SAR Compliance Test Report

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Tested device:	RM-1072		
FCC ID:	PYARM-1072	**IC:**	-
Supplement reports:	SAR_Photo_RM- 1072_02		

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.

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Period of test	2014-11-19 to 2014-12-04
HW and SW numbers of tested device	RM-1072, HW: 1500, SW: 02148.00000.14431.29000
Batteries used in testing	BV-T5C
Headsets used in testing	WH-108
Other accessories used in testing	Cover CC-3089 Optional back cover
State of sample	Prototype unit
Notes	-

1.2 Maximum Results

The maximum reported SAR values for Head, Body-Worn and Wireless Router configurations are given in section 1.2.1, 1.2.2 and 1.2.3 respectively. The device conforms to the requirements of the standards when the maximum measured SAR value is less than or equal to the limit.

1.2.1 Head Configuration

Mode	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
2-slot GPRS850	**0.69 W/kg**	1.6 W/kg	**PASSED**	**H1**
WCDMA850 (Band 5)	**0.47 W/kg**	1.6 W/kg	**PASSED**	**H2**
2-slot GPRS1900	**0.55 W/kg**	1.6 W/kg	**PASSED**	**H3**
LTE2500 (Band 7)	**0.43 W/kg**	1.6 W/kg	**PASSED**	**H4**
WLAN2450	**1.31 W/kg**	1.6 W/kg	**PASSED**	**H5**
Maximum of SPEAG combined multiband algorithm results				
2-slot GPRS850 + WLAN2450	**1.43 W/kg**	1.6 W/kg	**PASSED**	**H6**

1.2.2 Body Worn Configuration

Summary of Maximum Results for Body-worn mode at 15 mm

Mode	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
2-slot GPRS850	**0.64 W/kg**	1.6 W/kg	**PASSED**	**B1**
WCDMA850 (Band 5)	**0.45 W/kg**	1.6 W/kg	**PASSED**	**B2**
2-slot GPRS1900	**0.56 W/kg**	1.6 W/kg	**PASSED**	**B3**
LTE2500 (Band 7)	**0.66 W/kg**	1.6 W/kg	**PASSED**	**B4**
WLAN2450	**0.21 W/kg**	1.6 W/kg	**PASSED**	**B5**
Maximum of SPEAG combined multiband algorithm results				
2-slot GPRS850 + WLAN2450	**0.68 W/kg**	1.6 W/kg	**PASSED**	**-**

1.2.3 Wireless Router Configuration

Summary of Maximum Results for Wireless Router mode at 10 mm

Mode	Reported* SAR value (1g avg)	SAR limit (1g avg)	Result	Plot #
2-slot GPRS850	**0.77 W/kg**	1.6 W/kg	**PASSED**	**W1**
WCDMA850 (Band 5)	**0.55 W/kg**	1.6 W/kg	**PASSED**	**W2**
2-slot GPRS1900	**1.15 W/kg**	1.6 W/kg	**PASSED**	**W3**
LTE2500 (Band 7)	**1.19 W/kg**	1.6 W/kg	**PASSED**	**W4**
WLAN2450	**0.46 W/kg**	1.6 W/kg	**PASSED**	**W5**
Maximum of SPEAG combined multiband algorithm results				
2-slot GPRS1900 + WLAN2450	**1.15 W/kg**	1.6 W/kg	**PASSED**	**W3**

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

1.2.4 Summary SAR data

Description	FCC-defined SAR values for the Grants of Equipment Authorization		
	PCE	DTS	NII
Maximum Head SAR values	0.69	1.31	-
{Max + Max} Simultaneous Head SAR value	1.31		
Maximum Body SAR values	0.66	0.21	-
{Max + Max} Simultaneous Body SAR value	0.87		
Maximum Product Specific (Wireless Router) SAR values	1.19	0.46	-
{Max + Max} Simultaneous Product Specific (Wireless Router) SAR value	1.46		
Maximum Simultaneous SAR value **Wireless Router SAR: 2-slot GPRS1900 + WLAN2450**	1.46		

Note:

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

1.2.5 Maximum Drift

Maximum drift during measurements	≤ 0.2 dB

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

2.1 Bands and Modes of the DUT

Bands	Modes of Operation	Modulation Mode	Duty Cycle	Channel Bandwidth (MHz)	Transmitter Frequency Range (MHz)	Power Reduction in Wireless Router (Hotspot) Mode (dB)			
850	GSM/GPRS	GMSK	1/8 to 4/8		824 – 849	1-slot	2-slot	3-slot	4-slot
						0	0	0	0
850	EGPRS	GMSK/8PSK	1/8 to 4/8		824 – 849	0	0	0	0
850 (Band 5)	WCDMA		1		826 – 847	0			
850 (Band 5)	HSUPA		1		826 – 847	0			
850 (Band 5)	DC-HSDPA		1		826 – 847	0			
1900	GSM/GPRS	GMSK	1/8 to 4/8		1850 – 1910	1-slot	2-slot	3-slot	4-slot
						0	0	0	0
1900	EGPRS	GMSK/8PSK	1/8 to 4/8		1850 – 1910	0	0	0	0
2500 (Band 7)	LTE	QPSK / 16QAM	1	5, 10, 15, 20	2500 - 2570	1.5			
2450	BT	GFSK	1		2402 – 2480	0			
2450	WLAN b-mode	DSSS	1	20	2412 – 2462	0			
2450	WLAN g-mode	OFDM	1	20	2412 – 2462	0			
2450	WLAN n-mode	OFDM	1	20	2412 – 2462	0			

2.2 DUT Features and Test Requirements

Common features	Testing / Specification / KDB
Bands operating outside USA	These bands are not part of this filing: GSM/GPRS/EGPRS900 GSM/GPRS/EGPRS1800 WCDMA/HSUPA/DC-HSDPA900 (Band 8) WCDMA/HSUPA/DC-HSDPA2100 (Band 1) LTE850 (Band 20) LTE900 (Band 8) LTE1800 (Band 3) LTE2100 (Band 1)
Number of SIM cards:	1
Ambient temperature:	20.5 – 22.5 °C / Controlled
Ambient humidity (RH %):	35 – 55 %RH / Controlled
Output power and batteries	The device output power was set to maximum power level for all tests. A fully charged battery was used for every test sequence.
Test channels	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.
VOIP	This device has Voice-over-IP capability for use at the ear. Therefore SAR for data modes was evaluated against the head profile of the phantom for all communication systems.
Antennas	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. Same RF PA circuitry is used for both antennas and therefore same output power targets and conducted power results apply to both antennas. Control software was used to route the TX power to the chosen antenna during the SAR test sequence.
GSM/GPRS/EGPRS	**KDB 941225 D03 SAR Test Reduction Procedures for GSM/GPRS/EDGE**
Device Class	B
GSM multi slot class	33
DTM class	DTM class 11. 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 hotspot mode (Wireless Router mode) may operate concurrently in DTM mode with voice calls. The reported SAR test results are conservative regarding that use case, since output power in hotspot mode is equal to or lower than in normal voice and data modes. See Table 2.1 for hotspot mode power reductions. Also simultaneous transmissions with WLANs are already conservatively assessed for head and body-worn exposure conditions due to VoIP capability.

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

EGPRS	8PSK EGPRS mode was not measured, because maximum averaged output power is lower in 8PSK EGPRS mode than in GPRS mode.
Call tester settings	CMU200 / Anritsu: MS signal was always set to maximum power: Pmax 5 for GSM850 and 0 for GSM1900.
Number of slots used in testing	The number of Tx slots in all GSM/GPRS mode tests was based on tuning target/conducted power data, see Section 3. The number of slots with highest or equal highest time-average power was tested.
WCDMA	**KDB 941225 D01 SAR Measurement Procedures for 3G Devices**
WCDMA / HSUPA / DC-HSDPA	Rel 10. Conducted power measurements for WCDMA modes have been carried out in accordance with 3GPP TS34.1083 and GPP TS 34.121-1. See conducted power results in section 3
Call test settings for WCDMA	CMU200 / Anritsu: UE uplink signal was configured to 12.2kbps RMC with all TPC bit set to 1.
HSUPA	SAR tests for HSUPA mode have not been performed as no HSUPA Sub-test mode has an average power > 0.25 dB above the basic WCDMA 12.2 kbps RMC mode.
DC-HSDPA	SAR tests for DC-HSDPA mode have not been performed as no DC-HSDPA Sub-test mode has an average power > 0.25 dB above the basic WCDMA 12.2 kbps RMC mode.
LTE	**KDB 941225 D05 SAR for LTE Devices v02r02 DR07-41372**
LTE Category	4
Call tester settings	CMW500: Uplink Power Control was set to 'Max Power'. Additional Spectrum Emission was set to 'NS_01' to disable A-MPR.
LTE MPR	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. Conducted Power Tables in Section 3: "Nominal" column lists measured powers with MPR active. The "A-MPR active" column lists measured powers with MPR and A-MPR active (as defined by 3GPP TS 36.101).
WLAN	**KDB 248227 SAR Measurement Procedures for 802.11 a/b/g Transmitters**
WLAN modes tested	The standard transmission mode of the device in all WLAN b-mode tests was BPSK 1 Mbps. Additionally in WLAN b-mode QPSK 5.5Mbps and QPSK 11Mbps were used for check measurements. The standard transmission modes used have maximum time-averaged output powers within 0.25 dB of the highest time-averaged output power of all the WLAN a, b, g and n modulation modes in this device as illustrated by the tables in Section 3. In the tables in Section 3 it is shown if other transmission modes are used for check measurements.

WLAN power reduction 'held to ear'	This device applies 'held to ear' power reduction for SAR compliance for WLAN2450 mode. It always applies power reduction in voice or VOIP 'held to ear' scenarios on the WLAN transmitter, and does not impact any other transmitter in the device. Head SAR is evaluated at reduced power according to the head SAR test positions. Power reduction is -1.5 dB in all held-to-ear scenarios and WLAN modes. All other positions are evaluated at full power.
WLAN test settings	The device was put into operation by using control software.
BT	**KDB 447498 D01 General RF Exposure Guidance v05**
BT Class	I
BT testing	BT power tuning target upper limit is 12.0 dBm. WLAN2450 power tuning target upper limit is 19.0 dBm. Since WLAN2450 and BT use same frequency and antenna, WLAN2450 power is 7.0 dB 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 is below limit, also BT+cellular combined SAR can be deemed to comply without further analysis.
Simultaneous transmission	**KDB 447498 D01 General RF Exposure Guidance v05**
In Head and Body-worn use	Simultaneous transmission of any singular cellular, PCS or AWS with WLAN2450 is possible.
Wireless Router "Hotspot" mode	Yes
In Wireless Router use	Simultaneous transmission of any singular cellular, AWS or PCS band with WLAN2450 is possible. The hotspot mode (Wireless Router mode) may operate concurrently in DTM mode with voice calls. The reported SAR test results are conservative regarding that use case, since output power in hotspot mode is equal to or lower than in normal voice and data modes. See following chapter for hotspot mode power reductions. Also simultaneous transmissions with WLANs are already conservatively assessed for head and body-worn exposure conditions due to VoIP capability.
Power reduction for Wireless Router mode	See the table in Section 2.1.
KDBs used in testing	**KDB 248227 SAR Measurement Procedures for 802.11 a/b/g Transmitters** **KDB 447498 D01 General RF Exposure Guidance v05** **KDB 690783 D01 SAR Listings on Grants** **KDB 865664 D01 SAR Measurements 100 MHz to 6 GHz v01** **KDB 865664 D02 SAR Reporting v01** **KDB 941225 D01 SAR Measurement Procedures for 3G Devices** **KDB 941225 D03 SAR Test Reduction Procedures for GSM/GPRS/EDGE** **KDB 941225 D05 SAR for LTE Devices v02r02 DR07-41372**

3. CONDUCTED POWERS

The conducted output power of the device was measured by a separate test laboratory on the same units as used for SAR testing.

Shaded lines in the tables below show which mode/configuration is used in testing.

3.1 GSM/GPRS/EGPRS

3.1.1 GSM850 Antenna 1 Head, Body-worn and Wireless Router

GSM 850								
SN: 004402740483171			Conducted power (dBm)			Time-averaged power (dBm)		
Slot configuration	Tuning target (dBm)	Upper limit (dBm)	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 1-slot	**33.0**	**33.4**	32.8	33.0	32.8	23.8	24.0	23.8
GPRS 2-slot	**31.0**	**31.4**	30.6	30.7	30.7	24.6	**24.7**	**24.7**
GPRS 3-slot	**29.0**	**29.4**	28.6	28.7	28.6	24.3	24.4	24.3
GPRS 4-slot	**27.5**	**27.9**	27.2	27.3	27.2	24.2	24.3	24.2
EGRPS 1-slot	**27.0**	**27.4**	26.8	26.6	26.7	17.8	17.6	17.7
EGPRS 2-slot	**26.0**	**26.4**	26.0	26.0	26.0	20.0	20.0	**20.0**
EGPRS 3-slot	**24.2**	**24.6**	23.9	23.9	23.8	19.6	19.6	19.5
EGPRS 4-slot	**23.0**	**23.4**	22.7	22.7	22.7	19.7	19.7	19.7

3.1.2 GSM850 Antenna 2 Head, Body-worn and Wireless Router

GSM 850								
SN: 004402740483171			Conducted power (dBm)			Time-averaged power (dBm)		
Slot configuration	Tuning target (dBm)	Upper limit (dBm)	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 1-slot	**33.0**	**33.4**	32.7	32.9	32.7	23.7	23.9	23.7
GPRS 2-slot	**31.0**	**31.4**	30.5	30.6	30.6	24.5	**24.6**	**24.6**
GPRS 3-slot	**29.0**	**29.4**	28.5	28.6	28.5	24.2	24.3	24.2
GPRS 4-slot	**27.5**	**27.9**	27.1	27.2	27.1	24.1	24.2	24.1
EGRPS 1-slot	**27.0**	**27.4**	26.7	26.5	26.6	17.7	17.5	17.6
EGPRS 2-slot	**26.0**	**26.4**	25.9	25.9	25.9	**19.9**	19.9	19.9
EGPRS 3-slot	**24.2**	**24.6**	23.8	23.8	23.7	19.5	19.5	19.4
EGPRS 4-slot	**23.0**	**23.4**	22.6	22.6	22.6	19.6	19.6	19.6

3.1.3 GSM1900 Antenna 1 Head, Body-worn and Wireless Router

GSM 1900								
SN: 004402740483262			Conducted power (dBm)			Time-averaged power (dBm)		
Slot configuration	Tuning target (dBm)	Upper limit (dBm)	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 1-slot	**30.0**	**30.4**	29.8	29.8	29.9	20.8	20.8	20.9
GPRS 2-slot	**28.0**	**28.4**	28.0	27.9	28.1	22.0	21.9	**22.1**
GPRS 3-slot	**26.3**	**26.7**	26.2	26.1	26.3	21.9	21.8	22.0
GPRS 4-slot	**25.0**	**25.4**	24.6	24.6	24.7	21.6	21.6	21.7
EGRPS 1-slot	**26.0**	**26.4**	25.7	25.7	25.8	16.7	16.7	16.8
EGPRS 2-slot	**26.0**	**26.4**	25.7	25.5	25.7	19.7	19.5	19.7
EGPRS 3-slot	**24.2**	**24.6**	24.5	24.5	24.6	20.2	20.2	**20.3**
EGPRS 4-slot	**23.0**	**23.4**	23.0	23.0	23.1	20.0	20.0	20.1

3.1.4 GSM1900 Antenna 2 Head, Body-worn and Wireless Router

GSM 1900								
SN: 004402740483262			Conducted power (dBm)			Time-averaged power (dBm)		
Slot configuration	Tuning target (dBm)	Upper limit (dBm)	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 1-slot	**30.0**	**30.4**	29.7	29.7	29.8	20.7	20.7	20.8
GPRS 2-slot	**28.0**	**28.4**	27.9	27.8	28.0	21.9	21.8	**22.0**
GPRS 3-slot	**26.3**	**26.7**	26.1	26.0	26.2	21.8	21.7	21.9
GPRS 4-slot	**25.0**	**25.4**	24.5	24.5	24.6	21.5	21.5	21.6
EGRPS 1-slot	**26.0**	**26.4**	25.6	25.6	25.7	16.6	16.6	16.7
EGPRS 2-slot	**26.0**	**26.4**	25.6	25.4	25.6	19.6	19.4	19.6
EGPRS 3-slot	**24.2**	**24.6**	24.4	24.4	24.5	20.1	20.1	**20.2**
EGPRS 4-slot	**23.0**	**23.4**	22.9	22.9	23.0	19.9	19.9	20.0

3.2 WCDMA

3.2.1 WCDMA850 (Band 5) Antenna 1 Head, Body-worn and Wireless Router

SN: 004402740483171	WCDMA 5				
Mode	Tuning target (dBm)	Upper limit (dBm)	CH 4132 826.4 MHz	CH 4175 835.0 MHz	CH 4233 846.6 MHz
WCDMA	**23.5**	**23.9**	23.6	23.6	23.6
HSUPA Sub-mode 1	**22.2**	**22.6**	22.4	22.0	22.2
HSUPA Sub-mode 2	**21.5**	**21.9**	21.2	21.7	21.4
HSUPA Sub-mode 3	**21**	**21.4**	20.7	21.2	21.1
HSUPA Sub-mode 4	**22**	**22.4**	22.1	22.2	22.0
HSUPA Sub-mode 5	**22.5**	**22.9**	22.7	22.6	22.5
DC-HSDPA Sub-mode 1	**22.5**	**22.9**	22.7	22.6	22.6
DC-HSDPA Sub-mode 2	**22.5**	**22.9**	22.7	22.6	22.6
DC-HSDPA Sub-mode 3	**22.1**	**22.5**	22.2	22.1	22.1
DC-HSDPA Sub-mode 4	**22.1**	**22.5**	22.2	22.1	22.1

3.2.2 WCDMA850 (Band 5) Antenna 2 Head, Body-worn and Wireless Router

SN: 004402740483171	WCDMA 5				
Mode	Tuning target (dBm)	Upper limit (dBm)	CH 4132 826.4 MHz	CH 4175 835.0 MHz	CH 4233 846.6 MHz
WCDMA	**23.5**	**23.9**	23.5	23.5	23.5
HSUPA Sub-mode 1	**22.2**	**22.6**	22.3	21.9	22.1
HSUPA Sub-mode 2	**21.5**	**21.9**	21.1	21.6	21.3
HSUPA Sub-mode 3	**21**	**21.4**	20.6	21.1	21.0
HSUPA Sub-mode 4	**22**	**22.4**	22.0	22.1	21.9
HSUPA Sub-mode 5	**22.5**	**22.9**	22.6	22.5	22.4
DC-HSDPA Sub-mode 1	**22.5**	**22.9**	22.6	22.5	22.5
DC-HSDPA Sub-mode 2	**22.5**	**22.9**	22.6	22.5	22.5
DC-HSDPA Sub-mode 3	**22.1**	**22.5**	22.1	22.0	22.0
DC-HSDPA Sub-mode 4	**22.1**	**22.5**	22.1	22.0	22.0

3.3 LTE

3.3.1 LTE2500 (Band 7) Antenna 2 Head and Body-worn

SN: 004402740483205						Nominal		
Band / BW	**Modulation**	**RB Allocation**	**RB Offset**	**Tuning target (dBm)**	**Upper limit (dBm)**	**Ch20775 / 2502.5 MHz**	**Ch21100 / 2535 MHz**	**Ch21425 / 2567.5 MHz**
LTE7 5 MHz	QPSK	1	0	**22.5**	**22.9**	22.7	22.5	22.7
		1	12	**22.5**	**22.9**	22.7	22.6	22.6
		1	24	**22.5**	**22.9**	22.7	22.6	22.6
		12	0	**21.5**	**21.9**	21.8	21.6	21.7
		12	6	**21.5**	**21.9**	21.7	21.6	21.7
		12	13	**21.5**	**21.9**	21.8	21.6	21.7
		25	0	**21.5**	**21.9**	21.8	21.6	21.7
	16QAM	1	0	**21.5**	**21.9**	21.8	21.3	21.3
		1	12	**21.5**	**21.9**	21.8	21.4	21.2
		1	24	**21.5**	**21.9**	21.8	21.4	21.2
		12	0	**20.5**	**20.9**	20.8	20.6	20.7
		12	6	**20.5**	**20.9**	20.7	20.7	20.7
		12	13	**20.5**	**20.9**	20.7	20.7	20.7
		25	0	**20.5**	**20.9**	20.7	20.7	20.6

SN: 004402740483205						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20800 / 2505 MHz	Ch21100 / 2535 MHz	Ch21400 / 2565 MHz
LTE7 10 MHz	QPSK	1	0	22.5	22.9	22.6	22.5	22.6
		1	24	22.5	22.9	22.7	22.6	22.7
		1	49	22.5	22.9	22.8	22.7	22.6
		25	0	21.5	21.9	21.7	21.6	21.7
		25	12	21.5	21.9	21.7	21.6	21.7
		25	25	21.5	21.9	21.7	21.7	21.7
		50	0	21.5	21.9	21.7	21.6	21.7
	16QAM	1	0	21.5	21.9	21.8	21.4	21.7
		1	24	21.5	21.9	21.8	21.5	21.6
		1	49	21.5	21.9	21.9	21.6	21.7
		25	0	20.5	20.9	20.7	20.6	20.6
		25	12	20.5	20.9	20.7	20.6	20.6
		25	25	20.5	20.9	20.8	20.7	20.6
		50	0	20.5	20.9	20.7	20.6	20.6

SN: 004402740483205						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20825 / 2507.5 MHz	Ch21100 / 2535 MHz	Ch21375 / 2562.5 MHz
LTE7 15 MHz	QPSK	1	0	22.5	22.9	22.5	22.6	22.5
		1	36	22.5	22.9	22.6	22.5	22.7
		1	74	22.5	22.9	22.7	22.7	22.6
		36	0	21.5	21.9	21.6	21.5	21.6
		36	18	21.5	21.9	21.5	21.6	21.6
		36	38	21.5	21.9	21.6	21.6	21.7
		75	0	21.5	21.9	21.6	21.6	21.6
	16QAM	1	0	21.5	21.9	21.4	21.7	21.7
		1	36	21.5	21.9	21.5	21.7	21.8
		1	74	21.5	21.9	21.6	21.8	21.8
		36	0	20.5	20.9	20.5	20.5	20.5
		36	18	20.5	20.9	20.4	20.5	20.6
		36	38	20.5	20.9	20.6	20.6	20.6
		75	0	20.5	20.9	20.6	20.6	20.6

SN: 004402740483205						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20850 / 2510 MHz	Ch21100 / 2535 MHz	Ch21350 / 2560 MHz
LTE7 20 MHz	QPSK	1	0	22.5	22.9	22.5	22.5	22.5
		1	49	22.5	22.9	22.6	22.6	22.6
		1	99	22.5	22.9	**22.7**	22.6	22.7
		50	0	21.5	21.9	21.6	21.5	21.5
		50	24	21.5	21.9	21.7	21.6	21.5
		50	50	21.5	21.9	21.7	**21.7**	21.7
		100	0	21.5	21.9	21.6	21.6	**21.7**
	16QAM	1	0	21.5	21.9	21.3	21.4	21.6
		1	49	21.5	21.9	21.5	21.4	21.8
		1	99	21.5	21.9	21.5	21.5	21.7
		50	0	20.5	20.9	20.5	20.5	20.5
		50	24	20.5	20.9	20.6	20.6	20.5
		50	50	20.5	20.9	20.7	20.7	20.7
		100	0	20.5	20.9	20.5	20.6	20.6

3.3.2 LTE2500 (Band 7) Antenna 2 Wireless Router

SN: 004402740483247						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20775 / 2502.5 MHz	Ch21100 / 2535 MHz	Ch21425 / 2567.5 MHz
LTE7 5 MHz	QPSK	1	0	21.0	21.4	20.9	21.2	21.1
		1	12	21.0	21.4	20.9	21.1	21.0
		1	24	21.0	21.4	21.0	21.2	20.9
		12	0	20.0	20.4	19.9	20.1	20.0
		12	6	20.0	20.4	19.9	20.1	20.0
		12	13	20.0	20.4	20.0	20.1	20.0
		25	0	20.0	20.4	20.1	20.1	20.0
	16QAM	1	0	20.0	20.4	19.9	20.3	20.1
		1	12	20.0	20.4	20.0	20.2	20.1
		1	24	20.0	20.4	20.0	20.2	20.0
		12	0	19.0	19.4	18.9	19.1	19.0
		12	6	19.0	19.4	18.9	19.1	19.0
		12	13	19.0	19.4	19.0	19.2	18.9
		25	0	19.0	19.4	19.0	19.1	18.9

SN: 004402740483247						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20800 / 2505 MHz	Ch21100 / 2535 MHz	Ch21400 / 2565 MHz
LTE7 10 MHz	QPSK	1	0	21.0	21.4	20.9	21.1	21.0
		1	24	21.0	21.4	21.0	21.1	21.0
		1	49	21.0	21.4	21.1	21.2	21.0
		25	0	20.0	20.4	20.1	20.1	20.0
		25	12	20.0	20.4	20.0	20.1	20.1
		25	25	20.0	20.4	20.0	20.2	20.0
		50	0	20.0	20.4	20.1	20.2	20.1
	16QAM	1	0	20.0	20.4	20.0	20.3	19.9
		1	24	20.0	20.4	20.2	20.2	20.0
		1	49	20.0	20.4	20.3	20.3	19.9
		25	0	19.0	19.4	19.1	19.2	19.1
		25	12	19.0	19.4	19.1	19.2	19.1
		25	25	19.0	19.4	19.1	19.2	19.1
		50	0	19.0	19.4	19.1	19.2	19.1

SN: 004402740483247						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20825 / 2507.5 MHz	Ch21100 / 2535 MHz	Ch21375 / 2562.5 MHz
LTE7 15 MHz	QPSK	1	0	21.0	21.4	20.9	21.2	21.0
		1	36	21.0	21.4	21.1	21.1	21.0
		1	74	21.0	21.4	21.1	21.3	21.1
		36	0	20.0	20.4	20.0	20.1	20.0
		36	18	20.0	20.4	20.0	20.1	20.0
		36	38	20.0	20.4	20.1	20.2	20.1
		75	0	20.0	20.4	20.0	20.2	20.0
	16QAM	1	0	20.0	20.4	20.0	20.3	20.1
		1	36	20.0	20.4	20.2	20.3	20.2
		1	74	20.0	20.4	20.2	20.3	20.1
		36	0	19.0	19.4	19.1	19.1	19.0
		36	18	19.0	19.4	19.0	19.2	19.1
		36	38	19.0	19.4	19.1	19.2	19.1
		75	0	19.0	19.4	19.0	19.2	19.0

SN: 004402740483247						Nominal		
Band / BW	Modulation	RB Allocation	RB Offset	Tuning target (dBm)	Upper limit (dBm)	Ch20850 / 2510 MHz	Ch21100 / 2535 MHz	Ch21350 / 2560 MHz
LTE7 20 MHz	QPSK	1	0	**21.0**	**21.4**	20.9	21.1	20.9
		1	49	**21.0**	**21.4**	21.0	21.1	21.1
		1	99	**21.0**	**21.4**	21.1	**21.3**	21.1
		50	0	**20.0**	**20.4**	20.0	20.2	20.1
		50	24	**20.0**	**20.4**	20.1	20.2	20.0
		50	50	**20.0**	**20.4**	20.1	**20.3**	20.1
		100	0	**20.0**	**20.4**	20.0	20.2	20.0
	16QAM	1	0	**20.0**	**20.4**	20.0	20.1	19.8
		1	49	**20.0**	**20.4**	20.2	20.0	20.0
		1	99	**20.0**	**20.4**	20.2	20.1	19.9
		50	0	**19.0**	**19.4**	19.1	19.2	19.1
		50	24	**19.0**	**19.4**	19.1	19.2	19.1
		50	50	**19.0**	**19.4**	19.1	19.2	19.2
		100	0	**19.0**	**19.4**	19.0	19.2	19.0

3.4 BT

BT2450	
Tuning target (dBm)	Upper limit (dBm)
10.5	12.0

3.5 WLAN2450

3.5.1 WLAN 2450 Body-worn and Wireless Router

WLAN 2.4 GHz: 20 MHz channel bandwidth										
					Tuning target (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.0**
802.11b			QPSK	2	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.0**
802.11b			QPSK	5.5	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.0**
802.11b			QPSK	11	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.0**
802.11g			BPSK	6	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			BPSK	9	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			QPSK	12	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			QPSK	18	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			16QAM	24	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			16QAM	36	**14.0**	**15.0**	**15.0**	**15.0**	**15.0**	**11.0**
802.11g			64QAM	48	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**11.0**
802.11g			64QAM	54	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	0	1	BPSK	6.5 / 7.25	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	1	1	QPSK	13.0 / 14.4	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	2	1	QPSK	19.5 / 21.7	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	3	1	16QAM	26.0 / 28.9	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	4	1	16QAM	39.0 / 43.3	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**11.0**
802.11n	5	1	64QAM	52.0 / 57.8	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	6	1	64QAM	58.5 / 65.0	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	7	1	64QAM	65.0 / 72.2	**11.0**	**11.0**	**11.0**	**11.0**	**11.0**	**11.0**

WLAN 2.4 GHz: 20 MHz channel bandwidth										
					Upper limit of tuning target (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**19.0**	**19.0**	**19.0**	**19.0**	**19.0**	**18.5**
802.11b			QPSK	2	**19.0**	**19.0**	**19.0**	**19.0**	**19.0**	**18.5**
802.11b			QPSK	5.5	**19.0**	**19.0**	**19.0**	**19.0**	**19.0**	**18.5**
802.11b			QPSK	11	**19.0**	**19.0**	**19.0**	**19.0**	**19.0**	**18.5**
802.11g			BPSK	6	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			BPSK	9	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			QPSK	12	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			QPSK	18	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			16QAM	24	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			16QAM	36	**15.5**	**16.5**	**16.5**	**16.5**	**16.5**	**12.5**
802.11g			64QAM	48	**15.5**	**15.5**	**15.5**	**15.5**	**15.5**	**12.5**
802.11g			64QAM	54	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	0	1	BPSK	6.5 / 7.25	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	1	1	QPSK	13.0 / 14.4	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	2	1	QPSK	19.5 / 21.7	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	3	1	16QAM	26.0 / 28.9	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	4	1	16QAM	39.0 / 43.3	**15.5**	**15.5**	**15.5**	**15.5**	**15.5**	**12.5**
802.11n	5	1	64QAM	52.0 / 57.8	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	6	1	64QAM	58.5 / 65.0	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	7	1	64QAM	65.0 / 72.2	**12.5**	**12.5**	**12.5**	**12.5**	**12.5**	**12.5**

WLAN 2.4 GHz: 20 MHz channel bandwidth										
SN: 004402740483221					Measured value (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**17.7**	17.8	**18.0**	18.0	**17.8**	17.2
802.11b			QPSK	2	18.1	17.8	18.0	17.9	17.8	17.3
802.11b			QPSK	5.5	**18.5**	18.1	18.3	18.2	**18.2**	17.6
802.11b			QPSK	11	18.1	18.0	**18.4**	18.1	18.0	17.4
802.11g			BPSK	6	15.0	16.5	16.3	16.4	16.5	11.4
802.11g			BPSK	9	14.9	16.5	16.3	16.5	16.5	11.4
802.11g			QPSK	12	14.9	16.5	16.4	16.5	16.6	11.3
802.11g			QPSK	18	14.8	16.5	16.4	16.3	16.6	11.3
802.11g			16QAM	24	14.7	16.5	16.4	16.4	16.4	11.4
802.11g			16QAM	36	14.7	15.6	15.2	15.5	15.5	11.3
802.11g			64QAM	48	14.6	14.6	14.5	14.3	14.3	11.5
802.11g			64QAM	54	13.5	13.4	13.6	13.4	13.5	11.3
802.11n	0	1	BPSK	6.5 / 7.25	14.8	16.4	16.6	16.5	16.6	11.2
802.11n	1	1	QPSK	13.0 / 14.4	14.9	16.7	16.5	16.6	16.6	11.4
802.11n	2	1	QPSK	19.5 / 21.7	14.8	16.5	16.5	16.4	16.7	11.5
802.11n	3	1	16QAM	26.0 / 28.9	14.8	16.5	16.3	16.4	16.6	11.4
802.11n	4	1	16QAM	39.0 / 43.3	14.6	14.5	14.4	14.3	14.6	11.0
802.11n	5	1	64QAM	52.0 / 57.8	13.9	13.5	13.4	13.4	13.3	11.3
802.11n	6	1	64QAM	58.5 / 65.0	13.4	13.4	13.3	13.7	13.2	11.6
802.11n	7	1	64QAM	65.0 / 72.2	11.5	11.4	11.7	11.9	11.5	11.3

3.5.2 WLAN 2450 Head

WLAN 2.4 GHz: 20 MHz channel bandwidth										
					Tuning target (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**
802.11b			QPSK	2	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**
802.11b			QPSK	5.5	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**
802.11b			QPSK	11	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**	**16.0**
802.11g			BPSK	6	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			BPSK	9	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			QPSK	12	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			QPSK	18	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			16QAM	24	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11g			16QAM	36	**14.0**	**15.0**	**15.0**	**15.0**	**15.0**	**11.0**
802.11g			64QAM	48	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**11.0**
802.11g			64QAM	54	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	0	1	BPSK	6.5 / 7.25	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	1	1	QPSK	13.0 / 14.4	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	2	1	QPSK	19.5 / 21.7	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	3	1	16QAM	26.0 / 28.9	**14.0**	**16.0**	**16.0**	**16.0**	**16.0**	**11.0**
802.11n	4	1	16QAM	39.0 / 43.3	**14.0**	**14.0**	**14.0**	**14.0**	**14.0**	**11.0**
802.11n	5	1	64QAM	52.0 / 57.8	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	6	1	64QAM	58.5 / 65.0	**13.0**	**13.0**	**13.0**	**13.0**	**13.0**	**11.0**
802.11n	7	1	64QAM	65.0 / 72.2	**11.0**	**11.0**	**11.0**	**11.0**	**11.0**	**11.0**

WLAN 2.4 GHz: 20 MHz channel bandwidth										
					Upper limit of tuning target (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**
802.11b			QPSK	2	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**
802.11b			QPSK	5.5	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**
802.11b			QPSK	11	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**	**17.5**
802.11g			BPSK	6	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			BPSK	9	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			QPSK	12	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			QPSK	18	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			16QAM	24	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11g			16QAM	36	**15.5**	**16.5**	**16.5**	**16.5**	**16.5**	**12.5**
802.11g			64QAM	48	**15.5**	**15.5**	**15.5**	**15.5**	**15.5**	**12.5**
802.11g			64QAM	54	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	0	1	BPSK	6.5 / 7.25	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	1	1	QPSK	13.0 / 14.4	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	2	1	QPSK	19.5 / 21.7	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	3	1	16QAM	26.0 / 28.9	**15.5**	**17.5**	**17.5**	**17.5**	**17.5**	**12.5**
802.11n	4	1	16QAM	39.0 / 43.3	**15.5**	**15.5**	**15.5**	**15.5**	**15.5**	**12.5**
802.11n	5	1	64QAM	52.0 / 57.8	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	6	1	64QAM	58.5 / 65.0	**14.5**	**14.5**	**14.5**	**14.5**	**14.5**	**12.5**
802.11n	7	1	64QAM	65.0 / 72.2	**12.5**	**12.5**	**12.5**	**12.5**	**12.5**	**12.5**

WLAN 2.4 GHz: 20 MHz channel bandwidth										
SN: 004402740483221					Measured value (dBm)					
Standard	MCX index	Spatial streams	Modulation	Data speed [MBPS]	CH 1	CH 2	CH 6	CH 7	CH 10	CH 11
802.11b			BPSK	1	**16.4**	16.6	**16.8**	16.7	16.6	**16.7**
802.11b			QPSK	2	16.5	16.8	16.7	16.6	16.7	16.6
802.11b			QPSK	5.5	16.9	17.1	**17.2**	17.1	17.1	**17.2**
802.11b			QPSK	11	**17.0**	16.7	17.1	16.8	16.9	16.8
802.11g			BPSK	6	15.0	16.5	16.3	16.4	16.5	11.4
802.11g			BPSK	9	14.9	16.5	16.3	16.5	16.5	11.4
802.11g			QPSK	12	14.9	16.5	16.4	16.5	16.6	11.3
802.11g			QPSK	18	14.8	16.5	16.4	16.3	16.6	11.3
802.11g			16QAM	24	14.7	16.5	16.4	16.4	16.4	11.4
802.11g			16QAM	36	14.7	15.6	15.2	15.5	15.5	11.3
802.11g			64QAM	48	14.6	14.6	14.5	14.3	14.3	11.5
802.11g			64QAM	54	13.5	13.4	13.6	13.4	13.5	11.3
802.11n	0	1	BPSK	6.5 / 7.25	14.8	16.4	16.6	16.5	16.6	11.2
802.11n	1	1	QPSK	13.0 / 14.4	14.9	16.7	16.5	16.6	16.6	11.4
802.11n	2	1	QPSK	19.5 / 21.7	14.8	16.5	16.5	16.4	16.7	11.5
802.11n	3	1	16QAM	26.0 / 28.9	14.8	16.5	16.3	16.4	16.6	11.4
802.11n	4	1	16QAM	39.0 / 43.3	14.6	14.5	14.4	14.3	14.6	11.0
802.11n	5	1	64QAM	52.0 / 57.8	13.9	13.5	13.4	13.4	13.3	11.3
802.11n	6	1	64QAM	58.5 / 65.0	13.4	13.4	13.3	13.7	13.2	11.6
802.11n	7	1	64QAM	65.0 / 72.2	11.5	11.4	11.7	11.9	11.5	11.3

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
DAE4	1316	2014-10	2015-10
DAE4	793	2014-10	2015-10
DAE4	1213	2014-10	2015-10
E-field Probe ES3DV3	3118	2014-10	2015-10
E-field Probe ES3DV3	3131	2014-10	2015-10
E-field Probe EX3DV4	3835	2014-10	2015-10
Dipole Validation Kit, D835V2	462	2014-05	2016-05
Dipole Validation Kit, D1900V2	5d030	2014-05	2016-05
Dipole Validation Kit, D2450V2	729	2014-05	2016-05
Dipole Validation Kit, D2600V2	1009	2014-05	2016-05
DASY5 software	Version 52.8	-	-

Additional test equipment used in testing:

Test Equipment	Model	Serial Number	Calibration date	Calibration expiry
Signal Generator	E4438C	MY42080610	2014-09	2015-09
Signal Generator	SML03	101264	2014-09	2015-09
Signal Generator	E4436B	US39260114	2014-09	2015-09
Amplifier	5S1G4M3	302338	-	-
Amplifier	ZHL-42-SMA	NO72095-5	-	-
Amplifier	5S1G4	25583	-	-
Amplifier	5S1G4	330638	-	-
Power Meter	NRVS	838624/032	2014-09	2015-09
Power Meter	NRVD	840023/028	2014-09	2015-09
Power Meter	NRVZ	849305/029	2014-09	2015-09
Power Sensor	NRV-Z32	100067	2014-09	2015-09
Power Sensor	NRV-Z32	849745/018	2014-09	2015-09
Power Sensor	NRV-Z32	825600/002	2014-09	2015-09
Call Tester	CMU 200	103293	-	-
Call Tester	CMU 200	104983	-	-
Call Tester	CMW 500	110565	-	-
Call Tester	MT8820C	6200883095	-	-
Network Analyzer	ENA E5071C	MY46213166	2014-09	2015-09
Dielectric Probe Kit	DAK-3.5	1042	-	-

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 D
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 µW/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 Distance from probe tip to dipole centers: 2.0 mm
Application	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 D
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 µW/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 Distance from probe tip to dipole centers: 1.0 mm
Application	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 conform 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 ± 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 for all system check and device tests, measured from the ear reference point in the case of the SAM phantom and from the inner surface of the flat phantom.

4.3.1 Tissue Simulant Recipes

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

800 MHz 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

1900 MHz 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

2450-2600 MHz 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	Calibrated signal type(s)	DAE unit Type / SN	Validation done	
							Head tissue simulant	Body tissue simulant
835	TCC Salo / SAR-2	V52.8	D835V2 / 462	ES3DV4 / 3131	CW	DAE4 / 793	2014-10	2013-12
1900	TCC Salo / SAR-1	V52.8	D1900V2 / 5d030	EX3DV4 / 3118	CW	DAE4 / 1316	2014-10	2014-10
2450	TCC Salo / SAR-4	V52.8	D2450V2 / 729	EX3DV4 / 3835	CW	DAE4 / 1213	2014 -10	2014-10
2600	TCC Salo / SAR-4	V52.8	D2600V2 / 1009	EX3DV4 / 3835	CW	DAE4 / 1213	2014-10	2014-10

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. The dipole 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

Dipole freq. [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Dev. dSAR [%]	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters		SAR 1g Deviation from target	Dielectric Parameters Deviation from target		Temp [°C]	Plot #
						e_r	s [S/m]	dSAR [%]	de_r [%]	ds [%]		
	Tolerances			±3%				±10 %	±5 %	±5 %		
835	Target result **SN:462**	-	-	-	9.19	41.5	0.90	TCC Salo / SAR-2 ES3DV3 - SN:3131 Head 835 MHz				
	2014-11-20	2.28	2.32	1.75	9.12	40.3	0.90	-0.76	-2.89	0.00	22.4	-
	2014-11-21	2.26	2.31	2.21	9.04	39.9	0.89	-1.63	-3.86	-1.11	22.3	-
	2014-12-03	2.26	2.30	1.77	9.04	40.5	0.90	-1.63	-2.41	0.00	22.4	-
	2014-12-04	2.23	2.28	2.24	8.92	40.2	0.90	-2.94	-3.13	0.00	22.5	1
	Tolerances			±3%				±10 %	±5 %	±5 %		
1900	Target result **SN:5d030**	-	-	-	39.70	40.0	1.40	TCC Salo / SAR-1 ES3DV3 - SN:3118 Head 1900 MHz				
	2014-11-19	9.87	9.85	-0.20	39.48	38.8	1.37	-0.55	-3.00	-2.14	21.4	-
	2014-11-20	9.90	10.00	1.01	39.60	39.3	1.39	-0.25	-1.75	-0.71	21.4	-
	2014-11-26	9.69	9.86	1.75	38.76	38.9	1.38	-2.37	-2.75	-1.43	21.1	2
	2014-12-03	9.88	10.10	2.23	39.52	39.4	1.39	-0.45	-1.50	-0.71	21.1	-
	Tolerances			±3%				±10 %	±5 %	±5 %		
2450	Target result **SN:729**	-	-	-	52.60	39.2	1.80	TCC Salo / SAR-4 EX3DV4 - SN:3835 Head 2450 MHz				
	2014-11-23	12.40	12.40	0.00	49.60	38.4	1.77	-5.70	-2.04	-1.67	21.6	3
	2014-11-24	12.60	12.60	0.00	50.40	38.1	1.77	-4.18	-2.81	-1.67	22.2	-
	2014-12-03	12.60	12.60	0.00	50.40	38.0	1.77	-4.18	-3.06	-1.67	22.4	-
	2014-12-04	12.90	13.00	0.78	51.60	38.7	1.78	-1.90	-1.28	-1.11	22.1	-
	Tolerances			±3%				±10 %	±5 %	±5 %		
2600	Target result **SN:1009**	-	-	-	57.30	39.0	1.96	TCC Salo / SAR-4 EX3DV4 - SN:3835 Head 2600 MHz				
	2014-11-24	13.60	13.90	2.21	54.40	37.6	1.93	-5.06	-3.59	-1.53	22.2	-
	2014-11-27	13.00	13.20	1.54	52.00	38.1	1.93	-9.25	-2.31	-1.53	22.4	4
	2014-12-03	13.60	13.90	2.21	54.40	37.4	1.93	-5.06	-4.10	-1.53	22.4	-

* Dielectric parameter reference data taken from IEEE1528/IEC62209

System checking, body tissue simulant

Dipole freq. [MHz]	Description	SAR 1g [W/kg]	Estimated SAR 1g [W/kg]	Estimated SAR 1g Dev. dSAR [%]	Scaled 1W SAR 1g [W/kg]	Dielectric Parameters		SAR 1g Deviation from target	Dielectric Parameters Deviation from target		Temp [°C]	Plot #
						e_r	s [S/m]	dSAR [%]	de_r [%]	ds [%]		
	Tolerances			±3%				±10 %	±5 %	±5 %		
835	Target result **SN:462**	-	-	-	9.41	55.2	0.97	TCC Salo / SAR-2 ES3DV3 - SN:3131 Body 835 MHz				
	2014-11-24	2.38	2.41	1.26	9.52	54.1	0.96	1.17	-1.99	-1.03	21.2	5
	2014-11-25	2.38	2.40	0.84	9.52	54.0	0.97	1.17	-2.17	0.00	21.6	-
	2014-12-03	2.33	2.37	1.72	9.32	54.0	0.97	-0.96	-2.17	0.00	21.6	-
	Tolerances			±3%				±10 %	±5 %	±5 %		
1900	Target result **SN:5d030**	-	-	-	40.30	53.3	1.52	TCC Salo / SAR-1 ES3DV3 - SN:3118 Body 1900 MHz				
	2014-11-24	9.85	9.84	-0.10	39.40	52.6	1.51	-2.23	-1.31	-0.66	21.0	-
	2014-11-25	9.80	9.80	0.00	39.20	52.4	1.51	-2.73	-1.69	-0.66	21.2	6
	2014-11-27	9.92	9.82	-1.01	39.68	52.4	1.52	-1.54	-1.69	0.00	21.2	-
	2014-12-03	9.81	9.80	-0.10	39.24	51.8	1.52	-2.63	-2.81	0.00	21.0	-
	Tolerances			±3%				±10 %	±5 %	±5 %		
2450	Target result **SN:729**	-	-	-	51.40	52.7	1.95	TCC Salo / SAR-4 EX3DV4 - SN:3835 Body 2450 MHz				
	2014-11-21	12.60	12.50	-0.79	50.40	50.9	1.92	-1.95	-3.42	-1.54	22.2	-
	2014-11-24	12.50	12.40	-0.80	50.00	50.9	1.91	-2.72	-3.42	-2.05	22.2	7
	2014-12-03	12.70	12.60	-0.79	50.80	51.2	1.91	-1.17	-2.85	-2.05	22.1	-
	Tolerances			±3%				±10 %	±5 %	±5 %		
2600	Target result **SN:1009**	-	-	-	56.90	52.5	2.16	TCC Salo / SAR-4 EX3DV4 - SN:3835 Body 2600 MHz				
	2014-11-24	13.70	13.90	1.46	54.80	50.4	2.09	-3.69	-4.00	-3.24	22.2	-
	2014-11-25	13.60	13.80	1.47	54.40	50.1	2.09	-4.39	-4.57	-3.24	22.2	-
	2014-11-26	14.10	14.20	0.71	56.40	51.0	2.11	-0.88	-2.86	-2.31	22.2	-
	2014-12-03	13.40	13.50	0.75	53.60	50.7	2.09	-5.80	-3.43	-3.24	22.1	8

* 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]
		e_r	s [S/m]	de_r [%]	ds [%]	
835	Tolerances			±5 %	±5 %	
	Recommended value	41.5	0.90			
	2014-11-20	40.3	0.90	-2.89	0.00	22.4
	2014-11-21	39.9	0.89	-3.86	-1.11	22.3
	2014-12-03	40.5	0.90	-2.41	0.00	22.4
	2014-12-04	40.2	0.90	-3.13	0.00	22.5
836	Tolerances			±5 %	±5 %	
	Recommended value	41.5	0.90			
	2014-11-20	40.3	0.90	-2.89	0.00	22.4
	2014-11-21	39.9	0.90	-3.86	0.00	22.3
	2014-12-03	40.5	0.90	-2.41	0.00	22.4
	2014-12-04	40.2	0.90	-3.13	0.00	22.5
1880	Tolerances			±5 %	±5 %	
	Recommended value	40.0	1.40			
	2014-11-19	38.9	1.36	-2.75	-2.86	21.4
	2014-11-20	39.4	1.37	-1.50	-2.14	21.4
	2014-11-26	39.0	1.36	-2.50	-2.86	21.1
	2014-12-03	39.4	1.37	-1.50	-2.14	21.1
2437	Tolerances			±5 %	±5 %	
	Recommended value	39.2	1.79			
	2014-11-23	38.4	1.75	-2.04	-2.23	21.6
	2014-11-24	38.2	1.76	-2.55	-1.68	22.2
	2014-12-03	38.0	1.75	-3.06	-2.23	22.4
	2014-12-04	38.7	1.76	-1.28	-1.68	22.1
2535	Tolerances			±5 %	±5 %	
	Recommended value	39.1	1.89			
	2014-11-24	37.8	1.86	-3.32	-1.59	22.2
	2014-11-27	38.4	1.85	-1.79	-2.12	22.4
	2014-12-03	37.7	1.86	-3.58	-1.59	22.4

Body tissue simulant measurements

f [MHz]	Description	Dielectric Parameters e_r	Dielectric Parameters s [S/m]	Dielectric Parameters Deviation from recommended value de_r [%]	Dielectric Parameters Deviation from recommended value ds [%]	Temp [°C]
835	Tolerances			±5 %	±5 %	
	Recommended value	55.2	0.97			
	2014-11-24	54.1	0.96	-1.99	-1.03	21.2
	2014-11-25	54.0	0.97	-2.17	0.00	21.6
	2014-12-03	54.0	0.97	-2.17	0.00	21.6
836	Tolerances			±5 %	±5 %	
	Recommended value	55.2	0.97			
	2014-11-24	54.1	0.97	-1.99	0.00	21.2
	2014-11-25	54.0	0.97	-2.17	0.00	21.6
	2014-12-03	54.0	0.97	-2.17	0.00	21.6
1880	Tolerances			±5 %	±5 %	
	Recommended value	53.3	1.52			
	2014-11-24	52.7	1.50	-1.13	-1.32	21.0
	2014-11-25	52.5	1.49	-1.50	-1.97	21.2
	2014-11-27	52.4	1.50	-1.69	-1.32	21.2
	2014-12-03	51.9	1.50	-2.63	-1.32	21.0
2437	Tolerances			±5 %	±5 %	
	Recommended value	52.7	1.94			
	2014-11-21	51.0	1.90	-3.23	-2.06	22.2
	2014-11-24	50.9	1.90	-3.42	-2.06	22.2
	2014-12-03	51.3	1.90	-2.66	-2.06	22.1
2535	Tolerances			±5 %	±5 %	
	Recommended value	52.6	2.07			
	2014-11-24	50.6	2.02	-3.80	-2.42	22.2
	2014-11-25	50.3	2.01	-4.37	-2.90	22.2
	2014-11-26	51.2	2.03	-2.66	-1.93	22.2
	2014-12-03	50.9	2.01	-3.23	-2.90	22.1

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 Section 1.2 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.

Microsoft body-worn accessories are commonly available for the separation distance used in this testing.

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 mm 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 Dasy52 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 0.3-6G Hz range

Uncertainty Component	Section in IEEE 1528	Tol. (%)	Prob Dist	Div	c_i	$c_i . u_i$ (%)	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 0.3-6G Hz 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	$c_i . u_i$ (%)	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

2-slot GPRS850 Head SAR results – Antenna 1

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		**31.4**			**Scaling factor***				
Conducted Power		**30.6**	**30.7**	**30.7**	**0.8**	**0.7**	**0.7**	**dB**	
Time-averaged Power		**24.6**	**24.7**	**24.7**	**1.20**	**1.17**	**1.17**	**Lin**	
Left Cheek	Estimated SAR	-	0.442	-	-	0.519	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Tilt	Estimated SAR	-	0.255	-	-	0.300	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	0.446	0.499	0.579	0.536	0.586	0.680	0.01	H1
	Full SAR	-	-	0.590	-	-	**0.693**		
Right Tilt	Estimated SAR	-	0.262	-	-	0.308	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek CC-3089	Estimated SAR	0.380	0.463	0.524	0.457	0.544	0.616	0.03	-
	Full SAR	-	-	0.558	-	-	0.656		

2-slot 8PSK EGPRS850 Head SAR results – Antenna 1

2-slot 8PSK EGPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		**26.4**			**Scaling factor***				
Conducted Power		**26.0**	**26.0**	**26.0**	**0.4**	**0.4**	**0.4**	**dB**	
Time-averaged Power		**20.0**	**20.0**	**20.0**	**1.10**	**1.10**	**1.10**	**Lin**	
Right Cheek	Estimated SAR	-	-	0.211	-	-	0.231	0.00	-
	Full SAR	-	-	0.212	-	-	0.232		

2-slot GPRS850 Head SAR results – Antenna 2

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		31.4			Scaling factor*				
Conducted Power		30.5	30.6	30.6	0.9	0.8	0.8	dB	
Time-averaged Power		24.5	24.6	24.6	1.23	1.20	1.20	Lin	
Left Cheek	Estimated SAR	0.304	0.266	0.286	0.374	0.320	0.344	0.01	-
	Full SAR	0.315	-	-	0.388	-	-		
Left Tilt	Estimated SAR	-	0.157	-	-	0.189	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	-	0.218	-	-	0.262	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.143	-	-	0.172	-	-	-
	Full SAR	-	-	-	-	-	-		

2-slot 8PSK EGPRS850 Head SAR results – Antenna 2

2-slot 8PSK EGPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		26.4			Scaling factor*				
Conducted Power		25.9	25.9	25.9	0.5	0.5	0.5	dB	
Time-averaged Power		19.9	19.9	19.9	1.12	1.12	1.12	Lin	
Left Cheek	Estimated SAR	0.103	-	-	0.116	-	-	0.01	-
	Full SAR	0.109	-	-	0.122	-	-		

WCDMA850 (Band 5) Head SAR results – Antenna 1

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.6	23.6	23.6	0.3	0.3	0.3	dB	
Time-averaged Power		23.6	23.6	23.6	1.07	1.07	1.07	Lin	
Left Cheek	Estimated SAR	-	0.403	-	-	0.432	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Tilt	Estimated SAR	-	0.237	-	-	0.254	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	0.432	0.445	0.444	0.463	0.477	0.476	0.02	-
	Full SAR	-	0.428	-	-	0.459	-		
Right Tilt	Estimated SAR	-	0.246	-	-	0.264	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek CC-3089	Estimated SAR	0.420	0.400	0.414	0.450	0.429	0.444	0.01	H2
	Full SAR	0.434	-	-	**0.465**	-	-		

WCDMA850 (Band 5) Head SAR results – Antenna 2

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.5	23.5	23.5	0.4	0.4	0.4	dB	
Time-averaged Power		23.5	23.5	23.5	1.10	1.10	1.10	Lin	
Left Cheek	Estimated SAR	0.288	0.308	0.336	0.316	0.338	0.368	0.01	-
	Full SAR	-	-	0.346	-	-	0.379		
Left Tilt	Estimated SAR	-	0.181	-	-	0.198	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	-	0.239	-	-	0.262	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.156	-	-	0.171	-	-	-
	Full SAR	-	-	-	-	-	-		

2-slot GPRS1900 Head SAR results – Antenna 1

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		28.0	27.9	28.1	0.4	0.5	0.3	dB	
Time-averaged Power		22.0	21.9	22.1	1.10	1.12	1.07	Lin	
Left Cheek	Estimated SAR	0.321	0.264	0.251	0.352	0.296	0.269	0.01	-
	Full SAR	0.329	-	-	0.361	-	-		
Left Tilt	Estimated SAR	-	0.062	-	-	0.070	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	-	0.188	-	-	0.211	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.085	-	-	0.095	-	-	-
	Full SAR	-	-	-	-	-	-		

3-slot 8PSK EGPRS1900 Head SAR results – Antenna 1

3-slot 8PSK EGPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		24.6			Scaling factor*				
Conducted Power		24.5	24.5	24.6	0.1	0.1	-	dB	
Time-averaged Power		20.2	20.2	20.3	1.02	1.02	1.00	Lin	
Left Cheek	Estimated SAR	0.213	-	-	0.218	-	-	0.01	-
	Full SAR	0.218	-	-	0.223	-	-		

2-slot GPRS1900 Head SAR results – Antenna 2

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		27.9	27.8	28.0	0.5	0.6	0.4	dB	
Time-averaged Power		21.9	21.8	22.0	1.12	1.15	1.10	Lin	
Left Cheek	Estimated SAR	0.486	0.397	0.383	0.545	0.456	0.420	0.01	H3
	Full SAR	0.492	-	-	**0.552**	-	-		
Left Tilt	Estimated SAR	-	0.156	-	-	0.179	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	-	0.215	-	-	0.247	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.173	-	-	0.199	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Cheek CC-3089	Estimated SAR	0.472	0.386	0.347	0.530	0.443	0.380	0.00	-
	Full SAR	0.471	-	-	0.528	-	-		

3-slot 8PSK EGPRS1900 Head SAR results – Antenna 2

3-slot 8PSK EGPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		24.6			Scaling factor*				
Conducted Power		24.4	24.4	24.5	0.2	0.2	0.1	dB	
Time-averaged Power		20.1	20.1	20.2	1.05	1.05	1.02	Lin	
Left Cheek	Estimated SAR	0.317	-	-	0.332	-	-	0.00	-
	Full SAR	0.316	-	-	0.331	-	-		

LTE2500 (Band 7) Head SAR results – Antenna 2

LTE2500 (Band 7) - 20MHz - QPSK - 1 RB - Offset 99									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		22.9			Scaling factor*				
Conducted Power		22.7	22.6	22.7	0.2	0.3	0.2	dB	
Time-averaged Power		22.7	22.6	22.7	1.05	1.07	1.05	Lin	
Left Cheek	Estimated SAR	0.404	-	-	0.423	-	-	0.01	H4
	Full SAR	0.414	-	-	**0.434**	-	-		
Left Tilt	Estimated SAR	0.114	-	-	0.119	-	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	0.161	-	-	0.169	-	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	0.143	-	-	0.150	-	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Cheeck CC-3089	Estimated SAR	0.336	-	-	0.352	-	-	-	-
	Full SAR	0.336	-	-	0.352	-	-		
LTE2500 (Band 7) - 20MHz - QPSK - 50 RB - Offset 50									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		21.9			Scaling factor*				
Conducted Power		21.7	21.7	21.7	0.2	0.2	0.2	dB	
Time-averaged Power		21.7	21.7	21.7	1.05	1.05	1.05	Lin	
Left Cheek	Estimated SAR	-	0.300	-	-	0.314	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Tilt	Estimated SAR	-	0.098	-	-	0.102	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Cheek	Estimated SAR	-	0.129	-	-	0.135	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.133	-	-	0.139	-	-	-
	Full SAR	-	-	-	-	-	-		
LTE2500 (Band 7) - 20MHz - QPSK - 100 RB - Offset 0									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		21.9			Scaling factor*				
Conducted Power		21.6	21.6	21.7	0.3	0.3	0.2	dB	
Time-averaged Power		21.6	21.6	21.7	1.07	1.07	1.05	Lin	
Left Cheek	Estimated SAR	-	-	0.324	-	-	0.339	-	-
	Full SAR	-	-	-	-	-	-		

WLAN2450 Head SAR results

WLAN2450 b-mode BPSK 1 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 11 2462.0 MHz	CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 11 2462.0 MHz		
Upper limit		17.5	17.5	17.5	Scaling factor*				
Conducted Power		16.4	16.8	16.7	1.1	0.7	0.8	dB	
Time-averaged Power		16.4	16.8	16.7	1.29	1.17	1.20	Lin	
Left Cheek	Estimated SAR	0.987	0.913	0.854	1.272	1.073	1.027	0.06	-
	Full SAR	0.923	-	-	1.189	-	-		
Left Tilt	Estimated SAR	-	0.678	-	-	0.797	-	0.01	-
	Full SAR	-	0.667	-	-	0.784	-		
Right Cheek	Estimated SAR	-	0.491	-	-	0.577	-	-	-
	Full SAR	-	-	-	-	-	-		
Right Tilt	Estimated SAR	-	0.362	-	-	0.425	-	-	-
	Full SAR	-	-	-	-	-	-		
Left Cheek CC-3089	Estimated SAR	0.952	1.040	1.020	1.226	1.222	1.226	0.04	-
	Full SAR	-	-	0.985	-	-	1.184		
Left Cheek Repeated	Estimated SAR	1.050	-	-	1.353	-	-	0.03	H5
	Full SAR	1.020	-	-	**1.314**	-	-		
WLAN2450 b-mode QPSK 5.5 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		- -	CH 6 2437.0 MHz	CH 11 2462.0 MHz	- -	CH 6 2437.0 MHz	CH 11 2462.0 MHz		
Upper limit		-	17.5	17.5	Scaling factor*				
Conducted Power		-	17.2	17.2	-	0.3	0.3	dB	
Time-averaged Power		-	17.2	17.2	1.00	1.07	1.07	Lin	
Left Cheek	Estimated SAR	-	0.911	0.947	-	0.976	1.015	-	-
	Full SAR	-	-	-	-	-	-		
WLAN2450 b-mode QPSK 11 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	- -	- -	CH 1 2412.0 MHz	- -	- -		
Upper limit		17.5	-	-	Scaling factor*				
Conducted Power		17.0	-	-	0.5	-	-	dB	
Time-averaged Power		17.0	-	-	1.12	1.00	1.00	Lin	
Left Cheek	Estimated SAR	1.020	-	-	1.144	-	-	0.01	-
	Full SAR	1.010	-	-	1.133	-	-		

Individual Head SAR plots are given in Appendix B.

Simultaneous transmissions: Combined Head 1g SAR results – WLAN and Individual band Max results - Antenna 1

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	-	-	-	-
Left Cheek	1.314	0.519	0.432	0.361	-	-	-	-
Left Tilt	0.784	0.300	0.254	0.070	-	-	-	-
Right Cheek	0.577	0.693	0.465	0.211	-	-	-	-
Right Tilt	0.425	0.308	0.264	0.095	-	-	-	-

Simultaneous transmissions: Combined Head 1g SAR results – WLAN Max + Max combined results - Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Left Cheek	**1.833**	**1.746**	**1.675**	-	-	-	-	-
Left Tilt	1.084	1.038	0.854	-	-	-	-	-
Right Cheek	1.270	1.042	0.788	-	-	-	-	-
Right Tilt	0.733	0.689	0.520	-	-	-	-	-

Simultaneous transmissions: Combined Head 1g SAR results – WLAN and Individual band Max results - Antenna 2

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	LTE 2500 (Band 7)	-	-	-
Left Cheek	1.314	0.388	0.379	0.552	0.434	-	-	-
Left Tilt	0.784	0.189	0.198	0.179	0.119	-	-	-
Right Cheek	0.577	0.262	0.262	0.247	0.169	-	-	-
Right Tilt	0.425	0.172	0.171	0.199	0.150	-	-	-

Simultaneous transmissions: Combined Head 1g SAR results – WLAN Max + Max combined results - Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Left Cheek	**1.702**	**1.693**	**1.866**	**1.748**	-	-	-	-
Left Tilt	0.973	0.982	0.963	0.903	-	-	-	-
Right Cheek	0.839	0.839	0.824	0.746	-	-	-	-
Right Tilt	0.597	0.596	0.624	0.575	-	-	-	-

7.1.1 Simultaneous Transmission SAR Test Exclusion Considerations for Head Measurements

Simultaneous transmission SAR tests exclusion procedures as described in KDB 447498 D01 v05 is needed for some Head measurements. Following table gives antenna pair SAR to peak location separation ratios for the transmitter combinations for which the sum of simultaneously transmitting 1g SAR was above limit (See "Max+Max Combined results" table in previous section).

Antenna Pair SAR to Peak Location Separation Ratio - Antenna 1

	WLAN 2450	2-slot GPRS850	WLAN 2450	WCDMA 850 (Band 5)	WLAN 2450	2-slot GPRS1900	-	-
	Left Cheek		Left Cheek		Left Cheek		-	
X [mm]	33.0	67.2	33.0	67.2	33.0	66.3	-	-
Y [mm]	323.9	266.6	323.9	266.6	323.9	249.8	-	-
Z [mm]	-173.7	-174.0	-173.7	-174.0	-173.7	-172.9	-	-
DISTANCE [mm]	66.76		66.76		81.25		-	
MAX + MAX (Reported SAR)	1.83		1.75		1.68		-	
SAR to peak location separation ratio	0.04		0.03		0.03		-	

Antenna Pair SAR to Peak Location Separation Ratio - Antenna 2

	WLAN 2450	2-slot GPRS850	WLAN 2450	WCDMA 850 (Band 5)	WLAN 2450	2-slot GPRS1900	WLAN 2450	LTE 2500 (Band 7)
	Left Cheek		Left Cheek		Left Cheek		Left Cheek	
X [mm]	33.0	65.2	33.0	65.2	33.0	64.4	33.0	60.8
Y [mm]	323.9	266.0	323.9	266.0	323.9	252.6	323.9	252.5
Z [mm]	-173.7	-174.4	-173.7	-174.4	-173.7	-173.5	-173.7	-173.3
DISTANCE [mm]	66.26		66.27		77.94		76.62	
MAX + MAX (Reported SAR)	1.70		1.69		1.87		1.75	
SAR to peak location separation ratio	0.03		0.03		0.03		0.03	

All simultaneous transmitter configurations where the Antenna Pair SPLSR ≤ 0.04, are excluded from expanded zoom scan testing. For this product no expanded zoom scan testing is required.

7.1.2 Combined 1g 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.

The combinations are done for the maximum Head configuration of the each band. Maximum configurations are given in the Max+Max tables in the Section 7.1 of the report.

Simultaneous transmissions: Reported* Combined 1g SAR Head results – SPEAG Combined Multiband algorithm results – Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Left Cheek	1.430	-	-	-	-	-	-	-
Left Tilt	-	-	-	-	-	-	-	-
Right Cheek	-	-	-	-	-	-	-	-
Right Tilt	-	-	-	-	-	-	-	-

Simultaneous transmissions: Reported* Combined 1g SAR Head results – SPEAG Combined Multiband algorithm results – Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Left Cheek	-	-	1.390	1.370	-	-	-	-
Left Tilt	-	-	-	-	-	-	-	-
Right Cheek	-	-	-	-	-	-	-	-
Right Tilt	-	-	-	-	-	-	-	-

2-slot GPRS850 + WLAN2450 has the highest Max + Max result of the 850MHz grouped bands 2-slot GPRS850 and WCDMA850 (Band 5).

Note:
* Reported SAR values are scaled to, or measured at, upper limit of power tuning tolerance.
Highest result within individual zoom scan or individual expanded zoom scan results is given in Section 1.2 for each transmitter. Highest result within contributing individual zoom scan, individual expanded zoom scan, Speag combined algorithm or combined expanded zoom scan result is given in Section for the maximum simultaneous transmitter combination.

Speag Combined Multiband Head SAR plots are given in Appendix B.

7.2 The measured Body 15 mm SAR values for the test device

2-slot GPRS850 Body SAR results – Antenna 1

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		31.4			Scaling factor*				
Conducted Power		30.6	30.7	30.7	0.8	0.7	0.7	dB	
Time-averaged Power		24.6	24.7	24.7	1.20	1.17	1.17	Lin	
Back	Estimated SAR	0.483	0.494	0.532	0.581	0.580	0.625	0.01	B1
	Full SAR	-	-	0.546	-	-	**0.641**		
Display	Estimated SAR	-	0.463	-	-	0.544	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.371	0.419	0.456	0.446	0.492	0.536	0.01	-
	Full SAR	-	-	0.466	-	-	0.548		

2-slot GPRS850 Body SAR results – Antenna 2

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		31.4			Scaling factor*				
Conducted Power		30.5	30.6	30.6	0.9	0.8	0.8	dB	
Time-averaged Power		24.5	24.6	24.6	1.23	1.20	1.20	Lin	
Back	Estimated SAR	0.317	0.293	0.284	0.390	0.352	0.341	0.01	-
	Full SAR	0.325	-	-	0.400	-	-		
Display	Estimated SAR	-	0.235	-	-	0.283	-	-	-
	Full SAR	-	-	-	-	-	-		

WCDMA850 (Band 5) Body SAR results – Antenna 1

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.6	23.6	23.6	0.3	0.3	0.3	dB	
Time-averaged Power		23.6	23.6	23.6	1.07	1.07	1.07	Lin	
Back	Estimated SAR	0.407	0.408	0.415	0.436	0.437	0.445	0.01	B2
	Full SAR	-	-	0.423	-	-	**0.453**		
Display	Estimated SAR	-	0.391	-	-	0.419	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.365	0.353	0.354	0.391	0.378	0.379	0.01	-
	Full SAR	0.373	-	-	0.400	-	-		

WCDMA850 (Band 5) Body SAR results – Antenna 2

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.5	23.5	23.5	0.4	0.4	0.4	dB	
Time-averaged Power		23.5	23.5	23.5	1.10	1.10	1.10	Lin	
Back	Estimated SAR	0.338	0.354	0.365	0.371	0.388	0.400	0.01	-
	Full SAR	-	-	0.373	-	-	0.409		
Display	Estimated SAR	-	0.291	-	-	0.319	-	-	-
	Full SAR	-	-	-	-	-	-		

2-slot GPRS1900 Body SAR results – Antenna 1

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		28.0	27.9	28.1	0.4	0.5	0.3	dB	
Time-averaged Power		22.0	21.9	22.1	1.10	1.12	1.07	Lin	
Back	Estimated SAR	-	0.369	-	-	0.414	-	-	-
	Full SAR	-	-	-	-	-	-		
Display	Estimated SAR	0.452	0.433	0.360	0.496	0.486	0.386	0.06	B3
	Full SAR	0.510	-	-	**0.559**	-	-		
Display CC-3089	Estimated SAR	0.342	0.334	0.275	0.375	0.375	0.295	0.03	-
	Full SAR	0.373	-	-	0.409	-	-		

2-slot GPRS1900 Body SAR results – Antenna 2

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		27.9	27.8	28.0	0.5	0.6	0.4	dB	
Time-averaged Power		21.9	21.8	22.0	1.12	1.15	1.10	Lin	
Back	Estimated SAR	0.248	0.209	0.190	0.278	0.240	0.208	0.03	-
	Full SAR	0.274	-	-	0.307	-	-		
Display	Estimated SAR	-	0.197	-	-	0.226	-	-	-
	Full SAR	-	-	-	-	-	-		

LTE2500 (Band 7) Body SAR results – Antenna 2

LTE2500 (Band 7) - 20MHz - QPSK - 1 RB - Offset 99									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		22.9			Scaling factor*				
Conducted Power		22.7	22.6	22.7	0.2	0.3	0.2	dB	
Time-averaged Power		22.7	22.6	22.7	1.05	1.07	1.05	Lin	
Back	Estimated SAR	0.589	-	-	0.617	-	-	0.04	B4
	Full SAR	0.628	-	-	**0.658**	-	-		
Display	Estimated SAR	0.588	-	-	0.616	-	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.562	-	-	0.588	-	-	0.01	-
	Full SAR	0.568	-	-	0.595	-	-		
LTE2500 (Band 7) - 20MHz - QPSK - 50 RB - Offset 50									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		21.9			Scaling factor*				
Conducted Power		21.7	21.7	21.7	0.2	0.2	0.2	dB	
Time-averaged Power		21.7	21.7	21.7	1.05	1.05	1.05	Lin	
Back	Estimated SAR	-	0.492	-	-	0.515	-	-	-
	Full SAR	-	-	-	-	-	-		
Display	Estimated SAR	-	0.483	-	-	0.506	-	-	-
	Full SAR	-	-	-	-	-	-		
LTE2500 (Band 7) - 20MHz - QPSK - 100 RB - Offset 0									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		21.9			Scaling factor*				
Conducted Power		21.6	21.6	21.7	0.3	0.3	0.2	dB	
Time-averaged Power		21.6	21.6	21.7	1.07	1.07	1.05	Lin	
Back	Estimated SAR	-	-	0.526	-	-	0.551	-	-
	Full SAR	-	-	-	-	-	-		

WLAN2450 Body SAR results

WLAN2450 b-mode BPSK 1 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 10 2457.0 MHz	CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 10 2457.0 MHz		
Upper limit		**19.0**	**19.0**	**19.0**	**Scaling factor***				
Conducted Power		**17.7**	**18.0**	**17.8**	**1.3**	**1.0**	**1.2**	**dB**	
Time-averaged Power		**17.7**	**18.0**	**17.8**	**1.35**	**1.26**	**1.32**	**Lin**	
Back	Estimated SAR	0.134	0.143	0.136	0.181	0.180	0.179	0.02	B5
	Full SAR	0.156	-	-	**0.210**	-	-		
Display	Estimated SAR	-	0.139	-	-	0.175	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.078	0.095	0.103	0.106	0.119	0.136	0.00	-
	Full SAR	-	-	0.102	-	-	0.134		
WLAN2450 b-mode QPSK 5.5 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	- -	CH 10 2457.0 MHz	CH 1 2412.0 MHz	- -	CH 10 2457.0 MHz		
Upper limit		**19.0**	**-**	**19.0**	**Scaling factor***				
Conducted Power		**18.5**	**-**	**18.2**	**0.5**	**-**	**0.8**	**dB**	
Time-averaged Power		**18.5**	**-**	**18.2**	**1.12**	**-**	**1.20**	**Lin**	
Back	Estimated SAR	0.160	-	0.155	0.180	-	0.186	0.00	-
	Full SAR	-	-	0.155	-	-	0.186		
WLAN2450 b-mode QPSK 11 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		- -	CH 6 2437.0 MHz	- -	- -	CH 6 2437.0 MHz	- -		
Upper limit		**-**	**19.0**	**-**	**Scaling factor***				
Conducted Power		**-**	**18.4**	**-**	**-**	**0.6**	**-**	**dB**	
Time-averaged Power		**-**	**18.4**	**-**	**-**	**1.15**	**-**	**Lin**	
Back	Estimated SAR	-	0.148	-	-	0.170	-	0.00	-
	Full SAR	-	-	-	-	-	-		

Individual Body SAR plots are given Appendix B.

Simultaneous transmissions: Combined Body 1g SAR results – WLAN and Individual band Max results - Antenna 1

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	-	-	-	-
Back	0.210	0.641	0.453	0.414	-	-	-	-
Display	0.175	0.544	0.419	0.559	-	-	-	-

Simultaneous transmissions: Combined Body 1g SAR results – WLAN Max + Max combined results - Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Back	**0.851**	**0.663**	0.624	-	-	-	-	-
Display	0.719	0.594	**0.734**	-	-	-	-	-

Simultaneous transmissions: Combined Body 1g SAR results – WLAN and Individual band Max results - Antenna 2

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	LTE 2500 (Band 7)	-	-	-
Back	0.210	0.400	0.409	0.307	0.658	-	-	-
Display	0.175	0.283	0.319	0.226	0.616	-	-	-

Simultaneous transmissions: Combined Body 1g SAR results – WLAN Max + Max combined results - Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Back	**0.610**	**0.619**	**0.517**	**0.868**	-	-	-	-
Display	0.458	0.494	0.401	0.791	-	-	-	-

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

7.2.1 Combined 1g 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.

The combinations are done for the maximum Body configuration of the each band. Maximum configurations are given in the Max+Max tables in the Section 7.2 of the report.

Simultaneous transmissions: Reported* Combined 1g SAR Body results – SPEAG Combined Multiband algorithm results – Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Back	0.678	-	-	-	-	-	-	-
Display	-	-	0.519	-	-	-	-	-

Simultaneous transmissions: Reported* Combined 1g SAR Body results – SPEAG Combined Multiband algorithm results – Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Back	-	-	-	0.651	-	-	-	-
Display	-	-	-	-	-	-	-	-

2-slot GPRS850 + WLAN2450 has the highest Max + Max result of the 850MHz grouped bands 2-slot GPRS850 and WCDMA850 (Band 5).

Note:
* Reported SAR values are scaled to, or measured at, upper limit of power tuning tolerance.
Highest result within individual zoom scan or individual expanded zoom scan results is given in Section 1.2 for each transmitter. Highest result within contributing individual zoom scan, individual expanded zoom scan, Speag combined algorithm or combined expanded zoom scan result is given in Section for the maximum simultaneous transmitter combination.

7.3 The measured Body 10mm SAR values of Wireless Router mode for the test device

2-slot GPRS850 Wireless Router SAR results – Antenna 1

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		31.4			Scaling factor*				
Conducted Power		**30.6**	**30.7**	**30.7**	**0.8**	**0.7**	**0.7**	**dB**	
Time-averaged Power		**24.6**	**24.7**	**24.7**	**1.20**	**1.17**	**1.17**	**Lin**	
Back	Estimated SAR	0.526	0.571	0.642	0.632	0.671	0.754	0.02	W1
	Full SAR	-	-	0.657	-	-	**0.772**		
Display	Estimated SAR	-	0.568	-	-	0.667	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.032	-	-	0.037	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.511	-	-	0.600	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.299	-	-	0.351	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.523	-	-	0.614	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.478	0.526	0.542	0.575	0.618	0.637	0.02	-
	Full SAR	-	-	0.560	-	-	0.658		

2-slot GPRS850 Wireless Router SAR results – Antenna 2

2-slot GPRS850									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		31.4			Scaling factor*				
Conducted Power		**30.5**	**30.6**	**30.6**	**0.9**	**0.8**	**0.8**	**dB**	
Time-averaged Power		**24.5**	**24.6**	**24.6**	**1.23**	**1.20**	**1.20**	**Lin**	
Back	Estimated SAR	-	0.361	-	-	0.434	-	-	-
	Full SAR	-	-	-	-	-	-		
Display	Estimated SAR	0.425	0.404	0.412	0.523	0.486	0.495	0.01	-
	Full SAR	0.411	-	-	0.506	-	-		
Top	Estimated SAR	-	0.021	-	-	0.025	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.387	-	-	0.465	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.375	-	-	0.451	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.155	-	-	0.186	-	-	-
	Full SAR	-	-	-	-	-	-		

WCDMA850 (Band 5) Wireless Router SAR results – Antenna 1

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.6	23.6	23.6	0.3	0.3	0.3	dB	
Time-averaged Power		23.6	23.6	23.6	1.07	1.07	1.07	Lin	
Back	Estimated SAR	0.474	0.464	0.473	0.508	0.497	0.507	0.01	-
	Full SAR	0.483	-	-	0.518	-	-		
Display	Estimated SAR	-	0.458	-	-	0.491	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.022	-	-	0.024	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.395	-	-	0.423	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.260	-	-	0.279	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.429	-	-	0.460	-	-	-
	Full SAR	-	-	-	-	-	-		

WCDMA850 (Band 5) Wireless Router SAR results – Antenna 2

WCDMA850 (Band 5)									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		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		
Upper limit		23.9			Scaling factor*				
Conducted Power		23.5	23.5	23.5	0.4	0.4	0.4	dB	
Time-averaged Power		23.5	23.5	23.5	1.10	1.10	1.10	Lin	
Back	Estimated SAR	-	0.438	-	-	0.480	-	-	-
	Full SAR	-	-	-	-	-	-		
Display	Estimated SAR	0.480	0.503	0.525	0.526	0.552	0.576	0.02	W2
	Full SAR	-	-	0.501	-	-	**0.549**		
Top	Estimated SAR	-	0.026	-	-	0.029	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.412	-	-	0.452	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.346	-	-	0.379	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.177	-	-	0.194	-	-	-
	Full SAR	-	-	-	-	-	-		
Display CC-3089	Estimated SAR	0.303	0.317	0.339	0.332	0.348	0.372	0.00	-
	Full SAR	-	-	0.337	-	-	0.370		

2-slot GPRS1900 Wireless Router SAR results – Antenna 1

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		28.0	27.9	28.1	0.4	0.5	0.3	dB	
Time-averaged Power		22.0	21.9	22.1	1.10	1.12	1.07	Lin	
Back	Estimated SAR	0.722	0.725	0.671	0.792	0.813	0.719	0.16	-
	Full SAR	0.873	0.880	0.806	0.957	0.987	0.864		
Display	Estimated SAR	0.851	0.824	0.714	0.933	0.925	0.765	0.12	-
	Full SAR	0.960	0.931	0.832	1.053	1.045	0.892		
Top	Estimated SAR	-	0.017	-	-	0.020	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	0.826	0.792	0.745	0.906	0.889	0.798	0.09	-
	Full SAR	0.919	-	-	1.008	-	-		
Left	Estimated SAR	-	0.084	-	-	0.095	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.215	-	-	0.241	-	0.02	-
	Full SAR	-	0.237	-	-	0.266	-		
Display CC-3089	Estimated SAR	0.685	0.670	0.576	0.751	0.752	0.617	0.11	-
	Full SAR	0.776	0.776	0.678	0.851	0.871	0.726		
Display Repeated	Estimated SAR	0.898	-	-	0.985	-	-	0.15	W3
	Full SAR	1.050	-	-	**1.151**	-	-		

2-slot GPRS1900 Wireless Router SAR results – Antenna 2

2-slot GPRS1900									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		28.4			Scaling factor*				
Conducted Power		27.9	27.8	28.0	0.5	0.6	0.4	dB	
Time-averaged Power		21.9	21.8	22.0	1.12	1.15	1.10	Lin	
Back	Estimated SAR	0.552	0.386	0.444	0.619	0.443	0.487	0.09	-
	Full SAR	0.641	-	-	0.719	-	-		
Display	Estimated SAR	-	0.331	-	-	0.380	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.044	-	-	0.051	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.311	-	-	0.357	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.319	-	-	0.366	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.079	-	-	0.091	-	-	-
	Full SAR	-	-	-	-	-	-		

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

LTE2500 (Band 7) - 20MHz - QPSK - 1 RB - Offset 99									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		21.4			Scaling factor*				
Conducted Power		21.1	21.3	21.1	0.3	0.1	0.3	dB	
Time-averaged Power		21.1	21.3	21.1	1.07	1.02	1.07	Lin	
Back	Estimated SAR	-	0.766	-	-	0.784	-	0.01	-
	Full SAR	-	0.774	-	-	0.792	-		
Display	Estimated SAR	-	0.654	-	-	0.669	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.017	-	-	0.018	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	1.030	1.060	1.120	1.104	1.085	1.200	0.01	W4
	Full SAR	-	-	1.110	-	-	**1.189**		
Left	Estimated SAR	-	0.181	-	-	0.185	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.062	-	-	0.064	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom CC-3089	Estimated SAR	1.020	1.000	1.020	1.093	1.023	1.093	-	-
	Full SAR	-	-	1.020	-	-	1.093		
Bottom Repeated	Estimated SAR	-	-	1.100	-	-	1.179	0.01	-
	Full SAR	-	-	1.090	-	-	1.168		

LTE2500 (Band 7) - 20MHz - QPSK - 50 RB - Offset 50									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		20.4			Scaling factor*				
Conducted Power		20.1	20.3	20.1	0.3	0.1	0.3	dB	
Time-averaged Power		20.1	20.3	20.1	1.07	1.02	1.07	Lin	
Back	Estimated SAR	-	0.659	-	-	0.674	-	-	-
	Full SAR	-	-	-	-	-	-		
Display	Estimated SAR	-	0.537	-	-	0.550	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.016	-	-	0.016	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	0.843	0.857	0.904	0.903	0.877	0.969	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.147	-	-	0.150	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.050	-	-	0.052	-	-	-
	Full SAR	-	-	-	-	-	-		

LTE2500 (Band 7) - 20MHz - QPSK - 100 RB - Offset 0									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [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		
Upper limit		20.4			Scaling factor*				
Conducted Power		20.0	20.2	20.0	0.4	0.2	0.4	dB	
Time-averaged Power		20.0	20.2	20.0	1.10	1.05	1.10	Lin	
Bottom	Estimated SAR	-	0.856	-	-	0.896	-	-	-
	Full SAR	-	-	-	-	-	-		

WLAN2450 Wireless Router SAR results

WLAN2450 b-mode BPSK 1 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 10 2457.0 MHz	CH 1 2412.0 MHz	CH 6 2437.0 MHz	CH 10 2457.0 MHz		
Upper limit		**19.0**	**19.0**	**19.0**	**Scaling factor***				
Conducted Power		**17.7**	**18.0**	**17.8**	**1.3**	**1.0**	**1.2**	**dB**	
Time-averaged Power		**17.7**	**18.0**	**17.8**	**1.35**	**1.26**	**1.32**	**Lin**	
Back	Estimated SAR	0.329	0.304	0.277	0.444	0.383	0.365	0.02	W5
	Full SAR	0.344	-	-	**0.464**	-	-		
Display	Estimated SAR	-	0.245	-	-	0.308	-	-	-
	Full SAR	-	-	-	-	-	-		
Top	Estimated SAR	-	0.096	-	-	0.120	-	-	-
	Full SAR	-	-	-	-	-	-		
Bottom	Estimated SAR	-	0.009	-	-	0.011	-	-	-
	Full SAR	-	-	-	-	-	-		
Left	Estimated SAR	-	0.018	-	-	0.023	-	-	-
	Full SAR	-	-	-	-	-	-		
Right	Estimated SAR	-	0.141	-	-	0.178	-	-	-
	Full SAR	-	-	-	-	-	-		
Back CC-3089	Estimated SAR	0.197	0.220	0.236	0.266	0.277	0.311	0.01	-
	Full SAR	-	-	0.248	-	-	0.327		
WLAN2450 b-mode QPSK 5.5 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		CH 1 2412.0 MHz	- -	CH 10 2457.0 MHz	CH 1 2412.0 MHz	- -	CH 10 2457.0 MHz		
Upper limit		**19.0**	**-**	**19.0**	**Scaling factor***				
Conducted Power		**18.5**	**-**	**18.2**	**0.5**	**-**	**0.8**	**dB**	
Time-averaged Power		**18.5**	**-**	**18.2**	**1.12**	**1.00**	**1.20**	**Lin**	
Back	Estimated SAR	0.318	-	0.323	0.357	-	0.388	0.01	-
	Full SAR	-	-	0.336	-	-	0.404		
WLAN2450 b-mode QPSK 11 Mbps									
Device orientation	SAR measurement	Measured 1g SAR [W/kg]			Reported* 1g SAR [W/kg]			Max Deviation* [W/kg]	Plot #
		- -	CH 6 2437.0 MHz	- -	- -	CH 6 2437.0 MHz	- -		
Upper limit		**-**	**19.0**	**-**	**Scaling factor***				
Conducted Power		**-**	**18.4**	**-**	**-**	**0.6**	**-**	**dB**	
Time-averaged Power		**-**	**18.4**	**-**	**1.00**	**1.15**	**1.00**	**Lin**	
Back	Estimated SAR	-	0.308	-	-	0.354	-	-	-
	Full SAR	-	-	-	-	-	-		

Individual Wireless Router SAR plots are given in Appendix B.

Simultaneous transmissions: Combined Wireless Router 1g SAR results – WLAN and Individual band Max results - Antenna 1

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	-	-	-	-
Back	0.464	0.772	0.518	0.987	-	-	-	-
Display	0.308	0.667	0.491	1.151	-	-	-	-
Top	0.120	0.037	0.024	0.020	-	-	-	-
Bottom	0.011	0.600	0.423	1.008	-	-	-	-
Left	0.023	0.351	0.279	0.095	-	-	-	-
Right	0.178	0.614	0.460	0.266	-	-	-	-

Simultaneous transmissions: Combined Wireless Router 1g SAR results – WLAN Max + Max combined results - Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Back	**1.236**	**0.982**	1.451	-	-	-	-	-
Display	0.975	0.799	**1.459**	-	-	-	-	-
Top	0.157	0.144	0.140	-	-	-	-	-
Bottom	0.611	0.434	1.019	-	-	-	-	-
Left	0.374	0.302	0.118	-	-	-	-	-
Right	0.792	0.638	0.444	-	-	-	-	-

Simultaneous transmissions: Combined Wireless Router 1g SAR results – WLAN and Individual band Max results - Antenna 2

Test configuration	WLAN 2450	2-slot GPRS850	WCDMA 850 (Band 5)	2-slot GPRS1900	LTE 2500 (Band 7)	-	-	-
Back	0.464	0.434	0.480	0.719	0.792	-	-	-
Display	0.308	0.506	0.549	0.380	0.669	-	-	-
Top	0.120	0.025	0.029	0.051	0.018	-	-	-
Bottom	0.011	0.465	0.452	0.357	1.189	-	-	-
Left	0.023	0.451	0.379	0.366	0.185	-	-	-
Right	0.178	0.186	0.194	0.091	0.064	-	-	-

Simultaneous transmissions: Combined Wireless Router 1g SAR results – WLAN Max + Max combined results - Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Back	**0.898**	**0.944**	**1.183**	**1.256**	-	-	-	-
Display	0.814	0.857	0.688	0.977	-	-	-	-
Top	0.145	0.149	0.171	0.138	-	-	-	-
Bottom	0.476	0.463	0.368	1.200	-	-	-	-
Left	0.474	0.402	0.389	0.208	-	-	-	-
Right	0.364	0.372	0.269	0.242	-	-	-	-

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

7.3.1 Combined 1g Wireless Router 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.

The combinations are done for the maximum Wireless Router configuration of the each band. Maximum configurations are given in the Max+Max tables in the Section 7.3 of the report.

Simultaneous transmissions: Reported* Combined 1g SAR Wireless Router results – SPEAG Combined Multiband algorithm results - Antenna 1

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	- -	- -	- -	- -	- -
Back	0.845	-	-	-	-	-	-	-
Display	-	-	0.964	-	-	-	-	-
Top	-	-	-	-	-	-	-	-
Bottom	-	-	-	-	-	-	-	-
Left	-	-	-	-	-	-	-	-
Right	-	-	-	-	-	-	-	-

Simultaneous transmissions: Reported* Combined 1g SAR Wireless Router results – SPEAG Combined Multiband algorithm results - Antenna 2

Test configuration	2-slot GPRS850 + WLAN 2450	WCDMA 850 (Band 5) + WLAN 2450	2-slot GPRS1900 + WLAN 2450	LTE 2500 (Band 7) + WLAN 2450	- -	- -	- -	- -
Back	-	-	-	0.838	-	-	-	-
Display	-	-	-	-	-	-	-	-
Top	-	-	-	-	-	-	-	-
Bottom	-	-	-	-	-	-	-	-
Left	-	-	-	-	-	-	-	-
Right	-	-	-	-	-	-	-	-

2-slot GPRS850 + WLAN2450 has the highest Max + Max result of the 850MHz grouped bands 2-slot GPRS850 and WCDMA850 (Band 5).

Maximum of the Combined SAR values, namely 2-slot GPRS1900 + WLAN2450, in the above table is less than the maximum SAR value 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 this case, the maximum SAR values given for the combined Mode in the Summary table in Section 1.2.3 is that for the individual cellular band 2-slot GPRS1900.

Note:
* Reported SAR values are scaled to, or measured at, upper limit of power tuning tolerance.
Highest result within individual zoom scan or individual expanded zoom scan results is given in Section 1.2 for each transmitter. Highest result within contributing individual zoom scan, individual expanded zoom scan, Speag combined algorithm or combined expanded zoom scan result is given in Section for the maximum simultaneous transmitter combination.

APPENDIX A: SYSTEM CHECKING SCANS

Plot 1

Date/Time: 2014-12-04 07:21:38

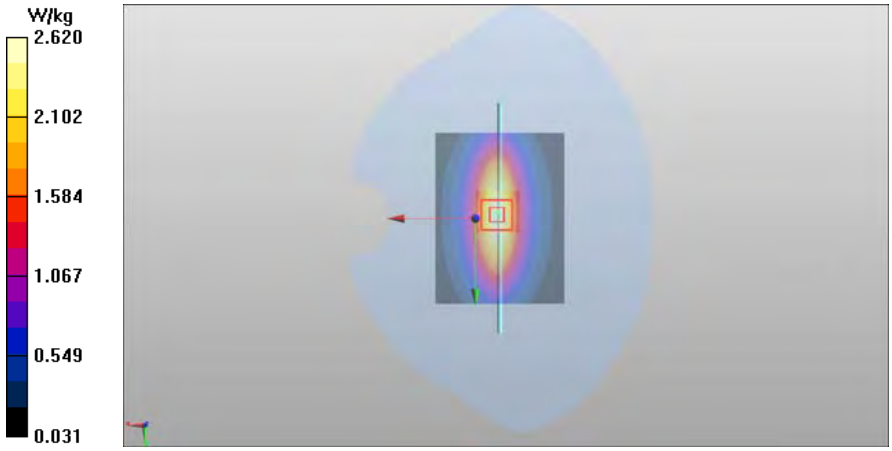
Test Laboratory: TCC Microsoft
Type: D835V2; Serial: D835V2 - SN:462

Communication System: CW
Frequency: **835 MHz**; Duty Cycle: 1:1
Medium: HSL800-900; Medium Notes: t= 22.6C
Medium parameters used: f = 835 MHz; σ = 0.897 S/m; ε_r = 40.231; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(6.04, 6.04, 6.04); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1596
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=15mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 52.283 V/m
Fast SAR: SAR(1 g) = 2.28 W/kg
Fast SAR(10 g) = 1.54 W/kg
Maximum value of SAR (interpolated) = 2.62 W/kg

d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.283 V/m
Peak SAR (extrapolated) = 3.31 W/kg
SAR(1 g) = 2.23 W/kg
SAR(10 g) = 1.46 W/kg
Power Drift = -0.02 dB
Maximum value of SAR (measured) = 2.60 W/kg



Plot 2

Date/Time: 2014-11-26 07:39:31

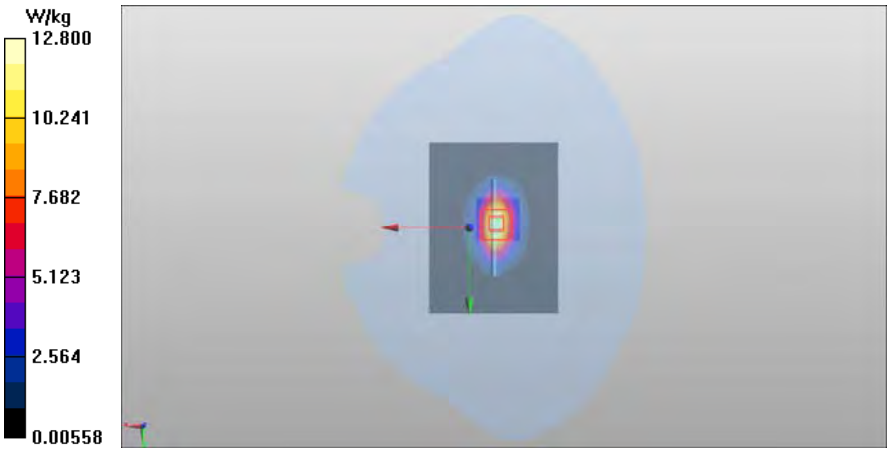
Test Laboratory: TCC Microsoft
Type: D1900V2; Serial: D1900V2 - SN:5d030

Communication System: CW
Frequency: **1900 MHz**; Duty Cycle: 1:1
Medium: HSL1900; Medium Notes: t= 21,1 C
Medium parameters used: f = 1900 MHz; σ = 1.385 S/m; ε_r = 38.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: ES3DV3 - SN3118
- ConvF(4.79, 4.79, 4.79); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 88.849 V/m
Fast SAR: SAR(1 g) = 9.86 W/kg
Fast SAR(10 g) = 5.09 W/kg
Maximum value of SAR (interpolated) = 12.8 W/kg

d=10mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 88.849 V/m
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.69 W/kg
SAR(10 g) = 5.08 W/kg
Power Drift = -0.00 dB
Maximum value of SAR (measured) = 12.0 W/kg



Plot 3

Date/Time: 2014-11-23 10:08:14

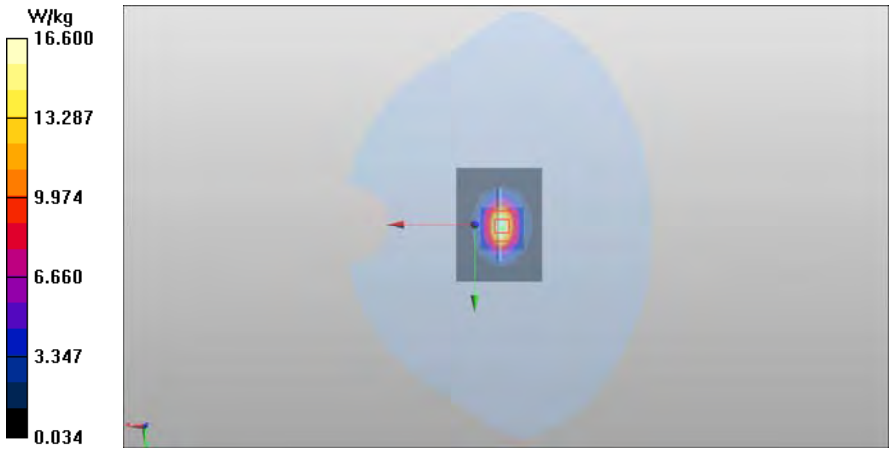
Test Laboratory: TCC Microsoft
Type: D2450V2; Serial: D2450V2 - SN:729

Communication System: CW
Frequency: **2450 MHz**; Duty Cycle: 1:1
Medium: HSL 2450; Medium Notes: t= 21.6 C
Medium parameters used: f = 2450 MHz; σ = 1.769 S/m; ε_r = 38.358; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.92, 6.92, 6.92); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 88.784 V/m
Fast SAR: SAR(1 g) = 12.4 W/kg
Fast SAR(10 g) = 5.47 W/kg
Maximum value of SAR (interpolated) = 16.6 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 88.784 V/m
Peak SAR (extrapolated) = 25.6 W/kg
SAR(1 g) = 12.4 W/kg
SAR(10 g) = 5.75 W/kg
Power Drift = 0.03 dB
Maximum value of SAR (measured) = 16.3 W/kg



Plot 4

Date/Time: 2014-11-27 10:35:52

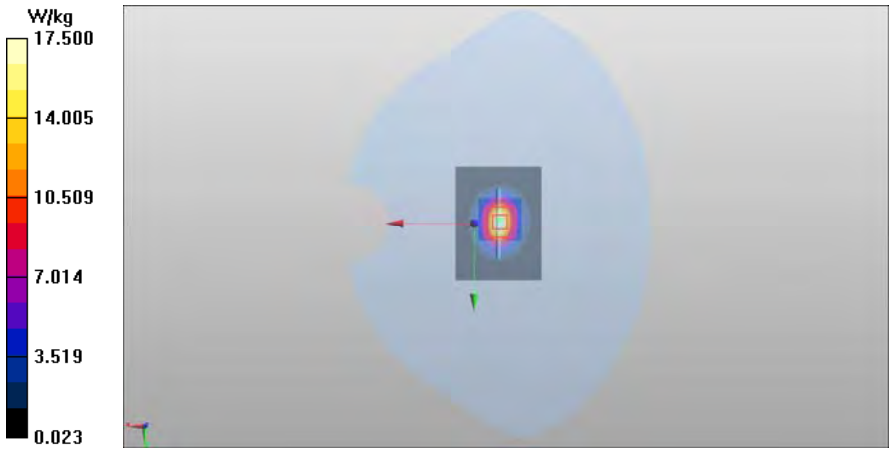
Test Laboratory: TCC Microsoft
Type: D2600V2; Serial: D2600V2 - SN:1009

Communication System: CW
Frequency: **2600 MHz**; Duty Cycle: 1:1
Medium: HSL2450; Medium Notes: t= 22.4 C
Medium parameters used: f = 2600 MHz; σ = 1.928 S/m; ε_r = 38.134; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.79, 6.79, 6.79); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 87.597 V/m
Fast SAR: SAR(1 g) = 13.2 W/kg
Fast SAR(10 g) = 5.89 W/kg
Maximum value of SAR (interpolated) = 17.5 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.597 V/m
Peak SAR (extrapolated) = 28.0 W/kg
SAR(1 g) = 13 W/kg
SAR(10 g) = 5.78 W/kg
Power Drift = 0.04 dB
Maximum value of SAR (measured) = 17.3 W/kg



Plot 5

Date/Time: 2014-11-24 06:43:45

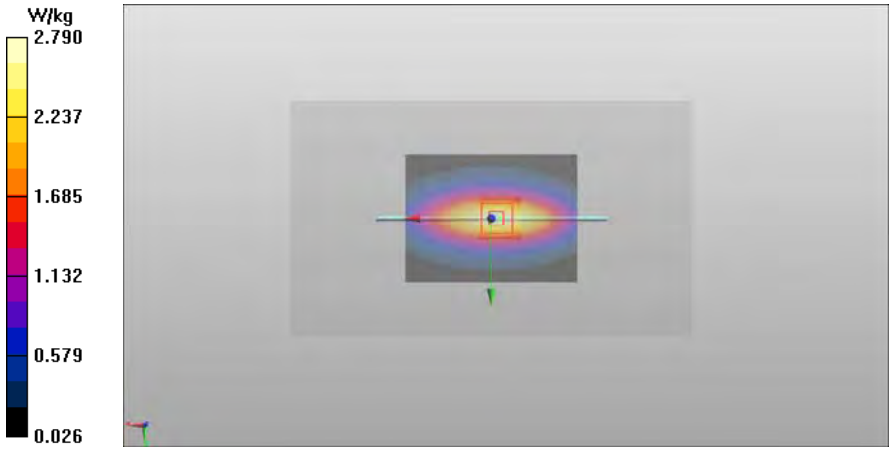
Test Laboratory: TCC Microsoft
Type: D835V2; Serial: D835V2 - SN:480

Communication System: CW
Frequency: **835 MHz**; Duty Cycle: 1:1
Medium: BSL835; Medium Notes: t= 21.2 C
Medium parameters used: f = 835 MHz; σ = 0.966 S/m; ε_r = 54.084; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(5.96, 5.96, 5.96); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 3 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1123/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=15mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 52.034 V/m
Fast SAR: SAR(1 g) = 2.41 W/kg
Fast SAR(10 g) = 1.61 W/kg
Maximum value of SAR (interpolated) = 2.79 W/kg

d=15mm, Pin=250mW/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 52.034 V/m
Peak SAR (extrapolated) = 3.49 W/kg
SAR(1 g) = 2.38 W/kg
SAR(10 g) = 1.57 W/kg
Power Drift = 0.00 dB
Maximum value of SAR (measured) = 2.76 W/kg



Plot 6

Date/Time: 2014-11-25 07:15:07

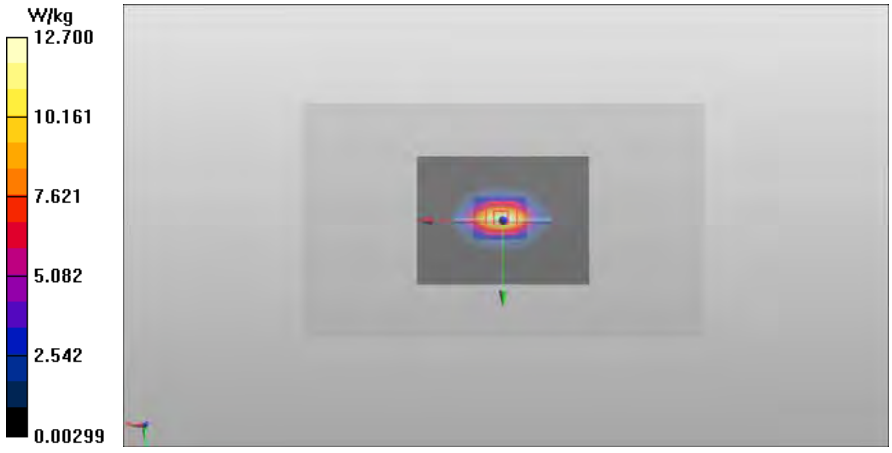
Test Laboratory: TCC Microsoft
Type: D1900V2; Serial: D1900V2 - SN:5d030

Communication System: CW
Frequency: **1900 MHz**; Duty Cycle: 1:1
Medium: BSL1900; Medium Notes: t= 21,2 C
Medium parameters used: f = 1900 MHz; σ = 1.511 S/m; ε_r = 52.411; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3118
- ConvF(4.44, 4.44, 4.44); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
- Phantom: SAM 2 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1124/2 (1800MHz), TP-1123/2 (1900MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 86.550 V/m
Fast SAR: SAR(1 g) = 9.8 W/kg
Fast SAR(10 g) = 4.94 W/kg
Maximum value of SAR (interpolated) = 12.7 W/kg

d=10mm, Pin=250mW/Zoom Scan (6x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 86.550 V/m
Peak SAR (extrapolated) = 17.2 W/kg
SAR(1 g) = 9.8 W/kg
SAR(10 g) = 5.17 W/kg
Power Drift = -0.04 dB
Maximum value of SAR (measured) = 12.2 W/kg



Plot 7

Date/Time: 2014-11-24 19:14:48

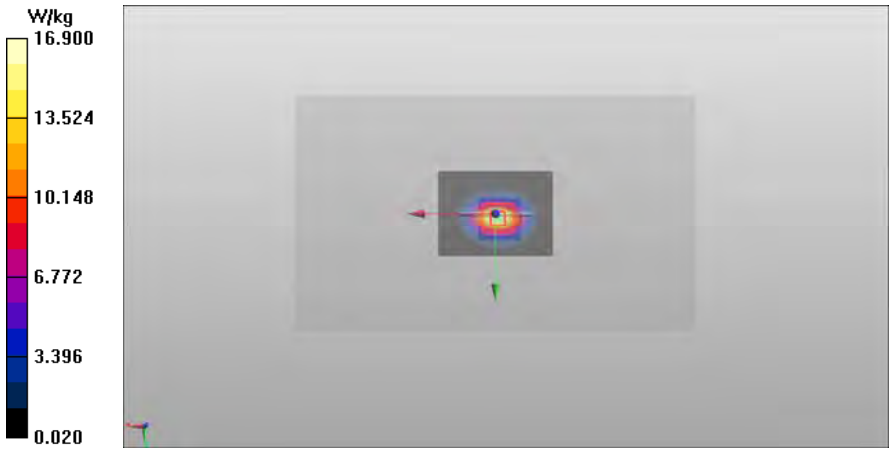
Test Laboratory: TCC Microsoft
Type: D2450V2; Serial: D2450V2 - SN:729

Communication System: CW
Frequency: **2450 MHz**; Duty Cycle: 1:1
Medium: BSL2450-2600; Medium Notes: t= 22.2 C
Medium parameters used: f = 2450 MHz; σ = 1.913 S/m; ε_r = 50.901; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.87, 6.87, 6.87); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 82.757 V/m
Fast SAR: SAR(1 g) = 12.4 W/kg
Fast SAR(10 g) = 5.41 W/kg
Maximum value of SAR (interpolated) = 16.9 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 82.757 V/m
Peak SAR (extrapolated) = 25.3 W/kg
SAR(1 g) = 12.5 W/kg
SAR(10 g) = 5.86 W/kg
Power Drift = 0.00 dB
Maximum value of SAR (measured) = 16.3 W/kg



Plot 8

Date/Time: 2014-12-03 06:35:46

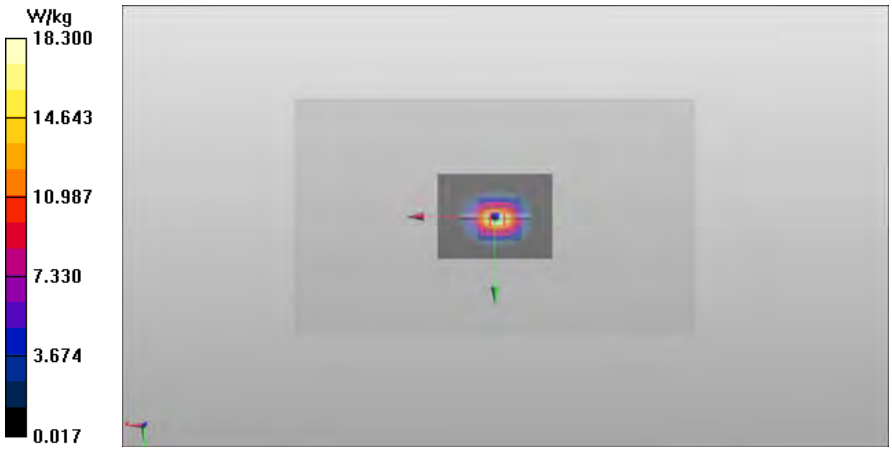
Test Laboratory: TCC Microsoft
Type: D2600V2; Serial: D2600V2 - SN:1009

Communication System: CW
Frequency: **2600 MHz**; Duty Cycle: 1:1
Medium: BSL2450-2600; Medium Notes: t= 22.1 C
Medium parameters used: f = 2600 MHz; σ = 2.089 S/m; ε_r = 50.74; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.74, 6.74, 6.74); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

d=10mm, Pin=250mW/Area Scan (81x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 85.004 V/m
Fast SAR: SAR(1 g) = 13.5 W/kg
Fast SAR(10 g) = 5.94 W/kg
Maximum value of SAR (interpolated) = 18.3 W/kg

d=10mm, Pin=250mW/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 85.004 V/m
Peak SAR (extrapolated) = 28.3 W/kg
SAR(1 g) = 13.4 W/kg
SAR(10 g) = 5.98 W/kg
Power Drift = -0.02 dB
Maximum value of SAR (measured) = 17.7 W/kg



APPENDIX B: MEASUREMENT SCANS

Plot H1

Date/Time: 2014-11-20 09:16:35

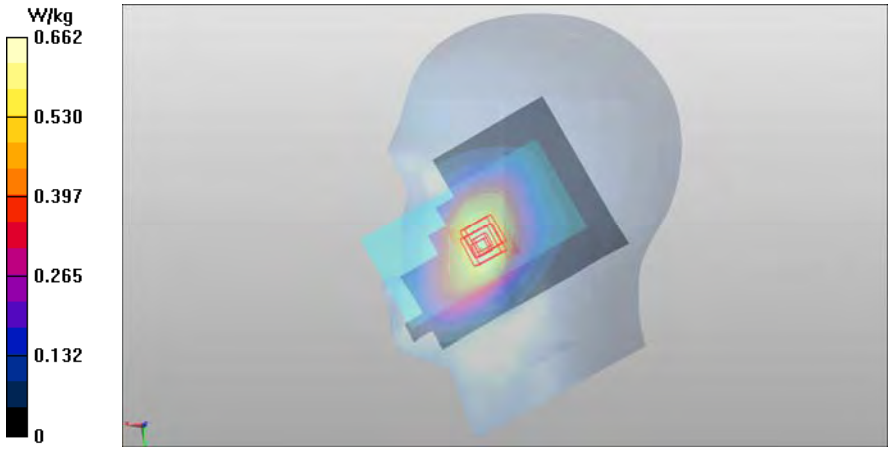
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: 2-slot GPRS850
Frequency: **848.8 MHz**; Duty Cycle: 1:4.19952
Medium: HSL835; Medium Notes: t= 21.4 C
Medium parameters used: f = 849 MHz; σ = 0.913 S/m; ε_r = 40.197; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(6.04, 6.04, 6.04); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1596
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS850 - Right/Cheek - CH 251 - Antenna 1/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 27.156 V/m
Fast SAR: SAR(1 g) = 0.579 W/kg
Fast SAR(10 g) = 0.403 W/kg
Maximum value of SAR (interpolated) = 0.662 W/kg

2-slot GPRS850 - Right/Cheek - CH 251 - Antenna 1/Zoom Scan (6x6x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 27.391 V/m
Peak SAR (extrapolated) = 0.771 W/kg
SAR(1 g) = 0.590 W/kg
SAR(10 g) = 0.453 W/kg
Power Drift = -0.00 dB
Maximum value of SAR (measured) = 0.652 W/kg



Plot H2

Date/Time: 2014-12-03 10:15:43

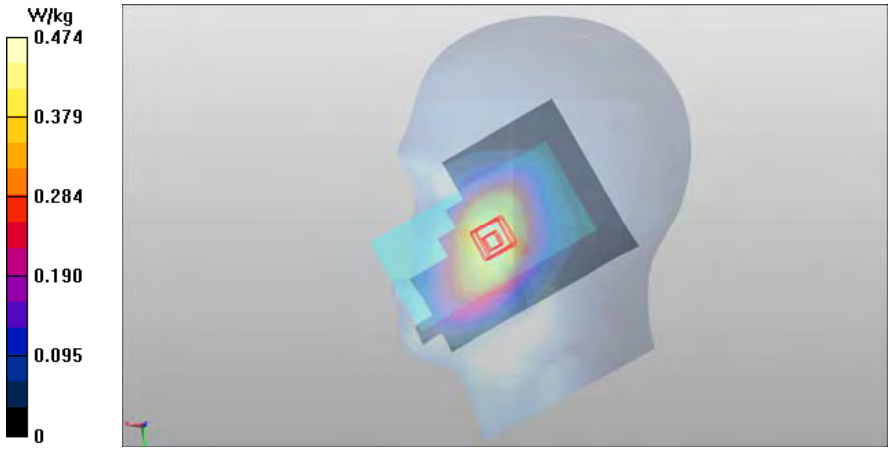
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: WCDMA850 (Band 5)
Frequency: **826.4 MHz**; Duty Cycle: 1:1
Medium: HSL835; Medium Notes: t= 22.4 C
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.899 S/m; ε_r = 40.542; ρ = 1000 kg/m^3
Phantom section: Right Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(6.04, 6.04, 6.04); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1596
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WCDMA850 (Band 5) - Right/Cheek - CH 4132 - Antenna 1 - Cover CC-3089/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 23.263 V/m
Fast SAR: SAR(1 g) = 0.420 W/kg
Fast SAR(10 g) = 0.298 W/kg
Maximum value of SAR (interpolated) = 0.474 W/kg

WCDMA850 (Band 5) - Right/Cheek - CH 4132 - Antenna 1 - Cover CC-3089/Zoom Scan (6x6x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 23.091 V/m
Peak SAR (extrapolated) = 0.538 W/kg
SAR(1 g) = 0.434 W/kg
SAR(10 g) = 0.337 W/kg
Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.451 W/kg



Plot H3

Date/Time: 2014-11-19 15:39:40

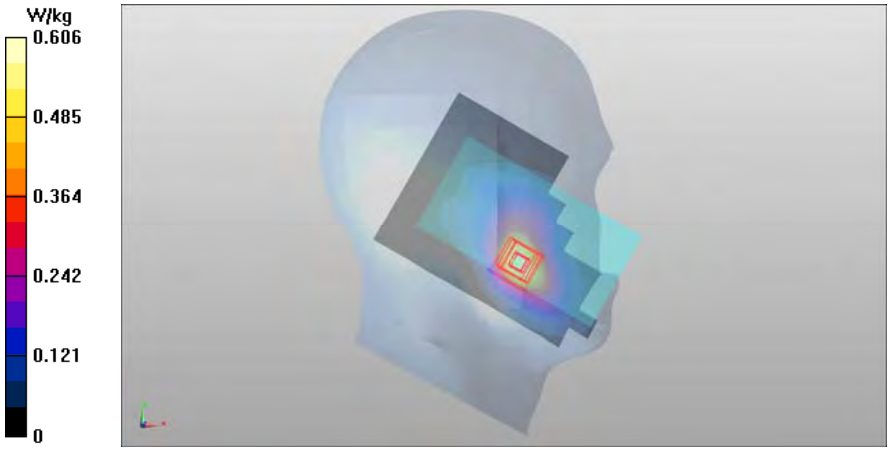
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048326/2

Communication System: 2-slot GPRS1900
Frequency: **1850.2 MHz**; Duty Cycle: 1:4.19952
Medium: HSL1900; Medium Notes: t= 21,4 C
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.333 S/m; ε_r = 38.99; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: ES3DV3 - SN3118
- ConvF(4.79, 4.79, 4.79); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
- Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS1900 - Left/Cheek - CH 512 - Antenna 2/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 19.755 V/m
Fast SAR: SAR(1 g) = 0.486 W/kg
Fast SAR(10 g) = 0.285 W/kg
Maximum value of SAR (interpolated) = 0.606 W/kg

2-slot GPRS1900 - Left/Cheek - CH 512 - Antenna 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 19.824 V/m
Peak SAR (extrapolated) = 0.734 W/kg
SAR(1 g) = 0.492 W/kg
SAR(10 g) = 0.313 W/kg
Power Drift = 0.05 dB
Maximum value of SAR (measured) = 0.573 W/kg



Plot H4

Date/Time: 2014-11-24 11:25:27

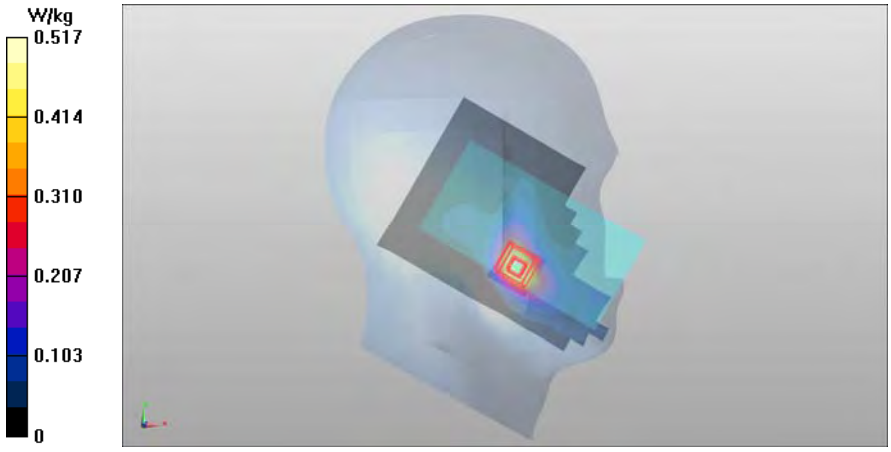
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048320/5

Communication System: LTE2500 (Band 7)
Frequency: **2510 MHz**; Duty Cycle: 1:1
Medium: HSL2600; Medium Notes: t= 22.2 C
Medium parameters used: f = 2510 MHz; σ = 1.839 S/m; ε_r = 37.887; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.79, 6.79, 6.79); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

LTE2500 (Band 7) - Left/Cheek - CH 20850 - 20MHz - QPSK - 1 RB - Offset 99 - Antenna 2/Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 14.782 V/m
Fast SAR: SAR(1 g) = 0.404 W/kg
Fast SAR(10 g) = 0.207 W/kg
Maximum value of SAR (interpolated) = 0.517 W/kg

LTE2500 (Band 7) - Left/Cheek - CH 20850 - 20MHz - QPSK - 1 RB - Offset 99 - Antenna 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 15.336 V/m
Peak SAR (extrapolated) = 0.757 W/kg
SAR(1 g) = 0.414 W/kg
SAR(10 g) = 0.213 W/kg
Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.522 W/kg



Plot H5

Date/Time: 2014-11-23 13:42:48

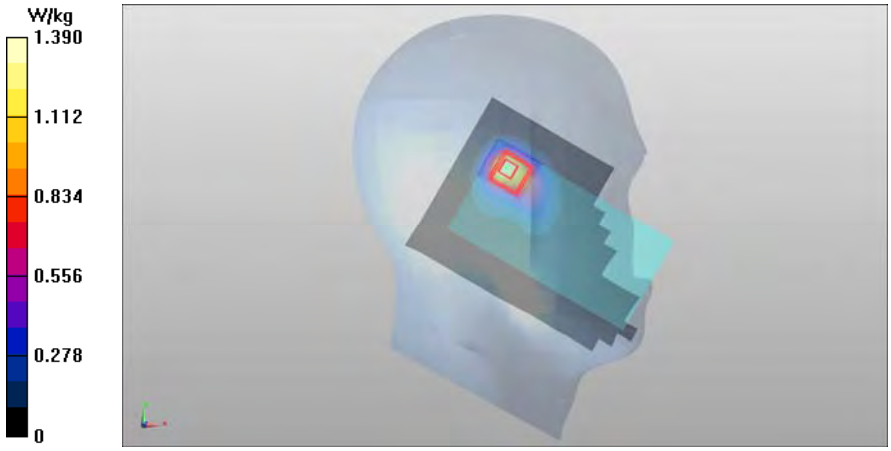
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1

Communication System: WLAN2450
Frequency: **2412 MHz**; Duty Cycle: 1:1
Medium: HSL 2450; Medium Notes: t= 21.6 C
Medium parameters used: f = 2412 MHz; σ = 1.731 S/m; ε_r = 38.459; ρ = 1000 kg/m^3
Phantom section: Left Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.92, 6.92, 6.92); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WLAN2450 b-mode - Left/Cheek - CH 1 - BPSK 1 Mbps - Repeated/Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 27.011 V/m
Fast SAR: SAR(1 g) = 1.05 W/kg
Fast SAR(10 g) = 0.500 W/kg
Maximum value of SAR (interpolated) = 1.39 W/kg

WLAN2450 b-mode - Left/Cheek - CH 1 - BPSK 1 Mbps - Repeated/Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.011 V/m
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 1.02 W/kg
SAR(10 g) = 0.514 W/kg
Power Drift = 0.05 dB
Maximum value of SAR (measured) = 1.30 W/kg



Plot H6

Date/Time: 2014-11-23 13:42:48

DASY Configuration for WLAN2450 b-mode - Left/Cheek - CH 1 - BPSK 1 Mbps - Repeated/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1
Communication System: WLAN2450; Frequency: 2412 MHz; Duty Cycle: 1:1; PMF: 1
Medium: HSL 2450 Medium parameters used: f = 2412 MHz; σ = 1.731 S/m; ε_r = 38.459; ρ = 1000 kg/m^3
Phantom section: Left Section

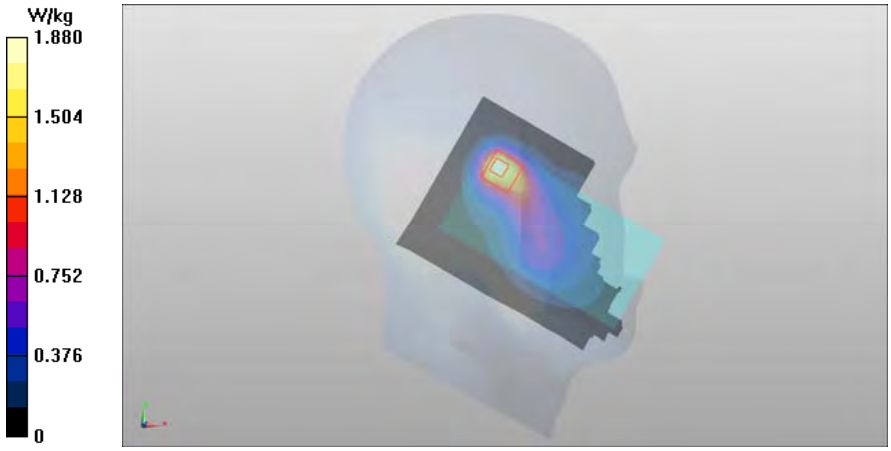
Probe: EX3DV4 - SN3835; ConvF(6.92, 6.92, 6.92); Calibrated: 2014-10-20;
Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used))
Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
Measurement SW: DASY52, Version 52.8 (8)

Date/Time: 2014-11-20 07:55:18

DASY Configuration for 2-slot GPRS850 - Left/Cheek - CH 190 - Antenna 1/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1
Communication System: 2-slot GPRS850; Frequency: 836.6 MHz; Duty Cycle: 1:4.19952; PMF: 2.04927
Medium: HSL835 Medium parameters used: f = 837 MHz; σ = 0.905 S/m; ε_r = 40.263; ρ = 1000 kg/m^3
Phantom section: Left Section

Probe: ES3DV3 - SN3131; ConvF(6.04, 6.04, 6.04); Calibrated: 2014-10-21;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn793; Calibrated: 2014-10-14
Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1596
Measurement SW: DASY52, Version 52.8 (8)

Fast SAR of Combined Scans: SAR(1 g) = 1.43 W/kg; SAR(10 g) = 0.717 W/kg
Maximum value of SAR (interpolated) = 1.88 W/kg



WLAN2450 b-mode was scaled with factor 1.29 and 2-slot GPRS850 with factor 1.17 before combining in SEMCAD SW.

Plot H7

Date/Time: 2014-11-23 13:42:48

DASY Configuration for WLAN2450 b-mode - Left/Cheek - CH 1 - BPSK 1 Mbps - Repeated/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1
Communication System: WLAN2450; Frequency: 2412 MHz; Duty Cycle: 1:1; PMF: 1
Medium: HSL 2450 Medium parameters used: f = 2412 MHz; σ = 1.731 S/m; ε_r = 38.459; ρ = 1000 kg/m^3
Phantom section: Left Section

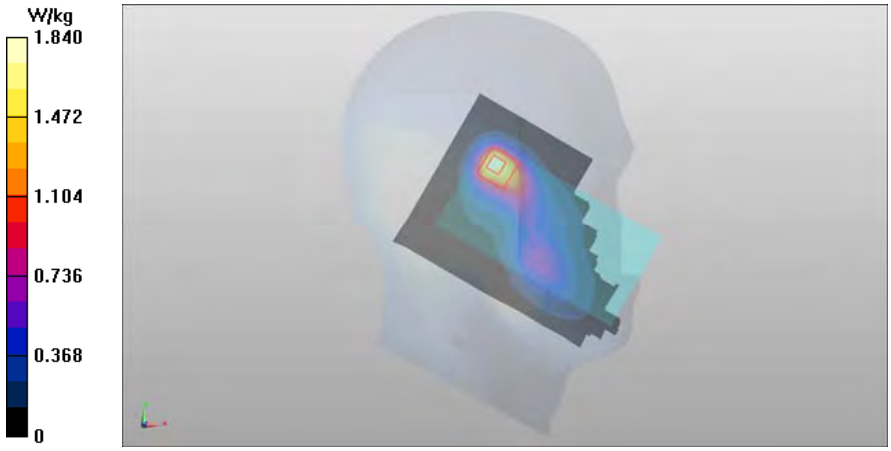
Probe: EX3DV4 - SN3835; ConvF(6.92, 6.92, 6.92); Calibrated: 2014-10-20;
Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used))
Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
Measurement SW: DASY52, Version 52.8 (8)

Date/Time: 2014-11-19 15:39:40

DASY Configuration for 2-slot GPRS1900 - Left/Cheek - CH 512 - Antenna 2/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048326/2
Communication System: 2-slot GPRS1900; Frequency: 1850.2 MHz; Duty Cycle: 1:4.19952; PMF: 2.04927
Medium: HSL1900 Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.333 S/m; ε_r = 38.99; ρ = 1000 kg/m^3
Phantom section: Left Section

Probe: ES3DV3 - SN3118; ConvF(4.79, 4.79, 4.79); Calibrated: 2014-10-21;
Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used))
Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
Phantom: SAM 1; Type: Twin SAM 040 CA; Serial: TP-1449
Measurement SW: DASY52, Version 52.8 (8)

Fast SAR of Combined Scans: SAR(1 g) = 1.39 W/kg; SAR(10 g) = 0.677 W/kg
Maximum value of SAR (interpolated) = 1.84 W/kg



WLAN2450 b-mode was scaled with factor 1.29 and 2-slot GPRS1900 with factor 1.12 before combining in SEMCAD SW.

Plot H8

Date/Time: 2014-11-23 13:42:48

DASY Configuration for WLAN2450 b-mode - Left/Cheek - CH 1 - BPSK 1 Mbps - Repeated/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1
Communication System: WLAN2450; Frequency: 2412 MHz; Duty Cycle: 1:1; PMF: 1
Medium: HSL 2450 Medium parameters used: f = 2412 MHz; σ = 1.731 S/m; ε_r = 38.459; ρ = 1000 kg/m^3
Phantom section: Left Section

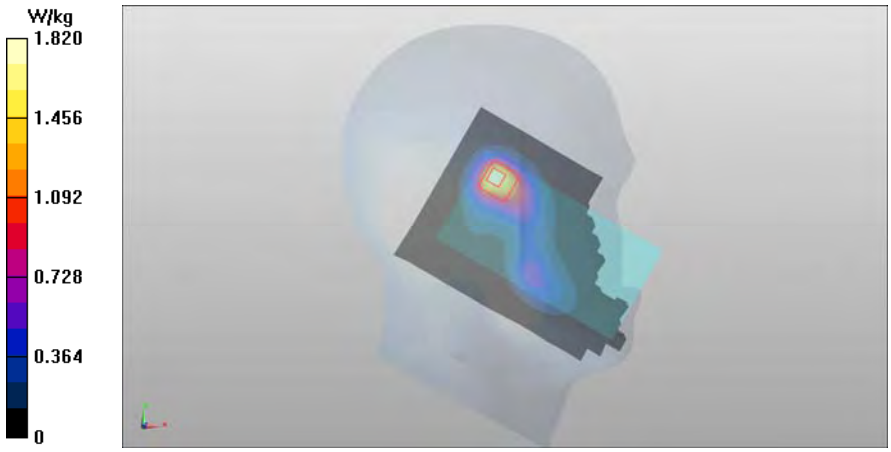
Probe: EX3DV4 - SN3835; ConvF(6.92, 6.92, 6.92); Calibrated: 2014-10-20;
Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used))
Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
Measurement SW: DASY52, Version 52.8 (8)

Date/Time: 2014-11-24 11:25:27

DASY Configuration for LTE2500 (Band 7) - Left/Cheek - CH 20850 - 20MHz - QPSK - 1 RB - Offset 99 - Antenna 2/Area Scan:
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048320/5
Communication System: LTE2500 (Band 7); Frequency: 2510 MHz; Duty Cycle: 1:1; PMF: 1
Medium: HSL2600 Medium parameters used: f = 2510 MHz; σ = 1.839 S/m; ε_r = 37.887; ρ = 1000 kg/m^3
Phantom section: Left Section

Probe: EX3DV4 - SN3835; ConvF(6.79, 6.79, 6.79); Calibrated: 2014-10-20;
Sensor-Surface: 3mm (Mechanical Surface Detection)
Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
Phantom: #3 SAM, SAR4 ; Type: QD000P40CD; Serial: TP-1691
Measurement SW: DASY52, Version 52.8 (8)

Fast SAR of Combined Scans: SAR(1 g) = 1.37 W/kg; SAR(10 g) = 0.655 W/kg
Maximum value of SAR (interpolated) = 1.82 W/kg



WLAN2450 b-mode was scaled with factor 1.29 and LTE2500 (Band 7) with factor 1.05 before combining in SEMCAD SW.

Plot B1

Date/Time: 2014-11-24 11:04:16

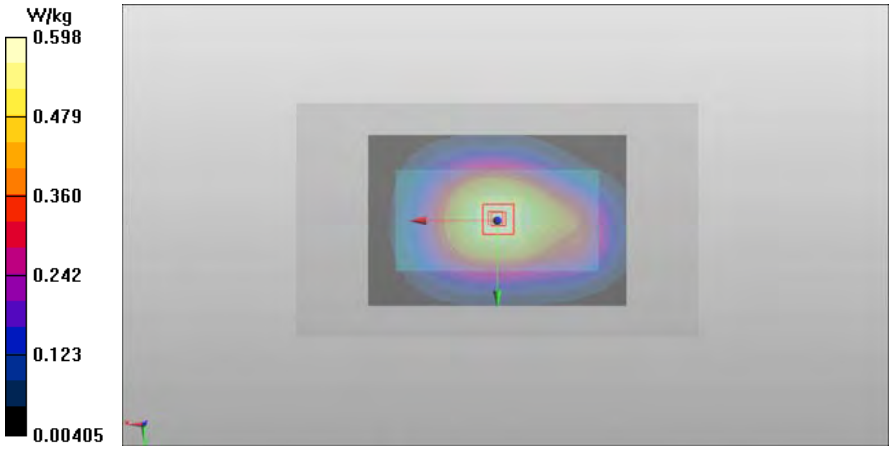
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: 2-slot GPRS850
Frequency: **848.8 MHz**; Duty Cycle: 1:4.19952
Medium: BSL835; Medium Notes: t= 21.2 C
Medium parameters used: f = 849 MHz; σ = 0.975 S/m; ε_r = 54.04; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(5.96, 5.96, 5.96); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 3 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1123/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS850/Body - CH 251 - 15mm - No Headset - Back - Antenna 1/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 25.488 V/m
Fast SAR: SAR(1 g) = 0.532 W/kg
Fast SAR(10 g) = 0.382 W/kg
Maximum value of SAR (interpolated) = 0.598 W/kg

2-slot GPRS850/Body - CH 251 - 15mm - No Headset - Back - Antenna 1/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 25.685 V/m
Peak SAR (extrapolated) = 0.680 W/kg
SAR(1 g) = 0.546 W/kg
SAR(10 g) = 0.417 W/kg
Power Drift = 0.03 dB
Maximum value of SAR (measured) = 0.597 W/kg



Plot B2

Date/Time: 2014-11-24 13:30:17

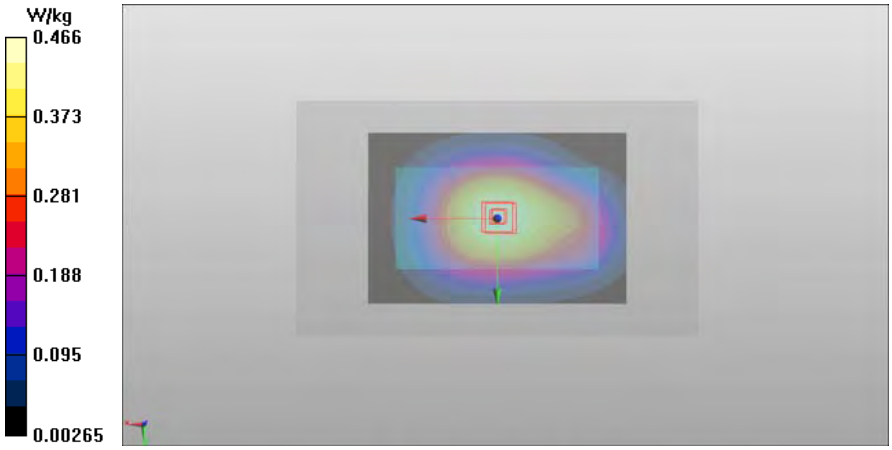
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: WCDMA850 (Band 5)
Frequency: **846.6 MHz**; Duty Cycle: 1:1
Medium: BSL835; Medium Notes: t= 21.2 C
Medium parameters used: f = 847 MHz; σ = 0.974 S/m; ε_r = 54.047; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(5.96, 5.96, 5.96); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 3 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1123/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WCDMA850 (Band 5)/Body - CH 4233 - 15mm - No Headset - Back - Antenna 1/Area Scan (81x121x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 22.643 V/m
Fast SAR: SAR(1 g) = 0.415 W/kg
Fast SAR(10 g) = 0.299 W/kg
Maximum value of SAR (interpolated) = 0.466 W/kg

WCDMA850 (Band 5)/Body - CH 4233 - 15mm - No Headset - Back - Antenna 1/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 22.638 V/m
Peak SAR (extrapolated) = 0.528 W/kg
SAR(1 g) = 0.423 W/kg
SAR(10 g) = 0.325 W/kg
Power Drift = -0.01 dB
Maximum value of SAR (measured) = 0.462 W/kg



Plot B3

Date/Time: 2014-11-25 08:13:28

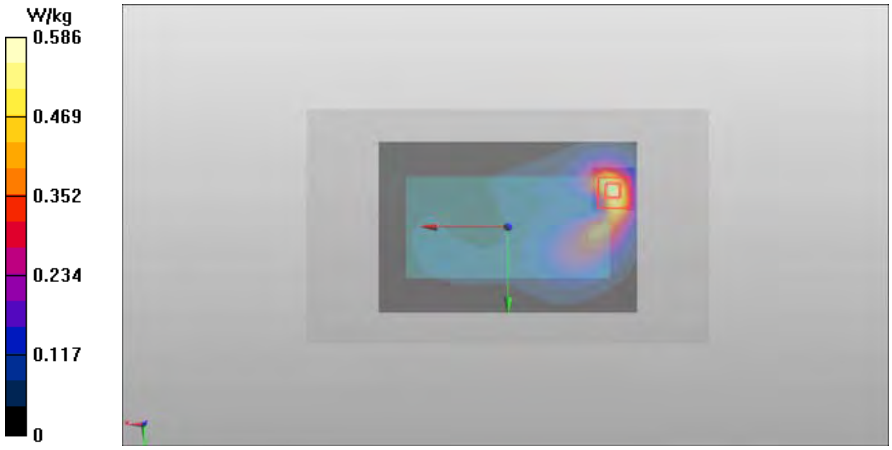
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048326/2

Communication System: 2-slot GPRS1900
Frequency: **1850.2 MHz**; Duty Cycle: 1:4.19952
Medium: BSL1900; Medium Notes: t= 21,2 C
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.469 S/m; ε_r = 52.502; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3118
- ConvF(4.44, 4.44, 4.44); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
- Phantom: SAM 2 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1124/2 (1800MHz), TP-1123/2 (1900MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS1900/Body - CH 512 - 15mm - No Headset - Display - Antenna 1/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 15.003 V/m
Fast SAR: SAR(1 g) = 0.452 W/kg
Fast SAR(10 g) = 0.243 W/kg
Maximum value of SAR (interpolated) = 0.586 W/kg

2-slot GPRS1900/Body - CH 512 - 15mm - No Headset - Display - Antenna 1/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 15.066 V/m
Peak SAR (extrapolated) = 0.855 W/kg
SAR(1 g) = 0.510 W/kg
SAR(10 g) = 0.281 W/kg
Power Drift = 0.04 dB
Maximum value of SAR (measured) = 0.567 W/kg



Plot B4

Date/Time: 2014-11-26 14:00:55

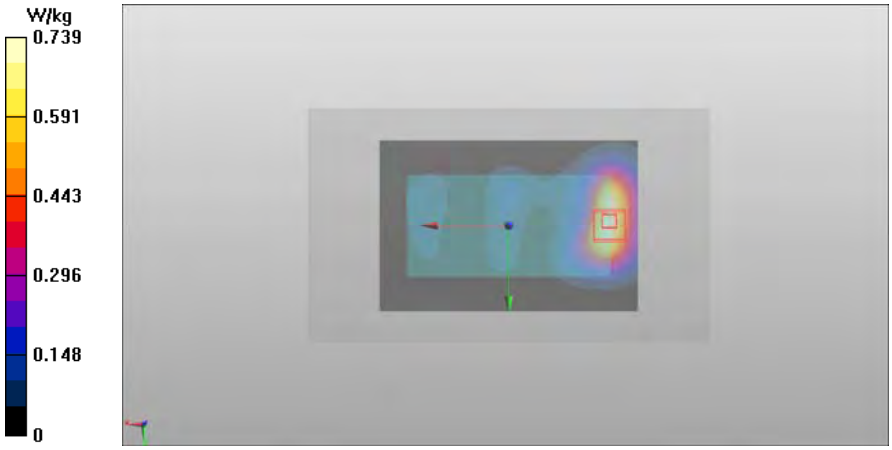
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048320/5

Communication System: LTE2500 (Band 7)
Frequency: **2510 MHz**; Duty Cycle: 1:1
Medium: BSL2600; Medium Notes: t= 22.2 C
Medium parameters used: f = 2510 MHz; σ = 2.003 S/m; ε_r = 51.297; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.74, 6.74, 6.74); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

LTE2500 (Band 7)/Body - CH 20850 - 20MHz - QPSK - 1 RB - Offset 99 - 15mm - No Headset - Back - Antenna 2/Area Scan (121x181x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 16.095 V/m
Fast SAR: SAR(1 g) = 0.589 W/kg
Fast SAR(10 g) = 0.321 W/kg
Maximum value of SAR (interpolated) = 0.739 W/kg

LTE2500 (Band 7)/Body - CH 20850 - 20MHz - QPSK - 1 RB - Offset 99 - 15mm - No Headset - Back - Antenna 2/Zoom Scan (9x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 16.796 V/m
Peak SAR (extrapolated) = 1.15 W/kg
SAR(1 g) = 0.628 W/kg
SAR(10 g) = 0.351 W/kg
Power Drift = 0.08 dB
Maximum value of SAR (measured) = 0.777 W/kg



Plot B5

Date/Time: 2014-11-22 13:33:24

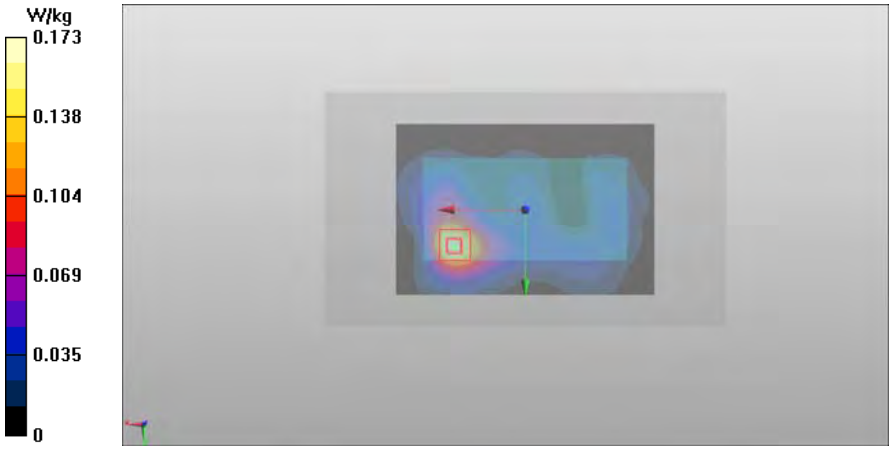
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1

Communication System: WLAN2450
Frequency: **2412 MHz**; Duty Cycle: 1:1
Medium: BSL2450; Medium Notes: t= 22.2 C
Medium parameters used: f = 2412 MHz; σ = 1.878 S/m; ε_r = 51.031; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.87, 6.87, 6.87); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WLAN2450 b-mode/Body - CH 1 - BPSK 1 Mbps - 15mm - No Headset - Back/Area Scan (121x181x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 9.279 V/m
Fast SAR: SAR(1 g) = 0.134 W/kg
Fast SAR(10 g) = 0.069 W/kg
Maximum value of SAR (interpolated) = 0.173 W/kg

WLAN2450 b-mode/Body - CH 1 - BPSK 1 Mbps - 15mm - No Headset - Back/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.004 V/m
Peak SAR (extrapolated) = 0.293 W/kg
SAR(1 g) = 0.156 W/kg
SAR(10 g) = 0.083 W/kg
Power Drift = 0.17 dB
Maximum value of SAR (measured) = 0.193 W/kg



Plot W1

Date/Time: 2014-11-25 12:48:11

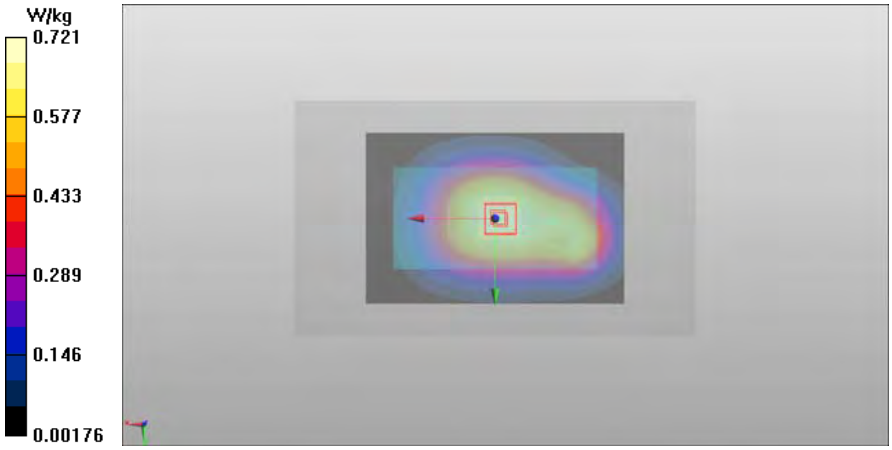
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: 2-slot GPRS850
Frequency: **848.8 MHz**; Duty Cycle: 1:4.19952
Medium: BSL835; Medium Notes: t= 21,6 C
Medium parameters used: f = 849 MHz; σ = 0.979 S/m; ε_r = 53.915; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(5.96, 5.96, 5.96); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 3 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1123/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS850/Body - CH 251 - 10mm - No Headset - Back - Antenna 1/Area Scan (81x121x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 27.783 V/m
Fast SAR: SAR(1 g) = 0.642 W/kg
Fast SAR(10 g) = 0.464 W/kg
Maximum value of SAR (interpolated) = 0.721 W/kg

2-slot GPRS850/Body - CH 251 - 10mm - No Headset - Back - Antenna 1/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 27.726 V/m
Peak SAR (extrapolated) = 0.806 W/kg
SAR(1 g) = 0.657 W/kg
SAR(10 g) = 0.508 W/kg
Power Drift = -0.03 dB
Maximum value of SAR (measured) = 0.715 W/kg



Plot W2

Date/Time: 2014-11-25 16:30:29

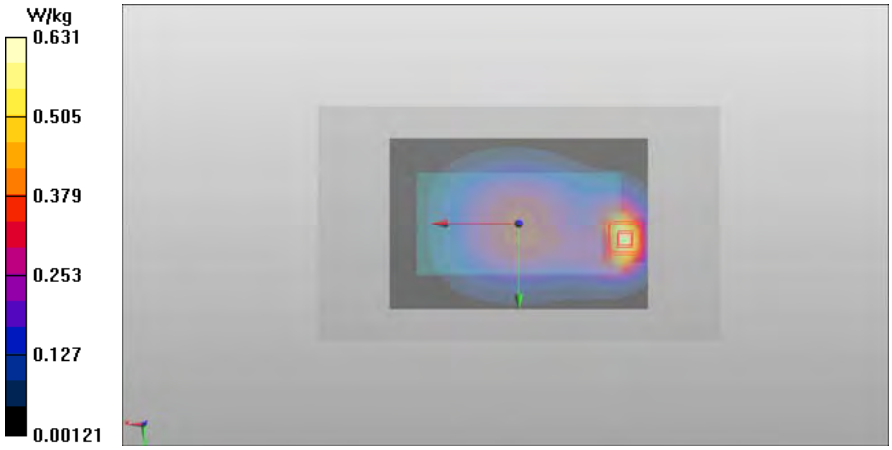
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048317/1

Communication System: WCDMA850 (Band 5)
Frequency: **826.4 MHz**; Duty Cycle: 1:1
Medium: BSL835; Medium Notes: t= 21,6 C
Medium parameters used (interpolated): f = 826.4 MHz; σ = 0.964 S/m; ε_r = 54.003; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3131
- ConvF(5.96, 5.96, 5.96); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn793; Calibrated: 2014-10-14
- Phantom: SAM 3 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1123/3
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WCDMA850 (Band 5)/Body - CH 4233 - 10mm - No Headset - Display - Antenna 2/Area Scan (81x121x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 25.624 V/m
Fast SAR: SAR(1 g) = 0.525 W/kg
Fast SAR(10 g) = 0.330 W/kg
Maximum value of SAR (interpolated) = 0.631 W/kg

WCDMA850 (Band 5)/Body - CH 4233 - 10mm - No Headset - Display - Antenna 2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 25.310 V/m
Peak SAR (extrapolated) = 0.875 W/kg
SAR(1 g) = 0.501 W/kg
SAR(10 g) = 0.290 W/kg
Power Drift = -0.02 dB
Maximum value of SAR (measured) = 0.623 W/kg



Plot W3

Date/Time: 2014-11-25 13:55:45

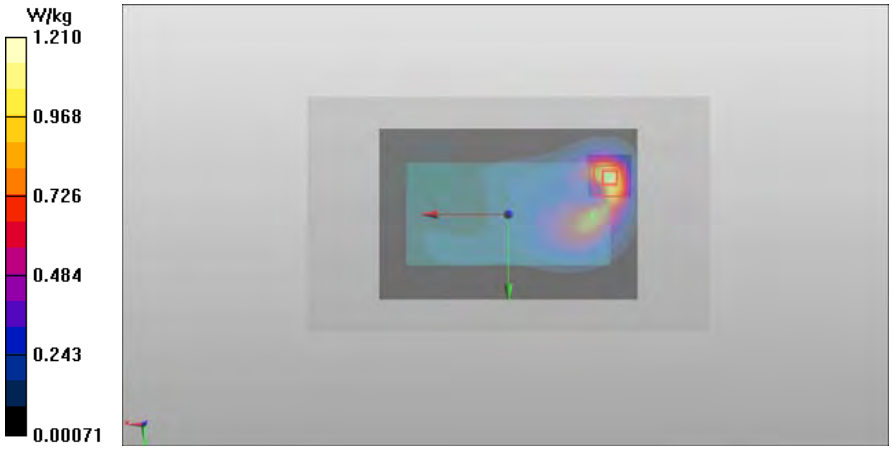
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048326/2

Communication System: 2-slot GPRS1900
Frequency: **1850.2 MHz**; Duty Cycle: 1:4.19952
Medium: BSL1900; Medium Notes: t= 21,2 C
Medium parameters used (interpolated): f = 1850.2 MHz; σ = 1.469 S/m; ε_r = 52.502; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: ES3DV3 - SN3118
- ConvF(4.44, 4.44, 4.44); Calibrated: 2014-10-21;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1316; Calibrated: 2014-10-14
- Phantom: SAM 2 Triple Phantom 5.1C; Type: QD 000 P51 CA; Serial: TP-1124/2 (1800MHz), TP-1123/2 (1900MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

2-slot GPRS1900/Body - CH 512 - 10mm - No Headset - Display - Antenna 1 - Repeated/Area Scan (81x121x1):
Interpolated grid: dx=1.500 mm, dy=1.500 mm
Reference Value = 26.681 V/m
Fast SAR: SAR(1 g) = 0.898 W/kg
Fast SAR(10 g) = 0.470 W/kg
Maximum value of SAR (interpolated) = 1.21 W/kg

2-slot GPRS1900/Body - CH 512 - 10mm - No Headset - Display - Antenna 1 - Repeated/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 26.734 V/m
Peak SAR (extrapolated) = 1.82 W/kg
SAR(1 g) = 1.05 W/kg
SAR(10 g) = 0.547 W/kg
Power Drift = -0.01 dB
Maximum value of SAR (measured) = 1.32 W/kg



Plot W4

Date/Time: 2014-11-25 18:32:26

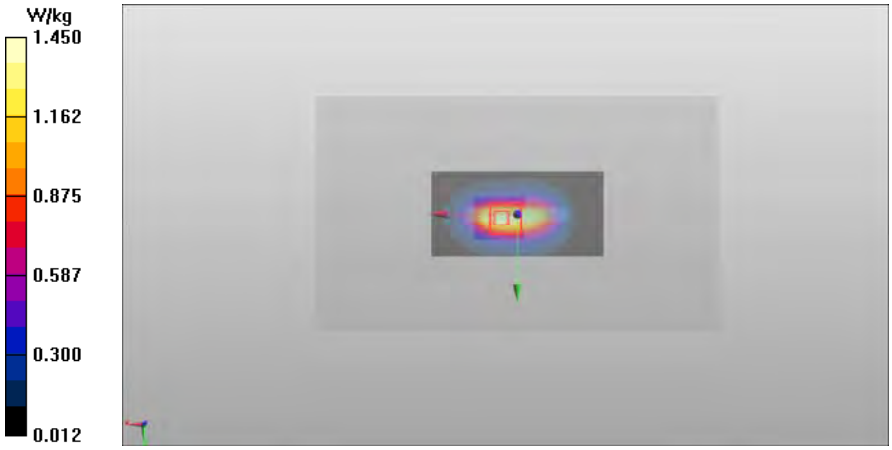
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048324/7

Communication System: LTE2500 (Band 7)
Frequency: **2560 MHz**; Duty Cycle: 1:1
Medium: BSL2600; Medium Notes: t= 22.2 C
Medium parameters used: f = 2560 MHz; σ = 2.042 S/m; ε_r = 50.203; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.74, 6.74, 6.74); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

LTE2500 (Band 7)/Body - CH 21350 - 20MHz - QPSK - 1 RB - Offset 99 - 10mm - No Headset – Bottom - Antenna 2/Area Scan (61x121x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 23.787 V/m
Fast SAR: SAR(1 g) = 1.12 W/kg
Fast SAR(10 g) = 0.567 W/kg
Maximum value of SAR (interpolated) = 1.45 W/kg

LTE2500 (Band 7)/Body - CH 21350 - 20MHz - QPSK - 1 RB - Offset 99 - 10mm - No Headset – Bottom - Antenna 2/Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 23.718 V/m
Peak SAR (extrapolated) = 2.13 W/kg
SAR(1 g) = 1.11 W/kg
SAR(10 g) = 0.571 W/kg
Power Drift = -0.00 dB
Maximum value of SAR (measured) = 1.41 W/kg



Plot W5

Date/Time: 2014-11-22 16:15:13

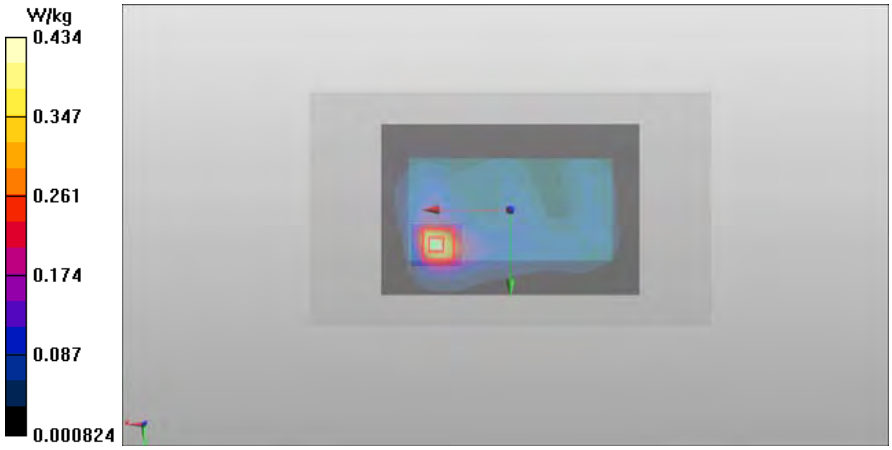
Test Laboratory: TCC Microsoft
Type: RM-1072; Serial: 004402/74/048322/1

Communication System: WLAN2450
Frequency: **2412 MHz**; Duty Cycle: 1:1
Medium: BSL2450; Medium Notes: t= 22.2 C
Medium parameters used: f = 2412 MHz; σ = 1.878 S/m; ε_r = 51.031; ρ = 1000 kg/m^3
Phantom section: Center Section

DASY Configuration:
- Probe: EX3DV4 - SN3835
- ConvF(6.87, 6.87, 6.87); Calibrated: 2014-10-20;
- Sensor-Surface: 3mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1213; Calibrated: 2014-10-14
- Phantom: #2 Triple, SAR4; Type: QD 000 P51 CA; Serial: TP-1123/1 (750 MHz), TP-1124/1 (2450 MHz)
- Measurement SW: DASY52, Version 52.8 (8); SEMCAD X Version 14.6.9 (7117)

WLAN2450 b-mode/Body - CH 1 - BPSK 1 Mbps - 10mm - No Headset - Back/Area Scan (121x181x1):
Interpolated grid: dx=1.000 mm, dy=1.000 mm
Reference Value = 14.965 V/m
Fast SAR: SAR(1 g) = 0.329 W/kg
Fast SAR(10 g) = 0.159 W/kg
Maximum value of SAR (interpolated) = 0.434 W/kg

WLAN2450 b-mode/Body - CH 1 - BPSK 1 Mbps - 10mm - No Headset - Back/Zoom Scan (7x8x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.396 V/m
Peak SAR (extrapolated) = 0.700 W/kg
SAR(1 g) = 0.344 W/kg
SAR(10 g) = 0.171 W/kg
Power Drift = 0.09 dB
Maximum value of SAR (measured) = 0.437 W/kg



APPENDIX C: DIELECTRIC PARAMETERS OF THE TISSUE SIMULANTS

Head tissue simulant dielectric parameters used in the measurements:

f (MHz)	GSM 850	Dielectric Parameters					
	Date	CH 128 824.2 MHz		CH 190 836.6 MHz		CH 251 848.8 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
836	2014-11-20	40.3	0.89	40.3	0.90	40.2	0.91
	2014-11-21	39.9	0.89	39.9	0.90	39.8	0.90
	2014-12-03	40.6	0.90	40.5	0.90	40.4	0.91
	2014-12-04	40.3	0.89	40.2	0.90	40.1	0.91
f (MHz)	WCDMA850 (Band 5)	Dielectric Parameters					
	Date	CH 4132 826.4 MHz		CH 4175 835.0 MHz		CH 4233 846.6 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
835	2014-11-20	40.3	0.90	40.3	0.90	40.2	0.91
	2014-11-21	39.9	0.89	39.9	0.89	39.8	0.90
	2014-12-03	40.5	0.90	40.5	0.90	40.4	0.91
	2014-12-04	40.3	0.89	40.2	0.90	40.2	0.90
f (MHz)	GSM 1900	Dielectric Parameters					
	Date	CH 512 1850.2 MHz		CH 661 1880.0 MHz		CH 810 1909.8 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
1880	2014-11-19	39.0	1.33	38.9	1.36	38.8	1.38
	2014-11-20	39.4	1.35	39.4	1.37	39.3	1.40
	2014-11-26	39.1	1.34	39.0	1.36	38.9	1.39
	2014-12-03	39.5	1.34	39.4	1.37	39.3	1.40
f (MHz)	WLAN 2450	Dielectric Parameters					
	Date	CH 1 2412.0 MHz		CH 6 2437.0 MHz		CH 11 2462.0 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
2437	2014-11-23	38.5	1.73	38.4	1.75	38.3	1.78
	2014-11-24	38.2	1.73	38.2	1.76	38.1	1.78
	2014-12-03	38.1	1.73	38.0	1.75	37.9	1.78
	2014-12-04	38.8	1.74	38.7	1.76	38.7	1.79
f (MHz)	LTE2500 (Band 7)	Dielectric Parameters					
	Date	CH 20850 2510.0 MHz		CH 21100 2535.0 MHz		CH 21350 2560.0 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
2535	2014-11-24	37.9	1.84	37.8	1.87	37.7	1.89
	2014-11-27	38.5	1.83	38.4	1.85	38.3	1.88
	2014-12-03	37.8	1.83	37.7	1.86	37.6	1.89

Body tissue simulant dielectric parameters used in the measurements:

f (MHz)	GSM 850	Dielectric Parameters					
	Date	CH 128 824.2 MHz		CH 190 836.6 MHz		CH 251 848.8 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
836	2014-11-24	54.1	0.96	54.1	0.97	54.0	0.97
	2014-11-25	54.0	0.96	54.0	0.97	53.9	0.98
	2014-12-03	54.0	0.96	54.0	0.97	53.9	0.98
f (MHz)	WCDMA850 (Band 5)	Dielectric Parameters					
	Date	CH 4132 826.4 MHz		CH 4175 835.0 MHz		CH 4233 846.6 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
835	2014-11-24	54.1	0.96	54.1	0.96	54.0	0.97
	2014-11-25	54.0	0.96	54.0	0.97	53.9	0.98
	2014-12-03	54.0	0.96	54.0	0.97	53.9	0.97
f (MHz)	GSM 1900	Dielectric Parameters					
	Date	CH 512 1850.2 MHz		CH 661 1880.0 MHz		CH 810 1909.8 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
1880	2014-11-24	52.7	1.47	52.7	1.50	52.6	1.52
	2014-11-25	52.5	1.47	52.5	1.49	52.4	1.52
	2014-11-27	52.5	1.47	52.4	1.50	52.3	1.53
	2014-12-03	52.0	1.47	51.9	1.50	51.8	1.53
f (MHz)	WLAN 2450	Dielectric Parameters					
	Date	CH 1 2412.0 MHz		CH 6 2437.0 MHz		CH 11 2462.0 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
2437	2014-11-21	51.0	1.88	51.0	1.90	50.9	1.93
	2014-11-24	51.0	1.87	50.9	1.90	50.9	1.92
	2014-12-03	51.3	1.87	51.3	1.90	51.2	1.92
f (MHz)	LTE2500 (Band 7)	Dielectric Parameters					
	Date	CH 20850 2510.0 MHz		CH 21100 2535.0 MHz		CH 21350 2560.0 MHz	
		er	s [S/m]	er	s [S/m]	er	s [S/m]
2535	2014-11-24	50.7	1.99	50.6	2.02	50.6	2.04
	2014-11-25	50.3	1.98	50.3	2.01	50.2	2.04
	2014-11-26	51.3	2.00	51.2	2.03	51.1	2.06
	2014-12-03	51.0	1.98	50.9	2.01	50.9	2.04

APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Accreditation No.: SCS 108

Client **TCC Microsoft**

Certificate No: ES3-3118_Oct14

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3118

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

Calibration date: October 21, 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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
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-14)	In house check: Oct-15

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

Issued: October 21, 2014

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3118

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)
750	41.9	0.89	6.04	6.04	6.04	0.24	2.17	± 12.0 %
835	41.5	0.90	5.83	5.83	5.83	0.74	1.18	± 12.0 %
1750	40.1	1.37	4.98	4.98	4.98	0.73	1.17	± 12.0 %
1900	40.0	1.40	4.79	4.79	4.79	0.80	1.16	± 12.0 %
2300	39.5	1.67	4.51	4.51	4.51	0.75	1.26	± 12.0 %
2450	39.2	1.80	4.25	4.25	4.25	0.80	1.25	± 12.0 %
2600	39.0	1.96	4.18	4.18	4.18	0.80	1.27	± 12.0 %

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

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε end 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:3118

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)
750	55.5	0.96	5.79	5.79	5.79	0.39	1.67	± 12.0 %
835	55.2	0.97	5.76	5.76	5.76	0.36	1.76	± 12.0 %
1750	53.4	1.49	4.64	4.64	4.64	0.60	1.40	± 12.0 %
1900	53.3	1.52	4.44	4.44	4.44	0.53	1.51	± 12.0 %
2300	52.9	1.81	4.22	4.22	4.22	0.80	1.19	± 12.0 %
2450	52.7	1.95	4.03	4.03	4.03	0.80	1.16	± 12.0 %
2600	52.5	2.16	3.93	3.93	3.93	0.80	1.04	± 12.0 %

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

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

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

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Accreditation No.: SCS 108

Client **TCC Microsoft**

Certificate No: ES3-3131_Oct14

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3131

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

Calibration date: October 21, 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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
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-14)	In house check: Oct-15

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

Issued: October 21, 2014

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3131

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)
750	41.9	0.89	6.29	6.29	6.29	0.58	1.27	± 12.0 %
835	41.5	0.90	6.04	6.04	6.04	0.62	1.27	± 12.0 %
1750	40.1	1.37	5.10	5.10	5.10	0.43	1.55	± 12.0 %
1900	40.0	1.40	4.92	4.92	4.92	0.58	1.32	± 12.0 %
2300	39.5	1.67	4.62	4.62	4.62	0.78	1.17	± 12.0 %
2450	39.2	1.80	4.39	4.39	4.39	0.65	1.33	± 12.0 %
2600	39.0	1.96	4.25	4.25	4.25	0.79	1.22	± 12.0 %

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

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

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3131

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)
750	55.5	0.96	5.97	5.97	5.97	0.27	2.03	± 12.0 %
835	55.2	0.97	5.96	5.96	5.96	0.54	1.37	± 12.0 %
1750	53.4	1.49	4.79	4.79	4.79	0.43	1.72	± 12.0 %
1900	53.3	1.52	4.58	4.58	4.58	0.65	1.40	± 12.0 %
2300	52.9	1.81	4.33	4.33	4.33	0.76	1.21	± 12.0 %
2450	52.7	1.95	4.14	4.14	4.14	0.80	1.11	± 12.0 %
2600	52.5	2.16	4.03	4.03	4.03	0.80	1.06	± 12.0 %

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

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

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

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Accreditation No.: SCS 108

Client Nokia SD

Certificate No: ES3-3112_Jan14

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3112

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

Calibration date: January 22, 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

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

Issued: January 22, 2014

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

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S Servizio svizzero di taratura
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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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Procedure to measure the Specific Absorption Rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)", February 2005

Methods Applied and Interpretation of Parameters:

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

Probe ES3DV3

SN:3112

Manufactured: March 9, 2006
Calibrated: January 22, 2014

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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3112

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.29	1.32	1.32	± 10.1 %
DCP (mV)[B]	100.8	99.9	99.0	

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	158.8	±3.0 %
		Y	0.0	0.0	1.0		163.6	
		Z	0.0	0.0	1.0		157.6	

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: ES3DV3 - SN:3112

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)
750	41.9	0.89	6.42	6.42	6.42	0.80	1.13	± 12.0 %
835	41.5	0.90	6.16	6.16	6.16	0.23	2.21	± 12.0 %
1750	40.1	1.37	5.25	5.25	5.25	0.51	1.40	± 12.0 %
1900	40.0	1.40	5.11	5.11	5.11	0.42	1.64	± 12.0 %
2100	39.8	1.49	5.17	5.17	5.17	0.49	1.49	± 12.0 %
2450	39.2	1.80	4.49	4.49	4.49	0.62	1.41	± 12.0 %
2600	39.0	1.96	4.33	4.33	4.33	0.77	1.34	± 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.

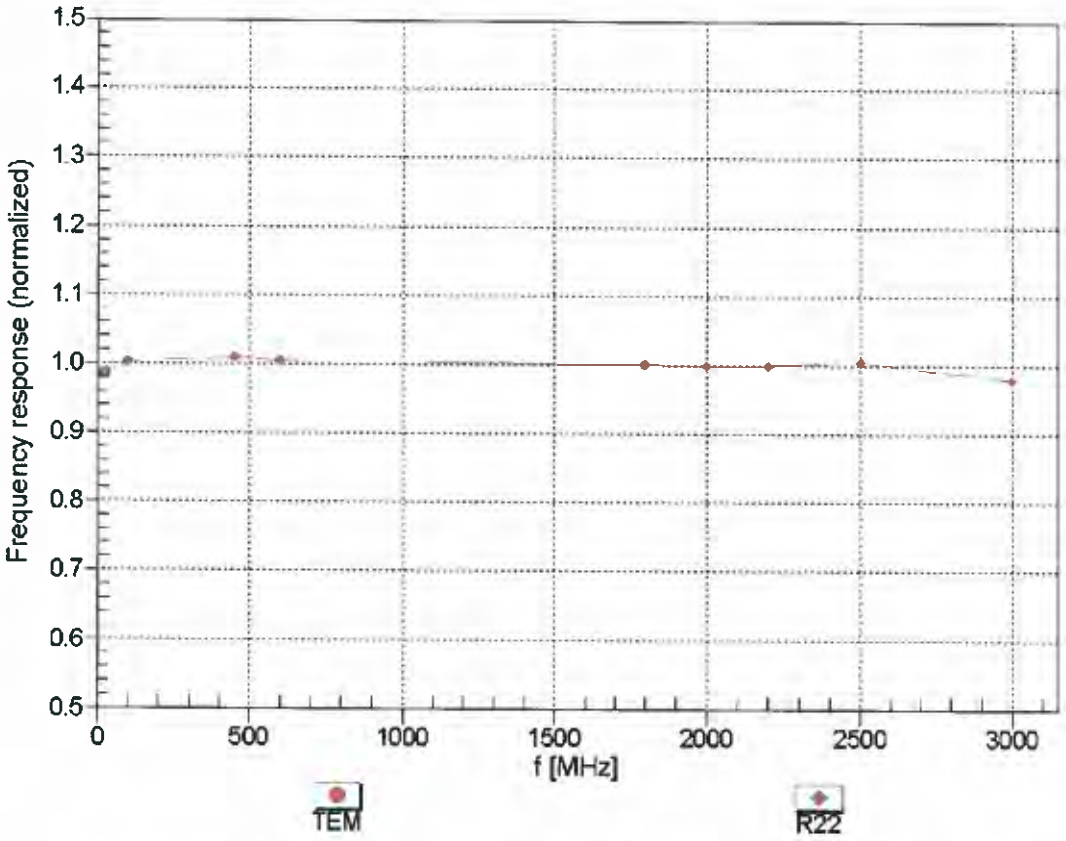
DASY/EASY - Parameters of Probe: ES3DV3 - SN:3112

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)
750	55.5	0.96	6.32	6.32	6.32	0.79	1.18	± 12.0 %
835	55.2	0.97	6.26	6.26	6.26	0.30	2.01	± 12.0 %
1750	53.4	1.49	4.90	4.90	4.90	0.35	2.00	± 12.0 %
1900	53.3	1.52	4.73	4.73	4.73	0.54	1.55	± 12.0 %
2100	53.2	1.62	4.86	4.86	4.86	0.50	1.66	± 12.0 %
2450	52.7	1.95	4.26	4.26	4.26	0.80	1.03	± 12.0 %
2600	52.5	2.16	4.05	4.05	4.05	0.59	0.83	± 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.

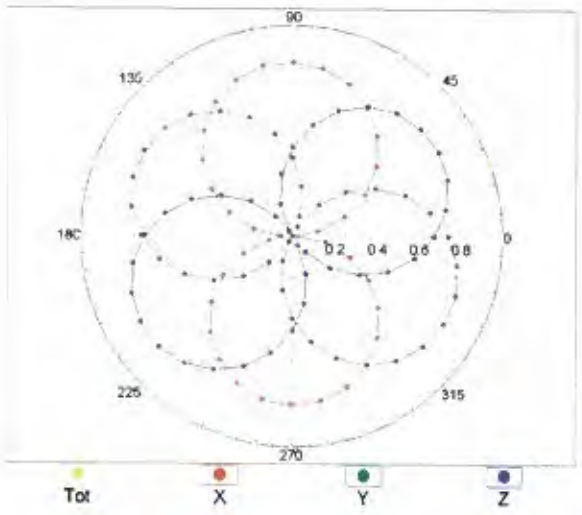
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



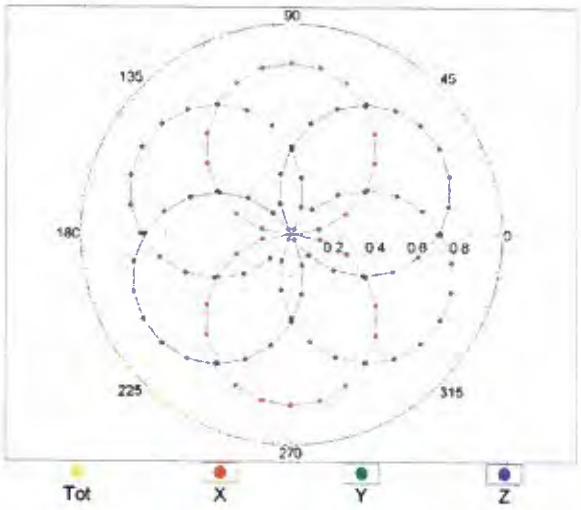
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

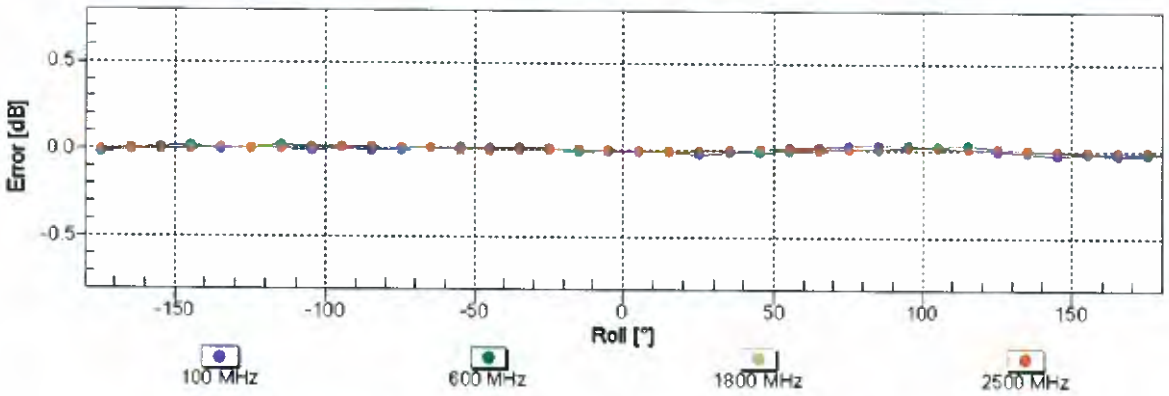
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



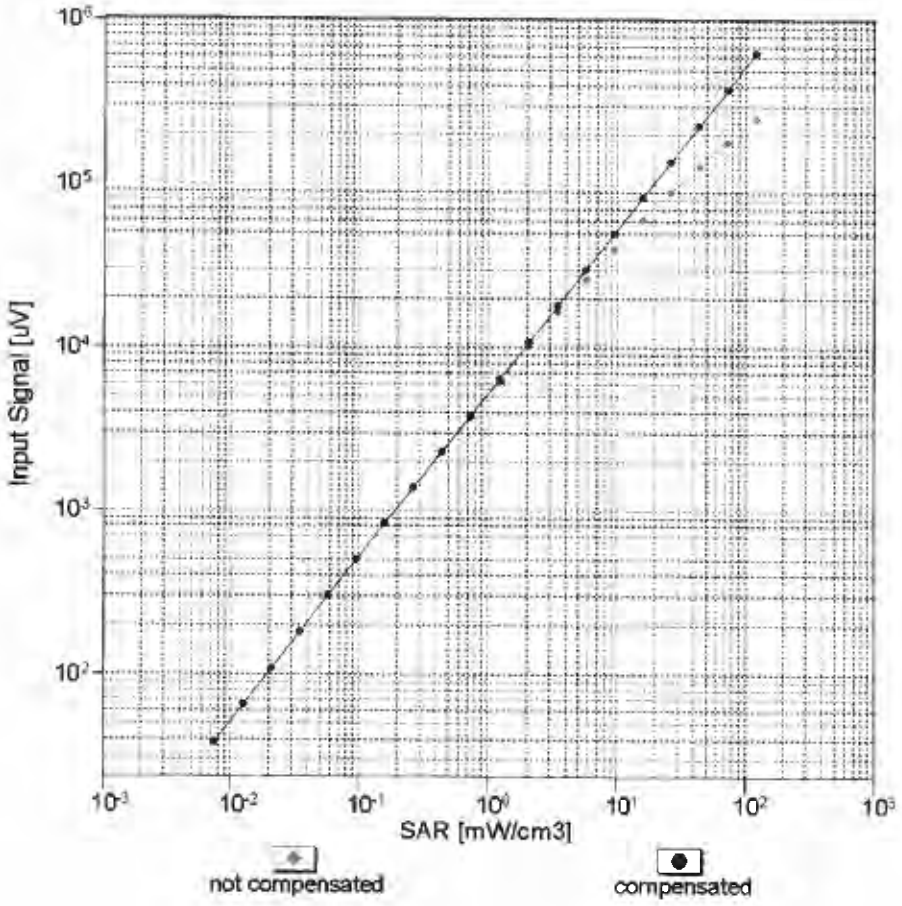
f=1800 MHz,R22

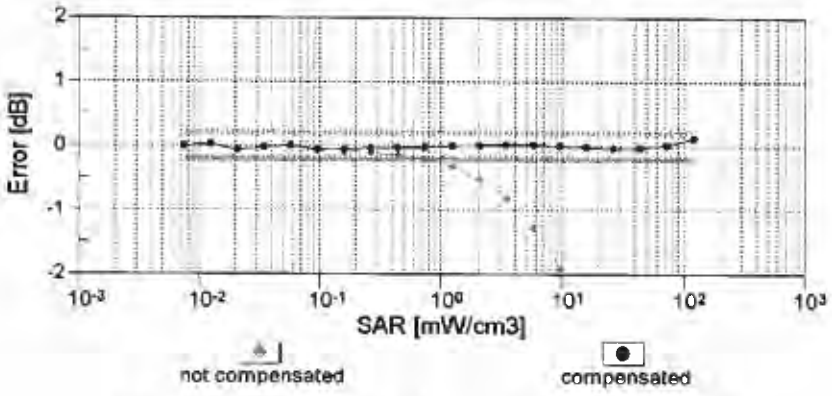




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR_{head})
(TEM cell , f = 900 MHz)

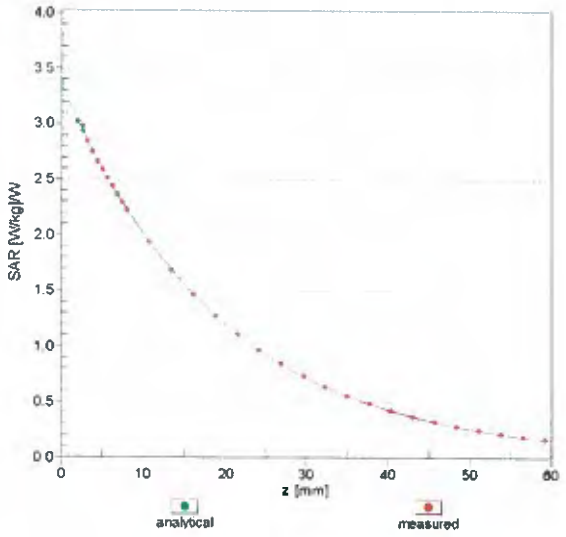




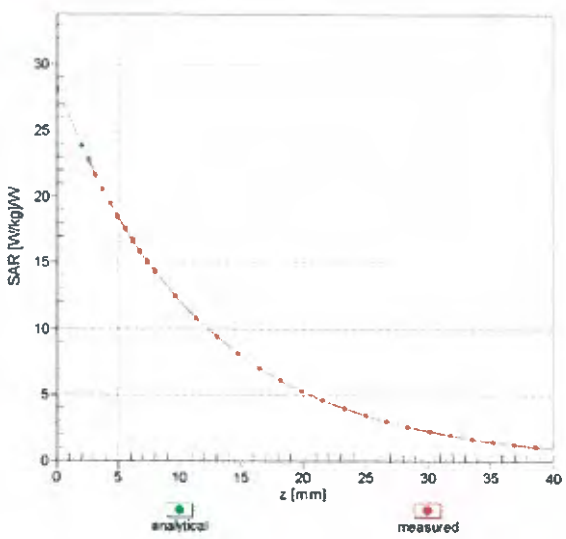
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz,WGLS R9 (H_convF)

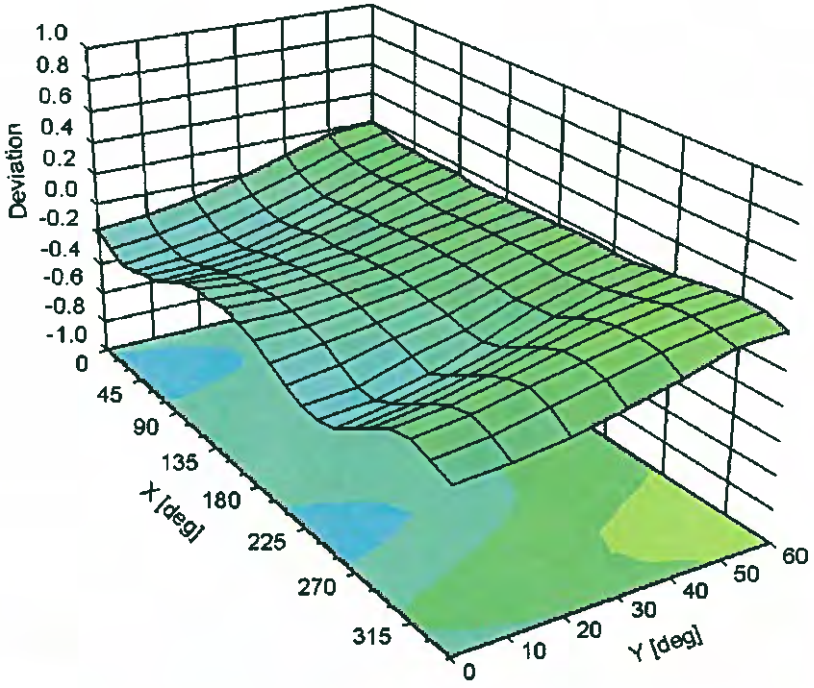


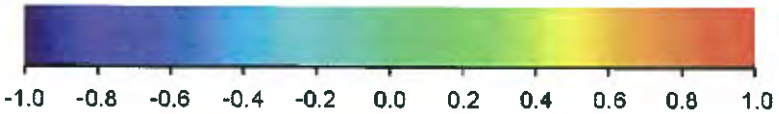
f = 1900 MHz,WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3112

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-134.7
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

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Zeughausstrasse 43, 8004 Zurich, Switzerland

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Swiss Calibration Service

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

Accreditation No.: SCS 108

Client **TCC Microsoft**

Certificate No: EX3-3835_Oct14

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3835

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: October 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	03-Apr-14 (No. 217-01911)	Apr-15
Power sensor E4412A	MY41498087	03-Apr-14 (No. 217-01911)	Apr-15
Reference 3 dB Attenuator	SN: S5054 (3c)	03-Apr-14 (No. 217-01915)	Apr-15
Reference 20 dB Attenuator	SN: S5277 (20x)	03-Apr-14 (No. 217-01919)	Apr-15
Reference 30 dB Attenuator	SN: S5129 (30b)	03-Apr-14 (No. 217-01920)	Apr-15
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-14)	In house check: Oct-15

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

Issued: October 21, 2014

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3835

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)
750	41.9	0.89	9.14	9.14	9.14	0.28	1.12	± 12.0 %
835	41.5	0.90	8.87	8.87	8.87	0.29	1.03	± 12.0 %
1750	40.1	1.37	7.73	7.73	7.73	0.50	0.72	± 12.0 %
1900	40.0	1.40	7.52	7.52	7.52	0.76	0.57	± 12.0 %
2300	39.5	1.67	7.23	7.23	7.23	0.50	0.70	± 12.0 %
2450	39.2	1.80	6.92	6.92	6.92	0.41	0.80	± 12.0 %
2600	39.0	1.96	6.79	6.79	6.79	0.40	0.84	± 12.0 %
5200	36.0	4.66	4.91	4.91	4.91	0.35	1.80	± 13.1 %
5300	35.9	4.76	4.73	4.73	4.73	0.35	1.80	± 13.1 %
5500	35.6	4.96	4.52	4.52	4.52	0.40	1.80	± 13.1 %
5600	35.5	5.07	4.32	4.32	4.32	0.40	1.80	± 13.1 %
5800	35.3	5.27	4.36	4.36	4.36	0.40	1.80	± 13.1 %

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

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

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

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3835

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)
750	55.5	0.96	8.80	8.80	8.80	0.24	1.33	± 12.0 %
835	55.2	0.97	8.90	8.90	8.90	0.63	0.67	± 12.0 %
1750	53.4	1.49	7.46	7.46	7.46	0.78	0.63	± 12.0 %
1900	53.3	1.52	7.17	7.17	7.17	0.43	0.80	± 12.0 %
2300	52.9	1.81	7.03	7.03	7.03	0.80	0.61	± 12.0 %
2450	52.7	1.95	6.87	6.87	6.87	0.80	0.58	± 12.0 %
2600	52.5	2.16	6.74	6.74	6.74	0.80	0.50	± 12.0 %
5200	49.0	5.30	4.20	4.20	4.20	0.45	1.90	± 13.1 %
5300	48.9	5.42	4.03	4.03	4.03	0.45	1.90	± 13.1 %
5500	48.6	5.65	3.79	3.79	3.79	0.45	1.90	± 13.1 %
5600	48.5	5.77	3.63	3.63	3.63	0.45	1.90	± 13.1 %
5800	48.2	6.00	3.80	3.80	3.80	0.50	1.90	± 13.1 %

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

[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.

APPENDIX E: RELEVANT PAGES FROM DIPOLE VALIDATION KIT REPORTS

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Schmid & Partner
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Zeughausstrasse 43, 8004 Zurich, Switzerland

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

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

Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D835V2-462_May14**

CALIBRATION CERTIFICATE

Object D835V2 - SN: 462

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

Calibration date: May 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

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

Issued: May 7, 2014

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.2 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.39 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.19 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.54 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.98 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.6 ± 6 %	1.02 mho/m ± 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	2.43 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**9.41 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	1.58 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**6.16 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 2.8 jΩ
Return Loss	-30.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	45.8 Ω - 5.4 jΩ
Return Loss	- 23.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.390 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 27, 2002

Date: 06.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 462

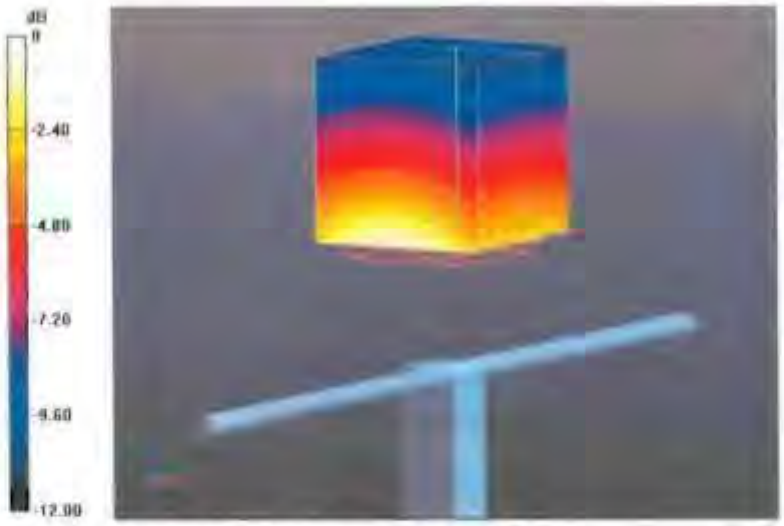
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

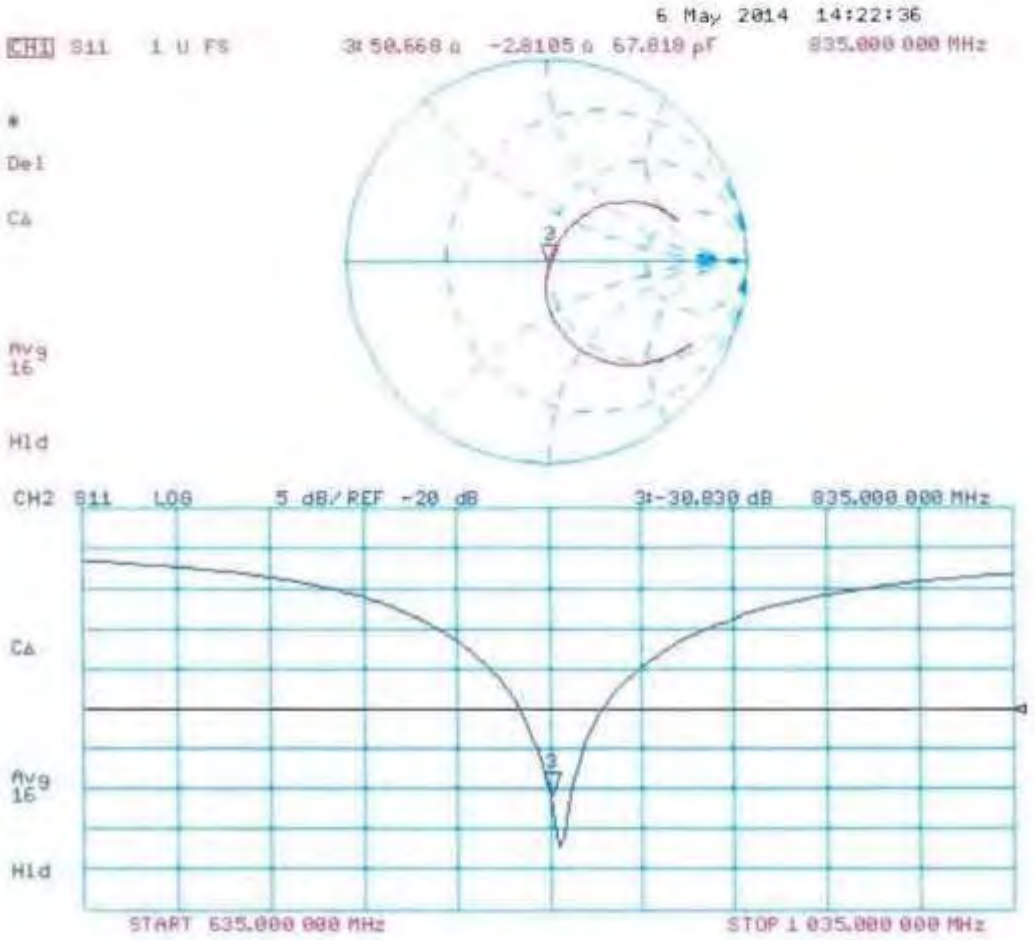
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.25 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 2.39 W/kg; SAR(10 g) = 1.54 W/kg
Maximum value of SAR (measured) = 2.80 W/kg



0 dB = 2.80 W/kg = 4.47 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 06.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 462

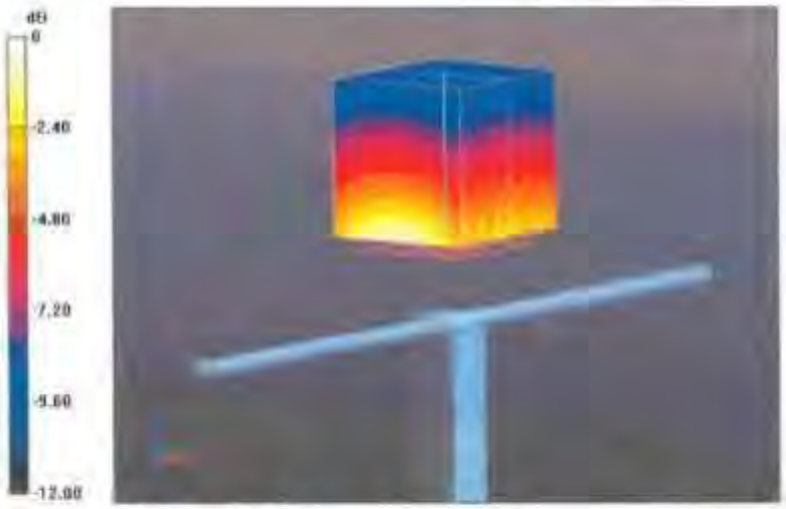
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 1.02 S/m; ε_r = 56.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 30.04.2014
- Phantom: Flat Phantom 4.9L; Type: QD000P49AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

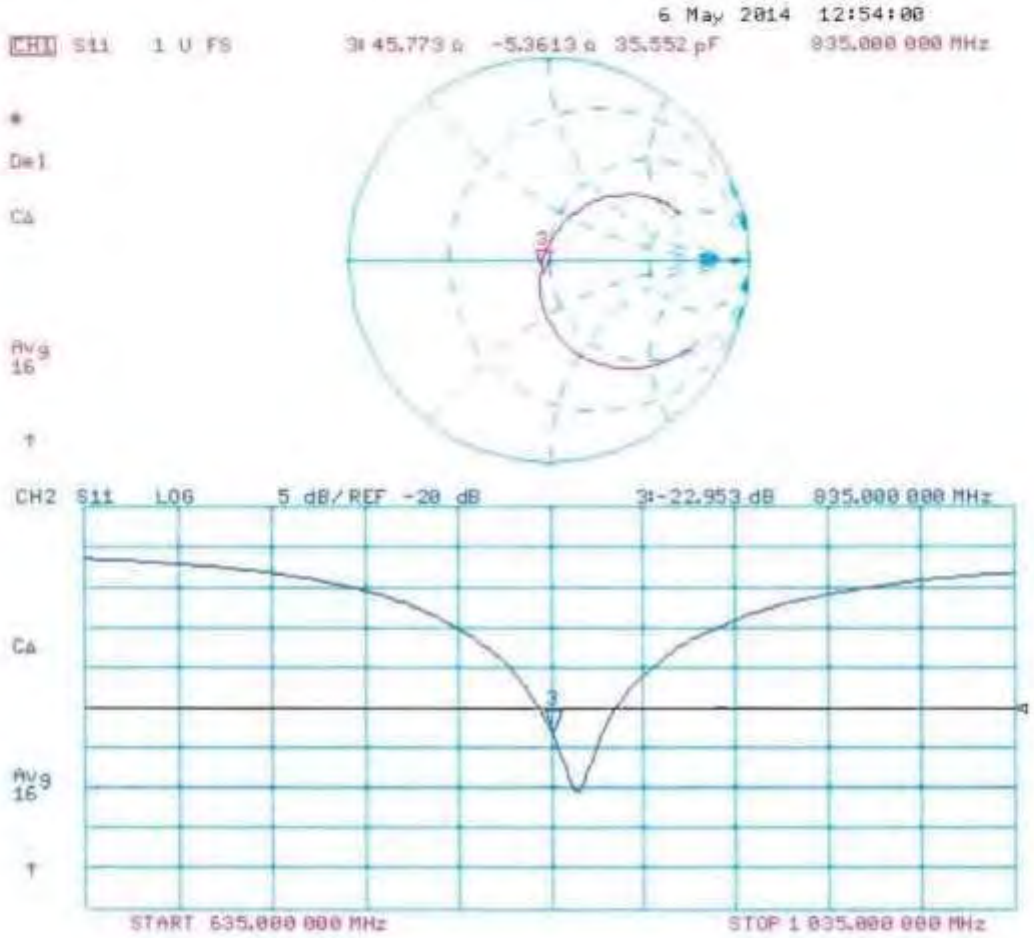
Dipole Calibration for Body Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 54.63 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.43 W/kg; SAR(10 g) = 1.58 W/kg
Maximum value of SAR (measured) = 2.85 W/kg



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

Impedance Measurement Plot for Body TSL



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D1900V2-5d030_May14**

CALIBRATION CERTIFICATE

Object D1900V2 - SN: 5d030

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

Calibration date May 14, 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

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

Issued: May 15, 2014

Measurement Conditions

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

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.83 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.15 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	52.5 ± 6 %	1.52 mho/m ± 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	10.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	5.34 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.3 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6 Ω + 4.3 jΩ
Return Loss	- 27.2 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.6 Ω + 4.4 jΩ
Return Loss	- 24.8 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.191 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	December 17, 2002

Date: 14.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

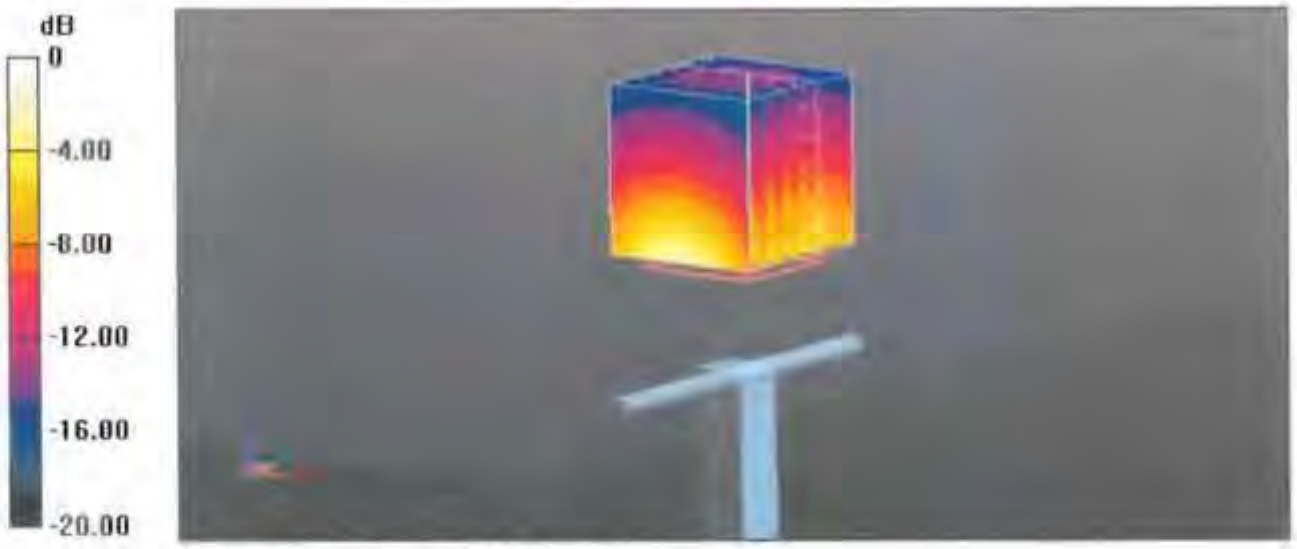
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.37 S/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

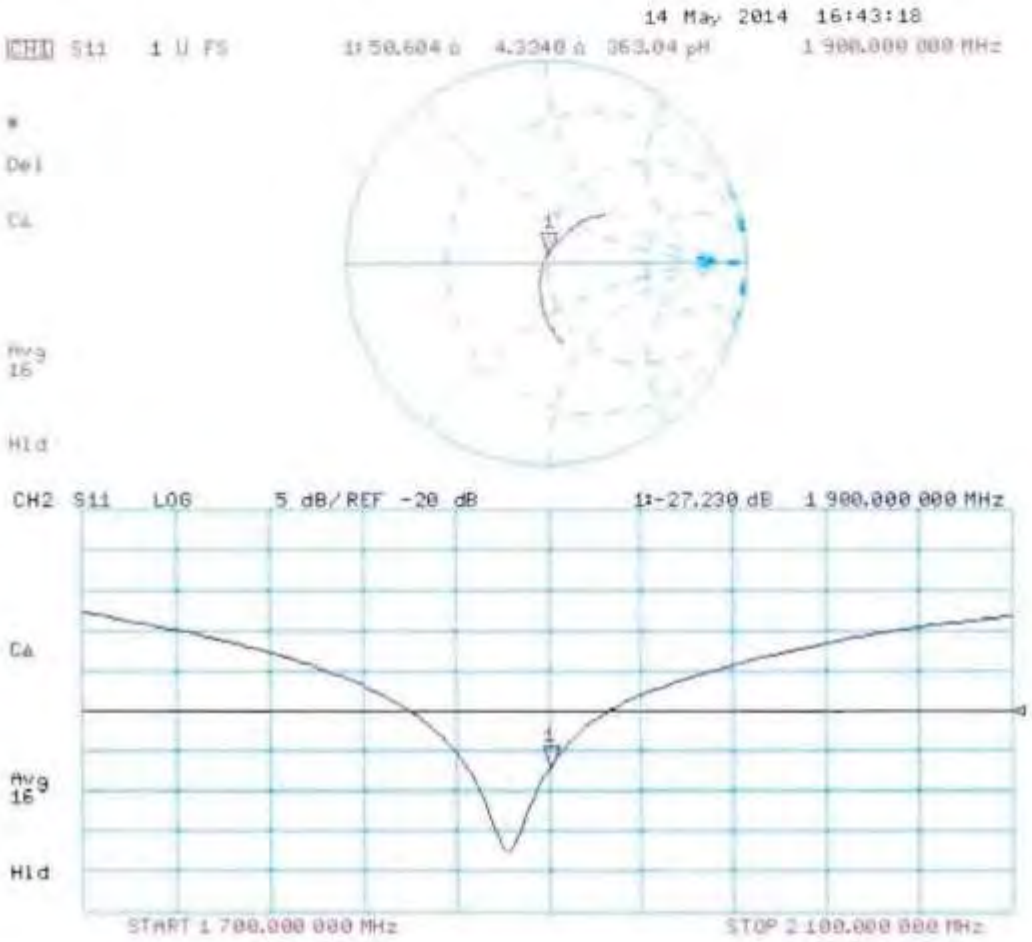
- Probe: ES3DV3 - SN3205; ConvF(5.06, 5.06, 5.06); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

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 = 97.75 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 9.83 W/kg; SAR(10 g) = 5.15 W/kg
Maximum value of SAR (measured) = 12.3 W/kg



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

Impedance Measurement Plot for Head TSL



Date: 14.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d030

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.52 S/m; ε_r = 52.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

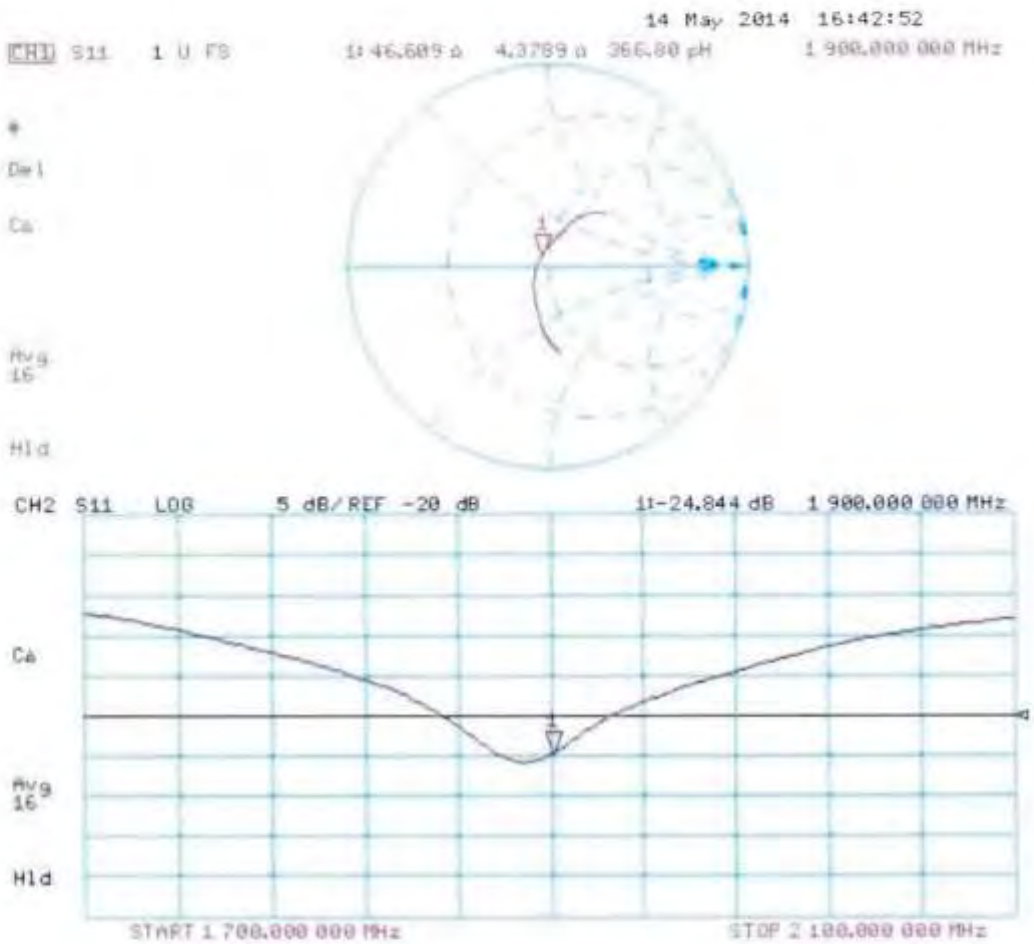
DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.76, 4.76, 4.76); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 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 = 94.65 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.34 W/kg
Maximum value of SAR (measured) = 12.6 W/kg

0 dB = 12.6 W/kg = 11.00 dBW/kg

Impedance Measurement Plot for Body TSL



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Accreditation No.: SCS 108

Client Nokia Salo TCC

Certificate No: D2450V2-729_May14

CALIBRATION CERTIFICATE

Object: D2450V2 - SN: 729

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

Calibration date: May 08, 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

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

Issued: May 16, 2014

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	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.5 ± 6 %	1.83 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.16 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.8 ± 6 %	2.03 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	—	—

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**51.4 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.13 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**24.1 W/kg ± 16.5 % (k=2)**

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.8 Ω - 0.4 jΩ
Return Loss	- 31.1 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	49.3 Ω + 1.2 jΩ
Return Loss	- 37.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.147 ns

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

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

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	January 09, 2003

DASY5 Validation Report for Head TSL

Date: 08.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 729

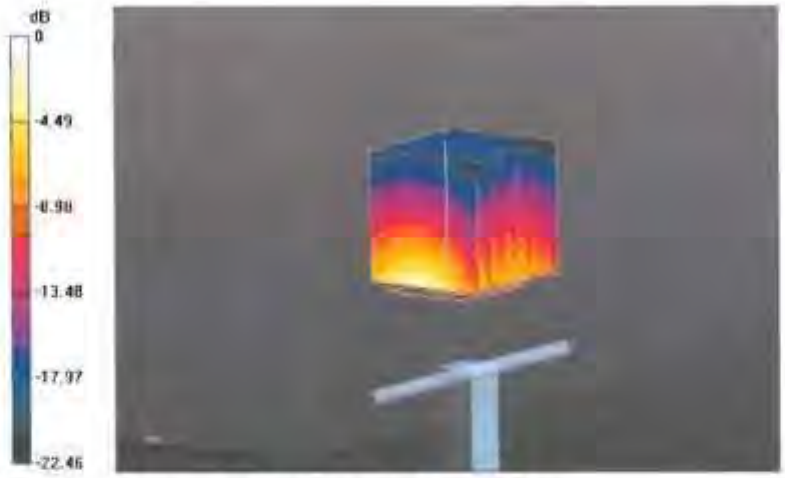
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.83 S/m; ε_r = 38.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

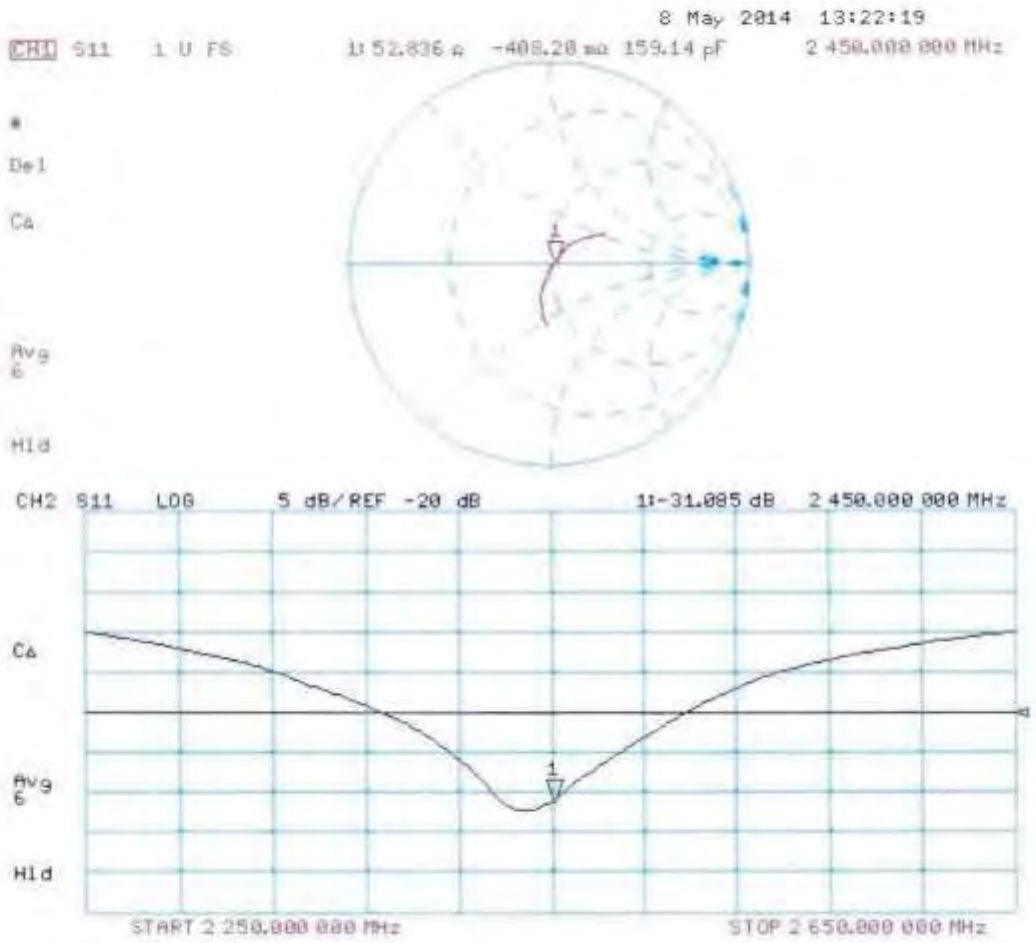
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.14 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.16 W/kg
Maximum value of SAR (measured) = 16.8 W/kg



0 dB = 16.8 W/kg = 12.25 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 08.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 729

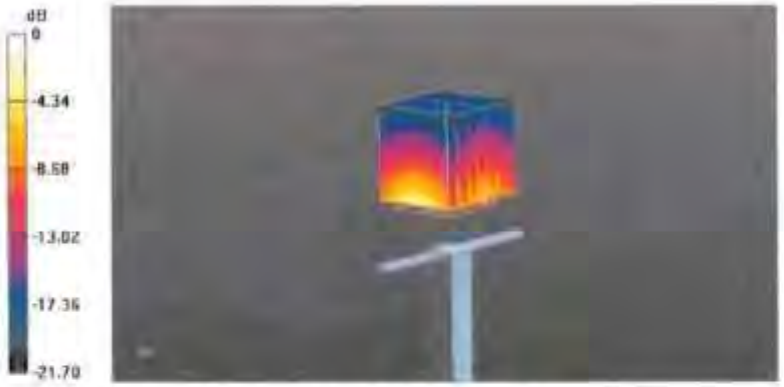
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 2.03 S/m; ε_r = 50.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

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: 30.04.2014
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

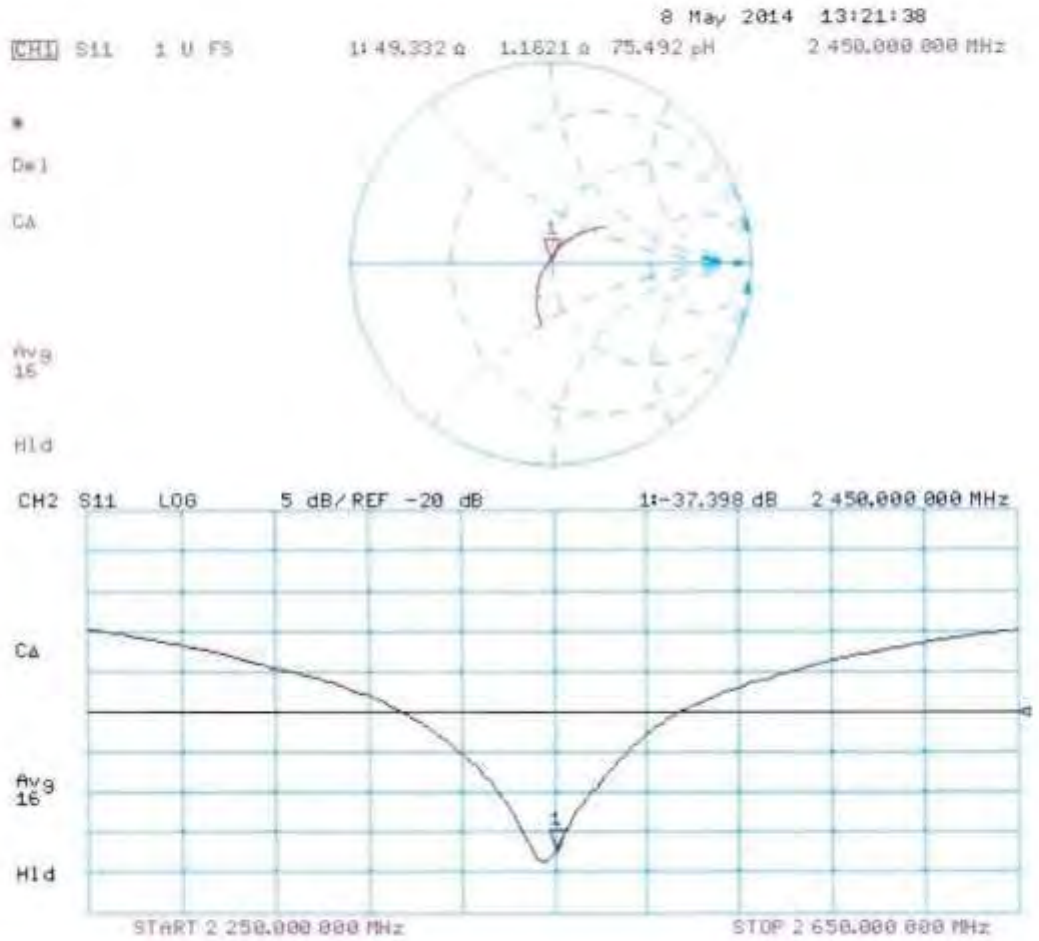
Dipole Calibration for Body Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.61 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 27.6 W/kg
SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.13 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 Body TSL



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Accreditation No.: **SCS 108**

Client **Nokia Salo TCC**

Certificate No: **D2600V2-1009_May14**

CALIBRATION CERTIFICATE

Object D2600V2 - SN: 1009

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

Calibration date: May 08, 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

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

Issued: May 15, 2014

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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.7 ± 6 %	1.98 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	57.3 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.6 W/kg ± 16.5 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.3 ± 6 %	2.21 mho/m ± 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	14.5 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	56.9 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	250 mW input power	6.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	25.2 W/kg ± 16.5 % (k=2)

Appendix

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.7 Ω - 4.0 jΩ
Return Loss	- 27.8 dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.4 Ω - 3.1 jΩ
Return Loss	- 26.2 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	April 12, 2007

DASY5 Validation Report for Head TSL

Date: 08.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1009

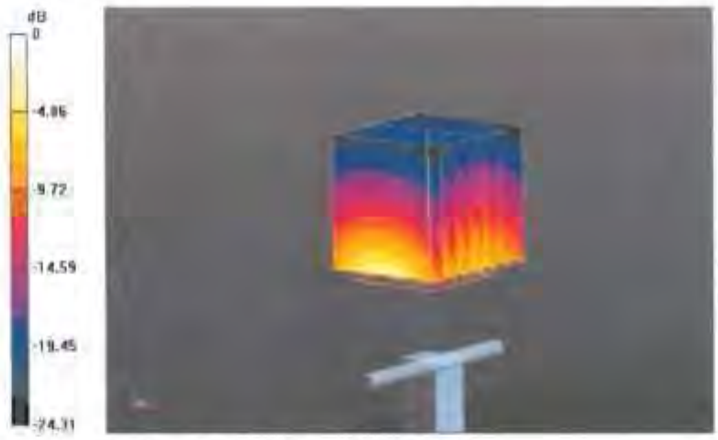
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 1.98 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.46, 4.46, 4.46); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.04.2014
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1222); SEMCAD X 14.6.10(7331)

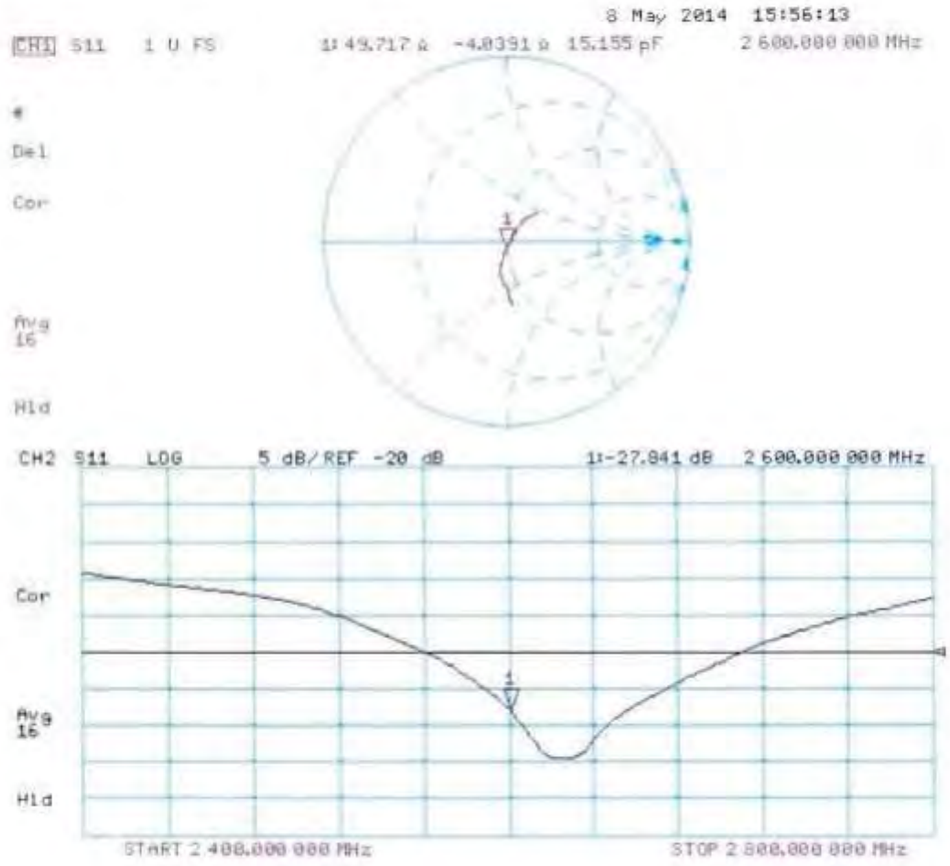
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.6 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.44 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



0 dB = 19.0 W/kg = 12.79 dBW/kg

Impedance Measurement Plot for Head TSL



Date: 08.05.2014

Test Laboratory: SPEAG, Zurich, Switzerland

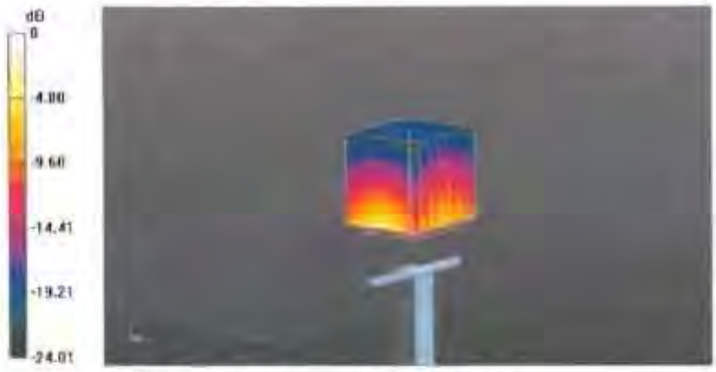
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1009

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.21 S/m; ε_r = 50.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY52 Configuration:

- Probe: ES3DV3 - SN3205; ConvF(4.24, 4.24, 4.24); Calibrated: 30.12.2013;
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 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 2/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 96.96 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.39 W/kg
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 19.3 W/kg = 12.86 dBW/kg

Impedance Measurement Plot for Body TSL