Test Report Serial Number:	45461383-R2.1
Test Report Date:	2 August 2017
Project Number:	1368

SAR Test Report - New Certification

Applicant:

Garmin International Inc.
1200 East 151 St.
Olathe, KS, 66062
USA

Maximum Reported 1g SAR			
FCC	Body	0.89	W/kg
ISED	Body	0.93	
General Pop. Limit:		1.60	

FCC ID:	ISED Registration Number
IPH-03164	1792A-03164
Product Model Number / HVIN	Product Name / PMN
A03164	A03164

In Accordance With:

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

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

Approved By:

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

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: 714830**

Table of Contents

1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:	Trevor Whillock		**Date(s) of Evaluation:**	23 March - 11 April, 2017	
Report Prepared By:	Trevor Whillock		**Report Reviewed By:**	Ben Hewson	
Report Revision	**Description of Revision**	**Revised Section**	**Revised By**	**Revision Date**	
1.0	Initial Release	n/a	Trevor Whillock	12 May 2017	
1.1	Corrections to Report	n/a	Art Voss	17 May 2017	
2.0	Revised Reported SAR	Cover	Art Voss	1 August 2017	
	Corrected Rated Power	3.0, 6.0			
	Revised Conducted Power Values	6.0			
	Corrected SAR Scaling	10.0			
	Revised OFDM/DSSS Evaluation	12.0			
2.1	Revised Table 6.0 to Included Tune-Up Tolerance	6.0	Art Voss	2 August 2017	

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 2010	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 2
FCC KDB	
KDB 865664 D01v01r04	SAR Measurement Requirements for 100MHz to 6GHz
FCC KDB	
KDB 447498 D01v06	Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies
FCC KDB	
KDB 248227 D01v02r02	SAR Test Guidane for IEEE 802.11 (WiFI) Transmitters
* When the issue number or issue date is omitted, the latest version is assumed.	

3.0 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-03164
	ISED: 1792A-03164
Type of Equipment:	Personal Navigation Divice
Device Model(s) / HVIN:	A03164
Device Marketing Name / PMN:	A03164
Test Sample Serial No.:	T/A Sample - Identical Prototype
Transmit Frequency Range:	BLE: 2402-2480 MHz
	WiFi: 2412-2462 MHz
Number of Channels:	n/a
Manuf. Max. Rated Output Power:	BT/BLE/ANT: 4dBm
	WiFi: CW Mode: 18.0dBm ± 1.0dB
	WiFi: DSSS: 18.0dBm ± 2.0dB
	WiFi: OFDM: 16.0dBm ± 2.0dB
	WiFi: MCS0-7 (20): 14.5dBm ± 2.0dB
Modulation:	CCK, DSSS, OFDM, MCS 0-7
Duty Cycle:	100%
DUT Power Source:	5V USB, Internal Li-ion battery
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

4.0 STATEMENT OF COMPLIANCE

This measurement report demonstrates that the:

Applicant:	Model / HVIN:
Garmin International Inc.	**A03164**

complies with the SAR (Specific Absorption Rate) RF exposure requirements and limits specified in the following:

Standard(s):	Measurement Procedure(s):
FCC 47 CFR §2.1093	**FCC KDB 865664, FCC KDB 447498, FCC KDB 248227**
Health Canada's Safety Code 6	**Industry Canada RSS-102 Issue 5**
	IEEE Standard 1528-2013, IEC 62209-2

Use Group:

☐ **Occupational / Controlled** ☒ **General Population / Uncontrolled**

Reason for Issue:

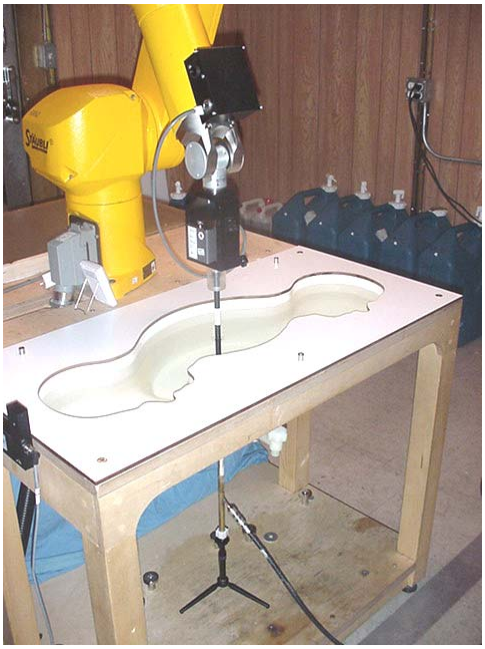
New Certification

A description of the device, operating configuration, detailed summary of the test results, methodology and procedures used during this evaluation, equipment used and the various provisions of the rules are included within this test report.

5.0 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 DASY 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 DASY 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 DASY 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 SAR System with SAM Phantom

6.0 RF CONDUCTED POWER MEASUREMENT

Table 6.0

Conducted Power Measurements

Channel	Frequency (MHz)	Modulation	Rate (Mbps)	Measured Power (dBm)	Rated Power (dBm)	SAR Test Channel (Y/N)
1	2412	CW	n/a	18.09	18±1.0	**Y**
6	2437	CW	n/a	18.07	18±1.0	**Y**
11	2462	CW	n/a	18.28	18±1.0	**Y**
1	2412	CCk	1.0	16.12	18±2.0	**N**
6	2437	CCk	1.0	16.25	18±2.0	**N**
11	2462	CCk	1.0	16.51	18±2.0	**N**
1	2412	DSSS	5.5	16.09	18±2.0	**N**
6	2437	DSSS	5.5	16.24	18±2.0	**N**
11	2462	DSSS	5.5	16.41	18±2.0	**N**
1	2412	OFDM	6.0	15.02	16±2.0	**N**
6	2437	OFDM	6.0	15.23	16±2.0	**N**
11	2462	OFDM	6.0	15.50	16±2.0	**N**
1	2412	MCS-0	6.5	14.48	14.5±2.0	**N**
6	2437	MCS-0	6.5	14.65	14.5±2.0	**N**
11	2462	MCS-0	6.5	14.94	14.5±2.0	**N**

Notes:

The Conducted Power of the DUT was measured at the antenna port, the unit was tested at 100% duty cycle transmit.
Reference Section 12.0 for Details of SAR Evaluation

7.0 NUMBER OF TEST CHANNELS (N_C)

As per FCC KDB 248277, the required 802.11 test channels are Ch1, Ch6 and Ch 11 CW Mode which were the highest output power channels compared to other modes.

8.0 ACCESSORIES EVALUATED

Table 8.0

Manufacturer's Accessory List						
Test Report ID Number	Manufacturer's Par Number	Description	UDC Group(1)	Type II Group(2)	SAR(3) Evaluated	SAR(4) Tested
T1	320-0059-00	Ca-Assy.,MIcro B to A, Mass Storage	n/a	n/a	N	N

9.0 SAR MEASUREMENT SUMMARY

Table 9.0

2450 Band Wifi- BODY SAR Evaluation Results (FCC/IC)										
Date	Model	Plot #	Side Tested	Freq (MHz)	Accessories		DUT Spacing		Measured SAR 1g (W/kg)	SAR Drift
							DUT	ANT	Duty Cycle	
					Body	Audio	(mm)	(mm)	100%	(dB)
23 Mar 2017	011-04262-00	B1	1	2412	n/a	n/a	0	0	0.478	-0.309
23 Mar 2017	011-04262-00	B2	1	2437	n/a	n/a	0	0	0.469	-0.585
23 Mar 2017	011-04262-00	B3	1	2462	n/a	n/a	0	0	0.432	-0.376
SAR LIMIT(S)					Body		Spatial Peak		RF Exposure Category	
FCC 47 CFR 2.1093		Health Canada Safety Code 6			1.6 W/kg		1g average		General Population	

Table 9.1

2450 Band Wifi- BODY/Side SAR Evaluation Results (FCC/IC)										
Date	Model	Plot #	Side Tested	Freq (MHz)	Accessories		DUT Spacing		Measured SAR 1g (W/kg)	SAR Drift
							DUT	ANT	Duty Cycle	
					Body	Audio	(mm)	(mm)	100%	(dB)
11 Apr 2017	011-04262-00	B4	2	2412	n/a	n/a	0	0	0.706	-0.174
11 Apr 2017	011-04262-00	B5	3	2412	n/a	n/a	0	0	0.333	-0.357
11 Apr 2017	011-04262-00	B6	5	2412	n/a	n/a	0	0	0.406	-1.140
11 Apr 2017	011-04262-00	B7	6	2412	n/a	n/a	0	0	0.108	-0.825
SAR LIMIT(S)					Body		Spatial Peak		RF Exposure Category	
FCC 47 CFR 2.1093		Health Canada Safety Code 6			1.6 W/kg		1g average		General Population	

10.0 SCALING OF MAXIMUM MEASURE SAR

Table 10.0

Scaling of Maximum Measured SAR (1)

Plot ID	Configuration	Freq (MHz)	Measured Fluid Deviation Permittivity	Measured Fluid Deviation Conductivity	Measured Conducted Power (dBm)	Measured Drift (dB)	Measured SAR (1g) (W/kg)
B4	Body	2412	-5.56%	3.03%	18.1	-0.293	0.706

Step 1 — Fluid Sensitivity Adjustment

Plot ID	Scale Factor (%)		Measured SAR (W/kg)		Step 1 Adjusted SAR (1g) (W/kg)
B4	2.730%	x	0.706	=	0.725

Step 2 — Manufacturer's Tune-Up Tolerance

Plot ID	Measured Conducted Power (dBm)	Rated Power (dBm)	Delta (dB)		Step 1 Adjusted SAR (W/kg)		Step 2 Adjusted SAR (1g) (W/kg)
B4	18.1	19.0	-0.9	+	0.725	=	0.892

Step 3 — Simultaneous Transmission - Bluetooth and/or WiFi*

Plot ID	Rated Output Power (Pmax) (mW)	Freq (MHz)	Separation Distance (mm)	Estimated SAR (W/kg)		Step 2 Adjusted SAR (W/kg)		Step 3 Adjusted SAR (1g) (W/kg)
B4	**2.5**	**2412**	**5**	**0.000**	+	**0.892**	=	**0.892**

Step 4 — Drift Adjustment

Plot ID	Measured Drift (dB)		Step 3 Adjusted SAR (W/kg)		Step 4 Adjusted SAR (1g) (W/kg)
B4	-0.174	+	0.892	=	0.928

Step 5 — Reported SAR

Plot ID	FCC From Steps 1 through 3 1g SAR (W/kg)	IC From Steps 1 through 4 1g SAR (W/kg)
B4	**0.892**	**0.928**

NOTE to Step 3:
The BlueTooth and WiFi transmitters share the same antenna. Transmission is interleaved between the two transmitters and can not transmit simultaneously.

Test Exclusion of the BlueTooth/BlueTooth Low Energy (BLE)/ANT transmitter is evaluated using Max Power = 4.0dBm (2.5mW), Separation Distance = 5mm, Transmit Frequency = 2.412GHz.

Per KDB 447498 D01v06 [4.3.1(a)], SAR Test Exclusion is given by:

[(Max Power, mW) / (Separation Distance, mm)] * [$\sqrt{}$ f, GHz] ≤ 3.0 for 1g SAR
[(2.5)/(5)] * [($\sqrt{}$ 2.412)] = 0.78 ≤ 3.0

Therefore the BlueTooth/BLE/ANT transmitter meets the SAR Test Exclusion criteria.

For reference only, per KDB 447498 D01v06 [4.3.2(b)], the estimated BlueTooth SAR is given by:

[(Max Power, mW) / (Separation Distance, mm)] * [($\sqrt{}$ f, GHz) / (x)], where x = 7.5 for 1g SAR
[(2.5)/(5)] * [($\sqrt{}$ 2.412) / (7.5)] = 0.105W/kg

NOTES to Table 10.0
(1) Scaling of the Maximum Measured SAR is based on the highest, 100% duty cycle, Face, Body and/or Head SAR measured of ALL test channels, configurations and accessories used during THIS evaluation. The Measured Fluid Deviation parameters apply only to deviation of the tissue equivalent fluids used at the frequencies which produced the highest measured SAR. The Measured Conducted Power applies to the Conducted Power measured at the frequencies producing the highest Face and Body SAR. The Measured Drift is the SAR drift associated with that specific SAR measurement. The Reported SAR is the accumulation of all SAR Adjustments from the applicable Steps 1 through 4. The Plot ID is for indentification of the SAR Measurement Plots in Annex A of this report. NOTE: Some of the scaling factors in Steps 1 through 4 may not apply and are identified by light gray text.
Step 1
Per IEC-62209-1 and FCC KDB 865664. Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, Table 10.1 will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).
Step 2
Per KDB 447498. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.
Step 3
Per KDB 447498 4.3.2. The SAR, either measured or calculated, of ANY and ALL simultaneous transmitters must be added together and includes all contributors.
Step 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.
Step 5
The Reported SAR is the Maximum Final Adjusted Cumulative SAR from the applicable Steps 1 through 4 and are reported on Page 1 of this report.

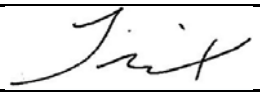
Table 10.1

Fluid Sensitivity Calculation (1g)

Delta SAR = Ce * Delta Er + C(sigma)*Delta Sigma

Frequency (GHz)	Plot ID
2.412	**B4**
Ce	-0.2251
Cσ	0.4885
Δ E	-5.56%
Δσ	3.03%
ΔSAR	2.73%
Scale Factor Is Positive. Scaling 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.



Trevor Whillock
Test Lab Engineer
Celltech Labs Inc.

27 April 2017
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(4)**	**Occupational / Controlled Exposure(5)**
Spatial Average(1) (averaged over the whole body)		0.08 W/kg	0.4 W/kg
Spatial Peak(2) (Head and Trunk averaged over any 1 g of tissue)		1.6 W/kg	**8.0 W/kg**
Spatial Peak(3) (Hands/Wrists/Feet/Ankles averaged over 10 g)		4.0 W/kg	20.0 W/kg
(1) The Spatial Average value of the SAR averaged over the whole body.			
(2) The Spatial Peak value of the SAR averaged over any 1 gram of tissue, defined as a tissue volume in the shape of a cube and over the appropriate averaging time.			
(3) The Spatial Peak value of the SAR averaged over any 10 grams of tissue, defined as a tissue volume in the shape of a cube and over the appropriate averaging time.			
(4) Uncontrolled environments are defined as locations where there is potential exposure to individuals who have no knowledge or control of their potential exposure.			
(5) Controlled environments are defined as locations where there is potential exposure to individuals who have knowledge of their potential exposure and can exercise control over their exposure.			

12.0 DETAILS OF SAR EVALUATION

EVALUATION DETAILS	
1	The DUT was evaluated for SAR in accordance with the procedures described in IEEE 1528, FCC KDB 865646, 447498, 248227 and RSS-102. Since the overall diagonal dimension of the device is < 20cm the device was evaluated at a phantom separation distance of less than 5mm on all surfaces and edges where the transmitter was located less than 25mm from that edge or surface.
2	The Device was capable of transmitting in Continuous Wave CW) and the Conducted Power was higher in CW mode than any other configuration. The DUT was evaluated for SAR at the maximum conducted output power level, preset by the manufacturer. The device was tested in an unmodulated continuous transmit mode at 100% duty cycle.
3	**2.4GHz 802.11g/n OFDM SAR Test Exclusion** As Per KDB 248277 D01v02r02 - 5.2.2, *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.* Maximum 802.11g/n OFDM specified power (P_{OFDM}) = 20dBm (18±2.0dBm) Maximum 802.11b DSSS specified power (P_{DSSS}) = 18dBm(16±2.0dBm) Ratio OFDM/DSSS power = 18.0 – 20.0 = -2dBm (< 100%) Therefore SAR * Ratio can not exceed 1.2W/kg
4	Each SAR evaluations were performed with a fully charged battery.
5	The fluid temperature remained within +/-2°C from the time of the fluid dielectric parameter measurement to the completion of the SAR evaluation.
6	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 ± 1^o
Area Scan Spatial Resolution ΔX, ΔY	12mm
Zoom Scan Spatial Resolution ΔX, ΔY	5mm
Zoom Scan Spatial Resolution ΔZ	5mm
Zoom Scan Volume X, Y, Z	30mm x 30mm x 30mm
Phantom	ELI
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	
$v_i = n - 1$	$v_{eff} = \frac{u_c^4}{\sum_{i=1}^{m} \frac{c_i^4 u_i^4}{v_i}}$

14.0 FLUID DIELECTRIC PARAMETERS

****

Aprel Laboratory
Test Result for UIM Dielectric Parameter
Wed 22/Mar/2017 15:50:46
Freq Frequency(GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	51.77	1.95
2.3600	52.82	1.86	51.79	1.97
2.3700	52.81	1.87	51.73	1.96
2.3800	52.79	1.88	51.63	1.97
2.3900	52.78	1.89	51.58	1.97
2.4000	52.77	1.90	51.45	2.01
2.4100	52.75	1.91	51.53	2.05
2.4200	52.74	1.92	51.64	2.06
2.4300	52.73	1.93	51.50	2.10
2.4400	52.71	1.94	51.60	2.08
2.4500	52.70	1.95	51.36	2.10
2.4600	52.69	1.96	51.47	2.08
2.4700	52.67	1.98	51.46	2.09
2.4800	52.66	1.99	51.39	2.10
2.4900	52.65	2.01	51.18	2.09
2.5000	52.64	2.02	51.31	2.14
2.5100	52.62	2.04	50.91	2.16
2.5200	52.61	2.05	51.04	2.19
2.5300	52.60	2.06	50.98	2.23
2.5400	52.59	2.08	51.09	2.20
2.5500	52.57	2.09	51.00	2.25

Table 14.0

FLUID DIELECTRIC PARAMETERS

Date:	22 Mar 2017	Fluid Temp:	23	Frequency:	2450MHz	Tissue:	Body

Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000		51.7700	1.9500	52.8300	1.85	-2.01%	5.41%
2360.0000		51.7900	1.9700	52.8200	1.86	-1.95%	5.91%
2370.0000		51.7300	1.9600	52.8100	1.87	-2.05%	4.81%
2380.0000		51.6300	1.9700	52.7900	1.88	-2.20%	4.79%
2390.0000		51.5800	1.9700	52.7800	1.89	-2.27%	4.23%
2400.0000		51.4500	2.0100	52.7700	1.90	-2.50%	5.79%
2410.0000		51.5300	2.0500	52.7500	1.91	-2.31%	7.33%
2412.0000	*	51.5520	2.0520	52.7480	1.91	-2.27%	7.32%
2420.0000		51.6400	2.0600	52.7400	1.92	-2.09%	7.29%
2430.0000		51.5000	2.1000	52.7300	1.93	-2.33%	8.81%
2437.0000	*	51.5700	2.0860	52.7160	1.94	-2.17%	7.69%
2440.0000		51.6000	2.0800	52.7100	1.94	-2.11%	7.22%
2450.0000		51.3600	2.1000	52.7000	1.95	-2.54%	7.69%
2460.0000		51.4700	2.0800	52.6900	1.96	-2.32%	6.12%
2462.0000	*	51.4680	2.0820	52.6860	1.96	-2.31%	6.01%
2470.0000		51.4600	2.0900	52.6700	1.98	-2.30%	5.56%
2472.0000	*	51.4460	2.0920	52.6680	1.98	-2.32%	5.55%
2480.0000		51.3900	2.1000	52.6600	1.99	-2.41%	5.53%
2490.0000		51.1800	2.0900	52.6500	2.01	-2.79%	3.98%
2500.0000		51.3100	2.1400	52.6400	2.02	-2.53%	5.94%
2510.0000		50.9100	2.1600	52.6200	2.04	-3.25%	5.88%
2520.0000		51.0400	2.1900	52.6100	2.05	-2.98%	6.83%
2530.0000		50.9800	2.2300	52.6000	2.06	-3.08%	8.25%
2540.0000		51.0900	2.2000	52.5900	2.08	-2.85%	5.77%
2550.0000		51.0000	2.2500	52.5700	2.09	-2.99%	7.66%

*Channel Frequency Tested

****

Aprel Laboratory
Test Result for UIM Dielectric Parameter
Tue 11/Apr/2017 15:01:54
Freq Frequency(GHz)
FCC_eH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Epsilon
FCC_sH FCC Bulletin 65 Supplement C (June 2001) Limits for Head Sigma
FCC_eB FCC Limits for Body Epsilon
FCC_sB FCC Limits for Body Sigma
Test_e Epsilon of UIM
Test_s Sigma of UIM

****

Freq	FCC_eB	FCC_sB	Test_e	Test_s
2.3500	52.83	1.85	50.11	1.87
2.3600	52.82	1.86	50.00	1.91
2.3700	52.81	1.87	49.73	1.90
2.3800	52.79	1.88	49.92	1.90
2.3900	52.78	1.89	49.94	1.95
2.4000	52.77	1.90	49.78	1.95
2.4100	52.75	1.91	49.81	1.96
2.4200	52.74	1.92	49.84	2.01
2.4300	52.73	1.93	49.58	2.00
2.4400	52.71	1.94	49.77	2.00
2.4500	52.70	1.95	49.53	2.01
2.4600	52.69	1.96	49.81	2.03
2.4700	52.67	1.98	49.45	2.04
2.4800	52.66	1.99	49.49	2.06
2.4900	52.65	2.01	49.54	2.08
2.5000	52.64	2.02	49.50	2.10
2.5100	52.62	2.04	49.50	2.10
2.5200	52.61	2.05	49.38	2.12
2.5300	52.60	2.06	49.46	2.12
2.5400	52.59	2.08	49.32	2.12
2.5500	52.57	2.09	49.21	2.17

Table 14.1

FLUID DIELECTRIC PARAMETERS

Date:	11 Apr 2017	Fluid Temp:	22.2	Frequency:	2450MHz	Tissue:	Body

Freq (MHz)		Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity
2350.0000		50.1100	1.8700	52.8300	1.85	-5.15%	1.08%
2360.0000		50.0000	1.9100	52.8200	1.86	-5.34%	2.69%
2370.0000		49.7300	1.9000	52.8100	1.87	-5.83%	1.60%
2380.0000		49.9200	1.9000	52.7900	1.88	-5.44%	1.06%
2390.0000		49.9400	1.9500	52.7800	1.89	-5.38%	3.17%
2400.0000		49.7800	1.9500	52.7700	1.90	-5.67%	2.63%
2410.0000		49.8100	1.9600	52.7500	1.91	-5.57%	2.62%
2412.0000	*	49.8160	1.9700	52.7480	1.91	-5.56%	3.03%
2420.0000		49.8400	2.0100	52.7400	1.92	-5.50%	4.69%
2430.0000		49.5800	2.0000	52.7300	1.93	-5.97%	3.63%
2437.0000	*	49.7130	2.0000	52.7160	1.94	-5.70%	3.25%
2440.0000		49.7700	2.0000	52.7100	1.94	-5.58%	3.09%
2450.0000		49.5300	2.0100	52.7000	1.95	-6.02%	3.08%
2460.0000		49.8100	2.0300	52.6900	1.96	-5.47%	3.57%
2462.0000	*	49.7380	2.0320	52.6860	1.96	-5.60%	3.46%
2470.0000		49.4500	2.0400	52.6700	1.98	-6.11%	3.03%
2472.0000	*	49.4580	2.0440	52.6680	1.98	-6.09%	3.13%
2480.0000		49.4900	2.0600	52.6600	1.99	-6.02%	3.52%
2490.0000		49.5400	2.0800	52.6500	2.01	-5.91%	3.48%
2500.0000		49.5000	2.1000	52.6400	2.02	-5.97%	3.96%
2510.0000		49.5000	2.1000	52.6200	2.04	-5.93%	2.94%
2520.0000		49.3800	2.1200	52.6100	2.05	-6.14%	3.41%
2530.0000		49.4600	2.1200	52.6000	2.06	-5.97%	2.91%
2540.0000		49.3200	2.1200	52.5900	2.08	-6.22%	1.92%
2550.0000		49.2100	2.1700	52.5700	2.09	-6.39%	3.83%

*Channel Frequency Tested

15.0 SYSTEM VERIFICATION TEST RESULTS

Table 15.0

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		Validation Source S/N	
22-Mar-17	2450	Body	23.1	22	16%	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	13	0.00%	6.14	6.05	1.49%	51.4	52.7	-2.54%	2.10	1.95	7.69%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 865664 and IEC 62209-1.
The dielectric parameters of the simulated tissue mixture were measured prior to the system performance check using a Dielectric Probe Kit and a Network Analyzer.
The forward power was applied to the dipole and the system was verified to a tolerance of +10% from the system manufacturer's dipole calibration target SAR value

Table 15.1

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		Validation Source S/N	
11-Apr-17	2450	Body	22.2	23	16%	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
13.7	13	5.38%	6.27	6.05	3.64%	49.5	52.7	-6.02%	2.01	1.95	3.08%

Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 865664 and IEC 62209-1.

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

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

16.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 16.0

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: DASY, 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
DASY 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	ELI
Shell Material	Fiberglass
Thickness	2mm +/- .2mm
Volume	> 30 Liter

Table 16.1

Measurement System Specification (Continued)

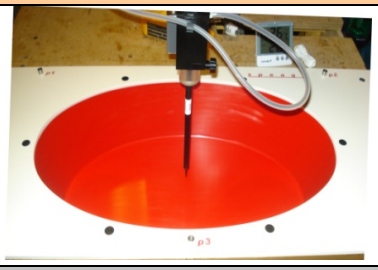
Probe Specification

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 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

Device Positioner Specification

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

Device Positioner

17.0 TEST EQUIPMENT LIST

Table 17.0

Test Equipment List

DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
Schmid & Partner DASY System	-	-	-	-
-DASY Measurement Server	00158	1078	CNR	CNR
-Robot	00046	599396-01	CNR	CNR
-DAE4	00019	353	20 April 2016	Annual
-EX3DV6 E-Field Probe	00213	3600	27 April 2016	Annual
-D2450V2 Validation Dipole	00219	825	22 April 2015	Triennial
ELI Phantom	00247	-	CNR	CNR
HP 85070C Dielectric Probe Kit	00033	none	CNR	CNR
Gigatronics 8652A Power Meter	00110	1835801	29 Feb 2016	Triennial
Gigatronics 80701A Power Sensor	00248	1833687	29 Feb 2016	Triennial
HP 8753ET Network Analyzer	00134	US39170292	22 Oct 2014	Triennial
Rohde & Schwarz SMR20 Signal Generator	00006	100104	8 May 2014	Triennial
Amplifier Research 5S1G4 Power Amplifier	00106	26235	CNR	CNR

CNR = Calibration Not Required

18.0 FLUID COMPOSITION

Table 18.0			2450MHz Body	
Tissue Simulating Liquid (TSL) Composition				
Component by Percent Weight				
Water	Glycol	Salt(1)	HEC(2)	Bacteriacide(3)
69.98	30.0	0.02	0.0	0.0

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

APPENDIX A – SYSTEM VERIFICATION PLOTS

Date/Time: 22/03/2017 2:31:46 PM

Test Laboratory: Celltech Labs

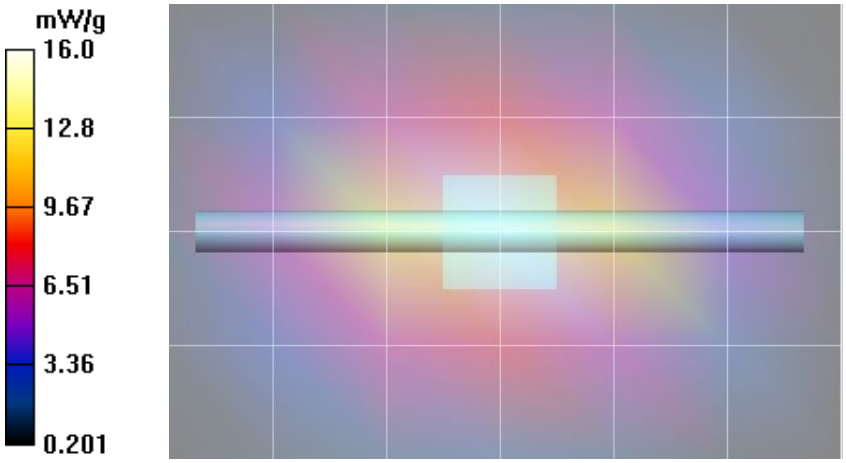
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 22/04/2015
Program Name: 2450MHz Body SPC

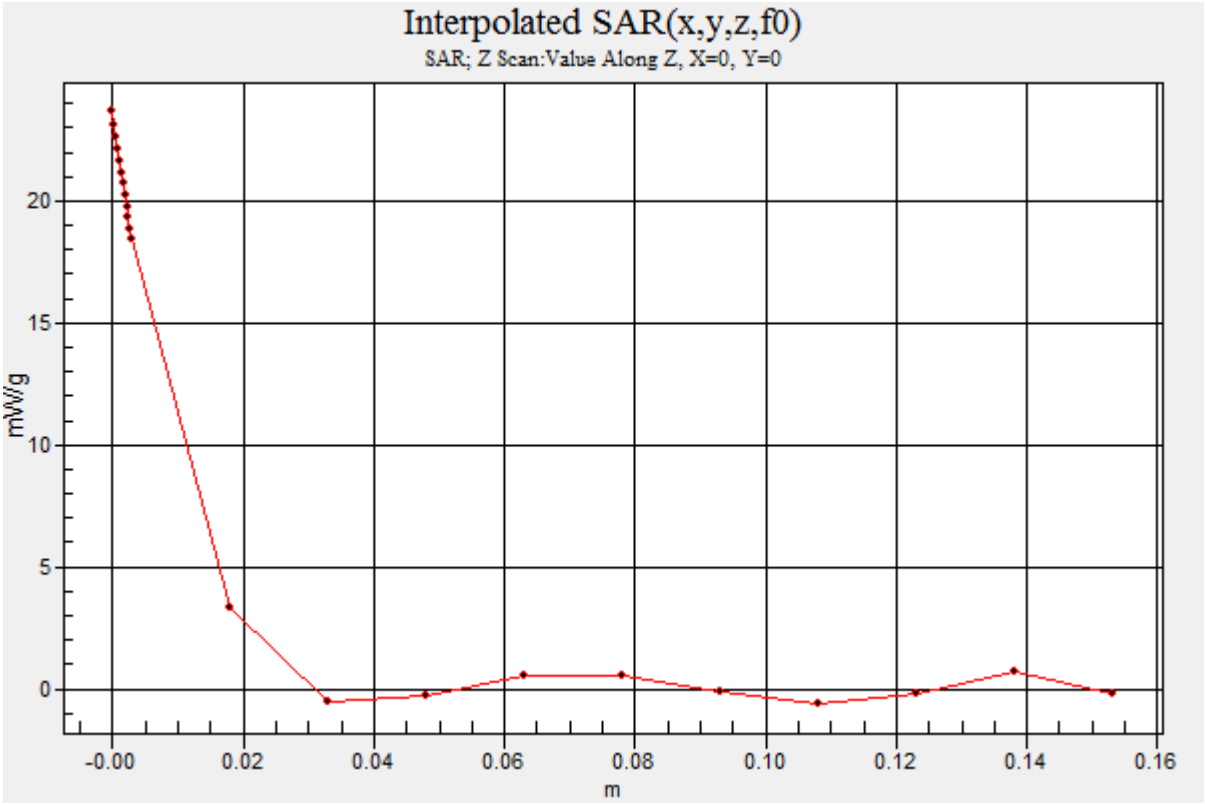
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.1 mho/m; ε_r = 51.4; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

2450MHz Body Dipole d=10mm P=250mW TS=[11.7][13.0][14.3]/Area Scan (5x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 16.0 mW/g

2450MHz Body Dipole d=10mm P=250mW TS=[11.7][13.0][14.3]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 95.5 V/m; Power Drift = -0.035 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 14 mW/g; SAR(10 g) = 6.5 mW/g
Maximum value of SAR (measured) = 15.8 mW/g





Date/Time: 11/04/2017 2:03:30 PM

Test Laboratory: Celltech Labs

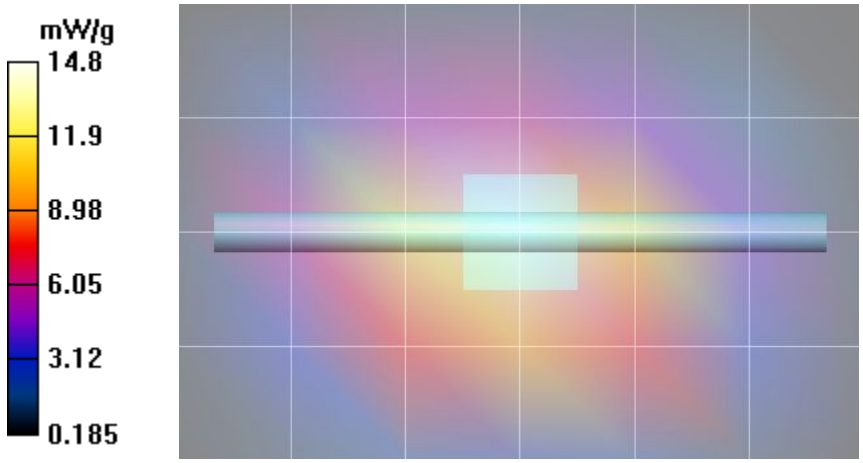
DUT: Dipole 2450 MHz; Type: D2450V2; Serial: 825; Calibrated: 22/04/2015
Program Name: 2450MHz Body SPC

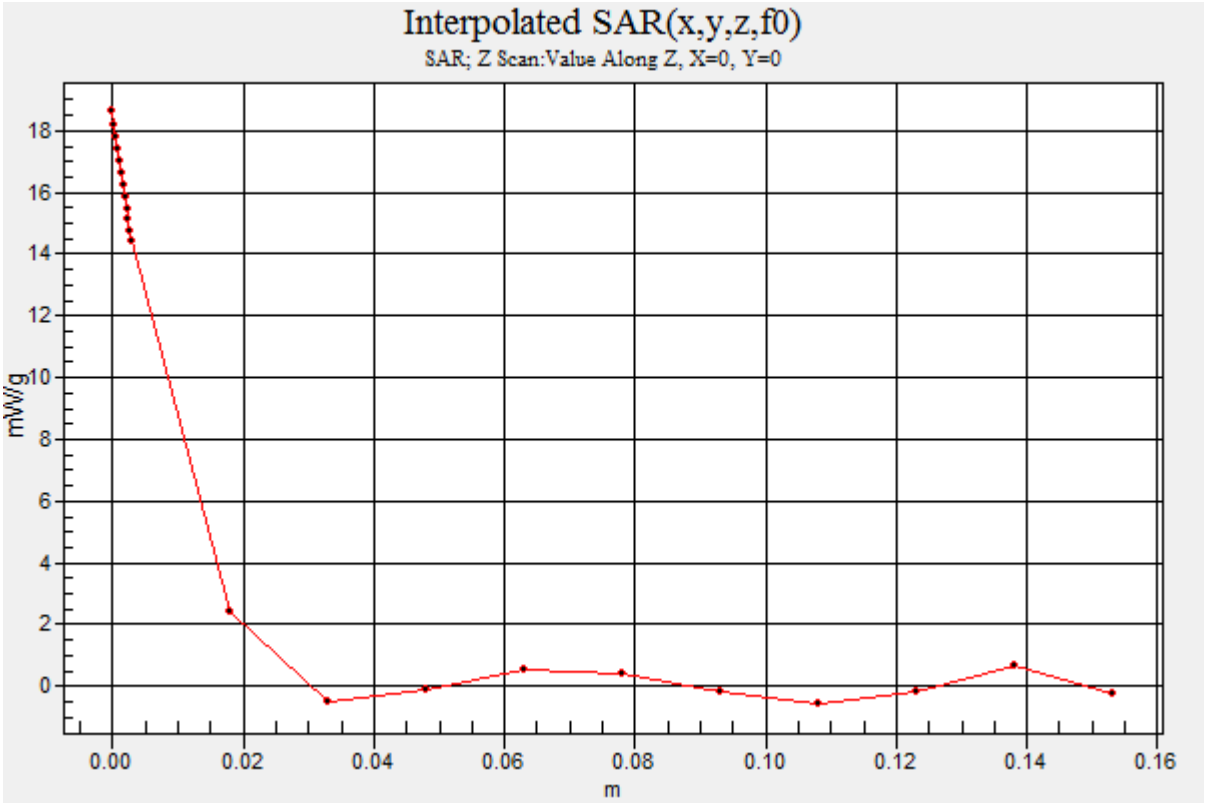
Communication System: CW; Frequency: 2450 MHz;Duty Cycle: 1:1
Medium parameters used: f = 2450 MHz; σ = 2.01 mho/m; ε_r = 49.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

2450MHz Body Dipole d=10mm P=250mW TS=[11.7][13.0][14.3]/Area Scan (5x7x1): Measurement grid: dx=10mm, dy=10mm
Maximum value of SAR (measured) = 14.8 mW/g

2450MHz Body Dipole d=10mm P=250mW TS=[11.7][13.0][14.3]/Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm
Reference Value = 92.1 V/m; Power Drift = 0.040 dB
Peak SAR (extrapolated) = 28.6 W/kg
SAR(1 g) = 13.7 mW/g; SAR(10 g) = 6.27 mW/g
Maximum value of SAR (measured) = 15.6 mW/g





APPENDIX B – MEASUREMENT PLOTS OF MAXIMUMUM MEASURED SAR

Plot B1

Date/Time: 23/03/2017 12:23:37 PM

Test Laboratory: Celltech Labs

DUT:Type:Serial:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 2.05 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

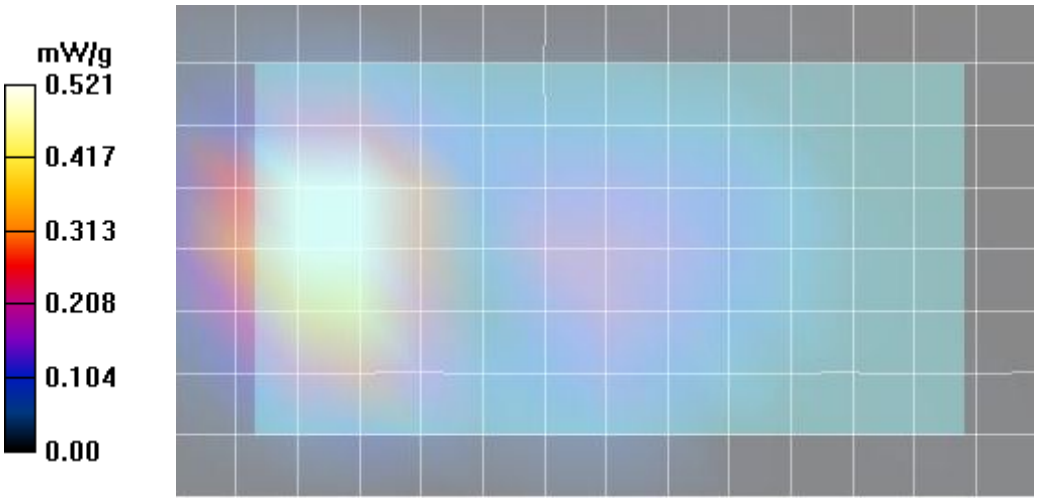
DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

B1 A03164, 2412 MHz Body/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.521 mW/g

B1 A03164, 2412 MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 12.8 V/m; Power Drift = -0.309 dB
Peak SAR (extrapolated) = 0.809 W/kg
SAR(1 g) = 0.478 mW/g; SAR(10 g) = 0.261 mW/g

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.529 mW/g



Plot B2

Date/Time: 23/03/2017 1:21:52 PM

Test Laboratory: Celltech Labs

DUT: ;
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2437 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2437 MHz; σ = 2.09 mho/m; ε_r = 51.6; ρ = 1000 kg/m^3
Phantom section: Flat Section

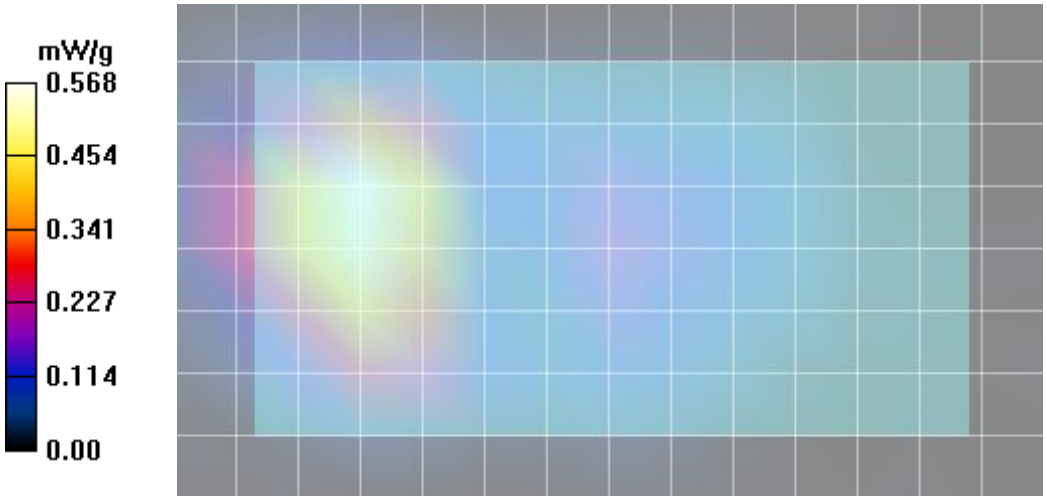
DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

B2 A03164, 2437MHz Body/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.568 mW/g

B2 A03164, 2437MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 10.6 V/m; Power Drift = -0.585 dB
Peak SAR (extrapolated) = 0.808 W/kg
SAR(1 g) = 0.469 mW/g; SAR(10 g) = 0.256 mW/g

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.518 mW/g



Plot B3

Date/Time: 23/03/2017 2:25:08 PM

Test Laboratory: Celltech Labs

DUT:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2462 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2462 MHz; σ = 2.08 mho/m; ε_r = 51.5; ρ = 1000 kg/m^3
Phantom section: Flat Section

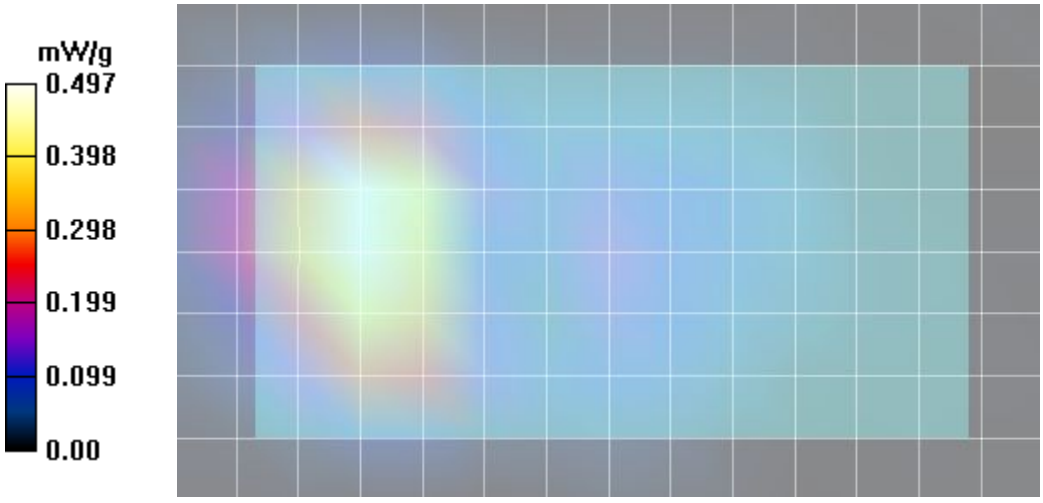
DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

B3 A03164, 2462MHz Body/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.497 mW/g

B3 A031642462MHz Body/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 9.45 V/m; Power Drift = -0.376 dB
Peak SAR (extrapolated) = 0.745 W/kg
SAR(1 g) = 0.432 mW/g; SAR(10 g) = 0.234 mW/g

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.474 mW/g



Plot B4

Date/Time: 11/04/2017 3:04:16 PM

Test Laboratory: Celltech Labs

DUT: A03164; Type:Serial:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.97 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

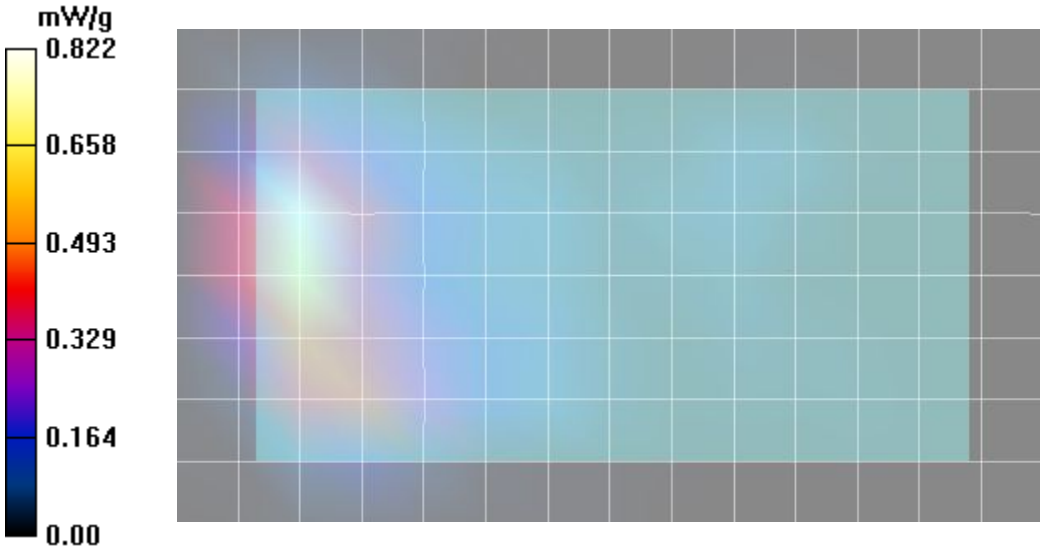
DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

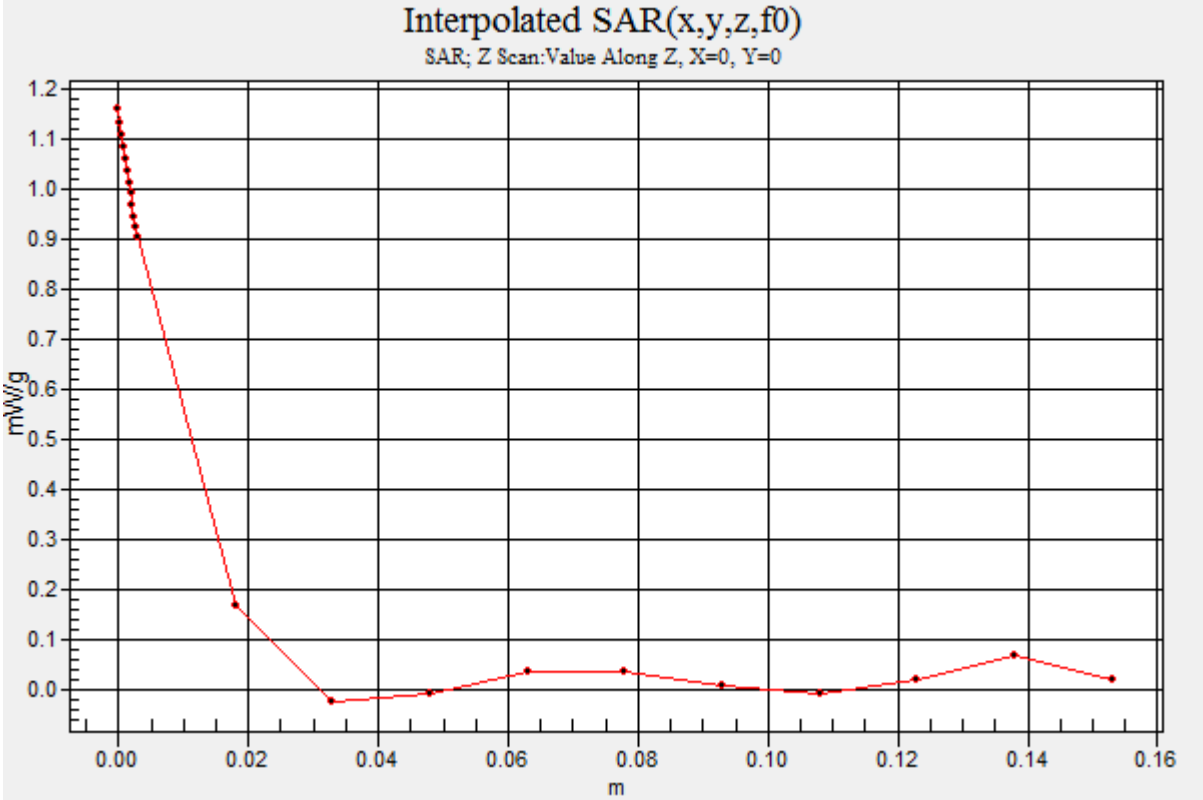
B4 A03164 w/c 2412 MHz Body ,Side 2/Area Scan (9x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.822 mW/g

B4 A03164 w/c 2412 MHz Body ,Side 2/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 14.2 V/m; Power Drift = -0.174 dB
Peak SAR (extrapolated) = 1.71 W/kg
SAR(1 g) = 0.706 mW/g; SAR(10 g) = 0.294 mW/g

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.808 mW/g




Interpolated SAR(x,y,z,f0)
SAR; Z Scan:Value Along Z, X=0, Y=0
mW/g
m
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16

Plot B5

Date/Time: 11/04/2017 3:48:20 PM

Test Laboratory: Celltech Labs

DUT: A03164; Type: Serial:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.97 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.5 Build 19; Postprocessing SW: SEMCAD, V1.8 Build 145

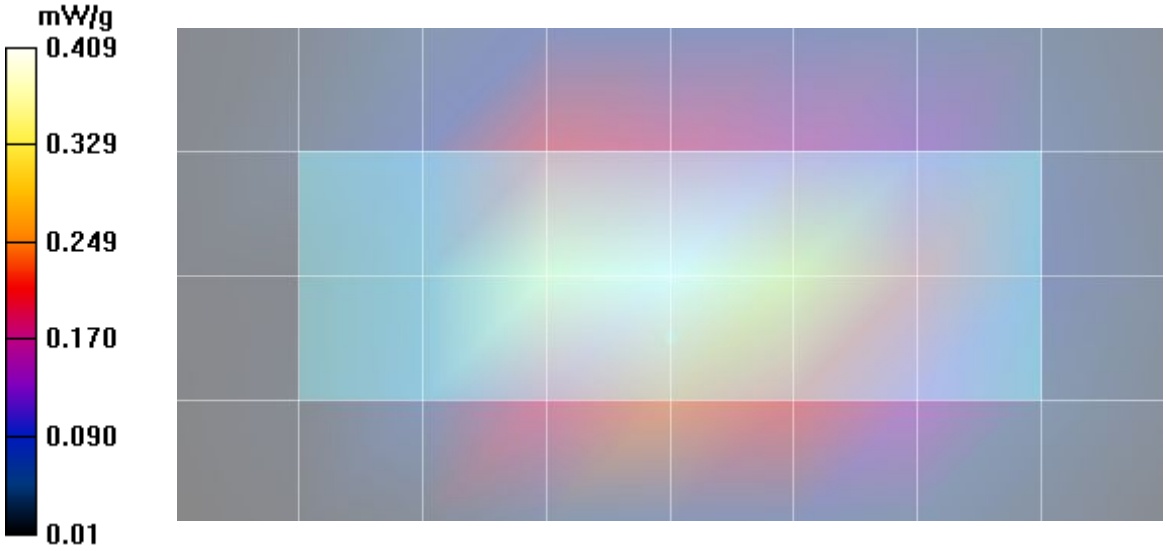
B5 A03164 w/c 2412 MHz Body ,Side 3/Area Scan (9x5x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.409 mW/g

B5 A03164 w/c 2412 MHz Body ,Side 3/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 11.3 V/m; Power Drift = -0.357 dB
Peak SAR (extrapolated) = 0.818 W/kg
SAR(1 g) = 0.333 mW/g; SAR(10 g) = 0.147 mW/g

Info: Interpolated medium parameters used for SAR evaluation!

Maximum value of SAR (measured) = 0.373 mW/g



Plot B6

Date/Time: 12/04/2017 9:19:45 AM

Test Laboratory: Celltech Labs

DUT: A03164 Side DUT; Type:Serial:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.97 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

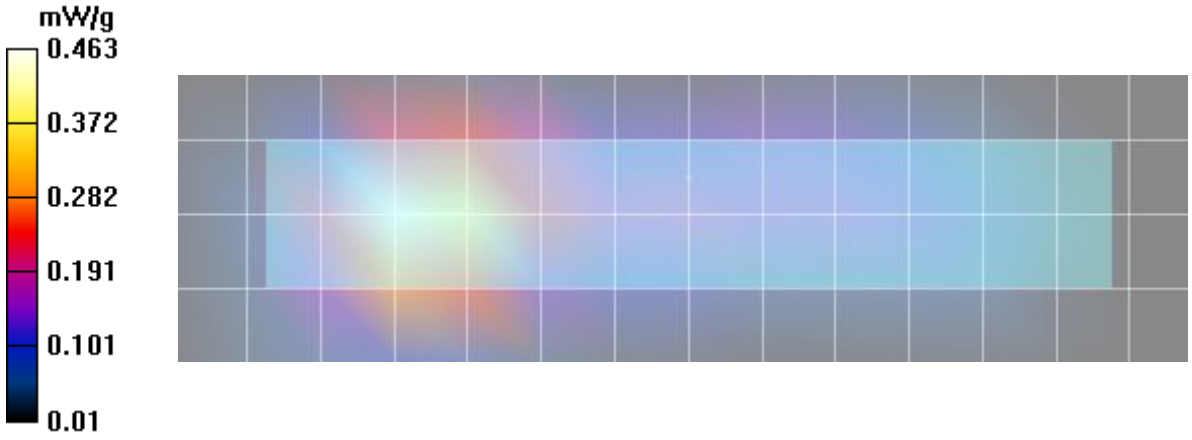
DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

B6 A03164 w/c 2412 MHz Body ,Side 5/Area Scan (5x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.463 mW/g

B6 A03164 w/c 2412 MHz Body ,Side 5/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 8.15 V/m; Power Drift = -1.14 dB
Peak SAR (extrapolated) = 0.913 W/kg
SAR(1 g) = 0.406 mW/g; SAR(10 g) = 0.184 mW/g

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.458 mW/g



Plot B7

Date/Time: 12/04/2017 9:58:49 AM

Test Laboratory: Celltech Labs

DUT: A03164 Side DUT; Type:Serial:
Program Name: 2450MHz Body

Communication System: CW; Frequency: 2412 MHz;Duty Cycle: 1:1
Medium parameters used (interpolated): f = 2412 MHz; σ = 1.97 mho/m; ε_r = 49.8; ρ = 1000 kg/m^3
Phantom section: Flat Section

DASY Configuration:
- Probe: EX3DV4 - SN3600 2016; ConvF(6.55, 6.55, 6.55); Calibrated: 27/04/2016
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used))Sensor-Surface: 4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn353 2016; Calibrated: 20/04/2016
- Phantom: ELI v5.0; Type: QDOVA002AA; Serial: TP:xxxx
- Measurement SW: DASY, V4.7 Build 80; Postprocessing SW: SEMCAD, V1.8 Build 145

B7 A03164 w/c 2412 MHz Body ,Side 6/Area Scan (5x15x1): Measurement grid: dx=10mm, dy=10mm

Info: Interpolated medium parameters used for SAR evaluation!
Maximum value of SAR (measured) = 0.115 mW/g

B7 A03164 w/c 2412 MHz Body ,Side 6/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 5.08 V/m; Power Drift = -0.825 dB
Peak SAR (extrapolated) = 0.231 W/kg
SAR(1 g) = 0.108 mW/g; SAR(10 g) = 0.057 mW/g

Info: Interpolated medium parameters used for SAR evaluation!

Maximum value of SAR (measured) = 0.121 mW/g