Test Report Serial Number:	45461668 R2.0
Test Report Date:	21 July 2021
Project Number:	1539

SAR Test Report - New Certification

Applicant:

GARMIN

Garmin International Inc.
1200 East 151 St.

Olathe, KS, 66062
USA

Maximum Reported 1g SAR			
FCC	BODY UNII	0.44	W/kg
	BODY DSS	0.85	
	BODY DXX	0.00	
	Sum of Simultaneous	0.44	
ISED	BODY UNII	0.45	
	BODY DSS	0.99	
	BODY DXX	0.00	
	Sum of Simultaneous	0.45	
General Pop. Limit:		1.60	

FCC ID:	ISED Registration Number
IPH-04157	1792A-04157
Product Model Number / HVIN	Product Name / PMN
A04157	A04157

In Accordance With:

FCC 47 CFR §2.1093
Radiofrequency Radiation Exposure Evaluation: Portable Devices

IC RSS-102 Issue 5
Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
Canada

ilac-MRA A2LA ACCREDITED

Test Lab Certificate: 2470.01

Industry Canada

IC Registration 3874A-1

FC

FCC Registration: CA3874

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Trevor Whillock / Ben Hewson	**Date(s) of Evaluation:**		Mar 29-31, May 26, 30, Jun 29,2021
Report Prepared By:	Ben Hewson	**Report Reviewed By:**		Art Voss
Report Revision	**Description of Revision**	**Revised Section**	**Revised / Issued By**	**Revision Date**
0.0	Draft	n/a	Ben Hewson	15 July 2021
1.0	Initial Release	n/a	Ben Hewson	19 July 2021
2.0	DXX simultaneous SAR	cover, 10.1	Ben Hewson	21 July 2021

2.0 CLIENT AND DEVICE INFORMATION

Client Information		
Applicant Name	**Garmin International Inc.**	
Applicant Address	1200 East 151 St.	
	Olathe, KS,66062	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**IPH-04157**
	IC:	**1792A-04157**
Type of Equipment:	Digital Transmission System (DTS) FCC Part 15, RSS 247	
	Spread Spectrum Transmitter (DSS) FCC Part 15	
	Unlicensed National Information Infrastructure (NII) FCC Part 15	
Device Model(s) / HVIN:	A04157	
Device Marketing Name / PMN:	A04157	
Test Sample Serial No.:	3361935726	
Transmit Frequency Range:	WiFi: 2412 - 2462 MHz	
	WiFi UNII 1: 5200 - 5240 MHz	
	WiFi UNII 3: 5745-5825 MHz	
	BT: 2402 - 2480 MHz	
Number of Channels:	See Section 7.0	
Manuf. Max. Avg Rated Output Power:	WiFi 2.4GHz: 802.11b: 14.77dBm /802.11g: 14.62dBm /802.11n:14.47dBm	
	WiFi 5 GHz UNII-1 802.11a: 13.98dBm / 802.11n: 13.80dBm/ 802.11n40: 13.42dBm/802.11ac80: 9.03dBm	
	WiFi 5 GHz UNII-3 802.11a: 13.98dBm / 802.11n: 13.80dBm/ 802.11n40: 13.62dBm/802.11ac80: 13.42dBm	
	BT:GFSK: 3.01dBm / PI/4-DQPSK: 3.01dBm / 8-DPSK: 3.01dBm	
	BLE: GFSK: 3.01 dBm	
Modulation:	WiFi 802.11b/g/n: DSSS, OFDM, MCS0-7	
	WiFi 802.11 a/ac: OFDM,MCS0-7	
	BT: GFSK, PI/4-DQPSK, 8-DPSK	
	BLE: GMSK	
DUT Power Source:	5V USB, Internal Li-ion battery	
Deviation(s) from standard/procedure:	None	

3.0 SCOPE OF EVALUATION

This Certification Report was prepared on behalf of:

Garmin International Inc.

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC 47 CFR Part §2.1091 and §2.1093, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in this report.

The A04157, FCC ID: IPH-04157 ISEDC ID: 1792A-04157 is a hand held transceiver with two transmiiters, one that operates in the 5GHz WiFi frequency band and the other in the 2.4GHz WiFi and Bluetooth frequency band. The transceiver is capable of simultaneous transmission between the 5GHz WiFi and Bluetooth. The device is intended for General Population Use. The product operates from an internal proprietary Li-ion rechargeable battery which can be connected to a compliant USB interface port, AC or DC adapter for charging. Test samples provided by the manufacturer were capable of transmitting at select frequencies and modulations preset by the manufacturer. An additional antenna modification was prepared for one sample allowing the ability to connect test equipment for antenna port conducted power analysis. The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer and in accordance with the procedures described in IEC\IEEE 62209-1528, IEEE 1528, IEC 62209-2, FCC KDB 865646, 447498, 248227 and RSS 102.

Application:

This is an application for a new device certification.

Scope:

Due to the nature of the device, the scope of this evaluation is to evaluate the SAR for intended and non-intended applications. It will include evaluation of the 2.4 GHz transmitter for all required RF exposure configurations and accessories types. The analysis of the Standalone Transmission SAR is found in Section 11.0 of this report.

The Test Plan developed for this evaluation is based on the required test channels and configurations which produced the highest worst case SAR and where applicable, SAR test reduction and/or SAR test exclusion may be utilized. The DUT was evaluated for SAR at the maximum tune up tolerance and conducted output power level, preset by the manufacturer and in accordance with the procedures described in IEC/IEEE 62209-1528, IEEE 1528, IEC 62209-1, IEC 62209-2, FCC 447498, and RSS 102

4.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025:2017	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2	Code of Federal Regulations
Title 47:	Telecommunication
Part 2.1093:	Radiofrequency Radiation Exposure Evaluation: Portable Devices
Health Canada	
Safety Code 6 (2015)	Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300GHz
Industry Canada Spectrum Management & Telecommunications Policy	
RSS-102 Issue 5:	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
IEC International Standard /IEEE International Committee on Electromagnetic Safety	
IEC/IEEE 62209-1528-2020:	Measurement procudeure for the assessment of specific absorption rate of human expoure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528; Human models, insturmentation, and procedures (Frequency range of 4 MHz to 10 GHz)
IEEE International Committee on Electromagnetic Safety	
IEEE 1528-2013:	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEC International Standard	
IEC 62209-2 2010	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 2
FCC KDB	
KDB 865664 D01v01r04	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB	
KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 248227 D01v02r02	SAR Test Guidane for IEEE 802.11 (WiFI) Transmitters

* When the issue number or issue date is omitted, the latest version is assumed.

5.0 STATEMENT OF COMPLIANCE

This measurement report demonstrates that samples of the product model(s) were evaluated for Specific Absorption Rate (SAR) on the date(s) shown, in accordance with the Measurement Procedures cited and were found to comply with the Standard(s) Applied based on the Exposure Limits of the Use Group indicated for which the product is intended to be used.

Applicant:	Model / HVIN:	
Garmin International Inc.	A03653	
Standard(s) Applied:	**Measurement Procedure(s):**	
FCC 47 CFR §2.1093 Health Canada's Safety Code 6	FCC KDB 865664, FCC KDB 447498, FCC KDB248227, FCC KDB 941225 Industry Canada RSS-102 Issue 5 IEC\IEEE 62209-1528, IEEE Standard 1528-2013, IEC 62209-2	
Reason For Issue:	**Use Group:**	**Limits Applied:**
[x] New Certification [ ] Class I Permissive Change [ ] Class II Permissive Change	[x] General Population / Uncontrolled [ ] Occupational / Controlled	[x] 1.6W/kg - 1g Volume [ ] 8.0W/kg - 1g Volume 4.0W/kg - 10g Volume
Reason for Change:		**Date(s) Evaluated:**
Original Filing		Mar 29-31, May 26, 30, Jun 29, 2021

The results of this investigation are based solely on the test sample(s) provided by the applicant which was not adjusted, modified or altered in any manner whatsoever except as required to carry out specific tests or measurements. A description of the device, operating configuration, detailed summary of the test results, methodologies and procedures used during this evaluation, the equipment used and the various provisions of the rules are included in this test report.

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

15 July 2021
Date

6.0 SAR MEASUREMENT SYSTEM

SAR Measurement System

Celltech Labs Inc. SAR measurement facility employs a Dosimetric Assessment System (DASY™) manufactured by Schmid & Partner Engineering AG (SPEAG™) of Zurich, Switzerland. The DASY6 measurement system is comprised of the measurement server, a robot controller, a computer, a near-field probe, a probe alignment sensor, an Elliptical Planar Phantom (ELI) phantom and a specific anthropomorphic mannequin (SAM) phantom for Head and/or Body SAR evaluations. The robot is a six-axis industrial robot performing precise movements to position the probe to the location (points) of maximum electromagnetic field (EMF). A cell controller system contains the power supply, robot controller and a teach pendant (Joystick) to control the robot's servo motors. The Staubli robot is connected to the cell controller to allow software manipulation of the robot. A data acquisition electronic (DAE) circuit performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. is connected to the Electro-optical coupler (EOC). The EOC performs the conversion from the optical form the DAE to digital electronic signal and transfers data to the DASY6 measurement server. The DAE4 utilizes a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16-bit AD-converter, a command decoder and a control logic unit. Transmission to the DASY6 measurement server is accomplished through an optical downlink for data and status information and an optical uplink for commands and clock lines. The mechanical probe-mounting device includes two different sensor systems for frontal and sidewise probe contacts. The sensor systems are also used for mechanical surface detection and probe collision detection. The robot utilizes a controller with built in VME-bus computer.

DASY 6 SAR System with SAM Phantom

DASY 6 Measurement Controller

7.0 RF CONDUCTED POWER MEASUREMENT

Table 7.0 Conducted Power Measurements WLAN 2.4GHz 802.11

Conducted Power Measurements											
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dB)	SAR Test Channel (Y/N)	Duty Cycle	Crest factor	Mode	Modulation	
1	2412	13.17	14.77	0.030	-1.60	-	95.5	1.048	WLAN 2.4G	DSS-1Mbps	802.11b
2	2417	13.26	14.77	0.030	-1.51	-	95.5	1.048		DSS-1Mbps	
3	2422	13.17	14.77	0.030	-1.60	-	95.5	1.048		DSS-1Mbps	
4	2427	13.35	14.77	0.030	-1.42	-	95.5	1.048		DSS-1Mbps	
5	2432	13.49	14.77	0.030	-1.28	-	95.5	1.048		DSS-1Mbps	
6	2437	13.44	14.77	0.030	-1.33	-	95.5	1.048		DSS-1Mbps	
7	2442	13.53	14.77	0.030	-1.24	-	95.5	1.048		DSS-1Mbps	
8	2447	13.53	14.77	0.030	-1.24	-	95.5	1.048		DSS-1Mbps	
9	2452	13.50	14.77	0.030	-1.27	-	95.5	1.048		DSS-1Mbps	
10	2457	13.49	14.77	0.030	-1.28	-	95.5	1.048		DSS-1Mbps	
11	2462	13.48	14.77	0.030	-1.29	-	95.5	1.048		DSS-1Mbps	
2	2417	13.45	14.77	0.030	-1.32	-	92.4	1.082		DSS-2Mbps	
		14.32	14.77	0.030	-0.45	-	83.8	1.194		DSS-5.5Mbps	
		14.40	14.77	0.030	-0.37	Y	88.3	1.133		DSS-11Mbps	
		14.34	14.62	0.030	-0.28	-	96.4	1.037		OFDM-6Mbps	802.11g
		13.01	14.62	0.030	-1.61	-	79.6	1.257		OFDM-24Mbps	
		12.17	14.62	0.030	-2.45	-	65.9	1.517		OFDM-54Mbps	
		14.21	14.47	0.030	-0.26	-	87.2	1.147		MCS-0	802.11n
		11.69	14.47	0.030	-2.78	-	53.2	1.881		MCS-7	
7	2442	13.66	14.77	0.030	-1.11	-	92.4	1.082		DSS-2Mbps	802.11b
		14.59	14.77	0.030	-0.18	-	83.8	1.194		DSS-5.5Mbps	
		14.67	14.77	0.030	-0.10	y	88.3	1.133		DSS-11Mbps	
		14.62	14.62	0.030	0.00	-	88.3	1.133		OFDM-6Mbps	802.11g
		13.26	14.62	0.030	-1.36	-	79.6	1.257		OFDM-24Mbps	
		12.44	14.62	0.030	-2.18	-	65.9	1.517		OFDM-54Mbps	
		14.45	14.47	0.030	-0.02	-	87.2	1.147		MCS-0	802.11n
		12.13	14.47	0.030	-2.34	-	53.2	1.881		MCS-7	
10	2457	13.62	14.77	0.030	-1.15	-	92.4	1.082		DSS-2Mbps	802.11b
		14.57	14.77	0.030	-0.20	-	83.8	1.194		DSS-5.5Mbps	
		14.77	14.77	0.030	0.00	Y	88.3	1.133		DSS-11Mbps	
		14.60	14.62	0.030	-0.02	-	96.4	1.037		OFDM-6Mbps	802.11g
		13.39	14.62	0.030	-1.23	-	79.6	1.257		OFDM-24Mbps	
		12.43	14.62	0.030	-2.19	-	65.9	1.517		OFDM-54Mbps	
		14.47	14.47	0.030	0.00	-	79.6	1.257		MCS-0	802.11n
		11.99	14.47	0.030	-2.48	-	65.9	1.517		MCS-7	

Table 7.1 Conducted Power Measurements WiFi 5GHz – UNII-1

Conducted Power Measurements												
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dB)	SAR Test Channel (Y/N)	Duty Cycle	Crest Factor	Mode	Modulation		
36	5180	13.98	13.98	0.025	0.00	Y	96.4	1.037	WiFI 5G	OFDM-6Mbps	802.11a - UNII-1	20MHz
36	5180	13.74	13.98	0.025	-0.24	-	94.2	1.062		OFDM-9Mbps		
36	5180	12.84	13.98	0.025	-1.14	-	80.4	1.244		OFDM-24Mbps		
36	5180	12.02	13.98	0.025	-1.96	-	66.5	1.504		OFDM-54Mbps		
36	5180	13.29	13.98	0.025	-0.69	-	88.1	1.135		MCS-0		
36	5180	12.00	13.98	0.025	-1.98	-	68.7	1.456		MCS-3		
36	5180	10.94	13.98	0.025	-3.04	-	53.4	1.873		MCS-7		
40	5200	13.96	13.98	0.030	-0.02	-	96.4	1.037		OFDM-6Mbps		
44	5220	13.92	13.98	0.030	-0.06	-	96.4	1.037		OFDM-6Mbps		
48	5240	13.85	13.98	0.030	-0.13	-	96.4	1.037		OFDM-6Mbps		
36	5180	13.70	13.80	0.024	-0.10	-	88.3	1.133		MCS-0	802.11n - UNII-1	
36	5180	12.45	13.80	0.024	-1.35	-	68.9	1.451		MCS-3		
36	5180	11.35	13.80	0.024	-2.45	-	53.7	1.862		MCS-7		
40	5200	13.80	13.80	0.024	0.00	-	88.3	1.133		MCS-0		
44	5220	13.67	13.80	0.024	-0.13	-	88.3	1.133		MCS-0		
48	5240	13.63	13.80	0.024	-0.17	-	88.3	1.133		MCS-0		
38	5190	13.42	13.42	0.022	0.00	-	79.6	1.256		MCS-0	802.11n - UNII-1	40MHz
46	5230	13.39	13.42	0.022	-0.03	-	44.9	2.227		MCS-0		
42	5210	9.03	9.03	0.008	0.00	-	67.6	1.479		MCS-0	802.11ac - UNII-1	80MHz

Table 7.2 Conducted Power Measurements WiFi 5GHz – UNII-3

Conducted Power Measurements												
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dB)	SAR Test Channel (Y/N)	Duty Cycle	Crest Factor	Mode	Modulation		
149	5745	13.45	13.98	0.025	-0.53	-	96.4	1.037	WiFI 5G	OFDM-6Mbps	802.11a - UNII-3	20MHz
149	5745	13.38	13.98	0.025	-0.60	-	94.2	1.062		OFDM-9Mbps		
149	5745	12.55	13.98	0.025	-1.43	-	80.4	1.244		OFDM-24Mbps		
149	5745	11.96	13.98	0.025	-2.02	-	66.5	1.504		OFDM-54Mbps		
149	5745	12.88	13.98	0.025	-1.10	-	88.1	1.135		MCS-0		
149	5745	11.73	13.98	0.025	-2.25	-	68.7	1.456		MCS-3		
149	5745	10.99	13.98	0.025	-2.99	-	53.4	1.873		MCS-7		
157	5785	13.69	13.98	0.030	-0.29	-	96.4	1.037		OFDM-6Mbps		
165	5825	13.98	13.98	0.030	0.00	Y	96.4	1.037		OFDM-6Mbps		
153	5765	13.59	13.98	0.030	-0.39	-	96.4	1.037		OFDM-6Mbps		
161	5805	13.95	13.98	0.030	-0.03	-	96.4	1.037		OFDM-6Mbps		
149	5745	13.80	13.80	0.024	0.00	-	88.3	1.133		MCS-0	802.11n - UNII-3	
149	5745	12.79	13.80	0.024	-1.01	-	68.9	1.451		MCS-3		
149	5745	11.77	13.80	0.024	-2.03	-	53.7	1.862		MCS-7		
157	5785	13.73	13.80	0.024	-0.07	-	88.3	1.133		MCS-0		
165	5825	13.65	13.80	0.024	-0.15	-	88.3	1.133		MCS-0		
151	5755	13.64	13.62	0.022	0.02	-	88.3	1.133		MCS-0	802.11n - UNII-3	40MHz
159	5795	13.60	13.62	0.022	-0.02	-	88.3	1.133		MCS-0		
155	5775	13.42	13.42	0.008	0.00	-	88.3	1.133		MCS-0	802.11ac - UNII-1	80MHz

Table 7.3 Conducted Power Measurements

Conducted Power Measurements										
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (mW)	Delta (dB)	SAR Test Channel (Y/N)	Duty Cycle	Crest Factor	Mode	Modulation
2	2402	3.01	3.01	2.00	0.00	Y	29.8	3.4	BT/BLE	BT(GFSK)
41	2441	1.79	3.01	2.00	-1.22	-				
80	2480	2.05	3.01	2.00	-0.96	-				
2	2402	2.80	3.01	2.00	-0.21	-	30.5	3.3		BT(PI/4-DQPSK)
41	2441	1.46	3.01	2.00	-1.55	-				
80	2480	1.80	3.01	2.00	-1.21	-				
2	2402	2.76	3.01	2.00	-0.25	-	30.5	3.3		8-DPSK
41	2441	1.79	3.01	2.00	-1.22	-				
80	2480	2.00	3.01	2.00	-1.01	-				

The rated power and tolerance are stated for typical transmission modes and data rates. Some modes and data rates may produce lower than rated conducted power levels. Power measurements taken across the various channels, modes and data rates did not produce levels in excess of the Rated Power plus Tolerance.SAR was evaluated using the power level setting specified by the manufacture to be the max output power and produce the most conservative SAR. SAR was evaluated at the *maximum average* tune up tolerance. See section 2.0 Client and Device Information for details. The *reported* SAR was not scaled down.

8.0 NUMBER OF TEST CHANNELS (N_C) AND CONFIGURATIONS

This device is intended to be mounted on a vehicle dashboard; optionally, the device can be hand-held .Due to the physical dimensions of the device and as it may transmit within the user's apparel, or used in contact with the user's body; the device was evaluated to Body SAR limits. Body SAR Limits are more stringent than Extremity SAR limits. Additional SAR measurements were made where the transmitter antenna location to an edge was sufficiently near that it was required in accordance to the FCC KDB guidance. The top side of the device was found to be the worst case setup configuration and produced the highest SAR in the 2.4 Ghz bands. The back side of the device was found to have the worse case setup configuration in the 5 Ghz bands. Note: Only worst case test data from the preliminary evaluation was reported. FCC KDB 941225D07V01r02 was used as guidance for the selection of test positions for SAR evaluation. Please see section 12.1 for details.

As per FCC KDB 248227, the required 802.11 test channels are Ch1, Ch6 and Ch 11; however, higher conducted output power was found on channel 2, 7 and 10 in the lower 2.4GHz WIFI frequency band. As a result the channels selected for SAR evaluation included Ch2, Ch7, and Ch10.

When applicable, SAR test reduction methods may be utilized.

802.11b DSSS SAR test reduction is determined according to the following:

a) When the *reported* SAR of the highest measured maximum output power channel is ≤ to 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration.

b) When the *reported* SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest output power channel. When any *reported* SAR is > 1.2 W/Kg, SAR is required for the third channel.

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

a) When KDB Publication 447498 SAR test exclusion applies to the OFDM configuration.

b) When 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.

See 12.1 for details.

The initial test configuration for 2.4 GHz and 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. An initial test position was established for Both UNII1 and UNII 3 bands.

When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until reported SAR is ≤ 1.2 W/kg or all required channels are tested.

NOTE: The Bluetooth transmitter is capable of simultaneous transmission with the 5GHz WiFi Transmitter.

Due to the nature of this device, Bluetooth was also evaluated for Simultaneous Transmission SAR. Conducted power measurements were taken across the various channels, modes and data rates. The Bluetooth test channel with the highest measured maximum output power was selected for evaluation in combination with the worst case 5GHz WiFi test configuration with the highest measured SAR.

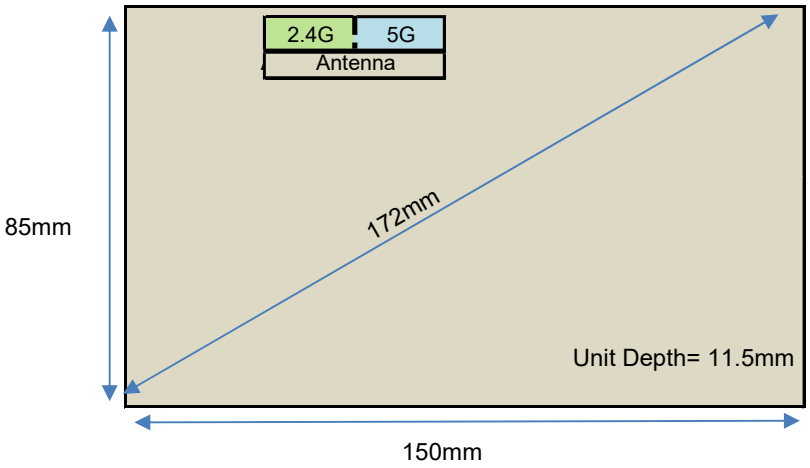
As per KDB 447498 D01V06, where appropriate SAR test exclusion based on antenna test separation distances may be applied.

1. When the distance is < 50mm exclusion threshold is "Ratio" , when the distance is >50 mm exclusion is in "mW"
2. Maximum power is the source-based-time-average power and represents the maximum RF output power among production units.
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user

4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separaton distances ≤ 50mm are determined by; (step a)
   [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]*[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the f channel transmit frequency in GHz
   - power and distance are rounded to the nearest MW and mm before calculation
   - result is rounded to one decimal place for comparison
   - the values 3.0 and 7.5 are referred to as numeric thresholds in step b
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for test separation distance > 50mm, the SAR test exclusion threshold is determined according to t the following; (step b)
   a) [Power allowed at numeric threshold for 50 mm in step a) + test separation distance - 50mm)*(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b)[Power allowed at numeric threshold for 50 mm in step a) + (test separation distance -50mm)* 10] mW at > 1500MHz and ≤ 6GHz

Table 8.1 Antenna Distances

Topographic View
Back Side



Antenna	Top Edge (mm)	Right Edge (mm)	Bottom Edge (mm)	Left Edge (mm)	Depth* (mm)
WLAN/BT	7.0	102.0	70.0	26.0	5.0
5GHz	8.0	110.0	71.0	29.0	5.0
*2.4 GHz and 5 Ghz antenna are on opposite sides of PCB - EUT depth is 11.5mm; 5mm used					

Table 8.2 Body SAR test Exclusion Workchart

Body SAR Test Exclusion Workchart: (≤ 3.0 for 1-g SAR - exclusion threshold < 50mm Ratio; >50mm mW)

Exposure Position	Wireless Interface	BT*	2.4GHz WLAN	5GHz WLAN (UNII-1)	5GHz WLAN (UNII-3)
	Calculated Frequency	2480	2462	5240	5825
	Maximum Power (dBm)	3.01	14.77	13.98	13.98
	Maximum rated Power (mW)	2	30	25	25
Bottom Face	Separation Distance (mm)	5	5	5	5
	exclusion threshold (ratio)	0.6	9.4	11.4	12.1
	testing required ?	No	Yes	Yes	Yes
Top Edge	Separation Distance (mm)	7	7	8	8
	exclusion threshold (ratio)	0.4	6.7	7.2	7.5
	testing required ?	No	Yes	Yes	Yes
Right Edge	Separation Distance (mm)	102	102	110	110
	exclusion threshold (mW)	615.3	615.6	665.5	662.2
	testing required ?	No	No	No	No
Bottom Edge	Separation Distance (mm)	70	70	71	71
	exclusion threshold (mW)	295.3	295.6	275.5	272.2
	testing required ?	No	No	No	No
Left Edge	Separation Distance (mm)	26	26	29	29
	exclusion threshold (ratio)	0.12	1.8	2.0	2.1
	testing required ?	No	No	No	No

*There is simultaneous Tx with BT and 5 Ghz, BT SAR measurement required.

9.0 SAR MEASUREMENT SUMMARY

Table 9.0: Measured Results

Measured SAR Results (1g) - BODY Configuration (FCC/ISED)														
Date	Plot ID	DUT		Test Frequency (MHz)	Modulation	Accessories				DUT Spacing		Conducted Power (dBm)	Measured SAR (1g) 100% DC (W/kg)	SAR Drift (dB)
		M/N	Configuration			Antenna ID	Battery ID	Body ID	Audio ID	DUT (mm)	Antenna (mm)			
29 Mar 2021	B1	A04157	Body-Back Side	2417	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.4	0.493	-0.030
29 Mar 2021	B2	A04157	Body-Back Side	2442	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.67	0.434	-0.260
29 Mar 2021	B3	A04157	Body-Back Side	2457	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.77	0.500	1.090
29 Mar 2021	B4	A04157	Body-Top Side	2457	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.77	0.753	-0.650
29 Mar 2021	B5	A04157	Body- Left Side	2457	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.77	0.049	0.310
30 Mar 2021	B6	A04157	Body-Front Side	2457	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.77	0.000	-0.160
31 Mar 2021	B7	A04157	Body- Tilt Back Side	2457	DSSS-11Mbps	n/a	Internal	n/a	n/a	0	0	14.77	0.497	0.090
26 May 2021	B8	A04157	Body-Back Side	5180	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.98	0.313	0.050
26 May 2021	B9	A04157	Body-Front Side	5180	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.98	0.012	0.000
26 May 2021	B10	A04157	Body-Back Side	5200	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.96	0.427	-0.050
26 May 2021	B11	A04157	Body-Top Side	5180	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.98	0.310	1.760
26 May 2021	B12	A04157	Body- Tilt Back Side	5200	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.96	0.412	1.630
30 May 2021	B13	A04157	Body-Back Side	5825	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.98	0.368	-0.140
30 May 2021	B14	A04157	Body-Top Side	5825	OFDM-6Mbps	n/a	Internal	n/a	n/a	0	0	13.98	0.355	4.390
29 Jun 2021	B15	A04157	Body-Top Side	2402	GFSK	n/a	Internal	n/a	n/a	0	0	3.01	0.000	0.000
SAR Limit							Spatial Peak			Body		RF Exposure Category		
FCC 47 CFR 2.1093				Health Canada Safety Code 6			1 Gram Average			1.6 W/kg		General Population		

10.0 SCALING OF MAXIMUM MEASURED SAR

Table 10.0 SAR Scaling

Scaling of Maximum Measured SAR (1g)					
Measured Parameters		Configuration			
		Body	Body	Body	
Plot ID		B15	B4	B10	
Maximum Measured SAR_M		0.000	0.753	0.426	(W/kg)
Frequency		2402	2457	5200	(MHz)
Power Drift		0.000 (1)	-0.650	-0.050	(dB)
Conducted Power		3.010	14.770	13.960	(dBm)
Crest Factor (CF)		3.400	1.133	1.037	(Dec)
Fluid Deviation from Target					
Δe	Permitivity	-1.31% (2)	-3.19% (2)	-0.64% (2)	
Δσ	Conductivity	1.71% (2)	3.87% (2)	2.80% (2)	

Note(2): Fluid Dielectric Parameters are Within 5% of Targets. SAR Adjustment for Fluid Sensitivity is not Required.

Fluid Sensitivity Calculation (1g)			IEC 62209-2 Annex F		
Delta SAR = Ce * Δe + Cσ * Δσ					(F.1)
$Ce = (-0.0007854*f^3) + (0.009402*f^2) - (0.02742*f) - 0.2026$					(F.2)
$Cσ = (0.009804*f^3) - (0.08661*f^2) + (0.02981*f) + 0.7829$					(F.3)
f	Frequency (GHz)	2.402	2.457	5.2	
Ce		-0.225	-0.225	-0.201	
Cσ		0.491	0.479	-0.026	
Ce * Δe		0.003	0.007	0.001	
Cσ * Δσ		0.008	0.019	-0.001	
ΔSAR		0.011	0.026	0.001	(%)

Manufacturer's Tuneup Tolerance				
Measured Conducted Power	3.010	14.770	13.960	(dBm)
Rated Conducted Power	3.010	14.770	13.980	(dBm)
ΔP	0.000 (4)	0.000 (4)	-0.020 (4)	(dB)

Note(4): SAR was Evaluated at the Maximum Tuneup Tolerance. SAR Adjustment is not Required.

SAR Adjustment for Fluid Sensitivity				
$SAR_1 = SAR_M * ΔSAR$	0.000	0.753	0.426	(W/kg)

SAR Adjustment for Tuneup Tolerance				
$SAR_2 = SAR_1 + [ΔP]$	0.000	0.753	0.428	(W/kg)

SAR Adjustment for Duty Cycle (Crest Factor)				
$SAR_3 = SAR_2 * CF$	0.000	0.853	0.444	(W/kg)

SAR Adjustment for Drift				
$SAR_4 = SAR_3 + Drift$	0.000	0.991	0.449	(W/kg)

reported SAR				
FCC = SAR_2	0.00	0.85	0.44	(W/kg)
ISED = SAR_3	0.00	0.99	0.45	(W/kg)

Table 10.1 Simultaneous SAR

Note: The device is only capable of simultaneous transmission between the Bluetooth Transmitter and the 5 GHz WiFi Transmitter. The 2.4GHz WiFi Transmitter and the Bluetooth Transmitter share the same antenna; therefore, they cannot simultaneously transmit. From Table 10.0 Step 4, the standalone Max SAR values for 2.4GHz Bluetooth and 5 GHz WiFi were used to calculate the simultaneous SAR below.

As Per FCC KDB 690783:

FCC Simultaneous SAR:

The sum of the simultaneous was calculated as follows.

Plot(B15)DXX=0.000 W/kg
Plot(B10)UNII 1=0.44W/kg

Sum of Simultaneous= DXX SAR + UNII 1 SAR

Sum of Simultaneous =0.000W/kg + 0.44W/kg= 0.44 **W/kg**

ISED Simultaneous SAR:

The sum of the simultaneous was calculated as follows.

Plot(B15)DXX=0.000 W/kg
Plot(B10)UNII 1=0.45W/kg

Sum of Simultaneous= DXX SAR + UNII 1 SAR

Sum of Simultaneous =0.000W/kg + 0.45W/kg= 0.45 **W/kg**

NOTES to Table 10.0
(1) Scaling of the Maximum Measured SAR is based on the highest, 100% duty cycle, Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face and Body SAR. The Measured Drift is the SAR drift associated with that specific SAR measurement. The Reported SAR is the accumulation of all SAR Adjustments from the applicable Steps 1 through 5. The Plot ID is for indentification of the SAR Measurement Plots in Annex A of this report. NOTE: Some of the scaling factors in Steps 1 through 5 may not apply and are identified by light gray text.
Step 1
Per IEC-62209-1 and FCC KDB 865664. Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, Table 11.1 will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).
Step 2
Per KDB 447498. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.
Step 3
Per IEC 62209-1. Scaling required only when Measured Drift is (-) Negative. The absolute value of Measured Drift is added to Reported or Simultaneous Reported SAR.
Step 4
The Reported SAR is the Maximum Final Adjusted Cumulative SAR from the applicable Steps 1 through 5 are reported on Page 1 of this report.

11.0 SAR EXPOSURE LIMITS

Table 11.0 Exposure Limits

SAR RF EXPOSURE LIMITS			
FCC 47 CFR§2.1093	Health Canada Safety Code 6	General Population / Uncontrolled Exposure(4)	Occupational / Controlled Exposure(5)
Spatial Average(1) (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak(2) (Head and Trunk averaged over any 1 g of tissue)		**1.6 W/kg**	8.0 W/kg
Spatial Peak(3) (Hands/Wrists/Feet/Ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
(1) The Spatial Average value of the SAR averaged over the whole body.			
(2) The Spatial Peak value of the SAR averaged over any 1 gram of tissue, defined as a tissue volume in the shape of a cube and over the appropriate averaging time.			
(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.			
(4) Uncontrolled environments are defined as locations where there is potential exposure to individuals who have no knowledge or control of their potential exposure.			
(5) Controlled environments are defined as locations where there is potential exposure to individuals who have knowledge of their potential exposure and can exercise control over their exposure.			

12.0 DETAILS OF SAR EVALUATION

12.0 Day Log

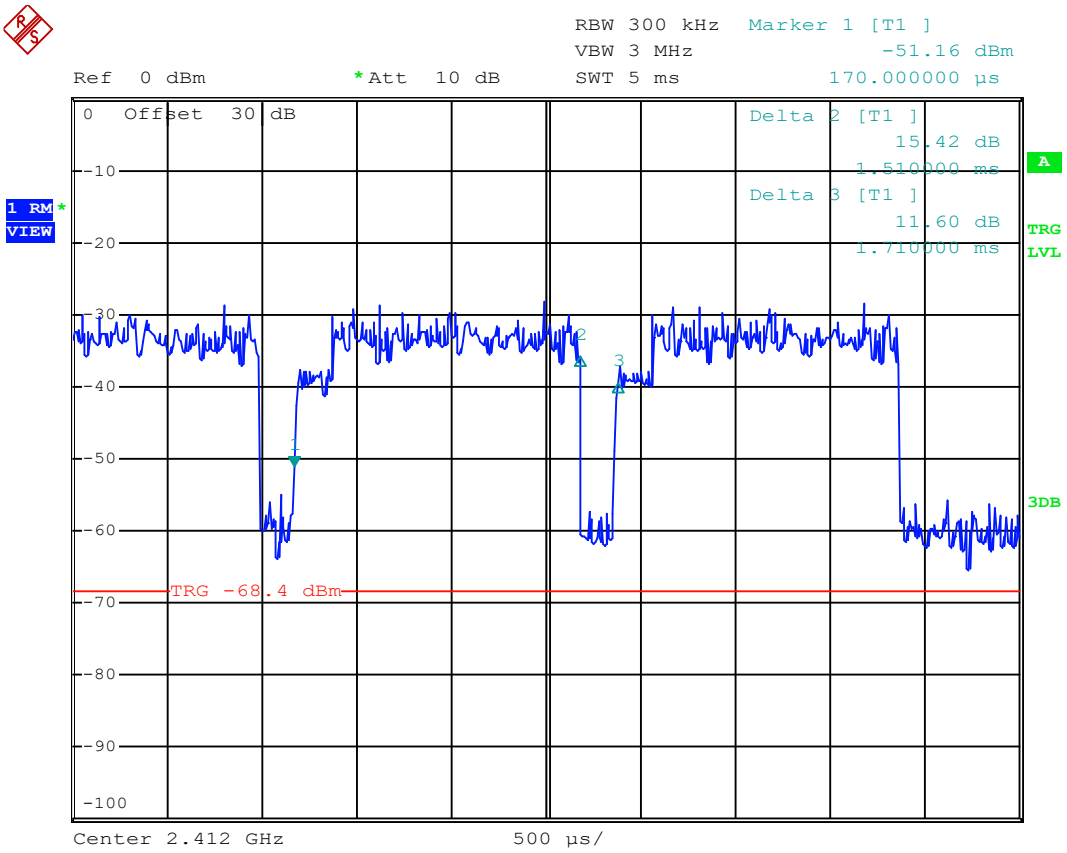
DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	Task
29 Mar 2021	22.6	21.2	19%	102.1	X	X	X	2450H Fluids & SPC, SAR Testing
30 Mar 2021	23.7	22.2	18%	102.9			X	2450H SAR Testing
31 Mar 2021	23.4	22.1	19%	101.1			X	2450H SAR Testing
25 May 2021	25.5	24.2	29%	101.5	X	X	X	5250H Fluids & SPC, SAR testing
26 May 2021	25.9	25.6	29%	101.5			X	5250H SAR testing
28 May 2021	25.5	24.2	29%	101.5	X	X	X	5250H & 5750H Fluids & SPC, SAR testing
29 May 2021	23.1	23.1	29%	102.4			X	5250H SAR Testing
30 May 2021	22.9	20.9	32%	102.0			X	5250H & 5750H SAR Testing
31 May 2021	24.8	22.3	33%	102.2			X	5750H SAR Testing
29 Jun 2021	29.6	23.8	39%	101.4	X	X	X	2450H Fluid, SPC, SAR Testing

* Per IEEE 1528 Test Series was started within 24 hours of Fluid Parameters Measurement and System Performance Check
**Per IEEE 1528 Fluid Parameters were measured at the end of test series

12.1 DUT Setup and Configuration

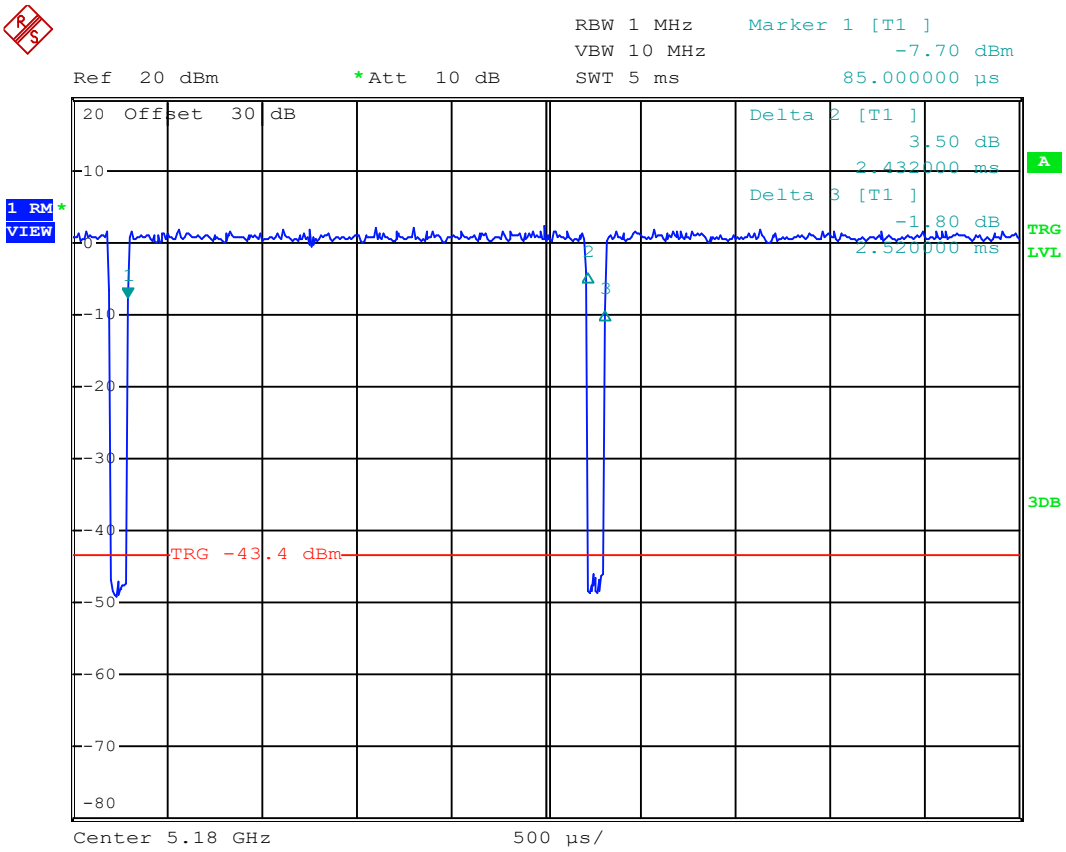
DUT Setup and Configuration	
1	The DUT was evaluated for SAR in accordance with the procedures described in IEC\IEEE 62209-1528, IEEE 1528, FCC KDB 865646, 447498, 941225, 248227, and RSS-102. The device was evaluated at a phantom separation distance of 0mm.
2	The intended use of the device is to be hand held or mounted. The DUT was additionaly evaluated for SAR in accordance with the procedures described in KDB 941225D07V01r02. The Back Side of the device was the highest SAR value for the highest output power channel, and was used as the default position. Additonally the Top Edge was evaluated as its proximity to the transitter was sufficiently near to require evaluation. Additionally somce voluntary evaluations of the Left Side and a Left SIde Tilt was undertaken but dit not provide a worse case SAR evaluation.
3	5GHz Initial Test Position SAR Test Reduction Procedure As per KDB 248227D01 When the reported SAR of the initial test position is ≤ 0.4 W/kg, further SAR measurement is not required for the other (remaining) test positions in that exposure configuration .
4	The Device was capable of transmitting at various modulations and data rates. The Conducted Power was higher when measured in DSS Mode-11Mbps for 2.4GHz ,OFDM Mode-6Mbps for UNII-1 and UNII-3 than any other configuration. The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer. Each SAR evaluation was performed with a fully charged battery.

12.2 Duty Cycle Evaluation



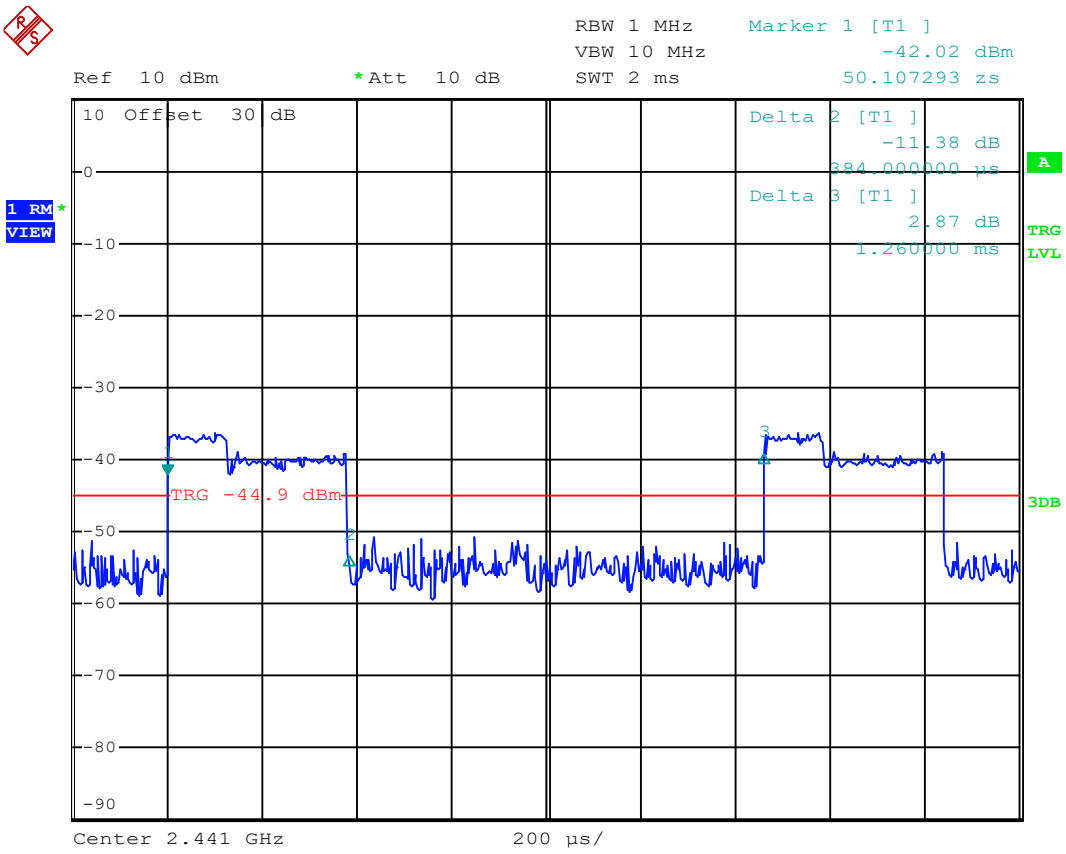
Date: 28.JUN.2021 10:03:38

DSSS at 11Mbps was found to be the worst case test mode for 2.4GHZ WIFi. The transmit Duty cycle was 88% as indicated in the above plot. This duty cycle cannot be altered by the user.



Date: 28.JUN.2021 11:00:49

OFDM at 6Mbps was found to be the worst case test mode for 5GHZ UNII WiFi. The transmit Duty cycle was 96% as indicated in the above plot. This duty cycle cannot be altered by the user.



Date: 28.JUN.2021 13:06:07

BT EDR3 was found to be the worst case test mode for Bluetooth. The transmit Duty cycle was 30% as indicated in the above plot. This duty cycle cannot be altered by the user.

12.3 DUT Positioning

DUT Positioning
Positioning
The DUT Positioner was securely fastened to the Phantom Platform. Registration marks were placed on the DUT and the Positioner to ensure consistent positioning of the DUT for each test evaluation.
FACE Configuration
This device is not intended to be held to the face and was not tested in the FACE configuration.
BODY Configuration
The DUT was securely clamped into the device holder with the surface of the DUT normally in contact with the body in direct contact with the bottom of the phantom, or 0mm separation from the DUT's accessory to the phantom.
HEAD Configuration
This device is not intended to be held to the ear and was not tested in the HEAD configuration.

12.4 General Procedures and Report

General Procedures and Reporting
General Procedures
The fluid dielectric parameters of the Active Tissue Simulating Liquid (TSL) were measured as described in this Section, recorded and entered into the DASY Measurement Server. Active meaning the TSL used during the SAR evaluation of the DUT. The temperature of the Active TSL was measured and recorded prior to performing a System Performance Check (SPC). An SPC was performed with the Active TSL prior to the start of the test series. The temperature of the Active TSL was measured throughout the day and the Active TSL temperature was maintained to ± 0.5°C. The Active TSL temperature was maintained to within ±2.0°C throughout the test series. The liquid parameters shall be measured within 24 hours before the start of a test series and if it takes longer than 48 hours, the liquid parameters shall also be measured at the end of the test series. An Area Scan exceeding the length and width of the DUT projection was performed and the locations of all maximas within 2dB of the Peak SAR recorded. A Zoom Scan centered over the Peak SAR location(s) was performed and the 1g and 10g SAR values recorded. The resolutions of the Area Scan and Zoom Scan are described in the Scan Resolution table(s) in this Section. A Power Reference Measurement was taken at the phantom reference point immediately prior to the Area Scan. A Power Drift measurement was taken at the phantom reference point immediately following the Zoom Scan to determine the power drift. A Z-Scan from the *Maximum Distance to Phantom Surface* to the fluid surface was performed following the power drift measurement.
Reporting
The 1g SAR, 10g SAR and power drift measurements are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The SAR values shown in the 100% DC (Duty Cycle) column are the SAR values reported by the SAR Measurement Server with the DUT operating at 100% transmit duty cycle. These tables also include other information such as transmit channel and frequency, modulation, accessories tested and DUT-phantom separation distance. In the Scaling of Maximum Measured SAR Section of this report, the highest measured SAR in the BODY configuration, within the entire scope of this assessment, are, when applicable, scaled for Fluid Sensitivity, Manufacturer's Tune-Up Tolerance, Simultaneous Transmission and Drift. With the exception of Duty Cycle correction/compensation, SAR values are ONLY scaled up, not down. The final results of this scaling is the *reported SAR* which appears on the Cover Page of this report.

12.5 Fluid Dielectric and Systems Performance Check

Fluid Dielectric and Systems Performance Check
Fluid Dielectric Measurement Procedure
The fluid dielectric parameters of the Tissue Simulating Liquid (TSL) are measured using the Open-Ended Coax Method connected to an Agilent 8753ET Network Analyzer connected to a measurement server running Aprel Dielectric Property Measurement System. A frequency range of ± 100MHz for frequencies > 300MHz and ± 50MHz for frequencies ≤ 300MHz with frequency step size of 10MHz is used. The center frequency is centered around the SAR measurement probe's calibration point for that TSL frequency range. A calibration of the setup is performed using a short-open-deionized water (at 23°C in a 300ml beaker) method. A sample of the TSL is placed in a 300ml beaker and the open-ended coax is submerged approximately 8mm below the fluid surface in the approximate center of the beaker. A check of the setup is made to ensure no air is trapped under the open-ended coax. The sample of TSL is measured and compared to the FCC KDB 865664 targets for HEAD or BODY for the entire fluid measurement range. Fluid adjustment are made if the dielectric parameters are > 5% in range that the DUT is to be tested. If the adjustments fail to bring the parameters to ≤ 5% but are < 10%, the SAR Fluid Sensitivity as per IEC 62201-1 and FCC KDB 865664 are applied to the highest measured SAR. A TSL with dielectric parameters > 10% in the DUT test frequency range are not used.
Systems Performance Check
The fluid dielectric parameters of the Active TSL are entered into the DASY Measurement Server at each of the 10MHz step size intervals. Active meaning the TSL used during the SAR evaluation of the DUT. The DASY Measurement System will automatically interpolate the dielectric parameters for DUT test frequencies that fall between the 10MHz step intervals. A Systems Performance Check (SPC) is performed in accordance with IEEE 1528 "System Check" and FCC KDB 865664 "System Verification". A validation source, dipole or Confined Loop Antenna (CLA), is placed under the geometric center of the phantom and separated from the phantom in accordance to the validation source's Calibration Certificate data. A CW signal set to the frequency of the validate source's and SAR measurement probe's calibration frequency with a forward power set to the validation source's Calibration Certificate data power setting is applied to the validation source. An Area Scan is centered over the projection of the validation source's feed point and an Area Scan is taken. A Zoom Scan centered over the Peak SAR measurement of the Area Scan and the 1g and 10g SAR is measured. The measured 1g and 10g SAR is compared to the 1g and 10g SAR measurements from the validation source's Calibration Certificate. When required, the measured SAR is normalized to 1.0W and compared to the normalized SAR indicated on the validation source's Calibration Certificate. The SPC is considered valid when the measured and normalized SAR is ≤ 10% of the measured and normalize SAR of the validation source's Calibration Certificate. The fluid dielectric parameters of the Active TSL and SPC are repeated when the Active TSL has been in use for greater than 84 hours or if the Active TSL temperature has exceed ± 1°C of the initial fluid analysis.

12.6 Scan Resolution 100MHz to 2GHz

Scan Resolution 100MHz to 2GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**15 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**7.5 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**5 mm**
Zoom Scan Volume X, Y, Z	**30 mm**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

12.7 Scan Resolution 2GHz to 3GHz

Scan Resolution 2GHz to 3GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**12 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**5 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**5 mm**
Zoom Scan Volume X, Y, Z	**30 mm**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

12.8 Scan Resolution 5GHz to 6GHz

Scan Resolution 5GHz to 6GHz	
Maximum distance from the closest measurement point to phantom surface: (Geometric Center of Probe Center)	**4 ± 1 mm**
Maximum probe angle normal to phantom surface. (Flat Section ELI Phantom)	**5° ± 1°**
Area Scan Spatial Resolution ΔX, ΔY	**10 mm**
Zoom Scan Spatial Resolution ΔX, ΔY	**4 mm**
Zoom Scan Spatial Resolution ΔZ (Uniform Grid)	**2 mm**
Zoom Scan Volume X, Y, Z	**22 mm**
Phantom	**ELI**
Fluid Depth	**100 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

13.0 MEASUREMENT UNCERTAINTIES

Table 13.0 Measurement Uncertainty

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEEE 1528-2013 Table 9)									
Source of Uncertainty	**IEEE 1528 Section**	**Toler ±%**	**Prob Dist**	**Div**	**c_i**	**c_i**	**Stand Unct ±%**	**Stand Unct ±%**	**V_i or V_{eff}**
Measurement System					**(1g)**	**(10g)**	**(1g)**	**(10g)**	
EX3DV4 Probe Calibration** (*k*=1)	E.2.1	6.7	N	1	1	1	**6.7**	**6.7**	∞
Axial Isotropy** (*k*=1)	E.2.2	0.6	R	√3	0.7	0.7	**0.2**	**0.2**	∞
Hemispherical Isotropy** (*k*=1)	E.2.2	3.2	R	√3	0.7	0.7	**1.3**	**1.3**	∞
Boundary Effect*	E.2.3	1.0	R	√3	1	1	0.6	0.6	∞
Linearity** (*k*=1)	E.2.4	**0.5**	R	√3	1	1	**0.3**	**0.3**	∞
System Detection Limits*	E.2.4	1.0	R	√3	1	1	0.6	0.6	∞
Modulation Response** (*k*=1)	E.2.5	**8.3**	R	√3	1	1	**4.8**	**4.8**	∞
Readout Electronics*	E.2.6	0.3	N	1	1	1	0.3	0.3	∞
Response Time*	E.2.7	0.8	R	√3	1	1	0.5	0.5	∞
Integration Time*	E.2.8	2.6	R	√3	1	1	1.5	1.5	∞
RF Ambient Conditions - Noise	E.6.1	**0.0**	R	√3	1	1	0.0	0.0	**10**
RF Ambient Conditions - Reflection	E.6.1	**0.0**	R	√3	1	1	0.0	0.0	**10**
Probe Positioner Mechanical Tolerance*	E.6.2	0.0	R	√3	1	1	0.0	0.0	∞
Probe Positioning wrt Phantom Shell*	E.6.3	0.4	R	√3	1	1	0.2	0.2	∞
Post-processing*	E.5	2.0	R	√3	1	1	1.2	1.2	∞
Test Sample Related									
Test Sample Positioning	E.4.2	**2.2**	N	1	1	1	2.2	2.2	**5**
Device Holder Uncertainty*	E.4.1	3.6	N	1	1	1	3.6	3.6	∞
SAR Drift Measurement[2]	E.2.9	0.0	R	√3	1	1	0.0	0.0	∞
SAR Power Scaling[3]	E.6.5	0.0	R	√3	1	1	0.0	0.0	∞
Phantom and Tissue Parameters									
Phantom Uncertainty*	E.3.1	6.1	R	√3	1	1	3.5	3.5	∞
SAR Correction Uncertainty	E.3.2	**1.6**	N	1	1	0.84	1.6	1.3	∞
Liquid Conductivity (measurement)	E.3.3	**5.0**	N	1	0.78	0.71	3.9	3.6	**10**
Liquid Permittivity (measurement)	E.3.3	**5.0**	N	1	0.23	0.26	1.2	1.3	**10**
Liquid Conductivity (Temperature)	E.3.2	**0.4**	R	√3	0.78	0.71	0.2	0.2	**10**
Liquid Permittivity Temperature)	E.3.2	**0.2**	R	√3	0.23	0.26	0.0	0.0	**10**
Effective Degrees of Freedom[1]								**V_{eff} =**	**1141**
Combined Standard Uncertainty			**RSS**				**11.1**	**11.0**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**22.2**	**21.9**	
Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003									

(1) The Effective Degrees of Freedom is > 30

Therefore a coverage factor of k=2 represents an approximate confidence level of 95%.

(2) The SAR Value is compensated for Drift

(3) SAR Power Scaling not Required

* Provided by SPEAG for DASY52

Table 13.1 Calculation of Degrees of Freedom

Calculation of the Degrees and Effective Degrees of Freedom	
$v_i = n - 1$	$v_{eff} = \frac{u_c^4}{\sum_{i=1}^{m} \frac{c_i^4 u_i^4}{v_i}}$

14.0 FLUID DIELECTRIC PARAMETERS

Table 14.0 Fluid Dielectric Parameters 2450MHz BODY TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Mon 29/Mar/2021 08:39:00
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.3500	39.38	1.71	38.41	1.76
2.3600	39.36	1.72	38.37	1.77
2.3700	39.34	1.73	38.32	1.78
2.3800	39.32	1.74	38.28	1.79
2.3900	39.31	1.75	38.24	1.80
2.4000	39.29	1.76	38.20	1.81
2.4100	39.27	1.76	38.15	1.82
2.4200	39.25	1.77	38.11	1.84
2.4300	39.24	1.78	38.07	1.85
2.4400	39.22	1.79	38.03	1.86
2.4500	39.20	1.80	37.99	1.87
2.4600	39.19	1.81	37.94	1.88
2.4700	39.17	1.82	37.90	1.89
2.4800	39.16	1.83	37.86	1.90
2.4900	39.15	1.84	37.82	1.91
2.5000	39.14	1.85	37.77	1.92
2.5100	39.12	1.87	37.73	1.93
2.5200	39.11	1.88	37.69	1.94
2.5300	39.10	1.89	37.65	1.96
2.5400	39.09	1.90	37.60	1.97
2.5500	39.07	1.91	37.56	1.98

FLUID DIELECTRIC PARAMETERS

Date:	29 Mar 2021	Fluid Temp:	22.1	Frequency:	2450MHz	Tissue:	Head

Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000		38.4100	1.7600	39.3800	1.71	-2.46%	2.92%
2360.0000		38.3700	1.7700	39.3600	1.72	-2.52%	2.91%
2370.0000		38.3200	1.7800	39.3400	1.73	-2.59%	2.89%
2380.0000		38.2800	1.7900	39.3200	1.74	-2.64%	2.87%
2390.0000		38.2400	1.8000	39.3100	1.75	-2.72%	2.86%
2400.0000		38.2000	1.8100	39.2900	1.76	-2.77%	2.84%
2410.0000		38.1500	1.8200	39.2700	1.76	-2.85%	3.41%
2420.0000		38.1100	1.8400	39.2500	1.77	-2.90%	3.95%
2430.0000		38.0700	1.8500	39.2400	1.78	-2.98%	3.93%
2440.0000		38.0300	1.8600	39.2200	1.79	-3.03%	3.91%
2450.0000		37.9900	1.8700	39.2000	1.80	-3.09%	3.89%
2460.0000		37.9400	1.8800	39.1900	1.81	-3.19%	3.87%
2470.0000		37.9000	1.8900	39.1700	1.82	-3.24%	3.85%
2480.0000		37.8600	1.9000	39.1600	1.83	-3.32%	3.83%
2490.0000		37.8200	1.9100	39.1500	1.84	-3.40%	3.80%
2500.0000		37.7700	1.9200	39.1400	1.85	-3.50%	3.78%
2510.0000		37.7300	1.9300	39.1200	1.87	-3.55%	3.21%
2520.0000		37.6900	1.9400	39.1100	1.88	-3.63%	3.19%
2530.0000		37.6500	1.9600	39.1000	1.89	-3.71%	3.70%
2540.0000		37.6000	1.9700	39.0900	1.90	-3.81%	3.68%
2550.0000		37.5600	1.9800	39.0700	1.91	-3.86%	3.66%

*Channel Frequency Tested

****

Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 29/Jun/2021 09:45:48
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
2.3500	39.38	1.71	39.03	1.73
2.3600	39.36	1.72	38.98	1.74
2.3700	39.34	1.73	38.93	1.75
2.3800	39.32	1.74	38.88	1.76
2.3900	39.31	1.75	38.83	1.77
2.4000	39.29	1.76	38.78	1.79
2.4100	39.27	1.76	38.73	1.80
2.4200	39.25	1.77	38.68	1.81
2.4300	39.24	1.78	38.63	1.82
2.4400	39.22	1.79	38.58	1.83
2.4500	39.20	1.80	38.53	1.85
2.4600	39.19	1.81	38.48	1.86
2.4700	39.17	1.82	38.43	1.87
2.4800	39.16	1.83	38.38	1.88
2.4900	39.15	1.84	38.33	1.89
2.5000	39.14	1.85	38.28	1.91
2.5100	39.12	1.87	38.23	1.92
2.5200	39.11	1.88	38.18	1.93
2.5300	39.10	1.89	38.13	1.94
2.5400	39.09	1.90	38.08	1.95
2.5500	39.07	1.91	38.03	1.97

FLUID DIELECTRIC PARAMETERS

Date:	29 Jun 2021	Fluid Temp:	23.8	Frequency:	2450MHz	Tissue:	Head

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000	39.0300	1.7300	39.3800	1.71	-0.89%	1.17%
2360.0000	38.9800	1.7400	39.3600	1.72	-0.97%	1.16%
2370.0000	38.9300	1.7500	39.3400	1.73	-1.04%	1.16%
2380.0000	38.8800	1.7600	39.3200	1.74	-1.12%	1.15%
2390.0000	38.8300	1.7700	39.3100	1.75	-1.22%	1.14%
2400.0000	38.7800	1.7900	39.2900	1.76	-1.30%	1.70%
2410.0000	38.7300	1.8000	39.2700	1.76	-1.38%	2.27%
2420.0000	38.6800	1.8100	39.2500	1.77	-1.45%	2.26%
2430.0000	38.6300	1.8200	39.2400	1.78	-1.55%	2.25%
2440.0000	38.5800	1.8300	39.2200	1.79	-1.63%	2.23%
2450.0000	38.5300	1.8500	39.2000	1.80	-1.71%	2.78%
2460.0000	38.4800	1.8600	39.1900	1.81	-1.81%	2.76%
2470.0000	38.4300	1.8700	39.1700	1.82	-1.89%	2.75%
2480.0000	38.3800	1.8800	39.1600	1.83	-1.99%	2.73%
2490.0000	38.3300	1.8900	39.1500	1.84	-2.09%	2.72%
2500.0000	38.2800	1.9100	39.1400	1.85	-2.20%	3.24%
2510.0000	38.2300	1.9200	39.1200	1.87	-2.28%	2.67%
2520.0000	38.1800	1.9300	39.1100	1.88	-2.38%	2.66%
2530.0000	38.1300	1.9400	39.1000	1.89	-2.48%	2.65%
2540.0000	38.0800	1.9500	39.0900	1.90	-2.58%	2.63%
2550.0000	38.0300	1.9700	39.0700	1.91	-2.66%	3.14%

Table 14.1 Fluid Dielectric Parameters 5250MHz BODY TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 25/May/2021 10:48:18
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1500	36.04	4.60	35.81	4.72
5.1600	36.03	4.61	35.80	4.73
5.1700	36.02	4.62	35.79	4.74
5.1800	36.01	4.63	35.78	4.76
5.1900	36.00	4.64	35.77	4.77
5.2000	35.99	4.65	35.76	4.78
5.2100	35.97	4.67	35.75	4.80
5.2200	35.96	4.68	35.74	4.81
5.2300	35.95	4.69	35.73	4.82
5.2400	35.94	4.70	35.72	4.84
5.2500	35.93	4.71	35.72	4.85
5.2600	35.92	4.72	35.71	4.86
5.2700	35.91	4.73	35.70	4.88
5.2800	35.89	4.74	35.69	4.89
5.2900	35.88	4.75	35.68	4.90
5.3000	35.87	4.76	35.67	4.92
5.3100	35.86	4.77	35.66	4.93
5.3200	35.85	4.78	35.65	4.94
5.3300	35.84	4.79	35.64	4.96
5.3400	35.83	4.80	35.63	4.97
5.3500	35.81	4.81	35.62	4.99

FLUID DIELECTRIC PARAMETERS

Date:	25 May 2021	Fluid Temp:	24.2	Frequency:	5250MHz	Tissue:	Head

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
5150.0000	35.8100	4.7200	36.0400	4.60	-0.64%	2.61%
5160.0000	35.8000	4.7300	36.0300	4.61	-0.64%	2.60%
5170.0000	35.7900	4.7400	36.0200	4.62	-0.64%	2.60%
5180.0000	35.7800	4.7600	36.0100	4.63	-0.64%	2.81%
5190.0000	35.7700	4.7700	36.0000	4.64	-0.64%	2.80%
5200.0000	35.7600	4.7800	35.9900	4.65	-0.64%	2.80%
5210.0000	35.7500	4.8000	35.9700	4.67	-0.61%	2.78%
5220.0000	35.7400	4.8100	35.9600	4.68	-0.61%	2.78%
5230.0000	35.7300	4.8200	35.9500	4.69	-0.61%	2.77%
5240.0000	35.7200	4.8400	35.9400	4.70	-0.61%	2.98%
5250.0000	35.7200	4.8500	35.9300	4.71	-0.58%	2.97%
5260.0000	35.7100	4.8600	35.9200	4.72	-0.58%	2.97%
5270.0000	35.7000	4.8800	35.9100	4.73	-0.58%	3.17%
5280.0000	35.6900	4.8900	35.8900	4.74	-0.56%	3.16%
5290.0000	35.6800	4.9000	35.8800	4.75	-0.56%	3.16%
5300.0000	35.6700	4.9200	35.8700	4.76	-0.56%	3.36%
5310.0000	35.6600	4.9300	35.8600	4.77	-0.56%	3.35%
5320.0000	35.6500	4.9400	35.8500	4.78	-0.56%	3.35%
5330.0000	35.6400	4.9600	35.8400	4.79	-0.56%	3.55%
5340.0000	35.6300	4.9700	35.8300	4.80	-0.56%	3.54%
5350.0000	35.6200	4.9900	35.8100	4.81	-0.53%	3.74%

*Channel Frequency Tested

****

Aprel Laboratory
Test Result for UIM Dielectric Parameter
Fri 28/May/2021 12:09:27
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.1500	36.04	4.60	37.40	4.58
5.1600	36.03	4.61	37.41	4.59
5.1700	36.02	4.62	37.42	4.61
5.1800	36.01	4.63	37.43	4.62
5.1900	36.00	4.64	37.44	4.63
5.2000	35.99	4.65	37.45	4.65
5.2100	35.97	4.67	37.46	4.66
5.2200	35.96	4.68	37.47	4.67
5.2300	35.95	4.69	37.48	4.69
5.2400	35.94	4.70	37.48	4.70
5.2500	35.93	4.71	37.49	4.71
5.2600	35.92	4.72	37.50	4.73
5.2700	35.91	4.73	37.51	4.74
5.2800	35.89	4.74	37.52	4.75
5.2900	35.88	4.75	37.53	4.77
5.3000	35.87	4.76	37.54	4.78
5.3100	35.86	4.77	37.55	4.79
5.3200	35.85	4.78	37.55	4.81
5.3300	35.84	4.79	37.56	4.82
5.3400	35.83	4.80	37.57	4.83
5.3500	35.81	4.81	37.58	4.85

FLUID DIELECTRIC PARAMETERS

Date:	28 May 2021	Fluid Temp:	20.6	Frequency:	5250MHz	Tissue:	Head

Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
5150.0000		37.4000	4.5800	36.0400	4.60	3.77%	-0.43%
5160.0000		37.4100	4.5900	36.0300	4.61	3.83%	-0.43%
5170.0000		37.4200	4.6100	36.0200	4.62	3.89%	-0.22%
5180.0000		37.4300	4.6200	36.0100	4.63	3.94%	-0.22%
5190.0000		37.4400	4.6300	36.0000	4.64	4.00%	-0.22%
5200.0000		37.4500	4.6500	35.9900	4.65	4.06%	0.00%
5210.0000		37.4600	4.6600	35.9700	4.67	4.14%	-0.21%
5220.0000		37.4700	4.6700	35.9600	4.68	4.20%	-0.21%
5230.0000		37.4800	4.6900	35.9500	4.69	4.26%	0.00%
5240.0000		37.4800	4.7000	35.9400	4.70	4.28%	0.00%
5250.0000		37.4900	4.7100	35.9300	4.71	4.34%	0.00%
5260.0000		37.5000	4.7300	35.9200	4.72	4.40%	0.21%
5270.0000		37.5100	4.7400	35.9100	4.73	4.46%	0.21%
5280.0000		37.5200	4.7500	35.8900	4.74	4.54%	0.21%
5290.0000		37.5300	4.7700	35.8800	4.75	4.60%	0.42%
5300.0000		37.5400	4.7800	35.8700	4.76	4.66%	0.42%
5310.0000		37.5500	4.7900	35.8600	4.77	4.71%	0.42%
5320.0000		37.5500	4.8100	35.8500	4.78	4.74%	0.63%
5330.0000		37.5600	4.8200	35.8400	4.79	4.80%	0.63%
5340.0000		37.5700	4.8300	35.8300	4.80	4.86%	0.63%
5350.0000		37.5800	4.8500	35.8100	4.81	4.94%	0.83%

*Channel Frequency Tested

Table 14.2 Fluid Dielectric Parameters 5750MHz BODY TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Fri 28/May/2021 12:22:40
Freq Frequency(GHz)
FCC_eH FCC OET 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC OET 65 Supplement C (June 2001) Limits for Head Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM
****

Freq	FCC_eH	FCC_sH	Test_e	Test_s
5.6500	35.47	5.12	34.93	4.97
5.6600	35.46	5.13	34.94	4.98
5.6700	35.45	5.14	34.94	5.00
5.6800	35.44	5.15	34.95	5.01
5.6900	35.43	5.16	34.96	5.02
5.7000	35.41	5.17	34.96	5.04
5.7100	35.40	5.18	34.97	5.05
5.7200	35.39	5.19	34.97	5.06
5.7300	35.38	5.20	34.98	5.08
5.7400	35.37	5.21	34.98	5.09
5.7500	35.36	5.22	34.99	5.10
5.7600	35.35	5.23	34.99	5.12
5.7700	35.33	5.24	35.00	5.13
5.7800	35.32	5.25	35.01	5.14
5.7900	35.31	5.26	35.01	5.16
5.8000	35.30	5.27	35.02	5.17
5.8100	35.29	5.28	35.02	5.19
5.8200	35.28	5.29	35.03	5.20
5.8300	35.27	5.30	35.03	5.21
5.8400	35.25	5.31	35.04	5.23
5.8500	35.24	5.32	35.05	5.24

FLUID DIELECTRIC PARAMETERS

Date:	28 May 2021	Fluid Temp:	20.6	Frequency:	5750MHz	Tissue:	Head

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
5650.0000	34.9300	4.9700	35.4700	5.12	-1.52%	-2.93%
5660.0000	34.9400	4.9800	35.4600	5.13	-1.47%	-2.92%
5670.0000	34.9400	5.0000	35.4500	5.14	-1.44%	-2.72%
5680.0000	34.9500	5.0100	35.4400	5.15	-1.38%	-2.72%
5690.0000	34.9600	5.0200	35.4300	5.16	-1.33%	-2.71%
5700.0000	34.9600	5.0400	35.4100	5.17	-1.27%	-2.51%
5710.0000	34.9700	5.0500	35.4000	5.18	-1.21%	-2.51%
5720.0000	34.9700	5.0600	35.3900	5.19	-1.19%	-2.50%
5730.0000	34.9800	5.0800	35.3800	5.20	-1.13%	-2.31%
5740.0000	34.9800	5.0900	35.3700	5.21	-1.10%	-2.30%
5750.0000	34.9900	5.1000	35.3600	5.22	-1.05%	-2.30%
5760.0000	34.9900	5.1200	35.3500	5.23	-1.02%	-2.10%
5770.0000	35.0000	5.1300	35.3300	5.24	-0.93%	-2.10%
5780.0000	35.0100	5.1400	35.3200	5.25	-0.88%	-2.10%
5790.0000	35.0100	5.1600	35.3100	5.26	-0.85%	-1.90%
5800.0000	35.0200	5.1700	35.3000	5.27	-0.79%	-1.90%
5810.0000	35.0200	5.1900	35.2900	5.28	-0.77%	-1.70%
5820.0000	35.0300	5.2000	35.2800	5.29	-0.71%	-1.70%
5830.0000	35.0300	5.2100	35.2700	5.30	-0.68%	-1.70%
5840.0000	35.0400	5.2300	35.2500	5.31	-0.60%	-1.51%
5850.0000	35.0500	5.2400	35.2400	5.32	-0.54%	-1.50%

*Channel Frequency Tested

15.0 SYSTEM VERIFICATION TEST RESULTS

Table 15.1 System Verification Results 2450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
29 Mar 2021		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	21.2	23	19%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
37.99	39.20	-3.09%	1.87	1.80	3.89%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
14.40	13.18	9.26%	6.47	6.01	7.74%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
57.60	52.72	9.26%	25.88	24.02	7.77%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.

The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.

The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value.

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Table 15.2 System Verification Results 2450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
29 Jun 2021		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.8	30	39%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
38.53	39.20	-1.71%	1.85	1.80	2.78%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
12.60	13.18	-4.40%	5.76	6.01	-4.08%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
50.40	52.72	-4.40%	23.04	24.02	-4.06%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.

The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.

The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value.

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Table 15.4 System Verification Results 5250MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
25 May 2021		5250	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	24.2	26	29%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
35.72	35.93	-0.58%	4.85	4.71	2.97%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
4.31	3.97	8.47%	1.25	1.15	9.12%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
86.20	79.47	8.47%	25.00	22.91	9.12%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.

The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.

The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value.

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

Table 15.5 System Verification Results 5750MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
28 May 2021		5750	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	24.2	26	29%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
34.99	35.36	-1.05%	5.10	5.22	-2.30%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.64	3.78	-3.63%	1.04	1.10	-5.50%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
72.80	75.54	-3.63%	20.80	22.01	-5.50%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.

The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.

The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value.

The forward power applied was same forward power applied by the calibration lab during the calibration of this validation source.

16.0 SYSTEM VALIDATION SUMMARY

Table 16.0 System Validation Summary

System Validation Summary											
Frequency (MHz)	Validation Date	Probe Model	Probe S/N	Validation Source	Source S/N	Tissue	Tissue Dielectrics		Validation Results		
							Permitivity	Conductivity	Sensitivity	Linearity	Isotropy
30	31-May-19	EX3DV4	3600	CLA-30	1005	Head	52.40	0.75	Pass	Pass	Pass
150	20-May-20	EX3DV4	3600	CLA-150	4007	Head	52.59	0.76	Pass	Pass	Pass
450	12-Aug-20	EX3DV4	3600	D450V3	1068	Head	43.64	0.84	Pass	Pass	Pass
750	20-Jun-19	EX3DV4	3600	D750V3	1061	Head	44.27	0.83	Pass	Pass	Pass
835	17-Aug-20	EX3DV4	3600	D835V2	4d075	Head	40.60	0.87	Pass	Pass	Pass
900	20-Aug-20	EX3DV4	3600	D900V2	045	Head	39.09	0.94	Pass	Pass	Pass
1640	5-Jul-18	EX3DV4	3600	1620-S-2	207-00102	Head	39.87	1.27	Pass	Pass	Pass
1800	18-Jun-19	EX3DV4	3600	D1800V2	247	Head	54.77	1.53	Pass	Pass	Pass
2450	27-May-20	EX3DV4	3600	D2450V2	825	Head	37.21	1.95	Pass	Pass	Pass
2450	29-Jun-21	EX3DV4	3600	D2450V2	825	Head	38.53	1.85	Pass	Pass	Pass
5250	29-May-20	EX3DV4	3600	D5GHzV2	1031	Head	34.44	5.07	Pass	Pass	Pass
5250	25-May-21	EX3DV4	3600	D5GHzV2	1031	Head	33.74	4.9	Pass	Pass	Pass
5750	28-May-20	EX3DV4	3600	D5GHzV2	1031	Head	35.16	5.56	Pass	Pass	Pass
5750	28-May-21	EX3DV4	3600	D5GHzV2	1031	Head	34.99	5.10	Pass	Pass	Pass

17.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 17.0 Measurement System Specifications

Measurement System Specification	
Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability	+/- 0.035 mm
No. of axis	6.0
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	Intel(R) Core(TM) i7-7700
Clock Speed	3.60 GHz
Operating System	Windows 10 Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY6, V 6.4.0.12171 / DASY52 V52.10.0.1446
	Postprocessing Software: SEMCAD X, V14.6.10(Deployment Build)
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	Intel ULV Celeron CPU 400 MHz; 128 MB chip disk; 128 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	EX3DV4
Serial No.	3600
Construction	Triangular core fiber optic detection system
Frequency	10 MHz to 6 GHz
Linearity	±0.2 dB (30 MHz to 3 GHz)
Phantom	
Type	ELI Elliptical Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 30 Liter

Measurement System Specification

Probe Specification

Construction:	Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy ± 8%)
Frequency:	10 MHz to > 6 GHz; Linearity: ± 0.2 dB (30 MHz to 3 GHz)
Directivity:	± 0.2 dB in head tissue (rotation around probe axis) ± 0.4 dB in head tissue (rotation normal to probe axis)
Dynamic Range:	5 μW/g to > 100 mW/g; Linearity: ± 0.2 dB
Surface Detect:	± 0.2 mm repeatability in air and clear liquids over diffuse reflecting surfaces
Dimensions:	Overall length: 330 mm; Tip length: 16 mm; Body diameter: 12 mm; Tip diameter: 6.8 mm Distance from probe tip to dipole centers: 2.7 mm
Application:	General dosimetry up to 3 GHz; Compliance tests of mobile phone

EX3DV4 E-Field Probe

Phantom Specification

The ELI V5.0 phantom is an elliptical planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to OET Bulletin 65, Supplement C, IEC\IEEE 62209-1528,IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.

ELI Phantom

Device Positioner Specification

The DASY device positioner has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65^{O}. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Positioner

18.0 TEST EQUIPMENT LIST

Table 18.0 Equipment List and Calibration

Test Equipment List				
DESCRIPTION	**ASSET NO.**	**SERIAL NO.**	**DATE CALIBRATED**	**CALIBRATION DUE**
Schmid & Partner DASY 6 System	-	-	-	-
-DASY Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	17-Mar-20	22-Apr-21
-DAE4	00019	353	22-Apr-21	22-Apr-22
-EX3DV4 E-Field Probe	00213	3600	25-Mar-20	20-Apr-21
-EX3DV4 E-Field Probe	00213	3600	20-Apr-21	20-Apr-22
-D2450V2 Validation Dipole	00219	825	24-Apr-18	24-Apr-21
-D2450V2 Validation Dipole	00219	825	24-Apr-21	24-Apr-24
-D5GHzV2 Validation Dipole	00126	1031	26-Apr-18	26-Apr-21
-D5GHzV2 Validation Dipole	00126	1031	27-Apr-21	27-Apr-24
ELI Phantom	00247	1234	CNR	CNR
SAM Phantom	00154	1033	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	26-Mar-19	26-Mar-22
Gigatronics 80701A Power Sensor	00186	1837002	COU	COU
Gigatronics 80334A Power Sensor	00237	1837001	26-Mar-19	26-Mar-22
HP 8753ET Network Analyzer	00134	US39170292	6-Jan-21	6-Jan-24
Rohde & Schwarz SMR20 Signal Generator	00006	100104	11-Aug-20	11-Aug-23
Amplifier Research 10W1000C Power Amplifier	00041	27887	CNR	CNR
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR
Narda Directional Coupler 3020A	00064	-	CNR	CNR
Kangaroo VWR Humidity/Thermometer	00334	192385455	5-Aug-19	6-Aug-22
Digital Multi Meter DMR-1800	00250	TE182	23-Jun-20	23-Jun-23
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	15-May-18	15-May-21
HP 8566B Spectrum Analyzer	00051	2747A055100	29-Jun-20	29-Jun-23
RF Cable-SMA	00311	-	CNR	CNR
HP Calibration Kit	00145	-	CNR	CNR

CNR = Calibration Not Required

COU = Calibrate on Use

19.0 FLUID COMPOSITION

Table 19.0 Fluid Composition 2450MHz BODY TSL

Tissue Simulating Liquid (TSL) Composition				
Component by Percent Weight				
Water	Glycol	Salt(1)	HEC(2)	Bacteriacide(3)
69.98	30.0	0.02	0.0	0.0

(1) Non-Iodinized
(2) **H**ydroxy**E**thyl-**C**ellulose: Sigma-Aldrich P/N 54290-500g
(3) Dow Chemical Dowicil 75 Antimicrobial Perservative

Table 19.1 Fluid Composition 5250MHz BODY TSL

This is a proprietary composition by SPEAG.

APPENDIX A – SYSTEM VERIFICATION PLOTS

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:825
Procedure Name: SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg 2

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.87 S/m; ε_r = 37.99; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/29/2021 11:06:40 AM

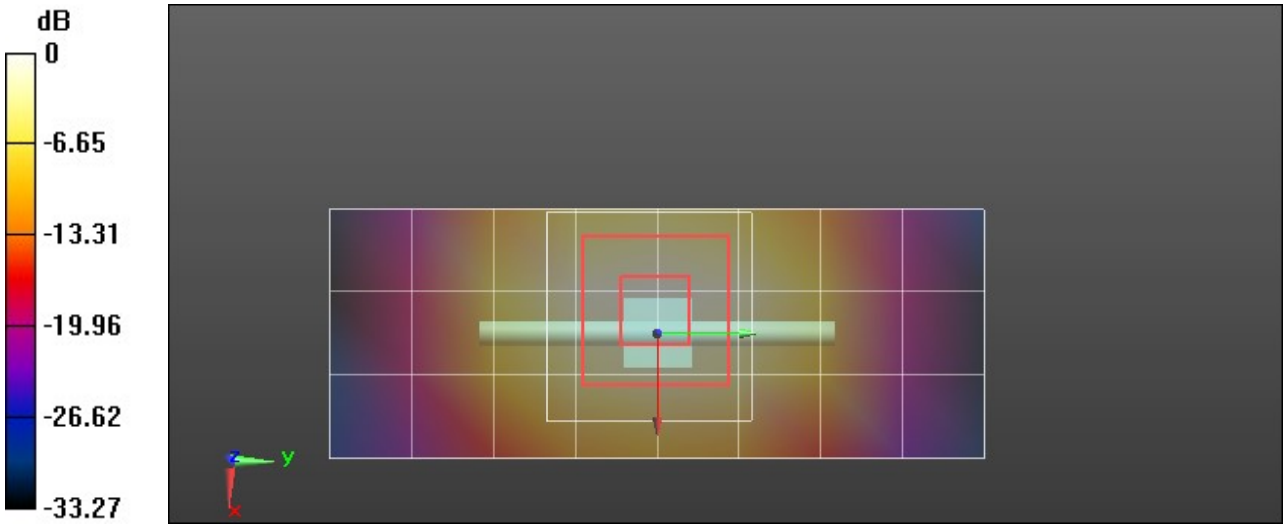
DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2450 MHz; Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

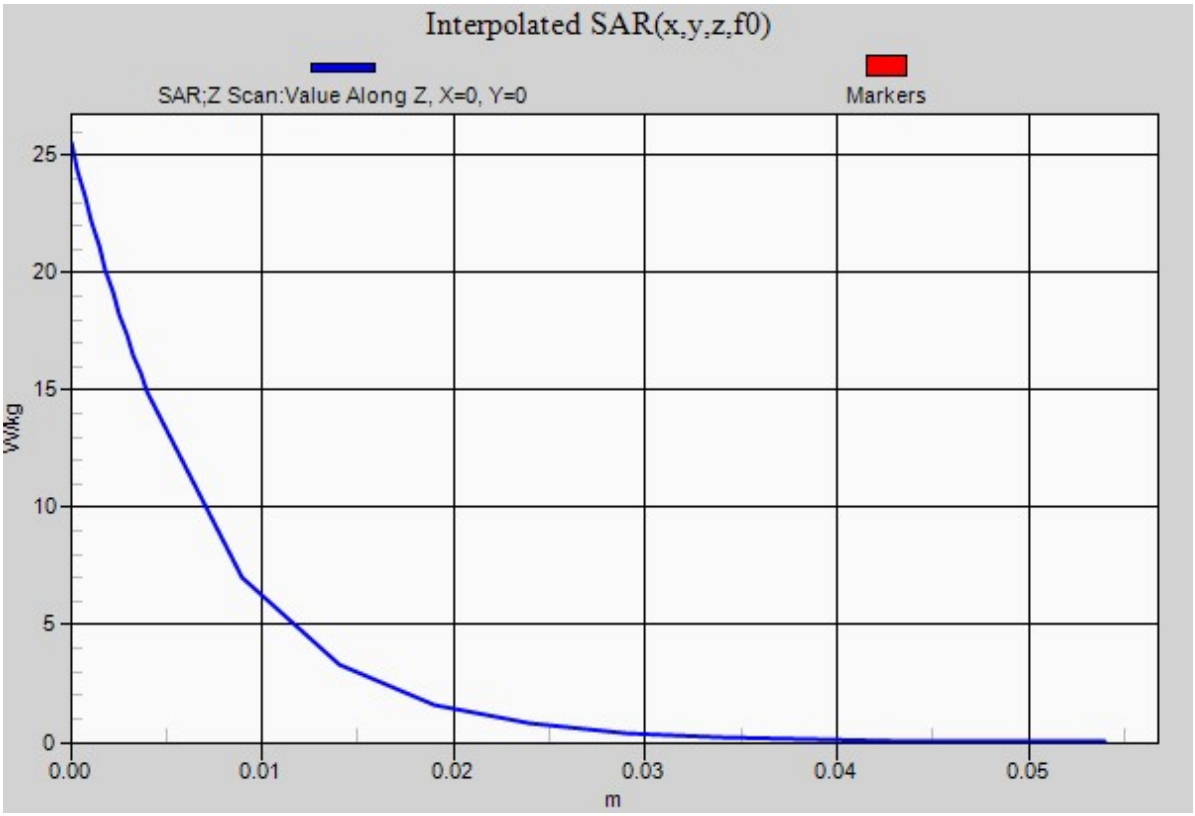
SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg 2/Area Scan (4x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 16.0 W/kg

SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 91.52 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 32.0 W/kg
SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.47 W/kg
Smallest distance from peaks to all points 3 dB below = 10.2 mm
Ratio of SAR at M2 to SAR at M1 = 45.9%
Maximum value of SAR (measured) = 16.1 W/kg

SPC/SPC 2450H Input=250mw, Target=[14.63][13.3][11.97]W/kg 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 6.741 (6.620, 6.900) [mm]
Maximum value of SAR (interpolated) = 25.5 W/kg



0 dB = 16.0 W/kg = 12.04 dBW/kg



DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw 2 2

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.85 S/m; ε_r = 35.72; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 5/25/2021 1:12:28 PM

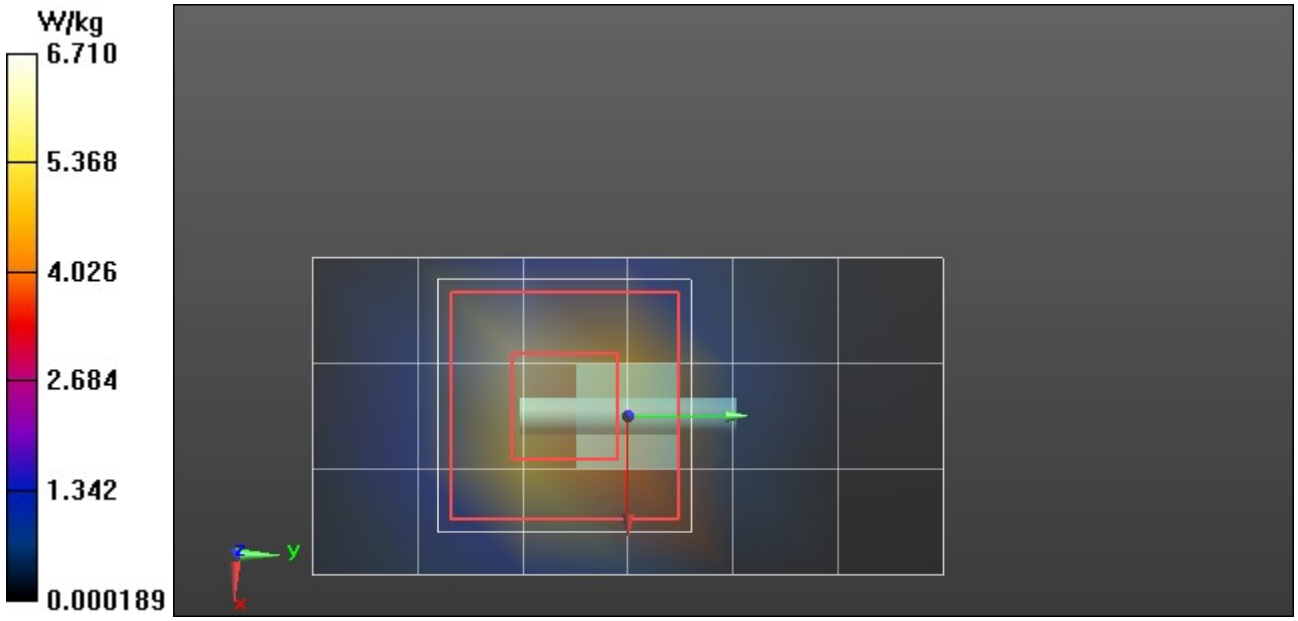
DASY5 Configuration:

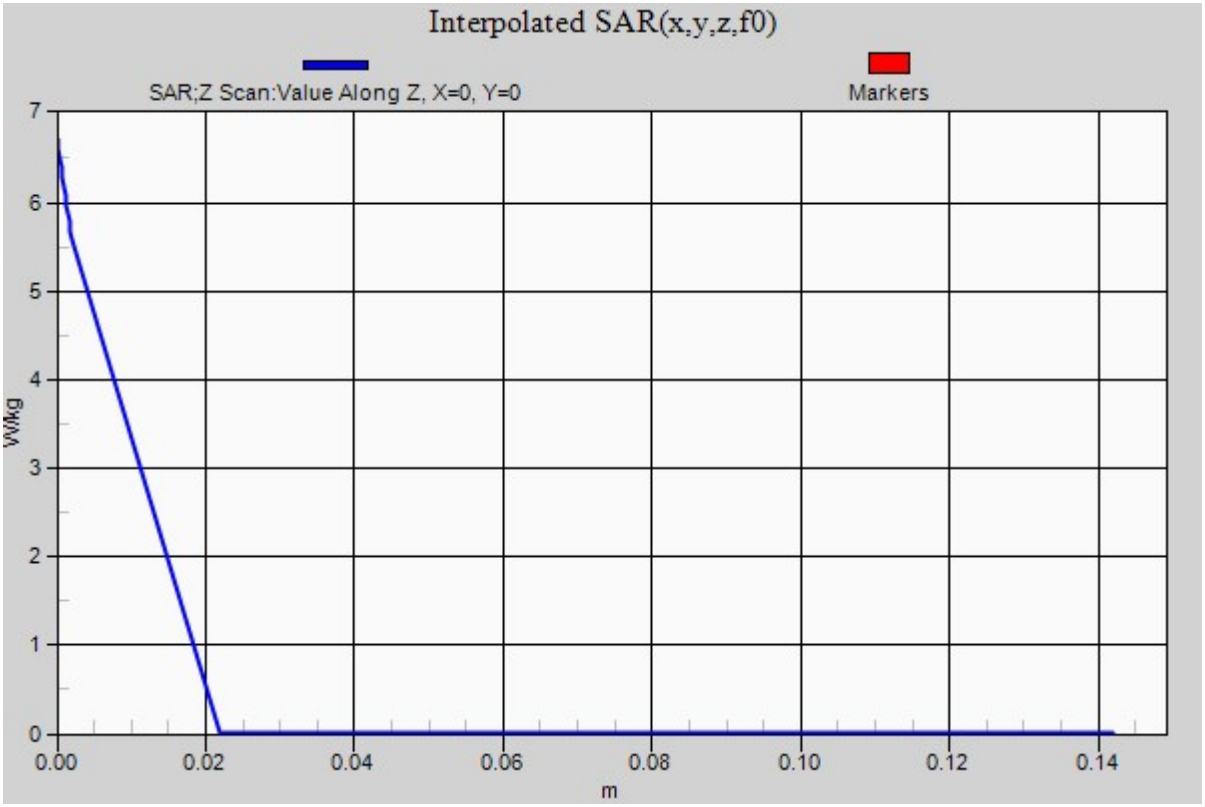
- Probe: EX3DV4 - SN3600; ConvF(4.41, 4.41, 4.41) @ 5250 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw 2 2/Area Scan (4x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.20 W/kg

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw 2 2/Zoom Scan (7x7x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 26.20 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 4.31 W/kg; SAR(10 g) = 1.25 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 55.5%
Maximum value of SAR (measured) = 8.94 W/kg

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw 2 2/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 3.097) [mm]
Maximum value of SAR (interpolated) = 6.71 W/kg


W/kg
6.710
5.368
4.026
2.684
1.342
0.000189
y


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
m
0
1
2
3
4
5
6
7
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.71 S/m; ε_r = 37.49; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 5/28/2021 1:21:32 PM

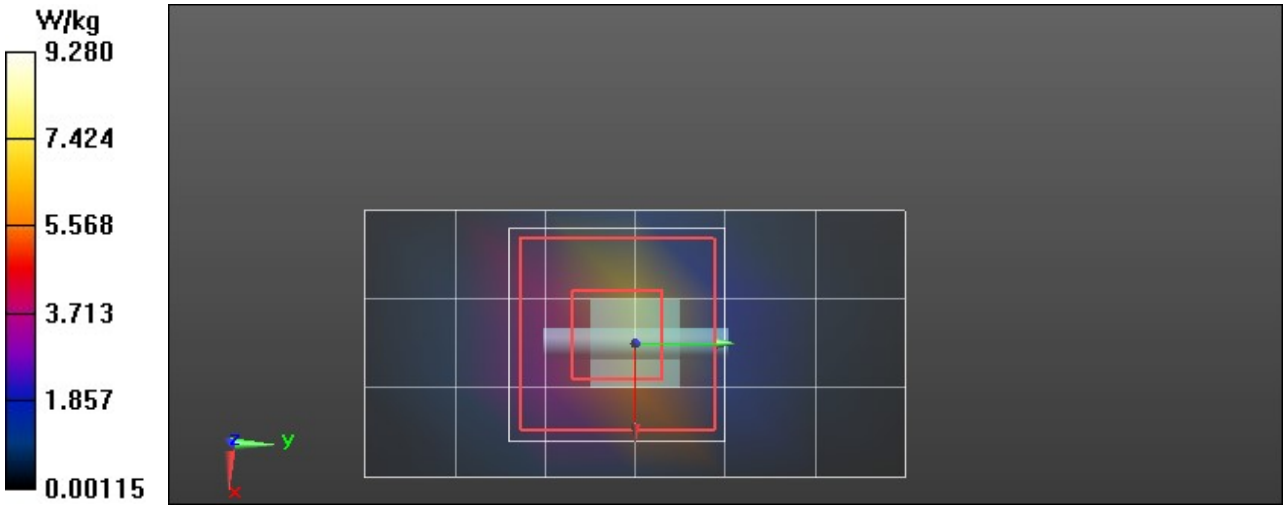
DASY5 Configuration:

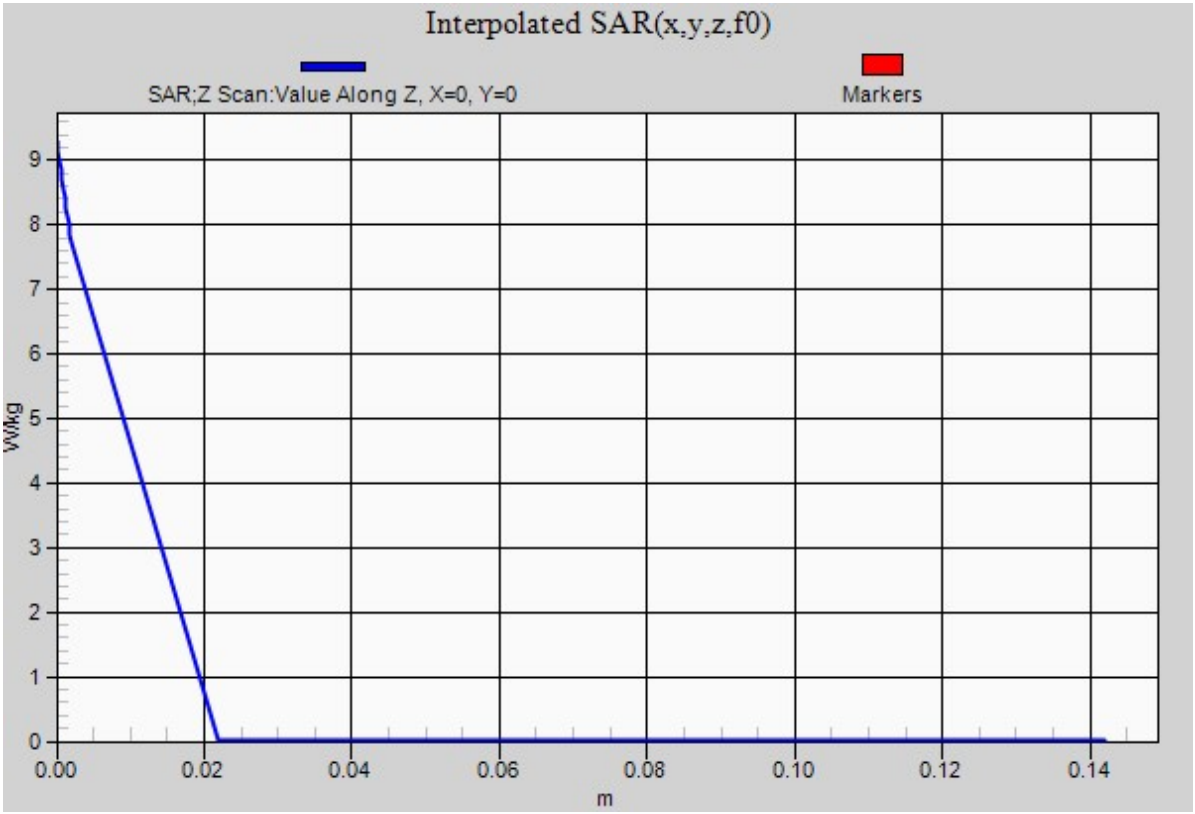
- Probe: EX3DV4 - SN3600; ConvF(4.41, 4.41, 4.41) @ 5250 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw/Area Scan (4x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.75 W/kg

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 31.70 V/m; Power Drift = -0.15 dB
Peak SAR (extrapolated) = 16.1 W/kg
SAR(1 g) = 4.05 W/kg; SAR(10 g) = 1.17 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 55%
Maximum value of SAR (measured) = 8.49 W/kg

SPC/SPC 5250H Input=50 mw, Target= [3.58][3.97][4.37], Target=79.5W/kg@1000mw/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 3.202) [mm]
Maximum value of SAR (interpolated) = 9.28 W/kg





DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx
Procedure Name: SPC 5750H Input=50 mw, Target=[3.399][3.777][4.155], Target=75.54W/kg@1000mw

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.1 S/m; ε_r = 34.99; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 5/28/2021 2:03:48 PM

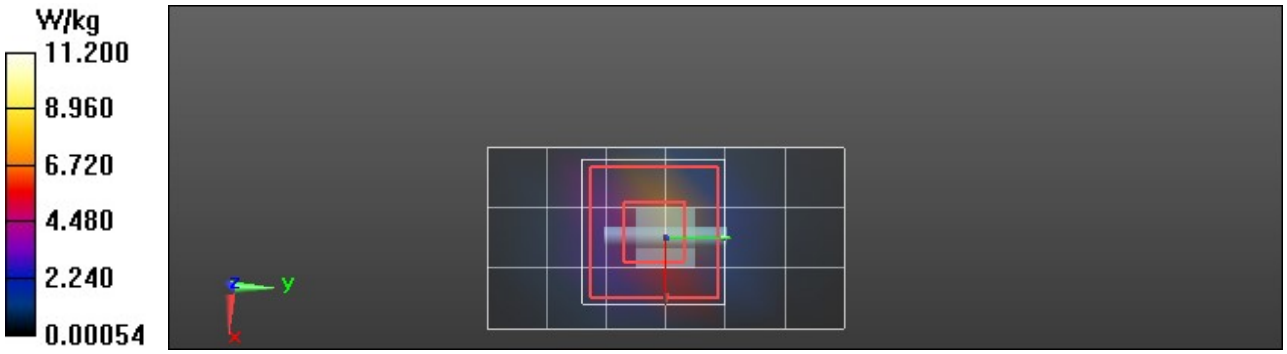
DASY5 Configuration:

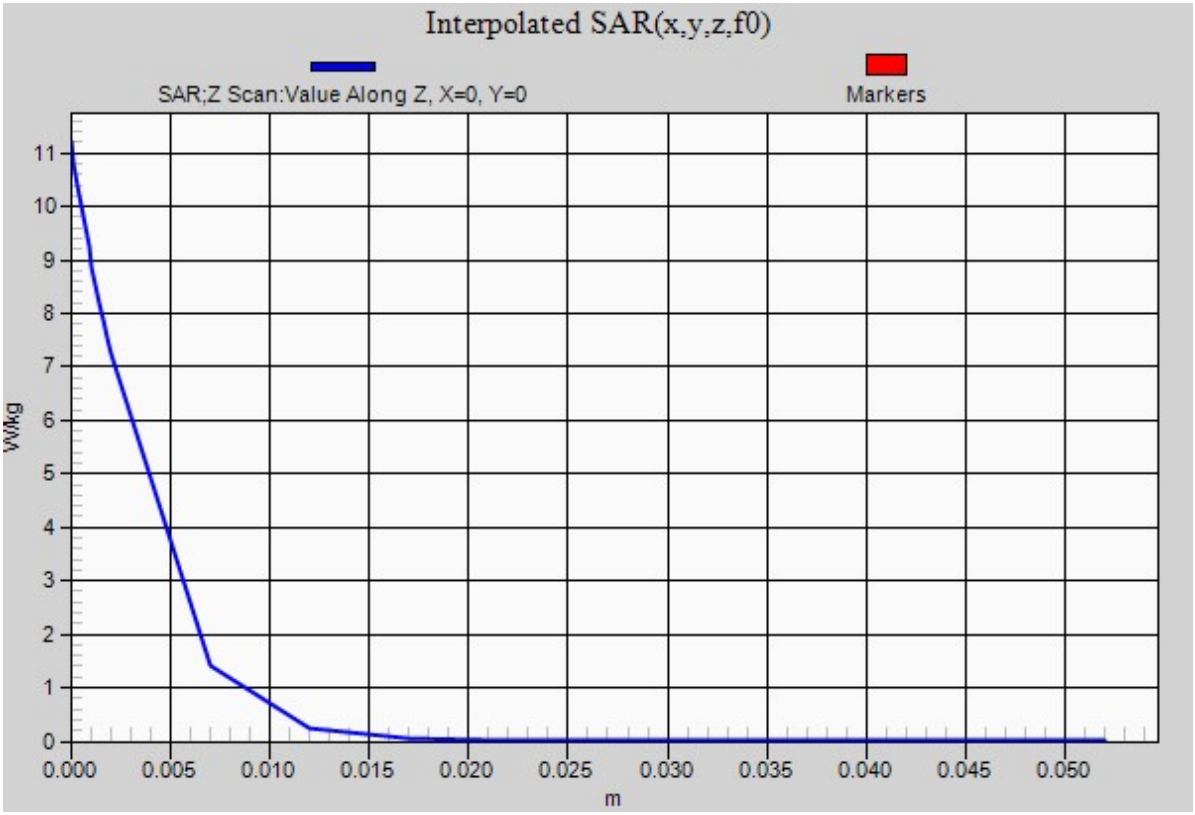
- Probe: EX3DV4 - SN3600; ConvF(4.06, 4.06, 4.06) @ 5750 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 5750H Input=50 mw, Target=[3.399][3.777][4.155], Target=75.54W/kg@1000mw/Area Scan (4x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.86 W/kg

SPC/SPC 5750H Input=50 mw, Target=[3.399][3.777][4.155], Target=75.54W/kg@1000mw/Zoom Scan (7x7x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 30.20 V/m; Power Drift = -0.63 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 3.64 W/kg; SAR(10 g) = 1.04 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 51.8%
Maximum value of SAR (measured) = 7.79 W/kg

SPC/SPC 5750H Input=50 mw, Target=[3.399][3.777][4.155], Target=75.54W/kg@1000mw/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 2.871 (3.049, 2.862) [mm]
Maximum value of SAR (interpolated) = 11.2 W/kg


W/kg
11.200
8.960
6.720
4.480
2.240
0.00054
y


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
11
10
9
8
7
6
5
4
3
2
1
0
0.000
0.005
0.010
0.015
0.020
0.025
0.030
0.035
0.040
0.045
0.050
m

DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:825
Procedure Name: SPC 2450H Input=250mw, Target=[11.86][13.18][14.498]W/kg 2

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.85 S/m; ε_r = 38.53; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 6/29/2021 10:22:16 AM

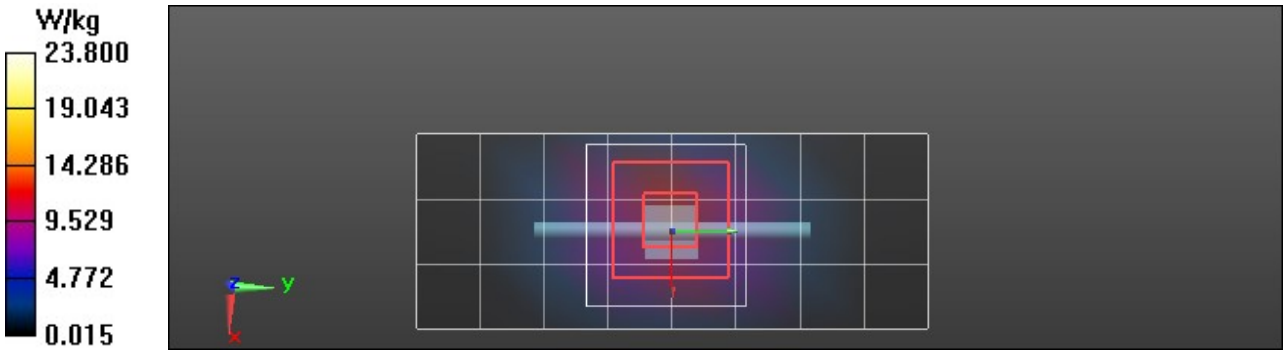
DASY5 Configuration:

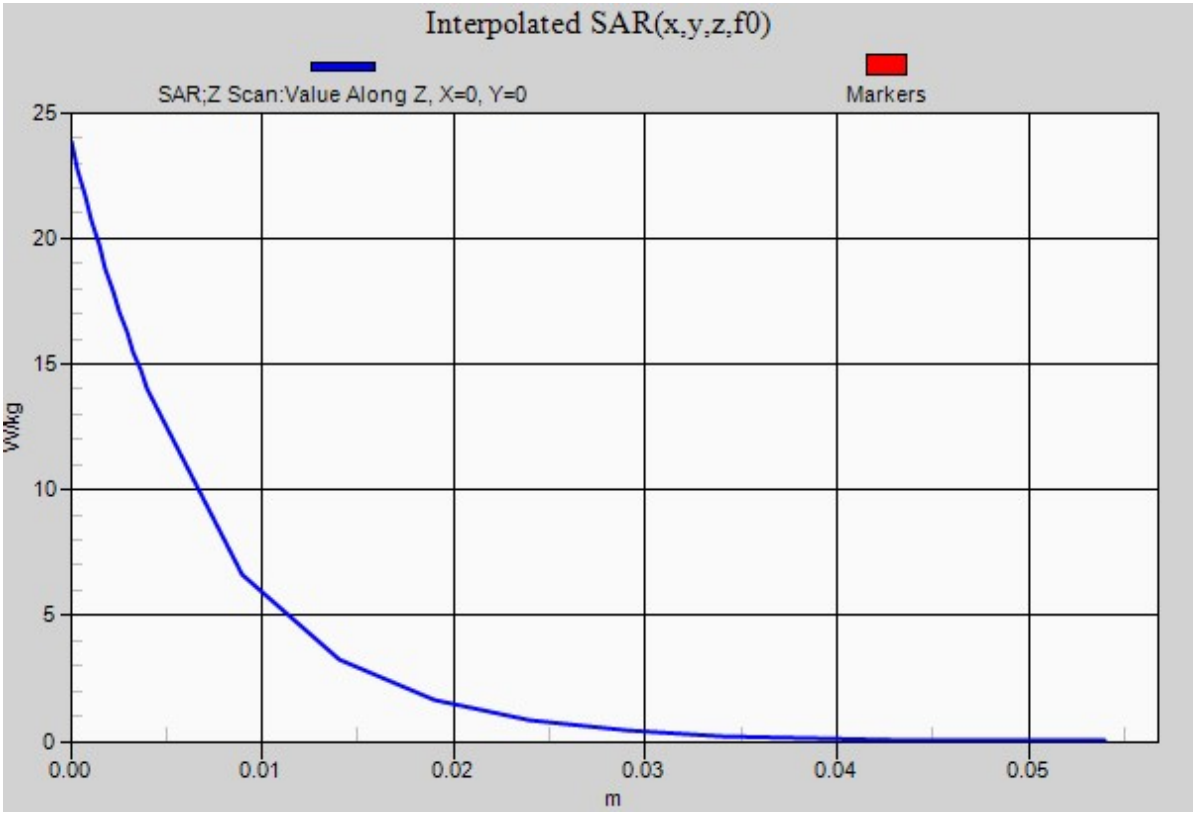
- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2450 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 2450H Input=250mw, Target=[11.86][13.18][14.498]W/kg 2/Area Scan (4x9x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 12.1 W/kg

SPC/SPC 2450H Input=250mw, Target=[11.86][13.18][14.498]W/kg 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 87.48 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 27.2 W/kg
SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.76 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 47.3%
Maximum value of SAR (measured) = 14.3 W/kg

SPC/SPC 2450H Input=250mw, Target=[11.86][13.18][14.498]W/kg 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 7.001 (6.741, 7.167) [mm]
Maximum value of SAR (interpolated) = 23.8 W/kg


W/kg
23.800
19.043
14.286
9.529
4.772
0.015
y
x


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
25
20
15
10
5
0
W/kg
0.00
0.01
0.02
0.03
0.04
0.05
m

APPENDIX B – MEASUREMENT PLOTS OF MAXIMUMUM MEASURED SAR

APPENDIX C - SETUP PHOTOS

Plot B4

DUT: A04157; Type: Transmitter

Procedure Name: B4-A04157, Body-Top Side, 2457MHz,WIFI

Communication System: UID 10574 - AAA, IEEE 802.11b WiFi 2.4 GHz (DSSS, 11 Mbps, 90pc duty cycle); Frequency: 2457 MHz;Duty Cycle: 1:1.57652
Medium parameters used (interpolated): f = 2457 MHz; σ = 1.877 S/m; ε_r = 37.955; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/29/2021 6:51:52 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2457 MHz; Calibrated: 3/25/2020
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 3/17/2020
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H/B4-A04157, Body-Top Side, 2457MHz,WIFI/Area Scan (5x20x1): Measurement grid: dx=12mm, dy=12mm

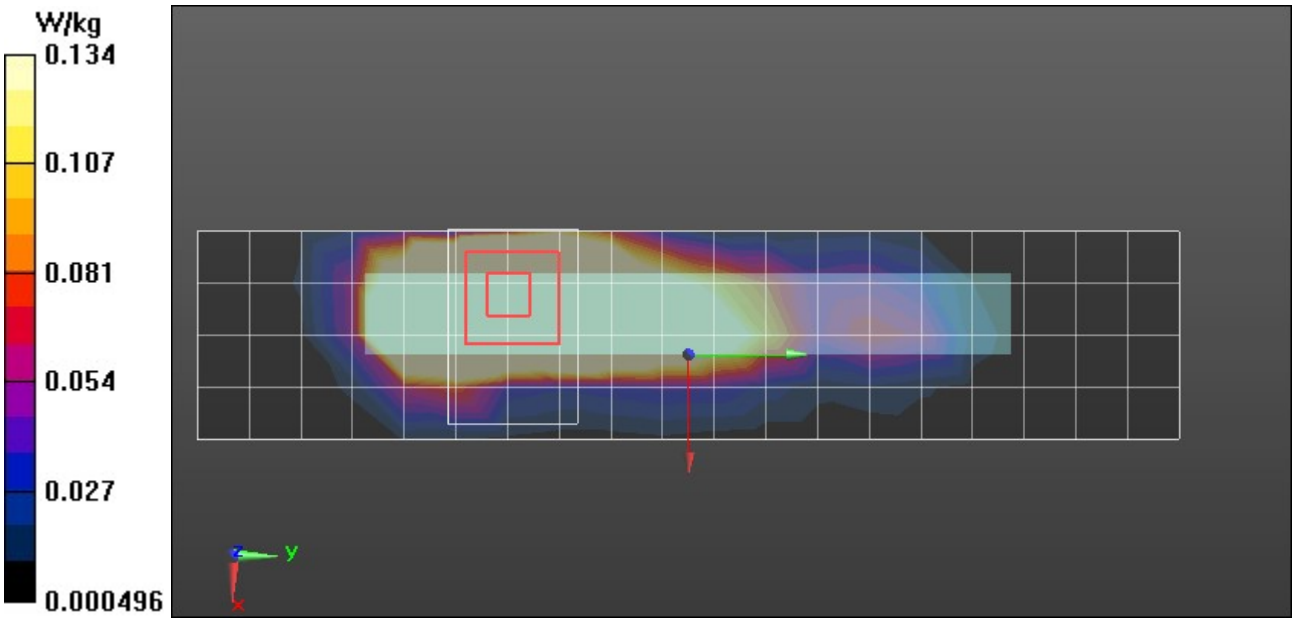
Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.944 W/kg

2450H/B4-A04157, Body-Top Side, 2457MHz,WIFI/Zoom Scan (10x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.183 V/m; Power Drift = -0.65 dB
Peak SAR (extrapolated) = 2.29 W/kg
SAR(1 g) = 0.753 W/kg; SAR(10 g) = 0.274 W/kg
Smallest distance from peaks to all points 3 dB below = 6 mm
Ratio of SAR at M2 to SAR at M1 = 37%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.916 W/kg

2450H/B4-A04157, Body-Top Side, 2457MHz,WIFI/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm

Info: Interpolated medium parameters used for SAR evaluation.
Penetration depth = n/a (n/a, 7.445) [mm]
Maximum value of SAR (interpolated) = 0.134 W/kg



Plot B10

DUT: A04157; Type: Transmitter

Procedure Name: B10-A04157, Back Side, 5200MHz,WIFI

Communication System: UID 10317 - AAC, IEEE 802.11a WiFi 5 GHz (OFDM, 6 Mbps, 96pc duty cycle); Frequency: 5200 MHz;Duty Cycle: 1:6.85962
Medium parameters used: f = 5200 MHz; σ = 4.78 S/m; ε_r = 35.76; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 5/26/2021 2:43:27 PM

DASY5 Configuration:

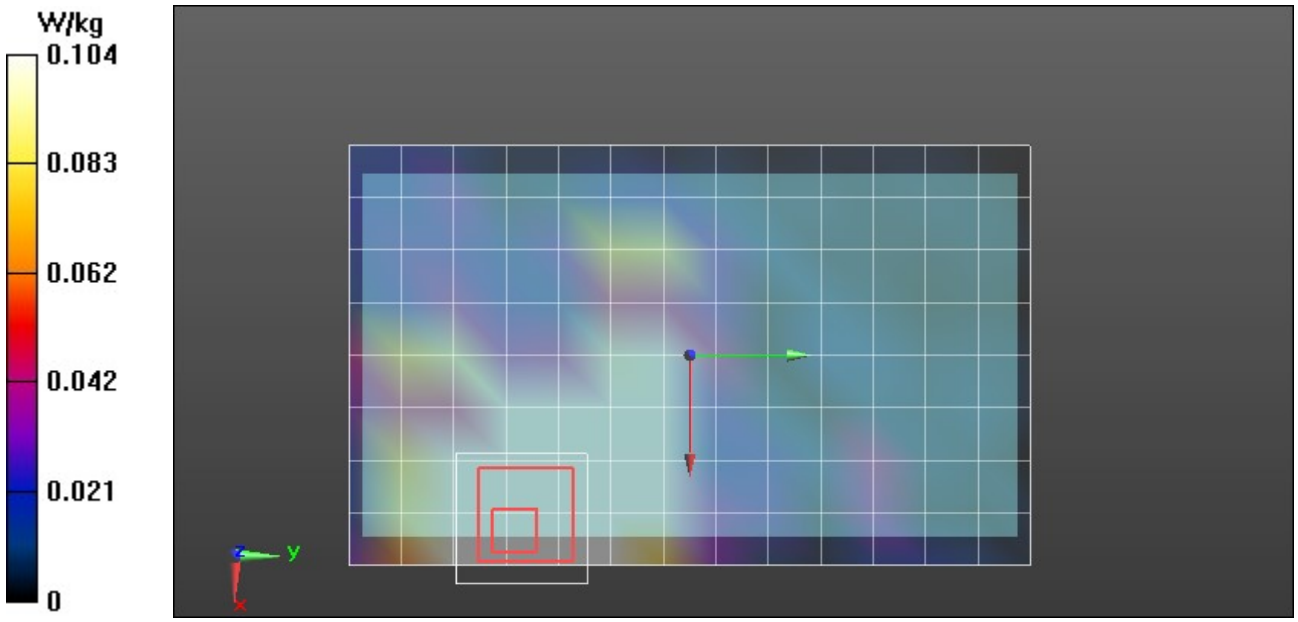
- Probe: EX3DV4 - SN3600; ConvF(4.41, 4.41, 4.41) @ 5200 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

5250MHz/B10-A04157, Back Side, 5200MHz,WIFI/Area Scan (9x14x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 0.547 W/kg

5250MHz/B10-A04157, Back Side, 5200MHz,WIFI/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.498 V/m; Power Drift = -0.05 dB
Peak SAR (extrapolated) = 3.62 W/kg
SAR(1 g) = 0.426 W/kg; SAR(10 g) = 0.148 W/kg
Smallest distance from peaks to all points 3 dB below = 8.5 mm
Ratio of SAR at M2 to SAR at M1 = 22.4%

Maximum value of SAR (measured) = 0.591 W/kg

5250MHz/B10-A04157, Back Side, 5200MHz,WIFI/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 0) [mm]
Maximum value of SAR (interpolated) = 0.104 W/kg



Plot B15

DUT: A04158; Type: Transmitter

Procedure Name: B104-A04157, Body-Top Side, 2402 Blue Tooth GFSK

Communication System: UID 0, CW (0); Frequency: 2402 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2402 MHz; σ = 1.792 S/m; ε_r = 38.77; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 6/29/2021 3:42:57 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.45, 6.45, 6.45) @ 2402 MHz; Calibrated: 4/28/2021
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/22/2021
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H/B104-A04157, Body-Top Side, 2402 Blue Tooth GFSK/Area Scan 2 (5x17x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00881 W/kg

2450H/B104-A04157, Body-Top Side, 2402 Blue Tooth GFSK/Zoom Scan (8x9x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.4930 V/m; Power Drift = not measured
Peak SAR (extrapolated) = 0.0120 W/kg
SAR(1 g) = 0.000175 W/kg; SAR(10 g) = 2.14e-005 W/kg
Ratio of SAR at M2 to SAR at M1 = 0%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0118 W/kg