Celltech
Testing and Engineering Services Lab

Test Report Serial Number:	45461876 R1.0
Test Report Date:	3 May 2023
Project Number:	1629

SAR Test Report - New Certification

Applicant:

BK TECHNOLOGIES

BK Technologies
7100 Technology Dr.
West Melbourne, FL 32904 USA

Maximum *reported* 1g SAR			
Equipment Class	Face	Body	
TNF	1.3	3.01	W/kg
DTS	<0.1	<0.1	
DSS	<0.1	<0.1	
UNII	0.33	<0.1	
Simultaneous	1.63	3.05	
Occupational Limit:	8.00	8.00	

FCC ID: **K95BKR9000-2**

Product Model Number / HVIN: **BKR9000-2**

IC Registration Number:

Product Name / PMN: **BKR9000**

In Accordance With:

FCC 47 CFR §2.1093

Radiofrequency Radiation Exposure Evaluation: Portable Devices

Approved By:

Ben Hewson, President
Celltech Labs Inc.
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ilac-MRA ACCREDITED

Test Lab Certificate: 2470.01

Industry Canada

IC Registration 3874A

FC

FCC Registration: CA3874

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Ben Hewson, Trevor Whillock	**Date(s) of Evaluation:**		9-17 & 29-30 March and 4-6 April, 2023
Report Prepared By:	Art Voss, P.Eng.	**Report Reviewed By:**		Ben Hewson
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft	n/a	Ben Hewson	21 April 2023
1.0	Initial Release	n/a	Ben Hewson	3 May 2023

2.0 APPLICANT AND DEVICE INFORMATION

Applicant Information		
Applicant Name	**BK Technologies**	
Applicant Address	7100 Technology Dr.	
	West Melbourne, FL	
	USA	
DUT Information		
Device Identifier(s):	**FCC ID:**	**K95BKR9000-2**
Host Marketing Name / HMN:	BKR9000	
Device Model(s) / HVIN:	BKR9000-2	
Test Sample Serial No.:	Production Sample Prototype	
Equipment Class (FCC):	Licensed Non-Broadcast Transmitter Held to Face (TNF) FCC Part 90 - LMRS	
Transmit Frequency Range (FCC):	VHF Band: 136 - 174MHz	
	UHF Band: 378 - 522MHz	
	700 Band: 763 - 776MHz, 793 - 806MHz	
	800 Band: 806 - 825MHz, 851 - 870MHz	
Number of Channels:	Programmable	
Transmitter Max Power : Including Tune-Up Tolerance	VHF Band: 7W (38.3dBm)	
	UHF Band: 6W (37.6dBm)	
	700 Band: 3W (34.8dBm)	
	800 Band: 3W (34.86dBm)	
Duty Cycle:	LMR: 50% PTT Duty Cycle	
DUT Power Source:	Li-ion Rechargeable 7.2V/4900mAh/35.28Wh	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

Integrated Module Information	
Module Manufacturer:	Texas Instruments Inc.
Device Identifier(s):	**FCC ID:** **Z64-WL18DBMOD**
	IC ID: **451I-WL18DBMOD**
Device Type:	WiFi and BlueTooth Module
Module Device Model(s) / HVIN:	WL1837MODGI
Equipment Class (FCC):	Digital Transmission System (DTS)
	Part 15 Spread Spectrum Transmitter (DSS)
	Unlicensed National Information Infrastructure Transmitter (U-NII)
Equipment Class (ISED):	Wireless Local Area Network Device
Transmit Frequency Range: [1]	WiFi : 2412-2462MHz
	U-NII-1: 5180 - 5240MHz, U-NII-3: 5745 - 5825MHz
	Bluetooth: 2402 - 2480MHz
Max. Output Power:	WiFi: 13.98dBm (sec 7.4)
	U-NII-1: 12.05dBm, U-NII-3: 11.63dBm (sec 7.5)
	Bluetooth: 10.71dBm (sec 7.4)

3.0 SCOPE OF EVALUATION

This Certification Report was prepared on behalf of:

BK Technologies

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47. 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.

Device Description:

The BKR9000, FCC ID K95BKR9000-2 is an Occupational multiband (VHF, UHF, 7/800 Band) LMR transceiver containing a pre-certified WiFi/Bluetooth module. The LMR transmitter is capable of simultaneous transmission with each of the WiFi/BT transmitters.

Regulatory Requirement:

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

Filing:

This is an original certification filing.

Scope:

The scope of this investigation is to evaluate the SAR for intended use applications. The Test Plan includes the evaluation of all LMR bands, including the analysis of all simultaneous transmission conditions, for all required RF exposure configurations and accessories types. Where applicable, SAR test reduction and/or SAR test exclusion may be utilized. Test procedures are based on the requirements IEC/IEEE 1528-62209, FCC KDB 865646, 447498, 643646, 248227.

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 Title 47: Part 2.1093:	Code of Federal Regulations Telecommunication Radiofrequency Radiation Exposure Evaluation: Portable Devices
FCC KDB KDB 865664 D01v01r04	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB KDB 447498 D01v07	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB KDB 643646 D01v01r03	SAR Test Reduction Considerations for Occupational PTT Radios
FCC KDB KDB 248227 D01v02r02	SAR Guidance for IEEE 802.11 (Wi-Fi) Transmitters

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:	
BK Technologies	BKR9000	
Standard(s) Applied:	**Measurement Procedure(s):**	
FCC 47 CFR §2.1093	FCC KDB 865664 ,FCC KDB 643646, FCC KDB 447498, FCC KDB 248227 IEC/IEEE Standard 62209-1528	
Reason For Issue:	**Use Group:**	**Limits Applied:**
[X] New Certification	[X] General Population / Uncontrolled	[X] 1.6W/kg - 1g Volume
[ ] Class I Permissive Change		[X] 8.0W/kg - 1g Volume
[ ] Class II Permissive Change	[X] Occupational / Controlled	[ ] 4.0W/kg - 10g Volume
Reason for Change:		**Date(s) Evaluated:**
		9-17 & 29-30 March and 4-6 April, 2023

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. 21 April 2023

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

DASY 6 Measurement Controller

7.0 RF CONDUCTED POWER MEASUREMENT

Table 7.1 Conducted Power Measurements TNF – VHF/UHF/7/800

Conducted Power Measurements								
Modulation	**Ch**	**Frequency (MHz)**	**Mode**	**Measured Power (dBm)**	**Rated Power (dBm)**	**Rated Power (W)**	**Delta (dBm)**	**SAR Test Channel (Y/N)**
LMRS VHF	1	138.0250	CW	37.93	38.26	6.70	-0.33	
	2	150.8125		37.93	38.26	6.70	-0.33	
	3	158.0700		38.06	38.26	6.70	-0.20	Y
	4	161.6250		38.02	38.26	6.70	-0.24	
	5	161.8000		38.01	38.26	6.70	-0.25	
	6	173.9750		38.01	38.26	6.70	-0.25	
LMRS UHF	1	380.0250	CW	36.82	37.56	5.70	-0.74	
	2	406.2000		36.97	37.56	5.70	-0.59	
	3	420.0000		36.87	37.56	5.70	-0.69	
	4	429.9750		37.41	37.56	5.70	-0.15	Y
	5	450.0250		37.31	37.56	5.70	-0.25	
	6	459.6500		37.29	37.56	5.70	-0.27	
	7	467.8250		37.37	37.56	5.70	-0.19	
	8	469.9750		37.27	37.56	5.70	-0.29	
	9	511.9750		37.32	37.56	5.70	-0.24	
	10	519.9750		37.3	36.99	5.00	0.31	
LMRS 7/800	1	768.0250	CW	34.68	34.77	3.00	-0.09	
	2	769.0250		34.23	34.77	3.00	-0.54	
	3	774.9750		34.1	34.77	3.00	-0.67	
	4	775.9750		34.75	34.77	3.00	-0.02	Y
	5	798.0250		34.52	34.77	3.00	-0.25	
	6	799.0250		34.03	34.77	3.00	-0.74	
	7	804.9750		34.11	34.77	3.00	-0.66	
	8	805.9750		34.53	34.77	3.00	-0.24	
	1	806.0250		34.12	34.77	3.00	-0.65	
	2	810.0250		34.12	34.77	3.00	-0.65	
	3	814.8750		34.19	34.77	3.00	-0.58	
	4	823.9750		34.45	34.77	3.00	-0.32	
	5	851.0250		34.4	34.77	3.00	-0.37	
	6	855.0250		34.49	34.77	3.00	-0.28	Y
	7	859.9750		34.49	34.77	3.00	-0.28	
	8	868.9750		34.05	34.77	3.00	-0.72	

Table 7.2 Conducted Power Measurements WiFi

BKR9000-Conducted Power Measurements									
Channel	Frequency (MHz)	Measured Power (dBm)	Max Power (dBm)	Delta (dBm)	SAR Test Channel (Y/N)	Mode	BW (MHz)	Modulation	
6	2437	13.44				WiFi	20	CCK 1	802.11b
		13.57						CCK 2	
		13.37						DSSS 5.5	
		13.34						DSSS 11	
1	2412	13.37	13.81	-0.44	Y			CCK 2	
6	2437	13.57	13.81	-0.24	-				
7	2442	13.81	13.81	0.00	Y				
11	2462	13.46	13.81	-0.35	Y				
6	2437	13.82						OFDM 6	802.11g
		13.80						OFDM 9	
		13.91						OFDM 12	
		11.68						OFDM 36	
		10.25						OFDM 54	
1	2412	9.10	9.10	0.00	-			OFDM 12	
5	2432	13.98	13.98	0.00	-				
6	2437	13.91	13.98	-0.07	-				
11	2462	9.14	9.14	0.00	-				
6	2437	12.94						MCS 0	802.11n
		13.25						MCS 3	
		9.25						MCS 7	
1	2412	9.14	9.14	0.00	-			MCS 3	
6	2437	13.25	13.25	0.00	-				
11	2462	9.23	9.23	0.00	-				
0	2402	10.70	10.71	-0.01	-	BT BR		GFSK	
38	2440	10.71	10.71	0.00	Y				
78	2480	11.06	10.71	0.35	-				
0	2402	9.28	9.28	0.00	-	BT EDR2		π/4-DQPSK	
38	2440	9.01	9.28	-0.27	-				
78	2480	8.75	9.28	-0.53	-				
0	2402	7.36	9.10	-1.74	-	BT EDR3		8-DPSK	
38	2440	8.01	9.10	-1.09	-				
78	2480	9.10	9.10	0.00	-				
37	2402	6.43	7.84	-1.41	-	BLE		GMSK	
17	2440	7.04	7.84	-0.80	-				
39	2480	7.84	7.84	0.00	-				

Table 7.3 Conducted Power Measurements BT/BLE

BKR9000-Conducted Power Measurements								
Channel	Frequency (MHz)	Measured Power (dBm)	Max Power (dBm)	Delta (dBm)	SAR Test Channel (Y/N)	Mode	BW (MHz)	Modulation
0	2402	10.70	10.71	-0.01	-	BT BR		GFSK
39	2441	10.71	10.71	0.00	Y			
78	2480	11.06	10.71	0.35	-			
0	2402	9.28	9.28	0.00	-	BT EDR2		π/4-DQPSK
39	2441	9.01	9.28	-0.27	-			
78	2480	8.75	9.28	-0.53	-			
0	2402	7.36	9.10	-1.74	-	BT EDR3		8-DPSK
39	2441	8.01	9.10	-1.09	-			
78	2480	9.10	9.10	0.00	-			
37	2402	6.43	7.84	-1.41	-	BLE		GMSK
17	2440	7.04	7.84	-0.80	-			
39	2480	7.84	7.84	0.00	-			

Table 7.4 Conducted Power Measurements UNII-1

BKR9000-Conducted Power Measurements									
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Delta (dB)	SAR Test Channel	Mode	BW (MHz)	Modulation	
36	5180	11.30			-	UNI-I 5G	20	OFDM6	802.11a
		11.40			-			OFDM9	
		12.05			-			OFDM24	
		11.45			-			OFDM54	
36	5180	12.05	12.05	0.00	Y			OFDM24	
40	5200	10.81	12.05	-1.24	-				
44	5220	10.65	12.05	-1.40	Y				
48	5240	10.72	12.05	-1.33	Y				
36	5180	11.54		11.54	-			MCS0	802.11n
		11.63		11.63	-			MCS3	
		9.45		9.45	-			MCS7	
36	5180	11.63	11.63	0.00	-			MCS3	
40	5200	11.43	11.63	-0.20	-				
44	5220	11.20	11.63	-0.43	-				
48	5240	11.32	11.63	-0.31	-				
38	5190	11.38	11.38	0.00	-		40	MCS0	802.11n40
46	5230	11.18	11.38	-0.20	-				

Table 7.5 Conducted Power Measurements UNII-3

BKR9000-Conducted Power Measurements									
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Delta (dB)	SAR Test Channel	Mode	BW (MHz)	Modulation	
149	5745	9.83			-	UNI-3 5G	20	OFDM6	802.11a
		10.03						OFDM9	
		9.25						OFDM24	
		9.52						OFDM54	
149	5745	10.03	10.03	0.00	Y				
153	5765	14.60	14.62	-0.02				OFDM9	
157	5785	14.62	14.62	0.00	Y				
161	5805	14.61	14.62	-0.01	-				
165	5825	10.64	10.64	0.00	Y				
149	5745	10.10						MCS0	802.11n
		10.29						MCS3	
		9.70						MCS7	
149	5745	10.29	10.29	0.00	-				
153	5765	14.40	14.42	-0.02	-			MCS3	
157	5785	14.42	14.42	0.00	-				
161	5805	14.40	14.42	-0.02	-				
165	5825	10.71	10.71	0.00	-				
151	5755	11.21	11.21	0.00	-		40	MCS0	802.11n40
159	5795	11.10	11.21	-0.11	-				

*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. Continuous Wave (CW) mode is a test mode not typical with normal transmission modes and may produce higher or 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 Maximum Power plus Tolerance. SAR was evaluated using .CW mode at the Maximum output power level setting and produced the most conservative SAR. The *reported* SAR was not scaled down.

8.0 NUMBER OF TEST CHANNELS (N_C)

LMR Transmitters

Per FCC KDB 447498 the required number of test channels are derived for each frequency band by the following formula.

KDB 447498: N_C = RoundUp { [100 (F_{HIGH} - F_{LOW})/Fc]$^{0.5}$ X (F_C/100)$^{0.2}$ }

There is also a provision for SAR test reduction noted on FCC KDB 643646 which assesses the SAR values obtained from initial evaluations, which was applicable for this device and are noted in section 11

2.4GHz WiFi SAR Evaluation

In accordance with FCC KDB 248227, when higher maximum output power is not specified for the other channels, channels 1, 6 and 11 are used to configure 22 MHz DSSS and 20 MHz OFDM channels for SAR measurements.

SAR was evaluated in CCK mode with a sample rate of 2 Mbps at a 100% duty cycle. The power level setting selected was specified by the manufacturer to be the max output power and produce the most conservative SAR.

The device is capable of simultaneous transmission between the Wi-Fi and LMR transmitters, see section 11 for Simultaneous SAR and Sum of Ratios.

802.11b DSSS SAR Test Requirements

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 (see 3.1) for the exposure configuration is ≤ 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 measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel; i.e., all channels require testing.

When 10g Extremity applies, the test reduction thresholds are multiplied by 2.5, or 2.0W/kg and 3W/kg, respectively.

2.4GHz 802.11g/n OFDM SAR Test Requirements

SAR is not required for the following 2.4 GHz OFDM conditions:

a) When KDB Publication 447498 D01 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.

When 10g Extremity applies, the test reduction threshold is multiplied by 2.5, or 3W/kg.

BT/BLE SAR Test Requirements

Bluetooth was evaluated for SAR at a transmit duty cycle of 100 % in the worst-case configuration from the WiFi test evaluation.
The duty cycle cannot be altered in test mode or by the user.

General SAR test reduction per FCC KDB 447498D01

Testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid band or highest output power channel is:

≤ 0.8W/kg or 2.0W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100Mhz.

The device is capable of simultaneous transmission between the BT/BLE and LMR transmitters, see section 11 for Simultaneous SAR and Sum of Ratios.

Per FCC KDB 447498 4.3.1 the BLE transmitter meets the standalone SAR test exclusion criteria. See section 11.0 for details.

The WiFi and Bluetooth transmitters were evaluated for Standalone SAR Only.

9.0 ACCESSORIES EVALUATED

Table 9.1 Manufacturer's Accessory List - Antenna

Manufacturer's Accessory List - Antenna			
Test Report ID Number	**Manufacturer's Part Number**	**Description**	**SAR(4) Tested**
T1	BKR0893-148-E	Tri-Band 25Cm VHF:136MHz-174MHz/UHF: 380MHz-520MHz/7/800:763MHz-870MHz	**Y**
T2	BKR-0893-148-E	Tri-Band 20Cm VHF:136MHz-174MHz/UHF: 380MHz-520MHz/7/800:763MHz-870MHz	**Y**
T3	BKR-0892-180	Dual Band VHF:136MHz-174MHz/7/800:769MHz-870MHz	**Y**
T4	BKR0813	VHF/GPS VHF:136MHz-174MHz	**Y**

Table 9.2 Manufacturer's Accessory List - Body

Manufacturer's Accessory List - Body			
Test Report ID Number	**Manufacturer's Part Number**	**Description**	**SAR(4) Tested**
B1	BKR0491B	Nylon Holster	**Y**
B2	BKR0405	Holster	**Y**
B3	BKR0412	Belt Loop Leather Case	**Y**
B4	BKR0420	Swivel Leather Case	**Y**
B5	KAA0448	Small Chest Pack	**Y**
B6	KAA0447	Large Chest Pack	**Y**
B7	BKR0447	Large Chest Pack	N*

* based on and equivalent to B6-KAA0447 – no SAR testing performed

Table 9.3 Manufacturer's Accessory List - Audio

Manufacturer's Accessory List - Audio			
Test Report ID Number	**Manufacturer's Part Number**	**Description**	**SAR(4) Tested**
A1	BKR0204	Remote Speaker Mic	**Y**
A2	BKR0225-2	Surveillance Accessory – Speaker Mic	N*

* interface connection equivalent with A1-BKR0204 - no SAR testing performed

Table 9.3 Manufacturer's Accessory List - Battery

Manufacturer's Accessory List - Audio			
Test Report ID Number	**Manufacturer's Part Number**	**Description**	**SAR(4) Tested**
P1	BKR0102	Li-ion Rechargeable 7.2V/4900mAh/35.28Wh	**Y**

10.0 SAR MEASUREMENT SUMMARY

Table 10.1: Measured Results – BODY – PTT

Measured 1g SAR Results - BODY Configuration																	
Date	Plot ID	Test Frequency (MHz)	DUT Configuration					Accessories	Spacing		Measured SAR (W/kg)	SAR Drift (dB)	Delta Power dB	Crest Factor n	Fluid Sensitivity n	reported SAR (W/kg)
			Pos	Mode	BW	Mod	BR (Mbps)		DUT (mm)	Antenna (mm)						
9 Mar 2023	B1	158.07	BODY	PTT	-	CW	-	P1 T1 B1 A1	15	45	4.960	-0.380	-0.200	1.000	1.000	2.834
9 Mar 2023	B2	158.07	BODY	PTT	-	CW	-	P1 T2 B1 A1	15	45	5.610	-0.100	-0.200	1.000	1.000	3.006
10 Mar 2023	B3	158.07	BODY	PTT	-	CW	-	P1 T3 B1 A1	15	45	2.880	-0.026	-0.200	1.000	1.000	1.517
10 Mar 2023	B4	158.07	BODY	PTT	-	CW	-	P1 T4-A B1 A1	15	45	2.010	-0.310	-0.200	1.000	1.000	1.130
10 Mar 2023	B5	158.07	BODY	PTT	-	CW	-	P1 T4-B B1 A1	15	45	2.270	-0.160	-0.200	1.000	1.000	1.233
11 Mar 2023	B6	158.07	BODY	PTT	-	CW	-	P1 T2 B1 A1	15	45	2.710	-0.240	-0.200	1.000	1.000	1.499
11 Mar 2023	B7	158.07	BODY	PTT	-	CW	-	P1 T2 B3 A1	20	25	4.280	-0.280	-0.200	1.000	1.000	2.390
11 Mar 2023	B8	158.07	BODY	PTT	-	CW	-	P1 T2 B4 A1	17	22	4.260	-0.310	-0.200	1.000	1.000	2.395
11 Mar 2023	B9	158.07	BODY	PTT	-	CW	-	P1 T2 B5	15	45	2.530	-0.440	-0.200	1.000	1.000	1.466
11 Mar 2023	B10	158.07	BODY	PTT	-	CW	-	P1 T2 B6	20	50	2.250	-0.260	-0.200	1.000	1.000	1.251
11 Mar 2023	B11	158.07	BODY	PTT	-	CW	-	P1 T2 B2 A1	30	40	1.430	-0.160	-0.200	1.000	1.000	0.777
13 Mar 2023	B20	429.975	BODY	PTT	-	CW	-	P1 T1 B1 A1	15	45	2.520	-0.190	-0.150	1.000	1.000	1.363
13 Mar 2023	B21	429.975	BODY	PTT	-	CW	-	P1 T2 B1 A1	15	45	1.460	-0.340	-0.150	1.000	1.000	0.817
13 Mar 2023	B22	429.975	BODY	PTT	-	CW	-	P1 T1 B2 A1	30	40	1.910	-0.230	-0.150	1.000	1.000	1.042
13 Mar 2023	B23	429.975	BODY	PTT	-	CW	-	P1 T1 B3 A1	20	25	3.340	-0.230	-0.150	1.000	1.000	1.823
14 Mar 2023	B24	429.975	BODY	PTT	-	CW	-	P1 T1 B4 A1	17	22	2.090	-0.320	-0.150	1.000	1.000	1.164
14 Mar 2023	B25	429.975	BODY	PTT	-	CW	-	P1 T1 B5 A1	15	45	1.820	-0.320	-0.150	1.000	1.000	1.014
14 Mar 2023	B26	429.975	BODY	PTT	-	CW	-	P1 T1 B6 A1	20	50	2.260	-0.370	-0.150	1.000	1.000	1.274
15 Mar 2023	B30	775.975	BODY	PTT	-	CW	-	P1 T1 B1 A1	15	45	2.860	-0.420	-0.020	1.000	1.011	1.600
16 Mar 2023	B31	775.975	BODY	PTT	-	CW	-	P1 T2 B1 A1	15	45	3.600	-0.210	-0.020	1.000	1.011	1.919
16 Mar 2023	B32	775.975	BODY	PTT	-	CW	-	P1 T3 B1 A1	15	45	2.710	-0.270	-0.020	1.000	1.011	1.465
17 Mar 2023	B33	775.975	BODY	PTT	-	CW	-	P1 T2 B2 A1	30	40	1.430	-0.110	-0.020	1.000	1.011	0.745
16 Mar 2023	B34	775.975	BODY	PTT	-	CW	-	P1 T2 B3 A1	20	25	0.051	-0.250	-0.020	1.000	1.011	0.028
17 Mar 2023	B38	775.975	BODY	PTT	-	CW	-	P1 T2 B3 A1	20	25	0.090	-0.350	-0.020	1.000	1.011	0.049
16 Mar 2023	B35	775.975	BODY	PTT	-	CW	-	P1 T2 B4 A1	17	22	2.820	-0.300	-0.020	1.000	1.011	1.535
16 Mar 2023	B36	775.975	BODY	PTT	-	CW	-	P1 T2 B5 A1	15	45	0.404	-0.170	-0.020	1.000	1.011	0.213
16 Mar 2023	B37	775.975	BODY	PTT	-	CW	-	P1 T2 B6 A1	20	50	0.027	-0.090	-0.020	1.000	1.011	0.014
17 Mar 2023	B50	855.025	BODY	PTT	-	CW	-	P1 T1 B1 A1	15	45	1.230	-0.050	-0.280	1.000	1.000	0.664
17 Mar 2023	B51	855.025	BODY	PTT	-	CW	-	P1 T2 B1 A1	15	45	1.270	-0.090	-0.280	1.000	1.000	0.691
17 Mar 2023	B52	855.025	BODY	PTT	-	CW	-	P1 T3 B1 A1	15	45	1.740	-0.150	-0.280	1.000	1.000	0.961
17 Mar 2023	B53	855.025	BODY	PTT	-	CW	-	P1 T3 B2 A1	30	40	1.910	-0.410	-0.280	1.000	1.000	1.119
17 Mar 2023	B54	855.025	BODY	PTT	-	CW	-	P1 T3 B3 A1	20	25	4.770	-0.270	-0.280	1.000	1.000	2.707
17 Mar 2023	B55	855.025	BODY	PTT	-	CW	-	P1 T3 B4 A1	17	22	1.080	-0.190	-0.280	1.000	1.000	0.602
17 Mar 2023	B56	855.025	BODY	PTT	-	CW	-	P1 T3 B5 A1	15	45	2.220	-0.310	-0.280	1.000	1.000	1.272
17 Mar 2023	B57	855.025	BODY	PTT	-	CW	-	P1 T3 B6 A1	20	50	1.680	-0.230	-0.280	1.000	1.000	0.945
Applicable SAR Limit								Use Group					Limit			
FCC CFR 2.1093								General Population/User Unaware					1.6 W/kg			

Table 10.2: Measured Results – BODY – DTS/DSS/UNII

Measured 1g SAR Results - BODY Configuration																	
Date	Plot ID	Test Frequency (*MHz*)	DUT Configuration					Accessories	Spacing		Measured SAR (*W/kg*)	SAR Drift (*dB*)	Delta Power *dB*	Crest Factor n	Fluid Sensitivity n	*reported* SAR (*W/kg*)
			Pos	Mode	BW	Mod	BR (Mbps)		DUT (*mm*)	Antenna (*mm*)						
29 Mar 2023	B58	2442	BODY	DTS	20	CCK	2	P1 T2 B1 A1	15	45	0.004	11.150	0.000	3.220	1.000	0.007
29 Mar 2023	B59	2412	BODY	DTS	20	CCK	2	P1 T2 B1 A1	15	45	0.003	0.410	-0.440	3.220	1.000	0.005
29 Mar 2023	B60	2462	BODY	DTS	20	CCK	2	P1 T2 B1 A1	15	45	0.008	2.920	-0.350	3.220	1.000	0.013
30 Mar 2023	B61	2441	BODY	DSS	-	EDR	-	P1 T2 B1 A1	15	45	0.003	7.230	0.000	1.000	1.000	0.001
5 Apr 2023	B80	5180	BODY	UNII-1	20	OFDM	24	P1 T2 B1 A1	15	45	0.015	3.260	0.000	2.062	1.000	0.015
5 Apr 2023	B81	5200	BODY	UNII-1	20	OFDM	24	P1 T2 B1 A1	15	45	0.016	1.580	-1.240	2.062	1.000	0.022
5 Apr 2023	B82	5240	BODY	UNII-1	20	OFDM	24	P1 T2 B1 A1	15	45	0.016	2.160	-1.330	2.062	1.000	0.022
5 Apr 2023	B90	5745	BODY	UNII-3	20	OFDM	9	P1 T2 B1 A1	15	45	0.010	3.860	0.000	2.062	1.000	0.011
6 Apr 2023	B91	5785	BODY	UNII-3	20	OFDM	9	P1 T2 B1 A1	15	45	0.003	1.020	0.000	2.062	1.000	0.003
6 Apr 2023	B92	5825	BODY	UNII-3	20	OFDM	9	P1 T2 B1 A1	15	45	0.012	3.980	0.000	2.062	1.000	0.012
Applicable SAR Limit								Use Group					Limit			
FCC CFR 2.1093								General Population/User Unaware					1.6 W/kg			

Table 10.3: Measured Results – FACE – PTT

Measured 1g SAR Results - FACE Configuration																
Date	Plot ID	Test Frequency (*MHz*)	DUT Configuration					Accessories	Spacing		Measured SAR (*W/kg*)	SAR Drift (*dB*)	Delta Power *dB*	Crest Factor n	Fluid Sensitivity n	*reported* SAR (*W/kg*)
			Pos	Mode	BW	Mod	BR (Mbps)		DUT (*mm*)	Antenna (*mm*)						
11 Mar 2023	F1	158.07	FACE	PTT	-	CW	-	P1 T1	25	30	2.290	-0.270	-0.200	1.000	1.000	1.276
11 Mar 2023	F2	158.07	FACE	PTT	-	CW	-	P1 T2	25	30	1.560	-0.400	-0.200	1.000	1.000	0.896
11 Mar 2023	F3	158.07	FACE	PTT	-	CW	-	P1 T3	25	30	2.250	-0.440	-0.200	1.000	1.000	1.304
11 Mar 2023	F4	158.07	FACE	PTT	-	CW	-	P1 T4-A	25	30	2.180	-0.400	-0.200	1.000	1.000	1.251
11 Mar 2023	F5	158.07	FACE	PTT	-	CW	-	P1 T4-B	25	30	2.340	-0.260	-0.200	1.000	1.000	1.301
14 Mar 2023	F10	429.975	FACE	PTT	-	CW	-	P1 T1	25	30	1.940	-0.290	-0.150	1.000	1.000	1.073
14 Mar 2023	F11	429.975	FACE	PTT	-	CW	-	P1 T2	25	30	1.280	-0.350	-0.150	1.000	1.000	0.718
17 Mar 2023	F30	775.975	FACE	PTT	-	CW	-	P1 T1	25	30	0.027	-0.280	-0.020	1.000	1.011	0.015
17 Mar 2023	F31	775.975	FACE	PTT	-	CW	-	P1 T2	25	30	0.013	-0.150	-0.020	1.000	1.011	0.007
17 Mar 2023	F32	775.975	FACE	PTT	-	CW	-	P1 T3	25	30	0.077	-0.130	-0.020	1.000	1.011	0.040
17 Mar 2023	F50	855.025	FACE	PTT	-	CW	-	P1 T1	25	30	0.115	-0.220	-0.280	1.000	1.000	0.065
17 Mar 2023	F51	855.025	FACE	PTT	-	CW	-	P1 T2	25	30	1.600	-0.400	-0.280	1.000	1.000	0.936
Applicable SAR Limit								Use Group					Limit			
FCC CFR 2.1093								General Population/User Unaware					1.6 W/kg			

Table 10.4: Measured Results – FACE - DTS/DSS/UNII

Measured 1g SAR Results - FACE Configuration																
Date	Plot ID	Test Frequency (*MHz*)	DUT Configuration					Accessories	Spacing		Measured SAR (*W/kg*)	SAR Drift (*dB*)	Delta Power *dB*	Crest Factor n	Fluid Sensitivity n	*reported* SAR (*W/kg*)
			Pos	Mode	BW	Mod	BR (Mbps)		DUT (*mm*)	Antenna (*mm*)						
30 Mar 2023	F53	2442	FACE	DTS	20	CCK	2	P1 T2	25	30	0.007	-0.490	0.000	3.220	1.000	0.013
30 Mar 2023	F54	2412	FACE	DTS	20	CCK	2	P1 T2	25	30	0.005	-0.040	-0.440	3.220	1.000	0.009
30 Mar 2023	F55	2462	FACE	DTS	20	CCK	2	P1 T2	25	30	0.008	1.160	-0.350	3.220	1.000	0.014
30 Mar 2023	F56	2441	FACE	DSS	-	EDR	-	P1 T2	25	30	0.004	0.150	0.000	1.000	1.000	0.002
5 Apr 2023	F80	5180	FACE	UNII-1	20	OFDM	24	P1 T2	25	30	0.080	1.830	0.000	2.062	1.000	0.082
5 Apr 2023	F81	5200	FACE	UNII-1	20	OFDM	24	P1 T2	25	30	0.120	1.500	-1.240	2.062	1.000	0.165
5 Apr 2023	F82	5240	FACE	UNII-1	20	OFDM	24	P1 T2	25	30	0.103	2.030	-1.330	2.062	1.000	0.144
6 Apr 2023	F90	5745	FACE	UNII-3	20	OFDM	9	P1 T2	25	30	0.103	-0.050	0.000	2.062	1.000	0.107
6 Apr 2023	F91	5785	FACE	UNII-3	20	OFDM	9	P1 T2	25	30	0.031	3.870	0.000	2.062	1.000	0.032
6 Apr 2023	F92	5825	FACE	UNII-3	20	OFDM	9	P1 T2	25	30	0.016	1.490	0.000	2.062	1.000	0.017
Applicable SAR Limit								Use Group					Limit			
FCC CFR 2.1093								General Population/User Unaware					1.6 W/kg			

11.0 SCALING OF MAXIMUM MEASURE SAR

Table 11.1 SAR Scaling – Body

Scaling of Maximum Measured SAR (1g)						
Measured Parameters		Configuration				
		Body	Body	Body	Body	
Plot ID		B2	B60	B61	B82	
Maximum Measured SAR_M		2.805	0.008	0.003	0.016	(W/kg)
Frequency		158.07	2462	2441	5240	(MHz)
Drift	Power Drift	-0.100	2.920 (1)	7.230 (1)	2.160 (1)	(dB)
Conducted Power		38.060	13.460	10.710	10.720	(dBm)
DC	Transmit Duty Cycle	100.000	31.1	100.0	48.500	(%)
Fluid Deviation from Target						
Δe	Permitivity	1.18% (2)	-8.39%	-8.61%	-4.81% (2)	
Δσ	Conductivity	0.80% (2)	3.97%	5.97%	0.85% (2)	

Note(1): Power Drift is Positive, Drift Adjustment not Required.

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

Fluid Sensitivity Calculation (1g)		IEC/IEEE 62209-1528 7.8.2				
Delta SAR = Ce * Δe + Cσ * Δσ					(8)	
$Ce = (-0.0007854*f^3) + (0.009402*f^2) - (0.02742*f) - 0.2026$					(9)	
$Cσ = (0.009804*f^3) - (0.08661*f^2) + (0.02981*f) + 0.7829$					(10)	
f	Frequency (GHz)	0.15807	2.462	2.441	5.24	
Ce		-0.207	-0.225	-0.225	-0.201	
Cσ		0.785	0.478	0.482	-0.028	
Ce * Δe		-0.002	0.019	0.019	0.010	
Cσ * Δσ		0.006	0.019	0.029	0.000	
ΔSAR		0.004	0.038 (3)	0.048 (3)	0.009	(%)

Note(3): Delta SAR is Positive, SAR Adjustment for Fluid Sensitivity is not Required, in accordance with ISED Notice 2012-DRS0529

Manufacturer's Tuneup Tolerance					
Measured Conducted Power	38.060	13.460	10.710	10.720	(dBm)
Rated Conducted Power	38.260	13.810	10.710	12.050	(dBm)
ΔP	-0.200	-0.350	0.000 (4)	-1.330	(dB)

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

Crest Factor					
Transmit Duty Cycle (DC)	100.000	31.1	100.0	48.500	(%)
CF (1/DC)	1.000 (5)	3.22	1.00 (5)	2.062	

Note(5): Crest Factor = 1 (100% Duty Cycle), Crest Factor Adjustment not Required.

SAR Adjustment for Fluid Sensitivity					
$SAR_1 = SAR_M$ X [ΔSAR]	2.805	0.008	0.003	0.016	(W/kg)
SAR Adjustment for Tuneup Tolerance					
$SAR_2 = SAR_1 + [ΔP]$	2.937	0.008	0.003	0.022	(W/kg)
SAR Adjustment for Drift					
$SAR_3 = SAR_2 + [Drift]$	3.006	0.008	0.003	0.022	(W/kg)
SAR Adjustment for Crest Factor					
$SAR_4 = SAR_3$ x [CF]	3.006	0.026	0.003	0.045	(W/kg)
***reported* 1g SAR**					
SAR_4	**3.01**	**0.03**	**0.003**	**0.04**	(W/kg)

Table 11.2 SAR Scaling – Face

Scaling of Maximum Measured SAR (1g)						
Measured Parameters		Configuration				
		Face	Face	Face	Face	
Plot ID		F3	F55	F56	F81	
Maximum Measured SAR_M		1.125	0.008	0.004	0.120	(W/kg)
Frequency		158.07	2462	2441	5200	(MHz)
Drift	Power Drift	-0.440	1.160 (1)	0.150 (1)	1.500 (1)	(dB)
Conducted Power		38.060	13.460	10.710	10.810	(dBm)
DC	Transmit Duty Cycle	100.000	31.1	100.0	48.500	(%)
Fluid Deviation from Target						
Δe	Permitivity	1.18% (2)	-8.39%	-8.61%	-5.00%	
Δσ	Conductivity	0.80% (2)	3.97%	5.97%	1.51%	

Note(1): Power Drift is Positive, Drift Adjustment not Required.
Note(2): Fluid Dielectric Parameters are Within 5% of Targets. SAR Adjustment for Fluid Sensitivity is not Required.

Fluid Sensitivity Calculation (1g)		IEC/IEEE 62209-1528 7.8.2				
Delta SAR = Ce * Δe + Cσ * Δσ				(8)		
$Ce = (-0.0007854*f^3) + (0.009402*f^2) - (0.02742*f) - 0.2026$				(9)		
$Cσ = (0.009804*f^3) - (0.08661*f^2) + (0.02981*f) + 0.7829$				(10)		
f	Frequency (GHz)	0.15807	2.462	2.441	5.2	
Ce		-0.207	-0.225	-0.225	-0.201	
Cσ		0.785	0.478	0.482	-0.026	
Ce * Δe		-0.002	0.019	0.019	0.010	
Cσ * Δσ		0.006	0.019	0.029	0.000	
ΔSAR		0.004	0.038 (3)	0.048 (3)	0.010 (3)	(%)

Note(3): Delta SAR is Positive, SAR Adjustment for Fluid Sensitivity is not Required, in accordance with ISED Notice 2012-DRS0529

Manufacturer's Tuneup Tolerance					
Measured Conducted Power	38.060	13.460	10.710	10.810	(dBm)
Rated Conducted Power	38.260	13.810	10.710	12.050	(dBm)
ΔP	-0.200	-0.350	0.000 (4)	-1.240	(dB)

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

Crest Factor					
Transmit Duty Cycle (DC)	100.000	31.1	100.0	48.500	(%)
CF (1/DC)	1.000 (5)	3.22	1.00 (5)	2.062	

Note(5): Crest Factor = 1 (100% Duty Cycle), Crest Factor Adjustment not Required.

SAR Adjustment for Fluid Sensitivity					
$SAR_1 = SAR_M$ X [ΔSAR]	1.125	0.008	0.004	0.120	(W/kg)

SAR Adjustment for Tuneup Tolerance					
$SAR_2 = SAR_1 + [ΔP]$	1.178	0.008	0.004	0.160	(W/kg)

SAR Adjustment for Drift					
$SAR_3 = SAR_2 + [Drift]$	1.304	0.008	0.004	0.160	(W/kg)

SAR Adjustment for Crest Factor					
$SAR_4 = SAR_3$ x [CF]	1.304	0.027	0.004	0.329	(W/kg)

reported 1g SAR					
SAR_4	**1.30**	**0.03**	**0.004**	**0.33**	(W/kg)

NOTES to Table11.1
(1) Scaling of the Maximum Measured SAR is based on the highest, 100% duty cycle for Face, Body and/or Head icluding 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 4. 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 4 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 10.1 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
Per KDB 447498 4.3.2. The SAR, either measured or calculated, of ANY and ALL simultaneous transmitters must be added together and includes all contributors.
Step 5
The Reported SAR is the Maximum Final Adjusted Cumulative SAR from the applicable Steps 1 through 4 and are reported on Page 1 of this report.

Table 11.3 SAR Test Reduction, Test Exclusion

SAR Test Reduction Occupational PTT Radios
Per FCC KDB 643646 D01v01r03 (A1)(A2)

I) When the Head/Body SAR of an antenna tested in A) is:
a) ≤ 3.5 W/kg, testing of all other required channels is not necessary for that antenna
b) > 3.5 W/kg and ≤ 4.0 W/kg, testing of the required immediately adjacent channel(s) is not necessary;3 testing of the other required channels may still be required
c) > 4.0 W/kg and ≤ 6.0 W/kg, Head/Body SAR should be measured for that antenna on the required immediately adjacent channels; testing of the other required channels still needs consideration
d) > 6.0 W/kg, test all required channels for that antenna

The highest SAR measured for all antennas was below the limit, the highest overall SAR occurred on the HOPC 158.07 MHz;
Face SAR ; 1.125 W/kg, and with scaling reported value was 1.30 W/kg
Body SAR ; 2.805 W/kg, and with scaling reported value was 3.006 W/kg

SAR test reduction is applicable.

SAR Test Exclusion

The SAR test exclusion threshold for the BLE transmitter as per FCC KDB 447498 4.3.1 is as follows:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] X [√f(GHz)] ≤ 3.0 for 1-g SAR

Max. Power = 6.08mW
f = 2.441GHz
Distance = 5mm
[6.08mW / 5mm] X [√2.41] = 1.89 ≤ 3.0

The BLE transmitter meets the SAR test exclusion threshold

802.11b DSSS SAR Test Reduction

802.11b DSSS SAR was evaluated on all required channels. 802.11b DSSS SAR Test Reduction was not applied.

2.4GHz 802.11g/n OFDM SAR Test Reduction

Max. Power DSSS (P_{DSSS}) = 24.04mW
Max. Power OFDM (P_{OFDM}) = 25.0mW
Max. reported DSSS SAR (SAR_{DSSS}) = 0.03W/kg 1g-SAR
Exclusion = [P_{OFDM}/P_{DSSS}] *X* SAR_{DSSS} ≤ *1.2W/kg 1g-SAR*
Exclusion = [25mW / 24.04mW] X 0.03W/kg = 0.03W/kg ≤ 1.2W/kg for 1g-SAR
The 2.4GHz 802.11g/n OFDM transmitter meets the SAR test exclusion requirement

Bluetooth SAR Test Reduction

Bluetooth was evaluated for SAR at a transmit duty cycle of 100 % in the worst-case configuration from the WiFi test evaluation.
The duty cycle cannot be altered in test mode or by the user.

General SAR test reduction per FCC KDB 447498D01

Testing of other required channels within the operating mode of a frequency band is not required when the *reported* 1-g or 10-g SAR for the mid band or highest output power channel is:

≤ 0.8W/kg or 2.0W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100Mhz.

Simultaneous Transmission Analysis

Introduction

The BKR9000 incorporates an integrated pre-certified WiFi/BlueTooth transceiver capable of simultaneously transmitting, in any combination, with the LMR transmitter. As per FCC KDB 447498, simultaneous transmission analysis is required for devices capable of simultaneous transmission. The WiFi/BT 1g SAR are subject to General Population limits of 1.6W/kg. The LMR 1g SAR is subject to Occupational limits of 8.0W/kg. To determine compliance when different SAR limits are applied to the different transmit modes, the Sum-of-the-Ratios of the SAR to the respective SAR limit is applied. When the Sum-of-the-Ratios is ≤ 1.0, simultaneous SAR test exclusion may be applied.

SAR for each transmission band, transmission mode and/or equipment class was evaluated with Body-Worn and Audio Accessories in the BODY and FACE configurations. Only the Maximum maximum *reported* SAR for each band and equipment class is used in the Sum-of-the-Ratios calculation and the worst case of all possible combinations is considered.

Table 11.4 List of Possible Simultaneous Transmitter Combinations

Simultaneous Transmitter Combinations Worst Case HEAD and BODY Configuration			
Transmitter Type			
TNF	DSS	DTS	U-NII
X	X		
X		X	
X			X

Table 11.5 Sum of the Ratios Analysis

Analysis of Sum-of-the-Ratios For All Simultaneous Transmitters Configurations														
Config.	Transmitter Type												Sum of Ratios	Sum of SARs (W/kg)
	LMR (TNF)			BlueTooth (DSS)			WiFi 2.4 (DTS)			WiFi 5 (U-NII)				
	Standalone SAR (W/kg)	Limit (W/kg)	Ratio to Limit	*Standalone* SAR (W/kg)	Limit (W/kg)	Ratio to Limit	*Standalone* SAR (W/kg)	Limit (W/kg)	Ratio to Limit	*Standalone* SAR (W/kg)	Limit (W/kg)	Ratio to Limit		
FACE	1.30	8.000	0.163	0.004	1.600	0.003							0.166	1.308
	1.30	8.000	0.163				0.014	1.600	0.009				0.172	1.318
	1.30	8.000	0.163							0.330	1.600	0.206	0.369	1.634
BODY	3.01	8.000	0.376	0.003	1.600	0.002							0.378	3.009
	3.01	8.000	0.376				0.013	1.600	0.008				0.384	3.019
	3.01	8.000	0.376							0.040	1.600	0.025	0.401	3.046

12.0 SAR EXPOSURE LIMITS

Table 12.1 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.			

13.0 DETAILS OF SAR EVALUATION

Table 13.1 Day Log

DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	
9 Mar 2023	24.7	23.3	18%	101.4	X	X	X	150H
10 Mar 2023	22.8	22.4	18%	99.9			X	150H
11 Mar 2023	22	21.4	20%	101.5			X	150H
13 Mar 2023	24	23.8	25%	100.2	X	X	X	450H
14 Mar 2023	22	23.2	25%	101.2			X	450H
15 Mar 2023	25.7	25.9	18%	101.8	X	X	X	835H
16 Mar 2023	22.5	23.1	19%	103.1			X	835H
17 Mar 2023	23.1	23.5	20%	102.8			X	835H
29 Mar 2023	25.4	23.0	19%	101.0	X	X	X	2450H
30 Mar 2023	25.2	23.5	18%	100.3			X	2450H
4 Apr 2023	24.7	23.3	18%	101.9	X	X	X	5250H
5 Apr 2023	26.5	23.7	17%	101.7	X	X	X	5250H/5750H
6 Apr 2023	24.7	23.7	16%	101.7			X	5750H

13.2 DUT Setup and Configuration

DUT Setup and Configuration
Overview
The BKR9000 was evaluated for *Body* and *Face* SAR at the maximum conducted output power level, preset by the manufacturer, with a fully charged battery in unmodulated continuous transmit operation (FM mode at 100% duty cycle) with the transmit key continuously depressed. For a Push-To-Talk (PTT) device with a manually operated transmit pushbutton, a 50% duty cycle compensation for the *reported SAR* was used, as per FCC KDB 447498 (6.1). The Wi-Fi / BT transmission were operated through test mode software, with a fully charged battery in a continuous transmit operation once set.

13.3 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
The DUT was securely clamped into the device holder with the surface of the DUT normally held to the user's face facing the phantom. The device holder was adjusted to ensure that the horizontal axis of the DUT was parallel to the bottom of the phantom. A 25mm spacer block was used to set the separation distance between the DUT and the phantom to 25mm. When applicable and unless by design, the antenna of the DUT was prevented from sagging away from the phantom. The spacer block was removed before testing.
BODY Configuration
Body-Worn and Audio Accessories were affixed to the DUT in the manner in which they are intended to be used. The DUT, with its accessories, were 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. Body-Worn Accessory straps, linkages, etc. were positioned in a fashion resembling that for which they were intended to be used. Audio Accessory cables, etc., were positioned in a fashion resembling that for which they were intended to be used.
HEAD Configuration
This device is not intended to be held to the ear and was not tested in the HEAD configuration.

13.4 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
Where applicable the 1g SAR and/or 10g SAR, power drift measurements, Crest factor and fluid sensitivity corrections are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The measured SAR values shown are the SAR values reported by the SAR Measurement Server, and if necessary a crest factor is used to revise these values to a 100% transmit duty cycle. For PTT receivers operating 100% DC the SAR Values are reported at 50% of the measured values. 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 , 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 was used in the Sum of the Ratios calculation used in section 11 with the results appearing on the Cover Page of this report.

13.5 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.

13.6 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**
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	

13.7 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**
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	

13.8 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**
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	

14.0 MEASUREMENT UNCERTAINTIES

Table 14.1 Measurement Uncertainty

Measurement uncertainty table per KDB 865664 V01r04 page 12
SAR measurement uncertainty analysis is required in SAR reports only when the highest measured SAR in a frequency band is ≥ 1.5 W/kg for 1-g SAR. The equivalent ratio (1.5/1.6) should be applied to extremity and occupational exposure conditions.
Where the highest reported SAR is > 0.80 W/kg for 1 g 1.6W/kg limit repeat measurement is requried, and further repeat measurements may be required based on results (see KDB for details). The same repeat measurement procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and 5 for occupational exposure to the corresponsing SAR thresholds.

The SAR values were below the limit required for repeat measurements, and the uncertainty table is not required.

Table 14.2 Calculation of Degrees of Freedom

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

15.0 FLUID DIELECTRIC PARAMETERS

Table 15.1 Fluid Dielectric Parameters 150MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Thu 09/Mar/2023 18:02:24
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
0.1500	52.30	0.76	55.65	0.75
0.1600	51.83	0.77	51.79	0.78
0.1700	51.37	0.77	52.51	0.80

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 9-Mar-2023		Fluid Temp: 23.3		Frequency: 150MHz		Tissue: Head		ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
150.0000		55.6500	0.7500	52.3000	0.76	6.41%	-1.32%	-0.024	-0.021	1.024	1.021
158.0700	*	52.5350	0.7742	51.9207	0.77	1.18%	0.80%	0.004	0.004	1.000	1.000
160.0000		51.7900	0.7800	51.8300	0.77	-0.08%	1.30%	0.010	0.010	1.000	1.000

*Channel Frequency Tested

Table 15.2 Fluid Dielectric Parameters 450MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Mon 13/Mar/2023 12:02:43
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
0.4200	43.86	0.87	45.89	0.80
0.4300	43.74	0.87	45.65	0.80
0.4400	43.62	0.87	45.76	0.82
0.4500	43.50	0.87	45.80	0.83
0.4600	43.45	0.87	44.99	0.84

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 13-Mar-2023		Fluid Temp: 23.6		Frequency: 450MHz		Tissue:	Head	ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
420.0000		45.8900	0.8000	43.8600	0.87	4.63%	-8.05%	-0.073	-0.063	1.073	1.063
429.9750	*	45.6506	0.8000	43.7403	0.87	4.37%	-8.05%	-0.072	-0.062	1.072	1.062
430.0000		45.6500	0.8000	43.7400	0.87	4.37%	-8.05%	-0.072	-0.062	1.072	1.062
440.0000		45.7600	0.8200	43.6200	0.87	4.91%	-5.75%	-0.055	-0.047	1.055	1.047
450.0000		45.8000	0.8300	43.5000	0.87	5.29%	-4.60%	-0.047	-0.040	1.047	1.040
460.0000		44.9900	0.8400	43.4500	0.87	3.54%	-3.45%	-0.034	-0.029	1.034	1.029

*Channel Frequency Tested

Table 15.3 Fluid Dielectric Parameters 835MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 14/Mar/2023 14:55:48
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
0.7750	41.81	0.90	41.78	0.90
0.7850	41.76	0.90	42.08	0.92
0.8250	41.55	0.90	41.51	0.96
0.8350	41.50	0.90	41.22	0.97
0.8450	41.50	0.91	41.04	0.98
0.8550	41.50	0.92	41.23	0.98
0.8650	41.50	0.93	41.00	1.00

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 15-Mar-2023		Fluid Temp: 25.9		Frequency: 835MHz		Tissue: Head		ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
775.0000		40.9900	0.8800	41.8100	0.90	-1.96%	-2.22%	-0.013	-0.011	1.013	1.011
775.9750	*	40.9754	0.8820	41.8051	0.90	-1.98%	-2.01%	-0.011	-0.009	1.011	1.009
785.0000		40.8400	0.9000	41.7600	0.90	-2.20%	0.00%	0.005	0.003	1.000	1.000
825.0000		40.4000	0.9400	41.5500	0.90	-2.77%	4.44%	0.040	0.031	1.000	1.000
835.0000		40.1900	0.9400	41.5000	0.90	-3.16%	4.44%	0.040	0.031	1.000	1.000
845.0000		40.0700	0.9600	41.5000	0.91	-3.45%	5.49%	0.049	0.038	1.000	1.000
855.0000		39.9900	0.9700	41.5000	0.92	-3.64%	5.43%	0.049	0.038	1.000	1.000
855.0250	*	39.9901	0.9700	41.5000	0.92	-3.64%	5.43%	0.049	0.038	1.000	1.000
865.0000		40.0100	0.9800	41.5000	0.93	-3.59%	5.38%	0.048	0.037	1.000	1.000

*Channel Frequency Tested

Table 15.4 Fluid Dielectric Parameters 2450MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 29/Mar/2023 14:52:28
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
2.4100	39.27	1.76	36.09	1.84
2.4200	39.25	1.77	35.91	1.85
2.4400	39.22	1.79	35.84	1.90
2.4500	39.20	1.80	35.84	1.88
2.4600	39.19	1.81	35.94	1.88
2.4700	39.17	1.82	35.74	1.90

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 29-Mar-2023		Fluid Temp: 23		Frequency: 2450MHz		Tissue:	Head	ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
2410.0000		36.0900	1.8400	39.2700	1.76	-8.10%	4.55%	0.040	0.025	1.000	1.000
2412.0000	*	36.0540	1.8420	39.2660	1.76	-8.18%	4.54%	0.041	0.025	1.000	1.000
2420.0000		35.9100	1.8500	39.2500	1.77	-8.51%	4.52%	0.041	0.025	1.000	1.000
2440.0000		35.8400	1.9000	39.2200	1.79	-8.62%	6.15%	0.049	0.030	1.000	1.000
2441.0000	*	35.8400	1.8980	39.2180	1.79	-8.61%	5.97%	0.048	0.029	1.000	1.000
2442.0000	*	35.8400	1.8960	39.2160	1.79	-8.61%	5.80%	0.047	0.029	1.000	1.000
2450.0000		35.8400	1.8800	39.2000	1.80	-8.57%	4.44%	0.041	0.025	1.000	1.000
2460.0000		35.9400	1.8800	39.1900	1.81	-8.29%	3.87%	0.037	0.023	1.000	1.000
2462.0000	*	35.9000	1.8840	39.1860	1.81	-8.39%	3.97%	0.038	0.024	1.000	1.000
2470.0000		35.7400	1.9000	39.1700	1.82	-8.76%	4.40%	0.041	0.025	1.000	1.000

*Channel Frequency Tested

Table 15.5 Fluid Dielectric Parameters 5250MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 04/Apr/2023 11:01:34
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
5.1700	36.02	4.62	34.38	4.69
5.1800	36.01	4.63	34.37	4.59
5.1900	36.00	4.64	34.03	4.70
5.2000	35.99	4.65	34.19	4.72
5.2100	35.97	4.67	33.97	4.75
5.2300	35.95	4.69	34.17	4.71
5.2400	35.94	4.70	34.21	4.74
5.2500	35.93	4.71	34.20	4.79

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 4-Apr-2023		Fluid Temp: 23.3		Frequency: 5250MHz		Tissue:	Head	ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
5170.0000		34.3800	4.6900	36.0200	4.62	-4.55%	1.52%	0.009	0.011	1.000	1.000
5180.0000	*	34.3700	4.5900	36.0100	4.63	-4.55%	-0.86%	0.009	0.012	1.000	1.000
5190.0000		34.0300	4.7000	36.0000	4.64	-5.47%	1.29%	0.011	0.013	1.000	1.000
5200.0000	*	34.1900	4.7200	35.9900	4.65	-5.00%	1.51%	0.010	0.012	1.000	1.000
5210.0000		33.9700	4.7500	35.9700	4.67	-5.56%	1.71%	0.011	0.013	1.000	1.000
5230.0000		34.1700	4.7100	35.9500	4.69	-4.95%	0.43%	0.010	0.012	1.000	1.000
5240.0000	*	34.2100	4.7400	35.9400	4.70	-4.81%	0.85%	0.009	0.012	1.000	1.000
5250.0000		34.2000	4.7900	35.9300	4.71	-4.81%	1.70%	0.009	0.011	1.000	1.000

*Channel Frequency Tested

Table 15.6 Fluid Dielectric Parameters 5750MHz HEAD TSL

****
Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 05/Apr/2023 16:34:58
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
5.7400	35.37	5.21	32.37	5.55
5.7500	35.36	5.22	32.52	5.59
5.7600	35.35	5.23	32.39	5.55
5.7800	35.32	5.25	32.41	5.50
5.7900	35.31	5.26	32.40	5.56
5.8200	35.28	5.29	32.62	5.62
5.8300	35.27	5.30	32.41	5.69

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 5-Apr-2023		Fluid Temp: 23.7		Frequency: 5750MHz		Tissue:	Head	ΔSAR	ΔSAR	SAR Correction Factor (1)	
Freq (MHz)		Test ε	Test σ (S/m)	Target ε	Target σ (S/m)	Deviation Permittivity	Deviation Conductivity	1g	10g	1g	10g
5740.0000		32.3700	5.5500	35.3700	5.21	-8.48%	6.53%	0.014	0.019	1.000	1.000
5745.0000	*	32.4450	5.5700	35.3650	5.22	-8.26%	6.81%	0.013	0.019	1.000	1.000
5750.0000		32.5200	5.5900	35.3600	5.22	-8.03%	7.09%	0.013	0.018	1.000	1.000
5760.0000		32.3900	5.5500	35.3500	5.23	-8.37%	6.12%	0.014	0.019	1.000	1.000
5780.0000		32.4100	5.5000	35.3200	5.25	-8.24%	4.76%	0.014	0.019	1.000	1.000
5785.0000	*	32.4050	5.5300	35.3150	5.26	-8.24%	5.23%	0.014	0.019	1.000	1.000
5790.0000		32.4000	5.5600	35.3100	5.26	-8.24%	5.70%	0.014	0.019	1.000	1.000
5820.0000		32.6200	5.6200	35.2800	5.29	-7.54%	6.24%	0.012	0.017	1.000	1.000
5825.0000	*	32.5150	5.6550	35.2750	5.30	-7.82%	6.80%	0.013	0.018	1.000	1.000
5830.0000		32.4100	5.6900	35.2700	5.30	-8.11%	7.36%	0.013	0.018	1.000	1.000

*Channel Frequency Tested

16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.1 System Verification Results 150MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
9 Mar 2023		150	CLA-150		4007
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.3	25	18%	1000	0
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
55.65	52.30	6.41%	0.75	0.76	-1.32%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.85	3.89	-1.03%	2.58	2.57	0.39%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
3.85	3.87	-0.52%	2.58	2.56	0.78%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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 16.2 System Verification Results 450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
13 Mar 2023		450	D450V3		1068
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.8	24	25%	250	15
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
45.80	43.50	5.29%	0.83	0.87	-4.60%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
1.17	1.20	-2.70%	0.81	0.79	2.03%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
4.68	4.81	-2.78%	3.22	3.16	2.03%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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 16.4 System Verification Results 835MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
15 Mar 2023		835	D835V2		4d075
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	25.9	26	18%	250	15
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
40.19	41.50	-3.16%	0.94	0.90	4.44%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
2.43	2.33	4.42%	1.55	1.50	2.79%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
9.73	9.32	4.43%	6.18	6.01	2.81%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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 16.5 System Verification Results 2450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
29 Mar 2023		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.0	25	19%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
35.84	39.20	-8.57%	1.88	1.80	4.44%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
13.60	13.18	3.19%	6.14	6.01	2.25%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
54.40	52.72	3.19%	24.56	24.02	2.27%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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 16.6 System Verification Results 5250MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
4 Apr 2023		5250	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.3	25	18%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
34.20	35.93	-4.81%	4.79	4.71	1.70%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.74	3.97	-5.88%	1.08	1.15	-5.72%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
74.80	79.47	-5.88%	21.60	22.91	-5.72%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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 16.6 System Verification Results 5750MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
5 Apr 2023		5750	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.7	27	17%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
32.52	35.36	-8.03%	5.59	5.22	7.09%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.64	3.78	-3.63%	1.06	1.10	-3.68%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
72.80	75.54	-3.63%	21.20	22.01	-3.68%

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 IEC/IEEE 62209-1528 and FCC KDB 846224,

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.

17.0 SYSTEM VALIDATION SUMMARY

Table 17.1 System Validation Summary

SAR Validation SummaryChart							
Validation Date	Validation Source	Source S/N	Validation Frequency	Tissue	Linearity	Isotropy	Extrapolation
27-May-22	CLA150	4007	150	Head	✓	✓	✓
14-Jul-22	D450V2	1068	450	Head	✓	✓	✓
19-Jul-22	D835V2	4d075	835	Head	✓	✓	✓
3-May-22	D2450V2	825	2450	Head	✓	✓	✓
13-May-22	D5GHzV2	1031	5250	Head	✓	✓	✓
19-May-22	D5GHzV2	1031	5750	Head	✓	✓	✓

18.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 18.1 Measurement System Specifications

Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY6, V 6.4.0.12171 / DASY52 V10.2(1504)
	Postprocessing Software: SEMCAD X, V14.6.12(7470)
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
Phantom	
Type	MFP V5.1C Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 8 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 (e.g. DGBE)
Calibration:	ISO/IEC 17025
Frequency:	4 MHz - 10 GHz; Linearity: ± 0.2 dB (30 MHz - 10 GHz)
Directivity:	± 0.1 dB in TSL (rotation around probe axis) ± 0.3 dB in TSL (rotation normal to probe axis)
Dynamic Range:	10 μW/g to > 100 mW/g; Linearity: ± 0.2 dB (noise: typically <1 mW/g)
Dimensions:	Overall length: 337 mm; (tip: 20 mm) Tip diameter: 2.5 mm; Tip (body: 12 mm) Typical distance from probe tip to dipole centers: 1 mm
Application:	High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields); the only probe that enables compliance testing for frequencies up to 6 GHz with precision of better than 30%

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.

ELI Phantom

Phantom Specification

The MFP V5.1C phantom is a flat 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.

MFP 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

19.0 TEST EQUIPMENT LIST

Table 19.1 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	14-Apr-22	14-Apr-23
-EX3DV4 E-Field Probe	00213	3600	20-Apr-22	20-Apr-23
-CLA150 Validation Dipole	00251	4007	18-Mar-20	18-Mar-23
-D450V3 Validation Dipole	00221	1068	27-Apr-21	27-Apr-24
-D835V2 Validation Dipole	00217	4D075	27-Apr-21	27-Apr-24
-D2450V2 Validation Dipole	00219	825	24-Apr-21	24-Apr-24
-D5GHzV2 Validation Dipole	00126	1031	27-Apr-21	27-Apr-24
ELI Phantom	00247	1234	CNR	CNR
MFP Phantom	00355	1177/2	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
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
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	9-Aug-21	9-Aug-24
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

20.0 FLUID COMPOSITION

Table 20.1 Fluid Composition 150MHz HEAD TSL

Tissue Simulating Liquid (TSL) Composition				150MHz Head
Component by Percent Weight				
Water	Sugar	Salt(1)	HEC(2)	Bacteriacide(3)
38.35	55.5	5.15	0.9	0.1

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

Table 20.2 Fluid Composition 450MHz HEAD TSL

Tissue Simulating Liquid (TSL) Composition				450MHz Head
Component by Percent Weight				
Water	Sugar	Salt(1)	HEC(2)	Bacteriacide(3)
38.56	56.32	3.95	0.98	0.19

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

Table 20.3 Fluid Composition 835MHz HEAD TSL

Tissue Simulating Liquid (TSL) Composition				835MHz Head
Component by Percent Weight				
Water	Sugar	Salt(1)	HEC(2)	Bacteriacide(3)
40.71	56.63	1.48	0.99	0.19

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

Table 20.4 Fluid Composition 2450MHz HEAD TSL

Tissue Simulating Liquid (TSL) Composition				2450MHz Head
Component by Percent Weight				
Water	Glycol	Salt(1)	HEC(2)	Bacteriacide(3)
52.0	48.0	0.0	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 20.5 Fluid Composition 5Ghz HEAD TSL

The 5GHz Head TSL is a SPEAG proprietary broad band fluid:

Type: **HBBL3500-5500V2**
Batch number: **131210-2**
P/N: **SL AAH 502 AC**

APPENDIX A – SYSTEM VERIFICATION PLOTS

DUT: CLA-150; Type: CLA-150; Serial: 4007
Procedure Name: SPC 150H Input=1.0W, Target[3.5][3.89][4.3]W/kg

Communication System: UID 0, CW (0); Frequency: 150 MHz;Duty Cycle: 1:1
Medium parameters used: f = 150 MHz; σ = 0.75 S/m; ε_r = 55.65; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/9/2023 6:56:23 PM

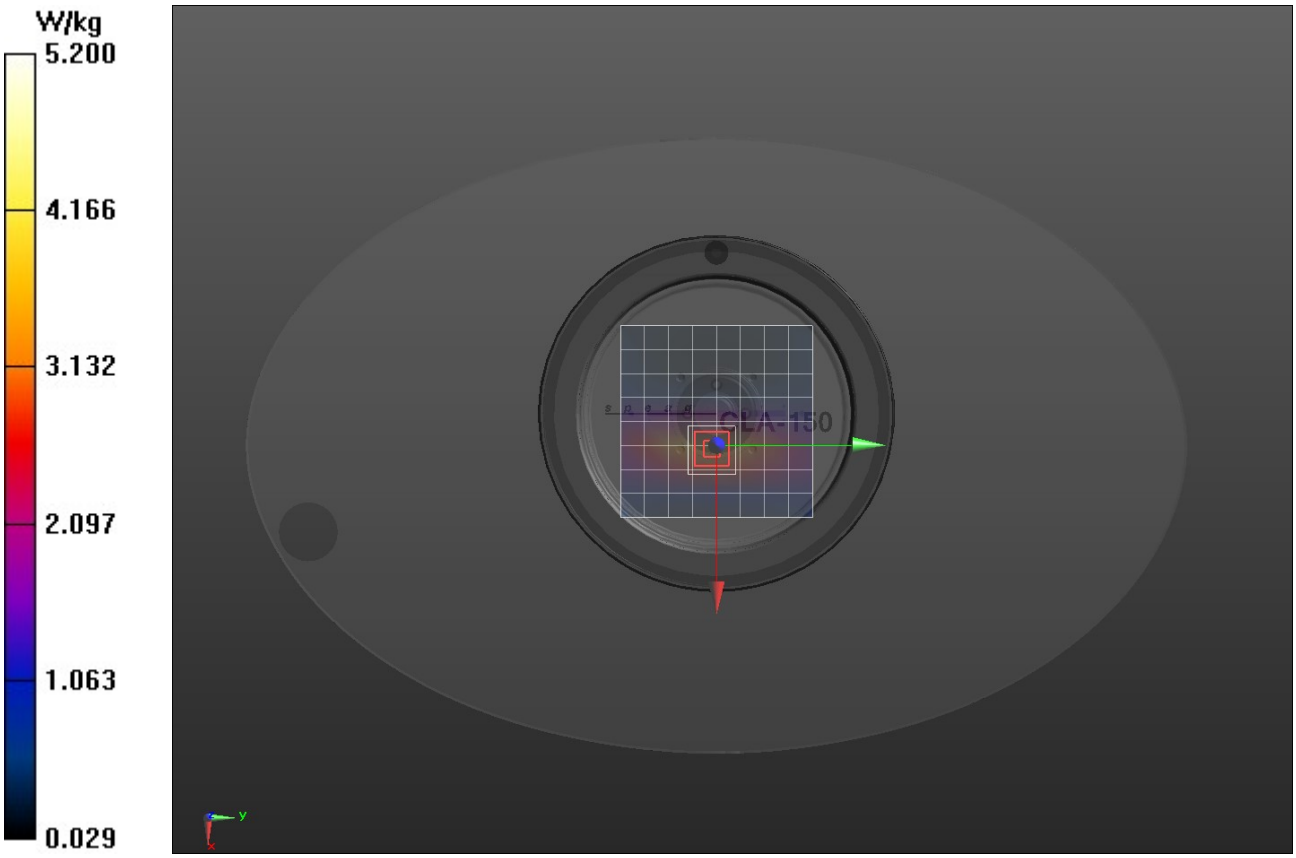
DASY5 Configuration:

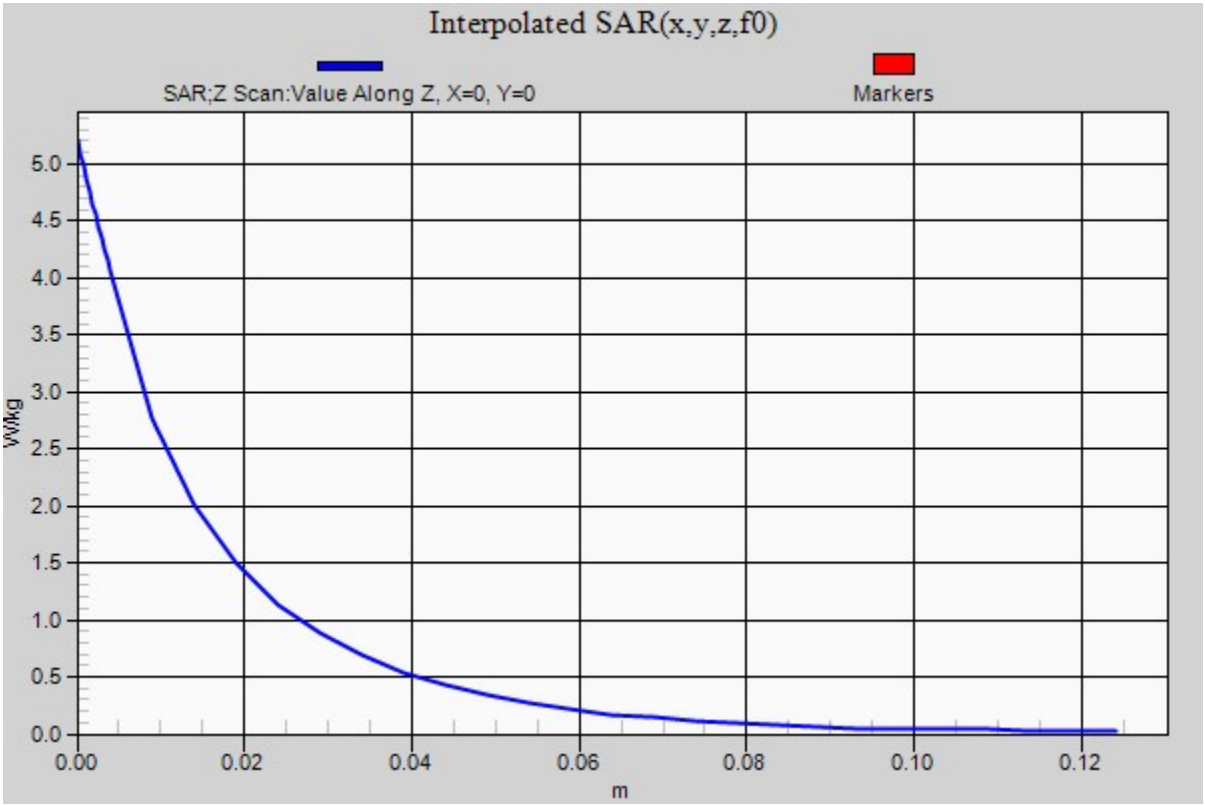
- Probe: EX3DV4 - SN3600; ConvF(9.65, 9.65, 9.65) @ 150 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 150H Input=1.0W, Target[3.5][3.89][4.3]W/kg_ 2 2 3/Area Scan (9x9x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 4.02 W/kg

SPC/SPC 150H Input=1.0W, Target[3.5][3.89][4.3]W/kg_ 2 2 3/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 73.74 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 5.91 W/kg
SAR(1 g) = 3.85 W/kg; SAR(10 g) = 2.58 W/kg
Ratio of SAR at M2 to SAR at M1 = 68%
Maximum value of SAR (measured) = 4.12 W/kg

SPC/SPC 150H Input=1.0W, Target[3.5][3.89][4.3]W/kg_ 2 2 3/Z Scan (1x1x36): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 15.37 (13.10, 17.06) [mm]
Maximum value of SAR (interpolated) = 5.20 W/kg





DUT: Dipole 450 MHz D450V3; Type: D450V3; Serial: D450V3 - SN:1068
Procedure Name: SPC 450H, Input 250mW, Taget[1.08315][1.2035][1.32385] W/kg

Communication System: UID 0, CW (0); Frequency: 450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 450 MHz; σ = 0.83 S/m; ε_r = 45.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/13/2023 1:46:31 PM

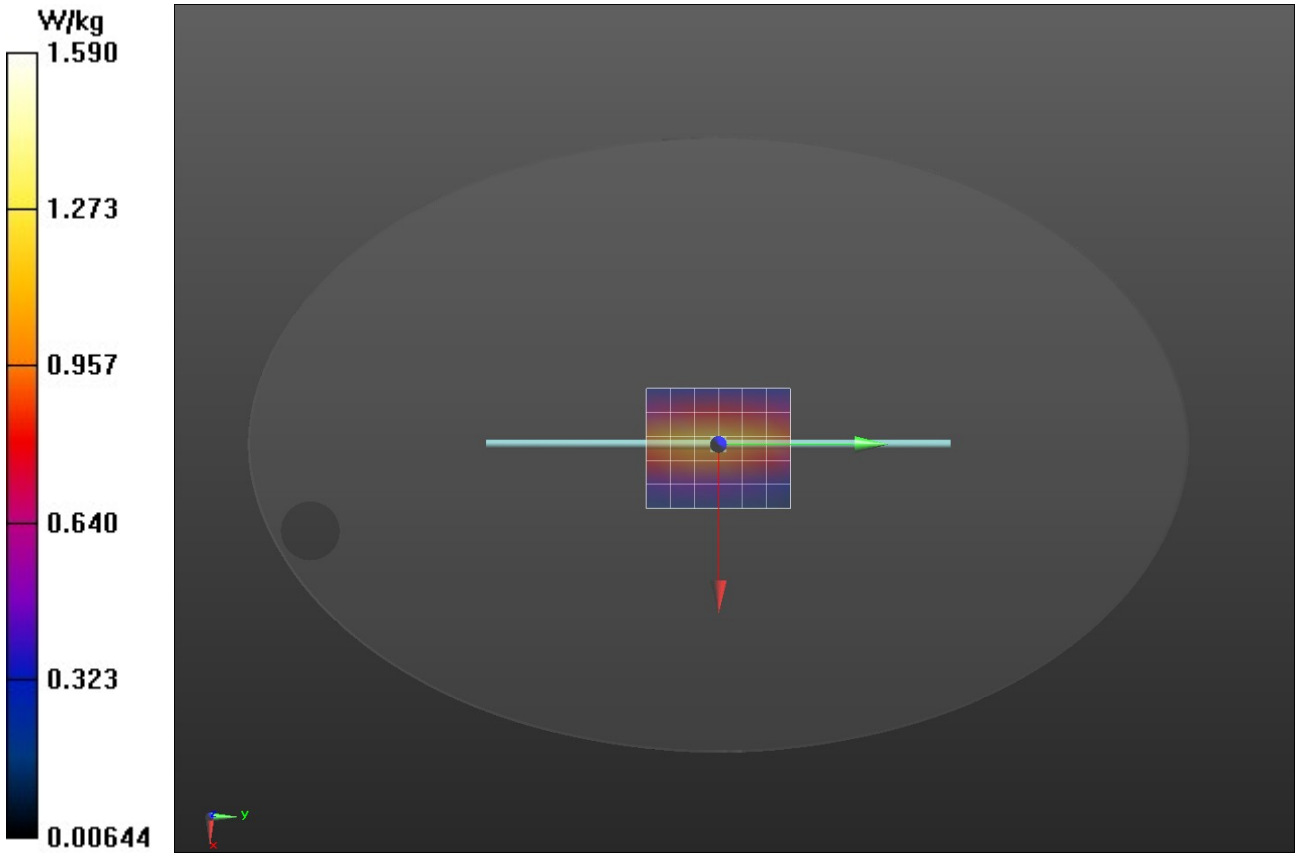
DASY5 Configuration:

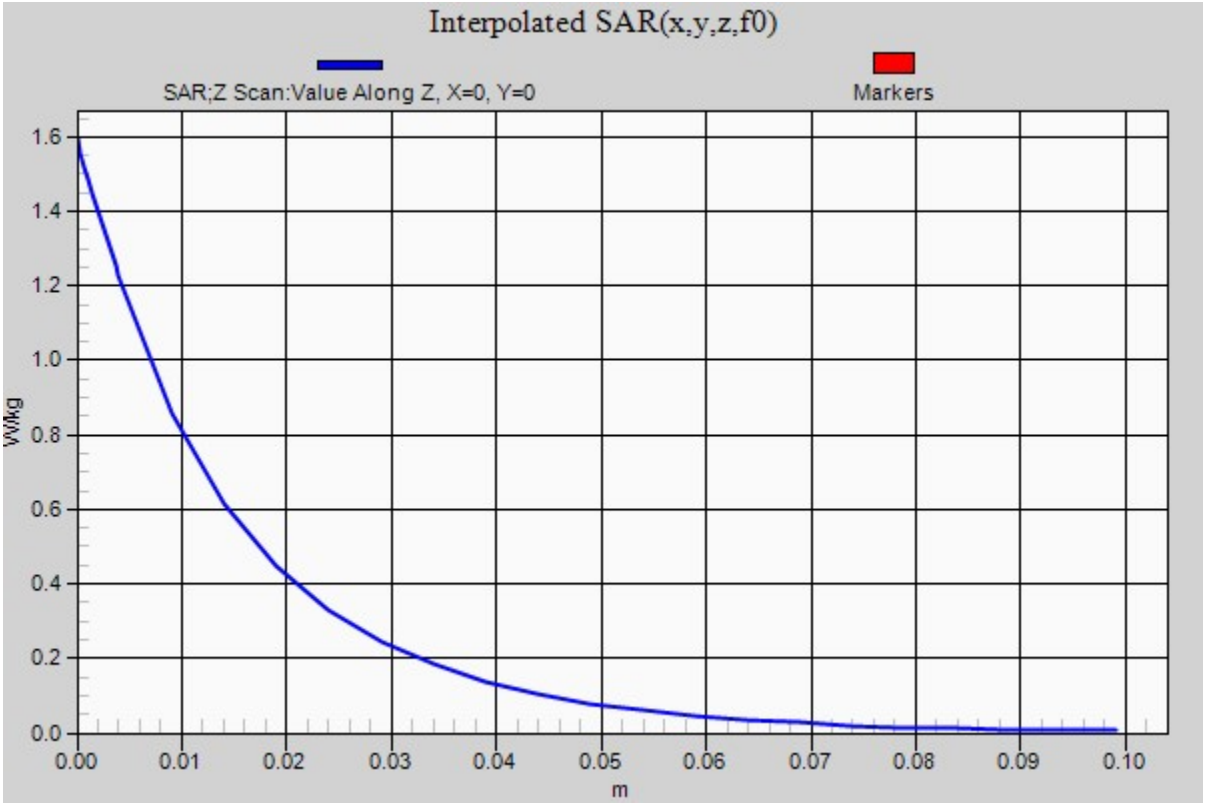
- Probe: EX3DV4 - SN3600; ConvF(8.78, 8.78, 8.78) @ 450 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 450H, Input 250mW, Taget[1.08315][1.2035][1.32385] W/kg/Area Scan (6x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.23 W/kg

SPC/SPC 450H, Input 250mW, Taget[1.08315][1.2035][1.32385] W/kg/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.76 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 1.69 W/kg
SAR(1 g) = 1.17 W/kg; SAR(10 g) = 0.806 W/kg
Ratio of SAR at M2 to SAR at M1 = 69.7%
Maximum value of SAR (measured) = 1.25 W/kg

SPC/SPC 450H, Input 250mW, Taget[1.08315][1.2035][1.32385] W/kg/Z Scan (1x1x31): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 15.03 (14.02, 15.68) [mm]
Maximum value of SAR (interpolated) = 1.59 W/kg





DUT: Dipole 835 MHz D835V2; Type: D835V2; Serial: D835V2 - SN:4d075
Procedure Name: SPC 835H, 1W Target=9.319W/kg ,6.011W/kg ,Input 250mW Target=2.33, 1.50- 2 2

Communication System: UID 0, CW (0); Frequency: 835 MHz;Duty Cycle: 1:1
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 40.19; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/15/2023 4:19:47 PM

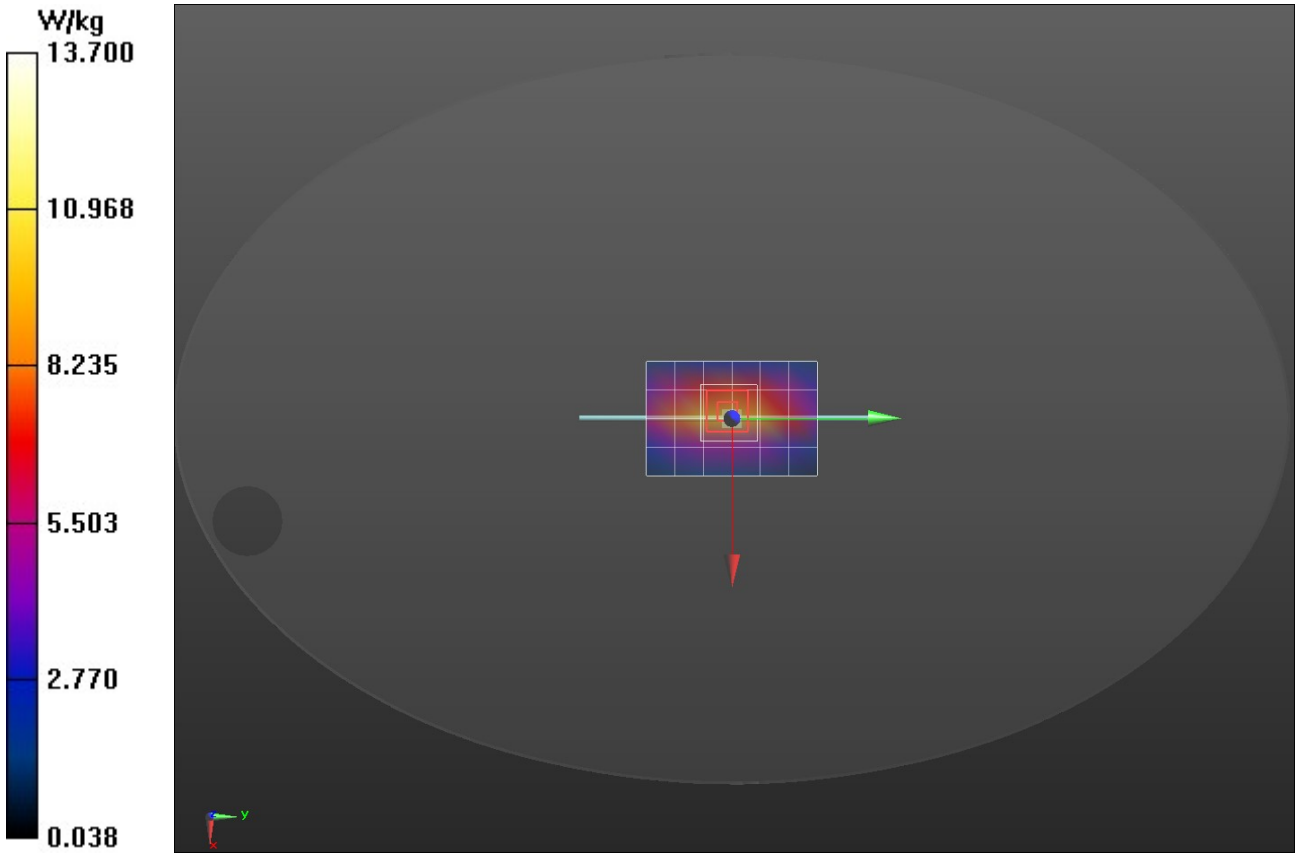
DASY5 Configuration:

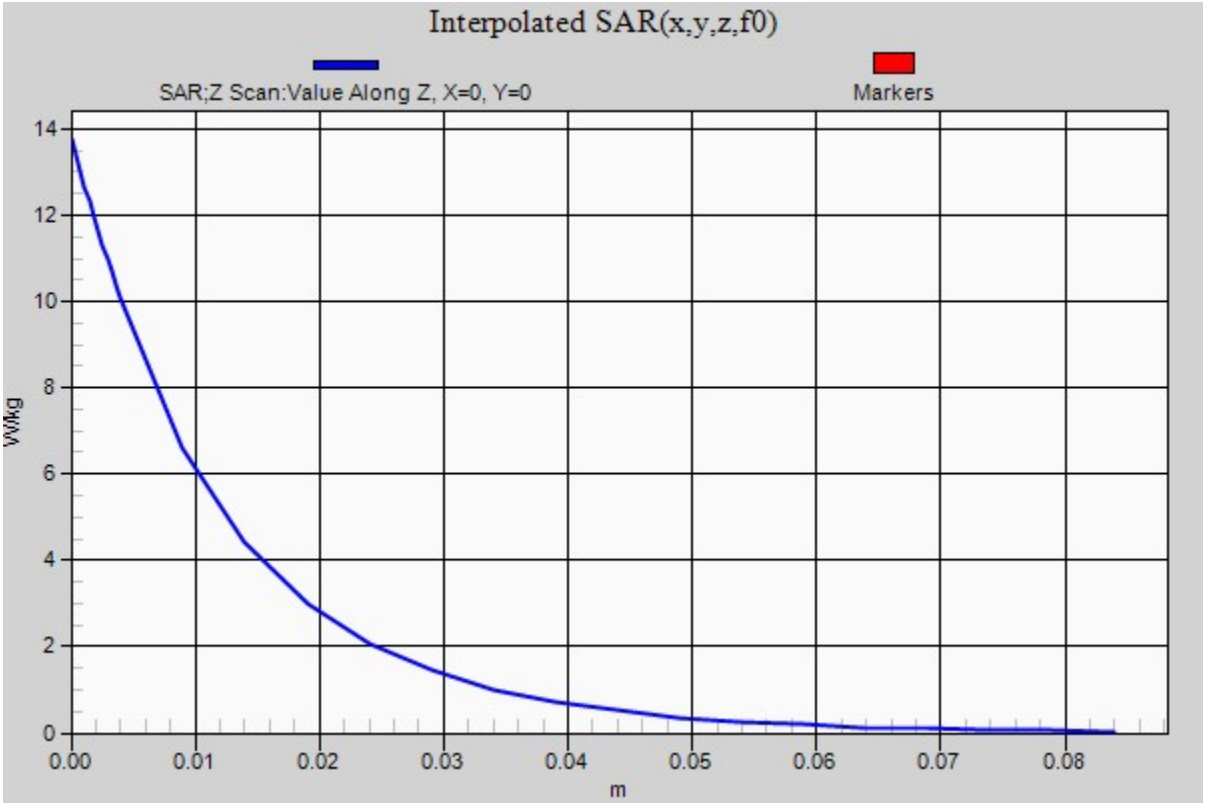
- Probe: EX3DV4 - SN3600; ConvF(8.11, 8.11, 8.11) @ 835 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 835H, 1W Target=9.319W/kg ,6.011W/kg ,Input 250mW Target=2.33, 1.50- 2 2/Area Scan (5x7x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 10.1 W/kg

SPC/SPC 835H, 1W Target=9.319W/kg ,6.011W/kg ,Input 250mW Target=2.33, 1.50- 2 2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 104.2 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 15.2 W/kg
SAR(1 g) = 9.73 W/kg; SAR(10 g) = 6.18 W/kg
Smallest distance from peaks to all points 3 dB below = 22.3 mm
Ratio of SAR at M2 to SAR at M1 = 64.6%
Maximum value of SAR (measured) = 10.5 W/kg

SPC/SPC 835H, 1W Target=9.319W/kg ,6.011W/kg ,Input 250mW Target=2.33, 1.50- 2 2/Z Scan (1x1x28): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 12.50 (11.73, 13.05) [mm]
Maximum value of SAR (interpolated) = 13.7 W/kg





DUT: Dipole 2450 MHz D2450V2; Type: D2450V2; Serial: D2450V2 - SN:825
Procedure Name: SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg

Communication System: UID 0, CW (0); Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 1.88 S/m; ε_r = 35.84; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 3/29/2023 4:55:42 PM

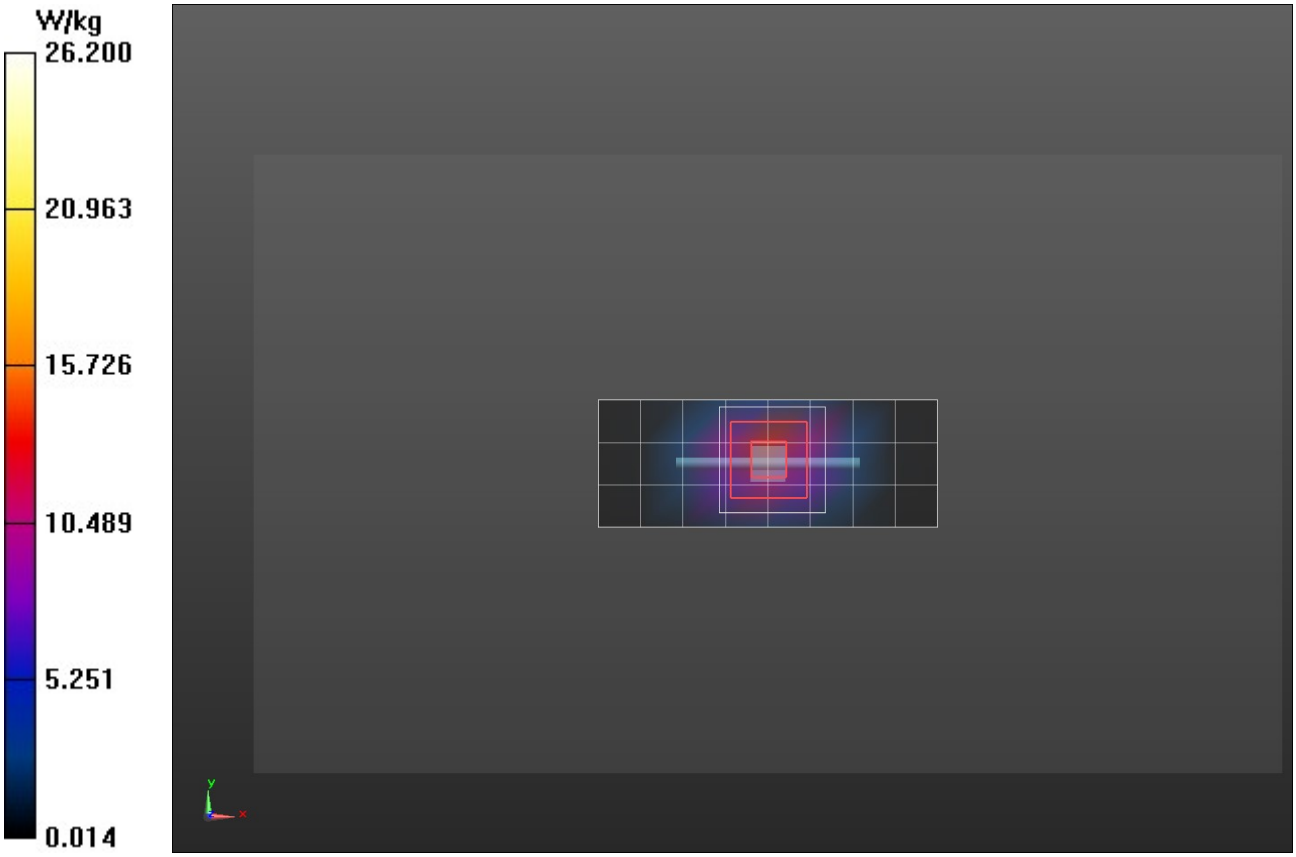
DASY5 Configuration:

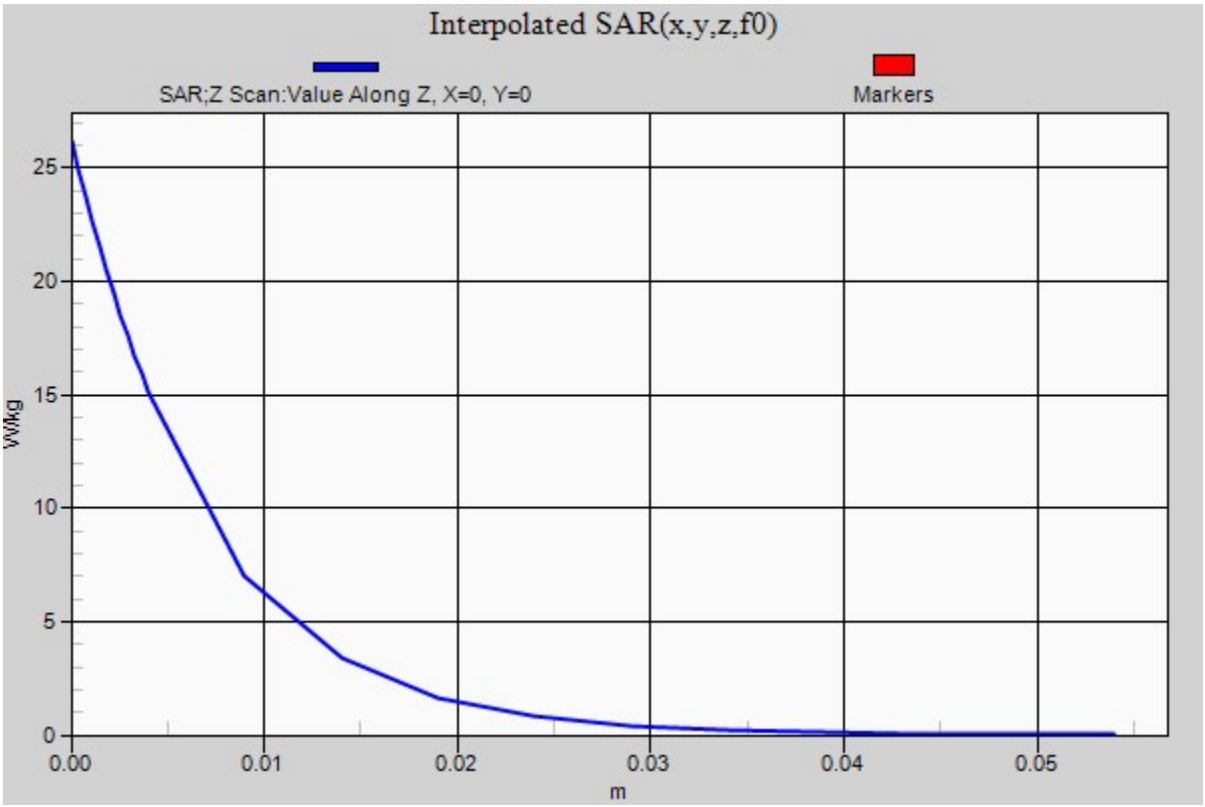
- Probe: EX3DV4 - SN3600; ConvF(6.58, 6.58, 6.58) @ 2450 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_ 2 2/Area Scan (9x4x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 13.5 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_ 2 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 90.07 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 29.8 W/kg
SAR(1 g) = 13.6 W/kg; SAR(10 g) = 6.19 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 46.5%
Maximum value of SAR (measured) = 15.3 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_ 2 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 6.808 (6.547, 6.915) [mm]
Maximum value of SAR (interpolated) = 26.2 W/kg


W/kg
26.200
20.963
15.726
10.489
5.251
0.014


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

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.79 S/m; ε_r = 34.2; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 4/4/2023 1:06:33 PM

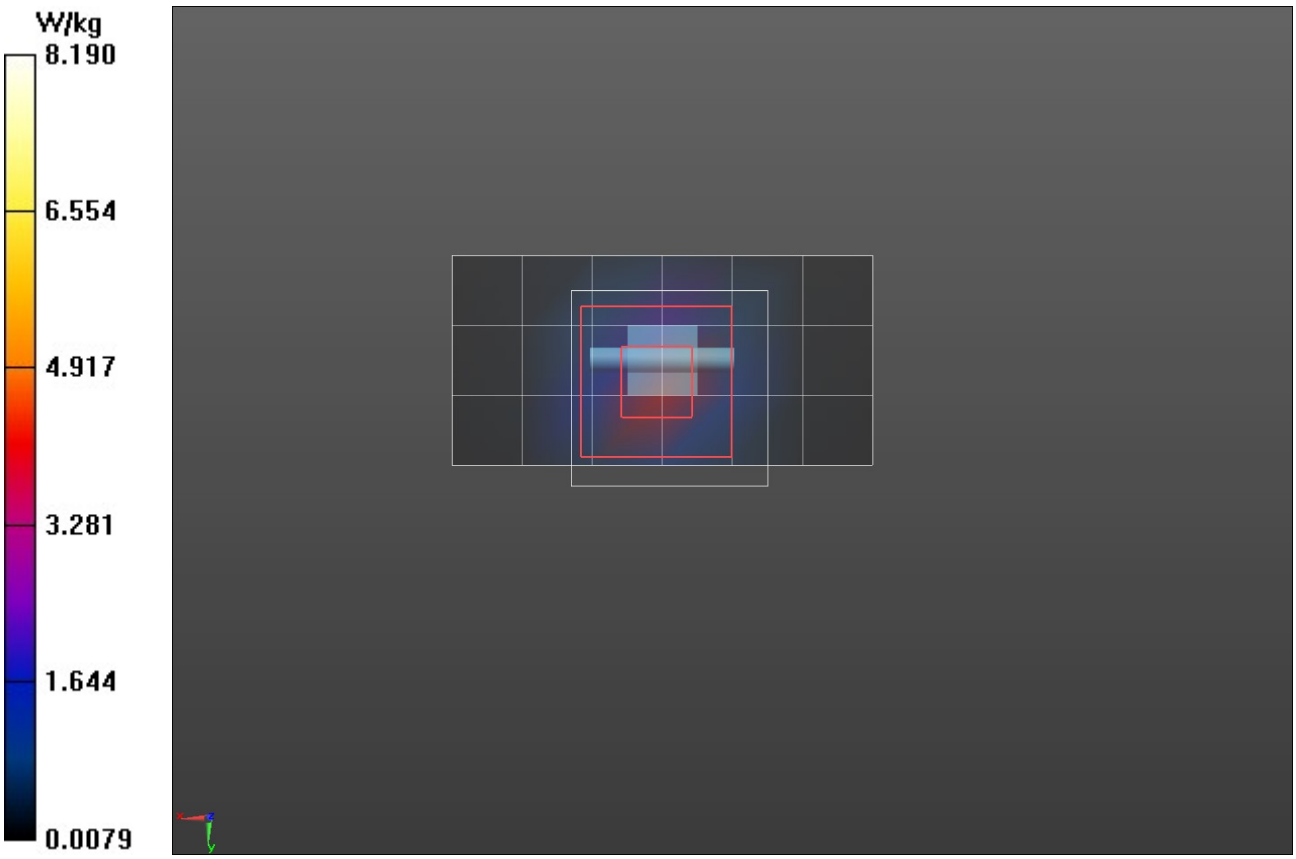
DASY5 Configuration:

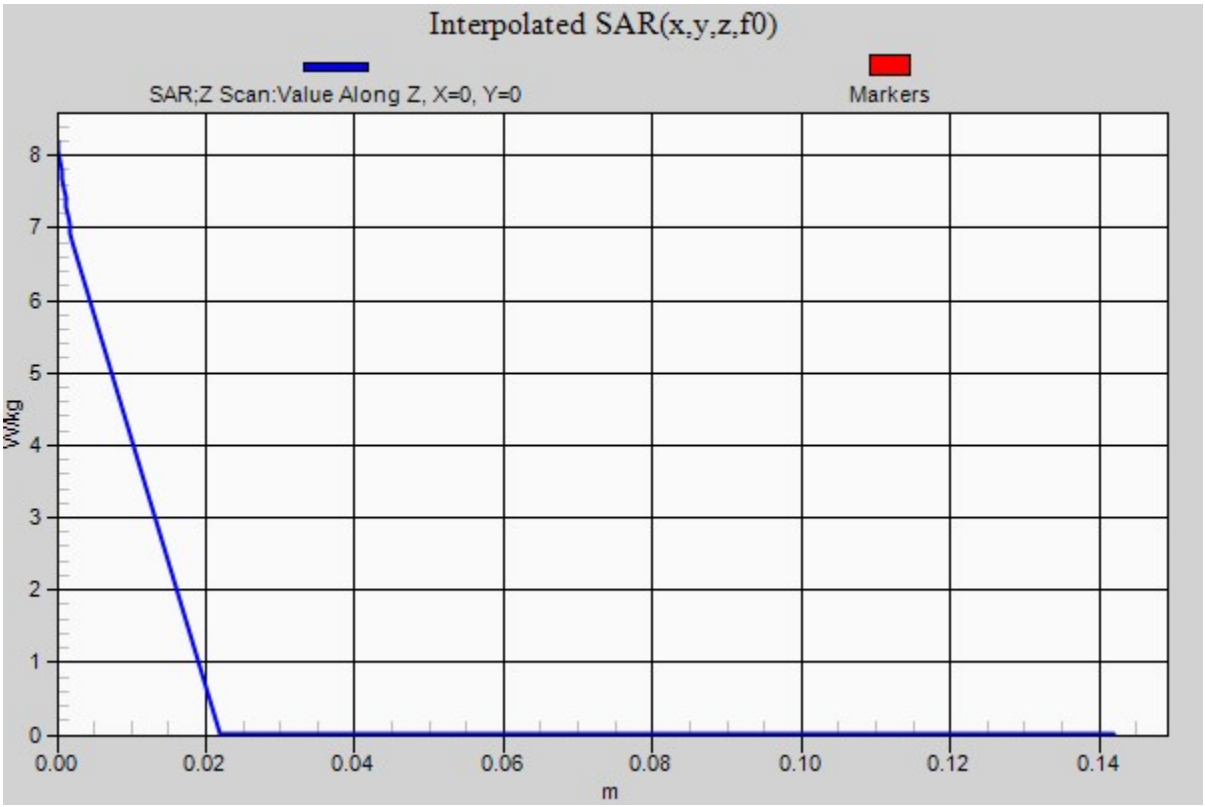
- Probe: EX3DV4 - SN3600; ConvF(4.55, 4.55, 4.55) @ 5250 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3/Area Scan (7x4x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 4.08 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3/Zoom Scan (8x8x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 28.75 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 14.9 W/kg
SAR(1 g) = 3.74 W/kg; SAR(10 g) = 1.08 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 54.8%
Maximum value of SAR (measured) = 7.60 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw 3/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 3.334) [mm]
Maximum value of SAR (interpolated) = 8.19 W/kg


W/kg
8.190
6.554
4.917
3.281
1.644
0.0079


Interpolated SAR(x,y,z,f0)
SAR;Z Scan:Value Along Z, X=0, Y=0
Markers
W/kg
0
1
2
3
4
5
6
7
8
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
m

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1031
Procedure Name: SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw

Communication System: UID 0, CW (0); Frequency: 5750 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5750 MHz; σ = 5.59 S/m; ε_r = 32.52; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 12/30/2022 1:19:57 PM

DASY5 Configuration:

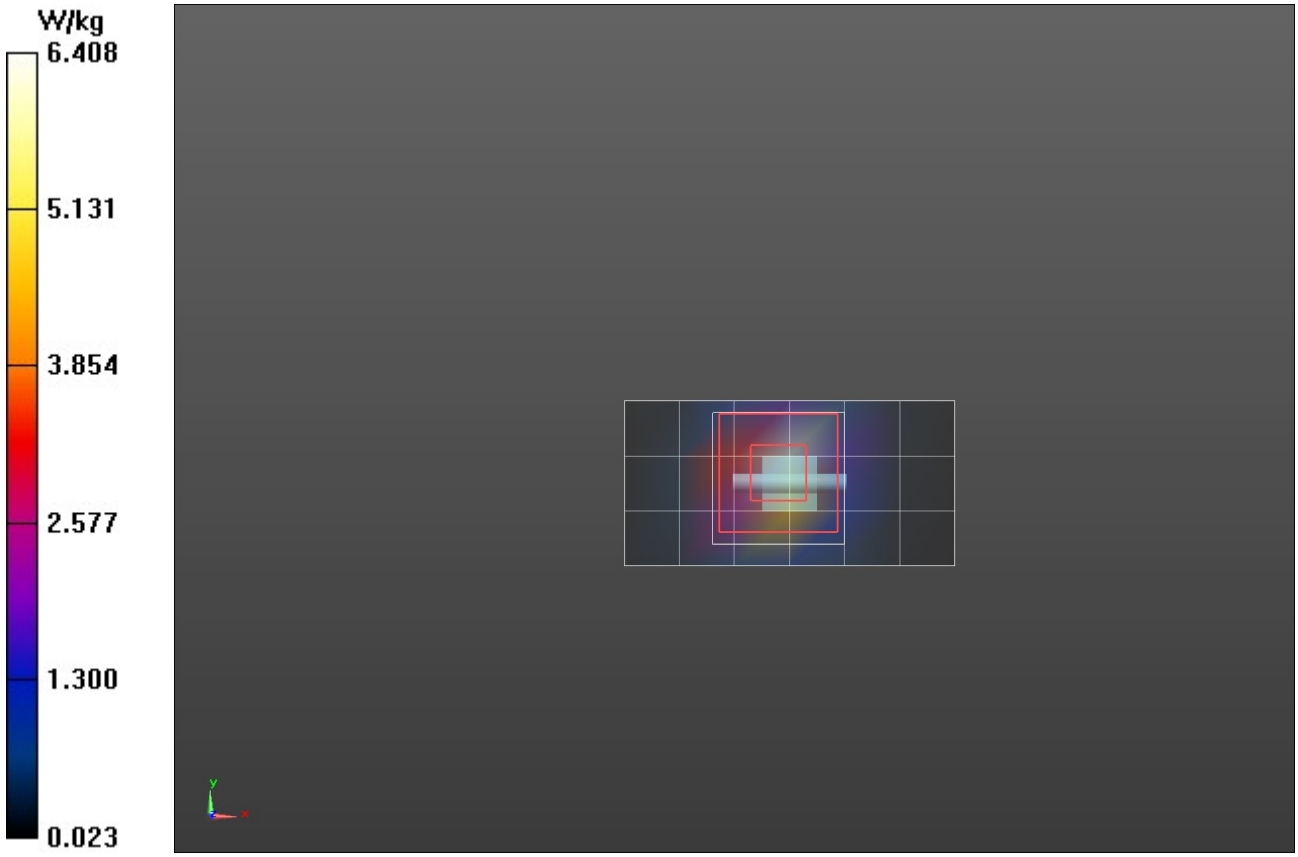
- Probe: EX3DV4 - SN3600; ConvF(4.16, 4.16, 4.16) @ 5750 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

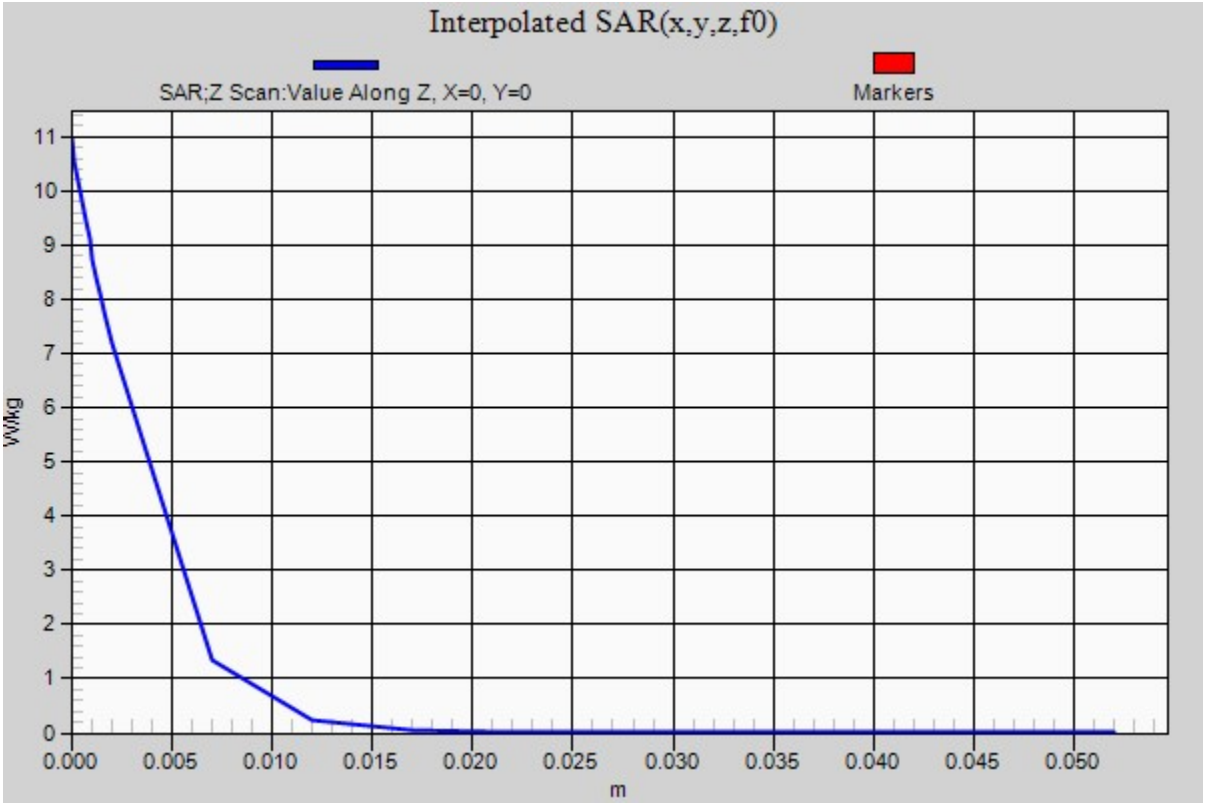
SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2/Area Scan (7x4x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 6.41 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2/Zoom Scan (7x7x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 26.13 V/m; Power Drift = 0.06 dB
Peak SAR (extrapolated) = 16.4 W/kg
SAR(1 g) = 3.64 W/kg; SAR(10 g) = 1.06 W/kg
Smallest distance from peaks to all points 3 dB below = 7.9 mm
Ratio of SAR at M2 to SAR at M1 = 50.8%

Maximum value of SAR (measured) = 7.67 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw 2/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 2.866 (2.988, 2.986) [mm]
Maximum value of SAR (interpolated) = 10.9 W/kg





APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR

Plot B2

DUT: BKR- 9000; Type: PTT;
Procedure Name: B2-BKR 9000,158.07 MHz Body Config, SPKR Mic BK0204 , B1, A1,bat P1, Ant T2

Communication System: UID 0, FM (0); Frequency: 158.07 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 158.07 MHz; σ = 0.774 S/m; ε_r = 52.535; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/9/2023 8:31:07 PM

DASY5 Configuration:

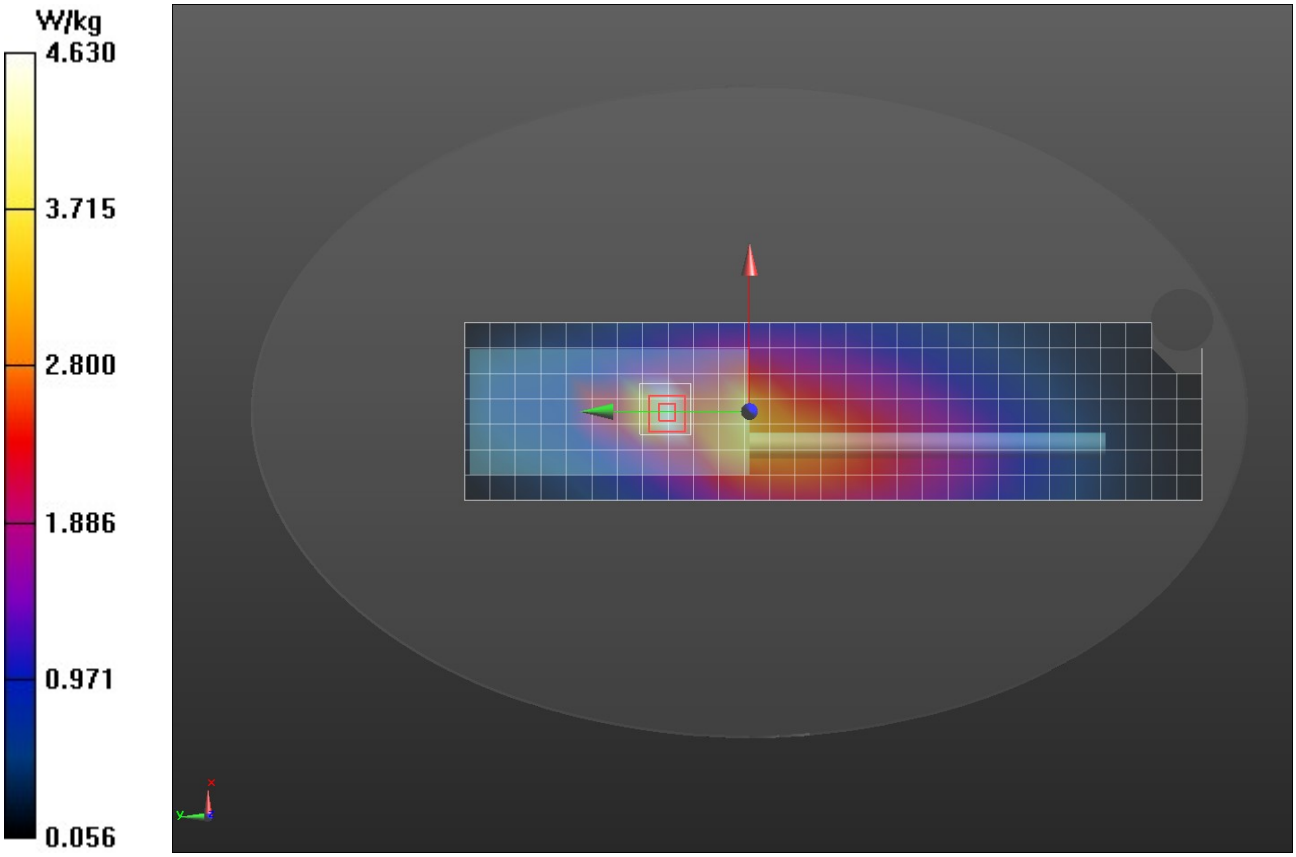
- Probe: EX3DV4 - SN3600; ConvF(9.65, 9.65, 9.65) @ 158.07 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

150H/B2-BKR 9000,158.07 MHz Body Config, SPKR Mic BK0204 , B1, A1,bat P1, Ant T2/Area Scan (8x30x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 6.53 W/kg

150H/B2-BKR 9000,158.07 MHz Body Config, SPKR Mic BK0204 , B1, A1,bat P1, Ant T2/Zoom Scan (5x5x7)/Cube 0:
Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 69.52 V/m; Power Drift = -0.10 dB
Peak SAR (extrapolated) = 13.5 W/kg
SAR(1 g) = 5.61 W/kg; SAR(10 g) = 3.02 W/kg
Smallest distance from peaks to all points 3 dB below = 12.8 mm
Ratio of SAR at M2 to SAR at M1 = 52.3%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 6.02 W/kg



Plot B60

DUT: BKR- 9000; Type: PTT;
Procedure Name: B60-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Body Config,bat P1, Ant T1,A1, B1

Communication System: UID 0, CW (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.884 S/m; ε_r = 35.9; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 3/29/2023 8:07:54 PM

DASY5 Configuration:

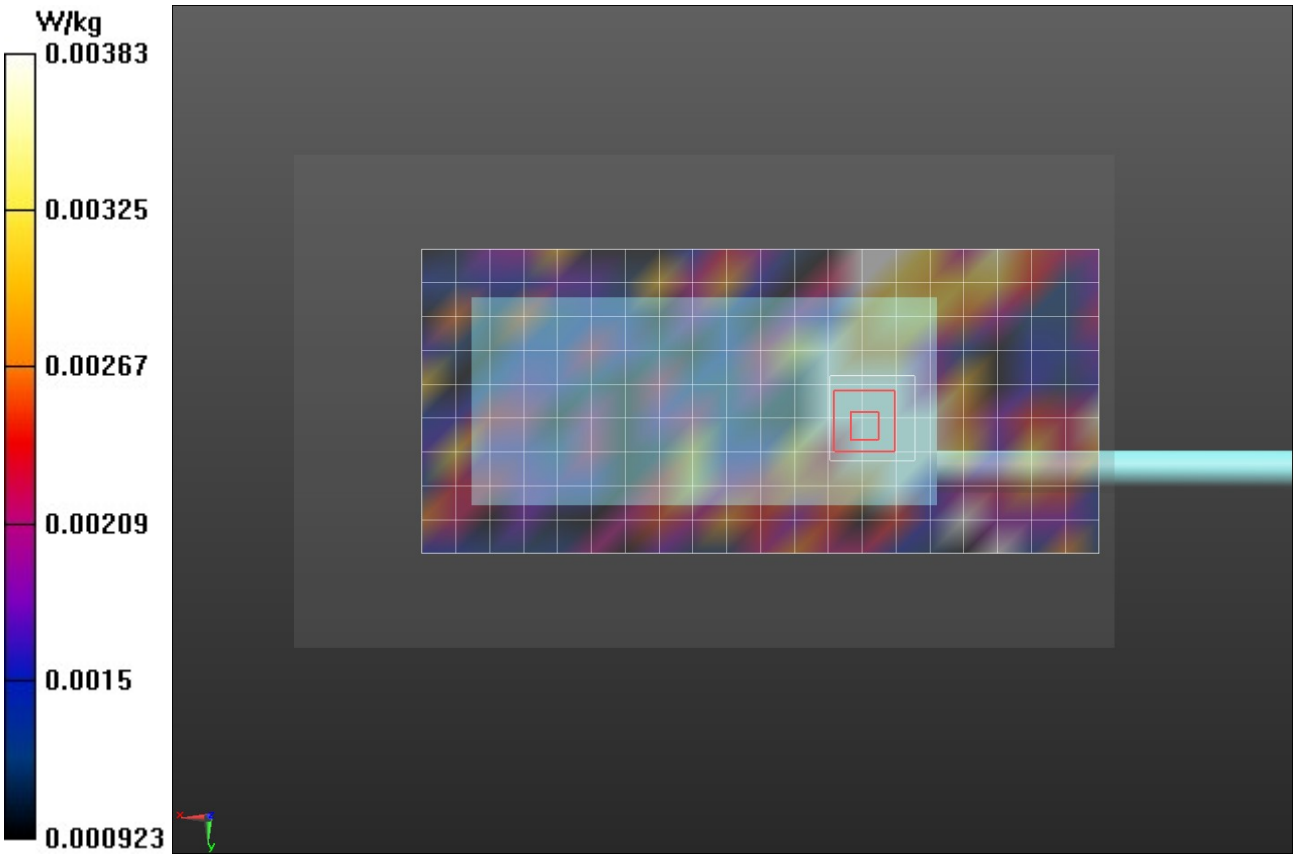
- Probe: EX3DV4 - SN3600; ConvF(6.58, 6.58, 6.58) @ 2462 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H Body-Face -2450 Band/B60-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Body Config,bat P1, Ant T1,A1, B1 2/Area Scan (21x10x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0130 W/kg

2450H Body-Face -2450 Band/B60-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Body Config,bat P1, Ant T1,A1, B1 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.7630 V/m; Power Drift = 2.92 dB
Peak SAR (extrapolated) = 0.0200 W/kg
SAR(1 g) = 0.00759 W/kg; SAR(10 g) = 0.0036 W/kg
Ratio of SAR at M2 to SAR at M1 = 41.5%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00880 W/kg



Plot B61

DUT: BKR- 9000; Type: PTT;
Procedure Name: B61-BKR 9000,2441MHz, BT-EDR, Body Config,bat P1, Ant T1,A1, B1

Communication System: UID 0, CW (0); Frequency: 2441 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.898 S/m; ε_r = 35.84; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 3/30/2023 8:17:18 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(6.58, 6.58, 6.58) @ 2441 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

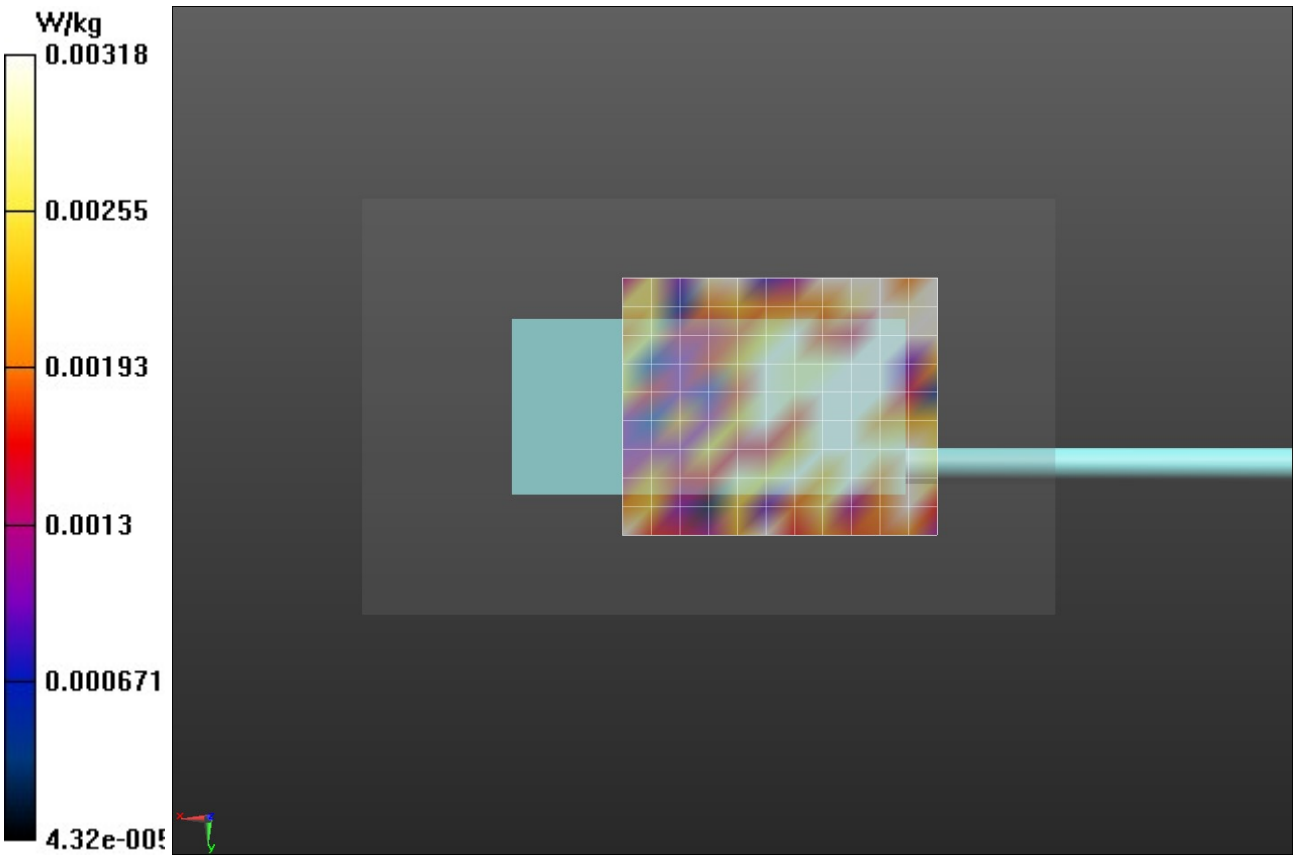
2450H Body-Face -2450 Band/B61-BKR 9000,2441MHz, BT-EDR, Body Config,bat P1, Ant T1,A1, B1/Area Scan (12x10x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00532 W/kg

2450H Body-Face -2450 Band/B61-BKR 9000,2441MHz, BT-EDR, Body Config,bat P1, Ant T1,A1, B1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 0.4610 V/m; Power Drift = 7.23 dB
Peak SAR (extrapolated) = 0.0120 W/kg
SAR(1 g) = 0.00288 W/kg; SAR(10 g) = 0.00182 W/kg
Ratio of SAR at M2 to SAR at M1 = 89%

Info: Interpolated medium parameters used for SAR evaluation.

Maximum value of SAR (measured) = 0.00472 W/kg



Plot B82

DUT: BKR- 9000; Type: PTT;
Procedure Name: B82-BKR 9000,5240MHz, UNII-1 OFDM 24Mbps, Body Config,bat P1, Ant T1,A1, B1

Communication System: UID 0, CW (0); Frequency: 5240 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5240 MHz; σ = 4.74 S/m; ε_r = 34.21; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 4/5/2023 3:30:58 PM

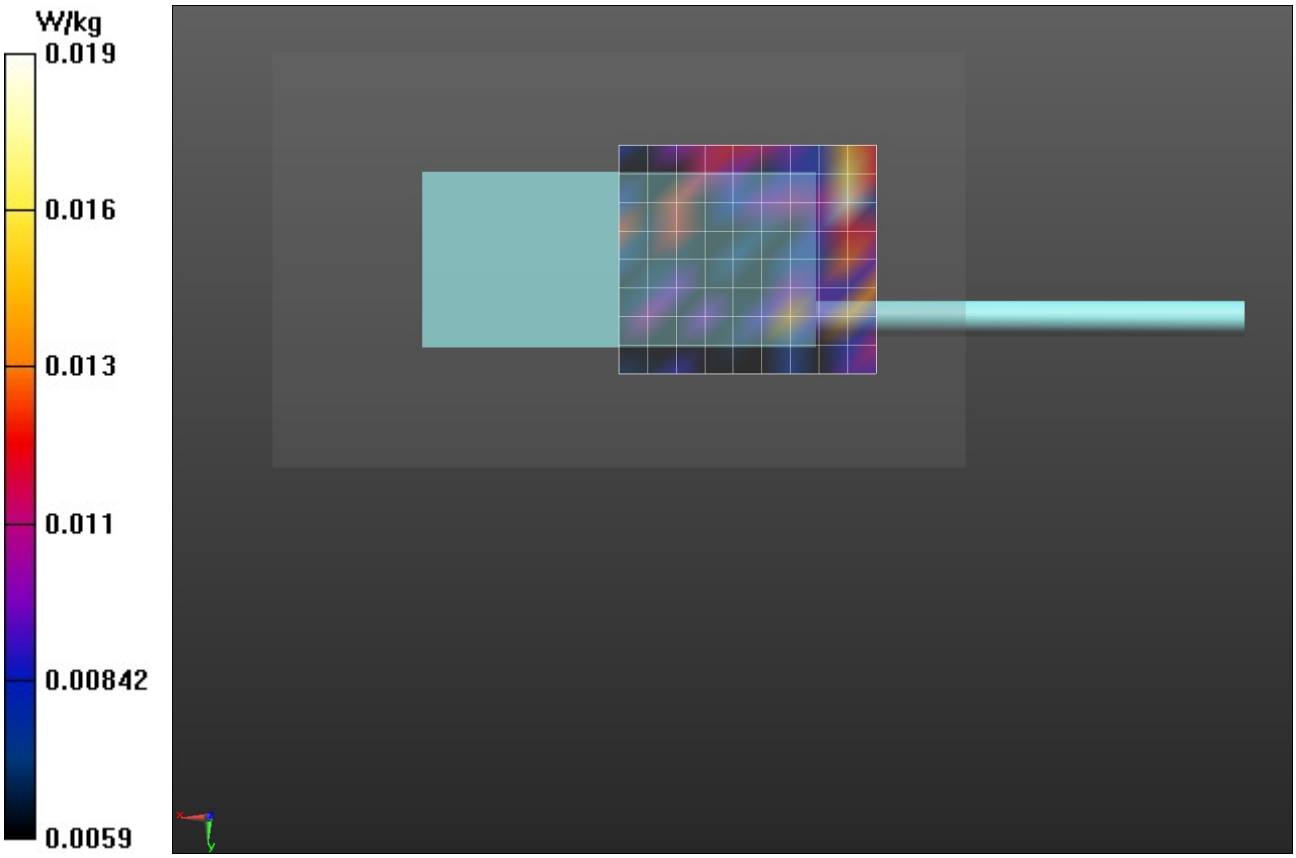
DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(4.55, 4.55, 4.55) @ 5240 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

5250H Body-Face -5250 UNII-1 Band/B82-BKR 9000,5240MHz, UNII-1 OFDM 24Mbps, Body Config,bat P1, Ant T1,A1, B1/Area Scan (10x9x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0179 W/kg

5250H Body-Face -5250 UNII-1 Band/B82-BKR 9000,5240MHz, UNII-1 OFDM 24Mbps, Body Config,bat P1, Ant T1,A1, B1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 1.022 V/m; Power Drift = 2.16 dB
Peak SAR (extrapolated) = 0.0380 W/kg
SAR(1 g) = 0.016 W/kg; SAR(10 g) = 0.013 W/kg
Ratio of SAR at M2 to SAR at M1 = 79.8%

Maximum value of SAR (measured) = 0.0216 W/kg



Plot F3

DUT: BKR- 9000; Type: PTT
Procedure Name: F3-BKR 9000,158.07 MHz Face Config, 25mm,bat P1, Ant T2

Communication System: UID 0, FM (0); Frequency: 158.07 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 158.07 MHz; σ = 0.774 S/m; ε_r = 52.535; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 3/11/2023 2:41:41 PM

DASY5 Configuration:

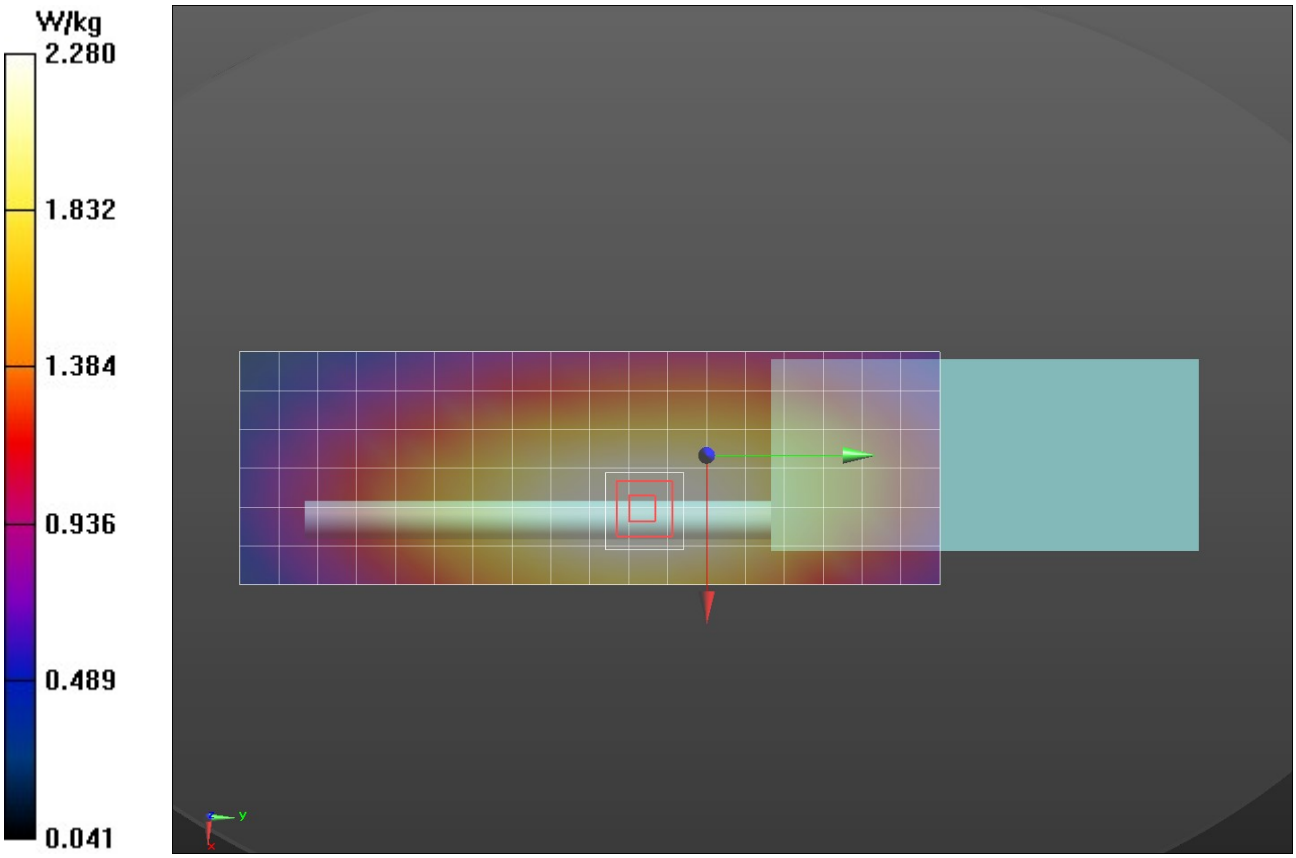
- Probe: EX3DV4 - SN3600; ConvF(9.65, 9.65, 9.65) @ 158.07 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

150H FACE/F3-BKR 9000,158.07 MHz Face Config, 25mm,bat P1, Ant T2/Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.40 W/kg

150H FACE/F3-BKR 9000,158.07 MHz Face Config, 25mm,bat P1, Ant T2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 53.09 V/m; Power Drift = -0.44 dB
Peak SAR (extrapolated) = 2.78 W/kg
SAR(1 g) = 2.25 W/kg; SAR(10 g) = 1.82 W/kg
Ratio of SAR at M2 to SAR at M1 = 81.3%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 2.34 W/kg



Plot F55

DUT: BKR- 9000; Type: PTT
Procedure Name: F55-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Face Config,bat P1, Ant T1

Communication System: UID 0, CW (0); Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 1.884 S/m; ε_r = 35.9; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 3/30/2023 7:00:50 PM

DASY5 Configuration:

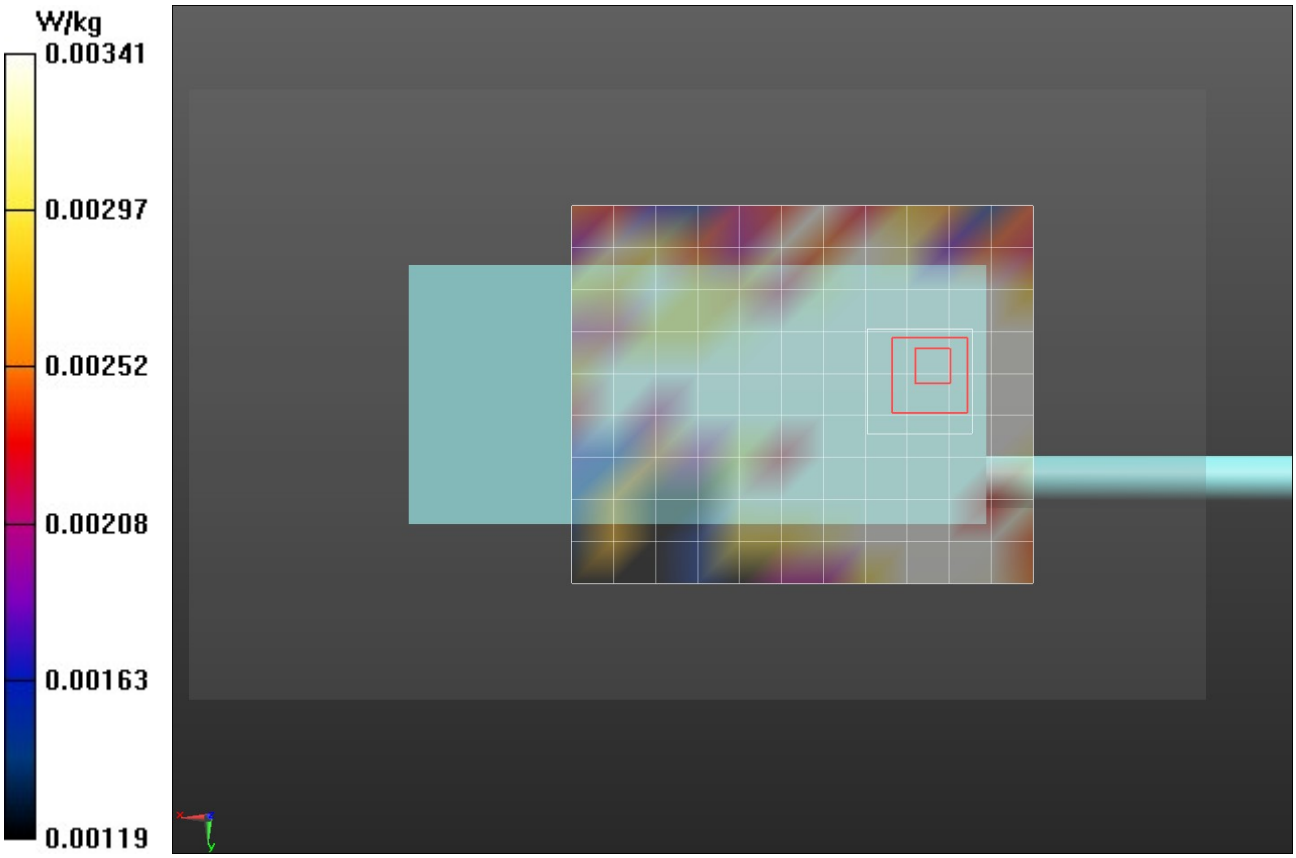
- Probe: EX3DV4 - SN3600; ConvF(6.58, 6.58, 6.58) @ 2462 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H Body-Face -2450 Band/F55-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Face Config,bat P1, Ant T1/Area Scan (12x10x1):
Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00947 W/kg

2450H Body-Face -2450 Band/F55-BKR 9000,2462MHz, WIFI-CCK-2Mbps, Face Config,bat P1, Ant T1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.073 V/m; Power Drift = 1.16 dB
Peak SAR (extrapolated) = 0.0200 W/kg
SAR(1 g) = 0.00782 W/kg; SAR(10 g) = 0.00478 W/kg
Ratio of SAR at M2 to SAR at M1 = 55.3%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00905 W/kg



Plot F56

DUT: BKR- 9000; Type: PTT
Procedure Name: F56-BKR 9000,2441MHz, BT-EDR, Face Config,bat P1, Ant T1

Communication System: UID 0, CW (0); Frequency: 2441 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2441 MHz; σ = 1.898 S/m; ε_r = 35.84; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 3/30/2023 7:38:30 PM

DASY5 Configuration:

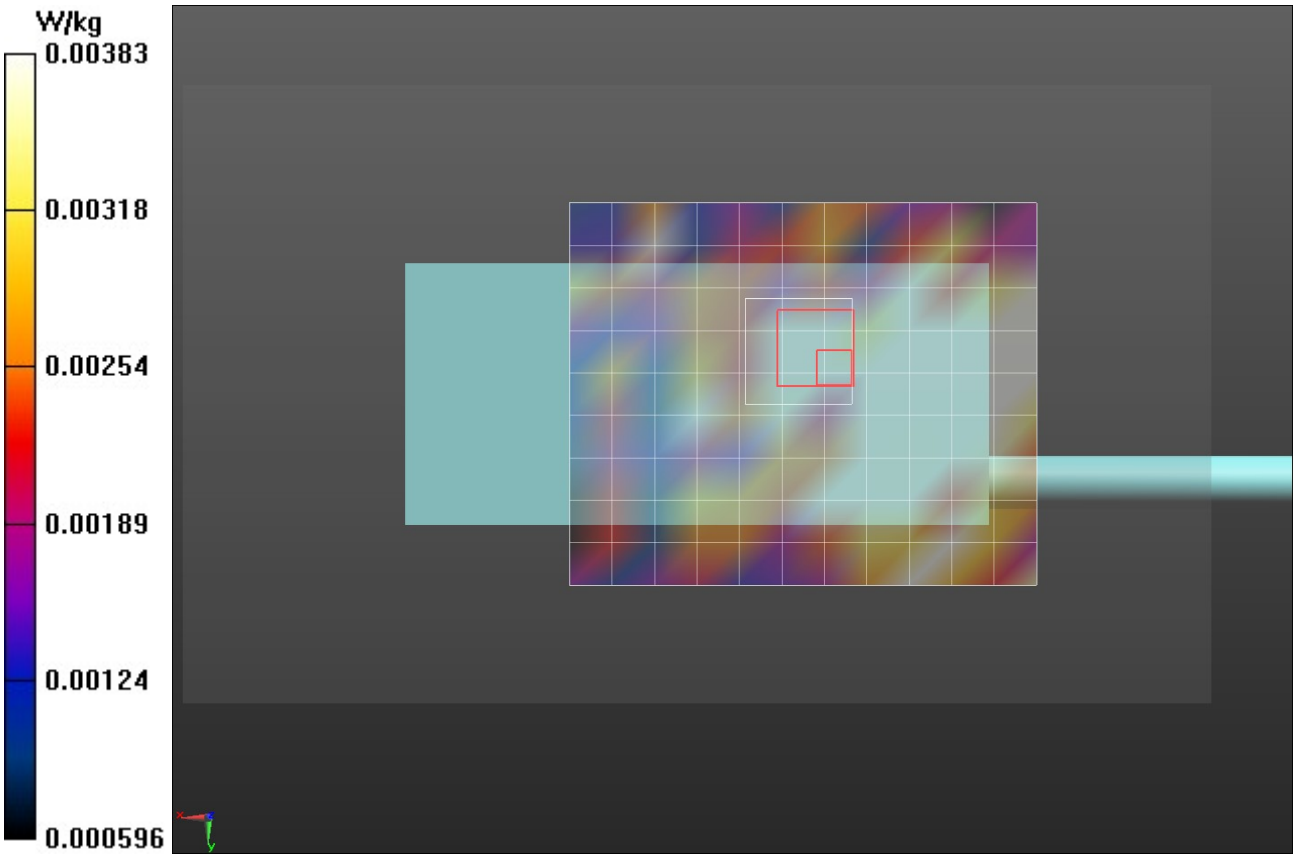
- Probe: EX3DV4 - SN3600; ConvF(6.58, 6.58, 6.58) @ 2441 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H Body-Face -2450 Band/F56-BKR 9000,2441MHz, BT-EDR, Face Config,bat P1, Ant T1/Area Scan (12x10x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00782 W/kg

2450H Body-Face -2450 Band/F56-BKR 9000,2441MHz, BT-EDR, Face Config,bat P1, Ant T1/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 1.353 V/m; Power Drift = 0.15 dB
Peak SAR (extrapolated) = 0.0100 W/kg
SAR(1 g) = 0.00364 W/kg; SAR(10 g) = 0.00181 W/kg
Ratio of SAR at M2 to SAR at M1 = 39.1%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.00544 W/kg



Plot F81

DUT: BKR- 9000; Type: PTT
Procedure Name: F81-BKR 9000,5200MHz, OFDM 24Mbps, Face Config,bat P1, Ant T1

Communication System: UID 0, CW (0); Frequency: 5200 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5200 MHz; σ = 4.72 S/m; ε_r = 34.19; ρ = 1000 kg/m^3
Phantom section: Left Section

Date/Time: 4/5/2023 2:35:59 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN3600; ConvF(4.55, 4.55, 4.55) @ 5200 MHz; Calibrated: 4/20/2022
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/14/2022
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 00355
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

5250H Body-Face -5250 UNII-1 Band/F81-BKR 9000,5200MHz, OFDM 24Mbps, Face Config,bat P1, Ant T1/Area Scan (10x9x1):
Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 0.0923 W/kg

5250H Body-Face -5250 UNII-1 Band/F81-BKR 9000,5200MHz, OFDM 24Mbps, Face Config,bat P1, Ant T1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 0.8930 V/m; Power Drift = 1.50 dB
Peak SAR (extrapolated) = 0.607 W/kg
SAR(1 g) = 0.120 W/kg; SAR(10 g) = 0.053 W/kg
Smallest distance from peaks to all points 3 dB below = 12 mm
Ratio of SAR at M2 to SAR at M1 = 31.8%
Maximum value of SAR (measured) = 0.102 W/kg