SAR Compliance Test Report

Date of Report	3/05/2024	**Client's Contact person:**	Lacy Roberts
Number of pages:	83	**Responsible Test engineer:**	Jesper Varis
Testing laboratory:	**Verkotan Oy** Elektroniikkatie 17 90590 Oulu Finland	**Client:**	**Intrex Inc.** 1896 Preston White Drive VA 20191 Reston USA
Tested device	**Wander Management wearable for elderly care/senior living**		
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:	03.05.2024 **Laboratory Manager** Miia Nurkkala		

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Equipment under Test (DUT):

Product:	Wander Management wearable for elderly care/senior living
Manufacturer:	INTREX Inc.
Model:	KALLOS
Serial Number:	MRD_04_01_03, MRD_04_01_18, MRD_04_01_04
FCC ID Number:	2AWYMKALLOS
ISED ID Number:	31261-KALLOSNA01
Software Version:	This report applies for SW version: Maradona_TA_v20240426 Testing has been executed on SW Version: Maradona_TA_v20240408
DUT Number:	20774 (SAR), 20775 (Conducted), 20776 (SAR)
Battery Type used in testing:	Li-Ion Battery
State of the Sample:	Production sample

Testing information:

Testing performed:	11.04.2024 – 25.04.2024, 01.05.2024 - 02.05.2024
Notes:	-
Document history:	Initial
Document ID:	FCC ISED_SAR report_KALLOS ID6399b_03052024.docx
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Jesper Varis, Kirsi Kyllönen
FCC Test Firm Designation Number:	FI0005
ISED Company Number:	22218

1.2 Maximum Results

The maximum reported* SAR values for Body-worn and 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 Head/Body SAR_{1g} is 1.6 W/kg and for Extremity SAR_{10g} is 4.0 W/kg.

1.2.1 Standalone SAR

System	Highest Reported* SAR_{1g}(W/kg) in Body-Worn Exposure Condition, 5mm separation distance	Highest Reported* SAR_{1g}(W/kg) in Next-to-Mouth Exposure Condition, 5mm separation distance	Highest Reported* SAR_{10g}(W/kg) in Extremity Exposure Condition, 0mm separation distance	Result
LTE-M1 B2	1.04	1.03	0.99	PASS
LTE-M1 B4	1.38	1.38	0.91	PASS
LTE-M1 B12	0.14	0.03	0.27	PASS
LTE-M1 B13	0.23	0.02	0.34	PASS
LTE-M1 B66	1.41	1.41	1.08	PASS
Bluetooth LE	0.014	0.014	0.005	PASS

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

System	Highest Reported* SAR_{1g}(W/kg) in Body-Worn Exposure Condition, 5mm separation distance	Highest Reported* SAR_{1g}(W/kg) in Next-to-Mouth Exposure Condition, 5mm separation distance	Highest Reported* SAR_{10g}(W/kg) in Extremity Exposure Condition, 0mm separation distance	Result
Cellular + Bluetooth LE	1.42	1.42	1.09	PASS

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

1.2.2 Maximum Drift

Maximum Drift During Measurements	-1.68dB*

*Larger than 5% drifts included to scaling factors

1.2.3 Measurement Uncertainty

SAR 1g: 0.3 – 3 GHz:

Expanded Uncertainty (k=2) 95 %	±22.1 %

SAR 10g: 0.3 – 3 GHz:

Expanded Uncertainty (k=2) 95 %	±21.9 %

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a safety and wellness wearable device to provide nurse calls, real-time location, fall detection and access control for senior communities. It can be used with a wristband or lanyard. The DUT supports cellular LTE-M1 and BLE technologies.

The DUT contains two different BLE SoCs manufactured by Nordic Semiconductor, nRF5340 and nRF52832. The chips are using the same antenna. Since the nRF52832 has higher maximum output power (4 dBm) than nRF5340 (3 dBm), SAR measurements has been evaluated for nRF52832.

Figure 1 The DUT with accessories

Device Category	Portable
Exposure Environment	General population uncontrolled

2.1 Supported Frequency Bands and Operational Modes

	Modes of Operation	Transmitter Frequency Range [MHz]
TX Frequency bands	LTE-M1, Band 2	1850-1910
	LTE-M1, Band 4	1710-1755
	LTE-M1, Band 12	698-716
	LTE-M1, Band 13	777-787
	LTE-M1 Band 66	1710 - 1780
	2x Bluetooth LE	2402 – 2480

2.2 Simultaneous Transmission

Cellular LTE-M1 and one of the Bluetooth LE SoCs can be operated simultaneously.

3. OUTPUT POWER

3.1 Maximum specified conducted output power

From the customer, including tune-up tolerances;

LTE-M1	Max Output Power [dBm]
LTE-M1, Band 2	19.7
LTE-M1, Band 4	22.7
LTE-M1, Band12	22.7
LTE-M1, Band 13	22.7
LTE-M1, Band 66	22.7

Bluetooth	Max Output Power [dBm]
Bluetooth LE (nRF52832)	4
Bluetooth LE (nRF5340)	3

3.2 Tested conducted power

Measured conducted output power at transmitting antenna connector;

Bluetooth:

Standard	Output power [dBm]		
	CH 37 2402 MHz	CH 17 2440 MHz	CH 39 2480 MHz
LE (nRF52832)	2.25	2.3	2.31

LTE-M1:

The samples used for SAR testing exceeds the maximum specified power on LTE-M1 B2, thus SAR results are overestimations.

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18607 1850.7 MHz	CH:18900 1880 MHz	CH:19193 1909.3 MHz
B2 / BW:1.4	QPSK	1	0	19.73	20.07	20.19
			2	19.73	19.88	19.63
			5	19.48	19.79	19.44
		3	0	18.7	19.02	18.79
			1	18.7	19.03	18.8
			3	18.65	18.87	18.63
		6	0	17.71	17.96	17.7
	16QAM	1	0	19.07	19.0	19.08
			2	19.09	19.03	19.11
			5	18.96	18.87	18.96
		3	0	17.95	17.84	18.01
			1	17.88	17.77	17.77
			3	17.62	17.5	17.61
		6	0	17.71	17.73	17.75

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18615 1851.5 MHz	CH:18900 1880 MHz	CH:19185 1908.5 MHz
B2 / BW:3	QPSK	1	0	19.85	20.02	19.9
			2	19.87	19.92	19.9
			5	19.65	19.68	19.66
		3	0	18.85	18.92	18.89
			1	18.75	19.0	18.91
			3	18.61	18.85	18.75
		6	0	17.57	17.82	17.64
	16QAM	1	0	18.75	19.1	19.02
			2	18.79	19.21	18.94
			5	18.54	19.07	18.79
		3	0	17.56	18.09	17.67
			1	17.43	17.9	17.68
			3	17.23	17.66	17.54
		6	0	17.42	17.95	17.71

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18625 1852.5 MHz	CH:18900 1880 MHz	CH:19175 1907.5 MHz
B2 / BW:5	QPSK	1	0	19.68	19.98	19.94
			2	19.7	19.99	19.85
			5	19.47	19.84	19.61
		3	0	19.69	20.01	19.8
			1	19.7	20.01	19.81
			3	19.5	19.85	19.66
		6	0	18.51	18.96	18.75
	16QAM	1	0	19.94	20.25	19.62
			2	19.87	20.27	19.53
			5	19.64	20.05	19.28
		3	0	19.8	20.07	19.66
			1	19.82	19.99	19.67
			3	19.67	19.83	19.54
		6	0	17.57	17.73	17.66

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18650 1855 MHz	CH:18900 1880 MHz	CH:19150 1905 MHz
B2 / BW:10	QPSK	1	0	19.75	20.08	20.03
			2	19.87	20.0	19.94
			5	19.63	19.84	19.89
		3	0	19.78	20.03	19.99
			1	19.67	20.0	19.89
			3	19.53	19.95	19.74
		6	0	18.58	18.98	18.82
	16QAM	1	0	19.99	20.36	19.59
			2	19.68	20.16	19.52
			5	19.69	19.92	19.26
		3	0	19.84	20.03	19.73
			1	19.62	20.05	19.74
			3	19.71	19.91	19.59
		6	0	18.62	18.88	18.67

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18675 1857.5 MHz	CH:18900 1880 MHz	CH:19125 1902.5 MHz
B2 / BW:15	QPSK	1	0	19.61	20.09	20.09
			2	19.61	20.12	20.03
			5	19.4	19.92	19.7
		3	0	19.62	20.09	19.88
			1	19.62	20.0	19.88
			3	19.43	19.85	19.71
		6	0	19.52	19.97	19.78
	16QAM	1	0	19.89	20.18	19.57
			2	19.82	20.09	19.45
			5	19.62	19.91	19.11
		3	0	19.79	20.07	19.76
			1	19.79	20.07	19.67
			3	19.66	19.92	19.67
		6	0	19.91	20.13	20.01

Band / BW [MHz]	Modulation	RBs	RB Start	CH:18700 1860 MHz	CH:18900 1880 MHz	CH:19100 1900 MHz
B2 / BW:20	QPSK	1	0	19.85	20.08	20.03
			2	19.88	20.17	19.97
			5	19.62	19.9	19.82
		3	0	19.77	20.07	19.95
			1	19.77	20.07	19.82
			3	19.61	19.92	19.67
		6	0	19.74	19.97	19.74
	16QAM	1	0	20.03	19.77	20.08
			2	20.01	19.6	19.9
			5	19.75	19.41	19.67
		3	0	19.69	19.94	19.83
			1	19.63	20.01	19.85
			3	19.71	19.85	19.69
		6	0	19.54	19.93	19.86

Band / BW [MHz]	Modulation	RBs	RB Start	CH:19957 1710.7 MHz	CH:20175 1732.5 MHz	CH:20393 1754.3 MHz
B4 / BW:1.4	QPSK	1	0	20.59	20.39	20.46
			2	20.66	20.26	20.43
			5	20.42	20.28	20.34
		3	0	19.64	19.28	19.47
			1	19.64	19.42	19.5
			3	19.48	19.25	19.4
		6	0	18.43	18.41	18.53
	16QAM	1	0	19.88	19.58	19.71
			2	19.89	19.42	19.6
			5	19.74	19.14	19.34
		3	0	18.73	18.24	18.5
			1	18.41	18.45	18.61
			3	18.26	18.31	18.54
		6	0	18.59	18.58	18.63

Band / BW [MHz]	Modulation	RBs	RB Start	CH:19965 1711.5 MHz	CH:20175 1732.5 MHz	CH:20385 1753.5 MHz
B4 / BW:3	QPSK	1	0	20.64	20.35	20.54
			2	20.57	20.35	20.52
			5	20.43	20.12	20.28
		3	0	19.57	19.23	19.34
			1	19.48	19.24	19.45
			3	19.33	19.09	19.21
		6	0	18.29	18.15	18.21
	16QAM	1	0	19.56	19.73	19.65
			2	19.67	19.61	19.75
			5	19.35	19.51	19.33
		3	0	18.28	18.33	18.25
			1	18.17	18.19	18.27
			3	18.03	18.04	18.13
		6	0	18.49	18.24	18.4

Band / BW [MHz]	Modulation	RBs	RB Start	CH:19975 1712.5 MHz	CH:20175 1732.5 MHz	CH:20375 1752.5 MHz
B4 / BW:5	QPSK	1	0	20.38	20.45	20.58
			2	20.39	20.46	20.58
			5	20.32	20.22	20.47
		3	0	20.53	20.39	20.64
			1	20.63	20.4	20.55
			3	20.49	20.24	20.4
		6	0	19.42	19.16	19.44
	16QAM	1	0	20.66	20.61	20.29
			2	20.68	20.55	20.14
			5	20.34	20.23	19.9
		3	0	20.53	20.27	20.19
			1	20.54	20.29	20.3
			3	20.4	20.12	20.17
		6	0	18.44	18.07	18.38

Band / BW [MHz]	Modulation	RBs	RB Start	CH:20000 1715 MHz	CH:20175 1732.5 MHz	CH:20350 1750 MHz
B4 / BW:10	QPSK	1	0	20.62	20.42	20.66
			2	20.61	20.47	20.66
			5	20.48	20.22	20.41
		3	0	20.63	20.46	20.61
			1	20.64	20.47	20.61
			3	20.51	20.33	20.38
		6	0	19.53	19.24	19.39
	16QAM	1	0	20.75	20.61	20.35
			2	20.58	20.49	20.14
			5	20.36	20.26	19.81
		3	0	20.6	20.32	20.26
			1	20.61	20.24	20.27
			3	20.47	20.1	20.22
		6	0	19.61	19.06	19.3

Band / BW [MHz]	Modulation	RBs	RB Start	CH:20025 1717.5 MHz	CH:20175 1732.5 MHz	CH:20325 1747.5 MHz
B4 / BW:15	QPSK	1	0	20.73	20.69	20.77
			2	20.72	20.57	20.81
			5	20.54	20.52	20.55
		3	0	20.71	20.58	20.65
			1	20.6	20.49	20.64
			3	20.45	20.25	20.5
		6	0	20.51	20.31	20.55
	16QAM	1	0	20.69	20.07	20.23
			2	20.62	19.9	19.99
			5	20.44	19.72	19.88
		3	0	20.5	20.16	20.2
			1	20.41	20.27	20.21
			3	20.26	20.15	20.15
		6	0	20.4	20.52	20.46

Band / BW [MHz]	Modulation	RBs	RB Start	CH:20050 1720 MHz	CH:20175 1732.5 MHz	CH:20300 1745 MHz
B4 / BW:20	QPSK	1	0	20.47	20.43	20.77
			2	20.49	20.42	20.73
			5	20.41	20.29	20.62
		3	0	20.63	20.47	20.69
			1	20.64	20.47	20.61
			3	20.5	20.35	20.44
		6	0	20.55	20.38	20.5
	16QAM	1	0	20.65	20.57	20.25
			2	20.54	20.44	20.08
			5	20.28	20.22	19.84
		3	0	20.52	20.33	20.27
			1	20.53	20.27	20.21
			3	20.39	20.12	20.14
		6	0	20.53	20.54	20.68

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23017 699.7 MHz	CH:23095 707.5 MHz	CH:23173 715.3 MHz
B12 / BW:1.4	QPSK	1	0	20.32	21.0	20.73
			2	20.31	20.97	20.67
			5	20.22	20.92	20.41
		3	0	19.57	20.22	19.66
			1	19.57	20.04	19.75
			3	19.52	19.89	19.58
		6	0	18.65	19.04	18.82
	16QAM	1	0	19.9	20.19	20.01
			2	19.95	20.19	20.06
			5	19.93	20.03	19.97
		3	0	18.91	18.98	19.11
			1	18.84	18.81	18.92
			3	18.69	18.66	18.77
		6	0	18.68	18.84	18.77

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23025 700.5 MHz	CH:23095 707.5 MHz	CH:23165 714.5 MHz
B12 / BW:3	QPSK	1	0	20.72	21.0	20.78
			2	20.71	20.98	20.3
			5	20.55	20.93	20.31
		3	0	19.7	20.07	19.64
			1	19.7	19.98	19.63
			3	19.56	19.91	19.56
		6	0	18.69	19.06	18.71
	16QAM	1	0	19.73	20.21	19.98
			2	19.74	20.03	20.04
			5	19.5	19.96	19.9
		3	0	18.64	18.92	19.0
			1	18.53	18.83	18.91
			3	18.31	18.59	18.74
		6	0	18.5	18.79	18.75

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23035 701.5 MHz	CH:23095 707.5 MHz	CH:23155 713.5 MHz
B12 / BW:5	QPSK	1	0	20.48	21.05	20.92
			2	20.59	21.03	20.79
			5	20.63	20.9	20.68
		3	0	20.79	20.99	20.78
			1	20.75	20.99	20.7
			3	20.43	20.84	20.55
		6	0	19.5	19.86	19.65
	16QAM	1	0	20.66	21.12	20.58
			2	20.5	20.88	20.46
			5	20.45	20.83	20.26
		3	0	20.52	20.81	20.32
			1	20.53	20.81	20.49
			3	20.39	20.88	20.44
		6	0	18.47	18.84	18.57

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23060 704 MHz	CH:23095 707.5 MHz	CH:23130 711 MHz
B12 / BW:10	QPSK	1	0	20.59	21.02	20.89
			2	20.59	20.86	20.86
			5	20.47	20.8	20.73
		3	0	20.83	20.95	20.82
			1	20.65	20.83	20.74
			3	20.69	20.86	20.66
		6	0	19.7	19.88	19.78
	16QAM	1	0	20.69	20.8	20.9
			2	20.52	20.75	20.73
			5	20.36	20.72	20.46
		3	0	20.41	20.78	20.73
			1	20.5	20.78	20.71
			3	20.63	20.64	20.56
		6	0	19.63	19.78	19.65

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23205 779.5 MHz	CH:23230 782 MHz	CH:23255 784.5 MHz
B13 / BW:5	QPSK	1	0	19.94	20.06	20.25
			2	19.87	20.02	20.03
			5	19.64	19.87	19.77
		3	0	20.01	20.08	20.01
			1	19.99	20.07	19.92
			3	19.82	19.89	19.75
		6	0	18.93	19.02	18.87
	16QAM	1	0	19.71	19.78	19.9
			2	19.57	19.63	19.81
			5	19.44	19.43	19.58
		3	0	19.83	19.73	19.68
			1	19.83	19.81	19.68
			3	19.76	19.77	19.65
		6	0	17.87	17.95	17.92

Band / BW [MHz]	Modulation	RBs	RB Start	CH:23230 782 MHz
B13 / BW:10	QPSK	1	0	19.96
			2	19.79
			5	19.69
		3	0	20.05
			1	20.03
			3	20.06
		6	0	19.13
	16QAM	1	0	19.76
			2	19.55
			5	19.46
		3	0	19.76
			1	19.83
			3	19.77
		6	0	18.82

Band / BW [MHz]	Modulation	RBs	RB Start	CH:131979 1710.7 MHz	CH:132322 1745 MHz	CH:132665 1779.3 MHz
B66 / BW:1.4	QPSK	1	0	20.08	20.36	20.71
			2	20.0	20.37	20.63
			5	19.93	20.11	20.46
		3	0	19.01	19.11	19.54
			1	19.02	19.11	19.54
			3	18.95	19.08	19.38
		6	0	18.04	18.07	18.51
	16QAM	1	0	19.28	19.42	19.89
			2	19.39	19.42	19.88
			5	19.14	19.3	19.71
		3	0	18.19	18.21	18.62
			1	18.09	18.3	18.73
			3	17.93	17.94	18.56
		6	0	18.24	18.15	18.68

Band / BW [MHz]	Modulation	RBs	RB Start	CH:131987 1711.5 MHz	CH:132322 1745 MHz	CH:132657 1778.5 MHz
B66 / BW:3	QPSK	1	0	19.92	20.21	20.19
			2	19.93	20.11	20.19
			5	19.83	19.87	20.2
		3	0	18.97	19.09	19.28
			1	18.98	19.1	19.29
			3	18.97	18.95	19.26
		6	0	18.09	17.98	18.25
	16QAM	1	0	18.97	19.56	19.46
			2	19.13	19.57	19.38
			5	19.06	19.32	19.13
		3	0	18.05	18.4	18.13
			1	17.97	18.07	18.24
			3	17.74	17.91	18.18
		6	0	17.96	18.07	18.77

Band / BW [MHz]	Modulation	RBs	RB Start	CH:131997 1712.5 MHz	CH:132322 1745 MHz	CH:132647 1777.5 MHz
B66 / BW:5	QPSK	1	0	19.92	20.28	20.51
			2	19.94	20.19	20.62
			5	19.7	19.95	20.38
		3	0	20.02	20.13	20.57
			1	20.03	20.13	20.58
			3	19.88	19.98	20.43
		6	0	19.04	19.1	19.42
	16QAM	1	0	20.29	20.17	20.8
			2	20.0	20.05	20.64
			5	19.77	19.96	20.4
		3	0	20.18	20.03	20.41
			1	20.18	19.86	20.42
			3	20.04	19.94	20.37
		6	0	17.98	17.86	18.29

Band / BW [MHz]	Modulation	RBs	RB Start	CH:132022 1715 MHz	CH:132322 1745 MHz	CH:132622 1775 MHz
B66 / BW:10	QPSK	1	0	19.91	20.22	20.52
			2	19.91	20.13	20.53
			5	19.69	19.96	20.28
		3	0	19.89	20.12	20.59
			1	19.99	20.13	20.59
			3	19.87	19.99	20.43
		6	0	18.9	19.0	19.47
	16QAM	1	0	19.98	20.39	20.85
			2	19.99	19.87	20.57
			5	19.77	19.98	20.47
		3	0	20.17	19.86	20.52
			1	20.18	19.88	20.53
			3	20.04	19.74	20.38
		6	0	18.88	18.92	19.3

Band / BW [MHz]	Modulation	RBs	RB Start	CH:132047 1717.5 MHz	CH:132322 1745 MHz	CH:132597 1772.5 MHz
B66 / BW:15	QPSK	1	0	19.93	20.35	20.55
			2	19.93	19.98	20.46
			5	19.68	19.97	20.3
		3	0	19.97	20.09	20.5
			1	19.96	20.09	20.43
			3	19.93	20.02	20.36
		6	0	20.0	20.01	20.54
	16QAM	1	0	20.15	20.23	20.42
			2	19.96	20.13	20.41
			5	19.88	20.01	20.34
		3	0	20.06	19.99	20.54
			1	20.06	19.99	20.42
			3	20.15	19.89	20.49
		6	0	20.14	19.95	20.46

Band / BW [MHz]	Modulation	RBs	RB Start	CH:132072 1720 MHz	CH:132322 1745 MHz	CH:132572 1770 MHz
B66 / BW:20	QPSK	1	0	19.97	20.33	20.65
			2	19.88	20.04	20.41
			5	19.83	19.97	20.43
		3	0	20.09	20.24	20.57
			1	20.1	20.07	20.56
			3	19.95	19.92	20.44
		6	0	20.07	19.99	20.47
	16QAM	1	0	20.08	20.29	20.64
			2	19.9	20.22	20.41
			5	19.81	20.13	20.27
		3	0	19.87	19.98	20.48
			1	19.96	19.98	20.54
			3	20.09	19.83	20.54
		6	0	20.13	20.35	20.75

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.

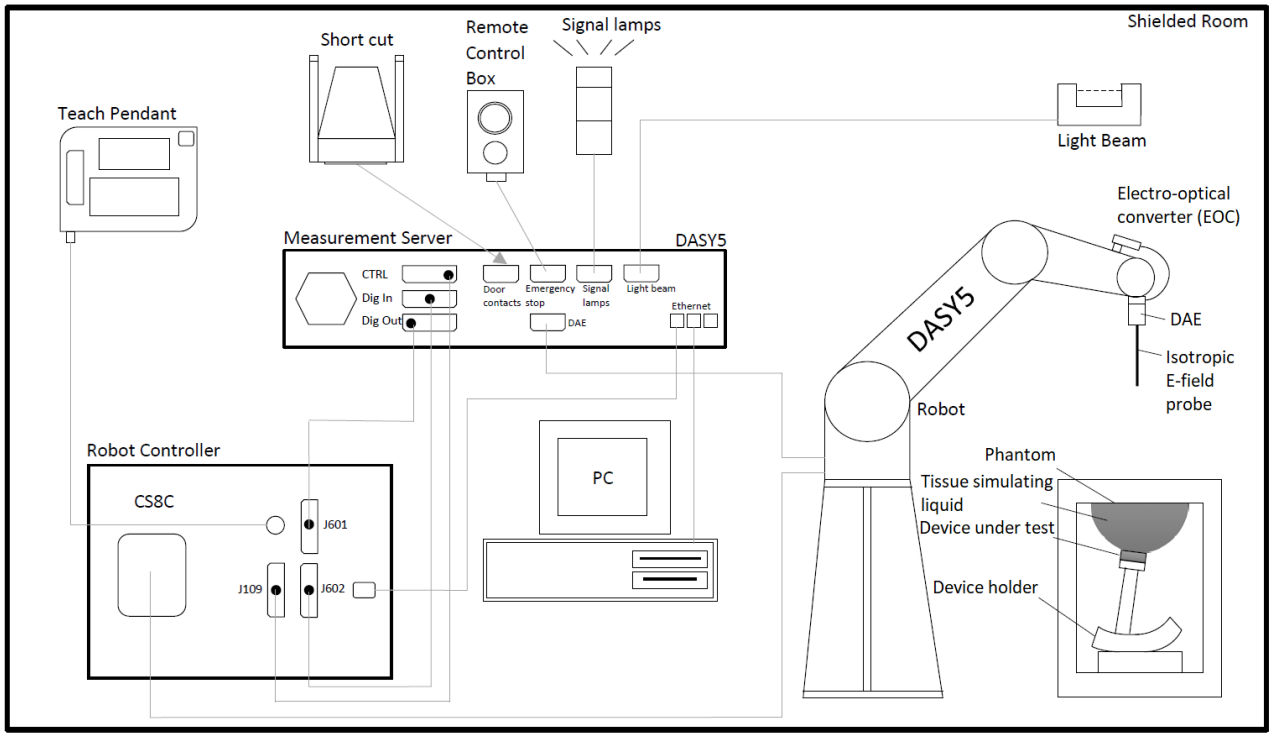


Figure 2 Schematic Laboratory Picture

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.

Used in testing during 11.04.2024 – 25.04.2024

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 800-4200MHz, 50W	5163F	1022	NA	NA
DAE4, converter	DAE4	1332	02/2024	1
Inline Peak Power Sensor	MA24105A	2102058	10/2023	1
Isotropic DOS probe	EX3DV4	7447	02/2024	1
Power Sensor	NRP8S	1419.0006K02-108508-HC	09/2023	2
System validation dipole	D2450V2	729	07/2022	3
System validation dipole	D750V3	1154	07/2022	3
System validation dipole	D1800V2	249	07/2022	3
System validation dipole	D1900V2	511	03/2023	3
Wideband Radio Communication Tester	CMW500	1201.0002K50-159661-pb	02/2024	1
Vector Signal Generator	MG3710E	6262028676	NA	NA
DASY5 Software	52.8.8.1258	-	NA	NA
ELI Phantom	QD0VA 002 AA	1176	NA	NA
Tissue simulant	WB Head	100923	NA	NA
Thermometer	Rotronic, Hygropalm3	21458349	09/2023	1

Used in testing during 01.05.2024 – 02.05.2024

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 800-4200MHz, 10W	10S1G4A	320421	NA	NA
DAE4, converter	DAE4	705	04/2024	1
Inline Peak Power Sensor	MA24105A	2102058	10/2023	1
Isotropic DOS probe	EX3DV4	3892	04/2024	1
System validation dipole	D1800V2	249	07/2022	3
Wideband Radio Communication Tester	CMW500	1201.0002K50-159661-pb	02/2024	1
Vector Signal Generator	MG3710E	6262028676	NA	NA
DASY5 Software	52.8.8.1258	-	NA	NA
Triple Modular Phantom	QD000 P51 CA	1128/2	NA	NA
Tissue simulant	WB Head	100923	NA	NA
Thermometer	Rotronic, Hygropalm3	21458349	09/2023	1

Dipole calibration period supporting data:

		Measured on 09/2023			Calibrated		
Dipole and serial number	Frequency (MHz)	Return loss (dB)	Impedance [Ω]		Return loss [dB]	Impedance [Ω]	
D750V3-SN: 1154	750	-27	54.4	-1.5	-31.9	51.4	-2.1
D1800V2-SN:249	1800	-28.3	48.5	-3.5	-33.4	51.8	-1.3
D2450V2-SN:729	2450	-30.1	53.1	0.8	-24.7	54.3	4.3

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 µW/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.

Triple Modular Phantom:

The Triple Modular Phantom consists of three identical modules that can be installed and removed separately without emptying the liquid. It is used for compliance testing of small wireless devices in body-worn configurations. The shell thickness of the bottom plate is 2±0.2mm. The dimensions are 308x192x182mm and filling volume is 9.2 liters giving a filling height of 155mm.

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 ±10% of the recommended values at frequencies under 3GHz and ±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, tween, salt

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
750	D750V3 - SN: 635	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	41.36	0.87	03/2024
1800	D1800V2- SN: 249	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	38.05	1.31	03/2024
1900	D1900V2- SN: 511	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	37.32	1.35	03/2024
2450	D2450V2 - SN: 729	EX3DV4 - SN: 7447	CW	DAE 4 / 1332	36.41	1.67	03/2024

Frequency [MHz]	Dipole Type / SN	Probe Type / SN	Calibrated Signal Type	DAE Unit / SN	Dielectric Constant [ε']	Conductivity σ [S/m]	Date
1800	D1800V2- SN: 249	EX3DV4 - SN: 3892	CW	DAE 4 / 705	39.08	1.35	05/2024

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 #
11.4.2024	WB Head	22	2450	250	12.3	52.3	49.2	-5.93	1
12.4.2024	WB Head	22	1900	250	9.49	38.02	37.96	-0.2	2
15.4.2024	WB Head	22	750	250	2.1	8.54	8.4	-1.64	NA
16.4.2024	WB Head	22	750	250	2.16	8.54	8.64	1.17	3
17.4.2024	WB Head	22	750	250	2.08	8.54	8.32	-2.58	4
18.4.2024	WB Head	22	750	250	2.18	8.54	8.72	2.11	5
18.4.2024	WB Head	22	1800	250	8.85	38.9	35.4	-9.0	6
22.4.2024	WB Head	22	1800	250	8.84	38.9	35.36	-9.1	7
23.4.2024	WB Head	22	1900	250	8.88	38.02	35.52	-6.6	8
24.4.2024	WB Head	22	1900	250	8.9	38.02	35.6	-6.4	9
25.4.2024	WB Head	22	1900	250	8.69	38.02	34.76	-8.6	10
25.4.2024	WB Head	22	1800	250	9.79	38.9	39.16	0.7	11
1.5.2024	WB Head	22	1800	250	9.3	38.9	37.2	-4.4	12

4.5.1 Tissue Simulant Verification

				Measured		Target		Deviation	
Date	**Tissue Type**	**Tissue Temp [°C]**	**Frequency [MHz]**	**Dielectric Constant [ε]**	**Conductivity σ [S/m]**	**Dielectric Constant [ε] Target**	**Conductivity σ [S/m] Target**	**ε [%]**	**σ [%]**
11.04.2024*	WB Head	22	1880	38.88	1.36	40.0	1.4	-2.8	-2.9
11.04.2024*	WB Head	22	1900	38.84	1.37	40.0	1.4	-2.9	-2.2
11.04.2024	WB Head	22	2402	38.04	1.66	39.28	1.76	-3.2	-5.3
11.04.2024	WB Head	22	2441	37.98	1.69	39.22	1.79	-3.1	-5.8
11.04.2024	WB Head	22	2450	37.97	1.69	39.2	1.8	-3.1	-5.9
11.04.2024	WB Head	22	2480	37.92	1.71	39.16	1.83	-3.2	-6.4
15.04.2024	WB Head	22	707.5	41.54	0.83	42.13	0.89	-1.4	-6.1
15.04.2024	WB Head	22	750	41.25	0.85	41.9	0.89	-1.6	-4.7
16.04.2024	WB Head	22	704	42.35	0.87	42.15	0.89	0.5	-1.7
16.04.2024	WB Head	22	707.5	42.33	0.87	42.13	0.89	0.5	-1.6
16.04.2024	WB Head	22	711	42.28	0.88	42.11	0.89	0.4	-1.4
16.04.2024	WB Head	22	750	42.02	0.89	41.9	0.89	0.3	-0.1
16.04.2024	WB Head	22	782	41.84	0.9	41.75	0.89	0.2	0.8
17.04.2024	WB Head	22	750	42.54	0.89	41.9	0.89	1.5	0.0
17.04.2024	WB Head	22	779.5	42.38	0.9	41.76	0.89	1.5	0.9
17.04.2024	WB Head	22	782	42.35	0.9	41.75	0.89	1.4	1.0
17.04.2024	WB Head	22	784.5	42.35	0.9	41.74	0.89	1.5	1.1
18.04.2024	WB Head	21.8	704	43.34	0.87	42.15	0.89	2.8	-2.1
18.04.2024	WB Head	21.8	707.5	43.3	0.87	42.13	0.89	2.8	-2.0
18.04.2024	WB Head	21.8	711	43.28	0.87	42.11	0.89	2.8	-1.8
18.04.2024	WB Head	21.8	750	43.02	0.89	41.9	0.89	2.7	-0.5
18.04.2024	WB Head	21.8	779.5	42.85	0.9	41.76	0.89	2.6	0.4
18.04.2024	WB Head	21.8	782	42.81	0.9	41.75	0.89	2.5	0.5
18.04.2024	WB Head	21.8	784.5	42.81	0.9	41.74	0.89	2.6	0.5
18.04.2024	WB Head	21.8	1745	38.28	1.35	40.08	1.37	-4.5	-1.0
18.04.2024	WB Head	21.8	1800	38.18	1.38	40.0	1.4	-4.5	-1.4
22.04.2024	WB Head	21.8	1720	38.74	1.27	40.11	1.35	-3.4	-6.1
22.04.2024	WB Head	21.8	1732.5	38.72	1.28	40.1	1.36	-3.4	-6.2
22.04.2024	WB Head	21.8	1745	38.69	1.29	40.08	1.37	-3.5	-6.1
22.04.2024	WB Head	21.8	1800	38.57	1.31	40.0	1.4	-3.6	-6.4
23.04.2024	WB Head	21.8	1860	37.52	1.33	40.0	1.4	-6.2	-5.1
23.04.2024	WB Head	21.8	1880	37.49	1.34	40.0	1.4	-6.3	-4.3
23.04.2024	WB Head	21.8	1900	37.46	1.35	40.0	1.4	-6.3	-3.7
24.04.2024	WB Head	22.3	1860	38.76	1.38	40.0	1.4	-3.1	-1.5
24.04.2024	WB Head	22.3	1880	38.73	1.39	40.0	1.4	-3.2	-0.7
24.04.2024	WB Head	22.3	1900	38.7	1.4	40.0	1.4	-3.2	0.0
25.04.2024	WB Head	22.3	1745	38.29	1.31	40.08	1.37	-4.5	-4.1
25.04.2024	WB Head	22.3	1800	38.19	1.34	40.0	1.4	-4.5	-4.2
25.04.2024	WB Head	22.3	1860	38.07	1.37	40.0	1.4	-4.8	-2.1
25.04.2024	WB Head	22.3	1880	38.04	1.38	40.0	1.4	-4.9	-1.3
25.04.2024	WB Head	22.3	1900	38.02	1.39	40.0	1.4	-5.0	-0.5
01.05.2024**	WB Head	22	1800	39.08	1.35	40	1.4	-2.3	-3.7
01.05.2024**	WB Head	22	1770	39.13	1.33	40.04	1.38	-2.3	-3.6

*Dielectric parameters measured on 11.04.2024 were used SAR measurements done on 11. – 12.4.2024.
**Dielectric parameters measured on 01.05.2024 were used SAR measurements don't on 01.05.2024 - 02.05.2024.

5. TEST PROCEDURE

Testing was carried out in accordance with FCC KDB Publications 447498 D04 Interim General RF Exposure Guidance v01 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.

A control software for Bluetooth was used to set the DUT to transmit at maximum power.

Maximum specified output power (including tune-up tolerance) of LTE-M1 B2 has been reduced from 22.7 dBm to 21.7 dBm, that was used for conducted power and SAR measurements (SW version Maradona_TA_v20240408). Due to the high SAR values, maximum specified output power was further reduced to 19.7 dBm (SW version Maradona_TA_v20240426), that also reduced the SAR scaling factor. Thus, the samples used for SAR testing exceed the maximum specified power on band B2 and SAR results are overestimated. Finally, the measured SAR values using 21.7 dBm maximum specified output power were scaled with this new scaling factor.

The DUT contains two different BLE SoCs manufactured by Nordic Semiconductor, nRF5340 and nRF52832. The chips are using the same antenna. Since the SoC nRF52832 has higher maximum output power (4 dBm) than SoC nRF5340 (3 dBm), SAR measurements have been evaluated for nRF52832.

According to April 2015 TCB workshop, SAR test exclusion can be applied for testing overlapping LTE bands when the specified maximum output power, including tune-up tolerance, is less or same for the smaller band as for the larger band.
The channel bandwidth and other operating parameters for the smaller band must be fully supported by the larger band.
For this product LTE-M1 Band 4 (1710 – 1755 MHz) and LTE-M1 Band 66 (1710 – 1780 MHz) share the same frequency area. Since the Band 4 has been fully tested, only a high channel 132572 (1770 MHz) of Band 66 was measured to cover the whole frequency area.

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 Body-worn Configuration & Wristband Next-to-Mouth, 5mm separation distance

Body SAR was tested from the front, back, left, right and bottom sides of the device using a lanyard accessory.

Wristband Next-to-Mouth SAR was tested from the front side of the device using wristband accessory. Since the Next-to-Mouth SAR needs to be measured at 10 mm separation distance, SAR results with 5mm separation distance are overestimation.

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 5mm. The distance between the device and the phantom was kept at 5mm using a separate flat spacer that was removed before the start of the measurements.

Photos of the test positions are presented in appendix A

5.2.2 Wristband Extremity Configuration, 0mm separation distance

Extremity SAR was tested from the back side of the device using wristband accessory. 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.	(ci) 1g	(ci) 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_{syz}	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%
$LIQ(T_\sigma)$	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%

7. TEST RESULTS

7.1 SAR Results for Body Exposure Condition with lanyard, with 5mm separation distance

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power** [dBm]	Test position	Measure SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Front	0.932	-0.23*	1.05	77.4	0.98	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Front	0.935	-0.44*	1.11	77.4	1.03	
LTE-M1 B2	18900	1880	QPSK / 20	6	0	19.7	19.97	Front	1.04	0	1.00	77.4	1.04	13
LTE-M1 B2	18700	1860	QPSK / 20	1	2	19.7	19.88	Front	0.633	-0.09	1.00	77.4	0.63	
LTE-M1 B2	18700	1860	QPSK / 20	3	0	19.7	19.77	Front	0.763	-0.37*	1.09	77.4	0.83	
LTE-M1 B2	18700	1860	QPSK / 20	6	0	19.7	19.74	Front	0.816	0.06	1.00	77.4	0.82	
LTE-M1 B2	19100	1900	QPSK / 20	1	0	19.7	20.03	Front	0.997	-0.12	1.00	77.4	1.00	
LTE-M1 B2	19100	1900	QPSK / 20	3	0	19.7	19.95	Front	0.985	-0.05	1.00	77.4	0.99	
LTE-M1 B2	19100	1900	QPSK / 20	6	0	19.7	19.74	Front	0.968	-0.13	1.00	77.4	0.97	
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Back	0.789	-0.39*	1.09	77.4	0.86	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Back	0.787	-0.11	1.00	77.4	0.79	
LTE-M1 B2	18900	1880	QPSK / 20	6	0	19.7	19.97	Back	0.745	-0.32*	1.08	77.4	0.80	
LTE-M1 B2	18700	1860	QPSK / 20	1	2	19.7	19.88	Back	0.586	-0.46*	1.11	77.4	0.65	
LTE-M1 B2	18700	1860	QPSK / 20	3	0	19.7	19.77	Back	0.587	-0.06	1.00	77.4	0.59	
LTE-M1 B2	19100	1900	QPSK / 20	1	0	19.7	20.03	Back	0.716	-0.4*	1.10	77.4	0.79	
LTE-M1 B2	19100	1900	QPSK / 20	3	0	19.7	19.95	Back	0.709	-0.04	1.00	77.4	0.71	
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Left	0.2	-0.17	1.00	77.4	0.20	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Left	0.208	-0.56*	1.14	77.4	0.24	
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Right	0.3	-0.31*	1.07	77.4	0.32	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Right	0.303	-0.4*	1.10	77.4	0.33	
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Bottom	0.047	-0.09	1.00	77.4	0.05	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Bottom	0.0513	-0.46*	1.11	77.4	0.06	
LTE-M1 B2	18900	1880	QPSK / 20	6	0	19.7	19.97	Front Repeat	1.02	-0.1	1.00	77.4	1.02	

*Larger than 5% drifts included to scaling factors
** Samples used for SAR testing exceeds the maximum specified power, thus SAR results are overestimations.

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Front	0.757	-0.18	1.56	77.4	1.18	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Front	0.818	-0.26*	1.69	77.4	1.38	14
LTE-M1 B4	20300	1745	QPSK / 20	6	0	22.7	20.5	Front	0.803	0.15	1.66	77.4	1.33	
LTE-M1 B4	20050	1720	QPSK / 20	1	2	22.7	20.49	Front	0.698	-0.14	1.66	77.4	1.16	
LTE-M1 B4	20050	1720	QPSK / 20	3	1	22.7	20.64	Front	0.675	-0.57*	1.83	77.4	1.24	
LTE-M1 B4	20050	1720	QPSK / 20	6	0	22.7	20.55	Front	0.662	-0.24*	1.73	77.4	1.15	
LTE-M1 B4	20175	1732.5	QPSK / 20	1	0	22.7	20.43	Front	0.725	-0.34*	1.82	77.4	1.32	
LTE-M1 B4	20175	1732.5	QPSK / 20	3	0	22.7	20.47	Front	0.738	-0.35*	1.81	77.4	1.34	
LTE-M1 B4	20175	1732.5	QPSK / 20	6	0	22.7	20.38	Front	0.756	-0.03	1.71	77.4	1.29	
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Back	0.298	-0.27*	1.66	77.4	0.49	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Back	0.301	0.01	1.59	77.4	0.48	
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Left	0.156	-0.37*	1.70	77.4	0.26	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Left	0.153	-0.08	1.59	77.4	0.24	
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Right	0.179	-0.08	1.56	77.4	0.28	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Right	0.181	-0.74*	1.88	77.4	0.34	
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Bottom	0.0484	-0.09	1.56	77.4	0.08	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Bottom	0.0491	0.14	1.59	77.4	0.08	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Front Repeat	0.745	-0.18	1.59	77.4	1.18	
LTE-M1 B66	132572	1770	QPSK / 20	1	0	22.7	20.65	Front	0.693	-0.08	1.60	77.4	1.11	
LTE-M1 B66	132572	1770	QPSK / 20	3	0	22.7	20.57	Front	0.828	0.02	1.63	77.4	1.35	
LTE-M1 B66	132572	1770	QPSK / 20	6	0	22.7	20.47	Front	0.843	-0.02	1.67	77.4	1.41	15
LTE-M1 B66	132572	1770	QPSK / 20	6	0	22.7	20.47	Front Repeat	0.782	-0.24*	1.77	77.4	1.38	

*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_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Front	0.00777	-0.04	1.47	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Front	0.00679	0.22*	1.57	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Back	0.0854	-0.16	1.47	77.4	0.13	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Back	0.0736	0.12	1.50	77.4	0.11	
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Left	0.0105	0.67*	1.72	77.4	0.02	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Left	0.00991	0.18	1.50	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Right	0.00689	0.19	1.47	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Right	0.00454	0.42*	1.65	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Bottom	0.00271	0	1.47	77.4	0.004	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Bottom	0.00231	0	1.50	77.4	0.003	
LTE-M1 B12	23060	704	QPSK / 10	1	0	22.7	20.59	Back	0.0663	0.15	1.63	77.4	0.11	
LTE-M1 B12	23130	711	QPSK / 10	1	0	22.7	20.89	Back	0.0914	-0.07	1.52	77.4	0.14	16

*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_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Front	0.00783	-0.73*	2.22	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Front	0.00812	-1.13*	2.38	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Back	0.108	-0.03	1.88	77.4	0.20	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Back	0.0803	-0.2	1.84	77.4	0.15	
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Left	0.0134	0**	1.88	77.4	0.03	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Left	0.0121	-0.21	1.84	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Right	0.00808	0.1	1.88	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Right	0.00898	0**	1.84	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Bottom	0.00659	0.38*	2.05	77.4	0.01	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Bottom	0.00678	0.27*	1.95	77.4	0.01	
LTE-M1 B13	23205	779.5	QPSK / 5	1	0	22.7	19.94	Back	0.113	-0.4*	2.07	77.4	0.23	17
LTE-M1 B13	23255	784.5	QPSK / 5	1	0	22.7	20.25	Back	0.112	-0.01	1.76	77.4	0.20	

*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	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
BLE	2480	39	Front	4	2.31	0.0094	-0.06	1.48	100	0.014	18
BLE	2480	39	Back	4	2.31	0.00448	-0.02	1.48	100	0.007	
BLE	2480	39	Left	4	2.31	0.0001****	0**	1.48	100	0.0002****	
BLE	2480	39	Right	4	2.31	0***	0**	1.48	100	0***	
BLE	2480	39	Bottom	4	2.31	0***	0**	1.48	100	0***	
BLE	2402	37	Front	4	2.25	0.00167	0.79*	1.79	100	0.003	
BLE	2440	17	Front	4	2.3	0.00245	0.26*	1.57	100	0.004	

*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.
***Due to low e-field generated by DUT, the measurements are not applicable
****Measured result of the area scan was below the dynamic range of the E-field Probe Type EX3DV4 thus zoom scan could not be measured. Area scan result was presented.

7.2 SAR Results for Next-to-Mouth Condition with wristband, 5mm separation distance

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power** [dBm]	Test position	Measure SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Front	0.932	-0.23*	1.05	77.4	0.98	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Front	0.935	-0.44*	1.11	77.4	1.03	
LTE-M1 B2	18900	1880	QPSK / 20	6	0	19.7	19.97	Front	1.04	0	1.00	77.4	1.04	13
LTE-M1 B2	18700	1860	QPSK / 20	1	2	19.7	19.88	Front	0.633	-0.09	1.00	77.4	0.63	
LTE-M1 B2	18700	1860	QPSK / 20	3	0	19.7	19.77	Front	0.763	-0.37*	1.09	77.4	0.83	
LTE-M1 B2	18700	1860	QPSK / 20	6	0	19.7	19.74	Front	0.816	0.06	1.00	77.4	0.82	
LTE-M1 B2	19100	1900	QPSK / 20	1	0	19.7	20.03	Front	0.997	-0.12	1.00	77.4	1.00	
LTE-M1 B2	19100	1900	QPSK / 20	3	0	19.7	19.95	Front	0.985	-0.05	1.00	77.4	0.99	
LTE-M1 B2	19100	1900	QPSK / 20	6	0	19.7	19.74	Front	0.968	-0.13	1.00	77.4	0.97	
LTE-M1 B2	18900	1880	QPSK / 20	6	0	19.7	19.97	Front Repeat	1.02	-0.1	1.00	77.4	1.02	

*Larger than 5% drifts included to scaling factors
** Samples used for SAR testing exceeds the maximum specified power, thus SAR results are overestimations.

Band	Channel	Frequency [MHz]	Modulation / BW [MHz]	RB Size	RB Offset	Maximum Power [dBm]	Conducted Power [dBm]	Test position	Measure SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Front	0.757	-0.18	1.56	77.4	1.18	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Front	0.818	-0.26*	1.69	77.4	1.38	14
LTE-M1 B4	20300	1745	QPSK / 20	6	0	22.7	20.5	Front	0.803	0.15	1.66	77.4	1.33	
LTE-M1 B4	20050	1720	QPSK / 20	1	2	22.7	20.49	Front	0.698	-0.14	1.66	77.4	1.16	
LTE-M1 B4	20050	1720	QPSK / 20	3	1	22.7	20.64	Front	0.675	-0.57*	1.83	77.4	1.24	
LTE-M1 B4	20050	1720	QPSK / 20	6	0	22.7	20.55	Front	0.662	-0.24*	1.73	77.4	1.15	
LTE-M1 B4	20175	1732.5	QPSK / 20	1	0	22.7	20.43	Front	0.725	-0.34*	1.82	77.4	1.32	
LTE-M1 B4	20175	1732.5	QPSK / 20	3	0	22.7	20.47	Front	0.738	-0.35*	1.81	77.4	1.34	
LTE-M1 B4	20175	1732.5	QPSK / 20	6	0	22.7	20.38	Front	0.756	-0.03	1.71	77.4	1.29	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Front Repeat	0.745	-0.18	1.59	77.4	1.18	
LTE-M1 B66	132572	1770	QPSK / 20	1	0	22.7	20.65	Front	0.693	-0.08	1.60	77.4	1.11	
LTE-M1 B66	132572	1770	QPSK / 20	3	0	22.7	20.57	Front	0.828	0.02	1.63	77.4	1.35	
LTE-M1 B66	132572	1770	QPSK / 20	6	0	22.7	20.47	Front	0.843	-0.02	1.67	77.4	1.41	15
LTE-M1 B66	132572	1770	QPSK / 20	6	0	22.7	20.47	Front Repeat	0.782	-0.24*	1.77	77.4	1.38	

*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_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Front	0.00777	-0.04	1.47	77.4	0.01	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Front	0.00679	0.22*	1.57	77.4	0.01	
LTE-M1 B12	23060	704	QPSK / 10	1	0	22.7	20.59	Front	0.0147	-0.68*	1.90	77.4	0.03	
LTE-M1 B12	23130	711	QPSK / 10	1	0	22.7	20.89	Front	0.0182	-0.14	1.52	77.4	0.03	19

*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_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Front	0.00783	-0.73*	2.22	77.4	0.02	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Front	0.00812	-1.13*	2.38	77.4	0.02	
LTE-M1 B13	23205	779.5	QPSK / 5	1	0	22.7	19.94	Front	0.00882	-1.68*	2.78	77.4	0.02	20
LTE-M1 B13	23255	784.5	QPSK / 5	1	0	22.7	20.25	Front	0.00537	0.17	1.76	77.4	0.01	

*Larger than 5% drifts included to scaling factors

Mode	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{1g} [W/kg]	Plot #
BLE	2480	39	Front	4	2.31	0.0094	-0.06	1.48	100	0.014	18
BLE	2402	37	Front	4	2.25	0.00167	0.79*	1.79	100	0.003	
BLE	2440	17	Front	4	2.3	0.00245	0.26*	1.57	100	0.004	

*Larger than 5% drifts included to scaling factors

7.3 SAR Results for Extremity Condition with wristband, 0mm separation distance

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]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{10g} [W/kg]	Plot #
LTE-M1 B2	18900	1880	QPSK / 20	1	2	19.7	20.17	Back	0.778	-0.75*	1.19	77.4	0.92	
LTE-M1 B2	18900	1880	QPSK / 20	3	0	19.7	20.07	Back	0.82	-0.15	1.00	77.4	0.82	
LTE-M1 B2	18700	1860	QPSK / 20	1	2	19.7	19.88	Back	0.628	-0.77*	1.19	77.4	0.75	
LTE-M1 B2	19100	1900	QPSK / 20	1	0	19.7	20.03	Back	0.843	-0.69*	1.17	77.4	0.99	21

*Larger than 5% drifts included to scaling factors
** Samples used for SAR testing exceeds the maximum specified power, thus SAR results are overestimations.

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]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{10g} [W/kg]	Plot #
LTE-M1 B4	20300	1745	QPSK / 20	1	0	22.7	20.77	Back	0.413	-0.08	1.56	77.4	0.64	
LTE-M1 B4	20300	1745	QPSK / 20	3	0	22.7	20.69	Back	0.51	-0.51*	1.79	77.4	0.91	22
LTE-M1 B4	20050	1720	QPSK / 20	1	2	22.7	20.49	Back	0.358	-0.59*	1.91	77.4	0.68	
LTE-M1 B4	20175	1732.5	QPSK / 20	1	0	22.7	20.43	Back	0.416	-0.6*	1.94	77.4	0.81	
LTE-M1 B66	132572	1770	QPSK / 20	1	0	22.7	20.65	Back	0.624	-0.35*	1.74	77.4	1.08	23

*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]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{10g} [W/kg]	Plot #
LTE-M1 B12	23095	707.5	QPSK / 10	1	0	22.7	21.02	Back	0.156	-0.46*	1.64	77.4	0.26	
LTE-M1 B12	23095	707.5	QPSK / 10	3	0	22.7	20.95	Back	0.151	-0.08	1.50	77.4	0.23	
LTE-M1 B12	23060	704	QPSK / 10	1	0	22.7	20.59	Back	0.135	0.01	1.63	77.4	0.22	
LTE-M1 B12	23130	711	QPSK / 10	1	0	22.7	20.89	Back	0.165	-0.26*	1.61	77.4	0.27	24

*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]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{10g} [W/kg]	Plot #
LTE-M1 B13	23230	782	QPSK / 10	1	0	22.7	19.96	Back	0.161	-0.23*	1.98	77.4	0.32	
LTE-M1 B13	23230	782	QPSK / 10	3	3	22.7	20.06	Back	0.154	-0.82*	2.22	77.4	0.34	25
LTE-M1 B13	23205	779.5	QPSK / 5	1	0	22.7	19.94	Back	0.122	-0.17	1.89	77.4	0.23	
LTE-M1 B13	23255	784.5	QPSK / 5	1	0	22.7	20.25	Back	0.15	-0.43*	1.94	77.4	0.29	

*Larger than 5% drifts included to scaling factors

Mode	Frequency [MHz]	Channel	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{10g} [W/kg]	Power Drift [dB]	Scaling Factor	Max Duty Cycle [%]	Reported SAR_{10g} [W/kg]	Plot #
BLE	2402	37	Back	4	2.25	0.00251	0.63*	1.73	100	0.004	
BLE	2440	17	Back	4	2.3	0.00324	0.09	1.48	100	0.005	26
BLE	2480	39	Back	4	2.31	0.00318	0.45*	1.64	100	0.005	

*Larger than 5% drifts included to scaling factors

7.4 Simultaneous Transmission Analysis

Simultaneous transmission analysis for the maximum SAR has been evaluated according to FCC KDB 447498 D04, Appendix C. Direct summation of SAR results was performed.

Body, Next-to-mouth Exposure and Extremity Conditions:

	Exposure Condition	Body SAR_{1g} [W/kg]				
	Test Position	**Front**	**Back**	**Left**	**Right**	**Bottom**
	LTE-M1 B2	1.04	0.86	0.24	0.33	0.06
	LTE-M1 B4 & LTE-M1 B66	1.41	0.49	0.26	0.34	0.08
	LTE-M1 B12	0.01	0.14	0.02	0.01	0.004
	LTE-M1 B13	0.02	0.23	0.03	0.02	0.01
Maximum Cellular SAR		**1.41**	**1.08**	**0.27**	**0.38**	**0.08**
Maximum Bluetooth SAR		**0.014**	**0.007**	**0**	**0**	**0**
SAR Summation:		**1.42**	**1.09**	**0.27**	**0.38**	**0.08**

	Exposure Condition	Next-to-mouth SAR_{1g} [W/kg]
	Test Position	Front
	LTE-M1 B2	1.03
	LTE-M1 B4 & LTE-M1 B66	1.41
	LTE-M1 B12	0.03
	LTE-M1 B13	0.02
Maximum Cellular SAR		1.41
Maximum Bluetooth SAR		0.014
SAR Summation:		1.42

	Exposure Condition	Extremity SAR_{10g} [W/kg]
	Test Position	Back
	LTE-M1 B2	0.99
	LTE-M1 B4 & LTE-M1 B66	1.08
	LTE-M1 B12	0.27
	LTE-M1 B13	0.34
Maximum Cellular SAR		1.08
Maximum Bluetooth SAR		0.005
SAR Summation:		1.09

7.5 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.

APPENDIX A: PHOTOS OF THE DUT

Size of the DUT is: ⌀ 45 mm x 10mm (diameter x height)

Figure 2 Overview of the DUT with lanyard and wristband

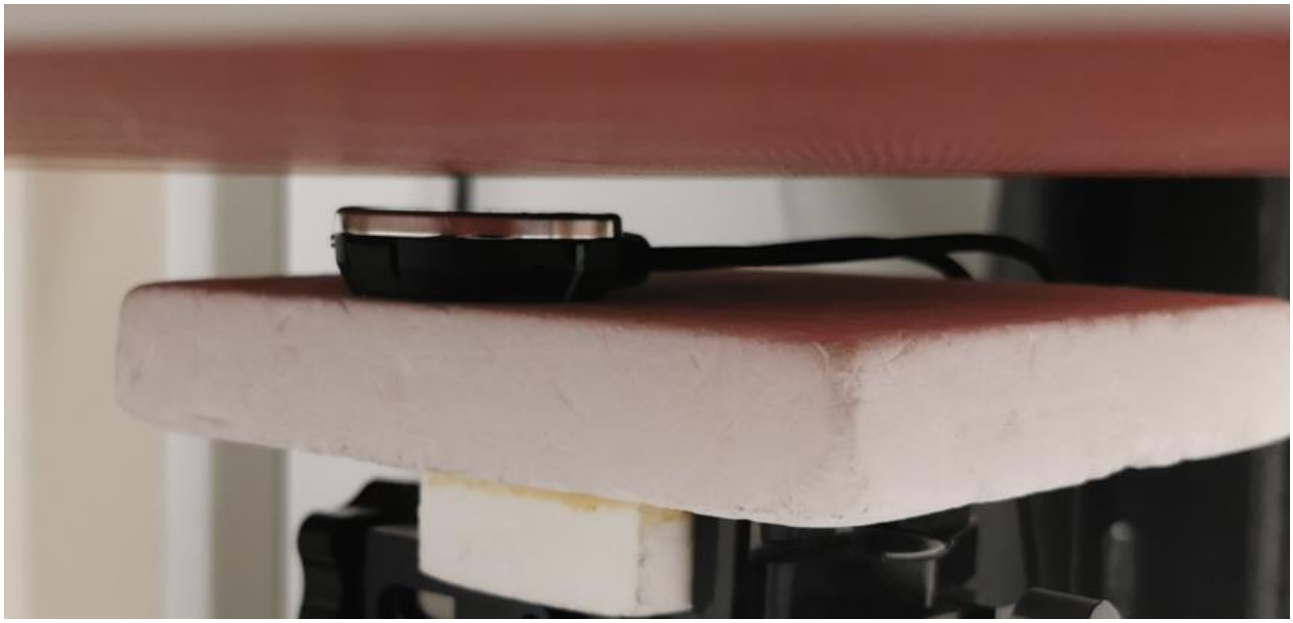


Figure 3 Front side of the DUT with lanyard against the phantom, 5mm separation distance

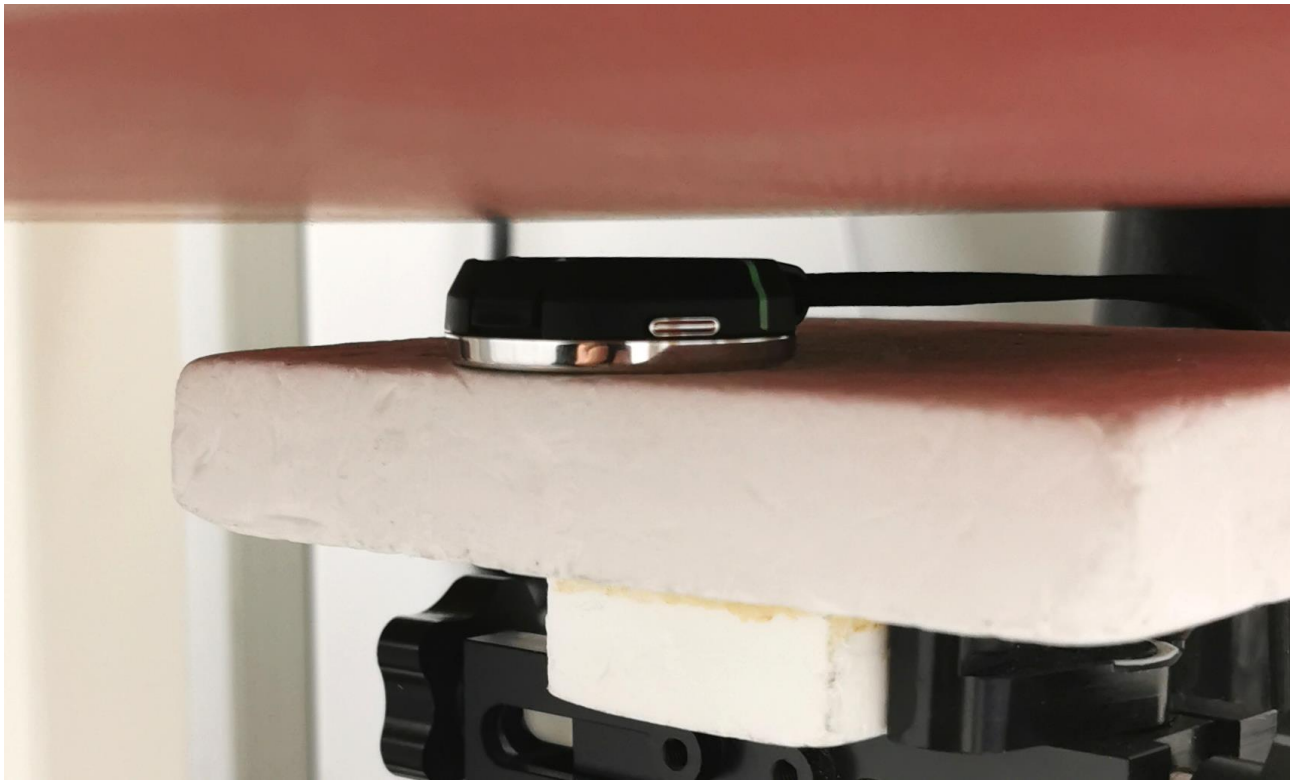


Figure 4 Back side of the DUT with lanyard against the phantom, 5mm separation distance

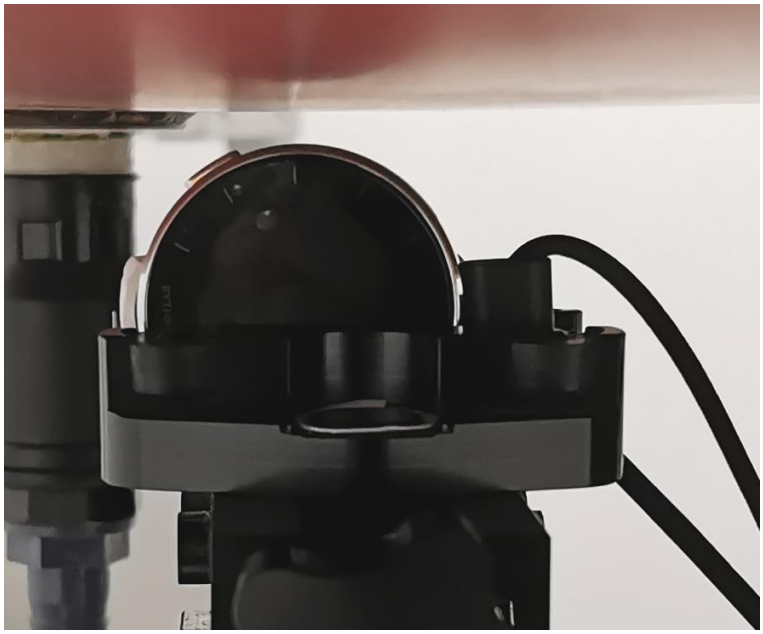


Figure 5 Left side of the DUT with lanyard against the phantom, 5mm separation distance

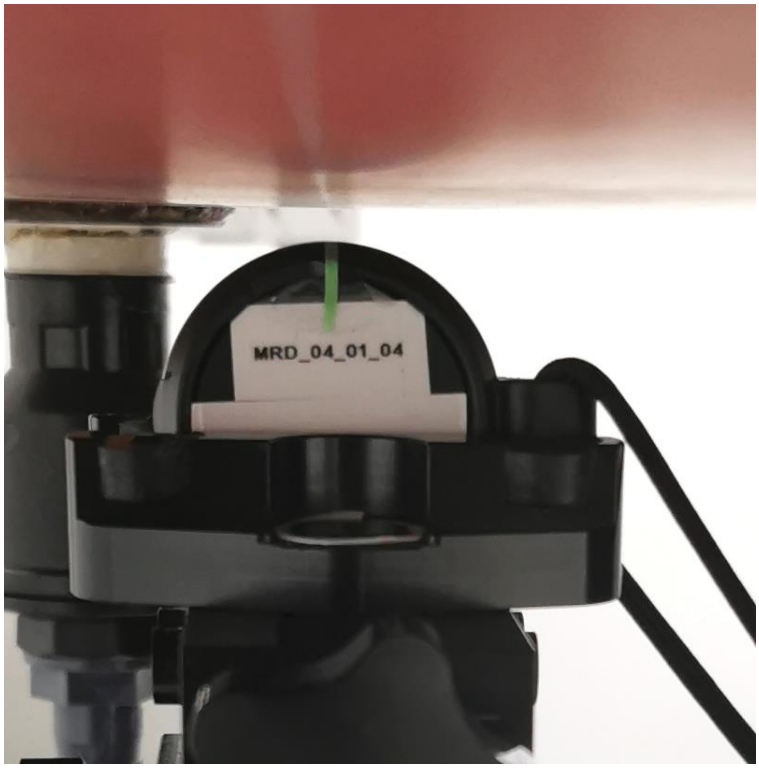


Figure 6 Right side of the DUT with lanyard against the phantom, 5mm separation distance

Figure 7 Bottom side of the DUT with lanyard against the phantom, 5mm separation distance

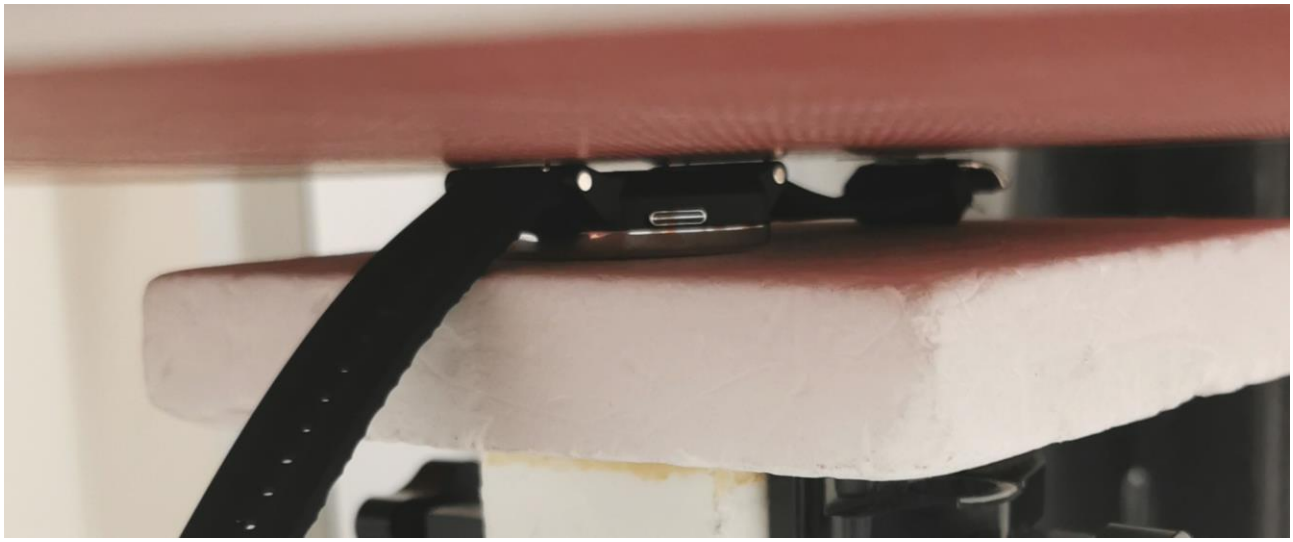


Figure 8 Back side of the DUT with wristband against the phantom, 0mm separation distance

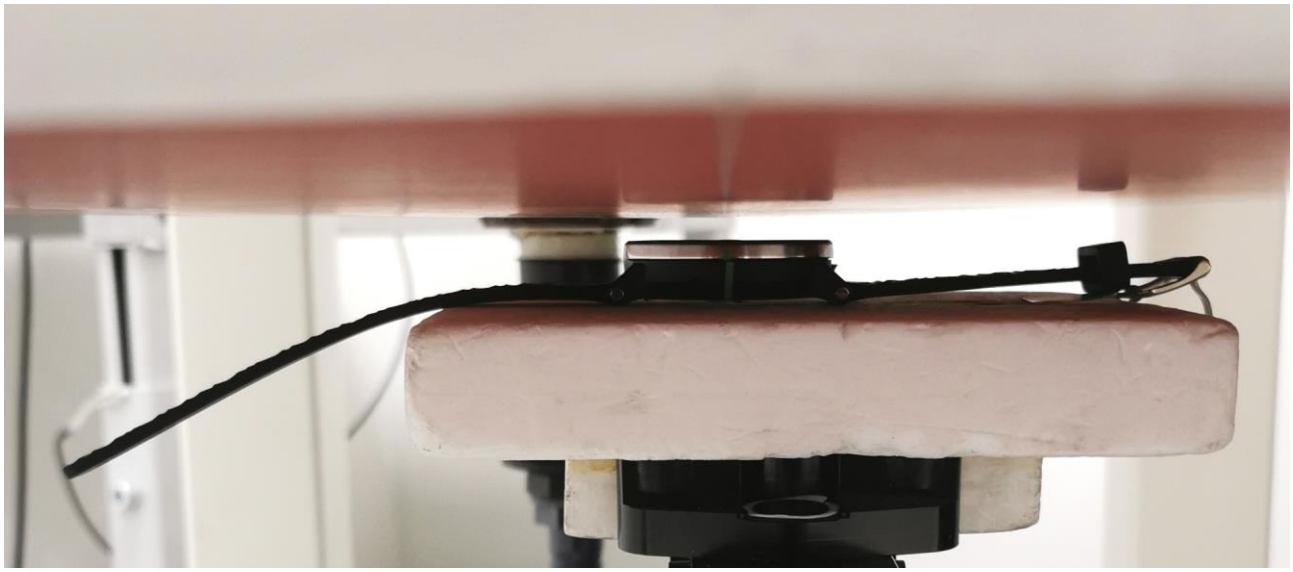


Figure 9 Front side of the DUT with wristband against the phantom, 5mm separation distance

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 11.4.24 13:43:36

Test Laboratory: Verkotan Oy

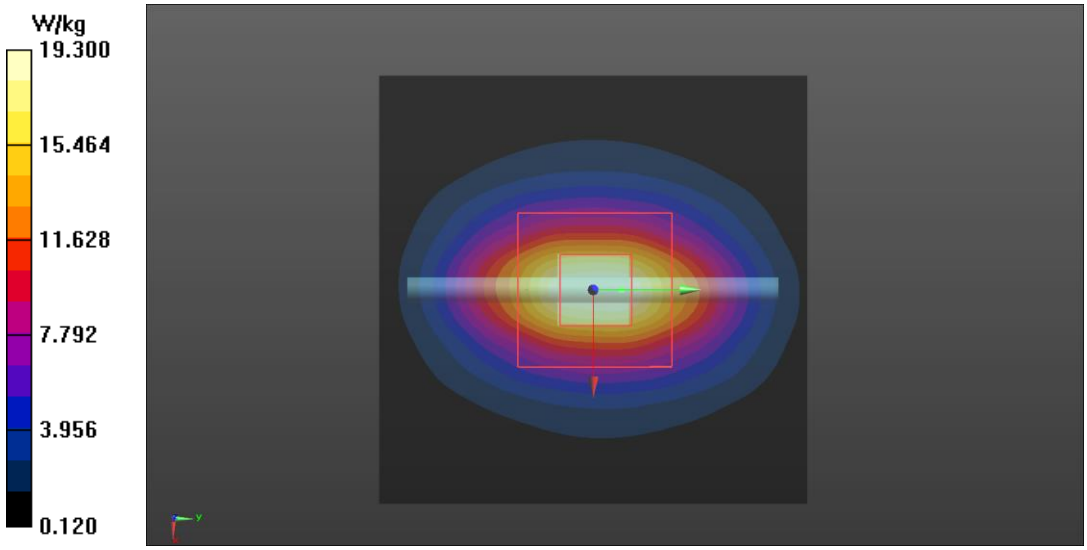
DUT: D2450V2 - SN729; Type: D2450V2; Serial: SN729

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.694 S/m; ε_r = 37.966; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.59, 7.49, 7.65) @ 2450 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 2450MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 106.5 V/m; Power Drift = -0.12 dB
Peak SAR (extrapolated) = 23.2 W/kg
SAR(1 g) = 12.3 W/kg; SAR(10 g) = 5.76 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 = 52.5%
Maximum value of SAR (measured) = 19.3 W/kg
Configuration/System Check 2450MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 19.7 W/kg



Plot 2

Date/Time: 12.4.24 13:38:41

Test Laboratory: Verkotan Oy

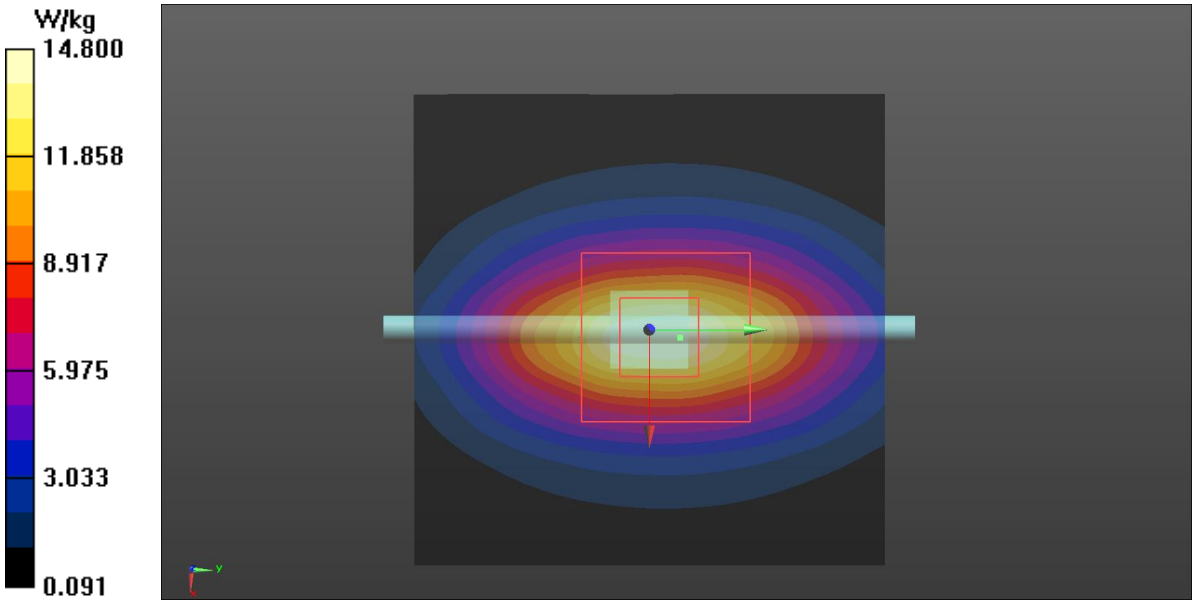
DUT: D1900V2 - SN511; Type: D1900V2; Serial: SN511

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; σ = 1.37 S/m; ε_r = 38.842; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1900 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1900MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 14.8 W/kg
Configuration/System Check 1900MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 100.5 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 17.1 W/kg
SAR(1 g) = 9.49 W/kg; SAR(10 g) = 4.95 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 = 55.9%
Maximum value of SAR (measured) = 14.4 W/kg



Plot 3

Date/Time: 16.4.24 08:32:10

Test Laboratory: Verkotan Oy

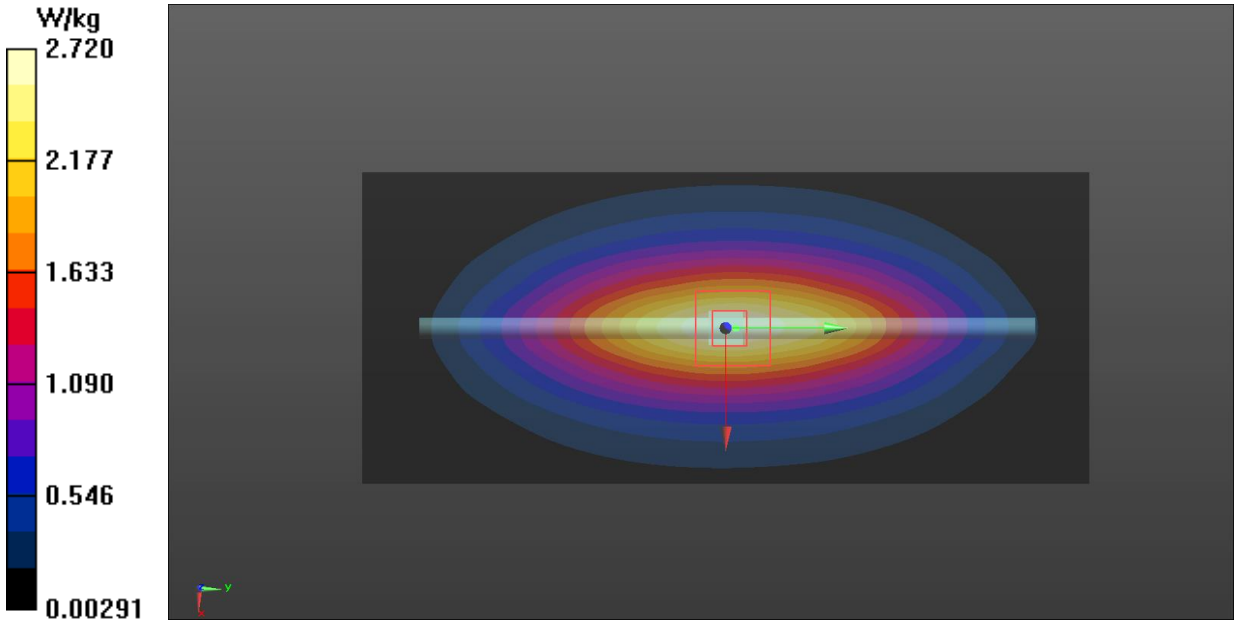
DUT: D750V3 - SN1154; Type: D750V3; Serial: SN1154

Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 750 MHz; σ = 0.889 S/m; ε_r = 42.021; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 750 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 750MHz/Area Scan (141x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.72 W/kg
Configuration/System Check 750MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.04 V/m; Power Drift = -0.25 dB
Peak SAR (extrapolated) = 3.19 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.42 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 67.1%
Maximum value of SAR (measured) = 2.87 W/kg



Plot 4

Date/Time: 17.4.24 08:18:49

Test Laboratory: Verkotan Oy

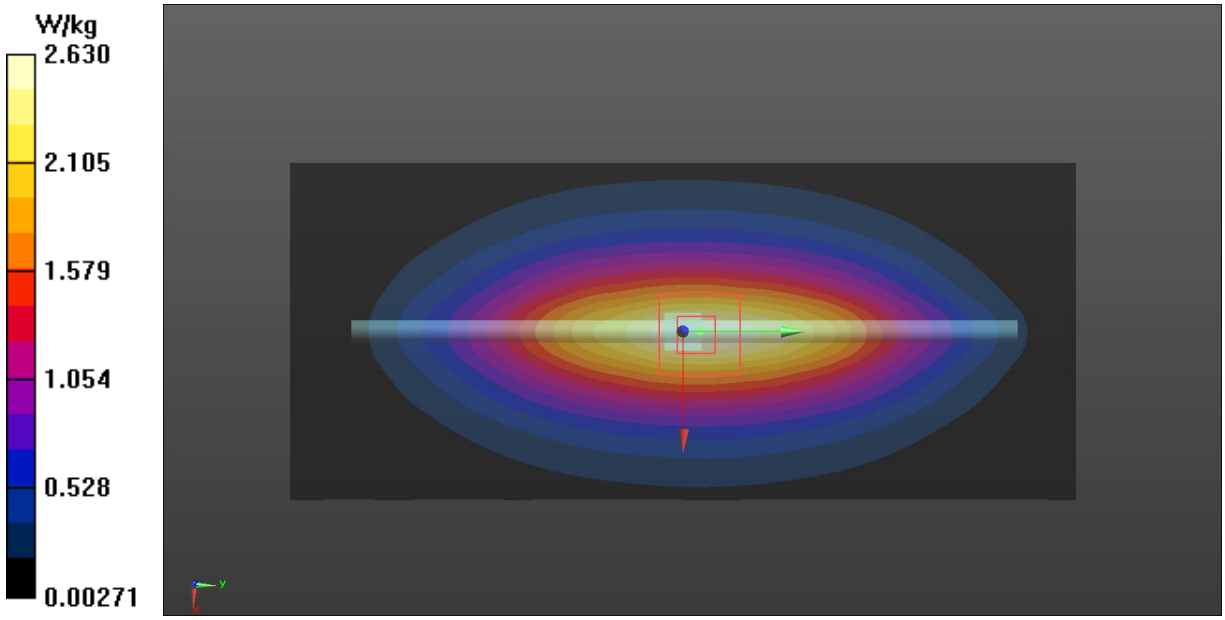
DUT: D750V3 - SN1154; Type: D750V3; Serial: SN1154

Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 750 MHz; σ = 0.89 S/m; ε_r = 42.54; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 750 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 750MHz/Area Scan (141x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.63 W/kg
Configuration/System Check 750MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 56.82 V/m; Power Drift = -0.24 dB
Peak SAR (extrapolated) = 3.01 W/kg
SAR(1 g) = 2.08 W/kg; SAR(10 g) = 1.36 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 20 mm
Ratio of SAR at M2 to SAR at M1 = 68.4%
Maximum value of SAR (measured) = 2.72 W/kg



Plot 5

Date/Time: 18.4.24 08:38:07

Test Laboratory: Verkotan Oy

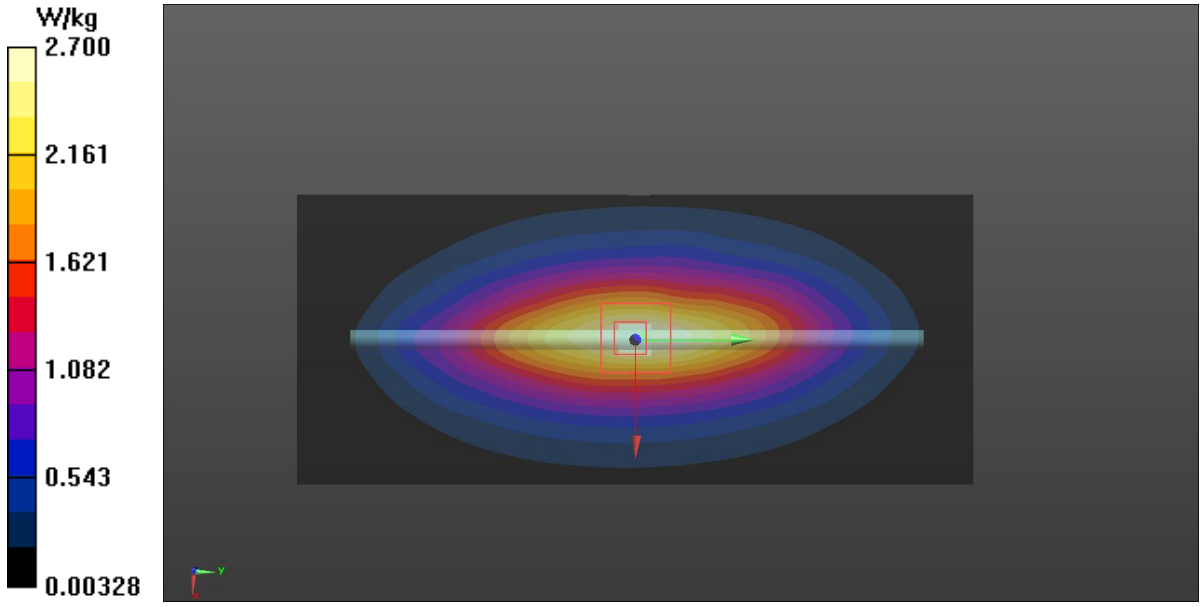
DUT: D750V3 - SN1154; Type: D750V3; Serial: SN1154

Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 750 MHz; σ = 0.886 S/m; ε_r = 43.02; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 750 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 750MHz/Area Scan (141x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.70 W/kg
Configuration/System Check 750MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 57.67 V/m; Power Drift = -0.24 dB
Peak SAR (extrapolated) = 3.17 W/kg
SAR(1 g) = 2.18 W/kg; SAR(10 g) = 1.42 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 17.4 mm
Ratio of SAR at M2 to SAR at M1 = 68.4%
Maximum value of SAR (measured) = 2.84 W/kg



Plot 6

Date/Time: 18.4.24 20:01:10

Test Laboratory: Verkotan Oy

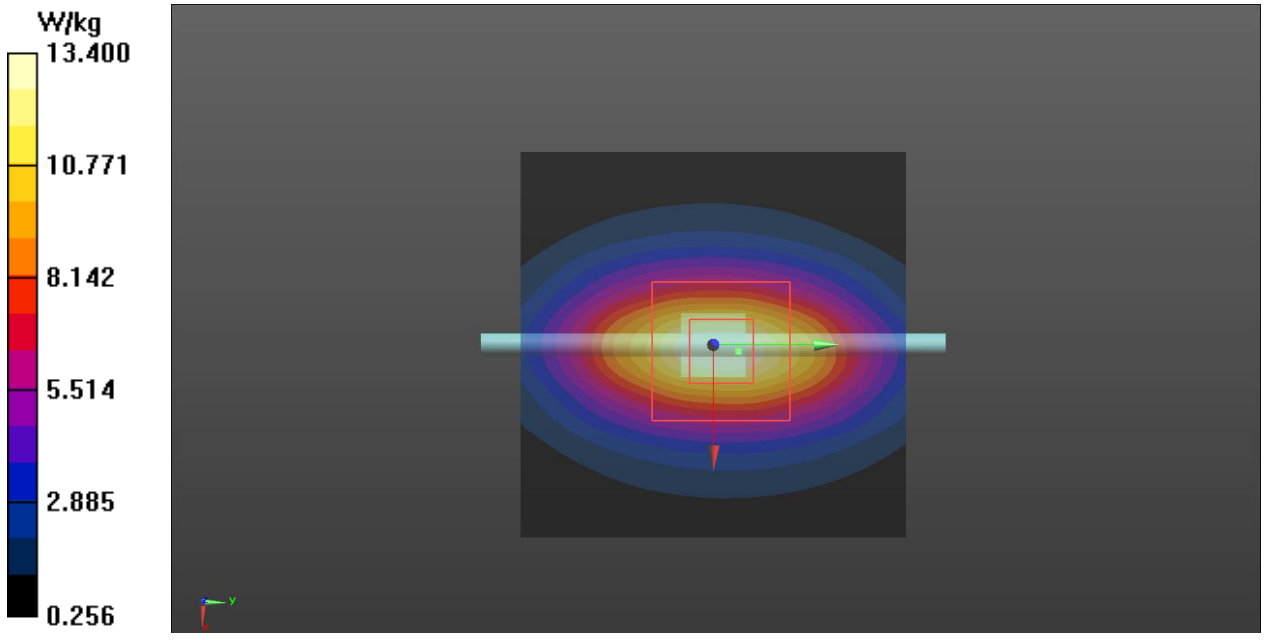
DUT: D1800V2 - SN249; Type: D1800V2; Serial: SN249

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; σ = 1.38 S/m; ε_r = 38.18; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.35, 8.14, 8.4) @ 1800 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1800MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.84 V/m; Power Drift = -0.32 dB
Peak SAR (extrapolated) = 15.7 W/kg
SAR(1 g) = 8.85 W/kg; SAR(10 g) = 4.71 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 = 57.3%
Maximum value of SAR (measured) = 13.4 W/kg
Configuration/System Check 1800MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.6 W/kg



Plot 7

Date/Time: 22.4.24 09:07:26

Test Laboratory: Verkotan Oy

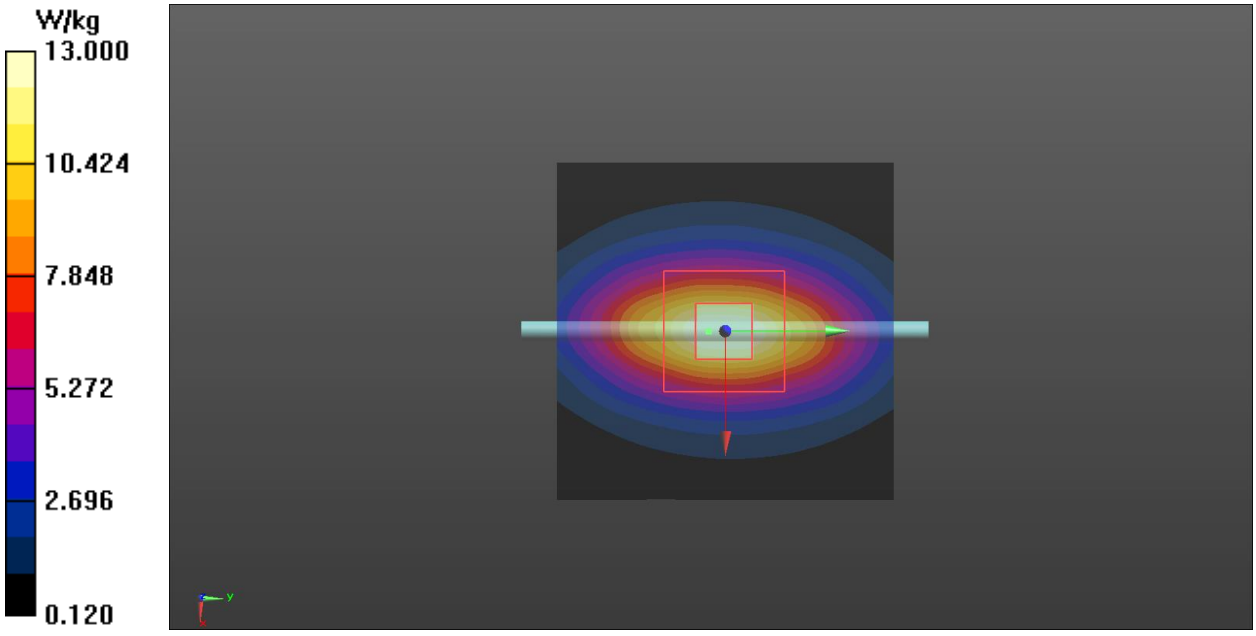
DUT: D1800V2 - SN249; Type: D1800V2; Serial: SN249

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; σ = 1.31 S/m; ε_r = 38.57; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.35, 8.14, 8.4) @ 1800 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1800MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.0 W/kg
Configuration/System Check 1800MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.32 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 15.5 W/kg
SAR(1 g) = 8.84 W/kg; SAR(10 g) = 4.61 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 = 55.4%
Maximum value of SAR (measured) = 13.1 W/kg



Plot 8

Date/Time: 23.4.24 09:13:34

Test Laboratory: Verkotan Oy

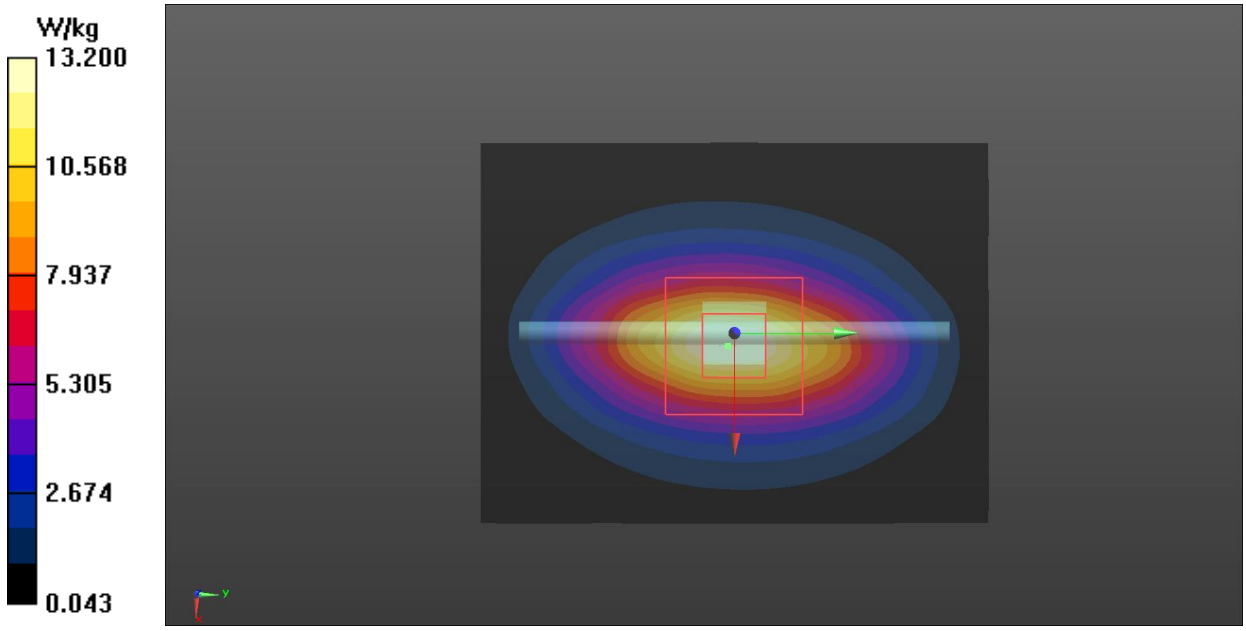
DUT: D1900V2 - SN511; Type: D1900V2; Serial: SN511

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; σ = 1.349 S/m; ε_r = 37.463; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1900 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1900MHz/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.2 W/kg
Configuration/System Check 1900MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 98.74 V/m; Power Drift = -0.23 dB
Peak SAR (extrapolated) = 15.6 W/kg
SAR(1 g) = 8.88 W/kg; SAR(10 g) = 4.64 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 = 56.9%
Maximum value of SAR (measured) = 13.5 W/kg



Plot 9

Date/Time: 24.4.24 09:04:45

Test Laboratory: Verkotan Oy

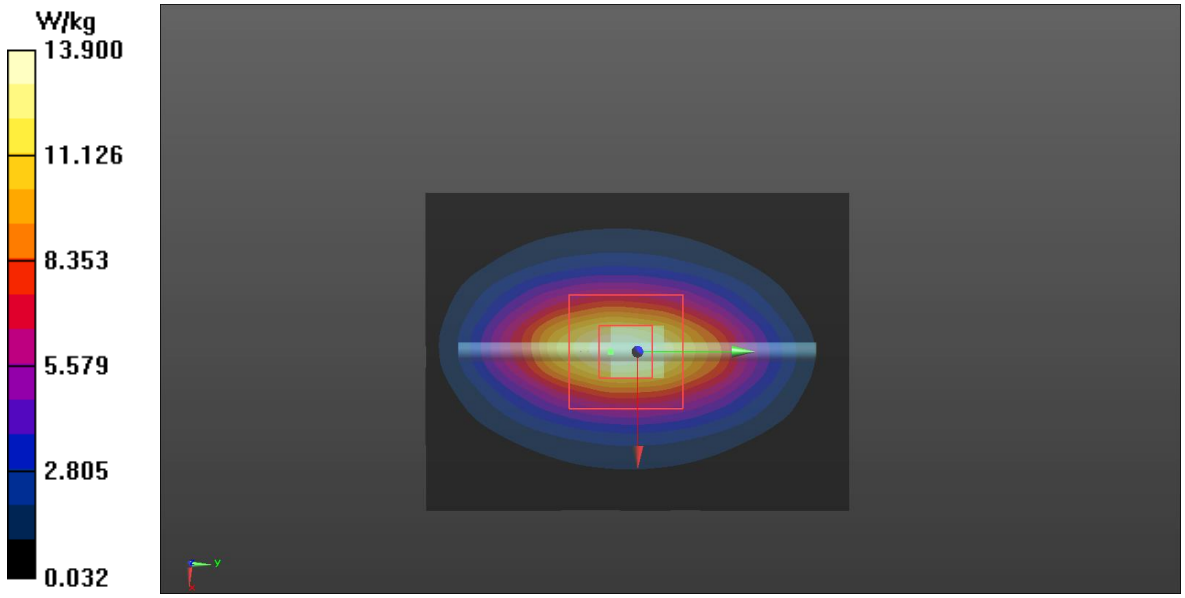
DUT: D1900V2 - SN511; Type: D1900V2; Serial: SN511

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; σ = 1.4 S/m; ε_r = 38.702; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1900 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1900MHz/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.9 W/kg
Configuration/System Check 1900MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.04 V/m; Power Drift = -0.18 dB
Peak SAR (extrapolated) = 16.2 W/kg
SAR(1 g) = 8.9 W/kg; SAR(10 g) = 4.64 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 = 55.3%
Maximum value of SAR (measured) = 13.7 W/kg



Plot 10

Date/Time: 25.4.24 09:54:03

Test Laboratory: Verkotan Oy

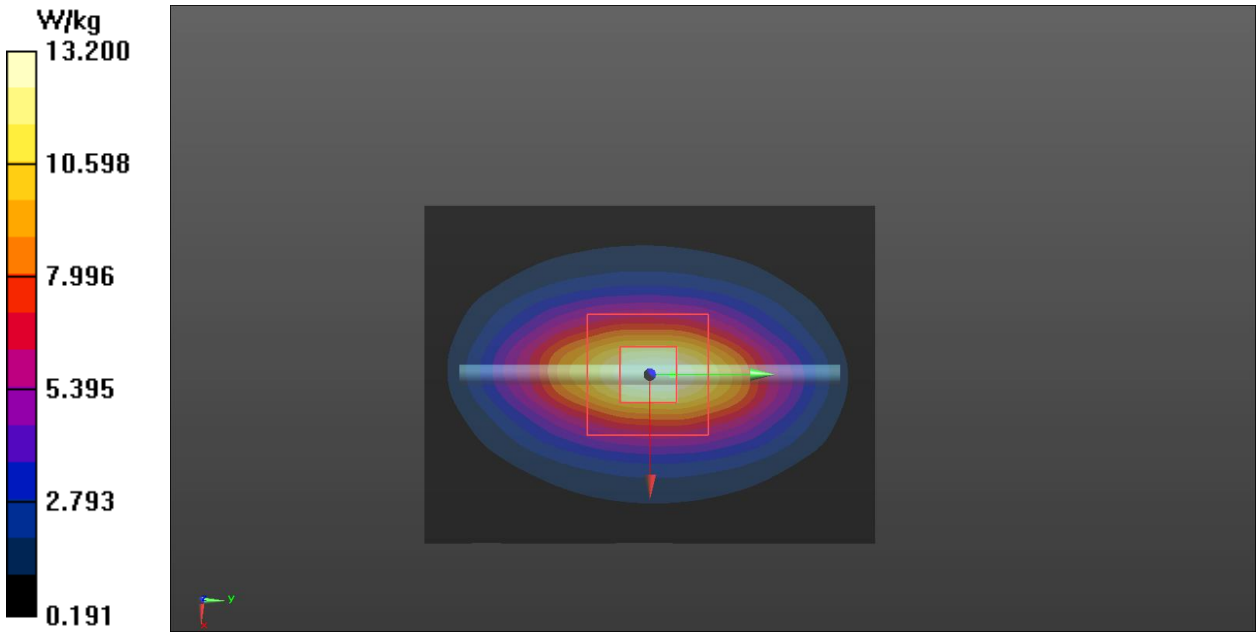
DUT: D1900V2 - SN511; Type: D1900V2; Serial: SN511

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; σ = 1.392 S/m; ε_r = 38.017; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1900 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1900MHz 2/Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 95.63 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 15.2 W/kg
SAR(1 g) = 8.69 W/kg; SAR(10 g) = 4.57 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 = 56.8%
Maximum value of SAR (measured) = 13.2 W/kg
Configuration/System Check 1900MHz 2/Area Scan (61x81x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 13.4 W/kg



Plot 11

Date/Time: 25.4.24 12:52:19

Test Laboratory: Verkotan Oy

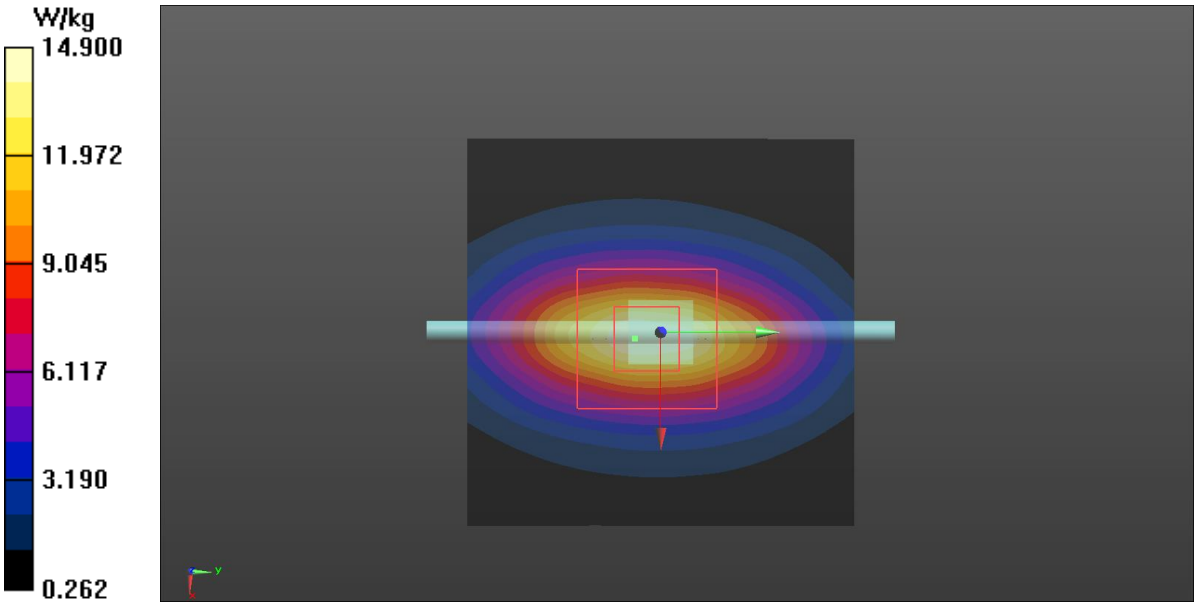
DUT: D1800V2 - SN249; Type: D1800V2; Serial: SN249

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; σ = 1.342 S/m; ε_r = 38.191; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.35, 8.14, 8.4) @ 1800 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System Check 1800MHz/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 104.5 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 18.0 W/kg
SAR(1 g) = 9.79 W/kg; SAR(10 g) = 5.05 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 9.9 mm
Ratio of SAR at M2 to SAR at M1 = 53.7%
Maximum value of SAR (measured) = 14.9 W/kg
Configuration/System Check 1800MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.6 W/kg



Plot 12

Date/Time: 01/05/2024 13:14:06

Test Laboratory: Verkotan Oy

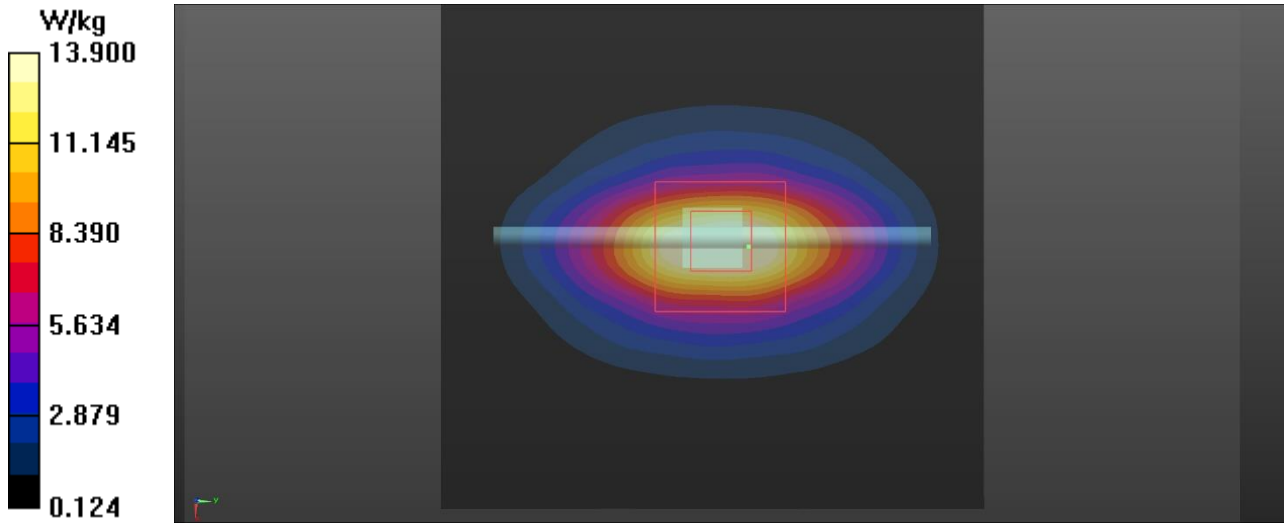
DUT: D1800V2 - SN249; Type: D1800V2; Serial: SN249

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; σ = 1.348 S/m; ε_r = 39.08; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.02, 8.45, 7.93) @ 1800 MHz; Calibrated: 15/04/2024
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn705; Calibrated: 09/04/2024
  - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/ System Check 1800MHz/Area Scan (61x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.9 W/kg
Configuration/ System Check 1800MHz/Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 99.97 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 16.9 W/kg
SAR(1 g) = 9.3 W/kg; SAR(10 g) = 4.82 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 = 55.4%
Maximum value of SAR (measured) = 13.9 W/kg



APPENDIX C: MEASUREMENT SCANS

Plot 13

Date/Time: 24.4.24 16:33:00

Test Laboratory: Verkotan Oy

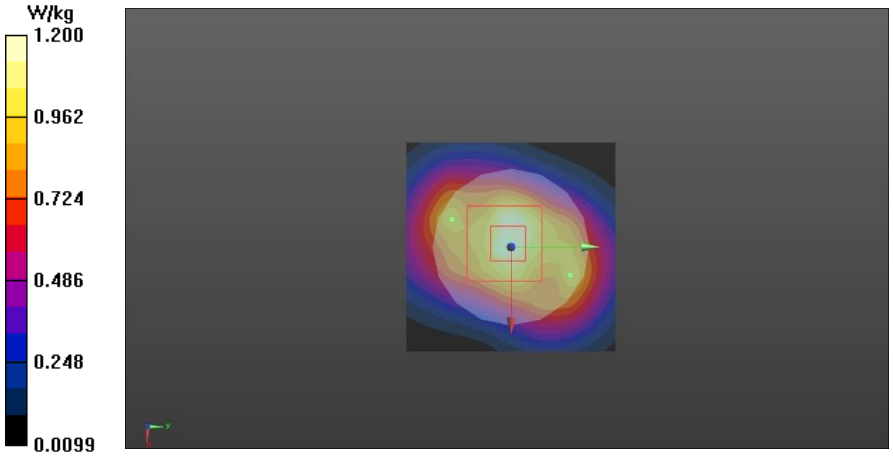
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 2; Frequency: 1880 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 1880 MHz; σ = 1.39 S/m; ε_r = 38.73; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1880 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B2 CH 18900 QPSK / BW 20 MHz / RB 6 Offset 0 Front 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 1.20 W/kg
Configuration/LTE-M1 B2 CH 18900 QPSK / BW 20 MHz / RB 6 Offset 0 Front 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 29.39 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 1.04 W/kg; SAR(10 g) = 0.609 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 15 mm
Ratio of SAR at M2 to SAR at M1 = 86.2%
Maximum value of SAR (measured) = 1.29 W/kg



Plot 14

Date/Time: 22.4.24 13:00:32

Test Laboratory: Verkotan Oy

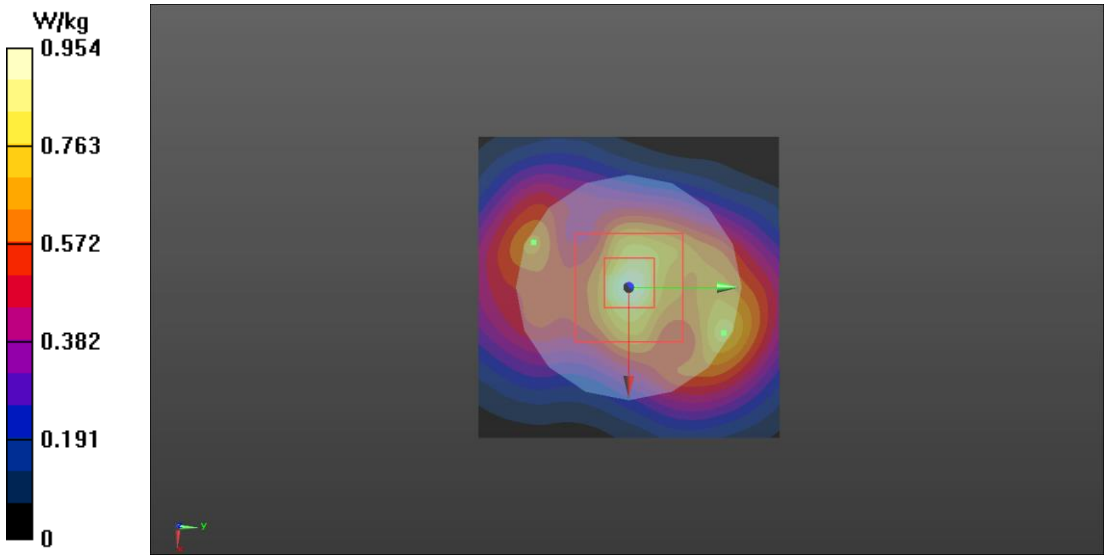
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 4; Frequency: 1745 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used (interpolated): f = 1745 MHz; σ = 1.285 S/m; ε_r = 38.686; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.35, 8.14, 8.4) @ 1745 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B4 CH 20300 QPSK / BW 20 MHz / RB 3 Offset 0 Front 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.954 W/kg
Configuration/LTE-M1 B4 CH 20300 QPSK / BW 20 MHz / RB 3 Offset 0 Front 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.92 V/m; Power Drift = -0.26 dB
Peak SAR (extrapolated) = 0.981 W/kg
SAR(1 g) = 0.818 W/kg; SAR(10 g) = 0.446 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 12 mm
Ratio of SAR at M2 to SAR at M1 = 87.8%
Maximum value of SAR (measured) = 0.958 W/kg



Plot 15

Date/Time: 02/05/2024 12:26:01

Test Laboratory: Verkotan Oy

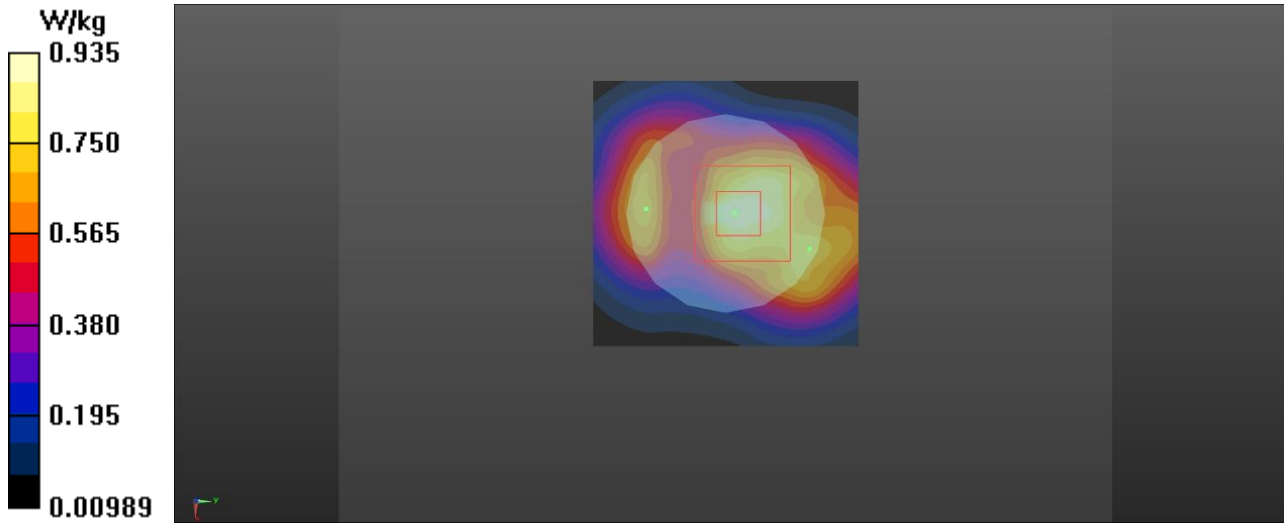
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 66; Frequency: 1770 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 1770 MHz; σ = 1.334 S/m; ε_r = 39.133; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.02, 8.45, 7.93) @ 1770 MHz; Calibrated: 15/04/2024
  - 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 Sn705; Calibrated: 09/04/2024
  - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B4 CH 132572 QPSK / BW 20 MHz / RB 6 Offset 0 Front 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.932 W/kg
Configuration/LTE-M1 B4 CH 132572 QPSK / BW 20 MHz / RB 6 Offset 0 Front 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 26.12 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 0.999 W/kg
SAR(1 g) = 0.843 W/kg; SAR(10 g) = 0.474 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 13.4 mm
Ratio of SAR at M2 to SAR at M1 = 79.4%
Maximum value of SAR (measured) = 0.935 W/kg



Plot 16

Date/Time: 16.4.24 10:52:42

Test Laboratory: Verkotan Oy

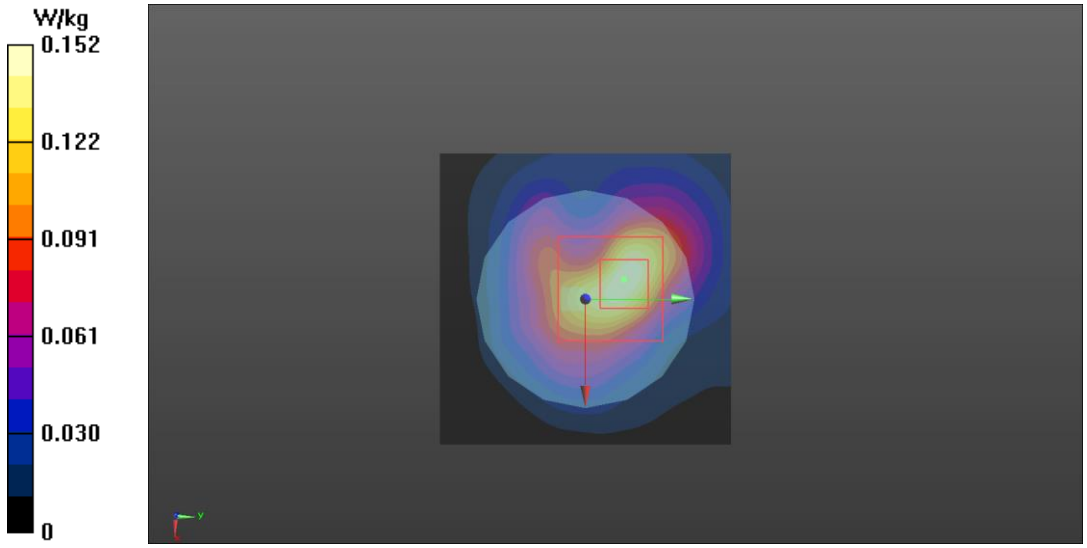
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 12; Frequency: 711 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 711 MHz; σ = 0.875 S/m; ε_r = 42.276; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 711 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Back 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.152 W/kg
Configuration/LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Back 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.62 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 0.237 W/kg
SAR(1 g) = 0.091 W/kg; SAR(10 g) = 0.042 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 = 38.8%
Maximum value of SAR (measured) = 0.174 W/kg



Plot 17

Date/Time: 17.4.24 12:07:20

Test Laboratory: Verkotan Oy

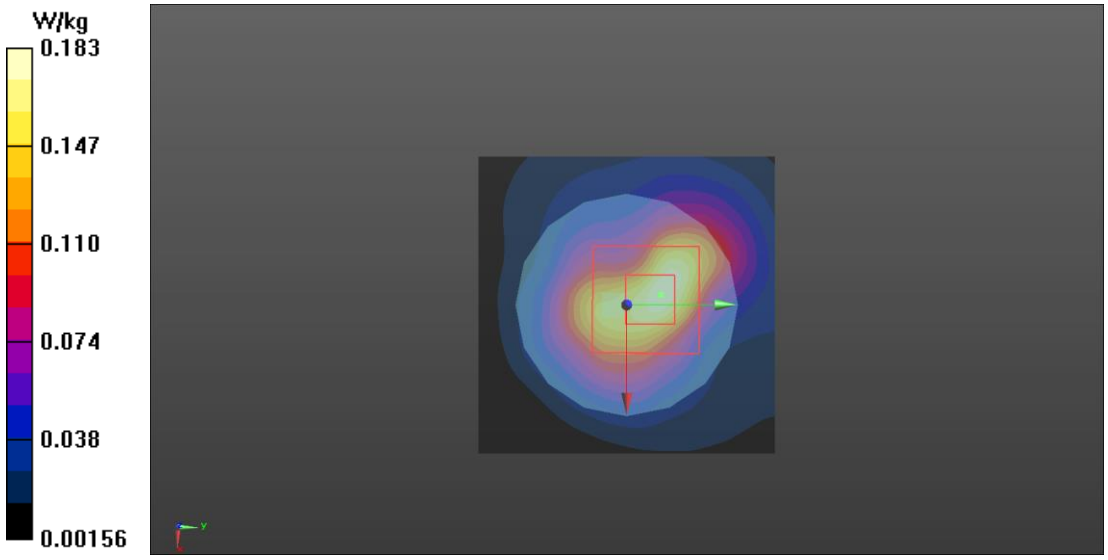
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 13; Frequency: 779.5 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used (interpolated): f = 779.5 MHz; σ = 0.901 S/m; ε_r = 42.38; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 779.5 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B13 CH 23205 QPSK / BW 5 MHz / RB 1 Offset 0 Back 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 13.35 V/m; Power Drift = -0.40 dB
Peak SAR (extrapolated) = 0.231 W/kg
SAR(1 g) = 0.113 W/kg; SAR(10 g) = 0.057 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 = 45.4%
Maximum value of SAR (measured) = 0.183 W/kg
Configuration/LTE-M1 B13 CH 23205 QPSK / BW 5 MHz / RB 1 Offset 0 Back 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.185 W/kg



Plot 18

Date/Time: 11.4.24 14:44:36

Test Laboratory: Verkotan Oy

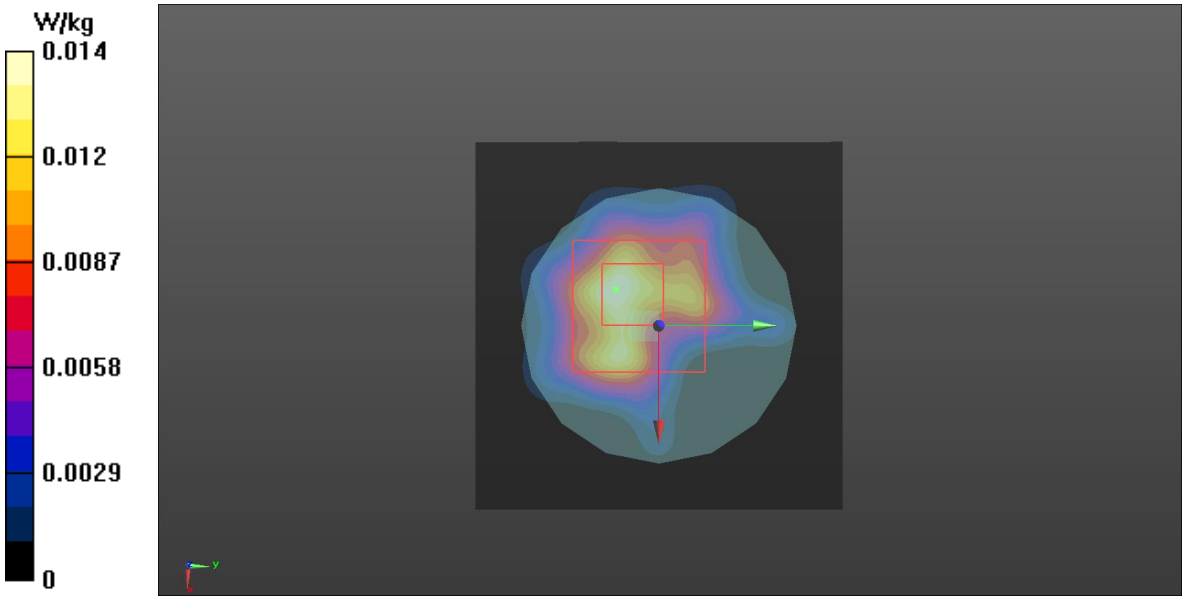
DUT: KALLOS

Communication System: UID 0, Bluetooth (0); Communication System Band: Bluetooth; Frequency: 2480 MHz;
Communication System PAR: 3.98 dB;
Medium parameters used: f = 2480 MHz; σ = 1.715 S/m; ε_r = 37.919; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.59, 7.49, 7.65) @ 2480 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/BLE CH 39 5mm Front/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.313 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 0.0200 W/kg
SAR(1 g) = 0.0094 W/kg; SAR(10 g) = 0.00261 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 57.8%
Maximum value of SAR (measured) = 0.0145 W/kg
Configuration/BLE CH 39 5mm Front/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0205 W/kg



Plot 19

Date/Time: 18.4.24 18:35:16

Test Laboratory: Verkotan Oy

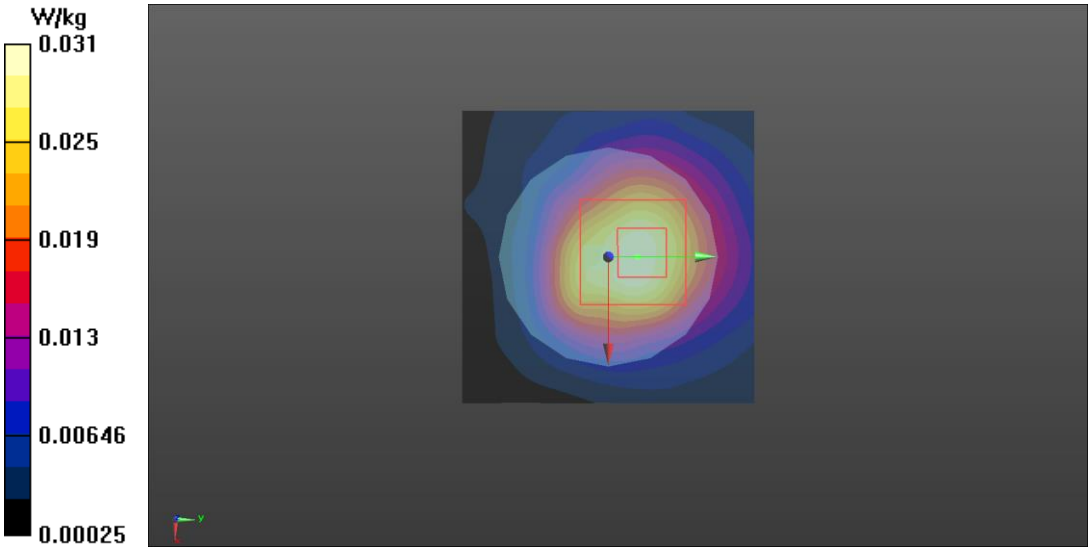
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 12; Frequency: 711 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 711 MHz; σ = 0.872 S/m; ε_r = 43.283; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 711 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Front 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.107 V/m; Power Drift = -0.14 dB
Peak SAR (extrapolated) = 0.0370 W/kg
SAR(1 g) = 0.018 W/kg; SAR(10 g) = 0.00962 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 47.7%
Maximum value of SAR (measured) = 0.0313 W/kg
Configuration/Wrist LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Front 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0235 W/kg



Plot 20

Date/Time: 18.4.24 11:08:34

Test Laboratory: Verkotan Oy

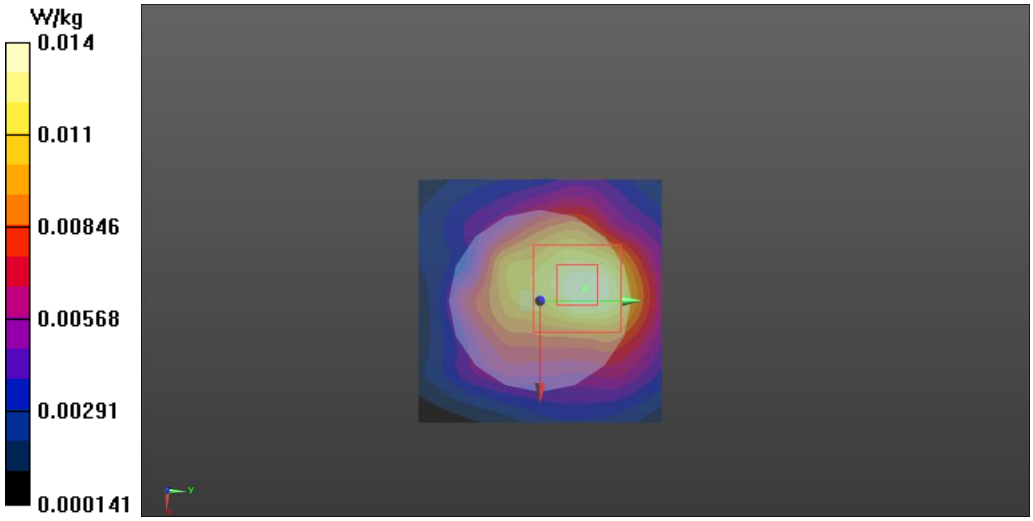
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 13; Frequency: 779.5 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used (interpolated): f = 779.5 MHz; σ = 0.898 S/m; ε_r = 42.84; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 779.5 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B13 CH 23205 QPSK / BW 5 MHz / RB 1 Offset 0 Front 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.835 V/m; Power Drift = -1.68 dB
Peak SAR (extrapolated) = 0.0170 W/kg
SAR(1 g) = 0.00882 W/kg; SAR(10 g) = 0.00503 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 49.3%
Maximum value of SAR (measured) = 0.0140 W/kg
Configuration/Wrist LTE-M1 B13 CH 23205 QPSK / BW 5 MHz / RB 1 Offset 0 Front 5mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0149 W/kg



Plot 21

Date/Time: 23.4.24 12:16:41

Test Laboratory: Verkotan Oy

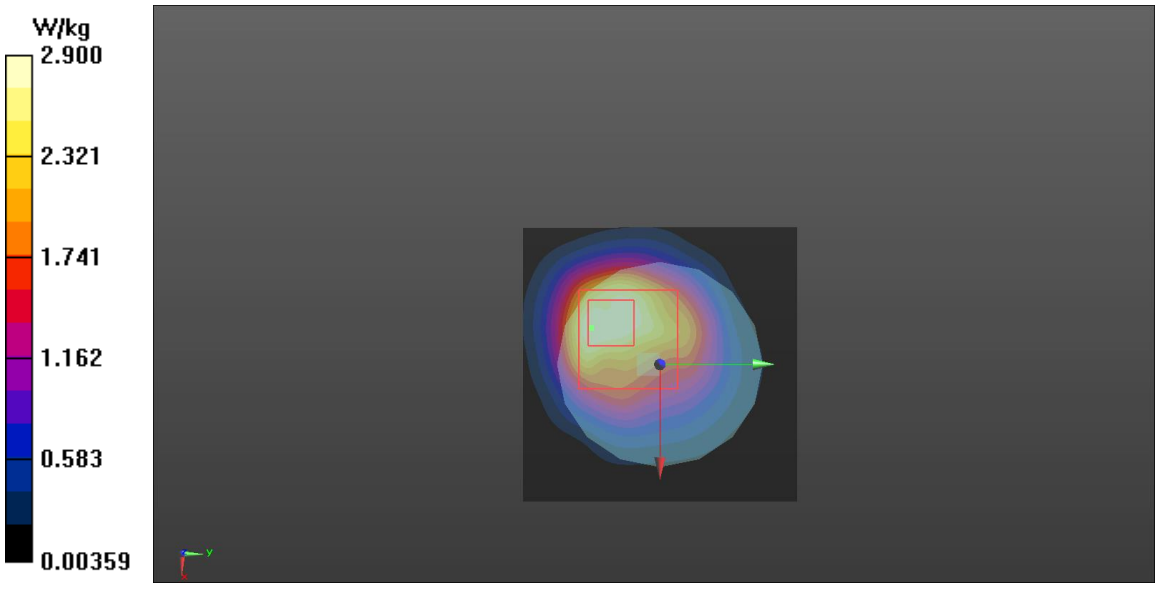
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 2; Frequency: 1900 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 1900 MHz; σ = 1.349 S/m; ε_r = 37.463; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.96, 7.8, 8.03) @ 1900 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B2 CH 19100 QPSK / BW 20 MHz / RB 1 Offset 0 Back 0mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.90 W/kg
Configuration/Wrist LTE-M1 B2 CH 19100 QPSK / BW 20 MHz / RB 1 Offset 0 Back 0mm/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 36.19 V/m; Power Drift = -0.69 dB
Peak SAR (extrapolated) = 4.66 W/kg
SAR(1 g) = 1.57 W/kg; SAR(10 g) = 0.843 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 8.3 mm
Ratio of SAR at M2 to SAR at M1 = 28.2%
Maximum value of SAR (measured) = 3.13 W/kg



Plot 22

Date/Time: 22.4.24 22:43:29

Test Laboratory: Verkotan Oy

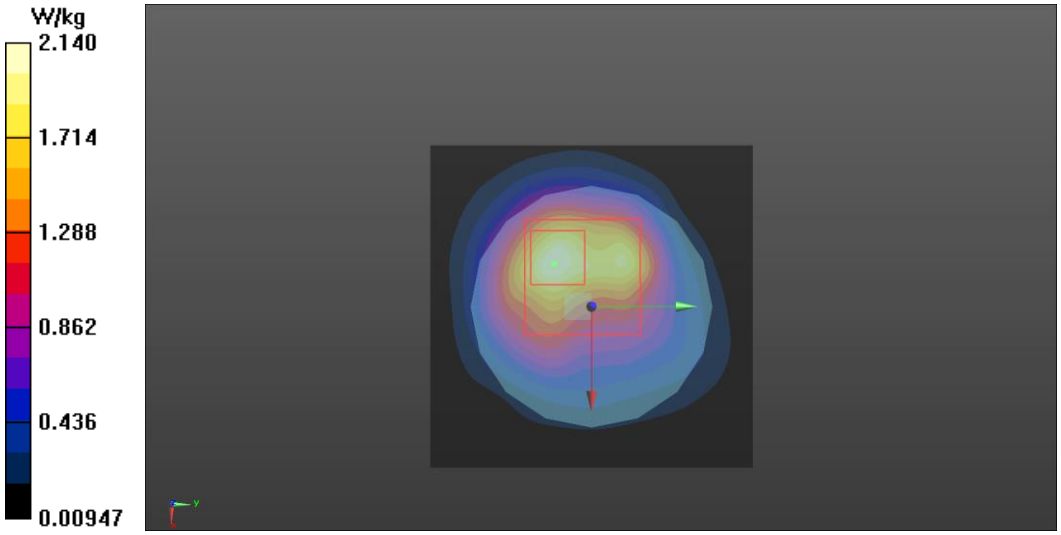
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 4; Frequency: 1745 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used (interpolated): f = 1745 MHz; σ = 1.285 S/m; ε_r = 38.686; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.35, 8.14, 8.4) @ 1745 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B4 CH 20300 QPSK / BW 20 MHz / RB 3 Offset 0 back 0mm/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 27.68 V/m; Power Drift = -0.51 dB
Peak SAR (extrapolated) = 3.29 W/kg
SAR(1 g) = 0.994 W/kg; SAR(10 g) = 0.510 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 6.1 mm
Ratio of SAR at M2 to SAR at M1 = 26.7%
Maximum value of SAR (measured) = 2.14 W/kg
Configuration/Wrist LTE-M1 B4 CH 20300 QPSK / BW 20 MHz / RB 3 Offset 0 back 0mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 2.15 W/kg



Plot 23

Date/Time: 02/05/2024 13:10:58

Test Laboratory: Verkotan Oy

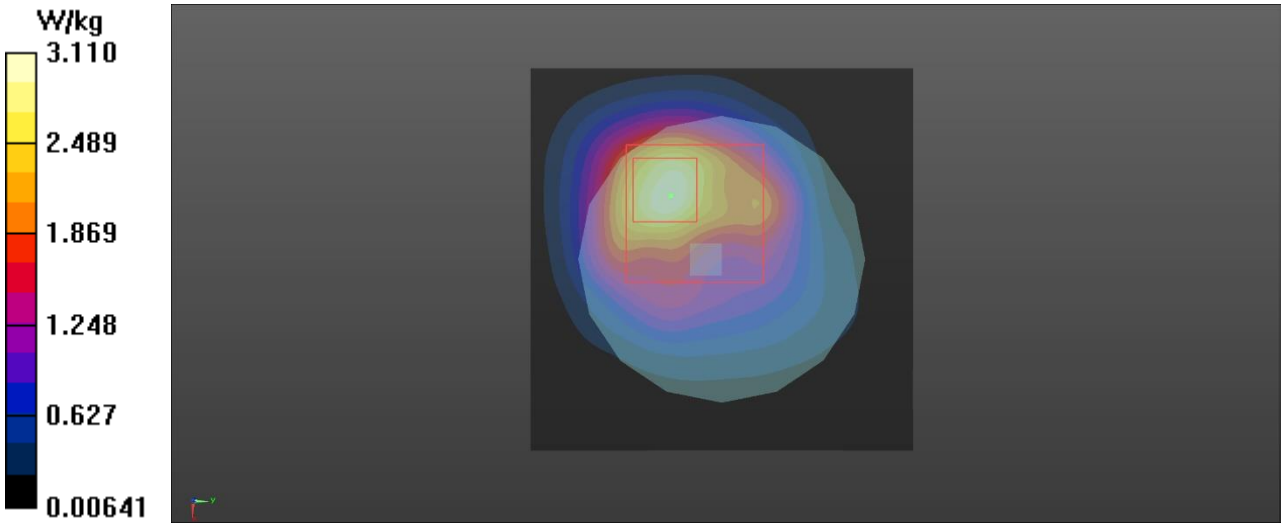
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 66; Frequency: 1770 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 1770 MHz; σ = 1.334 S/m; ε_r = 39.133; ρ = 1000 kg/m^3
Phantom section: Right Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.02, 8.45, 7.93) @ 1770 MHz; Calibrated: 15/04/2024
  - 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 Sn705; Calibrated: 09/04/2024
  - Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/LTE-M1 B4 CH 132572 QPSK / BW 20 MHz / RB 6 Offset 0 Back 0mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 28.73 V/m; Power Drift = -0.35 dB
Peak SAR (extrapolated) = 4.24 W/kg
SAR(1 g) = 1.24 W/kg; SAR(10 g) = 0.624 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 = 26.5%
Maximum value of SAR (measured) = 2.59 W/kg
Configuration/LTE-M1 B4 CH 132572 QPSK / BW 20 MHz / RB 6 Offset 0 Back 0mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 3.11 W/kg



Plot 24

Date/Time: 18.4.24 19:20:45

Test Laboratory: Verkotan Oy

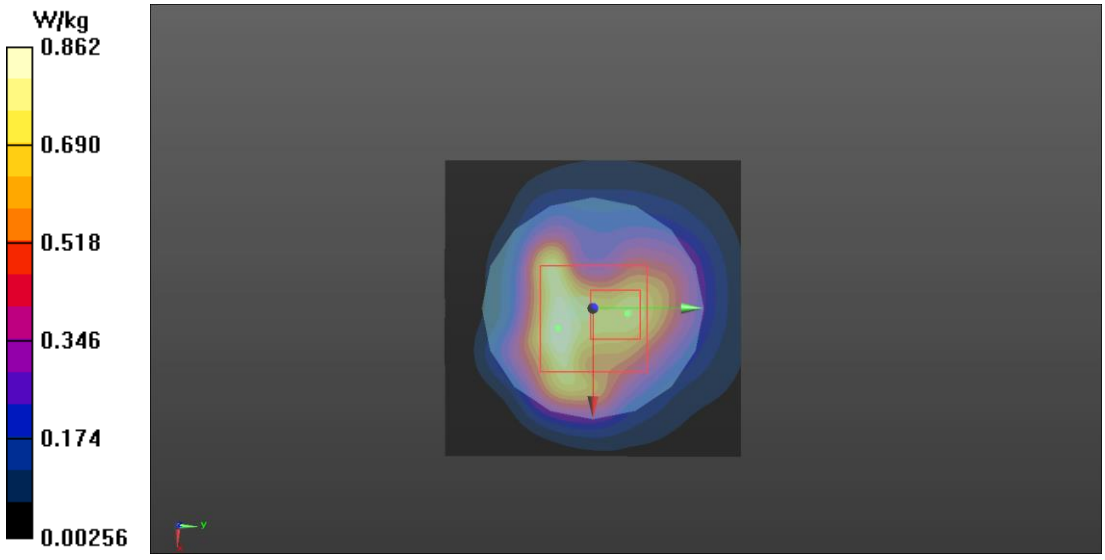
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 12; Frequency: 711 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 711 MHz; σ = 0.872 S/m; ε_r = 43.283; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 711 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Back 0mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.862 W/kg
Configuration/Wrist LTE-M1 B12 CH 23130 QPSK / BW 10 MHz / RB 1 Offset 0 Back 0mm/Zoom Scan (7x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 24.23 V/m; Power Drift = -0.26 dB
Peak SAR (extrapolated) = 0.923 W/kg
SAR(1 g) = 0.317 W/kg; SAR(10 g) = 0.165 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 = 31.2%
Maximum value of SAR (measured) = 0.635 W/kg



Plot 25

Date/Time: 18.4.24 09:18:33

Test Laboratory: Verkotan Oy

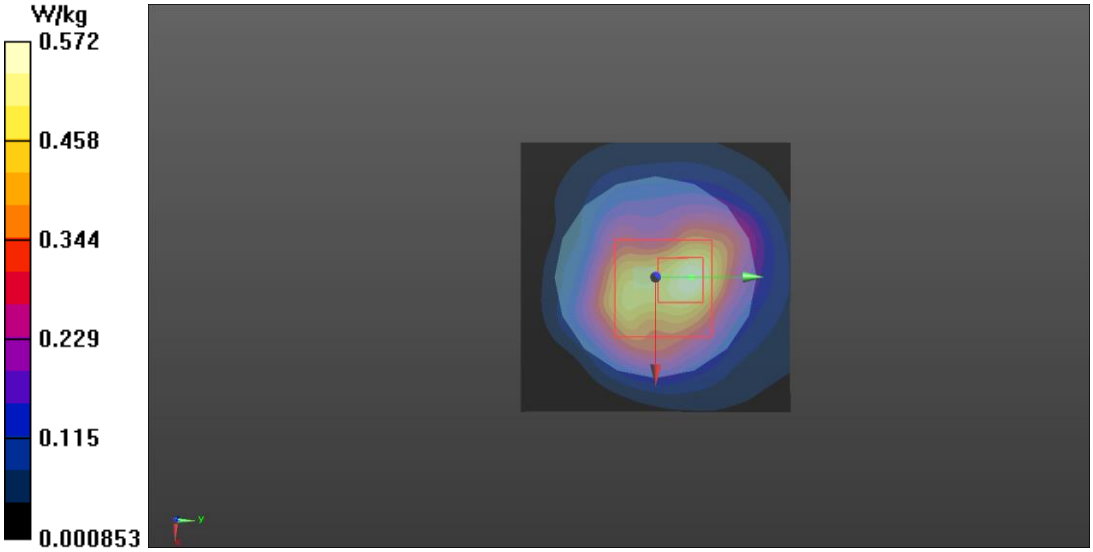
DUT: KALLOS

Communication System: UID 0, LTE M1 (0); Communication System Band: Band 13; Frequency: 782 MHz;
Communication System PAR: 5.22 dB;
Medium parameters used: f = 782 MHz; σ = 0.898 S/m; ε_r = 42.807; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(9.63, 9.05, 9.58) @ 782 MHz; Calibrated: 23.2.24
  - 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 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/Wrist LTE-M1 B13 CH 23230 QPSK / BW 10 MHz / RB 3 Offset 3 Back 0mm/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.572 W/kg
Configuration/Wrist LTE-M1 B13 CH 23230 QPSK / BW 10 MHz / RB 3 Offset 3 Back 0mm/Zoom Scan (8x8x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.71 V/m; Power Drift = -0.82 dB
Peak SAR (extrapolated) = 0.867 W/kg
SAR(1 g) = 0.299 W/kg; SAR(10 g) = 0.154 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 5 mm
Ratio of SAR at M2 to SAR at M1 = 30.2%
Maximum value of SAR (measured) = 0.607 W/kg



Plot 26

Date/Time: 12.4.24 09:35:13

Test Laboratory: Verkotan Oy

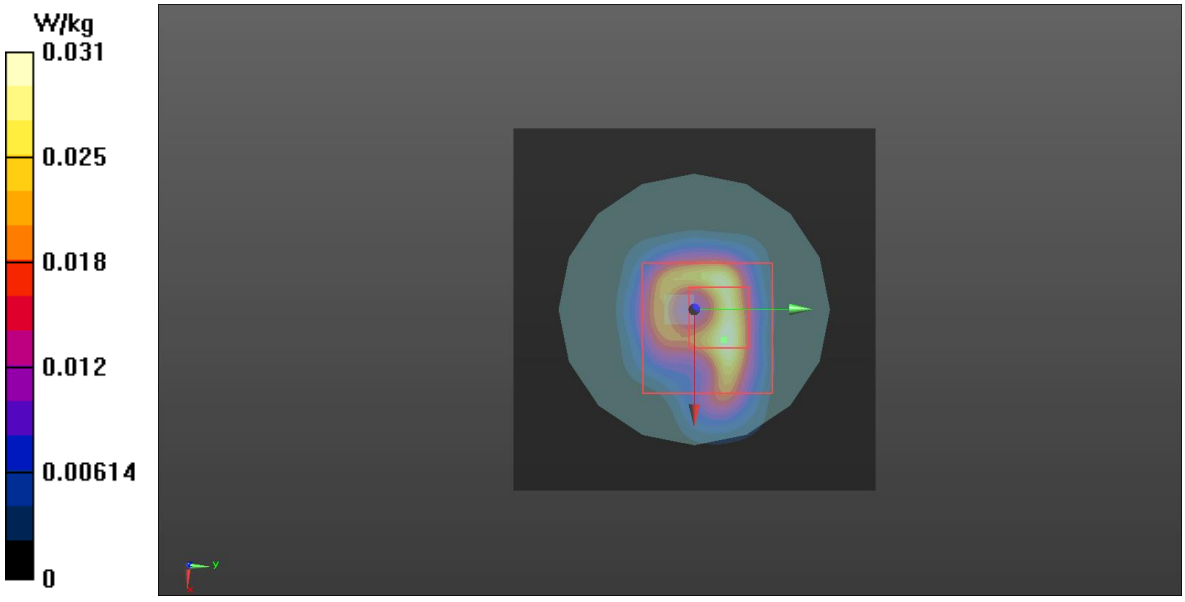
DUT: KALLOS

Communication System: UID 0, Bluetooth (0); Communication System Band: Bluetooth; Frequency: 2440 MHz;
Communication System PAR: 3.98 dB;
Medium parameters used: f = 2440 MHz; σ = 1.687 S/m; ε_r = 37.984; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.59, 7.49, 7.65) @ 2440 MHz; Calibrated: 23.2.24
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
  - Electronics: DAE4 Sn1332; Calibrated: 14.2.24
  - Phantom: SAR1_Phantom1_ELI_left; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/BLE CH17 0mm Back/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.0307 W/kg
Configuration/BLE CH17 0mm Back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 2.637 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 0.0450 W/kg
SAR(1 g) = 0.010 W/kg; SAR(10 g) = 0.00324 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below: Larger than measurement grid
Ratio of SAR at M2 to SAR at M1 = 63.2%
Maximum value of SAR (measured) = 0.0129 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 Oulu, Finland	Certificate No.	EX-7447_Feb24

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 23, 2024

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 NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	05-Oct-23 (OCP-DAK3.5-1249_Oct23)	Oct-24
OCP DAK-12	SN: 1016	05-Oct-23 (OCP-DAK12-1016_Oct23)	Oct-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe EX3DV4	SN: 7349	03-Nov-23 (No. EX3-7349_Nov23)	Nov-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	Aidonia Georgiadou	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: February 23, 2024

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

Certificate No: EX-7447_Feb24 Page 1 of 9

Parameters of Probe: EX3DV4 - SN:7447

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k = 2)
Norm (μV/(V/m)^2) [A]	0.42	0.42	0.43	±10.1%
DCP (mV) [B]	93.9	92.0	99.2	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] k = 2
0	CW	X	0.00	0.00	1.00	0.00	132.1	±2.0%	±4.7%
		Y	0.00	0.00	1.00		134.8		
		Z	0.00	0.00	1.00		127.6		

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.

Parameters of Probe: EX3DV4 - SN:7447

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	40.2°
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.

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	17.59	17.59	17.59	0.00	1.25	±13.3%
750	41.9	0.89	9.63	9.05	9.58	0.34	1.27	±11.0%
900	41.5	0.97	8.89	9.05	8.92	0.34	1.27	±11.0%
1750	40.1	1.37	8.35	8.14	8.40	0.25	1.27	±11.0%
1950	40.0	1.40	7.96	7.80	8.03	0.27	1.27	±11.0%
2150	39.7	1.53	7.80	7.68	7.86	0.29	1.27	±11.0%
2300	39.5	1.67	7.75	7.61	7.75	0.29	1.27	±11.0%
2450	39.2	1.80	7.59	7.49	7.65	0.29	1.27	±11.0%
2600	39.0	1.96	7.53	7.40	7.55	0.28	1.27	±11.0%
5250	35.9	4.71	5.27	5.32	5.36	0.35	1.62	±13.1%
5600	35.5	5.07	4.42	4.45	4.52	0.35	1.75	±13.1%
5750	35.4	5.22	4.62	4.68	4.75	0.34	1.83	±13.1%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–8 MHz, and ConvF assessed at 13 MHz is 9–18 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 SAR correction is applied.

[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.

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

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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, Oulu, Finland

Certificate No. EX-3892_Apr24

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3892

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: April 15, 2024

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 NRP2	SN: 104778	26-Mar-24 (No. 217-04036/04037)	Mar-25
Power sensor NRP-Z91	SN: 103244	26-Mar-24 (No. 217-04036)	Mar-25
OCP DAK-3.5 (weighted)	SN: 1249	05-Oct-23 (OCP-DAK3.5-1249_Oct23)	Oct-24
OCP DAK-12	SN: 1016	05-Oct-23 (OCP-DAK12-1016_Oct23)	Oct-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	26-Mar-24 (No. 217-04046)	Mar-25
DAE4	SN: 660	23-Feb-24 (No. DAE4-660_Feb24)	Feb-25
Reference Probe EX3DV4	SN: 7349	03-Nov-23 (No. EX3-7349_Nov23)	Nov-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	Sven Kühn	Technical Manager	

Issued: April 15, 2024

Parameters of Probe: EX3DV4 - SN:3892

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.47	0.39	0.49	±10.1%
DCP (mV) [B]	102.6	104.9	102.5	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	118.3	±1.9%	±4.7%
		Y	0.00	0.00	1.00		139.8		
		Z	0.00	0.00	1.00		123.5		

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

[A] The uncertainties of 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.

Parameters of Probe: EX3DV4 - SN:3892

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	34.0°
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.

Parameters of Probe: EX3DV4 - SN:3892

Calibration Parameter Determined in Head Tissue Simulating Media

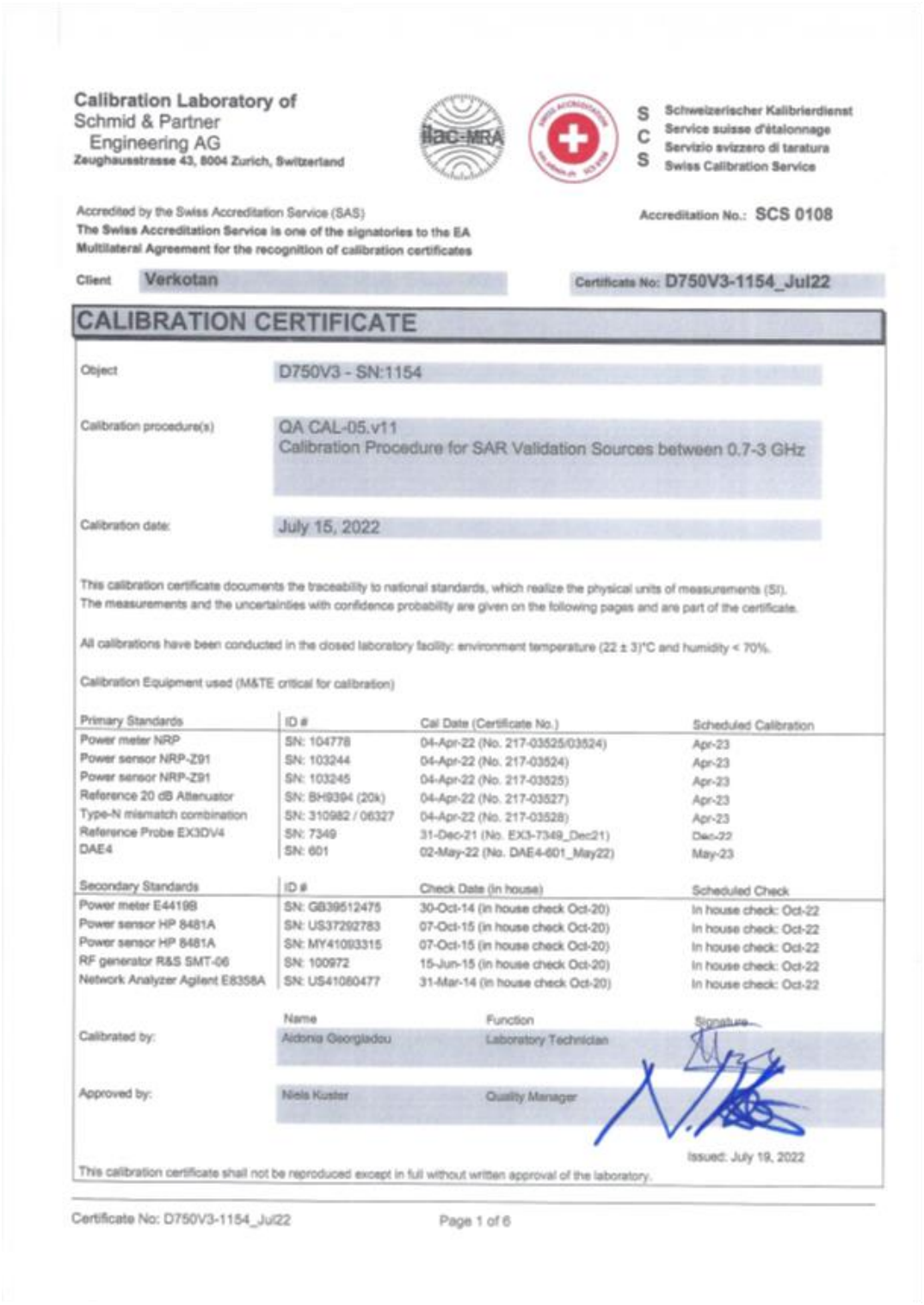
f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
300	45.3	0.87	11.28	11.28	11.28	0.09	1.00	±13.3%
450	43.5	0.87	10.66	10.66	10.66	0.16	1.30	±13.3%
600	42.7	0.88	10.14	10.14	10.14	0.10	1.25	±13.3%
750	41.9	0.89	9.10	9.76	9.42	0.38	1.27	±11.0%
900	41.5	0.97	9.05	9.23	9.06	0.37	1.27	±11.0%
1750	40.1	1.37	8.02	8.45	7.93	0.26	1.27	±11.0%
1950	40.0	1.40	7.72	8.09	7.63	0.29	1.27	±11.0%
2450	39.2	1.80	7.14	7.45	7.00	0.30	1.27	±11.0%
2600	39.0	1.96	6.97	7.29	6.83	0.29	1.27	±11.0%
4400	36.9	3.84	6.07	6.33	5.93	0.37	1.27	±13.1%
4800	36.4	4.25	5.75	6.00	5.64	0.37	1.27	±13.1%

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

[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



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Zeughausstrasse 43, 8004 Zurich, Switzerland

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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 0108

Client: Verkotan

Certificate No: D750V3-1154_Jul22

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1154

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 ± 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: 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: 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

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

Issued: July 19, 2022

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

Certificate No: D750V3-1154_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	750 MHz ± 1 MHz	

Head TSL parameters

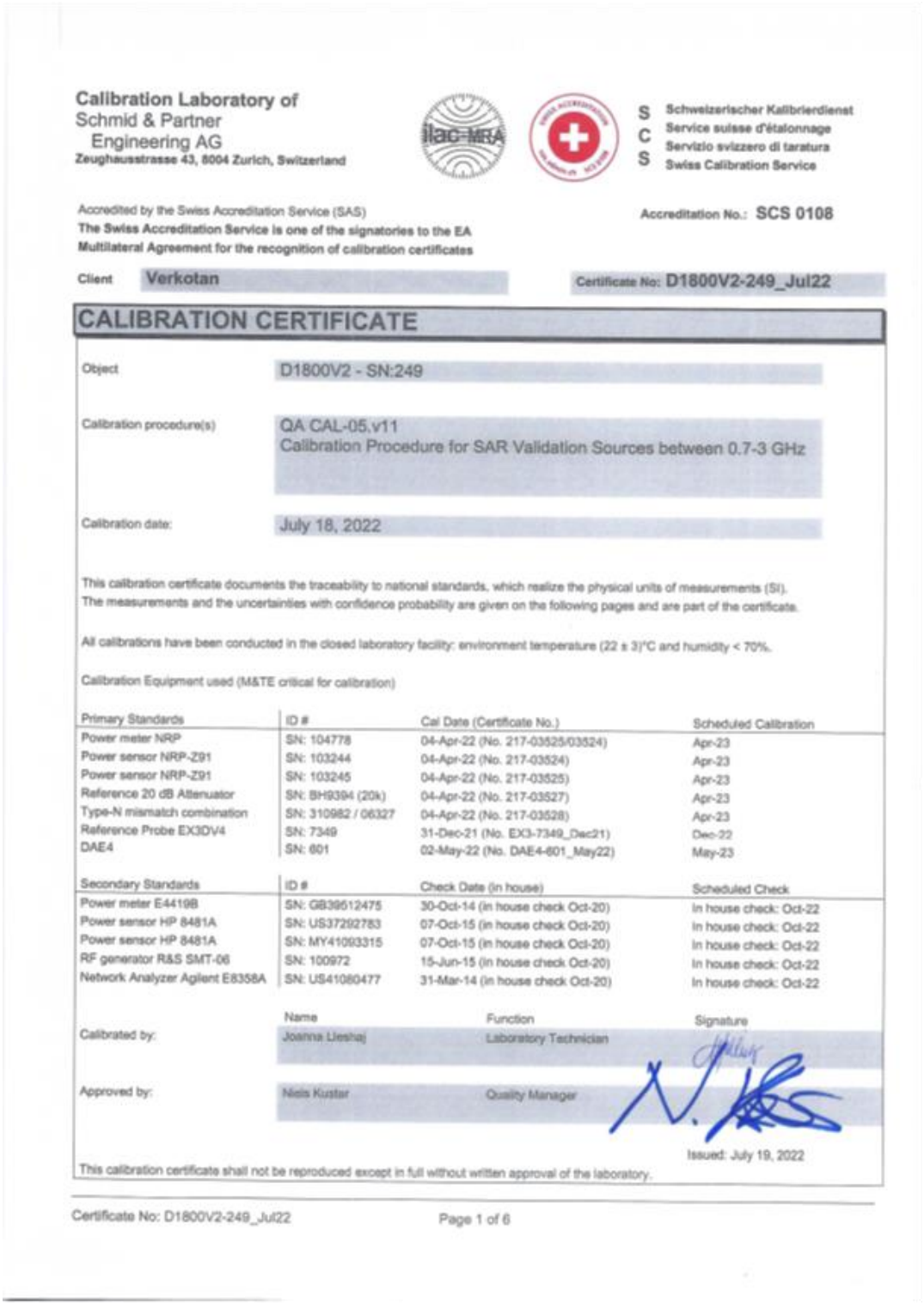
The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.5 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.54 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.57 W/kg ± 16.5 % (k=2)**



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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: 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: 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

	Name	Function	Signature
Calibrated by:	Joanna Lleshaj	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.9 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (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 ± 16.5 % (k=2)**

SAR Reference Dipole Calibration Report

Ref : ACR.68.5.23.BES.A

VERKOTAN OY
ELEKTRONIIKKATIE 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

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.

mvg

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

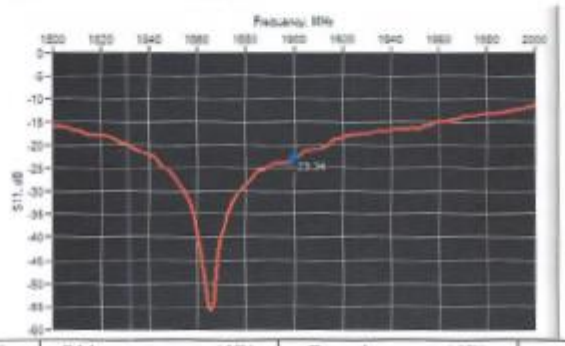
6 CALIBRATION RESULTS

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

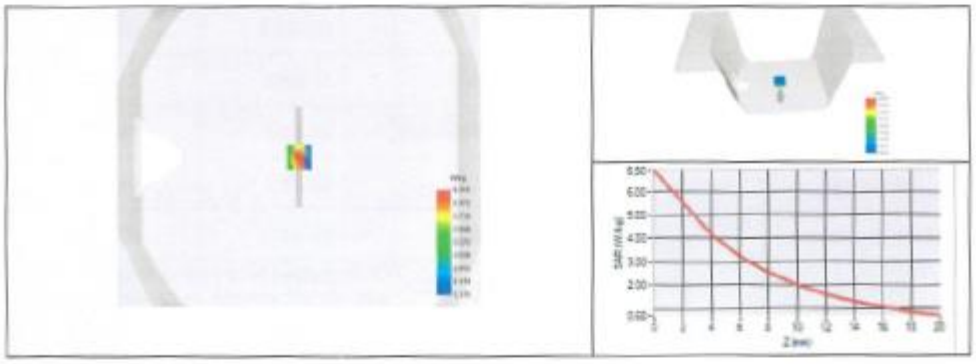
The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.5.23.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 40.4 sigma : 1.40
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	1900 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
1900 MHz	3.80	38.02	39.70	1.94	19.41	20.50



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Accredited by the Swiss Accreditation Service (SAS)
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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 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
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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: 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

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

Issued: July 19, 2022

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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 ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.4 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.21 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.5 W/kg ± 16.5 % (k=2)**

