

SAR Compliance Test Report

Date of Report	2/06/2023	Client's Contact person:	Stephane Ranchon
Number of pages:	77	Responsible Test engineer:	Ilari Kinnunen
Testing laboratory:	Verkotan Oy Elektroniikkatie 17 90590 Oulu Finland	Client:	LCIE BUREAU VERITAS ZI Centr'Alp 170 rue de Chatagnon 38430 Moirans France
		Applicant:	INGENICO 9 Avenue de la gare - Rovaltain TGV BP25156 VALENCE Cedex 9 FRANCE 26958
Tested device	Move/2600 CL/4G/WiFi		
Related reports:	-		
Testing has been carried out in accordance with:	47CFR §2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices FCC published RF exposure KDB procedures IEC/IEEE 62209-1528, 2020 Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices RSS-102, Issue 5, 2015 Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory		
Test Results:	The EUT complies with the requirements in respect of all parameters subject to the test. The test results relate only to devices specified in this document		

Date and signatures:

02.06.2023

Laboratory Manager

Miia Nurkkala

Digitaalinen
allekirjoittaja: Miia
Nurkkala
Päiväys: 2023.06.02
08:48:43 +03'00'

TABLE OF CONTENTS

1. SUMMARY OF SAR TEST REPORT	4
1.1 TEST DETAILS	4
1.2 MAXIMUM RESULTS	4
1.2.1 Standalone SAR	5
1.2.2 Simultaneous Transmission SAR	5
1.2.3 ISED	5
1.2.4 Maximum Drift	5
1.2.5 Measurement Uncertainty	6
2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)	7
2.1 SUPPORTED FREQUENCY BANDS AND OPERATIONAL MODES	7
2.2 TEST EXEMPTIONS	8
2.2.1 FCC	8
2.2.2 ISED	9
2.3 SIMULTANEOUS TRANSMISSION	9
3. OUTPUT POWER	10
3.1 MAXIMUM SPECIFIED CONDUCTED OUTPUT POWER	10
3.2 TESTED CONDUCTED POWER	12
4. TEST EQUIPMENT	19
4.1 TEST EQUIPMENT LIST	20
4.1.1 Isotropic E-field Probe Type EX3DV4	20
4.2 PHANTOMS	21
4.3 TISSUE SIMULANTS	21
4.4 SYSTEM VALIDATION STATUS	21
4.5 SYSTEM CHECK	22
4.5.1 Tissue Simulant Verification	22
5. TEST PROCEDURE	24
5.1 DEVICE HOLDER	24
5.2 TEST POSITIONS	24
5.2.1 Extremity Configuration, 0mm separation distance	24
5.3 SCAN PROCEDURES	25
5.4 SAR AVERAGING METHODS	25
6. MEASUREMENT UNCERTAINTY	26
7. TEST RESULTS	28
7.1 SAR RESULTS FOR EXTREMITY CONDITION WITH 0MM SEPARATION	28
7.2 IEC 62209-2 AMD1:2019	33
7.3 CALCULATED NFC SAR	34
7.3.1 FCC	34
7.3.2 ISED	34

7.4	SIMULTANEOUS TRANSMISSION ANALYSIS	35
7.4.1	FCC	35
7.4.2	ISED.....	36
APPENDIX A: PHOTOS OF THE DUT		37
APPENDIX B: SYSTEM CHECK SCAN.....		41
APPENDIX C: MEASUREMENT SCANS.....		49
APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS		60
APPENDIX E: RELEVANT PAGES FROM DIPOLE CALIBRATION REPORTS		64

1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Equipment under Test (DUT):

Product:	Payment terminal
Manufacturer:	Ingenico
Model:	Move/2600 CL/4G/WiFi
Serial Number:	Conducted sample: 221967317151286025803467 SAR sample: 222107317151286026031053
FCC ID Number:	XKB-M2600CL4GW
ISED ID Number:	2586D- M2600CL4GW
DUT Number:	Conducted sample: 21194 SAR sample: 21191
Battery Type used in testing:	Li-Ion Battery
State of the Sample:	Production sample

Testing information:

Testing performed:	05.05.2023 – 29.05.2023
Notes:	-
Document history:	Initial version
Document ID:	FCC ISED SAR report_Move2600_ID6030c_02062023.docx
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Ilari Kinnunen
FCC Test Firm Designation Number:	FI0005
ISED Company Number:	22218

1.2 Maximum Results

The maximum reported* SAR values for Extremity-configuration for transmitting systems are shown in a table below. The device conforms to the requirements of the standards when the maximum reported SAR value is less than or equal to the limit. The SAR limit specified in FCC 47 CFR part 2 (2.1093) and Health Canada's RF exposure guideline, Safety Code 6 for Extremity SAR_{10g} is 4.0 W/kg.

1.2.1 Standalone SAR

System	Highest Reported* SAR _{10g} (W/kg) in Extremity Exposure Condition, 0mm separation	Result
GSM 850	3.74	PASS
GSM 1900	2.46	PASS
WCDMA 2	3.75	PASS
WCDMA 5	1.49	PASS
LTE 2	3.16	PASS
LTE 4	3.26	PASS
LTE 5	1.72	PASS
2.4 GHz WLAN	0.90	PASS
5 GHz WLAN	1.94	PASS

* Reported SAR Values are scaled to upper limit of power tuning tolerance.

1.2.2 Simultaneous Transmission SAR

1.2.2.1 FCC

Highest Simultaneous Transmission SAR	SAR _{10g} (W/kg) in Extremity Exposure Condition
WCDMA 2 + 5 GHz WLAN + NFC	3.791

1.2.3 ISED

Highest Simultaneous Transmission SAR	SAR _{10g} (W/kg) in Extremity Exposure Condition
WCDMA 2 + 5 GHz WLAN + NFC	3.796

1.2.4 Maximum Drift

Maximum Drift During Measurements	-1.19dB*
-----------------------------------	----------

*Larger than 5% drifts included to scaling factors

1.2.5 Measurement Uncertainty

SAR10g: 0.3 – 3 GHz:

Expanded Uncertainty (k=2) 95 %	$\pm 21.9 \%$
--	---------------

SAR10g: 3 – 6 GHz:

Expanded Uncertainty (k=2) 95 %	$\pm 23.8 \%$
--	---------------

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a payment terminal which supports GPRS, WCDMA, LTE, 2.4 GHz WLAN and 5 GHz WLAN, with NFC.

Measurement report "Desk2600 class Antenna.pdf" states antenna gain of -12dBi for the NFC.



Device Category	Portable
Exposure Environment	General population uncontrolled

2.1 Supported Frequency Bands and Operational Modes

TX Frequency bands	Modes of Operation	Transmitter Frequency Range [MHz]
	GSM/GPRS 850	824 – 849
	GSM/GPRS 1900	1850 – 1910
	WCDMA 2	1850 – 1910
	WCDMA 5	824 – 849
	LTE 2	1850 – 1910
	LTE 4	1710 – 1755
	LTE 5	824 – 849
	WLAN 2.4 GHz	2412 – 2462
	WLAN 5GHz	5180 – 5825
	NFC	13.56

2.2 Test Exemptions

2.2.1 FCC

Exemption power threshold for distances $\leq 50\text{mm}$ in mW for less than 100 MHz, was calculated using the following equation below, stated in 447498 D01 General RF Exposure Guidance DR05-44791:

$$P_{7X}(d_{mm}, f_{MHz}) = S_f(f_{MHz}) * P_{431a}(d_{mm}, f_{MHz}) + (1 - S_f(f_{MHz})) * S_d(d_{mm}) P_{431b1}(50., 100.) * \left((1 + \log_{10} \left(\frac{100.}{f_{MHz}} \right)) \right)$$

(Equation 1)

where,

$$S_f(f_{MHz}) = -\frac{e^{(f_{MHz}-100)^2}}{250} \quad (\text{Equation 2})$$

$$S_d(d_{mm}) = \frac{1}{2} + \frac{\frac{(d_{mm}-50)^2}{250}}{2} \quad (\text{Equation 3})$$

$$P_{431a}(d_{mm}, f_{MHz}) = \frac{3 d_{mm}}{\sqrt{f_{MHz}/1000}} \quad (\text{Equation 4})$$

$$P_{431b1}(d_{mm}, f_{MHz}) = \frac{3 d_{mm}}{\sqrt{f_{MHz}/1000}} + \frac{(d_{mm}-50)*f_{MHz}}{150} \quad (\text{Equation 5})$$

Transmission mode	Frequency [MHz]	Separation distance [cm]	P _{7x} [mW]
NFC	13.56	0.5	443

2.2.1.1 Maximum defined Output Power and ERP

Maximum output power of the DUT's NFC's transmitter is 0 dBm i.e. 1 mW.

According to Appendix B at 447498 D01 General RF Exposure Guidance DR05-44791, the table (B.1.) defines the thresholds for available maximum time-averaged power or maximum time-averaged ERP, whichever is greater. Since the maximum output power is greater than the ERP of the DUT for NFC, it is used for SAR test exemption.

Transmission mode	Output power [dBm]	Output power [mW]	Power Gain of Antenna G [dBi]	ERP [dBm]	ERP [mW]	P _{7x} [mW]
NFC	0	1	-12	-14.15	0.04	443

2.2.2 ISED

SAR test exemption output power limits based on frequency and separation distance are from RSS-102, issue 5, 2015:

Table 1: SAR evaluation – Exemption limits for routine evaluation based on frequency and separation distance^{4,5}

Frequency (MHz)	Exemption Limits (mW)				
	At separation distance of ≤5 mm	At separation distance of 10 mm	At separation distance of 15 mm	At separation distance of 20 mm	At separation distance of 25 mm
≤300	71 mW	101 mW	132 mW	162 mW	193 mW
450	52 mW	70 mW	88 mW	106 mW	123 mW
835	17 mW	30 mW	42 mW	55 mW	67 mW
1900	7 mW	10 mW	18 mW	34 mW	60 mW
2450	4 mW	7 mW	15 mW	30 mW	52 mW
3500	2 mW	6 mW	16 mW	32 mW	55 mW
5800	1 mW	6 mW	15 mW	27 mW	41 mW

SAR test exclusion power threshold for 13.56 MHz is 71mW at ≤5mm separation distance.

2.2.2.1.1 Maximum defined output power and EIRP

According to the manufacturer NFC transmitter maximum TX output power is 0 dBm i.e. 1 mW. Peak antenna gain is -12dBi according to datasheet "Desk2600 class Antenna.pdf".

Maximum output power of the DUT's NFC transmitter is 0 dBm i.e. 1 mW. Since the maximum output power is greater than the EIRP of the DUT for NFC, it is used for SAR test exemption.

Transmission mode	Output power [dBm]	Output power [mW]	Power Gain of Antenna, G [dBi]	EIRP [dBm]	EIRP [mW]
NFC	0	1	-12	-12	0.06

The maximum output power of the NFC is below the test exclusion threshold.

2.3 Simultaneous transmission

Possible simultaneous transmissions are:

Cellular + WLAN 2.4GHz + NFC

Cellular + WLAN 5GHz + NFC

3. OUTPUT POWER

3.1 Maximum specified conducted output power

From the customer, including tune-up tolerances;

GPRS 850 Slot Configuration	Max Output Power [dBm]
GPRS (1Tx-slot)	35
GPRS (2Tx-slot)	33

GPRS 1900 Slot Configuration	Max Output Power [dBm]
GPRS (1Tx-slot)	32
GPRS (2Tx-slot)	29.3

WCDMA	Max Output Power [dBm]
WCDMA 2	23.5
WCDMA 5	25

LTE	Max Output Power [dBm]
LTE 2	24
LTE 4	24
LTE 5	25

WLAN 2.4GHz	Max Output Power [dBm]
802.11b	21
802.11g	19
802.11n	19

WLAN 5GHz	Max Output Power [dBm]
802.11a	20
802.11n	19

NFC	Max Output Power [dBm]
	0

3.2 Tested conducted power

Measured conducted output power at transmitting antenna connector.

GSM:

Slot Configuration Info	GSM 850 CH128 824.2 MHz	GSM 850 CH 190 836.6 MHz	GSM 850 CH 251 848.8 MHz	GSM 1900 CH512 1850.2 MHz	GSM 1900 CH661 1880.0 MHz	GSM 1900 CH810 1909.8 MHz
GPRS (GMSK, 1Tx-slot)	30.88	31.01	31.22	28.1	28.2	28.35
GPRS (GMSK, 2Tx-slot)	30.05	29.97	30.28	26.51	26.49	26.56
GPRS (GMSK, 3Tx-slot)	28.22	27.96	28.24	24.15	24.07	24.07
GPRS (GMSK, 4Tx-slot)	27.1	26.78	27.13	22.87	22.79	22.75

Time averaged power:

Slot Configuration Info	GSM 900 CH975 880.2 MHz	GSM 900 CH38 897.6 MHz	GSM 900 CH124 914.8 MHz	GSM 1800 CH512 1710.2 MHz	GSM 1800 CH699 1747.6 MHz	GSM 1800 CH885 1784.8 MHz
GPRS (GMSK, 1Tx-slot)	21.88	22.01	22.22	19.1	19.2	19.35
GPRS (GMSK, 2Tx-slot)	24.05	23.97	24.28	20.51	20.49	20.56
GPRS (GMSK, 3Tx-slot)	23.96	23.7	23.98	19.89	19.81	19.81
GPRS (GMSK, 4Tx-slot)	24.1	23.78	24.13	19.87	19.79	19.75

Slot configuration with highest time averaged power was selected for SAR testing.

WCDMA:

Reference Channel	WCDMA 2			WCDMA 5		
	CH 9262 1852.4 MHz	CH 9400 1880.0 MHz	CH 9538 1907.6 MHz	CH 4132 826.4 MHz	CH 4183 836.6 MHz	CH 4233 846.6 MHz
RMC 12.2K	22.48	22.47	22.32	23.45	23.61	23.56
HSDPA Subtest-1	21.59	21.63	21.56	23.3	23.25	23.3
HSDPA Subtest-2	21.75	21.63	21.86	23.44	23.36	23.46
HSDPA Subtest-3	21.27	21.08	21.36	23.33	22.82	23.02
HSDPA Subtest-4	21.23	21.04	21.21	23.27	22.76	22.95
HSUPA Subtest-1	21.79	21.66	21.86	23.7	23.34	23.55
HSUPA Subtest-2	21.68	21.2	21.4	23.27	23.02	22.89
HSUPA Subtest-3	22.17	21.67	21.92	23.83	23.29	23.66
HSUPA Subtest-4	21.9	21.68	21.63	23.45	23.41	23.21
HSUPA Subtest-5	22.26	21.65	21.94	23.71	23.45	23.6

LTE:

The DUT is LTE Cat 1 device and has limited data rate up to 5 Mb/s in uplink, for this reason the resource block allocations for 16QAM modulation have been changed.

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 18607 1850.7 MHz	CH18900 1880.0 MHz	CH19193 1909.3 MHz	3GPP MPR [dB]	CH18607 1850.7 MHz	CH18900 1880.0 MHz	CH19193 1909.3 MHz	3GPP MPR [dB]
2 / 1.4M	1	0	22.39	22.13	22.2	0	20.6	20.15	20.19	1
	1	2	22.57	22.19	22.2	0	20.61	20.06	20.41	1
	1	5	22.3	21.99	21.92	0	20.6	20.45	20.44	1
	3	0	22.23	22.12	22.2	0	20.86	20.88	20.9	1
	3	1	22.28	22.15	22.29	0	20.96	20.97	20.96	1
	3	3	22.22	22.19	22.11	0	20.91	20.94	20.97	1
	6	0	21.15	21.26	21.05	1	19.7	19.82	19.94	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH18615 1851.5 MHz	CH18900 1880.0 MHz	CH19185 1918.5 MHz	3GPP MPR [dB]	CH18615 1851.5 MHz	CH18900 1880.0 MHz	CH19185 1918.5 MHz	3GPP MPR [dB]
2 / 3M	1	0	22.11	22.28	22.29	0	20.13	20.41	20.52	1
	1	7	22.32	22.36	22.21	0	20.63	20.32	20.64	1
	1	14	22.18	22.19	22.21	0	19.99	20.31	20.49	1
	8	0	21.52	21.26	21.32	1	20.27	19.84	19.95	2
	8	3	21.38	21.22	21.22	1	19.82	19.92	20.31	2
	8	7	21.34	21.22	21.19	1	19.79	20.02	19.98	2
	15	0	21.34	21.24	21.21	1	19.74	19.87	20.2	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH18625 1852.5 MHz	CH18900 1880.0 MHz	CH19175 1907.5 MHz	3GPP MPR [dB]	CH18625 1852.5 MHz	CH18900 1880.0 MHz	CH19175 1907.5 MHz	3GPP MPR [dB]
2 / 5M	1	0	21.79	21.96	21.7	0	20.39	20.48	20.34	1
	1	12	22.0	21.88	22.11	0	20.73	20.45	20.72	1
	1	24	21.89	21.78	21.96	0	20.45	20.21	20.44	1
	12	0	20.97	21.02	20.99	1	19.79	19.54	19.73	2
	12	6	21.01	21.0	20.99	1	19.62	19.65	19.84	2
	12	13	21.1	20.95	21.04	1	20.04	19.76	19.88	2
	25	0	21.02	21.04	20.88	1	19.97	19.67	19.93	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH18650 1855 MHz	CH18900 1880.0	CH19150 1905 MHz	3GPP MPR [dB]	CH18650 1855 MHz	CH18900 1880.0 MHz	CH19150 1905 MHz	3GPP MPR [dB]
2 / 10M	1	0	22.17	22.18	22.02	0	20.87	20.66	20.25	1
	1	24	22.16	21.98	22.08	0	20.83	20.39	20.33	1
	1	49	21.81	22.1	22.08	0	20.19	20.14	20.13	1
	25	0	21.07	21.09	21.07	1	N/A*	N/A*	N/A*	N/A*
	25	12	21.17	20.97	21.08	1	N/A*	N/A*	N/A*	N/A*
	25	25	21.12	21.05	20.95	1	N/A*	N/A*	N/A*	N/A*
	50	0	21.09	21.02	21.14	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	19.76	19.85	19.81	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH18675 1857.5 MHz	CH18900 1880.0	CH19125 1902.5 MHz	3GPP MPR [dB]	CH18675 1857.5 MHz	CH18900 1880.0 MHz	CH19125 1902.5 MHz	3GPP MPR [dB]
2 / 15M	1	0	22.36	22.19	22.11	0	20.14	20.75	20.84	1
	1	37	22.39	22.26	22.55	0	20.31	20.63	20.87	1
	1	74	22.17	22.11	21.98	0	20.4	20.45	20.39	1
	36	0	21.25	21.18	21.12	1	N/A*	N/A*	N/A*	N/A*
	36	19	21.17	21.07	21.09	1	N/A*	N/A*	N/A*	N/A*
	36	39	21.17	21.09	21.07	1	N/A*	N/A*	N/A*	N/A*
	75	0	21.22	21.12	21.0	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	19.85	19.98	19.95	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH18700 1860.0 MHz	CH18900 1880.0	CH19100 1900.0 MHz	3GPP MPR [dB]	CH18700 1860.0 MHz	CH18900 1880.0	CH19100 1900.0 MHz	3GPP MPR [dB]
2 / 20M	1	0	22.14	22.12	22.5	0	20.49	20.52	20.5	1
	1	50	22.04	22.05	22.26	0	20.52	20.47	20.67	1
	1	99	21.94	22.01	22.18	0	20.43	20.17	20.13	1
	50	0	21.43	21.37	21.34	1	N/A*	N/A*	N/A*	N/A*
	50	25	21.38	21.27	21.24	1	N/A*	N/A*	N/A*	N/A*
	50	50	21.28	21.32	21.28	1	N/A*	N/A*	N/A*	N/A*
	100	0	21.18	21.39	21.21	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	19.89	19.87	20.12	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 19957 1710.7 MHz	CH 20175 1732.5 MHz	CH 20393 1754.3 MHz	3GPP MPR [dB]	CH 19957 1710.7 MHz	CH 20175 1732.5 MHz	CH 20393 1754.3 MHz	3GPP MPR [dB]
4 / 1.4M	1	0	21.96	22.17	21.79	0	20.61	20.27	20.58	1
	1	2	22.12	22.12	21.92	0	20.83	20.35	20.86	1
	1	5	22.01	21.84	21.83	0	20.79	20.17	20.6	1
	3	0	22.15	22.21	21.94	0	21.01	21.16	20.92	1
	3	1	22.07	22.12	22.01	0	21.04	21.14	20.97	1
	3	3	22.07	22.13	21.94	0	21.05	21.02	20.87	1
	6	0	21.05	21.11	20.85	1	20.08	19.98	19.91	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 19965 1711.5 MHz	CH 20175 1732.5 MHz	CH 20385 1753.5 MHz	3GPP MPR [dB]	CH 19965 1711.5 MHz	CH 20175 1732.5 MHz	CH 20385 1753.5 MHz	3GPP MPR [dB]
4 / 3M	1	0	22.14	22.29	21.8	0	20.7	20.48	20.62	1
	1	7	22.19	22.27	21.85	0	20.95	20.46	20.7	1
	1	14	22.16	22.14	21.96	0	20.98	20.3	20.48	1
	8	0	21.15	21.17	20.74	1	20.2	20.21	19.81	2
	8	3	21.13	21.13	20.76	1	20.2	20.13	19.92	2
	8	7	21.21	21.08	20.94	1	20.25	20.28	20.0	2
	15	0	21.1	21.07	20.74	1	20.28	20.34	19.89	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 19975 1711.5 MHz	CH 20175 1732.5 MHz	CH 20375 1753.5 MHz	3GPP MPR [dB]	CH 19975 1711.5 MHz	CH 20175 1732.5 MHz	CH 20375 1753.5 MHz	3GPP MPR [dB]
4 / 5M	1	0	22.02	22.13	21.8	0	20.2	20.57	20.4	1
	1	12	22.16	21.95	21.88	0	20.97	20.56	20.71	1
	1	24	22.1	21.89	22.09	0	20.94	20.12	20.6	1
	12	0	21.07	21.1	20.94	1	19.87	19.95	19.65	2
	12	6	21.16	21.09	20.94	1	20.09	19.81	19.88	2
	12	13	21.19	20.93	20.9	1	20.34	19.75	19.81	2
	25	0	21.06	21.03	20.92	1	20.19	20.09	19.95	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20000 1715.0 MHz	CH 20175 1732.5 MHz	CH 20350 1750.0 MHz	3GPP MPR [dB]	CH 20000 1715.0 MHz	CH 20175 1732.5 MHz	CH 20350 1750.0 MHz	3GPP MPR [dB]
4 / 10M	1	0	22.23	22.29	21.63	0	20.28	20.63	20.34	1
	1	24	22.29	21.98	21.82	0	20.56	20.49	20.34	1
	1	49	22.23	21.68	22.04	0	20.45	20.13	20.44	1
	25	0	21.26	21.15	20.88	1	N/A*	N/A*	N/A*	N/A*
	25	12	21.24	20.98	20.85	1	N/A*	N/A*	N/A*	N/A*
	25	25	21.19	21.0	20.93	1	N/A*	N/A*	N/A*	N/A*
	50	0	21.1	21.12	20.85	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	20.13	20.24	19.78	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20025 1717.0 MHz	CH 20175 1732.5 MHz	CH 20325 1747.5 MHz	3GPP MPR [dB]	CH 20025 1717.0 MHz	CH 20175 1732.5 MHz	CH 20325 1747.5 MHz	3GPP MPR [dB]
4 / 15M	1	0	22.26	22.35	22.16	0	20.39	20.85	20.59	1
	1	37	22.54	21.7	22.14	0	21.07	20.46	20.68	1
	1	74	22.13	21.8	22.09	0	20.81	19.95	20.65	1
	36	0	21.31	21.23	20.82	1	N/A*	N/A*	N/A*	N/A*
	36	19	21.27	21.07	20.88	1	N/A*	N/A*	N/A*	N/A*
	36	39	21.28	20.98	20.83	1	N/A*	N/A*	N/A*	N/A*
	75	0	21.18	21.19	20.81	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	20.25	20.39	19.74	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20050 1720.0 MHz	CH 20175 1732.5 MHz	CH 20300 1745.0 MHz	3GPP MPR [dB]	CH 20050 1720.0 MHz	CH 20175 1732.5 MHz	CH 20300 1745.0 MHz	3GPP MPR [dB]
4 / 20M	1	0	22.21	22.34	22.15	0	20.4	20.97	20.78	1
	1	50	22.25	21.95	21.86	0	21.01	20.69	20.37	1
	1	99	22.07	21.82	21.9	0	20.64	20.23	20.23	1
	50	0	21.18	21.22	20.97	1	N/A*	N/A*	N/A*	N/A*
	50	25	21.23	21.16	20.93	1	N/A*	N/A*	N/A*	N/A*
	50	50	21.27	20.97	20.87	1	N/A*	N/A*	N/A*	N/A*
	100	0	21.15	21.13	20.94	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	20.2	20.21	20.14	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20407 824.7 MHz	CH 20525 836.5 MHz	CH 20643 848.3 MHz	3GPP MPR [dB]	CH 20407 824.7 MHz	CH 20525 836.5 MHz	CH 20643 848.3 MHz	3GPP MPR [dB]
5 / 1.4M	1	0	22.92	22.73	22.69	0	21.27	21.32	21.26	1
	1	2	22.91	22.87	22.84	0	21.54	21.5	21.45	1
	1	5	22.74	22.78	22.74	0	21.27	21.47	21.38	1
	3	0	22.86	22.85	22.74	0	21.66	21.73	21.38	1
	3	1	22.87	22.87	22.83	0	21.97	21.94	21.74	1
	3	3	22.78	22.86	22.69	0	21.84	21.75	21.83	1
	6	0	21.75	21.78	21.67	1	20.56	20.74	20.5	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20415 825.5 MHz	CH 20525 836.5 MHz	CH 20635 847.5 MHz	3GPP MPR [dB]	CH 20415 825.5 MHz	CH 20525 836.5 MHz	CH 20635 847.5 MHz	3GPP MPR [dB]
5 / 3M	1	0	22.8	22.88	22.71	0	21.35	21.4	21.22	1
	1	7	22.81	22.91	22.77	0	21.22	21.48	21.33	1
	1	14	22.63	22.83	22.64	0	21.1	21.23	21.26	1
	8	0	21.88	21.82	21.77	1	20.65	20.87	20.57	2
	8	3	21.74	21.85	21.77	1	20.85	20.8	20.75	2
	8	7	21.62	21.85	21.82	1	20.7	20.85	20.8	2
	15	0	21.69	21.79	21.73	1	20.73	20.93	20.69	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20425 826.5 MHz	CH 20525 836.5 MHz	CH 20625 846.5 MHz	3GPP MPR [dB]	CH 20425 826.5 MHz	CH 20525 836.5 MHz	CH 20625 846.5 MHz	3GPP MPR [dB]
5 / 5M	1	0	22.72	22.66	22.53	0	21.29	21.35	20.77	1
	1	12	22.8	22.91	22.9	0	21.14	21.49	21.43	1
	1	24	22.6	22.72	22.68	0	21.1	21.22	21.26	1
	12	0	21.76	21.84	21.65	1	20.46	20.47	20.49	2
	12	6	21.58	21.86	21.8	1	20.27	20.85	20.73	2
	12	13	21.6	21.83	21.76	1	20.51	20.75	20.79	2
	25	0	21.67	21.8	21.73	1	20.59	20.72	20.64	2

LTE Band / BW	RBs	RB Start	QPSK				16QAM			
			CH 20450 829.0 MHz	CH 20525 836.5 MHz	CH 20600 844 MHz	3GPP MPR [dB]	CH 20450 829.0 MHz	CH 20525 836.5 MHz	CH 20600 844 MHz	3GPP MPR [dB]
5 / 10M	1	0	22.59	22.66	22.67	0	21.28	21.16	21.19	1
	1	24	22.8	22.87	22.61	0	20.99	21.35	20.81	1
	1	49	22.71	22.51	22.5	0	21.44	21.08	21.3	1
	25	0	21.65	21.84	21.65	1	N/A*	N/A*	N/A*	N/A*
	25	12	21.7	21.79	21.63	1	N/A*	N/A*	N/A*	N/A*
	25	25	21.74	21.78	21.71	1	N/A*	N/A*	N/A*	N/A*
	50	0	21.76	21.72	21.7	1	N/A*	N/A*	N/A*	N/A*
	27	0	N/A*	N/A*	N/A*	N/A*	20.71	20.67	20.61	2

WLAN 2.4 GHz:

Standard	Transmission mode	Data rate [Mbps]	Output power [dBm]		
			CH 1 2412 MHz	CH 6 2437 MHz	CH 11 2462 MHz
802.11b	DSSS	1	19.5	19.35	19.24

5GHz WLAN:

Standard	Channel	Frequency [MHz]	Transmission mode	Data Rate [Mbps]	Output power [dBm]
802.11a	52	5260	OFDM	6	18.74
802.11a	56	5280	OFDM	6	18.88
802.11a	60	5300	OFDM	6	18.96
802.11a	64	5320	OFDM	6	19.06
802.11a	100	5500	OFDM	6	19.3
802.11a	112	5560	OFDM	6	19.53
802.11a	116	5580	OFDM	6	19.46
802.11a	128	5640	OFDM	6	19.16
802.11a	132	5660	OFDM	6	19.05
802.11a	149	5745	OFDM	6	18.77
802.11a	165	5825	OFDM	6	18.01

4. TEST EQUIPMENT

Dasy52 near field scanning system, manufactured by SPEAG was used for SAR testing. The test system consists of high precision robotics system (Staubli), robot controller, computer, near-field probe, probe alignment sensor, and a phantom containing the tissue equivalent material. The robot is a six-axis industrial robot performing precise movements to position the probe to the location of maximum electromagnetic field.

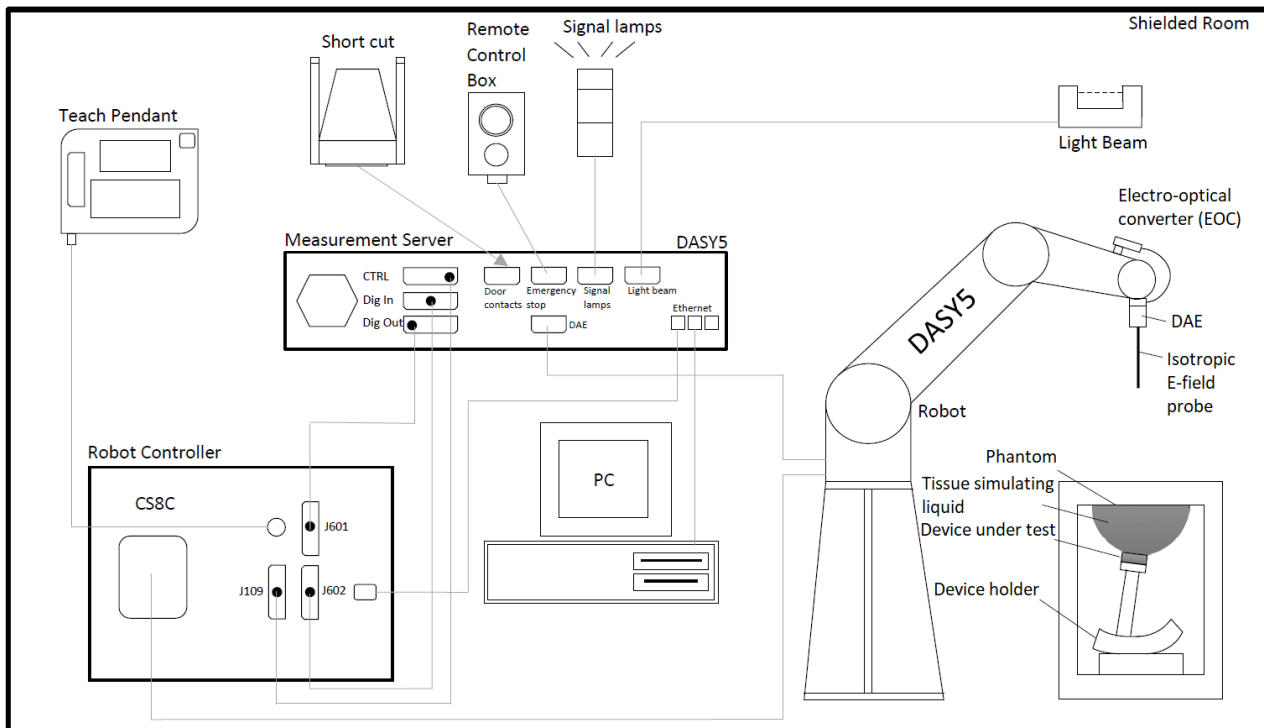


Figure 1 Schematic Laboratory Picture

4.1 Test Equipment List

Main used test system components are listed below. For full equipment list and calibration intervals, please contact the testing laboratory.

Test Equipment	Model	Serial Number	Calibration Date	Calibration Interval (years)
DASY5 Software	52.8.8.1258	-	N/A	N/A
Amplifier, 800-4200MHz, 50W	5163F	1022	N/A	N/A
Amplifier, 500-8000MHz	ZX60-83LN12+	NA	N/A	N/A
DAE4, converter	DAE4	710	10/2022	1
Inline Peak Power Sensor	MA24105A	2102058	11/2022	1
Power Sensor	NRP-Z11	100265	12/2022	1
Power Sensor	NRP8S	1419.0006K02-108509-Zh	08/2021	2
Isotropic DOS probe	EX3DV4	7447	02/2023	1
System validation dipole	D1800V2	249	07/2022	3
System validation dipole	D1900V2	511	03/2023	3
System validation dipole	D2450V2	729	07/2022	3
System validation dipole	D5GHzV2	1045	03/2023	3
System validation dipole	D835V2	455	07/2022	3
Radio Communication Analyzer	MT8820C	6200951734	12/2022	1
Network Analyzer	E5071C	MY46102812	05/2022	1
Vector Network Analyzer	P5008A	MY58100258	01/2023	1

4.1.1 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 μ W/g to > 100 mW/g, Linearity: ± 0.2 dB
Dimensions	Overall length: 330 mm Tip length: 10 mm Body diameter: 12 mm
Application	General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

Eli Phantom:

The phantom used in SAR tests was an ELI phantom, manufactured by SPEAG. ELI phantom is used for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. The phantom conforms to the requirements of IEC/IEEE 62209-1528 and FCC published RF Exposure KDB Procedures.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEC/IEEE 62209-1528 and FCC published RF Exposure KDB Procedures. The dielectric parameters of the used tissue simulants were within $\pm 10\%$ of the recommended values at frequencies under 3GHz and $\pm 5\%$ at frequencies above 3GHz. A liquid compensation algorithm was used in DASY5 with which measured peak average SAR values were corrected for the deviation of used liquid. Depth of the tissue simulant was at least 15.0 cm from the inner surface of the flat phantom.

Tissue simulant liquid Ingredients
Deionized Water, oil, salt, emulsifiers

4.4 System Validation Status

Frequency [MHz]	Dipole Type / SN	Probe Type / SN	Calibrated Signal Type	DAE Unit / SN	Dielectric Constant [ϵ']	Conductivity σ [S/m]	Date
835	D835V2-SN:455	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	45.03	0.88	03/2023
1800	D1800V2-SN:249	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	43.51	1.35	02/2023
1900	D1900V2-SN:511	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	43.33	1.4	02/2023
2450	D2450V2 - SN: 729	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	41.26	1.71	03/2023
5250	D5GHzV2 - SN: 1045	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	34.53	4.77	03/2023
5600	D5GHzV2 - SN: 1045	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	34.06	5.07	03/2023
5750	D5GHzV2 - SN: 1014	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	35.02	4.98	03/2023

4.5 System Check

Date	Tissue Type	Tissue Temp. [°C]	Frequency [MHz]	Input Power [mW]	Measured SAR _{1g} [W/kg]	1 W Target SAR _{1g} [W/kg]	1 W Normalized SAR _{1g} [W/kg]	Deviation [%]	Plot #
10.05.2023	WB Head	22	835	250	2.5	9.69	10.0	3.2	1
15.05.2023	WB Head	22	1800	250	9.03	38.9	36.12	-7.1	2
18.05.2023	WB Head	22	1900	250	9.16	38.02	36.64	-3.6	3
22.05.2023	WB Head	22	2450	250	11.9	52.3	47.6	-9.0	4
24.05.2023	WB Head	22	5250	250	7.11	73.09	71.1	-2.7	5
25.05.2023	WB Head	22	5600	250	7.77	72.92	77.7	6.6	6
26.05.2023	WB Head	22	5750	250	7.34	69.05	73.4	6.3	7
29.05.2023	WB Head	22	5750	250	7.19	69.05	71.9	4.1	8

4.5.1 Tissue Simulant Verification

Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Target		Measured		Deviation	
				Dielectric Constant [ε] Target	Conductivity σ [S/m] Target	Dielectric Constant [ε]	Conductivity σ [S/m]	ε (%)	σ (%)
10.05.2023	WB Head	22	824	41.55	0.9	42.68	0.89	2.7	-0.6
10.05.2023	WB Head	22	826	41.54	0.9	42.68	0.89	2.7	-0.6
10.05.2023	WB Head	22	835	41.5	0.9	42.67	0.9	2.8	-0.4
10.05.2023	WB Head	22	836	41.5	0.9	42.66	0.9	2.8	-0.5
10.05.2023	WB Head	22	836.5	41.5	0.9	42.66	0.9	2.8	-0.5
10.05.2023	WB Head	22	837	41.5	0.9	42.66	0.9	2.8	-0.5
10.05.2023	WB Head	22	847	41.5	0.91	42.65	0.9	2.8	-1.4
10.05.2023	WB Head	22	849	41.5	0.92	42.64	0.9	2.8	-1.5
12.05.2023	WB Head	22	829	41.53	0.9	42.57	0.89	2.5	-1.6
12.05.2023	WB Head	22	835	41.5	0.9	42.56	0.89	2.6	-1.4
12.05.2023	WB Head	22	836.5	41.5	0.9	42.57	0.89	2.6	-1.5
12.05.2023	WB Head	22	844	41.5	0.91	42.55	0.89	2.5	-2.1
15.05.2023	WB Head	22	1720	40.13	1.35	40.44	1.3	0.8	-3.9
15.05.2023	WB Head	22	1732.5	40.11	1.36	40.42	1.31	0.8	-3.9
15.05.2023	WB Head	22	1745	40.09	1.37	40.4	1.31	0.8	-3.9
15.05.2023	WB Head	22	1800	40	1.4	40.33	1.35	0.8	-3.7
15.05.2023	WB Head	22	1850	40	1.4	40.23	1.38	0.6	-1.6
15.05.2023	WB Head	22	1860	40	1.4	40.2	1.38	0.5	-1.2
15.05.2023	WB Head	22	1880	40	1.4	40.17	1.4	0.4	-0.2
15.05.2023	WB Head	22	1900	40	1.4	40.16	1.41	0.4	0.6
15.05.2023	WB Head	22	1910	40	1.4	40.14	1.41	0.3	0.9
18.05.2023	WB Head	22	1852	40	1.4	39.9	1.41	-0.3	0.5
18.05.2023	WB Head	22	1880	40	1.4	39.86	1.42	-0.4	1.7
18.05.2023	WB Head	22	1900	40	1.4	39.84	1.44	-0.4	2.6
18.05.2023	WB Head	22	1908	40	1.4	39.82	1.44	-0.4	3.0
22.05.2023	WB Head	22	2412	39.27	1.77	37.46	1.66	-4.6	-6.1
22.05.2023	WB Head	22	2437	39.22	1.79	37.43	1.67	-4.6	-6.4
22.05.2023	WB Head	22	2450	39.2	1.8	37.39	1.68	-4.6	-6.5
22.05.2023	WB Head	22	2462	39.18	1.81	37.36	1.69	-4.7	-6.8
24.05.2023	WB Head	22	5250	35.93	4.71	36.32	4.48	1.1	-4.9
24.05.2023	WB Head	22	5260	35.92	4.72	36.31	4.49	1.1	-4.9

24.05.2023	WB Head	22	5300	35.87	4.76	36.22	4.53	1.0	-4.7
24.05.2023	WB Head	22	5320	35.85	4.78	36.19	4.55	1.0	-4.7
24.05.2023	WB Head	22	5500	35.64	4.96	35.88	4.75	0.7	-4.3
24.05.2023	WB Head	22	5560	35.57	5.02	35.78	4.82	0.6	-4.1
24.05.2023	WB Head	22	5600	35.53	5.06	35.7	4.86	0.5	-4.0
24.05.2023	WB Head	22	5640	35.48	5.11	35.63	4.91	0.4	-3.9
26.05.2023	WB Head	22	5660	35.46	5.13	35.12	5.02	-1.0	-2.0
26.05.2023	WB Head	22	5750	35.36	5.22	34.94	5.12	-1.2	-1.8
29.05.2023	WB Head	22	5660	35.46	5.13	35.76	4.96	0.8	-3.3
29.05.2023	WB Head	22	5745	35.36	5.21	35.6	5.06	0.7	-3.0
29.05.2023	WB Head	22	5750	35.36	5.22	35.59	5.06	0.7	-3.0
29.05.2023	WB Head	22	5825	35.27	5.3	35.47	5.15	0.6	-2.8

5. TEST PROCEDURE

Testing was carried out in accordance with FCC KDB Publications 447498 D04 Interim General RF Exposure Guidance v01, 248227 D01 802.11 Wi-Fi SAR and RSS-102, Issue 5.

Low, mid and high frequency channels for the configuration with the highest SAR value were tested as per ISED notice 2016-DRS001.

For the cellular technologies, the device was set to transmit using maximum power with a communication tester.

The DUT is LTE Cat 1 device and has limited data rate up to 5 Mb/s in uplink, for this reason the resource block allocations for 16QAM modulation have been changed.

A control software for WLAN was used to set the DUT to transmit at maximum power and maximum duty cycle of 68.7%. Reported SAR is then scaled to 100%, according to 248227 D01 802.11 Wi-Fi SAR, section 2.2.

The WLAN transmission modes for testing were selected according to largest channel bandwidth configuration, lowest order modulation and lowest data rate.
WLAN 2.4GHz was tested with 802.11b standard with data rate of 1Mbit/s and WLAN 5GHz was tested with 802.11a standard with data rate of 6Mbit/s.

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

5.2 Test Positions

5.2.1 Extremity Configuration, 0mm separation distance

Extremity SAR was tested from all of the sides of the device. The device was placed on the top of a Rohacell and lifted towards the phantom until the distance between the phantom and the device was 0mm.

Photos of the test positions are presented in appendix A.

5.3 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan 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.

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 neighboring 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

DASY5 Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 300MHz - 3GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c) 1g	(c) 10g	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors								
CF	Probe Calibration	±12.0%	N	√2	1	1	±6.0%	±6.0%
CF _{drift}	Probe Calibration Drift	±1.7%	R	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±3.0%	R	√3	1	1	±1.7%	±1.7%
ISO	Probe Isotropy	±7.6%	R	3	1	1	±4.4%	±4.4%
DAE	Data Acquisition	±0.3%	N	1	1	1	±0.3%	±0.3%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±3.9%	N	1	0.14	0.14	±0.5%	±0.5%
DAT	Data Processing	±1.2%	N	1	1	1	±1.2%	±1.2%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) ^{DAK}	±2.5%	N	√1	0.78	0.71	±2.0%	±1.8%
LIQ(T _a)	Conductivity (temp.) ^{BB}	±3.3%	R	√3	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	3	0	0	±0%	±0%
DIS	Distance DUT - TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning (±0.5mm)	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	√1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±2.6%	R	3	1	1	±1.5%	±1.5%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0%	±0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	√1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0%	R	3	1	1	±0%	±0%
u(ΔSAR)	Combined Uncertainty						±11.0%	±10.9%
U	Expanded Uncertainty						±22.1%	±21.9%

DASY5 Uncertainty Budget According to IEC/IEEE 62209-1528 (Frequency band: 3GHz - 6GHz range)								
Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c) ₁ 1g	(c) ₂ 10g	Std. Unc. (1g)	Std. Unc. (10g)
Measurement System Errors								
CF	Probe Calibration	±14.0%	N	√2	1	1	±7.0%	±7.0%
CF _{drift}	Probe Calibration Drift	±1.7%	N	√3	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	√3	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.6%	R	√3	1	1	±1.5%	±1.5%
ISO	Probe Isotropy	±7.6%	R	3	1	1	±4.4%	±4.4%
DAE	Data Acquisition	±0.3%	N	1	1	1	±0.3%	±0.3%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ _{sys}	Probe Positioning	±3.9%	N	1	0.33	0.33	±1.3%	±1.3%
DAT	Data Processing	±2.3%	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.) ^{DAK}	±2.5%	N	√1	0.78	0.71	±2.0%	±1.8%
LIQ(T _σ)	Conductivity (temp.) ^{BB}	±3.4%	R	√3	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	3	0.25	0.25	±2.0%	±2.0%
DIS	Distance DUT - TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D _{xyz}	Device Positioning (±0.5mm)	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	√1	1	1	±3.6%	±3.6%
MOD	DUT Modulation ^m	±2.4%	R	√3	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±2.6%	R	3	1	1	±1.5%	±1.5%
RF _{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc. ^{val}	±0.0%	N	1	1	1	±0%	±0%
RF _{in}	Unc. Input Power ^{val}	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	√1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling ^p	±0%	R	3	1	1	±0%	±0%
u(ΔSAR)	Combined Uncertainty						±12.0%	±11.9%
U	Expanded Uncertainty						±24.0%	±23.8%

7. TEST RESULTS

7.1 SAR Results for Extremity Condition with 0mm separation

GPRS:

Band	Channel	Frequency [MHz]	Tx Slot Configuration	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
GPRS 850	190	836.6	2	33	29.97	Front	0.616	-0.54	1:4	2.28	1.40	
GPRS 850	190	836.6	2	33	29.97	Back	0.695	-0.03	1:4	2.01	1.40	
GPRS 850	190	836.6	2	33	29.97	Left	0.44	-0.66	1:4	2.34	1.03	
GPRS 850	190	836.6	2	33	29.97	Right	1.43	-0.02	1:4	2.01	2.87	
GPRS 850	190	836.6	2	33	29.97	Top	0.111	0.15	1:4	2.01	0.22	
GPRS 850	190	836.6	2	33	29.97	Bottom	0.0614	-0.02	1:4	2.01	0.12	
GPRS 850	128	824.2	2	33	30.05	Right	1.79	-0.25	1:4	2.09	3.74	9
GPRS 850	251	848.8	2	33	30.28	Right	1.54	-0.32	1:4	2.01	3.10	

*Larger than 5% drifts included to scaling factors

Band	Channel	Frequency [MHz]	Tx Slot Configuration	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
GPRS 1900	661	1880	2	29.3	26.49	Front	0.106	0.02	1:4	1.91	0.20	
GPRS 1900	661	1880	2	29.3	26.49	Back	0.0576	0.33	1:4	2.06	0.12	
GPRS 1900	661	1880	2	29.3	26.49	Left	0.0663	0.12	1:4	1.91	0.13	
GPRS 1900	661	1880	2	29.3	26.49	Right	1.29	-0.15	1:4	1.91	2.46	10
GPRS 1900	661	1880	2	29.3	26.49	Top	0.064	0.4	1:4	2.09	0.13	
GPRS 1900	661	1880	2	29.3	26.49	Bottom	0.0528	-0.18	1:4	1.91	0.10	
GPRS 1900	512	1850.2	2	29.3	26.51	Right	1.25	-0.11	1:4	1.90	2.38	
GPRS 1900	810	1909.8	2	29.3	26.56	Right	1.15	-0.05	1:4	1.88	2.16	

*Larger than 5% drifts included to scaling factors

WCDMA:

Band	Channel	Frequency [MHz]	Mode	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Front	0.201	0.03	1.27	1:1	0.25	
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Back	0.147	-0.03	1.27	1:1	0.19	
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Left	0.134	-0.07	1.27	1:1	0.17	
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Right	2.42	0.1	1.27	1:1	3.07	
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Top	0.147	-0.03	1.27	1:1	0.19	
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Bottom	0.133	0.01	1.27	1:1	0.17	
WCDMA 2	9262	1852.4	RMC 12.2K	23.5	22.48	Right	2.64	0.12	1.26	1:1	3.34	
WCDMA 2	9538	1907.6	RMC 12.2K	23.5	22.32	Right	2.86	0.06	1.31	1:1	3.75	11

*Larger than 5% drifts included to scaling factors

WCDMA 2 Repeat Measurements:

Band	Channel	Frequency [MHz]	Mode	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
WCDMA 2	9400	1880	RMC 12.2K	23.5	22.47	Right	2.72	0.18	1.27	1:1	3.45	
WCDMA 2	9262	1852.4	RMC 12.2K	23.5	22.48	Right	2.51	0.1	1.26	1:1	3.17	
WCDMA 2	9538	1907.6	RMC 12.2K	23.5	22.32	Right	2.7	0	1.31	1:1	3.54	

*Larger than 5% drifts included to scaling factors

Band	Channel	Frequency [MHz]	Mode	Maximum Power [dBm]	Conducted Power [dBm]	Test Position	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Front	0.462	0.07	1.38	1:1	0.64	
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Back	0.515	-0.41	1.51	1:1	0.78	
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Left	0.328	0.07	1.38	1:1	0.45	
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Right	1.03	-0.15	1.38	1:1	1.42	
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Top	0.0935	-0.32	1.48	1:1	0.14	
WCDMA 5	4183	836.6	RMC 12.2K	25	23.61	Bottom	0.0465	0.13	1.38	1:1	0.06	
WCDMA 5	4132	826.4	RMC 12.2K	25	23.45	Right	1.04	-0.17	1.43	1:1	1.49	12
WCDMA 5	4233	846.6	RMC 12.2K	25	23.56	Right	0.998	-0.14	1.39	1:1	1.39	

*Larger than 5% drifts included to scaling factors

LTE:

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Front	0.151	-0.1	1:1	1.41	0.21	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Front	0.115	0.14	1:1	1.85	0.21	
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Back	0.0938	-0.12	1:1	1.41	0.13	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Back	0.0703	-0.16	1:1	1.85	0.13	
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Left	0.122	-0.43	1:1	1.56	0.19	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Left	0.0967	-0.01	1:1	1.85	0.18	
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Right	1.92	0.14	1:1	1.41	2.71	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Right	1.5	0.09	1:1	1.85	2.77	
LTE 2	19100	1900	QPSK / 20	100	0	24	21.21	Right	1.55	0.06	1:1	1.90	2.95	
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Top	0.105	-0.05	1:1	1.41	0.15	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Top	0.0765	0.1	1:1	1.85	0.14	
LTE 2	19100	1900	QPSK / 20	1	0	24	22.5	Bottom	0.093	-0.15	1:1	1.41	0.13	
LTE 2	19100	1900	QPSK / 20	50	0	24	21.34	Bottom	0.0741	-0.07	1:1	1.85	0.14	
LTE 2	18700	1860	QPSK / 20	1	0	24	22.14	Right	1.95	-0.07	1:1	1.53	2.99	
LTE 2	18700	1860	QPSK / 20	50	0	24	21.43	Right	1.55	0.1	1:1	1.81	2.80	
LTE 2	18700	1860	QPSK / 20	100	0	24	21.18	Right	1.53	0.06	1:1	1.91	2.93	
LTE 2	18900	1880	QPSK / 20	1	0	24	22.12	Right	2.04	0.09	1:1	1.54	3.15	
LTE 2	18900	1880	QPSK / 20	50	0	24	21.37	Right	1.68	0.15	1:1	1.83	3.08	
LTE 2	18900	1880	QPSK / 20	100	0	24	21.39	Right	1.68	0.01	1:1	1.82	3.06	

*Larger than 5% drifts included to scaling factors

LTE 2 Repeat Measurements:

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
LTE 2	18900	1880	QPSK / 20	1	0	24	22.12	Right	2.05	0.07	1:1	1.54	3.16	13

*Larger than 5% drifts included to scaling factors

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Front	0.283	0.32	1:1	1.58	0.45	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Front	0.219	0.1	1:1	1.90	0.42	
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Back	0.273	0.11	1:1	1.47	0.40	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Back	0.206	0.06	1:1	1.90	0.39	
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Left	0.225	-0.05	1:1	1.47	0.33	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Left	0.171	-0.05	1:1	1.90	0.32	
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Right	1.92	0.2	1:1	1.47	2.81	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Right	1.52	0.05	1:1	1.90	2.88	
LTE 4	20175	1732.5	QPSK / 20	100	0	24	21.13	Right	1.57	0.05	1:1	1.94	3.04	
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Top	0.0804	0.13	1:1	1.47	0.12	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Top	0.0597	0.06	1:1	1.90	0.11	
LTE 4	20175	1732.5	QPSK / 20	1	0	24	22.34	Bottom	0.212	-0.05	1:1	1.47	0.31	
LTE 4	20175	1732.5	QPSK / 20	50	0	24	21.22	Bottom	0.17	-0.02	1:1	1.90	0.32	
LTE 4	20050	1720	QPSK / 20	1	50	24	22.25	Right	1.94	0.05	1:1	1.50	2.90	
LTE 4	20050	1720	QPSK / 20	50	50	24	21.27	Right	1.49	0.02	1:1	1.87	2.79	
LTE 4	20050	1720	QPSK / 20	100	0	24	21.15	Right	1.49	0	1:1	1.93	2.87	
LTE 4	20300	1745	QPSK / 20	1	0	24	22.15	Right	2.11	0.06	1:1	1.53	3.23	
LTE 4	20300	1745	QPSK / 20	50	0	24	20.97	Right	1.58	-0.06	1:1	2.01	3.17	
LTE 4	20300	1745	QPSK / 20	100	0	24	20.94	Right	1.61	0.09	1:1	2.02	3.26	14

*Larger than 5% drifts included to scaling factors

LTE 4 Repeat Measurements:

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
LTE 4	20300	1745	QPSK / 20	1	0	24	22.15	Right	1.98	-0.15	1:1	1.53	3.03	

*Larger than 5% drifts included to scaling factors

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR _{10g} [W/kg]	Power Drift* [dB]	Duty Cycle	Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Front	0.413	0.16	1:1	1.63	0.67	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Front	0.316	0.03	1:1	2.07	0.65	
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Back	0.437	-0.08	1:1	1.63	0.71	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Back	0.341	-0.05	1:1	2.07	0.71	
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Left	0.295	0.15	1:1	1.63	0.48	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Left	0.227	0.01	1:1	2.07	0.47	
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Right	0.886	-0.16	1:1	1.63	1.45	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Right	0.716	-0.64	1:1	2.40	1.72	15
LTE 5	20525	836.5	QPSK / 10	50	0	25	21.72	Right	0.699	-0.03	1:1	2.13	1.49	
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Top	0.0824	-0.12	1:1	1.63	0.13	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Top	0.0634	0.09	1:1	2.07	0.13	
LTE 5	20525	836.5	QPSK / 10	1	24	25	22.87	Bottom	0.0415	0.08	1:1	1.63	0.07	
LTE 5	20525	836.5	QPSK / 10	25	0	25	21.84	Bottom	0.0321	0.52	1:1	2.33	0.07	
LTE 5	20450	829	QPSK / 10	1	24	25	22.8	Right	0.887	-0.04	1:1	1.66	1.47	
LTE 5	20450	829	QPSK / 10	25	25	25	21.74	Right	0.698	-0.28	1:1	2.26	1.58	
LTE 5	20600	844	QPSK / 10	1	0	25	22.67	Right	0.883	0.04	1:1	1.71	1.51	
LTE 5	20600	844	QPSK / 10	25	25	25	21.71	Right	0.681	-0.01	1:1	2.13	1.45	

*Larger than 5% drifts included to scaling factors

2.4GHz WLAN:

Mode	Data Rate [Mbps]	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Scaling Factor	Duty Cycle [%]	Reported SAR _{10g} [W/kg]	Plot #
802.11b	1	2412	1	Front, 0mm	21	19.5	0.085	N/A**	1.41	85	0.12	
802.11b	1	2412	1	Back, 0mm	21	19.5	0.38	0.05	1.41	85	0.54	
802.11b	1	2412	1	Top, 0mm	21	19.5	0.025	0.48	1.58	85	0.04	
802.11b	1	2412	1	Bottom, 0mm	21	19.5	0.082	0.08	1.41	85	0.12	
802.11b	1	2412	1	Left, 0mm	21	19.5	0.64	0.06	1.41	85	0.90	16
802.11b	1	2412	1	Right, 0mm	21	19.5	0.03	-0.07	1.41	85	0.04	
802.11b	1	2437	6	Left, 0mm	21	19.35	0.61	0.05	1.46	85	0.90	
802.11b	1	2462	11	Left, 0mm	21	19.24	0.59	0.02	1.50	85	0.88	

*Larger than 5% drifts included to scaling factors

**Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable.

5GHz WLAN:

Mode	Data Rate [Mbps]	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Scaling Factor	Used Duty Cycle [%]	Duty Cycle Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
802.11a	6	5320	64	Front, 0mm	20	19.06	0.05	N/A**	1.24	68.7	1.46	0.08	
802.11a	6	5320	64	Back, 0mm	20	19.06	0.59	-0.14	1.24	68.7	1.46	1.06	
802.11a	6	5320	64	Top, 0mm	20	19.06	0.004	N/A**	1.24	68.7	1.46	0.01	
802.11a	6	5320	64	Bottom, 0mm	20	19.06	0.15	0.26	1.32	68.7	1.46	0.28	
802.11a	6	5320	64	Left, 0mm	20	19.06	0.93	-0.03	1.24	68.7	1.46	1.69	
802.11a	6	5320	64	Right, 0mm	20	19.06	0.02	-1.19	1.63	68.7	1.46	0.04	
802.11a	6	5260	52	Left, 0mm	20	18.74	1.00	0.07	1.34	68.7	1.46	1.94	17
802.11a	6	5300	60	Left, 0mm	20	18.96	0.95	-0.17	1.27	68.7	1.46	1.76	

*Larger than 5% drifts included to scaling factors

**Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable.

Mode	Data Rate [Mbps]	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Scaling Factor	Used Duty Cycle [%]	Duty Cycle Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
802.11a	6	5560	112	Front, 0mm	20	19.53	0.02	-0.33	1.20	68.7	1.46	0.04	
802.11a	6	5560	112	Back, 0mm	20	19.53	0.26	0.08	1.11	68.7	1.46	0.42	
802.11a	6	5560	112	Top, 0mm	20	19.53	0.0002	N/A**	1.11	68.7	1.46	0.0003	
802.11a	6	5560	112	Bottom, 0mm	20	19.53	0.07	0.25	1.18	68.7	1.46	0.13	
802.11a	6	5560	112	Left, 0mm	20	19.53	0.51	0.04	1.11	68.7	1.46	0.82	
802.11a	6	5560	112	Right, 0mm	20	19.53	0.02	-0.96	1.39	68.7	1.46	0.03	
802.11a	6	5560	112	Front, 0mm	20	19.3	0.63	-0.17	1.17	68.7	1.46	1.08	18
802.11a	6	5560	112	Back, 0mm	20	19.16	0.41	0.17	1.21	68.7	1.46	0.73	

*Larger than 5% drifts included to scaling factors

**Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable.

Mode	Data Rate [Mbps]	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR _{10g} [W/kg]	Power Drift* [dB]	Scaling Factor	Used Duty Cycle [%]	Duty Cycle Scaling Factor	Reported SAR _{10g} [W/kg]	Plot #
802.11a	6	5660	132	Front, 0mm	20	19.05	0.02	-0.12	1.24	68.7	1.46	0.03	
802.11a	6	5660	132	Back, 0mm	20	19.05	0.18	-0.04	1.24	68.7	1.46	0.32	
802.11a	6	5660	132	Top, 0mm	20	19.05	0.0002	N/A**	1.24	68.7	1.46	0.0003	
802.11a	6	5660	132	Bottom, 0mm	20	19.05	0.06	-0.67	1.45	68.7	1.46	0.13	
802.11a	6	5660	132	Left, 0mm	20	19.05	0.39	-0.02	1.24	68.7	1.46	0.70	
802.11a	6	5660	132	Right, 0mm	20	19.05	0.005	N/A**	1.24	68.7	1.46	0.01	
802.11a	6	5745	149	Front, 0mm	20	18.77	0.34	-0.12	1.33	68.7	1.46	0.66	
802.11a	6	5825	165	Back, 0mm	20	18.01	0.33	0.11	1.58	68.7	1.46	0.76	19

*Larger than 5% drifts included to scaling factors

**Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable.

7.2 IEC 62209-2 AMD1:2019

According to IEC 62209-2 AMD1:2019, the zoom scan complies if the peak spatial-average SAR is below 0.1 W/kg, or if the following criteria is met:

1. The smallest horizontal distance from the local SAR peaks to all points 3 dB below the SAR peak is larger than the horizontal grid step.
2. Ratio of SAR at the second measured point (M2) to the SAR at the closest measured point (M1) at the x-y location of the measured maximum is at least 30%.

Zoom scan compliance according to IEC 62209-2 AMD1:2019 is automatically verified by DASY5 software and all zoom scans in this test report do pass the criteria. The smallest horizontal distance and Ratio between measurement points M2 and M1 of the highest SAR results is available in Appendix C.

7.3 Calculated NFC SAR

7.3.1 FCC

For simultaneous transmission evaluation the estimated standalone SAR values are calculated according to the following equation below.

$$SAR_{estimated} = 0.4 * P_{ant}/P_{th} [W/kg] \quad \text{(Equation 6)}$$

$$\text{Estimated NFC 13.56 MHz SAR} = 0.4 * (1.0/443) = 0.00090 \text{ W/kg}$$

7.3.2 ISED

The estimated SAR value for NFC 13.56 MHz is evaluated according to the following equation stated in Notice 2016-DRS001:

(maximum power level including tune-up tolerance for transmitter A / maximum power level of exemption at the same frequency and distance) * 0.4 W/kg

According to RSS-102, issue 5, 2015, the SAR test exclusion power threshold for NFC is 71mW at ≤5mm separation distance.

$$\text{Estimated NFC SAR} = 1/71 * 0.4 = 0.0056 \text{ W/kg}$$

7.4 Simultaneous Transmission Analysis

Simultaneous transmission analysis for the maximum SAR is in the table below. Direct summation of SAR results was performed.

7.4.1 FCC

Extremity SAR:

Exposure Condition	Extremity SAR _{10g} [W/kg]					
Test Position	Front	Back	Left	Right	Top	Bottom
GPRS 850	1.40	1.40	1.03	3.74	0.22	0.12
GPRS 1900	0.20	0.12	0.13	2.46	0.13	0.10
WCDMA 2	0.25	0.19	0.17	3.75	0.19	0.17
WCDMA 5	0.64	0.78	0.45	1.49	0.14	0.06
LTE 2	0.21	0.13	0.19	3.16	0.15	0.14
LTE 4	0.45	0.40	0.33	3.26	0.12	0.32
LTE 5	0.67	0.71	0.48	1.72	0.13	0.07
Maximum Cellular SAR	1.4	1.4	1.03	3.75	0.22	0.32
Maximum 2.4 GHz WLAN SAR	0.12	0.54	0.90	0.04	0.04	0.12
Maximum 5 GHz WLAN SAR	0.08	1.06	1.94	0.04	0.01	0.28
Maximum NFC SAR	0.0009					
SAR Summation:	1.521	2.461	2.971	3.791	0.261	0.601

7.4.2 ISED

Extremity SAR:

Exposure Condition	Extremity SAR _{10g} [W/kg]					
Test Position	Front	Back	Left	Right	Top	Bottom
GPRS 850	1.40	1.40	1.03	3.74	0.22	0.12
GPRS 1900	0.20	0.12	0.13	2.46	0.13	0.10
WCDMA 2	0.25	0.19	0.17	3.75	0.19	0.17
WCDMA 5	0.64	0.78	0.45	1.49	0.14	0.06
LTE 2	0.21	0.13	0.19	3.16	0.15	0.14
LTE 4	0.45	0.40	0.33	3.26	0.12	0.32
LTE 5	0.67	0.71	0.48	1.72	0.13	0.07
Maximum Cellular SAR	1.4	1.4	1.03	3.75	0.22	0.32
Maximum 2.4 GHz WLAN SAR	0.12	0.54	0.90	0.04	0.04	0.12
Maximum 5 GHz WLAN SAR	0.08	1.06	1.94	0.04	0.01	0.28
Maximum NFC SAR	0.0056					
SAR Summation:	1.526	2.466	2.976	3.796	0.266	0.606

APPENDIX A: PHOTOS OF THE DUT

Size of the DUT is: 167 mm x 76 mm x 56 mm





Figure 2 Front test position, 0mm separation distance



Figure 3 Back test position, 0mm separation distance



Figure 4 Left test position, 0mm separation distance

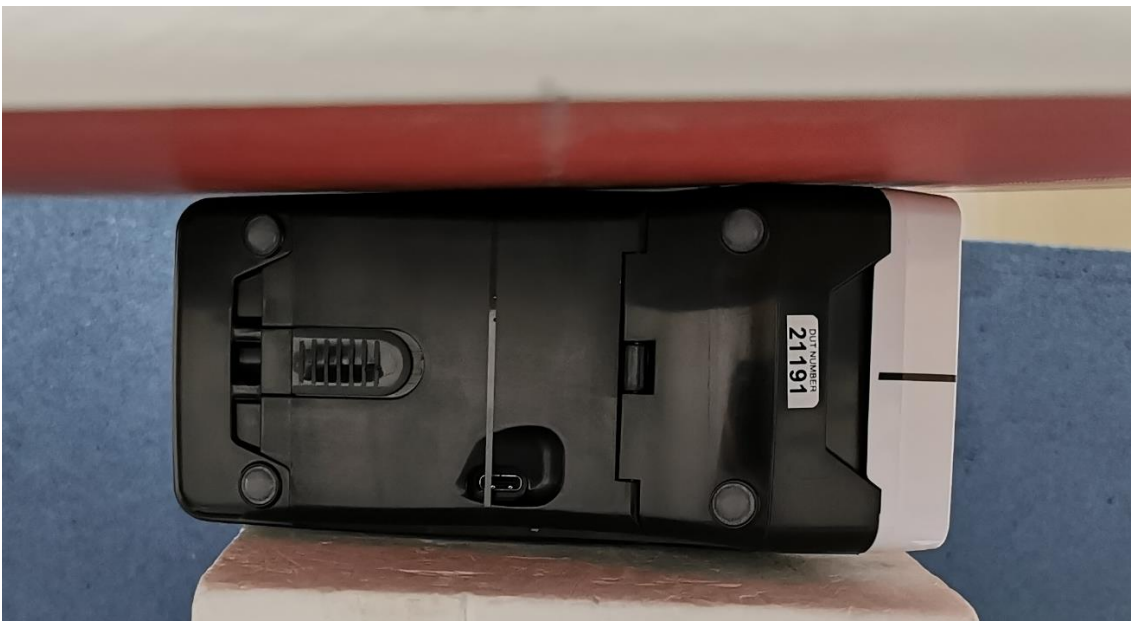


Figure 5 Right test position, 0mm separation distance



Figure 6 Top test position, 0mm separation distance

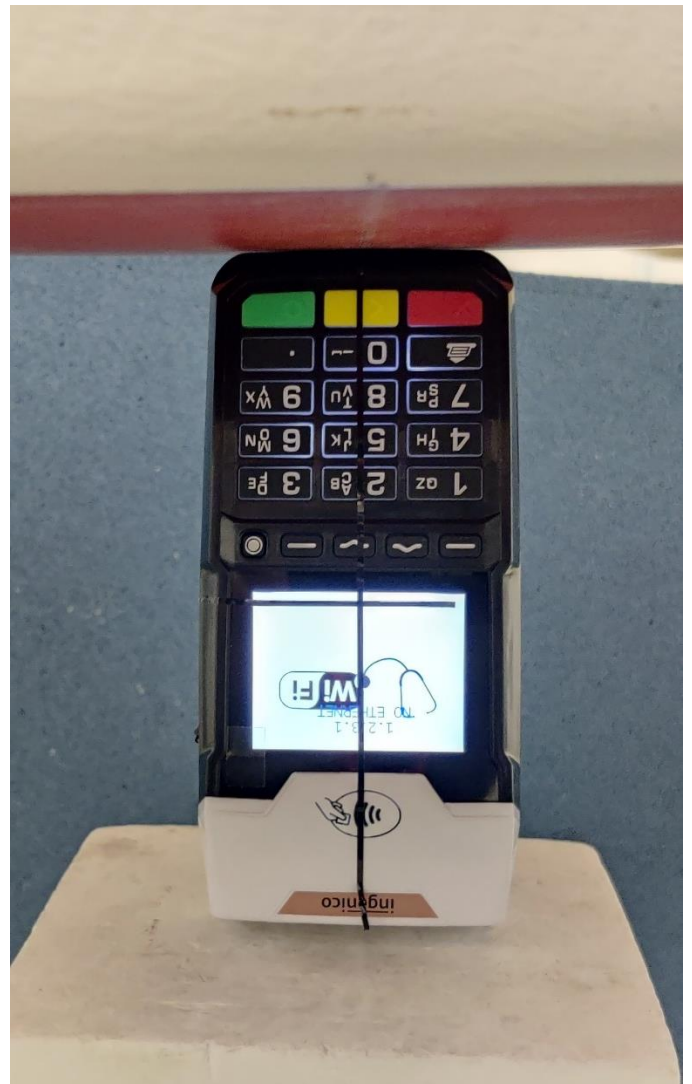


Figure 7 Bottom test position, 0mm separation distance

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 10.5.23 10:19:54

Test Laboratory: Verkotan Oy

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:455

Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 835 \text{ MHz}$; $\sigma = 0.897 \text{ S/m}$; $\epsilon_r = 42.666$; $\rho = 1000 \text{ kg/m}^3$

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.37, 8.45, 8.89) @ 835 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check, 835MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5\text{mm}$, $dy=5\text{mm}$, $dz=5\text{mm}$

Reference Value = 55.06 V/m; Power Drift = -0.03 dB

Peak SAR (extrapolated) = 3.58 W/kg

SAR(1 g) = 2.5 W/kg; SAR(10 g) = 1.65 W/kg (SAR corrected for target medium)

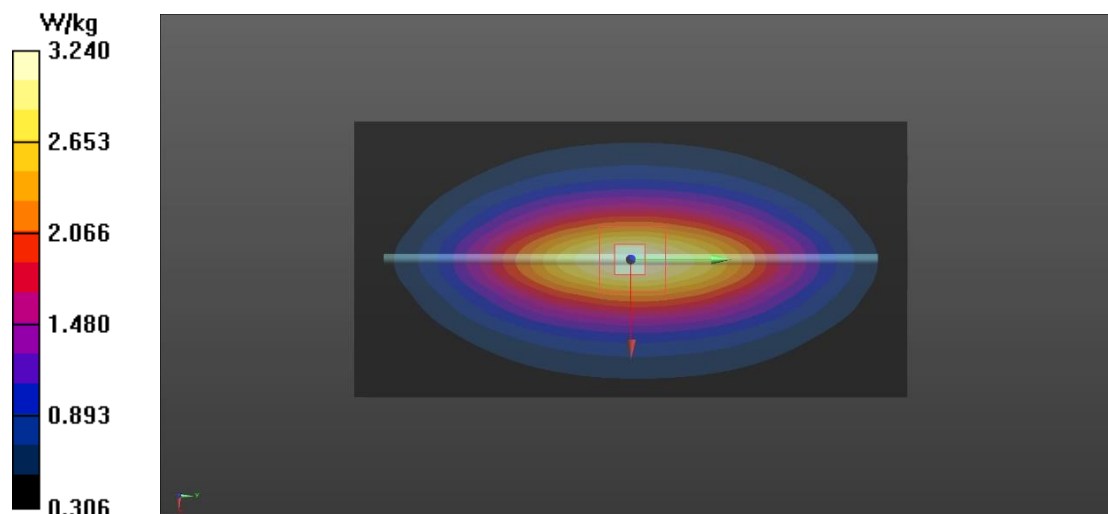
Smallest distance from peaks to all points 3 dB below = 16.6 mm

Ratio of SAR at M2 to SAR at M1 = 69%

Maximum value of SAR (measured) = 3.24 W/kg

Configuration/System check, 835MHz/Area Scan (61x121x1): Interpolated grid: $dx=1.500 \text{ mm}$, $dy=1.500 \text{ mm}$

Maximum value of SAR (interpolated) = 3.27 W/kg



Plot 2

Date/Time: 15.5.23 08:49:43

Test Laboratory: Verkotan Oy

DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:249

Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 1800$ MHz; $\sigma = 1.348$ S/m; $\epsilon_r = 40.325$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.45, 7.97, 8.4) @ 1800 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Area Scan (61x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

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

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 104.4 V/m; Power Drift = -0.11 dB

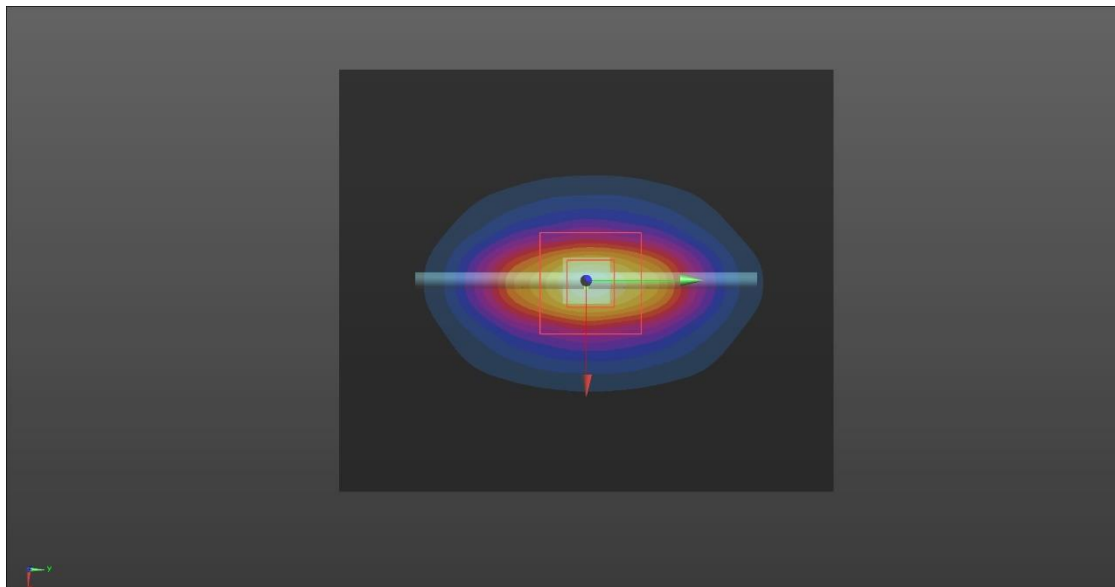
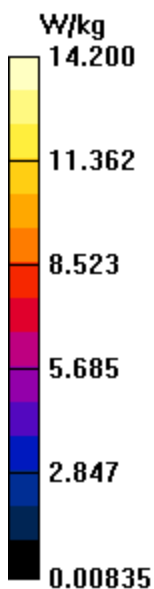
Peak SAR (extrapolated) = 15.6 W/kg

SAR(1 g) = 9.03 W/kg; SAR(10 g) = 4.8 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 57.2%

Maximum value of SAR (measured) = 13.3 W/kg



Plot 3

Date/Time: 18.5.23 08:26:19

Test Laboratory: Verkotan Oy

DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:511

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.436$ S/m; $\epsilon_r = 39.841$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.05, 7.59, 7.97) @ 1900 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 104.1 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 16.2 W/kg

SAR(1 g) = 9.16 W/kg; SAR(10 g) = 4.91 W/kg (SAR corrected for target medium)

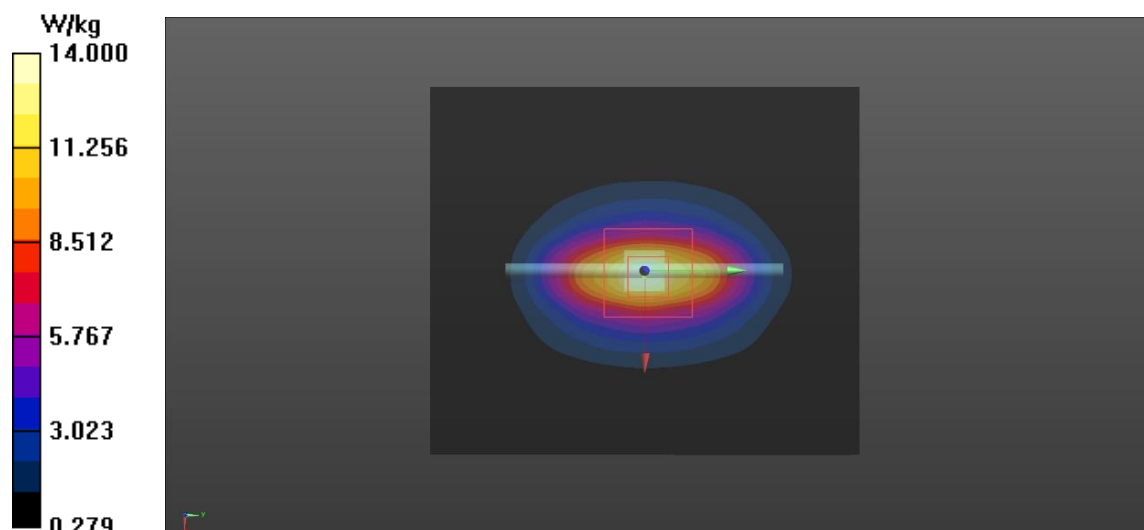
Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 57.6%

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

Configuration/system check/Area Scan (61x71x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

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



Plot 4

Date/Time: 22.5.23 15:11:44

Test Laboratory: Verkotan Oy

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

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.683$ S/m; $\epsilon_r = 37.394$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.7, 7.5, 7.63) @ 2450 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 102.3 V/m; Power Drift = -0.44 dB

Peak SAR (extrapolated) = 22.7 W/kg

SAR(1 g) = 11.9 W/kg; SAR(10 g) = 5.61 W/kg (SAR corrected for target medium)

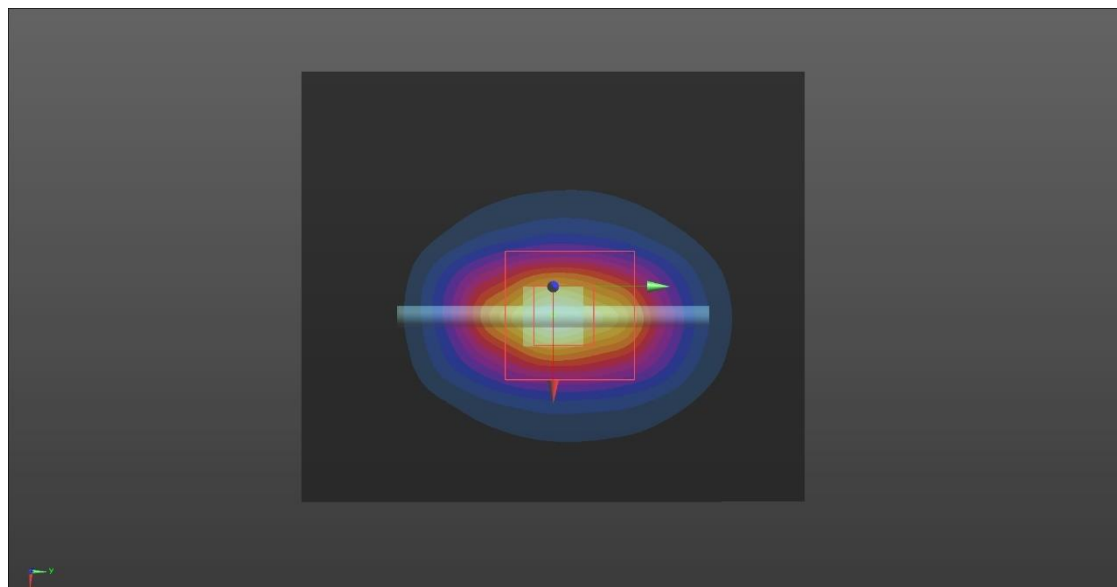
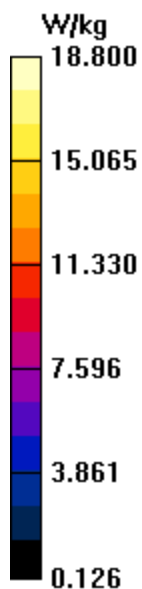
Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 51.9%

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

Configuration/system check/Area Scan (71x61x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 19.7 W/kg



Plot 5

Date/Time: 24.5.23 12:44:26

Test Laboratory: Verkotan Oy

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.476$ S/m; $\epsilon_r = 36.318$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(5.18, 4.99, 5.17) @ 5250 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 25.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check 5250MHz/Zoom Scan (7x7x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 67.17 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 26.9 W/kg

SAR(1 g) = 7.11 W/kg; SAR(10 g) = 2.06 W/kg (SAR corrected for target medium)

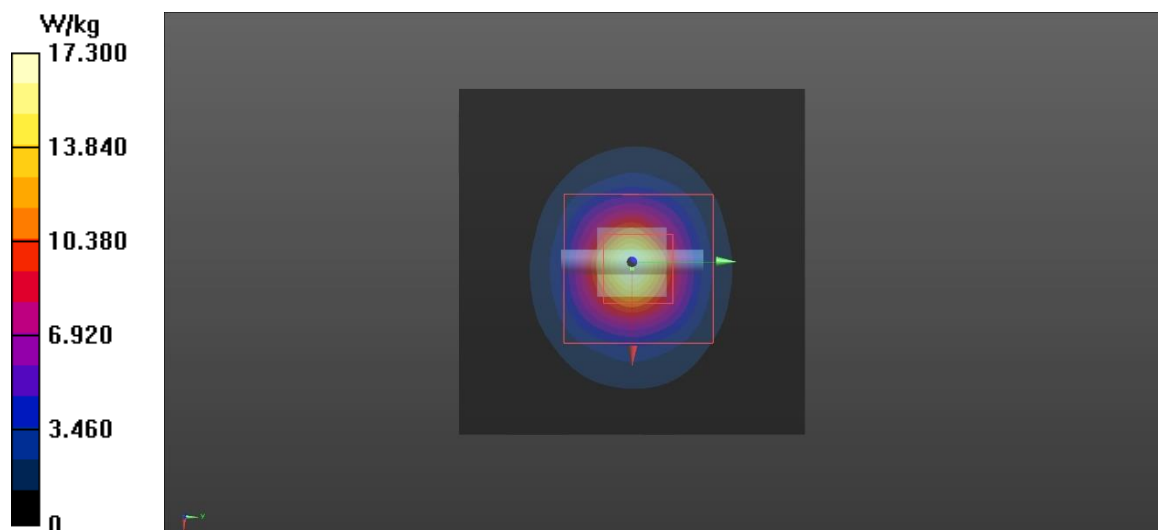
Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 67.2%

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

Configuration/system check 5250MHz/Area Scan (51x51x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.9 W/kg



Plot 6

Date/Time: 25.5.23 10:56:10

Test Laboratory: Verkotan Oy

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 5600$ MHz; $\sigma = 4.863$ S/m; $\epsilon_r = 35.7$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.4, 4.29, 4.43) @ 5600 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 25.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check 5600MHz/Area Scan (51x51x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 22.9 W/kg

Configuration/system check 5600MHz/Zoom Scan (7x7x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 69.78 V/m; Power Drift = 0.01 dB

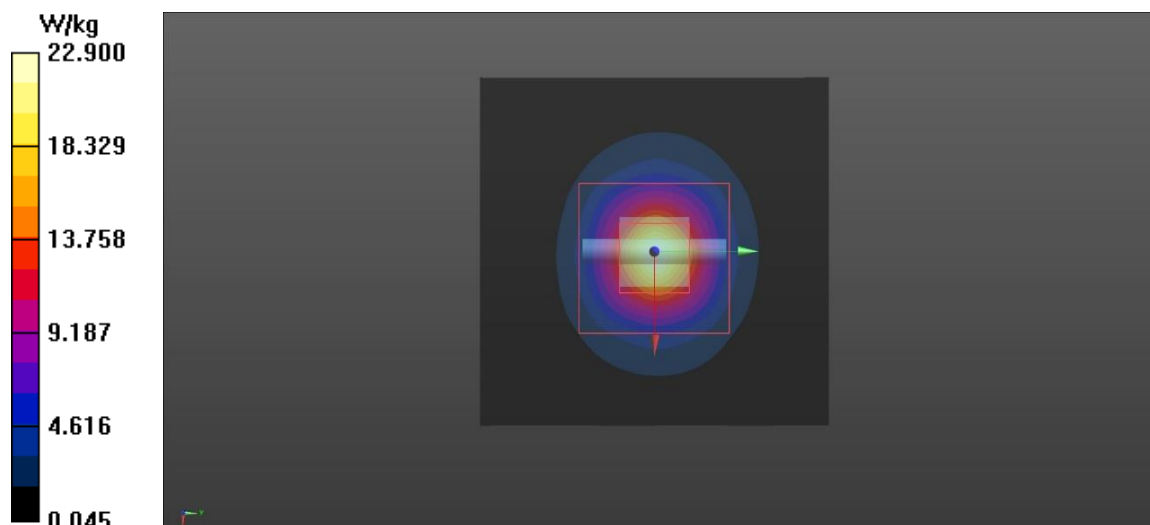
Peak SAR (extrapolated) = 32.8 W/kg

SAR(1 g) = 7.77 W/kg; SAR(10 g) = 2.18 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 6.9 mm

Ratio of SAR at M2 to SAR at M1 = 63.9%

Maximum value of SAR (measured) = 20.0 W/kg



Plot 7

Date/Time: 26.5.23 09:31:28

Test Laboratory: Verkotan Oy

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 5750$ MHz; $\sigma = 5.123$ S/m; $\epsilon_r = 34.944$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.47, 4.33, 4.53) @ 5750 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 25.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check 5750MHz/Zoom Scan (7x7x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 67.64 V/m; Power Drift = -0.06 dB

Peak SAR (extrapolated) = 32.3 W/kg

SAR(1 g) = 7.34 W/kg; SAR(10 g) = 2.09 W/kg (SAR corrected for target medium)

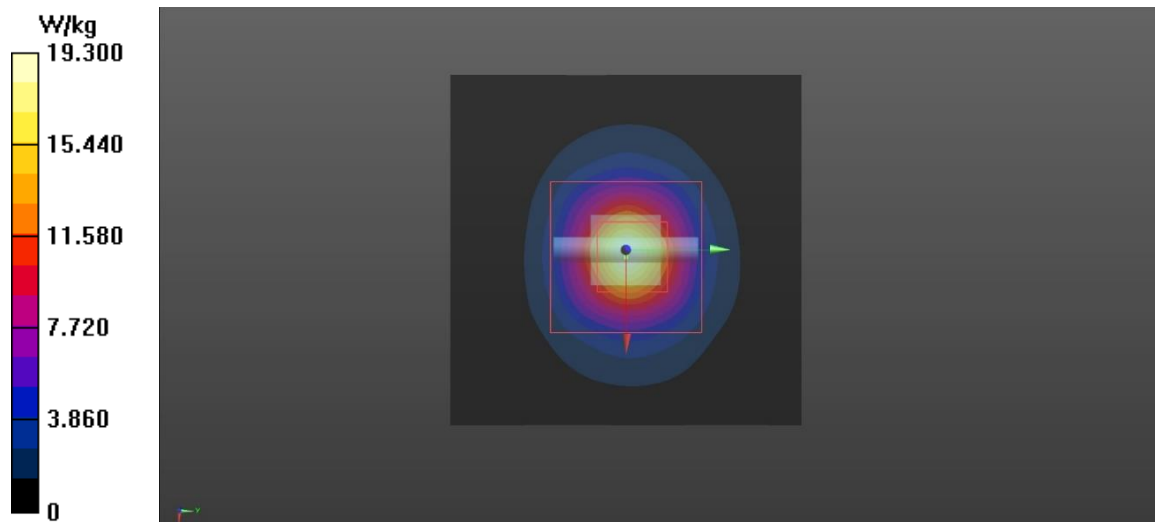
Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 62.1%

Maximum value of SAR (measured) = 19.3 W/kg

Configuration/system check 5750MHz/Area Scan (51x51x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 20.5 W/kg



Plot 8

Date/Time: 29.5.23 09:01:47

Test Laboratory: Verkotan Oy

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 5750$ MHz; $\sigma = 5.061$ S/m; $\epsilon_r = 35.593$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.47, 4.33, 4.53) @ 5750 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 25.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check 5750MHz/Zoom Scan (7x7x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 66.85 V/m; Power Drift = -0.10 dB

Peak SAR (extrapolated) = 30.4 W/kg

SAR(1 g) = 7.19 W/kg; SAR(10 g) = 2.07 W/kg (SAR corrected for target medium)

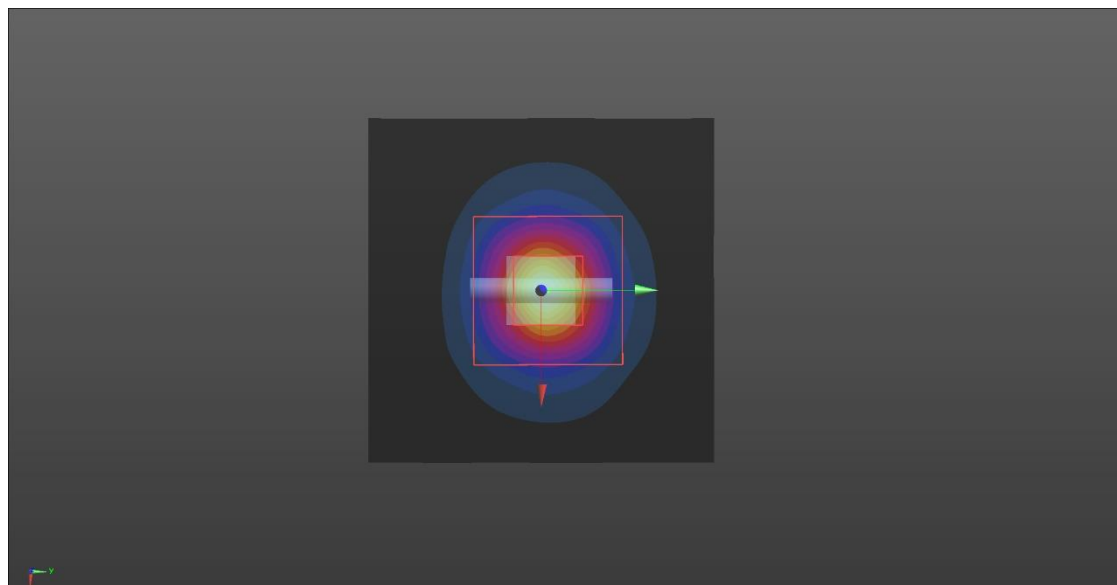
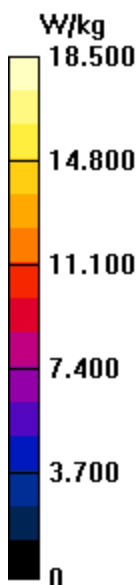
Smallest distance from peaks to all points 3 dB below = 7.1 mm

Ratio of SAR at M2 to SAR at M1 = 62.9%

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

Configuration/system check 5750MHz/Area Scan (51x51x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 19.5 W/kg



APPENDIX C: MEASUREMENT SCANS

Plot 9

Date/Time: 11.5.23 08:14:54

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, GPRS 2 slots (0); Communication System Band: GPRS 2 slots 850; Frequency: 824.2 MHz;

Communication System PAR: 6.335 dB;

Medium parameters used (interpolated): $f = 824.2$ MHz; $\sigma = 0.893$ S/m; $\epsilon_r = 42.679$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.37, 8.45, 8.89) @ 824.2 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Left & Right/Right, GPRS 850, Low CH, 2 TX Slots/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm
Maximum value of SAR (interpolated) = 5.30 W/kg

Left & Right/Right, GPRS 850, Low CH, 2 TX Slots/Zoom Scan (8x9x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 62.74 V/m; Power Drift = -0.26 dB

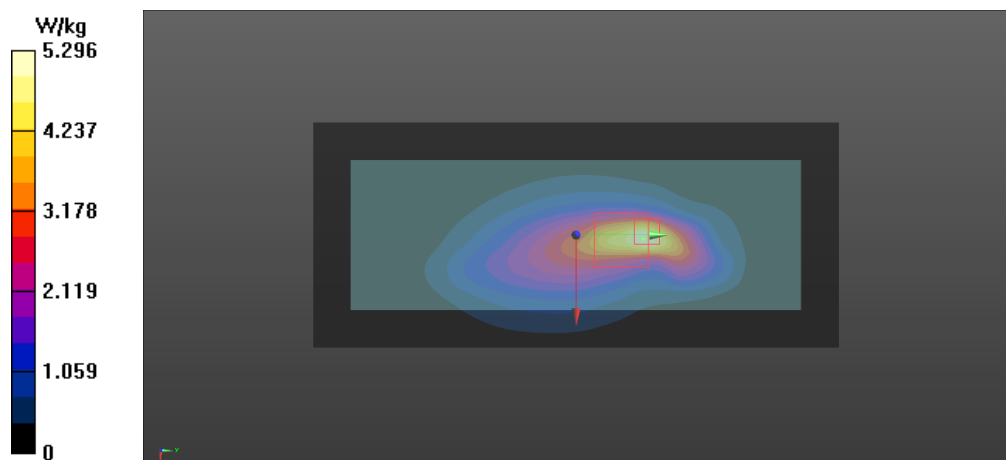
Peak SAR (extrapolated) = 7.81 W/kg

SAR(1 g) = 3.27 W/kg; SAR(10 g) = 1.79 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 7 mm

Ratio of SAR at M2 to SAR at M1 = 42.1%

Maximum value of SAR (measured) = 5.89 W/kg



Plot 10

Date/Time: 15.5.23 09:39:20

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, GPRS 2 slots (0); Communication System Band: GPRS 1900; Frequency: 1880 MHz;

Communication System PAR: 6.335 dB;

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.397$ S/m; $\epsilon_r = 40.174$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.05, 7.59, 7.97) @ 1880 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Left & Right/Right, GPRS 1900, Mid, 2 TX Slots/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 24.04 V/m; Power Drift = -0.15 dB

Peak SAR (extrapolated) = 6.04 W/kg

SAR(1 g) = 2.83 W/kg; SAR(10 g) = 1.29 W/kg (SAR corrected for target medium)

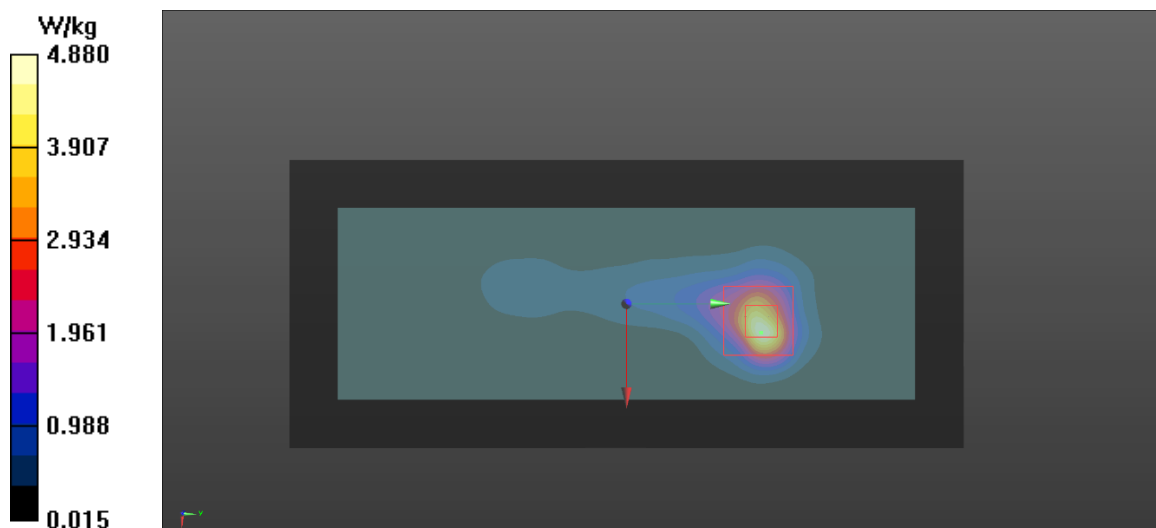
Smallest distance from peaks to all points 3 dB below = 7.6 mm

Ratio of SAR at M2 to SAR at M1 = 47.9%

Maximum value of SAR (measured) = 4.88 W/kg

Left & Right/Right, GPRS 1900, Mid, 2 TX Slots/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 5.09 W/kg



Plot 11

Date/Time: 18.5.23 10:38:00

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WCDMA (0); Communication System Band: Band 2; Frequency: 1907.6 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 1908$ MHz; $\sigma = 1.441$ S/m; $\epsilon_r = 39.822$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.05, 7.59, 7.97) @ 1907.6 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Right, WCDMA 2, HIGH, RMC 12.2K 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 34.31 V/m; Power Drift = 0.06 dB

Peak SAR (extrapolated) = 14.2 W/kg

SAR(1 g) = 6.4 W/kg; SAR(10 g) = 2.86 W/kg (SAR corrected for target medium)

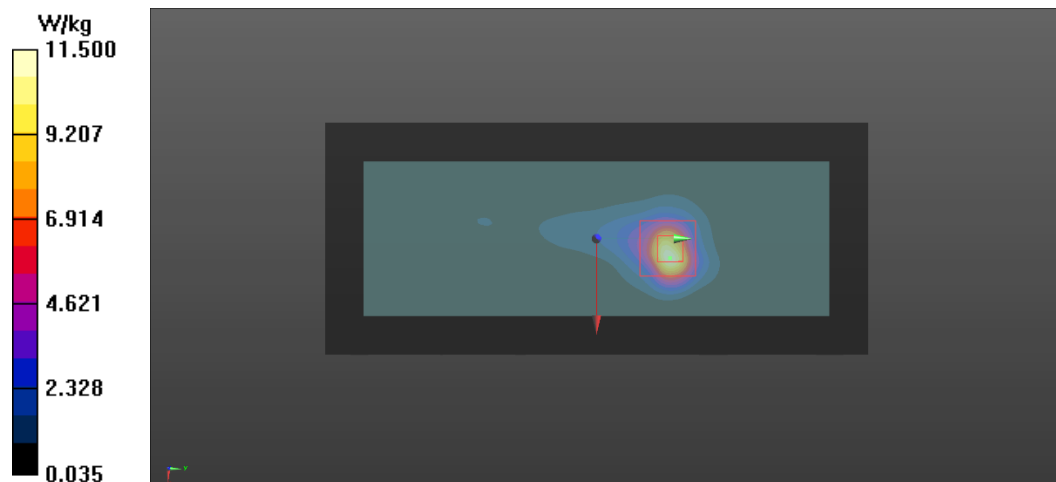
Smallest distance from peaks to all points 3 dB below = 7.6 mm

Ratio of SAR at M2 to SAR at M1 = 46.9%

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

Configuration/Right, WCDMA 2, HIGH, RMC 12.2K 2/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 11.1 W/kg



Plot 12

Date/Time: 11.5.23 12:34:39

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WCDMA (0); Communication System Band: Band 5; Frequency: 826.4 MHz;

Communication System PAR: 0 dB;

Medium parameters used (interpolated): $f = 826.4$ MHz; $\sigma = 0.894$ S/m; $\epsilon_r = 42.677$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.37, 8.45, 8.89) @ 826.4 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Left & Right 2/Right, WCDMA 5, Low, RMC 12.2K/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 2.34 W/kg

Left & Right 2/Right, WCDMA 5, Low, RMC 12.2K/Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 49.39 V/m; Power Drift = -0.17 dB

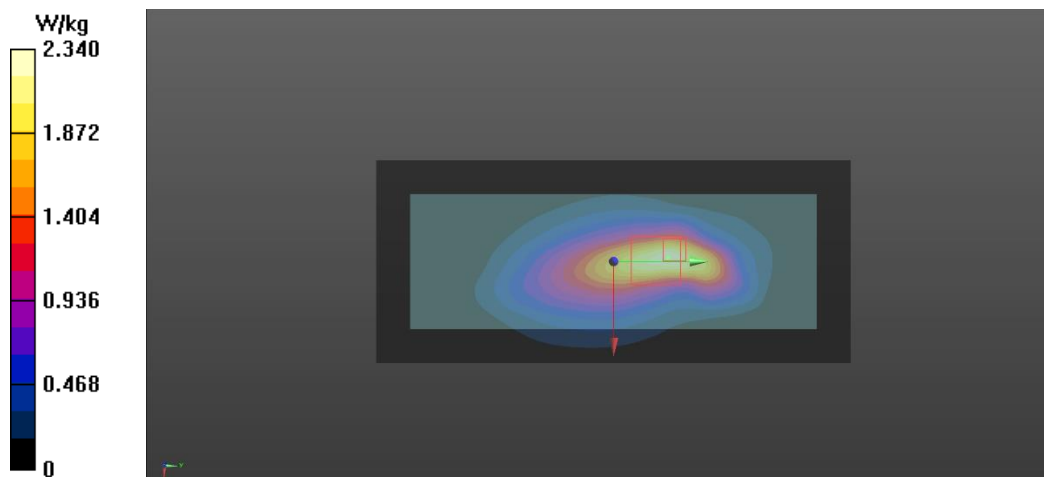
Peak SAR (extrapolated) = 4.81 W/kg

SAR(1 g) = 1.93 W/kg; SAR(10 g) = 1.04 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 7 mm

Ratio of SAR at M2 to SAR at M1 = 39.1%

Maximum value of SAR (measured) = 3.59 W/kg



Plot 13

Date/Time: 16.5.23 08:57:39

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz); Frequency: 1880 MHz;

Communication System PAR: 0 dB;

Medium parameters used: $f = 1880$ MHz; $\sigma = 1.397$ S/m; $\epsilon_r = 40.174$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.05, 7.59, 7.97) @ 1880 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration 2/Right, LTE 2, MID, QPSK/20, RB1, Offset0 Repeat/Zoom Scan (7x7x7)/Cube 0: Measurement grid:

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

Reference Value = 36.22 V/m; Power Drift = 0.07 dB

Peak SAR (extrapolated) = 9.38 W/kg

SAR(1 g) = 4.47 W/kg; SAR(10 g) = 2.05 W/kg (SAR corrected for target medium)

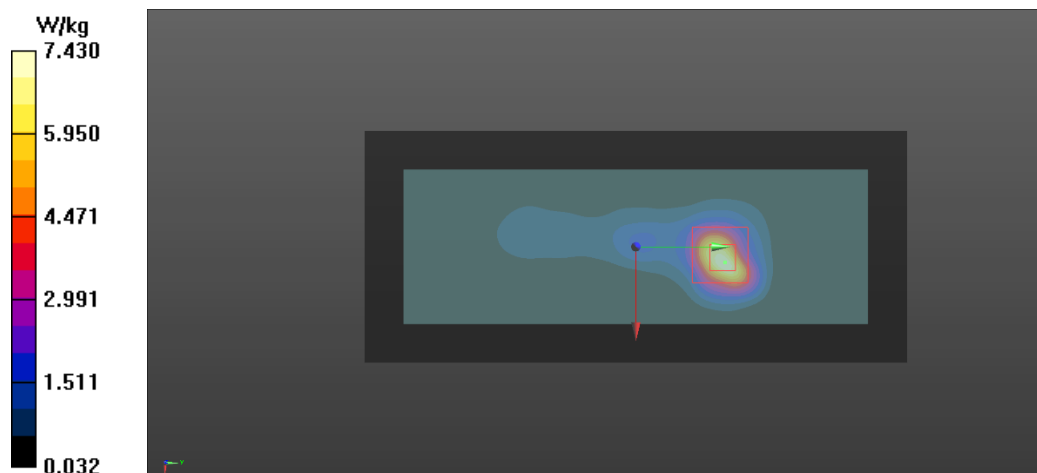
Smallest distance from peaks to all points 3 dB below = 8.1 mm

Ratio of SAR at M2 to SAR at M1 = 48.2%

Maximum value of SAR (measured) = 7.43 W/kg

Configuration 2/Right, LTE 2, MID, QPSK/20, RB1, Offset0 Repeat/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 7.46 W/kg



Plot 14

Date/Time: 17.5.23 08:45:01

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz); Frequency: 1745 MHz;

Communication System PAR: 0 dB;

Medium parameters used (interpolated): $f = 1745$ MHz; $\sigma = 1.315$ S/m; $\epsilon_r = 40.398$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.45, 7.97, 8.4) @ 1745 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Right, LTE 4, HIGH, QPSK/20, RB100, Offset0/Zoom Scan (8x8x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 41.14 V/m; Power Drift = 0.09 dB

Peak SAR (extrapolated) = 6.30 W/kg

SAR(1 g) = 3.28 W/kg; SAR(10 g) = 1.61 W/kg (SAR corrected for target medium)

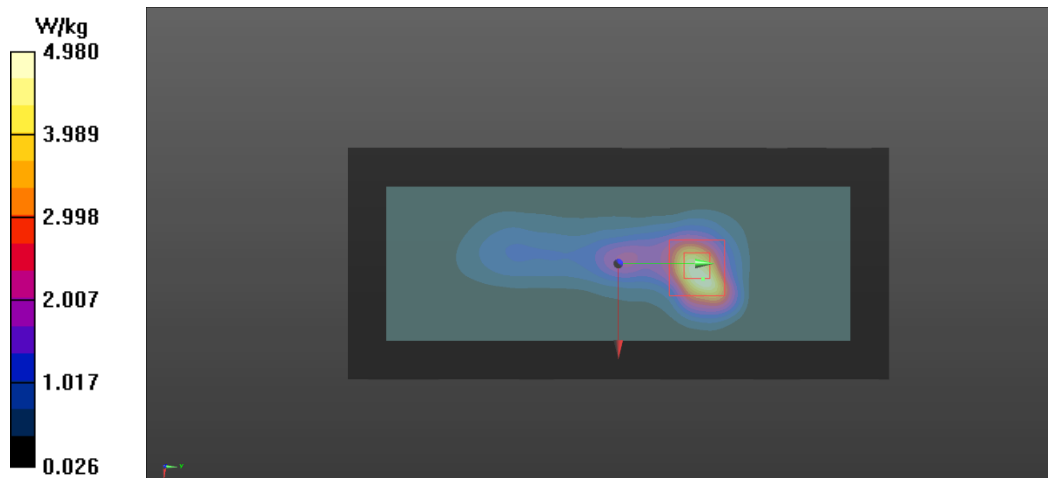
Smallest distance from peaks to all points 3 dB below = 8.9 mm

Ratio of SAR at M2 to SAR at M1 = 49.2%

Maximum value of SAR (measured) = 4.98 W/kg

Configuration/Right, LTE 4, HIGH, QPSK/20, RB100, Offset0/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 5.04 W/kg



Plot 15

Date/Time: 12.5.23 09:01:56

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, Generic LTE (0); Communication System Band: Band 5, E-UTRA/FDD (824.0 - 849.0 MHz); Frequency: 836.5 MHz;

Communication System PAR: 0 dB;

Medium parameters used (interpolated): $f = 836.5$ MHz; $\sigma = 0.888$ S/m; $\epsilon_r = 42.566$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.37, 8.45, 8.89) @ 836.5 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = 31.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Right & Left/Right, LTE 5, MID, QPSK/10, RB25, Offset0/Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 43.13 V/m; Power Drift = -0.65 dB

Peak SAR (extrapolated) = 3.66 W/kg

SAR(1 g) = 1.37 W/kg; SAR(10 g) = 0.716 W/kg (SAR corrected for target medium)

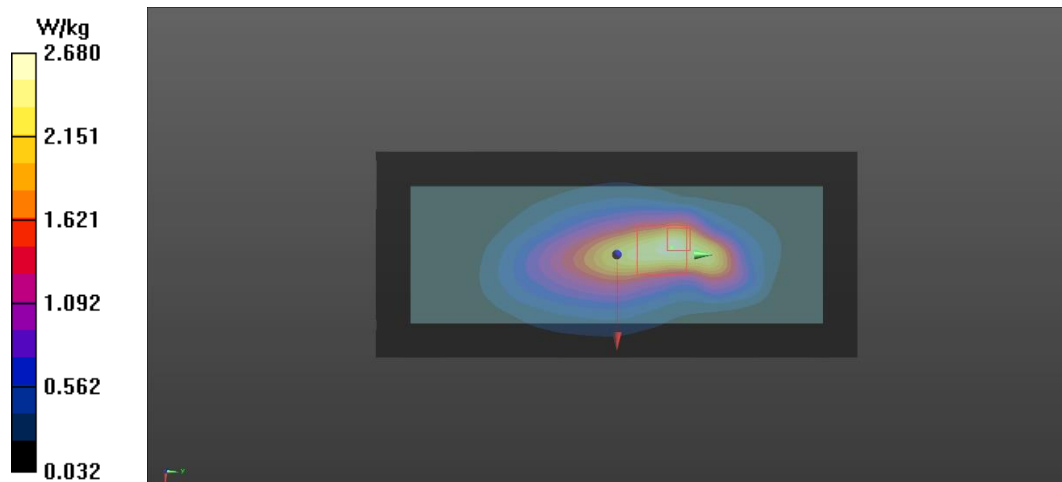
Smallest distance from peaks to all points 3 dB below = 6 mm

Ratio of SAR at M2 to SAR at M1 = 36.7%

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

Right & Left/Right, LTE 5, MID, QPSK/10, RB25, Offset0/Area Scan (141x61x1): Interpolated grid: $dx=1.500$ mm, $dy=1.500$ mm

Maximum value of SAR (interpolated) = 1.55 W/kg



Plot 16

Date/Time: 23.5.23 15:15:52

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WLAN 2.4 (0); Communication System Band: WLAN2.4GHz; Frequency: 2412 MHz;

Communication System PAR: 0.706 dB;

Medium parameters used: $f = 2412$ MHz; $\sigma = 1.658$ S/m; $\epsilon_r = 37.457$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.7, 7.5, 7.63) @ 2412 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 31.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_ELI; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Left, WLAN 2.4GHz, CH 1, 802.11b, 1Mbps 2 2/Area Scan (171x71x1): Interpolated grid: $dx=1.200$ mm, $dy=1.200$ mm

Maximum value of SAR (interpolated) = 1.96 W/kg

Configuration/Left, WLAN 2.4GHz, CH 1, 802.11b, 1Mbps 2 2/Zoom Scan (7x8x7)/Cube 0: Measurement grid: $dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 18.98 V/m; Power Drift = 0.06 dB

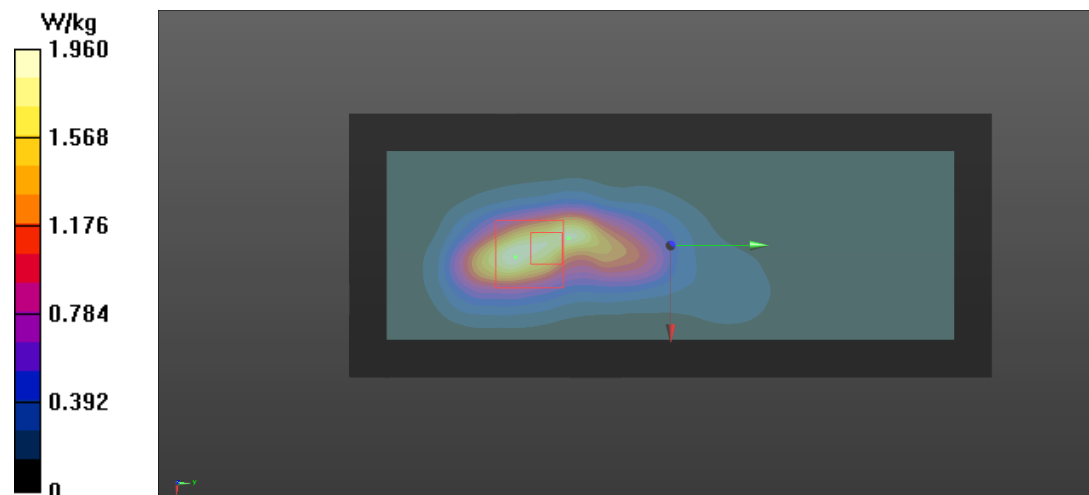
Peak SAR (extrapolated) = 2.70 W/kg

SAR(1 g) = 1.28 W/kg; SAR(10 g) = 0.638 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 8.9 mm

Ratio of SAR at M2 to SAR at M1 = 44.6%

Maximum value of SAR (measured) = 2.06 W/kg



Plot 17

Date/Time: 25.5.23 09:39:14

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5260 MHz;

Communication System PAR: 1.63 dB;

Medium parameters used: $f = 5260$ MHz; $\sigma = 4.487$ S/m; $\epsilon_r = 36.308$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(5.18, 4.99, 5.17) @ 5260 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), $z = -4.0, 25.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration 3/Left, WLAN 5GHz, CH 52, 802.11a, 6Mbps/Area Scan (211x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 7.22 W/kg

Configuration 3/Left, WLAN 5GHz, CH 52, 802.11a, 6Mbps/Zoom Scan (9x9x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 44.73 V/m; Power Drift = 0.07 dB

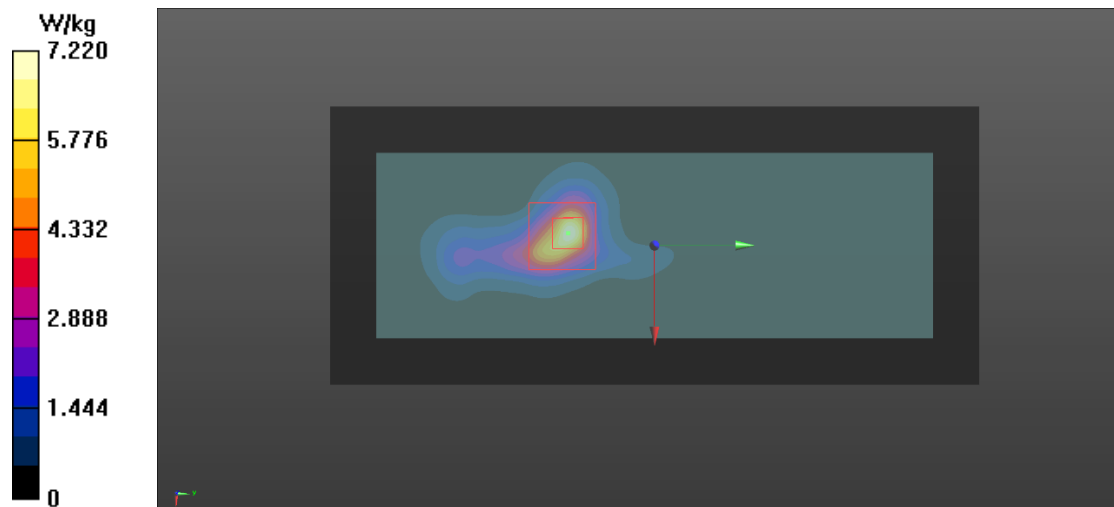
Peak SAR (extrapolated) = 12.0 W/kg

SAR(1 g) = 3.29 W/kg; SAR(10 g) = 0.996 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 6.8 mm

Ratio of SAR at M2 to SAR at M1 = 65.9%

Maximum value of SAR (measured) = 7.80 W/kg



Plot 18

Date/Time: 26.5.23 08:24:51

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5500 MHz;

Communication System PAR: 1.63 dB;

Medium parameters used: $f = 5500$ MHz; $\sigma = 4.747$ S/m; $\epsilon_r = 35.875$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.4, 4.29, 4.43) @ 5500 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 25.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration 2/Left, WLAN 5GHz, CH 100, 802.11a, 6Mbps 2/Zoom Scan (9x9x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 35.09 V/m; Power Drift = -0.17 dB

Peak SAR (extrapolated) = 7.97 W/kg

SAR(1 g) = 2.1 W/kg; SAR(10 g) = 0.631 W/kg (SAR corrected for target medium)

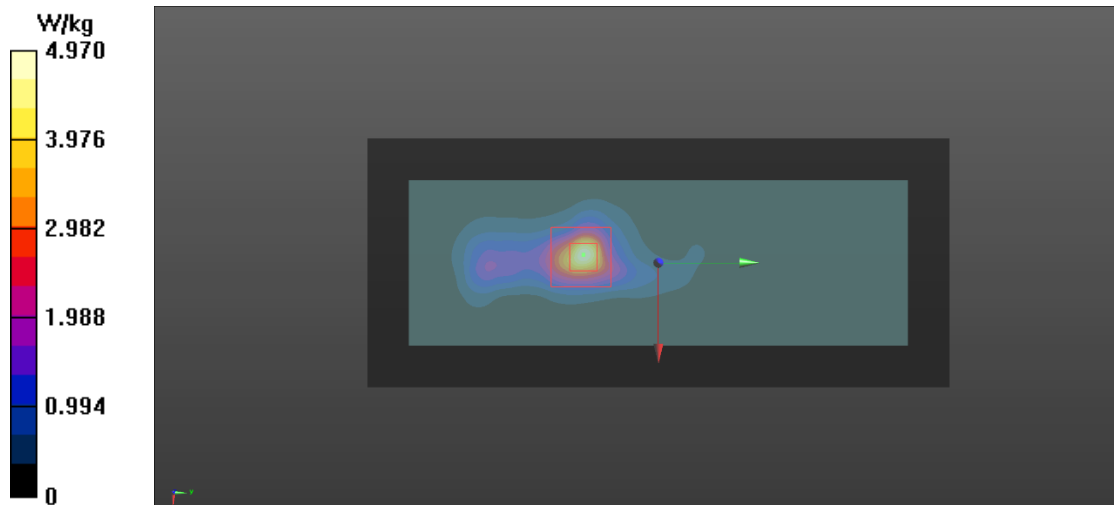
Smallest distance from peaks to all points 3 dB below = 6.4 mm

Ratio of SAR at M2 to SAR at M1 = 69.6%

Maximum value of SAR (measured) = 4.97 W/kg

Configuration 2/Left, WLAN 5GHz, CH 100, 802.11a, 6Mbps 2/Area Scan (211x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 4.95 W/kg



Plot 19

Date/Time: 29.5.23 12:25:19

Test Laboratory: Verkotan Oy

DUT: Move/2600 CL/4G/WiFi

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5825 MHz;

Communication System PAR: 1.63 dB;

Medium parameters used: $f = 5825$ MHz; $\sigma = 5.148$ S/m; $\epsilon_r = 35.472$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(4.47, 4.33, 4.53) @ 5825 MHz; Calibrated: 17.2.23
 - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), $z = 25.0, -4.0$
 - Electronics: DAE4 Sn710; Calibrated: 19.10.22
 - Phantom: SAR1_Phantom1_EL1; Type: QD OVA 002 AA;
 - DASYS2 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Left, WLAN 5GHz, CH 165, 802.11a, 6Mbps/Zoom Scan (8x8x8)/Cube 0: Measurement grid: $dx=4$ mm, $dy=4$ mm, $dz=1.4$ mm

Reference Value = 11.83 V/m; Power Drift = 0.11 dB

Peak SAR (extrapolated) = 5.14 W/kg

SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.329 W/kg (SAR corrected for target medium)

Smallest distance from peaks to all points 3 dB below = 5.6 mm

Ratio of SAR at M2 to SAR at M1 = 65%

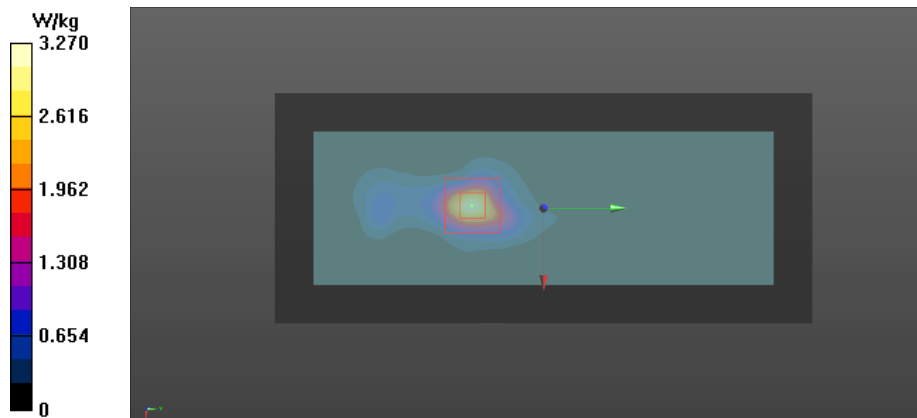
Maximum value of SAR (measured) = 3.27 W/kg

Configuration/Left, WLAN 5GHz, CH 165, 802.11a, 6Mbps/Area Scan 2 (41x21x1): Interpolated grid: $dx=5.000$ mm, $dy=5.000$ mm

Maximum value of SAR (interpolated) = 0.639 W/kg

Configuration/Left, WLAN 5GHz, CH 165, 802.11a, 6Mbps/Area Scan (211x91x1): Interpolated grid: $dx=1.000$ mm, $dy=1.000$ mm

Maximum value of SAR (interpolated) = 2.90 W/kg



APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS

Calibration Laboratory of
Schmid & Partner
Engineering AG
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 0108

Client **Verkotan**

Certificate No **EX-7447_Feb23**

CALIBRATION CERTIFICATE

Object **EX3DV4 - SN:7447**

Calibration procedure(s) **QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6,
QA CAL-25.v8
Calibration procedure for dosimetric E-field probes**

Calibration date **February 17, 2023**

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.
All calibrations have been conducted in the closed laboratory facility: environment temperature $(22 \pm 3)^\circ\text{C}$ and humidity $< 70\%$.
Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	04-Apr-22 (No. 217-03527)	Apr-23
DAE4	SN: 660	10-Oct-22 (No. DAE4-660_Oct22)	Oct-23
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-22)	In house check: Jun-24
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-22)	In house check: Jun-24
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Niels Kuster	Quality Manager	
This calibration certificate shall not be reproduced except in full without written approval of the laboratory.			
Issued: February 21, 2023			

EX3DV4 - SN:7447

February 17, 2023

Parameters of Probe: EX3DV4 - SN:7447

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.43	0.43	0.43	$\pm 10.1\%$
DCP (mV) ^B	90.0	91.0	96.0	$\pm 4.7\%$

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Max Unc ^E k = 2
0	CW	X	0.00	0.00	1.00	0.00	130.7	$\pm 2.3\%$	$\pm 4.7\%$
		Y	0.00	0.00	1.00		130.1		
		Z	0.00	0.00	1.00		134.6		

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 Norm X,Y,Z do not affect the E^2 -field uncertainty inside TSL (see Page 5).

^B Linearization parameter uncertainty for maximum specified field strength.

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

EX3DV4 - SN:7447

February 17, 2023

Parameters of Probe: EX3DV4 - SN:7447

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	-139.3°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3–4 mm for an Area Scan job.

EX3DV4 - SN:7447

February 17, 2023

Parameters of Probe: EX3DV4 - SN:7447

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) ^C	Relative Permittivity ^F	Conductivity ^F (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k = 2)
13	55.0	0.75	17.42	17.42	17.42	0.00	1.25	±13.3%
750	41.9	0.89	9.91	8.74	9.52	0.31	1.27	±12.0%
900	41.5	0.97	9.37	8.45	8.89	0.32	1.27	±12.0%
1750	40.1	1.37	8.45	7.97	8.40	0.25	1.27	±12.0%
1950	40.0	1.40	8.05	7.59	7.97	0.29	1.27	±12.0%
2150	39.7	1.53	8.01	7.58	7.90	0.28	1.27	±12.0%
2300	39.5	1.67	7.85	7.46	7.80	0.28	1.27	±12.0%
2450	39.2	1.80	7.70	7.50	7.63	0.28	1.27	±12.0%
2600	39.0	1.96	7.55	7.37	7.73	0.28	1.27	±12.0%
3300	38.2	2.71	7.02	6.71	7.02	0.34	1.27	±14.0%
5250	35.9	4.71	5.18	4.99	5.17	0.39	1.53	±14.0%
5600	35.5	5.07	4.40	4.29	4.43	0.38	1.77	±14.0%
5750	35.4	5.22	4.47	4.33	4.53	0.38	1.85	±14.0%

^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. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

^F The probes are calibrated using tissue simulating liquids (TSL) that deviate for ϵ and σ by less than ±5% from the target values (typically better than ±3%) and are valid for TSL with deviations of up to ±10%. If TSL with deviations from the target of less than ±5% are used, the calibration uncertainties are 11.1% for 0.7 - 3 GHz and 13.1% for 3 - 6 GHz.

^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 CALIBRATION REPORTS

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
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 0108**

Client: **Verkotan**

Certificate No: **D1800V2-249_Jul22**

CALIBRATION CERTIFICATE

Object: **D1800V2 - SN:249**

Calibration procedure(s): **QA CAL-05,v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **July 18, 2022**

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 NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH6394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	02-May-22 (No. DAE4-601_May22)	May-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41063315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41060477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

Calibrated by:

Approved by:

Name: **Joanna Lleshaj**

Name: **Nils Kuster**

Function: **Laboratory Technician**

Function: **Quality Manager**

Signature: 

Signature: 

Issued: July 19, 2022

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

Certificate No: D1800V2-249_Jul22

Page 1 of 6

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1800 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	38.4 $\pm$ 6 %	1.38 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	38.9 W/kg $\pm$ 17.0 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.3 W/kg $\pm$ 16.5 % (k=2)



SAR Reference Dipole Calibration Report

Ref : ACR.68.5.23.BES.A

VERKOTAN OY
ELEKTRONIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 1900 MHZ
SERIAL NO.: 511

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 03/09/2023



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

The use of the Cofrac brand and the accreditation references is prohibited from any reproduction.

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/8



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.5.23.BES.A

	Name	Function	Date	Signature
Prepared by :	Cyrille ONNEE	Measurement Responsible	3/9/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	3/9/2023	
Authorized by:	Yann Toutain	Laboratory Director	3/9/2023	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2023.03.09
15:01:12 +01'00'

	Customer Name
Distribution :	Verkotan Oy

Issue	Name	Date	Modifications
A	Cyrille ONNEE	3/9/2023	Initial release

Page: 2/8

Template: ACR.DDD.N.YY.MTVG.BES.SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MTVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MTVG.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.5.23.BES.A

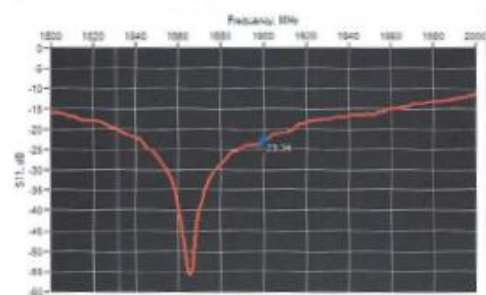
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	68.00 +/- 2%	-	39.50 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
1900	-23.34	-20	48.5Ω - 6.6jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Page: 6/8

Template: ACR.DDD.N.YY.MVGR.ISSUE_SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

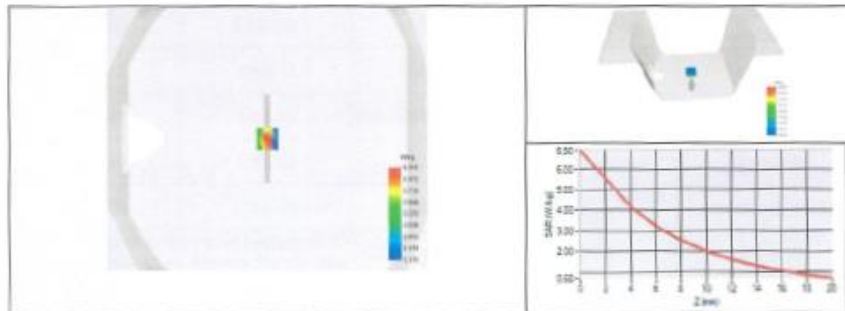


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.5.23.BUS.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: $\epsilon_{\text{ps}} = 40.4$ $\sigma = 1.40$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8\text{mm}/dy=8\text{mm}$
Zoom Scan Resolution	$dx=8\text{mm}/dy=8\text{mm}/dz=5\text{mm}$
Frequency	1900 MHz
Input power	20 dBm
Liquid Temperature	20 $\pm$ 1 $^{\circ}\text{C}$
Lab Temperature	20 $\pm$ 1 $^{\circ}\text{C}$
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
1900 MHz	3.80	38.02	39.70	1.94	19.41	20.50



Page: 7/8

Template_ACR.DDD.N.YV.MTG.ISSUE_SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MTG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MTG.



SAR Reference Dipole Calibration Report

Ref : ACR.68.8.23.BES.A

VERKOTAN OY
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 5200-5800 MHZ
SERIAL NO.: 1045

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 03/09/2023



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

The use of the Cofrac brand and the accreditation references is prohibited from any reproduction.

Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

Page: 1/9



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR44.8.23.BES.A

	Name	Function	Date	Signature
Prepared by :	Cyrille ONNEE	Measurement Responsible	3/9/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	3/9/2023	
Authorized by:	Yann Toutain	Laboratory Director	3/9/2023	

Yann
Toutain ID
Signature numérique de Yann
Toutain ID
Date: 2023.03.09
15:05:03 +01'00'

	Customer Name
Distribution :	Verkotan Oy

Issue	Name	Date	Modifications
A	Cyrille ONNEE	3/9/2023	Initial release

Page: 2/9

Template: ACR.DDD.N.Y1.MVGR.ISSUE_SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.8.23.BES.A

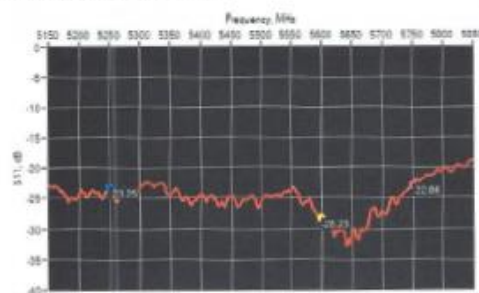
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	20.60 +/- 2%	-	40.30 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
5250	-23.25	-20	$47.8\Omega + 6.4j\Omega$
5600	-28.23	-20	$48.5\Omega - 3.5j\Omega$
5750	-22.86	-20	$46.7\Omega + 6.1j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

Page: 6/9

Template: ACR.DDD.N.YY.MVG.B.ISSUE_SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.



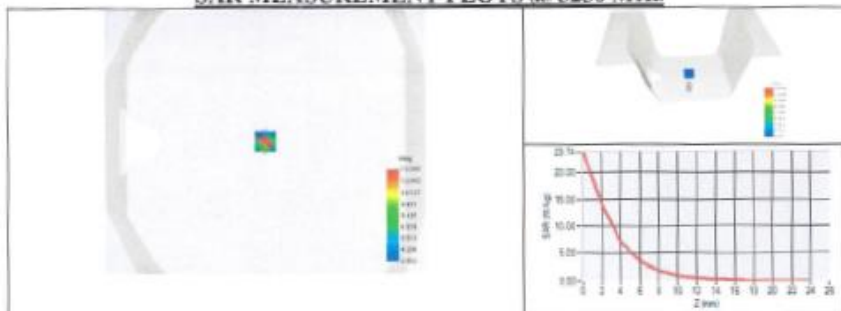
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.08.23.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values @ 5250 MHz: ϵ_p' : 34.3 sigma : 4.67 Head Liquid Values @ 5600 MHz: ϵ_p' : 33.6 sigma : 5.05 Head Liquid Values @ 5750 MHz: ϵ_p' : 32.9 sigma : 5.46
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=4mm/dy=4mm/dz=2mm$
Frequency	5250 MHz 5600 MHz 5750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
5250 MHz	7.31	73.09	-	2.11	21.12	-
5600 MHz	7.29	72.92	78.30	2.13	21.29	23.20
5750 MHz	6.91	69.05	-	2.03	20.27	-

SAR MEASUREMENT PLOTS @ 5250 MHz



Page: 7/9

Template: ACR.DDD.N.YT.MVGB.ISSUE_SAR Reference Dipole v1.

This document shall not be reproduced, except in full or in part, without the written approval of MVG. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of MVG.

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
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 0108**

Client **Verkotan**

Certificate No: **D2450V2-729_Jul22**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN:729**

Calibration procedure(s) **QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **July 15, 2022**

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

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

Calibration Equipment used (M&E critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	02-May-22 (No. DAE4-601_May22)	May-23
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37262783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

Calibrated by: **Aldonis Georgiadou** Function: **Laboratory Technician**

Approved by: **Niels Kuster** Quality Manager

Signature

Issued: July 19, 2022

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

Certificate No: D2450V2-729_Jul22

Page 1 of 6

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	37.9 $\pm$ 6 %	1.85 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C		

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.3 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.5 W/kg $\pm$ 16.5 % (k=2)

**Calibration Laboratory of
Schmid & Partner
Engineering AG**
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 0108**

Client **Verkotan**

Certificate No: **D835V2-455_Jul22**

CALIBRATION CERTIFICATE

Object **D835V2 - SN:455**

Calibration procedure(s) **QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz**

Calibration date: **July 15, 2022**

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH8394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	02-May-22 (No. DAE4-601_May22)	May-23
Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: G839512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

Calibrated by:	Name Aldonis Georgiadou	Function Laboratory Technician	Signature
Approved by:	Name Niels Kuster	Quality Manager	

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

Issued: July 19, 2022

Certificate No: **D835V2-455_Jul22**

Page 1 of 6

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz $\pm$ 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 $\pm$ 0.2) °C	40.3 $\pm$ 6 %	0.93 mho/m $\pm$ 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.69 W/kg $\pm$ 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.61 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.29 W/kg $\pm$ 16.5 % (k=2)