SAR Compliance Test Report

Date of Report	14/04/2021	**Client's Contact person:**	Christophe Merlaud
Number of pages:	76	**Responsible Test engineer:**	Kirsi Kyllönen
Testing laboratory:	**Verkotan Oy** Elektroniikkatie 17 90590 Oulu Finland	**Client:**	**THALES DIS AIS Deutschland GmbH** Siemensdamm 50 13629 Berlin Germany
Tested device	DGL61-W		
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** **RSS-102** Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands) **IEEE 1528 - 2013** IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Technique		
Documentation:	The 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:

For the contents:

14.04.2021

Miia Nurkkala

Digitaalinen allekirjoittaja: Miia Nurkkala
Päiväys: 2021.04.14 14:33:04 +03'00'

Laboratory Manager

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Device under Test (DUT):

Product:	Device Gateway LTE
Manufacturer:	THALES DIS AIS Deutschland GmbH
IMEI Number:	358244086404839
FCC ID Number:	QIPPLS62-W
IC ID Number:	7830A-PLS62W
Model:	DGL61-W
DUT Number:	22257, 22183
Battery Type used in testing:	External power UBS source
Portable/ Mobile device	Portable
State of the Sample	Production sample

Testing information:

Testing Performed:	13.11.-18.12.2020, 21.1.2021
Notes:	This report replaces the report FCC SAR Report DGL61-W ID4191 01022021.docx. LTE2 maximum output power updated.
Document ID:	FCC SAR Report DGL61-W ID4191 14042021.docx
Temperature °C	22±2 / Controlled
Humidity RH%	20±20 / Controlled
Measurement performed by:	Kirsi Kyllönen

1.2 Maximum Results

The maximum reported* SAR values for Body-worn 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 Health Canada's RF exposure guideline, Safety Code 6 and in FCC 47 CFR part 2 (2.1093) is SAR1g 1.6 W/kg.

System	Highest Reported* SAR_{1g}(W/kg) in Body-Worn Condition, 10mm separation distance	Result
GPRS 850	1.24	PASS
GPRS 1900	0.99	PASS
WCDMA 2	1.57	PASS
WCDMA 4	1.59	PASS
WCDMA 5	1.05	PASS
LTE 2	1.56	PASS
LTE 4	1.57	PASS
LTE 5	0.68	PASS
LTE 7	1.26	PASS
LTE 12	1.19	PASS

* Reported SAR Values are scaled to maximum theoretical output power.

1.2.1 Maximum Drift

Maximum Drift During Measurements	-0.64 dB*

*Drifts >5% have been considered in the scaling factor

1.2.2 Measurement Uncertainty

Expanded Uncertainty (k=2) 95 %	±23.4%

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a DGL61-W Device Gateway which offers for IoT applications the 2G, 3G and 4G connectivity. The LTE Device Gateway is connected via USB to industrial assets like vending, kiosks, ATMs and eHealth applications.

Device Category	Portable
Exposure Environment	Uncontrolled

2.1 Supported Frequency Bands and Operational Modes

	Modes of Operation	**Transmitter Frequency Range (MHz)**
TX Frequency bands	GSM/GPRS/EDGE 850	824 – 849
	GSM/GPRS/EDGE 1900	1850 – 1910
	WCDMA 2	1850-1910
	WCDMA 4	1710-1755
	WCDMA 5	824-849
	LTE 2	1850-1910
	LTE 4	1710-1755
	LTE 5	824-849
	LTE 7	2500-2570
	LTE 12	699-716

3. OUTPUT POWER

3.1.1 Maximum Output Power

From a Customer, maximum defined output power, including tune-up tolerance;

	Max Output Power [dBm]
GPRS 850 1-slots	35
GPRS 850 4-slots	29
GPRS 1900 1-slots	32
GPRS 1900 4-slots	26
EDGE 850 1-slots	30
EDGE 1900 1-slots	29
WCDMA 2	24.4
WCDMA 4	23.9
WCDMA 5	25
LTE 2	23.4
LTE 4	24
LTE 5	24
LTE 7	24.1
LTE 12	24

3.2 Tested conducted power

Measured conducted output power:

Slot Configuration Info	GSM 850 CH 128 824.2 MHz	GSM 850 CH 189 836.6 MHz	GSM 850 CH 251 848.8 MHz	GSM 1900 CH 512 1850.2 MHz	GSM 1900 CH 661 1880.0 MHz	GSM 1900 CH 810 1909.8 MHz
GPRS (GMSK, 1Tx-slot)	32.91	33.16	33.36	30.19	30.11	30.15
GPRS (GMSK, 2Tx-slot)	30.79	30.86	31.07	27.62	27.6	27.76
GPRS (GMSK, 3Tx-slot)	29.02	29.08	29.32	25.77	25.76	25.99
GPRS (GMSK, 4Tx-slot)	27.89	27.93	28.09	24.64	24.6	24.81
EDGE (8PSK, 1Tx-slot)	27.33	27.25	27.23	26.13	26.15	26.01
EDGE (8PSK, 2Tx-slot)	24.9	24.82	24.78	23.75	23.71	23.56
EDGE (8PSK, 3Tx-slot)	23.07	23.01	22.92	21.82	21.79	21.76
EDGE (8PSK, 4Tx-slot)	21.87	21.84	21.76	20.62	20.61	20.52

Time averaged power:

Slot Configuration	GSM850 CH 128 824.2 MHz	GSM 850 CH 190 836.6 MHz	GSM 850 CH 251 848.8MHz	GSM 1900 CH 512 1850.2 MHz	GSM 1900 CH 661 1880.0 MHz	GSM 1900 CH 810 1909.8 MHz
GPRS (GMSK, 1Tx-slot)	23.91	24.16	24.36	21.19	21.11	21.15
GPRS (GMSK, 2Tx-slot)	24.79	24.86	25.07	21.62	21.6	21.76
GPRS (GMSK, 3Tx-slot)	24.76	24.82	25.06	21.51	21.5	21.73
GPRS (GMSK, 4Tx-slot)	**24.89**	**24.93**	**25.09**	**21.64**	**21.6**	**21.81**
EDGE (8PSK, 1Tx-slot)	18.33	18.25	18.23	17.13	17.15	17.01
EDGE (8PSK, 2Tx-slot)	18.9	18.82	18.78	17.75	17.71	17.56
EDGE (8PSK, 3Tx-slot)	18.81	18.75	18.66	17.56	17.53	17.5
EDGE (8PSK, 4Tx-slot)	18.87	18.84	18.76	17.62	17.61	17.52

Mode Reference Channel	WCDMA Band V			WCDMA Band IV			WCDMA Band II		
	CH 4132 826.4 MHz	CH 4182 836.4 MHz	CH 4233 846.6 MHz	CH 1312 1712.4 MHz	CH 1413 1732.6 MHz	CH 1513 1752.6 MHz	CH 9262 1852.4 MHz	CH 9400 1880.0 MHz	CH 9538 1907.6 MHz
RMC 12.2K	**24.05**	**24.05**	**23.85**	**23.96**	**24.01**	**23.81**	**23.71**	**23.69**	**23.83**
HSDPA Subtest-1	24.07	24.09	23.88	23.99	24.04	23.78	23.75	23.65	23.86
HSDPA Subtest-2	23.04	23.02	22.81	22.99	23.04	22.84	22.79	22.7	22.87
HSDPA Subtest-3	22.56	22.55	22.35	22.53	22.56	22.3	22.27	22.21	22.41
HSDPA Subtest-4	22.35	22.28	22.05	22.23	22.29	22.09	22.04	21.94	22.11
HSUPA Subtest-1	23.57	23.56	23.36	23.52	23.51	23.31	23.25	23.19	23.34
HSUPA Subtest-2	24.04	24.04	23.83	24.02	24.07	23.79	23.74	23.68	23.88
HSUPA Subtest-3	22.55	22.58	22.34	22.5	22.54	22.34	22.25	22.18	22.41
HSUPA Subtest-4	24.1	24.06	23.83	23.94	24.0	23.71	23.67	23.63	23.77
HSUPA Subtest-5	23.04	23.04	22.81	22.93	22.96	22.77	22.7	22.63	22.84

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18607 1850.7 MHz	CH 18900 1880.0 MHz	CH 19193 1909.3 MHz	3GPP MPR [dB]	CH 18607 1850.7 MHz	CH 18900 1880.0 MHz	CH 19193 1909.3 MHz	3GPP MPR [dB]
2 / 1.4M	1	0	22.47	22.66	22.37	0	21.85	22.02	21.69	1
	1	2	22.45	22.63	22.36	0	21.83	21.98	21.77	1
	1	5	22.46	22.65	22.38	0	21.81	21.97	21.77	1
	3	0	22.52	22.7	22.41	0	21.71	21.91	21.69	1
	3	1	22.5	22.68	22.39	0	21.75	21.89	21.64	1
	3	3	22.5	22.69	22.42	0	21.73	21.87	21.63	1
	6	0	21.63	21.81	21.58	1	20.81	21.0	20.7	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18615 1851.5 MHz	CH 18900 1880.0 MHz	CH 19185 1918.5 MHz	3GPP MPR [dB]	CH 18615 1851.5 MHz	CH 18900 1880.0 MHz	CH 19185 1918.5 MHz	3GPP MPR [dB]
2 / 3M	1	0	22.46	22.65	22.43	0	21.8	21.95	21.76	1
	1	7	22.42	22.62	22.36	0	21.7	21.83	21.77	1
	1	14	22.38	22.58	22.31	0	21.66	21.79	21.7	1
	8	0	21.67	21.84	21.63	1	20.81	21.0	20.79	2
	8	3	21.64	21.83	21.6	1	20.81	20.98	20.76	2
	8	7	21.59	21.77	21.56	1	20.79	20.93	20.73	2
	15	0	21.62	21.79	21.55	1	20.76	20.95	20.68	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18625 1852.5 MHz	CH 18900 1880.0 MHz	CH 19175 1907.5 MHz	3GPP MPR [dB]	CH 18625 1852.5 MHz	CH 18900 1880.0 MHz	CH 19175 1907.5 MHz	3GPP MPR [dB]
2 / 5M	1	0	22.53	22.66	22.51	0	21.89	21.92	21.82	1
	1	12	22.41	22.62	22.4	0	21.78	21.94	21.74	1
	1	24	22.4	22.54	22.29	0	21.74	21.86	21.62	1
	12	0	21.71	21.87	21.7	1	20.86	21.02	20.84	2
	12	6	21.64	21.81	21.62	1	20.8	20.97	20.77	2
	12	13	21.62	21.77	21.59	1	20.82	20.95	20.73	2
	25	0	21.63	21.79	21.6	1	20.8	20.98	20.79	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18650 1855 MHz	CH 18900 1880.0	CH 19150 1905 MHz	3GPP MPR [dB]	CH 18650 1855 MHz	CH 18900 1880.0 MHz	CH 19150 1905 MHz	3GPP MPR [dB]
2 / 10M	1	0	22.68	22.9	22.74	0	22.1	22.2	22.09	1
	1	24	22.48	22.64	22.46	0	21.85	21.97	21.83	1
	1	49	22.41	22.59	22.28	0	21.82	21.93	21.7	1
	25	0	21.77	21.96	21.79	1	20.99	21.14	21.0	2
	25	12	21.67	21.83	21.66	1	20.84	21.02	20.85	2
	25	25	21.64	21.77	21.57	1	20.83	20.92	20.75	2
	50	0	21.72	21.87	21.69	1	20.9	21.03	20.88	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18675 1857.5 MHz	CH 18900 1880.0	CH 19125 1902.5 MHz	3GPP MPR [dB]	CH 18675 1857.5 MHz	CH 18900 1880.0 MHz	CH 19125 1902.5 MHz	3GPP MPR [dB]
2 / 15M	1	0	22.92	23.08	23.07	0	22.26	22.36	22.59	1
	1	37	22.58	22.7	22.57	0	21.81	21.98	21.91	1
	1	74	22.52	22.57	22.4	0	21.85	21.86	21.96	1
	36	0	21.94	22.03	21.99	1	21.14	21.26	21.33	2
	36	19	21.74	21.85	21.75	1	20.95	21.07	21.02	2
	36	39	21.72	21.77	21.65	1	20.93	20.99	21.0	2
	75	0	21.79	21.91	21.82	1	21.03	21.11	21.11	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 18700 1860.0 MHz	CH 18900 1880.0	CH 19100 1900.0 MHz	3GPP MPR [dB]	CH 18700 1860.0 MHz	CH 18900 1880.0	CH 19100 1900.0 MHz	3GPP MPR [dB]
2 / 20M	1	0	22.89	**23.08**	23.08	0	22.18	22.38	22.36	1
	1	50	22.46	22.6	22.52	0	21.73	21.86	21.77	1
	1	99	22.34	22.39	22.16	0	21.61	21.64	21.45	1
	50	0	21.94	**22.07**	22.05	1	21.14	21.3	21.25	2
	50	25	21.68	21.81	21.72	1	20.92	21.03	20.94	2
	50	50	21.67	21.75	21.64	1	20.87	20.96	20.85	2
	100	0	21.82	21.94	21.82	1	21.03	21.14	21.06	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 19957 1710.7 MHz	CH 20175 1732.5 MHz	CH 20393 1754.3 MHz	3GPP MPR [dB]	CH 19957 1710.7 MHz	CH 20175 1732.5 MHz	CH 20393 1754.3 MHz	3GPP MPR [dB]
4 / 1.4M	1	0	23.19	23.02	23.04	0	22.54	22.49	22.42	1
	1	2	23.14	22.96	23.0	0	22.65	22.44	22.43	1
	1	5	23.17	22.96	23.01	0	22.52	22.4	22.45	1
	3	0	23.19	23.0	23.06	0	22.52	22.35	22.33	1
	3	1	23.18	22.99	23.03	0	22.53	22.34	22.36	1
	3	3	23.17	22.98	23.03	0	22.47	22.31	22.34	1
	6	0	22.47	22.27	22.29	1	21.47	21.3	21.33	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 19965 1711.5 MHz	CH 20175 1732.5 MHz	CH 20385 1753.5 MHz	3GPP MPR [dB]	CH 19965 1711.5 MHz	CH 20175 1732.5 MHz	CH 20385 1753.5 MHz	3GPP MPR [dB]
4 / 3M	1	0	23.12	22.97	23.01	0	22.56	22.5	22.46	1
	1	7	23.08	22.93	22.97	0	22.49	22.44	22.39	1
	1	14	23.03	22.89	22.94	0	22.52	22.37	22.4	1
	8	0	22.44	22.34	22.33	1	21.54	21.35	21.34	2
	8	3	22.41	22.29	22.32	1	21.5	21.32	21.34	2
	8	7	22.38	22.25	22.29	1	21.49	21.27	21.32	2
	15	0	22.38	22.24	22.3	1	21.46	21.27	21.29	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 19975 1711.5 MHz	CH 20175 1732.5 MHz	CH 20375 1753.5 MHz	3GPP MPR [dB]	CH 19975 1711.5 MHz	CH 20175 1732.5 MHz	CH 20375 1753.5 MHz	3GPP MPR [dB]
4 / 5M	1	0	23.17	23.03	23.02	0	22.64	22.51	22.45	1
	1	12	23.08	22.94	22.94	0	22.59	22.39	22.44	1
	1	24	23.01	22.82	22.87	0	22.5	22.32	22.33	1
	12	0	22.48	22.35	22.34	1	21.52	21.37	21.37	2
	12	6	22.43	22.26	22.27	1	21.46	21.28	21.3	2
	12	13	22.39	22.23	22.25	1	21.41	21.24	21.29	2
	25	0	22.41	22.25	22.26	1	21.48	21.32	21.3	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20000 1715.0 MHz	CH 20175 1732.5 MHz	CH 20350 1750.0 MHz	3GPP MPR [dB]	CH 20000 1715.0 MHz	CH 20175 1732.5 MHz	CH 20350 1750.0 MHz	3GPP MPR [dB]
4 / 10M	1	0	23.33	23.22	23.21	0	22.76	22.8	22.67	1
	1	24	23.06	22.92	22.96	0	22.52	22.41	22.37	1
	1	49	22.99	22.78	22.91	0	22.39	22.28	22.38	1
	25	0	22.53	22.4	22.39	1	21.59	21.46	21.42	2
	25	12	22.41	22.26	22.26	1	21.45	21.33	21.29	2
	25	25	22.34	22.18	22.25	1	21.4	21.21	21.27	2
	50	0	22.44	22.29	22.3	1	21.48	21.35	21.33	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20025 1717.0 MHz	CH 20175 1732.5 MHz	CH 20325 1747.5 MHz	3GPP MPR [dB]	CH 20025 1717.0 MHz	CH 20175 1732.5 MHz	CH 20325 1747.5 MHz	3GPP MPR [dB]
4 / 15M	1	0	23.57	23.41	23.27	0	22.96	22.92	22.81	1
	1	37	23.12	22.96	22.95	0	22.58	22.41	22.42	1
	1	74	23.0	22.76	22.83	0	22.35	22.26	22.23	1
	36	0	22.71	22.54	22.49	1	21.66	21.57	21.47	2
	36	19	22.46	22.31	22.3	1	21.42	21.35	21.3	2
	36	39	22.4	22.2	22.23	1	21.36	21.28	21.23	2
	75	0	22.57	22.38	22.35	1	21.52	21.44	21.36	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20050 1720.0 MHz	CH 20175 1732.5 MHz	CH 20300 1745.0 MHz	3GPP MPR [dB]	CH 20050 1720.0 MHz	CH 20175 1732.5 MHz	CH 20300 1745.0 MHz	3GPP MPR [dB]
4 / 20M	1	0	**23.41**	23.35	23.16	0	22.93	22.78	22.66	1
	1	50	22.96	22.81	22.76	0	22.38	22.19	22.15	1
	1	99	22.57	22.49	22.46	0	22.06	21.91	21.96	1
	50	0	**22.64**	22.52	22.4	1	21.67	21.55	21.46	2
	50	25	22.31	22.19	22.11	1	21.36	21.21	21.15	2
	50	50	22.21	22.11	22.05	1	21.25	21.11	21.08	2
	100	0	22.44	22.33	22.26	1	21.47	21.34	21.28	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20407 824.7 MHz	CH 20525 836.5 MHz	CH 20643 848.3 MHz	3GPP MPR [dB]	CH 20407 824.7 MHz	CH 20525 836.5 MHz	CH 20643 848.3 MHz	3GPP MPR [dB]
5 / 1.4M	1	0	23.22	22.92	22.93	0	22.27	22.19	22.14	1
	1	2	23.12	22.91	22.92	0	22.25	22.17	22.09	1
	1	5	23.16	22.96	22.96	0	22.17	22.01	22.19	1
	3	0	23.13	22.93	22.92	0	22.21	22.0	22.04	1
	3	1	23.11	22.93	22.94	0	22.24	22.05	22.08	1
	3	3	23.11	22.95	22.95	0	22.25	22.01	22.05	1
	6	0	22.14	22.02	22.04	1	21.17	20.97	20.99	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20415 825.5 MHz	CH 20525 836.5 MHz	CH 20635 847.5 MHz	3GPP MPR [dB]	CH 20415 825.5 MHz	CH 20525 836.5 MHz	CH 20635 847.5 MHz	3GPP MPR [dB]
5 / 3M	1	0	23.09	22.88	22.87	0	22.13	22.04	22.08	1
	1	7	23.04	22.87	22.78	0	22.09	22.13	22.16	1
	1	14	22.97	22.84	22.5	0	22.07	22.04	22.08	1
	8	0	22.1	21.93	21.96	1	21.08	20.92	20.97	2
	8	3	22.08	21.89	21.97	1	21.07	20.95	21.04	2
	8	7	22.03	21.93	21.93	1	21.07	20.93	20.98	2
	15	0	22.08	21.89	21.94	1	21.0	20.88	20.93	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20425 826.5 MHz	CH 20525 836.5 MHz	CH 20625 846.5 MHz	3GPP MPR [dB]	CH 20425 826.5 MHz	CH 20525 836.5 MHz	CH 20625 846.5 MHz	3GPP MPR [dB]
5 / 5M	1	0	22.73	22.51	22.63	0	22.17	21.89	22.06	1
	1	12	22.71	22.56	22.65	0	22.14	22.02	22.09	1
	1	24	22.61	22.52	22.5	0	22.07	21.88	21.97	1
	12	0	22.07	21.9	22.02	1	21.12	20.91	20.99	2
	12	6	22.02	21.86	21.99	1	21.02	20.92	20.96	2
	12	13	21.98	21.87	21.95	1	20.99	20.92	20.92	2
	25	0	22.02	21.87	21.95	1	21.04	20.9	20.95	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20450 829.0 MHz	CH 20525 836.5 MHz	CH 20600 844 MHz	3GPP MPR [dB]	CH 20450 829.0 MHz	CH 20525 836.5 MHz	CH 20600 844 MHz	3GPP MPR [dB]
5 / 10M	1	0	**22.74**	22.53	22.54	0	22.2	22.06	22.03	1
	1	24	22.61	22.51	22.62	0	22.1	22.01	22.06	1
	1	49	22.43	22.47	22.42	0	22.01	21.9	22.03	1
	25	0	**21.97**	21.82	21.88	1	21.04	20.9	20.95	2
	25	12	21.88	21.8	21.86	1	20.98	20.89	20.93	2
	25	25	21.82	21.78	21.84	1	20.89	20.86	20.91	2
	50	0	21.89	21.84	21.89	1	20.98	20.87	20.98	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20775 2502.5 MHz	CH 21100 2535.0 MHz	CH 21425 2567.5 MHz	3GPP MPR [dB]	CH 20775 2502.5 MHz	CH 21100 2535.0 MHz	CH 21425 2567.5 MHz	3GPP MPR [dB]
7 / 5M	1	0	23.44	23.63	23.55	0	22.77	22.96	22.91	1
	1	12	23.36	23.57	23.51	0	22.69	22.89	22.82	1
	1	24	23.29	23.53	23.41	0	22.54	22.79	22.71	1
	12	0	22.57	22.78	22.72	1	21.62	21.79	21.74	2
	12	6	22.51	22.69	22.65	1	21.56	21.77	21.7	2
	12	13	22.47	22.7	22.65	1	21.54	21.76	21.66	2
	25	0	22.5	22.72	22.63	1	21.57	21.78	21.67	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20800 2505.0 MHz	CH 21100 2535.0 MHz	CH 21400 2565.0 MHz	3GPP MPR [dB]	CH 20800 2505.0 MHz	CH 21100 2535.0 MHz	CH 21400 2565.0 MHz	3GPP MPR [dB]
7 / 10M	1	0	23.64	23.89	23.79	0	23.09	23.21	23.03	1
	1	24	23.44	23.63	23.53	0	22.79	23.0	22.82	1
	1	49	23.34	23.6	23.5	0	22.72	22.97	22.79	1
	25	0	22.62	22.82	22.77	1	21.75	21.89	21.8	2
	25	12	22.44	22.68	22.6	1	21.56	21.75	21.65	2
	25	25	22.44	22.71	22.6	1	21.51	21.76	21.64	2
	50	0	22.53	22.75	22.68	1	21.61	21.82	21.71	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20825 2507.5 MHz	CH 21100 2535.0 MHz	CH 21375 2562.5 MHz	3GPP MPR [dB]	CH 20825 2507.5 MHz	CH 21100 2535.0 MHz	CH 21375 2562.5 MHz	3GPP MPR [dB]
7 / 15M	1	0	23.87	24.05	24.04	0	23.31	23.38	23.28	1
	1	37	23.26	23.48	23.41	0	22.63	22.82	22.71	1
	1	74	23.37	23.66	23.54	0	22.68	22.95	22.81	1
	36	0	22.76	22.95	22.91	1	21.83	21.97	21.9	2
	36	19	22.51	22.71	22.65	1	21.58	21.77	21.62	2
	36	39	22.49	22.75	22.65	1	21.54	21.78	21.65	2
	75	0	22.61	22.85	22.79	1	21.66	21.84	21.75	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 20850 2510.0 MHz	CH 21100 2535.0 MHz	CH 21350 2560.0 MHz	3GPP MPR [dB]	CH 20850 2510.0 MHz	CH 21100 2535.0 MHz	CH 21350 2560.0 MHz	3GPP MPR [dB]
7 / 20M	1	0	**23.79**	**23.93**	**24.01**	0	23.21	23.19	23.36	1
	1	50	23.13	23.36	23.24	0	22.45	22.64	22.57	1
	1	99	23.03	23.41	23.31	0	22.38	22.62	22.69	1
	50	0	**22.72**	**22.93**	**22.93**	1	21.81	21.92	21.98	2
	50	25	22.41	22.62	22.55	1	21.48	21.62	21.61	2
	50	50	22.38	22.67	22.58	1	21.46	21.64	21.62	2
	100	0	22.58	22.82	22.79	1	21.63	21.82	21.81	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 23017 699.7 MHz	CH 23095 707.5 MHz	CH 23173 715.3 MHz	3GPP MPR [dB]	CH 23017 699.7 MHz	CH 23095 707.5 MHz	CH 23173 715.3 MHz	3GPP MPR [dB]
12 / 1.4M	1	0	23.17	23.15	22.61	0	22.28	22.2	22.09	1
	1	2	23.17	23.11	22.62	0	22.32	22.14	22.09	1
	1	5	23.2	23.12	22.58	0	22.3	22.15	21.99	1
	3	0	23.22	23.15	22.62	0	22.14	22.11	21.93	1
	3	1	23.21	23.1	22.58	0	22.24	22.13	21.95	1
	3	3	23.2	23.08	22.61	0	22.19	22.1	22.04	1
	6	0	22.21	22.07	21.91	1	21.2	21.1	20.98	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 23025 700.5 MHz	CH 23095 707.5 MHz	CH 23165 714.5 MHz	3GPP MPR [dB]	CH 23025 700.5 MHz	CH 23095 707.5 MHz	CH 23165 714.5 MHz	3GPP MPR [dB]
12 / 3M	1	0	22.84	22.77	22.59	0	22.23	22.19	22.0	1
	1	7	22.85	22.73	22.62	0	22.35	22.15	22.05	1
	1	14	22.83	22.67	22.53	0	22.19	22.1	21.99	1
	8	0	22.14	22.04	21.95	1	21.25	21.12	21.05	2
	8	3	22.16	22.05	21.93	1	21.22	21.11	21.02	2
	8	7	22.11	22.01	21.91	1	21.19	21.07	21.0	2
	15	0	22.13	22.01	21.93	1	21.17	21.1	20.92	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 23035 701.5 MHz	CH 23095 707.5 MHz	CH 23155 713.5 MHz	3GPP MPR [dB]	CH 23035 701.5 MHz	CH 23095 707.5 MHz	CH 23155 713.5 MHz	3GPP MPR [dB]
12 / 5M	1	0	22.78	22.8	22.58	0	22.22	22.14	22.04	1
	1	12	22.83	22.75	22.64	0	22.31	22.14	22.16	1
	1	24	22.79	22.66	22.52	0	22.13	22.05	22.05	1
	12	0	22.14	22.1	21.95	1	21.21	21.14	21.02	2
	12	6	22.13	22.05	21.91	1	21.24	21.11	21.05	2
	12	13	22.1	22.04	21.89	1	21.2	21.07	21.07	2
	25	0	22.08	22.02	21.9	1	21.21	21.12	21.01	2

LTE Band / BW	RB Size RBs	RB Offset RB Start	QPSK				16QAM			
			CH 23060 704.0 MHz	CH 23095 707.5 MHz	CH 23130 711.0 MHz	3GPP MPR [dB]	CH 23060 704.0 MHz	CH 23095 707.5 MHz	CH 23130 711.0 MHz	3GPP MPR [dB]
12 / 10M	1	0	22.75	22.73	22.66	0	22.19	22.2	22.1	1
	1	24	**22.86**	22.72	22.63	0	22.21	22.18	22.11	1
	1	49	22.61	22.51	22.47	0	22.02	22.02	21.89	1
	25	0	22.1	21.99	21.98	1	21.18	21.09	21.06	2
	25	12	**22.11**	22.01	21.95	1	21.15	21.04	21.07	2
	25	25	22.04	21.93	21.88	1	21.07	21.01	20.92	2
	50	0	22.06	22.01	21.96	1	21.13	21.05	21.04	2

4. TEST EQUIPMENT

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

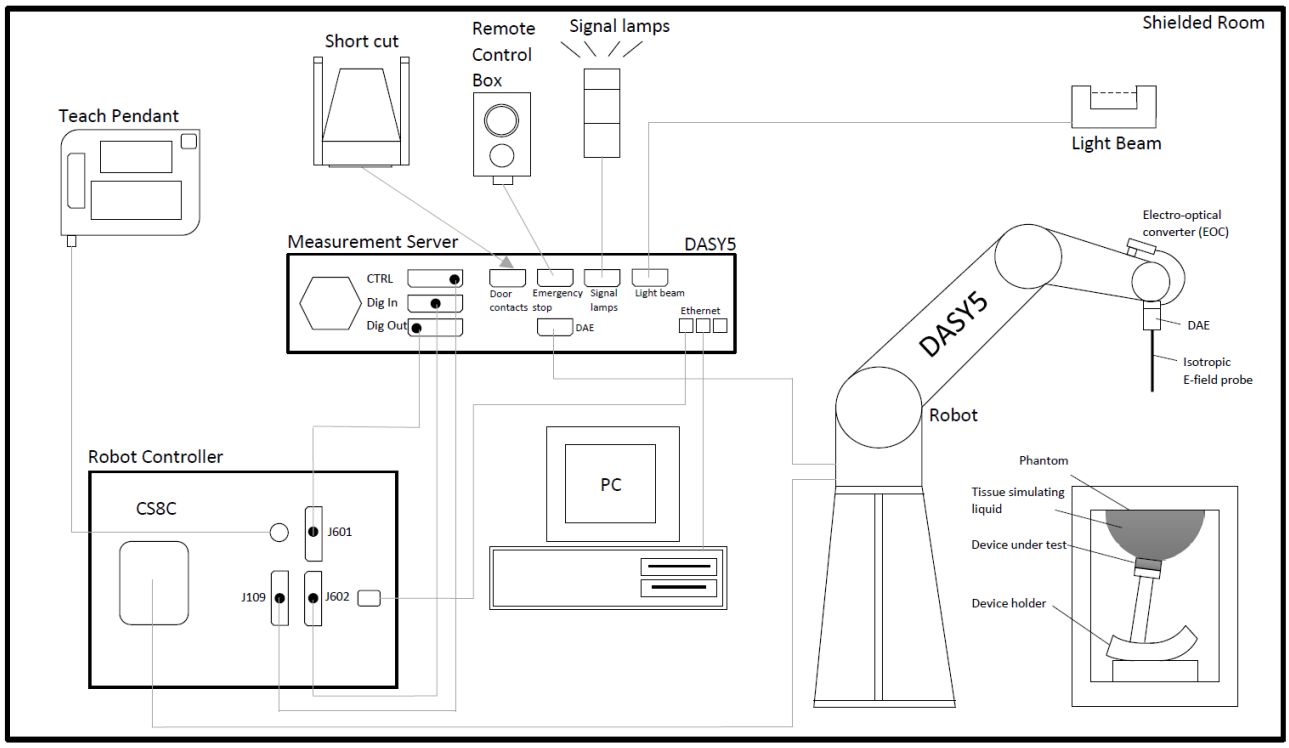


Figure 1 Schematic Laboratory Picture

4.1 Test Equipment List

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

Test Equipment	Model	Serial Number	Calibration Date
DAE	DAE4	756	03.2020
Probe	EX3DV4	3892	04.2020
Probe	EX3DV4	7447	03.2020
Dipole	D750V3	454	12.2018
Dipole	D835V2	448	03.2020
Dipole	D1800V2	249	03.2020
Dipole	D1800V2	2d075	12.2020
Dipole	D1900V2	511	03.2020

Dipole	D2600V2	474	12.2018
DASY5 Software	52.8.8.1258	-	NA
Signal Generator	R&S SMIQ06B	8349681023	NA
Amplifier	AR 10S1G4A	320421	NA
Radio Communication Tester	Anritsu MT8820C	6200951734	21.11.2019
Power Reflection Meter	NRT	835065/049	02.2020
Directional Power Sensor	NRT-Z44	835374/021	02.2020

Dipole calibration period supporting data:

		Measured on 09/2020			Calibrated		
Dipole and serial number	**Frequency (MHz)**	**Return loss (dB)**	**Impedance (Ω)**		**Return loss (dB)**	**Impedance (Ω)**	
DIP 0G750-454 42/17	750	-22.8	52.9	-6.9	-27.8	52.5	-3.3
51/18 DIP 2G600-474	2600	-23.4	43.7	-0.2	-27.62	48.5	3.9

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 Tip diameter: 2.5 mm Distance from probe tip to dipole centers: 1.0 mm
Application	General dosimetry up to 6 GHz Compliance tests of mobile phones Fast automatic scanning in arbitrary phantoms

4.2 Phantoms

The SAM Phantom:

The flat phantom section of the twin-headed "SAM Phantom" manufactured by SPEAG was used in SAR tests. The phantom conforms to the requirements of IEEE 1528 and FCC published RF Exposure KDB Procedures.

Modular flat 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.

4.3 Tissue Simulants

Recommended values for the dielectric parameters of the tissue simulants are given in IEEE 1528 and FCC published RF Exposure KDB Procedures. The dielectric parameters of the used tissue simulants were within ±10% of the recommended values in all frequencies used. 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.

Head 600-3000 MHz 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] Head tissue simulant	Conductivity σ [S/m] Head tissue simulant	Validation Done
							Head tissue simulant
750	D750V3 - SN: 454	EX3DV4 - SN: 3892	CW/FDD	DAE 4 / 705	42.3	0.91	05.2020
750	D750V3 - SN: 454	EX3DV4 - SN: 7447	FDD	DAE 4 / 756	41.2	0.86	04.2020
835	D835V2 - SN: 448	EX3DV4 - SN: 3892	CW/GMSK	DAE 4 / 705	42.0	0.95	05.2020
1800	D1800V2 - SN: 249	EX3DV4 - SN: 3892	CW/GMSK	DAE 4 / 705	40.1	1.41	05.2020
1800	D1800V2-SN:2D075	EX3DV4 - SN: 7447	CW/GMSK	DAE 4 / 756	39.8	1.39	04.2020
1900	D1900V2 - SN: 511	EX3DV4 - SN: 3892	CW/FDD	DAE 4 / 705	40.0	1.445	05.2020
2600	51/18 DIP2600V2 - SN: 474	EX3DV4 - SN: 3892	CW	DAE 4 / 705	39.0	1.96	05.2020

2600	51/18 DIP2600V2 - SN: 474	EX3DV4 - SN: 7447	CW	DAE 4 / 756	39.3	1.99	04.2020

4.5 System Check

Date	Tissue Type	Tissue Temp. [°C]	Frequency [MHz]	Input Power [mW]	Measured SAR1g [W/kg]	1 W Target SAR1g [W/kg]	1 W Normalized SAR1g [W/kg]	Deviation 1g [%]	Plot #
13.11.2020	WB HEAD	22±2	1900	250mW	9.68	37.1	38.72	4.4	1
18.11.2020	WB HEAD	22±2	835	250mW	2.37	9.38	9.48	1.1	2
19.11.2020	WB HEAD	22±2	750	250mW	2.01	8.52	8.04	-5.6	3
20.11.2020	WB HEAD	22±2	1800	250mW	9.41	39.21	37.64	-4.0	4
23.11.2020	WB HEAD	22±2	1900	250mW	9.5	37.1	38	2.4	5
24.11.2020	WB HEAD	22±2	1900	250mW	9.29	37.1	37.16	0.2	6
27.11.2020	WB HEAD	22±2	2600	250mW	14.7	55.08	58.8	6.8	7
18.12.2020	WB HEAD	22±2	1800	250mW	9.15	39.21	36.6	-6.7	8
19.01.2021	WB HEAD	22±2	750	250mW	2.11	8.52	8.44	-0.9	9
19.01.2021	WB HEAD	22±2	2600	250mW	14.1	55.08	56.4	2.4	10
19.01.2021	WB HEAD	22±2	1800	250mW	9.49	39.44	37.96	-3.8	11
21.01.2021	WB HEAD	22±2	1800	250mW	9.44	39.44	37.76	-4.3	12

4.5.1 Tissue Simulant Verification

				Target		Measured		Deviation	
Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Dielectric Constant [ε] Target	Conductivity σ [S/m] Target	Dielectric Constant [ε]	Conductivity σ [S/m]	ε (%)	σ (%)
13.11.2020	WB Head	22	1800	40	1.4	38.49	1.34	-3.8	-4.5
13.11.2020	WB Head	22	1880	40	1.4	38.35	1.37	-4.1	-1.8
18.11.2020	WB Head	22	824.2	41.59	0.91	41.31	0.91	-0.7	0.9
18.11.2020	WB Head	22	826.4	41.59	0.91	41.29	0.91	-0.7	0.9
18.11.2020	WB Head	22	829	41.58	0.91	41.3	0.92	-0.7	0.9
18.11.2020	WB Head	22	835	41.55	0.91	41.26	0.92	-0.7	0.9
18.11.2020	WB Head	22	836.5	41.55	0.91	41.25	0.92	-0.7	0.9
18.11.2020	WB Head	22	836.6	41.55	0.91	41.25	0.92	-0.7	0.9
18.11.2020	WB Head	22	844	41.52	0.91	41.2	0.92	-0.8	1.0
18.11.2020	WB Head	22	846.6	41.51	0.91	41.2	0.92	-0.8	1.0
18.11.2020	WB Head	22	848.8	41.5	0.92	41.17	0.92	-0.8	0.9
19.11.2020	WB Head	22	704	42.18	0.89	42.27	0.86	0.2	-3.8
19.11.2020	WB Head	22	707.5	42.16	0.89	42.26	0.86	0.2	-3.7
19.11.2020	WB Head	22	711	42.14	0.89	42.25	0.86	0.2	-3.6
19.11.2020	WB Head	22	750	41.94	0.89	41.95	0.87	0.0	-2.3
19.11.2020	WB Head	22	829	41.58	0.91	41.43	0.9	-0.4	-0.9
20.11.2020	WB Head	22	1712.4	40.14	1.35	38.38	1.25	-4.4	-7.3
20.11.2020	WB Head	22	1720	40.13	1.35	38.36	1.25	-4.4	-7.4
20.11.2020	WB Head	22	1732.5	40.11	1.36	38.35	1.26	-4.4	-7.4
20.11.2020	WB Head	22	1732.6	40.11	1.36	38.35	1.26	-4.4	-7.4
20.11.2020	WB Head	22	1745	40.09	1.37	38.32	1.27	-4.4	-7.5
20.11.2020	WB Head	22	1752.6	40.07	1.37	38.3	1.27	-4.4	-7.4
20.11.2020	WB Head	22	1800	40	1.4	38.21	1.29	-4.5	-7.6
23.11.2020	WB Head	22	836.6	41.55	0.91	39.75	0.87	-4.3	-4.6
23.11.2020	WB Head	22	1752.6	40.07	1.37	36.81	1.25	-8.1	-9.3
23.11.2020	WB Head	22	1850.2	40	1.4	36.61	1.29	-8.5	-7.8
23.11.2020	WB Head	22	1852.5	40	1.4	36.61	1.29	-8.5	-7.7
23.11.2020	WB Head	22	1880	40	1.4	36.55	1.3	-8.6	-6.9

23.11.2020	WB Head	22	1900	40	1.4	36.53	1.31	-8.7	-6.3
23.11.2020	WB Head	22	1907.6	40	1.4	36.51	1.32	-8.7	-5.9
23.11.2020	WB Head	22	1909.8	40	1.4	36.51	1.32	-8.7	-5.9
27.11.2020	WB Head	22	2510	39.1	1.87	38.7	1.81	-1.0	-3.2
27.11.2020	WB Head	22	2535	39.1	1.89	38.7	1.82	-1.0	-3.7
27.11.2020	WB Head	22	2560	39.1	1.92	38.6	1.84	-1.1	-4.1
27.11.2020	WB Head	22	2600	39.0	1.96	38.6	1.86	-1.1	-5.0
18.12.2020	WB Head	22	1720	40.1	1.35	39.5	1.35	-1.7	-0.5
18.12.2020	WB Head	22	1800	40.0	1.40	39.3	1.39	-1.7	-0.5
19.01.2021	WB Head	22	2600	39.0	1.96	41.0	2.01	5.1	2.3
19.01.2021	WB Head	22	1800	42.2	1.43	40.0	1.40	5.4	1.8
19.01.2021	WB Head	22	707.5	42.2	0.89	44.0	0.89	4.3	-0.2
19.01.2021	WB Head	22	711	42.1	0.89	44.0	0.89	4.3	-0.1
19.01.2021	WB Head	22	750	41.9	0.89	43.9	0.90	4.6	1.1
19.01.2021	WB Head	22	1720	40.1	1.35	41.8	1.37	4.2	1.3
19.01.2021	WB Head	22	1732.5	40.1	1.36	41.8	1.38	4.2	1.4
19.01.2021	WB Head	22	1745	40.1	1.37	41.8	1.39	4.2	1.4
19.01.2021	WB Head	22	2510	39.1	1.87	40.6	1.94	3.7	3.8
19.01.2021	WB Head	22	2535	39.1	1.89	40.5	1.96	3.6	3.4
21.01.2021	WB Head	22	1800	40.0	1.40	40.9	1.41	2.3	0.7
21.01.2021	WB Head	22	1752.6	40.1	1.37	41.0	1.39	2.4	1.0

5. TEST PROCEDURE

Testing was carried out in accordance with FCC KDB Publication 447498 D01 and RSS-102. KDB 941225 D05 was used to select LTE test modes for testing. Low, mid and high frequency channels for the configuration with the highest SAR value were tested as per ISED notice 2016-DRS001.

5.1 Test Positions

Appendix A presents photos of the test positions.

5.1.1 Body-worn, 10mm separation distance

The device was placed in the SPEAG holder and placed below the flat phantom with 5 sides, front, back, left, right and bottom of the device facing the flat phantom with 10mm separation distance as per FCC guidance.

5.2 Scan Procedures

First, area scans were used for determination of the field distribution. Next, a zoom scan with was performed around the highest E-field value to determine the averaged SAR value. Power drift was determined by measuring the same point at the start of the area scan and again at the end of the zoom scan.

5.3 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.

5.4 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.

6. MEASUREMENT UNCERTAINTY

Uncertainty Budget
IEEE 1528-2013

Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) 1g	(c_i) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(v_i) v_{eff}
Measurement System								
Probe Calibration	±6.0 %	N	1	1	1	±6.0 %	±6.0 %	∞
Axial Isotropy	±4.7 %	R		0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	1.73	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±1.0 %	R	1.73	1	1	±0.6 %	±0.6 %	∞
Linearity	±4.7 %	R	1.73	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	1.73	1	1	±0.6 %	±0.6 %	∞
Modulation Response^m	±2.4 %	R	1.73	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	1.73	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	1.73	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	1.73	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	1.73	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.4 %	R	1.73	1	1	±0.2 %	±0.2 %	∞
Probe Positioning	±2.9 %	R	1.73	1	1	±1.7 %	±1.7 %	∞
Max. SAR Eval.	±2.0 %	R	1.73	1	1	±1.2 %	±1.2 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	1.73	1	1	±2.9 %	±2.9 %	∞
Power Scaling	±6 %	R	1.73	1	1	±3.5 %	± 3.5%	∞
Phantom and Setup								
Phantom Uncertainty	±6.1 %	R	1.73	1	1	±3.5 %	±3.5 %	∞
SAR correction	±1.9 %	R	1.73	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)	±2.5 %	R	1.73	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.)	±2.5 %	R	1.73	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity	±3.4 %	R	1.73	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity	±0.4 %	R	1.73	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±11.7 %	±11.6 %	361
Expanded STD Uncertainty						**±23.4 %**	**±23.3 %**	

7. TEST RESULTS

7.1 SAR Results for Body-worn Condition, 10 mm separation distance

Band	Channel	Frequency [MHz]	TX Slot Configuration	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
GPRS 850	190	836.6	4	Front	29	27.93	0.6	-0.05	1.28	1:2	0.77	
GPRS 850	190	836.6	4	Back	29	27.93	0.89	0.11	1.28	1:2	1.14	
GPRS 850	190	836.6	4	Left Side	29	27.93	0.32	-0.04	1.28	1:2	0.41	
GPRS 850	190	836.6	4	Right Side	29	27.93	0.17	-0.07	1.28	1:2	0.22	
GPRS 850	190	836.6	4	Top	29	27.93	0.0581	0	1.28	1:2	0.07	
GPRS 850	128	824.2	4	Back	29	27.89	0.843	-0.03	1.29	1:2	1.09	
GPRS 850	251	848.8	4	Back	29	28.09	0.985	-0.02	1.26	1:2	1.24	13
GPRS 850	251	848.8	4	Back/ repeat	29	28.09	0.986	0.01	1.26	1:2	1.24	

Band	Channel	Frequency [MHz]	TX Slot Configuration	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
GPRS 1900	661	1880	4	Front	26	24.6	0.356	-0.15	1.38	1:2	0.49	
GPRS 1900	661	1880	4	Back	26	24.6	0.597	0.15	1.38	1:2	0.82	
GPRS 1900	661	1880	4	Left Side	26	24.6	0.569	-0.07	1.38	1:2	0.79	
GPRS 1900	661	1880	4	Right Side	26	24.6	0.0557	0	1.38	1:2	0.08	
GPRS 1900	661	1880	4	Top	26	24.6	0.297	-0.12	1.38	1:2	0.41	
GPRS 1900	512	1850.2	4	Back	26	24.64	0.615	-0.14	1.37	1:2	0.84	
GPRS 1900	810	1909.8	4	Back	26	24.81	0.755	0.17	1.32	1:2	0.99	14

Band	Channel	Frequency [MHz]	Mode	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
WCDMA 2	9400	1880	RMC 12.2K	Front	24.4	23.69	0.589	-0.16	1.18	1:1	0.69	
WCDMA 2	9400	1880	RMC 12.2K	Back	24.4	23.69	1.11	0.12	1.18	1:1	1.31	
WCDMA 2	9400	1880	RMC 12.2K	Left Side	24.4	23.69	1.09	-0.07	1.18	1:1	1.28	
WCDMA 2	9400	1880	RMC 12.2K	Right Side	24.4	23.69	0.103	-0.07	1.18	1:1	0.12	
WCDMA 2	9400	1880	RMC 12.2K	Top	24.4	23.69	0.552	-0.09	1.18	1:1	0.65	
WCDMA 2	9262	1852.4	RMC 12.2K	Back	24.4	23.71	1.11	-0.13	1.17	1:1	1.30	
WCDMA 2	9538	1907.6	RMC 12.2K	Back	24.4	23.83	1.3	0.12	1.14	1:1	1.48	
WCDMA 2	9538	1907.6	RMC 12.2K	Back/ repeat	24.4	23.83	1.38	0.17	1.14	1:1	1.57	15

Band	Channel	Frequency [MHz]	Mode	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
WCDMA 4	1413	1732.6	RMC 12.2K	Front	23.9	24.01*	0.85	-0.16	1.00	1:1	0.85	
WCDMA 4	1413	1732.6	RMC 12.2K	Back	23.9	24.01*	1.35	-0.06	1.00	1:1	1.35	
WCDMA 4	1413	1732.6	RMC 12.2K	Left Side	23.9	24.01*	0.587	-0.03	1.00	1:1	0.59	
WCDMA 4	1413	1732.6	RMC 12.2K	Right Side	23.9	24.01*	0.312	0.03	1.00	1:1	0.31	
WCDMA 4	1413	1732.6	RMC 12.2K	Top	23.9	24.01*	0.663	-0.11	1.00	1:1	0.66	
WCDMA 4	1312	1712.4	RMC 12.2K	Back	23.9	23.96*	1.34	-0.15	1.00	1:1	1.34	
WCDMA 4	1513	1752.6	RMC 12.2K	Back	23.9	23.81	1.45	-0.01	1.02	1:1	1.48	
WCDMA 4	1513	1752.6	RMC 12.2K	Back/repeat	23.9	23.81	1.42	0.21	1.02	1:1	1.45	
WCDMA 4	1513	1752.6	RMC 12.2K	Back/repeat	23.9	23.81	1.56	0	1.02	1:1	1.59	16

*The device used for testing showed slightly higher power than the maximum specified by the manufacturer thus the measured SAR values are conservative.

Band	Channel	Frequency [MHz]	Mode	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
WCDMA 5	4183	836.6	RMC 12.2K	Front	25	24.05	0.529	-0.56	1.42	1:1	0.75	
WCDMA 5	4183	836.6	RMC 12.2K	Back	25	24.05	0.845	0.09	1.24	1:1	1.05	17
WCDMA 5	4183	836.6	RMC 12.2K	Left Side	25	24.05	0.312	-0.04	1.24	1:1	0.39	
WCDMA 5	4183	836.6	RMC 12.2K	Right Side	25	24.05	0.132	-0.18	1.24	1:1	0.16	
WCDMA 5	4183	836.6	RMC 12.2K	Top	25	24.05	0.0559	-0.02	1.24	1:1	0.07	
WCDMA 5	4132	826.4	RMC 12.2K	Back	25	24.05	0.519	-0.09	1.24	1:1	0.65	
WCDMA 5	4233	846.6	RMC 12.2K	Back	25	23.85	0.67	-0.02	1.30	1:1	0.87	
WCDMA 5	4183	836.6	RMC 12.2K	Back/ repeat	25	24.05	0.763	-0.15	1.24	1:1	0.95	

Band	Channel	Frequency [MHz]	Modulation/ BW [MHz]	RB Size	RB Offset	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
LTE 2	18900	1880	QPSK / 20	1	0	Front	23.4	23.08	0.612	-0.45	1.19	1:1	0.73	
LTE 2	18900	1880	QPSK / 20	50	0	Front	23.4	22.07	0.537	-0.34	1.47	1:1	0.79	
LTE 2	18900	1880	QPSK / 20	1	0	Back	23.4	23.08	1.07	0.11	1.08	1:1	1.15	
LTE 2	18900	1880	QPSK / 20	50	0	Back	23.4	22.07	0.907	0.08	1.36	1:1	1.23	
LTE 2	18700	1860	QPSK / 20	1	0	Back	23.4	22.89	1.03	-0.2	1.12	1:1	1.16	
LTE 2	19100	1900	QPSK / 20	1	0	Back	23.4	23.08	1.31	0.17	1.08	1:1	1.41	
LTE 2	18700	1860	QPSK / 20	50	0	Back	23.4	21.94	0.816	-0.09	1.40	1:1	1.14	
LTE 2	19100	1900	QPSK / 20	50	0	Back	23.4	22.05	1.12	0.2	1.36	1:1	1.53	
LTE 2	19100	1900	QPSK / 20	50	25	Back	23.4	21.72	1.06	0.18	1.47	1:1	1.56	18
LTE 2	19100	1900	QPSK / 20	50	50	Back	23.4	21.64	1.04	0.09	1.50	1:1	1.56	
LTE 2	18900	1880	QPSK / 20	100	0	Back	23.4	21.94	0.955	0.18	1.40	1:1	1.34	
LTE 2	18900	1880	QPSK / 20	1	0	Left Side	23.4	23.08	0.83	-0.18	1.08	1:1	0.89	
LTE 2	18900	1880	QPSK / 20	50	0	Left Side	23.4	22.07	0.713	-0.13	1.36	1:1	0.97	
LTE 2	18700	1860	QPSK / 20	1	0	Left Side	23.4	22.89	0.888	-0.14	1.12	1:1	1.00	
LTE 2	19100	1900	QPSK / 20	1	0	Left Side	23.4	23.08	1.06	0	1.08	1:1	1.14	
LTE 2	18700	1860	QPSK / 20	50	0	Left Side	23.4	21.94	0.718	0.02	1.40	1:1	1.00	
LTE 2	19100	1900	QPSK / 20	50	0	Left Side	23.4	22.05	0.772	-0.09	1.36	1:1	1.05	
LTE 2	18900	1880	QPSK / 20	100	0	Left Side	23.4	21.94	0.756	-0.19	1.40	1:1	1.06	
LTE 2	18900	1880	QPSK / 20	1	0	Right Side	23.4	23.08	0.0657	-0.06	1.08	1:1	0.07	
LTE 2	18900	1880	QPSK / 20	50	0	Right Side	23.4	22.07	0.053	-0.23	1.43	1:1	0.08	
LTE 2	18900	1880	QPSK / 20	1	0	Top	23.4	23.08	0.66	-0.08	1.08	1:1	0.71	
LTE 2	18900	1880	QPSK / 20	50	0	Top	23.4	22.07	0.56	-0.19	1.36	1:1	0.76	

Band	Channel	Frequency [MHz]	Modulation/ BW [MHz]	RB Size	RB Offset	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
LTE 4	20050	1720	QPSK / 20	1	0	Front	24	23.41	0.745	-0.21	1.15	1:1	0.85	
LTE 4	20050	1720	QPSK / 20	50	0	Front	24	22.64	0.621	-0.08	1.37	1:1	0.85	
LTE 4	20175	1732.5	QPSK / 20	1	0	Front	24	23.35	0.734	-0.09	1.16	1:1	0.85	

LTE 4	20300	1745	QPSK / 20	1	0	Front	24	23.16	0.719	-0.05	1.21	1:1	0.87	
LTE 4	20175	1732.5	QPSK / 20	50	0	Front	24	22.52	0.686	0.04	1.41	1:1	0.96	
LTE 4	20300	1745	QPSK / 20	50	0	Front	24	22.4	0.728	0.02	1.45	1:1	1.05	
LTE 4	20050	1720	QPSK / 20	100	0	Front	24	22.44	0.674	-0.18	1.43	1:1	0.97	
LTE 4	20050	1720	QPSK / 20	1	0	Back	24	23.41	1.17	0.05	1.15	1:1	1.34	
LTE 4	20050	1720	QPSK / 20	50	0	Back	24	22.64	0.985	0.01	1.37	1:1	1.35	
LTE 4	20175	1732.5	QPSK / 20	1	0	Back	24	23.35	1.15	-0.02	1.16	1:1	1.34	
LTE 4	20300	1745	QPSK / 20	1	0	Back	24	23.16	1.14	0.08	1.21	1:1	1.38	
LTE 4	20175	1732.5	QPSK / 20	50	0	Back	24	22.52	1.02	-0.21	1.41	1:1	1.43	
LTE 4	20300	1745	QPSK / 20	50	0	Back	24	22.4	1.07	-0.02	1.45	1:1	1.55	
LTE 4	20300	1745	QPSK / 20	50	25	Back	24	22.11	1.01	0	1.55	1:1	1.56	
LTE 4	20300	1745	QPSK / 20	50	50	Back	24	22.05	1	0	1.57	1:1	1.57	19
LTE 4	20050	1720	QPSK / 20	100	0	Back	24	22.44	0.734	0.06	1.43	1:1	1.05	
LTE 4	20050	1720	QPSK / 20	1	0	Left Side	24	23.41	0.475	-0.19	1.15	1:1	0.54	
LTE 4	20050	1720	QPSK / 20	50	0	Left Side	24	22.64	0.401	-0.12	1.37	1:1	0.55	
LTE 4	20050	1720	QPSK / 20	1	0	Right Side	24	23.41	0.316	-0.03	1.15	1:1	0.36	
LTE 4	20050	1720	QPSK / 20	50	0	Right Side	24	22.64	0.254	-0.04	1.37	1:1	0.35	
LTE 4	20050	1720	QPSK / 20	1	0	Top	24	23.41	0.491	-0.21	1.15	1:1	0.56	
LTE 4	20050	1720	QPSK / 20	50	0	Top	24	22.64	0.4	-0.04	1.37	1:1	0.55	

Band	Channel	Frequency [MHz]	Modulation/ BW [MHz]	RB Size	RB Offset	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
LTE 5	20450	829	QPSK / 10	1	0	Front	24	22.74	0.333	-0.64	1.55	1:1	0.52	
LTE 5	20450	829	QPSK / 10	25	0	Front	24	21.97	0.25	-0.04	1.60	1:1	0.40	
LTE 5	20450	829	QPSK / 10	1	0	Back	24	22.74	0.399	-0.05	1.34	1:1	0.53	

LTE 5	20450	829	QPSK / 10	25	0	Back	24	21.97	0.34	0	1.60	1:1	0.54	
LTE 5	20450	829	QPSK / 10	1	0	Left Side	24	22.74	0.21	-0.52	1.51	1:1	0.32	
LTE 5	20450	829	QPSK / 10	25	0	Left Side	24	21.97	0.169	-0.03	1.60	1:1	0.27	
LTE 5	20450	829	QPSK / 10	1	0	Right Side	24	22.74	0.0742	-0.12	1.34	1:1	0.10	
LTE 5	20450	829	QPSK / 10	25	0	Right Side	24	21.97	0.0596	-0.06	1.60	1:1	0.10	
LTE 5	20450	829	QPSK / 10	1	0	Top	24	22.74	0.0378	0.02	1.34	1:1	0.05	
LTE 5	20450	829	QPSK / 10	25	0	Top	24	21.97	0.0323	0.24	1.69	1:1	0.05	
LTE 5	20525	836.5	QPSK / 10	1	0	Back	24	22.53	0.423	-0.16	1.40	1:1	0.59	
LTE 5	20600	844	QPSK / 10	1	24	Back	24	22.62	0.495	-0.09	1.37	1:1	0.68	20

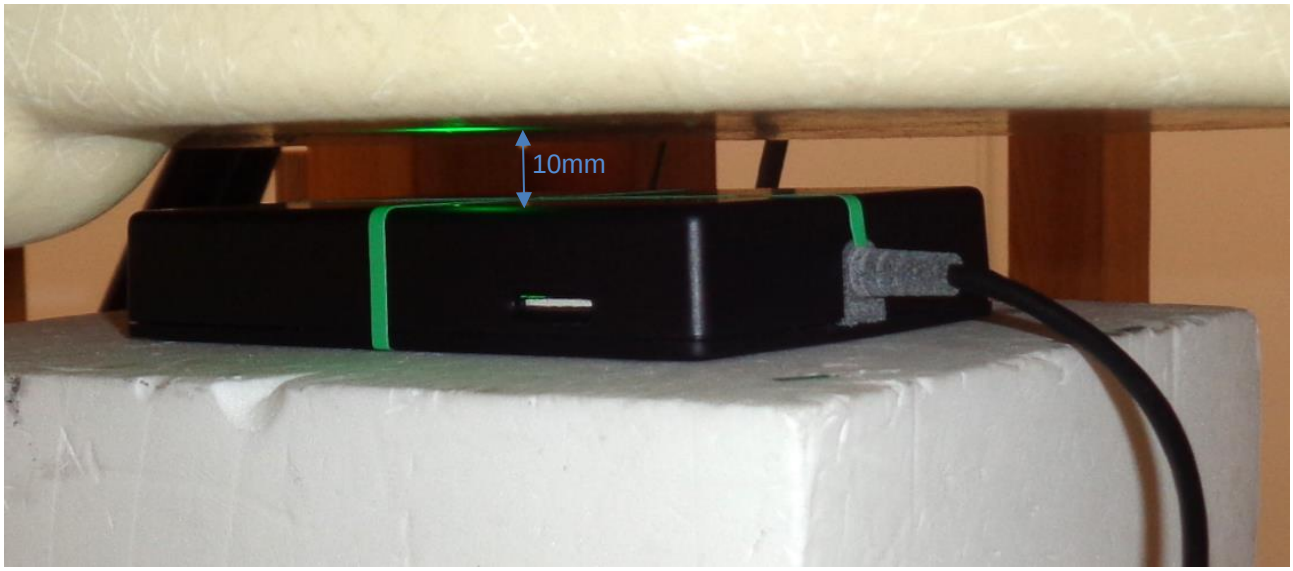
Band	Channel	Frequency [MHz]	Modulation/ BW [MHz]	RB Size	RB Offset	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
LTE 7	21350	2560	QPSK / 20	1	0	Front	24.1	24.01	0.541	0.07	1.02	1:1	0.55	
LTE 7	21350	2560	QPSK / 20	50	0	Front	24.1	22.93	0.416	-0.27	1.39	1:1	0.58	
LTE 7	21350	2560	QPSK / 20	1	0	Back	24.1	24.01	1.18	-0.09	1.02	1:1	1.20	
LTE 7	21350	2560	QPSK / 20	50	0	Back	24.1	22.93	0.871	0.11	1.31	1:1	1.14	
LTE 7	20850	2510	QPSK / 20	1	0	Back	24.1	23.79	1.16	-0.16	1.07	1:1	1.25	
LTE 7	21100	2535	QPSK / 20	1	0	Back	24.1	23.93	1.21	-0.02	1.04	1:1	1.26	21
LTE 7	20850	2510	QPSK / 20	50	0	Back	24.1	22.72	0.814	-0.16	1.37	1:1	1.12	
LTE 7	21100	2535	QPSK / 20	50	0	Back	24.1	23.93	0.81	0.03	1.04	1:1	0.84	
LTE 7	21350	2560	QPSK / 20	1	0	Left Side	24.1	24.01	0.488	-0.06	1.02	1:1	0.50	
LTE 7	21350	2560	QPSK / 20	50	0	Left Side	24.1	22.93	0.392	0.01	1.31	1:1	0.51	
LTE 7	21350	2560	QPSK / 20	1	0	Right Side	24.1	24.01	0.334	-0.07	1.02	1:1	0.34	
LTE 7	21350	2560	QPSK / 20	50	0	Right Side	24.1	22.93	0.267	0.06	1.31	1:1	0.35	
LTE 7	21350	2560	QPSK / 20	1	0	Top	24.1	24.01	0.656	0.06	1.02	1:1	0.67	
LTE 7	21350	2560	QPSK / 20	50	0	Top	24.1	22.93	0.536	-0.07	1.31	1:1	0.70	
LTE 7	21100	2535	QPSK / 20	100	0	Back	24.1	22.82	0.91	-0.01	1.34	1:1	1.22	

Band	Channel	Frequency [MHz]	Modulation/ BW [MHz]	RB Size	RB Offset	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR1g [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported SAR1g [W/kg]	Plot #
LTE 12	23060	704	QPSK / 10	1	24	Front	24	22.86	0.531	-0.16	1.30	1:1	0.69	
LTE 12	23060	704	QPSK / 10	25	12	Front	24	22.11	0.455	-0.1	1.55	1:1	0.70	
LTE 12	23060	704	QPSK / 10	1	24	Back	24	22.86	0.888	-0.05	1.30	1:1	1.15	
LTE 12	23060	704	QPSK / 10	25	12	Back	24	22.11	0.76	-0.09	1.55	1:1	1.17	
LTE 12	23095	707.5	QPSK / 10	1	0	Back	24	22.73	0.886	-0.06	1.34	1:1	1.19	22
LTE 12	23130	711	QPSK / 10	1	0	Back	24	22.66	0.847	-0.03	1.36	1:1	1.15	
LTE 12	23060	704	QPSK / 10	50	0	Back	24	22.06	0.755	-0.1	1.56	1:1	1.18	
LTE 12	23095	707.5	QPSK / 10	25	12	Back	24	22.01	0.696	-0.08	1.58	1:1	1.10	
LTE 12	23060	704	QPSK / 10	25	12	Back	24	22.01	0.696	-0.08	1.58	1:1	1.10	
LTE 12	23095	707.5	QPSK / 10	25	0	Back	24	21.98	0.683	0.15	1.59	1:1	1.09	
LTE 12	23130	711	QPSK / 10	25	0	Back	24	21.98	0.683	0.15	1.59	1:1	1.09	
LTE 12	23060	704	QPSK / 10	1	24	Left Side	24	22.86	0.314	-0.13	1.30	1:1	0.41	
LTE 12	23060	704	QPSK / 10	25	12	Left Side	24	22.11	0.262	-0.04	1.55	1:1	0.40	

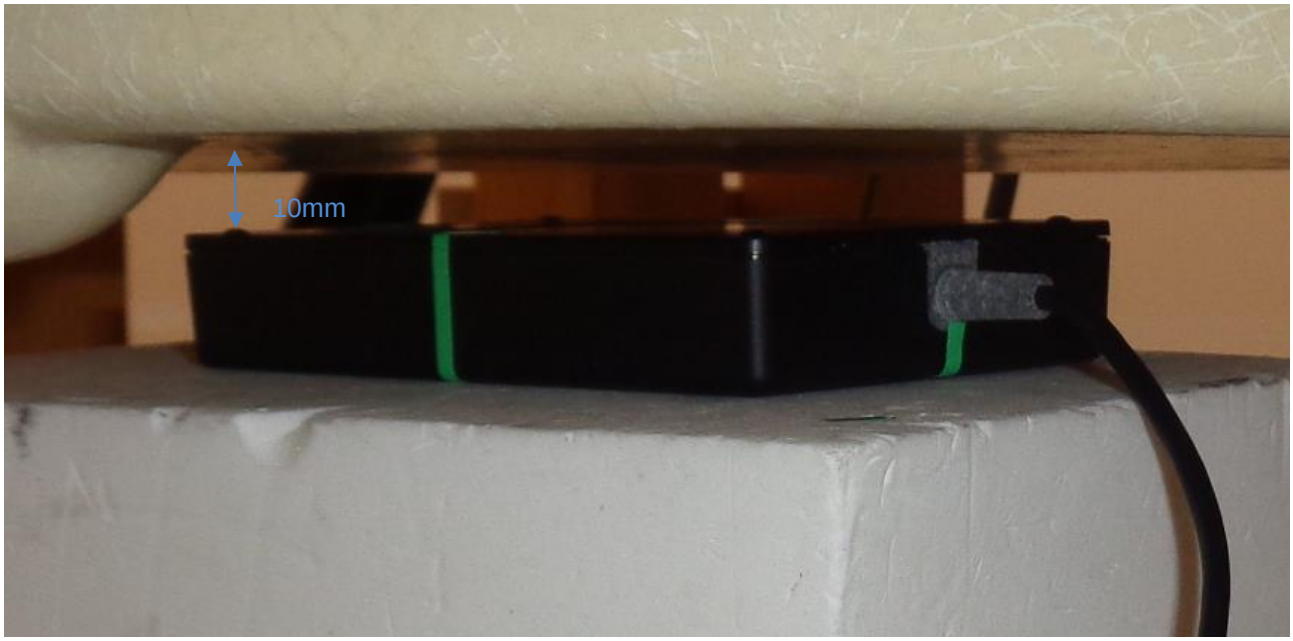
LTE 12	23060	704	QPSK / 10	1	24	Right Side	24	22.86	0.211	-0.09	1.30	1:1	0.27	
LTE 12	23060	704	QPSK / 10	25	12	Right Side	24	22.11	0.178	-0.08	1.55	1:1	0.28	
LTE 12	23060	704	QPSK / 10	1	24	Top	24	22.86	0.0445	-0.16	1.30	1:1	0.06	
LTE 12	23060	704	QPSK / 10	25	12	Top	24	22.11	0.04	0.19	1.55	1:1	0.06	

APPENDIX A: PHOTOS OF THE DUT

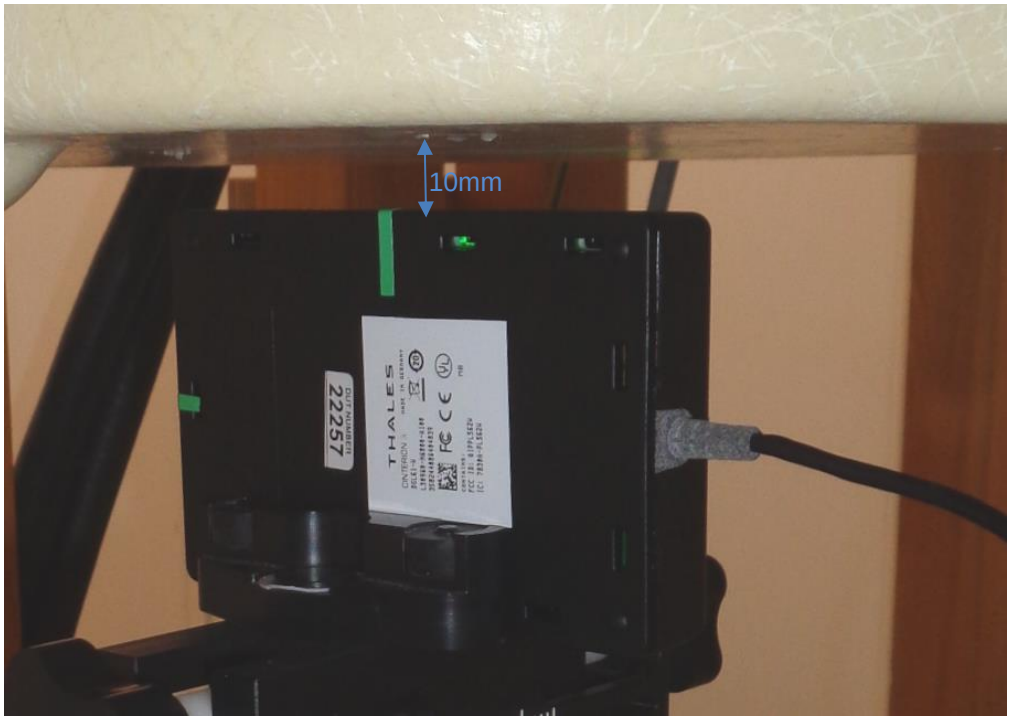
Size of the DUT is: 72.5x114x19.5mm with USB cord of 200mm.



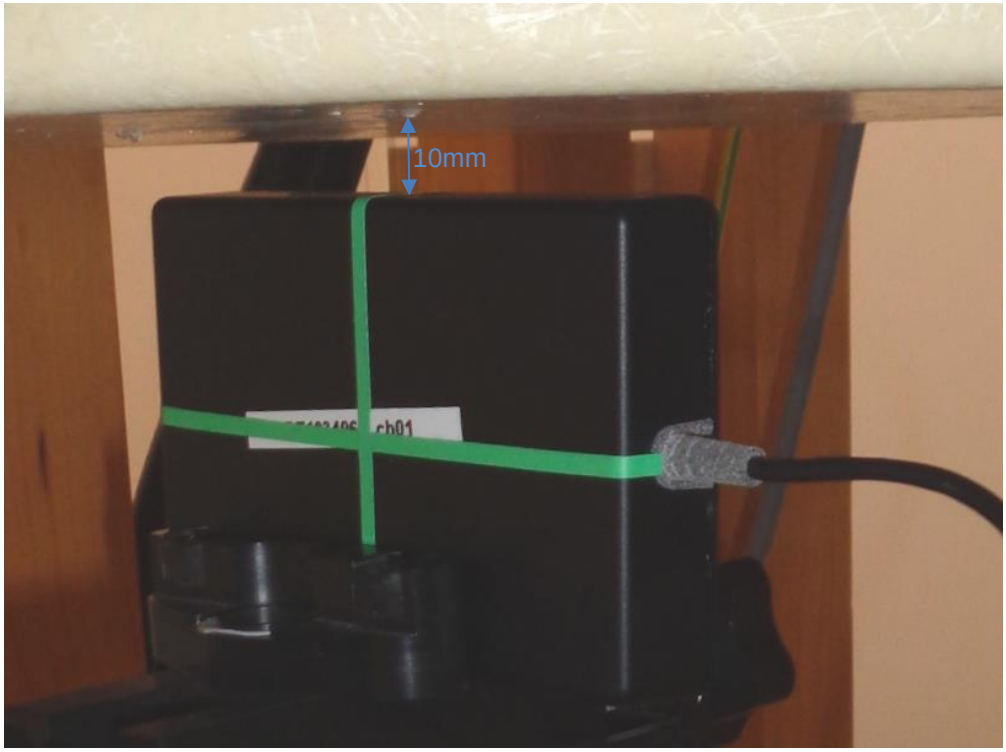
Front side of the device against the phantom with 10mm separation.



Back side of the device against the phantom with 10mm separation.



Left side of the device against the phantom with 10mm separation.



Right side of the device against the phantom with 10mm separation.

Top side of the device against the phantom with 10mm separation.

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 13/11/2020 10.59.09

Test Laboratory: Verkotan Oy

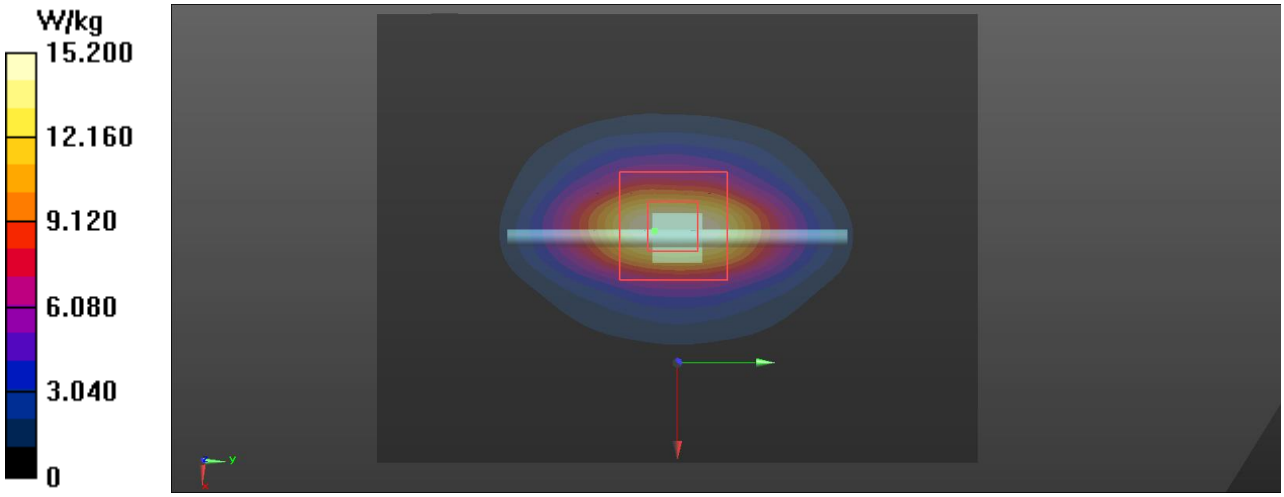
DUT: Dipole 1900 MHz D1900V2; Type: D1900V2; Serial: D1900V2 - SN:511

Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.386 S/m; ε_r = 38.326; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 107.0 V/m; Power Drift = -0.07 dB
Peak SAR (extrapolated) = 17.5 W/kg
SAR(1 g) = 9.68 W/kg; SAR(10 g) = 5.06 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 10.1 mm
Ratio of SAR at M2 to SAR at M1 = 55.1%
Maximum value of SAR (measured) = 14.7 W/kg
Configuration/system check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 15.2 W/kg



Plot 2

Date/Time: 18/11/2020 8.48.20

Test Laboratory: Verkotan Oy

DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:448

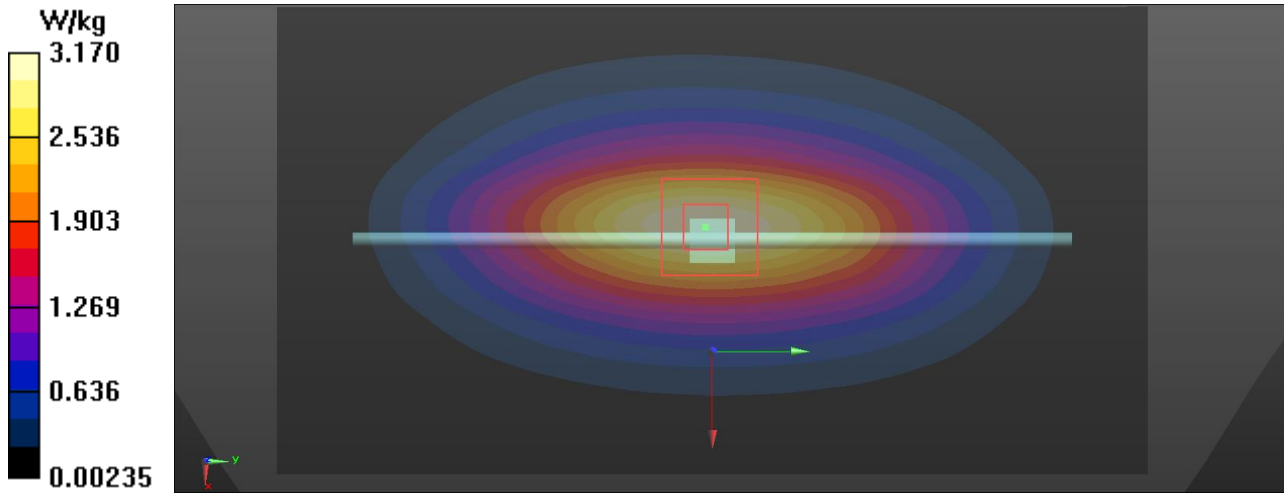
Communication System: UID 0, CW (0); Communication System Band: D835 (835.0 MHz); Frequency: 835 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 835 MHz; σ = 0.918 S/m; ε_r = 41.258; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 61.37 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 3.61 W/kg
SAR(1 g) = 2.37 W/kg; SAR(10 g) = 1.55 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 19.2 mm
Ratio of SAR at M2 to SAR at M1 = 66.6%
Maximum value of SAR (measured) = 3.23 W/kg

Configuration/system check/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 3.17 W/kg



Plot 3

Date/Time: 19/11/2020 9.17.33

Test Laboratory: Verkotan Oy

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN:454

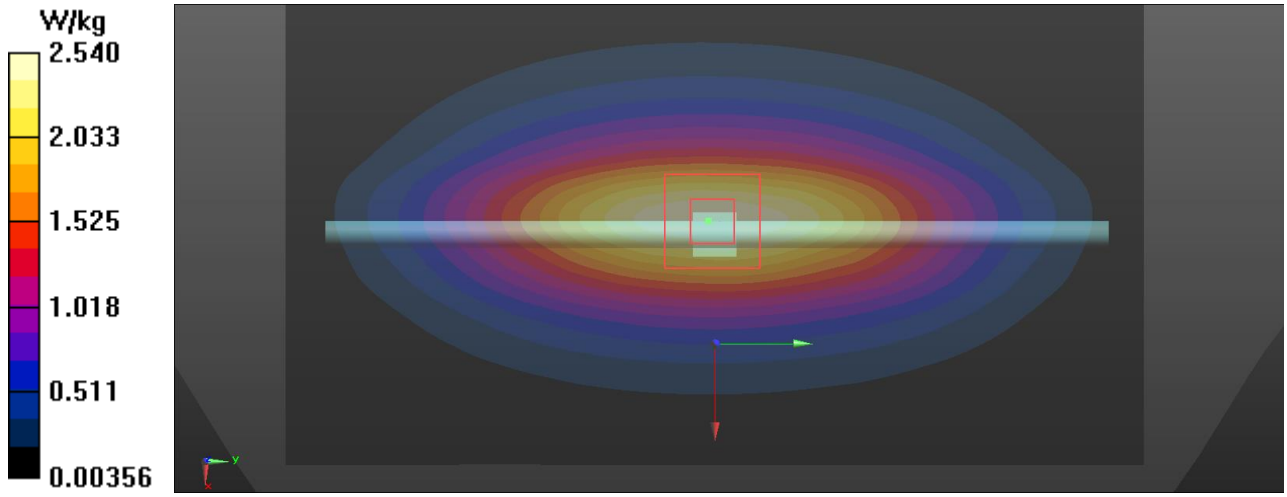
Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 750 MHz; σ = 0.873 S/m; ε_r = 41.945; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(10.21, 10.21, 10.21) @ 750 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 56.25 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 2.93 W/kg
SAR(1 g) = 2.01 W/kg; SAR(10 g) = 1.31 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 20.2 mm
Ratio of SAR at M2 to SAR at M1 = 67.3%
Maximum value of SAR (measured) = 2.64 W/kg

Configuration/system check/Area Scan (71x131x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.54 W/kg



Plot 4

Date/Time: 20/11/2020 8.54.28

Test Laboratory: Verkotan Oy

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

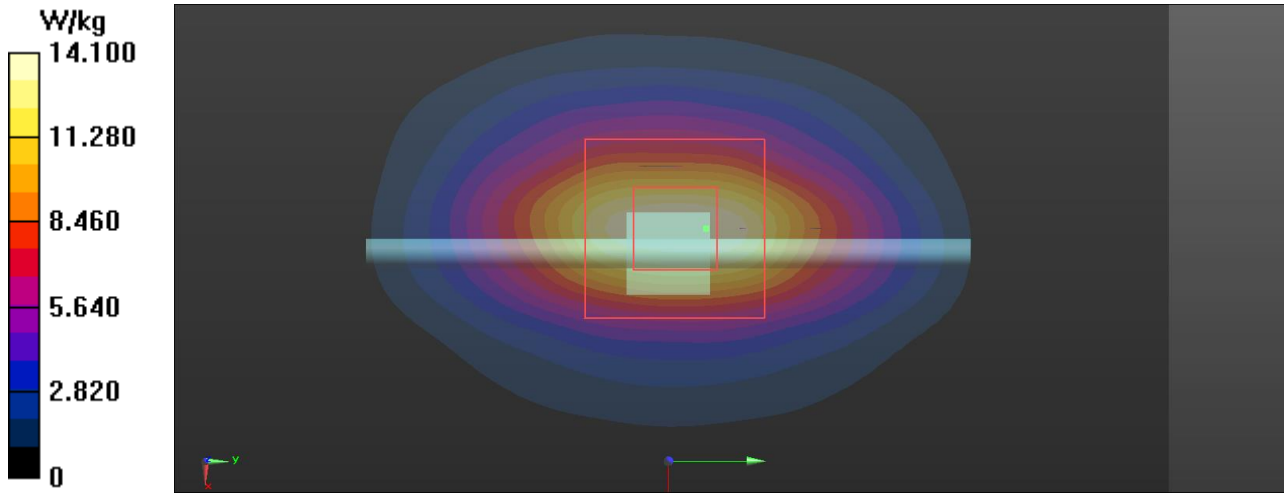
Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1800 MHz; σ = 1.293 S/m; ε_r = 38.206; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.52, 8.52, 8.52) @ 1800 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 103.3 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 16.7 W/kg
SAR(1 g) = 9.41 W/kg; SAR(10 g) = 4.92 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 54.6%
Maximum value of SAR (measured) = 13.8 W/kg

Configuration/system check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.1 W/kg



Plot 5

Date/Time: 23/11/2020 8.57.47

Test Laboratory: Verkotan Oy

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

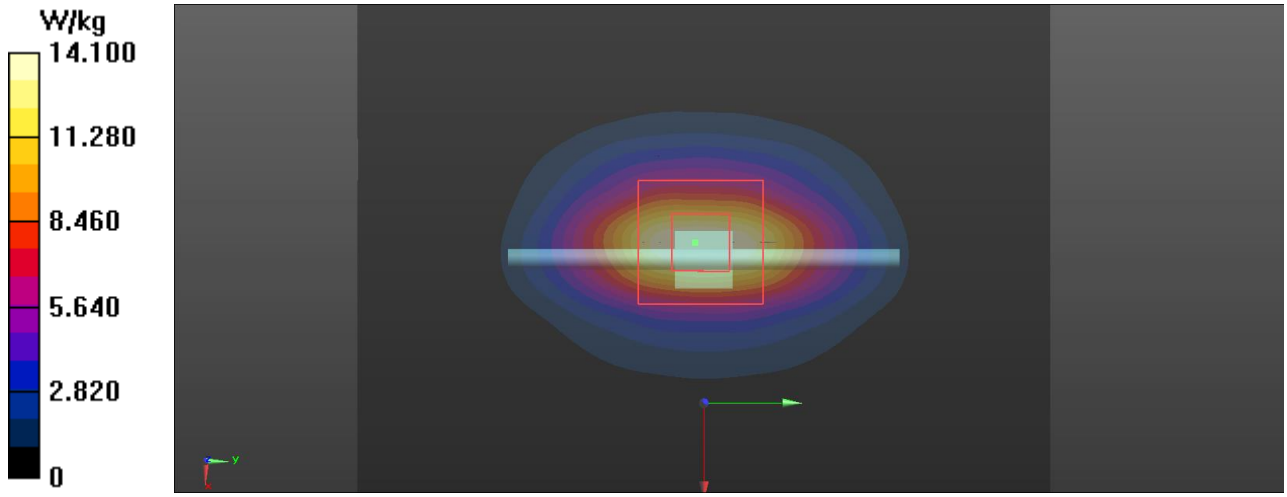
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.312 S/m; ε_r = 36.527; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 9.5 W/kg; SAR(10 g) = 4.95 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 54.9%
Maximum value of SAR (measured) = 14.5 W/kg

Configuration/system check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.1 W/kg



Plot 6

Date/Time: 24/11/2020 9.00.46

Test Laboratory: Verkotan Oy

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

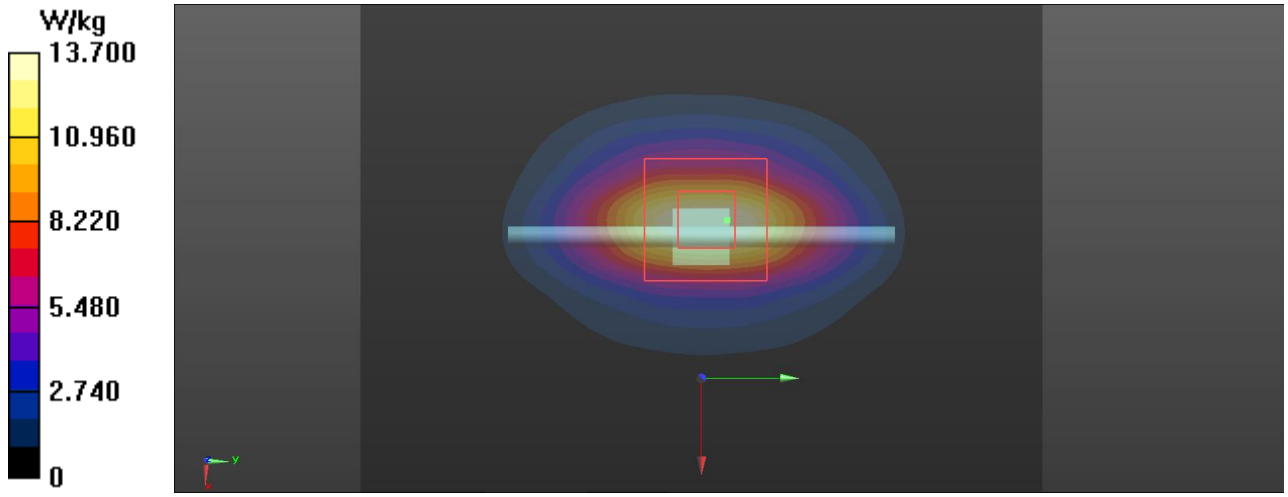
Communication System: UID 0, CW (0); Communication System Band: D1900 (1900.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.32 S/m; ε_r = 38.419; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26) @ 1900 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 103.1 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 16.5 W/kg
SAR(1 g) = 9.29 W/kg; SAR(10 g) = 4.83 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 10.1 mm
Ratio of SAR at M2 to SAR at M1 = 54.5%
Maximum value of SAR (measured) = 13.9 W/kg

Configuration/system check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 13.7 W/kg



Plot 7

Date/Time: 27/11/2020 10.14.18

Test Laboratory: Verkotan Oy

DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:474

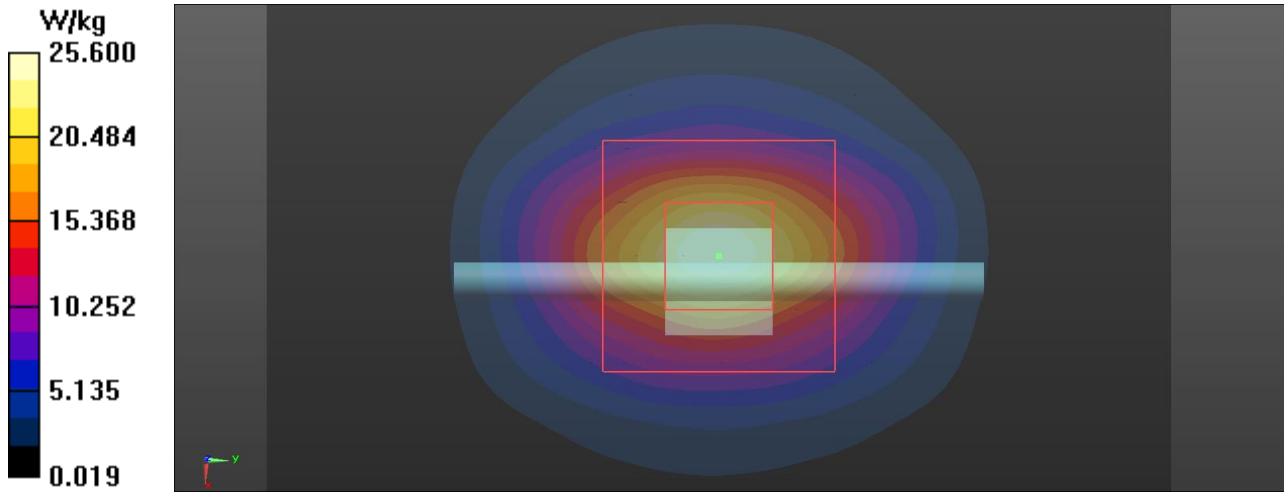
Communication System: UID 0, CW (0); Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2600 MHz; σ = 1.865 S/m; ε_r = 38.572; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe:
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 115.4 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 29.2 W/kg
SAR(1 g) = 14.7 W/kg; SAR(10 g) = 6.69 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 = 50%
Maximum value of SAR (measured) = 23.9 W/kg

Configuration/system check/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 25.6 W/kg



Plot 8

Date/Time: 18/12/2020 14.15.16

Test Laboratory: Verkotan Oy

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

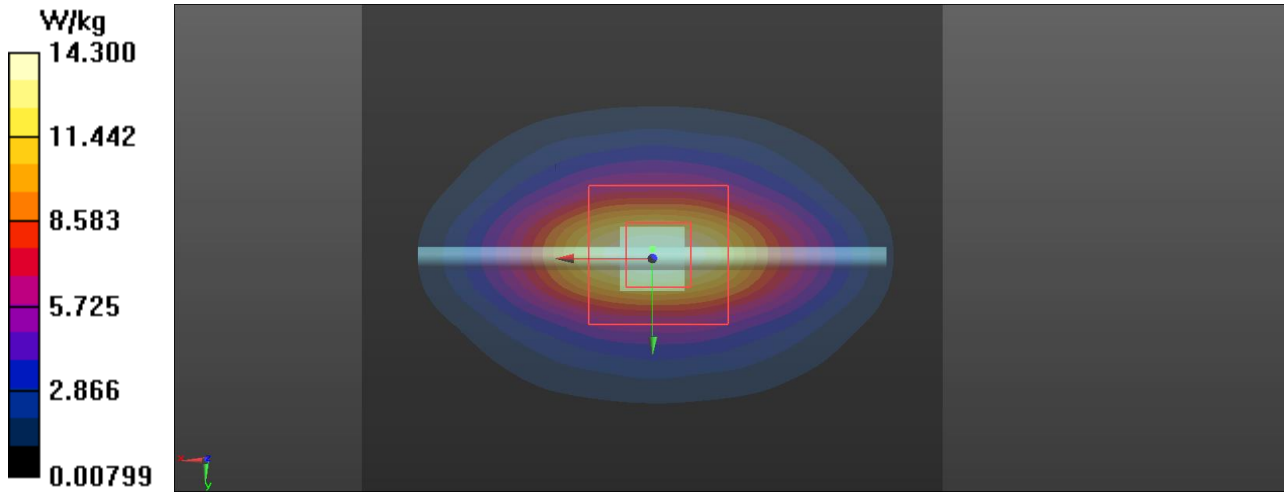
Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1800 MHz; σ = 1.394 S/m; ε_r = 39.333; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC))

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.65, 8.65, 8.65) @ 1800 MHz; Calibrated: 25/03/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- 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/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 109.0 V/m; Power Drift = -0.45 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 9.15 W/kg; SAR(10 g) = 4.8 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 10.5 mm
Ratio of SAR at M2 to SAR at M1 = 54.2%
Maximum value of SAR (measured) = 14.2 W/kg

Configuration/system check/Area Scan (61x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 14.3 W/kg



Plot 9

Date/Time: 1/19/2021 2:10:25 PM

Test Laboratory: Verkotan Oy

DUT: Dipole 750 MHz D750V3; Type: D750V3; Serial: D750V3 - SN:454

Communication System: UID 0, CW (0); Communication System Band: D750 (750.0 MHz); Frequency: 750 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 750 MHz; σ = 0.904 S/m; ε_r = 43.858; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

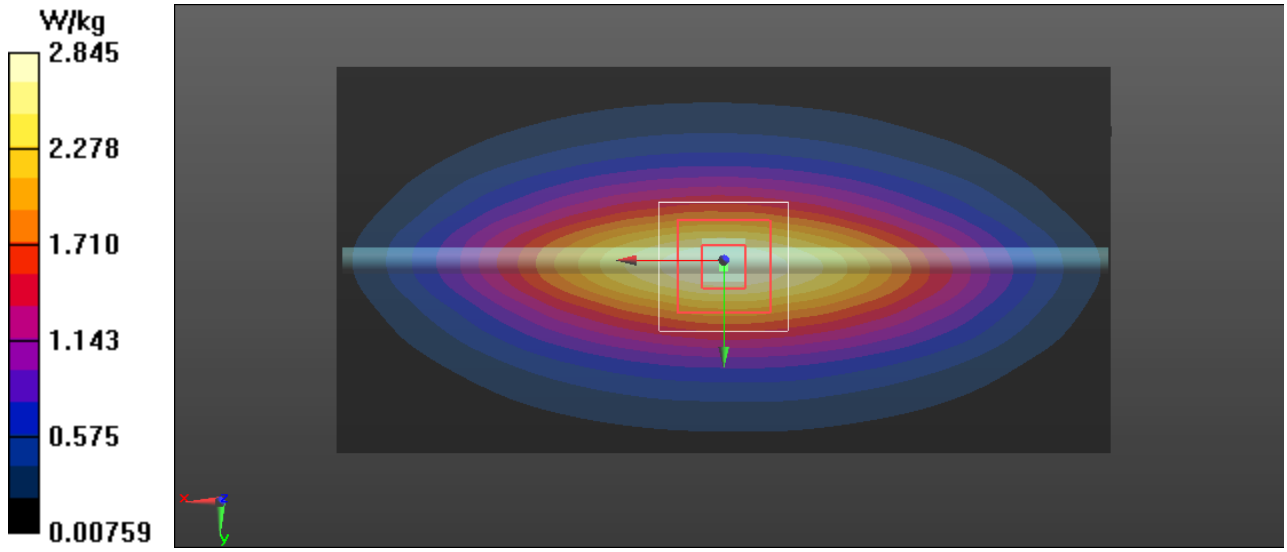
DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(10.38, 10.38, 10.38); Calibrated: 3/25/2020;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx
- DASY52 52.10.4(1527); SEMCAD X 14.6.10(7373)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 61.11 V/m; Power Drift = -0.35 dB
Peak SAR (extrapolated) = 3.14 W/kg
SAR(1 g) = 2.11 W/kg; SAR(10 g) = 1.38 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.82 W/kg

Configuration/system check/Area Scan (121x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm

Maximum value of SAR (interpolated) = 2.85 W/kg



Plot 10

Date/Time: 1/19/2021 12:10:53 PM

Test Laboratory: Verkotan Oy

DUT: Dipole 2600 MHz D2600V2; Type: D2600V2; Serial: D2600V2 - SN:474

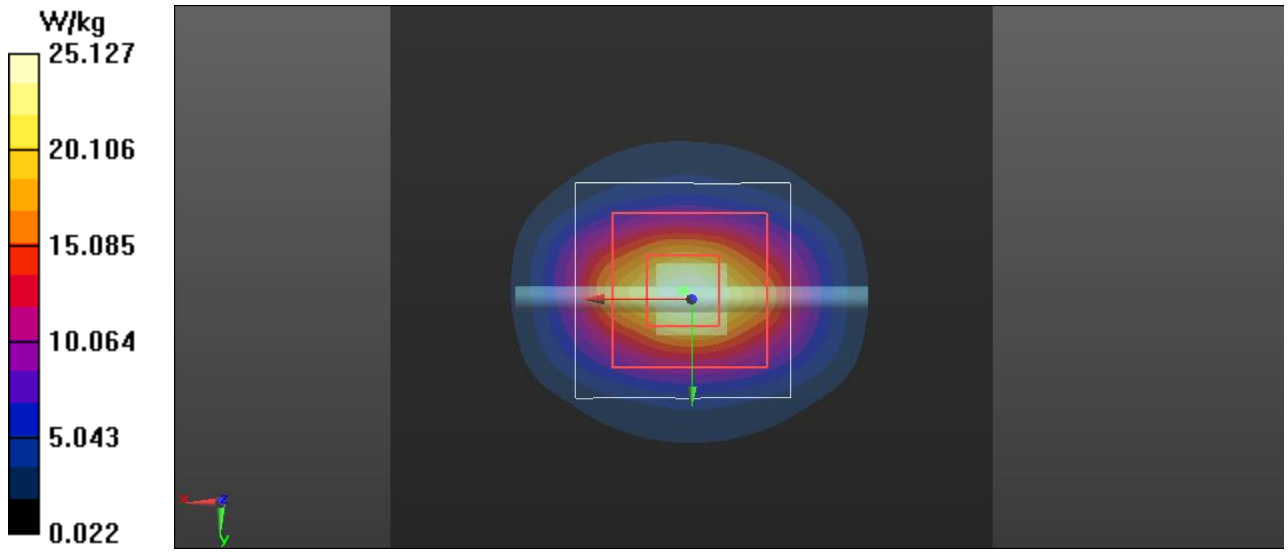
Communication System: UID 0, CW (0); Communication System Band: D2600 (2600.0 MHz); Frequency: 2600 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2600 MHz; σ = 2.009 S/m; ε_r = 40.989; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(7.64, 7.64, 7.64); Calibrated: 3/25/2020;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 120.9 V/m; Power Drift = -0.53 dB
Peak SAR (extrapolated) = 30.3 W/kg
SAR(1 g) = 14.1 W/kg; SAR(10 g) = 6.32 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 24.3 W/kg

Configuration/system check/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 25.1 W/kg



Plot 11

Date/Time: 1/19/2021 12:54:57 PM

Test Laboratory: Verkotan Oy

DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d075

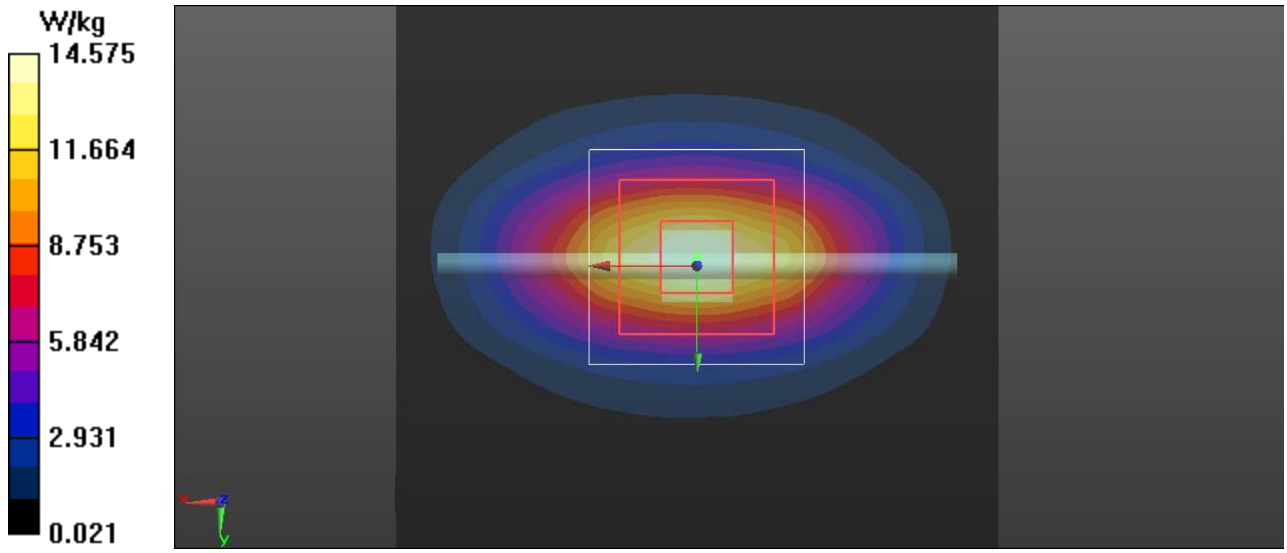
Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1800 MHz; σ = 1.425 S/m; ε_r = 42.157; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.65, 8.65, 8.65); Calibrated: 3/25/2020;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 103.9 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 17.6 W/kg
SAR(1 g) = 9.49 W/kg; SAR(10 g) = 4.98 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 14.8 W/kg

Configuration/system check/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 14.6 W/kg



Plot 12

Date/Time: 1/21/2021 4:52:28 PM

Test Laboratory: Verkotan Oy

DUT: Dipole 1800 MHz D1800V2; Type: D1800V2; Serial: D1800V2 - SN:2d075

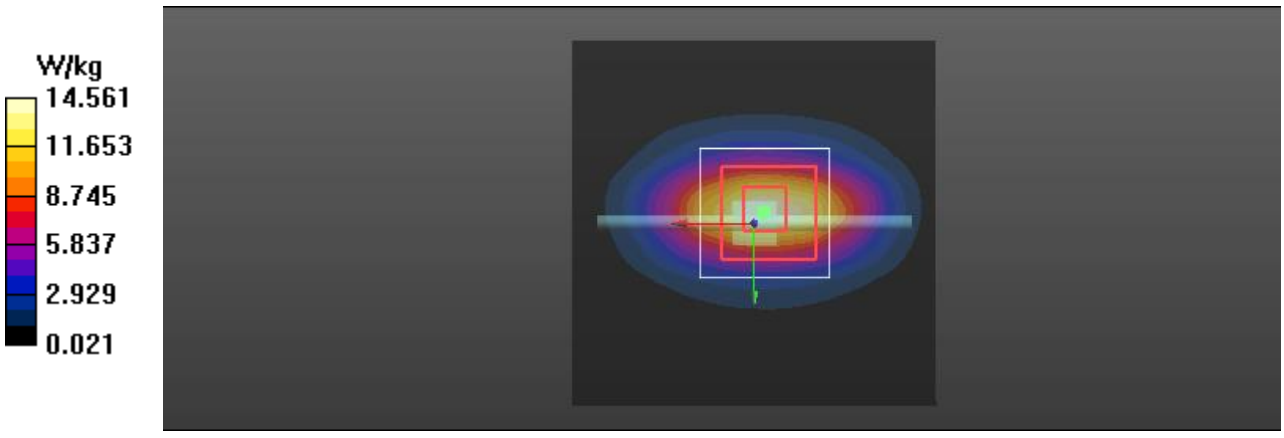
Communication System: UID 0, CW (0); Communication System Band: D1800 (1800.0 MHz); Frequency: 1800 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1800 MHz; σ = 1.409 S/m; ε_r = 40.935; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.65, 8.65, 8.65); Calibrated: 3/25/2020;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 101.5 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 17.3 W/kg
SAR(1 g) = 9.44 W/kg; SAR(10 g) = 4.99 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 14.6 W/kg

Configuration/system check/Area Scan (71x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 14.6 W/kg



APPENDIX C: MEASUREMENT SCAN

Plot 13

Date/Time: 18/11/2020 15.55.20

Test Laboratory: Verkotan Oy

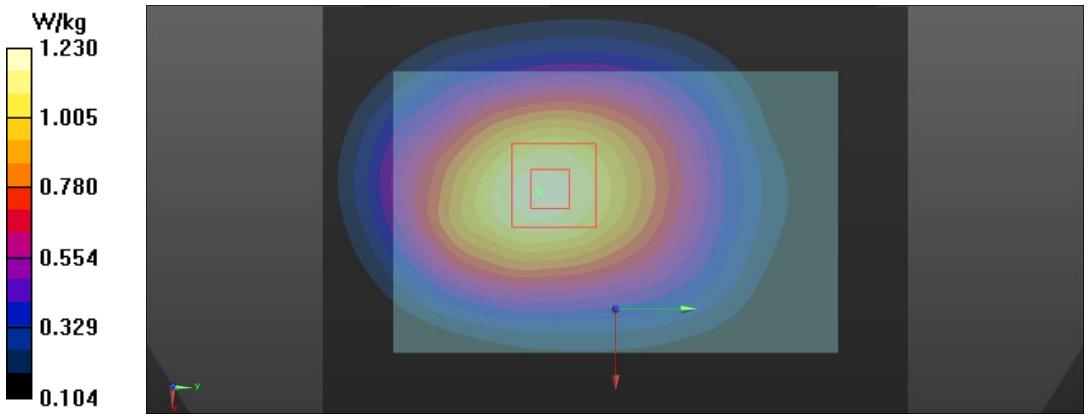
DUT: Device Gateway LTE; Model: DGL61-W

Communication System: UID 0, GPRS 850,900 4slots (0); Communication System Band: GPRS 850 4slots; Frequency: 848.8 MHz;Communication System PAR: 3.356 dB;
Medium parameters used: f = 849 MHz; σ = 0.924 S/m; ε_r = 41.168; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(9.95, 9.95, 9.95) @ 848.8 MHz; Calibrated: 28/04/2020
- 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 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

GPRS850 Back 2 2/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.19 W/kg
GPRS850 Back 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 34.36 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 1.34 W/kg
SAR(1 g) = 0.985 W/kg; SAR(10 g) = 0.696 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 = 73.9%
Maximum value of SAR (measured) = 1.23 W/kg



Plot 14

Date/Time: 23/11/2020 16.55.38

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

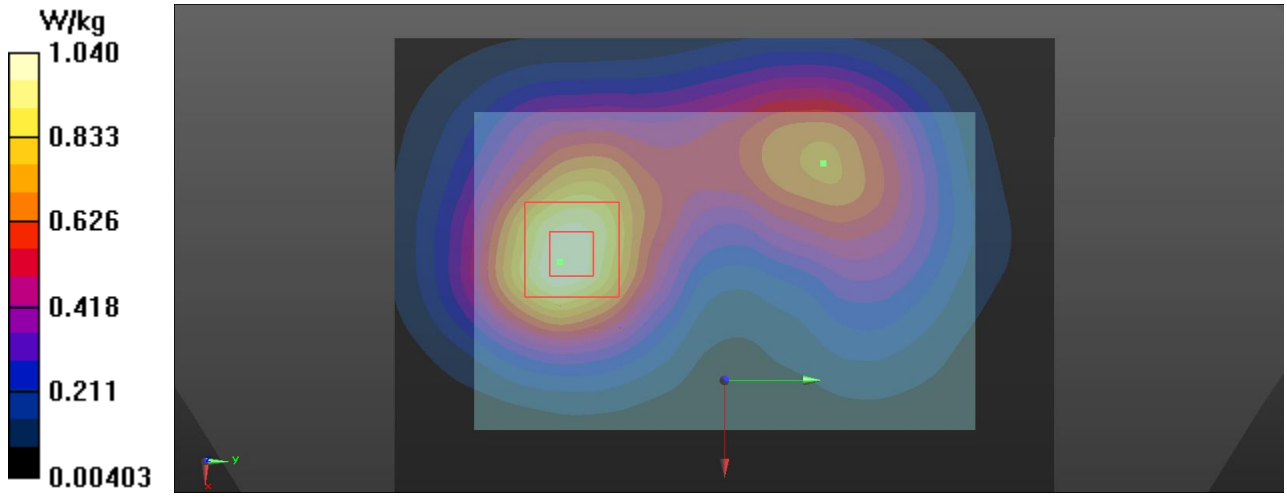
Communication System: UID 0, GPRS 1800,1900 4 slots (0); Communication System Band: 1900 4 slots; Frequency: 1909.8 MHz;Communication System PAR: 3.356 dB;
Medium parameters used: f = 1910 MHz; σ = 1.318 S/m; ε_r = 36.508; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26) @ 1909.8 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

GPRS 1900 Back 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.49 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.755 W/kg; SAR(10 g) = 0.452 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 17.1 mm
Ratio of SAR at M2 to SAR at M1 = 61.9%
Maximum value of SAR (measured) = 1.03 W/kg

GPRS 1900 Back 2 2/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.04 W/kg



Plot 15

Date/Time: 23/11/2020 18.30.36

Test Laboratory: Verkotan Oy

DUT: Gateway LTE; Model: DGL61-W

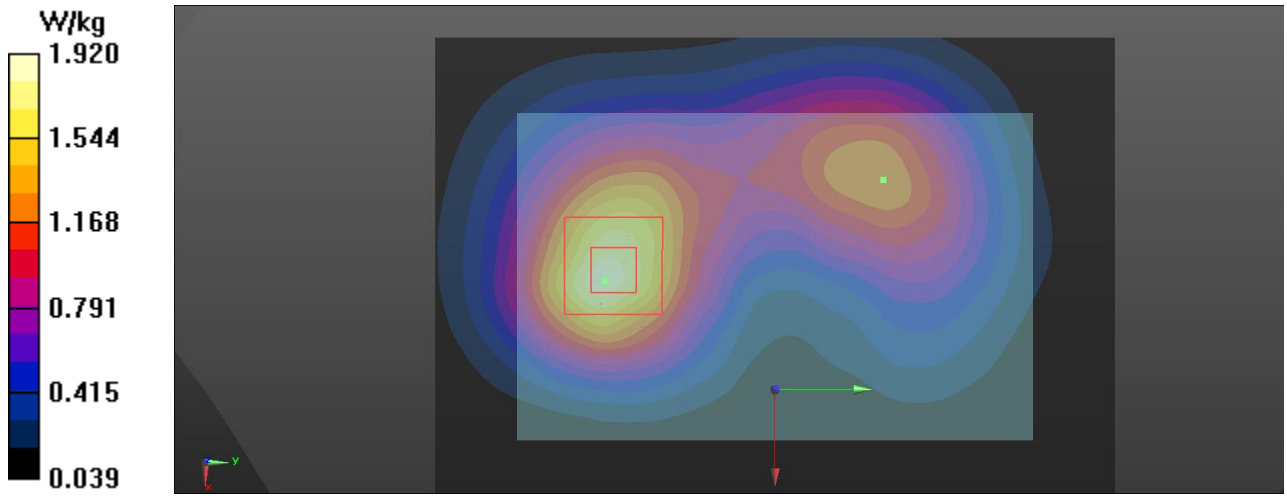
Communication System: UID 0, WCDMA (0); Communication System Band: Band 2; Frequency: 1907.6 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used: f = 1908 MHz; σ = 1.318 S/m; ε_r = 36.509; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26) @ 1907.6 MHz; Calibrated: 28/04/2020
- 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 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

WCDMA 2 back 2 2 2/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.87 W/kg

WCDMA 2 back 2 2 2/Zoom Scan (8x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 17.40 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 2.23 W/kg
SAR(1 g) = 1.38 W/kg; SAR(10 g) = 0.824 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 17.8 mm
Ratio of SAR at M2 to SAR at M1 = 59.8%
Maximum value of SAR (measured) = 1.92 W/kg



Plot 16

Date/Time: 1/21/2021 3:46:05 PM

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

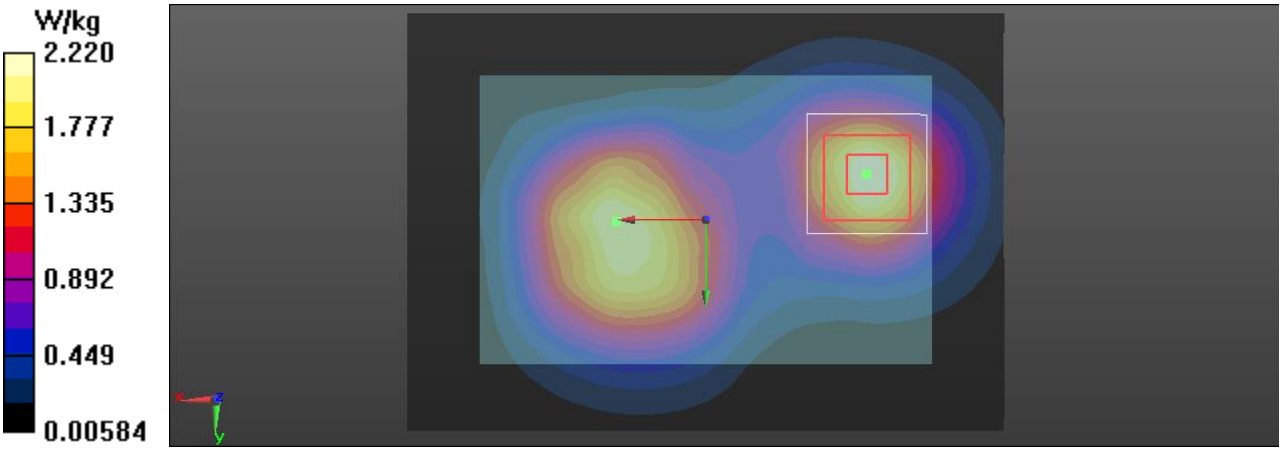
Communication System: UID 0, WCDMA (0); Communication System Band: Band 4; Frequency: 1752.6 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used: f = 1753 MHz; σ = 1.386 S/m; ε_r = 41.038; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.65, 8.65, 8.65); Calibrated: 3/25/2020;
- 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 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: xxxx
- DASY52 52.10.4(1527); SEMCAD X 14.6.10(7373)

WCDMA 2 back repeat 2 /Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 29.20 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 2.64 W/kg
SAR(1 g) = 1.56 W/kg; SAR(10 g) = 0.893 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 2.26 W/kg

WCDMA 2 back repeat 2/Area Scan (101x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 2.22 W/kg



Plot 17

Date/Time: 18/11/2020 14.41.16

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

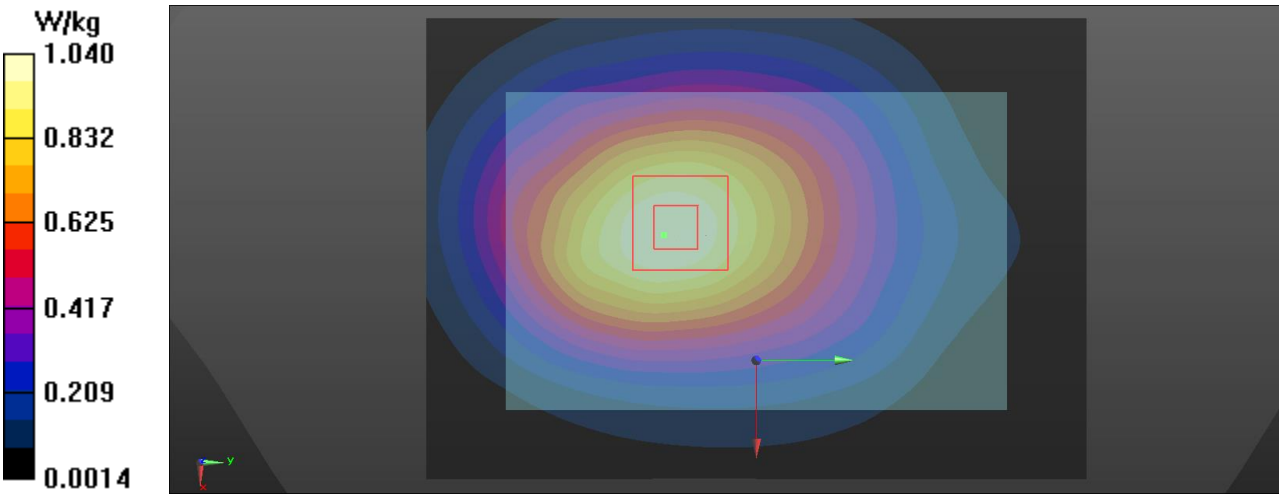
Communication System: UID 0, WCDMA (0); Communication System Band: Band 5; Frequency: 836.6 MHz;Communication System PAR: 0 dB; PMF: 1.12202e-005
Medium parameters used: f = 837 MHz; σ = 0.919 S/m; ε_r = 41.252; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(9.95, 9.95, 9.95) @ 836.6 MHz; Calibrated: 28/04/2020
- 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 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

WCDMA5 back/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.13 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 1.16 W/kg
SAR(1 g) = 0.845 W/kg; SAR(10 g) = 0.597 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 = 73.4%
Maximum value of SAR (measured) = 1.06 W/kg

WCDMA5 back/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.04 W/kg



Plot 18

Date/Time: 11/24/2020 4:11:16 PM

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

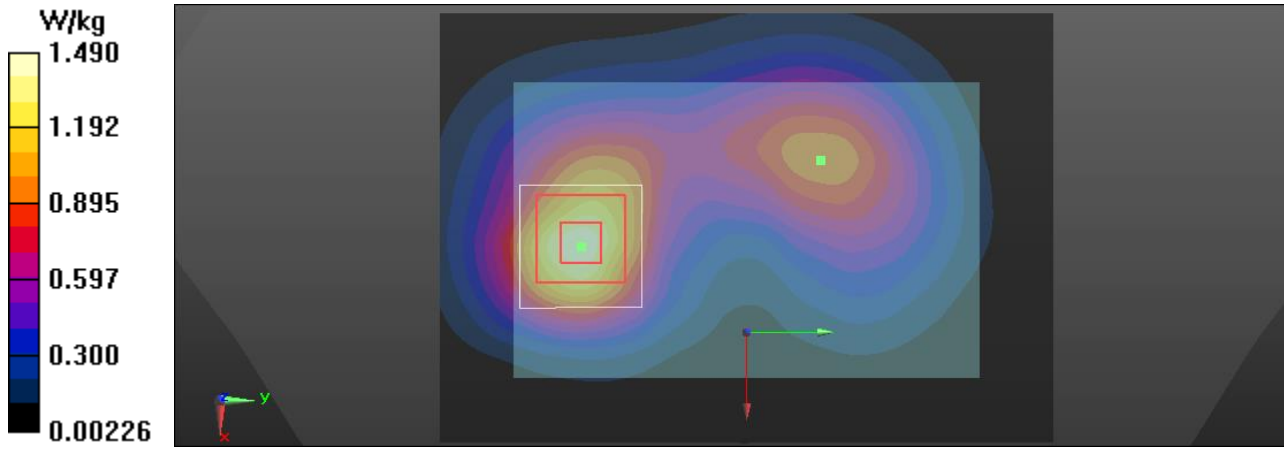
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 2, E-UTRA/FDD (1850.0 - 1910.0 MHz); Frequency: 1900 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1900 MHz; σ = 1.32 S/m; ε_r = 38.419; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(8.26, 8.26, 8.26); Calibrated: 4/28/2020;
- 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 Sn756; Calibrated: 3/17/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.10(7373)

LTE 2 Back high, BW20, 50RB offset 25/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.49 W/kg

LTE 2 Back high, BW20, 50RB offset 25/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 16.50 V/m; Power Drift = 0.18 dB
Peak SAR (extrapolated) = 1.67 W/kg
SAR(1 g) = 1.06 W/kg; SAR(10 g) = 0.626 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.44 W/kg



Plot 19

Date/Time: 1/19/2021 7:27:20 PM

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

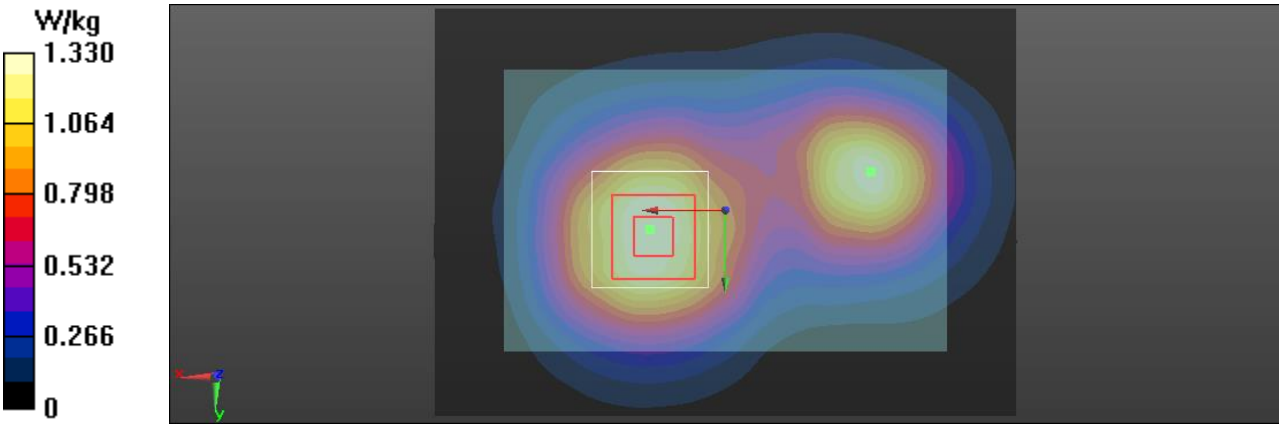
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 4, E-UTRA/FDD (1710.0 - 1755.0 MHz); Frequency: 1745 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 1745 MHz; σ = 1.391 S/m; ε_r = 42.261; ρ = 1000 kg/m^3
Phantom section: Center Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN7447; ConvF(8.65, 8.65, 8.65); Calibrated: 3/25/2020;
- 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 Sn756; Calibrated: 3/17/2020
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx;
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7373)

LTE4 Back BW20, RB50 offset 50/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 25.09 V/m; Power Drift = -0.00 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 1 W/kg; SAR(10 g) = 0.651 W/kg (SAR corrected for target medium)
Maximum value of SAR (measured) = 1.31 W/kg

LTE4 Back BW20, RB50 offset 50/Area Scan (101x71x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.33 W/kg



Plot 20

Date/Time: 18/11/2020 18.30.12

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

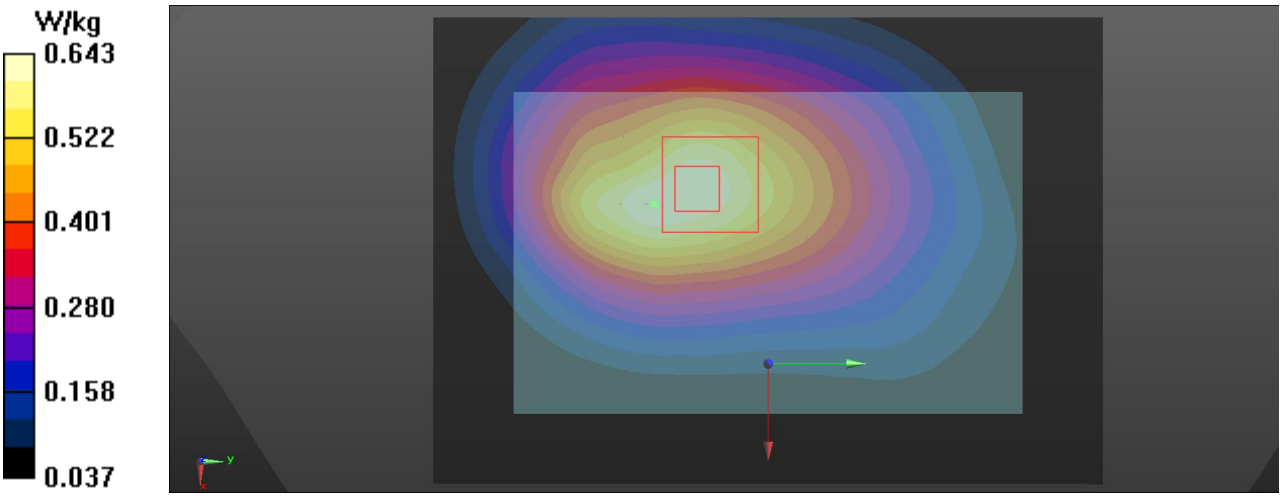
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 5, E-UTRA/FDD (824.0 - 849.0 MHz); Frequency: 844 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 844 MHz; σ = 0.923 S/m; ε_r = 41.198; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(9.95, 9.95, 9.95) @ 844 MHz; Calibrated: 28/04/2020
- 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 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Back LTE5, BW10, RB1, offset24 Back/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 0.642 W/kg

Back LTE5, BW10, RB1, offset24 Back/Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 22.42 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 0.712 W/kg
SAR(1 g) = 0.495 W/kg; SAR(10 g) = 0.348 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 27.6 mm
Ratio of SAR at M2 to SAR at M1 = 69.1%
Maximum value of SAR (measured) = 0.643 W/kg



Plot 21

Date/Time: 27/11/2020 13.23.02

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

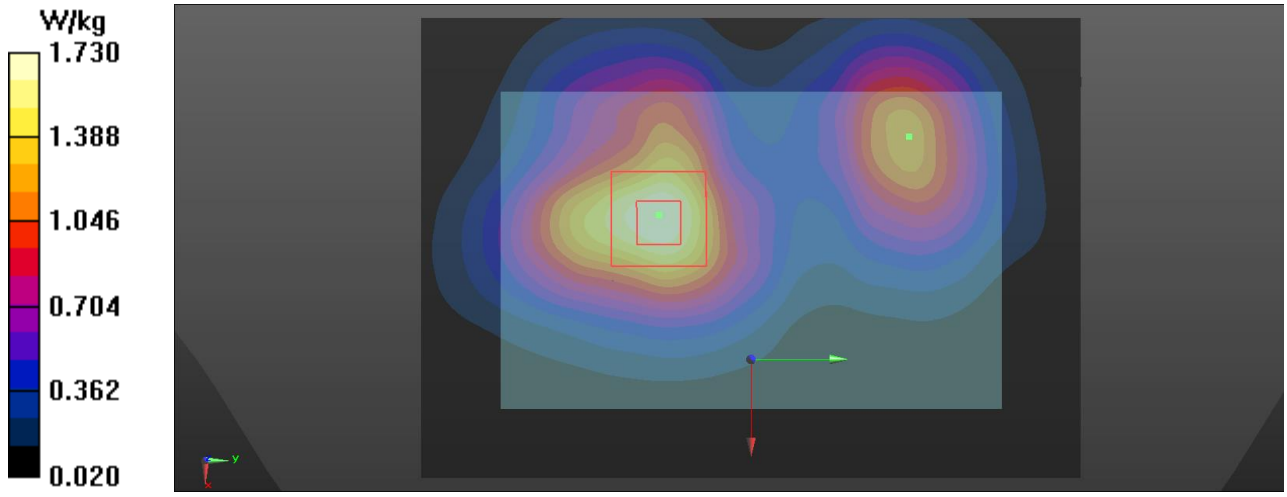
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 7, E-UTRA/FDD (2500.0 - 2570.0 MHz); Frequency: 2535 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used: f = 2535 MHz; σ = 1.822 S/m; ε_r = 38.693; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(7.33, 7.33, 7.33) @ 2535 MHz; Calibrated: 28/04/2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 31.0
- Electronics: DAE4 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Front back/LTE 7 Back Mid, BW20, RB1, offset 0 2/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.74 W/kg

Front back/LTE 7 Back Mid, BW20, RB1, offset 0 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 20.00 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 2.03 W/kg
SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.678 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 19 mm
Ratio of SAR at M2 to SAR at M1 = 58.6%
Maximum value of SAR (measured) = 1.73 W/kg



Plot 22

Date/Time: 19/11/2020 13.31.15

Test Laboratory: Verkotan Oy

DUT: Device Gateway LTE; Model: DGL61-W

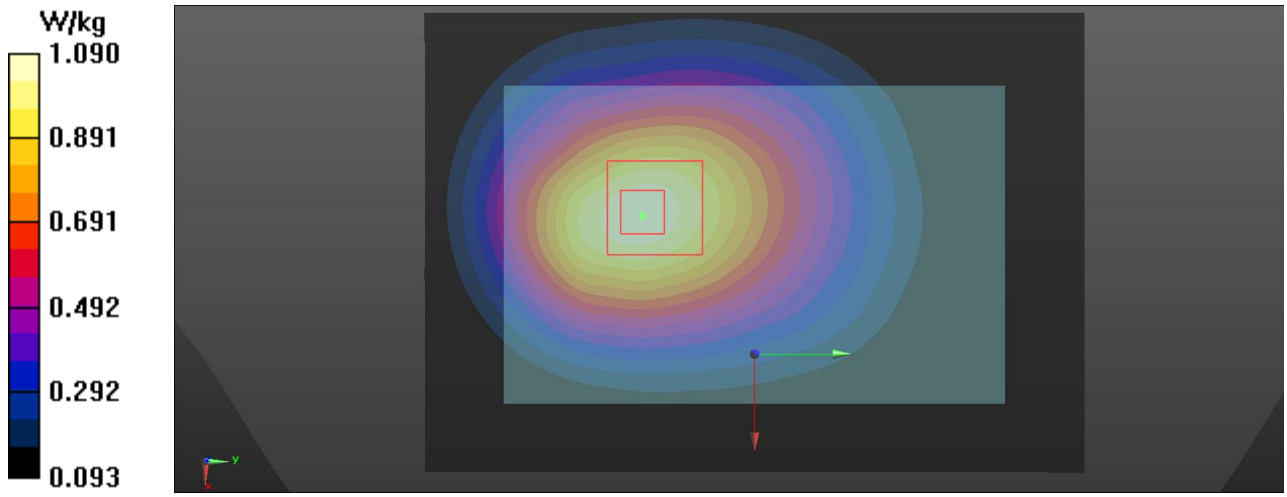
Communication System: UID 0, Generic LTE (0); Communication System Band: Band 12, E-UTRA/FDD (698.0 - 716.0 MHz); Frequency: 707.5 MHz;Communication System PAR: 0 dB; PMF: 1
Medium parameters used (interpolated): f = 707.5 MHz; σ = 0.857 S/m; ε_r = 42.26; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3892; ConvF(10.21, 10.21, 10.21) @ 707.5 MHz; Calibrated: 28/04/2020
- 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 Sn756; Calibrated: 17/03/2020
- Phantom: SAR2 frontTwin-SAM V4.0 (30deg probe tilt); Type: QD 000 P40 CC;
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

FCC LTE12, bw10, RB1, Offset 0 Back Mid/Area Scan (71x101x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 1.09 W/kg

FCC LTE12, bw10, RB1, Offset 0 Back Mid/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 30.61 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 1.20 W/kg
SAR(1 g) = 0.886 W/kg; SAR(10 g) = 0.616 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 = 72.1%
Maximum value of SAR (measured) = 1.09 W/kg



APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION

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
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: EX3-3892_Apr20**

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3892
Calibration procedure(s)	QA CAL-01.v9, QA CAL-12.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7 Calibration procedure for dosimetric E-field probes
Calibration date:	April 28, 2020

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	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: April 28, 2020

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

Certificate No: EX3-3892_Apr20 Page 1 of 9

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3892

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
600	42.7	0.88	10.46	10.46	10.46	0.10	1.20	± 13.3 %
750	41.9	0.89	10.21	10.21	10.21	0.39	0.96	± 12.0 %
900	41.5	0.97	9.95	9.95	9.95	0.38	0.92	± 12.0 %
1750	40.1	1.37	8.52	8.52	8.52	0.28	0.80	± 12.0 %
1900	40.0	1.40	8.26	8.26	8.26	0.36	0.80	± 12.0 %
2450	39.2	1.80	7.48	7.48	7.48	0.33	0.90	± 12.0 %
2600	39.0	1.96	7.33	7.33	7.33	0.34	0.90	± 12.0 %
4400	36.9	3.84	5.98	5.98	5.98	0.40	1.60	± 13.1 %
4600	36.7	4.04	5.77	5.77	5.77	0.35	1.80	± 13.1 %
4800	36.4	4.25	5.51	5.51	5.51	0.40	1.80	± 13.1 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. 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] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.
[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

Verkotan

FINAS
Finnish Accreditation Service
T287 (EN ISO/IEC 17025)

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

S C S
Schweizerischer Kalibrierdienst
Service suisse d'étalonnage
Servizio svizzero di taratura
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: EX3-7447_Mar20

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:7447

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v5, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: March 25, 2020

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	03-Apr-19 (No. 217-02892/02893)	Apr-20
Power sensor NRP-Z91	SN: 103244	03-Apr-19 (No. 217-02892)	Apr-20
Power sensor NRP-Z91	SN: 103245	03-Apr-19 (No. 217-02893)	Apr-20
Reference 20 dB Attenuator	SN: S5277 (20x)	04-Apr-19 (No. 217-02894)	Apr-20
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: March 27, 2020

DASY/EASY - Parameters of Probe: EX3DV4 - SN:7447

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.41	0.42	0.42	± 10.1 %
DCP (mV)[B]	98.5	91.0	100.2	

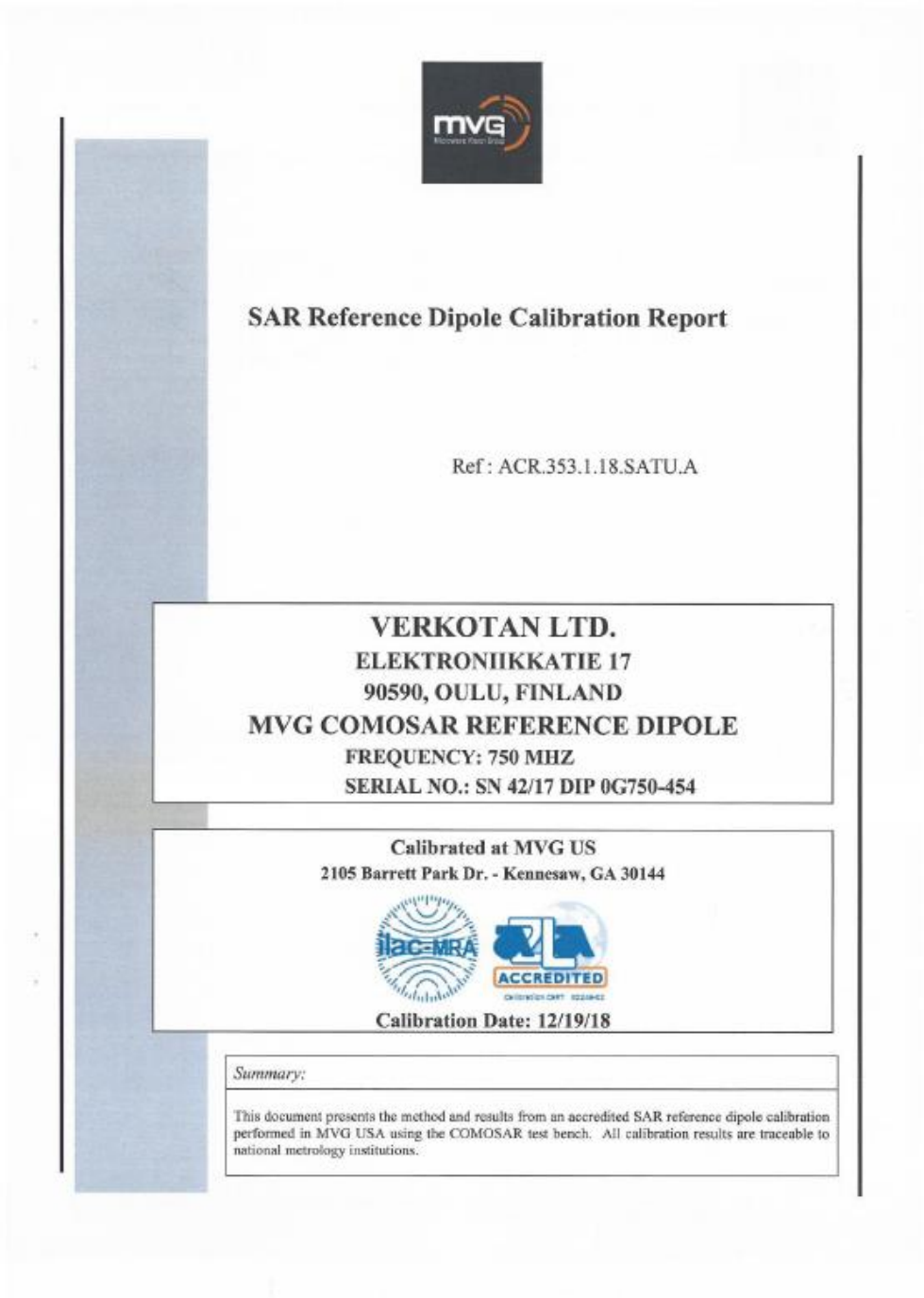
Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	197.2	± 2.7 %	± 4.7 %
		Y	0.0	0.0	1.0		185.8		
		Z	0.0	0.0	1.0		172.3		

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] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

APPENDIX E: RELEVANT PAGES FROM DIPOLE CALIBRATION REPORTS



SAR Reference Dipole Calibration Report

Ref : ACR.353.1.18.SATU.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 750 MHZ
SERIAL NO.: SN 42/17 DIP 0G750-454

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144

ACCREDITED

Calibration Date: 12/19/18

Summary:

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

1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 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.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 40.0 sigma : 0.93
Distance between dipole center and liquid	15.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=8mm/dy=8mm/dz=5mm
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49	8.52 (0.85)	5.55	5.62 (0.56)
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	

SAR Reference Dipole Calibration Report

Ref : ACR.84.3.20.MVGB.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 835 MHZ
SERIAL NO.: SN 448

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

Calibration date: 03/23/2020

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 at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 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.

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56	9.38 (0.94)	6.22	5.94 (0.59)
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	

SAR Reference Dipole Calibration Report

Ref : ACR.84.4.20.MVGB.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 1800 MHZ
SERIAL NO.: SN 249

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

Calibration date: 03/23/2020

ilac-MRA cofrac ETALONNAGE

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 at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 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.

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 41.7 sigma : 1.46
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	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-80 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %	41.7	1.40 ±10 %	1.46
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	

2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 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.

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	39.21 (3.92)	20.1	20.96 (2.10)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	

SAR Reference Dipole Calibration Report

Ref : ACR.352.4.20.MVGB.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 1800 MHZ
SERIAL NO.: SN 2D075

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

Calibration date: 12/17/20

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.

Page: 1/11

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Technical Manager	12/17/2020	
Checked by :	Jérôme LUC	Technical Manager	12/17/2020	
Approved by :	Yann Toutain	Laboratory Director	12/17/2020	Yann Toutain 2020.12.17 18:24:02 +01'00'

	Customer Name
Distribution :	Verkotan Ltd.

Issue	Name	Date	Modifications
A	Jérôme LUC	12/17/2020	Initial release

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε,')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %	43.7	1.40 ±10 %	1.34
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3300	38.2 ±10 %		2.71 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	
3700	37.7 ±10 %		3.12 ±10 %	
3900	37.5 ±10 %		3.32 ±10 %	
4200	37.1 ±10 %		3.63 ±10 %	
4600	36.7 ±10 %		4.04 ±10 %	
4900	36.3 ±10 %		4.35 ±10 %	

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 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.

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 43.7 sigma : 1.34
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	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	39.44 (3.94)	20.1	20.87 (2.09)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3300	-		-	
3500	67.1		25	
3700	67.4		24.2	
3900	-		-	
4200	-		-	
4600	-		-	
4900	-		-	

SAR Reference Dipole Calibration Report

Ref : ACR.84.5.20.MVGB.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND
SAR REFERENCE DIPOLE
FREQUENCY: 1900 MHZ
SERIAL NO.: SN 511

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

Calibration date: 03/23/2020

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 at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

The IEEE Std. 1528, FCC KDBs and CEI/IEC 62209 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.

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: eps' : 38.5 sigma : 1.45
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	30-80 %

7.2 HEAD LIQUID MEASUREMENT

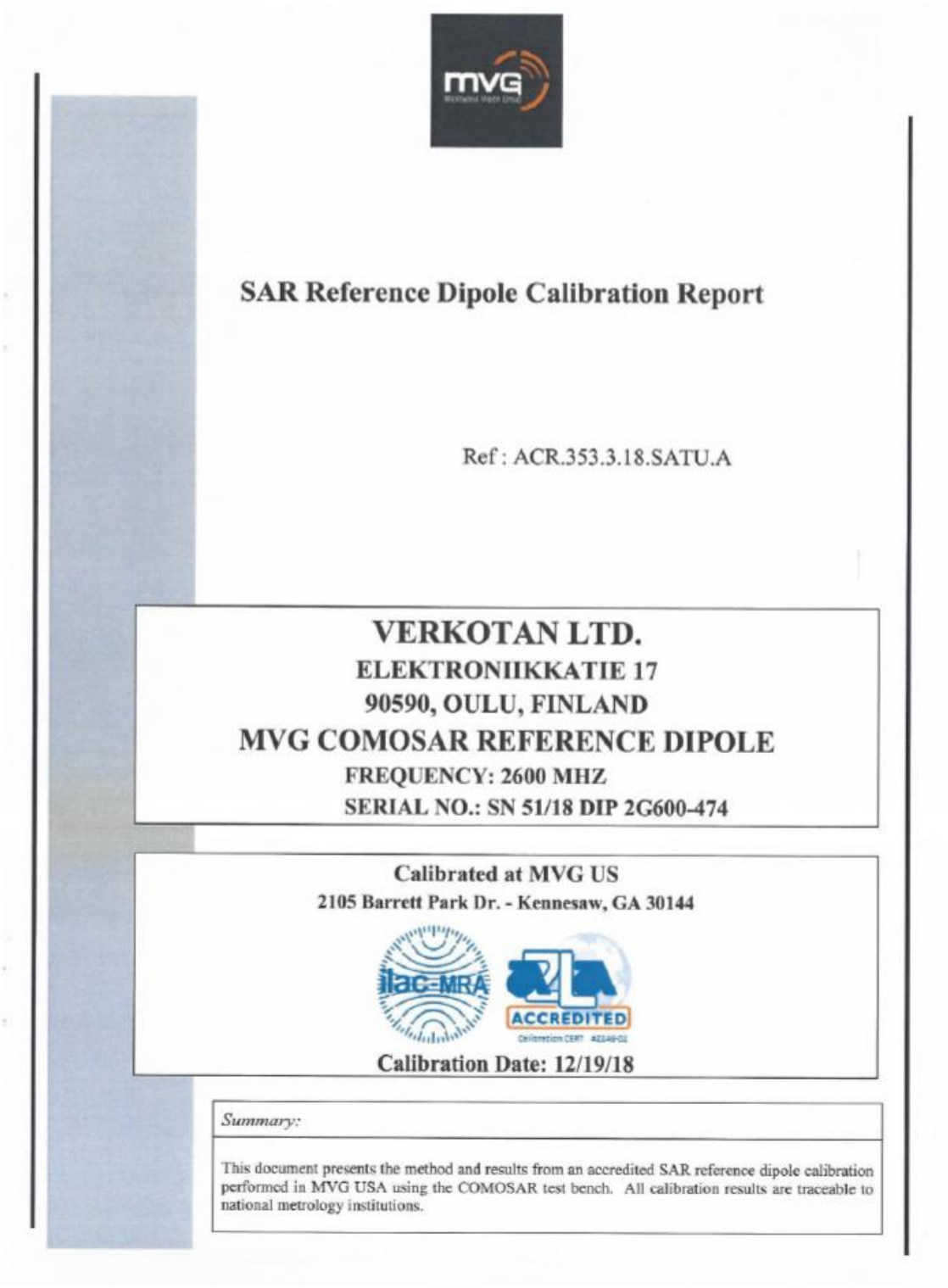
Frequency MHz	Relative permittivity (ε_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %	38.5	1.40 ±10 %	1.45
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	
2100	39.8 ±10 %		1.49 ±10 %	

2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

The IEEE Std. 1528 and CEI/IEC 62209 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.

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7	37.10 (3.71)	20.5	19.14 (1.91)
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR Reference Dipole Calibration Report

Ref : ACR.353.3.18.SATU.A

VERKOTAN LTD.
ELEKTRONIIKKATIE 17
90590, OULU, FINLAND

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2600 MHZ
SERIAL NO.: SN 51/18 DIP 2G600-474

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144

ilac-MRA ACCREDITED

Calibration Date: 12/19/18

Summary:

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

1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %	PASS	1.96 ±5 %	PASS
3000	38.5 ±5 %		2.40 ±5 %	
3500	37.9 ±5 %		2.91 ±5 %	

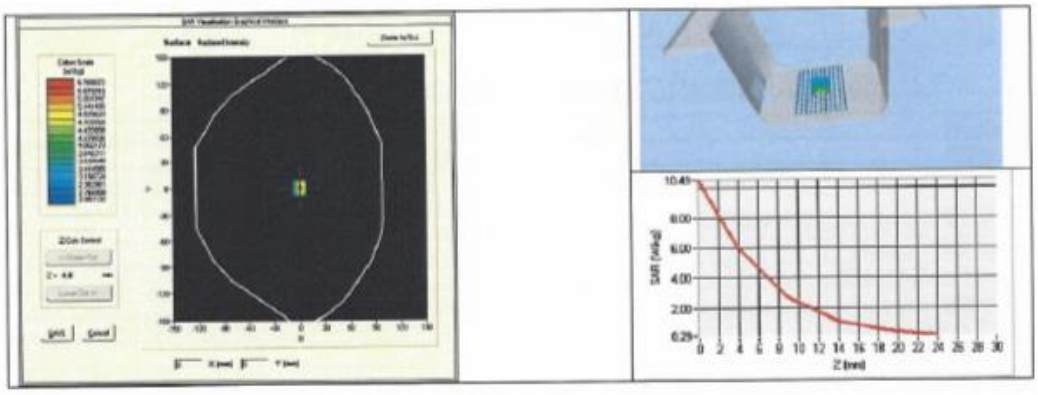
7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

The IEEE Std. 1528 and CEI/IEC 62209 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.

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 39.8 sigma : 1.99
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	

1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3	55.08 (5.51)	24.6	24.14 (2.41)
3000	63.8		25.7	
3500	67.1		25	
3700	67.4		24.2	



7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ε')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 ±5 %		0.80 ±5 %	
300	58.2 ±5 %		0.92 ±5 %	
450	56.7 ±5 %		0.94 ±5 %	
750	55.5 ±5 %		0.96 ±5 %	
835	55.2 ±5 %		0.97 ±5 %	
900	55.0 ±5 %		1.05 ±5 %	
915	55.0 ±5 %		1.06 ±5 %	
1450	54.0 ±5 %		1.30 ±5 %	
1610	53.8 ±5 %		1.40 ±5 %	
1800	53.3 ±5 %		1.52 ±5 %	
1900	53.3 ±5 %		1.52 ±5 %	
2000	53.3 ±5 %		1.52 ±5 %	
2100	53.2 ±5 %		1.62 ±5 %	