TEST REPORT

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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2023-09-05

2. Use of Report : Certification

3. Name of Product and Model : Tablet PC
- Model Name : SM-X300
- Manufacturer and Country of Origin : Samsung Electronics Co., Ltd. / Korea

4. FCC ID : A3LSMX300

5. Date of Test : 2023-10-23 ~ 2023-10-31

6. Location of Test : ■ Permanent Testing Lab ☐ On Site Testing
(Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

7. Test Standards : IEEE 1528-2013, ANSI/IEEE C95.1, KDB Publication

8. Test Results : Refer to the test result in the test report

Affirmation	Tested by Name : Mungi Jeong (Signature)	Technical Manager Name : Jongwon Ma (Signature)

2023-11-23

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-11-14	Originally issued	-
2023-11-23	Basic description revised	5

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

1. Identification when information is provided by the customer: Information marked " # " is provided by the customer. - Disclaimer: This information is provided by the customer and can affect the validity of results.

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1. General information

Client	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
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Laboratory	:	Eurofins KCTL Co.,Ltd.
Address	:	65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
Accreditations	:	FCC Site Designation No: KR0040, FCC Site Registration No: 687132 VCCI Registration No. : R-3327, G-198, C-3706, T-1849 CAB Identifier: KR0040, ISED Number: 8035A KOLAS No.: KT231

1.1 Report Overview

This report details the results of testing carried out on the samples listed in section 2, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this test report is used in any configuration other than that detailed in the test report, the manufacturer must ensure the new configuration complies with all relevant standards and certification requirements. Any mention of Eurofins KCTL Co.,Ltd. Wireless lab or testing done by Eurofins KCTL Co.,Ltd. Wireless lab made in connection with the distribution or use of the tested product must be approved in writing by Eurofins KCTL Co.,Ltd. Wireless lab.

2. Device information

2.1 Basic description

Product Name		Tablet PC		
Product Model Name		SM-X300		
Product Manufacturer		Samsung Electronics Co., Ltd.		
Product Serial Number	Radiation	R32W9001L1R		
	Conduction	R32W9001LQT, R32W9001LMN, R32W9001L4Z		
Device Overview		Band & Mode	Operating Modes	Tx Frequency (㎒)
		2.4 ㎓ WLAN	Data	2 412.0 ~ 2 472.0
		U-NII-1	Data	5 180.0 ~ 5 240.0
		U-NII-2A	Data	5 260.0 ~ 5 320.0
		U-NII-2C	Data	5 500.0 ~ 5 720.0
		U-NII-3	Data	5 745.0 ~ 5 825.0
		Bluetooth	Data	2 402.0 ~ 2 480.0
		NFC	Data	13.56
		Digitizer	Data	0.53125 ~ 0.59375
TDWR Information		5.60 ㎓~ 5.65 ㎓ band (TDWR) is supported by the device.		

2.2 Summary of SAR Test Results

Band	Equipment Class	Highest Reported Body 1g SAR (W/kg)
WLAN 2.4 ㎓	DTS	1.04
U-NII-2A	NII	0.73
U-NII-2C	NII	1.35
U-NII-3	NII	**1.35**
Bluetooth	DSS	0.86
Simultaneous SAR per KDB 690783 D01v01r03		1.35

2.3 #Antenna information

Antenna Type		LDS Antenna				
Band		WLAN 2.4 ㎓ / Bluetooth	UNII-1	UNII-2A	UNII-2C	UNII-3
Peak gain (dBi)	WIFI1	-4.0	-4.5	-4.7	-4.5	-4.5
	WIFI2	-4.5	-4.0	-4.4	-5.0	-4.4

2.4 Power Reduction for SAR

This device utilizes a power reduction mechanism for wireless modes and bands for SAR compliance under some conditions when the device is being used in close proximity to the user's hand. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in Tablet use conditions. Detailed descriptions of the power reduction mechanism are included in the operational description.

2.5 #Maximum Tune-up power

This device operates using the following maximum output power specifications. SAR values were scaled to the maximum allowed power to determine compliance per KDB Publication 447498 D01v06.

When the specified maximum output power is the same for both UNII Band1 and UNII Band 2A, begins SAR measurement in UNII band 2A; and if the highest reported SAR for U NII band 2A is ≤ 1.2W/kg, SAR is not required for U-NII-1 band for that configuration; otherwise, each band is tested independently for SAR.

2.5.1 #Maximum Output Power

Band	Ant.	Mode	Channel	Output Power(dBm)			
				Normal, P_{max}		Back-off (Grip Sensor)	
				Target	Max. Allowed	Target	Max. Allowed
WLAN 2.4 GHz	Ant.1/ MIMO (Ant.1,Ant.2)	802.11b	Except Ch.	17.50	**18.50**	9.50	**10.50**
			11	16.00	**17.00**		
			12	5.00	**6.00**	N/A	
			13	-2.00	**-1.00**		
		802.11g/ 802.11n(HT20)/ 802.11ax (SU 20 MHz)	Except Ch.	17.00	**18.00**	9.00	**10.00**
			11	15.00	**16.00**		
			12	5.00	**6.00**	N/A	
			13	-2.00	**-1.00**		
U-NII-1, U-NII-2A, U-NII-2C	Ant.2/ MIMO (Ant.1,Ant.2)	802.11a	Except Ch.	16.00	**17.00**	5.50	**6.50**
			140	11.00	**12.00**		
			144	14.50	**15.50**		
		802.11n(HT20)/ 802.11ac(VHT20)/ 802.11ax(SU 20 MHz)	Except Ch.	15.00	**16.00**	5.00	**6.00**
			140	10.00	**11.00**		
			144	13.50	**14.50**		
		802.11n(HT40)/ 802.11ac(VHT40)/ 802.11ax(SU 40 MHz)	ALL	13.00	**14.00**	5.00	**6.00**
		802.11ac(VHT80)/ 802.11ax(SU 80 MHz)	ALL	12.00	**13.00**	5.00	**6.00**

Band	Ant.	Mode	Channel	Output Power(dBm)			
				Normal, P_{max}		Back-off (Grip Sensor)	
				Target	Max. Allowed	Target	Max. Allowed
U-NII-3	Ant.2/ MIMO (Ant.1,Ant.2)	802.11a	ALL	14.50	**15.50**	5.50	**6.50**
		802.11g/ 802.11n(HT20)/ 802.11ax (SU 20 ㎒)	ALL	13.50	**14.50**	5.00	**6.00**
		802.11n(HT40)/ 802.11ac(VHT40)/ 802.11ax(SU 40 ㎒)	ALL	13.00	**14.00**	5.00	**6.00**
		802.11ac(VHT80)/ 802.11ax(SU 80 ㎒)	ALL	12.00	**13.00**	5.00	**6.00**
Bluetooth		BDR(GFSK)	All Channel	15.50	**16.50**	11.00	**12.00**
		EDR (π/4DQPSK)	All Channel	11.00	**12.00**	11.00	**12.00**
		EDR(8DPSK)	All Channel	11.00	**12.00**	11.00	**12.00**
		LE(GFSK) 1/2 Mbps 125/500 Kbps	Except Ch.	15.00	**16.00**	11.00	**12.00**
			39	13.00	**14.00**	9.00	**10.00**

Note:

1) WLAN 2.4 ㎓ only supports Ant.1 in SISO mode.

2) WLAN 5 ㎓ only supports Ant.2 in SISO mode.

2.6 SAR Test Configurations

2.6.1 #DUT Antenna Locations

The overall dimensions of this device are > 20 cm. A diagram showing the location of the device antennas. Please refer to Appendix D.

2.6.2 SAR Test Exclusion Considerations

2.6.2.1 Maximum Tune-up Power

Ant.	Band	Frequency (MHz)	Output power		Separation distances [mm]					SAR Exemption				
			dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left Edge	Right Edge	Top	Bot.
WIFI1	2.4 GHz	2462	18.50	71	5	5	113	16	196	22.28 Measure	22.28 Measure	722mW EXEMPT	6.96 Measure	1560mW EXEMPT
	U-NII-2A	5320	17.00	50						23.07 Measure	23.07 Measure	692mW EXEMPT	7.21 Measure	1530mW EXEMPT
	U-NII-2C	5720	17.00	50						23.92 Measure	23.92 Measure	689mW EXEMPT	7.47 Measure	1527mW EXEMPT
	U-NII-3	5825	15.50	35						16.89 Measure	16.89 Measure	689mW EXEMPT	5.28 Measure	1527mW EXEMPT
	Bluetooth	2480	16.50	45						14.17 Measure	14.17 Measure	722mW EXEMPT	4.43 Measure	1560mW EXEMPT
WIFI2	2.4 GHz	2462	18.50	71	5	24	89	5	198	22.28 Measure	4.64 Measure	482mW EXEMPT	22.28 Measure	1571mW EXEMPT
	U-NII-2A	5320	17.00	50						23.07 Measure	4.81 Measure	452mW EXEMPT	23.07 Measure	1540mW EXEMPT
	U-NII-2C	5720	17.00	50						23.92 Measure	4.98 Measure	450mW EXEMPT	23.92 Measure	1538mW EXEMPT
	U-NII-3	5825	15.50	35						16.89 Measure	3.52 Measure	449mW EXEMPT	16.89 Measure	1537mW EXEMPT

Note 1: For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
Note 2: Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.
Note 3: If the antenna separation distance is > 50mm then the value listed is the output power threshold, above which SAR measurement is required. For separation <= 50mm the value is the KDB 447498 calculated value and must be less than 3.0 for SAR exemption.
Note 4: Formulas round separation distance to nearest mm and power to nearest mW before calculating thresholds or exemption values.
Note 5: This is equivalent to the KDB 447498 formula written as: [(max. power of channel, including tune-up tolerance, mW)/(60/√f(GHz) mW)]·[20 mm/(min. test separation distance, mm)] ≤ 1.0 for 1-g SAR must be less.

SAR Test Exclusion (Maximum Output Power)

Ant.	Band	SAR Exemption				
		Rear	Left Edge	Right Edge	Top	Bottom
WIFI1	2.4 GHz	Yes	Yes	No	Yes	No
	U-NII-2A	Yes	Yes	No	Yes	No
	U-NII-2C	Yes	Yes	No	Yes	No
	U-NII-3	Yes	Yes	No	Yes	No
	Bluetooth	Yes	Yes	No	Yes	No
WIFI2	2.4 GHz	Yes	Yes	No	Yes	No
	U-NII-2A	Yes	Yes	No	Yes	No
	U-NII-2C	Yes	Yes	No	Yes	No
	U-NII-3	Yes	Yes	No	Yes	No

2.6.2.2 Reduced Tune-up Power

Ant.	Band	Frequency (MHz)	Output power		Separation distances [mm]					SAR Exemption				
			dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left Edge	Right Edge	Top	Bot.
WIFI1	WLAN 2.4GHz	2462	10.50	11	5	5	113	16.0	196	3.45 Measure	3.45 Measure	Non-Power-Back-off	Non-Power-Back-off	Non-Power-Back-off
	U-NII-2A	5320	6.50	4						1.85 EXEMPT	1.85 EXEMPT			
	U-NII-2C	5720	6.50	4						1.91 EXEMPT	1.91 EXEMPT			
	U-NII-3	5825	6.50	4						1.93 EXEMPT	1.93 EXEMPT			
	Bluetooth	2480	12.00	16						5.04 Measure	5.04 Measure			
WIFI2	WLAN 2.4GHz	2462	10.50	11	5	24	89	5	198	3.45 Measure	Non-Power-Back-off	Non-Power-Back-off	3.45 Measure	Non-Power-Back-off
	U-NII-2A	5320	6.50	4						1.85 EXEMPT			1.85 EXEMPT	
	U-NII-2C	5720	6.50	4						1.91 EXEMPT			1.91 EXEMPT	
	U-NII-3	5825	6.50	4						1.93 EXEMPT			1.93 EXEMPT	

Note 1: For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
Note 2: Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.
Note 3: If the antenna separation distance is > 50mm then the value listed is the output power threshold, above which SAR measurement is required. For separation <= 50mm the value is the KDB 447498 calculated value and must be less than 3.0 for SAR exemption.
Note 4: Formulas round separation distance to nearest mm and power to nearest mW before calculating thresholds or exemption values.
Note 5: Non-power back-off means Grip Sensor is not applied.

SAR Test Exclusion (Reduced Output Power)

Ant.	Band	SAR Exemption				
		Rear	Left Edge	Right Edge	Top	Bottom
WIFI1	2.4 GHz	Yes	Yes	Non-Power-Back-off	Non-Power-Back-off	Non-Power-Back-off
	U-NII-2A	Note)Yes	Note)Yes			
	U-NII-2C	Note)Yes	Note)Yes			
	U-NII-3	Note)Yes	Note)Yes			
	Bluetooth	Yes	Yes			
WIFI2	2.4 GHz	Yes	Non-Power-Back-off	Non-Power-Back-off	Yes	Non-Power-Back-off
	U-NII-2A	Note)Yes			Note)Yes	
	U-NII-2C	Note)Yes			Note)Yes	
	U-NII-3	Note)Yes			Note)Yes	

Note: Additional testing required in order satisfying FCC simultaneous transmission limit criteria.

2.6.2.3 Digitizer and NFC RF Exposure evaluation

According to KDB 447498 D01 General RF Exposure Guidance v05, section 4.3.1 c), For frequencies below 100 ㎒, the following may be considered for SAR test exclusion (also illustrated in Appendix C):

1) For test separation distances > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 ㎒ in step b) is multiplied by [1 + log(100/f(㎒))]
2) For test separation distances ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 ㎒ is multiplied by ½
3) SAR measurement procedures are not established below 100 ㎒.

Appendix C

***SAR Test Exclusion Thresholds* for < 100 MHz and < 200 mm**

Approximate SAR test exclusion power thresholds at selected frequencies and test separation distances are illustrated in the following table. The equation and threshold in 4.3.1 must be applied to determine SAR test exclusion.

MHz	< 50	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	mm
100	237	474	481	487	494	501	507	514	521	527	534	541	547	554	561	567	
50	308	617	625	634	643	651	660	669	677	686	695	703	712	721	729	738	
10	474	948	961	975	988	1001	1015	1028	1041	1055	1068	1081	1095	1108	1121	1135	
1	711	1422	1442	1462	1482	1502	1522	1542	1562	1582	1602	1622	1642	1662	1682	1702	mW
0.1	948	1896	1923	1949	1976	2003	2029	2056	2083	2109	2136	2163	2189	2216	2243	2269	
0.05	1019	2039	2067	2096	2125	2153	2182	2211	2239	2268	2297	2325	2354	2383	2411	2440	
0.01	1185	2370	2403	2437	2470	2503	2537	2570	2603	2637	2670	2703	2737	2770	2803	2837	

Using Field Strength Approach formula (linear terms), this value corresponds to an output power of 0.000 000 18 mW. For more detail the calculation method is as below.

$$P = (E \times d) \text{ squared } / (30 \times G)$$

Where:

- P = Transmitter output power in watts
- G = Numeric gain of the transmitting antenna (unitless)
- E = the measured maximum field strength in V/m
- d = Measurement distance in meters (m)

Therefore,

- E-Field strength in V/m, E-Field (V/m) = [$10^{((dB\mu V - 120) / 20)}$]
- Antenna gain = 0 dBi (numeric gain = 1.0)
- Measurement distance = 30 m

SAR Test Exclusion Conclusion according to KDB447498 D01, appendix C,

RF Exposure Transmitter	Min. distance (mm)	Freq.	E-Field strength (dBμV/m)	Transmitter output power (㎽)	Thresholds level (㎽)
Digitizer(S-Pen)	5	595 ㎑	10.6	0.000 000 34	764.4
NFC	5	13.56 ㎒	16.5	0.000 001 31	442.7

Because output power value (㎽) is less than threshold level (㎽), SAR measurement is not required
Also, This device is tablet device;

Digitizer: SAR test is not required for front side (display) according to KDB 616217 D04 SAR for laptop and tablets v01r02. So TER analysis is not require with other transmitters.

NFC: SAR test is not required for Extremity(10g-SAR) according to KDB 616217 D04 SAR for laptop and tablets v01r02. The NFC transmission will only operate in hand held(extremity 10g-SAR), so simultaneous transmission is not considered.

2.7 SAR Test Methods and Procedures

The tests documented in this report were performed in accordance with IEEE 1528-2013 and the following published KDB procedures:

- IEEE 1528-2013
- 248227 D01 802.11 Wi-Fi SAR v02r02
- 447498 D01 General RF Exposure Guidance v06
- 865664 D01 SAR measurement 100 ㎒ to 6 ㎓ v01r04
- 865664 D02 RF Exposure Reporting v01r02
- 616217 D04 SAR for laptop and tablets v01r02 (Proximity Sensor)
- October 2016 TCB Workshop Notes (Bluetooth Duty Factor)
- April 2019 TCB Workshop Notes (Tissue Simulating Liquids)

3. Specific Absorption Rate

3.1 Introduction

The SAR is related to the rate at which energy is absorbed per unit mass in an object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational / controlled and general population/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

3.2 SAR Definition

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element (dv) of a given density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt}\left(\frac{dW}{dm}\right) = \frac{d}{dt}\left(\frac{dW}{\rho dv}\right)$$

SAR is expressed in units of Watts per kilogram (W/kg)
SAR measurement can be either related to the temperature elevation in tissue by

$$SAR = C\left(\frac{\delta T}{\delta t}\right)$$

Where: C is the specific head capacity, δT is the temperature rise and δt is the exposure duration, or related to the electrical field in the tissue by

$$SAR = \left(\frac{\sigma |E|^2}{\rho}\right)$$

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength. However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

4. SAR Measurement Procedures

4.1 SAR Scan Procedures

Step 1: Power Reference Measurement
The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The Minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. The minimum distance of probe sensors to surface is 1.4 mm. This distance cannot be smaller than the Distance of sensor calibration points to probe tip as defined in the probe properties.
Step 2: Area Scan & Zoom Scan
The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot and Zoom Scans are used to assess the peak spatial SAR values within a cubic averaging volume containing1 g and 10 g of simulated tissue. If only one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximums are detected, the number of Zoom Scans has to be increased accordingly. Area Scan & Zoom Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm ± 1 mm	½·δ·ln(2) mm 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·Δz_{Zoom}(n-1) mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details. * When zoom scan is required and the reported SAR from the area scan based 1-g SAR estimation procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

Step 3: Power drift measurement
The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the last Power Reference Measurement. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

5. SAR Measurement Configurations

5.1 SAR Testing for Tablet Configurations

Per FCC KDB Publication 616217 D04v01r02, for the back surface and edges of the tablet should be tested touching the phantom.

SAR evaluation for the front surface of tablet display screens are generally not necessary, except for tablets that are designed to require continuous operations with the hand next to the antenna.

The SAR exclusion threshold in KDB 447498 D01v06 can be applied to determine SAR test exclusion for adjacent edge configuration. The closest distance from the antenna to an adjacent tablet edge is used to determine if SAR testing is required for the adjacent edges, with the adjacent edge positioned against the phantom and the edge containing the antenna positioned perpendicular to the phantom.

5.2 Proximity Sensor Considerations

This device uses a power reduction mechanism to reduce output powers in certain use conditions when the device is used close to the user's body.
When the device's antenna is within a certain distance of the user, the sensor activates and reduces the maximum allowed output power. However, the sensor is not active when the device is moved beyond the sensor triggering distance and the maximum output power is no longer limited. Therefore, additional evaluation is needed in the vicinity of the triggering distance to ensure SAR is compliant when the device is allowed to operate at a non-reduced output power level. FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device at these additional test positions.

6. RF Exposure Limits

UNCONTROLLED ENVIRONMENTS are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure. The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

CONTROLLED ENVIRONMENTS are defined as locations where there is exposure that may be incurred by persons who are aware of the potential for exposure, (i.e. as a result of employment or occupation). In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

Human Exposure	Uncontrolled Environment General Population	Controlled Environment Occupational
Partial Peak SAR [1] (Partial)	1.60 mW/g	8.00 mW/g
Partial Average SAR [2] (Whole Body)	0.08 mW/g	0.40 mW/g
Partial Peak SAR [3] (Hands/Feet/Ankle/Wrist)	4.00 mW/g	20.00 mW/g

1) The spatial Peak value of the SAR averaged over any 1g gram of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.
2) The spatial Average value of the SAR averaged over the whole body.
3) The Spatial Peak value of the SAR averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube) and over the appropriate averaging time.

7. FCC SAR General Measurement Procedures

7.1 Measured and Reported SAR

Per FCC KDB Publication 447498 D01v06, When SAR is not measured at the maximum power level allowed for production units, the results must be scaled to the maximum tune-up tolerance limit according to the power applied to the individual channels tested to determine compliance. For simultaneous transmission, the measured aggregate SAR must be scaled according to the sum of the differences between the maximum tune-up tolerance and actual power used to test each transmitter. When SAR is measured at or scaled to the maximum tune-up tolerance limit, the results are referred to as reported SAR. Test highest reported SAR results are identified on the grant of equipment authorization according to procedures in KDB 690783 D01v01r03.

7.2 SAR Testing with 802.11 Transmitters

The normal network operating configurations are not suitable for measuring the SAR of 802.11 a/b/g transmitters. Unpredictable fluctuations in network traffic and antenna diversity conditions can introduce undesirable variations in SAR results. The SAR for these devices should be measured using chipset based test mode software to ensure the results are consistent and reliable.

7.2.1 General Device Setup

Chipset based test mode software is hardware dependent and generally varies among manufacturers. The device operating parameters established in test mode for SAR measurements must be identical to those programmed in production units, including output power levels, amplifier gain settings and other RF performance tuning parameters. A periodic duty factor is required for current generation SAR systems to measure SAR. When 802.11 frame gaps are accounted for in the transmission, a maximum transmission duty factor of 92 – 96% is typically achievable in most test mode configurations. A minimum transmission duty factor of 85% is required to avoid certain hardware and device implementation issues related to wide range SAR scaling. The reported SAR is scaled to 100% transmission duty factor to determine compliance at the maximum tune-up tolerance limit.

7.2.2 U-NII-1 and U-NII-2A

For devices that operate in both U-NII-1 and U-NII-2A bands, when the same maximum output power is specified for both bands, SAR measurement using OFDM SAR test procedures is not required for U-NII-1 unless the highest reported SAR for U-NII-2A is > 1.2 W/kg. When different maximum output powers is not required unless the highest reported SAR for the U-NII band with the higher maximum output power, adjusted by the ratio of lower to higher specified maximum output power for the two bands, is > 1.2 W/kg. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

7.2.3 U-NII-2C and U-NII-3

The frequency range covered by U-NII-2C and U-NII-3 is 380 ㎒ (5.47 – 5.85 ㎓), which requires a minimum of at least two SAR probe calibration frequency points to support SAR measurements. When Terminal Doppler Weather Radar (TDWR) restriction applies, the channels at 5.60 – 5.65 ㎓ in U-NII-2C band must be disabled with acceptable mechanisms and documented in the equipment certification. Unless band gap channels are permanently disabled, SAR must be considered for these channels. When band gap channels are disabled, each band is tested independently according to the normally required OFDM SAR measurement and probe calibration frequency point requirements.

7.2.4 Initial Test Position Procedure

For exposure conditions with multiple test positions, such as handset operating next to the ear, devices with hotspot mode or UMPC mini-tablet, procedures for initial test position can be applied. Using the transmission mode determined by the DSSS procedure or initial test configuration, area scans are measured for all positions in an exposure condition. The test position with the highest extrapolated (peak) SAR is used as the initial test position. When reported SAR for the initial test position is ≤ 0.4 W/kg, no additional testing for the remaining test positions is required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is ≤ 0.8 W/kg or all test positions are measured.

7.2.5 2.4 ㎓ SAR Test Requirement

SAR is measured for 2.4 ㎓ 802.11b DSSS using either the fixed test position or, when applicable, the initial test position procedure. SAR test reduction is determined according to the following.

1) When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.
2) When the reported SAR is > 0.8 W/kg, SAR is required for that position using the next highest measured output power channel; i.e., all channels require testing.

2.4 ㎓ 802.11g/n OFDM are additionally evaluated for SAR if highest reported SAR for 802.11b, adjusted by the ratio of the OFDM to DSSS specified maximum output power, is > 1.2 W/kg. When SAR is required for OFDM modes in 2.4 ㎓ band, the Initial Test Configuration Procedures should be followed.

7.2.6 OFDM Transmission Mode and SAR Test Channel Selection

For the 2.4 ㎓ and 5 ㎓ band, when the same maximum output power was specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration with the largest channel bandwidth, lowest order modulation and lowest data rate. When the maximum output power of a channel is the same for equivalent OFDM configurations; for example, 802.11a, 802.11n and 802.11ac or 802.11g and 802.11n with the same channel band width, modulation and data rate etc., the lower order 802.11 mode i.e., 802.11a, then 802.11n and 802.11ac or 802.11g then 802.11n, is used for SAR measurement. When maximum output power are the same for multiple test channels, either according to the default or additional power measurement requirements, SAR is measured using the channel closest to the middle of the frequency band or aggregated band. When there are multiple channels with the same maximum output power, SAR is measured using the higher number channel.

7.2.7 Initial Test Configuration Procedure

For OFDM, in both 2.4 and 5 GHz bands, an initial test configuration is determined for each frequency band and aggregated band, according to the transmission mode with the highest maximum output power specified for SAR measurements. When the same maximum output power is specified for multiple OFDM transmission mode configurations in a frequency band or aggregated band, SAR is measured using the configuration(s) with the largest channel bandwidth, lowest order modulation, and lowest data rate. If the average RF output powers of the highest identical transmission modes are within 0.25 dB of each other, mid channel of the transmission mode with highest average RF output power is the initial test channel. Otherwise, the channel of the transmission mode with the highest average RF output conducted power will be the initial test configuration.

When the reported SAR is ≤ 0.8 W/kg, no additional measurements on other test channels are required. Otherwise, SAR is evaluated using the subsequent highest average RF output channel until the reported SAR result is ≤ 1.2 W/kg or all channels are measured. When there are multiple untested channels having the same subsequent highest average RF output power, the channel with higher frequency from the lowest 802.11 mode is considered for SAR measurements.

7.2.8 Subsequent Test Configuration Procedures

For OFDM configurations in each frequency band and aggregated band, SAR is evaluated for initial test configuration using the fixed test position or the initial test position procedure. When the highest reported SAR (for the initial test configuration), adjusted by the ratio of the specified maximum output power of the subsequent test configuration to initial test configuration, is ≤ 1.2 W/kg, no additional SAR tests for the subsequent test configurations are required. When 10g SAR measurement is considered, a factor of 2.5 is applied to the thresholds above.

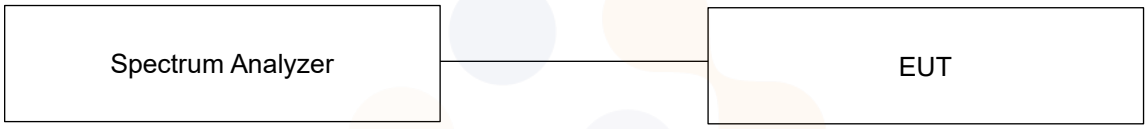
8. RF Average Conducted Output Power

8.1 WLAN & Bluetooth Average Conducted Output Power

Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02:

- Power measurements were performed for the transmission mode configuration with the highest maximum output power specified for production units.
- For transmission modes with the same maximum output power specification, powers were measured for the largest channel bandwidth, lowest order modulation and lowest data rate.
- For transmission modes with identical maximum specified output power, channel bandwidth, modulation and data rates, power measurements were required for all identical configurations.
- For each transmission mode configuration, powers were measured for the highest and lowest channels; and at the mid-band channel(s) when there were at least 3 channels supported. For configurations with multiple mid-band channels, due to an even number of channels, both channels were measured.

Power Measurement Setup



8.1.1 WLAN Average Conducted Output Power

Band	Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)			
				Main Ant.	Aux Ant.	MIMO Ant.	
						Main	Aux
WLAN 2.4 GHz	802.11b	2 412.0	1	18.22	N/A	18.00	18.21
		2 437.0	6	**18.49**		**18.22**	18.25
		2 462.0	11	16.27		16.23	16.42
U-NII-2A	802.11a	5 260.0	52	N/A	**16.48**	16.21	15.67
		5 280.0	56		15.75	16.06	15.29
		5 300.0	60		15.47	16.20	15.16
		5 320.0	64		15.98	16.86	**15.15**
U-NII-2C	802.11a	5 500.0	100		16.91	16.96	**15.61**
		5 600.0	120		**16.99**	**15.59**	16.29
		5 720.0	144		14.31	14.90	**13.60**
U-NII-3	802.11a	5 745.0	149		**14.07**	13.95	14.35
		5 785.0	157		**14.45**	**14.22**	14.25
		5 825.0	165		13.89	15.23	**14.23**

8.1.2 WLAN Average Conducted Output Power(Back-off_Grip Sensor)

Band	Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)			
				Main Ant.	Aux Ant.	MIMO Ant.	
						Main	Aux
WLAN 2.4 GHz	802.11b	2 412.0	1	**10.06**	N/A	10.14	**10.07**
		2 437.0	6	9.86		9.53	9.88
		2 462.0	11	**10.18**		**10.10**	10.40
U-NII-2A	802.11a	5 260.0	52	N/A	**6.04**	5.22	5.25
		5 280.0	56		5.29	4.79	4.69
		5 300.0	60		5.65	6.15	**4.77**
		5 320.0	64		4.60	5.80	4.55
U-NII-2C	802.11a	5 500.0	100		**6.48**	5.99	**5.20**
		5 600.0	120		6.24	**5.75**	6.23
		5 720.0	144		4.81	6.48	**5.08**
U-NII-3	802.11a	5 745.0	149		6.00	6.40	**6.08**
		5 785.0	157		**6.44**	6.41	**5.76**
		5 825.0	165		**6.29**	6.47	**4.51**

8.1.3 Bluetooth Average Conducted Output Power

Band	Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)
Bluetooth	BDR DH5	2 402.0	0	15.44
		2 441.0	39	14.88
		2 480.0	78	**16.00**

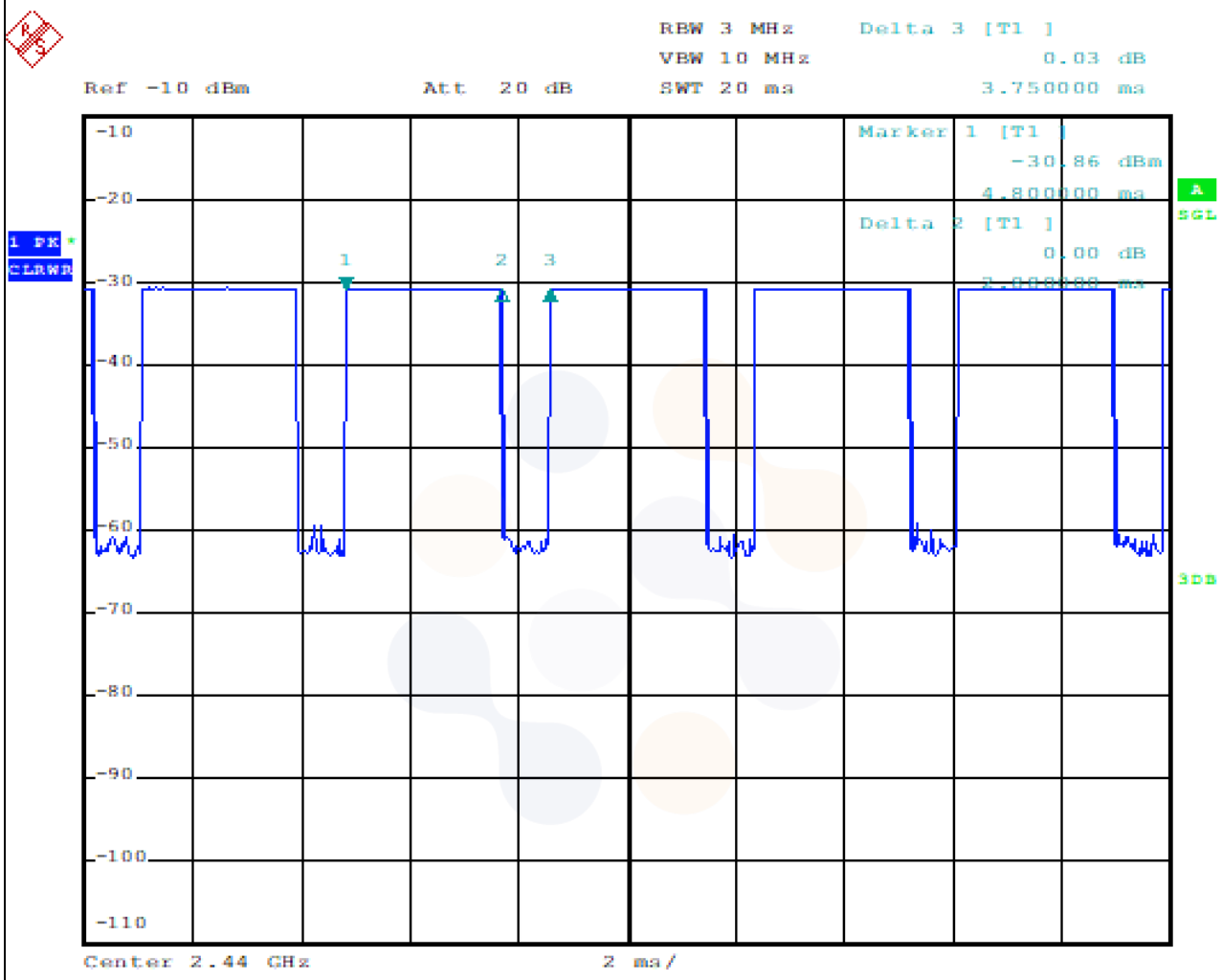
8.1.4 Bluetooth Average Conducted Output Power(Back-off_Grip Sensor)

Band	Mode	Freq. [MHz]	Channel	Conducted Powers (dBm)
				Grip Sensor
Bluetooth	LE 125 Coded 255	2 402.0	0	**11.27**
		2 440.0	19	**10.51**
		2 480.0	39	8.68

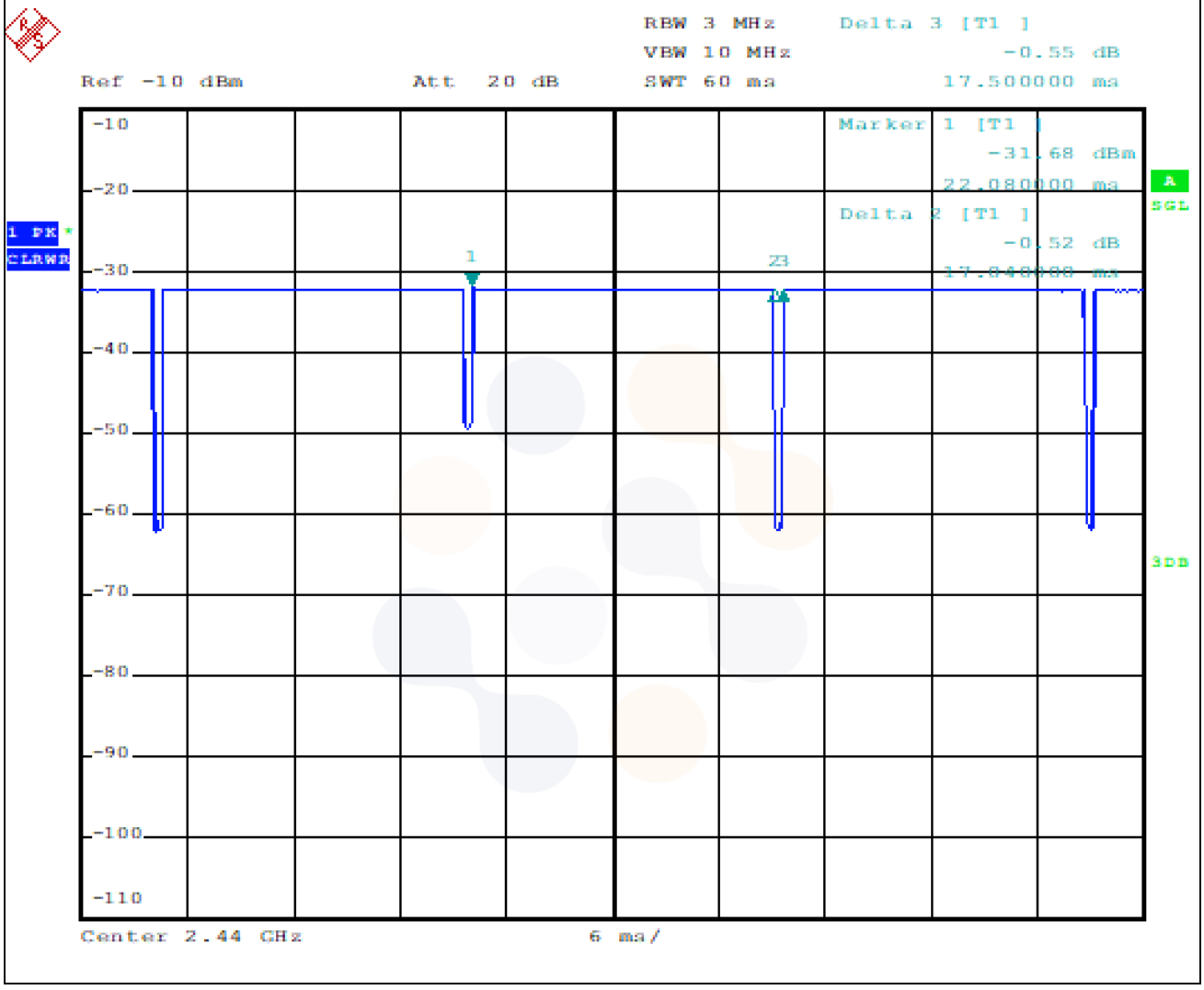
8.2 Wireless Band Duty Cycle

Wireless Bands	Frequency Bands	Ant.	Mode	Duty Cycle (%)
WLAN	2.4 GHz	Ant.1/MIMO	802.11b	98.70
	U-NII	Ant.2	802.11a	93.90
		MIMO		94.40

Wireless Bands	Frequency Bands		On, Off Time		Duty Cycle	
	Mode	Packet	On Time (ms)	On-Off Time (ms)	Duty Cycle (%)	Duty Cycle Compensate Factor
Bluetooth	BDR(GFSK)	DH5	2.88	3.75	76.8	1.302



Wireless Bands	Frequency Bands	On, Off Time		Duty Cycle	
	Mode	On Time (ms)	On-Off Time (ms)	Duty Cycle (%)	Duty Cycle Compensate Factor
Bluetooth	LE_125 Coded 255	17.04	17.05	97.4	1.027



9. System Verification

9.1 Measurement date and environment

Shield room	Date	Environment			
		Temperature (°C)		Humidity (%)	
8F - 2	2023-10-31	21.4	21.2	53.1	55.3
8F - 3	2023-10-23	21.2	21.5	51.5	51.9
	2023-10-24	21.3	21.6	52.2	52.8
	2023-10-25	21.5	21.7	53.0	53.2
	2023-10-26	21.2	21.4	52.9	53.3
	2023-10-30	21.2	21.5	52.9	53.0

9.2 Tissue Verification

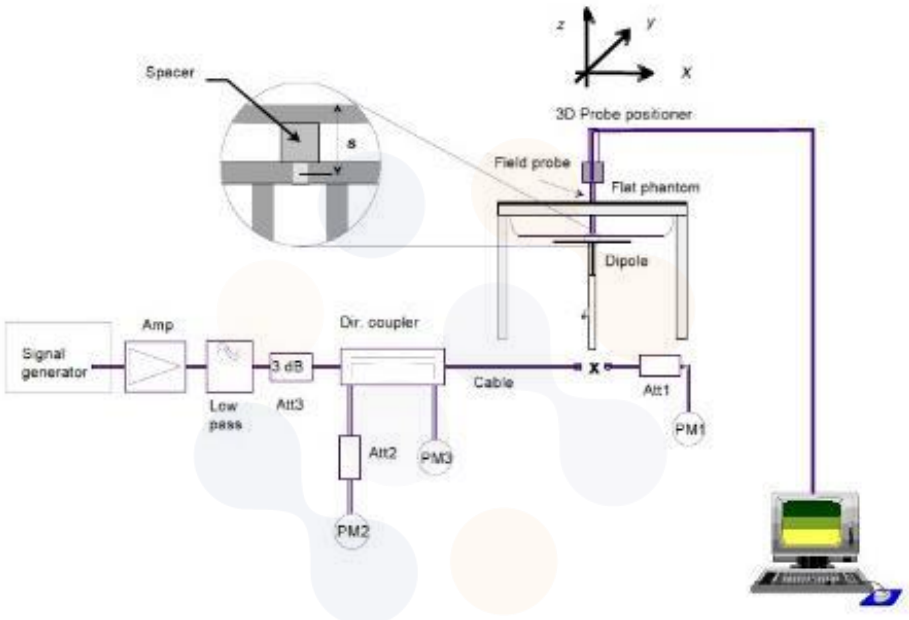
The dielectric properties for this Tissue Simulant Liquids were measured by using the SPEAG Model DAK3.5 Dielectric Probe in conjunction with Agilent E5071B Network Analyzer (300 kHz – 8 500 ㎒). The Conductivity (σ) and Permittivity (ρ) are listed in Table 1.For the SAR measurement given in this report. The temperature variation of the Tissue Simulant Liquids was (22 ± 2) ℃.

Frequency (㎒)	Limit/Measured		Permittivity (ρ)	Conductivity (σ)	Temp. (°C)
2 450.0	Recommended Limit		39.20± 5 % (37.24 ~ 41.16)	1.80± 5 % (1.71 ~ 1.89)	22 ± 2
	Measured	2023-10-23	38.07	1.75	20.88
5 250.0	Recommended Limit		35.95 ± 5 % (34.15 ~ 37.75)	4.71 ± 5 % (4.47 ~ 4.95)	22 ± 2
	Measured	2023-10-24	35.10	4.68	20.71
5 600.0	Recommended Limit		35.50 ± 5 % (33.73 ~ 37.28)	5.07 ± 5 % (4.82 ~ 5.32)	22 ± 2
	Measured	2023-10-25	34.90	5.10	20.75
5 800.0	Recommended Limit		35.30 ± 5 % (33.54 ~ 37.07)	5.27 ± 5 % (5.01 ~ 5.53)	22 ± 2
	Measured	2023-10-26	34.54	5.31	20.84
		2023-10-30	34.48	5.20	20.79
		2023-10-31	33.92	5.16	20.79

<Table 1. Measurement result of Tissue electric parameters>

9.3 Test System Verification

The microwave circuit arrangement for system verification is sketched below picture.
The daily system accuracy verification occurs within the flat section of the SAM phantom. A SAR measurement was performed to see if the measured SAR was within ± 10% from the t arget SAR values. The tests were conducted on the same days as the measurement of the EUT. The obtained results from the system accuracy verification are displayed in the Table 2. During the tests, the ambient temperature of the laboratory was in the range (22 ± 2) ℃, th e relative humidity was in the range(50 ± 20)% and the liquid depth Above the ear/grid refer ence points was above 15 cm in all the cases. It is seen that the system is operating within its specification, as the results are within acceptable tolerance of the reference values.



Verification Kit	Probe S/N	Frequency (MHz)	Tissue Type	Date	Limit/Measured (Normalized to 1 W) Recommended 1g
D2450V2 SN: 895	EX3DV4 SN: 3697	2 450.0	HSL	Recommended Limit	52.20 ± 10 % (46.98 ~ 57.42)
				2023-10-23	51.80
D5GHzV2 SN: 1293	EX3DV4 SN: 3697	5 250.0	HSL	Recommended Limit	80.50 ± 10 % (72.45~88.55)
				2023-10-24	84.20
D5GHzV2 SN: 1293	EX3DV4 SN: 3697	5 600.0	HSL	Recommended Limit	82.60 ± 10 % (74.34~90.86)
				2023-10-25	88.30
D5GHzV2 SN: 1293	EX3DV4 SN: 3697	5 800.0	HSL	Recommended Limit	80.10 ± 10 % (72.09~88.11)
				2023-10-26	85.00
				2023-10-30	82.30
	EX3DV4 SN: 7840			2023-10-31	77.20

<Table 2. System Verification Result>

10. SAR Test Results

WLAN 2.4 GHz										
Ant./ Mode	EUT Position	Distance (mm)	Frequency (㎒)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Duty Cycle Compensate Factor	Measured 1 g SAR (W/kg)	Reported 1 g SAR (W/kg)	Plot No.
Ant.1 802.11b	Grip Sensor Off									
	Rear	15	2 437.0	18.49	18.50	1.002	1.013	0.339	0.344	
	Left	9	2 437.0	18.49	18.50	1.002	1.013	0.350	0.355	
	Top	0	2 437.0	18.49	18.50	1.002	1.013	0.069	0.070	
	Grip Sensor On									
	Rear	0	2 462.0	10.18	10.50	1.076	1.013	0.776	**0.846**	1
		0	2 412.0	10.06	10.50	1.107	1.013	0.709	0.795	
	Left	0	2 462.0	10.18	10.50	1.076	1.013	0.204	0.222	
MIMO 802.11b	Grip Sensor Off									
	Rear	14	2 437.0	18.22	18.50	1.067	1.013	0.721	0.779	
	Left	9	2 437.0	18.22	18.50	1.067	1.013	0.492	0.532	
	Top	12	2 437.0	18.22	18.50	1.067	1.013	0.093	0.101	
	Grip Sensor On									
	Rear	0	2 462.0	10.10	10.50	1.096	1.013	0.934	**1.037**	2
		0	2 412.0	10.07	10.50	1.104	1.013	0.686	0.767	
	Left	0	2 462.0	10.10	10.50	1.309	1.013	0.290	0.385	
	Top	0	2 462.0	10.10	10.50	1.096	1.013	0.077	0.085	
	Repeated SAR Test									
	Rear	0	2 462.0	10.10	10.50	1.096	1.013	0.903	1.003	

U-NII-2A										
Ant./ Mode	EUT Position	Distance (mm)	Frequency (㎒)	Measured Conducted Power (dBm)	Max. Tune-up Power (dBm)	Power Scaling Factor	Duty Cycle Compensate Factor	Measured 1 g SAR (W/kg)	Reported 1 g SAR (W/kg)	Plot No.
Ant.2 802.11a	Grip Sensor Off									
	Rear	14	5 260.0	16.48	17.00	1.127	1.065	0.199	0.239	
	Left	0	5 260.0	16.48	17.00	1.127	1.065	0.156	0.187	
	Top	12	5 260.0	16.48	17.00	1.127	1.065	0.166	0.199	
	Grip Sensor On									
	Rear	0	5 260.0	6.04	6.50	1.112	1.065	0.450	**0.533**	3
	Top	0	5 260.0	6.04	6.50	1.112	1.065	0.148	0.175	
MIMO 802.11a	Grip Sensor Off									
	Rear	14	5 320.0	15.15	17.00	1.531	1.059	0.453	**0.734**	4
	Left	9	5 320.0	15.15	17.00	1.531	1.059	0.390	0.632	
	Top	12	5 320.0	15.15	17.00	1.531	1.059	0.127	0.206	
	Grip Sensor On									
	Rear	0	5 300.0	4.77	6.50	1.489	1.059	0.354	0.558	
	Left	0	5 300.0	4.77	6.50	1.489	1.059	0.053	0.084	
	Top	0	5 300.0	4.77	6.50	1.489	1.059	0.133	0.210	

U-NII-2C										
Ant./ Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Reported 1 g SAR (W/kg)**	**Plot No.**
Ant.2 802.11a	Grip Sensor Off									
	Rear	14	5 600.0	16.99	17.00	1.002	1.065	1.010	**1.078**	5
	Rear	14	5 500.0	16.91	17.00	1.021	1.065	0.489	0.532	
	Left	0	5 600.0	16.99	17.00	1.002	1.065	0.318	0.339	
	Top	12	5 600.0	16.99	17.00	1.002	1.065	0.422	0.450	
	Grip Sensor On									
	Rear	0	5 500.0	6.48	6.50	1.005	1.065	0.642	0.687	
	Top	0	5 500.0	6.48	6.50	1.005	1.065	0.292	0.313	
	Repeated SAR									
	Rear	14	5 600.0	16.99	17.00	1.002	1.065	0.963	1.028	
MIMO 802.11a	Grip Sensor Off									
	Rear	14	5 500.0	15.61	17.00	1.377	1.059	0.922	**1.345**	6
	Rear	14	5 600.0	15.59	17.00	1.384	1.059	0.862	1.263	
	Rear	14	5 720.0	13.60	15.50	1.549	1.059	0.465	0.763	
	Left	9	5 500.0	15.61	17.00	1.377	1.059	0.580	0.846	
	Left	9	5 600.0	15.59	17.00	1.384	1.059	0.504	0.739	
	Top	12	5 500.0	15.61	17.00	1.377	1.059	0.244	0.356	
	Grip Sensor On									
	Rear	0	5 600.0	5.75	6.50	1.189	1.059	1.030	1.297	
	Rear	0	5 720.0	5.08	6.50	1.387	1.059	0.792	1.163	
	Rear	0	5 500.0	5.20	6.50	1.349	1.059	0.913	1.304	
	Left	0	5 600.0	5.75	6.50	1.189	1.059	0.099	0.125	
	Top	0	5 600.0	5.75	6.50	1.189	1.059	0.324	0.408	
	Repeated SAR									
	Rear	0	5 600.0	5.75	6.50	1.189	1.059	1.020	1.284	

U-NII-3										
Ant./ Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Reported 1 g SAR (W/kg)**	**Plot No.**
Ant.2 802.11a	Grip Sensor Off									
	Rear	14	5 785.0	14.45	15.50	1.274	1.065	0.479	0.650	
		14	5 745.0	14.07	15.50	1.390	1.065	0.362	0.536	
	Left	0	5 785.0	14.45	15.50	1.274	1.065	0.163	0.221	
	Top	12	5 785.0	14.45	15.50	1.274	1.065	0.221	0.300	
	Grip Sensor On									
	Rear	0	5 785.0	6.44	6.50	1.014	1.065	0.813	0.878	
		0	5 825.0	6.29	6.50	1.050	1.065	1.050	**1.174**	7
	Top	0	5 785.0	6.44	6.50	1.014	1.065	0.319	0.344	
	Repeated SAR Test									
	Rear	0	5 825.0	6.29	6.50	1.050	1.065	1.040	1.163	
MIMO 802.11a	Grip Sensor Off									
	Rear	14	5 825.0	14.23	15.50	1.340	1.059	0.669	0.949	
		14	5 785.0	14.22	15.50	1.343	1.059	0.595	0.846	
	Left	9	5 825.0	14.23	15.50	1.340	1.059	0.252	0.358	
	Top	12	5 825.0	14.23	15.50	1.340	1.059	0.255	0.362	
	Grip Sensor On									
	Rear	0	5 745.0	6.08	6.50	1.102	1.059	0.905	1.056	
		0	5 785.0	5.76	6.50	1.186	1.059	1.000	1.256	
		0	5 825.0	4.51	6.50	1.581	1.059	0.808	**1.353**	8
	Left	0	5 745.0	6.08	6.50	1.102	1.059	0.061	0.071	
	Top	0	5 745.0	6.08	6.50	1.102	1.059	0.285	0.333	
	Repeated SAR									
	Rear	0	5 785.0	5.76	6.50	1.186	1.059	0.978	1.228	
	Additional SAR Test(With Keyboard Cover & S-pen)									
	Rear	0	5 825.0	4.51	6.50	1.581	1.059	0.299	0.501	

Bluetooth										
Mode	**EUT Position**	**Distance (mm)**	**Frequency (㎒)**	**Measured Conducted Power (dBm)**	**Max. Tune-up Power (dBm)**	**Power Scaling Factor**	**Duty Cycle Compensate Factor**	**Measured 1 g SAR (W/kg)**	**Reported 1 g SAR (W/kg)**	**Plot No.**
BDR DH5	Grip Sensor Off									
	Rear	15	2 480.0	16.00	16.50	1.122	1.302	0.042	0.061	
	Left	9	2 480.0	16.00	16.50	1.122	1.302	0.041	0.060	
	Top	0	2 480.0	16.00	16.50	1.122	1.302	0.007	0.010	
LE 125 Coded 255	Grip Sensor On									
	Rear	0	2 402.0	11.27	12.00	1.183	1.027	0.704	**0.855**	9
		0	2 440.0	10.51	12.00	1.409	1.027	0.576	0.833	
	Left	0	2 402.0	11.27	12.00	1.183	1.027	0.041	0.050	

General Notes:

1. The test data reported are the worst-case SAR values according to test procedures specified in IEEE 1528-2013 and FCC KDB Publication 447498 D01.
2. All modes of operation were investigated, and worst-case results are reported.
3. Battery is fully charged for all readings and the standard batteries are the only options.
4. Liquid tissue depth was at least 15 cm.
5. The manufacturer has confirmed that the device(s) tested have the same physical, mechanical and thermal characteristics and are within operational tolerances expected for production units.
6. SAR results were scaled to the maximum allowed power to demonstrate compliance per FCC KDB Publication 447498 D01v06.
7. This device utilizes power reduction for some wireless modes, as outlined in Section 2.3. The maximum output power allowed for each transmitter and exposure condition was evaluated for SAR compliance based on expected use conditions and simultaneous transmission scenarios.
8. Additional testing required in order satisfying FCC simultaneous transmission limit criteria.
9. Accessory (Keyboard Cover + S-pen) were verified under the worst configuration RF exposure condition.

WLAN & Bluetooth Notes:

1. Justification for test configurations for WLAN per KDB Publication 248227 D01v02r02 for 2.4㎓ WIFI operations, the highest measured maximum output power channel for DSSS was selected for SAR measurement.

   SAR for OFDM modes (2.4㎓ 802.11g/n) was not required due to the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
2. The device was configured to transmit continuously at the required data rate, channel bandwidth and signal modulation, using the highest transmission duty factor supported by the test mode tools. The reported SAR was scaled to the 100% transmission duty factor to determine compliance.
3. When the same transmission mode configurations have the same maximum output power on the same channel for the 802.11 a/g/n/ac modes, the channel in the lower order/sequence 802.11 mode (i.e. a, g, n then ac) is selected.
4. When the specified maximum output power is the same for both UNII Band1 and UNII Band 2A, begins SAR measurement in UNII band 2A; and if the highest reported SAR for UNII band 2A is ≤ 1.2W/kg, SAR is not required for UNII band1 > 1.2W/kg, both bands should be tested independently for SAR.
5. When the maximum reported 1g averaged SAR is ≤0.8 W/kg, SAR testing on additional channels was not required. Otherwise, SAR for the next highest output power channel was required until the reported SAR result was ≤ 1.20 W/kg for 1g evaluations or all test channels were measured.
6. This device supports 2X2 MIMO Tx for WLAN 802.11a/b/g/n/ac/ax. 802.11a/b/g/n/ac/ax supports CDD and STBC, 802.11n/ac/ax supports SDM. WLAN MIMO evaluation was applied conservatively.

11. Simultaneous Transmission

The following procedures adopted from FCC KDB Publication 447498 D01v06 are applicable to devices with built in unlicensed transmitters such as 802.11 and Bluetooth devices which may simultaneously transmit with the licensed transmitter.

This device contains transmitters that may operate simultaneously. Therefore, simultaneous transmission analysis is required. Per FCC KDB Publication 447498 D01v06 4.3.2 and IEEE 1528-2013 Section 6.3.4.1.2, simultaneous transmission SAR test exclusion may be applied when the sum of the 1g or 10g SAR for all the simultaneous transmitting antennas in a specific a physical test configuration is within SAR limits. The different test positions in an exposure condition may be considered collectively to determine SAR test exclusion according to the sum of 1g or 10g SAR.

11.1 Estimated SAR (Maximum Output Power)

Ant.	Band	Frequency (MHz)	Output power		Separation distances [mm]					SAR Exemption				
			dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left Edge	Right Edge	Top	Bot.
WIFI1	2.4 GHz	2462	18.50	71	5	5	113	16	196	Measure	Measure	0.400	Measure	0.400
	U-NII-2A	5320	17.00	50						Measure	Measure	0.400	Measure	0.400
	U-NII-2C	5720	17.00	50						Measure	Measure	0.400	Measure	0.400
	U-NII-3	5825	15.50	35						Measure	Measure	0.400	Measure	0.400
	Bluetooth	2480	16.50	45						Measure	Measure	0.400	Measure	0.400
WIFI2	2.4 GHz	2462	18.50	71	5	24	89	5	198	Measure	Measure	0.400	Measure	0.400
	U-NII-2A	5320	17.00	50						Measure	Measure	0.400	Measure	0.400
	U-NII-2C	5720	17.00	50						Measure	Measure	0.400	Measure	0.400
	U-NII-3	5825	15.50	35						Measure	Measure	0.400	Measure	0.400

11.2 Estimated SAR (Reduced Output Power)

Ant.	Band	Frequency (MHz)	Output power		Separation distances [mm]					SAR Exemption				
			dBm	mW	Rear	Left	Right	Top	Bot.	Rear	Left Edge	Right Edge	Top	Bot.
WIFI1	2.4 GHz	2462	10.50	11	5	5	113	16	196	Measure	Measure	Non-Power-Back-off	Non-Power-Back-off	Non-Power-Back-off
	U-NII-2A	5320	6.50	4						Measure	Measure			
	U-NII-2C	5720	6.50	4						Measure	Measure			
	U-NII-3	5825	6.50	4						Measure	Measure			
	Bluetooth	2480	12.00	16						Measure	Measure			
WIFI2	2.4 GHz	2462	10.50	11	5	24	89	5	198	Measure	Non-Power-Back-off	Non-Power-Back-off	Measure	Non-Power-Back-off
	U-NII-2A	5320	6.50	4						Measure			Measure	
	U-NII-2C	5720	6.50	4						Measure			Measure	
	U-NII-3	5825	6.50	4						Measure			Measure	

Notes:

- For distances < 5mm, a distance of 5mm is used to determine SAR exclusion and estimated SAR value.
- Output power is the maximum rated power (including tune-up or manufacturing tolerances) and includes source-based averaging.
- If the antenna separation distance is > 50mm then the estimated SAR value is the lesser of the estimated value at 50mm or 0.4 W/Kg.
- Formulas round separation distance to nearest mm and power to nearest mW before calculating estimated SAR or determining if SAR is excluded.

11.3 #Simultaneous Transmission Configurations

According to FCC KDB 447498 D01v06, transmitters are considered to be transmitting simultaneously when there is overlapping transmission, with the exception of transmissions during network hand-offs with maximum hand-off duration less than 30 seconds.
This device contains multiple transmitters that may operate simultaneously, and therefore requires a simultaneous transmission analysis according to FCC KDB Publication 447498 D01v06 4.3.2 procedures.

No.	Scenario	RF Exposure Condition
		Body
1	WLAN 2.4 ㎓ + Bluetooth	No
2	WLAN 5 ㎓ Ant.1 or MIMO + Bluetooth Ant.1	No
3	WLAN 5 ㎓ Ant.2 + Bluetooth Ant.1	Yes
4	WLAN 2.4 ㎓ + WLAN 5 ㎓	No

11.3.1 Simultaneous Transmission Analysis

Position		Band					Summation
		2.4 ㎓ Ant.1	2.4 ㎓ MIMO	5 ㎓ Ant.2	5 ㎓ MIMO	Bluetooth Ant.1	Scenario No.3
		[①]	[②]	[③]	[④]	[⑤]	[③+⑤]
Body	Rear	0.846	1.037	1.174	1.353	0.855	**2.029**
	Left	0.355	0.532	0.339	0.846	0.060	0.399
	Right	0.400	0.400	0.400	0.400	0.400	0.800
	Top	0.070	0.101	0.450	0.408	0.010	0.460
	Bottom	0.400	0.400	0.400	0.400	0.400	0.800

11.4 SAR to Peak Location Separation Ratio Analysis

The simultaneous transmitting antennas in each operating mode and exposure condition combination are considered one pair at a time to determine the SPLSR. When SAR is measured for both antennas in the pair, the peak location separation distance is computed by the following formula.

$$\text{Peak Location Separation Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$$

Where (x1, y1, z1) and (x2, y2, z2) are the coordinates of the extrapolated peak SAR locations in the area or zoom scans.

When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna. Due to curvatures on the SAM phantom, when SAR is estimated for one of the antennas in an antenna pair, the measured peak SAR location will be translated onto the test device to determine the peak location separation for the antenna pair.

The SPLSR is determined by the following formula.

$$\text{SPLSR} = \frac{(\text{SAR}_1 + \text{SAR}_2)^{1.5}}{R_i}$$

Where SAR_1 and SAR_2 are the highest reported or estimated SAR for each antenna in the pair, and R_i is the separation distance between the peak SAR locations for the antenna pair in mm.

When the SPLSR is <= 0.04, <= 0.10 (10g) the simultaneous transmission SAR is not required. Otherwise, the enlarged zoom scan and volume scan post-processing procedures will be performed.

11.4.1 Maximum Simultaneous Transmission Analysis

11.4.1.1 Maximum Worst case Analysis

Exposure Condition /Position		WLAN 2.4 GHz		WLAN 5 GHz		Bluetooth	Worst Summation		SPLSR Result (≤ 0.04 Limit)	Volume Scan
		Ant.1	MIMO	Ant.2	MIMO					
		[①]	[②]	[③]	[④]	[⑤]	Sum No.	[W/kg]		
Body	Rear	0.846	1.037	1.174	1.353	0.855	[③+⑤]	2.029	0.11	Required

11.4.1.2 SPLSR Analysis

WLAN 2.4 GHz Ant.1	WLAN 2.4 GHz MIMO	WLAN 5 GHz Ant.2	WLAN 5 GHz MIMO	Bluetooth
[①]	[②]	[③]	[④]	[⑤]

SPLSR – Rear Position	
Scenario No.	No.1
Scenario	[③]+[⑤]
Rear	2.029
Volume scan	**Required**

Scenario No.		Scenario		Position		SUM	
1		[③]+[⑤]		Rear		2.029	
Distance [mm]	SPLSR ≤ 0.04 Limit	Numbering	Mode	SAR W/kg	Coordinates		
					X	Y	Z
25.33	0.11	③	WLAN 5 GHz Ant.2	1.174	-0.03420	-0.09420	-0.17900
		⑤	Bluetooth	0.855	-0.05220	-0.07640	-0.17800

11.4.1.3 Volume Scan Analysis

Exposure Condition /Position		Enlarge Zoom WLAN 5 ㎓ [W/kg]	Enlarge Zoom Bluetooth [W/kg]	Scaled Volume Scan SUM Result [W/kg]
		Ant.2	Ant.1	
Body	Rear	0.937	0.691	1.260

WLAN 5 GHz Ant.2 Standalone Volume Scan Plot – Rear

Date: 10/31/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: **1. WLAN 5.8GHz_WIFI2_Body_VS.da53:0**

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

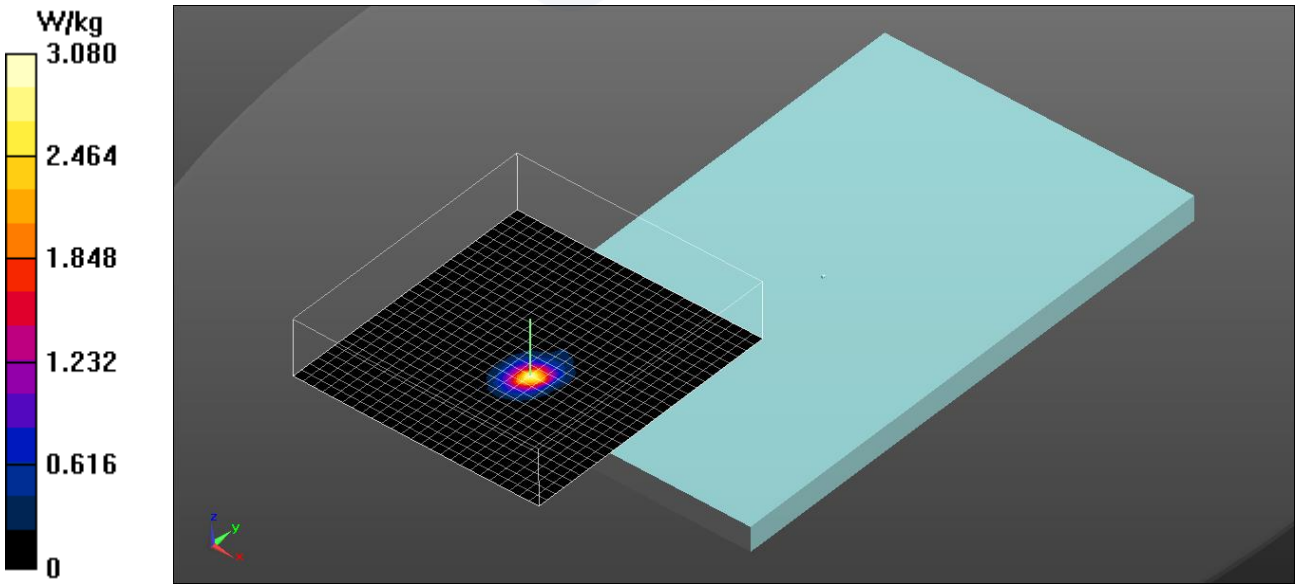
Communication System: UID 0, 5GWLAN (0); Frequency: 5825 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 5.202 S/m; ε_r = 33.909; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7840;ConvF(4.72, 4.69, 4.74) @ 5825 MHz; Calibrated: 8/25/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1758; Calibrated: 8/24/2023
- Phantom: ELI v5.0 sn1178; Type: QDOVA002AA; Serial: TP:1178
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/WLAN5GHz_802.11a_Ch165_WIFI2_Rear_0 mm VS/Volume Scan (26x28x7): Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 27.47 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 6.25 W/kg
SAR(1 g) = 0.937 W/kg; SAR(10 g) = 0.183 W/kg
Total Absorbed Power = 0.00226 W

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 3.08 W/kg



Bluetooth Standalone Volume Scan Plot – Rear

Date: 10/23/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: **1. Bluetooth_LE_Body_VS.da53:0**

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

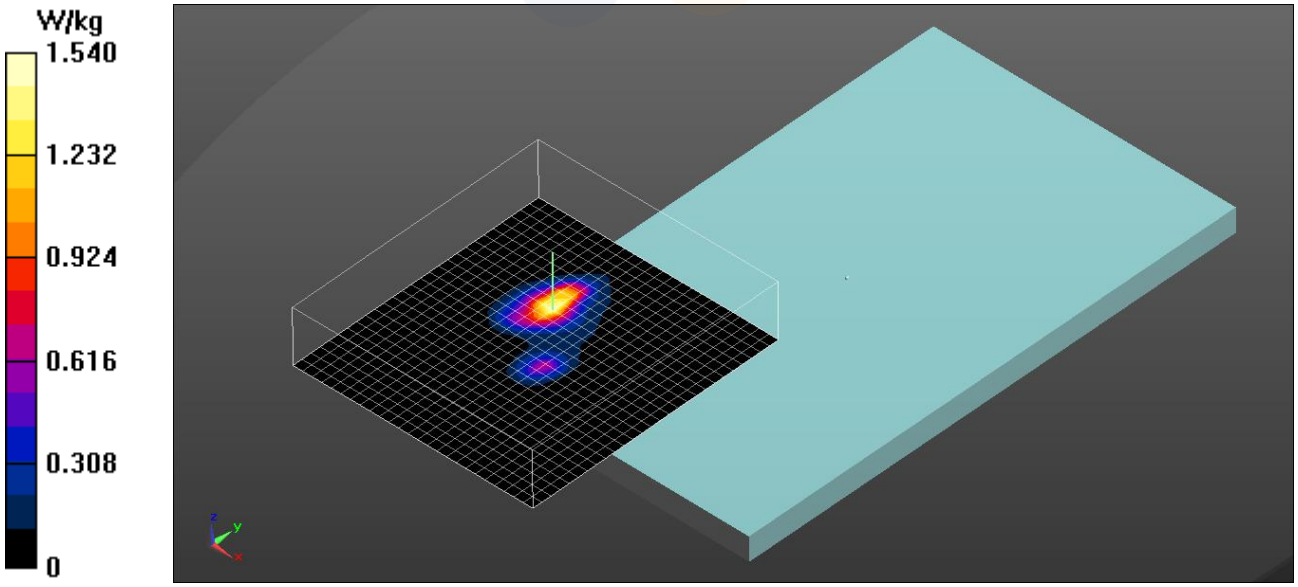
Communication System: UID 0, Bluetooth LE (0); Frequency: 2402 MHz; Duty Cycle: 1:1.02683
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.724 S/m; ε_r = 38.22; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.2, 7.2, 7.2) @ 2402 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/Bluetooth_LE_125 Coded 255_CH0_Rear_0 mm Grip Sensor On_VS/Volume Scan (26x28x7):
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 22.72 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 2.66 W/kg
SAR(1 g) = 0.691 W/kg; SAR(10 g) = 0.227 W/kg
Total Absorbed Power = 0.00409 W

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.54 W/kg



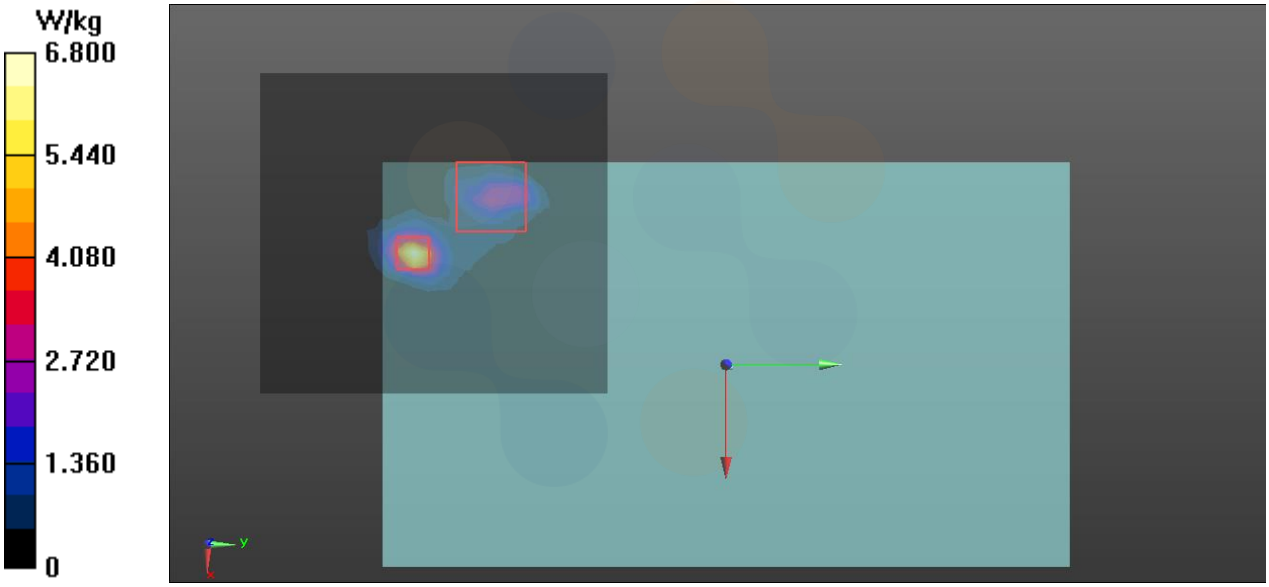
No.1 : Volume Scan Scenario : WLAN 5 ㎓ Ant.2 + Bluetooth

Multi-Band Average SAR
Multi-Band Configurations:

DASY Configuration for Configuration/WLAN5GHz_802.11a_Ch165_WIFI2_Rear_0 mm VS/Volume Scan:

DASY Configuration for Configuration/Bluetooth_LE_125 Coded 255_CH0_Rear_0 mm Grip Sensor On_VS/Volume Scan:

Multi Band Result:
SAR(1 g) = 1.26 W/kg; SAR(10 g) = 0.293 W/kg
Maximum value of SAR (interpolated) = 6.80 W/kg



12. SAR Measurement Variability

Per FCC KDB Publication 865664 D01v01r04, SAR measurement variability was assessed for each frequency band, which was determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media were required for SAR measurements in a frequency band, the variability measurement procedures were applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. These additional measurements were repeated after the completion of all measurements requiring the same head or body tissue equivalent medium in a frequency band. The test device was returned to ambient conditions (normal room temperature) with the battery fully charged before it was re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR Measurement Variability was assessed using the following procedures for each frequency band:

1) Repeated measurements are not required when the original highest measured SAR is < 0.80 W/kg.
2) **When the original highest measured SAR is ≥ 0.80 W/㎏, the measurement was repeated once.**
3) A second repeated measurement was performed only if the ratio of largest to smallest SAR for the original and first repeated measurements was > 1.20 or when the original or repeated measurement was ≥ 1.45 W/kg (~ 10％ from the 1-g SAR limit).
4) A third repeated measurement was performed only if the original, first or second repeated measurement was ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20.

	Band / Ant.		Mode	Frequency (㎒)	EUT Position	Separation Distance (㎜)	Measured 1 g SAR (W/kg)	Repeated 1 g SAR (W/kg)	Ratio
Body	WLAN 2.4 GHz	MIMO	802.11b	2 462.0	Rear	0	0.934	0.903	1.03
	U-NII-2C	Ant.2	802.11a	5 600.0	Rear	14	1.010	0.963	1.05
		MIMO		5 600.0	Rear	0	1.030	1.020	1.01
	U-NII-3	Ant.2	802.11a	5 825.0	Rear	0	1.050	1.040	1.01
		MIMO		5 785.0	Rear	0	1.000	0.978	1.02

13. Measurement Uncertainty

Per KDB 865664 D01 SAR measurement 100㎒ to 6㎓, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be ≤ 30%, for a confidence interval of *k* = 2. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Standard 1528-2013 is not required in SAR reports submitted for equipment approval. For this device, the highest measured 1-g SAR is less 1.5W/kg and highest measured 10-g SAR is less 3.75W/kg. Therefore, the measurement uncertainty table is not required in this report.

14. Test Equipment Information

Test Platform	SPEAG DASY5 System			
Version	DASY52: 52.10.4.1535 / SEMCAD: 14.6.14 (7501)			
Location	Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, Korea			
Manufacture	SPEAG			
Hardware Reference				
Equipment	Model	Serial Number	Date of Calibration	Due date of next Calibration
Shield Room	-	8F - 2	-	-
Shield Room	-	8F - 3	-	-
DASY5 Robot	TX90XL speag	F12/5L7FA1/A/01	-	-
DASY6 Robot	TX90XL speag	F/18/0004968/A/001	-	-
Phantom	2mm Oval Phantom ELI5	1178	-	-
Phantom	2mm Oval Phantom ELI5	2097	-	-
Mounting Device	Mounting Device	-	-	-
Mounting Device	Laptop Holder	-	-	-
DAE	DAE4	1756	2023-09-20	2024-09-20
DAE	DAE4	1758	2023-08-24	2024-08-24
Probe	EX3DV4	3697	2023-04-13	2024-04-13
Probe	EX3DV4	7840	2023-08-25	2024-08-25
ESG Vector Signal Generator	E4438C	MY42080486	2023-04-25	2024-04-25
Dual Power Meter	EPM-442A	GB37480680	2023-04-26	2024-04-26
Power Sensor	8481H	2703A11902	2023-04-26	2024-04-26
Power Sensor	8481H	3318A18090	2023-04-26	2024-04-26
Attenuator	PE7005-10	2228-4	2022-12-15	2023-12-15
Attenuator	PE7005-10	2228-5	2022-12-15	2023-12-15
Attenuator	PE7005-10	2228-6	2022-12-15	2023-12-15
Dual Directional Coupler	772D	2839A160504	2023-04-26	2024-04-26
Power Amplifier	AMP2027ADB	10005	2023-04-26	2024-04-26
Low Pass Filter	VLF-3000+	31831	2023-04-26	2024-04-26
Low Pass Filter	LA-60N	40059	2023-02-09	2024-02-09
Dipole Validation Kits	D2450V2	895	2023-09-26	2025-09-26
Dipole Validation Kits	D5GHzV2	1293	2023-01-25	2025-01-25
Network Analyzer	E5071B	MY42403524	2023-02-09	2024-02-09
Dielectric Assessment Kit	DAK-3.5	1078	2023-05-24	2024-05-24
Humidity/Temp	MHB-382SD	25737	2023-05-03	2024-05-03
Humidity/Temp	MHB-382SD	46307	2023-02-14	2024-02-14
Wideband Radio Communication Tester	CMW500	132120	2023-04-25	2024-04-25
Spectrum Analyzer	FSP7	100289	2022-12-08	2023-12-08

15. Test System Verification Results

Date: 10/23/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 2450 MHz Verification Input Power 100 mW 2023-10-23.da5:0

DUT: Dipole 2450 MHz D2450V2, Type: D2450V2, Serial: D2450V2 - SN:895

Communication System: UID 0, CW (0); Frequency: 2450 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2450 MHz; σ = 1.751 S/m; ε_r = 38.071; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

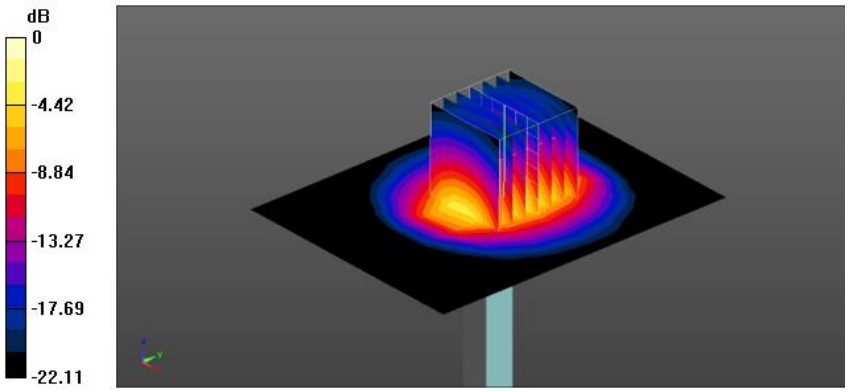
- Probe: EX3DV4 - SN3697;ConvF(7.2, 7.2, 7.2) @ 2450 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/2450 MHz Verification Input Power 100 mW 2023-10-23/Area Scan (8x10x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 6.66 W/kg

Configuration/2450 MHz Verification Input Power 100 mW 2023-10-23/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 71.76 V/m; Power Drift = -0.13 dB
Peak SAR (extrapolated) = 11.1 W/kg
SAR(1 g) = 5.18 W/kg; SAR(10 g) = 2.39 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 8.86 W/kg



0 dB = 8.86 W/kg = 9.47 dBW/kg

Date: 10/24/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 5250 MHz Verification Input Power 100 mW 2023-10-24.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1293

Communication System: UID 0, CW (0); Frequency: 5250 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5250 MHz; σ = 4.684 S/m; ε_r = 35.098; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

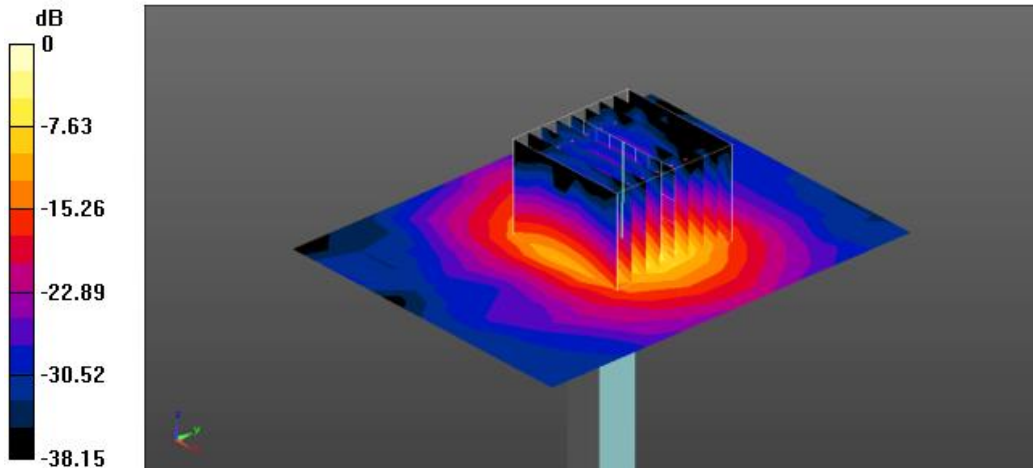
- Probe: EX3DV4 - SN3697;ConvF(4.8, 4.8, 4.8) @ 5250 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5250 MHz Verification Input Power 100 mW 2023-10-24/Area Scan (9x11x1):
Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 17.7 W/kg

Configuration/5250 MHz Verification Input Power 100 mW 2023-10-24/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.72 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 8.42 W/kg; SAR(10 g) = 2.5 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 20.6 W/kg



0 dB = 20.6 W/kg = 13.14 dBW/kg

Date: 10/25/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 5600 MHz Verification Input Power 100 mW 2023-10-25.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1293

Communication System: UID 0, CW (0); Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.104 S/m; ε_r = 34.903; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

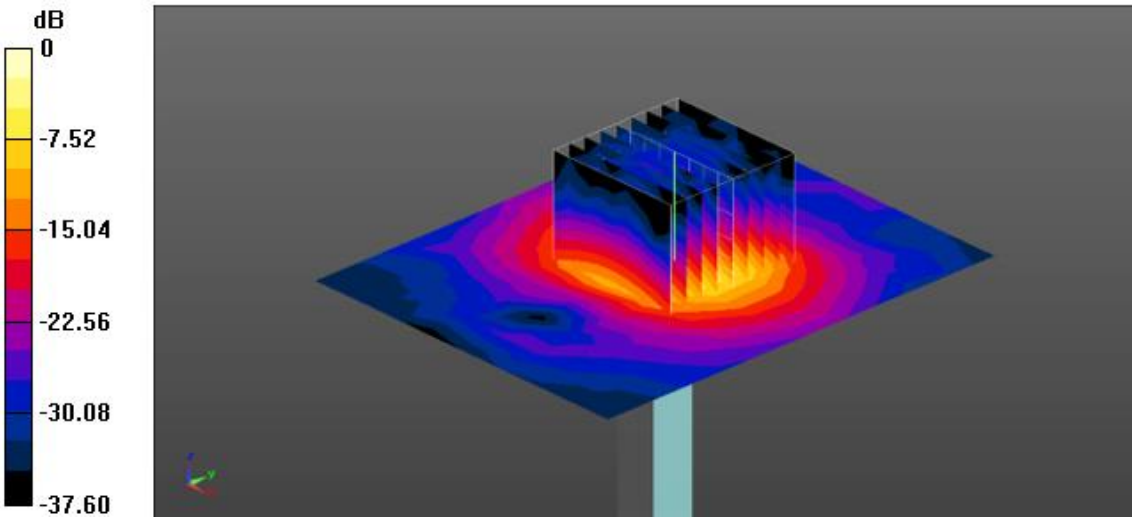
- Probe: EX3DV4 - SN3697;ConvF(4.46, 4.46, 4.46) @ 5600 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5600 MHz Verification Input Power 100 mW 2023-10-25/Area Scan (9x11x1): Measurement grid: dx=10mm, dy=10mm

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

Configuration/5600 MHz Verification Input Power 100 mW 2023-10-25/Zoom Scan (9x9x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 65.16 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 36.2 W/kg
SAR(1 g) = 8.83 W/kg; SAR(10 g) = 2.58 W/kg
Maximum value of SAR (measured) = 22.3 W/kg



0 dB = 22.3 W/kg = 13.48 dBW/kg

Date: 10/26/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 5800 MHz Verification Input Power 100 mW 2023-10-26.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1293

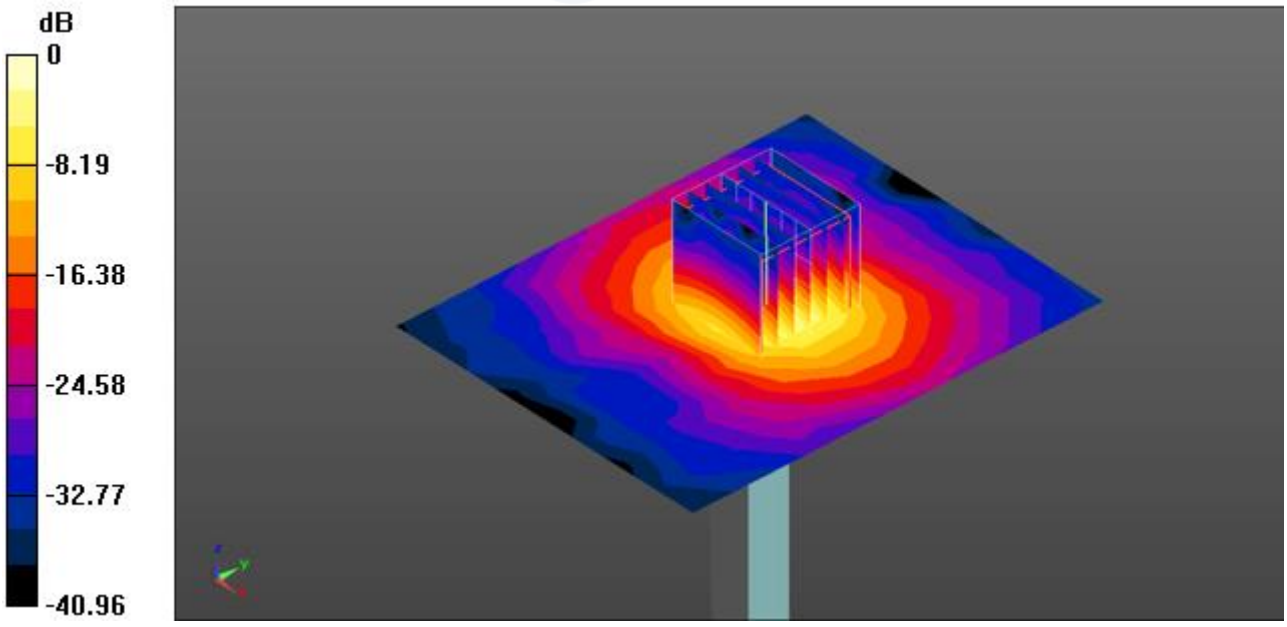
Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.307 S/m; ε_r = 34.539; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.44, 4.44, 4.44) @ 5800 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-26/Area Scan (9x11x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 17.9 W/kg

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-26/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.71 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 37.4 W/kg
SAR(1 g) = 8.5 W/kg; SAR(10 g) = 2.47 W/kg
Maximum value of SAR (measured) = 22.0 W/kg



0 dB = 22.0 W/kg = 13.42 dBW/kg

Date: 10/30/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 5800 MHz Verification Input Power 100 mW 2023-10-30.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1293

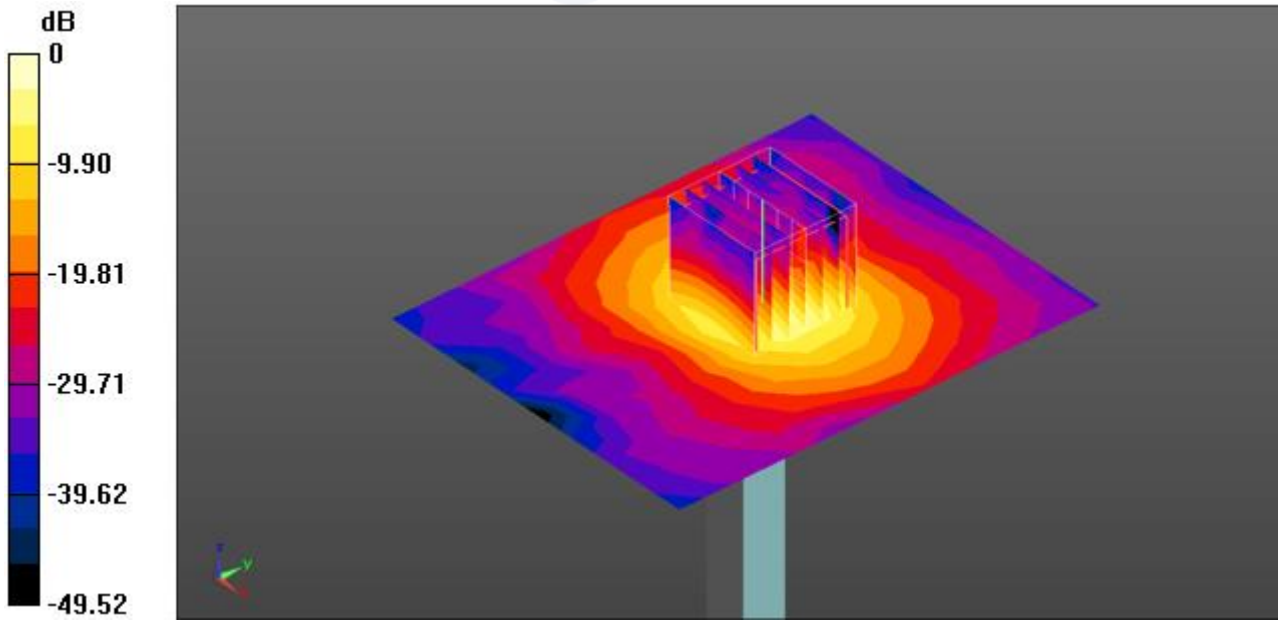
Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.203 S/m; ε_r = 34.484; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.44, 4.44, 4.44) @ 5800 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-30/Area Scan (9x11x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 17.6 W/kg

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-30/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 36.5 W/kg
SAR(1 g) = 8.23 W/kg; SAR(10 g) = 2.32 W/kg
Maximum value of SAR (measured) = 21.5 W/kg



0 dB = 21.5 W/kg = 13.32 dBW/kg

Date: 10/31/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 5800 MHz Verification Input Power 100 mW 2023-10-31.da5:0

DUT: Dipole D5GHzV2, Type: D5GHzV2, Serial: D5GHzV2 - SN:1293

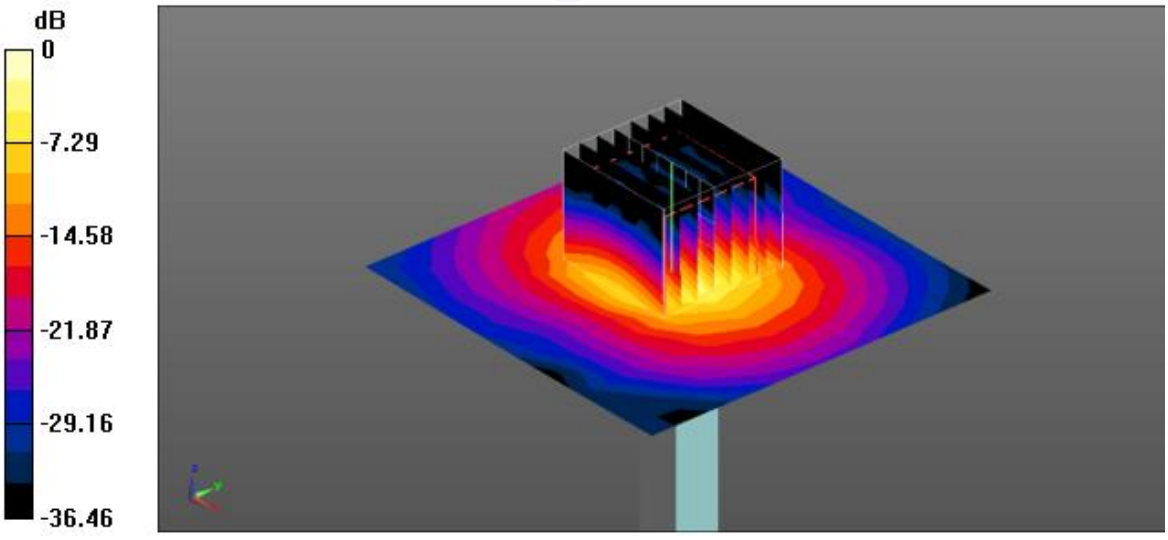
Communication System: UID 0, CW (0); Frequency: 5800 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5800 MHz; σ = 5.155 S/m; ε_r = 33.922; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7840;ConvF(4.72, 4.69, 4.74) @ 5800 MHz; Calibrated: 8/25/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1758; Calibrated: 8/24/2023
- Phantom: ELI v5.0 sn1178; Type: QDOVA002AA; Serial: TP:1178
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-31/Area Scan (9x9x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 18.3 W/kg

Configuration/5800 MHz Verification Input Power 100 mW 2023-10-31/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.21 V/m; Power Drift = 0.12 dB
Peak SAR (extrapolated) = 36.4 W/kg
SAR(1 g) = 7.72 W/kg; SAR(10 g) = 2.19 W/kg
Maximum value of SAR (measured) = 20.4 W/kg



0 dB = 20.4 W/kg = 13.10 dBW/kg

16. Test Results

1)

Date: 10/23/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 2.45 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

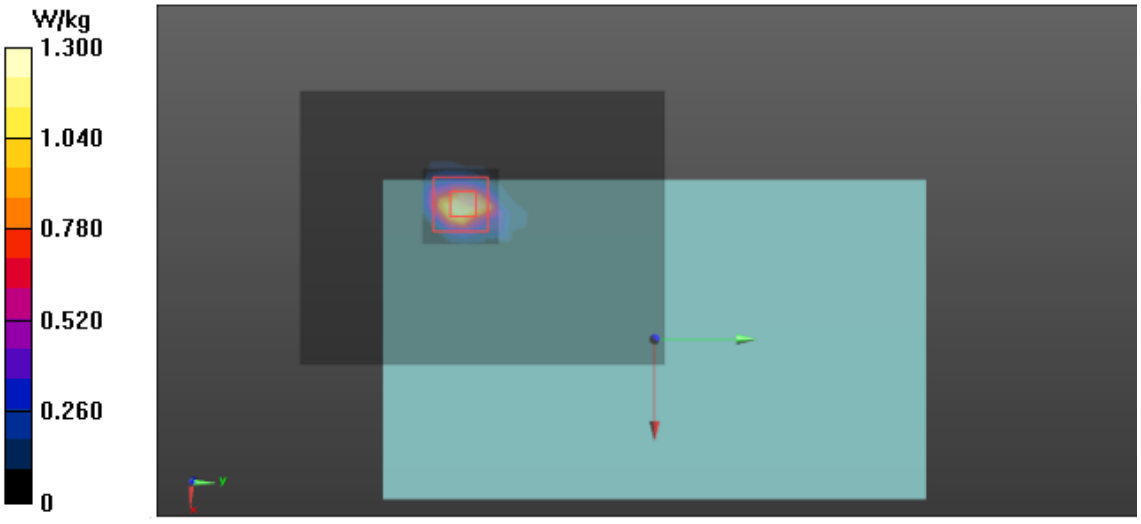
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.76 S/m; ε_r = 38.059; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.2, 7.2, 7.2) @ 2462 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 b_Ant1_CH11_Rear_0 mm_Grip Sensor On/Area Scan (10x13x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 1.30 W/kg

Configuration/802.11 b_Ant1_CH11_Rear_0 mm_Grip Sensor On/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 30.90 V/m; Power Drift = 0.17 dB
Peak SAR (extrapolated) = 2.32 W/kg
SAR(1 g) = 0.776 W/kg; SAR(10 g) = 0.249 W/kg
Maximum value of SAR (measured) = 1.69 W/kg



2)

Date: 10/23/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 2.45 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

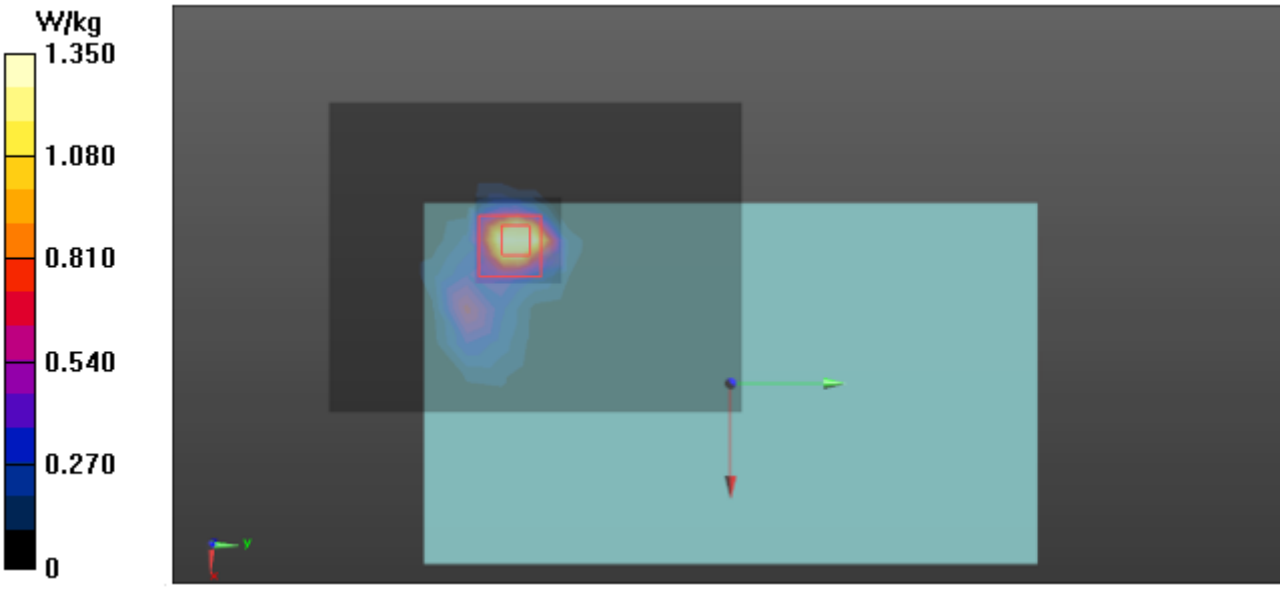
Communication System: UID 0, 2.4GWLAN (0); Frequency: 2462 MHz; Duty Cycle: 1:1
Medium parameters used: f = 2462 MHz; σ = 1.76 S/m; ε_r = 38.059; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(7.2, 7.2, 7.2) @ 2462 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 b_MIMO_CH11_Rear_0 mm_Grip Sensor On/Area Scan (10x13x1):
Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 1.35 W/kg

Configuration/802.11 b_MIMO_CH11_Rear_0 mm_Grip Sensor On/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 31.48 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 2.80 W/kg
SAR(1 g) = 0.934 W/kg; SAR(10 g) = 0.350 W/kg
Maximum value of SAR (measured) = 2.04 W/kg



3)

Date: 10/24/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.3 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

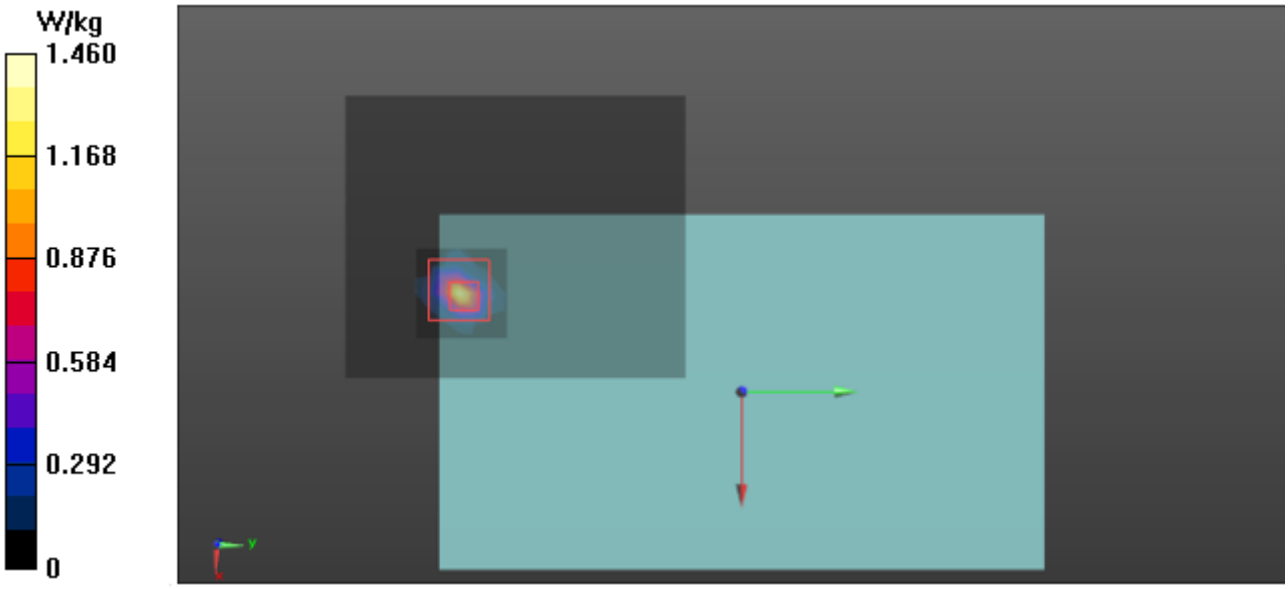
Communication System: UID 0, 5GWLAN (0); Frequency: 5260 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5260 MHz; σ = 4.694 S/m; ε_r = 35.073; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.8, 4.8, 4.8) @ 5260 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant2_CH52_Rear_0 mm_Grip Sensor On/Area Scan (11x13x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.30 W/kg

Configuration/802.11 a_Ant2_CH52_Rear_0 mm_Grip Sensor On/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 16.16 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 2.80 W/kg
SAR(1 g) = 0.450 W/kg; SAR(10 g) = 0.092 W/kg
Maximum value of SAR (measured) = 1.46 W/kg



4)

Date: 10/24/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.3 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

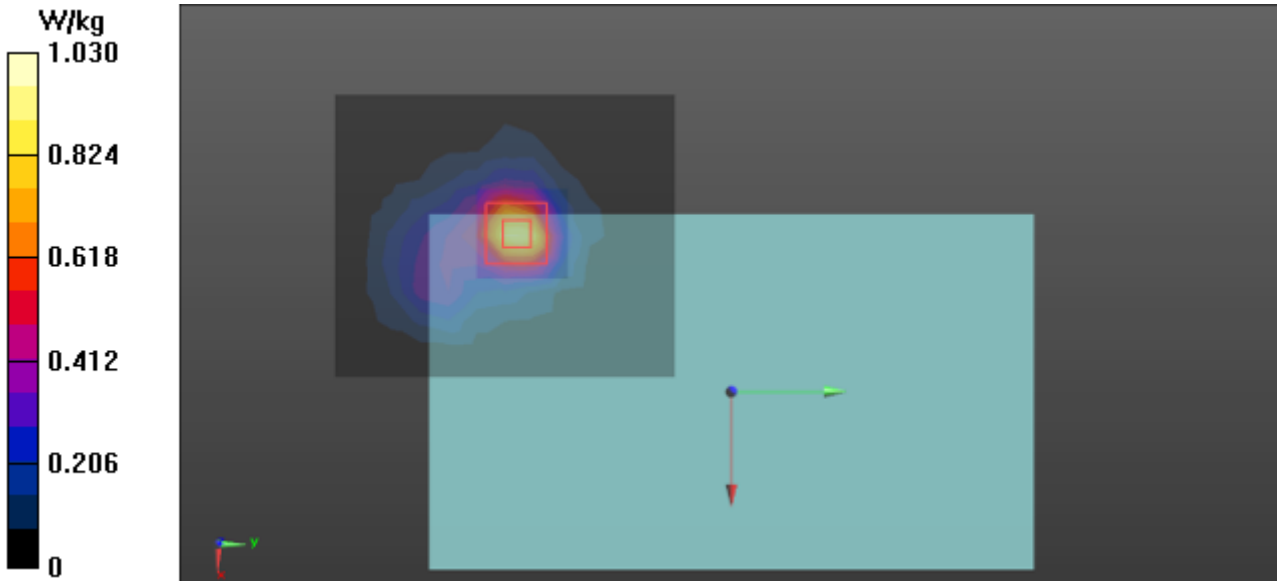
Communication System: UID 0, 5GWLAN (0); Frequency: 5320 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5320 MHz; σ = 4.768 S/m; ε_r = 34.948; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.8, 4.8, 4.8) @ 5320 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_MIMO_CH64_Rear_14 mm_Grip Sensor Off/Area Scan (11x13x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.907 W/kg

Configuration/802.11 a_MIMO_CH64_Rear_14 mm_Grip Sensor Off/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 16.29 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 1.76 W/kg
SAR(1 g) = 0.453 W/kg; SAR(10 g) = 0.164 W/kg
Maximum value of SAR (measured) = 1.03 W/kg



5)

Date: 10/25/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.6 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

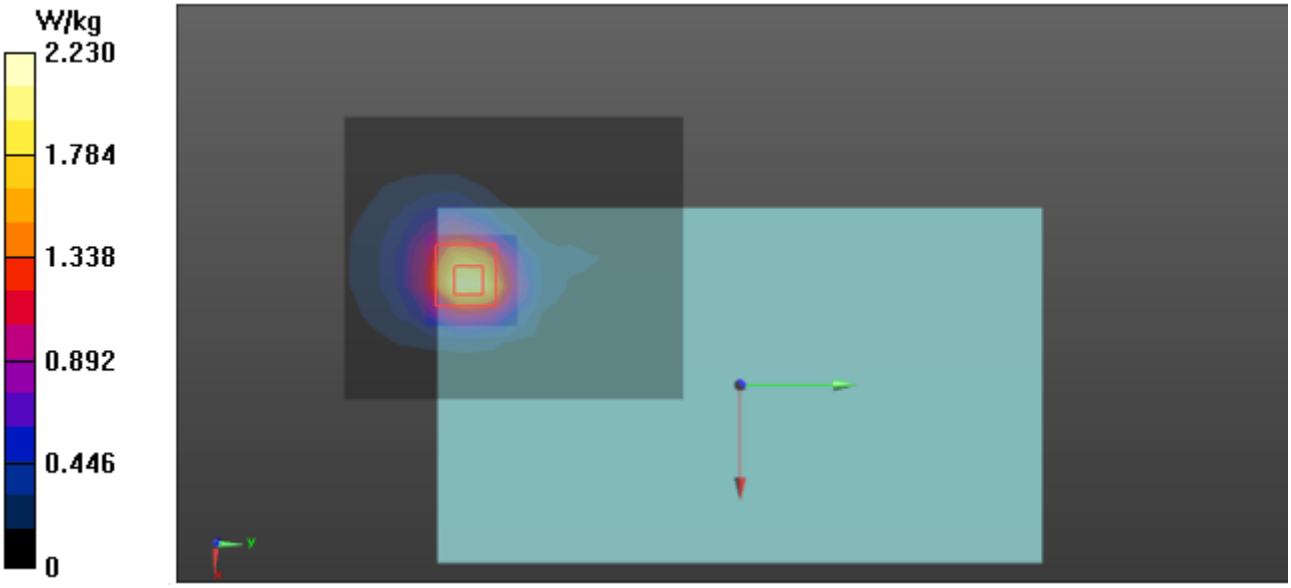
Communication System: UID 0, 5GWLAN (0); Frequency: 5600 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5600 MHz; σ = 5.104 S/m; ε_r = 34.903; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.46, 4.46, 4.46) @ 5600 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant2_CH120_Rear_14 mm_Grip Sensor Off/Area Scan (11x13x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 2.03 W/kg

Configuration/802.11 a_Ant2_CH120_Rear_14 mm_Grip Sensor Off/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 22.98 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 3.68 W/kg
SAR(1 g) = 1.01 W/kg; SAR(10 g) = 0.391 W/kg
Maximum value of SAR (measured) = 2.23 W/kg



6)

Date: 10/25/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.6 GHz_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

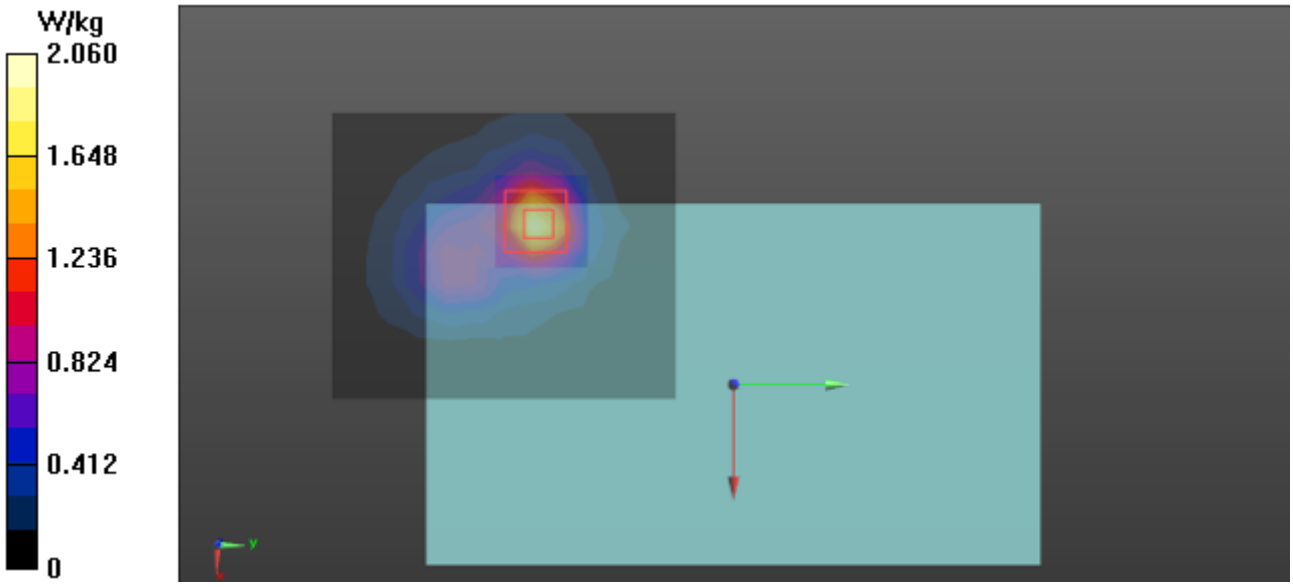
Communication System: UID 0, 5GWLAN (0); Frequency: 5500 MHz; Duty Cycle: 1:1
Medium parameters used: f = 5500 MHz; σ = 4.975 S/m; ε_r = 35.086; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3697;ConvF(4.46, 4.46, 4.46) @ 5500 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_MIMO_CH100_Rear_14 mm_Grip Sensor Off/Area Scan (11x13x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.96 W/kg

Configuration/802.11 a_MIMO_CH100_Rear_14 mm_Grip Sensor Off/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 16.30 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 3.38 W/kg
SAR(1 g) = 0.922 W/kg; SAR(10 g) = 0.340 W/kg
Maximum value of SAR (measured) = 2.06 W/kg



7)

Date: 10/26/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.8 GHz_Body(Back off).da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

Communication System: UID 0, 5GWLAN (0); Frequency: 5825 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 5.366 S/m; ε_r = 34.488; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

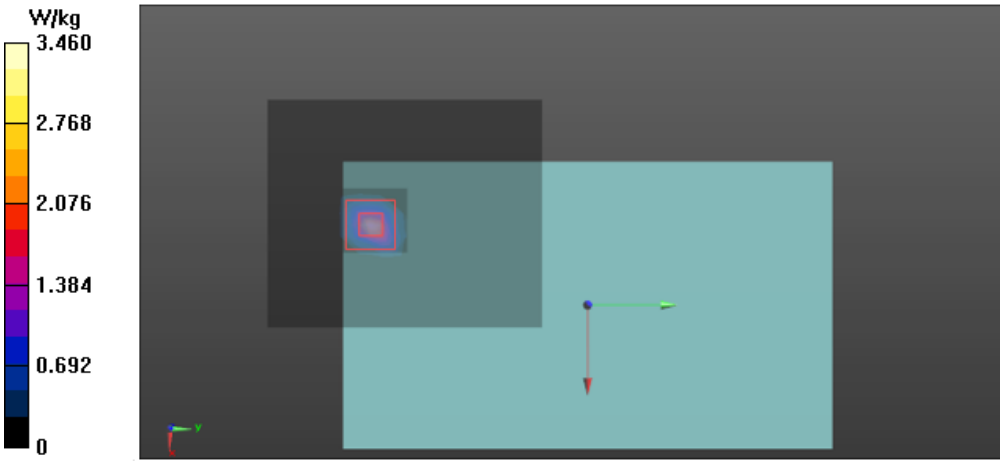
- Probe: EX3DV4 - SN3697;ConvF(4.44, 4.44, 4.44) @ 5825 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_Ant2_CH165_Rear_0 mm_Grip Sensor On/Area Scan (11x13x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.50 W/kg

Configuration/802.11 a_Ant2_CH165_Rear_0 mm_Grip Sensor On/Zoom Scan (8x8x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 24.35 V/m; Power Drift = 0.09 dB
Peak SAR (extrapolated) = 6.34 W/kg
SAR(1 g) = 1.05 W/kg; SAR(10 g) = 0.210 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 3.46 W/kg



8)

Date: 10/26/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 1. WLAN 5.8 GHz_Body(Back off).da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

Communication System: UID 0, 5GWLAN (0); Frequency: 5825 MHz; Duty Cycle: 1:1
Medium parameters used (interpolated): f = 5825 MHz; σ = 5.366 S/m; ε_r = 34.488; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

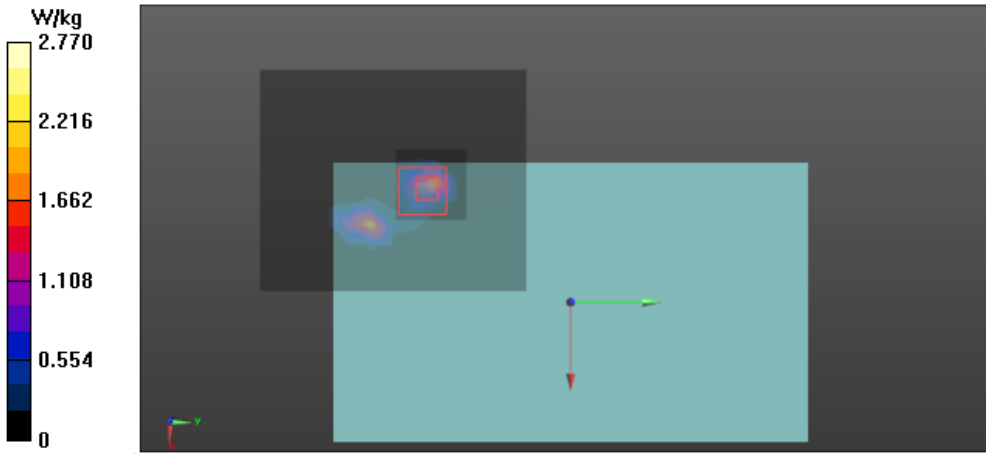
- Probe: EX3DV4 - SN3697;ConvF(4.44, 4.44, 4.44) @ 5825 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/802.11 a_MIMO_CH165_Rear_0 mm_Grip Sensor On/Area Scan (11x13x1):
Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.97 W/kg

Configuration/802.11 a_MIMO_CH165_Rear_0 mm_Grip Sensor On/Zoom Scan (9x9x7)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 25.18 V/m; Power Drift = -0.11 dB
Peak SAR (extrapolated) = 5.30 W/kg
SAR(1 g) = 0.808 W/kg; SAR(10 g) = 0.163 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.77 W/kg



9)

Date: 10/23/2023

Test Laboratory: Eurofins KCTL Co.,Ltd.
File Name: 2. Bluetooth_Body.da53:0

DUT: SM-X300, Type: Tablet, Serial: R32W9001L1R

Communication System: UID 0, Bluetooth LE (0); Frequency: 2402 MHz; Duty Cycle: 1:1.02683
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.724 S/m; ε_r = 38.22; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY5 Configuration:

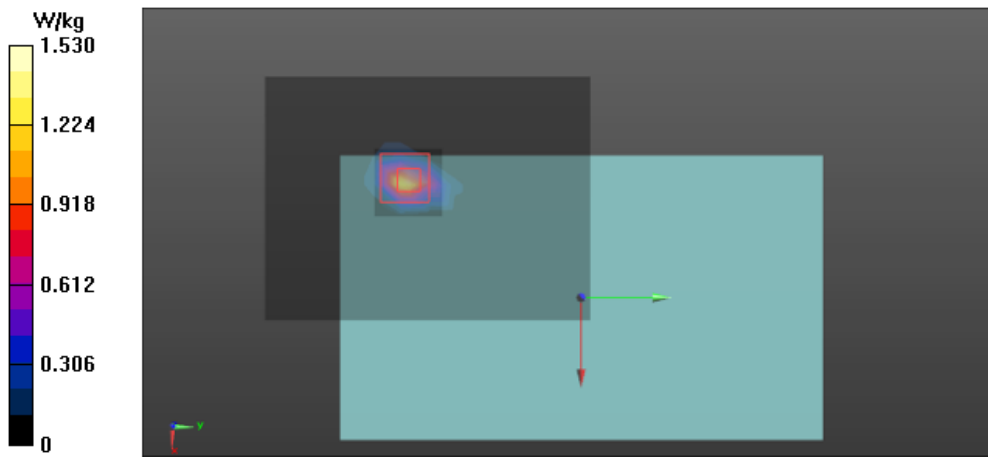
- Probe: EX3DV4 - SN3697;ConvF(7.2, 7.2, 7.2) @ 2402 MHz; Calibrated: 4/13/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1756; Calibrated: 9/20/2023
- Phantom: ELI V8.0; Type: QD OVA 004 Ax; Serial: 2097
- Measurement SW: DASY52, Version 52.10 (4);

Configuration/Bluetooth_125 Coded_255_CH0_Rear_0 mm/Area Scan (10x13x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.24 W/kg

Configuration/Bluetooth_125 Coded_255_CH0_Rear_0 mm/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 20.03 V/m; Power Drift = 0.10 dB
Peak SAR (extrapolated) = 2.11 W/kg
SAR(1 g) = 0.704 W/kg; SAR(10 g) = 0.232 W/kg

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 1.53 W/kg



Appendixes List

Appendix A	A.1 Probe Calibration certificate (EX3DV4_SN3697) A.2 Probe Calibration certificate (EX3DV4_SN7840) A.3 Dipole Calibration certificate (D2450V2_SN895) A.4 Dipole Calibration certificate (D5GHzV2_SN1293)
Appendix B	SAR Tissue Specification
Appendix C	Power Reduction Verification
Appendix D	#Antenna Location & Distance
Appendix E	EUT Photo
Appendix F	Test Setup Photo