

SAR Test Report - New Filing

Applicant:



Cobra Electronics Corporation
6500 West Cortland Street
Chicago, IL, 60707
USA

Maximum Reported 1g SAR			
FCC	HEAD:	<0.1	W/kg
	BODY:	<0.1	
ISED	HEAD:	<0.1	
	BODY:	<0.1	
General Pop. Limit:		1.60	

FCC ID:

BBOHH50WXST

Product Model Number / HVIN

HH50WXST

IC Registration Number

906A-HH50WXST

Product Name / PMN

HH50WXST

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

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Test Lab Certificate: 2470.01



Industry
Canada

IC Registration 3874A-1



FCC Registration: 714830

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1.0 DOCUMENT CONTROL

Revision History				
Samples Tested By:	Trevor Whillock	Date(s) of Evaluation:	4 - 13 December, 2017	
Report Prepared By:	Art Voss, P.Eng.	Report Reviewed By:	Art Voss	
Report Revision	Description of Revision	Revised Section	Revised By	Revision Date
0.0	Draft Release	n/a	Trevor Whillock	13 December 2017
1.0	Initial Release- Revised Table 2.0 as per client request	n/a	Trevor Whillock	13 December 2017

2.0 CLIENT AND DEVICE INFORMATION

Client Information	
Applicant Name	Cobra Electronics Corporation
Applicant Address	6500 West Cortland Street
	Chicago, IL, 60707
	USA
DUT Information	
Device Identifier(s):	FCC ID: BBOHH50WXST
	IC: 906A-HH50WXST
Type of Equipment:	FCC Part 95(subpart D) radio equipment- non- licensed
	General Radio Service Equipment Operating in the Band(26.960-27.410MHz) RSS-236.
DUT Description	Two-Way CB Radio
Device Model(s) / HVIN:	HH50WXST
Device Marketing Name / PMN:	HH50WXST
Test Sample Serial No.:	T/A Sample - Identical Prototype
Transmit Frequency Range:	26.965 - 27.405 MHz
Number of Channels:	Fixed
Manuf. Max. Rated Output Power:	4 Watts
Modulation:	AM Analog
Duty Cycle:	50% PTT Duty Cycle
DUT Power Source:	See Section 8.0
Deviation(s) from standard/procedure:	None
Modification of DUT:	None

3.0 NORMATIVE REFERENCES

Normative References*	
ANSI / ISO 17025:2005	General Requirements for competence of testing and calibration laboratories
FCC CFR Title 47 Part 2 Title 47: Part 2.1093:	Code of Federal Regulations Telecommunication Radiofrequency Radiation Exposure Evaluation: Portable Devices
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 643646 D01v01r03	SAR Test Reduction Considerations for Occupational PTT Radios
* When the issue number or issue date is omitted, the latest version is assumed.	

4.0 STATEMENT OF COMPLIANCE

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

Applicant: Cobra Electronics Corporation	Model / HVIN: HH50WXST	
Standard(s) Applied: FCC 47 CFR §2.1093 Health Canada's Safety Code 6	Measurement Procedure(s): FCC KDB 865664, FCC KDB 447498, Industry Canada RSS-102 Issue 5 IEEE Standard 1528-2013, IEC 62209-2	
Reason For Issue: <input checked="" type="checkbox"/> New Certification <input type="checkbox"/> Class I Permissive Change <input type="checkbox"/> Class II Permissive Change	Use Group: <input checked="" type="checkbox"/> General Population / Uncontrolled <input type="checkbox"/> Occupational / Controlled	Limits Applied: <input checked="" type="checkbox"/> 1.6W/kg - 1g Volume <input type="checkbox"/> 8.0W/kg - 1g Volume <input type="checkbox"/> 4.0W/kg - 10g Volume
Reason for Change: Original Filing		Date(s) Evaluated: December 9 & 11, 2017

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

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



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

08 December 2017
Date



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



DASY 6 SAR System with SAM Phantom



DASY 6 Measurement Controller

6.0 RF CONDUCTED POWER MEASUREMENT

Table 6.0 Conducted Power Measurements P1 1.5V Alkaline

Conducted Power Measurements						
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dBm)	SAR Test Channel (Y/N)
1	26.9650	35.61	36.00	4.00	-0.39	Y
2	26.9750	35.57	36.00	4.00	-0.43	N
18	27.1750	35.56	36.00	4.00	-0.44	Y
19	27.1850	35.54	36.00	4.00	-0.46	N
20	27.2050	35.53	36.00	4.00	-0.47	N
39	27.3950	35.53	36.00	4.00	-0.47	Y
40	27.4050	35.49	36.00	4.00	-0.51	N
Notes:						
The Conducted Power of the DUT was measured at the antenna port, the unit was tested at 100% duty cycle transmit.						

Table 6.1 Conducted Power Measurements P2 1.2V NiMH

Conducted Power Measurements						
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dBm)	SAR Test Channel (Y/N)
1	26.9650	34.92	36.00	4.00	-1.08	Y
2	26.9750	34.92	36.00	4.00	-1.08	N
18	27.1750	34.87	36.00	4.00	-1.13	Y
19	27.1850	34.86	36.00	4.00	-1.14	N
20	27.2050	34.86	36.00	4.00	-1.14	N
39	27.3950	34.84	36.00	4.00	-1.16	Y
40	27.4050	34.83	36.00	4.00	-1.17	N
Notes:						
The Conducted Power of the DUT was measured at the antenna port, the unit was tested at 100% duty cycle transmit.						

Table 6.2 Conducted Power Measurements P3 Power Supply w/ battery

Conducted Power Measurements						
Channel	Frequency (MHz)	Measured Power (dBm)	Rated Power (dBm)	Rated Power (W)	Delta (dBm)	SAR Test Channel (Y/N)
1	26.9650	35.92	36.00	4.00	-0.08	Y
2	26.9750	35.91	36.00	4.00	-0.09	N
18	27.1750	35.91	36.00	4.00	-0.09	Y
19	27.1850	35.91	36.00	4.00	-0.09	N
20	27.2050	35.91	36.00	4.00	-0.09	N
39	27.3950	35.91	36.00	4.00	-0.09	Y
40	27.4050	35.90	36.00	4.00	-0.10	N
Notes:						
The Conducted Power of the DUT was measured at the antenna port, the unit was tested at 100% duty cycle transmit.						

*The rated power and tolerance are stated for typical transmission modes and data rates. Some modes and data rates may produce lower than rated conducted power levels. Continuous Wave (CW) mode is a test mode not typical with normal transmission modes and may produce higher than rated conducted power levels. Power measurements taken across the various channels, modes and data rates did not produce levels in excess of the Rated Power plus Tolerance. SAR was evaluated using CW mode at the Maximum output power level setting and produced the most conservative SAR. The reported SAR was not scaled down.

7.0 NUMBER OF TEST CHANNELS (N_C)

Number of Required Test Channels						
Frequency			Number of Channels		Spacing	
f _{LOW} (MHz)	f _{HIGH} (MHz)	f _C (MHz)	KDB 447498 (N _C)	IEC 62209 (N _C)	KDB 447498 (MHz)	IEC 62209 (MHz)
26.965	27.405	27.185	1	3		0.2
<p>KDB 447498: $N_C = \text{RoundUp} \{ [100 (F_{HIGH} - F_{LOW}) / F_C]^{0.5} \times (F_C / 100)^{0.2} \}$</p> <p>IEC 62209-1: $N_C = 2 \times \{ \text{RoundUp} [10 (F_{HIGH} - F_{LOW}) / F_C] \} + 1$</p>						

The number of channels tested was based on Low, Mid and High CB Channels.

8.0 ACCESSORIES EVALUATED

Table 8.0 Manufacturer's Accessory List

Manufacturer's Accessory List						
Test Report ID Number	Manufacturer's Part Number	Description	UDC Group ⁽²⁾	Type II Group ⁽³⁾	SAR ⁽⁴⁾ Evaluated	SAR ⁽⁵⁾ Tested
Antenna Accessory						
T1	HH-ANT	Rubber Duck Antenna	n/a	n/a	Y	Y
T2	HG-TA	Telescope Antenna	n/a	n/a	Y	Y
T3	HH-MINI	Magnet Mount Antenna*	n/a	n/a	Y	Y
Battery Accessory						
P1	-	Battery Pack (AA 1.5V) Alkaline Non Rechargeable	n/a	n/a	Y	Y
P2	-	Battery Pack (AA 1.5V) NiMH Rechargeable	n/a	n/a	Y	Y
P3	CLA-HH50	DC Power Cords	n/a	n/a	Y	Y
	SJB1600100PU	DC Power Cord Battery Charging Adapter	n/a	n/a	-	-
	-	AC Adapter	n/a	n/a	-	-
Body-Worn Accessory						
B1	-	Plastic Belt-Clip	n/a	n/a	Y	Y
Audio Accessory						
A1	PMR-SM	Speaker-Microphone	n/a	n/a	Y	Y
A2	PMR-EBM	Ear-bud Mic with PTT	n/a	n/a	Y	Y

*This antenna evaluated for MPE

9.0 SAR MEASUREMENT SUMMARY

Table 9.0: Measured Results – BODY

Measured SAR Results (1g) - BODY Configuration (FCC/ISED)																
Date	Plot ID	DUT M/N	Test Frequency (MHz)	Modulation	Accessories				DUT Spacing		Conducted Power (dBm)	Measured SAR (1g)		SAR* Drift (dB)		
					Antenna ID	Battery ID	Body ID	Audio ID	DUT (mm)	Antenna (mm)		100% DC (W/kg)	50% DC (W/kg)			
BODY																
09 Dec 2017	B1	HH50	26.965	CW	T1	P2	B1	A1	0	30	34.92	0.070	0.035	-		
09 Dec 2017	B2	HH50	26.965	CW	T1	P2	B1	A2	0	30	34.92	0.046	0.023	-		
11 Dec 2017	B3	HH50	26.965	CW	T1	P3-(PS w/ Batt)	B1	A1	0	30	35.92	0.023	0.011	-		
09 Dec 2017	B4	HH50	26.965	CW	T1	P1	B1	A1	0	30	35.61	0.100	0.050	-		
11 Dec 2017	B5	HH50	27.175	CW	T1	P1	B1	A1	0	30	35.56	0.054	0.027	-		
11 Dec 2017	B6	HH50	27.405	CW	T1	P1	B1	A1	0	30	35.49	0.036	0.018	-		
11 Dec 2017	B7	HH50	26.965	CW	T2	P1	B1	A1	0	30	35.61	0.000	0.000	-		
11 Dec 2017	B8	HH50	26.965	CW	T3	P1	B1	A1	0	30	35.61	0.131	0.066	-		
SAR Limit						Spatial Peak			BODY		RF Exposure Category					
FCC 47 CFR 2.1093						Health Canada Safety Code 6			1 Gram Average		1.6 W/kg		General Population			

*Due to the low measured SAR and location of the Phantom Reference Point, drift measurements were not indicative of the actual power drift. Conductive power measurements made prior to the beginning of the tests and at the end of the tests produced an average drift of -0.2dB.

Table 9.1: Measured Results – FACE

Measured SAR Results (1g) - FACE Configuration (FCC/ISED)																
Date	Plot ID	DUT M/N	Test Frequency (MHz)	Modulation	Accessories				DUT Spacing		Conducted Power (dBm)	Measured SAR (1g)		SAR* Drift (dB)		
					Antenna ID	Battery ID	Body ID	Audio ID	DUT (mm)	Antenna (mm)		100% DC (W/kg)	50% DC (W/kg)			
FACE																
11 Dec 2017	F1	HH50	26.965	CW	T1	P1	n/a	n/a	25	32	35.61	0.060	0.030	-		
11 Dec 2017	F2	HH50	26.965	CW	T2	P1	n/a	n/a	25	32	35.61	0.001	0.000	-		
11 Dec 2017	F3	HH50	26.965	CW	T3	P1	n/a	n/a	25	32	35.61	0.007	0.003	-		
SAR Limit					Spatial Peak				FACE		RF Exposure Category					
FCC 47 CFR 2.1093					Health Canada Safety Code 6				1 Gram Average		1.6 W/kg		General Population			

*Due to the low measured SAR and location of the Phantom Reference Point, drift measurements were not indicative of the actual power drift. Conductive power measurements made prior to the beginning of the tests and at the end of the tests produced an average drift of -0.2dB.

10.0 SCALING OF MAXIMUM MEASURE SAR

Table 10.0 SAR Scaling

Scaling of Maximum Measured SAR ⁽¹⁾							
Plot ID	Configuration	Freq (MHz)	Measured* Fluid Deviation		Measured Conducted Power (dBm)	Measured Drift (dB)	Measured SAR (1g) (W/kg)
			Permittivity	Conductivity			
B8	Body	26.965	-4.7%	-1.30%	35.6	-0.200	0.066
F1	Face	26.965	-4.70%	-1.30%	35.6	-0.200	0.060
Step 1							
Fluid Sensitivity Adjustment							
Plot ID	Scale Factor (%)		X	Measured SAR (W/kg)	=	Step 1 Adjusted SAR (1g) (W/kg)	
	B8	-3.280%				X	0.066
F1	-3.280%		X	0.060	=	0.060	
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)
B8	35.6	36.0	-0.4	+	0.066	=	0.072
F1	35.6	36.0	-0.4	+	0.060	=	0.066
Step 3 (ISED)							
Drift Adjustment							
Plot ID	Measured Drift (dB)		+	Step 2 Adjusted SAR (W/kg)		=	Step 3 Adjusted SAR (1g)
	(W/kg)						
B8	-0.200		+	0.072		=	0.075
F1	-0.200		+	0.066		=	0.069
Step 4 (FCC)							
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 4 Adjusted SAR (1g)
							(W/kg)
B8			0		+		0.080
F1			0		+		0.118
Step 5							
Reported SAR							
Plot ID	FCC From Steps 1 through 2 1g SAR (W/kg)			ISED From Steps 1 through 3 1g SAR (W/kg)			
	B8	0.072			0.075		
F1	0.066			0.069			

*Fluid dielectric targets above and below 30MHz are not publish. Fluid deviation is based on the 30MHz target.

NOTES to Table 9.0

(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 identification of the SAR Measurement Plots in Annex A of this report.

NOTE: Some of the scaling factors in Steps 1 through 4 may not apply and are identified by light gray text.

Step 1

Per IEC-62209-1 and FCC KDB 865664. Scaling required only when Measured Fluid Deviation is greater than 5%. If the Measured Fluid Deviation is greater than 5%, Table 10.1 will be shown and will indicate the SAR scaling factor in percent (%). SAR is MULTIPLIED by this scaling factor only when the scaling factor is positive (+).

Step 2

Per KDB 447498. Scaling required only when the difference (Delta) between the Measured Conducted Power and the Manufacturer's Rated Conducted Power is (-) Negative. The absolute value of Delta is ADDED to the SAR.

Step 3

Per IEC 62209-1. Scaling required only when Measured Drift is (-) Negative. The absolute value of Measured Drift is added to Reported or Simultaneous Reported SAR.

Step 4

Per KDB 447498 4.3.2. The SAR, either measured or calculated, of ANY and ALL simultaneous transmitters must be added together and includes all contributors.

Step 5

The Reported SAR is the Maximum Final Adjusted Cumulative SAR from the applicable Steps 1 through 4 and are reported on Page 1 of this report.

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.

6 December 2017
Date

11.0 SAR EXPOSURE LIMITS

Table 11.0 Exposure Limits

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

12.0 DETAILS OF SAR EVALUATION

12.0 Day Log

DAY LOG				Fluid Dielectric	SPC	Test
Date	Ambient Temp °C	Fluid Temp °C	Humidity			
8 Dec 2017	28	21.2	36%	X	X	
9 Dec 2017	27	21.2	36%			X
11 Dec 2017	27	20.8	36%			X

12.1 DUT Setup and Configuration

DUT Setup and Configuration

Overview

The HH50WXST was evaluated for *Body* and *Face* SAR at the maximum conducted output power level, preset by the manufacturer, with a fully charged battery in unmodulated continuous transmit operation (Continuous Wave mode at 100% duty cycle) with the transmit key continuously depressed. For a Push-To-Talk (PTT) device with a manually operated transmit pushbutton, a 50% duty cycle compensation for the reported SAR was used, as per FCC KDB 447498 (6.1).

The test procedures outlined in FCC KDB 447498 " General SAR Test Reduction Considerations for " as well as FCC KDB 865664, ISEDC RSS-102 and IEEE 1528 were used throughout the evaluation of this device in the LMR bands.

12.2 DUT Positioning

DUT Positioning	
Positioning	The DUT Positioner was securely fastened to the Phantom Platform. Registration marks were placed on the DUT and the Positioner to ensure consistent positioning of the DUT for each test evaluation.
FACE Configuration	The DUT was securely clamped into the device holder with the surface of the DUT normally held to the user's face facing the phantom. The device holder was adjusted to ensure that the horizontal axis of the DUT was parallel to the bottom of the phantom. A 25mm spacer block was used to set the separation distance between the DUT and the phantom to 25mm. When applicable and unless by design, the antenna of the DUT was prevented from sagging away from the phantom. The spacer block was removed before testing.
BODY Configuration	Body-Worn and Audio Accessories were affixed to the DUT in the manner in which they are intended to be used. The DUT, with its accessories, were securely clamped into the device holder with the surface of the DUT normally in contact with the body in direct contact with the bottom of the phantom, or 0mm separation from the DUT's accessory to the phantom. Body-Worn Accessory straps, linkages, etc. were positioned in a fashion resembling that for which they were intended to be used. Audio Accessory cables, etc., were positioned in a fashion resembling that for which they were intended to be used.
HEAD Configuration	This device is not intended to be held to the ear and was not tested in the HEAD configuration.

12.3 General Procedures and Report

General Procedures and Reporting	
General Procedures	<p>The fluid dielectric parameters of the Active Tissue Simulating Liquid (TSL) were measured as described in this Section, recorded and entered into the DASY Measurement Server. Active meaning the TSL used during the SAR evaluation of the DUT. The temperature of the Active TSL was measured and recorded prior to performing a System Performance Check (SPC). An SPC was performed with the Active TSL prior to the start of the test series. The temperature of the Active TSL was measured throughout the day and the Active TSL temperature was maintained to $\pm 0.5^{\circ}\text{C}$. The Active TSL temperature was maintained to within $\pm 1.0^{\circ}\text{C}$ throughout the test series. TSL analysis and SPC were repeated when the Active TSL use exceeded 84 hours.</p> <p>An Area Scan exceeding the length and width of the DUT projection was performed and the locations of all maximas within 2dB of the Peak SAR recorded. A Zoom Scan centered over the Peak SAR location(s) was performed and the 1g and 10g SAR values recorded. The resolutions of the Area Scan and Zoom Scan are described in the Scan Resolution table(s) in this Section. A Power Reference Measurement was taken at the phantom reference point immediately prior to the Area Scan. A Power Drift measurement was taken at the phantom reference point immediately following the Zoom Scan to determine the power drift. A Z-Scan from the <u>Maximum Distance to Phantom Surface</u> to the fluid surface was performed following the power drift measurement.</p>
Reporting	<p>The 1g SAR, 10g SAR and power drift measurements are recorded in the SAR Measurement Summary tables in the SAR Measurement Summary Section of this report. The SAR values shown in the 100% DC (Duty Cycle) column are the SAR values reported by the SAR Measurement Server with the DUT operating at 100% transmit duty cycle. These tables also include other information such as transmit channel and frequency, modulation, accessories tested and DUT-phantom separation distance.</p> <p>In the Scaling of Maximum Measured SAR Section of this report, the highest measured SAR in the BODY configuration, within the entire scope of this assessment, are, when applicable, scaled for Fluid Sensitivity, Manufacturer's Tune-Up Tolerance, Simultaneous Transmission and Drift. With the exception of Duty Cycle correction/compensation, SAR values are <u>ONLY</u> scaled up, not down. The final results of this scaling is the <u>reported SAR</u> which appears on the Cover Page of this report.</p>

12.4 Fluid Dielectric and Systems Performance Check

Fluid Dielectric and Systems Performance Check	
Fluid Dielectric Measurement Procedure	
<p>The fluid dielectric parameters of the Tissue Simulating Liquid (TSL) are measured using the Open-Ended Coax Method connected to an Agilent 8753ET Network Analyzer connected to a measurement server running Aprel Dielectric Property Measurement System. A frequency range of $\pm 100\text{MHz}$ for frequencies $> 300\text{MHz}$, $\pm 50\text{MHz}$ for frequencies $\leq 300\text{MHz}$ and $\pm 20\text{MHz}$ for frequencies $\leq 30\text{MHz}$ with frequency step size of 10MHz (5MHz below 100MHz) is used. The center frequency is centered around the SAR measurement probe's calibration point for that TSL frequency range. A calibration of the setup is performed using a short-open-deionized water (at 23°C in a 300ml beaker) method. A sample of the TSL is placed in a 300ml beaker and the open-ended coax is submerged approximately 8mm below the fluid surface in the approximate center of the beaker. A check of the setup is made to ensure no air is trapped under the open-ended coax. The sample of TSL is measured and compared to the FCC OET Bulletin 65 Supplement C targets for HEAD or BODY for the entire fluid measurement range. Fluid adjustment are made if the dielectric parameters are $> 5\%$ in range that the DUT is to be tested. If the adjustments fail to bring the parameters to $\leq 5\%$ but are $< 10\%$, the SAR Fluid Sensitivity as per IEC 62201-1 and FCC KDB 865664 are applied to the highest measured SAR. A TSL with dielectric parameters $> 10\%$ in the DUT test frequency range are not used.</p>	
Systems Performance Check	
<p>The fluid dielectric parameters of the Active TSL are entered into the DASY Measurement Server at each of the 10MHz step size intervals. Active meaning the TSL used during the SAR evaluation of the DUT. The DASY Measurement System will automatically interpolate the dielectric parameters for DUT test frequencies that fall between the 10MHz step intervals.</p> <p>A Systems Performance Check (SPC) is performed in accordance with IEEE 1528 "System Check" and FCC KDB 865664 "System Verification". A validation source, dipole or Confined Loop Antenna (CLA), is placed under the geometric center of the phantom and separated from the phantom in accordance to the validation source's Calibration Certificate data. A CW signal set to the frequency of the validate source's and SAR measurement probe's calibration frequency with a forward power set to the validation source's Calibration Certificate data power setting is applied to the validation source. An Area Scan is centered over the projection of the validation source's feed point and an Area Scan is taken. A Zoom Scan centered over the Peak SAR measurement of the Area Scan and the 1g and 10g SAR is measured. The measured 1g and 10g SAR is compared to the 1g and 10g SAR measurements from the validation source's Calibration Certificate. When required, the measured SAR is normalized to 1.0W and compared to the normalized SAR indicated on the validation source's Calibration Certificate. The SPC is considered valid when the measured and normalized SAR is $\leq 10\%$ of the measured and normalize SAR of the validation source's Calibration Certificate.</p> <p>The fluid dielectric parameters of the Active TSL and SPC are repeated when the Active TSL has been in use for greater than 84 hours or if the Active TSL temperature has exceed $\pm 1^\circ\text{C}$ of the initial fluid analysis.</p>	

12.5 Scan Resolution 100MHz to 2GHz

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

12.6 Scan Resolution 2GHz to 3GHz

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

12.7 Scan Resolution 5GHz to 6GHz

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

13.0 MEASUREMENT UNCERTAINTIES

Table 13.0 Measurement Uncertainty

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

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

14.0 FLUID DIELECTRIC PARAMETERS

Table 14.0 Fluid Dielectric Parameters 150MHz HEAD TSL

```

*****
                Aprel Laboratory
            Test Result for UIM Dielectric Parameter
                Fri 08/Dec/2017 9:56:58
                Freq   Frequency(GHz)
                Test_e Epsilon of UIM
                Test_s Sigma of UIM
*****
                Freq   Test_e Test_s
                0.025  53.00  0.73
                0.030  52.40  0.74
                0.035  52.00  0.75
    
```

FLUID DIELECTRIC PARAMETERS							
Date:	8 Dec 2017	Fluid Temp:	21.2	Frequency:	30MHz	Tissue:	Head
Freq (MHz)	Test_e	Test_s	Target_e	Target_s	Deviation Permittivity	Deviation Conductivity	
25.0000	53.0000	0.7300	55.0	0.75	-3.6%	-2.7%	
30.0000	52.4000	0.7400	55.0	0.75	-4.7%	-1.3%	
35.0000	52.0000	0.7500	55.0	0.75	-5.4%	0.0%	

Fluid dielectric targets above and below 30MHz are not published. Deviation based on 30MHz target.

15.0 SYSTEM VERIFICATION TEST RESULTS

Table 15.0 System Verification Results 30MHz HEAD TSL

System Verification Test Results					
Date		Frequency (MHz)	Validation Source		
			P/N		S/N
8 Dec 2017		30	CLA-30		1005
Fluid Type	Fluid Temp °C	Ambient Temp °C	Ambient Humidity (%)	Forward Power (mW)	Source Spacing (mm)
Head	21.2	28	36%	1000	0
Fluid Parameters					
Permittivity			Conductivity		
Measured	Target	Deviation	Measured	Target	Deviation
52.40	55.00	-4.70%	0.75	0.76	-1.30%
Measured SAR					
1 gram			10 gram		
Measured	Target	Deviation	Measured	Target	Deviation
1.21	1.25	-3.20%	0.76	0.78	-2.56%
Measured SAR Normalized to 1.0W					
1 gram			10 gram		
Normalized	Target	Deviation	Normalized	Target	Deviation
1.21	1.27	-4.72%	0.76	0.79	-3.79%
<p>Prior to the SAR evaluations, system checks were performed on the planar section of the phantom and a SPEAG validation dipole in accordance with the procedures described in IEEE 1528-2013, FCC KDB 846224 and IEC 62209-1.</p> <p>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.</p> <p>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.</p> <p>The forward power applied was same forward power applied by the calibration lab during the calibration of this validation</p>					

16.0 MEASUREMENT SYSTEM SPECIFICATIONS

Table 16.0 Measurement System Specifications

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

Measurement System Specification	
Probe Specification	
Construction:	Symmetrical design with triangular core; Built-in shielding against static charges PEEK enclosure material (resistant to organic solvents, glycol)
Calibration:	In air from 10 MHz to 2.5 GHz In head simulating tissue at frequencies of 900 MHz and 1.8 GHz (accuracy $\pm 8\%$)
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 μ W/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
Phantom Specification	
<p>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.</p>	
Device Positioner Specification	
<p>The DASY device positioner has two scales for device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear openings). The plane between the ear openings and the mouth tip has a rotation angle of 65°. The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections.</p>	



EX3DV4 E-Field Probe



ELI Phantom



Device Positioner

17.0 TEST EQUIPMENT LIST

Table 17.0 Equipment List and Calibration

Test Equipment List				
DESCRIPTION	ASSET NO.	SERIAL NO.	DATE CALIBRATED	CALIBRATION INTERVAL
Schmid & Partner DASY System	-	-	-	-
-DASY Measurement Server	294	1078	CNR	CNR
-Robot	-	599396-01	CNR	CNR
-DAE4	19	353	24-Apr-17	Annual
-EX3DV4 E-Field Probe	213	3600	27-Apr-17	Annual
-CLA-30 Validation Dipole	300	1005	23-Nov-17	Triennial
-CLA150 Validation Source	251	4007	27-Apr-17	Triennial
-D835V2 Validation Dipole	217	4D075	23-Apr-15	Triennial
-D450V3 Validation Dipole	221	1068	21-Apr-15	Triennial
-D2450V2 Validation Dipole	219	825	23-Apr-15	Triennial
-D5GHzV2 Validation Dipole	126	1031	20-Apr-15	Triennial
ELI Phantom	247	-	CNR	CNR
HP 85070C Dielectric Probe Kit	33	none	CNR	CNR
Gigatronics 8652A Power Meter	110	1835801	29-Feb-16	Triennial
Gigatronics 80701A Power Sensor	248	1833687	29-Feb-16	Triennial
HP 8753ET Network Analyzer	134	US39170292	Extended	Triennial
Rohde & Schwarz SMR20 Signal Generator	6	100104	29-May-17	Triennial
Amplifier Research 5S1G4 Power Amplifier	106	26235	CNR	CNR

CNR = Calibration Not Required

18.0 FLUID COMPOSITION

Table 18.0 Fluid Composition 150MHz HEAD TSL

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

(1) Non-Iodinized

(2) HydroxyEthyl-Cellulose: Sigma-Aldrich P/N 54290-500g

(3) Dow Chemical Dowicil 75 Antimicrobial Perservative

Note: 150MHz HEAD TSL formulation was used during this evaluation.

APPENDIX A – SYSTEM VERIFICATION PLOTS

Date/Time: 12/8/2017 1:46:23 PM

Test Laboratory: Celltech Labs

SPC-150H Dec 08 2017
DUT: CLA-30; Type: CLA-30; Serial: 1xxx

Communication System: UID 0, CW (0); Communication System Band: FullSpan (0.0 - 6000.0 MHz); Frequency: 30 MHz; Communication System PAR: 0 dB; PMF: 1

Medium: TSL_150H[08DEC17]
 Medium parameters used: $f = 30$ MHz; $\sigma = 0.74$ S/m; $\epsilon_r = 52.4$; $\rho = 1000$ kg/m³
 Phantom section: Flat Section
 Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600 --add ConvF; ConvF(12.17, 12.17, 12.17); Calibrated: 11/23/2017;
 - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection), $z = -1.5, 31.0, 101.0$
- Electronics: DAE4 Sn353; Calibrated: 4/24/2017
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax;
- DASYS5 52.10.0(1446);

Frequency: 30 MHz

SPC 150H/30MHz Input=1.0W, Target=1.25W/kg/Area Scan (21x21x1): Measurement grid: dx=15mm, dy=15mm

Maximum value of SAR (measured) = 1.30 W/kg

SPC 150H/ 30MHz Input=1.0W, Target=1.25W/kg/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 42.52 V/m; Power Drift = -0.14 dB

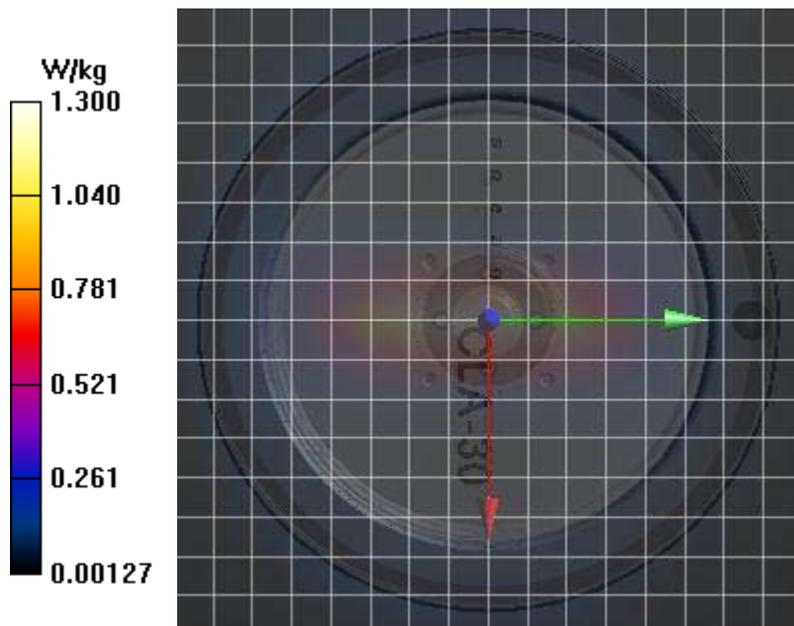
Peak SAR (extrapolated) = 1.96 W/kg

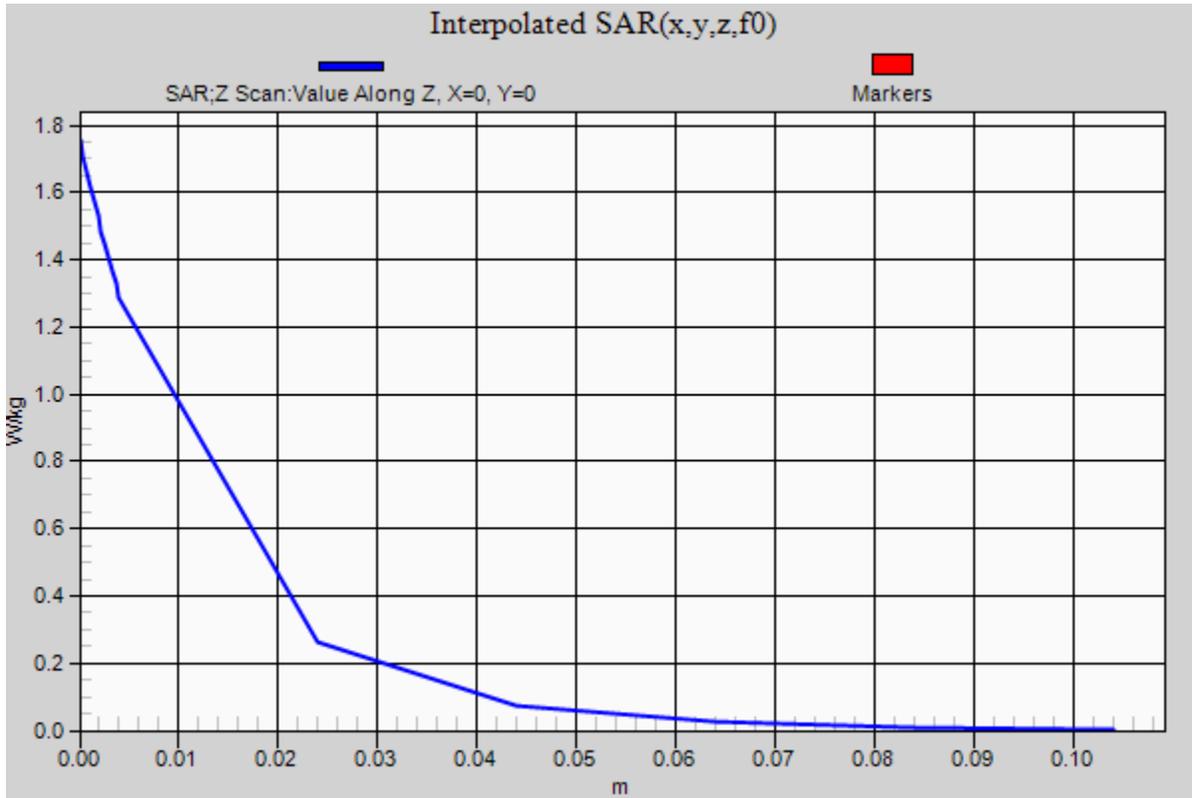
SAR(1 g) = 1.21 W/kg; SAR(10 g) = 0.761 W/kg

SPC 150H/ 30MHz Input=1.0W, Target=1.25W/kg/Z Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=20mm

Penetration depth = n/a (n/a, 12.57) [mm]

Maximum value of SAR (interpolated) = 1.75 W/kg





APPENDIX B – MEASUREMENT PLOTS OF MAXIMUM MEASURED SAR

Plot B8

Date/Time: 12/11/2017 12:54:08 PM

Test Laboratory: Celltech Labs

Cobra Test 150H Dec 11 2017

DUT: HH50 Body w. Antenna T3; Type: Sample; Serial: IMEI Number

Communication System: UID 0, CW (0); Communication System Band: FullSpan (0.0 - 6000.0 MHz); Frequency: 26.965 MHz; Communication System PAR: 0 dB; PMF: 1

Medium: TSL_150H[08DEC17]

Medium parameters used (interpolated): $f = 26.965$ MHz; $\sigma = 0.734$ S/m; $\epsilon_r = 52.764$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS5 (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600 --add ConvF; ConvF(12.17, 12.17, 12.17); Calibrated: 11/23/2017;
 - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), $z = -1.5, 31.0, 101.0$
- Electronics: DAE4 Sn353; Calibrated: 4/24/2017
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax;
- DASYS5 52.10.0(1446);

Frequency: 26.965 MHz

150H/B8*-HH50 26.965MHz Body, w/ bc, A1, Ant T3, P1/Area Scan (6x28x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.131 W/kg

150H/B8*-HH50 26.965MHz Body, w/ bc, A1, Ant T3, P1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Peak SAR (extrapolated) = 0.233 W/kg

SAR(1 g) = 0.131 W/kg; SAR(10 g) = 0.080 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

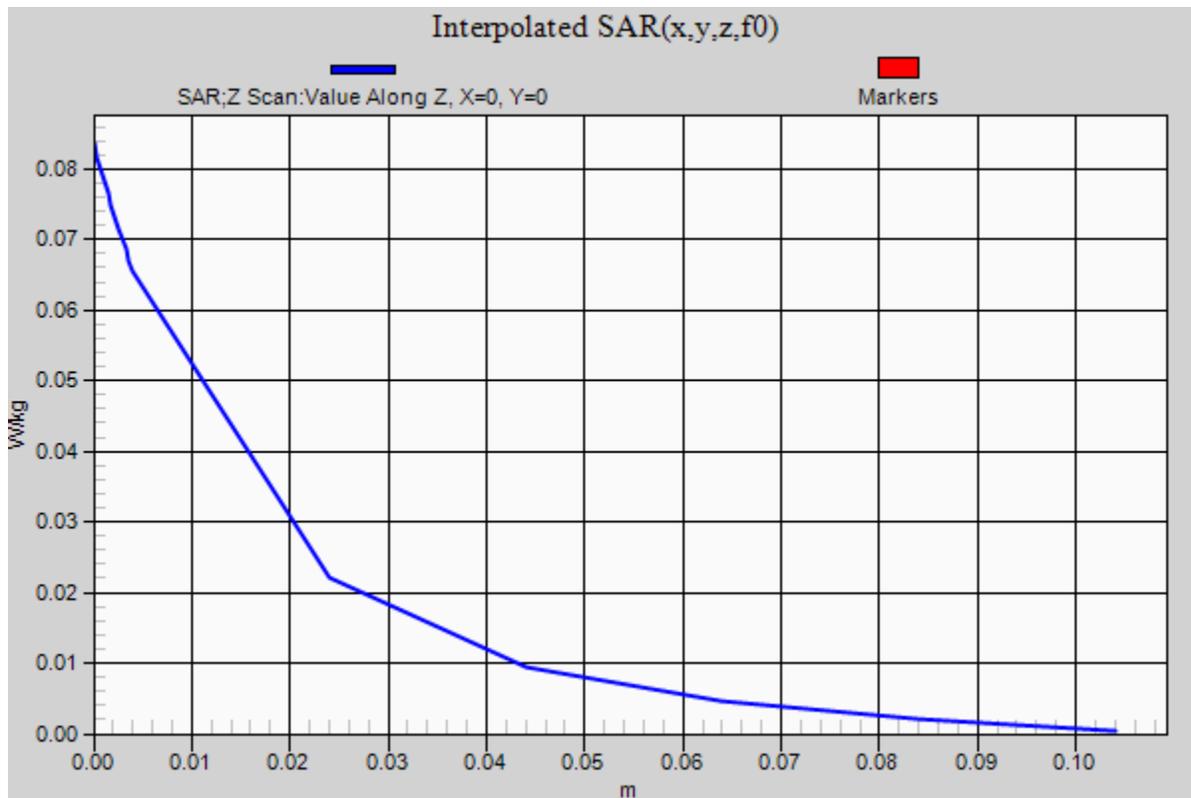
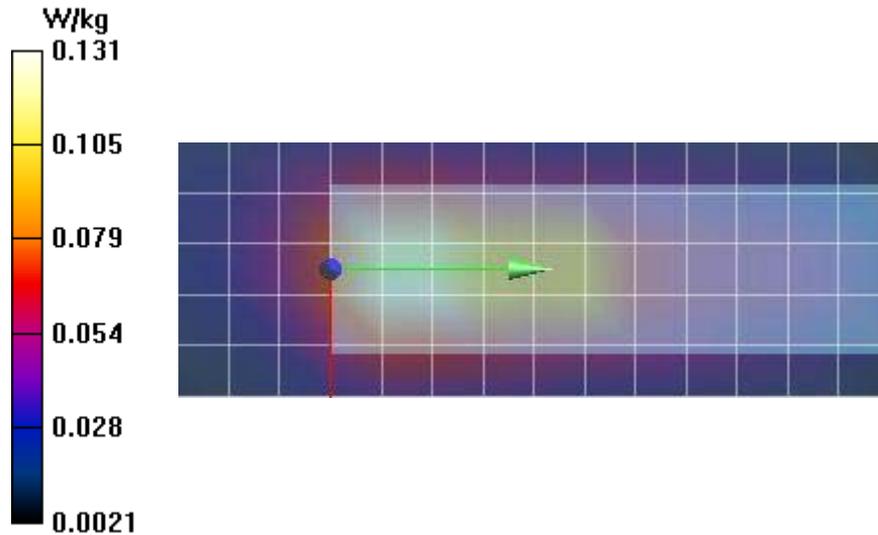
Maximum value of SAR (measured) = 0.140 W/kg

150H/B8*-HH50 26.965MHz Body, w/ bc, A1, Ant T3, P1/Z Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=20mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Penetration depth = n/a (n/a, 18.50) [mm]

Maximum value of SAR (interpolated) = 0.0835 W/kg



Plot F1

Date/Time: 12/11/2017 1:37:13 PM

Test Laboratory: Celltech Labs

Cobra Test 150H Dec 11 2017

DUT: DUT Sample Brick w. Antenna; Type: Sample; Serial: IMEI Number

Communication System: UID 0, CW (0); Communication System Band: FullSpan (0.0 - 6000.0 MHz); Frequency: 26.965 MHz; Communication System PAR: 0 dB; PMF: 1

Medium: TSL_150H[08DEC17]

Medium parameters used (interpolated): $f = 26.965$ MHz; $\sigma = 0.734$ S/m; $\epsilon_r = 52.764$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASYS (IEEE/IEC/ANSI C63.19-2011)

DASY Configuration:

- Probe: EX3DV4 - SN3600 --add ConvF; ConvF(12.17, 12.17, 12.17); Calibrated: 11/23/2017;
 - Modulation Compensation:
- Sensor-Surface: 4mm (Mechanical Surface Detection (Locations From Previous Scan Used)), Sensor-Surface: 4mm (Mechanical Surface Detection), $z = -1.5, 31.0, 101.0$
- Electronics: DAE4 Sn353; Calibrated: 4/24/2017
- Phantom: ELI V5.0 (20deg probe tilt); Type: QD OVA 002 Ax;
- DASYS2 52.10.0(1446);

Frequency: 26.965 MHz

150H/F1*-HH50 26.965MHz Body, Ant T1, P1/Area Scan (6x28x1): Measurement grid: dx=15mm, dy=15mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0818 W/kg

150H/F1*-HH50 26.965MHz Body, Ant T1, P1/Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=7.5mm, dy=7.5mm, dz=5mm

Peak SAR (extrapolated) = 0.0890 W/kg

SAR(1 g) = 0.060 W/kg; SAR(10 g) = 0.041 W/kg

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Maximum value of SAR (measured) = 0.0633 W/kg

150H/F1*-HH50 26.965MHz Body, Ant T1, P1/Z Scan (1x1x17): Measurement grid: dx=20mm, dy=20mm, dz=20mm

[Info: Interpolated medium parameters used for SAR evaluation.](#)

Penetration depth = n/a (n/a, 31.23) [mm]

Maximum value of SAR (interpolated) = 0.00632 W/kg

