

SAR Compliance Test Report

Test report no.:	FCC_RM-1038_03	Date of report:	2014-07-14
Template version:	19.7	Number of pages:	98
Testing laboratory:	TCC Microsoft Beijing Laboratory Beijing Economic and Technological Development Area No.5 Donghuan Zhonglu Beijing PRC China 100176 Tel. +86 10 8711 8888 Fax. +86 10 8711 4550	Client:	Microsoft Beijing Economic and Technological Development Area No.5 Donghuan Zhonglu Beijing PRC China 100176 Tel. +86 10 8711 8888 Fax. +86 10 8711 4550
Responsible test engineer:	Zhang Luwen	Product contact person:	Hu Helen
Measurements made by:	Cai Jim, Liu Xianchao, Zhang Luwen, Yuan Rui, He Ying, Xu Liping, Wang Weike		
Tested device:	RM-1038		
FCC ID:	QTLRM-1038	IC:	-
Supplement reports:	SAR_Photo_RM-1038_04		
Testing has been carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC published RF exposure KDB procedures RSS-102, Issue 4 Evaluation Procedure for Mobile and Portable Radio Transmitters with Respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields IEEE 1528 - 2013 IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique		
Documentation:	The documentation of the testing performed on the tested devices is archived for 15 years at TCC Microsoft.		
Test results:	The tested device complies with the requirements in respect of all parameters subject to the test. The test results and statements relate only to the items tested. The test report shall not be reproduced except in full, without written approval of the laboratory.		

Date and signatures:

For the contents:



Digitally signed by Zhang Luwen
DN: cn=Zhang Luwen,
o=Microsoft, ou=TCC RCL,
email=Luwen.zhang@microsoft.com, c=CN
Date: 2014.08.06 09:39:34 +08'00'

CONTENTS

1. SUMMARY OF SAR TEST REPORT	4
1.1 TEST DETAILS.....	4
1.2 MAXIMUM RESULTS.....	4
1.2.1 Head Configuration.....	4
1.2.2 Body Worn Configuration.....	5
1.2.3 Wireless Router Configuration.....	5
1.2.4 Summary SAR data.....	6
1.2.5 Maximum Drift	6
1.2.6 Measurement Uncertainty.....	6
2. DESCRIPTION OF THE DEVICE UNDER TEST.....	7
2.1 DESCRIPTION OF THE ANTENNA.....	9
3. TEST CONDITIONS	11
3.1 TEMPERATURE AND HUMIDITY.....	11
3.2 TEST SIGNAL, FREQUENCIES AND OUTPUT POWER.....	11
4. DESCRIPTION OF THE TEST EQUIPMENT.....	13
4.1 MEASUREMENT SYSTEM AND COMPONENTS	13
4.1.1 Isotropic E-field Probe Type ES3DV3.....	15
4.1.2 Isotropic E-field Probe Type EX3DV4.....	15
4.2 PHANTOMS	16
4.3 TISSUE SIMULANTS	16
4.3.1 Tissue Simulant Recipes.....	16
4.4 SYSTEM VALIDATION AND SYSTEM CHECKING.....	17
4.4.1 System validation status.....	17
4.4.2 System checking.....	17
4.5 TISSUE SIMULANTS USED IN THE MEASUREMENTS	20
5. DESCRIPTION OF THE TEST PROCEDURE.....	21
5.1 DEVICE HOLDER.....	21
5.2 TEST POSITIONS.....	21
5.2.1 Against Phantom Head.....	21
5.2.2 Body Worn Configuration.....	21
5.2.3 Wireless Router Configuration.....	22
5.3 SCAN PROCEDURES.....	22
5.4 SAR AVERAGING METHODS.....	22
6. MEASUREMENT UNCERTAINTY	23
7. RESULTS	25
7.1 THE MEASURED HEAD SAR VALUES FOR THE TEST DEVICE ARE TABULATED BELOW:	25
7.1.1 Combined Head SAR data	33
7.2 THE MEASURED BODY SAR VALUES FOR THE TEST DEVICE ARE TABULATED BELOW:	35
7.2.1 Combined Body SAR data.....	43
7.3 BODY SAR ASSESSMENT OF WIRELESS ROUTER MODE AT 10.0MM SEPARATION DISTANCE.....	45
7.3.1 Combined Body SAR data.....	54
APPENDIX A: SYSTEM CHECKING SCANS	56

APPENDIX B: MEASUREMENT SCANS.....	64
APPENDIX C: DIELECTRIC PARAMETERS OF THE TISSUE SIMULANTS	79
APPENDIX D: CONDUCTED AVERAGE POWER MEASUREMENTS FOR WCDMA AND HSUPA.....	81
APPENDIX E: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)	82
APPENDIX F: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)	83
APPENDIX G: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED LTE TRANSMISSION MODES	84
G.1 POWER TUNING TARGETS.....	84
G.2 CONDUCTED POWER FROM THE SAMPLES USED IN THE TESTING.....	84
APPENDIX H: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED GSM/GPRS/EGPRS TRANSMISSION MODES	94
APPENDIX I: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED WCDMA TRANSMISSION MODES.....	96
APPENDIX J: CONDUCTED POWER RESULTS FOR WLAN2450	97
J.1 POWER TUNING TARGETS.....	97
J.2 CONDUCTED POWER FROM THE SAMPLES USED IN THE TESTING	98

1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2014-07-09 to 2014-07-23
SN, HW and SW numbers of tested device	SN: 004402/47/923288/0, HW: 0201, SW: 02030.00000.14244.22000, DUT: 54100 SN: 004402/47/923231/0, HW: 0201, SW: 02030.00000.14244.22000, DUT: 54099 SN: 004402/47/923282/3, HW: 0201, SW: 02030.00000.14244.22000, DUT: 54098 SN: 004402/47/923297/1, HW: 0201, SW: 02030.00000.14244.22000, DUT: 54101
Batteries used in testing	BL-4UL, DUT: 54113, 54119, 54118, 54117, 54116
Headsets used in testing	WH-108, DUT: 54082, 54083, 53594
Other accessories used in testing	Normal Cover, DUT: 54055, 54057, 54058, 54059 CC-3086, DUT: 54052, 54053, 54042, 54054, 54048, 54049, 54050, 54051
State of sample	Prototype unit
Notes	-

1.2 Maximum Results

The maximum measured SAR values for Head configuration and Body Worn configuration are given in section 1.2.1, 1.2.2 and 1.2.3 respectively. The device conforms to the requirements of the standard(s) when the maximum measured SAR value is less than or equal to the limit.

1.2.1 Head Configuration

Mode	Ch / f(MHz)	Conducted power	Position	Measured SAR value (1g avg)	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
4-slot GPRS850	251 / 848.8	27.4 dBm	Left, Cheek	0.374 W/kg	0.37 W/kg	1.6 W/kg	PASSED	1
WCDMA850 (Band 5)	4233 / 846.6	23.3 dBm	Left, Cheek	0.358 W/kg	0.41 W/kg	1.6 W/kg	PASSED	2
3-slot GPRS1900	512 / 1850.2	25.3 dBm	Left, Cheek	0.283 W/kg	0.30 W/kg	1.6 W/kg	PASSED	3
LTE2500 (Band 7)	21100 / 2535.0	22.4 dBm	Left, Cheek	0.651 W/kg	0.73 W/kg	1.6 W/kg	PASSED	4
WLAN2450	6 / 2437.0	16.4 dBm	Left, Cheek	0.598 W/kg	0.86 W/kg	1.6 W/kg	PASSED	5
4-slot GPRS850 + WLAN2450	-	-	Left, Cheek	0.620 W/kg	0.88 W/kg	1.6 W/kg	PASSED	-
WCDMA850 (Band 5) + WLAN2450	-	-	Left, Cheek	0.624 W/kg	0.89 W/kg	1.6 W/kg	PASSED	-
3-slot GPRS1900 + WLAN2450	-	-	Left, Cheek	0.598 W/kg	0.86 W/kg	1.6 W/kg	PASSED	5
LTE2500 (Band 7) + WLAN2450	-	-	Left, Cheek	0.673 W/kg	0.91 W/kg	1.6 W/kg	PASSED	-

1.2.2 Body Worn Configuration

Mode	Ch / f(MHz)	Conducted power	Separation distance	Measured SAR value (1g avg)	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
4-slot GPRS850	128 / 824.2	27.3 dBm	1.5 cm	0.421 W/kg	0.43 W/kg	1.6 W/kg	PASSED	6
WCDMA850 (Band 5)	4233 / 846.6	23.3 dBm	1.5 cm	0.302 W/kg	0.35 W/kg	1.6 W/kg	PASSED	7
3-slot GPRS1900	512 / 1850.2	25.3 dBm	1.5 cm	0.239 W/kg	0.26 W/kg	1.6 W/kg	PASSED	8
LTE2500 (Band 7)	21100 / 2535.0	22.4 dBm	1.5 cm	0.576 W/kg	0.65 W/kg	1.6 W/kg	PASSED	9
WLAN2450	6 / 2437.0	16.4 dBm	1.5 cm	0.085 W/kg	0.12 W/kg	1.6 W/kg	PASSED	10
4-slot GPRS850 + WLAN2450	-	-	1.5 cm	0.437 W/kg	0.45 W/kg	1.6 W/kg	PASSED	-
WCDMA850 (Band 5) + WLAN2450	-	-	1.5 cm	0.326 W/kg	0.38 W/kg	1.6 W/kg	PASSED	-
3-slot GPRS1900 + WLAN2450	-	-	1.5 cm	0.249 W/kg	0.27 W/kg	1.6 W/kg	PASSED	-
LTE2500 (Band 7) + WLAN2450	-	-	1.5 cm	0.588 W/kg	0.66 W/kg	1.6 W/kg	PASSED	-

1.2.3 Wireless Router Configuration

Summary of Maximum Results for Wireless Router mode at 10.0mm

Mode	Ch / f(MHz)	Conducted power	Separation distance	Measured SAR value (1g avg)	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
4-slot GPRS850	128 / 824.2	27.3 dBm	10.0 mm	0.474 W/kg	0.49 W/kg	1.6 W/kg	PASSED	11
WCDMA850 (Band 5)	4233 / 846.6	23.3 dBm	10.0 mm	0.408 W/kg	0.47 W/kg	1.6 W/kg	PASSED	12
3-slot GPRS1900	512 / 1850.2	25.3 dBm	10.0 mm	0.333 W/kg	0.36 W/kg	1.6 W/kg	PASSED	13
LTE2500 (Band 7)	21100 / 2535.0	22.4 dBm	10.0 mm	1.16 W/kg	1.30 W/kg	1.6 W/kg	PASSED	14
WLAN2450	6 / 2437.0	16.4 dBm	10.0 mm	0.169 W/kg	0.24 W/kg	1.6 W/kg	PASSED	15
4-slot GPRS850 + WLAN2450	-	-	10.0 mm	0.493 W/kg	0.51 W/kg	1.6 W/kg	PASSED	-
WCDMA850 (Band 5) + WLAN2450	-	-	10.0 mm	0.408 W/kg	0.47 W/kg	1.6 W/kg	PASSED	12
3-slot GPRS1900 + WLAN2450	-	-	10.0 mm	0.333 W/kg	0.36 W/kg	1.6 W/kg	PASSED	13
LTE2500 (Band 7) + WLAN2450	-	-	10.0 mm	1.16 W/kg	1.30 W/kg	1.6 W/kg	PASSED	14

* Reported SAR values are scaled to, or measured at, upper limit of power tuning tolerance.

1.2.4 Summary SAR data

	FCC-defined SAR values for the Grants of Equipment Authorization		
	PCE	DTS	NII
Maximum Head SAR values	0.730 W/kg	0.864 W/kg	-
{Max + Max} Simultaneous Head SAR value	1.59 W/kg		
Maximum Body SAR values	0.646 W/kg	0.123 W/kg	-
{Max + Max} Simultaneous Body SAR value	0.737 W/kg		
Maximum Product Specific (Wireless Router) SAR values	1.30 W/kg	0.244 W/kg	-
{Max + Max} Simultaneous Product Specific SAR value	1.37 W/kg		
Maximum Simultaneous SAR value Head SAR: LTE2500 + WLAN2450	1.59 W/kg		

Note:

PCE contains the highest results between all cellular modes (cellular, AWS and PCS bands)
DTS contains the highest results between WLAN 2.4GHz + RLAN 5725-5850MHz
NII contains the highest results between RLAN 5150-5250, 5250-5350 and 5470-5725

1.2.5 Maximum Drift

Maximum drift covered by 5% scaling up of the SAR values	Maximum drift during measurements
0.2dB	0.16dB

1.2.6 Measurement Uncertainty

Expanded Uncertainty (k=2) 95%	± 29.8%
--------------------------------	---------

2. DESCRIPTION OF THE DEVICE UNDER TEST

Device category	Portable
Exposure environment	General population / uncontrolled

Modes of Operation	Bands	Modulation Mode	Duty Cycle	Transmitter Frequency Range (MHz)	Power Tuning Target (dBm)				Upper Limit of Power Tuning Tolerance (dBm)			
					1-slot	2-slot	3-slot	4-slot	1-slot	2-slot	3-slot	4-slot
GSM / GPRS	850	GMSK	1/8 to 4/8	824 – 849	33.0	30.0	28.2	27.0	33.4	30.4	28.6	27.4
	1900			1850 – 1910	30.0	27.0	25.2	24.0	30.4	27.4	25.6	24.4
EGPRS	850	GMSK	1/8 to 4/8	824 – 849	27.0	24.0	22.2	21.0	27.4	24.4	22.6	21.4
	1900			1850 – 1910	26.0	23.0	21.2	20.0	26.4	23.4	21.6	20.4
WCDMA HSUPA	850 (Band V)		1	826 – 847	23.5				23.9			
	850 (Band V)		1	826 – 847	See Appendix D for details							
LTE	2500 (Band 7)	QPSK / 16QAM	1	2402 – 2480	22.5 / 21.5				22.9 / 21.9			
BT	2450	GFSK	1	2402 – 2480	10.0				11.5			
					Ch 1	Ch 2-10	Ch 11		Ch 1	Ch 2-10	Ch 11	
WLAN b-mode	2450	Up to QPSK 11Mbps	1	2412 – 2472	16.0	16.5	16.0		17.5	18.0	17.5	
WLAN g-mode	2450	Up to 64QAM 54 Mbps	1	2412 – 2472	12.0	15.0	12.0		13.5	16.5	13.5	
WLAN n-mode	2450	Up to 64QAM 72.2 Mbps	1	2412 – 2462 2412 – 2472	11.0	13.0	11.0		12.5	14.5	12.5	

Outside of USA, the transmitter of the device is capable of operating also in GSM/GPRS900 and GSM/GPRS1800, HSUPA/WCDMA900(Band 8) and HSUPA/WCDMA2100(Band 1), LTE845(Band 20) and LTE1800(Band 3) bands which are not part of this filing.

This device has Voice-over-IP/Dual Transfer Mode capability for use at the ear. Therefore, SAR for multi slot GPRS mode was evaluated against the head profile of the phantom. Dual Transfer Mode is a feature that utilises the multi-slot GPRS capability in this device; it allows simultaneous transmission of voice and data during the same call, using the same transmitter and antenna.

This device has also HSUPA capabilities in all WCDMA bands listed above. HSUPA target powers are always lower than or equal to the corresponding WCDMA target power listed above, details of the HSUPA MPR scheme, power targets and power results can be found in Appendix D. SAR tests for HSUPA mode have not been performed as no HSUPA Sub-test mode has an average power > 0.25dB above the basic WCDMA 12.2kbps RMC mode.

This is an LTE Category 3 device; it contains 1 FCC LTE bands, namely LTE bands 2500(Band 7). In LTE2500(Band 7), the device possesses Channel Bandwidths of 20MHz, 15MHz, 10MHz and 5MHz are available.

This is a BT Class 1 device and its power tuning target upper limit is 10dBm. WLAN2450 power tuning target upper limit is 18dBm. Since WLAN2450 and BT use same frequency and antenna, WLAN2450 power is 8.0dB higher, and they cannot transmit simultaneously, the WLAN2450 standalone SAR is conservative estimation of BT SAR. As WLAN2450 SAR result is below limit, also BT SAR can be deemed to comply without further analysis or standalone measurements. Also WLAN2450+cellular bands combined SAR results can be regarded as conservative estimation of BT+cellular combined SARs. As WLAN2450+cellular combined SAR result are below limit, also BT+cellular combined SAR can be deemed to comply without further analysis and estimations required in KDB 447498 for simultaneous transmission exclusion.

This is a BT Class 1 device; as its power tuning target is 10dBm (10mW), SAR testing was deemed unnecessary since $(10\text{mW}/5\text{mm}) \cdot \sqrt{2.48\text{GHz}} < 3.0$ (KDB447498 D01 General RF Exposure Guidelines v05 Section 4.3.1 Standalone SAR test exclusion considerations).

This device has Wireless Router "Hotspot" mode capability.

Two antennas are used for transmission of some of the cellular bands in diversity-Tx mode. In this mode the antennas can not transmit at the same time. See table below for applicable antennas in each transmission band and mode. A separate single antenna is used for WLAN. All antennas are fully and separately SAR tested for individual transmission. Simultaneous transmissions with WLAN2450 are assessed separately for both cellular antennas.

	Tx Antennas	
	Antenna 1	Antenna 2
GSM/GPRS/EGPRS850		✓
GSM/GPRS/EGPRS1900	✓	
WCDMA850 (Band 5)		✓
LTE2500 (Band 7)	✓	✓

Simultaneous transmission of any singular cellular and PCS band is possible with WLAN in Head, Body-worn and Wireless router use according to the table below.

Simultaneous transmission capabilities in Head, Body-worn and Wireless Router use	
	WLAN2450
GSM/GPRS/EGPRS850	✓
WCDMA850	✓
GSM/GPRS/EGPRS1900	✓
LTE2500 (Band 7)	✓

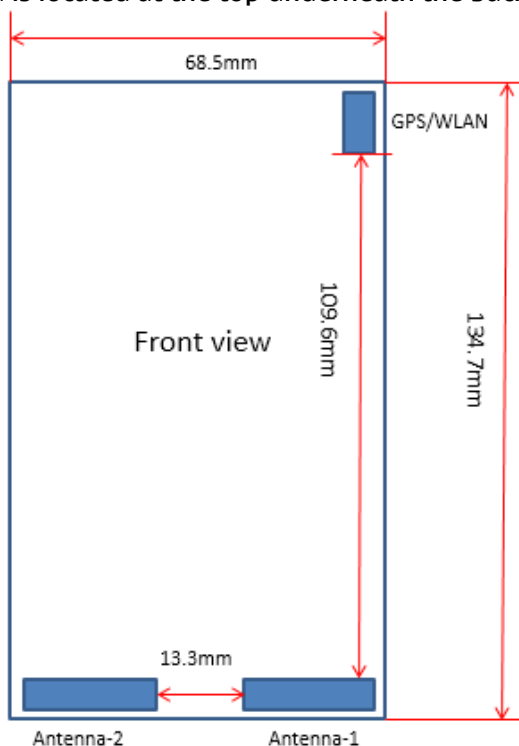
2.1 Power reductions in Wireless Router configurations

The following table details the power reductions active in Wireless Router mode:

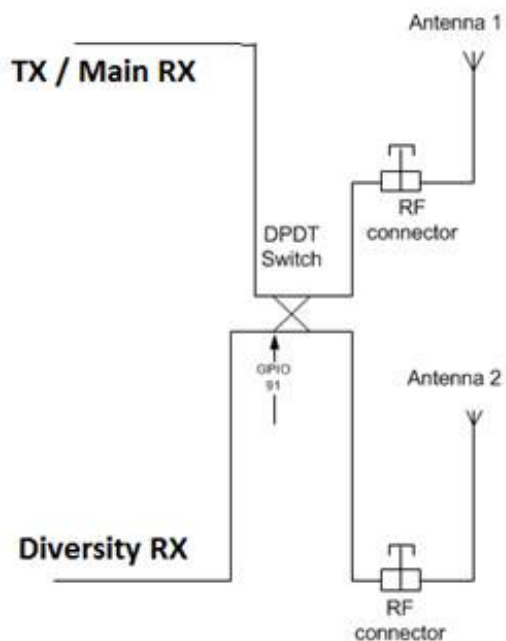
Band	Power reduction in WR mode	Target tuning power in WR mode	
GPRS/EGPRS850	0 dB	1-slot GPRS: 33.0dBm 2-slot GPRS: 30.0dBm 3-slot GPRS: 28.2dBm 4-slot GPRS: 27.0dBm	1-slot EGPRS: 27.0dBm 2-slot EGPRS: 24.0dBm 3-slot EGPRS: 22.2dBm 4-slot EGPRS: 21.0dBm
WCDMA850	0 dB	23.5dBm	
GPRS/EGPRS1900	0 dB	1-slot GPRS: 30.0dBm 2-slot GPRS: 27.0dBm 3-slot GPRS: 25.2dBm 4-slot GPRS: 24.0dBm	1-slot EGPRS: 26.0dBm 2-slot EGPRS: 23.0dBm 3-slot EGPRS: 21.2dBm 4-slot EGPRS: 20.0dBm
LTE2500 (QPSK)	0 dB	22.5dBm	
WLAN2450 b-mode (1Mbps DSSS)	0 dB	16.5 dBm	

2.2 Description of the Antenna

The device has 2 separate internal antennas for cellular, AWS and PCS use and one internal antenna for WLAN use. The cellular antenna 1 is located at the near right bottom underneath the back cover and cellular antenna 2 is located at the near left bottom underneath the back cover. The WLAN antenna is located at the top underneath the back cover.



Schematics showing Tx and Rx circuitry, antenna switch, conducted ports and antenna.



3. TEST CONDITIONS

3.1 Temperature and Humidity

Ambient temperature (°C):	20.5 – 22.5
Ambient humidity (RH %):	35 - 55

3.2 Test Signal, Frequencies and Output Power

The device was put into operation by using a call tester except for testing WLAN2450 where control software was used. Communication between the device and the call tester was established by air link.

The device output power was set to maximum power level for all tests; a fully charged battery was used for every test sequence.

Main testing has been done with the charging back cover type CC-3086. The worst case check measurements have been done with the normal back cover of the device.

This device was tested in all the available multi-slot GMSK GPRS modes; Dual Transfer Mode was not specifically tested as the average power in multi-slot GMSK GPRS mode is always greater than, or equal to, the average power in Dual Transfer Mode in Microsoft devices.

The transmission mode of the device in all WCDMA tests was configured to 12.2kbps RMC with all TPC bits set as “1”. All WCDMA testing has been carried out in accordance with FCC KDB 941225: SAR Measurement Procedures for 3G Devices.

In all operating bands the measurements were performed on lowest, middle and highest channels, and/or on all required test channels as defined in Published FCC KDB Procedures.

The number of Tx slots in all GSM/GPRS mode tests was based on tuning target/conducted power data, see Appendix H. The number of slots with highest or equal highest time-average power was tested.

The conducted output power of the device was measured by a separate test laboratory on the same unit(s) as used for SAR testing. The results are given in the appendixes G-J of this report.

The transmission mode of the device in all WLAN b-mode tests was BPSK 1Mbps. Additionally in WLAN b-mode QPSK 2Mbps and 11Mbps were used for check measurements. These modes have the highest time-averaged output power of all the WLAN a, b, g and n modulation modes in this device as illustrated in table in Appendix J. All WLAN testing has been carried out in accordance with FCC KDB 248227: SAR Measurement Procedures for 802.11 a/b/g Transmitters.

LTE band has been tested according to the guidance given in KDB941225 D05 SAR for LTE Devices v01. MPR values as stipulated in Table 6.2.3_1 of 3GPP TS 36.101 (presented below)

have been incorporated into the device; these MPR values are dependent on the modulation, Channel Bandwidth and Resource Block allocations as shown:

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

No additional MPR settings have been incorporated into the design of the device and therefore no A-MPR settings have been active during its testing.

Here is a summary list of the KDB documents used in the reported testing:

KDB941225 D05 SAR for LTE Devices v02r02 DR07-41372
 KDB 941225 D01 SAR Measurement Procedures for 3G Devices
 KDB 248227: SAR Measurement Procedures for 802.11 a/b/g Transmitters
 KDB 648474 D04 SAR Handsets Multi Xmitter and Ant v01
 KDB 941225 D06 v01 Hot Spot SAR
 KDB 447498 D01 General RF Exposure Guidance v05
 KDB 690783 D01 SAR Listings on Grants
 KDB 865664 D01 SAR Measurements 100MHz to 6GHz v01
 KDB 865664 D02 SAR Reporting v01

4. DESCRIPTION OF THE TEST EQUIPMENT

4.1 Measurement System and Components

The measurements were performed using an automated DASY near-field scanning system manufactured by Schmid & Partner Engineering AG (SPEAG) in Switzerland. The SAR extrapolation algorithm used in all measurements was the 'advanced extrapolation' algorithm.

The following table lists calibration dates of SPEAG components:

Test Equipment	Serial Number	Calibration date	Calibration expiry
DAE 4	860	2013-09	2014-09
DAE 4	1319	2013-09	2014-09
DAE 4	480	2013-09	2014-09
DAE 4	887	2014-03	2015-03
E-field Probe EX3DV4	3839	2013-09	2014-09
E-field Probe EX3DV4	3823	2013-09	2014-09
E-field Probe ES3DV3	3280	2014-03	2015-03
E-field Probe EX3DV4	3574	2013-09	2014-09
Dipole Validation Kit, D835V2	4d005	2014-03	2016-03
Dipole Validation Kit, D1900V2	509	2012-12	2014-12
Dipole Validation Kit, D2450V2	883	2014-03	2016-03
Dipole Validation Kit, D2450V2	760	2013-03	2015-03
Dipole Validation Kit, D2600V2	1042	2013-09	2015-09
Dipole Validation Kit, D2600V2	1082	2014-06	2016-06
DASY5 software	Version 52.8	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration expiry
Signal Generator	8648C	3847M00258	2014-04	2015-04
Signal Generator	SME06	829445/008	2014-04	2015-04
Signal Generator	E4432B	US40052231	2014-04	2015-04
Signal Generator	SME06	829683/005	2014-04	2015-04
Call Tester	CMU200	835352/008	-	-
Call Tester	CMU200	831593/001	-	-
Call Tester	CMU200	110735	-	-
Call Tester	CMW500	113277	-	-
Call Tester	CMW500	115794	-	-
Call Tester	SP6010	SP6010-0329	-	-
Call Tester	SP6010	SP6010-0299	-	-
Amplifier	ZHL-42W	QA1252001	-	-
Amplifier	5S1G4M3	302339	-	-
Amplifier	AR 5S1G4M1	306024	-	-
Amplifier	ZHL-4240W	e060204/1	-	-
RF Network Analyzer	E5071C	MY46104578	2014-04	2015-04
RF Network Analyzer	8753ES	US39170317	2014-04	2015-04
RF Network Analyzer	8753ES	My40002096	2014-04	2015-04
Dielectric Probe Kit	DAK-3.5	1065	-	-
Dielectric Probe Kit	85070C	653	-	-
Dielectric Probe Kit	85070C	2577	-	-
Power Meter	NRP	101293	2014-04	2015-04
Power Sensor	NRP-Z51	100410	2014-04	2015-04
Power Meter	NRP2	103071	2014-04	2015-04
Power Sensor	NRP-Z51	104120	2014-04	2015-04
Power Meter	E4419B	My41291520	2014-04	2015-04
Power Sensor	8482A	US37295410	2014-04	2015-04
Power Meter	NRVD	840297/008	2014-04	2015-04
Power Sensor	NRV-Z51	101135	2014-04	2015-04

4.1.1 Isotropic E-field Probe Type ES3DV3

Construction	Symmetrical design with triangular core Interleaved sensors Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., butyl diglycol)
Calibration	Calibration certificate in Appendix E
Frequency	10 MHz to 4 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 4 GHz)
Directivity	± 0.2 dB in HSL (rotation around probe axis) ± 0.3 dB in HSL (rotation normal to probe axis)
Dynamic Range	5 μ W/g to > 100 mW/g; Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 20 mm Body diameter: 12 mm Tip diameter: 3.9 mm
Application	Distance from probe tip to dipole centers: 2.0 mm General dosimetry up to 4 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.1.2 Isotropic E-field Probe Type EX3DV4

Construction	Symmetrical design with triangular core Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, e.g., DGBE)
Calibration	Calibration certificate in Appendix E
Frequency	10 MHz to >6 GHz (dosimetry); Linearity: ± 0.2 dB (30 MHz to 6 GHz)
Directivity	± 0.3 dB in HSL (rotation around probe axis) ± 0.5 dB in tissue material (rotation normal to probe axis)
Dynamic Range	10 μ W/g to > 100 mW/g, Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 10 mm Body diameter: 12 mm Tip diameter: 2.5 mm
Application	Distance from probe tip to dipole centers: 1.0 mm General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

The phantom used for all Head SAR tests i.e. for both system checks and device testing, was the twin-headed "SAM Phantom", manufactured by SPEAG; the SAM phantom conforms to the requirements of IEEE 1528.

The phantom used for all Body SAR tests i.e. for both system checks and device testing, was a flat phantom also manufactured by SPEAG. This phantom conforms to the requirements of FCC published RF Exposure KDB Procedures.

The SPEAG device holder (see Section 5.1) was used to position the device in all tests whilst a tripod was used to position the validation dipoles against the flat section of phantom.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 and FCC published RF Exposure KDB Procedures. All tests were carried out using simulants whose dielectric parameters were within $\pm 5\%$ of the recommended values. All tests were carried out within 24 hours of measuring the dielectric parameters.

The depth of the tissue simulant was at least 15.0 cm measured from the ear reference point during system checking and device measurements.

4.3.1 Tissue Simulant Recipes

The following recipe(s) were used for Head and Body tissue simulant(s):

800MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	51.50	69.25
Tween 20	47.35	30.00
Salt	1.15	0.75

1900MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	54.50	70.25
Tween 20	45.23	29.41
Salt	0.27	0.34

2450MHz band

Ingredient	Head (% by weight)	Body (% by weight)
Deionised Water	56.0	70.20
Tween 20	44.0	29.62
Salt	-	0.18

4.4 System validation and System checking

4.4.1 System validation status

Probe Calibration Point f / MHz	Test System	DASY SW	Dipole Type / SN	Probe Type / SN	DAE unit Type / SN	Validation done	
						Head tissue simulant	Body tissue simulant
835	TCC Beijing / SAR-1	V52.8	D835V2 / 479	EX3DV4 / 3839	DAE4 / 860	2014-02	2014-07
1900	TCC Beijing / SAR-3	V52.8	D1900V2 / 509	ES3DV3 / 3574	DAE4 / 480	2014-02	2014-07
2450	TCC Beijing / SAR-2	V52.8	D2450V2 / 760	ES3DV3 / 3823	DAE4 / 1319	2014-02	-
2450	TCC Beijing / SAR-4	V52.8	D2450V2 / 883	EX3DV4 / 3280	DAE4 / 887	2014-05	2014-07
2600	TCC Beijing / SAR-4	V52.8	D2600V2 / 1042	EX3DV4 / 3280	DAE4 / 887	2014-05	2014-07

4.4.2 System checking

The manufacturer calibrates the probes annually. Dielectric parameters of the tissue simulants were measured every day using the dielectric probe kit and the network analyser. A system check measurement was made following the determination of the dielectric parameters of the simulant, using the dipole validation kit. A power level of 250 mW was supplied to the dipole antenna, which was placed under the flat section of the twin SAM phantom for head system checking, and under the flat phantom for body system checking. The system checking results (dielectric parameters and SAR values) are given in the table below.

System checking, head tissue simulant

f [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Deviation	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters*		SAR 1g Deviation from target	Dielectric Parameters Deviation from target			Temp [°C]	Plot #
				dSAR [%]		ϵ_r	σ [S/m]		dSAR [%]	d ϵ_r [%]	d σ [%]		
	Tolerances			±3%				±10 %	±5 %	±5 %			
835	Target result SN:4d005	-	-	-	9.32	41.5	0.90	TCC Beijing/SAR-1 EX3DV4 SN:3839 Head 835MHz					
	2014-07-09	2.37	2.36	-0.42	9.48	42.0	0.91	1.72	1.20	1.11	21.2	-	
	2014-07-11	2.38	2.35	-1.26	9.52	41.9	0.91	2.15	0.96	1.11	21.2	1	
1900	Target result SN:509	-	-	-	38.7	40.0	1.40	TCC Beijing/SAR-3 EX3DV4 SN:3574 Head 1900MHz					
	2014-07-11	9.57	9.65	0.84	38.3	38.5	1.35	-1.03	-3.75	-3.57	21.2	2	
2450	Target result SN:760	-	-	-	53.6	39.2	1.80	TCC Beijing/SAR-2 EX3DV4 SN:3823 Head 2450MHz					
	2014-07-11	12.8	12.8	0.00	51.2	38.6	1.78	-4.48	-1.53	-1.11	21.3	3	
2600	Target result SN:1042	-	-	-	56.5	39.0	1.96	TCC Beijing/SAR-4 ES3DV3 SN:3280 Head 2600MHz					
	2014-07-09	14.9	14.8	-0.67	59.6	37.6	2.01	5.49	-3.59	2.55	21.2	4	
	2014-07-10	14.7	14.8	0.68	58.8	37.7	1.99	4.07	-3.33	1.53	21.2	-	
	2014-07-16	14.8	14.7	-0.68	59.2	38.2	2.00	4.78	-2.05	2.04	21.4	-	

* Dielectric parameter reference data taken from IEEE1528/IEC62209

System checking, body tissue simulant

f [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Deviation	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters*		SAR 1g Deviation from target	Dielectric Parameters Deviation from target		Temp [°C]	Plot #
				dSAR [%]		ϵ_r	σ [S/m]		dSAR [%]	d ϵ_r [%]	d σ [%]	
	Tolerances			±3%				±10 %	±5 %	±5 %		
835	Target result SN:4d005	-	-	-	9.31	55.2	0.97	TCC Beijing/SAR-1 EX3DV4 SN:3839 Body 835MHz				
	2014-07-11	2.50	2.49	-0.40	10.0	54.5	0.96	7.41	-1.27	-1.03	21.3	5
1900	Target result SN:509	-	-	-	39.2	53.3	1.52	TCC Beijing/SAR-3 EX3DV4 SN:3574 Body 1900MHz				
	2014-07-11	9.66	9.70	0.41	38.6	51.2	1.48	-1.43	-3.94	-2.63	21.2	-
	2014-07-23	9.57	9.64	0.73	38.3	51.4	1.56	-2.30	-3.56	2.63	21.2	6
2450	Target result SN:883	-	-	-	51.0	52.7	1.95	TCC Beijing/SAR-4 ES3DV3 SN:3280 Body 2450MHz				
	2014-07-14	13.8	13.8	0.00	55.2	52.0	1.91	8.24	-1.33	-2.05	21.0	7
2600	Target result SN:1082	-	-	-	56.0	52.5	2.16	TCC Beijing/SAR-4 EX3DV3 SN:3280 Body 2600MHz				
	2014-07-11	15.2	15.2	0.00	60.8	51.8	2.16	8.57	-1.33	0.00	21.0	8
	2014-07-15	14.5	14.7	1.38	58.0	51.7	2.14	3.57	-1.52	-0.93	21.0	-
	2014-07-16	13.9	14.0	0.72	55.6	51.6	2.15	-0.71	-1.71	-0.46	21.4	-

* Dielectric parameter reference data taken from FCC Published RF Exposure KDB Procedures

Plots of the system checking scans are given in Appendix A.

4.5 Tissue Simulants used in the Measurements

Head tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Dielectric Parameters Deviation from recommended value		Temp [°C]
		ϵ_r	σ [S/m]	d ϵ_r [%]	d σ [%]	
	Tolerances			±5 %	±5 %	
835	Recommended value	41.5	0.90			
	2014-07-09	42.0	0.91	1.20	1.11	21.2
836	Recommended value	41.5	0.90			
	2014-07-09	42.0	0.91	1.20	1.11	21.2
	2014-07-11	41.9	0.91	0.96	1.11	21.2
1880	Recommended value	40.0	1.40			
	2014-07-11	38.5	1.33	-3.75	-5.00	21.2
2347	Recommended value	39.2	1.79			
	2014-07-11	38.6	1.77	-1.53	-1.12	21.3
2535	Recommended value	39.1	1.89			
	2014-07-09	37.9	1.92	-3.07	1.59	21.2
	2014-07-10	37.4	1.90	-4.35	0.53	21.2
	2014-07-16	37.7	1.91	-3.58	1.06	21.4

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters		Dielectric Parameters Deviation from Recommended value		Temp [°C]
		ϵ_r	σ [S/m]	d ϵ_r [%]	d σ [%]	
	Tolerances			±5 %	±5 %	
835	Recommended value	55.2	0.97			
	2014-07-11	54.5	0.96	-1.27	-1.03	21.3
836	Recommended value	55.2	0.97			
	2014-07-11	54.5	0.96	-1.27	-1.03	21.3
1880	Recommended value	53.3	1.52			
	2014-07-11	51.2	1.46	-3.94	-3.95	21.2
	2014-07-23	51.5	1.54	-3.38	1.32	21.2
2437	Recommended value	52.7	1.94			
	2014-07-14	52.1	1.89	-1.14	-2.58	21.0
2535	Recommended value	52.6	2.07			
	2014-07-11	51.9	2.05	-1.33	-0.97	21.0
	2014-07-15	51.6	2.04	-1.90	-1.45	21.0
	2014-07-16	51.8	2.03	-1.52	-1.93	21.4

Dielectric parameter data for the band edges is given in Appendix C.

5. DESCRIPTION OF THE TEST PROCEDURE

5.1 Device Holder

The device was placed in the device holder (illustrated below) that is supplied by SPEAG as an integral part of the Dasy system.



Device holder supplied by SPEAG

A spacer (illustrated below) was used to position the device within the SPEAG holder. The spacer positions the device so that the holder has minimal effect on the test results but still holds the device securely. The spacer was removed before the tests.



Spacer

5.2 Test Positions

5.2.1 Against Phantom Head

Measurements were made in “cheek” and “tilt” positions on both the left hand and right hand sides of the phantom.

The positions used in the measurements were according to IEEE 1528 "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques".

5.2.2 Body Worn Configuration

The device was placed in the SPEAG holder using the spacer and placed below the flat phantom. The distance between the device and the phantom was kept at the separation distance indicated in the photo below using a separate flat spacer that was removed before the start of the measurements. The device was oriented with both sides facing the phantom to find the highest results.

5.2.3 Wireless Router Configuration

The device was placed in the SPEAG holder and, in sequence, the back, display and each of the 4 edges was positioned 10.0mm away from the flat phantom. The spacer was removed before the start of the measurements.

5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan, a minimum of 5x5x7 points covering a volume of at least 30x30x30mm, was performed around the highest E-field value to determine the averaged SAR value. Drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan. Fast SAR is measured according to the KDB 447498 D01 General RF Exposure Guidance v05r01.

5.4 SAR Averaging Methods

The maximum SAR value was averaged over a cube of tissue using interpolation and extrapolation.

The interpolation, extrapolation and maximum search routines within Dasy4 are all based on the modified Quadratic Shepard's method (Robert J. Renka, "Multivariate Interpolation Of Large Sets Of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).

The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighbouring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

In the zoom scan, the interpolation function is used to extrapolate the Peak SAR from the deepest measurement points to the inner surface of the phantom.

6. MEASUREMENT UNCERTAINTY

Table 6.1 – Measurement uncertainty evaluation for 1g Full SAR in 0.3-6GHz range

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	C_i	$C_i \cdot U_i$ (%)	V_i
Measurement System							
Probe Calibration	E2.1	±6.6	N	1	1	±6.6	∞
Axial Isotropy	E2.2	±4.7	R	√3	$(1-c_p)^{1/2}$	±1.9	∞
Hemispherical Isotropy	E2.2	±9.6	R	√3	$(c_p)^{1/2}$	±3.9	∞
Boundary Effect	E2.3	±2.0	R	√3	1	±1.2	∞
Linearity	E2.4	±4.7	R	√3	1	±2.7	∞
System Detection Limits	E2.5	±1.0	R	√3	1	±0.6	∞
Modulation response	E2.5	±2.4	R	√3	1	±1.4	
Readout Electronics	E2.6	±0.3	N	1	1	±0.3	∞
Response Time	E2.7	±0.8	R	√3	1	±0.5	∞
Integration Time	E2.8	±2.6	R	√3	1	±1.5	∞
RF Ambient Conditions - Noise	E6.1	±3.0	R	√3	1	±1.7	∞
RF Ambient Conditions - Reflections	E6.1	±3.0	R	√3	1	±1.7	∞
Probe Positioner Mechanical Tolerance	E6.2	±0.8	R	√3	1	±0.5	∞
Probe Positioning with respect to Phantom Shell	E6.3	±6.7	R	√3	1	±3.9	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	E5	±4.0	R	√3	1	±2.3	∞
Test sample Related							
Test Sample Positioning	E4.2	±6.0	N	1	1	±6.0	11
Device Holder Uncertainty	E4.1	±3.6	N	1	1	±3.6	5
Output Power Variation - SAR drift measurement	E2.9	±5.0	R	√3	1	±2.9	∞
Phantom and Tissue Parameters							
Phantom Uncertainty (shape and thickness tolerances)	E3.1	±6.6	R	√3	1	±3.8	∞
SAR correction	E3.2	±1.9	R	√3	1	±1.1	∞
Conductivity Target - tolerance	E3.4	±5.0	R	√3	0.6	±1.8	∞
Conductivity - measurement uncertainty	E3.3	±5.5	N	1	0.6	±3.5	5
Permittivity Target - tolerance	E3.4	±5.0	R	√3	0.6	±1.7	∞
Permittivity - measurement uncertainty	E3.3	±2.9	N	1	0.6	±1.7	5
Combined Standard Uncertainty			RSS			±14.0	198
Coverage Factor for 95%			k=2				
Expanded Uncertainty						±28.2	

Table 6.2 – Measurement uncertainty evaluation for 1g Fast SAR in 0.3-6GHz range

Relative DASY5 Uncertainty Budget for Fast SAR Tests According to IEEE 1528/2011 and IEC 62209-1/2011 (0.3-6 GHz range)						
Uncertainty Component	Tol. (%)	Prob Dist.	Div.	C_i	$C_i \cdot U_i$ (%)	V_i
Measurement System						
Probe Calibration	±6.6	N	1	0		
Axial Isotropy	±4.7	R	√3	$(1-c_p)^{1/2}$	±1.9	∞
Hemispherical Isotropy	±9.6	R	√3	$(c_p)^{1/2}$	±3.9	∞
Boundary Effect	±2.0	R	√3	1	±1.2	∞
Linearity	±4.7	R	√3	1	±2.7	∞
System Detection Limits	±1.0	R	√3	1	±0.6	∞
Modulation Response	±2.4	R	√3	1	±1.4	∞
Readout Electronics	±0.3	N	1	0		
Response Time	±0.8	R	√3	0		
Integration Time	±2.6	R	√3	1	±1.5	∞
RF Ambient Conditions - Noise	±3.0	R	√3	1	±1.7	∞
RF Ambient Conditions - Reflections	±3.0	R	√3	0		
Probe Positioner Mechanical Tolerance	±0.8	R	√3	1	±0.5	∞
Probe Positioning with respect to Phantom Shell	±6.7	R	√3	1	±3.9	∞
Spatial x-y Resolution	±10.0	R	√3	1	±5.8	∞
Fast SAR z Approximation	±14.0	R	√3	1	±8.1	∞
Test sample Related						
Test Sample Positioning	±6.0	N	1	1	±6.0	12
Device Holder Uncertainty	±3.6	N	1	1	±3.6	5
Output Power Variation - SAR drift measurement	±5.0	R	√3	1	±2.9	∞
Power Scaling	±0	R	√3	0		
Phantom and Setup						
Phantom Uncertainty (shape and thickness tolerances)	±6.6	R	√3	1	±3.8	∞
SAR correction	±1.9	R	√3	0		
Conductivity Target - tolerance	±1.9	R	√3	0		
Conductivity - measurement uncertainty	±5.0	R	√3	0		
Permittivity Target - tolerance	±5.5	N	1	0		
Permittivity - measurement uncertainty	±5.0	R	√3	0		
Combined Standard Uncertainty						
		RSS			±14.9	748
Coverage Factor for 95%						
		k=2				
Expanded Uncertainty						
					±29.8	

7. RESULTS

7.1 The measured Head SAR values for the test device are tabulated below:

850MHz Band Head SAR results / Antenna 2

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz	Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz		
GSM	Tuning Target + Tolerance [dBm]		33.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		32.7	32.8	32.7	0.7	0.6	0.7	dB	
	Time-averaged power [dBm]		23.7	23.8	23.7	1.17	1.15	1.17	Lin	
			No testing required for this slot configuration							
2-slot GPRS	Tuning Target + Tolerance [dBm]		30.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		30.1	30.3	30.3	0.3	0.1	0.1	dB	
	Time-averaged power [dBm]		24.1	24.3	24.3	1.07	1.02	1.02	Lin	
			No testing required for this slot configuration							
3-slot GPRS	Tuning Target + Tolerance [dBm]		28.6			Scaling factor*				
	Conducted Slot Average Power [dBm]		28.2	28.5	28.5	0.4	0.1	0.1	dB	
	Time-averaged power [dBm]		23.9	24.2	24.2	1.10	1.02	1.02	Lin	
			No testing required for this slot configuration							
4-slot GPRS	Tuning Target + Tolerance [dBm]		27.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		27.3	27.4	27.4	0.1	0.0	0.0	dB	
	Time-averaged power [dBm]		24.3	24.4	24.4	1.02	1.00	1.00	Lin	
	Left Cheek	Estimated SAR	0.341	0.331	0.369	0.349	0.331	0.369	0.02	-
		Full SAR	-	-	0.353	-	-	0.353		
	Left Tilt	Estimated SAR	-	0.195	-	-	0.195	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.251	-	-	0.251	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.187	-	-	0.187	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Left Cheek	Estimated SAR	0.363	0.356	0.382	0.371	0.356	0.382	0.01	1
Full SAR		-	-	0.374	-	-	0.374			
1-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		27.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		26.5	26.5	26.5	0.9	0.9	0.9	dB	
	Time-averaged power [dBm]		17.5	17.5	17.5	1.23	1.23	1.23	Lin	
			No testing required for this slot configuration							

(Table Continues)

(Table Continues)

2-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		24.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		23.9	24.0	24.0	0.5	0.4	0.4	dB	
	Time-averaged power [dBm]		17.9	18.0	18.0	1.12	1.10	1.10	Lin	
			No testing required for this slot configuration							
3-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		22.6			Scaling factor*				
	Conducted Slot Average Power [dBm]		21.9	22.1	22.2	0.7	0.5	0.4	dB	
	Time-averaged power [dBm]		17.6	17.8	17.9	1.17	1.12	1.10	Lin	
			No testing required for this slot configuration							
4-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		21.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		21.2	21.3	21.4	0.2	0.1	0.0	dB	
	Time-averaged power [dBm]		18.2	18.3	18.4	1.05	1.02	1.00	Lin	
	Left Cheek	Estimated SAR	-	-	0.091	-	-	0.091	-	-
		Full SAR	-	-	-	-	-	-		
	Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]
Ch 4132 826.4 MHz				Ch 4175 835.0 MHz	Ch 4233 846.6 MHz	Ch 4132 826.4 MHz	Ch 4175 835.0 MHz	Ch 4233 846.6 MHz		
WCDMA	Tuning Target + Tolerance [dBm]		23.9			Scaling factor*				
	Conducted Slot Average Power [dBm]		23.5	23.4	23.3	0.4	0.5	0.6	dB	
	Time-averaged power [dBm]		23.5	23.4	23.3	1.10	1.12	1.15	Lin	
	Left Cheek	Estimated SAR	0.302	0.340	0.361	0.331	0.381	0.414	0.01	-
		Full SAR	-	-	0.355	-	-	0.408		
	Left Tilt	Estimated SAR	-	0.199	-	-	0.223	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.238	-	-	0.267	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.168	-	-	0.188	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Left Cheek	Estimated SAR	0.302	0.326	0.370	0.331	0.366	0.425	0.01	2
		Full SAR	-	-	0.358	-	-	0.411		

1900MHz Band Head SAR results / Antenna 1

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz	Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz		
GSM	Tuning Target + Tolerance [dBm]		30.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		30.1	30.2	30.3	0.3	0.2	0.1	dB	
	Time-averaged power [dBm]		21.1	21.2	21.3	1.07	1.05	1.02	Lin	
			No testing required for this slot configuration							
2-slot GPRS	Tuning Target + Tolerance [dBm]		27.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		26.8	26.9	27.1	0.6	0.5	0.3	dB	
	Time-averaged power [dBm]		20.8	20.9	21.1	1.15	1.12	1.07	Lin	
			No testing required for this slot configuration							
3-slot GPRS	Tuning Target + Tolerance [dBm]		25.6			Scaling factor*				
	Conducted Slot Average Power [dBm]		25.3	25.4	25.6	0.3	0.2	0.0	dB	
	Time-averaged power [dBm]		21.0	21.1	21.3	1.07	1.05	1.00	Lin	
	Left Cheek	Estimated SAR	0.244	0.187	0.184	0.261	0.196	0.184	0.01	-
		Full SAR	0.235	-	-	0.252	-	-		
	Left Tilt	Estimated SAR	-	0.106	-	-	0.111	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.159	-	-	0.166	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.119	-	-	0.125	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Left Cheek	Estimated SAR	0.285	0.249	0.224	0.305	0.261	0.224	0.00	3
Full SAR		0.283	-	-	0.303	-	-			
4-slot GPRS	Tuning Target + Tolerance [dBm]		24.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		23.9	24.0	24.2	0.5	0.4	0.2	dB	
	Time-averaged power [dBm]		20.9	21.0	21.2	1.12	1.10	1.05	Lin	
			No testing required for this slot configuration							
1-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		26.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		26.3	26.2	26.3	0.1	0.2	0.1	dB	
	Time-averaged power [dBm]		17.3	17.2	17.3	1.02	1.05	1.02	Lin	
			No testing required for this slot configuration							
2-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		23.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		23.1	23.1	23.2	0.3	0.3	0.2	dB	
	Time-averaged power [dBm]		17.1	17.1	17.2	1.07	1.07	1.05	Lin	
			No testing required for this slot configuration							

(Table Continues)

(Table Continues)

3-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		21.6			Scaling factor*				
	Conducted Slot Average Power [dBm]		21.2	21.3	21.5	0.4	0.3	0.1	dB	
	Time-averaged power [dBm]		16.9	17.0	17.2	1.10	1.07	1.02	Lin	
			No testing required for this slot configuration							
4-slot 8PSK EGPRS	Tuning Target + Tolerance [dBm]		20.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		20.4	20.3	20.4	0.0	0.1	0.0	dB	
	Time-averaged power [dBm]		17.4	17.3	17.4	1.00	1.02	1.00	Lin	
	Left Cheek	Estimated SAR	0.130	-	-	0.130	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-

LTE2500 (Band 7) Head SAR results / Antenna 1

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz	Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz		
20MHz Ch BW 1RB 0% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged Power [dBm]		22.7	22.7	22.7	1.05	1.05	1.05	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 1RB 50% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.8	22.7	0.2	0.1	0.2	dB	
	Time-averaged Power [dBm]		22.7	22.8	22.7	1.05	1.02	1.05	Lin	
	Left Cheek	Estimated SAR	-	0.304	-	-	0.311	-	-	-
		Full SAR	-	-	-	-	-	-		
	Left Tilt	Estimated SAR	-	0.225	-	-	0.230	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.638	-	-	0.653	-	0.01	-
		Full SAR	-	0.632	-	-	0.647	-		
	Right Tilt	Estimated SAR	-	0.132	-	-	0.135	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Right Cheek	Estimated SAR	-	0.603	-	-	0.617	-	0.00	-
		Full SAR	-	0.602	-	-	0.616	-		
20MHz Ch BW 1RB 100% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.8	0.2	0.2	0.1	dB	
	Time-averaged Power [dBm]		22.7	22.7	22.8	1.05	1.05	1.02	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 0% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged Power [dBm]		22.7	22.7	22.7	1.05	1.05	1.05	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 50%RB 50% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.8	22.7	0.2	0.1	0.2	dB	
	Time-averaged Power [dBm]		22.7	22.8	22.7	1.05	1.02	1.05	Lin	
	Left Cheek	Estimated SAR	-	0.247	-	-	0.253	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left Tilt	Estimated SAR	-	0.177	-	-	0.181	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right Cheek	Estimated SAR	-	0.518	-	-	0.530	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right Tilt	Estimated SAR	-	0.103	-	-	0.105	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 50%RB 100% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.8	0.2	0.2	0.1	dB	
	Time-averaged Power [dBm]		22.7	22.7	22.8	1.05	1.05	1.02	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 100% RB	Tuning Target + Tolerance [dBm]		21.9			Scaling factor*				
	Conducted Power [dBm]		21.7	21.7	21.7	0.2	0.2	0.2	dB	
	Time-averaged Power [dBm]		21.7	21.7	21.7	1.05	1.05	1.05	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

LTE2500 (Band 7) Head SAR results / Antenna 2

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz	Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz		
20MHz Ch BW 1RB 0% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged Power [dBm]		22.3	22.4	22.3	1.15	1.12	1.15	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 1RB 50% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.4	22.4	22.3	0.5	0.5	0.6	dB	
	Time-averaged Power [dBm]		22.4	22.4	22.3	1.12	1.12	1.15	Lin	
	Left Cheek	Estimated SAR	-	0.654	-	-	0.734	-	0.00	4
		Full SAR	-	0.651	-	-	0.730	-		
	Left Tilt	Estimated SAR	-	0.266	-	-	0.298	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.426	-	-	0.478	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.277	-	-	0.311	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Left Cheek	Estimated SAR	-	0.613	-	-	0.688	-	-	-
		Full SAR	-	0.619	-	-	0.695	-		
20MHz Ch BW 1RB 100% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.4	0.6	0.5	0.5	dB	
	Time-averaged Power [dBm]		22.3	22.4	22.4	1.15	1.12	1.12	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 50%RB 0% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged Power [dBm]		22.3	22.4	22.3	1.15	1.12	1.15	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 50% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.4	22.4	22.3	0.5	0.5	0.6	dB	
	Time-averaged Power [dBm]		22.4	22.4	22.3	1.12	1.12	1.15	Lin	
	Left Cheek	Estimated SAR	-	0.525	-	-	0.589	-	-	-
		Full SAR	-	-	-	-	-	-		
	Left Tilt	Estimated SAR	-	0.206	-	-	0.231	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.356	-	-	0.399	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.215	-	-	0.241	-	-	-
Full SAR		-	-	-	-	-	-			
20MHz Ch BW 50%RB 100% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.4	0.6	0.5	0.5	dB	
	Time-averaged Power [dBm]		22.3	22.4	22.4	1.15	1.12	1.12	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 100% RB	Tuning Target + Tolerance [dBm]		21.9			Scaling factor*				
	Conducted Power [dBm]		21.3	21.4	21.3	0.6	0.5	0.6	dB	
	Time-averaged Power [dBm]		21.3	21.4	21.3	1.15	1.12	1.15	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

2450MHz Head SAR results

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz	Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz		
WLAN b-mode BPSK 1Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.6	16.4	16.4	1.4	1.6	1.6	dB	
	Time-averaged power [dBm]		16.6	16.4	16.4	1.38	1.45	1.45	Lin	
	Left Cheek	Estimated SAR	0.539	0.578	0.444	0.744	0.835	0.642	0.02	5
		Full SAR	-	0.598	-	-	0.864	-		
	Left Tilt	Estimated SAR	-	0.435	-	-	0.629	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Cheek	Estimated SAR	-	0.320	-	-	0.463	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right Tilt	Estimated SAR	-	0.378	-	-	0.546	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Left Cheek	Estimated SAR	0.496	0.527	0.487	0.685	0.762	0.704	0.03	-
Full SAR		-	0.498	-	-	0.720	-			
WLAN b-mode QPSK 2Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.7	16.6	16.7	1.3	1.4	1.3	dB	
	Time-averaged power [dBm]		16.7	16.6	16.7	1.35	1.38	1.35	Lin	
	Left Cheek	Estimated SAR	-	-	0.394	-	-	0.531		-
		Full SAR	-	-	-	-	-	-		
WLAN b-mode QPSK 11Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.9	17.1	16.6	1.1	0.9	1.4	dB	
	Time-averaged power [dBm]		16.9	17.1	16.6	1.29	1.23	1.38	Lin	
	Left Cheek	Estimated SAR	0.416	0.443	-	0.536	0.545	-	0.05	-
		Full SAR	-	-	-	-	-	-		

Simultaneous transmissions: Combined head SAR results – Individual band Max results

Test configuration	Max. Reported* 1g SAR results		
	WLAN	Antenna 1	
		3-slot GPRS1900	LTE2500 (Band 7)
Head: Left, Cheek	0.864	0.303	0.311
Head: Left, Tilt	0.629	0.111	0.230
Head: Right, Cheek	0.463	0.166	0.647
Head: Right, Tilt	0.546	0.125	0.135

Test configuration	Max. Reported* 1g SAR results			
	WLAN	Antenna 2		
		4-slot GPRS850	WCDMA850 (Band 5)	LTE2500 (Band 7)
Head: Left, Cheek	0.864	0.374	0.411	0.730
Head: Left, Tilt	0.629	0.195	0.223	0.298
Head: Right, Cheek	0.463	0.251	0.267	0.478
Head: Right, Tilt	0.546	0.187	0.188	0.311

**Simultaneous transmissions: Combined head SAR results –
Max + Max combined results**

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Head: Left, Cheek	1.17	1.18
Head: Left, Tilt	0.740	0.859
Head: Right, Cheek	0.629	1.11
Head: Right, Tilt	0.671	0.681

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Head: Left, Cheek	1.24	1.28	1.59
Head: Left, Tilt	0.824	0.852	0.927
Head: Right, Cheek	0.714	0.730	0.941
Head: Right, Tilt	0.733	0.734	0.857

Note: Simultaneous Transmission Procedures as described in KDB648474 are not required for this product.

7.1.1 Combined Head SAR data

The Combined SAR data given in the tables below has been voluntarily calculated and should be ignored for FCC certification.

The following table gives a more accurate assessment of the SAR values for simultaneous transmission. These values have been calculated using the SPEAG Combined Multiband algorithm, which is based on area scans. It a) converts the 2D area scans into 3D volume scans

by assuming frequency-dependent decay characteristics for the E-field, b) sums the SAR values for WLAN2450 and the cellular bands point-by-point and c) calculates the combined average SAR values.

**Simultaneous transmissions: Combined head SAR results –
SPEAG Combined Multiband algorithm results**

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Head: Left, Cheek	0.858	-
Head: Left, Tilt	-	-
Head: Right, Cheek	-	-
Head: Right, Tilt	-	-

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Head: Left, Cheek	0.880	0.890	0.907
Head: Left, Tilt	-	-	-
Head: Right, Cheek	-	-	-
Head: Right, Tilt	-	-	-

One of the Combined SAR values in the above table are less than the maximum SAR values for the contributing cellular band. This is due to a) minimal overlap of the SAR distributions of the cellular band with WLAN2450 and b) uncertainties associated with the different methods of calculation. In these cases, the maximum SAR values given for the combined Modes in the Summary table in Section 1.2 are those for the individual cellular band.

7.2 The measured Body SAR values for the test device are tabulated below:

850MHz Band Body SAR results / Antenna 2

Mode	Device orientation		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #	
				Ch 128	Ch 190	Ch 251	Ch 128	Ch 190	Ch 251			
				824.2 MHz	836.6 MHz	848.8 MHz	824.2 MHz	836.6 MHz	848.8 MHz			
4-slot GPRS	Tuning Target + Tolerance [dBm]			27.4			Scaling factor*					
	Conducted Slot Average Power [dBm]			27.3	27.4	27.4	0.1	0.0	0.0	dB		
	Time-averaged power [dBm]			24.3	24.4	24.4	1.02	1.00	1.00	Lin		
	Back facing phantom	Without headset	Estimated SAR	0.419	0.367	0.334	0.429	0.367	0.334	0.00	6	
			Full SAR	0.421	-	-	0.431	-	-			
		Headset WH-108	Estimated SAR	-	0.212	-	-	0.212	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Display facing phantom	Without headset	Estimated SAR	-	0.344	-	-	0.344	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
		Headset WH-108	Estimated SAR	-	0.190	-	-	0.190	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Normal Cover Back facing phantom Without headset			Estimated SAR	0.394	0.344	0.308	0.403	0.344	0.308	0.01	-
				Full SAR	0.401	-	-	0.410	-	-		
Mode	Device orientation		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #	
				Ch 4132	Ch 4175	Ch 4233	Ch 4132	Ch 4175	Ch 4233			
				826.4 MHz	835.0 MHz	846.6 MHz	826.4 MHz	835.0 MHz	846.6 MHz			
WCDMA	Tuning Target + Tolerance [dBm]			23.9			Scaling factor*					
	Conducted Slot Average Power [dBm]			23.5	23.4	23.3	0.4	0.5	0.6	dB		
	Time-averaged power [dBm]			23.5	23.4	23.3	1.10	1.12	1.15	Lin		
	Back facing phantom	Without headset	Estimated SAR	0.177	0.282	0.193	0.194	0.316	0.222	0.01	-	
			Full SAR	-	0.287	-	-	0.322	-			
		Headset WH-108	Estimated SAR	-	0.177	-	-	0.199	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Display facing phantom	Without headset	Estimated SAR	-	0.277	-	-	0.311	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
		Headset WH-108	Estimated SAR	-	0.205	-	-	0.230	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Normal Cover Back facing phantom Without headset			Estimated SAR	0.316	0.306	0.308	0.346	0.343	0.354	0.01	7
				Full SAR	-	-	0.302	-	-	0.347		

1900MHz Band Body SAR results / Antenna 1

Mode	Device orientation		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
				Ch 512	Ch 661	Ch 810	Ch 512	Ch 661	Ch 810		
				1850.2 MHz	1880.0 MHz	1909.8 MHz	1850.2 MHz	1880.0 MHz	1909.8 MHz		
3-slot GPRS	Tuning Target + Tolerance [dBm]			25.6			Scaling factor*				
	Conducted Slot Average Power [dBm]			25.3	25.4	25.6	0.3	0.2	0.0	dB	
	Time-averaged power [dBm]			21.0	21.1	21.3	1.07	1.05	1.00	Lin	
	Back facing phantom	Without headset	Estimated SAR	-	0.112	-	-	0.117	-	-	-
			Full SAR	-	-	-	-	-			
		Headset WH-108	Estimated SAR	-	0.125	-	-	0.131	-	-	-
			Full SAR	-	-	-	-	-	-		
	Display facing phantom	Without headset	Estimated SAR	0.177	0.140	0.110	0.190	0.147	0.110	0.01	-
			Full SAR	0.182	-	-	0.195	-	-		
		Headset WH-108	Estimated SAR	-	0.131	-	-	0.137	-	-	-
			Full SAR	-	-	-	-	-	-		
	Normal Cover Display facing phantom Without headset		Estimated SAR	0.238	0.177	0.150	0.255	0.185	0.150	0.00	8
			Full SAR	0.239	-	-	0.256	-	-		

LTE2500 (Band 7) Body SAR results / Antenna 1

Mode	Test configuration		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
				Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz	Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz		
20MHz Ch BW 1RB 0% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged power [dBm]			22.7	22.7	22.7	1.05	1.05	1.05	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 1RB 50% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.7	22.8	22.7	0.2	0.1	0.2	dB	
	Time-averaged power [dBm]			22.7	22.8	22.7	1.05	1.02	1.05	Lin	
	Back facing phantom	Without headset	Estimated SAR	-	0.440	-	-	0.450	-	-	-
			Full SAR	-	-	-	-	-			
		Headset WH-108	Estimated SAR	-	0.447	-	-	0.457	-	0.01	-
			Full SAR	-	0.454	-	-	0.465	-		
	Display facing phantom	Without headset	Estimated SAR	-	0.390	-	-	0.399	-	-	-
			Full SAR	-	-	-	-	-			
		Headset WH-108	Estimated SAR	-	0.392	-	-	0.401	-	-	-
			Full SAR	-	-	-	-	-			
	Normal Cover Back facing phantom Headset WH-108		Estimated SAR	-	0.500	-	-	0.512	-	0.02	-
			Full SAR	-	0.515	-	-	0.527	-		
20MHz Ch BW 1RB 100% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.7	22.7	22.8	0.2	0.2	0.1	dB	
	Time-averaged power [dBm]			22.7	22.7	22.8	1.05	1.05	1.02	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 50%RB 0% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged power [dBm]			22.7	22.7	22.7	1.05	1.05	1.05	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 50% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*					
	Conducted Power [dBm]			22.7	22.8	22.7	0.2	0.1	0.2	dB		
	Time-averaged power [dBm]			22.7	22.8	22.7	1.05	1.02	1.05	Lin		
	Back facing phantom	Without headset	Estimated SAR	-	0.345	-	-	0.353	-	-	-	
			Full SAR	-	-	-	-	-	-	-	-	
		Headset WH-108	Estimated SAR	-	0.344	-	-	0.352	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Display facing phantom	Without headset	Estimated SAR	-	0.305	-	-	0.312	-	-	-	
			Full SAR	-	-	-	-	-	-	-	-	
		Headset WH-108	Estimated SAR	-	0.306	-	-	0.313	-	-	-	
Full SAR			-	-	-	-	-	-	-	-		
20MHz Ch BW 50%RB 100% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*					
	Conducted Power [dBm]			22.7	22.7	22.8	0.2	0.2	0.1	dB		
	Time-averaged power [dBm]			22.7	22.7	22.8	1.05	1.05	1.02	Lin		
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02								
20MHz Ch BW 100% RB	Tuning Target + Tolerance [dBm]			21.9			Scaling factor*					
	Conducted Power [dBm]			21.7	21.7	21.7	0.2	0.2	0.2	dB		
	Time-averaged power [dBm]			21.7	21.7	21.7	1.05	1.05	1.05	Lin		
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02								

LTE2500 (Band 7) Body SAR results / Antenna 2

Mode	Test configuration		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
				Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz	Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz		
20MHz Ch BW 1RB 0% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged power [dBm]			22.3	22.4	22.3	1.15	1.12	1.15	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 1RB 50% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.4	22.4	22.3	0.5	0.5	0.6	dB	
	Time-averaged power [dBm]			22.4	22.4	22.3	1.12	1.12	1.15	Lin	
	Back facing phantom	Without headset	Estimated SAR	-	0.435	-	-	0.488	-	-	-
			Full SAR	-		-	-	-			
		Headset WH-108	Estimated SAR	-	0.472	-	-	0.530	-	-	-
			Full SAR	-		-	-	-			
	Display facing phantom	Without headset	Estimated SAR	-	0.512	-	-	0.574	-	-	-
			Full SAR	-		-	-	-			
		Headset WH-108	Estimated SAR	-	0.527	-	-	0.591	-	0.01	-
			Full SAR	-	0.526	-	-	0.586	-		
	Normal Cover Display facing phantom Headset WH-108		Estimated SAR	-	0.577	-	-	0.647	-	0.00	9
			Full SAR	-	0.576	-	-	0.646	-		
20MHz Ch BW 1RB 100% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.3	22.4	22.4	0.6	0.5	0.5	dB	
	Time-averaged power [dBm]			22.3	22.4	22.4	1.15	1.12	1.12	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 50%RB 0% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*				
	Conducted Power [dBm]			22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged power [dBm]			22.3	22.4	22.3	1.15	1.12	1.15	Lin	
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 50% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*					
	Conducted Power [dBm]			22.4	22.4	22.3	0.5	0.5	0.6	dB		
	Time-averaged power [dBm]			22.4	22.4	22.3	1.12	1.12	1.15	Lin		
	Back facing phantom	Without headset	Estimated SAR	-	0.349	-	-	0.392	-	-	-	
			Full SAR	-	-	-	-	-	-	-	-	
		Headset WH-108	Estimated SAR	-	0.362	-	-	0.406	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Display facing phantom	Without headset	Estimated SAR	-	0.405	-	-	0.454	-	-	-	-
Full SAR			-	-	-	-	-	-	-	-	-	
Headset WH-108		Estimated SAR	-	0.402	-	-	0.451	-	-	-	-	
		Full SAR	-	-	-	-	-	-	-	-	-	
20MHz Ch BW 50%RB 100% offset	Tuning Target + Tolerance [dBm]			22.9			Scaling factor*					
	Conducted Power [dBm]			22.3	22.4	22.4	0.6	0.5	0.5	dB		
	Time-averaged power [dBm]			22.3	22.4	22.4	1.15	1.12	1.12	Lin		
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02								
20MHz Ch BW 100% RB	Tuning Target + Tolerance [dBm]			21.9			Scaling factor*					
	Conducted Power [dBm]			21.3	21.4	21.3	0.6	0.5	0.6	dB		
	Time-averaged power [dBm]			21.3	21.4	21.3	1.15	1.12	1.15	Lin		
				No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02								

2450MHz Body SAR results

Mode	Device orientation		SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #	
				Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz	Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz			
WLAN b-mode BPSK 1 Mbps	Tuning Target + Tolerance [dBm]			18.0			Scaling factor*					
	Conducted Power [dBm]			16.6	16.4	16.4	1.4	1.6	1.6	dB		
	Time-averaged power [dBm]			16.6	16.4	16.4	1.38	1.45	1.45	Lin		
	Back facing phantom	Without headset	Estimated SAR	-	0.075	-	-	0.109	-	-	-	
			Full SAR	-	-	-	-	-	-	-	-	
		Headset WH-108	Estimated SAR	-	0.061	-	-	0.089	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
	Display facing phantom	Without headset	Estimated SAR	0.079	0.086	0.067	0.109	0.124	0.096	-	-	
			Full SAR	-	0.084	-	-	0.122	-	-	-	
		Headset WH-108	Estimated SAR	-	0.063	-	-	0.091	-	-	-	-
			Full SAR	-	-	-	-	-	-	-	-	-
Normal Cover Display facing phantom Without headset		Estimated SAR	0.072	0.085	0.076	0.099	0.123	0.110	-	10		
		Full SAR	-	0.085	-	-	0.123	-				
WLAN b-mode QPSK 2 Mbps	Tuning Target + Tolerance [dBm]			18.0			Scaling factor*					
	Conducted Power [dBm]			16.7	16.6	16.7	1.3	1.4	1.3	dB		
	Time-averaged power [dBm]			16.7	16.6	16.7	1.35	1.38	1.35	Lin		
	Display facing phantom Without headset		Estimated SAR	-	-	0.062	-	-	0.084	-	-	
			Full SAR	-	-	-	-	-	-			
WLAN b-mode QPSK 11 Mbps	Tuning Target + Tolerance [dBm]			18.0			Scaling factor*					
	Conducted Power [dBm]			16.9	17.1	16.6	1.1	0.9	1.4	dB		
	Time-averaged power [dBm]			16.9	17.1	16.6	1.29	1.23	1.38	Lin		
	Display facing phantom Without headset		Estimated SAR	0.062	0.064	-	0.080	0.078	-	-	-	
			Full SAR	-	-	-	-	-	-			

**Simultaneous transmissions: Combined body SAR results –
Individual band Max results**

Test configuration	Max. Reported* 1g SAR results		
	WLAN	Antenna 1	
		3-slot GPRS1900	LTE2500 (Band 7)
Body: Back facing phantom, Without Headset	0.109	0.117	0.450
Body: Back facing phantom, Headset WH-108	0.089	0.131	0.527
Body: Display facing phantom, Without Headset	0.123	0.256	0.399
Body: Display facing phantom, Headset WH-108	0.091	0.137	0.401

Test configuration	Max. Reported* 1g SAR results			
	WLAN	Antenna 2		
		4-slot GPRS850	WCDMA850 (Band 5)	LTE2500 (Band 7)
Body: Back facing phantom, Without Headset	0.109	0.431	0.347	0.488
Body: Back facing phantom, Headset WH-108	0.089	0.212	0.199	0.530
Body: Display facing phantom, Without Headset	0.123	0.344	0.311	0.574
Body: Display facing phantom, Headset WH-108	0.091	0.190	0.230	0.646

**Simultaneous transmissions: Combined body SAR results –
Max + Max combined results**

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Body: Back facing phantom, Without Headset	0.226	0.559
Body: Back facing phantom, Headset WH-108	0.220	0.616
Body: Display facing phantom, Without Headset	0.379	0.522
Body: Display facing phantom, Headset WH-108	0.228	0.492

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Body: Back facing phantom, Without Headset	0.540	0.456	0.597
Body: Back facing phantom, Headset WH-108	0.301	0.288	0.619
Body: Display facing phantom, Without Headset	0.467	0.434	0.697
Body: Display facing phantom, Headset WH-108	0.281	0.321	0.737

Note: Simultaneous Transmission Procedures as described in KDB648474 are not required for this product.

7.2.1 Combined Body SAR data

The Combined SAR data given in the tables below has been voluntarily calculated and should be ignored for FCC certification.

The following table gives a more accurate assessment of the SAR values for simultaneous transmission. These values have been calculated using the SPEAG Combined Multiband algorithm, which is based on area scans. It a) converts the 2D area scans into 3D volume scans by assuming frequency-dependent decay characteristics for the E-field, b) sums the SAR values for WLAN2450 and the cellular bands point-by-point and c) calculates the combined average SAR values. It is these values that appear in the Summary table in Section 1.2.

**Simultaneous transmissions: Combined body SAR results –
SPEAG Combined Multiband algorithm results**

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Body: Back facing phantom, Without Headset	-	-
Body: Back facing phantom, Headset WH-108	-	-
Body: Display facing phantom, Without Headset	0.270	-
Body: Display facing phantom, Headset WH-108	-	-

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Body: Back facing phantom, Without Headset	0.453	0.380	-
Body: Back facing phantom, Headset WH-108	-	-	-
Body: Display facing phantom, Without Headset	-	-	-
Body: Display facing phantom, Headset WH-108	-	-	0.662

7.3 Body SAR assessment of Wireless Router mode at 10.0mm separation distance

850MHz Band Wireless Router SAR results / Antenna 2

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 128	Ch 190	Ch 251	Ch 128	Ch 190	Ch 251		
			824.2 MHz	836.6 MHz	848.8 MHz	824.2 MHz	836.6 MHz	848.8 MHz		
4-slot GPRS	Tuning Target + Tolerance [dBm]		27.4			Scaling factor*				
	Conducted Slot Average Power [dBm]		27.3	27.4	27.4	0.1	0.0	0.0	dB	
	Time-averaged power [dBm]		24.3	24.4	24.4	1.02	1.00	1.00	Lin	
	Back facing phantom	Estimated SAR	-	0.462	-	-	0.462	-	-	-
		Full SAR	-	-	-	-	-	-		
	Display facing phantom	Estimated SAR	-	0.367	-	-	0.367	-	-	-
		Full SAR	-	-	-	-	-	-		
	Top edge facing phantom	Estimated SAR	-	0.010	-	-	0.010	-	-	-
		Full SAR	-	-	-	-	-	-		
	Bottom edge facing phantom	Estimated SAR	-	0.296	-	-	0.296	-	-	-
		Full SAR	-	-	-	-	-	-		
	Left edge facing phantom	Estimated SAR	0.480	0.465	0.444	0.491	0.465	0.444	0.01	11
		Full SAR	0.474	-	-	0.485	-	-		
	Right edge facing phantom	Estimated SAR	-	0.219	-	-	0.219	-	-	-
		Full SAR	-	-	-	-	-	-		
Normal Cover Left edge facing phantom	Estimated SAR	0.452	0.430	0.406	0.463	0.430	0.406	0.00	-	
	Full SAR	0.456	-	-	0.467	-	-			
Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 4132	Ch 4175	Ch 4233	Ch 4132	Ch 4175	Ch 4233		
			826.4 MHz	835.0 MHz	846.6 MHz	826.4 MHz	835.0 MHz	846.6 MHz		
WCDMA	Tuning Target + Tolerance [dBm]		23.9			Scaling factor*				
	Conducted Slot Average Power [dBm]		23.5	23.4	23.3	0.4	0.5	0.6	dB	
	Time-averaged power [dBm]		23.5	23.4	23.3	1.10	1.12	1.15	Lin	
	Back facing phantom	Estimated SAR	-	0.344	-	-	0.386	-	-	-
		Full SAR	-	-	-	-	-	-		
	Display facing phantom	Estimated SAR	-	0.346	-	-	0.388	-	-	-
		Full SAR	-	-	-	-	-	-		
	Top edge facing phantom	Estimated SAR	-	0.015	-	-	0.016	-	-	-
		Full SAR	-	-	-	-	-	-		
	Bottom edge facing phantom	Estimated SAR	-	0.356	-	-	0.399	-	-	-
		Full SAR	-	-	-	-	-	-		
	Left edge facing phantom	Estimated SAR	0.377	0.390	0.404	0.413	0.438	0.464	0.00	12
		Full SAR	-	-	0.408	-	-	0.468		
	Right edge facing phantom	Estimated SAR	-	0.150	-	-	0.168	-	-	-
		Full SAR	-	-	-	-	-	-		
Normal Cover Left edge facing phantom	Estimated SAR	0.365	0.387	0.395	0.400	0.434	0.454	0.01	-	
	Full SAR	-	-	0.401	-	-	0.460			

1900MHz Band Wireless Router SAR results / Antenna 1

Mode	Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz	Ch 512 1850.2 MHz	Ch 661 1880.0 MHz	Ch 810 1909.8 MHz		
3-slot GPRS	Tuning Target + Tolerance [dBm]		25.6			Scaling factor*				
	Conducted Slot Average Power [dBm]		25.3	25.4	25.6	0.3	0.2	0.0	dB	
	Time-averaged power [dBm]		21.0	21.1	21.3	1.07	1.05	1.00	Lin	
	Back facing phantom	Estimated SAR	-	0.245	-	-	0.257	-	-	-
		Full SAR	-	-	-	-	-	-		
	Display facing phantom	Estimated SAR	-	0.287	-	-	0.301	-	-	-
		Full SAR	-	-	-	-	-	-		
	Top edge facing phantom	Estimated SAR	-	0.027	-	-	0.029	-	-	-
		Full SAR	-	-	-	-	-	-		
	Bottom edge facing phantom	Estimated SAR	0.328	0.301	0.279	0.351	0.315	0.279	0.01	13
		Full SAR	0.333	-	-	0.357	-	-		
	Left edge facing phantom	Estimated SAR	-	0.107	-	-	0.112	-	-	-
		Full SAR	-	-	-	-	-	-		
	Right edge facing phantom	Estimated SAR	-	0.072	-	-	0.075	-	-	-
		Full SAR								
	Normal Cover Bottom edge facing phantom	Estimated SAR	0.321	0.319	0.301	0.344	0.334	0.301	0.01	-
		Full SAR	0.321	-	-	0.344	-	-		

LTE2500 (Band 7) Wireless Router SAR results / Antenna 1

Mode	Test configuration	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 20850	Ch 21100	Ch 21350	Ch 20850	Ch 21100	Ch 21350		
			2510.0 MHz	2535.0 MHz	2560.0 MHz	2510.0 MHz	2535.0 MHz	2560.0 MHz		
20MHz Ch BW 1RB 0 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged power [dBm]		22.7	22.7	22.7	1.05	1.05	1.05	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 1RB 50 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.8	22.7	0.2	0.1	0.2	dB	
	Time-averaged power [dBm]		22.7	22.8	22.7	1.05	1.02	1.05	Lin	
20MHz Ch BW 1RB 50 % offset	Back facing phantom	Estimated SAR	0.795	0.829	-	0.832	0.848	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	0.746	-	-	0.763	-	0.00	-
		Full SAR	-	0.745	-	-	0.762	-	-	-
	Top edge facing phantom	Estimated SAR	-	0.037	-	-	0.038	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	0.821	0.841	-	0.860	0.861	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	0.054	-	-	0.055	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	0.398	-	-	0.407	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 1RB 100 % offset	Normal Cover Bottom edge facing phantom	Estimated SAR	0.755	0.833	-	0.791	0.852	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 1RB 100 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.8	0.2	0.2	0.1	dB	
	Time-averaged power [dBm]		22.7	22.7	22.8	1.05	1.05	1.02	Lin	
20MHz Ch BW 1RB 100 % offset	Back facing phantom	Estimated SAR	-	-	0.848	-	-	0.868	0.03	-
		Full SAR	-	-	0.878	-	-	0.898	-	-
	Display facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	-	0.955	-	-	0.977	0.02	-
		Full SAR	-	-	0.971	-	-	0.994	-	-
	Left edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 50%RB 0 % offset	Normal Cover Bottom edge facing phantom	Estimated SAR	-	-	0.993	-	-	1.02	0.02	-
		Full SAR	-	-	1.01	-	-	1.03	-	-
	Repeated SAR Normal Cover Bottom edge facing phantom	Estimated SAR	-	-	0.996	-	-	1.02	0.02	-
		Full SAR	-	-	1.02	-	-	1.04	-	-
20MHz Ch BW 50%RB 0 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.7	0.2	0.2	0.2	dB	
	Time-averaged power [dBm]		22.7	22.7	22.7	1.05	1.05	1.05	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 50 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.8	22.7	0.2	0.1	0.2	dB	
	Time-averaged power [dBm]		22.7	22.8	22.7	1.05	1.02	1.05	Lin	
20MHz Ch BW 50%RB 50 % offset	Back facing phantom	Estimated SAR	-	0.639	-	-	0.654	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	0.602	-	-	0.616	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	0.029	-	-	0.029	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	0.674	-	-	0.690	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	0.042	-	-	0.043	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	0.315	-	-	0.322	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 50%RB 100 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.7	22.7	22.8	0.2	0.2	0.1	dB	
	Time-averaged power [dBm]		22.7	22.7	22.8	1.05	1.05	1.02	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 100 %RB	Tuning Target + Tolerance [dBm]		21.9			Scaling factor*				
	Conducted Power [dBm]		21.7	21.7	21.7	0.2	0.2	0.2	dB	
	Time-averaged power [dBm]		21.7	21.7	21.7	1.05	1.05	1.05	Lin	
	Back facing phantom	Estimated SAR	-	0.656	-	-	0.687	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	0.676	-	-	0.708	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-

LTE2500 (Band 7) Wireless Router SAR results / Antenna 2

Mode	Test configuration	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz	Ch 20850 2510.0 MHz	Ch 21100 2535.0 MHz	Ch 21350 2560.0 MHz		
20MHz Ch BW 1RB 0 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged power [dBm]		22.3	22.4	22.3	1.15	1.12	1.15	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 1RB 50 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.4	22.4	22.3	0.5	0.5	0.6	dB	
	Time-averaged power [dBm]		22.4	22.4	22.3	1.12	1.12	1.15	Lin	
	Back facing phantom	Estimated SAR	0.805	0.850	-	0.903	0.954	-	0.01	-
		Full SAR	-	0.859	-	-	0.964	-		
	Display facing phantom	Estimated SAR	1.02	1.00	-	1.14	1.12	-	0.01	-
		Full SAR	1.03	-	-	1.16	-	-		
	Top edge facing phantom	Estimated SAR	-	0.034	-	-	0.038	-	-	-
		Full SAR	-	-	-	-	-	-		
	Bottom edge facing phantom	Estimated SAR	0.889	1.15	-	0.997	1.29	-	0.01	14
		Full SAR	-	1.16	-	-	1.30	-		
	Left edge facing phantom	Estimated SAR	-	0.233	-	-	0.261	-	0.01	-
		Full SAR	-	0.245	-	-	0.275	-		
	Right edge facing phantom	Estimated SAR	-	0.143	-	-	0.160	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Display edge facing phantom	Estimated SAR	1.04	-	-	1.17	-	-	-	-
		Full SAR	-	-	-	-	-	-		
	Normal Cover Bottom edge facing phantom	Estimated SAR	-	1.06	-	-	1.19	-	-	-
		Full SAR	-	-	-	-	-	-		
	Repeated SAR Bottom edge facing phantom	Estimated SAR	-	1.14	-	-	1.28	-	0.02	-
		Full SAR	-	1.16	-	-	1.30	-		

(Table Continues)

(Table Continues)

20MHz Ch BW 1RB 100 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.4	0.6	0.5	0.5	dB	
	Time-averaged power [dBm]		22.3	22.4	22.4	1.15	1.12	1.12	Lin	
	Back facing phantom	Estimated SAR	-	-	0.788	-	-	0.884	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	-	0.884	-	-	0.992	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	-	1.15	-	-	1.29	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
Right edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-	
	Full SAR	-	-	-	-	-	-	-	-	
Normal Cover Bottom egde facing phantom	Estimated SAR	-	-	1.070	-	-	1.20	0.02	-	
	Full SAR	-	-	1.090	-	-	1.22			
20MHz Ch BW 50%RB 0 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.3	0.6	0.5	0.6	dB	
	Time-averaged power [dBm]		22.3	22.4	22.3	1.15	1.12	1.15	Lin	
			No testing required for this CBW/RB/RB offset configuration according to KDB 941225 D05 SAR for LTE Devices v02r02							
20MHz Ch BW 50%RB 50 % offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.4	22.4	22.3	0.5	0.5	0.6	dB	
	Time-averaged power [dBm]		22.4	22.4	22.3	1.12	1.12	1.15	Lin	
	Back facing phantom	Estimated SAR	-	0.677	-	-	0.760	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	0.826	0.799	-	0.927	0.896	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	0.028	-	-	0.031	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	0.697	0.915	-	0.782	1.03	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	0.188	-	-	0.211	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
Right edge facing phantom	Estimated SAR	-	0.114	-	-	0.128	-	-	-	
	Full SAR	-	-	-	-	-	-	-	-	

(Table Continues)

(Table Continues)

20MHz Ch BW 50%RB 100% offset	Tuning Target + Tolerance [dBm]		22.9			Scaling factor*				
	Conducted Power [dBm]		22.3	22.4	22.4	0.6	0.5	0.5	dB	
	Time-averaged power [dBm]		22.3	22.4	22.4	1.15	1.12	1.12	Lin	
20MHz Ch BW 50%RB 100% offset	Back facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	-	0.740	-	-	0.830	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	-	0.978	-	-	1.10	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
20MHz Ch BW 100 % RB	Tuning Target + Tolerance [dBm]		21.9			Scaling factor*				
	Conducted Power [dBm]		21.3	21.4	21.3	0.6	0.5	0.6	dB	
	Time-averaged power [dBm]		21.3	21.4	21.3	1.15	1.12	1.15	Lin	
	Back facing phantom	Estimated SAR	-	0.678	-	-	0.761	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	0.787	-	-	0.883	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Bottom edge facing phantom	Estimated SAR	-	0.908	-	-	1.019	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Right edge facing phantom	Estimated SAR	-	-	-	-	-	-	-	-
		Full SAR	-	-	-	-	-	-	-	-

2450MHz Wireless Router SAR results

Mode	Test configuration	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation (Estimated SAR - Full SAR) [W/kg]	Plot #
			Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz	Ch 2 2417.0 MHz	Ch 6 2437.0 MHz	Ch 10 2457.0 MHz		
WLAN b-mode BPSK 1 Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.6	16.4	16.4	1.4	1.6	1.6	dB	
	Time-averaged power [dBm]		16.6	16.4	16.4	1.38	1.45	1.45	Lin	
	Back facing phantom	Estimated SAR	-	0.120	-	-	0.173	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Display facing phantom	Estimated SAR	-	0.139	-	-	0.201	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Top edge facing phantom	Estimated SAR	0.147	0.165	0.143	0.203	0.238	0.207	0.00	15
		Full SAR	-	0.169	-	-	0.244	-		
	Bottom edge facing phantom	Estimated SAR	-	0.007	-	-	0.010	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
	Left edge facing phantom	Estimated SAR	-	0.038	-	-	0.055	-	-	-
		Full SAR	-	-	-	-	-	-	-	-
Right edge facing phantom	Estimated SAR	-	0.079	-	-	0.114	-	-	-	
Normal Cover Top edge facing phantom	Estimated SAR	0.137	0.162	0.154	0.189	0.234	0.223	0.00	-	
	Full SAR	-	0.165	-	-	0.238	-			
WLAN b-mode QPSK 2 Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.7	16.6	16.7	1.3	1.4	1.3	dB	
	Time-averaged power [dBm]		16.7	16.6	16.7	1.35	1.38	1.35	Lin	
	Top edge facing phantom	Estimated SAR	-	-	0.126	-	-	0.170	-	-
Full SAR		-	-	-	-	-	-			
WLAN b-mode QPSK 11 Mbps	Tuning Target + Tolerance [dBm]		18.0			Scaling factor*				
	Conducted Power [dBm]		16.9	17.1	16.6	1.1	0.9	1.4	dB	
	Time-averaged power [dBm]		16.9	17.1	16.6	1.29	1.23	1.38	Lin	
	Top edge facing phantom	Estimated SAR	0.110	0.123	-	0.142	0.151	-	-	-
		Full SAR	-	-	-	-	-	-		

Simultaneous transmissions: Combined SAR results – Individual band Max results

Test configuration	Max. Reported* 1g SAR results		
	WLAN	Antenna 1	
		3-slot GPRS1900	LTE2500 (Band 7)
Back facing phantom	0.173	0.257	0.898
Display facing phantom	0.201	0.301	0.762
Top facing phantom	0.244	0.029	0.038
Bottom facing phantom	0.010	0.357	1.04
Left facing phantom	0.055	0.112	0.055
Right facing phantom	0.114	0.075	0.407

Test configuration	Max. Reported* 1g SAR results			
	WLAN	Antenna 2		
		4-slot GPRS850	WCDMA850 (Band 5)	LTE2500 (Band 7)
Back facing phantom	0.173	0.462	0.386	0.964
Display facing phantom	0.201	0.367	0.388	1.17
Top facing phantom	0.244	0.010	0.016	0.038
Bottom facing phantom	0.010	0.296	0.399	1.30
Left facing phantom	0.055	0.485	0.468	0.275
Right facing phantom	0.114	0.219	0.168	0.160

Simultaneous transmissions: Combined body SAR results – Max + Max combined results

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Back facing phantom	0.430	1.07
Display facing phantom	0.502	0.963
Top facing phantom	0.273	0.282
Bottom facing phantom	0.367	1.05
Left facing phantom	0.167	0.110
Right facing phantom	0.189	0.521

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Back facing phantom	0.635	0.559	1.14
Display facing phantom	0.568	0.589	1.37
Top facing phantom	0.254	0.260	0.282
Bottom facing phantom	0.306	0.409	1.31
Left facing phantom	0.540	0.523	0.330
Right facing phantom	0.333	0.282	0.274

Note: Simultaneous Transmission Procedures as described in KDB648474 are not required for this product.

7.3.1 Combined Body SAR data

The Combined SAR data given in the tables below has been voluntarily calculated and should be ignored for FCC certification.

The following table gives a more accurate assessment of the SAR values for simultaneous transmission. These values have been calculated using the SPEAG Combined Multiband algorithm, which is based on area scans. It a) converts the 2D area scans into 3D volume scans by assuming frequency-dependent decay characteristics for the E-field, b) sums the SAR values for WLAN2450 and the cellular bands point-by-point and c) calculates the combined average SAR values.

**Simultaneous transmissions: Combined SAR results –
SPEAG Combined Multiband algorithm results**

Test configuration	Max. Reported* 1g SAR results	
	Antenna 1 + WLAN	
	3-slot GPRS1900 + WLAN	LTE2500 (Band 7) + WLAN
Back facing phantom	-	-
Display facing phantom	0.336	-
Top facing phantom	-	-
Bottom facing phantom	-	-
Left facing phantom	-	-
Right facing phantom	-	-

Test configuration	Max. Reported* 1g SAR results		
	Antenna 2 + WLAN		
	4-slot GPRS850 + WLAN	WCDMA850 (Band 5) + WLAN	LTE2500 (Band 7) + WLAN
Back facing phantom	0.508	-	-
Display facing phantom	-	0.414	1.18
Top facing phantom	-	-	-
Bottom facing phantom	-	-	-
Left facing phantom	-	-	-
Right facing phantom	-	-	-

Some of the Combined SAR values in the above table are less than the maximum SAR values for the contributing cellular band. This is due to a) minimal overlap of the SAR distributions of the cellular band with WLAN2450 and b) uncertainties associated with the different methods of calculation. In these cases, the maximum SAR values given for the combined Modes in the Summary table in Section 1.2 are those for the individual cellular band.

Plots of the Measurement scans are given in Appendix B.

APPENDIX A: SYSTEM CHECKING SCANS

Plot1:

Date/Time: 2014-07-11 10:32:45 PM

Test Laboratory: TCC Microsoft

Type: D835V2; Serial: 4d005

Communication System: CW835

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: Head 835 SAR1; Medium Notes: Medium Temperature: $t=21.2$

Medium parameters used: $f = 835$ MHz; $\sigma = 0.909$ S/m; $\epsilon_r = 41.894$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.83, 8.83, 8.83); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - SAM1; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=15mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 53.025 V/m

Fast SAR: SAR(1 g) = 2.35 W/kg

Fast SAR(10 g) = 1.6 W/kg

Maximum value of SAR (interpolated) = 2.53 W/kg

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 53.025 V/m

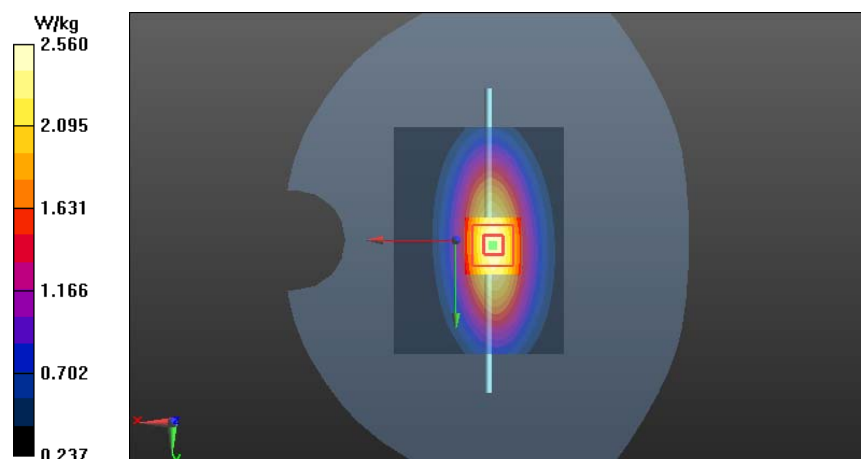
Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.38 W/kg

SAR(10 g) = 1.56 W/kg

Power Drift = -0.04 dB

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



Plot2:

Date/Time: 2014-07-11 10:21:39 AM

Test Laboratory: TCC Microsoft

Type: D1900V2; Serial: 509

Communication System: CW1900

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Head 1900 SAR3; Medium Notes: Medium Temperature: $t=21.2\text{ C}$

Medium parameters used: $f = 1900\text{ MHz}$; $\sigma = 1.348\text{ S/m}$; $\epsilon_r = 38.449$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3574
- ConvF(7.29, 7.29, 7.29); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2013-09-16
- Phantom: SAR3 - SAM2 ; Type: Not specified; Serial: Not specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.500\text{ mm}$, $dy=1.500\text{ mm}$

Reference Value = 88.933 V/m

Fast SAR: SAR(1 g) = 9.65 W/kg

Fast SAR(10 g) = 5.07 W/kg

Maximum value of SAR (interpolated) = 11.2 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 88.933 V/m

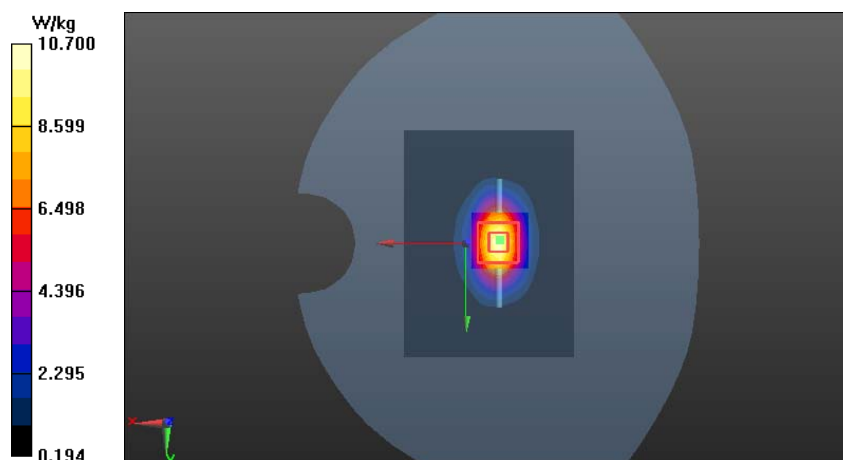
Peak SAR (extrapolated) = 17.9 W/kg

SAR(1 g) = 9.57 W/kg

SAR(10 g) = 4.98 W/kg

Power Drift = 0.07 dB

Maximum value of SAR (measured) = 10.7 W/kg



Plot3:

Date/Time: 2014-07-11 9:55:29 AM

Test Laboratory: TCC Microsoft

Type: D2450V2; Serial: D2450V2 - SN:760

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Head 2450 SAR2; Medium Notes: Medium Temperature: $t=21.3^{\circ}\text{C}$

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.787 \text{ S/m}$; $\epsilon_r = 38.598$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY Configuration:

- Probe: EX3DV4 - SN3823
- ConvF(6.85, 6.85, 6.85); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2013-09-18
- Phantom: SAR2 - SAM2; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 90.064 V/m

Fast SAR: SAR(1 g) = 12.8 W/kg

Fast SAR(10 g) = 5.73 W/kg

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

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 90.064 V/m

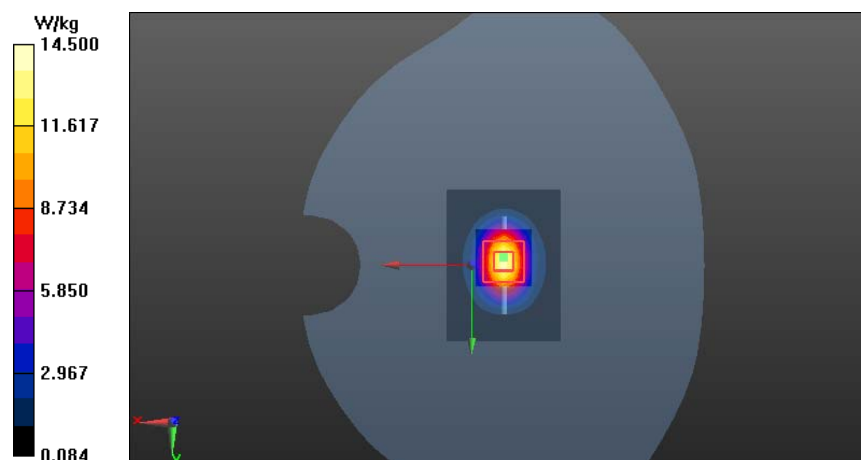
Peak SAR (extrapolated) = 26.6 W/kg

SAR(1 g) = 12.8 W/kg

SAR(10 g) = 5.95 W/kg

Power Drift = 0.04 dB

Maximum value of SAR (measured) = 14.5 W/kg



Plot4:

Date/Time: 2014-07-09 11:03:19 AM

Test Laboratory: TCC Microsoft

Type: D2600V2; Serial: D2600V2 - SN:1042

Communication System: CW2600

Frequency: 2600 MHz; Duty Cycle: 1:1

Medium: Head 2600 SAR4; Medium Notes: Medium Temperature: $t=21.2^{\circ}\text{C}$

Medium parameters used: $f = 2600 \text{ MHz}$; $\sigma = 2.013 \text{ S/m}$; $\epsilon_r = 37.587$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(4.35, 4.35, 4.35); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - SAM3; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 90.335 V/m

Fast SAR: SAR(1 g) = 14.8 W/kg

Fast SAR(10 g) = 6.68 W/kg

Maximum value of SAR (interpolated) = 17.3 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 90.335 V/m

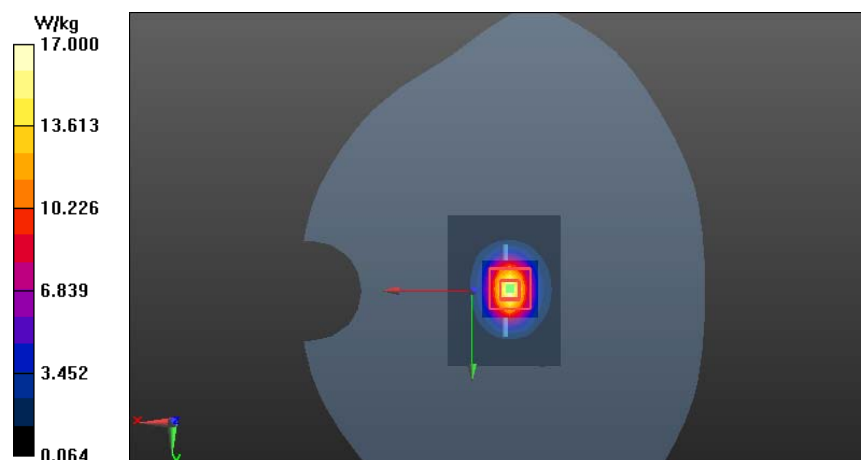
Peak SAR (extrapolated) = 33.5 W/kg

SAR(1 g) = 14.9 W/kg

SAR(10 g) = 6.49 W/kg

Power Drift = 0.03 dB

Maximum value of SAR (measured) = 17.0 W/kg



Plot5:

Date/Time: 2014-07-11 10:03:12 AM

Test Laboratory: TCC Microsoft

Type: D835V2; Serial: 4d005

Communication System: CW835

Frequency: 835 MHz; Duty Cycle: 1:1

Medium: Body 835 SAR1; Medium Notes: Medium Temperature: $t=21.3$

Medium parameters used: $f = 835$ MHz; $\sigma = 0.96$ S/m; $\epsilon_r = 54.517$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.72, 8.72, 8.72); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=15mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 51.515 V/m

Fast SAR: SAR(1 g) = 2.49 W/kg

Fast SAR(10 g) = 1.68 W/kg

Maximum value of SAR (interpolated) = 2.68 W/kg

d=15mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

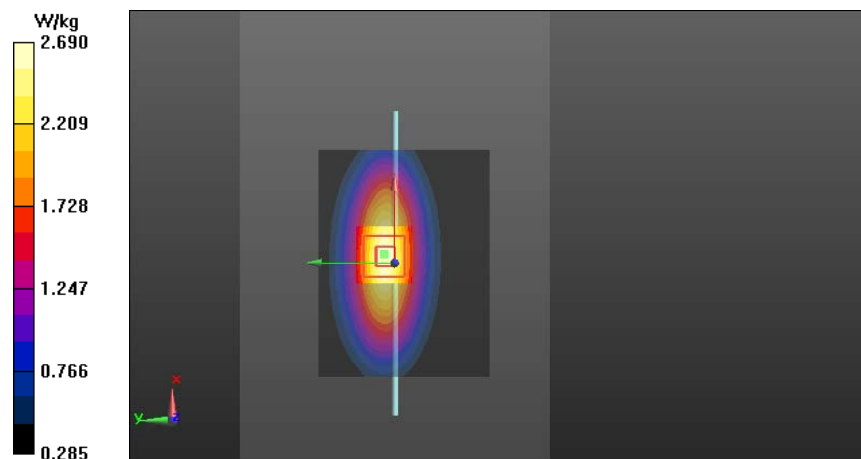
Reference Value = 51.515 V/m

Peak SAR (extrapolated) = 3.60 W/kg

SAR(1 g) = 2.5 W/kg

Maximum value of SAR (measured) = 2.69 W/kg

Power Drift = -0.01 dB



Plot6:

Date/Time: 2014-07-23 12:10:09 PM

Test Laboratory: TCC Microsoft

Type: D1900V2; Serial: 509

Communication System: CW1900

Frequency: 1900 MHz; Duty Cycle: 1:1

Medium: Body 1900 SAR3; Medium Notes: Medium Temperature: $t=21.2\text{ C}$

Medium parameters used: $f = 1900\text{ MHz}$; $\sigma = 1.56\text{ S/m}$; $\epsilon_r = 51.371$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3574
- ConvF(6.73, 6.73, 6.73); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2013-09-16
- Phantom: SAR3 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: $dx=1.500\text{ mm}$, $dy=1.500\text{ mm}$

Reference Value = 82.121 V/m

Fast SAR: SAR(1 g) = 9.64 W/kg

Fast SAR(10 g) = 4.87 W/kg

Maximum value of SAR (interpolated) = 11.6 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 82.121 V/m

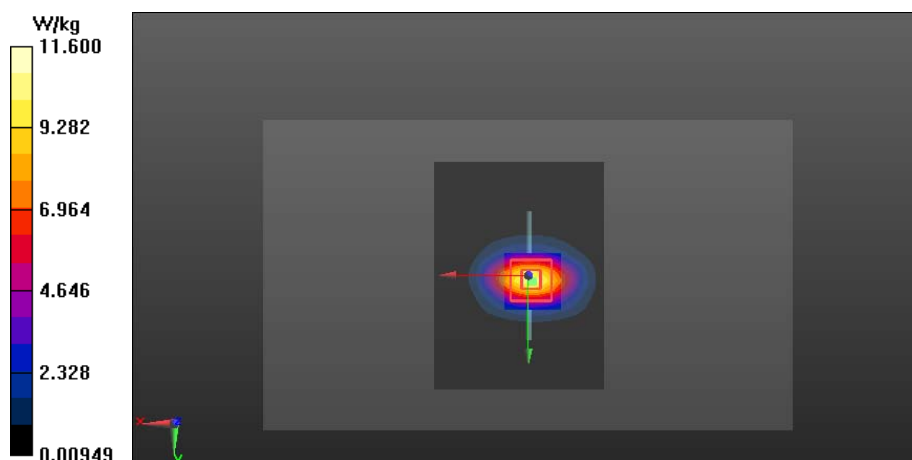
Peak SAR (extrapolated) = 17.3 W/kg

SAR(1 g) = 9.57 W/kg

SAR(10 g) = 5.02 W/kg

Power Drift = 0.01 dB

Maximum value of SAR (measured) = 10.8 W/kg



Plot7:

Date/Time: 2014-07-14 9:54:01 AM

Test Laboratory: TCC Microsoft

Type: D2450V2; Serial: D2450V2 - SN:883

Communication System: CW2450

Frequency: 2450 MHz; Duty Cycle: 1:1

Medium: Body 2450 SAR4; Medium Notes: Medium Temperature: $t=21.0^{\circ}\text{C}$

Medium parameters used: $f = 2450 \text{ MHz}$; $\sigma = 1.912 \text{ S/m}$; $\epsilon_r = 52.047$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(4.2, 4.2, 4.2); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 92.485 V/m

Fast SAR: SAR(1 g) = 13.8 W/kg

Fast SAR(10 g) = 6.08 W/kg

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

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

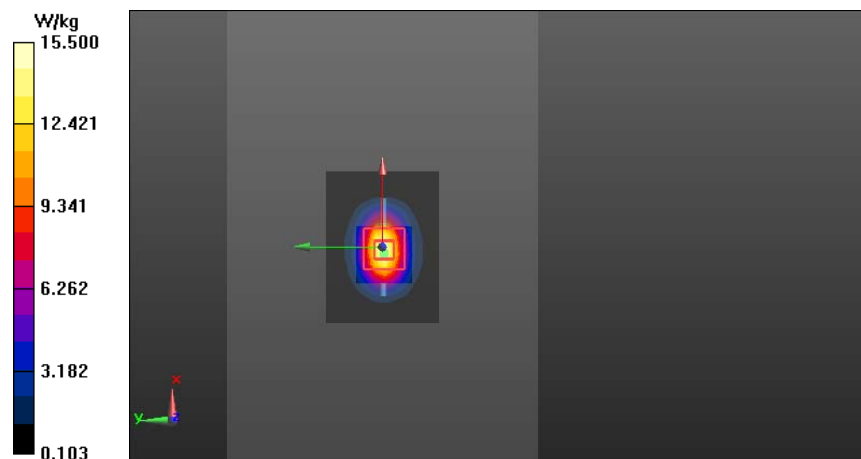
Reference Value = 92.485 V/m

Peak SAR (extrapolated) = 28.6 W/kg

SAR(1 g) = 13.8 W/kg

Maximum value of SAR (measured) = 15.5 W/kg

Power Drift = -0.06 dB



Plot8:

Date/Time: 2014-07-11 10:12:41 AM

Test Laboratory: TCC Microsoft

Type: D2600V2; Serial: D2600V2 - SN:1082

Communication System: CW2600

Frequency: 2600 MHz; Duty Cycle: 1:1

Medium: Body 2600 SAR4; Medium Notes: Medium Temperature: t=21.0C

Medium parameters used: f = 2600 MHz; $\sigma = 2.164$ S/m; $\epsilon_r = 51.75$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(3.99, 3.99, 3.99); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

d=10mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 90.209 V/m

Fast SAR: SAR(1 g) = 15.2 W/kg

Fast SAR(10 g) = 6.76 W/kg

Maximum value of SAR (interpolated) = 17.8 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

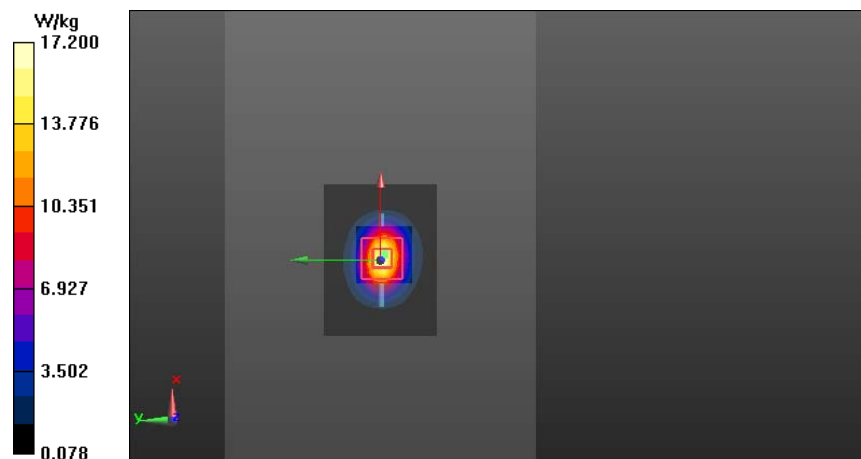
Reference Value = 90.209 V/m

Peak SAR (extrapolated) = 33.1 W/kg

SAR(1 g) = 15.2 W/kg

Maximum value of SAR (measured) = 17.2 W/kg

Power Drift = 0.01 dB



APPENDIX B: MEASUREMENT SCANS

Plot1:

Date/Time: 2014-07-11 11:13:36 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: 4-slot GPRS850

Frequency: 848.8 MHz; Duty Cycle: 1:2.09991

Medium: Head 850 SAR1; Medium Notes: Medium Temperature: t=21.2

Medium parameters used: f = 849 MHz; $\sigma = 0.922$ S/m; $\epsilon_r = 41.721$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.83, 8.83, 8.83); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - SAM1; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

4-slot GPRS850 - Left/Cheek - High – Antenna 2 - Normal Cover/Area Scan (81x121x1): Interpolated grid:

dx=1.500 mm, dy=1.500 mm

Reference Value = 7.083 V/m

Fast SAR: SAR(1 g) = 0.382 W/kg

Fast SAR(10 g) = 0.266 W/kg

Maximum value of SAR (interpolated) = 0.408 W/kg

4-slot GPRS850 - Left/Cheek - High – Antenna 2 - Normal Cover/Zoom Scan (6x6x7)/Cube 0: Measurement grid:

dx=7.5mm, dy=7.5mm, dz=5mm

Reference Value = 7.083 V/m

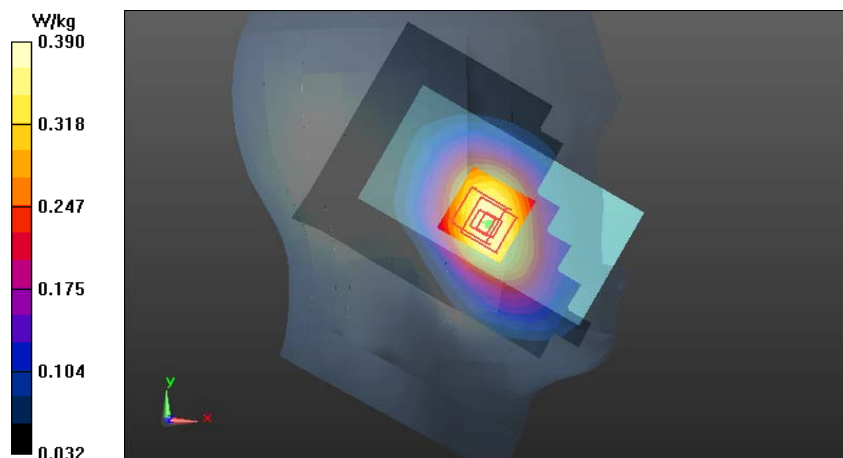
Peak SAR (extrapolated) = 0.476 W/kg

SAR(1 g) = 0.374 W/kg

SAR(10 g) = 0.283 W/kg

Power Drift = 0.08 dB

Maximum value of SAR (measured) = 0.390 W/kg



Plot2:

Date/Time: 2014-07-09 2:40:40 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: WCDMA850 (Band 5)

Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: Head 835 SAR1; Medium Notes: Medium Temperature: $t=21.2$

Medium parameters used: $f = 847$ MHz; $\sigma = 0.918$ S/m; $\epsilon_r = 41.827$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.83, 8.83, 8.83); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - SAM1; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WCDMA850 (Band 5) - Left/Cheek – High – Antenna 2 – Normal Cover/Area Scan (81x121x1): Interpolated grid:

$dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 6.814 V/m

Fast SAR: SAR(1 g) = 0.370 W/kg

Fast SAR(10 g) = 0.257 W/kg

Maximum value of SAR (interpolated) = 0.396 W/kg

WCDMA850 (Band 5) - Left/Cheek – High - Antenna 2 – Normal Cover/Zoom Scan (5x5x7)/Cube 0: Measurement

grid: $dx=7.5$ mm, $dy=7.5$ mm, $dz=5$ mm

Reference Value = 6.814 V/m

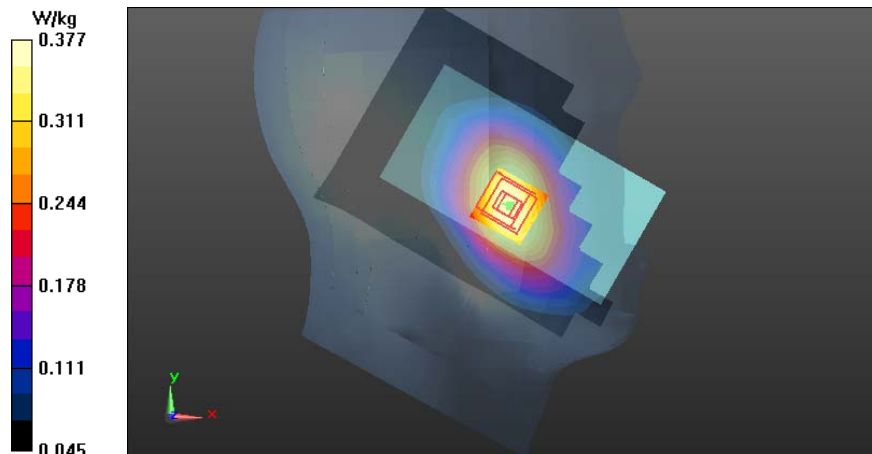
Peak SAR (extrapolated) = 0.457 W/kg

SAR(1 g) = 0.358 W/kg

SAR(10 g) = 0.271 W/kg

Power Drift = 0.16 dB

Maximum value of SAR (measured) = 0.377 W/kg



Plot3:

Date/Time: 2014-07-11 5:25:29 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923282/3

Communication System: 3-slot GPRS1900

Frequency: 1850.2 MHz; Duty Cycle: 1:2.80027

Medium: Head 1900 SAR3; Medium Notes: Medium Temperature: $t=21.2$ C

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.301$ S/m; $\epsilon_r = 38.653$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3574
- ConvF(7.29, 7.29, 7.29); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2013-09-16
- Phantom: SAR3 - SAM2 ; Type: Not specified; Serial: Not specified
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.8 (7028)

3-slot GPRS1900 - Left/Cheek – Low - Antenna 1 – Normal Cover/Area Scan (81x121x1): Interpolated grid:

$dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 6.395 V/m

Fast SAR: SAR(1 g) = 0.285 W/kg

Fast SAR(10 g) = 0.167 W/kg

Maximum value of SAR (interpolated) = 0.318 W/kg

3-slot GPRS1900 - Left/Cheek – Low - Antenna 1 – Normal Cover/Zoom Scan (5x5x7)/Cube 0: Measurement

grid: $dx=7.5$ mm, $dy=7.5$ mm, $dz=5$ mm

Reference Value = 6.395 V/m

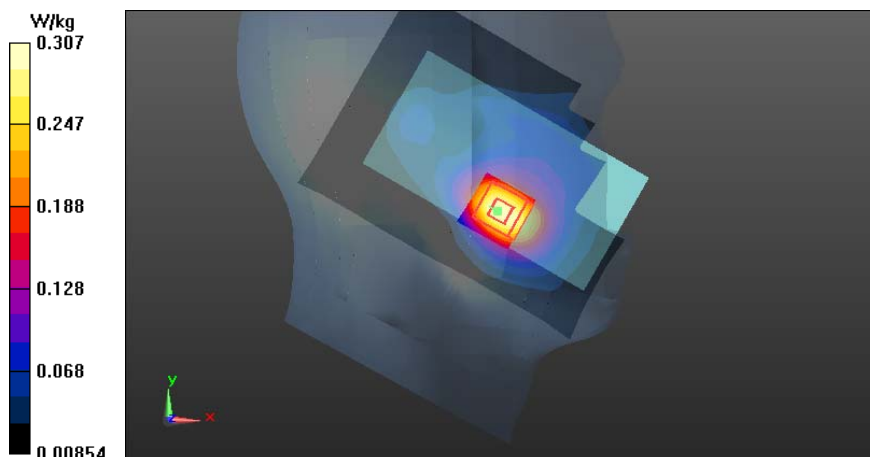
Peak SAR (extrapolated) = 0.423 W/kg

SAR(1 g) = 0.283 W/kg

SAR(10 g) = 0.178 W/kg

Power Drift = 0.06 dB

Maximum value of SAR (measured) = 0.307 W/kg



Plot4:

Date/Time: 2014-07-10 10:51:04 AM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923231/0

Communication System: LTE2500 (Band 7)

Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: Head 2600 SAR4; Medium Notes: Medium Temperature: t=21.2C

Medium parameters used: f = 2535 MHz; $\sigma = 1.904$ S/m; $\epsilon_r = 37.412$; $\rho = 1000$ kg/m³

Phantom section: Left Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(4.35, 4.35, 4.35); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - SAM3; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

LTE2500 (Band 7) - Left/Cheek - Middle - QPSK - 20MHz - 1RB - 50% offset - Antenna 2/Area Scan (121x181x1):

Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 7.724 V/m

Fast SAR: SAR(1 g) = 0.654 W/kg

Fast SAR(10 g) = 0.361 W/kg

Maximum value of SAR (interpolated) = 0.711 W/kg

LTE2500 (Band 7) - Left/Cheek - Middle - QPSK - 20MHz - 1RB - 50% offset - Antenna 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 7.724 V/m

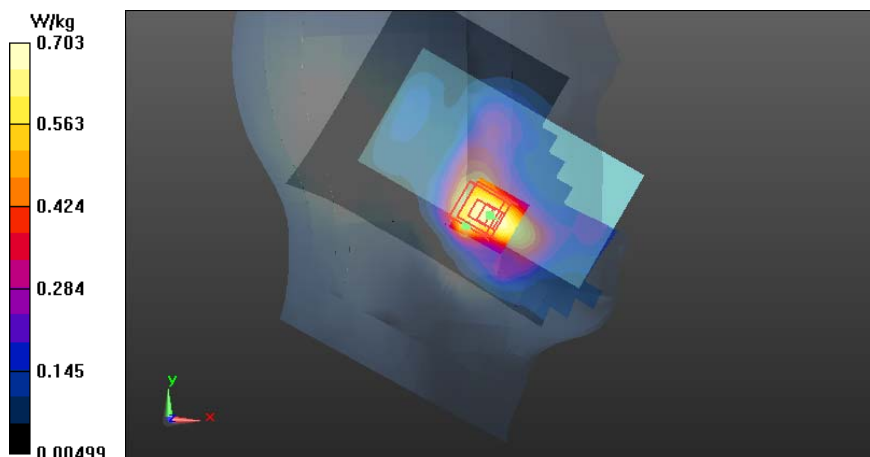
Peak SAR (extrapolated) = 1.22 W/kg

SAR(1 g) = 0.651 W/kg

SAR(10 g) = 0.360 W/kg

Power Drift = 0.07 dB

Maximum value of SAR (measured) = 0.703 W/kg



Plot5:

Date/Time: 2014-07-11 10:30:19 AM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923288/0

Communication System: WLAN2450 b-mode

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: Head 2450 SAR2; Medium Notes: Medium Temperature: $t=21.3^{\circ}\text{C}$

Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.773 \text{ S/m}$; $\epsilon_r = 38.639$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Left Section

DASY Configuration:

- Probe: EX3DV4 - SN3823
- ConvF(6.85, 6.85, 6.85); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1319; Calibrated: 2013-09-18
- Phantom: SAR2 - SAM2; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WLAN2450 b-mode - Left/Cheek - Channel 6 - BPSK 1 Mbps/Area Scan (121x181x1): Interpolated grid:

$dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 11.921 V/m

Fast SAR: SAR(1 g) = 0.578 W/kg

Fast SAR(10 g) = 0.289 W/kg

Maximum value of SAR (interpolated) = 0.647 W/kg

WLAN2450 b-mode - Left/Cheek - Channel 6 - BPSK 1 Mbps/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

$dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 11.921 V/m

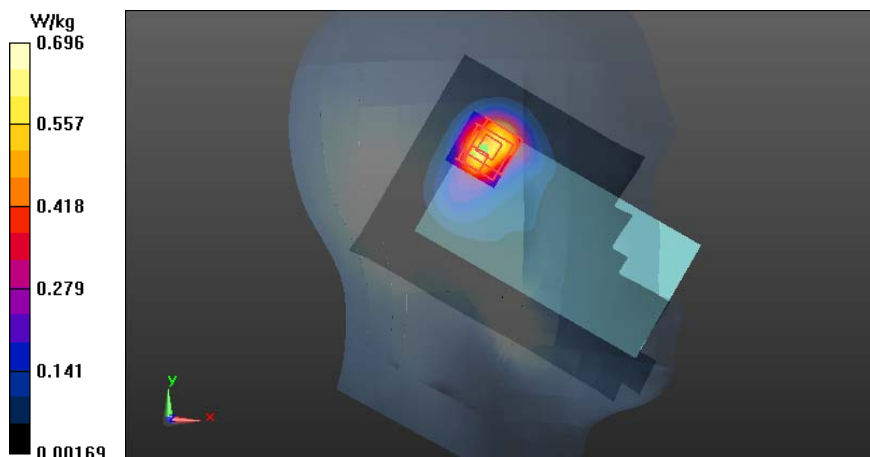
Peak SAR (extrapolated) = 1.42 W/kg

SAR(1 g) = 0.598 W/kg

SAR(10 g) = 0.290 W/kg

Power Drift = 0.06 dB

Maximum value of SAR (measured) = 0.696 W/kg



Plot6:

Date/Time: 2014-07-11 12:50:32 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: 4-slot GPRS850

Frequency: 824.2 MHz; Duty Cycle: 1:2.09991

Medium: Body 835 SAR1; Medium Notes: Medium Temperature: t=21.3

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.949 S/m; ϵ_r = 54.614; ρ = 1000 kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.72, 8.72, 8.72); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

4-slot GPRS850/Body - Low - Spacer 15mm - No Headset - Back Facing Phantom – Antenna 2/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 21.347 V/m

Fast SAR: SAR(1 g) = 0.419 W/kg

Fast SAR(10 g) = 0.302 W/kg

Maximum value of SAR (interpolated) = 0.442 W/kg

4-slot GPRS850/Body - Low - Spacer 15mm - No Headset - Back Facing Phantom – Antenna 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

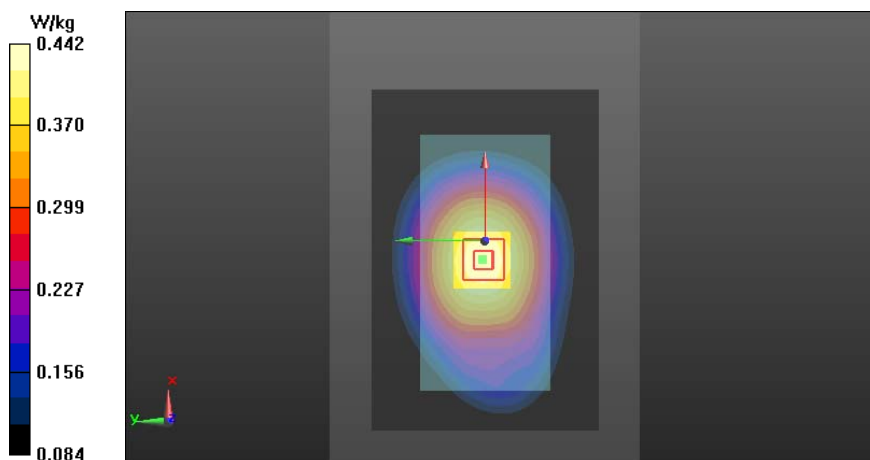
Reference Value = 21.347 V/m

Peak SAR (extrapolated) = 0.516 W/kg

SAR(1 g) = 0.421 W/kg

Maximum value of SAR (measured) = 0.442 W/kg

Power Drift = 0.04 dB



Plot7:

Date/Time: 2014-07-11 9:55:46 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: WCDMA850 (Band 5)

Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: Body 835 SAR1; Medium Notes: Medium Temperature: t=21.3

Medium parameters used: f = 847 MHz; $\sigma = 0.971$ S/m; $\epsilon_r = 54.408$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.72, 8.72, 8.72); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WCDMA850 (Band 5)/Body - High - Spacer 15mm - No Headset - Back Facing Phantom – Antenna 2 – Normal Cover/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 16.841 V/m

Fast SAR: SAR(1 g) = 0.308 W/kg

Fast SAR(10 g) = 0.220 W/kg

Maximum value of SAR (interpolated) = 0.326 W/kg

WCDMA850 (Band 5)/Body - High - Spacer 15mm - No Headset - Back Facing Phantom – Antenna 2 – Normal Cover/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

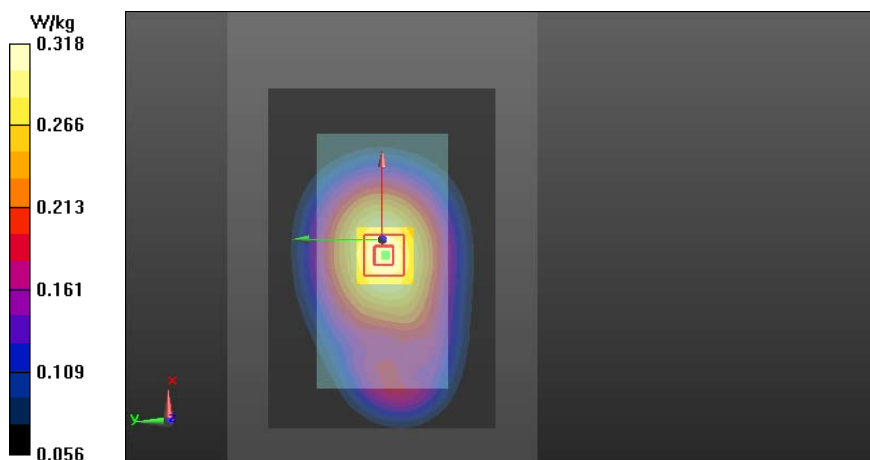
Reference Value = 16.841 V/m

Peak SAR (extrapolated) = 0.369 W/kg

SAR(1 g) = 0.302 W/kg

Maximum value of SAR (measured) = 0.318 W/kg

Power Drift = -0.00 dB



Plot8:

Date/Time: 2014-07-11 9:04:17 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923282/3

Communication System: 3-slot GPRS1900

Frequency: 1850.2 MHz; Duty Cycle: 1:2.80027

Medium: Body 1900 SAR3; Medium Notes: Medium Temperature: $t=21.2\text{ C}$

Medium parameters used (interpolated): $f = 1850.2\text{ MHz}$; $\sigma = 1.432\text{ S/m}$; $\epsilon_r = 51.265$; $\rho = 1000\text{ kg/m}^3$

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3574
- ConvF(6.73, 6.73, 6.73); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2013-09-16
- Phantom: SAR3 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

3-slot GPRS1900/Body - Low - Spacer 15mm - No Headset - Display Facing Phantom – Antenna 1 - Normal Cover/Area Scan (81x121x1): Interpolated grid: $dx=1.500\text{ mm}$, $dy=1.500\text{ mm}$

Reference Value = 3.958 V/m

Fast SAR: SAR(1 g) = 0.238 W/kg

Fast SAR(10 g) = 0.146 W/kg

Maximum value of SAR (interpolated) = 0.260 W/kg

3-slot GPRS1900/Body - Low - Spacer 15mm - No Headset - Display Facing Phantom – Antenna 1 – Normal Cover/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5\text{mm}$, $dy=7.5\text{mm}$, $dz=5\text{mm}$

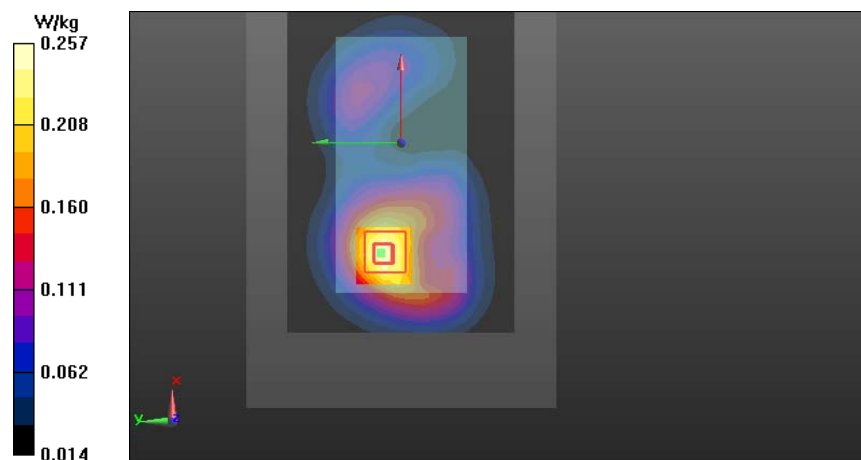
Reference Value = 3.958 V/m

Peak SAR (extrapolated) = 0.357 W/kg

SAR(1 g) = 0.239 W/kg

Maximum value of SAR (measured) = 0.257 W/kg

Power Drift = -0.00 dB



Plot9:

Date/Time: 2014-07-16 10:28:32 AM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923231/0

Communication System: LTE2500 (Band 7)

Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: Body 2600 SAR4; Medium Notes: Medium Temperature: $t=21.4^{\circ}\text{C}$

Medium parameters used: $f = 2535 \text{ MHz}$; $\sigma = 2.037 \text{ S/m}$; $\epsilon_r = 51.76$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(3.99, 3.99, 3.99); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

LTE2500 (Band7)/Body - Middle - QPSK - 20MHz - 1RB - 50% offset - Spacer 15mm - WH-108 - Display Facing Phantom - Antenna 2 - Normal Cover/Area Scan (121x181x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 6.655 V/m

Fast SAR: SAR(1 g) = 0.577 W/kg

Fast SAR(10 g) = 0.315 W/kg

Maximum value of SAR (interpolated) = 0.631 W/kg

LTE2500 (Band7)/Body - Middle - QPSK - 20MHz - 1RB - 50% offset - Spacer 15mm - WH-108 - Display Facing Phantom - Antenna 2 - Normal Cover/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

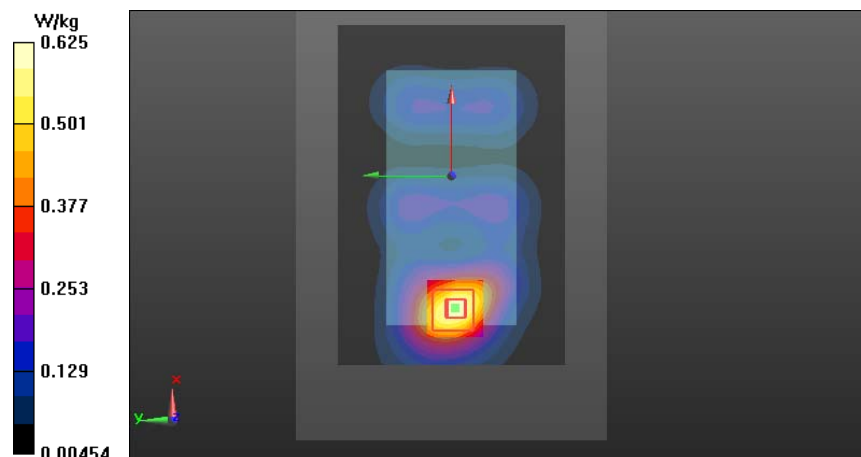
Reference Value = 6.655 V/m

Peak SAR (extrapolated) = 1.06 W/kg

SAR(1 g) = 0.576 W/kg

Maximum value of SAR (measured) = 0.625 W/kg

Power Drift = 0.01 dB



Plot10:

Date/Time: 2014-07-14 1:35:03 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923288/0

Communication System: WLAN2450 b-mode

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: Body 2450 SAR4; Medium Notes: Medium Temperature: $t=21.0^{\circ}\text{C}$

Medium parameters used: $f = 2437 \text{ MHz}$; $\sigma = 1.889 \text{ S/m}$; $\epsilon_r = 52.081$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280

- ConvF(4.2, 4.2, 4.2); Calibrated: 2014-03-20;

- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)

- Electronics: DAE4 Sn887; Calibrated: 2014-03-31

- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified

- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WLAN2450 b-mode/Body - Channel 6 - BPSK 1 Mbps - Spacer 15mm - No Headset - Display Facing Phantom - Normal Cover/Area Scan (121x181x1): Interpolated grid: $dx=1.000 \text{ mm}$, $dy=1.000 \text{ mm}$

Reference Value = 3.907 V/m

Fast SAR: SAR(1 g) = 0.085 W/kg

Fast SAR(10 g) = 0.046 W/kg

Maximum value of SAR (interpolated) = 0.0932 W/kg

WLAN2450 b-mode/Body - Channel 6 - BPSK 1 Mbps - Spacer 15mm - No Headset - Display Facing Phantom - Normal Cover/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

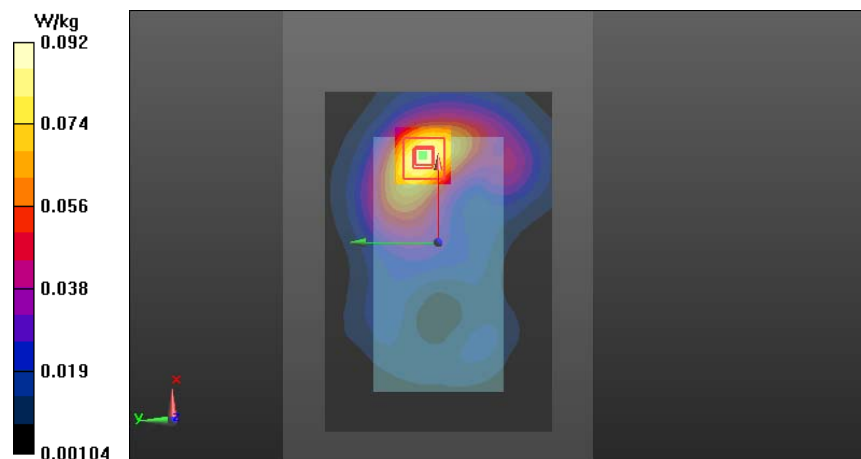
Reference Value = 3.907 V/m

Peak SAR (extrapolated) = 0.151 W/kg

SAR(1 g) = 0.085 W/kg

Maximum value of SAR (measured) = 0.0922 W/kg

Power Drift = 0.11 dB



Plot11:

Date/Time: 2014-07-11 4:37:51 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: 4-slot GPRS850

Frequency: 824.2 MHz; Duty Cycle: 1:2.09991

Medium: Body 835 SAR1; Medium Notes: Medium Temperature: t=21.3

Medium parameters used (interpolated): f = 824.2 MHz; σ = 0.949 S/m; ϵ_r = 54.614; ρ = 1000 kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.72, 8.72, 8.72); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

4-slot GPRS850/Body - Low - Spacer 10mm - No Headset - Left Facing Phantom – Antenna 2/Area Scan

(41x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Reference Value = 22.527 V/m

Fast SAR: SAR(1 g) = 0.480 W/kg

Fast SAR(10 g) = 0.331 W/kg

Maximum value of SAR (interpolated) = 0.512 W/kg

4-slot GPRS850/Body - Low - Spacer 10mm - No Headset - Left Facing Phantom – Antenna 2/Zoom Scan

(5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

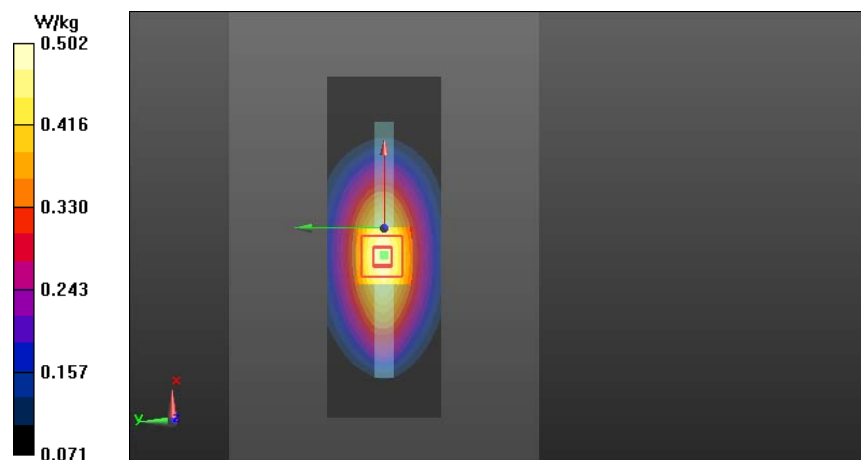
Reference Value = 22.527 V/m

Peak SAR (extrapolated) = 0.638 W/kg

SAR(1 g) = 0.474 W/kg

Maximum value of SAR (measured) = 0.502 W/kg

Power Drift = -0.07 dB



Plot12:

Date/Time: 2014-07-11 7:34:00 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923297/1

Communication System: WCDMA850 (Band 5)

Frequency: 846.6 MHz; Duty Cycle: 1:1

Medium: Body 835 SAR1; Medium Notes: Medium Temperature: $t=21.3$

Medium parameters used: $f = 847$ MHz; $\sigma = 0.971$ S/m; $\epsilon_r = 54.408$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3839
- ConvF(8.72, 8.72, 8.72); Calibrated: 2013-09-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn860; Calibrated: 2013-09-16
- Phantom: SAR1 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WCDMA850 (Band 5)/Body - High - Spacer 10mm - No Headset - Left Facing Phantom – Antenna 2/Area Scan (41x121x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 21.175 V/m

Fast SAR: SAR(1 g) = 0.404 W/kg

Fast SAR(10 g) = 0.277 W/kg

Maximum value of SAR (interpolated) = 0.431 W/kg

WCDMA850 (Band 5)/Body - High - Spacer 10mm - No Headset - Left Facing Phantom – Antenna 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5$ mm, $dy=7.5$ mm, $dz=5$ mm

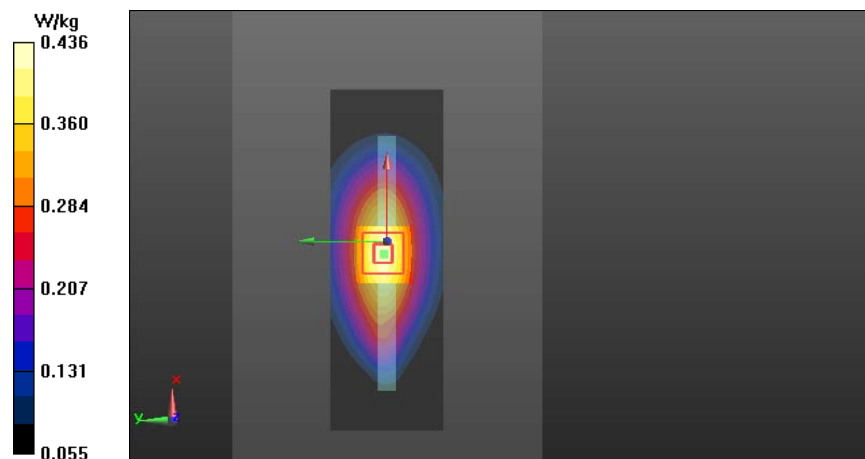
Reference Value = 21.175 V/m

Peak SAR (extrapolated) = 0.555 W/kg

SAR(1 g) = 0.408 W/kg

Maximum value of SAR (measured) = 0.436 W/kg

Power Drift = -0.02 dB



Plot13:

Date/Time: 2014-07-23 1:39:33 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923282/3

Communication System: 3-slot GPRS1900

Frequency: 1850.2 MHz; Duty Cycle: 1:2.80027

Medium: Body 1900 SAR3; Medium Notes: Medium Temperature: $t=21.2$ C

Medium parameters used (interpolated): $f = 1850.2$ MHz; $\sigma = 1.499$ S/m; $\epsilon_r = 51.549$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: EX3DV4 - SN3574
- ConvF(6.73, 6.73, 6.73); Calibrated: 2013-09-19;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn480; Calibrated: 2013-09-16
- Phantom: SAR3 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (7); SEMCAD X Version 14.6.8 (7028)

3-slot GPRS1900/Body - Low - Spacer 10mm - No Headset - Bottom Facing Phantom – Antenna 1/Area Scan (41x81x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Reference Value = 3.528 V/m

Fast SAR: SAR(1 g) = 0.328 W/kg

Fast SAR(10 g) = 0.180 W/kg

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

3-slot GPRS1900/Body - Low - Spacer 10mm - No Headset - Bottom Facing Phantom – Antenna 1/Zoom Scan (5x5x7)/Cube 0: Measurement grid: $dx=7.5$ mm, $dy=7.5$ mm, $dz=5$ mm

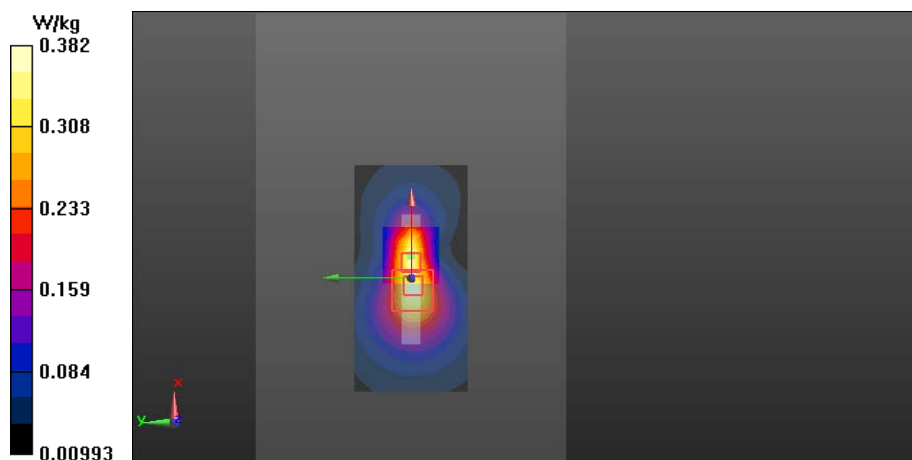
Reference Value = 3.528 V/m

Peak SAR (extrapolated) = 0.611 W/kg

SAR(1 g) = 0.333 W/kg

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

Power Drift = 0.13 dB



Plot14:

Date/Time: 2014-07-15 3:25:16 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923231/0

Communication System: LTE2500 (Band 7)

Frequency: 2535 MHz; Duty Cycle: 1:1

Medium: Body 2600 SAR4; Medium Notes: Medium Temperature: t=21.0C

Medium parameters used: f = 2535 MHz; $\sigma = 2.045$ S/m; $\epsilon_r = 51.595$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(3.99, 3.99, 3.99); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

LTE2500 (Band 7)/Body - Middle - QPSK - 1 RB - 50% offset - Spacer 10mm - No Headset - Bottom Facing

Phantom – Antenna 2/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 22.038 V/m

Fast SAR: SAR(1 g) = 1.15 W/kg

Fast SAR(10 g) = 0.555 W/kg

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

LTE2500 (Band 7)/Body - Middle - QPSK - 1 RB - 50% offset - Spacer 10mm - No Headset - Bottom Facing

Phantom – Antenna 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

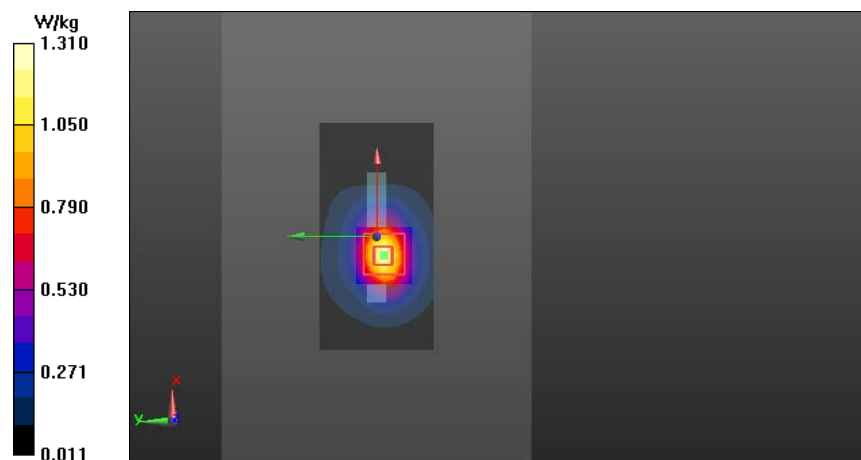
Reference Value = 22.038 V/m

Peak SAR (extrapolated) = 2.32 W/kg

SAR(1 g) = 1.16 W/kg

Maximum value of SAR (measured) = 1.31 W/kg

Power Drift = 0.07 dB



Plot15:

Date/Time: 2014-07-14 3:47:29 PM

Test Laboratory: TCC Microsoft

Type: RM-1038; Serial: 004402/47/923288/0

Communication System: WLAN2450 b-mode

Frequency: 2437 MHz; Duty Cycle: 1:1

Medium: Body 2450 SAR4; Medium Notes: Medium Temperature: t=21.0C

Medium parameters used: f = 2437 MHz; σ = 1.889 S/m; ϵ_r = 52.081; ρ = 1000 kg/m³

Phantom section: Center Section

DASY Configuration:

- Probe: ES3DV3 - SN3280
- ConvF(4.2, 4.2, 4.2); Calibrated: 2014-03-20;
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn887; Calibrated: 2014-03-31
- Phantom: SAR4 - TFP; Type: Not Specified; Serial: Not Specified
- Measurement SW: DASY52, Version 52.8 (5); SEMCAD X Version 14.6.8 (7028)

WLAN 2450 b-mode/Body - Channel 6 - BPSK 1 Mbps - Spacer 10mm - No Headset - Top Facing Phantom/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Reference Value = 9.170 V/m

Fast SAR: SAR(1 g) = 0.165 W/kg

Fast SAR(10 g) = 0.083 W/kg

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

WLAN 2450 b-mode/Body - Channel 6 - BPSK 1 Mbps - Spacer 10mm - No Headset - Top Facing Phantom/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

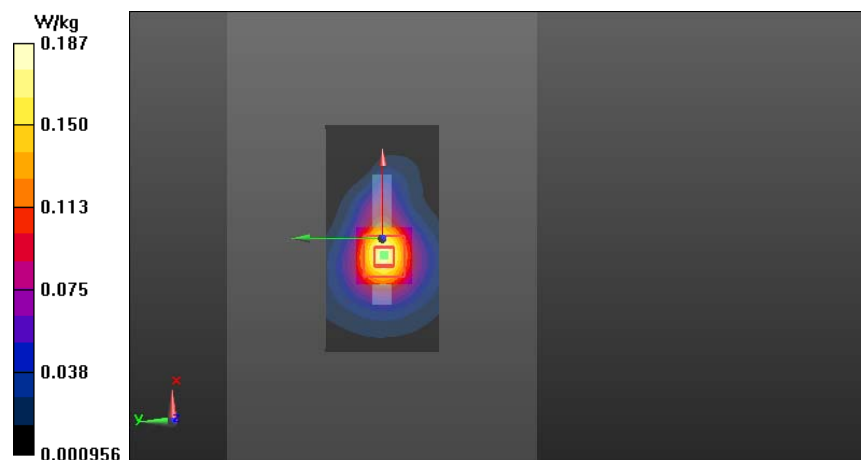
Reference Value = 9.170 V/m

Peak SAR (extrapolated) = 0.308 W/kg

SAR(1 g) = 0.169 W/kg

Maximum value of SAR (measured) = 0.187 W/kg

Power Drift = 0.04 dB



APPENDIX C: DIELECTRIC PARAMETERS OF THE TISSUE SIMULANTS

Head tissue simulant dielectric parameters used in the measurements:

f (MHz)	Date	Dielectric Parameters					
		Ch 128 824.2 MHz		Ch 190 836.6 MHz		Ch 251 848.8 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
GSM/GPRS/ EGPRS850	2014-07-09	42.1	0.90	42.0	0.91	41.8	0.92
	2014-07-11	42.0	0.90	41.9	0.91	41.7	0.92
f (MHz)	Date	Dielectric Parameters					
		Ch 4132 826.4 MHz		Ch 4175 835.0 MHz		Ch 4233 846.6 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
WCDMA850 (Band 5)	2014-07-09	42.1	0.90	42.0	0.91	41.8	0.92
f (MHz)	Date	Dielectric Parameters					
		Ch 512 1850.2 MHz		Ch 661 1880.0 MHz		Ch 810 1909.8 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
GSM/GPRS/ EGPRS1900	2014-07-11	38.7	1.30	38.5	1.33	38.4	1.36
f (MHz)	Date	Dielectric Parameters					
		Ch 20850 2510.0 MHz		Ch 21100 2535.0 MHz		Ch 21350 2560.0 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
LTE2500 (Band 7)	2014-07-09	38.0	1.89	37.9	1.92	37.8	1.96
	2014-07-10	37.7	1.85	37.4	1.90	37.6	1.96
f (MHz)	Date	Dielectric Parameters					
		Ch 1 2412.0 MHz		Ch 6 2437.0 MHz		Ch 11 2462.0 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
WLAN2450	2014-07-11	38.7	1.74	38.6	1.77	38.6	1.80

Body tissue simulant dielectric parameters used in the measurements:

f (MHz)	Date	Dielectric Parameters					
		Ch 128 824.2 MHz		Ch 190 836.6 MHz		Ch 251 848.8 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
GSM/GPRS/ EGPRS850	2014-07-11	54.6	0.95	54.5	0.96	54.4	0.97
f (MHz)	Date	Dielectric Parameters					
		Ch 4132 826.4 MHz		Ch 4175 835.0 MHz		Ch 4233 846.6 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
WCDMA850 (Band 5)	2014-07-11	54.6	0.95	54.5	0.96	54.4	0.97
f (MHz)	Date	Dielectric Parameters					
		Ch 512 1850.2 MHz		Ch 661 1880.0 MHz		Ch 810 1909.8 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
GSM/GPRS/ EGPRS1900	2014-07-11	51.3	1.43	51.2	1.46	51.1	1.49
	2014-07-23	51.6	1.50	51.5	1.54	51.3	1.57
f (MHz)	Date	Dielectric Parameters					
		Ch 20850 2510.0 MHz		Ch 21100 2535.0 MHz		Ch 21350 2560.0 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
LTE2500 (Band 7)	2014-07-11	52.0	2.00	51.9	2.05	51.8	2.09
	2014-07-15	51.7	1.98	51.6	2.04	51.9	2.11
	2014-07-16	51.8	2.00	51.8	2.03	51.7	2.08
f (MHz)	Date	Dielectric Parameters					
		Ch 1 2412.0 MHz		Ch 6 2437.0 MHz		Ch 11 2462.0 MHz	
		ϵ_r	σ [S/m]	ϵ_r	σ [S/m]	ϵ_r	σ [S/m]
WLAN2450	2014-07-14	52.1	1.84	52.1	1.89	52.0	1.93

APPENDIX D: CONDUCTED AVERAGE POWER MEASUREMENTS FOR WCDMA AND HSUPA

Type: RM-1038; Serial: 004402/47/923297/1, HW: 0201, SW: 02030.00000.14244.22000

D.1. WCDMA850 (Band 5) Test results

Average power

Ch / f(MHz)	P [dBm]
4132 / 826.4	23.5
4175 / 835.0	23.4
4233 / 846.6	23.3

D.2. HSUPA850 Test results

Average power

Ch / f(MHz)	P [dBm]				
	Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
4132 / 826.4	22.1	21.3	21.0	21.8	22.3
4175 / 835.0	22.0	21.3	21.2	21.7	22.1
4233 / 846.6	21.9	20.8	21.0	21.5	22.1

Note: In HSUPA operation, the output power is reduced relative to the tuning target power for WCDMA. This device runs an HSUPA power control routine: MPR to ensure PA linearity. As a result, the MPR for each of the Subtest modes is as follows:

Maximum Power Reduction (MPR)				
Subtest mode 1	Subtest mode 2	Subtest mode 3	Subtest mode 4	Subtest mode 5
1.5dB	2.0dB	1.0dB	2.0dB	0.0dB

APPENDIX E: RELEVANT PAGES FROM PROBE CALIBRATION REPORT(S)



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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **EX3-3839_Sep13**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3839**

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

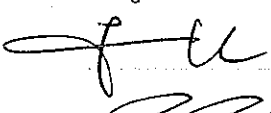
Calibration date: **September 20, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	4-Sep-13 (No. DAE4-660_Sep13)	Apr-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: September 20, 2013			

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3839

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.48	0.44	0.44	$\pm 10.1 \%$
DCP (mV) ^B	98.6	99.0	102.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	159.3	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		153.8	
		Z	0.0	0.0	1.0		148.7	

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

^A The uncertainties of NormX,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Pages 5 and 6).

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3839

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	8.83	8.83	8.83	0.70	0.65	± 12.0 %
1750	40.1	1.37	7.73	7.73	7.73	0.38	0.82	± 12.0 %
1900	40.0	1.40	7.47	7.47	7.47	0.55	0.67	± 12.0 %
5200	36.0	4.66	5.08	5.08	5.08	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.90	4.90	4.90	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.58	4.58	4.58	0.35	1.80	± 13.1 %
5600	35.5	5.07	4.28	4.28	4.28	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.52	4.52	4.52	0.40	1.80	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3839

Calibration Parameter Determined in Body Tissue Simulating Media

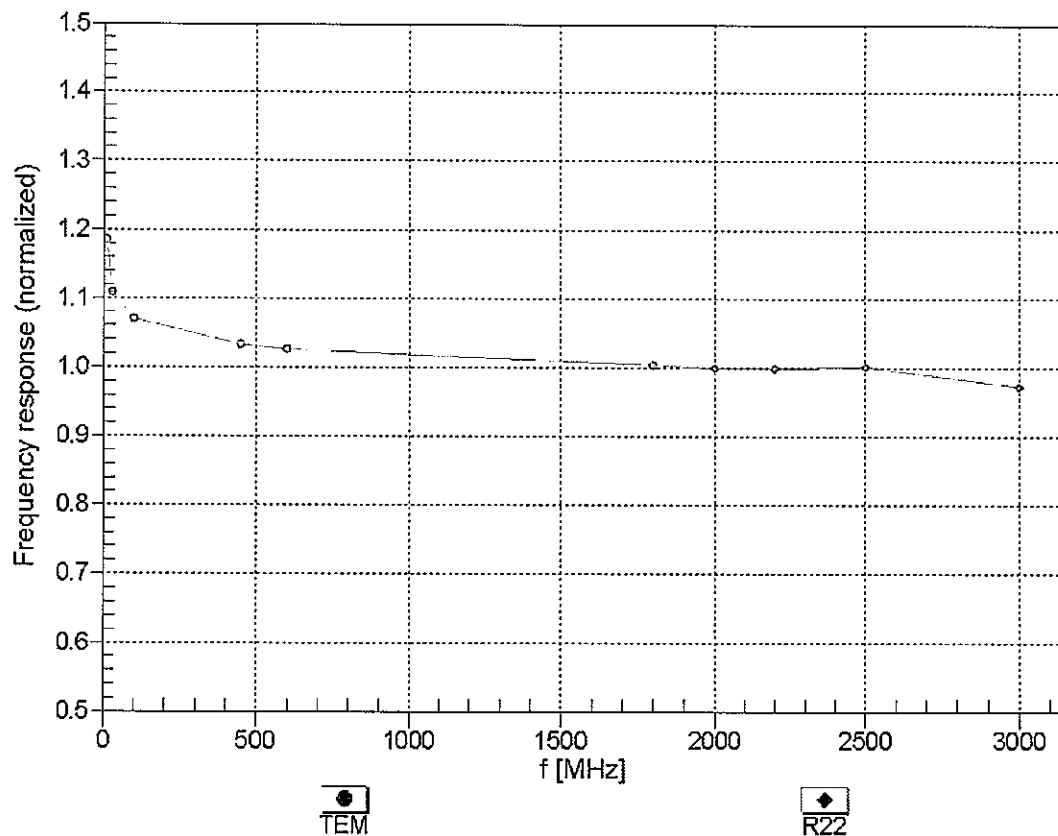
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	8.72	8.72	8.72	0.22	1.55	± 12.0 %
1750	53.4	1.49	7.63	7.63	7.63	0.46	0.81	± 12.0 %
1900	53.3	1.52	7.13	7.13	7.13	0.33	0.91	± 12.0 %
5200	49.0	5.30	4.11	4.11	4.11	0.50	1.90	± 13.1 %
5300	48.9	5.42	3.90	3.90	3.90	0.50	1.90	± 13.1 %
5500	48.6	5.65	3.76	3.76	3.76	0.50	1.90	± 13.1 %
5600	48.5	5.77	3.51	3.51	3.51	0.55	1.90	± 13.1 %
5800	48.2	6.00	3.99	3.99	3.99	0.50	1.90	± 13.1 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

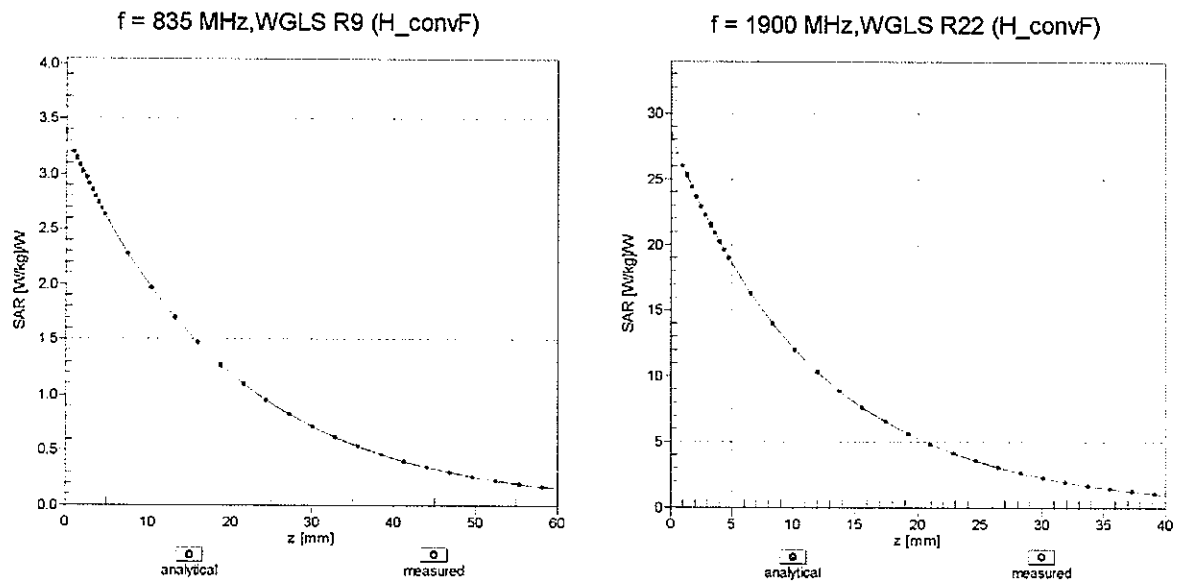
Frequency Response of E-Field

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



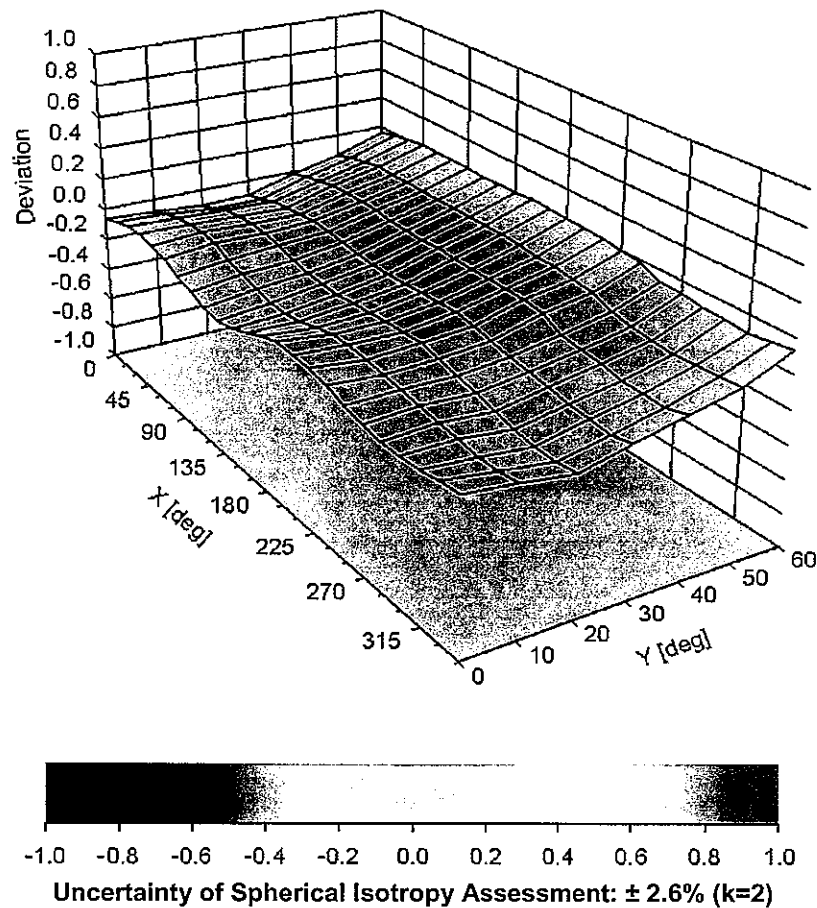
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$





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

Accreditation No.: **SCS 108**

Client **Nokai Beijing TCC**

Certificate No: **EX3-3823_Sep13**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3823**

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

Calibration date: **September 19, 2013**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	4-Sep-13 (No. DAE4-660_Sep13)	Apr-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: September 20, 2013			

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3823

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.41	0.36	0.47	$\pm 10.1 \%$
DCP (mV) ^B	100.7	102.3	98.9	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	135.4	$\pm 3.0 \%$
		Y	0.0	0.0	1.0		136.8	
		Z	0.0	0.0	1.0		151.8	

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

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

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3823

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	41.5	0.90	9.02	9.02	9.02	0.30	0.99	± 12.0 %
1750	40.1	1.37	7.86	7.86	7.86	0.67	0.59	± 12.0 %
1900	40.0	1.40	7.68	7.68	7.68	0.62	0.63	± 12.0 %
1950	40.0	1.40	7.43	7.43	7.43	0.51	0.68	± 12.0 %
2450	39.2	1.80	6.85	6.85	6.85	0.25	0.95	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3823

Calibration Parameter Determined in Body Tissue Simulating Media

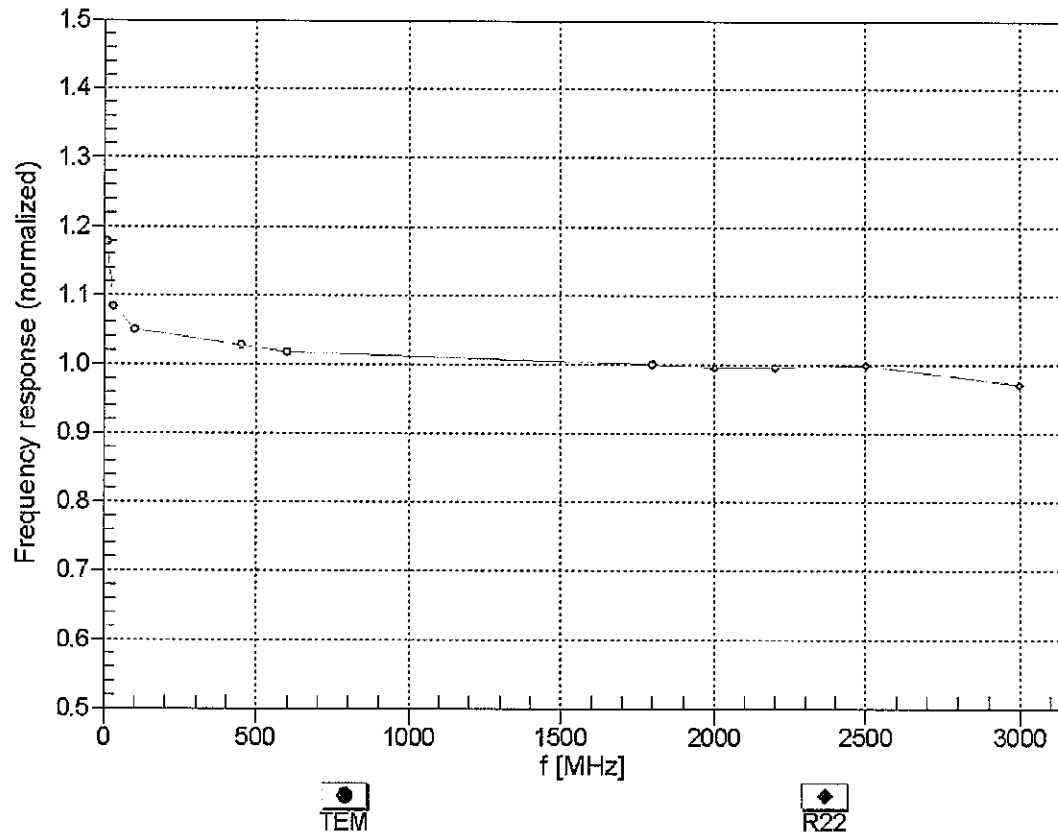
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
835	55.2	0.97	9.00	9.00	9.00	0.43	0.84	± 12.0 %
1750	53.4	1.49	7.56	7.56	7.56	0.45	0.79	± 12.0 %
1900	53.3	1.52	7.30	7.30	7.30	0.44	0.77	± 12.0 %
2450	52.7	1.95	6.85	6.85	6.85	0.76	0.56	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

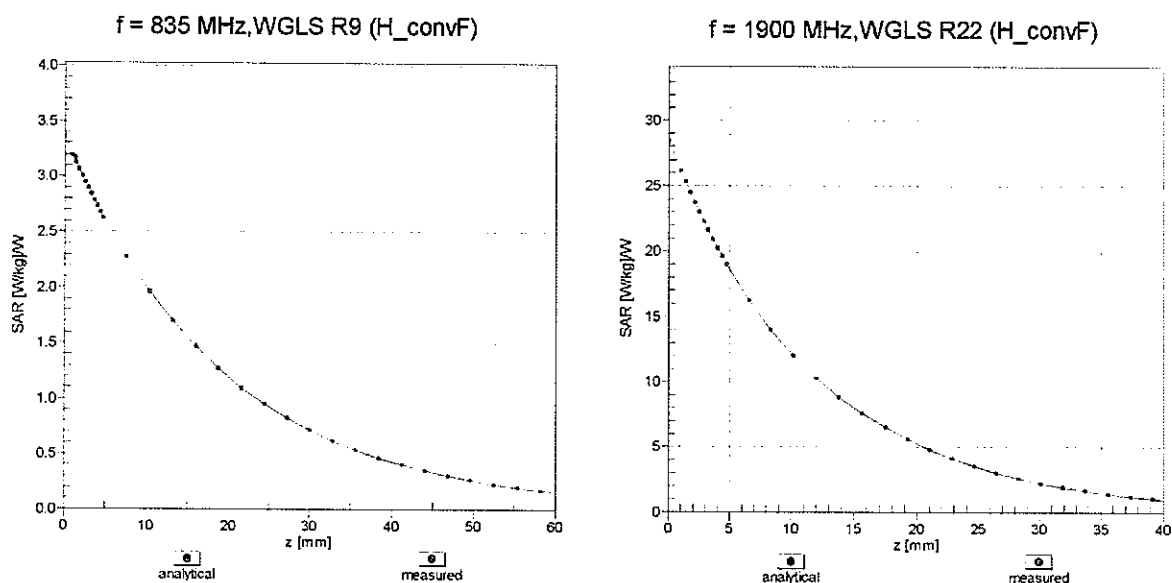
Frequency Response of E-Field

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



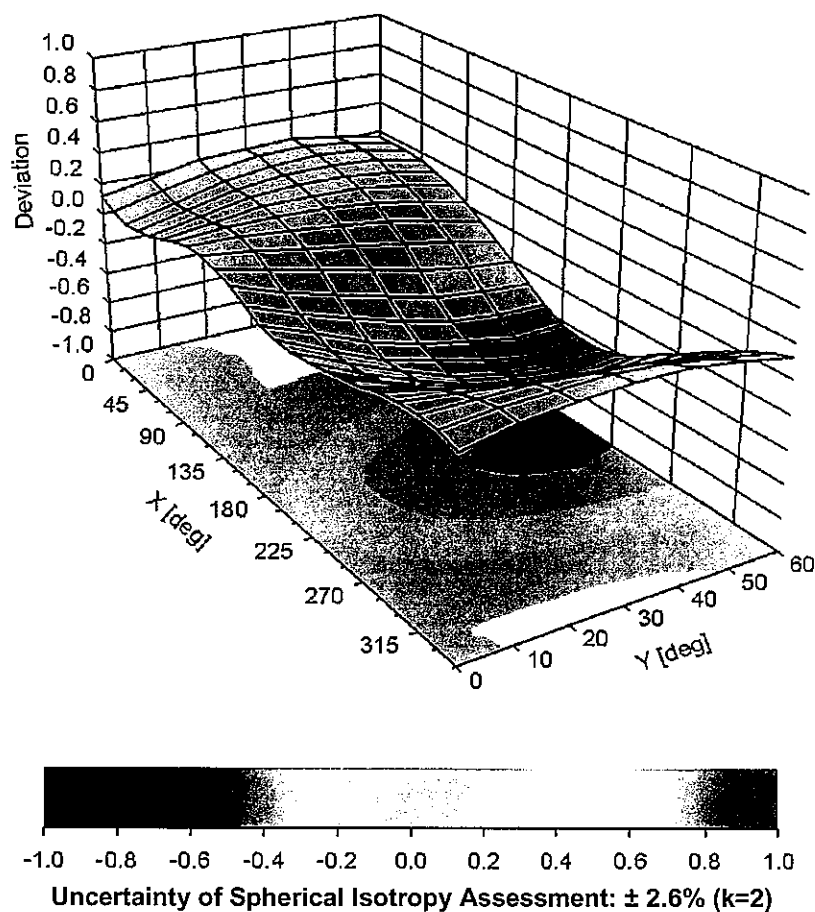
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$





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

Accreditation No.: **SCS 108**

Client: **Nokia Beijing TCC**

Certificate No: **ES3-3280_Mar14**

CALIBRATION CERTIFICATE

Object: **ES3DV3 - SN:3280**

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

Calibration date: **March 20, 2014**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	30-Dec-13 (No. ES3-3013_Dec13)	Dec-14
DAE4	SN: 660	13-Dec-13 (No. DAE4-660_Dec13)	Dec-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-16
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

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

Issued: March 22, 2014

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3280

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.27	1.31	1.33	± 10.1 %
DCP (mV) ^B	104.3	102.8	104.6	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	219.4	±3.8 %
		Y	0.0	0.0	1.0		192.4	
		Z	0.0	0.0	1.0		219.9	

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

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

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3280

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unct. (k=2)
835	41.5	0.90	6.07	6.07	6.07	0.44	1.56	± 12.0 %
1750	40.1	1.37	5.25	5.25	5.25	0.41	1.58	± 12.0 %
1900	40.0	1.40	5.06	5.06	5.06	0.80	1.16	± 12.0 %
2450	39.2	1.80	4.54	4.54	4.54	0.78	1.25	± 12.0 %
2600	39.0	1.96	4.35	4.35	4.35	0.80	1.26	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3280

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)
835	55.2	0.97	6.03	6.03	6.03	0.80	1.16	± 12.0 %
1750	53.4	1.49	4.83	4.83	4.83	0.53	1.52	± 12.0 %
1900	53.3	1.52	4.62	4.62	4.62	0.62	1.47	± 12.0 %
2450	52.7	1.95	4.20	4.20	4.20	0.72	1.13	± 12.0 %
2600	52.5	2.16	3.99	3.99	3.99	0.80	1.04	± 12.0 %

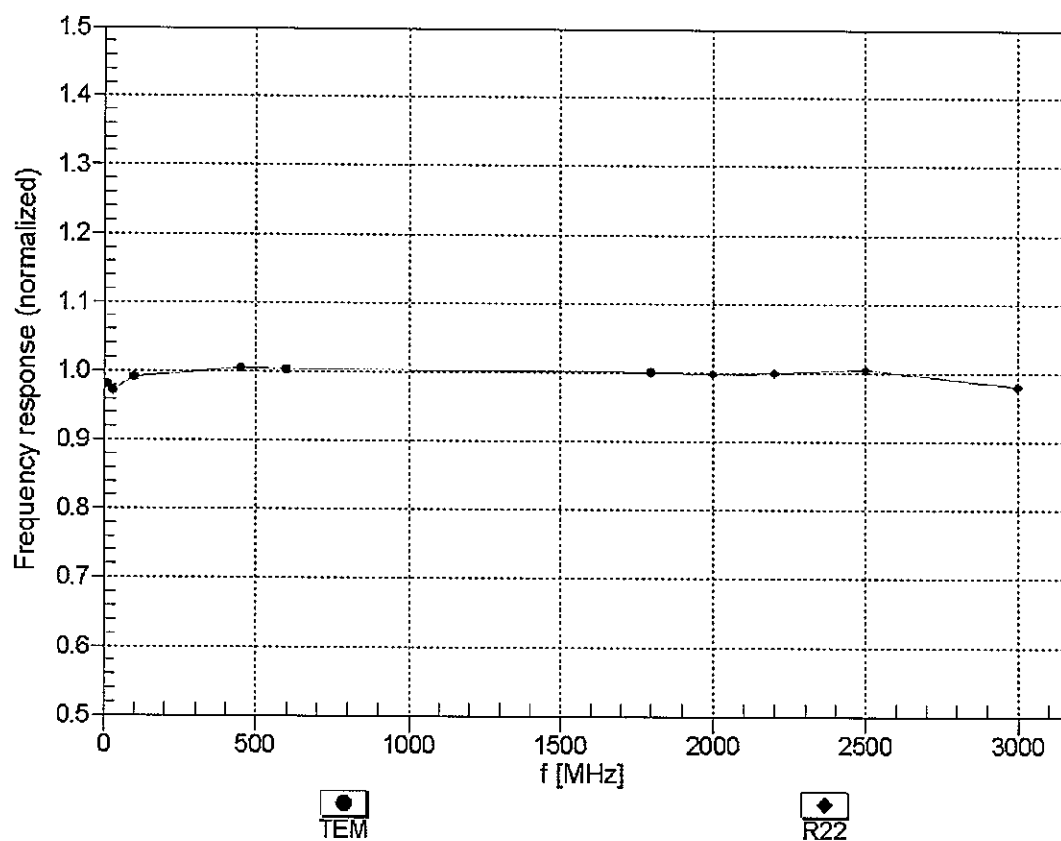
^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

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

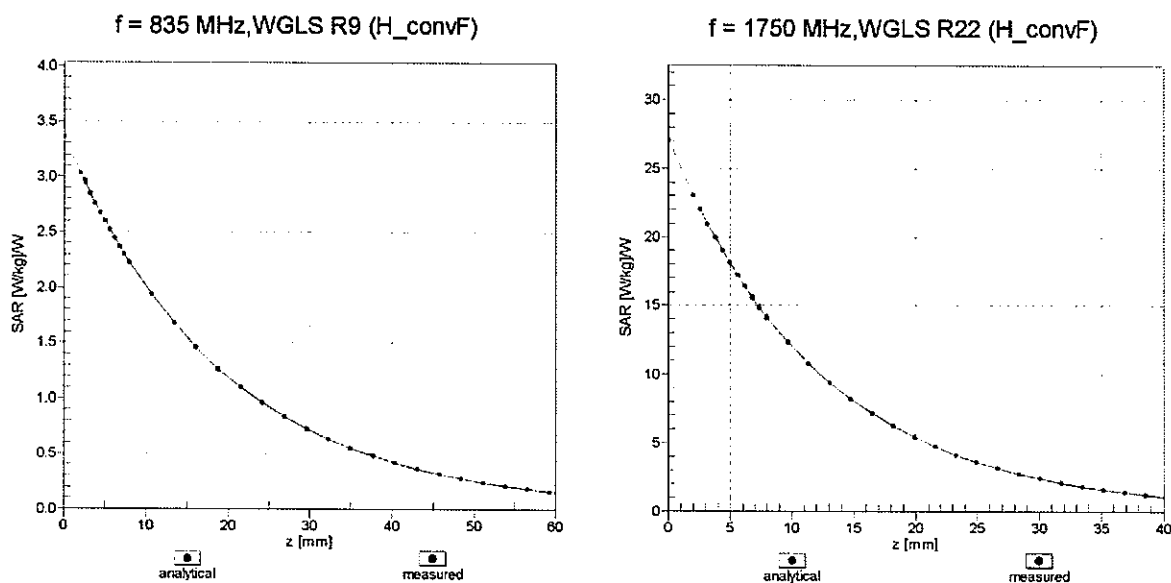
Frequency Response of E-Field

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



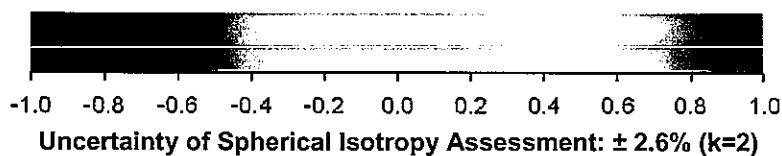
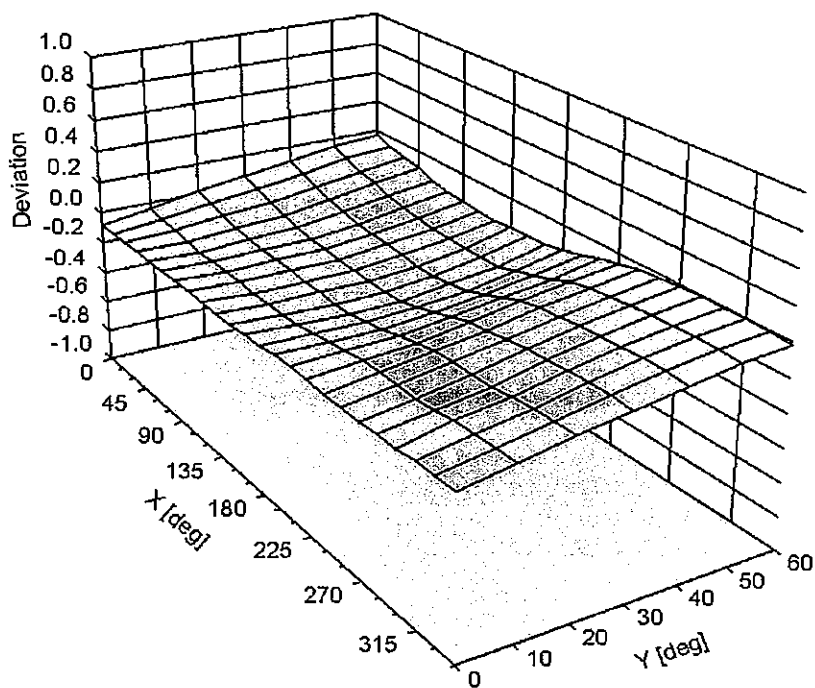
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



DASY/EASY - Parameters of Probe: ES3DV3 - SN:3280

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-75.4
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm



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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **EX3-3574_Sep13**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:3574**

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

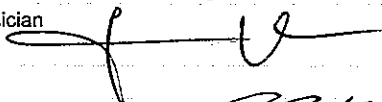
Calibration date: **September 19, 2013**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter E4419B	GB41293874	04-Apr-13 (No. 217-01733)	Apr-14
Power sensor E4412A	MY41498087	04-Apr-13 (No. 217-01733)	Apr-14
Reference 3 dB Attenuator	SN: S5054 (3c)	04-Apr-13 (No. 217-01737)	Apr-14
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-13 (No. 217-01735)	Apr-14
Reference 30 dB Attenuator	SN: S5129 (30b)	04-Apr-13 (No. 217-01738)	Apr-14
Reference Probe ES3DV2	SN: 3013	28-Dec-12 (No. ES3-3013_Dec12)	Dec-13
DAE4	SN: 660	4-Sep-13 (No. DAE4-660_Sep13)	Apr-14
Secondary Standards	ID	Check Date (in house)	Scheduled Check
RF generator HP 8648C	US3642U01700	4-Aug-99 (in house check Apr-13)	In house check: Apr-15
Network Analyzer HP 8753E	US37390585	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature 
Approved by:	Katja Pokovic	Technical Manager	
			Issued: September 20, 2013

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3574

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V/m})^2$) ^A	0.54	0.47	0.42	± 10.1 %
DCP (mV) ^B	98.6	100.3	104.3	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB/ μV	C	D dB	VR mV	Unc ^E (k=2)
0	CW	X	0.0	0.0	1.0	0.00	164.5	±2.7 %
		Y	0.0	0.0	1.0		160.0	
		Z	0.0	0.0	1.0		150.5	

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%.

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

^B Numerical linearization parameter: uncertainty not required.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3574

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	41.9	0.89	8.67	8.67	8.67	0.16	1.65	± 12.0 %
835	41.5	0.90	8.45	8.45	8.45	0.18	1.63	± 12.0 %
1750	40.1	1.37	7.57	7.57	7.57	0.33	0.90	± 12.0 %
1900	40.0	1.40	7.29	7.29	7.29	0.57	0.68	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3574

Calibration Parameter Determined in Body Tissue Simulating Media

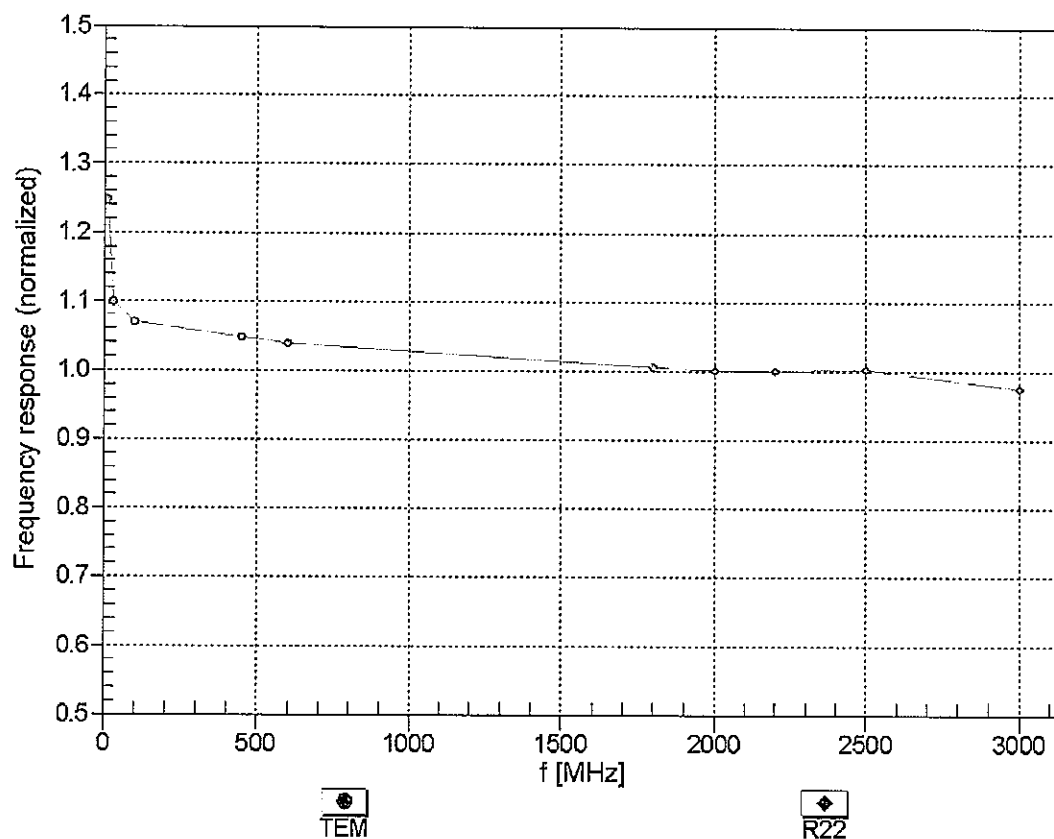
f (MHz) ^C	Relative Permittivity ^F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha	Depth (mm)	Unct. (k=2)
750	55.5	0.96	8.47	8.47	8.47	0.23	1.40	± 12.0 %
835	55.2	0.97	8.39	8.39	8.39	0.26	1.27	± 12.0 %
1750	53.4	1.49	7.13	7.13	7.13	0.48	0.79	± 12.0 %
1900	53.3	1.52	6.73	6.73	6.73	0.32	0.91	± 12.0 %

^C Frequency validity of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.

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

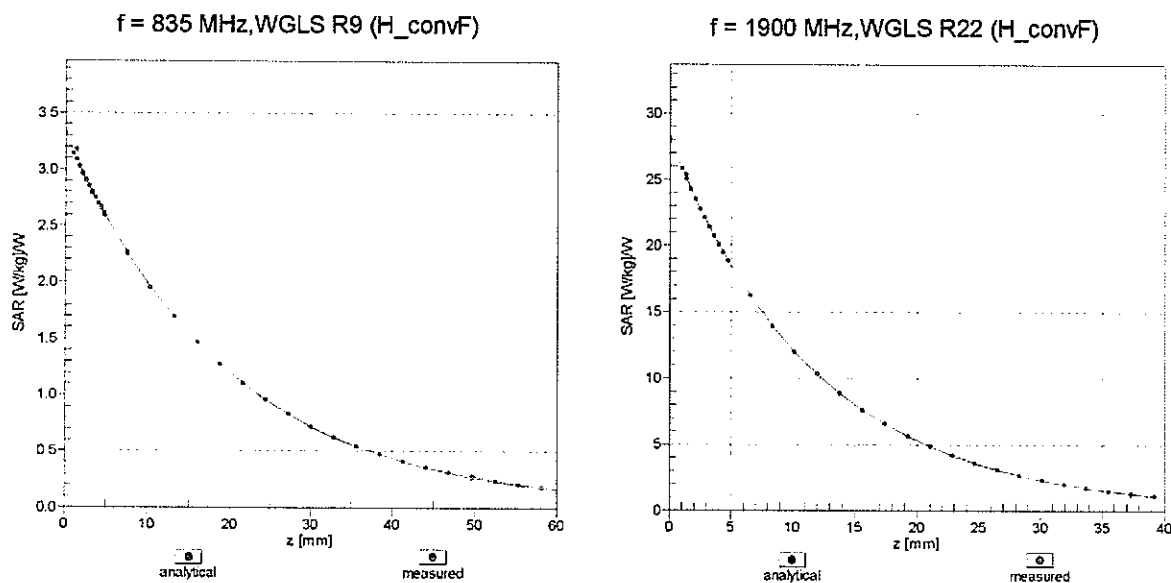
Frequency Response of E-Field

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



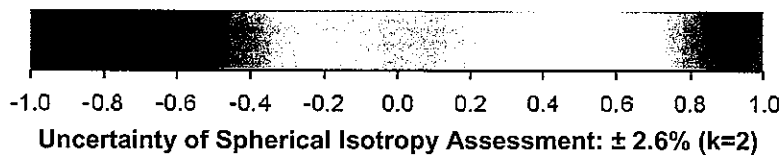
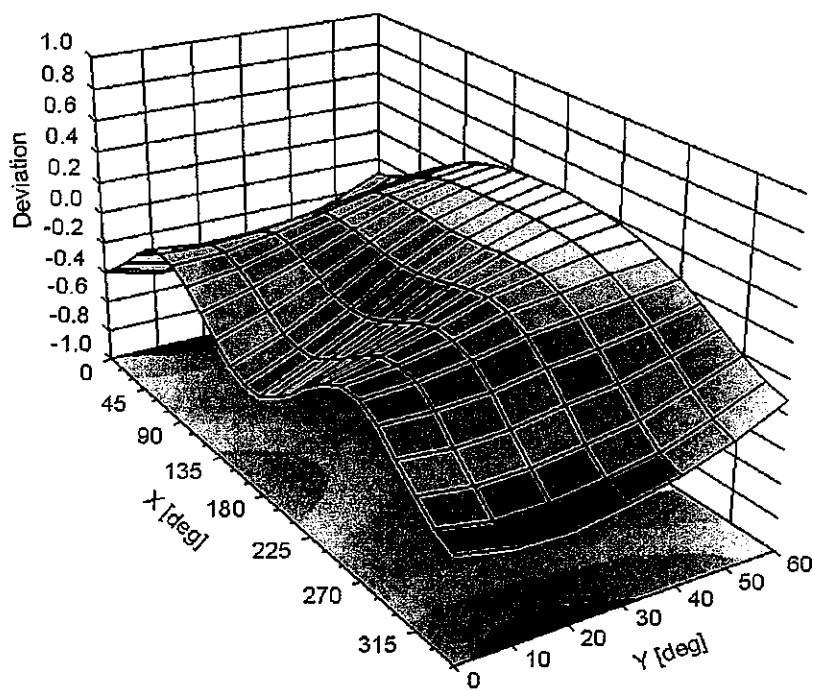
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ ($k=2$)

Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, θ), $f = 900 \text{ MHz}$



APPENDIX F: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORT(S)

.



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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **D835V2-4d005_Mar14**

CALIBRATION CERTIFICATE

Object **D835V2 - SN: 4d005**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **March 18, 2014**

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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Israe El-Naouq** Name: **Israe El-Naouq** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Name: **Katja Pokovic** Function: **Technical Manager**

Signature

Israe El-Naouq
Katja Pokovic

Issued: March 18, 2014

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 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 $\pm$ 0.2) °C	40.5 $\pm$ 6 %	0.94 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.32 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.06 W/kg $\pm$ 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 $\pm$ 0.2) °C	55.0 $\pm$ 6 %	1.01 mho/m $\pm$ 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	9.31 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.09 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω - 2.9 j Ω
Return Loss	- 29.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.3 Ω - 6.5 j Ω
Return Loss	- 22.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.395 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	July 11, 2003

DASY5 Validation Report for Head TSL

Date: 18.03.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d005

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 0.94$ S/m; $\epsilon_r = 40.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.22, 6.22, 6.22); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

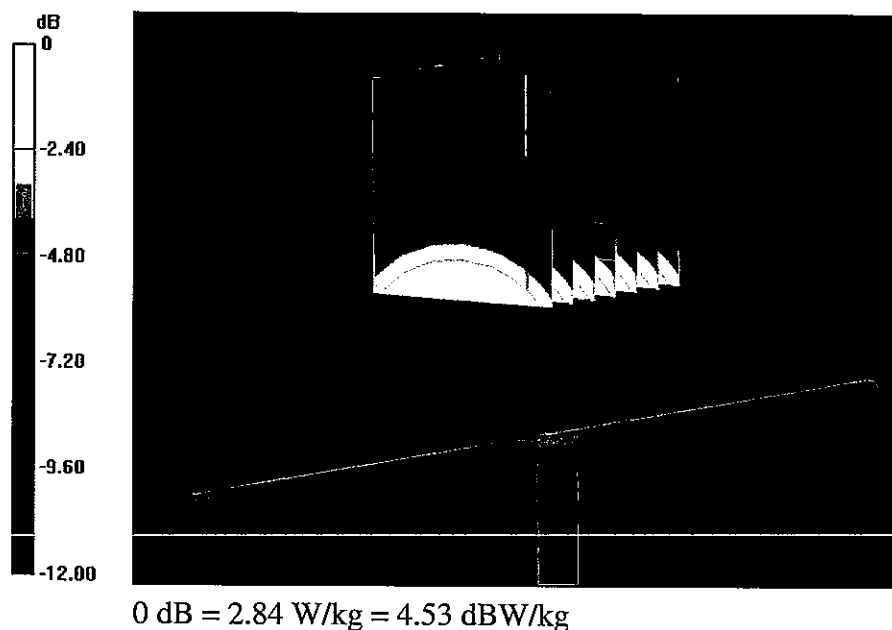
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 57.167 V/m; Power Drift = -0.09 dB

Peak SAR (extrapolated) = 3.67 W/kg

SAR(1 g) = 2.42 W/kg; SAR(10 g) = 1.56 W/kg

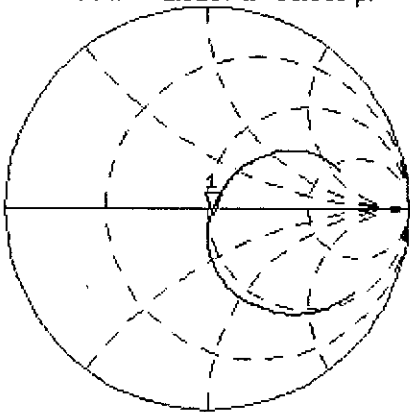
Maximum value of SAR (measured) = 2.84 W/kg



Impedance Measurement Plot for Head TSL

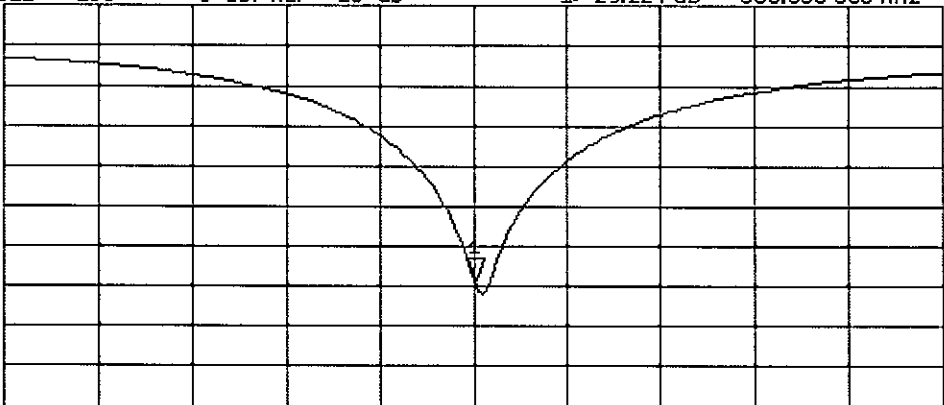
18 Mar 2014 13:04:58
CH1 S11 1 U FS 1: 51.959 $\angle$ -2.9297 $\angle$ 65.060 pF 835.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/ REF -20 dB 1: -29.224 dB 835.000 000 MHz

CA
Avg
16
H1d



START 635.000 000 MHz STOP 1 035.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 14.03.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d005

Communication System: UID 0 - CW; Frequency: 835 MHz

Medium parameters used: $f = 835$ MHz; $\sigma = 1.01$ S/m; $\epsilon_r = 55$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(6.09, 6.09, 6.09); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

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

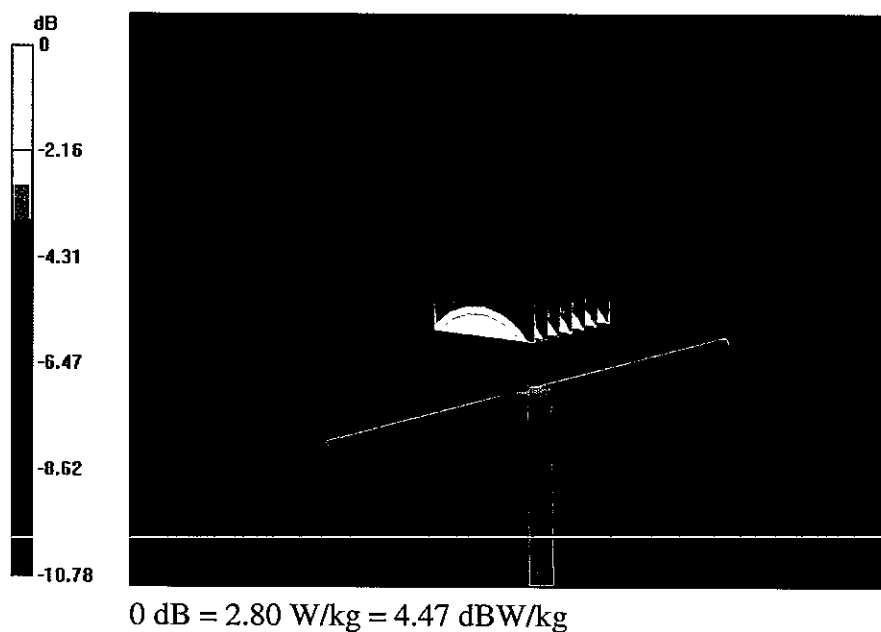
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 54.814 V/m; Power Drift = -0.07 dB

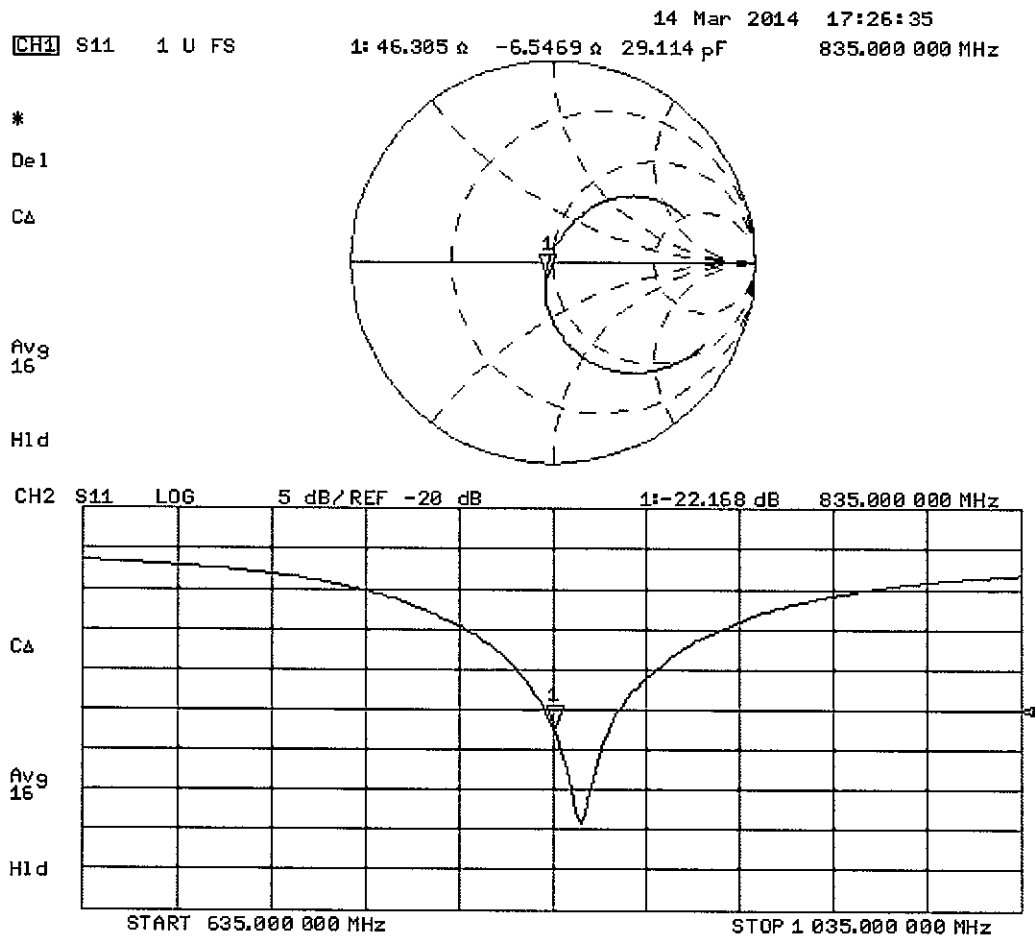
Peak SAR (extrapolated) = 3.56 W/kg

SAR(1 g) = 2.4 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 2.80 W/kg



Impedance Measurement Plot for Body TSL





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

Accreditation No.: SCS 108

Client Nokia Beijing TCC

Certificate No: D1900V2-509_Dec12

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 509

Calibration procedure(s) QA CAL-05.v8
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: December 06, 2012

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	30-Dec-11 (No. ES3-3205_Dec11)	Dec-12
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by: Name Israe El-Naouq Function Laboratory Technician

Approved by: Katja Pokovic Technical Manager

Signature

Issued: December 6, 2012

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.3
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 $\pm$ 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 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.38 mho/m $\pm$ 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	9.63 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.7 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.3 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	52.2 $\pm$ 6 %	1.52 mho/m $\pm$ 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	9.84 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	39.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.16 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	20.6 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.1 Ω - 5.1 j Ω
Return Loss	- 24.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.7 Ω - 5.2 j Ω
Return Loss	- 21.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.192 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	October 20, 1999

DASY5 Validation Report for Head TSL

Date: 06.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 509

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.38$ mho/m; $\epsilon_r = 39.5$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(5.01, 5.01, 5.01); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

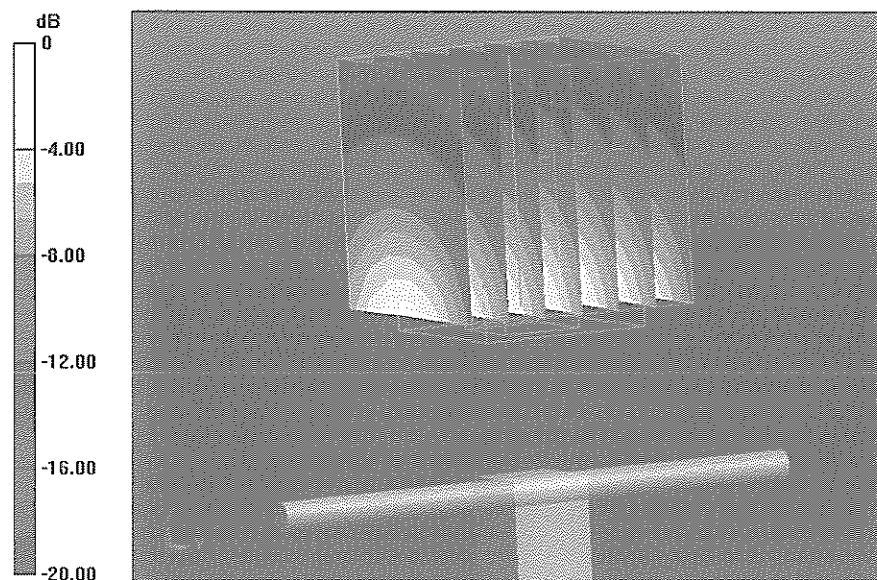
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.248 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.2 W/kg

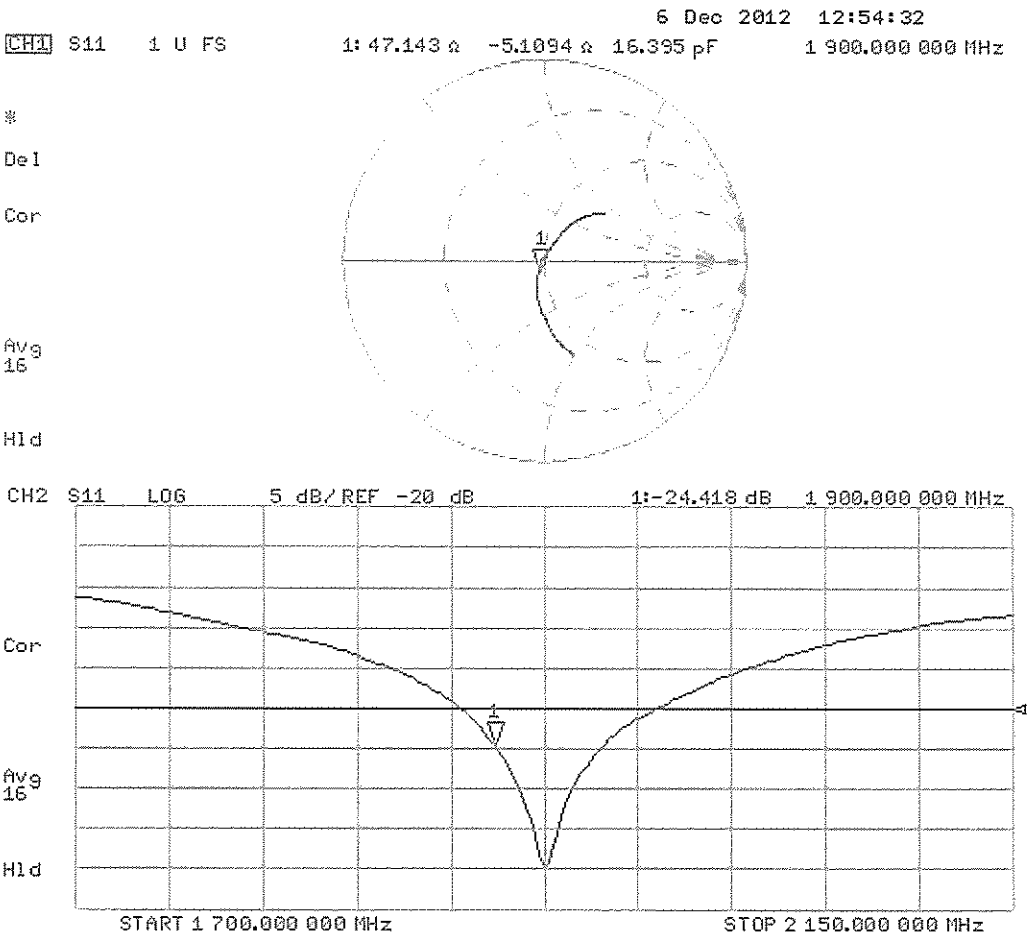
SAR(1 g) = 9.63 W/kg; SAR(10 g) = 5.05 W/kg

Maximum value of SAR (measured) = 11.9 W/kg



0 dB = 11.9 W/kg = 10.76 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.12.2012

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 509

Communication System: CW; Frequency: 1900 MHz

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.52$ mho/m; $\epsilon_r = 52.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.62, 4.62, 4.62); Calibrated: 30.12.2011;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.3(988); SEMCAD X 14.6.7(6848)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

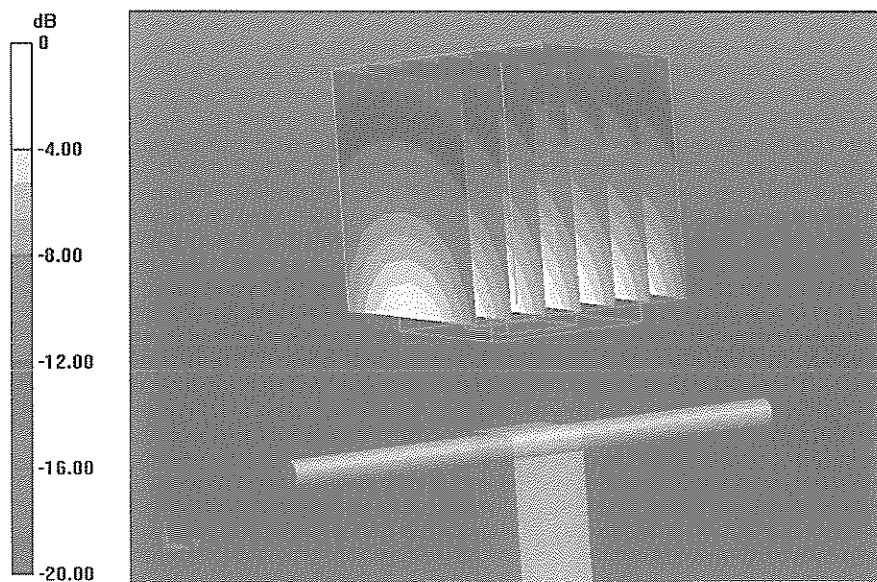
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.176 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.4 W/kg

SAR(1 g) = 9.84 W/kg; SAR(10 g) = 5.16 W/kg

Maximum value of SAR (measured) = 12.4 W/kg

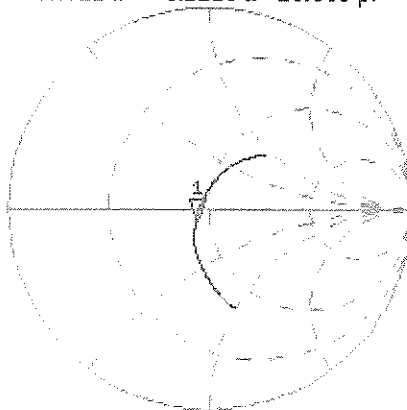


0 dB = 12.4 W/kg = 10.93 dBW/kg

Impedance Measurement Plot for Body TSL

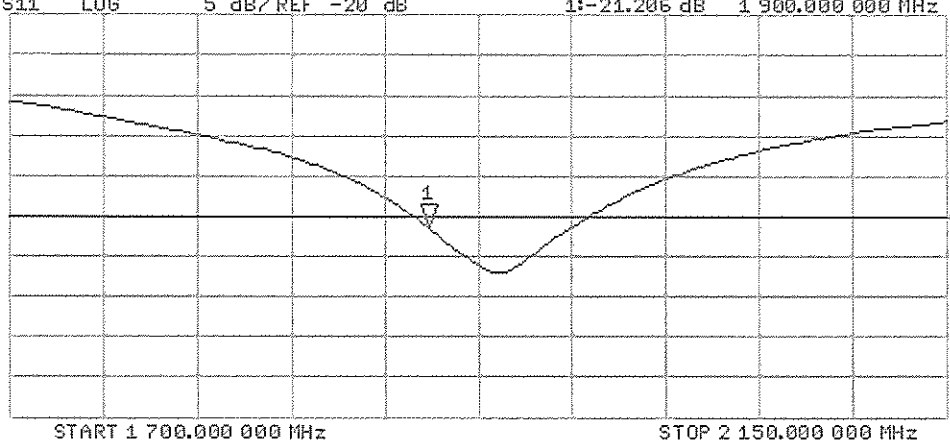
6 Dec 2012 12:54:05
 CH1 S11 1 U FS 1: 43.711 Ω -5.2129 Ω 16.069 pF 1 900.000 000 MHz

*
 De1
 Cor
 Avg
 16
 H1d



CH2 S11 LOG 5 dB/REF -20 dB 1: -21.206 dB 1 900.000 000 MHz

Cor
 Avg
 16
 H1d



Dipole D1900V2 – SN: 509 Antenna Parameters

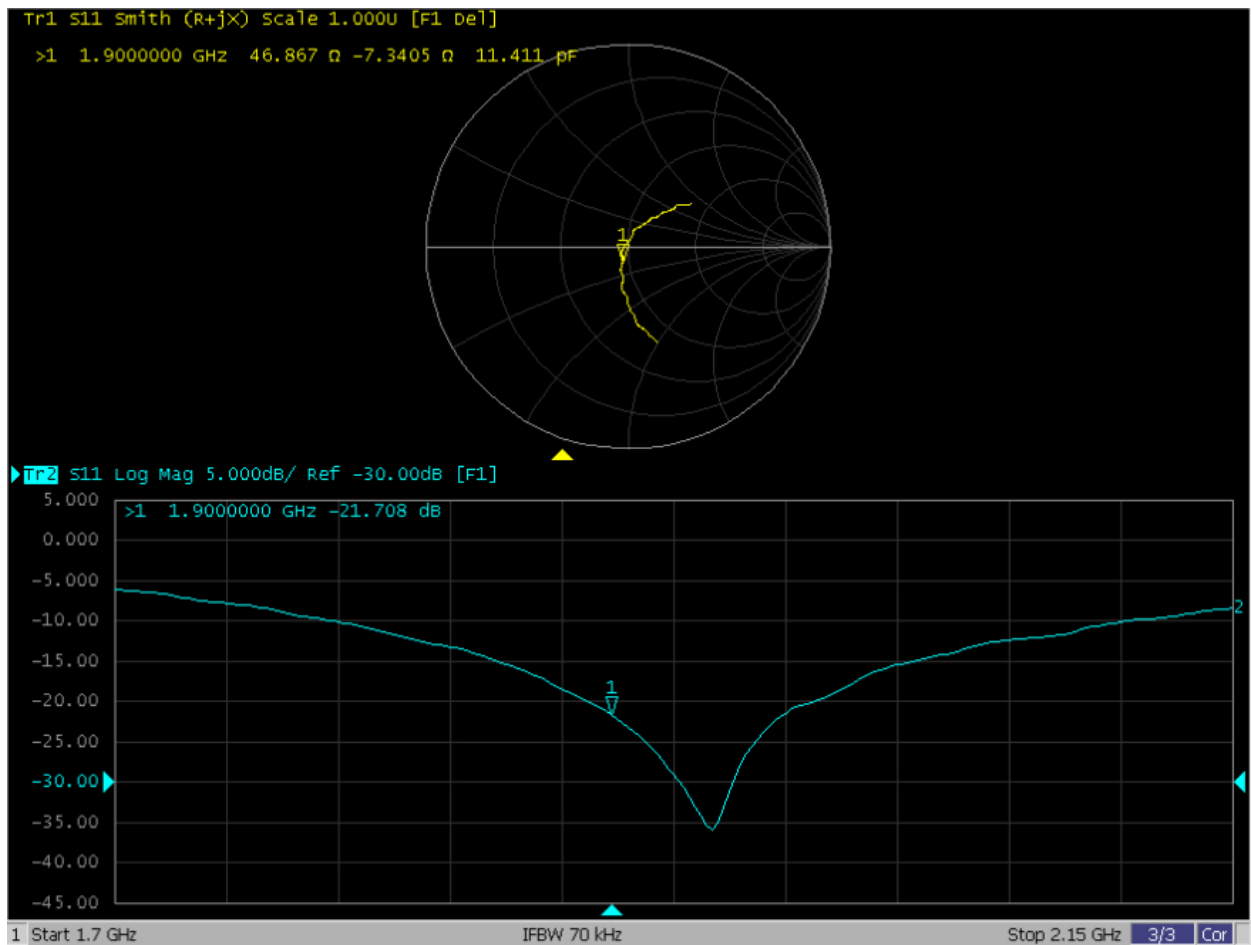
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement 2014-06-11
Impedance, transformed to feed point	47.1 Ω - 5.1 j Ω	46.9 Ω - 7.3 j Ω
Return loss	- 24.4 dB	- 21.7 dB

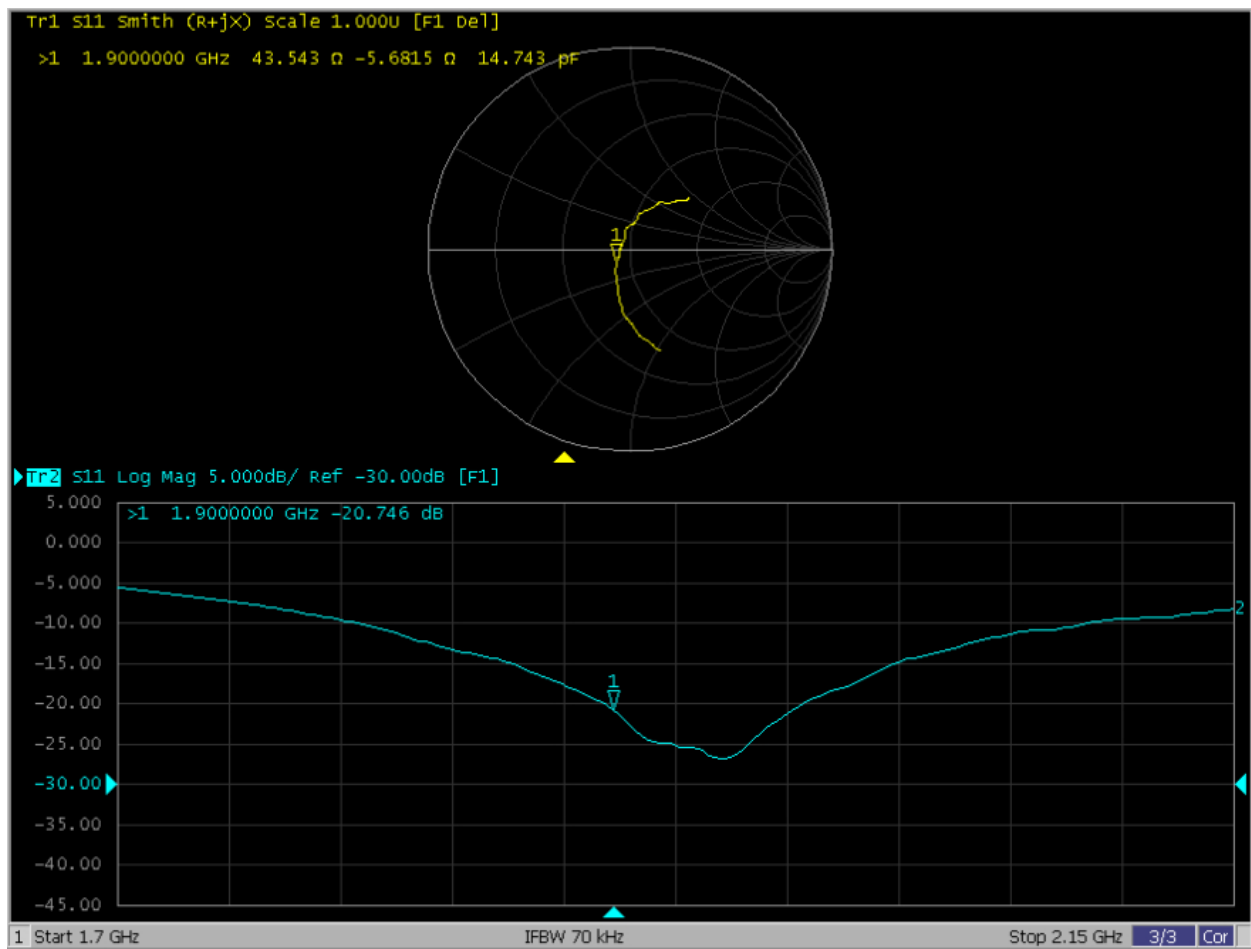
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement 2014-06-11
Impedance, transformed to feed point	43.7 Ω - 5.2 j Ω	43.5 Ω - 5.7 j Ω
Return loss	- 21.2 dB	- 20.7 dB

Impedance Measurement plot for Head TSL 1900



Impedance Measurement plot for Body TSL 1900





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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **D2450V2-883_Mar14**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 883**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **March 12, 2014**

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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Leif Klysner** Function: **Laboratory Technician**

Approved by: **Katja Pokovic** Technical Manager

Signature

Issued: March 12, 2014

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.2 $\pm$ 6 %	1.86 mho/m $\pm$ 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	13.6 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.2 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.6 $\pm$ 6 %	2.02 mho/m $\pm$ 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 $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.03 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.7 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.1 Ω - 1.1 j Ω
Return Loss	- 27.9 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	50.5 Ω + 1.0 j Ω
Return Loss	- 38.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.167 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	October 06, 2011

DASY5 Validation Report for Head TSL

Date: 11.03.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 883

Communication System: UID 0 - CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.86$ S/m; $\epsilon_r = 38.2$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.53, 4.53, 4.53); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

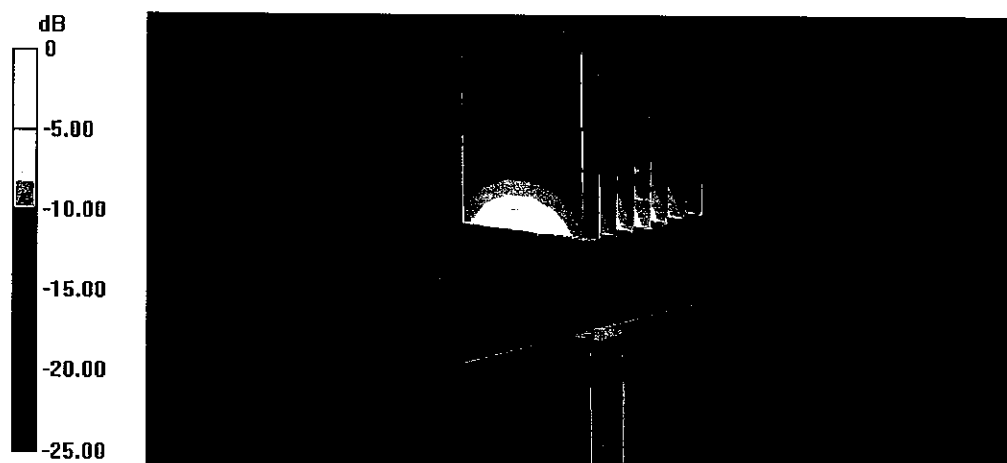
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 100.4 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 28.4 W/kg

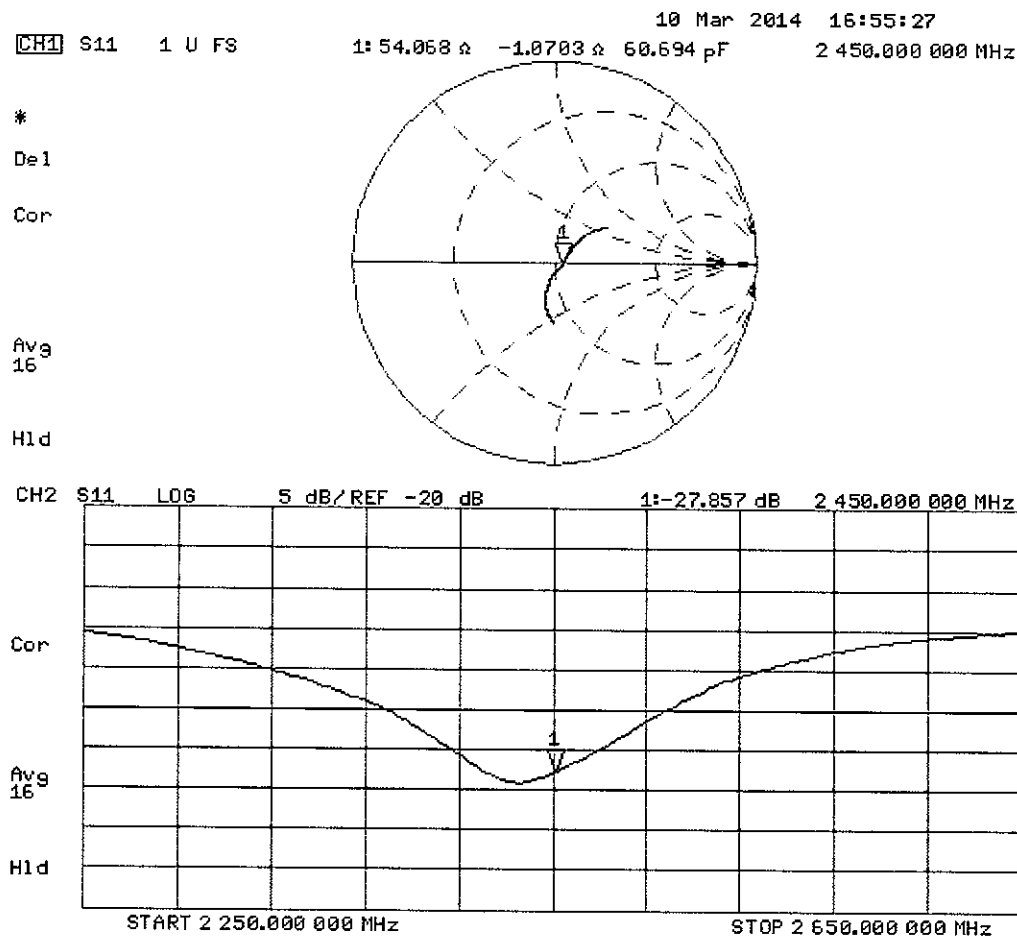
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.3 W/kg

Maximum value of SAR (measured) = 17.4 W/kg



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

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 12.03.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 883

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 C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.35, 4.35, 4.35); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

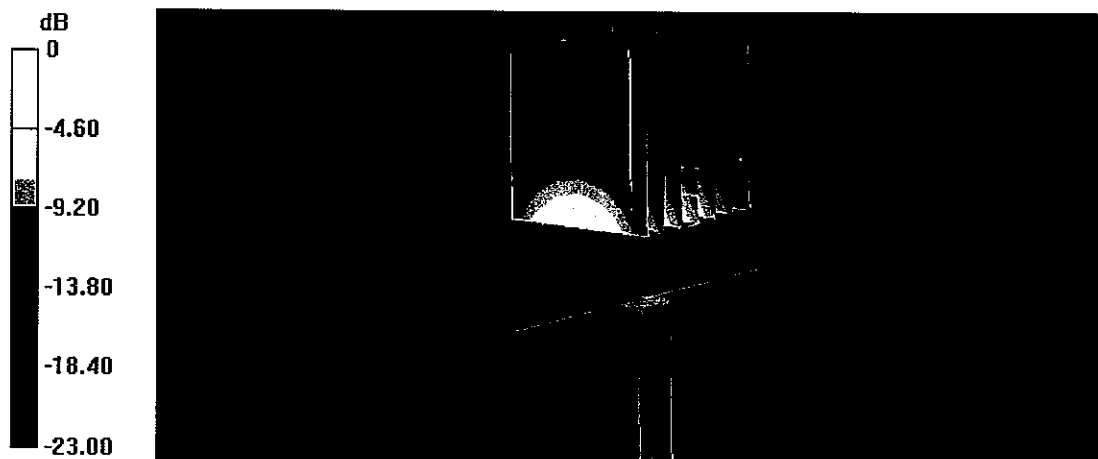
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.054 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 27.6 W/kg

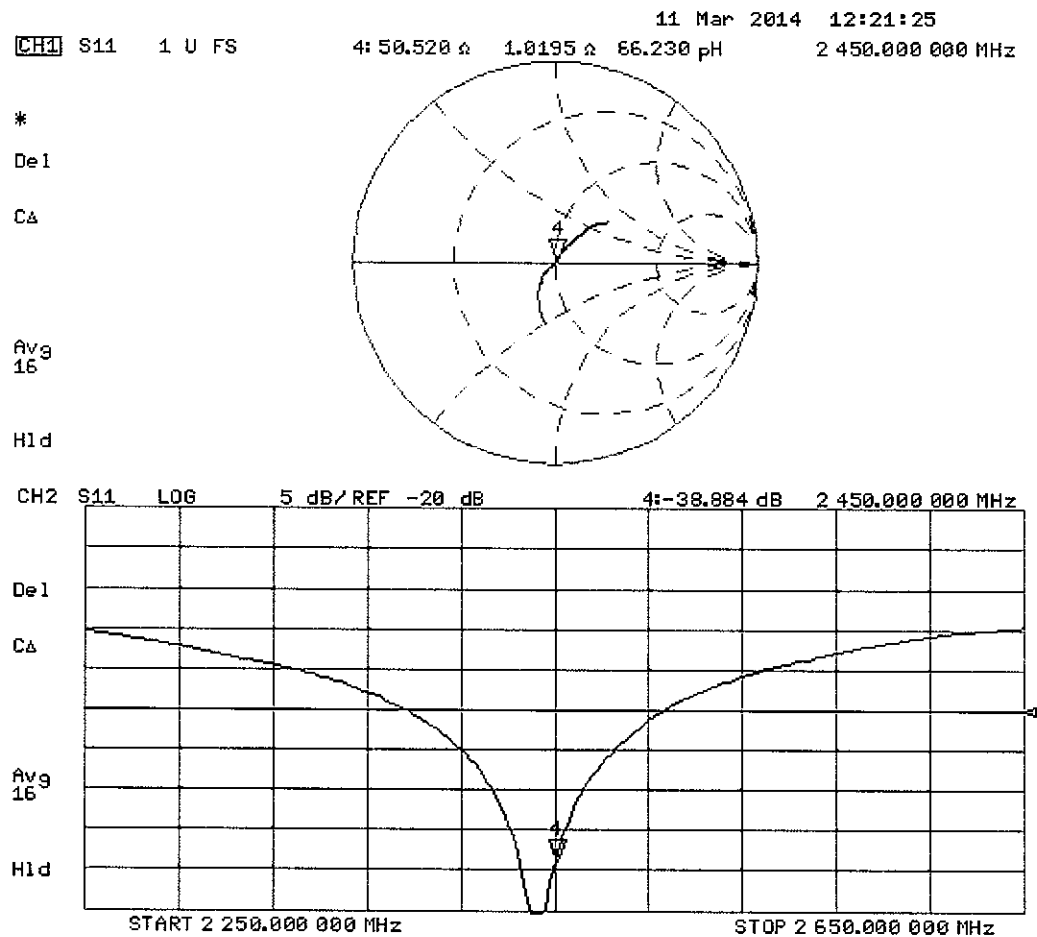
SAR(1 g) = 13.1 W/kg; SAR(10 g) = 6.03 W/kg

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



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

Impedance Measurement Plot for Body TSL





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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **D2450V2-760_Mar13**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 760**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **March 06, 2013**

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

All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	27-Mar-12 (No. 217-01530)	Apr-13
Type-N mismatch combination	SN: 5047.3 / 06327	27-Mar-12 (No. 217-01533)	Apr-13
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	27-Jun-12 (No. DAE4-601_Jun12)	Jun-13

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

Calibrated by: **Israe El-Naouq** **Function**
Laboratory Technician

Signature

Israe El-Naouq

Approved by: **Katja Pokovic** **Technical Manager**

Katja Pokovic

Issued: March 6, 2013

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.5
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 $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.8 $\pm$ 6 %	1.85 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.6 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.9 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.7 $\pm$ 6 %	2.01 mho/m $\pm$ 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	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.92 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.3 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	55.5 Ω + 4.3 j Ω
Return Loss	- 23.6 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	51.8 Ω + 5.0 j Ω
Return Loss	- 25.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.156 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	April 22, 2004

DASY5 Validation Report for Head TSL

Date: 06.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 760

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ S/m; $\epsilon_r = 37.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.52, 4.52, 4.52); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

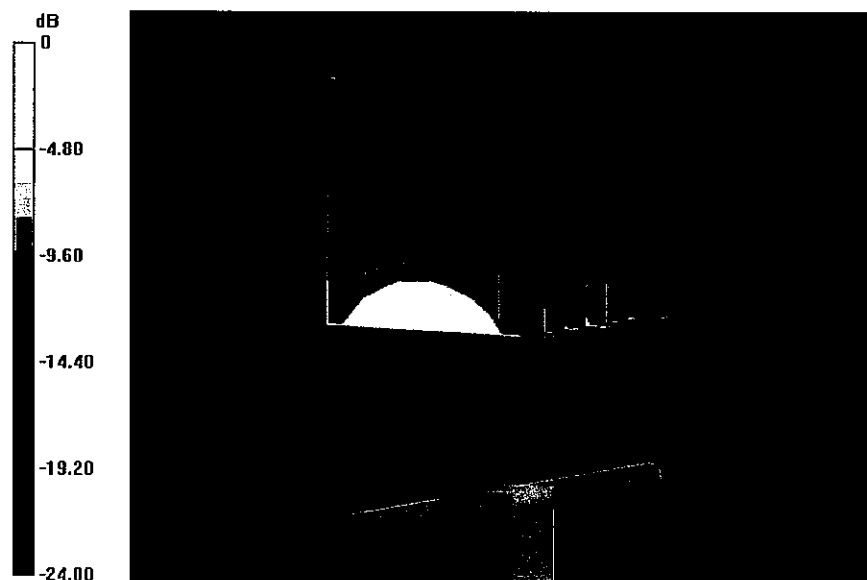
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.711 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 28.7 W/kg

SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.3 W/kg

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



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

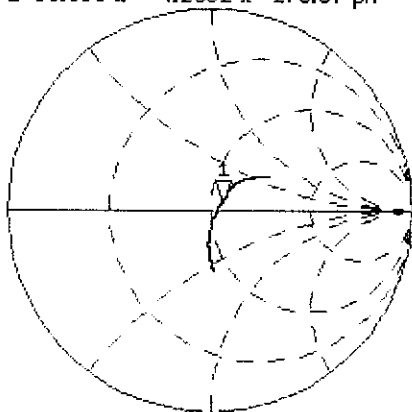
Impedance Measurement Plot for Head TSL

5 Mar 2013 10:07:43
 CH1 S11 1 U FS 1: 55.539 Ω 4.2852 Ω 278.37 pF 2 450.000 000 MHz

*
 De1
 CA

Avg
 16

H1d

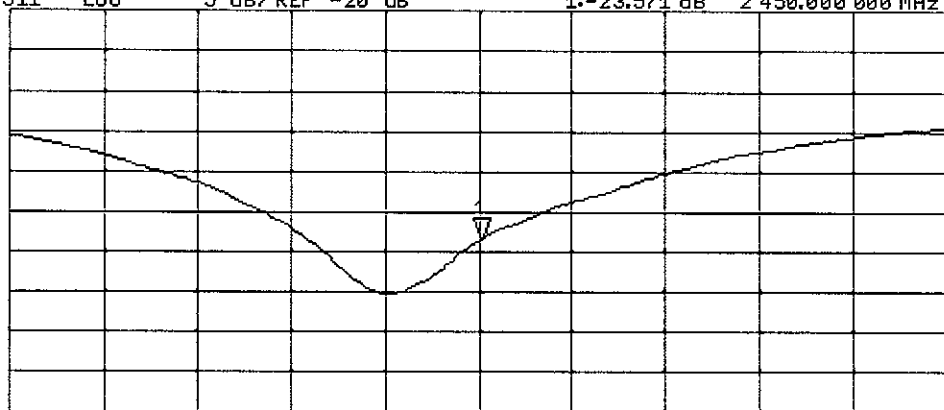


CH2 S11 LOG 5 dB/REF -20 dB 1:-23.571 dB 2 450.000 000 MHz

CA

Avg
 16

H1d



START 2 250.000 000 MHz

STOP 2 650.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 06.03.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 760

Communication System: CW; Frequency: 2450 MHz

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.01$ S/m; $\epsilon_r = 50.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.42, 4.42, 4.42); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 27.06.2012
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.5(1059); SEMCAD X 14.6.8(7028)

Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

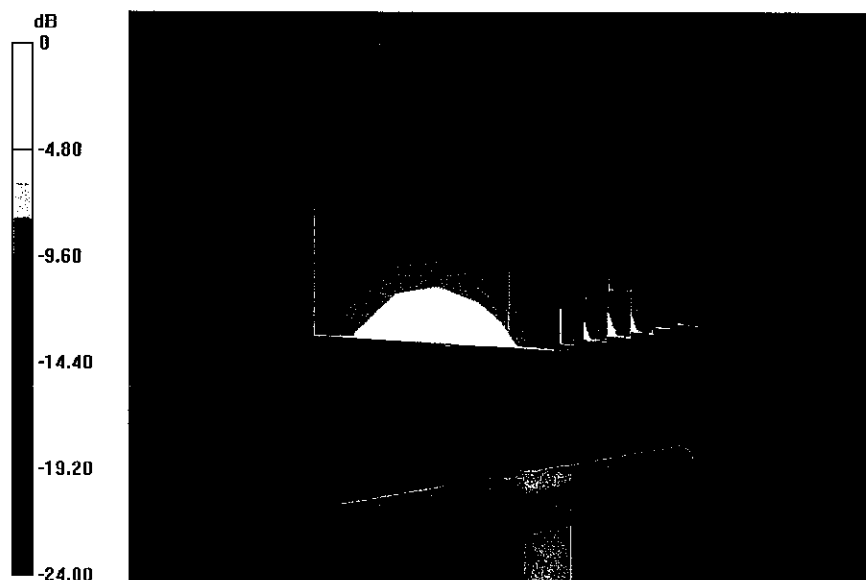
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 94.711 V/m; Power Drift = -0.01 dB

Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.92 W/kg

Maximum value of SAR (measured) = 16.9 W/kg

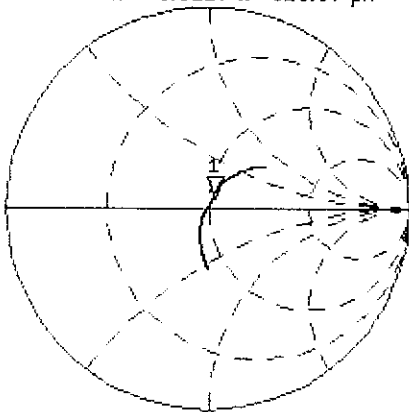


0 dB = 16.9 W/kg = 12.28 dBW/kg

Impedance Measurement Plot for Body TSL

6 Mar 2013 10:06:44
CH1 S11 1 U FS 1: 51.783 Ω 5.0117 Ω 325.57 pF 2 450.000 000 MHz

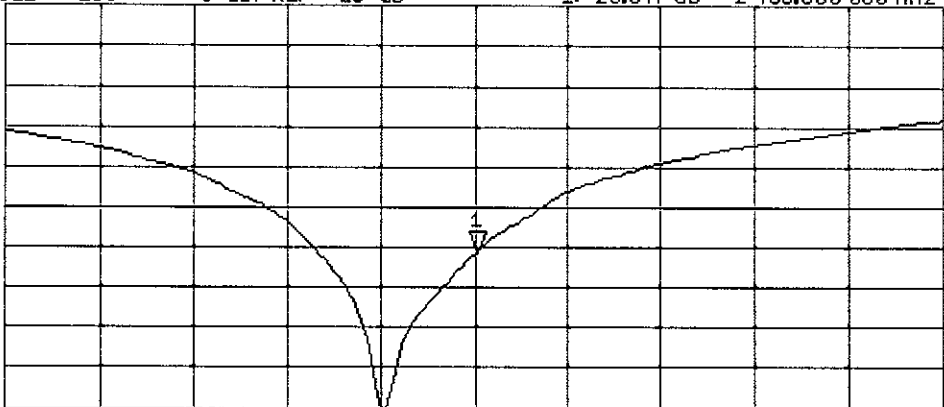
*
Del
CA



Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-25.647 dB 2 450.000 000 MHz

CA
Avg
16
H1d



START 2 250.000 000 MHz STOP 2 650.000 000 MHz

Dipole D2450V2 – SN: 760 Antenna Parameters

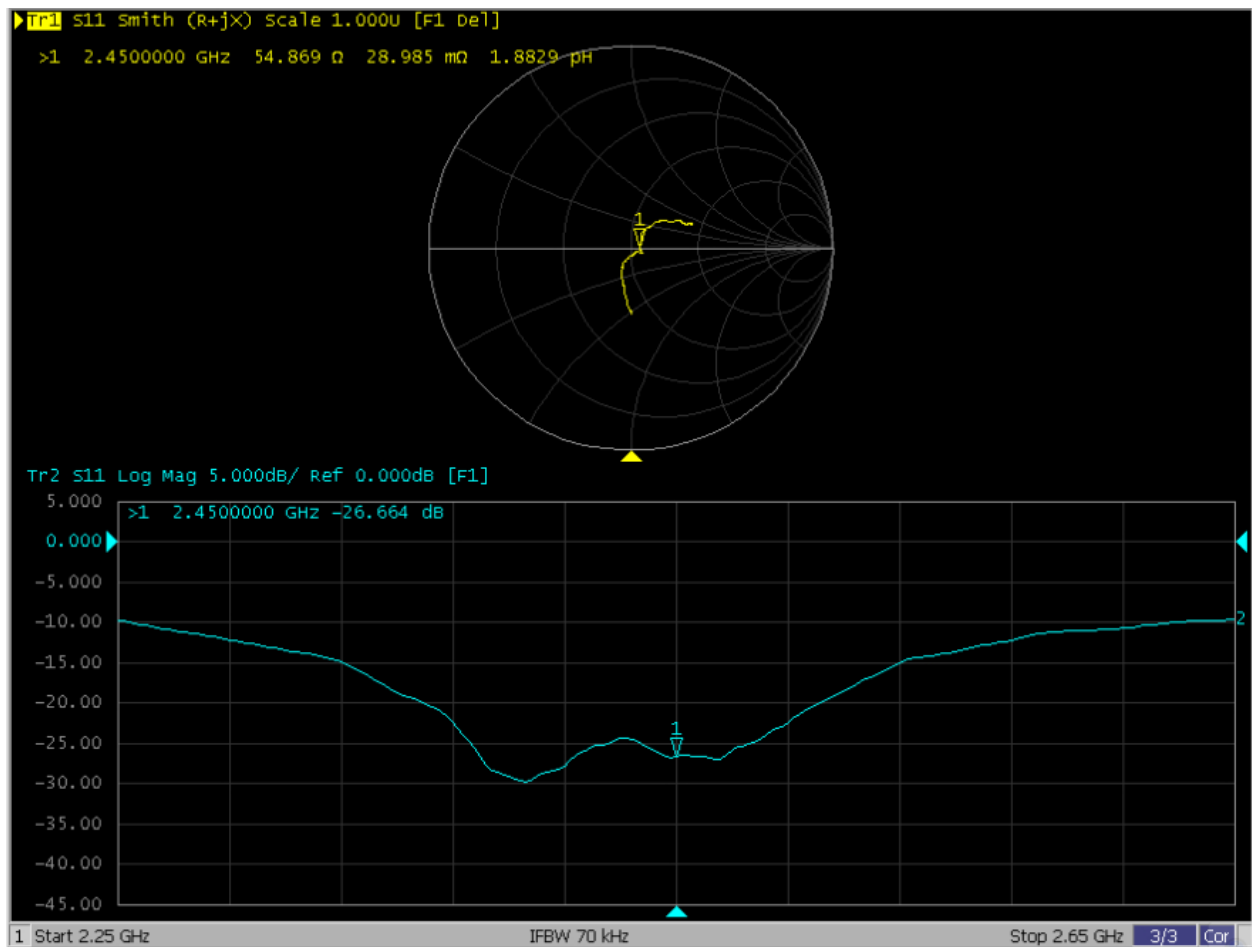
Antenna Parameters with Head TSL

	Calibration certificate	Annual measurement 2014-06-11
Impedance, transformed to feed point	55.5 Ω + 4.3 j Ω	54.9 Ω + 0.0 j Ω
Return loss	- 23.6 dB	- 26.7 dB

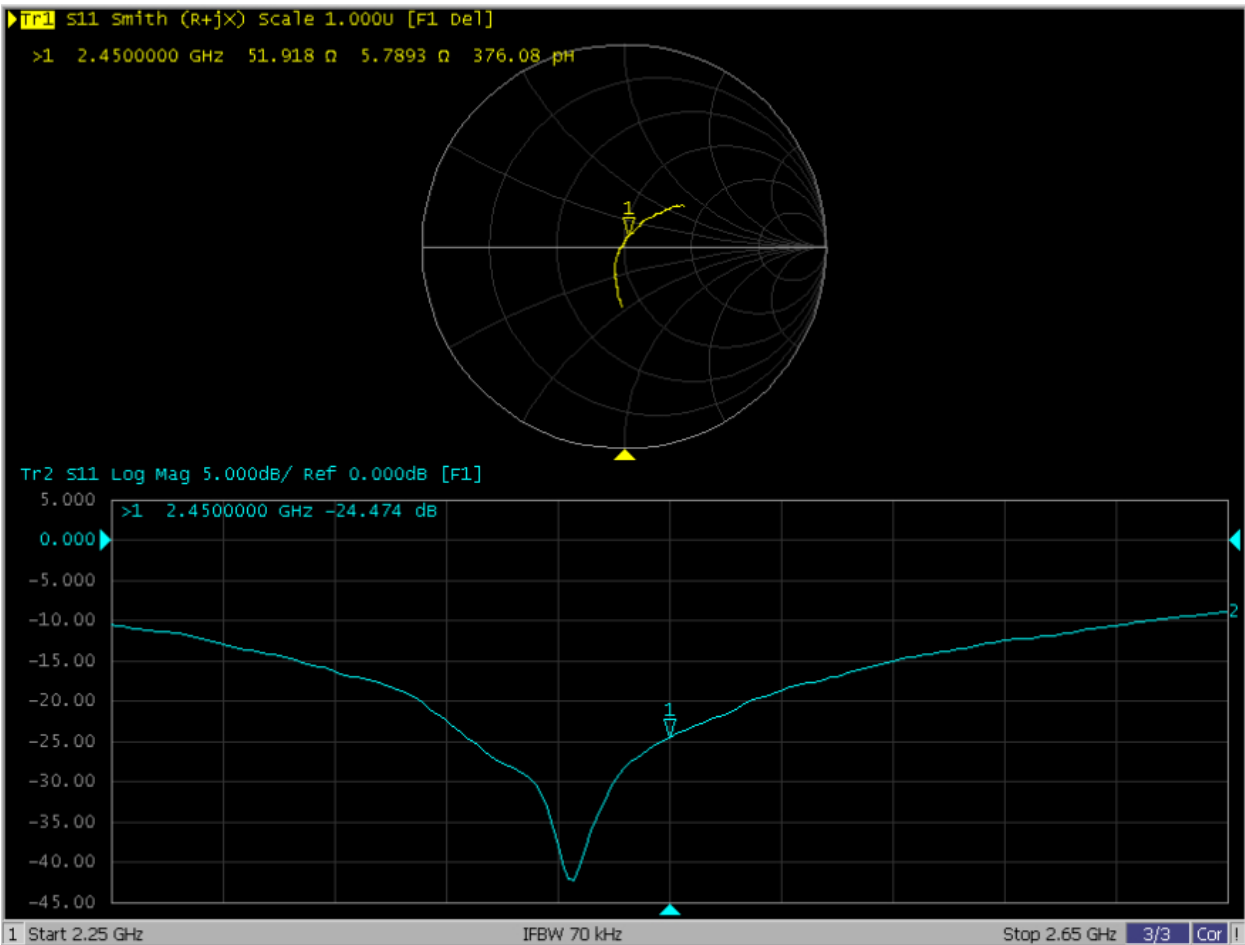
Antenna Parameters with Body TSL

	Calibration certificate	Annual measurement 2014-06-11
Impedance, transformed to feed point	51.8 Ω + 5.0 j Ω	51.9 Ω + 5.8 j Ω
Return loss	- 25.6 dB	- 24.5 dB

Impedance Measurement plot for Head TSL 2450



Impedance Measurement plot for Body TSL 2450





Accredited by the Swiss Accreditation Service (SAS)

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

Accreditation No.: SCS 108

Client **Nokia Beijing TCC**

Certificate No: **D2600V2-1042_Sep13**

CALIBRATION CERTIFICATE

Object **D2600V2 - SN: 1042**

Calibration procedure(s) **QA CAL-05.v9
Calibration procedure for dipole validation kits above 700 MHz**

Calibration date: **September 11, 2013**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter EPM-442A	GB37480704	01-Nov-12 (No. 217-01640)	Oct-13
Power sensor HP 8481A	US37292783	01-Nov-12 (No. 217-01640)	Oct-13
Reference 20 dB Attenuator	SN: 5058 (20k)	04-Apr-13 (No. 217-01736)	Apr-14
Type-N mismatch combination	SN: 5047.3 / 06327	04-Apr-13 (No. 217-01739)	Apr-14
Reference Probe ES3DV3	SN: 3205	28-Dec-12 (No. ES3-3205_Dec12)	Dec-13
DAE4	SN: 601	25-Apr-13 (No. DAE4-601_Apr13)	Apr-14
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power sensor HP 8481A	MY41092317	18-Oct-02 (in house check Oct-11)	In house check: Oct-13
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-11)	In house check: Oct-13
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-12)	In house check: Oct-13

Calibrated by:	Name Leif Klysner	Function Laboratory Technician	Signature
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 11, 2013

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

Measurement Conditions

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

DASY Version	DASY5	V52.8.7
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.9 $\pm$ 6 %	1.98 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	56.5 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.2 W/kg $\pm$ 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.3 Ω - 6.1 j Ω
Return Loss	- 23.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.150 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	May 24, 2011

DASY5 Validation Report for Head TSL

Date: 11.09.2013

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1042

Communication System: UID 0 - CW ; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 1.98$ S/m; $\epsilon_r = 38.9$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.45, 4.45, 4.45); Calibrated: 28.12.2012;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 25.04.2013
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

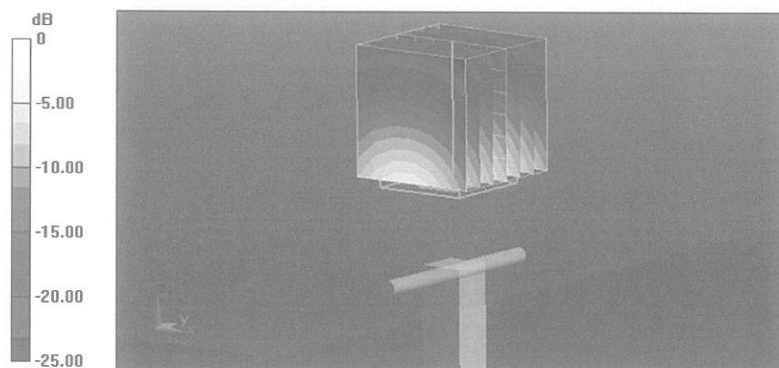
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.945 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 30.6 W/kg

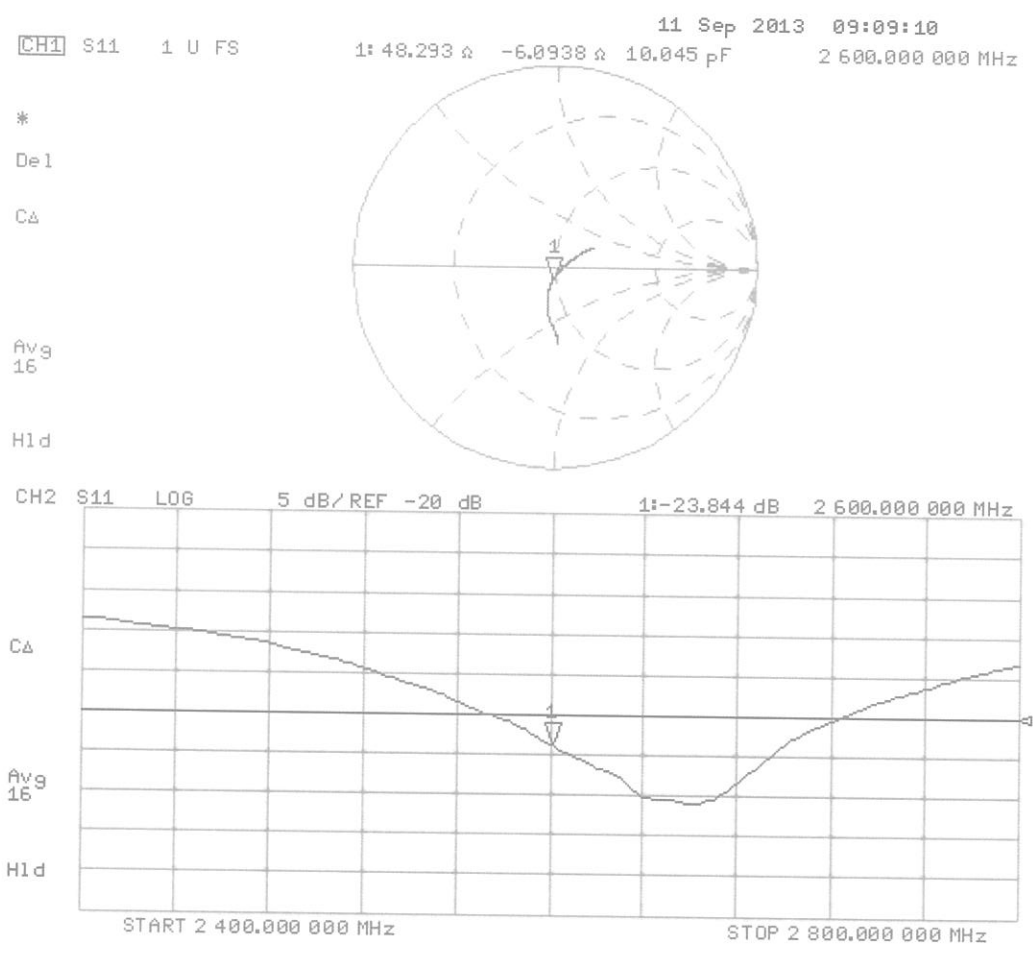
SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.33 W/kg

Maximum value of SAR (measured) = 18.4 W/kg



0 dB = 18.4 W/kg = 12.65 dBW/kg

Impedance Measurement Plot for Head TSL





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

Accreditation No.: **SCS 108**

Client **Nokia Beijing TCC**

Certificate No: **D2600V2-1082_Jun14**

CALIBRATION CERTIFICATE

Object **D2600V2 - SN: 1082**

Calibration procedure(s) **QA CAL-05.v9**
Calibration procedure for dipole validation kits above 700 MHz

Calibration date: **June 06, 2014**

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	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	US37292783	09-Oct-13 (No. 217-01827)	Oct-14
Power sensor HP 8481A	MY41092317	09-Oct-13 (No. 217-01828)	Oct-14
Reference 20 dB Attenuator	SN: 5058 (20k)	03-Apr-14 (No. 217-01918)	Apr-15
Type-N mismatch combination	SN: 5047.2 / 06327	03-Apr-14 (No. 217-01921)	Apr-15
Reference Probe ES3DV3	SN: 3205	30-Dec-13 (No. ES3-3205_Dec13)	Dec-14
DAE4	SN: 601	30-Apr-14 (No. DAE4-601_Apr14)	Apr-15

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
RF generator R&S SMT-06	100005	04-Aug-99 (in house check Oct-13)	In house check: Oct-16
Network Analyzer HP 8753E	US37390585 S4206	18-Oct-01 (in house check Oct-13)	In house check: Oct-14

Calibrated by: **Name**
Leif Klysner **Function**
Laboratory Technician

Signature

Approved by: **Katja Pokovic** **Technical Manager**

Issued: June 6, 2014

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

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	2600 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.0 $\pm$ 6 %	2.00 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.9 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.57 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	26.0 W/kg $\pm$ 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 $\pm$ 0.2) °C	50.8 $\pm$ 6 %	2.19 mho/m $\pm$ 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	14.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	56.0 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.29 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	24.9 W/kg $\pm$ 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.9 Ω - 4.8 j Ω
Return Loss	- 26.4 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.6 Ω - 3.9 j Ω
Return Loss	- 26.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.151 ns
----------------------------------	----------

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

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	March 14, 2014

DASY5 Validation Report for Head TSL

Date: 06.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1082

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2$ S/m; $\epsilon_r = 38$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- 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:

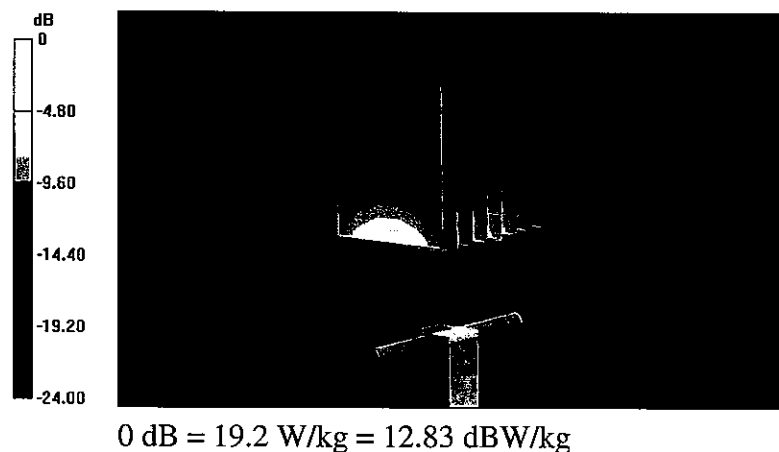
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 102.4 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 31.1 W/kg

SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.57 W/kg

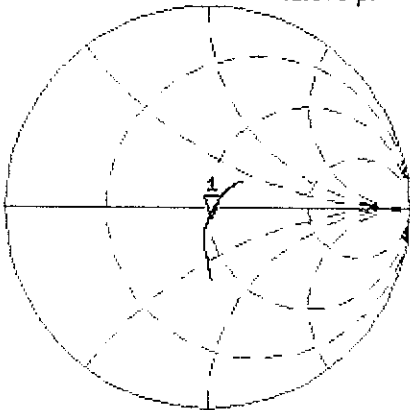
Maximum value of SAR (measured) = 19.2 W/kg



Impedance Measurement Plot for Head TSL

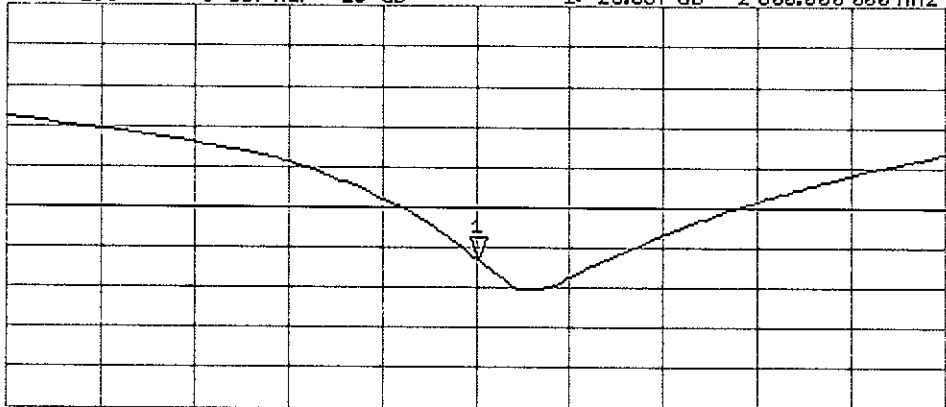
6 Jun 2014 10:03:44
CH1 S11 1 U FS 1: 50.906 Ω -4.7539 Ω 12.876 pF 2 600.000 000 MHz

*
De1
CA
Avg
16
H1d



CH2 S11 LOG 5 dB/REF -20 dB 1:-26.387 dB 2 600.000 000 MHz

De1
CA
Avg
16
H1d



START 2 400.000 000 MHz STOP 2 800.000 000 MHz

DASY5 Validation Report for Body TSL

Date: 06.06.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1082

Communication System: UID 0 - CW; Frequency: 2600 MHz

Medium parameters used: $f = 2600$ MHz; $\sigma = 2.19$ S/m; $\epsilon_r = 50.8$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

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

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- 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:

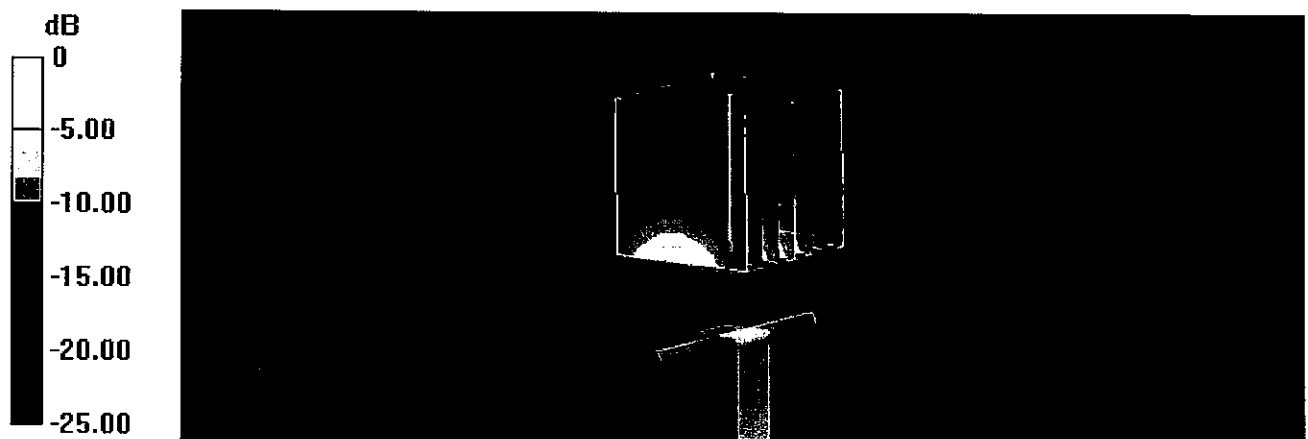
Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.05 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 30.5 W/kg

SAR(1 g) = 14.2 W/kg; SAR(10 g) = 6.29 W/kg

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

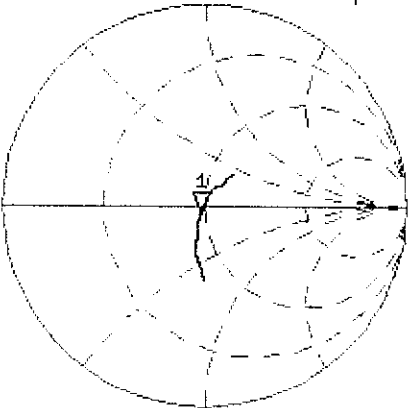


0 dB = 18.8 W/kg = 12.74 dBW/kg

Impedance Measurement Plot for Body TSL

CH1 S11 1 U FS 1: 47.592 Ω -3.9375 Ω 15.546 pF 6 Jun 2014 10:02:55 2 600.000 000 MHz

*
De1
Ca

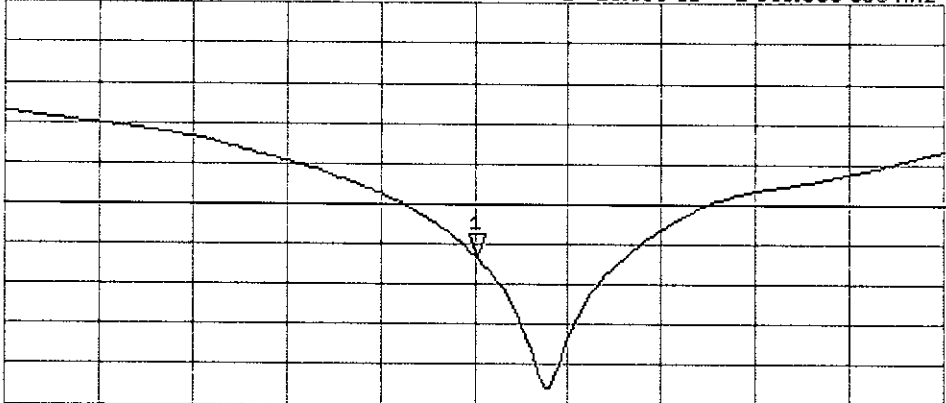


Avg
16
H1d

CH2 S11 LOG 5 dB/REF -20 dB 1:-26.509 dB 2 600.000 000 MHz

De1
Ca

Avg
16
H1d



START 2 400.000 000 MHz STOP 2 600.000 000 MHz

APPENDIX G: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED LTE TRANSMISSION MODES

G.1 Power Tuning Targets

Band	Modulation	Target Tuning Power in Head, Body-worn and Wireless Router measurements					
		1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE2500(Band 7)	QPSK	N/A	N/A	22.5	22.5	22.5	22.5
	16QAM	N/A	N/A	21.5	21.5	21.5	21.5

G.2 Conducted Power from the Samples used in the Testing

Type: RM-1038; Serial number: 004402/47/923231/0, HW: 0201, SW: 02030.00000.14244.22000 used for LTE2500 (Band7) Antenna 1 for Head, Body-worn and Wireless Router SAR measurements.

“Max Average Power (dBm)” column lists measured powers with MPR active. The “Reduced Power (dBm)” column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE2500 (Band 7) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2502.5	20775	5	1	0	QPSK	22.7	-
2502.5	20775	5	1	12	QPSK	22.7	-
2502.5	20775	5	1	24	QPSK	22.7	-
2502.5	20775	5	12	0	QPSK	22.7	-
2502.5	20775	5	12	6	QPSK	22.7	-
2502.5	20775	5	12	13	QPSK	22.7	-
2502.5	20775	5	25	0	QPSK	21.7	-
2502.5	20775	5	1	0	16QAM	21.7	-
2502.5	20775	5	1	12	16QAM	21.7	-
2502.5	20775	5	1	24	16QAM	21.7	-
2502.5	20775	5	12	0	16QAM	21.7	-
2502.5	20775	5	12	6	16QAM	21.7	-
2502.5	20775	5	12	13	16QAM	21.7	-
2502.5	20775	5	25	0	16QAM	20.7	-
2535.0	21100	5	1	0	QPSK	22.7	-
2535.0	21100	5	1	12	QPSK	22.8	-
2535.0	21100	5	1	24	QPSK	22.7	-
2535.0	21100	5	12	0	QPSK	22.7	-
2535.0	21100	5	12	6	QPSK	22.8	-
2535.0	21100	5	12	13	QPSK	22.7	-
2535.0	21100	5	25	0	QPSK	21.7	-
2535.0	21100	5	1	0	16QAM	21.7	-
2535.0	21100	5	1	12	16QAM	21.8	-
2535.0	21100	5	1	24	16QAM	21.7	-
2535.0	21100	5	12	0	16QAM	21.7	-

(Table continues)

(Table continues)

2535.0	21100	5	12	6	16QAM	21.8	-
2535.0	21100	5	12	13	16QAM	21.7	-
2535.0	21100	5	25	0	16QAM	20.7	-
2567.5	21425	5	1	0	QPSK	22.7	-
2567.5	21425	5	1	12	QPSK	22.7	-
2567.5	21425	5	1	24	QPSK	22.8	-
2567.5	21425	5	12	0	QPSK	22.7	-
2567.5	21425	5	12	6	QPSK	22.7	-
2567.5	21425	5	12	13	QPSK	22.8	-
2567.5	21425	5	25	0	QPSK	21.7	-
2567.5	21425	5	1	0	16QAM	21.7	-
2567.5	21425	5	1	12	16QAM	21.7	-
2567.5	21425	5	1	24	16QAM	21.8	-
2567.5	21425	5	12	0	16QAM	21.7	-
2567.5	21425	5	12	6	16QAM	21.7	-
2567.5	21425	5	12	13	16QAM	21.8	-
2567.5	21425	5	25	0	16QAM	20.7	-
2505.0	20800	10	1	0	QPSK	22.7	-
2505.0	20800	10	1	24	QPSK	22.7	-
2505.0	20800	10	1	49	QPSK	22.7	-
2505.0	20800	10	25	0	QPSK	22.7	-
2505.0	20800	10	25	12	QPSK	22.7	-
2505.0	20800	10	25	25	QPSK	22.7	-
2505.0	20800	10	50	0	QPSK	21.7	-
2505.0	20800	10	1	0	16QAM	21.7	-
2505.0	20800	10	1	24	16QAM	21.7	-
2505.0	20800	10	1	49	16QAM	21.7	-
2505.0	20800	10	25	0	16QAM	21.7	-
2505.0	20800	10	25	12	16QAM	21.7	-
2505.0	20800	10	25	25	16QAM	21.7	-
2505.0	20800	10	50	0	16QAM	20.7	-
2535.0	21100	10	1	0	QPSK	22.7	-
2535.0	21100	10	1	24	QPSK	22.8	-
2535.0	21100	10	1	49	QPSK	22.7	-
2535.0	21100	10	25	0	QPSK	22.7	-
2535.0	21100	10	25	12	QPSK	22.8	-
2535.0	21100	10	25	25	QPSK	22.7	-
2535.0	21100	10	50	0	QPSK	21.7	-
2535.0	21100	10	1	0	16QAM	21.7	-
2535.0	21100	10	1	24	16QAM	21.8	-
2535.0	21100	10	1	49	16QAM	21.7	-
2535.0	21100	10	25	0	16QAM	21.7	-
2535.0	21100	10	25	12	16QAM	21.8	-

(Table continues)

(Table continues)

2535.0	21100	10	25	25	16QAM	21.7	-
2535.0	21100	10	50	0	16QAM	20.7	-
2565.0	21400	10	1	0	QPSK	22.7	-
2565.0	21400	10	1	24	QPSK	22.7	-
2565.0	21400	10	1	49	QPSK	22.8	-
2565.0	21400	10	25	0	QPSK	22.7	-
2565.0	21400	10	25	12	QPSK	22.7	-
2565.0	21400	10	25	25	QPSK	22.8	-
2565.0	21400	10	50	0	QPSK	21.7	-
2565.0	21400	10	1	0	16QAM	21.7	-
2565.0	21400	10	1	24	16QAM	21.7	-
2565.0	21400	10	1	49	16QAM	21.8	-
2565.0	21400	10	25	0	16QAM	21.7	-
2565.0	21400	10	25	12	16QAM	21.7	-
2565.0	21400	10	25	25	16QAM	21.8	-
2565.0	21400	10	50	0	16QAM	20.7	-
2507.5	20825	15	1	0	QPSK	22.7	-
2507.5	20825	15	1	36	QPSK	22.7	-
2507.5	20825	15	1	74	QPSK	22.7	-
2507.5	20825	15	37	0	QPSK	22.7	-
2507.5	20825	15	37	18	QPSK	22.7	-
2507.5	20825	15	37	38	QPSK	22.7	-
2507.5	20825	15	75	0	QPSK	21.7	-
2507.5	20825	15	1	0	16QAM	21.7	-
2507.5	20825	15	1	36	16QAM	21.7	-
2507.5	20825	15	1	74	16QAM	21.7	-
2507.5	20825	15	37	0	16QAM	21.7	-
2507.5	20825	15	37	18	16QAM	21.7	-
2507.5	20825	15	37	38	16QAM	21.7	-
2507.5	20825	15	75	0	16QAM	20.7	-
2535.0	21100	15	1	0	QPSK	22.7	-
2535.0	21100	15	1	36	QPSK	22.8	-
2535.0	21100	15	1	74	QPSK	22.7	-
2535.0	21100	15	37	0	QPSK	22.7	-
2535.0	21100	15	37	18	QPSK	22.8	-
2535.0	21100	15	37	38	QPSK	22.7	-
2535.0	21100	15	75	0	QPSK	21.7	-
2535.0	21100	15	1	0	16QAM	21.7	-
2535.0	21100	15	1	36	16QAM	21.8	-
2535.0	21100	15	1	74	16QAM	21.7	-
2535.0	21100	15	37	0	16QAM	21.7	-
2535.0	21100	15	37	18	16QAM	21.8	-
2535.0	21100	15	37	38	16QAM	21.7	-

(Table continues)

(Table continues)

2535.0	21100	15	75	0	16QAM	20.7	-
2562.5	21375	15	1	0	QPSK	22.7	-
2562.5	21375	15	1	36	QPSK	22.7	-
2562.5	21375	15	1	74	QPSK	22.8	-
2562.5	21375	15	37	0	QPSK	22.7	-
2562.5	21375	15	37	18	QPSK	22.7	-
2562.5	21375	15	37	38	QPSK	22.8	-
2562.5	21375	15	75	0	QPSK	21.7	-
2562.5	21375	15	1	0	16QAM	21.7	-
2562.5	21375	15	1	36	16QAM	21.7	-
2562.5	21375	15	1	74	16QAM	21.8	-
2562.5	21375	15	37	0	16QAM	21.7	-
2562.5	21375	15	37	18	16QAM	21.7	-
2562.5	21375	15	37	38	16QAM	21.8	-
2562.5	21375	15	75	0	16QAM	20.7	-
2510.0	20850	20	1	0	QPSK	22.7	-
2510.0	20850	20	1	49	QPSK	22.7	-
2510.0	20850	20	1	99	QPSK	22.7	-
2510.0	20850	20	50	0	QPSK	22.7	-
2510.0	20850	20	50	24	QPSK	22.7	-
2510.0	20850	20	50	50	QPSK	22.7	-
2510.0	20850	20	100	0	QPSK	21.7	-
2510.0	20850	20	1	0	16QAM	21.7	-
2510.0	20850	20	1	49	16QAM	21.7	-
2510.0	20850	20	1	99	16QAM	21.7	-
2510.0	20850	20	50	0	16QAM	21.7	-
2510.0	20850	20	50	24	16QAM	21.7	-
2510.0	20850	20	50	50	16QAM	21.7	-
2510.0	20850	20	100	0	16QAM	20.7	-
2535.0	21100	20	1	0	QPSK	22.7	-
2535.0	21100	20	1	49	QPSK	22.8	-
2535.0	21100	20	1	99	QPSK	22.7	-
2535.0	21100	20	50	0	QPSK	22.7	-
2535.0	21100	20	50	24	QPSK	22.8	-
2535.0	21100	20	50	50	QPSK	22.7	-
2535.0	21100	20	100	0	QPSK	21.7	-
2535.0	21100	20	1	0	16QAM	21.7	-
2535.0	21100	20	1	49	16QAM	21.8	-
2535.0	21100	20	1	99	16QAM	21.7	-
2535.0	21100	20	50	0	16QAM	21.7	-
2535.0	21100	20	50	24	16QAM	21.8	-
2535.0	21100	20	50	50	16QAM	21.7	-
2535.0	21100	20	100	0	16QAM	20.7	-

(Table continues)

(Table continues)

2560.0	21350	20	1	0	QPSK	22.7	-
2560.0	21350	20	1	49	QPSK	22.7	-
2560.0	21350	20	1	99	QPSK	22.8	-
2560.0	21350	20	50	0	QPSK	22.7	-
2560.0	21350	20	50	24	QPSK	22.7	-
2560.0	21350	20	50	50	QPSK	22.8	-
2560.0	21350	20	100	0	QPSK	21.7	-
2560.0	21350	20	1	0	16QAM	21.7	-
2560.0	21350	20	1	49	16QAM	21.7	-
2560.0	21350	20	1	99	16QAM	21.8	-
2560.0	21350	20	50	0	16QAM	21.7	-
2560.0	21350	20	50	24	16QAM	21.7	-
2560.0	21350	20	50	50	16QAM	21.8	-
2560.0	21350	20	100	0	16QAM	20.7	-

Type: RM-1038; Serial number: 004402/47/923231/0, HW: 0201, SW: 02030.00000.14244.22000
used for LTE2500 (Band7) Antenna 2 for Head, Body-worn and Wireless Router SAR measurements.

“Max Average Power (dBm)” column lists measured powers with MPR active. The “Reduced Power (dBm)” column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101). A-MPR is not specified for LTE2500 (Band 7) in this specification (Table 6.2.4-1).

Frequency (MHz)	Channel Number	Bandwidth (MHz)	RB Number	RB Offset	Modulation	Max Average Power (dBm)	Reduced Power(dBm)
2502.5	20775	5	1	0	QPSK	22.3	-
2502.5	20775	5	1	12	QPSK	22.4	-
2502.5	20775	5	1	24	QPSK	22.3	-
2502.5	20775	5	12	0	QPSK	22.3	-
2502.5	20775	5	12	6	QPSK	22.4	-
2502.5	20775	5	12	13	QPSK	22.3	-
2502.5	20775	5	25	0	QPSK	21.3	-
2502.5	20775	5	1	0	16QAM	21.3	-
2502.5	20775	5	1	12	16QAM	21.4	-
2502.5	20775	5	1	24	16QAM	21.3	-
2502.5	20775	5	12	0	16QAM	21.3	-
2502.5	20775	5	12	6	16QAM	21.4	-
2502.5	20775	5	12	13	16QAM	21.3	-
2502.5	20775	5	25	0	16QAM	20.3	-
2535.0	21100	5	1	0	QPSK	22.4	-
2535.0	21100	5	1	12	QPSK	22.4	-
2535.0	21100	5	1	24	QPSK	22.4	-
2535.0	21100	5	12	0	QPSK	22.4	-
2535.0	21100	5	12	6	QPSK	22.4	-
2535.0	21100	5	12	13	QPSK	22.4	-
2535.0	21100	5	25	0	QPSK	21.4	-
2535.0	21100	5	1	0	16QAM	21.4	-
2535.0	21100	5	1	12	16QAM	21.4	-
2535.0	21100	5	1	24	16QAM	21.4	-
2535.0	21100	5	12	0	16QAM	21.4	-
2535.0	21100	5	12	6	16QAM	21.4	-
2535.0	21100	5	12	13	16QAM	21.4	-
2535.0	21100	5	25	0	16QAM	20.4	-
2567.5	21425	5	1	0	QPSK	22.3	-
2567.5	21425	5	1	12	QPSK	22.3	-
2567.5	21425	5	1	24	QPSK	22.4	-
2567.5	21425	5	12	0	QPSK	22.3	-
2567.5	21425	5	12	6	QPSK	22.3	-
2567.5	21425	5	12	13	QPSK	22.4	-
2567.5	21425	5	25	0	QPSK	21.3	-
2567.5	21425	5	1	0	16QAM	21.3	-

(Table continues)

(Table continues)

2567.5	21425	5	1	12	16QAM	21.3	-
2567.5	21425	5	1	24	16QAM	21.4	-
2567.5	21425	5	12	0	16QAM	21.3	-
2567.5	21425	5	12	6	16QAM	21.3	-
2567.5	21425	5	12	13	16QAM	21.4	-
2567.5	21425	5	25	0	16QAM	20.3	-
2505.0	20800	10	1	0	QPSK	22.3	-
2505.0	20800	10	1	24	QPSK	22.4	-
2505.0	20800	10	1	49	QPSK	22.3	-
2505.0	20800	10	25	0	QPSK	22.3	-
2505.0	20800	10	25	12	QPSK	22.4	-
2505.0	20800	10	25	25	QPSK	22.3	-
2505.0	20800	10	50	0	QPSK	21.3	-
2505.0	20800	10	1	0	16QAM	21.3	-
2505.0	20800	10	1	24	16QAM	21.4	-
2505.0	20800	10	1	49	16QAM	21.3	-
2505.0	20800	10	25	0	16QAM	21.3	-
2505.0	20800	10	25	12	16QAM	21.4	-
2505.0	20800	10	25	25	16QAM	21.3	-
2505.0	20800	10	50	0	16QAM	20.3	-
2535.0	21100	10	1	0	QPSK	22.4	-
2535.0	21100	10	1	24	QPSK	22.4	-
2535.0	21100	10	1	49	QPSK	22.4	-
2535.0	21100	10	25	0	QPSK	22.4	-
2535.0	21100	10	25	12	QPSK	22.4	-
2535.0	21100	10	25	25	QPSK	22.4	-
2535.0	21100	10	50	0	QPSK	21.4	-
2535.0	21100	10	1	0	16QAM	21.4	-
2535.0	21100	10	1	24	16QAM	21.4	-
2535.0	21100	10	1	49	16QAM	21.4	-
2535.0	21100	10	25	0	16QAM	21.4	-
2535.0	21100	10	25	12	16QAM	21.4	-
2535.0	21100	10	25	25	16QAM	21.4	-
2535.0	21100	10	50	0	16QAM	20.4	-
2565.0	21400	10	1	0	QPSK	22.3	-
2565.0	21400	10	1	24	QPSK	22.3	-
2565.0	21400	10	1	49	QPSK	22.4	-
2565.0	21400	10	25	0	QPSK	22.3	-
2565.0	21400	10	25	12	QPSK	22.3	-
2565.0	21400	10	25	25	QPSK	22.4	-
2565.0	21400	10	50	0	QPSK	21.3	-
2565.0	21400	10	1	0	16QAM	21.3	-
2565.0	21400	10	1	24	16QAM	21.3	-

(Table continues)

(Table continues)

2565.0	21400	10	1	49	16QAM	21.4	-
2565.0	21400	10	25	0	16QAM	21.3	-
2565.0	21400	10	25	12	16QAM	21.3	-
2565.0	21400	10	25	25	16QAM	21.4	-
2565.0	21400	10	50	0	16QAM	20.3	-
2507.5	20825	15	1	0	QPSK	22.3	-
2507.5	20825	15	1	36	QPSK	22.4	-
2507.5	20825	15	1	74	QPSK	22.3	-
2507.5	20825	15	37	0	QPSK	22.3	-
2507.5	20825	15	37	18	QPSK	22.4	-
2507.5	20825	15	37	38	QPSK	22.3	-
2507.5	20825	15	75	0	QPSK	21.3	-
2507.5	20825	15	1	0	16QAM	21.3	-
2507.5	20825	15	1	36	16QAM	21.4	-
2507.5	20825	15	1	74	16QAM	21.3	-
2507.5	20825	15	37	0	16QAM	21.3	-
2507.5	20825	15	37	18	16QAM	21.4	-
2507.5	20825	15	37	38	16QAM	21.3	-
2507.5	20825	15	75	0	16QAM	20.3	-
2535.0	21100	15	1	0	QPSK	22.4	-
2535.0	21100	15	1	36	QPSK	22.4	-
2535.0	21100	15	1	74	QPSK	22.4	-
2535.0	21100	15	37	0	QPSK	22.4	-
2535.0	21100	15	37	18	QPSK	22.4	-
2535.0	21100	15	37	38	QPSK	22.4	-
2535.0	21100	15	75	0	QPSK	21.4	-
2535.0	21100	15	1	0	16QAM	21.4	-
2535.0	21100	15	1	36	16QAM	21.4	-
2535.0	21100	15	1	74	16QAM	21.4	-
2535.0	21100	15	37	0	16QAM	21.4	-
2535.0	21100	15	37	18	16QAM	21.4	-
2535.0	21100	15	37	38	16QAM	21.4	-
2535.0	21100	15	75	0	16QAM	20.4	-
2562.5	21375	15	1	0	QPSK	22.3	-
2562.5	21375	15	1	36	QPSK	22.3	-
2562.5	21375	15	1	74	QPSK	22.4	-
2562.5	21375	15	37	0	QPSK	22.3	-
2562.5	21375	15	37	18	QPSK	22.3	-
2562.5	21375	15	37	38	QPSK	22.4	-
2562.5	21375	15	75	0	QPSK	21.3	-
2562.5	21375	15	1	0	16QAM	21.3	-
2562.5	21375	15	1	36	16QAM	21.3	-
2562.5	21375	15	1	74	16QAM	21.4	-

(Table continues)

(Table continues)

2562.5	21375	15	37	0	16QAM	21.3	-
2562.5	21375	15	37	18	16QAM	21.3	-
2562.5	21375	15	37	38	16QAM	21.4	-
2562.5	21375	15	75	0	16QAM	20.3	-
2510.0	20850	20	1	0	QPSK	22.3	-
2510.0	20850	20	1	49	QPSK	22.4	-
2510.0	20850	20	1	99	QPSK	22.3	-
2510.0	20850	20	50	0	QPSK	22.3	-
2510.0	20850	20	50	24	QPSK	22.4	-
2510.0	20850	20	50	50	QPSK	22.3	-
2510.0	20850	20	100	0	QPSK	21.3	-
2510.0	20850	20	1	0	16QAM	21.3	-
2510.0	20850	20	1	49	16QAM	21.4	-
2510.0	20850	20	1	99	16QAM	21.3	-
2510.0	20850	20	50	0	16QAM	21.3	-
2510.0	20850	20	50	24	16QAM	21.4	-
2510.0	20850	20	50	50	16QAM	21.3	-
2510.0	20850	20	100	0	16QAM	20.3	-
2535.0	21100	20	1	0	QPSK	22.4	-
2535.0	21100	20	1	49	QPSK	22.4	-
2535.0	21100	20	1	99	QPSK	22.4	-
2535.0	21100	20	50	0	QPSK	22.4	-
2535.0	21100	20	50	24	QPSK	22.4	-
2535.0	21100	20	50	50	QPSK	22.4	-
2535.0	21100	20	100	0	QPSK	21.4	-
2535.0	21100	20	1	0	16QAM	21.4	-
2535.0	21100	20	1	49	16QAM	21.4	-
2535.0	21100	20	1	99	16QAM	21.4	-
2535.0	21100	20	50	0	16QAM	21.4	-
2535.0	21100	20	50	24	16QAM	21.4	-
2535.0	21100	20	50	50	16QAM	21.4	-
2535.0	21100	20	100	0	16QAM	20.4	-
2560.0	21350	20	1	0	QPSK	22.3	-
2560.0	21350	20	1	49	QPSK	22.3	-
2560.0	21350	20	1	99	QPSK	22.4	-
2560.0	21350	20	50	0	QPSK	22.3	-
2560.0	21350	20	50	24	QPSK	22.3	-
2560.0	21350	20	50	50	QPSK	22.4	-
2560.0	21350	20	100	0	QPSK	21.3	-
2560.0	21350	20	1	0	16QAM	21.3	-
2560.0	21350	20	1	49	16QAM	21.3	-
2560.0	21350	20	1	99	16QAM	21.4	-
2560.0	21350	20	50	0	16QAM	21.3	-

(Table continues)

(Table continues)

2560.0	21350	20	50	24	16QAM	21.3	-
2560.0	21350	20	50	50	16QAM	21.4	-
2560.0	21350	20	100	0	16QAM	20.3	-

APPENDIX H: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED GSM/GPRS/EGPRS TRANSMISSION MODES

Type: RM-1038, Serial number 004402/47/923297/1 HW: 0201, SW: 02030.00000.14244.22000 used for GSM/GPRS/EGPRS850 SAR Head, Body-worn and Wireless Router measurements.

GSM/GPRS/EGPRS850 / Tuning target (dBm) Head, Body-worn and Wireless Router			
Slot configuration	Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM 1-slot	33.0	33.0	33.0
GPRS 2-slot	30.0	30.0	30.0
GPRS 3-slot	28.2	28.2	28.2
GPRS 4-slot	27.0	27.0	27.0
EGPRS 1-slot	27.0	27.0	27.0
EGPRS 2-slot	24.0	24.0	24.0
EGPRS 3-slot	22.2	22.2	22.2
EGPRS 4-slot	21.0	21.0	21.0
GSM/GPRS/EGPRS850 / Conducted power (dBm) Head, Body-worn and Wireless Router			
Slot configuration	Ch 128 824.2 MHz	Ch 190 836.6 MHz	Ch 251 848.8 MHz
GSM 1-slot	32.7	32.8	32.7
GPRS 2-slot	30.1	30.3	30.3
GPRS 3-slot	28.2	28.5	28.5
GPRS 4-slot	27.3	27.4	27.4
EGPRS 1-slot	26.5	26.5	26.5
EGPRS 2-slot	23.9	24.0	24.0
EGPRS 3-slot	21.9	22.1	22.2
EGPRS 4-slot	21.1	21.3	21.4

Type: RM-1038, Serial number 004402/47/923282/3, HW: 0201, SW: 02030.00000.14244.22000 used for GSM/GPRS/EGPRS1900 SAR Head, Body-worn and Wireless Router measurements.

GSM/GPRS/EGPRS1900 / Tuning target (dBm) Head, Body-worn and Wireless Router			
Slot configuration	CH 512 1850.2 MHz	CH 661 1880.0 MHz	CH 810 1909.8 MHz
GSM 1-slot	30.0	30.0	30.0
GPRS 2-slot	27.0	27.0	27.0
GPRS 3-slot	25.2	25.2	25.2
GPRS 4-slot	24.0	24.0	24.0
EGPRS 1-slot	26.0	26.0	26.0
EGPRS 2-slot	23.0	23.0	23.0
EGPRS 3-slot	21.2	21.2	21.2
EGPRS 4-slot	20.0	20.0	20.0
GSM/GPRS/EGPRS1900 / Conducted power (dBm) Head, Body-worn and Wireless Router			
Slot configuration	CH 512 1850.2 MHz	CH 661 1880.0 MHz	CH 810 1909.8 MHz
GSM 1-slot	30.1	30.2	30.3
GPRS 2-slot	26.8	26.9	27.1
GPRS 3-slot	25.3	25.4	25.6
GPRS 4-slot	23.9	24.0	24.2
EGPRS 1-slot	26.3	26.2	26.3
EGPRS 2-slot	23.1	23.1	23.2
EGPRS 3-slot	21.2	21.3	21.5
EGPRS 4-slot	20.2	20.3	20.4

APPENDIX I: CONDUCTED POWER MEASUREMENTS FOR SUPPORTED WCDMA TRANSMISSION MODES

Type: RM-1038; SN: 004402/47/923297/1, HW: 0201, SW: 02030.00000.14244.22000 used for WCDMA850 (Band 5) Head, Body-worn and Wireless router SAR measurements

WCDMA 850 (Band 5) / Tuning target (dBm) Head, Body-worn and Wireless Router			
Mode	Low channel	Mid channel	High channel
WCDMA	23.5	23.5	23.5
WCDMA 850 (Band 5) / Conducted power (dBm) Head, Body-worn and Wireless Router			
Mode	Low channel	Mid channel	High channel
WCDMA	23.5	23.4	23.3

WCDMA and HSUPA Subtest mode conducted powers, measured from a separate, fully representative sample are presented in Appendix D.

APPENDIX J: CONDUCTED POWER RESULTS FOR WLAN2450

J.1 Power Tuning Targets

WLAN 2.4 GHz: 20 MHz channel bandwidth								
Standard	Modulation	Data speed [Mbps]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b	BPSK	1	16.0	16.5	16.5	16.5	16.5	16.0
802.11b	QPSK	2	16.0	16.5	16.5	16.5	16.5	16.0
802.11b	QPSK	5.5	16.0	16.5	16.5	16.5	16.5	16.0
802.11b	QPSK	11	16.0	16.5	16.5	16.5	16.5	16.0
802.11g	BPSK	6	12.0	15.0	15.0	15.0	15.0	12.0
802.11g	BPSK	9	12.0	15.0	15.0	15.0	15.0	12.0
802.11g	QPSK	12	12.0	15.0	15.0	15.0	15.0	12.0
802.11g	QPSK	18	12.0	15.0	15.0	15.0	15.0	12.0
802.11g	16QAM	24	12.0	15.0	15.0	15.0	15.0	12.0
802.11g	16QAM	36	12.0	14.0	14.0	14.0	14.0	12.0
802.11g	64QAM	48	12.0	13.0	13.0	13.0	13.0	12.0
802.11g	64QAM	54	11.5	11.5	11.5	11.5	11.5	11.5
802.11n	BPSK	6.5 / 7.25	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	QPSK	13.0 / 14.4	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	QPSK	19.5 / 21.7	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	16QAM	26.0 / 28.9	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	16QAM	39.0 / 43.3	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	64QAM	52.0 / 57.8	11.0	13.0	13.0	13.0	13.0	11.0
802.11n	64QAM	58.5 / 65.0	11.0	11.0	11.0	11.0	11.0	11.0
802.11n	64QAM	65.0 / 72.2	11.0	11.0	11.0	11.0	11.0	11.0

J.2 Conducted Power from the Samples used in the Testing

Type: RM-1038; SN: 004402/47/923288/0; HW: 0201, SW: 02030.00000.14244.22000 used for WLAN2450 for SAR Head, Body-worn and Wireless Router measurements.

WLAN 2.4 GHz: 20 MHz channel bandwidth								
Standard	Modulation	Data speed [Mbps]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b	BPSK	1	16.2	16.6	16.4	16.6	16.4	16.1
802.11b	QPSK	2	16.1	16.7	16.6	16.4	16.7	15.9
802.11b	QPSK	5,5	16.3	16.8	16.8	16.6	16.7	16.1
802.11b	QPSK	11	16.2	16.9	17.1	16.9	16.6	15.8
802.11g	BPSK	6	11.8	14.8	14.5	14.7	15.2	11.6
802.11g	BPSK	9	11.7	15.1	14.8	14.7	15.1	11.7
802.11g	QPSK	12	11.7	15.2	14.7	14.4	14.6	11.5
802.11g	QPSK	18	11.9	15.1	15.1	14.7	14.8	11.7
802.11g	16QAM	24	11.5	15.1	14.8	15.1	14.9	11.6
802.11g	16QAM	36	11.9	14.1	13.6	13.7	13.6	11.4
802.11g	64QAM	48	11.7	13.1	13.2	13.2	12.8	11.7
802.11g	64QAM	54	10.8	11.1	11.3	10.9	10.8	10.9
802.11n	BPSK	6.5 / 7.25	10.9	12.5	12.9	12.6	12.5	10.8
802.11n	QPSK	13.0 / 14.4	11.1	12.7	12.7	12.7	12.7	10.9
802.11n	QPSK	19.5 / 21.7	10.6	12.8	12.9	12.9	12.8	10.7
802.11n	16QAM	26.0 / 28.9	10.8	12.9	12.5	12.5	12.9	10.8
802.11n	16QAM	39.0 / 43.3	10.9	12.5	12.9	12.8	12.5	10.7
802.11n	64QAM	52.0 / 57.8	10.7	12.8	12.6	12.6	12.8	10.9
802.11n	64QAM	58.5 / 65.0	10.8	10.7	10.9	10.7	10.7	10.6
802.11n	64QAM	65.0 / 72.2	10.7	10.5	10.6	10.7	10.5	10.6