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SAR TEST REPORT





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

Equipment Under Test Tablet PC

Brand Name hp

Model No. HSTNN-I72C

Company Name HP Inc.

Company Address 1501 Page Mill Road, Palo Alto, California 94304, USA

Standards IEEE /ANSI C95.1, C95.3, IEEE 1528 2013,

KDB616217D04v01r02,KDB865664D01v01r04, KDB865664D02v01r02,KDB941225D01v03r01,

KDB447498D01v06

FCC ID B94HNI72CWR

Date of Receipt Sep. 04, 2015

Date of Test(s) Oct. 26, 2015 ~ Mar.,07, 2016

Date of Issue Mar. 10, 2016

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

Remarks:

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

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

Signed on behalf of SGS	
Sr. Engineer	Supervisor
Matt Kuo Matt Kuo	John Yeh
Date: Mar. 10, 2016	Date: Mar. 10, 2016



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Revision History

Report Number	Revision	Description	Issue Date
EN/2016/30001	Rev.00	Initial creation of document	Mar. 10, 2016
EN/2016/30001	Rev.01	1 st modification	Mar. 10, 2016
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1. General Information

1.1 Testing Laboratory

SGS Taiwan Ltd. Electronics & Communication Laboratory								
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1.2 Details of Applicant

Company Name	HP Inc.
Company Address	1501 Page Mill Road, Palo Alto, California 94304, USA



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1.3 Description of EUT

Equipment Under Test	Tablet PC						
Brand Name	hp						
Model No.	HSTNN-I72C						
Integrated Medula	WWAN Brand Name : Huawei Model Name : MU736						
Integrated Module	WLAN/WiGig	Brand Nam Model Nam		NGW			
FCC ID	B94HNI72CWR						
Mode of Operation	⊠GPRS ⊠EDGE ⊠	WCDMA 🗵	HSDPA	⊠HS	UPA		
	GPRS 1/2 (1D) 1/2.76 (1) 1/4.1 (1E) 1/8.3 (1E)				Dn3UP) Dn2UP)		
Duty Cycle	EDGE	1/2 (1Dn4UP) 1/2.76 (1Dn3UP) 1/4.1 (1Dn2UP) 1/8.3 (1Dn1UP)					
	WCDMA		1				
	GPRS850		824.2	_	848.8		
TV Fraguency Dange	GPRS1900	1850.2	_	1909.8			
TX Frequency Range (MHz)	WCDMA Band II	1852.4	_	1907.6			
,	WCDMA Band IV		1712.4	_	1752.6		
	WCDMA Band V		826.4	_	846.6		
	GPRS850		128	_	251		
	GPRS1900		512	_	810		
Channel Number (ARFCN)	WCDMA Band II		9262	_	9538		
(ANFON)	WCDMA Band IV		1312	_	1513		
	WCDMA Band V	4132	_	4233			



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Max. SAR (1 g) (Unit: W/Kg)								
Band	Measured	Reported	Channel	Position	Highest * Simultaneous Transmission 1g SAR(W/kg)			
GPRS 850	0.644	0.889	190	Back side	1.097			
GRPS 1900	0.719	0.905	661	Back side	(WWAN)			
WCDMA Band II	0.921	1.097	9262	Back side	0.63 (WLAN Main)			
WCDMA Band IV	0.914	1.169	1513	Back side	` 1.18 ´			
WCDMA Band V	0.709	0.729	4233	Back side	(WLAN Aux)			

^{*}The highest simultaneous transmission SAR sum is 2.907 and SPLSR is ≤ 0.04 for all simultaneous transmission configurations.



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GPRS/EDGE conducted power table (Full power):

Burst average power							
Max. Rated Avg. Power + Max. Tolerance (dBm)			33.5	30.5	28.5	27.5	
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP	
EUT mode	node Frequency (MHz) CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	
GPRS	824.2	128	32.00	29.10	27.20	26.20	
850	836.6	190	32.00	29.10	27.20	26.10	
650	848.8 251		32.00	29.10	27.20	26.20	
		S	ource-based tim	e average powe	er		
GPRS	824.2	128	22.97	23.08	22.94	23.19	
850	836.6	190	22.97	23.08	22.94	23.09	
650	848.8	251	22.97	23.08	22.94	23.19	
	The division factor compared to the number of TX time slot						
Div	ision factor			2 TX time slot		4 TX time slot	
			-9.03	-6.02	-4.26	-3.01	

Burst average power							
Max. Rated Avg. Power + Max. Tolerance (dBm)			29	26	24	23	
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP	
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	
EDGE	824.2	128	26.20	23.30	21.40	20.40	
850	836.6	190	26.20	23.30	21.40	20.40	
(MCS5)	848.8	251	26.20	23.30	21.40	20.50	
		S	ource-based tim	e average powe	er		
EDGE	824.2	128	17.17	17.28	17.14	17.39	
850	836.6	190	17.17	17.28	17.14	17.39	
(MCS5)	848.8	251	17.17	17.28	17.14	17.49	
	The division factor compared to the number of TX time slot						
Div	vision factor			2 TX time slot	3 TX time slot	4 TX time slot	
	rision factor		-9.03	-6.02	-4.26	-3.01	



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Burst average power							
Max. Rated Avg. Power + Max. Tolerance (dBm)			30.5	27.5	25.5	24.5	
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP	
EUT mode	Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	
GPRS	1850.2	512	29.50	26.40	24.40	23.50	
1900	1880	661	29.70	26.50	24.60	23.60	
1900	1900 1909.8 810		29.30	26.20	24.20	23.20	
		S	ource-based tim	e average powe	er		
GPRS	1850.2	512	20.47	20.38	20.14	20.49	
1900	1880	661	20.67	20.48	20.34	20.59	
1900	1909.8	810	20.27	20.18	19.94	20.19	
	The division factor compared to the number of TX time slot						
Div	ision factor			2 TX time slot	3 TX time slot	4 TX time slot	
	יוטוטוו ומטנטו		-9.03	-6.02	-4.26	-3.01	

	Burst average power							
Max. Rated Avg. Power + Max. Tolerance (dBm)			28	25	23	22		
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP		
EUT mode	Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)		
EDGE	1850.2	512	26.00	23.00	20.90	19.90		
1900	1880	661	26.00	23.10	21.00	20.00		
(MCS5)	1909.8 810		25.60	22.70	20.60	19.60		
		S	ource-based tim	e average powe	er			
EDGE	1850.2	512	16.97	16.98	16.64	16.89		
1900	1880	661	16.97	17.08	16.74	16.99		
(MCS5)	1909.8	810	16.57	16.68	16.34	16.59		
	The div	ision fa	actor compared	to the number of	f TX time slot			
Div	ision factor		1 TX time slot	2 TX time slot		4 TX time slot		
	ASION IACION		-9.03	-6.02	-4.26	-3.01		



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GPRS conducted power table (Reduced power):

	Burst average power							
Max. Rated Avg. Power + Max. Tolerance (dBm)			28.5	25.5	23.5	22.5		
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP		
EUT mode	de Frequency CH		Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)		
GPRS	824.2	128	27.20	24.20	22.20	21.20		
850	836.6	190	27.20	24.20	22.20	21.30		
650	848.8 25		27.20	24.20	22.20	21.20		
		S	ource-based tim	e average powe	er			
GPRS	824.2	128	18.17	18.18	17.94	18.19		
850	836.6	190	18.17	18.18	17.94	18.29		
830	848.8	251	18.17	18.18	17.94	18.19		
	The div	rision fa	actor compared	to the number of	of TX time slot			
Div	vision factor		1 TX time slot	2 TX time slot	3 TX time slot	4 TX time slot		
	rision factor		-9.03	-6.02	-4.26	-3.01		

			Burst avera	age power					
	ted Avg. Pow olerance (dBr		26.5	23.5	21.5	20.5			
			1Dn1UP	1Dn2UP	1Dn3UP	1Dn4UP			
EUT mode	Frequency (MHz)	CH	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)	Avg. (dBm)			
GPRS	1850.2	512	25.40	22.40	20.40	19.50			
1900	1880	661	25.50	22.60	20.50	19.50			
1900	1909.8	810	25.20	22.20	20.20	19.30			
		S	ource-based tim	urce-based time average power					
GPRS	1850.2	512	16.37	16.38	16.14	16.49			
1900	1880	661	16.47	16.58	16.24	16.49			
1900	1909.8	810	16.17	16.18	15.94	16.29			
	The div	ision fa	actor compared	to the number of	of TX time slot				
Div	Division factor			2 TX time slot -6.02	3 TX time slot -4.26	4 TX time slot -3.01			



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WCDMA Band II / Band IV / Band V - HSDPA / HSUPA conducted power table (Full power):

Dond	СН	Max. Rated Avg.	Rel99	HS	SDPA mo	de AV(dE	sm)	HSUPA mode AV(dBm)				
Band	СП	Power + Max. Tolerance (dBm)	AV(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA	9262	24.5	23.75	22.69	22.63	22.21	22.28	23.67	22.22	22.23	22.35	22.50
Band II	9400	24.5	24.00	23.08	22.86	22.63	22.64	23.98	22.53	22.54	22.66	23.02
Rel 7	9538	24.5	23.20	22.28	22.05	21.75	21.87	23.14	21.69	21.70	21.82	22.15
WCDMA	1312	24.5	23.58	22.60	22.46	22.12	22.19	23.50	22.05	22.06	22.18	22.52
Band IV	1412	24.5	23.37	22.41	22.23	21.96	21.97	23.35	21.90	21.91	22.03	22.37
Rel 7	1513	24.5	23.43	22.40	22.28	21.87	21.99	23.37	21.92	21.93	22.05	22.35
WCDMA	4132	24.5	23.30	22.30	22.23	21.84	21.89	23.26	21.32	21.30	21.37	22.21
Band V	4183	24.5	23.17	22.14	22.06	21.66	21.7	23.10	21.18	21.16	21.24	22.13
Rel 7	4233	24.5	23.04	21.93	21.91	21.44	21.5	22.96	21	21.04	21.08	21.89

HSDPA

SUB-TEST	β_{c}	β_{d}	β _d (SF)	β_c/β_d	β _{HS} (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	βς	β _d	β _d (SF)	β _c /β _d	β _{HS} (Note1)	β _{ec}	β _{ed} (Note 5) (Note 6)	β _{ed} (SF)	β _{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β _{ed} 1: 47/15 β _{ed} 2: 47/15	4 4	2	2.0	1.0	15	92
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71
5	15/15	15/15	64	15/15	30/15	24/15	134/15	4	1	1.0	0.0	21	81



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WCDMA Band II / Band IV / Band V - HSDPA / HSUPA conducted power table (Reduced power):

Band	СН	Max. Rated Avg. Power +	Rel99	HS	SDPA mo	de AV(dE	Bm)	HSUPA mode AV(dBm)				
Бапи	СП	Max. Tolerance (dBm)	AV(dBm)	SUB-1	SUB-2	SUB-3	SUB-4	SUB-1	SUB-2	SUB-3	SUB-4	SUB-5
WCDMA	9262	18	17.24	17.04	16.12	16.56	16.63	17.16	15.71	15.72	15.84	16.97
Band II	9400	18	17.63	17.50	16.49	17.05	17.06	17.61	16.16	16.17	16.29	17.37
Rel 7	9538	18	16.90	16.71	15.75	16.18	16.3	16.84	15.39	15.40	15.52	16.66
WCDMA	1312	18	18.00	17.97	16.88	17.49	17.56	17.92	16.47	16.48	16.60	17.86
Band IV	1412	18	17.94	17.80	16.80	17.35	17.36	17.92	16.47	16.48	16.60	17.78
Rel 7	1513	18	17.99	17.86	16.84	17.33	17.45	17.93	16.48	16.49	16.61	17.80
WCDMA	4132	20	19.97	19.65	18.90	19.19	19.24	19.93	17.99	17.97	18.04	19.58
Band V	4183	20	20.00	19.54	18.89	19.06	19.1	19.93	18.01	17.99	18.07	19.45
Rel 7	4233	20	19.88	19.60	18.75	19.11	19.17	19.80	17.84	17.88	17.92	19.29

HSDPA

SUB-TEST	βς	β_{d}	β _d (SF)	β_c/β_d	β _{HS} (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	βς	β _d	β _d (SF)	β _o /β _d	β _{HS} (Note1)	β _{ec}	β _{ed} (Note 5) (Note 6)	β _{ed} (SF)	β _{ed} (Codes)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 6)	E-TFCI
1	11/15	15/15	64	11/15	22/15	209/225	1309/225	4	1	1.0	0.0	20	75
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67
3	15/15	9/15	64	15/9	30/15	30/15	β _{ed} 1: 47/15 β _{ed} 2: 47/15	4	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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1.4 Test Environment

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

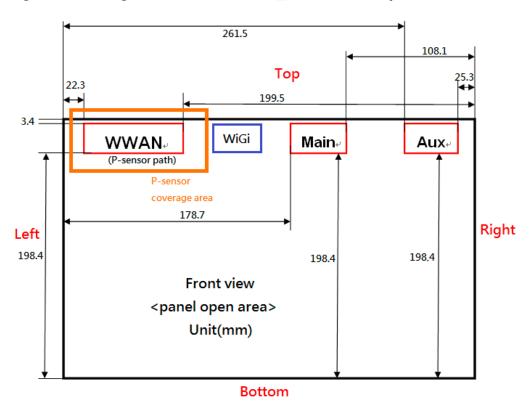
1.5 Operation Description

1. WWAN (GPRS/EDGE/WCDMA/HSDPA/HSPA):

The EUT is controlled by using Radio Communication Tester(R&S CMU200 and Anritsu MT8820C), and the communication between the EUT and the tester is established by air link.

Configuration 1: back/top side_0mm with power reduction and _10mm without power reduction

Configuration 2: right/bottom/left sides_0mm without power reduction



Antenna position plot



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2. WLAN and WiGig

For WLAN and WiGig part, since the RF hardware/software of FCC ID: B94HNI72CWR is the same with that of FCC ID: PD918260NG, so the WLAN and WiGig data is refer to the WLAN SAR report and WiGig MPE report of FCC ID: PD918260NG after verifying the worst cases of the WLAN SAR report.

Note:

- SAR test for GPRS was performed on the maximum sourced-based time-averaged power.
- 2. SAR measurement is not required for HSDPA/HSPA since its maximum output power is less than 1/4 dB higher than RMC without HSDPA/HSPA
- 3. Based on KDB447498D01.
 - (1) SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances≤ 50 mm are determined by:

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

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

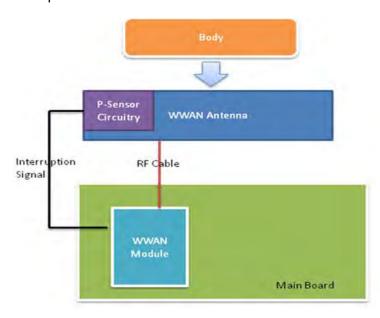
- (2) For test separation distances > 50 mm, and the frequency at 100 MHz to 1500MHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01. [(Threshold at 50mm in step1) + (test separation distance-50mm)x(f(MHz)/130)](mW),
- (3) For test separation distances > 50 mm, and the frequency at >1500MHz to 6GHz, the SAR test exclusion threshold is determined according to the following, and as illustrated in Appendix B of KDB447498 D01.
- **4.** According to KDB447498 D01, testing of other required channels is not required when the reported 1-g SAR for the highest output channel is ≤ 0.8 W/kg, when the transmission band is ≤ 100 MHz.
- 5. According to KDB865664 D01, SAR measurement variability must be assessed for each frequency band. When the original highest measured SAR is ≥ 0.8 W/kg, repeated that measurement once. Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg (~ 10% from the 1-g SAR limit).



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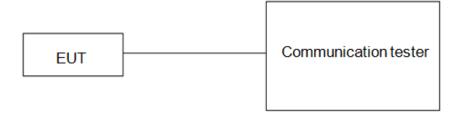
1.6 Proximity sensor operation description

The P-sensor being used to reduce output power is capacitive in which when the object such as human body, metal or plastic is being approached, the sensing capacitance would be increased with the antenna pad. Once the capacitance is accumulated, and reached over the threshold as set in MCU of the microchip, the interruption signal is pulled low (High state without trigger) and further inform modem module of the transmitter to make power reduction.



1.6.1 Proximity sensor measurement procedure

- 1. The proximity sensor is collocated with WWAN antenna.
- Output power is measured, and monitored by using the communication tester. A RF cables with sufficient length was being attached from the antenna port of the module, and used for the measurement. The appropriate loss attenuated from cable is compensated in the communication tester.





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1.6.2 Trigger distances for back/top side

Test procedure:

- 1. The entire back surface or edge of the tablet is positioned below a flat phantom filled with the required tissue equivalent medium and positioned at least 20 mm further than the distance that triggers power reduction.
- 2. The back surface or edge is moved toward the phantom in 3 mm steps until the sensor triggers.
- The back surface or edge is then moved back (further away) from the phantom until maximum output power is returned to the normal maximum level.
- 4. The back surface or edge is again moved toward the phantom, but in 1 mm steps, until it is at least 5 mm past the triggering point or touching the phantom
- 5. If the tablet is not touching the phantom, it is moved in 3 mm steps until it touches the phantom to confirm that the sensor remains triggered and the maximum power stays reduced.
- 6. The process is then reversed by moving the tablet away from the phantom to determine triggering release, until it is at least 10 mm beyond the point that triggers the return of normal maximum power.
- 7. The measured output power within ± 5 mm of the triggering points, or until the tablet is touching the phantom, for movements to and from the phantom should be tabulated.
- 3. To ensure all production units are compliant, it is generally necessary to reduce the triggering distance determined from the triggering tests by 1 mm, or more if it is necessary, and use the smallest distance for movements to and from the phantom, minus 1 mm, as the sensor triggering distance for determining the SAR measurement distance.
- 9. For back side, the trigger distance of proximity sensor is 11mm.
- For top side, the trigger distance of proximity sensor is 12mm, and we perform the 1.6.3 tilt angle testing in next step.



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1.6.3 Tilt angle testing

Test procedure:

- 1. The influence of table tilt angles to proximity sensor triggering is determined by positioning each tablet edge that contains a transmitting antenna, perpendicular to the flat phantom, at the smallest sensor triggering test distance determined in sections 1.6.2 by rotating the tablet around the edge next to the phantom in ≤ 10 deg increments until the tablet is +/- 45deg or more from the vertical position at 0 deg.
- 2. If sensor triggering is released and normal maximum output power is restored within the +/- 45deg range, the procedures in step 1) should be repeated by reducing the tablet to phantom separation distance by 1 mm until the proximity sensor no longer releases triggering, and maximum output power remains in the reduced mode.
- 3. The smallest separation distance determined in steps 1) and 2), minus 1 mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance determined in sections 1.6.2, 1.6.3 minus 1 mm should be used in the SAR measurements.
- 4. The influence of tablet tilt angles to proximity sensor triggering is determined by positioning top and right sides, please refer to table 1.6.5 and 1.6.6.
- 5. After the tilt angle testing for top side, the sensor is not released during +/- 45deg, so 12-1=11mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance minus 1 mm(11-1=10mm) should be used in the SAR measurements.



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1.6.4 Proximity sensor coverage

The following procedures do not apply and are not required for configurations where the antenna and sensor are collocated and the peak SAR location is overlapping with the sensor.

Test procedure:

- The back surface or edges of the tablet is positioned at a test separation distance less than or equal to the distance required for back surface or edge triggering, with both the antenna and sensor pad located at least 20 mm laterally outside the edge (boundary) of the phantom, along the direction of maximum antenna and sensor offset.
- 2. The similar sequence of steps applied to determine sensor triggering distance in section 1.6.2 are used to verify back surface and edge sensor coverage by moving the tablet (sensor and antenna) horizontally toward the phantom while maintaining the same vertical separation between the back surface or edge and the phantom.
- 3. After the exact location where triggering of power reduction is determined, with respect to the sensor and antenna, the tablet movement should be continued, in 3 mm increments, until both the sensor and antenna(s) are fully under the phantom and at least 20 mm inside the phantom edge.
- 4. The process is then repeated from the other direction, at the opposite end of maximum antenna and sensor offset, by rotating the tablet 180 degrees.



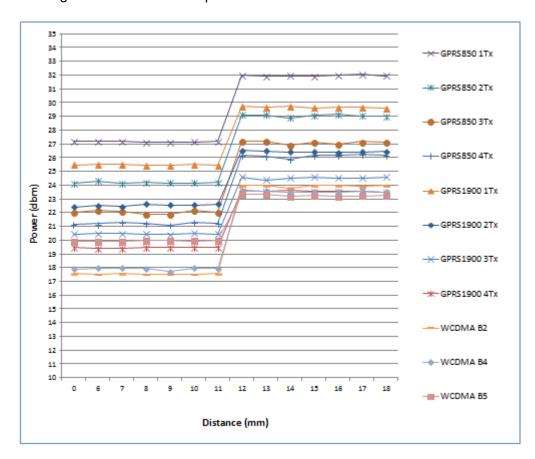
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1.6.5 Results

The measured output power within \pm 5 mm of the triggering points, or until the tablet is touching the phantom, for movements to and from the phantom is tabulated in the following.

Back side

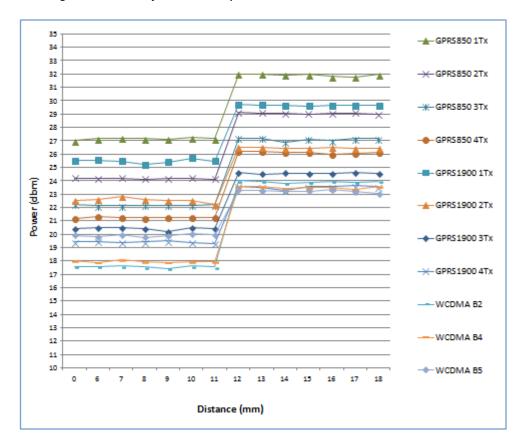
Moving device toward the phantom





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Moving device away from the phantom



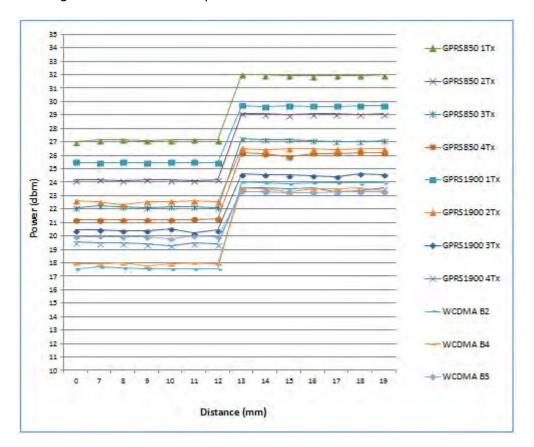
For back side, the worst trigger distance of proximity sensor is 11mm, thus we test back side SAR in 10mm without power reduction and 0mm with power reduction.



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Top side

Moving device toward the phantom





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Moving device away from the phantom

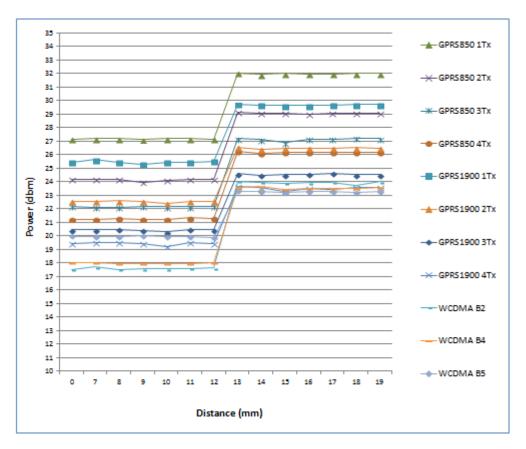


Table 1.6.5 Tilt angle test results for top side

P-sensor	-50	-45	-40	-30	-20	-10	0	10	20	30	40	45	50
ON/OFF	deg												
12mm	ON												

During the tilt angle testing for top side, the sensor is not released in 12mm, so 12-1=11mm, is the sensor triggering distance for tablet tilt coverage. The smallest separation distance minus 1 mm(11-1=10mm) should be used in the SAR measurements for top side.



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Note:

- 1. The triggering variations and hysteresis effect has been evaluated separately according to the tissue-equivalent medium required for each frequency band, and sensor triggering does not change with different tissue-equivalent media.
- 2. The default power level for sensor failure and malfunctioning, including all compliance concerns, has been addressed in the client's operation description (1.6.6) for the proximity sensor implementation to be acceptable.
- 3. Conducted power is monitored qualitatively to identify the general triggering characteristics and recorded quantitatively, versus spacing.



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1.6.6 Operation description for P-sensor

Power Reduction Design Specification (for P-sensor)

The mechanism of power reduction is used only for WWAN. The reduced power for each technology/band is defined in Table1-1. With P-sensor mechanism, the GPRS/WCDMA default power when P-sensor failure or malfunction are show in Table1-2 as below.

Table1-1: The power reduction scenario table

Band	Power Reduction
GPRS850	YES
GPRS1900	YES
WCDMA B2	YES
WCDMA B4	YES
WCDMA B5	YES

Table1-2: The default maximum power when p-sensor failure or malfunction

Technology / Band	Mode	Default Maximum Power (dBm)			
	Class 8	28.5			
GPRS 850	Class 10	25.5			
GFN3 650	Class 11	23.5			
	Class 12	22.5			
	Class 8	26.5			
GPRS 1900	Class 10	23.5			
GFN3 1900	Class 11	21.5			
	Class 12	20.5			



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Technology / Band	Mode	Default Maximum Power (dBm)
	RMC 12.2K data	18
	HSDPA case 1	18
	HSDPA case 2	18
	HSDPA case 3	18
UMTS B2	HSDPA case 4	18
OW15 B2	HSUPA case 1	18
	HSUPA case 2	18
	HSUPA case 3	18
	HSUPA case 4	18
	HSUPA case 5	18
	RMC 12.2K data	18
	HSDPA case 1	18
	HSDPA case 2	18
	HSDPA case 3	18
UMTS B4	HSDPA case 4	18
OW13 B4	HSUPA case 1	18
	HSUPA case 2	18
	HSUPA case 3	18
	HSUPA case 4	18
	HSUPA case 5	18



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Technology / Band	Mode	Default Maximum Power (dBm)
	RMC 12.2K data	20
	HSDPA case 1	20
	HSDPA case 2	20
	HSDPA case 3	20
LIMTO DE	HSDPA case 4	20
UMTS B5	HSUPA case 1	20
	HSUPA case 2	20
	HSUPA case 3	20
	HSUPA case 4	20
	HSUPA case 5	20



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1.7 The SAR Measurement System

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

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

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

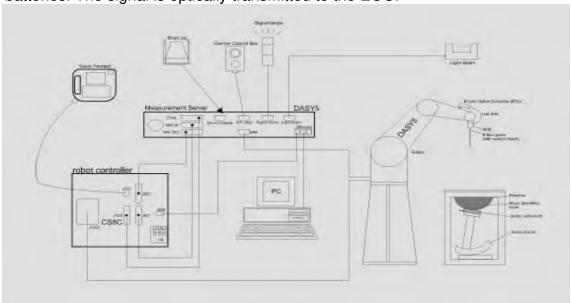


Fig. a The block diagram of SAR system



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



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1.8 System Components

EX3DV4 E-Field Probe

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)						
Calibration	Basic Broad Band Calibration in air Conversion Factors (CF) for HSL 835/1750/1900/2450/5300 MHz Additional CF for other liquids and frequencies upon request						
Frequency	10 MHz to > 6 GHz						
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)						
Dynamic	$10 \mu W/g \text{ to } > 100 \text{ mW/g}$						
Range	Linearity: ± 0.2 dB (noise: typically < 1 μW/g)						
Dimensions	Tip diameter: 2.5 mm						
Application	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%.						



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SAM PHANTOM V4.0C

SAIN FITAINI	JIVI V 4.UC					
Construction	The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by manually teaching three points with the robot.					
Shell Thickness	2 ± 0.2 mm					
Filling Volume	Approx. 25 liters	The same of the sa				
Dimensions	Height: 850 mm; Length: 1000 mm; Width: 500 mm					

DEVICE HOLDER

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



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1.9 SAR System Verification

The microwave circuit arrangement for system verification is sketched in Fig. b. The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within +/- 10% from the target SAR values. These tests were done at 850/1750/1900/2450/5300 MHz. The tests were conducted on the same days as the measurement of the DUT. The obtained results from the system accuracy verification are displayed in the table 1 (SAR values are normalized to 1W forward power delivered to the dipole). During the tests, the ambient temperature of the laboratory was 21.7° C, the relative humidity was 62% and the liquid depth above the ear reference points was ≥ 15 cm ± 5 mm (frequency ≤ 3 GHz) or ≥ 10 cm ± 5 mm (frequency > 3 G Hz) in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.

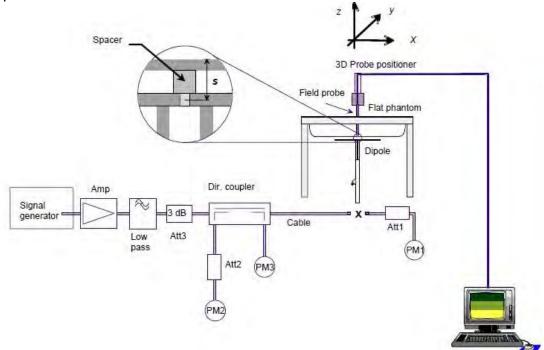


Fig. b The block diagram of system verification



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Validation Kit	S/N	Frequency (MHz)		1W Target SAR-1g (mW/g)	Measured SAR-1g (mW/g)	Measured SAR-1g normalized to 1W	Deviatio n (%)	Measured Date
D835V2	4d063	835	Body	9.28	2.33	9.32	0.43%	Oct. 26, 2015
D1750V2	1008	1750	Body	37.4	9.82	39.28	5.03%	Oct. 28, 2015
D1900V2	5d027	1900	Body	39.3	9.49	37.96	-3.41%	Oct. 27, 2015
D2450V2	727	2450	Body	51	13.3	53.2	4.31%	Mar. 07,2016
D5GHzV2	1023	5300	Body	75.1	7.59	75.9	1.07%	Mar. 07,2016

Table 1. Results of system validation



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1.10 Tissue Simulant Fluid for the Frequency Band

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

All dielectric parameters of tissue simulates were measured within 24 hours of SAR measurements. The depth of the tissue simulant in the flat section of the phantom was \geq 15 cm \pm 5 mm (Frequency \leq 3G) or \geq 10 cm \pm 5 mm (Frequency \geq 3G) during all tests. (Fig. 2)

Tissue Type	Measured Frequency (MHz)	Target Dielectric Constant, εr	Target Conductivity, σ (S/m)	Measured Dielectric Constant, £r	Measured Conductivity, σ (S/m)	% dev εr	% dev σ	Measurement Date
	824.2	55.242	0.969	56.698	0.995	-2.64%	-2.67%	
	826.4	55.234	0.969	56.695	0.999	-2.65%	-3.06%	
	835	55.200	0.970	56.677	1.011	-2.68%	-4.23%	Oct 26 2015
	836.6	55.195	0.972	56.671	1.013	-2.67%	-4.22%	Oct. 26, 2015
	846.6	55.164	0.984	56.504	1.02	-2.43%	-3.63%	
	848.8	55.158	0.987	56.517	1.025	-2.46%	-3.85%	
	1712.4	53.531	1.465	51.989	1.408	2.88%	3.87%	
	1732.4	53.478	1.477	51.951	1.428	2.86%	3.34%	Oct. 28, 2015
	1750	53.432	1.488	51.901	1.448	2.86%	% 2.72% Oct. 28, 2	Oct. 20, 2015
	1752.6	53.425	1.490	51.902	1.447	2.85%	2.89%	
Body	1850.2	53.300	1.520	53.282	1.479	0.03%	2.70%	
,	1852.4	53.300	1.520	53.265	1.481	0.07%	2.57%	Oct. 27, 2015
	1880	53.300	1.520	53.062	1.508	0.45%	0.79%	
	1900	53.300	1.520	52.924	1.531	0.71%	-0.72%	
	1907.6	53.300	1.520	52.888	1.539	0.77%	-1.25%	
	1909.8	53.300	1.520	52.862	1.551	0.82%	-2.04%	
	2437	52.717	1.938	52.438	1.979	0.53%	-2.13%	
	2441	52.712	1.941	52.443	1.976	0.51%	-1.78%	
	2450	52.697	1.953	52.416	1.991	0.53%	-1.97%	Mar 07 0016
	2462	52.685	1.967	52.412	2.006	0.52%	-1.96%	Mar. 07,2016
	5280	48.906	5.393	48.400	5.447	1.03%	-1.00%	
	5300	48.879	5.416	48.392	5.468	1.00%	-0.96%	

Table 2. Dielectric Parameters of Tissue Simulant Fluid



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The composition of the body tissue simulating liquid:

			Takal					
Frequency (MHz)	Mode	DGMBE	Water	Salt	Preventol D-7	Cellulose	Sugar	Total amount
850	Body	_	631.68 g	11.72 g	1.2 g	_	600 g	1.0L(Kg)
1750	Body	300.67 g	716.56 g	4.0 g	_	_	_	1.0L(Kg)
1900	Body	300.67 g	716.56 g	4.0 g	_	_	1	1.0L(Kg)
2450	Body	301.7ml	698.3ml	_	_	_	_	1.0L(Kg)

Simulating Liquids for 5 GHz, Manufactured by SPEAG:

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

Table 3. Recipes for Tissue Simulating Liquid



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1.11 Evaluation Procedures

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

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

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

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

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

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



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

1.12 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:

1.12.1 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 $\boldsymbol{\sigma}$ is the conductivity, $\boldsymbol{\rho}$ the density and \boldsymbol{c} the heat capacity of the liquid.

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



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

- 2. The measured volume around the temperature probe is not well defined. It is difficult to calculate the energy transfer from a surrounding gradient temperature field into the probe. These effects must be considered, since temperature probes are calibrated in liquid with homogeneous temperatures. There is no traceable standard for temperature rise measurements.
- 3. The calibration depends on the assessment of the specific density, the heat capacity and the conductivity of the medium. While the specific density and heat capacity can be measured accurately with standardized procedures (\sim 2% for c; much better for ρ), there is no standard for the measurement of the conductivity. Depending on the method and liquid, the error can well exceed ±5%.
- 4. Temperature rise measurements are not very sensitive and therefore are often performed at a higher power level than the E-field measurements. The nonlinearities in the system (e.g., power measurements, different components, etc.) must be considered.

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

1.12.2 Calibration with Analytical Fields

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

points must be considered in the assessment of the uncertainty:

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



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

References

- 1. N. Kuster, Q. Balzano, and J.C. Lin, Eds., *Mobile Communications Safety*, Chapman & Hall, London, 1997.
- K. Meier, M. Burkhardt, T. Schmid, and N. Kuster, \Broadband calibration of E-field probes in lossy media", *IEEE Transactions on Microwave Theory and Techniques*, vol. 44, no. 10, pp. 1954{1962, Oct. 1996.
- 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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1.13 Test Standards and Limits

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

- 1. Limits for Occupational/Controlled exposure: 0.4 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 8 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 20 W/kg, as averaged over an 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.
- 3. Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not



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exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section. (Table 4.)

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Spatial Peak SAR (Brain)	1.60 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

GPRS 850 (without power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg.	Scaling	Averaged 1, (W/	g	Plot page
		(111111)						Measured	Reported	
	Back side	10mm	128	824.2	27.5	26.20	34.90%	0.635	0.857	-
	Back side	10mm	190	836.6	27.5	26.10	38.04%	0.644	0.889	-
0.000.000	Back side	10mm	251	848.8	27.5	26.20	34.90%	0.648	0.874	99
GPRS 850 (1Dn4Up)	Top side	10mm	251	848.8	27.5	26.20	34.90%	0.482	0.650	-
(1511406)	Bottom side	0mm	251	848.8	27.5	26.20	34.90%	0.0312	0.042	-
	Left side	0mm	251	848.8	27.5	26.20	34.90%	0.298	0.402	-
	Right side	0mm	251	848.8	27.5	26.20	34.90%	0.012	0.016	-

GPRS 850 (with power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged 1 (W/ Measured	g kg)	Plot page
	Back side	0mm	128	824.2	27.5	26.20	34.90%	0.598	0.807	-
GPRS 850	Back side	0mm	190	836.6	27.5	26.10	38.04%	0.608	0.839	-
(1Dn4Up)	Back side	0mm	251	848.8	27.5	26.20	34.90%	0.607	0.819	-
	Top side	0mm	190	836.6	27.5	26.10	38.04%	0.478	0.660	-



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GPRS 1900 (without power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged 1 (W/	g	Plot page
		(111111)						Measured	Reported	
	Back side	10mm	512	1850.2	30.5	29.50	25.89%	0.655	0.825	-
	Back side	10mm	661	1880	30.5	29.70	20.23%	0.662	0.796	-
	Back side	10mm	810	1909.8	30.5	29.30	31.83%	0.604	0.796	-
GPRS 1900 (1Dn1Up)	Top side	10mm	661	1880	30.5	29.70	20.23%	0.400	0.481	-
(тыттор)	Bottom side	0mm	661	1880	30.5	29.70	20.23%	0.00513	0.006	-
	Left side	0mm	661	1880	30.5	29.70	20.23%	0.216	0.260	-
	Right side	0mm	661	1880	30.5	29.70	20.23%	0.00957	0.012	-

GPRS 1900 (with power reduction)

Mode	Position	Distanc e (mm)		Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged 1 (W/	g	Plot page
		(111111)			Tolerance (dbiii)	(dBm)		Measured	Reported	
	Back side	0mm	512	1850.2	20.5	19.50	25.89%	0.66	0.831	-
GPRS 1900	Back side	0mm	661	1880	20.5	19.50	25.89%	0.719	0.905	100
(1Dn4Up)	Back side	0mm	810	1909.8	20.5	19.30	31.83%	0.673	0.887	-
	Top side	0mm	661	1880	20.5	19.50	25.89%	0.353	0.444	-



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WCDMA Band II (without power reduction)

Mode	Position	Distanc e	011		Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power	Scaling	Averaged 1 (W/	g	Plot page
		(111111)			Tolerance (dbill)	(dBm)		Measured	Reported	
	Back side	10mm	9262	1852.4	24.5	23.75	18.85%	0.887	1.054	-
	Back side	10mm	9400	1880	24.5	24.00	12.20%	0.75	0.842	-
	Back side	10mm	9538	1909.8	24.5	23.20	34.90%	0.737	0.994	-
WCDMA Band II	Top side	10mm	9400	1880	24.5	24.00	12.20%	0.483	0.542	-
Danu II	Bottom side	0mm	9400	1880	24.5	24.00	12.20%	0.00327	0.004	-
	Left side	0mm	9400	1880	24.5	24.00	12.20%	0.309	0.347	-
	Right side	0mm	9400	1880	24.5	24.00	12.20%	0.0329	0.037	-

WCDMA Band II (with power reduction)

Mode	de Position e		istanc e mm) CH Freq. (MHz)		Max. Rated Avg. Power + Max. Tolerance (dBm)	Measured Avg. Power (dBm)	Scaling	Averaged 1, (W/	g kg)	Plot page
	Back side	0mm	9262	1852.4	18	17.24	19.12%	Measured 0.921	1.097	101
	Back side*	0mm	9262	1852.4	18	17.24	19.12%	0.905	1.078	-
WCDMA Band II	Back side	0mm	9400	1880	18	17.63	8.89%	0.691	0.752	-
Bandiii	Back side	0mm	9538	1909.8	18	16.90	28.82%	0.798	1.028	-
	Top side	0mm	9400	1880	18	17.63	8.89%	0.528	0.575	-

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



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WCDMA Band IV (without power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged 1 (W/ Measured	g kg)	Plot page
	Back side	10mm	1312	1712.4	24.5	23.58	23.59%	0.846	1.046	-
	Back side	10mm	1412	1732.6	24.5	23.37	29.72%	0.791	1.026	-
	Back side	10mm	1513	1752.6	24.5	23.43	27.94%	0.914	1.169	102
WCDMA	Back side*	10mm	1513	1752.6	24.5	23.43	27.94%	0.896	1.146	-
Band IV	Top side	10mm	1312	1712.4	24.5	23.58	23.59%	0.518	0.640	-
	Bottom side	0mm	1312	1712.4	24.5	23.58	23.59%	0.00441	0.005	-
	Left side	0mm	1312	1712.4	24.5	23.58	23.59%	0.345	0.426	-
	Right side	0mm	1312	1712.4	24.5	23.58	23.59%	0.0674	0.083	-

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

WCDMA Band IV (with power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	Averaged 1 (W/ Measured	g kg)	Plot page
	Back side	0mm	1312	1712.4	18	18.00	0.00%	0.748	0.748	-
WCDMA	Back side	0mm	1412	1732.6	18	17.94	1.39%	0.875	0.887	-
Band IV	Back side	0mm	1513	1752.6	18	17.99	0.23%	0.894	0.896	-
	Top side	0mm	1312	1712.4	18	18.00	0.00%	0.327	0.327	-



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WCDMA Band V (without power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Power + Max	Avg. Power	Avg. Scaling	Averaged 1 (W/	g	Plot page
		(111111)						Measured	Reported	
	Back side	10mm	4132	826.4	24.5	23.30	31.83%	0.407	0.537	-
	Back side	10mm	4183	836.6	24.5	23.17	35.83%	0.429	0.583	-
	Back side	10mm	4233	846.6	24.5	23.04	39.96%	0.453	0.634	-
WCDMA Band V	Top side	10mm	4132	826.4	24.5	23.30	31.83%	0.272	0.359	-
Dana v	Bottom side	0mm	4132	826.4	24.5	23.30	31.83%	0.016	0.021	-
	Left side	0mm	4132	826.4	24.5	23.30	31.83%	0.157	0.207	-
	Right side	0mm	4132	826.4	24.5	23.30	31.83%	0.0406	0.054	-

WCDMA Band V (with power reduction)

Mode	Position	Distanc e (mm)	СН	Freq. (MHz)	Max. Rated Avg. Power + Max. Tolerance (dBm)	Avg. Power	Scaling	l ĭ 1	kg)	Plot page
	Back side	0mm	4132	826.4	20	19.98	0.46%	0.640	0.643	-
WCDMA	Back side	0mm	4183	836.6	20	20.00	0.00%	0.667	0.667	-
Band V	Back side	0mm	4233	846.6	20	19.88	2.80%	0.709	0.729	103
	Top side	0mm	4183	836.6	20	20.00	0.00%	0.419	0.419	-

In order to evaluate the simultaneous transmission SAR analysis based on the SAR data from both SAR reports(FCC ID: B94HNI72CWR & FCC ID: PD918260NG), we check the worst cases of WLAN SAR report in 2.4G and 5G respectively, such as the following shown.

WLAN SISO

Mode	Antenna	Position	Distance	СН	Freq.	Max. Rated Avg. Power +	Measured Avg. Power	Scaling		SAR over 1g /kg)	Plot
ivioue	Antenna	POSITION	(mm)	СП	(MHz)	Max. Tolerance (dBm)	(dBm)	Scaling	Measured	Reported	page
WLAN802.11 b	Main	Back side	0	11	2462	15	14.95	1.16%	0.547	0.553	-
WLANOUZ.11 D	Aux	Back side	0	6	2437	15	14.92	1.86%	0.955	0.973	-
Bluetooth (GFSK)	Aux	Back side	0	39	2441	11.5	11.32	4.23%	0.302	0.315	-
	Main	Back side	0	60	5300	13.5	13.45	1.16%	0.601	0.608	104
WLAN802.11 a 5.3G		Top side	0	60	5300	13.5	13.45	1.16%	0.501	0.507	-
WLAN802.11 a 5.3G	Aux B	Back side	0	56	5280	13.5	13.43	1.62%	1.050	1.067	105
	Aux	Top side	0	56	5280	13.5	13.43	1.62%	0.978	0.994	-



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3. Simultaneous Transmission Analysis

Simultaneous Transmission Scenarios:

Simultaneous Transmit Configurations	Body
GPRS850/1900 + 2.4/5GHz WLAN Main	Yes
GPRS850/1900 + 2.4/5GHz WLAN Aux	Yes
GPRS850/1900 + 2.4/5GHz WLAN MIMO	Yes
WCDMA B2/4/5 + 2.4/5GHz WLAN Main	Yes
WCDMA B2/4/5 + 2.4/5GHz WLAN Aux	Yes
WCDMA B2/4/5 + 2.4/5GHz WLAN MIMO	Yes
GPRS850/1900 + 2.4/5GHz WLAN Main + BT	Yes
WCDMA B2/4/5 + 2.4/5GHz WLAN Main + BT	Yes

Note:

- 1. WWAN, WLAN and WiGig may transmit simultaneously.
- 2. Bluetooth and WLAN Aux share the same antenna path, and BT may transmit with WLAN Main simultaneously.
- 3. In order to evaluate the simultaneous transmission SAR based on the WLAN SAR report (FCC ID: PD918260NG), we checked the worst cases of WLAN SAR report in 2.4G and 5G respectively then used the highest reported WLAN SAR in the both reports to evaluate the simultaneous transmission SAR analysis to be more conservative.
- 4. The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all \leq 0.04, and the [Σ of MPE ratios] is \leq 1.0. Based on KDB447498D01, the simultaneous transmitted RF exposure test exclusion applied.



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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-1g.

Mode / Band	frequency (GHz)	Test position	test separation distance(mm)	Estimated SAR(W/kg)
WLAN Main 2.4 / 5G	2.462	right / left	> 50mm	0.4
WLAN Aux 2.4 / 5G	2.462	left	> 50mm	0.4
BT	2.48	left	> 50mm	0.4

3.2 SPLSR evaluation and analysis

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

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

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

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

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



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GPRS 850 + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR										
	GPRS 850	Back side	0	0.819	0.630	1.180	2.629	Analyzed as below										
		GPRS 850	Top side	0	0.630	0.150	0.360	1.140	ΣSAR<1.6, Not required									
'			GPRS 850	GFN3 830	GI 113 650	GF N3 650	GF N3 650	GF N3 650	GF N3 650	GFN3 830	GPH3 850	GPR5 850	Right side	0	0.016	0.400	0.040	0.456
		Left side	0	0.402	0.400	0.400	1.202	ΣSAR<1.6, Not required										

		SAR	Cooi	rdinates	(cm)	504B	Peak Location		Simultaneous	
Conditions		Position	Value (W/kg)				ΣSAR (W/kg)	Separation S Distance	SPLSR	Transmission SAR Test
		(* 3)		у	Z		(mm)			
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.449	106.1	0.016	SPLSR<0.04,	
WLAN Main		0.63	9.46	3.66	-0.02	1.449	100.1	0.010	Not required	





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WWAN & WLAN Aux

WWAN & W	LAN Aux	(
Conditions	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.999	180.3	0.016	SPLSR<0.04,
WLAN Aux	Dack side	1.18	9.24	11.08	0.00	1.000	100.0	0.010	Not required
0		WW.	Â		Aux				

WLAN Main	VLAN Main & WLAN Aux											
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission			
		(W/kg)	х	у	Z				SAR Test			
WLAN Main	Back side	0.63	9.46	3.66	-0.02	1.81	74.2	0.033	SPLSR<0.04,			
WLAN Aux	Baok oldo	1.18	9.24	11.08	0.00	1.01		0.000	Not required			
0					Ma	nin .	Aux					
									Z			



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GPRS 1900 + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR								
	GPRS 1900	Back side	0	0.905	0.630	1.180	2.715	Analyzed as below								
		Top side	0	0.444	0.150	0.360	0.954	ΣSAR<1.6, Not required								
2				1900	1900	1900	1900	1900	1900	Right side	0	0.012	0.400	0.040	0.452	ΣSAR<1.6, Not required
		Left side	0	0.260	0.400	0.400	1.060	ΣSAR<1.6, Not required								

Conditions	Position	SAR Value	Cooi	rdinates	(cm)	ΣSAR (W/kg)	(W/kg) Separation		Simultaneous Transmission
		(W/kg)	Х	у	Z	(W/Kg)	Distance (mm)		SAR Test
GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	1.535	124.6	0.015	SPLSR<0.04,
WLAN Main		0.630	9.46	3.66	-0.02	1.555	124.0	0.013	Not required





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WWAN & WLAN Aux

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	2.085	198.8	0.015	SPLSR<0.04,
WLAN Aux		1.18	9.24	11.08	0	2.065	190.0	0.015	Not required



WLAN Main	VLAN Main & WLAN Aux											
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission			
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test			
WLAN Main	Back side	0.63	9.46	3.66	-0.02	1.81	74.2	0.033	SPLSR<0.04,			
WLAN Aux	Buon oldo	1.18	9.24	11.08	0.00	1.01		0.000	Not required			
					Ma	nin	Aux					

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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WCDMA Band II + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR											
	WCDMA B2	Back side	0	1.097	0.630	1.180	2.907	Analyzed as below											
3			Top side	0	0.575	0.150	0.360	1.085	ΣSAR<1.6, Not required										
			B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	B2	Right side	0	0.044	0.400	0.040	0.484
		Left side	0	0.417	0.400	0.400	1.217	ΣSAR<1.6, Not required											

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z				SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.727	135.2	0.017	SPLSR<0.04,
WLAN Main		0.630	9.46	3.66	-0.02	1.727	133.2	0.017	Not required





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WWAN & WI AN Aux

WWAN & W	LAN Aux	`							
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	X	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.727	135.2	0.017	SPLSR<0.04,
WLAN Aux	Baok oldo	0.63	9.46	3.66	-0.02	1.727	100.2	0.017	Not required
0		W	WAN		1	_	Aux		

Conditions Position Value (W/kg) X y z Separation Distance (mm) SPLSR Transmission SAR Test	WLAN Main	& WLAN	l Aux							
WLAN Main Back side 0.63 9.46 3.66 -0.02 1.81 74.2 0.033 SPLSR<0.04, Not required	Conditions	Position		Coo	rdinates	(cm)		Location	SPLSR	Simultaneous Transmission
WLAN Aux Back side 1.18 9.24 11.08 0.00 1.81 74.2 0.033 SPLSR<0.04, Not required			(W/kg)	Х	у	Z	(VV/Kg)			SAR Test
WLAN Aux 1.18 9.24 11.08 0.00 Not required	WLAN Main	Back side		9.46	3.66	-0.02	1 81	74.2	0.033	SPLSR<0.04,
Main Aux	WLAN Aux	Dack Side		9.24	11.08	0.00	1.01	14.2	0.033	Not required
	0					Ma	nin	Aux		



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WCDMA Band IV + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
		Back side	0	0.896	0.630	1.180	2.706	Analyzed as below
4	WCDMA	Top side	0	0.327	0.150	0.360	0.837	ΣSAR<1.6, Not required
4	B4	Right side	0	0.087	0.400	0.040	0.527	ΣSAR<1.6, Not required
		Left side	0	0.448	0.400	0.400	1.248	ΣSAR<1.6, Not required

Conditions Position	Position	SAR Value	Cooi	rdinates	(cm)	ΣSAR	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(W/kg)	Distance (mm)		SAR Test
WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.526	134.4	0.014	SPLSR<0.04,
WLAN Main	Daok side	0.63	9.46	3.66	-0.02	1.020	154.4	0.014	Not required





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WWAN & W	LAN Aux	(
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(W/Kg)	Distance (mm)		SAR Test
WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	2.076	208.4	0.014	SPLSR<0.04,
WLAN Aux	Dack side	1.18	9.24 11.08 0		2.070	200.4	0.014	Not required	
	W	/WAI	V	1	-	Aux			

WLAN Main	. & WLAN	√ Aux							
Conditions	Position	SAR Value	Coo	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	
		(W/kg)	Х	у	Z	(vv/kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.63	9.46	3.66	-0.02	1.81	74.2	0.033	SPLSR<0.04,
WLAN Aux	Dack Side	1.18	9.24	11.08	0.00	1.01	14.2	0.033	Not required
1/6									
10					Ma	iin	Aux		
					•				
1									
1									

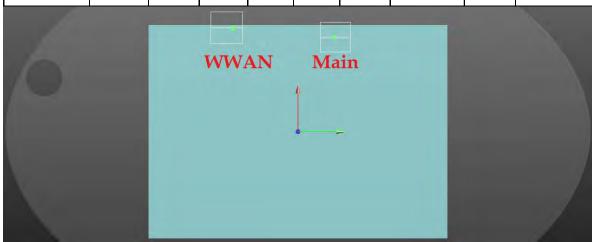


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WCDMA Band V + 2.4GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
		Back side	0	0.729	0.630	1.180	2.539	Analyzed as below
5	WCDMA	Top side	0	0.419	0.150	0.360	0.929	ΣSAR<1.6, Not required
	B5	Right side	0	0.054	0.400	0.040	0.494	ΣSAR<1.6, Not required
		Left side	0	0.207	0.400	0.400	1.007	ΣSAR<1.6, Not required

,	_,								
Conditions	Position		Value		ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
	(W/kg)	x	у	Z	(W/kg)	Distance (mm)		SAR Test	
WCDMA B5	Back side	0.729	10.4	-6.51	-0.22	1.359	102.2	0.016	SPLSR<0.04,
WLAN Main	Daon side	0.630	9.46	3.66	-0.02	1.000	102.2	0.010	Not required





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WWAN & WI AN Aux

WWAN & W	LAN AUX	<u>κ</u>					Peak		
Conditions	Position	SAR Value	Coordinates (cm) SAR Location		Location Separation	SPLSR	Simultaneous Transmission		
		(W/kg)	х	у	Z	(vv/kg)	Distance (mm)		SAR Test
WCDMA B5	Back side	0.729	10.4	-6.51	-0.22	1.909	176.3	0.015	SPLSR<0.04,
WLAN Aux	Buon oldo	1.18	9.24	11.08	0	1.000	170.0	0.010	Not required
			ww.	AN			Aux		
					Å				
					<u></u>	-			
V									

WLAN Main	& WLAN	N Aux							
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.63	9.46	3.66	-0.02	1.81	74.2	0.033	SPLSR<0.04,
WLAN Aux	Dack side	1.18	9.24	11.08	0.00	1.01	74.6	0.000	Not required
					Ma	iin	Aux		



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GPRS 850 + 5GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
		Back side	0	0.819	0.608	1.067	2.494	Analyzed as below
6	GPRS 850	Top side	0	0.630	0.610	1.140	2.380	Analyzed as below
o Gr	GF N3 650	Right side	0	0.016	0.400	0.110	0.526	ΣSAR<1.6, Not required
		Left side	0	0.402	0.400	0.400	1.202	ΣSAR<1.6, Not required

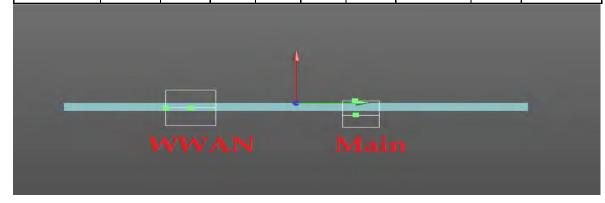


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Conditions	Position	Position SAR Value (W/kg)	Coor	dinates	(cm)	ΣSAR	Peak Location Separation	SPLSR	Simultaneous Transmission
			Х	у	Z	(W/kg)	Distance (mm)		SAR Test
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.427	110.4	0.015	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.90	4.04	-0.01	1.427	110.4	0.013	Not required



Conditions	Position	SAR Value (W/kg)	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission
			Х	у	Z				SAR Test
GPRS 850	Top side	0.63	-0.47	-6.85	-0.25	1.24	107.5	0.013	SPLSR<0.04,
WLAN Main	rop side	0.610	-1.08	3.88	-0.16	1.24	107.5	0.013	Not required





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WWAN & WLAN Aux

WWAN & W	LAN Aux	(
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	x	у	z	(VV/Ng)	Distance (mm)		SAR Test
GPRS 850	·Back side	0.819	10.12	-6.93	-0.22	1.886	187.1	0.014	SPLSR<0.04,
WLAN Aux	Dack Side	1.067	9.4	11.76	0.04	1.880	107.1	0.014	Not required
6		V	VWA	N	1		Aux		
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Ng)	Distance (mm)		SAR Test
GPRS 850	Top side	0.63	-0.47	-6.85	-0.25	1.77	208.5	0.011	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.77	200.5	0.011	Not required
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WWAN									



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WLAN Main & WLAN Aux

WLAN Main	Q VVLAI	N Aux							
Conditions F	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.9	4.04	-0.01	1.675	77.4	0.028	SPLSR<0.04,
WLAN Aux	Dack side	1.067	9.4	11.76	0.04	1.073	11.4	0.020	Not required
6					M	ain	Aux		

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.75	101.3	0.023	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.75	101.5	0.023	Not required
				1					



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GPRS 1900 + 5GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR	
		Back side	0	0.905	0.608	1.067	2.58	Analyzed as below	
7	GPRS	Top side	0	0.444	0.610	1.140	2.194	Analyzed as below	
/	1900		Right side	0	0.012	0.400	0.110	0.522	ΣSAR<1.6, Not required
		Left side	0	0.260	0.400	0.400	1.060	ΣSAR<1.6, Not required	

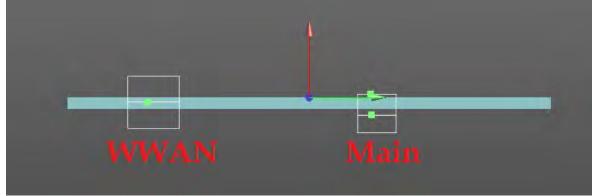


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	Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (M/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			(W/kg)	Х	у	Z	(W/kg)	Distance (mm)		SAR Test
	GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	1.513	128.5	0.014	SPLSR<0.04,
	WLAN Main	Dack side	0.608	8.9	4.04	-0.01	1.515	120.5	0.014	Not required



Conditions	Position			rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
GPRS 1900	T	0.444	-0.33	-9.94	-0.18	1.054	138.4	0.008	SPLSR<0.04,
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.034	130.4	0.008	Not required





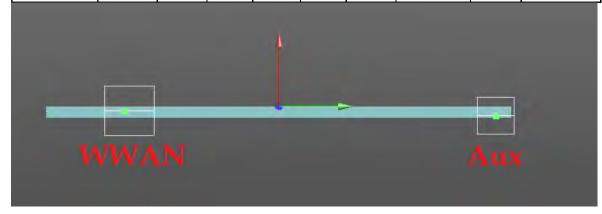
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WWAN & WLAN Aux

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Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Ng)	Distance (mm)		SAR Test
GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	1.972	205.6	0.013	SPLSR<0.04,
WLAN Aux		1.067	9.4	11.76	0.04			0.013	Not required
1									
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Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission SAR Test
		(W/kg)	Х	у	Z				
GPRS 1900	Top side	0.444	-0.33	-9.94	-0.18	1.584	239.4	0.008	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	6 14 -0.1		1.304	239.4	0.008	Not required





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WLAN Main & WLAN Aux

WLAN Main	X VVLAI	v Aux				•			
Conditions	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.9	4.04	-0.01	1.675	77.4	0.028	SPLSR<0.04,
WLAN Aux	Back side	1.067	9.4	11.76	0.04	1.070	77.4	0.020	Not required
6					M	lain	Aux		

Conditions	Position	SAR Value	Coo	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.75	101.3	0.023	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.75	101.5	0.023	Not required
•				1	M	ain		Aux	



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WCDMA Band II + 5GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR			
		Back side	0	1.097	0.608	1.067	2.772	Analyzed as below			
8	WCDMA	Top side	0	0.575	0.610	1.140	2.325	Analyzed as below			
ð	B2	Right side	0	0.044	0.400	0.110	0.554	ΣSAR<1.6, Not required			
		Left side	0	0.417	0.400	0.400	1.217	ΣSAR<1.6, Not required			

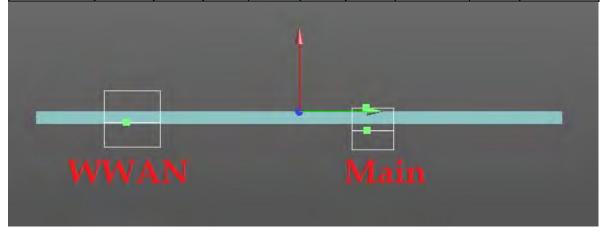


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Conditions	ns Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(W/Kg)	Distance (mm)		SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.705	138.9	0.016	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.9	4.04	-0.01	1.703	130.9	0.010	Not required



Conditions			Cod	ordinates ((cm)	ΣSAR (M/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	У	Z	(W/kg)	Distance (mm)		SAR Test
WCDMA B2	Top side	0.575	-0.3	-10.13	-0.2	1.185	140.3	0.009	SPLSR<0.04,
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.165	140.3	0.009	Not required





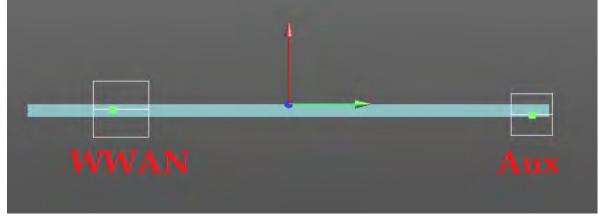
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WWAN & WLAN Aux

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	2.164	216.1	0.015	SPLSR<0.04,
WLAN Aux	Dack Side	1.067	9.4	11.76	0.04	2.104	210.1	0.013	Not required



Conditions			Coc	ordinates ((cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B2	Top side	0.575	-0.3	-10.13	-0.2	1.715	241.3	0.009	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.713	241.0	0.009	Not required





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WLAN Main & WLAN Aux

WLAN Main	& VVLAI	N Aux							
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
	(W/kg) x y z Dis		Distance (mm)		SAR Test				
WLAN Main	Back side	0.608	8.9	4.04	-0.01	1.675	77.4	0.028	SPLSR<0.04,
WLAN Aux	Back side	1.067	9.4	11.76	0.04	1.070	77.4	0.020	Not required
					M	ain	Aux		

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(vv/kg)	Distance (mm)		SAR Test
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.75	101.3	0.023	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.75	101.0	0.023	Not required
					M	ain		Aux	



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WCDMA Band IV + 5GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
		Back side	0	0.896	0.608	1.067	2.571	Analyzed as below
9	WCDMA	Top side	0	0.327	0.610	1.140	2.077	Analyzed as below
9	B4	Right side	0	0.087	0.400	0.110	0.597	ΣSAR<1.6, Not required
		Left side	0	0.448	0.400	0.400	1.248	ΣSAR<1.6, Not required



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Conditions	Position SAR Value		Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation		Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.504	137.9	0.013	SPLSR<0.04,
WLAN Main	Dack side	0.608	8.9	4.04	-0.01	1.504	107.9	0.013	Not required



Conditions			Cod	ordinates ((cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
		(W/kg)		у	Z	(VV/Kg)	Distance (mm)		SAR Test	
WCDMA B4	Top side	0.327	-0.16	-10.63	-0.18	0.937	145.4	0.006	SPLSR<0.04,	
WLAN Main	Top side	0.610	-1.08	08 3.88 -0.1		0.937	140.4	0.000	Not required	
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WWAN & WI AN Aux

WWAN & W	LAN Aux	(
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission SAR Test
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		
WCDMA B4	Back side			-9.75	-0.12	1.963	215.2	0.013	SPLSR<0.04,
WLAN Aux	Dack side	1.067	9.4	11.76	0.04	1.505	210.2	0.013	Not required
		M	/WAI	N	k		Aux		
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	•							•	
Conditions	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Ng)	Distance (mm)		SAR Test
WCDMA B4	Top side	0.327	-0.16	-10.63	-0.18	1.467	246.3	0.007	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.407	240.0	0.007	Not required
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	-		_						_
TAZ	WA								Aux
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WLAN Main & WLAN Aux

Conditions Position Value (W/kg) X y z Separation Distance (mm) SPLSR Transmission SAR Test	WLAN Main	<u> </u>	· / tux							
WLAN Main Back side 0.608 8.9 4.04 -0.01 1.675 77.4 0.028 SPLSR<0.04, Not required	Conditions	Position	Value	llue				Location Separation	SPLSR	Simultaneous Transmission
WLAN Aux Back side 1.067 9.4 11.76 0.04 1.675 77.4 0.028 SPLSR<0.04, Not required			(W/kg)	Х	у	Z	(VV/Kg)			SAR Test
WLAN Aux 1.067 9.4 11.76 0.04 Not required	WLAN Main	Back side		8.9	4.04	-0.01	1 675	77 4	0.028	SPLSR<0.04,
Main Aux	WLAN Aux	Buok oldo		9.4	11.76	0.04	1.070	77.1	0.020	Not required
	6					M	ain	Aux		

Conditions	Position	SAR Value (W/kg)	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	· Top side	0.610	-1.08	3.88	-0.16	1.75	101.3	0.023	SPLSR<0.04, Not required
WLAN Aux		1.140	-0.6	14	-0.1				
				1	M	ain		Aux	



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WCDMA Band V + 5GHz WLAN MIMO

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	Max. WLAN Aux	SAR Sum	SPLSR
		Back side	0	0.729	0.608	1.067	2.404	Analyzed as below
10	WCDMA	Top side	0	0.419	0.610	1.140	2.169	Analyzed as below
10	B5	Right side	0	0.054	0.400	0.110	0.564	ΣSAR<1.6, Not required
		Left side	0	0.207	0.400	0.400	1.007	ΣSAR<1.6, Not required

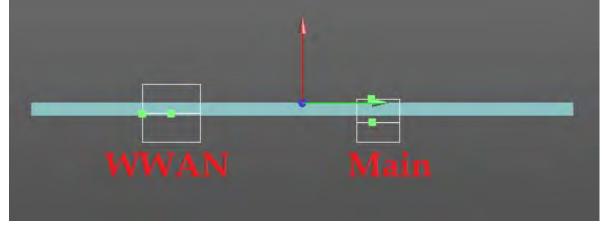


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Conditions	Position			(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B5	Daalaaida	0.729	10.4	-6.51	-0.22	1.337	106.6	0.015	SPLSR<0.04,
WLAN Main	Back side	0.608	8.9	4.04	-0.01	1.557	100.0	0.013	Not required



Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)			SAR Test
WCDMA B5	Top side	0.419	-0.6	-7.25	-0.27	1.029	111.4	0.009	SPLSR<0.04,
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.029	111.4	0.009	Not required





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WWAN & WLAN Aux

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Conditions	Position	SAR Value	Coo	rdinates ((cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
		(W/kg)	Х	у	Z	(VV/Ng)	Distance (mm)		SAR Test	
WCDMA B5	Back side	0.729	10.40	-6.51	-0.22	1.796	183	0.013	SPLSR<0.04,	
WLAN Aux	Dack side	1.067	9.40	11.76	0.04	1.730	100	0.013	Not required	
			WWA	AN	1		Aux			

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission	
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test	
WCDMA B5	Top side	0.419	-0.60	-7.25	-0.27	1.559	212.5	0.009	SPLSR<0.04,	
WLAN Aux	Top side	1.14	-0.60	14.00	-0.10	1.555	212.5	0.003	Not required	
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WLAN Main & WLAN Aux

WLAN Main	& VVLAI	N Aux							
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.9	4.04	-0.01	1.675	77.4	0.028	SPLSR<0.04,
WLAN Aux	Back side	1.067	9.4	11.76	0.04	1.070	77.4	0.020	Not required
					M	ain	Aux		

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Top side	0.610	-1.08	3.88	-0.16	1.75	101.3	0.023	SPLSR<0.04,
WLAN Aux	Top side	1.140	-0.6	14	-0.1	1.75	101.0	0.023	Not required



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GPRS 850 + 2.4GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	0.819	0.630	0.320	1.769	Analyzed as below
11	GPRS 850	Top side	0	0.630	0.150	0.130	0.910	ΣSAR<1.6, Not required
' '	GFN3 650	Right side	0	0.016	0.400	0.040	0.456	ΣSAR<1.6, Not required
		Left side	0	0.402	0.400	0.400	1.202	ΣSAR<1.6, Not required

	Conditions Po	Position	SAR Value	Coor	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			(W/kg)	Х	у	Z		Distance (mm)		SAR Test
	GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.449	106.1	0.016	SPLSR<0.04,
	WLAN Main	Dack side	0.63	9.46	3.66	-0.02	1.443	100.1	0.010	Not required





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WWAN & RT

WWAN & B	<u> </u>								
Conditions	Position	SAR Value	Coo	rdinates ((cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	x y z		(VV/Kg)	Distance (mm)		SAR Test	
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.139	178.9	0.007	SPLSR<0.04,
ВТ	Dack side	0.32	9.26	10.94	0.02	1.100	170.5	0.007	Not required
6			WWA	N	<u></u>		BT		

WLAN Main	WLAN Main & BT												
Conditions	Position	SAR Value	Coc	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR					
		(W/kg)	Х	у	z	(VV/Ng)	Distance (mm)		SAR Test				
WLAN Main	Back side	0.63	9.46	3.66	-0.02	0.95	72.8	0.013	SPLSR<0.04,				
ВТ	Dack Side	0.32	9.26	10.94	0.02	0.93	72.0	0.013	Not required				
A				M	ain	BT							
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GPRS 1900 + 2.4GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	0.905	0.630	0.320	1.855	Analyzed as below
12	GPRS	Top side	0	0.444	0.150	0.130	0.724	ΣSAR<1.6, Not required
12	1900	Right side	0	0.012	0.400	0.040	0.452	ΣSAR<1.6, Not required
		Left side	0	0.260	0.400	0.400	1.060	ΣSAR<1.6, Not required

	Conditions	Position	SAR Value	Coor	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)	SPLSR	Simultaneous Transmission
			(W/kg)	Х	у	Z				SAR Test
	GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	1.535	124.6	0.015	SPLSR<0.04,
	WLAN Main		0.630	9.46	3.66	-0.02	1.555	124.0	0.013	Not required





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WWAN & BT

WWAN & B									
Conditions	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(W/Kg)	Distance (mm)		SAR Test
GPRS 1900	Back side	0.905	9.35	-8.80	-0.09	1.225	197.4	0.007	SPLSR<0.04,
ВТ	Buok Glac	0.32	9.26	10.94	0.02	1.220	107.1	0.007	Not required
0		W	WAN		1		BT		

WLAN Main	/LAN Main & BT												
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission				
		(W/kg)	Х	у	Z	(VV/Ng)	Distance (mm)		SAR Test				
WLAN Main	Back side	0.63	9.46	3.66	-0.02	0.95	72.8	0.013	SPLSR<0.04,				
ВТ				10.94	0.02	0.00	72.0	0.010	Not required				
6					Ma	ain	BT						
									7				

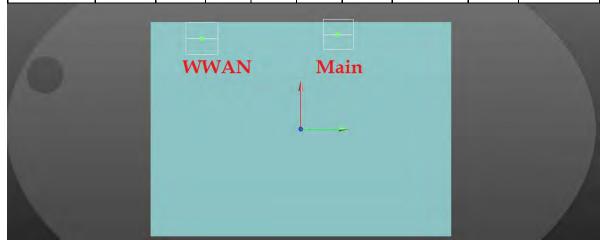


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WCDMA Band II + 2.4GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	1.097	0.630	0.320	2.047	Analyzed as below
13	WCDMA	Top side	0	0.575	0.150	0.130	0.855	ΣSAR<1.6, Not required
13	B2	Right side	0	0.044	0.400	0.040	0.484	ΣSAR<1.6, Not required
		Left side	0	0.417	0.400	0.400	1.217	ΣSAR<1.6, Not required

	Conditions P	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			(W/kg)	Х	у	Z	(vv/kg)	Distance (mm)		SAR Test
	WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.727	135.2	0.017	SPLSR<0.04,
	WLAN Main	Dack Side	0.630	9.46	3.66	-0.02	1.727	100.2	0.017	Not required





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WWAN & RT

WWAN & B	1								
Conditions	Position	SAR Value	Coo	rdinates	ates (cm) ΣSAR (W/kg)		Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.417	207.9	0.008	SPLSR<0.04,
ВТ	Baok oldo	0.32	9.26	10.94	0.02	1.117	207.0	0.000	Not required
6		W	WAN	J	^		ВТ		

MI ANIMALA O DT

WLAN Main	& BT								
Conditions	Position	SAR Value	Coo	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.63	9.46	3.66	-0.02	0.95	72.8	0.013	SPLSR<0.04,
ВТ	Buok oldo	0.32	9.26	10.94	0.02	0.00	72.0	0.010	Not required
6			Ī	1	Ma	ain	BT		
				133	<u>.</u>				



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WCDMA Band IV + 2.4GHz WLAN Main + BT

<u></u>	ODMA Build IV + E. HOLLE WEAR MUIII + DT												
No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR					
		Back side	0	0.729	0.630	0.320	1.679	Analyzed as below					
14	WCDMA	Top side	0	0.419	0.150	0.130	0.699	ΣSAR<1.6, Not required					
14	B4	Right side	0	0.054	0.400	0.040	0.494	ΣSAR<1.6, Not required					
		Left side	0	0.207	0.400	0.400	1.007	ΣSAR<1.6, Not required					

Conditions	Position	SAR Value	Coordinates (cm)			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(vv/kg)	Distance (mm)		SAR Test
WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.526	134.4	0.014	SPLSR<0.04,
WLAN Main	Dack Side	0.63	9.46	3.66	-0.02	1.520	134.4	0.014	Not required





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WWAN & BT

_\	WWAIN & B	l								
	Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			(W/kg)	Х	у	Z	(W/Kg)	Distance (mm)		SAR Test
	WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.216	207	0.006	SPLSR<0.04,
	ВТ	Dack side	0.32	9.26	10.94	0.02	1.210	201	0.000	Not required
			W	WAN	J	1		BT		

WLAN Mair	/LAN Main & BT											
Conditions	Position	SAR Value	Coc	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR				
		(W/kg)	Х	У	Z	(VV/Kg)	Distance (mm)		SAR Test			
WLAN Main	- Back side	0.63	9.46	3.66	-0.02	0.95	72.8	0.013	SPLSR<0.04,			
ВТ	Daok sids	0.32	9.26	10.94	0.02	0.55	12.0	0.010	Not required			
1												
10					Ma	ain	BT					
No.												



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WCDMA Band V + 2.4GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR				
		Back side	0	0.729	0.630	0.320	1.679	Analyzed as below				
15	WCDMA	Top side	0	0.419	0.150	0.130	0.699	ΣSAR<1.6, Not required				
13	B5		Right side	0	0.054	0.400	0.040	0.494	ΣSAR<1.6, Not required			
		Left side	0	0.207	0.400	0.400	1.007	ΣSAR<1.6, Not required				

Conditions	SAR Position Value		Cooi	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation		Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B5	Back side	0.729	10.4	-6.51	-0.22	1.359	102.2	0.016	SPLSR<0.04,
WLAN Main	Dack Side	0.63	9.46	3.66	-0.02	1.559	102.2	0.010	Not required





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WWAN & BT

WWAIN & B	l								
Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WCDMA B5	Back side	0.729	10.40	-6.51	-0.22	1.049	174.9	0.006	SPLSR<0.04,
ВТ	Back side	0.32	9.26	10.94	0.02	1.040	174.0	0.000	Not required
6			ww	AN			ВТ		

WLAN Mair	1 & BT								
Conditions	Position	SAR Value	Coc	ordinates ((cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(vv/kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.63	9.46	3.66	-0.02	0.95	72.8	0.013	SPLSR<0.04,
ВТ	Daok side	0.32	9.26	10.94	0.02	0.55	72.0	0.010	Not required
6					Ma	ain	BT		

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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GPRS 850 + 5GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	0.819	0.608	0.320	1.747	Analyzed as below
16	GPRS 850	Top side	0	0.630	0.610	0.130	1.370	ΣSAR<1.6, Not required
10	GFN3 650	Right side	0	0.016	0.400	0.040	0.456	ΣSAR<1.6, Not required
		Left side	0	0.402	0.400	0.400	1.202	ΣSAR<1.6, Not required

Conditions	SAR Position Value		Coor	dinates	(cm)	ΣSAR	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(W/kg)	Distance (mm)		SAR Test
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.427	110.4	0.015	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.90	4.04	-0.01	1.427	110.4	0.013	Not required





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WWAN & BT

WWAN & B									
Conditions	Conditions Position		Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
GPRS 850	Back side	0.819	10.12	-6.93	-0.22	1.139	178.9	0.007	SPLSR<0.04,
ВТ	Dack side	0.32	9.26	10.94	0.02	1.100	170.5	0.007	Not required
6		V	VWA	N	1		BT		

WLAN Main & BT

WLAN Main	αΒΙ								
Conditions	Position	SAR Value	Coo	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.90	4.04	-0.01	0.928	69.1	0.013	SPLSR<0.04,
ВТ		0.32	9.26	10.94	0.02				Not required
6					M	ain	BT		



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GPRS 1900 + 5GHz WLAN Main + BT

				· · · · · ·				
No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	0.905	0.608	0.330	1.843	Analyzed as below
17	GPRS	Top side	0	0.444	0.610	0.090	1.144	ΣSAR<1.6, Not required
17	1900	Right side	0	0.012	0.400	0.010	0.422	ΣSAR<1.6, Not required
		Left side	0	0.260	0.400	0.400	1.060	ΣSAR<1.6, Not required

Conditions	SAR Position Value		Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
GPRS 1900	Back side	0.905	9.35	-8.8	-0.09	1.513	128.5	0.014	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.9	4.04	-0.01	1.515	120.5	0.014	Not required





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WWAN & BT

6		W	WAN		4		вт		1
ВТ	Dack side	0.32	9.26	10.94	0.02	1.223	137.4	0.007	Not required
GPRS 1900	Back side	0.905	9.35	-8.80	-0.09	1.225	197.4	0.007	SPLSR<0.04,
		(W/kg)	х	у	Z	(VV/NG)	Distance (mm)		SAR Test
Conditions	Position	SAR Coordinates (cm) Value (W/kg)			ΣSAR (W/kg)	Peak Location Separation	SPLSR		

WLAN Main	& BT								
Conditions	Position	SAR Value	Cod	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.90	4.04	-0.01	0.928	69.1	0.013	SPLSR<0.04,
ВТ	Dack Side	0.32	9.26	10.94	0.02	0.920	09.1	0.013	Not required
6					M	ain	BT		



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WCDMA Band II + 5GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR
		Back side	0	1.097	0.608	0.330	2.035	Analyzed as below
18	WCDMA	Top side	0	0.575	0.610	0.090	1.275	ΣSAR<1.6, Not required
10	B2	Right side	0	0.044	0.400	0.010	0.454	ΣSAR<1.6, Not required
		Left side	0	0.417	0.400	0.400	1.217	ΣSAR<1.6, Not required

Conditions Position		SAR Value	Coo	rdinates	(cm)	ΣSAR (M/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
	(W/kg)	Х	у	Z	(W/kg)	Distance (mm)		SAR Test	
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.705	138.9	0.016	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.9	4.04	-0.01	1.703	130.9	0.010	Not required





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WWAN & BT

WWAIN & B						_			
Conditions Position		SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	
		(W/kg)	х	у	Z	(VV/Ng)	Distance (mm)		SAR Test
WCDMA B2	Back side	1.097	9.05	-9.85	-0.12	1.417	207.9	0.008	SPLSR<0.04,
ВТ	Dack side	0.32	9.26	10.94	0.02	1.417	207.5	0.000	Not required
6	WV	VAN		1		BT			
									7

WLAN Main	ı & BT								
Conditions Position		SAR Value	lue				Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	х	у	Z	(W/kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.90	4.04	-0.01	0.928	69.1	0.013	SPLSR<0.04,
ВТ	Dack Side	0.32	9.26	10.94	0.02	0.920	09.1	0.013	Not required
0					M	ain	BT		



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WCDMA Band IV + 5GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR					
		Back side	0	0.896	0.608	0.330	1.834	Analyzed as below					
10	19 WCDMA B4	Top side	0	0.327	0.610	0.090	1.027	ΣSAR<1.6, Not required					
19		B4	B4	Right side	0	0.087	0.400	0.010	0.497	ΣSAR<1.6, Not required			
		Left side	0	0.448	0.400	0.400	1.248	ΣSAR<1.6, Not required					

Conditions Position		SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
	(W/kg)	Х	у	Z	(vv/kg)	Distance (mm)		SAR Test	
WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.504	137.9	0.013	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.9	4.04	-0.01	1.304	107.9	0.013	Not required





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1	WWAN & B	<u>Γ</u>								
	Conditions	Position	SAR Value	e ZS			ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
			(W/kg)	х	У	Z	(VV/NG)	Distance (mm)		SAR Test
	WCDMA B4	Back side	0.896	8.64	-9.75	-0.12	1.216	207	0.006	SPLSR<0.04,
	ВТ	Dack side	0.32	9.26	10.94	0.02	1.210	207	0.000	Not required
		v	VWA:	N		-	ВТ			

WLAN Main	WLAN Main & BT											
Conditions Position		SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission			
		(W/kg)	х	у	Z	(VV/Kg)	Distance (mm)		SAR Test			
WLAN Main	- Back side	0.608	8.90	4.04	-0.01	0.928	69.1	0.013	SPLSR<0.04,			
ВТ	Dack Side	0.32	9.26	10.94	0.02	0.920	09.1	0.013	Not required			
0					M	ain	BT					



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WCDMA Band V + 5GHz WLAN Main + BT

No.	Conditions	Position	Distanc e (mm)	Max. WWAN	Max. WLAN Main	ВТ	SAR Sum	SPLSR					
		Back side	0	0.729	0.608	0.330	1.667	Analyzed as below					
20	20 WCDMA B5	Top side	0	0.419	0.610	0.090	1.119	ΣSAR<1.6, Not required					
20			Right side	0	0.054	0.400	0.010	0.464	ΣSAR<1.6, Not required				
		Left side	0	0.207	0.400	0.400	1.007	ΣSAR<1.6, Not required					

Conditions	Position	SAR Value	Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation Distance (mm)		Simultaneous Transmission
		(W/kg)	Х	у	Z	(w/kg)			SAR Test
WCDMA B5	Back side	0.729	10.4	-6.51	-0.22	1.337	106.6	0.015	SPLSR<0.04,
WLAN Main	Dack Side	0.608	8.9	4.04	-0.01	1.557	100.0	0.013	Not required





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WWAN & BT

WWAIN & E) [
Conditions	Conditions Position		Coo	rdinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	
		(W/kg)	x y z (W/Ng)		Distance (mm)		SAR Test		
WCDMA B5	Back side	0.729	10.40	-6.51	-0.22	1.049	174.9	0.006	0.006 SPLSR<0.04,
ВТ	Dack side	0.32	9.26	10.94	0.02	1.043	174.0	0.000	Not required
6	WWAN						BT		

WLAN Main	ı & BT								
Conditions Position		SAR Value	Coo	ordinates	(cm)	ΣSAR (W/kg)	Peak Location Separation	SPLSR	Simultaneous Transmission
		(W/kg)	Х	У	Z	(VV/Kg)	Distance (mm)		SAR Test
WLAN Main	Back side	0.608	8.90	4.04	-0.01	0.928	69.1	0.013	SPLSR<0.04,
ВТ	Dack Side	0.32	9.26	10.94	0.02	0.920	09.1	0.013	Not required
0					M	ain	вт		



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4. Instruments List

Manufacturer	Device	Туре	Serial number	Date of last calibration	Date of next calibration
Schmid &			3770		Apr.27,2016
Partner	Dosimetric E-Field Probe	EX3DV4	3831	Jan.29,2015	Jan.28,2016
Engineering AG			3831	Jan.27,2016	Jan.26,2017
		D835V2	4d063	Aug.24,2015	Aug.23,2016
Schmid &	System Validation Dipole	D1750V2	1008	Aug.20,2015	Aug.19,2016
Partner		D1900V2	5d027	Apr.29,2015	Apr.28,2016
Engineering AG	·	D2450V2	727	Apr.22,2015	Apr.21,2016
		D5GHzV2	1023	Jan.26,2016	Jan.25,2017
Schmid & Partner	Data acquisition	DAE4	856	Aug.24,2015	Aug.23,2016
Engineering AG	Electronics	DAL4	1336	Aug.26,2015	Aug.25,2016
Schmid & Partner Engineering AG	Software	DASY 52 V52.8.8	N/A	Calibration not required	Calibration not required
Schmid & Partner Engineering AG	Phantom	SAM	N/A	Calibration not required	Calibration not required
HP	Network Analyzer	8753D	3410A05547	May.21,2015	May.20,2016



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Manufacturer	Device	Туре	Serial	Date of last	Date of next
			number	calibration	calibration
Agilent	Dielectric Probe Kit	85070E	MY44300677	Calibration	Calibration
				not required	not required
Agilent	Dual-directional coupler	772D	MY46151242	Jul.15,2015	Jul.14,2016
		778D	MY52180302	Feb.05,2015	Feb.04,2016
Agilent	RF Signal Generator	N5181A	MY50145142	Feb.06.2015	Feb.05.2016
			MY50145142	Feb.19,2016	Feb.18,2017
Agilent	Power Meter	E4417A	MY52240003	Jul.15,2015	Jul.14,2016
Agilent	Power Sensor	E9301H	MY52200004	Jul.15,2015	Jul.14,2016
TECPEL	Digital thermometer	DTM-303A	TP130075	Mar.27,2015	Mar.26,2016
R&S	Radio Communication Test	CMU200	122498	Aug.26,2015	Aug.25,2016
Anritsu	Radio Communication Test	MT8820C	6201061049	Feb.02.2015	Feb.01.2016
			6201061014	Oct.07,2015	Oct.06,2016



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5. Measurements

Date: 2015/10/26

GPRS 850_Body_Back_CH 251_10mm

Communication System: GPRS (1Dn4Up); Frequency: 848.8 MHz

Medium parameters used: f = 849 MHz; $\sigma = 1.025 \text{ S/m}$; $\epsilon_r = 56.517$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3770; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/4/28;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn856; Calibrated: 2015/8/24
- Phantom: Body
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/Body/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.836 W/kg

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

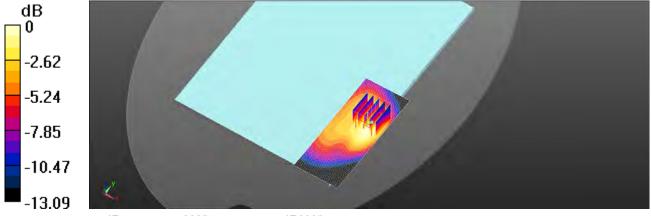
dy=8mm, dz=5mm

Reference Value = 3.515 V/m; Power Drift = 0.19 dB

Peak SAR (extrapolated) = 0.990 W/kg

SAR(1 g) = 0.648 W/kg; SAR(10 g) = 0.415 W/kg

Maximum value of SAR (measured) = 0.836 W/kg



0 dB = 0.836 W/kg = -0.78 dBW/kg



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Date: 2015/10/27

GPRS 1900_Body_Back_CH 661_0mm

Communication System: GPRS (1Dn4Up); Frequency: 1880 MHz

Medium parameters used: f = 1880 MHz; $\sigma = 1.508 \text{ S/m}$; $\varepsilon_r = 53.062$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.59, 7.59, 7.59); Calibrated: 2015/4/28;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

Configuration/Body/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.11 W/kg

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

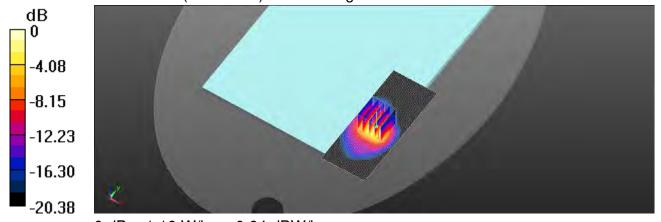
dy=8mm, dz=5mm

Reference Value = 2.931 V/m; Power Drift = 0.12 dB

Peak SAR (extrapolated) = 1.53 W/kg

SAR(1 g) = 0.719 W/kg; SAR(10 g) = 0.337 W/kg

Maximum value of SAR (measured) = 1.16 W/kg



0 dB = 1.16 W/kg = 0.64 dBW/kg



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Date: 2015/10/27

WCDMA Band 2 Body Back CH 9262 0mm

Communication System: WCDMA; Frequency: 1852.4 MHz

Medium parameters used: f = 1852.4 MHz; $\sigma = 1.481$ S/m; $\epsilon_r = 53.265$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.59, 7.59, 7.59); Calibrated: 2015/4/28;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

Configuration/Body/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

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

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

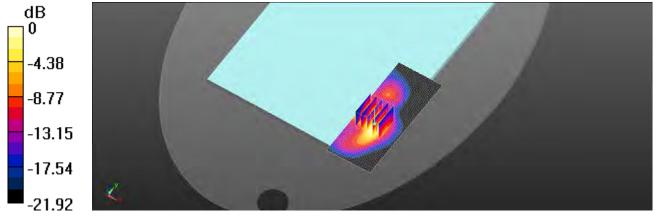
dy=8mm, dz=5mm

Reference Value = 3.265 V/m; Power Drift = 0.16 dB

Peak SAR (extrapolated) = 1.90 W/kg

SAR(1 g) = 0.921 W/kg; SAR(10 g) = 0.448 W/kg

Maximum value of SAR (measured) = 1.44 W/kg



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



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Date: 2015/10/28

WCDMA Band 4_Body_Back_CH 1513_10mm

Communication System: WCDMA; Frequency: 1752.6 MHz

Medium parameters used: f = 1753 MHz; $\sigma = 1.447$ S/m; $\varepsilon_r = 51.902$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.79, 7.79, 7.79); Calibrated: 2015/4/28;

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

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

Configuration/Body/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 1.21 W/kg

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

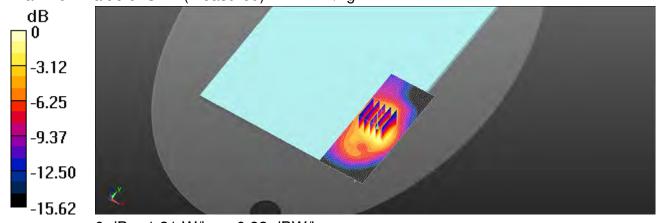
dy=8mm, dz=5mm

Reference Value = 4.502 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 1.49 W/kg

SAR(1 g) = 0.914 W/kg; SAR(10 g) = 0.536 W/kg

Maximum value of SAR (measured) = 1.21 W/kg



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



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Date: 2015/10/26

WCDMA Band 5_Body_Back_CH 4233_0mm

Communication System: WCDMA; Frequency: 846.6 MHz

Medium parameters used: f = 847 MHz; $\sigma = 1.02 \text{ S/m}$; $\epsilon_r = 56.504$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/4/28;

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

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

Configuration/Body/Area Scan (41x101x1): Interpolated grid: dx=15 mm, dy=15 mm

Maximum value of SAR (interpolated) = 0.860 W/kg

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

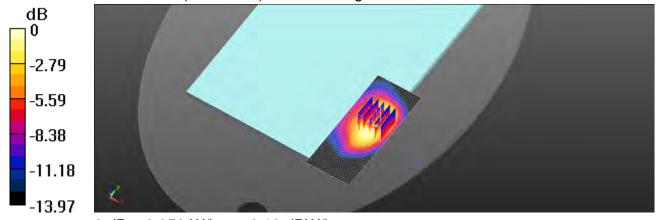
dy=8mm, dz=5mm

Reference Value = 3.634 V/m; Power Drift = 0.14 dB

Peak SAR (extrapolated) = 1.19 W/kg

SAR(1 g) = 0.709 W/kg; SAR(10 g) = 0.432 W/kg

Maximum value of SAR (measured) = 0.958 W/kg



0 dB = 0.958 W/kg = -0.19 dBW/kg



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Date: 2016/3/7

WLAN802.11a 5.3G_Body_Back side_CH 60_0 mm_Main

Communication System: WLAN(5G); Frequency: 5300 MHz

Medium parameters used: f = 5300 MHz; $\sigma = 5.468 \text{ S/m}$; $\varepsilon_r = 48.392$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.81, 3.81, 3.81); Calibrated: 2016/1/27;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2015/8/26
- Phantom: Body
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/BODY/Area Scan (91x131x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 1.57 W/kg

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

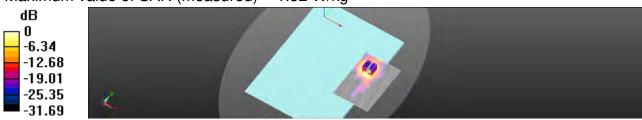
dy=4mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 3.61 W/kg

SAR(1 g) = 0.601 W/kg; SAR(10 g) = 0.202 W/kg

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



0 dB = 1.72 W/kg = 1.82 dBW/kg



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Date: 2016/3/7

WLAN802.11a 5.3G_Body_Back side_CH 56_0 mm_Aux

Communication System: WLAN(5G); Frequency: 5280 MHz

Medium parameters used: f = 5280 MHz; $\sigma = 5.447 \text{ S/m}$; $\varepsilon_r = 48.4$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 SN3831; ConvF(3.81, 3.81, 3.81); Calibrated: 2016/1/27;
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1336; Calibrated: 2015/8/26
- Phantom: Body
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

Configuration/BODY/Area Scan (91x101x1): Interpolated grid: dx=10 mm, dy=10 mm

Maximum value of SAR (interpolated) = 2.13 W/kg

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

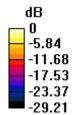
dy=4mm, dz=2mm

Reference Value = 0 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 4.72 W/kg

SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.289 W/kg

Maximum value of SAR (measured) = 2.26 W/kg





0 dB = 2.26 W/kg = 3.54 dBW/kg



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6. SAR System Performance Verification

Date: 2015/10/26

Dipole 835 MHz SN:4d063

Communication System: CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; $\sigma = 1.011 \text{ S/m}$; $\epsilon_r = 56.677$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(9.17, 9.17, 9.17); Calibrated: 2015/4/28;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

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

Maximum value of SAR (interpolated) = 2.94 W/kg

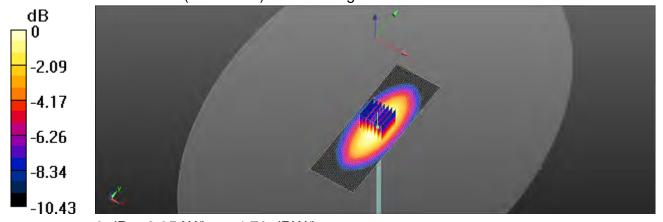
Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

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

Reference Value = 54.80 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.47 W/kg

SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.53 W/kgMaximum value of SAR (measured) = 2.95 W/kg



0 dB = 2.95 W/kg = 4.70 dBW/kg



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Date: 2015/10/28

Dipole 1750 MHz_SN:1008

Communication System: CW; Frequency: 1750 MHz

Medium parameters used: f = 1750 MHz; $\sigma = 1.448 \text{ S/m}$; $\varepsilon_r = 51.901$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

• Probe: EX3DV4 - SN3770; ConvF(7.79, 7.79, 7.79); Calibrated: 2015/4/28;

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

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

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

Maximum value of SAR (interpolated) = 14.0 W/kg

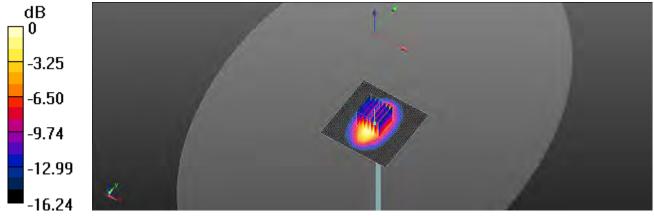
Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

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

Reference Value = 100.0 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 17.7 W/kg

SAR(1 g) = 9.82 W/kg; SAR(10 g) = 5.21 W/kg Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.49 dBW/kg



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Date: 2015/10/27

Dipole 1900 MHz SN:5d027

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: f = 1900 MHz; $\sigma = 1.531 \text{ S/m}$; $\varepsilon_r = 52.924$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3770; ConvF(7.59, 7.59, 7.59); Calibrated: 2015/4/28;

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

Electronics: DAE4 Sn856; Calibrated: 2015/8/24

Phantom: Body

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

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

Maximum value of SAR (interpolated) = 13.7 W/kg

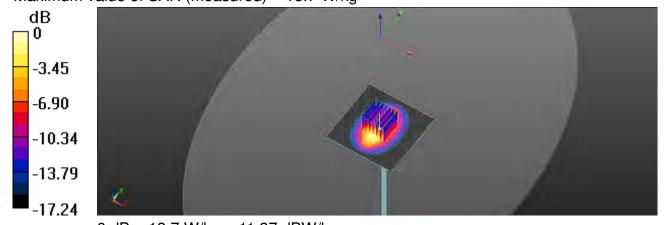
Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

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

Reference Value = 95.96 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 9.49 W/kg; SAR(10 g) = 4.9 W/kg Maximum value of SAR (measured) = 13.7 W/kg



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



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Date: 2016/3/7

Dipole 2450 MHz SN:727

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; $\sigma = 1.991 \text{ S/m}$; $\varepsilon_r = 52.416$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3831; ConvF(6.81, 6.81, 6.81); Calibrated: 2016/1/27;

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

Electronics: DAE4 Sn1336; Calibrated: 2015/8/26

Phantom: Body

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

Configuration/Pin=250mW/Area Scan (61x91x1): Interpolated grid: dx=12 mm, dy=12 mm

Maximum value of SAR (interpolated) = 19.9 W/kg

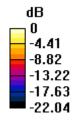
Configuration/Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

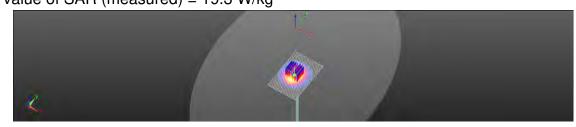
dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.39 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 25.8 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.17 W/kg Maximum value of SAR (measured) = 19.3 W/kg





0 dB = 19.3 W/kg = 12.85 dBW/kg



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Date: 2016/3/7

Dipole 5300 MHz SN:1023

Communication System: CW; Frequency: 5300 MHz

Medium parameters used: f = 5300 MHz; $\sigma = 5.468 \text{ S/m}$; $\varepsilon_r = 48.392$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY5 Configuration:

Probe: EX3DV4 - SN3831; ConvF(3.81, 3.81, 3.81); Calibrated: 2016/1/27;

Sensor-Surface: 2mm (Mechanical Surface Detection)

Electronics: DAE4 Sn1336; Calibrated: 2015/8/26

Phantom: Body

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

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

Maximum value of SAR (interpolated) = 16.1 W/kg

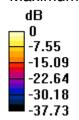
Configuration/Pin=100mW/Zoom Scan (7x7x12)/Cube 0: Measurement grid:

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

Reference Value = 48.05 V/m; Power Drift = -0.11 dB

Peak SAR (extrapolated) = 32.5 W/kg

SAR(1 g) = 7.59 W/kg; SAR(10 g) = 2.18 W/kg Maximum value of SAR (measured) = 16.5 W/kg





0 dB = 16.5 W/kg = 12.18 dBW/kg



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7. DAE & Probe Calibration Certificate

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





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

Accreditation No.: SCS 0108

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

Certificate No: DAE4-856 Aug15

SGS-TW (Auden) CALIBRATION CERTIFICATE Object DAE4 - SD 000 D04 BM - SN: 856 QA CAL-06.v29 Calibration procedure(s) Calibration procedure for the data acquisition electronics (DAE) Calibration date: August 24, 2015 This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility; environment temperature (22 ± 3)°C and humidity < 70% Calibration Equipment used (M&TE critical for calibration) Primary Standards Cal Date (Certificate No.) Scheduled Calibration Kelthley Multimeter Type 2001 SN: 0810278 03-Oct-14 (No:15573) Secondary Standards Check Date (in house) Scheduled Check Auto DAE Calibration Unit SE UWS 053 AA 1001 05-Jan-15 (in house check) In house check: Jan-16 Catibrator Box V2.1 SE UMS 006 AA 1002 06-Jan-15 (in house check) In house check: Jan-16 Name Function Calibrated by: Eric Hainfeld Technician Approved by: Fin Bomholt Deputy Technical Manager This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No. DAE4-856 Aug 15

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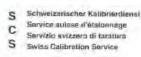


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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrause 43, 8004 Zurich, Switzerland







Accresitation No.: SCS 0108

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Glossary

DAE Connector angle

data acquisition electronics

information used in DASY system to align probe sensor X to the robot

coordinate system.

Methods Applied and Interpretation of Parameters

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

Certificate No: DAE4-956, Aug 15

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DC Voltage Measurement
A/D - Converter Resolution nominal
High Range: 1LSB = High Range: $1LSB = 6.1 \mu V$, full range = -100...+300 mVLow Range: 1LSB = 61 nV, full range = -1......+3 mVDASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec 6.1μV , 61nV ,

Calibration Factors	x	Y	Z
High Range	403.449 ± 0.02% (k=2)	404.566 ± 0.02% (k=2)	403.891 ± 0.02% (k=2)
Low Range	3.97700 ± 1.50% (k=2)	3.97782 ± 1.50% (k=2)	3.97836 ± 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 SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199992.51	-4.66	-0.00
Channel X + Input	19999.73	-1.55	-0.01
Channel X - Input	-20000.27	0.65	-0.00
Channel Y + Input	199994.28	-2.70	-0.00
Channel Y + Input	19998.57	-2.81	-0.01
Channel Y - Input	-20000.71	0.04	-0.00
Channel Z + Input	199992.81	-4.34	-0.00
Channel Z + Input	19999.01	-2.35	-0.01
Channel Z - Input	-20000.10	0.80	-0.00

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2001.37	0.19	0.01
Channel X + Input	201.64	0.16	0.08
Channel X - Input	-198.09	0.34	-0.17
Channel Y + Input	2001.06	-0.21	-0.01
Channel Y + Input	200.99	-0.56	-0.28
Channel Y - Input	-198.69	-0.28	0.14
Channel Z + Input	2001.06	-0.14	-0.01
Channel Z + Input	200.61	-0.93	-0.46
Channel Z - Input	-200.00	-1.57	0.79

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-15.01	-16.59
	- 200	17.32	15.62
Channel Y	200	-1.48	-2.07
	- 200	0.66	0.22
Channel Z	200	9.97	10.11
	- 200	-12.79	-13.13

3. Channel separation

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

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	2.90	-2.95
Channel Y	200	6.94	-	3.00
Channel Z	200	9.06	5.52	

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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	16218	15903
Channel Y	15939	16589
Channel Z	15873	16638

5. Input Offset Measurement

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

Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (µV)
Channel X	0.50	-0.61	1.57	0.38
Channel Y	-0.24	-1.01	1.18	0.39
Channel Z	-0.85	-1.73	0.44	0.36

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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

Certificate No: DAE4-856_Aug15

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Calibration Laboratory of Schmid & Partner Engineering AG Zeughausstrasse 43, 6004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredited by the Swise Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signaturies to the EA Multiliateral Agreement for the recognition of calibration certificates

CALIBRATION	CERTIFICATE		
Object	DAE4 - SD 000 D	04 BM - SN 1336	
Culbration propadure(s)	QA CAL-06,v29 Calibration process	dure for the data acquisition electr	onics (DAE)
Colibration during	August 26, 2015		
The measurements and the unce	staintins with confidence pri clied in the cinsed laborators	inal standards, which realize the physical units obsolity are given on the following pages and reliably, environment temperature (22 a 3)°C a	are part of the certificate.
Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
	ID # SN: 0816278	Cal Date (Certificate No.) 03-Oct-14 (No:15579)	Scheduled Calibration Opt-15
Keithley Multimeter Type 2001	100,00		
Secondary Standards Auto DAE Celibration Unit	SN: 0816278	03-Oct-14 (No:15579) Check Date (in house) 06-Jan-15 (in house check)	Oct-16
Secondary Standards Secondary Standards Auto DAE Celibration Unit Celibrator Box V2.1	SN: 0810278 ID # SE UWS 053 AA 1001	03-Oct-14 (No:15579) Check Date (in house) 08-Jan-15 (in house check)	Oct-16 Scheduled Check In house check: Jan-16
Secondary Standards Secondary Standards Auto DAE Celibration Unit Celibrator Box V2.1	SN: 0810278 ID # SE LIWS 053 AA 1001 SE LIMS 006 AA 1002 Name	OS-Oct-14 (No:15579) Check Date (in house) OS-Jan-15 (in house check) OS-Jan-15 (in house check)	Oct-15 Schadulad Chack In house chack: Jan-16 In house chack: Jan-16
Selbrated by:	SN: 0810278 ID # SE LIWS 053 AA 1001 SE LIMS 006 AA 1002 Name	OS-Oct-14 (No:15579) Check Date (in house) OS-Jan-15 (in house check) OS-Jan-15 (in house check)	Oct-15 Scheduled Check In house check: Jan-16 In house check: Jan-16
Primary Standards Keithiey Multimeter Type 2001 Secondary Standards Auto DAE Celibration Unit Celibrator Box Y2.1 Calibrated by:	SN: 0810278 ID # SE LIWS 053 AA 1001 SE LIMS 066 AA 1002 Name Enc Halmfeld	OS-Oct-14 (No:15573) Check Date (in house) OS-Jan-15 (in house check) OS-Jan-15 (in house check) Function Function	Oct-15 Scheduled Check In house check: Jan-16 In house check: Jan-16

Certificate No. DAE4-1335_Aug 15

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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 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

full range = -100...+300 mV full range = -1......+3mV High Range: 1LSB = 6.1µV , 1LSB = Low Range: 61nV, DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	x	Y	z
High Range	403.276 ± 0.02% (k=2)	403.573 ± 0.02% (k=2)	403.056 ± 0.02% (k=2)
Low Range	3.95163 ± 1.50% (k=2)	3.98593 ± 1.50% (k=2)	3.99669 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	121,0 °± 1 °
	12.110 2.1

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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (µV)	Difference (μV)	Error (%)
Channel X + Input	200039.73	3.06	0.00
Channel X + Input	20005.75	1.87	0.01
Channel X - Input	-20006.63	0.10	-0.00
Channel Y + Input	200040.44	3.89	0.00
Channel Y + Input	20002.50	-1.26	-0.01
Channel Y - Input	-20009.40	-2.57	0.01
Channel Z + Input	200042.26	5.60	0.00
Channel Z + Input	20002.80	-0.91	-0.00
Channel Z - Input	-20009.67	-2.80	0.01

Low Range	Reading (µV)	Difference (µV)	Error (%)
Channel X + Input	2000.27	0.19	0.01
Channel X + Input	199.51	-0.49	-0.24
Channel X - Input	-200.10	-0.12	0.06
Channel Y + Input	1999.75	-0.24	-0.01
Channel Y + Input	199.19	-0.66	-0.33
Channel Y - Input	-200.95	-0.99	0.49
Channel Z + Input	2000.22	0.38	0.02
Channel Z + Input	198.50	-1.33	-0.66
Channel Z - Input	-201.27	-1.23	0.61

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (µV)	Low Range Average Reading (μV)
Channel X	200	5.53	4.41
	- 200	-3.35	-4.87
Channel Y	200	-3.56	-3.80
	- 200	3.14	2.36
Channel Z	200	20.99	21.07
	- 200	-24.36	-24.58

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	-	5.96	-1.54
Channel Y	200	8.46		7.20
Channel Z	200	8.25	6.18	

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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	15867	16258
Channel Y	15914	16000
Channel Z	15868	16245

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	0.23	-0.56	1.25	0.37
Channel Y	0.11	-0.69	1.02	0.34
Channel Z	-1.22	-2.26	0.20	0.41

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

one of the arrivation (17) point values for informations					
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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Certificate No: EX3-3770_Apr15

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CALIBRATION CERTIFICATE

Object

EX3DV4 - SN:3770

Calibration procedure(s)

QA CAL-01.v9, QA CAL-14.v4, QA CAL-23.v5, QA CAL-25.v6

Calibration procedure for dosimetric E-field probes

Calibration date:

April 28, 2015

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	01-Apr-15 (No. 217-02128)	Mar-16
Power sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuator	SN: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mar-16
Reference 20 dB Attenuator	SN: S5277 (20x)	01-Apr-15 (No. 217-02132)	Mar-16
Reference 30 dB Attenuator	SN: S5129 (30b)	01-Apr-15 (No. 217-02133)	Mar-16
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013_Dec14)	Dec-15
DAE4	SN: 660	14-Jan-15 (No. DAE4-660_Jan15)	Jan-16
Secondary Standards	1D	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-14)	In house check: Oct-15

Function Jeton Kastrati Calibrated by: Laboratory Technician Katja Pokovic Approved by: Technical Manager Issued: April 30, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Accreditation No.: SCS 0108

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Glossary:

TSL tissue simulating liquid
NORMx,y,z sensitivity in free space
ConvF sensitivity in TSL / NORMx,y,z
DCP diode compression point

CF crest factor (1/duty_cycle) of the RF signal A, B, C, D modulation dependent linearization parameters

Polarization ip protation around probe axis

Polarization 9 9 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:

- 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.
- 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

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 E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)x,y,z = NORMx,y,z * frequency_response (see Frequency Response Chart). This linearization is
 implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included
 in the stated uncertainty of ConvF.
- DCPx,y,z: DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal pharacteristics
- Ax.y,z; Bx.y,z; Cx.y,z; Dx.y,z; VRx.y,z; A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. VR is the maximum calibration range expressed in RMS voltage across the diode.
- ConvF and Boundary Effect Parameters: Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx,y,z * ConvF whereby the uncertainty corresponds to that given for ConvF. A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical isotropy (3D deviation from isotropy): in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no uncertainty required).

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EX3DV4 – SN:3770 April 28, 2015

Probe EX3DV4

SN:3770

Manufactured: July 6, 2010 Calibrated: April 28, 2015

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

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April 28, 2015 EX3DV4-SN:3770

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (μV/(V/m) ²) ^A	0.31	0.62	0.40	± 10.1 %
DCP (mV) ⁸	105.3	100.7	101.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Unc ^E (k=2)
0	CW	Х	0.0	0.0	1.0	0.00	145.1	±3.8 %
		Y	0.0	0.0	1.0		129.4	
		Z	0.0	0.0	1.0		138.4	

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

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

⁸ Numerical linearization parameter: uncertainty not required.

⁸ 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:3770 April 28, 2015

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

Calibration Parameter Determined in Head Tissue Simulating Media

anbration	indiation Paralleter Determined in Head Tissue Simulating Media							
f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
750	41.9	0.89	9.53	9.53	9.53	0.26	1.28	± 12.0 %
835	41.5	0.90	9.13	9.13	9.13	0.21	1.53	± 12.0 %
900	41.5	0.97	8.89	8.89	8.89	0.23	1.38	± 12.0 %
1450	40.5	1.20	8.19	8.19	8.19	0.18	1.59	± 12.0 %
1750	40.1	1.37	8.04	8.04	8.04	0.38	0.80	± 12.0 %
1900	40.0	1.40	7.82	7.82	7.82	0.36	0.80	± 12.0 %
2000	40.0	1.40	7.81	7.81	7.81	0.36	0.80	± 12.0 %
2300	39.5	1.67	7.47	7.47	7.47	0.27	0.96	± 12.0 %
2450	39.2	1.80	7.16	7.16	7.16	0.34	0.80	± 12.0 %
2600	39.0	1.96	6.85	6.85	6.85	0.34	0.92	± 12.0 %
5250	35.9	4.71	5.27	5.27	5.27	0.30_	1.80	± 13.1 %
5600	35.5	5.07	4.65	4.65	4.65	0.35	1.80	± 13.1 %
5750	35.4	5.22	4.92	4.92	4.92	0.40	1.80	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

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



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April 28, 2015 EX3DV4-SN:3770

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

Calibration Parameter Determined in Body Tissue Simulating Media

f (MHz) ^C	Relative Permittivity F	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
T (MHZ)	Permittivity	(S/III)	COLLAL	COLLAN	CONVI	Alpha	(11111)	(11 2)
750	55.5	0.96	9.30	9.30	9.30	0.25	1.38	± 12.0 %
835	55.2	0.97	9.17	9.17	9.17	0.34	1.05	± 12.0 %
900	55.0	1.05	8.91	8.91	8.91	0.30	1.20	± 12.0 %
1450	54.0	1.30	8.12	8.12	8.12	0.18	1.62	± 12.0 %
1750	53.4	1.49	7.79	7.79	7.79	0.44	0.80	± 12.0 %
1900	53.3	1.52	7.59	7.59	7.59	0.44	0.80	± 12.0 %
2000	53.3	1.52	7.73	7.73	7.73	0.42	0.80	± 12.0 %
2300	52.9	1.81	7.32	7.32	7.32	0.41	0.80	± 12.0 %
2450	52.7	1.95	7.21	7.21	7.21	0.31	0.80	± 12.0 %
2600	52.5	2.16	6.96	6.96	6.96	0.27	0.80	± 12.0 %
5250	48.9	5.36	4.70	4.70	4.70	0.35	1.90	± 13.1 %
5600	48.5	5.77	4.03	4.03	4.03	0.45	1.90	± 13.1 %
5750	48.3	5.94	4.33	4.33	4.33	0.50	1.90	± 13.1 %

^C Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

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

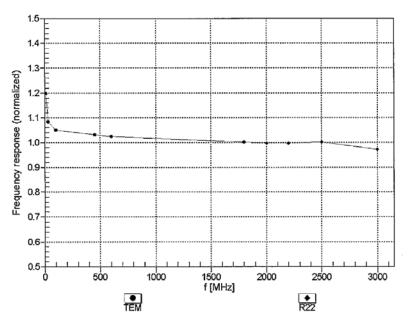
diameter from the boundary.



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April 28, 2015 EX3DV4-SN:3770

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



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

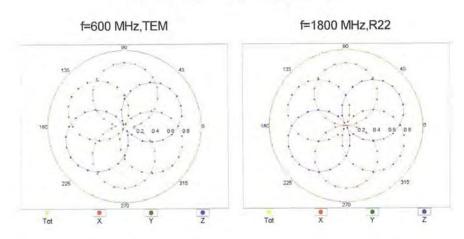
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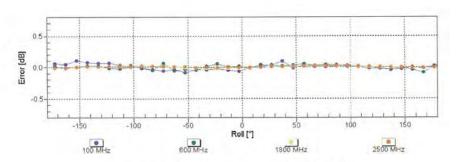


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Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$





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

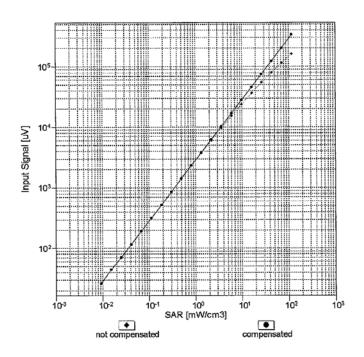


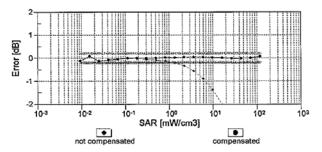
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April 28, 2015

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)





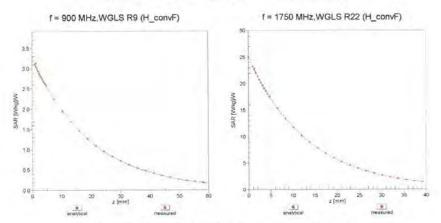
Uncertainty of Linearity Assessment: ± 0.6% (k=2)



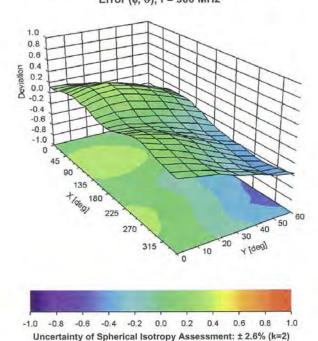
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EX3DV4- SN:3770 April 28, 2015

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (φ, θ), f = 900 MHz





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EX3DV4- SN:3770 April 28, 2015

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-32.7
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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SGS-TW (Auden)

Certificate No. EX3-3831_Jan15

CALIBRATION CERTIFICATE Object EX3DV4 SN:3831 Calitronon procedure(s) QA CAL-01 v9, DA CAL-14.v4, DA CAL-23.v5, DA CAL-25.v6 Calibration procedure for desimetric E-field probes Californion date: January 29, 2015 This calibrator cartificate documents the tracescality to national sourcards, which resists the physical units of measurements (Si). The massatements and the uncertainties with confidence preschilly are given on the following sages and are put of the confiscore All calibrations have been conducted in the closed inborately facility, envisionment temperature (22 ± 1)°C and number < 70% Certration Equipment used (MSTE critical for calibration)

Primary Standards	(0)	Cal Date (Certificate No.)	Scheduled Carbratton
Power meter £44198	CIB41293874	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	05-Apr-14 (No. 217-01911)	Api-16
Reterence 3 dB Attenuator	SN: 85054 (3a)	R3-Apr-14 (No. 217-81915)	April 5
Reference 20 dB Attenuator	SN S5277 (20x)	H3-Apr-14 (No. 217-01919)	April 15
Reference 30 dB Attenuator	SN: 55 (29 (38t)	II3-Apr-14 (No. 217-01920)	Apr-15
Reference Probe ES3DV2	SN: 3013	30-Dec-14 (No. ES3-3013, Dec14)	Dec-15
DAE4	SN: 680	14-Jan-15 (No. DAE4-980 JB-15)	Jan-16
Secondary Standards	ID.	Check Date (in house)	Schwaled Check
RF generator HF 6646C	US3842U01700	4-Aug-90 (in house theck Apr. 13)	In house check: April 16
Network Analyzer HP 8753E	11537300585	/II-Oct-01 (in house check Oct-14)	In rigura chack: Oct-15

	Mamm	Fundion	Signature
Dailbrated by	TIMOR (CHANN)	Laboratory Technician	+ 1
Approved by:	Kinja Pokosio	Technical (danager)	Re My
			insued January 29, 2010

Certificate No: EX3-3831_lantil

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





S Schweizerscher Kalentordione C Service suises d'étalcarage S Bervizio avezairo di farajum Swiss Calibration Service

Acceptation No.: SCS 0108

Accepted by the Swiss Acceptation Service (8AS)

The Swee Accreditation Service is one of the eigencomes to the EA Mullimeral Agreement for the recognition of cathrollon certificates

Glossary:

TSL Issue simulating liquid.
NORMs,y,z sensitivity in free space
Convin sensitivity in TSL / NORMs,y,z.
DGP diode conferession point.

CF crest factor (1/dirty, cycle) of the RF aignal modulation dependent innearization parameters in rotation around interest axis.

Polarization a la rotation around probe axis
Polarization 5 a rotation around an existination

Polarization I) Protesion around an exis that is in the plane normal to probe exis (at measurement center).

i.e., it = 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:

 IEEE SM 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.

Techniques", June 2013

b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for fund-hald devices used in close proximity to the ear (finquency range of 300 MHz to 3 GHz)", Fabruary 2005

Methods Applied and Interpretation of Parameters:

- NORMx,y,z: Assessed for E-field polarization 3 = 0 (f = 300 MHz in TEM-call; f > 1800 MHz: R22 waveguide).
 NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E³-field uncertainty inside TSL (see galow Control.)
- MORM(f)x,y,z = MORMx,y,z * frequency_esponse (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The smootheinty of the frequency response is included in the stated uncertainty of CopyF.
- DCRx.y.r: OCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). OCP does not depend on frequency nor media.
- PAR: PAR is the Peak to Average Ratio that is not calibrated bull determined based on the signal characteristics
- AX,Y,Z, BX,Y,Z, CX,Y,Z, DX,Y,Z, VRX,Y,Z, A, B, C, D are numerical linearization parameters assessed based on the data of power sweep for specific modutation signal. The parameters do not depend on frequency normetila. 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 1 300 UH-z) and inside waveguide using analytical field distributions based on power measurements for I > 800 MHz; Thir same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncortainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMx, y, z * ConvF whereby the uncertainty corresponds to that given for ConvF A frequency dependent ConvF is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- Spherical browdy (3D deviation from isotropy); in a field of low gladdents realized using a flat phentom exposed by a patch enterna.
- Serior Offset. The sensor offset corresponds to the offset of Withial measurement penter from the property.
 (bn probe axis). No tolerance required.
- Connector Angle: The angle is assessed using the information gained by determining the NORMx (no. unpertainty required).

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EX3DV4 - SN:3831

January 29, 2015

Probe EX3DV4

SN:3831

Manufactured: Calibrated: September 6, 2011 January 29, 2015

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

Certificate No: EX3-3831_Jan15

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EX3DV4- SN:3831

January 29, 2015

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) ²) ^A	0.45	0.42	0.43	± 10.1 %
DCP (mV) ⁸	99.7	101.1	100.8	

Modulation Calibration Parameters

מוט	Communication System Name		Α	В	С	D	VR	Unc
			dB	dB√μV		dB	mV	(k=2)
0	CW	X	0.0	0.0	1.0	0.00	152.6	±3.5 %
		Y	0.0	0.0	1.0	_	143.5	
		Z	0.0	0.0	1.0		145.4	

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

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

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EX3DV4-SN:3831

January 29, 2015

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

Calibration Parameter Determined in Head Tissue Simulating Media

Calibration	Parameter Do	etermined in	Head Tis	sue Sim	ulating Me	edia		
f (MHz) ^c	Relative Permittivity ^F	Conductivity (S/m) 7	ConvF X	ConvF Y	ConvF Z	Alpha ⁶	Depth ^G (mm)	Unet. (k=2)
750	41.9	0.89	9.28	9.28	9.28	0.31	0.99	± 12.0 %
835	41.5	0.90	8.95	8.95	8.95	0.28	1.17	± 12.0 %
900	41.5	0.97	8.76	8.76	8.76	0.25	1.23	± 12.0 %
1450	40.5	1.20	7.92	7.92	7.92	0.13	1.92	± 12.0 %
1750	40.1	1.37	7.75	7.75	7.75	0.32	0.89	± 12.0 %
1900	40.0	1.40	7.58	7.58	7.58	0.63	0.65	± 12.0 %
2000	40.0_	1.40	7.48	7.48	7.48	0.80	0.57	± 12.0 %
2300	39.5	1.67	7.09	7.09	7.09	0.27	0.99	± 12.0 %
2450	39.2	1.80	6.81	6.81	6.81	0.51	0.68	± 12.0 %
2600	39.0	1.96	6.54	6.54	6.54	0.28	1.01	± 12.0 %
5250	35.9	4.71	4.60	4.60	4.60	0.40	1.80	± 13.1 %
5600	35.5	5.07	4,14	4.14	4.14	0.45	1.80	± 13.1 %
5750	35.4	5.22	4.41	4,41	4.41	0.45	1.80	± 13.1 %

O Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 100 MHz.
At frequencies below 3 GHz, the validity of tissue parameters (a and o) can be relaxed to ± 10% if Equit compensation formula is applied to measured SAR values. Aftergeneries above 3 GHz, the validity of tissue parameters (a and o) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
AlphaCepth are determined during calibration. SFEAG warrants that the remaining deviation due to the boundary effect after compensation is always lists than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe fip diameter from the boundary.

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EX3DV4- SN:3831

January 29, 2015

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

Calibration Parameter Determined in Body Tissue Simulating Modific

libration	bration Parameter Determined in Body Tissue Simulating Media							
f (MHz) ^c	Relative Permittivity ^P	Conductivity (S/m) F	ConvF X	ConvF Y	ConvF Z	Alpha ⁶	Depth ^G (mm)	Unct. (k=2)
750	55.5	0.96	9.07	9.07	9.07	0.20	1.58	± 12.0 %
835	55.2	0.97	9.00	9.00	9.00	0.25	1.30	± 12.0 %
900	55.0	1.05	8.87	8.87	8.87	0.33	1.00	± 12.0 %
1450	54.0	1.30	7.68	7.68	7.68	0.19	1.44	± 12.0 %
1750	53.4	1.49	7.50	7.50	7.50	0.40	0.89	± 12.0 %
1900	53.3	1.52	7.34	7.34	7.34	0.31	1.06	± 12.0 %
2000	53.3	1.52	7.41	7.41	7.41	0.33	0.98	± 12.0 %
2300	52.9	1.81	7.08	7.08	7.08	0.40	0.89	± 12.0 %
2450	52.7	1.95	6,81	6.81	6.81	0.44	0.80	± 12.0 %
2600	52.5	2.16	6.65	6.65	6.65	0.80	0.58	± 12.0 %
5250	48.9	5.36	3.92	3.92	3.92	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.49	3.49	3.49	0.55	1.90	± 13.1 %
5750	48.3	5.94	3.70	3.70	3.70	0.55	1.90	± 13.1 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvP uncertainty at collection frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvP assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 100 MHz.

*At frequencies below 3 GHz, the validity of tissue parameters (is and in) can be reissed to ± 10% if flight compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of fissue parameters (and or is restricted to ± 5%. The uncertainty is the PRSS of the ConvP uncertainty for indicated target tissue parameters.

*AthalCophs are delemined during cultivation. 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 6p diameter from the boundary.

Certificate No: EX3-3831_Jan15

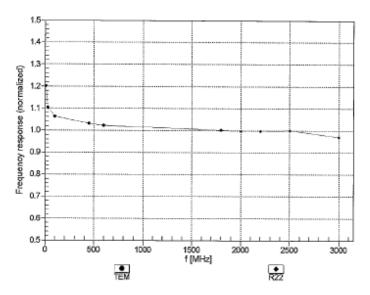


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EX3DV4- SN:3831

January 29, 2015

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



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

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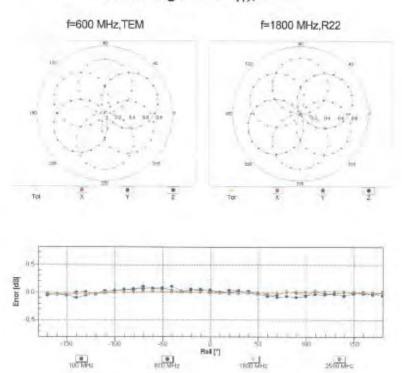
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EX3DV4- SN:3831 January 29, 2015

Receiving Pattern (6), 9 = 0°



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

Certificate No: EX3-3831_Jan15

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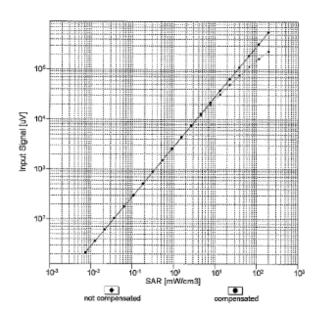


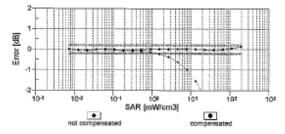
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EX3DV4-SN:3831

January 29, 2015

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)





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

Certificate No: EX3-3831_Jan15

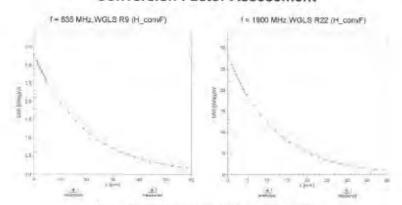
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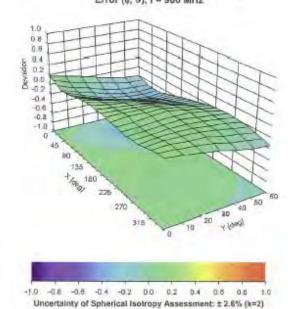
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Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (4, 8), f = 900 MHz



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EX3DV4-SN:3831

January 29, 2015

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-20.5
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

Certificate No: EX3-3831_Jan15

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Calibration Laboratory of

Schmid & Partner Engineering AG Zeughausstrasse 43, 8504 Zurich, Switzerland





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

Accomplisation No.: SCS 0108

According by the Bess According Service (SAS)

The Swiss Accreditation Service is one of the signatures to the EA Multilateral Agreement for the recognition of calibration certification

Clent SGS-TW (Audan)

Certificate No: EX3-3831 Jan16

CALIBRATION CERTIFICATE

Disject

EX3DV4 - SN:3831

Calibration procedure(s)

QA CAL-01.V9, QA CAL-14.V4, QA CAL-23.V5, QA CAL-25.V6

Calibration procedure for dosimetric E-field probes

Calibration date:

January 27, 2016

This calibration conflicate documents the tracerbility to national standards, which makes the physical units of measurements (51) The measurements and the upperformer with confidence probability are given on the following pages and are part of the confidence

All contentions have been conducted in the closed aboratory facility in winnered hanguasture (22 ± 3) °C and humbity = 70° iii.

Calibration Equipment used (M&TE critical for calibration)

Primary Shandards	ID	Cai Dare (Certificate No.)	Scheduled Californition
Fower meter E44198	GB41293874	Ct-Apr-15 (No. 217-02128)	Main Mi
Fower sensor E4412A	MY41498087	01-Apr-15 (No. 217-02128)	Mar-16
Reference 3 dB Attenuated	5N: S5054 (3c)	01-Apr-15 (No. 217-02129)	Mari-16
Reference 20 dB Atlenuator	SN: 95277 (20x)	01-Apr-15 (No. 217-02132)	Mai-15
Refinance 30 dB Atturigator	SN: \$5129 (30th)	61-Apr-15 (No. 217-02133)	(Vinte-1f)
Reference Probe ES3DV2	SN 3013	51-Dec-15 (No. ES3-3013_Dec15)	Dec.16
DAE4	SN: 650	23-Dec-15 (No. DAE4-REC_Oxc15)	Dec-16
Secondary Standards	1D	Creck Date (in house)	Scheduled Check
RF generalist HP 5648C	US36421J01700	4-Aug-98 (in house check Apr-13)	In house check. Apr-16
Network Anglyzes HP 8753E	US37398565	18-Oct-01 (in house check Oct-15)	to house check Dot 18

	Name	Function	Signature
Castorated by:	.нове Касган	Labjardory Technique	(= Le
Appman3.th	Kinga Fishiovic	Tankrapa) Manager	Rely
			issuest January 79, 1010

Gertificate No. EX3-3831 Jan 16

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





Schweizenscher Kallbriedlienel S Service suisse d'étalormage C Servicio avienero di terretara S Serios Calibration Service

Accreditation No.: SCS 0108

According by the Swiss Accreditation Samue (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Mullistersi Agreement for the recognition of calibration certification

Glossary:

tissue simulating liquid NORMx,y,z sensitivity in tree space sensitivity in TSL / NORMx.y.z ConvP DOP Glode compression point

crest factor (1/duty_cycle) of the RF signal modulation dependent inserization parameters A.B.C.D

y rotation around probe axis: Polarization at

A rotation around an axis final is in the plane normar to probe axis rat measurement conter), Poisrization %

i.m., % = 0 is normal to probe axis

Connector Angle information used in DASY system to sligh probe sensor X to the robal coordinate system

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, IEEE Recommended Practice for Determining Ihm Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Davices: Measurement.

Techniques", June 2013
b) IEC 62209 1, "Procedure to measure the Specific Absorption Reta (SAR) for hand-held devices used in close proximity to the sar (frequency range of 300 MHz to 3 GHz)", February 2006
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices."

used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)*, March 2010

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

Methods Applied and Interpretation of Parameters:

NORMx,y,z: Assessed for E-field potanization B=0 (f ≤ 900 MHz in TEM-cell; t > 1800 MHz; R22 waveguide), NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E²-field

uncontainty maids TSL (see below CorwF).

WORM(f): $y_i z = NDR(Mx, y_i z)$ frequency response (see Frequency Response Chart). This linearization is implemented in DASY4 sortware 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 personetrics assessed based on the data of power swincp with CW signal (no uncertainty required). DCP datas not depend on frequency rior media.

PAR: PAR is the Peak to Average Ratio that is not callurated but determined based on the signel

Ax.y.z. Bx.y.z. Cx.y.z. Dx.y.z. VRx.y.z. A, 6, 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 for modile. VR is the maximum calcuration 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 $f \le 800$ MHz) and inside waveguide using analytical field distributions based on power measurements for $f \ge 800$ MHz. The same satisps are used for assessment of the parameters applied for measurements for 1.9 atto MHz. The same sames are used to assessment of the same special boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY# software to emprove probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORMs, y.z.* CoviF whereby the uncertainty corresponds to their given for CoviF. A frequency deparament CoviF 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 rising a flat phantom exposed by a patch anlenne

Sensor Offset. The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe sxis). No tolerance required.

Connector Angle: The angle is assessed using the information gained by determining the NORMs (no. uncertainty required)

Derthicsse Nov EX3-3831 Jan 16



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EX3DV4 - SN:3831

January 27, 2016

Probe EX3DV4

SN:3831

Manufactured: Calibrated: September 6, 2011 January 27, 2016

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

Certificate No: EX3-3831_Jan16

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EX3DV4-SN:3831

January 27, 2016

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) ²) ^A	0.45	0.42	0.43	± 10.1 %
DCP (mV) ^R	100.7	102.6	99.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB√μV	С	D dB	VR mV	Une ⁴ (k=2)
0	CW	X	0.0	0.0	1.0	0.00	153.7	±3.3 %
		Y	0.0	0.0	1.0		139.5	
		Z	0.0	0.0	1.0		143.5	

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: EX3-3831_Jan16

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

Numerical linearization parameter: uncertainty not required.

Uncertainty is determined using the max, deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



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EX3DV4-SN:3831

January 27, 2016

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

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^G	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ⁸ (mm)	Unc (k=2)
750	41.9	0.89	9.38	9.38	9.38	0.23	1.35	± 12.0 %
835	41.5	0.90	8.84	8.84	8.84	0.19	1.62	± 12.0 %
900	41.5	0.97	8.77	8.77	8.77	0.20	1.51	± 12.0 %
1450	40.5	1.20	8.17	8.17	8.17	0.28	0.97	± 12.0 %
1750	40.1	1.37	7.92	7.92	7.92	0.41	0.80	± 12.0 %
1900	40.0	1.40	7.66	7.86	7.66	0.37	0.80	± 12.0 %
2000	40.0	1.40	7.61	7.61	7.61	0.32	0.80	± 12.0 %
2300	39.5	1.67	7.33	7.33	7.33	0.31	0.96	±12.0 %
2450	39.2	1.80	6.92	6.92	6.92	0.27	1.09	± 12.0 %
2600	39.0	1.96	6.71	6.71	6.71	0.40	0.89	± 12.0 %
3500	37.9	2.91	6.41	6.41	6.41	0.42	1.03	±_13.1 %
5200	36.0	4.66	4.76	4.76	4.76	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.46	4.46	4.46	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.08	4.08	4.08	0.50	1.80	± 13.1 %
5800	35.3	5.27	4,10	4.10	4.10	0.50	1.80	± 13.1 %

⁶ Frequency validity above 300 MHz of ± 100 MHz only applies for DASY vd.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at outbretton frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 55, 40, 60 and 70 MHz for convF assessments at 30, 66, 128, 160 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 (c and c) can be released to ± 10% if figuid compensation formule is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (c and c) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

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

Certificate No: EX3-3831_Jan16

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EX3DV4-SN:3831

January 27, 2016

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

Calibration Parameter Determined in Body Tissue Simulating Media

inbration Parameter Determined in Body Tissue Simulating media										
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ⁶	Depth ⁶ (mm)	Unc (k=2)		
750	55.5	0.96	9.25	9.25	9.25	0.26	1.29	±12.0%		
835	55.2	0.97	9.08	9.08	9.08	0.35	1.04	± 12.0 %		
900	55.0	1.05	9.05	9.05	9.05	0.30	1.12	± 12.0 %		
1750	53.4	1.49	7.74	7.74	7.74	0.27	1.01	± 12.0 %		
1900	53.3	1.52	7.54	7.54	7.54	0.35	0.85	± 12.0 %		
2000	53.3	1.52	7.62	7.62	7.62	0.37	0.84	± 12.0 %		
2300	52.9	1.81	7.06	7.06	7.06	0.35	0.80	± 12.0 %		
2450	52.7	1.95	7.05	7.05	7.05	0.34	0.80	± 12.0 %		
2600	52.5	2.16	6.71	6.71	6.71	0.37	0.80	± 12.0 %		
5200	49.0	5.30	4.07	4.07	4.07	0.50	1.90	± 13.1 %		
5300	48.9	5.42	3.81	3.81	3.81	0.55	1.90	± 13.1 %		
5600	48.5	5.77	3,47	3.47	3.47	0.55	1.90	± 13.1 %		
5800	48.2	6.00	3.52	3.52	3.52	0.60	1.90	± 13.1 %		

[©] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 90 MHz. The uncertainty is the RSS of the CornF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for cornF assessments at 30, 64, 128, 150 and 220 MHz respectively. Above 5 GHz frequency validity can be extended to ± 110 MHz.

*At frequencies below 3 GHz, the validity of tissue parameters (a and or) can be relaxed to ± 10% if figuid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (a and or) is assistant to ± 5%. The uncertainty is the RSS of the CornF uncertainty for indicated target fiscue parameters.

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

Certificate No: EX3-3831 Jen16

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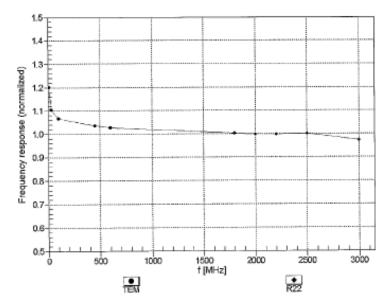
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EX3DV4-SN:3831

January 27, 2016

Frequency Response of E-Field

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



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

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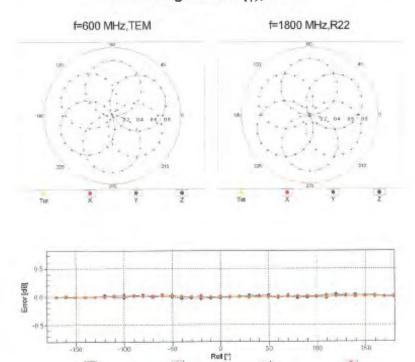
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EX3DV4- SN:3831

January 27, 2016

2500 MHz

Receiving Pattern (\$\phi\$), \$\partial = 0°



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

8CO MHz

Certificate No. EX3-3831_Jan16

100 MHz

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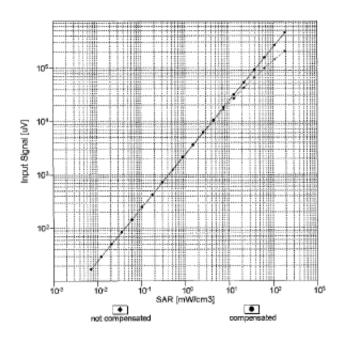


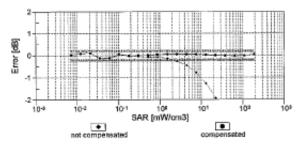
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EX3DV4- SN:3831

January 27, 2016

Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)





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

Certificate No: EX3-3831_Jan16

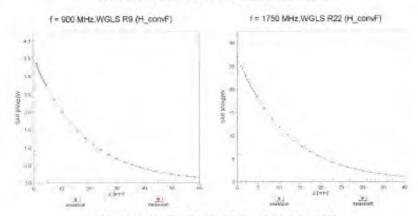
Page 9 of 11



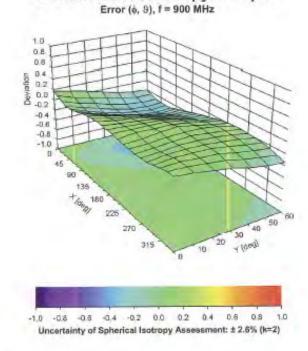
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EX3DV4- SN:3831 January 27, 2016

Conversion Factor Assessment



Deviation from Isotropy in Liquid



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EX3DV4-SN:3831

January 27, 2016

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

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (*)	-20.3
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overali Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Certificate No: EX3-3831_Jan16

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8. Uncertainty Budget

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

		-			,		h . + f / .		
A	C Toloropoo/	D Probabilit	е		Ť	g	h=c * f / e	i=c * g / e Standard	k
Source of Uncertainty	Tolerance/ Uncertainty	У	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.55%	N	1	1	1	1	6.55%	6.55%	œ
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	œ
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	00
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	œ
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	80
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	œ
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	80
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	8
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	œ
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	œ
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	œ
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	œ
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	œ
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	œ
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	80
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	œ
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	œ
Deviation from reference liquid target ε 'r(Body)	1.03%	N	1	1	0.64	0.43	0.66%	0.44%	М
Deviation from reference liquid target σ (Body)	1.00%	N	1	1	0.6	0.49	0.60%	0.49%	М
Combined standard uncertainty		RSS					11.67%	11.64%	
Expant uncertainty (95% confidence							23.33%	23.28%	



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

А	С	D	е		f	g	h=c * f / e	i=c * g / e	k
Source of Uncertainty	Tolerance/ Uncertainty	Probabilit y	Div	Div Value	ci (1g)	ci (10g)	Standard uncertainty	Standard uncertainty	vi, or Veff
Measurement system									
Probe calibration	6.00%	N	1	1	1	1	6.00%	6.00%	∞
Isotropy , Axial	3.50%	R	√3	1.732	1	1	2.02%	2.02%	∞
Isotropy, Hemispherical	9.60%	R	√3	1.732	1	1	5.54%	5.54%	∞
Boundary Effect	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Linearity	4.70%	R	√3	1.732	1	1	2.71%	2.71%	∞
Detection Limits	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Readout Electronics	0.30%	N	1	1	1	1	0.30%	0.30%	∞
Response time	0.80%	R	√3	1.732	1	1	0.46%	0.46%	∞
Integration Time	2.60%	R	√3	1.732	1	1	1.50%	1.50%	∞
Measurement drift (class A evaluation)	1.75%	R	√3	1.732	1	1	1.01%	1.01%	∞
RF ambient condition - noise	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
RF ambient conditions - reflections	3.00%	R	√3	1.732	1	1	1.73%	1.73%	∞
Probe positioner Mechanical restrictions	0.40%	R	√3	1.732	1	1	0.23%	0.23%	∞
Probe Positioning with respect to phantom	2.90%	R	√3	1.732	1	1	1.67%	1.67%	∞
Post-processing	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Max SAR Eval	1.00%	R	√3	1.732	1	1	0.58%	0.58%	∞
Test Sample related									
Test sample positioning	2.90%	N	1	1	1	1	2.90%	2.90%	M-1
Device Holder Uncertainty	3.60%	N	1	1	1	1	3.60%	3.60%	M-1
Drift of output power	5.00%	R	√3	1.732	1	1	2.89%	2.89%	∞
Phantom and Setup									
Phantom Uncertainty	4.00%	R	√3	1.732	1	1	2.31%	2.31%	∞
Deviation from reference liquid target ε 'r(Body)	2.88%	N	1	1	0.64	0.43	1.84%	1.24%	М
Deviation from reference liquid target σ (Body)	4.23%	N	1	1	0.6	0.49	2.54%	2.07%	М
Combined standard uncertainty		RSS					11.76%	11.58%	
Expant uncertainty (95% confidence							23.52%	23.15%	



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9. Phantom Description

Schmis & Parmer Engineering AG Zeughausstrases 43, 8004 Zurich, Switzelland. Phona +41 1 245 9700, Fax +41 1 245 9779 Info@spasg.com, http://www.apaag.com

Certificate of Conformity / First Article Inspection

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

Tests

The series production process used allows the limitation to test of first articles.

Complete tests were made on the pre-series Type No. QD 000 P40 AA, Serial No. TP-1001 and on the series first article Type No. QD 000 P40 BA, Serial No. TP-1006. Certain parameters have been refested using further series items (called samples) or are tested at each item.

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

- Standards [1] CENELEC EN 50361 [2] IEEE Std 1528-2003 [3] IEO 62209 Part I

Signature / Stamp

- FCC OET Suiletin 65, Supplement C, Edition 01-01
 The IT'IS CAD file is derived from [2] and is also within the tolerance requirements of the shapes of the other documents.

Conformity

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

07.07.2005

Sennit & Parani Engineering AQ Triuphauaginee 43, 8004 Zurich, Suitzerland Pacas 45, 1, 265 Brook Facility 245 0778 Into Depart, com. http://www.apear.com

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10. System Validation from Original Equipment Supplier

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





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

Accreditation No.: SCS 0108

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

Client SGS-TW (Auden)

Certificate No: D835V2-4d063_Aug15

	ERTIFICATE		
Object	D835V2 - SN: 4d	063	
Calibration procedure(s)	QA CAL-05.v9 Calibration proce	dure for dipole validation kits abo	ove 700 MHz
Calibration date:	August 24, 2015		
		onal standards, which realize the physical un robability are given on the following pages an	
All calibrations have been conduc	cted in the closed laborator	y facility: environment temperature (22 ± 3)°0	C and numidity < 70%.
Calibration Equipment used (M&	TE critical for calibration)		
	TE-critical for calibration)	Cal Date (Certificate No.)	Scheduled Calibration
rimary Standards		Cal Date (Certificate No.) 07-Oct-14 (No. 217-02020)	Scheduled Calibration Oct-15
Primary Standards Power meter EPM-442A	ID#		
Primary Standards Power meter EPM-442A Power sensor HP 8481A	ID # GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A	ID # GB37480704 US37292783	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020)	Oct-15 Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination	ID # GB37480704 US37292783 MY41092317	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021)	Oct-15 Oct-15 Oct-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Pelerence 20 dB Attenuator Type N mismatch combination Reference Probe ES3DV3	ID-# GB37480704 US37292763 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3	ID-# GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16
Primary Standards Power meter EPM-442A Power sensor HP 9481A Power sensor HP 9481A Power sensor HP 8481A Type N mismatch combination Reference Probe ES3DV3 DAE4	ID-# GB37480704 US37292763 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator (ype-N mismatch combination Reference Probe ES3DV3)AE4 Secondary Standards	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Occ-14 (No. ESS-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16
Calibration Equipment used (M& Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenualor Type N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02131) 30-Dec-14 (No. ES3-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15) Check Date (in house)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16 Scheduled Check
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES30V3 DAE4 Secondary Standards RF generator R8S SMT-06	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 \$4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Occ-14 (No. E53-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16 Scheduled Check In house check: Oct-16 In house check: Oct-16
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Resondary Standards RF generator R8S SMT-08 Retwork Analyzer HP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 3205 SN: 801 ID # 100005 US37390585 \$4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15) Check Date (in house) 04-Aug-99 (in inouse check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16 Scheduled Check
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R8.S SMT-08 Network Analyzer HP 8753E	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 \$4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Occ-14 (No. E53-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16 Scheduled Check In bouse check: Oct-16 In house check: Oct-16
Primary Standards Power meter EPM-442A Power sensor HP 8481A Power sensor HP 8481A Reference 20 dB Attenuator Type N mismatch combination Reference Probe ES30V3 DAE4 Secondary Standards RF generator R&S SMT-06	ID # GB37480704 US37292783 MY41092317 SN: 5058 (20k) SN: 5047 2 / 06327 SN: 3205 SN: 801 ID # 100005 US37390585 \$4206	07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02020) 07-Oct-14 (No. 217-02021) 01-Apr-15 (No. 217-02021) 01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 17-Aug-15 (No. DAE4-601_Aug15) Check Date (in house) 04-Aug-99 (in inouse check Oct-13) 18-Oct-01 (in house check Oct-14)	Oct-15 Oct-15 Oct-15 Mar-16 Mar-16 Dec-15 Aug-16 Scheduled Check In house check: Oct-16 In house check: Oct-16

Certificate No: D835V2-4d063_Aug15

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





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS).

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

Glossary:

tissue simulating liquid TSL 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
- IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)*, March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: DB35V2-40063 Aug15

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Measurement Conditions

DASY system configuration, 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

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.9 ± 6 %	0.93 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.11 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.97 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.1 ± 6 %	1.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.40 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.28 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.57 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.11 W/kg ± 16.5 % (k=2)

Certificate No: D835V2-4d063_Aug15



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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.3 Ω - 1.7 jΩ
Return Loss	- 33.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.9 Ω - 2.7 jΩ
Return Loss	- 29.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.394 ns

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

Certificate No: D835V2-4d063_Aug15

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DASY5 Validation Report for Head TSL

Date: 21.08.2015

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; $\sigma = 0.93 \text{ S/m}$; $\epsilon_r = 41.9$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.2, 6.2, 6.2); Calibrated: 30.12.2014;
- · Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17,08.2015
- 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 = 55.92 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 3.44 W/kg

SAR(1 g) = 2.33 W/kg; SAR(10 g) = 1.52 W/kgMaximum value of SAR (measured) = 2.73 W/kg



0 dB = 2.73 W/kg = 4.36 dBW/kg

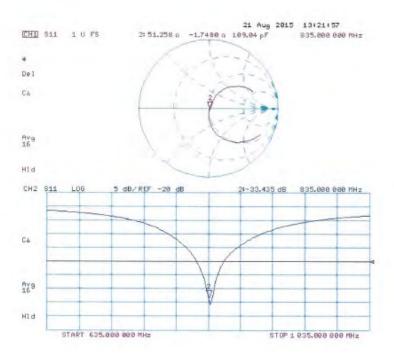
Certificate No: D835V2-4d063_Aug15

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Impedance Measurement Plot for Head TSL



Certificate No: D835V2-4d063_Aug15

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DASY5 Validation Report for Body TSL

Date: 24.08.2015

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; $\sigma = 1.02 \text{ S/m}$; $\epsilon_r = 56.1$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(6.17, 6.17, 6.17); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

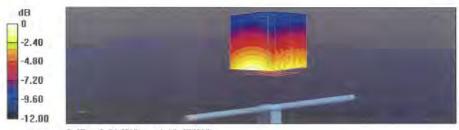
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 54.07 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 3,52 W/kg

SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.57 W/kg

Maximum value of SAR (measured) = 2.81 W/kg

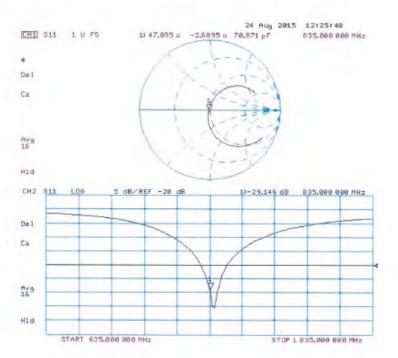


0 dB = 2.81 W/kg = 4.49 dBW/kg



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Impedance Measurement Plot for Body TSL





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Swiss Calibration Service

Accreditation No.: SCS 0108

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

Multilateral Agreement for the recognition of calibration certificates

SGS-TW (Auden) Certificate No: D1750V2-1008_Aug15 CALIBRATION CERTIFICATE Object D1750V2 - SN: 1008 Dalibration procedura(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz Calibration date. August 20, 2015 This calibration conflicate documents the traceability to national standards, which resilize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility, unvironment temperature $(22 \pm 3)^{\circ}$ C and number < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards (D) # Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Oct 15 Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 01-Apr-15 (No. 217-02131) Mar-16 Type-N mismatch combination SN: 5047.2 / 06327 01-Apr-15 (No. 217-02134) Mar-16 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205_Dec14) Dec-15 DAE4 SN: 601 17-Aug-15 (No. DAE4-601_Aug15) Aug-18 Secondary Standards Check Date (in house) Scheduled Check RF generator R&S SMT-06 100006 94 Aug 99 (in house check Oct-13) In house church. Oct-16 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Name Function Laboratory Technician Calibrated by: Michael Weber Approved by: Kalja Pokovic Technical Manager issued: August 21, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

Certificate No: D1750V2-1008_Aug15

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Calibration Laboratory of

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Accreditation No.: SCS 0108

Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)

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Glossary:

TSL

tissue simulating liquid

ConvF N/A

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)*, February 2005
- c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- 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	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.8 ± 6 %	1.36 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.85 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.4 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.1 ± 6 %	1.48 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		even.

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.36 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.4 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.05 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 SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.5 Ω + 1.1 jΩ
Return Loss	- 38.7 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.9 Ω + 1.0 jΩ
Return Loss	- 29.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.221 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

Certificate No: D1750V2-1008_Aug15

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DASY5 Validation Report for Head TSL

Date: 20.08.2015

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; $\sigma = 1.36 \text{ S/m}$; $\epsilon_r = 39.8$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

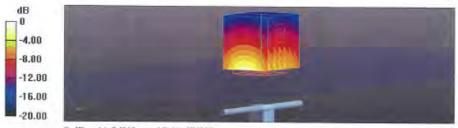
DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5.2, 5.2, 5.2); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- 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 = 95.15 V/m; Power Drift = 0.04 dB Peak SAR (extrapolated) = 16.3 W/kg SAR(1 g) = 9.12 W/kg; SAR(10 g) = 4.85 W/kg

Maximum value of SAR (measured) = 11.5 W/kg

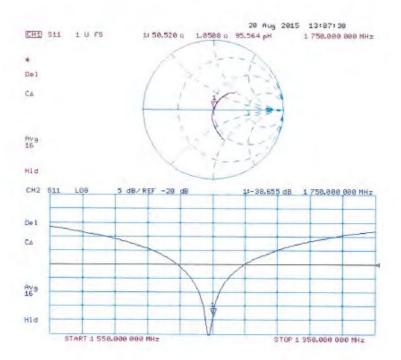


0 dB = 11.5 W/kg = 10.61 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 20.08.2015

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; $\sigma = 1.48$ S/m; $\varepsilon_r = 52.1$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

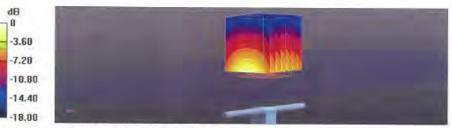
DASY52 Configuration:

- Probe; ES3DV3 SN3205; ConvF(4.88, 4.88, 4.88); Calibrated: 30.12.2014;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 17.08.2015
- 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 = 93.12 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 16.1 W/kg

SAR(1 g) = 9.36 W/kg; SAR(10 g) = 5.05 W/kgMaximum value of SAR (measured) = 11.8 W/kg

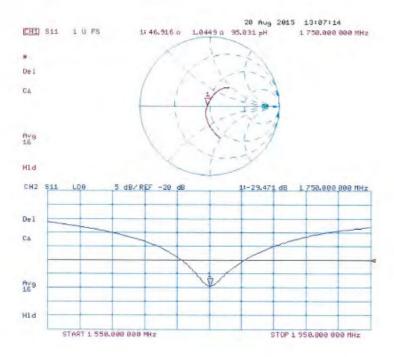


0 dB = 11.8 W/kg = 10.72 dBW/kg



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Impedance Measurement Plot for Body TSL



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SGS-TW (Auden)

Accreditation No.: SCS 0108

Certificate No: D1900V2-5d027_Apr15

CALIBRATION CERTIFICATE Object D1900V2 - SN:5d027 Calibration procedure(s) QA CAL-05.v9 Calibration procedure for dipole validation kits above 700 MHz April 29, 2015 Calibration date: This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate. All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3) °C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) Primary Standards ID# Cal Date (Certificate No.) Scheduled Calibration Power meter EPM-442A GB37480704 07-Oct-14 (No. 217-02020) Oct-15 Power sensor HP 8481A US37292783 07-Oct-14 (No. 217-02020) Power sensor HP 8481A MY41092317 07-Oct-14 (No. 217-02021) Oct-15 Reference 20 dB Attenuator SN: 5058 (20k) 01-Apr-15 (No. 217-02131) Mar-16 Type-N mismatch combination SN: 5047.2 / 06327 01-Apr-15 (No. 217-02134) Mar-16 Reference Probe ES3DV3 SN: 3205 30-Dec-14 (No. ES3-3205 Dec14) Dec-15 DAE4 SN: 601 18-Aug-14 (No. DAE4-601_Aug14) Aug-15 ID# Check Date (in house) Scheduled Check Secondary Standards RF generator R&S SMT-06 04-Aug-99 (in house check Oct-13) In house check: Oct-16 100005 Network Analyzer HP 8753E US37390585 S4206 18-Oct-01 (in house check Oct-14) In house check: Oct-15 Function Name Claudio Leubler Laboratory Technician Calibrated by: Katja Pokovic Technical Manager Approved by: Issued: April 29, 2015 This calibration certificate shall not be reproduced except in full without written approval of the laboratory

Certificate No: D1900V2-5d027_Apr15

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Accreditation No.: SCS 0108

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

- 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
- 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	V52.8.8
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	38.6 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.6 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	21.3 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied

The following parameters and calculations were appropriate	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	52.8 ± 6 %	1.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.78 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.3 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.9 W/kg ± 16.5 % (k=2)

Certificate No: D1900V2-5d027_Apr15



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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.2 Ω + 2.5 jΩ
Return Loss	- 32.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	$46.5 \Omega + 2.5 j\Omega$
Return Loss	- 27.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.197 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 17, 2002

Certificate No: D1900V2-5d027_Apr15

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DASY5 Validation Report for Head TSL

Date: 29.04.2015

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; $\sigma = 1.37 \text{ S/m}$; $\varepsilon_r = 38.6$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

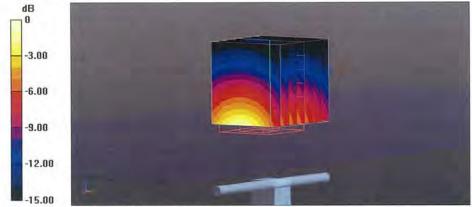
DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(5, 5, 5); Calibrated: 30.12.2014;
- 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 = 97.71 V/m; Power Drift = 0.03 dB Peak SAR (extrapolated) = 18.5 W/kg SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.3 W/kg

Maximum value of SAR (measured) = 12.3 W/kg

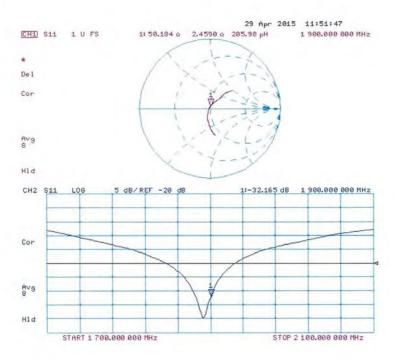


0 dB = 12.3 W/kg = 10.90 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 29.04.2015

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; $\sigma = 1.5$ S/m; $\epsilon_r = 52.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

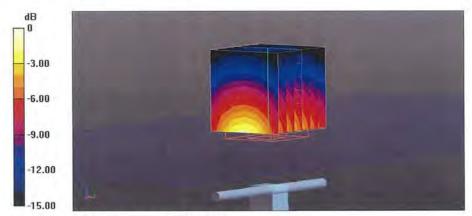
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.65, 4.65, 4.65); Calibrated: 30.12.2014;
- · 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 = 94.63 V/m; Power Drift = 0.06 dB Peak SAR (extrapolated) = 16.7 W/kg SAR(1 g) = 9.78 W/kg; SAR(10 g) = 5.2 W/kg Maximum value of SAR (measured) = 12.4 W/kg



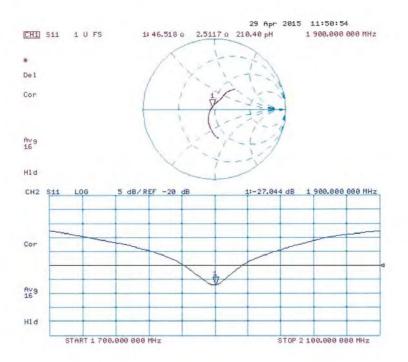
0 dB = 12.4 W/kg = 10.93 dBW/kg

Certificate No: D1900V2-5d027_Apr15



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Impedance Measurement Plot for Body TSL





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S Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

client SGS-TW (Auden)

Cartificate No: D2450V2-727 Apr15

	ERTIFICATE		
Object	D2450V2 - SN: 7	27	
calibration procedure(s)	QA CAL-05.v9 Calibration proces	dure for dipole validation kits abo	ve 700 MHz
Calibration date:	April 22, 2015		
		onal ständards, which realize the physical un robability are given on the following pages an	
All calibrations have been conduc	cted in the closed laborator	y facility: environment temperature (22 ± 3)°C	2 and humidity < 70%.
Calibration Equipment used (M&	TE critical for calibration)		
rimary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
ower meter EPM-442A	GB37480704	07-Oct-14 (No. 217-02020)	Oct-15
ower sensor HP 8481A	US37292783	07-Oct-14 (No. 217-02020)	Oct-15
ower sensor HP 8481A	MY41092317	07-Oct-14 (No. 217-02021)	Oct-15
	SN: 5058 (20k)		OCI-19
eference 20 dB Attenuator	314. 3030 (ZUK)	01-Apr-15 (No. 217-02131)	Mar-16
	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02131) 01-Apr-15 (No. 217-02134)	
ype-N mismatch combination			Mar-16
Type-N mismatch combination Reference Probe ES3DV3	SN: 5047.2 / 06327	01-Apr-15 (No. 217-02134)	Mar-16 Mar-16
Reference 20 dB Attenuator Type-N mismatch combination Reference Probe ES3DV3 DAE4	SN: 5047.2 / 06327 SN: 3205 SN: 601	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Mar-16 Mar-16 Dec-15
ype-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards	SN: 5047.2 / 06327 SN: 3205	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house)	Mar-16 Mar-16 Dec-15 Aug-15 Scheduled Check
Type-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards RF generator R&S SMT-06	SN: 5047.2 / 06327 SN: 3205 SN: 601	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14)	Mar-16 Mar-16 Dec-15 Aug-15 Scheduled Check In house check: Oct-16
Type-N mismatch combination Reference Probe ES3DV3	SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-801_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Mar-16 Mar-16 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15
ype-N mismatch combination Reference Probe ES3DV3 DAE4 Recondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Mar-16 Mar-16 Dec-15 Aug-15
Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06	SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-801_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Mar-16 Mar-16 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15
Type-N mismatch combination Reference Probe ES3DV3 DAE4 Secondary Standards RF generator R&S SMT-06 Network Analyzer HP 8753E	SN: 5047.2 / 06327 SN: 3205 SN: 601 ID # 100005 US37390585 S4206	01-Apr-15 (No. 217-02134) 30-Dec-14 (No. ES3-3205_Dec14) 18-Aug-14 (No. DAE4-601_Aug14) Check Date (in house) 04-Aug-99 (in house check Oct-13) 18-Oct-01 (in house check Oct-14)	Mar-16 Mar-16 Dec-15 Aug-15 Scheduled Check In house check: Oct-16 In house check: Oct-15

Certificate No: D2450V2-727_Apr15

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S Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Glossary:

TSL tissue simulating liquid

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

Multilateral Agreement for the recognition of calibration certificates

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
- 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

as far as not given on nage 1

DASY Version	DASY5	V52.8.8
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

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.6 ± 6 %	1.82 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.10 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg ± 16.5 % (k=2)

Body TSL parameters
The fellowing 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 %	2.02 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	51.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	24.0 W/kg ± 16.5 % (k=2)

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	56.2 Ω + 1.3 jΩ
Return Loss	- 24.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.8 Ω + 3.3 jΩ
Return Loss	- 28.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 ns

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

Certificate No: D2450V2-727_Apr15

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DASY5 Validation Report for Head TSL

Date: 22.04.2015

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; $\sigma = 1.82$ S/m; $\varepsilon_r = 37.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.54, 4.54, 4.54); Calibrated: 30.12.2014;
- · 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 = 101.5 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 27.4 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.1 W/kg

Maximum value of SAR (measured) = 17.5 W/kg

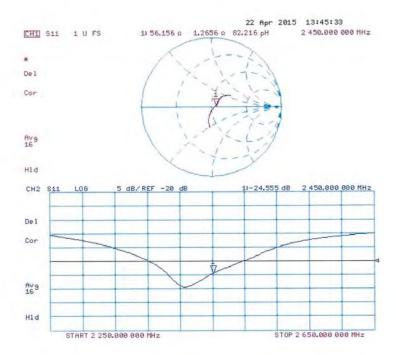


0 dB = 17.5 W/kg = 12.43 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 22.04.2015

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; $\sigma = 2.02$ S/m; $\epsilon_r = 50.6$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: ES3DV3 SN3205; ConvF(4.32, 4.32, 4.32); Calibrated: 30.12.2014;
- · 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 = 95.54 V/m; Power Drift = -0.01 dB Peak SAR (extrapolated) = 27.2 W/kg SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.1 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.1 W/kgMaximum value of SAR (measured) = 17.4 W/kg

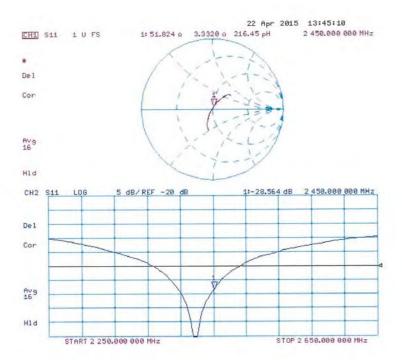


0 dB = 17.4 W/kg = 12.41 dBW/kg



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Impedance Measurement Plot for Body TSL



Certificate No: D2450V2-727_Apr15

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Accreditation No.: SCS 0108

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

SGS-TW (Auden) Certificate No. D5GHzV2-1023 Jan 16 CALIBRATION CERTIFICATE Object D5GHzV2 - SN: 1023 QA CAL-22.V2 Calibration procedure(s) Calibration procedure for dipole validation kits between 3-6 GHz Calibration date January 26, 2016 This collibration certificate documents the traceability to national standards, which realize the physical units of measurements (Si) The measurements and the uncontainties with confidence probability are given on the following pages and are cart of the certificate, All calibrations have been conducted in the closed laboratory facility: environment temperature (22 a 31°C and humidity < 70%. Calibration Equipment used (M&TE critical for calibration) D# Cai Date (Certificate No.) Primary Standards GB37480704 07-Oct-15 (No. 217-02222) Power meter EPM-442A Oct-16 US37292783 07-Oct-15 (No. 217-02222) Oct-16 Power sensor HP 8461A Power sonsor HP 8481A MY41092317 07-Oct-15 (No. 217-02223) Oct-16 Reference 20 dB Attenuator SN: 5056 (20k) 01-Apr-15 (No. 217-02131) Mar-16 Type-N mismatch combination SN: 5047.2 / 06327 81-Apr-15 (No. 217-02154) May-16 Reference Probe EX3DV4 SM 3503 31 Dec-15 (No. EX3-3533, Dec 15) Dec-18 DAE4 SN. 801 30-Dec-15 (No. DAE4-601_Dec15) Dec-16 Secondary Standards 10.8 Check Date (in house) Scheduled Check 15-Jun-15 (in house check Jun-15) In house check: Jun-18 RF generator R&S SMT-06 100972 US37390685-\$4206 In house chack: Oct-16 Nelwork Analyzar HP 8753E 18-Oct-01 (in house check Oct-15) Name **Function** Calibrated by Michael Weber Liaboratory Technician Approved by: Kata Poković Technical Manager issued: January 28, 2018 This calibration certificate shall not be reproduced except in full without written approval of the inberatory

Certificate No: 05GHzV2-1023 Jan16

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Accreditation No.: SCS 0108

Accurated by # a Swini Accurationum Service (SAS)

The Swiss Accreatation Service is any of the signatories to the EA Multilatoral Agreement for the recognition of calibration certificates.

Glossary:

TSL ConvF N/A tissue simulating liquid

sensitivity in TSL / NOFM x,y,z not applicable or not measured

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
- EC 62208-2. "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
- 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.
- Fued Point Impedence 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	V52.8.8
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 5600 MHz ± 1 MHz	

Head TSL parameters at 5200 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	36.0	4.66 m/no/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.2 ± 6 %	4.51 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	77.0 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.1 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	35.1 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5300 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.03 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	79.9 W / kg ± 19.9 % (k=2)

SAR averaged over 10 cm3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.1 W/kg ± 19.5 % (k=2)

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.7 ± 6 %	4.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm3 (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	82.6 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.38 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.6 W/kg ± 19.5 % (k=2)

Certificate No: D5GHzV2-1023_Jan16

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Head TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.3	5.27 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	5.10 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL at 5800 MHz

SAR averaged over 1 cm ² (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.78 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	77.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.22 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	22.0 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	47.1 ± 6 %	5.37 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL at 5200 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	71.9 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.05 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.3 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	46.9 ± 6 %	5.50 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		

SAR result with Body TSL at 5300 MHz

SAR averaged over 1 cm3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.57 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	75.1 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.2 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	46.4 ± 6 %	5.91 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C		****

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	78.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ² (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	22.1 W/kg ± 19.5 % (k=2)

Body TSL parameters at 5800 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.2	6.00 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.0 ± 6 %	6.19 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	7.59 W/kg
SAR for nominal Borly TSL parameters	normalized to 1W	75.3 W/kg ± 19.9 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	21.1 W/kg ± 19.5 % (k=2)

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Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5200 MHz

Impedance, transformed to feed point	49.1 Ω - 8.4 jΩ
Return Loss	- 21.4 dB

Antenna Parameters with Head TSL at 5300 MHz

Impedance, transformed to feed point	49.6 Ω · 4.2 jΩ
Return Loss	- 27.4 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.9 Ω - 1.4 jΩ
Return Loss	- 26.3 dB

Antenna Parameters with Head TSL at 5800 MHz

Impedance, transformed to feed point	55.9 Ω + 2.2 jΩ
Return Loss	- 24.5 dB

Antenna Parameters with Body TSL at 5200 MHz

Impedance, transformed to feed point	49.4 Ω - 6.8 jΩ
Return Loss	- 23.3 dB

Antenna Parameters with Body TSL at 5300 MHz

Impedance, transformed to feed point	50.9 Ω - 2.4 jΩ
Return Loss	- 31.8 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.0 Ω - 0.1 jΩ
Fleturn Loss	- 25.0 dB

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Antenna Parameters with Body TSL at 5800 MHz

Impedance, transformed to feed point	56.4 Ω + 2.4 jΩ
Return Loss	- 23.8 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-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	February 05, 2004



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DASY5 Validation Report for Head TSL

Date: 26.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

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

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600

MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz; σ = 4.51 S/m; ϵ_r = 35.2; ρ = 1000 kg/m³, Medium parameters used: f = 5300 MHz; σ = 4.6 S/m; ϵ_r = 35.1; ρ = 1000 kg/m³, Medium parameters used: f = 5600 MHz; σ = 4.9 S/m; ϵ_r = 34.7; ρ = 1000 kg/m³, Medium parameters used: f = 5800 MHz; σ = 5.1 S/m; ϵ_r = 34.4; ρ = 1000 kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(5.59, 5.59, 5.59); Calibrated: 31.12.2015, ConvF(5.25, 5.25, 5.25); Calibrated: 31.12.2015, ConvF(4.99, 4.99, 4.99); Calibrated: 31.12.2015, ConvF(4.95, 4.95, 4.95); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- · Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Scrial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 72.68 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 28.1 W/kg

SAR(1 g) = 7.74 W/kg; SAR(10 g) = 2.23 W/kgMaximum value of SAR (measured) = 17.8 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 73.14 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 30.0 W/kg

SAR(1 g) = 8.03 W/kg; SAR(10 g) = 2.33 W/kg Maximum value of SAR (measured) = 18.7 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 = 73.32 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 32.6 W/kg

SAR(1 g) = 8.31 W/kg; SAR(10 g) = 2.38 W/kg

Maximum value of SAR (measured) = 19.8 W/kg

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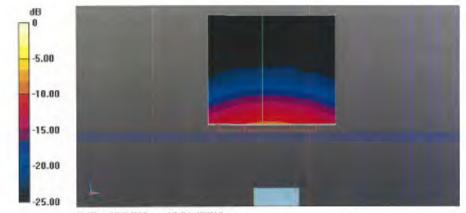
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm Reference Value = 70.15 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 32.0 W/kg

SAR(1 g) = 7.78 W/kg; SAR(10 g) = 2.22 W/kg

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

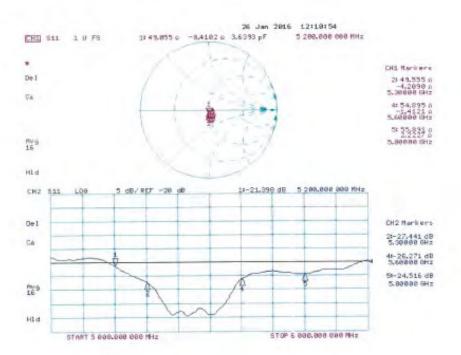


0 dB = 18.8 W/kg = 12.74 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 25.01.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1023

Communication System: UID 0 - CW; Frequency: 5200 MHz, Frequency: 5300 MHz, Frequency: 5600 MHz, Frequency: 5800 MHz

Medium parameters used: f = 5200 MHz; $\sigma = 5.37$ S/m; $\varepsilon_r = 47.1$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5300 MHz; $\sigma = 5.5$ S/m; $\varepsilon_r = 46.9$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5600 MHz; $\sigma = 5.91$ S/m; $\varepsilon_r = 46.4$; $\rho = 1000$ kg/m³, Medium parameters used: f = 5800 MHz; $\sigma = 6.19$ S/m; $\varepsilon_r = 46$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 SN3503; ConvF(4.99, 4.99, 4.99); Calibrated: 31.12.2015, ConvF(4.75, 4.75, 4.75); Calibrated: 31.12.2015, ConvF(4.35, 4.35, 4.35); Calibrated: 31.12.2015, ConvF(4.27, 4.27, 4.27); Calibrated: 31.12.2015;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5200 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 66.72 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 7.25 W/kg; SAR(10 g) = 2.05 W/kg

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

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5300 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 67.43 V/m; Power Drift = 0.02 dB

Peak SAR (extrapolated) = 29.1 W/kg

SAR(1 g) = 7.57 W/kg; SAR(10 g) = 2.14 W/kg

Maximum value of SAR (measured) = 17.7 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 = 67.67 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 32.6 W/kg

SAR(1 g) = 7.89 W/kg; SAR(10 g) = 2.23 W/kg

Maximum value of SAR (measured) = 19.1 W/kg

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Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5800 MHz/Zoom Scan,

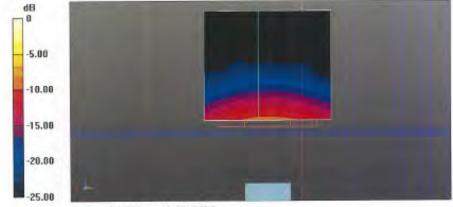
dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.76 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 33.0 W/kg

SAR(1 g) = 7.59 W/kg; SAR(10 g) = 2.13 W/kg

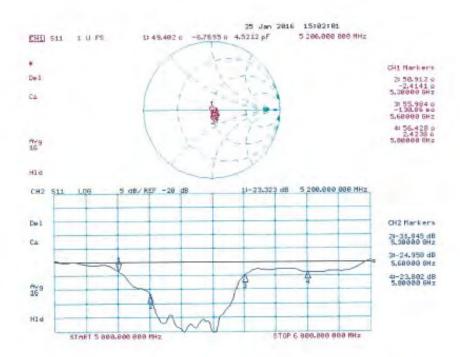
Maximum value of SAR (measured) = 18.5 W/kg





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Impedance Measurement Plot for Body TSL



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- End of 1st part of report -