Test Report Serial Number:	16122-R1.1
Test Report Date:	26 February 2016
Project Number:	1342

SAR Test Report

Applicant:

Going further in critical communications

Sepura PLC
9000 Cambridge Research Park Beach Drive,
WaterBeach
Cambridge, UK, CB25 9TL

Maximum Reported 1g SAR			
FCC	FACE:	0.72	W/kg
	BODY:	0.79	
	HEAD:	1.92	
IC	FACE:	0.72	
	BODY:	0.81	
	HEAD:	1.95	
Occupational Limit:		8.00	

FCC ID: **XX6SC2024**

IC Registration Number: **8739A-SC2024**

Product Model Number / HVIN: **SC2024**

Product Name / PMN: **SC2024**

In Accordance With:

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

Health Canada Safety Code 6
Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300GHz

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-1

FCC Registration: 714830

TABLE OF CONTENTS

1.0 DOCUMENT CONTROL

Tested By:	**Jasmeet Gill**
Prepared By:	**Art Voss**
Reviewed By:	**Art Voss**

Issue Number	Description	By	Issue Date
1.0	Initial Release	Art Voss	29 February 2016

2.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2	Code of Federal Regulations
Title 47:	Telecommunication
Part 2.1093:	Radiofrequency Radiation Exposure Evaluation: Portable Devices
Health Canada	
Safety Code 6 (2015)	Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3kHz to 300GHz
Industry Canada Spectrum Management & Telecommunications Policy	
RSS-102 Issue 5:	Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
IEEE International Committee on Electromagnetic Safety	
IEEE 1528-2013:	IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques
IEC International Standard	
IEC 62209-2	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 2
FCC KDB	
KDB 865664	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB	
KDB 447498	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 643646	SAR Test Reduction Considerations for Occupational PTT Radios
* When the issue number or issue date is omitted, the latest version is assumed.	

3.0 CLIENT AND DEVICE INFORMATION

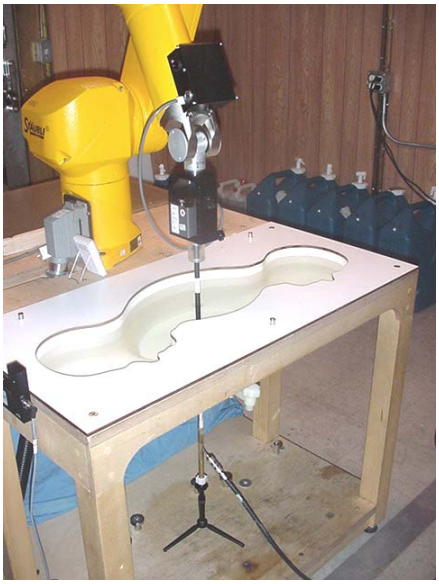
Client Information	
Applicant Name	Sepura PLC
Applicant Address	9000 Cambridge Research Park Beach Drive, Waterbeach
	Cambridge, UK, CB25 9TL
	UK
DUT Information	
Device Identifier(s):	**FCC ID:** XX6SC2024
	IC: 8739A-SC2014
Device Type:	Licensed Non-Broadcast Transmitter Held to Face (TNF) FCC Part 90
	Land Mobile Radio Transmitter/Receiver (27.41-960MHz) RSS-119
Type of Equipment:	Portable Digital Push-To-Talk (PTT) Radio Transceiver
Device Model(s) / HVIN:	SC2024
Device Marketing Name / PMN:	SC2024
Firmware Version ID Number / FVIN:	n/a
Host Marketing Name / HMN:	n/a
Test Sample Serial No.:	T/A Sample - Identical Prototype
Transmit Frequency Range:	UHF: 404-470MHz
	WiFi: 2412-2462MHz
	BLE: 2402-2480MHz
Number of Channels:	n/a
Manuf. Max. Rated Output Power:	UHF: 34.77dBm (3.0W)
Manuf. Max. Rated BW/Data Rate:	n/a
Antenna Gain:	n/a
Modulation:	TDMA
Mode:	TETRA
Duty Cycle:	25% Transmit Duty Cycle
DUT Power Source:	7.4VDC Li-Ion Battery
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

4.0 INTRODUCTION

This measurement report demonstrates that the Sepura plc Models: SC2024 Portable TETRA Radio L Portable PTT Radio Transceiver with Bluetooth complies with the SAR (Specific Absorption Rate) RF exposure requirements specified FCC 47 CFR §2.1093 and Health Canada's Safety Code 6 for the Occupational / Controlled Exposure environment. The measurement procedures were in accordance of KDB 447498; KDB 865664; IC RSS-102 Issue 4 and IEEE Standard 1528-2013. 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.

5.0 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 DASY4 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 DASY4 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 DASY4 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.



DASY4 SAR System with SAM Phantom

DASY4 Measurement Server

6.0 RF CONDUCTED POWER MEASUREMENT

Table 6.0

MEASURED CONDUCTED OUTPUT POWER

Freq (MHz)	Mode	SC2024	Rated
		dBm	dBm
406.1	100% DC	34.82	34.77
418	100% DC	34.82	34.77
430	100% DC	34.82	34.77
440	100% DC	34.82	34.77
450	100% DC	34.82	34.77
460	100% DC	34.82	34.77
470	100% DC	34.82	34.77
Note: All channels were test at 100% TETRA Duty Cycle			
Note: Max normal operating TETRA duty cycle: 1 time slot in 4 = 25%			

7.0 NUMBER OF TEST CHANNELS (N_C)

Table 7.0

Antenna Part No.		Antenna Type	Antenna Freq. Range	N_c	Test Frequencies (MHz)
1	300-00499	Extended	403 - 470 MHz	3	406.1, 418, 430,450,460,470
2	300-00662	Extended	410 - 430 MHz	3	406.1, 418, 430
3	300-00663	Extended	450 - 470 MHz	3	450, 460, 470
4	300-01031	Whip	410 - 430 MHz	3	410, 420, 430
5	300-01032	Whip	450 - 470 MHz	3	450, 460, 470
Note: The number of test channels (*Nc*) were determined by selecting Low, Mid, and High channels for each antenna					

8.0 MANUFACTURER'S ACCESSORY LIST

Table 8.0

Accessory ID # for Test Report	ACCESSORY CATEGORY: ANTENNA			
	Part Number	Description		SAR Evaluation
499	300-00499	Extended	403 - 470 MHz	Yes
662	300-00662	Extended	410 - 430 MHz	Yes
663	300-00663	Extended	450 - 470 MHz	Yes
1031	300-01031	Whip	410 - 430 MHz	Yes
1032	300-01032	Whip	450 - 470 MHz	Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BATTERY**			
	Part Number	**Description**		**SAR Evaluation**
Default	300-01174	Li-Poly battery, 7.4V, 1160mAh		Yes
B2	300-01175	Li-Ion battery, 7.4V, 1880mAh		Yes
Accessory ID # for Test Report	**ACCESSORY CATEGORY: BODY-WORN**			
	Part Number	**Description**		**SAR Evaluation**
442	300-00442	Belt-Clip		Yes
1385	300-01385	Lightweight Leather Case		Yes
1386	300-01386	Heavy Duty Leather Case		Yes
1387	300-01387	Nylon Holster		Yes

9.0 SAR MEASUREMENT SUMMARY

Table 9.0

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.30/16	F1	SC2024		406.1	Tetra	662	1174	n/a	n/a			0.990	0.495	0.434
Jan.30/16	F2	SC2024		418	Tetra	662	1174	n/a	n/a			1.090	0.545	0.403
Jan.30/16	F3	SC2024		430	Tetra	662	1174	n/a	n/a			1.420	0.710	0.367
Feb.01/16	F19	SC2024		430	Tetra	662	1175	n/a	n/a			1.230	0.615	-0.447
June.23/15	LC3	SC2024		M 420	Tetra	662	1174					2.980	1.490	-0.051
June.23/15	LT2	SC2024		M 420	Tetra	662	1174					3.120	1.560	-0.082
June.24/15	RC2	SC2024		M 420	Tetra	662	1174					2.400	1.200	-0.001
June.24/15	RT2	SC2024		M 420	Tetra	662	1174					2.620	1.310	-0.037
June.27/15	LC9	SC2024		L 410	Tetra	662	1174					3.210	1.605	-0.067
June.27/15	LC10	SC2024		H 430	Tetra	662	1174					3.310	1.655	-0.038

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.1

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.28/16	B1	SC2024		406.1	CW	662	1174	1589	388			0.925	0.463	-0.037
Jan.28/16	B2	SC2024		418	CW	662	1174	1589	388			1.030	0.515	0.689
Jan.28/16	B3	SC2024		430	CW	662	1174	1589	388			1.310	0.655	-0.058

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.2

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.30/16	F4	SC2024		406.1	CW	1031	1174	n/a	n/a			0.078	0.039	0.272
Jan.30/16	F5	SC2024		418	CW	1031	1174	n/a	n/a			0.855	0.428	-0.104
Jan.30/16	F6	SC2024		430	CW	1031	1174	n/a	n/a			0.953	0.477	-0.166
June.23/15	LC5	2024		M 420	Tetra	1031						1.920	0.960	-0.052
June.23/15	LT4	2024		M 420	Tetra	1031						2.250	1.125	-0.056
June.24/15	RC4	2024		M 420	Tetra	1031						1.510	0.755	-0.011
June.24/15	RT4	2024		M 420	Tetra	1031						1.660	0.830	0.101
June.27/15	LT6	2024		L 410	Tetra	1031						2.130	1.065	-0.044
June.27/15	LT7	2024		H 430	Tetra	1031						2.690	1.345	-0.030

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.3

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.28/16	B4	SC2024		406.1	CW	1031	1174	1589	388			0.780	0.390	-0.124
Jan.28/16	B5	SC2024		418	CW	1031	1174	1589	388			0.880	0.440	-0.056
Jan.28/16	B6	SC2024		430	CW	1031	1174	1589	388			0.969	0.485	-0.080

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.4

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT		Test Frequency (*MHz*)	Modulation	Accessories				DUT Spacing		Measured SAR (1g)		SAR Drift (dB)
		M/N	Type			Antenna ID	Battery ID	Body ID	Audio ID	DUT (*mm*)	Antenna (*mm*)	100% DC (*W/kg*)	50% DC (*W/kg*)	
Jan.31/16	F7	SC2024		406.1	CW	499	1174	n/a	n/a			0.838	0.419	-0.181
Jan.31/16	F8	SC2024		418	CW	499	1174	n/a	n/a			1.030	0.515	-0.131
Jan.31/16	F9	SC2024		430	CW	499	1174	n/a	n/a			1.330	0.665	0.024
Jan.31/16	F10	SC2024		450	CW	499	1174	n/a	n/a			1.260	0.630	0.240
Jan.31/16	F11	SC2024		460	CW	499	1174	n/a	n/a			1.050	0.525	-0.067
Jan.31/16	F12	SC2024		470	CW	499	1174	n/a	n/a			0.789	0.395	-0.046
June.23/15	LC2	2024		M 440	Tetra	499						3.530	1.765	-0.042
June.23/15	LT1	2024		M 440	Tetra	499						2.650	1.325	-0.017
June.24/15	RC1	2024		M 440	Tetra	499						2.630	1.315	-0.013
June.24/15	RT1	2024		M 440	Tetra	499						2.540	1.270	-0.016
June.25/15	LC7	2024		L 403	Tetra	499						2.430	1.215	-0.090
June.25/15	LC8	2024		H 470	Tetra	499						1.990	0.995	-0.018
SAR Limit							Head/Body			Spatial Peak		RF Exposure Category		
FCC 47 CFR 2.1093				Health Canada Safety Code 6			8.0 W/kg			1 Gram Average		Occupational		

Table 9.5

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT		Test Frequency (*MHz*)	Modulation	Accessories				DUT Spacing		Measured SAR (1g)		SAR Drift (dB)
		M/N	Type			Antenna ID	Battery ID	Body ID	Audio ID	DUT (*mm*)	Antenna (*mm*)	100% DC (*W/kg*)	50% DC (*W/kg*)	
Jan.28/16	B7	SC2024		406.1	CW	499	1174	1589	388			0.825	0.413	-0.142
Jan.28/16	B8	SC2024		418	CW	499	1174	1589	388			1.040	0.520	-0.192
Jan.28/16	B9	SC2024		430	CW	499	1174	1589	388			1.310	0.655	0.388
Jan.28/16	B10	SC2024		450	CW	499	1174	1589	388			1.110	0.555	0.032
Jan.28/16	B11	SC2024		460	CW	499	1174	1589	388			0.891	0.446	0.248
Jan.28/16	B12	SC2024		470	CW	499	1174	1589	388			0.702	0.351	0.184
SAR Limit							Head/Body			Spatial Peak		RF Exposure Category		
FCC 47 CFR 2.1093				Health Canada Safety Code 6			8.0 W/kg			1 Gram Average		Occupational		

Table 9.6

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.31/16	F13	SC2024		450	CW	663	1174	n/a	n/a			1.360	0.680	-0.403
Jan.31/16	F14	SC2024		460	CW	663	1174	n/a	n/a			1.390	0.695	0.418
Feb.01/16	F15	SC2024		470	CW	663	1174	n/a	n/a			1.310	0.655	-0.130
Feb.01/16	LC1	SC2024		450	CW	663	1175	n/a	n/a			3.590	1.795	0.396
June.23/15	LC4	2024		M 460	Tetra	663						3.510	1.755	-0.004
June.23/15	LT3	2024		M 460	Tetra	663						2.810	1.405	-0.020
June.24/15	RC3	2024		M 460	Tetra	663						2.860	1.430	-0.029
June.24/15	RT3	2024		M 460	Tetra	663						2.740	1.370	0.006
June.27/15	LC11	2024		L 450	Tetra	663						3.610	1.805	-0.058
June.27/15	LC12	2024		H 470	Tetra	663						3.180	1.590	-0.055

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

able 9.7

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Jan.28/16	B13	SC2024		450	CW	663	1174	1589	388			1.330	0.665	0.483
Jan.28/16	B14	SC2024		460	CW	663	1174	1589	388			1.480	0.740	-0.438
Jan.28/16	B15	SC2024		470	CW	663	1174	1589	388			1.310	0.655	-0.229
Jan.29/16	B19	SC2024		460	CW	663	1175	1589	388			1.520	0.760	-0.112
Jan.29/16	B20	SC2024		460	CW	663	1175	1385	388			1.440	0.720	0.027
Jan.29/16	B21	SC2024		460	CW	663	1175	1386	388			0.906	0.453	-0.045
Jan.29/16	B22	SC2024		460	CW	663	1175	1387	388			1.440	0.720	-0.045
Jan.29/16	B23	SC2024		460	CW	663	1175	n/a	388			0.689	0.345	0.373

SAR Limit		Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093	Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.8

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (MHz)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (mm)	DUT Spacing Antenna (mm)	Measured SAR (1g) 100% DC (W/kg)	Measured SAR (1g) 50% DC (W/kg)	SAR Drift (dB)
Jan.31/16	F16	SC2024		450	CW	1032	1174	n/a	n/a			0.745	0.373	0.305
Jan.31/16	F17	SC2024		460	CW	1032	1174	n/a	n/a			0.822	0.411	0.332
Jan.31/16	F18	SC2024		470	CW	1032	1174	n/a	n/a			0.996	0.498	-0.009
Feb.01/16	LC1	SC2024		450	CW	663	1175	n/a	n/a			3.590	1.795	0.396
June.24/15	LC6	2024		M 460	Tetra	1032						2.080	1.040	-0.072
June.24/15	LT5	2024		M 460	Tetra	1032						2.580	1.290	-0.090
June.25/15	RC5	2024		M 460	Tetra	1032						1.740	0.870	-0.086
June.25/15	RT5	2024		M 460	Tetra	1032						1.940	0.970	-0.035
June.27/15	LT8	2024		L 450	Tetra	1032						2.130	1.065	-0.058
June.27/15	LT9	2024		L 470	Tetra	1032						2.640	1.320	-0.073

SAR Limit	Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093 / Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.9

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (MHz)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (mm)	DUT Spacing Antenna (mm)	Measured SAR (1g) 100% DC (W/kg)	Measured SAR (1g) 50% DC (W/kg)	SAR Drift (dB)
Jan.28/16	B16	SC2024		450	CW	1032	1174	1589	388			0.664	0.332	0.394
Jan.28/16	B17	SC2024		460	CW	1032	1174	1589	388			0.822	0.411	0.465
Jan.28/16	B18	SC2024		470	CW	1032	1174	1589	388			1.130	0.565	-0.412

SAR Limit	Head/Body	Spatial Peak	RF Exposure Category
FCC 47 CFR 2.1093 / Health Canada Safety Code 6	8.0 W/kg	1 Gram Average	Occupational

Table 9.10

Measured SAR Results (1g)- FACE Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Feb.02/16	F20	SC2024		2412	wifi	662	1174	n/a	n/a			0.006	0.003	-2.920
Feb.02/16	F21	SC2024		2437	wifi	662	1174	n/a	n/a			0.005	0.003	2.310
Feb.02/16	F22	SC2024		2462	wifi	662	1174	n/a	n/a			0.006	0.003	2.110
Feb.02/16	F23	SC2024		2402	BT	662	1174	n/a	n/a			0.006	0.003	-1.590
Feb.02/16	LC2	SC2024		2412	wifi	662	1174	n/a	n/a			0.014	0.007	-0.036
Feb.02/16	LC3	SC2024		2437	wifi	662	1174	n/a	n/a			0.018	0.009	-0.056
Feb.02/16	LC4	SC2024		2462	wifi	662	1174	n/a	n/a			0.018	0.009	-0.437
Feb.02/16	LT1	SC2024		2437	wifi	662	1174	n/a	n/a			0.012	0.006	0.690
Feb.03/16	LC5	SC2024		2402	BT	662	1174	n/a	n/a			0.024	0.012	1.170
Feb.02/16	RC1	SC2024		2412	wifi	662	1174	n/a	n/a			0.011	0.005	1.650
Feb.03/16	RC2	SC2024		2437	wifi	662	1174	n/a	n/a			0.010	0.005	-4.350
Feb.03/16	RC3	SC2024		2462	wifi	662	1174	n/a	n/a			0.016	0.008	0.229
Feb.03/16	RT1	SC2024		2462	wifi	662	1174	n/a	n/a			0.013	0.007	-0.601
Feb.03/16	RC4	SC2024		2402	BT	662	1174	n/a	n/a			0.021	0.011	0.378
SAR Limit							Head/Body			Spatial Peak		RF Exposure Category		
FCC 47 CFR 2.1093				Health Canada Safety Code 6			8.0 W/kg			1 Gram Average		Occupational		

Table 9.11

Measured SAR Results (1g)- BODY Configuration (FCC/IC)

Date	Plot ID	DUT M/N	DUT Type	Test Frequency (*MHz*)	Modulation	Accessories Antenna ID	Accessories Battery ID	Accessories Body ID	Accessories Audio ID	DUT Spacing DUT (*mm*)	DUT Spacing Antenna (*mm*)	Measured SAR (1g) 100% DC (*W/kg*)	Measured SAR (1g) 50% DC (*W/kg*)	SAR Drift (dB)
Feb.04/16	B24	SC2024		2412	wifi	662	1174	n/a	n/a			0.013	0.007	2.830
Feb.04/16	B25	SC2024		2437	wifi	662	1174	n/a	n/a			0.012	0.006	0.755
Feb.04/16	B26	SC2024		2462	wifi	662	1174	n/a	n/a			0.013	0.006	0.259
Feb.04/16	B27	SC2024		2402	BT	662	1174	n/a	n/a			0.016	0.008	-0.579
SAR Limit							Head/Body			Spatial Peak		RF Exposure Category		
FCC 47 CFR 2.1093				Health Canada Safety Code 6			8.0 W/kg			1 Gram Average		Occupational		

10.0 SCALING OF MAXIMUM MEASURE SAR

Table 10.0

Scaling of Maximum Measured SAR

Plot ID	Configuration	Freq	Measured Fluid Deviation		Measured Conducted Power	Measured Drift	Measured SAR (1g)
		(MHz)	Permittivity	Conductivity	(dBm)	(dB)	(W/kg)
F3	Face 00662	H 430	1.81%	-4.60%	34.82	0.367	0.710
B19	Body 00663	M 460	-3.72%	1.06%	34.82	-0.112	0.760
LC11	Left Cheek 00663	L 450	3.93%	6.90%	34.82	-0.058	1.805

Step 1

Fluid Sensitivity Adjustment (1)

Plot ID	Scale Factor (%)	x	Measured SAR (W/kg)	=	Adjusted SAR (1g) (W/kg)
F3	n/a	x	0.710	=	0.710
B19	n/a	x	0.760	=	0.760
LC11	4.071%	x	1.805	=	1.878

Step 2

Manufacturer's Tune-Up Tolerance (2)

Plot ID	Measured Conducted Power (dBm)	Rated Power (dBm)	Delta (dB)	+	Adjusted SAR (W/kg)	=	Reported SAR (1g) (W/kg)
F3	34.82	34.77	0.05	+	0.710	=	0.710
B19	34.82	34.77	0.05	+	0.760	=	0.760
LC11	34.82	34.77	0.05	+	1.878	=	1.878

Step 3

Simultaneous Transmission (3) - Bluetooth

Plot ID	Rated Output Power (Pmax) (mW)	Freq (MHz)	Separation Distance (mm)	Estimated SAR (W/kg)	+	Reported SAR (W/kg)	=	Simultaneous Reported SAR (W/kg)
F3	n/a	n/a	n/a	n/a	+	0.710	=	0.710
B19	n/a	n/a	n/a	n/a	+	0.760	=	0.760
LC11	n/a	n/a	n/a	n/a	+	1.878	=	1.878

Step 4 (IC/EU/AU)

Drift Adjustment (4)

Plot ID	Measured Drift (dB)	+	Reported or Simultaneous Reported SAR (W/kg)	=	Scaled SAR (1g) (W/kg)
F3	0.367	+	0.710	=	0.710
B19	-0.112	+	0.760	=	0.780
LC11	-0.058	+	1.878	=	1.903

Notes

See Notes Below

Notes
(1) Per IEC-62209-1. Scaling required only when Measured Fluid Deviation is greater than 5% and only when the Scale Factor is (+) Positive. See Table 8.1
(2) Per KDB 447498. Scaling required only when Delta is (-) Negative. The absolute value of Delta is added to Adjusted SAR.
(3) Per KDB 447498 4.3.2.
(4) 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.

Table 10.1

Fluid Sensitivity Calculation (1g)	
Delta SAR = Ce * Delta Er + C(sigma)*Delta Sigma	
Frequency (GHz)	**Plot ID**
0.450	**LC10**
Ce	-0.1583
Cσ	0.6802
Δ E	3.93%
Δσ	6.9%
ΔSAR	**4.071%**
Scale Factor Is Negative. Scaling NOT Required	

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.

26 February 2016
Date

11.0 SAR EXPOSURE LIMITS

Table 11.0

SAR RF EXPOSURE LIMITS			
FCC 47 CFR 2.1093	**Health Canada Safety Code 6**	**(General Population / Uncontrolled Exposure)**	**(Occupational / Controlled Exposure)**
Spatial Average (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak (averaged over any 1 g of tissue)		1.6 W/kg	**8.0 W/kg**
Spatial Peak (hands/wrists/feet/ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
The Spatial Average value of the SAR averaged over the whole body.			
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.			
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.			
Uncontrolled environments are defined as locations where there is potential exposure to individuals who have no knowledge or control of their potential exposure.			
Controlled environments are defined as locations where there is potential exposure to individuals who have knowledge of their potential exposure and can exercise control over their exposure.			

12.0 DETAILS OF SAR EVALUATION

EVALUATION DETAILS	
1	The test channels selected for the SAR evaluations were based test procedures IEC 62209-1 and IEC 62209-2. The procedure yielding the highest channel count was applied.
2	The DUT was evaluated for SAR in accordance with the procedures described in IEC 62209-1 and IEC 62209-2.
3	The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer, in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key continuously depressed. For a Push-To-Talk (PTT) device, the 50% duty cycle compensation reported assumes a transmit/receive cycle of equal time base. As this is a TETRA transceiver with a 25% transmit duty cycle, a Crest factor of 4 was used.
4	A single point SAR measurement was taken prior to the Area Scan and after the Zoom Scan and the SAR drift of the DUT was evaluated. The measured SAR drift was added to the measured SAR levels of the Maximum ***reported*** SAR (IC/EU only).
5	Each SAR evaluations were performed with a fully charged battery.
6	The fluid temperature remained within +/-2°C from the time of the fluid dielectric parameter measurement to the completion of the SAR evaluation.
7	The fluid temperature remained within +/-0.5°C throughout the test day.

SCAN PROCEDURE	
Maximum distance from the closest measurement point to phantom surface.	4 ± 1mm
Maximum probe angle normal to phantom surface.	$5^{o} \pm 1^{o}$
Area Scan Spatial Resolution ΔX, ΔY	15mm
Zoom Scan Spatial Resolution ΔX, ΔY	7.5mm
Zoom Scan Spatial Resolution ΔZ	5mm
Zoom Scan Volume X, Y, Z	30mm x 30mm x 30mm
Phantom	SAM
Fluid Depth	150mm
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-averge SAR	

13.0 MEASUREMENT UNCERTAINTIES

Table 13.0

UNCERTAINTY BUDGET FOR DEVICE EVALUATION (IEEE 1528-2013 Table 9)

Uncertainty Component	IEEE 1528 Section	Uncertainty Value ±%	Probability Distribution	Divisor	ci 1g	ci 10g	Uncertainty Value ±% (1g)	Uncertainty Value ±% (10g)	V_i or V_{eff}
Measurement System									
Probe Calibration*	E.2.1	6.6	Normal	1	1	1	6.60	6.60	∞
Axial Isotropy*	E.2.2	4.7	Rectangular	1.732050808	0.7	0.7	1.9	1.9	∞
Hemispherical Isotropy*	E.2.2	9.6	Rectangular	1.732050808	0.7	0.7	3.9	3.9	∞
Boundary Effect*	E.2.3	8.3	Rectangular	1.732050808	1	1	4.8	4.8	∞
Linearity*	E.2.4	4.7	Rectangular	1.732050808	1	1	2.7	2.7	∞
System Detection Limits*	E.2.4	1.0	Rectangular	1.732050808	1	1	0.6	0.6	∞
Modulation Response	E.2.5	4.0	Rectangular	1.732050808	1	1	2.3	2.3	∞
Readout Electronics*	E.2.6	1.0	Normal	1	1	1	1.0	1.0	∞
Response Time*	E.2.7	0.8	Rectangular	1.732050808	1	1	0.5	0.5	∞
Integration Time*	E.2.8	1.4	Rectangular	1.732050808	1	1	0.8	0.8	∞
RF Ambient Conditions - Noise	E.6.1	0.0	Rectangular	1.732050808	1	1	0.0	0.0	∞
RF Ambient Conditions - Reflection	E.6.1	0.0	Rectangular	1.732050808	1	1	0.0	0.0	∞
Probe Positioner Mechanical Tolerance*	E.6.2	0.4	Rectangular	1.732050808	1	1	0.2	0.2	∞
Probe Positioning wrt Phantom Shell*	E.6.3	2.9	Rectangular	1.732050808	1	1	1.7	1.7	∞
Extrapolation, interpolation & integration algorithms for max. SAR evaluation*	E.5	3.9	Rectangular	1.732050808	1	1	2.3	2.3	∞
Test Sample Related									
Test Sample Positioning	E.4.2	0.3	Normal	1	1	1	0.3	0.3	5
Device Holder Uncertainty*	E.4.1	3.6	Normal	1	1	1	3.6	3.6	∞
SAR Drift Measurement**	E.2.9	0.0	Rectangular	1.732050808	1	1	0.0	0.0	∞
SAR Scaling***	E.6.5	2.0	Rectangular	1.732050808	1	1	1.2	1.2	∞
Phantom and Tissue Parameters									
Phantom Uncertainty*	E.3.1	4.0	Rectangular	1.732050808	1	1	2.3	2.3	∞
SAR Correction Uncertainty	E.3.2	1.2	Normal	1	1	0.84	1.2	1.0	∞
Liquid Conductivity (measurement)	E.3.3	6.8	Normal	1	0.78	0.71	5.3	4.8	10
Liquid Permittivity (measurement)	E.3.3	5.3	Normal	1	0.23	0.26	1.2	1.4	10
Liquid Conductivity (Temperature)	E.3.2	0.1	Rectangular	1.732050808	0.78	0.71	0.1	0.0	∞
Liquid Permittivity Temperature)	E.3.2	0.0	Rectangular	1.732050808	0.23	0.26	0.0	0.0	∞
Effective Degrees of Freedom(1)								**V_{eff} =**	**873.2**
Combined Standard Uncertainty			**RSS**				**12.59**	**12.40**	
Expanded Uncertainty (95% Confidence Interval)			**k=2**				**25.18**	**24.80**	

Measurement Uncertainty Table in accordance with IEEE Standard 1528-2003

(1) The Effective Degrees of Freedom is > 30 therefore a coverage factor of k=2 represents an approximate confidence level of 95%.

* Provided by SPEAG

Table 13.1

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

14.0 TISSUE SIMULATING LIQUID (TSL) RECIPE

Table 14.0

Simulated Tissue Mixture	
Frequency:	**Fluid Type**
450 MHz	**HEAD**
Ingredient	**% by Weight**
Water	38.56
Sugar	56.32
Salt	3.95
HEC	0.98
Bactericide	0.19

15.0 FLUID DIELECTRIC PARAMETERS

Table 15.0

FLUID DIELECTRIC PARAMETERS

Date:	26-Jan-16	Fluid Temp:	22.8	Frequency:	450MHz	Tissue:	Body

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
350.0000	55.5200	0.8600	57.7000	0.93	-3.78%	-7.53%
360.0000	55.9600	0.8700	57.6000	0.93	-2.85%	-6.45%
370.0000	55.5200	0.8700	57.5000	0.93	-3.44%	-6.45%
380.0000	54.7300	0.8800	57.4000	0.93	-4.65%	-5.38%
390.0000	55.0800	0.8800	57.3000	0.93	-3.87%	-5.38%
400.0000	55.2100	0.8800	57.2000	0.93	-3.48%	-5.38%
410.0000	54.0200	0.8900	57.1000	0.93	-5.39%	-4.30%
420.0000	55.3200	0.9000	57.0000	0.94	-2.95%	-4.26%
430.0000	54.8700	0.9100	56.9000	0.94	-3.57%	-3.19%
440.0000	53.8400	0.9200	56.8000	0.94	-5.21%	-2.13%
450.0000	54.5700	0.9500	56.7000	0.94	-3.76%	1.06%
460.0000	54.5500	0.9500	56.6600	0.94	-3.72%	1.06%
470.0000	54.3300	0.9500	56.6200	0.94	-4.04%	1.06%
480.0000	53.3400	0.9500	56.5800	0.94	-5.73%	1.06%
490.0000	53.7100	0.9500	56.5400	0.94	-5.01%	1.06%
500.0000	53.7300	0.9700	56.5100	0.94	-4.92%	3.19%
510.0000	52.9900	0.9800	56.4700	0.94	-6.16%	4.26%
520.0000	52.8000	0.9800	56.4300	0.95	-6.43%	3.16%
530.0000	53.1300	1.0100	56.3900	0.95	-5.78%	6.32%
540.0000	53.0800	1.0000	56.3500	0.95	-5.80%	5.26%
550.0000	53.0700	1.0300	56.3100	0.95	-5.75%	8.42%

Table 15.1

FLUID DIELECTRIC PARAMETERS

Date:	29-Jan-16	Fluid Temp:	22.4	Frequency:	450MHz	Tissue:	Head

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
350.0000	45.5600	0.7800	44.7000	0.87	1.92%	-10.34%
360.0000	45.0300	0.7700	44.5800	0.87	1.01%	-11.49%
370.0000	45.3000	0.7800	44.4600	0.87	1.89%	-10.34%
380.0000	44.8100	0.7900	44.3400	0.87	1.06%	-9.20%
390.0000	45.3200	0.7900	44.2200	0.87	2.49%	-9.20%
400.0000	44.8100	0.8100	44.1000	0.87	1.61%	-6.90%
410.0000	44.9100	0.8200	43.9800	0.87	2.11%	-5.75%
420.0000	43.7800	0.8300	43.8600	0.87	-0.18%	-4.60%
430.0000	44.5300	0.8300	43.7400	0.87	1.81%	-4.60%
440.0000	43.9200	0.8400	43.6200	0.87	0.69%	-3.45%
450.0000	43.6700	0.8600	43.5000	0.87	0.39%	-1.15%
460.0000	44.0100	0.8500	43.4500	0.87	1.29%	-2.30%
470.0000	43.9300	0.8600	43.4000	0.87	1.22%	-1.15%
480.0000	43.3500	0.8700	43.3400	0.87	0.02%	0.00%
490.0000	42.9700	0.8800	43.2900	0.87	-0.74%	1.15%
500.0000	42.8200	0.9000	43.2400	0.87	-0.97%	3.45%
510.0000	42.1200	0.8900	43.1900	0.87	-2.48%	2.30%
520.0000	41.8100	0.9100	43.1400	0.88	-3.08%	3.41%
530.0000	42.3900	0.9200	43.0800	0.88	-1.60%	4.55%
540.0000	42.2200	0.9200	43.0300	0.88	-1.88%	4.55%
550.0000	42.2900	0.9400	42.9800	0.88	-1.61%	6.82%

Table 15.2

FLUID DIELECTRIC PARAMETERS

Date:	01-Feb-16	Fluid Temp:	22.9	Frequency:	2450MHz	Tissue:	Head

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000	36.4100	1.7600	39.3800	1.71	-7.54%	2.92%
2360.0000	36.4500	1.7900	39.3600	1.72	-7.39%	4.07%
2370.0000	36.2800	1.7800	39.3400	1.73	-7.78%	2.89%
2380.0000	36.3200	1.7900	39.3200	1.74	-7.63%	2.87%
2390.0000	36.1900	1.8100	39.3100	1.75	-7.94%	3.43%
2400.0000	36.0600	1.8100	39.2900	1.76	-8.22%	2.84%
2410.0000	36.1000	1.8300	39.2700	1.76	-8.07%	3.98%
2420.0000	36.0800	1.8300	39.2500	1.77	-8.08%	3.39%
2430.0000	36.2200	1.8700	39.2400	1.78	-7.70%	5.06%
2440.0000	36.0800	1.8700	39.2200	1.79	-8.01%	4.47%
2450.0000	35.9800	1.8900	39.2000	1.80	-8.21%	5.00%
2460.0000	35.9800	1.8800	39.1900	1.81	-8.19%	3.87%
2470.0000	36.1200	1.9200	39.1700	1.82	-7.79%	5.49%
2480.0000	35.9600	1.9000	39.1600	1.83	-8.17%	3.83%
2490.0000	35.7800	1.9100	39.1500	1.84	-8.61%	3.80%
2500.0000	35.8900	1.9400	39.1400	1.85	-8.30%	4.86%
2510.0000	35.8500	1.9500	39.1200	1.87	-8.36%	4.28%
2520.0000	35.7900	1.9500	39.1100	1.88	-8.49%	3.72%
2530.0000	35.7100	1.9700	39.1000	1.89	-8.67%	4.23%
2540.0000	35.7000	2.0100	39.0900	1.90	-8.67%	5.79%
2550.0000	35.7900	1.9800	39.0700	1.91	-8.40%	3.66%

Table 15.3

FLUID DIELECTRIC PARAMETERS

Date:	03-Feb-16	Fluid Temp:	23.3	Frequency:	2450MHz	Tissue:	Body

Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000	50.4800	1.8100	52.8300	1.85	-4.45%	-2.16%
2360.0000	50.5000	1.8100	52.8200	1.86	-4.39%	-2.69%
2370.0000	50.6600	1.8200	52.8100	1.87	-4.07%	-2.67%
2380.0000	50.3900	1.8300	52.7900	1.88	-4.55%	-2.66%
2390.0000	50.1800	1.8200	52.7800	1.89	-4.93%	-3.70%
2400.0000	50.2100	1.8500	52.7700	1.90	-4.85%	-2.63%
2410.0000	50.1800	1.8600	52.7500	1.91	-4.87%	-2.62%
2420.0000	50.1200	1.8600	52.7400	1.92	-4.97%	-3.12%
2430.0000	50.0200	1.8800	52.7300	1.93	-5.14%	-2.59%
2440.0000	50.0600	1.9100	52.7100	1.94	-5.03%	-1.55%
2450.0000	50.0900	1.9300	52.7000	1.95	-4.95%	-1.03%
2460.0000	50.1400	1.9500	52.6900	1.96	-4.84%	-0.51%
2470.0000	50.2700	1.9400	52.6700	1.98	-4.56%	-2.02%
2480.0000	50.0900	1.9700	52.6600	1.99	-4.88%	-1.01%
2490.0000	50.0600	1.9600	52.6500	2.01	-4.92%	-2.49%
2500.0000	49.9700	1.9700	52.6400	2.02	-5.07%	-2.48%
2510.0000	50.0900	2.0000	52.6200	2.04	-4.81%	-1.96%
2520.0000	49.9400	2.0000	52.6100	2.05	-5.08%	-2.44%
2530.0000	49.8700	2.0100	52.6000	2.06	-5.19%	-2.43%
2540.0000	49.7200	2.0500	52.5900	2.08	-5.46%	-1.44%
2550.0000	49.9400	2.0700	52.5700	2.09	-5.00%	-0.96%

16.0 SYSTEM VERIFICATION TEST RESULTS

Table 16.0

System Verification Test Results

Date	Frequency (MHz)	Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Dipole Spacing (mm)	Validation Source	
								P/N	S/N
26 Jan 2016	450	Body	22.8	25	13%	250	15	D450V3	1068

SAR						Fluid Parameters					
1 gram			10 gram			Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation
1.13	1.12	0.89%	0.76	0.74	3.52%	54.57	56.70	-3.76%	0.95	0.94	1.06%

Table 16.1

System Verification Test Results

Date	Frequency (MHz)	Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Dipole Spacing (mm)	Validation Source	
								P/N	S/N
30 Jan 2016	450	Head	22.9	24	13%	250	15	D450V3	1068

SAR						Fluid Parameters					
1 gram			10 gram			Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation
1.15	1.16	-0.86%	0.78	0.78	0.13%	43.67	43.50	0.39%	0.86	0.87	-1.15%

Table 16.2

System Verification Test Results

Date	Frequency (MHz)	Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Dipole Spacing (mm)	Validation Source	
								P/N	S/N
01 Feb 2016	2450	Head	22.9	26	12%	250	10	D2450V2	825

SAR						Fluid Parameters					
1 gram			10 gram			Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation
12.20	13.10	-6.87%	5.58	6.06	-7.92%	35.98	39.20	-8.21%	1.89	1.80	5.00%

Table 16.3

System Verification Test Results

Date	Frequency (MHz)	Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Dipole Spacing (mm)	Validation Source	
								P/N	S/N
03 Feb 2016	2450	Body	23.3	26	12%	250	10	D2450V2	825

SAR						Fluid Parameters					
1 gram			10 gram			Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation	Measured	Target	Deviation
13.30	13.00	2.31%	6.20	6.05	2.48%	50.09	52.70	-4.95%	1.93	1.95	-1.03%

17.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 17.0

Measurement System Specification	
Specifications	
Positioner	Stäubli Unimation Corp. Robot Model: RX60L
Repeatability	0.02 mm
No. of axis	6
Data Acquisition Electronic (DAE) System	
Cell Controller	
Processor	AMD Athlon XP 2400+
Clock Speed	2.0 GHz
Operating System	Windows XP Professional
Data Converter	
Features	Signal Amplifier, multiplexer, A/D converter, and control logic
Software	Measurement Software: DASY4, V4.7 Build 80
	Postprocessing Software: SEMCAD, V1.8 Build 186
Connecting Lines	Optical downlink for data and status info., Optical uplink for commands and clock
DASY4 Measurement Server	
Function	Real-time data evaluation for field measurements and surface detection
Hardware	PC/104 166MHz Pentium CPU; 32 MB chipdisk; 64 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	SAM
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 30 Liter

Table 17.1

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

EX3DV4 E-Field Probe

Phantom Specification

The SAM phantom is a **Specific Anthropomorphic Mannequin** planar fiberglass shell phantom with a shell thickness of 2.0mm +/- .2mm at the planar area. This phantom conforms to IEEE 1528-2013, IEC 62209-1 and
IEC 62209-2.

SAM Phantom

Device Positioner Specification

The DASY4 device positioner has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65^{O}. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.

Device Positioner

18.0 TEST EQUIPMENT LIST

Table 18.0

Test Equipment List

DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
Schmid & Partner DASY4 System	-	-	-	-
-DASY4 Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	9 April 2014	Biennial
-DAE3	00018	370	23 April 2015	Biennial
-EX3DV6 E-Field Probe	00017	3600	23 April 2015	Annual
-D450V3 Validation Dipole	00221	1068	21 April 2015	Triennial
SAM Phantom	00247	-	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00110	1835801	17 March 2014	Biennial
Gigatronics 80701A Power Sensor	00249	1834473	17 March 2014	Biennial
Gigatronics 80701A Power Sensor	00248	1833687	17 March 2014	Biennial
HP 8753ET Network Analyzer	00134	US39170292	22 Oct 2014	Biennial
Rohde & Schwarz SMR20 Signal Generator	00006	100104	8 May 2014	Biennial
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR

CNR = Calibration Not Required

APPENDIX A - SAR MEASUREMENT PLOTS

Plot B19

Date/Time: 29/01/2016 11:48:59 AM

2024 Jan 29 2016 450B Body 00663 WC

DUT: Sepura SC2020 Series ; Type: PTT-Tetra; Serial: Not Specified

Program Notes: Jan 29 2016 Ambient Temp: 22C Fluid Temp: 21.2C Humidity: 14%

Procedure Notes:

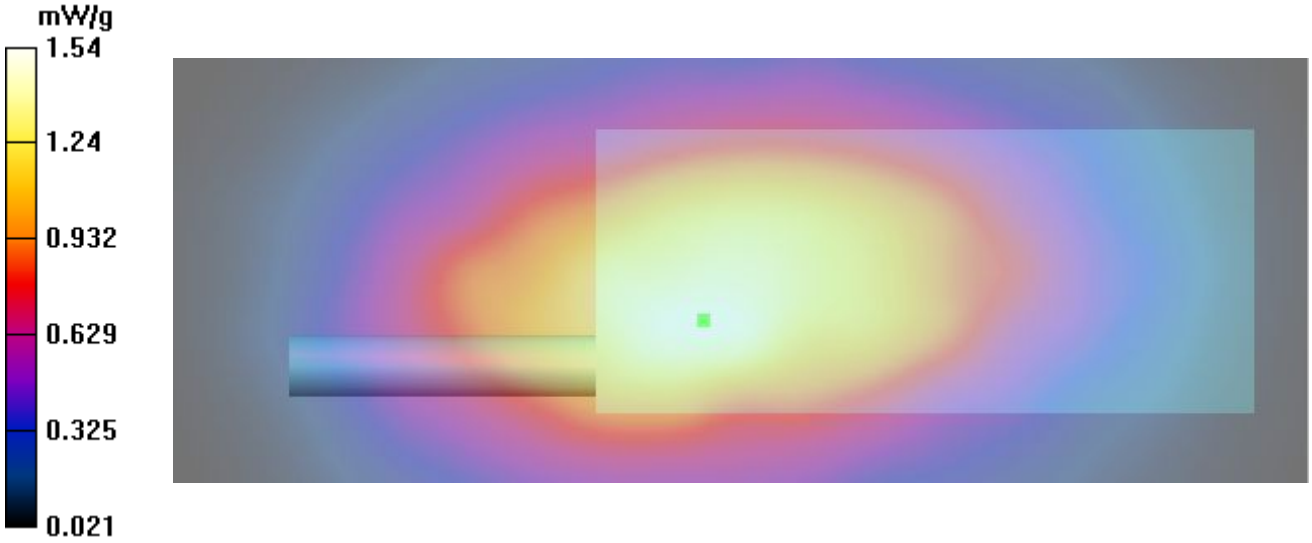
Communication System: UHF 380-470
Frequency: 460 MHz; Duty Cycle: 1:4
Medium: TSL_450B[26JA16] Medium parameters used: f = 460 MHz; σ = 0.95 mho/m; ε_r = 54.5; ρ = 1000 kg/m^3

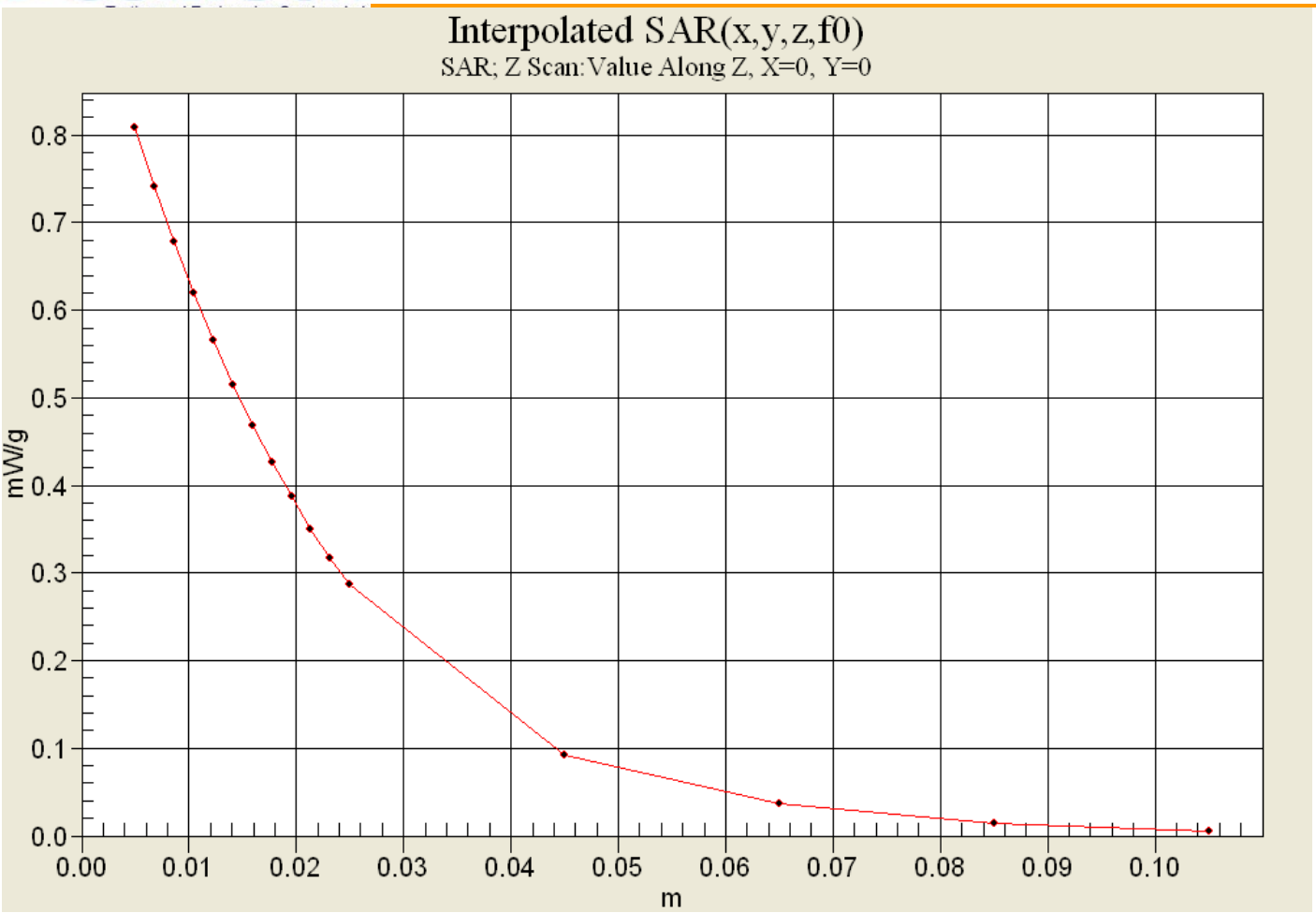
- Probe: EX3DV4 - SN3600; ConvF(8.8, 8.8, 8.8); Calibrated: 23/04/2015
- Sensor-Surface: 5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 23/04/2015
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

B19 Body SC2024 3W Antenna 00663 Frequency 460MHz Battery 2/Area Scan (61x161x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.54 mW/g

B19 Body SC2024 3W Antenna 00663 Frequency 460MHz Battery 2/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.7 V/m; Power Drift = -0.112 dB
Peak SAR (extrapolated) = 2.43 W/kg
SAR(1 g) = 1.52 mW/g; SAR(10 g) = 1.08 mW/g

Maximum value of SAR (measured) = 1.50 mW/g





Plot F3

Date/Time: 30/01/2016 11:55:06 AM

2024 Jan 30 2016 450H Face 00662

DUT: Sepura SC2020 Series ; Type: PTT-Tetra; Serial: Not Specified

Program Notes: Jan 30 2016 Ambient Temp: 24C Fluid Temp: 22.9C Humidity: 13%

Procedure Notes:

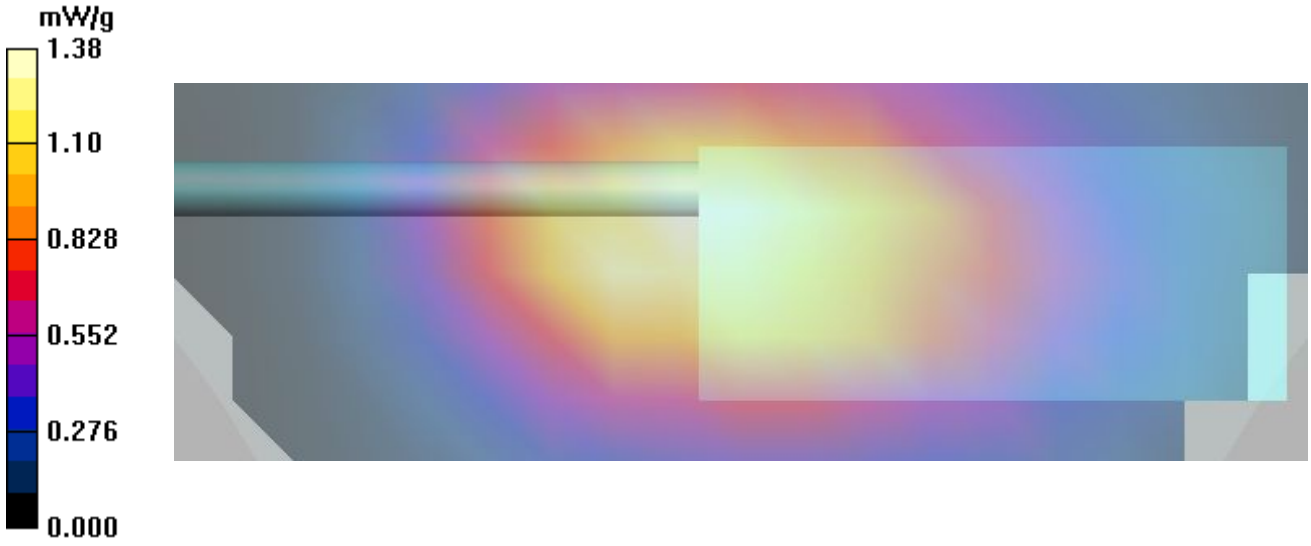
Communication System: UHF 380-470
Frequency: 430 MHz; Duty Cycle: 1:4
Medium: TSL_450H[29JA16] Medium parameters used: f = 430 MHz; σ = 0.83 mho/m; ε_r = 44.5; ρ = 1000 kg/m^3

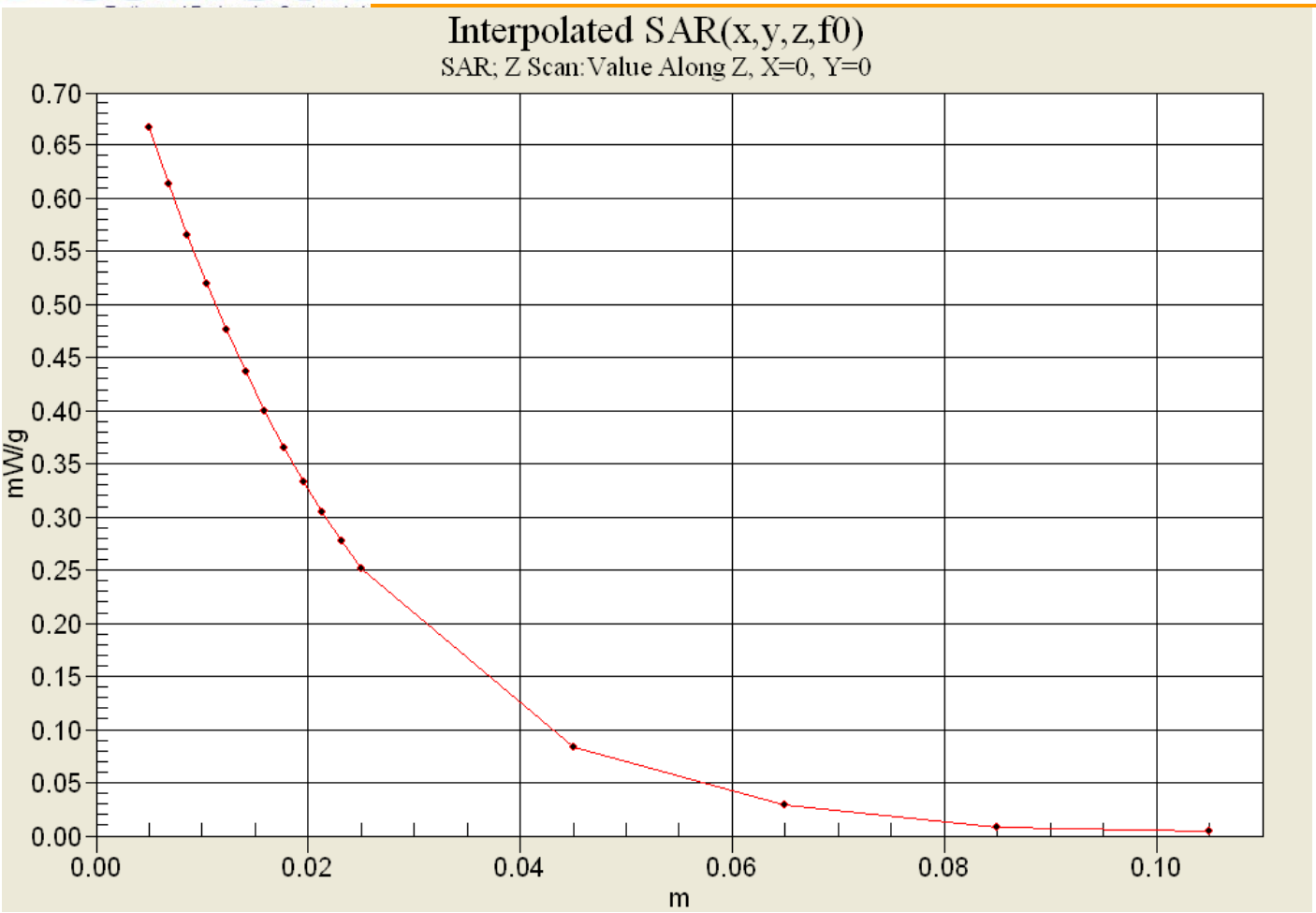
- Probe: EX3DV4 - SN3600; ConvF(9.03, 9.03, 9.03); Calibrated: 23/04/2015
- Sensor-Surface: 5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 23/04/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

F3 Face SC2024 3W Antenna 00662 Frequency 430.0MHz High/Area Scan (7x21x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.38 mW/g

F3 Face SC2024 3W Antenna 00662 Frequency 430.0MHz High/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 39.0 V/m; Power Drift = 0.367 dB
Peak SAR (extrapolated) = 2.02 W/kg
SAR(1 g) = 1.42 mW/g; SAR(10 g) = 1.02 mW/g

Maximum value of SAR (measured) = 1.43 mW/g





Plot LC11

Date/Time: 27/06/2015 8:46:47 PM

2024 June 27 2015 450H 3W Head wc 00663

DUT: Sepura SC2020 Series ; Type: PTT-Tetra; Serial: Not Specified

Program Notes: June 27 2015 Ambient Temp: 27C Fluid Temp: 24.1C Humidity: 22%

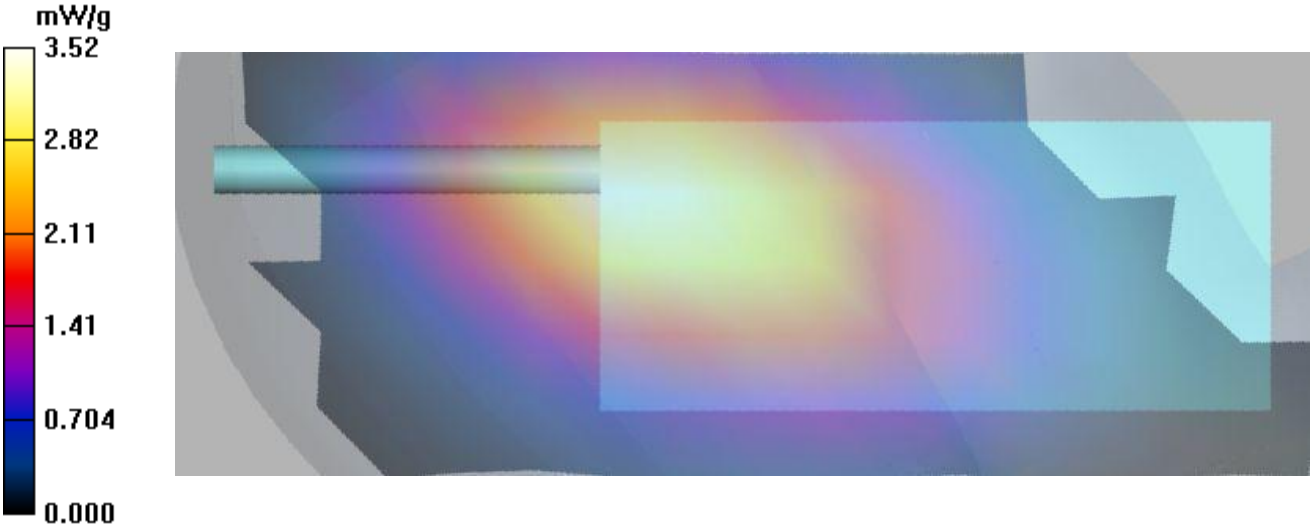
Procedure Notes:

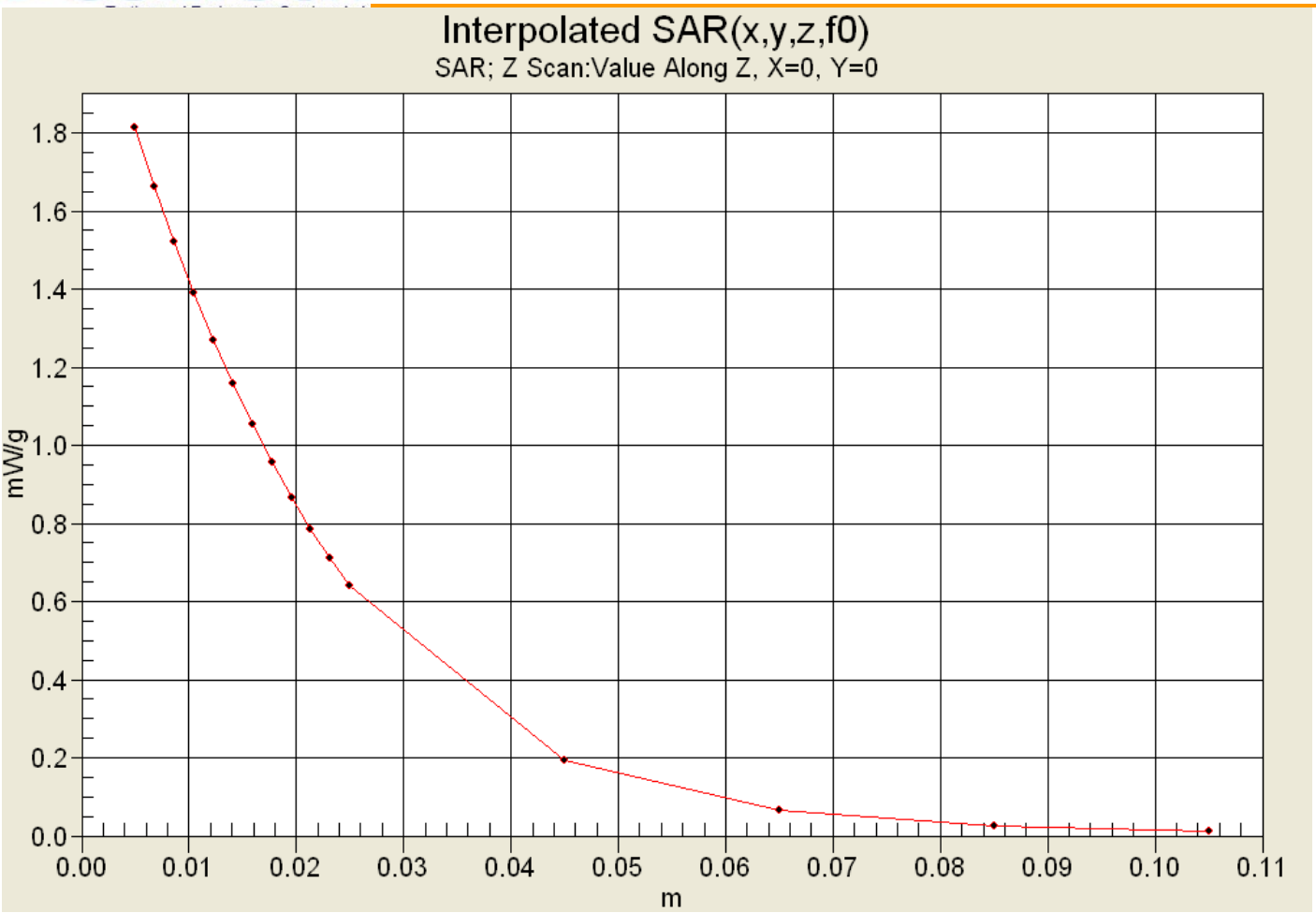
Communication System: UHF 380-470
Frequency: 450 MHz; Duty Cycle: 1:4
Medium: TSL_450H Medium parameters used: f = 450 MHz; σ = 0.93 mho/m; ε_r = 45.2; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600; ConvF(9.03, 9.03, 9.03); Calibrated: 23/04/2015
- Sensor-Surface: 5mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 5mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370; Calibrated: 23/04/2015
- Phantom: SAM with CRP; Type: SAM;
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

LC SC2024 3W Antenna 00663 Frequency 450MHz Low/Area Scan (7x19x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 3.52 mW/g

LC SC2024 3W Antenna 00663 Frequency 450MHz Low/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 56.8 V/m; Power Drift = -0.058 dB
Peak SAR (extrapolated) = 5.30 W/kg
SAR(1 g) = 3.61 mW/g; SAR(10 g) = 2.45 mW/g
Maximum value of SAR (measured) = 3.59 mW/g





APPENDIX B - SYSTEM VERIFICATION MEASUREMENT PLOTS

Date/Time: 26/01/2016 2:15:59 PM

SPC 450B - 26 Jan 2016

DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 04/27/2012

Program Notes: 30 Dec 2015 Ambient Temp: 25C Fluid Temp: 23.8C; Humidity: 9%

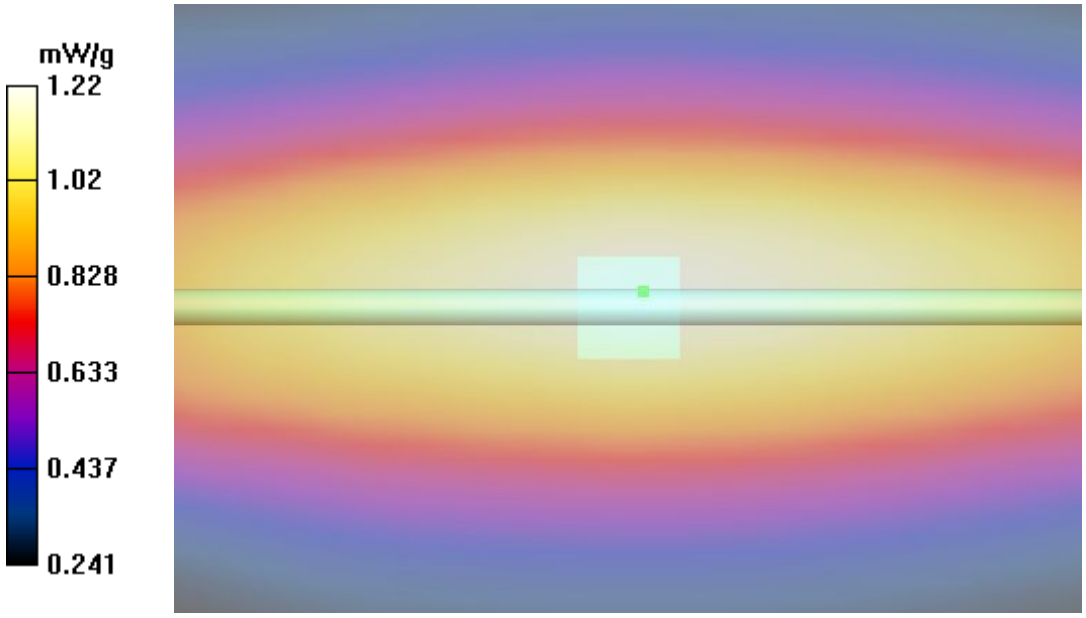
Procedure Notes:

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: TSL_450B[26JA16] Medium parameters used: f = 450 MHz; σ = 0.95 mho/m; ε_r = 54.6; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600 2015; ConvF(8.8, 8.8, 8.8); Calibrated: 23/04/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370 2015; Calibrated: 23/04/2015
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Body d=15mm Pin=250mW, TS=[1.008][1.12][1.232]/Area Scan (41x61x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (interpolated) = 1.22 mW/g

Body d=15mm Pin=250mW, TS=[1.008][1.12][1.232]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 35.6 V/m; Power Drift = 0.015 dB
Peak SAR (extrapolated) = 1.65 W/kg
SAR(1 g) = 1.13 mW/g; SAR(10 g) = 0.764 mW/g
Maximum value of SAR (measured) = 1.21 mW/g



Date/Time: 30/01/2016 10:05:32 AM

SPC 450H - 30 Jan 2016

DUT: Dipole 450 MHz; Type: D450V3; Serial: 1068; Calibrated: 04/27/2012

Program Notes: 30 Jan 2016 Ambient Temp: 24C Fluid Temp: 22.9C; Humidity: 13%

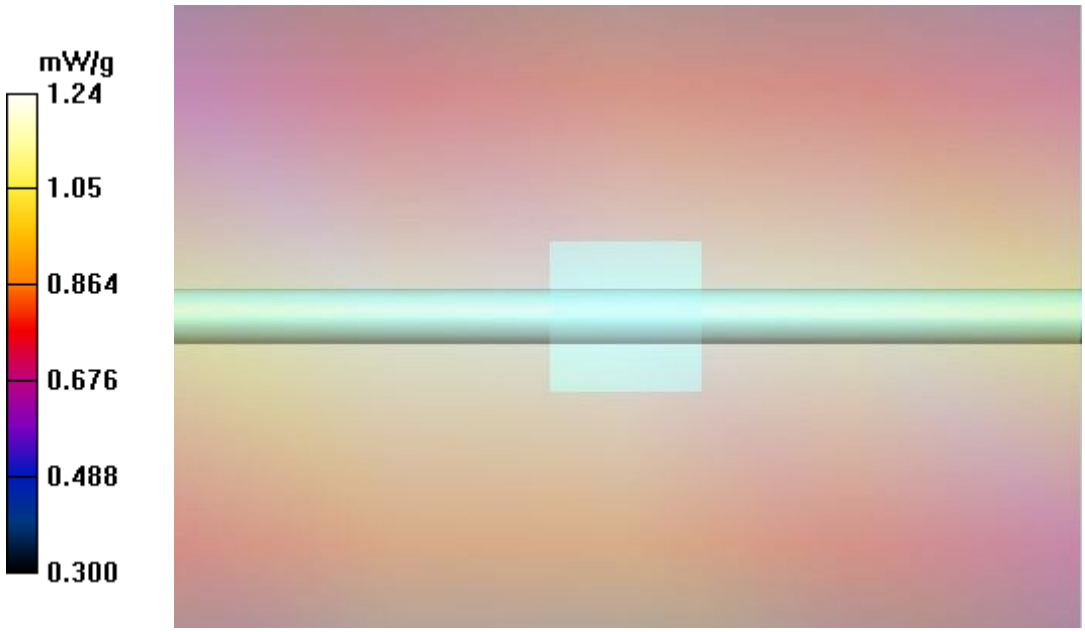
Procedure Notes:

Communication System: CW
Frequency: 450 MHz; Duty Cycle: 1:1
Medium: TSL_450H[29JA16] Medium parameters used: f = 450 MHz; σ = 0.86 mho/m; ε_r = 43.7; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600 2015; ConvF(9.03, 9.03, 9.03); Calibrated: 23/04/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370 2015; Calibrated: 23/04/2015
- Phantom: SAM with CRP; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

Head d=15mm Pin=250mW, TS=[1.044][1.16][1.276]/Area Scan (5x5x1): Measurement grid: dx=15mm, dy=15mm
Maximum value of SAR (measured) = 1.24 mW/g

Head d=15mm Pin=250mW, TS=[1.044][1.16][1.276]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 38.4 V/m; Power Drift = -0.021 dB
Peak SAR (extrapolated) = 1.68 W/kg
SAR(1 g) = 1.15 mW/g; SAR(10 g) = 0.779 mW/g



Date/Time: 01/02/2016 3:59:48 PM

SPC 2450H 01 February 2016

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 25/04/2012

Program Notes: 01 February 2016 Ambient Temp: 26C; Fluid Temp: 22.9C; Humidity: 12%

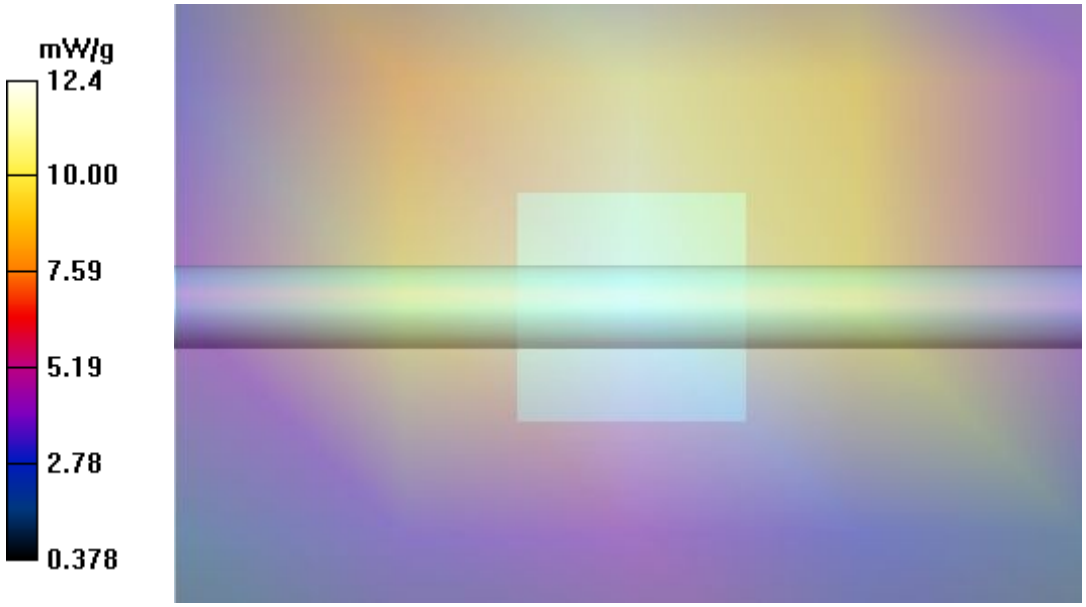
Procedure Notes:

Communication System: CW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: TSL_2450H[01FE16] Medium parameters used: f = 2450 MHz; σ = 1.89 mho/m; ε_r = 36; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600 2015; ConvF(6.06, 6.06, 6.06); Calibrated: 23/04/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370 2015; Calibrated: 23/04/2015
- Phantom: SAM with CRP; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450 MHz Head Dipole d=10mm P=250mW TS=[11.43][12.70][13.97]/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.4 mW/g

2450 MHz Head Dipole d=10mm P=250mW TS=[11.43][12.70][13.97]/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 75.4 V/m; Power Drift = -0.038 dB
Peak SAR (extrapolated) = 26.5 W/kg
SAR(1 g) = 12.2 mW/g; SAR(10 g) = 5.58 mW/g
Maximum value of SAR (measured) = 13.9 mW/g



Date/Time: 03/02/2016 5:33:04 PM

SPC 2450B 03 February 2016

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 25/04/2012

Program Notes: 01 February 2016 Ambient Temp: 26C; Fluid Temp: 22.9C; Humidity: 12%

Procedure Notes:

Communication System: CW
Frequency: 2450 MHz; Duty Cycle: 1:1
Medium: TSL_2450H[01FE16] Medium parameters used: f = 2450 MHz; σ = 1.89 mho/m; ε_r = 36; ρ = 1000 kg/m^3

- Probe: EX3DV4 - SN3600 2015; ConvF(6.06, 6.06, 6.06); Calibrated: 23/04/2015
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE3 Sn370 2015; Calibrated: 23/04/2015
- Phantom: SAM with CRP; Type: SAM; Serial: Not Specified
- Measurement SW: DASY4, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 186

2450 MHz Head Dipole d=10mm P=250mW TS=[11.70][13.00][14.30]/Area Scan (5x5x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 12.6 mW/g

2450 MHz Head Dipole d=10mm P=250mW TS=[11.70][13.00][14.30]/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 69.0 V/m; Power Drift = 0.030 dB
Peak SAR (extrapolated) = 27.1 W/kg
SAR(1 g) = 13.3 mW/g; SAR(10 g) = 6.2 mW/g
Maximum value of SAR (measured) = 15.2 mW/g