SAR Compliance Test Report

Date of Report	31/07/2024	**Client's Contact person:**	Imad Hjije
Number of pages:	66		
		Responsible Test engineer:	Ilari Kinnunen
Testing laboratory:	**Verkotan Oy** Elektroniikkatie 17 90590 Oulu Finland	**Client:**	**Trixell** 460 Rue de Pommarin 38430 Moirans France
Tested device	**Wi-Fi flat panel**		
Related reports:	-		
Testing has been carried out in accordance with:	**47CFR §2.1093** Radiofrequency Radiation Exposure Evaluation: Portable Devices **FCC published RF exposure KDB procedures** **IEC/IEEE 62209-1528, 2020** Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices **RSS-102, Issue 6, 2023** Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)		
Documentation:	The test report must always be reproduced in full; reproduction of an excerpt only is subject to written approval of the testing laboratory		
Test Results:	**The EUT complies with the requirements in respect of all parameters subject to the test.** The test results relate only to devices specified in this document		
Date and signatures:	31.07.2024 **Laboratory Manager**		

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1. SUMMARY OF SAR TEST REPORT

1.1 Test Details

Equipment under Test (DUT):

Product:	Wi-Fi flat panel
Manufacturer:	Trixell
Models:	2430EZ, 3543EZ, 3543EZh
MAC-address	78.c4.0e.c1.1e.8c, 78.c4.0e.c1.53.fc, 78.c4.0e.c1.1e.5c
FCC ID Number:	Contains FCC ID: XO2-SPB228D
ISED ID Number:	Contains IC ID: 8713A-SPB228D
DUT Number:	2430EZ: 21022 (Module 21016) 3543EZ: 21024 (Module 21020) 3543EZh: 21023 (Module 21021)
Battery Type used in testing:	Li-Ion Battery
State of the Sample:	Prototype

Testing information:

Testing performed:	04.10.2023, 18.07.2024 – 30.07.2024
Notes:	-
Document history:	Initial version
Document ID:	FCC ISED_SAR report_X-Ray ID6786_31072024.docx
Temperature °C	22±2 / Controlled
Humidity RH%	30±20 / Controlled
Measurement performed by:	Ilari Kinnunen
FCC Test Firm Designation Number:	FI0005
ISED Company Number:	22218

1.2 Maximum Results

The maximum reported* SAR values for Body-worn for transmitting systems are shown in a table below. The device conforms to the requirements of the standards when the maximum reported SAR value is less than or equal to the limit. The SAR limit specified in FCC 47 CFR part 2 (2.1093) and Health Canada's RF exposure guideline, Safety Code 6 for Head/Body SAR_{1g} is 1.6 W/kg.

1.2.1 Standalone SAR

System	Highest Reported* SAR_{1g}(W/kg) in Body-Worn Exposure Condition, 5mm separation distance	Result
2.4 GHz WLAN	**0.03**	**PASS**
5 GHz WLAN	**0.09**	**PASS**
Bluetooth	**0.04****	**PASS**

* Reported SAR Values are scaled to upper limit of power tuning tolerance.
** Bluetooth SAR measured at 0mm separation distance

1.2.2 Simultaneous Transmission SAR

Highest Simultaneous Transmission SAR	SAR_{1g}(W/kg) in Body-Worn Exposure Condition	Result
5 GHz WLAN + Bluetooth	**0.13**	**PASS**

1.2.3 Maximum Drift

Maximum Drift During Measurements	-1.04dB*

*Larger than 5% drifts included to scaling factors

1.2.4 Measurement Uncertainty

DASY5:

SAR 1g: 0.3 – 3 GHz:

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

SAR 1g: 3 – 6 GHz:

Expanded Uncertainty (k=2) 95 %	±24.0 %

DASY8:

SAR 1g: 0.3 – 3 GHz:

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

SAR 1g: 3 – 6 GHz:

Expanded Uncertainty (k=2) 95 %	±23.3 %

2. DESCRIPTION OF THE DEVICE UNDER TEST (DUT)

The DUT is a flat panel X-Ray detector, which supports 2.4 GHz WLAN, 5 GHz WLAN and Bluetooth.

Device Category	Portable
Exposure Environment	General population uncontrolled

2.1 Supported Frequency Bands and Operational Modes

TX Frequency bands	Modes of Operation	Transmitter Frequency Range [MHz]
	WLAN 2.4 GHz	2412 – 2462
	WLAN 5GHz	5180 – 5825
	Bluetooth	2402 – 2480

2.2 Simultaneous transmission

- 2.4 GHz WLAN supports 2x2 MIMO
- 5 GHz WLAN supports 2x2 MIMO
- 2.4 GHz WLAN & Bluetooth
- 5 GHz WLAN & Bluetooth

3. OUTPUT POWER

3.1 Maximum specified conducted output power

From the customer, including tune-up tolerances;

WLAN 2.4GHz	Max Output Power [dBm]	Tune-up Tolerance [dBm]
802.11b	14	±1.5
802.11g	14	±1.5
802.11n, HT20	14	±1.5
802.11n, HT40	14	±1.5

WLAN 5GHz	Max Output Power [dBm]	Tune-up Tolerance [dBm]
802.11a	14	±1.5
802.11n, HT20	14	±1.5
802.11n, HT40	14	±1.5
802.11ac, VHT20	14	±1.5
802.11ac, VHT40	11	±1.5
802.11ac, VHT80	10	±1.5

Bluetooth	Max Output Power [dBm]	Tune-up Tolerance [dBm]
Bluetooth BR	6.5	±1.5
Bluetooth EDR	6.5	±1.5
Bluetooth LE	6.5	±1.5

3.2 Tested conducted power

The DUT has two transmitting antennas, model FXP831.07.0100C manufactured by TAOGLAS. According to antenna datasheet, maximum antenna gains for the DUT in free space are 2.5 dBi at 2.4 GHz and 4.5 dBi at 4.9 GHz - 6 GHz. Maximum antenna gains on plastic are 3 dBi at 2.4 GHz and 5.5 dBi at 4.9 GHz - 6 GHz.

Measured conducted output power at transmitting antenna connector;

2.4 GHz WLAN:

Standard	Antenna	Mode	Output power [dBm]	
			CH 3 2422 MHz	CH 9 2452 MHz
802.11n	A	HT40, MCS0	13.37	13.31
802.11n	B	HT40, MCS0	13.44	13.38

5GHz WLAN:

Standard	Channel	Frequency [MHz]	Antenna	Mode	Output power [dBm]
802.11n	54	5270	A	HT40, MCS0	13.42
802.11n	62	5310	A	HT40, MCS0	13.15
802.11n	102	5510	A	HT40, MCS0	13.81
802.11n	118	5590	A	HT40, MCS0	14.37
802.11n	126	5630	A	HT40, MCS0	14.43
802.11n	142	5710	A	HT40, MCS0	14.81
802.11n	151	5755	A	HT40, MCS0	14.92
802.11n	159	5795	A	HT40, MCS0	14.95
802.11n	54	5270	B	HT40, MCS0	13.88
802.11n	62	5310	B	HT40, MCS0	14.51
802.11n	102	5510	B	HT40, MCS0	14.59
802.11n	118	5590	B	HT40, MCS0	14.13
802.11n	126	5630	B	HT40, MCS0	14.26
802.11n	142	5710	B	HT40, MCS0	13.97
802.11n	151	5755	B	HT40, MCS0	14.26
802.11n	159	5795	B	HT40, MCS0	14.32

Bluetooth:

Standard	Antenna	Packet Type	Output power [dBm]		
			CH 0 2402 MHz	CH 39 2441 MHz	CH 78 2480 MHz
Bluetooth	B	DH5	6.59	6.4	6.19

4. TEST EQUIPMENT

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

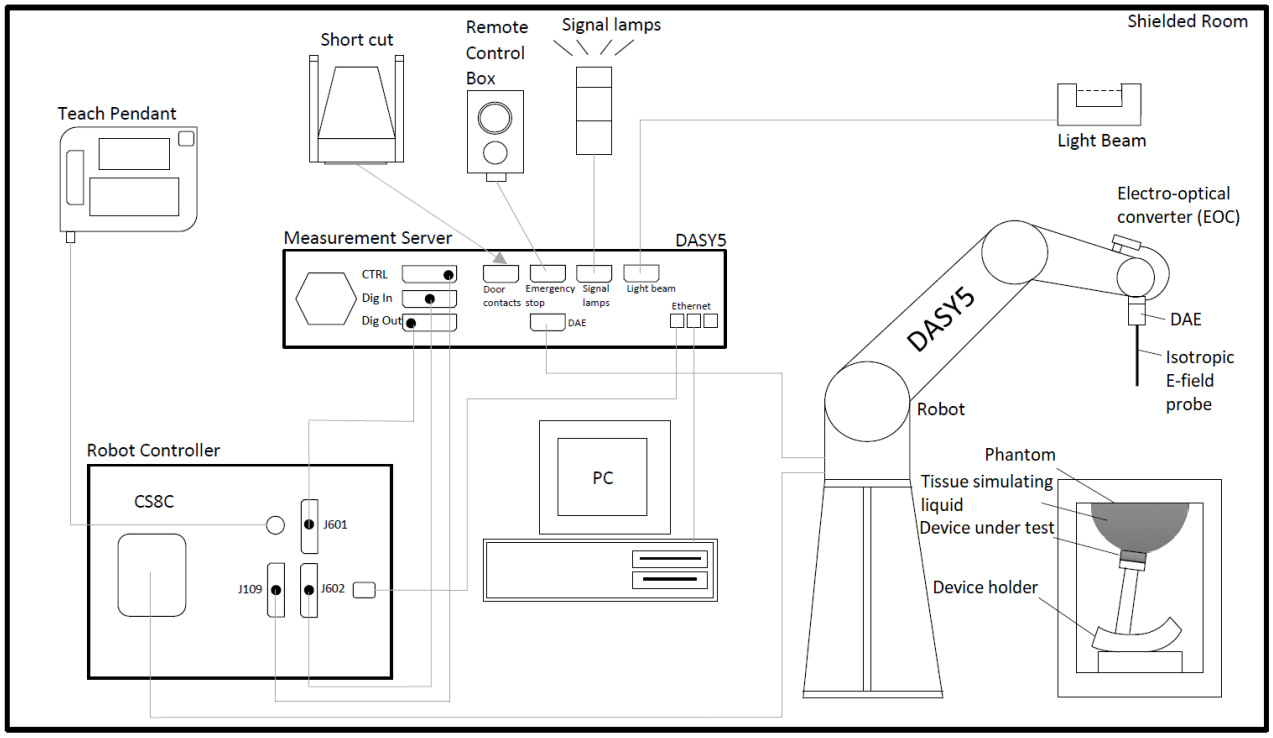


Figure 1 Schematic Laboratory Picture

4.1 Test Equipment List

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

04.10.2023:

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 800-4200MHz, 50W	5163F	1022	NA	NA
Inline Peak Power Sensor	MA24105A	2102058	11/2022	1
Network Analyzer	E5071C	MY46102812	05/2023	1
Power Sensor	NRP-Z11	100265	12/2022	1
System validation dipole	D2450V2	729	07/2022	3
System validation dipole	D5GHzV2	1045	03/2023	3
Isotropic DOS probe	EX3DV4	7827	06/2023	1
Vector Signal Generator	SMP02	836402/004	NA	NA
DAE4, converter	DAE4ip	1774	06/2023	1
DASY8 Software	16.2.4.2524	NA	NA	NA

18.07.2024 – 30.07.2024:

Test Equipment	Model	Serial Number	Calibration Date	Interval [years]
Amplifier, 800MHz-4200MHz, 10W	10S1G4A	320421	NA	NA
DAE4, converter	DAE4	710	10/2023	1
Inline Peak Power Sensor	MA24105A	2102058	10/2023	1
Isotropic DOS probe	EX3DV4	3852	10/2023	1
Network Analyzer	E5071B	MY42301191	03/2024	1
Power Sensor	NRP8S	1419.0006K02-108508-HC	09/2023	2
System validation dipole	D2450V2	729	07/2022	3
System validation dipole	D5GHzV2	1045	03/2023	3
Vector Network Analyzer	P5008A	MY58100258	05/2024	1
Vector Signal Generator	MG3710A	6201502519	NA	1

4.1.1 Isotropic E-field Probe Type EX3DV4

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

4.2 Phantoms

Eli Phantom:

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

4.3 Tissue Simulants

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

Tissue simulant liquid Ingredients
Deionized Water, tween, salt

4.4 System Validation Status

Frequency [MHz]	Dipole Type / SN	Probe Type / SN	Calibrated Signal Type	DAE Unit / SN	Dielectric Constant [ε']	Conductivity σ [S/m]	Date
2450	D2450V2 - SN: 758	EX3DV4 - SN: 3852	CW	DAE 4 / 710	38.16	1.69	11/2023
5250	D5GHzV2 - SN: 1014	EX3DV4 - SN: 3852	CW	DAE 4 / 710	37.55	4.49	12/2023
5600	D5GHzV2 - SN: 1014	EX3DV4 - SN: 3852	CW	DAE 4 / 710	36.93	4.89	12/2023
5750	D5GHzV2 - SN: 1014	EX3DV4 - SN: 3852	CW	DAE 4 / 710	36.55	4.99	12/2023
2450	D2450V2 - SN: 758	EX3DV4 - SN: 7827	SMC	DAE4ip / 1774	38.89	1.69	07/2023

4.5 System Check

Date	Tissue Type	Tissue Temp. [°C]	Frequency [MHz]	Input Power [mW]	Measured SAR_{1g} [W/kg]	1 W Target SAR_{1g} [W/kg]	1 W Normalized SAR_{1g} [W/kg]	Deviation [%]	Plot #
04/10/2023	WB Head	22	2450	250	12.4	52.3	49.6	-5.16	1
19/07/2024	WB Head	22	2450	250	11.9	52.3	47.6	-9.0	2
22/07/2024	WB Head	22	2450	250	12	52.3	48	-8.2	3
23/07/2024	WB Head	22	5250	100	6.74	73.09	67.4	-7.8	4
24/07/2024	WB Head	22	5250	100	6.87	73.09	68.7	-6.0	5
24/07/2024	WB Head	22	5600	100	7.21	72.92	72.1	-1.1	6
25/07/2024	WB Head	22	5600	100	7.09	72.92	70.9	-2.8	7
29/07/2024	WB Head	22	5750	100	6.68	69.05	66.8	-3.3	8
30/07/2024	WB Head	22	5250	100	6.79	73.09	67.9	-7.1	9
30/07/2024	WB Head	22	5750	100	6.81	69.05	68.1	-1.4	10

4.6 Tissue Simulant Verification

				Measured		Target		Deviation	
Date	Tissue Type	Tissue Temp [°C]	Frequency [MHz]	Dielectric Constant [ε]	Conductivity σ [S/m]	Dielectric Constant [ε] Target	Conductivity σ [S/m] Target	ε [%]	σ [%]
04.10.2023	WB Head	21	2402	39.28	1.76	38.71	1.64	-1.5	-6.9
04.10.2023	WB Head	21	2441	39.22	1.79	38.65	1.66	-1.4	-7.3
04.10.2023	WB Head	21	2450	39.2	1.8	38.64	1.67	-1.4	-7.4
04.10.2023	WB Head	21	2480	39.16	1.83	38.6	1.69	-1.4	-8.0
19.07.2024	WB Head	22	2422	38.64	1.78	39.25	1.78	-1.6	0.0
19.07.2024	WB Head	22	2450	38.6	1.79	39.2	1.8	-1.5	-0.3
22.07.2024	WB Head	22	2422	38.36	1.71	39.25	1.77	-2.3	-3.4
22.07.2024	WB Head	22	2450	38.3	1.73	39.2	1.8	-2.3	-3.7
22.07.2024	WB Head	22	2452	38.3	1.73	39.2	1.8	-2.3	-3.7
23.07.2024	WB Head	22	5250	34.93	4.59	35.95	4.71	-2.8	-2.5
23.07.2024	WB Head	22	5270	34.91	4.61	35.93	4.73	-2.8	-2.5
23.07.2024	WB Head	22	5310	34.84	4.64	35.89	4.77	-2.9	-2.6
24.07.2024	WB Head	22	5250	35.15	4.68	35.95	4.71	-2.2	-0.7
24.07.2024	WB Head	22	5270	35.12	4.69	35.93	4.73	-2.3	-0.8
24.07.2024	WB Head	22	5510	34.77	4.91	35.64	4.98	-2.4	-1.4
24.07.2024	WB Head	22	5600	34.63	4.99	35.5	5.07	-2.4	-1.5
24.07.2024	WB Head	22	5710	34.48	5.1	35.39	5.18	-2.6	-1.6
25.07.2024	WB Head	22	5510	34.46	4.9	35.64	4.98	-3.3	-1.4
25.07.2024	WB Head	22	5600	34.33	4.99	35.5	5.07	-3.3	-1.6
25.07.2024	WB Head	22	5630	34.29	5.02	35.47	5.1	-3.3	-1.6
25.07.2024	WB Head	22	5710	34.18	5.1	35.39	5.18	-3.4	-1.6
29.07.2024	WB Head	22	5750	34.32	4.97	35.35	5.22	-2.9	-4.8
29.07.2024	WB Head	22	5755	34.31	4.98	35.34	5.22	-2.9	-4.8
29.07.2024	WB Head	22	5795	34.26	5.01	35.3	5.26	-3.0	-4.8
30.07.2024	WB Head	22	5250	34.82	4.53	35.95	4.71	-3.2	-3.8
30.07.2024	WB Head	22	5310	34.73	4.58	35.89	4.77	-3.2	-3.9
30.07.2024	WB Head	22	5750	34.14	4.97	35.35	5.22	-3.4	-4.9
30.07.2024	WB Head	22	5755	34.13	4.97	35.34	5.22	-3.4	-4.9
30.07.2024	WB Head	22	5795	34.08	5.01	35.3	5.26	-3.5	-4.9

5. TEST PROCEDURE

Testing was carried out in accordance with FCC KDB Publications 447498 D04 Interim General RF Exposure Guidance v01, 248227 D01 802.11 Wi-Fi SAR and RSS-102, Issue 6.

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

Control software for WLAN was used to set the DUT to transmit at maximum power and 100% duty cycle.

The WLAN transmission modes for testing were selected according to largest channel bandwidth configuration, lowest order modulation and lowest data rate.
2.4 GHz WLAN was tested with 802.11n standard in mode HT40, MCS0 and WLAN 5GHz was tested with 802.11n in mode HT40, MCS0.

Control software for Bluetooth was used to set the DUT to transmit at maximum power. Bluetooth was tested in BR mode using packet type DH5, which provided the highest duty cycle of 77.4%.

Three different variants were evaluated, each containing the same wireless module and antennas. Difference between the antennas were height, width and depth. Smallest variant (2430EZ) was tested fully, and spot checks were then made with the two larger ones (3543EZ & 3543EZh).

5.1 Device Holder

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

Device holder supplied by SPEAG

5.2 Test Positions

5.2.1 Body-worn Configuration, 5mm separation distance

WLAN 2.4 GHz & WLAN 5 GHz Body SAR was tested from the front, back, left, right and top sides. The device was placed in the SPEAG holder/on the top of a Rohacell and lifted towards the phantom until the distance between the phantom and the device was 5mm.

Photos of the test positions are presented in appendix A

5.2.2 Body-worn Configuration, 0mm separation distance

Bluetooth Body SAR was tested from the front, back, left, right and top sides. The device was placed in the SPEAG holder/on the top of a Rohacell and lifted towards the phantom until the distance between the phantom and the device was 0mm resulting overestimation of Body SAR at 5mm.

Photos of the test positions are presented in appendix A

5.3 Scan Procedures

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

5.4 SAR Averaging Methods

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

The interpolation, extrapolation and maximum search routines within Dasy are all based on the modified Quadratic Shepard's method (Robert J. Renka," Multivariate Interpolation of Large Sets of Scattered Data", University of North Texas ACM Transactions on Mathematical Software, vol. 14, no. 2, June 1988, pp. 139-148).
The interpolation scheme combines a least-square fitted function method with a weighted average method. A trivariate 3-D / bivariate 2-D quadratic function is computed for each measurement point and fitted to neighboring points by a least-square method. For the zoom scan, inverse distance weighting is incorporated to fit distant points more accurately. The interpolating function is finally calculated as a weighted average of the quadratics.

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

6. MEASUREMENT UNCERTAINTY

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

DASY5 Uncertainty Budget

According to IEC/IEEE 62209-1528

(Frequency band: 300MHz - 3GHz range)

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

DASY8 Uncertainty Budget

According to IEC/IEEE 62209-1528

(Frequency band: 300 MHz–3 GHz range)

Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) (1 g)	(c_i) (10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)
Measurement System Errors								
CF	Probe Calibration	±12.0%	N	2	1	1	±6.0%	±6.0%
CF_{drift}	Probe Calibration Drift	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±3.0%	R	$\sqrt{3}$	1	1	±1.7%	±1.7%
ISO	Probe Isotropy	±7.6%	R	$\sqrt{3}$	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±0.7%	N	1	1	1	±0.7%	±0.7%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ_{sys}	Probe Positioning	±0.006 mm	N	1	0.14	0.14	±0.10%	±0.10%
DAT	Data Processing	±1.2%	N	1	1	1	±1.2%	±1.2%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.)^{DAK}	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T_σ)	Conductivity (temp.)^{BB}	±3.3%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	$\sqrt{3}$	0	0	±0%	±0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D_{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation^{m}	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
RF_{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc.^{val}	±0.0%	N	1	1	1	±0%	±0%
RF_{in}	Unc. Input Power^{val}	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling^{p}	±0%	R	$\sqrt{3}$	1	1	±0%	±0%
u(ΔSAR)	Combined Uncertainty						±10.9%	±10.9%
U	**Expanded Uncertainty**						±21.9%	±21.8%

DASY8 Uncertainty Budget

According to IEC/IEEE 62209-1528

(Frequency band: 3 GHz–6 GHz range)

Symbol	Error Description	Uncert. value	Prob. Dist.	Div.	(c_i) (1 g)	(c_i) (10 g)	Std. Unc. (1 g)	Std. Unc. (10 g)
Measurement System Errors								
CF	Probe Calibration	±13.1%	N	2	1	1	±6.55%	±6.55%
CF_{drift}	Probe Calibration Drift	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
LIN	Probe Linearity	±4.7%	R	$\sqrt{3}$	1	1	±2.7%	±2.7%
BBS	Broadband Signal	±2.6%	R	$\sqrt{3}$	1	1	±1.5%	±1.5%
ISO	Probe Isotropy	±7.6%	R	$\sqrt{3}$	1	1	±4.4%	±4.4%
DAE	Other Probe+Electronic	±1.2%	N	1	1	1	±1.2%	±1.2%
AMB	RF Ambient	±1.8%	N	1	1	1	±1.8%	±1.8%
Δ_{xyz}	Probe Positioning	±0.005 mm	N	1	0.29	0.29	±0.15%	±0.15%
DAT	Data Processing	±2.3%	N	1	1	1	±2.3%	±2.3%
Phantom and Device Errors								
LIQ(σ)	Conductivity (meas.)^{DAK}	±2.5%	N	1	0.78	0.71	±2.0%	±1.8%
LIQ(T_σ)	Conductivity (temp.)^{BB}	±3.4%	R	$\sqrt{3}$	0.78	0.71	±1.5%	±1.4%
EPS	Phantom Permittivity	±14.0%	R	$\sqrt{3}$	0.25	0.25	±2.0%	±2.0%
DIS	Distance DUT – TSL	±2.0%	N	1	2	2	±4.0%	±4.0%
D_{xyz}	Device Positioning	±1.0%	N	1	1	1	±1.0%	±1.0%
H	Device Holder	±3.6%	N	1	1	1	±3.6%	±3.6%
MOD	DUT Modulation^{m}	±2.4%	R	$\sqrt{3}$	1	1	±1.4%	±1.4%
TAS	Time-average SAR	±1.7%	R	$\sqrt{3}$	1	1	±1.0%	±1.0%
RF_{drift}	DUT drift	±2.5%	N	1	1	1	±2.5%	±2.5%
VAL	Val Antenna Unc.^{val}	±0.0%	N	1	1	1	±0%	±0%
RF_{in}	Unc. Input Power^{val}	±0.0%	N	1	1	1	±0%	±0%
Correction to the SAR results								
C(ε, σ)	Deviation to Target	±1.9%	N	1	1	0.84	±1.9%	±1.6%
C(R)	SAR scaling^{p}	±0%	R	$\sqrt{3}$	1	1	±0%	±0%
u(ΔSAR)	Combined Uncertainty						±11.6%	±11.5%
U	**Expanded Uncertainty**						±23.3%	±23.0%

7. TEST RESULTS

7.1 SAR Results for Body Exposure Condition with 5mm separation

2.4 GHz WLAN:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	2422	3	A	Top 5mm	15.5	13.37	0.0141	0.76**	1.95	1:1	0.03	11
802.11n	HT40, MCS0	2422	3	A	Front 5mm	15.5	13.37	0.000000757	N/A***	1.63	1:1	0.000001	
802.11n	HT40, MCS0	2422	3	A	Back 5mm	15.5	13.37	0****	N/A***	1.63	1:1	0****	
802.11n	HT40, MCS0	2422	3	A	Right 5mm	15.5	13.37	0****	N/A***	1.63	1:1	0****	
802.11n	HT40, MCS0	2422	3	A	Left 5mm	15.5	13.37	0****	N/A***	1.63	1:1	0****	
802.11n	HT40, MCS0	2452	9	A	Top 5mm	15.5	13.31	0.00391	0.8**	1.99	1:1	0.01	
802.11n	HT40, MCS0	2422	3	B	Top 5mm	15.5	13.44	0.00000616	N/A***	1.61	1:1	0.00001	
802.11n	HT40, MCS0	2422	3	B	Front 5mm	15.5	13.44	0****	N/A***	1.61	1:1	0****	
802.11n	HT40, MCS0	2422	3	B	Back 5mm	15.5	13.44	0****	N/A***	1.61	1:1	0****	
802.11n	HT40, MCS0	2422	3	B	Right 5mm	15.5	13.44	0****	N/A***	1.61	1:1	0****	
802.11n	HT40, MCS0	2422	3	B	Left 5mm	15.5	13.44	0.00338	N/A***	1.61	1:1	0.01	
802.11n	HT40, MCS0	2452	9	B	Left 5mm	15.5	13.38	0****	N/A***	1.63	1:1	0****	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.

3543EZ:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	2422	3	A	Top 5mm	15.5	13.37	0.00288	0.18	1.633	1:1	0.005	
802.11n	HT40, MCS0	2422	3	B	Left 5mm	15.5	13.44	0****	N/A***	1.607	1:1	0****	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.

3543EZh:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	2422	3	A	Top 5mm	15.5	13.37	0.00474	0.45**	1.81	1:1	0.01	
802.11n	HT40, MCS0	2422	3	B	Left 5mm	15.5	13.44	0.0000283 *****	N/A***	1.61	1:1	0.00005 *****	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
*****Due to low e-field generated by DUT, only area scan result available

5 GHz WLAN, UNII 2A:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5270	54	A	Top 5mm	15.5	13.42	0.039	N/A***	1.61	1:1	0.06	12
802.11n	HT40, MCS0	5270	54	A	Front 5mm	15.5	13.42	N/A****	N/A***	1.61	1:1	0.00	
802.11n	HT40, MCS0	5270	54	A	Back 5mm	15.5	13.42	0.000112 *****	N/A***	1.61	1:1	0.0002 *****	
802.11n	HT40, MCS0	5270	54	A	Right 5mm	15.5	13.42	0.0000651 *****	N/A***	1.61	1:1	0.0001 *****	
802.11n	HT40, MCS0	5270	54	A	Left 5mm	15.5	13.42	N/A****	N/A***	1.61	1:1	0.00	
802.11n	HT40, MCS0	5310	62	A	Top 5mm	15.5	13.15	0.00957	N/A***	1.72	1:1	0.02	
802.11n	HT40, MCS0	5310	62	B	Top 5mm	15.5	14.51	0.00707	N/A***	1.26	1:1	0.01	
802.11n	HT40, MCS0	5310	62	B	Front 5mm	15.5	14.51	N/A****	N/A***	1.26	1:1	0.00	
802.11n	HT40, MCS0	5310	62	B	Back 5mm	15.5	14.51	N/A****	N/A***	1.26	1:1	0.00	
802.11n	HT40, MCS0	5310	62	B	Right 5mm	15.5	14.51	N/A****	N/A***	1.26	1:1	0.00	
802.11n	HT40, MCS0	5310	62	B	Left 5mm	15.5	14.51	N/A****	N/A***	1.26	1:1	0.00	
802.11n	HT40, MCS0	5270	54	B	Top 5mm	15.5	13.88	0.0268	N/A***	1.45	1:1	0.04	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.
*****Due to low e-field generated by DUT, only area scan result available

3543EZ:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5270	54	A	Top 5mm	15.5	13.42	0.0131	N/A***	1.61	1:1	0.02	
802.11n	HT40, MCS0	5270	54	B	Top 5mm	15.5	13.88	0.0284	N/A***	1.45	1:1	0.04	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable

3543EZh:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5270	54	A	Top 5mm	15.5	13.42	0.0143	-1.04**	2.05	1:1	0.029	
802.11n	HT40, MCS0	5270	54	B	Top 5mm	15.5	13.88	0.0165	-0.82**	1.75	1:1	0.029	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors

5 GHz WLAN, UNII 2C:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift** [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5710	142	A	Top 5mm	15.5	14.81	0.0111	N/A***	1.17	1:1	0.01	
802.11n	HT40, MCS0	5710	142	A	Front 5mm	15.5	14.81	0.0000904 *****	N/A***	1.17	1:1	0.0001	
802.11n	HT40, MCS0	5710	142	A	Back 5mm	15.5	14.81	0****	N/A***	1.17	1:1	0****	
802.11n	HT40, MCS0	5710	142	A	Right 5mm	15.5	14.81	0****	N/A***	1.17	1:1	0****	
802.11n	HT40, MCS0	5710	142	A	Left 5mm	15.5	14.81	0****	N/A***	1.17	1:1	0****	
802.11n	HT40, MCS0	5510	102	A	Top 5mm	15.5	13.81	0.0605	N/A***	1.48	1:1	0.09	13
802.11n	HT40, MCS0	5630	126	A	Top 5mm	15.5	14.43	0.00426	N/A***	1.28	1:1	0.01	
802.11n	HT40, MCS0	5510	102	B	Top 5mm	15.5	14.59	0.00432	N/A***	1.23	1:1	0.01	
802.11n	HT40, MCS0	5510	102	B	Front 5mm	15.5	14.59	0.000109 *****	N/A***	1.23	1:1	0.0001 *****	
802.11n	HT40, MCS0	5510	102	B	Back 5mm	15.5	14.59	0.000114	N/A***	1.23	1:1	0.0001	
802.11n	HT40, MCS0	5510	102	B	Right 5mm	15.5	14.59	0.0000483 *****	N/A***	1.23	1:1	0.0001 *****	
802.11n	HT40, MCS0	5510	102	B	Left 5mm	15.5	14.59	0****	N/A***	1.23	1:1	0****	
802.11n	HT40, MCS0	5630	126	B	Top 5mm	15.5	14.26	0.00516 *****	N/A***	1.33	1:1	0.01 *****	
802.11n	HT40, MCS0	5710	142	B	Top 5mm	15.5	13.97	0.00138	N/A***	1.42	1:1	0.002	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.
*****Due to low e-field generated by DUT, only area scan result available

3543EZ:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5510	102	A	Top 5mm	15.5	13.81	0.0037	-0.73**	1.75	1:1	0.01	
802.11n	HT40, MCS0	5510	102	B	Top 5mm	15.5	14.59	0.00543	-0.93**	1.53	1:1	0.01	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors

3543EZh:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift** [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5510	102	A	Top 5mm	15.5	13.81	0.0133	N/A***	1.48	1:1	0.02	
802.11n	HT40, MCS0	5510	102	B	Top 5mm	15.5	14.59	0****	N/A***	1.23	1:1	0****	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.

5 GHz WLAN, UNII 3:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5795	159	A	Top 5mm	15.5	14.95	0.00649	N/A***	1.14	1:1	0.01	
802.11n	HT40, MCS0	5795	159	A	Front 5mm	15.5	14.95	0****	N/A***	1.14	1:1	0****	
802.11n	HT40, MCS0	5795	159	A	Back 5mm	15.5	14.95	0.000175 *****	N/A***	1.14	1:1	0.0002 *****	
802.11n	HT40, MCS0	5795	159	A	Right 5mm	15.5	14.95	0.000123	N/A***	1.14	1:1	0.0001	
802.11n	HT40, MCS0	5795	159	A	Left 5mm	15.5	14.95	0****	N/A***	1.14	1:1	0****	
802.11n	HT40, MCS0	5755	151	A	Top 5mm	15.5	14.92	0.00515	N/A***	1.14	1:1	0.01	
802.11n	HT40, MCS0	5795	159	B	Top 5mm	15.5	14.32	0.0049	0.57**	1.50	1:1	0.01	
802.11n	HT40, MCS0	5795	159	B	Front 5mm	15.5	14.32	0.000204	N/A***	1.31	1:1	0.0003	
802.11n	HT40, MCS0	5795	159	B	Back 5mm	15.5	14.32	0****	N/A***	1.31	1:1	0****	
802.11n	HT40, MCS0	5795	159	B	Right 5mm	15.5	14.32	0****	N/A***	1.31	1:1	0****	
802.11n	HT40, MCS0	5795	159	B	Left 5mm	15.5	14.32	0****	N/A***	1.31	1:1	0****	
802.11n	HT40, MCS0	5755	151	B	Top 5mm	15.5	14.26	0.00534	N/A***	1.33	1:1	0.01	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.
*****Due to low e-field generated by DUT, only area scan result available

3543EZ:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5795	159	A	Top 5mm	15.5	14.95	0.00783	-0.64**	1.32	1:1	0.01	
802.11n	HT40, MCS0	5755	151	B	Top 5mm	15.5	14.26	0.0185	N/A***	1.33	1:1	0.02	14

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable
****Due to low e-field generated by DUT, the measurements are not applicable.
*****Due to low e-field generated by DUT, only area scan result available

3543EZh:

Standard	Mode	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
802.11n	HT40, MCS0	5795	159	A	Top 5mm	15.5	14.95	0.0153	N/A***	1.14	1:1	0.02	
802.11n	HT40, MCS0	5755	151	B	Top 5mm	15.5	14.26	0.00459	-0.98**	1.67	1:1	0.01	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable

7.2 SAR Results for Body Exposure Condition with 0mm separation

Bluetooth:

Bluetooth was measured at 0mm separation distance, resulting in conservative estimation of Body SAR at 5mm.

Packet Type	Data Rate [Mbps]	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
DH5	1	2402	0	B	Top 0mm	8	6.59	0.015	0.34**	1.73	77.4	0.02	
DH5	1	2402	0	B	Front 0mm	8	6.59	0.002	0***	1.60	77.4	0.003	
DH5	1	2402	0	B	Back 0mm	8	6.59	0.002	0***	1.60	77.4	0.003	
DH5	1	2402	0	B	Right 0mm	8	6.59	0.001	0***	1.60	77.4	0.001	
DH5	1	2402	0	B	Left 0mm	8	6.59	0.002	0***	1.60	77.4	0.003	
DH5	1	2441	39	B	Top 0mm	8	6.4	0.009	0.35**	1.82	77.4	0.01	
DH5	1	2480	78	B	Top 0mm	8	6.19	0.011	0.46**	1.96	77.4	0.02	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power
**Larger than 5% drifts included to scaling factors
***Due to low e-field generated by DUT at the location of drift measurement, the measurements are not applicable

3543EZ:

Packet Type	Data Rate [Mbps]	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
DH5	1	2402	0	B	Top 0mm	8	6.59	0.03	-0.16	1.60	77.4	0.04	

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power

3543EZh:

Packet Type	Data Rate [Mbps]	Frequency [MHz]	Channel	Antenna	Test position	Maximum Power [dBm]	Conducted Power [dBm]	Measured SAR_{1g} [W/kg]	Power Drift [dB]	Scaling Factor	Duty Cycle	Reported* SAR_{1g} [W/kg]	Plot #
DH5	1	2402	0	B	Top 0mm	8	6.59	0.03	0.06	1.60	77.4	0.04	15

*Measured SAR has been scaled to the maximum power using Scaling Factor = Maximum Power / Conducted Power

7.3 Simultaneous Transmission Analysis

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

Body SAR:

Exposure Condition	Body SAR_{1g} [W/kg]									
Test Position	Front		Back		Left		Right		Top	
Antenna	A	B	A	B	A	B	A	B	A	B
Bluetooth	-	0.003	-	0.003	-	0.003	-	0.001	-	0.04
2.4 GHz WLAN	0.000001	0	0	0	0	0.01	0	0	0.03	0.00001
5 GHz WLAN	0.0001	0.0003	0.0002	0.0001	0	0	0.0001	0.0001	0.09	0.04
Maximum SAR	0.003		0.003		0.01		0.001		0.13	

APPENDIX A: PHOTOS OF THE DUT

Model	Size (w, h, d) [mm]
2430EZ	326 x 267 x 15
3543EZ	460 x 383 x 15
3543EZh	460 x 383 x 18

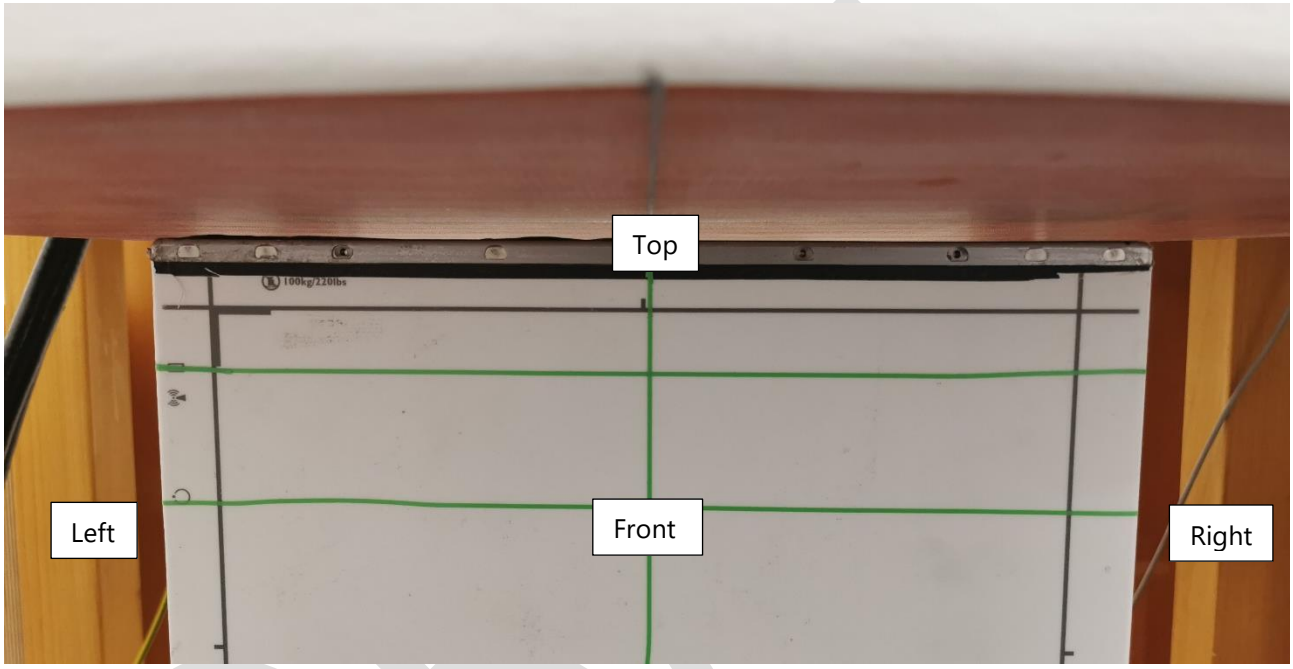


Figure 2. Top side of the DUT, 5mm separation distance

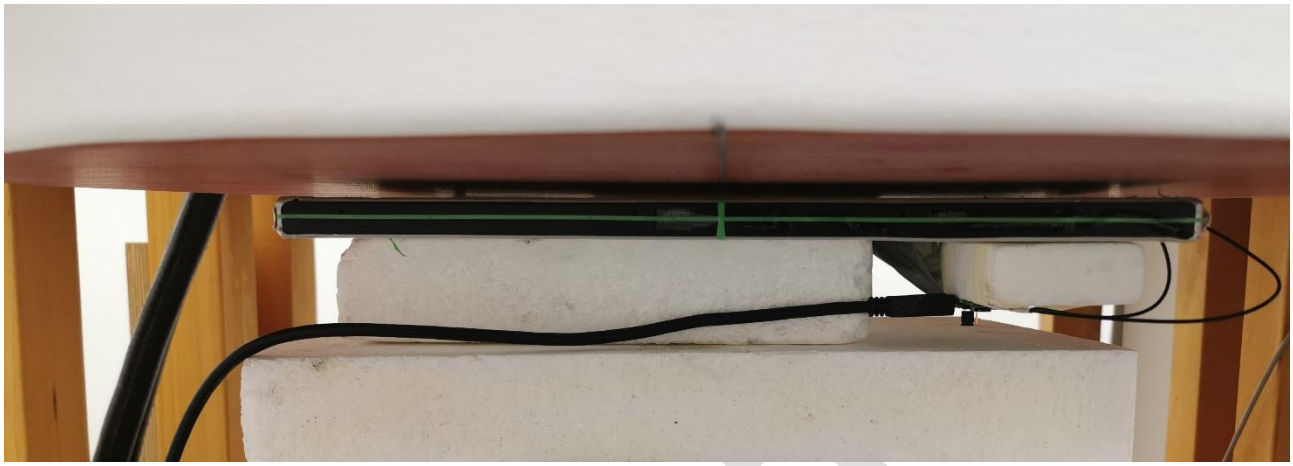


Figure 3. Front side of the DUT, 5mm separation distance

Figure 4. Back side of the DUT, 5mm separation distance

Figure 5. Left side of the DUT, 5mm separation distance

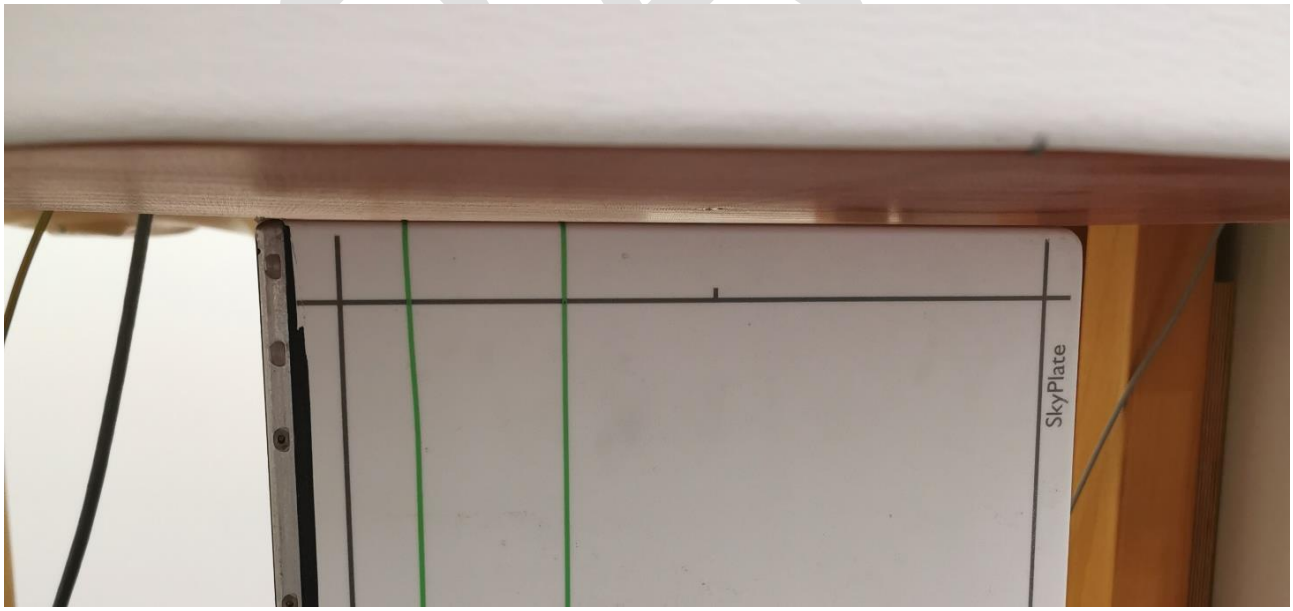


Figure 6. Right side of the DUT, 5mm separation distance

Figure 7. Top side of the DUT (3543EZ), 5mm separation distance

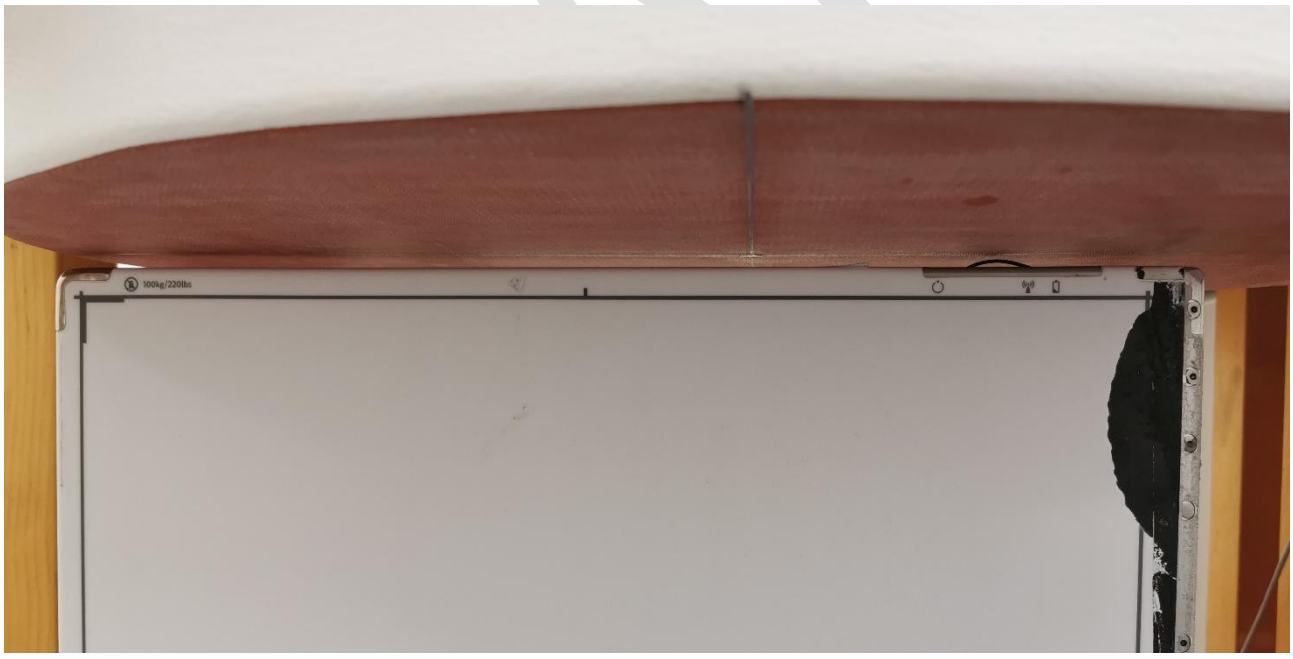


Figure 8. Left side of the DUT (3543EZ), 5mm separation distance

Figure 9. Top side of the DUT (3543EZh), 5mm separation distance

Figure 10. Left side of the DUT (3543EZh), 5mm separation distance

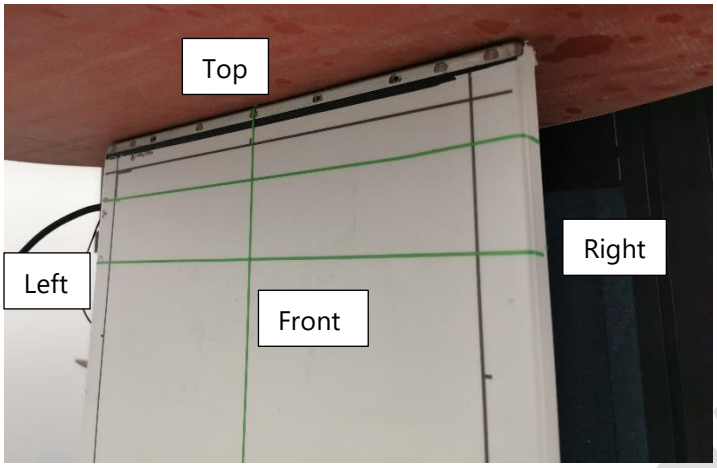


Figure 11. Top side of the DUT, 0mm

Figure 12. Front side of the DUT, 0mm

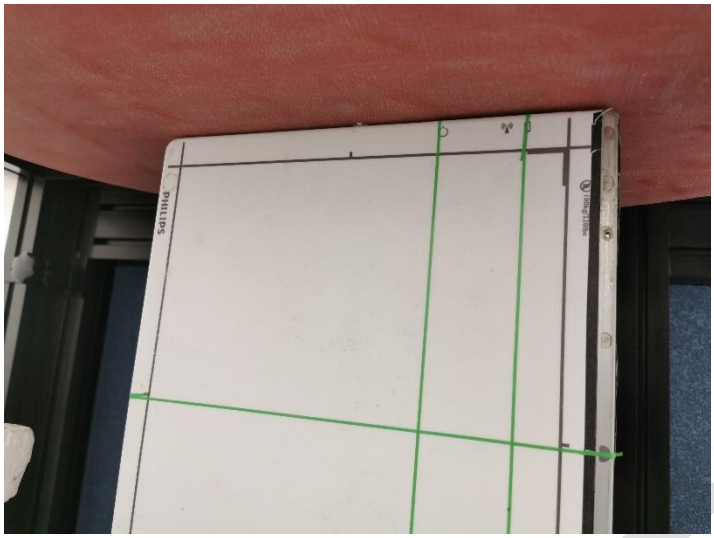


Figure 13. Left side of the DUT, 0mm

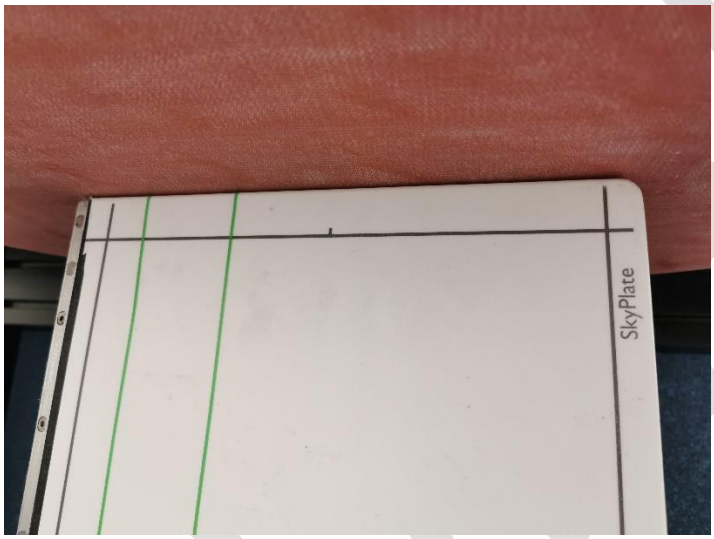


Figure 14. Right side of the DUT, 0mm

Figure 15. Back side of the DUT, 0mm

Figure 16. Top side of the DUT (3543EZ), 0mm

Figure 17. Top side of the DUT (3543EZh), 0mm

APPENDIX B: SYSTEM CHECK SCAN

Plot 1

Date/Time: 2023-10-04, 12:10

Test Laboratory: Verkotan Oy

DUT: D2450V2 – SN: 729

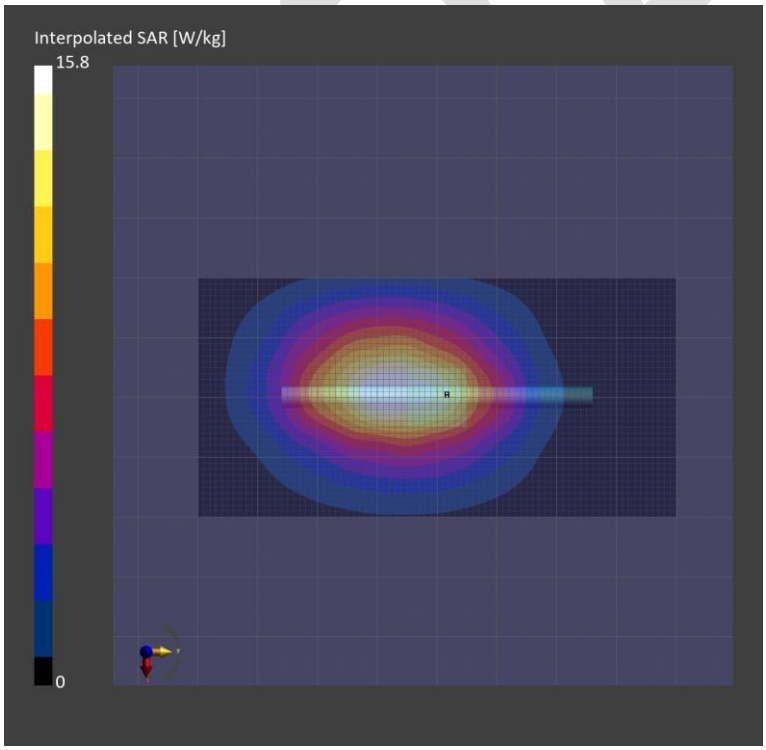
Communication System: UID 0, CW; Frequency 2450.000 MHz;

Medium parameters used: f= 2450.000; σ = 1.67 S/m; ε_r = 38.6; HSL;
Phantom section: Flat section
Measurement Standard: DASY8 (IEC/IECC)

DASY Configuration:

- Probe: EX3DV4 - SN7827; ConvF(7.5, 7.4, 7.2); Calibrated: 2023-06-04
  - Sensor-Surface: 1.4 mm (VMS + 6p), Mother scan peak deviation; 0.08; Mother scan avg offset: 0.13;
  - Electronics: DAE4ip - SN1774; Calibrated: 2023-06-02
  - Phantom: ELI V8.0 (20deg probe tilt)
  - DASY8 16.2.4.2524

Area Scan: Measurement grid: (40.0 mm x 80.0 mm)
Zoom Scan: Measurement grid: (30.0 mm x 30.0 mm x 30.0 mm)
Reference Value = 9.64 V/m; Power Drift = -0.04 dB
SAR(1 g) = 12.4 W/kg; SAR(10g) = 5.83 W/kg (Positive / Negative)
Smallest distance from peaks to all points 3dB below = 9.0 mm
Ratio of SAR at M2 to SAR at M1 = 80.9%



Plot 2

Date/Time: 19/07/2024 08:53:41

Test Laboratory: Verkotan Oy

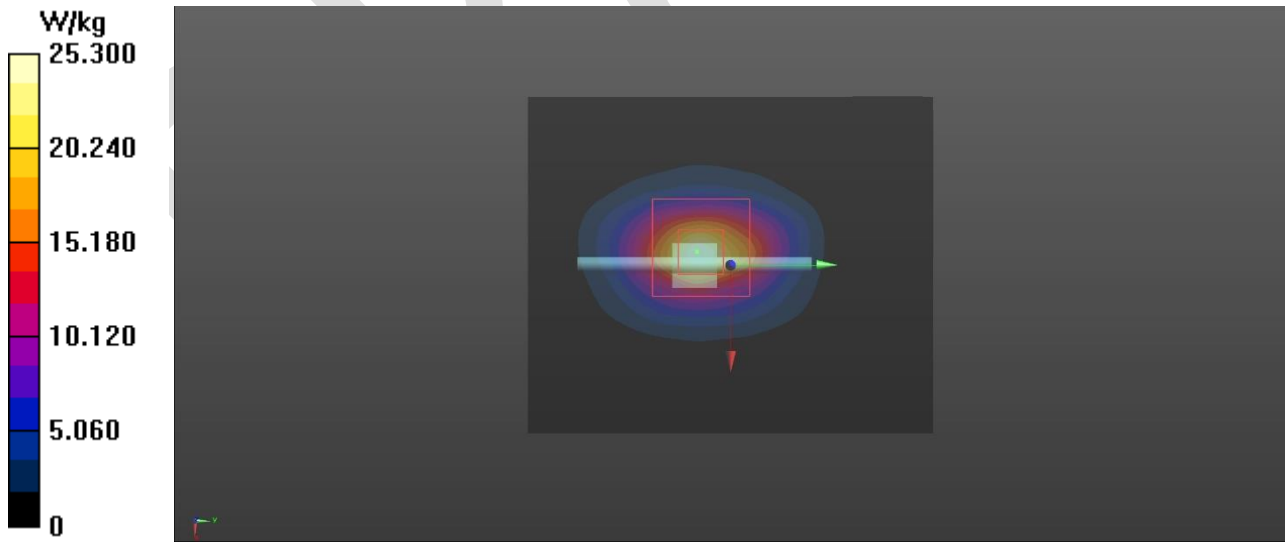
DUT: D2450V2 - SN729; Type: D2450V2; Serial: SN729

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 2450 MHz; σ = 1.795 S/m; ε_r = 38.596; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(7.07, 7.09, 7.16) @ 2450 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 97.61 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 22.9 W/kg
SAR(1 g) = 11.9 W/kg; SAR(10 g) = 5.72 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 6.7 mm
Ratio of SAR at M2 to SAR at M1 = 52.6%
Maximum value of SAR (measured) = 18.8 W/kg
Configuration/system check/Area Scan (51x61x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm
Maximum value of SAR (interpolated) = 25.3 W/kg



Plot 3

Date/Time: 22/07/2024 08:05:23

Test Laboratory: Verkotan Oy

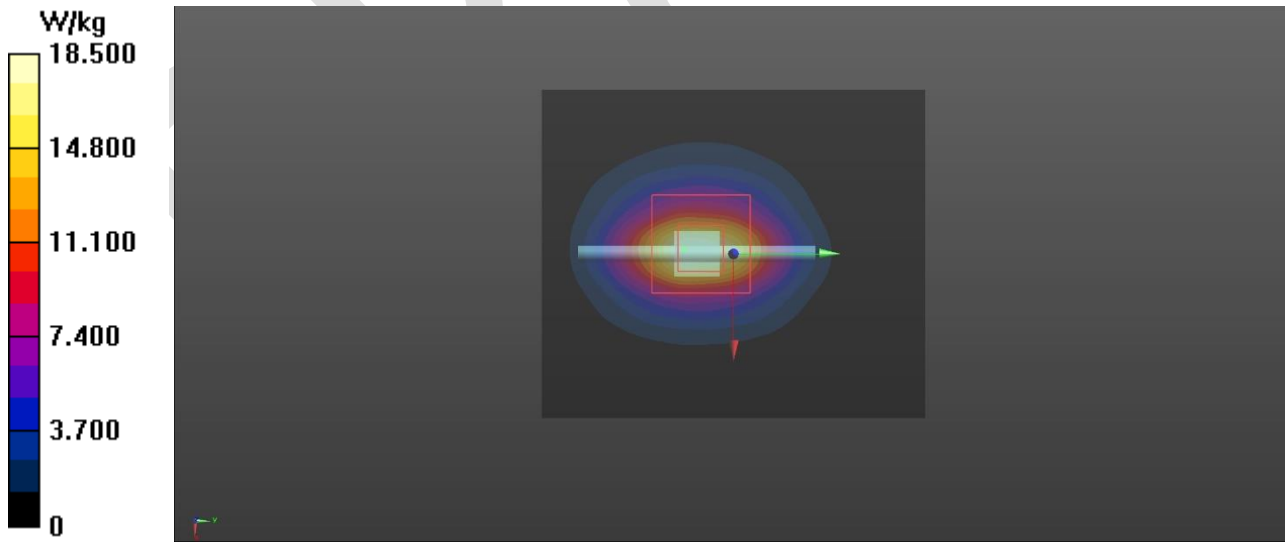
DUT: D2450V2 - SN729; Type: D2450V2; Serial: SN729

Communication System: UID 0, CW (0); Communication System Band: D2450 (2450.0 MHz); Frequency: 2450 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 2450 MHz; σ = 1.734 S/m; ε_r = 38.299; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(7.07, 7.09, 7.16) @ 2450 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 31.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/system check/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 102.5 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 22.7 W/kg
SAR(1 g) = 12 W/kg; SAR(10 g) = 5.7 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 7.3 mm
Ratio of SAR at M2 to SAR at M1 = 52.4%
Maximum value of SAR (measured) = 18.7 W/kg
Configuration/system check/Area Scan (61x71x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Maximum value of SAR (interpolated) = 18.5 W/kg



Plot 4

Date/Time: 23/07/2024 11:35:18

Test Laboratory: Verkotan Oy

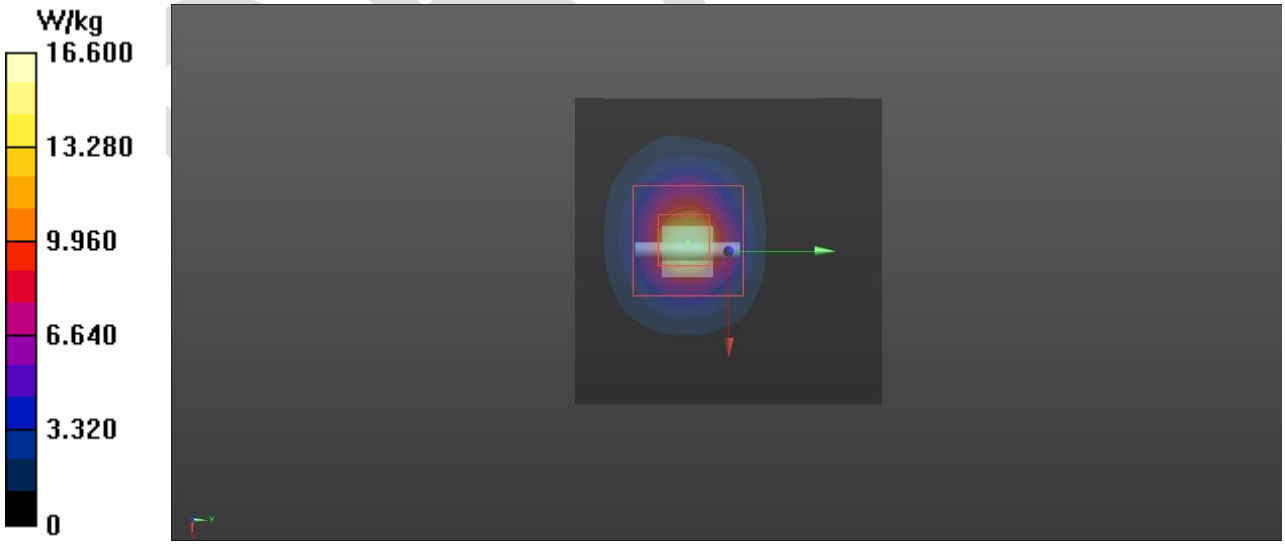
DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 5250 MHz; σ = 4.593 S/m; ε_r = 34.93; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.99, 4.95, 5.05) @ 5250 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5250MHz 2/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 15.2 W/kg
Configuration/System check 5250MHz 2/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.12 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 26.9 W/kg
SAR(1 g) = 6.74 W/kg; SAR(10 g) = 1.91 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 5.1 mm
Ratio of SAR at M2 to SAR at M1 = 65.3%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 16.6 W/kg



Plot 5

Date/Time: 24/07/2024 11:50:21

Test Laboratory: Verkotan Oy

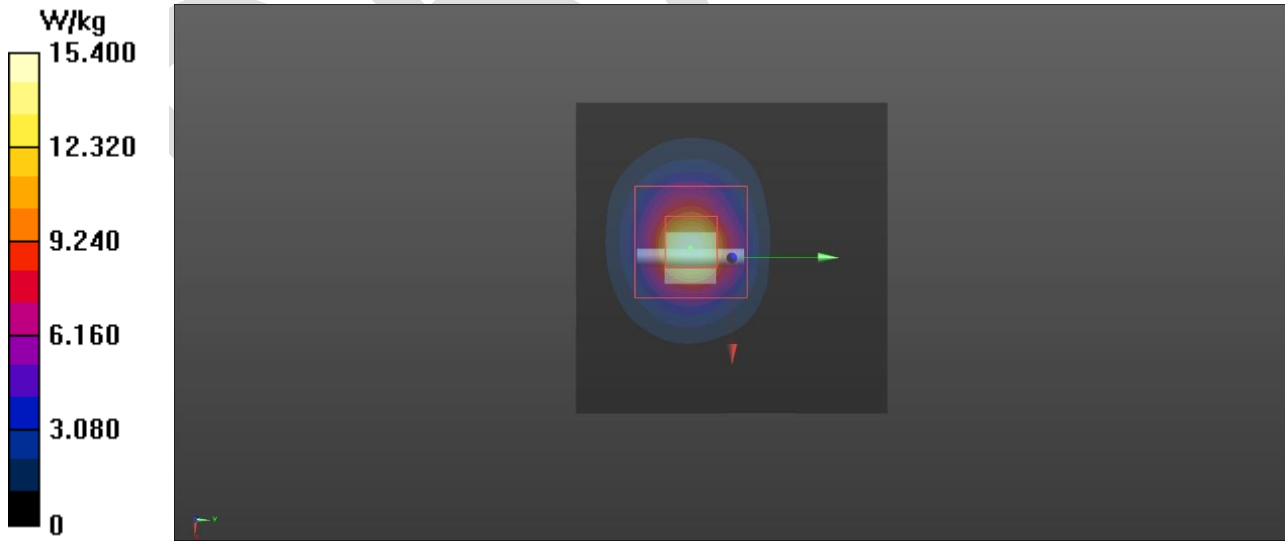
DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045

Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 5250 MHz; σ = 4.675 S/m; ε_r = 35.146; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.99, 4.95, 5.05) @ 5250 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = 25.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5250MHz 2/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 41.01 V/m; Power Drift = 0.19 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 6.87 W/kg; SAR(10 g) = 1.95 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 65.5%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 17.1 W/kg
Configuration/System check 5250MHz 2/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 15.4 W/kg



Plot 6

Date/Time: 24/07/2024 12:11:10

Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045

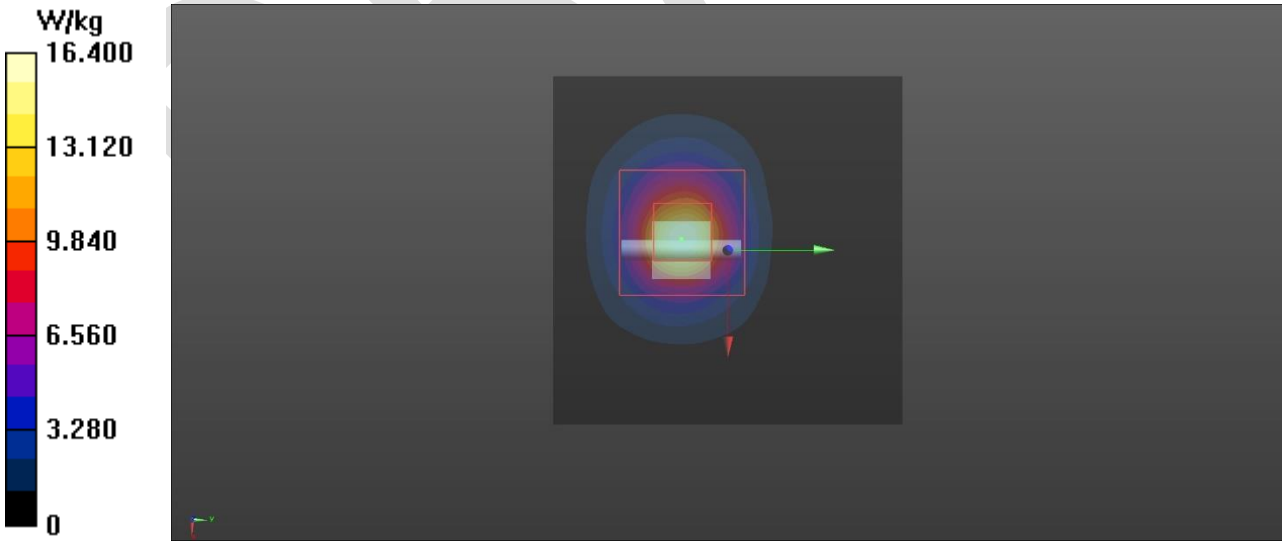
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5600 MHz; σ = 4.992 S/m; ε_r = 34.634; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.54, 4.5, 4.6) @ 5600 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), z = 25.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5600MHz 2 2/Zoom Scan (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 42.05 V/m; Power Drift = 0.08 dB
Peak SAR (extrapolated) = 30.8 W/kg
SAR(1 g) = 7.21 W/kg; SAR(10 g) = 2.03 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 64.2%
Maximum value of SAR (measured) = 18.2 W/kg

Configuration/System check 5600MHz 2 2/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.4 W/kg



Plot 7

Date/Time: 25/07/2024 12:42:43

Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045

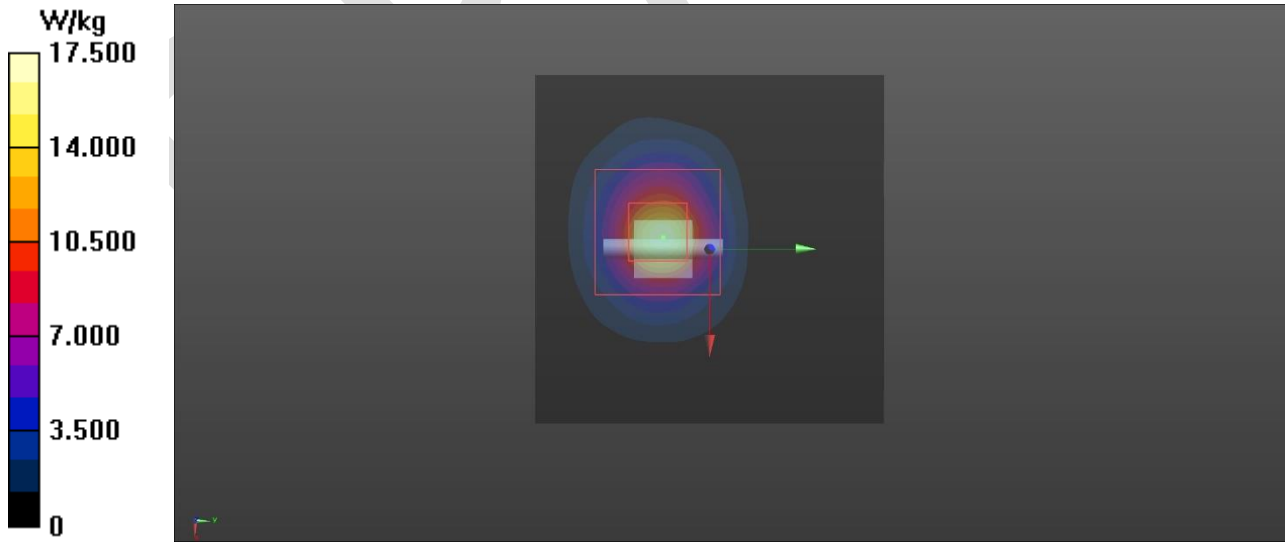
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5600 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5600 MHz; σ = 4.991 S/m; ε_r = 34.332; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.54, 4.5, 4.6) @ 5600 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5600MHz 2 2/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 16.0 W/kg

Configuration/System check 5600MHz 2 2/Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 40.76 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 29.1 W/kg
SAR(1 g) = 7.09 W/kg; SAR(10 g) = 1.99 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 6.4 mm
Ratio of SAR at M2 to SAR at M1 = 64.4%
Maximum value of SAR (measured) = 17.5 W/kg



Plot 8

Date/Time: 29/07/2024 08:34:17

Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045

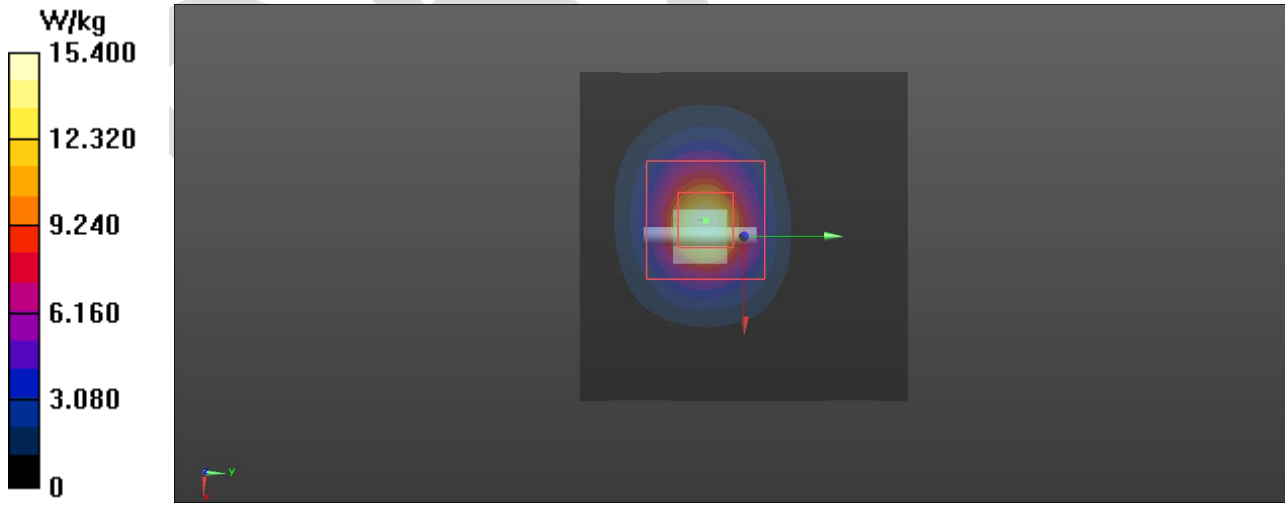
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5750 MHz; σ = 4.971 S/m; ε_r = 34.317; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.62, 4.57, 4.67) @ 5750 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), z = 25.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5750/Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 44.01 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 30.7 W/kg
SAR(1 g) = 6.68 W/kg; SAR(10 g) = 1.88 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 4.6 mm
Ratio of SAR at M2 to SAR at M1 = 61.5%
Maximum value of SAR (measured) = 17.2 W/kg

Configuration/System check 5750/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.4 W/kg



Plot 9

Date/Time: 30/07/2024 08:18:12

Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5250 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 5250 MHz; σ = 4.533 S/m; ε_r = 34.816; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)
DASY Configuration:

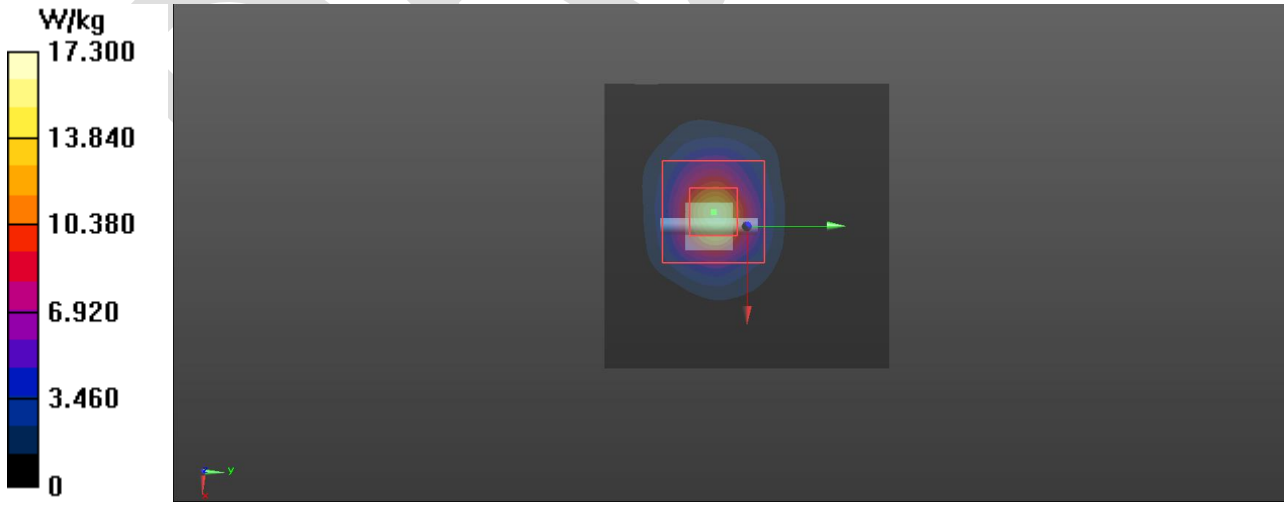
- Probe: EX3DV4 - SN3852; ConvF(4.99, 4.95, 5.05) @ 5250 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5250MHz/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 15.3 W/kg

Configuration/System check 5250MHz/Zoom Scan (7x7x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 46.52 V/m; Power Drift = -0.17 dB
Peak SAR (extrapolated) = 27.8 W/kg
SAR(1 g) = 6.79 W/kg; SAR(10 g) = 1.93 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 5.4 mm
Ratio of SAR at M2 to SAR at M1 = 64.9%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 17.3 W/kg



Plot 10

Date/Time: 30/07/2024 08:39:38

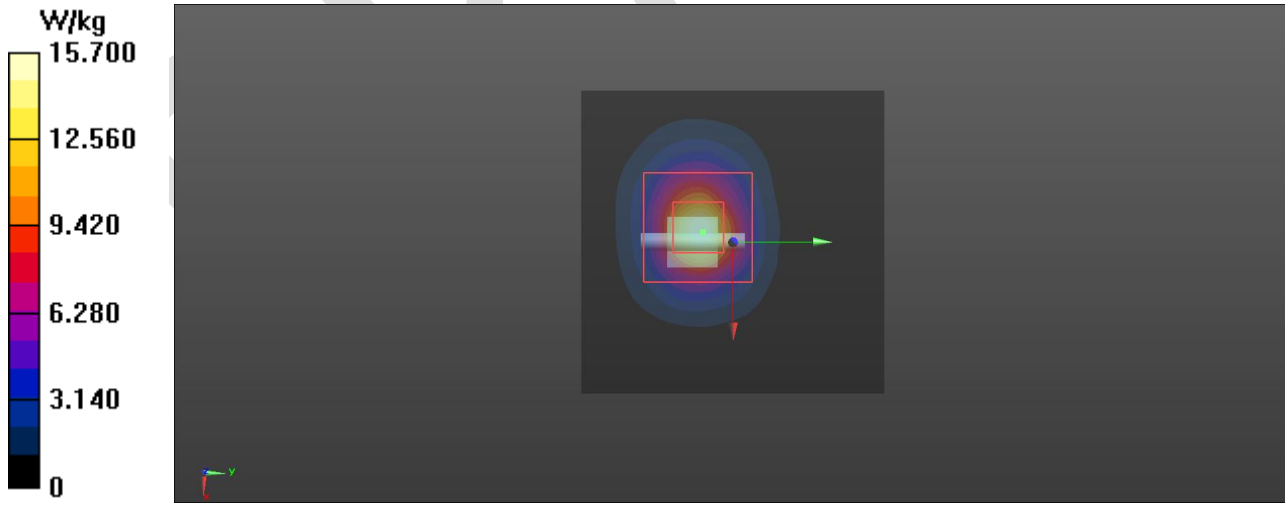
Test Laboratory: Verkotan Oy

DUT: D5GHzV2 - SN1045; Type: D5GHzV2; Serial: SN1045
Communication System: UID 0, CW (0); Communication System Band: D5GHz (5000.0 - 6000.0 MHz); Frequency: 5750 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5750 MHz; σ = 4.966 S/m; ε_r = 34.144; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)
DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.62, 4.57, 4.67) @ 5750 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), z = 25.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/System check 5750/Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 45.81 V/m; Power Drift = 0.21 dB
Peak SAR (extrapolated) = 27.5 W/kg
SAR(1 g) = 6.81 W/kg; SAR(10 g) = 1.94 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 7.2 mm
Ratio of SAR at M2 to SAR at M1 = 62.6%
Maximum value of SAR (measured) = 16.3 W/kg

Configuration/System check 5750/Area Scan (61x61x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 15.7 W/kg



APPENDIX C: MEASUREMENT SCANS

Plot 11

Date/Time: 22/07/2024 08:57:53

Test Laboratory: Verkotan Oy

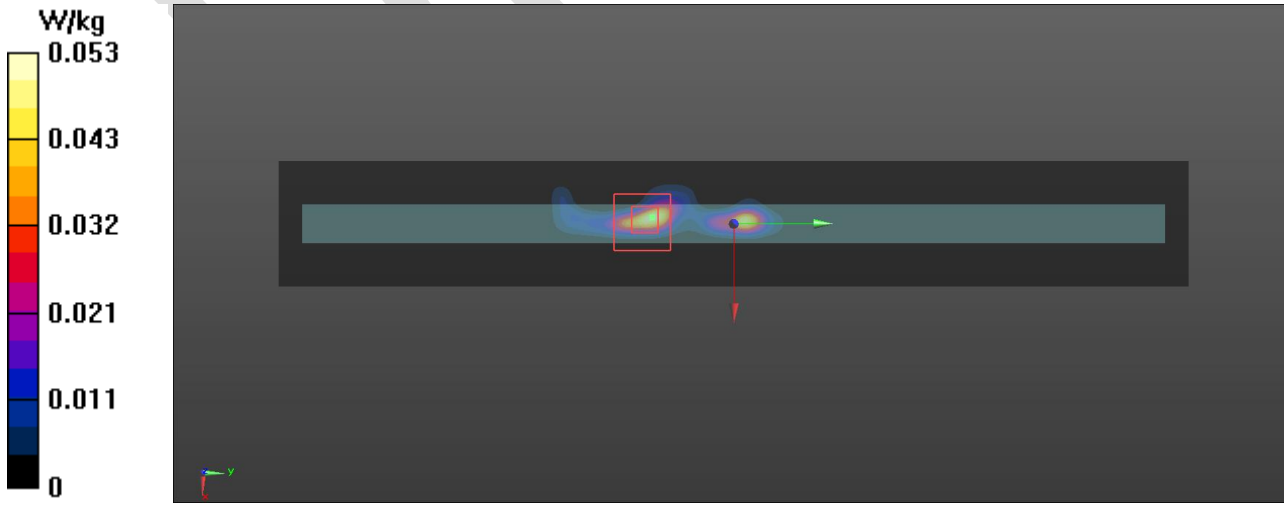
DUT: 2430EZ

Communication System: UID 0, WLAN 2.4 (0); Communication System Band: WLAN2.4GHz; Frequency: 2422 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 2422 MHz; σ = 1.714 S/m; ε_r = 38.35; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(7.07, 7.09, 7.16) @ 2422 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), z = 31.0, -4.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/WLAN 2.4 GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 3, Top 5mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 4.896 V/m; Power Drift = 0.76 dB
Peak SAR (extrapolated) = 0.0500 W/kg
SAR(1 g) = 0.014 W/kg; SAR(10 g) = 0.00264 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 = 23.2%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0394 W/kg
Configuration/WLAN 2.4 GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 3, Top 5mm/Area Scan (41x291x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0533 W/kg



Plot 12

Date/Time: 24/07/2024 09:27:48

Test Laboratory: Verkotan Oy

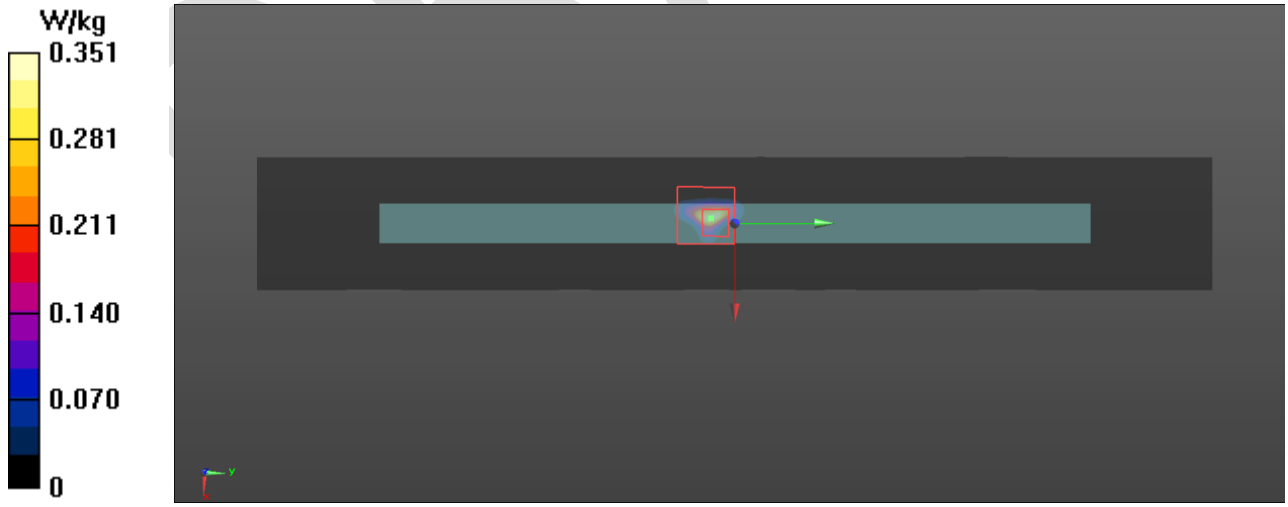
DUT: 2430EZ

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5270 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5270 MHz; σ = 4.611 S/m; ε_r = 34.906; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.99, 4.95, 5.05) @ 5270 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration 2/WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 54, Top/Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 1.14 W/kg
SAR(1 g) = 0.039 W/kg; SAR(10 g) = 0.00535 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 2.4 mm
Ratio of SAR at M2 to SAR at M1 = 58.5%
Maximum value of SAR (measured) = 0.251 W/kg
Configuration 2/WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 54, Top/Area Scan (51x361x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.351 W/kg



Plot 13

Date/Time: 26/07/2024 08:03:55

Test Laboratory: Verkotan Oy

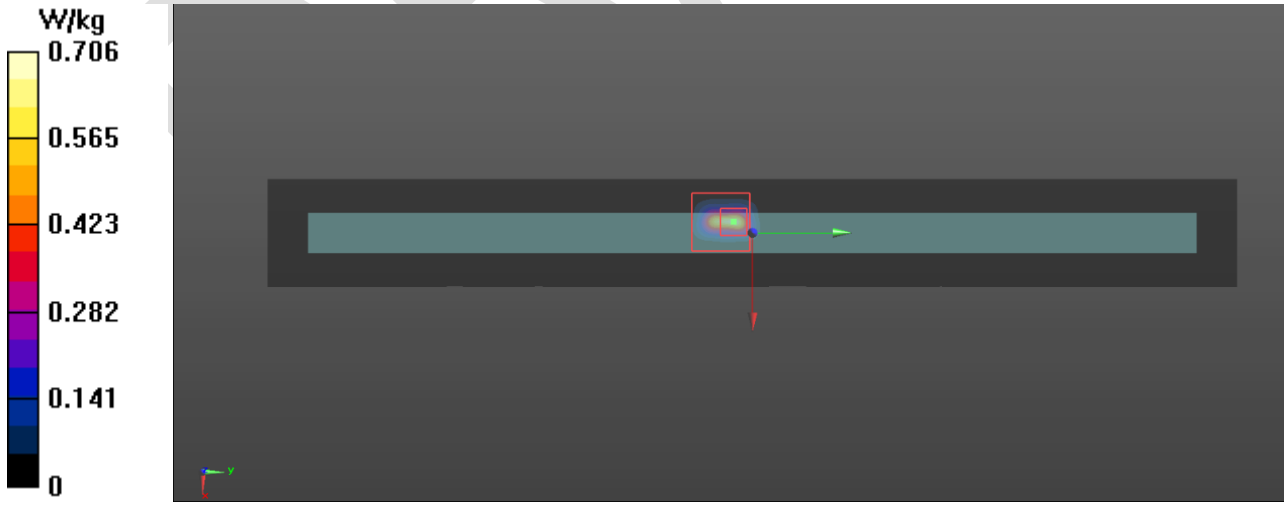
DUT: 2430EZ

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5510 MHz;
Communication System PAR: 0 dB;
Medium parameters used: f = 5510 MHz; σ = 4.905 S/m; ε_r = 34.464; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.54, 4.5, 4.6) @ 5510 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 102, Top/Area Scan (41x361x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Maximum value of SAR (interpolated) = 0.706 W/kg
Configuration/WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna A, CH 102, Top/Zoom Scan (9x9x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 1.592 V/m; Power Drift = 2.03 dB
Peak SAR (extrapolated) = 1.49 W/kg
SAR(1 g) = 0.061 W/kg; SAR(10 g) = 0.00983 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 2.9 mm
Ratio of SAR at M2 to SAR at M1 = 56.9%
Maximum value of SAR (measured) = 0.283 W/kg



Plot 14

Date/Time: 30/07/2024 09:25:54

Test Laboratory: Verkotan Oy

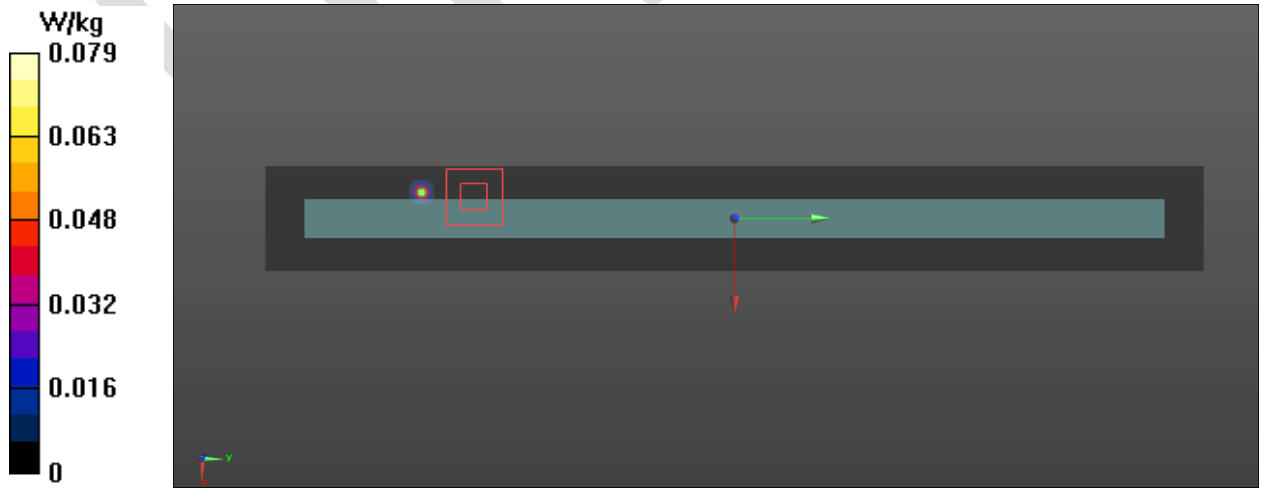
DUT: 3543EZ

Communication System: UID 0, WLAN5GHz (0); Communication System Band: 5GHz; Frequency: 5755 MHz;
Communication System PAR: 0 dB;
Medium parameters used (interpolated): f = 5755 MHz; σ = 4.97 S/m; ε_r = 34.133; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC)

DASY Configuration:

- Probe: EX3DV4 - SN3852; ConvF(4.62, 4.57, 4.67) @ 5755 MHz; Calibrated: 23/10/2023
  - Sensor-Surface: 1.4mm (Mechanical Surface Detection), z = -4.0, 25.0
  - Electronics: DAE4 Sn710; Calibrated: 24/10/2023
  - Phantom: SAR2_Phantom1_ELI; Type: QD OVA 002 AA;
  - DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

Configuration/3543EZ, WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna B, CH 151, Top/Area Scan (41x361x1): Interpolated grid: dx=1.000 mm, dy=1.000 mm
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (interpolated) = 0.0793 W/kg
Configuration/3543EZ, WLAN 5GHz, 802.11n, 40 MHz, MCS0, Antenna B, CH 151, Top/Zoom Scan (10x12x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 0.7290 V/m; Power Drift = -999.00 dB
Peak SAR (extrapolated) = 0.305 W/kg
SAR(1 g) = 0.019 W/kg; SAR(10 g) = 0.00205 W/kg (SAR corrected for target medium)
Smallest distance from peaks to all points 3 dB below = 3.2 mm
Ratio of SAR at M2 to SAR at M1 = 56.5%
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0904 W/kg



Plot 15

Date/Time: 2023-10-05, 09:25

Test Laboratory: Verkotan Oy

DUT: Wi-Fi Flat panel

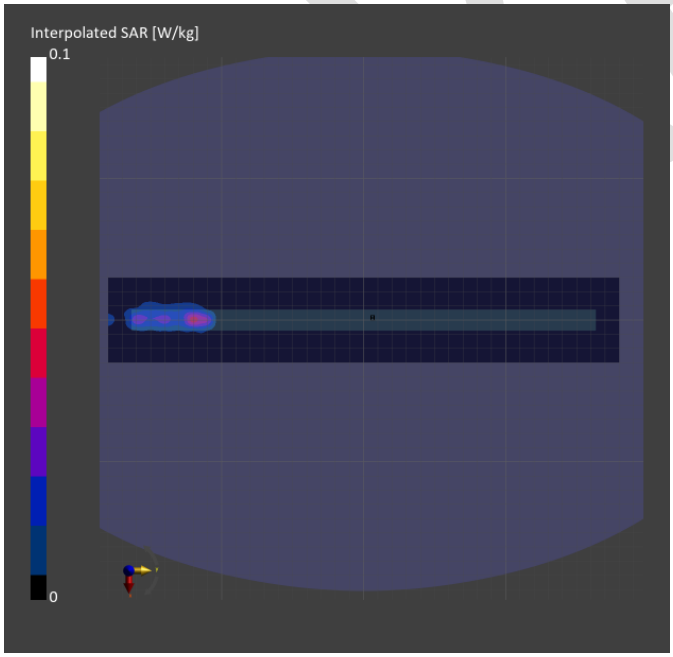
Communication System: UID 10032, Bluetooth; Communication System Band: ISM 2.4 GHz Band; Frequency 2402.000 MHz;

Medium parameters used: f= 2402.000; σ = 1.64 S/m; ε_r = 38.7; HSL;
Phantom section: Flat section
Measurement Standard: DASY8 (IEC/IECC)

DASY Configuration:

- Probe: EX3DV4 - SN7827; ConvF(7.5, 7.4, 7.2); Calibrated: 2023-06-04
  - Sensor-Surface: 1.4 mm (VMS + 6p), Mother scan peak deviation; 0.10; Mother scan avg offset: 0.46;
  - Electronics: DAE4ip - SN1774; Calibrated: 2023-06-02
  - Phantom: ELI V8.0 (20deg probe tilt)
  - DASY8 16.2.4.2524

Measurement Group:
ISM 2.4 GHz Band, IEEE 802.15.1 Bluetooth (GFSK, DH5), CH0, EDGE TOP, 0.00 mm
Area Scan: Measurement grid: (60.0 mm x 360.0 mm)
Zoom Scan: Measurement grid: (30.0 mm x 30.0 mm x 30.0 mm)
Reference Value = 0.02 V/m; Power Drift = 0.06 dB
SAR(1 g) = 0.030 W/kg; SAR(10g) = 0.009 W/kg (No correction)
Smallest distance from peaks to all points 3dB below = 3.5 mm
Ratio of SAR at M2 to SAR at M1 = 67.9%



APPENDIX D: RELEVANT PAGES FROM PROBE CALIBRATION REPORTS

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

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

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

Accreditation No.: SCS 0108

Client	Verkotan Oulu, Finland	Certificate No.	EX-7827_Jun23

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:7827
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	June 04, 2023

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	20-Oct-22 (OCP-DAK3.5-1249_Oct22)	Oct-23
OCP DAK-12	SN: 1016	20-Oct-22 (OCP-DAK12-1016_Oct22)	Oct-23
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

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

	Name	Function	Signature
Calibrated by	Jeton Kastrati	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: June 06, 2023

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

Certificate No: EX-7827_Jun23 Page 1 of 22

Parameters of Probe: EX3DV4 - SN:7827

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.68	0.59	0.64	±10.1%
DCP (mV) [B]	105.2	106.9	108.4	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB$\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	131.5	±1.6%	±4.7%
		Y	0.00	0.00	1.00		140.7		
		Z	0.00	0.00	1.00		126.6		
10352	Pulse Waveform (200Hz, 10%)	X	1.54	60.55	6.12	10.00	60.0	±3.5%	±9.6%
		Y	1.45	60.21	5.80		60.0		
		Z	1.40	60.00	5.79		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	0.79	60.00	4.61	6.99	80.0	±2.8%	±9.6%
		Y	0.81	60.00	4.49		80.0		
		Z	0.86	60.00	4.73		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	0.07	141.02	0.21	3.98	95.0	±2.8%	±9.6%
		Y	0.03	131.64	0.01		95.0		
		Z	0.41	159.30	18.09		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	3.45	131.09	9.75	2.22	120.0	±1.7%	±9.6%
		Y	3.12	159.98	2.74		120.0		
		Z	7.70	82.24	0.21		120.0		
10387	QPSK Waveform, 1 MHz	X	0.45	64.23	13.07	1.00	150.0	±3.0%	±9.6%
		Y	0.38	61.88	11.02		150.0		
		Z	0.47	64.93	13.22		150.0		
10388	QPSK Waveform, 10 MHz	X	1.27	66.90	13.96	0.00	150.0	±0.9%	±9.6%
		Y	1.09	64.87	12.54		150.0		
		Z	1.28	67.25	13.88		150.0		
10396	64-QAM Waveform, 100 kHz	X	1.60	63.90	15.81	3.01	150.0	±1.1%	±9.6%
		Y	1.70	65.07	16.17		150.0		
		Z	1.73	65.26	16.18		150.0		
10399	64-QAM Waveform, 40 MHz	X	2.72	66.63	15.27	0.00	150.0	±2.6%	±9.6%
		Y	2.62	66.09	14.81		150.0		
		Z	2.75	67.08	15.37		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	3.72	66.83	15.55	0.00	150.0	±4.0%	±9.6%
		Y	3.65	66.57	15.27		150.0		
		Z	3.61	66.64	15.34		150.0		

Note: For details on UID parameters see Appendix

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 Pages 5 and 6).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:7827

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 ms V^{-2}	T2 ms V^{-1}	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	7.4	53.86	33.74	1.85	0.00	4.90	0.00	0.05	1.00
y	7.2	52.61	33.58	3.25	0.00	4.90	0.53	0.00	1.00
z	7.0	50.07	32.48	5.09	0.00	4.90	0.67	0.00	1.00

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	-76.3°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Parameters of Probe: EX3DV4 - SN:7827

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
750	41.9	0.89	9.60	9.47	9.21	0.39	1.27	±12.0%
900	41.5	0.97	9.32	8.86	8.61	0.38	1.27	±12.0%
1750	40.1	1.37	8.35	8.24	7.90	0.26	1.27	±12.0%
1950	40.0	1.40	7.98	7.87	7.60	0.28	1.27	±12.0%
2100	39.8	1.49	7.88	7.77	7.55	0.29	1.27	±12.0%
2300	39.5	1.67	7.80	7.69	7.48	0.30	1.27	±12.0%
2450	39.2	1.80	7.50	7.40	7.20	0.29	1.27	±12.0%
2600	39.0	1.96	7.43	7.31	7.12	0.29	1.27	±12.0%
3300	38.2	2.71	7.07	7.00	6.81	0.35	1.27	±14.0%
3500	37.9	2.91	6.96	6.89	6.71	0.36	1.27	±14.0%
3700	37.7	3.12	6.88	6.80	6.63	0.36	1.27	±14.0%
3900	37.5	3.32	6.83	6.75	6.59	0.37	1.27	±14.0%
4100	37.2	3.53	6.60	6.50	6.36	0.37	1.27	±14.0%
5250	35.9	4.71	5.60	5.58	5.42	0.39	1.53	±14.0%
5600	35.5	5.07	4.95	4.87	4.73	0.38	1.67	±14.0%
5750	35.4	5.22	5.14	5.02	4.94	0.38	1.75	±14.0%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

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

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

Parameters of Probe: EX3DV4 - SN:7827

Calibration Parameter Determined in Head Tissue Simulating Media

f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
6500	34.5	6.07	4.95	4.87	4.85	0.20	2.50	±18.6%

[C] Frequency validity at 6.5 GHz is −600/+700 MHz, and ±700 MHz at or above 7 GHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band.
[F] The probes are calibrated using tissue simulating liquids (TSL) that deviate for ε and σ by less than ±10% from the target values (typically better than ±6%) and are valid for TSL with deviations of up to ±10%.
[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; below ±2% for frequencies between 3–6 GHz; and below ±4% for frequencies between 6–10 GHz at any distance larger than half the probe tip diameter from the boundary.

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

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

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

Accreditation No.: **SCS 0108**

Client	Verkotan Oulu, Finland	Certificate No.	EX-3852_Oct23

CALIBRATION CERTIFICATE

Object	EX3DV4 - SN:3852
Calibration procedure(s)	QA CAL-01.v10, QA CAL-12.v10, QA CAL-14.v7, QA CAL-23.v6, QA CAL-25.v8 Calibration procedure for dosimetric E-field probes
Calibration date	October 23, 2023

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP2	SN: 104778	30-Mar-23 (No. 217-03804/03805)	Mar-24
Power sensor NRP-Z91	SN: 103244	30-Mar-23 (No. 217-03804)	Mar-24
OCP DAK-3.5 (weighted)	SN: 1249	05-Oct-23 (OCP-DAK3.5-1249_Oct23)	Oct-24
OCP DAK-12	SN: 1016	05-Oct-23 (OCP-DAK12-1016_Oct23)	Oct-24
Reference 20 dB Attenuator	SN: CC2552 (20x)	30-Mar-23 (No. 217-03809)	Mar-24
DAE4	SN: 660	16-Mar-23 (No. DAE4-660_Mar23)	Mar-24
Reference Probe ES3DV2	SN: 3013	06-Jan-23 (No. ES3-3013_Jan23)	Jan-24

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

	Name	Function	Signature
Calibrated by	Joanna Lleshaj	Laboratory Technician	
Approved by	Sven Kühn	Technical Manager	

Issued: October 23, 2023

Parameters of Probe: EX3DV4 - SN:3852

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k = 2$)
Norm ($\mu V/(V/m)^2$) [A]	0.42	0.40	0.47	±10.1%
DCP (mV) [B]	102.6	101.5	101.2	±4.7%

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B $dB\sqrt{\mu V}$	C	D dB	VR mV	Max dev.	Max Unc[E] $k = 2$
0	CW	X	0.00	0.00	1.00	0.00	148.1	±1.2%	±4.7%
		Y	0.00	0.00	1.00		135.0		
		Z	0.00	0.00	1.00		125.7		
10352	Pulse Waveform (200Hz, 10%)	X	20.00	88.23	18.81	10.00	60.0	±2.9%	±9.6%
		Y	15.83	86.04	18.58		60.0		
		Z	20.00	89.60	19.58		60.0		
10353	Pulse Waveform (200Hz, 20%)	X	20.00	89.81	18.49	6.99	80.0	±1.6%	±9.6%
		Y	20.00	89.05	18.11		80.0		
		Z	20.00	91.94	19.69		80.0		
10354	Pulse Waveform (200Hz, 40%)	X	20.00	94.09	19.25	3.98	95.0	±1.2%	±9.6%
		Y	20.00	88.35	16.15		95.0		
		Z	20.00	93.97	19.35		95.0		
10355	Pulse Waveform (200Hz, 60%)	X	20.00	100.39	20.91	2.22	120.0	±1.2%	±9.6%
		Y	2.38	71.76	9.70		120.0		
		Z	20.00	97.37	19.68		120.0		
10387	QPSK Waveform, 1 MHz	X	1.64	66.74	15.13	1.00	150.0	±2.8%	±9.6%
		Y	1.57	65.66	14.38		150.0		
		Z	1.68	66.38	15.01		150.0		
10388	QPSK Waveform, 10 MHz	X	2.18	68.09	15.84	0.00	150.0	±0.9%	±9.6%
		Y	2.13	67.56	15.26		150.0		
		Z	2.26	68.28	15.80		150.0		
10396	64-QAM Waveform, 100 kHz	X	2.80	70.45	18.83	3.01	150.0	±0.7%	±9.6%
		Y	2.67	68.53	17.69		150.0		
		Z	2.75	69.32	18.17		150.0		
10399	64-QAM Waveform, 40 MHz	X	3.46	67.10	15.80	0.00	150.0	±2.2%	±9.6%
		Y	3.46	66.99	15.61		150.0		
		Z	3.55	67.36	15.87		150.0		
10414	WLAN CCDF, 64-QAM, 40 MHz	X	4.78	65.65	15.56	0.00	150.0	±4.1%	±9.6%
		Y	4.86	65.73	15.56		150.0		
		Z	4.73	65.20	15.31		150.0		

Note: For details on UID parameters see Appendix

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

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Linearization parameter uncertainty for maximum specified field strength.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

Parameters of Probe: EX3DV4 - SN:3852

Sensor Model Parameters

	C1 fF	C2 fF	α V^{-1}	T1 msV^{-2}	T2 msV^{-1}	T3 ms	T4 V^{-2}	T5 V^{-1}	T6
x	40.1	298.39	35.39	12.42	0.00	5.06	1.30	0.18	1.01
y	45.2	342.83	36.51	8.80	0.45	5.06	0.00	0.49	1.01
z	44.9	336.32	35.73	13.60	0.00	5.08	0.53	0.35	1.01

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle	-56.9°
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

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

Parameters of Probe: EX3DV4 - SN:3852

Calibration Parameter Determined in Head Tissue Simulating Media

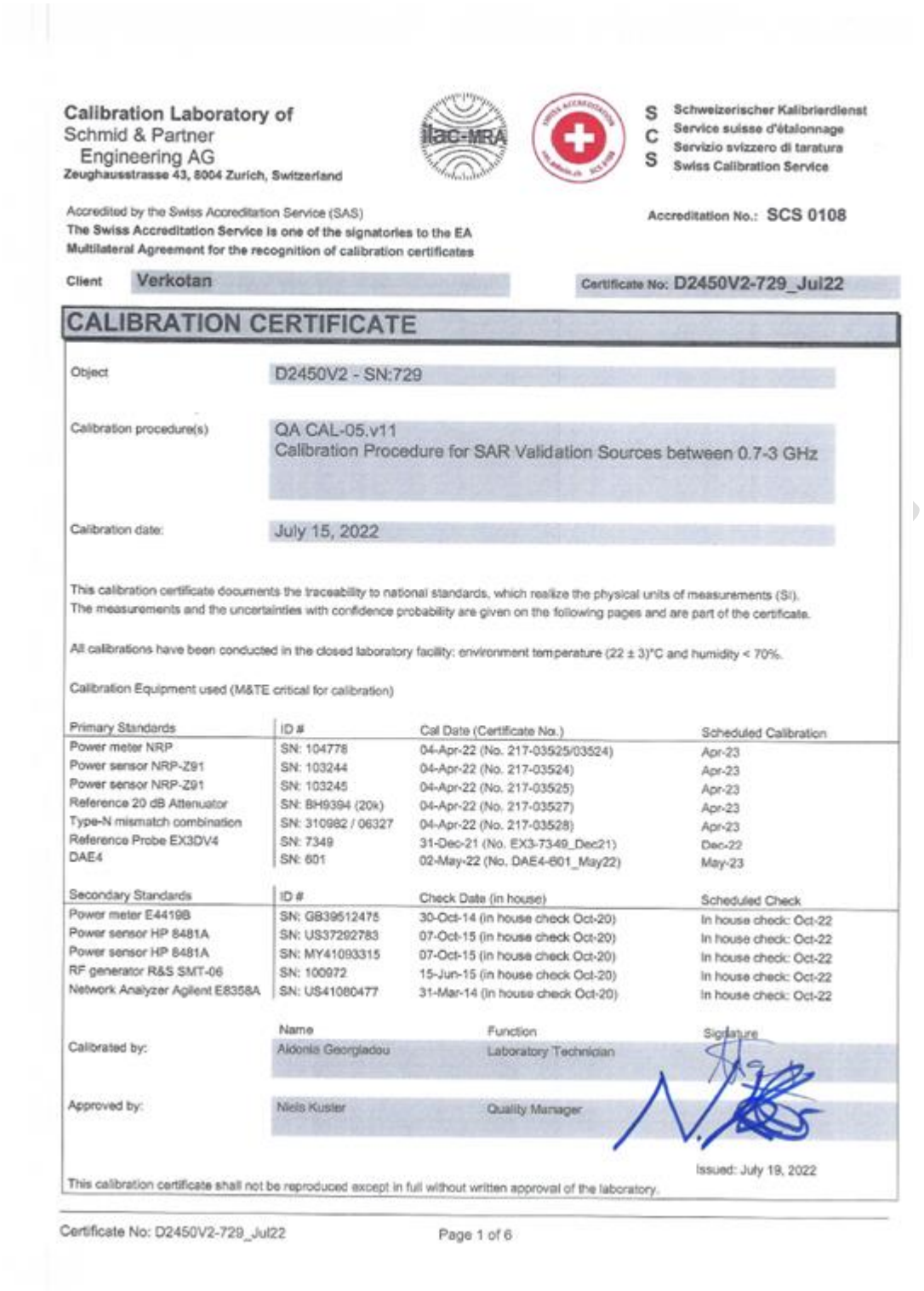
f (MHz)[C]	Relative Permittivity[F]	Conductivity[F] (S/m)	ConvF X	ConvF Y	ConvF Z	Alpha[G]	Depth[G] (mm)	Unc ($k = 2$)
6	55.0	0.75	14.87	14.87	14.87	0.00	1.25	±13.3%
13	55.0	0.75	13.94	13.94	13.94	0.00	1.25	±13.3%
30	55.0	0.75	12.97	12.97	12.97	0.00	1.25	±13.3%
64	54.2	0.75	11.54	11.54	11.54	0.00	1.25	±13.3%
128	52.8	0.76	11.14	11.14	11.14	0.00	1.25	±13.3%
220	49.0	0.81	10.56	10.56	10.56	0.00	1.25	±13.3%
450	43.5	0.87	9.99	9.99	9.99	0.16	1.30	±13.3%
1300	40.8	1.14	8.19	7.92	8.28	0.48	1.27	±12.0%
1450	40.5	1.20	8.04	7.77	8.01	0.46	1.27	±12.0%
1640	40.2	1.31	8.04	7.69	8.00	0.43	1.27	±12.0%
1810	40.0	1.40	7.69	7.64	7.66	0.28	1.27	±12.0%
1900	40.0	1.40	7.75	7.66	7.73	0.28	1.27	±12.0%
2450	39.2	1.80	7.07	7.09	7.16	0.31	1.27	±12.0%
3300	38.2	2.71	6.76	6.56	6.80	0.32	1.27	±14.0%
3500	37.9	2.91	6.75	6.56	6.76	0.33	1.27	±14.0%
3700	37.7	3.12	6.56	6.40	6.58	0.34	1.27	±14.0%
3900	37.5	3.32	6.52	6.37	6.54	0.34	1.27	±14.0%
4100	37.2	3.53	6.23	6.14	6.27	0.35	1.27	±14.0%
5250	35.9	4.71	4.99	4.95	5.05	0.37	1.53	±14.0%
5600	35.5	5.07	4.54	4.50	4.60	0.37	1.75	±14.0%
5750	35.4	5.22	4.62	4.57	4.67	0.36	1.84	±14.0%

[C] Frequency validity above 300 MHz of ±100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ±50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ±10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4–9 MHz, and ConvF assessed at 13 MHz is 9–19 MHz. Above 5 GHz frequency validity can be extended to ±110 MHz.

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

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

APPENDIX E: RELEVANT PAGES FROM DIPOLE CALIBRATION REPORTS



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

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

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

Client Verkotan

Certificate No: D2450V2-729_Jul22

CALIBRATION CERTIFICATE

Object	D2450V2 - SN:729
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	July 15, 2022

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

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

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	02-May-22 (No. DAE4-601_May22)	May-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

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

Issued: July 19, 2022

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

Certificate No: D2450V2-729_Jul22 Page 1 of 6

Measurement Conditions

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

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

Head TSL parameters

The following parameters and calculations were applied.

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

SAR result with Head TSL

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

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

SAR Reference Dipole Calibration Report

Ref : ACR.68.8.23.BES.A

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

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

Calibration date: 03/09/2023

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

Summary:

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

mvg

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref: ACR.60.8.23.BES.A

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

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

	Customer Name
Distribution :	Verkotan Oy

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

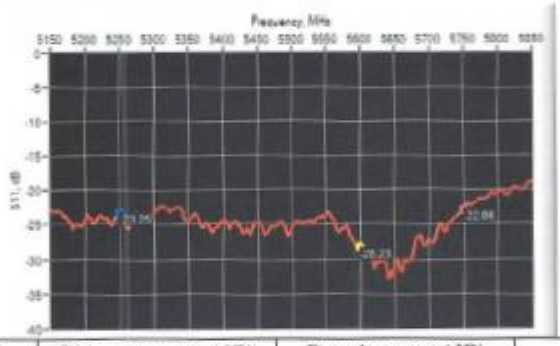
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



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

6.3 SAR

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

6.3.1 SAR with Head Liquid

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

mvg

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.68.8.23.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values @ 5250 MHz: eps' : 34.3 sigma : 4.67 Head Liquid Values @ 5600 MHz: eps' : 33.6 sigma : 5.05 Head Liquid Values @ 5750 MHz: eps' : 32.9 sigma : 5.46
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4mm/dz=2mm
Frequency	5250 MHz 5600 MHz 5750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

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

SAR MEASUREMENT PLOTS @ 5250 MHz