=2)	404.581 ± 0.02% (6+2)	403.903 ± 0.02% (k-2)
Low Range	3.97681 ± 1.50% (k-2)	3.97783 ± 1.50% (k=2)	3.97815 ± 1.50% (k+2)

# Connector Angle

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

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# Appendix (Additional assessments outside the scope of SCS108)

# 1. DC Voltage Linearity

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	#9999B33	0.84	0.00
Channel X + Input	19990.20	32.25	+0,01
Channel X - Input	20000.45	0.34	-0,00
Channel Y + Input	199999.95	0.96	0.00
Channel Y + Input	19997,51	-3.82	-0,02
Channal Y Input	-2000n 77	0.07	-0,00
Channel Z + Input	199997.26	0.19	-0,00
Channel Z + Input	19997.65	-3.57	-0.02
Channel Z - Input	-20002.47	1.55	0.01

Low Bange	Heading (µV)	Difference (µV)	Error (%)
Channel X + Input	2001.05	-0.09	-0,00
Channel X + Input	202,34	D 60	0.40
Channel X - Input	-198.91	0.26	-0.13
Channel Y + Input	2001.39	0,26	0.01
Channel Y + Input	201.08	-0,36	0.18
Channel Y - Input	-199.24	-0.78	0,39
Channel Z # Input	2000.92	-0.16	-0.01
Channel Z + Input	200,26	-1.22	-0.60
Channel Z - Input	-199,91	+1,47	0.74

# 2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time; 9 sec; Measuring time: 3 sec

	Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	-14,76	-16.42
	-200	17,19	15,88
Channel Y	500	-2.17	2,25
	+200	0.30	.0.01
Channel Z	200	10.27	10,05
	-300	-13.06	-13.03

### 3. Channel separation

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

	Input Voltage (mV)	Channel X (µV)	Channel V (µV)	Channel Z (µV)
Channel X	200		2.81	-1.15
Channel Y	200	7.99		.3:07
Channel Z	200	8.55	5.24	-

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Page # 015

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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	16226	16620
Channel Y	15942	16803
Channel 2	15875	16811

# 5. Input Offset Measurement

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

In			

	Average (μV)	min. Offset (µV)	max. Offset (µV)	Std. Deviation (µV)
Channel X	0.72	+0.77	1.89	0.38
Channel Y	-0.24	-1.07	1,89	0,42
Channel Z	-0.98	-2.01	0.07	0.40

# 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)	Alarm Level (VDC)	
Supply (+ Vcc)	+7.9		
Supply (- Vcc)	-7.0		

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0;01	-8	-9

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SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: DAE4-1374 Nov14

# CALIBRATION CERTIFICATE DAE4 - SD 000 D04 BM - SN: 1374 QA CAL-06.V28 Cathraling procedure(s) Calibration procedure for the data acquisition electronics (DAE) Calibration date: November 18, 2014 This assignation certificate accuments the traceability to national standards, which realize the physical units of mass The measurements and the uncestainties with confidence probability are given on the following pages and are part of the confidence All calibrations have been conducted in the closed laboratory facility environment temperature (22 = 3)°C and turn dily < 70% Calibration Equipment used (M&TE critical for calibration) 1D# Car Date (Certificate No.) Scheduled Calibration Primary Standards Keithley Multimeter Type 2001 SN 0810278 03-Oct 14 (No:15573) Doi-15 Check Date (in house) Scheduled Check Secondary Standards Auto DAE Calibration Unit BE UWS 063 AA 1001 07 Jan-14 (in house check) In house check: Jan-15 Calibrator Box V2.1 SE UMS 006 AA 1002 07-Jan-14 fin house check! in house chack: Jar-15. Fundion Blaneture Commigue Statten Continued for Technister Deputy Technical Manage himself November 18, 2014 This calibration certricule shall not be reproduced except in full without written approval of the laboratory.

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Accreditation No.: SCS 108

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# Glossary

DAE data acquisition electronics

Connector angle information used in DASY system to align probe sensor X to the robot

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### 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.
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  - DC Voltage Measurement Linearity: Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - Common mode sensitivity: Influence of a positive or negative common mode voltage on the differential measurement.
  - Channel separation: influence of a voltage on the neighbor channels not subject to an input voltage.
  - AD Converter Values with inputs shorted: Values on the internal AD converter corresponding to zero input voltage
  - Input Offset Measurement. Output voltage and statistical results over a large number of zero voltage measurements.
  - Input Offset Current: Typical value for information: Maximum channel input offset current, not considering the input resistance.
  - Input resistance: Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - Low Battery Alarm Voltage: Typical value for information. Below this voltage, a battery alarm signal is generated.
  - Power consumption: Typical value for information. Supply currents in various operating modes.

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# DC Voltage Measurement

A/D - Converter Resolution nominal High Range: 1LSB = full range = -100...+300 mV full range = -1......+3mV 6.1µV . 1LSB = 61nV, Low Range: DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.035 ± 0.02% (k=2)	405.315 ± 0.02% (k=2)	404.974 ± 0.02% (k=2)
Low Range	3.99839 ± 1.50% (k=2)	4.01042 ± 1.50% (k=2)	3.94307 ± 1.50% (k=2)

### Connector Angle

	1,000,000,000,000,000,000
Connector Angle to be used in DASY system	245.5°±1°

Certificate No: DAE4-1374 Nov14 Page 3 of 5

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# Appendix (Additional assessments outside the scope of SCS108)

High Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	200030.74	-5.53	-0.00
Channel X + Input	20004:82	1,02	0.01
Channel X - Input	-20002.76	2.80	-0.01
Channel Y + Input	200031.50	-4.36	-0.00
Channel Y + Input	20000.22	-0,50	=0.0G
Channel Y - Input	-20005.15	0.53	-0.00
Channel Z + Input	200033,39	-2.72	-0,00
Channel Z. 4 Input	20001.26	-2.46	-0.01
Channel Z - Input	-20005.91	0.24	0.00

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel K + Input	2000.14	-0.27	-0,01
Channel X + Input	201-87	0.50	0.25
Channel X - Input	-189.20	0.28	-0,14
Channel Y + Input	1999.83	-0.48	-0.422
Channel V + Input	199.63	-0.73	0.36
Channel V - Input	-200.60	-1.02	(3.51
Channel Z + Input	2001.36	1/33	0.06
Channel 2 + Input	199,82	-0.58	-0.29
Channel Z - Input	-201.49	-1.84	0.92

# 2. Common mode sensitivity

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (µV)
Channel X	200	18,42	16,65
	- 200	-15.63	-17.40
Channel Y	200	5.00	-5,33
	- 200	4.04	2.44
Channel Z	200	40.12	-0.30
	200	-3.07	3.01

# 3. Channel separation

	Input Voltage (mV)	Channel X (µV)	Channel Y (uV)	Channal Z (µV)
Channel X	200	-	6,00	1,86
Channel V	200	10.04	5-5-5	B (38
Channel Z	200	9,45	7.00	-

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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	15851	16263
Channel Y	15925	16689
Channel Z	15301	15199

# 5. Input Offset Measurement

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

	Average (μV)	min. Offset (µV)	max. Offset (μV)	Std. Deviation (µV)
Channel X	-0,50	1.55	0.57	0.45
Channel V	0.21	-1,30	4.15	0.49
Channel Z	-1.60	-2.85	0.25	0.57

# 6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25/A

7. Input Resistance (Typical values for Information).

	Zeroing (kOhm)	Mesauring (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 (+ Vec)	67.9	
Supply (- Voc)	-7.6	

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0,01	-6	-9

Cartilicate No. DAE4-1374 Nov14

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Calibration Laboratory of Schmid & Partner Engineering AG Zoughausstrasse 43, 8004 Zurich, Switzelland





Schweizerischer Kallerierdienst Service suisse d'étalormage Servizio svizzero di taratura Swiss Calibration Service

Accreditation No.: SCS 108

Accepted by the swest Acceptation Service (BAE)
The Swiss Acceptation Service is one of the signaturies to the EA
Multilateral Agreement for the recognition of anibration certification

Cline

SGS-TW (Auden)

Certificate No: EX3-3923\_Aug14

# CALIBRATION CERTIFICATE Detect EX3DV4 - SN:3923 Calibration procedure(s) QA GAL-01.v9, QA GAL-14.v4, QA GAL-23.v5, QA GAL-25.v6 Calibration procedure for dosimetric E field probes Calibration bate: August 28, 2014 The calibration conficule documents me traceability to national standards, which realize the physical units of measurements and the uncentrarias with confidence procedure for given on the following pages and are part of the confidence in the closest laboratory facility: environment temperature (22 ± 3)°Q and stumidity < 70%. Gaillatology Equipment used (M& TE critical for calibration)

Primary Standards	.0	Cal Date (Certificate No.)	Scheduled Calibration
Power minter E44198	GB41293874	03-Apr-14 (No. 217-01811)	Apr-15
Power serior E4412A	MY41498087	03-Apr:14 (No. 217-01911)	April 5
Reference 3 dft Attenuator	BN: 85064 (3u)	03-Apr-14 (No. 217-01915)	Apr:15
Reference 28 de Attenuator	SN: 85277 (20x)	113-Apr-14 (No. 217-01919)	Apr-15
Reference 30 oB Attempelor	SN. 85129 (30b)	II3-Apr-14 (No. 217-01920)	Apr.15
Reference Probe E83DV2	SM: 3013	30-Dec-13 (No. ESS-3013 Dec13)	Dec-14
DAE4	SN. 660	13-Dec-13 (No. DAE4-660_Dec/3)	Dec-14
Secondary Standards	10	Check Date (in house)	Scheduled Chick
RF generator HP 8548C	LIS3642U01700	4-Aug-99 (in house check Apr-13)	in house check. Apr-16
Network Ababzer HP 8753E	us37390589	18-Oct-01 (In house check Oct-13)	In house check, Oct-14

Certificate No: EX3-3923 Aug 14

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### Calibration Laboratory of

Schmid & Partner
Engineering AG
Zeughteestraam 42, 800 & Zurich, Switterland





S Schweizenscher Kalteremerst
C Service suisse d'étaionnage
Service syltzere di santium
Swas Calibration Service

Acceptimise No.: SCS 108

Accredited by the Same Accomplision Service (SAS)

The Swian Accreditation Service is one of the signatories to the Elli Munitational Agmement for the recognition of calibration conflicts

### Glossary:

TSL taskie simulating liquid
NORMX,y.z sensitivity in free space
ConyF sensitivity in TSL / NORMX,y.z
DCP diode compression point

CF crest factor (1/duty\_cycle) of this RF signal A, B, C, D modulation dependent linearization parameters

Polarization in in rotation around probe axis

Polarization is a repeat around an axis that is in the plane norms to probe sale (at measurement cambri),

i.e., it = 0 is normal to proop axis

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

### Calibration is Performed According to the Following Standards:

 i) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial Averaged Specific Absorption Rata (SAR) in the Human Head from Wireless Communications Devices: Minecomment Techniques." June 2013.

Techniques", June 2013

DEC 62209-1, "Procedure to measure the Specific Attemption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx, y,z: Assessed for E-field polarization 8 = 6 (f = 100 MHz in TEM-call; f > 1900 MHz, R22 waveguide).
   NORMx, y,z are only intermediate values, i.e., the uncertainties of NORMx, y,z does not affect the E<sup>2</sup>-field uncertainty inside TSL (see below ConVF).
- MORM(f)x,y,z = NCRMx,y,z \* frequency\_response (see Frequency Response Charl). 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 aweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak in Average Ratio that is not calibrated but determined based on the signal characteristics.
- As, y.z. Bs, y.z. Cs, y.z. Ds, y.z. VRx, y.z. A. B. C. D an numerical invariantion parameters assessed based on the data of power sweet for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the tilode.
- ConvF and Boundary Effect Parameters. Assessed in flat phantom using E-field (or Temperature Transfer
  Standard for t < 800 MHz) and inside wavegude using analytical field distributions based on power
  measurements for t > 800 MHz. The same setups are used for assessment of the parameters applied for
  boundary companisation (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 NORMs, y, z \* ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent
  ConvF is used in DASY variable 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100
  MHz.
- Spherical isotropy (3D deviation from isotropy); it is field of low gradients realized using a flat phantom exposed by a patch witerina.
- Sensor Offset: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No toterance required.
- Connector Angle: The angle is assessed using the Information gained by determining the NORMx (no. uncertainty required).

Perincan No. EX3-1925 Aug 14

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EX 10VA - SVLTVE

7800006-20 -501to

# Probe EX3DV4

SN:3923

Manufactured; Calibrated: March 8, 2013 August 28, 2014

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

Contificate No: EX343923\_Aug14

Page 2.6111

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EX3DV4-5N 3973

- Avignet set 2014

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Basic Calibration Parameters

	Sensor	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m)*)*	0.58	0.48	0.47	±10,1%
DCP (mV)"	99.2	102.2	103.3	

### Modulation Calibration Parameters

UID	Communication System Name		A dB	B dBõV	C	dB	WR mV	Unc (k=Z)
O-	CW	X	0.0	0.0	1.0	0.00	132.9	23.0 %
		Y	0.0	-0.0	1.0		134 B	_
		2	0.0	0.0	1.0		135 (0	

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

Certificate No. EX3-3923\_August

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The uncertainties of MormX,Y,Z do not wheat the E field undertainty make TEL (see Page 5 4nd 5) formers of mentional presented uncertainty our required. Or entering to call the next using the reak deviation from most response opposing victor grain section into a requestion Celline equally of the



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August 20, 2014 EX30V4 SN:3923

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Calibration Parameter Determined in Head Tissue Simulating Media

r (MHz) <sup>©</sup>	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF V	ConvF Z	Alphé 9	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41,9	0:89	10.91	10.91	10.91	0.25	1.16	± 12.0 %
835	41.5	0.90	10.48	10.48	10.48	0.27	1.07	± 12.0 %
900	41.5	0.97	10.26	10.25	10.26	0.17	1.53	± 12.0 %
1750	40.1	1.37	8.72	B;72	8.72	0:75	0.57	± 12.0 9
1900	40.0	1.40	3.42	8.42	8.42	0.45	0.77	±12.09
2000	40.0	1.48	8.46	5,46	8.46	0,67	0.63	± 12.0 %
2300	39.5	1.67	B.02	5.02	W.02	0.35	0.85	±1209
2450	39.2	1.80	7.66	7,66	7,66	0.33	0.87	112.01
2600	39.0	1.96	7.41	7.41	7.41	0.35	0.86	±12.05
5200	36.0	4.68	5.17	5.17	5.17	0.35	1.80	+13.13
5300	35.9	4.76	4.99	4.99	4,99	0.35	1,80	±13.19
SECKT	35.5	5.07	4.71	4.71	4.71	0.40	1.80	±13.19
5600	35.3	5.27	4.67	4.67	4.67	0.40	1.80	± 13.1 %

<sup>&</sup>lt;sup>6</sup> Frequency weldily above 300 MHz of a 100 MHz only applies to CASY 44 and higher (see Page 2), vice 4 is restricted to a 50 MHz. The uncertainty is the RSS of the Cornel uncertainty at celebration frequency and the uncertainty to the ordinated frequency welday better 500 MHz (a.1.0...25, 40, 50 and 70 MHz (b.). Some secondard to 200 MHz (b.). Above 5 GHz requency validity can be exceeded to 110 MHz.
\*A frequencies better 3 CPS, the validity of feature currentless (c.) and be retained for 110 MHz.
\*A frequencies better 3 CPS, the validity of feature currentless (c.) and be retained for 110 MHz.

Certocato No. EX3-3921, Aug 14

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E330V4- SN:3022

August 28, 2014

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) E	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvFY	ConvF 2	Alphu "	Depth to (mm)	Unct. (k=2)
750	55.5	0.96	10.29	10.29	10.29	0.30	1.04	± 12.0.%
635	55.2	0.97	10.32	10.32	10.32	0.55	0.78	± 12.0 %
900	55,0	1,05	10.04	10.04	10.04	0.44	0.88	± 12.0 %
1750	53.4	1.49	8.30	8.30	8,30	0.39	0.85	± 12.01
1900	53,8	1,52	8.03	B 03	8.03	0.30	0.95	± 12.09
2000	53,3	1.52	8.16	B.16	8.16	0.23	116	± 12.09
2300	62.9	1.01	7.76	7.76	7.76	0.44	0.77	± 12,0 9
2450	52.7	1.95	7.58	7.56	7.56	0.80	0.50	± 12.0 9
2600	52.5	216	7.36	7,36	7.36	0.80	0.50	± 12.0 9
5200	49.0	5,30	4.71	4.71	4.71	0.35	1.90	± 13.1 %
5300	48,9	5.42	4.58	4,58	4.58	0.35	1.90	213.13
5600	48.5	5.77	4.09	4.09	4:09	-0.4D	1.00	±13.19
5800	48.2	6.00	4.33	4,33	4:33	0.40	1.90	2 13.13

Finguously validity above 380 MHz of ± 107 MHz only applied for DAGY vid a and higher [see Page 2], should be asserted to ± 50 MHz. The uncertainty is the HSS of the Count uncertainty at contrastion begans and the uncertainty for the indicated frequency band. Finguestry saidity below 360 MHz or ± 10, 25, 40, 50 and 70 MHz by Count asserted at 30, 54, 128, 150 and 200 MHz or page of key. Above 5 GHz begans or yaidity can be exceeded to ± 110 MHz.

All frequences below 3 GHz, the validity of issue parameters (a amile) can be released to ± 10% 1 input compression formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of issue parameters. In and or its restricted to ± 5%. The uncertainty of the 150 of the Count and other parameters.

Applied out are delationated earger tissue parameters.

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Applied out to the boundary effect offer outperfers below ± 2% for higher costs between 3-8 GHz at any delation larger than full this price to

Certificate No. EX3-3923\_Aug 14

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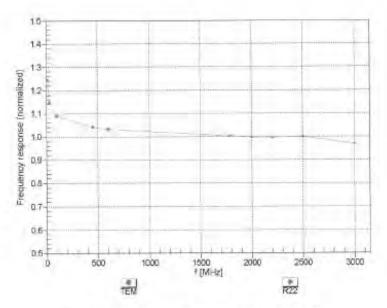
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EX3DV4- SN:3923

August 28, 2014

# Frequency Response of E-Field

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



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

Certificate No: EX3-3923\_Aug/14

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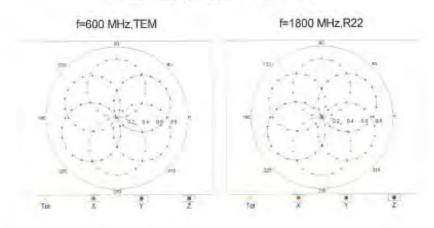
SGS Taiwan Ltd.

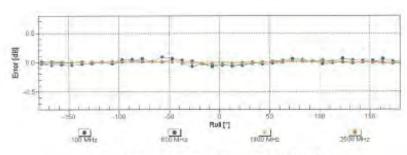


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August 28, 2014 EX3DV4-SN:3923

# Receiving Pattern (6), 9 = 0°





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

Gertificate No: EX3-3923\_Aug14

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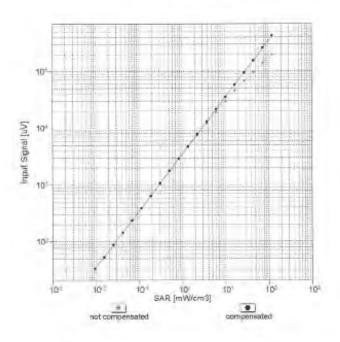
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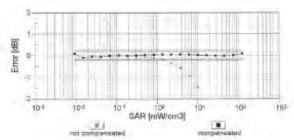


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August 28, 2014 EX3DV4- SN:3923

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , feval= 1900 MHz)





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

Certificate No: EX3-3923\_Aug14

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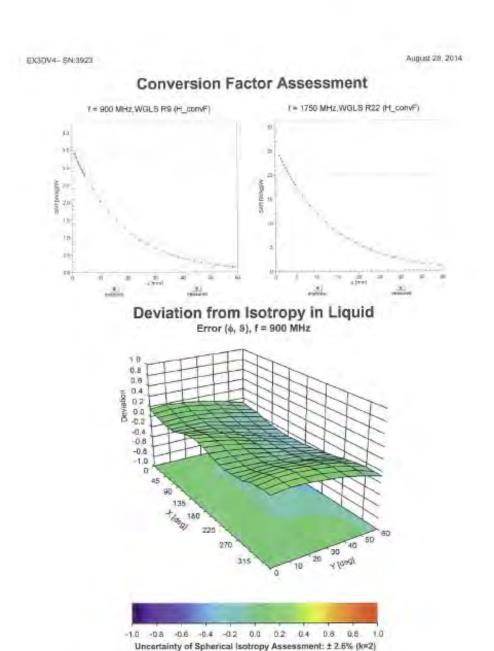
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Certificate No: EX3-3923\_Aug 14

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EXCCV4\_SN:3923

August 28, 2016

# DASY/EASY - Parameters of Probe: EX3DV4 - SN:3923

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-57
Mechanical Surface Delection Mode	anabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 min
Probe Body Diameter	10 cmm
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 2 Calibration Point	1 mm
Recommended Messurement Distance from Surface	1.4 rem

Certificate No. EX3-3925\_Aug 14

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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zorich, Switterland





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Accreditation No.: SCS 108

C

Object	EX3DV4 - SN:38	31	
Colematic productive(t)		A CAL-14.v4. QA CAL-23.v5, QA dure for dosimetric E-field probes	CAL-25.v6
California date	January 31, 2014	1	
The measurements and the one	amaintes eith confidence a	anal stantaco, which realize the physical units uttability are given as the histoering pages and: y fazzify, environment temporature (22 = 31°C 4	ampart of this certificate
Primary Standards	I (D	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4410B	G84120087#	84-Apr-13 (No. 217-01733)	April 14
	MY41498D82	B4-Apr-13 (No. 217-01733)	April4
and the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s			
Phwer sensor E4412A	THE STREET		
Phwer sensor E4412A Reference 3 dB Attenuator	SN: \$5054 (3c) SN: \$5277 (20x)	04-Apr-13 (No. 217-01737)	Apri-14
Power sensor E4412A Reference 3 dB Attenueser Reference 20 dB Attenueser	SN \$5054 (3c)	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735)	Apr14 Apr14
Power sensor E4412A Reference 3 dB Attenuation Reference 20 dB Attenuation Reference 30 dB Attenuation	SN: 85854 (3c) SN: 85277 (20x)	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01738)	Apri-14
Power sensor E4412A Reference 3 dB Attenuation Reference 20 dB Attenuation Reference 30 dB Attenuation Reference Probe E83DVZ	SN 88854 (3c) SN: 88277 (20x) SN: S3128 (30b)	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735)	Apr-14 Apr-14 Apr-14
Phwer sensor E4412A Robrense 3 dB Attenueur Robrense 20 dB Attenueur Robrense 30 dB Attenueur Robrense Prope E53DV2 DAE4	SN \$5054 (3c) SN: \$5277 (20x) SN: \$5128 (30p) SN: 3013	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01738) 36-Dec-13 (No. ESS-3013 Dec-13)	Apr14 Apr14 Apr14 Date-14
Power sensor E4412A Reference 3 dB Attenuation Reference 20 dB Attenuation Reference 30 dB Attenuation Reference Prope E83DV2 DAE4 Secondary Standards	SN 88054 (Ikc) SN: 88277 (204) SN: 83128 (30b) SN: 3013 SN: 860	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01736) 30-Oeo-13 (No. ESS-3013 Dec) 3) 13-Oeo-13 (No. DAEA-690 Dec) 1)	Apr14 Apr14 Apr14 Dats-14 Disc-14
Phwer sensor E4412A Robrence 3 dB Attenuation Robrence 20 dB Attenuation Robrence 30 dB Attenuation Robrence Probe E83DV2 DAE4 Secondary Standards RF generator HP 884BC	SN 85054 (3c) SN: 85277 (20) SN: 53128 (30b) SN: 3013 SN: 960	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01735) 30-Dec-13 (No. ESS-3013 (Dec)3) 13-Dec-13 (No. DAEA-690 (Dec)13) Check Dain (in house)	Apr14 Apr14 Apr14 Date-14 Extredished Cheek
Power sensor E4412A Robrence 3 dB Atlanuation Reference 20 dB Atlanuation Reference 30 dB Atlanuation Reference Prope E83DV2 DAE4 Secondary Standards RF generation HP 6848C	SN: \$5054 (3c) SN: \$5277 (2ch) SN: \$5128 (30b) SN: 50128 (30b) SN: 5013 SN: 660 UD UB3642(40)1700	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01735) 04-Opr-13 (No. 253-0143, Opr-13) 13-Opr-13 (No. DAEA-950, Opr-13) Crieck Dain (in house) 4-Aug-99 (in house)	Apr14 Apr14 Das-14 Das-14 Das-14 Signed-sted Check In house offeck: Apr16
Power sensor E4412A Reference 3 dB Attenuation Reference 20 dB Attenuation Reference 30 dB Attenuation Reference 30 dB Attenuation Reference Probe E83DV2 DAE4	SN: \$5054 (3c) SN: \$5277 (204) SN: \$5128 (309) SN: 3012 3N: 5012 (0) UB3642(UB1700) UB3642(UB1700) UB377(36)(38)	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01735) 30-Oeo-13 (No. ESS-301-3 Dec) 3) 13-Oeo-13 (No. ESS-301-3 Dec) 3) 13-Oeo-13 (No. DAEA-690 Dec) 13) Check Data (in house) 4-Aug-99 (in house check Apr-13) 18-Cd-01 (in house check Apr-13)	Apr.14 Apr.14 Apr.14 Dac-14 Dac-14 Siznedsled Check In house check: Apr.18 In house check: Dig-14 Signature
Power sensor E4412A Roberence 3 dB Attenuation Reference 20 dB Attenuation Reference 30 dB Attenuation Reference Prope E83DV2 DAE4 Secondary Standards RF generation HP 68480 Netwerk Analyzer HP 6759E	SN: \$5054 (3c) SN: \$5277 (204) SN: \$5128 (309) SN: 3013 SN: 3013 SN: 5013 UB: 501 UB:	04-Apr-13 (No. 217-01737) 04-Apr-13 (No. 217-01735) 04-Apr-13 (No. 217-01735) 36-Oeo-13 (No. 217-01735) 13-Oeo-13 (No. DAEA-680, Oeo13) Check Dale (in house) 4-Aug-95 (in house check Apr-13) 18-Oet-01 (in house) Function	Apr14 Apr14 Apr14 Date-14 Signed sled Check In house check: Apr18 In house check: Dig14

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# Calibration Laboratory of

Schmid & Partner Engineering AG oughausstrasse 43, 8004 Zurich, Switzerland





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Accreditation No.: SCS 108

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Glossary:

tissue simulating liquid NORMx,y,z sensitivity in free space sensitivity in TSL / NORMx,y,z ConvF DCP diode compression point

crest factor (1/duty\_cycle) of the RF signal modulation dependent linearization parameters A, B, C, D

Polarization @ o rotation around probe axis

Polarization 9 a rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 9 = 0 is normal to probe axis

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

- Calibration is Performed According to the Following Standards:

  a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement
  - Techniques", June 2013
    IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization  $\theta = 0$  (f  $\leq 900$  MHz in TEM-cell; f  $\geq 1800$  MHz: R22 wavegu NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-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 medi
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters applied for 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  $\pm$  50 MHz to  $\pm$  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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EX3DV4 - SN:3831

January 31, 2014

# Probe EX3DV4

SN:3831

Manufactured: Calibrated: September 6, 2011 January 31, 2014

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

Certificate No: EX3-3831\_Jan14

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EX3DV4-- SN:3831

January 31, 2014

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

### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.45	0.42	0.43	± 10.1 %
DCP (mV) <sup>B</sup>	102.4	100.1	97.7	

### **Modulation Calibration Parameters**

UID	Communication System Name		A dB	B dBõV	С	D dB	VR mV	Unc <sup>t</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	153.1	±3.0 %
		Y	0.0	0.0	1.0		146.3	
		Z	0.0	0.0	1.0		154.8	

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%.

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<sup>&</sup>lt;sup>A</sup> The uncertainfies of NormX,Y,Z do not affect the E<sup>4</sup>-field uncertainty inside TSL (see Pages 5 and 6).

\*\*Numerical Incarization 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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EX3DV4-SN:3831

January 31, 2014

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

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
750	41.9	0.89	9.59	9.59	9.59	0.74	0.84	± 12.0 %
835	41.5	0.90	9.14	9.14	9.14	0.22	1.36	± 12.0 %
900	41.5	0.97	9.17	9.17	9.17	0.28	0.96	± 12.0 %
1750	40.1	1.37	8.00	8.00	8.00	0.26	0.99	± 12.0 %
1900	40.0	1.40	7.79	7.79	7.79	0.60	0.65	± 12.0 %
2000	40.0	1.40	7.71	7.71	7.71	0.39	0.79	± 12.0 %
2300	39.5	1.67_	7.35	7.35	7.35	0.43	0.76	± 12.0 %
2450	39.2	1.80	6.99	6.99	6.99	0.37	0.85	± 12.0 %
2600	39.0	1.96	6.62	6.62	6.62	0.38	0.87	± 12.0 %
5200	36,0	4.66	4.67	4.67	4.67	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.41	4.41	4.41	0.40	1.80	± 13.1 %
5600	35.5	5.07	3.99	3.99	3.99	0.50	1.80	± 13.1 %
5800	35.3	5.27	4.12	4.12	4.12	0.45	1.80	± 13.1 %

Certificate No: EX3-3831\_Jan14

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<sup>&</sup>lt;sup>6</sup> Frequency validity of ± 100 MHz cirtly applies for DASY v4.4 and higher (see Page 2), also it is restricted to ± 50 MHz. The uncertainty is the RSS of the Corner uncertainty at cellbration frequency and the uncertainty for the indicated frequency band.

\*At frequencies below 3 GHz, the validity of tissue parameters (a and a) can be released to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of issue parameters (a and a) is restricted to ± 5%. The uncertainty is the RSS of the Corner uncertainty for indicated target issue parameters.

\*AphatDepth 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 at any distance larger than half the probe tip dismeter from the boundary.



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EX3DV4-- SN:3831

January 31, 2014

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

### Calibration Parameter Determined in Body Tissue Simulating Media

anbrauon	Parameter De	eterminea in	Body 118	ssue Sim	ulating M	edia		
f (MHz) <sup>c</sup>	Relative Permittivity	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>5</sup>	Depth <sup>c</sup> (mm)	Unct. (k=2)
750	55.5	0.96	9.10	9.10	9.10	0.50	0.80	± 12.0 %
835	55.2	0.97	9.03	9.03	9.03	0.28	1.15	± 12.0 %
900	55.0	1.05	8.84	8.84	8.84	0.29	1.08	± 12.0 %
1750	53.4	1.49	7.63	7.63	7.63	0.26	1.16	± 12.0 %
1900	53.3	1.52	7.19	7.19	7.19	0.32	1.01	± 12.0 %
2000	53.3	1.52	7.17	7.17	7.17	0.44	0.83	± 12.0 %
2300	52.9	1.81	6.90	6.90	8.90	0.52	0.76	± 12.0 %
2450	52.7	1.95	6.68	6.68	6.68	0.80	0.56	± 12.0 %
2600	52.5	2.16	6.50	6.50	6.50	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.08	4.08	4.08	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.87	3.87	3.87	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.36	3.36	3.36	0.60	1.90	± 13.1 %
5800	48.2	6.00	3.78	3.78	3.78	0.55	1.90	± 13.1 %

Certificate No: EX3-3831\_Jan14

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<sup>&</sup>lt;sup>0</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), clase it is asstricted to ± 50 MHz. The uncertainty is the RS3 of the Cornel' uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

\*At frequencies below 3 GHz, the validity of tissue parameters (a and e) can be released to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (a and e) is restricted to ± 6%. The uncertainty is the RSS of the ConvF uncertainty for indicated target issue parameters.

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



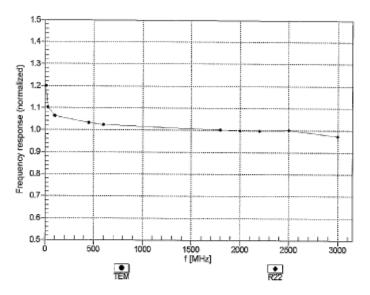
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EX3DV4- SN:3831

January 31, 2014

# Frequency Response of E-Field

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



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

Certificate No: EX3-3831\_Jan14

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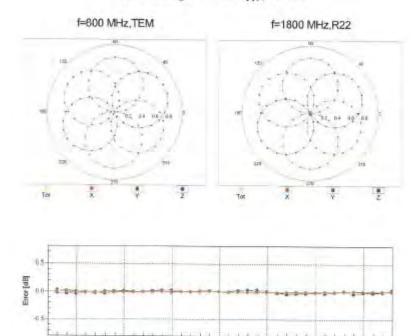


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EX3DV4- SN:3831

January 31, 2014

# Receiving Pattern (6), 9 = 0°



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

1000 M Hz

BOO Meta

Certificate No: EX3-3831\_Jan14

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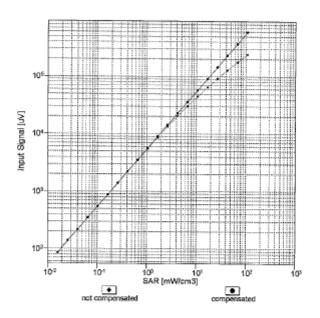


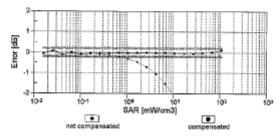
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EX3DV4- SN:3831

January 31, 2014

# Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f = 900 MHz)





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

Certificate No: EX3-3831\_Jan14

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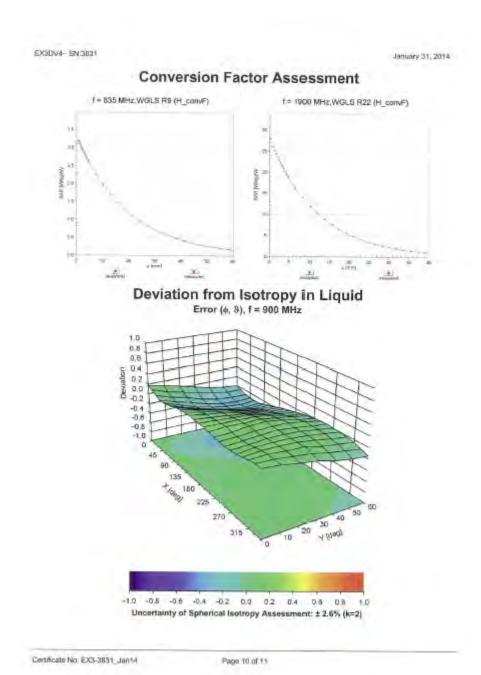
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EX3DV4-- \$N:3831

January 31, 2014

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

### Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-20.6
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tlp Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	2 mm

Certificate No: EX3-3531\_Jan14

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switterland





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Multilateral Agreement for the recognition of calibration cardificates

Client SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No. EX3-3938 Jul 14

CALIBRATION CERTIFICATE

DELIVER EX3DV4 - SN:3838

QA CAL-01.V9, QA CAL-14.V4, QA CAL-28.V5, QA CAL-25.V6

Calibration procedure for dosimetric E-field probes

Calibration date July 25, 2014

This spilination certificate documents the troughthy to national standards, which relates the physical units of measurements (B). The measurements and the incontainties with confidence probability are given or the following pages and are part of the cedificate.

All calcitations have been conducted in the classed laboratory facility: environment impermine (22 ± 3 °C and humory < 78%)

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	(0)	Call Cote (Certificate Avs.)	Scheduled Calibration
Power maler E4419E	GB41293874	03-Apr-14 (No. 217-01911)	April 1
Power sensor E4412A	MY41498887	03-Apr-14 (No. 217-01911)	Apr-15
Relevence 3 dB Attenualor	SN: 55094 (3c)	03-Apr-14 (No. 217-01915)	Apx+10:
Reference 20 dB Attenuator	SNI 56277 (20x)	03-Apr-14 (No. 217-01919)	Apr 15
Flatimaryon 30 df: Abstruator	SN 55179 (Mb)	03-Apr-14 (No. 217-01920)	Apr-12
Paterence Prope ES3DV2	SN 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	BN: 660	13-Dec-13 (No. DAE4-860_Dec13)	Dec-14
Secondary Standards	(0	Check Daire (in house)	Scheduled Check
RF generator HF 86480.	US3642U01700	#-Aug-99 (in house check Apr-13)	In house check Apr-16
Network Analyzer HP 8750E	US3/399580	18-Oct-01 (in house check Gizt-13)	in house street. Dicy-14

Embryaled by:

Italia El-Necus

Approved by:

Italia Followin

Technical Manager

Approved by:

Italia Followin

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### Calibration Laboratory of

Schmid & Partner Engineering AG





Service suisse d'étalonnage C Servizio svizzero di taratura

Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signal Multilateral Agreement for the recognition of calibration certificates

Glossary:

tissue simulating liquid NORMx,y,z sensitivity in free spa sensitivity in TSL / NORMx,y,z DCP

diode compression point crest factor (1/duty\_cycle) of the RF signal modulation dependent linearization parameters A, B, C, D

Polarization φ φ rotation around probe axis

Polarization 9 9 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e.,  $\theta$  = 0 is normal to probe axis 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:

- 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
- Techniquee\*, June 2013
  b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

### Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 9 = 0 (f < 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-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
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f < 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe securacy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z \* CanvF 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
- 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).

Certificate No: EX3-3938\_Jul14

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July 25, 2014 EX3DV4 -- SN:3938

# Probe EX3DV4

SN:3938

Manufactured: Calibrated:

May 2, 2013 July 25, 2014

Calibrated for DASY/EASY Systems

(Note: non-compatible with DASY2 system!)

Certificate No: EX3-3938 Jul 14 Page 3 of 11

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EX3DV4-- SN:3938

July 25, 2014

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

### **Basic Calibration Parameters**

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)	
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.52	0.59	0.34	± 10.1 %	
DCP (mV) <sup>6</sup>	98.3	99.4	104.7		

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc <sup>E</sup> (k=2)
0	CW	X	0.0	0.0	1.0	0.00	166.6	±3.0 %
		Y	0.0	0.0	1.0		157.7	
		Z	0.0	0.0	1.0		153.7	

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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The uncertainties of NormX,Y,Z do not affect the IE<sup>2</sup>-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



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EX3DV4-SN:3938

July 25, 2014

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

### Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) <sup>0</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>G</sup> (mm)	Unct. (k=2)
835	41.5	0.90	9.41	9.41	9.41	0.80	0.50	± 12.0 %
900	41.5	0.97	9.26	9.26	9.26	0.61	0.68	± 12.0 %
1750	40.1	1.37	7.91	7.91	7.91	0.59	0.66	± 12.0 %
1900	40.0	1.40	7.65	7.65	7.65	0.54	0.72	± 12.0 %
2000	40.0	1.40	7.66	7.66	7.66	0.80	0.59	± 12.0 %
2450	39.2	1.80	6.97	6.97	6.97	0.41	0.78	± 12.0 %
2600	39.0	1.96	6.83	6.83	6.83	0.38	0.86	± 12.0 %
5200	36.0	4.66	4.95	4.95	4.95	0.40	1.80	± 13.1 %
5300	35.9	4.76	4.74	4.74	4.74	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.47	4.47	4.47	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.49	4.49	4.49	0.40	1.80	± 13.1 %

<sup>&</sup>lt;sup>C</sup> 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 estituation 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 ± 10 MHz.

<sup>f</sup> At frequencies below 3 GHz, the validity of tissue parameters (s and o) can be released to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (s and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target Issue parameters.

<sup>g</sup> Apha/Depth are determined during cationation. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always lass than ± 1% for frequencies below 3 GHz and balow ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip clameter from the boundary.

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EX3DV4-SN:3938 July 25, 2014

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

### Calibration Parameter Determined in Body Tissue Simulating Media

ambration Parameter Determined in Body Hissue Simulating Media								
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha <sup>6</sup>	Depth <sup>C</sup> (mm)	Unct. (k=2)
835	55.2	0.97	9.35	9.35	9.35	0.80	0.60	± 12.0 %
900	55.0	1.05	9.24	9.24	9.24	0.80	0.50	± 12.0 %
1750	53.4	1.49	7.36	7.36	7.36	0.80	0.62	± 12.0 %
1900	53.3	1.52	7.03	7.03	7.03	0.44	0.83	± 12.0 %
2000	53.3	1.52	7.21	7.21	7.21	0.30	0.97	± 12.0 %
2450	52.7	1.95	6.69	6.69	6.69	0.75	0.57	± 12.0 %
2600	52.5	2.16	6.57	6.57	6.57	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.27	4.27	4.27	0.45	1.90_	±13.1 %
5300	48.9	5.42	4.11	4.11	4.11	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.70	3.70	3.70	0.50	1.90	± 13.1 %
5800	48.2	6.00	3.92	3.92	3.92	0.50	1.90	± 13.1 %

Grequency 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 before 300 MHz is ± 10, 25, 46, 30 and 70 MHz for ConvF assessments at 30, 84, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

AphatOepth 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 3-8 GHz at any distance larger than half the probe tip disances from the boundary.

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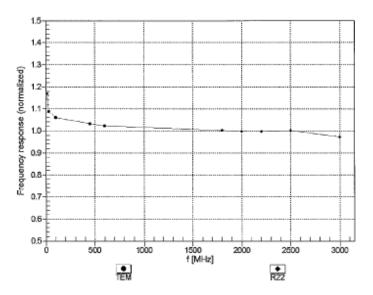
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EX3DV4-- SN:3938

July 25, 2014

## 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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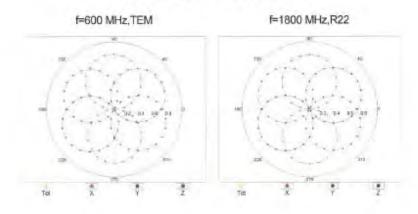
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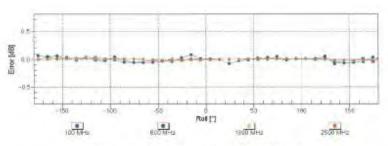


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EX30V4- SN:3938 July 25, 2014

## Receiving Pattern (6), 9 = 0°





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

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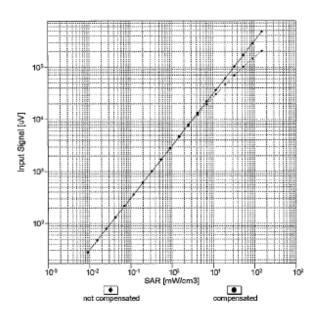
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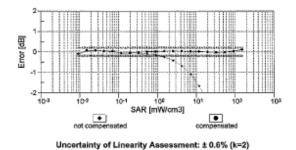


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July 25, 2014 EX3DV4-- SN:3938

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , fevel = 1900 MHz)





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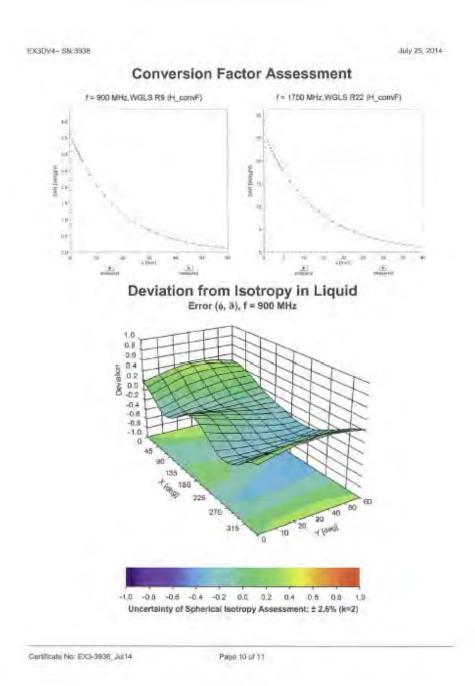
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EX30V4- SN:3938 July 25, 2014

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

## Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-25.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 1004 Zurich, Switzerand





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Multilateral Agreement for the recognition of satisfactors certificates

Chart

SGS-TW (Auden)

Accreditation No.: SCS 108
Contilicate No.: EX3-3770 Apr14

CALIBRATION CERTIFICATE

Chipret

Calibration (accordance)

QA CAL 01.V9, QA CAL-14.V4: QA CAL-23.V5, QA CAL-25.V6

Calibration (procedure for dosimetric E-field probes

Certificate dose April 24, 2014

This paths also certificate documents the tracentristy to represent standards, which relates the physical units of measurements (3). The recognitionals and the uncertainties with coefficients probability are given on the following pages and are got of the certificate.

All calibrations have been constrainties in the classed subclatory facility on wronment temperature (22.1.3)\*C and numrity = Title Celebration Equationary used (MATE critical for salibration)

Printing Standards	iti	Cal Date (Certificate No.)	Scheduled Califration
Power meter E4419B	GB41293874	E3-Agr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 cB Attenuation	SN: 36054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 db Atlemator	SN: 35277 (204)	03-Apr-14 (No. 217-01619)	April 15
Raterence 30 cB Abenuator	Siv. S5129 (30b)	(CS-Apri-14 (No. 217-01900)	April 15
Reterence Probe E330V2	EN: 3013	30-Den-13 (No. ES3-3013_Dec13)	Dec-14
DAEI	SN 680	13 Dec-13 (No. DAE4-660, Dec13)	Dec-14
Secondary Standards	(D	Check Date (in house)	Scheduled Check
RF generator HP 8848C	US3842U01700	4-Aug-99 (in house check Apr-13)	tri froyaercheck: Apr-15
Network Analyzes HP 8753E	US37890560	18-Oct-01 (in house check Oct-13)	in house check Oct-14

Norme	Fueldion	Signiture
Jeion Kastreli	Laboratory Technique	FILE
Kata Polovic	Technical Manager	JERY.
		Issued, April 24, 2014
	Katja Pokovic	

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Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signat Multilateral Agreement for the recognition of calibration certificates

Glossary:

tissue simulating liquid NORMx,y,z sensitivity in free space sensitivity in TSL / NORMx,y,z DCP diode compression point

crest factor (1/duty\_cycle) of the RF signal A, B, C, D modulation dependent linearization parameters

Polarization φ o rotation around probe axis

9 rotation around an axis that is in the plane normal to probe axis (at measurement center), Polarization 9

i.e., 9 = 0 is normal to probe axis 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:

- 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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

#### Methods Applied and Interpretation of Parameters:

- WORMx,y,z: Assessed for E-field polarization 9 = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E<sup>2</sup>-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
- Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f s 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
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom
- 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).

Certificate No: EX3-3770\_Apr14

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EX3DV4 - SN:3770

April 24, 2014

# Probe EX3DV4

SN:3770

Manufactured: Calibrated:

July 6, 2010 April 24, 2014

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

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April 24, 2014 EX3DV4-SN:3770

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

## Basic Calibration Parameters

Daoic Cambration Fara	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) <sup>2</sup> ) <sup>A</sup>	0.31	0.61	0.40	± 10.1 %
DCP (mV) <sup>th</sup>	104.0	96.9	102.5	

## Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc <sup>tt</sup> (k=2)
0	CW	×	0.0	0.0	1.0	0.00	141.8	±3.5 %
		Y	0.0	0.0	1.0		132.9	
		Z	0.0	0.0	1.0		135.7	

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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<sup>&</sup>lt;sup>A</sup> The uncertainties of NormX,Y,Z do not affect the E<sup>2</sup>-field uncertainty inside TSL (see Pages 6 and 6).

<sup>a</sup> Numerical linearization parameter: uncertainty not required.

<sup>a</sup> 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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EX3DV4-SN:3770

April 24, 2014

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

#### Calibration Parameter Determined in Head Tissue Simulating Media

anbration	illoration Parameter Determined in Head Tissue Simulating Media							
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) <sup>F</sup>	ConvF X	ConvF Y	ConvF Z	Alpha <sup>o</sup>	Depth <sup>6</sup> (mm)	Unet. (k=2)
750	41.9	0.89	9.70	9.70	9.70	0.27	1.09	± 12.0 %
835	41.5	0.90	9.32	9.32	9.32	0.52	0.77	± 12.0 %
900	41.5	0.97	9.16	9.16	9.16	0.14	1.68	± 12.0 %
1750	40.1	1.37	8.08	8.08	8.08	0.28	0.92	± 12.0 %
1900	40.0	1.40	7.79	7.79	7.79	0.36	0.81	± 12.0 %
2000	40.0	1.40	7.75	7.75	7.75	0.40	0.78	± 12.0 %
2300	39.5	1.67	7.35	7.35	7.35	0.26	0.95	± 12.0 %
2450	39.2	1.80	6.97	6.97	6.97	0.35	0.82	± 12.0 %
2600	39.0	1.96	6.73	6.73	6.73	0.45	0.73	± 12.0 %
5200	36.0	4.66	5.25	5.25	5.25	0.35	1.80	± 13.1 %
5300	35.9	4.76	5.07	5.07	5.07	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.48	4.48	4.48	0.45	1.80	± 13.1 %
5800	35.3	5.27	4.65	4.65	4.65	0.45	1.80	± 13.1 %

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Frequency validity of a 100 MHz only applies for DASY w.A. and higher (see Page 2), also it is restricted to ± 60 MHz. The uncertainty is the RSS of the ConvE uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

At frequencies below 3 GHz, the validity of lissue parameters (a and o) can be relaxed to ± 10% if liquid compensation formats is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (a and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvE uncertainty for indicated trappt fissue parameters.

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



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EX3DV4- SN:3770

April 24, 2014

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

## Calibration Parameter Determined in Body Tissue Simulating Media

anpracion	ilibration Parameter Determined in Body Tissue Simulating Media							
f (MHz) <sup>C</sup>	Relative Permittivity <sup>F</sup>	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha <sup>0</sup>	Depth <sup>6</sup> (mm)	Unct. (k=2)
750	55,5	0.96	9.54	9.54	_9.54	0.53	0.79	± 12.0 %
835	55.2	0.97	9.40	9.40	9.40	0.19	1.60	± 12.0 %
900	55.0	1.05	9.23	9.23	9.23	0.27	1.20	± 12.0 %
1750	53.4	1.49	7.79	7.79	7.79	0.37	0.87	± 12.0 %
1900	53.3	1.52	7.51	7.51	7.51	0.47	0.78	± 12.0 %
2000	53.3	1.52	7.59	7.59	7.59	0.61	0.69	± 12.0 %
2300	52.9	1.81	7.27	7.27	7.27	0.60	0.69	± 12.0 %
2450	52.7	1.95	7.15	7.15	7.15	0.52	0.72	± 12.0 %
2600	52.5	2.16	6.90	6.90	6.90	0.80	0.50	±12.0 %
5200	49.0	5.30	4.56	4.56	4.56	0.50	1.90	± 13.1 %
5300	48.9	5.42	4.38	4.38	4.38	0.50_	1.90	± 13.1 %
5800	48.5	5.77	3.76	3.76	3.76	0.55	1.90	± 13.1 %
5800	48.2	6.00	4.13	4.13	4.13	0.55	1.90	± 13.1 %

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<sup>&</sup>lt;sup>6</sup> Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), also it is restricted to ± 60 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

\*At frequencies below 3 GHz, the validity of floate parameters (a and e) can be reliated to ± 10% if liquid compensation formula is applied to measured SAR values. Aff requencies above 3 GHz, the validity of tissue parameters (a and e) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target fease parameters.

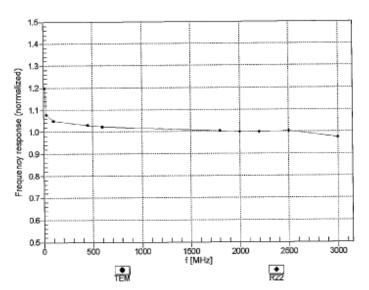
\*AphatOppth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-8 GHz at any distance larger than half the probe tip diameter from the boundary.



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# 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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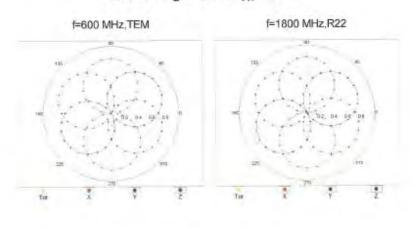
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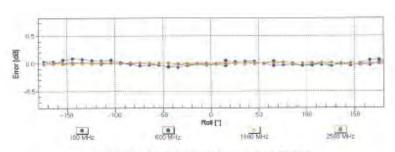


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EX3DV4—SN:3770 April 24, 2014

## Receiving Pattern (\$\phi\$), 9 = 0°





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

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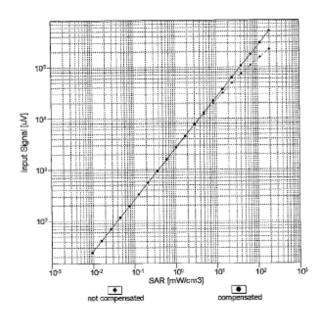


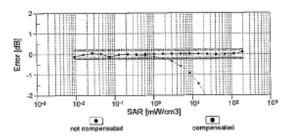
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April 24, 2014

## Dynamic Range f(SAR<sub>head</sub>) (TEM cell , f<sub>eval</sub>= 1900 MHz)





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

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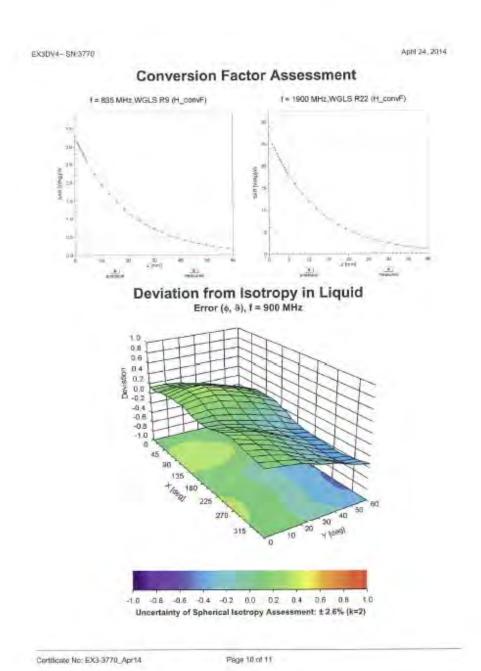
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EX3DV4-- SN:3770

April 24, 2014

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

## Other Probe Parameters

Triangular
-34.3
enabled
disabled
337 mm
10 mm
9 mm
2.5 mm
1 mm
1 mm
1 mm
2 mm

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# 8. Uncertainty Budget

Measurement Uncertainty evaluation template for DUT SAR test

IEEE 1528								
A	С	D	е	f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty %	Probability Distributioin	Div	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system								
Probe calibration(under 6Ghz)	6.55%	N	1		1	1 6.55%	6.55%	$\infty$
Isotropy , Axial	3.50%	R	√3		1	1 2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3		1	1 5.54%	5.54%	$\infty$
Boundary Effect	1.00%	R	√3		1	1 0.58%	0.58%	∞
Linearity	4.70%	R	$\sqrt{3}$		1	1 2.71%	2.71%	$\infty$
Detection Limits	1.00%	R	$\sqrt{3}$		1	1 0.58%	0.58%	$\infty$
Readout Electronics	0.30%	N	1		1	1 0.30%		
Response time	0.80%	R	$\sqrt{3}$		1	1 0.46%	0.46%	$\infty$
Integration Time	2.60%	R	$\sqrt{3}$		1	1 1.50%	1.50%	$\infty$
Measurement drift	1.75%	R	$\sqrt{3}$		1	1.01%	1.01%	∞
(class A evaluation)	1.7570	K	<b>V</b> 3		1	1.01 /6	1.0170	
RF ambient condition - noise	3.00%	R	√3		1	1.73%	1.73%	$\infty$
RF ambient conditions - reflections	3.00%	R	$\sqrt{3}$		1	1.73%	1.73%	$\infty$
Probe positioner Mechanical restrictions	0.40%	R	√3		1	1 0.23%	0.23%	$\infty$
Probe Positioning with respect to phantom shell	2.90%	R	√3		1	1 1.67%	1.67%	$\infty$
Post-processing	1.00%	R	√3		1	1 0.58%	0.58%	$\infty$
Max SAR Eval	1.00%	R	$\sqrt{3}$		1	1 0.58%	0.58%	$\infty$
Test Sample related								
Test sample positioning	2.90%	N	1		1	1 2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%		1		1	1 3.60%		
Drift of output power	5.00%	R	√3		1	1 2.89%	2.89%	∞
Phantom and Setup	2.0070		, ,			2.07 /0	2.07 70	
Phantom Uncertainty	4.00%	R	√3		1	1 2.31%	2.31%	~
Liquid	4.00 //	K	VJ		1	2.51 /0	2.31 /0	-
conductivity(meas.)	4.88%	N	1	0.6	1 0.4	3.12%	2.10%	M
Liquid permitivity(meas.)	4.98%	N	1	0.0	0.49	9 2.99%	2.44%	M
Combined standard uncertainty		RSS				12.35%	12.01%	
Expant uncertainty (95% confidence interval), K=2						24.70%	24.02%	

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## 9. Phantom Description



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## 10. System Validation from Original Equipment Supplier



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





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The Swiss Accreditation Service is one of the signatures to the EA Worlding of Agreement for the recognition of calibration carbinates

#### 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:

- EEE 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
- EC 62209-1. "Procedure to measure the Specific Absorption Rate (SAR) for hand held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)".
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the 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 No: D835V2-4df6:L Augili

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## Measurement Conditions

ASY system corriguration, as far as not	given on page 1.	
DASY Version	DASY5	V52.8.8
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

he following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.0 ± 6 %	0.94 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

## SAR result with Head TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.24 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (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	6.05 W/kg ± 16.5 % (k=2)

## **Body TSL 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	55.2 ± 6 %	1.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.41 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.35 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.59 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.21 W/kg ± 16.5 % (k=2)

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## Appendix (Additional assessments outside the scope of SCS108)

## Antenna Parameters with Head TSL

Impedance: transformed to fried point	51.7 \Omega - 3.6 \Omega	
Return Loss.	-28,2 dB	

## Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.1 LL - 5.8 ju	
Raturn Loss	-23.7 dB	

## General Antenna Parameters and Design

Electrical Delay (one direction)	T-391 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 symfrigin coaxial cable. The center conductor of the feeding line at directly connected to the second arm of the dipole. The antenna is therefore short-diculted 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 Standars.

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

## Additional EUT Data

Manufactured by	SPEAG	
Manufactured on	November 27, 2006	

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## DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz.

Medium parameters used: f = 835 MHz;  $\sigma = 0.94$  S/m;  $\varepsilon_r = 42$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section; Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63,19-2011)

#### DASY52 Configuration:

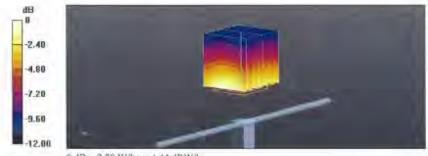
- Probe: ES3DV3 SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12,2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial; 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## 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 = 56.23 V/m; Power Drift = -0,02 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.38 W/kg; SAR(10 g) = 1.55 W/kgMaximum value of SAR (measured) = 2.78 W/kg



0 dB = 2.78 W/kg = 4.44 dBW/kg

Certificate No: D835V2-4d083\_Aug14

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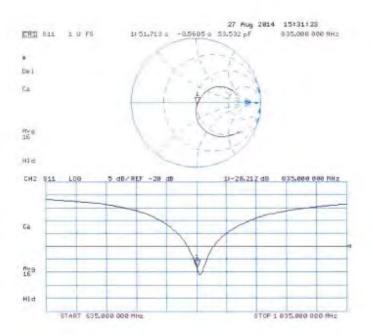
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## Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d063\_Aug14

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## DASY5 Validation Report for Body TSL

Date: 27.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz;  $\sigma = 1.01 \text{ S/m}$ ;  $\varepsilon_c = 55.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

## DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface; 3mm (Mechanical Surface Detection)
- Efectronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001.
- DASY52 52.8,8(1222); SEMCAD X 14.6.10(7331)

## 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 = 54.65 V/m; Power Drift = -0.03 dB Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.41 W/kg; SAR(10 g) = 1.59 W/kgMaximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Certificate No: D835V2-4d063\_Aug14

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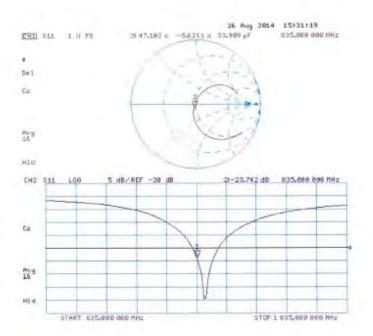
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## Impedance Measurement Plot for Body TSL



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Client SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: D1750V2-1008 Aug14

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Primary Standards Fower meter EPM-442A Power sensor HP 6481A Power sensor HP 6481A Relevence 20 dB Attenuator Type-N manufacts conditionation Reference Probe ESSOV3	ID:4 GE07460704 Uss7292783 MY41092317 SN: 0058 (204) SN: 5047.2 / 06327 SN: 3205	Ri-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01828) DB-Apr-14 (No. 217-01918) DB-Apr-14 (No. 217-01921) DB-Occ-13 (No. ESS-3266_Dect3)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Oct-14
Primary Standards Fower meter EPM-442A Power sansor HF 6481A Power sensor HF 6481A Relevence 20 dB Attenuator Type-N manufacts combination Reference Probe ESSOV3	ID. 8 GB07460704 US37292783 MY41092317 SN: 5059 (208) SN: 5047 2/ 08327	RH-Oct-13 (No. 217-01827) DH-Oct-13 (No. 217-01827) DH-Oct-13 (No. 217-01828) DG-Apr-14 (No. 217-01918) DG-Apr-14 (No. 217-01921)	Oct-14 Ccs-1a Oct-14 Apr-15 Apr-15
Primary Standards Fower meter EPM-442A Power seasor HP 8481A Power seasor HP 8481A Released 20 db Attenuator Type-N manualch continuation Reference Probe ESSOV3 DAE4 Secundary Standards	ID:4 GE07460704 Uss7292783 MY41092317 SN: 0058 (204) SN: 5047.2 / 06327 SN: 3205	Ri-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01828) D3-Apr-14 (No. 217-01918) D3-Apr-14 (No. 217-01921) SB-Occ-13 (No. E55-3206, DHz13) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (In house)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Oct-14
Primary Standards Fower meter EPM-142A Power sensor HP 8481A Power sensor HP 8481A Relevence 20 db Attenuator Type-N manualch combination Reference Probe ESSOV3 DAE4 Secundary Standards	ID 4 GB07460704 US37292783 M741062317 SH: 5058 (204) SH: 5047.2 / 06327 SH: 3205 SR: 601	IBi-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01828) DB-Apr-14 (No. 217-01918) DB-Apr-14 (No. 217-01921) 30-Oce-13 (No. ES3-3266 DHc13) 18-Aug-14 (No. DAE4-631_Aug14)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Disc-14 Aug-15
Primary Standards Fower treats EPM-4s2A Power sensor HP 8481A Power sensor HP 8481A Released 20 d0 Attenuator Type-N manualch combination Reference Probe ESSOV3 DAE4 Securitary Standards RF generator RAS EMT-96	ID:4 GB07460704 US37292783 MY41092317 SN: 5050 (204) SN: 5047.2/ (08327 SN: 3205 SN: 601	Ri-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01828) D3-Apr-14 (No. 217-01918) D3-Apr-14 (No. 217-01921) SB-Occ-13 (No. E55-3206, DHz13) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (In house)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Dec-14 Aug-15 Scheduled Check
Primary Standards Fower treater EPM-462A Power sensor HP 6481A Power sensor HP 6481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ESSOV3 DAE4	ID 4 G507460704 U537292783 MY41092317 SN: 50509 (20%) SN: 5047 2/ 06327 SN: 3205 SN: 601	Ri-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DG-Oct-13 (No. 217-01828) D3-Apr-14 (No. 217-01918) D3-Apr-14 (No. 217-01918) S0-Occ-13 (No. ESS-3266, Dect-3) 18-Aug-14 (No. DAE4-631_Aug-14) Check Eate (In house) D4-Aug-98 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Dec-14 Aug-15 Scheduled Check in heuse crieck: Oct-18
Primary Standards Fower meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Relevance 20 dB Attenuator Type-N manualch contrination Reference Probe ESSOV3 DAE4 Secundary Standards HF generator RAS SMT-96	ID 4 GB07460704 US37292783 M741092317 SH: 5050 (204) SH: 5047 27 (06327 SH: 3205 SR: 601	Ri-Oct-13 (No. 217-01827) D9-Oct-13 (No. 217-01827) D9-Oct-13 (No. 217-01828) D3-Apr-14 (No. 217-01918) D3-Apr-14 (No. 217-01921) 39-Occ-13 (No. ESS-3206, Dec13) 18-Aug-14 (No. DAE4-60*_Aug-14) Check Date (In house) D4-Aug-98 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Dec-14 Aug-15 Scheduled Check in house check: Oct-18 in house check: Oct-14
Primary Standards Flower rester EPM-462A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N manufacts continuation Reference Probe ESSOV3 DAE4 Secundary Standards RF generator RAS SMT-96 Reference Analyzes HP 87S3E	ID:4 GB07460704 US37292783 MY41092317 SN: 5058 (20%) SN: 5047.2/ 06327 SN: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 501 EX: 502 EX: 501 EX: 502 EX: 503 EX: 503	Rii-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01827) DB-Oct-13 (No. 217-01928) DB-Apri-14 (No. 217-01981) DB-Apri-14 (No. 217-01981) DB-Aug-14 (No. 217-01981) DB-Aug-14 (No. DAE4-601_Aug-14) Check Date (In house) DB-Aug-89 (in house check Oct-13) 18-Oct-01 (in house check Oct-13)	Oct-14 Oct-14 Oct-14 Apr-15 Apr-15 Dec-14 Aug-15 Scheduled Check in house check: Oct-18 in house check: Oct-14

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Accreditation No.: SCS 108

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## Glossary:

TSL

tissue simulating liquid

CanvF N/A sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- i) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices; Measurement Techniques", June 2013
- b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005.
- d) KDB 865864, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

d) DASY4/5 System Handbook.

## Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end.
  of the 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 exis.
- 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 I W at the entenna 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 Version	DASY5	V52.6,8
Extrapolation	Advanced Extrapolation	
Phentom	Modular Flat Phantom	
Distance Dipole Center - TSL	) D mm	with Space
Zoom Scan Resolution	dx. dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	55.0 °C	40.1	1.37 m/m/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	392=5%	1.37 mho/m = 6 %
Head TSL temperature change during test	< 0.5 °C		-

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.9 W/kg = 17.0 % (k=2)

SAR averaged over 10 cm² (10 g) of Head T5L	rioridinos	
SAR measured	250 mW input power	4.91 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.6 W/kg ± 16.5 % (k±2)

## **Body TSL parameters**

	Tamperature	Permittivity	Conductivity
Nomical Body TSL parameters	22,0 °C	53,A	1.49 mhalm
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.0±8%	1.49 mbo/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW Input power	9.44 W/kg
SAR for nominal Body TSL parameters	nomelized to 1W	37.5 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.07 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.2 W/kg ± 16.5 % (k=2)

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## Appendix (Additional assessments outside the scope of SCS108)

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	$50.4 \Omega + 0.3 j\Omega$	
Return Loss	-46.4 dB	

## Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.4 \Omega + 0.3 j\Omega$	
Return Loss	- 28.5 dB	

## General Antenna Parameters and Design

	100000000
Electrical Delay (one direction)	1.222 ns

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 11, 2009

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## DASY5 Validation Report for Head TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: f = 1750 MHz;  $\sigma = 1.37 \text{ S/m}$ ;  $\varepsilon_r = 39.2$ ;  $p = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

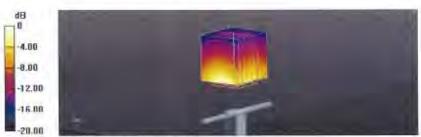
## DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConyF(5.23, 5.23, 5.23); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18.08.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 95.53 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 16.7 W/kg

SAR(1 g) = 9.26 W/kg; SAR(10 g) = 4.91 W/kgMaximum value of SAR (measured) = 11.6 W/kg



0 dB = 11.6 W/kg = 10.64 dBW/kg

Certificate No: D1750V2-1008 Aug14

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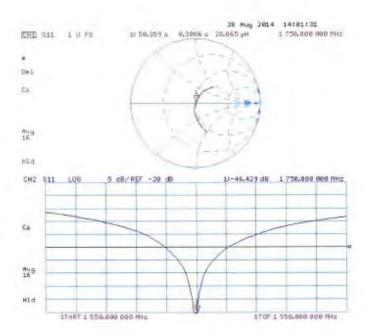
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## Impedance Measurement Plot for Head TSL



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## DASY5 Validation Report for Body TSL

Date: 28.08.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1750 MHz

Medium parameters used: f = 1750 MHz;  $\sigma = 1.49 \text{ S/m}$ ;  $\epsilon_r = 52$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

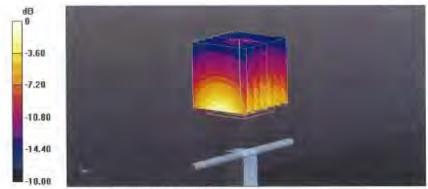
## DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.89, 4.89, 4.89); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 18:08:2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

## 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 = 93,44 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 16.3 W/kg

SAR(1 g) = 9,44 W/kg; SAR(10 g) = 5.07 W/kg Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

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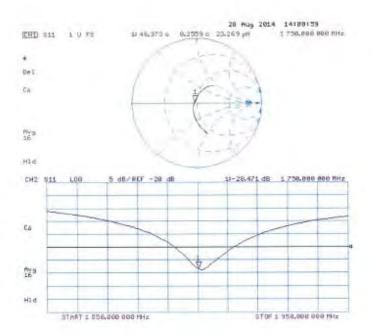
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## Impedance Measurement Plot for Body TSL



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Cilent SGS-TW (Auden)

Accreditation No.: SCS 108

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Certificate No: D1900V2-5d027\_Apr14

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Celtrellon date	April 23, 2014		
		oral standards, which remize the physical un robability are given on the following pages or	
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## Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Accreditation No.: SCS 108

Accredited by the Swiss Accreditation Service (SAS)

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#### Glossarv:

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, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

#### Additional Documentation:

d) DASY4/5 System Handbook

## Methods Applied and Interpretation of Parameters:

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

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

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#### Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

## Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.1 ± 6 %	1.36 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	****	

## SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.71 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.3 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.6 W/kg ± 16.5 % (k=2)

# **Body TSL parameters**

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.4 ± 6 %	1.52 mha/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.87 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.3 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.22 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.8 W/kg ± 16.5 % (k=2)

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## Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5 Ω + 6.8 jΩ
Return Loss	- 23.0 dB

## Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω + 2.8 jΩ
Return Loss	- 26.4 dB

## 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-dirouted 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	December 17, 2002

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#### **DASY5 Validation Report for Head TSL**

Date: 23.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.36 \text{ S/m}$ ;  $\epsilon_r = 39.1$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

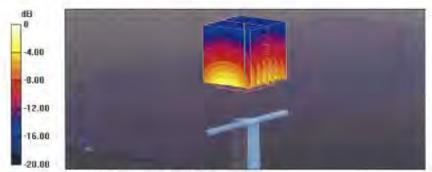
#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25,04,2013
- Phantom: Flat Phantom 5.0 (front); Type; QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

## 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 = 97.825 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 17.8 W/kg

SAR(1 g) = 9.71 W/kg; SAR(10 g) = 5.1 W/kgMaximum value of SAR (measured) = 12.3 W/kg



0 dB = 12.3 W/kg = 10.90 dBW/kg

Certificate No. D1900V2-5d027\_Apr14

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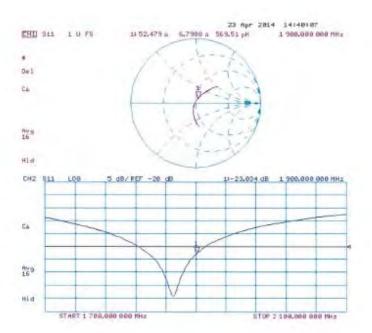
No.134,Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803/新北市五股區新北產業園區五工路 134 號 t (886-2) 2299-3279 f (886-2) 2298-0488

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## Impedance Measurement Plot for Head TSL



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#### DASY5 Validation Report for Body TSL

Date: 22.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: LIID 0 - CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz;  $\sigma = 1.52$  S/m;  $\epsilon_c = 52.4$ ;  $\rho = 1000$  kg/m<sup>2</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

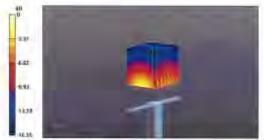
#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25,04,2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm 2/Zoom Scan (7x7x7)/Cube 0;

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 94.526 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 17.2 W/kg

SAR(1 g) = 9.87 W/kg; SAR(10 g) = 5.22 W/kg Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg

Certificate No: D1900V2-5d027\_Apr14

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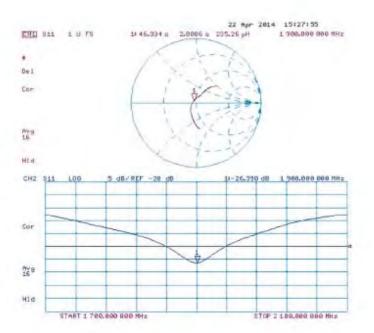
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## Impedance Measurement Plot for Body TSL



Certificate No: D1900V2-5d027\_Apr14

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





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Client SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: D2450V2-727 Apr14

Otject	D2450V2 - SN: 7	27	
Calibration procedurals)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calexation date:	April 23, 2014		
		onal standants, which réalize the drystcal un robability are given on the following pages an	
All calibrations have been condu	sted in the closed laborator	y facility covercement temperature (32 ± 31/1	C and humidity < 70%
		ry fucility: environment lemperature (22 ± 3)*(	C and numidity < 70%
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Glossary:

TSL ConvF N/A tissue simulating liquid sensitivity in TSL / NORM x,y,z

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
- EC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

## Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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

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

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#### Measurement Conditions

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

DASY Version	DASY5	V52.8.7
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	38.2 ± 6 %	1.81 mho/m ±6%
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.09 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg ± 16.5 % (k=2)

# Body TSL parameters

ing 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	50.6 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.90 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.3 W/kg ± 16.5 % (k=2)

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#### Appendix

#### Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.6 Ω + 1.9 jΩ
Return Loss	- 26.5 dB

## Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.1 Ω + 3.5 jΩ
Return Loss	- 28.7 dB

#### General Antenna Parameters and Design

Electrical Delay (one direction) 1.148 ns		
	1.148 ns	Electrical Delay (one direction)

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

Certificate No: D2450V2-727\_Apr14

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#### DASY5 Validation Report for Head TSL

Date: 23.04.2014

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;  $\sigma = 1.81$  S/m;  $\varepsilon_r = 38.2$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04,2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52,8.7(1137); SEMCAD X 14,6.10(7164)

## 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 = 100.01 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 27.0 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.09 W/kgMaximum value of SAR (measured) = 17.1 W/kg



0 dB = 17.1 W/kg = 12.33 dBW/kg

Certificate No: D2450V2-727\_April4.

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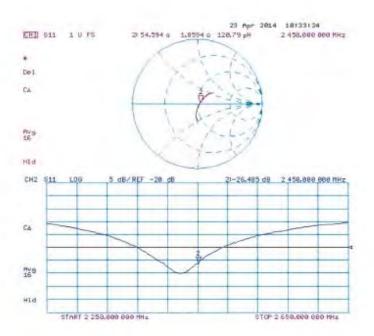
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## Impedance Measurement Plot for Head TSL



Certificate No: D2450V2-727\_Apr14 Page 6 of 8

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#### DASY5 Validation Report for Body TSL

Date: 23.04,2014

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;  $\epsilon_r = 50.6$ ;  $\rho = 1000$  kg/m<sup>3</sup>

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

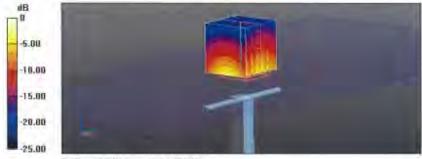
#### DASY52 Configuration:

- Probe: ES3DV3 SN3205: ConvF(4.35, 4.35, 4.35); Calibrated: 30.12,2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# 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 = 94.356 V/m; Power Drift = -0.07 dB Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.9 W/kgMaximum value of SAR (measured) = 16.7 W/kg



0 dB = 16.7 W/kg = 12.23 dBW/kg

Certificate No: D2450V2-727\_Apr14

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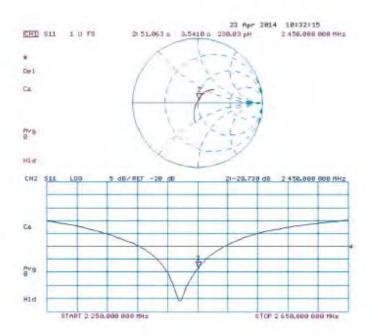
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## Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727\_Apr14

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





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SGS-TW (Auden)

Accreditation No.: SCS 108

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Certificate Nor D2600V2-1005 Jan14

Disper	D2600V2 - SN: 1	005	
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Calinearies Equipment used (MAT Primary Scandings Power select EPM 442A Power sensor FP 4481A Power sensor FP 4481A Power sensor FP 4481A Power sensor FP 4481A Type-N insurance continuation Participate Probe ESSEVS DAE4 Secondary Stanzanss RE generator FIAS SMT-06	TE critical for pallbattion)  ID #  GB87480704 US37292783 MY41082517 BH 5058 (20b) SN 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 5047.3 / 06027 SN: 504	Gai Daie (Certificato No.)  09-Oct-13 (No. 217-01027)  09-Oct-13 (No. 217-01027)  09-Oct-13 (No. 217-01028)  04-Apr-13 (No. 217-01028)  04-Apr-13 (No. 217-01730)  00-Dec-13 (No. 217-01730)  00-Dec-13 (No. DAE4-001, April)  Chica Date (In house check Oct-13)  18-Oct-01 (In house check Oct-13)  Function	Schedund Calbration Oct-14 Oct-14 Opr-14 Apr-14 Dec-14 Apr-14 Scheduled Check In nouse check: Oct-16

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Calibration Laboratory of Schmid & Partner

Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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Swiss Calibration Service

Accreditation No.: SCS 108

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## Glossary:

TSL ConvF

N/A

tissue simulating liquid

sensitivity in TSL / NORM x,y,z not applicable or not measured

## Calibration is Performed According to the Following Standards:

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

#### Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the 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
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

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## Measurement Conditions

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

DASY Version	DASY5	V62.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz ± 1 MHz	

#### Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.2 ± 6 %	2.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL

SAR averaged over 1 cm <sup>2</sup> (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.7 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	26.0 W/kg ± 16.5 % (k=2)

# Body TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.9 ± 6 %	2.21 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.3 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	56.2 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	25.1 W/kg ± 16.5 % (k=2)

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#### Appendix

## Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.1 Ω - 3.2 jΩ
Return Loss	- 30.0 dB

## Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.5 Ω - 2.6 jΩ
Return Loss	- 26.8 dB

## General Antenna Parameters and Design

Electrical Delay (one direction)	1.155 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	December 23, 2006

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#### DASY5 Validation Report for Head TSL

Date: 28.01,2014

Test Laboratory: SPEAG, Zurich, Switzerland

#### DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1005

Communication System; UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz;  $\sigma = 2.02 \text{ S/m}$ ;  $\epsilon_c = 38.2$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

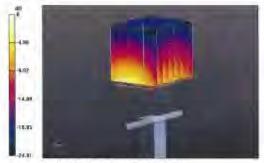
Measurement Standard; DASY5 (IEEE/IEC/ANSI C63:19-2007)

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5,0 (front); Type: QD000P50AA; Serial: [00]
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# 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 = 98.590 V/m; Power Drift = 0.08 dE Peak SAR (extrapolated) = 31.3 W/kg. SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg Maximum value of SAR (measured) = 19.3 W/kg



0 0B = 19,3 W/kg = 12,86 dBW/kg

Centicate No: D2600V2-1005\_lan14

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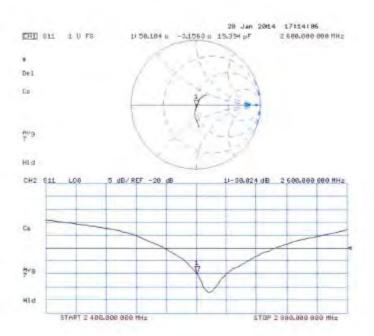
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## Impedance Measurement Plot for Head TSL



Certificate No: D2600V2-1005\_Jan14

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#### DASY5 Validation Report for Body TSL

Date: 28.01.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1005

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: f = 2600 MHz;  $\alpha = 2.21 \text{ S/m}$ ;  $\epsilon_r = 50.9$ ;  $\rho = 1000 \text{ kg/m}^3$ 

Phantom section: Flat Section

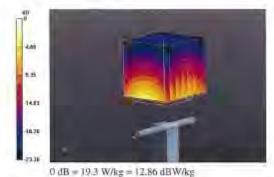
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Su601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# 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 = 96,624 V/m; Power Drift = -0.00 dB Peak SAR (extrapolated) = 30.8 W/kg SAR(1 g) = 14.3 W/kg; SAR(10 g) = 6.33 W/kgMaximum value of SAR (measured) = 19.3 W/kg



Certificate No: D2600V2-1085\_Jan1ii

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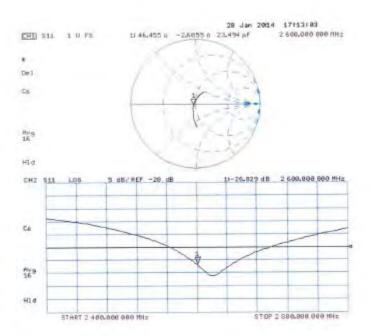
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## Impedance Measurement Plot for Body TSL



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Client SGS-TW (Auden)

Accreditation No.: SCS 108

Certificate No: D5GHzV2-1104 Apr14

Object.	D5GHzV2 - SN:	1104	
Calibration processure(s)	QA CAL-22.v2 Calibration proce	dure for dipole validation kits bet	ween 3-6 GHz
Calibration date:	April 16, 2014		
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#### Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8004 Zurich, Switzerland





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ditation No.: SCS 108

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

#### Glossary:

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

## Calibration is Performed According to the Following Standards:

- a) IEC 62209-2, "Evaluation of Human Exposure to Radio Frequency Fields from Handheld and Body-Mounted Wireless Communication Devices in the Frequency Range of 30 MHz to 6 GHz: Human models, Instrumentation, and Procedures"; Part 2: "Procedure to determine the Specific Absorption Rate (SAR) for including accessories and multiple transmitters", March 2010
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"
- c) 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

## Additional Documentation:

d) DASY4/5 System Handbook

#### Methods Applied and Interpretation of Parameters:

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

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

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#### Measurement Conditions

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5200 MHz ± 1 MHz 5300 MHz ± 1 MHz 5600 MHz ± 1 MHz 5800 MHz ± 1 MHz	

## Head TSL parameters at 5200 MHz

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.8 ± 6 %	4.43 mha/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.02 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	80.0 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>2</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.29 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.8 W/kg ± 19.5 % (k=2)

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## Head TSL parameters at 5300 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.76 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.7 ± 6 %	4.54 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.45 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	84.3 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.0 W/kg ± 19.5 % (k=2)

# Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.3 ± 6 %	4.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

## SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.31 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	82.8 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.5 W/kg ± 19.5 % (k=2)

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## Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 ℃	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.0 ± 6 %	5.03 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

#### SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.95 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.2 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.26 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.5 W/kg ± 19.5 % (k=2)

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#### Body TSL parameters at 5200 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	49.0	5.30 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.0 ± 6 %	5.44 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 <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.69 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	76.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.15 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.3 W/kg ± 19.5 % (k=2)

#### Body TSL parameters at 5300 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.42 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.8 ± 6 %	5.57 mha/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.84 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	77.8 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.19 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.7 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	46.3 ± 6 %	5.96 mha/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

# SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm <sup>3</sup> (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	8.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	81.4 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm <sup>3</sup> (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.6 W/kg ± 19.5 % (k=2)

## Body TSL parameters at 5800 MHz

ne following parameters and carculations were applied.			
	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.23 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

## SAR result with Body TSL at 5800 MHz

SAR averaged over 1 cm3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.73 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	76.7 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg ± 19.5 % (k=2)

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#### Appendix

# Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	48.2 Ω - 4.8 jΩ
Return Loss	- 25.6 dB

#### Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	48.5 Ω - 7.6 jΩ
Return Loss	- 22.2 dB

#### Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	53.9 Ω + 0.5 jΩ
Return Loss	- 28.5 dB

#### Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	58.3 Ω - 4.4 jΩ
Return Loss	- 21.2 dB

#### Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	52.6 Ω - 9.2 μΩ
Return Loss	- 20.6 dB

## Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	53.3 Ω - 1.8 jΩ
Return Loss	- 28.7 dB

# Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.7 Ω - 5.2 jΩ
Return Loss	- 20.6 dB

## Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	57.0 Ω + 2.2 jΩ
Return Loss	- 23.3 dB

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#### General Antenna Parameters and Design

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

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

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

#### Additional EUT Data

Manufactured by	SPEAG
Manufactured on	September 24, 2010

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# **DASY5 Validation Report for Head TSL**

Date: 16.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600

MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz;  $\sigma = 4.43 \text{ S/m}$ ;  $\epsilon_r = 35.8$ ;  $\rho = 1000 \text{ kg/m}^3$ , Medium parameters used: f = 5300 MHz;  $\sigma = 4.54$  S/m;  $\epsilon_r = 35.7$ ;  $\rho = 1000$  kg/m $^3$  , Medium parameters used: f = 5600 MHz;  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  , Medium parameters used:  $\sigma = 1000$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m $^3$  kg/m4.83 S/m;  $\epsilon_r$  = 35.3;  $\rho$  = 1000 kg/m³, Medium parameters used: f = 5800 MHz;  $\sigma$  = 5.03 S/m;  $\epsilon_r$  = 35;  $\rho$  = 1000 kg/m3

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.52, 5.52, 5.52); Calibrated: 30.12.2013, ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2013, ConvF(4.86, 4.86, 4.86); Calibrated: 30.12.2013, ConvF(4.91, 4.91, 4.91); Calibrated: 30.12.2013;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# 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 = 66.950 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 29.4 W/kg

SAR(1 g) = 8.02 W/kg; SAR(10 g) = 2.29 W/kg

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

## Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.460 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 8.45 W/kg; SAR(10 g) = 2.41 W/kg

Maximum value of SAR (measured) = 19.4 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 = 64.602 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 33.3 W/kg

SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.36 W/kg

Maximum value of SAR (measured) = 19.7 W/kg

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Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 62.293 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 33.5 W/kg

SAR(1 g) = 7.95 W/kg; SAR(10 g) = 2.26 W/kgMaximum value of SAR (measured) = 19.1 W/kg



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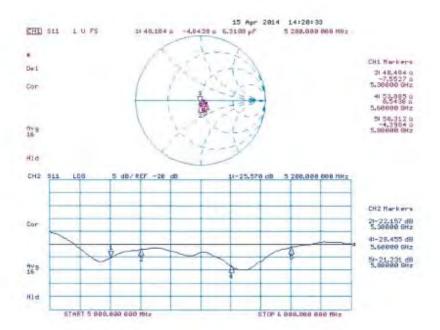
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## Impedance Measurement Plot for Head TSL



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#### DASY5 Validation Report for Body TSL

Date: 15.04.2014

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600

MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz;  $\sigma = 5.44$  S/m;  $\varepsilon_r = 47$ ;  $\rho = 1000$  kg/m<sup>3</sup>, Medium parameters used: f= 5300 MHz;  $\sigma$  = 5.57 S/m;  $\epsilon_r$  = 46.8;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used: f = 5600 MHz;  $\sigma$  = 5.96 S/m;  $\epsilon_r$  = 46.3;  $\rho$  = 1000 kg/m<sup>3</sup>, Medium parameters used: f = 5800 MHz;  $\sigma$  = 6.23 S/m;  $\epsilon_r$  = 46;  $\rho$  = 1000 kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

#### DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2013, ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013, ConvF(4.3, 4.3, 4.3); Calibrated: 30.12.2013, ConvF(4.47, 4.47, 4.47); Calibrated: 30.12.2013:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

# Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.628 V/m; Power Drift = -0.05 dB

Peak SAR (extrapolated) = 30.7 W/kg

SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.15 W/kg

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

## Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 59.482 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 32.5 W/kg

SAR(1 g) = 7.84 W/kg; SAR(10 g) = 2.19 W/kg

Maximum value of SAR (measured) = 18.7 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 = 58.886 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 36.9 W/kg

SAR(1 g) = 8.21 W/kg; SAR(10 g) = 2.28 W/kg

Maximum value of SAR (measured) = 20.1 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 = 56.160 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 36.8 W/kg

SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.13 W/kg

Maximum value of SAR (measured) = 19.4 W/kg



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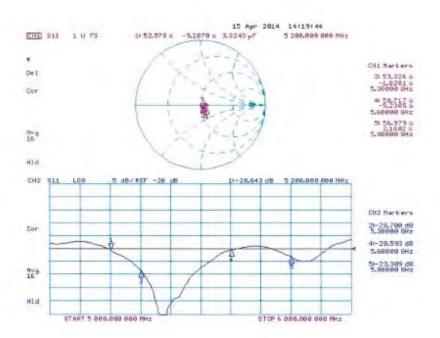
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## Impedance Measurement Plot for Body TSL



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# End of 1st part of report

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