Test Report Serial Number:	45461892 R2.0
Test Report Date:	28 November 2023
Project Number:	1639

SAR Test Report - New Application

Applicant:

Garmin International Inc.
Olathe, KS, 66062
USA

Maximum *reported* SAR			
Body (1g)	WiFi - 2.4GHz	0.06	W/kg
	WiFi - 5GHz	1.04	
	Simultaneous	1.06	
General Pop. Limit:		1.60	
Extremity (10g)	WiFi - 2.4GHz	0.03	
	WiFi - 5GHz	0.37	
	Simultaneous	0.38	
General Pop. Limit:		4.00	

FCC ID:	IC Registration Number
IPH-04752	
Product Model Number / HVIN	Product Name / PMN
A04752	**TREAD OEM WITH CAN**

In Accordance With:

FCC 47 CFR §2.1093

Radiofrequency Radiation Exposure Evaluation: Portable Devices

Approved By:

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

Test Lab Certificate: 2470.01 | **IC Registration 3874A** | **FCC Registration: CA3874**

This report shall not be reproduced in any form without the expressed written consent of Celltech Labs Inc.

© 2023 Celltech Labs Inc,

Table of Contents

1.0 REVISION HISTORY *4*
2.0 CLIENT AND DEVICE INFORMATION *5*
3.0 SCOPE OF EVALUATION *6*
4.0 NORMATIVE REFERENCES *7*
5.0 STATEMENT OF COMPLIANCE *8*
6.0 SAR MEASUREMENT SYSTEM *9*
7.0 RF CONDUCTED POWER MEASUREMENT *10*
TABLE 7.1 CONDUCTED POWER MEASUREMENTS, 2.4 GHZ WIFI 10
TABLE 7.2 CONDUCTED POWER MEASUREMENT RESULTS, BLUETOOTH 10
TABLE 7.3 CONDUCTED POWER MEASUREMENTS, 5 GHZ WIFI UNI-1 11
TABLE 7.4 CONDUCTED POWER MEASUREMENTS, 5 GHZ WIFI UNI-3 11
8.0 NUMBER OF TEST CHANNELS (N_C) *12*
TABLE 8.1 NUMBER OF TEST CHANNELS 12
TABLE 8.2 ANTENNA DISTANCES 13
TABLE 8.3 SAR TEST EXCLUSION BASED ON ANTENNA TEST SEPARATION DISTANCES BODY 14
TABLE 8.4 SAR TEST EXCLUSION BASED ON ANTENNA TEST SEPARATION DISTANCES EXTREMITY 15
9.0 ACCESSORIES EVALUATED *15*
TABLE 9.1 MANUFACTURER'S ACCESSORY LIST 15
10.0 SAR MEASUREMENT SUMMARY *16*
TABLE 10.1: MEASURED RESULTS, BODY (1G) 16
TABLE 10.2: MEASURED RESULTS, EXTREMITY (10G) 17
11.0 SCALING OF MAXIMUM MEASURE SAR *18*
TABLE 11.1 SAR SCALING – BODY (1G) 18
TABLE 11.2 SAR SCALING – EXTREMITY (10G) 19
11.3 SIMULTANEOUS SAR – FCC 21
12.0 SAR EXPOSURE LIMITS *22*
TABLE 12.1 EXPOSURE LIMITS 22
13.0 DETAILS OF SAR EVALUATION *23*
13.1 DAY LOG 23
13.2 DUT SETUP AND CONFIGURATION 24
13.3 DUT POSITIONING 24
13.4 GENERAL PROCEDURES AND REPORT 25
13.5 FLUID DIELECTRIC AND SYSTEMS PERFORMANCE CHECK 26
13.6 SCAN RESOLUTION 100MHZ TO 2GHZ 26
13.7 SCAN RESOLUTION 2GHZ TO 3GHZ 27
13.8 SCAN RESOLUTION 5GHZ TO 6GHZ 27
14.0 MEASUREMENT UNCERTAINTIES *27*
TABLE 14.1 MEASUREMENT UNCERTAINTY 27
15.0 FLUID DIELECTRIC PARAMETERS *28*
TABLE 15.1 FLUID DIELECTRIC PARAMETERS 2450MHZ HEAD TSL 28
TABLE 15.2 FLUID DIELECTRIC PARAMETERS 5250MHZ HEAD TSL 28

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

TABLE 15.3 FLUID DIELECTRIC PARAMETERS 5750MHZ HEAD TSL 29
16.0 SYSTEM VERIFICATION TEST RESULTS 30
TABLE 16.1 SYSTEM VERIFICATION RESULTS 2450MHZ HEAD TSL 30
TABLE 16.2 SYSTEM VERIFICATION RESULTS 5250MHZ HEAD TSL 31
TABLE 16.3 SYSTEM VERIFICATION RESULTS 5750MHZ HEAD TSL 32
17.0 SYSTEM VALIDATION SUMMARY 33
TABLE 17.0 SYSTEM VALIDATION SUMMARY 33
18.0 MEASUREMENT SYSTEM SPECIFICATIONS 34
TABLE 18.1 MEASUREMENT SYSTEM SPECIFICATIONS 34
19.0 TEST EQUIPMENT LIST 36
TABLE 19.1 EQUIPMENT LIST AND CALIBRATION 36
20.0 FLUID COMPOSITION 37
TABLE 20.1 FLUID COMPOSITION 2450MHZ HEAD TSL 37
TABLE 20.4 FLUID COMPOSITION 5250, 5750MHZ HEAD TSL 37
END OF REPORT 37
APPENDIX A – SYSTEM VERIFICATION PLOTS 38
APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR 44
APPENDIX C - SETUP PHOTOS 48
FIGURE C.1 – SETUP PHOTOS, BACK SIDE TOUCH – ELI PHANTOM 48
FIGURE C.2 – SETUP PHOTOS, FRONT SIDE – ELI PHANTOM 49
FIGURE C.3 – SETUP PHOTOS, RIGHT EDGE TOUCH - ELI PHANTOM 50
FIGURE C.4 – SETUP PHOTOS, BOTTOM - TOUCH – ELI PHANTOM 51
APPENDIX D – PROBE CALIBRATION 52
APPENDIX E – DIPOLE CALIBRATION 53
APPENDIX F - PHANTOM 54

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

1.0 REVISION HISTORY

Revision History					
Samples Tested By:		Ben Hewson	**Date(s) of Evaluation:**		11, 12, 15, 18 September 2023
Report Prepared By:		Ben Hewson	**Report Reviewed By:**		Art Voss
Report Revision	**Description of Revision**		**Revised Section**	**Revised By**	**Revision Date**
0.1	Draft		n/a	Ben Hewson	11 November 2023
1.0	Initial Release		n/a	Ben Hewson	12 November 2023
2.0	Revised UPN and HVIN		All	Art Voss	28 November 2023

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

2.0 CLIENT AND DEVICE INFORMATION

Client Information	
Applicant Name	**Garmin International Inc.**
Applicant Address	1200 East 151 St
	Olathe, KS, 66062
	USA
DUT Information	
Device Identifier(s):	**FCC ID:** **IPH-04752**
Device Model(s) / HVIN:	A04752
Test Sample Serial No.:	Production Sample Protoype
Device Type:	Personal Navigation Device
Transmit Frequency Range:	BT (DTS, DSS): 2402-2480MHz
	WiFi (DTS): 2412-2462MHz
	U-NII-1: 5180 - 5240, U-NII-3: 5745-5825
Manuf. Max. Avg. Rated Output Power:	BT BR (DSS): 0.44mW (-3.57 dBm)
	BT 2EDR (DTS): 0.09mW (-10.46 dBm)
	BT 3EDR (DTS): 0.09 (-10.46 dBm)
	BT LE (DTS): 0.54mW (-2.68 dBm)
	802.11b (DTS): 21mW (13.22dBm)
	802.11g (DTS): 19.3mW (12.86 dBm)
	802.11n40 (DTS): 5.29mW (7.23 dBm)
	U-NII-1 20(UNII): 21.0mW (13.22dBm)
	U-NII-1 40 (UNII): 5.29mW (7.23dBm)
	U-NII-3 20 (UNII):20.20W (13.05dBm)
	U-NII-3 40 (UNII): 5.25mW (7.20dBm)
Antenna Type and Gain:	2.4GHz: 1.64 dBi PIFA, 5GHz: 4.25 dBi PIFA
Modulation:	ANT: GFSK:
	BT BR: GFSK
	BT 2EDR: π/4-DQPSK
	Bt 3EDR: 8DPSK
	BLE: GMSK
	WiFi: CCK, DSSS, OFDM, CCK, MCS
DUT Power Source:	5V USB, Internal Li-Ion Battery
DUT Dimensions [LxWxH]	L x W x H: 250mm x 165mm x 24mm
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

3.0 SCOPE OF EVALUATION

This Certification Report was prepared on behalf of:

Garmin International Inc.

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

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

The A04752 FCC ID: IPH-04752, is a Low Power Digital Transmitter that offers use as a hand-held, transportation mounted or portable configuration , with a Wi-Fi transceiver that is capable of operating in the 2.4GHz WiFi, 5GHz U-NII-1 & 3 frequency bands as well as 2.4Ghz BT/BLE frequency bands. The device has two antennas, for the 2.4GHZ and a 5Ghz frequencies and is capable of simultaneous transmisson between the BT and UNII bands. The device is intended for General Population Use. The product operates from an internal proprietary Li-ion rechargeable battery which can be connected to a compliant USB interface port, AC or DC adapter for charging. Test samples provided by the manufacturer were capable of transmitting at select frequencies and modulations preset by the manufacturer. An additional antenna modification was prepared for one sample allowing the ability to connect test equipment for antenna port conducted power analysis. The DUT was evaluated for SAR at the maximum average conducted output power level, preset by the manufacturer, and as measured by GCL and verified by CLI, and in accordance with the procedures described in IEC/IEEE 62209-1528, FCC KDB 865646, 447498, 248227. A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used in the evaluation, equipment used and the various provisions of the rules are included within this test report.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

4.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2	Code of Federal Regulations
Title 47:	Telecommunication
Part 2.1093:	Radiofrequency Radiation Exposure Evaluation: Portable Devices
IEC International Standard /IEEE International Committee on Electromagnetic Safety	
IEC/IEEE 62209-1528	Measurement procudeure for the assessment of sepcific absorption rate of human expoure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1528; Human models, insturmentation, and procedures (Frequency range of 4 MHz to 10 GHz)
FCC KDB	
KDB 865664 D01v01r04	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB	
KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 248227 D01v02r02	SAR Guidance for IEEE 802.11 (WiFi) Transmitters
* When the issue number or issue date is omitted, the latest version is assumed.	

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

5.0 STATEMENT OF COMPLIANCE

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

Applicant:	Model / HVIN:	
Garmin International Inc.	A04752 / TREAD OEM WITH CAN	
Standard(s) Applied:	**Measurement Procedure(s):**	
FCC 47 CFR §2.1093	FCC KDB 865664, 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		[ ] 8.0W/kg - 1g Volume
[ ] Class II Permissive Change	[ ] Occupational / Controlled	[x] 4.0W/kg - 10g Volume
Reason for Change:		**Date(s) Evaluated:**
		11,12,15,18 September 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.	Ben Hewson Celltech Labs Inc. 11 November 2023 Date

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

7.0 RF CONDUCTED POWER MEASUREMENT

Table 7.1 Conducted Power Measurements, 2.4 GHz WiFi

A04752-Conducted Power Measurements										
Channel	Frequency (MHz)	Measured Power GCL (mW)	Measured Power (dBm)	Rated Average Power (dBm)	Delta (dB)	SAR Test Channel (Y/N)	Mode	BW (MHz)	Modulation	
6	2437	11.35	10.55			-	WLAN 2.4G	20	DSSS-1Mbps	802.11b
		10.31	10.13			-			DSSS-2Mbps	
		8.29	9.19			-			DSSS-5.5Mbps	
		6.45	8.10			-			DSSS-11Mbps	
1	2412	11.17	10.48	10.70	-0.22	Y			DSSS-1Mbps	
6	2437	11.35	10.55	10.70	-0.15	Y				
11	2462	11.74	10.70	10.70	0.00	Y				
6	2437	9.57	9.81	9.81	0.00	-	WLAN 2.4G	20	OFDM-6Mbps	802.11g
		7.71	8.87	9.81	-0.94	-			OFDM-9Mbps	
		6.66	8.23	9.81	-1.58	-			OFDM-12Mbps	
		3.42	5.34	9.81	-4.47	-			OFDM-36Mbps	
		1.38	1.40	9.81	-8.41	-			OFDM-54Mbps	
6	2437	4.31	6.34	6.34	0.00	-	WLAN 2.4G	20	MCS-0	802.11n
		2.03	3.07	6.34	-3.27	-			MCS-3	
1-11	2412-2462	2.08	3.18	3.18	0.00	-	WLAN 2.4G	40	MCS-0-7	802.11n

Table 7.2 Conducted Power Measurement Results, Bluetooth

A04752- Conducted Power Measurements								
Mode	Modulation	Channel	Frequency (MHz)	Measured Power GCL (mW)	Measured Power (dBm)	Rated Avg Power (dBm)	Delta (mW)	SAR test Channel
BT BR	GFSK	2	2402.00	0.36	-4.44	-3.57	0.87	-
		40	2440.00	0.4	-3.98	-3.57	0.41	-
		80	2480.00	0.44	-3.57	-3.57	0.00	-
BT 2EDR	π/4 -DQPSK	2	2402.00	0.07	-11.55	-10.46	1.09	-
		40	2440.00	0.08	-10.97	-10.46	0.51	-
		80	2480.00	0.09	-10.46	-10.46	0.00	-
BT 3EDR	8DPSK	2	2402.00	0.07	-11.55	-10.46	1.09	-
		40	2440.00	0.08	-10.97	-10.46	0.51	-
		80	2480.00	0.09	-10.46	-10.46	0.00	-
BT BLE	GMSK	37	2402.00	0.44	-3.57	-2.68	0.89	-
		17	2440.00	0.49	-3.10	-2.68	0.42	-
		39	2480.00	0.54	-2.68	-2.68	0.00	-

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 7.3 Conducted Power Measurements, 5 GHz WiFi UNI-1

A04752-Conducted Power Measurements										
Channel	Frequency (MHz)	Measured Power GCL (mW)	Measured Power (dBm)	Rated Avg. Power (dBm)	Delta (dB)	SAR Test Channel	Mode	BW (MHz)	Modulation	
36	5180	13.39	11.27			-	UNI-I 5G	20	OFDM6	802.11a
		10.76	10.32			-			OFDM9	
		9.45	9.75			-			OFDM12	
		3.17	5.01			-			OFDM54	
36	5180	13.39	11.27	13.22	-1.95	Y			OFDM6	
44	5220	21.00	13.22	13.22	0.00	Y				
48	5240	20.37	13.09	13.22	-0.13	Y				
36	5180	12.38	10.93	12.86	-1.93	-			MCS0	802.11n
		6.88	8.38	12.86	-4.48	-			MCS3	
		2.81	4.49	12.86	-8.37	-			MCS7	
40	5200	19.33	12.86	12.86	0.00	-			MCS0	
44	5220	18.79	12.74	12.86	-0.12	-				
48	5240	18.95	12.78	12.86	-0.08	-				
38	5190	4.33	6.36	7.23	-0.87	-		40	MCS0	802.11n40
46	5230	5.29	7.23	7.23	0.00	-				

Table 7.4 Conducted Power Measurements, 5 GHz WiFi UNI-3

A04752-Conducted Power Measurements										
Channel	Frequency (MHz)	Measured Power GCL (mW)	Measured Power (dBm)	Rated Avg. Power (dBm)	Delta (dB)	SAR Test Channel	Mode	BW (MHz)	Modulation	
149	5745	19.61	12.92			-	UNI-3 5G	20	OFDM6	802.11a
		16.34	12.13			-			OFDM9	
		14.20	11.52			-			OFDM12	
		4.72	6.74			-			OFDM54	
149	5745	19.61	12.92	13.05	-0.13	Y			OFDM6	
157	5785	19.45	12.89	13.05	-0.16	Y				
165	5825	20.20	13.05	13.05	0.00	Y				
149	5745	19.50	12.90	12.90	0.00	-			MCS0	802.11n
153	5765	18.92	12.77	12.90	-0.13	-				
157	5785	18.27	12.62	12.90	-0.28	-				
161	5805	18.73	12.73	12.90	-0.17	-				
165	5825	17.90	12.53	12.90	-0.37	-				
151	5755	5.25	7.20	7.20	0.00			40	MCS0	802.11n40
159	5795	5.05	7.03	7.20	-0.17	-				

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

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

8.0 NUMBER OF TEST CHANNELS (N_C)

Table 8.1 Number of Test Channels

Wi-FI SAR Evaluation:

SAR was evaluated in DSSS mode at the maximum duty cycle. The power level setting selected was specified by the manufacturer to be the max output power and produce the most conservative SAR.

As per FCC KDB 248227, the required 802.11 test channels are Ch1, Ch 6 and Ch 11. The mid-channel conducted power at various bit rates was evaluated to derive the worse case and the conducted output power was investigated on channels with this bit rate. The highest conduced power was found on Channel 6. As a result, this channel was selected for initial SAR evaluation.

SAR test reduction methodology was applied to reduce the total number of required test channels from the SAR test evaluation.

When applicable, SAR test reduction methods may be utilized.

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

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

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

2.4 GHz 802.11g/n OFDM SAR Test Exclusion Requirements

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

b) When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.

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

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

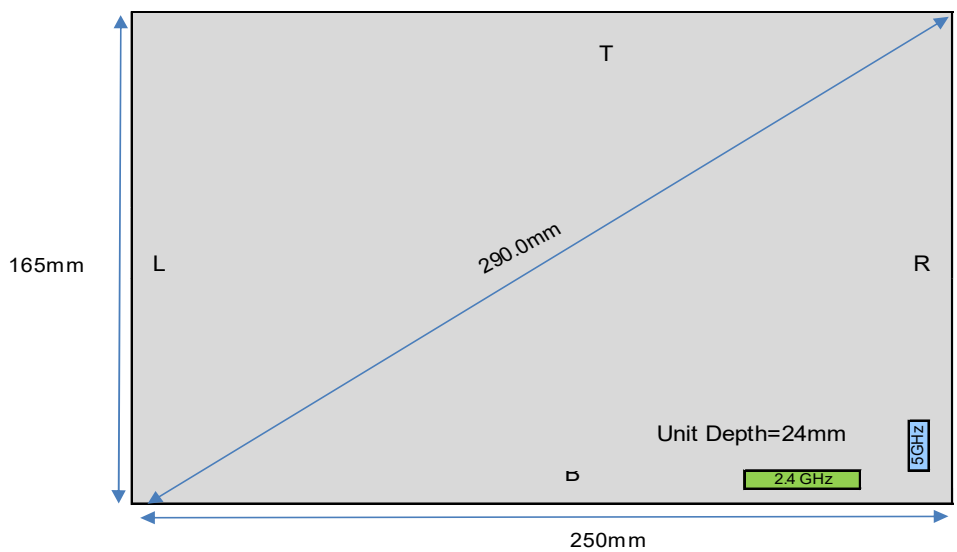
NOTE: The Bluetooth transmitter is capable of simultaneous transmission with the 5GHz WiFi Transmitter. The device SAR was evaluated for simultaneous SAR.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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

1. When the distance is < 50mm exclusion threshold is “Ratio”. when the distance is >50 mm exclusion is in “mW”
2. Maximum power is the source-based-time-average power and represents the maximum RF output power among production units.
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50mm are determined by; (step a)
   [(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)]*[√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR
   - f(GHz) is the f channel transmit frequency in GHz
   - power and distance are rounded to the nearest MW and mm before calculation
   - result is rounded to one decimal place for comparison
   - the values 3.0 and 7.5 are referred to as numeric thresholds in step b
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for test separation distance > 50mm, the SAR test exclusion threshold is determined according to t the following; (step b)
   a) [Power allowed at numeric threshold for 50 mm in step a) + test separation distance - 50mm)*(f(MHz)/150)] mW, at 100 MHz to 1500 MHz
   b) [Power allowed at numeric threshold for 50 mm in step a) + (test separation distance -50mm)* 10] mW at > 1500MHz and ≤ 6GHz

Table 8.2 Antenna Distances



Antenna	Top Edge (mm)	Left Edge (mm)	Bottom Edge (mm)	Right Edge (mm)	Front Depth (mm)	Back Depth (mm)
WLAN/BT	140.0	200.0	17.0	30.0	9.0	9.0
5GHz	120.0	230.0	35.0	10.0	9.0	9.0

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 8.3 SAR test exclusion based on antenna test separation distances Body

SAR Test Exclusion Analysis Antenna Separation to DUT Surfaces A04752					
BODY Configuration (1g)		Band			
		2.4GHz WiFi	5GHz WLAN U-NII-1	5GHz WLAN U-NII-3	BT
Exposure Position	Frequency (MHz)	2480	5240	5825	2480
	Pow er (mW)	11.74	13.22	13.05	0.44
	Antenna Gain (dBi)	1.65	4.26	1.50	1.65
	Total ERP (mW)	17.17	35.26	18.43	0.64
Front Side	Separation Distance (mm)	9.00	9.00	9.00	9.00
	Exclusion Threshold (Pth)(mW)	12.20	7.62	7.13	12.20
	Testing Required	Yes	Yes	Yes	No
Back Side	Separation Distance (mm)	9.00	9.00	9.00	9.00
	Exclusion Threshold (Pth)(mW)	12.20	7.62	7.13	12.20
	Testing Required	Yes	Yes	Yes	No
Top Edge	Separation Distance (mm)	140.00	120.00	120.00	140.00
	Exclusion Threshold (Pth)(mW)	913.11	656.71	645.57	913.11
	Testing Required	No	No	No	No
Bottom Edge	Separation Distance (mm)	17.00	35.00	35.00	17.00
	Exclusion Threshold (Pth)(mW)	22.03	26.21	24.86	22.03
	Testing Required	No	Yes	No	No
Left Edge	Separation Distance (mm)	200.00	230.00	230.00	200.00
	Exclusion Threshold (Pth)(mW)	1769.04	2752.14	2748.90	1769.04
	Testing Required	No	No	No	No
Right Edge	Separation Distance (mm)	33.00	10.00	10.00	33.00
	Exclusion Threshold (Pth)(mW)	98.90	6.25	5.84	98.90
	Testing Required	No	Yes	Yes	No

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 8.4 SAR test exclusion based on antenna test separation distances Extremity

SAR Test Exclusion Analysis Antenna Separation to DUT Surfaces					
A04752					
EXTREMITY Configuration (10g)		4 Band			
		2.4GHz WiFi	5GHz WLAN U-NII-1	5GHz WLAN U-NII-3	BT
Exposure Position	Frequency (MHz)	2480	5240	5825	2480
	Pow er (mW)	11.74	13.22	13.05	0.44
	Antenna Gain (dBi)	1.65	4.26	1.50	1.65
	Total ERP (mW)	17.17	35.26	18.43	0.64
Front Side	Separation Distance (mm)	9.00	9.00	9.00	9.00
	Exclusion Threshold (Pth)(mW)	30.50	19.04	17.81	30.50
	Testing Required	No	Yes	Yes	No
Back Side	Separation Distance (mm)	9.00	9.00	9.00	9.00
	Exclusion Threshold (Pth)(mW)	30.50	19.04	17.81	30.50
	Testing Required	No	Yes	Yes	No
Top Edge	Separation Distance (mm)	140.00	120.00	120.00	140.00
	Exclusion Threshold (Pth)(mW)	2282.78	1641.76	1613.91	2282.78
	Testing Required	No	No	No	No
Bottom Edge	Separation Distance (mm)	17.00	35.00	35.00	17.00
	Exclusion Threshold (Pth)(mW)	55.07	65.53	62.15	55.07
	Testing Required	No	No	No	No
Left Edge	Separation Distance (mm)	200.00	230.00	230.00	200.00
	Exclusion Threshold (Pth)(mW)	4422.61	6880.36	6872.25	4422.61
	Testing Required	No	No	No	No
Right Edge	Separation Distance (mm)	30.00	10.00	10.00	30.00
	Exclusion Threshold (Pth)(mW)	247.25	15.64	14.60	247.25
	Testing Required	No	Yes	Yes	No

9.0 ACCESSORIES EVALUATED

Table 9.1 Manufacturer's Accessory List

There are no manufacturer's accessories available when used in a portable application.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

10.0 SAR MEASUREMENT SUMMARY

Table 10.1: Measured Results, Body (1g)

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)	Duty Factor (%)	reported SAR (W/kg)
			Pos	Mode	BW	Mod	BR		DUT (mm)	Antenna (mm)							
9/12/2023	B1	2437	Front	802.11b	20	CCK	1	- - - -	0	9	0.019	0.440	-0.150	1.028	1.000	100.000	0.020
9/12/2023	B2	2437	Back	802.11b	20	CCK	1	- - - -	0	9	0.046	0.460	-0.150	1.028	1.000	100.000	0.049
9/12/2023	B3	2437	Bottom Edge	802.11b	20	CCK	1	- - - -	0	8	0.047	0.530	-0.150	1.028	1.000	100.000	0.050
9/12/2023	B4	2412	Bottom Edge	802.11b	20	CCK	1	- - - -	0	9	0.058	0.710	-0.220	1.028	1.000	100.000	0.063
9/12/2023	B5	2462	Bottom Edge	802.11b	20	CCK	1	- - - -	0	9	0.044	1.590	0.000	1.028	1.000	100.000	0.045
9/15/2023	B10	5220	Front	UNII-1	20	OFDM6	6	- - - -	0	9	0.165	-0.450	0.000	1.389	1.000	100.000	0.254
9/15/2023	B11	5220	Back	UNII-1	20	OFDM6	6	- - - -	0	9	0.248	1.220	0.000	1.389	1.000	100.000	0.344
9/15/2023	B12	5220	Bottom Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.097	0.440	0.000	1.389	1.000	100.000	0.134
9/15/2023	B13	5220	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.747	-0.020	0.000	1.389	1.000	100.000	1.042
9/15/2023	B14	5180	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.353	0.040	-1.950	1.389	1.000	100.000	0.768
9/15/2023	B15	5240	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.482	0.170	-0.130	1.389	1.000	100.000	0.690
9/18/2023	B20	5745	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	8	0.219	-0.010	-0.130	1.389	1.000	100.000	0.314
9/18/2023	B21	5785	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	w/c	0.205	-0.140	-0.160	1.389	1.000	100.000	0.305
9/18/2023	B22	5825	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	8	0.301	-0.050	0.000	1.389	1.000	100.000	0.423
Applicable SAR Limit								Use Group					Limit				
FCC CFR 2.1093			Health Canada Safety Code 6					General Population/User Unaware					1.6 W/kg				

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 10.2: Measured Results, Extremity (10g)

Measured 10g SAR Results - EXTREMITY 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)	Duty Factor (%)	reported SAR (W/kg)
			Pos	Mode	BW	Mod	BR		DUT (mm)	Antenna (mm)							
9/12/2023	E1	2437	Front	802.11b	20	CCK	1	- - - -	0	9	0.011	0.440	-0.150	1.028	1.000	100.000	0.011
9/12/2023	E2	2437	Back	802.11b	20	CCK	1	- - - -	0	9	0.023	0.460	-0.150	1.028	1.000	100.000	0.025
9/12/2023	E3	2437	Bottom Edge	802.11b	20	CCK	1	- - - -	0	8	0.024	0.530	-0.150	1.028	1.000	100.000	0.026
9/12/2023	E4	2412	Bottom Edge	802.11b	20	CCK	1	- - - -	0	8	0.028	0.710	-0.220	1.028	1.000	100.000	0.030
9/12/2023	E5	2462	Bottom Edge	802.11b	20	CCK	1	- - - -	0	8	0.023	1.590	0.000	1.028	1.000	100.000	0.023
9/15/2023	E10	5220	Front	UNII-1	20	OFDM6	6	- - - -	0	9	0.066	-0.450	0.000	1.389	1.000	100.000	0.102
9/15/2023	E11	5220	Back	UNII-1	20	OFDM6	6	- - - -	0	9	0.097	1.220	0.000	1.389	1.000	100.000	0.134
9/15/2023	E12	5220	Bottom Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.038	0.440	0.000	1.389	1.000	100.000	0.053
9/15/2023	E13	5220	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.265	-0.020	0.000	1.389	1.000	100.000	0.370
9/15/2023	E14	5180	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.131	0.040	-1.950	1.389	1.000	100.000	0.285
9/15/2023	E15	5240	Right Edge	UNII-1	20	OFDM6	6	- - - -	0	8	0.186	0.170	-0.130	1.389	1.000	100.000	0.266
9/18/2023	E20	5745	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	8	0.081	-0.010	-0.130	1.389	1.000	100.000	0.117
9/18/2023	E21	5785	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	8	0.078	-0.140	-0.160	1.389	1.000	100.000	0.115
9/18/2023	E22	5825	Right Edge	UNII-3	20	OFDM6	6	- - - -	0	8	0.106	-0.050	0.000	1.389	1.000	100.000	0.149
Applicable SAR Limit								Use Group					Limit				
FCC CFR 2.1093			Health Canada Safety Code 6					General Population/User Unaware					4 W/kg				

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

11.0 SCALING OF MAXIMUM MEASURE SAR

Table 11.1 SAR Scaling – Body (1g)

Scaling of Maximum Measured SAR (1g)					
Measured Parameters		Configuration			
		Body	Body		
Plot ID		B4	B13		
Maximum Measured SAR_M		0.058	0.747		(W/kg)
Frequency		2412	5220		(MHz)
Drift	Power Drift	0.710 (1)	-0.020		(dB)
Conducted Power		10.480	13.220		(dBm)
DC	Transmit Duty Cycle	97.300	72.0		(%)
Fluid Deviation from Target					
Δe	Permitivity	-8.48%	-8.51%		
Δσ	Conductivity	2.95%	3.21%		

Note(1): Power Drift is Positive, Drift Adjustment 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)
$C\sigma = (0.009804*f^3) - (0.08661*f^2) + (0.02981*f) + 0.7829$					(10)
f	Frequency (GHz)	2.412	5.22		
Ce		-0.225	-0.201		
Cσ		0.489	-0.027		
Ce * Δe		0.019	0.017		
Cσ * Δσ		0.014	-0.001		
ΔSAR		0.034 (3)	0.016 (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	10.480	13.220		(dBm)
Rated Conducted Power	10.700	13.220		(dBm)
ΔP	-0.220	0.000 (4)		(dB)

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

Crest Factor				
Transmit Duty Cycle (DC)	97.300	72.0		(%)
CF (1/DC)	1.028	1.39 (5)		

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

SAR Adjustment for Fluid Sensitivity				
$SAR_1 = SAR_M$ X [ΔSAR]	0.058	0.747		(W/kg)

SAR Adjustment for Tuneup Tolerance				
$SAR_2 = SAR_1$ + [ΔP]	0.061	0.747		(W/kg)

SAR Adjustment for Drift				
$SAR_3 = SAR_2$ + [Drift]	0.061	0.750		(W/kg)

SAR Adjustment for Crest Factor				
$SAR_4 = SAR_3$ x [CF]	0.063	1.042		(W/kg)

reported 1g SAR				
SAR_4	**0.06**	**1.04**		(W/kg)

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 11.2 SAR Scaling – Extremity (10g)

Scaling of Maximum Measured SAR (10g)					
Measured Parameters		Configuration			
		Extremity	Extremity		
Plot ID		E4	E13		
Maximum Measured SAR_M		0.028	0.265		(W/kg)
Frequency		2412	5220		(MHz)
Drift	Power Drift	0.710 (1)	-0.020		(dB)
Conducted Power		10.480	13.220		(dBm)
DC	Transmit Duty Cycle	97.300	72.0		(%)
Fluid Deviation from Target					
Δe	Permitivity	-8.48%	-8.51%		
Δσ	Conductivity	2.95%	3.21%		

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

Fluid Sensitivity Calculation (10g)			IEC/IEEE 62209-1528 7.8.2		
Delta SAR = Ce * Δe + Cσ * Δσ					(8)
$Ce = (0.003456*f^3) - (0.03531*f^2) + (0.07675*f) - 0.186$					(11)
$C\sigma = (0.004479*f^3) - (0.01586*f^2) - (0.1972*f) + 0.7717$					(12)
f	Frequency (GHz)	2.412	5.22		
Ce		-0.158	-0.256		
Cσ		0.267	-0.053		
Ce * Δe		0.013	0.022		
Cσ * Δσ		0.008	-0.002		
ΔSAR		0.021 (3)	0.020 (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	10.480	13.220		(dBm)
Rated Conducted Power	10.700	13.220		(dBm)
ΔP	-0.220 (4)	0.000 (4)		(dB)

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

Crest Factor				
Transmit Duty Cycle (DC)	97.300	72.0		(%)
CF (1/DC)	1.028 (5)	1.39 ###		

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

SAR Adjustment for Fluid Sensitivity				
$SAR_1 = SAR_M$ X [ΔSAR]	0.028	0.265		(W/kg)
SAR Adjustment for Tuneup Tolerance				
$SAR_2 = SAR_1$ + [ΔP]	0.029	0.265		(W/kg)
SAR Adjustment for Drift				
$SAR_3 = SAR_2$ + [Drift]	0.029	0.266		(W/kg)
SAR Adjustment for Crest Factor				
$SAR_4 = SAR_3$ x [CF]	0.030	0.370		(W/kg)
***reported* 10g SAR**				
SAR_4	**0.03**	**0.37**		(W/kg)

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

NOTES to Table
Scaling of the Maximum Measured SAR is based on the highest Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face, Body and/or Head 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 the Annexes of this report. NOTE: Some of the scaling factors in Steps 1 through 4may not apply and are identified by grayed fields.
Step 1 Per IEC/IEEE 62209-1528, FCC KDB 865664, ISED RSS-102 and ISED Notice 2012-DRS0529 . 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 IEC/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. 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/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. Scaling required only when Measured Drift is (-) Negative. The absolute value of Measured Drift is added to Reported.
Step 4 Per IEC/IEEE 62209-1528, FCC KDB 865664 and ISED RSS-102. When the transmit Duty Cyle (DC) is less than 100%, the *reported* SAR must be scaled to 100% by the Crest Factor (CF). CF = 1/DC where DC is in decimal.
Step 5 The Reported SAR is the Maximum Final Adjusted SAR from the applicable Steps 1 through 4and are reported on Page 1 of this report.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

11.3 Simultaneous SAR

The estimated Bluetooth SAR, in accordance with FCC KDB 447498 D01v06 4.3.2 (b)(1), is given by:

$$SAR = \frac{P}{d} X \frac{\sqrt{f}}{x}$$

Where P is power, *mW*, d is separation distance, *mm*, f is frequency, *GHz* and x = 7.5 for 1g SAR and 18.75 for 10g SAR

1g SAR ; 0.44mW, d = 5mm, f = 2.440GHz = 0.018W/kg
10g SAR; 0.44mW, d = 5mm, f = 2.440GHz = 0.007W/kg

Simultaneous SAR = SAR_1 + SAR_2

Where SAR_1 = highest measured ***reported*** SAR, SAR_2 = *Standalone* Bluetooth SAR
5Ghz Body Config (1g) SAR_1 = 1.04W/kg, SAR_2 = 0.018W/kg
5Ghz Extremity Config (10g) SAR_1 = 0.37W/kg, SAR_2 = 0.007W/kg

1g Simultaneous *reported* SAR = 1.06W/kg

10g Simultaneous *reported* SAR = 0.38W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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.			

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

13.0 DETAILS OF SAR EVALUATION

13.1 Day Log

DAY LOG								
Date	Ambient Temp (°C)	Fluid Temp (°C)	Relative Humidity (%)	Barometric Pressure (kPa)	Fluid Dielectric	SPC	Test	
11 Sep 2023	23.3	23.4	33%	101.3	X	X		2450H
12 Sep 2023	25.4	22.5	34%	101.4			X	2450H
15 Sep 2023	22.8	23.7	35%	101.3	X	X	X	5250H
18 Sep 2023	22.7	22.4	36%	101.1	X	X	X	5750H

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

13.2 DUT Setup and Configuration

DUT Setup and Configuration
Overview
The DUT was evaluated for Body SAR at the maximum conducted output power level, preset by the manufacturer, with a fully charged battery in unmodulated continuous transmit operation (Maximum duty cycle), as provided by the manufacturer with a unit set up and pre-installed with Compliance Test Mode.

13.3 DUT Positioning

DUT Positioning
Positioning
The DUT Positioner was securely fastened to the Phantom Platform to ensure consistent positioning of the DUT for each test evaluation.
FACE Configuration
This device is not capable of voice communication and was not tested in the FACE configuration.
BODY Configuration
There are no Body-Worn and Audio Accessories for this device however the device could be rested on the torso while transmitting. BODY configuration was evaluted at a separation distance of 5mm.
HEAD Configuration
This device is not intended to be held to the ear and was not tested in the HEAD configuration.
EXTREMITY Configuration
The DUT, was securely clamped into the device holder with the surface of the DUT normally in contact with the body (hand) in direct contact with the bottom of the phantom, or 0mm separation from the DUT to the phantom resembling that for which it was intended to be used.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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
The 1g SAR, 10g SAR and power drift measurements are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The SAR values shown in the SAR column are the SAR values reported by the SAR Measurement Server with the DUT operating at maximum transmit duty cycle. These tables also include other information such as transmit channel and frequency, modulation, accessories tested and DUT-phantom separation distance. In the Scaling of Maximum Measured SAR Section of this report, the highest measured SAR in the BODY configuration, within the entire scope of this assessment, are, when applicable, scaled for Fluid Sensitivity, Manufacturer's Tune-Up Tolerance, Simultaneous Transmission and Drift. With the exception of Duty Cycle correction/compensation, SAR values are ONLY scaled up, not down. The final results of this scaling is the *reported SAR* which appears on the Cover Page of this report.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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 62209-1528 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 IEC 62209-1528 "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**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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**
Phantom	**ELI**
Fluid Depth	**150 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

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**
Phantom	**ELI**
Fluid Depth	**100 ± 5 mm**
An Area Scan with an area extending beyond the device was used to locate the candidate maximas within 2dB of the global maxima.	
A Zoom Scan centered over the peak SAR location(s) determined by the Area Scan was used to determine the 1-gram and 10-gram peak spatial-average SAR	

14.0 MEASUREMENT UNCERTAINTIES

Table 14.1 Measurement Uncertainty

Per FCC KDB 865664 D01v01r04, 2.8.2, SAR Measurement Uncertainty is only required when the *reported* SAR is:

≥ 1.5 W/kg (General Population) 1g
≥ 3.75 W/kg (General Population) 10g Extremity
≥ 7.5 W/kg (Occupational) 1g
≥ 18.75 W/kg (Occupational) 10g Extremity

The highest *reported* SAR for this evaluation is < 1.5 W/kg.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

15.0 FLUID DIELECTRIC PARAMETERS

Table 15.1 Fluid Dielectric Parameters 2450MHz HEAD TSL

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 11-Sep-2023		Fluid Temp: 23.4		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		35.9700	1.8100	39.2700	1.76	-8.40%	2.84%	0.033	0.021	1.000	1.000
2412.0000	*	35.9360	1.8140	39.2660	1.76	-8.48%	2.95%	0.034	0.021	1.000	1.000
2420.0000		35.8000	1.8300	39.2500	1.77	-8.79%	3.39%	0.036	0.023	1.000	1.000
2430.0000		35.8400	1.8400	39.2400	1.78	-8.66%	3.37%	0.036	0.023	1.000	1.000
2437.0000	*	35.7770	1.8540	39.2260	1.79	-8.79%	3.75%	0.038	0.024	1.000	1.000
2440.0000		35.7500	1.8600	39.2200	1.79	-8.85%	3.91%	0.039	0.024	1.000	1.000
2450.0000		35.7700	1.8600	39.2000	1.80	-8.75%	3.33%	0.036	0.023	1.000	1.000
2451.0000	*	35.7610	1.8620	39.1990	1.80	-8.77%	3.39%	0.036	0.023	1.000	1.000
2457.0000	*	35.7070	1.8740	39.1930	1.81	-8.89%	3.71%	0.038	0.024	1.000	1.000
2460.0000		35.6800	1.8800	39.1900	1.81	-8.96%	3.87%	0.039	0.024	1.000	1.000

Table 15.2 Fluid Dielectric Parameters 5250MHz HEAD TSL

FLUID DIELECTRIC PARAMETERS								Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date: 15-Sep-2023		Fluid Temp: 24.1		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		33.2800	4.6900	36.0200	4.62	-7.61%	1.52%	0.015	0.019	1.000	1.000
5180.0000	*	33.1900	4.7100	36.0100	4.63	-7.83%	1.73%	0.015	0.019	1.000	1.000
5190.0000		33.2600	4.8500	36.0000	4.64	-7.61%	4.53%	0.014	0.017	1.000	1.000
5210.0000		33.0400	4.7700	35.9700	4.67	-8.15%	2.14%	0.016	0.020	1.000	1.000
5220.0000	*	32.9000	4.8300	35.9600	4.68	-8.51%	3.21%	0.016	0.020	1.000	1.000
5230.0000		33.0800	4.8400	35.9500	4.69	-7.98%	3.20%	0.015	0.019	1.000	1.000
5240.0000	*	33.0200	4.8400	35.9400	4.70	-8.12%	2.98%	0.015	0.019	1.000	1.000
5250.0000		33.1800	4.8600	35.9300	4.71	-7.65%	3.18%	0.014	0.018	1.000	1.000

*Channel Frequency Tested

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 15.3 Fluid Dielectric Parameters 5750MHz HEAD TSL

FLUID DIELECTRIC PARAMETERS									Fluid Sensitivity Calculation IEC/IEEE 62209-1528 7.8.2			
Date:	18-Sep-2023	Fluid Temp:	23.5	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		33.8900	5.5200	35.3700	5.21	-4.18%	5.95%		0.006	0.009	1.000	1.000
5745.0000	*	33.7550	5.5100	35.3650	5.22	-4.55%	5.66%		0.006	0.010	1.000	1.000
5750.0000		33.6200	5.5000	35.3600	5.22	-4.92%	5.36%		0.007	0.011	1.000	1.000
5780.0000		32.9800	5.4700	35.3200	5.25	-6.63%	4.19%		0.011	0.015	1.000	1.000
5785.0000	*	32.9100	5.5100	35.3150	5.26	-6.81%	4.85%		0.011	0.016	1.000	1.000
5790.0000		32.8400	5.5500	35.3100	5.26	-7.00%	5.51%		0.011	0.016	1.000	1.000
5820.0000		32.6900	5.6800	35.2800	5.29	-7.34%	7.37%		0.011	0.016	1.000	1.000
5825.0000	*	32.8200	5.6800	35.2750	5.30	-6.96%	7.27%		0.011	0.016	1.000	1.000
5830.0000		32.9500	5.6800	35.2700	5.30	-6.58%	7.17%		0.010	0.015	1.000	1.000

*Channel Frequency Tested

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.1 System Verification Results 2450MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
11 Sep 2023		2450	D2450V2		825
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.4	23	33%	250	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
35.77	39.20	-8.75%	1.86	1.80	3.33%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
14.49	13.18	9.93%	6.52	6.01	8.58%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
57.96	52.72	9.93%	26.08	24.02	8.60%

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.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 16.2 System Verification Results 5250MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
15 Sep 2023		5250	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	23.7	23	35%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
33.18	35.93	-7.65%	4.86	4.71	3.18%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.80	3.97	-4.37%	1.09	1.15	-4.85%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
76.00	79.47	-4.37%	21.80	22.91	-4.85%

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.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Table 16.3 System Verification Results 5750MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
18 Sep 2023		5750	D5GHzV2		1031
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	22.4	23	36%	50	10
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
33.62	35.36	-4.92%	5.50	5.22	5.36%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
3.72	3.78	-1.51%	1.05	1.10	-4.59%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
74.40	75.54	-1.51%	21.00	22.01	-4.59%

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.

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

17.0 SYSTEM VALIDATION SUMMARY

Table 17.0 System Validation Summary

SAR Validation Summary Chart							
Validation Date	Probe Model	Probe S/N	Validation Source	Frequency (MHz)	Validation Results		
					Linearity	Isotropy	Extrapolation
21-Jun-23	EX3DV4	7826	D2450V2	2450	Pass	Pass	Pass
28-Jun-23	EX3DV4	7826	D5GHzV2	5250	Pass	Pass	Pass
30-Jun-23	EX3DV4	7826	D5GHzV2	5750	Pass	Pass	Pass

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

18.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 18.1 Measurement System Specifications

Measurement System Specification	
Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: TX90XL
Repeatability	+/- 0.035 mm
No. of axis	6.0
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	Intel(R) Core(TM) i7-7700
Clock Speed	3.60 GHz
Operating System	Windows 10 Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY6, V 6.4.0.12171 / DASY52 V52.10.0.1446
	Postprocessing Software: SEMCAD X, V14.6.10(Deployment Build)
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	Intel ULV Celeron CPU 400 MHz; 128 MB chip disk; 128 MB RAM
Connections	COM1, COM2, DAE, Robot, Ethernet, Service Interface
E-Field Probe	
Model	EX3DV4
Construction	Triangular core fiber optic detection system
Frequency	4 MHz to 10 GHz
Linearity	±0.2 dB (30 MHz to 10 GHz)
Phantom	
Type	ELI Elliptical Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 30 Liter
Phantom	
Type	SAM Flat Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	approx. 25 Liter
Phantom	
Type	MFP Flat Planar Phantom
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	approx.8.1 Liter

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

Measurement System Specification (Continued)

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, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.	 **ELI Phantom**

Phantom Specification

The SAM V4.0 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, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.	 **SAM 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, IEEE 1528-2013, IEC 62209-1 and IEC 62209-2.	 **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°. 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**

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

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	16-Apr-23	16-Apr-24
-EX3DV4 E-Field Probe	00357	7826	16-May-23	16-May-24
-D2450V2 Validation Dipole	00219	825	24-Apr-21	24-Apr-24
ELI Phantom	00247	1234	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00007	1835801	10-May-22	10-May-25
Gigatronics 80334A Power Sensor	00237	1837001	10-May-22	10-May-25
HP 8753ET Network Analyzer	00134	US39170292	06-Jan-21	06-Jan-24
Rohde & Schwarz SMR20 Signal Generator	00006	100104	11-Aug-20	COU
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
Bipolar Power Supply 6299A	00086	1144A02155	CNR	CNR
DC-18G 10W 30db Attenuator	00102	-	COU	COU
R&S FSP40 Spectrum Analyzer	00241	100500	09-Aug-21	09-Aug-24
RF Cable-SMA	00311	-	CNR	CNR
HP Calibration Kit	00145	-	CNR	CNR

CNR = Calibration Not Required

COU = Calibrate on Use

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

20.0 FLUID COMPOSITION

Table 20.1 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 20.4 Fluid Composition 5250, 5750MHz 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**

END OF REPORT

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

APPENDIX A – SYSTEM VERIFICATION PLOTS

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 = 1.86 S/m; ε_r = 35.77; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 9/11/2023 3:41:11 PM

DASY5 Configuration:

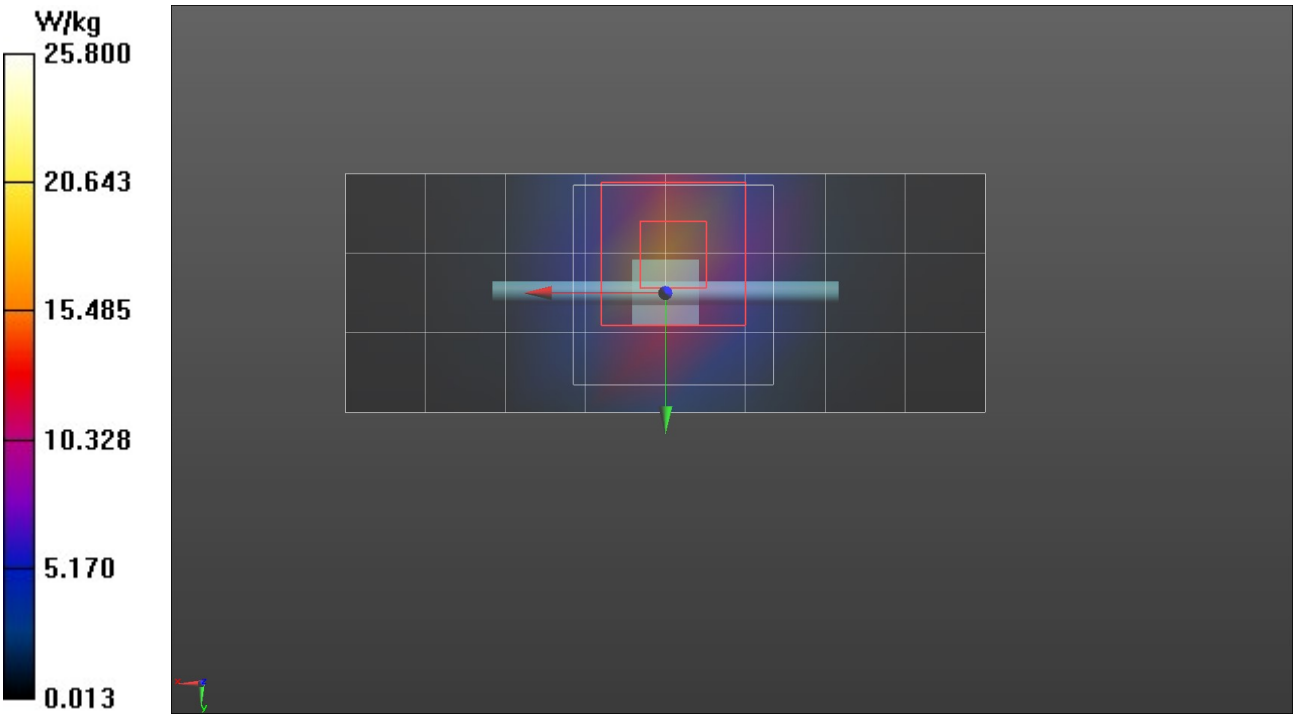
- Probe: EX3DV4 - SN7826; ConvF(7.91, 7.42, 7.62) @ 2450 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

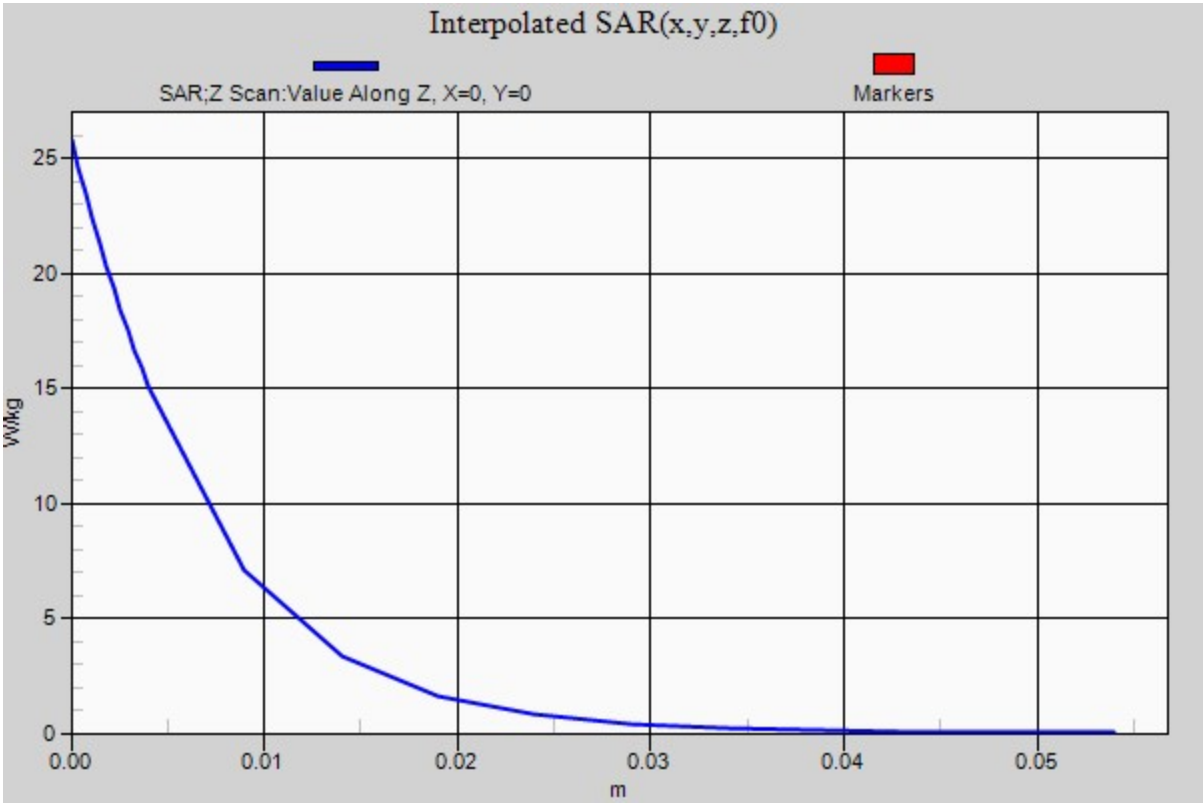
SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_/Area Scan (9x4x1): Measurement grid: dx=12mm, dy=12mm
Maximum value of SAR (measured) = 16.1 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 89.50 V/m; Power Drift = 0.16 dB
Peak SAR (extrapolated) = 31.8 W/kg
SAR(1 g) = 14.49 W/kg; SAR(10 g) = 6.52 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 46.6%
Maximum value of SAR (measured) = 16.5 W/kg

SPC/SPC 2450H_Input=250mw, Target=[11.86]13.18][14.50]W/kg_/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 6.753 (6.588, 6.821) [mm]
Maximum value of SAR (interpolated) = 25.8 W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.


W/kg
25.800
20.643
15.485
10.328
5.170
0.013


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_ 2

Communication System: UID 0, CW (0); Frequency: 5250 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5250 MHz; σ = 4.86 S/m; ε_r = 33.18; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 9/15/2023 1:34:44 PM

DASY5 Configuration:

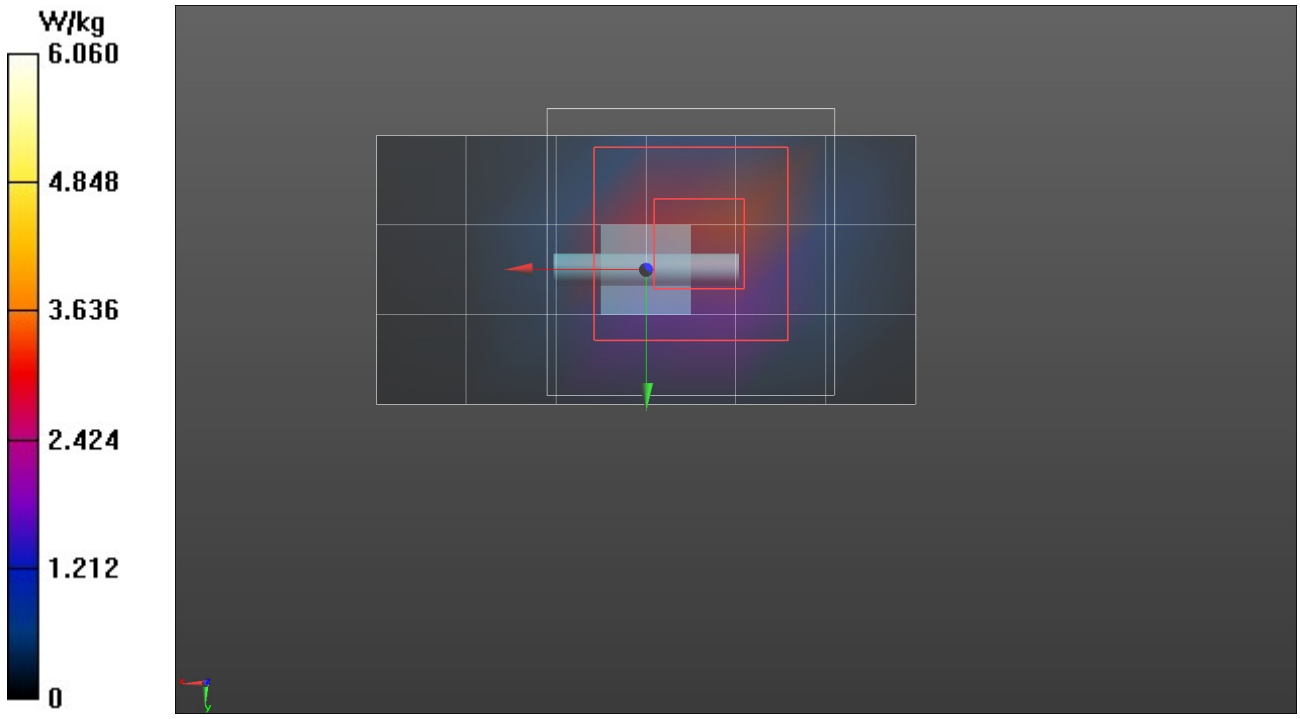
- Probe: EX3DV4 - SN7826; ConvF(5.59, 5.24, 5.42) @ 5250 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection), Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

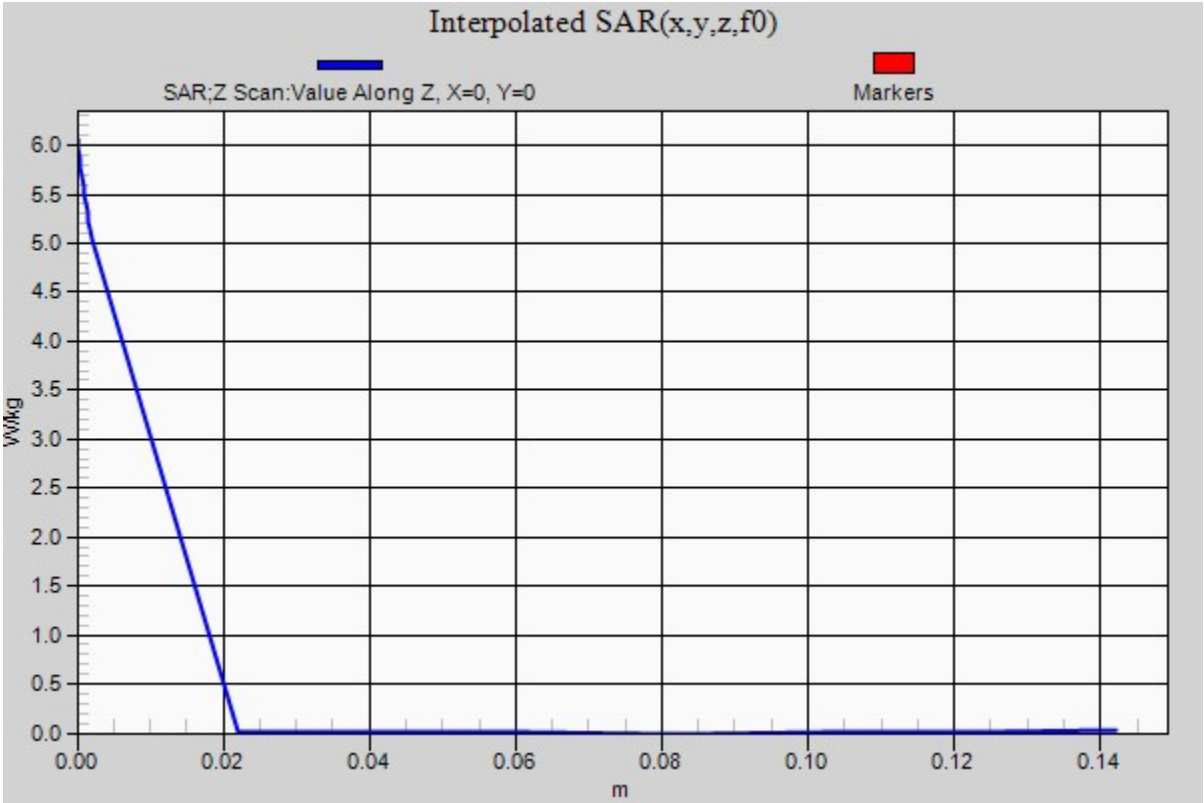
SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw_ 2/Area Scan (7x4x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 3.26 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw_ 2/Zoom Scan (9x9x6)/Cube 0:
Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 24.28 V/m; Power Drift = 0.42 dB
Peak SAR (extrapolated) = 15.9 W/kg
SAR(1 g) = 3.8 W/kg; SAR(10 g) = 1.09 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 53.6%
Maximum value of SAR (measured) = 7.97 W/kg

SPC/SPC 5250H Input=47 mw, Target= [3.36[3.74][4.11] Target=79.47W/kg@1000mw_ 2/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 3.584) [mm]
Maximum value of SAR (interpolated) = 6.06 W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.





©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:xxx
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 = 5.5 S/m; ε_r = 33.62; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 9/18/2023 12:48:03 PM

DASY5 Configuration:

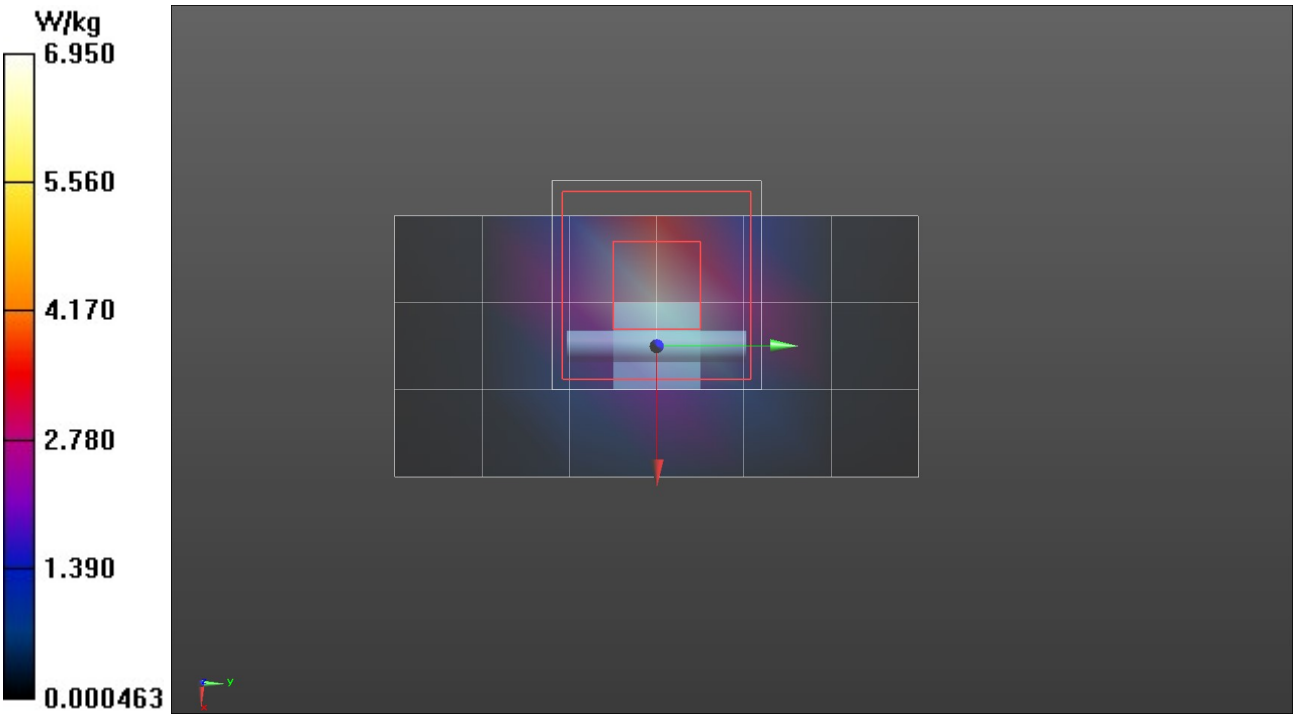
- Probe: EX3DV4 - SN7826; ConvF(5.14, 4.73, 4.93) @ 5750 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 2mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

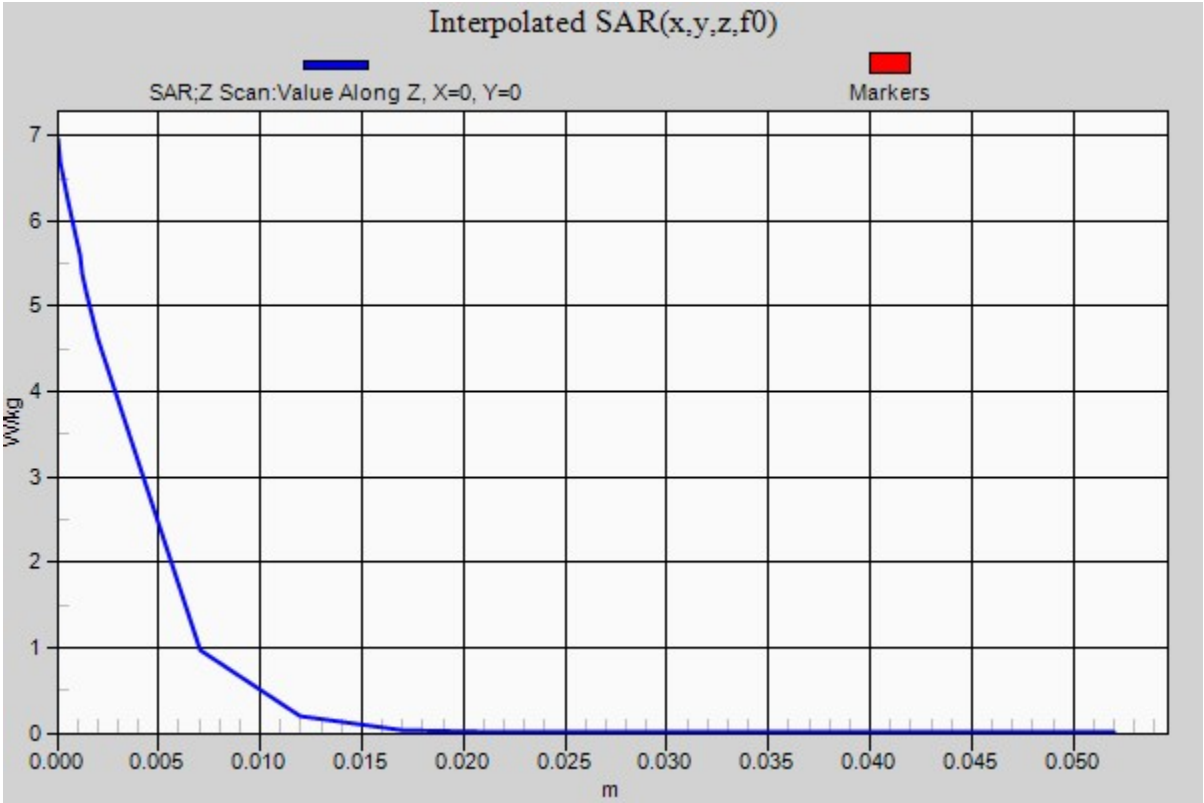
SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw/Area Scan (4x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 7.60 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw/Zoom Scan (7x7x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 21.42 V/m; Power Drift = 0.44 dB
Peak SAR (extrapolated) = 17.0 W/kg
SAR(1 g) = 3.72 W/kg; SAR(10 g) = 1.05 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 50.5%
Maximum value of SAR (measured) = 7.93 W/kg

SPC/SPC 5750H Input=50mw, Target=[3.40][3.78][4.16], Target=75.54W/kg@1000 mw/Z Scan (1x1x22): Measurement grid: dx=20mm, dy=20mm, dz=5mm
Penetration depth = 3.046 (3.235, 3.076) [mm]
Maximum value of SAR (interpolated) = 6.95 W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.





©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR

B4/E4

DUT: A04752; Type: Transmitter; Serial: Sample Prototype
Procedure Name: B4-A04752, Bottom Edge -P, 2412MHz 1mb,WIFI

Communication System: UID 0, CW (0); Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.814 S/m; ε_r = 35.936; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 9/12/2023 4:03:15 PM

DASY5 Configuration:

- Probe: EX3DV4 - SN7826; ConvF(7.91, 7.42, 7.62) @ 2412 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

2450H/B4- A04752, Bottom Edge -P, 2412MHz 1mb,WIFI/Area Scan (15x6x1): Measurement grid: dx=12mm, dy=12mm

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0688 W/kg

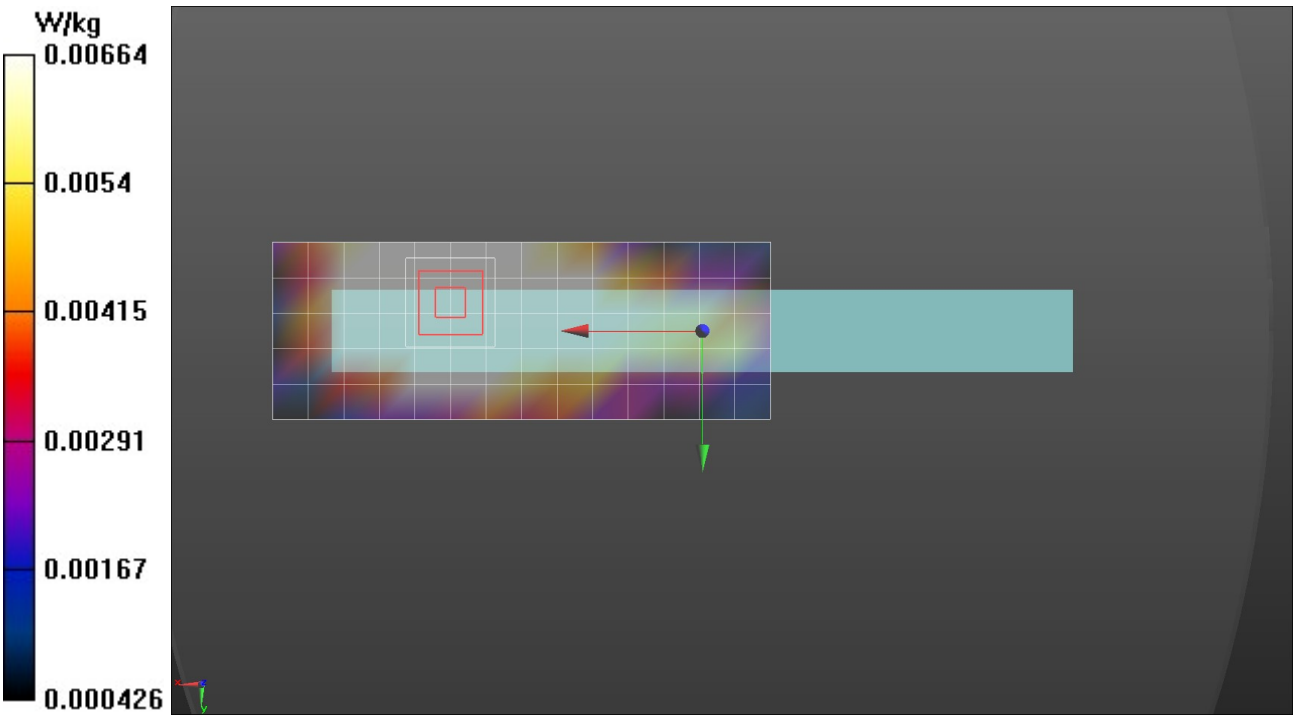
2450H/B4- A04752, Bottom Edge -P, 2412MHz 1mb,WIFI/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 3.197 V/m; Power Drift = 0.71 dB
Peak SAR (extrapolated) = 0.120 W/kg
SAR(1 g) = 0.058 W/kg; SAR(10 g) = 0.028 W/kg
Ratio of SAR at M2 to SAR at M1 = 47.5%

Info: Interpolated medium parameters used for SAR evaluation.
Maximum value of SAR (measured) = 0.0966 W/kg

2450H/B4-A04752, Bottom Edge -P, 2412MHz 1mb,WIFI/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm

Info: Interpolated medium parameters used for SAR evaluation.
Penetration depth = n/a (n/a, 8.399) [mm]
Maximum value of SAR (interpolated) = 0.00664 W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.



©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.

B13/E13

DUT: A04752; Type: Transmitter; Serial: Sample Prototype
Procedure Name: B13-A04752,Right Edge -P, 5220MHz OFDM6 20MHz,WIFI

Communication System: UID 0, CW (0); Frequency: 5220 MHz;Duty Cycle: 1:1
Medium parameters used: f = 5220 MHz; σ = 4.83 S/m; ε_r = 32.9; ρ = 1000 kg/m^3
Phantom section: Flat Section

Date/Time: 9/15/2023 5:07:56 PM

DASY5 Configuration:

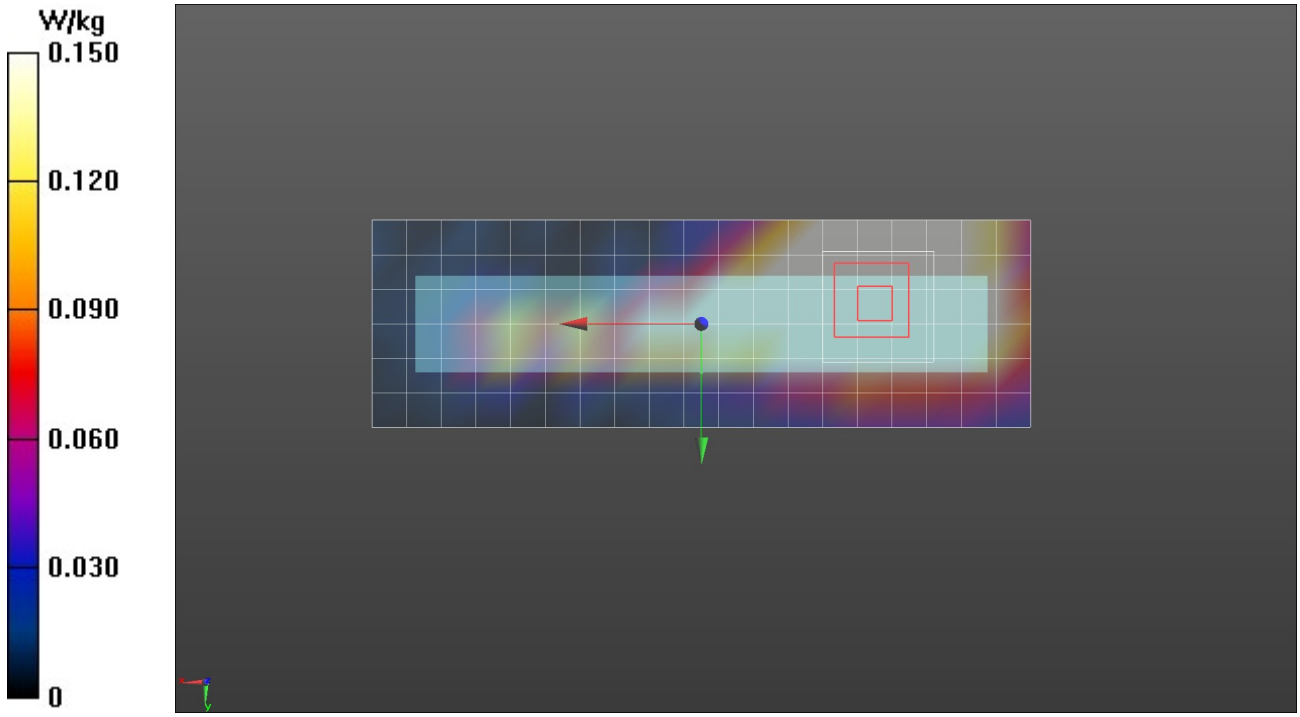
- Probe: EX3DV4 - SN7826; ConvF(5.59, 5.24, 5.42) @ 5220 MHz; Calibrated: 5/16/2023
- Sensor-Surface: 1.4mm (Mechanical Surface Detection), Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353; Calibrated: 4/18/2023
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax; Serial: 1234
- Measurement SW: DASY52, Version 52.10 (3); SEMCAD X Version 14.6.13 (7474)

5250H/B13-A04752,Right Edge -P, 5220MHz OFDM6 20MHz,WIFI/Area Scan (20x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 1.44 W/kg

5250H/B13-A04752,Right Edge -P, 5220MHz OFDM6 20MHz,WIFI/Zoom Scan (9x9x6)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=2mm
Reference Value = 7.641 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.02 W/kg
SAR(1 g) = 0.747 W/kg; SAR(10 g) = 0.265 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 51.8%
Maximum value of SAR (measured) = 1.78 W/kg

5250H/B13-A04752,Right Edge -P, 5220MHz OFDM6 20MHz,WIFI/Z Scan (1x1x19): Measurement grid: dx=20mm, dy=20mm, dz=20mm
Penetration depth = n/a (n/a, 0) [mm]
Maximum value of SAR (interpolated) = 0.150 W/kg

©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.



©2023 Celltech Labs Inc. This document is not to be reproduced in whole or in part without the expressed written permission of Celltech Labs Inc.